Industrial Internet Innovation Center (Shanghai) Co.,Ltd.

RF TEST REPORT

PRODUCT	Handheld Wireless Terminal
BRAND	SUNMI
MODEL	T8F1B
APPLICANT	Shanghai Sunmi Technology Co.,Ltd.
FCC ID	2AH25T8F1B
IC	22621-T8F1B
ISSUE DATE	February 14, 2025
STANDARD(S)	FCC Part 2, FCC Part 22H, FCC Part 24E, RSS-Gen Issue 5, RSS-132 Issue 4, RSS-133 Issue 7

Prepared by: ***Jia Rongwei*** **Reviewed by:** ***Yang Fan*** **Approved by:** ***Zhang Min***

CONTENTS

1. Summary of Test Report

1.1 Test Standard (s)

No.	Test Standard	Title	Version
1	FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	--
2	FCC Part 22H	CELLULAR RADIOTELEPHONE SERVICE	--
3	FCC Part 24E	BROADBAND PCS	--
4	RSS-132 Issue 4	Cellular Systems Operating in the Bands 824-849 MHz and 869-894 MHz	2023-01
5	RSS-133 Issue 7	Personal Communications Service Equipment Operating in the Bands 1850-1915 MHz and 1930-1995 MHz	2024-07
Note: The standard of FCC Part 2 has not been accredited by A2LA.			

1.2 Reference Documents

No.	Test Standard	Title	Version
1	ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
2	ANSI C63.26	American National Standard of Procedures for Compliance Testing of Licensed Transmitters Used in Licensed Radio	2015
3	KDB 971168 D01	Measurement Guidance for Certification of Licensed Digital Transmitters	v03r01
Note: The standard of KDB 971168 D01 Power Meas License Digital Systems has not been accredited by A2LA.			

1.3 Summary of Test Results

GSM850

Items	Test Name	Clause in FCC rules	Clause in IC rules	Verdict
1	Output Power/EIRP	2.1046/24.232(c)	RSS-133 5.5	Pass
2	Emission Limit	2.1053/24.238(a)	RSS-133 5.6	Pass
3	Frequency Stability	2.1055/24.235	RSS-133 5.4	Pass
4	Occupied Bandwidth	2.1049	RSS-GEN 6.7	Pass
5	Emission Bandwidth	2.1049	RSS-GEN 6.7	Pass
6	Band Edge Compliance	2.1051/24.238(a)	RSS-133 5.6	Pass
7	Conducted Spurious Emission	2.1051/24.238(a)	RSS-133 5.6	Pass
8	Peak to Average Power Ratio	24.232 (d)	RSS-133 5.5	Pass

PCS1900

Items	Test Name	Clause in FCC rules	Clause in IC rules	Verdict
1	Output Power/ERP	2.1046/22.913(a)	RSS-132 5.4	Pass
2	Emission Limit	2.1053/22.917(a)	RSS-132 5.5	Pass
3	Frequency Stability	2.1055/22.355	RSS-132 5.3	Pass
4	Occupied Bandwidth	2.1049	RSS-GEN 6.7	Pass
5	Emission Bandwidth	2.1049	RSS-GEN 6.7	Pass
6	Band Edge Compliance	2.1051/22.917(a)	RSS-132 5.5	Pass
7	Conducted Spurious Emission	2.1051/22.917(a)	RSS-132 5.5	Pass
8	Peak to Average Power Ratio	N/A	RSS-132 5.4	Pass

Note:

The T8F1B manufactured by Shanghai Sunmi Technology Co.,Ltd. is a new product for testing.

Industrial Internet Innovation Center (Shanghai) Co., Ltd. only performed test cases which identified with Pass/Fail/Inc result in section 1.3.

Industrial Internet Innovation Center (Shanghai) Co., Ltd. has verified that the compliance of the tested device specified in section 4 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 1 of this test report.

1.4 Data Provided by Applicant

No.	Item(s)	Data
1	GSM 850	-0.37 dBi
2	PCS 1900	2.19 dBi
Note: The data of antenna gain is provided by Antenna specification may affect the validity of the test results in this report, and the impact and consequences of this shall be undertaken by the customer.		

2. General Information of The Laboratory

2.1 Testing Laboratory

Lab Name	Industrial Internet Innovation Center (Shanghai) Co.,Ltd.
Address	Building 4，No. 766，Jingang Road，Pudong，Shanghai，China
Telephone	021-68866880
FCC Registration No.	708870
FCC Designation No.	CN1364
IC Designation No.	10766A
CAB identifier	CN0067

2.2 Laboratory Environmental Requirements

Temperature	15℃~35℃
Relative Humidity	25%RH~75%RH
Atmospheric Pressure	86kPa~106kPa

2.3 Project Information

Project Manager	Gao Hongning
Test Date	November 30, 2024 to January 8, 2025

3. General Information of The Customer

3.1 Applicant

Company	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505, No.388,Song Hu Road, Yang Pu District, Shanghai, China
Telephone	8618501703215

3.2 Manufacturer

Company	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505, No.388,Song Hu Road, Yang Pu District, Shanghai, China
Telephone	8618501703215

4. General Information of The Product

4.1 Product Description for Equipment under Test (EUT)

Product	Handheld Wireless Terminal
Model	T8F1B
Date of Receipt	S10aa:November 29,2024 S14aa:December 2, 2024
EUT ID*	S10aa/S14aa
SN/IMEI	S10aa: 862072070026691'862072070026709 S14aa: 862072070026774'862072070026782
Supported Radio Technology and Bands	GSM 850/900/1800/1900 WCDMA Band I/II/IV/V/VI/VIII/XIX LTE Band 1/2/3/4/5/7/8/12/13/14/17/18/19/20/25/26/28/30/34/38/39/40/41/66/71 WLAN 802.11b/g/n WLAN 802.11a/n/ac BT 5.2 BR/EDR/BLE NFC GPS/GLONASS/BDS/Galileo
Hardware Version	V00
Software Version	1.00.00.20241113_186_userdebug
HVIN	T8F1B
FCC ID	2AH25T8F1B
IC	22621-T8F1B
NOTE1: EUT ID is the internal identification code of the laboratory. NOTE2: Samples in the test report are provided by the customer. The test results are only applicable to the samples received by the laboratory.	

4.2 Description for Auxiliary Equipment (AE)

AE ID*	Description	Model	SN/Remark
AE1	RF Cable	N/A	Cable Loss: 0.5 dB
CG01	Adapter	TPA-141A050200UU01	SHENZHEN TIANYIN ELECTRONICS CO., LTD. OUTPUT: 5V 2A
CH01	Adapter	UC13US	Jiangsu Chenyang Electron Co., Ltd. OUTPUT: 5V 2A
CI01	Adapter	TPA-10120150UU	SHENZHEN TIANYIN ELECTRONICS CO., LTD. OUTPUT: 9V 2A
UA10	AC Cable	SSM-A033A	Saibao (Jiangxi) Industry Co., LTD
BA10	Battery	GYPA	HUNAN GAOYUAN BATTERY CO.,LTD. 5000mAh 3.87V

NOTE1: AE ID is the internal identification code of the laboratory.

4.3 Additional Information

Type of modulation	GMSK/8PSK

Band Frequency Range:

Band	Frequency Rang(MHz)
GSM850	824.2-848.8
PCS1900	1850.2-1909.8

Band List:

Band	Low Channel	Low Freq. (MHz)	Mid Channel	Mid Freq. (MHz)	High Channel	High Freq. (MHz)
GSM850	128	824.2	190	836.6	251	848.8
PCS1900	512	1850.2	661	1880	810	1909.8

Emissions Information:

Band	Frequency Min (MHz)	Frequency Max (MHz)	Modulation	Max OutPut Power (dBm)	Max OutPut Power EIRP (dBm)	Max OutPut Power EIRP (W)	Max OutPut Power ERP (W)	OBW (KHz)	Necessary Bandwidth & Emission Classification
GSM850	824.2	848.8	GMSK	32.88	32.51	1.7824	1.0864	248.3	248KGXW
GSM850	824.2	848.8	8PSK	27.88	27.51	0.5636	0.3436	245.8	246KG7W
GSM1900	1850.2	1909.8	GMSK	29.89	32.08	1.6144	0.984	246.6	247KGXW
GSM1900	1850.2	1909.8	8PSK	26.75	28.94	0.7834	0.4775	245.3	245KG7W

5. Test Configuration Information

5.1 Laboratory Environmental Conditions

5.1.1 Permanent Facilities

Relative Humidity	Min. = 45%, Max. = 55 %		
Atmospheric Pressure	101kPa		
Temperature	Normal	Minimum	Maximum
	25℃	-20℃	55℃
Working Voltage of EUT	Normal	Minimum	Maximum
	3.87V	3.6V	4.45 V

5.2 Test Equipments Utilized

Conduction test system

No.	Name	Model	S/N	SW Version	HW Version	Manufacturer	Cal. Date	Cal. Interval
1	Software	Eagle V3.3	N/A	V3.3	N/A	3IN	N/A	N/A
2	Frequency spectrum analyzer	FSQ	101091	V4.75	V11.00	R&S	2024-07-25	1 Year
3	Frequency spectrum analyzer	FSW	101943	1.12	00	R&S	2024-08-21	1 Year
4	Wideband Radio Communication Tester	CMW 500	148874	V3.5.136	N/A	R&S	2024-07-26	1 Year
5	Temperature Chamber	B-TF-107C	201804107	N/A	N/A	BoYi	2024-06-07	1 Year
6	Programmable power supply	Keithley 2303	4039070	N/A	N/A	Keithley	2024-06-07	1 Year
7	RF Test Automation Box	RF 2021B	2001	V3.3	N/A	RANATEC	N/A	N/A

Radiated emission test system

No.	Name	Model	S/N	SW Version	HW Version	Manufacturer	Cal. Date	Cal. Interval
1	Universal Radio Communication Tester	CMU200	123126	V5.2.1	B12	R&S	2024-10-09	1 Year
2	Universal Radio Communication Tester	CMW500	104178	V3.7.20	1206.0600.00	R&S	2024-10-09	1 Year
3	EMI Test Receiver	ESU40	100307	V5.1-24-3	01	R&S	2023-12-19 2024-12-13	1 Year
4	TRILOG Broadband Antenna	VULB9163	01345	N/A	N/A	Schwarzbeck	2024-03-29	1 Year
5	Double- ridged Waveguide Antenna	ETS-3117	00135890	N/A	N/A	ETS	2024-03-16	1 Year
6	EMI Test Software	EMC32 V10.35.02	N/A	N/A	N/A	R&S	N/A	N/A
7	Preamplifier	SCU08F1	8320024	N/A	N/A	R&S	2024-10-09	1 Year
8	Preamplifier	SCU18	10155	N/A	N/A	R&S	2024-10-09	1 Year
9	Antenna	SWB-VUBA 9117	9117-266	N/A	N/A	Schwarzbeck	2024-08-31	1 Year
10	Antenna	BBHA9120D	02112	N/A	N/A	Schwarzbeck	2024-08-03	1 Year
11	Signal Generator	SMF100A	102314	3.20.390.24	05.10	R&S	2024-10-09	1 Year
12	Antenna Tower	TPMDC-LF	N/A	N/A	N/A	Top Precision	N/A	N/A
13	Antenna Tower	TPMDC-HF	N/A	N/A	N/A	Top Precision	N/A	N/A

Anechoic chamber

Fully anechoic chamber by ETS.

5.3 Measurement Uncertainty

Measurement uncertainty for all the testing in this report are within the limit specified in 3IN documents. The detailed measurement uncertainty is defined in 3IN documents.

Measurement Uncertainty of Radiation test

Frequency Range	Uncertainty(dB)
30MHz ≤ f ≤ 1GHz	±5.10
1GHz ≤ f ≤ 18GHz	±5.66
18GHz ≤ f ≤ 40GHz	±5.22

Measurement Uncertainty of Conduction test

No	Item	Extended uncertainty （k=2）	
1	Frequency Tolerance	23Hz	
2	RF Output Power	0.7dB	
3	conducted spurious	9kHz～3.6GHz	1.5dB
		3.6GHz～8.4GHz	2.8dB
		8.4GHz～12.75GHz	3.4dB
4	EVM	2.1%	
6	Occupied Bandwidth	Bandwidth 1.4MHz	0.03MHz
		Bandwidth 3MHz	0.03MHz
		Bandwidth 5MHz	0.03MHz
		Bandwidth 10MHz	0.05MHz
		Bandwidth 15MHz	0.06MHz
		Bandwidth 20MHz	0.08MHz
7	Emission intermodulation	Adjacent channel	1.4dB
		Alternate channel	1.4dB
8	Range of frequency	0.08MHz	

6. Test Results

6.1 Output Power

6.1.1 Measurement Limit

FCC §22.913(a) Mobile stations are limited to 7 watts.

FCC §24.232(c) Mobile and portable stations are limited to 2 watts.

RSS-133 5.5

The maximum power spectral density of the equipment, measured in terms of average values, shall comply with the limits specified in table 2. These limits are either specified in terms of equivalent isotropically radiated power (e.i.r.p.) or TRP for the purpose of certification and may not apply to all deployment scenarios. Consult SRSP-510 for more deployment details in the bands 1850-1915 MHz and 1930-1995 MHz.

AAS equipment with eight antenna elements or less can demonstrate compliance with the e.i.r.p limit specified for non-AAS equipment in table, instead of the TRP limit.

Equipment type	Maximum power spectral density
Non-AAS fixed station and base station	3280 W/MHz e.i.r.p
AAS fixed station and base station	46 dBm/MHz TRP
Subscriber equipment	2 W /channel bandwidth e.i.r.p

In addition, the peak-to-average power ratio (PAPR) of the equipment 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.

RSS-132 5.4

The transmitter output power shall be measured in terms of average power. The equivalent radiated power (e.r.p.) shall not exceed 7 watts for mobile equipment and 3 watts for portable equipment. The effective isotropic radiated power (e.i.r.p.) shall not exceed the limits specified in SRSP-503 for base station equipment.

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 using a signal corresponding to the highest PAPR during periods of continuous transmission.

6.1.2 Method of Measurements

Method of measurements please refer to KDB971168 D01 v03 clause 5.

The EUT was set up for the max output power with pseudo random data modulation.

The power was measured with Rhode & Schwarz base station CMW500.

These measurements were done at 3 frequencies.(bottom, middle and top of operational frequency range).

1. The transmitter output port was connected to base station.
2. Set the EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.

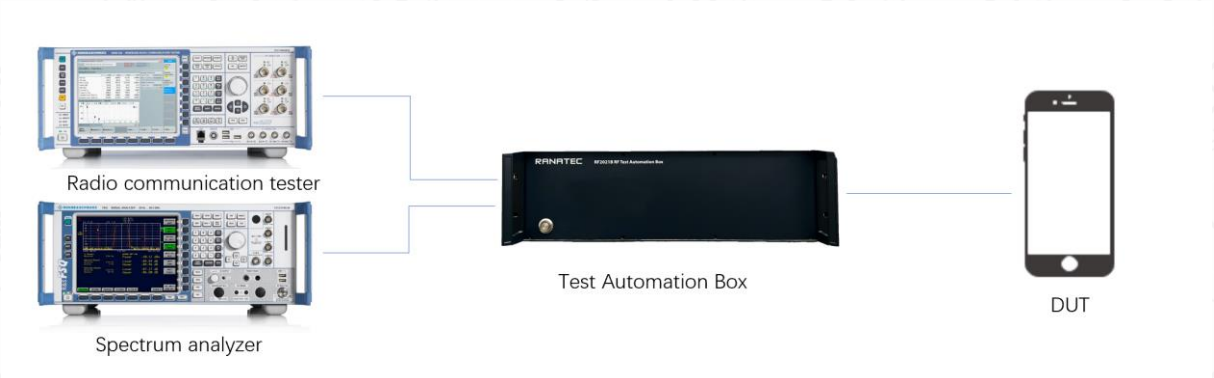
4. Measure and record maximum average power for other modulation signal.
5. During the process of testing, the EUT was controlled Rhode & Schwarz Digital Radio.
6. Communication tester to ensure max power transmission and proper modulation.
7. This result contains output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

EIRP= Conducted power+Gain, ERP = EIRP -2.15dBi.

6.1.3 Test procedures

The transmitter output power was connected to calibrated attenuator, the other end of which was connected to signal analyzer. Transmitter output power was read off the power in dBm. The power outputs at the transmitter antenna port was determined by adding the value of attenuator to the base station reading.

6.1.4 Test Setup



6.1.5 Output Power Measurement results

GSM 850 (GMSK 1 Slot)	
Channel/fc(MHz)	**Conducted Output Power (dBm)**
Low 128/824.2	32.75
Mid 190/836.6	32.87
High 251/848.8	32.84
GSM 1900 (GMSK 1 Slot)	
Channel/fc(MHz)	**Conducted Output Power (dBm)**
Low 512/1850.2	29.89
Mid 661/1880	29.68
High 810/1909.8	29.57
GPRS 850 (GMSK 1 Slot)	
Channel/fc(MHz)	**Conducted Output Power (dBm)**
Low 128/824.2	32.79
Mid 190/836.6	32.88
High 251/848.8	32.86
GPRS 1900 (GMSK 1 Slot)	
Channel/fc(MHz)	**Conducted Output Power (dBm)**
Low 512/1850.2	29.88
Mid 661/1880	29.66
High 810/1909.8	29.58
EGPRS 850 (8PSK 1 Slot)	
Channel/fc(MHz)	**Conducted Output Power (dBm)**
Low 128/824.2	27.81
Mid 190/836.6	27.84
High 251/848.8	27.88
EGPRS 1900 (8PSK 1 Slot)	
Channel/fc(MHz)	**Conducted Output Power (dBm)**
Low 512/1850.2	26.46
Mid 661/1880	26.61
High 810/1909.8	26.75

6.1.6 EIRP/ERP results

GSM850

GSM(GMSK)

Frequency(MHz)	EIRP (dBm)	ERP (dBm)
824.2	32.38	30.23
836.6	32.5	30.35
848.8	32.47	30.32

GPRS(GMSK)

Frequency(MHz)	EIRP (dBm)	ERP (dBm)
824.2	32.42	30.27
836.6	32.51	30.36
848.8	32.49	30.34

EGPRS(8PSK)

Frequency(MHz)	EIRP (dBm)	ERP (dBm)
824.2	27.44	25.29
836.6	27.47	25.32
848.8	27.51	25.36

PCS 1900

GSM (GMSK)

Frequency(MHz)	EIRP (dBm)
1850.2	32.08
1880.0	31.87
1909.8	31.76

GPRS (GMSK)

Frequency(MHz)	EIRP (dBm)
1850.2	32.07
1880.0	31.85
1909.8	31.77

EGPRS(8PSK)

Frequency(MHz)	EIRP (dBm)
1850.2	28.65
1880.0	28.80
1909.8	28.94

6.2 Peak-to-Average Power Ratio

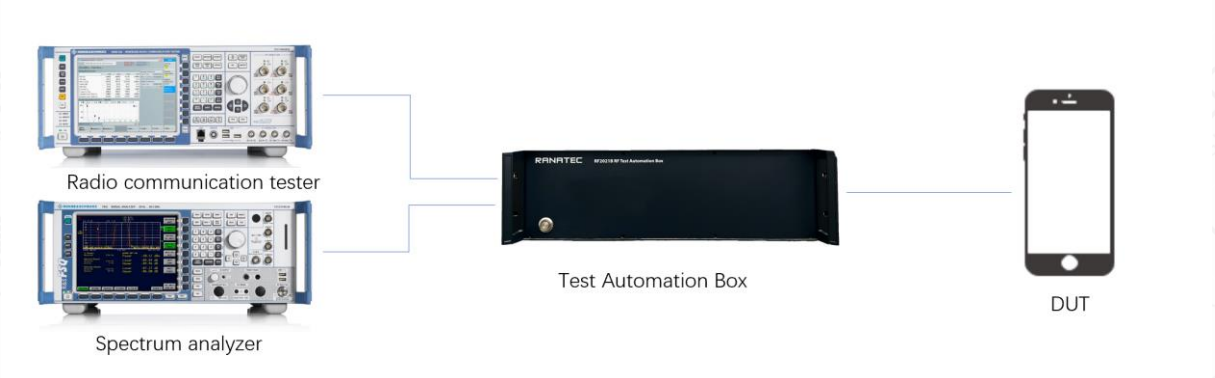
6.2.1 Measurement Limit

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

6.2.2 Method of Measurement

The EUT was connected to the spectrum analyzer and system simulator via a power divider.
Select the spectrum analyzer CCDF function.
Set RBW ≥ signal's occupied bandwidth.
Set the number of counts to a value that stabilizes the measured CCDF cure;
Sweep time ≥ 1s.
Record the maximum PAPR level associated with a probability of 0.1%.

6.2.3 Test Setup



6.2.4 Measurement results

Band	Network	Channel	PCL/Gamma	PAPR	Limit
GSM850	GSM	128	5	10.77	13
GSM850	GSM	190	5	9.29	13
GSM850	GSM	251	5	11.03	13
GSM850	GPRS	128	3	8.46	13
GSM850	GPRS	190	3	8.81	13
GSM850	GPRS	251	3	11.22	13
GSM850	EDGE	128	6	10.64	13
GSM850	EDGE	190	6	10.64	13
GSM850	EDGE	251	6	7.63	13
GSM1900	GSM	512	0	10.61	13
GSM1900	GSM	661	0	10.16	13
GSM1900	GSM	810	0	10.64	13

GSM1900	GPRS	512	3	8.53	13
GSM1900	GPRS	661	3	8.46	13
GSM1900	GPRS	810	3	7.63	13
GSM1900	EDGE	512	5	9.71	13
GSM1900	EDGE	661	5	10.64	13
GSM1900	EDGE	810	5	7.63	13

6.3 99% Occupied Bandwidth

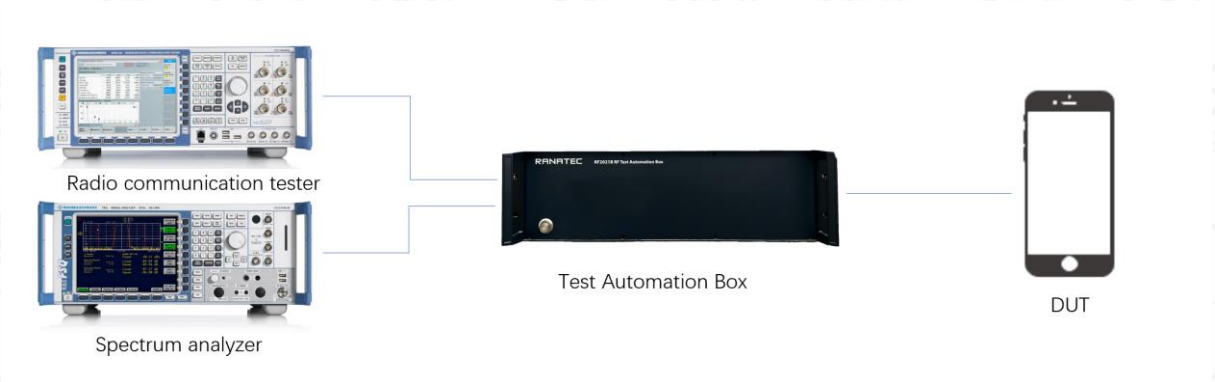
6.3.1 Summary

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of GSM850, PCS1900.

6.3.2 Method of Measurement

The EUT output RF connector was connected with a short cable to the signal analyzer.
RBW was set to about 1% of emission BW, VBW >= 3 times RBW,.
99% bandwidth were measured, the occupied bandwidth is delta frequency between the two points where the display line intersects the signal trace.

6.3.3 Test Setup

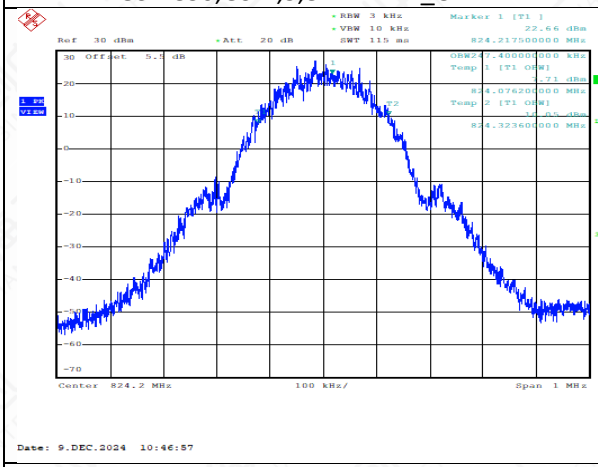


6.3.4 Measurement results

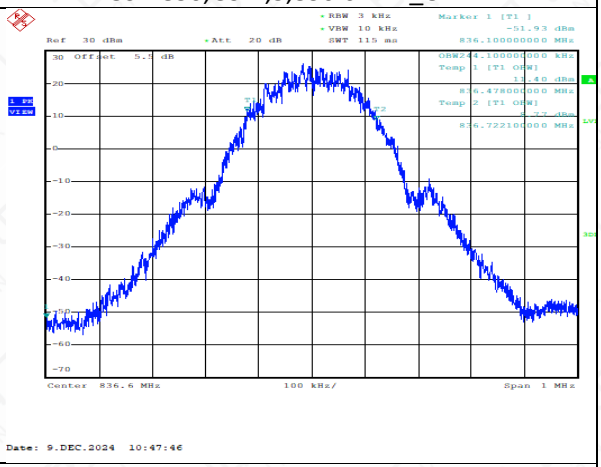
Band	Network	Channel/fc(MHz)	Gamma	99%OBW(kHz)
GSM850	GSM	128	5	247.40
GSM850	GSM	190	5	244.10
GSM850	GSM	251	5	246.00
Band	**Network**	**Channel/fc(MHz)**	**Gamma**	**99%OBW(kHz)**
GSM850	GPRS	128	3	246.40
GSM850	GPRS	190	3	248.30
GSM850	GPRS	251	3	242.20
Band	**Network**	**Channel/fc(MHz)**	**Gamma**	**99%OBW(kHz)**
GSM850	EDGE	128	6	245.80
GSM850	EDGE	190	6	245.20
GSM850	EDGE	251	6	244.50
Band	**Network**	**Channel/fc(MHz)**	**Gamma**	**99%OBW(kHz)**
GSM1900	GSM	512	0	246.60
GSM1900	GSM	661	0	243.40

GSM1900	GSM	810	0	243.00
Band	**Network**	**Channel/fc(MHz)**	**Gamma**	**99%OBW(kHz)**
GSM1900	GPRS	512	3	243.90
GSM1900	GPRS	661	3	245.80
GSM1900	GPRS	810	3	243.30
Band	**Network**	**Channel/fc(MHz)**	**Gamma**	**99%OBW(kHz)**
GSM1900	EDGE	512	5	245.30
GSM1900	EDGE	661	5	243.50
GSM1900	EDGE	810	5	245.10

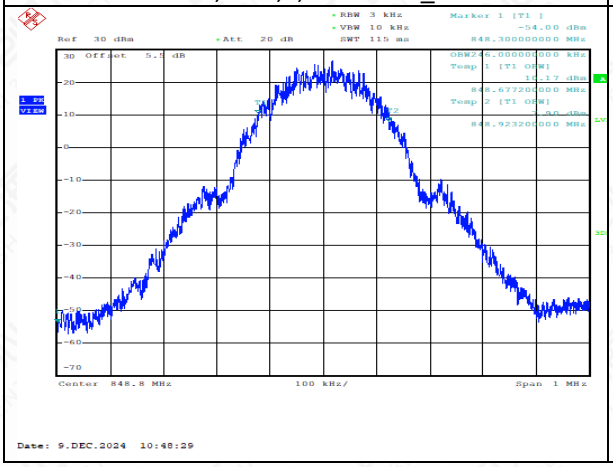
GSM850,GSM,5,824.2MHz_OBW



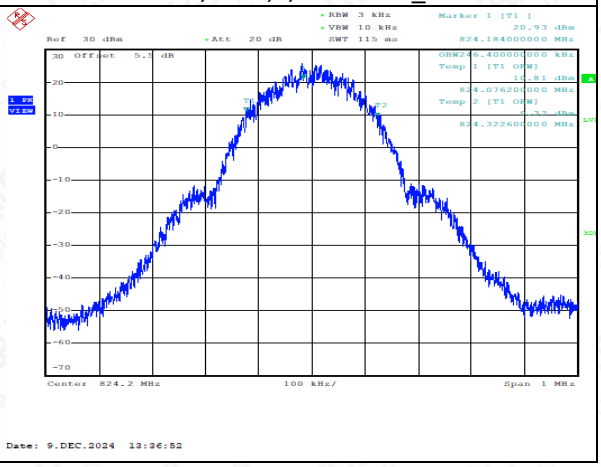
GSM850,GSM,5,836.6MHz_OBW



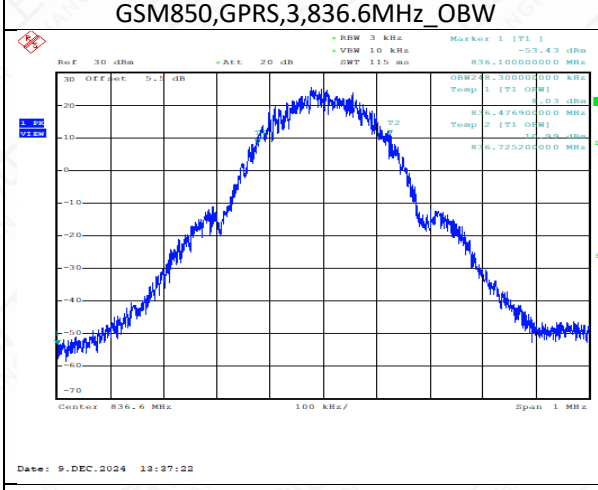
GSM850,GSM,5,848.8MHz_OBW



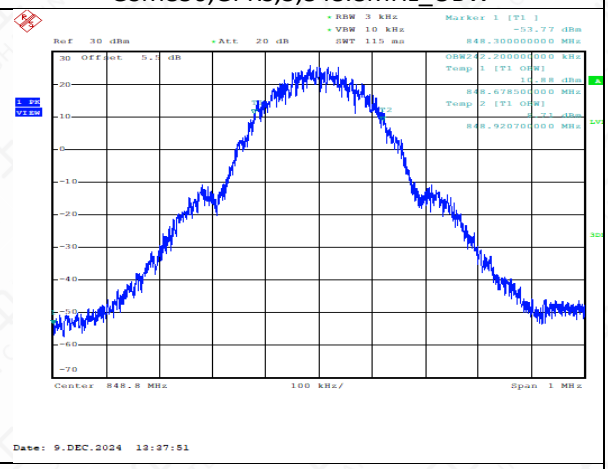
GSM850,GPRS,3,824.2MHz_OBW



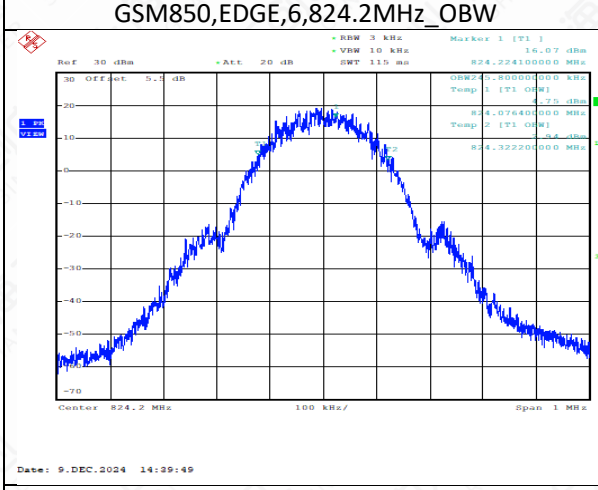
GSM850,GPRS,3,836.6MHz_OBW



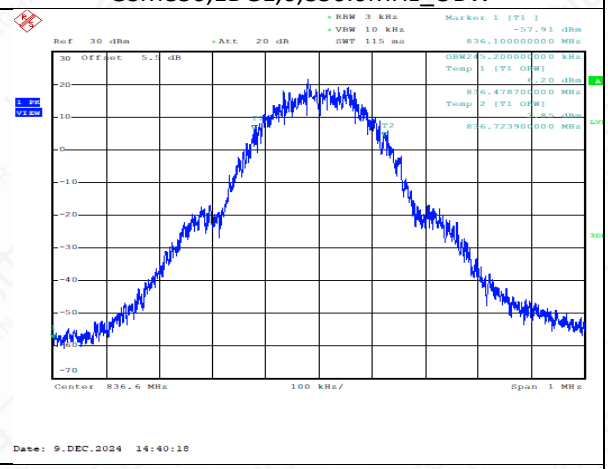
GSM850,GPRS,3,848.8MHz_OBW



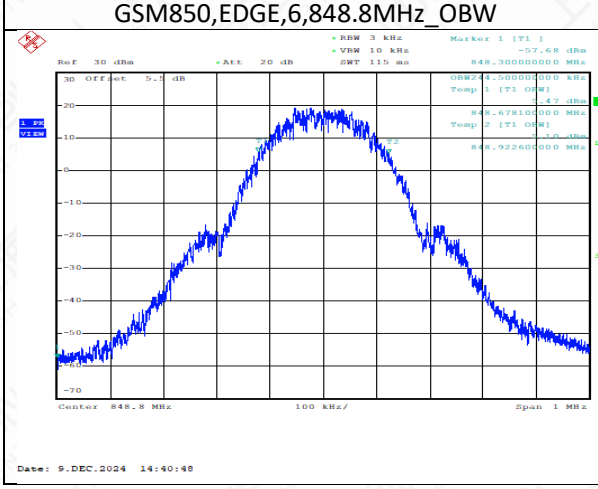
GSM850,EDGE,6,824.2MHz_OBW



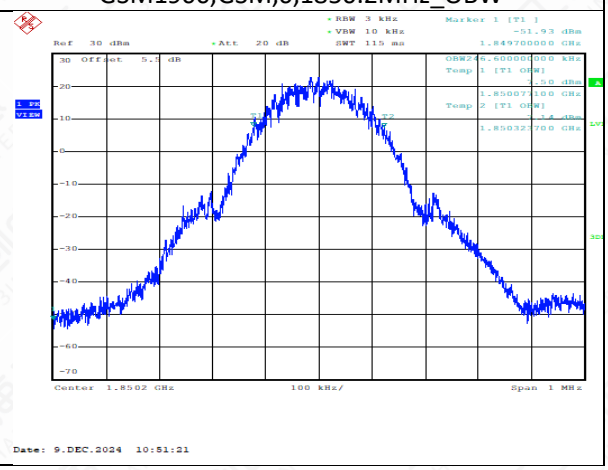
GSM850,EDGE,6,836.6MHz_OBW



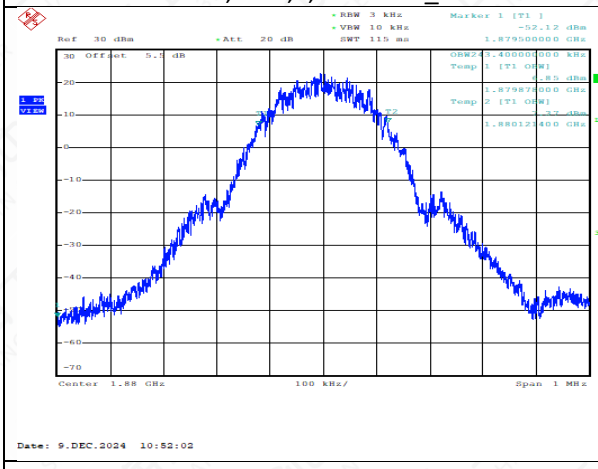
GSM850,EDGE,6,848.8MHz_OBW



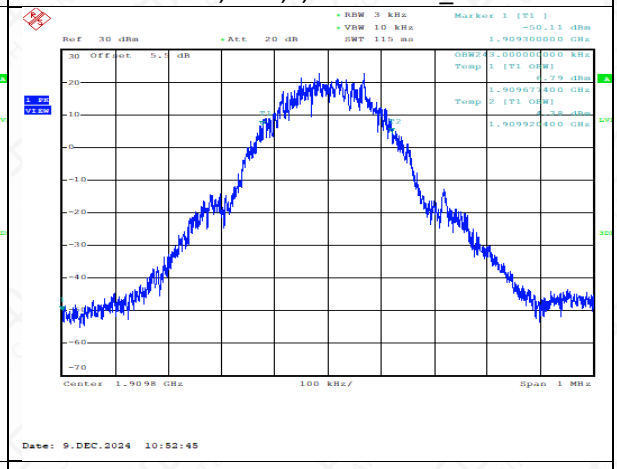
GSM1900,GSM,0,1850.2MHz_OBW



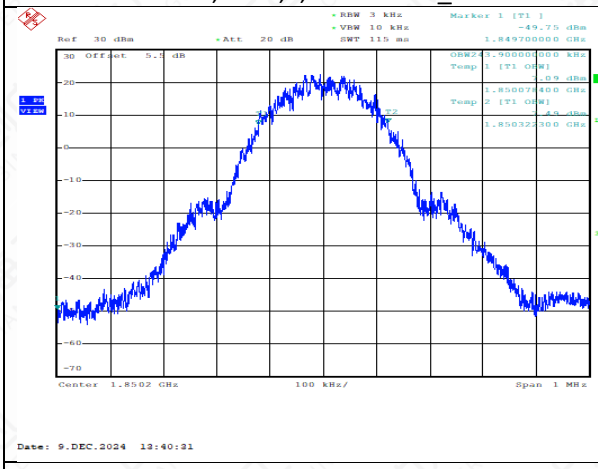
GSM1900,GSM,0,1880MHz_OBW



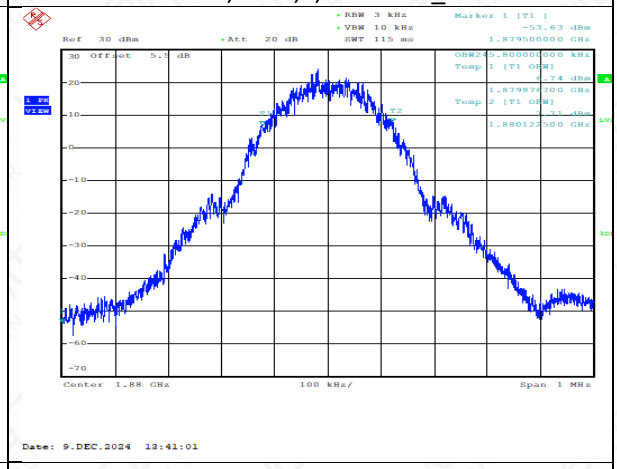
GSM1900,GSM,0,1909.8MHz_OBW



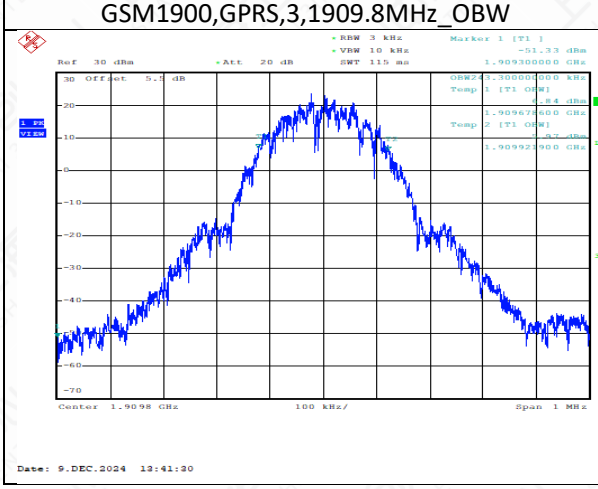
GSM1900,GPRS,3,1850.2MHz_OBW



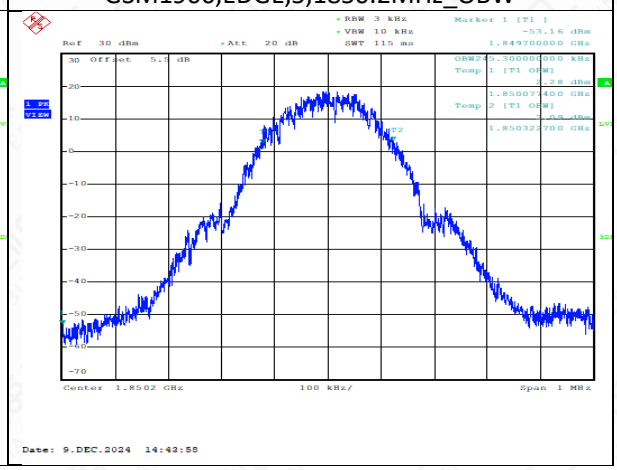
GSM1900,GPRS,3,1880MHz_OBW



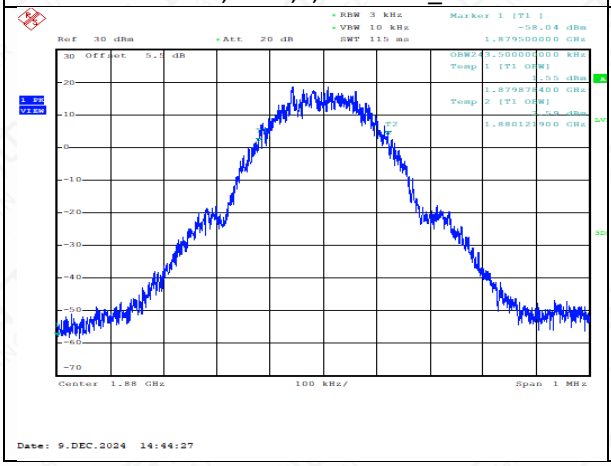
GSM1900,GPRS,3,1909.8MHz_OBW



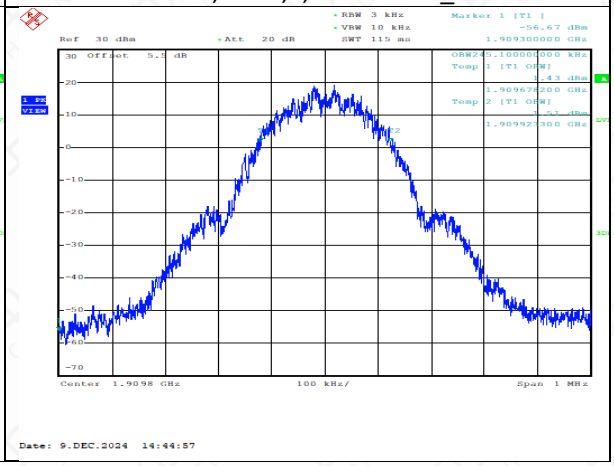
GSM1900,EDGE,5,1850.2MHz_OBW



GSM1900,EDGE,5,1880MHz_OBW



GSM1900,EDGE,5,1909.8MHz_OBW



6.4 26dB Emission Bandwidth

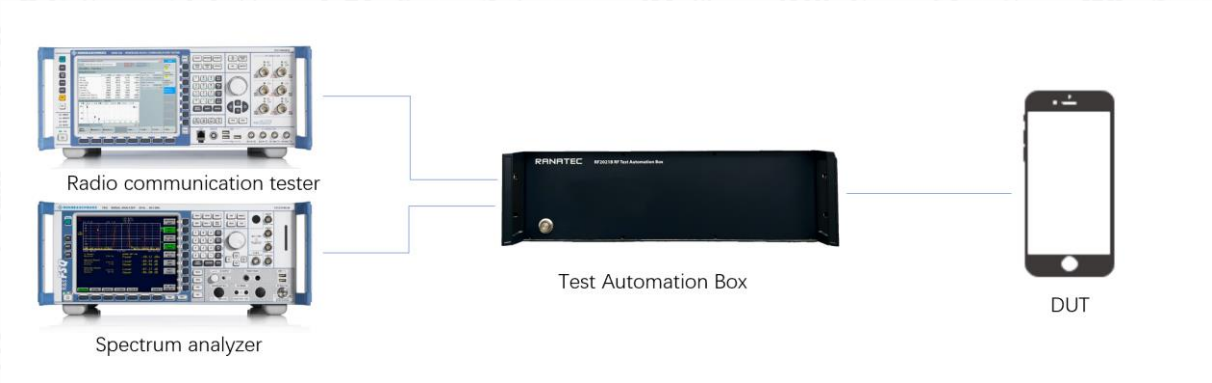
6.4.1 Summary

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of GSM850,PCS1900.

6.4.2 Method of Measurement

The EUT output RF connector was connected with a short cable to the signal analyzer.
RBW was set to about 1% of emission BW, VBW >= 3 times RBW,.
26dB bandwidth were measured, the occupied bandwidth is delta frequency between the two points where the display line intersects the signal trace.
For GSM: signal analyzer setting as: RBW= 3KHz; VBW=10KHz; Span=1MHz.

6.4.3 Test Setup

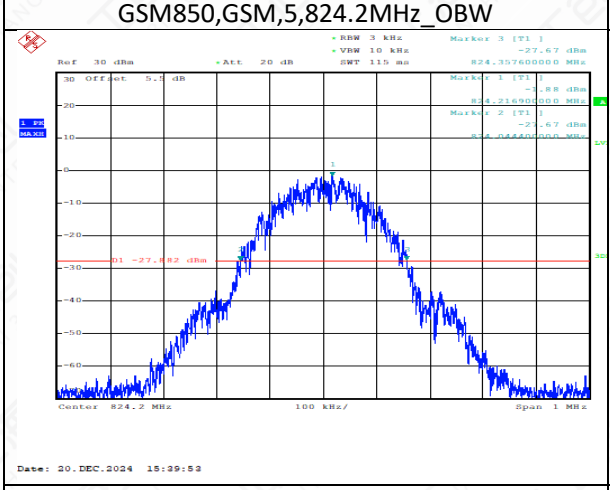


6.4.4 Measurement results

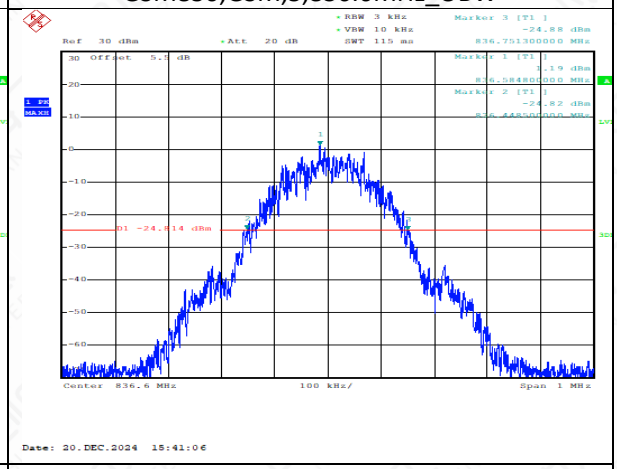
Band	Network	Channel	Gamma	26dBDown OccupiedWidth(kHz)	Limit(kHz)
GSM850	GSM	128	5	313.20	N/A
GSM850	GSM	190	5	302.80	N/A
GSM850	GSM	251	5	306.30	N/A
Band	**Network**	**Channel**	**Gamma**	**26dBDown OccupiedWidth(kHz)**	**Limit(kHz)**
GSM850	GPRS	128	3	310.00	N/A
GSM850	GPRS	190	3	309.40	N/A
GSM850	GPRS	251	3	303.90	N/A
Band	**Network**	**Channel**	**Gamma**	**26dBDown OccupiedWidth(kHz)**	**Limit(kHz)**
GSM850	EDGE	128	6	317.00	N/A
GSM850	EDGE	190	6	314.70	N/A
GSM850	EDGE	251	6	311.50	N/A

Band	Network	Channel	Gamma	26dBDown OccupiedWidth(kHz)	Limit(kHz)
GSM1900	GSM	512	0	305.00	N/A
GSM1900	GSM	661	0	314.00	N/A
GSM1900	GSM	810	0	308.60	N/A
Band	**Network**	**Channel**	**Gamma**	**26dBDown OccupiedWidth(kHz)**	**Limit(kHz)**
GSM1900	GPRS	512	3	303.90	N/A
GSM1900	GPRS	661	3	318.20	N/A
GSM1900	GPRS	810	3	303.60	N/A
Band	**Network**	**Channel**	**Gamma**	**26dBDown OccupiedWidth(kHz)**	**Limit(kHz)**
GSM1900	EDGE	512	5	310.20	N/A
GSM1900	EDGE	661	5	311.00	N/A
GSM1900	EDGE	810	5	303.60	N/A

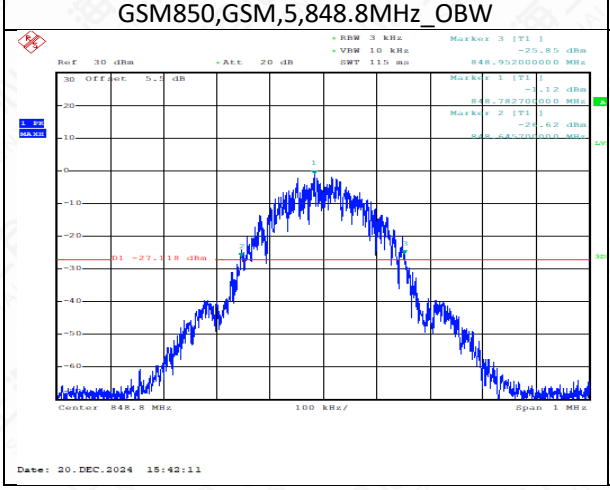
GSM850,GSM,5,824.2MHz_OBW



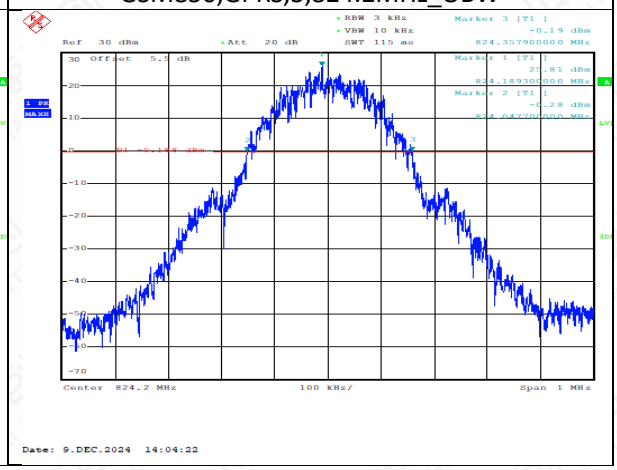
GSM850,GSM,5,836.6MHz_OBW



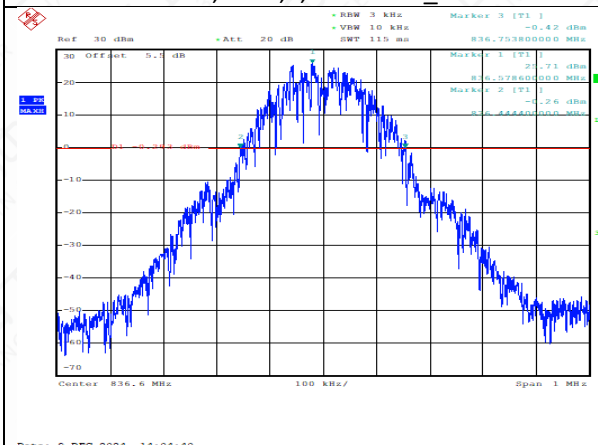
GSM850,GSM,5,848.8MHz_OBW



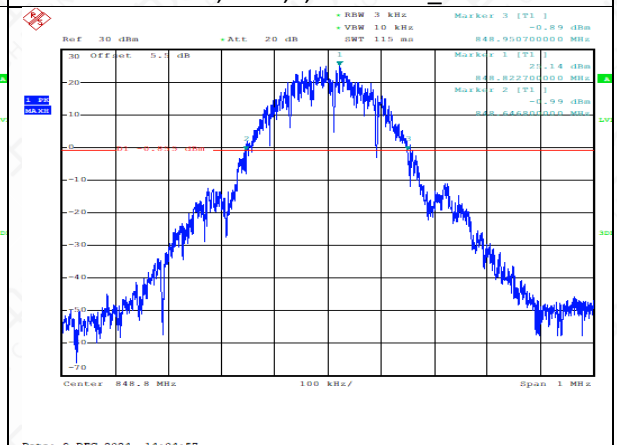
GSM850,GPRS,3,824.2MHz_OBW



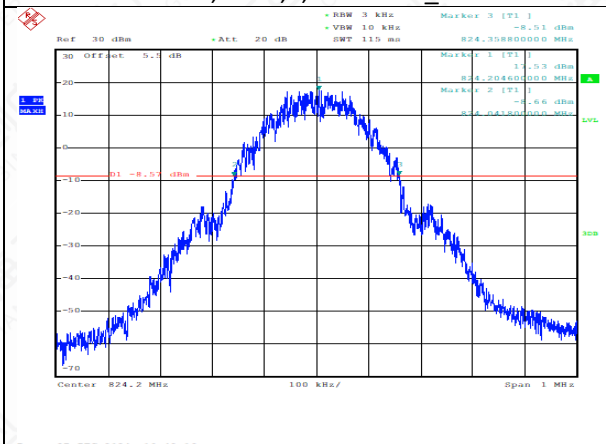
GSM850,GPRS,3,836.6MHz_OBW



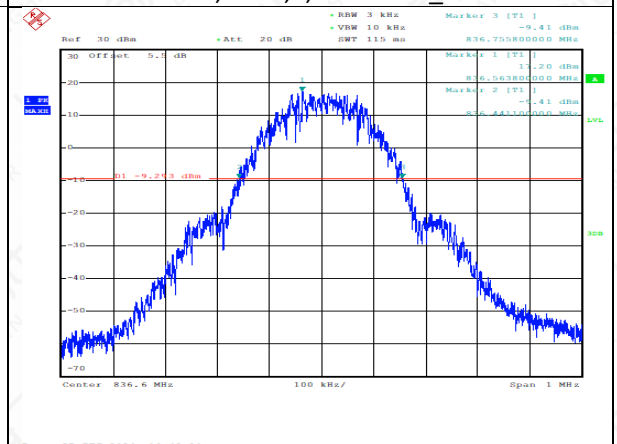
GSM850,GPRS,3,848.8MHz_OBW



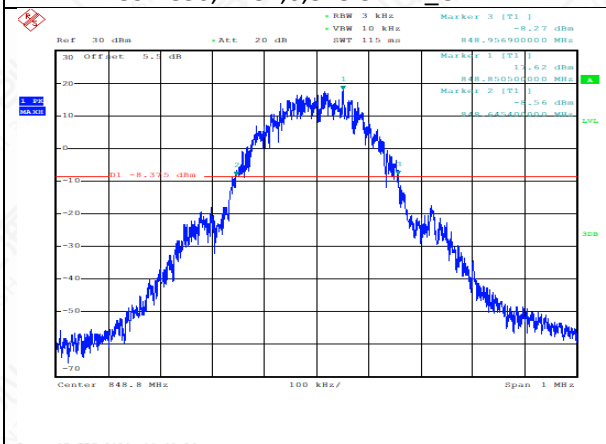
GSM850,EDGE,6,824.2MHz_OBW



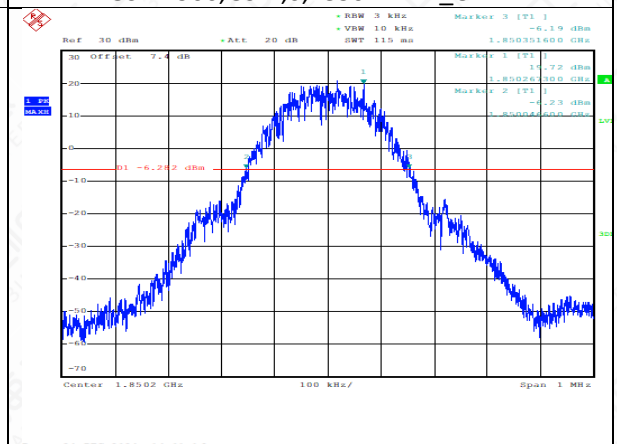
GSM850,EDGE,6,836.6MHz_OBW



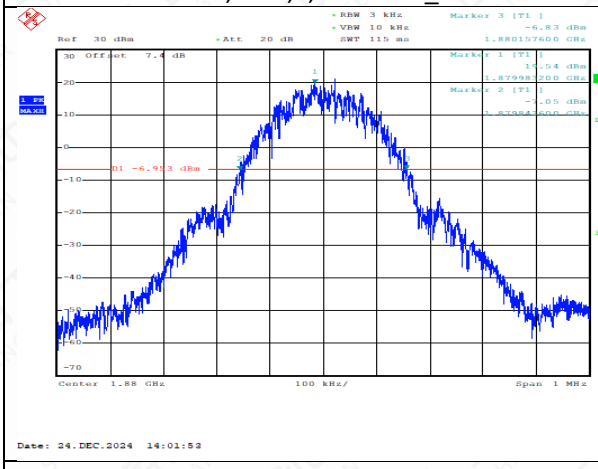
GSM850,EDGE,6,848.8MHz_OBW



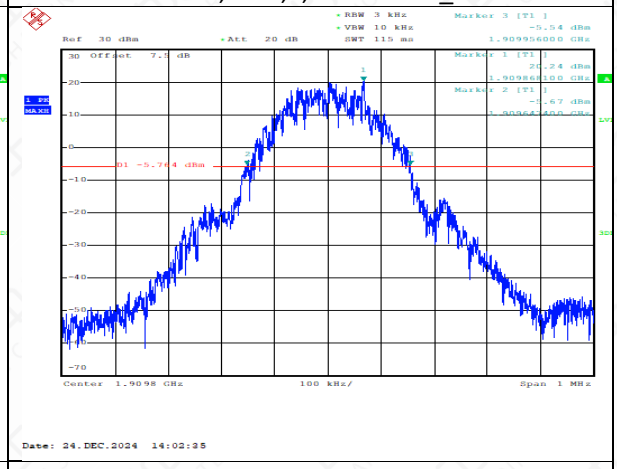
GSM1900,GSM,0,1850.2MHz_OBW



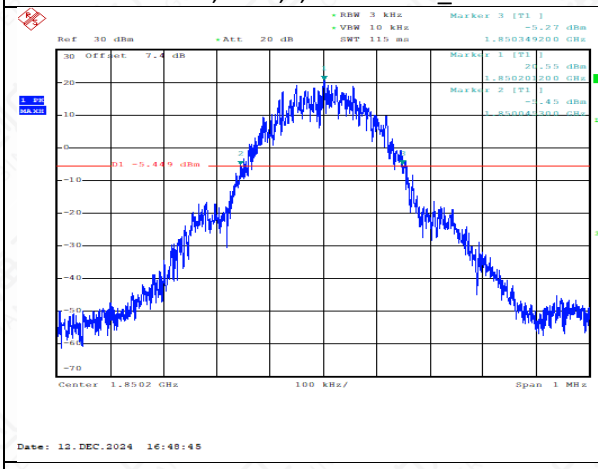
GSM1900,GSM,0,1880MHz_OBW



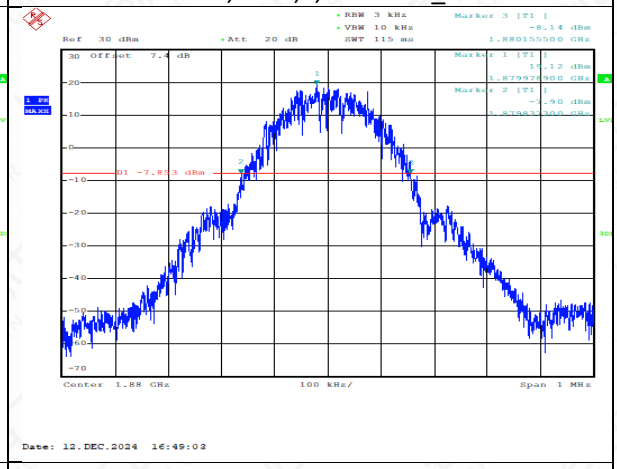
GSM1900,GSM,0,1909.8MHz_OBW



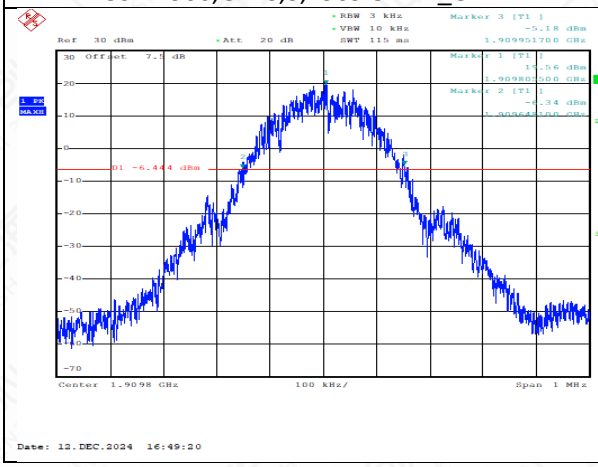
GSM1900,GPRS,3,1850.2MHz_OBW



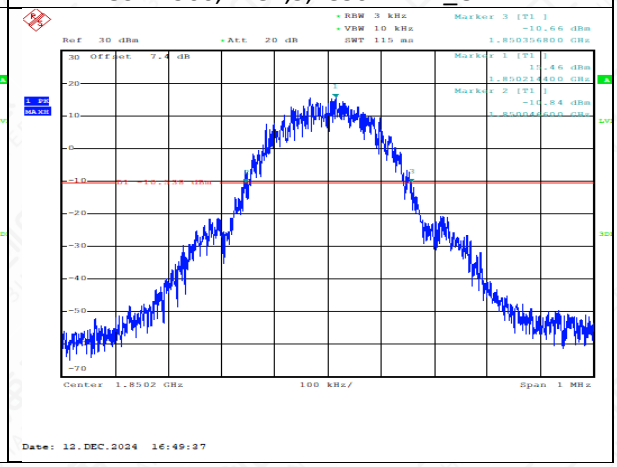
GSM1900,GPRS,3,1880MHz_OBW



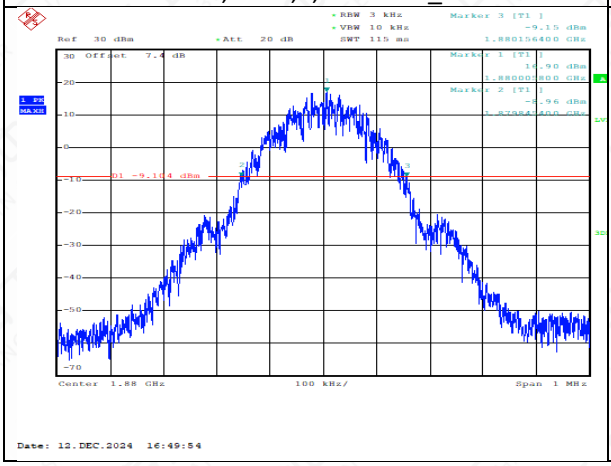
GSM1900,GPRS,3,1909.8MHz_OBW



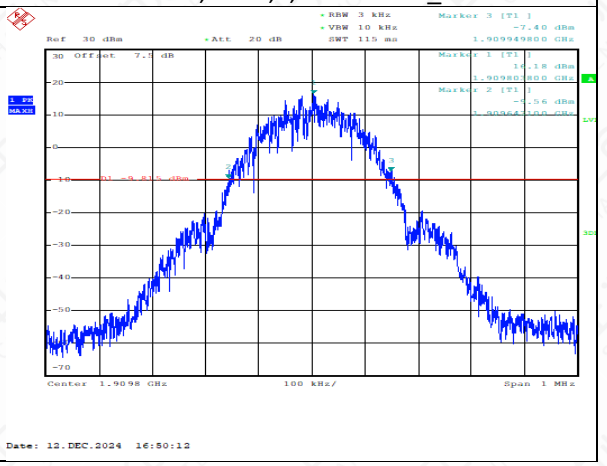
GSM1900,EDGE,5,1850.2MHz_OBW



GSM1900,EDGE,5,1880MHz_OBW



GSM1900,EDGE,5,1909.8MHz_OBW



6.5 Band Edge at antenna terminals

6.5.1 Measurement Limit

FCC §22.917(a)

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

FCC §24.238(a)

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

RSS-133 5.6

Unwanted emissions shall be measured in terms of average values while the transmitter is operating at the manufacturer's rated power and modulated as specified in RSS-Gen.

Equipment shall meet the unwanted emission limits, specified in table 3, outside each frequency block group. For each channel bandwidth supported by the equipment under test, the unwanted emissions shall be measured and reported for two channel frequencies: one located as close as possible to the low end and one located as close as possible to the high end of the equipment's operating frequency range.

For the unwanted emission limits, in the 1 MHz bands immediately outside and adjacent to the frequency block group, the power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth (OBW). Beyond these 1 MHz bands, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth may be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz, or 1% of the OBW, as applicable.

For all equipment, the TRP or total conducted power (sum of conducted power across all antenna connectors), where applicable, of the unwanted emissions outside the frequency block or frequency block group shall not exceed the limits shown in the table 3.

Offset frequency from the edge of the frequency block group (MHz)	Unwanted emission limit
≤ 1	-13 dBm/(1% of OBW)
> 1	-13 dBm/MHz

RSS-132 5.5

Equipment shall meet the unwanted emission limits specified below:

i. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated below the transmitter output power P (dBW) by at least 43 + 10 log(p) dB.

ii. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated below the transmitter output power P (dBW) by at least 43 + 10 log(p) dB. If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

p is the output power specified in watts.

6.5.2 Method of Measurement

The RF output of the transceiver was connected to a signal analyzer through appropriate attenuation.

In the 1MHz 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 RF fundamental frequency should be excluded against the limit line in the operating frequency band

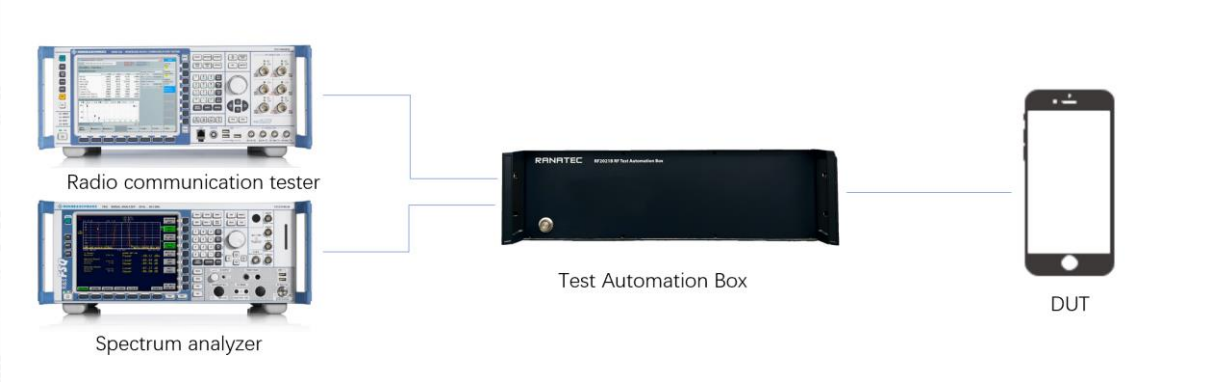
The limit line is derived from 43+10log(P) Db below the transmitter power P(Watts)

=P(W)-[43+10log(P)](dB)

=[30+10log(P)](dBm)-[43+10log(P)](dB)

=-13dBm

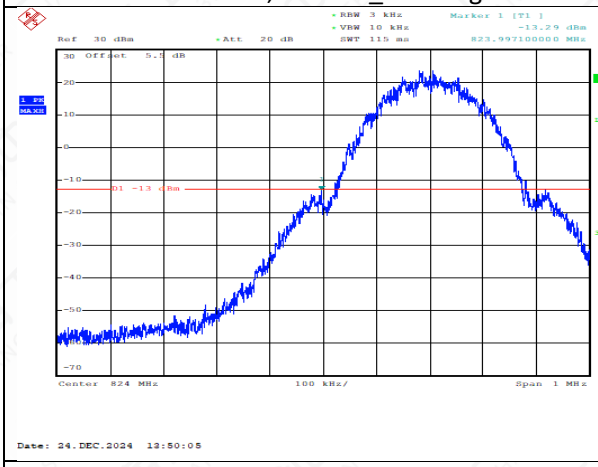
6.5.3 Test Setup



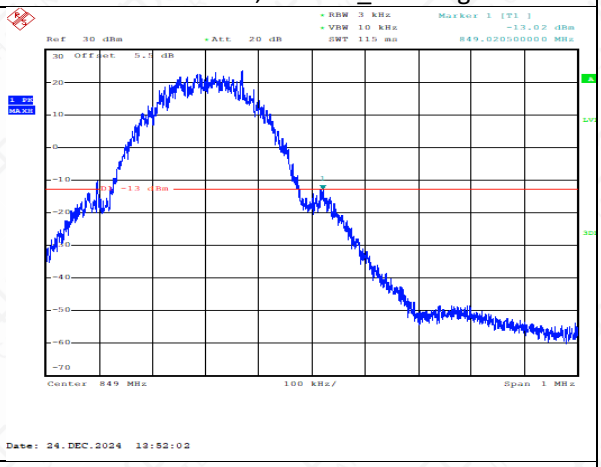
6.5.4 Measurement Result

Band	Network	Channel	PCL/Gamma	BandEdgeWorstResult(dBm)	Limit(dBm)	TestVerdict
GSM850	GSM	128	5	-13.29	-13	Pass
GSM850	GSM	251	5	-13.02	-13	Pass
GSM850	GPRS	128	3	-13.32	-13	Pass
GSM850	GPRS	251	3	-13.11	-13	Pass
GSM850	EDGE	128	6	-18.57	-13	Pass
GSM850	EDGE	251	6	-19.17	-13	Pass
GSM1900	GSM	512	0	-15.53	-13	Pass
GSM1900	GSM	810	0	-14.46	-13	Pass
GSM1900	GPRS	512	3	-13.76	-13	Pass
GSM1900	GPRS	810	3	-16.1	-13	Pass
GSM1900	EDGE	512	5	-18.5	-13	Pass
GSM1900	EDGE	810	5	-19.05	-13	Pass

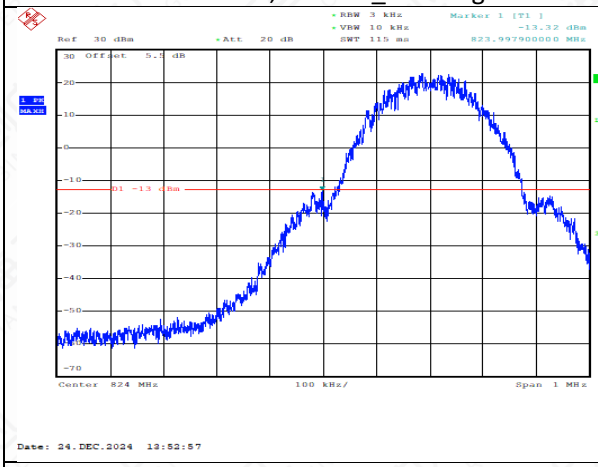
GSM850GSM,824MHz_BandEdge



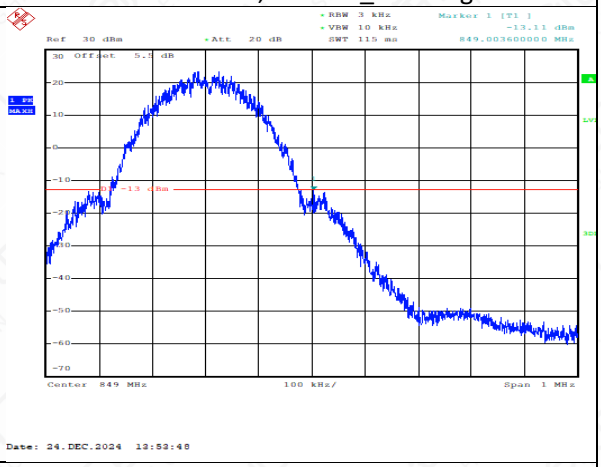
GSM850GSM,849MHz_BandEdge



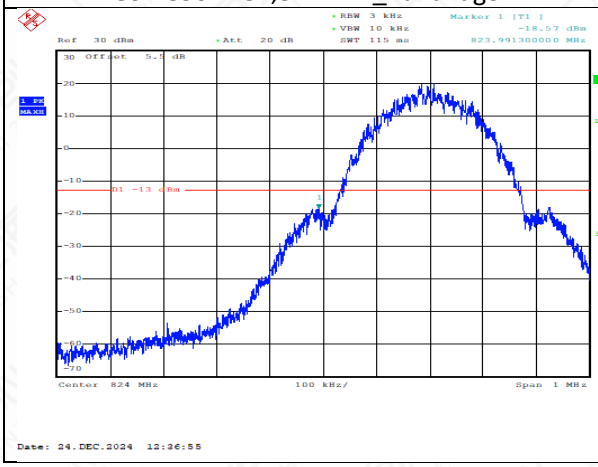
GSM850GPRS,824MHz_BandEdge



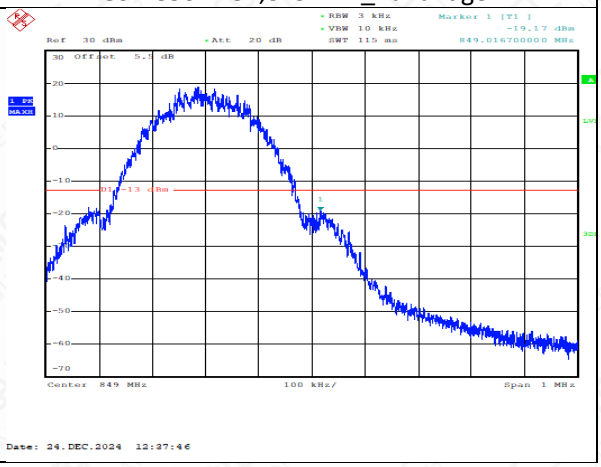
GSM850GPRS,849MHz_BandEdge



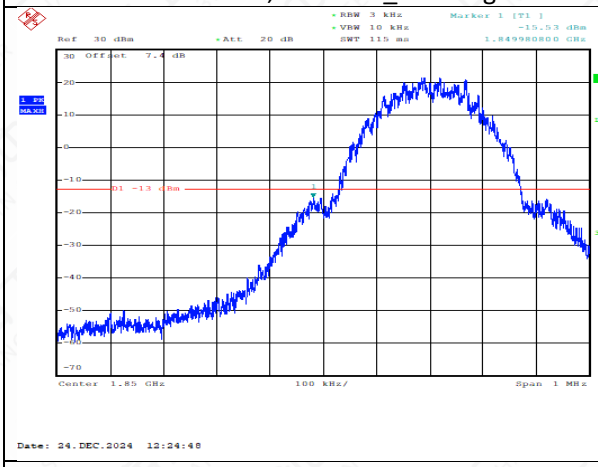
GSM850EDGE,824MHz_BandEdge



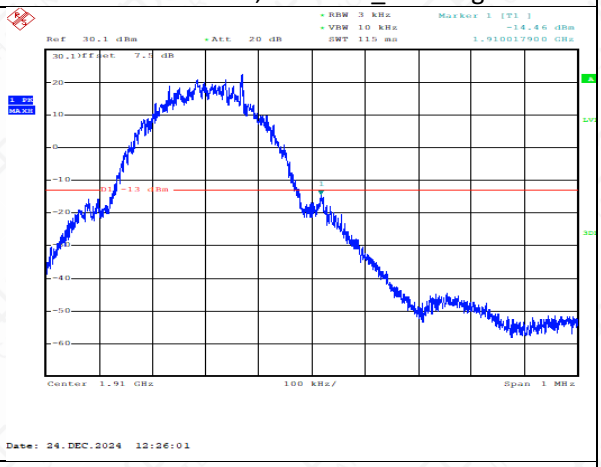
GSM850EDGE,849MHz_BandEdge



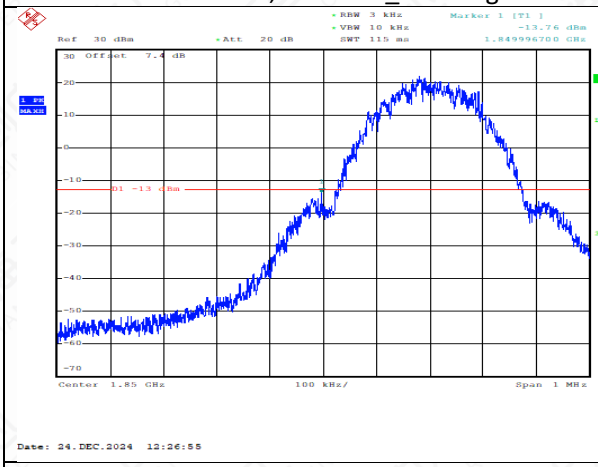
GSM1900GSM,1850MHz_BandEdge



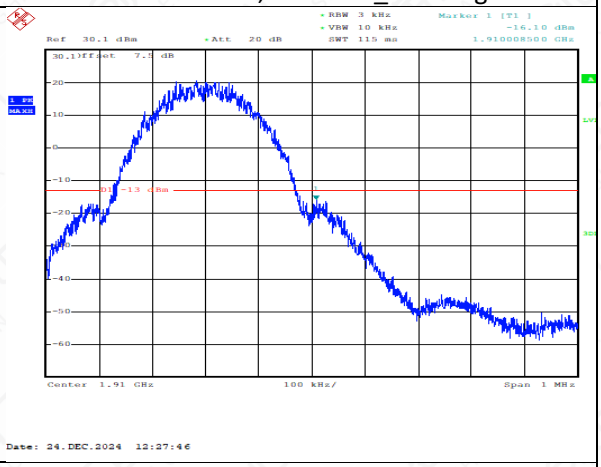
GSM1900GSM,1910MHz_BandEdge



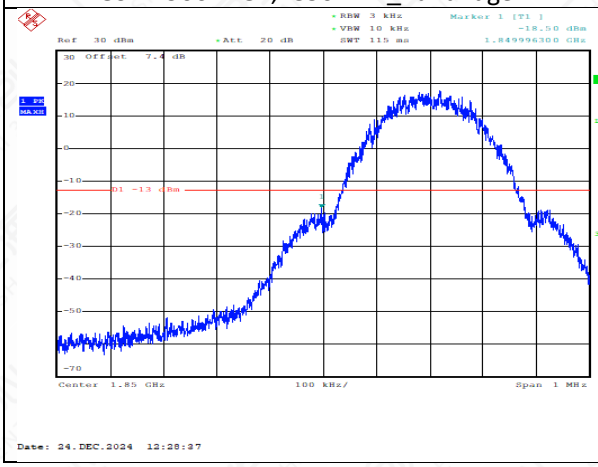
GSM1900GPRS,1850MHz_BandEdge



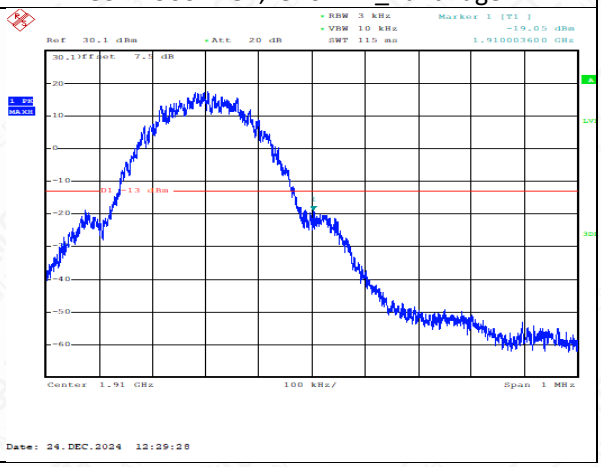
GSM1900GPRS,1910MHz_BandEdge



GSM1900EDGE,1850MHz_BandEdge



GSM1900EDGE,1910MHz_BandEdge



6.6 Frequency Stability

6.6.1 Measurement Limit

FCC §2.1055 The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From −30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
(2) From −20° to + 50° centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radiobeacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.
FCC §24.235 Frequency stability.The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.
FCC §22.355 Frequency tolerance.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.
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The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block or frequency block group when tested to the temperature and supply voltage variations specified in RSS-Gen.
RSS-132 5.3
The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within each of the sub-bands when tested at the temperature and supply voltage variations specified in RSS-Gen.

6.6.2 Method of Measurement

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.
1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on mid channel of GSM850, PCS1900, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50℃.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

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

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

6.6.3 Test Setup

6.6.4 Test results

Band	Network	Channel	Gamma	Temperature	Voltage	Frequency Error(Hz)	Frequency Error(ppm)	Result
GSM850	GSM	190	5	Normal	Low	-6.393	-0.008	Pass
GSM850	GSM	190	5	Normal	Normal	-5.489	-0.007	Pass
GSM850	GSM	190	5	Normal	High	-5.941	-0.007	Pass
GSM850	GSM	190	5	50	Normal	-4.326	-0.005	Pass
GSM850	GSM	190	5	40	Normal	-3.616	-0.004	Pass
GSM850	GSM	190	5	30	Normal	-7.555	-0.009	Pass
GSM850	GSM	190	5	20	Normal	-6.877	-0.008	Pass
GSM850	GSM	190	5	10	Normal	-4.423	-0.005	Pass
GSM850	GSM	190	5	0	Normal	-6.780	-0.008	Pass
GSM850	GSM	190	5	-10	Normal	-6.360	-0.008	Pass
GSM850	GSM	190	5	-20	Normal	-5.424	-0.006	Pass
GSM850	GSM	190	5	-30	Normal	-6.393	-0.008	Pass
Band	Network	Channel	Gamma	Temperature	Voltage	Frequency Error(Hz)	Frequency Error(ppm)	Result
GSM850	GPRS	190	3	Normal	Low	-2.131	-0.003	Pass
GSM850	GPRS	190	3	Normal	Normal	0.097	0.000	Pass
GSM850	GPRS	190	3	Normal	High	-1.485	-0.002	Pass
GSM850	GPRS	190	3	50	Normal	-1.647	-0.002	Pass
GSM850	GPRS	190	3	40	Normal	-3.358	-0.004	Pass

GSM850	GPRS	190	3	30	Normal	-5.553	-0.007	Pass
GSM850	GPRS	190	3	20	Normal	-5.747	-0.007	Pass
GSM850	GPRS	190	3	10	Normal	-0.258	0.000	Pass
GSM850	GPRS	190	3	0	Normal	-5.359	-0.006	Pass
GSM850	GPRS	190	3	-10	Normal	-3.293	-0.004	Pass
GSM850	GPRS	190	3	-20	Normal	-3.455	-0.004	Pass
GSM850	GPRS	190	3	-30	Normal	1.388	0.002	Pass
Band	Network	Channel	Gamma	Temperature	Voltage	Frequency Error(Hz)	Frequency Error(ppm)	Result
GSM850	EDGE	190	6	Normal	Low	-0.936	-0.001	Pass
GSM850	EDGE	190	6	Normal	Normal	-1.614	-0.002	Pass
GSM850	EDGE	190	6	Normal	High	2.325	0.003	Pass
GSM850	EDGE	190	6	50	Normal	-0.613	-0.001	Pass
GSM850	EDGE	190	6	40	Normal	-0.936	-0.001	Pass
GSM850	EDGE	190	6	30	Normal	3.681	0.004	Pass
GSM850	EDGE	190	6	20	Normal	-0.678	-0.001	Pass
GSM850	EDGE	190	6	10	Normal	5.521	0.007	Pass
GSM850	EDGE	190	6	0	Normal	1.001	0.001	Pass
GSM850	EDGE	190	6	-10	Normal	0.549	0.001	Pass
GSM850	EDGE	190	6	-20	Normal	2.357	0.003	Pass
GSM850	EDGE	190	6	-30	Normal	-1.711	-0.002	Pass
Band	Network	Channel	Gamma	Temperature	Voltage	Frequency Error(Hz)	Frequency Error(ppm)	Result
GSM1900	GSM	661	0	Normal	Low	-6.199	-0.003	Pass
GSM1900	GSM	661	0	Normal	Normal	1.065	0.001	Pass
GSM1900	GSM	661	0	Normal	High	-3.390	-0.002	Pass
GSM1900	GSM	661	0	50	Normal	-3.939	-0.002	Pass
GSM1900	GSM	661	0	40	Normal	-10.170	-0.005	Pass
GSM1900	GSM	661	0	30	Normal	-12.559	-0.007	Pass
GSM1900	GSM	661	0	20	Normal	-4.133	-0.002	Pass
GSM1900	GSM	661	0	10	Normal	-3.874	-0.002	Pass

GSM1900	GSM	661	0	0	Normal	-1.840	-0.001	Pass
GSM1900	GSM	661	0	-10	Normal	-16.208	-0.009	Pass
GSM1900	GSM	661	0	-20	Normal	-16.789	-0.009	Pass
GSM1900	GSM	661	0	-30	Normal	-12.043	-0.006	Pass
Band	Network	Channel	Gamma	Temperature	Voltage	Frequency Error(Hz)	Frequency Error(ppm)	Result
GSM1900	GPRS	661	3	Normal	Low	19.081	0.010	Pass
GSM1900	GPRS	661	3	Normal	Normal	13.851	0.007	Pass
GSM1900	GPRS	661	3	Normal	High	19.920	0.011	Pass
GSM1900	GPRS	661	3	50	Normal	20.146	0.011	Pass
GSM1900	GPRS	661	3	40	Normal	24.085	0.013	Pass
GSM1900	GPRS	661	3	30	Normal	14.948	0.008	Pass
GSM1900	GPRS	661	3	20	Normal	19.759	0.011	Pass
GSM1900	GPRS	661	3	10	Normal	15.368	0.008	Pass
GSM1900	GPRS	661	3	0	Normal	17.305	0.009	Pass
GSM1900	GPRS	661	3	-10	Normal	25.926	0.014	Pass
GSM1900	GPRS	661	3	-20	Normal	10.654	0.006	Pass
GSM1900	GPRS	661	3	-30	Normal	20.050	0.011	Pass
Band	Network	Channel	Gamma	Temperature	Voltage	Frequency Error(Hz)	Frequency Error(ppm)	Result
GSM1900	EDGE	661	5	Normal	Low	9.331	0.005	Pass
GSM1900	EDGE	661	5	Normal	Normal	18.242	0.010	Pass
GSM1900	EDGE	661	5	Normal	High	24.892	0.013	Pass
GSM1900	EDGE	661	5	50	Normal	35.740	0.019	Pass
GSM1900	EDGE	661	5	40	Normal	41.390	0.022	Pass
GSM1900	EDGE	661	5	30	Normal	15.239	0.008	Pass
GSM1900	EDGE	661	5	20	Normal	19.468	0.010	Pass
GSM1900	EDGE	661	5	10	Normal	20.469	0.011	Pass
GSM1900	EDGE	661	5	0	Normal	20.276	0.011	Pass
GSM1900	EDGE	661	5	-10	Normal	18.887	0.010	Pass
GSM1900	EDGE	661	5	-20	Normal	31.511	0.017	Pass

GSM1900	EDGE	661	5	-30	Normal	32.028	0.017	Pass

6.7 Conducted Spurious Emission

6.7.1 Measurement Limit

FCC §22.917(a)

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

(a)Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

FCC §24.238(a)

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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Unwanted emissions shall be measured in terms of average values while the transmitter is operating at the manufacturer's rated power and modulated as specified in RSS-Gen.

Equipment shall meet the unwanted emission limits, specified in table 3, outside each frequency block group. For each channel bandwidth supported by the equipment under test, the unwanted emissions shall be measured and reported for two channel frequencies: one located as close as possible to the low end and one located as close as possible to the high end of the equipment's operating frequency range.

For the unwanted emission limits, in the 1 MHz bands immediately outside and adjacent to the frequency block group, the power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth (OBW). Beyond these 1 MHz bands, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth may be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz, or 1% of the OBW, as applicable.

For all equipment, the TRP or total conducted power (sum of conducted power across all antenna connectors), where applicable, of the unwanted emissions outside the frequency block or frequency block group shall not exceed the limits shown in the table.

Offset frequency from the edge of the frequency block group (MHz)	Unwanted emission limit
≤ 1	-13 dBm/(1% of OBW)
> 1	-13 dBm/MHz

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Equipment shall meet the unwanted emission limits specified below:

i. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated below the transmitter output power P (dBW) by at least 43 + 10 log(p) dB.

ii. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated below the transmitter output power P (dBW) by at least 43 + 10 log(p) dB. If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

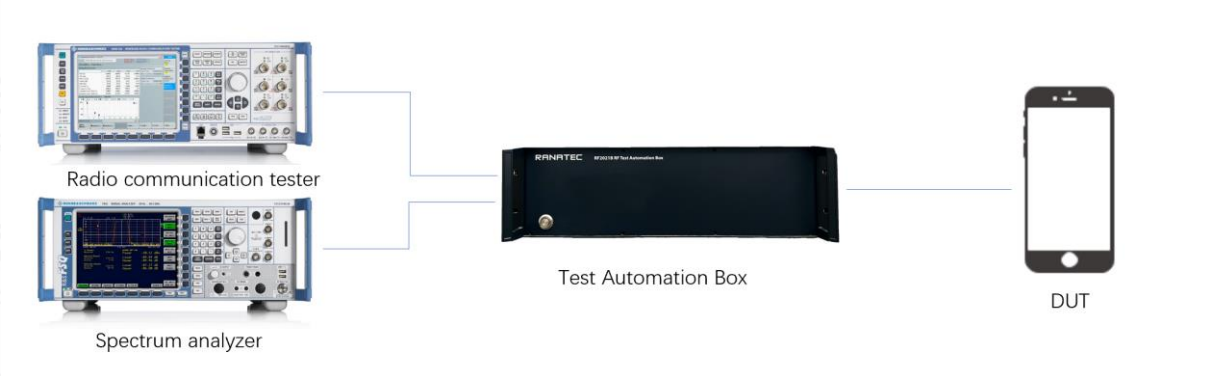
p is the output power specified in watts.

6.7.2 Method of Measurement

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For GSM850, data taken from 30 MHz to 10 GHz.
2. The sweep time is set automatically by instrument itself. That should be the optimal sweep time for the span and the RBW. If the sweep time is too short, that is sweep is too fast, the sweep result is not accurate; If the sweep time is too long, that is sweep is too low, some frequency components may be lost. The instrument will give a optimal sweep time according the selected span and RBW.
3. The procedure to get the conducted spurious emission is as follows:
The trace mode is set to MaxHold to get the highest signal at each frequency;
Wait 25 seconds; Get the result.
4. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

6.7.3 Test Setup

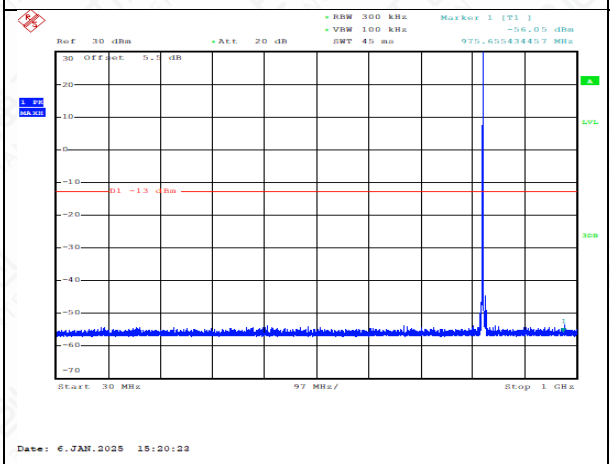


6.7.4 Measurement Result

Band	Network	Channel	TestRange(MHz)	TestResult (dBm)	Limit (dBm)	TestVerdict
GSM850	GSM	128	30MHz-1000MHz	-53.76	-13	Pass
GSM850	GSM	128	1000MHz-26000MHz	-27.24	-13	Pass
GSM850	GSM	190	30MHz-1000MHz	-53.94	-13	Pass
GSM850	GSM	190	1000MHz-26000MHz	-30.31	-13	Pass
GSM850	GSM	251	30MHz-1000MHz	-53.83	-13	Pass
GSM850	GSM	251	1000MHz-26000MHz	-20.38	-13	Pass
GSM850	GPRS	128	30MHz-1000MHz	-53.69	-13	Pass
GSM850	GPRS	128	1000MHz-26000MHz	-21.78	-13	Pass
GSM850	GPRS	190	30MHz-1000MHz	-53.60	-13	Pass
GSM850	GPRS	190	1000MHz-26000MHz	-20.22	-13	Pass
GSM850	GPRS	251	30MHz-1000MHz	-53.94	-13	Pass
GSM850	GPRS	251	1000MHz-26000MHz	-20.29	-13	Pass
GSM850	EDGE	128	30MHz-1000MHz	-54.07	-13	Pass
GSM850	EDGE	128	1000MHz-26000MHz	-32.31	-13	Pass
GSM850	EDGE	190	30MHz-1000MHz	-53.88	-13	Pass
GSM850	EDGE	190	1000MHz-26000MHz	-30.65	-13	Pass
GSM850	EDGE	251	30MHz-1000MHz	-53.88	-13	Pass
GSM850	EDGE	251	1000MHz-26000MHz	-41.28	-13	Pass
GSM1900	GSM	512	30MHz-1000MHz	-53.65	-13	Pass
GSM1900	GSM	512	1000MHz-26000MHz	-41.68	-13	Pass
GSM1900	GSM	661	30MHz-1000MHz	-52.88	-13	Pass
GSM1900	GSM	661	1000MHz-26000MHz	-42.25	-13	Pass
GSM1900	GSM	810	30MHz-1000MHz	-53.63	-13	Pass
GSM1900	GSM	810	1000MHz-26000MHz	-42.49	-13	Pass
GSM1900	GPRS	512	30MHz-1000MHz	-53.68	-13	Pass
GSM1900	GPRS	512	1000MHz-26000MHz	-42.67	-13	Pass
GSM1900	GPRS	661	30MHz-1000MHz	-52.76	-13	Pass

GSM1900	GPRS	661	1000MHz-26000MHz	-41.77	-13	Pass
GSM1900	GPRS	810	30MHz-1000MHz	-53.80	-13	Pass
GSM1900	GPRS	810	1000MHz-26000MHz	-42.54	-13	Pass
GSM1900	EDGE	512	30MHz-1000MHz	-53.43	-13	Pass
GSM1900	EDGE	512	1000MHz-26000MHz	-41.99	-13	Pass
GSM1900	EDGE	661	30MHz-1000MHz	-53.71	-13	Pass
GSM1900	EDGE	661	1000MHz-26000MHz	-42.33	-13	Pass
GSM1900	EDGE	810	30MHz-1000MHz	-53.93	-13	Pass
GSM1900	EDGE	810	1000MHz-26000MHz	-42.57	-13	Pass

GSM850_GSM_128_30MHz-1000MHz_CSE



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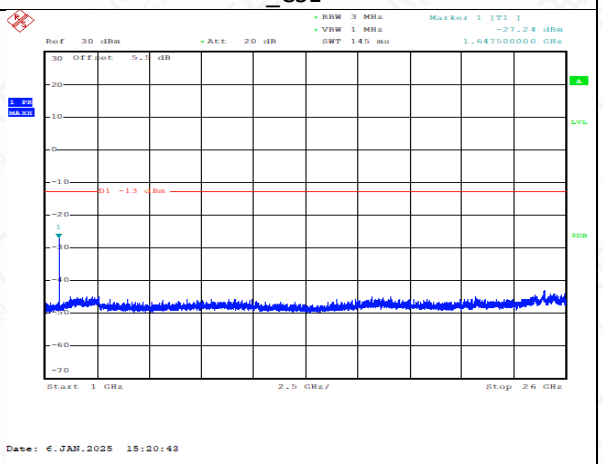
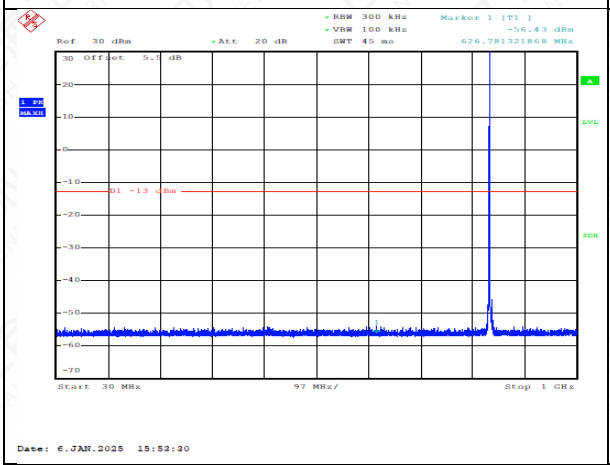
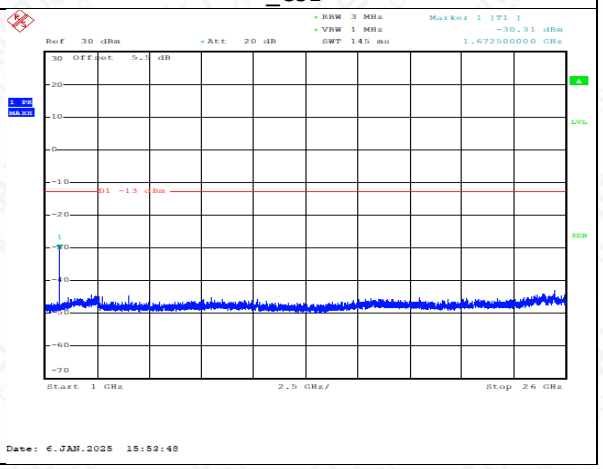


GSM850_GSM_190_30MHz-1000MHz_CSE



GSM850_GSM_190_1000MHz-26000MHz_CSE



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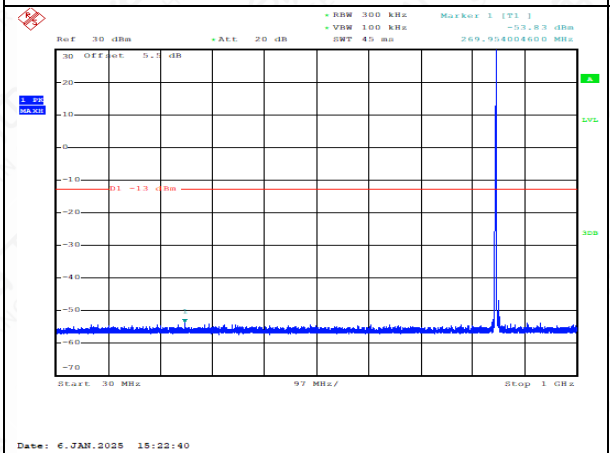	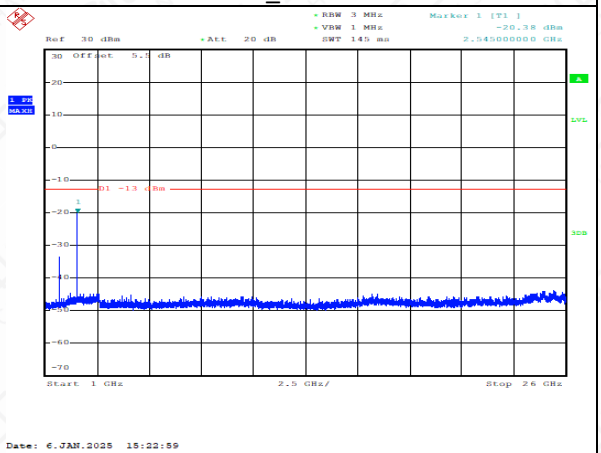
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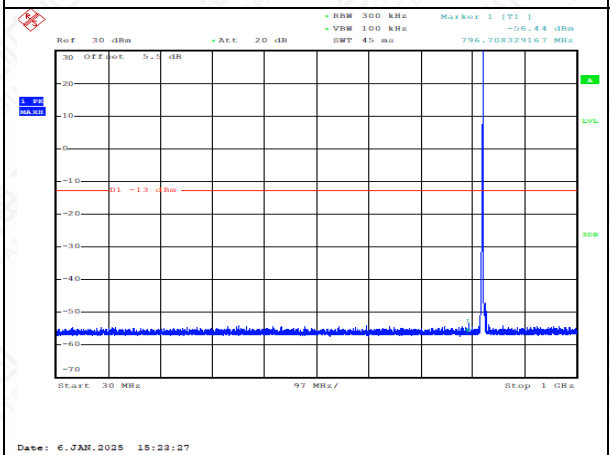	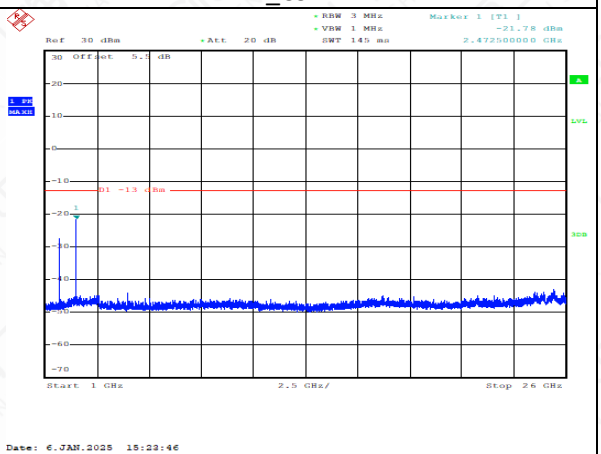
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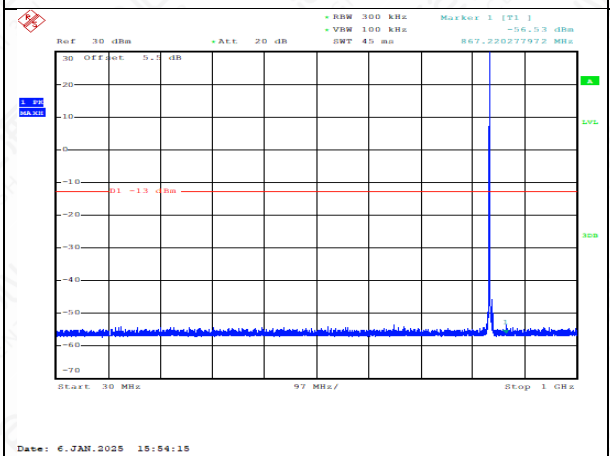
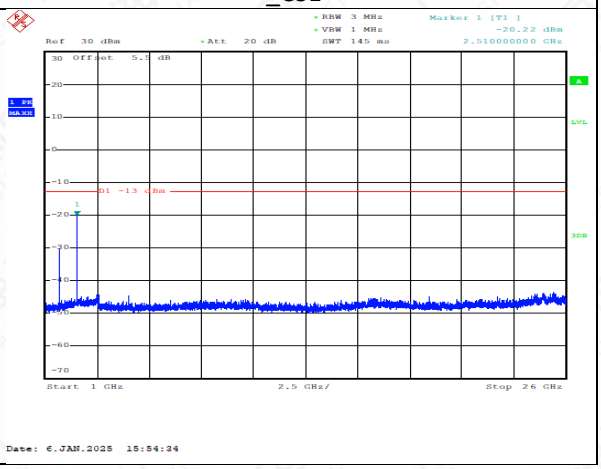
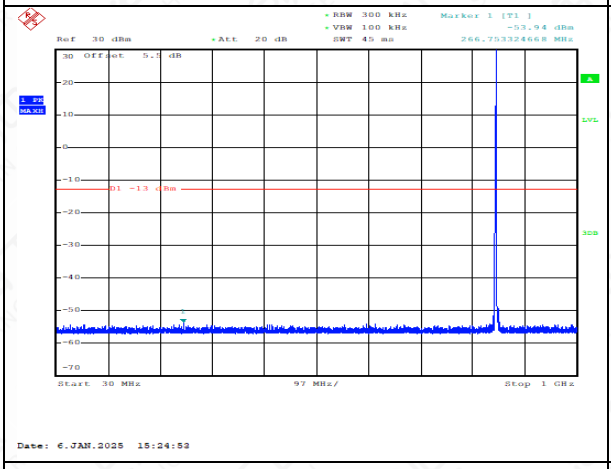
	

GSM850_GPRS_251_30MHz-1000MHz_CSE



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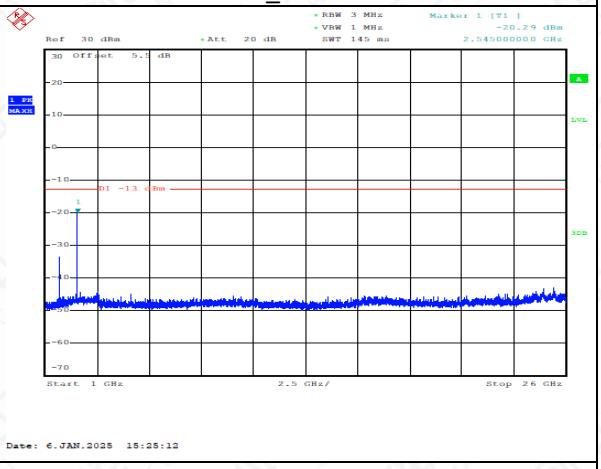

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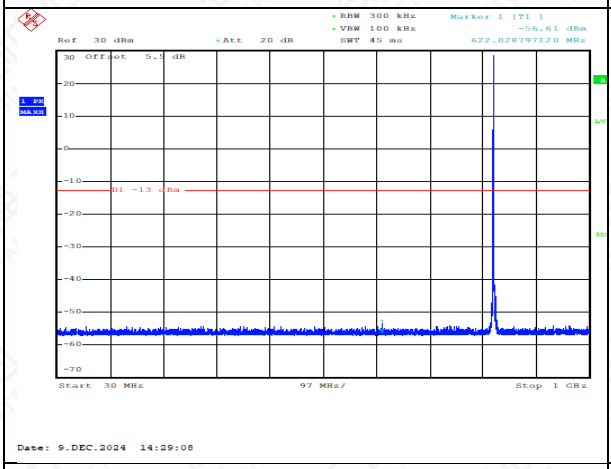
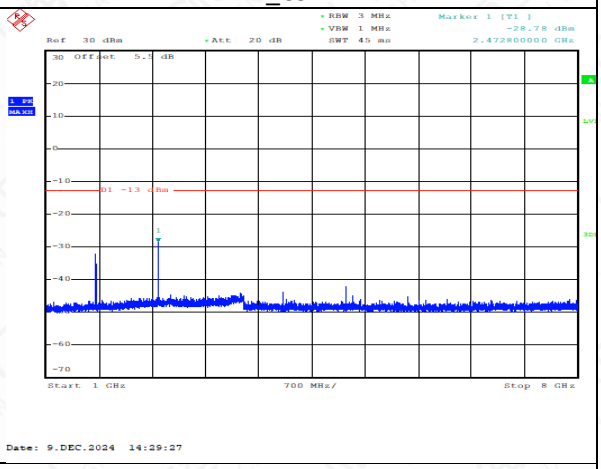


GSM850_EDGE_128_1000MHz-26000MHz_CSE



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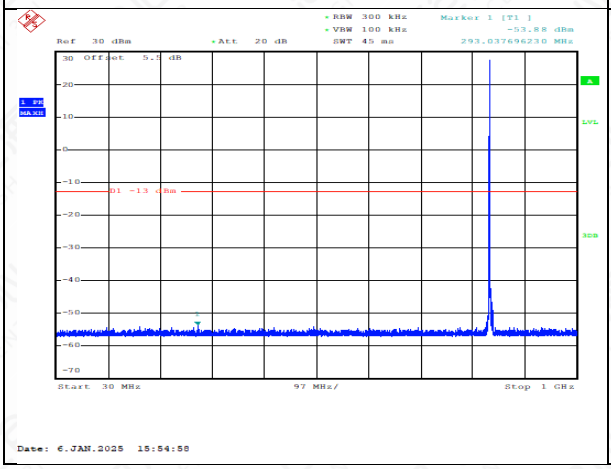

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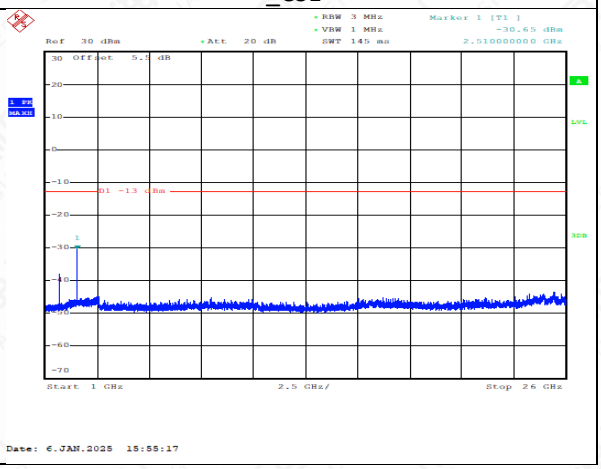

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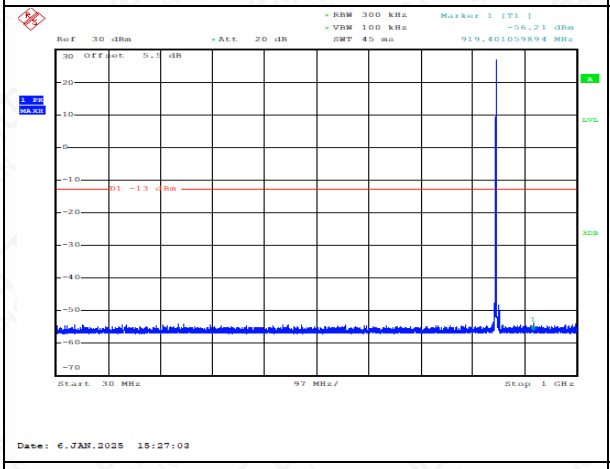

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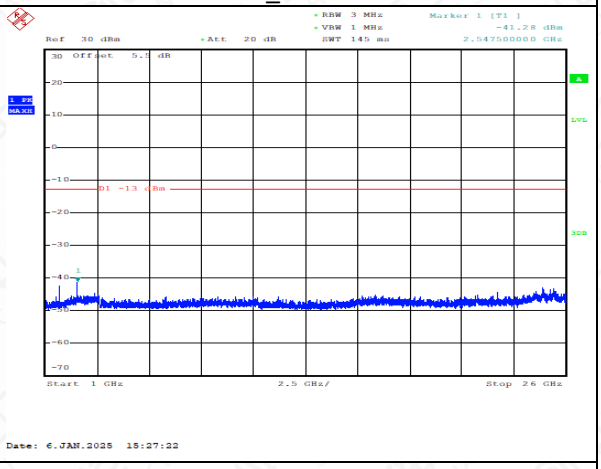

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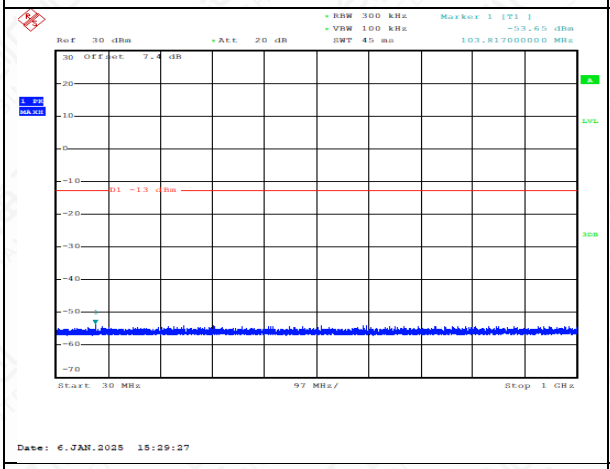
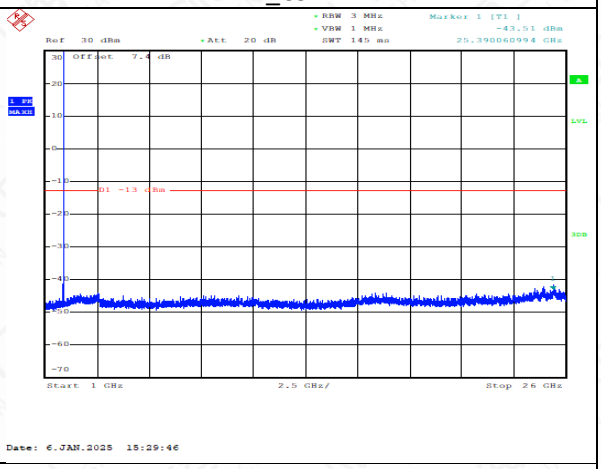


GSM1900_GSM_512_1000MHz-26000MHz_CSE



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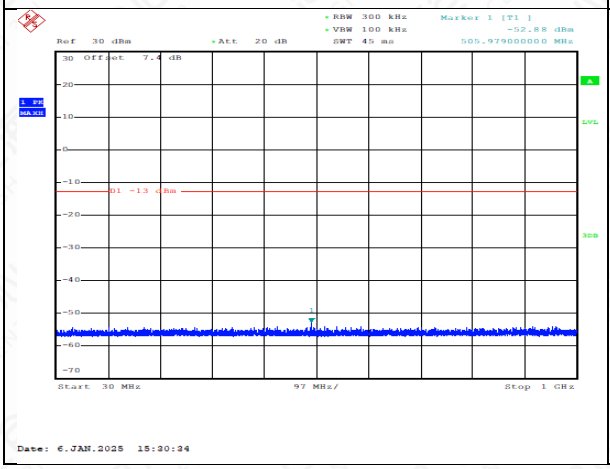

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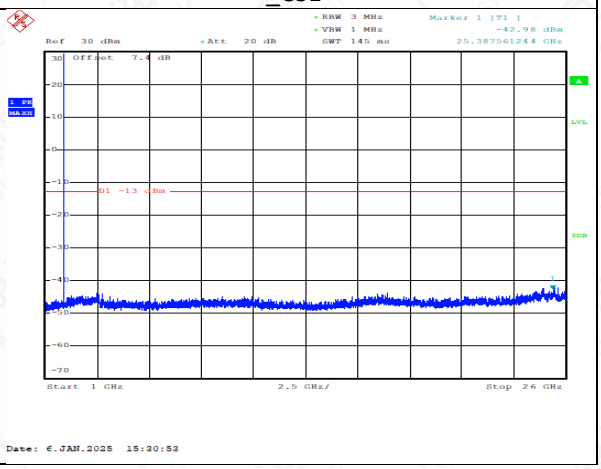

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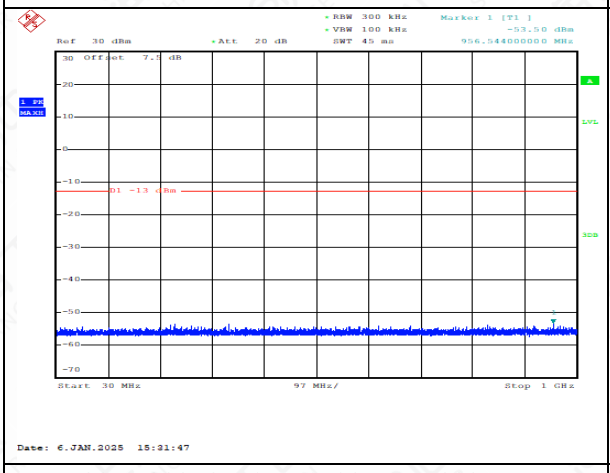	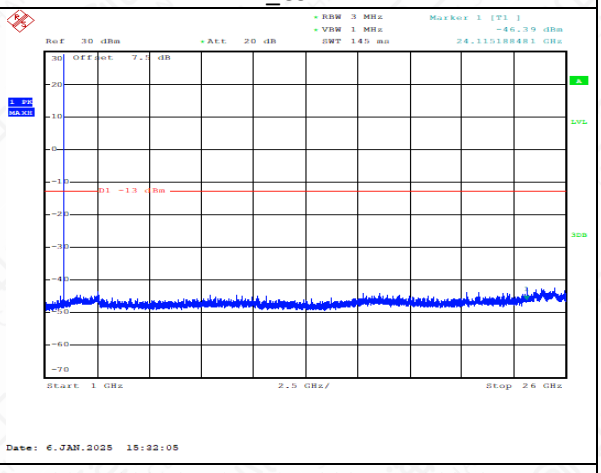
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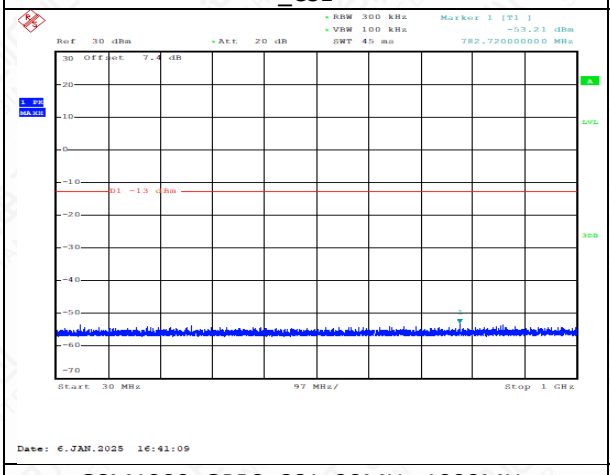	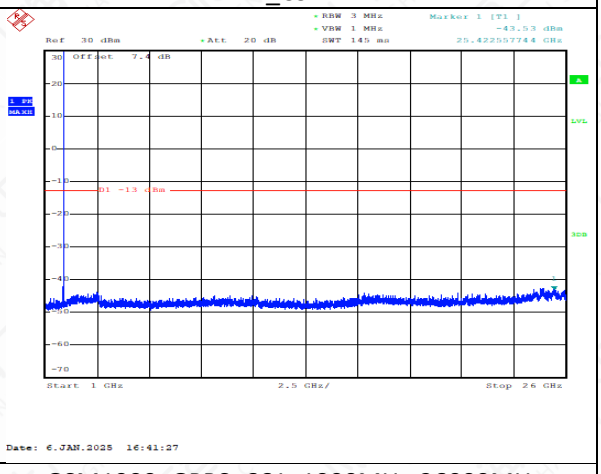
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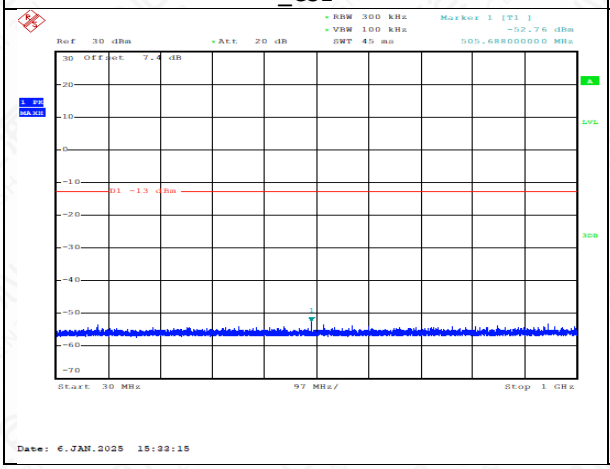
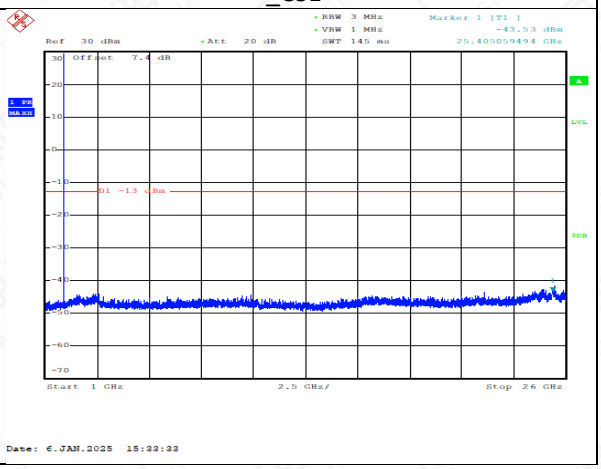
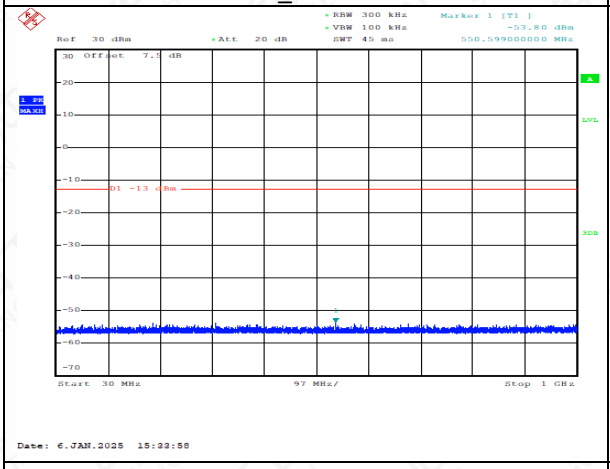
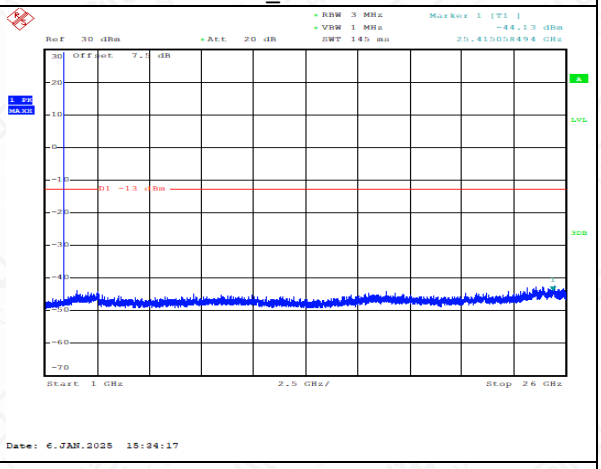
	

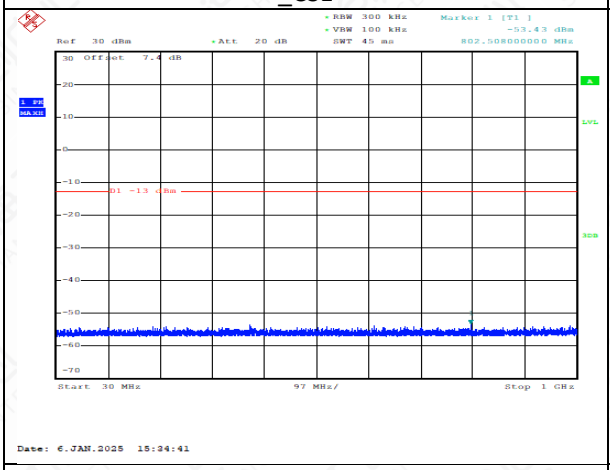
GSM1900_GPRS_810_30MHz-1000MHz_CSE



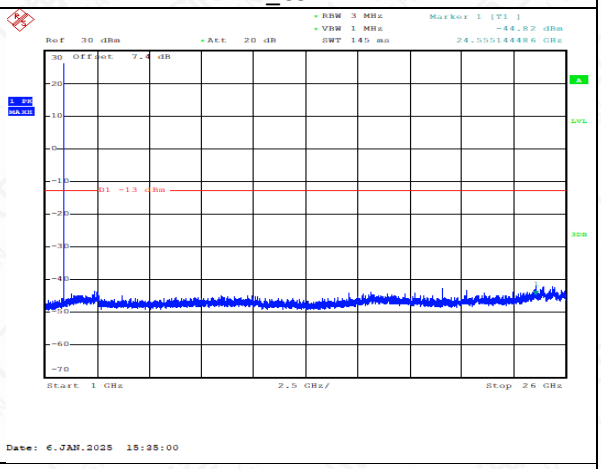
GSM1900_GPRS_810_1000MHz-26000MHz_CSE



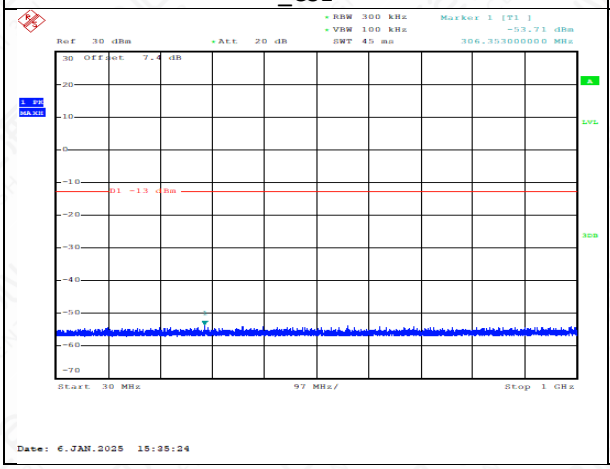
GSM1900_EDGE_512_30MHz-1000MHz_CSE



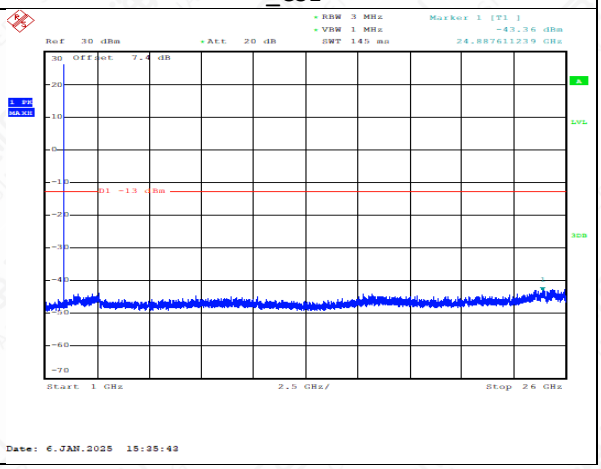
GSM1900_EDGE_512_1000MHz-26000MHz_CSE

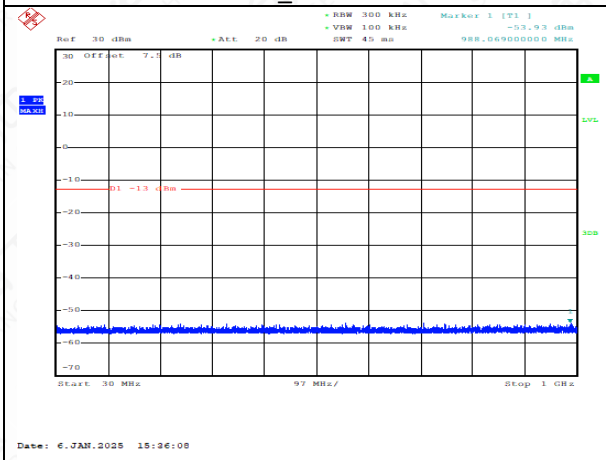
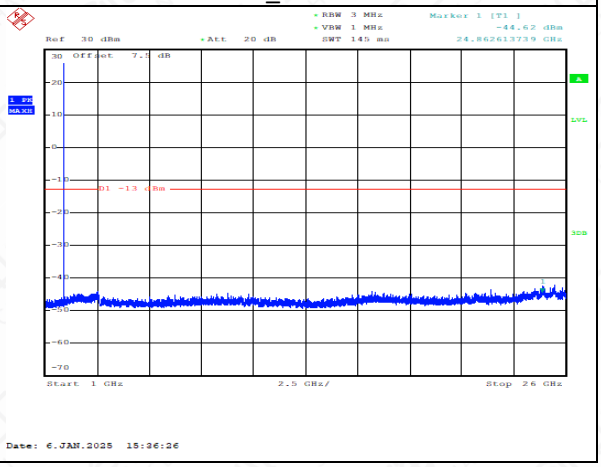


GSM1900_EDGE_661_30MHz-1000MHz_CSE



GSM1900_EDGE_661_1000MHz-26000MHz_CSE



GSM1900_EDGE_810_30MHz-1000MHz _CSE	GSM1900_EDGE_810_1000MHz-26000MHz _CSE
	

6.8 Emission Limit

6.8.1 Measurement Limit

FCC §22.917/24.238(a) specifies that " In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p (watts).

(ii) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required." Limit -13 dBm

RSS-133 5.6

Unwanted emissions shall be measured in terms of average values while the transmitter is operating at the manufacturer's rated power and modulated as specified in RSS-Gen.

Equipment shall meet the unwanted emission limits, specified in table 3, outside each frequency block group. For each channel bandwidth supported by the equipment under test, the unwanted emissions shall be measured and reported for two channel frequencies: one located as close as possible to the low end and one located as close as possible to the high end of the equipment's operating frequency range.

For the unwanted emission limits, in the 1 MHz bands immediately outside and adjacent to the frequency block group, the power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth (OBW). Beyond these 1 MHz bands, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth may be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz, or 1% of the OBW, as applicable.

For all equipment, the TRP or total conducted power (sum of conducted power across all antenna connectors), where applicable, of the unwanted emissions outside the frequency block or frequency block group shall not exceed the limits shown in the table.

Offset frequency from the edge of the frequency block group (MHz)	Unwanted emission limit
≤ 1	-13 dBm/(1% of OBW)
> 1	-13 dBm/MHz

RSS-132 5.5

Equipment shall meet the unwanted emission limits specified below:

i. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated below the transmitter output power P (dBW) by at least 43 + 10 log(p) dB.

ii. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated below the transmitter output power P (dBW) by at least 43 + 10 log(p) dB. If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

p is the output power specified in watts.

6.8.2 Method of Measurement

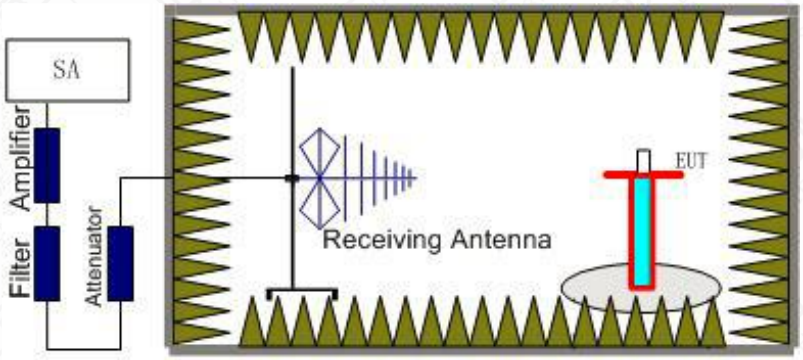
The measurements procedures in TIA-603E-2016 are used.

The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set as outlined in Part 24.238 and Part 24.917.

The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of PCS1900 and GSM850.

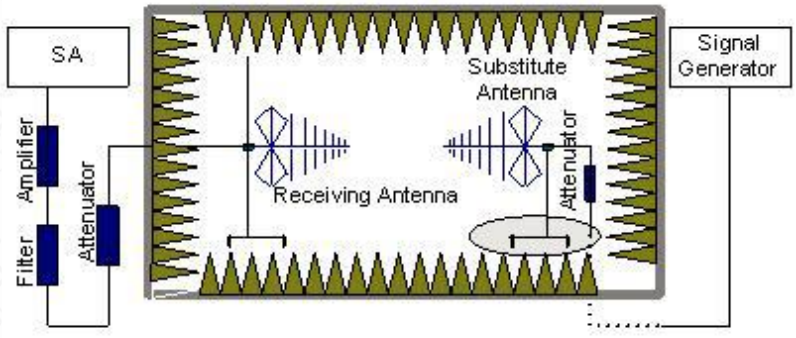
The procedure of radiated spurious emissions is as follows

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10thharmonic were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).

3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (Pcl) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (Ga) should be recorded after test.

A amplifier should be connected in for the test.
The Path loss (Pcl) is the summation of the cable loss .
The test results are obtained as described below:
Power(EIRP)=PMea- Pcl+ Ga
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi

6.8.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the PCS1900 band (1850.2 MHz, 1880 MHz and 1909.8 MHz) and GSM850 band (824.2MHz, 836.6MHz, 848.8MHz) . It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the PCS1900 ,GSM850 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

Frequency	Channel	Frequency Range	Result
GSM850	Low	30MHz~10GHz	Pass
	Mid	30MHz~10GHz	Pass
	High	30MHz~10GHz	Pass
GSM1900	Low	30MHz~20GHz	Pass
	Mid	30MHz~20GHz	Pass
	High	30MHz~20GHz	Pass

RSE-GSM850-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
1642.5	-49.52	4.2	4.7	-49.02	-13	36.02	V
2473.9	-41.16	5.4	5.6	-40.96	-13	27.96	V
3296.5	-49.26	6.2	6.9	-48.56	-13	35.56	H
4121.5	-50.69	7.0	8.6	-49.09	-13	36.09	H
4945.4	-49.4	7.7	9.6	-47.5	-13	34.50	H
5770.4	-49.69	8.5	10.2	-47.99	-13	34.99	H

RSE-G850-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
1674.6	-50.01	4.5	4.7	-49.81	-13	36.81	H
2510.4	-39.28	5.4	5.6	-39.08	-13	26.08	V
3348.5	-51.73	6.2	6.9	-51.03	-13	38.03	H
4183.8	-51.08	7.0	8.9	-49.18	-13	36.18	H
5019.2	-48.45	7.8	9.6	-46.65	-13	33.65	H
5856.9	-49.82	8.4	10.2	-48.02	-13	35.03	H

RSE-G850-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
1699.3	-49.66	4.5	4.7	-49.46	-13	36.46	H
2545.7	-41.27	5.4	5.6	-41.07	-13	28.07	H
3393.5	-52.12	6.3	7.8	-50.62	-13	37.62	H
4242.7	-52.7	7.1	8.9	-50.9	-13	37.90	V
5093.1	-46.24	7.9	9.6	-44.54	-13	31.54	H
5941.2	-51.67	8.5	10.2	-49.97	-13	36.97	H

RSE-GPRS850-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
1777.5	-48.26	4.5	4.7	-48.06	-13	35.06	H
2861.8	-39.83	5.8	6.1	-39.53	-13	26.53	H
3522.7	-48.81	6.4	7.8	-47.41	-13	34.41	V
5070.0	-45.9	7.8	9.6	-44.1	-13	31.10	H
6409.2	-49.77	8.9	10.6	-48.07	-13	35.07	H
7609.2	-50.61	9.7	11.6	-48.71	-13	35.71	V

RSE-GPRS850-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
1862.1	-46.63	4.6	4.7	-46.53	-13	33.53	H
3745.4	-51.25	6.6	7.9	-49.95	-13	36.95	H
5071.2	-46.1	7.8	9.6	-44.3	-13	31.30	V
6076.9	-50.16	8.7	10.2	-48.66	-13	35.66	V
7104.6	-50.41	9.4	11.1	-48.71	-13	35.71	H
8450.8	-47.66	10.2	12.6	-45.26	-13	32.26	V

RSE-GPRS850-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
2631.4	-40.21	5.5	6.1	-39.61	-13	26.61	H
4225.4	-49.02	7.1	8.9	-47.22	-13	34.22	V
5070.0	-46.09	7.8	9.6	-44.29	-13	31.29	V
6086.2	-50.27	8.7	10.2	-48.77	-13	35.77	V
7095.4	-50.93	9.4	11.1	-49.23	-13	36.23	V
8450.8	-48.75	10.2	12.6	-46.35	-13	33.35	V

RSE-EGPRS850-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
1647.9	-49.75	4.2	4.7	-49.25	-13	36.25	V
2473.9	-40.88	5.4	5.6	-40.68	-13	27.68	V
3296.5	-48.81	6.2	6.9	-48.11	-13	35.11	H
4120.4	-45.09	7.0	8.6	-43.49	-13	30.49	V
4945.4	-47.57	7.7	9.6	-45.67	-13	32.67	H
5771.5	-47.73	8.5	10.2	-46.03	-13	33.03	V

RSE-EGPRS850-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
1673.6	-49.44	4.5	4.7	-49.24	-13	36.24	H
2510.4	-41.81	5.4	5.6	-41.61	-13	28.61	H
3297.7	-48.91	6.2	6.9	-48.21	-13	35.21	H
4182.7	-50.15	7.0	8.9	-48.25	-13	35.25	V
5018.1	-48.98	7.8	9.6	-47.18	-13	34.18	H
5856.9	-49.64	8.4	10.2	-47.84	-13	34.84	V

RSE-EGPRS850-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
1699.3	-49.86	4.5	4.7	-49.66	-13	36.66	H
2545.7	-43.14	5.4	5.6	-42.94	-13	29.94	V
3394.6	-52.62	6.3	7.8	-51.12	-13	38.12	H
4243.8	-48.39	7.1	8.9	-46.59	-13	33.59	V
5093.1	-43.92	7.9	9.6	-42.22	-13	29.22	V
5942.3	-50.81	8.5	10.2	-49.11	-13	36.11	H

RSE-GSM1900-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
3700.8	-51.49	6.6	7.9	-50.19	-13	37.19	H
5550.6	-47.25	8.2	9.8	-45.65	-13	32.65	H
7404.0	-53.91	9.7	11.6	-52.01	-13	39.01	H
9253.2	-52.51	10.7	12.7	-50.51	-13	37.51	V
11101.2	-49.16	12.1	12.3	-48.96	-13	35.96	H
12951.6	-44.75	13.2	12.3	-45.65	-13	32.65	H

RSE-GSM1900-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
3759.6	-52.32	6.6	7.9	-51.02	-13	38.02	H
5640.6	-51.19	8.3	10.2	-49.29	-13	36.29	V
7522.8	-53.83	9.7	11.6	-51.93	-13	38.93	V
9399.6	-51.15	10.7	12.7	-49.15	-13	36.15	H
11262.0	-47.04	12.1	12.3	-46.84	-13	33.84	H
13160.4	-46.07	13.0	12.3	-46.77	-13	33.77	H

RSE-GSM1900-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
3819.6	-48.7	6.7	7.9	-47.5	-13	34.50	V
5730.0	-54.43	8.5	10.2	-52.73	-13	39.73	V
7636.8	-55.06	9.7	11.8	-52.96	-13	39.96	V
9549.6	-52.34	10.7	12.7	-50.34	-13	37.34	H
11460.0	-47.3	12.3	12.3	-47.3	-13	34.30	V
13369.2	-42.36	13.7	12.3	-43.76	-13	30.76	H

RSE-GPRS1900-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
3700.8	-52.34	6.6	7.9	-51.04	-13	38.04	H
5551.2	-50.14	8.2	9.8	-48.54	-13	35.54	V
7404.0	-54.25	9.7	11.6	-52.35	-13	39.35	V
9254.4	-52.59	10.7	12.7	-50.59	-13	37.59	V
11113.2	-48.08	12.1	12.3	-47.88	-13	34.88	H
12950.4	-45.5	13.2	12.3	-46.4	-13	33.40	H

RSE-GPRS1900-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
3759.6	-51.57	6.6	7.9	-50.27	-13	37.27	H
5640.0	-51.63	8.3	10.2	-49.73	-13	36.73	H
7519.2	-54.05	9.7	11.6	-52.15	-13	39.15	H
9404.4	-52.15	10.7	12.7	-50.15	-13	37.15	V
11277.6	-47.97	12.1	12.3	-47.77	-13	34.77	V
13159.2	-47.13	13.0	12.3	-47.83	-13	34.83	H

RSE-GPRS1900-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
3819.6	-50	6.7	7.9	-48.8	-13	35.80	V
5729.4	-53.36	8.5	10.2	-51.66	-13	38.66	V
7644.0	-55.14	9.7	11.8	-53.04	-13	40.04	H
9553.2	-52.66	10.8	12.7	-50.76	-13	37.76	H
11460.0	-47.97	12.3	12.3	-47.97	-13	34.97	V
13368.0	-41.75	13.7	12.3	-43.15	-13	30.15	H

RSE-EGPRS1900-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
3700.2	-51.88	6.6	7.9	-50.58	-13	37.58	V
5551.2	-50.98	8.2	9.8	-49.38	-13	36.38	V
7414.8	-53.78	9.7	11.6	-51.88	-13	38.88	H
9250.8	-52.47	10.7	12.7	-50.47	-13	37.47	V
11107.2	-48.74	12.1	12.3	-48.54	-13	35.54	H
12951.6	-45.39	13.2	12.3	-46.29	-13	33.29	H

RSE-EGPRS1900-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
3759.6	-51.16	6.6	7.9	-49.86	-13	36.86	V
5639.4	-51.55	8.3	10.2	-49.65	-13	36.65	V
7516.8	-53.94	9.7	11.6	-52.04	-13	39.04	H
9399.6	-52.2	10.7	12.7	-50.2	-13	37.20	H
11272.8	-48.55	12.1	12.3	-48.35	-13	35.35	V
13160.4	-45.72	13.0	12.3	-46.42	-13	33.42	V

RSE-EGPRS1900-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
3819.0	-49.44	6.7	7.9	-48.24	-13	35.24	V
5730.0	-54.07	8.5	10.2	-52.37	-13	39.37	V
7636.8	-55.61	9.7	11.8	-53.51	-13	40.51	H
9534.0	-52.6	10.7	12.7	-50.6	-13	37.60	V
11458.8	-46.5	12.3	12.3	-46.5	-13	33.50	V
13368.0	-42.56	13.7	12.3	-43.96	-13	30.96	H

Annex A: Revised History

Version	Revised Content
V0	Initial

Annex B: Accreditation Certificate

Accredited Laboratory

A2LA has accredited

INDUSTRIAL INTERNET INNOVATION CENTER (SHANGHAI) CO., LTD.

Shanghai, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 20th day of September 2023.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3682.01
Valid to February 28, 2025

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

END OF REPORT