

FCC TEST REPORT

Product Name: Enterprise Key-Based Touch Mobile Computer

Trade Mark:



Model No.: EK430

Add. Model No.: N/A

Report Number: 210520024RFM-1

Test Standards: FCC 47 CFR Part 22 Subpart H
FCC 47 CFR Part 24 Subpart E

FCC ID: SS4EK430

Test Result: PASS

Date of Issue: September 30, 2021

Prepared for:

Bluebird Inc.

3F, 115, Irwon-ro, Gangnam-gu, Seoul, Republic of Korea

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

TEL: +86-755-2823 0888

FAX: +86-755-2823 0886

Prepared by:

Kieron Luo
Project Engineer

Reviewed by:

Henry Lu
Team Leader

Approved by:

Kevin Liang
Assistant Manager

Date: September 30, 2021

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCC23G-V1.1

Version

Version No.	Date	Description
V1.0	September 30, 2021	Original

**Shenzhen UnionTrust Quality and Technology Co., Ltd.**

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com<http://www.uttlab.com>

UTTR-RF-FCC23G-V1.1

CONTENTS

1. GENERAL INFORMATION	4
1.1 CLIENT INFORMATION	4
1.2 EUT INFORMATION	4
1.2.1 GENERAL DESCRIPTION OF EUT	4
1.2.2 DESCRIPTION OF ACCESSORIES	5
1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD	6
1.4 DESCRIPTION OF SUPPORT UNITS	7
1.5 TEST LOCATION	7
1.6 TEST FACILITY	7
1.7 DEVIATION FROM STANDARDS	7
1.8 ABNORMALITIES FROM STANDARD CONDITIONS	7
1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER	8
1.10 MEASUREMENT UNCERTAINTY	8
2. TEST SUMMARY	9
3. EQUIPMENT LIST	10
4. TEST CONFIGURATION	11
4.1 ENVIRONMENTAL CONDITIONS FOR TESTING	11
4.2 TEST SETUP	12
4.2.1 FOR RADIATED EMISSIONS TEST SETUP	12
4.2.2 FOR CONDUCTED RF TEST SETUP	13
4.3 TEST CHANNELS	14
4.4 SYSTEM TEST CONFIGURATION	15
4.5 PRE-SCAN	15
5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION	17
5.1 REFERENCE DOCUMENTS FOR TESTING	17
5.2 MAXIMUM ERP/EIRP	17
5.3 CONDUCTED OUTPUT POWER	18
5.4 PEAK-TO-AVERAGE RATIO	19
5.5 99%&26dB BANDWIDTH	21
5.6 BAND EDGE AT ANTENNA TERMINALS	23
5.7 SPURIOUS EMISSIONS AT ANTENNA TERMINALS	25
5.8 FIELD STRENGTH OF SPURIOUS RADIATION	27
5.9 FREQUENCY STABILITY	29
APPENDIX 1 PHOTOS OF TEST SETUP	31
APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS	31

1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Bluebird Inc.
Address of Applicant:	3F, 115, Irwon-ro, Gangnam-gu, Seoul, Republic of Korea
Manufacturer:	Bluebird Inc.
Address of Manufacturer:	3F, 115, Irwon-ro, Gangnam-gu, Seoul, Republic of Korea

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Enterprise Key-Based Touch Mobile Computer		
Model No.:	EK430		
Add. Model No.:	N/A		
Trade Mark:			
DUT Stage:	Identical Prototype		
EUT Supports Function:	UTRA Bands:	Band II/ Band V	
	E-UTRA Bands:	FDD Band 2/ Band 4/ Band 5/ Band 7	
	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
		Bluetooth 5.0	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n/ac
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n/ac
		5 470 MHz to 5 725 MHz	IEEE 802.11a/n/ac
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n/ac
	RNSS Bands:	1559 MHz to 1610 MHz	GPS/ GLONASS/ BDS
NFC:	13.553 MHz to 13.567 MHz		
Software Version:	EK430-VX500-AND10-EN-20210510_R1.00-user		
Hardware Version:	0.2		
Sample Received Date:	May 21, 2021		
Sample Tested Date:	May 25, 2021 to July 28, 2021		

1.2.2 Description of Accessories

Adapter	
Model No.:	XSD-0503000DEXU
Input:	100-240 V~50/60 Hz 0.5 A Max
Output:	5.0 V $\equiv$ 3.0A
AC Cable:	N/A
DC Cable:	N/A

Battery (Main)	
Model No.:	BAT-680001
Battery Type:	Lithium-ion Rechargeable Battery
Rated Voltage:	3.6 Vdc
Limited Charge Voltage:	4.2 Vdc
Rated Capacity:	6700 mAh

Battery (Sub)	
Model No.:	VK401324PH-Q5
Battery Type:	Lithium-ion Rechargeable Battery
Rated Voltage:	3.7 Vdc
Limited Charge Voltage:	4.2 Vdc
Rated Capacity:	65 mAh

Cable	
Model No.:	N/A
Description:	USB Type-C Plug Cable
Cable Type:	Shielded without ferrite
Length:	1 Meter

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com<http://www.uttlab.com>

UTTR-RF-FCC23G-V1.1

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Support Networks:	WCDMA, HSDPA, HSUPA	
Type of Modulation:	WCDMA	BPSK
	HSDPA/DC-HSDPA:	QPSK
	HSUPA:	QPSK
Frequency Range:	WCDMA Band II:	1852.4-1907.6 MHz
	WCDMA Band V:	826.4-846.6 MHz
Max RF Output Power:	WCDMA Band II:	23.90dBm
	WCDMA Band V:	23.52dBm
Emission Designator:	WCDMA Band II:	4M15F9W
	WCDMA Band V:	4M16F9W
Antenna Type:	PIFA Antenna	
Antenna Gain:	WCDMA Band II:	0.68 dBi
	WCDMA Band V:	1.11 dBi
Normal Test Voltage:	3.9 Vdc	
Extreme Test Voltage:	3.6 to 4.3Vdc	
Extreme Test Temperature:	-30 °C to +50 °C	

1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
--	--	--	--	--

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	SMA Cable	SMA	0.3 Meter	Bluebird

1.5 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Telephone: +86 (0) 755 2823 0888

Fax: +86 (0) 755 2823 0886

1.6 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

1.7 DEVIATION FROM STANDARDS

None.

1.8 ABNORMALITIES FROM STANDARD CONDITIONS

None.

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCC23G-V1.1

1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.10 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Effective Radiated Power (ERP)	±4.9 dB
2	Conducted Output Power	±0.7 dB
3	Peak-to-average ratio	±0.68 dB
4	99%&26dB Bandwidth	±1.86%
5	Band Edge at antenna terminals	±2.7dB
6	Spurious emissions at antenna terminals	±2.7dB
7	Field strength of spurious radiation	30MHz-1000MHz: ±4.9dB Above 1GHz: ±4.8dB
8	Frequency stability	± 6.5 x 10 ⁻⁸

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCC23G-V1.1

2. TEST SUMMARY

FCC 47 CFR Part 22 Subpart H Test Cases			
Test Item	Test Requirement	Test Method	Result
Effective Radiated Power (ERP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 22.913(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 22.917(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 22.355	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS

FCC 47 CFR Part 24 Subpart E Test Cases			
Test Item	Test Requirement	Test Method	Result
Equivalent Isotropic Radiated Power (EIRP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 24.232(d)	KDB 971168 D01v03r01	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 24.238(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 24.238(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 24.235	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☒	3m SAC	ETS-LINDGREN	3m	N/A	Jan. 22, 2021	Jan. 21, 2024
☒	Receiver	R&S	ESIB26	100114	Nov. 18, 2020	Nov. 17, 2021
☒	Loop Antenna	ETS-LINDGREN	6502	00202525	Nov. 14, 2020	Nov. 13, 2022
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 14, 2020	Nov. 13, 2022
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 14, 2020	Nov. 13, 2022
☒	Preamplifier	HP	8447F	2805A02960	Nov. 10, 2020	Nov. 9, 2021
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	Apr. 30, 2021	Apr. 29, 2023
☒	Pre-amplifier	ETS-LINDGREN	00118385	00201874	Nov. 10, 2020	Nov. 9, 2021
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Nov. 17, 2020	Nov. 16, 2022
☒	Pre-amplifier	ETS-LINDGREN	00118384	00202652	Nov. 17, 2020	Nov. 16, 2022
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Wideband Radio Communication Tester	R&S	CMW500	119583	Apr. 22, 2021	Apr. 21, 2022
☒	Test Software	Audix	e3	Software Version: 9.160323		

RF Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☒	Spectrum Analyzer	R&S	FSV40-N	101653	Apr. 22, 2021	Apr. 21, 2022
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Apr. 22, 2021	Apr. 21, 2022
☒	EXA Spectrum Analyzer	KEYSIGHT	N9020A	MY51286807	Nov. 10, 2020	Nov. 9, 2021
☒	Wideband Radio Communication Tester	R&S	CMW500	120932	Apr. 22, 2021	Apr. 21, 2022
☐	Wideband Radio Communication Tester	R&S	CMW500	119583	Apr. 22, 2021	Apr. 21, 2022
☒	DC Source	KIKUSUI	PWR400L	LK003024	Oct. 29, 2020	Oct. 28, 2021
☒	Temp & Humidity chamber	Votisch	VT4002	58566133290020	Apr. 21, 2021	Apr. 20, 2022

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCC23G-V1.1

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

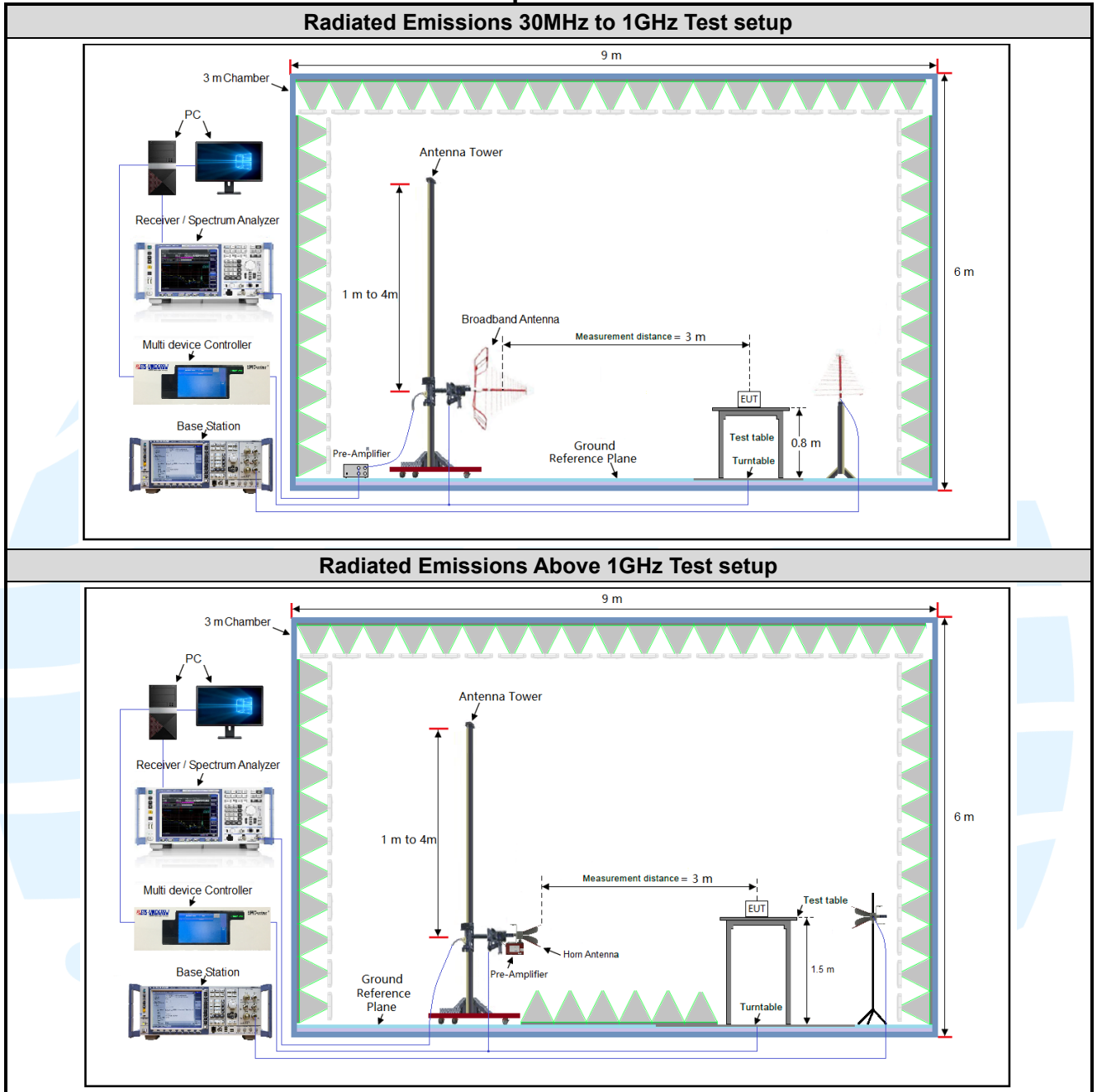
Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	3.9	20 to 75
TL/VL	-30	3.6	20 to 75
TH/VL	+50	3.6	20 to 75
TL/VH	-30	4.3	20 to 75
TH/VH	+50	4.3	20 to 75

Remark:

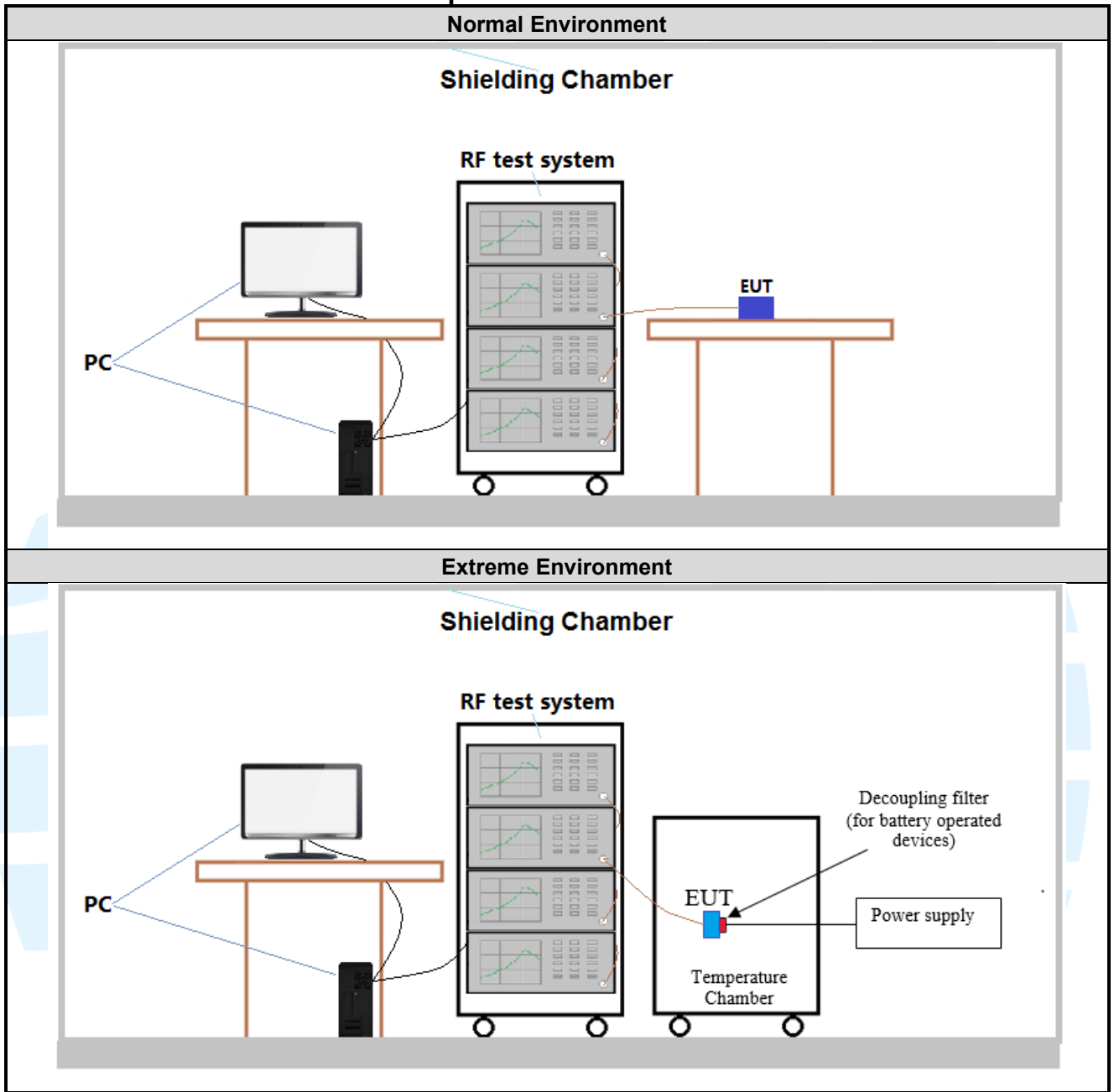
- 1) The EUT just work in such extreme temperature of -30 °C to +50 °C and the extreme voltage of 3.6 V to 4.3 V, so here the EUT is tested in the temperature of -30 °C to +50 °C and the voltage of 3.6 V to 4.3 V.
- 2) VN: Normal Voltage; TN: Normal Temperature;
TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;
VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

4.2 TEST SETUP

4.2.1 For Radiated Emissions test setup



4.2.2 For Conducted RF test setup



4.3 TEST CHANNELS

Bands	Tx/Rx Frequency	RF Channel		
		Low(L)	Middle(M)	High(H)
WCDMA band V	Tx (824 MHz ~ 849 MHz)	Channel 4132	Channel 4182	Channel 4233
		826.4 MHz	836.4 MHz	846.6 MHz

Bands	Tx/Rx Frequency	RF Channel		
		Low(L)	Middle(M)	High(H)
WCDMA Band II	Tx (1850 MHz-1910 MHz)	Channel 9262	Channel 9400	Channel 9538
		1852.4 MHz	1880.0 MHz	1907.6 MHz

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com
<http://www.uttlab.com>

UTTR-RF-FCC23G-V1.1

4.4 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a 3.9Vdc rechargeable Li-on battery. Only the worst case data were recorded in this test report.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, X/Y/Z axis, and antenna ports.

The worst case was found when positioned as the table below.

Bands	Mode	Antenna Port	Worst-case axis positioning
WCDMA Band II	1TX	Chain 0	X axis
WCDMA Band V	1TX	Chain 0	X axis

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4.5 PRE-SCAN

Pre-scan under all rate at lowest middle and highest channel, find the transmitter power as below:

WCDMA Band II Maximum Average Power (dBm)			
Channel	9262	9400	9538
Frequency(MHz)	1852.4 MHz	1880.0 MHz	1907.6 MHz
RMC 12.2kbps	23.82	23.90	23.71
HSDPA Subtest-1	22.81	22.94	22.75
HSDPA Subtest-2	22.90	22.96	22.87
HSDPA Subtest-3	22.88	22.38	22.17
HSDPA Subtest-4	22.22	22.53	22.72
HSUPA Subtest-1	22.88	23.01	22.53
HSUPA Subtest-2	22.38	22.47	22.03
HSUPA Subtest-3	22.91	22.95	22.45
HSUPA Subtest-4	22.85	22.94	22.43
HSUPA Subtest-5	22.94	22.91	22.50

WCDMA Band V Maximum Average Power (dBm)			
Channel	4132	4182	4233
Frequency(MHz)	826.4 MHz	836.4 MHz	846.6 MHz
RMC 12.2kbps	23.51	23.28	23.52
HSDPA Subtest-1	22.58	22.29	22.52
HSDPA Subtest-2	22.53	22.28	22.61
HSDPA Subtest-3	22.05	22.75	21.89
HSDPA Subtest-4	22.02	22.30	22.01
HSUPA Subtest-1	22.60	22.40	22.50
HSUPA Subtest-2	21.98	21.93	21.97
HSUPA Subtest-3	22.58	22.47	22.55
HSUPA Subtest-4	22.54	22.38	22.50
HSUPA Subtest-5	22.59	22.45	22.55

Pre-scan all bandwidth and RB, find worse case mode are chosen to the report, the worse mode applicability and tested channel detail as below:

Band	Radiated	Conducted
WCDMA Band II/V	RMC 12.2kbps Link	RMC 12.2kbps Link

5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 22	Public Mobile Services
3	FCC 47 CFR Part 24	Personal Communications Services
4	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
5	KDB 971168 D01	KDB 971168 D01 Power Meas License Digital Systems v03r01

5.2 MAXIMUM ERP/EIRP

Test Requirement: FCC 47 CFR Part 2.1046(a),
FCC 47 CFR Part 22.913(a),
FCC 47 CFR Part 24.232(c)

Test Method: KDB 971168 D01v03r01 Section 5.6 & ANSI C63.26-2015

Limit:

FCC 47 CFR Part 22.913(a)

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

FCC 47 CFR Part 24.232(c)

Mobile and portable stations are limited to 2 watts EIRP.

Test Procedure:

$$\text{ERP or EIRP} = P_{\text{Meas}} + G_T - L_C$$

where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively
(expressed in the same units as P_{Meas}, typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

Test Setup: Refer to section 4.2.1 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: See table below

Bands	Modulation	Max. Conducted Avg. Power	Ant. Gain	Limit	ERP		Result
		(dBm)	(dBi)	(W)	(dBm)	(W)	
WCDMA Band V (824-849 MHz)	RMC 12.2kbps	23.52	1.11	7.0	22.48	0.177011	Pass
	HSUPA	22.60	1.11		21.56	0.143219	Pass
	HSDPA	22.75	1.11		21.71	0.148252	Pass

Bands	Modulation	Max. Conducted Avg. Power	Ant. Gain	Limit	EIRP		Result
		(dBm)	(dBi)	(W)	(dBm)	(W)	
WCDMA Band II (1850-1910 MHz)	RMC 12.2kbps	23.90	0.68	2.0	24.58	0.287078	Pass
	HSUPA	23.01	0.68		23.69	0.233884	Pass
	HSDPA	22.96	0.68		23.64	0.231206	Pass

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCC23G-V1.1

5.3 CONDUCTED OUTPUT POWER

Test Requirement: FCC 47 CFR Part 2.1046(a),
FCC 47 CFR Part 22.913(a),
FCC 47 CFR Part 24.232(c)

Test Method: KDB 971168 D01v03r01 & ANSI C63.26-2015

Limit:

FCC 47 CFR Part 22.913(a)

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

FCC 47 CFR Part 24.232(c)

Mobile and portable stations are limited to 2 watts EIRP.

Test Procedure:

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, CDMA2000, and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: The full result refer to section 4.5 for details.

5.4 PEAK-TO-AVERAGE RATIO

Test Requirement: FCC 47 CFR Part 22.913(a),
FCC 47 CFR Part 24.232(c)

Test Method: KDB 971168 D01v03r01 Section 5.7

Limit: In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.

- Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth
- Set the number of counts to a value that stabilizes the measured CCDF curve
- Record the maximum PAPR level associated with a probability of 0.1 %

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

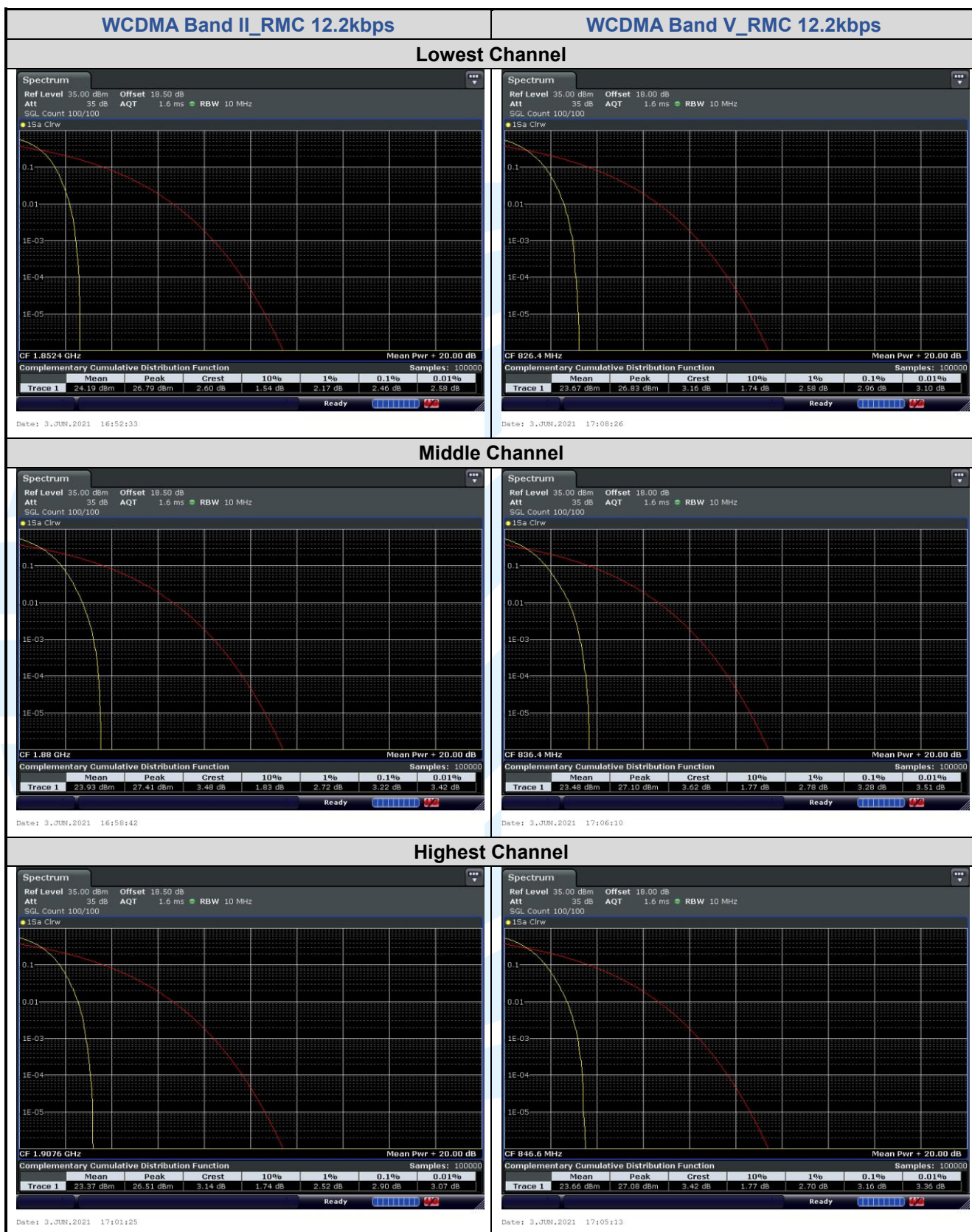
Test Mode: Link mode

Test Results: Pass

Test Data: See table below

Bands	Modulation	Peak-to-average ratio (dB)			Limit (dBm)	Result
		Lowest	Middle	Highest		
WCDMA Band II	RMC 12.2kbps	2.46	3.22	2.90	13	Pass
WCDMA Band V	RMC 12.2kbps	2.96	3.28	3.16	13	Pass

The test plots as follows:



Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCC23G-V1.1

5.599%&26DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 2.1049(h),
FCC 47 CFR Part 22.917(b),
FCC 47 CFR Part 24.238(b)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01 Section 4

Limit: No Limit, for reporting purposes only.

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

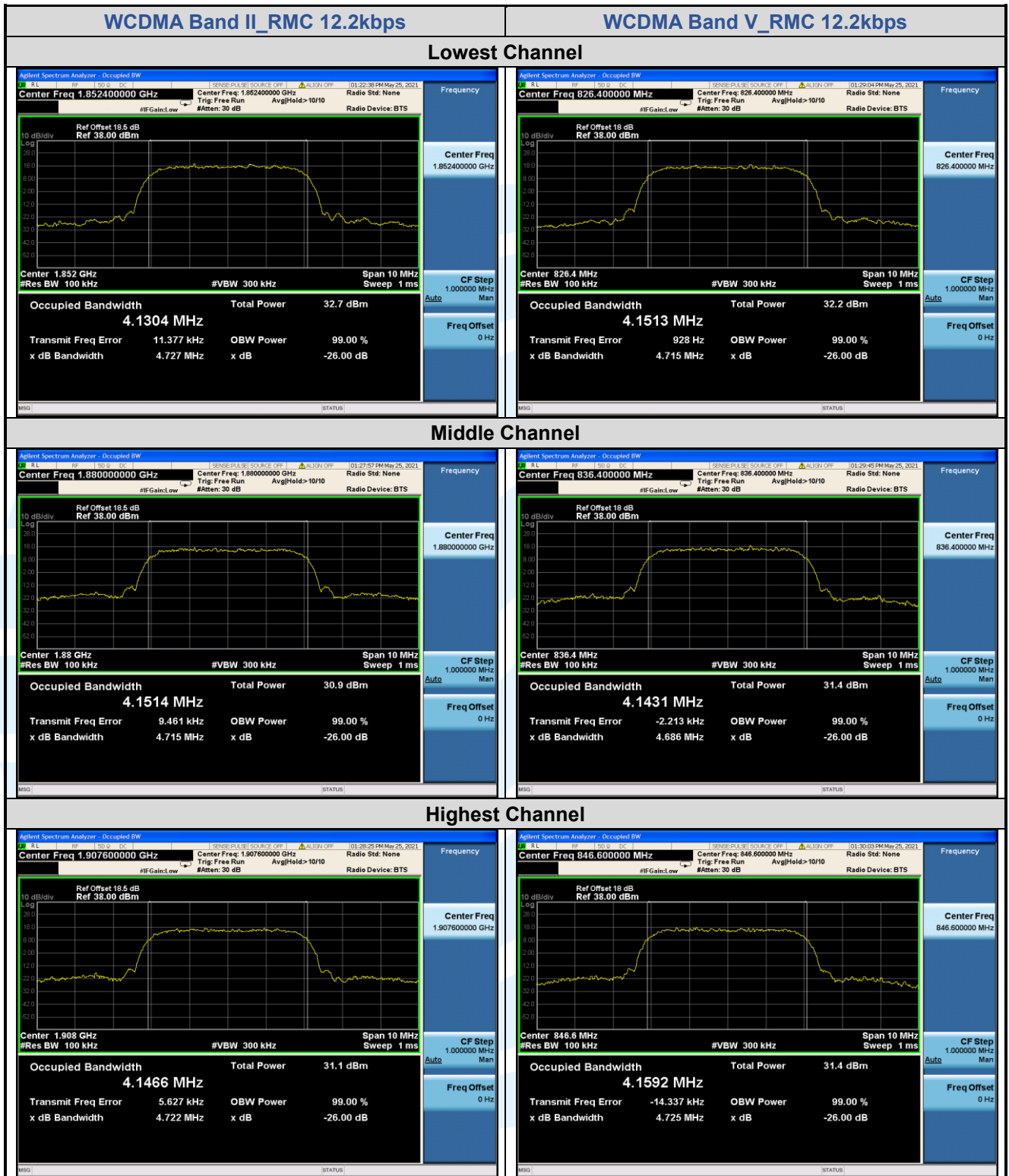
Test Mode: Link mode

Test Results: Pass

Test Data: See table below

Bands	Modulation	Channel	Frequency (MHz)	26 dB BW (MHz)	99% BW (MHz)
WCDMA Band II	RMC 12.2kbps	9262	1852.4	4.727	4.1304
		9400	1880.0	4.715	4.1514
		9538	1907.6	4.722	4.1466
WCDMA Band V	RMC 12.2kbps	4132	826.4	4.715	4.1513
		4182	836.4	4.686	4.1431
		4233	846.6	4.725	4.1592

The test plots as follows:



Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCC23G-V1.1

5.6 BAND EDGE AT ANTENNA TERMINALS

Test Requirement: FCC 47 CFR Part 2.1051,
FCC 47 CFR Part 22.917(a),
FCC 47 CFR Part 24.238(a)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limit:

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 emission limit equal to -13 dBm.

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.

For each band edge measurement:

- 1) Set the spectrum analyzer span to include the block edge frequency.
- 2) Set a marker to point the corresponding band edge frequency in each test case.
- 3) Set display line at -13 dBm
- 4) Set resolution bandwidth to at least 1% of emission bandwidth.
- 5) Set spectrum analyzer with RMS detector.
- 6) Record the max trace plot into the test report

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

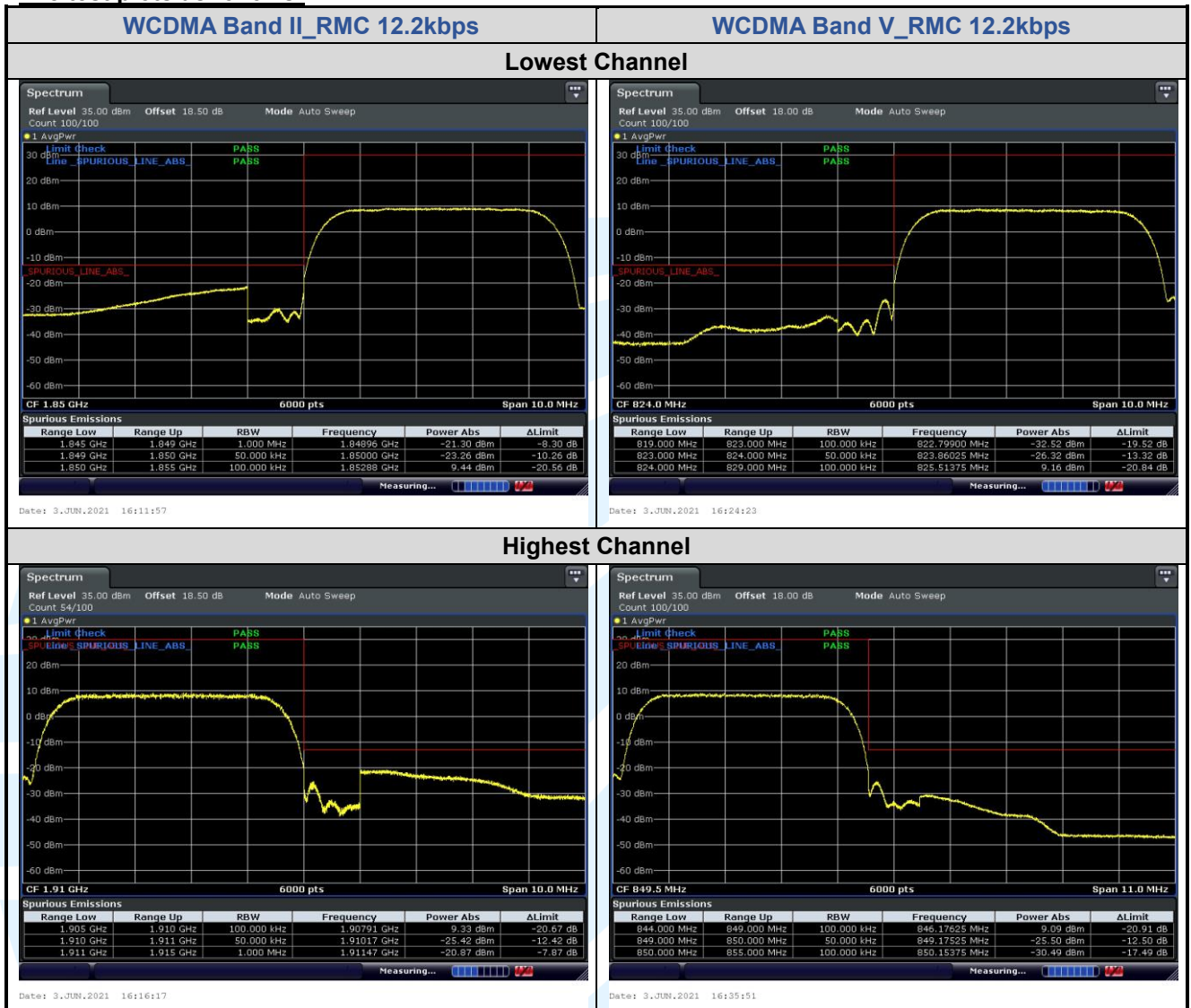
Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

The test plots as follows:



5.7 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Requirement: FCC 47 CFR Part 2.1051,
FCC 47 CFR Part 22.917(a)(b),
FCC 47 CFR Part 24.238(a)(b)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limit:

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 emission limit equal to -13 dBm.

Test Procedure:

The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range. b. Measuring frequency range is from 30 MHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

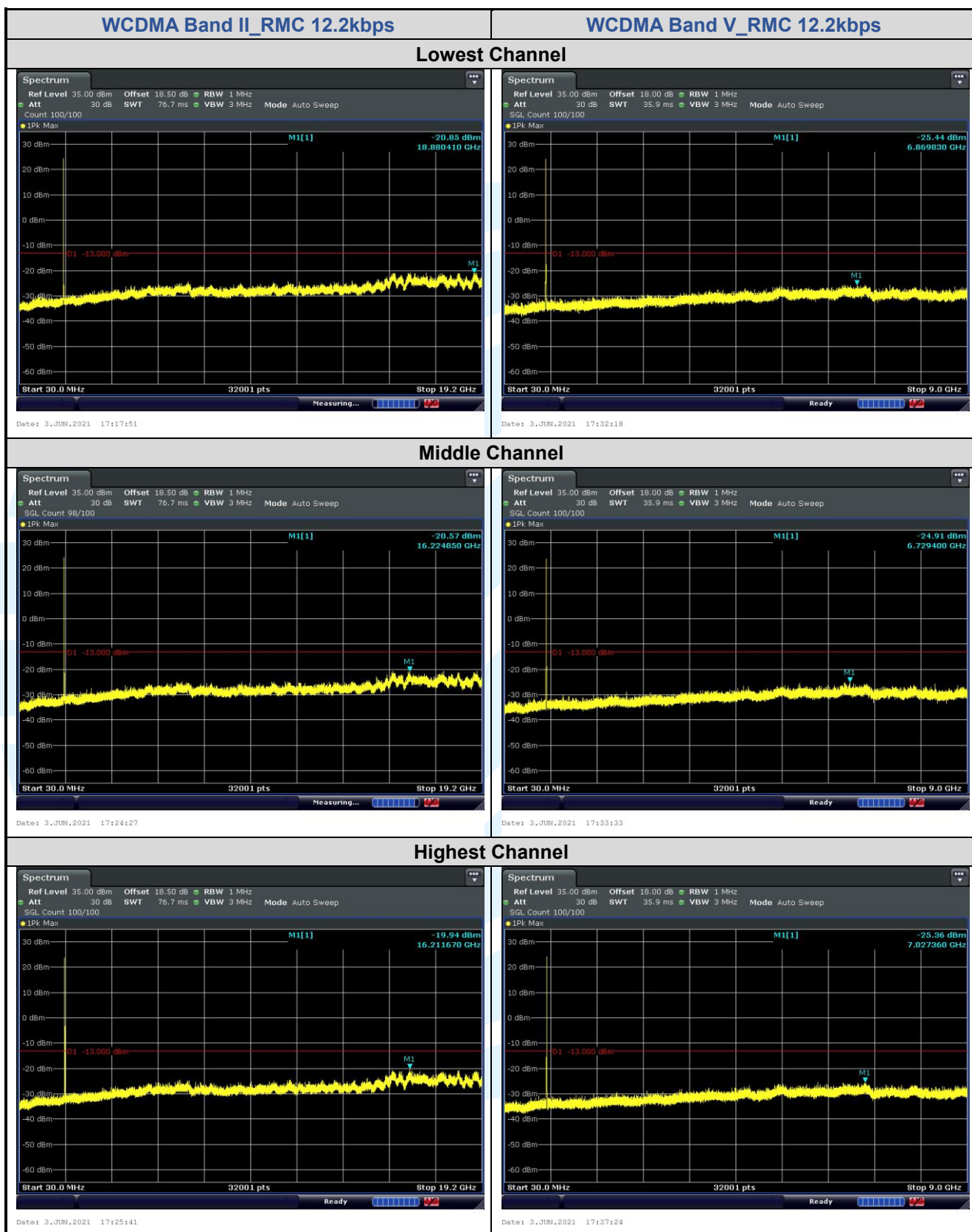
Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

The test plots as follows:



Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCC23G-V1.1

5.8 FIELD STRENGTH OF SPURIOUS RADIATION

Test Requirement: FCC 47 CFR Part 2.1053,
FCC 47 CFR Part 22.917(a)(b),
FCC 47 CFR Part 24.238(a)(b)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01 Section 7

Limits:

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 emission limit equal to -13 dBm.

Test Setup: Refer to section 4.2.1 for details.

Test Procedures: KDB 971168 D01v03r01 Section 7

Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:

WCDMA Band II							
No.	Frequency (MHz)	SA Reading (dBm)	Correction factor (dB/m)	EIRP Result (dBm)	Limit (dBm)	Margin (dB)	Ant. Pol.
RMC 12.2kbps_ Lowest Channel							
1	34.527	-72.81	4.61	-68.20	-13.00	-55.20	Horizontal
2	120.612	-66.63	-6.41	-73.04	-13.00	-60.04	Horizontal
3	669.952	-79.98	10.03	-69.95	-13.00	-56.95	Horizontal
4	3704.800	-56.70	7.59	-49.11	-13.00	-36.11	Horizontal
5	5557.250	-66.24	11.75	-54.49	-13.00	-41.49	Horizontal
6	34.770	-66.48	4.51	-61.97	-13.00	-48.97	Vertical
7	103.335	-69.24	-6.33	-75.57	-13.00	-62.57	Vertical
8	804.252	-76.08	12.07	-64.01	-13.00	-51.01	Vertical
9	3704.800	-61.71	7.59	-54.12	-13.00	-41.12	Vertical
10	5557.200	-66.93	11.75	-55.18	-13.00	-42.18	Vertical
RMC 12.2kbps_ Middle Channel							
1	34.527	-72.38	4.61	-67.77	-13.00	-54.77	Horizontal
2	120.612	-66.35	-6.41	-72.76	-13.00	-59.76	Horizontal
3	899.958	-80.36	13.78	-66.58	-13.00	-53.58	Horizontal
4	3760.000	-59.93	7.79	-52.14	-13.00	-39.14	Horizontal
5	5640.000	-64.10	11.56	-52.54	-13.00	-39.54	Horizontal
6	32.411	-66.04	4.74	-61.30	-13.00	-48.30	Vertical
7	38.096	-66.86	2.73	-64.13	-13.00	-51.13	Vertical
8	804.252	-77.24	12.07	-65.17	-13.00	-52.17	Vertical
9	3760.000	-63.52	7.79	-55.73	-13.00	-42.73	Vertical
10	5640.000	-65.06	11.56	-53.50	-13.00	-40.50	Vertical
RMC 12.2kbps_ Highest Channel							
1	33.335	-72.16	4.86	-67.30	-13.00	-54.30	Horizontal
2	120.612	-65.55	-6.41	-71.96	-13.00	-58.96	Horizontal
3	986.044	-81.02	14.45	-66.57	-13.00	-53.57	Horizontal
4	3815.200	-55.62	7.99	-47.63	-13.00	-34.63	Horizontal
5	5722.800	-63.20	11.38	-51.82	-13.00	-38.82	Horizontal
6	32.640	-68.73	4.80	-63.93	-13.00	-50.93	Vertical
7	80.238	-69.87	-7.89	-77.76	-13.00	-64.76	Vertical
8	833.013	-68.99	12.53	-56.46	-13.00	-43.46	Vertical
9	3815.200	-61.40	7.99	-53.41	-13.00	-40.41	Vertical
10	5722.800	-63.96	11.38	-52.58	-13.00	-39.58	Vertical

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCC23G-V1.1

WCDMA Band V							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
RMC 12.2kbps_ Lowest Channel							
1	34.045	-72.11	4.79	-67.32	-13.00	-54.32	Horizontal
2	120.612	-65.39	-6.41	-71.80	-13.00	-58.80	Horizontal
3	875.013	-70.34	13.26	-57.08	-13.00	-44.08	Horizontal
4	1652.800	-34.15	0.23	-33.92	-13.00	-20.92	Horizontal
5	2479.200	-58.19	3.61	-54.58	-13.00	-41.58	Horizontal
6	32.411	-68.87	4.74	-64.13	-13.00	-51.13	Vertical
7	43.538	-66.22	-0.68	-66.90	-13.00	-53.90	Vertical
8	875.013	-73.50	13.26	-60.24	-13.00	-47.24	Vertical
9	1652.800	-29.15	0.23	-28.92	-13.00	-15.92	Vertical
10	2479.200	-55.28	3.61	-51.67	-13.00	-38.67	Vertical
RMC 12.2kbps_ Middle Channel							
1	34.527	-71.89	4.61	-67.28	-13.00	-54.28	Horizontal
2	120.612	-66.32	-6.41	-72.73	-13.00	-59.73	Horizontal
3	887.398	-71.82	13.66	-58.16	-13.00	-45.16	Horizontal
4	1672.800	-28.09	0.36	-27.73	-13.00	-14.73	Horizontal
5	2509.200	-52.81	3.71	-49.10	-13.00	-36.10	Horizontal
6	32.640	-69.19	4.80	-64.39	-13.00	-51.39	Vertical
7	44.466	-65.87	-1.43	-67.30	-13.00	-54.30	Vertical
8	887.398	-74.27	13.66	-60.61	-13.00	-47.61	Vertical
9	1672.800	-31.57	0.36	-31.21	-13.00	-18.21	Vertical
10	2509.200	-60.29	3.71	-56.58	-13.00	-43.58	Vertical
RMC 12.2kbps_ Highest Channel							
1	34.527	-71.93	4.61	-67.32	-13.00	-54.32	Horizontal
2	120.612	-65.01	-6.41	-71.42	-13.00	-58.42	Horizontal
3	893.656	-73.63	13.82	-59.81	-13.00	-46.81	Horizontal
4	1693.200	-35.25	0.50	-34.75	-13.00	-21.75	Horizontal
5	2539.800	-63.12	3.78	-59.34	-13.00	-46.34	Horizontal
6	32.411	-68.97	4.74	-64.23	-13.00	-51.23	Vertical
7	44.466	-65.25	-1.43	-66.68	-13.00	-53.68	Vertical
8	502.247	-77.43	6.74	-70.69	-13.00	-57.69	Vertical
9	1693.200	-38.65	0.50	-38.15	-13.00	-25.15	Vertical
10	2539.800	-61.34	3.78	-57.56	-13.00	-44.56	Vertical

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCC23G-V1.1

5.9 FREQUENCY STABILITY

Test Requirement: FCC 47 CFR Part 2.1055 &
FCC 47 CFR Part 22.355 &
FCC 47 CFR Part 24.235

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limits:

FCC 47 CFR Part 22.355,

The carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations.

FCC 47 CFR Part 24.235

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Setup: Refer to section 4.2.2 for details.

Test Procedures:

1) Use CMW 500 with Frequency Error measurement capability.

a) Temp. = -30° to $+50^{\circ}\text{C}$

b) Voltage = low voltage, 3.6 Vdc, Normal, 3.9 Vdc and High voltage, 4.3 Vdc.

2) Frequency Stability vs Temperature:

The EUT is placed inside a temperature chamber. The temperature is set to 20°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until $+50^{\circ}\text{C}$ is reached.

3) Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

Equipment Used: Refer to section 3 for details.

Test Result: Pass

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature ($^{\circ}\text{C}$)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
WCDMA Band V RMC 12.2Kbps							
BPSK	4182 / 836.4	VL	TN	-43	-0.0514	± 2.5	Pass
		VN		-46	-0.0550	± 2.5	Pass
		VH		-43	-0.0514	± 2.5	Pass
		VN	50	-47	-0.0562	± 2.5	Pass
			40	-43	-0.0514	± 2.5	Pass
			30	-47	-0.0562	± 2.5	Pass
			20	-44	-0.0526	± 2.5	Pass
			10	-45	-0.0538	± 2.5	Pass
			0	-46	-0.0550	± 2.5	Pass
			-10	-42	-0.0502	± 2.5	Pass
			-20	-47	-0.0562	± 2.5	Pass
			-30	-46	-0.0550	± 2.5	Pass

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Pass/ Fail
	(MHz)	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	
WCDMA Band II RMC 12.2Kbps							
BPSK	9400 / 1880.0	VL	TN	19	0.0101	N/A	Pass
		VN		16	0.0085		Pass
		VH		14	0.0074		Pass
		VN	50	12	0.0064		Pass
			40	15	0.0080		Pass
			30	21	0.0112		Pass
			20	15	0.0080		Pass
			10	15	0.0080		Pass
			0	20	0.0106		Pass
			-10	18	0.0096		Pass
			-20	21	0.0112		Pass
			-30	20	0.0106		Pass

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-RF-FCC23G-V1.1

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.
