

## RF TEST REPORT

### FCC ID: 2AJYL-AB23

**Product Name** : AIRBOLT CELLULAR GPS  
**Brand Name** : AIRBOLT  
**Test Model** : ABGPS-23  
**Series Model** : N/A  
**Applicant** : AirBolt Pty Ltd  
**Address** : PO Box 192, Bulleen, Victoria city, Australia 3105  
**Manufacturer** : BOTERLAN TECHNOLOGY CO., LIMITED  
**Address** : 4F, Buliding B2, Guangshen high and new science and technology park  
Youmagang, Jiangshi, Gongming, Guangming new zone, Shenzhen,  
Guangdong, China  
**Date of Receipt** : 2022.12.27  
**Date of Test** : 2022.12.27-2023.03.26  
**Issued Date** : 2023.03.26  
**Report Version** : V1.0  
**Test Sample** : Engineering Sample No.: AIT22122704-1  
**Standard(s)** : 47 CFR FCC Part 02; 47 CFR FCC Part 22; 47 CFR FCC Part 24;  
47 CFR FCC Part 27; ANSI C63.26:2015

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This device described above has been tested by Dongguan Yaxu (AiT) Technology Limited and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Reviewed by:



Simba huang

Approved by:



Seal Chen

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**Revision History**

| Revision | Issue Date | Revisions     | Revised By |
|----------|------------|---------------|------------|
| V1.0     | 2023.03.26 | Initial Issue | Seal Chen  |
|          |            |               |            |
|          |            |               |            |

# 1. General Information

## 1.1 Applicant

**AirBolt Pty Ltd**

PO Box 192,Bulleen,Victoria city,Australia 3105

## 1.2 Manufacturer

**BOTERLAN TECHNOLOGY CO.,LIMITED**

4F,Buliding B2,Guangshen high and new science and technology park  
Youmagang,Jiangshi,Gongming,Guangming new zone,Shenzhen,  
Guangdong,China

## 1.3 Basic Description of Equipment Under Test

| Items                  | Description                        |                                               |
|------------------------|------------------------------------|-----------------------------------------------|
| Product Name           | AIRBOLT CELLULAR GPS               |                                               |
| Band Name              | AIRBOLT                            |                                               |
| Test Model Number      | ABGPS-23                           |                                               |
| Series Model           | N/A                                |                                               |
| Difference Description | N/A                                |                                               |
| Power Supply           | DC 3.7V 400mAh                     |                                               |
| Antenna Type:          | FPC antenna                        |                                               |
| Operating Temperature  | -20~65℃                            |                                               |
| Hardware Version       | N/A                                |                                               |
| Software Version       | N/A                                |                                               |
| EUT Stage              | <input type="radio"/> Product Unit | <input checked="" type="radio"/> Final-Sample |
| Radio SystemType       | LTE                                |                                               |
| Operating Band         | Band 2, Band 4, Band 12, Band13    |                                               |

## 1.4 Technical Specification

| Characteristics                                                                                                                                                                 | Description                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Radio System Type                                                                                                                                                               | LTE                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Supported Frequency Range                                                                                                                                                       | LTE BAND2                                                                           | Transmission (TX): 1850 to 1910 MHz                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                                                                                                                                                                 |                                                                                     | Receiving (RX): 1930 to 1990 MHz                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                                                                                                                                 | LTE BAND4                                                                           | Transmission (TX): 1710 to 1755 MHz                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                                                                                                                                                                 |                                                                                     | Receiving (RX): 2110 to 2155 MHz                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                                                                                                                                 | LTE BAND12                                                                          | Transmission (TX): 699 to 716 MHz                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                 |                                                                                     | Receiving (RX): 729 to 746MHz                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                                                                                                                 | LTE BAND13                                                                          | Transmission (TX): 777 to 787MHz                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                                                                                                                                 |                                                                                     | Receiving (RX): 746 to 756MHz                                                                                                                                                                                                                                                                                                                                                                                                                    |
| TX and RX Antenna Ports                                                                                                                                                         | TX & RX port:                                                                       | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                 | TX-only port:                                                                       | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                 | RX-only port:                                                                       | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Target TX Output Power                                                                                                                                                          | LTE BAND2:24.00dBm; LTE BAND4:23.89dBm;<br>LTE BAND12:21.74dBm;LTE BAND13:24.72dBm; |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Antenna Gain:                                                                                                                                                                   | LTE BAND2:1.39dBi;LTE BAND4: 0.76dBi;<br>LTE BAND12: -0.49dBi; LTE BAND13:2.42dBi;  |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Supported Channel Bandwidth                                                                                                                                                     | LTE BAND2                                                                           | 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                                                                                                                 | LTE BAND4                                                                           | 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                                                                                                                 | LTE BAND12                                                                          | 1.4 MHz, 3 MHz, 5 MHz, 10 MHz                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                                                                                                                 | LTE BAND13                                                                          | 1.4 MHz, 3 MHz, 5 MHz, 10 MHz                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Designation of Emissions<br>(Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.) | LTE BAND2:                                                                          | 1M1G7D (1.4 MHz QPSK modulation),<br>1M1W7D (1.4 MHz 16QAM modulation)<br>2M70G7D (3 MHz QPSK modulation),<br>2M70W7D (3 MHz 16QAM modulation)<br>4M47G7D (5 MHz QPSK modulation)<br>4M47W7D (5 MHz 16QAM modulation)<br>8M95G7D (10 MHz QPSK modulation)<br>8M95W7D (10 MHz 16QAM modulation)<br>13M5G7D (15 MHz QPSK modulation)<br>13M5W7D (15 MHz 16QAM modulation)<br>17M9G7D (20 MHz QPSK modulation)<br>17M9W7D (20 MHz 16QAM modulation) |
|                                                                                                                                                                                 | LTE BAND4:                                                                          | 1M09G7D (1.4 MHz QPSK modulation)<br>1M09W7D (1.4 MHz 16QAM modulation)<br>2M70G7D (3 MHz QPSK modulation)<br>2M69W7D (3 MHz 16QAM modulation)<br>4M48G7D (5 MHz QPSK modulation)<br>4M47W7D (5 MHz 16QAM modulation)                                                                                                                                                                                                                            |

| Characteristics | Description |                                                                                                                                                                                                                                                                                                |
|-----------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |             | 8M95G7D (10 MHz QPSK modulation)<br>8M93W7D (10 MHz 16QAM modulation)<br>13M5G7D (15 MHz QPSK modulation)<br>13M5W7D (15 MHz 16QAM modulation)<br>17M9G7D (20 MHz QPSK modulation)<br>17M9W7D (20 MHz 16QAM modulation)                                                                        |
|                 | LTE BAND12: | 1M09G7D (1.4 MHz QPSK modulation)<br>1M09W7D (1.4 MHz 16QAM modulation)<br>2M69G7D (3 MHz QPSK modulation)<br>2M68W7D (3 MHz 16QAM modulation)<br>4M47G7D (5 MHz QPSK modulation)<br>4M47W7D (5 MHz 16QAM modulation)<br>8M97G7D (10 MHz QPSK modulation)<br>8M94W7D (10 MHz 16QAM modulation) |
|                 | LTE BAND13: | 4M47G7D (5 MHz QPSK modulation)<br>4M47W7D (5 MHz 16QAM modulation)<br>8M93G7D (10 MHz QPSK modulation)<br>8M92W7D (10 MHz 16QAM modulation)                                                                                                                                                   |

## 2. Summary of Test Results

### 2.1 Application of Standard

47 CFR FCC Part 02

47 CFR FCC Part 22

47 CFR FCC Part 24

47 CFR FCC Part 27

KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI C63.26:2015

### 2.2 Band2 (1850-1910MHz paired with 1930-1990MHz)

| Test Item                                             | FCC Rule No.              | Requirements                                                                                                        | Test Result | Verdict (Note1) |
|-------------------------------------------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------|-------------|-----------------|
| Effective(Isotropic)<br>Radiated Power Output<br>Data | Part<br>2.1046,<br>24.232 | EIRP $\leq$ 2W                                                                                                      | Appendix    | Pass            |
| Peak-Average Ratio                                    | Part<br>2.1046,<br>24.232 | Limit $\leq$ 13dB                                                                                                   | Appendix    | Pass            |
| Bandwidth                                             | Part 2.1049               | OBW:No limit.<br>EBW:No limit.                                                                                      | Appendix    | Pass            |
| Band Edges Compliance                                 | Part<br>2.1051,<br>24.238 | $\leq$ -13dBm/1%*EBW,in1MHz bands<br>immediately outside and adjacent to<br>the frequency block.                    | Appendix    | Pass            |
| Spurious Emission at<br>Antenna Terminals             | Part<br>2.1051,<br>24.238 | $\leq$ -13dBm/1MHz,from 9 kHz to<br>10 <sup>th</sup> harmonicsbut outside authorized<br>operating frequency ranges. | Appendix    | Pass            |
| Field Strength of<br>Spurious Radiation               | Part<br>2.1053,<br>24.238 | $\leq$ -13dBm/1MHz.                                                                                                 | Appendix    | Pass            |
| Frequency Stability                                   | Part<br>2.1055,<br>24.235 | $\leq \pm 2.5$ ppm.                                                                                                 | Appendix    | Pass            |

Note1: For the verdict,the "N/A"denotes "not applicable",the "N/T"denotes "not tested".

### 2.3 Band4 (1710-1755MHz paired with 2110-2155MHz)

| Test Item                                       | FCC Rule No.          | Requirements                                                                                                   | Test Result | Verdict (Note1) |
|-------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------|-------------|-----------------|
| Effective(Isotropic) Radiated Power Output Data | Part 2.1046, 27.50(d) | EIRP $\leq$ 1W                                                                                                 | Appendix    | Pass            |
| Peak-Average Ratio                              | Part 2.1046, 27.50(d) | Limit $\leq$ 13 dB                                                                                             | Appendix    | Pass            |
| Bandwidth                                       | Part 2.1049           | OBW:No limit.<br>EBW:No limit.                                                                                 | Appendix    | Pass            |
| Band Edges Compliance                           | Part 2.1051, 27.53(h) | $\leq$ -13 dBm/1%*EBW,in1MHz bands immediately outside and adjacent to the frequency block.                    | Appendix    | Pass            |
| Spurious Emission at Antenna Terminals          | Part 2.1051, 27.53(h) | $\leq$ -13 dBm/1MHz,from9 kHz to 10 <sup>th</sup> harmonics but outside authorized operating frequency ranges. | Appendix    | Pass            |
| Field Strength of Spurious Radiation            | Part 2.1053, 27.53(h) | $\leq$ -13 dBm/1MHz.                                                                                           | Appendix    | Pass            |
| Frequency Stability                             | Part 2.1055, 27.54    | $\leq \pm 2.5$ ppm.                                                                                            | Appendix    | Pass            |

Note1: For the verdict, the“N/A”denotes“not applicable”,the“N/T”denotes“not tested”.

## 2.4 Band12 (699-716MHz paired with 729-746 MHz)

| Test Item                                                                                   | FCC Rule No                | Requirements                                                                                                 | Test Result | Verdict (Note1) |
|---------------------------------------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------|-------------|-----------------|
| Effective (Isotropic) Radiated Power Output Data                                            | Part 27.50(c)              | FCC: ERP $\leq$ 3 W.                                                                                         | Appendix    | Pass            |
| Peak-Average Ratio                                                                          | Part 2.1046, Part 27.50(c) | Limit $\leq$ 13 dB                                                                                           | Appendix    | Pass            |
| Bandwidth                                                                                   | Part 2.1047                | OBW: No limit.<br>EBW: No limit.                                                                             | Appendix    | Pass            |
| Band Edges Compliance                                                                       | Part 2.1051, Part 27.53(g) | $\leq$ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.               | Appendix    | Pass            |
| Spurious Emission at Antenna Terminals                                                      | Part 2.1051, 27.53(g)      | FCC: $\leq$ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. | Appendix    | Pass            |
| Field Strength of Spurious Radiation                                                        | Part 2.1051, 27.53(g)      | FCC: $\leq$ -13 dBm/100 kHz.                                                                                 | Appendix    | Pass            |
| Frequency Stability                                                                         | Part 2.1055 27.54          | $\leq \pm 2.5$ ppm.                                                                                          | Appendix    | Pass            |
| Note1: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested". |                            |                                                                                                              |             |                 |

## 2.5 Band13 (777-787 MHz)

| Test Item                                        | FCC Rule No                              | Requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Test Result | Verdict (Note1) |
|--------------------------------------------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------|
| Effective (Isotropic) Radiated Power Output Data | Part 2.1046, Part 27.50(b)               | FCC: ERP $\leq$ 3 W.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Appendix    | Pass            |
| Peak-Average Ratio                               | Part 27.50                               | Limit $\leq$ 13 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Appendix    | Pass            |
| Bandwidth                                        | Part 2.1049                              | OBW: No limit.<br>EBW: No limit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Appendix    | Pass            |
| Band Edges Compliance                            | Part 2.1051, Part 27.53(g)               | $\leq -13$ dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Appendix    | Pass            |
| Spurious Emission at Antenna Terminals           | Part 2.1051, Part 27.53(c) Part 27.53(f) | FCC: $\leq -13$ dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations. For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to $-70$ dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and $-80$ dBW EIRP for discrete emissions of less than 700 Hz bandwidth. | Appendix    | Pass            |
| Field Strength of Spurious Radiation             | Part 2.1051, Part 27.53(c) Part 27.53(f) | FCC: $\leq -13$ dBm/100 kHz. For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to $-70$ dBW/MHz equivalent isotropically radiated power (EIRP) for wide band signals, and $-80$ dBW EIRP for discrete emissions of less than 700 Hz bandwidth.                                                                                                                                                                                                                                                     | Appendix    | Pass            |



|                                                                                             |                         |                           |          |      |
|---------------------------------------------------------------------------------------------|-------------------------|---------------------------|----------|------|
| Frequency<br>Stability                                                                      | Part<br>2.1055<br>27.54 | $\leq \pm 2.5\text{ppm.}$ | Appendix | Pass |
| Note1: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested". |                         |                           |          |      |

### 3. General Test Frequency and Configuration

#### 3.1 Test Modes

| Test Mode | Test Modes Description       |
|-----------|------------------------------|
| LTE/TM1   | LTE system, QPSK modulation  |
| LTE/TM2   | LTE system, 16QAM modulation |

#### 3.2 Test Frequency

| Test Mode  | TX / RX  | RF Channel    |               |               |
|------------|----------|---------------|---------------|---------------|
|            |          | Low (B)       | Middle (M)    | High (T)      |
| LTE Band 2 | TX(1.4M) | Channel 18607 | Channel 18900 | Channel 19193 |
|            |          | 1850.7 MHz    | 1880 MHz      | 1909.3 MHz    |
|            | TX(3M)   | Channel 18615 | Channel 18900 | Channel 19185 |
|            |          | 1851.5 MHz    | 1880 MHz      | 1908.5 MHz    |
|            | TX(5M)   | Channel 18625 | Channel 18900 | Channel 19175 |
|            |          | 1852.5 MHz    | 1880 MHz      | 1907.5 MHz    |
|            | TX(10M)  | Channel 18650 | Channel 18900 | Channel 19150 |
|            |          | 1855 MHz      | 1880 MHz      | 1905 MHz      |
|            | TX(15M)  | Channel 18675 | Channel 18900 | Channel 19125 |
|            |          | 1857.5 MHz    | 1880 MHz      | 1902.5 MHz    |
|            | TX(20M)  | Channel 18700 | Channel 18900 | Channel 19100 |
|            |          | 1860 MHz      | 1880 MHz      | 1900 MHz      |
|            | RX(1.4M) | Channel 607   | Channel 900   | Channel 1193  |
|            |          | 1930.7 MHz    | 1960 MHz      | 1989.3 MHz    |
|            | RX(3M)   | Channel 615   | Channel 900   | Channel 1185  |
|            |          | 1931.5 MHz    | 1960 MHz      | 1988.5 MHz    |
|            | RX(5M)   | Channel 625   | Channel 900   | Channel 1175  |
|            |          | 1932.5 MHz    | 1960 MHz      | 1987.5 MHz    |
|            | RX(10M)  | Channel 650   | Channel 900   | Channel 1150  |
|            |          | 1935 MHz      | 1960 MHz      | 1985 MHz      |
|            | RX(15M)  | Channel 675   | Channel 900   | Channel 1125  |
|            |          | 1937.5 MHz    | 1960 MHz      | 1982.5 MHz    |
|            | RX(20M)  | Channel 700   | Channel 900   | Channel 1100  |
|            |          | 1940 MHz      | 1960 MHz      | 1980 MHz      |
| Test Mode  | TX / RX  | RF Channel    |               |               |
|            |          | Low (B)       | Middle (M)    | High (T)      |
| LTE Band 4 | TX(1.4M) | Channel 19957 | Channel 20175 | Channel 20393 |
|            |          | 1710.7 MHz    | 1732.5 MHz    | 1754.3 MHz    |
|            | TX(3M)   | Channel 19965 | Channel 20175 | Channel 20385 |
|            |          | 1711.5 MHz    | 1732.5 MHz    | 1753.5 MHz    |

|             |          |               |               |               |
|-------------|----------|---------------|---------------|---------------|
|             | TX(5M)   | Channel 19975 | Channel 20175 | Channel 20375 |
|             |          | 1712.5 MHz    | 1732.5 MHz    | 1752.5 MHz    |
|             | TX(10M)  | Channel 20000 | Channel 20175 | Channel 20350 |
|             |          | 1715 MHz      | 1732.5 MHz    | 1750 MHz      |
|             | TX(15M)  | Channel 20025 | Channel 20175 | Channel 20325 |
|             |          | 1717.5 MHz    | 1732.5 MHz    | 1747.5 MHz    |
|             | TX(20M)  | Channel 20050 | Channel 20175 | Channel 20300 |
|             |          | 1720 MHz      | 1732.5 MHz    | 1745 MHz      |
|             | RX(1.4M) | Channel 1975  | Channel 2175  | Channel 2375  |
|             |          | 2112.5 MHz    | 2132.5MHz     | 2152.5 MHz    |
|             | RX(3M)   | Channel 2000  | Channel 2175  | Channel 2350  |
|             |          | 2115 MHz      | 2132.5MHz     | 2150 MHz      |
|             | RX(5M)   | Channel 1975  | Channel 2175  | Channel 2375  |
|             |          | 2112.5 MHz    | 2132.5MHz     | 2152.5 MHz    |
|             | RX(10M)  | Channel 2000  | Channel 2175  | Channel 2350  |
|             |          | 2115 MHz      | 2132.5MHz     | 2150 MHz      |
|             | RX(15M)  | Channel 2025  | Channel 2175  | Channel 2325  |
|             |          | 2117.5 MHz    | 2132.5MHz     | 2147.5 MHz    |
|             | RX(20M)  | Channel 2050  | Channel 2175  | Channel 2300  |
|             |          | 2120 MHz      | 2132.5MHz     | 2145 MHz      |
| Test Mode   | TX / RX  | RF Channel    |               |               |
|             |          | Low (B)       | Middle (M)    | High (T)      |
| LTE Band 12 | TX(1.4M) | Channel 23017 | Channel 23095 | Channel 23173 |
|             |          | 699.7 MHz     | 707.5 MHz     | 715.3 MHz     |
|             | TX(3M)   | Channel 23025 | Channel 23095 | Channel 23165 |
|             |          | 700.5 MHz     | 707.5 MHz     | 714.5 MHz     |
|             | TX(5M)   | Channel 23035 | Channel 23095 | Channel 23155 |
|             |          | 701.5 MHz     | 707.5 MHz     | 713.5 MHz     |
|             | TX(10M)  | Channel 23060 | Channel 23095 | Channel 23130 |
|             |          | 704 MHz       | 707.5 MHz     | 711 MHz       |
|             | RX(1.4M) | Channel 5017  | Channel 5095  | Channel 5173  |
|             |          | 729.7 MHz     | 737.5 MHz     | 745.3 MHz     |
|             | RX (3M)  | Channel 5025  | Channel 5095  | Channel 5165  |
|             |          | 730.5 MHz     | 737.5 MHz     | 744.5 MHz     |
| Test Mode   | TX / RX  | RF Channel    |               |               |
|             |          | Low (B)       | Middle (M)    | High (T)      |
| LTE Band 13 | TX(5M)   | Channel 23025 | Channel 23230 | Channel 23255 |
|             |          | 779.5 MHz     | 782 MHz       | 784.5 MHz     |
|             | TX(10M)  | Channel 23230 | Channel 23230 | Channel 23230 |

|  |          |              |              |              |
|--|----------|--------------|--------------|--------------|
|  | RX(5M)   | 782 MHz      | 782 MHz      | 782 MHz      |
|  |          | Channel 5205 | Channel 5230 | Channel 5255 |
|  | RX (10M) | 748.5 MHz    | 751 MHz      | 753.5 MHz    |
|  |          | Channel 5230 | Channel 5230 | Channel 5230 |
|  |          | 751 MHz      | 751 MHz      | 751 MHz      |

### 3.3 Test Environment

| Applicable to                          | Environmental conditions | Input Power  | Tested by   |
|----------------------------------------|--------------------------|--------------|-------------|
| Transmitter Conducted Power Output     | 24.5°C, 52 % RH          | 120Vac, 60Hz | Simba Huang |
| Peak-Average Ratio                     | 24.5°C, 52 % RH          | 120Vac, 60Hz | Simba Huang |
| Modulation Characteristics             | 24.5°C, 52 % RH          | 120Vac, 60Hz | Simba Huang |
| Bandwidth                              | 24.5°C, 52 % RH          | 120Vac, 60Hz | Simba Huang |
| Emission Mask                          | 24.5°C, 52 % RH          | 120Vac, 60Hz | Simba Huang |
| Spurious Emission at Antenna Terminals | 24.5°C, 53 % RH          | 120Vac, 60Hz | Simba Huang |
| Field Strength of Spurious Radiation   | 24.4°C, 53 % RH          | 120Vac, 60Hz | Simba Huang |
| Frequency Stability                    | 24.5°C, 52 % RH          | 120Vac, 60Hz | Simba Huang |

The applicant declare the operating environment of EUT as below:

Normal conditions: 5.0V DC, 15°C ~35°C

Extreme conditions: 4.59V DC~5.61V DC, -20°C ~65°C

VL= lower extreme test voltage, VN= nominal voltage, VH= upper extreme test voltage

TL= lower extreme test temperature, TN= normal temperature, TH= upper extreme test temperature

### 3.4 Test Instruments

| N<br>o | Test Equipment                      | Manufacturer | Model No            | Serial No                  | Cal. Date  | Cal. Due Date |
|--------|-------------------------------------|--------------|---------------------|----------------------------|------------|---------------|
| 1      | Spectrum Analyzer                   | R&S          | FSV40               | 101470                     | 2022.09.02 | 2023.09.01    |
| 2      | EMI Measuring Receiver              | R&S          | ESR                 | 101660                     | 2022.09.02 | 2023.09.01    |
| 3      | Low Noise Pre Amplifier             | HP           | HP8447E             | 1937A01855                 | 2022.09.02 | 2023.09.01    |
| 4      | Low Noise Pre Amplifier             | Tsj          | MLA-0120-A0<br>2-34 | 2648A04738                 | 2022.09.02 | 2023.09.01    |
| 5      | Passive Loop                        | ETS          | 6512                | 00165355                   | 2020.09.05 | 2022.09.04    |
| 6      | TRILOG Super Broadband test Antenna | SCHWARZBECK  | VULB9160            | 9160-3206                  | 2021.08.29 | 2024.08.28    |
| 7      | Broadband Horn Antenna              | SCHWARZBECK  | BBHA9120D           | 452                        | 2021.08.29 | 2024.08.28    |
| 8      | SHF-EHF Horn Antenna 15-40GHz       | SCHWARZBECK  | BBHA9170            | BBHA91703<br>67d           | 2020.11.24 | 2023.11.23    |
| 9      | EMI Test Receiver                   | R&S          | ESCI                | 100124                     | 2022.09.02 | 2023.09.01    |
| 10     | LISN                                | Kyoritsu     | KNW-242             | 8-837-4                    | 2022.09.02 | 2023.09.01    |
| 11     | LISN                                | R&S          | ESH3-Z2             | 0357.8810.54-<br>101161-S2 | 2022.09.02 | 2023.09.01    |
| 12     | Pro.Temp&Humi.chamber               | MENTEK       | MHP-150-1C          | MAA081125<br>01            | 2022.09.02 | 2023.09.01    |
| 13     | RF Automatic Test system            | MW           | MW100-RFCB          | 21033016                   | 2022.09.02 | 2023.09.01    |
| 14     | Signal Generator                    | Agilent      | N5182A              | MY5014300<br>9             | 2022.09.02 | 2023.09.01    |
| 15     | Wideband Radio communication tester | R&S          | CMW500              | 1201.0002K<br>50           | 2022.09.02 | 2023.09.01    |
| 16     | RF Automatic Test system            | MW           | MW100-RFCB          | 21033016                   | 2022.09.02 | 2023.09.01    |
| 17     | DC power supply                     | ZHAOXIN      | RXN-305D-2          | 2807000255<br>9            | N/A        | N/A           |
| 18     | RE Software                         | EZ           | EZ-EMC_RE           | Ver.AIT-03A                | N/A        | N/A           |
| 19     | CE Software                         | EZ           | EZ-EMC_CE           | Ver.AIT-03A                | N/A        | N/A           |
| 20     | RF Software                         | MW           | MTS 8310            | 2.0.0.0                    | N/A        | N/A           |
| 21     | temporary antenna connector(Note)   | NTS          | R001                | N/A                        | N/A        | N/A           |
| 22     | Spectrum Analyzer                   | Agilent      | N9020A              | MT21033052                 | 2022.09.02 | 2023.09.01    |

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

### 3.5 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

| Uncertainty                                   |                           |
|-----------------------------------------------|---------------------------|
| Parameter                                     | Uncertainty               |
| Occupied Channel Bandwidth                    | $\pm 142.08\text{KHz}$    |
| RF power conducted                            | $\pm 0.74\text{dB}$       |
| Band Edge Compliance                          | $\pm 1.24\text{dB}$       |
| Frequency stability                           | $\pm 0.12\text{ ppm}$     |
| Spurious emissions, radiated (0.009MHz~30MHz) | 3.10dB                    |
| Spurious emissions, radiated (30MHz~1GHz)     | 3.75dB                    |
| Spurious emissions, radiated (1GHz~18GHz)     | 3.88dB                    |
| Spurious emissions, radiated (18GHz ~ 40GHz)  | 3.88dB                    |
| Humidity                                      | $\pm 4.0\%$               |
| Temperature                                   | $\pm 0.5^{\circ}\text{C}$ |
| Time                                          | $\pm 1.20\%$              |

### 3.6 Test Location

|                                         |                                                                                |
|-----------------------------------------|--------------------------------------------------------------------------------|
| Company:                                | Dongguan Yaxu (AIT) Technology Limited                                         |
| Address:                                | No.22, Jinqianling 3rd Street, Jitigang, Huangjiang,Dongguan, Guangdong, China |
| CNAS Registration Number:               | CNAS L6177                                                                     |
| A2LA Registration Number:               | 6317.01                                                                        |
| FCC Accredited Lab. Designation Number: | CN1313                                                                         |
| FCC Test Firm Registration Number:      | 703111                                                                         |

### 3.7 Deviation from Standards

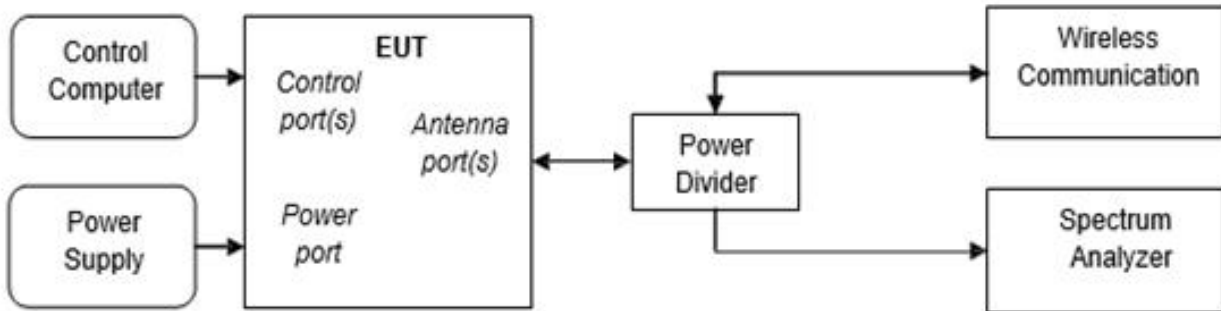
None

### 3.8 Abnormalities from Standard Conditions

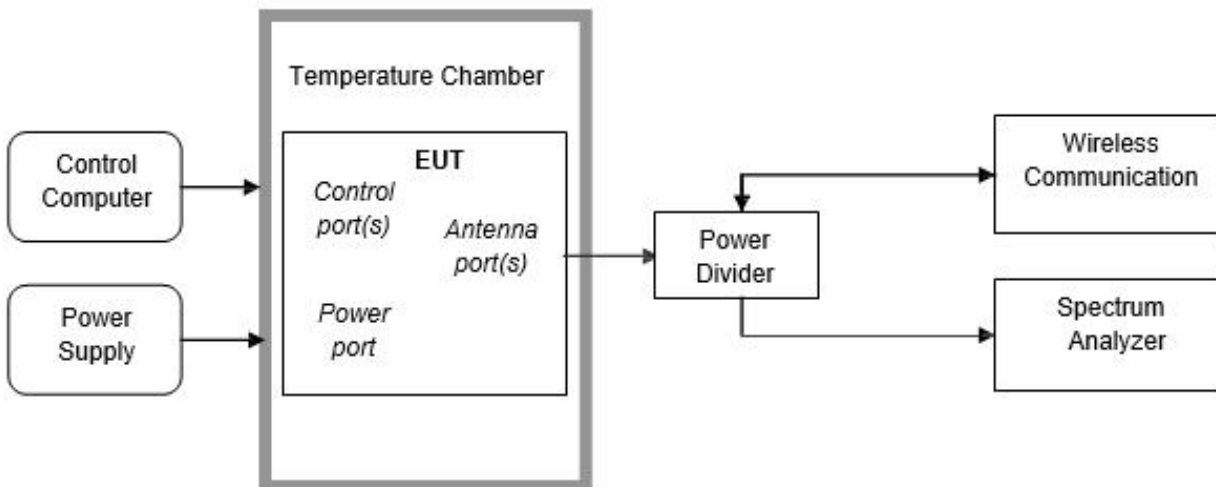
None

## 4. Test Setup and Conditions

### 4.1 Test Setup 1



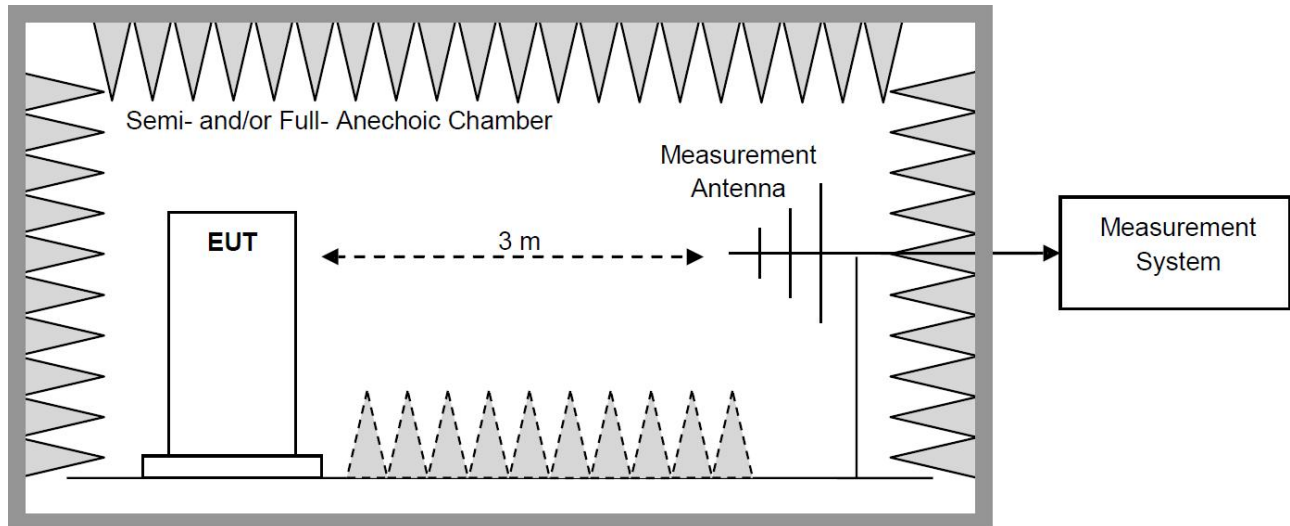
### 4.2 Test Setup 2



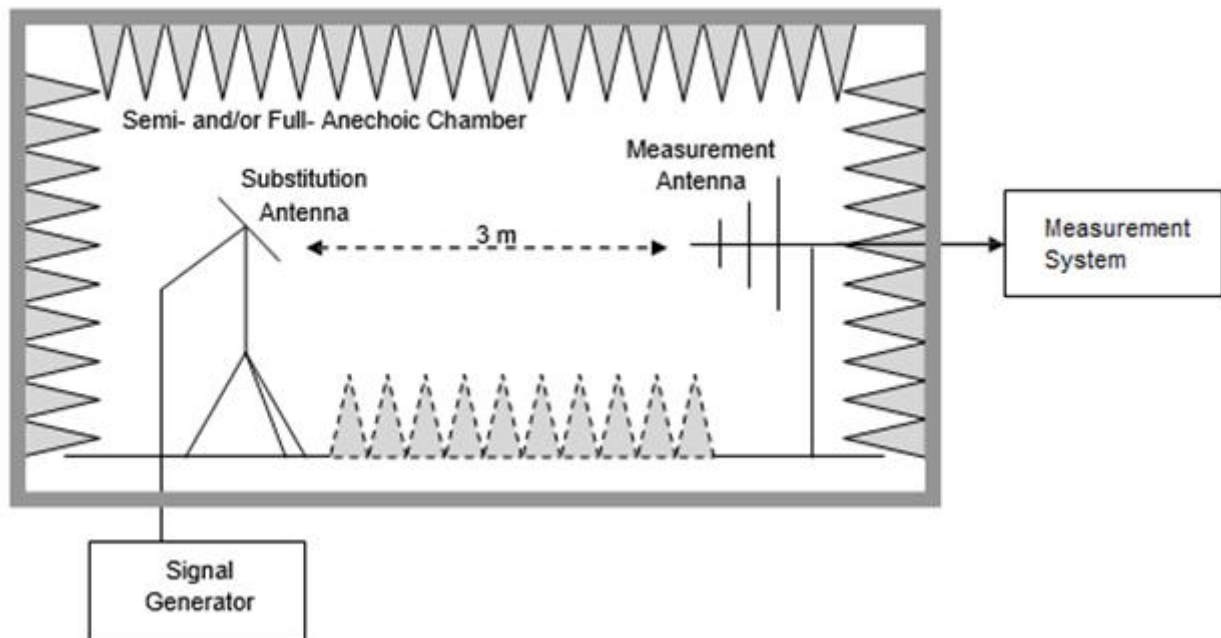
### 4.3 Test Setup 3

NOTE: Effective radiated power (ERP) and Equivalent Isotropic Radiated Power (EIRP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.

#### Step 1: Pre-test



#### Step 2: Substitution method to verify the maximum ERP/EIRP



## 4.4 Test Conditions

| Test Case                                |                                                           | Test Conditions     |                                                                         |
|------------------------------------------|-----------------------------------------------------------|---------------------|-------------------------------------------------------------------------|
| Transmit<br>Output<br>Power Data         | Average<br>Power, Total                                   | Test Env.           | Ambient Climate & Rated Voltage                                         |
|                                          |                                                           | Test Setup          | Test Setup 1                                                            |
|                                          |                                                           | RF Channels<br>(TX) | L, M, H<br>(L= low channel, M= middle channel, H= high channel)         |
|                                          |                                                           | Test Mode           | LTE/TM1, LTE/TM2                                                        |
|                                          | Average<br>Power,<br>Spectral<br>Density (if<br>required) | Test Env.           | Ambient Climate & Rated Voltage                                         |
|                                          |                                                           | Test Setup          | Test Setup 1                                                            |
|                                          |                                                           | RF Channels<br>(TX) | L, M, H<br>(L= low channel, M= middle channel, H= high channel)         |
|                                          |                                                           | Test Mode           | LTE/TM1,LTE/TM2                                                         |
| Peak-to-Average Ratio<br>(if required)   |                                                           | Test Env.           | Ambient Climate & Rated Voltage                                         |
|                                          |                                                           | Test Setup          | Test Setup 1                                                            |
|                                          |                                                           | RF Channels<br>(TX) | L, M, H<br>(L= low channel, M= middle channel, H= high channel)         |
|                                          |                                                           | Test Mode           | LTE/TM1,LTE/TM2                                                         |
| Bandwidth                                | Occupied<br>Bandwidth                                     | Test Env.           | Ambient Climate & Rated Voltage                                         |
|                                          |                                                           | Test Setup          | Test Setup 1                                                            |
|                                          |                                                           | RF Channels<br>(TX) | L, M, H<br>(L= low channel, M= middle channel, H= high channel)         |
|                                          |                                                           | Test Mode           | LTE/TM1,LTE/TM2                                                         |
|                                          | Emission<br>Bandwidth (if<br>required)                    | Test Env.           | Ambient Climate & Rated Voltage                                         |
|                                          |                                                           | Test Setup          | Test Setup 1                                                            |
|                                          |                                                           | RF Channels<br>(TX) | L, M, H<br>(L= low channel, M= middle channel, H= high channel)         |
|                                          |                                                           | Test Mode           | LTE/TM1,LTE/TM2                                                         |
| Band Edges Compliance                    |                                                           | Test Env.           | Ambient Climate & Rated Voltage                                         |
|                                          |                                                           | Test Setup          | Test Setup 1                                                            |
|                                          |                                                           | RF Channels<br>(TX) | L, H<br>(L= low channel, M= middle channel, H= high channel)            |
|                                          |                                                           | Test Mode           | LTE/TM1,LTE/TM2                                                         |
| Spurious Emission at<br>AntennaTerminals |                                                           | Test Env.           | Ambient Climate & Rated Voltage                                         |
|                                          |                                                           | Test Setup          | Test Setup 1                                                            |
|                                          |                                                           | RF Channels<br>(TX) | L, M, H<br>(L= low channel, M= middle channel, H= high channel)         |
|                                          |                                                           | Test Mode           | LTE/TM1,LTE/TM2                                                         |
| Field Strength of<br>SpuriousRadiation   |                                                           | Test Env.           | Ambient Climate & Rated Voltage                                         |
|                                          |                                                           | Test Setup          | Test Setup 3                                                            |
|                                          |                                                           | RF Channels<br>(TX) | L, M, H (L= low channel, M= middle channel, H= high channel)            |
|                                          |                                                           | Test Mode           | LTE/TM1, LTE/TM2<br>NOTE: If applicable, the EUT conf. that has maximum |

|                     |                  |                                                                                                                  |
|---------------------|------------------|------------------------------------------------------------------------------------------------------------------|
|                     |                  | power density (based on the equivalent power level) is selected.                                                 |
| Frequency Stability | Test Env.        | (1) -20 °C to +65 °C with step 10 °C at Rated Voltage;<br>(2) VL, VN and VH of Rated Voltage at Ambient Climate. |
|                     | Test Setup       | Test Setup 2                                                                                                     |
|                     | RF Channels (TX) | L, M, H (L= low channel, M= middle channel, H= high channel)                                                     |
|                     | Test Mode        | LTE/TM1, LTE/TM2                                                                                                 |

## 5. Description of Tests

### 5.1 Effective (Isotropic) Radiated Power

#### **Below 1GHz test procedure as below:**

- 1). The EUT was powered ON and placed on a 0.8m high table in the chamber. The antenna of the transmitter was extended to its maximum length.
- 2). 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.
- 3). Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
- 4). 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.
- 5). 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 2) is obtained for this set of conditions.
- 6). The output power into the substitution antenna was then measured.
- 7). Steps 5) and 6) were repeated with both antennas polarized.
- 8). Calculate power in dBm by the following formula:  $ERP\ (dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$  Where: Pg is the generator output power into the substitution antenna.

#### **Above 1GHz test procedure as below:**

- 1). Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber
- 2). Calculate power in dBm by the following formula:  $EIRP(dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBi)}$   $EIRP=ERP+2.15dB$  Where: Pg is the generator output power into the substitution antenna.
- 3). Test the EUT in the lowest channel, the middle channel the Highest channel
- 4). The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.
- 5). Repeat above procedures until all frequencies measured was complete.

#### **Test Procedures Used**

FCC KDB 971168 D01 V03r01 ; ANSI/ C63.10

Note: Reference test setup 3

#### **Test result**

Please refer to AIT22122704FW2\_Appendix Data\_ LTE

## 5.2 Peak-Average Ratio

A peak to average ratio measurement is performed at the conducted port of the EUT. For WCDMA signals, the spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level. For GSM signals, an average and a peak trace are used on a spectrum analyzer to determine the largest deviation between the average and the peak power of the EUT in a bandwidth greater than the emission bandwidth. The traces are generated with the spectrum analyzer set to zero span mode.

### Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

### **Test Procedures Used**

FCC KDB 971168 D01 V03r01 Section 5.7.1

Note: Reference test setup 1

### **Test result**

Please refer to AIT22122704FW2\_Appendix Data\_ LTE

### 5.3 Occupied Bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyser, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel, middle channel and high channel). The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 percent of the selected span as is possible without being below 1 percent. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual. The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 percent of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

#### Test Procedures Used:

FCC KDB 971168 D01 V03r01 Section 4.2

#### Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW  $\geq 3 \times$  RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

Note: Reference test setup 1.

#### Test result

Please refer to AIT22122704FW2\_Appendix Data\_ LTE

## 5.4 Band Edge Compliance

The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyser, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel and high channel). In the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of 100kHz or 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed. The EUT emission bandwidth is measured as the width of the signal between two points, outside of which all emission are attenuated at least 26dB below the transmitter power. The video bandwidth of the spectrum analyzer was set at thrice the resolution bandwidth. Detector Mode was set to peak or peak hold power.

### Test Procedures Used

FCC KDB 971168 D01 V03r01 Section 6.0

#### Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3.  $RBW \geq 1\%$  of the emission bandwidth
4.  $VBW \geq 3 \times RBW$
5. Detector = RMS
6. Number of sweep points  $\geq 2 \times \text{Span}/RBW$
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Note: Reference test setup 1.

### Test result

Please refer to AIT22122704FW2\_Appendix Data\_ LTE

## 5.5 Spurious and Harmonic Emissions at Antenna Terminal

The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyzer, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel and high channel). The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

### Test Procedures Used

FCC KDB 971168 D01 V03r01

### Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least  $10 \times$  the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Note: Reference test setup 1.

### Test result

Please refer to AIT22122704FW2\_Appendix Data\_ LTE

## 5.6 Field Strength of Spurious Radiation

### PROVISIONS APPLICABLE:

(A) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least  $43 + 10\log(P)$  dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least  $43 + 10\log(P)$  dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm.

At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

(B) For specific criteria, please refer to the description in section 10.2 of the report for corresponding evaluation.

### MEASUREMENT PROCEDURE:

- 1). The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2). Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3). The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4). For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5). Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6). For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7). When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8). If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9). For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit

(that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

10). In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

11). For spurious emissions above 1GHz, a horn antenna is substituted in place of the EUT.

The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The spurious emissions is calculated by the following formula;

$$\text{Result(dBm)} = \text{Pg(dBm)} + \text{Factor(dB)}$$

$$\text{Factor(dB)} = \text{Ant Gain(dB)} - \text{Cable Loss(dB)} + \text{Power Splitter(dB)} \text{ (Above 1GHz)}$$

$$\text{Factor(dB)} = \text{Ant Gain(dB)} - \text{Cable Loss(dB)} \text{ (Below 1GHz)}$$

Where: Pg is the generator output power into the substitution antenna.

If the fundamental frequency is below 1GHz, RF output power has been converted to EIRP.

$$\text{EIRP(dBm)} = \text{ERP(dBm)} + 2.15$$

Examples of Factor parameters for testing radiation spurious:

| FrequencyRange(MHz) | Factor(dB) |
|---------------------|------------|
| 30-500              | 6.18       |
| 500-1000            | 9.37       |
| 1000-1500           | 27.56      |
| 1500-2000           | 28.27      |
| 2000-3000           | 29.45      |
| 3000-5000           | 30.15      |
| 5000-10000          | 31.26      |
| 10000-15000         | 32.78      |
| 15000-20000         | 33.99      |
| Above 20GHz         | 35.04      |

### Test Procedures Used

FCC KDB 971168 D01 V03r01; ANSI/ C63.10

Note: Reference test setup 3.

## Test result

### LTEBand2\_TX Mode Lowchannel

| Frequency (MHz) | Polarity (H/V) | Emission Level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|----------------|----------------------|-------------|-------------|
| 5579.25         | V              | -41.10               | -13         | -28.1       |
| 3719.75         | V              | -39.74               | -13         | -26.74      |
| 694.83          | V              | -47.24               | -13         | -34.24      |
| 411.59          | V              | -49.75               | -13         | -36.75      |
| 5579.25         | H              | -39.01               | -13         | -26.01      |
| 3719.75         | H              | -40.84               | -13         | -27.84      |
| 694.83          | H              | -48.01               | -13         | -35.01      |
| 411.59          | H              | -49.76               | -13         | -36.76      |

### Middlechannel

| Frequency (MHz) | Polarity (H/V) | Emission Level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|----------------|----------------------|-------------|-------------|
| 5639.47         | V              | -40.22               | -13         | -27.22      |
| 3759.79         | V              | -39.16               | -13         | -26.16      |
| 884.96          | V              | -47.35               | -13         | -34.35      |
| 617.71          | V              | -48.50               | -13         | -35.5       |
| 5639.47         | H              | -48.20               | -13         | -35.2       |
| 3759.79         | H              | -40.84               | -13         | -27.84      |
| 884.96          | H              | -44.05               | -13         | -31.05      |
| 617.71          | H              | -47.89               | -13         | -34.89      |

### Highchannel

| Frequency (MHz) | Polarity (H/V) | Emission Level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|----------------|----------------------|-------------|-------------|
| 5699.97         | V              | -41.44               | -13         | -28.44      |
| 3799.71         | V              | -41.44               | -13         | -28.44      |
| 664.13          | V              | -46.95               | -13         | -33.95      |
| 524.88          | V              | -46.07               | -13         | -33.07      |
| 5699.97         | H              | -39.85               | -13         | -26.85      |
| 3799.71         | H              | -38.58               | -13         | -25.58      |
| 664.13          | H              | -47.63               | -13         | -34.63      |
| 524.88          | H              | -47.04               | -13         | -34.04      |

### LTE Band 4\_TX Mode Lowchannel

| Frequency (MHz) | Polarity (H/V) | Emission Level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|----------------|----------------------|-------------|-------------|
| 5159.43         | V              | -39.42               | -13         | -26.42      |
| 3439.68         | V              | -39.69               | -13         | -26.69      |
| 744.63          | V              | -44.68               | -13         | -31.68      |
| 527.67          | V              | -46.98               | -13         | -33.98      |
| 5159.43         | H              | -39.12               | -13         | -26.12      |
| 3439.68         | H              | -39.91               | -13         | -26.91      |
| 744.63          | H              | -46.34               | -13         | -33.34      |
| 527.67          | H              | -44.32               | -13         | -31.32      |

### Middlechannel

| Frequency (MHz) | Polarity (H/V) | Emission Level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|----------------|----------------------|-------------|-------------|
| 5197.15         | V              | -39.53               | -13         | -26.53      |
| 3464.74         | V              | -39.25               | -13         | -26.25      |
| 669.01          | V              | -45.32               | -13         | -32.32      |
| 512.00          | V              | -48.35               | -13         | -35.35      |
| 5197.15         | H              | -39.05               | -13         | -26.05      |
| 3464.74         | H              | -40.36               | -13         | -27.36      |
| 669.01          | H              | -46.96               | -13         | -33.96      |
| 512.00          | H              | -46.15               | -13         | -33.15      |

### Highchannel

| Frequency (MHz) | Polarity (H/V) | Emission Level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|----------------|----------------------|-------------|-------------|
| 5234.86         | V              | -38.37               | -13         | -25.37      |
| 3489.51         | V              | -39.93               | -13         | -26.93      |
| 710.28          | V              | -49.16               | -13         | -36.16      |
| 528.11          | V              | -48.04               | -13         | -35.04      |
| 5234.86         | H              | -39.50               | -13         | -26.5       |
| 3489.51         | H              | -38.12               | -13         | -25.12      |
| 710.28          | H              | -45.58               | -13         | -32.58      |
| 528.11          | H              | -45.61               | -13         | -32.61      |

### LTE Band 12\_TX Mode Lowchannel

| Frequency (MHz) | Polarity (H/V) | Emission Level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|----------------|----------------------|-------------|-------------|
| 2112.00         | V              | -27.48               | -13         | -14.48      |
| 1407.58         | V              | -34.68               | -13         | -21.68      |
| 657.89          | V              | -35.36               | -13         | -22.36      |
| 516.78          | V              | -31.98               | -13         | -18.98      |
| 2112.00         | H              | -26.22               | -13         | -13.22      |
| 1407.58         | H              | -34.68               | -13         | -21.68      |
| 657.89          | H              | -35.26               | -13         | -22.26      |
| 516.78          | H              | -36.19               | -13         | -23.19      |

### Middlechannel

| Frequency (MHz) | Polarity (H/V) | Emission Level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|----------------|----------------------|-------------|-------------|
| 2121.71         | V              | -27.91               | -13         | -14.91      |
| 1414.42         | V              | -34.63               | -13         | -21.63      |
| 650.79          | V              | -35.70               | -13         | -22.7       |
| 512.51          | V              | -32.71               | -13         | -19.71      |
| 2121.71         | H              | -26.91               | -13         | -13.91      |
| 1414.42         | H              | -34.95               | -13         | -21.95      |
| 650.79          | H              | -35.66               | -13         | -22.66      |
| 512.51          | H              | -36.29               | -13         | -23.29      |

### Highchannel

| Frequency (MHz) | Polarity (H/V) | Emission Level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|----------------|----------------------|-------------|-------------|
| 2132.76         | V              | -27.53               | -13         | -14.53      |
| 1421.95         | V              | -33.80               | -13         | -20.8       |
| 652.36          | V              | -35.67               | -13         | -22.67      |
| 591.85          | V              | -32.52               | -13         | -19.52      |
| 2132.76         | H              | -26.73               | -13         | -13.73      |
| 1421.95         | H              | -34.27               | -13         | -21.27      |
| 652.36          | H              | -35.82               | -13         | -22.82      |
| 591.85          | H              | -36.65               | -13         | -23.65      |

### LTE Band 13\_TX Mode Lowchannel

| Frequency (MHz) | Polarity (H/V) | Emission Level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|----------------|----------------------|-------------|-------------|
| 2110.50         | V              | -28.10               | -13         | -15.1       |
| 1406.79         | V              | -34.03               | -13         | -21.03      |
| 657.22          | V              | -35.19               | -13         | -22.19      |
| 516.06          | V              | -31.87               | -13         | -18.87      |
| 2110.50         | H              | -26.52               | -13         | -13.52      |
| 1406.79         | H              | -34.81               | -13         | -21.81      |
| 657.22          | H              | -35.40               | -13         | -22.4       |
| 516.06          | H              | -35.71               | -13         | -22.71      |

### Middlechannel

| Frequency (MHz) | Polarity (H/V) | Emission Level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|----------------|----------------------|-------------|-------------|
| 2121.63         | V              | -27.75               | -13         | -14.75      |
| 1414.25         | V              | -34.61               | -13         | -21.61      |
| 650.86          | V              | -35.76               | -13         | -22.76      |
| 511.95          | V              | -32.64               | -13         | -19.64      |
| 2121.63         | H              | -26.58               | -13         | -13.58      |
| 1414.25         | H              | -35.08               | -13         | -22.08      |
| 650.86          | H              | -35.95               | -13         | -22.95      |
| 511.95          | H              | -35.72               | -13         | -22.72      |

### Highchannel

| Frequency (MHz) | Polarity (H/V) | Emission Level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|----------------|----------------------|-------------|-------------|
| 2132.24         | V              | -28.15               | -13         | -15.15      |
| 1421.44         | V              | -34.44               | -13         | -21.44      |
| 653.22          | V              | -35.50               | -13         | -22.5       |
| 591.97          | V              | -32.41               | -13         | -19.41      |
| 2132.24         | H              | -26.96               | -13         | -13.96      |
| 1421.44         | H              | -34.94               | -13         | -21.94      |
| 653.22          | H              | -35.57               | -13         | -22.57      |
| 591.97          | H              | -35.98               | -13         | -22.98      |

## 5.7 Frequency Stability / Temperature Variation

The frequency stability of the transmitter is measured by:

- a.) Temperature: The temperature is varied from -10°C to +50°C in 10°C increments using an environmental chamber.
- b.) Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer. Specification – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm ) of the center frequency.

Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -10°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

### Test Procedures Used

Frequency stability testing is performed in accordance with the guidelines of FCC KDB 971168 D01 V03r01; ANSI/ C63.10

Note: Reference test setup 2.

### Test result

Please refer to AIT22122704FW2\_Appendix Data\_ LTE.

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(END OF REPORT)