

# FCC TEST REPORT

Product Name: Mobile Phone  
 Trade Mark: BLU  
 Model No.: ZOEY SMART  
 Report Number: 190529019RFM-1  
 Test Standards: FCC 47 CFR Part 22 Subpart H  
 FCC 47 CFR Part 24 Subpart E  
 FCC 47 CFR Part 2  
 FCC ID: YHLBLUZOEYSMART  
 Test Result: PASS  
 Date of Issue: July 11, 2019

Prepared for:

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

Prepared by:

**Shenzhen UnionTrust Quality and Technology Co., Ltd.**  
**16/F, Block A, Building 6, Baoneng Science and Technology Park,**  
**Qingxiang Road No.1, Longhua New District, Shenzhen, China**  
**TEL: +86-755-2823 0888**  
**FAX: +86-755-2823 0886**

Prepared by: Henry Lu  
 Henry Lu  
 Team Leader

Reviewed by: Kevin Liang  
 Kevin Liang  
 Assistant Manager

Approved by: Billy Li  
 Billy Li  
 Technical Director



Date: July 11, 2019

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

**Version**

Version No.	Date	Description
V1.0	July 11, 2019	Original

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

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

[Http://www.uttlab.com](http://www.uttlab.com)

## CONTENTS

<b>1. GENERAL INFORMATION</b> .....	<b>4</b>
<b>1.1 CLIENT INFORMATION</b> .....	<b>4</b>
<b>1.2 EUT INFORMATION</b> .....	<b>4</b>
1.2.1 GENERAL DESCRIPTION OF EUT .....	4
1.2.2 DESCRIPTION OF ACCESSORIES.....	4
<b>1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD</b> .....	<b>5</b>
<b>1.4 DESCRIPTION OF SUPPORT UNITS</b> .....	<b>6</b>
<b>1.5 TEST LOCATION</b> .....	<b>6</b>
<b>1.6 TEST FACILITY</b> .....	<b>6</b>
<b>1.7 DEVIATION FROM STANDARDS</b> .....	<b>6</b>
<b>1.8 ABNORMALITIES FROM STANDARD CONDITIONS</b> .....	<b>6</b>
<b>1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER</b> .....	<b>6</b>
<b>1.10 MEASUREMENT UNCERTAINTY</b> .....	<b>7</b>
<b>2. TEST SUMMARY</b> .....	<b>8</b>
<b>3. EQUIPMENT LIST</b> .....	<b>9</b>
<b>4. TEST CONFIGURATION</b> .....	<b>10</b>
<b>4.1 ENVIRONMENTAL CONDITIONS FOR TESTING</b> .....	<b>10</b>
4.1.1 NORMAL OR EXTREME TEST CONDITIONS .....	10
4.1.2 RECORD OF NORMAL ENVIRONMENT.....	10
<b>4.2 TEST SETUP</b> .....	<b>11</b>
4.2.1 FOR RADIATED EMISSIONS TEST SETUP .....	11
4.2.2 FOR CONDUCTED RF TEST SETUP .....	13
<b>4.3 TEST CHANNELS</b> .....	<b>14</b>
<b>4.4 SYSTEM TEST CONFIGURATION</b> .....	<b>14</b>
<b>4.5 PRE-SCAN</b> .....	<b>15</b>
<b>5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION</b> .....	<b>17</b>
<b>5.1 REFERENCE DOCUMENTS FOR TESTING</b> .....	<b>17</b>
<b>5.2 EFFECTIVE RADIATED POWER (ERP)</b> .....	<b>17</b>
<b>5.3 CONDUCTED OUTPUT POWER</b> .....	<b>19</b>
<b>5.4 PEAK-TO-AVERAGE RATIO</b> .....	<b>20</b>
<b>5.5 99%&amp;26dB BANDWIDTH</b> .....	<b>23</b>
<b>5.6 BAND GPRS AT ANTENNA TERMINALS</b> .....	<b>27</b>
<b>5.7 SPURIOUS EMISSIONS AT ANTENNA TERMINALS</b> .....	<b>31</b>
<b>5.8 FIELD STRENGTH OF SPURIOUS RADIATION</b> .....	<b>35</b>
5.8.1 RADIATED EMISSION TEST DATA (30 MHZ TO 1 GHZ) .....	36
5.8.2 RADIATED EMISSION TEST DATA (ABOVE 1GHZ).....	41
<b>5.9 FREQUENCY STABILITY</b> .....	<b>47</b>
<b>APPENDIX 1 PHOTOS OF TEST SETUP</b> .....	<b>49</b>
<b>APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS</b> .....	<b>49</b>

## 1. GENERAL INFORMATION

### 1.1 CLIENT INFORMATION

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

### 1.2 EUT INFORMATION

#### 1.2.1 General Description of EUT

<b>Product Name:</b>	Mobile Phone	
<b>Model No.:</b>	ZOEY SMART	
<b>Trade Mark:</b>	BLU	
<b>DUT Stage:</b>	Identical Prototype	
<b>EUT Supports Function:</b>	<b>GSM Bands:</b>	GSM850/1900
	<b>UTRA Bands:</b>	Band II/ Band V
	<b>2.4 GHz ISM Band:</b>	IEEE 802.11b/g/n Bluetooth V4.0
<b>Sample Received Date:</b>	May 30, 2019	
<b>Sample Tested Date:</b>	May 30, 2019 to July 9, 2019	

#### 1.2.2 Description of Accessories

Adapter	
<b>Trade Mark:</b>	BLU
<b>Model No.:</b>	US-NB-0550
<b>Input:</b>	AC100-240V~50/60Hz 0.15A
<b>Output:</b>	5V~500mA
<b>DC Cable:</b>	1 Meter, Unshielded without ferrite
<b>Manufacturer:</b>	ShenZhen NanBang Electronics co., LTD

Battery	
<b>Trade Mark:</b>	BLU
<b>Model No.:</b>	N5C100T
<b>Battery Type:</b>	Lithium-ion Rechargeable Battery
<b>Rated Voltage:</b>	3.7 Vdc
<b>Limited Charge Voltage:</b>	4.2 Vdc
<b>Rated Capacity:</b>	1000 mAh
<b>Manufacturer:</b>	Shenzhen Utility Power Source Co.,Ltd

### 1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

<b>Support Networks:</b>	GSM, GPRS, WCDMA, HSDPA, HSUPA	
<b>Type of Modulation:</b>	GSM/GPRS:	GMSK
	WCDMA	BPSK
	HSDPA:	QPSK
	HSUPA:	QPSK
<b>Frequency Range:</b>	GSM/GPRS 850:	824.2-848.8 MHz
	GSM/GPRS 1900:	1850.2-1909.8 MHz
	WCDMA Band II:	1852.4-1907.6 MHz
	WCDMA Band V:	826.4-846.6 MHz
<b>Max RF Output Power:</b>	GSM/GPRS 850:	33.88dBm
	GSM/GPRS 1900:	31.43dBm
	WCDMA Band II:	23.47dBm
	WCDMA Band V:	23.61dBm
<b>Type of Emission:</b>	GSM/GPRS 850:	248KGXW
	GSM/GPRS 1900:	249KGXW
	WCDMA Band II:	4M15F9W
	WCDMA Band V:	4M16F9W
<b>Antenna Type:</b>	PIFA Antenna	
<b>Antenna Gain:</b>	GSM 850:	-1.3 dBi
	GSM 1900:	-1.5 dBi
	WCDMA Band II:	-1.5 dBi
	WCDMA Band V:	-1.4 dBi
<b>GPRS/GPRS Class:</b>	Class 4	
<b>Normal Test Voltage:</b>	3.7 Vdc	
<b>Extreme Test Voltage:</b>	3.5 to 4.3Vdc	
<b>Extreme Test Temperature:</b>	-30 °C to +50 °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	0.30 Meter	UnionTrust

## 1.5 TEST LOCATION

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

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, 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/EN 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: 2005 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	±3.8 dB
2	Conducted emission 150KHz-30MHz	±3.4 dB
3	Radiated emission 9KHz-30MHz	±4.9 dB
4	Radiated emission 30MHz-1GHz	±4.7 dB
5	Radiated emission 1GHz-18GHz	±5.1 dB
6	Radiated emission 18GHz-26GHz	±5.2 dB
7	Radiated emission 26GHz-40GHz	±5.2 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/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 22.913(a)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Band GPRS at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)(b)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 22.917(a)(b)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 22.355	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
<b>Note:</b>			
1) N/A: In this whole report not applicable.			

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/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c)	ANSI/TIA-603-E-2016 & 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/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Band GPRS at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)(b)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 24.238(a)(b)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 24.235	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
<b>Note:</b>			
1) N/A: In this whole report not applicable.			



### 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 Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 03, 2018	Dec. 03, 2021
<input checked="" type="checkbox"/>	Receiver	R&S	ESIB26	100114	Nov. 24, 2018	Nov. 24, 2019
<input type="checkbox"/>	Loop Antenna	ETS-LINDGREN	6502	00202525	Dec. 03, 2018	Dec. 03, 2019
<input checked="" type="checkbox"/>	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Dec. 08, 2018	Dec. 08, 2019
<input checked="" type="checkbox"/>	6dB Attenuator	Talent	RA6A5-N-18	18103001	Dec. 08, 2018	Dec. 08, 2019
<input checked="" type="checkbox"/>	Preamplifier	HP	8447F	2805A02960	Nov. 24, 2018	Nov. 24, 2019
<input checked="" type="checkbox"/>	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	May 19, 2018	May 18, 2020
<input checked="" type="checkbox"/>	6dB Attenuator	Talent	RA6A5-N-18	18103002	Nov. 24, 2018	Nov. 24, 2019
<input checked="" type="checkbox"/>	Horn Antenna	ETS-LINDGREN	3117	00164202	Dec. 08, 2018	Dec. 08, 2019
<input checked="" type="checkbox"/>	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May 22, 2018	May 18, 2020
<input type="checkbox"/>	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Jan. 05, 2019	Jan. 05, 2020
<input checked="" type="checkbox"/>	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
<input checked="" type="checkbox"/>	Highpass Filter (1.2GHz~18GHz)	Micro-Tronics	HPM50108	G552	Nov. 29, 2018	Nov. 29, 2019
<input checked="" type="checkbox"/>	Highpass Filter (3GHz~18GHz)	Micro-Tronics	HPM50117	G005	Nov. 29, 2018	Nov. 29, 2019
<input checked="" type="checkbox"/>	Wideband Radio Communication Tester	R&S	CMW500	116254	Jun. 07, 2019	Jun. 07, 2020
<input checked="" type="checkbox"/>	Test Software	Audix	e3	Software Version: 9.160333		

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"/>	Receiver	R&S	ESR7	1316.3003K07-101181-K3	Nov. 24, 2018	Nov. 24, 2019
<input checked="" type="checkbox"/>	EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY57471561	Nov. 24, 2018	Nov. 24, 2019
<input checked="" type="checkbox"/>	Wideband Radio Communication Tester	R&S	CMW500	116254	Jun. 07, 2019	Jun. 07, 2020
<input checked="" type="checkbox"/>	DC Source	KIKUSUI	PWR400L	LK003024	Sep. 18, 2018	Sep. 18, 2019
<input type="checkbox"/>	Temp & Humidity chamber	Espec	GL(U)04K A(W)	16921H201P3	Sep. 20, 2018	Sep. 20, 2019
<input checked="" type="checkbox"/>	Temp & Humidity chamber	Votisch	VT4002	58566133290020	Jun. 05, 2018	Jun. 05, 2020

## 4. TEST CONFIGURATION

### 4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

#### 4.1.1 Normal or Extreme Test Conditions

Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	3.7	20 to 75
TL/VL	-30	3.5	20 to 75
TH/VL	+50	3.5	20 to 75
TL/VH	-30	4.3	20 to 75
TH/VH	+50	4.3	20 to 75

**Remark:**

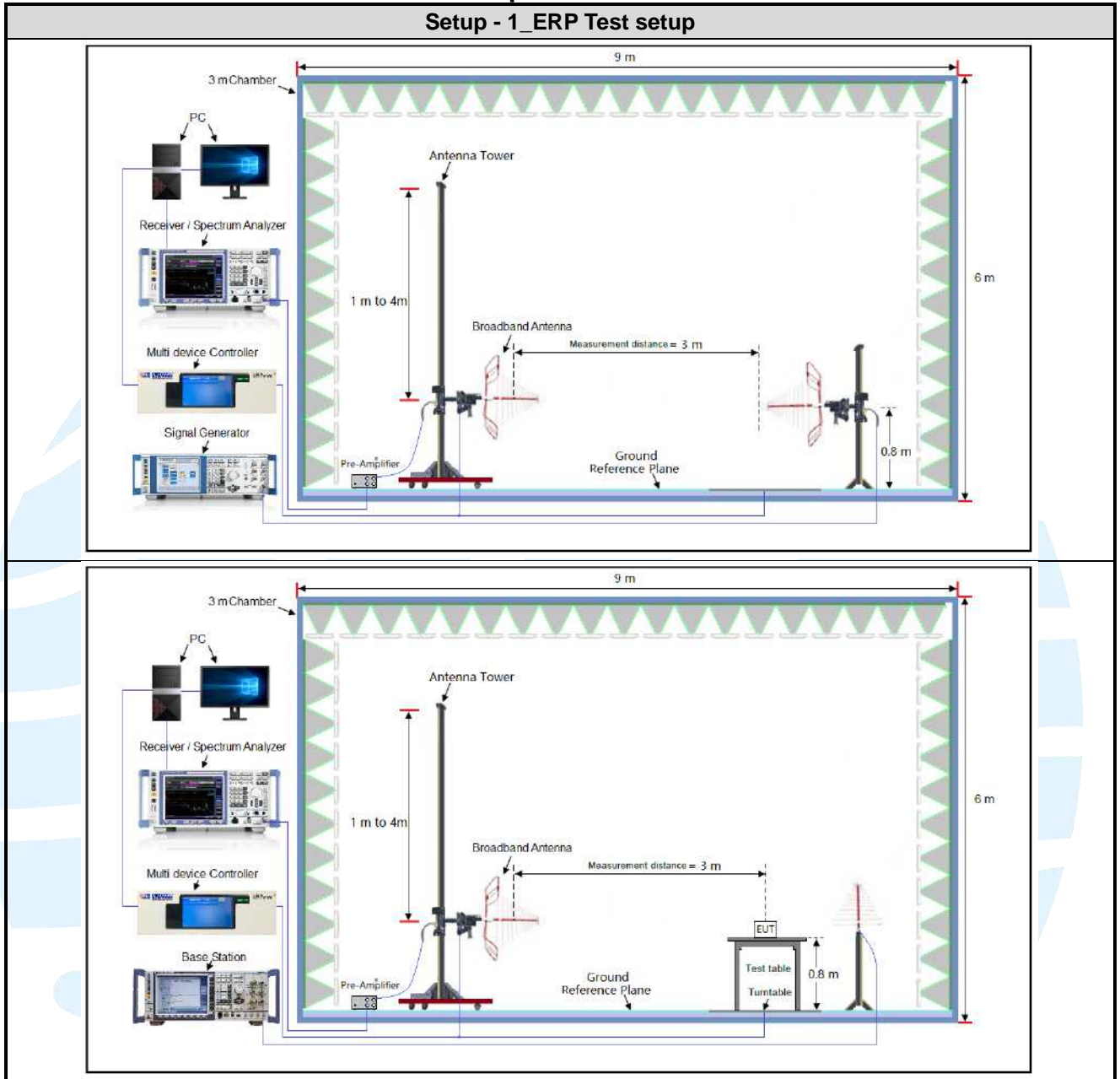
- The EUT just work in such extreme temperature of -30 °C to +50 °C and the extreme voltage of 3.5 V to 4.3 V, so here the EUT is tested in the temperature of -30 °C to +50 °C and the voltage of 3.5 V to 4.3 V.
- VN: Normal Voltage; TN: Normal Temperature;  
 TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;  
 VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

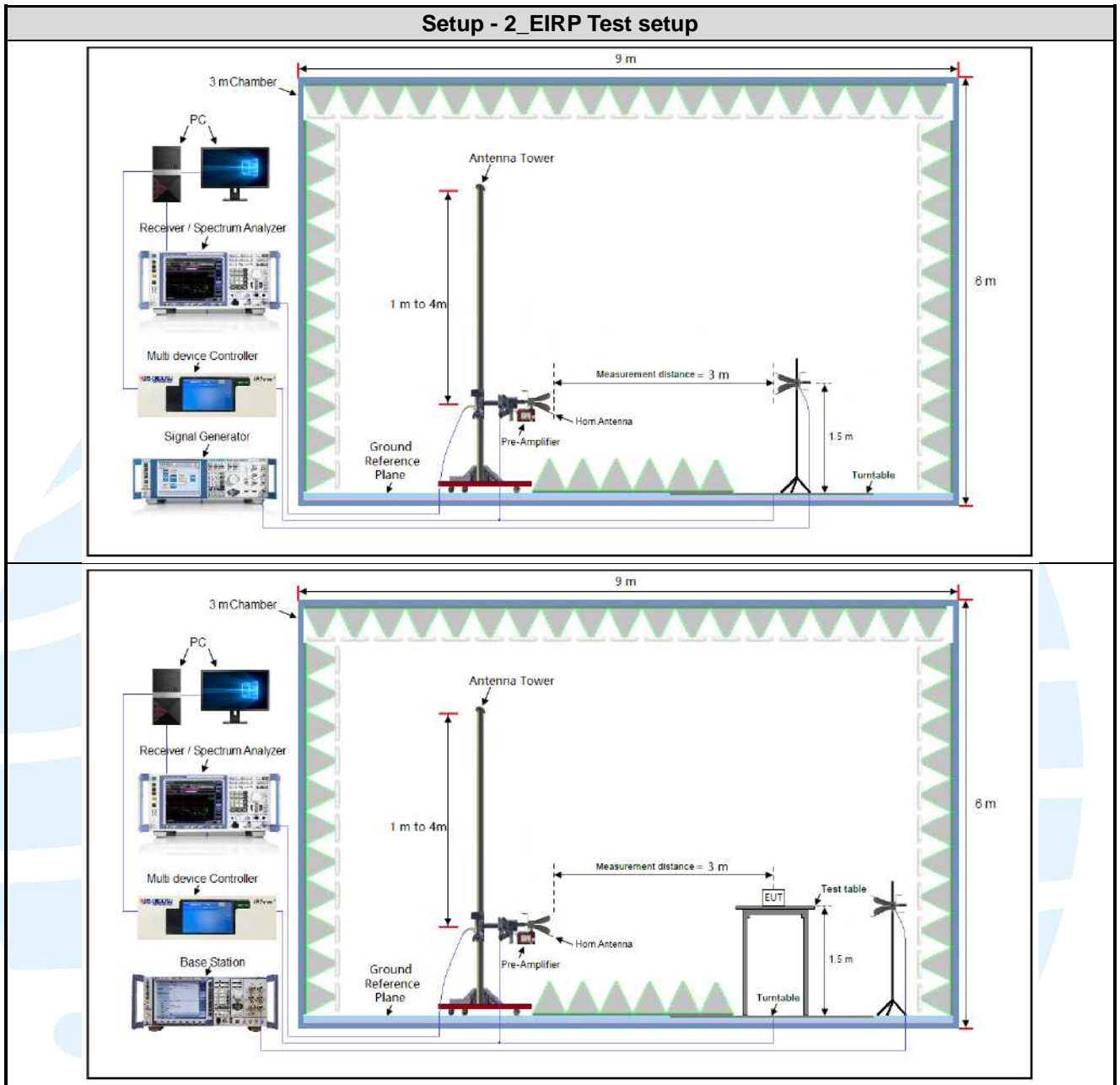
#### 4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Tested by
Equivalent Isotropic Radiated Power (EIRP)	24.3	51	99.80	Hank Wu
Conducted Output Power	24.3	51	99.80	Hank Wu
Peak-to-average ratio	24.3	51	99.80	Hank Wu
99%&26dB Bandwidth	24.3	51	99.80	Hank Wu
Band GPRS at antenna terminals	24.3	51	99.80	Hank Wu
Spurious emissions at antenna terminals	25.1	52	100.02	Fire Huo
Field strength of spurious radiation	25.1	52	100.02	Fire Huo
Frequency stability	24.3	51	99.80	Hank Wu

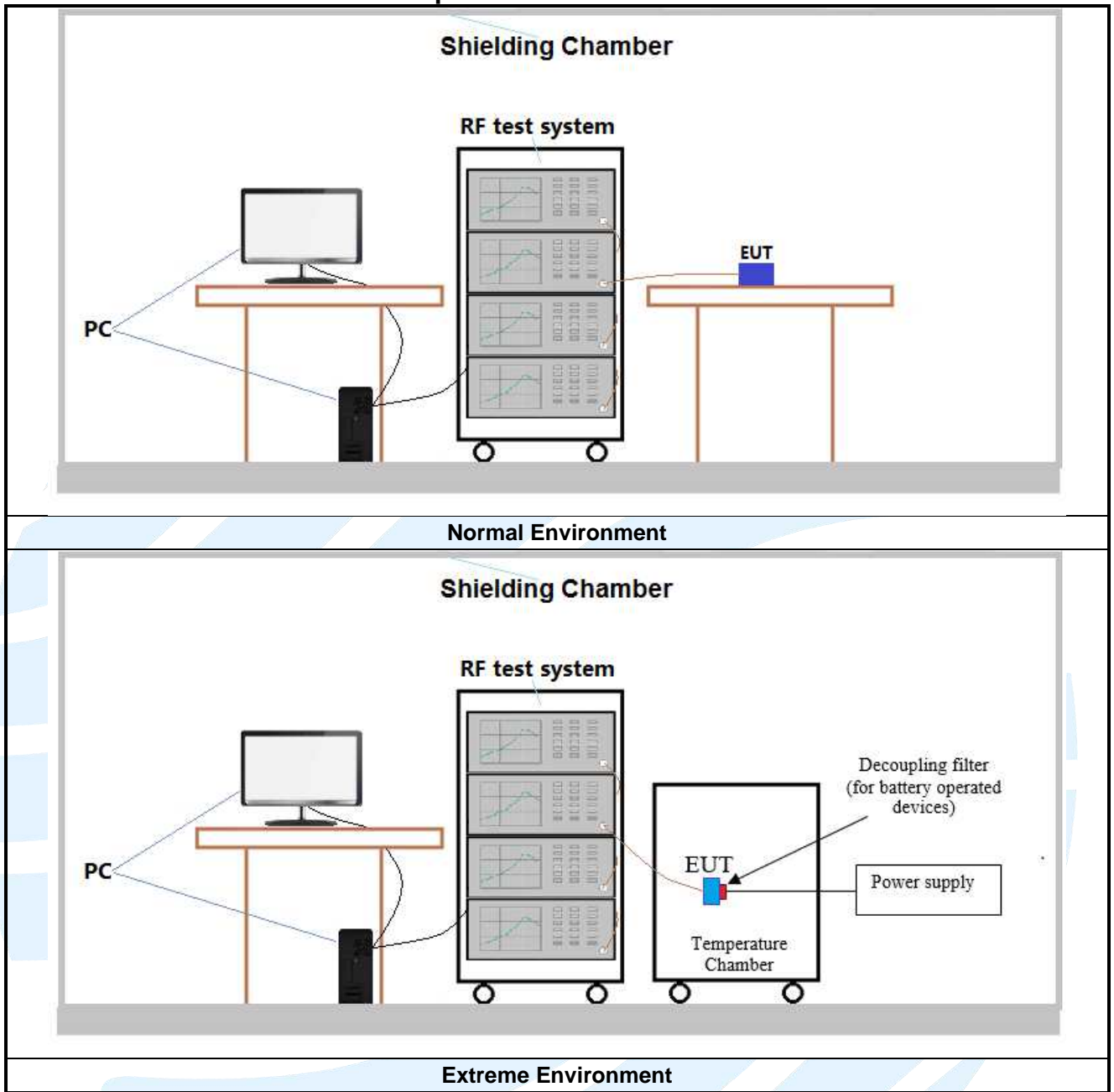
## 4.2 TEST SETUP

### 4.2.1 For Radiated Emissions test setup





4.2.2 For Conducted RF test setup



### 4.3 TEST CHANNELS

Band	Tx/Rx Frequency	RF Channel		
		Low(L)	Middle(M)	High(H)
GSM/GPRS/850	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

Band	Tx/Rx Frequency	RF Channel		
		Low(L)	Middle(M)	High(H)
GSM/GPRS/1900	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 3.7 Vdc 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.

Band	Mode	Antenna Port	Worst-case axis positioning
GSM 850	1TX	Chain 0	Y axis
GSM 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)	33.88	33.79	33.87
GPRS (GMSK, 1Tx-slot)	33.86	33.78	33.82
GPRS (GMSK, 2Tx-slot)	31.71	31.75	31.75
GPRS (GMSK, 3Tx-slot)	30.27	30.25	30.29
GPRS (GMSK, 4Tx-slot)	28.47	28.46	28.44

GSM 1900 Maximum Average Power (dBm)			
Channel	512	661	810
Frequency(MHz)	1850.2 MHz	1880.0 MHz	1909.8 MHz
GSM (GMSK, 1Tx-slot)	31.43	31.12	30.89
GPRS (GMSK, 1Tx-slot)	31.38	31.10	30.86
GPRS (GMSK, 2Tx-slot)	29.01	29.08	28.98
GPRS (GMSK, 3Tx-slot)	27.57	27.72	27.61
GPRS (GMSK, 4Tx-slot)	25.74	25.86	25.83

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	23.47	23.25	22.99
HSDPA Subtest-1	22.36	22.42	21.61
HSDPA Subtest-2	21.97	21.98	21.27
HSDPA Subtest-3	21.54	21.47	20.89
HSDPA Subtest-4	21.57	21.49	20.86
HSUPA Subtest-1	21.24	21.12	20.79
HSUPA Subtest-2	19.02	19.15	18.64
HSUPA Subtest-3	19.49	19.15	18.55
HSUPA Subtest-4	19.57	19.45	18.92
HSUPA Subtest-5	21.96	21.81	21.12

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	23.52	23.50	23.61
HSDPA Subtest-1	22.35	22.36	22.39
HSDPA Subtest-2	22.70	22.68	22.65
HSDPA Subtest-3	21.84	21.85	21.71
HSDPA Subtest-4	21.87	21.90	21.70
HSUPA Subtest-1	21.16	21.49	21.19
HSUPA Subtest-2	18.84	18.94	18.80
HSUPA Subtest-3	19.08	19.34	19.17
HSUPA Subtest-4	19.13	19.19	19.00
HSUPA Subtest-5	22.02	22.08	22.02

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/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 Subpart J	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 22 Subpart H	Cellular Radiotelephone Service
3	FCC 47 CFR Part 24 Subpart E	PART 24 – PERSONAL COMMUNICATIONS SERVICES Subpart E – Broadband PCS
4	ANSI/TIA-603-E-2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
5	KDB 971168 D01	KDB 971168 D01 Power Meas License Digital Systems v03r01

### 5.2 EFFECTIVE RADIATED POWER (ERP)

**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/TIA-603-E-2016

**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:**

Test procedure as below:

- The EUT was powered ON and placed on a 0.8/1.5m high table at a 3 meter semi/fully Anechoic Chamber. The antenna of the transmitter was extended to its maximum length. Modulation mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.
- Steps 1) to 3) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
- The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.
- A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 3) is obtained for this set of conditions.
- The output power into the substitution antenna was then measured.
- Steps 6) and 7) were repeated with both antennas polarized.
- Calculate power in dBm by the following formula:

$$ERP(dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$

$$EIRP(dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBi)}$$

$$EIRP = ERP + 2.15dB$$

where:

Pg is the generator output power into the substitution antenna.

- Test the EUT in the lowest channel, the middle channel the Highest channel
- The radiation measurements are performed in X, Y, Z axis positioning for EUT operation mode, and found the Y axis positioning which it is worse case.
- Repeat above procedures until all frequencies measured was complete.

**Receiver Setup:**

Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Peak	100kHz	300kHz	Peak
Above 1GHz	Peak	1MHz	3MHz	Peak

**Test Setup:** Refer to section 4.2.1 for details.

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

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

[Http://www.uttlab.com](http://www.uttlab.com)

**Instruments Used:** Refer to section 3 for details  
**Test Mode:** Link mode  
**Test Results:** Pass  
**Test Data:** See table below

Maximum ERP (dBm)				
Channel	GSM 850 1Tx-slot	WCDMA Band V RMC 12.2Kbps	Limit (dBm)	Result
Lowest	30.43	20.72	38.45	Pass
Middle	30.34	20.70	38.45	Pass
Highest	30.42	20.81	38.45	Pass

Maximum EIRP (dBm)				
Channel	GSM 1900 1Tx-slot	WCDMA Band II RMC 12.2Kbps	Limit (dBm)	Result
Lowest	27.78	20.57	33.01	Pass
Middle	27.47	20.35	33.01	Pass
Highest	27.24	20.09	33.01	Pass

### 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:** ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01

**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, 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

**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

Peak-to-average ratio (dB)				
Channel	GSM 1900 1Tx-slot	WCDMA Band II RMC 12.2Kbps	Limit (dB)	Result
Lowest	1.10	4.46	13	Pass
Middle	0.90	4.14	13	Pass
Highest	0.92	4.36	13	Pass

The test plots as follows:



Peak-to-average ratio (dB)				
Channel	GSM 850 1Tx-slot	WCDMA Band V RMC 12.2Kbps	Limit (dB)	Result
Lowest	3.07	4.00	13	Pass
Middle	1.43	3.86	13	Pass
Highest	1.03	3.74	13	Pass

The test plots as follows:



### 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),

**Test Method:** ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01

**Limit:** No Limit

**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

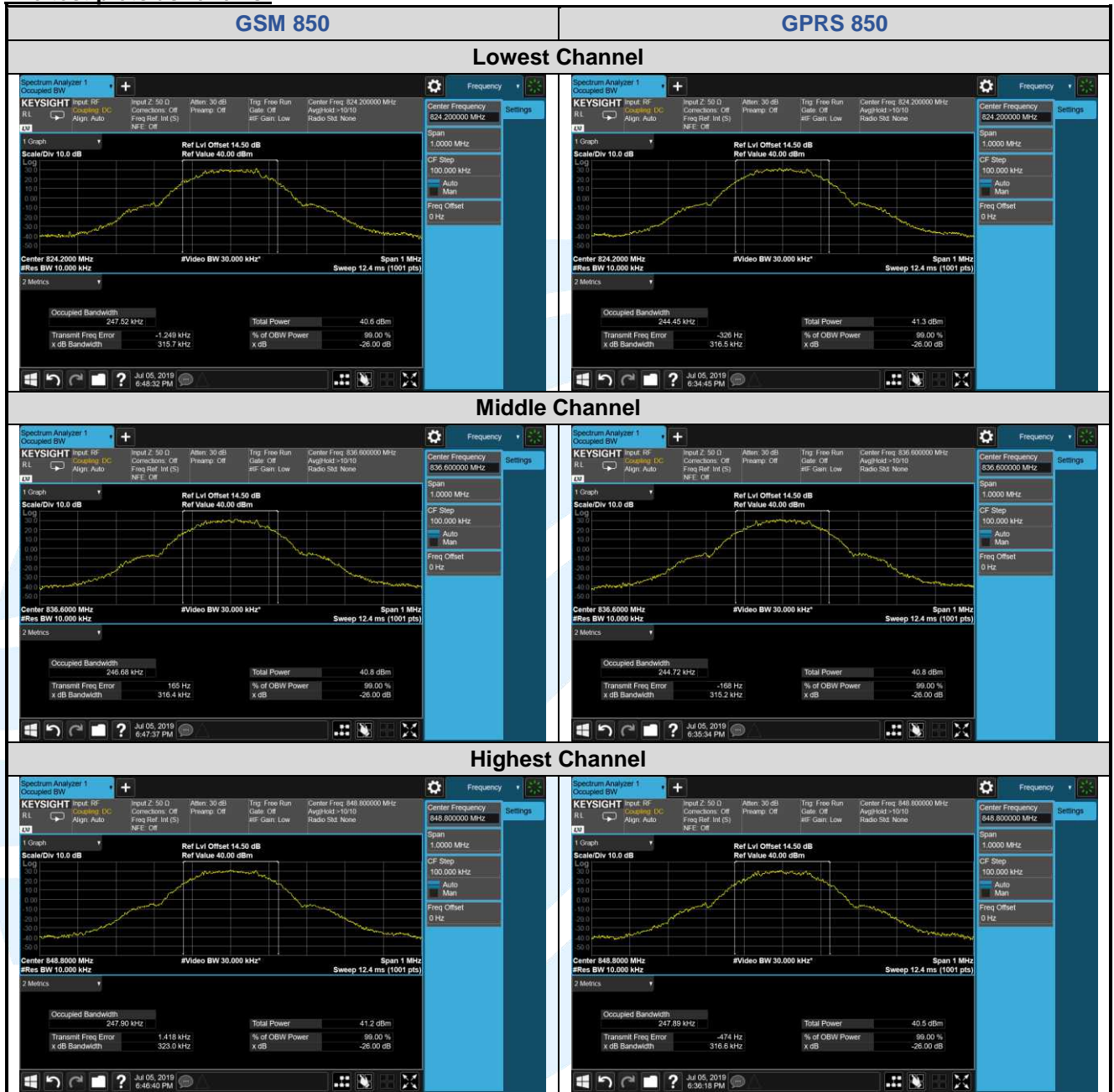
**Test Results:** Pass

**Test Data:** See table below

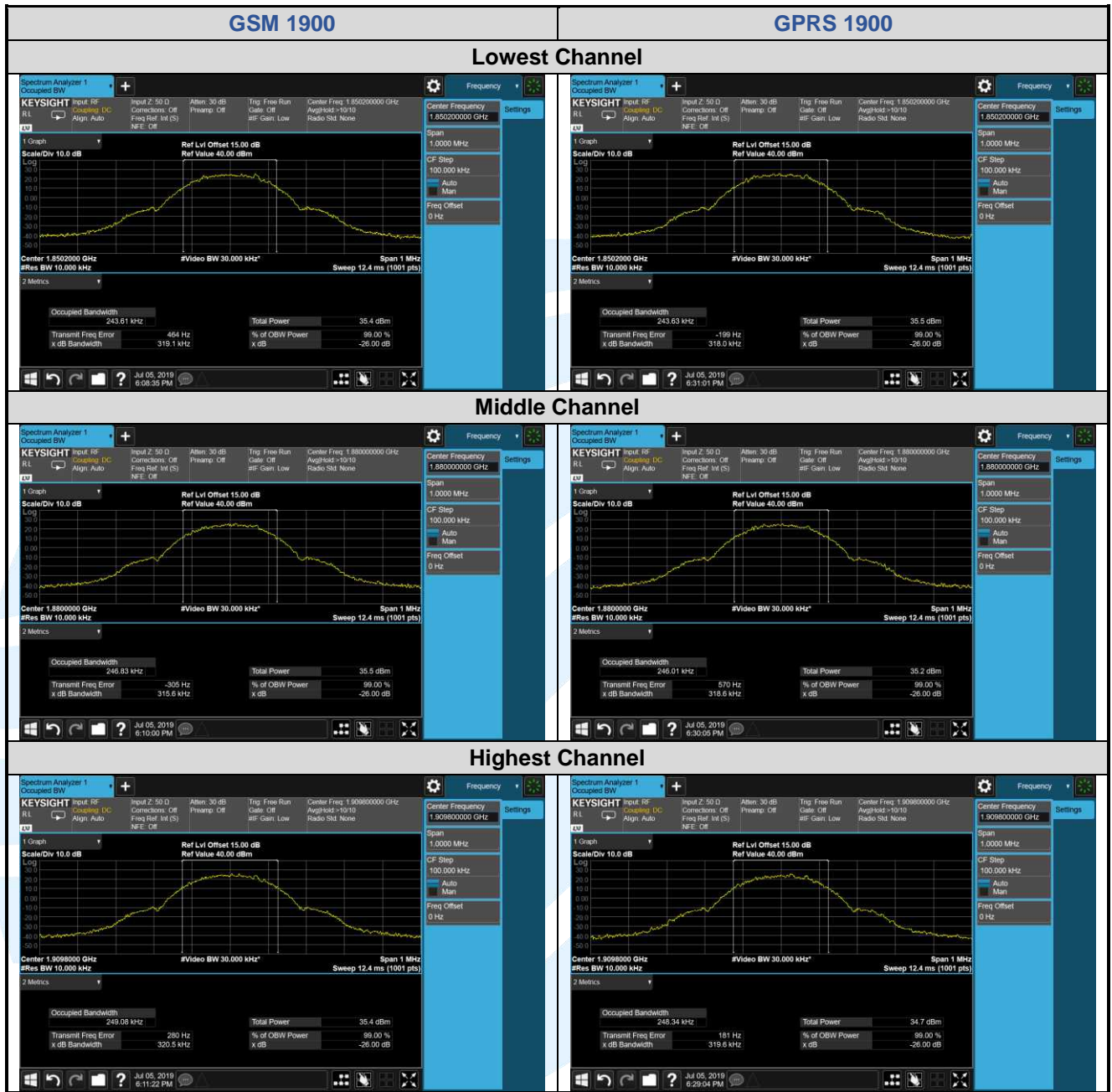
99% & 26 dB Bandwidth				
Test Mode	Channel	Frequency (MHz)	26 dB BW (kHz)	99% BW (kHz)
GSM 850 1Tx-slot	128	824.2	315.7	247.52
	190	836.6	316.4	246.68
	251	848.8	323.0	247.90
GPRS 850 1Tx-slot	128	824.2	316.5	244.45
	190	836.6	315.2	244.72
	251	848.8	316.6	247.89
GSM 1900 1Tx-slot	512	1850.2	319.1	243.61
	661	1880.0	315.6	246.83
	810	1909.8	320.5	249.08
GPRS 1900 1Tx-slot	512	1850.2	318.0	243.63
	661	1880.0	318.6	346.01
	810	1909.8	319.6	248.34

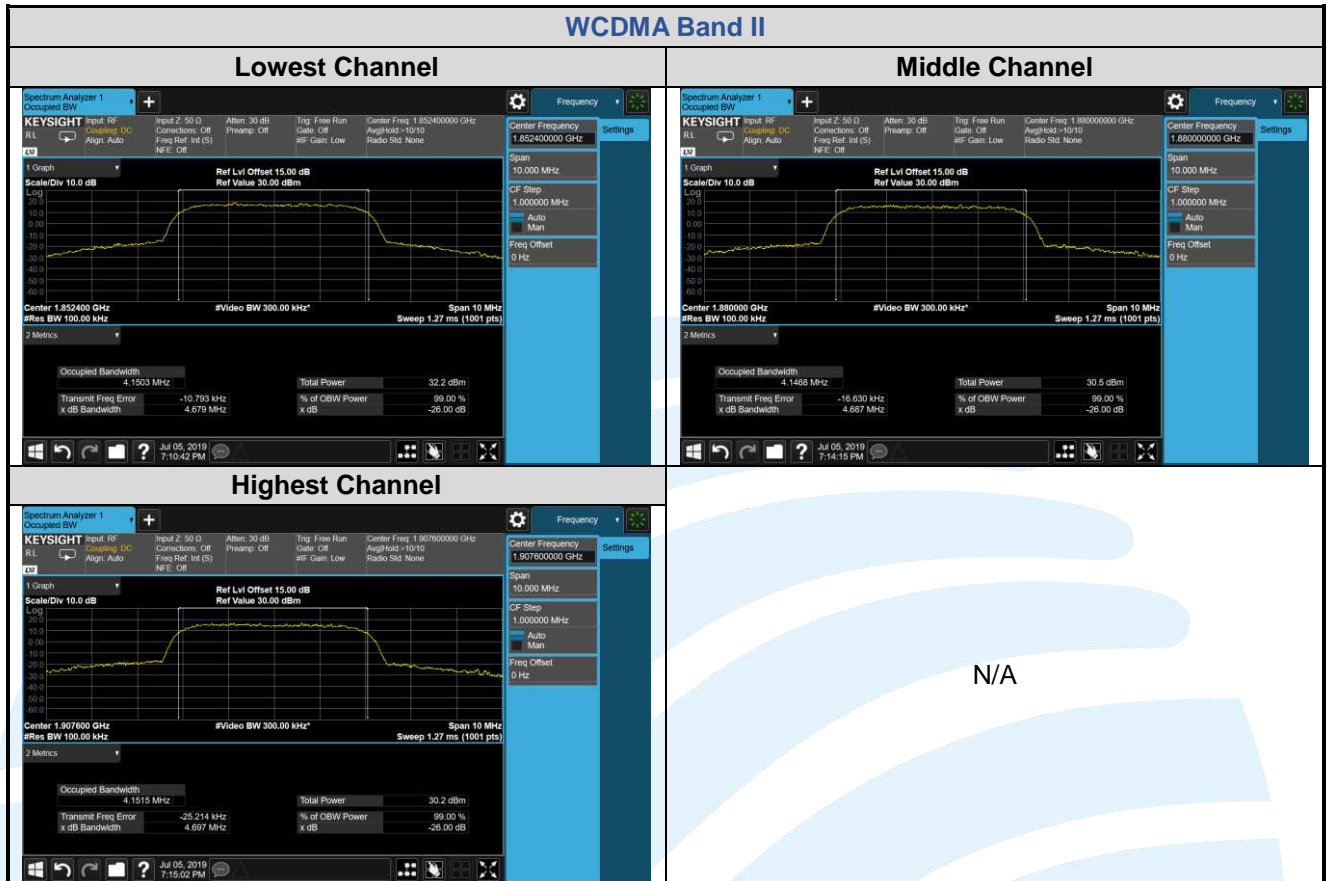
99% & 26 dB Bandwidth				
Test Mode	Channel	Frequency (MHz)	26 dB BW (MHz)	99% BW (MHz)
WCDMA Band II RMC 12.2Kbps	9262	1852.4	4.679	4.1503
	9400	1880.0	4.687	4.1468
	9538	1907.6	4.697	4.1515
WCDMA Band V RMC 12.2Kbps	4132	826.4	4.682	4.1555
	4182	836.4	4.700	4.1522
	4233	846.6	4.732	4.1604

The test plots as follows:









## 5.6 BAND GPRS 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/TIA-603-E-2016 & 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 GPRS measurement:

- 1) Set the spectrum analyzer span to include the block GPRS frequency.
- 2) Set a marker to point the corresponding band GPRS 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.

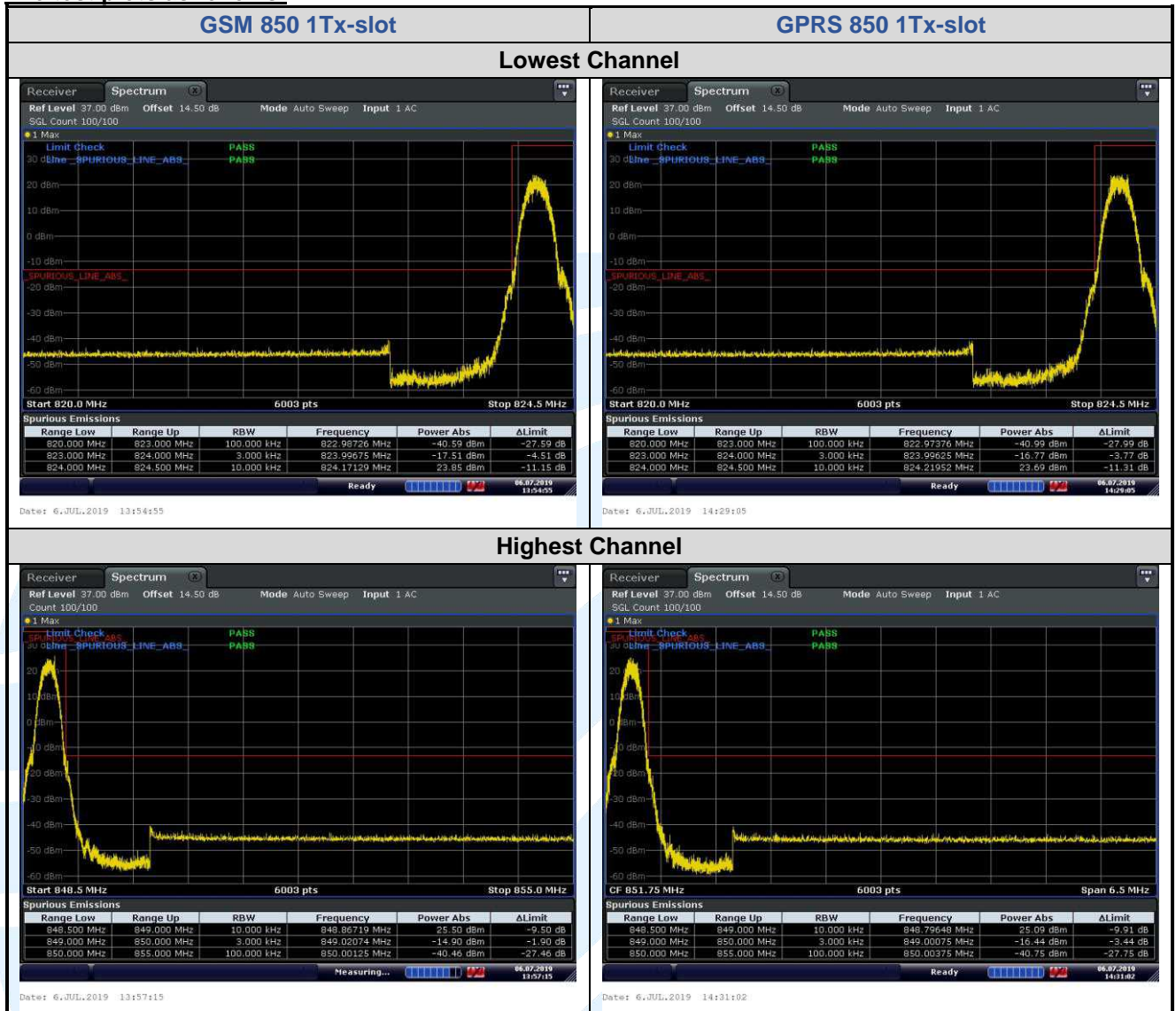
**Test Setup:** Refer to section 4.2.2 for details.

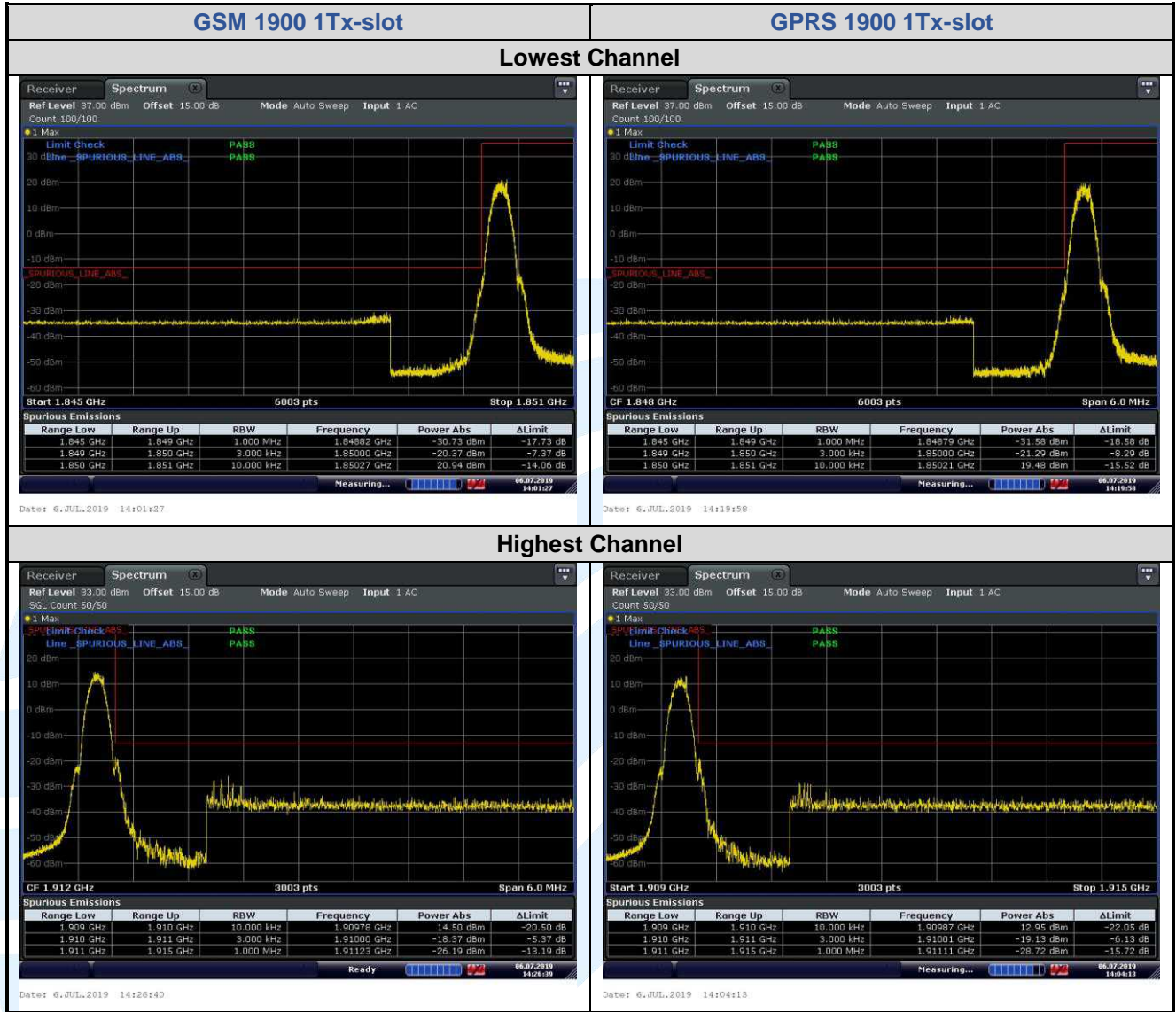
**Instruments Used:** Refer to section 3 for details

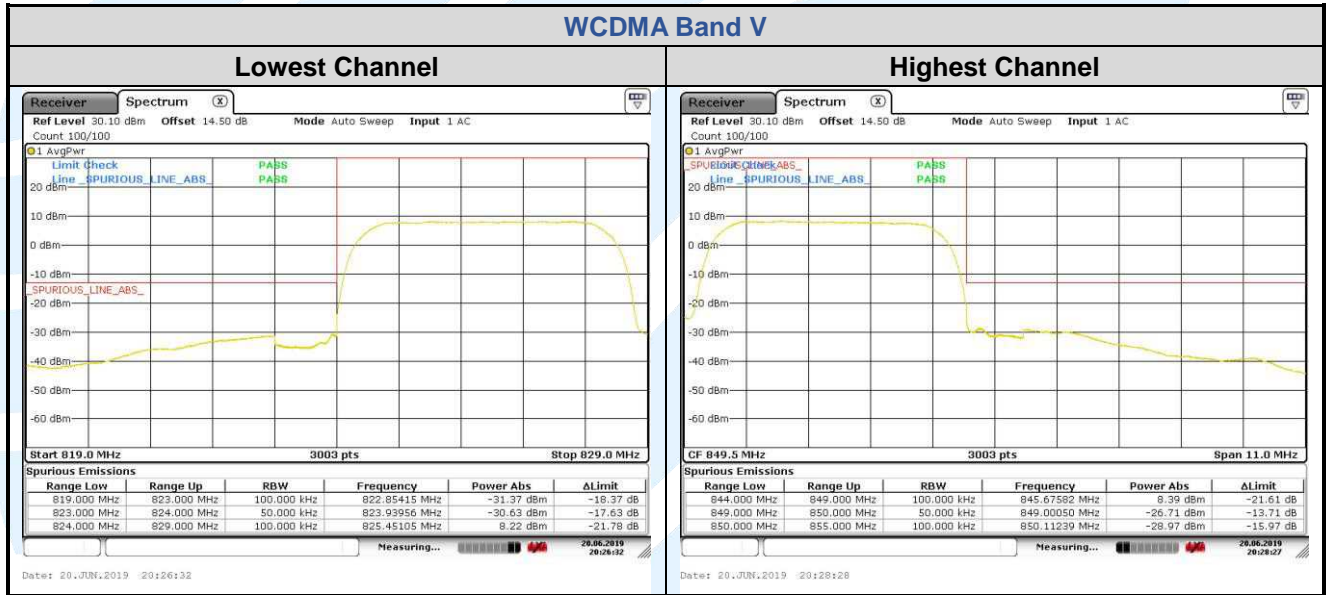
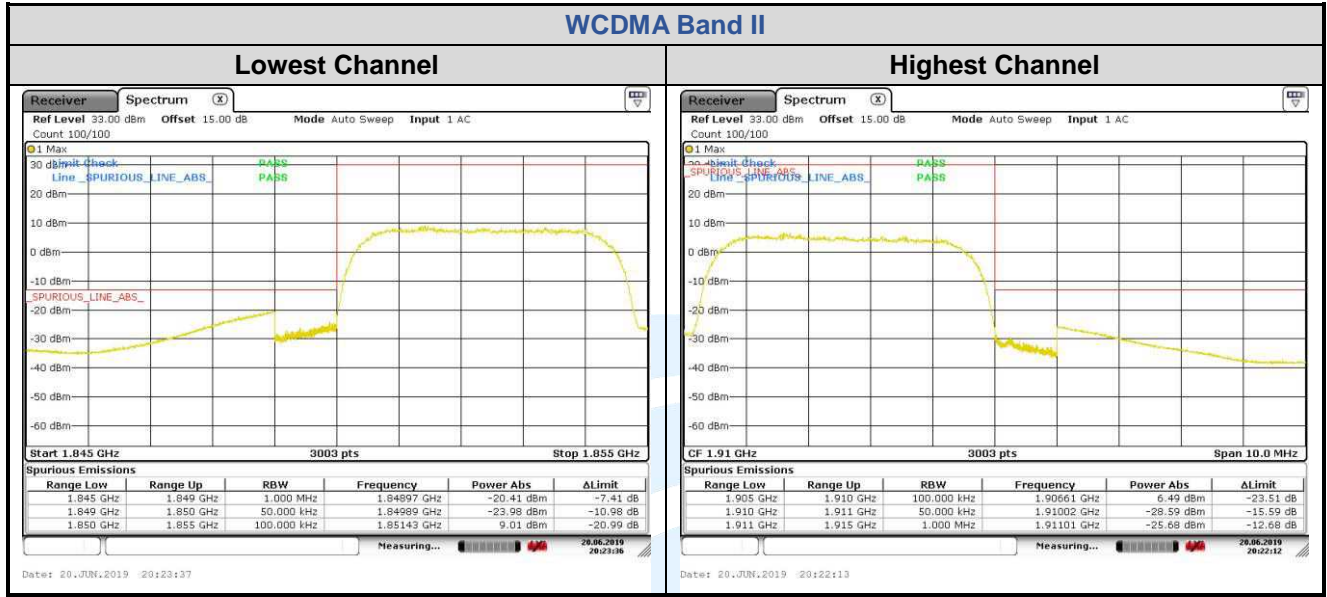
**Test Mode:** Link mode

**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/TIA-603-E-2016 & 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.

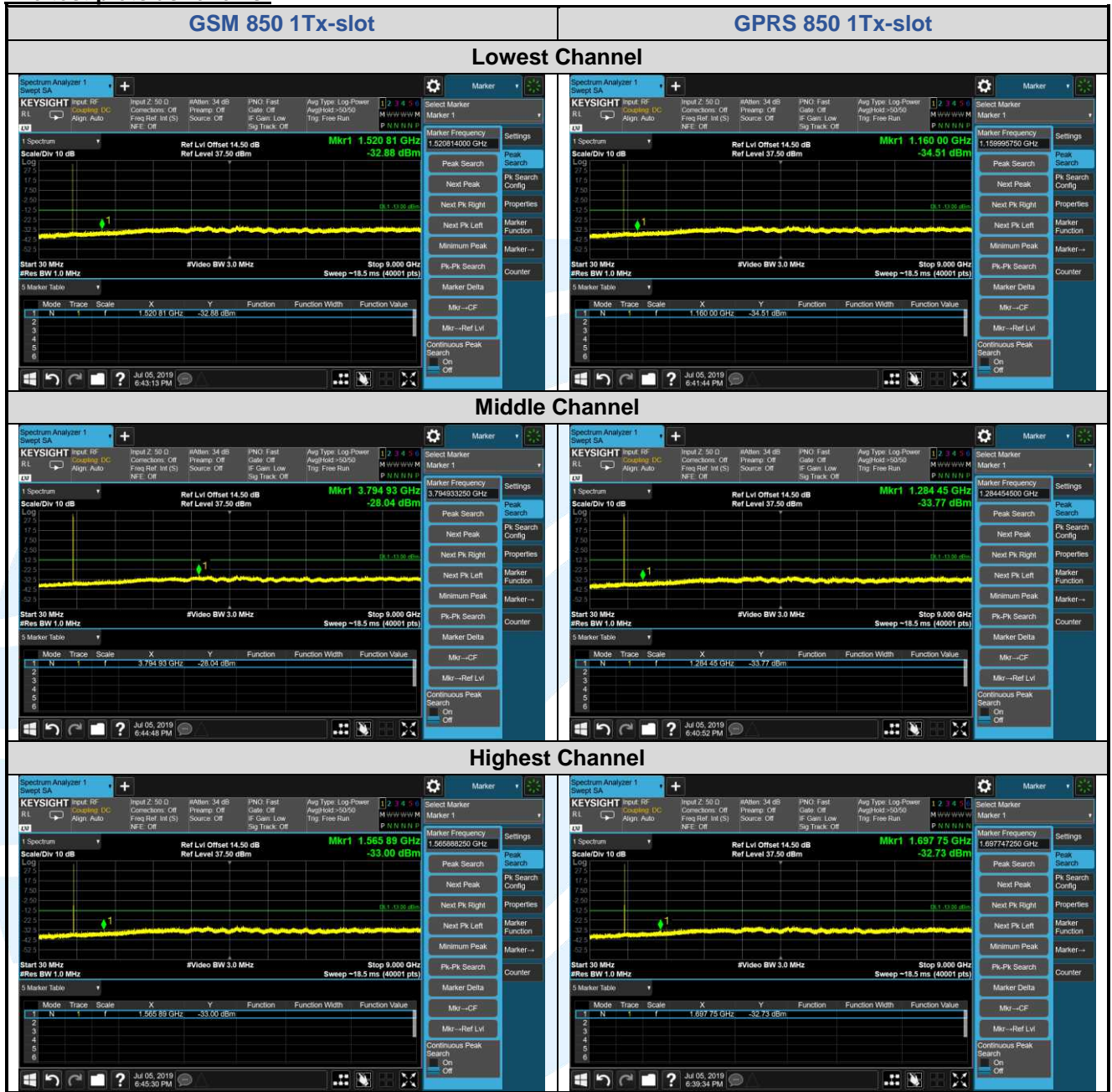
**Test Setup:** Refer to section 4.2.2 for details.

**Instruments Used:** Refer to section 3 for details

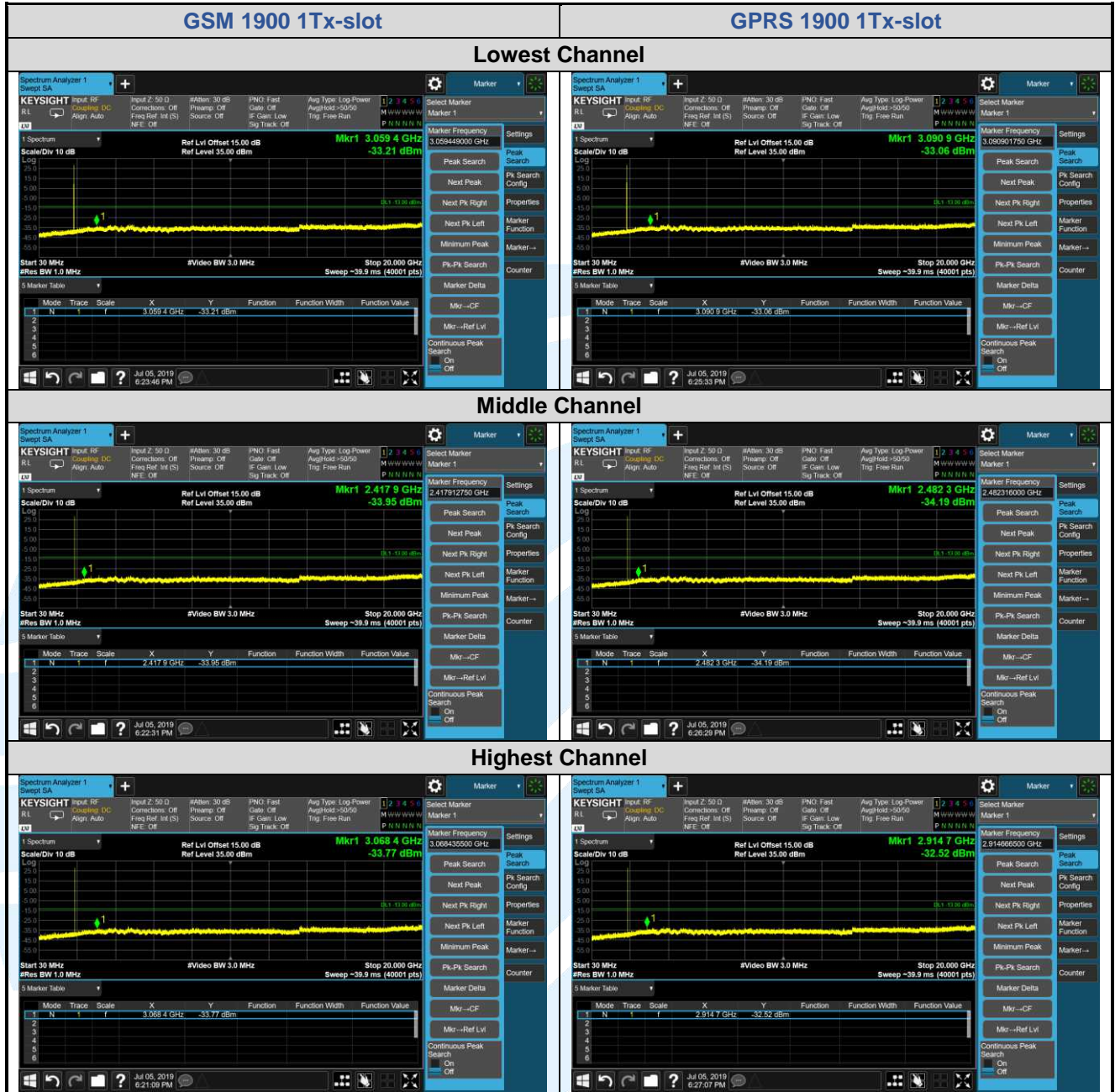
**Test Mode:** Link mode

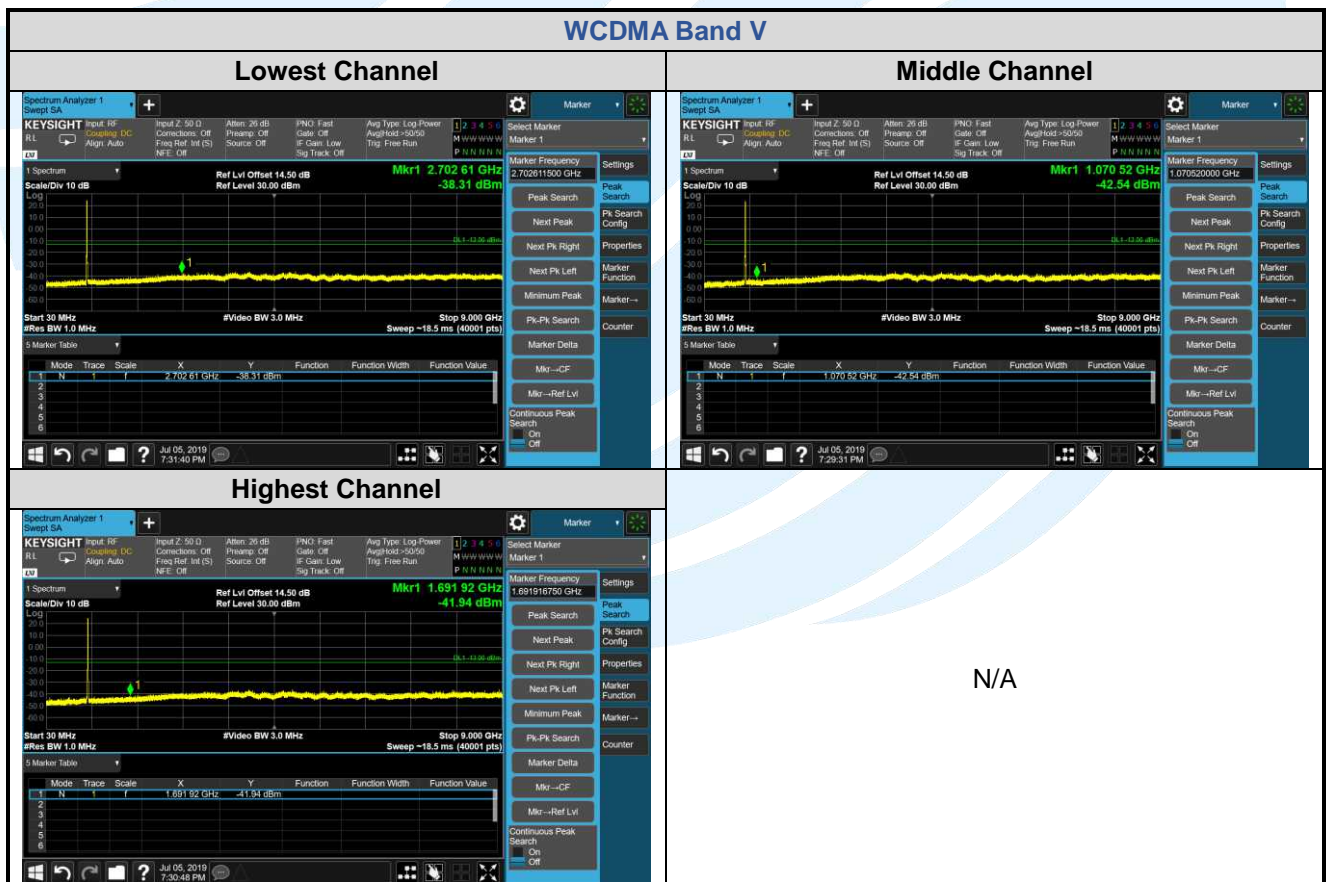
**Test Results:** Pass

The test plots as follows:









### 5.8 FIELD STRENGTH OF SPURIOUS RADIATION

**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/TIA-603-E-2016 & KDB 971168 D01v03r01

**Receiver Setup:**

Frequency	Detector	RBW	VBW	Remark
0.009 MHz-30 MHz	Peak	10 kHz	30 KHz	Peak
30 MHz-1 GHz	Quasi-peak	100 kHz	300 KHz	Peak
Above 1 GHz	Peak	1 MHz	3 MHz	Peak

**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:**

1. Scan up to 10th harmonic, find the maximum radiation frequency to measure.
2. The technique used to find the Spurious Emissions of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual ERP/EIRP emission levels of the EUT.

Test procedure as below:

- 1) The EUT was powered ON and placed on a 0.8/1.5m high table at a 3 meter semi/fully Anechoic Chamber. The antenna of the transmitter was extended to its maximum length. Modulation mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- 2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 3) The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.
- 4) Steps 1) to 3) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
- 5) The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.
- 6) A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 3) is obtained for this set of conditions.
- 7) The output power into the substitution antenna was then measured.
- 8) Steps 6) and 7) were repeated with both antennas polarized.
- 9) Calculate power in dBm by the following formula:

$$ERP(dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$

$$EIRP(dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBi)}$$

$$EIRP=ERP+2.15dB$$

where:

Pg is the generator output power into the substitution antenna.

- 10) Test the EUT in the lowest channel, the middle channel the Highest channel
- 11) The radiation measurements are performed in X, Y, Z axis positioning for EUT operation mode, and found the Y axis positioning which it is worse case.
- 12) Repeat above procedures until all frequencies measured was complete.

**Equipment Used:** Refer to section 3 for details.

**Test Result:** Pass

**The measurement data as follows:**

**5.8.1 Radiated Emission Test Data (30 MHz to 1 GHz)**

GSM 850 1Tx-slot_Lowest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	31.959	-87.45	33.13	-54.32	-13.00	-41.32	Peak
2	38.365	-84.31	28.89	-55.42	-13.00	-42.42	Peak
3	97.002	-82.54	26.48	-56.06	-13.00	-43.06	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	31.959	-86.67	33.13	-53.54	-13.00	-40.54	Peak
2	97.002	-84.36	26.48	-57.88	-13.00	-44.88	Peak
3	698.804	-86.71	39.12	-47.59	-13.00	-34.59	Peak

GSM 850 1Tx-slot_Middle Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	31.959	-81.61	33.13	-48.48	-13.00	-35.48	Peak
2	37.830	-80.62	29.16	-51.46	-13.00	-38.46	Peak
3	771.047	-86.36	40.01	-46.35	-13.00	-33.35	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	32.184	-79.83	32.93	-46.90	-13.00	-33.90	Peak
2	95.649	-79.43	26.37	-53.06	-13.00	-40.06	Peak
3	201.454	-78.47	27.70	-50.77	-13.00	-37.77	Peak

GSM 850 1Tx-slot_Highest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	31.959	-81.61	33.13	-48.48	-13.00	-35.48	Peak
2	39.182	-77.67	28.49	-49.18	-13.00	-36.18	Peak
3	798.620	-85.98	40.39	-45.59	-13.00	-32.59	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	32.184	-85.11	32.93	-52.18	-13.00	-39.18	Peak
2	38.365	-80.39	28.89	-51.50	-13.00	-38.50	Peak
3	798.620	-86.93	40.39	-46.54	-13.00	-33.54	Peak

GSM 1900 1Tx-slot_Lowest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	586.217	-80.40	7.70	-72.70	-13.00	-59.70	Peak
2	765.648	-81.31	10.79	-70.52	-13.00	-57.52	Peak
3	893.656	-81.38	12.51	-68.87	-13.00	-55.87	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	424.300	-80.05	4.97	-75.08	-13.00	-62.08	Peak
2	684.226	-80.05	9.58	-70.47	-13.00	-57.47	Peak
3	965.474	-81.08	14.12	-66.96	-13.00	-53.96	Peak

GSM 1900 1Tx-slot_Middle Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	54.135	-72.62	-4.18	-76.80	-13.00	-63.80	Peak
2	689.051	-80.92	9.59	-71.33	-13.00	-58.33	Peak
3	925.613	-81.54	13.54	-68.00	-13.00	-55.00	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	471.467	-80.99	5.47	-75.52	-13.00	-62.52	Peak
2	665.261	-80.63	9.19	-71.44	-13.00	-58.44	Peak
3	938.714	-81.71	13.75	-67.96	-13.00	-54.96	Peak

GSM 1900 1Tx-slot_Highest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	607.181	-80.70	8.52	-72.18	-13.00	-59.18	Peak
2	821.387	-80.18	11.13	-69.05	-13.00	-56.05	Peak
3	952.000	-81.37	13.69	-67.68	-13.00	-54.68	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	461.631	-80.79	5.39	-75.40	-13.00	-62.40	Peak
2	538.811	-80.05	6.73	-73.32	-13.00	-60.32	Peak
3	899.958	-81.37	12.79	-68.58	-13.00	-55.58	Peak

WCDMA Band II RMC 12.2Kbps_Lowest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	495.238	-80.35	5.97	-74.38	-13.00	-61.38	Peak
2	602.929	-80.73	8.42	-72.31	-13.00	-59.31	Peak
3	958.714	-81.75	14.05	-67.70	-13.00	-54.70	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	427.292	-79.63	5.08	-74.55	-13.00	-61.55	Peak
2	679.435	-81.25	9.55	-71.70	-13.00	-58.70	Peak
3	754.963	-81.27	10.57	-70.70	-13.00	-57.70	Peak

WCDMA Band II RMC 12.2Kbps_Middle Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	646.822	-80.58	8.78	-71.80	-13.00	-58.80	Peak
2	844.803	-80.90	11.58	-69.32	-13.00	-56.32	Peak
3	972.283	-81.33	14.18	-67.15	-13.00	-54.15	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	523.876	-80.67	6.45	-74.22	-13.00	-61.22	Peak
2	744.427	-79.82	10.20	-69.62	-13.00	-56.62	Peak
3	958.714	-81.66	14.05	-67.61	-13.00	-54.61	Peak

WCDMA Band II RMC 12.2Kbps_Highest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	546.437	-80.48	6.73	-73.75	-13.00	-60.75	Peak
2	684.226	-81.18	9.58	-71.60	-13.00	-58.60	Peak
3	938.714	-81.77	13.75	-68.02	-13.00	-55.02	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	439.473	-80.62	5.23	-75.39	-13.00	-62.39	Peak
2	620.117	-81.17	8.71	-72.46	-13.00	-59.46	Peak
3	850.760	-80.77	11.68	-69.09	-13.00	-56.09	Peak

WCDMA Band V RMC 12.2Kbps_Lowest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	32.184	-79.46	32.93	-46.53	-13.00	-33.53	Peak
2	38.365	-75.34	28.89	-46.45	-13.00	-33.45	Peak
3	97.002	-75.41	26.48	-48.93	-13.00	-35.93	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	32.184	-80.14	32.93	-47.21	-13.00	-34.21	Peak
2	38.636	-79.49	28.76	-50.73	-13.00	-37.73	Peak
3	97.002	-79.39	26.48	-52.91	-13.00	-39.91	Peak

WCDMA Band V RMC 12.2Kbps_Middle Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	32.184	-79.47	32.93	-46.54	-13.00	-33.54	Peak
2	39.182	-76.92	28.49	-48.43	-13.00	-35.43	Peak
3	97.002	-77.41	26.48	-50.93	-13.00	-37.93	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	31.959	-82.54	33.13	-49.41	-13.00	-36.41	Peak
2	38.636	-79.06	28.76	-50.30	-13.00	-37.30	Peak
3	97.002	-78.84	26.48	-52.36	-13.00	-39.36	Peak

WCDMA Band V RMC 12.2Kbps_Highest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	32.184	-78.66	32.93	-45.73	-13.00	-32.73	Peak
2	38.096	-75.52	29.02	-46.50	-13.00	-33.50	Peak
3	97.002	-75.59	26.48	-49.11	-13.00	-36.11	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	32.184	-84.12	32.93	-51.19	-13.00	-38.19	Peak
2	42.931	-79.41	27.03	-52.38	-13.00	-39.38	Peak
3	97.002	-79.78	26.48	-53.30	-13.00	-40.30	Peak



**5.8.2 Radiated Emission Test Data (Above 1GHz)**

GSM 850 1Tx-slot_Lowest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	2472.600	-49.02	9.16	-39.86	-13.00	-26.86	Peak
2	4109.610	-63.83	14.51	-49.32	-13.00	-36.32	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	2468.481	-53.17	11.49	-41.68	-13.00	-28.68	Peak
2	4109.610	-59.85	15.98	-43.87	-13.00	-30.87	Peak

GSM 850 1Tx-slot_Middle Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1664.833	-53.70	2.53	-51.17	-13.00	-38.17	Peak
2	2497.244	-49.21	9.16	-40.05	-13.00	-27.05	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1664.833	-52.92	4.22	-48.70	-13.00	-35.70	Peak
2	2497.244	-54.80	11.47	-43.33	-13.00	-30.33	Peak

GSM 850 1Tx-slot_Highest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1694.016	-53.05	2.75	-50.30	-13.00	-37.30	Peak
2	2541.018	-49.18	9.22	-39.96	-13.00	-26.96	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1694.016	-55.47	4.55	-50.92	-13.00	-37.92	Peak
2	2541.018	-51.54	11.45	-40.09	-13.00	-27.09	Peak

GSM 1900 1Tx-slot_Lowest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3681.329	-53.58	13.74	-39.84	-13.00	-26.84	Peak
2	5521.982	-58.57	16.05	-42.52	-13.00	-29.52	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3681.329	-55.89	15.08	-40.81	-13.00	-27.81	Peak
2	5521.982	-57.37	16.95	-40.42	-13.00	-27.42	Peak

GSM 1900 1Tx-slot_Middle Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3745.858	-60.71	13.85	-46.86	-13.00	-33.86	Peak
2	7506.207	-58.07	19.08	-38.99	-13.00	-25.99	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3745.858	-49.55	15.25	-34.30	-13.00	-21.30	Peak
2	5618.776	-54.92	16.91	-38.01	-13.00	-25.01	Peak

GSM 1900 1Tx-slot_Highest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3811.519	-54.05	13.97	-40.08	-13.00	-27.08	Peak
2	7637.782	-52.01	19.11	-32.90	-13.00	-19.90	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3811.519	-44.33	15.42	-28.91	-13.00	-15.91	Peak
2	5717.266	-49.12	17.19	-31.93	-13.00	-18.93	Peak

WCDMA Band II RMC 12.2Kbps_Lowest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3704.800	-65.93	13.78	-52.15	-13.00	-39.15	Peak
2	5557.200	-67.76	16.01	-51.75	-13.00	-38.75	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3704.800	-66.45	15.14	-51.31	-13.00	-38.31	Peak
2	5557.200	-68.57	16.90	-51.67	-13.00	-38.67	Peak

WCDMA Band II RMC 12.2Kbps_Middle Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3760.000	-66.13	13.87	-52.26	-13.00	-39.26	Peak
2	5640.000	-67.67	16.10	-51.57	-13.00	-38.57	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3760.000	-60.32	15.28	-45.04	-13.00	-32.04	Peak
2	5640.000	-67.22	16.97	-50.25	-13.00	-37.25	Peak

WCDMA Band II RMC 12.2Kbps_Highest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3815.200	-69.68	13.97	-55.71	-13.00	-42.71	Peak
2	5722.800	-68.62	16.35	-52.27	-13.00	-39.27	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3815.200	-65.03	15.43	-49.60	-13.00	-36.60	Peak
2	5722.800	-68.62	17.21	-51.41	-13.00	-38.41	Peak

WCDMA Band V RMC 12.2Kbps_Lowest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1652.800	-65.02	2.43	-62.59	-13.00	-49.59	Peak
2	2479.200	-67.13	9.16	-57.97	-13.00	-44.97	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1652.800	-63.19	4.08	-59.11	-13.00	-46.11	Peak
2	2479.200	-68.88	11.48	-57.40	-13.00	-44.40	Peak

WCDMA Band V RMC 12.2Kbps_Middle Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1672.800	-65.81	2.59	-63.22	-13.00	-50.22	Peak
2	2509.200	-69.31	9.17	-60.14	-13.00	-47.14	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1672.800	-66.10	4.31	-61.79	-13.00	-48.79	Peak
2	2509.200	-71.39	11.46	-59.93	-13.00	-46.93	Peak

WCDMA Band V RMC 12.2Kbps_Highest Channel							
Horizontal							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1693.200	-67.10	2.75	-64.35	-13.00	-51.35	Peak
2	2539.800	-70.68	9.22	-61.46	-13.00	-48.46	Peak

Vertical							
No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1693.200	-67.07	4.54	-62.53	-13.00	-49.53	Peak
2	2539.800	-70.92	11.45	-59.47	-13.00	-46.47	Peak

**Remark:**

- 1) All the above radiation data, the fundamental frequency is not marked, it may exceed the limit, please ignore it.
- 2) Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
- 3) Result = Reading + Correct Factor.
- 4) Margin = Result - Limit

### 5.9 FREQUENCY STABILITY

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

**Test Method:** ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01

**Limits:** The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

**Test Setup:** Refer to section 4.2.2 for details.

**Test Procedures:**

- 1) Use CMW 500 or CMU 200 with Frequency Error measurement capability.
  - a) Temp. =  $-30^{\circ}$  to  $+50^{\circ}\text{C}$
  - b) Voltage = low voltage, 3.5 Vdc, Normal, 3.7 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  $20^{\circ}\text{C}$  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	Temperature	Deviation	Deviation	Limit	Pass/ Fail
		(Vdc)	( $^{\circ}\text{C}$ )	(Hz)	(ppm)	(ppm)	
<b>GSM 850 1Tx-slot</b>							
GMSK	190 / 836.6	VL	TN	-9	-0.0108	$\pm 2.5$	Pass
		VN		-9	-0.0108	$\pm 2.5$	Pass
		VH		-5	-0.0060	$\pm 2.5$	Pass
		VN	50	-13	-0.0155	$\pm 2.5$	Pass
			40	-12	-0.0143	$\pm 2.5$	Pass
			30	9	0.0108	$\pm 2.5$	Pass
			20	-7	-0.0084	$\pm 2.5$	Pass
			10	5	0.0060	$\pm 2.5$	Pass
			0	8	0.0096	$\pm 2.5$	Pass
			-10	7	0.0084	$\pm 2.5$	Pass
			-20	7	0.0084	$\pm 2.5$	Pass
			-30	6	0.0072	$\pm 2.5$	Pass

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Pass/ Fail
	(MHz)	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	
<b>WCDMA Band V RMC 12.2Kbps</b>							
BPSK	4182 / 836.4	VL	TN	-9	-0.0108	± 2.5	Pass
		VN		-9	-0.0108	± 2.5	Pass
		VH		-7	-0.0084	± 2.5	Pass
		VN	50	-11	-0.0132	± 2.5	Pass
			40	-13	-0.0155	± 2.5	Pass
			30	8	0.0096	± 2.5	Pass
			20	9	0.0108	± 2.5	Pass
			10	5	0.0060	± 2.5	Pass
			0	9	0.0108	± 2.5	Pass
			-10	7	0.0084	± 2.5	Pass
			-20	6	0.0072	± 2.5	Pass
-30	3	0.0036	± 2.5	Pass			

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Pass/ Fail
	(MHz)	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	
<b>GSM 1900 1Tx-slot</b>							
GMSK	661 / 1880.0	VL	TN	-8	-0.0043	Note 1	Pass
		VN		-9	-0.0048		Pass
		VH		-5	-0.0027		Pass
		VN	50	-12	-0.0064		Pass
			40	-13	-0.0069		Pass
			30	-9	-0.0048		Pass
			20	9	0.0048		Pass
			10	5	0.0027		Pass
			0	8	0.0043		Pass
			-10	7	0.0037		Pass
			-20	8	0.0043		Pass
-30	6	0.0032	Pass				

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Pass/ Fail
	(MHz)	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	
<b>WCDMA Band II RMC 12.2Kbps</b>							
BPSK	9400 / 1880.0	VL	TN	-9	-0.0048	Note 1	Pass
		VN		-9	-0.0048		Pass
		VH		-5	-0.0027		Pass
		VN	50	-11	-0.0059		Pass
			40	-8	-0.0043		Pass
			30	-10	-0.0053		Pass
			20	-5	-0.0027		Pass
			10	9	0.0048		Pass
			0	8	0.0043		Pass
			-10	6	0.0032		Pass
			-20	9	0.0048		Pass
-30	6	0.0032	Pass				

**Note1:** The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

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

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

[Http://www.uttlab.com](http://www.uttlab.com)



## 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.

---