

FCC TEST REPORT

Product Name: Mobile Phone
Trade Mark: BLU
Model No.: STUDIO X10 2022
Report Number: 210923014RFM-1
Test Standards: FCC 47 CFR Part 22 Subpart H
FCC 47 CFR Part 24 Subpart E
FCC ID: YHLBLUX102022
Test Result: PASS
Date of Issue: October 27, 2021

Prepared for:

BLU Products, Inc.
10814 NW 33rd St # 100 Doral, FL 33172 ,USA

Prepared by:

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UTTR-RF-FCC23G-V1.1

Version

Version No.	Date	Description
V1.0	October 27, 2021	Original



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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	BLU Products, Inc.
Address of Applicant:	10814 NW 33rd St # 100 Doral, FL 33172 ,USA
Manufacturer:	BLU Products, Inc.
Address of Manufacturer:	10814 NW 33rd St # 100 Doral, FL 33172 ,USA

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Mobile Phone	
Model No.:	STUDIO X10 2022	
Trade Mark:	BLU	
DUT Stage:	Identical Prototype	
EUT Supports Function:	GSM Bands:	GSM850/1900
	UTRA Bands:	Band II/ Band V
	2.4 GHz ISM Band:	IEEE 802.11b/g/n Bluetooth V4.2
Sample Received Date:	September 23, 2021	
Sample Tested Date:	September 23, 2021 to October 20, 2021	

1.2.2 Description of Accessories

Adapter	
Model No.:	US-FC-0750
Input:	100-240 V~50/60 Hz 0.2A
Output:	5.0 V = 750mA
DC Cable:	0.9 Meter, Unshielded without ferrite

Battery	
Model No.:	C775444200L
Battery Type:	Lithium-ion Rechargeable Battery
Rated Voltage:	3.8 Vdc
Limited Charge Voltage:	4.35 Vdc
Rated Capacity:	2000 mAh

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Support Networks:	GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA	
Type of Modulation:	GSM/GPRS/:	GMSK
	EDGE:	GMSK
	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 V:	826.4-846.6 MHz
Max RF Output Power:	GSM/GPRS 850:	30.11dBm
	GSM/GPRS 1900:	29.60dBm
	WCDMA Band II:	22.27dBm
	WCDMA Band V:	19.53dBm
Emission Designator:	GSM/GPRS 850:	249KGXW
	GSM/GPRS 1900:	250KGXW
	WCDMA Band II:	4M15F9W
	WCDMA Band V:	4M15F9W
Antenna Type:	PIFA Antenna	
Antenna Gain:	GSM 850:	-0.73 dBi
	PCS 1900:	-0.37 dBi
	WCDMA Band II:	-0.56 dBi
	WCDMA Band V:	-0.73 dBi
Normal Test Voltage:	3.8 Vdc	
Extreme Test Voltage:	3.6 to 4.35Vdc	
Extreme Test Temperature:	0 °C to +55 °C	

1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.2 Meter	Applicant

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

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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

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 emission 9kHz-150kHz	±3.2 dB
2	Conducted emission 150kHz-30MHz	±2.7 dB
3	Radiated spurious emissions 30MHz-1GHz	± 4.9 dB
4	Radiated spurious emissions 1GHz-18GHz	± 4.8 dB
5	Radiated spurious emissions 18GHz-40GHz	± 5.1 dB
6	Occupied Bandwidth	± 1.86 %
7	DC Supply Voltages	± 0.68 %
8	Temperature	± 0.62 °C
9	Humidity	± 3.9 %
10	Conducted spurious emissions	± 2.7 dB
11	DC Supply Voltages	± 0.68 %
12	AC Supply Voltages	± 1.2 %
13	Radio Frequency	± 6.5 x 10 ⁻⁸
14	RF Power, Conducted	± 0.9 dB

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)
<input checked="" type="checkbox"/>	3m SAC	ETS-LINDGREN	3M	N/A	Jan. 22, 2021	Jan. 21, 2024
<input checked="" type="checkbox"/>	Receiver	R&S	ESIB26	100114	Nov. 18, 2020	Nov. 17, 2021
<input type="checkbox"/>	Loop Antenna	ETS-LINDGREN	6502	00202525	Nov. 14, 2020	Nov. 13, 2021
<input checked="" type="checkbox"/>	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 14, 2020	Nov. 13, 2021
<input checked="" type="checkbox"/>	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 14, 2020	Nov.13, 2021
<input checked="" type="checkbox"/>	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	Apr. 30, 2021	Apr. 29, 2022
<input checked="" type="checkbox"/>	Pre-amplifier	ETS-Lindgren	00118385	00201874	Nov. 10, 2020	Nov. 9, 2021
<input checked="" type="checkbox"/>	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Nov. 14, 2020	Nov. 13, 2021
<input checked="" type="checkbox"/>	Pre-amplifier	ETS-Lindgren	00118384	00202652	Nov. 14, 2020	Nov. 13, 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 Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
<input checked="" type="checkbox"/>	Spectrum Analyzer	R&S	FSV40-N	101653	Apr. 22, 2021	Apr. 21, 2022
<input checked="" type="checkbox"/>	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Apr. 22, 2021	Apr. 21, 2022
<input checked="" type="checkbox"/>	Wideband Radio Communication Tester	R&S	CMW500	120932	Apr. 22, 2021	Apr. 21, 2022
<input checked="" type="checkbox"/>	DC Source	KIKUSUI	PWR400L	LK003024	N/A	N/A
<input checked="" type="checkbox"/>	Digital multimeter	FLUKE	15B+	30701460WS 15	Nov. 12, 2020	Nov. 11, 2021
<input checked="" type="checkbox"/>	Temp & Humidity chamber	Votisch	VT4002	58566133290 020	Apr. 22, 2021	Apr. 21, 2022

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

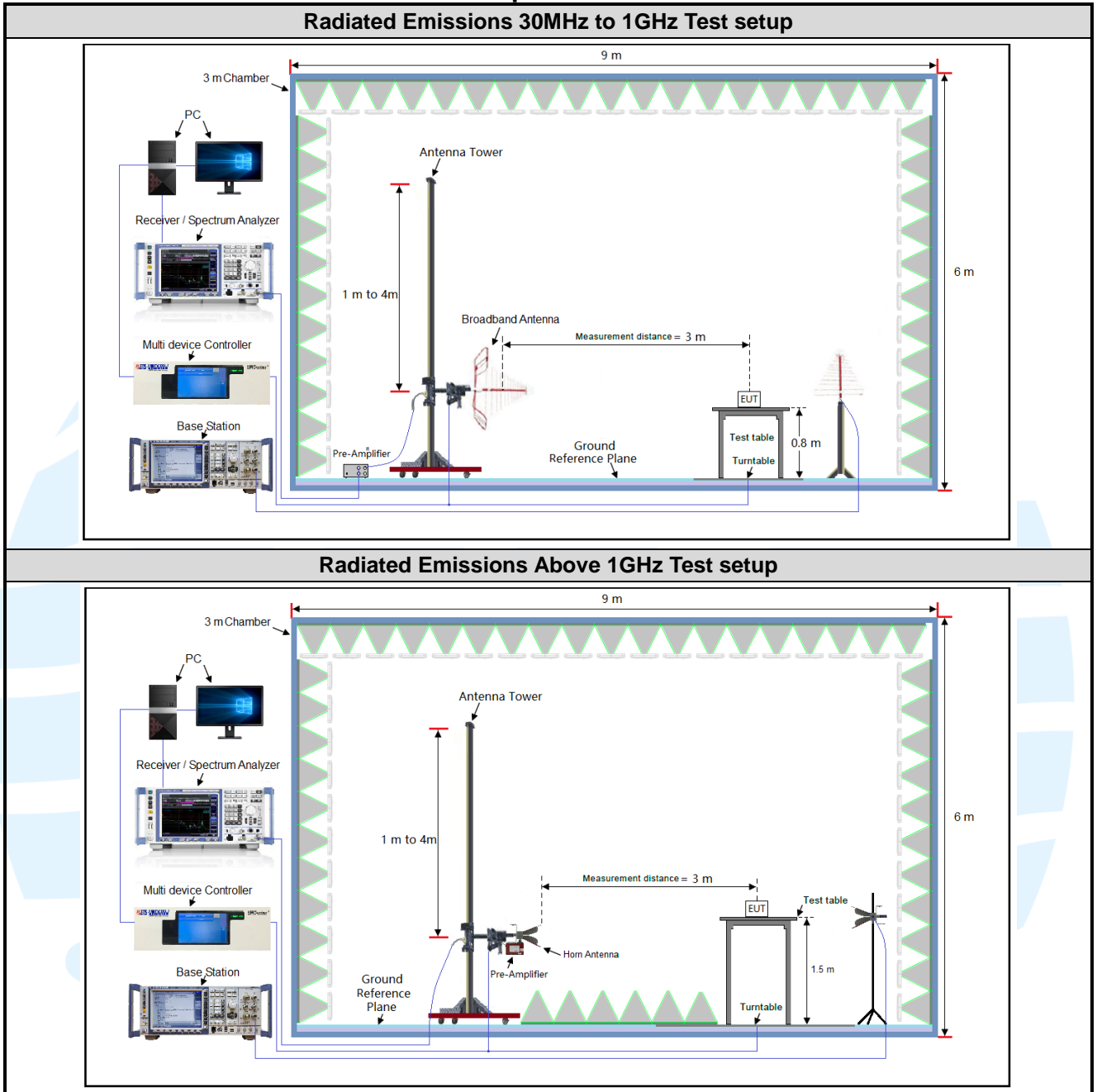
Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	3.8	20 to 75
TL/VL	0	3.6	20 to 75
TH/VL	+55	3.6	20 to 75
TL/VH	0	4.35	20 to 75
TH/VH	+55	4.35	20 to 75

Remark:

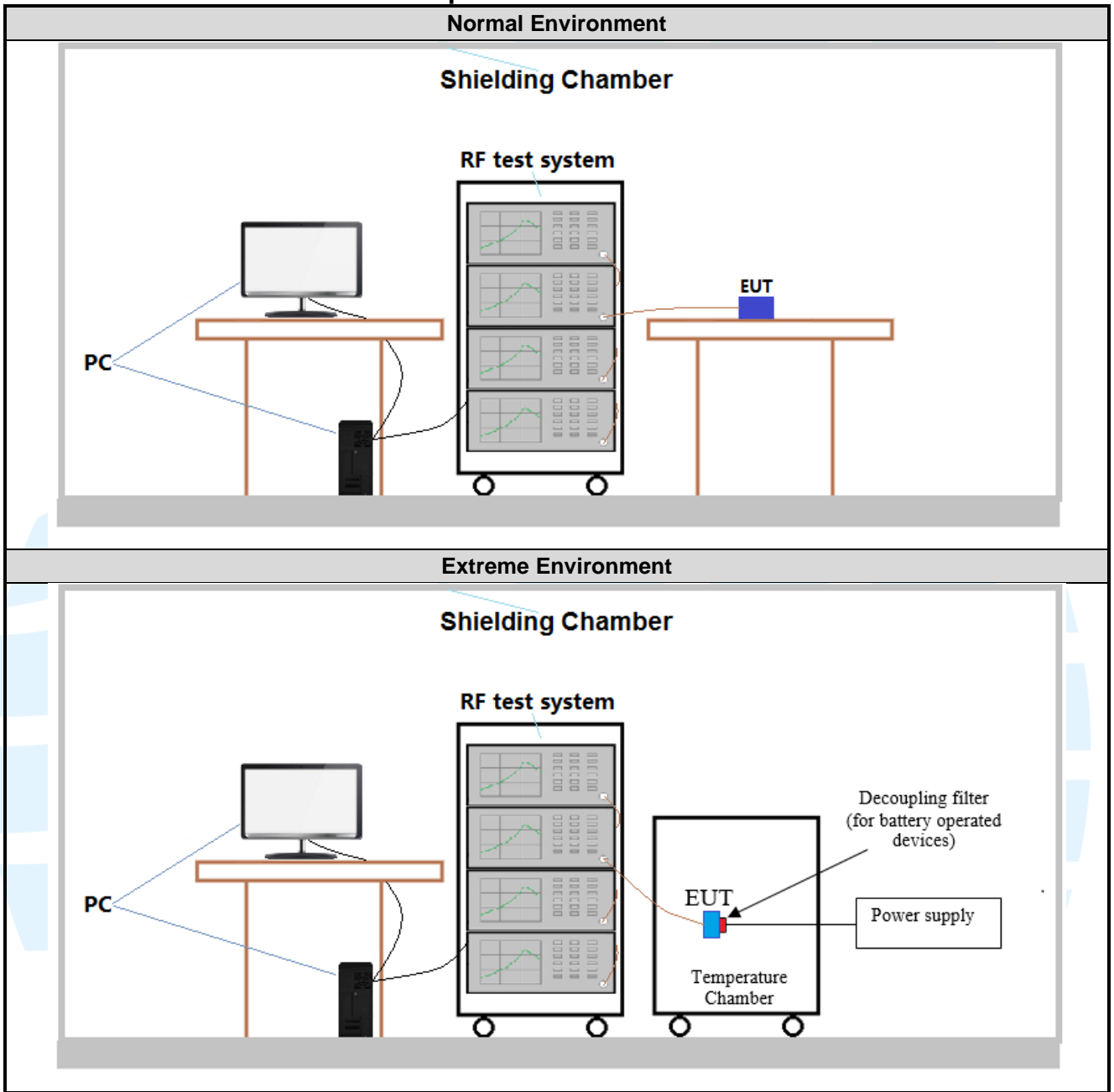
- 1) The EUT just work in such extreme temperature of 0 °C to +55 °C and the extreme voltage of 3.6 V to 4.35 V, so here the EUT is tested in the temperature of 0 °C to +55 °C and the voltage of 3.6 V to 4.35 V.
- 2) VN: Normal Voltage; TN: Normal Temperature;
 TL: Low Extreme Test Temperature; TH: High 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

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 3.8Vdc 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
GSM 850	1TX	Chain 0	Y axis
PCS 1900	1TX	Chain 0	Y axis
WCDMA Band II	1TX	Chain 0	Y axis
WCDMA Band V	1TX	Chain 0	Y 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:
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)	32.98	32.89	32.80
GPRS (GMSK, 1Tx-slot)	32.99	32.87	32.81
GPRS (GMSK, 2Tx-slot)	31.20	30.99	30.92
GPRS (GMSK, 3Tx-slot)	29.60	29.38	29.29
GPRS (GMSK, 4Tx-slot)	27.97	27.76	27.60

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)	29.97	29.85	29.76
GPRS (GMSK, 1Tx-slot)	29.90	29.94	29.78
GPRS (GMSK, 2Tx-slot)	27.82	27.90	27.80
GPRS (GMSK, 3Tx-slot)	26.52	26.61	26.54
GPRS (GMSK, 4Tx-slot)	24.76	24.86	24.78

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	22.27	22.83	22.30
HSDPA Subtest-1	22.16	22.63	22.18
HSDPA Subtest-2	21.34	21.95	21.79
HSDPA Subtest-3	20.50	21.03	21.01
HSDPA Subtest-4	22.25	22.77	22.80
HSUPA Subtest-1	20.88	21.48	21.25
HSUPA Subtest-2	20.94	20.99	21.02
HSUPA Subtest-3	21.01	20.92	20.84
HSUPA Subtest-4	21.03	21.10	20.99
HSUPA Subtest-5	20.32	20.21	20.33

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	22.16	22.41	22.30
HSDPA Subtest-1	22.03	22.29	22.16
HSDPA Subtest-2	21.65	21.90	21.70
HSDPA Subtest-3	20.89	21.12	20.95
HSDPA Subtest-4	22.20	22.40	22.26
HSUPA Subtest-1	20.90	21.15	20.99
HSUPA Subtest-2	21.06	20.92	20.94
HSUPA Subtest-3	21.10	21.06	20.99
HSUPA Subtest-4	21.02	21.09	20.94
HSUPA Subtest-5	20.41	20.32	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	1) GSM (GMSK,1Tx-slot) Link 2) GPRS (GMSK, 1Tx-slot) Link
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:

$$\text{ERP or EIRP} = P_{\text{Meas}} + G_{\text{T}} - L_{\text{c}}$$

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)	
GSM 850 (824-849 MHz)	GPRS	32.99	-0.73	7.0	30.11	1.025652	Pass
WCDMA Band V (824-849 MHz)	RMC 12.2kbps	22.41	-0.73	7.0	19.53	0.089743	Pass
	HSUPA	21.15	-0.73		18.27	0.067143	Pass
	HSDPA	22.40	-0.73		19.52	0.089536	Pass

Bands	Modulation	Max. Conducted Avg. Power	Ant. Gain	Limit	EIRP		Result
		(dBm)	(dBi)	(W)	(dBm)	(W)	
PCS 1900 (1850-1910 MHz)	GPRS	29.97	-0.37	2.0	29.60	0.912011	Pass
WCDMA Band II (1850-1910 MHz)	RMC 12.2kbps	22.83	-0.56	2.0	22.27	0.168655	Pass
	HSUPA	21.48	-0.56		20.92	0.123595	Pass
	HSDPA	22.63	-0.56		22.07	0.161065	Pass

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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 EUT was connected to Spectrum Analyzer and Base Station via power divider. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Some regulatory requirements specify a PAPR limit when the output power limits are specified in terms of average power. If it becomes necessary to provide measurement data to demonstrate compliance to a PAPR limit, then the appropriate procedure from those provided in 5.2.3 shall be utilized to determine the peak power (or peak PSD) and the appropriate procedure from those provided in 5.2.4 shall be used to determine the average power (or average PSD). The data from these measurements is then used in Equation (2) to determine the PAPR of a narrowband CW-like signal. See 5.2.3.4 for guidance on determining the PAPR of a broadband noise-like signal.

$$PAPR (dB) = PPK (dBm \text{ or } dBW) - PAvg (dBm \text{ or } dBW)$$

where:

PAPR peak-to-average power ratio, in dB;

PPk measured peak power or peak PSD level, in dBm or dBW;

PAvg measured average power or average PSD level, in dBm or dBW.

OR

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

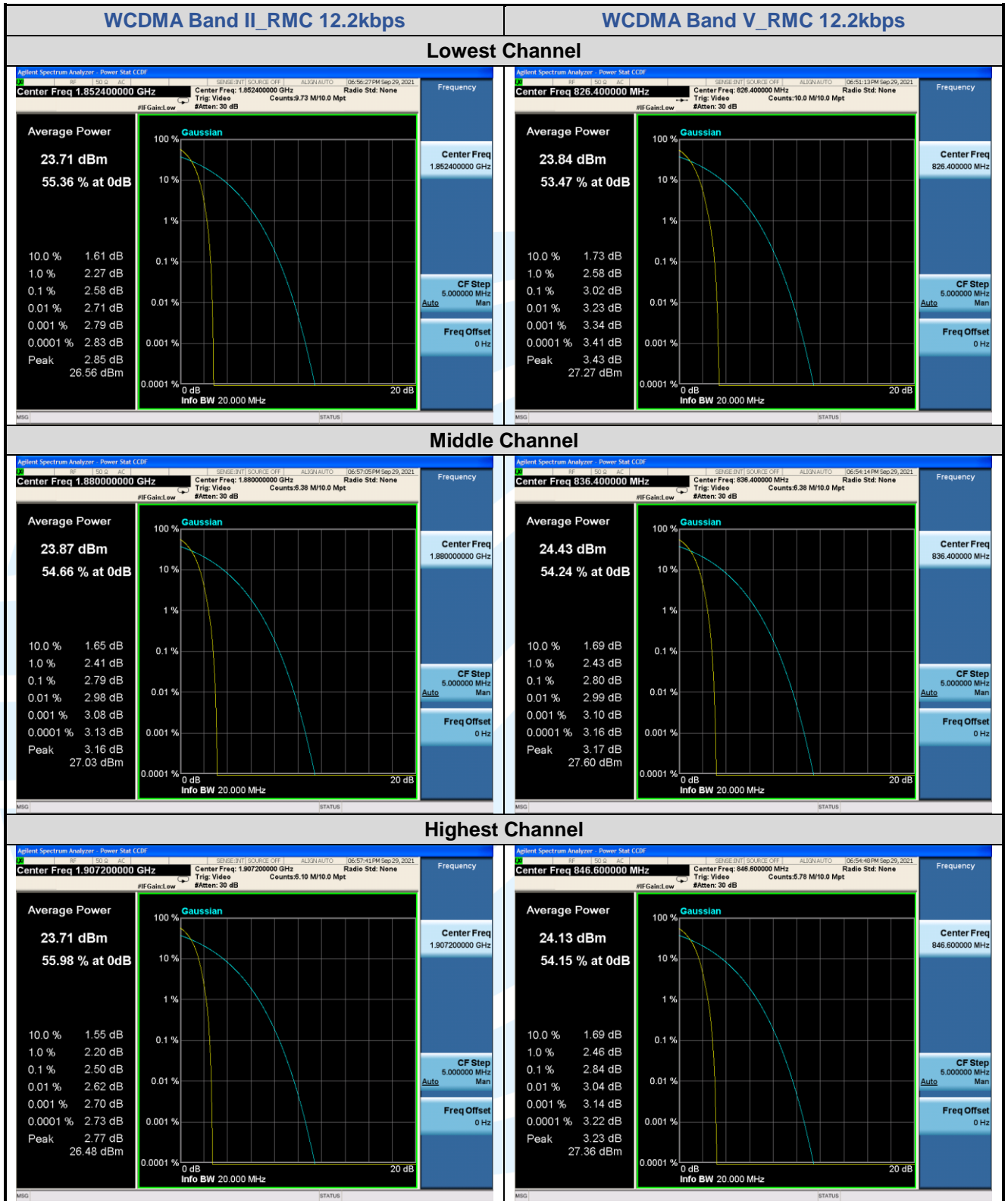
Test Results: Pass

Test Data: See table below

Bands	Modulation	Peak-to-average ratio (dB)			Limit (dB)	Result
		Lowest	Middle	Highest		
GSM 850	GSM	0.36	0.51	0.57	13	Pass
PCS 1900	GSM	0.47	0.35	0.29	13	Pass
WCDMA Band II	RMC 12.2kbps	2.58	2.79	2.50	13	Pass
WCDMA Band V	RMC 12.2kbps	3.02	2.80	2.84	13	Pass

The test plots as follows:





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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

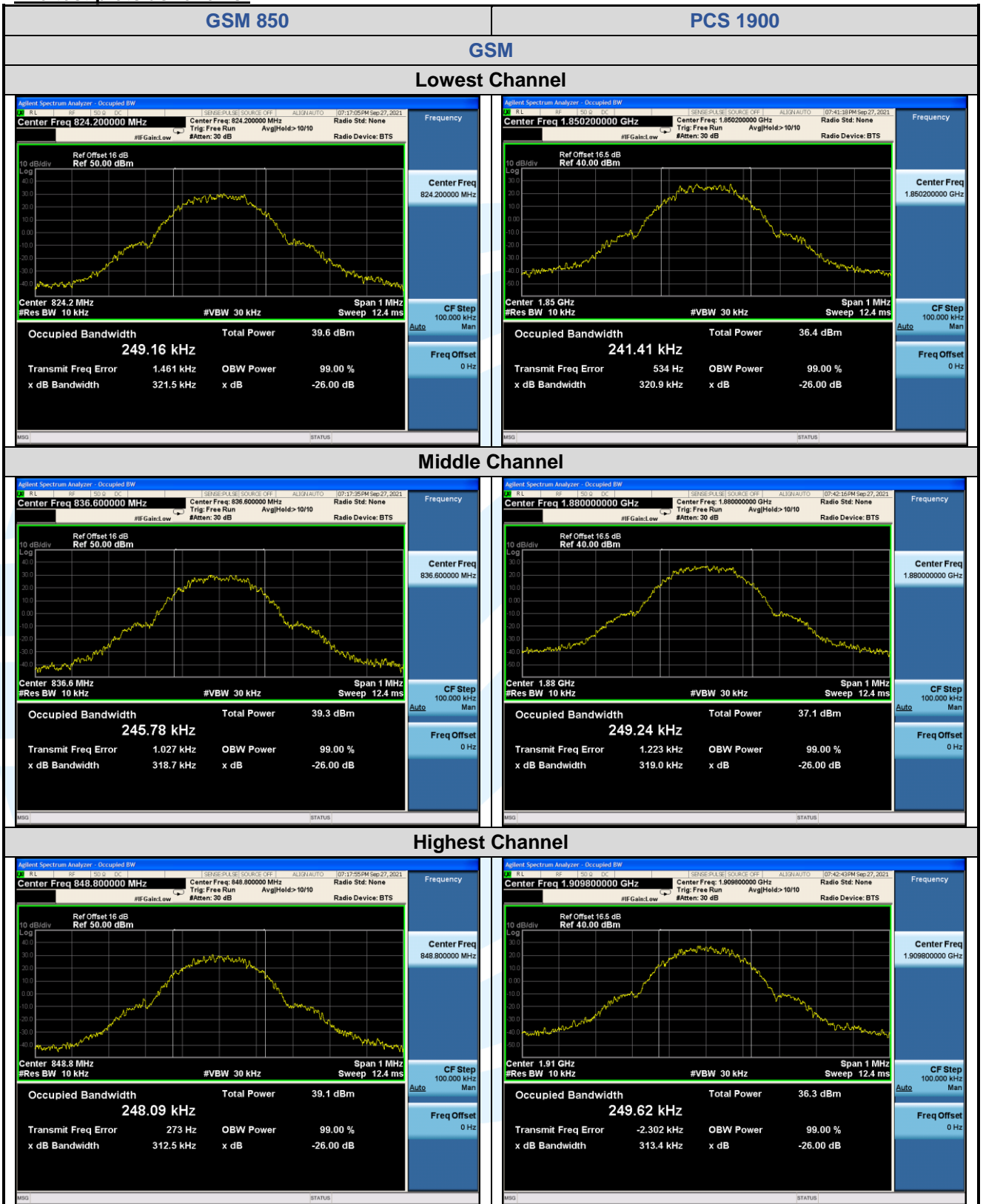
Test Results: Pass

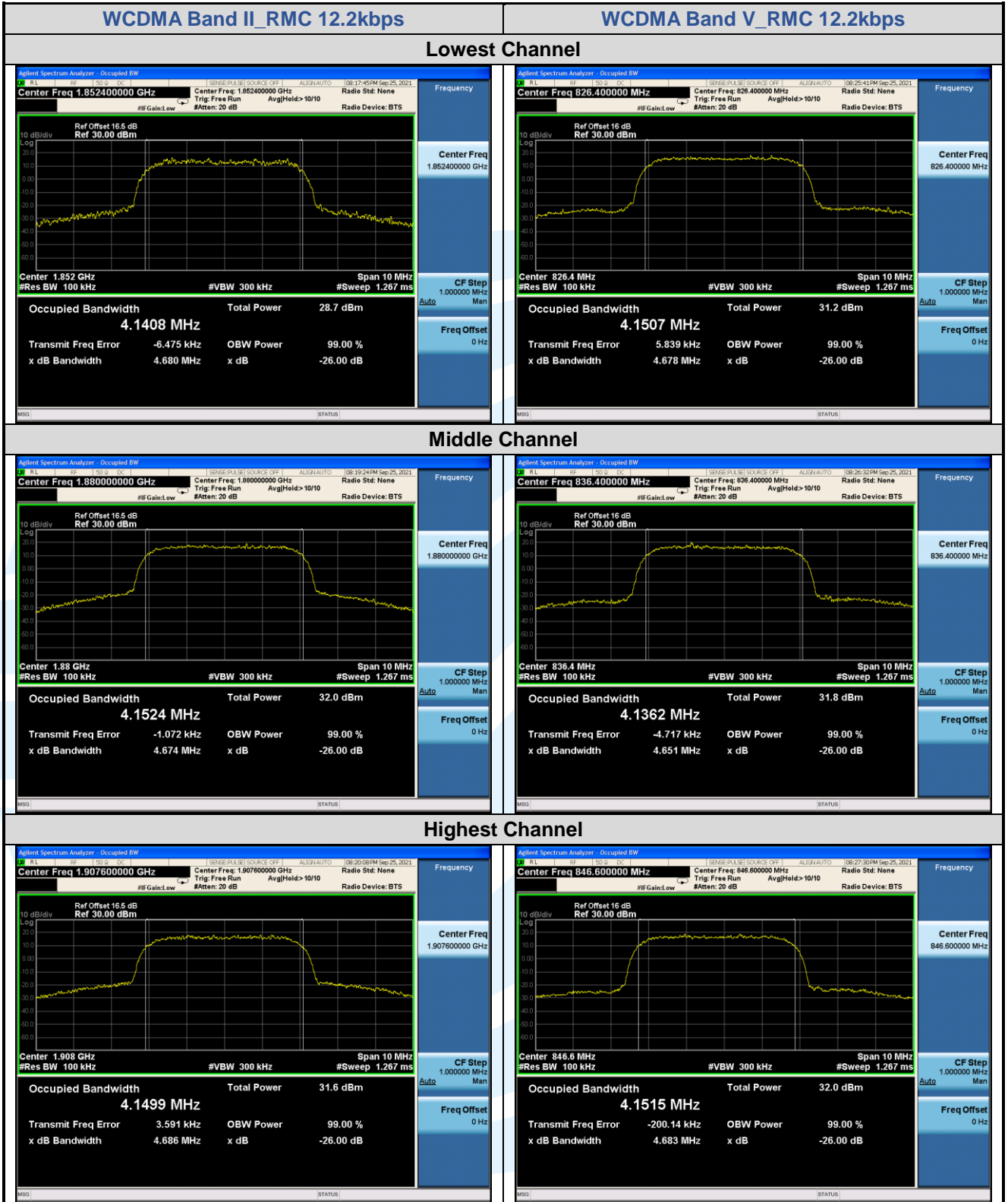
Test Data: See table below

Bands	Modulation	Channel	Frequency (MHz)	26 dB BW (kHz)	99% BW (kHz)
GSM 850	GSM	128	824.2	321.5	249.16
		190	836.6	318.7	245.78
		251	848.8	312.5	248.09
PCS 1900	GSM	512	1850.2	320.9	241.41
		661	1880.0	319.0	249.24
		810	1909.8	313.4	249.62

Bands	Modulation	Channel	Frequency (MHz)	26 dB BW (MHz)	99% BW (MHz)
WCDMA Band II	RMC 12.2kbps	9262	1852.4	4.680	4.1408
		9400	1880.0	4.674	4.1524
		9538	1907.6	4.686	4.1499
WCDMA Band V	RMC 12.2kbps	4132	826.4	4.678	4.1507
		4182	836.4	4.651	4.1362
		4233	846.6	4.683	4.1515

The test plots as follows:





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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),
FCC 47 CFR Part 27.53(h)(1)

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.

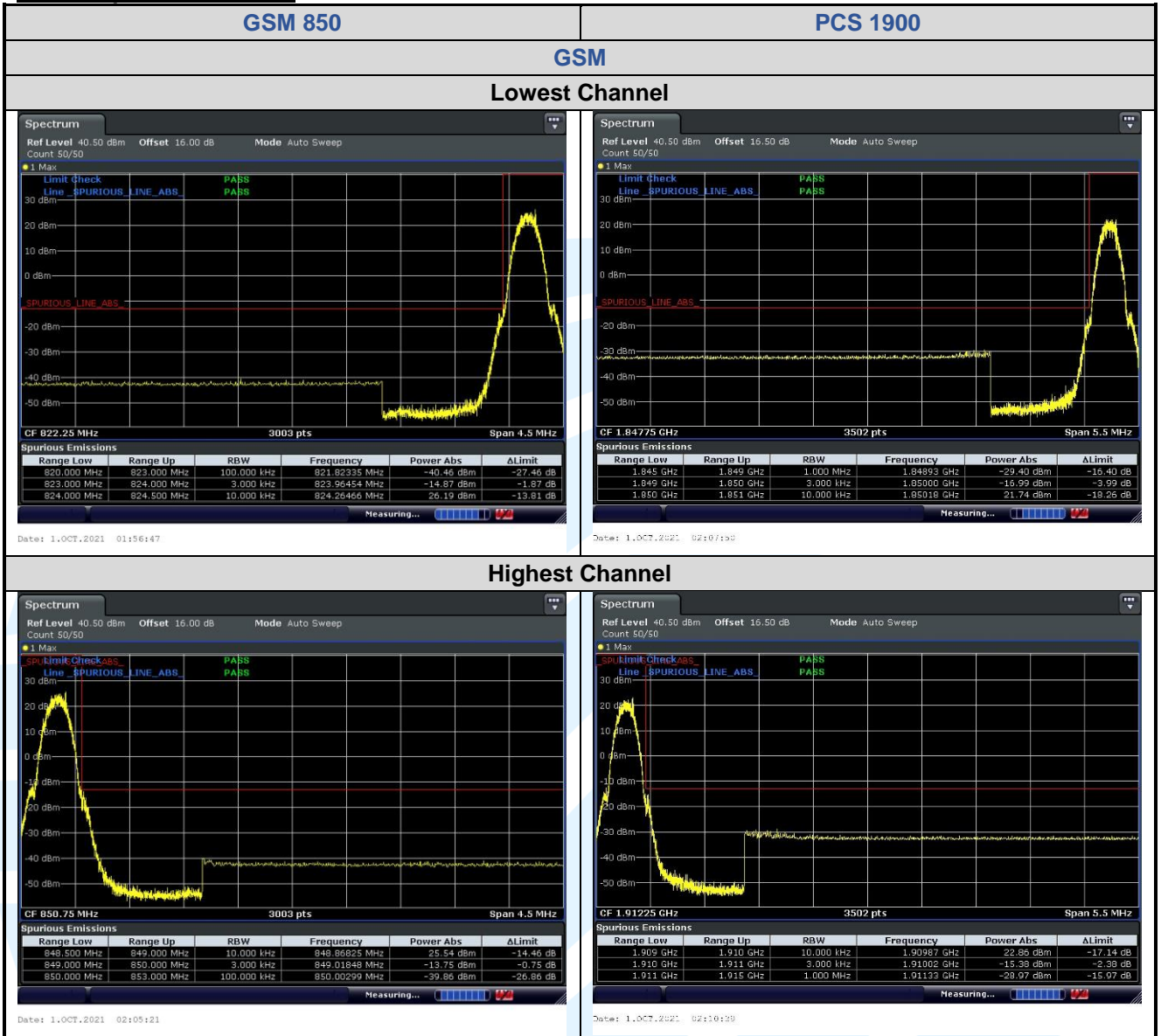
Test Setup: Refer to section 4.2.2 for details.

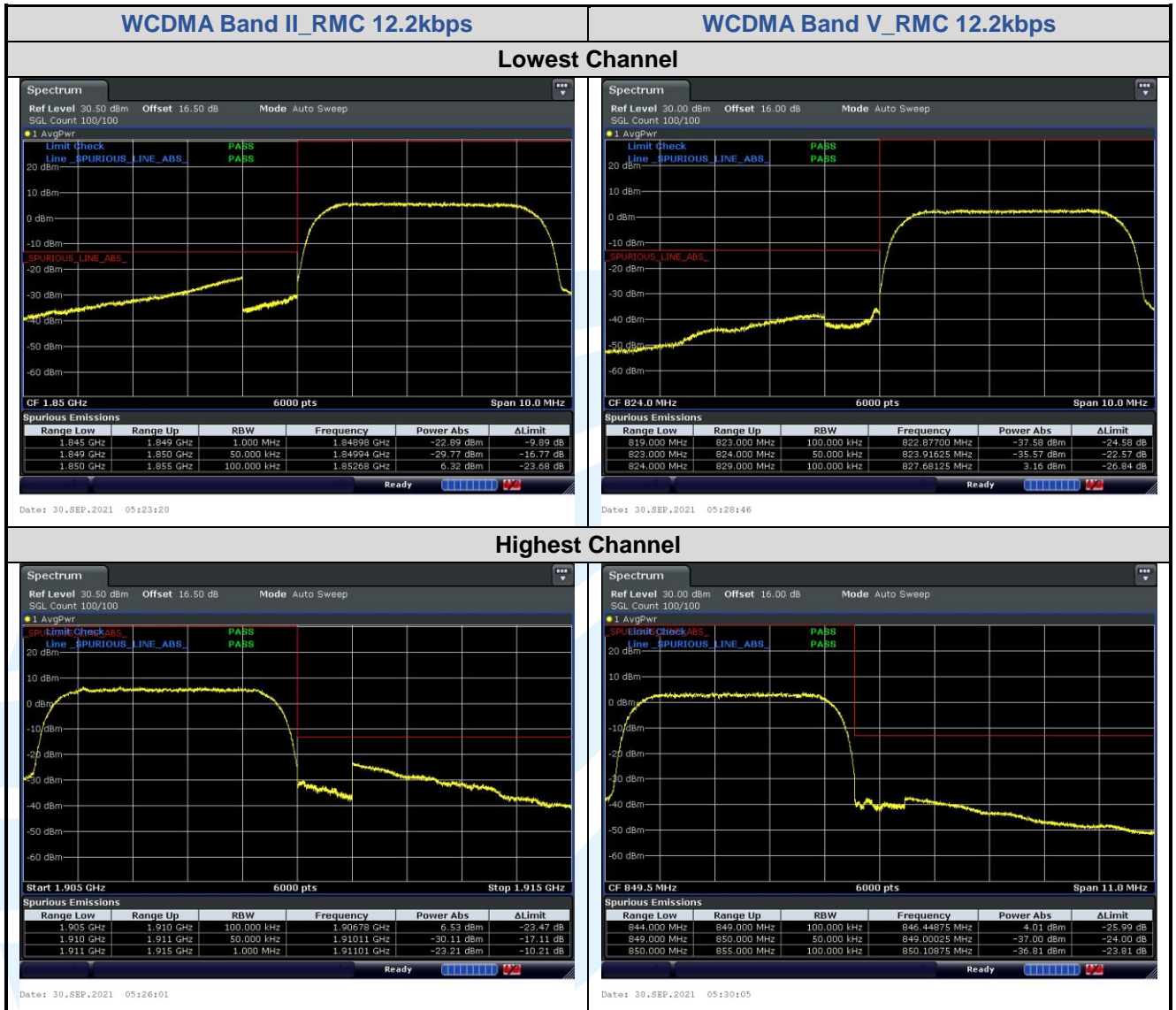
Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

The test plots as follows:





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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),
FCC 47 CFR Part 27.53(h)(1)

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.

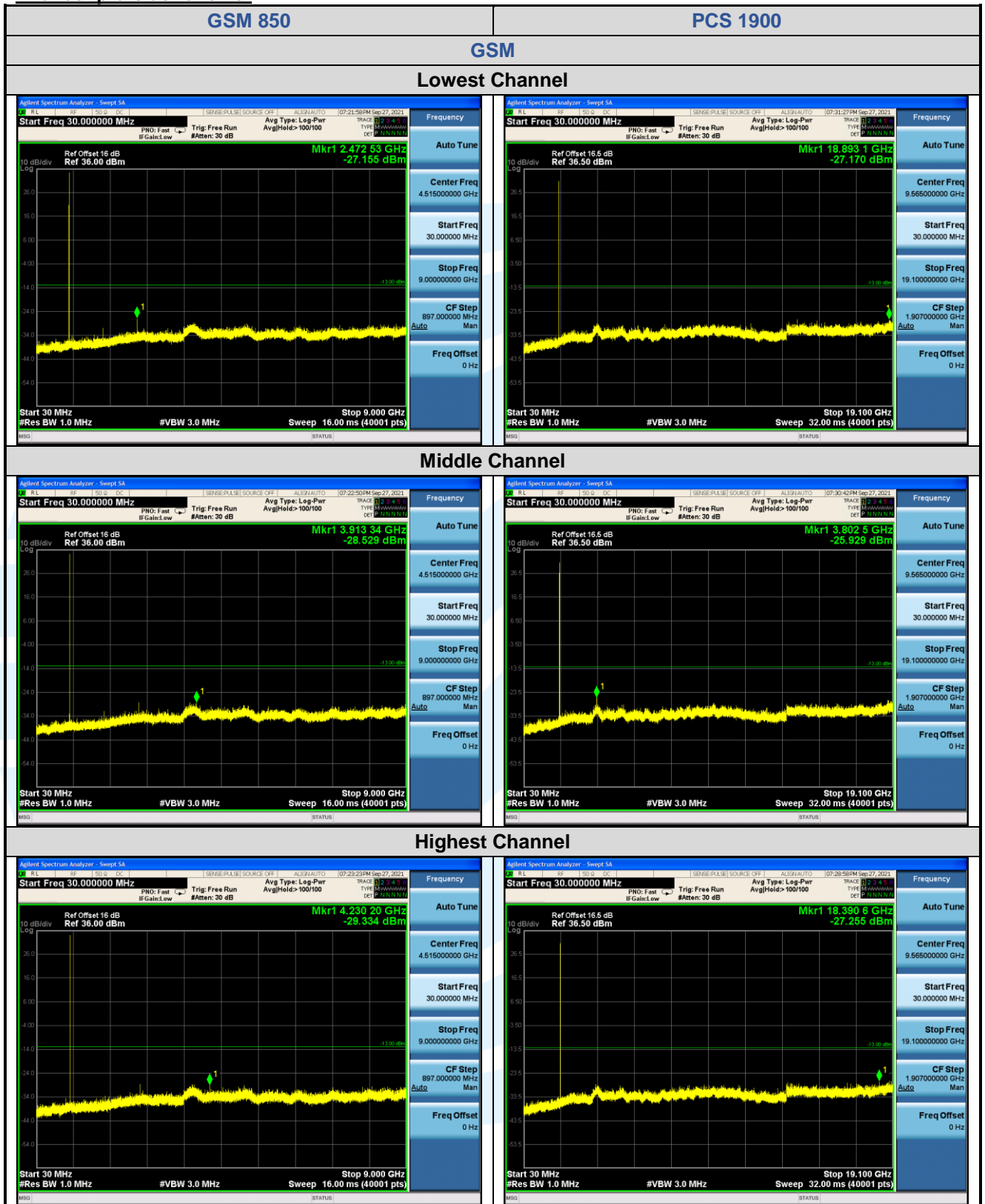
Test Setup: Refer to section 4.2.2 for details.

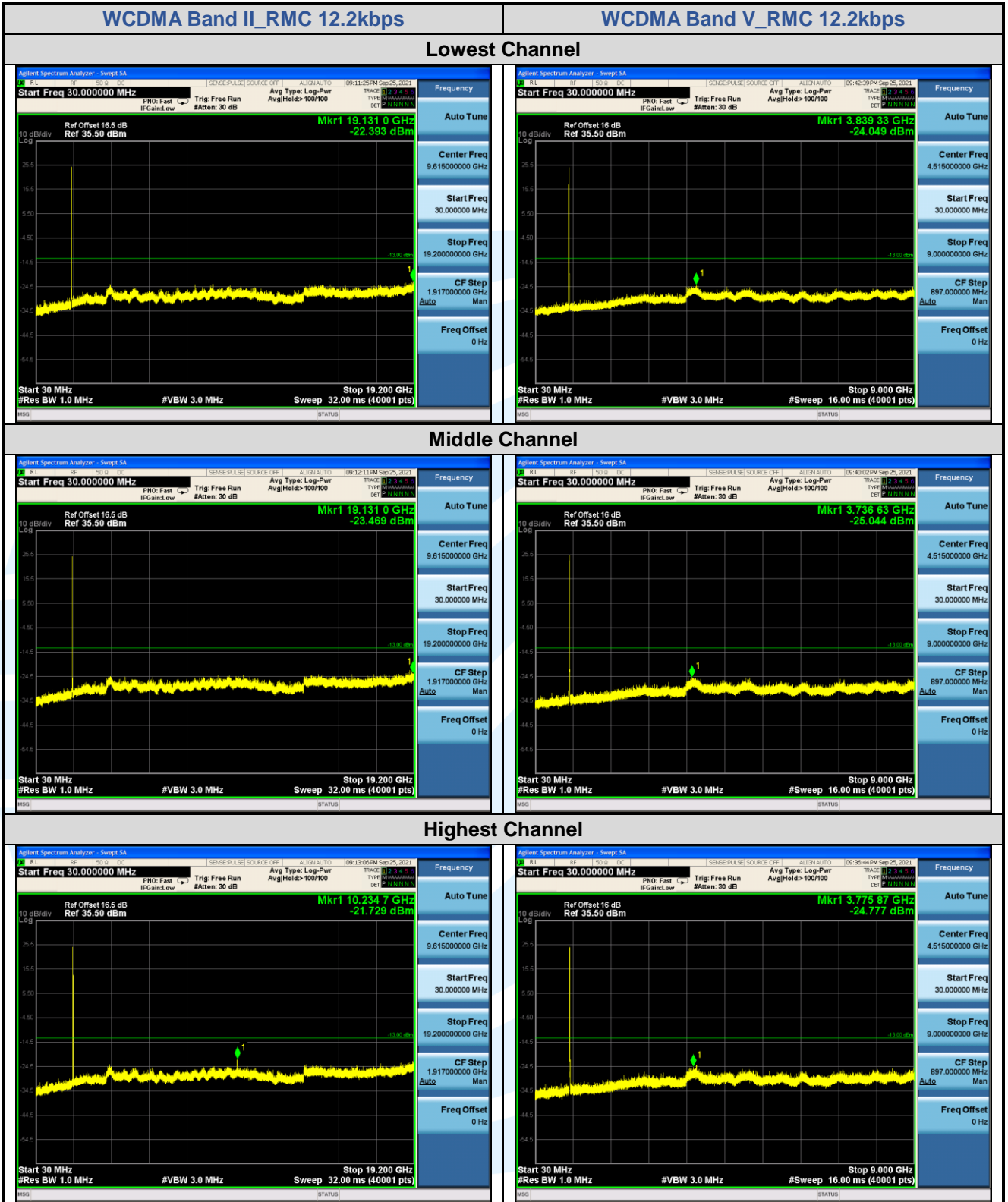
Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

The test plots as follows:





Remark:

1) All the above radiation data, the fundamental frequency is not marked, it may exceed the limit, please ignore it.

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),
FCC 47 CFR Part 27.53(h)(1)

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:

GSM 850							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
Lowest Channel							
1	35.762	-91.03	32.96	-58.07	-13.00	-45.07	Horizontal
2	280.294	-89.52	30.12	-59.40	-13.00	-46.40	Horizontal
3	912.695	-86.96	42.81	-44.15	-13.00	-31.15	Horizontal
4	1648.400	-43.86	0.20	-43.66	-13.00	-30.66	Horizontal
5	2472.600	-54.98	3.59	-51.39	-13.00	-38.39	Horizontal
1	33.101	-89.94	33.68	-56.26	-13.00	-43.26	Vertical
2	178.770	-89.99	27.99	-62.00	-13.00	-49.00	Vertical
3	952.000	-86.58	42.55	-44.03	-13.00	-31.03	Vertical
4	1648.400	-43.35	0.20	-43.15	-13.00	-30.15	Vertical
5	2472.600	-54.99	3.59	-51.40	-13.00	-38.40	Vertical
Middle Channel							
1	30.855	-90.69	33.79	-56.90	-13.00	-43.90	Horizontal
2	348.514	-89.02	32.60	-56.42	-13.00	-43.42	Horizontal
3	881.184	-86.37	42.45	-43.92	-13.00	-30.92	Horizontal
4	1673.200	-46.23	0.36	-45.87	-13.00	-32.87	Horizontal
5	2509.800	-58.76	3.71	-55.05	-13.00	-42.05	Horizontal
1	32.640	-90.00	33.61	-56.39	-13.00	-43.39	Vertical
2	395.507	-89.60	33.41	-56.19	-13.00	-43.19	Vertical
3	992.997	-86.94	43.31	-43.63	-13.00	-30.63	Vertical
4	1673.200	-46.43	0.36	-46.07	-13.00	-33.07	Vertical
5	2509.800	-59.95	3.71	-56.24	-13.00	-43.24	Vertical
Middle Channel							
1	30.855	-91.33	33.79	-57.54	-13.00	-44.54	Horizontal
2	243.543	-89.95	28.56	-61.39	-13.00	-48.39	Horizontal
3	992.997	-87.11	43.31	-43.80	-13.00	-30.80	Horizontal
4	1697.600	-47.28	0.52	-46.76	-13.00	-33.76	Horizontal
5	2546.400	-63.86	3.80	-60.06	-13.00	-47.06	Horizontal
1	37.830	-88.62	31.68	-56.94	-13.00	-43.94	Vertical
2	505.789	-89.11	36.19	-52.92	-13.00	-39.92	Vertical
3	899.958	-87.06	42.67	-44.39	-13.00	-31.39	Vertical
4	1697.600	-47.26	0.52	-46.74	-13.00	-33.74	Vertical
5	2546.400	-64.07	3.80	-60.27	-13.00	-47.27	Vertical

PCS 1900							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
Lowest Channel							
1	32.640	-91.39	33.61	-57.78	-13.00	-44.78	Horizontal
2	484.907	-88.86	35.42	-53.44	-13.00	-40.44	Horizontal
3	893.656	-86.54	42.73	-43.81	-13.00	-30.81	Horizontal
4	3700.400	-63.59	7.58	-56.01	-13.00	-43.01	Horizontal
5	5550.600	-66.27	11.77	-54.50	-13.00	-41.50	Horizontal
1	32.870	-90.54	33.65	-56.89	-13.00	-43.89	Vertical
2	254.031	-90.52	28.98	-61.54	-13.00	-48.54	Vertical
3	932.141	-87.70	42.65	-45.05	-13.00	-32.05	Vertical
4	3700.400	-63.30	7.58	-55.72	-13.00	-42.72	Vertical
5	5550.600	-67.16	11.77	-55.39	-13.00	-42.39	Vertical
Middle Channel							
1	30.639	-92.30	33.87	-58.43	-13.00	-45.43	Horizontal
2	225.427	-89.00	27.21	-61.79	-13.00	-48.79	Horizontal
3	979.139	-87.03	42.83	-44.20	-13.00	-31.20	Horizontal
4	3760.000	-64.05	7.79	-56.26	-13.00	-43.26	Horizontal
5	5640.000	-66.17	11.56	-54.61	-13.00	-41.61	Horizontal
1	33.570	-89.48	33.64	-55.84	-13.00	-42.84	Vertical
2	442.572	-89.20	34.21	-54.99	-13.00	-41.99	Vertical
3	972.283	-87.03	42.83	-44.20	-13.00	-31.20	Vertical
4	3760.000	-64.33	7.79	-56.54	-13.00	-43.54	Vertical
5	5640.000	-66.24	11.56	-54.68	-13.00	-41.68	Vertical
Highest Channel							
1	32.184	-91.28	33.51	-57.77	-13.00	-44.77	Horizontal
2	336.482	-89.90	32.16	-57.74	-13.00	-44.74	Horizontal
3	893.656	-86.70	42.73	-43.97	-13.00	-30.97	Horizontal
4	3819.600	-64.20	8.01	-56.19	-13.00	-43.19	Horizontal
5	5729.400	-65.87	11.36	-54.51	-13.00	-41.51	Horizontal
1	38.096	-88.06	31.53	-56.53	-13.00	-43.53	Vertical
2	307.105	-89.63	31.29	-58.34	-13.00	-45.34	Vertical
3	945.334	-86.90	42.56	-44.34	-13.00	-31.34	Vertical
4	3819.600	-64.25	8.01	-56.24	-13.00	-43.24	Vertical
5	5729.400	-66.87	11.36	-55.51	-13.00	-42.51	Vertical

WCDMA Band II							
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	31.513	-90.74	33.60	-57.14	-13.00	-44.14	Horizontal
2	302.819	-90.25	31.06	-59.19	-13.00	-46.19	Horizontal
3	912.695	-88.44	42.81	-45.63	-13.00	-32.63	Horizontal
4	3704.800	-52.96	7.59	-45.37	-13.00	-32.37	Horizontal
5	5557.200	-56.66	11.75	-44.91	-13.00	-31.91	Horizontal
1	38.365	-88.96	31.30	-57.66	-13.00	-44.66	Vertical
2	355.940	-88.78	32.84	-55.94	-13.00	-42.94	Vertical
3	958.714	-86.93	42.45	-44.48	-13.00	-31.48	Vertical
4	3704.800	-54.01	7.59	-46.42	-13.00	-33.42	Vertical
5	5557.200	-58.69	11.75	-46.94	-13.00	-33.94	Vertical
RMC 12.2kbps_ Middle Channel							
1	33.807	-91.16	33.63	-57.53	-13.00	-44.53	Horizontal
2	191.784	-89.24	27.47	-61.77	-13.00	-48.77	Horizontal
3	728.897	-87.00	40.54	-46.46	-13.00	-33.46	Horizontal
4	3760.000	-49.83	7.79	-42.04	-13.00	-29.04	Horizontal
5	5640.000	-61.00	11.56	-49.44	-13.00	-36.44	Horizontal
1	32.640	-89.83	33.61	-56.22	-13.00	-43.22	Vertical
2	546.437	-88.30	36.95	-51.35	-13.00	-38.35	Vertical
3	912.695	-87.39	42.81	-44.58	-13.00	-31.58	Vertical
4	3760.000	-50.97	7.79	-43.18	-13.00	-30.18	Vertical
5	5640.000	-61.12	11.56	-49.56	-13.00	-36.56	Vertical
RMC 12.2kbps_ Highest Channel							
1	33.807	-91.32	33.63	-57.69	-13.00	-44.69	Horizontal
2	348.514	-89.74	32.60	-57.14	-13.00	-44.14	Horizontal
3	893.656	-86.92	42.73	-44.19	-13.00	-31.19	Horizontal
4	3815.200	-46.88	7.99	-38.89	-13.00	-25.89	Horizontal
5	5722.800	-51.38	11.38	-40.00	-13.00	-27.00	Horizontal
1	30.639	-89.88	33.87	-56.01	-13.00	-43.01	Vertical
2	178.770	-90.80	27.99	-62.81	-13.00	-49.81	Vertical
3	932.141	-86.85	42.65	-44.20	-13.00	-31.20	Vertical
4	3815.200	-47.44	7.99	-39.45	-13.00	-26.45	Vertical
5	5722.800	-57.70	11.38	-46.32	-13.00	-33.32	Vertical

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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	32.640	-91.19	33.61	-57.58	-13.00	-44.58	Horizontal
2	520.208	-88.79	36.29	-52.50	-13.00	-39.50	Horizontal
3	875.013	-72.91	42.22	-30.69	-13.00	-17.69	Horizontal
4	1652.200	-66.14	0.23	-65.91	-13.00	-52.91	Horizontal
5	2479.200	-63.51	3.61	-59.90	-13.00	-46.90	Horizontal
1	34.285	-91.16	33.51	-57.65	-13.00	-44.65	Vertical
2	542.610	-88.38	36.84	-51.54	-13.00	-38.54	Vertical
3	875.013	-72.13	42.22	-29.91	-13.00	-16.91	Vertical
4	1652.800	-65.67	0.23	-65.44	-13.00	-52.44	Vertical
5	2479.200	-65.75	3.61	-62.14	-13.00	-49.14	Vertical
RMC 12.2kbps_ Middle Channel							
1	33.570	-90.99	33.64	-57.35	-13.00	-44.35	Horizontal
2	669.952	-87.28	39.43	-47.85	-13.00	-34.85	Horizontal
3	887.398	-70.96	42.59	-28.37	-13.00	-15.37	Horizontal
4	1672.800	-55.14	0.36	-54.78	-13.00	-41.78	Horizontal
5	2509.200	-59.54	3.71	-55.83	-13.00	-42.83	Horizontal
1	33.807	-90.54	33.63	-56.91	-13.00	-43.91	Vertical
2	180.030	-89.91	27.74	-62.17	-13.00	-49.17	Vertical
3	881.184	-72.66	42.45	-30.21	-13.00	-17.21	Vertical
4	1672.800	-55.44	0.36	-55.08	-13.00	-42.08	Vertical
5	2509.800	-63.51	3.71	-59.80	-13.00	-46.80	Vertical
RMC 12.2kbps_ Highest Channel							
1	34.285	-90.98	33.51	-57.47	-13.00	-44.47	Horizontal
2	176.275	-89.29	27.46	-61.83	-13.00	-48.83	Horizontal
3	893.656	-70.30	42.73	-27.57	-13.00	-14.57	Horizontal
4	1693.200	-53.78	0.50	-53.28	-13.00	-40.28	Horizontal
5	2539.800	-62.55	3.78	-58.77	-13.00	-45.77	Horizontal
1	39.182	-87.54	30.66	-56.88	-13.00	-43.88	Vertical
2	498.730	-87.60	35.90	-51.70	-13.00	-38.70	Vertical
3	893.656	-72.09	42.73	-29.36	-13.00	-16.36	Vertical
4	1693.200	-54.78	0.50	-54.28	-13.00	-41.28	Vertical
5	2539.800	-65.19	3.78	-61.41	-13.00	-48.41	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

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5.9 FREQUENCY STABILITY

Test Requirement: FCC 47 CFR Part 2.1055 &
 FCC 47 CFR Part 22.355 &
 FCC 47 CFR Part 24.235 &
 FCC 47 CFR Part 27.54

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, FCC 47 CFR Part 27.54

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, 3.85 Vdc and High voltage, 4.35 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)	Result
GSM 850							
GMSK	190 / 836.6	VL	TN	26	0.0311	± 2.5	Pass
		VN		24	0.0287	± 2.5	Pass
		VH		33	0.0394	± 2.5	Pass
		VN	50	35	0.0418	± 2.5	Pass
			40	28	0.0335	± 2.5	Pass
			30	32	0.0383	± 2.5	Pass
			20	27	0.0323	± 2.5	Pass
			10	28	0.0335	± 2.5	Pass
			0	37	0.0442	± 2.5	Pass
			-10	32	0.0383	± 2.5	Pass
			-20	31	0.0371	± 2.5	Pass
			-30	25	0.0299	± 2.5	Pass

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Result
	(MHz)	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	
PCS 1900							
GMSK	661 / 1880.0	VL	TN	29	0.0154	N/A	Pass
		VN		31	0.0165		Pass
		VH		26	0.0138		Pass
		VN	50	31	0.0165		Pass
			40	24	0.0128		Pass
			30	31	0.0165		Pass
			20	29	0.0154		Pass
			10	31	0.0165		Pass
			0	24	0.0128		Pass
			-10	26	0.0138		Pass
			-20	31	0.0165		Pass
			-30	32	0.0170		Pass

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Result
	(MHz)	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	
WCDMA Band II							
RMC 12.2kbps	9400 / 1880.0	VL	TN	26	0.0138	N/A	Pass
		VN		33	0.0176		Pass
		VH		31	0.0165		Pass
		VN	50	32	0.0170		Pass
			40	27	0.0144		Pass
			30	23	0.0122		Pass
			20	29	0.0154		Pass
			10	38	0.0202		Pass
			0	32	0.0170		Pass
			-10	24	0.0128		Pass
			-20	31	0.0165		Pass
			-30	25	0.0133		Pass

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Result
	(MHz)	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	
WCDMA Band V							
RMC 12.2kbps	4182 / 836.4	VL	TN	26	0.0311	± 2.5	Pass
		VN		27	0.0323	± 2.5	Pass
		VH		24	0.0287	± 2.5	Pass
		VN	50	31	0.0371	± 2.5	Pass
			40	26	0.0311	± 2.5	Pass
			30	31	0.0371	± 2.5	Pass
			20	27	0.0323	± 2.5	Pass
			10	28	0.0335	± 2.5	Pass
			0	29	0.0347	± 2.5	Pass
			-10	34	0.0407	± 2.5	Pass
			-20	26	0.0311	± 2.5	Pass
			-30	29	0.0347	± 2.5	Pass

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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.
