FCC RF Test Report

APPLICANT	:	Xiaomi Communications Co., Ltd.
EQUIPMENT	:	Mobile Phone
BRAND NAME	:	XIAOMI
MODEL NAME	:	2211133G
FCC ID	:	2AFZZ133G
STANDARD	:	47 CFR Part 2, 22(H), 24(E), 27(L)
CLASSIFICATION	:	PCS Licensed Transmitter Held to Ear (PCE)
TEST DATE(S)	:	Sep. 23, 2022 ~ Oct. 09, 2022

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

This report contains data that were produced under subcontract by Sporton International Inc. (ShenZhen).

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED
Cert #5145.02

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APPENDIX A. TEST RESULTS OF CONDUCTED TEST

APPENDIX B. TEST RESULTS OF RADIATED TEST

APPENDIX C. TEST SETUP PHOTOGRAPHS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG291702A	Rev. 01	Initial issue of report	Nov. 11, 2022

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	-	Report Only	-
	§22.913(a)(5)	Effective Radiated Power	< 7 Watts	PASS	-
	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
	§27.50(d)(4)	Equivalent Isotropic Radiated Power	< 1 Watts	PASS	-
3.5	§24.232(d)	Peak-to-Average Ratio	< 13 dB	PASS	-
3.6	§2.1049	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §22.917(a) §24.238(a) §27.53(h)	Band Edge Measurement	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §22.917(a) §24.238(a) §27.53(h)	Conducted Emission	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §22.355	Frequency Stability for Temperature & Voltage	< 2.5 ppm for Part 22	PASS	-
	§2.1055 §24.235 §27.54		Within Authorized Band		
4.4	§2.1053; §22.917(a); §24.238(a); §27.53(h)	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	PASS	Under limit 21.56 dB at 2509.200 MHz

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Applicant

Xiaomi Communications Co., Ltd.
#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

1.2 Manufacturer

Xiaomi Communications Co., Ltd.
#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	XIAOMI
Model Name	2211133G
FCC ID	2AFZZ133G
IMEI Code	Conducted: 866917060018858/866917060018866 Radiation: 866917060033675/866917060033683
HW Version	P2
SW Version	MIUI 14
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	**GSM/GPRS/EDGE:** 850: 824 MHz ~ 849 MHz 1900: 1850MHz ~ 1910MHz **WCDMA:** Band V: 824 MHz ~ 849 MHz Band II: 1850 MHz ~ 1910 MHz Band IV: 1710 MHz ~ 1755 MHz
Rx Frequency	**GSM/GPRS/EDGE:** 850: 869 MHz ~ 894 MHz 1900: 1930 MHz ~ 1990 MHz **WCDMA:** Band V: 869 MHz ~ 894 MHz Band II: 1930 MHz ~ 1990 MHz Band IV: 2110 MHz ~ 2155 MHz
Maximum Output Power to Antenna	**Ant. 0:** **GSM/GPRS/EDGE:**

	850: 32.88 dBm **WCDMA:** Band V: 24.28 dBm Band IV: 22.39 dBm **Ant. 1:** **GSM/GPRS/EDGE:** 850: 32.91 dBm **WCDMA:** Band V: 24.27 dBm **Ant. 3:** **GSM/GPRS/EDGE:** 1900: 29.74 dBm **WCDMA:** Band II: 24.34 dBm Band IV: 24.21 dBm **Ant. 4:** **GSM/GPRS/EDGE:** 1900: 29.18 dBm **WCDMA:** Band II: 24.08 dBm Band IV: 23.92 dBm **Ant. 6:** Band IV: 23.87 dBm
Antenna Type	PIFA Antenna
Antenna Gain	**Ant. 0:** Cellular Band: -3.7 dBi AWS Band: -4.98 dBi **Ant. 1:** Cellular Band: -3.0 dBi **Ant. 3:** PCS Band: -3.2 dBi AWS Band: -2.4 dBi **Ant. 4:** PCS Band: -1.6 dBi AWS Band: -0.86 dBi **Ant. 6:** AWS Band: -2.7 dBi
Type of Modulation	GSM: GMSK GPRS: GMSK EDGE: GMSK / 8PSK WCDMA : BPSK HSDPA/DC-HSDPA : QPSK HSUPA : QPSK HSPA+ : 16QAM DC-HSDPA : 64QAM

Note: The maximum EIRP/ERP is calculated from max output power and antenna gain, only the maximum EIRP/ERP of antenna 1 for GSM850/ Band V, Antenna 3 for GSM1900 and Antenna 4 for Band II/ Band IV are shown in the report.

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Maximum ERP/EIRP Power, and Emission Designator

FCC Rule	Frequency Band	Frequency Range (MHz)	Type of Modulation	Maximum ERP/EIRP (W)	Emission Designator
Part 22	GSM850 (GSM)	824.2 ~ 848.8	GMSK	0.5970	242KGXW
Part 22	GSM850 (EDGE)	824.2 ~ 848.8	8PSK	0.1439	243KG7W
Part 22	WCDMA Band V	826.4 ~ 846.6	BPSK	0.0817	4M15F9W
Part 24	GSM1900 (GSM)	1850.2 ~ 1909.8	GMSK	0.4416	243KGXW
Part 24	GSM1900 (EDGE)	1850.2 ~ 1909.8	8PSK	0.1607	244KG7W
Part 24	WCDMA Band II	1852.4 ~ 1907.6	BPSK	0.1770	4M15F9W
Part 27	WCDMA Band IV	1712.4 ~ 1752.6	BPSK	0.2023	4M16F9W

1.7 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	TH01-KS	CN1257	314309

Sporton International Inc. (Shenzhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (Shenzhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH01-SZ	CN1256	421272

Note: Test data subcontracted: RSE test case in section 4.4 of this report

1.8 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH01-SZ	AUDIX	E3	6.2009-8-24

1.9 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2, 22(H), 24(E), 27(L)
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Radiated emissions were investigated as following frequency range:

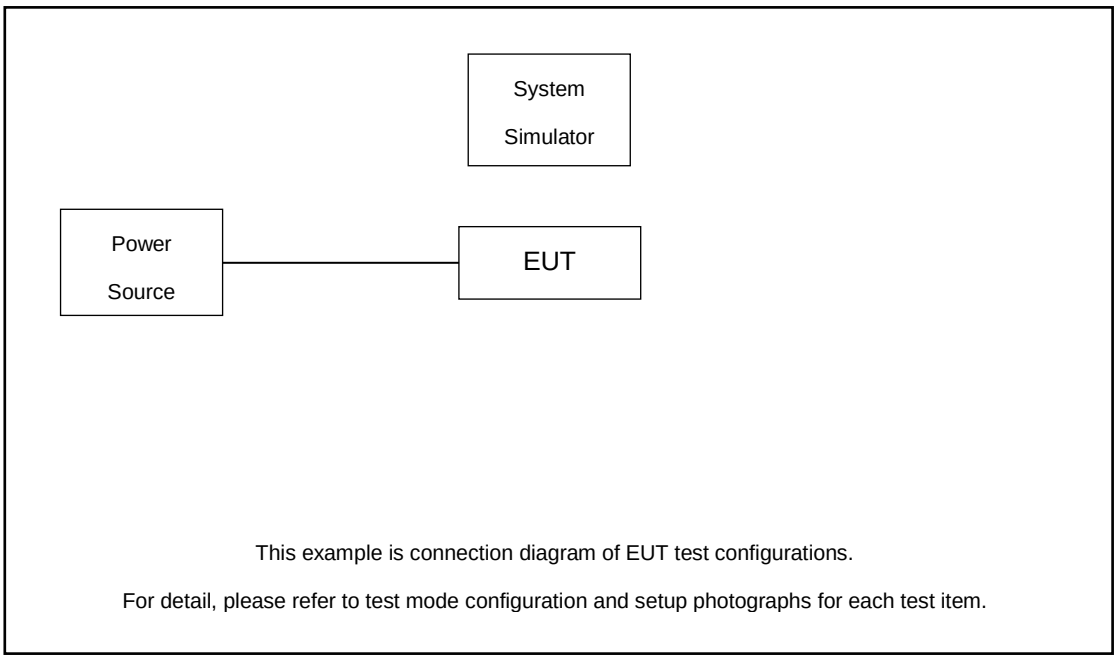
1. 30 MHz to 9000 MHz for GSM850 and WCDMA Band V.
2. 30 MHz to 18000 MHz for WCDMA Band IV.
3. 30 MHz to 19100 MHz for GSM1900 and WCDMA Band II.

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

Test Modes		
Band	**Radiated TCs**	**Conducted TCs**
GSM 850	■ GSM Link ■ EDGE 1 Tx slots Link	■ GSM Link ■ EDGE 1 Tx slots Link
GSM 1900	■ GSM Link ■ EDGE 1 Tx slots Link	■ GSM Link ■ EDGE 1 Tx slots Link
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band II	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band IV	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

2.2 Connection Diagram of Test System



The EUT has been configuration operated in a manner tended to maximize its emission characteristics in a typical application.

2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	Fcc DoC	N/A	Unshielded, 1.8 m

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

The following shows an offset computation example with RF cable loss 4.6 dB and a 10dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.6 + 10 = 14.6 (dB)

2.5 Frequency List of Low/Middle/High Channels

Frequency List				
Band	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
GSM850	Channel	128	189	251
	Frequency	824.2	836.4	848.8
WCDMA Band V	Channel	4132	4182	4233
	Frequency	826.4	836.4	846.6
GSM1900	Channel	512	661	810
	Frequency	1850.2	1880.0	1909.8
WCDMA Band II	Channel	9262	9400	9538
	Frequency	1852.4	1880.0	1907.6
WCDMA Band IV	Channel	1312	1413	1513
	Frequency	1712.4	1732.6	1752.6

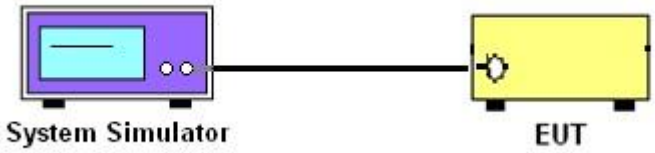
3 Conducted Test Result

3.1 Measuring Instruments

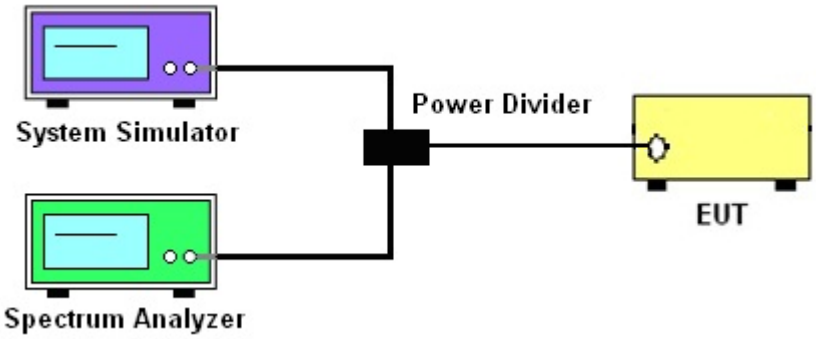
See list of measuring instruments of this test report.

3.2 Test Setup

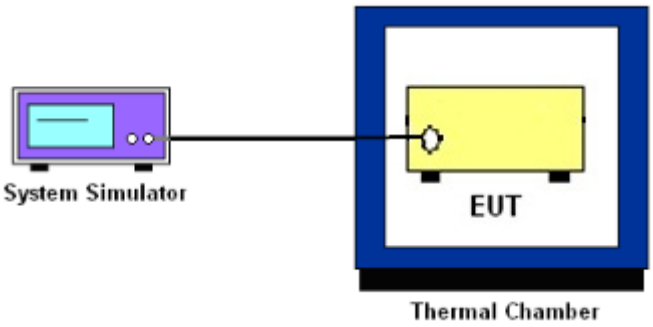
3.2.1 Conducted Output Power



3.2.2 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge and Conducted Spurious Emission



3.2.3 Frequency Stability



3.3 Test Result of Conducted Test

Please refer to Appendix A.

3.4 Conducted Output Power and ERP/EIRP

3.4.1 Description of the Conducted Output Power and ERP/EIRP

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 7 Watts for GSM850 and WCDMA Band V.

The EIRP of mobile transmitters must not exceed 2 Watts for GSM1900 and WCDMA Band II.

The EIRP of mobile transmitters must not exceed 1 Watts for WCDMA Band IV.

According to KDB 412172 D01 Power Approach,

EIRP = $P_T + G_T – L_C$, ERP = EIRP -2.15, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

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

3.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.

3.5 Peak-to-Average Ratio

3.5.1 Description of the PAR Measurement

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

3.5.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2.3.4 (CCDF).
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.

3.6 99% Occupied Bandwidth and 26dB Bandwidth Measurement

3.6.1 Description of 99% Occupied Bandwidth and 26dB Bandwidth Measurement

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

3.6.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.4
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
4. The nominal resolution bandwidth (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.
5. Set the detection mode to peak, and the trace mode to max hold.
6. 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)
7. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
8. 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 the “–X dB down amplitude” determined in step 6. 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.
9. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

3.7 Conducted Band Edge

3.7.1 Description of Conducted Band Edge Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

3.7.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The band edges of low and high channels for the highest RF powers were measured.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

3.8 Conducted Spurious Emission

3.8.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

3.8.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

3.9 Frequency Stability

3.9.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

3.9.2 Test Procedures for Temperature Variation

1. The testing follows ANSI C63.26 section 5.6.4
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.9.3 Test Procedures for Voltage Variation

1. The testing follows ANSI C63.26 section 5.6.5
2. The EUT was placed in a temperature chamber at 20±5°C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value for other than hand carried battery equipment.
4. For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
5. The variation in frequency was measured for the worst case.

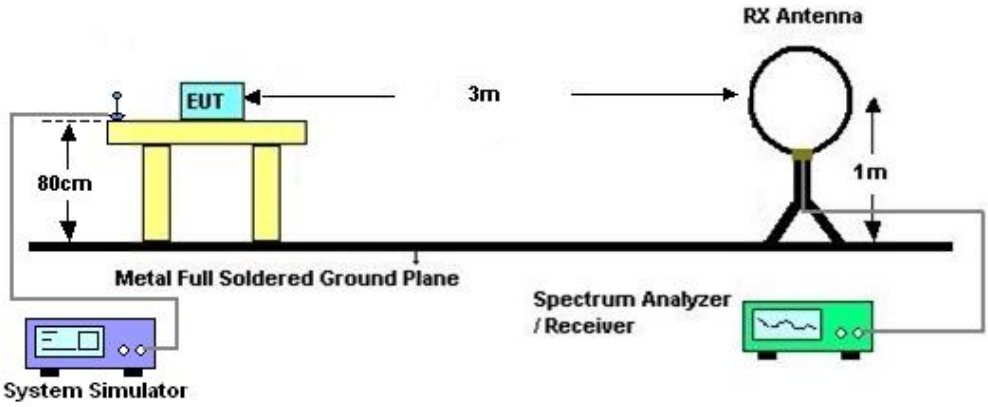
4 Radiated Test Items

4.1 Measuring Instruments

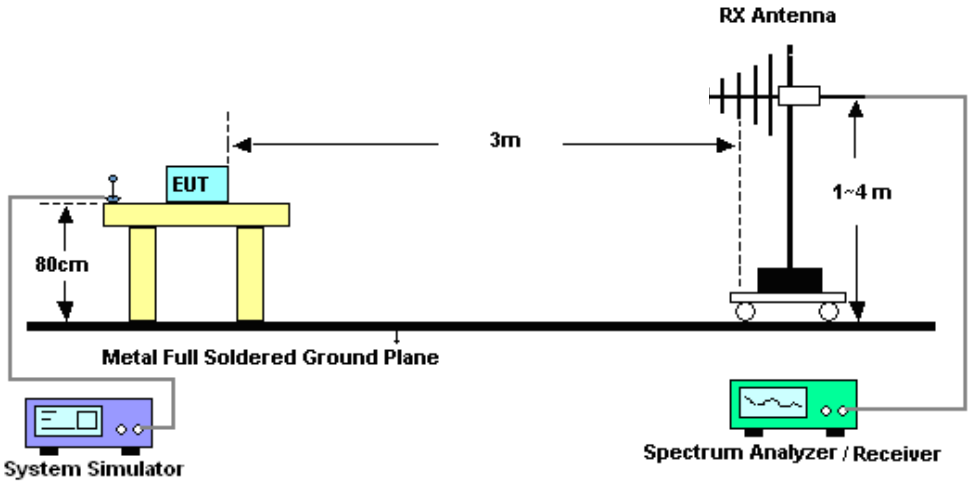
See list of measuring instruments of this test report.

4.2 Test Setup

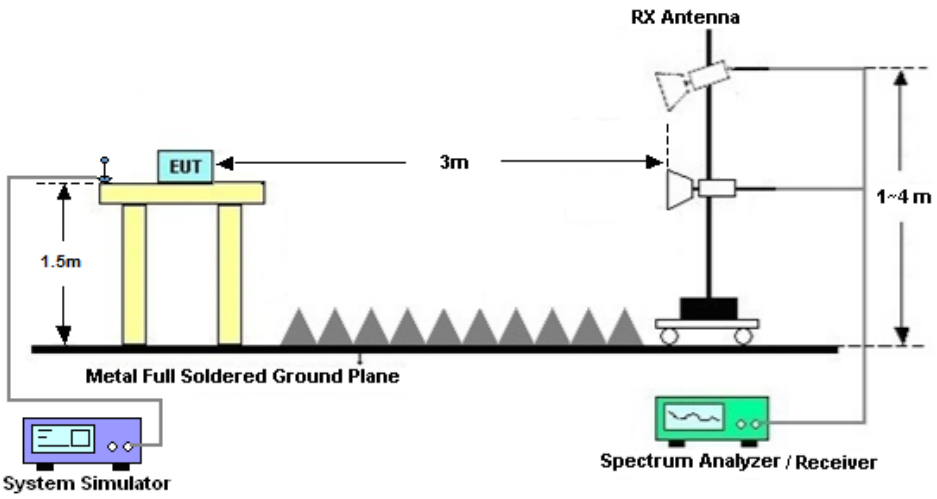
4.2.1 For radiated test below 30MHz



4.2.2 For radiated test from 30MHz to 1GHz



4.2.3 For radiated test above 1GHz



4.3 Test Result of Radiated Test

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

Please refer to Appendix B.

4.4 Field Strength of Spurious Radiation Measurement

4.4.1 Description of Field Strength of Spurious Radiated Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a rotatable wooden table 0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
12. ERP (dBm) = EIRP - 2.15
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 14, 2021	Sep. 23, 2022	Oct. 13, 2022	Conducted (TH01-KS)
Power divider	STI	STI08-0055	-	0.5~40GHz	Aug. 26, 2022	Sep. 23, 2022	Aug. 25, 2023	Conducted (TH01-KS)
Temperature &humidity chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jul. 15, 2022	Sep. 23, 2022	Jul. 14, 2023	Conducted (TH01-KS)
EMI Test Receiver&SA	Agilent	N9038A	MY52260185	20Hz~26.5GHz	Dec. 27, 2021	Oct. 09, 2022	Dec. 26, 2022	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jul. 28, 2022	Oct. 09, 2022	Jul. 27, 2023	Radiation (03CH01-SZ)
HF Amplifier	KEYSIGHT	83017A	MY53270105	0.5GHz~26.5Ghz	Oct. 22, 2021	Oct. 09, 2022	Oct. 21, 2022	Radiation (03CH01-SZ
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	Sep. 28, 2022	Oct. 09, 2022	Sep. 27, 2023	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Jul. 07, 2022	Oct. 09, 2022	Jul. 06, 2023	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 10, 2022	Oct. 09, 2022	Apr. 09 2023	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 06, 2022	Oct. 09, 2022	Apr. 05, 2023	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-00 101800-30-1	1943528	1GHz~18GHz	Oct. 22, 2021	Oct. 09, 2022	Oct. 21, 2022	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35 -HG	1871923	18GHz~40GHz	Jul. 06, 2022	Oct. 09, 2022	Jul. 05, 2023	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Oct. 09, 2022	NCR	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Oct. 09, 2022	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Oct. 09, 2022	NCR	Radiation (03CH01-SZ)

NCR: No Calibration Required

6 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Power	±0.46 dB
Conducted Emissions	±0.48 dB
Occupied Channel Bandwidth	±0.10 %

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.5dB

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.5dB

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.0dB

---------- THE END ----------

Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

GSM850-Ant 1	Burst Average Power (dBm)		
TX Channel	128	189	251
Frequency (MHz)	824.2	836.4	848.8
GSM 1 Tx slot	32.79	32.74	32.91
GPRS 1 Tx slot	32.71	32.69	32.85
GPRS 2 Tx slots	29.81	29.67	29.72
GPRS 3 Tx slots	27.85	27.78	27.82
GPRS 4 Tx slots	26.42	26.44	26.33
EDGE 1 Tx slot	26.67	26.59	26.73
EDGE 2 Tx slots	23.62	23.57	23.62
EDGE 3 Tx slots	21.68	21.62	21.78
EDGE 4 Tx slots	20.56	20.51	20.68

GSM1900-Ant 3	Burst Average Power (dBm)		
TX Channel	512	661	810
Frequency (MHz)	1850.2	1880	1909.8
GSM 1 Tx slot	29.65	29.58	29.74
GPRS 1 Tx slot	29.59	29.51	29.66
GPRS 2 Tx slots	26.53	26.47	26.61
GPRS 3 Tx slots	24.65	24.48	24.65
GPRS 4 Tx slots	23.42	23.46	23.42
EDGE 1 Tx slot	25.25	25.09	25.26
EDGE 2 Tx slots	22.61	22.44	22.53
EDGE 3 Tx slots	20.51	20.47	20.65
EDGE 4 Tx slots	19.34	19.22	19.45

Band		WCDMA V-Ant 1		
TX Channel		4132	4182	4233
Rx Channel		4357	4407	4458
Frequency (MHz)		826.4	836.4	846.6
3GPP Rel 99	AMR 12.2Kbps	24.16	24.21	24.12
3GPP Rel 99	RMC 12.2Kbps	24.23	24.27	24.19
3GPP Rel 6	HSDPA Subtest-1	23.18	23.33	23.27
3GPP Rel 6	HSDPA Subtest-2	23.28	23.26	23.17
3GPP Rel 6	HSDPA Subtest-3	22.62	22.75	22.73
3GPP Rel 6	HSDPA Subtest-4	22.70	22.89	22.68
3GPP Rel 8	DC-HSDPA Subtest-1	23.27	23.39	23.20
3GPP Rel 8	DC-HSDPA Subtest-2	23.23	23.36	23.27
3GPP Rel 8	DC-HSDPA Subtest-3	22.65	22.87	22.75
3GPP Rel 8	DC-HSDPA Subtest-4	22.80	22.87	22.64
3GPP Rel 6	HSUPA Subtest-1	23.18	23.39	23.35
3GPP Rel 6	HSUPA Subtest-2	21.18	21.38	21.29
3GPP Rel 6	HSUPA Subtest-3	22.32	22.36	22.14
3GPP Rel 6	HSUPA Subtest-4	21.11	21.34	21.23
3GPP Rel 6	HSUPA Subtest-5	23.18	23.26	23.17
3GPP Rel 7	HSPA+ (16QAM) Subtest-1	20.80	20.77	20.73

Band		WCDMA II-Ant 4		
TX Channel		9262	9400	9538
Rx Channel		9662	9800	9938
Frequency (MHz)		1852.4	1880	1907.6
3GPP Rel 99	AMR 12.2Kbps	23.83	24.00	23.93
3GPP Rel 99	RMC 12.2Kbps	23.94	24.08	24.01
3GPP Rel 6	HSDPA Subtest-1	22.83	22.98	22.97
3GPP Rel 6	HSDPA Subtest-2	22.91	22.97	22.96
3GPP Rel 6	HSDPA Subtest-3	22.39	22.52	22.36
3GPP Rel 6	HSDPA Subtest-4	22.34	22.47	22.40
3GPP Rel 8	DC-HSDPA Subtest-1	22.92	23.07	22.71
3GPP Rel 8	DC-HSDPA Subtest-2	22.98	22.97	22.79
3GPP Rel 8	DC-HSDPA Subtest-3	22.51	22.54	22.21
3GPP Rel 8	DC-HSDPA Subtest-4	22.48	22.59	22.53
3GPP Rel 6	HSUPA Subtest-1	22.94	22.99	22.92
3GPP Rel 6	HSUPA Subtest-2	20.91	20.96	20.92
3GPP Rel 6	HSUPA Subtest-3	21.89	22.04	21.96
3GPP Rel 6	HSUPA Subtest-4	20.95	21.01	20.86
3GPP Rel 6	HSUPA Subtest-5	22.93	22.99	22.96
3GPP Rel 7	HSPA+ (16QAM) Subtest-1	20.37	20.52	20.37

Band		WCDMA IV-Ant 4		
TX Channel		9262	9400	9538
Rx Channel		9662	9800	9938
Frequency (MHz)		1852.4	1880	1907.6
3GPP Rel 99	AMR 12.2Kbps	23.80	23.86	23.75
3GPP Rel 99	RMC 12.2Kbps	23.88	23.92	23.81
3GPP Rel 6	HSDPA Subtest-1	22.78	22.94	22.72
3GPP Rel 6	HSDPA Subtest-2	22.84	22.87	22.72
3GPP Rel 6	HSDPA Subtest-3	22.14	22.34	22.24
3GPP Rel 6	HSDPA Subtest-4	22.21	22.43	22.30
3GPP Rel 8	DC-HSDPA Subtest-1	22.80	22.84	22.64
3GPP Rel 8	DC-HSDPA Subtest-2	22.78	22.93	22.75
3GPP Rel 8	DC-HSDPA Subtest-3	22.21	22.43	22.17
3GPP Rel 8	DC-HSDPA Subtest-4	22.34	22.36	22.28
3GPP Rel 6	HSUPA Subtest-1	22.76	22.94	22.92
3GPP Rel 6	HSUPA Subtest-2	20.79	20.94	20.85
3GPP Rel 6	HSUPA Subtest-3	21.80	21.89	21.74
3GPP Rel 6	HSUPA Subtest-4	20.71	20.87	20.87
3GPP Rel 6	HSUPA Subtest-5	22.75	22.84	22.76
3GPP Rel 7	HSPA+ (16QAM) Subtest-1	20.34	20.30	20.31

ERP/EIRP

GSM850 (G_T - L_C= -3.0 dB)			
Channel	128	189	251
	(Low)	(Mid)	(High)
Frequency (MHz)	824.2	836.4	848.8
Conducted Power (dBm)	32.79	32.74	32.91
Conducted Power (Watts)	1.9011	1.8793	1.9543
ERP(dBm)	27.64	27.59	27.76
ERP(Watts)	0.5808	0.5741	0.5970

EDGE850 (G_T - L_C= -3.0 dB)			
Channel	128	189	251
	(Low)	(Mid)	(High)
Frequency (MHz)	824.2	836.4	848.8
Conducted Power (dBm)	26.67	26.59	26.73
Conducted Power (Watts)	0.4645	0.4560	0.4710
ERP(dBm)	21.52	21.44	21.58
ERP(Watts)	0.1419	0.1393	0.1439

GSM1900 (G_T - L_C= -3.2 dB)			
Channel	512	661	810
	(Low)	(Mid)	(High)
Frequency (MHz)	1850.2	1880	1909.8
Conducted Power (dBm)	29.65	29.58	29.74
Conducted Power (Watts)	0.9226	0.9078	0.9419
EIRP(dBm)	26.45	26.38	26.54
EIRP(Watts)	0.4416	0.4345	0.4508

EDGE1900 (G_T - L_C= -3.2 dB)			
Channel	512	661	810
	(Low)	(Mid)	(High)
Frequency (MHz)	1850.2	1880	1909.8
Conducted Power (dBm)	25.25	25.09	25.26
Conducted Power (Watts)	0.3350	0.3228	0.3357
EIRP(dBm)	22.05	21.89	22.06
EIRP(Watts)	0.1603	0.1545	0.1607

WCDMA Band V (G_T - L_C = -3.0 dB)			
Channel	4132	4182	4233
	(Low)	(Mid)	(High)
Frequency (MHz)	826.4	836.4	846.6
Conducted Power (dBm)	24.23	24.27	24.19
Conducted Power (Watts)	0.2649	0.2673	0.2624
ERP(dBm)	19.08	19.12	19.04
ERP(Watts)	0.0809	0.0817	0.0802

WCDMA Band II (G_T - L_C = -1.6 dB)			
Channel	9262	9400	9538
	(Low)	(Mid)	(High)
Frequency (MHz)	1852.4	1880	1907.6
Conducted Power (dBm)	23.94	24.08	24.01
Conducted Power (Watts)	0.2477	0.2559	0.2518
EIRP(dBm)	22.34	22.48	22.41
EIRP(Watts)	0.1714	0.1770	0.1742

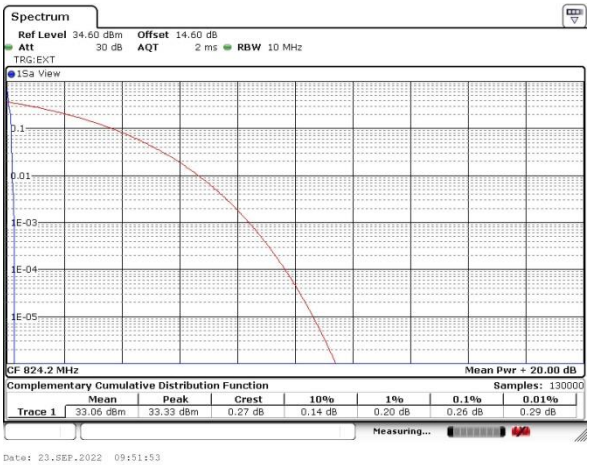
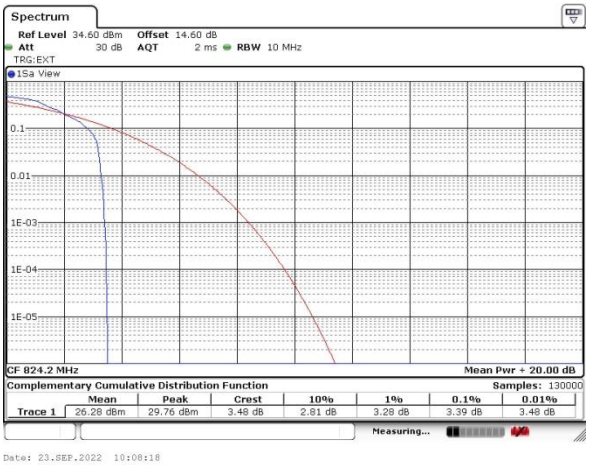
WCDMA Band IV (G_T - L_C = -0.86 dB)			
Channel	1312	1413	1513
	(Low)	(Mid)	(High)
Frequency (MHz)	1712.4	1732.6	1752.6
Conducted Power (dBm)	23.88	23.92	23.81
Conducted Power (Watts)	0.2443	0.2466	0.2404
EIRP(dBm)	23.02	23.06	22.95
EIRP(Watts)	0.2004	0.2023	0.1972

A1. GSM

Peak-to-Average Ratio

Mode	GSM850		Limit: 13dB
Mod.	GSM	EDGE class 8	Result
Lowest CH	0.26	3.39	PASS
Middle CH	0.23	3.45	
Highest CH	0.26	3.30	

Mode	GSM1900		Limit: 13dB
Mod.	GSM	EDGE class 8	Result
Lowest CH	0.43	3.62	PASS
Middle CH	0.38	3.77	
Highest CH	0.35	3.48	

GSM850 (GSM)	GSM850 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
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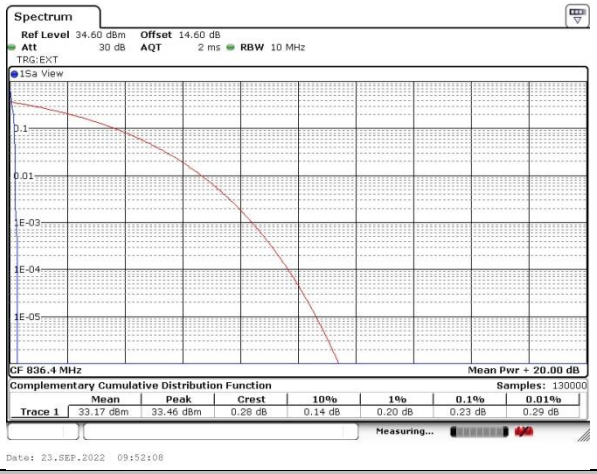
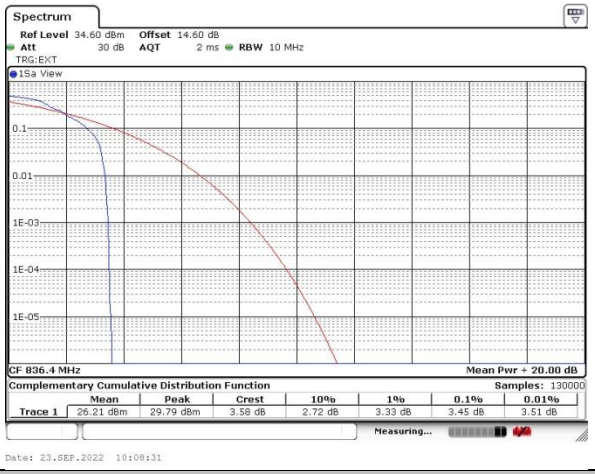
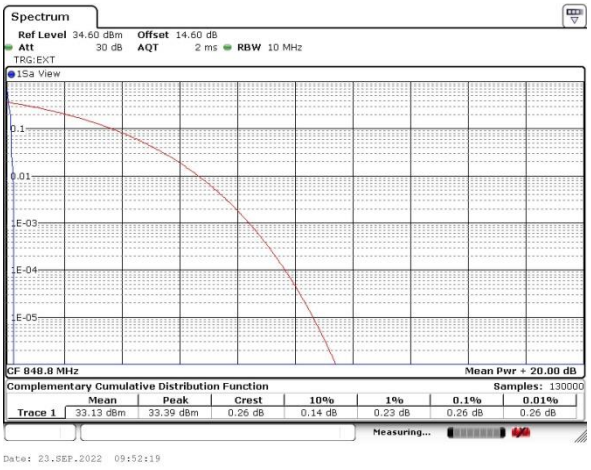
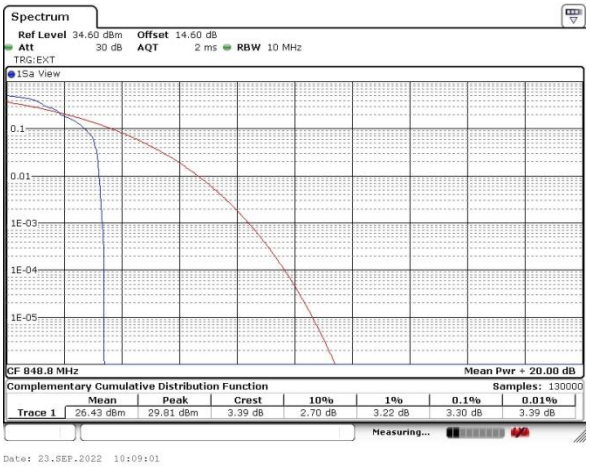
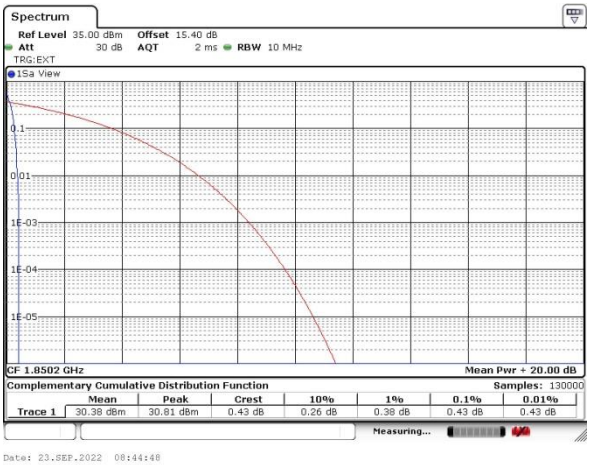
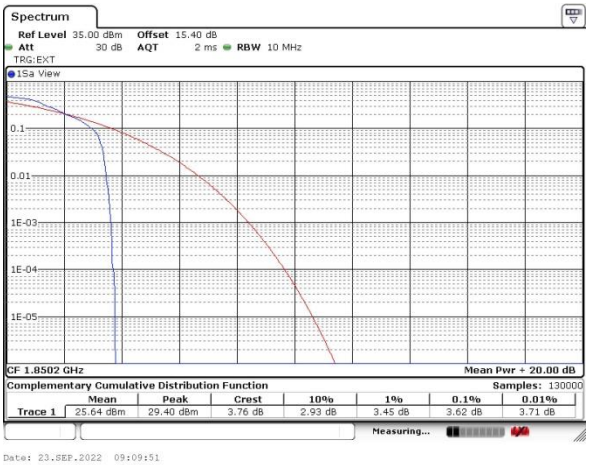
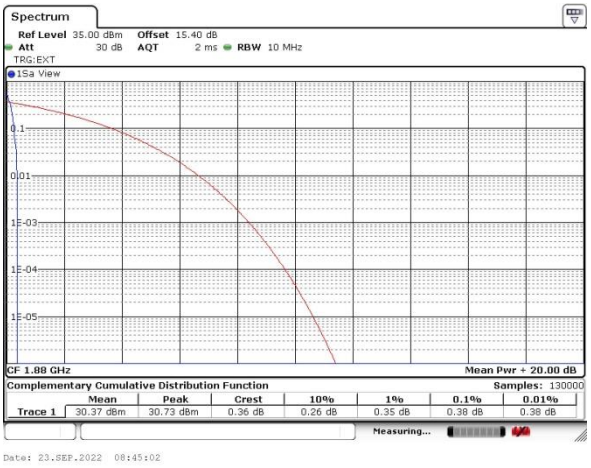
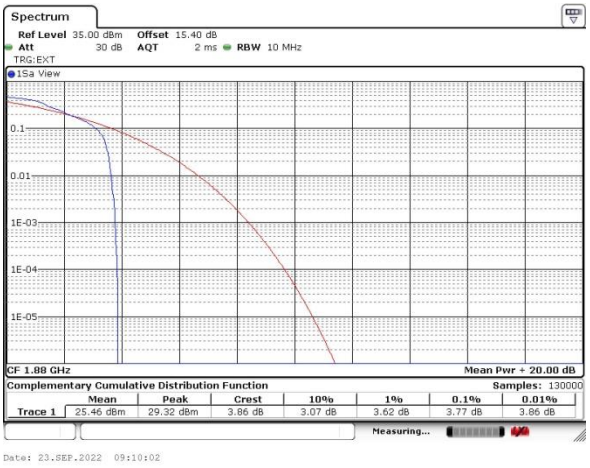
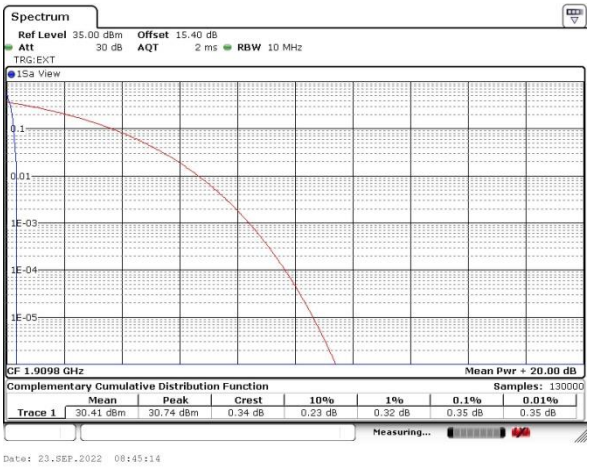
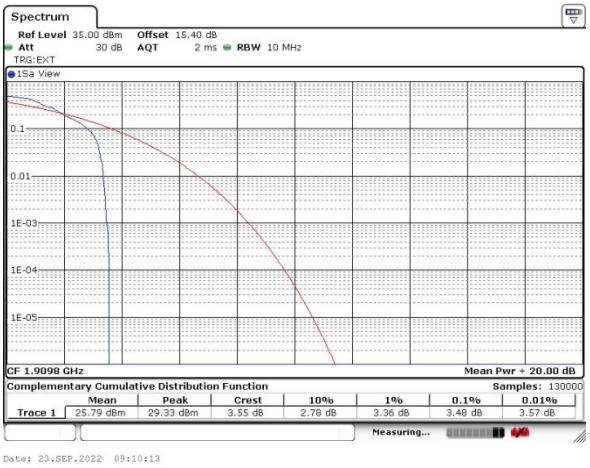
	
Highest Channel	**Highest Channel**
	

GSM1900 (GSM)	GSM1900 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

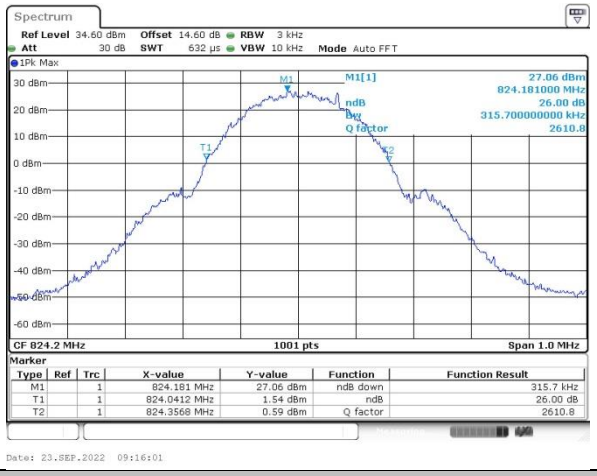
26dB Bandwidth

Mode	GSM850(MHz)	
Mod.	GSM	EDGE class 8
Lowest CH	0.316	0.312
Middle CH	0.314	0.310
Highest CH	0.316	0.315

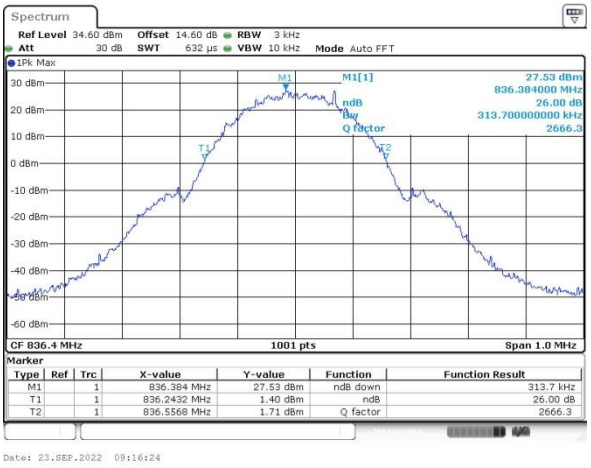
Mode	GSM1900(MHz)	
Mod.	GSM	EDGE class 8
Lowest CH	0.311	0.310
Middle CH	0.312	0.312
Highest CH	0.311	0.306

GSM850 (GSM)

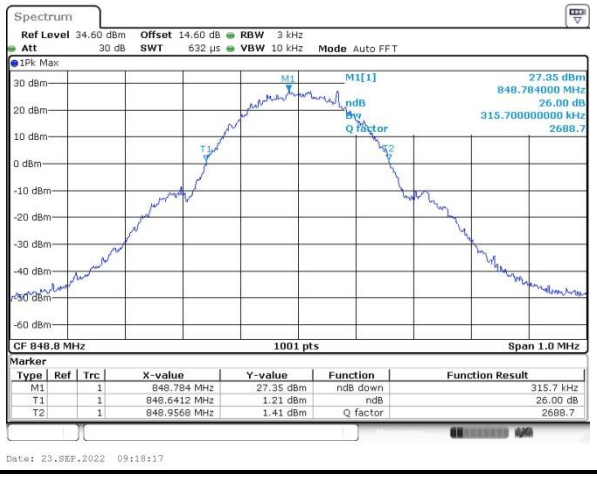
Lowest Channel



Middle Channel

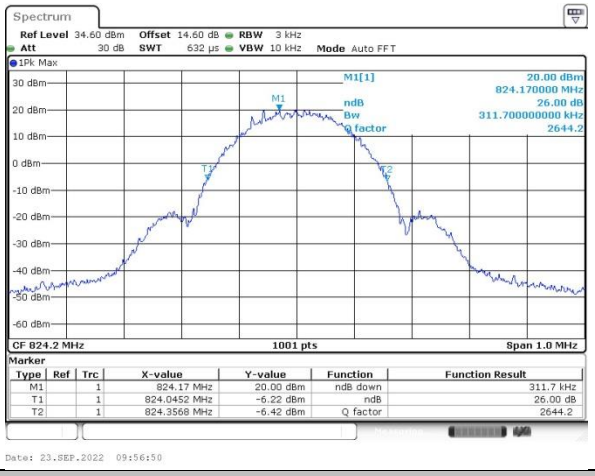


Highest Channel

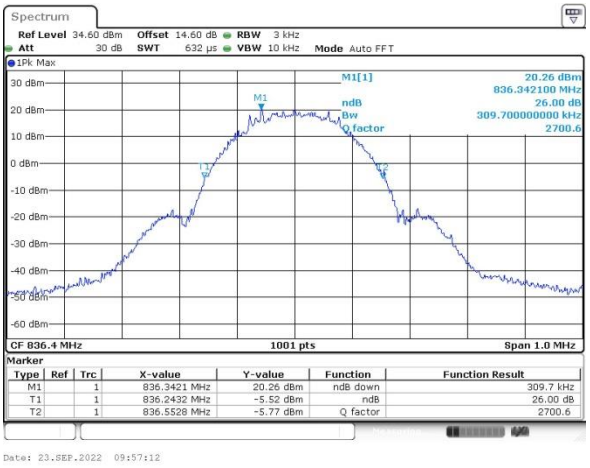


GSM850 (EDGE class 8)

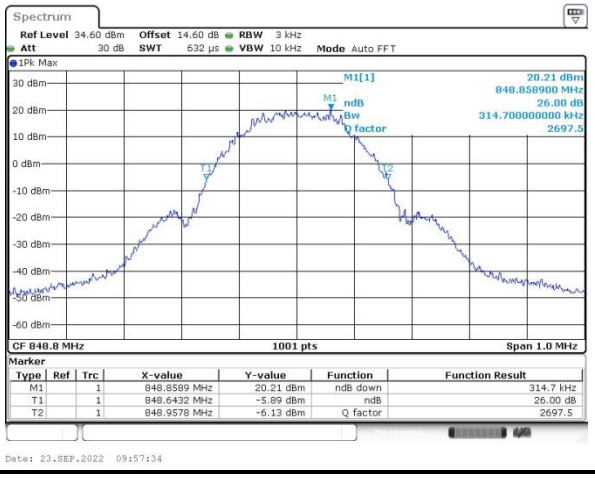
Lowest Channel

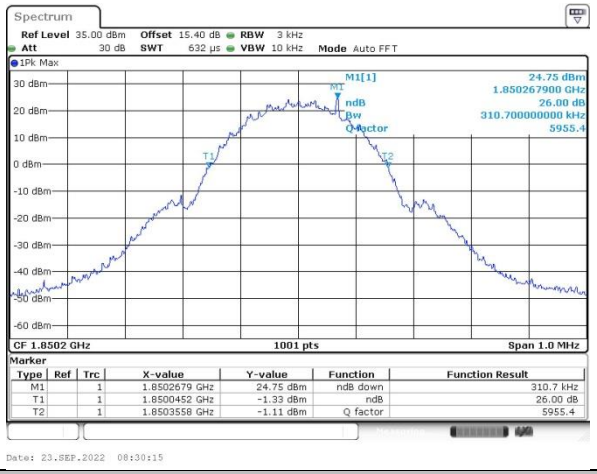
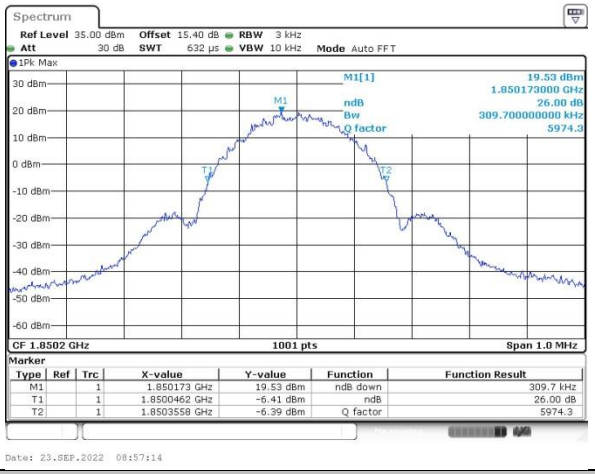
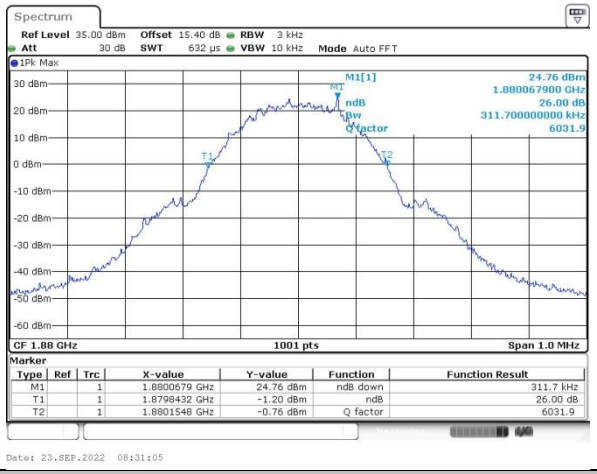
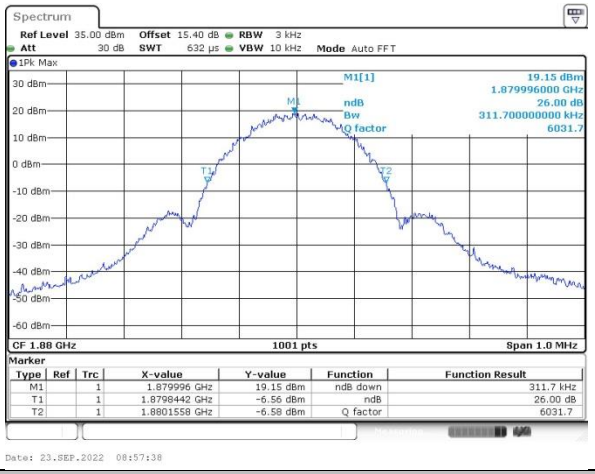
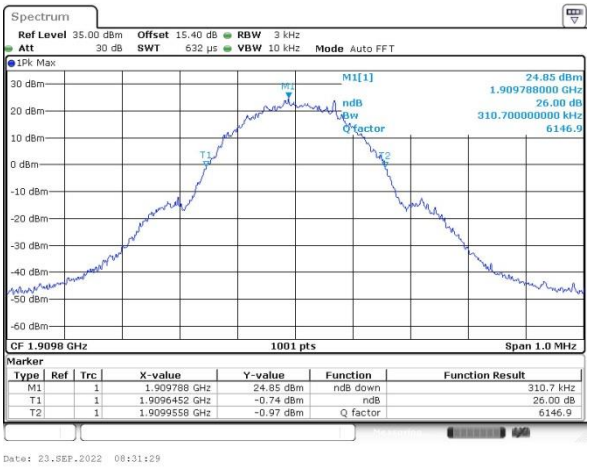
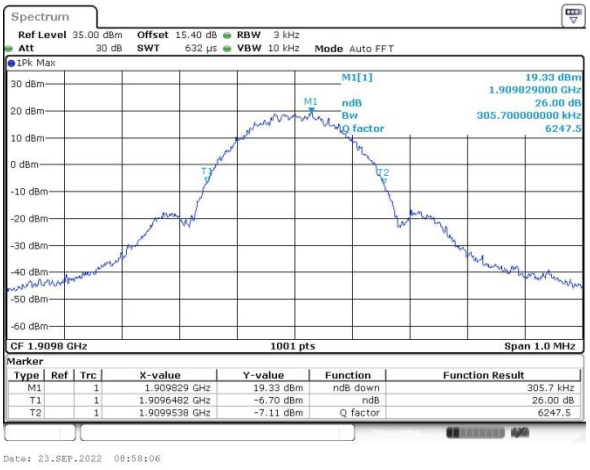


Middle Channel



Highest Channel

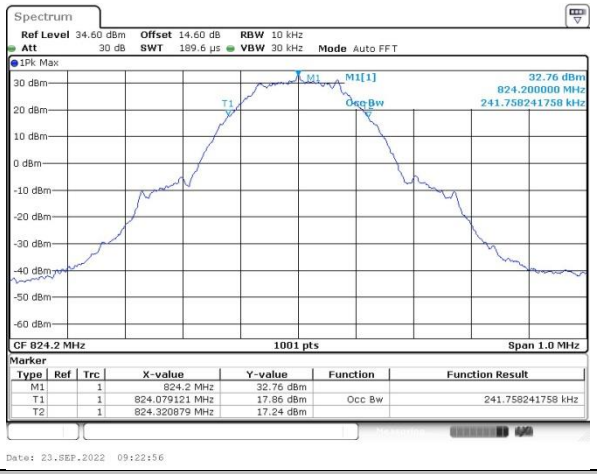
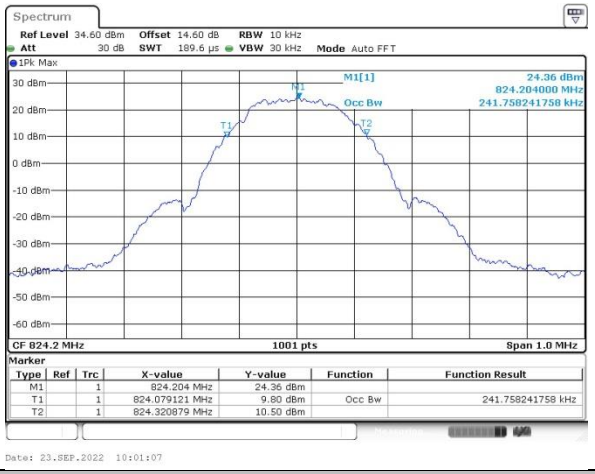
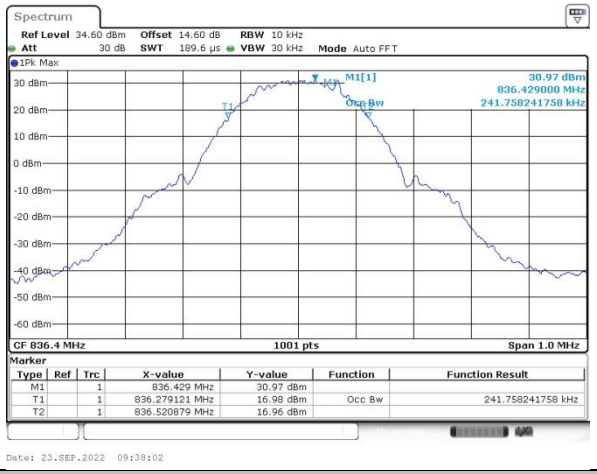
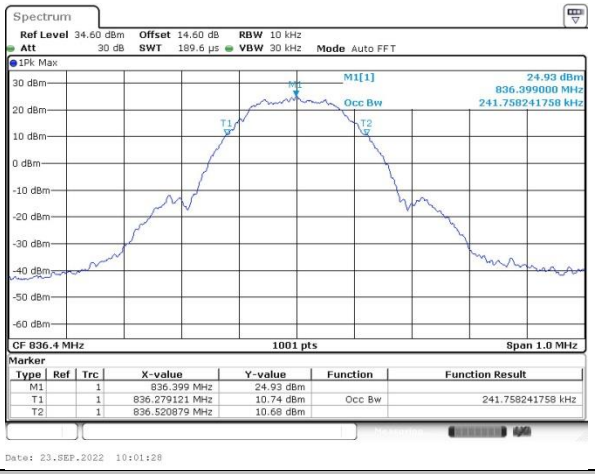


GSM1900 (GSM)	GSM1900 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

Occupied Bandwidth

Mode	GSM850(MHz)	
Mod.	GSM	EDGE class 8
Lowest CH	0.242	0.242
Middle CH	0.242	0.242
Highest CH	0.240	0.243

Mode	GSM1900(MHz)	
Mod.	GSM	EDGE class 8
Lowest CH	0.241	0.244
Middle CH	0.242	0.242
Highest CH	0.243	0.243

GSM850 (GSM)	GSM850 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
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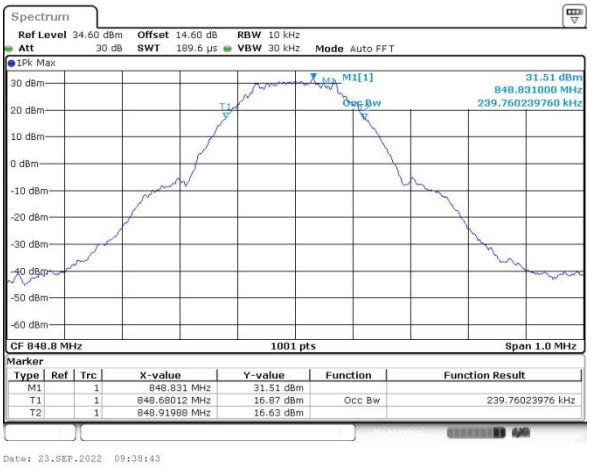
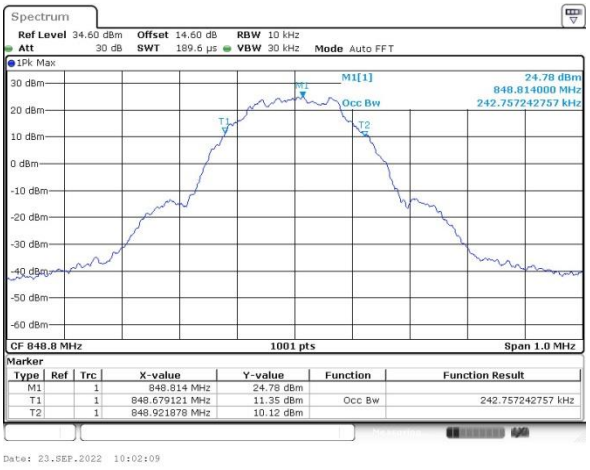
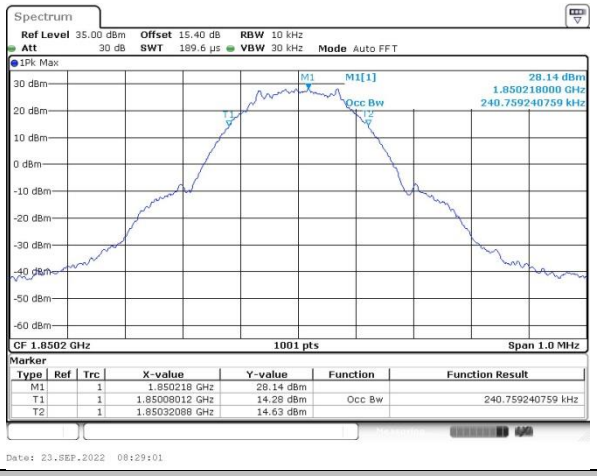
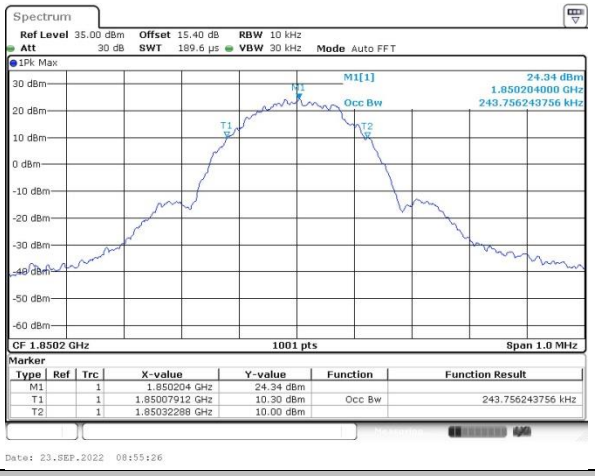
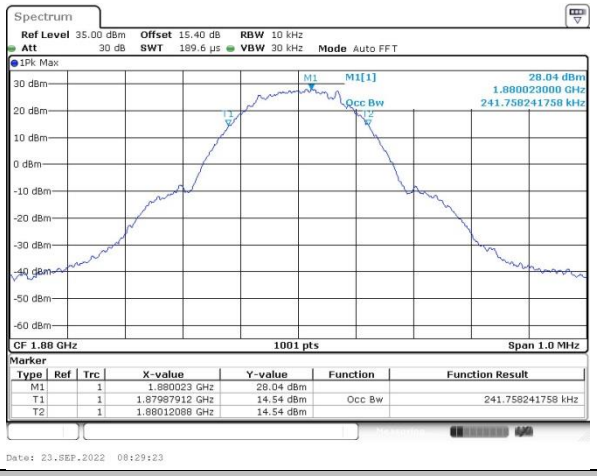
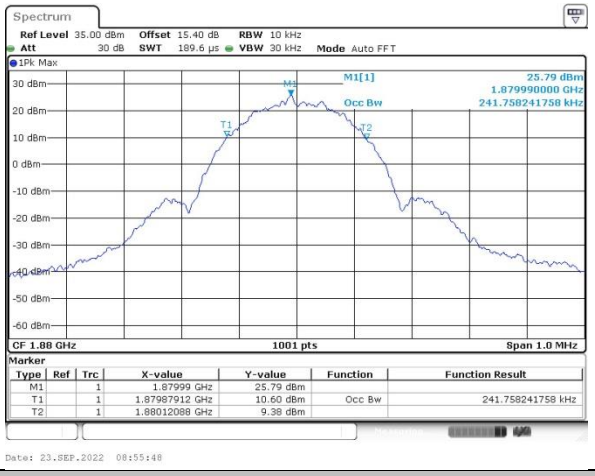
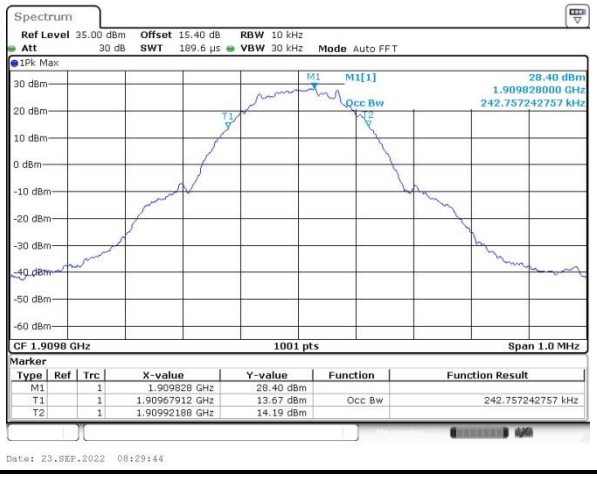
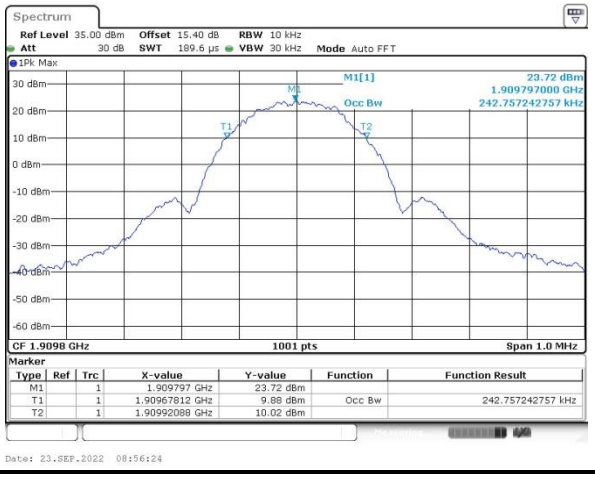
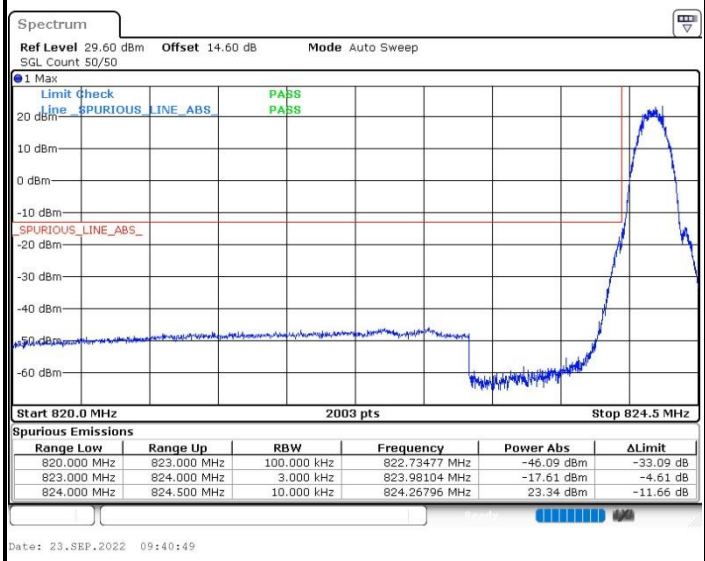
	

GSM1900 (GSM)	GSM1900 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Cannel**
	

Conducted Band Edge

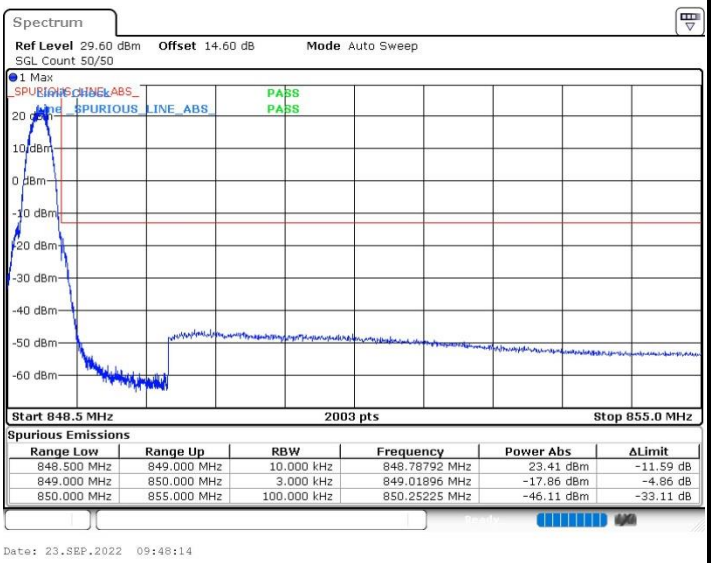
GSM850 (GSM)	
Lowest Band Edge	**Highest Band Edge**



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
820.000 MHz	823.000 MHz	100.000 kHz	822.73477 MHz	-46.09 dBm	-33.09 dB
823.000 MHz	824.000 MHz	3.000 kHz	823.98104 MHz	-17.61 dBm	-4.61 dB
824.000 MHz	824.500 MHz	10.000 kHz	824.26796 MHz	23.34 dBm	-11.66 dB

Date: 23.SEP.2022 09:40:49



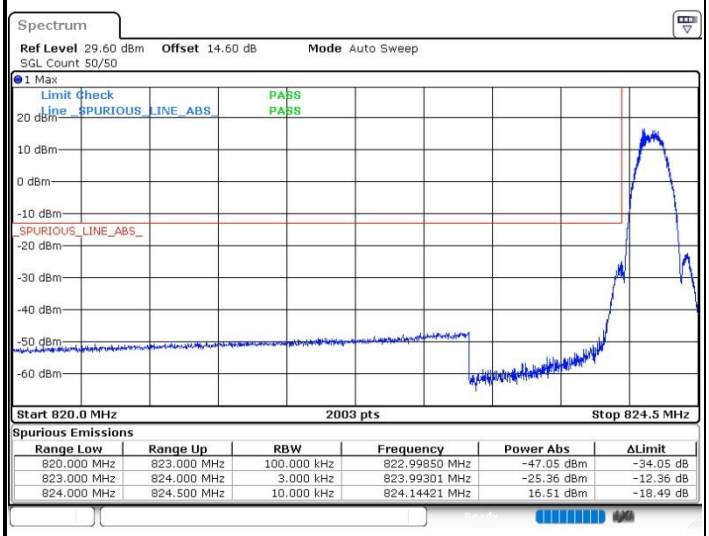
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
848.500 MHz	849.000 MHz	10.000 kHz	848.78792 MHz	23.41 dBm	-11.59 dB
849.000 MHz	850.000 MHz	3.000 kHz	849.01896 MHz	-17.86 dBm	-4.86 dB
850.000 MHz	855.000 MHz	100.000 kHz	850.25225 MHz	-46.11 dBm	-33.11 dB

Date: 23.SEP.2022 09:48:14

GSM850 (EDGE class 8)

Lowest Band Edge

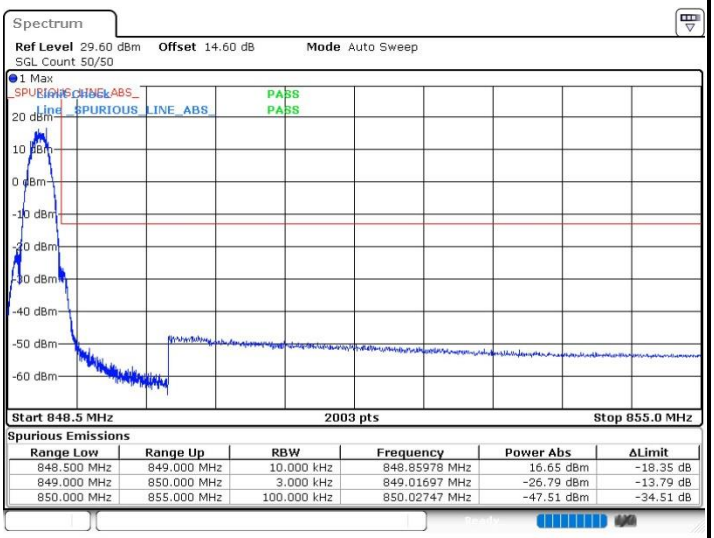


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
820.000 MHz	823.000 MHz	100.000 kHz	822.99850 MHz	-47.05 dBm	-34.05 dB
823.000 MHz	824.000 MHz	3.000 kHz	823.99301 MHz	-25.36 dBm	-12.36 dB
824.000 MHz	824.500 MHz	10.000 kHz	824.14421 MHz	16.51 dBm	-18.49 dB

Date: 23.SEP.2022 10:04:25

Highest Band Edge



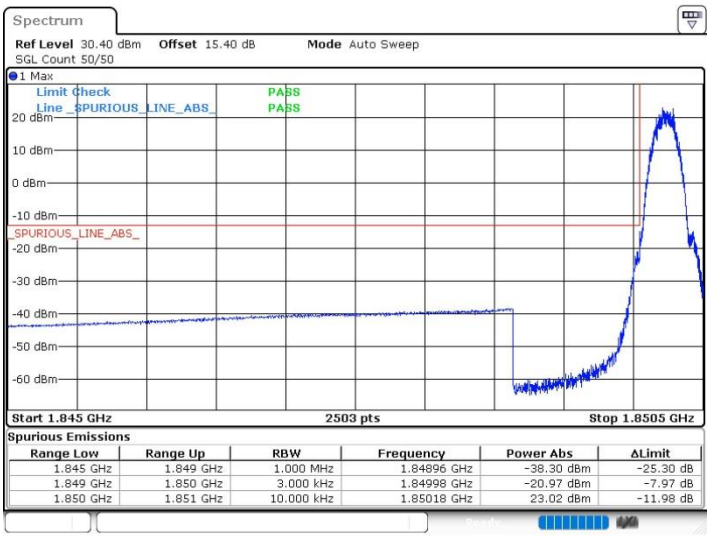
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
848.500 MHz	849.000 MHz	10.000 kHz	848.85978 MHz	16.65 dBm	-18.35 dB
849.000 MHz	850.000 MHz	3.000 kHz	849.01697 MHz	-26.79 dBm	-13.79 dB
850.000 MHz	855.000 MHz	100.000 kHz	850.02747 MHz	-47.51 dBm	-34.51 dB

Date: 23.SEP.2022 10:06:04

GSM1900 (GSM)

Lowest Band Edge

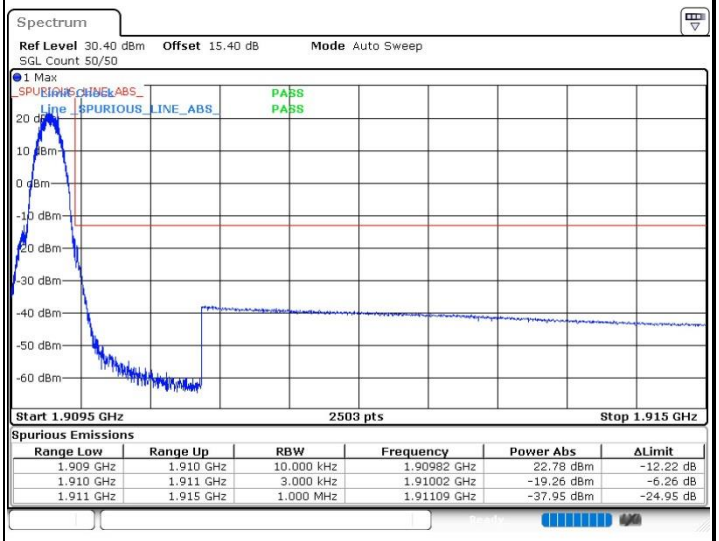


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.845 GHz	1.849 GHz	1.000 MHz	1.84896 GHz	-38.30 dBm	-25.30 dB
1.849 GHz	1.850 GHz	3.000 kHz	1.84998 GHz	-20.97 dBm	-7.97 dB
1.850 GHz	1.851 GHz	10.000 kHz	1.85018 GHz	23.02 dBm	-11.98 dB

Date: 23.SEP.2022 08:33:57

Highest Band Edge

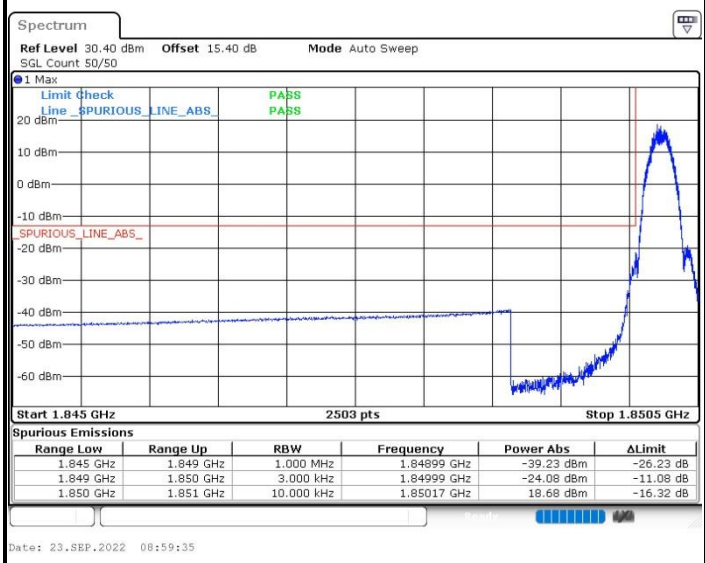


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.909 GHz	1.910 GHz	10.000 kHz	1.90982 GHz	22.78 dBm	-12.22 dB
1.910 GHz	1.911 GHz	3.000 kHz	1.91002 GHz	-19.26 dBm	-6.26 dB
1.911 GHz	1.915 GHz	1.000 MHz	1.91109 GHz	-37.95 dBm	-24.95 dB

Date: 23.SEP.2022 08:35:28

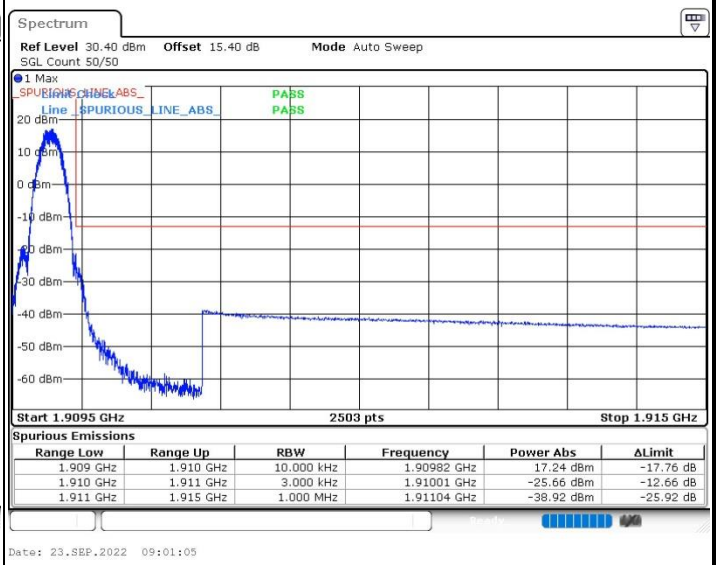
GSM1900 (EDGE class 8)	
Lowest Band Edge	**Highest Band Edge**



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.845 GHz	1.849 GHz	1.000 MHz	1.84899 GHz	-39.23 dBm	-26.23 dB
1.849 GHz	1.850 GHz	3.000 kHz	1.84999 GHz	-24.08 dBm	-11.08 dB
1.850 GHz	1.851 GHz	10.000 kHz	1.85017 GHz	18.68 dBm	-16.32 dB

Date: 23.SEP.2022 08:59:35



Spurious Emissions

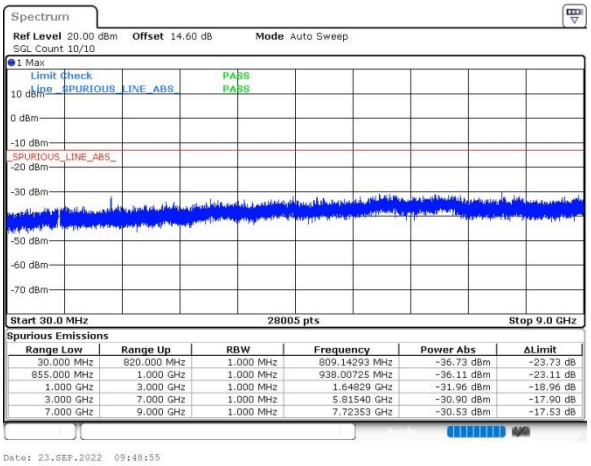
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.909 GHz	1.910 GHz	10.000 kHz	1.90982 GHz	17.24 dBm	-17.76 dB
1.910 GHz	1.911 GHz	3.000 kHz	1.91001 GHz	-25.66 dBm	-12.66 dB
1.911 GHz	1.915 GHz	1.000 MHz	1.91104 GHz	-38.92 dBm	-25.92 dB

Date: 23.SEP.2022 09:01:05

Conducted Spurious Emission

GSM850 (GSM)

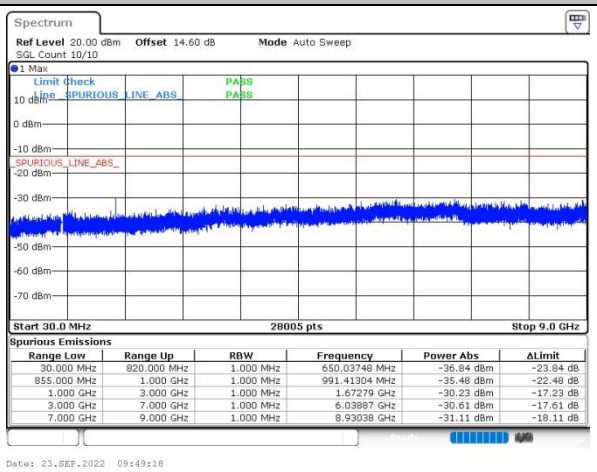
Lowest Channel



Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	809.14293 MHz	-36.73 dBm	-23.73 dB
855.000 MHz	1.000 GHz	1.000 MHz	938.00725 MHz	-36.11 dBm	-23.11 dB
1.000 GHz	3.000 GHz	1.000 MHz	1.64829 GHz	-31.96 dBm	-18.96 dB
3.000 GHz	7.000 GHz	1.000 MHz	5.81540 GHz	-30.90 dBm	-17.90 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.72353 GHz	-30.53 dBm	-17.53 dB

Date: 23.SEP.2022 09:48:55

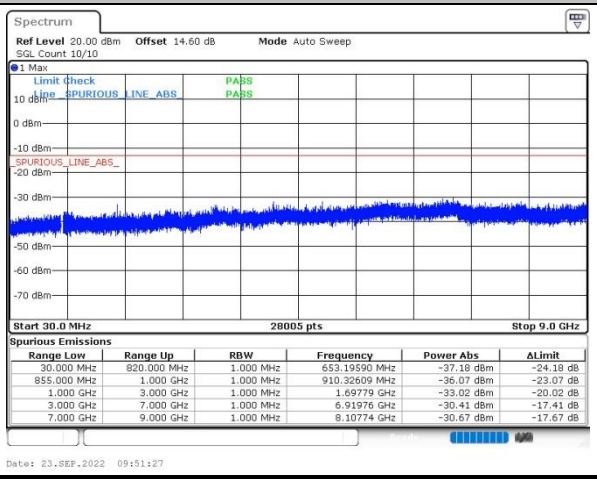
Middle Channel



Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	650.03748 MHz	-36.84 dBm	-23.84 dB
855.000 MHz	1.000 GHz	1.000 MHz	991.41304 MHz	-35.48 dBm	-22.48 dB
1.000 GHz	3.000 GHz	1.000 MHz	1.67279 GHz	-30.23 dBm	-17.23 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.03887 GHz	-30.61 dBm	-17.61 dB
7.000 GHz	9.000 GHz	1.000 MHz	8.93038 GHz	-31.11 dBm	-18.11 dB

Date: 23.SEP.2022 09:49:18

Highest Channel

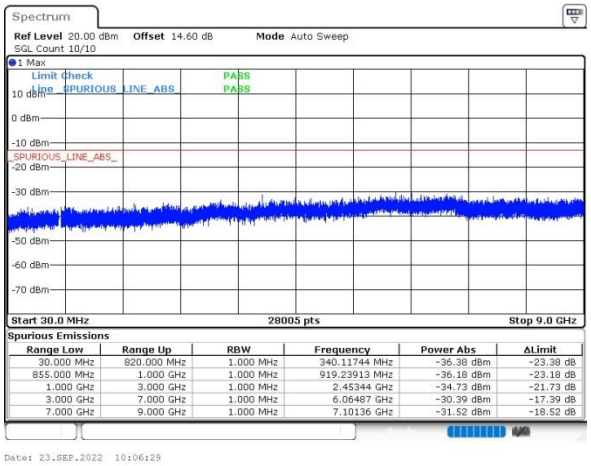


Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	653.19590 MHz	-37.18 dBm	-24.18 dB
855.000 MHz	1.000 GHz	1.000 MHz	910.32609 MHz	-36.07 dBm	-23.07 dB
1.000 GHz	3.000 GHz	1.000 MHz	1.69779 GHz	-33.02 dBm	-20.02 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.91976 GHz	-30.41 dBm	-17.41 dB
7.000 GHz	9.000 GHz	1.000 MHz	8.10774 GHz	-30.67 dBm	-17.67 dB

Date: 23.SEP.2022 09:51:27

GSM850 (EDGE class 8)

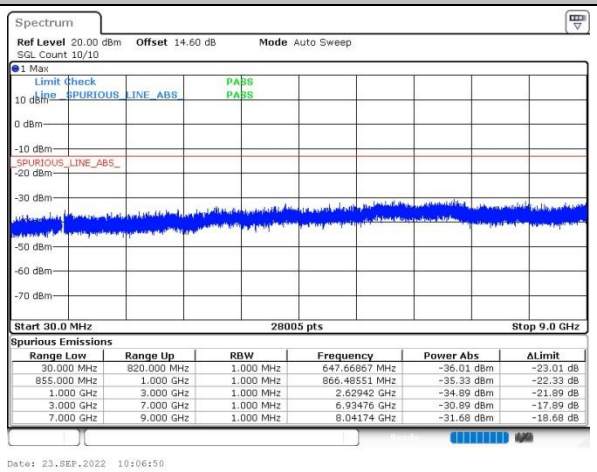
Lowest Channel



Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	340.11744 MHz	-36.38 dBm	-23.38 dB
855.000 MHz	1.000 GHz	1.000 MHz	919.23913 MHz	-36.18 dBm	-23.18 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.45344 GHz	-34.73 dBm	-21.73 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.06487 GHz	-30.39 dBm	-17.39 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.10136 GHz	-31.52 dBm	-18.52 dB

Date: 23.SEP.2022 10:06:29

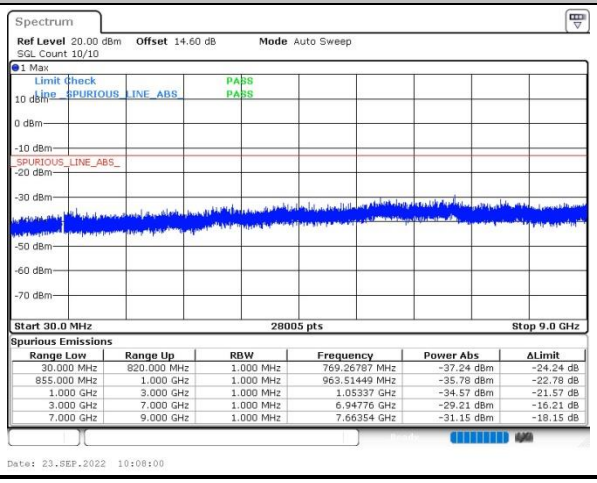
Middle Channel



Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	647.66867 MHz	-36.01 dBm	-23.01 dB
855.000 MHz	1.000 GHz	1.000 MHz	866.48551 MHz	-35.33 dBm	-22.33 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.62942 GHz	-34.89 dBm	-21.89 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.93476 GHz	-30.89 dBm	-17.89 dB
7.000 GHz	9.000 GHz	1.000 MHz	8.04174 GHz	-31.68 dBm	-18.68 dB

Date: 23.SEP.2022 10:06:50

Highest Channel

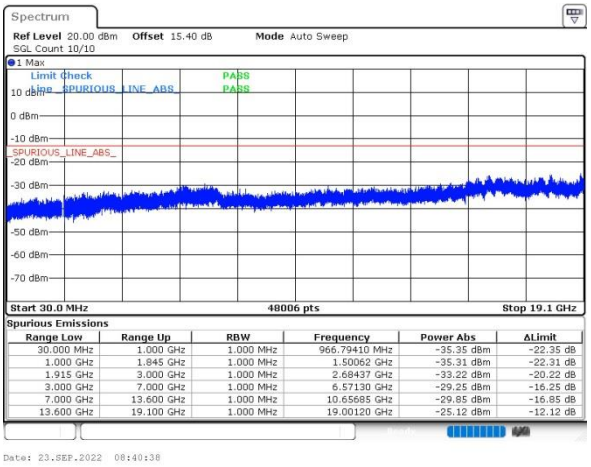


Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	769.26787 MHz	-37.24 dBm	-24.24 dB
855.000 MHz	1.000 GHz	1.000 MHz	963.51449 MHz	-35.78 dBm	-22.78 dB
1.000 GHz	3.000 GHz	1.000 MHz	1.05337 GHz	-34.57 dBm	-21.57 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.94776 GHz	-29.21 dBm	-16.21 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.66354 GHz	-31.15 dBm	-18.15 dB

Date: 23.SEP.2022 10:08:00

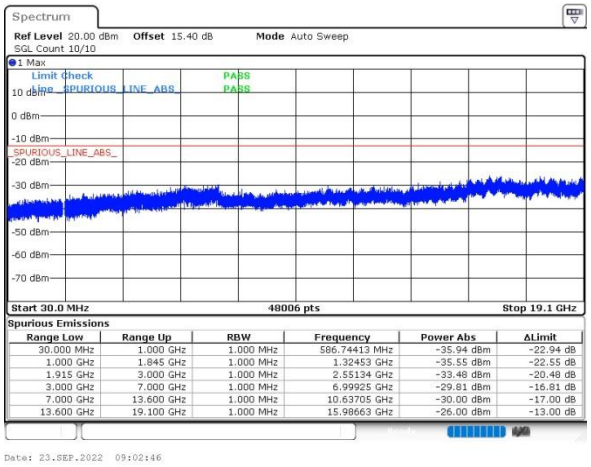
GSM1900 (GSM)

Lowest Channel

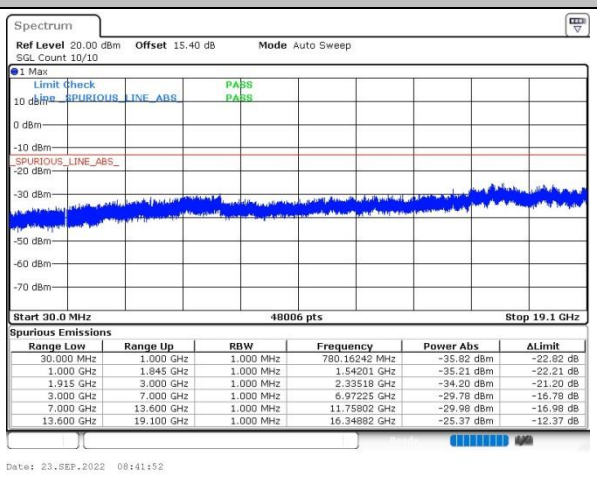


GSM1900 (EDGE class 8)

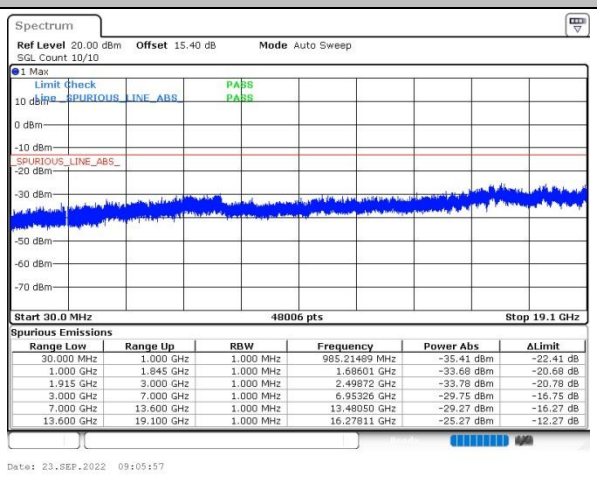
Lowest Channel



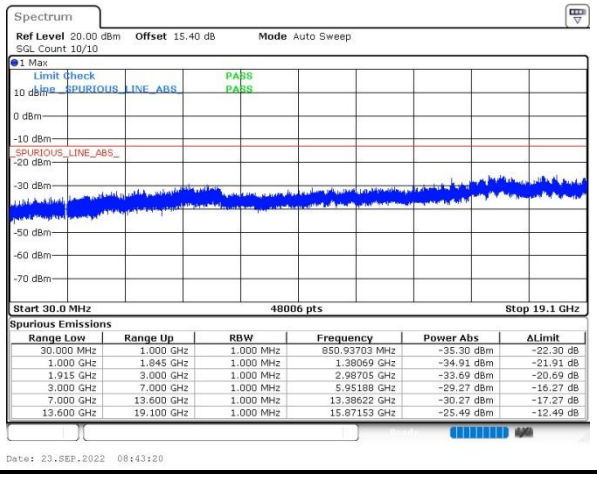
Middle Channel



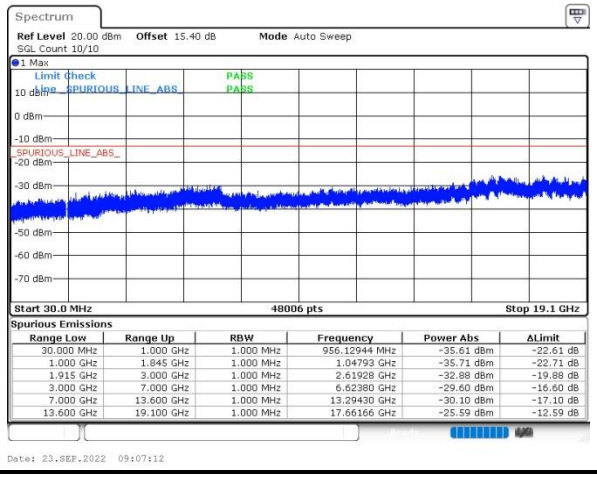
Middle Channel



Highest Channel



Highest Channel



Frequency Stability

Test Conditions	Middle Channel	GSM850 (GSM)	GSM850 (EDGE class 8)	Limit 2.5ppm
Temperature (°C)	Voltage (Volt)	Deviation (ppm)		Result
50	Normal Voltage	0.0072	0.0022	PASS
40	Normal Voltage	0.0056	0.0015	
30	Normal Voltage	0.0019	0.0031	
20(Ref.)	Normal Voltage	0.0000	0.0000	
10	Normal Voltage	0.0023	0.0016	
0	Normal Voltage	0.0035	0.0023	
-10	Normal Voltage	0.0017	0.0027	
-20	Normal Voltage	0.0009	0.0015	
-30	Normal Voltage	0.0015	0.0013	
20	Maximum Voltage	0.0037	0.0009	
20	Normal Voltage	0.0018	0.0012	
20	Battery End Point	0.0026	0.0014	

Test Conditions	Middle Channel	GSM1900 (GSM)	GSM1900 (EDGE class 8)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)		Result
50	Normal Voltage	0.0027	0.0036	PASS
40	Normal Voltage	0.0016	0.0042	
30	Normal Voltage	0.0033	0.0013	
20(Ref.)	Normal Voltage	0.0000	0.0000	
10	Normal Voltage	0.0015	0.0036	
0	Normal Voltage	0.0013	0.0025	
-10	Normal Voltage	0.0024	0.0015	
-20	Normal Voltage	0.0021	0.0027	
-30	Normal Voltage	0.0019	0.0032	
20	Maximum Voltage	0.0008	0.0011	
20	Normal Voltage	0.0022	0.0018	
20	Battery End Point	0.0025	0.0024	

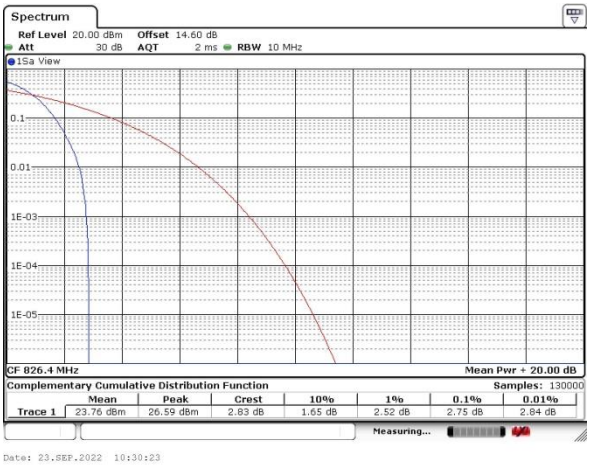
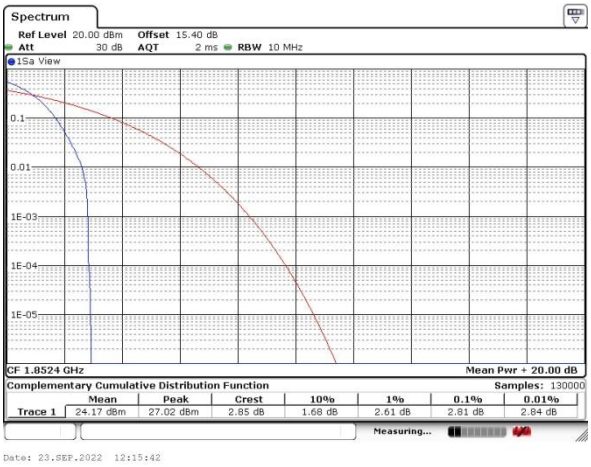
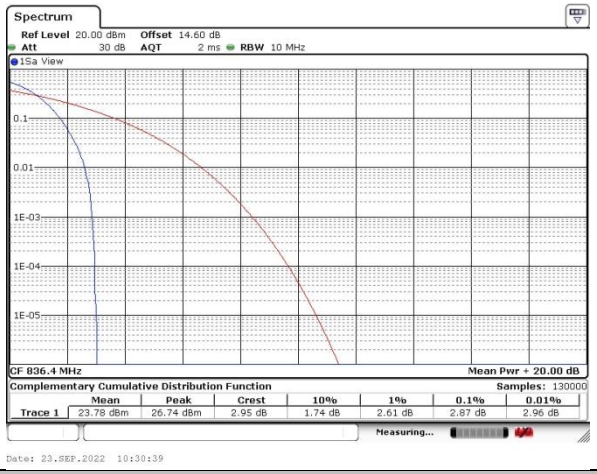
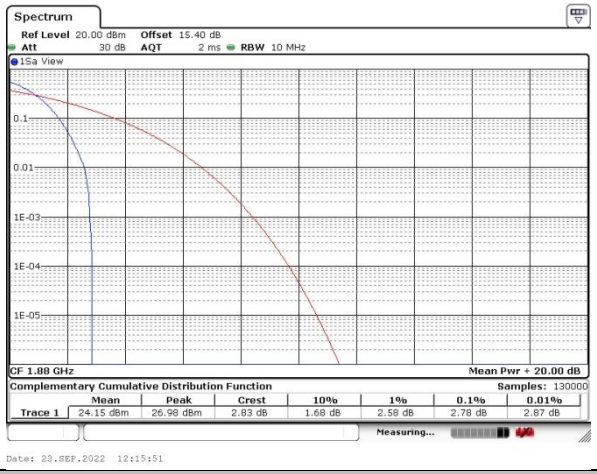
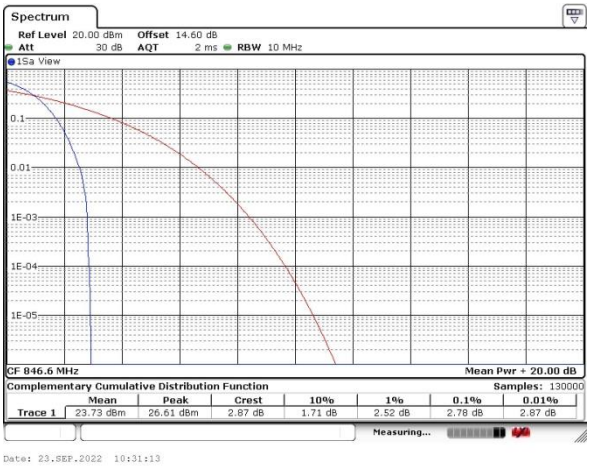
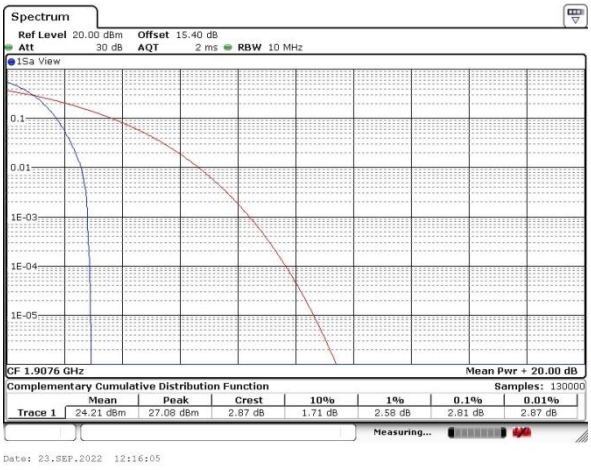
Note:

1. Normal Voltage = 3.88V ; Battery End Point (BEP) =3.6V. ; Maximum Voltage =4.27V
2. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

A2. WCDMA

Peak-to-Average Ratio

Mode	WCDMA Band V	WCDMA Band II	WCDMA Band IV	Limit: 13dB
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps	Result
Lowest CH	2.75	2.81	2.81	PASS
Middle CH	2.87	2.78	2.75	
Highest CH	2.78	2.81	2.75	

WCDMA Band V (RMC 12.2Kbps)	WCDMA Band II (RMC 12.2Kbps)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**