



RF Test Report

For

Applicant Name: SHENCHUANG INDUSTRIAL (HK) LIMITED
Address: FLAT/RM P 4/F LLADRO CENTRE, 72 HOI YUEN ROAD, KWUN TONG, KOWLOON HONG KONG
EUT Name: Tablet PC
Brand Name: Acer
Model Number: Acer One 8 T9-422L, T87
Series Model Number: Refer to section 2

Issued By

Company Name: BTF Testing Lab (Shenzhen) Co., Ltd.
Address: F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Report Number: BTF231010R00706
Test Standards: FCC CFR Title 47 Part2
FCC CFR Title 47 Part22
FCC CFR Title 47 Part24
FCC CFR Title 47 Part27
FCC CFR Title 47 Part90
FCC ID: 2BC27-T87
Test Conclusion: Pass
Test Date: 2023-08-23 to 2023-09-18
Date of Issue: 2023-10-10

Prepared By:

Chris Liu

Date:

Chris Liu / Project Engineer
2023-10-10

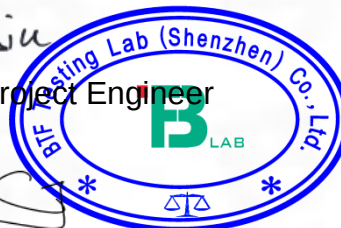
Approved By:

Ryan.CJ

Ryan.CJ / EMC Manager

Date:

2023-10-10



Note: All the test results in this report only related to the testing samples. Which can be duplicated completely for the legal use with approval of applicant; it shall not be reproduced except in full without the written approval of BTF Testing Lab (Shenzhen) Co., Ltd., All the objections should be raised within thirty days from the date of issue. To validate the report, you can contact us.

Revision History		
Version	Issue Date	Revisions Content
R_V0	2023-10-10	Original
Note:		Once the revision has been made, then previous versions reports are invalid.

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1. Introduction

1.1 Identification of Testing Laboratory

Company Name:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Phone Number:	+86-0755-23146130
Fax Number:	+86-0755-23146130

1.2 Identification of the Responsible Testing Location

Test Location:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Description:	All measurement facilities used to collect the measurement data are located at F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
FCC Registration Number:	518915
Designation Number:	CN1330

1.3 Laboratory Condition

Ambient Temperature:	20°C to 35°C
Ambient Relative Humidity:	45% to 55%
Ambient Pressure:	100 kPa to 102 kPa

1.4 Announcement

- (1) The test report reference to the report template version v0.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) This document may not be altered or revised in any way unless done so by BTF and all revisions are duly noted in the revisions section.
- (5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

(6) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

2. Product Information

2.1 Application Information

Company Name:	SHENCHUANG INDUSTRIAL (HK) LIMITED
Address:	FLAT/RM P 4/F LLADRO CENTRE,72 HOI YUEN ROAD,KWUN TONG,KOWLOON HONG KONG

2.2 Manufacturer Information

Company Name:	Shenzhen Yuko Technology Co., Ltd
Address:	6th floor A9 Bldg,&4th floor,A4 Bldg,Tianrui Industrial Park, Fuyuan 1st Rd, Fuyong, Baoan District, Shenzhen

2.3 General Description of Equipment under Test (EUT)

EUT Name:	Tablet PC
Test Model Number:	Acer One 8 T9-422L
Series Model Number:	T87

2.4 Technical Information

Operating Bands	GSM/GPRS/EGPRS 850/1900 MHz FDD LTE Band 5 TDD LTE Band 41	
Modulation Type	GPRS	GMSK
	EGPRS	8PSK
	LTE	QPSK
		16QAM
TX Frequency Range	GSM/GPRS/EGPRS 850: 824 MHz-849 MHz GSM/GPRS/EGPRS 1900: 1850 MHz-1910 MHz FDD LTE Band 5: 824 MHz-849 MHz TDD LTE Band 41: 2535 MHz-2655 MHz	
Rx Frequency Range	GSM/GPRS/EGPRS 850: 869 MHz-894 MHz GSM/GPRS/EGPRS 1900: 1930 MHz-1990 MHz FDD LTE Band 5: 869 MHz-894 MHz TDD LTE Band 41: 2535MHz-2655 MHz	
Power Class	GPRS 850: 4 GPRS 1900: 1 EGPRS 850/1900: E2 FDD LTE Band 5: 3 TDD LTE Band 41: 3	
Multislot Class	GPRS/EGPRS: 12	
Antenna Type:	Integral Antenna	

Antenna Gain [#]	GSM850 -0.07dBi	GSM1900 -0.44dBi	LTE B5 -0.07dBi	LTE B41 -0.82dBi
The Max RF Output Power (EIRP/ERP)	GSM850: 32.45dBm GSM1900: 30.42dBm FDD LTE Band 5: 23.10dBm TDD LTE Band 41:23.22dBm			

Note:

1. #: The antenna gain provided by the applicant, and the laboratory will not be responsible for the accumulated calculation results which covers the information provided by the applicant.

3. Summary of Test Results

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 22 Subpart H	Cellular Radiotelephone Service
3	47 CFR Part 24 Subpart E	Broadband PCS
4	47 CFR Part 27	Miscellaneous Wireless Communications Services
5	ANSI/TIA-603-E-2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
6	KDB 971168 D01 v03r01	Measurement Guidance for Certification of Licensed Digital Transmitters
7	ANSI C63.26:2015	IEEE/ANSI Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
8	47 CFR Part 90	PRIVATE LAND MOBILE RADIO SERVICES.

3.2 Summary of Test Result

No.	Description	FCC Part No.	Test Verdict	Remark
1	Conducted RF Output Power	2.1046	Pass	--
2	Effective (Isotropic) Radiated Power	2.1046 22.913(a) 24.232(c) 27.50 90.635(b) 90.542(a)	Pass	--
3	Peak to Average Ratio	2.1046 22.913(d) 24.232(d) 27.50(d)	Pass	--
4	Occupied Bandwidth	2.1049 22.917(b) 24.238(b) 27.53 90.209	Pass	--
5	Frequency Stability	2.1055 22.355 24.235 27.54 90.213	Pass	--
6	Spurious Emission at Antenna Terminals	2.1051 22.917 24.238 27.53 90.691 90.543	Pass	--
7	Band Edge	2.1051 22.917 24.238 27.53 90.691 90.543	Pass	--
8	Field Strength of Spurious Radiation	2.1053 22.917 24.238 27.53 90.691 90.543	Pass	--

3.3 Uncertainty of Test

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2 and TR100 028-1/-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Value
RF output power, conducted	0.63 dB
Conducted spurious emissions	0.94 dB
Radiated emissions (<1 GHz)	4.12 dB
Radiated emissions (>1 GHz)	4.16 dB
Occupied Channel Bandwidth	69 KHz
Frequency Stability	0.4 KHz
Temperature	0.82 °C
Humidity	4.1 %

4. Test Configuration

4.1 Environment Condition

During the measurement, the environmental conditions were within the listed ranges:

Test Voltage of the EUT	NV (Normal Voltage)	3.80 V
	LV (Low Voltage)	3.42 V
	HV (High Voltage)	4.18 V
Test Temperature of the EUT	NT (Normal Temperature)	+25 °C
	LT (Low Temperature)	-30 °C
	HT (High Temperature)	+50 °C

4.2 Test Equipment List

Conducted Method Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50410020	2022.11.24	2023.11.23	☑
WIDEBAND RADIO COMMUNICATION TESTER	Rohde & Schwarz	CMW500	161997	2022.11.24	2023.11.23	☑
ESG VECTOR SIGNAL GENERATOR	Agilent	E4438C	MY45094854	2022.11.24	2023.11.23	☑
MXG Vector Signal Generator	Agilent	N5182A	MY46240163	2022.11.24	2023.11.23	☑
Adjustable Direct Current Regulated Power Supply	Dongguan Tongmen Electronic Technology Co., LTD	etm-6050c	20211026123	2022.11.25	2023.11.24	☑
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2022.11.24	2023.11.23	☑
RF Control Unit	TST	TST-Full	S01	/	/	☑
RF Test software	TST	V2.0	/	/	/	☑

Radiated Method Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
SIGNAL ANALYZER	ROHDE&SCHWARZ	FSQ40	100010	2022.11.24	2023.11.23	☑
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI7	101032	2022.11.24	2023.11.23	☑
Log periodic antenna	SCHWARZBECK	VULB 9168	01328	2021.11.28	2023.11.27	☑
Horn Antenna	SCHWARZBECK	BBHA9170	01157	2021.11.28	2023.11.27	☑

POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/	☒
RE Cable	REBES Talent	UF2-NMNM-10m	21101570	2022.11.24	2023.11.23	☒
RE Cable	REBES Talent	UF2-NMNM-2.5m	21101573	2022.11.24	2023.11.23	☒
RE Cable	REBES Talent	UF2-NMNM-1m	21101576	2022.11.24	2023.11.23	☒
Coaxial cable Multiflex 141	Schwarzbeck	N/SMA 0.5m	517386	2023.3.24	2024.3.23	☒
RE Cable	Talent Microwave	A40-2.92M2.92 M-14M	22080539	2022.11.24	2023.11.23	☒
RE Cable	Talent Microwave	A81-SMAMNM- 14M	22080538	2022.11.24	2023.11.23	☒
Preamplifier	SCHWARZBECK	BBV9744	00246	2022.11.24	2023.11.23	☒
Horn Antenna	Schwarzbeck	BBHA9120D	2597	2022.5.22	2024.5.21	☒
Broadband Preamplifier	Schwarzbeck	BBV9718D	00008	2023.3.24	2024.3.23	☒

4.3 Test Auxiliary Equipment

Description	Manufacturer	Model	Serial No.	Length	Description	Use
/	/	/	/	/	/	☒

4.4 Test Configurations

Test Items	Test Mode	Test Channel		
		LCH	MCH	HCH
Effective (Isotropic) Radiated Power	GPRS 850	v	v	v
	GPRS 1900	v	v	v
	EGPRS 850	v	v	v
	EGPRS 1900	v	v	v
Peak to Average Ratio	GPRS 850	v	v	v
	GPRS 1900	v	v	v
	EGPRS 850	v	v	v
	EGPRS 1900	v	v	v

Occupied Bandwidth	GPRS 850	v	v	v
	GPRS 1900	v	v	v
	EGPRS 850	v	v	v
	EGPRS 1900	v	v	v
Frequency Stability	GPRS 850	v	v	v
	GPRS 1900	v	v	v
	EGPRS 850	v	v	v
	EGPRS 1900	v	v	v

Spurious Emission at Antenna Terminals	GPRS 850	v	v	v
	GPRS 1900	v	v	v
	EGPRS 850	v	v	v
	EGPRS 1900	v	v	v
Band Edge	GPRS 850	v	--	v
	GPRS 1900	v	--	v
	EGPRS 850	v	--	v
	EGPRS 1900	v	--	v

Field Strength of Spurious Radiation	GPRS 850	v	v	v
	GPRS 1900	v	v	v
	EGPRS 850	v	v	v
	EGPRS 1900	v	v	v
Note 1: The mark “v” means that this configuration is chosen for testing.				

Test Mode	UL Channel	UL Channel No.	UL Frequency (MHz)
GSM/GPRS/EGPRS 850	Low Channel	128	824.2
	Middle Channel	190	836.6
	High Channel	251	848.8
GSM/GPRS/EGPRS 1900	Low Channel	512	1850.2
	Middle Channel	661	1880.0
	High Channel	810	1909.8

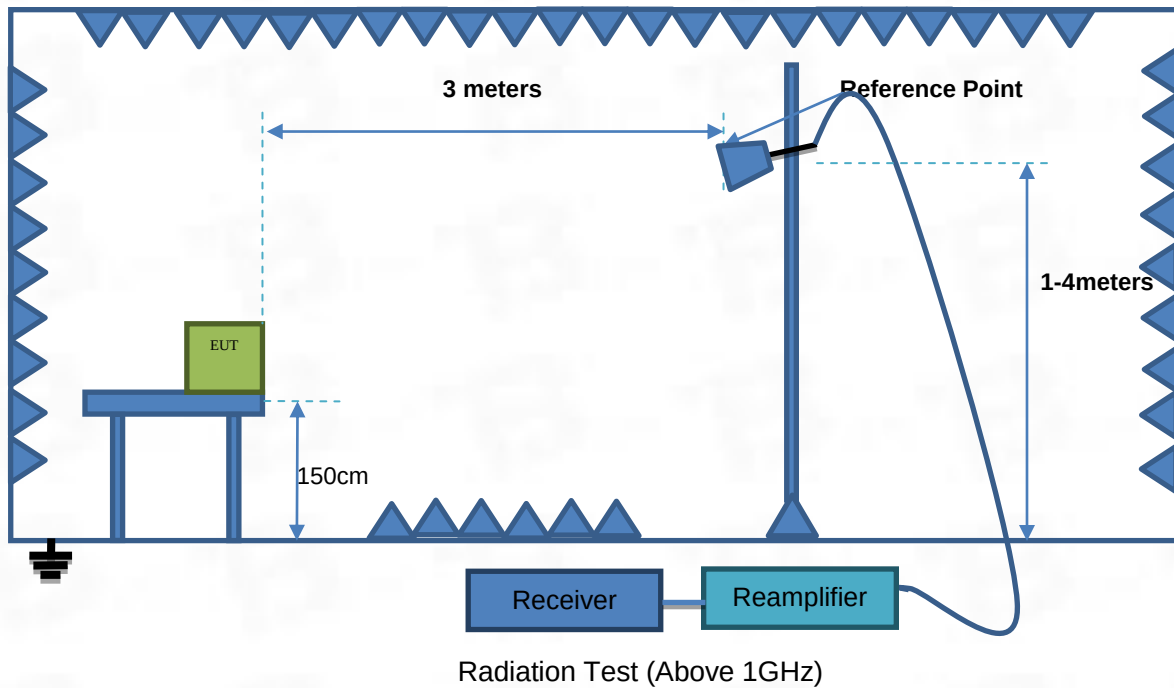
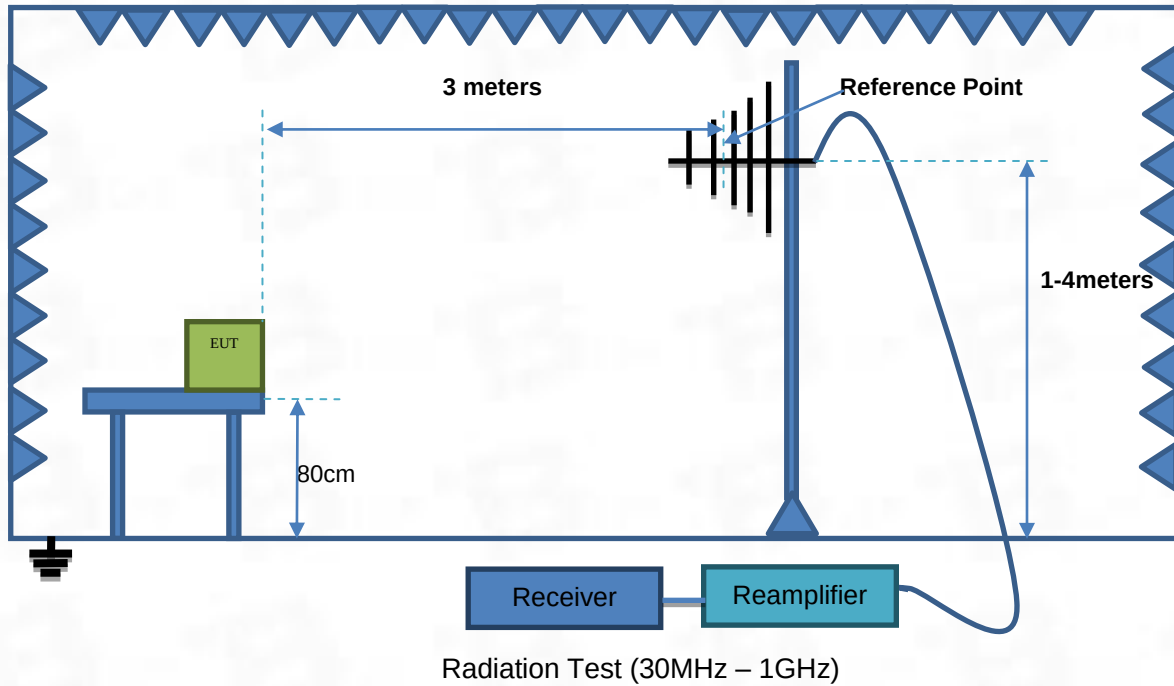
Operation Frequency List:

LTE Band 5 (1.4MHz)		LTE Band 5 (3MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
20407	824.70	20415	825.50
20408	824.80	20416	825.60
....			
20524	836.40	20524	836.40
20525	836.50	20525	836.50
20526	836.60	20526	836.60
...	...	...	...
20642	848.20	20634	847.40
20643	848.30	20635	847.50
LTE Band 5 (5MHz)		LTE Band 5 (10MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
20425	826.50	20450	829.00
20426	826.60	20451	829.10
....			
20524	836.40	20524	836.40
20525	836.50	20525	836.50
20526	836.60	20526	836.60
...	...	...	...
20624	846.40	20599	839.90
20625	846.50	20600	844.00

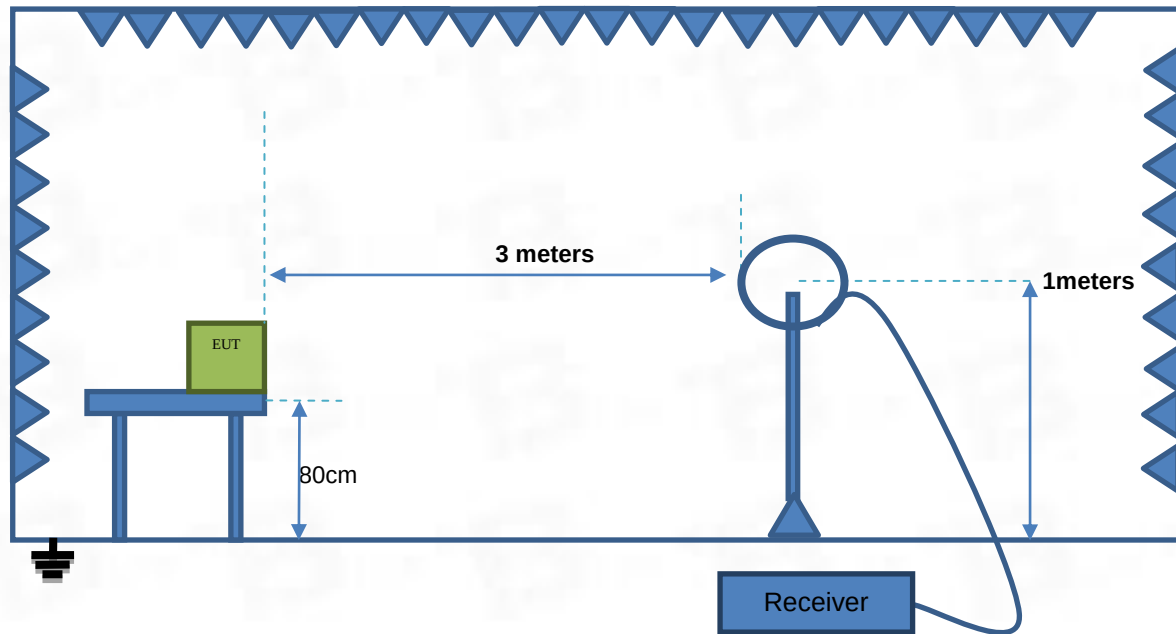
LTE Band 41 (5MHz)		LTE Band 41 (10MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
40065	2537.50	40090	2540.00
40066	2537.60	40091	2540.10
....			
40639	2594.90	40639	2594.90
40640	2595.00	40640	2595.00
40641	2595.10	40641	2595.10
...	...	...	...
41214	2652.40	41189	2649.90
41215	2652.50	41190	2650.00
LTE Band 41 (15MHz)		LTE Band 41 (20MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
40115	2542.50	40140	2545.00
40116	2542.60	40141	2545.10
....			
40639	2594.90	40639	2594.90
40640	2595.00	40640	2595.00
40641	2595.10	40641	2595.10
...	...	...	...
41164	2647.40	41139	2644.90
41165	2647.50	41140	2645.00

4.5 Test Setup

Test Setup 1

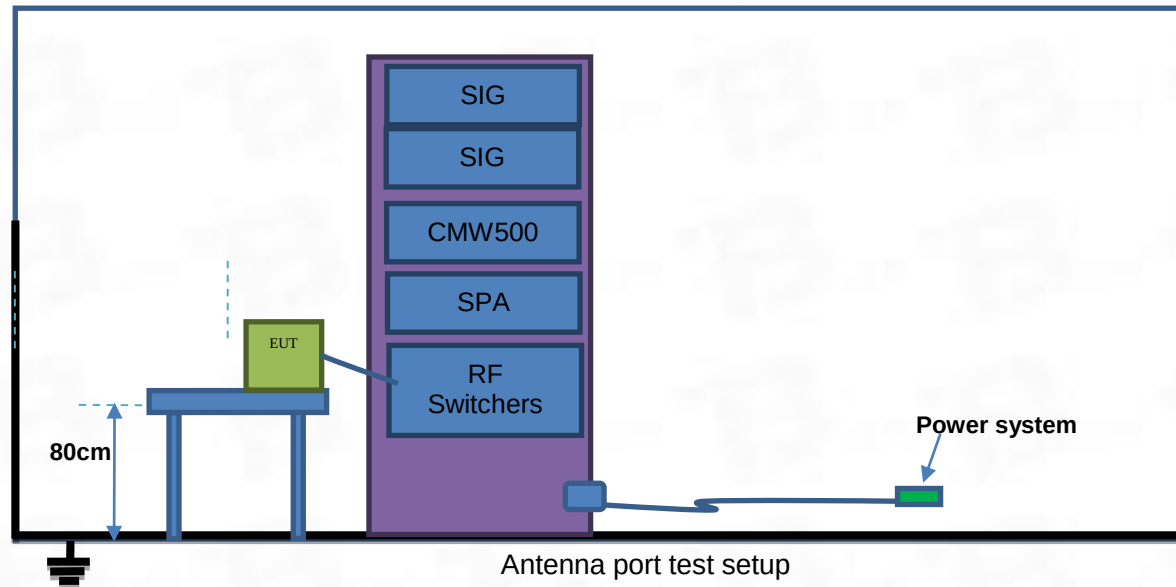


Test Setup 2



Radiation Test (9k - 30MHz)

Test Setup 3



Antenna port test setup

5. Test Items

5.1 Transmitter Radiated Power (EIRP/ERP)

5.1.1 Limit

FCC § 2.1046 & 22.913(a) & 24.232(c) & 27.50(a) & 27.50(b) & 27.50(c) & 27.50(d) & 27.50(h) & 90.635(b) & 90.542(a); RSS-103 4.6; RSS-132 5.4, RSS-133 6.4, RSS-139 6.5, RSS199 4.4

According to FCC section 22.913(a) (5), the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC section 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.

According to FCC section 27.50(a) (3), for mobile and portable stations transmitting in the 2305-2315MHz band or the 2350-2360MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards.

FCC section 27.50(b) (10), portable stations (hand-held devices) transmitting in the 746-757MHz, 776-788MHz, and 805-806MHz bands are limited to 3 watts ERP.

FCC section 27.50(c) (10), portable stations (hand-held devices) in the 600MHz uplink band and the 698-746MHz band, and fixed and mobile stations in the 600MHz uplink band are limited to 3 watts ERP.

FCC section 27.50(d) (4), fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

(7) Fixed, mobile, and portable (hand-held) stations operating in the 2000-2020 MHz band are limited to 2 watts EIRP.

And FCC section 27.50(h) (2), for mobile and other user stations, mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

According to FCC section 90.635(b), the maximum output power of the transmitter for mobile stations is 100 watts (20dBW).

According to FCC section 90.542(a) (7), portable stations (hand-held devices) transmitting in the 758-768 MHz band and the 788-798 MHz band are limited to 3 watts ERP.

5.1.2 Test Setup

The section 4.4 test setup 4 description is used for conducted test, and the test setup description is used for radiated test. The photo of test setup please refer to ANNEX B.

5.1.3 Test Procedure

Description of the Conducted Output Power Measurement

The EUT is coupled to the SS with attenuator through power splitter; the RF load attached to EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. A system simulator is used to establish communication with the EUT, and its parameters are set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The relevant equation for determining the conducted measured value is:

$$\text{Conducted Output Power Value (dBm)} = \text{Measured Value (dBm)} + \text{Path Loss (dB)}$$

where:

Conducted Output Power Value = final conducted measured value in the conducted power test, in dBm; Measured Value = measured conducted power received by spectrum analyzer or power meter, in dBm;

Path Loss = signal attenuation in the connecting cable between the transmitter and spectrum analyzer or power meter, including external cable loss, in dB;

During the test, the data of Path Loss (dB) is added in the spectrum analyzer or power meter, so Measured Value (dBm) is the final values which contains the data of Path Loss (dB).

For example:

In the conducted output power test, when measured value for GSM850 is 24.7 dBm, and path loss is 8.5 dB, then final conducted output power value is:

$$\text{Conducted Output Power Value (dBm)} = 24.7 \text{ dBm} + 8.5 \text{ dB} = 33.2 \text{ dBm}$$

Description of the Transmitter Radiated Power Measurement

In many cases, the RF output power limits for licensed digital transmission devices is specified in terms of effective radiated power (ERP) or equivalent isotropic radiated power (EIRP). Typically, ERP is specified when the operating frequency is less than or equal to 1 GHz and EIRP is specified when the operating frequency is greater than 1 GHz. Both are determined by adding the transmit antenna gain to the conducted RF output power with the primary difference between the two being that when determining the ERP, the transmit antenna gain is referenced to a dipole antenna (i.e., dBd) whereas when determining the EIRP, the transmit antenna gain is referenced to an isotropic antenna (dBi).

Final measurement calculation as below:

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

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

where:

ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as P_{Meas}, typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW; GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP); dBd (ERP)=dBi (EIRP) -2.15 dB

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

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

For example:

In the EIRP test, when P_{Meas} value for GSM1900 is 30.2 dBm, LC is 0.6 dB, and GT is -3.4 dB, then final EIRP value is:

$$\text{EIRP for GSM1900} = 30.2 \text{ dBm} - 3.4 \text{ dBi} - 0.6 \text{ dB} = 26.2 \text{ dBm}$$

The relevant equation for determining the ERP/EIRP from the radiated RF output power is:

$$\text{ERP/EIRP (dBm)} = \text{SA Read Value (dBm)} + \text{Correction Factor (dB)}$$

where:

ERP/EIRP = effective or equivalent radiated power, in dBm;

SA Read Value = measured transmitter power received by EMI receiver or spectrum analyzer, in dBm; Correction

Factor = total correction factor including cable loss, in dB;

During the test, the data of Correction Factor (dB) is added in the EMI receiver or spectrum analyzer, so SA Read Value (dBm) is the final values which contains the data of Correction Factor (dB).

For example:

In the ERP test, when SA read value for GSM850 is 21dBm, and correction factor is 8dB, then final ERP value for GSM850 is:

$$\text{ERP (dBm)} = 21\text{dBm} + 8\text{dB} = 29\text{dBm}$$

5.1.4 Test Result

Please refer to ANNEX A.1

5.2 Peak to Average Ratio

5.2.1 Limit

FCC § 2.1046 & 24.232(d) & 27.50(d); RSS-130 4.6.1, RSS-133 6.4, RSS-139 6.5, RSS199 4.4

In addition, when the transmitter power is measured in terms of average value, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

According to FCC section 24.232(d); RSS-133 6.4, power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with 24.232 (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of § 24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

FCC section 24.232(e)); RSS-133 6.4,, peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

According to FCC section 27.50(d) (5); RSS-139 6.5, in measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

According to RSS-19 4.4, In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

5.2.2 Test Setup

The section 4.5 test setup 5 description is used for conducted test, and the test setup description is used for radiated test. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

Here the lowest, middle and highest channels are selected to perform testing to verify the peak-to-average ratio. According to KDB 971168 D01, there is CCDF procedure for PAPR:

- a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
- b) Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth;
- c) Set the number of counts to a value that stabilizes the measured CCDF curve;
- d) Set the measurement interval as follows:
 - 1)for continuous transmissions, set to 1 ms,

2)for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.

e) Record the maximum PAPR level associated with a probability of 0.1%.

Alternate procedure for PAPR:

Use one of the procedures presented in 4.1 to measure the total peak power and record as PPk. Use one of the applicable procedures presented 4.2 to measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

$PAPR (dB) = PPk (dBm) - PAvg (dBm).$

5.2.4 Test Result

Please refer to ANNEX A.2

5.3 Occupied Bandwidth

5.3.1 Limit

FCC § 2.1049, RSS-Gen 6.7

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Many of the individual rule parts specify a relative OBW in lieu of the 99% OBW. In such cases, the OBW is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated by at least X dB below the transmitter power, where the value of X is typically specified as 26.

5.3.2 Test Setup

The section 4.5 test setup 5 description is used for conducted test, and the test setup description is used for radiated test. The photo of test setup please refer to ANNEX B.

5.3.3 Test Procedure

The following procedure shall be used for measuring power bandwidth.

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the anticipated OBW).
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
- c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least $10\log(\text{OBW} / \text{RBW})$ below the reference level.
- d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.
- e) For -26 dB OBW, the dynamic range of the spectrum analyzer at the selected RBW shall be at least 10dB below the target “-X dB down” requirement, e.g. -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be 36dB below the reference value.
- f) Set the detection mode to peak, and the trace mode to max hold.
- g) For 99% OBW, use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.
If the instrument does not have a 99 % power bandwidth function, the trace data points are to be recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99 % power bandwidth is the difference between these two frequencies.

- h) For -26 dB OBW, determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value). Determine the “-X dB down amplitude” as equal to (reference value -X). Alternatively, this calculation can be performed by the analyzer by using the marker-delta function.
Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below “-X dB down amplitude” determined in step g). If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
- i) The OBW shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).
- j) Change variable modulations, coding, or channel bandwidth settings, then repeat above test procedures.

5.3.4 Test Result

Please refer to ANNEX A.3

5.4 Frequency Stability

5.4.1 Limit

FCC § 2.1055 & 22.355 & 24.235 & 27.54 & 90.213; RSS-130 4.5, RSS-132 5.3, RSS-133 6.3, RSS-139 6.4, RSS199 4.3

The frequency stability shall be measured with variation of ambient temperature as follows:

- (1) The temperature is varied from -30°C to +50°C.
- (2) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10°C through the range.

The frequency stability shall be measured with variation of primary supply voltage as follows:

- (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than carried battery equipment.
- (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating and point which shall be specified by the manufacture.
- (3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

FCC § 22.355, RSS-132 5.3

Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

Table C-1—Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile > 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/a

FCC § 24.235, RSS-133 6.3

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

FCC § 27.54, RSS-139 6.4

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

FCC § 90.213, RSS199 4.3

The frequency stability shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations.

5.4.2 Test Setup

The section 4.5 test setup 6 description is used for conducted test, and the test setup description is used for radiated test. The photo of test setup please refer to ANNEX B.

5.4.3 Test Procedure

1. The EUT is placed in a temperature chamber.
2. The temperature is set to 25°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured.
3. The temperature is increased by not more than 10 degrees, allowed to stabilize and soak, and then repeat the frequency error measurement.
4. Repeat procedure 3 until +50°C and -30°C is reached.
5. Change supply voltage, and repeat measurement until extreme voltage is reached.

5.4.4 Test Result

Please refer to ANNEX A.4

5.5 Spurious Emission at Antenna Terminals

5.5.1 Limit

FCC § 2.1051 & 22.917(a) & 24.238(a) & 27.53(a) & 27.53(c) & 27.53(f) & 27.53(g) & 27.53(h) & 27.53(m) & 90.691 & 90.543; RSS-130 4.7, RSS-132 5.5, RSS-133 6.5, RSS-139 6.6, RSS199 4.5

In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

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

FCC § 22.917(a) & 24.238(a), RSS-132 5.5, RSS-133 6.5

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. This is calculated to be -13 dBm.

FCC § 27.53(a) (4), RSS-139 6.6

For mobile and portable stations operating in the 2305-2315MHz and 2350-2360MHz bands:

- (1) By a factor of not less than: $43 + 10 \log(P)$ dB on all frequencies between 2305 and 2320MHz and on all frequencies between 2345 and 2360MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log(P)$ dB on all frequencies between 2320 and 2324MHz and on all frequencies between 2341 and 2345MHz, not less than $61 + 10 \log(P)$ dB on all frequencies between 2324 and 2328MHz and on all frequencies between 2337 and 2341MHz, and not less than $67 + 10 \log(P)$ dB on all frequencies between 2328 and 2337MHz.
- (2) By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2300 and 2305MHz, $55 + 10 \log(P)$ dB on all frequencies between 2296 and 2300MHz, $61 + 10 \log(P)$ dB on all frequencies between 2292 and 2296MHz, $67 + 10 \log(P)$ dB on all frequencies between 2288 and 2292MHz, and $70 + 10 \log(P)$ dB below 2288MHz.
- (3) By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2360 and 2365MHz, and not less than $70 + 10 \log(P)$ dB above 2365MHz.

FCC § 27.53(c), RSS-139 6.6

For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;
- (2) On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;
- (3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $76 + 10 \log(P)$ dB in a 6.25 kHz band segment, for base and fixed stations;
- (4) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;

- (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;
- (6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

FCC § 27.53(f) , RSS-139 6.6

For operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to - 70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

FCC § 27.53(g) , RSS-139 6.6

For operations in the 600MHz band and the 698-746MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43+10\log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

FCC § 27.53(h) (1) , RSS-139 6.6

Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

FCC § 27.53(m) (4) , RSS-139 6.6

For mobile digital stations (BRS and EBS stations), the attenuation factor shall be not less than:

- $40+10\log P$ dB (-10 dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge.
- $43+10\log P$ dB (-13 dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge,
- $55+10\log P$ dB (-25 dBm, 3 nW) on all frequencies more than X MHz from the channel edge, where X is the greater of 6 MHz or the actual emission bandwidth (26 dB).

In addition, the attenuation factor shall not be less than $43 + 10 \log(P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or

EBS licensees.

FCC § 90.691

- (a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:
- (1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.
 - (2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.
- (b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

FCC § 90.543

- (e) For operations in the 758–768 MHz and the 788–798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
- (1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than $76 + 10 \log(P)$ dB in a 6.25 kHz band segment, for base and fixed stations.
 - (2) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations.
 - (3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least $43 + 10 \log(P)$ dB.
 - (4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.
- (f) For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/ MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

RSS199 4.5

- (a) for base station and fixed subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$.
- (b) for mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:
- (i) $40 + 10 \log_{10} p$ from the channel edges to 5 MHz away
 - (ii) $43 + 10 \log_{10} p$ between 5 MHz and X MHz from the channel edges, and
 - (iii) $55 + 10 \log_{10} p$ at X MHz and beyond from the channel edges

In addition, the attenuation shall not be less than $43 + 10 \log_{10} p$ on all frequencies between 2490.5 MHz and 2496 MHz, and $55 + 10 \log_{10} p$ at or below 2490.5 MHz.

In (a) and (b), p is the transmitter power measured in watts and X is 6 MHz or the equipment occupied bandwidth, whichever is greater.

5.5.2 Test Setup

The section 4.5 test setup 5 description is used for conducted test, and the test setup description is used for radiated test. The photo of test setup please refer to ANNEX B.

5.5.3 Test Procedure

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency blocks a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

The EUT is coupled to the system simulator and spectrum analyzer; the RF load attached to EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

CMW500 is used to establish communication with the EUT, and its parameters are set to force the EUT transmitting at maximum output power.

The RF output of the transmitter is connected to the input of the spectrum analyzer through sufficient attenuation.

Spurious emissions are tested with 0.001MHz RBW for frequency less than 150kHz, 0.01MHz RBW for frequency less than 30MHz, 0.1MHz RBW for frequency less than 1GHz, and 1MHz RBW for frequency above 1GHz. And sweep point number are at least 401, referring to following formula.

Sweep point number = $\text{Span/RBW VBW} = 3 \times \text{RBW}$

Detector Mode=mean or average power

Record the frequencies and levels of spurious emissions.

5.5.4 Test Result

Please refer to ANNEX A.5

5.6 Band Edge Emission

5.6.1 Limit

FCC § 2.1051 & 22.917(a) & 24.238(a) & 27.53(a) & 27.53(c) & 27.53(g) & 27.53(h) & 27.53(m) & 90.691 & 90.543; RSS-130 4.7, RSS-132 5.5, RSS-133 6.5, RSS-139 6.6, RSS199 4.5

In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

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

FCC § 22.917(a) & 24.238(a), RSS-132 5.5, RSS-133 6.5

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. This is calculated to be -13 dBm.

FCC § 27.53(a) (4), RSS-139 6.6

For mobile and portable stations operating in the 2305-2315MHz and 2350-2360MHz bands:

- (1) By a factor of not less than: $43 + 10 \log(P)$ dB on all frequencies between 2305 and 2320MHz and on all frequencies between 2345 and 2360MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log(P)$ dB on all frequencies between 2320 and 2324MHz and on all frequencies between 2341 and 2345MHz, not less than $61 + 10 \log(P)$ dB on all frequencies between 2324 and 2328MHz and on all frequencies between 2337 and 2341MHz, and not less than $67 + 10 \log(P)$ dB on all frequencies between 2328 and 2337MHz.
- (2) By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2300 and 2305MHz, $55 + 10 \log(P)$ dB on all frequencies between 2296 and 2300MHz, $61 + 10 \log(P)$ dB on all frequencies between 2292 and 2296MHz, $67 + 10 \log(P)$ dB on all frequencies between 2288 and 2292MHz, and $70 + 10 \log(P)$ dB below 2288MHz.
- (3) By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2360 and 2365MHz, and not less than $70 + 10 \log(P)$ dB above 2365MHz.

FCC § 27.53(c), RSS-139 6.6

For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;
- (2) On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;
- (3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $76 + 10 \log(P)$ dB in a 6.25Hz band segment, for base and fixed stations;

- (4) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25kHz band segment, for mobile and portable stations;
- (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

- (6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

FCC § 27.53(g), RSS-139 6.6

For operations in the 600MHz band and the 698-746MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

FCC § 27.53(h) (1), RSS-139 6.6

Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

FCC § 27.53(m) (4), RSS-139 6.6

For mobile digital stations (BRS and EBS stations), the attenuation factor shall be not less than:

- $40 + 10 \log P$ dB (–10 dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge.
- $43 + 10 \log P$ dB (–13 dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge,
- $55 + 10 \log P$ dB (–25 dBm, 3 nW) on all frequencies more than X MHz from the channel edge, where X is the greater of 6 MHz or the actual emission bandwidth (26 dB).

In addition, the attenuation factor shall not be less than $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

FCC § 90.691

- (a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:
 - (1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels

- or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.
- (2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.
- (b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

FCC § 90.543

- (e) For operations in the 758–768 MHz and the 788–798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
- (1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than $76 + 10 \log(P)$ dB in a 6.25 kHz band segment, for base and fixed stations.
 - (2) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations.
 - (3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least $43 + 10 \log(P)$ dB.
 - (4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

RSS199 4.5

- (a) for base station and fixed subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$.
- (b) for mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:
- (i) $40 + 10 \log_{10} p$ from the channel edges to 5 MHz away
 - (ii) $43 + 10 \log_{10} p$ between 5 MHz and X MHz from the channel edges, and
 - (iii) $55 + 10 \log_{10} p$ at X MHz and beyond from the channel edges

In addition, the attenuation shall not be less than $43 + 10 \log_{10} p$ on all frequencies between 2490.5 MHz and 2496 MHz, and $55 + 10 \log_{10} p$ at or below 2490.5 MHz.

In (a) and (b), p is the transmitter power measured in watts and X is 6 MHz or the equipment occupied bandwidth, whichever is greater.

5.6.2 Test Setup

The section 4.5 test setup 5 description is used for conducted test, and the test setup description is used for radiated test. The photo of test setup please refer to ANNEX B.

5.6.3 Test Procedure

The EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50 Ohm; the path loss as the factor is calibrated to correct the reading.

1. The EUT is coupled to the system simulator and spectrum analyzer; the RF load attached to EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.
2. CMW500 is used to establish communication with the EUT, and its parameters are set to force the EUT transmitting at maximum output power.
3. The RF output of the transmitter is connected to the input of the spectrum analyzer through sufficient attenuation.
4. The center of the spectrum analyzer was set to block edge frequency.
5. Band edge are tested with 1%*cBW (RBW), and sweep point number referred to following formula.
Sweep point number = $2 * \text{Span} / \text{RBW}$ VBW=3RBW
6. Record the frequencies and levels of spurious emissions.

For mobile and portable stations, on all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance. By using a 10 kHz bandwidth on the spectrum analyzer.

$$10 * \log(10 \text{ kHz} / 6.25 \text{ kHz}) = 2.04 \text{ dB}$$
$$\text{Limit Line} = -35 \text{ dBm} + 2.04 \text{ dB} = -32.96 \text{ dBm}$$

5.6.4 Test Result

Please refer to ANNEX A.6

5.7 Field Strength of Spurious Radiation

5.7.1 Limit

FCC § 2.1053 & 22.917(a) & 24.238(a) & 27.53(a) & 27.53(c) & 27.53(f) & 27.53(g) & 27.53(h) & 27.53(m) & 90.691 & 90.543 ; RSS-130 4.7, RSS-132 5.5, RSS-133 6.5, RSS-139 6.6, RSS199 4.5

FCC § 22.917(a) & 24.238(a)

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. This is calculated to be -13 dBm.

FCC § 27.53(a) (4), RSS-139 6.6

For mobile and portable stations operating in the 2305-2315MHz and 2350-2360MHz bands:

- (1) By a factor of not less than: $43 + 10 \log(P)$ dB on all frequencies between 2305 and 2320MHz and on all frequencies between 2345 and 2360MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log(P)$ dB on all frequencies between 2320 and 2324MHz and on all frequencies between 2341 and 2345MHz, not less than $61 + 10 \log(P)$ dB on all frequencies between 2324 and 2328MHz and on all frequencies between 2337 and 2341MHz, and not less than $67 + 10 \log(P)$ dB on all frequencies between 2328 and 2337MHz.
- (2) By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2300 and 2305MHz, $55 + 10 \log(P)$ dB on all frequencies between 2296 and 2300MHz, $61 + 10 \log(P)$ dB on all frequencies between 2292 and 2296MHz, $67 + 10 \log(P)$ dB on all frequencies between 2288 and 2292MHz, and $70 + 10 \log(P)$ dB below 2288MHz.
- (3) By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2360 and 2365MHz, and not less than $70 + 10 \log(P)$ dB above 2365MHz.

FCC § 27.53(c), RSS-139 6.6

For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;
- (2) On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;
- (3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $76 + 10 \log(P)$ dB in a 6.25 kHz band segment, for base and fixed stations;
- (4) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;
- (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;
- (6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of

measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

FCC § 27.53(f), RSS-139 6.6

For operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to - 70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

FCC § 27.53(g), RSS-139 6.6

For operations in the 600MHz band and the 698-746MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43+10\log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

FCC § 27.53(h) (1), RSS-139 6.6

Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB. FCC § 27.53(m) (4)

For mobile digital stations (BRS and EBS stations), the attenuation factor shall be not less than:

- $40+10\log P$ dB (-10 dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge.
- $43+10\log P$ dB (-13 dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge,
- $55+10\log P$ dB (-25 dBm, 3 nW) on all frequencies more than X MHz from the channel edge, where X is the greater of 6 MHz or the actual emission bandwidth (26 dB).

In addition, the attenuation factor shall not be less than $43 + 10 \log(P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

FCC § 90.691

(a) Out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

- (2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10\log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.
- (b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

FCC § 90.543

- (e) For operations in the 758–768 MHz and the 788–798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
- (1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations.
 - (2) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations.
 - (3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least $43 + 10 \log (P)$ dB.
 - (4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

RSS199 4.5

- (a) for base station and fixed subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$.
- (b) for mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:
- (i) $40 + 10 \log_{10} p$ from the channel edges to 5 MHz away
 - (ii) $43 + 10 \log_{10} p$ between 5 MHz and X MHz from the channel edges, and
 - (iii) $55 + 10 \log_{10} p$ at X MHz and beyond from the channel edges

In addition, the attenuation shall not be less than $43 + 10 \log_{10} p$ on all frequencies between 2490.5 MHz and 2496 MHz, and $55 + 10 \log_{10} p$ at or below 2490.5 MHz.

In (a) and (b), p is the transmitter power measured in watts and X is 6 MHz or the equipment occupied bandwidth, whichever is greater.

5.7.2 Test Setup

The section 4.5 test setup 4 description is used for conducted test, and the test setup description is used for radiated test. The photo of test setup please refer to ANNEX B.

5.7.3 Test Procedure

1. On a test site, the EUT shall be placed at 80cm height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.

3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. During the measurement of the EUT, the resolution bandwidth was to 1 MHz and the average bandwidth was set to 1 MHz.
5. The transmitter shall be switched on; the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until the maximum signal level is detected by the measuring receiver.
7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. The EUT was replaced by half-wave dipole (824 ~ 849 MHz) or horn antenna (1 850 ~ 1 910 MHz) connected to a signal generator.
11. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
13. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
14. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

Final measurement calculation as below:

The relevant equation for determining the ERP/EIRP from the radiated RF output power is: $ERP/EIRP \text{ (dBm)} = SA \text{ Read Value (dBm)} + \text{Correction Factor (dB)}$

where:

ERP/EIRP = effective or equivalent radiated power, in dBm;

SA Read Value = measured transmitter power received by EMI receiver or spectrum analyzer, in dBm; Correction

Factor = total correction factor including cable loss, in dB;

During the test, the data of Correction Factor (dB) is added in the EMI receiver or spectrum analyzer, so SA Read Value (dBm) is the final values which contains the data of Correction Factor (dB).

For example:

In the ERP test, when SA read value for GSM850 is 21dBm, and correction factor is 8dB, then final ERP value for GSM850 is:

$$ERP \text{ (dBm)} = 21\text{dBm} + 8\text{dB} = 29\text{dBm}$$

5.7.4 Test Result

Please refer to ANNEX A.7

ANNEX A Test Results

A.1 Transmitter Radiated Power (ERP/EIRP)

GSM850 BAND:

Mode		Frequency (MHz)	Peak Power(dBm)	Avg.Burst Power(dBm)	PAP	Duty cycle Factor(dB)	Frame Power(dBm)
GSM850		824.2	33.03	32.44	0.59	-9	23.44
		836.6	33.61	32.59	1.02	-9	23.59
		848.8	33.71	32.15	1.56	-9	23.15
GPRS850	1 Tx Slots	824.2	31.32	29.92	1.40	-9	20.92
		836.6	31.16	29.97	1.19	-9	20.97
		848.8	29.30	29.07	0.23	-9	20.07
	2 Tx Slots	824.2	30.60	29.54	1.06	-6	23.54
		836.6	30.83	30.33	0.49	-6	24.33
		848.8	30.84	29.70	1.14	-6	23.70
	3 Tx Slots	824.2	30.48	29.33	1.15	-4.26	25.07
		836.6	31.38	30.22	1.16	-4.26	25.96
		848.8	29.29	28.73	0.56	-4.26	24.47
	4 Tx Slots	824.2	30.63	29.78	0.85	-3	26.78
		836.6	31.43	29.73	1.70	-3	26.73
		848.8	31.21	29.49	1.72	-3	26.49
EGPRS850	1 Tx Slots	824.2	25.06	24.06	1.00	-9	15.06
		836.6	24.89	24.58	0.31	-9	15.58
		848.8	25.14	24.42	0.72	-9	15.42
	2 Tx Slots	824.2	26.06	24.89	1.17	-6	18.89
		836.6	26.31	25.16	1.15	-6	19.16
		848.8	26.10	24.64	1.46	-6	18.64
	3 Tx Slots	824.2	24.85	24.08	0.77	-4.26	19.82
		836.6	25.39	24.68	0.71	-4.26	20.42
		848.8	26.51	24.96	1.55	-4.26	20.70
	4 Tx Slots	824.2	25.80	24.68	1.12	-3	21.68
		836.6	25.81	24.85	0.96	-3	21.85
		848.8	24.90	23.70	1.20	-3	20.70

Duty cycle Factor = 1 Tx Slots, $10 \cdot \log(1/8) = -9.03\text{dB}$, 2 Tx Slots, $10 \cdot \log(2/8) = -6.02\text{dB}$,
3Tx Slots, $10 \cdot \log(3/8) = -4.26\text{dB}$, 4 Tx Slots, $10 \cdot \log(4/8) = -3.01\text{dB}$

PCS1900 BAND:

Mode		Frequency (MHz)	Peak Power(dBm)	Avg.Burst Power(dBm)	PAP	Duty cycle Factor(dB)	Frame Power(dBm)
GSM1900		1850.2	30.82	29.05	1.77	-9	20.05
		1880	29.64	28.99	0.65	-9	19.99
		1909.8	29.63	28.62	1.01	-9	19.62
GPRS1900	1 Tx Slots	1850.2	27.09	26.50	0.58	-9	17.50
		1880	28.05	26.95	1.10	-9	17.95
		1909.8	28.28	26.69	1.59	-9	17.69
	2 Tx Slots	1850.2	28.05	26.58	1.47	-6	20.58
		1880	26.79	26.50	0.29	-6	20.50
		1909.8	27.91	27.00	0.91	-6	21.00
	3 Tx Slots	1850.2	27.51	26.95	0.57	-4.26	22.69
		1880	27.51	26.98	0.53	-4.26	22.72
		1909.8	27.86	26.78	1.08	-4.26	22.52
	4 Tx Slots	1850.2	26.98	25.97	1.02	-3	22.97
		1880	28.17	26.89	1.28	-3	23.89
		1909.8	27.10	26.54	0.57	-3	23.54
EGPRS1900	1 Tx Slots	1850.2	23.25	22.73	0.52	-9	13.73
		1880	23.63	23.39	0.24	-9	14.39
		1909.8	23.74	23.22	0.52	-9	14.22
	2 Tx Slots	1850.2	25.49	23.68	1.81	-6	17.68
		1880	24.98	23.64	1.33	-6	17.64
		1909.8	24.80	24.18	0.63	-6	18.18
	3 Tx Slots	1850.2	24.63	23.35	1.28	-4.26	19.09
		1880	24.10	23.20	0.89	-4.26	18.94
		1909.8	23.97	22.66	1.31	-4.26	18.40
	4 Tx Slots	1850.2	24.70	23.80	0.90	-3	20.80
		1880	24.64	24.15	0.49	-3	21.15
		1909.8	24.25	23.37	0.88	-3	20.37

Duty cycle Factor = 1 Tx Slots, $10 \cdot \log(1/8) = -9.03\text{dB}$, 2 Tx Slots, $10 \cdot \log(2/8) = -6.02\text{dB}$,
3Tx Slots, $10 \cdot \log(3/8) = -4.26\text{dB}$, 4 Tx Slots, $10 \cdot \log(4/8) = -3.01\text{dB}$

Radiated Power (ERP) for GSM 850 MHZ

Mode	Frequency (MHz)	P _{Mea} (dBm)	Amplifier Gain (dBi)	Path Loss	Antenna Gain	Correction (dB)	ERP (Peak) (dBm)	Polarization
GSM850	824.2	4.46	31.23	1.02	-0.07	2.15	32.45	H
	836.6	4.13	31.23	1.02	-0.07	2.15	32.12	H
	848.8	3.86	31.23	1.02	-0.07	2.15	31.85	H

Radiated Power (ERP) for EGPRS850 MHZ

Mode	Frequency (MHz)	P _{Mea} (dBm)	Amplifier Gain (dBi)	Path Loss	Antenna Gain	Correction (dB)	ERP (Peak) (dBm)	Polarization
EGPRS 850	824.2	-1.03	31.23	1.02	-0.07	2.15	26.96	H
	836.6	-0.57	31.23	1.02	-0.07	2.15	27.42	H
	848.8	-0.55	31.23	1.02	-0.07	2.15	27.44	H

Radiated Power (E.I.R.P) for PCS 1900 MHZ

Mode	Frequency (MHz)	P _{Mea} (dBm)	Amplifier Gain (dBi)	Path Loss (dB)	Antenna Gain (dB)	Correction (dB)	E.I.R.P. (Peak) (dBm)	Polarization
GSM 1900	1850.2	0.61	31.23	1.02	-0.44	0	30.38	H
	1880.0	0.65	31.23	1.02	-0.44	0	30.42	H
	1909.8	0.57	31.23	1.02	-0.44	0	30.34	H

Radiated Power (E.I.R.P) for EGPRS 1900 MHZ

Mode	Frequency (MHz)	P _{Mea} (dBm)	Amplifier Gain (dBi)	Path Loss (dB)	Antenna Gain (dB)	Correction (dB)	E.I.R.P. (Peak) (dBm)	Polarization
EGPRS 1900	1850.2	-5.55	31.23	1.02	-0.44	0	24.22	H
	1880.0	-5.48	31.23	1.02	-0.44	0	24.29	H
	1909.8	-6.30	31.23	1.02	-0.44	0	23.47	H

ERP or E.I.R.P = P_{Mea} + Amplifier Gain – Path Loss + Antenna Gain – Correction Factor
Note: Each channel is scanned 10 times, and the peak value of each channel is recorded.

LTE power is filtered as the worst mode data

Radiated Power (ERP) for E-UTRA Band 5

Mode	Band width (MHz)	Modulation	Frequency (MHz)	P _{Mea} (dBm)	Amplifier Gain (dBi)	Path Loss (dB)	Antenna Gain (dB)	Correction (dB)	E.I.R.P. (Peak) (dBm)	Polarization
E-UTRA Band 5	1.4	QPSK	836.5	-7.33	31.23	1.02	-0.07	0	22.81	H
		Q16	836.5	-7.54	31.23	1.02	-0.07	0	22.60	H
	3	QPSK	836.5	-7.62	31.23	1.02	-0.07	0	22.52	H
		Q16	836.5	-7.04	31.23	1.02	-0.07	0	23.10	H
	5	QPSK	836.5	-7.12	31.23	1.02	-0.07	0	23.02	H
		Q16	836.5	-7.66	31.23	1.02	-0.07	0	22.48	H
	10	QPSK	836.5	-7.72	31.23	1.02	-0.07	0	22.42	H
		Q16	836.5	-7.38	31.23	1.02	-0.07	0	22.76	H

ERP or E.I.R.P = P_{Mea} + Amplifier Gain – Path Loss + Antenna Gain – Correction Factor

Note: Each channel is scanned 10 times, the worst data is recorded.

Radiated Power (E.I.R.P) for E-UTRA Band 41

Mode	Band width (MHz)	Modulation	Frequency (MHz)	P _{Mea} (dBm)	Amplifier Gain (dBi)	Path Loss (dB)	Antenna Gain (dB)	Correction (dB)	E.I.R.P. (Peak) (dBm)	Polarization
E-UTRA Band 41	5	QPSK	2605.0	-6.22	31.23	1.02	-0.82	0	23.17	H
		Q16	2605.0	-7.08	31.23	1.02	-0.82	0	22.31	H
	10	QPSK	2605.0	-6.17	31.23	1.02	-0.82	0	23.22	H
		Q16	2605.0	-6.55	31.23	1.02	-0.82	0	22.84	H
	15	QPSK	2605.0	-6.33	31.23	1.02	-0.82	0	23.06	H
		Q16	2605.0	-6.36	31.23	1.02	-0.82	0	23.03	H
	20	QPSK	2605.0	-6.37	31.23	1.02	-0.82	0	23.02	H
		Q16	2605.0	-6.51	31.23	1.02	-0.82	0	22.88	H

ERP or E.I.R.P = P_{Mea} + Amplifier Gain – Path Loss + Antenna Gain – Correction Factor

Note: Each channel is scanned 10 times, the worst data is recorded.

A.2 Peak to Average Ratio

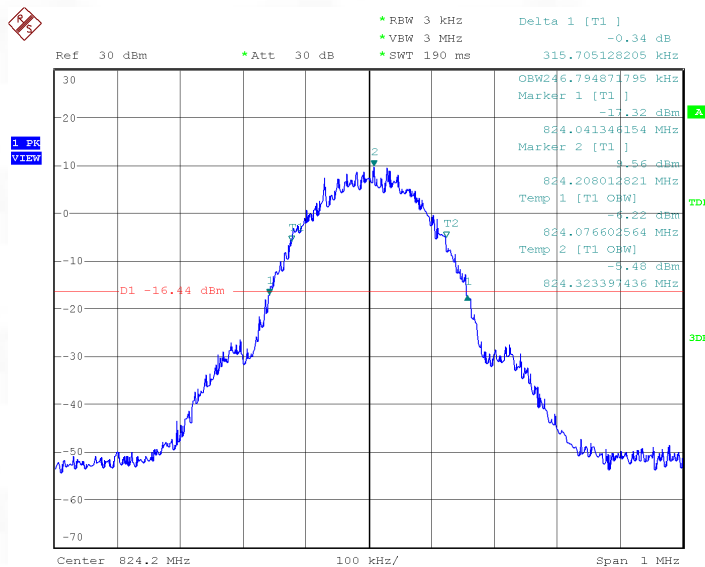
Band	Channel	PCL	Result(dB)	Limit(dB)	Verdict
GSM850	190	3	2.68	13	PASS
EGPRS850	190	8	5.18	13	PASS
GSM1900	661	0	2.69	13	PASS
EGPRS1900	661	2	5.34	13	PASS

Refer to E-UTRA Annex for LTE Band2, Band4, Band5, Band7, Band38, Band41.

A.3 Occupied Bandwidth

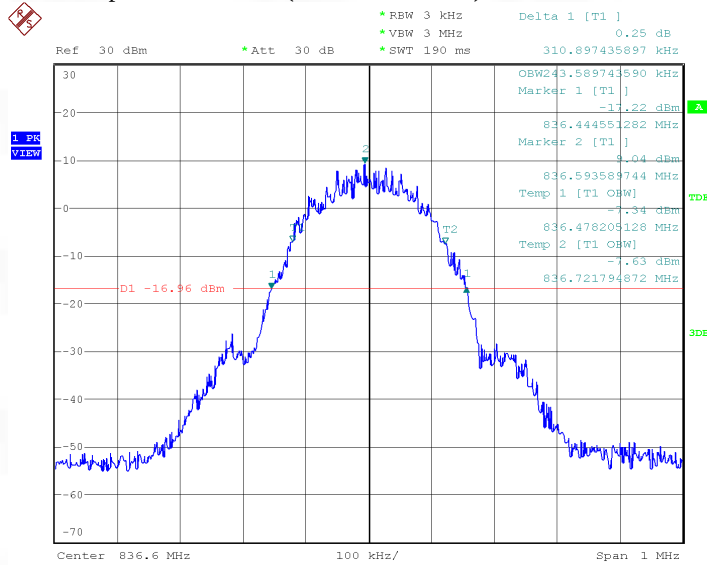
Test Plot(s)

Occupied Bandwidth (99% and -26dBc) GSM 850 BAND CH 128



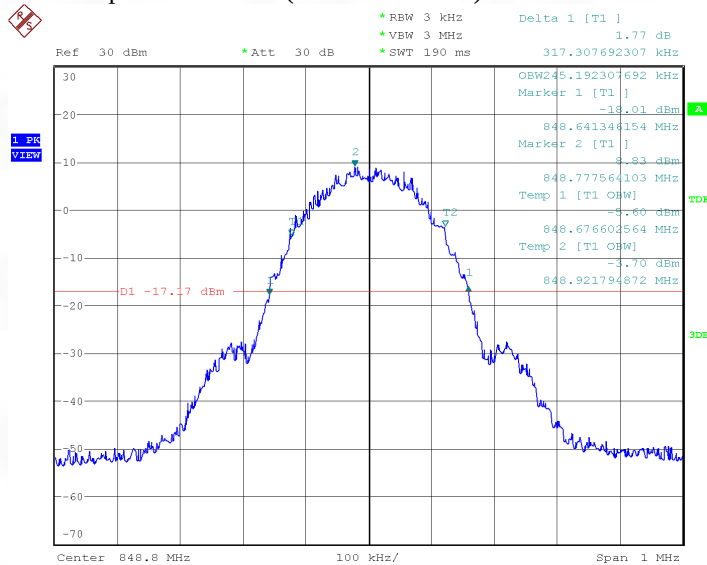
Date: 13.SEP.2023 19:29:20

Occupied Bandwidth (99% and -26dBc) GSM 850 BAND CH 190



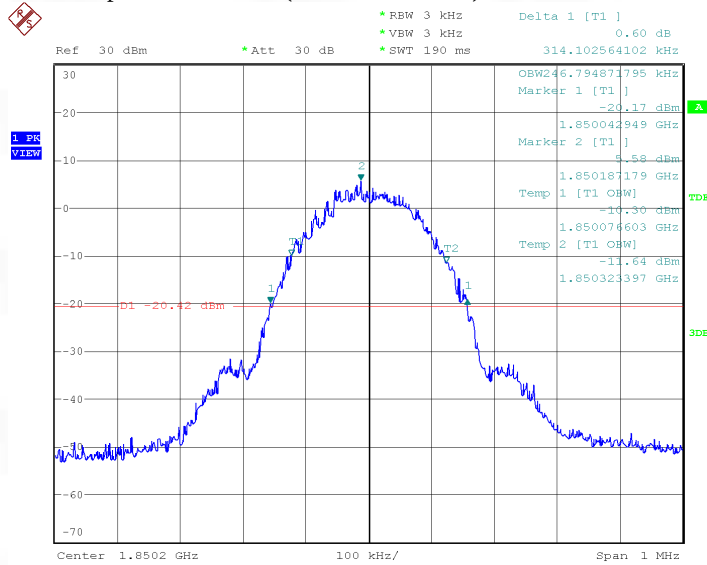
Date: 13.SEP.2023 19:23:43

Occupied Bandwidth (99% and -26dBc) GSM 850 BAND CH 251



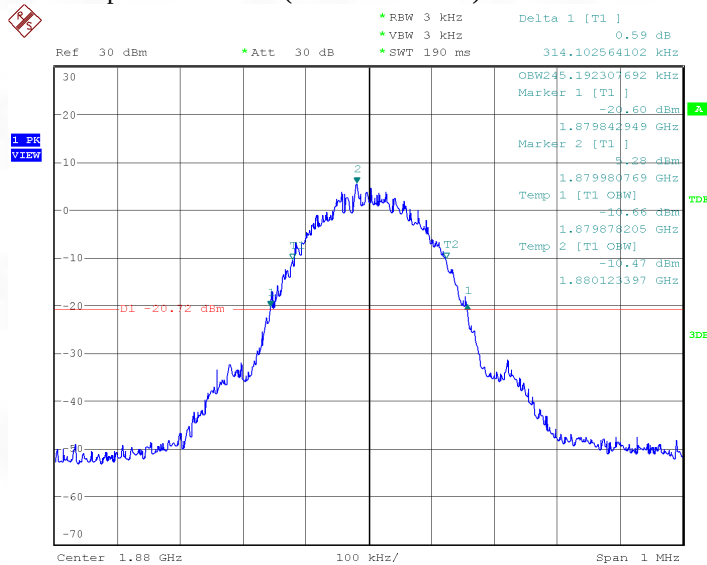
Date: 13.SEP.2023 19:19:06

Occupied Bandwidth (99% and -26dBc) PCS 1900 BAND CH 512



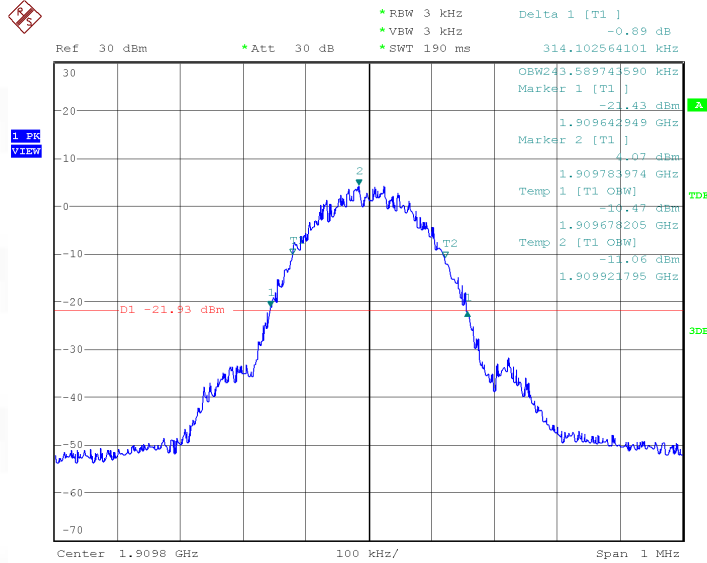
Date: 13.SEP.2023 20:27:38

Occupied Bandwidth (99% and -26dBc) PCS 1900 BAND CH 661



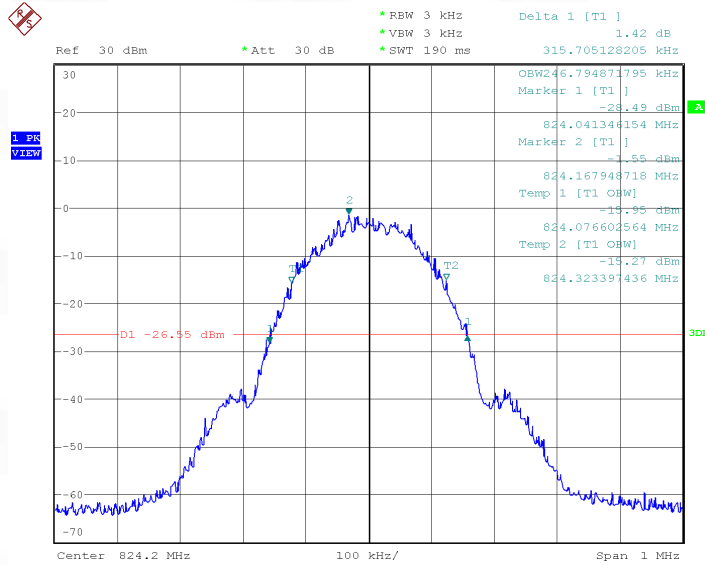
Date: 13.SEP.2023 20:25:44

Occupied Bandwidth (99% and -26dBc) PCS 1900 BAND CH 810



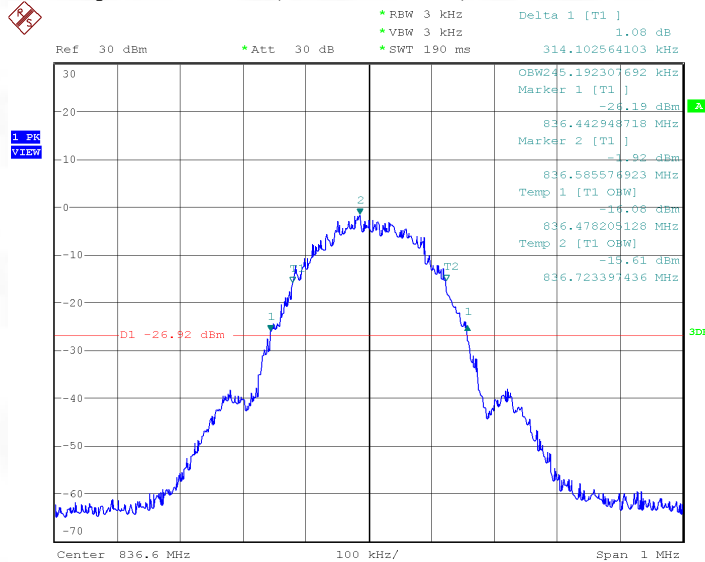
Date: 13.SEP.2023 20:23:33

Occupied Bandwidth (99% and -26dBc) EGPRS 850 BAND CH 128



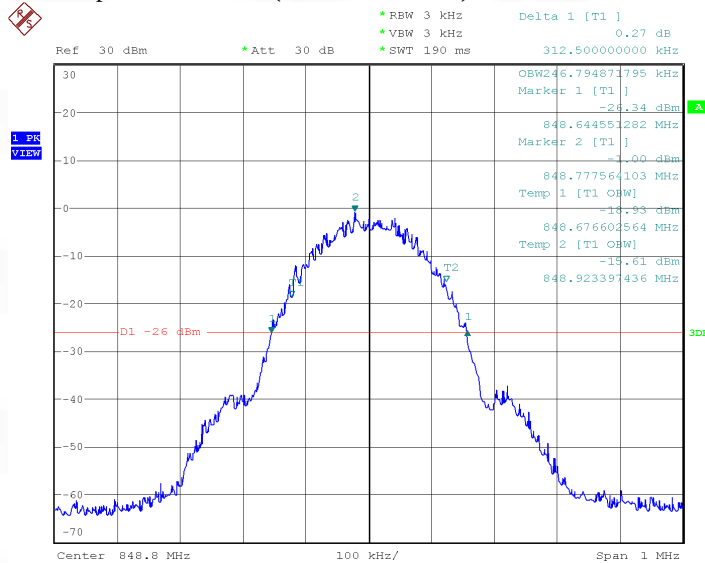
Date: 13.SEP.2023 20:35:04

Occupied Bandwidth (99% and -26dBc) EGPRS 850 BAND CH 190



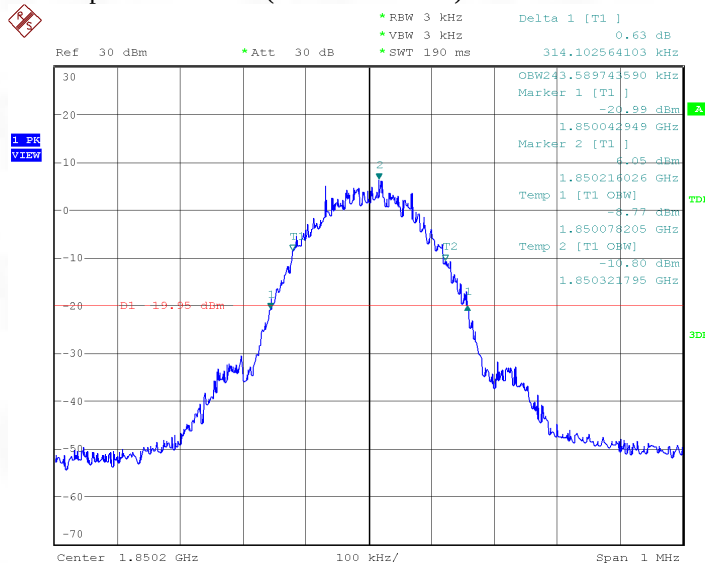
Date: 13.SEP.2023 20:37:10

Occupied Bandwidth (99% and -26dBc) EGPRS 850 BAND CH 251



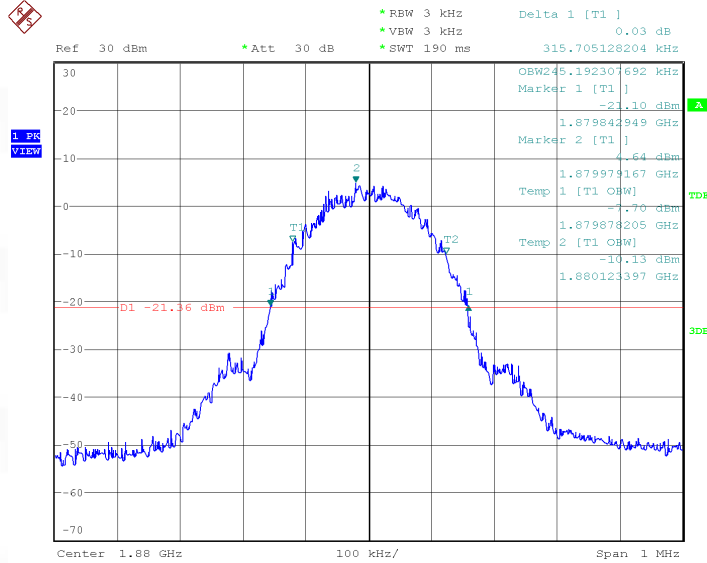
Date: 13.SEP.2023 20:39:40

Occupied Bandwidth (99% and -26dBc) EGPRS 1900 BAND CH 512



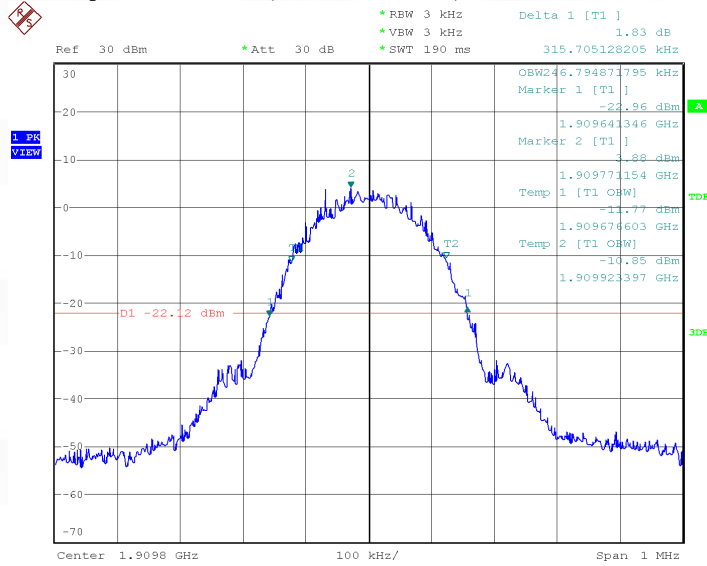
Date: 13.SEP.2023 20:14:27

Occupied Bandwidth (99% and -26dBc) EGPRS 1900 BAND CH 661



Date: 13.SEP.2023 20:16:18

Occupied Bandwidth (99% and -26dBc) EGPRS 1900 BAND CH 810



Date: 13.SEP.2023 20:18:19

Refer to E-UTRA Annex for LTE Band5, Band41.

A.4 Frequency Stability

Frequency Error against Voltage for GSM 850 band (836.6MHz)

Voltage(V)	Frequency error(Hz)	Frequency error (ppm)
3.45	29	0.035
3.8	34	0.041
4.35	37	0.044

Frequency Error against Temperature for GSM 850 band (836.6MHz)

Temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-10	29	0.035
0	31	0.038
10	34	0.040
20	31	0.037
30	38	0.045
40	29	0.035
50	35	0.042

Frequency Error against Voltage for PCS 1900 band (1880MHz)

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.45	29	0.015
3.8	36	0.019
4.35	40	0.022

Frequency Error against Temperature for PCS 1900 band (1880MHz)

Temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-10	33	0.017
0	39	0.021
10	35	0.018
20	39	0.021
30	31	0.017
40	35	0.019
50	33	0.017

Frequency Error against Voltage for EGPRS 850 band (836.6MHz)

Voltage(V)	Frequency error(Hz)	Frequency error (ppm)
3.45	35	0.042
3.8	40	0.048
4.35	28	0.034

Frequency Error against Temperature for EGPRS 850 band (836.6MHz)

Temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-10	39	0.047
0	37	0.044
10	37	0.044
20	38	0.045
30	31	0.037
40	30	0.036
50	39	0.046

Frequency Error against Voltage for EGPRS 1900 band (1880MHz)

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.45	30	0.016
3.8	41	0.022
4.35	33	0.018

Frequency Error against Temperature for EGPRS 1900 band (1880MHz)

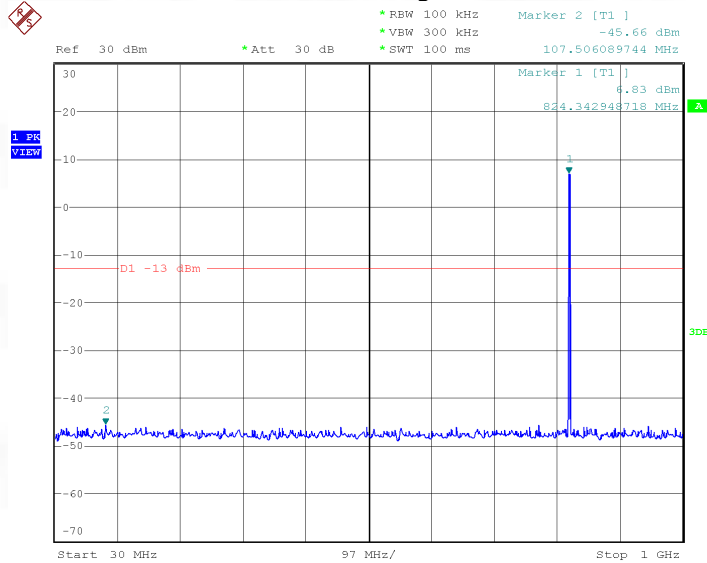
Temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-10	36	0.019
0	38	0.020
10	35	0.019
20	28	0.015
30	37	0.020
40	35	0.019
50	38	0.020

Refer to E-UTRA Annex for LTE Band5, Band41.

A.5 Spurious Emission at Antenna Terminals

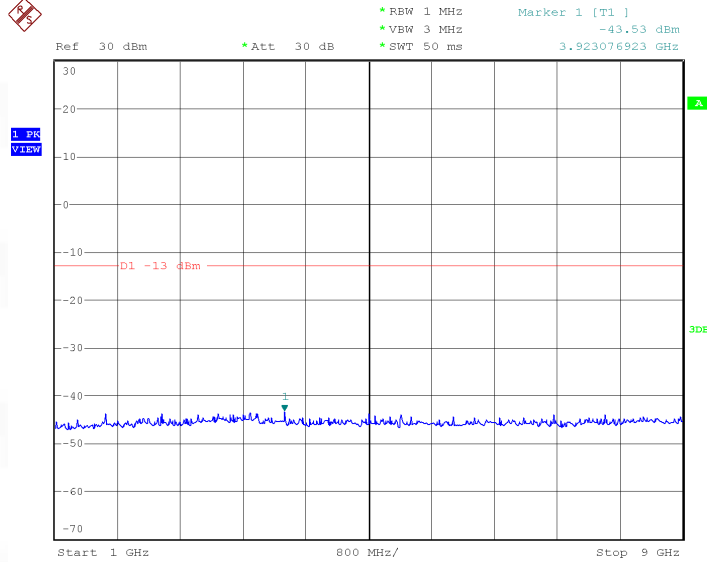
CONDUCTED EMISSION IN GSM850 BAND

Conducted Emission Transmitting Mode CH 128 30MHz – 1GHz



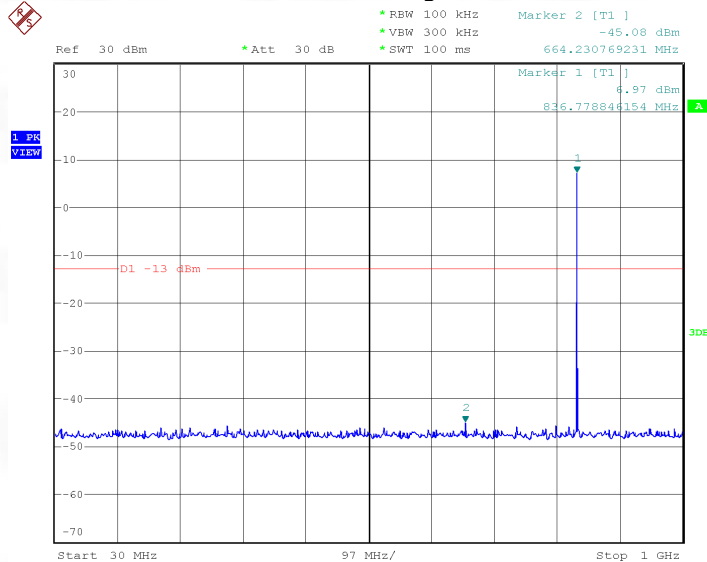
Date: 13.SEP.2023 19:34:00

Conducted Emission Transmitting Mode CH 128 1GHz – 9GHz



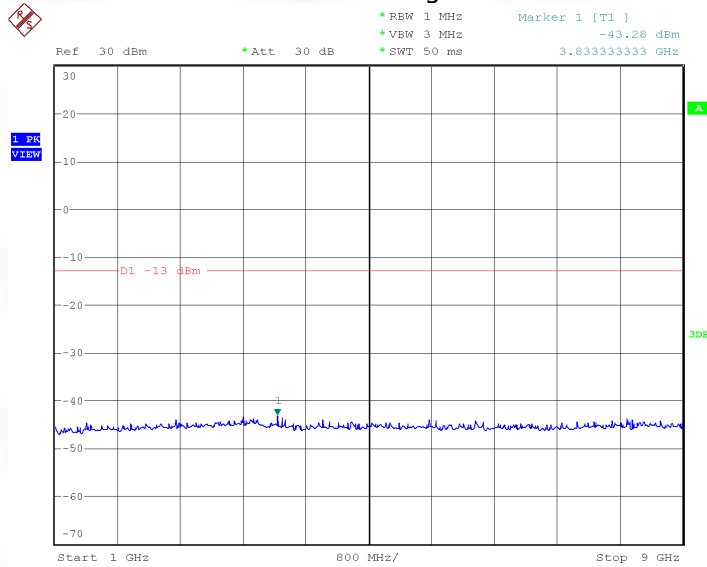
Date: 13.SEP.2023 19:41:26

Conducted Emission Transmitting Mode CH 190 30MHz – 1GHz



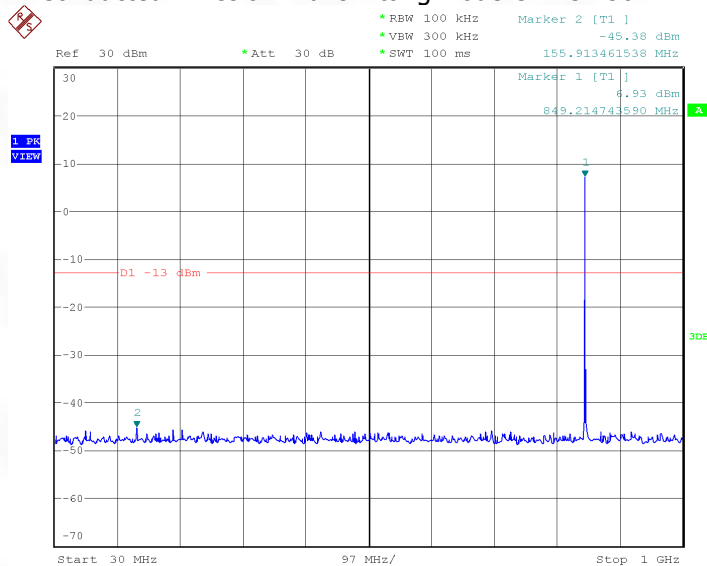
Date: 13.SEP.2023 19:35:35

Conducted Emission Transmitting Mode CH 190 1GHz – 9GHz



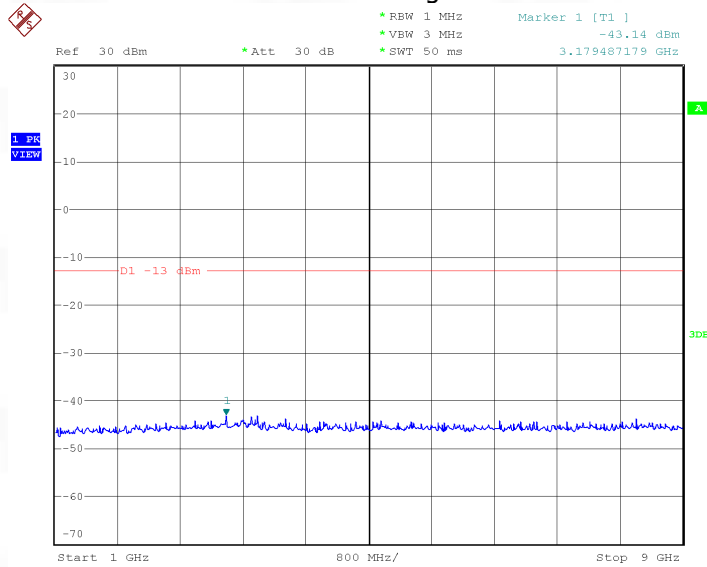
Date: 13.SEP.2023 19:40:30

Conducted Emission Transmitting Mode CH 251 30MHz – 1GHz



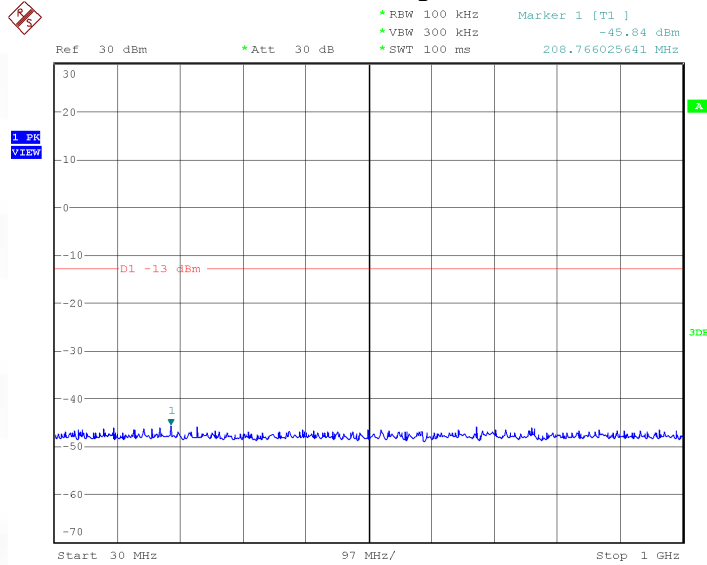
Date: 13.SEP.2023 19:36:52

Conducted Emission Transmitting Mode CH 251 1GHz – 9GHz



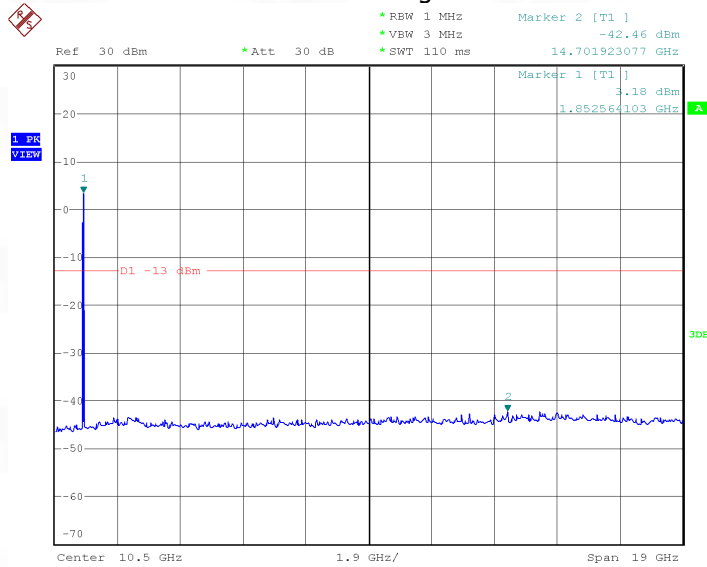
Date: 13.SEP.2023 19:39:29

CONDUCTED EMISSION IN PCS1900 BAND Conducted Emission Transmitting Mode CH 512 30MHz – 1GHz



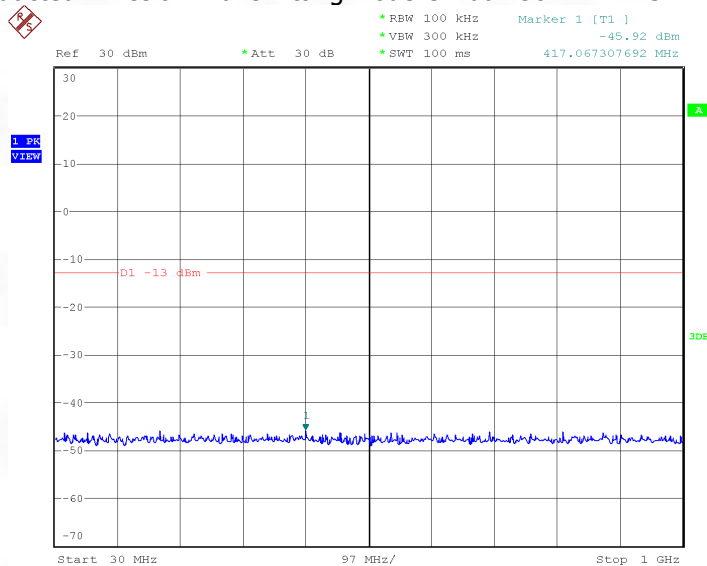
Date: 13.SEP.2023 20:06:46

Conducted Emission Transmitting Mode CH 512 1GHz – 20GHz



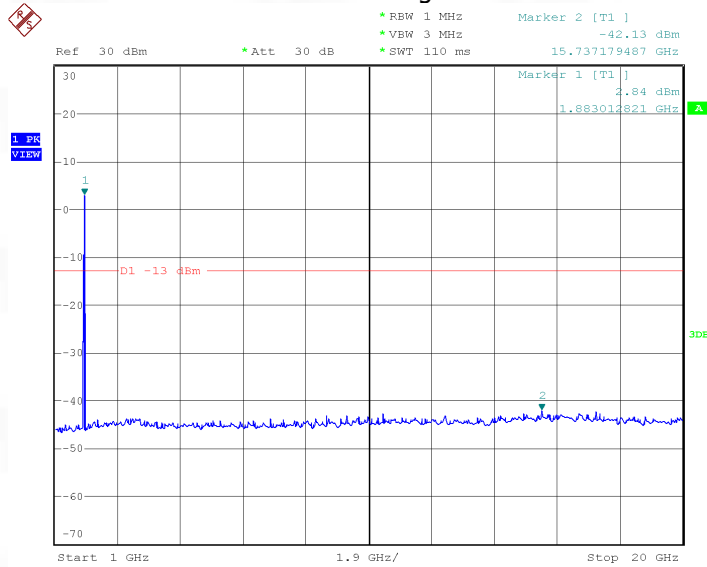
Date: 13.SEP.2023 19:59:46

Conducted Emission Transmitting Mode CH 661 30MHz – 1GHz



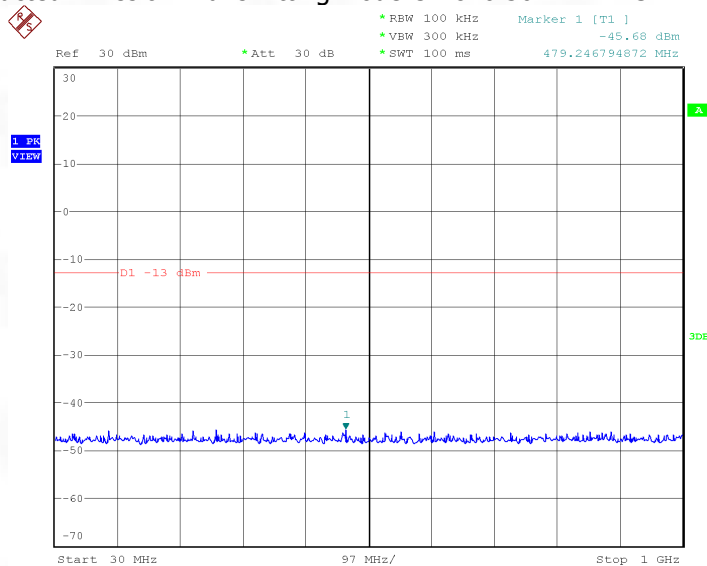
Date: 13.SEP.2023 20:05:47

Conducted Emission Transmitting Mode CH 661 1GHz – 20GHz



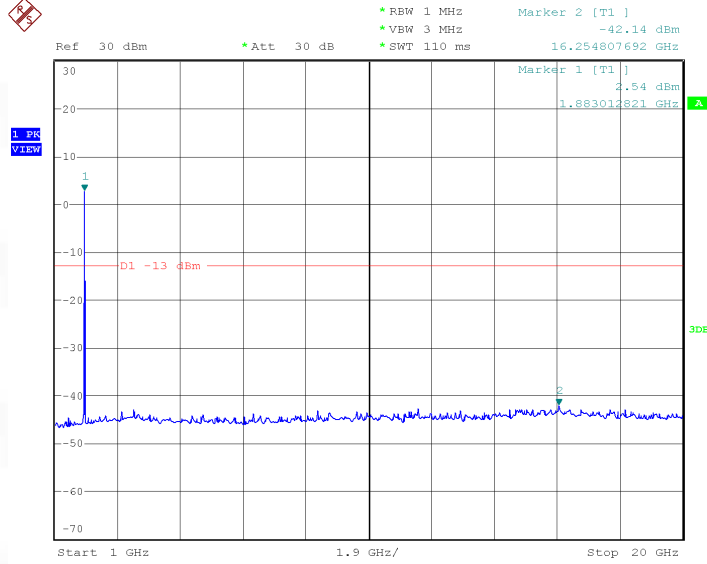
Date: 13.SEP.2023 20:01:39

Conducted Emission Transmitting Mode CH 810 30MHz – 1GHz



Date: 13.SEP.2023 20:04:53

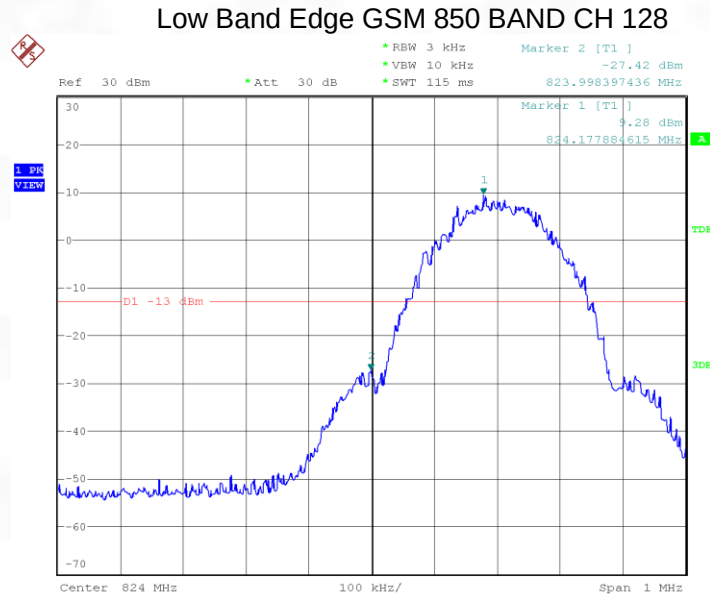
Conducted Emission Transmitting Mode CH 810 1GHz – 20GHz



Date: 13.SEP.2023 20:03:21

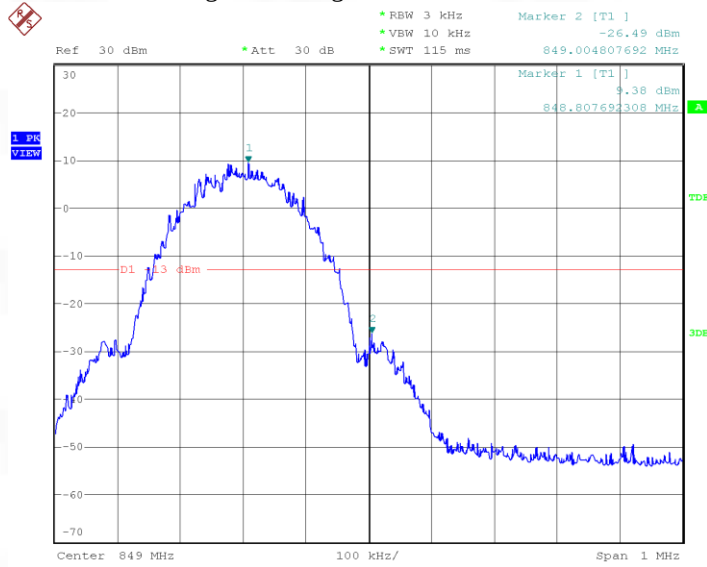
Refer to E-UTRA Annex for LTE Band5, Band41.

A.6 Band Edge Emission



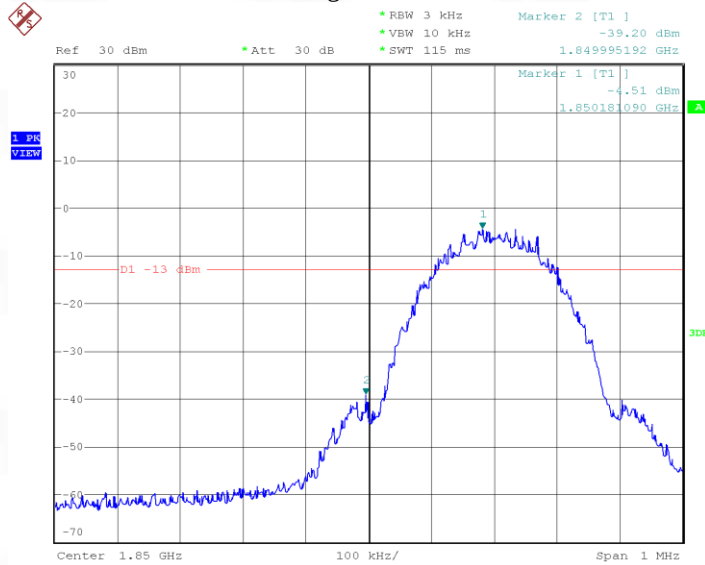
Date: 13.SEP.2023 19:09:07

High Band Edge GSM 850 BAND CH 251



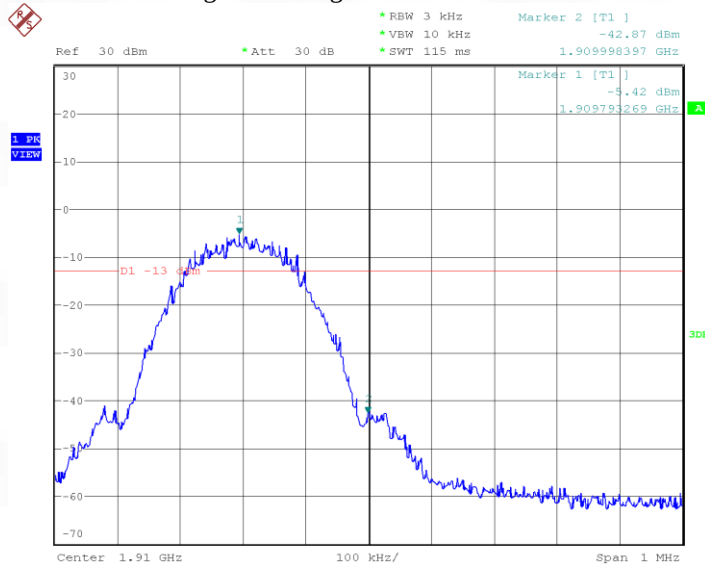
Date: 13.SEP.2023 19:12:52

Low Band Edge PCS 1900 BAND CH 512



Date: 13.SEP.2023 19:45:28

High Band Edge PCS 1900 BAND CH 810



Date: 13.SEP.2023 19:47:14

Refer to E-UTRA Annex for LTE Band5, Band41.

A.7 Field Strength of Spurious Radiation

GSM850:

Mode 1					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
1648.4	-59.12	2.38	-61.50	-13	Horizontal
1648.4	-57.15	2.38	-59.53	-13	Vertical
2472.6	-55.56	2.38	-57.94	-13	Horizontal
2472.6	-55.66	2.38	-58.04	-13	Vertical

Mode 2					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
1673.2	-59.25	2.38	-61.63	-13	Horizontal
1673.2	-59.09	2.38	-61.47	-13	Vertical
2509.8	-58.81	2.38	-61.19	-13	Horizontal
2509.8	-58.92	2.38	-61.30	-13	Vertical

Mode 3					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
1697.6	-58.54	1.48	-60.02	-13	Horizontal
1697.6	-59.44	1.48	-60.92	-13	Vertical
2546.4	-56.76	1.48	-58.24	-13	Horizontal
2546.4	-58.51	1.48	-59.99	-13	Vertical

PCS1900:

Mode 1					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
3700.4	-56.72	1.48	-58.20	-13	Horizontal
3700.4	-60.07	1.48	-61.55	-13	Vertical
5550.6	-56.98	1.48	-58.46	-13	Horizontal
5550.6	-57.63	1.48	-59.11	-13	Vertical

Mode 2					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
3760	-57.02	1.48	-58.50	-13	Horizontal
3760	-55.39	1.48	-56.87	-13	Vertical
5640	-60.74	1.48	-62.22	-13	Horizontal
5640	-56.94	1.48	-58.42	-13	Vertical

Mode 3					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
3819.6	-57.84	1.48	-59.32	-13	Horizontal
3819.6	-57.38	1.48	-58.86	-13	Vertical
5729.4	-60.21	1.48	-61.69	-13	Horizontal
5729.4	-59.76	1.48	-61.24	-13	Vertical

E-UTRA BANDS

BAND 5:

Mode 1					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
1658	-58.02	2.38	-60.40	-13	Horizontal
1658	-55.05	2.38	-57.43	-13	Vertical
2487	-60.45	2.38	-62.83	-13	Horizontal
2487	-55.89	2.38	-58.27	-13	Vertical

Mode 2					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
1673	-57.91	2.38	-60.29	-13	Horizontal
1673	-55.34	2.38	-57.72	-13	Vertical
2509.5	-60.05	2.38	-62.43	-13	Horizontal
2509.5	-57.57	2.38	-59.95	-13	Vertical

Mode 3					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
1688	-58.94	2.38	-61.32	-13	Horizontal
1688	-59.44	2.38	-61.82	-13	Vertical
2532	-59.94	2.38	-62.32	-13	Horizontal
2532	-57.55	2.38	-59.93	-13	Vertical

BAND 41:

Mode 1					
Frequency(MHz)	Power(dBm)	ARpl(dBm)	PMea(dBm)	Limit (dBm)	Polarity
5130	-60.83	1.52	-62.35	-13	Horizontal
5130	-58.10	1.52	-59.62	-13	Vertical
7695	-57.83	1.52	-59.35	-13	Horizontal
7695	-56.48	1.52	-58.00	-13	Vertical

Mode 2					
Frequency(MHz)	Power(dBm)	ARpl(dBm)	PMea(dBm)	Limit (dBm)	Polarity
5210	-55.75	1.52	-57.27	-13	Horizontal
5210	-58.68	1.52	-60.20	-13	Vertical
7815	-56.38	1.52	-57.90	-13	Horizontal
7815	-56.33	1.52	-57.85	-13	Vertical

Mode 3					
Frequency(MHz)	Power(dBm)	ARpl(dBm)	PMea(dBm)	Limit (dBm)	Polarity
5290	-60.69	1.52	-62.21	-13	Horizontal
5290	-57.97	1.52	-59.49	-13	Vertical
7935	-56.64	1.52	-58.16	-13	Horizontal
7935	-55.52	1.52	-57.04	-13	Vertical



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