





TEST REPORT

No. I22N02642-RF GSM

for

TCL Communication Ltd.

Mobile Phone

Model Name: T507J

FCC ID: 2ACCJB186

with

Hardware Version: 05

Software Version: Vvk54

Issued Date: 2023-01-12

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of SAICT.

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I22N02642-RF GSM	Rev.0	1st edition	2023-01-12



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A		/0



1. SUMMARY OF TEST REPORT

1.1. Test Items

Description	Mobile Phone
Model Name	T507J
Code Name	T507J
Applicant's name	TCL Communication Ltd.
Manufacturer's Name	TCL Communication Ltd.

1.2. Test Standards

FCC Part 2/22/24	10-1-20 Edition
ANSI C63.26	2015
KDB971168 D01	v03r01

1.3. Test Result

All test items are passed. Please refer to "6 Summary of Test Results" for detail.

1.4. <u>Testing Location</u>

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China 518000

1.5. Project Data

Testing Start Date: 2022-07-25

Testing End Date: 2022-09-05

1.6. Signature



Wang Ping (Prepared this test report)

Zhang Hao (Approved this test report)

Huang Qiuqin (Reviewed this test report)



2. CLIENT INFORMATION

2.1. Applicant Information

Company Name	TCL Communication Ltd.			
Address	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong			
Audress	Science Park, Shatin, NT, Hong Kong			
Contact	Annie Jiang			
Email	nianxiang.jiang@tcl.com			
Tel.	+86 755 36611621			
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2.2. Manufacturer Information

Company Name	TCL Communication Ltd.			
Address	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong			
Audress	Science Park, Shatin, NT, Hong Kong			
Contact	Annie Jiang			
Email	nianxiang.jiang@tcl.com			
Tel.	+86 755 36611621			
Fax	+86 755 3661 2000-81722			



3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT

<u>(AE)</u>

3.1. About EUT

Description	Mobile Phone	
Model Name	T507J	
Code Name	T507J	
FCC ID	2ACCJB186	
Frequency Bands	GSM850; PCS1900	
Antenna	Integrated	
Extreme vol. Limits	3.60V to 4.40V (nominal: 3.85V)	
Condition of EUT as received	No abnormality in appearance	
Note: Components list, please refer to documents of the manufacturer.		

3.2. Internal Identification of EUT used during the test

3.2. Internal identification of EUT used during the test				
EUT ID*	IMEI	HW Version	SW Version	Sample Arrival Date
UT03aa 🗧	35063489000	01581 05	vVK54	2022-07-25
UT28aa 🗧	35338054000	03042 05	vVK54	2022-08-16
*EUT ID: is u	used to identi	fy the test sample in th	e lab internally.	
UT003aa is	used for cond	duction test, UT28aa is	used for radiation test.	
3.3. <u>Interi</u>	nal Identific	cation of AE used o	<u>during the test</u>	
AE ID*	Descript	ion		SN
AE1	Battery			1
AE1-1				
Model	TL	_p048A8		
Manufactu	urer Do	ongguan Ganfeng Elec	tronics co.,LTD	
Capacity	50)00mAh		
Nominal Voltage 3.85V				
AE1-2				
Model	TL	_p048A7		
Manufacturer VEKEN				
Capacity 5000mAh				
Nominal Voltage 3.85V				
*AFID: is used to identify the test semals in the lab internally				

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

3.4. <u>General Description</u>

The Equipment Under Test (EUT) is a model Mobile Phone with integrated antenna. It consists of normal options: lithium battery, charger. Manual and specifications of the EUT were provided to fulfil the test. Samples undergoing test were selected by the Client.



4. <u>REFERENCE DOCUMENTS</u>

4.1. <u>Reference Documents for testing</u>

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

Title	Version
PUBLIC MOBILE SERVICES	10-1-20
	Edition
FREQUENCY ALLOCATIONS AND RADIO TREATY	10-1-20
MATTERS; GENERAL RULES AND REGULATIONS	Edition
PERSONAL COMMUNICATIONS SERVICES	10-1-20
T ERGONAE COMMONICATIONS SERVICES	Edition
American National Standard for Compliance Testing of	2015
Transmitters Used in Licensed Radio Services	2010
Power Meas License Digital Systems	v03r01
	PUBLIC MOBILE SERVICES FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS PERSONAL COMMUNICATIONS SERVICES American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services



5. LABORATORY ENVIRONMENT

Shielded room did not exceed following limits along the RF testing:

	5 5
Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz>60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	>2 MΩ
Ground system resistance	<4 Ω

Fully-anechoic chamber did not exceed following limits along the EMC testing

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	<4 Ω
Voltage Standing Wave Ratio (VSWR)	\leq 6 dB, from 1 to 18 GHz, 3 m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz



6. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:		
Verdict Column	Р	Pass
	F	Fail
	NA	Not applicable
	NM	Not measured
Location Column	A/B/C/D	The test is performed in test location A, B, C or D
		which are described in section 1.1 of this report

GSM850

Items	List	Clause in FCC rules	Section in this report	Verdict
1	Output Power	2.1046/22.913	A.1	Р
2	Field Strength of Spurious Radiation	2.1053/22.917	A.2	Р
3	Frequency Stability	2.1055/22.355	A.3	Р
4	Occupied Bandwidth	2.1049/22.917	A.4	Р
5	Emission Bandwidth	2.1049/22.917	A.5	Р
6	Band Edge Compliance	2.1051/22.917	A.6	Р
7	Conducted Spurious Emission	2.1051/22.917	A.7	Р
8	Peak-to-Average Power Ratio	KDB971168 D01	A.8	Р

PCS1900

Items	List	Clause in FCC rules	Section in this report	Verdict
1	Output Power	2.1046/24.232	A.1	Р
2	Field Strength of Spurious Radiation	2.1053/24.238	A.2	Р
3	Frequency Stability	2.1055/24.235	A.3	Р
4	Occupied Bandwidth	2.1049/24.238	A.4	Р
5	Emission Bandwidth	2.1049/24.238	A.5	Р
6	Band Edge Compliance	2.1051/24.238	A.6	Р
7	Conducted Spurious Emission	2.1051/24.238	A.7	Р
8	Peak-to-Average Power Ratio	24.232/KDB971168 D01	A.8	Р



7. STATEMENT

The Mobile Phone, T507J, manufactured by TCL Communication Ltd. is a variant of T506A for testing.

According to the declaration, reused all test data from No.I22N01585-RF-GSM. For detail information please check the declaration provided by the manufacturer.

Since the information of samples in this report is provided by the client, the laboratory is not responsible for the authenticity of sample information.

This report takes measured values as criterion of test conclusion. The test conclusion meets the limit requirements.



8. TEST EQUIPMENTS UTILIZED

NO.	Description	TYPE	Manufacture	series number	CAL DUE DATE
1	Test Receiver	ESR7	R&S	101676	2022-11-24
2	BiLog Antenna	3142E	ETS-Lindgren	0224831	2024-05-27
3	Horn Antenna	3117	ETS-Lindgren	00066585	2025-03-15
4	Horn Antenna	QSH-SL-18 -26-S-20	Q-par	17013	2023-01-06
5	Antenna	BBHA 9120D	Schwarzbeck	1593	2022-12-05
6	Antenna	VUBA 9117	Schwarzbeck	207	2023-07-15
7	Antenna	QWH-SL-18 -40-K-SG	Q-par	15979	2023-01-06
8	preamplifier	83017A	Agilent	MY39501110	/
9	Signal Generator	SMB100A	R&S	179725	2022-11-24
10	Fully Anechoic Chamber	FACT3-2.0	ETS-Lindgren	1285	2023-05-29
11	Spectrum Analyzer	FSV40	R&S	101192	2023-01-12
12	Universal Radio Communication Tester	CMU200	R&S	114545	2023-01-12
13	Universal Radio Communication Tester	CMU200	R&S	123210	2022-12-13
14	Spectrum Analyzer	FSU	R&S	101506	2022-12-13
15	Temperature Chamber	SH-241	ESPEC	92007516	2022-10-15
16	DC Power Supply	U3606A	Agilent Technologies	MY50450012	2022-11-13

Test software

Item	Name	Vesion
Radiated	EMC32	V10.50.40



ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

Reference

FCC: CFR Part 2.1046, 22.913, 24.232.

A.1.1 Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation.

This result contains max output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

A.1.2 Conducted

A.1.2.1 Method of Measurements

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

These measurements were done at 3 frequencies, 1850.2 MHz, 1880.0MHz and 1909.8MHz for PCS1900 band; 824.2MHz, 836.6MHz and 848.8MHz for GSM850 band. (bottom, middle and top of operational frequency range).

GSM850

	Power step	Nominal Peak output power (dBm)
GSM	5	33dBm(2W)
GPRS	3	33dBm(2W)
EGPRS	6	27dBm(0.5W)

Measurement result

GSM(GMSK)

Frequency(MHz)	Power Step	Output power(dBm)
824.2	5	32.46
836.6	5	32.41
848.8	5	32.45

GPRS(GMSK,1Slot)

Frequency(MHz)	Power Step	Output power(dBm)
824.2	3	32.26
836.6	3	32.36
848.8	3	32.37

EGPRS(8PSK,1Slot)

Frequency(MHz)	Power Step	Output power(dBm)
824.2	6	27.65
836.6	6	27.37
848.8	6	27.12

Note: Expanded measurement uncertainty is U = 0.49dB, k = 1.96



PCS1900

	Dower stop	Nominal Peak output
	Power step	power (dBm)
GSM	0	30dBm(1W)
GPRS	3	30dBm(1W)
EGPRS	5	26dBm(0.4W)

Measurement result

GSM(GMSK)

Frequency(MHz)	Power Step	Output power(dBm)
1850.2	0	29.88
1880.0	0	29.79
1909.8	0	29.71

GPRS(GMSK,1Slot)

Frequency(MHz)	Power Step	Output power(dBm)
1850.2	3	29.89
1880.0	3	29.73
1909.8	3	29.62

EGPRS(8PSK,1Slot)

Frequency(MHz)	Power Step	Output power(dBm)
1850.2	5	26.32
1880.0	5	25.99
1909.8	5	25.98

Note: Expanded measurement uncertainty is U = 0.49dB, k = 1.96



A.1.3 Radiated

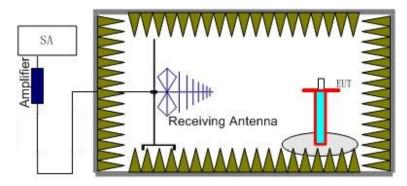
A.1.3.1 Description

This is the test for the maximum radiated power from the EUT.

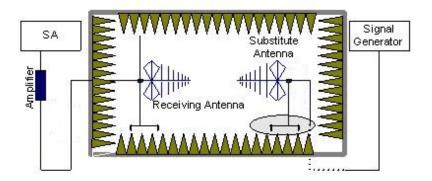
Rule Part 24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage." Rule Part 22.913(a) specifies "The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

A.1.3.2 Method of Measurement

 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 transmit frequencies in three channels (High, Middle, Low) 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, a 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 (P_{Mea}) 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 (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

- A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}) ,the Substitution Antenna Gain(dBi) (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test. The measurement results are obtained as described below: Power(EIRP)=P_{Mea}- P_{Ag} - P_{cl} + G_a
- 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 -2.15dB.



GSM 850-ERP 22.913(a)

Limits

	Power Step	Burst Peak ERP (dBm)
GSM	5	≤38.45dBm (7W)
GPRS	3	≤38.45dBm (7W)
EGPRS	6	≤38.45dBm (7W)

Measurement result

GSM

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)+ P _{Ag} (dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
824.20	-2.67	-33.60	-0.79	2.15	27.99	38.45	н
836.60	-2.79	-33.50	-0.74	2.15	27.83	38.45	Н
848.80	-2.93	-33.50	-0.73	2.15	27.69	38.45	Н

GPRS

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)+ P _{Ag} (dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
824.20	-3.12	-33.60	-0.79	2.15	27.54	38.45	Н
836.60	-3.17	-33.50	-0.74	2.15	27.45	38.45	Н
848.80	-3.30	-33.50	-0.73	2.15	27.32	38.45	Н

EGPRS-8PSK

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)+ P _{Ag} (dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
824.20	-7.98	-33.60	-0.79	2.15	22.67	38.45	Н
836.60	-7.66	-33.50	-0.74	2.15	22.96	38.45	Н
848.80	-8.05	-33.50	-0.73	2.15	22.57	38.45	Н

Frequency: 824.20MHz

Peak ERP(dBm)=PMea(-2.67dBm)-(Pcl+PAg)(-33.60dB)+Ga(-0.79dB)-2.15dB=27.99dBm ANALYZER SETTINGS: RBW = VBW = 3MHz

Note: The maximum value of expanded measurement uncertainty for this test item is U =

2.87dB(30MHz-3GHz)/3.35dB(3GHz-18GHz)/2.68dB(18GHz-40GHz), k = 2

Note: Both of Vertical and Horizontal polarizations are evaluated, but only the worst case is recorded in this report.



PCS1900-EIRP 24.232(c)

Limits

	Power Step Burst Peak EIRP (dBm			
GSM	0	≤33dBm (2W)		
GPRS	3	≤33dBm (2W)		
EGPRS	5	≤33dBm (2W)		

Measurement result

GSM

Frequency(MHz) P _{Mea} (dBm)	tea(dBm) P _{cl} (dB)+ P _{Ag} (dB)	Ga Antenna	EIRP(dBm)	Limit(dBm)	Polarization	
		Gain(dBi)		Linit(dDiri)	1 Olarization	
1850.20	-10.88	-29.30	8.10	26.52	33.00	V
1880.00	-10.45	-29.40	8.10	27.05	33.00	V
1909.80	-9.48	-29.30	8.10	27.92	33.00	V

GPRS

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)+ P _{Ag} (dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1850.20	-11.22	-29.40	8.10	26.29	1850.20	V
1880.00	-10.57	-29.30	8.10	26.83	1880.00	V
1909.80	-9.74	-29.30	8.10	27.66	1909.80	V

EGPRS-8PSK

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)+ P _{Ag} (dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
1850.20	-15.33	-29.40	8.10	22.18	33.00	Н
1880.00	-15.09	-29.30	8.10	22.31	33.00	Н
1909.80	-14.68	-29.30	8.10	22.72	33.00	Н

Frequency: 1909.80MHz

Peak EIRP(dBm)= PMea(-9.48dBm) -(Pcl+PAg)(-29.30dB)+Ga (8.10dB) =27.92dBm

ANALYZER SETTINGS: RBW = VBW = 3MHz

Note: The maximum value of expanded measurement uncertainty for this test item is U =

2.87dB(30MHz-3GHz)/3.35dB(3GHz-18GHz)/2.68dB(18GHz-40GHz), k = 2

Note: Both of Vertical and Horizontal polarizations are evaluated, but only the worst case is recorded in this report.





A.2 FIELD STRENGTH OF SPURIOUS RADIATION

Reference

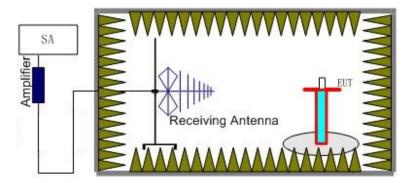
FCC: CFR 2.1053, 22.917, 24.238.

A.2.1 Measurement Method

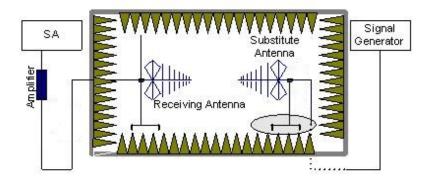
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set 1MHz as outlined in Part 24.238 and Part 22.917. The spectrum is scanned with the mobile 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:

 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 10th harmonic 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 (P_{Mea}) 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 (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain(dBi) (G_a) should be recorded after test.
A amplifier should be connected in for the test.
The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.
The measurement results are obtained as described below:

Power(EIRP)=P_{Mea} - P_{pl} + G_a

- 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 -2.15dB.



A.2.2 Measurement Limit

Part 24.238 and Part 22.917 specify that 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.

The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

A.2.3 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.



A.2.4 Measurement Results Table

Frequency	Channel	Frequency Range	Result
	Low	30MHz-10GHz	Pass
GSM 850MHz	Middle	30MHz-10GHz	Pass
	High	30MHz-10GHz	Pass
	Low	30MHz-20GHz	Pass
GSM 1900MHz	Middle	30MHz-20GHz	Pass
	High	30MHz-20GHz	Pass

A.2.5 Sweep Table

Working Frequency	Subrange (GHz)	RBW	VBW	Sweep time (s)
	0.03~1	100KHz	300KHz	10
	1-2	1 MHz	3 MHz	2
850MHz	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~10	1 MHz	3 MHz	3
	0.03~1	100KHz	300KHz	10
	1-2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
1900MHz	5~8	1 MHz	3 MHz	3
19001012	8~11	1 MHz	3 MHz	3
	11~14	1 MHz	3 MHz	3
	14~18	1 MHz	3 MHz	3
	18~20	1 MHz	3 MHz	2



GSM Mode Channel 128/824.2MHz

	IHz) P _{Mea} (dBm)	Path	Antenna	Peak	Limit	Delerization
Frequency(MHz)		loss	Gain(dBi)	ERP(dBm)	(dBm)	Polarization
2472.92	-45.57	0.90	9.80	-38.82	-13.00	Н
9100.00	-48.61	2.20	11.60	-41.36	-13.00	Н
9299.00	-47.26	2.00	11.60	-39.81	-13.00	Н
9474.00	-47.99	2.10	11.60	-40.64	-13.00	V
9737.00	-47.59	2.20	11.20	-40.74	-13.00	Н
9782.00	-47.90	2.30	11.20	-41.15	-13.00	Н

GSM Mode Channel 190/836.6MHz

	D (dDm)	Path	Antenna	Peak	Limit	Polarization
Frequency(MHz)	P _{Mea} (dBm)	loss	Gain(dBi)	ERP(dBm)	(dBm)	Polarization
2509.17	-47.17	0.90	10.70	-39.52	-13.00	Н
8475.00	-48.04	1.80	11.30	-40.69	-13.00	Н
9096.50	-48.03	2.20	11.60	-40.78	-13.00	Н
9224.50	-46.83	2.10	11.60	-39.48	-13.00	Н
9473.00	-47.87	2.10	11.60	-40.52	-13.00	V
9722.00	-47.59	2.20	11.20	-40.74	-13.00	Н

GSM Mode Channel 251/848.8MHz

	D. (dDm)	Path	Antenna	Peak	Limit	Polarization
Frequency(MHz)	P _{Mea} (dBm)	loss	Gain(dBi)	ERP(dBm)	(dBm)	Polarization
2546.25	-45.67	0.90	10.70	-38.02	-13.00	Н
7329.00	-49.13	1.70	12.00	-40.98	-13.00	Н
9106.00	-48.18	2.20	11.60	-40.93	-13.00	Н
9231.00	-47.37	2.10	11.60	-40.02	-13.00	Н
9474.50	-47.73	2.10	11.60	-40.38	-13.00	V
9740.00	-47.23	2.20	11.20	-40.38	-13.00	Н

Note: The maximum value of expanded measurement uncertainty for this test item is U =

2.87dB(30MHz-3GHz)/3.35dB(3GHz-18GHz)/2.68dB(18GHz-40GHz), k = 2



	D (dDm)	Path	Antenna	Peak	Limit	Polarization
Frequency(MHz)	P _{Mea} (dBm)	loss	Gain(dBi)	EIRP(dBm)	(dBm)	Polarization
16981.50	-41.59	2.90	16.50	-27.99	-13.00	Н
17119.50	-40.85	2.90	14.50	-29.25	-13.00	Н
17362.50	-40.37	3.20	14.50	-29.07	-13.00	Н
17515.50	-37.68	2.90	12.80	-27.78	-13.00	Н
17614.50	-36.51	3.30	12.80	-27.01	-13.00	Н
17773.50	-37.34	3.60	12.80	-28.14	-13.00	Н

GSM Mode Channel 512/1850.2MHz

GSM Mode Channel 661/1880.0MHz

Frequency(MHz)	D. (dPm)	Path	Antenna	Peak	Limit	Polarization
Fiequency(MHZ)	P _{Mea} (dBm)	loss	Gain(dBi)	EIRP(dBm)	(dBm)	Foldrization
16980.00	-41.85	2.90	16.50	-28.25	-13.00	Н
17214.00	-40.60	2.90	14.50	-29.00	-13.00	Н
17347.50	-39.44	3.20	14.50	-28.14	-13.00	Н
17503.50	-37.40	2.90	12.80	-27.50	-13.00	Н
17577.00	-36.92	3.30	12.80	-27.42	-13.00	Н
17760.00	-37.22	3.60	12.80	-28.02	-13.00	Н

GSM Mode Channel 810/1909.8MHz

Frequency(MHz)	D. (dDm)	Path	Antenna	Peak	Limit	Polarization
Fiequency(MHZ)	P _{Mea} (dBm)	loss	Gain(dBi)	EIRP(dBm)	(dBm)	Folanzation
16981.50	-41.97	2.90	16.50	-28.37	-13.00	Н
17131.50	-40.88	2.90	14.50	-29.28	-13.00	Н
17281.50	-39.71	3.20	14.50	-28.41	-13.00	Н
17457.00	-39.00	2.90	14.50	-27.40	-13.00	Н
17577.00	-36.65	3.30	12.80	-27.15	-13.00	Н
17758.50	-36.89	3.60	12.80	-27.69	-13.00	Н

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.87dB(30MHz-3GHz)/3.35dB(3GHz-18GHz)/2.68dB(18GHz-40GHz), k = 2



A.3 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 22.355, 24.235.

A.3.1 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.

- 1. Measure the carrier frequency at room temperature.
- 2. Subject the EUT to overnight soak at -30° C.
- With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on mid channel of PCS 1900 and GSM850, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
- 4. Repeat the above measurements at 10[°]C increments from -30[°]C to +50[°]C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
- 5. Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring 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 $^{\circ}$ C.
- 7. With the EUT, powered via nominal voltage, connected to the CMU200 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 -30[°]C to +50[°]C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
- 9. At all temperature levels hold the temperature to +/- 0.5° during the measurement procedure.

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of the lower, higher and nominal voltage. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress.



A.3.2 Measurement results

GSM 850

Frequency Error vs Voltage

Temperature(℃)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)	
20		824.024	848.972	Olisel(HZ)	r requericy error(ppin)	
50	3.85			-0.84	0.0020	
40				0.03	0.0001	
30				-0.13	0.0003	
10				-1.23	0.0029	
0				0.68	0.0029	
-10				-1.00	0.0024	
-20				0.19	0.0005	
-30				4.78	0.0114	

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	mperature(℃) FL(MHz) FH(MHz) Offset(Hz)		Offset(Hz)	Frequency error(ppm)
3.60	20	024 024	848.972	5.36	0.0128
4.40		824.024		4.94	0.0118

Expanded measurement uncertainty is 10Hz, k = 2

PCS 1900

Frequency Error vs Voltage

Temperature(℃)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)	
20	3.85			Olisel(112)		
50				-2.20	0.0023	
40		1850.036		-5.68	0.0060	
30			1850.036 1909.964 -0.84 0 -2.87 0 3.52 0 -0.52 0	-7.20	0.0077	
10				-0.84	0.0009	
0				-2.87	0.0031	
-10	-			3.52	0.0037	
-20				0.0006		
-30				-0.19	0.0002	

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	erature(°C) FL(MHz) FH(MHz) O		Offset(Hz)	Frequency error(ppm)
3.60	20	1950.026	1909.964	-5.10	0.0054
4.40	20	1850.036	1909.904	-7.49	0.0080

Expanded measurement uncertainty is 10Hz, k = 2



A.4 OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049, 22.917, 24.238.

A.4.1 Measurement Procedure

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

d) Set the detection mode to peak, and the trace mode to max hold.

e) Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

A.4.2 Occupied Bandwidth Results

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 the US Cellular/PCS frequency bands. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.



GSM 850(99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)
824.2	245.917
836.6	246.588
848.8	246.470

GSM 850

Channel 128-Occupied Bandwidth (99% BW)

					I				●1Pk View
			~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	mm			M1[1] 8:	27.41 dBr 24.184520 MH
	TI	~~^							+
							What has a second secon		
2	$\sim$						~~	λ	
~								- house	-
									-~~
-									-
									+
			1001 pt	te	5	0.0.647/			pan 500.0 kH
			1001 p			0.0 KHZ			pan 300.0 Ki i
0	X-Va	alue		Y-Value		Function		Function R	esult
8	X-Va 324.184	alue	1001 pt		Occ Bw	0.0 kHz/ Function			

#### Channel 190-Occupied Bandwidth (99% BW)

Att TDF "1"		837 µs (~7.6 ms) ● VBV	V 20 kHz Mode Auto	FFT			o d Dha Ulana
Occupied B	andwidth		m	hm		M1[1] 8	01Pk View 27.44 dB 36.603000 MI
D dBm		T1 X			MT2		
) dBm					- M	~	
dBm						$\sim$	
.0 dBm						- have	$\sim \sim \sim \sim$
20 dBm							
0 dBm							
0 dBm							
0 dBm							
50 dBm							
= 836.6 MHz Marker Tab		10	01 pts	50.0 kHz/		5	Span 500.0 kl
Marker Fac Type Re M1 T1 T2		X-Value 836.603 MHz 836.476953 MHz 836.723541 MHz	Y-Value 27.44 dBm 12.94 dBm 10.85 dBm	Function Occ Bw Occ Bw Centroid Occ Bw Freq Offset	24		

Channel 251-Occupied Bandwidth (99% BW)



MultiView	<ul> <li>Spectrum</li> </ul>	L							
Ref Level 30	0.00 dBm Offse	t 0.50	dB 🖷 RBW 5 k	Hz					
Att TDF "1"	35 dB SWT	837 µs (~7.6 m	is) 🖷 VBW 20 k	Hz Mode Auto	FFT				
1 Occupied Ba	andwidth						_		•1Pk View
				m	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m.		M1[1] 84	28.16 dBm 8.820980 MHz
20 dBm		T1 2	$\sqrt{2}$				T2		
10 dBm		m					- h		
0 dBm									
-10 dBm								h	hann
-20 dBm									
-30 dBm									
-40 dBm									
-50 dBm									
-60 dBm									
CF 848.8 MHz			1001 pt			0.0 kHz/			pan 500.0 kHz
2 Marker Tab			1001 pt	5	51	U.U KHZ/		8	Jan 300.0 KHz
Type Re M1 T1	ef Trc	X-Value 48.82098 M 848.677577 N		Y-Value 28.16 dBm 13.09 dBm	Occ Bw Occ Bw Cer	Function	2	Function Re 46.4700374 848.80081	106 kHz
T2	1	848.677577 N 848.924047 N		13.09 dBm 12.28 dBm	Occ Bw Cer Occ Bw Fre				298185 Hz
	v						Measuring		02.08.2022 10:33:49

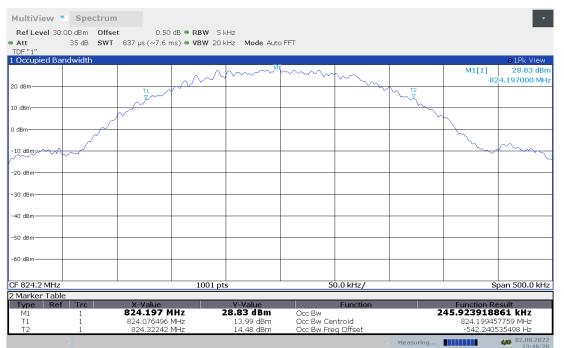


#### GPRS 850(99% BW)

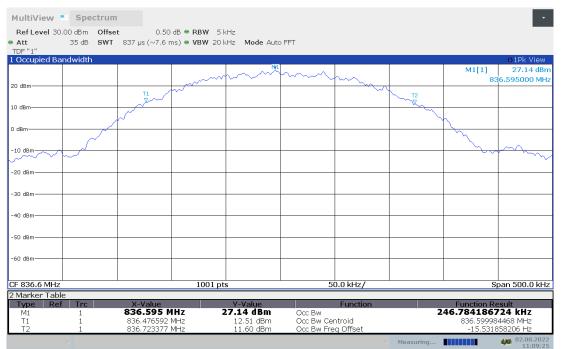
Frequency(MHz)	Occupied Bandwidth (99% BW)( kHz)
824.2	245.924
836.6	246.784
848.8	245.139

#### **GPRS 850**

#### Channel 128-Occupied Bandwidth (99% BW)



#### Channel 190-Occupied Bandwidth (99% BW)



#### Channel 251-Occupied Bandwidth (99% BW)

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Occupied Ba	andwidth								●1Pk Vie
			$\wedge \sim$	$\sim$	nm	mont.		M1[1]	27.04 dt 348.823980 M
) dBm			$\sim \sim \sim$				T2		-
) dBm							he m		
10	~						5		
dBm								the second secon	
								~	-
_~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	$\sim$								
0 dBm									
0 dBm									
0 dBm									
0 dBm									
o ubiii									
0 dBm									
	-		1001 pt	S	5	0.0 kHz/			Span 500.0 k
F 848.8 MHz Marker Tab	-		1001 pt	S	5	0.0 kHz/			Span 50
ype Re M1		X-Value 848.82398 M	Hz :	Y-Value 27.04 dBm	Occ Bw	Function	2	Function F 45.138791	
T1 T2	1	848.67734   848.922479	MHz	12.78 dBm 10.81 dBm	Occ Bw Ce Occ Bw Fre				909845 MHz 4939294 Hz

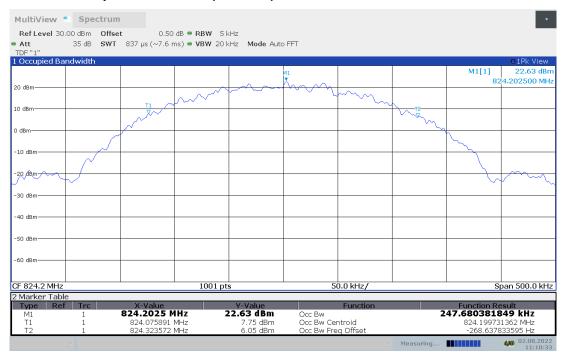


#### EGPRS 850(99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)( kHz)
824.2	247.680
836.6	246.173
848.8	248.758

#### EGPRS 850

#### Channel 128-Occupied Bandwidth (99% BW)



#### Channel 190-Occupied Bandwidth (99% BW)



Channel 251-Occupied Bandwidth (99% BW)



Att TDF "1" I Occupied B		837 μs (~7.6 r	ns) <b>= VBW</b> 201	kHz <b>Mode</b> Auto	) FF I				o1Pk View
e occupied b					M1			M1[1]	21.36 dBr
20 dBm						_		84	48.812990 MH
			m	$\sim \sim \sim \sim$		m			
0 dBm		<u> </u>	~~~~				~ 12		
							hay		
dBm							~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		+
	$\int $							$\sim$	
10 dBm									
									~
20 dBm								$\sim$	
30 dBm									
00 0011									
40 dBm									
50 dBm									-
60 dBm									+
F 848.8 MH			1001 pt	s	5	0.0 kHz/		S	ipan 500.0 k⊢
Marker Tak		X-Value		Y-Value		Function		Function Re	
Type Re M1		848.81299 N	1Hz 2	21.36 dBm	Occ Bw	Function	2	48.7575307	
T1	1	848.675368		7.04 dBm	Occ Bw Ce	ntroid		848.79974	



#### PCS 1900(99% BW)

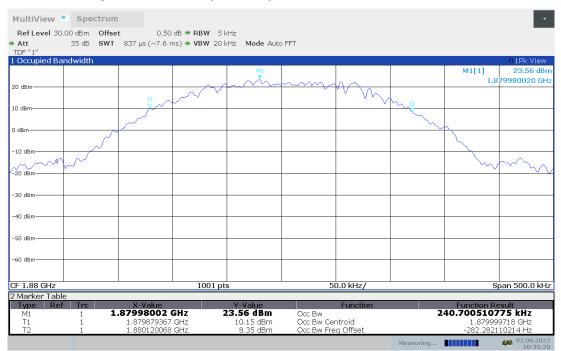
Frequency(MHz)	Occupied Bandwidth (99% BW)( kHz)
1850.2	245.518
1880.0	240.701
1909.8	244.869

#### PCS 1900

#### Channel 512-Occupied Bandwidth (99% BW)



#### Channel 661-Occupied Bandwidth (99% BW)



Channel 810-Occupied Bandwidth (99% BW)



Occupied B	andwidth								o1Pk View
				h				M1[1] 1.	25.21 dB 909806490 GI
D dBm		T1	$\sim \sim \sim$	$\gamma \sim \gamma$		$\sim$			1
) dBm			~~				Me		
dBm							- m	~	
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~							$\gamma$	
0 dBm									
0 dBm	~~							~ .	1 m
10 dBm									
U dBm									
0 dBm									
0 dBm									
i0 dBm	1								1
- 1.9098 GH	lz		1001 pt	ts	5	0.0 kHz/			Span 500.0 kł
Marker Tab						_			
Type Re M1		X-Value 1.90980649 (Y-Value 25.21 dBm	Occ Bw	Function	24	Function F 44.869419	307 kHz
T1 T2	1	1.909677099 1.909921969		9.62 dBm 9.11 dBm	Occ Bw Ce Occ Bw Fre				99534 GHz 836411 Hz



GPRS 1900(99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)
1850.2	245.231
1880.0	245.166
1909.8	244.599

GPRS 1900

Channel 512-Occupied Bandwidth (99% BW)

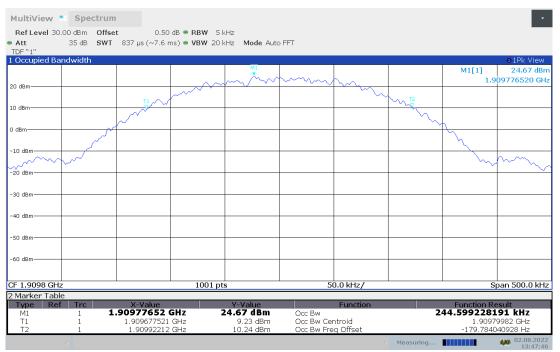


Channel 661-Occupied Bandwidth (99% BW)





Channel 810-Occupied Bandwidth (99% BW)





EGPRS 1900(99% BW)

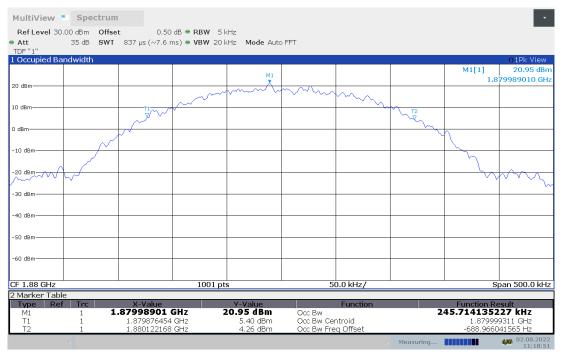
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)
1850.2	252.068
1880.0	245.714
1909.8	246.199

EGPRS 1900

Channel 512-Occupied Bandwidth (99% BW)



Channel 661-Occupied Bandwidth (99% BW)





MultiView - Spectrum Ref Level 30.00 dBm Offset 0.50 dB 🗢 RBW 5 kHz Att 35 dB TDF "1" 1 Occupied Bandwidth 35 dB SWT 837 µs (~7.6 ms) ● VBW 20 kHz Mode Auto FFT o1Pk View M1[1] 21.20 dBm 1.909793510 GHz м1 20 dBm A. 10 dBm 1 0 dBm -10 dBm -20 dBm--30 dBm -40 dBm -50 dBm -60 dBm 1001 pts 50.0 kHz/ Span 500.0 kHz CF 1.9098 GH 2 Marker Table Type Ref Trc Function Result 246.198607075 kHz X-Value 1.90979351 GHz 21.20 dBm Occ Bw Occ Bw Centroid Occ Bw Freq Offset M1 T1 T2 1.909799056 GHz -943.562166214 Hz 1 1.909675957 GHz 1.909922156 GHz 5.94 dBm 5.64 dBm **400** 02.08.202 11:19:2

Channel 810-Occupied Bandwidth (99% BW)

Note: Expanded measurement uncertainty is U = 3428Hz, k = 2



A.5 EMISSION BANDWIDTH

Reference

FCC: CFR Part 2.1049, 22.917, 24.238

A.5.1 Measurement Procedure

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

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency.

The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

d) Set the detection mode to peak, and the trace mode to max hold.

e) Use the 26dB bandwidth function of the spectrum analyzer and report the measured bandwidth.

A.5.2Emission Bandwidth Results

Similar to conducted emissions; Emission 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 PCS1900 band and GSM850 band. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

GSM 850(-26dBc BW)

Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)
824.2	315.18
836.6	313.69
848.8	315.68

GSM 850

Channel 128-Emission Bandwidth (-26dBc BW)



	Spectrun		dB = RBW 51	/Hz					•
Att TDF "1"	35 dB SWT	837 µs (~7.6 n			o FFT				
l Frequency	Sweep			N¥1		1			●1Pk View
			~~~~~	m		$\sim$		M1[1] 82	27.10 dBn 4.181520 MH
20 dBm		~~~	$\sim$				~~		
10 dBm	T1	and the second s					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	 	
D dBm	7							₹	
-10 dBm	~~~~							han	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
-20 dBm									
-30 dBm									
-40 dBm									
-50 dBm									
-60 dBm									
			100		_				
CF 824.2 MH: Marker Tab			1001 pt	S	5	0.0 kHz/		S	oan 500.0 kH
Type Re		X-Value		Y-Value		Function		Function Re	esult
M1 T1 T2	1 <b>8</b> 1	24.18152 M 824.04316 M 824.35834 M	1Hz	27.10 dBm 1.26 dBm 1.00 dBm	ndB ndB down I Q Factor			26.0 315.18 k 261	dB ( <b>Hz</b>
12	~	024.33034 14	11 12	1.00 UDIII	Q T ACCUT	~	Measuring		4.9 02.08.2022 10:37:40

## Channel 190-Emission Bandwidth (-26dBc BW)

MultiView	Spectru	m							•
Ref Level 30			dB 🗢 RBW – 5 k						
<ul> <li>Att TDF "1"</li> </ul>	35 dB <b>SW</b>	T 837 μs (~7.6 r	ns) 🗢 VBW 20 k	Hz Mode Auto	> FFT				
1 Frequency S	weep								●1Pk View
				000				M1[1]	27.66 dBm
00 d0					$\sim \sim \sim \sim$	mm.		83	6.617980 MHz
20 dBm			$\sim$				N .		
10 dBm		~~~~					1 mg		
TO UBIN	т						~~~	T2	
0 dBm	Σ	$\gamma$						ĺΫ.	
o dom	~							3	
-10 dBm	<u> </u>								
	$\sim$								$\sim \sim$
-20 dBm									
20 00									
-30 dBm									
-40 dBm									
-50 dBm									
-60 dBm		_							
CF 836.6 MHz			1001 pt		5	0.0 kHz/		<u> </u>	oan 500.0 kHz
2 Marker Tabl	e		1001 pt	3	5			3	Sun Soord Kinz
Type Ref	Trc	X-Value		Y-Value		Function		Function Re	esult
M1	1	836.61798 M		27.66 dBm	ndB			26.0	dB
T1 T2	1	836.44216 N 836.75584 N		1.74 dBm 1.53 dBm	ndB down I O Factor	RW		<b>313.69 k</b> 266	
	~	000.700041		1.00 0011	Q. 4600		Measuring		02.08.2022

## Channel 251-Emission Bandwidth (-26dBc BW)



, inequency	Sweep								o1Pk View
			$\sim$	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m	m.		M1[1] 84	26.83 dBr 8.782020 MH
20 dBm		~~					$\sim$		
0 dBm	T1,	~~~					- ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	\JT2	
) dBm	- J							E.	
10 dBm	~~~~							h	
20 dBm									
30 dBm									
40 dBm									
50 dBm									
60 dBm									
					E.	0.0 kHz/			pan 500.0 kH
F 848.8 MH:			1001 pt						



### GPRS 850(-26dBc BW)

Frequency(MHz)	Emission Bandwidth (-26dBc BW)( kHz)
824.2	316.68
836.6	313.19
848.8	317.18

### **GPRS 850**

### Channel 128-Emission Bandwidth (-26dBc BW)

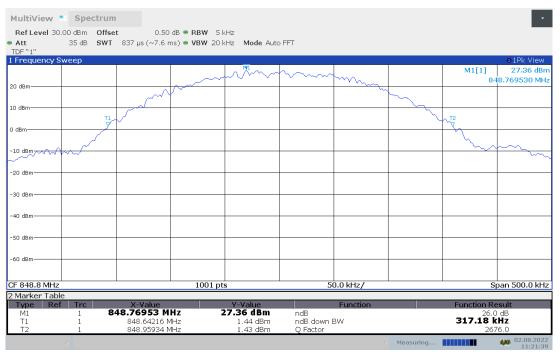
Frequency :	Sweep								o1Pk View
20 dBm				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	$\sim$		M1[1] 8:	27.54 dBn 24.225470 MH
		~~~					$\sim$		
0 dBm	T1						<u> </u>	\T2 ▼	
dBm	~								~
10 dBm									
20 dBm									
30 dBm									
40 dBm									
50 dBm									
60 dBm									
F 824.2 MHz			1001 pt		5	0.0 kHz/			pan 500.0 kH
F 0Z4.Z ⊠⊡Z	<u> </u>		1001 pt	5	<u> </u>			3	рап эоо.о кн

Channel 190-Emission Bandwidth (-26dBc BW)

Att TDF "1"		/T 837 μs (~7.6 r	dB ● RBW 51 ns) ● VBW 201		FFT				
Frequency S	Sweep				I	1	1		• 1Pk View 28,03 dB
				~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m.		M1[1]	28.03 dB 36.584020 MF
0 dBm			$\sim$			- · · · · ·	~~~		10100 1020 111
							~~~		
) dBm		-					V~		+
							V	ſ¥_	
dBm	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~							ГЪ,	+
	\sim								\sim
	~~~								
20 dBm									
30 dBm									
10.10									
10 dBm									
50 dBm									
50 dBm									
JO UDIII									
F 836.6 MHz			1001 pt	s	5	0.0 kHz/		S	pan 500.0 kl
Marker Tab Type Re		X-Value		Y-Value		Function		Function Re	a au alta
M1		836.58402 M	Hz 2	28.03 dBm	ndB	Function		26.0	0 dB
T1	÷	836.44316 N		2.32 dBm	ndB down l	DIAL		313.19 k	CH7



### Channel 251-Emission Bandwidth (-26dBc BW)





### EGPRS 850(-26dBc BW)

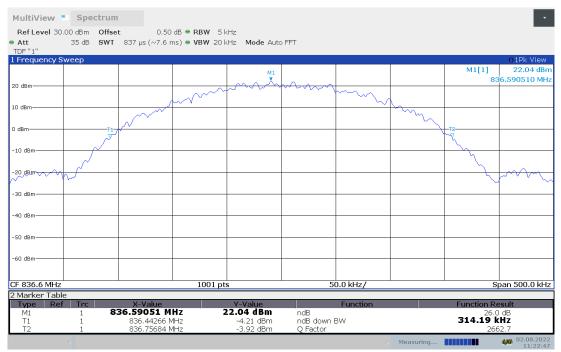
Frequency(MHz)	Emission Bandwidth (-26dBc BW)( kHz)
824.2	315.68
836.6	314.19
848.8	316.18

### EGPRS 850

#### Channel 128-Emission Bandwidth (-26dBc BW)

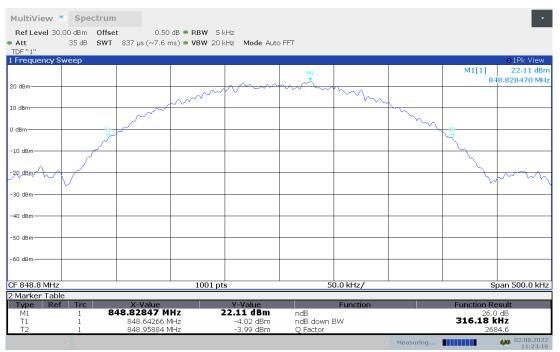


### Channel 190-Emission Bandwidth (-26dBc BW)





### Channel 251-Emission Bandwidth (-26dBc BW)



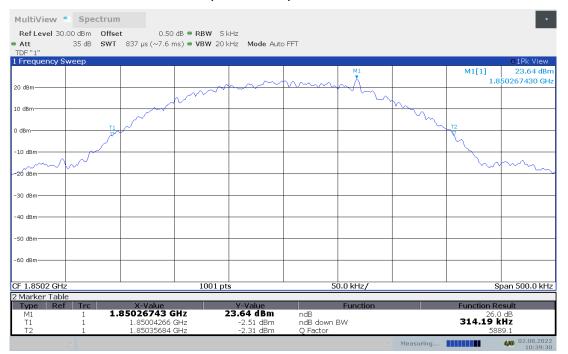


### PCS 1900(-26dBc BW)

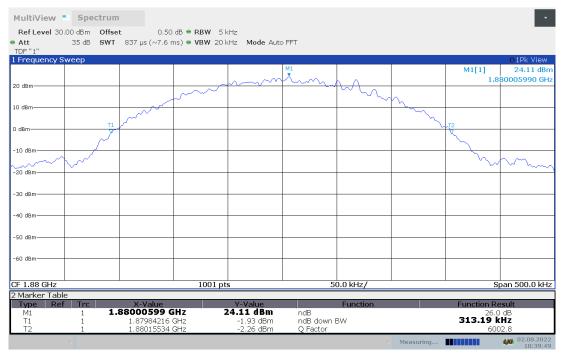
Frequency(MHz)	Emission Bandwidth (-26dBc BW)( kHz)
1850.2	314.19
1880.0	313.19
1909.8	314.69

### PCS 1900

### Channel 512-Emission Bandwidth (-26dBc BW)



### Channel 661-Emission Bandwidth (-26dBc BW)



### Channel 810-Emission Bandwidth (-26dBc BW)

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	.00 dBm Offs		dB • RBW 5						
Att TDF "1"	35 dB SWI	Γ 837 μs (~7.6 r	ns) 🗢 VBW 20	kHz Mode Auto	5 FF I				
Frequency S	weep					-			•1Pk View
				M1				M1[1] 1.9	24.03 dB 09786510 G
0 dBm				F~~~~		har a			
0 dBm			-	+		~	No the second		
dBm	T1						$\sim$	T2	
asm	*ر							R.	
10 dBm				+					
20 dBm									$1 \sim $
30 dBm									
40 dBm									
50 dBm				+	-				
60 dBm									-
F 1.9098 GHz Marker Tabl			1001 p	is	5	0.0 kHz/		S	pan 500.0 kł
Type Ref	Trc	X-Value		Y-Value		Function		Function R	
M1	1 1	.90978651 0	iHz	24.03 dBm	ndB ndB down			26.0 314.69	JdB



### GPRS 1900(-26dBc BW)

Frequency(MHz)	Emission Bandwidth (-26dBc BW)( kHz)
1850.2	310.69
1880.0	317.68
1909.8	322.68

### GPRS 1900

#### Channel 512-Emission Bandwidth (-26dBc BW)



### Channel 661-Emission Bandwidth (-26dBc BW)



Channel 810-Emission Bandwidth (-26dBc BW)



	Spectrum								-
	0.00 dBm Offse		dB • RBW 5						
Att TDF "1"	35 dB SWI	837 µs (~7.6 r	ns) 🖶 VBW 20	KHZ Mode Auto	OFFI				
I Frequency	Sweep								●1Pk View
					M1			M1[1]	24.31 dBn
20 dBm				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<u></u>		1.9	09823480 GH
			$\sim \sim \sim \sim \sim \sim$			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			
10 dBm		× ~~				· · · · ·	m		
							$\sim$		
0 dBm	T1	r~					~ ~	$\gamma_{\gamma}^{T2}$	
-10 dBm								<u> </u>	
~~~~~								l m	m m
-20 dBm									
-30 dBm									
-40 dBm									
-50 dBm									
-60 dBm									
-00 0611									
CF 1.9098 GH			1001 pt	is	5	0.0 kHz/		S	pan 500.0 kH:
2 Marker Tab Type Re		X-Value		Y-Value		Function		Function Re	ecult
M1		90982348 0		24.31 dBm	ndB			26.0) dB
T1	1	1.90963916		-1.57 dBm	ndB down I	BW		322.68 k	
T2	1	1.90996184	JHZ	-1.87 dBm	Q Factor			591	18.7 102.08.2022



EGPRS 1900(-26dBc BW)

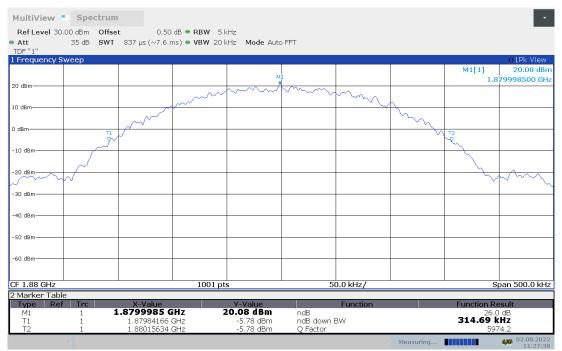
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)
1850.2	317.18
1880.0	314.69
1909.8	319.18

EGPRS 1900

Channel 512-Emission Bandwidth (-26dBc BW)



Channel 661-Emission Bandwidth (-26dBc BW)



Channel 810-Emission Bandwidth (-26dBc BW)

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Frequency	Sweep								•1Pk View
					M1			M1[1]	20.15 dBr 09804500 GH
0 dBm				~~~~~	i	m			
) dBm		~~~	۲°				m		
dBm	T1	<i>ل</i> ا							
10 dBm									
20 dBm								6	mm
30 dBm									
10 dBm									
50 dBm									
60 dBm									
- 1 0000 0	Hz		1001 pt	s	5	0.0 kHz/		S	 pan 500.0 kH
F 1.9098 G Marker Ta									

Note: Expanded measurement uncertainty is U = 3428Hz, k = 2



A.6 BAND EDGE COMPLIANCE

Reference

FCC: CFR Part 2.1051, 22.917, 24.238

Measurement limit

On any frequency outside frequency band of the US Cellular/PCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log (P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm. A relaxation of the reference bandwidth is often provided for measurements within a specified frequency range at the edge of the authorized frequency block/band. This is often implemented by permitting the use of a narrower RBW (typically limited to a minimum RBW of 1% of the OBW) for measuring the out-of-band emissions without a requirement to integrate the result over the full reference bandwidth.

Measurement Procedure

The testing follows ANSI C63.26

a) The EUT was connected to spectrum analyzer and system simulator via a power divider.

b) The band edges of low and high channels for the highest RF powers were measured.

c) Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.

d) Set spectrum analyzer with RMS detector.

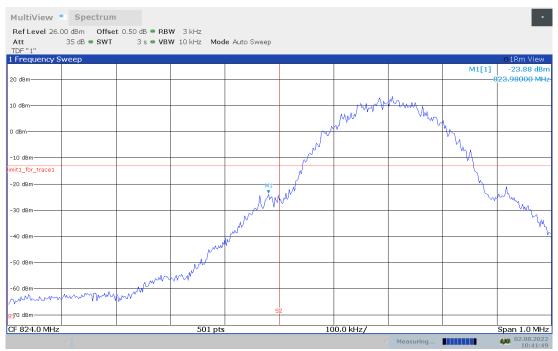
e) The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

f) Checked that all the results comply with the emission limit line.

Only worst case result is given below

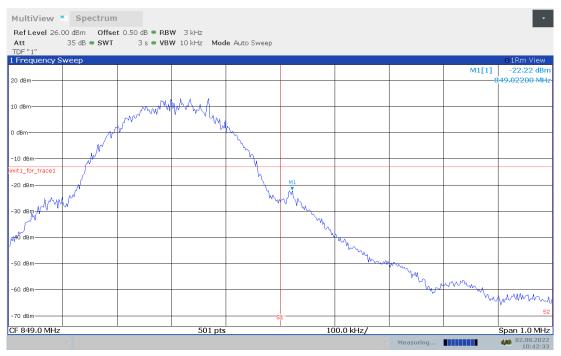
GSM 850

LOW BAND EDGE BLOCK-A-Channel 128



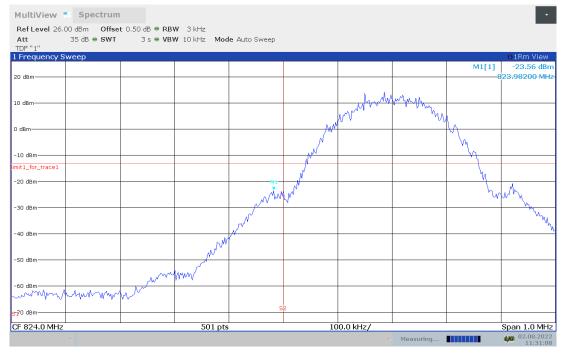


HIGH BAND EDGE BLOCK-C - Channel 251

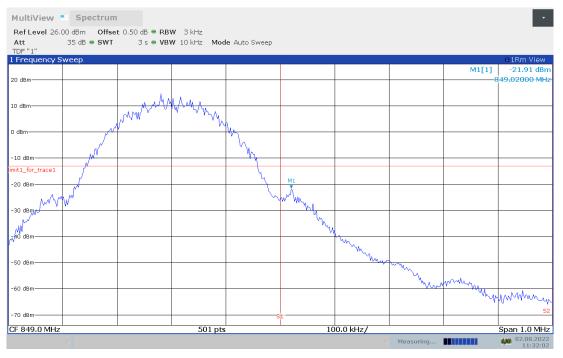




GPRS 850 LOW BAND EDGE BLOCK-A-Channel 128

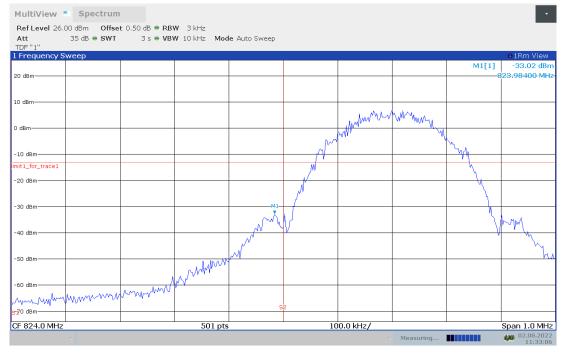


HIGH BAND EDGE BLOCK-C-Channel 251

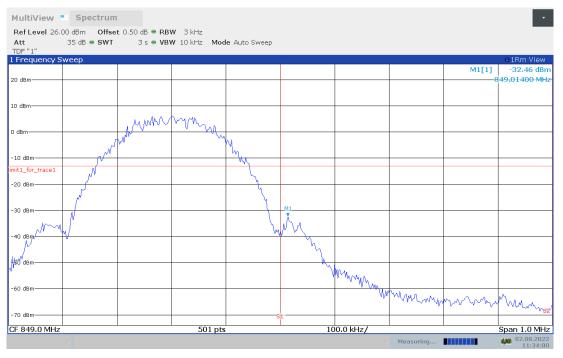




EGPRS 850 LOW BAND EDGE BLOCK-A-Channel 128

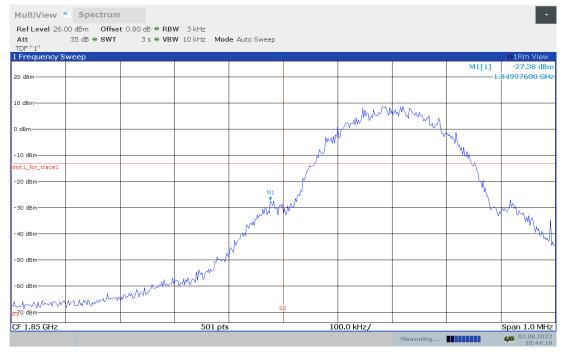


HIGH BAND EDGE BLOCK-C-Channel 251

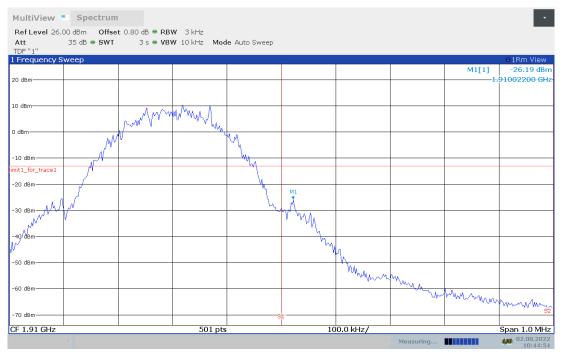




PCS 1900 LOW BAND EDGE BLOCK-A-Channel 512

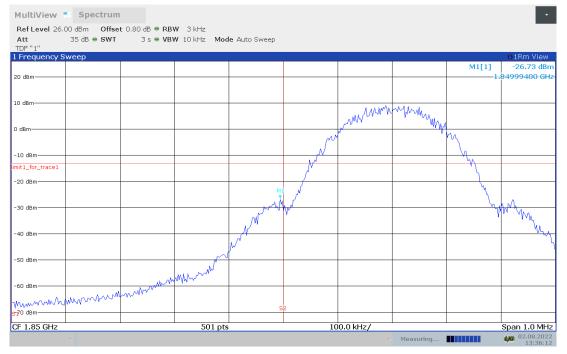


HIGH BAND EDGE BLOCK-C–Channel 810

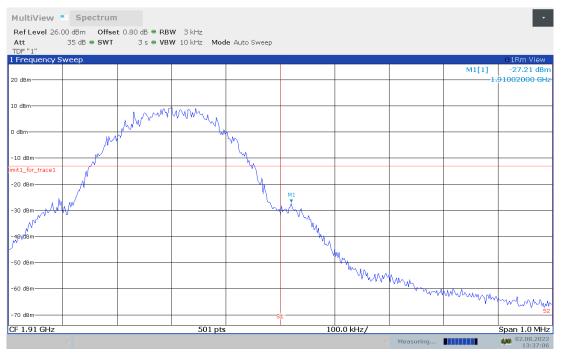




GPRS 1900 LOW BAND EDGE BLOCK-A-Channel 512

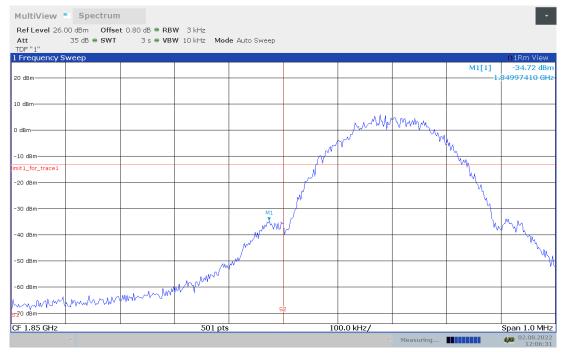


HIGH BAND EDGE BLOCK-C-Channel 810

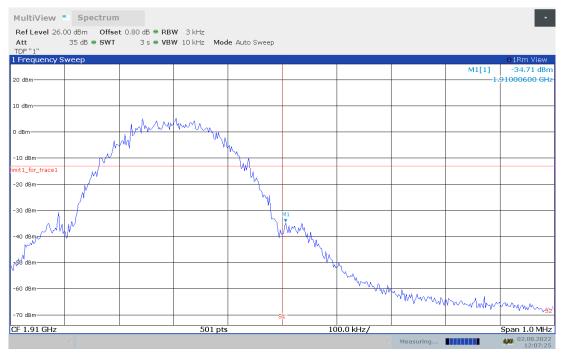




EGPRS 1900 LOW BAND EDGE BLOCK-A-Channel 512



HIGH BAND EDGE BLOCK-C–Channel 810



Note: Expanded measurement uncertainty is U = 0.49dB(100KHz-2GHz)/1.21dB(2GHz-26.5GHz), k = 1.96



A.7 CONDUCTED SPURIOUS EMISSION

Reference

FCC: CFR Part 2.1051, 22.917, 24.238

A.7.1 Measurement Method

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

- Determine frequency range for measurements: From CFR 2.1051 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 mobile station equipment tested, this equates to a frequency range of 13 MHz to 9 GHz, data taken from 10 MHz to 25 GHz.
- 2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

Channel	Frequency (MHz)
128	824.2
190	836.6
251	848.8
D004000 T	

GSM850 Transmitter

PCS1900 Transmitter

Channel	Frequency (MHz)				
512	1850.2				
661	1880.0				
810	1909.8				

A. 7.2 Measurement Limit

Part 24.238 and Part 22.917 specify that 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.

The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.



A.7.3 Measurement result Only worst case result is given below

GSM850

Channel 128: 30MHz-8.49 GHz

Spurious emission limit –13dBm

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

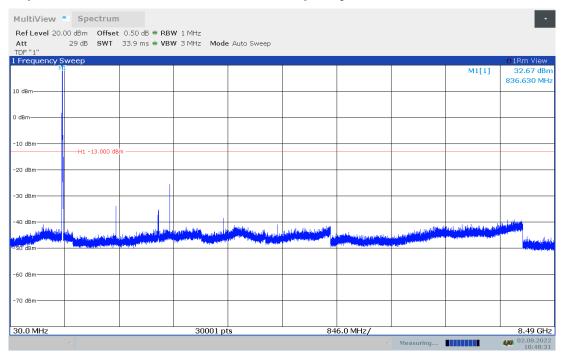
I Frequency Sweep 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0										Att TDF "1"
0 dBm- 10 dBm- 10 dBm- 10 dBm- H1 - 13.000 dBm- 30 dBm- 40 dBm- 10 dBm- 10 dBm- H1 - 13.000 dBm- 10 dBm- H1 - 13.000 dBm- H1 -					1				Sweep	
ndm- Image: state of the st	824.230 Mł	M1[1]								N
10 dBm H1 - 13.000 dBm Image: state of the state of t										J dBm
H1 - 13.000 dBm H1 - 13.000 dBm <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>dBm</td></td<>										dBm
										10 dBm
								m	H1 -13.000 dB	
								1		20 dBm
									1	30 dBm
	an at a share a start a	اللاليانية من معني الم			a ana aka sa	and the second second	ul in adapted a second			40 dBm
SU dam	In the state of th	not a second	and a state of the	an a construction a second second	and a first state of the second state of the		A second s	and provide the product of the second s	t part flates this	
										so usm
60 dBm										60 dBm
70 dBm-										70 dBm



Channel 190: 30MHz – 8.49GHz

Spurious emission limit –13dBm

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

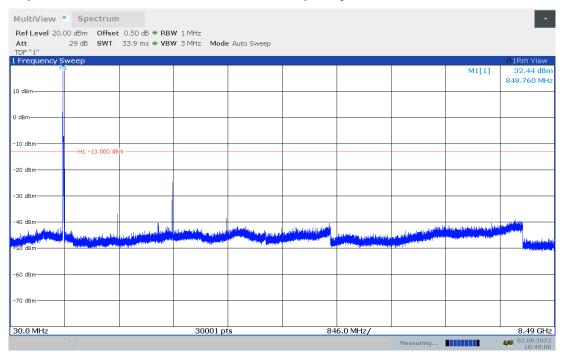




Channel 251: 30MHz - 8.49 GHz

Spurious emission limit –13dBm.

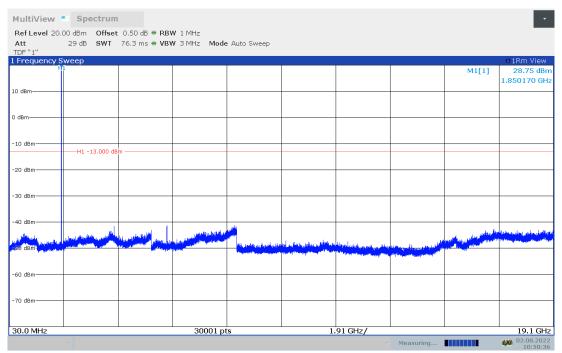
NOTE: peak above the limit line is the carrier frequency.





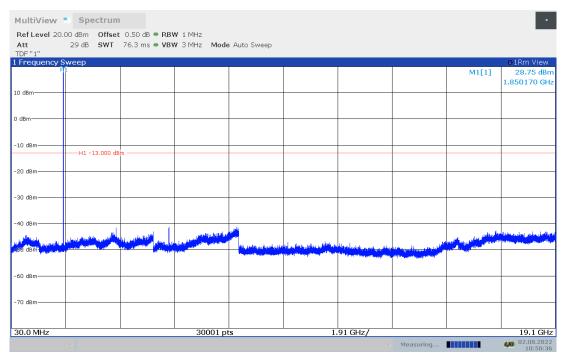
PCS1900 Channel 512: 30MHz – 19.1GHz

Spurious emission limit -13dBm.



Channel 661: 30MHz –19.1GHz

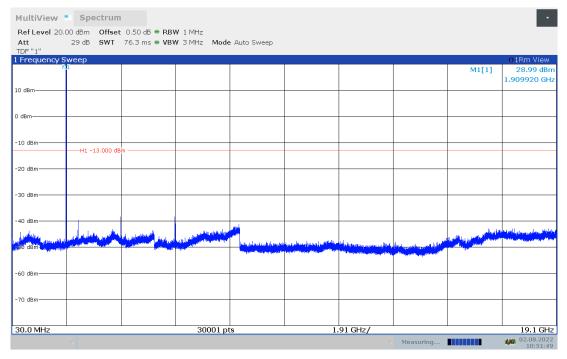
Spurious emission limit –13dBm





Channel 810: 30MHz –19.1GHz

Spurious emission limit –13dBm.



Note: Expanded measurement uncertainty is U = 0.49dB(100KHz-2GHz)/1.21dB(2GHz-26.5GHz), k = 1.96



A.8 PEAK-TO-AVERAGE POWER RATIO

Reference

FCC: CFR Part 24.232, KDB971168 D01.

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

a)Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;

b) Set resolution/measurement bandwidth \geq signal' s occupied bandwidth;

c) Set the number of counts to a value that stabilizes the measured CCDF curve;

d) Set the measurement interval to 1 ms

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

A.8.1 Measurement limit

not exceed 13 dB

A.8.2 Measurement results

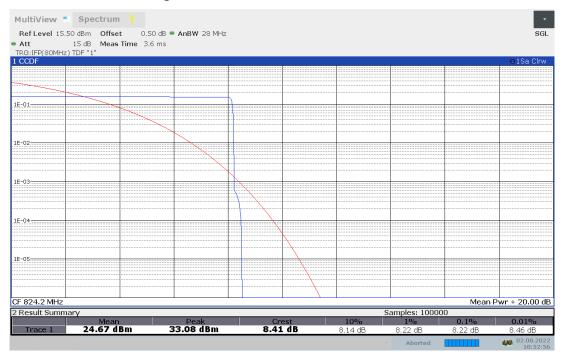
Only worst case result is given below

GSM850

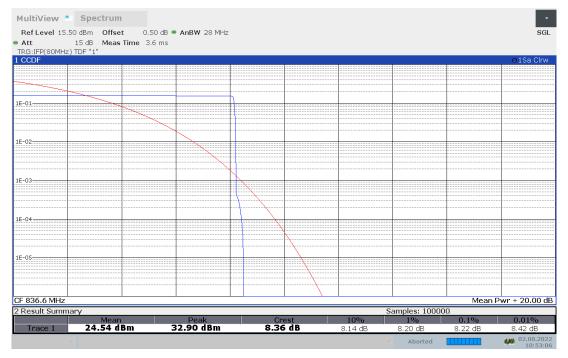
Frequency(MHz)	Peak-To-Average Power Ratio(PAPR)(dB)
824.2	8.22
836.6	8.22
848.8	8.22

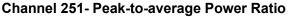


GSM 850 Channel 128- Peak-to-average Power Ratio



Channel 190- Peak-to-average Power Ratio









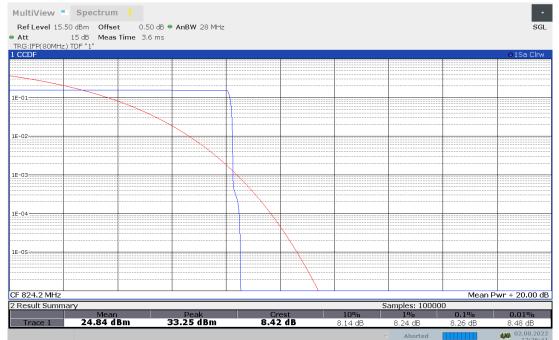


GPRS 850 (PAPR)

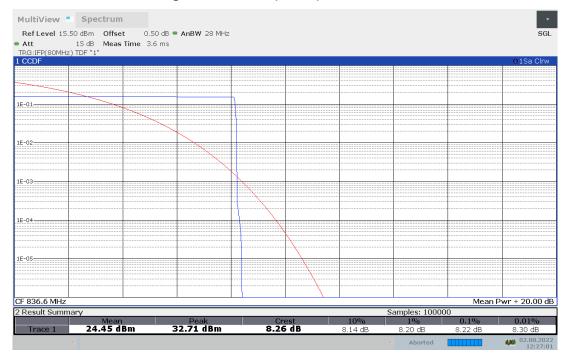
Frequency(MHz)	Peak-To-Average Power Ratio(PAPR)(dB)
824.2	8.26
836.6	8.22
848.8	8.22

GPRS 850





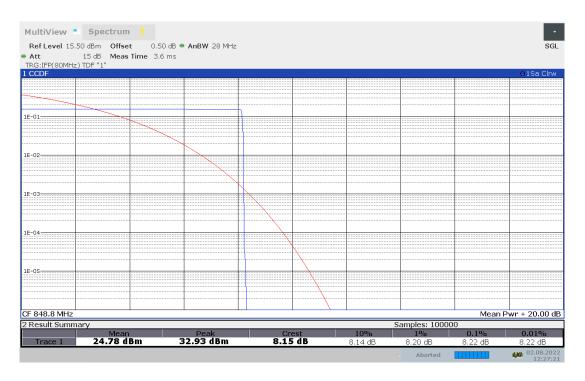
Channel 190- Peak-To-Average Power Ratio(PAPR)



Channel 251- Peak-To-Average Power Ratio(PAPR)

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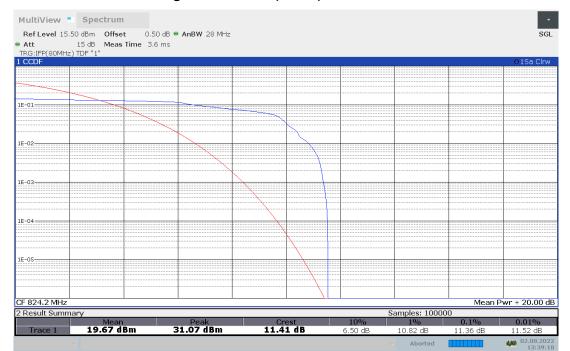


EGPRS 850 (PAPR)

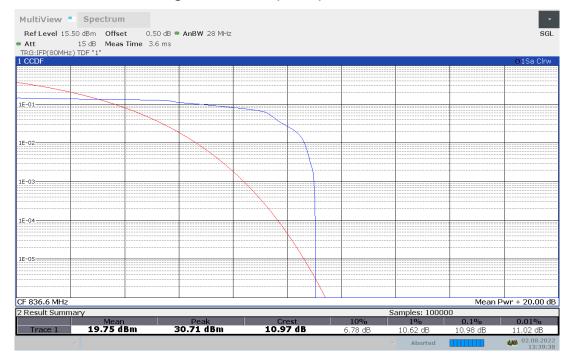
Frequency(MHz)	Peak-To-Average Power Ratio(PAPR)(dB)
824.2	11.36
836.6	10.98
848.8	11.32

EGPRS 850

Channel 128- Peak-To-Average Power Ratio(PAPR)

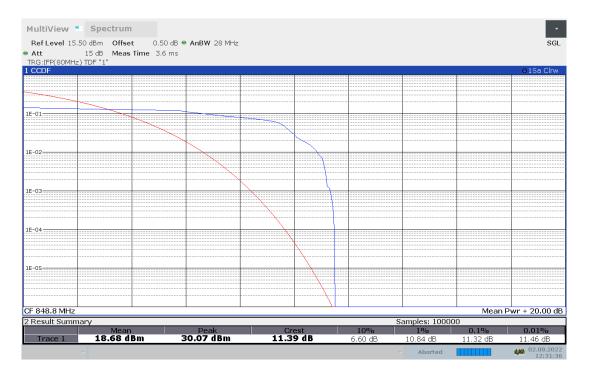


Channel 190- Peak-To-Average Power Ratio(PAPR)



Channel 251- Peak-To-Average Power Ratio(PAPR)





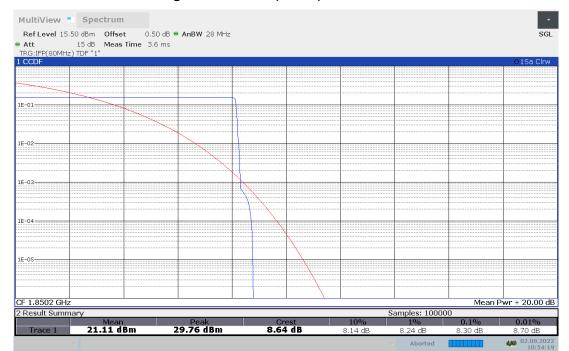


PCS1900 (PAPR)

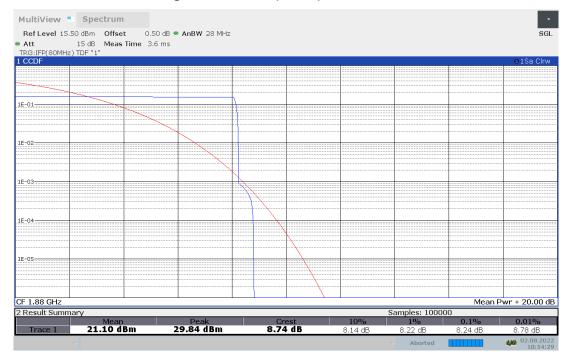
Frequency(MHz)	Peak-To-Average Power Ratio(PAPR)(dB)
1852.4	8.30
1880.0	8.24
1909.7	8.44

PCS 1900

Channel 512- Peak-To-Average Power Ratio(PAPR)

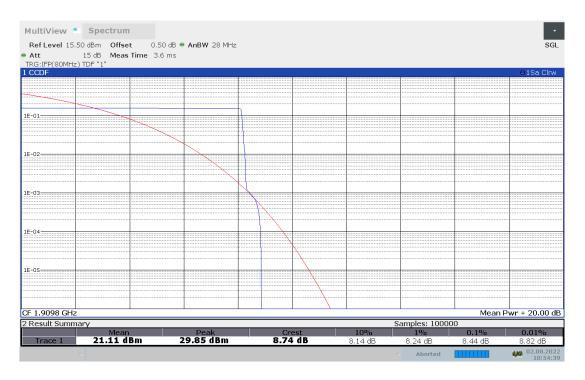


Channel 661- Peak-To-Average Power Ratio(PAPR)



Channel 810- Peak-To-Average Power Ratio(PAPR)





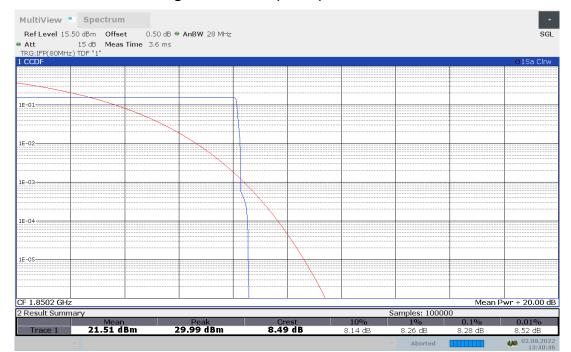


GPRS1900 (PAPR)

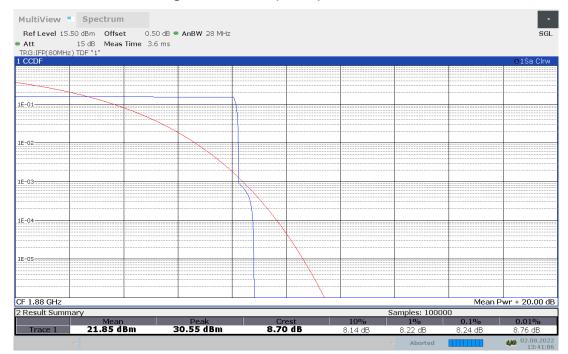
Frequency(MHz)	Peak-To-Average Power Ratio(PAPR)(dB)
1852.4	8.28
1880.0	8.24
1909.7	8.32

GPRS 1900

Channel 512- Peak-To-Average Power Ratio(PAPR)

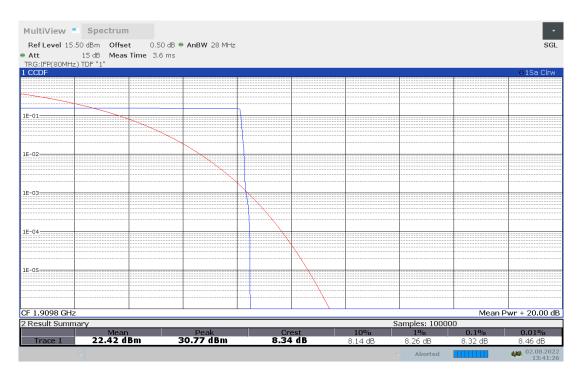


Channel 661- Peak-To-Average Power Ratio(PAPR)



Channel 810- Peak-To-Average Power Ratio(PAPR)





Note: Expanded measurement uncertainty is U = 0.49 dB, k = 2

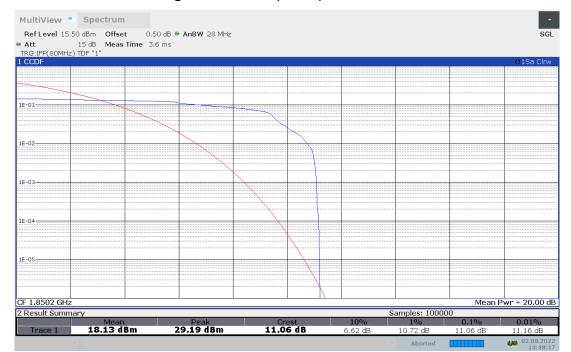


EGPRS1900 (PAPR)

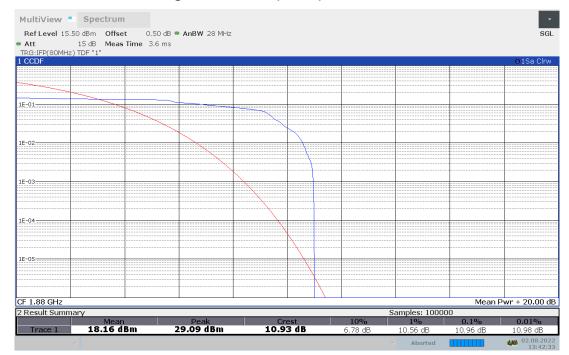
Frequency(MHz)	Peak-To-Average Power Ratio(PAPR)(dB)
1852.4	11.06
1880.0	10.96
1909.7	11.14

EGPRS 1900

Channel 512- Peak-To-Average Power Ratio(PAPR)



Channel 661- Peak-To-Average Power Ratio(PAPR)



Channel 810- Peak-To-Average Power Ratio(PAPR)





END OF REPORT