

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

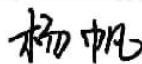
### FCC WCDMA TEST REPORT

<b>PRODUCT</b>	SIMCom Module
<b>BRAND</b>	SIMCom
<b>MODEL</b>	SIM8262A-M2
<b>APPLICANT</b>	SIMCom Wireless Solutions Limited
<b>FCC ID</b>	2AJYU-8XN0003
<b>ISSUE DATE</b>	February 28,2023
<b>STANDARD(S)</b>	FCC Part 2, FCC Part 22, FCC Part 24,FCC Part27

Prepared by: Wu Rui



Reviewed by: Yang Fan



Approved by: Zhang Min



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## CONTENTS

<b>1. SUMMARY OF TEST REPORT .....</b>	<b>3</b>
1.1 TEST STANDARD (S).....	3
1.2 REFERENCE DOCUMENTS .....	3
1.3 SUMMARY OF TEST RESULTS .....	3
1.4 DATA PROVIDED BY APPLICANT.....	4
<b>2. GENERAL INFORMATION OF THE LABORATORY .....</b>	<b>5</b>
2.1 TESTING LABORATORY .....	5
2.2 LABORATORY ENVIRONMENTAL REQUIREMENTS .....	5
2.3 PROJECT INFORMATION.....	5
<b>3. GENERAL INFORMATION OF THE CUSTOMER.....</b>	<b>6</b>
3.1 APPLICANT .....	6
3.2 MANUFACTURER.....	6
<b>4. GENERAL INFORMATION OF THE PRODUCT.....</b>	<b>7</b>
4.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	7
4.2 DESCRIPTION FOR AUXILIARY EQUIPMENT (AE).....	7
4.3 ADDITIONAL INFORMATION .....	7
<b>5. TEST CONFIGURATION INFORMATION .....</b>	<b>8</b>
5.1 LABORATORY ENVIRONMENTAL CONDITIONS .....	8
5.2 TEST EQUIPMENTS UTILIZED .....	8
5.3 MEASUREMENT UNCERTAINTY .....	9
<b>6. TEST RESULTS.....</b>	<b>10</b>
6.1 OUTPUT POWER.....	10
6.2 PEAK-TO-AVERAGE POWER RATIO .....	12
6.3 99% OCCUPIED BANDWIDTH.....	14
6.4 -26dB EMISSION BANDWIDTH.....	21
6.5 BAND EDGE AT ANTENNA TERMINALS .....	28
6.6 FREQUENCY STABILITY.....	30
6.7 CONDUCTED SPURIOUS EMISSION.....	34
6.8 RADIATED .....	42
<b>ANNEX A: REVISED HISTORY.....</b>	<b>49</b>
<b>ANNEX B: ACCREDITATION CERTIFICATE.....</b>	<b>50</b>



## 1. Summary of Test Report

### 1.1 Test Standard (s)

No.	Test Standard	Title	Version
1	FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	2021-10-01
2	FCC Part 22	PUBLIC MOBILE SERVICES	2021-10-01
3	FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	2021-10-01
4	FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	2021-10-01

Note: FCC 47 CFR Part 2 is not in the scope of ISO 17025 accreditation by A2LA.

### 1.2 Reference Documents

No.	Test Standard (Include the version of standard)	Title	Version
1	ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
2	ANSI C63.26	American National Standard of Procedures for Compliance Testing of Licensed Transmitters Used in Licensed Radio	2015
3	KDB 971168 D01	Measurement Guidance for Certification of Licensed Digital Transmitters	v03r01

### 1.3 Summary of Test Results

Measurement Items	Sub-clause of FCC	Verdict
Output Power	2.1046/22.913(a)/24.232(c)/27.50(d)(4)	Pass
Peak-to-Average Ratio	24.232(d)/27.50(a)	Pass
99%Occupied Bandwidth	2.1049(h)(i)/ 22.917(b)	Pass
-26dB Emission Bandwidth	22.917(b)/24.238(b)/27.53(h)	Pass
Band Edge at antenna terminals	22.917(a)/24.238(a)/27.53(h)	Pass
Frequency stability	2.1055/24.235/27.54	Pass
Conducted Spurious mission	2.1053/22.917(a)/24.238(a)/27.53(h)	Pass
Emission Limit	2.1051/22.917/24.238/22.913/24.232/27.53(h)	Pass

Note:

The SIM8262A-M2, manufactured by SIMCom Wireless Solutions Limited is a new product for testing. Industrial Internet Innovation Center (Shanghai) Co., Ltd. only performed test cases which identified with Pass/Fail/Inc result in section 1.3.

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

#### 1.4 Data Provided by Applicant

No.	Item(s)	Data
1	WCDMA Band 2	0.98dBi
2	WCDMA Band 4	1.25dBi
3	WCDMA Band 5	1.58dBi

Note: The data of 1.4 is provided by the customer may affect the validity of the test results in this report, and the impact and consequences of this shall be undertaken by the customer.



## 2. General Information of The Laboratory

### 2.1 Testing Laboratory

Lab Name	Industrial Internet Innovation Center (Shanghai) Co.,Ltd.
Address	Building 4, No. 766, Jingang Road, Pudong, Shanghai, China
Telephone	021-68866880
FCC Registration No.	958356
FCC Designation No.	CN1177

### 2.2 Laboratory Environmental Requirements

Temperature	15°C~35°C
Relative Humidity	25%RH~75%RH
Atmospheric Pressure	101kPa

### 2.3 Project Information

Project Manager	Zhang Heng
Test Date	August 30, 2022 to February 28, 2023

### 3. General Information of The Customer

#### 3.1 Applicant

Company	SIMCom Wireless Solutions Limited
Address	SIMCom Headquarters Building, Building 3, No.289 Linhong Road, Changning District, Shanghai, China
Telephone	86 21 3157 5100

#### 3.2 Manufacturer

Company	SIMCom Wireless Solutions Limited
Address	SIMCom Headquarters Building, Building 3, No.289 Linhong Road, Changning District, Shanghai, China



## 4. General Information of The Product

### 4.1 Product Description for Equipment under Test (EUT)

Product	SIMCom Module
Model	SIM8262A-M2
Date of Receipt	S01aa/S05aa/ S05ab:August 29,2022
EUT ID*	S01aa/S05aa/S05ab/S14aa
SN/IMEI	S01aa: 866713060007243 S05aa:/ S05ab:866713060007631
Supported Radio Technology and Bands	WCDMA Band II/IV/V LTE Band 2/4/5/7/12/13/14/17/25/26/30/41/42/43/48/66/71 5G NR n2/n5/n7/n12/n13/n14/n25/n26/n30/n38/n41/n66/n71/n77/n78
Hardware Version	V1.02
Software Version	2212B02X62M44A-M2
FCC ID	2AJYU-8XN0003
NOTE: EUT ID is the internal identification code of the laboratory.	

### 4.2 Description for Auxiliary Equipment (AE)

AE ID*	Description	Model	SN/Remark
AE1	RF Cable	N/A	N/A
NOTE: AE ID is the internal identification code of the laboratory.			

### 4.3 Additional Information

Type of modulation	QPSK/16QAM/64QAM
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## 5. Test Configuration Information

### 5.1 Laboratory Environmental Conditions

#### 5.1.1 Permanent Facilities

<b>Relative Humidity</b>	Min. = 45%, Max. = 55 %		
<b>Atmospheric Pressure</b>	101kPa		
<b>Temperature</b>	Normal	Minimum	Maximum
	25°C	-30°C	70°C
<b>Working Voltage of EUT</b>	Normal	Minimum	Maximum
	3.8V	3.135V	4.4V

### 5.2 Test Equipments Utilized

Radiated emission test system

No.	Name	Model	S/N	Manufacturer	Cal. Date	Cal. Interval
1	Universal Radio Communication Tester	CMU200	123123	R&S	October 17,2022	1 Year
					May 10,2021	1.5 Years
2	Universal Radio Communication Tester	CMW500	104178	R&S	October 17,2022	1 Year
					May 10,2021	1.5 Years
3	EMI Test Receiver	ESU40	100307	R&S	February 23, 2022	1 Year
4	TRILOG Broadband Antenna	VULB9163	VULB9163-515	Schwarzbeck	March 11, 2022	1 Year
5	Double- ridged Waveguide Antenna	ETS-3117	00135890	ETS	March 9, 2022	2 Years
6	2-Line V-Network	ENV216	101380	R&S	February 21, 2022	1 Year
					December 12,2022	1 Year
7	EMI Test Software	EMC32 V9.15.00	N/A	R&S	N/A	N/A

Anechoic chamber

Fully anechoic chamber by ETS.

Conducted Test System

No.	Name	Model	S/N	Manufacturer	Cal. Date	Cal. Interval
1	Universal Radio Communication	CMW500	148874	R&S	August. 23,2022	1 Year



	Tester					
2	Vector Signal Analyzer	FSQ26	101091	R&S	August. 23,2022	1 Year
3	Programmable power supply	Keithley 2303	4039070	Keithley	July 12,2022	1 Year
4	Eagle Test Software	Eagle V3.3	N/A	ECIT	N/A	N/A
5	Temperature Chamber	B-TF-107C	BTF107C-201804107	BoYi	June 30,2022	1Year

### 5.3 Measurement Uncertainty

Measurement uncertainty for all the testing in this report are within the limit specified in 3IN documents.

The detailed measurement uncertainty is defined in 3IN documents.

Measurement Items	Range	Confidence Level	Calculated Uncertainty
Maximum Peak Output Power	30MHz-3600MHz	95%	±0.544dB
EBW and VBW	30MHz-3600MHz	95%	±62.04Hz
Transmitter Spurious Emission-Conducted	30MHz-2GHz	95%	±0.90dB
Transmitter Spurious Emission-Conducted	2GHz-3.6GHz	95%	±0.88dB
Transmitter Spurious Emission-Conducted	3.6GHz-8GHz	95%	±0.96dB
Transmitter Spurious Emission-Conducted	8GHz-20GHz	95%	±0.94dB
Transmitter Spurious Emission-Radiated	9KHz-30MHz	95%	±5.66dB
Transmitter Spurious Emission-Radiated	30MHz-1000MHz	95%	±4.98dB
Transmitter Spurious Emission-Radiated	1000MHz -18000MHz	95%	±5.06dB
Transmitter Spurious Emission-Radiated	18000MHz -40000MHz	95%	±5.20dB
Frequency stability	1MHz-16GHz	95%	±62.04Hz

## 6. Test Results

### 6.1 Output Power

#### 6.1.1 Summary

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

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

#### 6.1.2 Conducted

##### 6.1.2.1 Method of Measurements

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

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

The power was measured with Rhode & Schwarz Spectrum Analyzer FSQ(peak).

These measurements were done at 3 frequencies, 1852.4 MHz, 1880.0MHz and 1907.6MHz for WCDMA Band II; 1732.6 MHz, 1712.4MHz and 1752.6MHz for WCDMA Band IV; 826.4MHz, 836.6MHz and 846.6MHz for WCDMA Band V. (bottom, middle and top of operational frequency range).

##### 6.1.2.2 Test procedures

The transmitter output port was connected to base station.

Set the EUT at maximum power through base station.

Select lowest, middle, and highest channels for each band and different modulation.

Measure maximum average power for other modulation signal.

##### 6.1.2.3 Limit

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

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

27.50d(4) Fixed, mobile, and portable (hand-held) 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.

##### 6.1.2.4 Test Procedure

The transmitter output power was connected to calibrated attenuator, the other end of which was

connected to signal analyzer. Transmitter output power was read off the power in dBm. The power

outputs at the transmitter antenna port was determined by adding the value of attenuator to the signal analyzer reading.

##### 6.1.2.5 Test Setup



##### 6.1.2.6 WCDMA Test Condition

RBW	VBW	Sweep time	Span
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10MHz	30MHz	Auto	50MHz
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### 6.1.2.7 Measurement results

#### WCDMA Band 2

WCDMA	CH	Frequency (MHz)	output power (dBm)QPSK	output power (dBm)16QAM
	9262	1852.4	23.97	23.97
	9400	1880	23.88	23.91
	9538	1907.6	23.92	23.92

#### WCDMA Band 4

WCDMA	CH	Frequency (MHz)	output power (dBm)QPSK	output power (dBm)16QAM
	1312	1712.4	24.09	24.02
	1412	1732.4	23.59	23.60
	1513	1752.6	23.97	23.97

#### WCDMA Band 5

WCDMA	CH	Frequency (MHz)	output power (dBm)QPSK	output power (dBm)16QAM
	4132	826.4	25.52	25.51
	4183	836.6	25.42	25.43
	4233	846.6	25.38	25.39

## 6.2 Peak-to-Average Power Ratio

Method of test measurements please refer to KDB971168 D01 v03 clause 5.7.

### 6.2.1 PAPR Limit

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

### 6.2.2 Test procedures

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

Select the spectrum analyzer CCDF function.

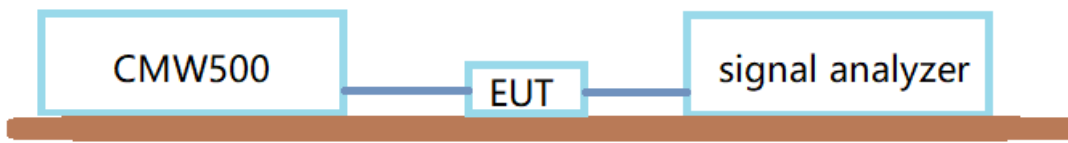
Set RBW  $\geq$  signal's occupied bandwidth.

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

Sweep time  $\geq$  1s.

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

### 6.2.3 Test Setup



### 6.2.4 Test results:

WCDMA Band 2			
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880	1907.6
PAPR(dB)	3.01	2.92	3.14

WCDMA Band 4			
Channel	1312	1412	1513
Frequency (MHz)	1712.4	1732.4	1752.6
PAPR(dB)	3.11	2.88	3.14

WCDMA Band 5			
Channel	4132	4183	4233



Frequency (MHz)	826.4	836.6	846.6
PAPR(dB)	2.37	2.95	2.53

### 6.3 99% Occupied Bandwidth

Method of test please refer to KDB971168 D01 v03 clause 4.0.

#### 6.3.1. Occupied Bandwidth

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

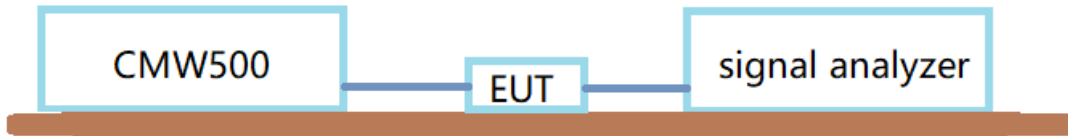
#### 6.3.2 Test Procedure

The EUT output RF connector was connected with a short cable to the signal analyzer.

RBW was set to about 1% of emission BW, VBW >= 3 times RBW,.

99% bandwidth were measured, the occupied bandwidth is delta frequency between the two points where the display line intersects the signal trace.

#### 6.3.3 Test Setup



#### 6.3.4 Test result

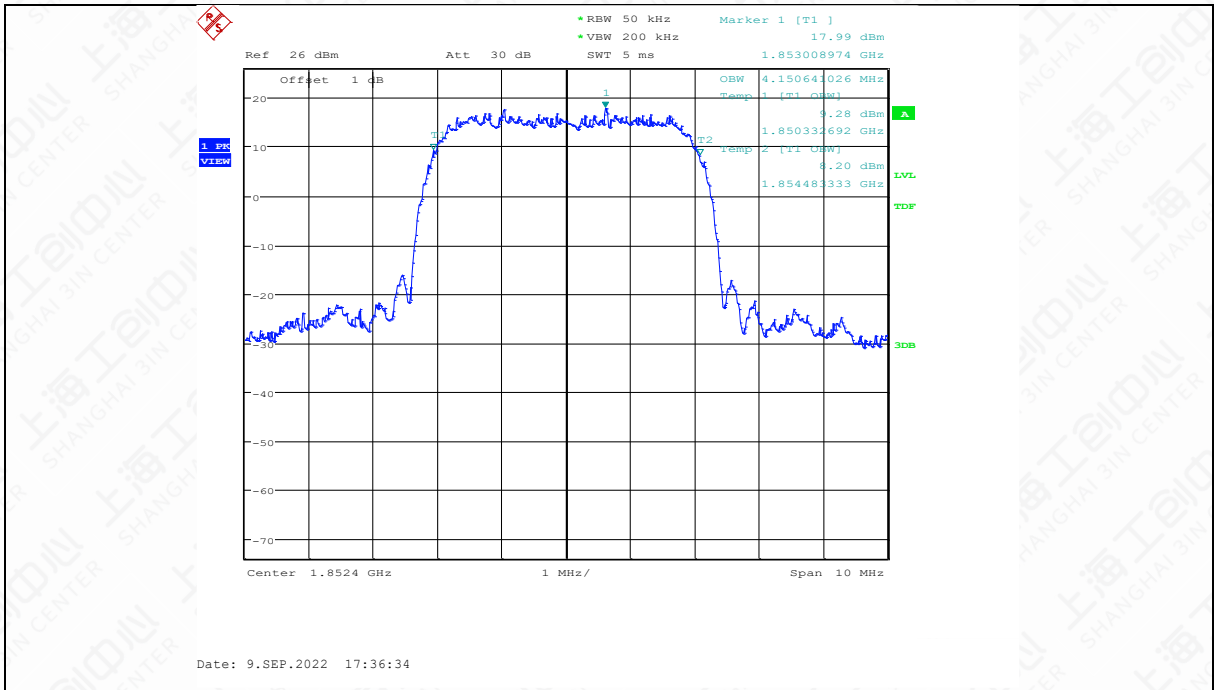
##### WCDMA Band 2 (99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)
1852.4	4.151
1880	4.183
1907.6	4.167

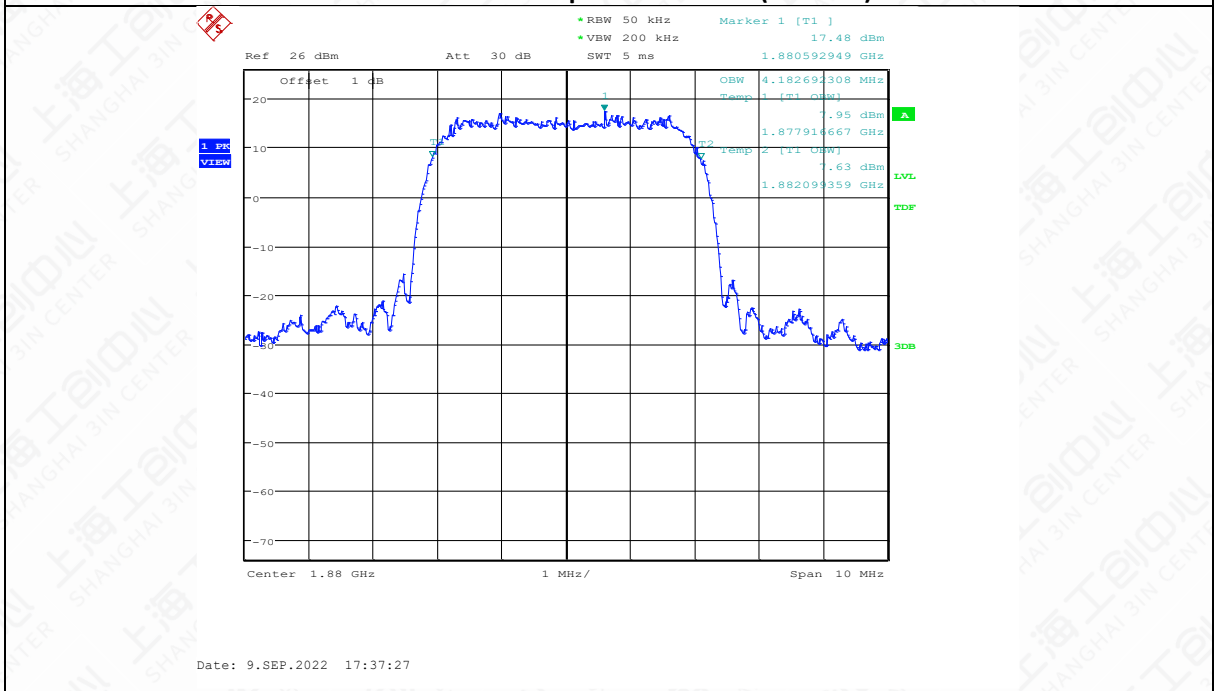
##### WCDMA Band 2 (99%)

Channel 9262-Occupied Bandwidth (99% BW)

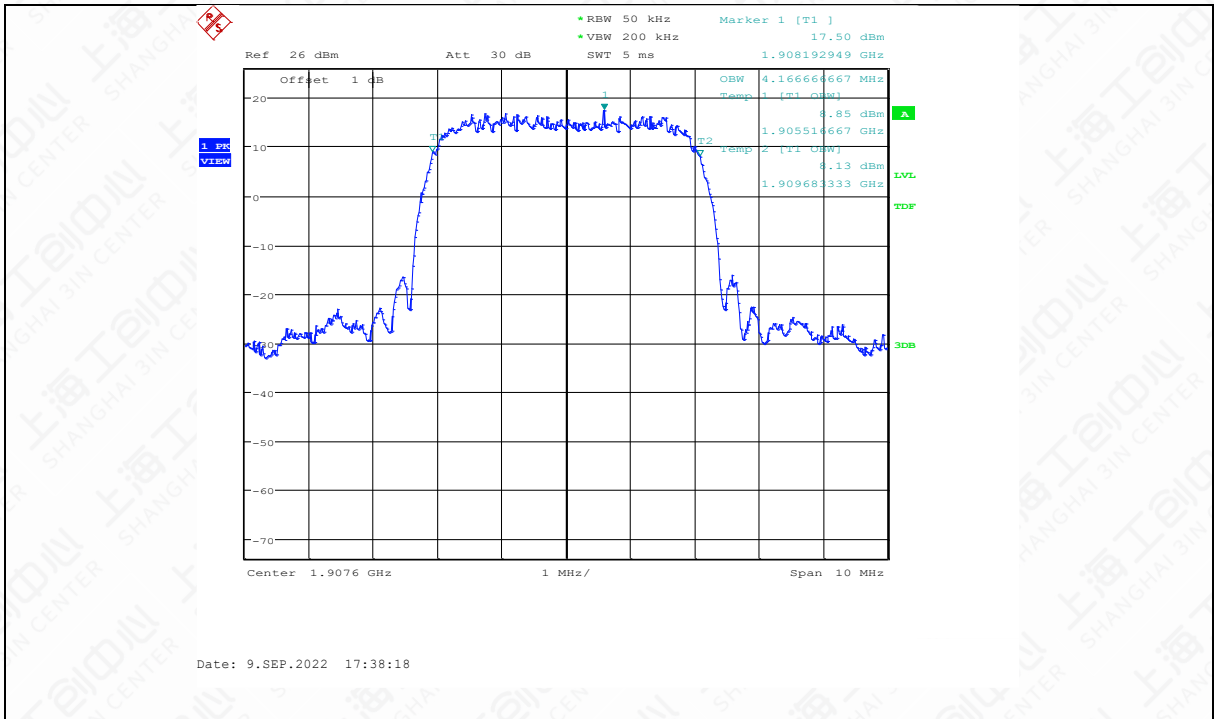




Channel 9400-Occupied Bandwidth (99% BW)



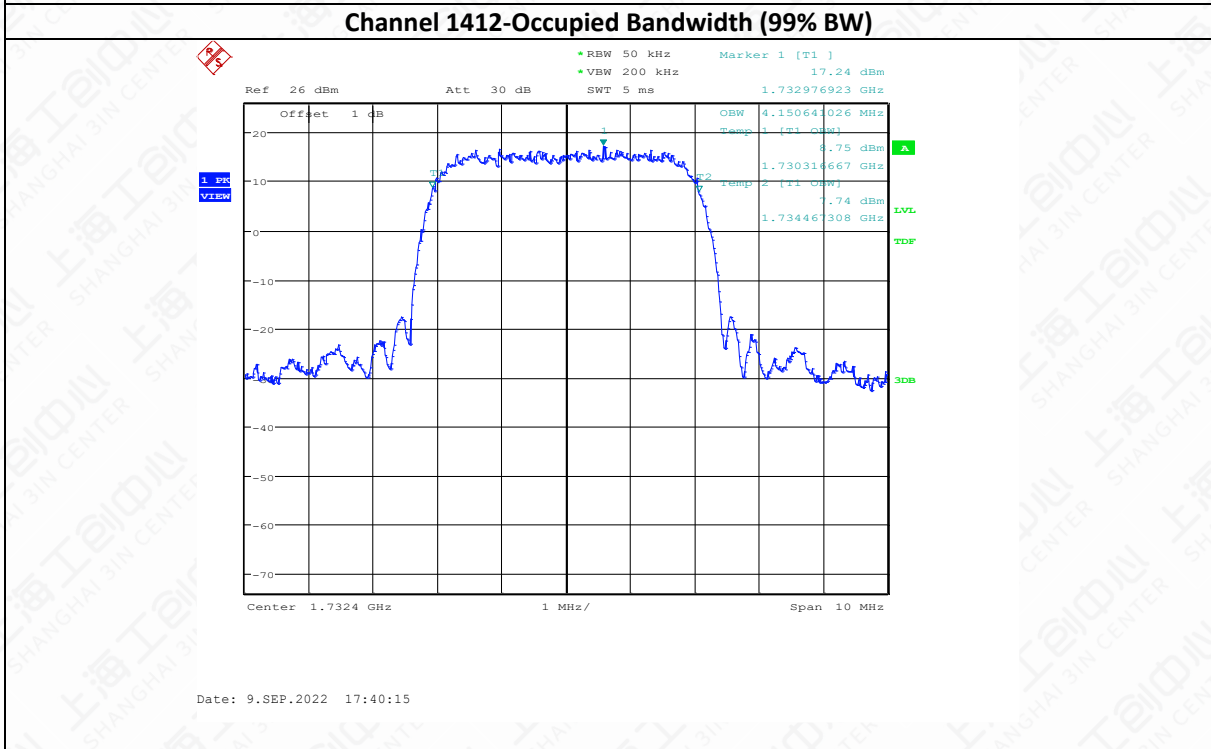
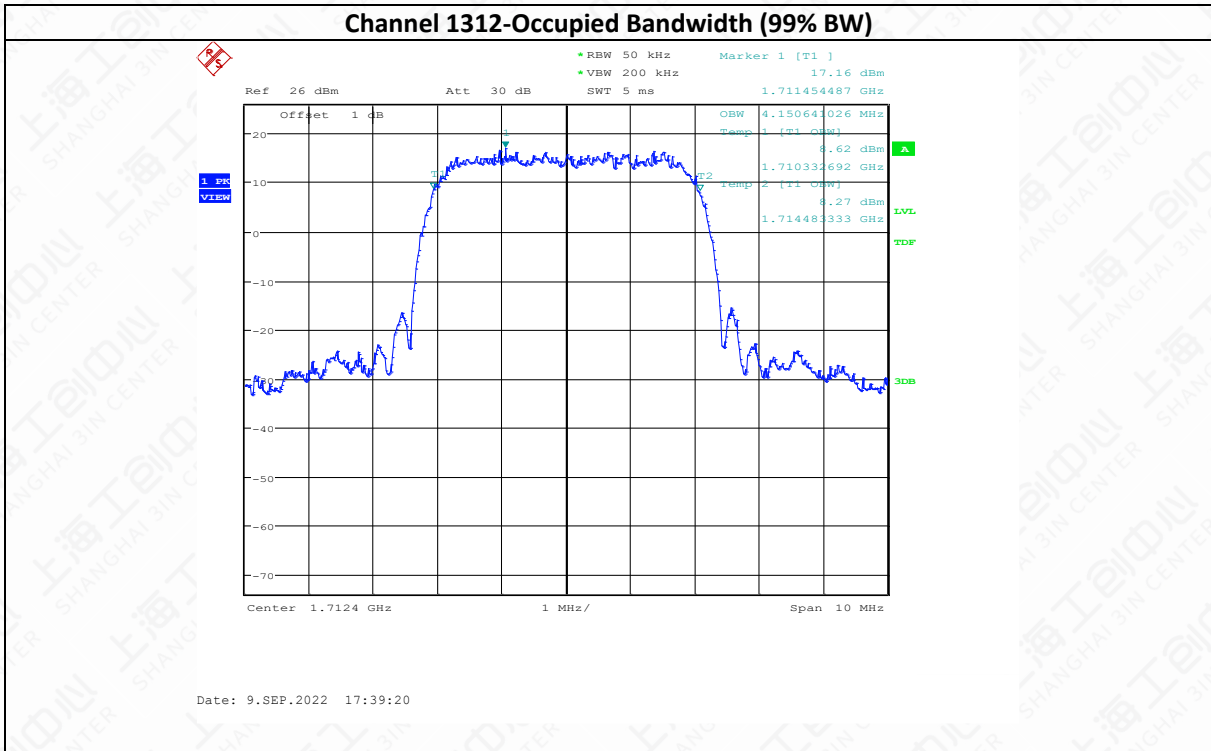
Channel 9538-Occupied Bandwidth (99% BW)

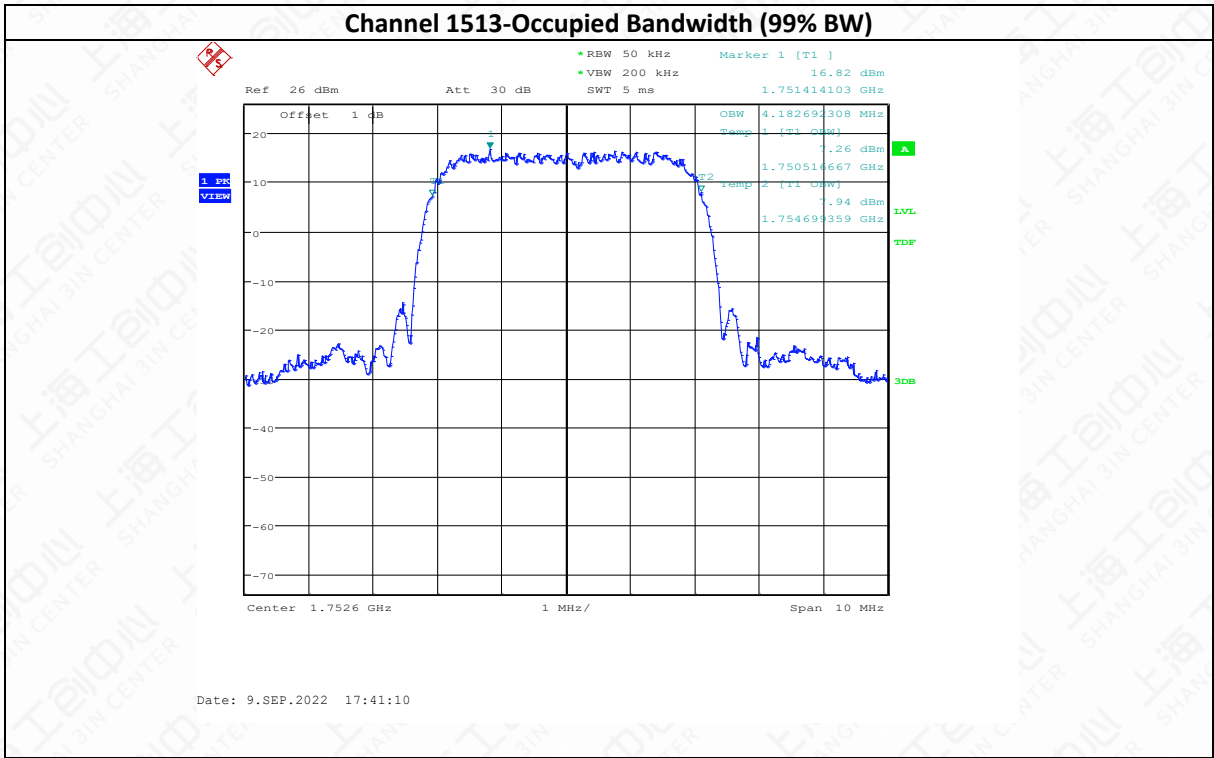




**WCDMA Band 4 (99%)**

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)
1712.4	4.151
1732.4	4.151
1752.6	4.183

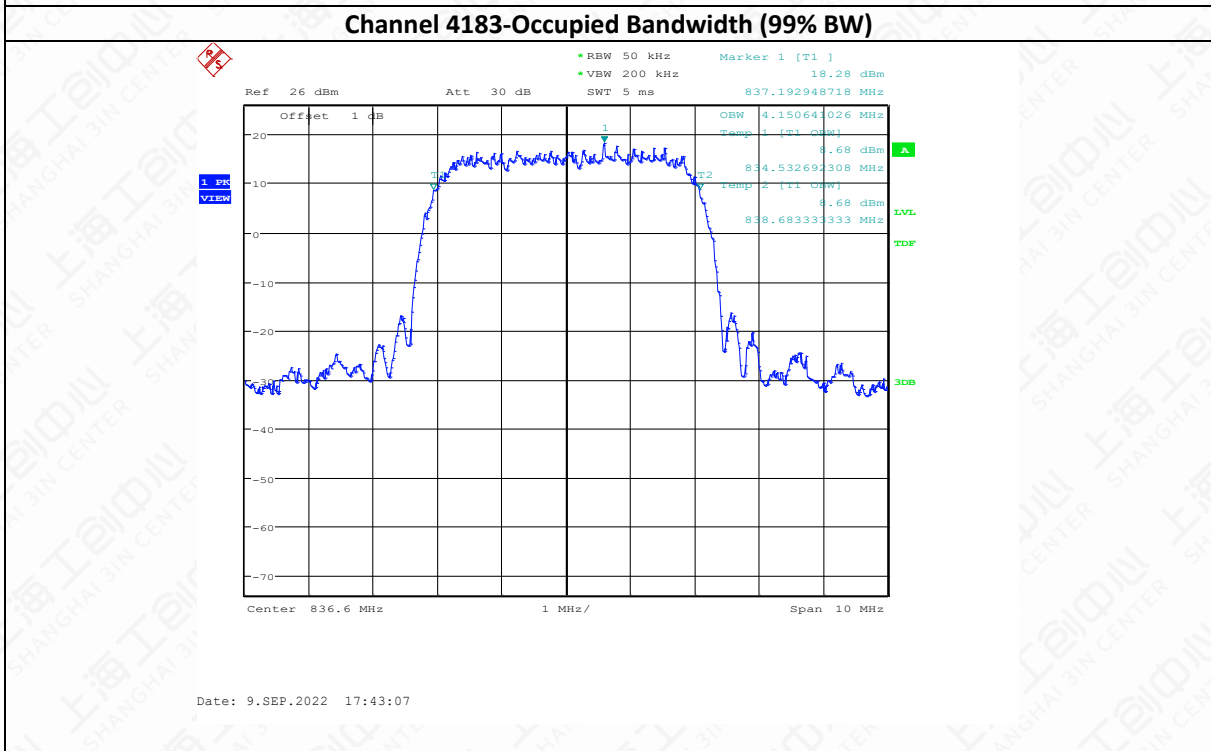
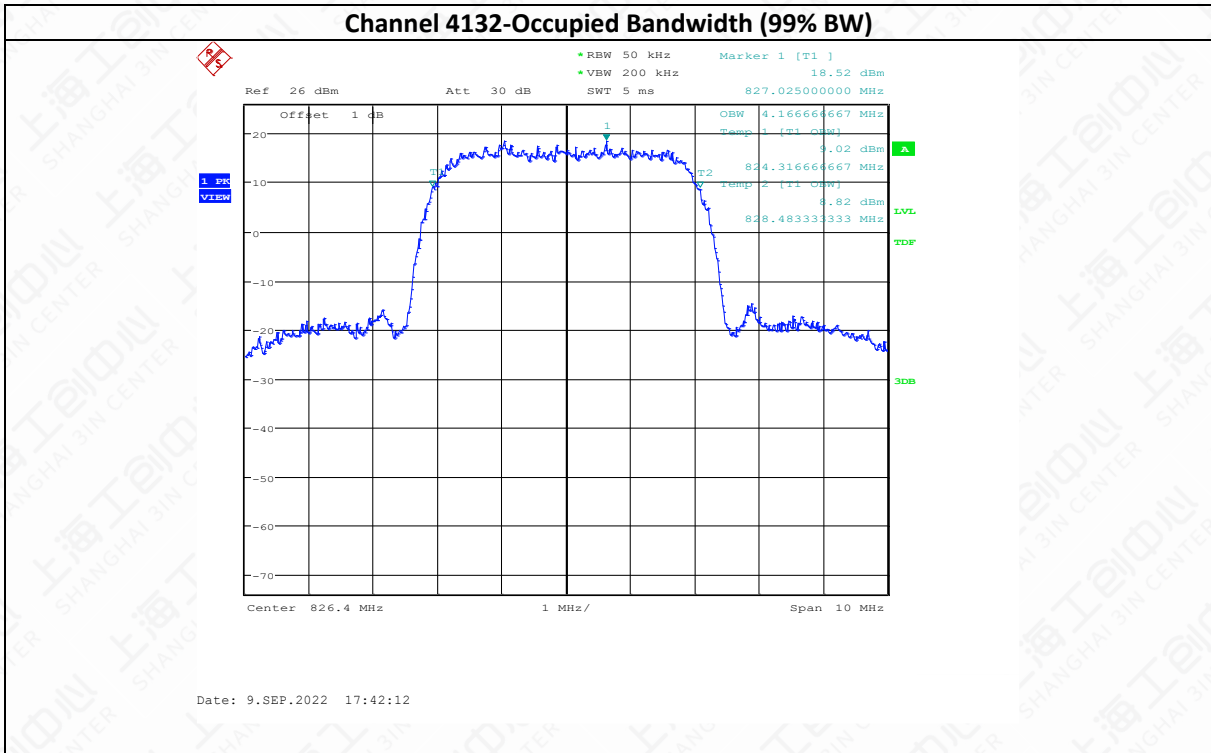
**WCDMA Band 4 (99%)**


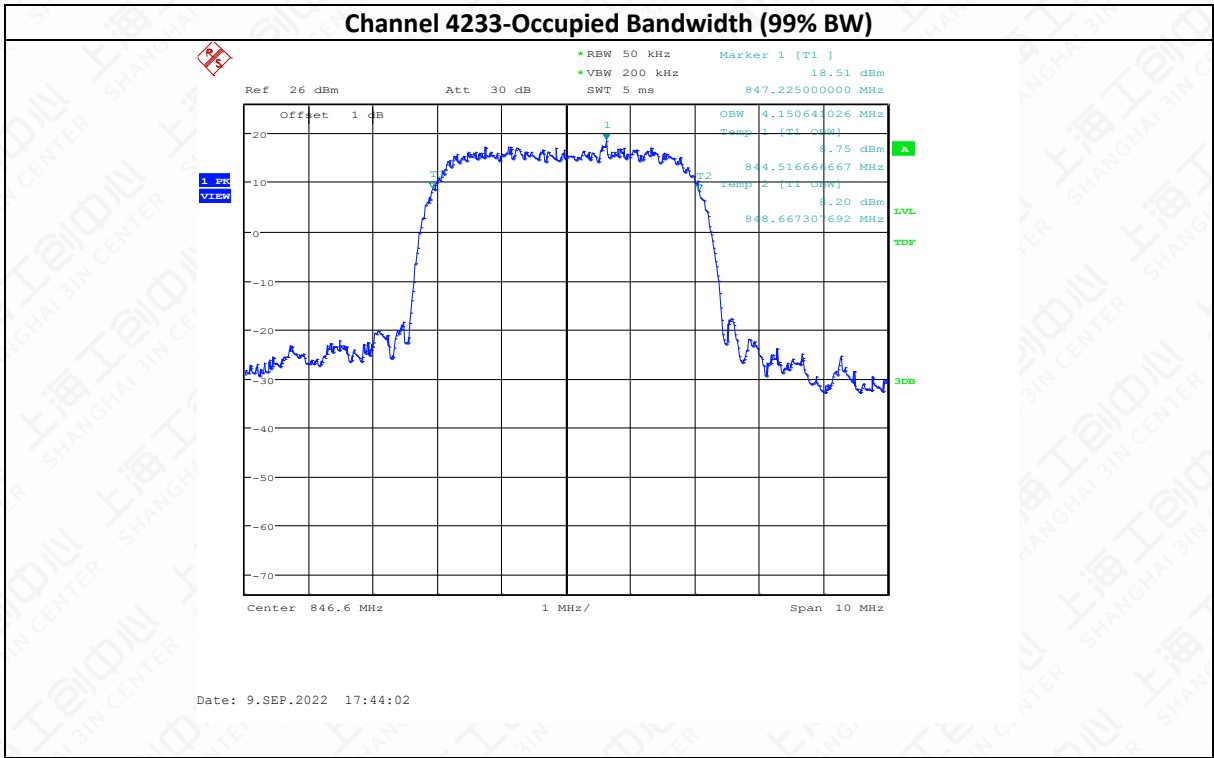




**WCDMA Band 5 (99%)-QPSK**

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)
826.4	4.167
836.6	4.151
846.6	4.151

**WCDMA Band 5 (99%)**






## 6.4 -26dB Emission Bandwidth

Method of test please refer to KDB971168 D01 v03 clause 4.0.

### 6.4.1. -26dB Emission Bandwidth

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

### 6.4.2 Test Procedure:

The EUT output RF connector was connected with a short cable to the signal analyzer.

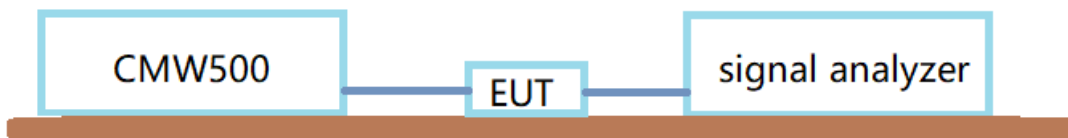
RBW was set to about 1% of emission BW, VBW  $\geq$  3 times RBW,.

26dB bandwidth were measured, the occupied bandwidth is delta frequency between the two points where the display line intersects the signal trace.

### 6.4.3 Measurement methods:

For WCDMA: signal analyzer setting as: RBW=50KHz; VBW=200KHz; Span=10MHz.

### 6.4.4 Test Setup



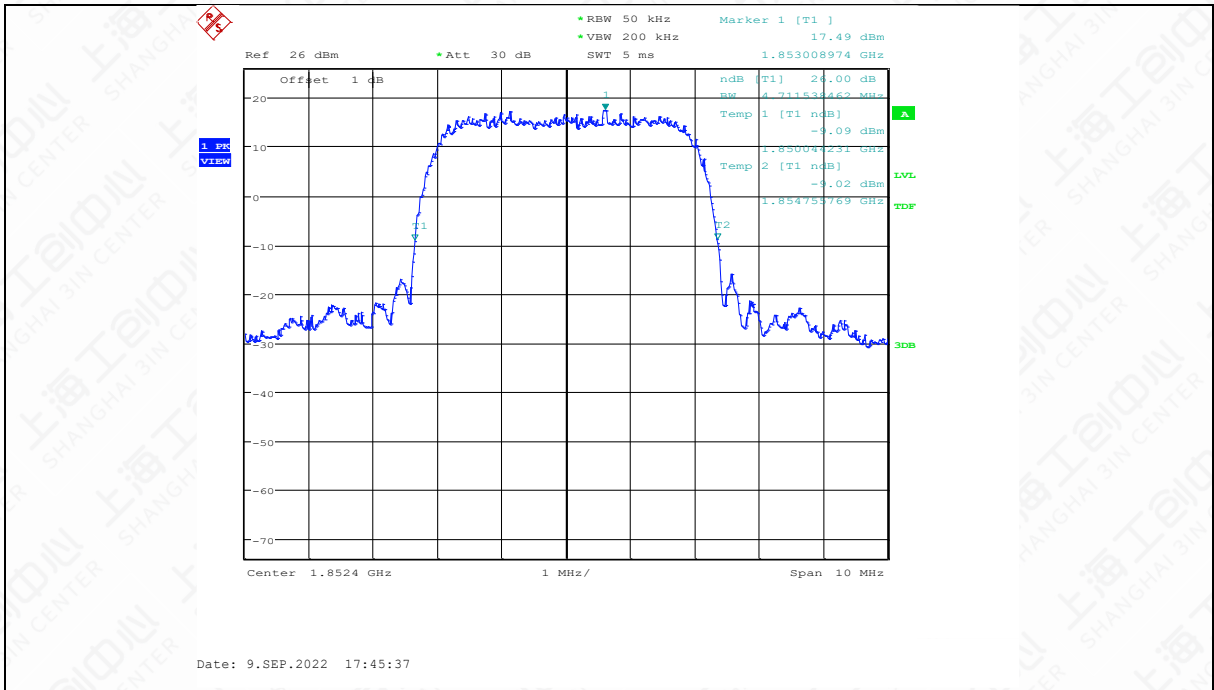
### 6.4.5 Test results:

#### WCDMA Band 2 (-26dBc)-QPSK

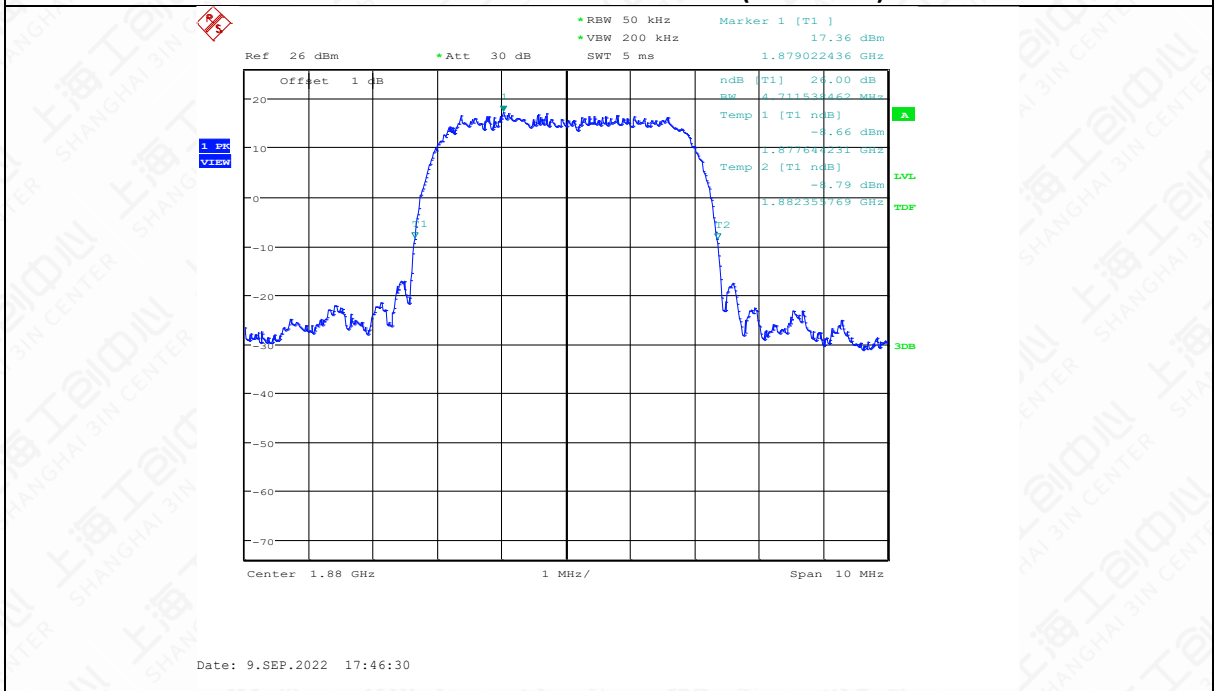
Frequency (MHz)	Emission Bandwidth (-26dBc)(MHz)
1852.4	4.712
1880	4.712
1907.6	4.696

#### WCDMA Band 2 (-26dBc)

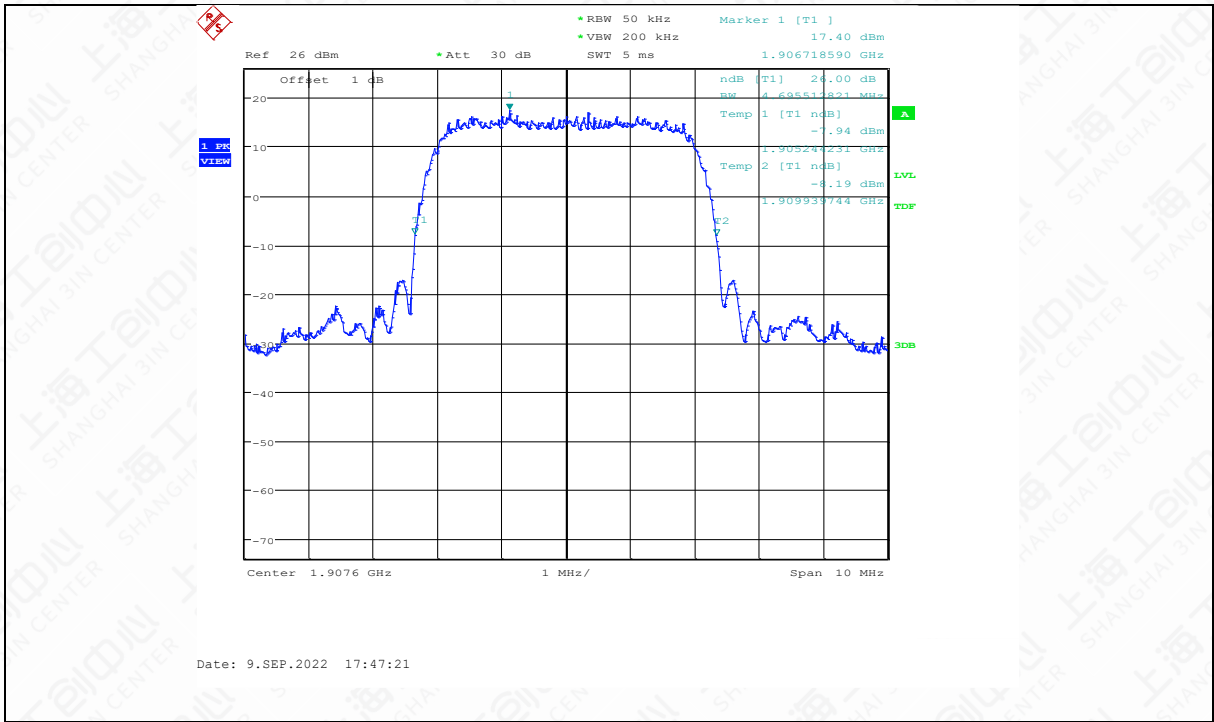
Channel 9262-Emission Bandwidth (-26dBc BW)
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Channel 9400-Emission Bandwidth (-26dBc BW)



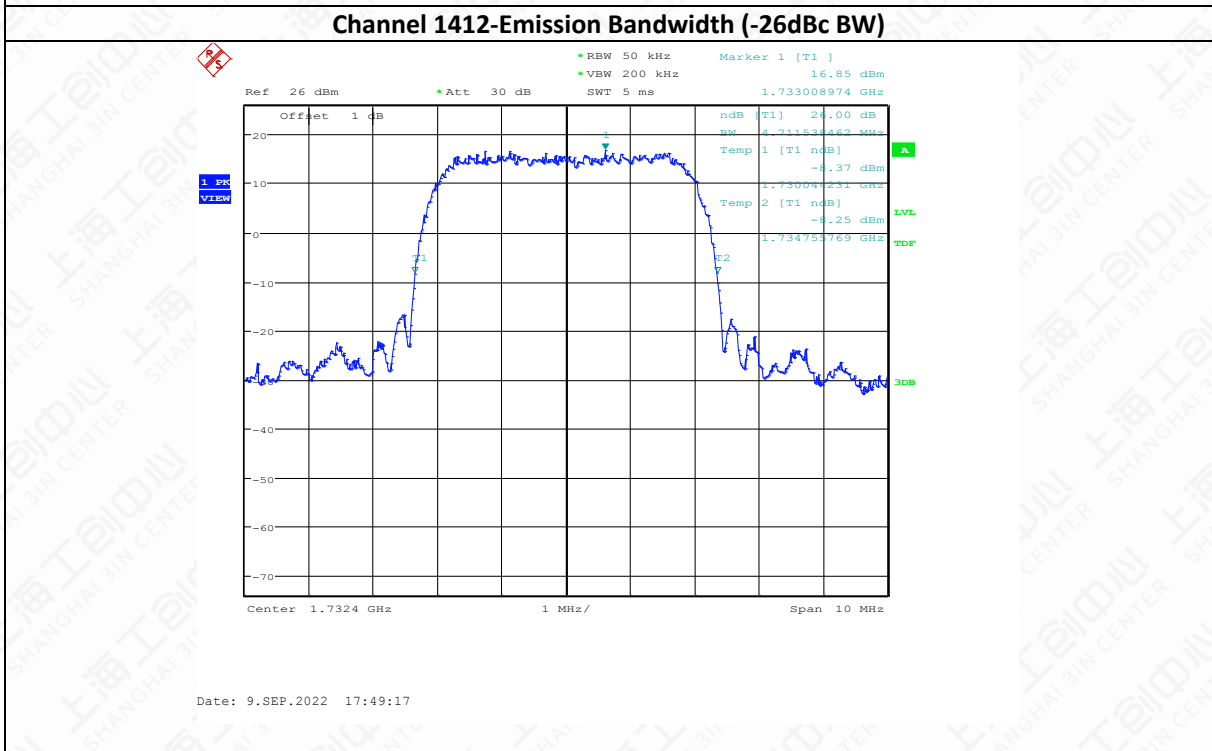
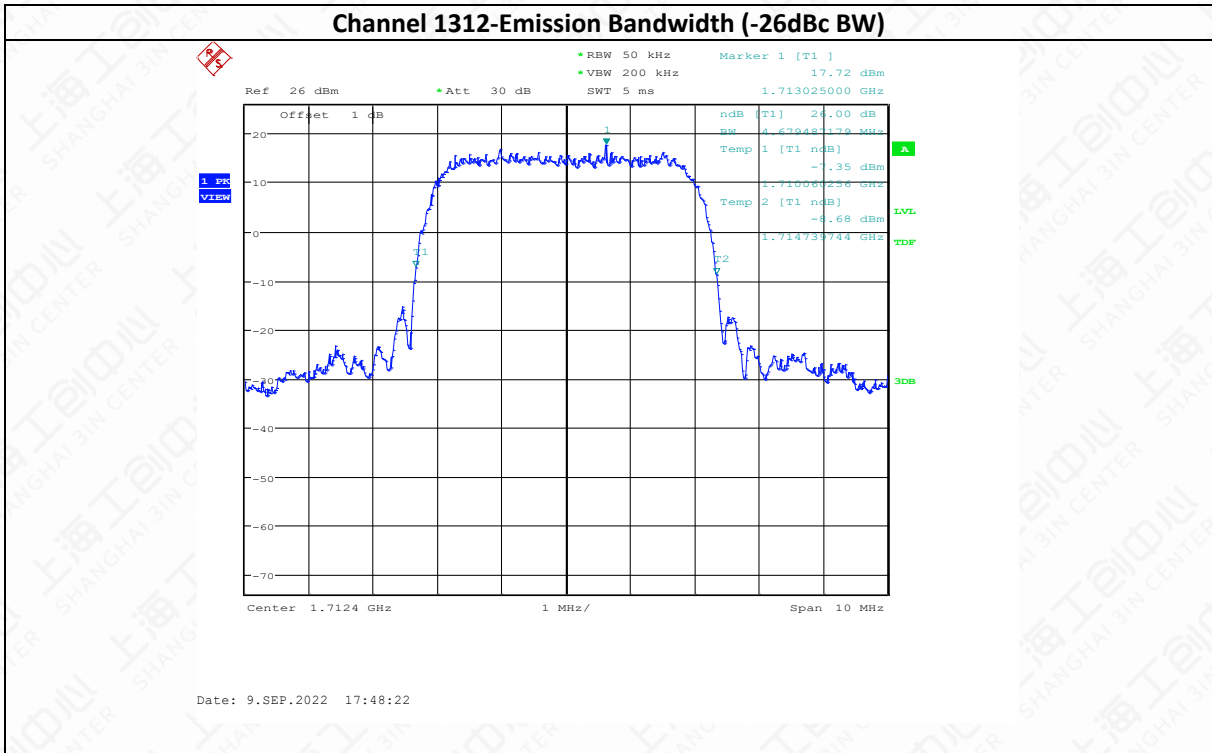
Channel 9538-Emission Bandwidth (-26dBc BW)

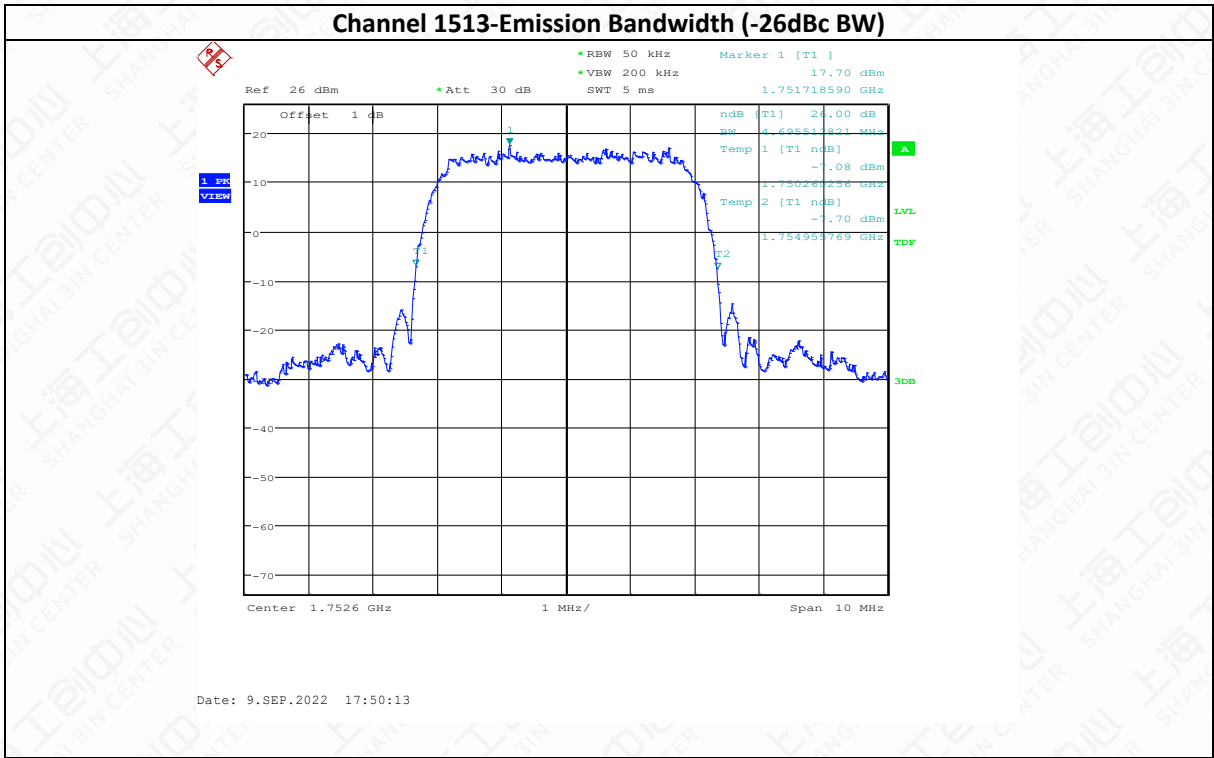




**WCDMA Band 4 (-26dBc)**

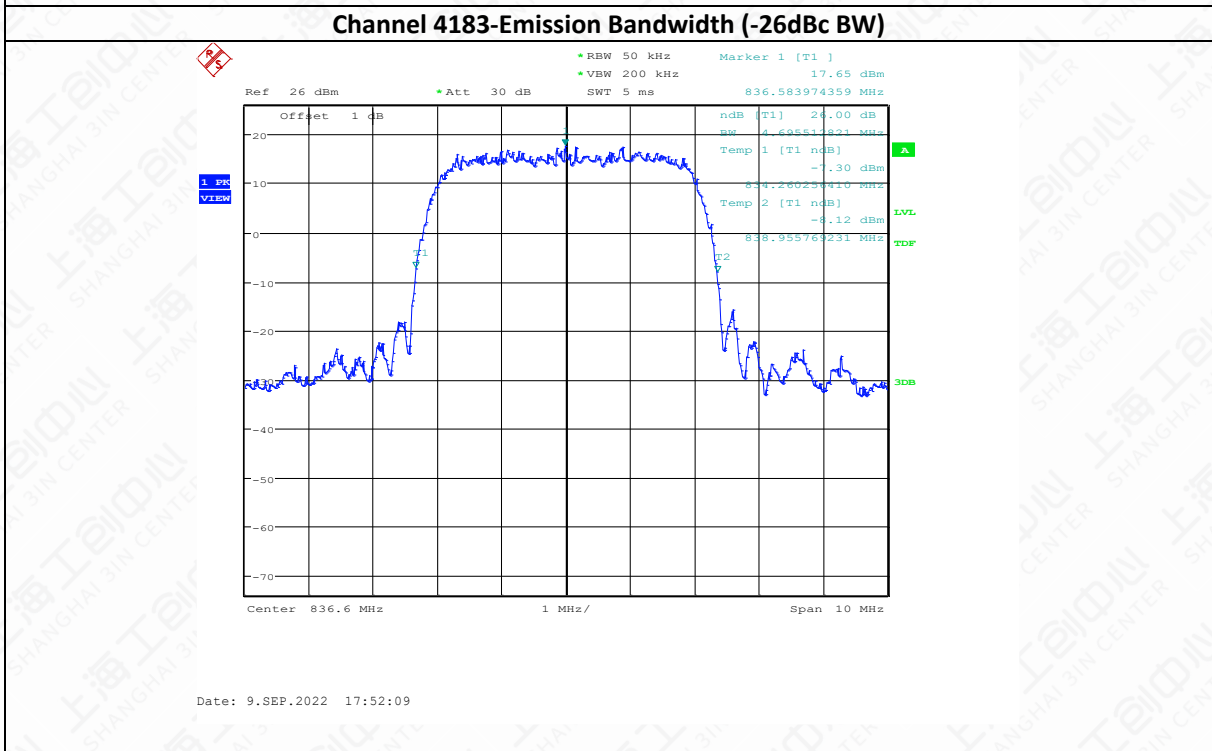
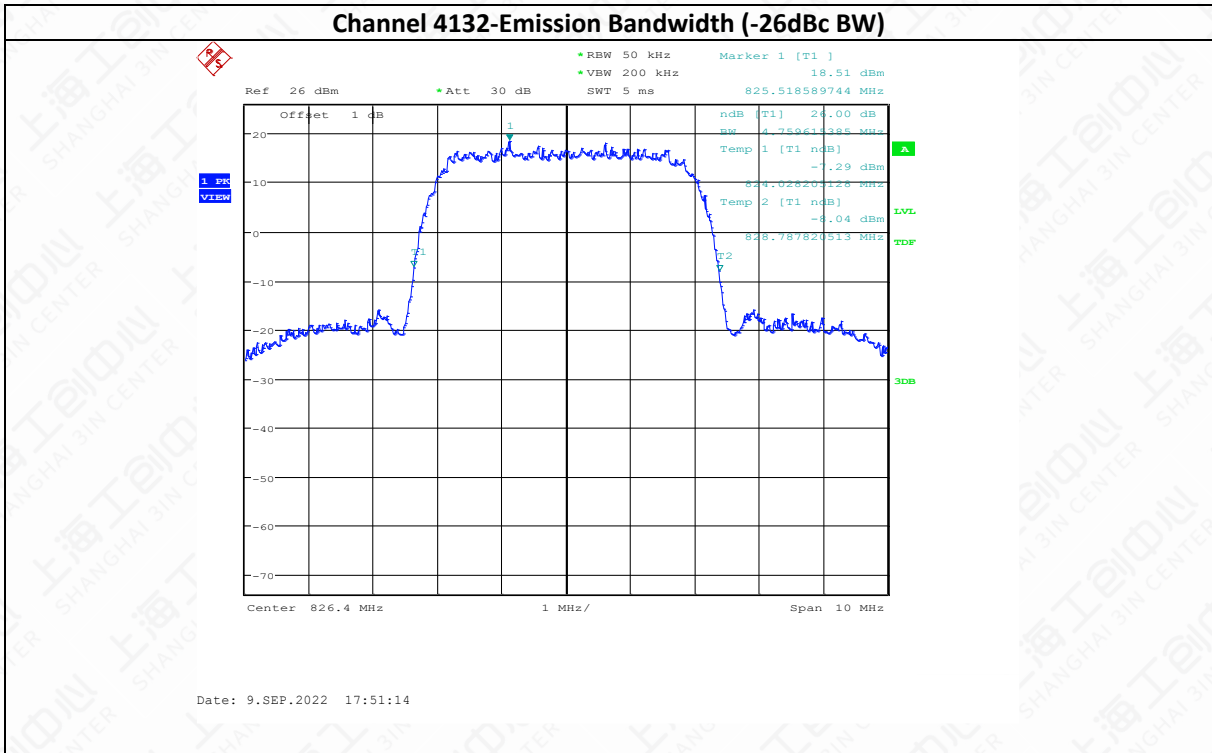
Frequency (MHz)	Emission Bandwidth (-26dBc)(MHz)
1712.4	4.679
1732.4	4.712
1752.6	4.696

**WCDMA Band 4 (-26dBc)**


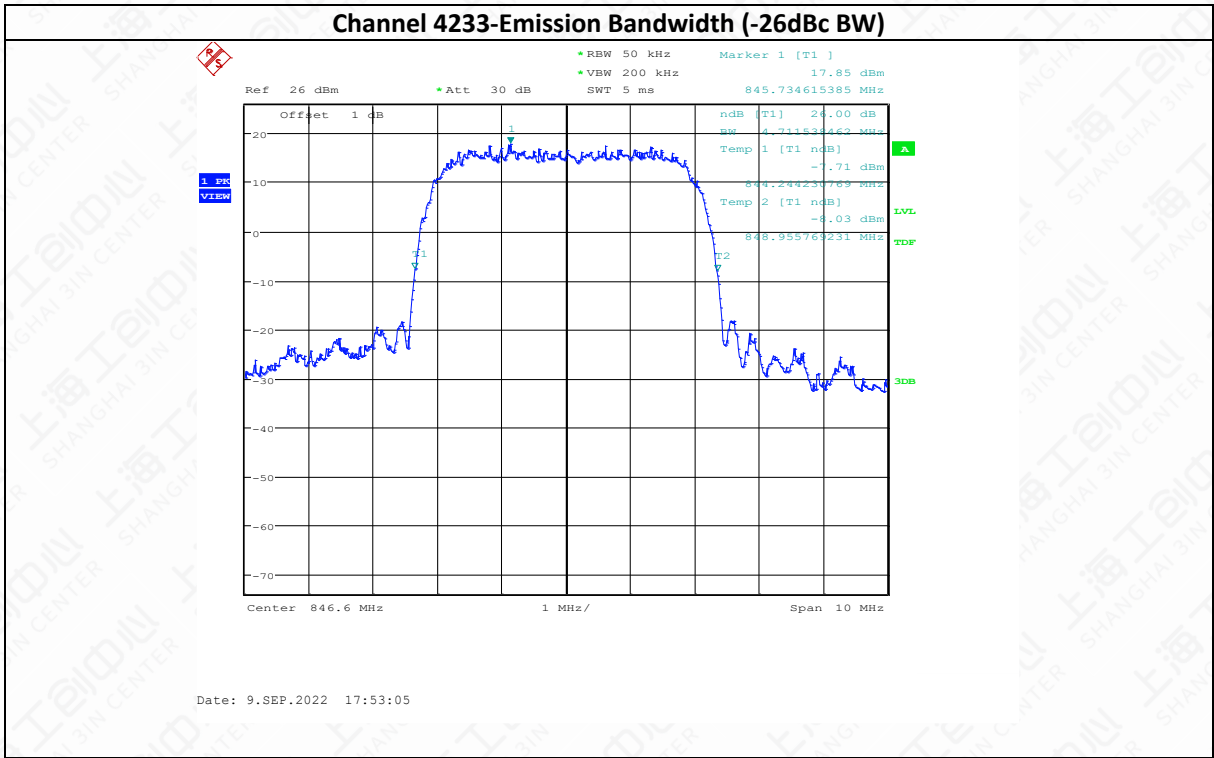


**WCDMA Band 5 (-26dBc)**

Frequency (MHz)	Emission Bandwidth (-26dBc)(MHz)
826.4	4.760
836.6	4.696
846.6	4.712

**WCDMA Band 5 (-26dBc)**






## 6.5 Band Edge at antenna terminals

Method of test measurements please refer to KDB971168 D01 v03 clause 6

### 6.5.1 Limit:

Part 22.917(a),24.238(a) state 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.

Part 27.53(h) state that 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  $43+10\text{Log}(P)$  dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

### 6.5.2 Test procedure:

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

In the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

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

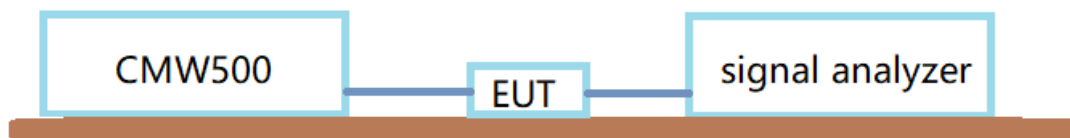
The limit line is derived from  $43+10\log(P)$  Db below the transmitter power P(Watts)

$$=P(W)-[43+10\log(P)](\text{Db})$$

$$=[30+10\log(P)](\text{dBm})-[43+10\log(P)](\text{Db})$$

$$=-13\text{dBm}$$

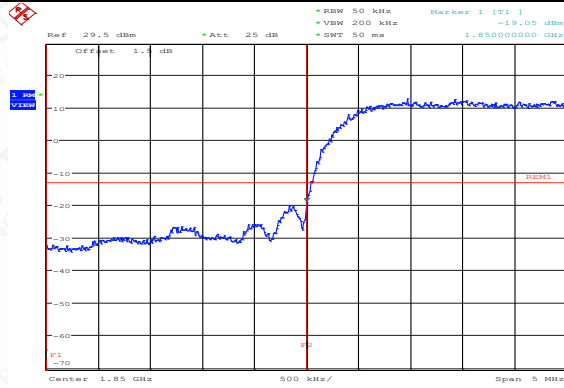
### 6.5.3 Test Setup



### 6.5.4 Test Result:

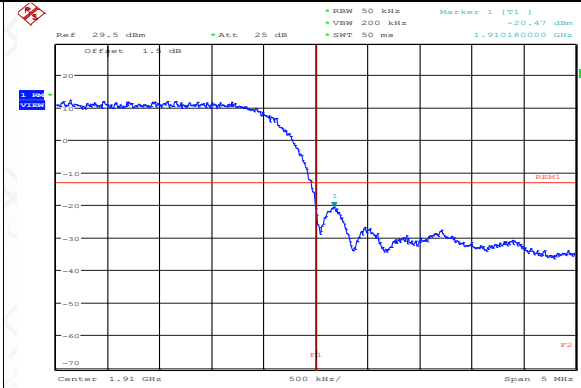
WCDMA BAND 2

WCDMA\_OB2,1852.4MHz\_BandEdge



Date: 9\_SEP.2022 17:54:58

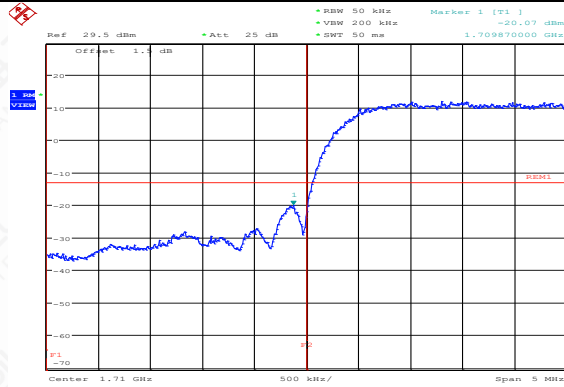
WCDMA\_OB2,1907.6MHz\_BandEdge



Date: 9\_SEP.2022 17:55:46

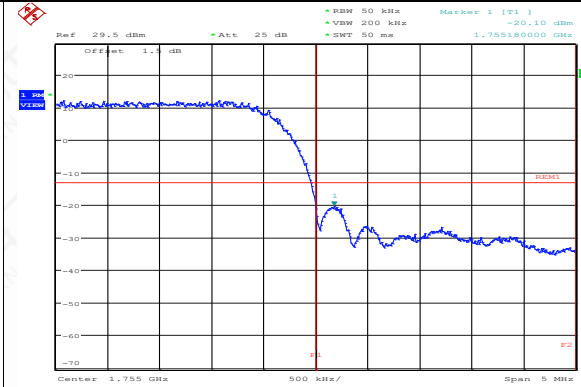
WCDMA BAND 4

WCDMA\_OB4,1712.4MHz\_BandEdge



Date: 9\_SEP.2022 17:56:36

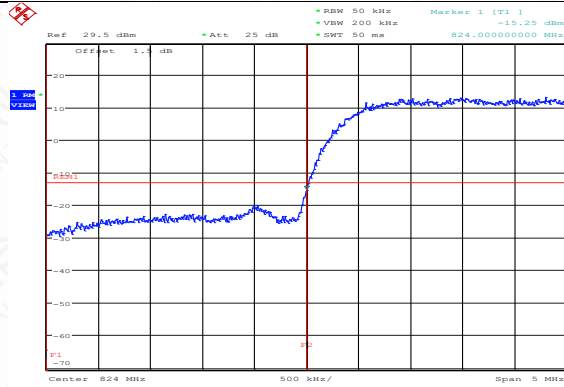
WCDMA\_OB4,1752.6MHz\_BandEdge



Date: 9\_SEP.2022 17:57:24

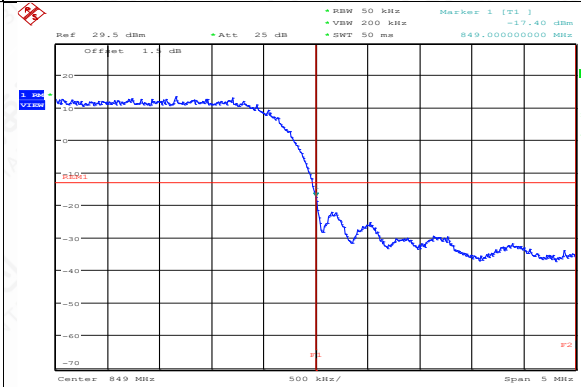
WCDMA BAND 5

WCDMA\_OB5,826.4MHz\_BandEdge



Date: 9\_SEP.2022 17:58:14

WCDMA\_OB5,846.6MHz\_BandEdge



Date: 9\_SEP.2022 17:59:01



## 6.6 Frequency Stability

Method of test measurements please refer to KDB971168 D01 v03 clause 9

### 6.6.1 Method of Measurement and test procedures

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at  $-10^{\circ}\text{C}$ .
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on mid channel of WCDMA BANDII, WCDMA BANDIV and WCDMA BANDV, 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  $-10^{\circ}\text{C}$  increments from  $-10^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ . Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at  $+50^{\circ}\text{C}$ .
7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 C increments from  $+50^{\circ}\text{C}$  to  $-10^{\circ}\text{C}$ . Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to  $\pm 0.5^{\circ}\text{C}$  during the measurement procedure.

### 6.6.2. Measurement Limit

#### 6.6.2.1. For Hand carried battery powered equipment

According to the JTC standard the GSM frequency stability of the carrier shall be accurate to within 0.1ppm of the received frequency from the base station. And the WCDMA is 2.5ppm. This accuracy is sufficient to meet Sec.24.235, Frequency Stability. 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 between 3.6VDC and 4.35VDC, with a nominal voltage of 3.8VDC. 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. These voltages was varied from 85% to 115%.

#### 6.6.2.2. For equipment powered by primary supply voltage

According to the JTC standard the GSM frequency stability of the carrier shall be accurate to within 0.1ppm of the received frequency from the base station. And the WCDMA is 2.5ppm. This accuracy is sufficient to meet Sec.24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1)

applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

### 6.6.3 Test Setup



### 6.6.4 Test results

#### WCDMA Band 2-QPSK

#### Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	Offset(Hz)	Frequency error(ppm)
20	3.8		
50		-12.259	0.007
40		-12.76	0.007
30		-11.158	0.006
10		-12.417	0.007
0		-10.993	0.006
-10		-8.512	0.005
-20		-6.173	0.003
-30		-14.963	0.008

#### Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	Offset(Hz)	Frequency error(ppm)
3.135	20	-6.881	0.004
4.4		-13.919	0.007



**WCDMA Band 4-QPSK**
**Frequency Error vs Temperature**

Temperature(°C)	Voltage(V)	Offset(Hz)	Frequency error(ppm)
20	3.8		
50		-8.39	0.009
40		-5.815	0.006
30		-12.331	0.014
10		-4.056	0.005
0		-10.664	0.012
-10		-10.321	0.011
-20		-11.93	0.013
-30		-7.317	0.008

**Frequency Error vs Voltage**

Voltage(V)	Temperature(°C)	Offset(Hz)	Frequency error(ppm)
3.135	20	-11.036	0.012
4.4		-6.566	0.007



**WCDMA Band 5-QPSK**
**Frequency Error vs Temperature**

Temperature(°C)	Voltage(V)	Offset(Hz)	Frequency error(ppm)
20	3.8		
50		-7.575	0.009
40		-8.054	0.01
30		-11.687	0.014
10		-6.022	0.007
0		-9.685	0.012
-10		-5.064	0.006
-20		-9.656	0.012
-30		-8.404	0.01

**Frequency Error vs Voltage**

Voltage(V)	Temperature(°C)	Offset(Hz)	Frequency error(ppm)
3.135	20	-8.762	0.01
4.4		-9.634	0.012

## 6.7 Conducted Spurious Emission

### 6.7.1 WCDMA Measurement Method and test procedures

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

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of WCDMA Band II and WCDMA BANDIV, these equate to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For WCDMA Band V, data taken from 30 MHz to 10GHz.

2. The sweep time is set automatically by instrument itself. That should be the optimal sweep time for the span and the RBW. If the sweep time is too short, that is sweep is too fast, the sweep result is not accurate; If the sweep time is too long, that is sweep is too low, some frequency components may be lost. The instrument will give a optimal sweep time according the selected span and RBW.

3. The procedure to get the conducted spurious emission is as follows:

The trace mode is set to MaxHold to get the highest signal at each frequency;

Wait 25 seconds;

Get the result.

4. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

#### WCDMA Band II Transmitter

Channel	Frequency (MHz)
9262	1852.40
9400	1880.00
9538	1907.60

#### WCDMA Band IV Transmitter

Channel	Frequency (MHz)
1312	1712.40
1413	1732.40
1513	1752.60

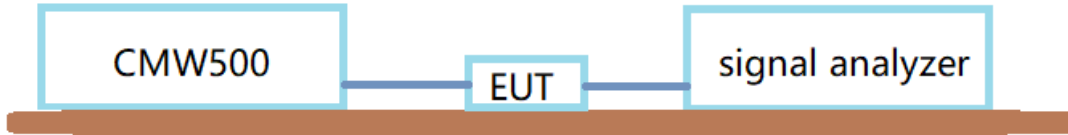
#### WCDMA Band V Transmitter

Channel	Frequency (MHz)
4132	826.40
4183	836.60



4233	846.60
------	--------

### 6.7.1.1 Test Setup



### 6.7.1.2 Measurement Limit

Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

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

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.

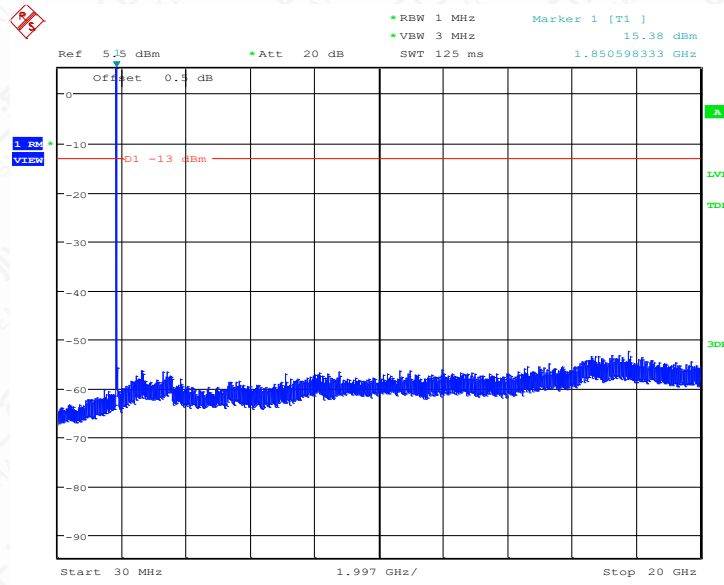
### 6.7.1.3 Measurement result

#### WCDMA Band 2-QPSK

Channel 9262:30MHZ - 20000MHZ

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

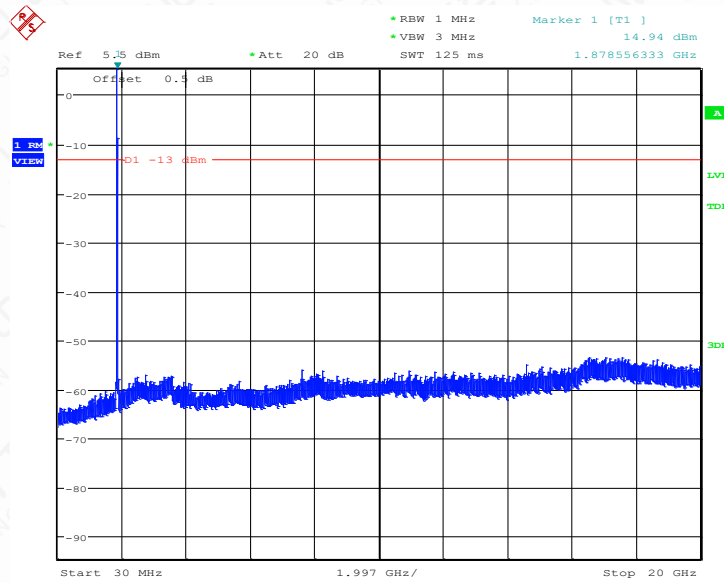




Date: 13.FEB.2023 12:28:28

**Channel 9400:30MHZ - 20000MHZ**

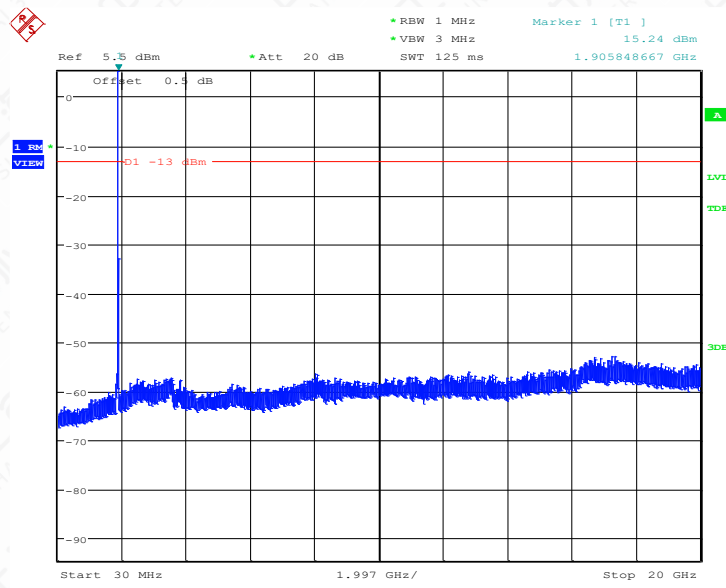
**NOTE: peak above the limit line is the carrier frequency.**



Date: 13.FEB.2023 12:29:01

**Channel 9538:30MHZ - 20000MHZ**

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

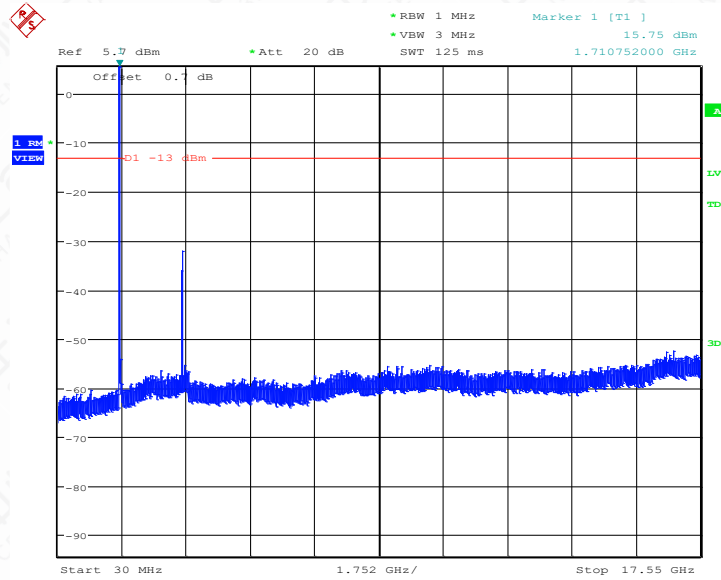


Date: 13.FEB.2023 12:29:38

WCDMA Band 4-QPSK

Channel 1312:30MHZ - 17550MHZ

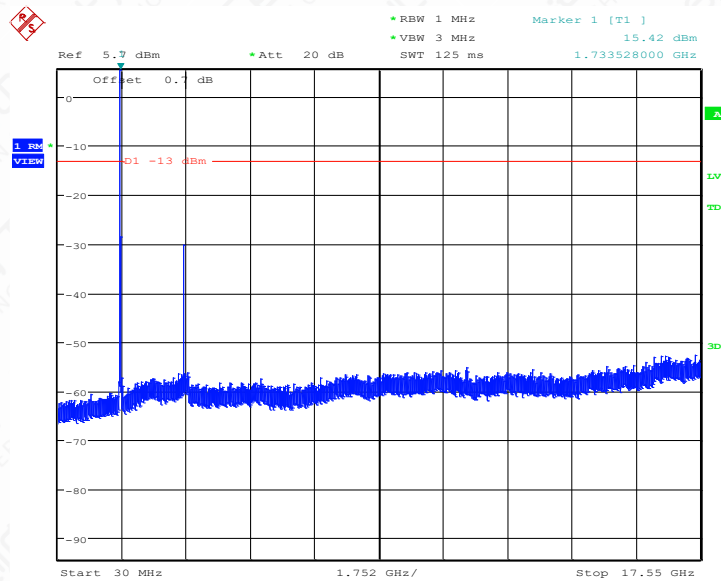
NOTE: peak above the limit line is the carrier frequency.



Date: 13.FEB.2023 12:30:15

Channel 1412:30MHZ - 17550MHZ

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

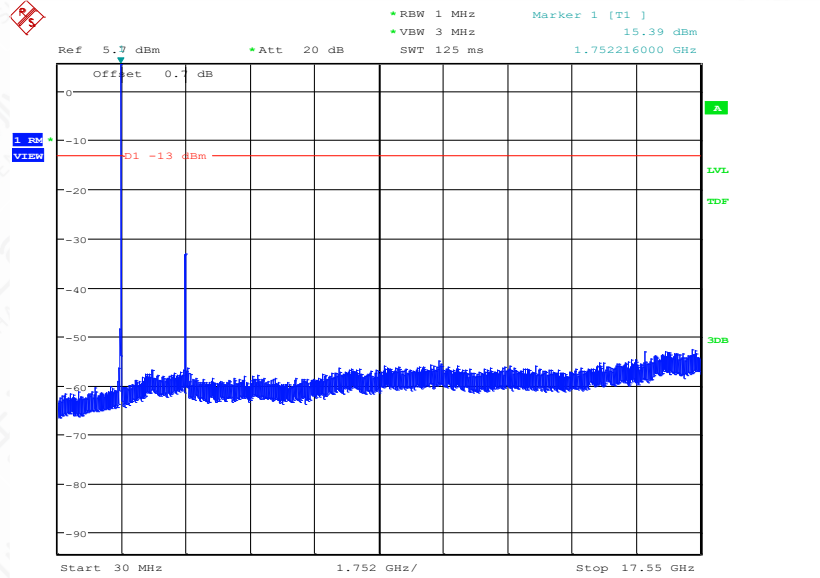


Date: 13.FEB.2023 12:30:51



Channel 1513:30MHZ - 17550MHZ

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

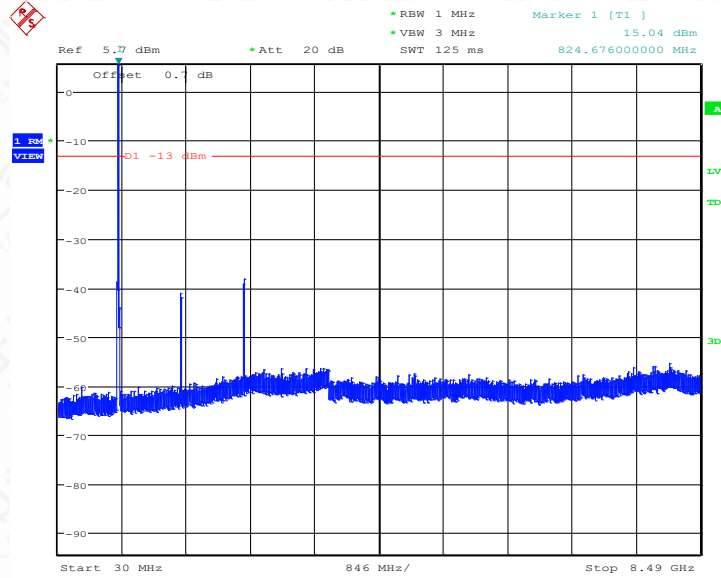


Date: 13.FEB.2023 12:31:26

WCDMA Band 5-QPSK

Channel 4132:30MHZ - 8490MHZ

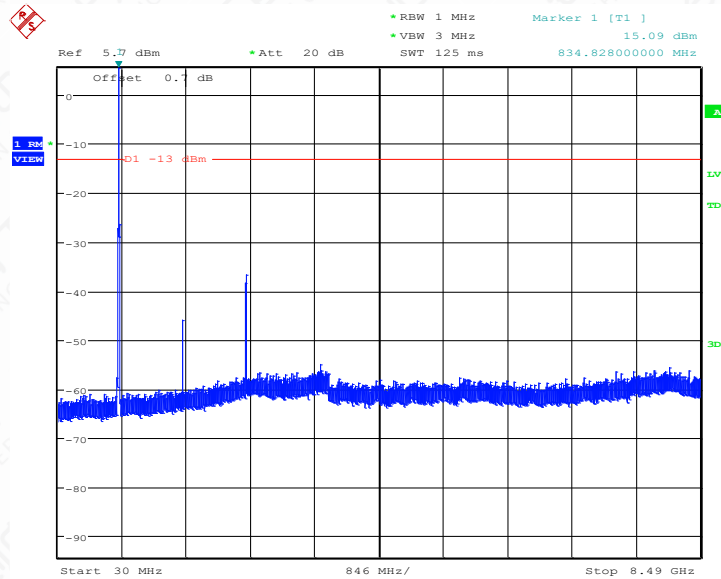
NOTE: peak above the limit line is the carrier frequency.



Date: 13.FEB.2023 12:32:05

Channel 4183:30MHZ - 8490MHZ

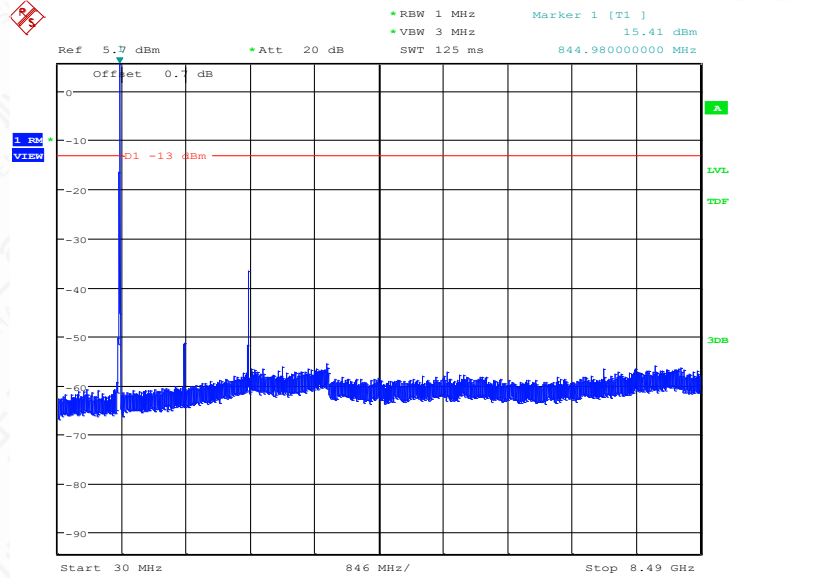
NOTE: peak above the limit line is the carrier frequency.



Date: 13.FEB.2023 12:32:40

Channel 4233:30MHZ - 8490MHZ

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



Date: 13.FEB.2023 12:33:16



## 6.8 Radiated

### 6.8.1 EIRP

#### 6.8.1.1 WCDMA EIRP

##### 6.8.1.1.1. Description

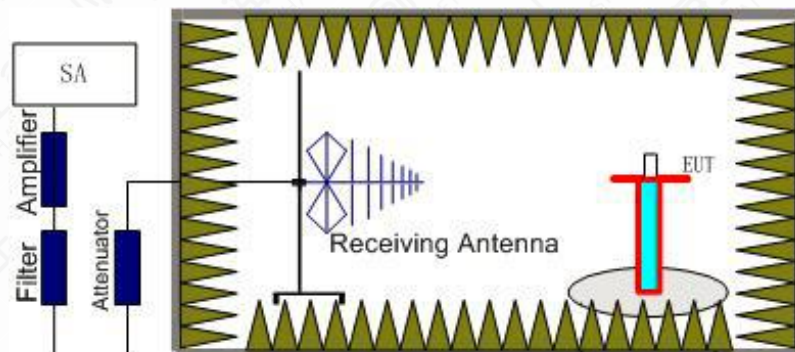
This is the test for the maximum radiated power from the EUT.

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

##### 6.8.1.1.2. Method of Measurement

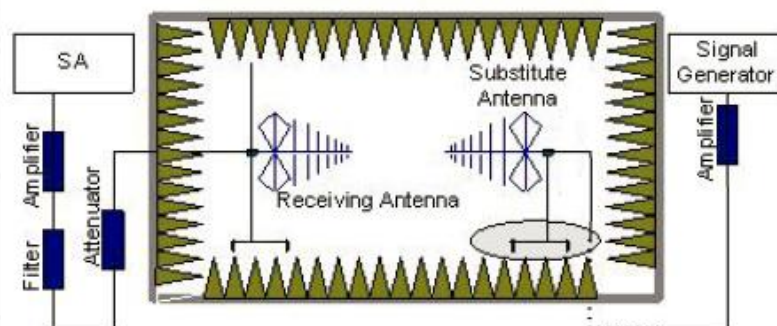
The measurements procedures in TIA-603E-2016 are used.

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

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



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power ( $P_{Mea}$ ) is applied to the input of the

substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. 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 (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.

The measurement results are obtained as described below:

Power (EIRP)=PMea+ PAg -Pcl+ Ga

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.

6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.

#### 6.8.1.1.3. Method of Measurement

27.53(h)state that 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  $43+10\log(P)$  dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB. Limit -13 dBm

#### 6.8.1.1.4.Measurement result

##### WCDMA Band 2

Frequency (MHz)	Peak EIRP (dBm)	Polarization
1852.6	24.95	V
1880.0	24.86	H
1907.4	24.9	V

##### WCDMA Band 4

Frequency(MHz)	Peak EIRP(dBm)	Polarization
1712.4	25.34	H
1732.6	24.84	H
1752.6	25.22	H

##### WCDMA Band 5

Frequency(MHz)	Peak EIRP (dBm)	Peak ERP (dBm)	Polarization
----------------	-----------------	----------------	--------------



826.4	27.1	24.95	H
836.6	27	24.85	H
846.6	26.96	24.81	H

**Note:** the EUT was displayed in several different direction, the worst cases were shown.

## 6.8.2 EMISSION LIMIT

### 6.8.2.1 WCDMA Measurement Method

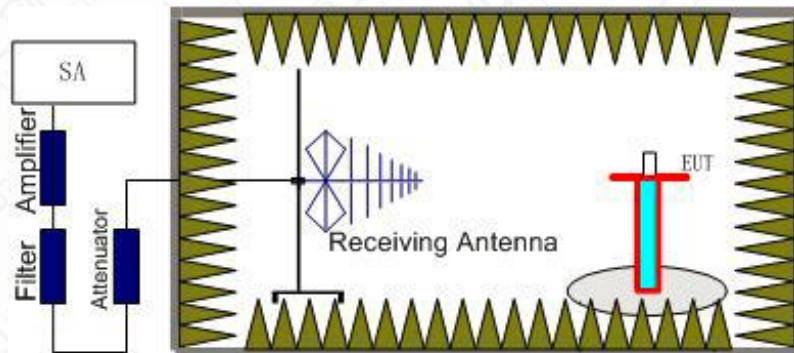
The measurements procedures in TIA-603E-2016 are used.

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

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

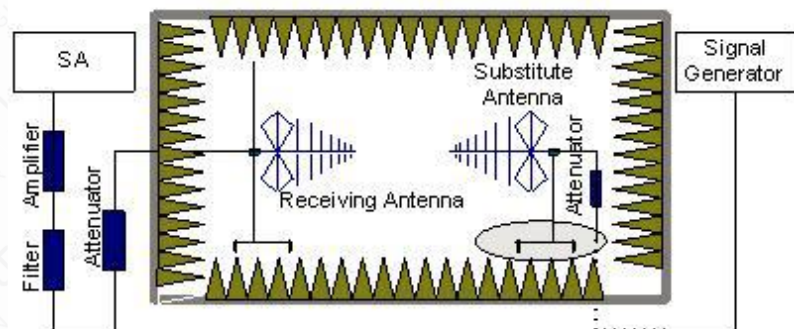
### 6.8.2.2 The procedure of radiated spurious emissions is as follows

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



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

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



In the chamber, an substitution antenna for the frequency band of interest is placed at the



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

4. The Path loss (P<sub>pl</sub>) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G<sub>a</sub>) should be recorded after test.

A amplifier should be connected in for the test.

The Path loss (P<sub>pl</sub>) is the summation of the cable loss .

The measurement results are obtained as described below:

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

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 -2.15dBi

### 6.8.2.3 Measurement Limit

Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

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

After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB. Limit -13 dBm

### 6.8.2.4 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the WCDMA Band V (826.4MHz, 836.6MHz and 846.6MHz) . 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 V 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.

### 6.8.2.5 Measurement Results Table

Frequency	Channel	Frequency Range	Result
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
WCDMA Band V	Low	30MHz~20GHz	Pass
	Middle	30MHz~20GHz	Pass
	High	30MHz~20GHz	Pass

**RSE-W2-H-S01AA**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3842.8	-60.77	6.7	7.9	-59.57	-13	H
5091.2	-59.99	7.9	9.6	-58.29	-13	H
7021.2	-59.92	9.3	11.1	-58.12	-13	H
8797.6	-60.74	10.4	12.7	-58.44	-13	V
11074.9	-55.92	12.1	12.3	-55.72	-13	V
13676.1	-56.73	13.9	12.3	-58.33	-13	H

**RSE-W2-L-S01AA**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
5174.8	-59.31	7.9	9.4	-57.81	-13	V
6640.0	-59.89	9.1	10.9	-58.09	-13	H
8802.4	-60.47	10.4	12.7	-58.17	-13	H
11008.8	-55.68	12.0	12.3	-55.38	-13	H
12750.0	-55.94	12.7	12.3	-56.34	-13	H
15941.0	-51.78	15.0	12.3	-54.48	-13	H

**RSE-W2-M-S01AA**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
4570.0	-60.48	7.4	8.7	-59.18	-13	H
6298.8	-59.83	8.8	10.3	-58.33	-13	H
7488.0	-59.37	9.7	11.6	-57.47	-13	V



9029.2	-60.55	10.4	12.6	-58.35	-13	V
12054.9	-55.94	12.6	12.3	-56.24	-13	H
16860.8	-49.26	16.3	12.3	-53.26	-13	H

**RSE-W4-H-S01AA**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
5222.8	-58.91	8.0	9.4	-57.51	-13	V
8456.4	-61.07	10.2	12.6	-58.67	-13	H
10463.6	-59.54	11.6	12.3	-58.84	-13	H
14002.6	-58.04	13.7	12.3	-59.44	-13	V
15568.2	-53.76	14.6	12.3	-56.06	-13	H
17069.7	-50.12	16.0	12.3	-53.82	-13	V

**RSE-W4-L-S01AA**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
5884.8	-59.48	8.5	10.2	-57.78	-13	V
9139.6	-60.66	10.5	12.6	-58.56	-13	V
11952.7	-58.31	12.6	12.3	-58.61	-13	V
13676.1	-57.33	13.9	12.3	-58.93	-13	V
15762.4	-52.37	14.9	12.3	-54.97	-13	H
17025.6	-49.6	16.0	12.3	-53.3	-13	H

**RSE-W4-M-S01AA**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
5248.8	-59.47	8.0	9.4	-58.07	-13	V
7492.0	-59.72	9.7	11.6	-57.82	-13	V
9684.4	-60.43	10.9	12.7	-58.63	-13	V
12055.2	-56.03	12.6	12.3	-56.33	-13	H
14001.6	-58.01	13.7	12.3	-59.41	-13	V
16721.1	-50.39	15.1	12.3	-53.19	-13	H



**RSE-W5-H-S01AA**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
2436.5	-55.1	5.3	5.6	-54.8	-13	V
3609.2	-61.85	6.5	7.8	-60.55	-13	V
4694.0	-60.82	7.5	9.0	-59.32	-13	H
5817.2	-60.8	8.4	10.2	-59	-13	H
7168.6	-60.72	9.4	11.4	-58.72	-13	V
8839.6	-61.16	10.4	12.7	-58.86	-13	V

**RSE-W5-L-S01AA**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
2615.8	-54.46	5.5	5.6	-54.36	-13	H
3752.4	-60.92	6.6	7.9	-59.62	-13	V
4568.8	-60.52	7.4	8.7	-59.22	-13	H
6088.8	-59.92	8.7	10.2	-58.42	-13	H
7459.6	-60.6	9.7	11.6	-58.7	-13	V
8797.0	-61.09	10.4	12.7	-58.79	-13	H

**RSE-W5-M-S01AA**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1608.2	-63.41	4.2	5.3	-62.31	-13	V
2281.2	-57.22	5.1	5.1	-57.22	-13	V
3712.8	-61.88	6.6	7.9	-60.58	-13	H
4714.8	-60.75	7.5	9.0	-59.25	-13	H
6672.0	-59.85	9.1	10.9	-58.05	-13	V
8802.4	-61.5	10.4	12.7	-59.2	-13	V

## Annex A: Revised History

Version	Revised Content
V00	Initial

## Annex B: Accreditation Certificate



**Accredited Laboratory**

A2LA has accredited

**INDUSTRIAL INTERNET INNOVATION CENTER  
(SHANGHAI) CO., LTD.**  
*Shanghai, People's Republic of China*

for technical competence in the field of  
**Electrical Testing**

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



Presented this 12<sup>th</sup> day of April 2021.



Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 3682.01  
Valid to February 28, 2023

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

**END OF REPORT**