WCDMA TEST REPORT

No. 25T04Z200151-012

for

Samsung Electronics Co., Ltd.

Multi-band GSM/WCDMA/LTE Tablet with Bluetooth,WLAN

Model Name: SM-X135G

FCC ID: ZCASMX135G

with

Hardware Version: REV1.0

Software Version: X135G.001

Issued Date: 2025-07-08

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 CTTL.

Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0)10-62304633-2512, Fax:+86(0)10-62304633-2504

Email: cttl_terminals@caict.ac.cn, website: www.caict.ac.cn

©Copyright. All rights reserved by CTTL.

REPORT HISTORY

Report Number	Revision	Description	Issue Date
25T04Z200151-012	Rev.0	1st edition	2025-07-08

Note: the latest revision of the test report supersedes all previous version.

©Copyright. All rights reserved by CTTL.

CONTENTS

1. TEST LABORATORY 4
1.1. INTRODUCTION & ACCREDITATION 4
1.2. TESTING LOCATION 4
1.3. TESTING ENVIRONMENT 4
1.4. PROJECT DATA 4
1.5. SIGNATURE 4
2. CLIENT INFORMATION 5
2.1. APPLICANT INFORMATION 5
2.2. MANUFACTURER INFORMATION 5
3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) 6
3.1. ABOUT EUT 6
3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST 6
3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST 6
4. REFERENCE DOCUMENTS 7
4.1. DOCUMENTS SUPPLIED BY APPLICANT 7
4.2. REFERENCE DOCUMENTS FOR TESTING 7
5. SUMMARY OF TEST RESULT 8
6. TEST EQUIPMENT UTILIZED 10
7. MEASUREMENT UNCERTAINTY 11
ANNEX A: MEASUREMENT RESULTS 12
A.1 OUTPUT POWER 12
A.2 EMISSION LIMIT 18
A.3 FREQUENCY STABILITY 24
A.4 OCCUPIED BANDWIDTH 27
A.5 EMISSION BANDWIDTH 40
A.6 BAND EDGE COMPLIANCE 53
A.7 CONDUCTED SPURIOUS EMISSION 57
A.8 PEAK-TO-AVERAGE POWER RATIO 66
ANNEX B: ACCREDITATION CERTIFICATE 67

©Copyright. All rights reserved by CTTL.

1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under American Association for Laboratory Accreditation (A2LA) with lab code 7049.01, and is also an FCC accredited test laboratory (CN1349), and ISED accredited test laboratory (CAB identifier:CN0066). The detail accreditation scope can be found on A2LA website.

1.2. Testing Location

Location 1: CTTL (huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191

Location 2: CTTL (BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology Development Area, Beijing, P. R. China 100176

1.3. Testing Environment

Normal Temperature: 15-35℃

Relative Humidity: 20-75%

1.4. Project Data

Testing Start Date: 2025-06-06

Testing End Date: 2025-07-07

1.5. Signature

Wang Xing

(Prepared this test report)

Zhou Yu

(Reviewed this test report)

Zhao Hui Lin

(Approved this test report)

©Copyright. All rights reserved by CTTL.

2. Client Information

2.1. Applicant Information

Company Name:	Samsung Electronics Co., Ltd.
Address /Post:	19 Chapin Rd.,Building D Pine Brook, NJ 07058
Contact:	Jenni Chun
Email:	j1.chun@samsung.com
Telephone:	+1-201-937-4203

2.2. Manufacturer Information

Company Name:	Samsung Electronics Co., Ltd.
Address /Post:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Republic of Korea
Contact:	Kobe Cho
Email:	ggobi.cho@samsung.com
Telephone:	+82-10-2722-4159

©Copyright. All rights reserved by CTTL.

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Multi-band GSM/WCDMA/LTE Tablet with Bluetooth,WLAN
Model Name	SM-X135G
FCC ID	ZCASMX135G
Antenna	Embedded
Output power	24.95dBm maximum EIRP measured for WCDMA Band II
Extreme Voltage	3.45VDC to 4.4VDC (nominal: 3.82VDC)
Extreme Temperature	-10°C to +55°C

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

3.2. Internal Identification of EUT used during the test

EUT ID*	SN	HW Version	SW Version	Date of receipt
UT10a	2504200151UT10a	REV1.0	X135G.001	2025-06-06
UT03a	2504200151UT03a	REV1.0	X135G.001	2025-06-06

UT03a was used for emission limit test and UT10a was used for other testing cases.
*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description
AE1	Battery
AE2	Battery

AE1

Model	HQ-3565S-OT9
Manufacturer	SCUD (FUJIAN) Electronics Co., Ltd.
Capacitance	5100mAh

AE2

Model	HQ-6739SDS
Manufacturer	SCUD (FUJIAN) Electronics Co., Ltd.
Capacitance	5100mAh

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

©Copyright. All rights reserved by CTTL.

4. Reference Documents

4.1. Documents supplied by applicant

EUT parameters are supplied by the customer, which are the bases of testing. CAICT is not responsible for the accuracy of customer supplied technical information that may affect the test results (for example, antenna gain and loss of customer supplied cable).

4.2. Reference Documents for testing

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

Reference	Title	Version
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	10-1-23 Edition
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-23 Edition
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-23 Edition
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
ANSI C63.26	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services	2015
KDB 971168 D01	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS	v03r01

©Copyright. All rights reserved by CTTL.

5. Summary of Test Result

WCDMA Band II

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	24.232	P
2	Emission Limit	2.1051/24.238	P
3	Frequency Stability	2.1055	P
4	Occupied Bandwidth	2.1049	P
5	Emission Bandwidth	24.238	P
6	Band Edge Compliance	24.238	P
7	Conducted Spurious Emission	24.238	P
8	Peak-to-Average Power Ratio	24.232	P

WCDMA Band V

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	22.913	P
2	Emission Limit	2.1051/22.917	P
3	Frequency Stability	2.1055	P
4	Occupied Bandwidth	2.1049	P
5	Emission Bandwidth	22.917	P
6	Band Edge Compliance	22.917	P
7	Conducted Spurious Emission	22.917	P

WCDMA Band IV

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50	P
2	Emission Limit	2.1051/27.53	P
3	Frequency Stability	2.1055	P
4	Occupied Bandwidth	2.1049	P
5	Emission Bandwidth	27.53	P
6	Band Edge Compliance	27.53	P
7	Conducted Spurious Emission	27.53	P
8	Peak-to-Average Power Ratio	27.50	P

©Copyright. All rights reserved by CTTL.

Terms used in Verdict column

P	Pass. The EUT complies with the essential requirements in the standard.
NP	Not Performed. The test was not performed by CTTL.
NA	Not Applicable. The test was not applicable.
BR	Re-use test data from basic model report.
F	Fail. The EUT does not comply with the essential requirements in the standard.

All the test results are based on normal power.

Measurement uncertainty is not taken into account when stating conformity with a specified requirement.

Explanation of worst-case configuration

The worst-case scenario for all measurements is based on the conducted output power measurement investigation results. Output power was measured on QPSK and 16QAM modulations. It was found that QPSK was the worst case. All testing was performed using QPSK modulations to represent the worst case unless otherwise stated. The test results shown in the following sections represent the worst case emission.

©Copyright. All rights reserved by CTTL.

6. Test Equipment Utilized

Description	Type	Series Number	Manufacture	Cal Due Date	Calibration Interval
Wideband Radio Communication Tester	CMW500	159082	R&S	2025-12-03	1 year
Spectrum Analyzer	FSV	101576	R&S	2026-05-05	1 year
Climate chamber	SH-241	92004642	ESPEC	2025-10-29	1 year
Test Receiver	ESW44	103144	R&S	2026-01-15	1 year
Antenna	VULB9163	9163-01223	Schwarzbeck	2025-09-11	1 year
Antenna	LB-7180-NF	2030013000041	A-INFO	2025-10-23	1 year
Antenna	LB-180400-25-C-KF	J211060826	A-INFO	2025-08-29	1 year
Antenna	9117	167	Schwarzbeck	2026-10-15	2 years
Antenna	3117	00119024	ETS-Lindgren	2025-10-23	1 year
Antenna	3116	2663	ETS-Lindgren	2026-03-03	1 year
Signal Generator	SMF100A	101295	R&S	2026-02-16	1 year
Power Amplifier	5S1G4	0341863	AR	/	/
Universal Radio Communication Tester	CMW500	143008	R&S	2026-01-15	1 year

Note: Only the latest Cal Due Dates of equipment are listed above and all equipment is in valid calibration period when used.

©Copyright. All rights reserved by CTTL.

7. Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.26. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. Measurement uncertainty is not taken into account when stating conformity with a specified requirement.

Test item		Measurement uncertainty
Output Power(dB)		1.17
Emission Limit(dB)		3.44
Frequency Stability	FE(ppm)	1.16
	F_LF_H(kHz)	6.10
Occupied Bandwidth(%)		0.35
Emission Bandwidth(%)		0.39
Band Edge Compliance(dB)		1.59
Conducted Spurious Emission(dB)		4.78
Peak-to-Average Power Ratio(dB)		1.44

©Copyright. All rights reserved by CTTL.

Annex A: Measurement Results

A.1 Output Power

A.1.1 Summary

During the process of testing, the EUT was controlled via communication tester to ensure max power transmission and proper modulation.

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 (bottom, middle and top of operational frequency range) for each bandwidth.

The results below include a correction factor for cable loss that is provided by the customer.

A.1.2.2 Measurement Result

WCDMA Band II

QPSK

	CH	Frequency (MHz)	output power (dBm)
WCDMA (Band II)	9262	1852.4	23.71
	9400	1880.0	23.61
	9538	1907.6	23.62

16QAM

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

WCDMA Band V

QPSK

	CH	Frequency (MHz)	output power (dBm)
WCDMA (Band V)	4132	826.4	23.93
	4183	836.6	23.76
	4233	846.6	23.70

16QAM

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

©Copyright. All rights reserved by CTTL.

WCDMA Band IV

QPSK

	CH	Frequency (MHz)	output power (dBm)
WCDMA (Band IV)	1312	1712.4	23.54
	1412	1732.4	23.60
	1513	1752.6	23.38

16QAM

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

©Copyright. All rights reserved by CTTL.

A.1.3 Radiated

A.1.3.1 Description

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

Part 22.913(a) specifies "The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts".

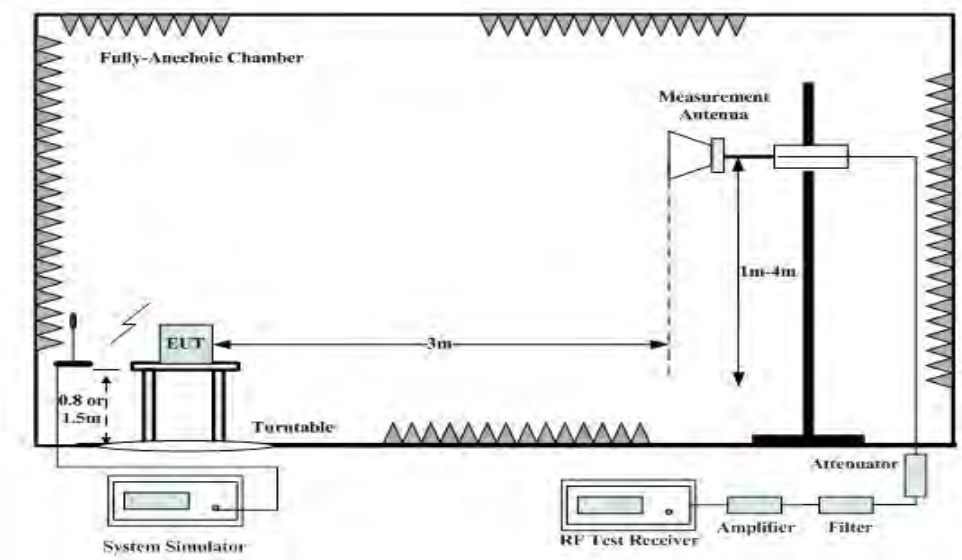
Part 24.232(c) specifies "Mobile and portable stations are limited to 2 watts EIRP".

Part 27.50(d) specifies "Fixed, mobile and portable (handheld) stations operating in the 1710–1755 MHz band and mobile and portable stations operating in the 1695–1710 MHz and 1755–1780 MHz bands are limited to 1 watt EIRP".

A.1.3.2 Method of Measurement

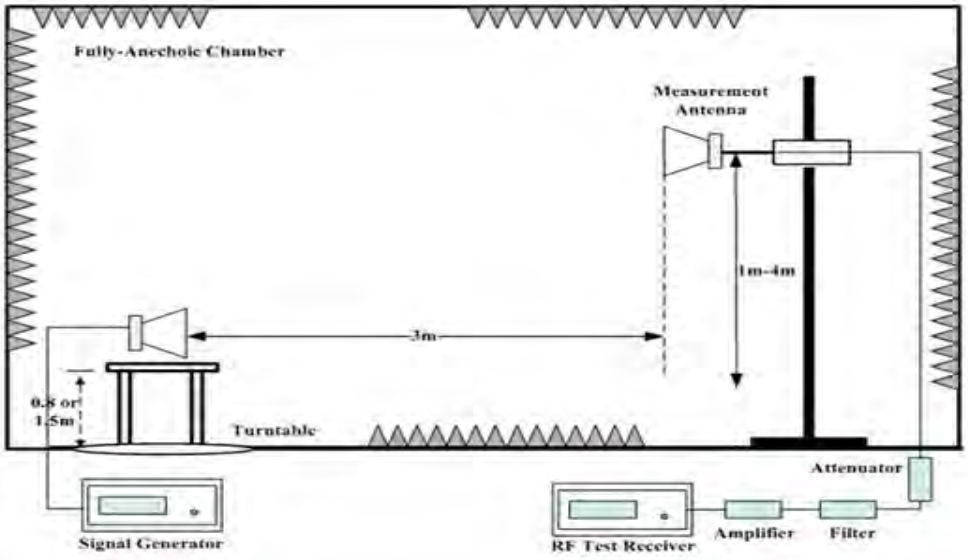
The measurements procedures in ANSI C63.26 are used.

1. EUT was placed on a 0.8/1.5 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 receiving antenna shall be varied from 1 to 4m in height above the reference ground. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and the EUT is manipulated through all orthogonal planes representative of its typical use. The test is carried out with both vertical and horizontal polarization of the receiving antenna. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with rms 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.

©Copyright. All rights reserved by CTTL.



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 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. An amplifier should be connected to the Signal Source output port. And the cable should be connected between the Amplifier and the Substitution Antenna.
   The cable loss (P_{cl}), the Substitution Antenna Gain (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 -2.15dBi.

©Copyright. All rights reserved by CTTL.

WCDMA Band II-EIRP

Limits

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

Measurement result

QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1852.40	-21.31	6.76	43.75	9.28	24.95	33.00	8.05	H
1880.00	-21.73	6.96	43.75	9.00	24.06	33.00	8.94	H
1907.60	-22.06	6.88	43.77	8.76	23.60	33.00	9.40	H

16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1852.40	-21.37	6.76	43.75	9.28	24.89	33.00	8.11	H
1880.00	-21.76	6.96	43.75	9.00	24.03	33.00	8.97	H
1907.60	-22.06	6.88	43.77	8.76	23.60	33.00	9.40	H

WCDMA Band V-ERP

Limits

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

Measurement result

QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
826.40	-23.56	4.02	45.77	-0.63	2.15	15.41	38.45	23.04	H
836.60	-23.16	4.12	45.66	-0.73	2.15	15.50	38.45	22.95	H
846.60	-23.00	4.23	45.56	-0.82	2.15	15.37	38.45	23.08	V

16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Correction (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
826.40	-23.61	4.02	45.77	-0.63	2.15	15.36	38.45	23.09	V
836.60	-23.22	4.12	45.66	-0.73	2.15	15.44	38.45	23.01	H
846.60	-23.08	4.23	45.56	-0.82	2.15	15.29	38.45	23.16	V

©Copyright. All rights reserved by CTTL.

WCDMA Band IV-EIRP

Limits

Band	Burst Peak EIRP (dBm)
WCDMA Band IV	≤30dBm

Measurement result

QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1712.40	-23.13	6.39	44.10	9.33	23.91	30.00	6.09	H
1732.40	-24.10	6.18	44.13	9.43	23.28	30.00	6.72	H
1752.60	-23.65	6.25	44.14	9.52	23.76	30.00	6.24	H

16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1712.40	-23.14	6.39	44.10	9.33	23.90	30.00	6.10	H
1732.40	-24.14	6.18	44.13	9.43	23.24	30.00	6.76	H
1752.60	-23.68	6.25	44.14	9.52	23.73	30.00	6.27	H

Frequency: 1752.60MHz

Peak EIRP (dBm)=P_{Mea}(-23.65)-P_{cl}(6.25dB)+P_{Ag}(44.14dB)+G_a (9.52dB) = 23.73dBm

©Copyright. All rights reserved by CTTL.

A.2 Emission Limit

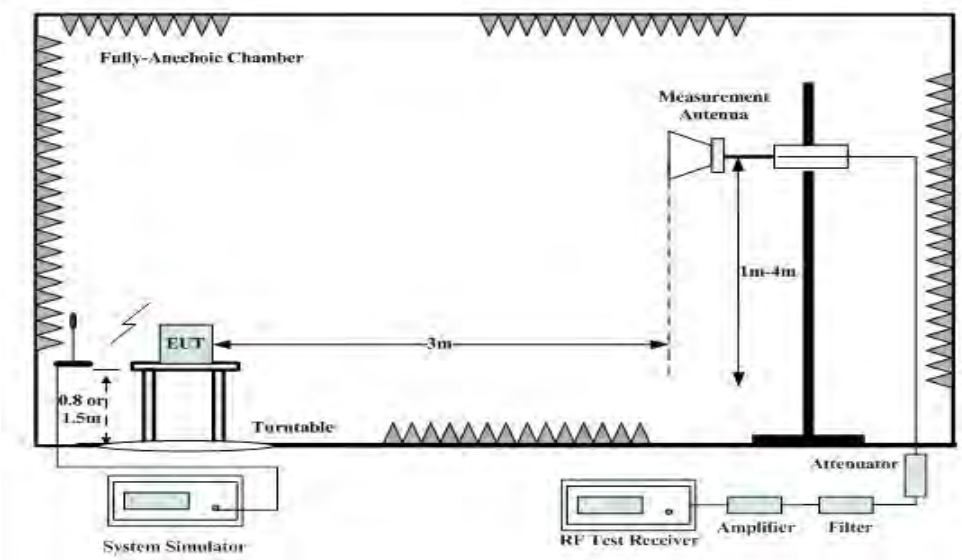
A.2.1 Measurement Method

The measurement procedures in ANSI C63.26 are used.

The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set as outlined in Part 24.238, Part 22.917, 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.

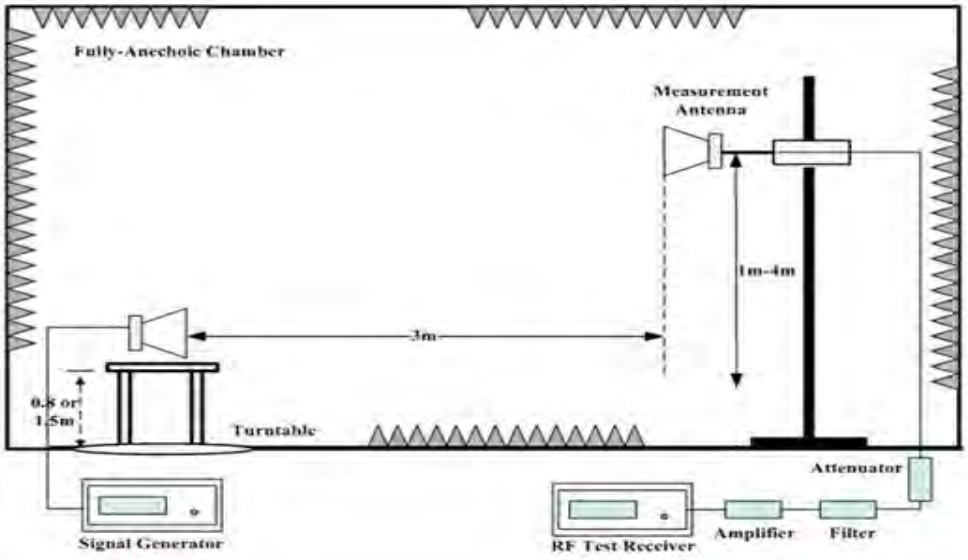
The procedure of radiated spurious emissions is as follows:

For measurements performed at frequencies less than or equal to 1 GHz, the EUT was placed on a 80cm-high non-conductive support; For measurements performed at frequencies above 1GHz, EUT was placed on a 1.5-meter-high non-conductive support. A measurement antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. In the initial test, the height of the measurement antenna was varied from 1 m to 4 m 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 non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.



1. 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).
2. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.

©Copyright. All rights reserved by CTTL.



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. The height of measurement antenna varied between 1 m to 4 m to maximize the received signal amplitude for each emission that was detected and measured in the initial test. 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 was performed with the measurement antenna in both vertical and horizontal polarization.

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

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

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.

A.2.2 Measurement Limit

Part 22.917, Part 24.238 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 + 10log(P) dB.

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

©Copyright. All rights reserved by CTTL.

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.
The range of evaluated frequency is from 9 kHz to 10th harmonic; measurement value listed in this report is the 6 maximum emissions.

A.2.4 Measurement Results Table

Frequency	Channel	Frequency Range	Result
WCDMA Band V	Low	9kHz-10GHz	Pass
	Middle	9kHz-10GHz	Pass
	High	9kHz-10GHz	Pass
WCDMA Band II	Low	9kHz-20GHz	Pass
	Middle	9kHz-20GHz	Pass
	High	9kHz-20GHz	Pass
WCDMA Band IV	Low	9kHz-20GHz	Pass
	Middle	9kHz-20GHz	Pass
	High	9kHz-20GHz	Pass

A.2.5 Sweep Table

Subrange	RBW	VBW
9~150 kHz	0.2kHz	0.6kHz
150kHz~30MHz	9kHz	27kHz
30MHz~1 GHz	100KHz	300KHz
1~20 GHz	1 MHz	3 MHz

©Copyright. All rights reserved by CTTL.

A.2.6 Measurement Result

WCDMA BAND II Mode Channel 9262/1852.4MHz

Frequency (MHz)	P_{Mea} (dBm)	Path Loss (dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3713.00	-64.57	3.51	10.35	-57.73	-13.00	44.73	H
5568.00	-61.56	5.39	11.24	-55.71	-13.00	42.71	V
7404.50	-52.79	8.07	10.10	-50.76	-13.00	37.76	V
9271.00	-51.19	8.85	11.70	-48.34	-13.00	35.34	V
11111.50	-48.92	9.81	12.61	-46.12	-13.00	33.12	H
12952.50	-45.28	12.49	12.75	-45.02	-13.00	32.02	V

WCDMA BAND II Mode Channel 9400/1880MHz

Frequency (MHz)	P_{Mea} (dBm)	Path Loss (dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3763.00	-64.70	3.80	10.15	-58.35	-13.00	45.35	H
5630.50	-60.50	5.62	11.36	-54.76	-13.00	41.76	H
7521.50	-53.06	7.71	10.24	-50.53	-13.00	37.53	V
9393.50	-50.98	9.12	11.50	-48.60	-13.00	35.60	H
11280.00	-49.56	10.63	12.62	-47.57	-13.00	34.57	H
13168.00	-45.45	13.18	12.53	-46.10	-13.00	33.10	V

WCDMA BAND II Mode Channel 9538/1907.6MHz

Frequency (MHz)	P_{Mea} (dBm)	Path Loss (dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3811.50	-63.64	3.95	9.98	-57.61	-13.00	44.61	V
5728.50	-59.87	5.89	11.34	-54.42	-13.00	41.42	V
7637.50	-53.95	6.77	10.38	-50.34	-13.00	37.34	V
9544.50	-51.05	9.11	11.89	-48.27	-13.00	35.27	V
11455.00	-45.88	12.37	12.54	-45.71	-13.00	32.71	V
13359.00	-43.85	13.11	12.44	-44.52	-13.00	31.52	V

©Copyright. All rights reserved by CTTL.

WCDMA BAND V Mode Channel 4132/826.4MHz

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1655.50	-58.67	2.55	9.49	2.15	-53.88	-13.00	40.88	V
2481.00	-53.99	4.34	10.34	2.15	-50.14	-13.00	37.14	H
5772.00	-60.09	5.68	11.17	2.15	-56.75	-13.00	43.75	V
6624.00	-56.72	5.98	10.35	2.15	-54.50	-13.00	41.50	V
7432.50	-52.39	7.91	10.10	2.15	-52.35	-13.00	39.35	V
8255.50	-53.13	7.60	11.20	2.15	-51.68	-13.00	38.68	V

WCDMA BAND V Mode Channel 4183/836.6MHz

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1670.50	-58.56	2.82	9.46	2.15	-54.07	-13.00	41.07	H
2495.50	-54.76	4.46	10.31	2.15	-51.06	-13.00	38.06	H
5864.50	-60.34	5.62	10.94	2.15	-57.17	-13.00	44.17	V
6679.50	-55.45	6.37	10.46	2.15	-53.51	-13.00	40.51	H
7526.00	-52.53	7.71	10.25	2.15	-52.14	-13.00	39.14	V
8367.00	-53.03	8.20	11.30	2.15	-52.08	-13.00	39.08	V

WCDMA BAND V Mode Channel 4233/846.6MHz

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1694.50	-56.85	2.93	9.41	2.15	-52.52	-13.00	39.52	V
2537.50	-54.94	4.66	10.30	2.15	-51.45	-13.00	38.45	V
5935.50	-59.00	6.02	10.73	2.15	-56.44	-13.00	43.44	H
6761.00	-55.56	6.41	10.32	2.15	-53.80	-13.00	40.80	H
7611.50	-53.35	6.59	10.32	2.15	-51.77	-13.00	38.77	H
8467.50	-52.56	8.02	11.30	2.15	-51.43	-13.00	38.43	V

©Copyright. All rights reserved by CTTL.

WCDMA BAND IV Mode Channel 1312/1712.4MHz

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
8557.00	-62.98	8.51	11.20	-60.29	-13.00	47.29	V
10265.00	-59.18	10.80	11.90	-58.08	-13.00	45.08	V
11974.50	-56.20	12.28	13.05	-55.43	-13.00	42.43	V
13694.00	-53.72	13.03	12.20	-54.55	-13.00	41.55	H
15424.00	-57.58	14.93	15.45	-57.06	-13.00	44.06	H
17126.00	-47.34	18.44	13.47	-52.31	-13.00	39.31	V

WCDMA BAND IV Mode Channel 1412/1732.4MHz

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
8674.50	-62.68	8.54	11.15	-60.07	-13.00	47.07	H
10395.50	-59.82	10.65	12.00	-58.47	-13.00	45.47	V
12113.50	-58.09	12.07	13.31	-56.85	-13.00	43.85	H
13854.50	-53.40	13.09	12.10	-54.39	-13.00	41.39	H
15587.00	-55.17	16.54	15.60	-56.11	-13.00	43.11	H
17338.00	-44.86	19.25	13.12	-50.99	-13.00	37.99	H

WCDMA BAND IV Mode Channel 1513/1752.6MHz

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
8766.00	-62.11	7.95	11.13	-58.93	-13.00	45.93	H
10530.50	-59.81	10.41	11.93	-58.29	-13.00	45.29	V
12267.50	-59.11	11.56	13.40	-57.27	-13.00	44.27	H
14015.00	-52.64	14.28	12.22	-54.70	-13.00	41.70	H
15779.00	-55.61	16.48	15.58	-56.51	-13.00	43.51	V
17532.00	-44.04	19.68	13.13	-50.59	-13.00	37.59	V

Note: Peak EIRP (dBm) = PMea(dBm) - Path Loss(dB) + Antenna Gain(dBi)

©Copyright. All rights reserved by CTTL.

A.3 Frequency Stability

A.3.1 Method of Measurement

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage. Two reference points are established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation shall be identified as F_L and F_H respectively.

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 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℃ decrements 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.

©Copyright. All rights reserved by CTTL.

A.3.2 Measurement results

WCDMA Band II-QPSK

Frequency Error vs Temperature

Temperature(℃)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.82	1850.150	1909.860		
50				-1.15	0.0006
40				-0.47	0.0002
30				-1.00	0.0005
10				0.55	0.0003
0				0.54	0.0003
-10				-0.84	0.0004
-20				0.06	0.0000
-30				1.36	0.0007

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.45	20	1850.150	1909.860	0.61	0.0003
4.4				2.68	0.0014

WCDMA Band IV-QPSK

Frequency Error vs Temperature

Temperature(℃)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.82	1710.160	1754.860		
50				-2.08	0.0012
40				1.78	0.0010
30				0.64	0.0004
10				-0.26	0.0002
0				3.56	0.0021
-10				1.67	0.0010
-20				6.57	0.0038
-30				3.19	0.0018

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.45	20	1710.160	1754.860	5.26	0.0030
4.4				6.32	0.0036

©Copyright. All rights reserved by CTTL.

WCDMA Band V-QPSK

Frequency Error vs Temperature

Temperature(℃)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.82	824.150	848.850		
50				0.23	0.0003
40				1.19	0.0014
30				0.78	0.0009
10				1.94	0.0023
0				2.76	0.0033
-10				1.86	0.0022
-20				2.04	0.0024
-30				2.55	0.0030

Frequency Error vs Voltage

Voltage(V)	Temperature(℃)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.45	20	824.150	848.850	0.90	0.0011
4.4				2.34	0.0028

©Copyright. All rights reserved by CTTL.

A.4 Occupied Bandwidth

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 frequency. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.
The measurement method is from ANSI C63.26:
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.
b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.
c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
d) Set the detection mode to peak, and the trace mode to max-hold.

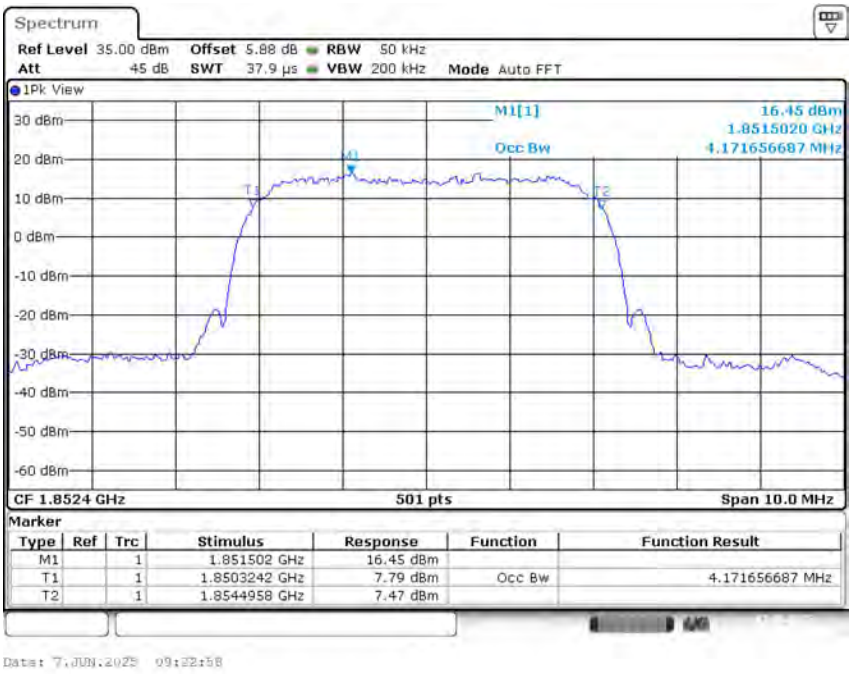
©Copyright. All rights reserved by CTTL.

WCDMA Band II (99%)-QPSK

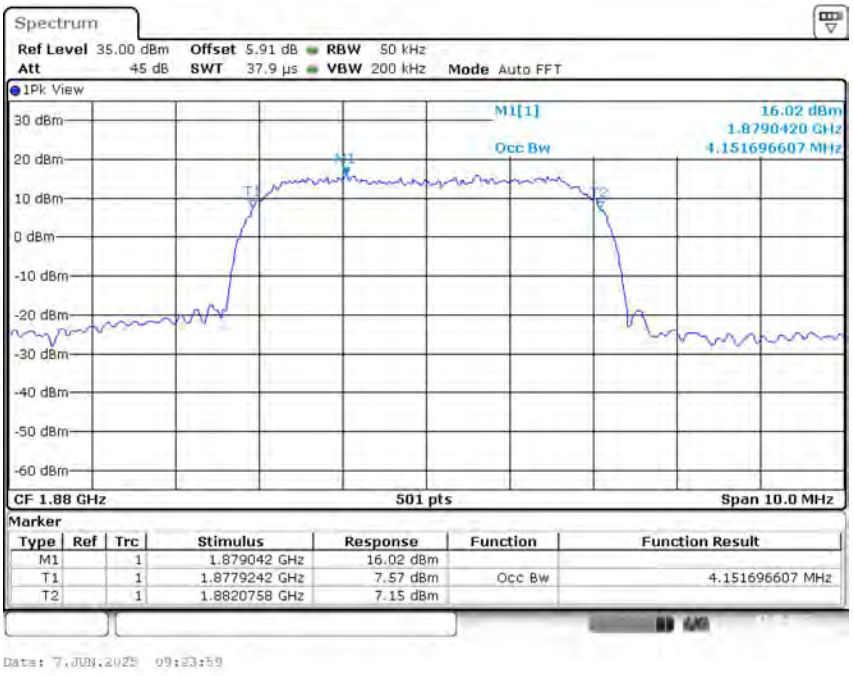
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)
1852.4	4.172
1880	4.152
1907.6	4.152

WCDMA Band II (99%)

Channel 9262-Occupied Bandwidth (99% BW)

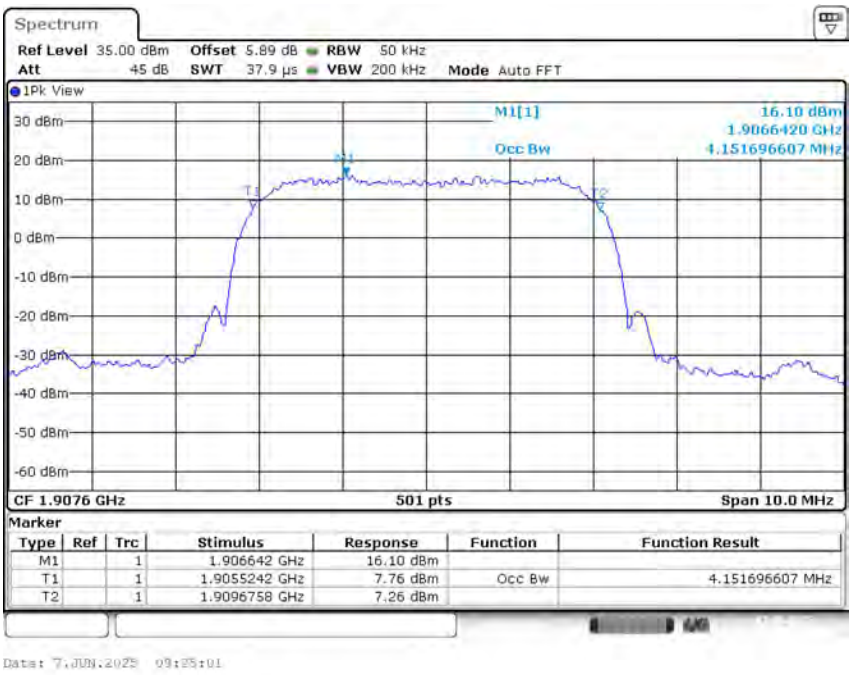


Channel 9400-Occupied Bandwidth (99% BW)



©Copyright. All rights reserved by CTTL.

Channel 9538-Occupied Bandwidth (99% BW)



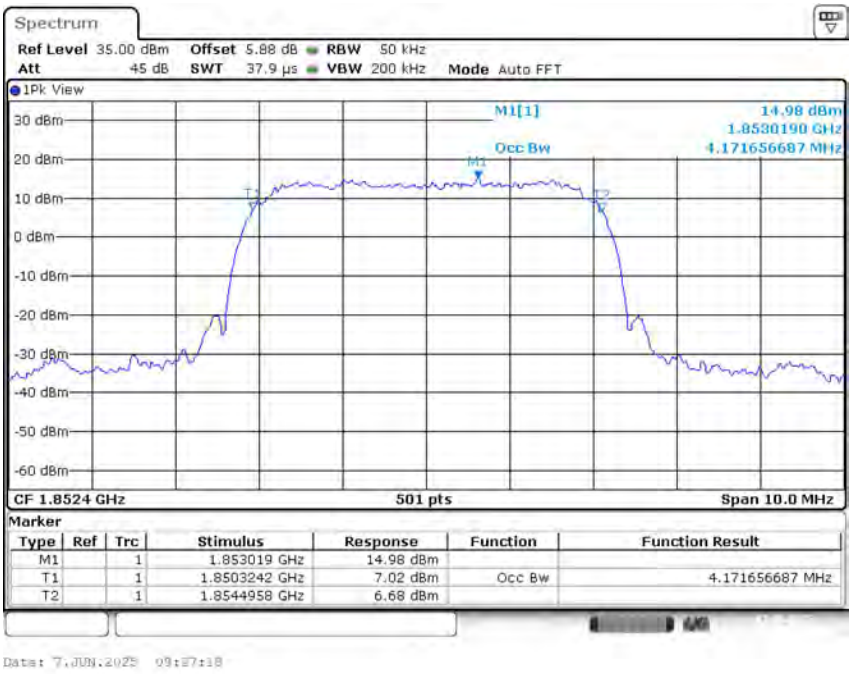
©Copyright. All rights reserved by CTTL.

WCDMA Band II (99%)-16QAM

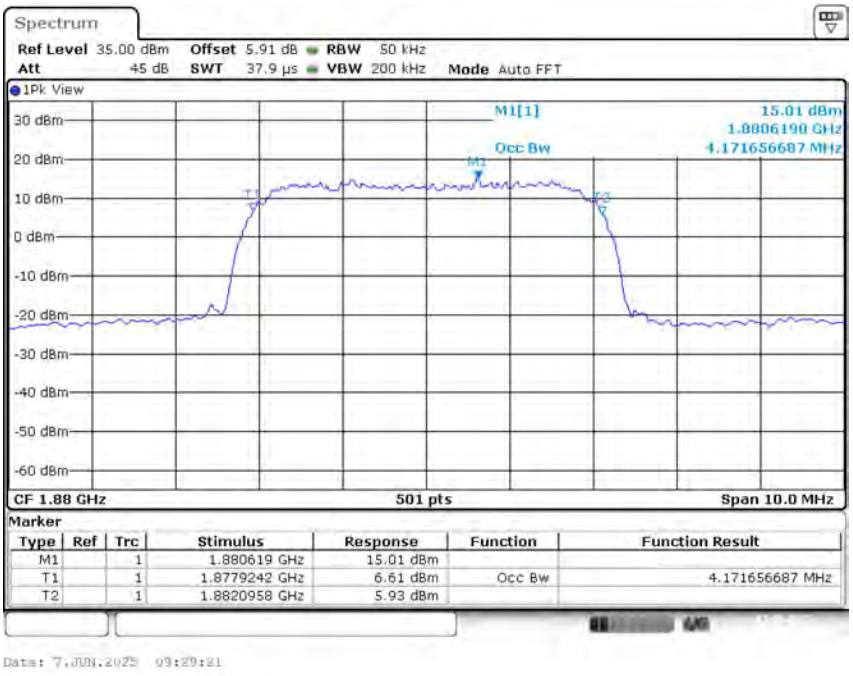
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)
1852.4	4.172
1880	4.172
1907.6	4.172

WCDMA Band II (99%)

Channel 9262-Occupied Bandwidth (99% BW)

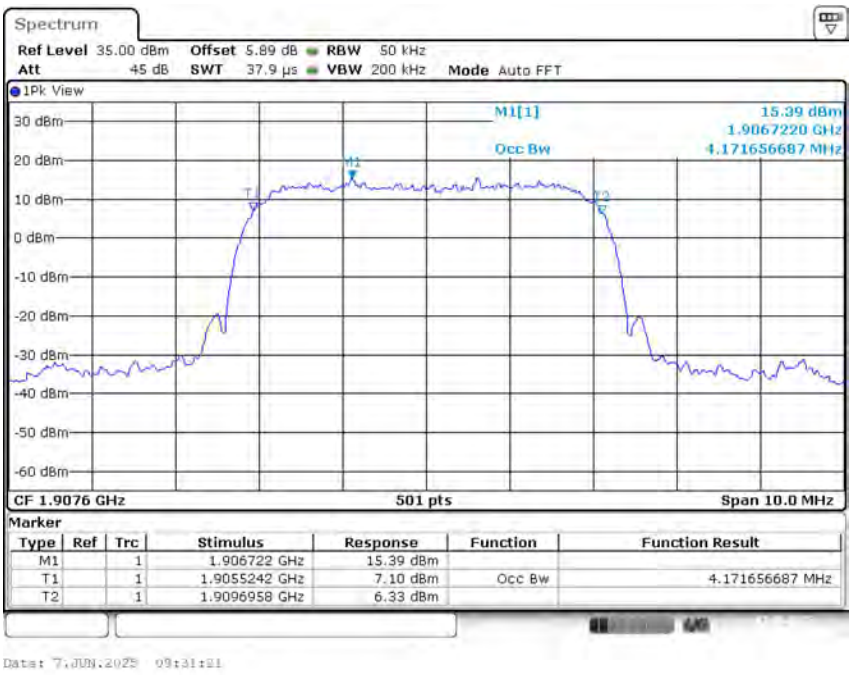


Channel 9400-Occupied Bandwidth (99% BW)



©Copyright. All rights reserved by CTTL.

Channel 9538-Occupied Bandwidth (99% BW)



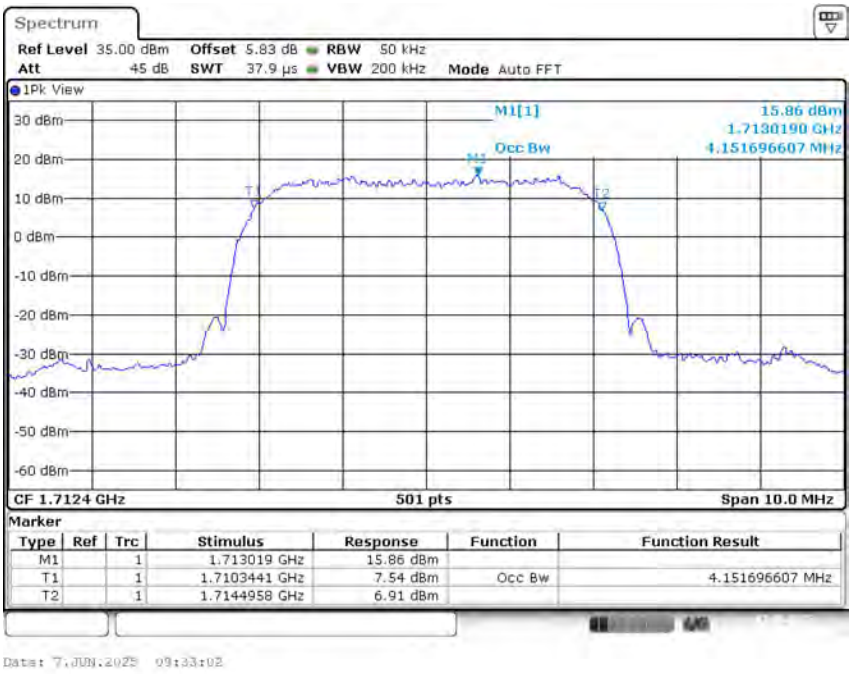
©Copyright. All rights reserved by CTTL.

WCDMA Band IV (99%)-QPSK

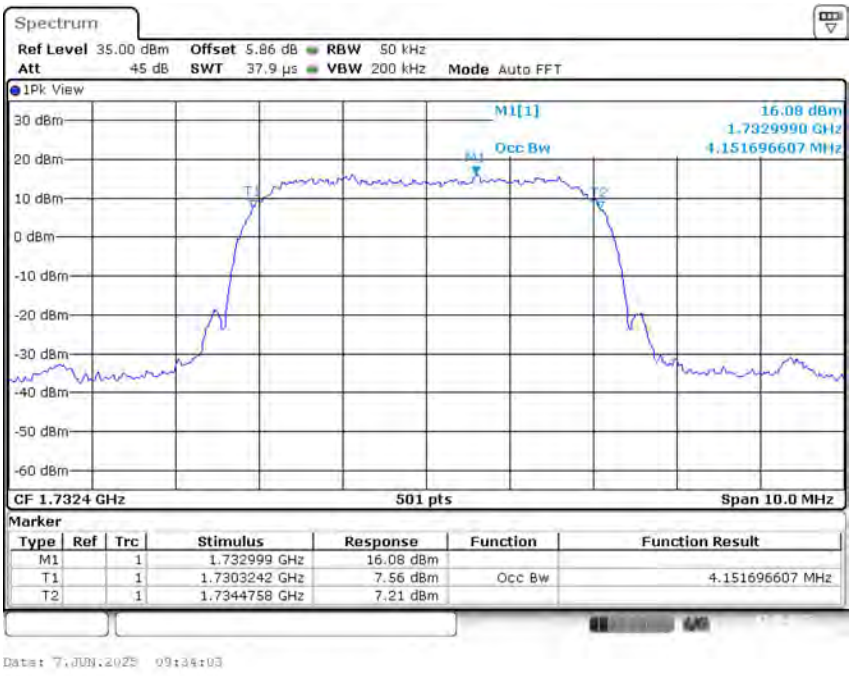
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)
1712.4	4.152
1732.4	4.152
1752.6	4.172

WCDMA Band IV (99%)

Channel 1312-Occupied Bandwidth (99% BW)

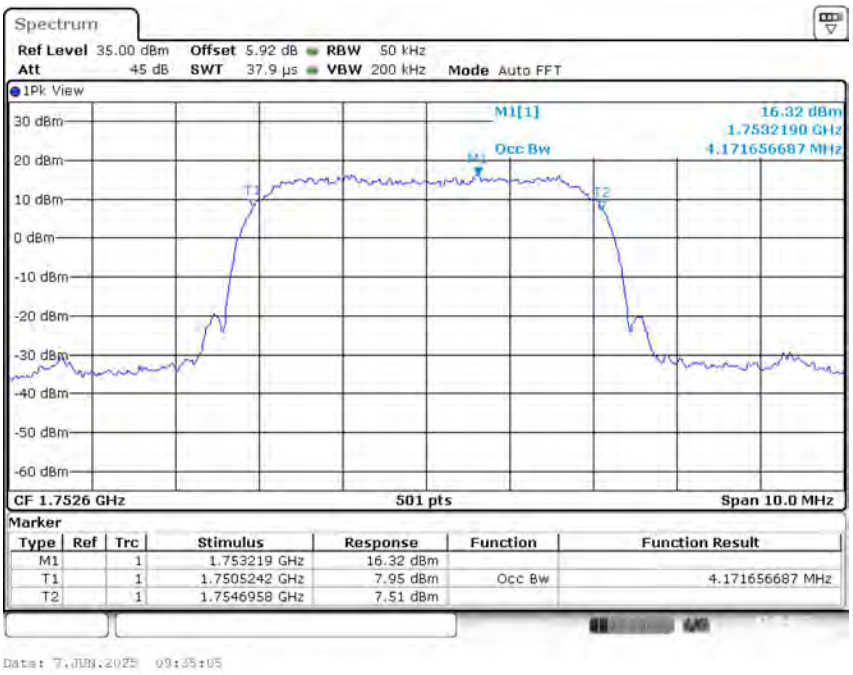


Channel 1412-Occupied Bandwidth (99% BW)



©Copyright. All rights reserved by CTTL.

Channel 1513-Occupied Bandwidth (99% BW)



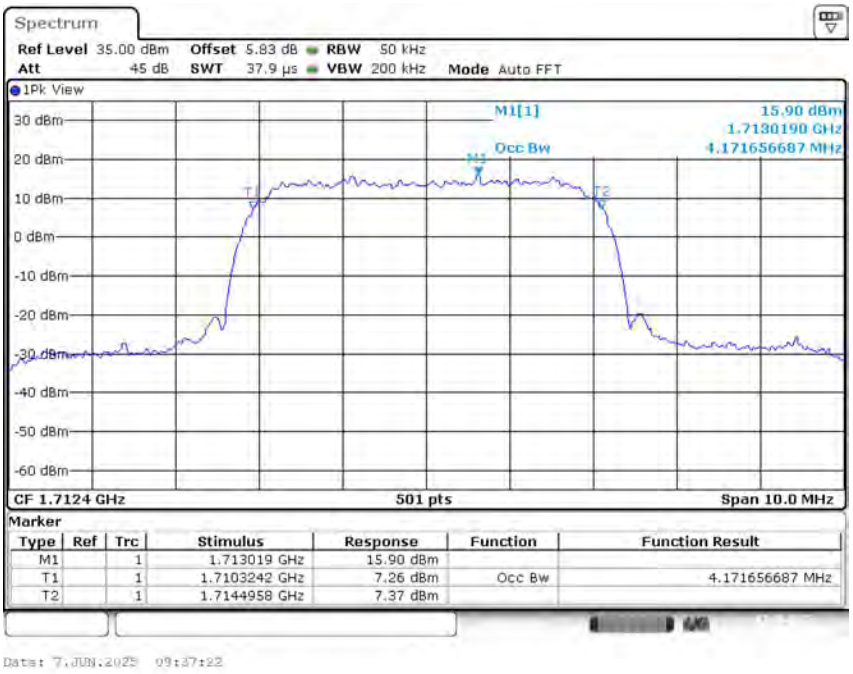
©Copyright. All rights reserved by CTTL.

WCDMA Band IV (99%)-16QAM

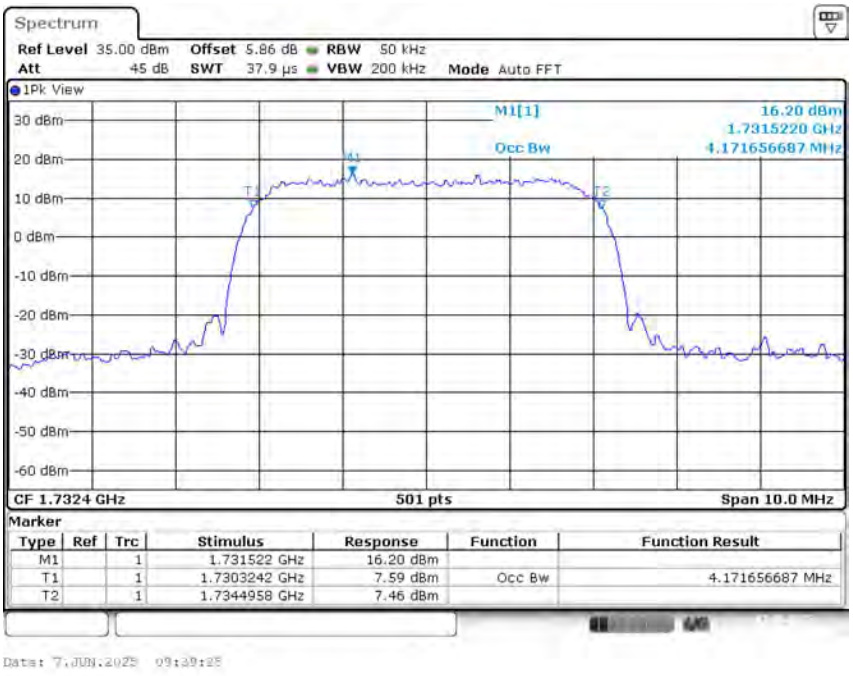
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)
1712.4	4.172
1732.4	4.172
1752.6	4.172

WCDMA Band IV (99%)

Channel 1312-Occupied Bandwidth (99% BW)

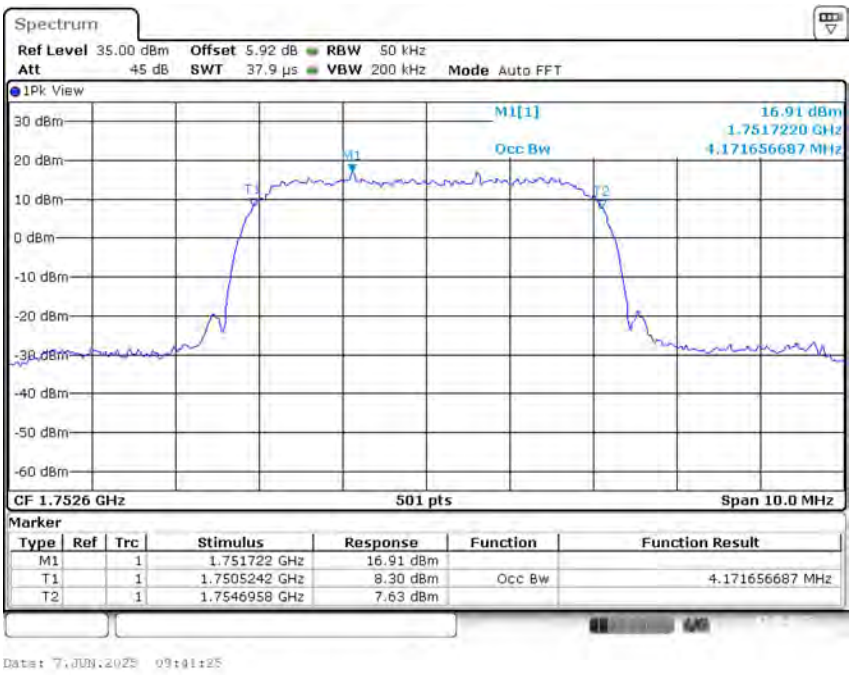


Channel 1412-Occupied Bandwidth (99% BW)



©Copyright. All rights reserved by CTTL.

Channel 1513-Occupied Bandwidth (99% BW)



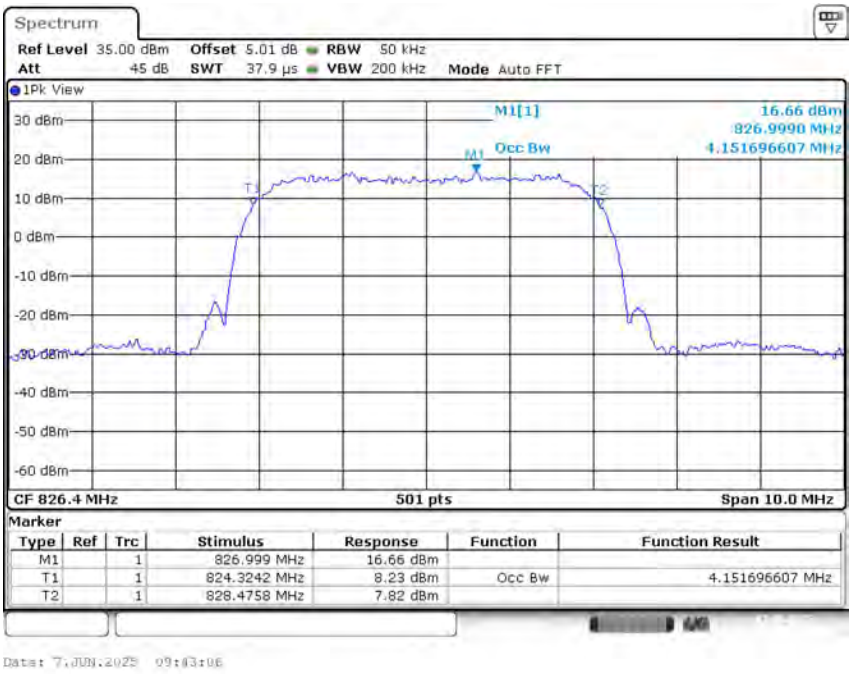
©Copyright. All rights reserved by CTTL.

WCDMA Band V (99%)-QPSK

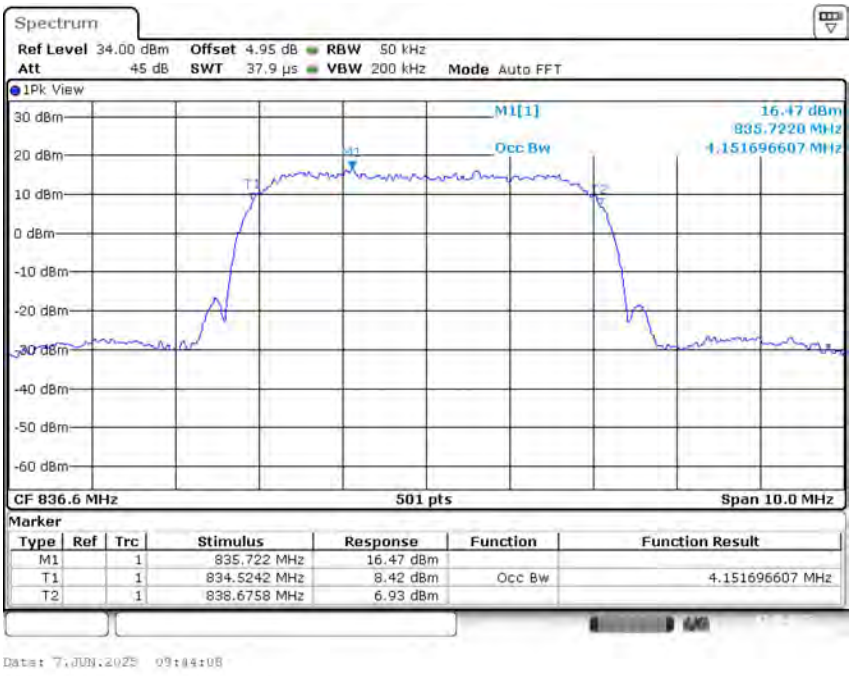
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)
826.4	4.152
836.6	4.152
846.6	4.152

WCDMA Band V (99%)

Channel 4132-Occupied Bandwidth (99% BW)

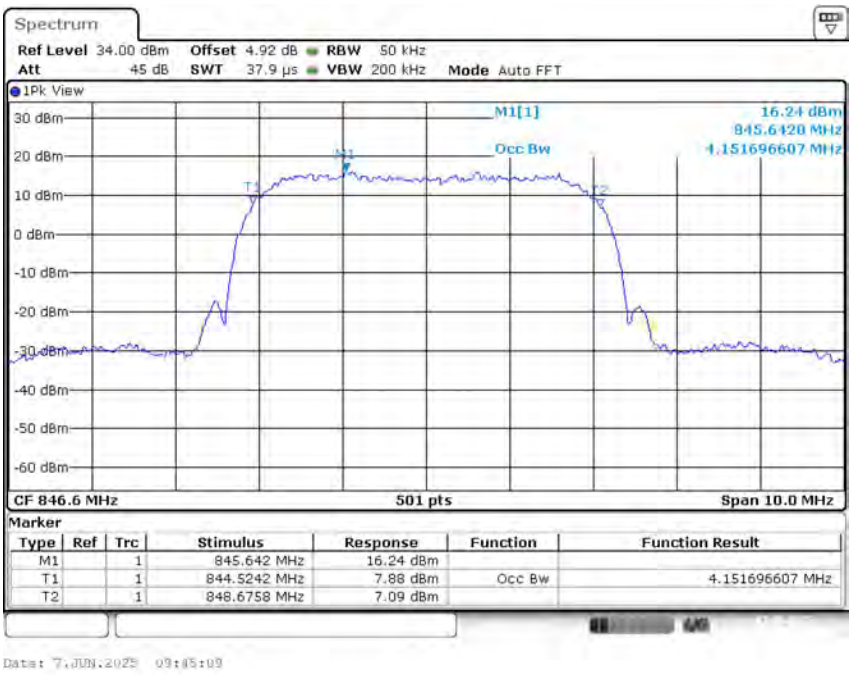


Channel 4183-Occupied Bandwidth (99% BW)



©Copyright. All rights reserved by CTTL.

Channel 4233-Occupied Bandwidth (99% BW)



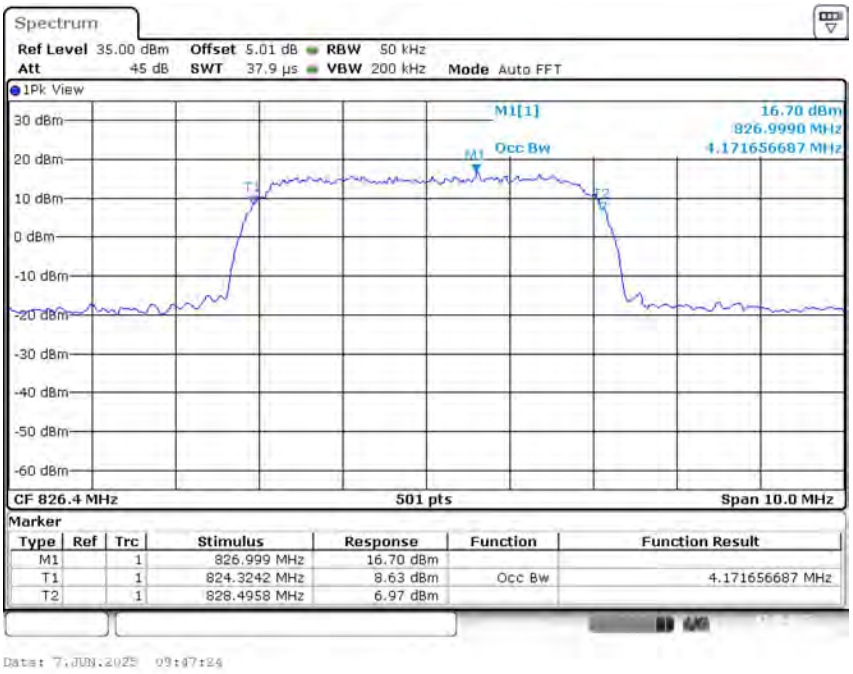
©Copyright. All rights reserved by CTTL.

WCDMA Band V (99%)-16QAM

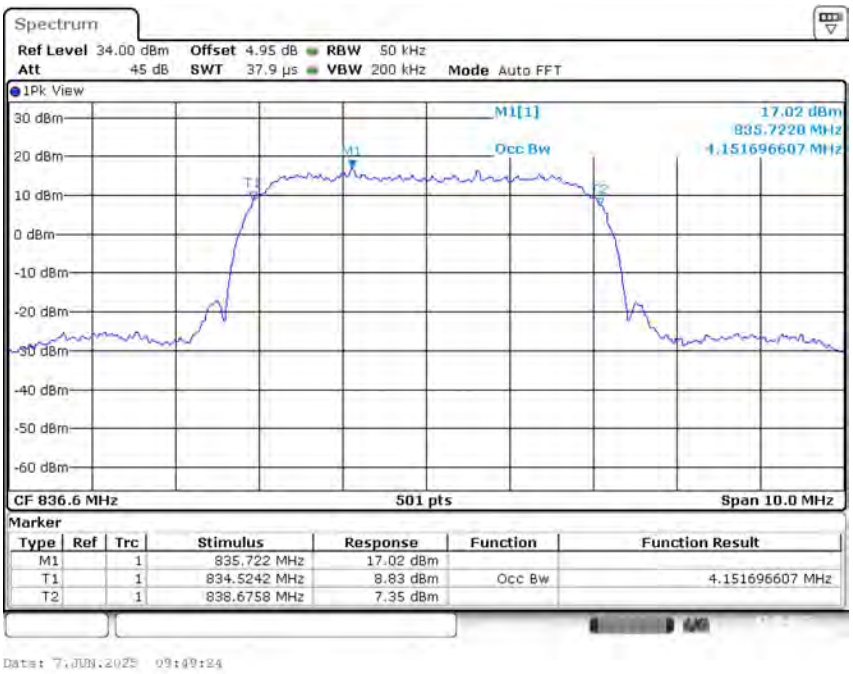
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)
826.4	4.172
836.6	4.152
846.6	4.152

WCDMA Band V (99%)

Channel 4132-Occupied Bandwidth (99% BW)

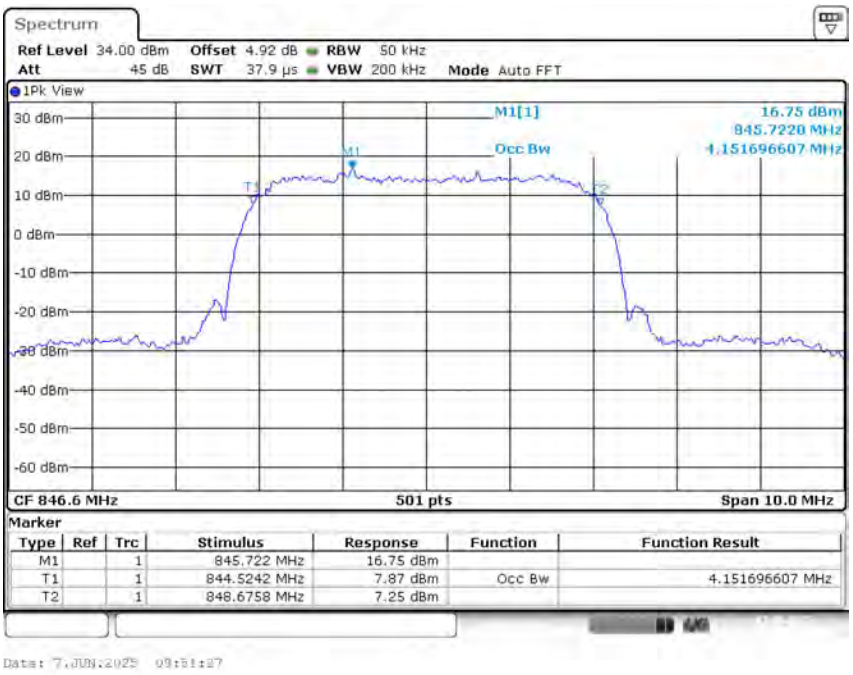


Channel 4183-Occupied Bandwidth (99% BW)



©Copyright. All rights reserved by CTTL.

Channel 4233-Occupied Bandwidth (99% BW)



©Copyright. All rights reserved by CTTL.

A.5 Emission Bandwidth

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
The measurement method is from ANSI C63.26:
a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.
c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “−X dB” requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.

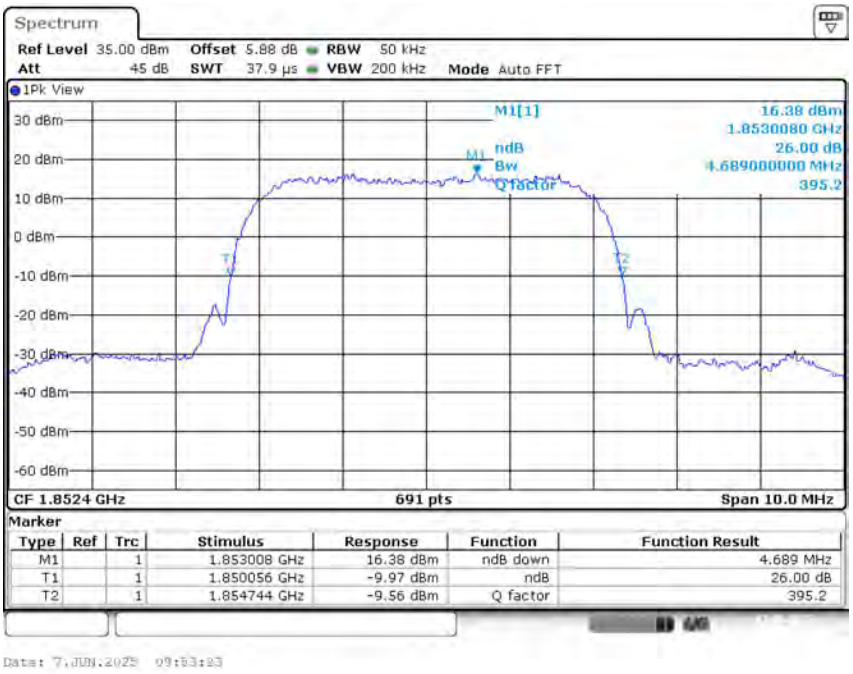
©Copyright. All rights reserved by CTTL.

WCDMA Band II (-26dBc)-QPSK

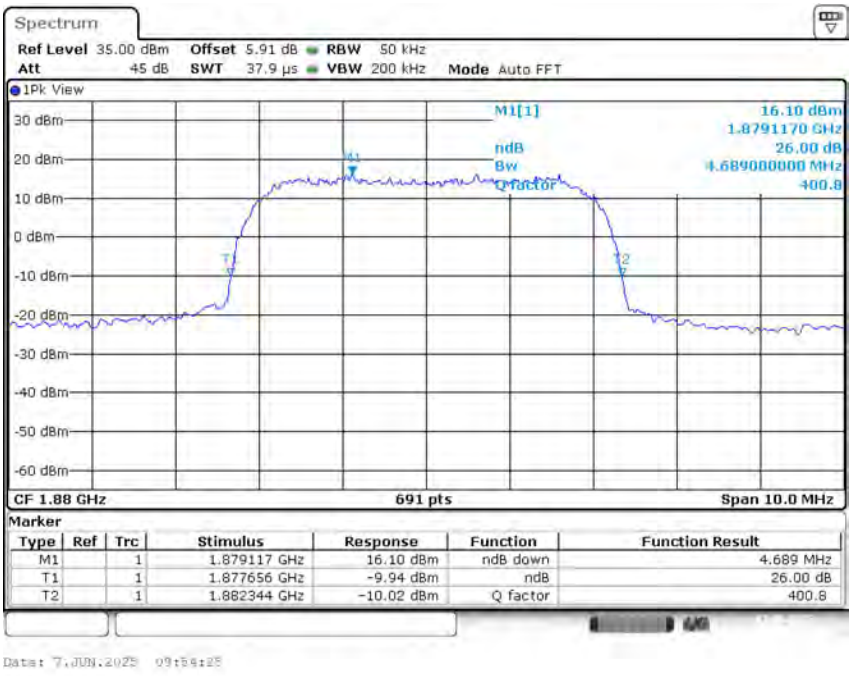
Frequency (MHz)	Emission Bandwidth (-26dBc)(MHz)
1852.4	4.689
1880	4.689
1907.6	4.674

WCDMA Band II (-26dBc)

Channel 9262-Emission Bandwidth (-26dBc BW)

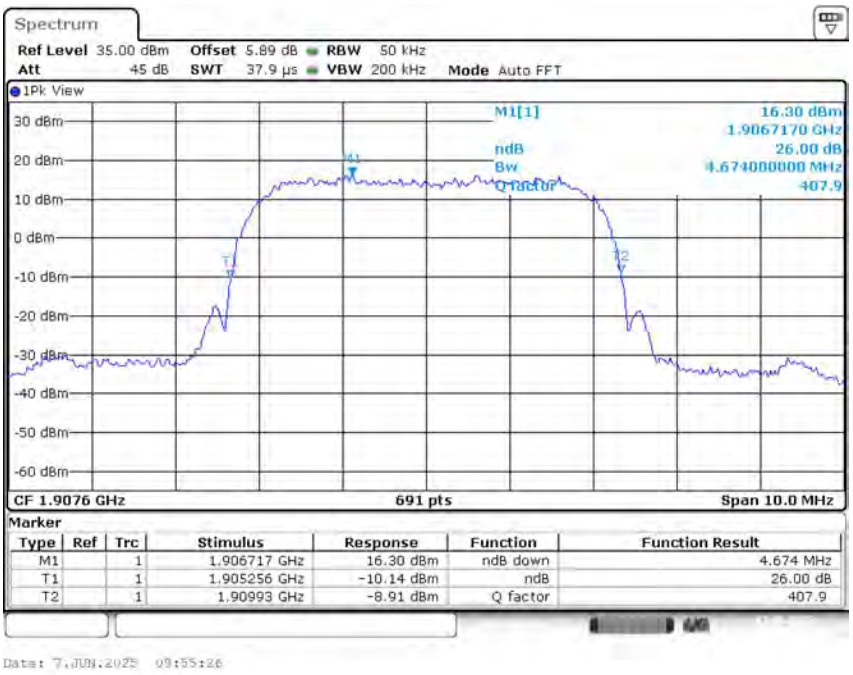


Channel 9400-Emission Bandwidth (-26dBc BW)



©Copyright. All rights reserved by CTTL.

Channel 9538-Emission Bandwidth (-26dBc BW)



©Copyright. All rights reserved by CTTL.

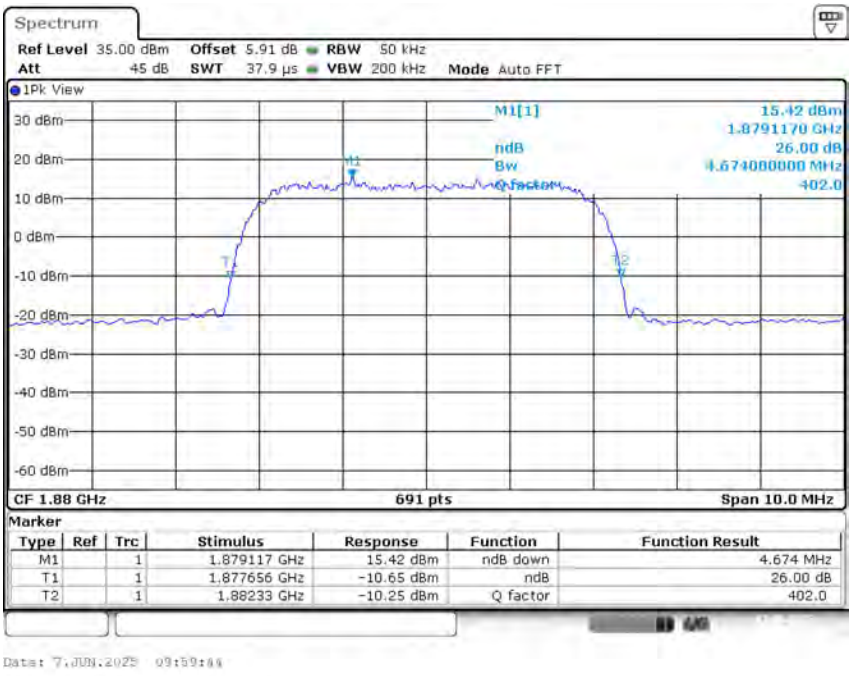
WCDMA Band II (-26dBc)-16QAM

Frequency (MHz)	Emission Bandwidth (-26dBc)(MHz)
1852.4	4.674
1880	4.674
1907.6	4.689

WCDMA Band II (-26dBc)

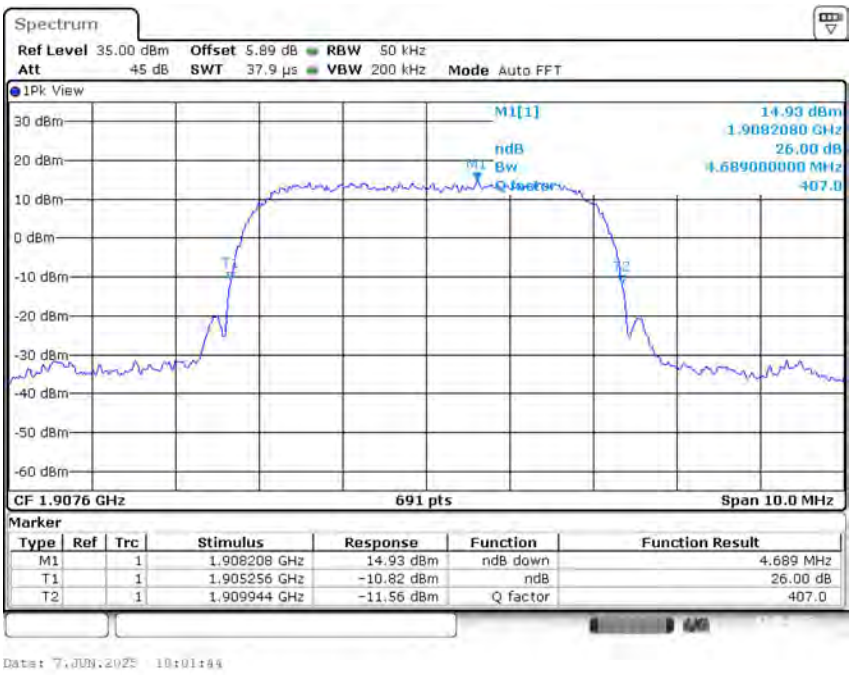
Channel 9262-Emission Bandwidth (-26dBc BW)

Channel 9400-Emission Bandwidth (-26dBc BW)



©Copyright. All rights reserved by CTTL.

Channel 9538-Emission Bandwidth (-26dBc BW)



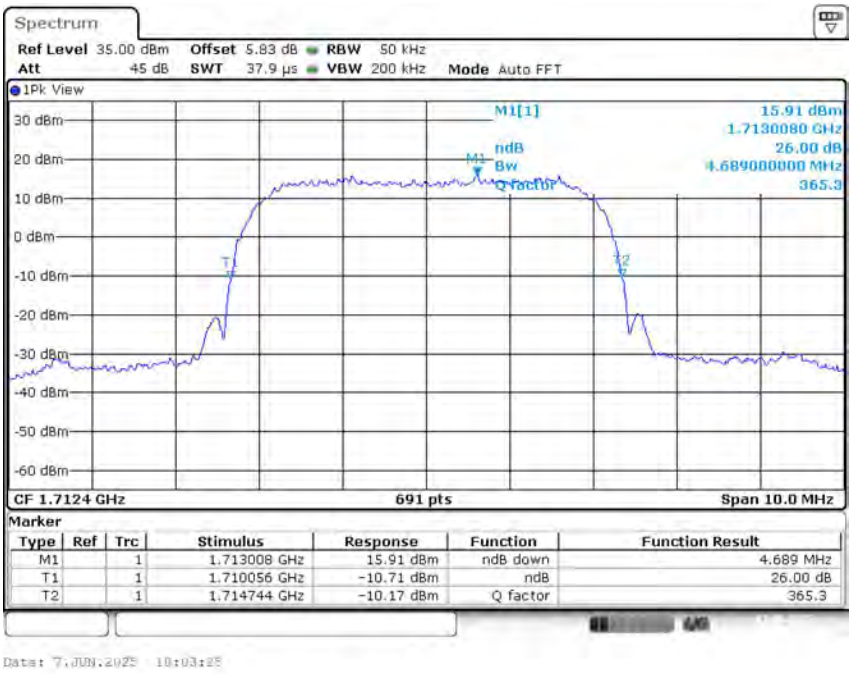
©Copyright. All rights reserved by CTTL.

WCDMA Band IV (-26dBc)-QPSK

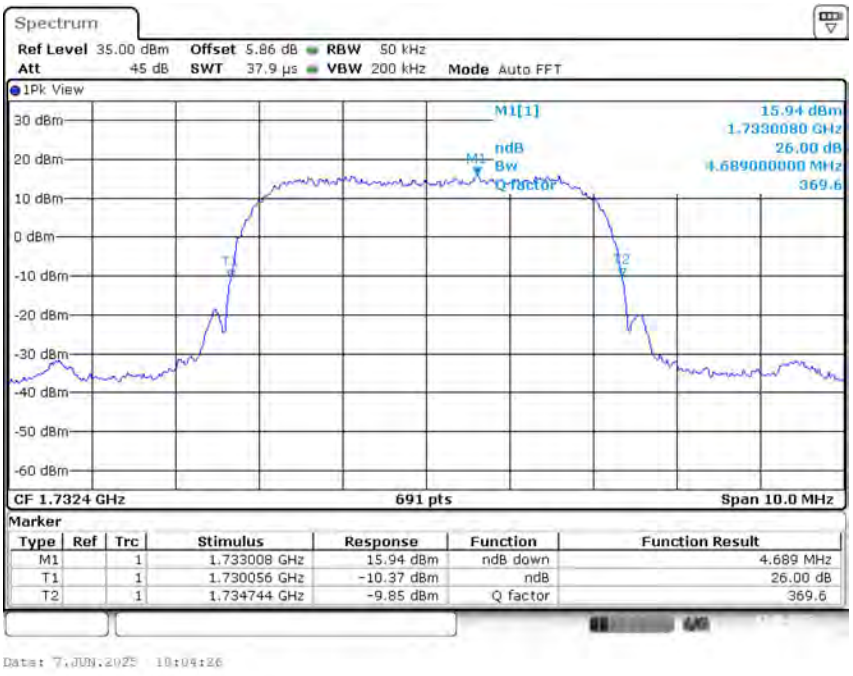
Frequency (MHz)	Emission Bandwidth (-26dBc)(MHz)
1712.4	4.689
1732.4	4.689
1752.6	4.689

WCDMA Band IV (-26dBc)

Channel 1312-Emission Bandwidth (-26dBc BW)



Channel 1412-Emission Bandwidth (-26dBc BW)



©Copyright. All rights reserved by CTTL.