



TEST REPORT

REPORT NUMBER: I22W00076-GSM-RF-FCC-Rev1

ON

Type of Equipment: IoT Module
Type of Designation: L710
Brand Name: LYNQ
Manufacturer: Shanghai MobileTek Communication Ltd.
FCC ID: 2AK9D-L710G

ACCORDING TO

FCC CFR Part 2, FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS;
GENERAL RULES AND REGULATIONS, e-CFR
PART 22, PUBLIC MOBILE SERVICES, e-CFR
PART 24, PERSONAL COMMUNICATIONS SERVICES, e-CFR
ANSI C63.26-2015 American National Standard for Compliance Testing of Transmitters
Used in Licensed Radio Services

Chongqing Academy of Information and Communications Technology

Month date, year

Dec, 23, 2022

Signature



Xiang Luoyong

Director

Note:

The test results in this test report relate only to the devices specified in this report.
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Report No.: I22W00076-GSM-RF-FCC-Rev1

Revision Version

Report Number	Revision	Date	Memo
I22W00076-GSM-RF-FCC	00	2022-12-14	Initial creation of test report
I22W00076-GSM-RF-FCC-Rev1	01	2022-12-23	The second change of test report

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1. Test Laboratory

1.1. Testing Location

Name:	Chongqing Academy of Information and Communications Technology
FCC Registration Number:	CN1239
Address:	Building C, Technology Innovation Center, No.8, Yuma Road, Chayuan New Area, Nan'an District, Chongqing, People's Republic of China
	No.19 East Road, Xiantao Big-data Valley, Yubei District, Chongqing, People's Republic of China
Postal Code:	401336
Telephone:	0086-23-88069965
Fax:	0086-23-88608777

1.2. Testing Environment

Normal Temperature:	15-35°C
Relative Humidity:	30-60%

1.3. Project data

Testing Start Date:	2022-10-29
Testing End Date:	2022-12-09

1.4. Signature



2022-12-23

Dong Junxin
(Prepared this test report)

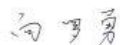
Date



2022-12-23

Li Xu
(Reviewed this test report)

Date



2022-12-23

Xiang Luoyong
Director of the laboratory
(Approved this test report)

Date

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2. Client Information

2.1. Applicant Information

Company name:	Shanghai MobileTek Communication Ltd.
Address /Post:	Free Trade Zone No. 33, No. 17 building 6H3 Xiya Road China (Shanghai)
City:	Shanghai
Country:	China
Telephone:	15821966417
Fax:	--
Email:	qh.zhang@mobiletek.cn
Contact Person:	Qinghua Zhang

2.2. Manufacturer Information

Company Name:	Shanghai MobileTek Communication Ltd.
Address /Post:	Free Trade Zone No. 33, No. 17 building 6H3 Xiya Road China (Shanghai)
City:	Shanghai
Country:	China
Telephone:	15821966417
Fax:	--
Email:	qh.zhang@mobiletek.cn
Contact Person:	Qinghua Zhang

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3. Equipment under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

EUT Description	IoT Module
Model name	L710
Brand name	LYNQ
GSM Frequency Band	GSM850/GSM1900
Type of modulation	GMSK/8PSK
Extreme Temperature	-40/+85°C
Nominal Voltage	3.8
Extreme High Voltage	4.2
Extreme Low Voltage	3.4

Note: Photographs of EUT are shown in ANNEX A of this test report.

Note: High and low voltage values in extreme condition test are given by manufacturer.

3.2. Internal Identification of EUT used during the test

EUT ID	SN or IMEI	HW Version	SW Version	Date of receipt
S2	866884049909641	V4.0	L710v09.01b01G_FGP.01	2022-10-27
S3	866884049878903	V4.0	L710v09.01b01G_FGP.01	2022-10-27

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Outline of Equipment under Test

Technology	Band	UL Freq.(MHz)	DL Freq.(MHz)	Note
GSM	GSM1900	1850.2-1909.8	1930.2-1989.8	--
	GSM850	824.2-848.8	869.2-893.8	--

3.4. Internal Identification of AE used during the test

AE ID*	Description	Manufacturer	Model
AE1	SUB	Shanghai Mobiletek Communication Ltd.	L710 EPI
AE2	EVb	Shanghai Mobiletek Communication Ltd.	L506 EVb
AE3	Antenna	Shanghai Jesoncom Communication Engineering Co., Ltd.	5J002B

*AE ID: is used to identify the test sample in the lab internally.

Band	Antenna Gain (dBi)
GSM850	3
GSM1900	2

Antenna gain: is provided customer.

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4. Reference Documents

4.1. Documents supplied by applicant

PICS/PIXIT, referring to Annex B for detailed information, is supplied by the client or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC CFR Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS, e-CFR	--
FCC CFR Part 22	PUBLIC MOBILE SERVICES	--
FCC CFR Part 24	PERSONAL COMMUNICATIONS SERVICES , e-CFR	--
ANSI C63.26	American National Standard for Complicance Testing of Transmitters Used in Licensed Radio Services	2015

5. Test Equipments Utilized

5.1. RF Test System

No.	Equipment	Model	SN	HW Version	SW Version	Manuf acture	Cal.Due Date
1	spectrum analyzer	FSQ 26	201137/026	--	--	R&S	2023-06-29
2	DC Power Supply	3303D	801128	--	--	Topwar d	2023-06-29
3	Universal Radio Communication Tester	CMW500	152395	--	--	R&S	2023-06-29

5.2. RSE Test System

No.	Equipment	Model	SN	HW Version	SW Version	Manufactu re	Cal.Due Date
1	Test Receiver	ESU26	100367	01	4.43 SP3	R&S	2023-06-29
2	Ultra-wideband Log Periodic Antenna	VULB 9163	01392	--	--	Schwarzbeck	2024-05-04
3	Double Ridged Guide Antenna	HF907	100357	--	--	R&S	2023-02-10
4	Universal Radio Communication Tester	CMU 200	122993	--	--	R&S	2023-06-29
5	Double Ridged Guide Antenna	HF907	100356	--	--	R&S	2023-07-07
6	Generator	SMU 200A	104517	--	--	R&S	2023-06-29
7	Ultra-wideband Log Periodic Antenna	VULB 9163	00995	--	--	R&S	2023-04-03
8	Amplifier1	150A	1429	--	--	Beehive	2023-06-18
9	Amplifier2	SCU 18	10141	--	--	R&S	--

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5.3. Climate Chamber

No.	Name	Type	SN	Manufacture	Cal.Due Date
1	Climate chamber	SH-241	92010759	ESPEC	2023-06-29
2	Fully-Anechoic Chamber	FACT3-2	--	ETS	2025-04-29

5.4. Vibration table

No.	Name	Type	SN	Manufacture	Cal.Due Date
--	--	--	--	--	--

5.5. Test software

No.	Name	version	SN	Manufacture
1	EMC32	V 8.51.00	--	R&S
2	T-RFS500	V2.0	--	Manufacturer:Beijing Zhiwang Xince Technology Co., Ltd.

6. Test Results

6.1. Summary of Test Results

A brief summary of the tests carried out is shown as following.

FCC Rules	Name of Test	Result
2.1046,22.913(a),24.232(c)	Conducted RF Power Output	Pass
2.1046,22.913(a),24.232(c)	ERP and EIRP	Pass
2.1049,22.917(b), 24.238(b)	Occupied Bandwidth	*Note 1
2.1051,24.238,2.1053,22.917	Conducted spurious emissions	Pass
2.1051,24.238,2.1053,22.917	Radiated Spurious Emission	Pass
2.1051,24.238, 2.1053, 22.917	Band Edge	Pass
2.1055, 22.355,24.235	Frequency Stability	Pass
24.232	Peak to Average Ratio	Pass
Note 1: No applicable performance criteria.		
Note 2: Explanation of worst-case configuration The worst-case scenario for all measurements is based on the conducted output power. Output power was measured on GMSK,8PSK modulations. It was found that GMSK was the worst case. All testing was performed using GMSK modulations to represent the worst case unless otherwise stated.		

6.2. Conducted RF Power Output

Specifications:	FCC Part 2.1046, 22.913(a), 24.232(c)
DUT Serial Number:	866884049909641
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit Level Construction:

According to Part 22.913(a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to Part 24.232(c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty	0.6 dB (k=2)

Test Setup:

During the test, the EUT was controlled via the Wireless Telecommunications Test Set to ensure max power transmission and proper modulation



Test Method:

The EUT is connected to the Universal Radio Communication Tester through the RF cable, and the average power and peak power are obtained through the Universal Radio Communication Tester

Note: --

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6.2.1 Conducted RF Power Output Results

GSM850

GSM(GMSK)

Frequency (MHz)	Power Step	Avg power (dBm)	Peak power (dBm)
824.2	5	30.56	30.55
836.6	5	30.35	30.40
848.8	5	30.40	30.43

GSM850

GPRS(GMSK)

Frequency (MHz)	Power Step	Slot	Avg power (dBm)	Peak power (dBm)
824.2	3	1TS	30.63	30.77
824.2	3	2TS	30.18	30.22
824.2	3	3TS	29.57	29.87
824.2	3	4TS	29.18	29.33
836.6	3	1TS	30.17	30.29
836.6	3	2TS	29.76	29.89
836.6	3	3TS	29.30	29.51
836.6	3	4TS	28.89	29.20
848.8	3	1TS	30.17	30.26
848.8	3	2TS	29.82	29.92
848.8	3	3TS	29.37	29.56
848.8	3	4TS	28.98	29.29

GSM850

EGPRS(GMSK)

Frequency (MHz)	Power Step	Slot	Avg power (dBm)	Peak power (dBm)
824.2	3	1TS	30.32	30.37
824.2	3	2TS	29.87	29.99
824.2	3	3TS	29.37	29.64
824.2	3	4TS	28.94	29.15
836.6	3	1TS	30.00	30.09
836.6	3	2TS	29.62	29.75
836.6	3	3TS	29.21	29.42
836.6	3	4TS	28.88	29.19
848.8	3	1TS	30.10	30.15
848.8	3	2TS	29.71	29.84
848.8	3	3TS	29.30	29.58

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848.8	3	4TS	28.98	29.37
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GSM850
EGPRS(8PSK)

Frequency (MHz)	Power Step	Slot	Avg power (dBm)	Peak power (dBm)
824.2	6	1TS	27.79	27.84
824.2	6	2TS	27.42	27.50
824.2	6	3TS	26.67	27.29
824.2	6	4TS	26.86	27.09
836.6	6	1TS	27.60	27.68
836.6	6	2TS	27.23	27.35
836.6	6	3TS	26.90	27.06
836.6	6	4TS	26.63	26.85
848.8	6	1TS	27.66	27.76
848.8	6	2TS	27.29	27.41
848.8	6	3TS	26.95	27.21
848.8	6	4TS	26.19	26.88

PCS1900
GSM(GMSK)

Frequency (MHz)	Power Step	Avg power (dBm)	Peak power (dBm)
1850.2	0	30.33	30.33
1880	0	30.02	30.02
1909.8	0	29.68	29.69

PCS1900
GPRS(GMSK)

Frequency (MHz)	Power Step	Slot	Avg power (dBm)	Peak power (dBm)
1850.2	3	1TS	30.43	30.43
1850.2	3	2TS	30.28	30.30
1850.2	3	3TS	30.18	30.19
1850.2	3	4TS	30.14	30.16
1880	3	1TS	30.05	30.05
1880	3	2TS	29.86	29.99
1880	3	3TS	29.90	29.93
1880	3	4TS	29.86	29.89
1909.8	3	1TS	29.64	29.67
1909.8	3	2TS	29.61	29.62

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1909.8	3	3TS	29.57	29.57
1909.8	3	4TS	29.53	29.54

PCS1900
EGPRS(GMSK)

Frequency (MHz)	Power Step	Slot	Avg power (dBm)	Peak power (dBm)
1850.2	3	1TS	30.30	30.31
1850.2	3	2TS	30.20	30.22
1850.2	3	3TS	30.15	30.17
1850.2	3	4TS	30.09	30.13
1880	3	1TS	29.84	29.97
1880	3	2TS	29.91	29.93
1880	3	3TS	29.88	29.89
1880	3	4TS	29.82	29.86
1909.8	3	1TS	29.90	29.95
1909.8	3	2TS	29.91	29.92
1909.8	3	3TS	29.54	29.58
1909.8	3	4TS	29.78	29.86

PCS1900
EGPRS(8PSK)

Frequency (MHz)	Power Step	Slot	Avg power (dBm)	Peak power (dBm)
1850.2	5	1TS	29.53	29.71
1850.2	5	2TS	29.45	29.59
1850.2	5	3TS	29.46	29.65
1850.2	5	4TS	29.40	29.56
1880	5	1TS	29.19	29.30
1880	5	2TS	29.20	29.29
1880	5	3TS	29.16	29.19
1880	5	4TS	28.93	29.12
1909.8	5	1TS	28.96	29.11
1909.8	5	2TS	28.90	28.97
1909.8	5	3TS	28.49	28.98
1909.8	5	4TS	28.82	28.83

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6.3. ERP and EIRP

Specifications:	FCC Part 2.1046, 22.913(a), 24.232(c)
DUT Serial Number:	866884049909641
Results:	Pass

Frequency Band	AntennaGain (dBi)	AntennaGain (dBd)
GSM 1900	2	N/A
GSM 850	3	0.85

Conducted RF Power+Antenna Gain(dBi)=EIRP

Conducted RF Power+Antenna Gain(dBd)=ERP

Antenna Gain(dBd)= Antenna Gain(dBi)-2.15

6.3.1 GSM 850 Measurement result

Limits 38.5dBm(7w)

Max ERP:31.48dBm

GSM(GMSK)

Frequency (MHz)	Power Step	Avg power (dBm)	Radiated Power(dBm) G _T =0.85dBd
824.2	5	30.56	31.41
836.6	5	30.35	31.20
848.8	5	30.40	31.25

GPRS(GMSK)

Frequency (MHz)	Power Step	Slot	Avg power (dBm)	Radiated Power(dBm) G _T =0.85dBd
824.2	3	1TS	30.63	31.48
824.2	3	2TS	30.18	31.03
824.2	3	3TS	29.57	30.42
824.2	3	4TS	29.18	30.03
836.6	3	1TS	30.17	31.02
836.6	3	2TS	29.76	30.61
836.6	3	3TS	29.30	30.15
836.6	3	4TS	28.89	29.74
848.8	3	1TS	30.17	31.02
848.8	3	2TS	29.82	30.67
848.8	3	3TS	29.37	30.22
848.8	3	4TS	28.98	29.83

EGPRS(8PSK)

Frequency (MHz)	Power Step	Slot	Avg power (dBm)	Radiated Power(dBm) G _T =0.85dBd
824.2	6	1TS	27.79	28.64
824.2	6	2TS	27.42	28.27
824.2	6	3TS	26.67	27.52
824.2	6	4TS	26.86	27.71
836.6	6	1TS	27.60	28.45
836.6	6	2TS	27.23	28.08
836.6	6	3TS	26.90	27.75
836.6	6	4TS	26.63	27.48
848.8	6	1TS	27.66	28.51

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848.8	6	2TS	27.29	28.14
848.8	6	3TS	26.95	27.80
848.8	6	4TS	26.19	27.04

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6.3.2 PCS 1900 Measurement result

GSM GMSK Mode

Limits 33.0dBm(2w)

Max EIRP:32.43dBm

PCS1900

GSM(GMSK)

Frequency (MHz)	Power Step	Avg power (dBm)	Radiated Power(dBm) G _T = 2dBi
1850.2	0	30.33	32.33
1880	0	30.02	32.02
1909.8	0	29.68	31.68

GPRS(GMSK)

Frequency (MHz)	Power Step	Slot	Avg power (dBm)	Radiated Power(dBm) G _T = 2dBi
1850.2	3	1TS	30.43	32.43
1850.2	3	2TS	30.28	32.28
1850.2	3	3TS	30.18	32.18
1850.2	3	4TS	30.14	32.14
1880	3	1TS	30.05	32.05
1880	3	2TS	29.86	31.86
1880	3	3TS	29.90	31.90
1880	3	4TS	29.86	31.86
1909.8	3	1TS	29.64	31.64
1909.8	3	2TS	29.61	31.61
1909.8	3	3TS	29.57	31.57
1909.8	3	4TS	29.53	31.53

PCS1900

EGPRS(8PSK)

Frequency (MHz)	Power Step	Slot	Avg power (dBm)	Radiated Power(dBm) G _T = 2dBi
1850.2	5	1TS	29.53	31.53
1850.2	5	2TS	29.45	31.45
1850.2	5	3TS	29.46	31.46
1850.2	5	4TS	29.40	31.40
1880	5	1TS	29.19	31.19
1880	5	2TS	29.20	31.20
1880	5	3TS	29.16	31.16

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1880	5	4TS	28.93	30.93
1909.8	5	1TS	28.96	30.96
1909.8	5	2TS	28.90	30.90
1909.8	5	3TS	28.49	30.49
1909.8	5	4TS	28.82	30.82

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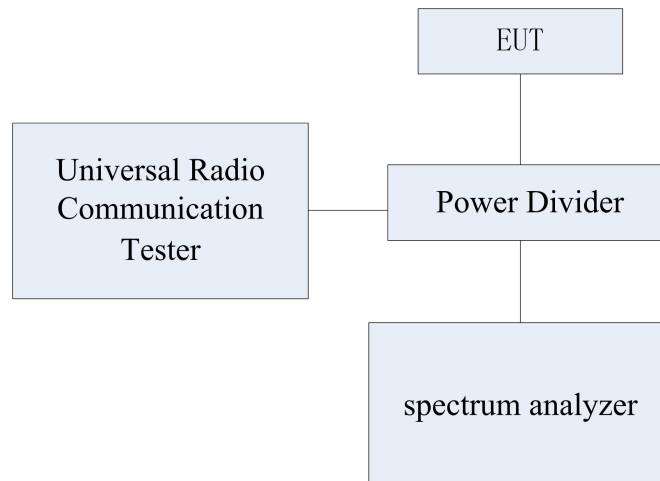
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6.4. Occupied Bandwidth

Specifications:	FCC Part 2.1049, 22.917(b), 24.238(b)
DUT Serial Number:	866884049909641
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	--

Test Setup

During the test, the EUT was controlled via the Wireless Communications Test Set to ensure max power transmission and proper modulation and measured by spectrum analyzer.



Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty	70.04 Hz (k=2)

Test Method

The 99% occupied Bandwidth was calculated from the spectrum analyzer. Markers in the spectrum analyzer were then placed between the calculated frequencies to show the calculated 99% power Band. The 26dB Bandwidth was also measured and recorded.

Note: --

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6.4.1 Occupied bandwidth Results

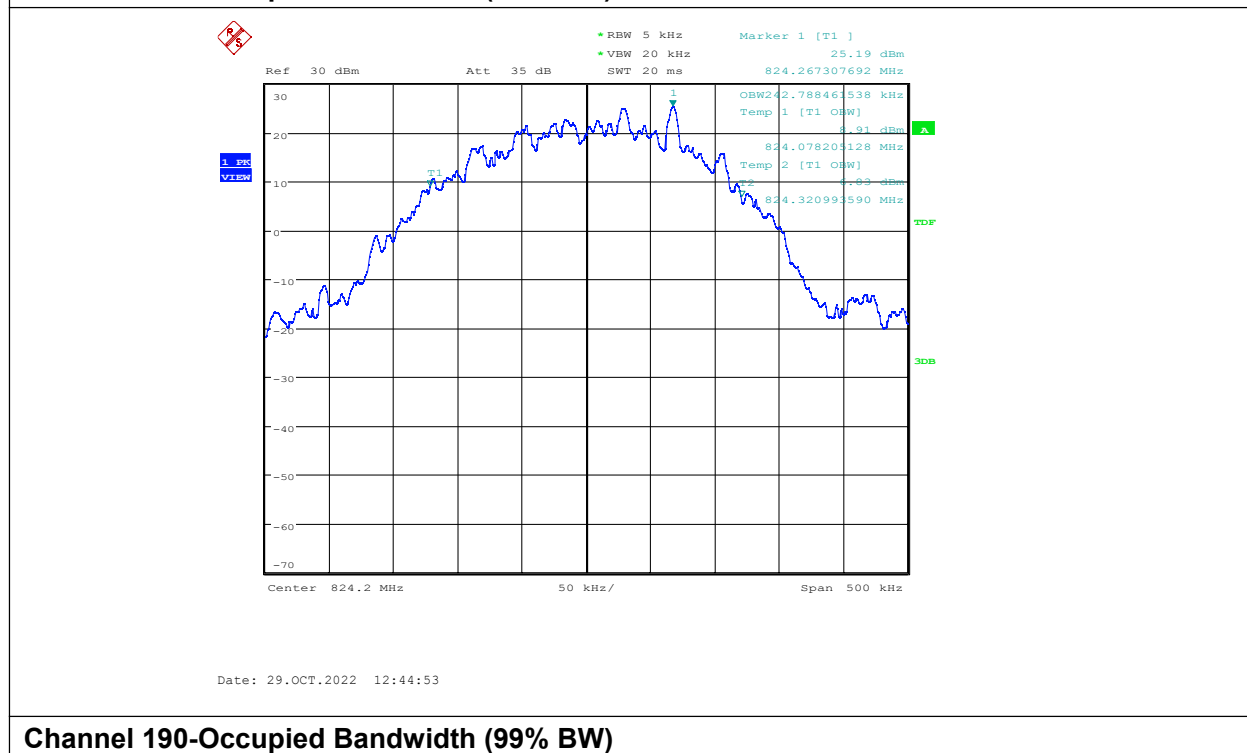
GSM850 (99 %)

GSM

Frequency (MHz)	Occupied Bandwidth (99%) (kHz)
824.2	242.788
836.6	242.788
848.8	241.987

GSM850

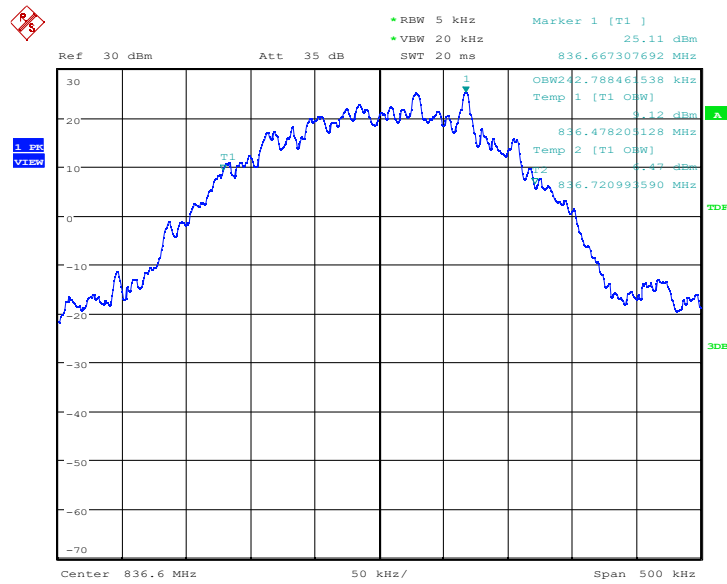
Channel 128-Occupied Bandwidth (99% BW)



Channel 190-Occupied Bandwidth (99% BW)

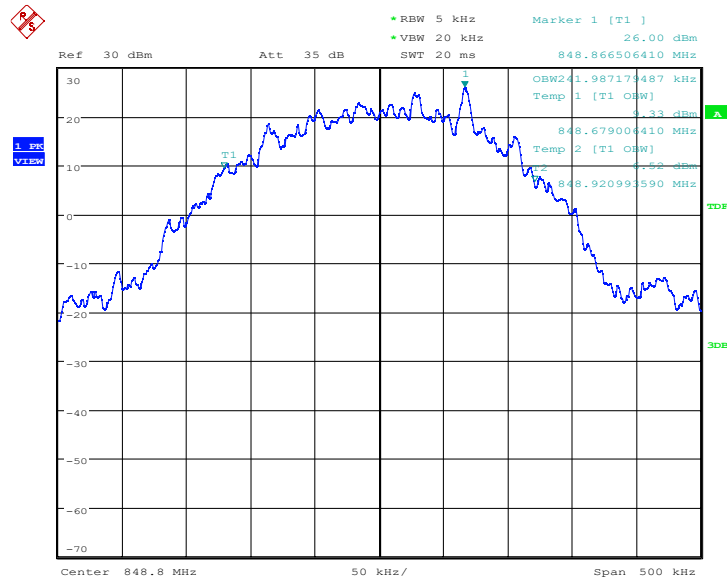
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Date: 29.OCT.2022 12:45:24

Channel 251-Occupied Bandwidth (99% BW)



Date: 29.OCT.2022 12:45:54

GSM850 (99 %)

GPRS

Frequency (MHz)	Occupied Bandwidth (99%) (kHz)
824.2	244.391
836.6	247.596

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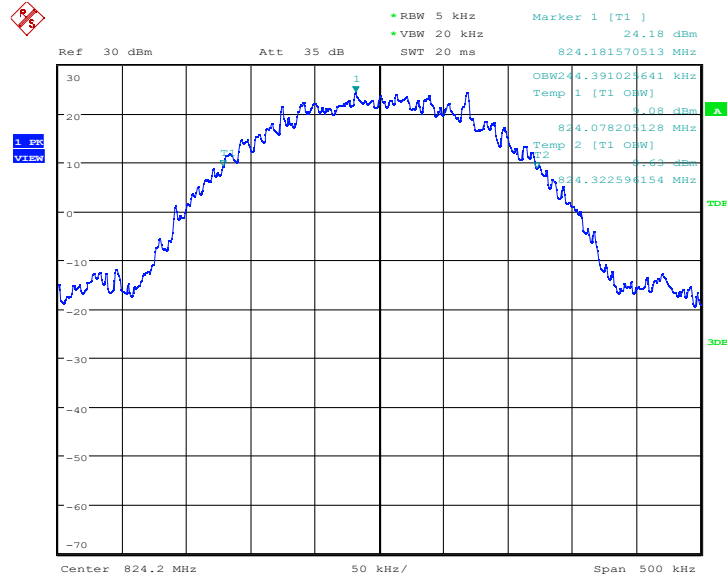
Address: No. 8,Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China,401336
Tel: 0086-23-88069965 FAX:0086-23-88608777

848.8

246.795

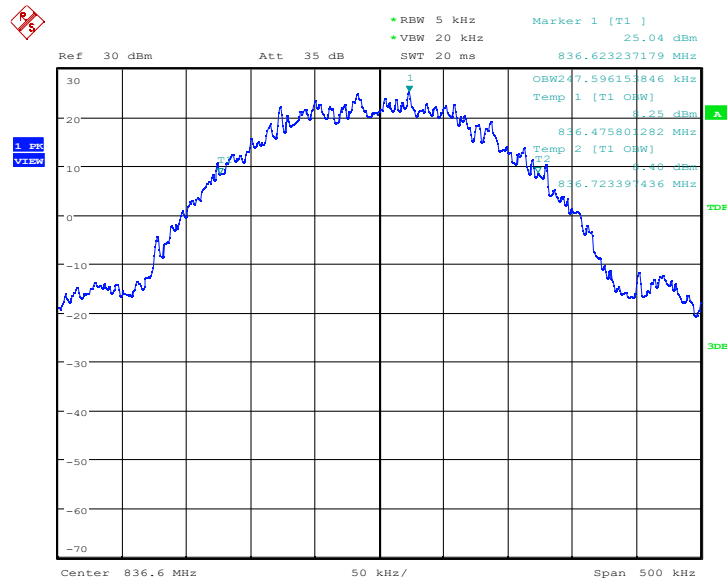
GSM850

Channel 128-Occupied Bandwidth (99% BW)



Date: 29.OCT.2022 12:47:15

Channel 190-Occupied Bandwidth (99% BW)

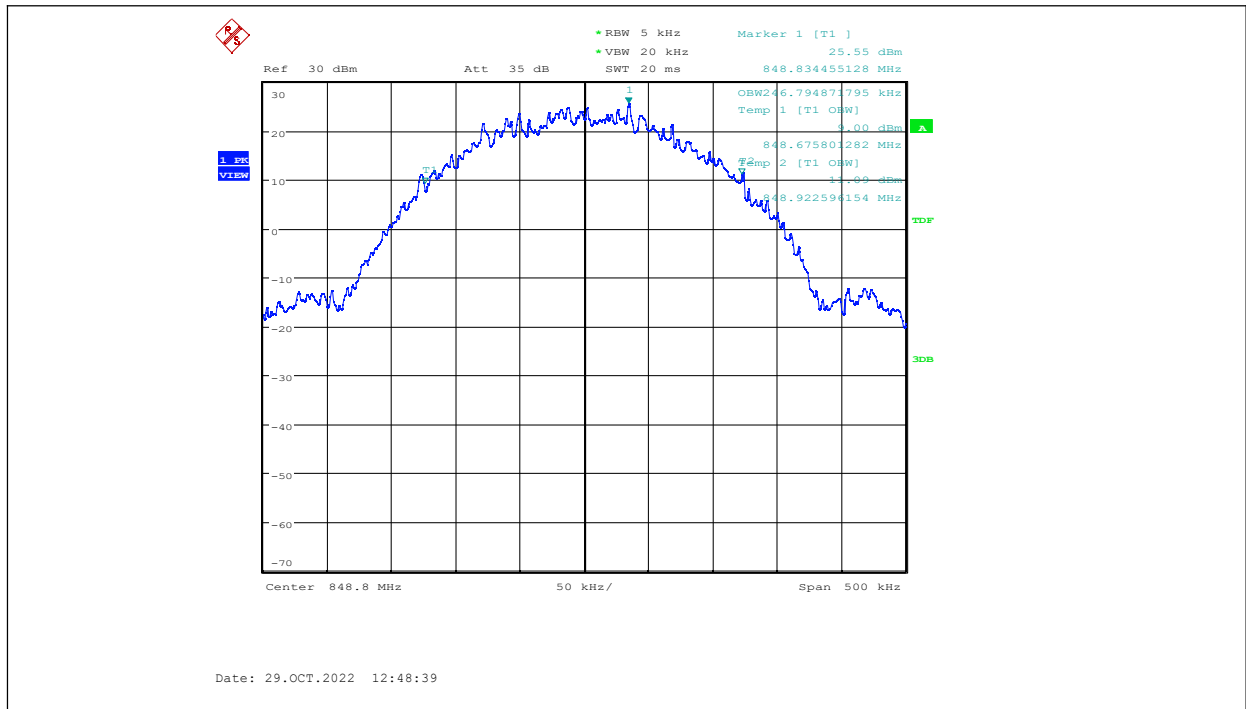


Date: 29.OCT.2022 12:47:57

Channel 251-Occupied Bandwidth (99% BW)

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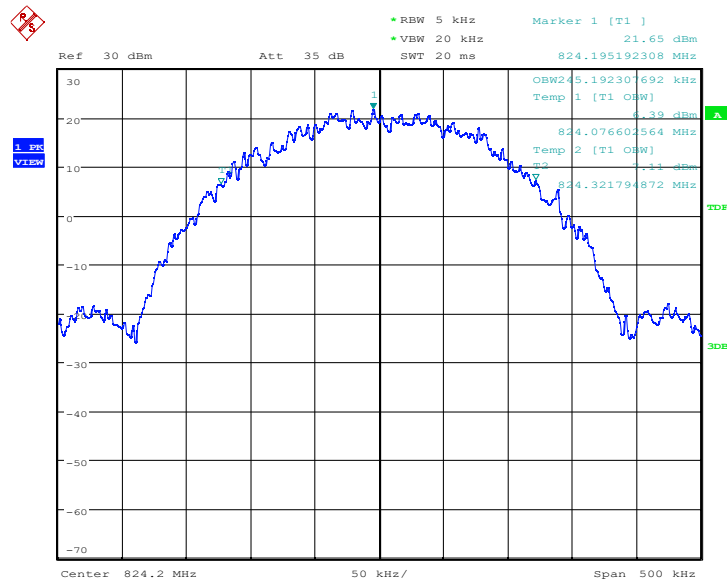
GSM850 (99 %)

EGPRS-8PSK

Frequency (MHz)	Occupied Bandwidth (99%) (kHz)
824.2	245.192
836.6	249.199
848.8	245.192

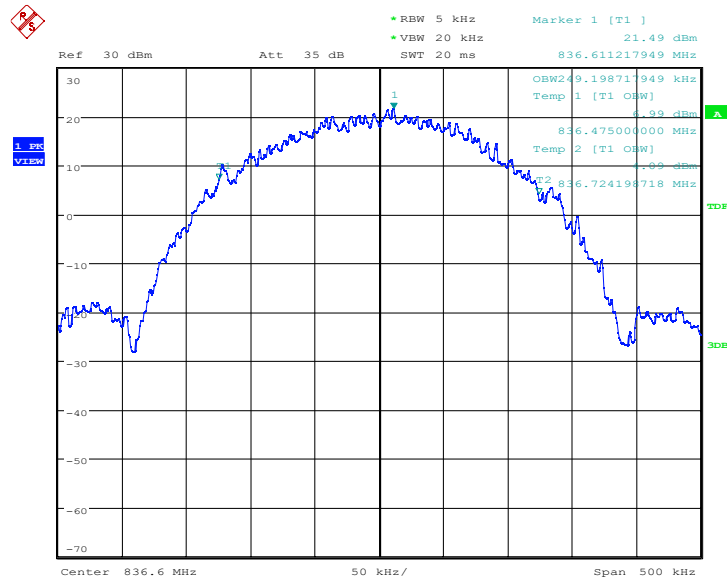
GSM850

Channel 128-Occupied Bandwidth (99% BW)



Date: 29.OCT.2022 12:49:26

Channel 190-Occupied Bandwidth (99% BW)

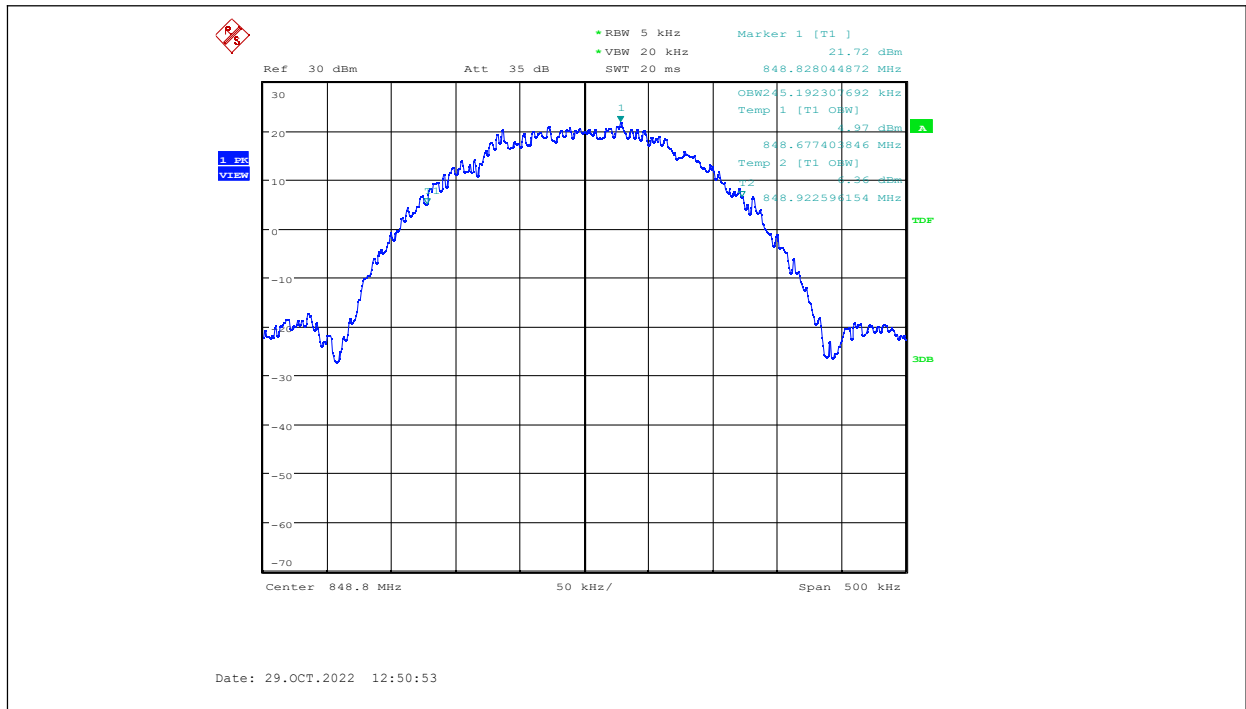


Date: 29.OCT.2022 12:50:10

Channel 251-Occupied Bandwidth (99% BW)

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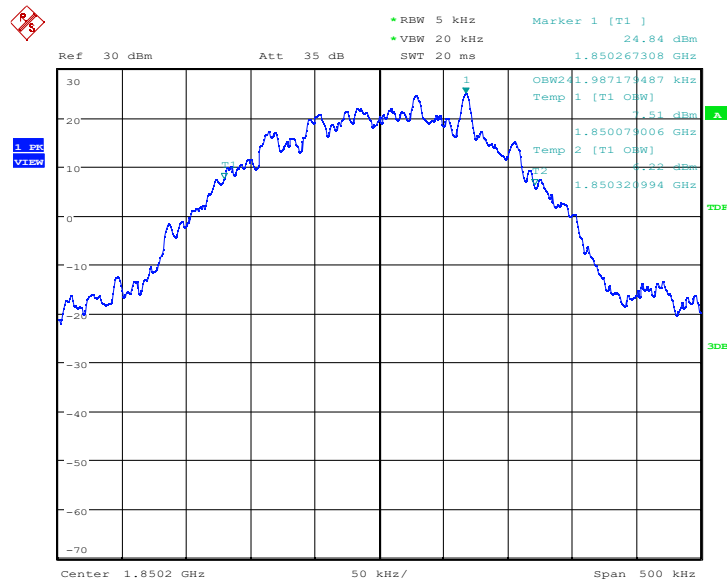
PCS1900 (99 %)

GSM

Frequency (MHz)	Occupied Bandwidth (99%) (kHz)
1850.2	241.987
1880	241.987
1909.8	243.590

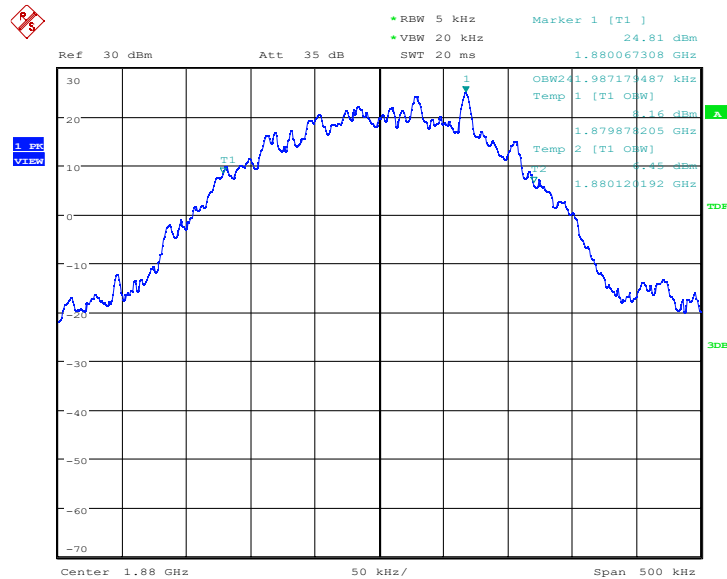
PCS1900

Channel 512-Occupied Bandwidth (99% BW)



Date: 29.OCT.2022 12:54:30

Channel 661-Occupied Bandwidth (99% BW)



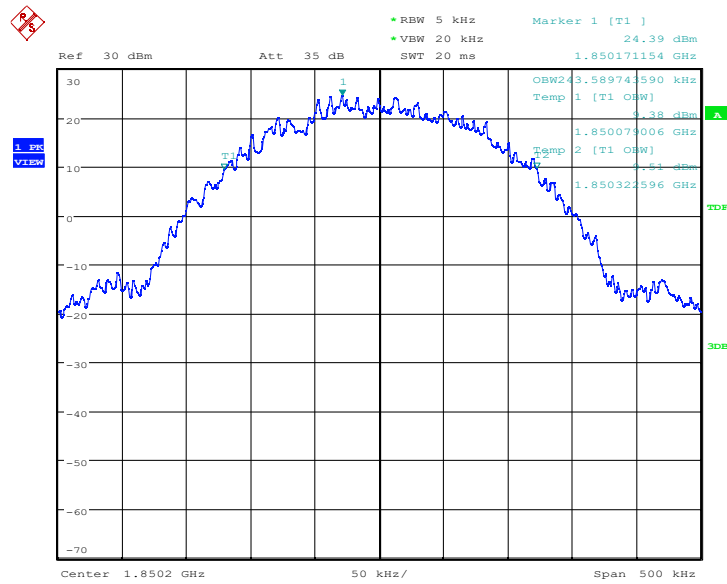
Date: 29.OCT.2022 12:55:01

Channel 810-Occupied Bandwidth (99% BW)

Chongqing Academy of Information and Communication Technology

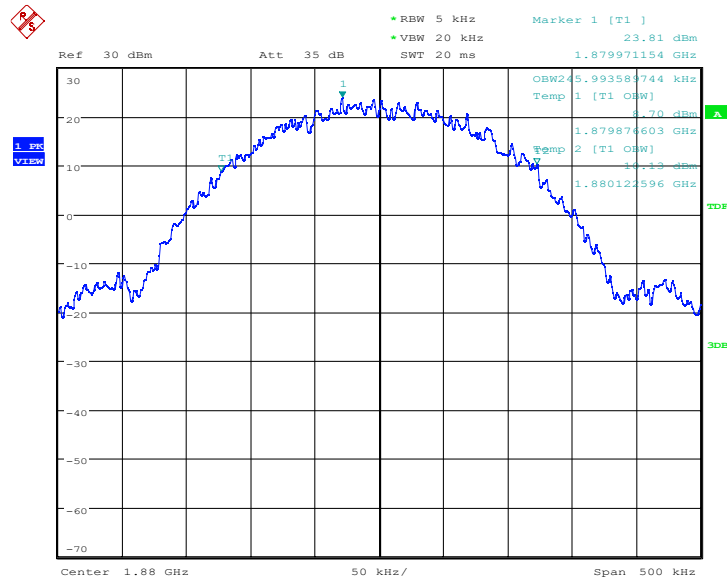
Address: No. 8,Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China,401336
Tel: 0086-23-88069965 FAX:0086-23-88608777

[illegible]



Date: 29.OCT.2022 12:57:03

Channel 661-Occupied Bandwidth (99% BW)

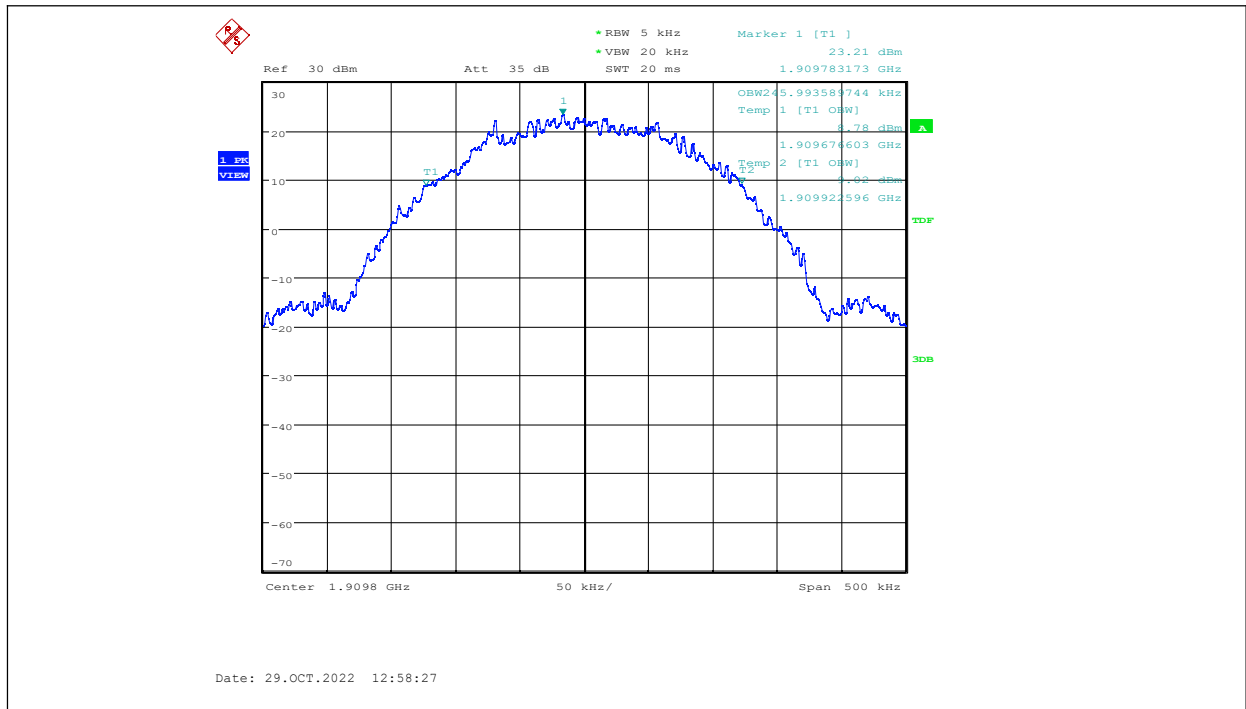


Date: 29.OCT.2022 12:57:45

Channel 810-Occupied Bandwidth (99% BW)

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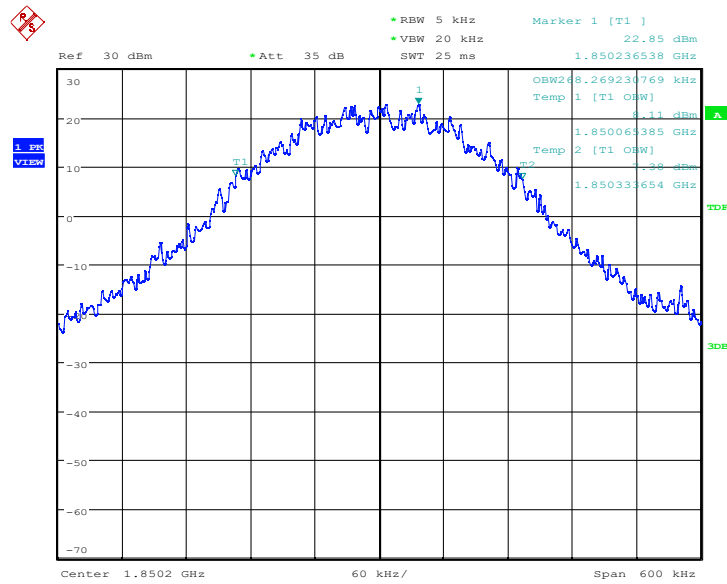
PCS1900 (99 %)

EGPRS-8PSK

Frequency (MHz)	Occupied Bandwidth (99%) (kHz)
1850.2	268.269
1880	272.115
1909.8	271.154

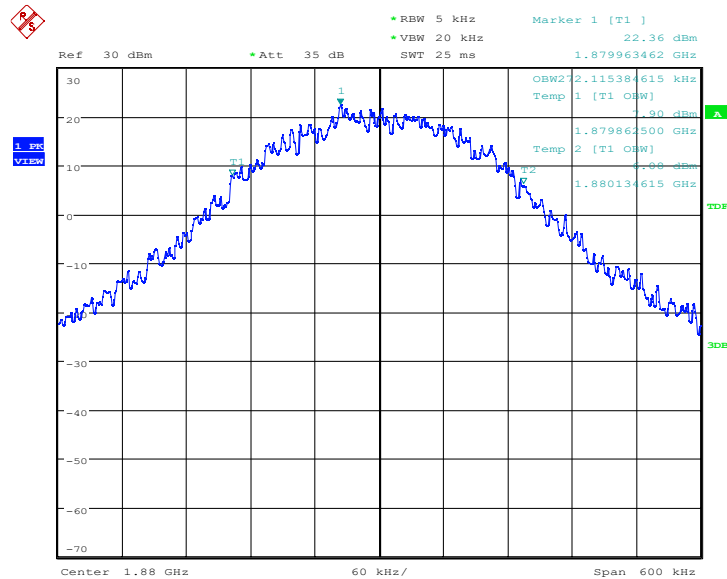
PCS1900

Channel 512-Occupied Bandwidth (99% BW)



Date: 31.OCT.2022 14:16:26

Channel 661-Occupied Bandwidth (99% BW)

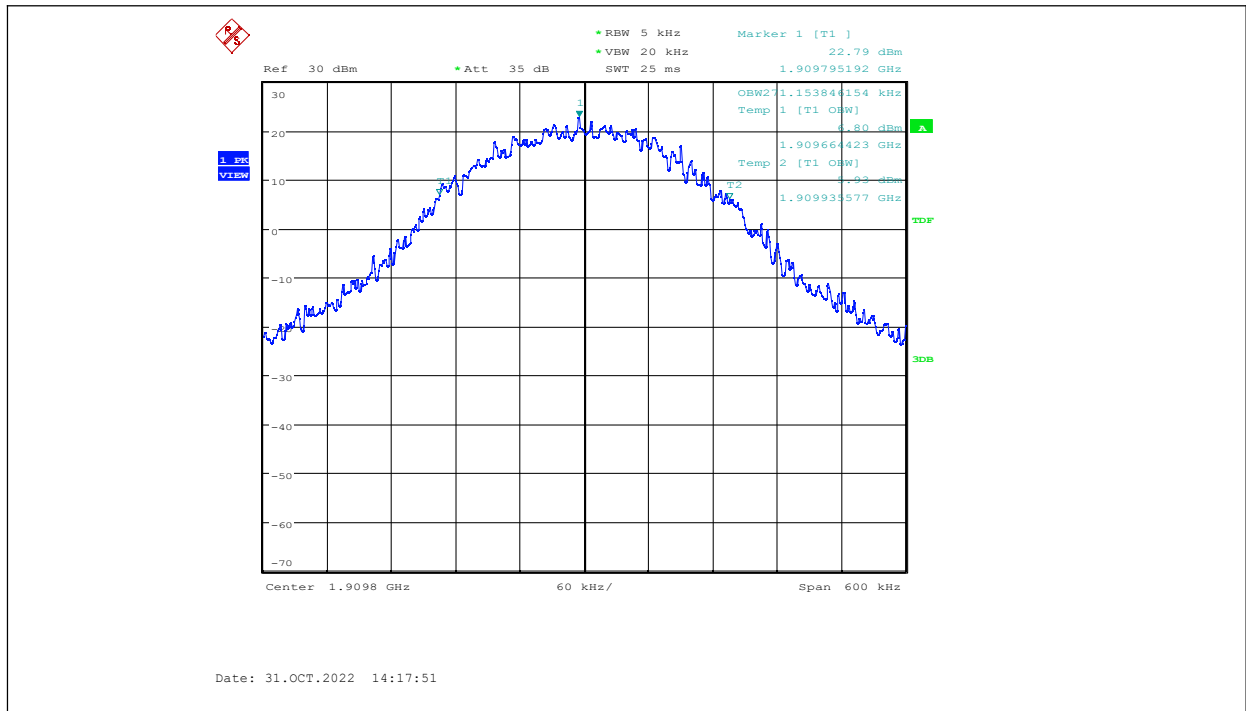


Date: 31.OCT.2022 14:17:08

Channel 810-Occupied Bandwidth (99% BW)

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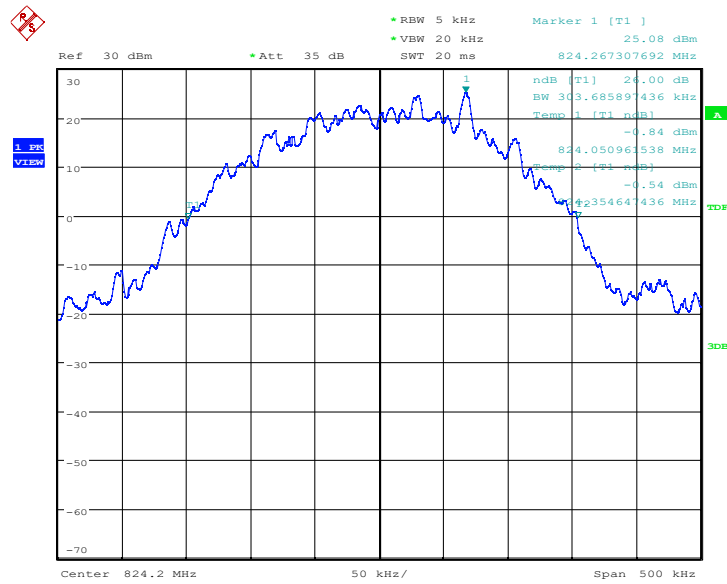
GSM850 (-26dBc)

GSM

Frequency (MHz)	Emission Bandwidth (-26dBc)(kHz)
824.2	303.686
836.6	303.686
848.8	302.885

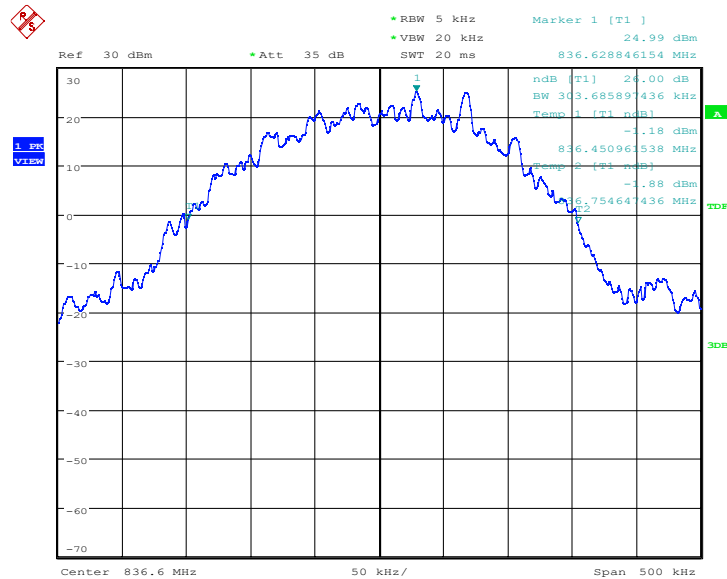
GSM850

Channel 128-Emission Bandwidth (-26dBc BW)



Date: 29.OCT.2022 13:01:49

Channel 190-Emission Bandwidth (-26dBc BW)

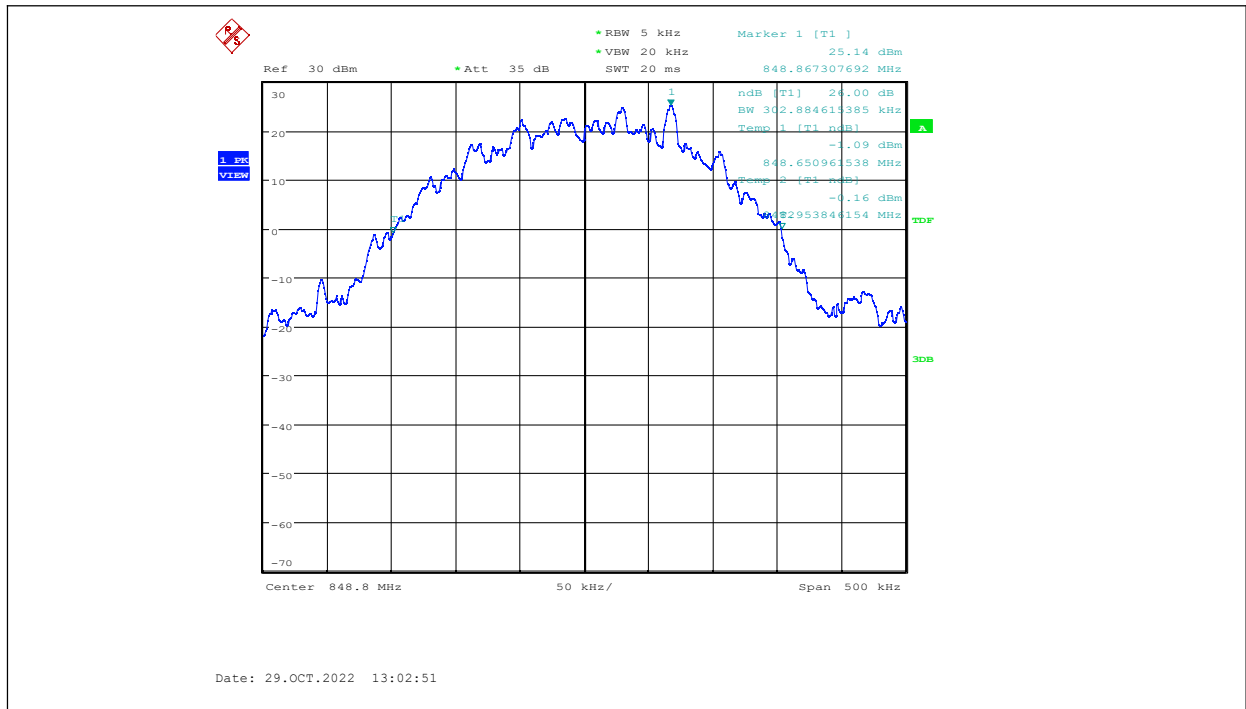


Date: 29.OCT.2022 13:02:20

Channel 251-Emission Bandwidth (-26dBc BW)

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GSM850 (-26dBc)

GPRS

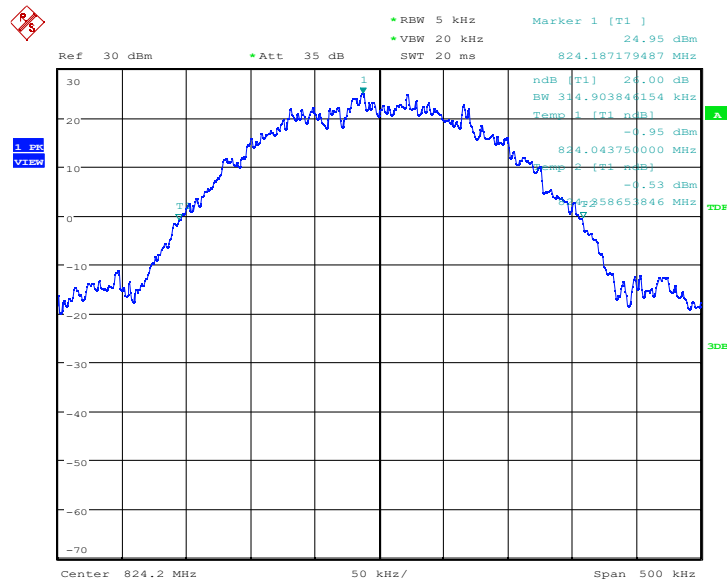
Frequency (MHz)	Emission Bandwidth (-26dBc)(kHz)
824.2	314.904
836.6	313.301
848.8	314.103

GSM850

Channel 128-Emission Bandwidth (-26dBc BW)

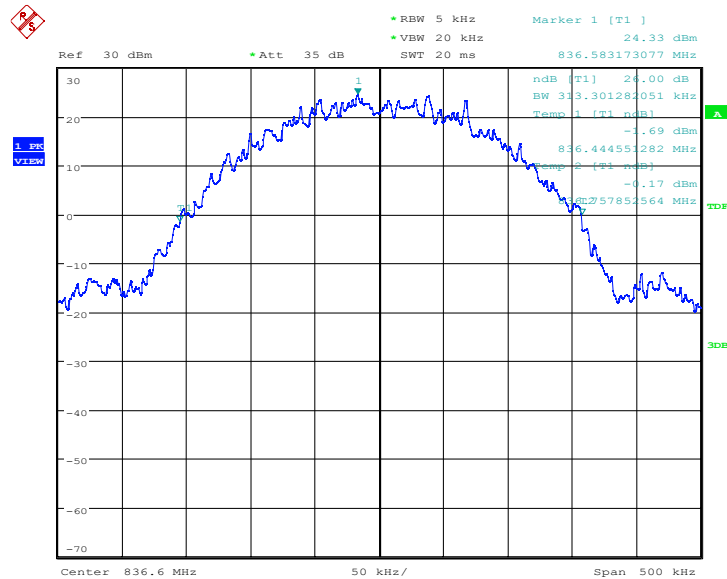
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Date: 29.OCT.2022 13:04:09

Channel 190-Emission Bandwidth (-26dBc BW)

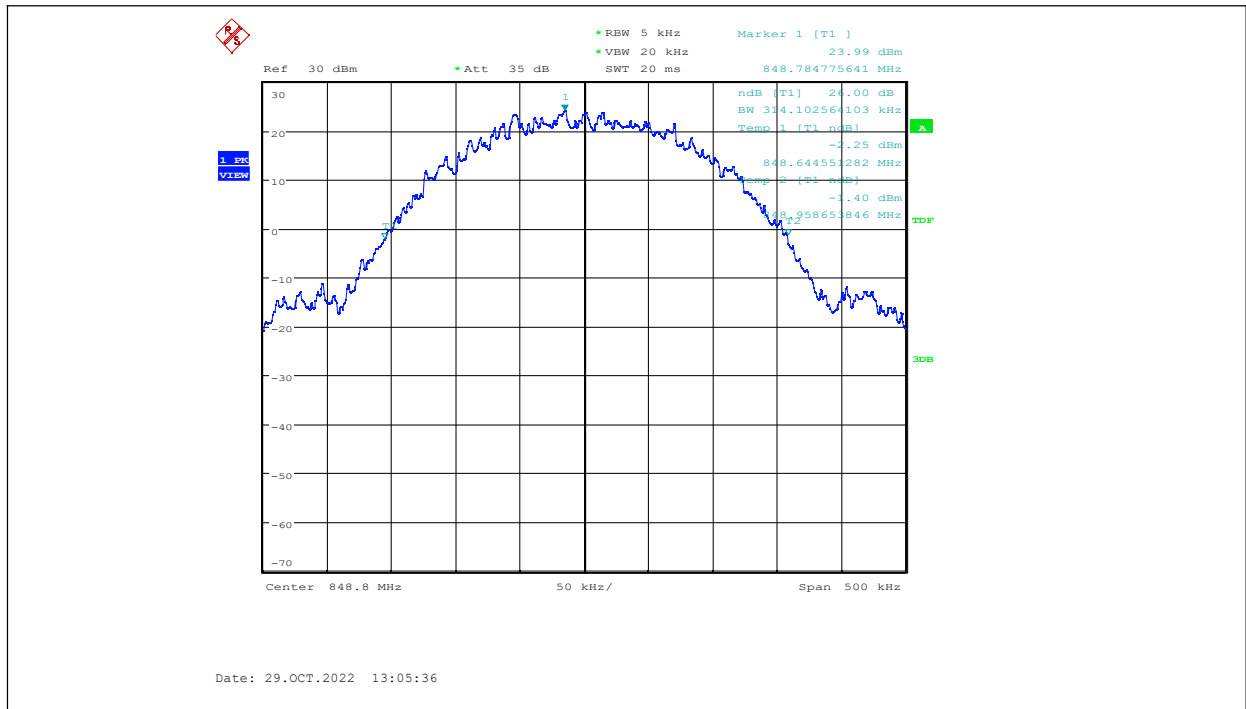


Date: 29.OCT.2022 13:04:51

Channel 251-Emission Bandwidth (-26dBc BW)

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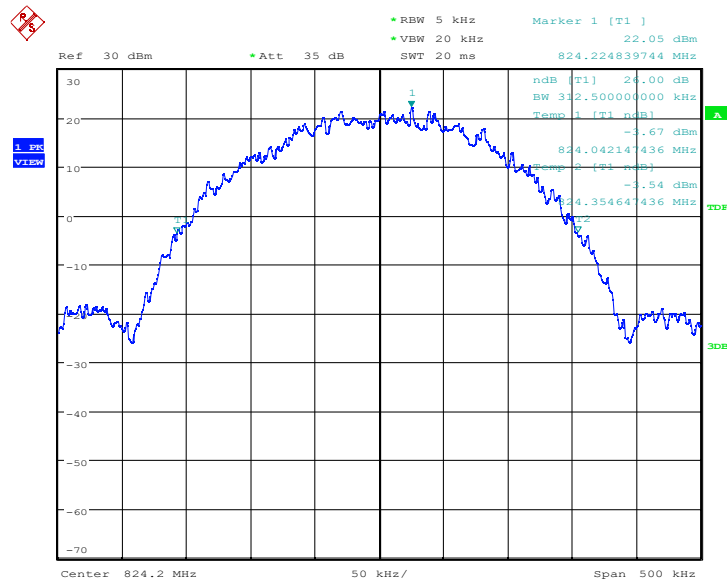
GSM850 (-26dBc)

EGPRS-8PSK

Frequency (MHz)	Emission Bandwidth (-26dBc)(kHz)
824.2	312.500
836.6	306.090
848.8	306.891

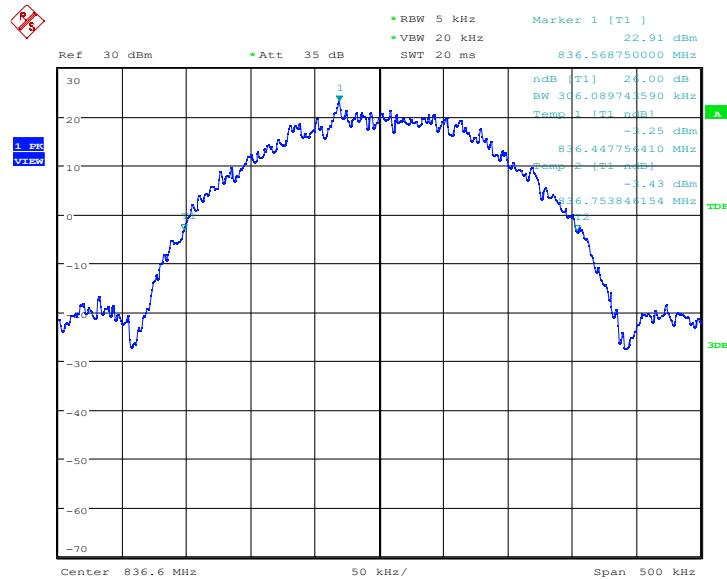
GSM850

Channel 128-Emission Bandwidth (-26dBc BW)



Date: 29.OCT.2022 13:06:35

Channel 190-Emission Bandwidth (-26dBc BW)

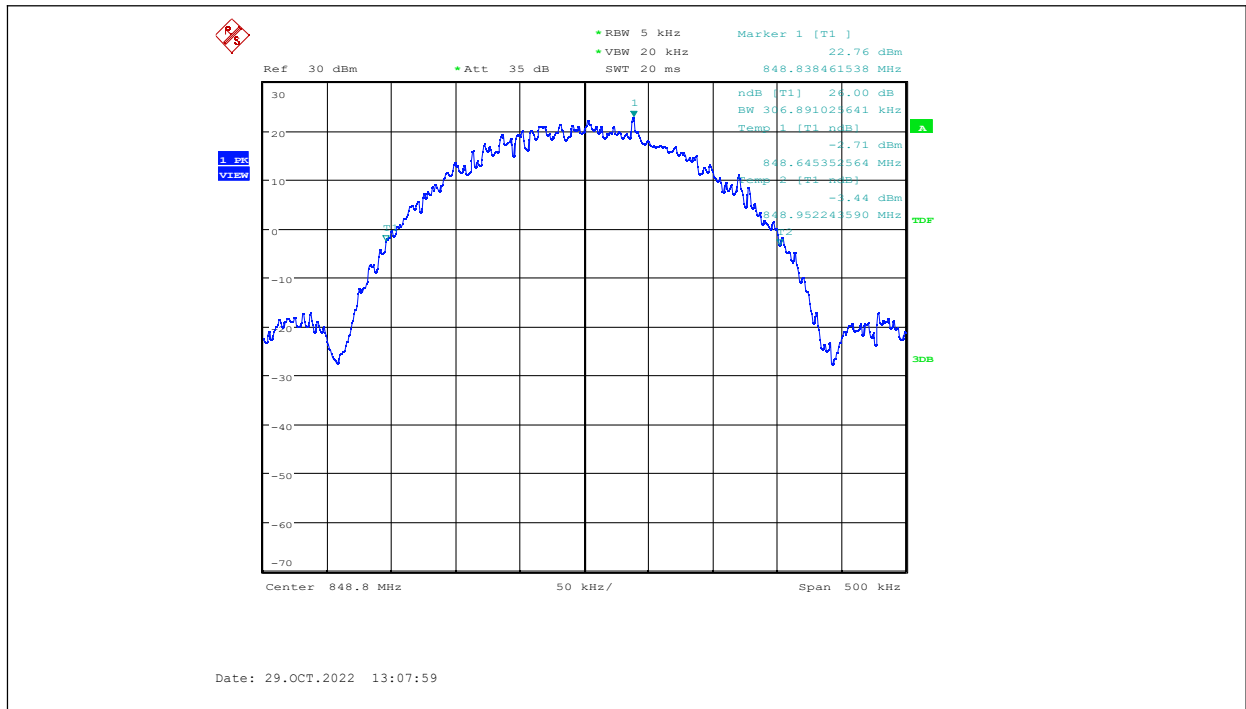


Date: 29.OCT.2022 13:07:17

Channel 251-Emission Bandwidth (-26dBc BW)

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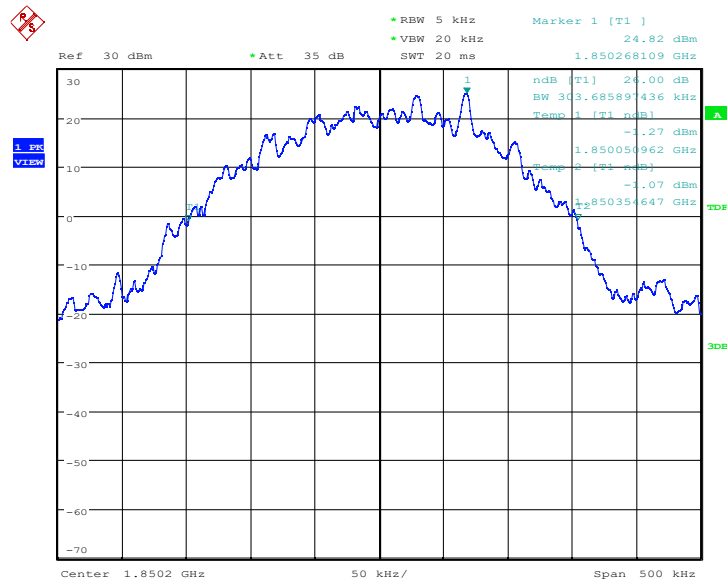
PCS1900 (-26dBc)

GSM

Frequency (MHz)	Emission Bandwidth (-26dBc)(kHz)
1850.2	303.686
1880	304.487
1909.8	303.686

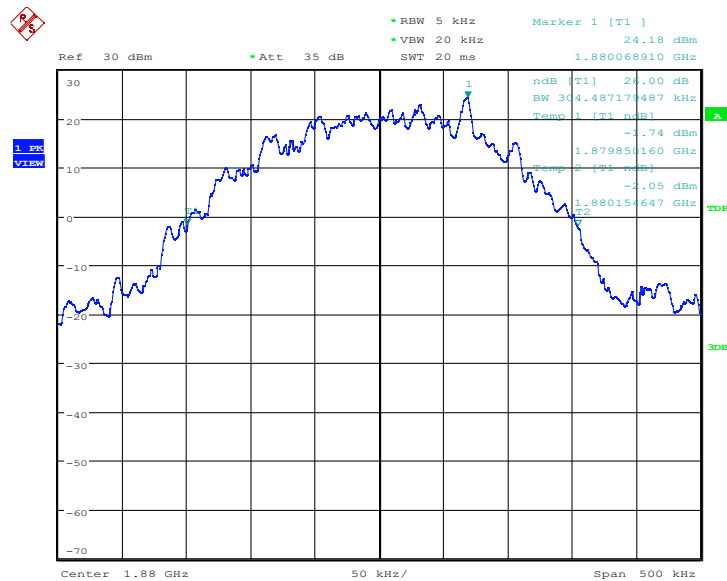
PCS1900

Channel 512-Emission Bandwidth (-26dBc BW)



Date: 29.OCT.2022 13:20:15

Channel 661-Emission Bandwidth (-26dBc BW)

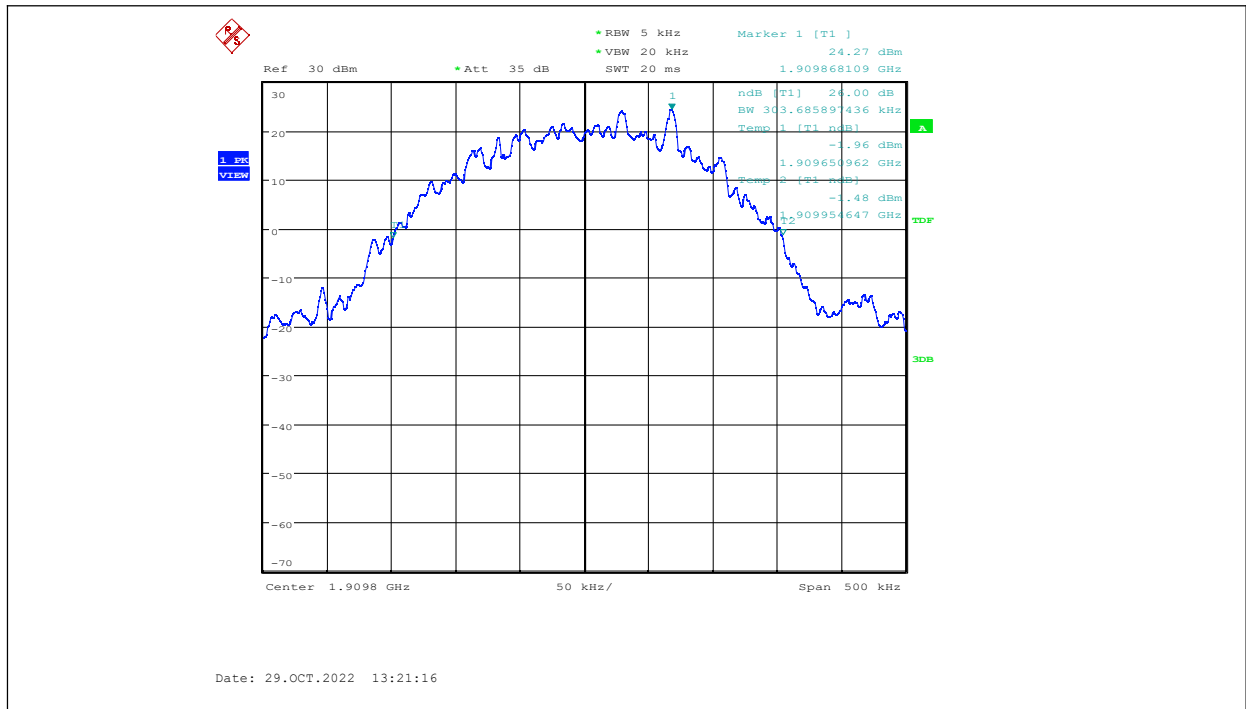


Date: 29.OCT.2022 13:20:45

Channel 810-Emission Bandwidth (-26dBc BW)

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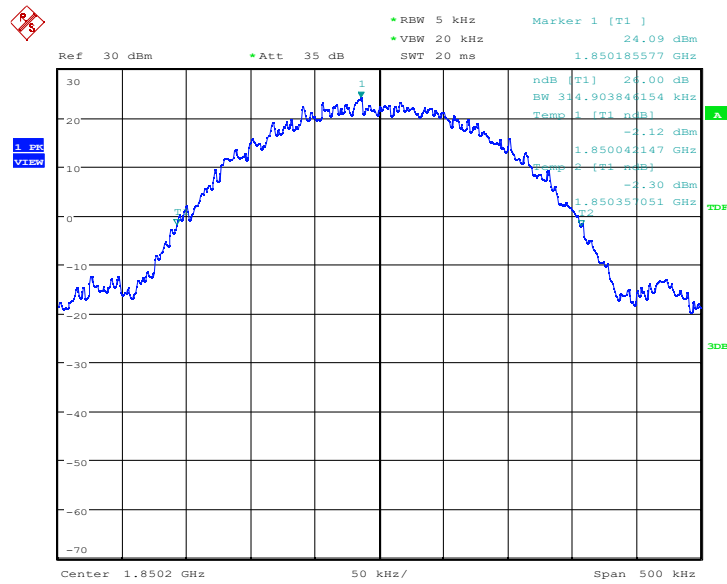
PCS1900 (-26dBc)

GPRS

Frequency (MHz)	Emission Bandwidth (-26dBc)(kHz)
1850.2	314.904
1880	315.705
1909.8	315.705

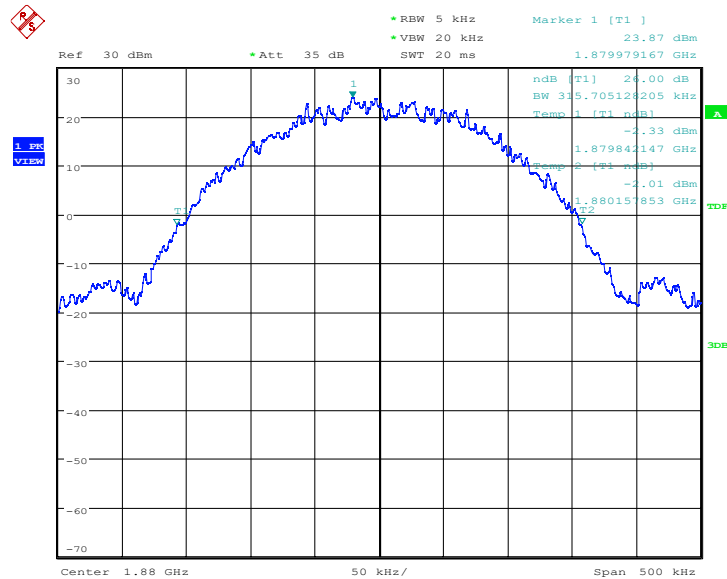
PCS1900

Channel 512-Emission Bandwidth (-26dBc BW)



Date: 29.OCT.2022 13:25:09

Channel 661-Emission Bandwidth (-26dBc BW)

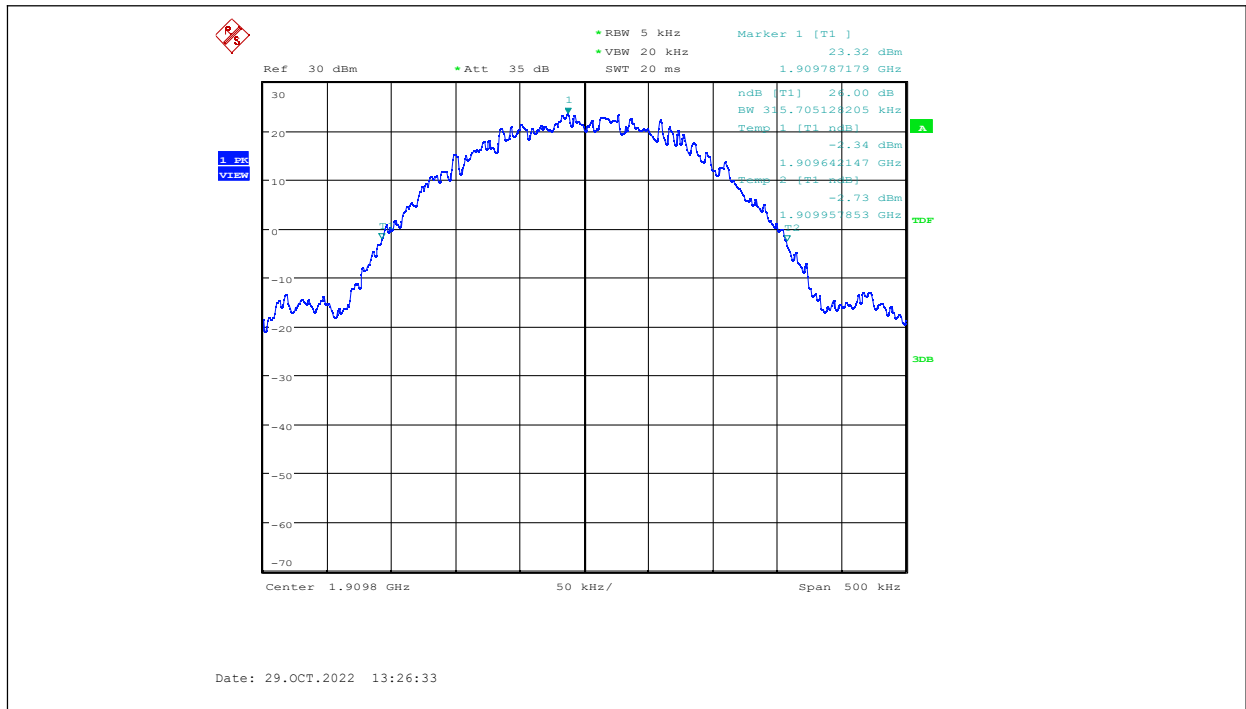


Date: 29.OCT.2022 13:25:51

Channel 810-Emission Bandwidth (-26dBc BW)

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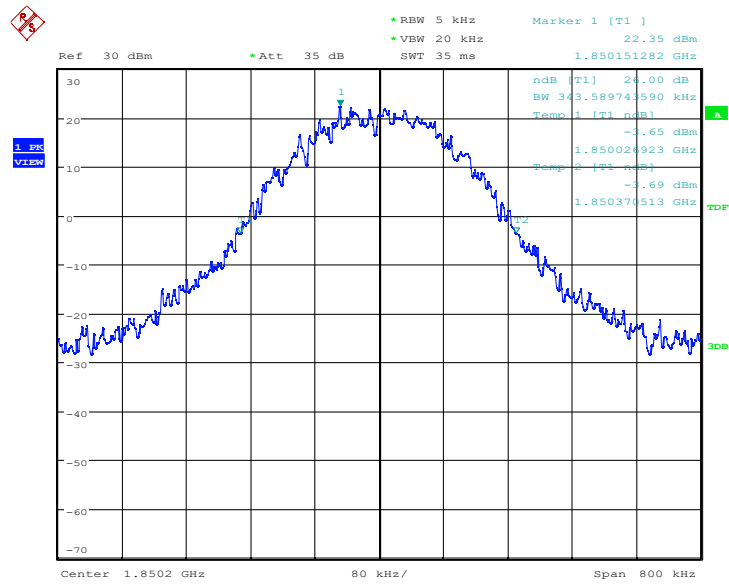
PCS1900 (-26dBc)

EGPRS-8PSK

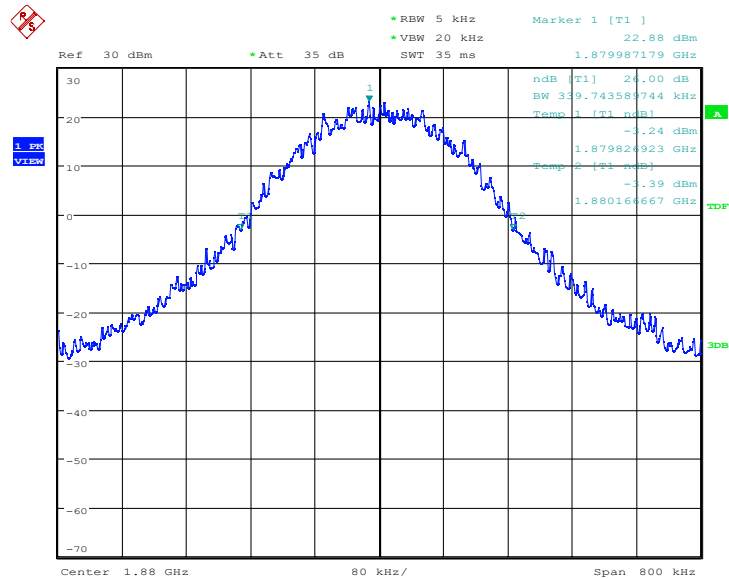
Frequency (MHz)	Emission Bandwidth (-26dBc)(kHz)
1850.2	343.590
1880	339.744
1909.8	334.615

PCS1900

Channel 512-Emission Bandwidth (-26dBc BW)



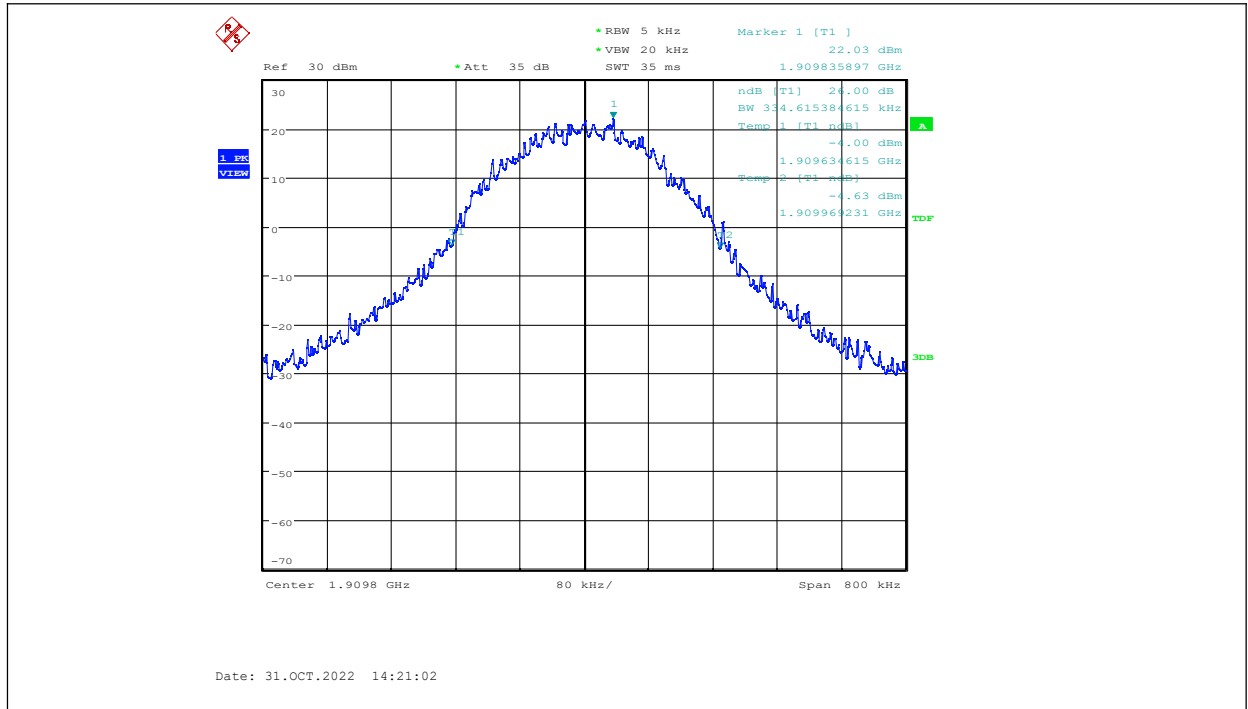
Channel 661-Emission Bandwidth (-26dBc BW)



Channel 810-Emission Bandwidth (-26dBc BW)

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6.5. Conducted spurious emissions

Specifications:	FCC Part 2.1051, 24.238, 2.1053, 22.917
DUT Serial Number:	866884049909641
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit Level Construction:

According to Part 22.917 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

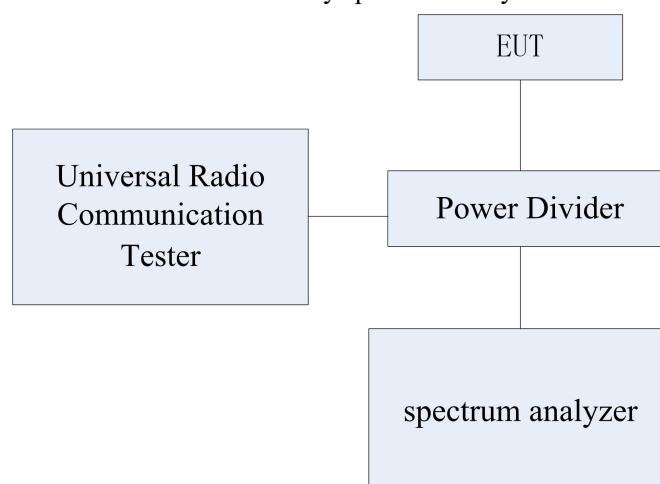
According to Part 24.238 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB, so the limit level is: $P(\text{dBm}) - (43 + 10 \log(P)) \text{ dB} = -13\text{dBm}$.

Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty	1.74 dB (k=2)

Test Setup:

During the test, the EUT was controlled via the Wireless Communications Test Set to ensure max power transmission and proper modulation and measured by spectrum analyzer.



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Test Method:

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-Band emissions, if any, up to 10th harmonic. The EUT was scanned for spurious emissions from 30MHz to 20GHz with sufficient Bandwidth and video resolution. The spectrum analyzer was set to Maximum hold mode to ensure that the worst-case emissions were captured.

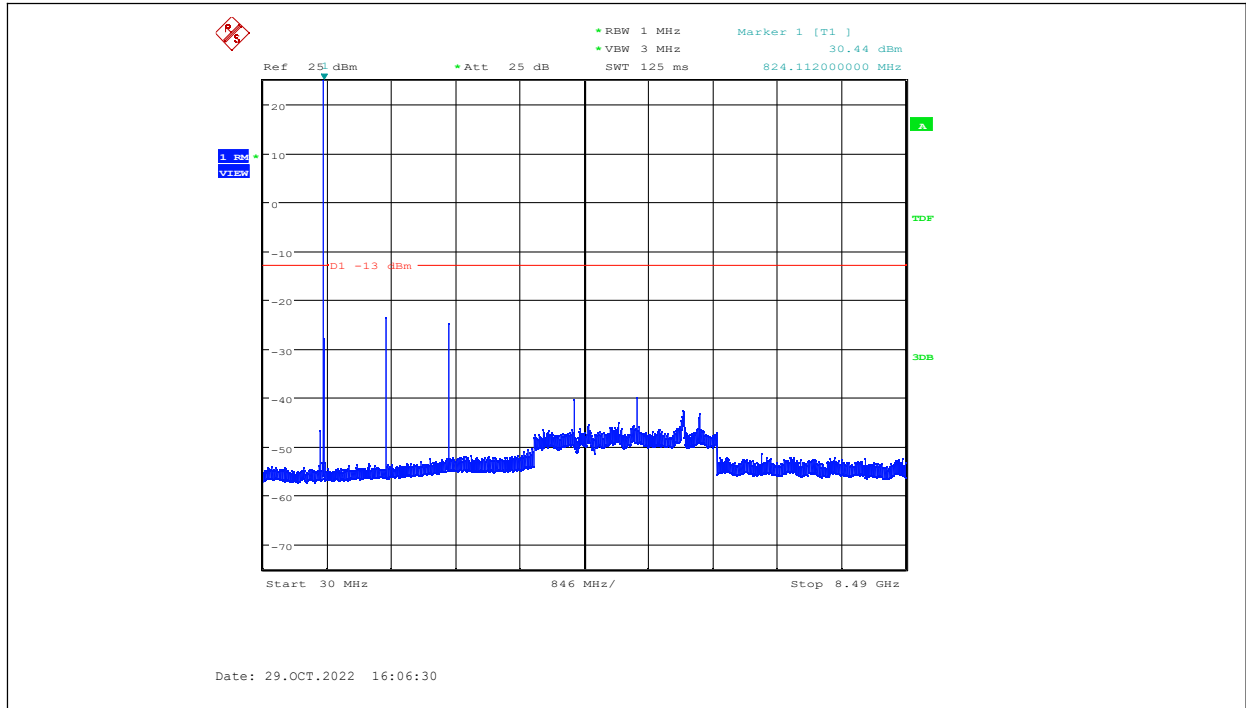
Note: All modes were test, only the worst case voice mode were present in this report

6.5.1 Conducted Spurious Emission Results

GSM850-VOICE

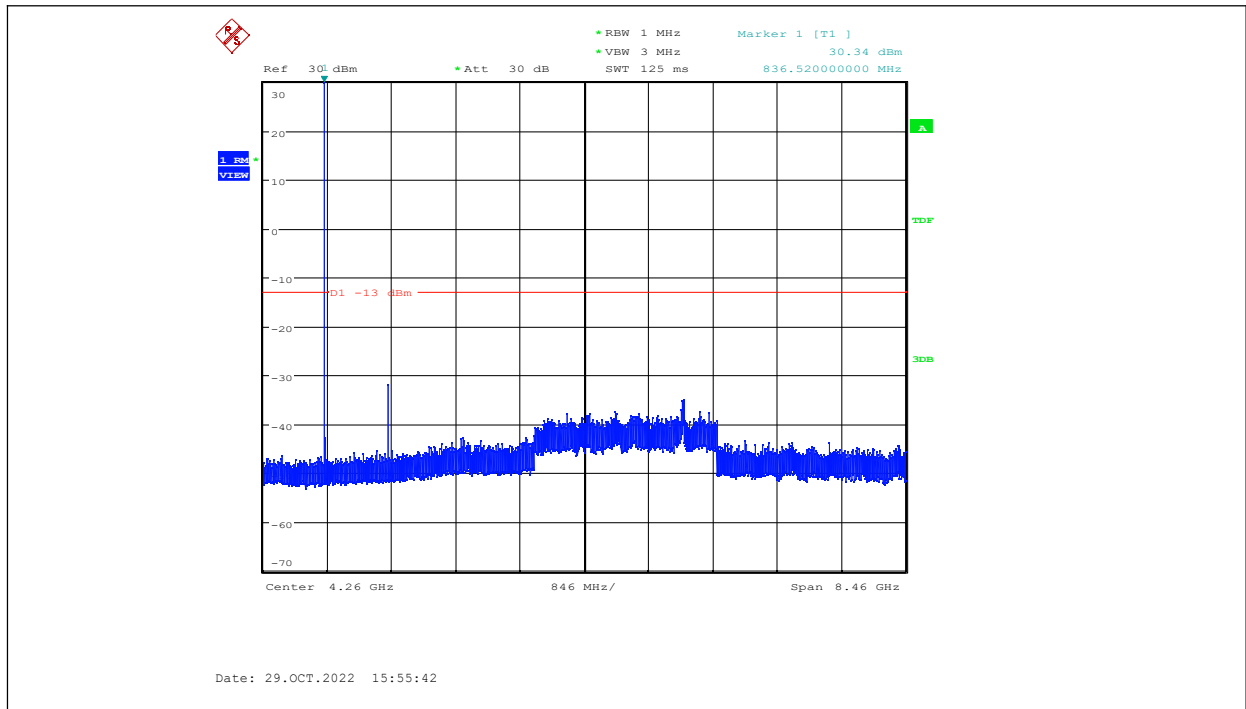
Channel 128:30MHZ - 8490MHZ

NOTE: peak above the limit line is the carrier frequency.



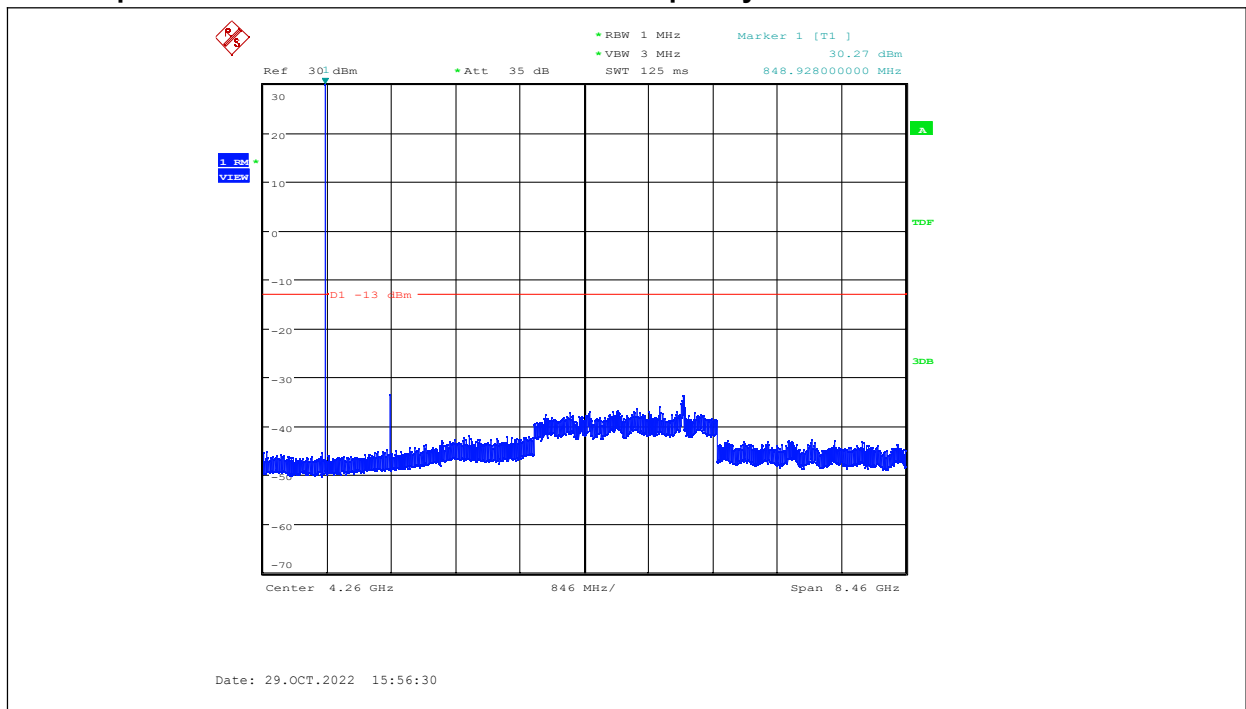
Channel 190:30MHZ - 8490MHZ

NOTE: peak above the limit line is the carrier frequency.



Channel 251:30MHZ - 8490MHZ

NOTE: peak above the limit line is the carrier frequency.



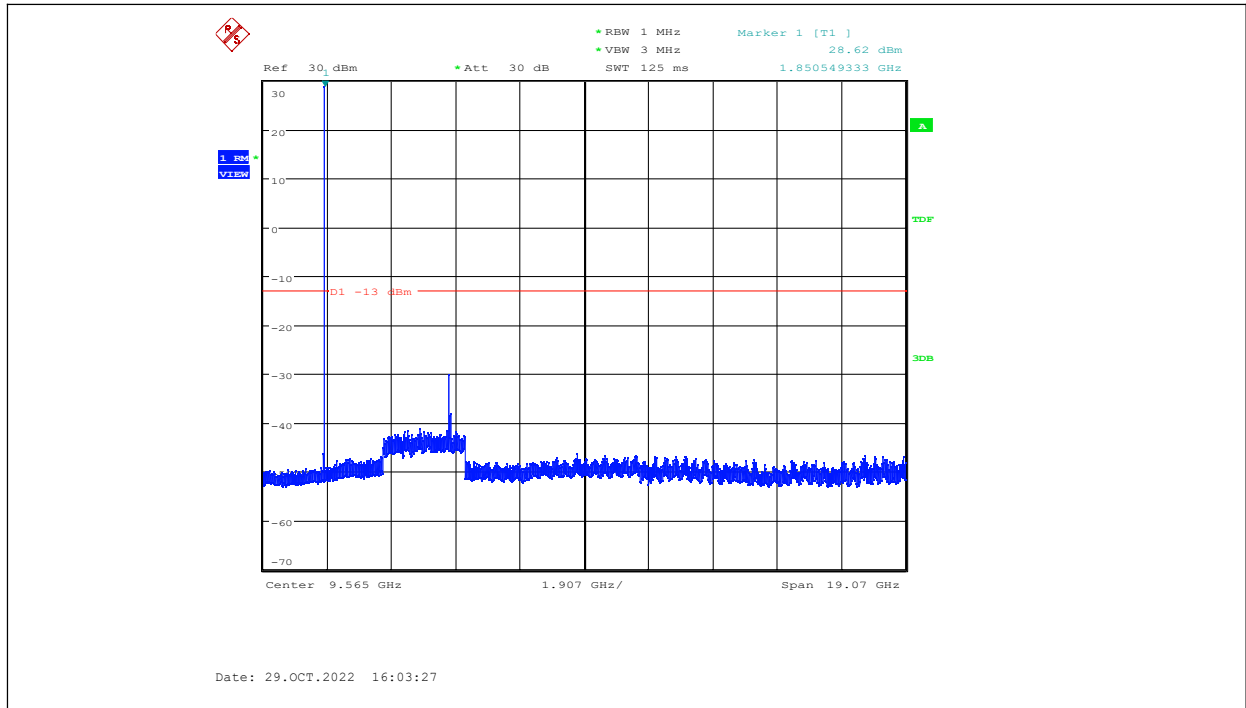
PCS1900-VOICE

Channel 512:30MHZ - 19100MHZ

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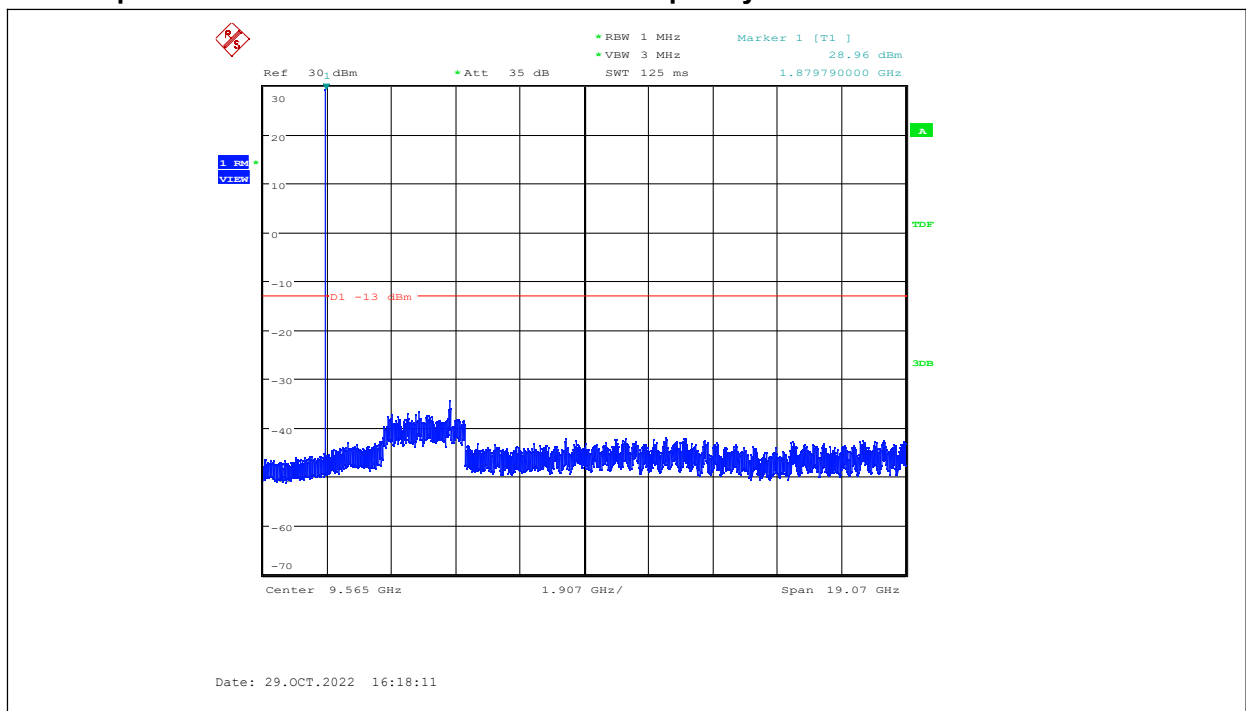
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NOTE: peak above the limit line is the carrier frequency.



Channel 661:30MHZ - 19100MHZ

NOTE: peak above the limit line is the carrier frequency.

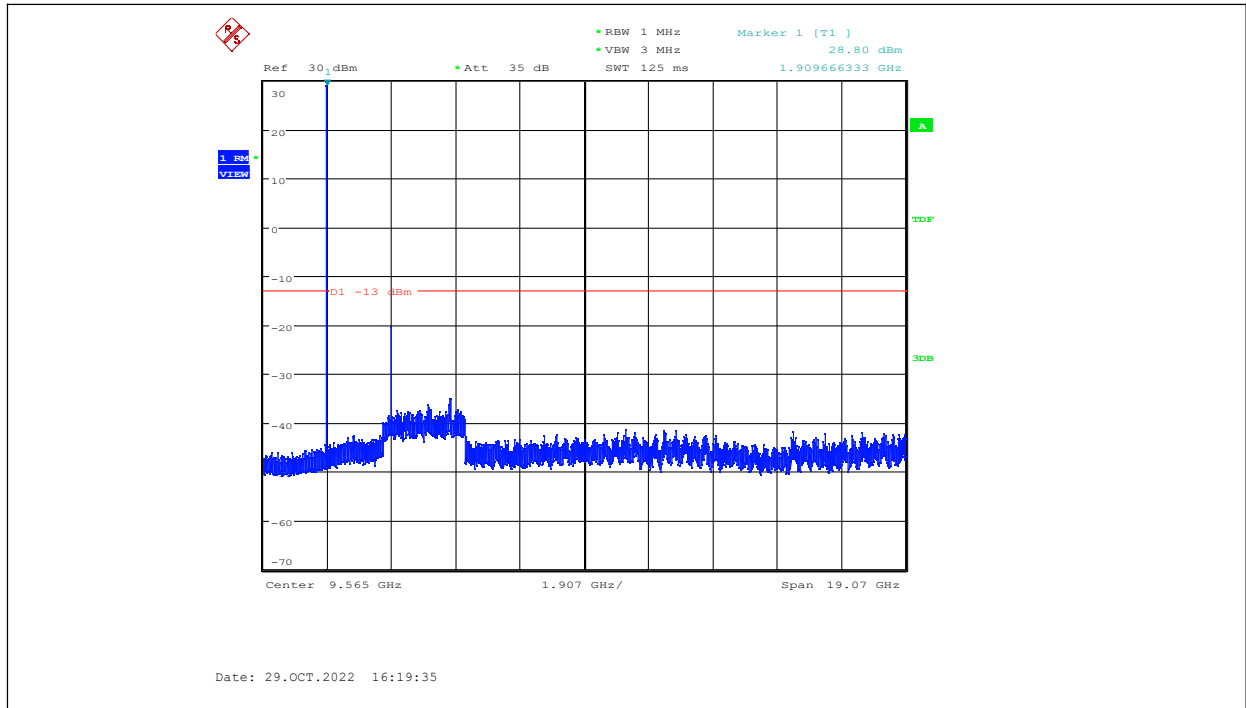


Channel 810:30MHZ - 19100MHZ

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NOTE: peak above the limit line is the carrier frequency.



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6.6. Radiated Spurious Emission

Specifications:	FCC Part 2.1051, 2.1053, 24.238, 22.917
DUT Serial Number:	866884049878903
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit Level Construction:

According to Part 22.917 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to Part 24.238 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB, so the limit level is: $P(\text{dBm}) - (43 + 10 \log(P)) \text{ dB} = -13\text{dBm}$.

Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty (30MHz-150MHz)	5.15 dB (k=2)
Expanded Uncertainty (150MHz-1GHz)	4.09dB (k=2)
Expanded Uncertainty (1GHz-3GHz)	2.92dB (k=2)
Expanded Uncertainty (3GHz-6GHz)	2.93dB (k=2)
Expanded Uncertainty (6GHz-20GHz)	2.69dB (k=2)

Test Setup:

The EUT was placed in an anechoic chamber. The Wireless Communications Test Set was used to set the TX channel and power level and modulate the TX signal with different bit patterns.

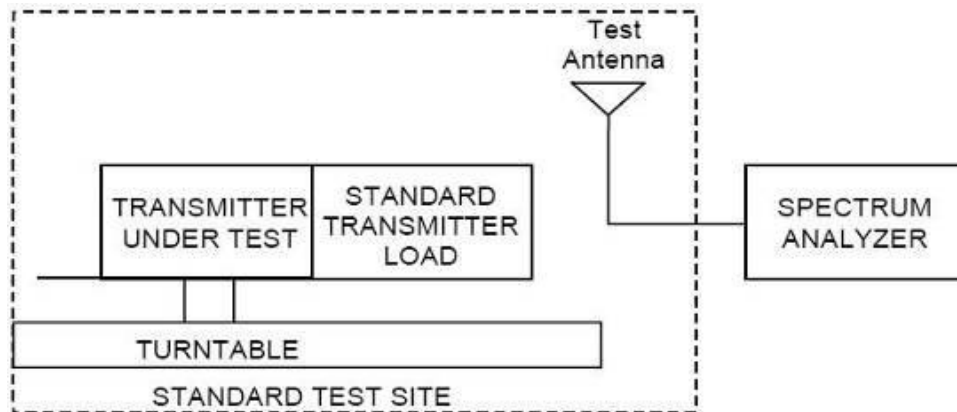
Test Method:

The measurement method is substitution method accordance with section 2.2.12 of ANSI/TIA-603-E: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

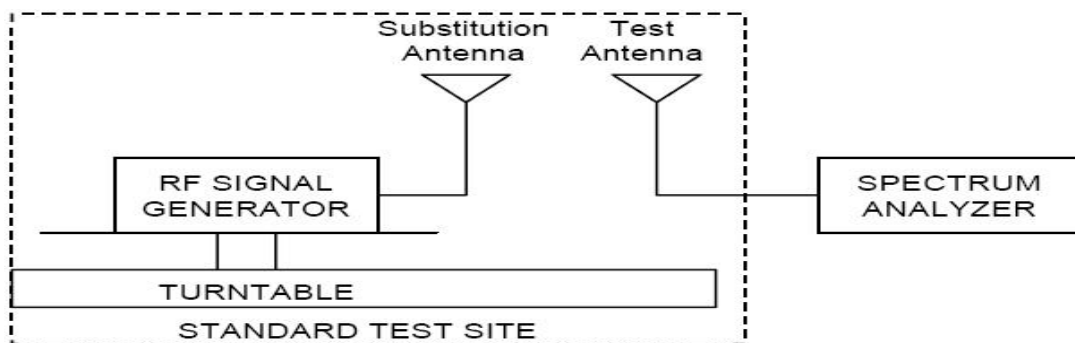
(a) Connect the equipment as illustrated and measure the spurious emissions as the method as above. The distance from the device to the antenna is 3 m .

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(b) Reconnect the equipment as illustrated.



(c) Remove the transmitter and replace it with a substitution antenna. The center of the substitution antenna should be approximately at the same location as the center of the transmitter.

(d) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized, and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.

(e) Repeat step d) with both antennas vertically polarized for each spurious frequency.

(f) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps d) and e) by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:

$$P_d(\text{dBm}) = P_g(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dB)}$$

where:

P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.

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Radiated Spurious Emission Results

Test frequency: 30MHz-20GHz

All modes were tested,only the worst case was reported.

6.6.1GSM 850 Radiated Spurious Emission Results

Test Data (GPRS Mode CH128)

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
239.760	-74.27	0.37	5.23	-69.41	H
675.269	-66.57	0.64	7.22	-59.99	H
1806.000	-55.07	1.08	6.94	-49.21	V
4459.200	-56.76	1.79	9.66	-48.89	V
7572.800	-53.32	2.51	11.54	-44.29	V
11251.800	-50.37	3.22	13.80	-39.79	V

GSM 850 Radiated Spurious Emission Results

Test Data (EGPRS Mode CH128)

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
242.800	-84.24	0.37	5.23	-79.38	H
577.269	-68.68	0.59	7.12	-62.15	V
1480.769	-59.87	0.96	7.45	-53.38	H
4945.200	-55.44	1.93	9.46	-47.91	V
8512.000	-52.40	3.13	12.18	-43.35	V
10144.100	-49.63	3.45	12.95	-40.13	V

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GSM 850 Radiated Spurious Emission Results**Test Data (GPRS Mode CH190)**

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
376.840	-89.80	0.47	6.61	-83.66	H
721.442	-65.94	0.66	7.28	-59.32	H
1897.200	-55.42	1.11	6.41	-50.12	H
4935.600	-55.14	1.92	9.46	-47.60	V
7510.400	-53.56	2.53	11.69	-44.40	V
11956.900	-48.11	4.11	14.03	-38.19	V

GSM 850 Radiated Spurious Emission Results**Test Data (EGPRS Mode CH190)**

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
271.040	-89.88	0.39	6.16	-84.11	H
620.615	-69.89	0.61	6.48	-64.02	H
1663.200	-57.85	1.03	7.58	-51.3	H
4929.600	-55.82	1.92	9.46	-48.28	V
6526.400	-54.02	2.37	11.16	-45.23	V
11750.100	-48.59	3.53	13.94	-38.18	V

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GSM 850 Radiated Spurious Emission Results**Test Data (GPRS Mode CH251)**

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
233.680	-83.62	0.36	5.35	-78.63	H
794.780	-74.05	0.69	7.34	-67.40	H
1392.628	-61.29	0.93	7.65	-54.57	H
4965.600	-55.74	1.95	9.80	-47.89	V
8145.600	-52.43	2.72	11.76	-43.39	V
11736.900	-48.33	3.37	13.83	-37.87	V

GSM 850 Radiated Spurious Emission Results**Test Data (EGPRS Mode CH251)**

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
365.360	-88.10	0.46	6.78	-81.78	H
723.327	-65.79	0.66	7.14	-59.31	H
2077.200	-56.65	1.17	7.57	-50.25	H
5385.600	-55.97	2.08	10.52	-47.53	V
7638.400	-52.26	2.58	11.54	-43.30	V
12065.800	-48.42	3.65	14.03	-38.04	V

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GSM1900 Radiated Spurious Emission Results**Test Data (GPRS Mode CH512)**

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
138.000	-92.11	0.27	4.93	-87.45	V
842.949	-66.65	0.72	7.32	-60.05	H
2854.144	-46.47	1.39	5.33	-42.53	H
4929.600	-56.67	1.92	9.46	-49.13	V
6650.700	-55.46	2.38	11.30	-46.54	V
11354.100	-51.05	3.33	13.81	-40.57	V

GSM1900 Radiated Spurious Emission Results**Test Data (EGPRS Mode CH512)**

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
215.760	-85.51	0.35	5.78	-80.08	H
1121.360	-60.75	0.83	6.76	-54.82	V
2665.040	-47.30	1.34	5.59	-43.05	H
4976.400	-57.94	1.97	9.80	-50.11	V
7512.000	-54.98	2.53	11.69	-45.82	V
10198.500	-51.83	3.89	13.07	-42.65	V

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GSM1900 Radiated Spurious Emission Results**Test Data (GPRS Mode CH661)**

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
201.920	-88.92	0.33	4.75	-84.50	H
1369.984	-60.27	0.92	7.34	-53.85	H
1638.944	-58.02	1.02	7.58	-51.46	H
4430.400	-57.10	1.87	9.07	-49.90	V
6558.900	-55.22	2.39	11.11	-46.50	V
10060.800	-52.29	3.29	12.95	-42.63	V

GSM1900 Radiated Spurious Emission Results**Test Data (EGPRS Mode CH661)**

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
211.320	-86.43	0.34	5.77	-81.00	H
1668.464	-57.54	1.03	7.58	-50.99	H
2145.216	-51.56	1.20	6.68	-46.08	H
4963.200	-57.80	1.95	9.80	-49.95	V
6588.600	-55.50	2.46	11.11	-46.85	V
10052.700	-52.58	3.22	12.95	-42.85	V

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GSM1900 Radiated Spurious Emission Results**Test Data (GPRS Mode CH810)**

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
240.080	-75.25	0.37	5.23	-70.39	H
727.564	-64.06	0.66	7.14	-57.58	H
1631.072	-56.47	1.02	7.58	-49.91	H
4707.600	-57.61	1.91	9.90	-49.62	V
6480.600	-55.52	2.39	11.16	-46.75	V
9439.800	-52.21	3.17	12.27	-43.11	V

GSM1900 Radiated Spurious Emission Results**Test Data (EGPRS Mode CH810)**

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
257.240	-83.66	0.38	5.46	-78.58	H
1095.776	-60.51	0.83	6.76	-54.58	V
1646.160	-57.08	1.02	7.58	-50.52	H
4954.800	-57.71	1.93	9.80	-49.84	V
7482.300	-55.07	2.51	11.69	-45.89	V
10147.200	-52.62	3.29	13.07	-42.84	V

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6.7. Band Edge

Specifications:	FCC Part 2.1051, 24.238, 2.1053, 22.917
DUT Serial Number:	866884049909641
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit Level Construction:

According to Part 22.917 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

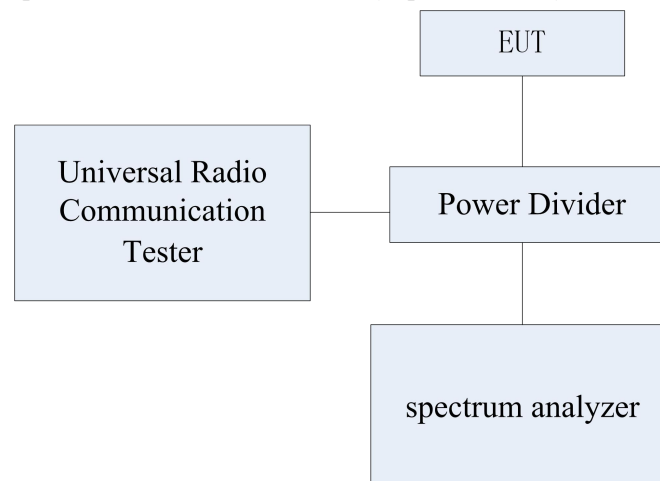
According to Part 24.238 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB, so the limit level is: $P(\text{dBm}) - (43 + 10 \log(P)) \text{ dB} = -13\text{dBm}$.

Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty	1.28 dB (k=2)

Test Setup:

During the test, the EUT was controlled via the Wireless Communications Test Set to ensure max power transmission and proper modulation and measured by spectrum analyzer.



Test Method:

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- 1) The EUT was coupled to the EMI test receiver analyzer mode and the base station simulator through a power divider. The loss of the cables the test system is calibrated to correct the readings.
- 2) The spectrum analyzer was set to Average Detector function and Maximum hold mode.
- 3) The resolution Bandwidth of the spectrum analyzer was a little greater than 1% of the emission Bandwidth.

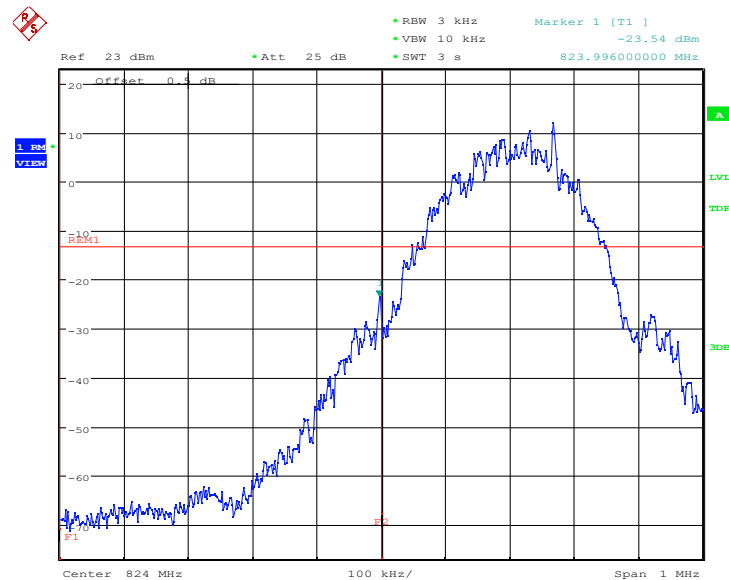
Note: --

6.7.1 Band Edge Results

GSM850

GSM

Channel 128

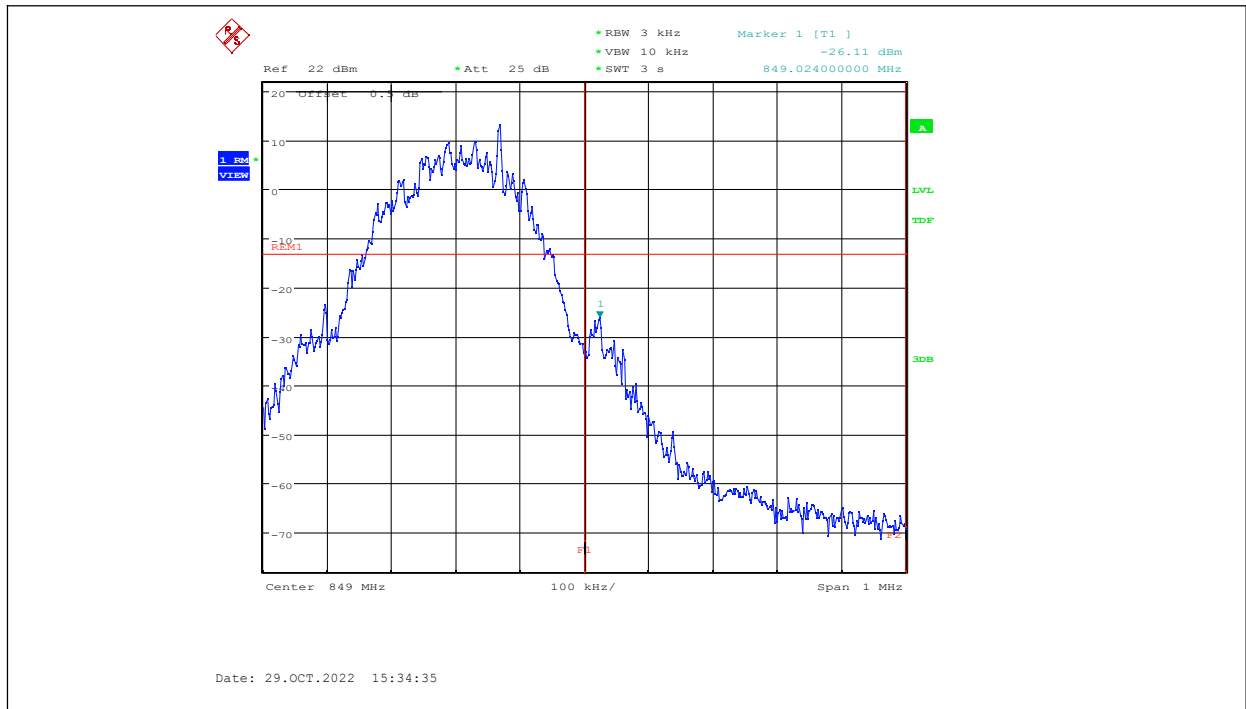


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Channel 251

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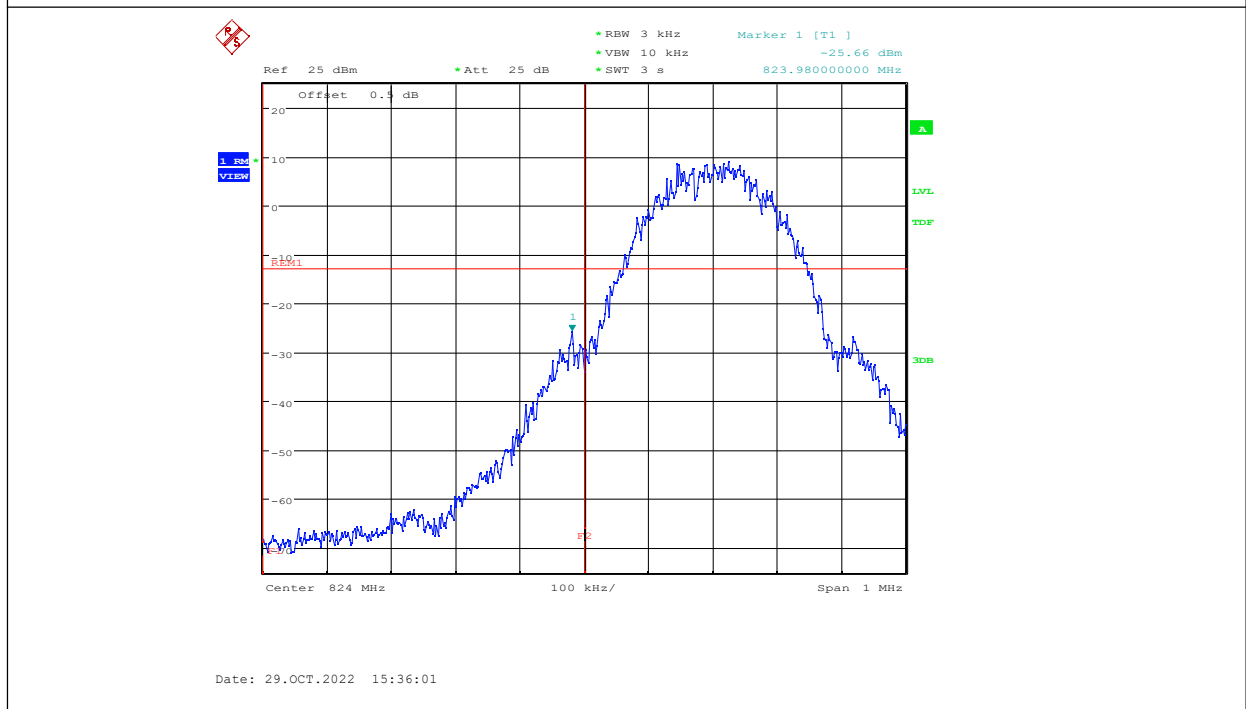
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GSM850

GPRS

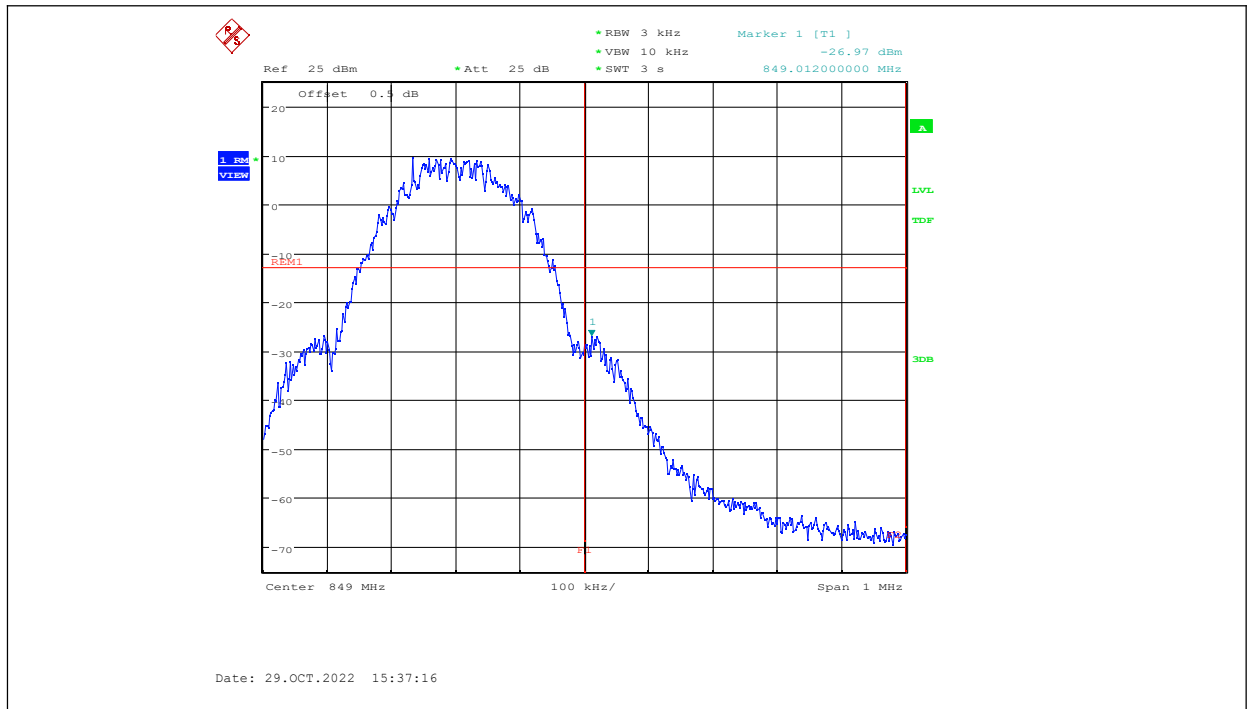
Channel 128



Channel 251

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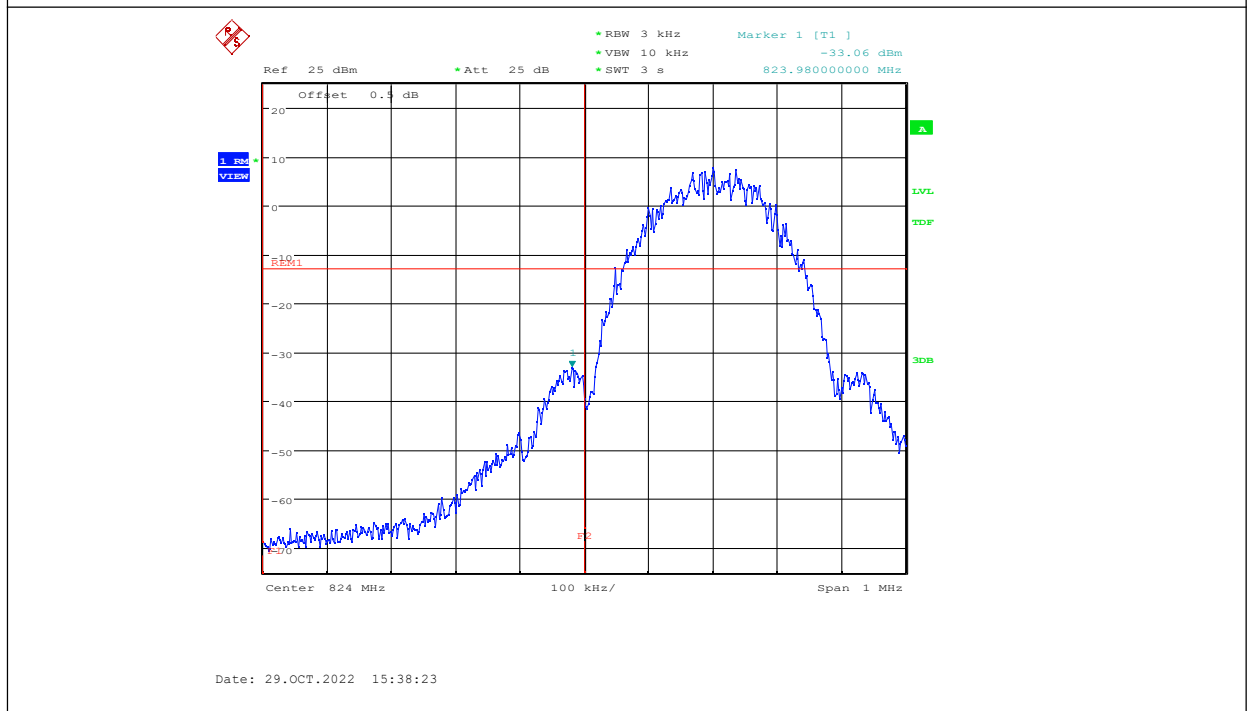
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GSM850

EGPRS

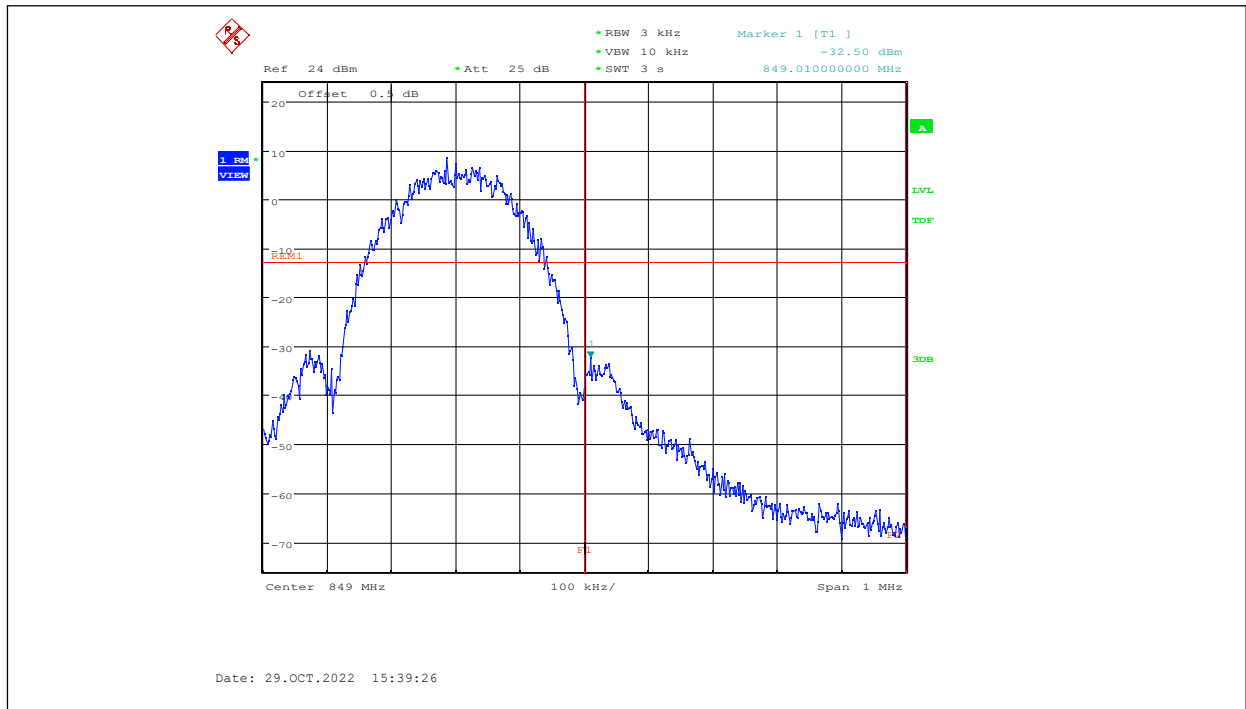
Channel 128



Channel 251

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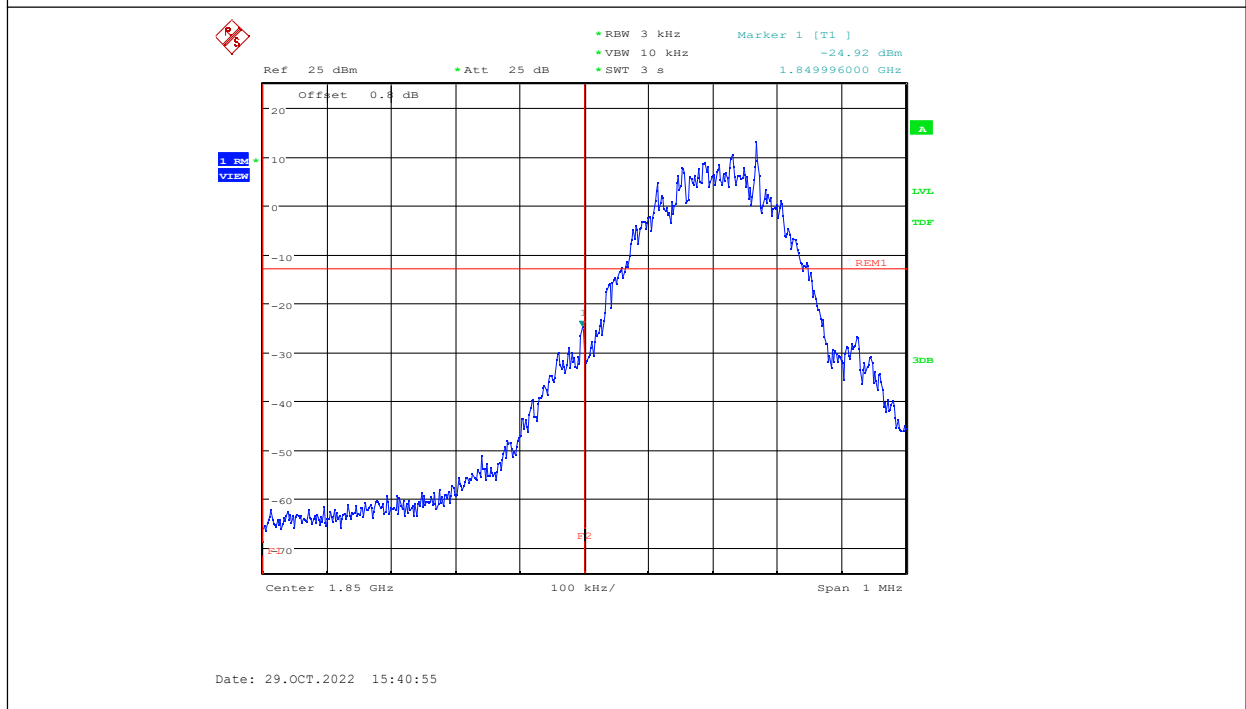
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PCS1900

GSM

Channel 512



Channel 810

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Ref 25 dBm Att 25 dB RBW 3 kHz VBW 10 kHz SWT 3 s Marker 1 [T1] -26.73 dBm 1.910024000 GHz

Offset 0.8 dB

1.90 VIEW

REMI

1

FL

F2

Center 1.91 GHz 100 kHz/ Span 1 MHz

A

LVL

TDF

3DB

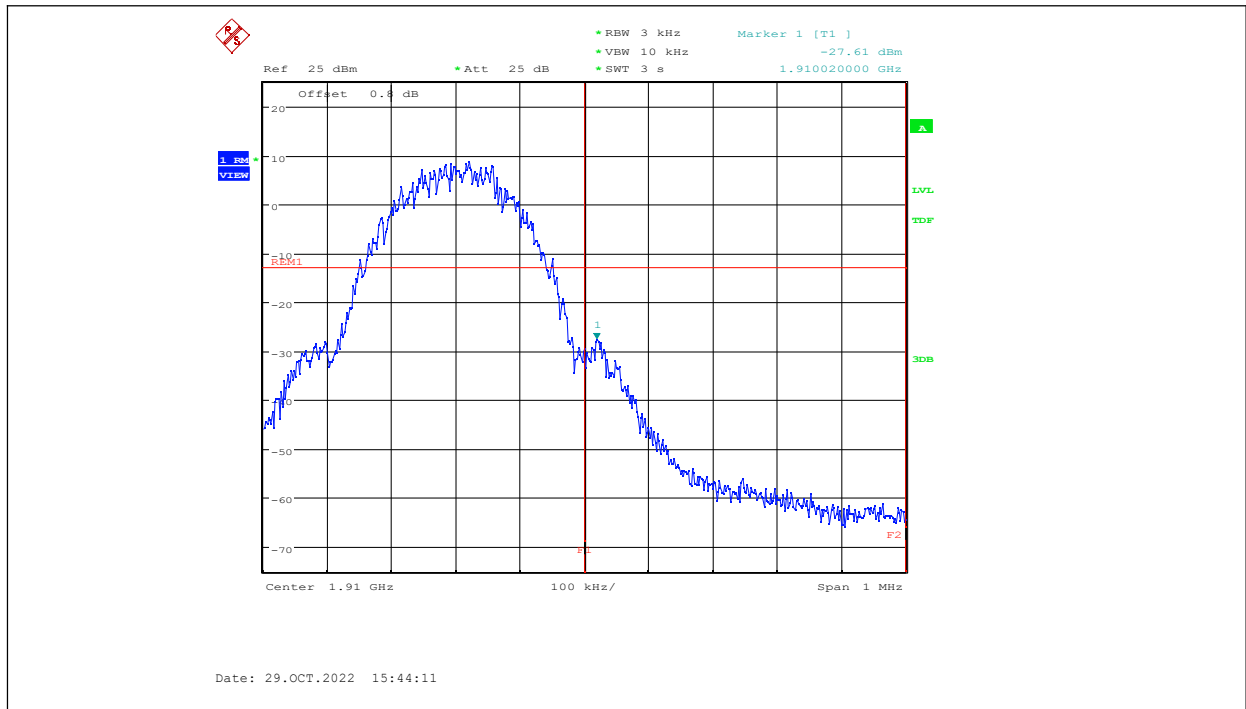
Ref 25 dBm Att 25 dB

• RBW 3 kHz Marker 1 [T1] -26.30 dBm
 • VBW 10 kHz
 • SWT 3 s 1.849976000 GHz

Offset 0.6 dB

1.849976000 GHz

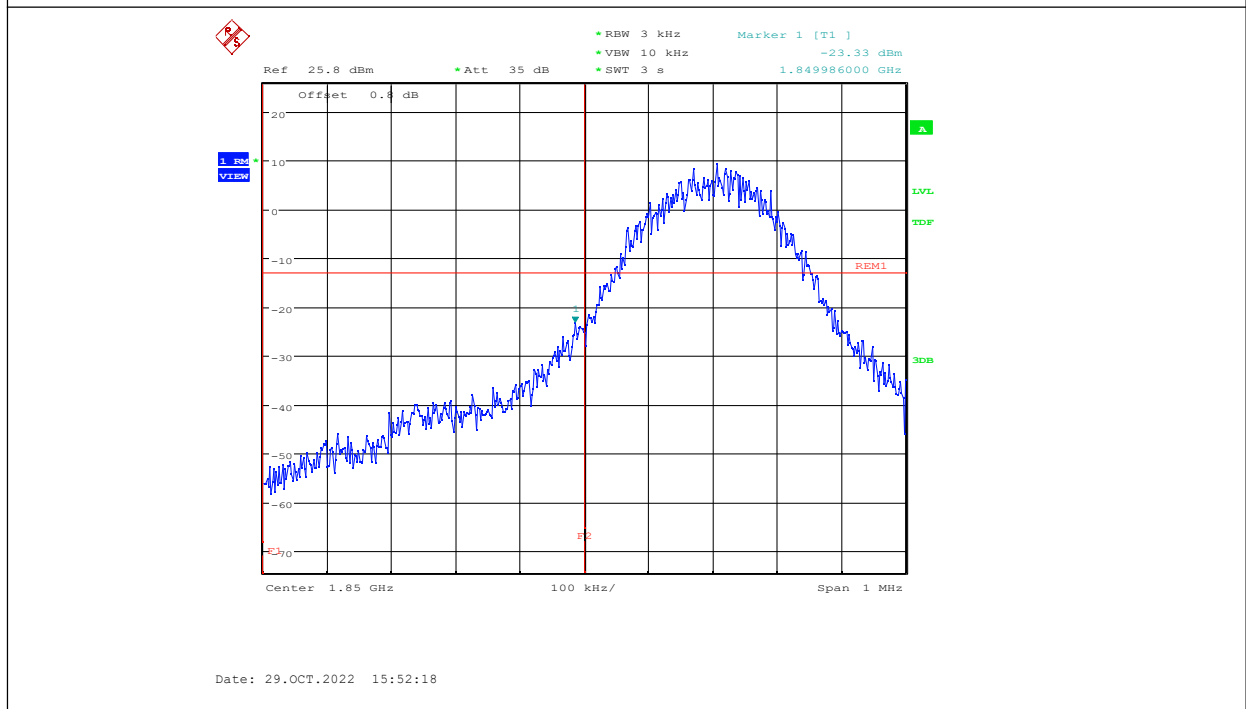
Center 1.85 GHz 100 kHz/ Span 1 MHz



PCS1900

EGPRS

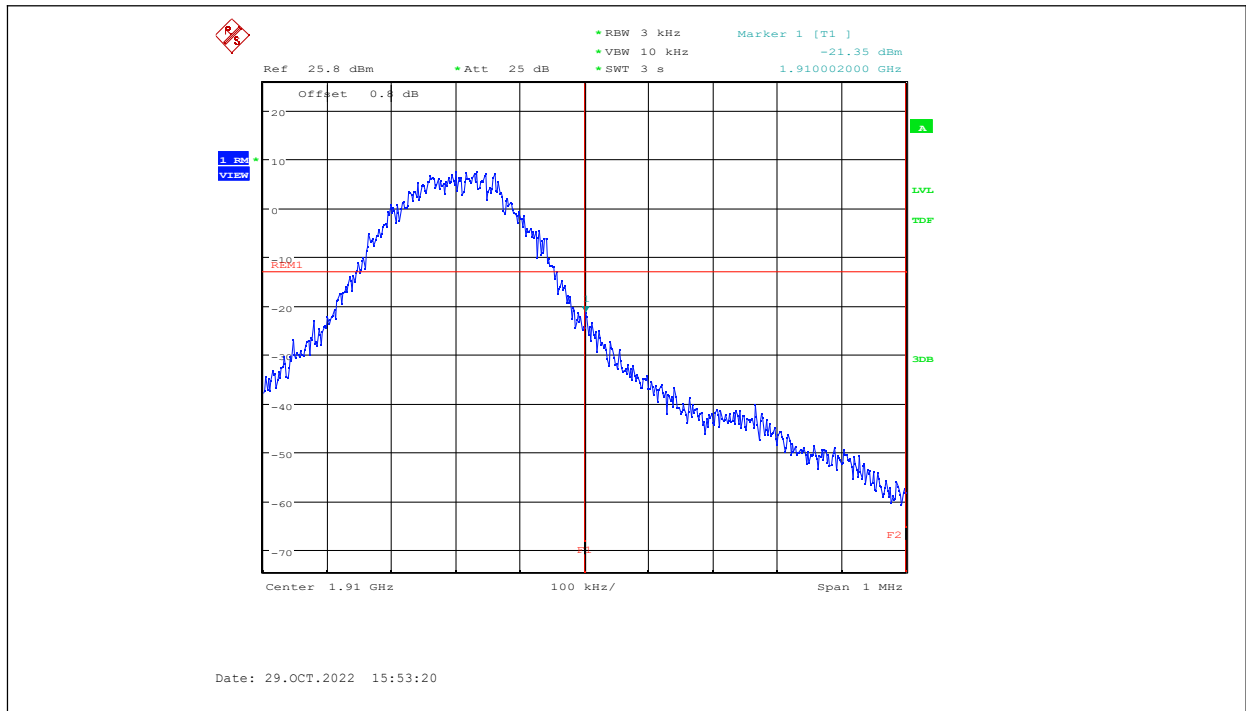
Channel 512



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6.8. Frequency Stability

Specifications:	FCC Part 2.1055, 22.355, 24.235
DUT Serial Number:	866884049909641
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit	
Frequency deviation [ppm]	±2.5

Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty	1.54 Hz (k=2)

Test Method

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage. Two reference points are established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation shall be identified as FL and FH respectively.

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of CMW500.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30°C.
3. With the EUT, powered via nominal voltage, connected to the CMW500, and in a simulated call on middle channel for each LTE band, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any

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self-heating to stabilize, before continuing.

6. Subject the EUT to overnight soak at +50°C.

7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the center channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

8. Repeat the above measurements at 10 °C increments from +50°C to -30°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.

9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

6.8.1 Frequency Stability over Temperature Variation Results

GSM850

Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	Center frequency(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	836.6	34.61	0.0414
50			26.51	0.0317
40			21.12	0.0252
30			20.31	0.0243
10			21.57	0.0258
0			21.99	0.0263
-10			21.18	0.0253
-20			21.12	0.0252
-30			23.25	0.0278

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	Center frequency(MHz)	Offset(Hz)	Frequency error(ppm)
3.4	20	836.6	24.60	0.0294
4.2			19.08	0.0228

PCS1900

Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	Center frequency(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	1880	27.73	0.0148
50			16.95	0.0090
40			14.63	0.0078
30			14.82	0.0079
10			13.66	0.0073
0			14.11	0.0075
-10			15.76	0.0084

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-20			14.30	0.0076
-30			13.95	0.0074

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	Center frequency(MHz)	Offset(Hz)	Frequency error(ppm)
3.4	20	1880	20.44	0.0109
4.2			14.63	0.0078

6.9. Peak to Average Ratio

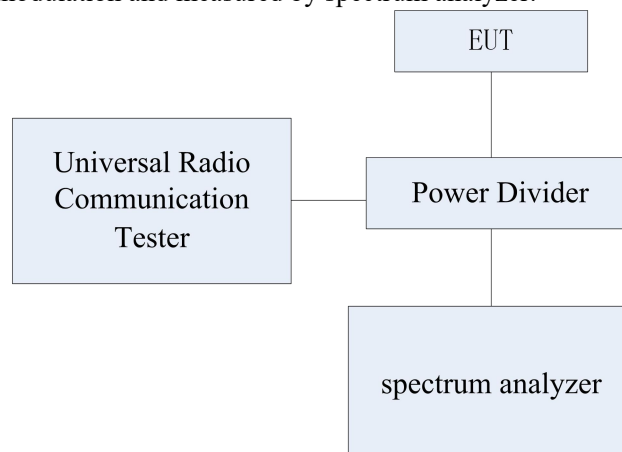
Specifications:	FCC Part 24.232
DUT Serial Number:	866884049909641
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit

The EUT meets the requirement of having a peak to average ratio of less than 13dB.

Test Setup

During the test, the EUT was controlled via the Wireless Communications Test Set to ensure max power transmission and proper modulation and measured by spectrum analyzer.



Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty	0.22 dB (k=2)

Test Method

The transmitter output was connected to a CMW500 through a coaxial RF cable and directional coupler, and configured to operate at maximum power. The peak to average ratio was measured at the required operating frequencies in each Band on the Spectrum Analyzer.

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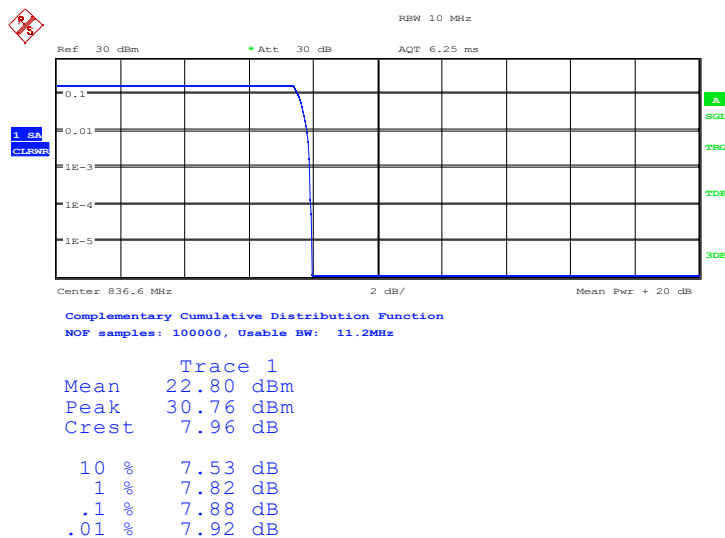
6.9.1 Peak to Average Ratio Results

GSM850

Measurement result

GSM850	Frequency (MHz)	PAPR (dB)
GSM	836.6	7.88
GPRS	836.6	7.92
EGPRS	836.6	10.67

Channel GSM-836.6MHz

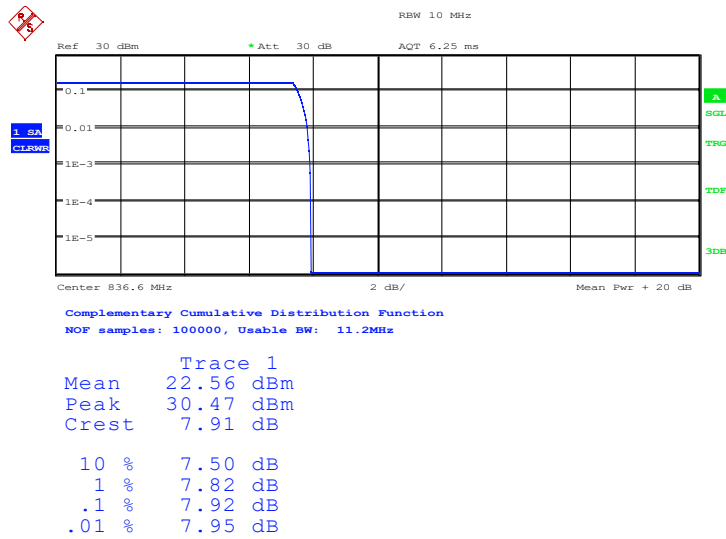


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Channel GPRS-836.6MHz

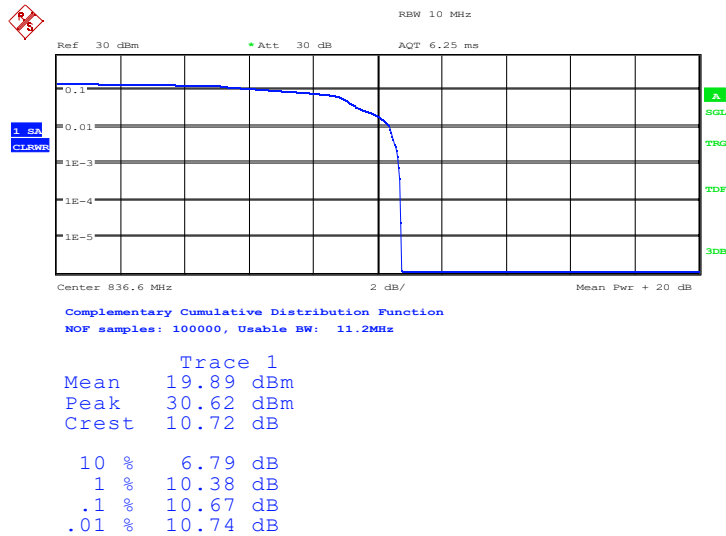
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Channel EGPRS-836.6MHz



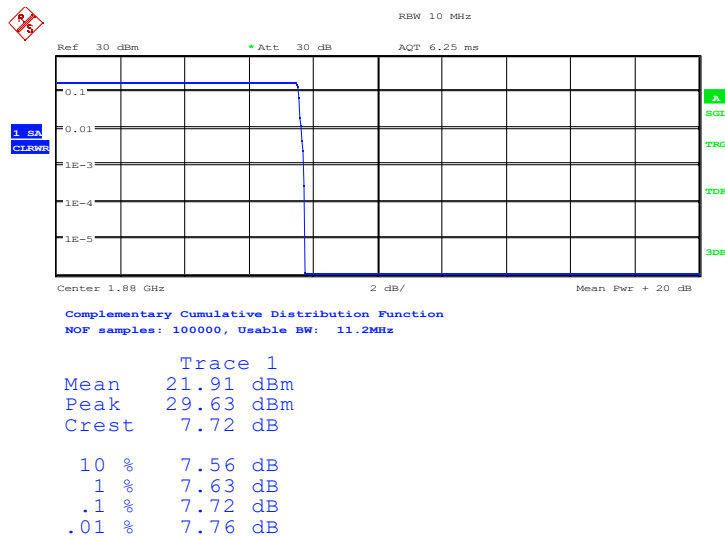
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PCS1900

Measurement result

PCS1900	Frequency (MHz)	PAPR (dB)
GSM	1880	7.72
GPRS	1880	7.72
EGPRS	1880	9.10

Channel GSM-1880MHz

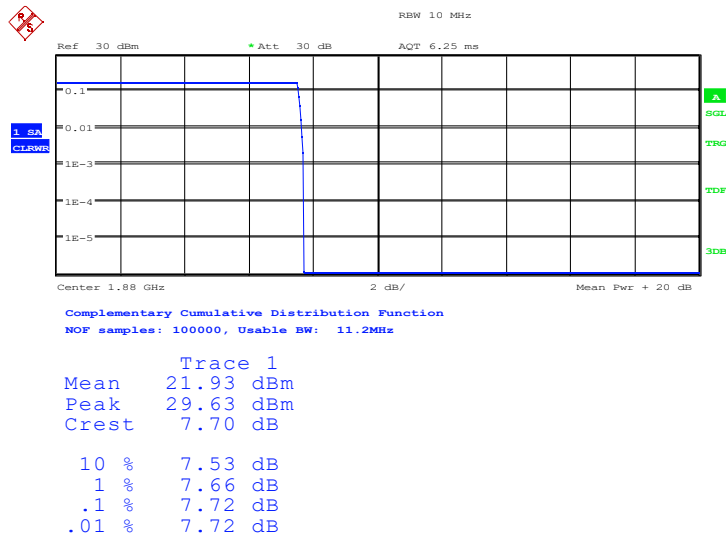


Date: 29.OCT.2022 14:13:40

Channel GPRS-1880MHz

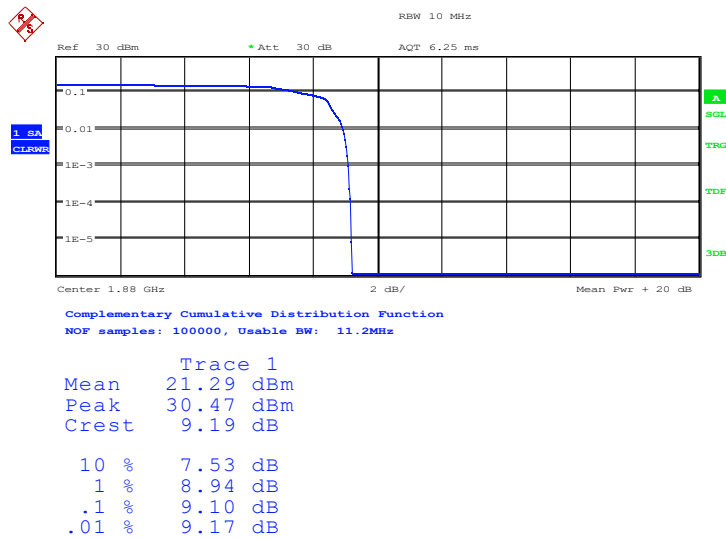
Chongqing Academy of Information and Communication Technology

Address: No. 8,Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China,401336
Tel: 0086-23-88069965 FAX:0086-23-88608777



Date: 29.OCT.2022 14:19:13

Channel EGPRS-1880MHz



Date: 29.OCT.2022 14:19:51

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Address: No. 8,Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China,401336
Tel: 0086-23-88069965 FAX:0086-23-88608777



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Annex A EUT Photos

See the document "I22W00076-External Photos".

See the document "I22W00076-Internal Photos".

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ANNEX B Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

*****END OF REPORT*****

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