TEST REPORT

No.24T04N001247-004-RF WCDMA

for

HMD Global Oy

Mobile Phone

Model Name: TA-1689

FCC ID: 2AJOTTA-1689

with

Hardware Version: FF638-MB-V0.2

Software Version: 0.2420.17.00

Issued Date: 2024-07-24

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
24T04N001247-004-RF WCDMA	Rev.0	1st edition	2024-07-24

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1. SUMMARY OF TEST REPORT

1.1. Test Items

Description	Mobile Phone
Model Name	TA-1689
Brand Name	NOKIA
Applicant's name	HMD Global Oy
Manufacturer's Name	HMD Global Oy

1.2. Test Standards

FCC Part 2/22/24/27	10-1-23 Edition
ANSI C63.26	2015
KDB971168 D01	v03r01

1.3. Test Result

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

1.4. Testing Location

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: 2024-06-04 Testing End Date: 2024-07-09

1.6. Signature

Wang Ping
(Prepared this test report)

Huang Qiuqin
(Reviewed this test report)

Zhang Hao
(Approved this test report)

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2. CLIENT INFORMATION

2.1. Applicant Information

Company Name:	HMD Global Oy
Address /Post:	Bertel Jungin aukio 9,02600 Espoo,Finland
Contact Person:	reza.serafat
Contact Email	reza.serafat@hmdglobal.com
Telephone:	+491735287964
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2.2. Manufacturer Information

Company Name:	HMD Global Oy
Address /Post:	Bertel Jungin aukio 9,02600 Espoo,Finland
Contact Person:	reza.serafat
Contact Email	reza.serafat@hmdglobal.com
Telephone:	+491735287964
Fax:	/

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3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE)

3.1. About EUT

Description	Mobile Phone
Model Name	TA-1689
FCC ID	2AJOTTA-1689
Frequency Bands	WCDMA Band II/4/5
Antenna	Integrated
Extreme vol. Limits	3.60V to 4.20V (nominal: 3.80V)
Condition of EUT as received	No abnormality in appearance

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of SAICT.

3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
UT14aa	352178850000892	FF638-MB-V0.2	0.2420.17.00	2024-06-06
UT15aa	351768880001810	FF638-MB-V0.2	0.2420.17.00	2024-06-04

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

UT14aa are used for conduction test, UT15aa is used for radiation test.

3.3. Internal Identification of AE

AE ID*	Description
AE1	Battery

AE1

Model	BA-L4M
Manufacturer	SHENZHEN UTILITY ENERGY CO.,LTD.
Capacity	1450mAh
Nominal Voltage	3.8V

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

AE: ancillary equipment

3.4. General Description

The Equipment under Test (EUT) is a model of Mobile Phone with integrated antenna and battery. It consists of normal options: Lithium Battery and Charger. Manual and specifications of the EUT were provided to fulfil the test. Samples undergoing test were selected by the client.

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4. REFERENCE DOCUMENTS

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

Reference	Title	Version
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-23 Edition
FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	10-1-23 Edition
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	10-1-23 Edition
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-23 Edition
ANSI C63.26	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services	2015
KDB971168 D01	Power Meas License Digital Systems	v03r01

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5. LABORATORY ENVIRONMENT

Shielded room did not exceed following limits along the RF 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	>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)	≤ 6 dB, from 1 to 18 GHz, 3 m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

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6. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:		
Verdict Column	P	Pass
	F	Fail
	NA	Not applicable
	NM	Not measured

WCDMA Band II

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

WCDMA Band IV

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	2.1046/27.50(d)	A.1	P
2	Field Strength of Spurious Radiation	2.1053/27.53(h)	A.2	P
3	Frequency Stability	2.1055/27.54	A.3	P
4	Occupied Bandwidth	2.1049/27.53(g)	A.4	P
5	Emission Bandwidth	2.1049/27.53(g)	A.5	P
6	Band Edge Compliance	2.1051/27.53(h)	A.6	P
7	Conducted Spurious Emission	2.1051/27.53(h)	A.7	P
8	Peak-to-Average Power Ratio	27.50(d) /KDB971168 D01	A.8	P

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WCDMA Band V

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

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7. STATEMENT

The Mobile Phone, TA-1689, HMD Global Oy is a variant of TA-1686 for testing.

According to the declaration, retested RSE，spot-check Conduction power and reused all other data from No.24T04N001218-005-RF WCDMA. 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.

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8. TEST EQUIPMENTS UTILIZED

No.	Description	Type	Manufacture	Series Number	Cal Due Date
1	Test Receiver	ESR7	R&S	101676	2024-11-22
2	Hybrid antenna	VULB 9163	Schwarzbeck	330	2027.04.21
3	Horn Antenna	3117	ETS-Lindgren	00066577	2025-04-17
4	Horn Antenna	QSH-SL-18-26-S-20	Q-par	17013	2026-02-01
5	Antenna	BBHA 9120D	Schwarzbeck	1593	2025-10-24
6	Antenna	QWH-SL-18-40-K-SG	Q-par	15979	2026-01-30
7	preamplifier	83017A	Agilent	MY39501110	/
8	Signal Generator	SMB100A	R&S	179725	2024-11-22
9	Fully Anechoic Chamber	FACT3-2.0	ETS-Lindgren	1285	2025-05-28
10	Spectrum Analyzer	FSV40	R&S	101192	2025-01-10
11	Universal Radio Communication Tester	CMU200	R&S	114545	2025-01-10
12	Universal Radio Communication Tester	CMW500	R&S	152499	2024-07-13
13	Power Supply	HMC8042	103284	R&S	2025-05-07
14	Universal Radio Communication Tester	CMW500	R&S	129146	2025-04-10
15	Spectrum Analyzer	FSW26	R&S	102197	2025-05-07
16	Temperature Chamber	SH-241	ESPEC	92007516	2024-10-15

Test software

Item	Name	Version
Radiated	EMC32	V10.50.40

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ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

Reference

FCC: CFR Part 2.1046, 22.913, 24.232, 27.50(d)

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, 1852.4 MHz, 1880.0MHz and 1907.6MHz for WCDMA Band II;826.4MHz, 836.6MHz and 846.6MHz for WCDMA Band V and 1712.4MHz, 1732.4MHz and 1752.6MHz for WCDMA Band IV (bottom, middle and top of operational frequency range).

Limit According to FCC Part 2.1046

WCDMA Band II

A.1.2.2 Measurement result

QPSK

	CH	Frequency(MHz)	output power(dBm)
WCDMA (Band II)	9262	1852.4	22.24
	9400	1880.0	22.24
	9538	1907.6	22.41

16QAM

	CH	Frequency(MHz)	output power(dBm)
WCDMA (Band II)	9262	1852.4	22.06
	9400	1880.0	22.02
	9538	1907.6	22.12

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WCDMA Band IV

Measurement result

QPSK

	CH	Frequency(MHz)	output power(dBm)
WCDMA (Band IV)	1312	1712.4	21.89
	1412	1732.4	22.23
	1513	1752.6	22.15

16QAM

	CH	Frequency(MHz)	output power(dBm)
WCDMA (Band IV)	1312	1712.4	21.55
	1412	1732.4	22.04
	1513	1752.6	22.02

WCDMA Band V

Measurement result

QPSK

	CH	Frequency(MHz)	output power(dBm)
WCDMA (Band V)	4132	826.4	22.35
	4183	836.6	22.30
	4233	846.6	22.36

16QAM

	CH	Frequency(MHz)	output power(dBm)
WCDMA (Band V)	4132	826.4	22.03
	4183	836.6	22.02
	4233	846.6	22.06

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

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A.1.3 Radiated

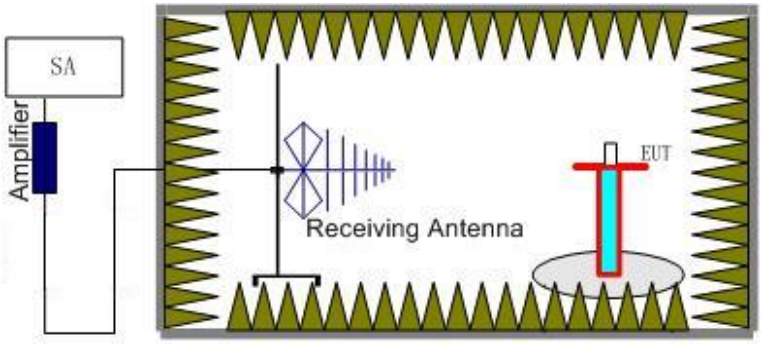
A.1.3.1 Description

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

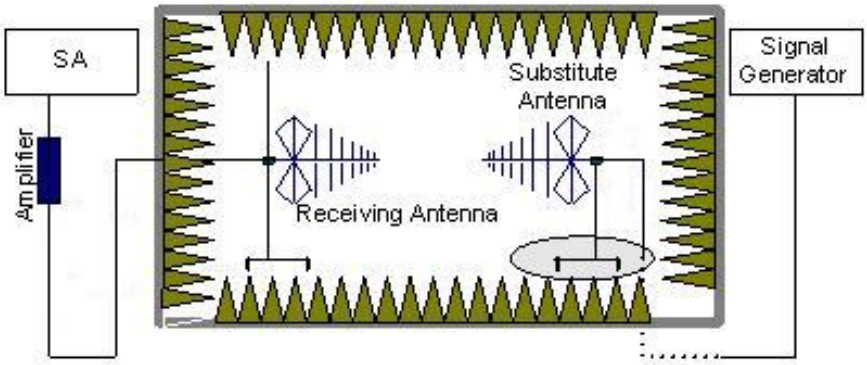
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. "Rule Part 22.913(a)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

A.1.3.2 Method of Measurement

1. For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, EUT was placed on a 80 cm high non-conductive stand at a 3 meter test distance from the receive antenna. For radiated measurements performed at frequencies above 1 GHz, EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. Receiving antenna was placed on the antenna mast 3 meters from the EUT. For emission measurements. The receiving antenna shall be varied from 1 m to 4 m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level. 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.



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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 adjusts 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. 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.

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WCDMA Band II-EIRP

Limits

	Burst Peak EIRP (dBm)
WCDMA Band II	≤33dBm (2W)

Measurement result

WCDMA Band II QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Polarization
1852.40	-14.84	-29.30	8.10	22.56	33.00	V
1880.00	-14.95	-29.40	8.10	22.55	33.00	V
1907.60	-14.59	-29.30	8.10	22.81	33.00	V

WCDMA Band II 16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Polarization
1852.40	-15.50	-29.30	8.10	21.90	33.00	V
1880.00	-15.63	-29.40	8.10	21.87	33.00	V
1907.60	-15.29	-29.30	8.10	22.11	33.00	V

ANALYZER SETTINGS: RBW = VBW = 5MHz

WCDMA Band IV-EIRP

Limits

	Burst Peak EIRP (dBm)
WCDMA Band IV	≤30.00dBm

Measurement result

WCDMA Band IV QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Polarization
1712.40	-16.20	-29.60	8.10	21.50	30.00	H
1732.60	-15.67	-29.50	8.10	21.93	30.00	H
1752.60	-15.46	-29.50	8.10	22.14	30.00	H

WCDMA Band IV 16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Polarization
1712.40	-17.30	-29.60	8.10	20.40	30.00	H
1732.60	-16.70	-29.50	8.10	20.89	30.00	H
1752.60	-16.33	-29.50	8.10	21.27	30.00	H

ANALYZER SETTINGS: RBW = VBW = 5MHz

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WCDMA Band V-ERP

Limits

	Burst Peak ERP (dBm)
WCDMA Band V	≤38.45dBm

Measurement result

WCDMA Band V QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Polarization
826.40	-9.26	-33.60	-0.84	2.15	21.35	38.45	V
836.60	-9.60	-33.50	-0.74	2.15	21.01	38.45	V
846.60	-9.51	-33.50	-0.73	2.15	21.11	38.45	V

WCDMA Band V 16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Polarization
826.40	-10.03	-33.60	-0.84	2.15	20.58	38.45	V
836.60	-10.42	-33.50	-0.74	2.15	20.20	38.45	V
846.60	-10.27	-33.50	-0.73	2.15	20.34	38.45	V

ANALYZER SETTINGS: RBW = VBW = 5MHz

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.82dB(30MHz-3GHz)/3.06dB(3GHz-18GHz)/2.40dB(18GHz-40GHz), k = 2

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

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A.2 FIELD STRENGTH OF SPURIOUS RADIATION

Reference

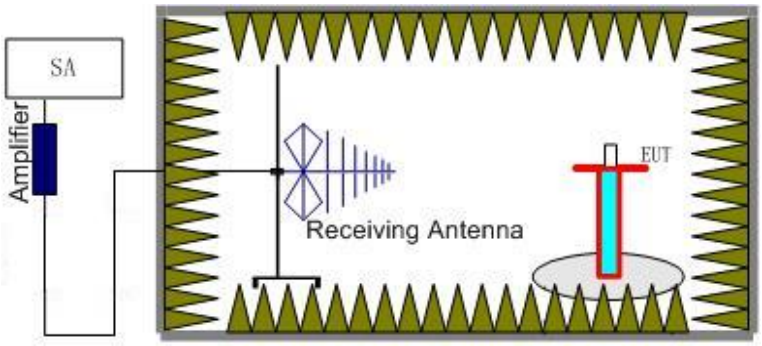
FCC: CFR 2.1053, 22.917, 24.238, 27.53(h).

A.2.1 Measurement Method

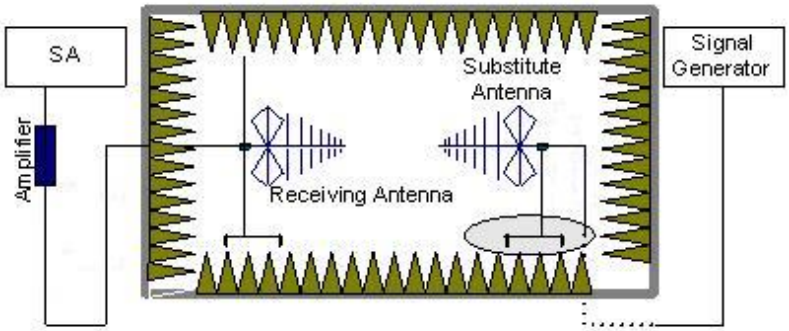
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set 1MHz as outlined in Part 24.238, Part 22.917 and Part 27.53.The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of WCDMA Band II, WCDMA Band V and WCDMA Band IV.

The procedure of radiated spurious emissions is as follows:

1. For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, EUT was placed on a 80 cm high non-conductive stand at a 3 meter test distance from the receive antenna. For radiated measurements performed at frequencies above 1 GHz, EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. Receiving antenna was placed on the antenna mast 3 meters from the EUT. For emission measurements. The receiving antenna shall be varied from 1 m to 4 m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level. 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, an substitution antenna for the frequency band of interest is placed at the

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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 adjusts 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 , Part 22.917 and Part 27.50 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 WCDMA Band II (1852.4 MHz, 1880.0MHz and 1907.6MHz), WCDMA Band V(826.4MHz, 836.6MHz and 846.6MHz) and WCDMA Band IV (1712.4MHz, 1732.4MHz and 1752.6MHz). 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 WCDMA Band II,WCDMA Band V and WCDMA Band IV 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.

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A.2.4 Measurement Results Table

Frequency	Channel	Frequency Range	Result
WCDMA Band V	Low	30MHz-10GHz	Pass
	Middle	30MHz-10GHz	Pass
	High	30MHz-10GHz	Pass
WCDMA Band II	Low	30MHz-20GHz	Pass
	Middle	30MHz-20GHz	Pass
	High	30MHz-20GHz	Pass
WCDMA Band IV	Low	30MHz-20GHz	Pass
	Middle	30MHz-20GHz	Pass
	High	30MHz-20GHz	Pass

A.2.5 Sweep Table

Working Frequency	Subrange (GHz)	RBW	VBW	Sweep time (s)
WCDMA Band V	0.03~1	100KHz	300KHz	10
	1-2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~10	1 MHz	3 MHz	3
WCDMA Band II	0.03~1	100KHz	300KHz	10
	1-2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	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
WCDMA Band IV	0.03~1	100KHz	300KHz	10
	1-2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	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	3

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WCDMA BAND II Mode Channel 9662/1932.4MHz(QPSK)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
16987.50	-44.28	2.90	16.50	-30.68	-13.00	H
17144.00	-43.50	2.90	14.50	-31.90	-13.00	H
17256.00	-42.91	3.20	14.50	-31.61	-13.00	H
17471.00	-41.27	2.90	14.50	-29.67	-13.00	H
17621.00	-38.64	3.30	12.80	-29.14	-13.00	H
17807.00	-39.57	3.60	12.80	-30.37	-13.00	H

WCDMA BAND II Mode Channel 9800/1960MHz(QPSK)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
16936.50	-44.45	2.90	16.50	-30.85	-13.00	H
17118.50	-43.39	2.90	14.50	-31.79	-13.00	H
17241.50	-41.92	3.20	14.50	-30.62	-13.00	H
17514.50	-39.27	2.90	12.80	-29.37	-13.00	H
17532.00	-39.45	2.90	12.80	-29.55	-13.00	H
17832.00	-39.39	3.60	12.80	-30.19	-13.00	H

WCDMA BAND II Mode Channel 9938/1987.6MHz(QPSK)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
16954.50	-45.22	2.90	16.50	-31.62	-13.00	H
17209.50	-43.57	2.90	14.50	-31.97	-13.00	H
17362.50	-42.46	3.20	14.50	-31.16	-13.00	H
17406.00	-41.49	2.90	14.50	-29.89	-13.00	H
17598.00	-39.44	3.30	12.80	-29.94	-13.00	H
17819.50	-39.68	3.60	12.80	-30.48	-13.00	H

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WCDMA BAND II Mode Channel 9662/1932.4MHz(16QAM)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
16468.50	-46.06	2.70	17.40	-31.36	-13.00	H
16962.00	-44.40	2.90	16.50	-30.80	-13.00	H
17353.00	-42.85	3.20	14.50	-31.55	-13.00	H
17433.00	-40.61	2.90	14.50	-29.01	-13.00	H
17597.00	-39.03	3.30	12.80	-29.53	-13.00	H
17836.00	-39.70	3.60	12.80	-30.50	-13.00	H

WCDMA BAND II Mode Channel 9800/1960MHz(16QAM)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
17001.50	-42.12	2.90	14.50	-30.52	-13.00	H
17176.00	-43.47	2.90	14.50	-31.87	-13.00	H
17272.50	-42.12	3.20	14.50	-30.82	-13.00	H
17461.50	-41.50	2.90	14.50	-29.90	-13.00	H
17617.00	-38.94	3.30	12.80	-29.44	-13.00	H
17779.50	-39.24	3.60	12.80	-30.04	-13.00	H

WCDMA BAND II Mode Channel 9938/1987.6MHz(16QAM)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
17001.00	-42.14	2.90	14.50	-30.54	-13.00	H
17190.50	-42.70	2.90	14.50	-31.10	-13.00	H
17276.50	-42.84	3.20	14.50	-31.54	-13.00	H
17438.50	-41.42	2.90	14.50	-29.82	-13.00	H
17627.50	-39.14	3.30	12.80	-29.64	-13.00	H
17836.50	-39.05	3.60	12.80	-29.85	-13.00	H

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WCDMA BAND IV Mode Channel 1537/1712.4MHz(QPSK)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
16891.00	-45.43	2.90	16.50	-31.83	-13.00	H
16938.50	-45.11	2.90	16.50	-31.51	-13.00	H
17244.00	-42.45	3.20	14.50	-31.15	-13.00	H
17519.00	-39.59	2.90	12.80	-29.69	-13.00	H
17595.00	-38.75	3.30	12.80	-29.25	-13.00	H
17840.00	-39.71	3.60	12.80	-30.51	-13.00	H

WCDMA BAND IV Mode Channel 1638/1732.6MHz(QPSK)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
16949.00	-43.29	2.90	16.50	-29.69	-13.00	H
17205.00	-42.15	2.90	14.50	-30.55	-13.00	H
17299.00	-40.62	3.20	14.50	-29.32	-13.00	H
17458.50	-38.89	2.90	14.50	-27.29	-13.00	H
17569.00	-37.38	3.30	12.80	-27.88	-13.00	H
17795.50	-37.66	3.60	12.80	-28.46	-13.00	H

WCDMA BAND IV Mode Channel 1738/1752.6MHz(QPSK)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
16969.00	-44.45	2.90	16.50	-30.85	-13.00	H
17184.00	-42.69	2.90	14.50	-31.09	-13.00	H
17281.00	-42.57	3.20	14.50	-31.27	-13.00	H
17475.00	-41.29	2.90	14.50	-29.69	-13.00	H
17581.50	-39.07	3.30	12.80	-29.57	-13.00	H
17823.00	-39.26	3.60	12.80	-30.06	-13.00	H

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WCDMA BAND IV Mode Channel 1537/1712.4MHz(16QAM)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
16964.00	-44.20	2.90	16.50	-30.60	-13.00	H
17203.50	-43.16	2.90	14.50	-31.56	-13.00	H
17362.50	-42.84	3.20	14.50	-31.54	-13.00	H
17502.50	-38.96	2.90	12.80	-29.06	-13.00	H
17529.00	-39.46	2.90	12.80	-29.56	-13.00	H
17836.00	-39.69	3.60	12.80	-30.49	-13.00	H

WCDMA BAND IV Mode Channel 1638/1732.6MHz(16QAM)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
16960.00	-44.19	2.90	16.50	-30.59	-13.00	H
17211.00	-42.22	2.90	14.50	-30.62	-13.00	H
17300.00	-41.14	3.20	14.50	-29.84	-13.00	H
17449.50	-40.40	2.90	14.50	-28.80	-13.00	H
17574.00	-37.54	3.30	12.80	-28.04	-13.00	H
17811.50	-38.33	3.60	12.80	-29.13	-13.00	H

WCDMA BAND IV Mode Channel 1738/1752.6MHz(16QAM)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
16959.00	-45.08	2.90	16.50	-31.48	-13.00	H
17131.50	-43.16	2.90	14.50	-31.56	-13.00	H
17288.50	-43.23	3.20	14.50	-31.93	-13.00	H
17458.50	-40.98	2.90	14.50	-29.38	-13.00	H
17601.00	-38.37	3.30	12.80	-28.87	-13.00	H
17812.00	-39.35	3.60	12.80	-30.15	-13.00	H

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WCDMA BAND V Mode Channel 4357/871.4MHz(QPSK)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit (dBm)	Polarization
8409.75	-51.89	1.80	11.30	-44.54	-13.00	H
8770.50	-52.60	1.90	12.00	-44.65	-13.00	H
9226.75	-51.03	2.10	11.60	-43.68	-13.00	H
9300.25	-50.65	2.00	11.60	-43.20	-13.00	H
9424.75	-51.99	2.10	11.60	-44.64	-13.00	H
9477.75	-50.77	2.10	11.60	-43.42	-13.00	V

WCDMA BAND V Mode Channel 4408/881.6MHz(QPSK)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit (dBm)	Polarization
9107.00	-50.59	2.10	11.60	-43.24	-13.00	H
9226.25	-50.07	2.10	11.60	-42.72	-13.00	H
9301.00	-51.25	2.00	11.60	-43.80	-13.00	H
9427.50	-51.68	2.10	11.60	-44.33	-13.00	H
9476.25	-51.74	2.10	11.60	-44.39	-13.00	V
9720.75	-51.22	2.20	11.20	-44.37	-13.00	H

WCDMA BAND V Mode Channel 4458/891.6MHz(QPSK)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit (dBm)	Polarization
8418.00	-52.04	1.80	11.30	-44.69	-13.00	H
9097.00	-51.88	2.20	11.60	-44.63	-13.00	H
9219.75	-50.73	2.10	11.60	-43.38	-13.00	H
9300.25	-50.33	2.00	11.60	-42.88	-13.00	H
9433.00	-52.01	2.10	11.60	-44.66	-13.00	H
9475.25	-51.59	2.10	11.60	-44.24	-13.00	V

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WCDMA BAND V Mode Channel 4357/871.4MHz(16QAM)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit (dBm)	Polarization
8453.75	-52.19	1.80	11.30	-44.84	-13.00	H
9108.50	-52.11	2.10	11.60	-44.76	-13.00	H
9225.00	-51.74	2.10	11.60	-44.39	-13.00	H
9299.25	-51.22	2.00	11.60	-43.77	-13.00	H
9423.00	-51.37	2.10	11.60	-44.02	-13.00	H
9471.75	-50.72	2.10	11.60	-43.37	-13.00	V

WCDMA BAND V Mode Channel 4408/881.6MHz(16QAM)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit (dBm)	Polarization
8517.75	-52.40	2.10	12.00	-44.65	-13.00	H
9105.75	-51.80	2.20	11.60	-44.55	-13.00	H
9223.75	-50.88	2.10	11.60	-43.53	-13.00	H
9302.00	-50.96	2.00	11.60	-43.51	-13.00	H
9422.00	-51.69	2.10	11.60	-44.34	-13.00	H
9475.50	-52.03	2.10	11.60	-44.68	-13.00	V

WCDMA BAND V Mode Channel 4458/891.6MHz(16QAM)

Frequency(MHz)	P_{Mea}(dBm)	Path loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit (dBm)	Polarization
9098.75	-51.66	2.20	11.60	-44.41	-13.00	H
9147.00	-51.63	2.10	11.60	-44.28	-13.00	H
9223.25	-51.47	2.10	11.60	-44.12	-13.00	H
9299.50	-51.01	2.00	11.60	-43.56	-13.00	H
9424.75	-51.17	2.10	11.60	-43.82	-13.00	H
9470.50	-51.15	2.10	11.60	-43.80	-13.00	V

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.82dB(30MHz-3GHz)/3.06dB(3GHz-18GHz)/2.40dB(18GHz-40GHz), k = 2

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A.3 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 22.355, 24.235, 27.54

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℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on mid channel of each band, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 1.5 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 1.5 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℃ 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.

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.

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A.3.2 Measurement results

WCDMA Band II

Frequency Error vs Voltage

Temperature(℃)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.80	1850.060	1909.830		
50				-8.57	0.0091
40				3.61	0.0038
30				-9.00	0.0096
10				1.23	0.0013
0				-5.47	0.0058
-10				-2.64	0.0028
-20				11.02	0.0117
-30				-1.32	0.0014

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.60	20	1850.060	1909.830	1.90	0.0020
4.20				0.24	0.0003

WCDMA Band IV

Frequency Error vs Voltage-QPSK

Temperature(℃)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.80	1710.200	1754.820		
50				0.99	0.0011
40				-1.01	0.0012
30				-4.65	0.0054
10				-5.37	0.0062
0				4.88	0.0056
-10				1.35	0.0016
-20				6.60	0.0076
-30				-0.68	0.0008

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.60	20	1710.200	1754.820	-5.39	0.0062
4.20				1.10	0.0013

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WCDMA Band V

Frequency Error vs Voltage-QPSK

Temperature(℃)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.80	824.170	848.820		
50				-0.89	0.0021
40				-1.04	0.0025
30				-3.26	0.0078
10				-1.17	0.0028
0				-1.95	0.0047
-10				-2.61	0.0062
-20				-1.93	0.0046
-30				-3.70	0.0088

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.60	20	824.170	848.820	1.27	0.0030
4.20				-0.11	0.0003

Expanded measurement uncertainty is 10Hz, k = 2

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A.4 OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049, 22.917, 24.238, 27.53(g).

A.4.1 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.

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.

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

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

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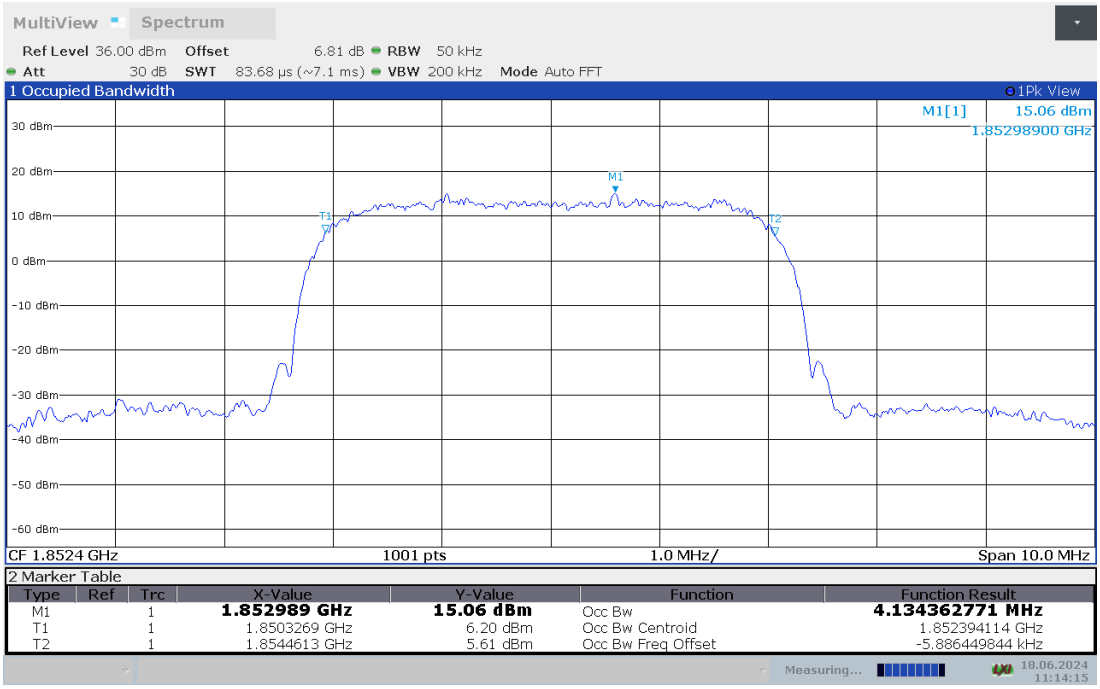
WCDMA Band II (99% BW)-QPSK

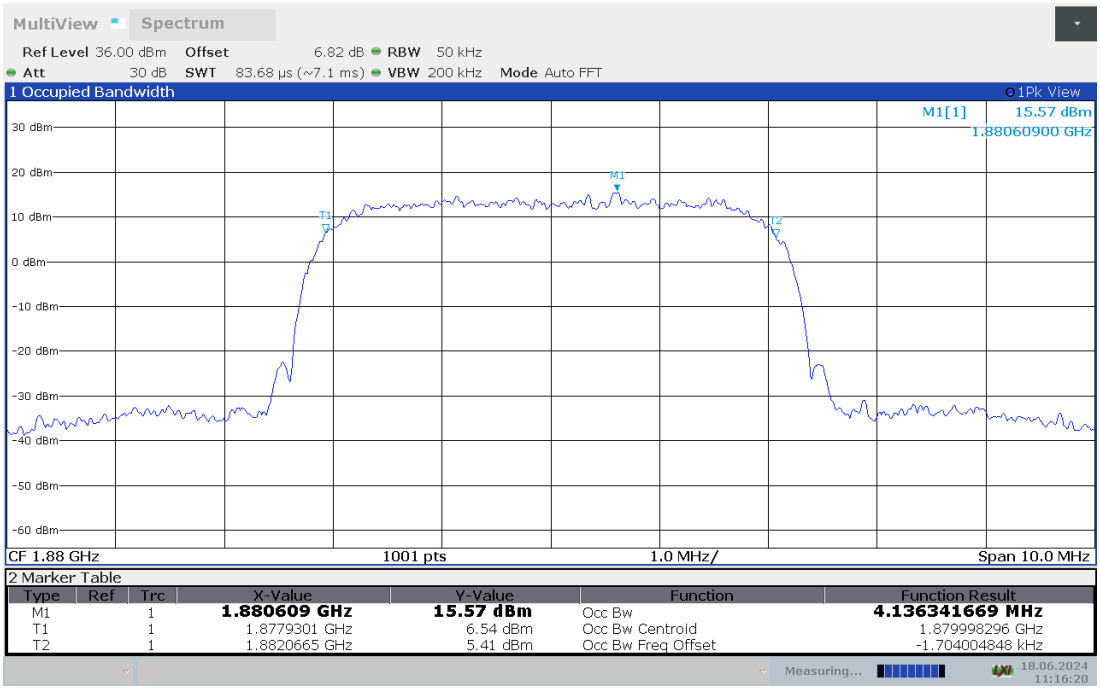
Frequency (MHz)	Occupied Bandwidth (99% BW) (MHz)
1852.4	4.134
1880	4.136
1907.6	4.160

WCDMA Band II (99% BW)

Channel 9262-Occupied Bandwidth (99% BW)



Channel 9400-Occupied Bandwidth (99% BW)



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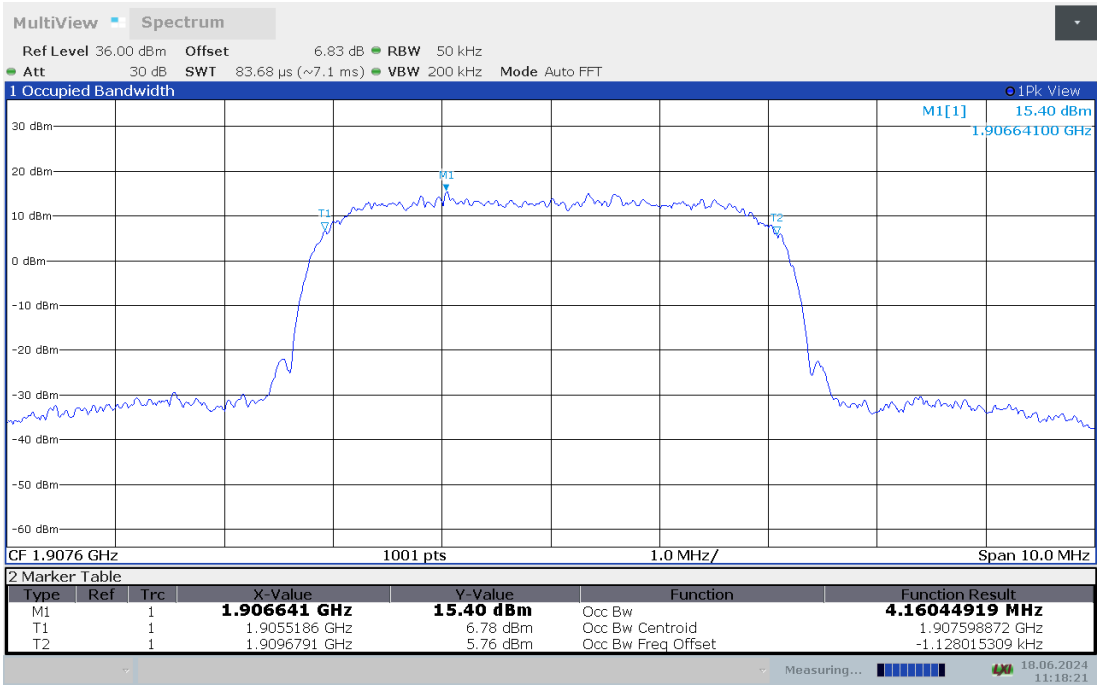
Channel 9538-Occupied Bandwidth (99% BW)

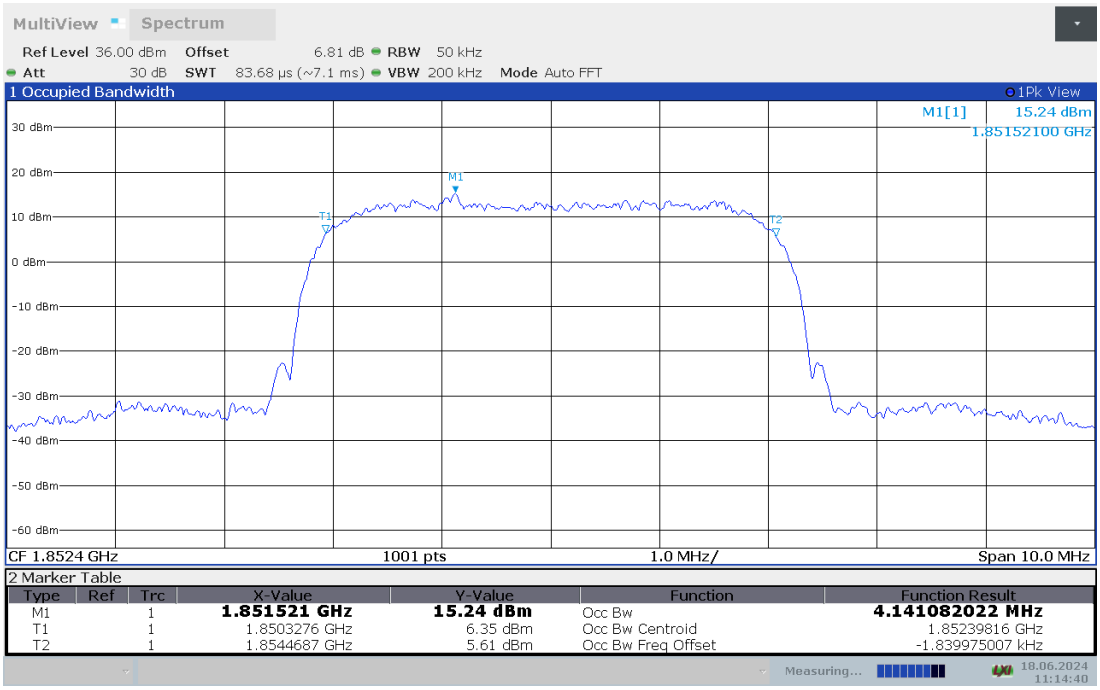


WCDMA Band II (99% BW)-16QAM

Frequency (MHz)	Occupied Bandwidth (99% BW) (MHz)
1852.4	4.141
1880	4.141
1907.6	4.151

WCDMA Band II (99% BW)

Channel 9262-Occupied Bandwidth (99% BW)



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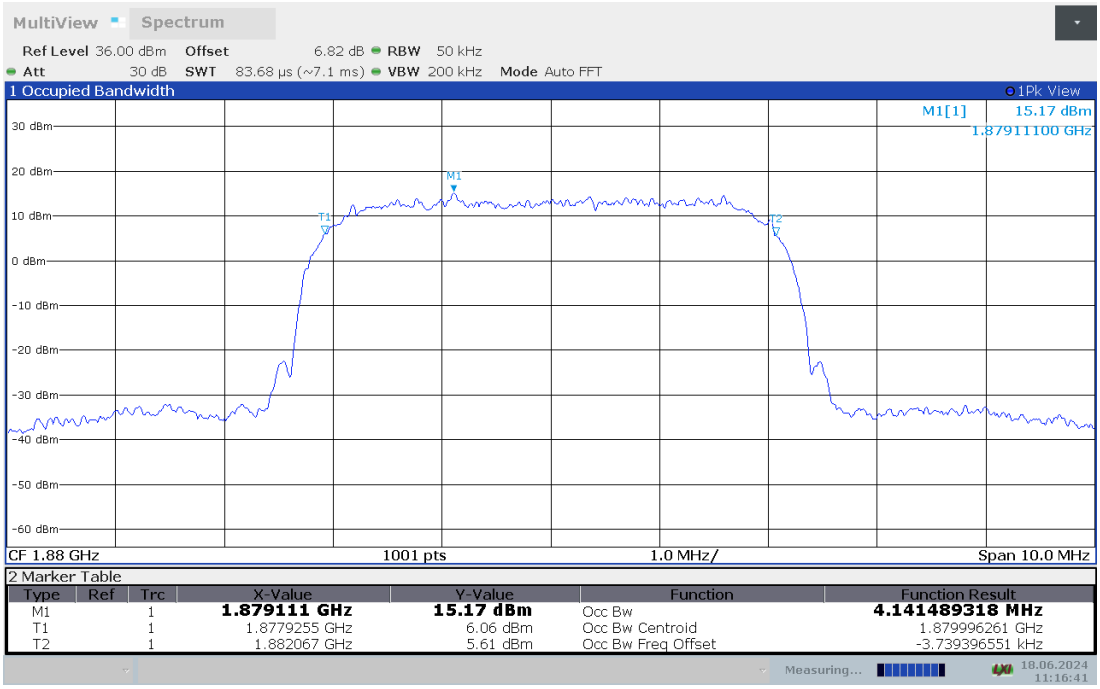
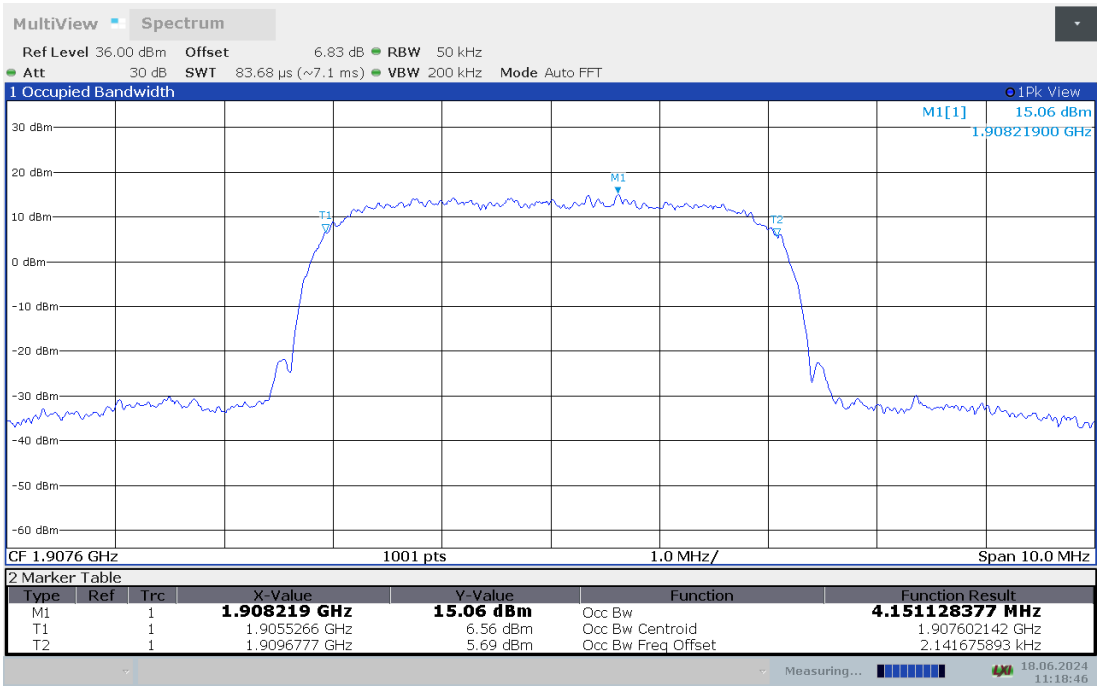
Channel 9400-Occupied Bandwidth (99% BW)



Channel 9538-Occupied Bandwidth (99% BW)



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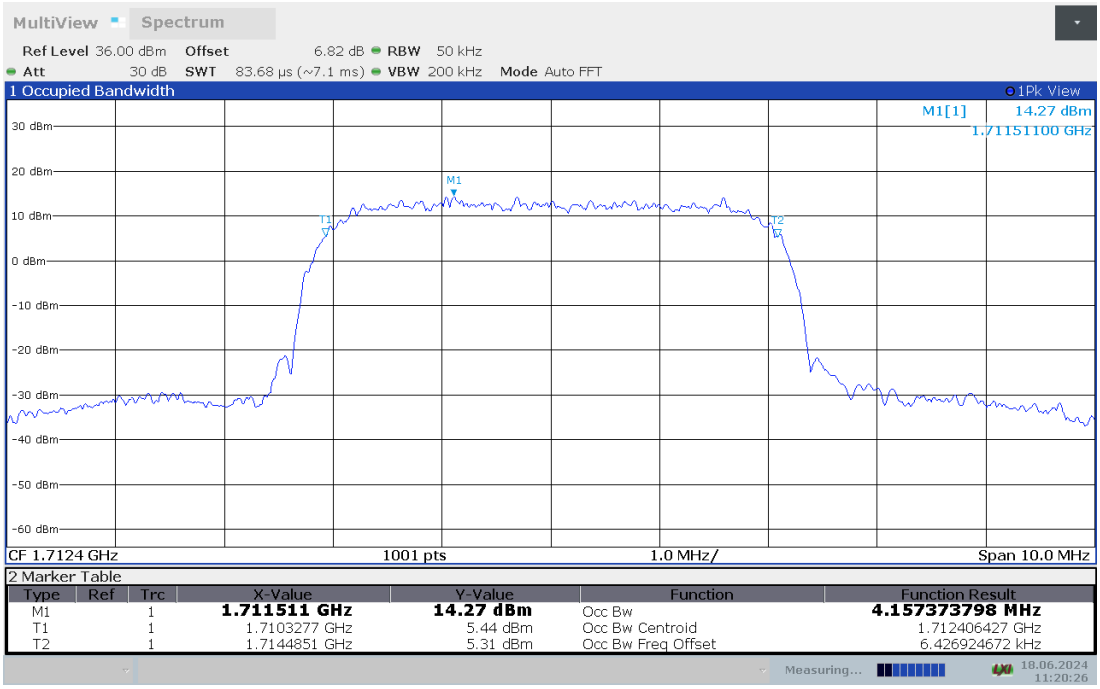
WCDMA Band IV (99% BW)-QPSK

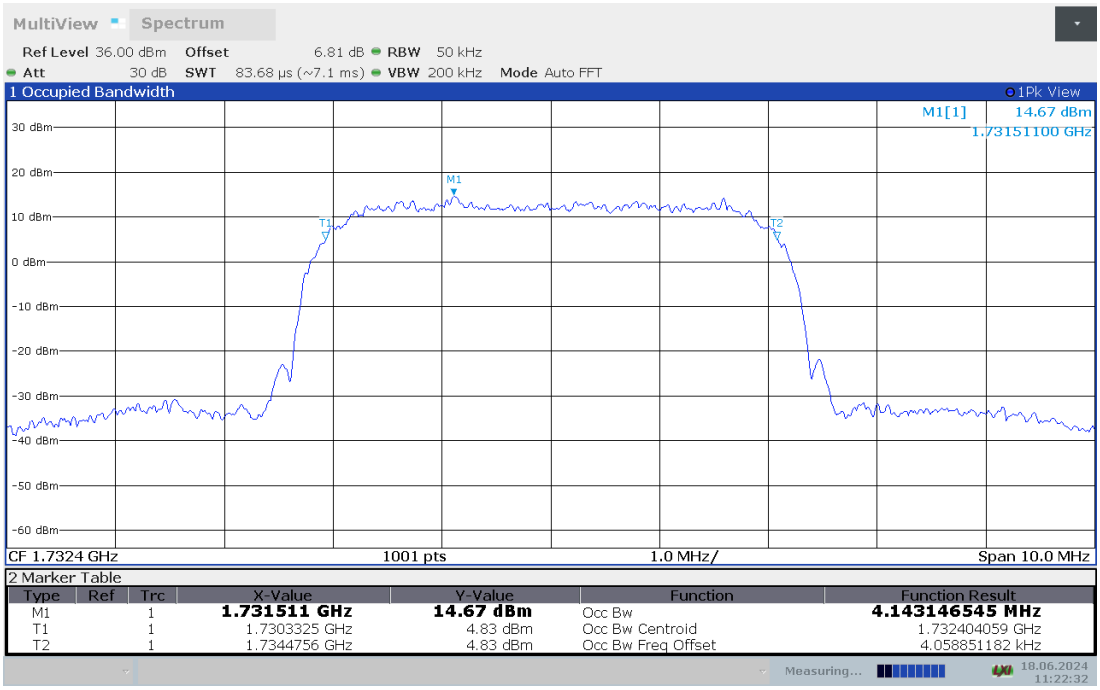
Frequency (MHz)	Occupied Bandwidth (99% BW) (MHz)
1712.4	4.157
1732.4	4.143
1752.6	4.153

WCDMA Band IV (99% BW)

Channel 1312-Occupied Bandwidth (99% BW)



Channel 1412-Occupied Bandwidth (99% BW)



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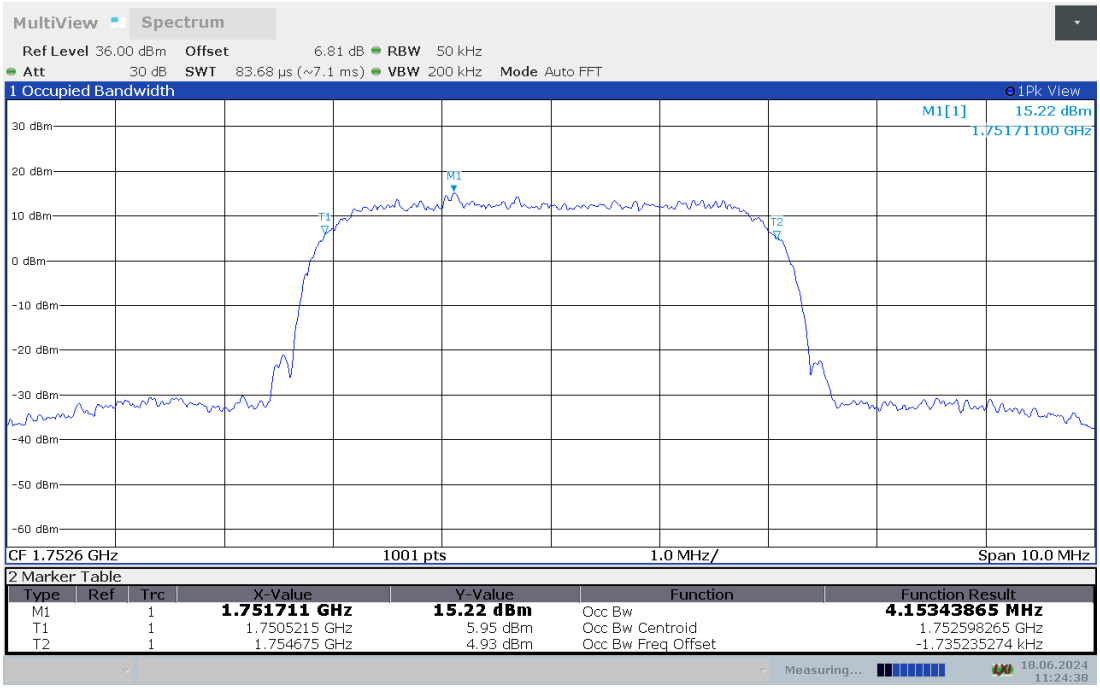
Channel 1513-Occupied Bandwidth (99% BW)

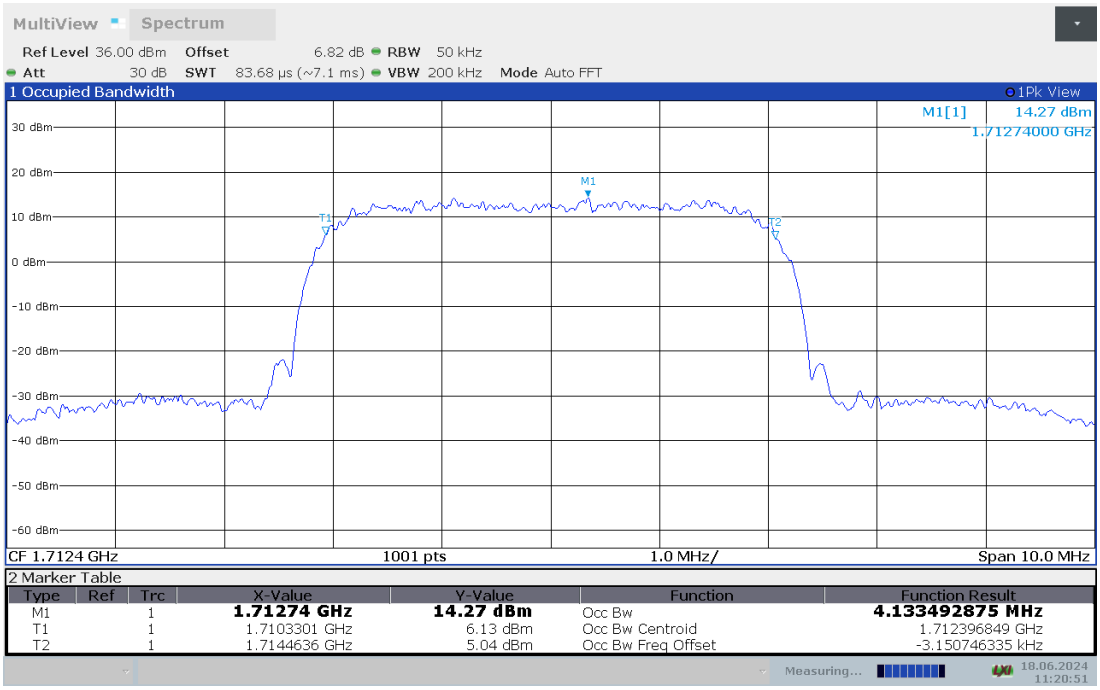


WCDMA Band IV (99% BW)-16QAM

Frequency (MHz)	Occupied Bandwidth (99% BW) (MHz)
1712.4	4.133
1732.4	4.144
1752.6	4.151

WCDMA Band IV (99% BW)

Channel 1312-Occupied Bandwidth (99% BW)



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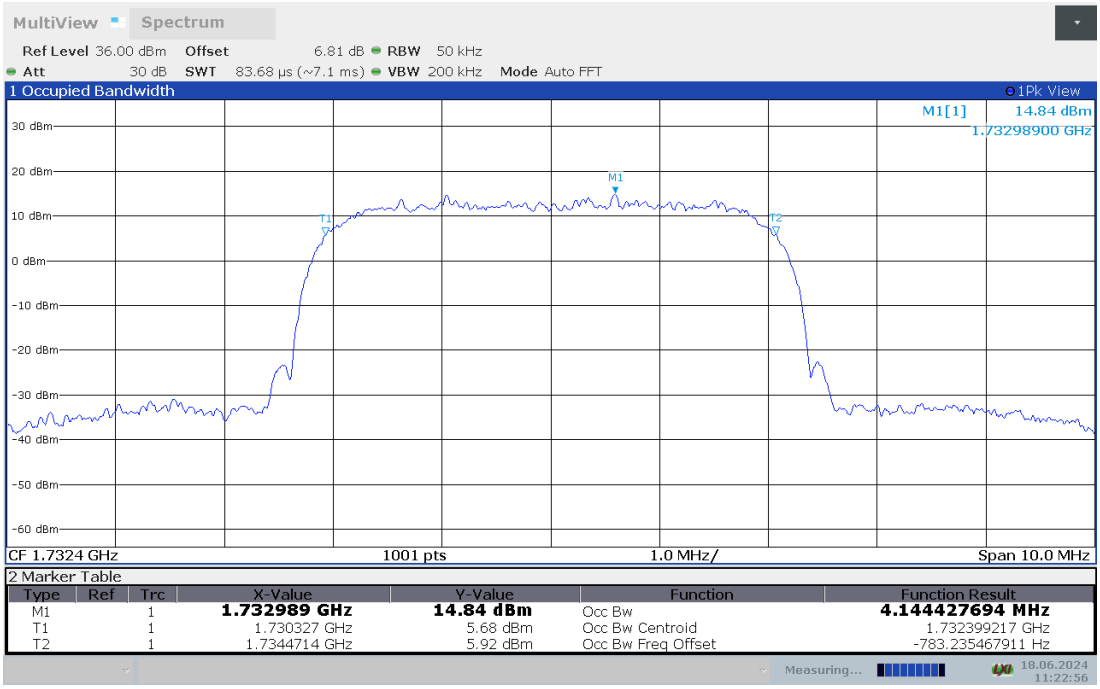
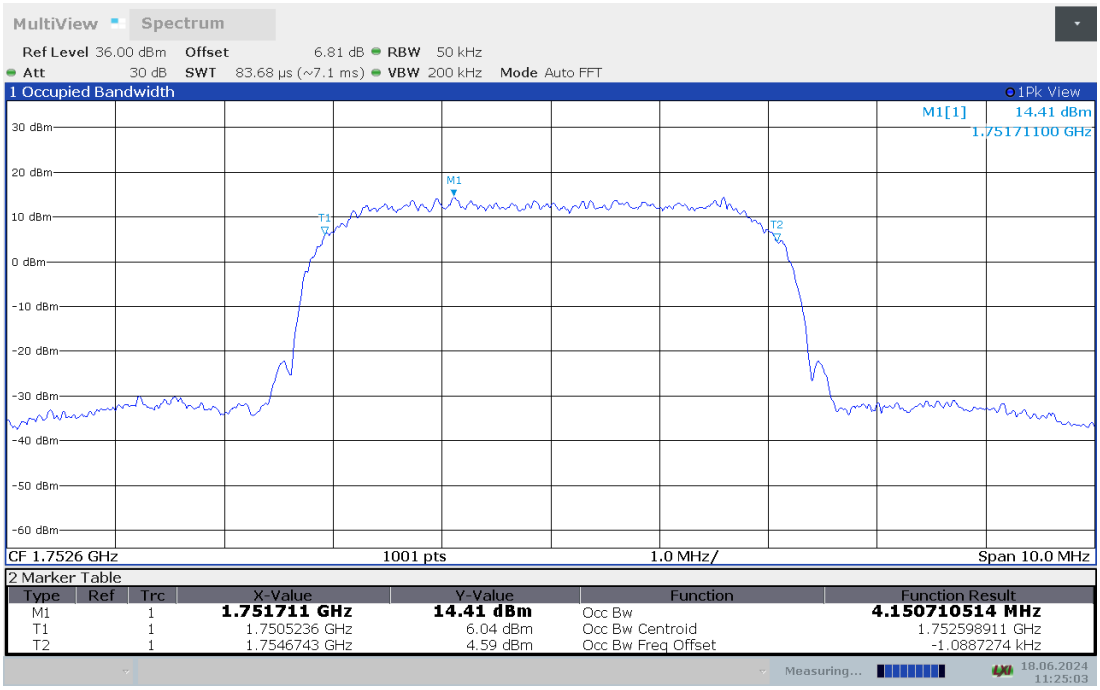
Channel 1412-Occupied Bandwidth (99% BW)



Channel 1513-Occupied Bandwidth (99% BW)



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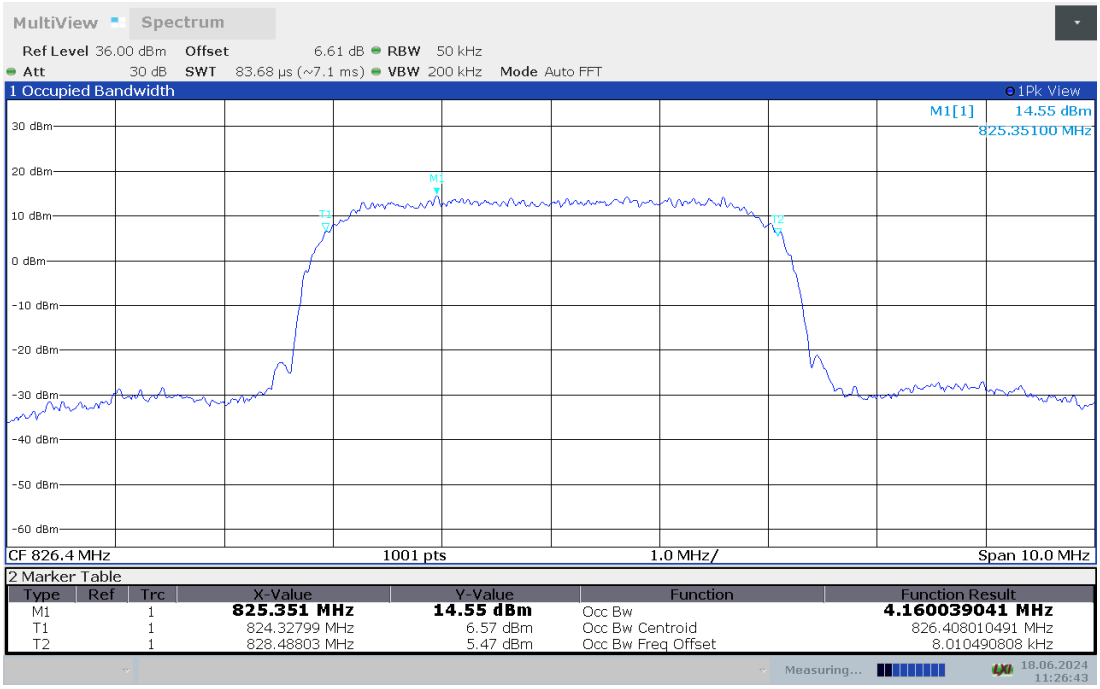
WCDMA Band V (99% BW)-QPSK

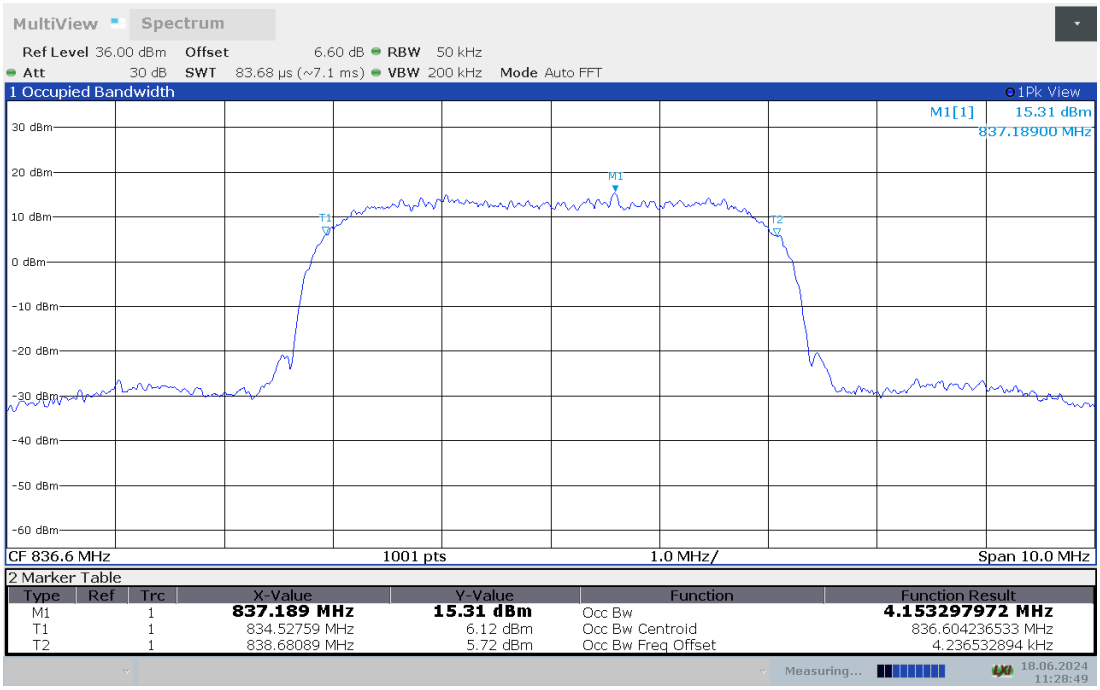
Frequency (MHz)	Occupied Bandwidth (99% BW) (MHz)
826.4	4.160
836.6	4.153
846.6	4.147

WCDMA Band V (99% BW)

Channel 4132-Occupied Bandwidth (99% BW)



Channel 4183-Occupied Bandwidth (99% BW)



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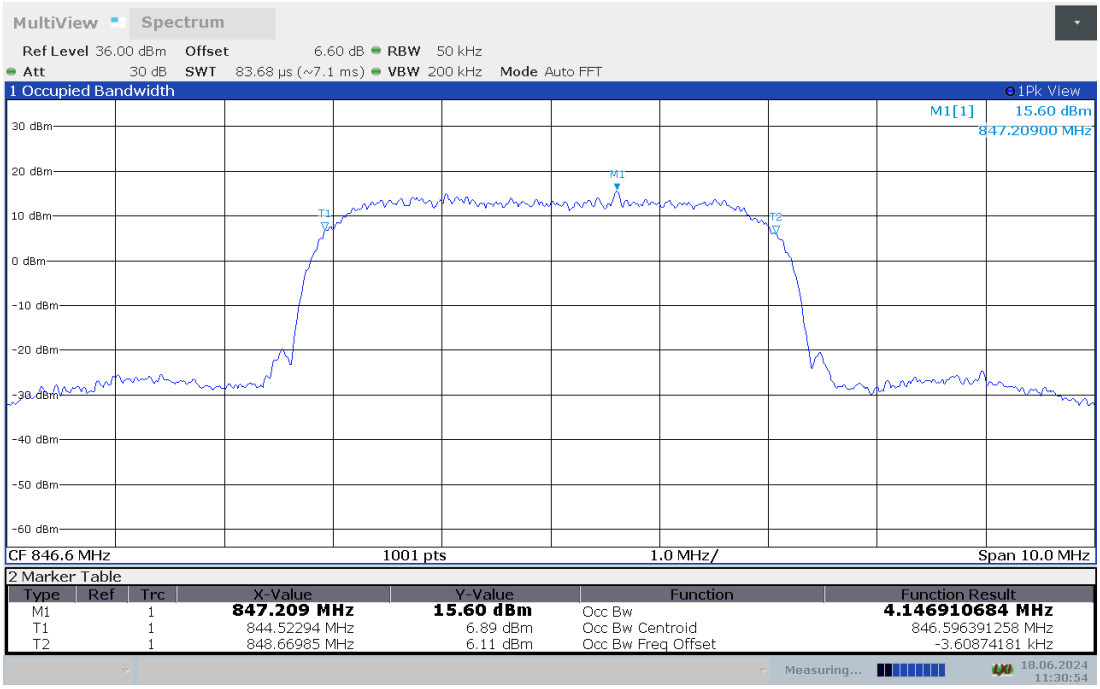
Channel 4233-Occupied Bandwidth (99% BW)

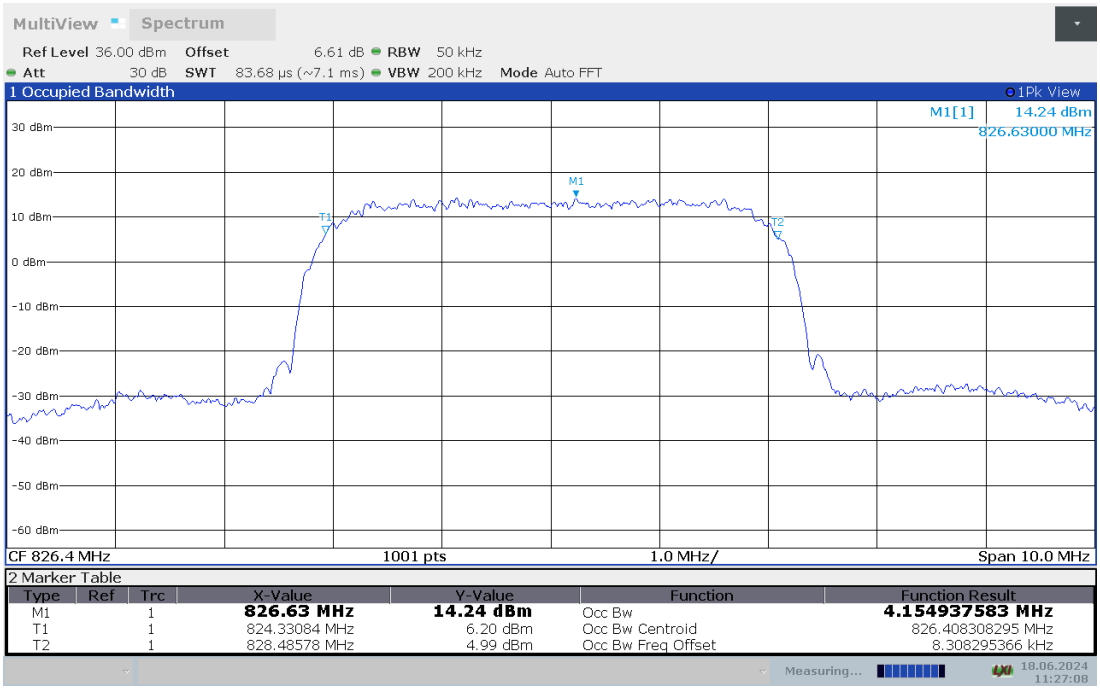


WCDMA Band V (99% BW)-16QAM

Frequency (MHz)	Occupied Bandwidth (99% BW) (MHz)
826.4	4.155
836.6	4.168
846.6	4.157

WCDMA Band V (99% BW)

Channel 4132-Occupied Bandwidth (99% BW)



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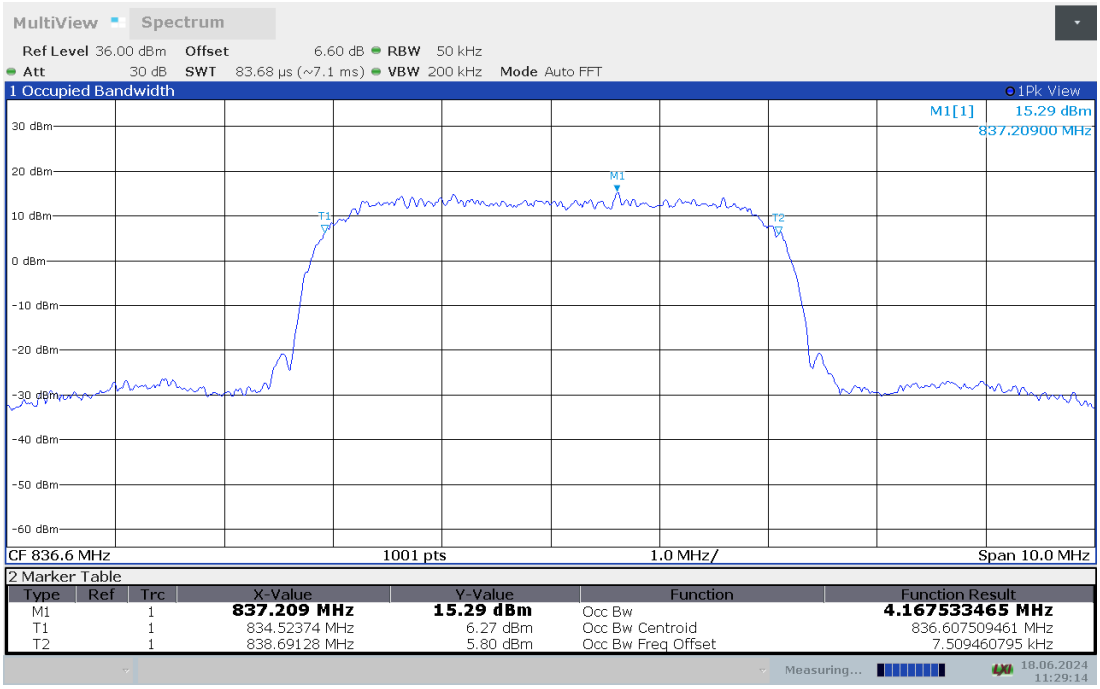
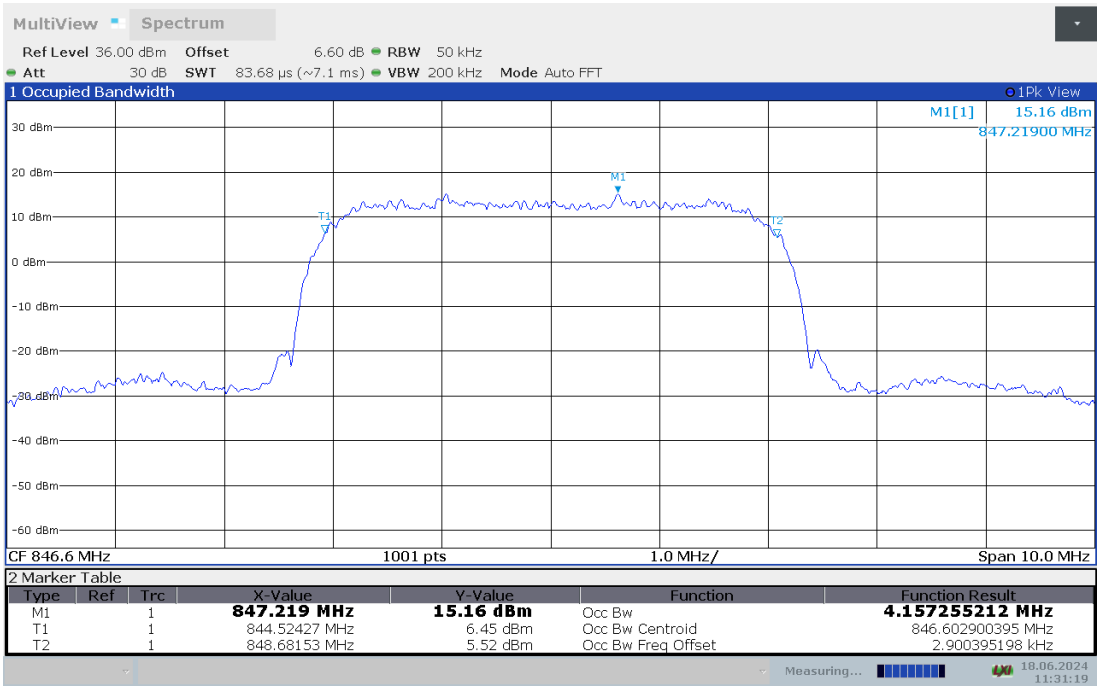
Channel 4183-Occupied Bandwidth (99% BW)



Channel 4233-Occupied Bandwidth (99% BW)



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

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A.5 EMISSION BANDWIDTH

Reference

FCC: CFR Part 2.1049, 22.917, 24.238, 27.53(g).

A.5.1Emission Bandwidth Results

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 26dB below the transmitter power.

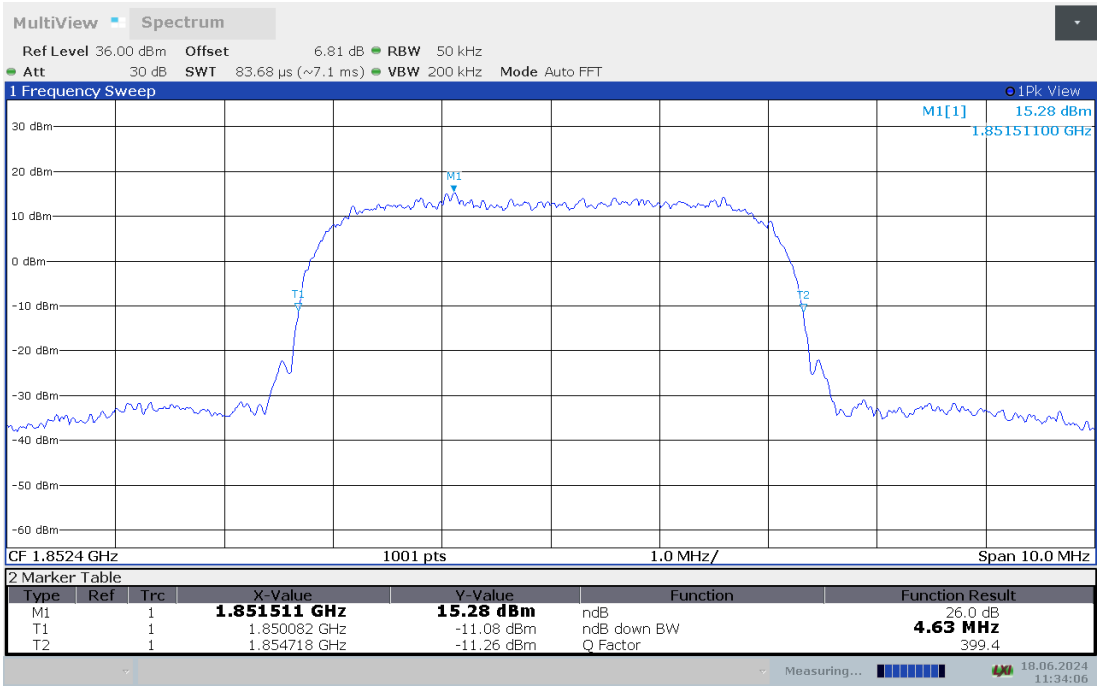
Similar to conducted emissions; Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

WCDMA Band II (-26dBc BW)-QPSK

Frequency (MHz)	Emission Bandwidth (-26dBc BW)(MHz)
1852.4	4.635
1880	4.635
1907.6	4.635

WCDMA Band II (-26dBc BW)

Channel 9262-Emission Bandwidth (-26dBc BW)



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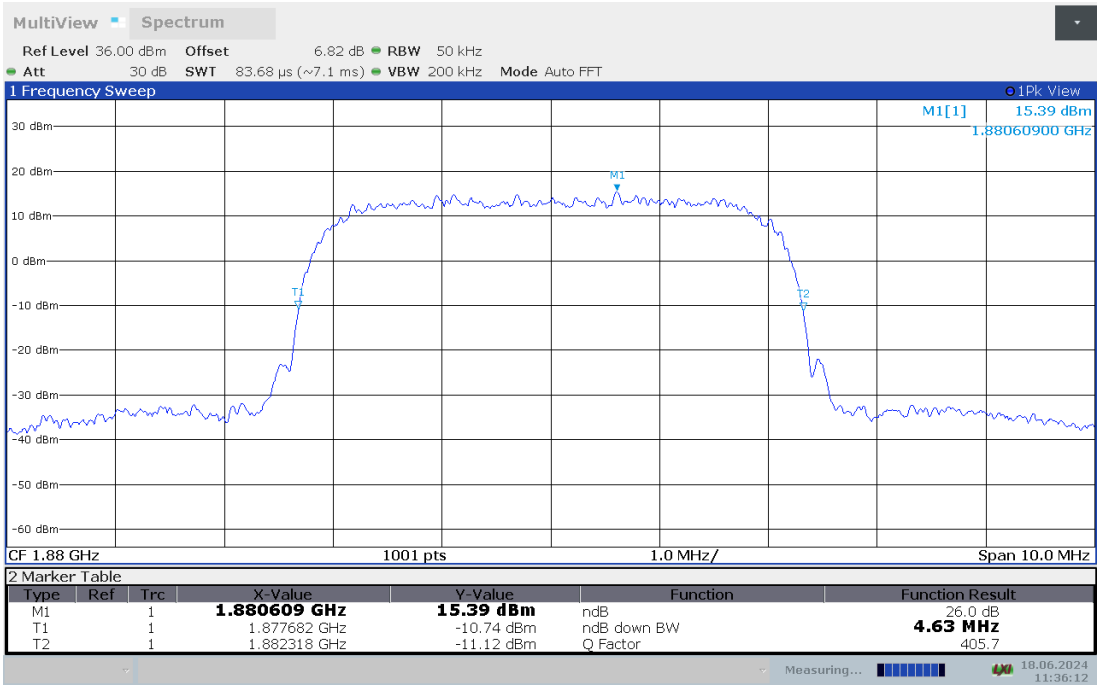
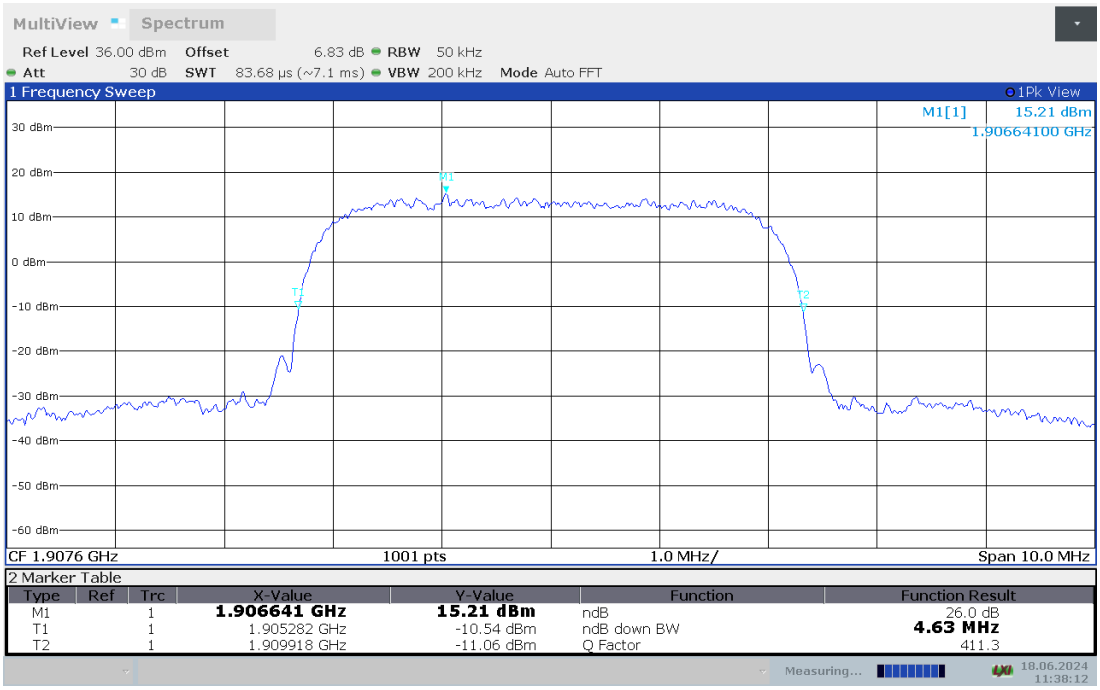
Channel 9400-Emission Bandwidth (-26dBc BW)



Channel 9538-Emission Bandwidth (-26dBc BW)



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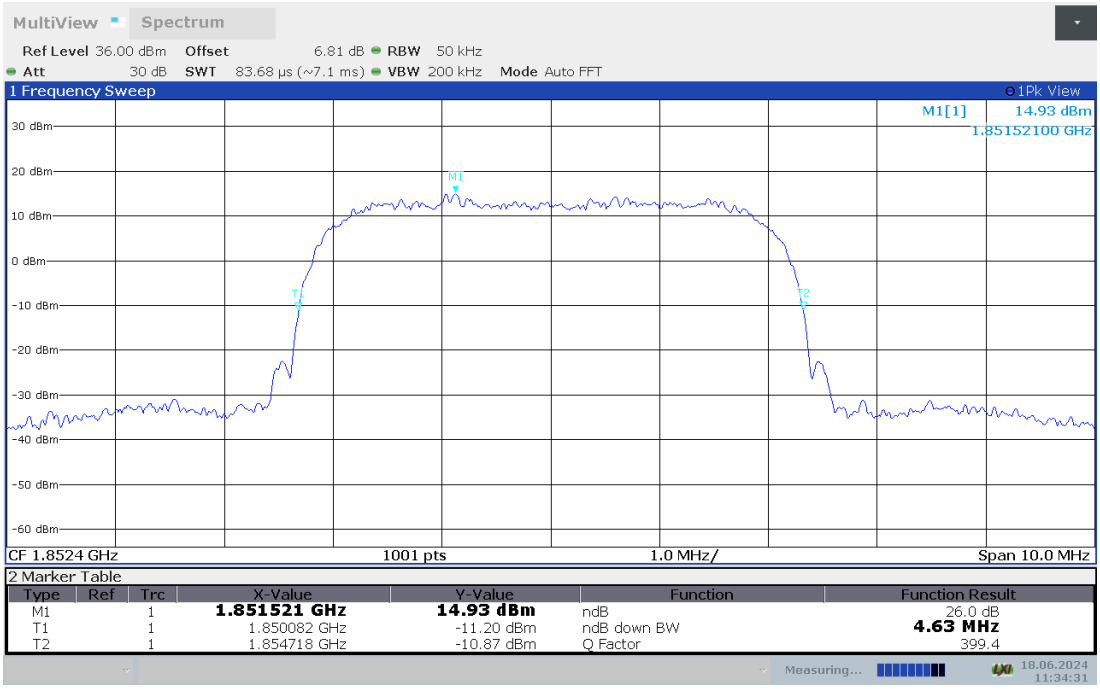
WCDMA Band II (-26dBc BW)-16QAM

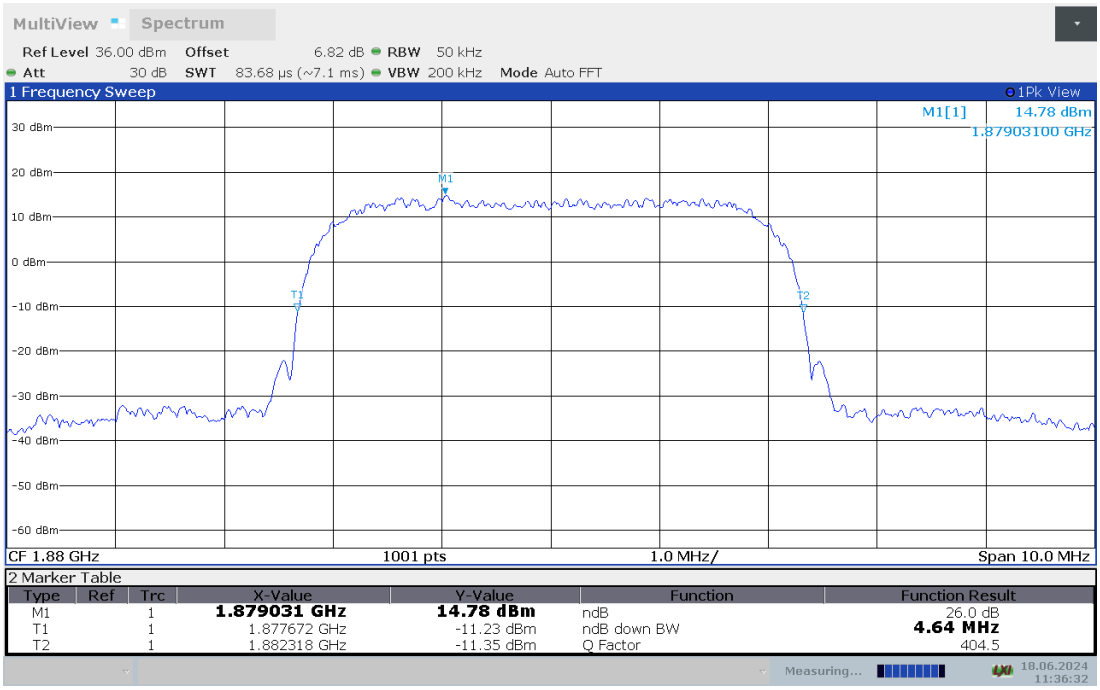
Frequency (MHz)	Emission Bandwidth (-26dBc BW)(MHz)
1852.4	4.635
1880	4.645
1907.6	4.635

WCDMA Band II (-26dBc BW)

Channel 9262-Emission Bandwidth (-26dBc BW)



Channel 9400-Emission Bandwidth (-26dBc BW)



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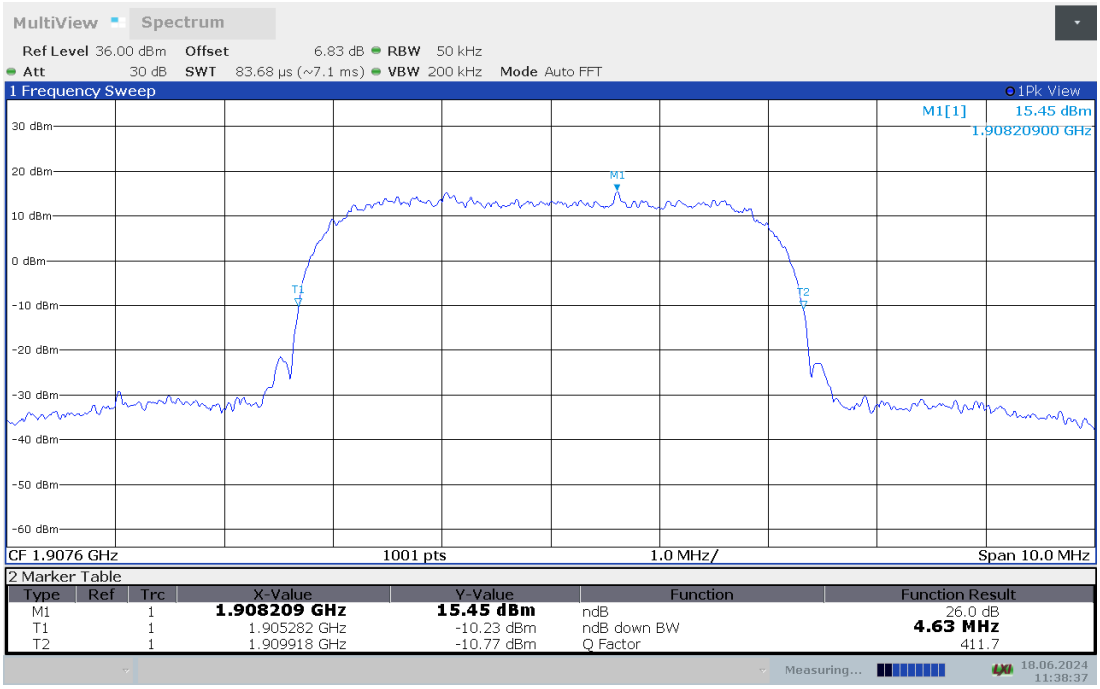
Channel 9538-Emission Bandwidth (-26dBc BW)



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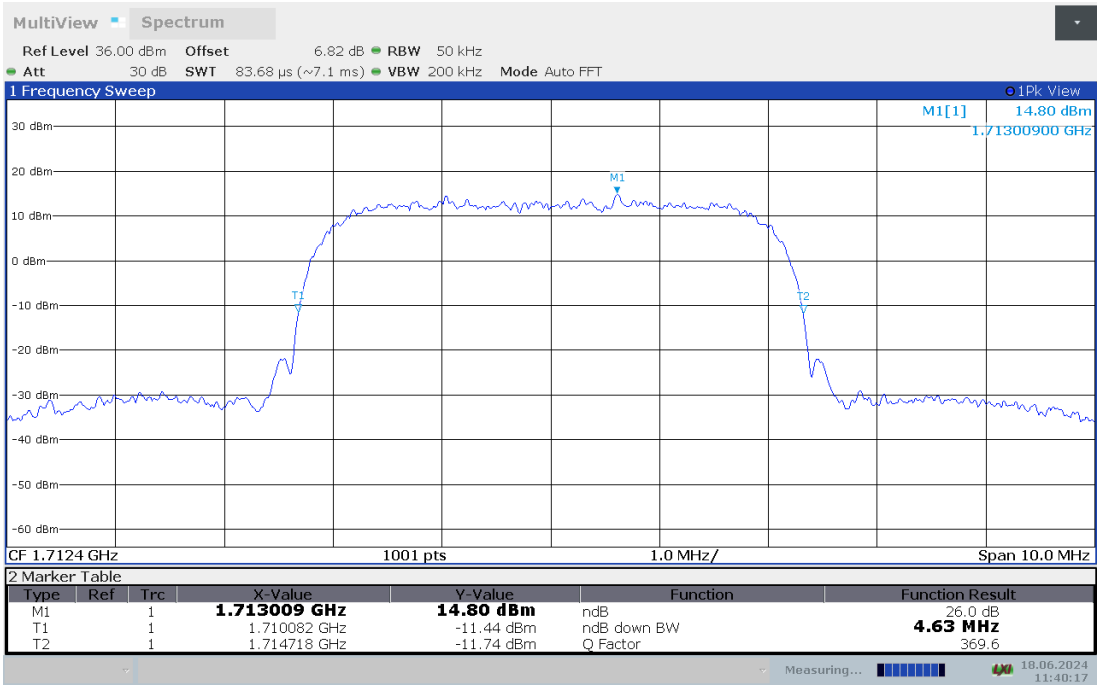
WCDMA Band IV (-26dBc BW)-QPSK

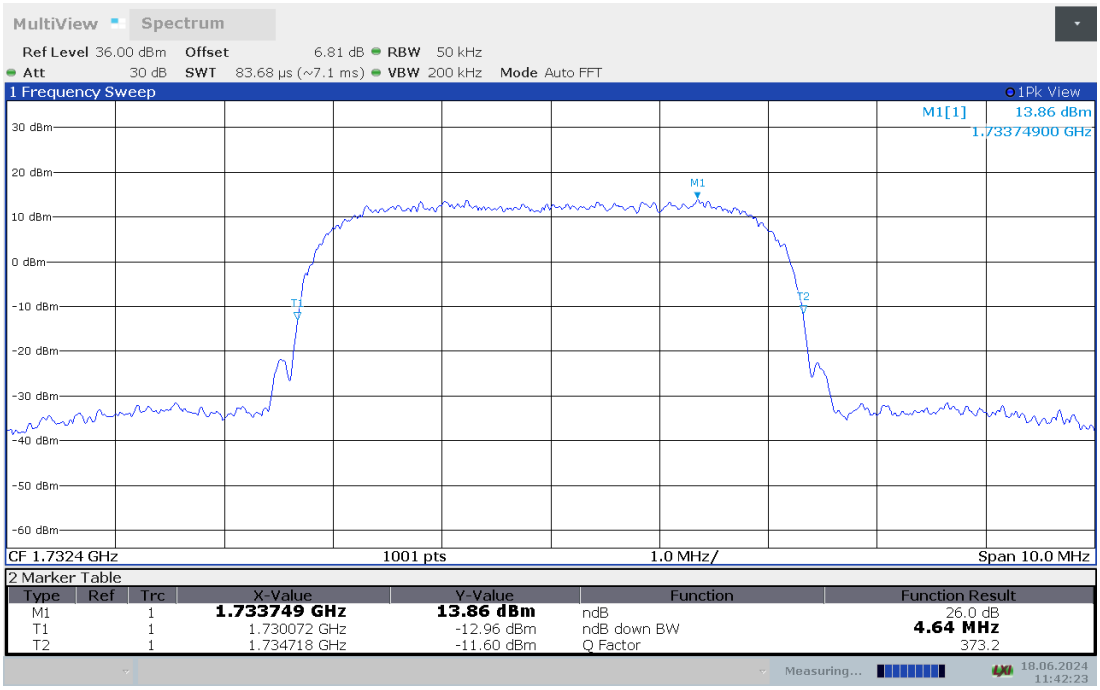
Frequency (MHz)	Emission Bandwidth (-26dBc BW)(MHz)
1712.4	4.635
1732.4	4.645
1752.6	4.635

WCDMA Band IV (-26dBc BW)

Channel 1312-Emission Bandwidth (-26dBc BW)



Channel 1412-Emission Bandwidth (-26dBc BW)



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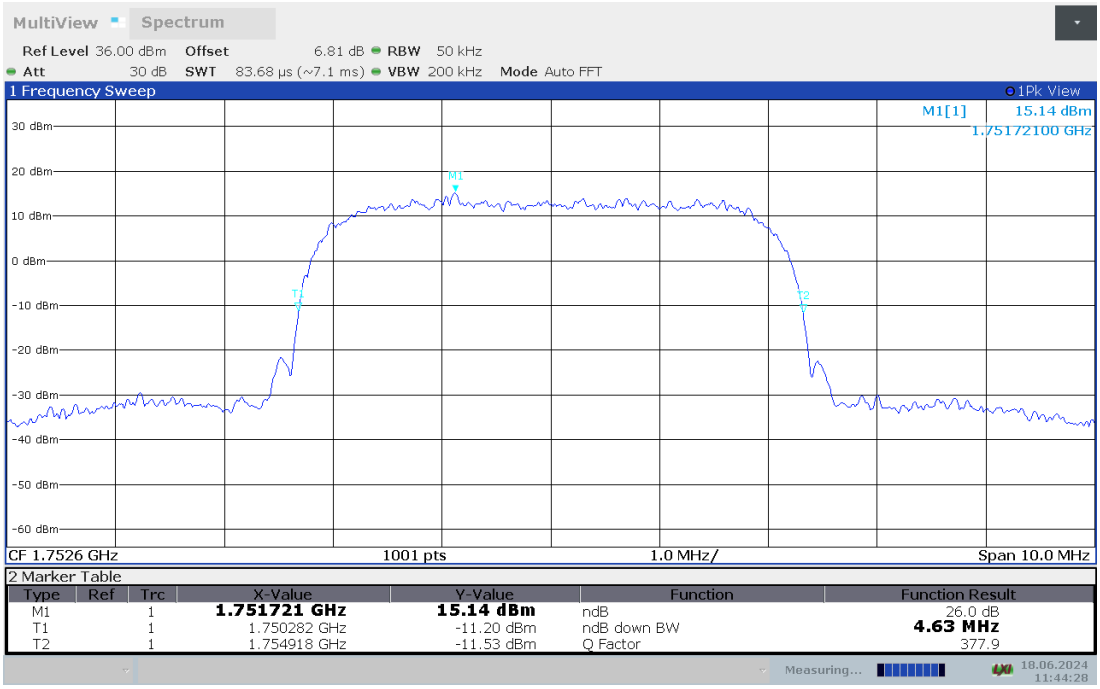
Channel 1513-Emission Bandwidth (-26dBc BW)

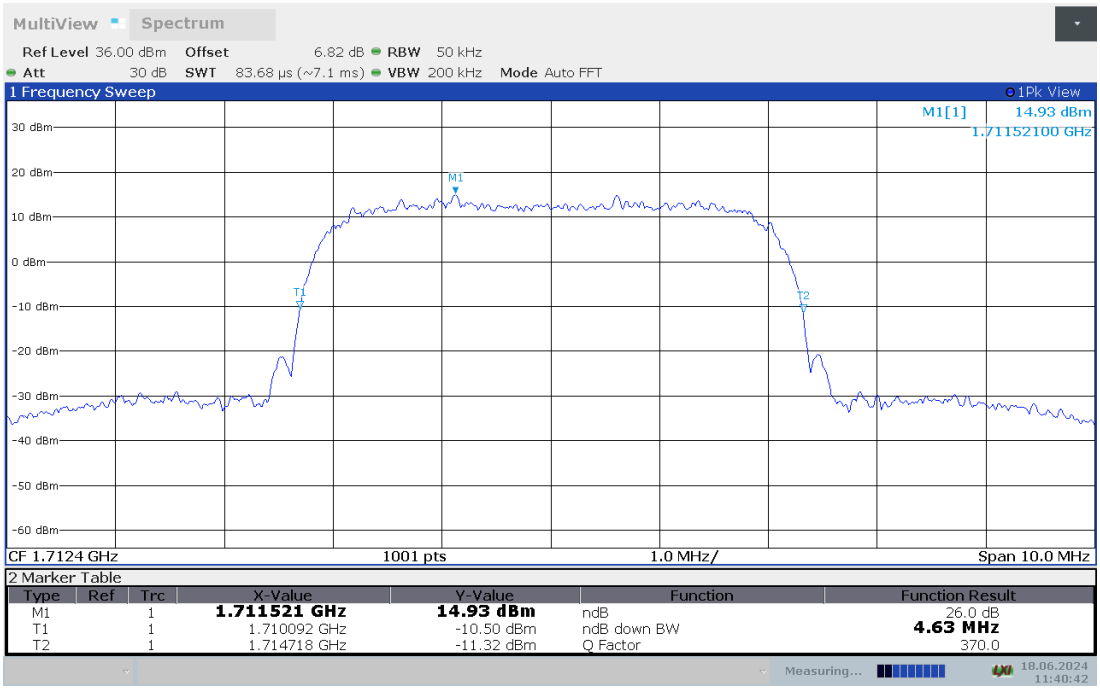


WCDMA Band IV (-26dBc BW)-16QAM

Frequency (MHz)	Emission Bandwidth (-26dBc BW)(MHz)
1712.4	4.625
1732.4	4.635
1752.6	4.635

WCDMA Band IV (-26dBc BW)

Channel 1312-Emission Bandwidth (-26dBc BW)



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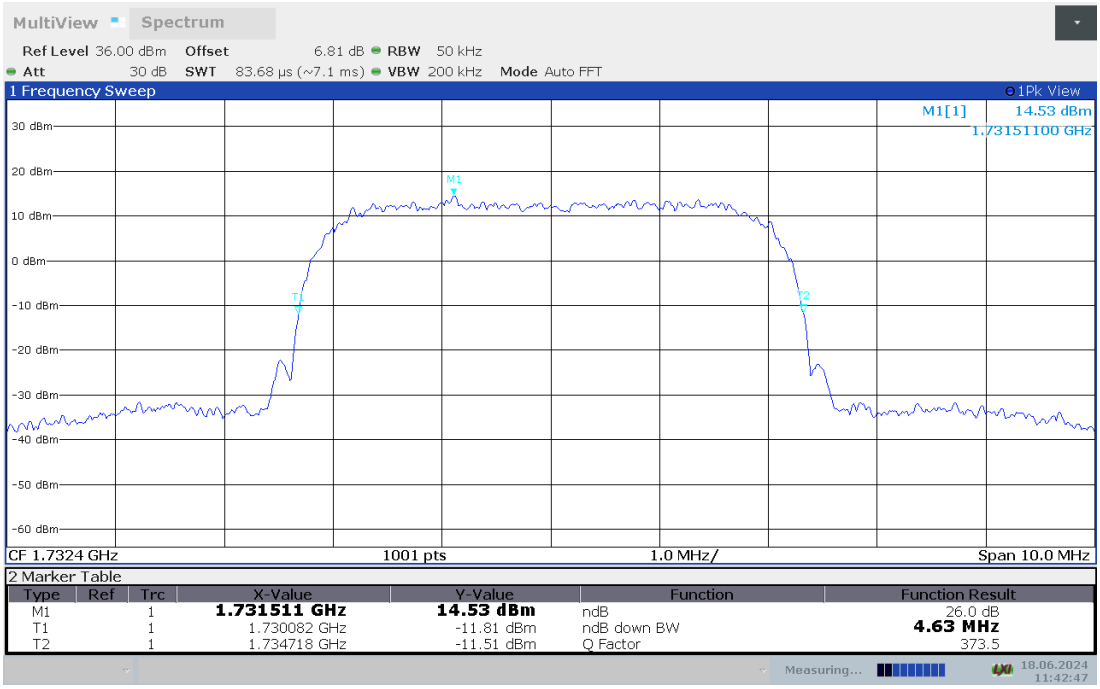
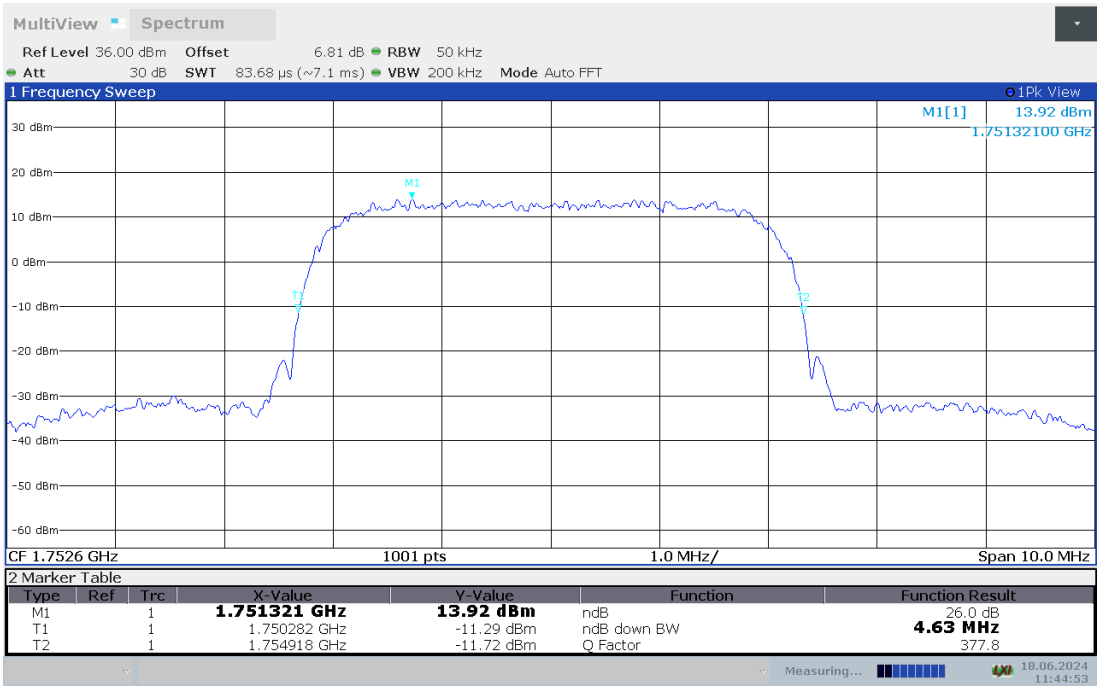
Channel 1412-Emission Bandwidth (-26dBc BW)



Channel 1513-Emission Bandwidth (-26dBc BW)



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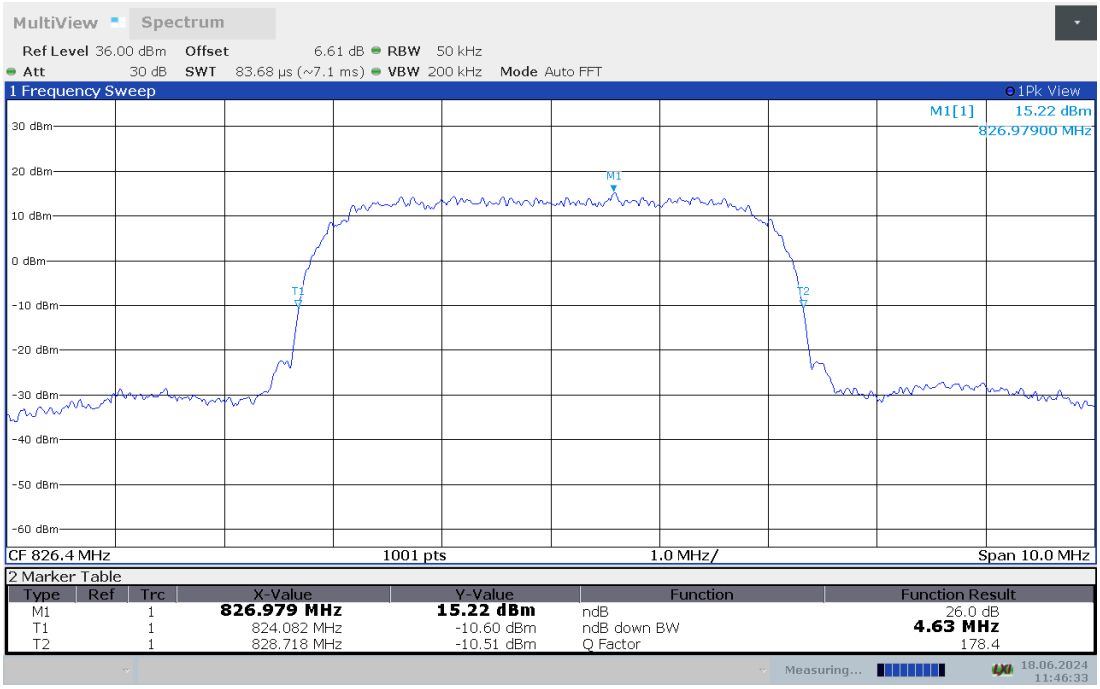
WCDMA Band V (-26dBc BW)-QPSK

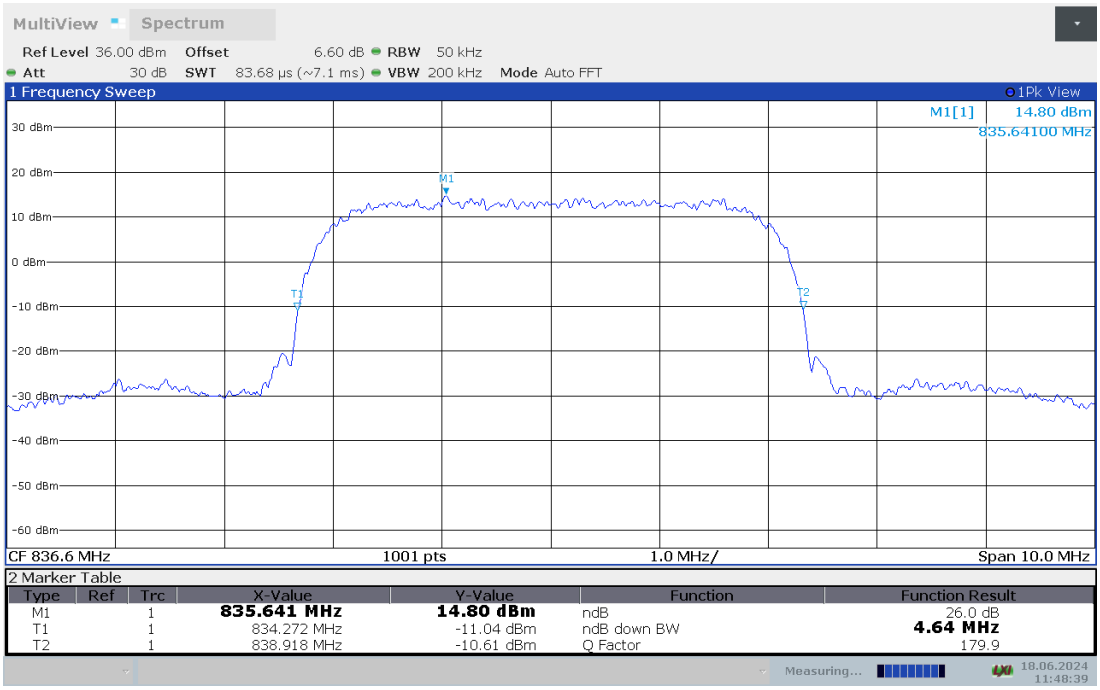
Frequency (MHz)	Emission Bandwidth (-26dBc BW)(MHz)
826.4	4.635
836.6	4.645
846.6	4.625

WCDMA Band V (-26dBc BW)

Channel 4132-Emission Bandwidth (-26dBc BW)



Channel 4183-Emission Bandwidth (-26dBc BW)



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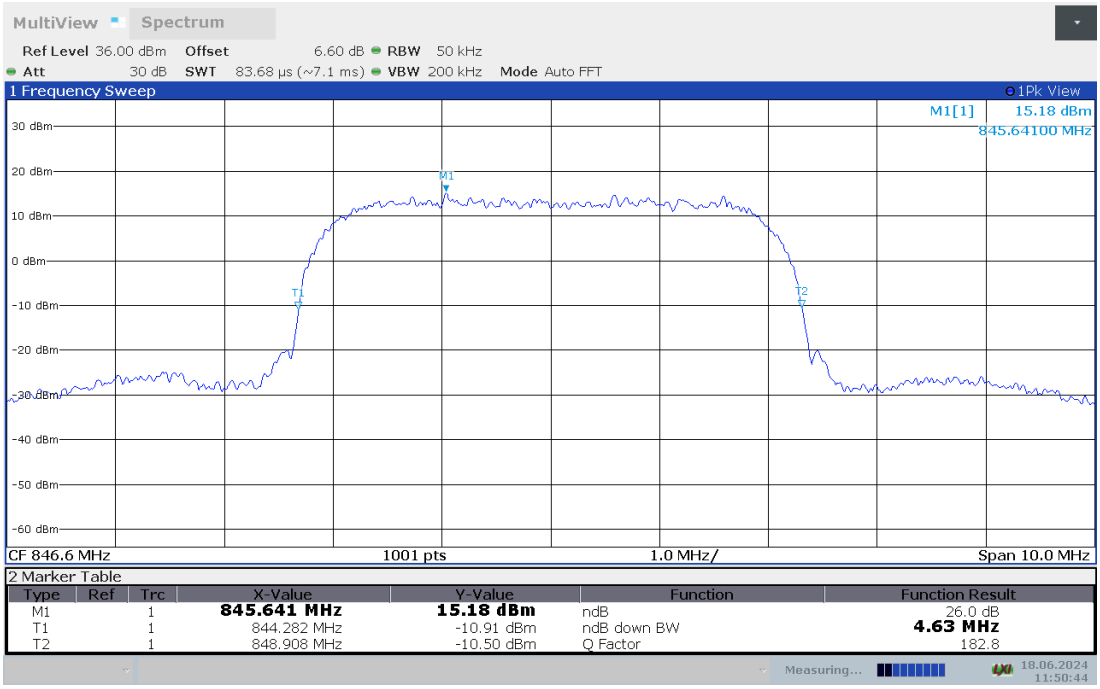
Channel 4233-Emission Bandwidth (-26dBc BW)

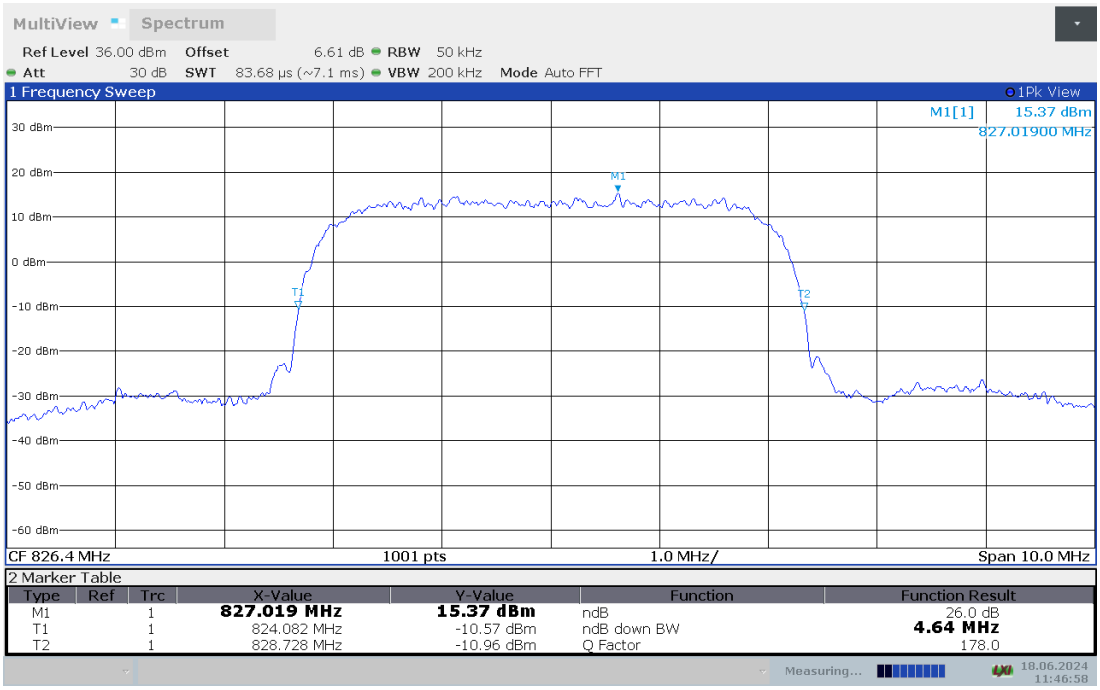


WCDMA Band V (-26dBc BW)-16QAM

Frequency (MHz)	Emission Bandwidth (-26dBc BW)(MHz)
826.4	4.645
836.6	4.625
846.6	4.625

WCDMA Band V (-26dBc BW)

Channel 4132-Emission Bandwidth (-26dBc BW)



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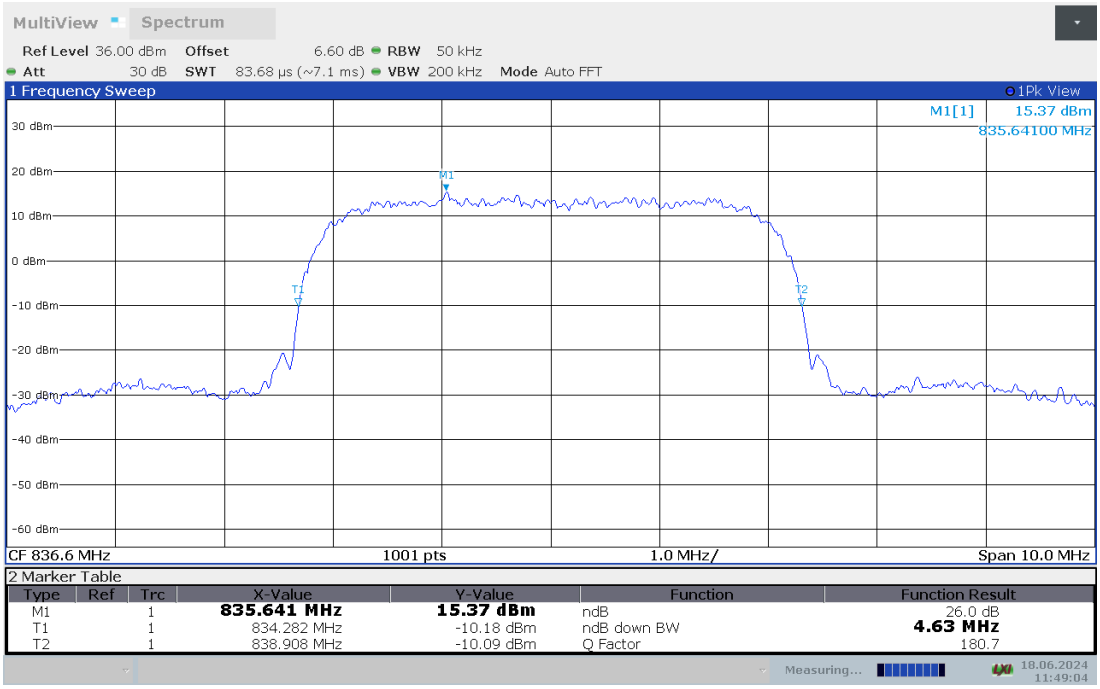
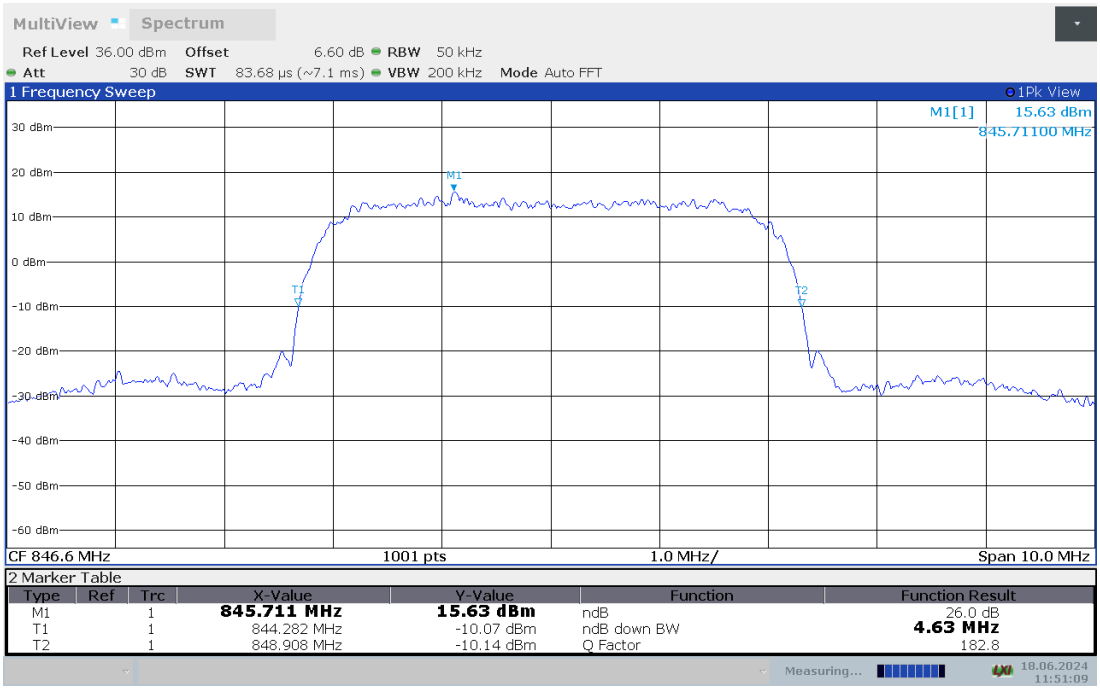
Channel 4183-Emission Bandwidth (-26dBc BW)



Channel 4233-Emission Bandwidth (-26dBc BW)



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

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A.6 BAND EDGE COMPLIANCE

Reference

FCC: CFR Part 2.1051, 22.917, 24.238, 27.53(h).

A.6.1 Measurement limit

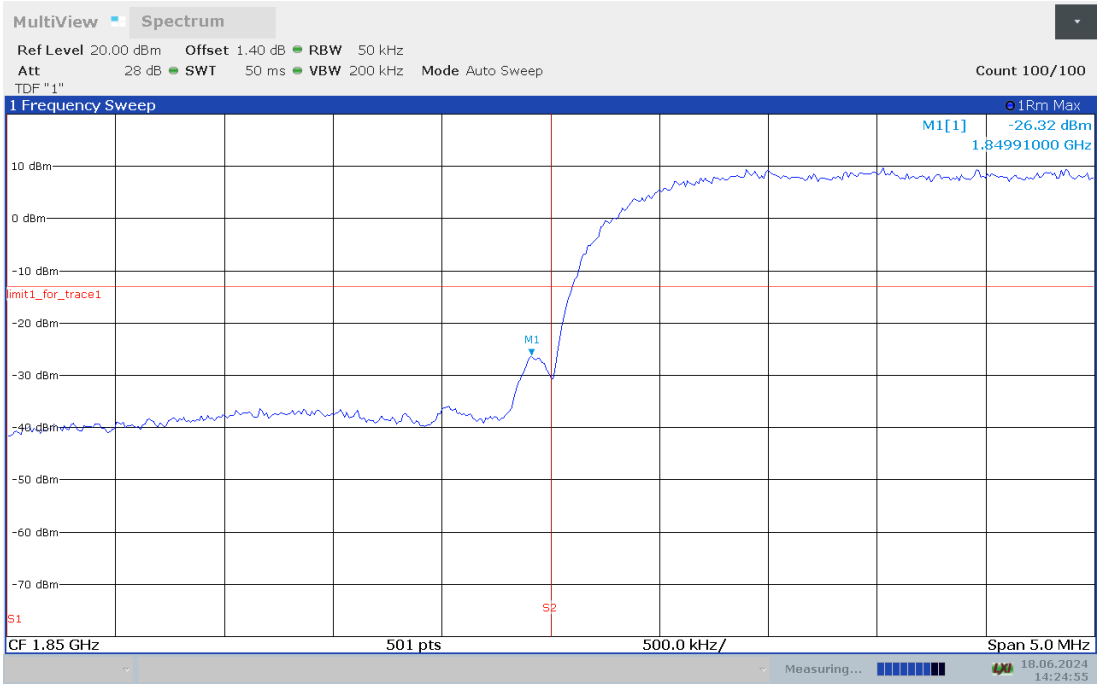
On any frequency outside frequency band of the US Cellular/PCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log (P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm. A relaxation of 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.

A.6.2 Measurement result

Only worst case result is given below

WCDMA Band II

LOW BAND EDGE BLOCK-A-Channel 9262



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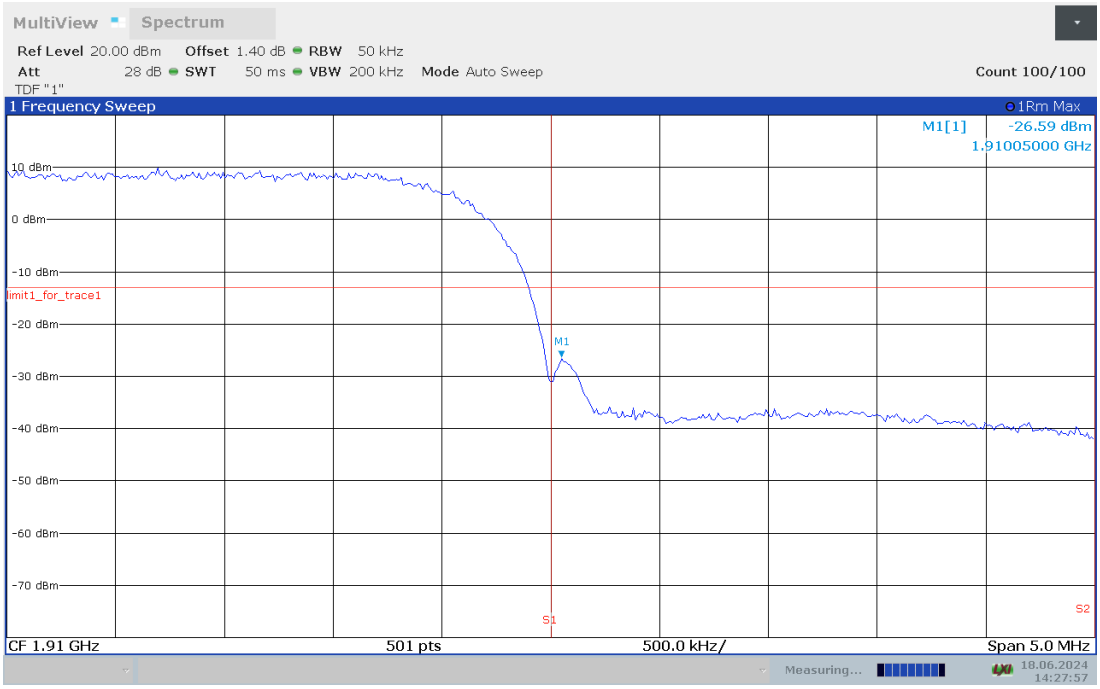
HIGH BAND EDGE BLOCK-C–Channel 9538



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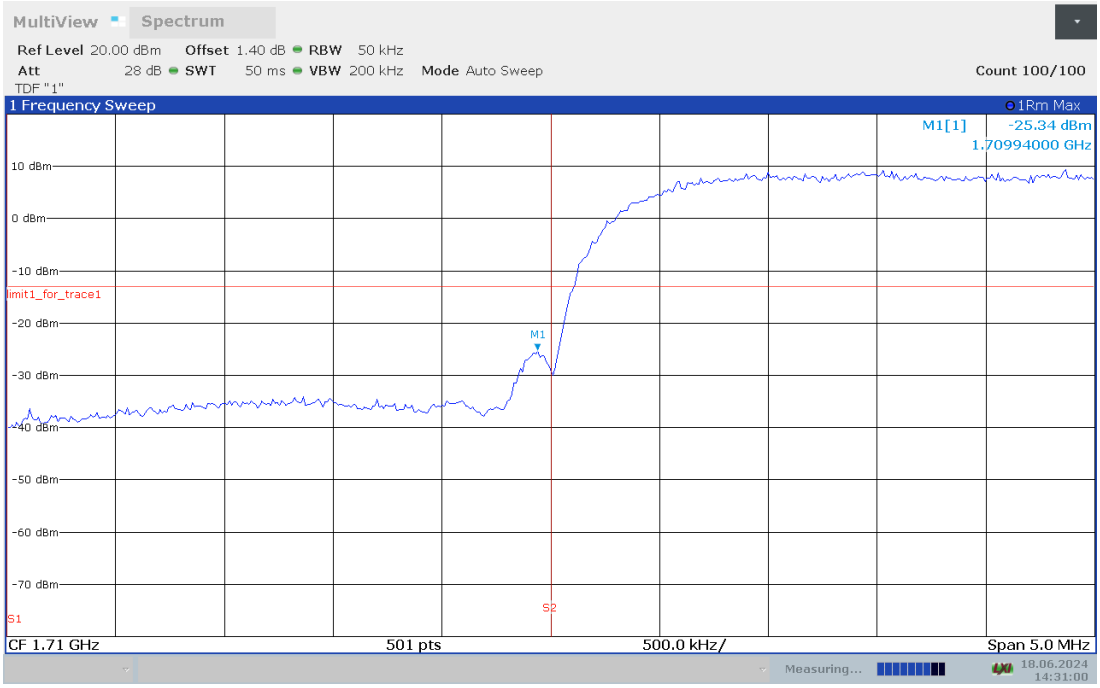
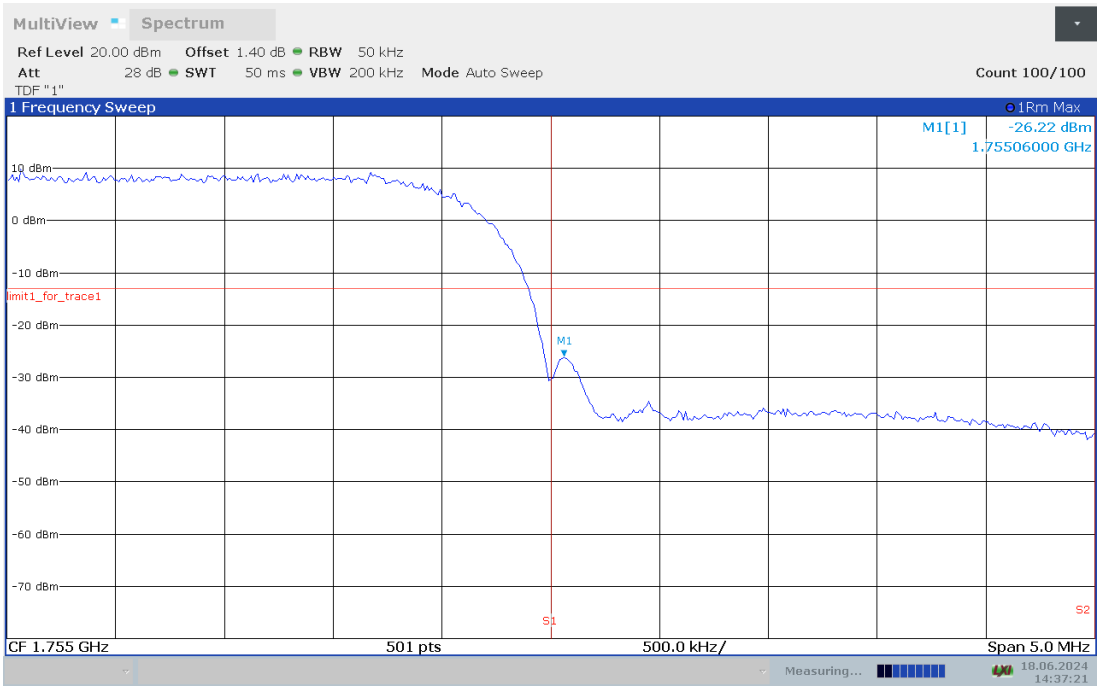
WCDMA Band IV

LOW BAND EDGE BLOCK-A -Channel 1312



HIGH BAND EDGE BLOCK-C–Channel 1513



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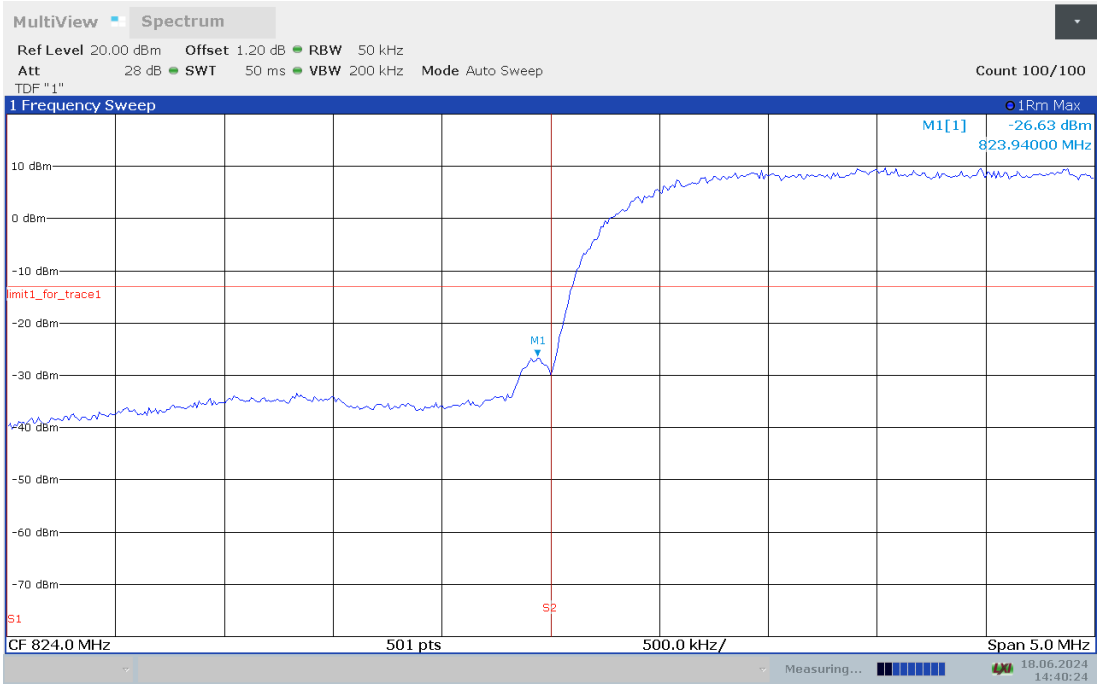
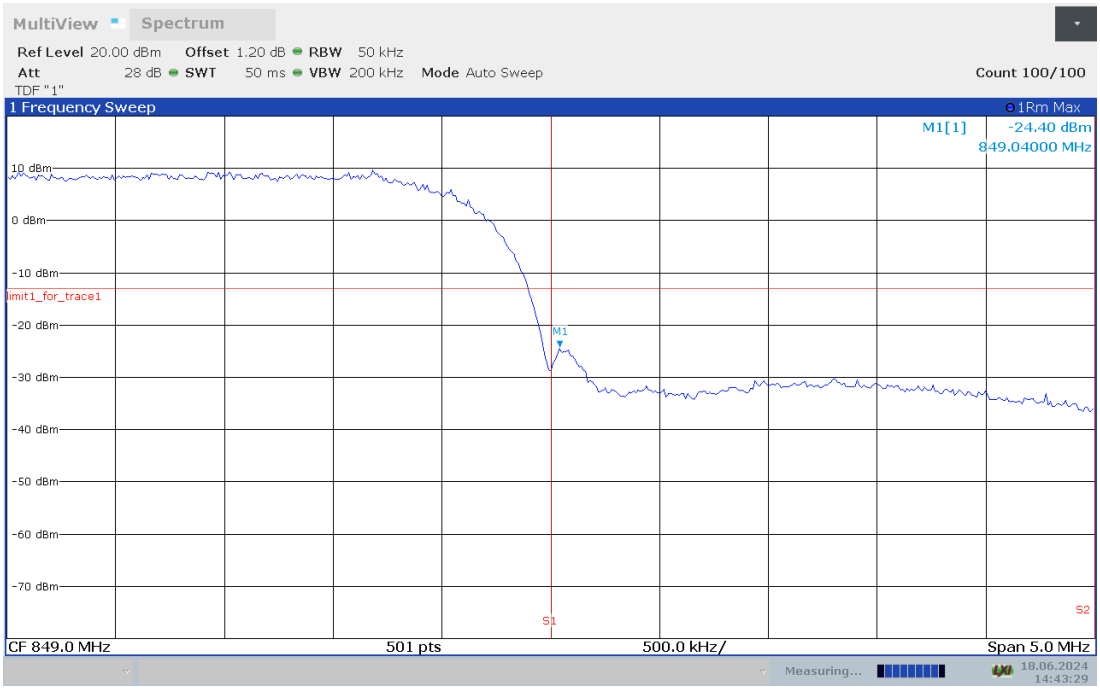
WCDMA Band Ⅴ

LOW BAND EDGE BLOCK-A-Channel 4132



HIGH BAND EDGE BLOCK-C–Channel 4233



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

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A.7 CONDUCTED SPURIOUS EMISSION

Reference

FCC: CFR Part 2.1051, 22.917, 24.238, 27.53(h).

A.7.1 Measurement Method

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

1. 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.

WCDMA Band Ⅱ Transmitter

Channel	Frequency (MHz)
9262	1852.4
9400	1880.0
9538	1907.6

WCDMA Band Ⅴ Transmitter

Channel	Frequency (MHz)
4132	826.4
4183	836.6
4233	846.6

WCDMA Band IV Transmitter

Channel	Frequency (MHz)
1312	1712.4
1412	1732.4
1513	1752.6

A.7.2 Measurement Limit

Part 24.238, Part 22.917 and Part 27.53(h) 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

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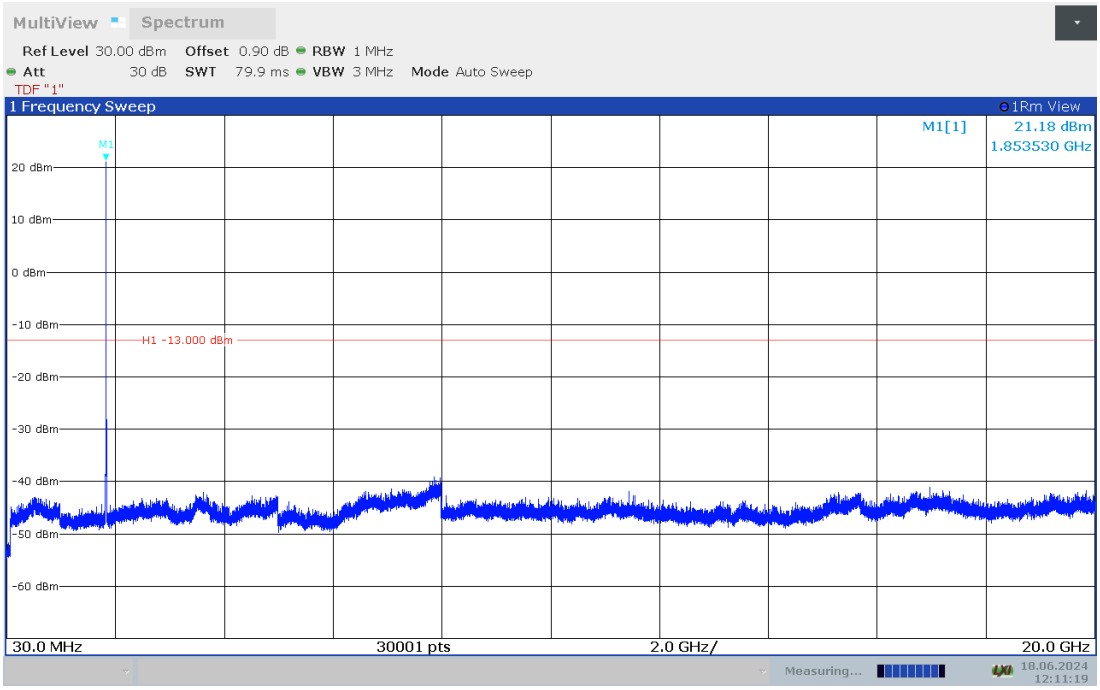
WCDMA Band II

Channel 9262: 30MHz –19.1GHz

Spurious emission limit –13dBm.

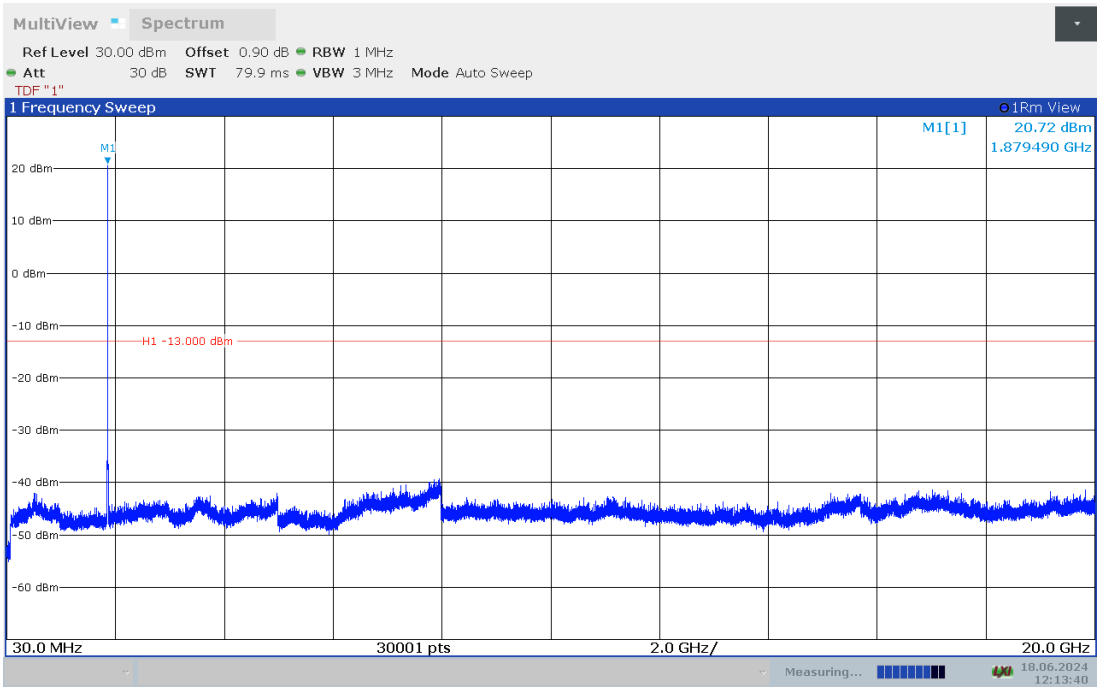
NOTE: peak above the limit line is the carrier frequency.



Channel 9400: 30MHz –19.1GHz

Spurious emission limit –13dBm.

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



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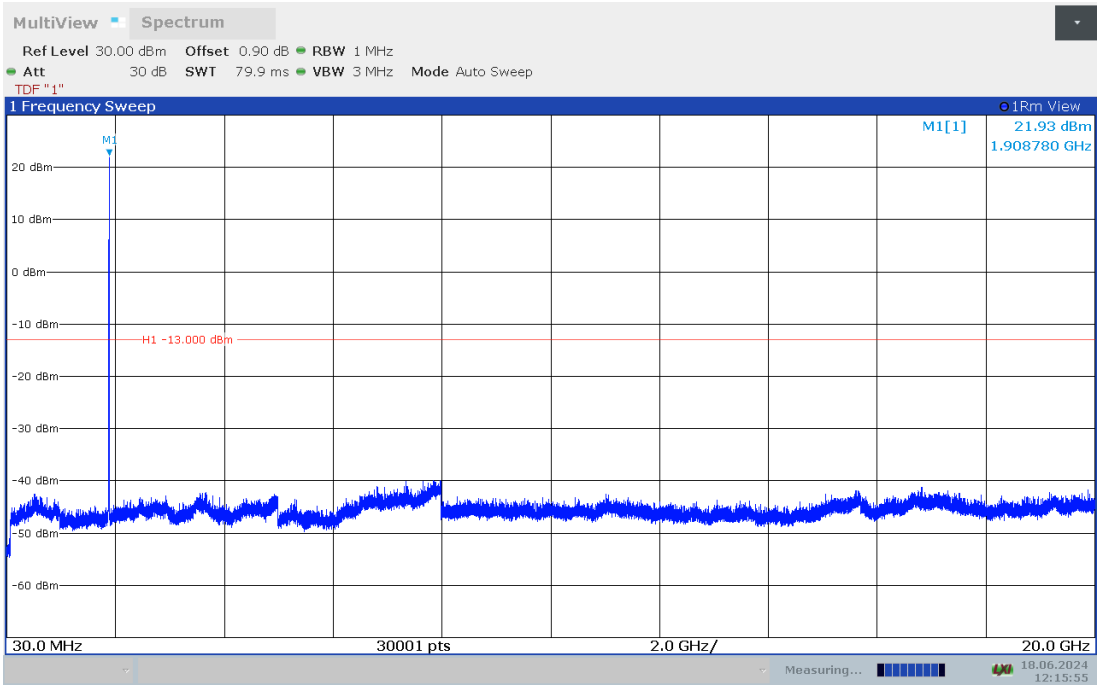
Channel 9538: 30MHz –19.1GHz

Spurious emission limit –13dBm.

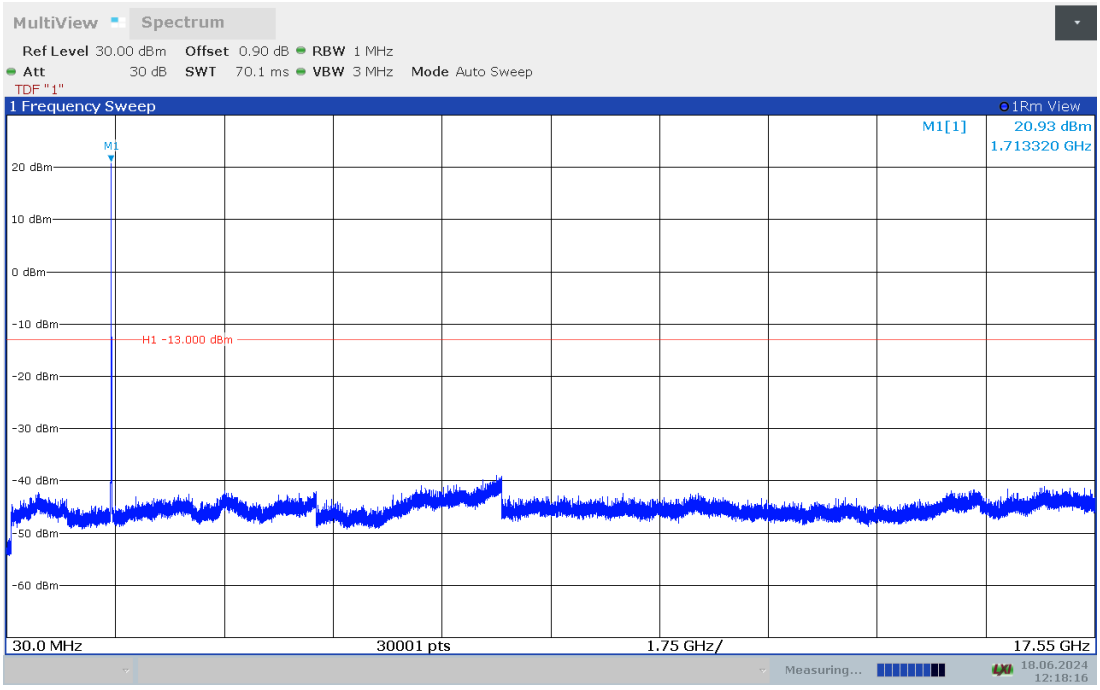
NOTE: peak above the limit line is the carrier frequency.



WCDMA Band IV

Channel 1312: 30MHz –17.55GHz

Spurious emission limit –13dBm.



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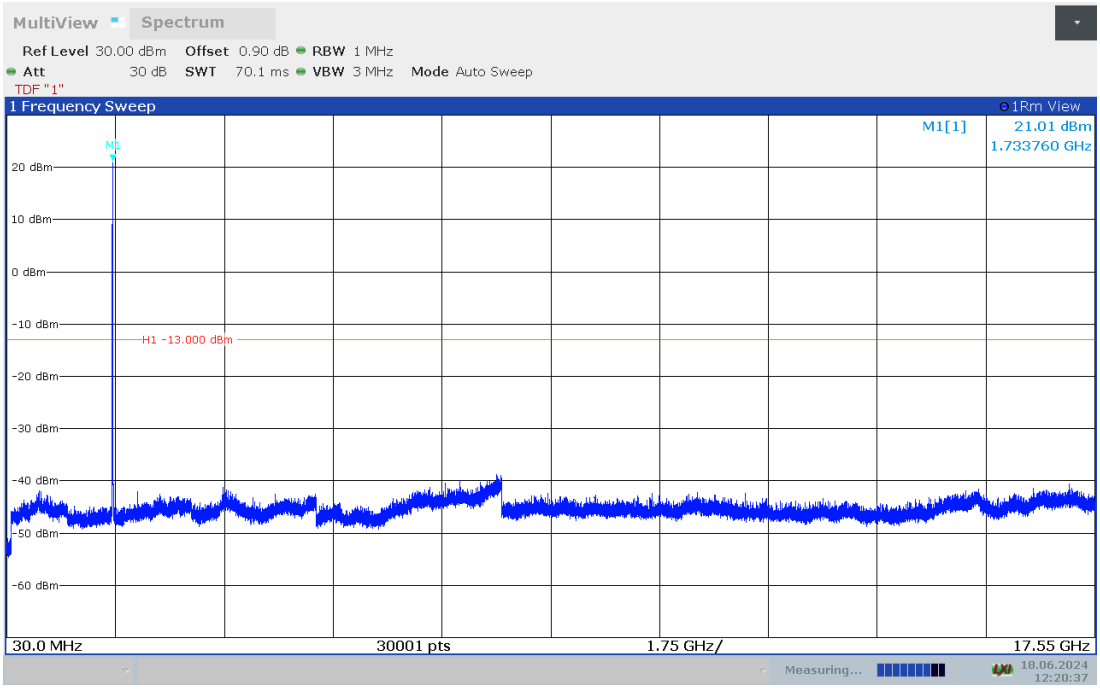
Channel 1412: 30MHz –17.55GHz

Spurious emission limit –13dBm.

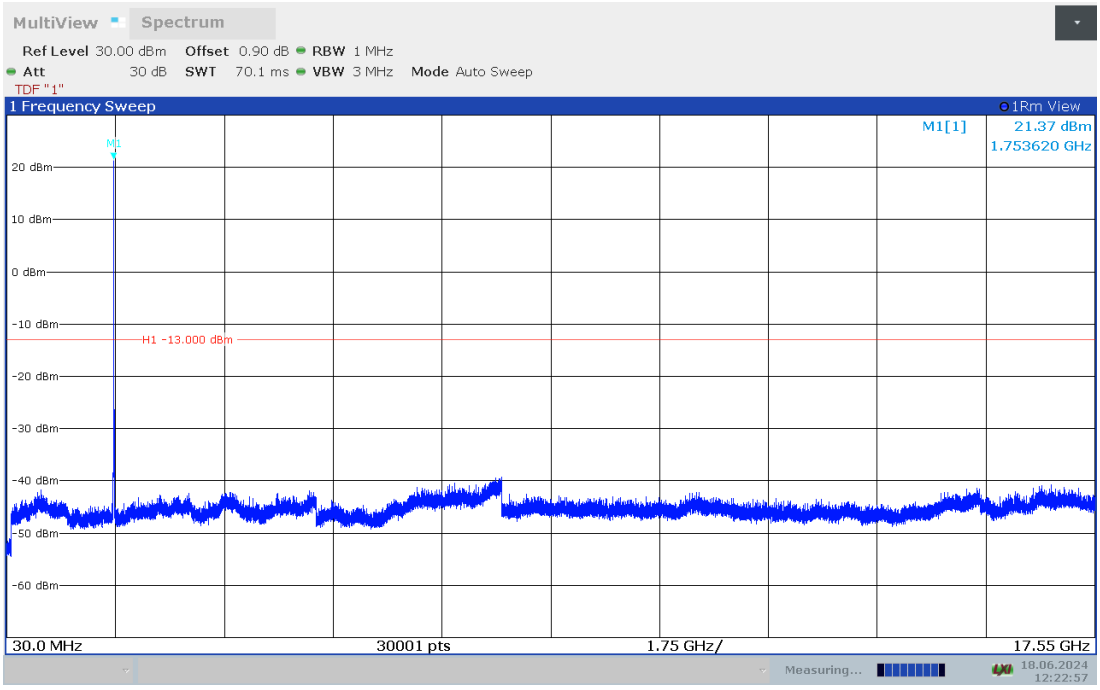
NOTE: peak above the limit line is the carrier frequency.



Channel 1513: 30MHz –17.55GHz

Spurious emission limit –13dBm.

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



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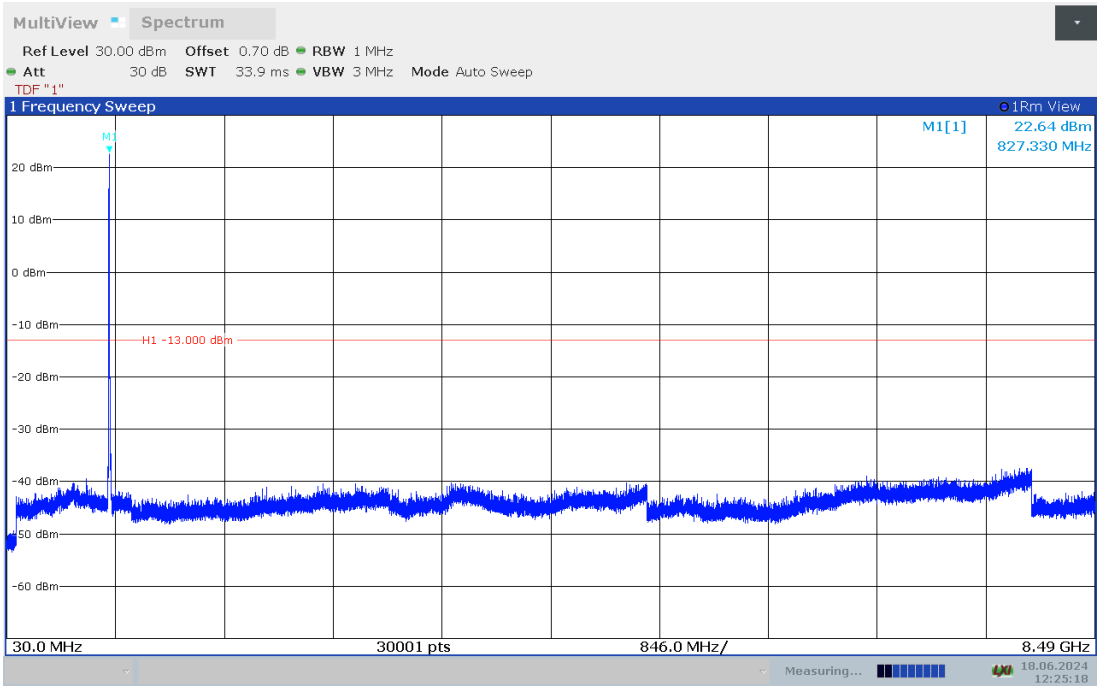
WCDMA Band Ⅴ

Channel 4132: 30MHz –8.49GHz

Spurious emission limit –13dBm.

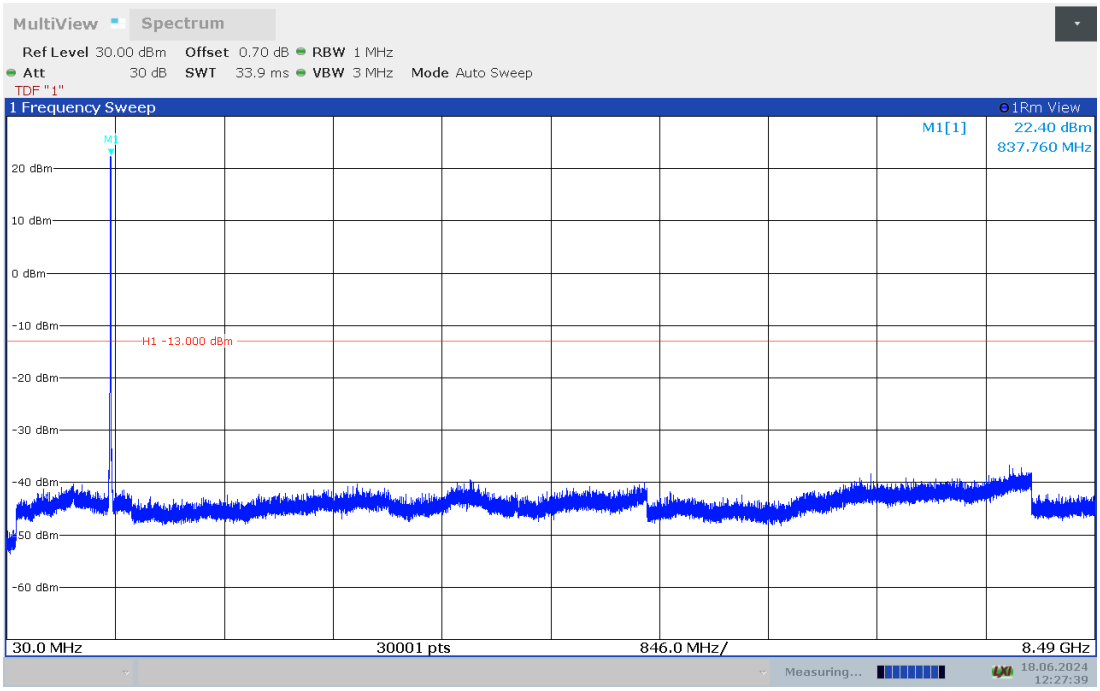
NOTE: peak above the limit line is the carrier frequency.



Channel 4183: 30MHz –8.49GHz

Spurious emission limit –13dBm.

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



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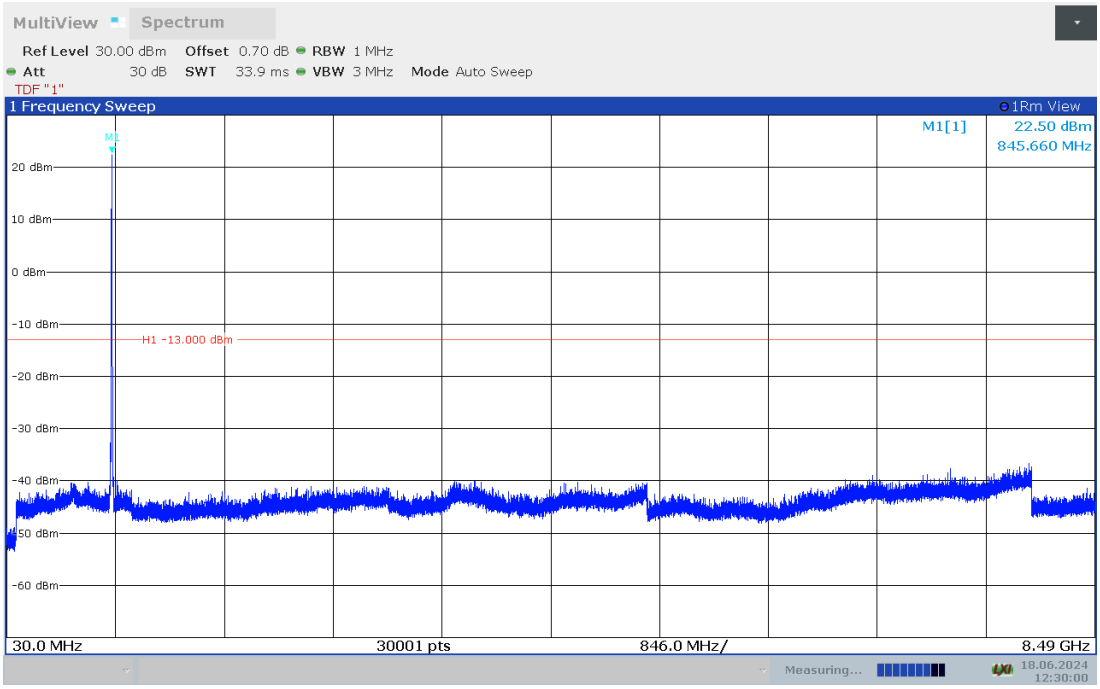
Channel 4233: 30MHz –8.49GHz

Spurious emission limit –13dBm.

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



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

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A.8 PEAK-TO-AVERAGE POWER RATIO

Reference

FCC: CFR Part 24.232, 27.50(d), 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 ≥ 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

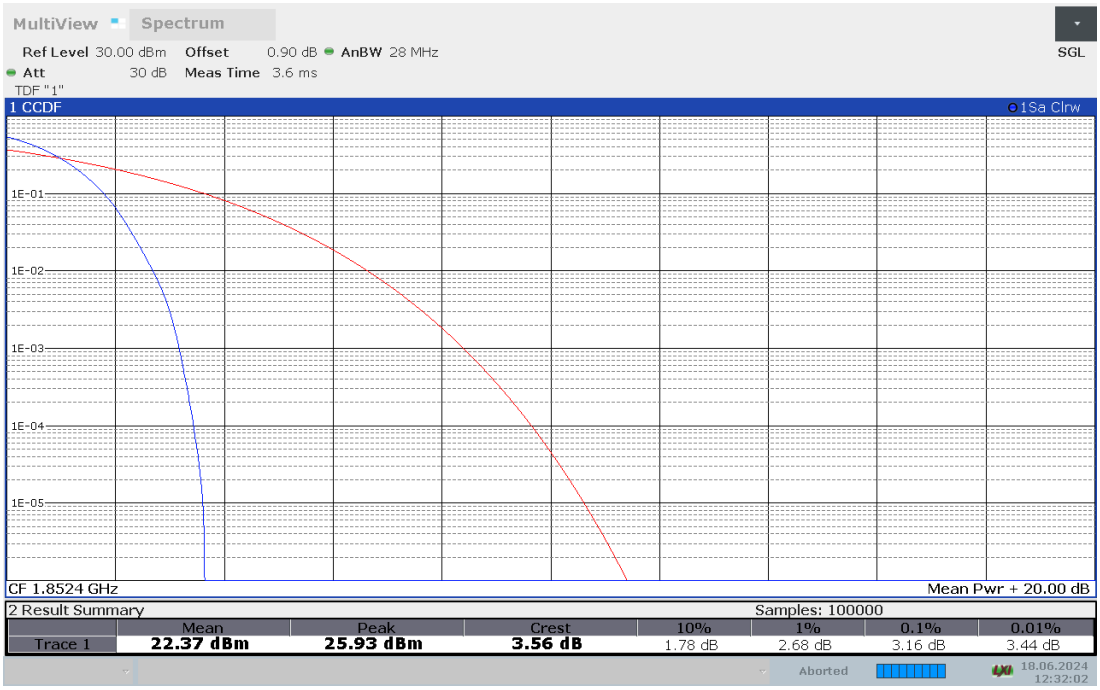
A.8.2 Measurement results

Only worst case result is given below

WCDMA Band II (PAPR)-QPSK

CH	Frequency (MHz)	PAPR (dB)
9262	1852.4	3.16
9400	1880	3.20
9538	1907.6	3.12

Channel 9262-1852.4MHz



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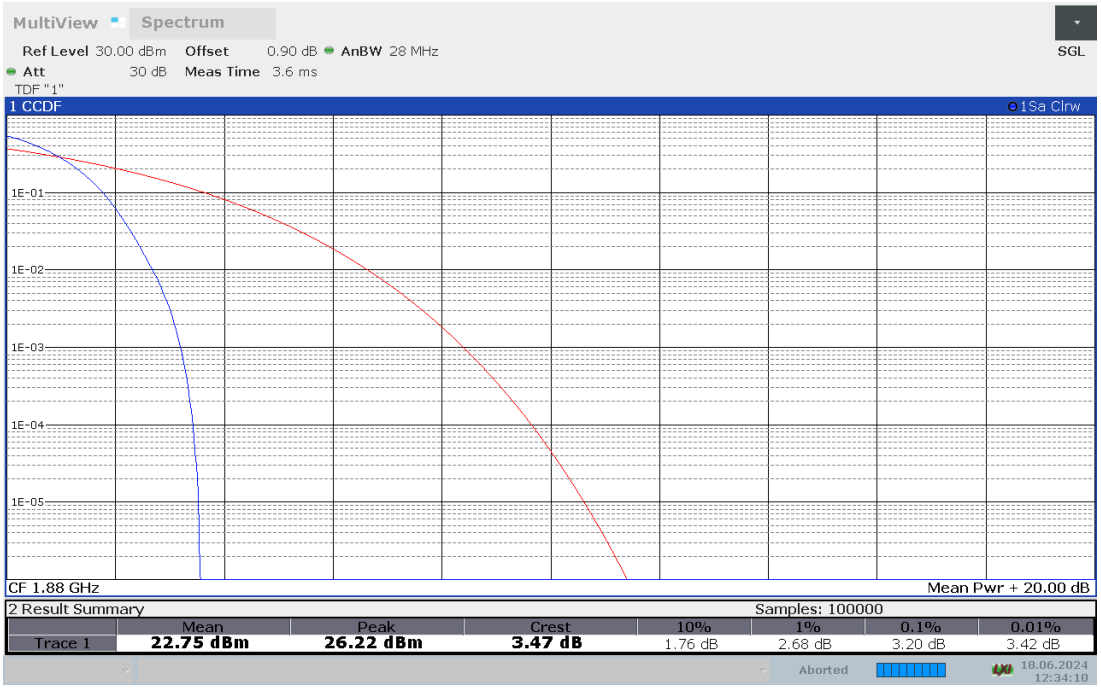
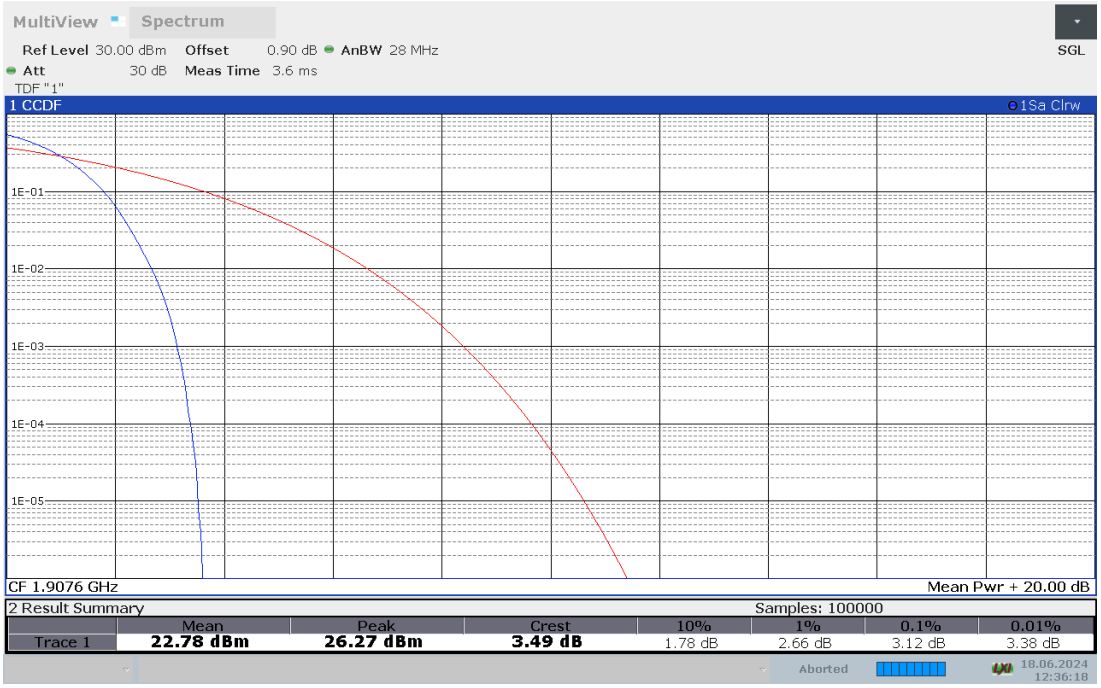
Channel 9400-1880MHz



Channel 9538-1907.6MHz



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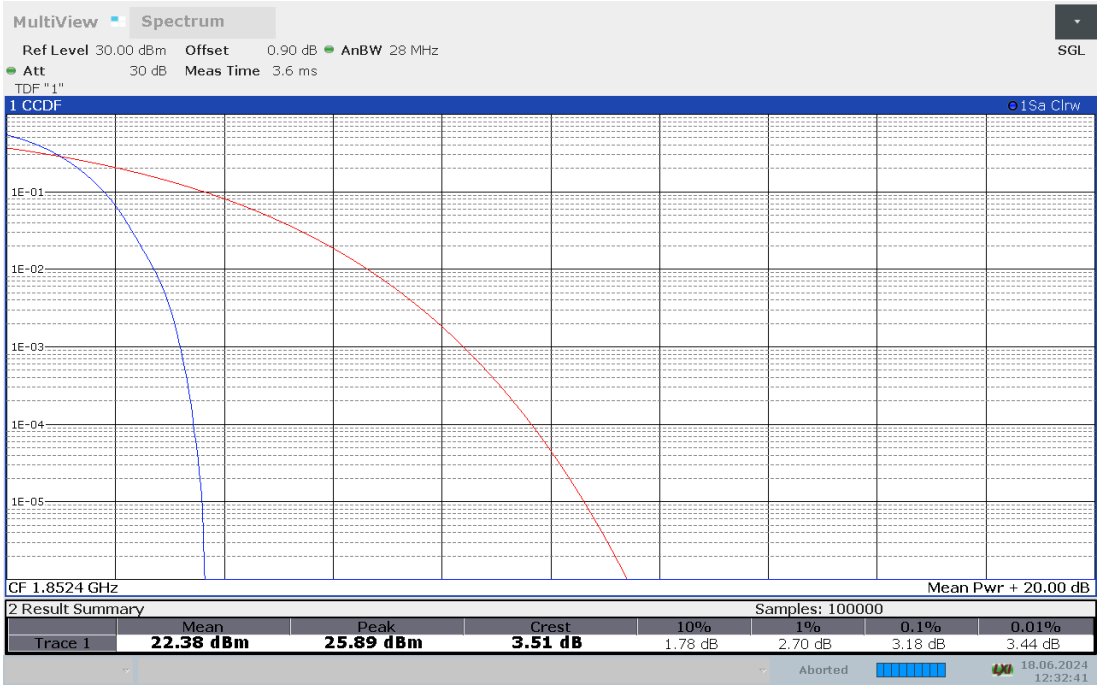
WCDMA Band II-16QAM

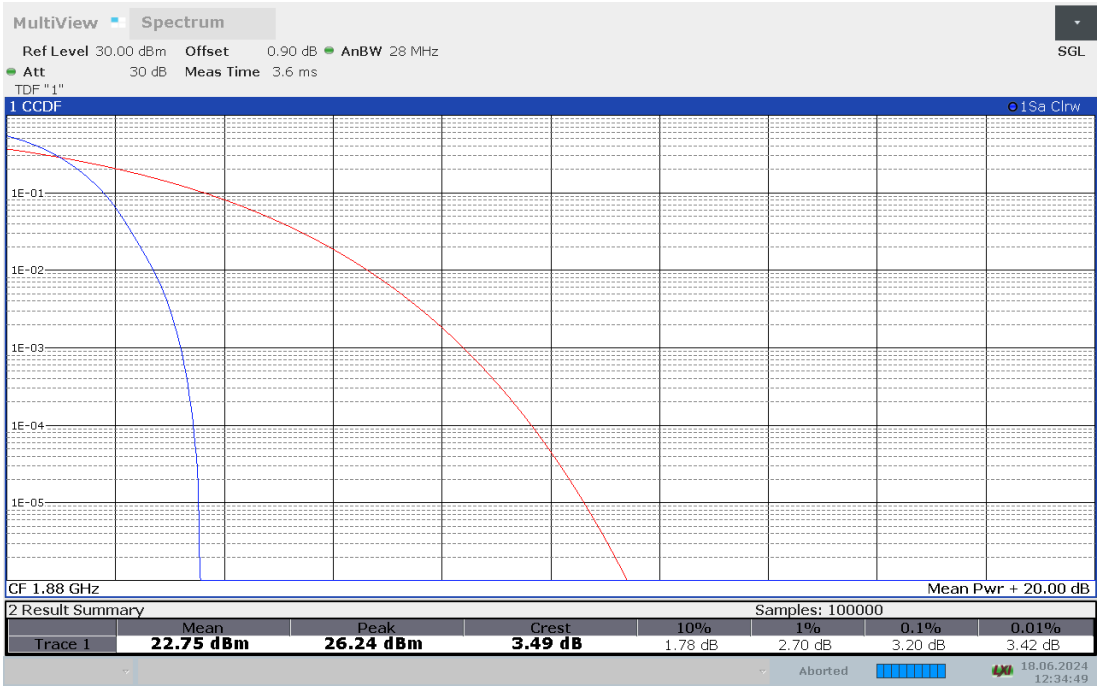
Measurement result

CH	Frequency (MHz)	PAPR (dB)
9262	1852.4	3.18
9400	1880	3.20
9538	1907.6	3.12

Channel 9262-1852.4MHz



Channel 9400-1880MHz



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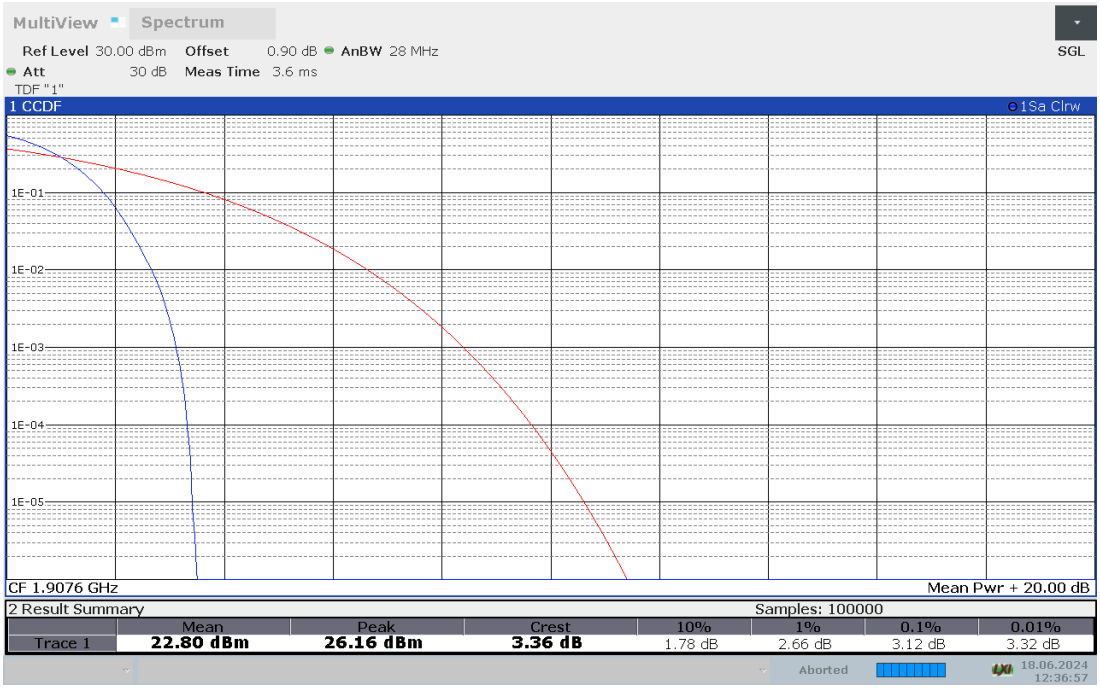
Channel 9538-1907.6MHz



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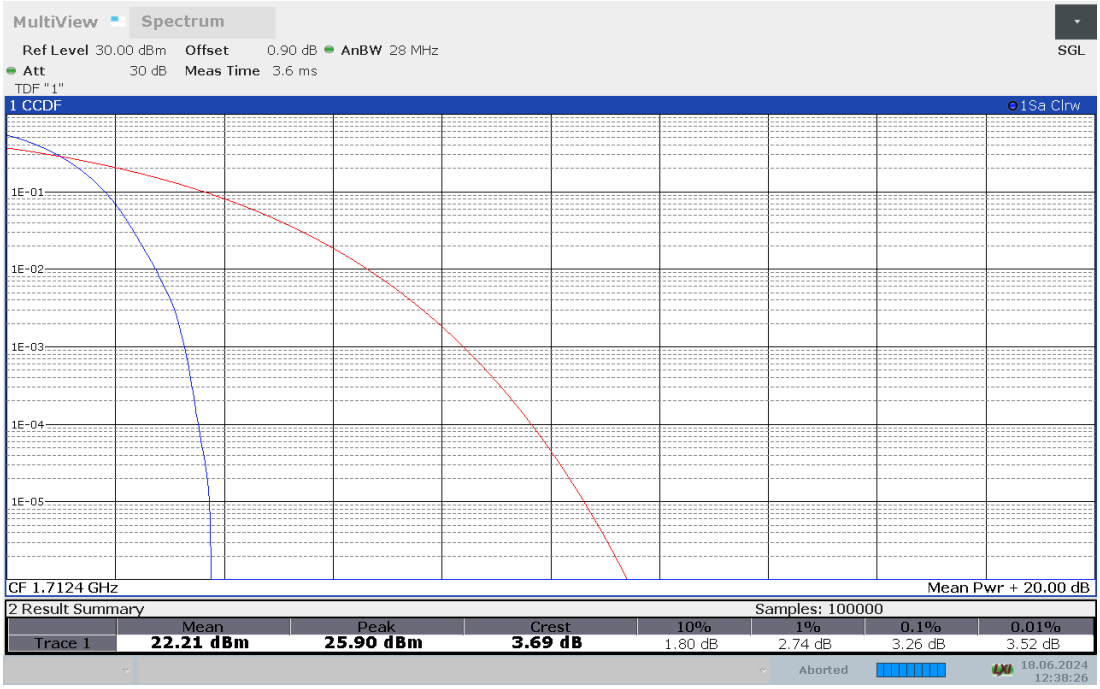
WCDMA Band IV-QPSK

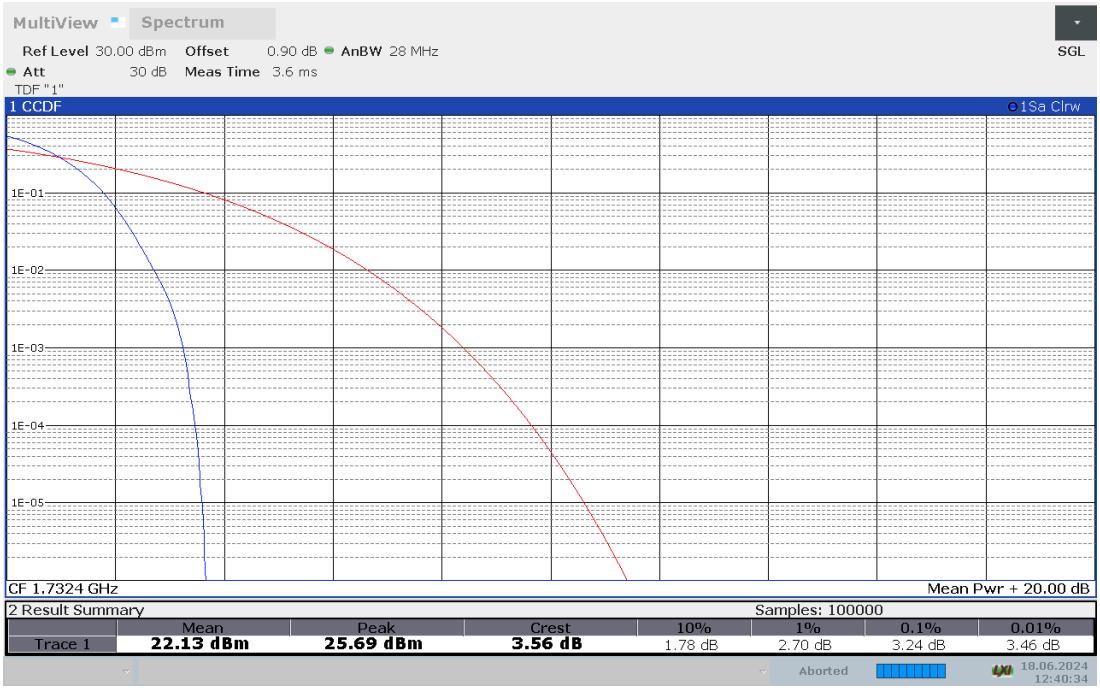
Measurement result

CH	Frequency (MHz)	PAPR (dB)
1312	1712.4	3.26
1412	1732.4	3.24
1513	1752.6	3.24

Channel 1312-1712.4MHz



Channel 1412-1732.4MHz



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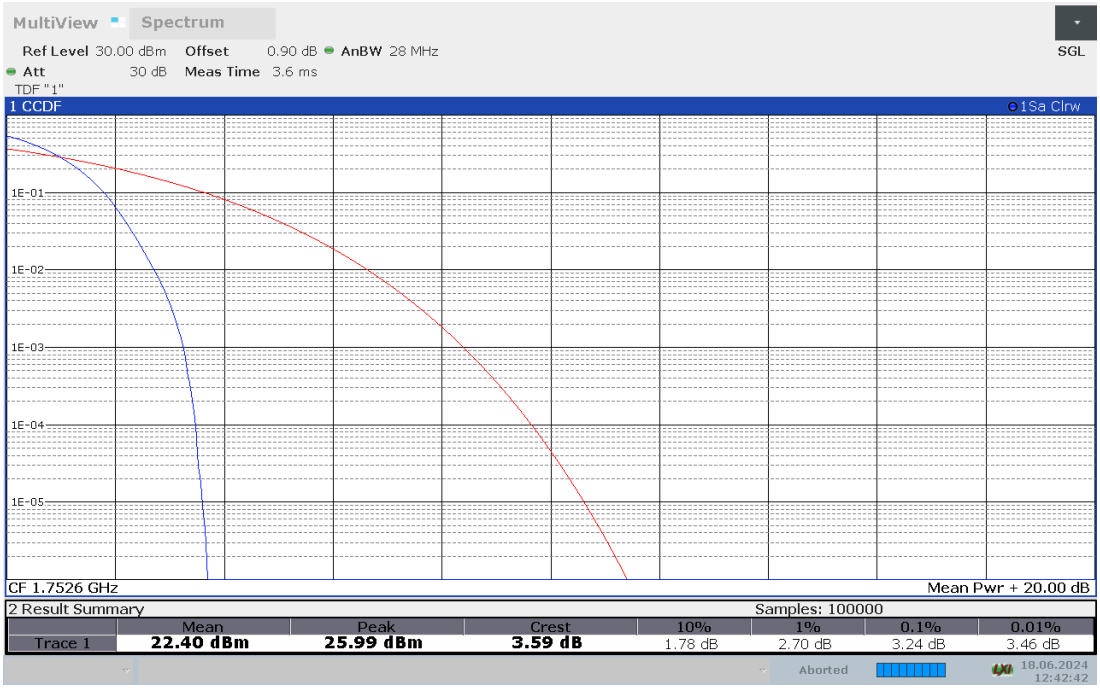
Channel 1513-1752.6MHz



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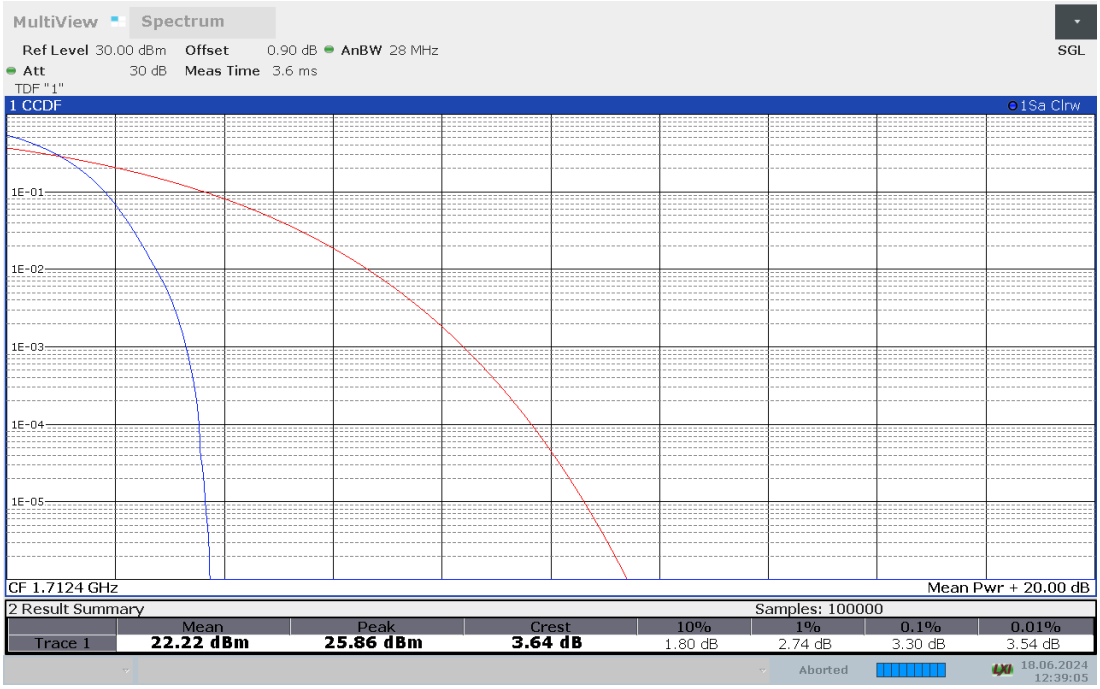
WCDMA Band IV-16QAM

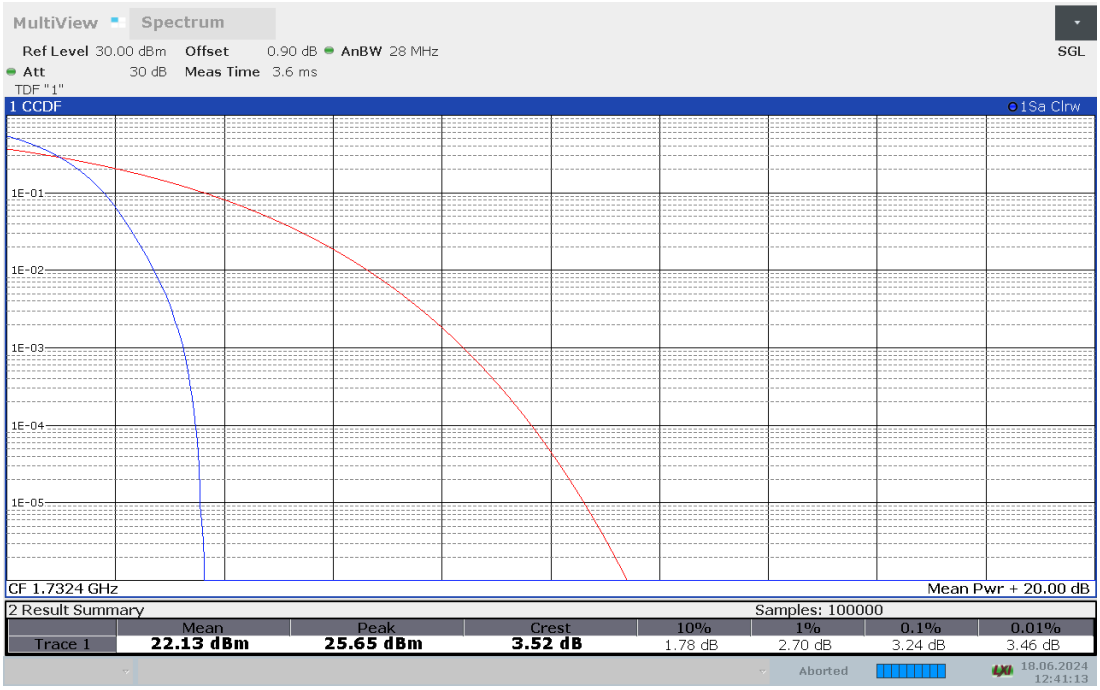
Measurement result

CH	Frequency (MHz)	PAPR (dB)
1312	1712.4	3.30
1412	1732.4	3.24
1513	1752.6	3.22

Channel 1312-1712.4MHz



Channel 1412-1732.4MHz



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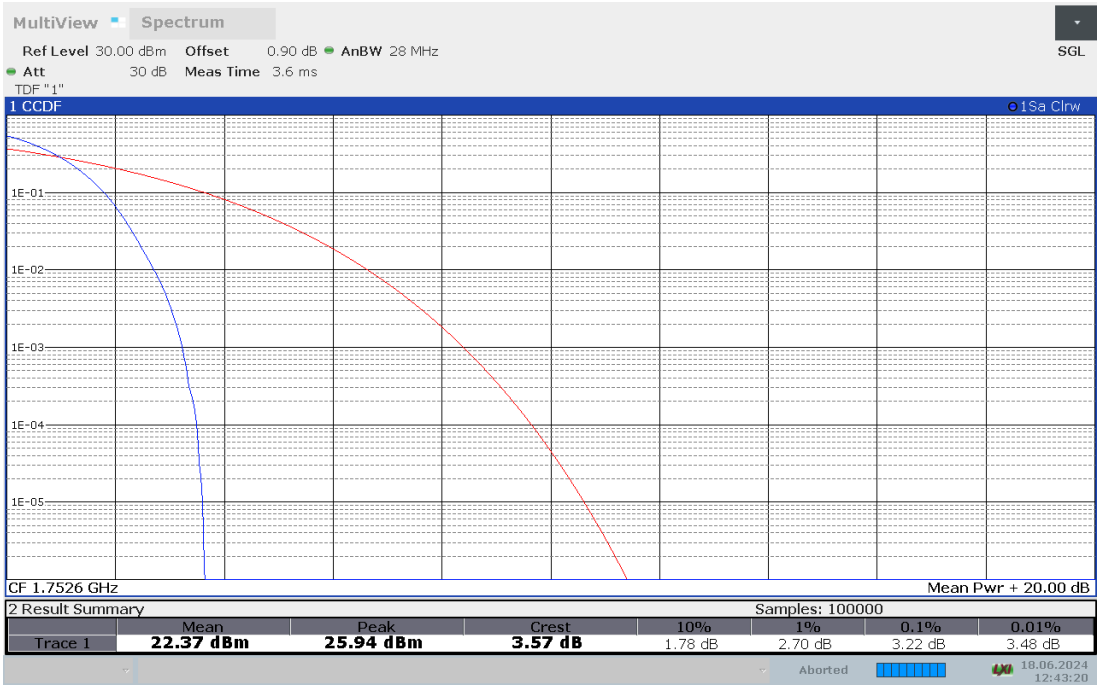
Channel 1513-1752.6MHz



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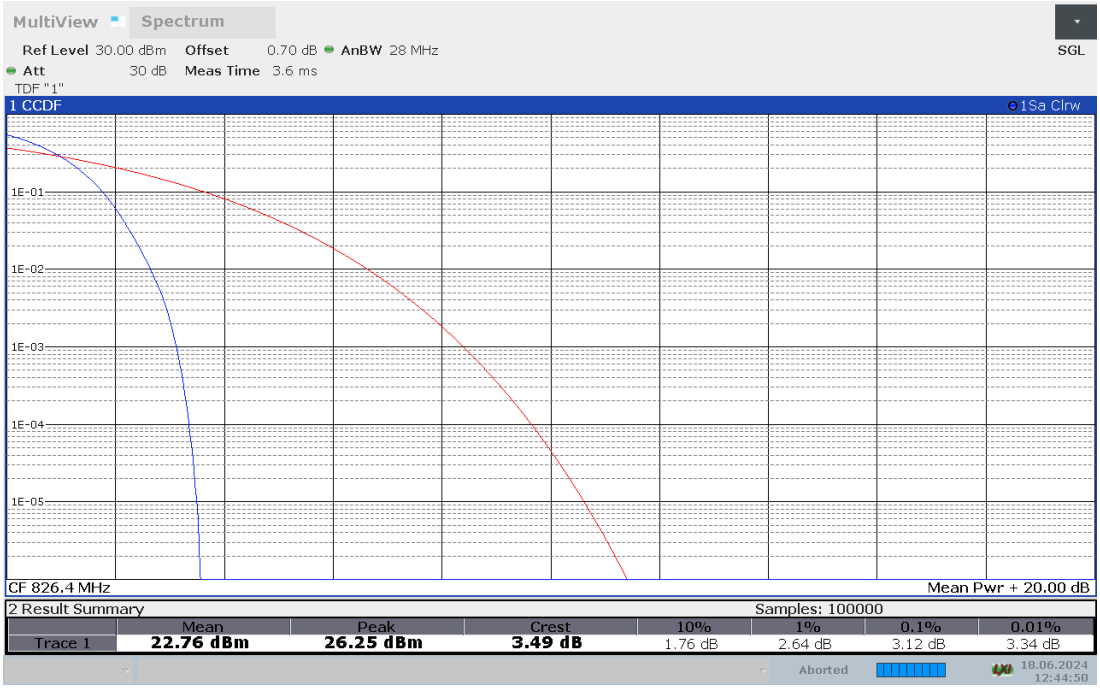
WCDMA Band V-QPSK

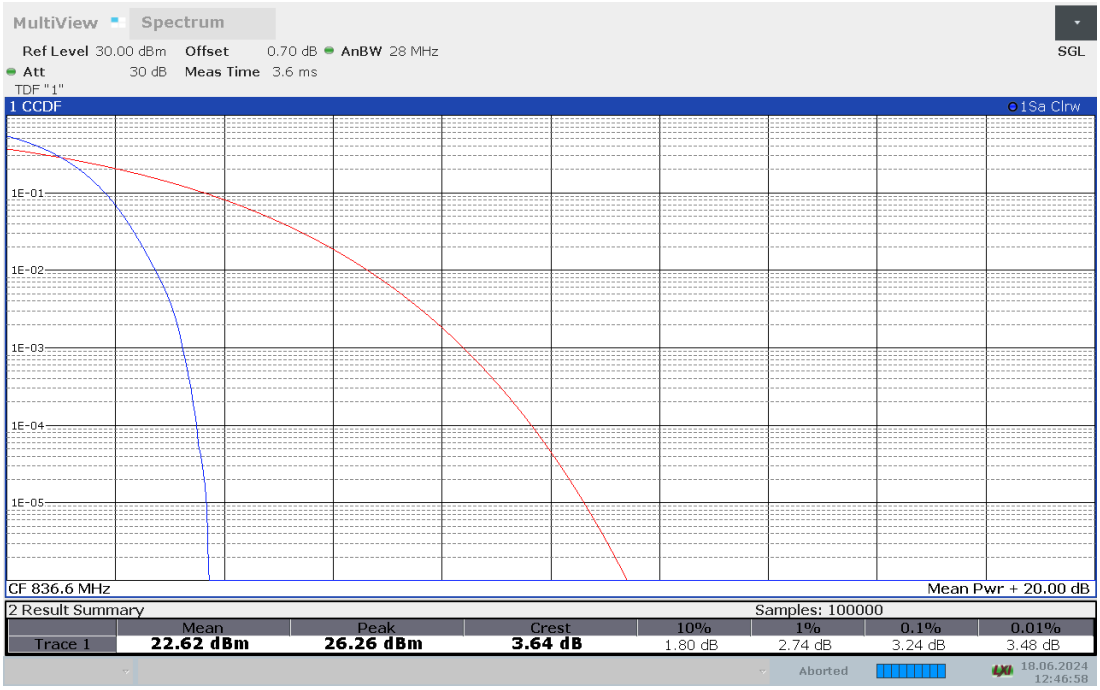
Measurement result

CH	Frequency (MHz)	PAPR (dB)
4132	826.4	3.12
4183	836.6	3.24
4233	846.6	3.20

Channel 4132-826.4MHz



Channel 4183-836.6MHz



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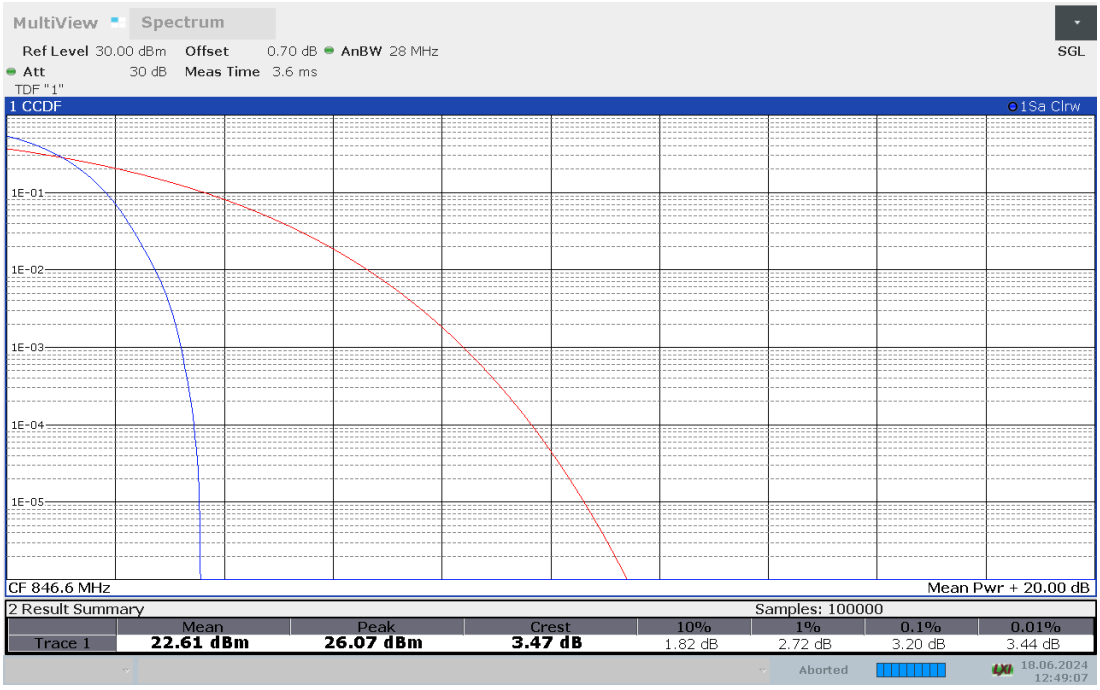
Channel 4233-846.6MHz



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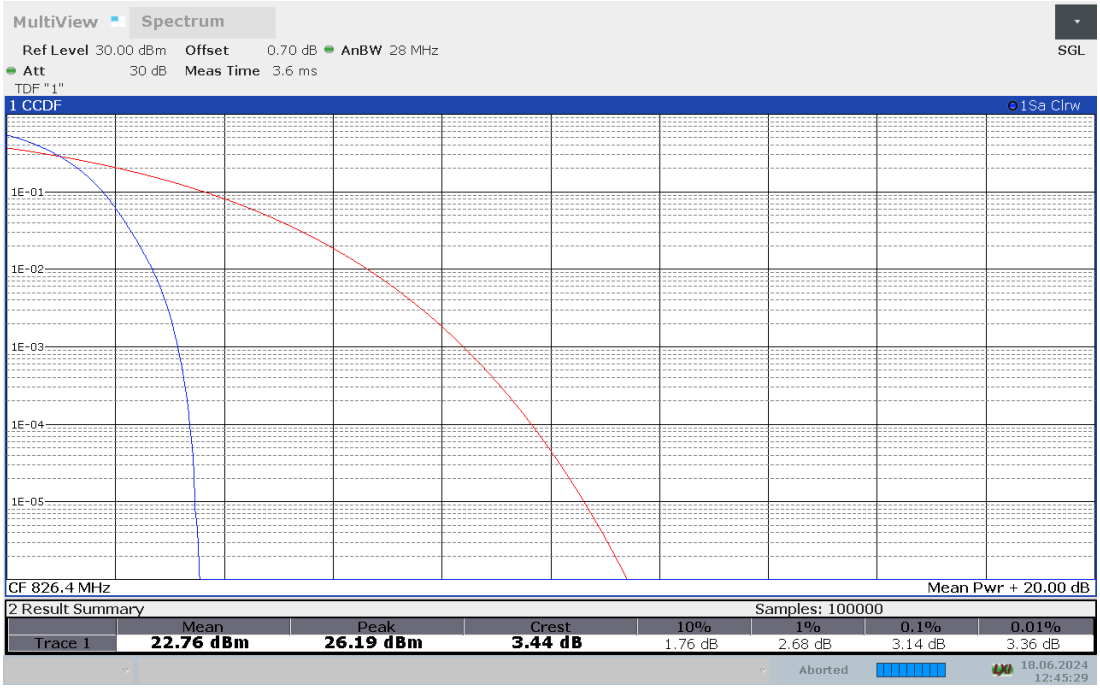
WCDMA Band V-16QAM

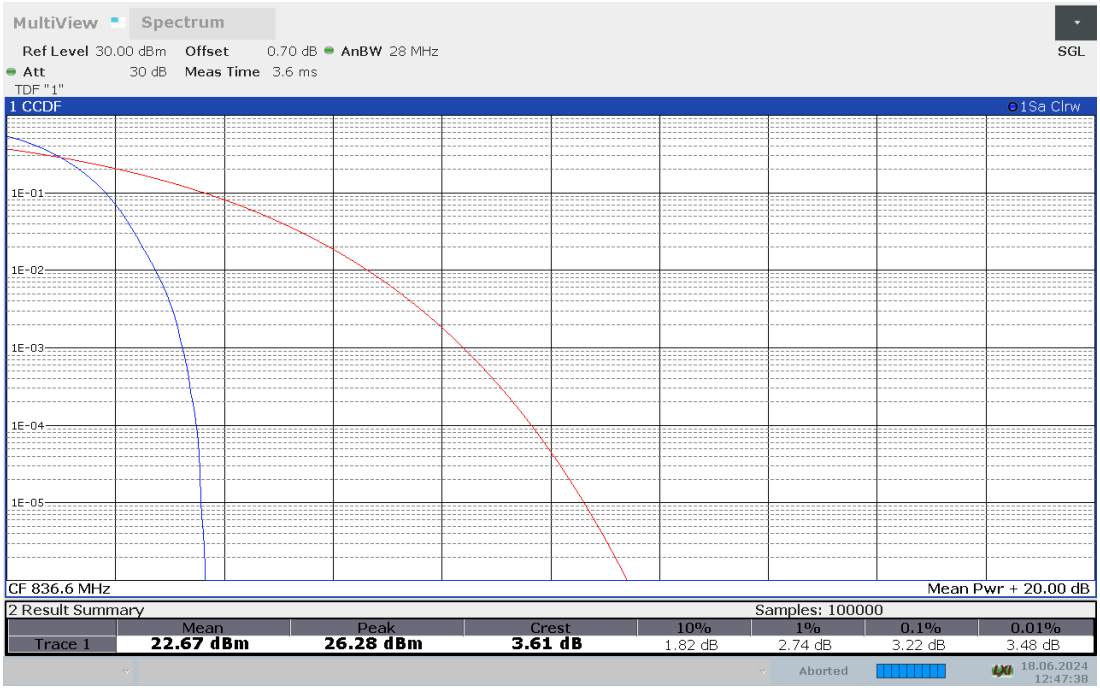
Measurement result

CH	Frequency (MHz)	PAPR (dB)
4132	826.4	3.14
4183	836.6	3.22
4233	846.6	3.24

Channel 4132-826.4MHz



Channel 4183-836.6MHz



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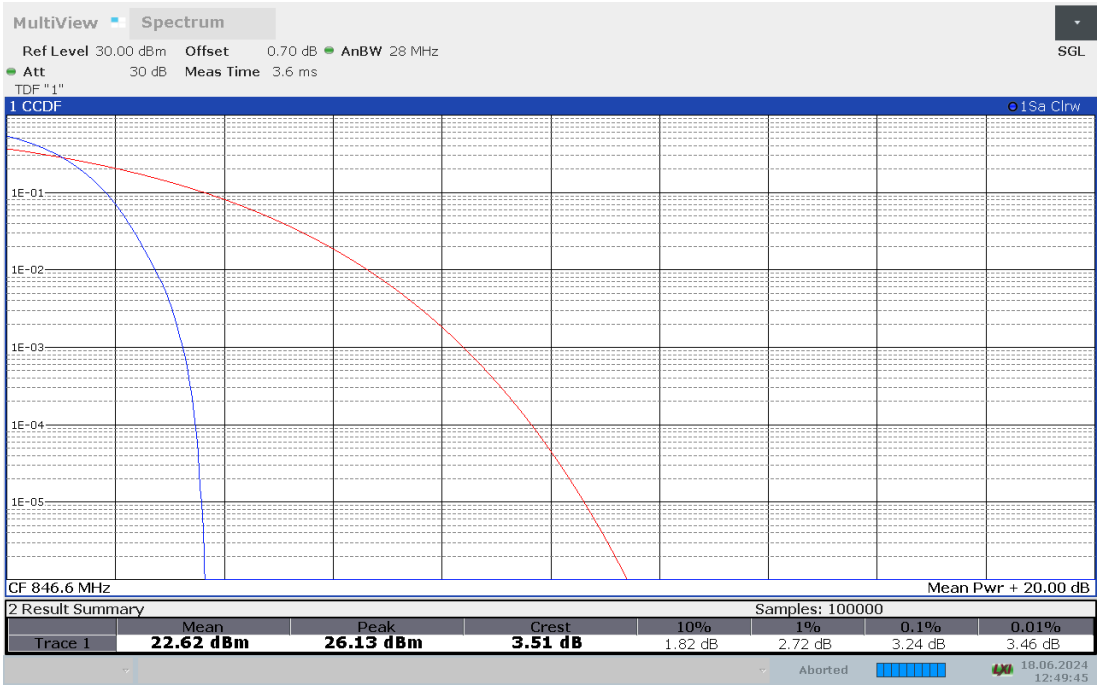
Channel 4233-846.6MHz



Note: Expanded measurement uncertainty is U = 0.48 dB, k = 2

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ANNEX B: Accreditation Certificate

Accredited Laboratory

A2LA has accredited

SHENZHEN ACADEMY OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

Shenzhen, 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 14th day of November 2023.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4353.01
Valid to November 30, 2025

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

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ANNEX C: Certificate of Brand Authorization

编号 No.：CTTL-001

TTL泰爾實驗室

品牌授权书

Certificate of Brand Authorization

兹授权 **深圳信息通信研究院** 为“泰尔实验室”品牌实验室，可以使用“泰尔实验室”品牌开展检验检测相关业务，本授权书有效期至 **2024** 年 **10** 月 **31** 日。

This is to certify that **Shenzhen Academy of Information and Communications Technology** is authorized as the brand laboratory of “CTTL”, which may undertake inspection and testing related business using the “CTTL” brand. This certificate is valid for the period to **31 October 2024**.

“泰尔实验室”品牌是属于中国信息通信研究院所有的检验检测品牌，为了维护良好的品牌形象，不断提高品牌的价值，被授权机构必须严格遵照《“泰尔实验室”品牌管理手册》要求开展相关业务活动。

The brand “CTTL” is the inspection and testing brand owned by China Academy of Information and Communication Technology. In order to maintain a good brand image, and continuously improve the brand value, the authorized institutions must strictly comply with the requirements of *"CTTL" brand management manual* to carry out relevant business activities.

授权单位：中国信息通信研究院

China Academy of Information and Communication Technology（CAICT）

授权日期：2019 年 10 月 30 日

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