

FCC TEST REPORT

Product Name: Smart Phone
Trade Mark: N/A
Model No.: Helium Pro
Add. Model No.: N/A
Report Number: 2209171673RFM-2
Test Standards: FCC 47 CFR Part 22 Subpart H
 FCC 47 CFR Part 24 Subpart E
 FCC 47 CFR Part 27 Subpart L
FCC ID: 2AUOUHP
Test Result: PASS
Date of Issue: November 9, 2022

Prepared for:

Rhino Mobility LLC
8 The Green, Suite A, Dover, Delaware, 19901, USA

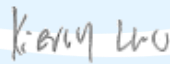
Prepared by:

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:

November 9, 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

Version

Version No.	Date	Description
V1.0	November 9, 2022	Original

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

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Rhino Mobility LLC
Address of Applicant:	8 The Green, Suite A, Dover, Delaware, 19901, USA
Manufacturer:	Rhino Mobility LLC
Address of Manufacturer:	8 The Green, Suite A, Dover, Delaware, 19901, USA

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Smart Phone		
Model No.:	Helium Pro		
Add. Model No.:	N/A		
Trade Mark:	N/A		
DUT Stage:	Identical Prototype		
EUT Supports Function: (Provided by the customer)	GSM Bands:	GSM850/1900	
	UTRA Bands:	Band II/ Band IV/ Band V	
	E-UTRA Bands:	FDD Band 2/ Band 4/ Band 5/ Band 12/ Band 17/ Band 29/ Band 30/ Band 66	
	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	
BSR:	VHF Band II	FM	
Software Version:	Helium Pro_20221022 (Provided by the customer)		
Hardware Version:	G2251E-MA-V1.1 (Provided by the customer)		
Sample Received Date:	September 17, 2022		
Sample Tested Date:	September 17, 2022 to October 19, 2022		
Remark:	The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.		

1.2.2 Description of Accessories

Adapter	
Model No.:	HJ-0501000E1-US
Input:	100-240 V~50/60 Hz 0.2 A Max
Output:	5.0 V \equiv 1.0 A
AC Cable:	N/A
DC Cable:	N/A

Battery	
Model No.:	THP
Battery Type:	Lithium-ion Rechargeable Battery
Rated Voltage:	3.8 Vdc
Limited Charge Voltage:	4.35 Vdc
Rated Capacity:	2500 mAh

Cable	
Description:	USB Type-C Plug Cable
Cable Type:	Shielded without ferrite
Length:	1 Meter

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1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Support Networks:	GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA	
Type of Modulation:	GSM/GPRS:	GMSK
	EDGE:	GMSK, 8PSK
	WCDMA	BPSK
	HSDPA:	QPSK
	HSUPA:	QPSK
Frequency Range:	GSM/GPRS/EDGE 850:	824.2-848.8 MHz
	GSM/GPRS/EDGE 1900:	1850.2-1909.8 MHz
	WCDMA Band II:	1852.4-1907.6 MHz
	WCDMA Band IV:	1712.4-1752.6 MHz
	WCDMA Band V:	826.4-846.6 MHz
Max RF Output Power:	GSM/GPRS 850:	32.25 dBm
	EDGE 850:	28.12 dBm
	GSM/GPRS 1900:	28.58 dBm
	EDGE 1900:	25.22 dBm
	WCDMA Band II:	21.79 dBm
	WCDMA Band IV:	21.16 dBm
	WCDMA Band V:	22.10 dBm
Emission Designator:	GSM/GPRS 850:	251KGXW
	EDGE 850:	247KG7W
	GSM/GPRS 1900:	245KGXW
	EDGE 1900:	246KG7W
	WCDMA Band II:	4M19F9W
	WCDMA Band IV:	4M18F9W
	WCDMA Band V:	4M17F9W
Antenna Type: (Provided by the customer)	PIFA Antenna	
Antenna Gain: (Provided by the customer)	GSM 850:	0.62 dBi
	PCS 1900:	0.61 dBi
	WCDMA Band II:	0.52 dBi
	WCDMA Band IV:	0.68 dBi
	WCDMA Band V:	0.74 dBi
GPRS/EDGE Class:	Class 12	
Sample No.:	Radiated: S20220917543-ZJA04/8	
	Conducted: S20220917543-ZJA05/8, S20220917543-ZJA06/8	
Normal Test Voltage:	3.8 Vdc	
Extreme Test Voltage:	3.5 to 4.35Vdc	
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	Antenna Cable	SMA	0.3 Meter	UnionTrust

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, China 518109

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.

1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

Shenzhen UnionTrust Quality and Technology Co., Ltd.

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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	Conducted Output Power	±0.7 dB
2	99%&26dB Bandwidth	±1.86 %
3	Emission Mask	±2.7 dBm
4	Spurious emissions at antenna terminals	±2.7 dBm
5	Field strength of spurious radiation	30 MHz-1 GHz: ±4.9 dB 1 GHz-18 GHz: ±4.8 dB 18 GHz-40 GHz: ±5.1 dB
6	Frequency stability	±6.5 x 10 ⁻⁸
7	Humidity	±3.9 %
8	Temperature	±0.62 °C
9	DC Voltages	±0.68 %

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

FCC 47 CFR Part 27 Subpart L 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 27.50(d)(4)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(d)(4)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 27.50(d)(5)	KDB 971168 D01v03r01	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 27.53(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 27.53(h)(1)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.53(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.53(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 27.54	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS

Disclaimer and Explanations:

The declared of product specification and data (e.g. antenna gain, RF specification, etc) for EUT presented in the report are provided by the customer, and the customer takes all the responsibilities for the accuracy of product specification.

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
<input checked="" type="checkbox"/>	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	Euroshiedpn-CT001270-1317	22-Jan-2021	21-Jan-2024
<input checked="" type="checkbox"/>	Receiver	R&S	ESIB26	100114	5-Nov-2021	4-Nov-2022
<input checked="" type="checkbox"/>	Broadband Antenna	ETS-LINDGREN	3142E	00201566	11-Nov-2021	10-Nov-2023
<input checked="" type="checkbox"/>	6dB Attenuator	Talent	RA6A5-N-18	18103001	11-Nov-2021	10-Nov-2023
<input checked="" type="checkbox"/>	Preamplifier	HP	8447F	2805A02960	5-Nov-2021	4-Nov-2022
<input checked="" type="checkbox"/>	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	17-Apr-2022	16-Apr-2024
<input checked="" type="checkbox"/>	Pre-amplifier	ETS-LINDGREN	00118385	00201874	6-Nov-2021	5-Nov-2022
<input type="checkbox"/>	Horn Antenna	ETS-LINDGREN	3116C	00200180	17-Apr-2022	16-Apr-2024
<input checked="" type="checkbox"/>	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	14-Nov-2020	13-Nov-2022
<input checked="" type="checkbox"/>	Pre-amplifier	ETS-LINDGREN	00118384	00202652	17-Nov-2020	16-Nov-2022
<input checked="" type="checkbox"/>	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
<input checked="" type="checkbox"/>	Test Software	Audix	e3	Software Version: 9.160323		

RF Conducted Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
<input checked="" type="checkbox"/>	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	15-Apr-2022	14-Apr-2023
<input checked="" type="checkbox"/>	EXA Spectrum Analyzer	KEYSIGHT	N9020A	MY51286807	5-Nov-2021	4-Nov-2022
<input checked="" type="checkbox"/>	Spectrum analyzer	R&S	FSV40-N	101653	15-Apr-2022	14-Apr-2023
<input checked="" type="checkbox"/>	DC Source	KIKUSUI	PWR400L	LK003024	20-Aug-2022	19-Aug-2023
<input checked="" type="checkbox"/>	Temp & Humidity chamber	Votisch	VT4002	58566133290020	15-Apr-2022	14-Apr-2023
<input checked="" type="checkbox"/>	Wideband Radio Communication Tester	R&S	CMW500	119583	15-Apr-2022	14-Apr-2023
<input checked="" type="checkbox"/>	Wideband Radio Communication Tester	R&S	CMW500	120932	15-Apr-2022	14-Apr-2023

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

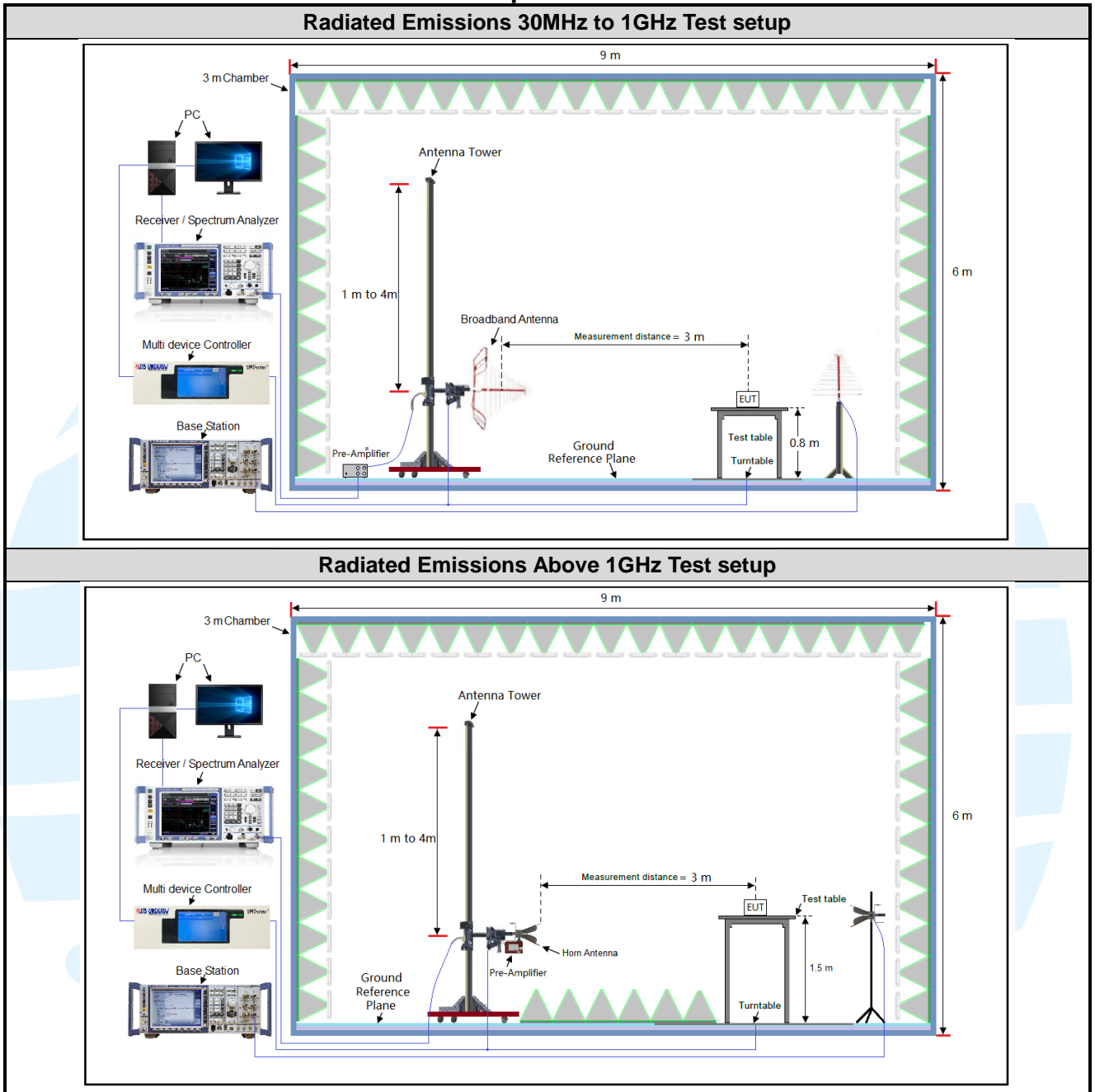
Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	3.8	20 to 75
TL/VL	-30	3.5	20 to 75
TH/VL	+50	3.5	20 to 75
TL/VH	-30	4.35	20 to 75
TH/VH	+50	4.35	20 to 75

Remark:

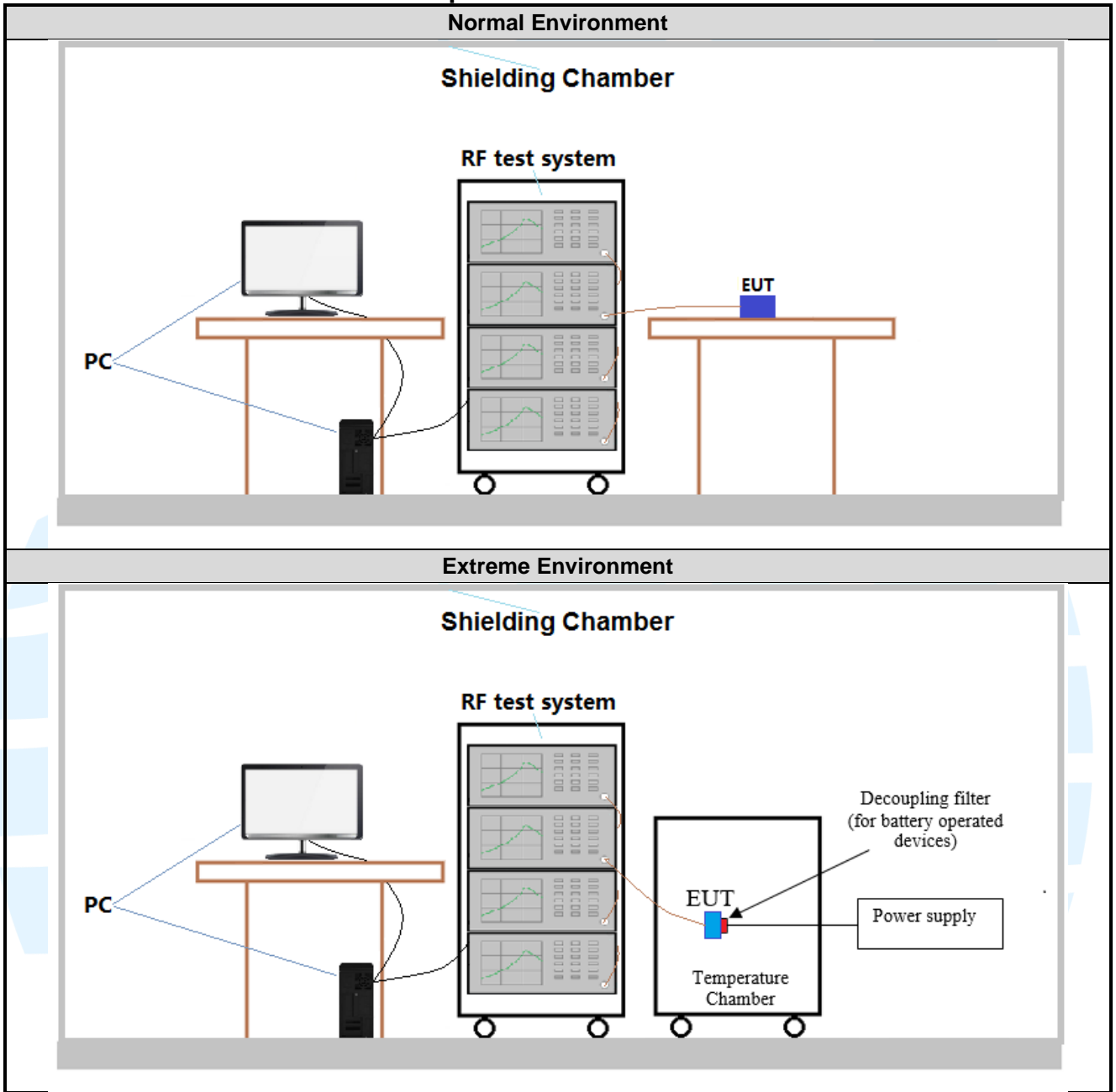
- 1) The EUT just work in such extreme temperature of -30 °C to +50 °C and the extreme voltage of 3.5 V to 4.35 V, so here the EUT is tested in the temperature of -30 °C to +50 °C and the voltage of 3.5 V to 4.35 V.
- 2) VN: Normal Voltage; TN: Normal Temperature;
 TL: Low Extreme Test Temperature; TH: 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)
GSM/GPRS/EDGE850	Tx (824 MHz ~ 849 MHz)	Channel 128	Channel 190	Channel 251
		824.2 MHz	836.6 MHz	848.8 MHz
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)
GSM/GPRS/EDGE1900	Tx (1850 MHz-1910 MHz)	Channel 512	Channel 661	Channel 810
		1850.2 MHz	1880.0 MHz	1909.8 MHz
WCDMA Band II	Tx (1850 MHz-1910 MHz)	Channel 9262	Channel 9400	Channel 9538
		1852.4 MHz	1880.0 MHz	1907.6 MHz

Bands	Tx/Rx Frequency	RF Channel		
		Low(L)	Middle(M)	High(H)
WCDMA Band IV	Tx (1710 MHz-1755 MHz)	Channel 1312	Channel 1412	Channel 1513
		1712.4 MHz	1732.4 MHz	1752.6 MHz

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 3.85Vdc 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.

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:
SIM 1 Card Conducted transmitter power measurement result.

GSM 850 Maximum Average Power (dBm)			
Channel	128	190	251
Frequency(MHz)	824.2 MHz	836.6 MHz	848.8 MHz
GSM (GMSK, 1Tx-slot)	32.18	32.24	32.18
GPRS (GMSK, 1Tx-slot)	32.16	32.25	32.17
GPRS (GMSK, 2Tx-slot)	31.44	31.49	31.40
GPRS (GMSK, 3Tx-slot)	29.70	29.73	29.65
GPRS (GMSK, 4Tx-slot)	28.33	28.40	28.32
EDGE (8PSK, 1Tx-slot)	27.92	28.07	28.12
EDGE (8PSK, 2Tx-slot)	26.68	26.77	26.88
EDGE (8PSK, 3Tx-slot)	24.15	24.18	24.22
EDGE (8PSK, 4Tx-slot)	23.02	23.20	23.09

PCS 1900 Maximum Average Power (dBm)			
Channel	512	661	810
Frequency(MHz)	1850.2 MHz	1880.0 MHz	1909.8 MHz
GSM (GMSK, 1Tx-slot)	28.10	28.50	28.58
GPRS (GMSK, 1Tx-slot)	28.08	28.47	28.52
GPRS (GMSK, 2Tx-slot)	27.22	27.65	27.67
GPRS (GMSK, 3Tx-slot)	25.45	25.83	25.84
GPRS (GMSK, 4Tx-slot)	24.06	24.44	24.50
EDGE (8PSK, 1Tx-slot)	25.22	24.88	24.21
EDGE (8PSK, 2Tx-slot)	24.01	24.31	23.76
EDGE (8PSK, 3Tx-slot)	21.72	22.06	22.65
EDGE (8PSK, 4Tx-slot)	20.13	20.76	21.25

WCDMA Band II Maximum Average Power (dBm)			
Channel	9262	9400	9538
Frequency (MHz)	1852.4 MHz	1880.0 MHz	1907.6 MHz
RMC 12.2K	21.79	21.74	21.54
HSDPA Subtest-1	21.61	21.78	21.58
HSDPA Subtest-2	20.79	20.74	20.58
HSDPA Subtest-3	20.37	20.31	20.12
HSDPA Subtest-4	20.32	20.28	20.08
HSUPA Subtest-1	20.80	20.74	20.53
HSUPA Subtest-2	20.76	20.73	20.56
HSUPA Subtest-3	20.34	20.24	20.11
HSUPA Subtest-4	20.80	20.75	20.59
HSUPA Subtest-5	20.31	20.23	19.63

WCDMA Band IV Maximum Average Power (dBm)			
Channel	1312	1412	1513
Frequency (MHz)	1712.4 MHz	1732.4 MHz	1752.6 MHz
RMC 12.2K	21.16	21.13	21.10
HSDPA Subtest-1	21.15	21.14	21.11
HSDPA Subtest-2	20.21	20.17	20.18
HSDPA Subtest-3	19.73	19.71	19.77
HSDPA Subtest-4	19.71	19.68	19.72
HSUPA Subtest-1	20.18	20.13	20.16
HSUPA Subtest-2	20.21	20.16	20.18
HSUPA Subtest-3	19.71	19.65	19.64
HSUPA Subtest-4	20.22	20.18	20.22
HSUPA Subtest-5	19.74	19.67	19.38

WCDMA Band V Maximum Average Power (dBm)			
Channel	4132	4182	4233
Frequency (MHz)	826.4 MHz	836.4 MHz	846.6 MHz
RMC 12.2K	22.10	22.05	22.07
HSDPA Subtest-1	22.09	22.03	22.04
HSDPA Subtest-2	21.15	21.08	21.11
HSDPA Subtest-3	20.65	20.58	20.59
HSDPA Subtest-4	20.64	20.58	20.60
HSUPA Subtest-1	21.05	21.02	21.00
HSUPA Subtest-2	21.10	21.01	21.05
HSUPA Subtest-3	20.61	20.52	20.54
HSUPA Subtest-4	21.10	21.05	21.05
HSUPA Subtest-5	20.56	20.55	20.51

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
GSM/GPRS/EDGE 850/1900	1) GSM (GMSK, 1Tx-slot) Link 2) GPRS (GMSK, 1Tx-slot) Link 3) EDGE (8PSK, 1Tx-slot) Link	1) GSM (GMSK,1Tx-slot) Link 2) GPRS (GMSK, 1Tx-slot) Link 3) EDGE (8PSK, 1Tx-slot) Link
WCDMA Band II/IVV	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 27	Miscellaneous Wireless Communications Services
4	FCC 47 CFR Part 24	Personal Communications Services
5	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
6	KDB 971168 D01	KDB 971168 D01 Power Meas License Digital Systems v03r01
7	KDB 412172 D01 Determining ERP and EIRP v01r01	Guidelines for determining the effective radiated power (ERP) and isotropically radiated power (EIRP) of an RF transmitting system

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),
 FCC 47 CFR Part 27.50(d)(4)

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.

FCC 47 CFR Part 27.50(d)(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.

Test Procedure:

According to KDB 412172 D01 Power Approach,

1. $ERP \text{ or } EIRP = P_T + G_T - L_C$
2. $ERP = EIRP - 2.15$

where

3. P_T = transmitter output power, expressed in dBW, dBm, or PSD;
4. G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
5. 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

Band		Ant. Gain (dBi)	Maximum ERP/EIRP (dBm)				Maximum ERP/EIRP (W)				Result
			Low	Mid	High	Limit (dBm)	Low	Mid	High	Limit (W)	
PCS 1900	GSM	0.61	28.71	29.11	29.19	33.01	0.7430	0.8147	0.8299	2	Pass
	GPRS		28.52	28.52	28.52	33.01	0.7112	0.7112	0.7112	2	Pass
	EGPRS		25.83	25.83	25.83	33.01	0.3828	0.3828	0.3828	2	Pass
GSM 850	GSM	0.62	30.65	30.71	30.65	38.45	1.1614	1.1776	1.1614	7	Pass
	GPRS		30.72	30.72	30.72	38.45	1.1803	1.1803	1.1803	7	Pass
	EGPRS		26.59	26.59	26.59	38.45	0.4560	0.4560	0.4560	7	Pass

Band		Ant. Gain (dBi)	Maximum ERP/EIRP (dBm)				Maximum ERP/EIRP (W)				Result
			Low	Mid	High	Limit (dBm)	Low	Mid	High	Limit (W)	
WCDMA Band II	RMC 12.2K	0.52	22.31	22.26	22.06	33.01	0.1702	0.1683	0.1607	2	Pass
	HSDPA		21.78	21.78	21.78	33.01	0.1507	0.1507	0.1507	2	Pass
	HSUPA		21.32	21.32	21.32	33.01	0.1355	0.1355	0.1355	2	Pass
WCDMA Band V	RMC 12.2K	0.74	20.69	20.64	20.66	38.45	0.1172	0.1159	0.1164	7	Pass
	HSDPA		20.68	20.68	20.68	38.45	0.1169	0.1169	0.1169	7	Pass
	HSUPA		19.69	19.69	19.69	38.45	0.0931	0.0931	0.0931	7	Pass
WCDMA Band IV	RMC 12.2K	0.68	21.84	21.81	21.78	30	0.1528	0.1517	0.1507	1	Pass
	HSDPA		21.83	21.83	21.83	30	0.1524	0.1524	0.1524	1	Pass
	HSUPA		20.90	20.90	20.90	30	0.1230	0.1230	0.1230	1	Pass

Note: The maximum ERP/EIRP is calculated from max output power and antenna gain, the antenna gain provided by the customer, and the customer takes all the responsibilities for the accuracy of antenna gain.

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),
FCC 47 CFR Part 27.50(d)(4)

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.

FCC 47 CFR Part 27.50(d)(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.

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),
FCC 47 CFR Part 27.50(d)(5)

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.

- a) Set resolution/measurement bandwidth \geq signal's occupied bandwidth
- b) Set the number of counts to a value that stabilizes the measured CCDF curve
- c) 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		
GSM 850	GSM	0.24	0.31	0.30	13	Pass
	EDGE	0.45	0.56	0.30	13	Pass
PCS 1900	GSM	0.43	0.45	0.75	13	Pass
	EDGE	0.41	0.57	0.74	13	Pass
WCDMA Band II	RMC 12.2kbps	3.08	3.05	3.04	13	Pass
WCDMA Band IV	RMC 12.2kbps	3.05	3.03	2.94	13	Pass
WCDMA Band V	RMC 12.2kbps	2.90	2.90	3.15	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



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

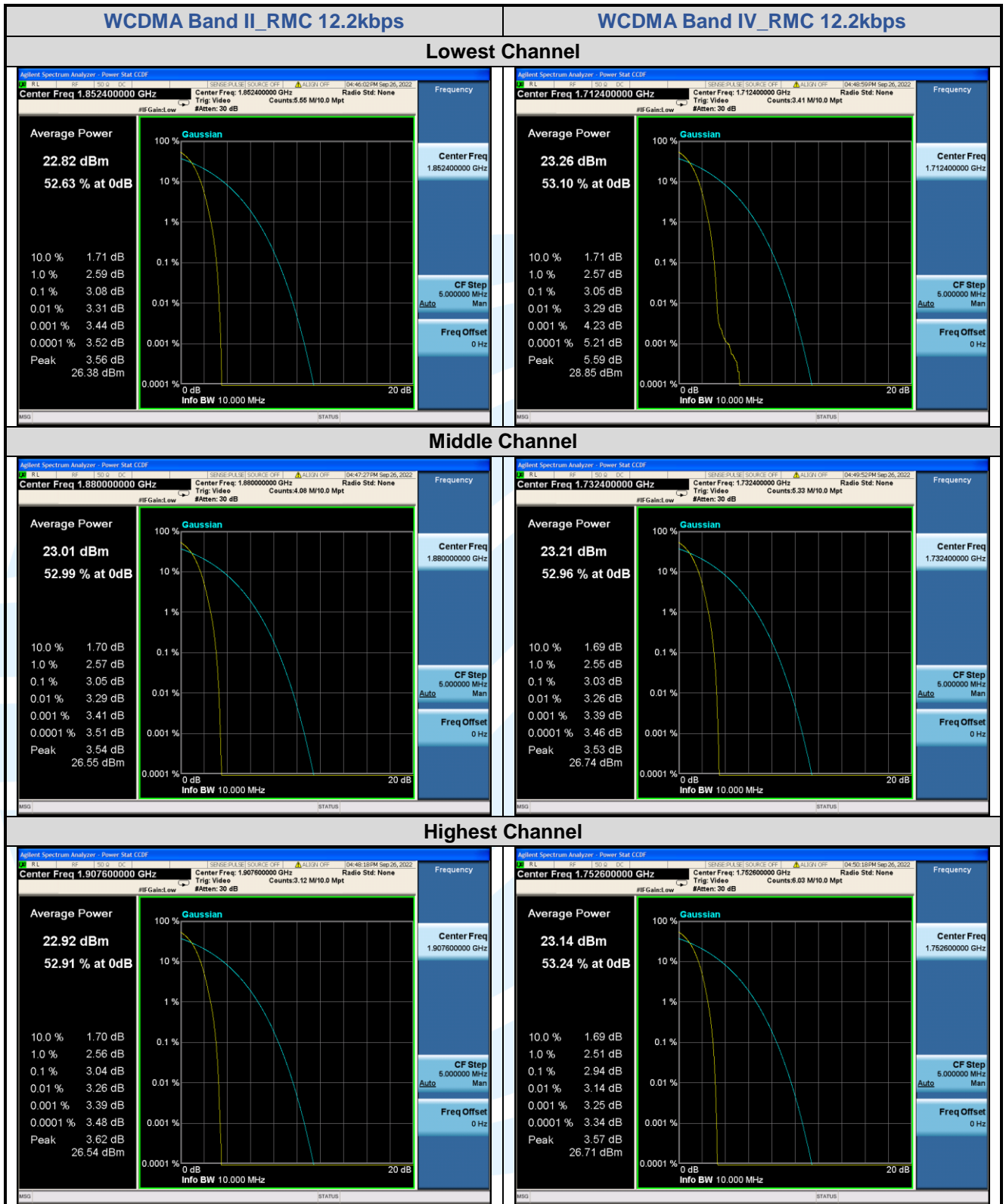
Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

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5.5 99%&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),
 FCC 47 CFR Part 27.53(h)

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

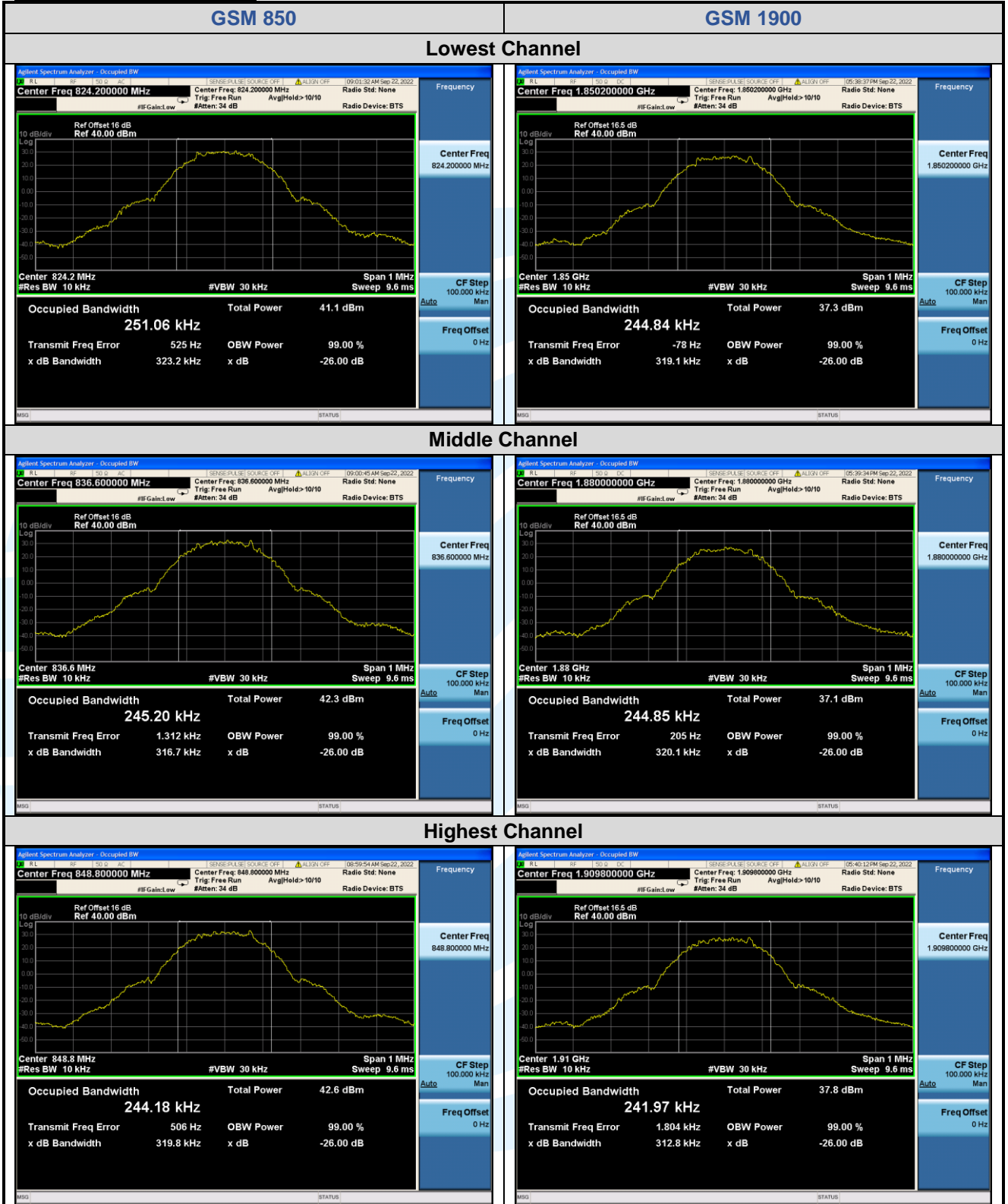
Test Results: Pass

Test Data: See table below

Bands	Modulation	Channel	Frequency (MHz)	26 dB BW (kHz)	99% BW (kHz)
GSM 850	GSM	128	824.2	323.2	251.06
		190	836.6	316.7	245.20
		251	848.8	319.8	244.18
	GPRS	128	824.2	322.7	245.62
		190	836.6	318.1	248.71
		251	848.8	322.1	248.40
	EDGE	128	824.2	318.1	244.95
		190	836.6	320.9	246.10
		251	848.8	318.5	246.53
PCS 1900	GSM	512	1850.2	319.1	244.84
		661	1880.0	320.1	244.85
		810	1909.8	312.8	241.97
	GPRS	512	1850.2	313.6	243.88
		661	1880.0	320.0	242.28
		810	1909.8	322.0	244.36
	EDGE	512	1850.2	319.2	241.58
		661	1880.0	313.2	242.31
		810	1909.8	320.9	245.88
WCDMA Band II	RMC 12.2kbps	9262	1852.4	4.1938	4.728
		9400	1880.0	4.1816	4.708
		9538	1907.6	4.1596	4.712
WCDMA Band IV	RMC 12.2kbps	1312	1712.4	4.1864	4.731
		1412	1732.4	4.1683	4.721
		1513	1752.6	4.1758	4.706
WCDMA Band V	RMC 12.2kbps	4132	826.4	4.1765	4.720
		4182	836.4	4.1661	4.711
		4233	846.6	4.1724	4.728

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The test plots as follows:



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

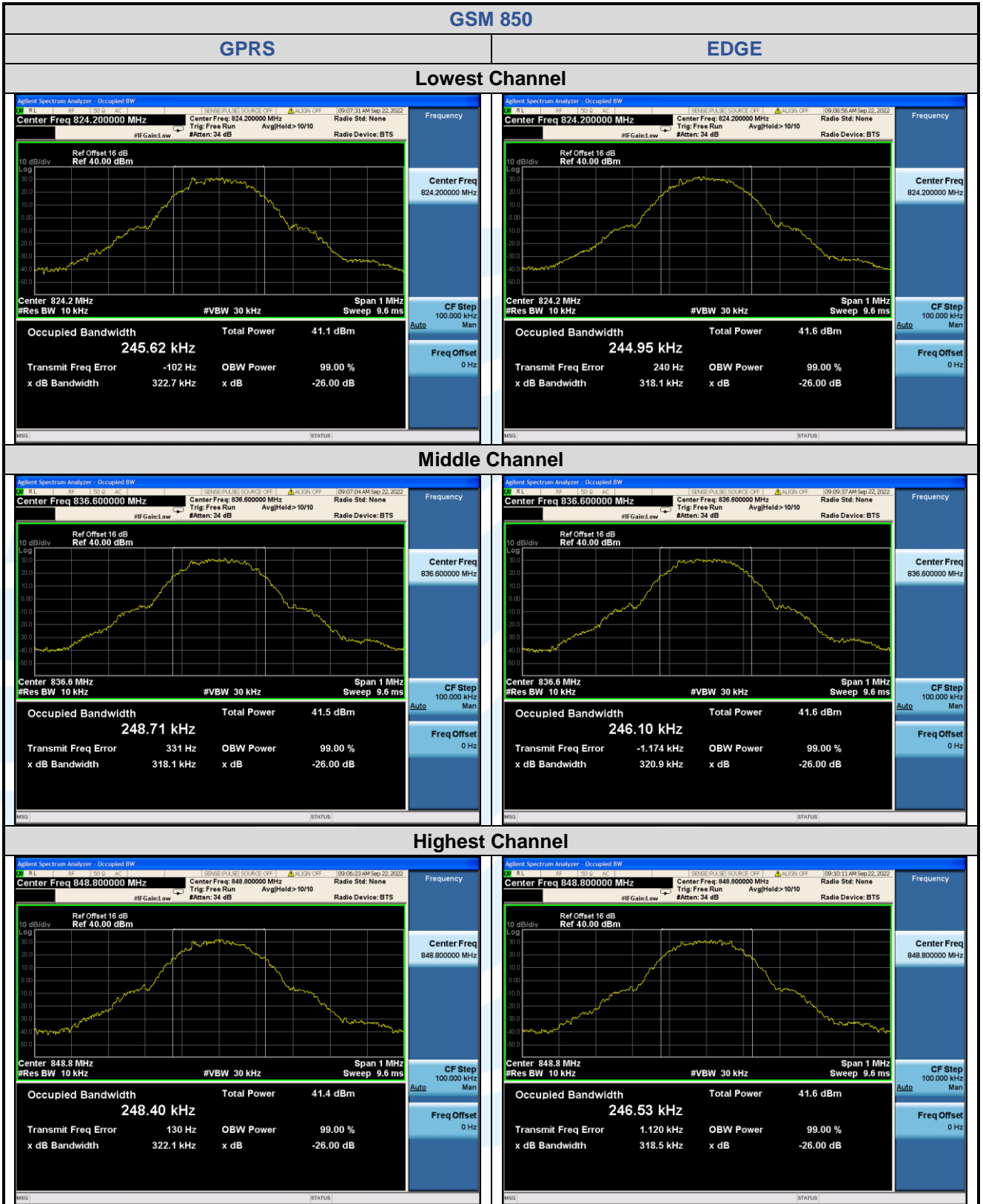
Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

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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

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E-mail: info@uttlab.com

<http://www.uttlab.com>

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E-mail: info@uttlab.com

<http://www.uttlab.com>

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