

## **FCC 15.407 U-NII & RSS-247 Issue 2 5GHz Test Report**

**for**

**LG Electronics USA**

**111 Sylvan Avenue, North Building,  
Englewood Cliffs, NJ 07632**

**Product Name : Wireless Audio Module**  
**Model Name : WL1BKR23**  
**Brand : LG**  
**FCC ID : BEJ-WL1BKR23**  
**IC : 2703H-WL1BKR23**

**Prepared by: : AUDIX Technology Corporation,  
EMC Department**



The test report is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.

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|                                                   |           |
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## TEST REPORT

Applicant : LG Electronics USA  
Manufacturer : LG Electronics Inc.  
Factory : Shenzhen Shi Xinzhongxin Technology Co., Ltd.  
EUT Description  
(1) Product : Wireless Audio Module  
(2) Model : WL1BKR23  
(3) Brand : LG  
(4) Power Supply : DC 3.3V

Applicable Standards:

Title 47 FCC CFR Part 15 Subpart E  
RSS-Gen (Issue 5), Amendment 2, February 2021  
RSS-247 (Issue 2), February 2017

**Audix Technology Corp.** tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

**Audix Technology Corp.** does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2023. 03. 07

Reviewed by:

Sunnie Huang

(Sunnie Huang/Administrator)

Approved by:

Johnny Hsueh

(Johnny Hsueh/Section Manager)

## 1. REVISION RECORD OF TEST REPORT

| Edition No | Issued Date  | Revision Summary | Report Number |
|------------|--------------|------------------|---------------|
| 0          | 2023. 03. 07 | Original Report  | EM-F230125    |

## 2. SUMMARY OF TEST RESULTS

| Rule                                                                 |                                                          | Description                                                                           | Results           |
|----------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------|
| FCC                                                                  | IC                                                       |                                                                                       |                   |
| 15.207                                                               | RSS-Gen §8.8                                             | Conducted Emission                                                                    | <b>PASS</b>       |
| 15.205/<br>15.209                                                    | RSS-Gen §8.9/RSS-247<br>§6.2.1.2/6.2.2.2/6.2.3.2/6.2.4.2 | Undesirable Emissions Limits:<br>Radiated Band Edge and<br>Radiated Spurious Emission | <b>PASS</b>       |
| 15.407(a)(5)/<br>15.407(e)                                           | RSS-247<br>§6.2.1.1/6.2.2.1/6.2.3.1/6.2.4.1              | Emission/Occupied Bandwidth                                                           | <b>PASS</b>       |
| 15.407(a)                                                            | RSS-247<br>§6.2.1.1/6.2.2.1/6.2.3.1/6.2.4.1              | Maximum Output Power                                                                  | <b>PASS</b>       |
| 15.407(b)                                                            | RSS-247<br>§6.2.1.2/6.2.2.2/6.2.3.2/6.2.4.2              | Conducted Band Edges                                                                  | <b>N/A</b>        |
| 15.407(a)                                                            | RSS-247<br>§6.2.1.1/6.2.2.1/6.2.3.1/6.2.4.1              | Power Spectral Density                                                                | <b>PASS</b>       |
| 15.407                                                               | ---                                                      | Frequency Stability                                                                   | <b>PASS</b>       |
| 15.407(h)(2)                                                         | RSS-247<br>§6.3                                          | Dynamic Frequency<br>Selection(DFS)                                                   | <b>N/A</b>        |
| 15.203                                                               | RSS-Gen §6.8                                             | Antenna Requirement                                                                   | <b>Compliance</b> |
| Note: The uncertainties value is not used in determining the result. |                                                          |                                                                                       |                   |

### 3. GENERAL INFORMATION

#### 3.1. Description of Application

|              |                                                                                                                                                                                                                        |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant    | LG Electronics USA<br>111 Sylvan Avenue, North Building, Englewood Cliffs, NJ 07632                                                                                                                                    |
| Manufacturer | LG Electronics Inc.<br>222, LG-ro, Jinwi-myeon Pyeongtaek-Si, Gyeonggi-Do, 17709 Republic of Korea                                                                                                                     |
| Factory      | Shenzhen Shi Xinzhongxin Technology Co., Ltd<br>Floor1~3 of Block1, Dong Huan Industrial Park, NanPu Road No.293,<br>Shang Liao Community, Xin Qiao Street, BaoAn District, Shenzhen City,<br>Guangdong Province, PRC. |
| Product      | Wireless Audio Module                                                                                                                                                                                                  |
| Model        | WL1BKR23                                                                                                                                                                                                               |
| Brand        | LG                                                                                                                                                                                                                     |

### 3.2. Description of EUT

|                        |                                                                                                                                                                                                                                                                                                                                              |                         |          |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------|
| Test Model             | WL1BKR23                                                                                                                                                                                                                                                                                                                                     |                         |          |
| Serial Number          | N/A                                                                                                                                                                                                                                                                                                                                          |                         |          |
| Power Rating           | DC 3.3V                                                                                                                                                                                                                                                                                                                                      |                         |          |
| Software Version       | V1.1                                                                                                                                                                                                                                                                                                                                         |                         |          |
| Hardware version       | V1.3                                                                                                                                                                                                                                                                                                                                         |                         |          |
| RF Features            | GFSK                                                                                                                                                                                                                                                                                                                                         |                         |          |
| Transmit Type          | 1T1R                                                                                                                                                                                                                                                                                                                                         |                         |          |
| Device Category        | <input type="checkbox"/> Outdoor Access Point<br><input type="checkbox"/> Fixed point-to-point Access Point<br><input type="checkbox"/> Indoor Access Point<br><input checked="" type="checkbox"/> Mobile and Portable client device (For FCC 15.407 U-NII)<br><input checked="" type="checkbox"/> LE-LAN (Indoor only)(For RSS-247 Issue 2) |                         |          |
| Test Sample            | Sample No.                                                                                                                                                                                                                                                                                                                                   | Test Item               | Firmware |
|                        | 03                                                                                                                                                                                                                                                                                                                                           | AC Conduction, Radiated | N/A      |
|                        | 02                                                                                                                                                                                                                                                                                                                                           | RF Conducted            | N/A      |
| Sample Status          | Trial sample                                                                                                                                                                                                                                                                                                                                 |                         |          |
| Date of Receipt        | 2023. 01. 13                                                                                                                                                                                                                                                                                                                                 |                         |          |
| Date of Test           | 2023. 01. 30 ~ 03. 07                                                                                                                                                                                                                                                                                                                        |                         |          |
| Interface Ports of EUT | None                                                                                                                                                                                                                                                                                                                                         |                         |          |
| Accessories Supplied   | None                                                                                                                                                                                                                                                                                                                                         |                         |          |

### 3.3. Reference Test Guidance

KDB 789033 D02 General UNII Test Procedures New Rules v02r01  
ANSI C63.10:2013

### 3.4. Antenna Information

| No. | Antenna Part Number  | Manufacturer                                       | Antenna Type         | Frequency (MHz) | Gain (dBi) |
|-----|----------------------|----------------------------------------------------|----------------------|-----------------|------------|
| 1.  | Antenna_L<br>(ANT 1) | SHENZHEN<br>XINZHONGXIN<br>TECHNOLOGY<br>CO., LTD. | PCB Printing Antenna | 5720.0          | 1.73       |
|     |                      |                                                    |                      | 5740.0          | 1.85       |
|     |                      |                                                    |                      | 5760.0          | 2.36       |
|     |                      |                                                    |                      | 5780.0          | 1.45       |
|     |                      |                                                    |                      | 5800.0          | 2.70       |
|     |                      |                                                    |                      | 5820.0          | 1.78       |
|     |                      |                                                    |                      | 5840.0          | 3.39       |
|     |                      |                                                    |                      | 5860.0          | 2.34       |
| 2.  | Antenna_R<br>(ANT 2) | SHENZHEN<br>XINZHONGXIN<br>TECHNOLOGY<br>CO., LTD. | PCB Printing Antenna | 5720.0          | 0.96       |
|     |                      |                                                    |                      | 5740.0          | 1.67       |
|     |                      |                                                    |                      | 5760.0          | 1.79       |
|     |                      |                                                    |                      | 5780.0          | 2.73       |
|     |                      |                                                    |                      | 5800.0          | 2.25       |
|     |                      |                                                    |                      | 5820.0          | 0.84       |
|     |                      |                                                    |                      | 5840.0          | 2.08       |
|     |                      |                                                    |                      | 5860.0          | 1.64       |

### 3.5. EUT Specifications Assessed in Current Report

| Modulation | U-NII Band | Fundamental Range (MHz) | Channel Number | Data Rate |
|------------|------------|-------------------------|----------------|-----------|
| GFSK       | 3          | 5730-5848               | 119            | 2Mbps     |

| Channel List   |                 |                |                 |                |                 |                |                 |                |                 |
|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|
| U-NII Band 3   |                 |                |                 |                |                 |                |                 |                |                 |
| Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) |
| 0              | 5730            | 24             | 5754            | 48             | 5778            | 72             | 5802            | 96             | 5826            |
| 1              | 5731            | 25             | 5755            | 49             | 5779            | 73             | 5803            | 97             | 5827            |
| 2              | 5732            | 26             | 5756            | 50             | 5780            | 74             | 5804            | 98             | 5828            |
| 3              | 5733            | 27             | 5757            | 51             | 5781            | 75             | 5805            | 99             | 5829            |
| 4              | 5734            | 28             | 5758            | 52             | 5782            | 76             | 5806            | 100            | 5830            |
| 5              | 5735            | 29             | 5759            | 53             | 5783            | 77             | 5807            | 101            | 5831            |
| 6              | 5736            | 30             | 5760            | 54             | 5784            | 78             | 5808            | 102            | 5832            |
| 7              | 5737            | 31             | 5761            | 55             | 5785            | 79             | 5809            | 103            | 5833            |
| 8              | 5738            | 32             | 5762            | 56             | 5786            | 80             | 5810            | 104            | 5834            |
| 9              | 5739            | 33             | 5763            | 57             | 5787            | 81             | 5811            | 105            | 5835            |
| 10             | 5740            | 34             | 5764            | 58             | 5788            | 82             | 5812            | 106            | 5836            |
| 11             | 5741            | 35             | 5765            | 59             | 5789            | 83             | 5813            | 107            | 5837            |
| 12             | 5742            | 36             | 5766            | 60             | 5790            | 84             | 5814            | 108            | 5838            |
| 13             | 5743            | 37             | 5767            | 61             | 5791            | 85             | 5815            | 109            | 5839            |
| 14             | 5744            | 38             | 5768            | 62             | 5792            | 86             | 5816            | 110            | 5840            |
| 15             | 5745            | 39             | 5769            | 63             | 5793            | 87             | 5817            | 111            | 5841            |
| 16             | 5746            | 40             | 5770            | 64             | 5794            | 88             | 5818            | 112            | 5842            |
| 17             | 5747            | 41             | 5771            | 65             | 5795            | 89             | 5819            | 113            | 5843            |
| 18             | 5748            | 42             | 5772            | 66             | 5796            | 90             | 5820            | 114            | 5844            |
| 19             | 5749            | 43             | 5773            | 67             | 5797            | 91             | 5821            | 115            | 5845            |
| 20             | 5750            | 44             | 5774            | 68             | 5798            | 92             | 5822            | 116            | 5846            |
| 21             | 5751            | 45             | 5775            | 69             | 5799            | 93             | 5823            | 117            | 5847            |
| 22             | 5752            | 46             | 5776            | 70             | 5800            | 94             | 5824            | 118            | 5848            |
| 23             | 5753            | 47             | 5777            | 71             | 5801            | 95             | 5825            |                |                 |

Note: Test modes are presented at section 3.7.

Only the duty cycle of 5846 to 5848 MHz is 1 and the bandwidth is 1.6 MHz, the duty cycle of other channels is 0.226 and the bandwidth is 3.9MHz. Please see section 3.7 and appendix A for more information.

### 3.6. Description of Key Components

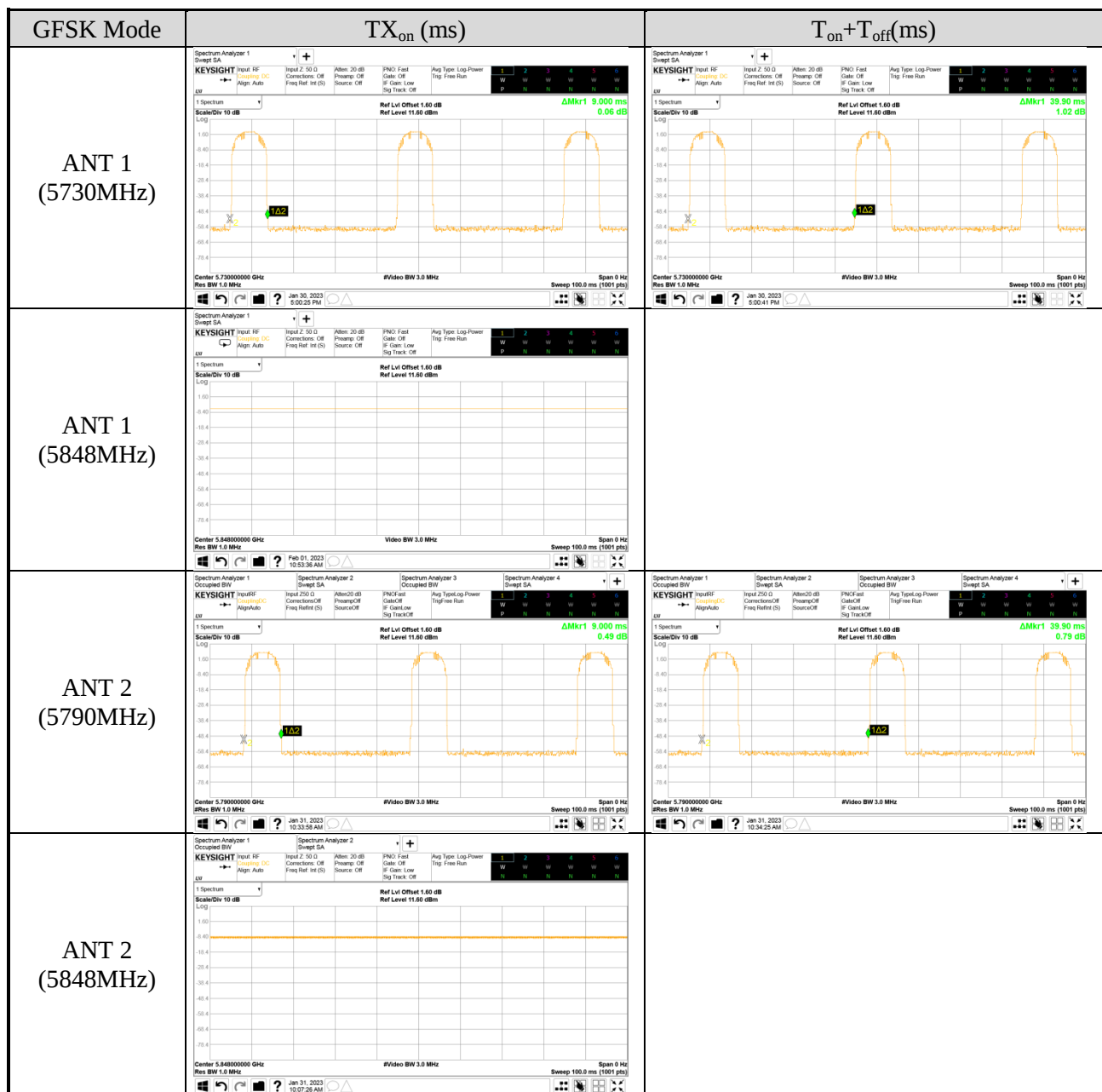
None

## 3.7. Test Configuration

| GFSK Mode |         | TX <sub>on</sub><br>(ms) | TX <sub>on+off</sub><br>(ms) | Duty Cycle<br>(x) | Duty Cycle Factor [10log(1/x)]<br>(dB) |
|-----------|---------|--------------------------|------------------------------|-------------------|----------------------------------------|
| ANT 1     | 5730MHz | 9                        | 39.9                         | 0.226             | 6.459                                  |
|           | 5848MHz | N/A <sup>Note 2</sup>    | N/A <sup>Note 2</sup>        | 1                 | N/A                                    |
| ANT 2     | 5790MHz | 9                        | 39.9                         | 0.226             | 6.459                                  |
|           | 5848MHz | N/A <sup>Note 2</sup>    | N/A <sup>Note 2</sup>        | 1                 | N/A                                    |

Note: 1. When duty cycle is less than 98% (0.98) that duty cycle factor 10log(1/x) is needed to add in conducted test items measured in average detector.

2. N/A represent the duty cycle is 100%, TX<sub>on</sub> and TX<sub>on+off</sub> cannot be measured.



| AC Conduction    |  |
|------------------|--|
| Normal Operation |  |

| Item               |                                                                  | Modulation | Data Rate | Antenna | Test Frequency (MHz)      |
|--------------------|------------------------------------------------------------------|------------|-----------|---------|---------------------------|
| Radiated Test Case | Radiated Spurious Emission (30MHz~1GHz) <sup>Note1 &amp; 2</sup> | GFSK       | 2 Mbps    | ANT 1   | 5845                      |
|                    |                                                                  |            |           | ANT 2   | 5790                      |
|                    | Radiated Band Edge                                               | GFSK       | 2 Mbps    | ANT 1   | 5730 / 5848               |
|                    |                                                                  |            |           | ANT 2   | 5730 / 5848               |
|                    | Radiated Spurious Emission (Above 1GHz)                          | GFSK       | 2 Mbps    | ANT 1   | 5730 / 5790 / 5845 / 5848 |
|                    |                                                                  |            |           | ANT 2   | 5730 / 5790 / 5845 / 5848 |

| Item                |                             | Modulation | Data Rate | Antenna | Test Frequency (MHz)                    |
|---------------------|-----------------------------|------------|-----------|---------|-----------------------------------------|
| Conducted Test Case | Emission/Occupied Bandwidth | GFSK       | 2 Mbps    | ANT 1   | 5730 / 5790 / 5845 / 5846 / 5847 / 5848 |
|                     |                             |            |           | ANT 2   | 5730 / 5790 / 5845 / 5846 / 5847 / 5848 |
|                     | Maximum output power        | GFSK       | 2 Mbps    | ANT 1   | 5730 / 5790 / 5845 / 5846 / 5847 / 5848 |
|                     |                             |            |           | ANT 2   | 5730 / 5790 / 5845 / 5846 / 5847 / 5848 |
|                     | Power spectral density      | GFSK       | 2 Mbps    | ANT 1   | 5730 / 5790 / 5845 / 5846 / 5847 / 5848 |
|                     |                             |            |           | ANT 2   | 5730 / 5790 / 5845 / 5846 / 5847 / 5848 |

Note 1: ☐ Mobile Device ☒ Portable Device,

and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow: ☒ Lie ☐ Side ☐ Stand

Note 2: Low, mid, and high channels were measured, only the worst channel was presented in this report.

### 3.8. Output Power Setting

| Mode | U-NII Band | Antenna | Centre Frequency (MHz) | POWER SETTING |
|------|------------|---------|------------------------|---------------|
| GFSK | 3          | ANT 1   | 5730                   | Default       |
|      |            |         | 5790                   | Default       |
|      |            |         | 5848                   | Default       |
|      |            | ANT 2   | 5730                   | Default       |
|      |            |         | 5790                   | Default       |
|      |            |         | 5848                   | Default       |

### 3.9. Tested Supporting System List

#### 3.9.1. Support Peripheral Unit

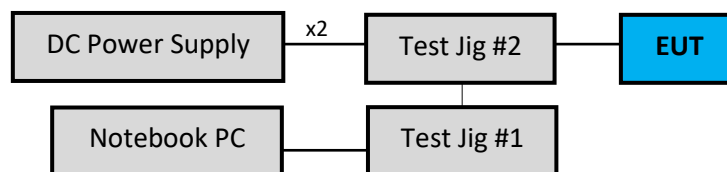
| No. | Product         | Brand    | Model No. | Serial No. | Approval |
|-----|-----------------|----------|-----------|------------|----------|
| 1.  | Test Jig #1     | N/A      | N/A       | N/A        | N/A      |
| 2.  | Test Jig #2     | N/A      | N/A       | N/A        | N/A      |
| 3.  | DC Power Supply | TOP WARD | 6303A     | N/A        | N/A      |
| 4.  | Notebook PC     | ASUS     | E403SA    | N/A        | N/A      |

#### 3.9.2. Cable Lists

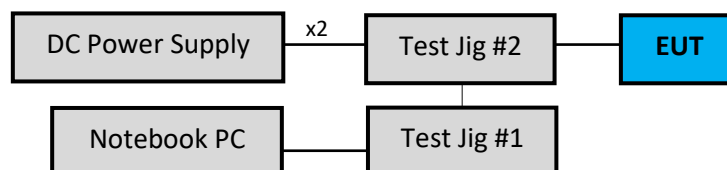
| No. | Cable Description Of The Above Support Units                                                                  |
|-----|---------------------------------------------------------------------------------------------------------------|
| 1.  | USB Cable: Unshielded, Undetectable, 0.5m, Bonded a ferrite core<br>USB Cable: Unshielded, Undetectable, 0.3m |
| 2.  | Data Cable: Unshielded, Undetectable, 0.05m                                                                   |
| 3.  | DC Power Cordx2: Unshielded, Undetectable, 1.0m                                                               |
| 4.  | Adapter: ASUS, M/N AD890526<br>DC Power Cord : Unshielded, Undetachable, 2.0m                                 |

### 3.10. Setup Configuration

#### 3.10.1. EUT Configuration for Power Line & Radiated Emission



#### 3.10.2. EUT Configuration for RF Conducted Test Items



### 3.11. Operating Condition of EUT

Test program “Uart Assist.exe” is used for enabling EUT RF function under continues transmitting and choosing channel.

### 3.12. Description of Test Facility

|                   |                                                                                                                                                                                                                                                                                                                                        |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name of Test Firm | Audix Technology Corporation / EMC Department<br>No. 491, Zhongfu Rd., Linkou Dist., New Taipei City 244, Taiwan<br>Tel: +886-2-26092133<br>Fax: +886-2-26099303<br>Website : <a href="http://www.audixtech.com">www.audixtech.com</a><br>Contact e-mail: <a href="mailto:attemc_report@audixtech.com">attemc_report@audixtech.com</a> |
| Accreditations    | The laboratory is accredited by following organizations under ISO/IEC 17025:2017<br>(1) NVLAP(USA)<br>NVLAP Lab Code 200077-0<br>(2) TAF(Taiwan)<br>No. 1724                                                                                                                                                                           |
| Test Facilities   | FCC OET Designation Number under APEC MRA by NCC is : TW1724<br>ISED CAB Identifier Number under APEC TEL MRA by NCC is TW1724<br>(1) No.8 Shielded Room<br>(2) No.1 3m Semi Anechoic Chamber                                                                                                                                          |

### 3.13.Measurement Uncertainty

| Test Items/Facilities |                                     |                               | Frequency Range                | Uncertainty |
|-----------------------|-------------------------------------|-------------------------------|--------------------------------|-------------|
| Conduction Test       | <input type="checkbox"/>            | No. 7 Shielded Room           | 30MHz-200MHz, 3m, Horizontal   | ±3.6dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Horizontal | ±4.3dB      |
|                       | <input checked="" type="checkbox"/> | No. 8 Shielded Room           | 30MHz-200MHz, 3m, Vertical     | ±4.4dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Vertical   | ±4.8dB      |
| Radiation Test        | <input checked="" type="checkbox"/> | No.1 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal   | ±3.6dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Horizontal | ±4.3dB      |
|                       |                                     |                               | 30MHz-200MHz, 3m, Vertical     | ±4.4dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Vertical   | ±4.8dB      |
|                       |                                     |                               | 1GHz-6GHz, 3m                  | ±4.8dB      |
|                       |                                     |                               | 6GHz-18GHz, 3m                 | ±4.5dB      |
|                       | <input type="checkbox"/>            | No.3 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal   | ±3.7dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Horizontal | ±4.1dB      |
|                       |                                     |                               | 30MHz-200MHz, 3m, Vertical     | ±4.6dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Vertical   | ±4.9dB      |
|                       |                                     |                               | 1GHz-6GHz, 3m                  | ±4.7dB      |
|                       |                                     |                               | 6GHz-18GHz, 3m                 | ±4.1dB      |
|                       | <input type="checkbox"/>            | No.4 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal   | ±4.0dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Horizontal | ±4.4dB      |
|                       |                                     |                               | 30MHz-200MHz, 3m, Vertical     | ±4.7dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Vertical   | ±4.5dB      |
|                       |                                     |                               | 1GHz-6GHz, 3m                  | ±4.8dB      |
|                       |                                     |                               | 6GHz-18GHz, 3m                 | ±4.5dB      |
|                       | <input type="checkbox"/>            | No.5 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal   | ±4.3dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Horizontal | ±4.2dB      |
|                       |                                     |                               | 30MHz-200MHz, 3m, Vertical     | ±4.8dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Vertical   | ±4.7dB      |
|                       |                                     |                               | 1GHz-6GHz, 3m                  | ±4.6dB      |
|                       |                                     |                               | 6GHz-18GHz, 3m                 | ±4.4dB      |
|                       | Radiated emissions (18GHz-40GHz)    |                               | 18GHz-40GHz, 3m                | ±3.4dB      |

Remark : Uncertainty =  $kuc(y)$

| Test Items             | Uncertainty |
|------------------------|-------------|
| Bandwidth              | ± 0.2kHz    |
| Maximum output power   | ± 0.33dB    |
| Power spectral density | ± 0.13dB    |

## 4. MEASUREMENT EQUIPMENT LIST

### 4.1. Conducted Emission Measurement

| Item | Type                       | Manufacturer | Model No. | Serial No. | Cal. Date  | Cal. Interval |
|------|----------------------------|--------------|-----------|------------|------------|---------------|
| 1.   | Test Receiver              | R&S          | ESR3      | 101774     | 2023.01.11 | 1 Year        |
| 2.   | A.M.N.                     | R&S          | ENV432    | 101567     | 2022.05.26 | 1 Year        |
| 3.   | L.I.S.N.                   | Kyoritsu     | KNW-407   | 8-855-9    | 2022.12.19 | 1 Year        |
| 4.   | Pulse Limiter              | R&S          | ESH3-Z2   | 100354     | 2022.12.14 | 1 Year        |
| 5.   | Digital Thermo-Hygro Meter | iMax         | HTC-1     | No.8 S/R   | 2022.04.14 | 1 Year        |
| 6.   | Coaxial Cable              | Yeida        | RG/58AU   | CE-08      | 2022.09.07 | 1 Year        |
| 7.   | Test Software              | Audix        | e3        | V9 18621a  | N.C.R.     | N.C.R.        |

### 4.2. Radiated Emission Measurement

| Item | Type                         | Manufacturer | Model No.    | Serial No.  | Cal. Date  | Cal. Interval |
|------|------------------------------|--------------|--------------|-------------|------------|---------------|
| 1.   | Spectrum Analyzer            | Agilent      | N9010A-526   | MY53400071  | 2022.08.24 | 1 Year        |
| 2.   | Spectrum Analyzer            | Keysight     | N9010B-544   | MY55460198  | 2022.04.08 | 1 Year        |
| 3.   | Test Receiver                | R&S          | ESCS30       | 100039      | 2022.06.01 | 1 Year        |
| 4.   | Microwave Amplifier          | HP           | 8447D        | 2944A06305  | 2022.12.29 | 1 Year        |
| 5.   | Microwave Amplifier          | HP           | 8449B        | 3008A01284  | 2022.06.01 | 1 Year        |
| 6.   | Microwave Amplifier          | Keysight     | 83051A       | MY56480113  | 2022.09.07 | 1 Year        |
| 7.   | Bilog Antenna                | TESEQ        | CBL6112D     | 33821       | 2022.07.01 | 1 Year        |
| 8.   | Double-Ridged Waveguide Horn | EMCO         | 3115         | 9112-3775   | 2022.05.18 | 1 Year        |
| 9.   | Horn Antenna                 | COM-POWER    | AH-840       | 101092      | 2022.12.30 | 1 Year        |
| 10.  | 5G Notch Filter              | Microwave    | H3G018G1     | 484796      | 2022.07.23 | 1 Year        |
| 11.  | Coaxial Cable                | MIYAZAKI     | 5D2W         | RE-11       | 2023.01.07 | 1 Year        |
| 12.  | Coaxial Cable                | HUBER+SUHNER | SUCOFLEX 106 | RE-14       | 2023.01.07 | 1 Year        |
| 13.  | Coaxial Cable                | HUBER+SUHNER | SUCOFLEX 102 | RE-30       | 2022.08.22 | 1 Year        |
| 14.  | Digital Thermo-Hygro Meter   | iMax         | HTC-1        | No.1 3m A/C | 2022.04.14 | 1 Year        |
| 15.  | Test Software                | Audix        | e3           | V9 18621a   | N.C.R.     | N.C.R.        |

### 4.3. RF Conducted Measurement

| Item | Type                       | Manufacturer | Model No.  | Serial No. | Cal. Date  | Cal. Interval |
|------|----------------------------|--------------|------------|------------|------------|---------------|
| 1.   | Spectrum Analyzer          | Keysight     | N9010B-544 | MY55460198 | 2022.04.08 | 1 Year        |
| 2.   | Power Meter                | Anritsu      | ML2495A    | 1145008    | 2022.06.22 | 1 Year        |
| 3.   | Power Sensor               | Anritsu      | MA2411B    | 1126096    | 2022.06.22 | 1 Year        |
| 4.   | Digital Thermo-Hygro Meter | iMax         | HTC-1      | RF-03      | 2022.04.14 | 1 Year        |

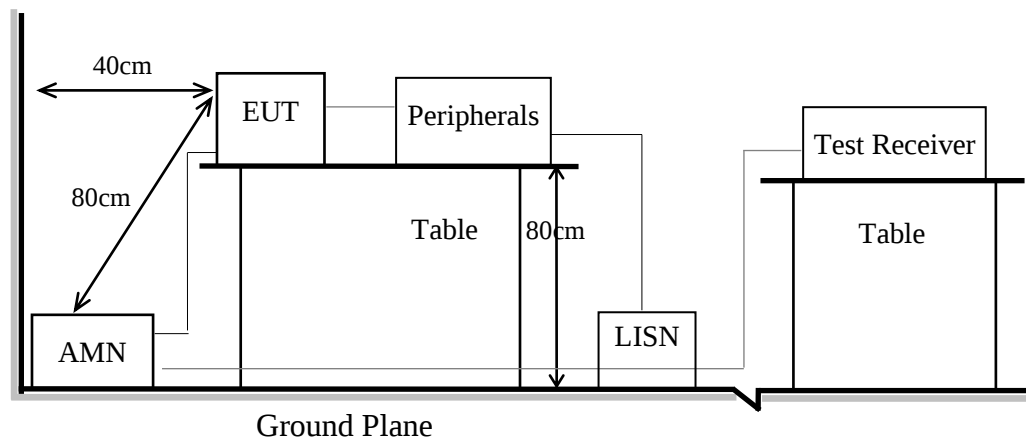
## 5. CONDUCTED EMISSION

### 5.1. Block Diagram of Test Setup

#### 5.1.1. Block Diagram of EUT

Indicated as section 3.10

#### 5.1.2. Shielded Room Setup Diagram



### 5.2. Conducted Emission Limit

| Frequency       | Conducted Limit    |                    |
|-----------------|--------------------|--------------------|
|                 | Quasi-Peak Level   | Average Level      |
| 150kHz ~ 500kHz | 66 ~ 56 dB $\mu$ V | 56 ~ 46 dB $\mu$ V |
| 500kHz ~ 5MHz   | 56 dB $\mu$ V      | 46 dB $\mu$ V      |
| 5MHz ~ 30MHz    | 60 dB $\mu$ V      | 50 dB $\mu$ V      |

Remark1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

### 5.3. Test Procedure

- 5.3.1. To set up the EUT as indicated in ANSI C63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.
- 5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).
- 5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)
- 5.3.4. Checking frequency range from 150kHz to 30 MHz and record the emission which does not have 20 dB below limit.

### 5.4. Test Results

Please refer to Appendix A.

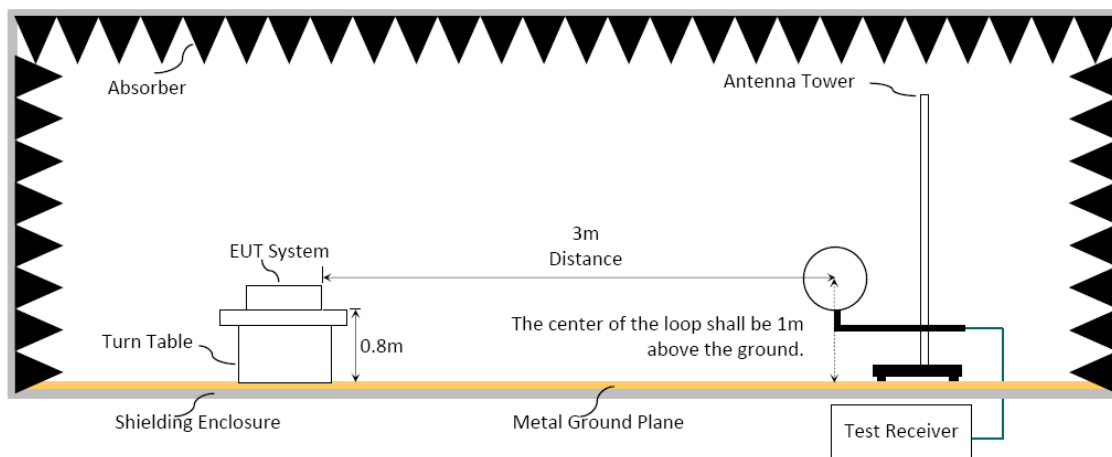
## 6. RADIATED EMISSION

### 6.1. Block Diagram of Test Setup

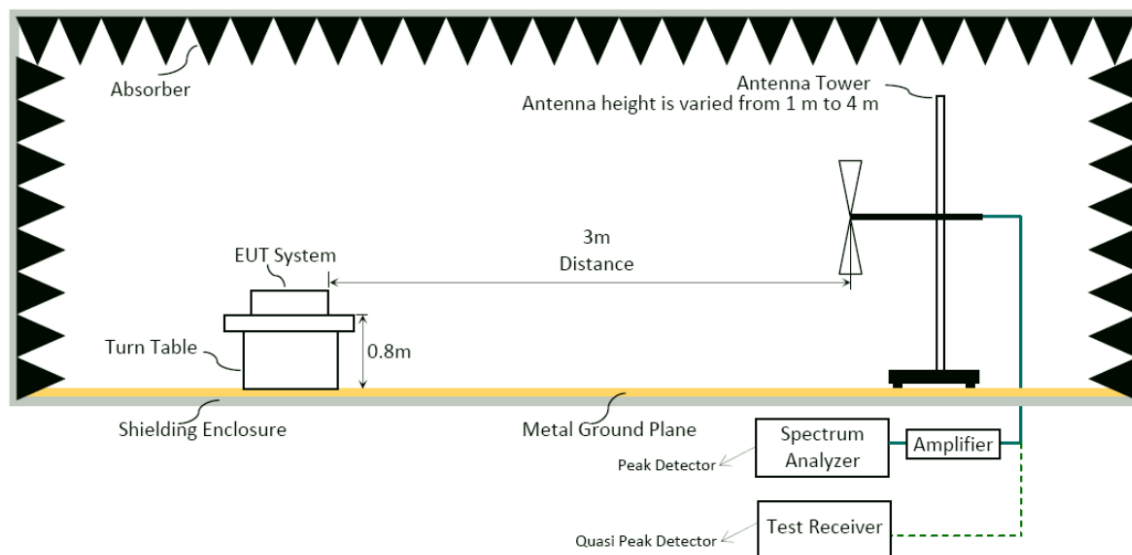
#### 6.1.1. Block Diagram of EUT

Indicated as section 3.10

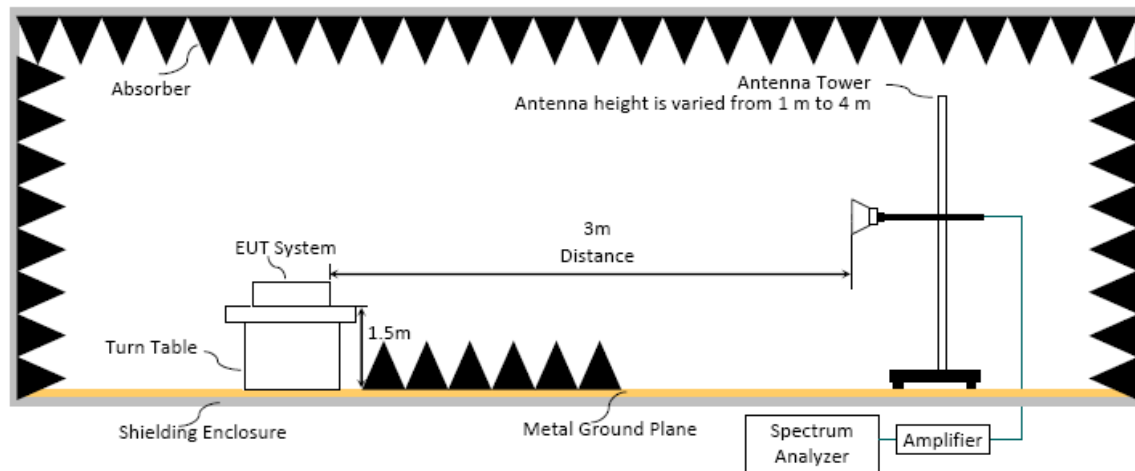
#### 6.1.2. Setup Diagram for 9kHz-30MHz



#### 6.1.3. Setup Diagram for 30-1000MHz



## 6.1.4. Setup Diagram for above 1GHz



## 6.2. Radiated Emission Limits

Radiated emissions fall in restricted bands, as defined in Section 15.205 must be in compliance with the radiated emission limits specified in 15.209 as below.

### 6.2.1. General Limit

| Frequency (MHz) | Distance(m) | Limits                                                  |             |
|-----------------|-------------|---------------------------------------------------------|-------------|
|                 |             | dB $\mu$ V/m                                            | $\mu$ V/m   |
| 0.009 - 0.490   | 300         | 67.6-20 log f(kHz)                                      | 2400/f kHz  |
| 0.490 - 1.705   | 30          | 87.6-20 log f(kHz)                                      | 24000/f kHz |
| 1.705 - 30      | 30          | 29.5                                                    | 30          |
| 30 - 88         | 3           | 40.0                                                    | 100         |
| 88- 216         | 3           | 43.5                                                    | 150         |
| 216- 960        | 3           | 46.0                                                    | 200         |
| Above 960       | 3           | 54.0                                                    | 500         |
| Above 1000      | 3           | 74.0 dB $\mu$ V/m (Peak)<br>54.0 dB $\mu$ V/m (Average) |             |

Remark : (1) dB $\mu$ V/m = 20 log ( $\mu$ V/m)

(2) The tighter limit applies to the edge between two frequency bands.

(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

(4) Fundamental and emission fall within operation band are exempted from this section.

(5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

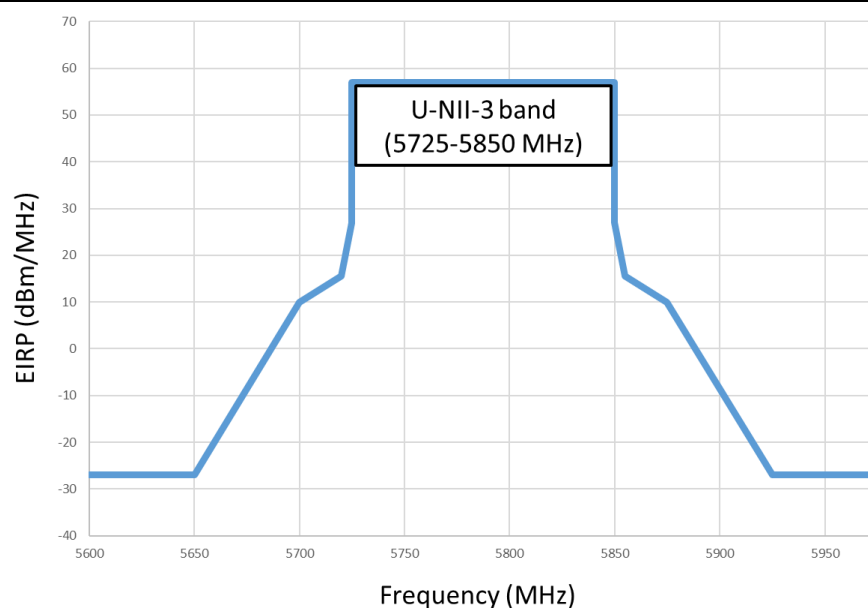
### 6.2.2. Limit for non-restricted frequency above 1 GHz

| Frequency Band (MHz) | E.I.R.P. Limit | Field Strength Limit at 3 m |
|----------------------|----------------|-----------------------------|
| 5150 to 5250         | -27 dBm        | 68.2 dB $\mu$ V/m           |
| 5250 to 5350         |                | 68.2 dB $\mu$ V/m           |
| 5470 to 5725         |                | 68.2 dB $\mu$ V/m           |

Note: Field Strength at 3 m = E.I.R.P. + 95.2 dB

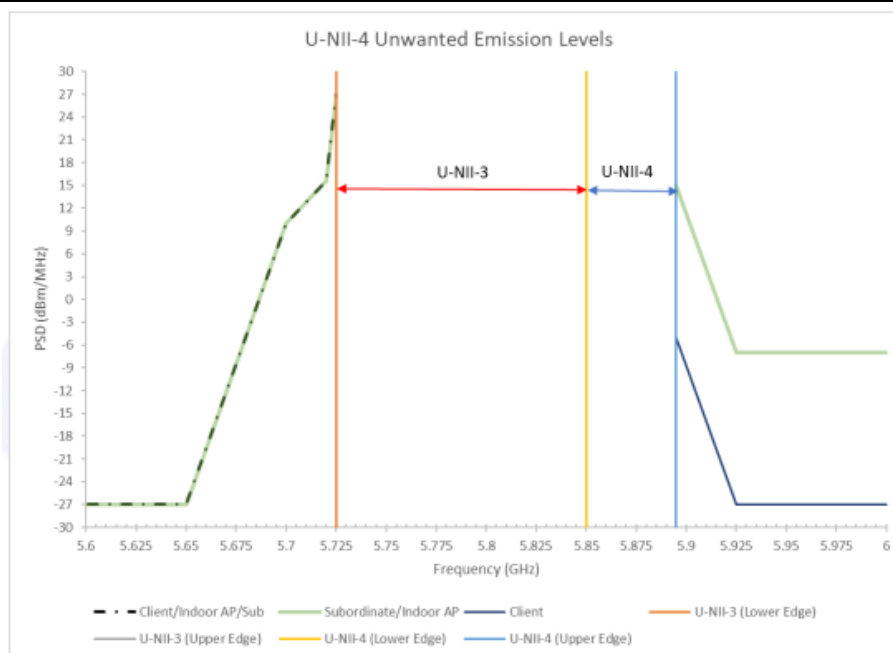
### For FCC 15.407 U-NII

| Frequency Band (MHz) | Field Strength Limit at 3 m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5725 to 5850         | <input checked="" type="checkbox"/> 15.407(b)(4)(i) All emissions shall be limited to a level of 68.2 dB $\mu$ V/m at 75 MHz or more above or below the band edge increasing linearly to 105.2 dB $\mu$ V/m at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 110.8 dB $\mu$ V/m at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 122.2 dB $\mu$ V/m at the band edge. |
|                      | <input type="checkbox"/> 15.407(b)(4)(ii) ,compliance with the emission limits in § 15.247(d) Shall be at least 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power,. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c))         |



## For FCC 15.407 U-NII

| Frequency Band (MHz) | Field Strength Limit at 3 m         |                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5850 to 5895         | <input type="checkbox"/>            | 15.407(b)(5)(i) For an indoor access point or subordinate device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of 15 dBm/MHz and shall decrease linearly to an e.i.r.p. of -7 dBm/MHz at or above 5.925 GHz.                                                                                                                                                    |
|                      | <input checked="" type="checkbox"/> | 15.407(b)(5)(ii) , For a client device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of -5 dBm/MHz and shall decrease linearly to an e.i.r.p. of -27 dBm/MHz at or above 5.925 GHz.                                                                                                                                                                             |
|                      | <input checked="" type="checkbox"/> | 15.407(b)(5)(iii) , For a client device or indoor access point or subordinate device, all emissions below 5.725 GHz shall not exceed an e.i.r.p. of -27 dBm/MHz at 5.65 GHz increasing linearly to 10 dBm/MHz at 5.7 GHz, and from 5.7 GHz increasing linearly to a level of 15.6 dBm/MHz at 5.72 GHz, and from 5.72 GHz increasing linearly to a level of 27 dBm/MHz at 5.725 GHz. |



## For RSS-247 Issue 2

| Frequency Band (MHz) | Field Strength Limit at 3 m         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5725 to 5850         | <input checked="" type="checkbox"/> | <p>RSS-247 Section 6.2.4.2</p> <p>a) 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edges;</p> <p>b) 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;</p> <p>c) 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and</p> <p>d) -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.</p> |
|                      | <input type="checkbox"/>            | <p>RSS-247 Section 6.2.4.2, compliance with the emission limits in RSS-247 Section 5.5 Shall be at least 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power,. Attenuation below the general limits specified in RSS-Gen Section 8.9 table 4 is not required. In addition, radiated emissions which fall in the restricted bands, as defined in RSS-Gen Section 8.10 table 6, must also comply with the radiated emission limits specified in RSS-Gen Section 8.9 table 4</p>       |

The graph illustrates the EIRP (dBm/MHz) versus Frequency (MHz) for the U-NII-3 band (5725-5850 MHz). The y-axis ranges from -40 to 70 dBm/MHz, and the x-axis ranges from 5600 to 5950 MHz. The EIRP is constant at -27 dBm/MHz for frequencies below 5725 MHz and above 5850 MHz. Within the 5725-5850 MHz band, the EIRP increases linearly from -27 dBm/MHz at 5725 MHz to 55 dBm/MHz at 5730 MHz, remains constant at 55 dBm/MHz until 5845 MHz, and then decreases linearly back to -27 dBm/MHz at 5850 MHz.

| Frequency (MHz) | EIRP (dBm/MHz) |
|-----------------|----------------|
| 5600            | -27            |
| 5650            | -27            |
| 5700            | 10             |
| 5725            | 55             |
| 5730            | 55             |
| 5845            | 55             |
| 5850            | -27            |
| 5900            | -27            |
| 5950            | -27            |

### 6.3. Test Procedure

#### **Frequency Range 9kHz~30MHz:**

The EUT setup on the turntable which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

- (1) RBW = 9kHz with peak and average detector.
- (2) Detector: average and peak (9kHz-490kHz)  
Q.P. (490kHz-30MHz)

#### **Frequency Range 30MHz ~ 40GHz:**

The EUT setup on the turn table which has 80cm (for 30-1000MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

#### **Frequency below 1GHz:**

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120kHz
- (2) VBW  $\geq 3 \times$  RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

Note 1: When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

Note 2: 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.

#### **Frequency above 1GHz to 10th harmonic(up to 40 GHz):**

##### **Peak Detector:**

- (1) RBW = 1MHz
- (2) VBW  $\geq 3 \times$  RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

Note: When peak-detected value is lower than limit that the measurement using the average detector is not required, otherwise using average detector for final measurement.

**Average Detector:****■ Option 1:**

(1) RBW = 1MHz

(2) VBW  $\geq 1/T$ . (Duty Cycle < 98%, when duty cycle presented in section 3.7)

(3) VBW = set VBW  $\leq$  RBW / 100, but not less than 10Hz (Duty Cycle  $\geq$  98%, when duty cycle presented in section 3.7)

| Mode | Antenna | VBW Setting |
|------|---------|-------------|
| GFSK | ANT 1   | 120Hz       |
|      | ANT 2   | 120Hz       |

(4) Detector = Peak.

(5) Sweep time = auto.

(6) Trace mode = max hold.

(7) Allow sweeps to continue until the trace stabilizes.

**□ Option 2:**

Average Emission Level(dB $\mu$ V/m) = Peak Emission Level(dB $\mu$ V/m) + DCCF(dB).

**6.4. Measurement Result Explanation**

■ Peak Emission Level(dB $\mu$ V/m) = Antenna Factor(dB/m) + Cable Loss (dB) – Preamp Gain (dB) + Reading(dB $\mu$ V).

■ Average Emission Level(dB $\mu$ V/m) = Antenna Factor(dB/m) + Cable Loss (dB) – Preamp Gain (dB) + Reading(dB $\mu$ V).

□ Average Emission Level(dB $\mu$ V/m) = Peak Emission Level(dB $\mu$ V/m) + DCCF(dB)  
Duty Cycle Correction Factor (DCCF)(dB) =  $20\log(TX_{on}/TX_{on+off})$  presented in section 3.7.

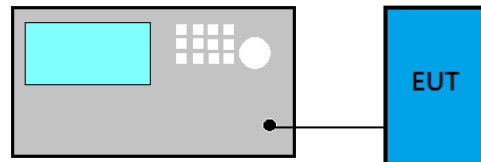
□ ERP(dBm) = Peak Emission Level(dB $\mu$ V/m) - 95.2dB - 2.14dB

**6.5. Test Results**

Please refer to Appendix A.

## 7. EMISSION/OCCUPIED BANDWIDTH

### 7.1. Block Diagram of Test Setup



### 7.2. Specification Limits

| Frequency Band (MHz) | Limit                |
|----------------------|----------------------|
| 5150 to 5250         | Reference only       |
| 5250 to 5350         |                      |
| 5470 to 5725         |                      |
| 5725 to 5895         | $\geq 500\text{kHz}$ |

### 7.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 and KDB 291074 D02 EMC Measurement v01:

#### For Emission Bandwidth

■ Applicable to all bands except to 5725 MHz –5850 MHz.

- (1) Set RBW = 1% of the emission bandwidth
- (2) Set VBW > RBW
- (3) Detector = Peak
- (4) Trace mode = max hold
- (5) Setting channel bandwidth function x dB to -26 dB to record the final bandwidth.

#### ■ Minimum Emission Bandwidth for the band 5725 MHz –5850 MHz.

- (1) Set RBW = 100 kHz.
- (2) Set the video bandwidth (VBW)  $\geq 3 \times \text{RBW}$ .
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -6 dB to record the final bandwidth.

#### **For 99% Occupied Bandwidth**

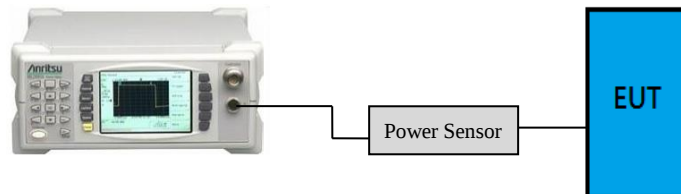
- (1) Set Span range 1.5~5 times the OBW
- (2) Set RBW close to 1% to 5% of OBW.
- (3) Set  $VBW \geq 3 \times RBW$ .
- (4) Detector = Peak.
- (5) Trace mode = Max hold
- (6) Sweep = Auto couple.
- (7) Allow the trace to stabilize.

### **7.4. Test Results**

Please refer to Appendix A

## 8. MAXIMUM OUTPUT POWER

### 8.1. Block Diagram of Test Setup



### 8.2. Specification Limits

#### For FCC 15.407 U-NII

| Frequency Band (MHz) | Category                          | Limit                                                                                                                   |
|----------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| 5150 to 5250         | Outdoor Access Point              | 1 W(30 dBm)/<br>Max e.i.r.p. $\leq 125$ mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon |
|                      | Fixed point-to-point Access Point | 1 W(30 dBm)                                                                                                             |
|                      | Indoor Access Point               | 1 W(30 dBm)                                                                                                             |
|                      | Mobile and Portable client device | 250 mW(24 dBm)                                                                                                          |
| 5250 to 5350         | N/A                               | 250 mW or 11 dBm + 10 log B <sup>Note1</sup>                                                                            |
| 5470 to 5725         |                                   | 250 mW or 11 dBm + 10 log B <sup>Note1</sup>                                                                            |
| 5725 to 5850         | N/A                               | 1 W(30 dBm)                                                                                                             |
| 5850 to 5895         | indoor access point               | 4 W (36 dBm) (e.i.r.p.)                                                                                                 |
|                      | client devices                    | 1 W (30 dBm) (e.i.r.p.)                                                                                                 |
|                      | subordinate device                | 4 W (36 dBm) (e.i.r.p.)                                                                                                 |

Note 1: B is the 26 dB emission bandwidth, which presented in section 7 and appendix A.1.

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| Frequency Band (MHz) | Limit                |                                              |
|----------------------|----------------------|----------------------------------------------|
| 5150 to 5250         | E.I.R.P.             | 200 mW or 10 dBm + 10 log B <sup>Note1</sup> |
| 5250 to 5350         | Maximum output power | 250 mW or 11 dBm + 10 log B <sup>Note1</sup> |
|                      | E.I.R.P.             | 1.0 W or 17dBm + 10 log B <sup>Note1</sup>   |
| 5470 to 5725         | Maximum output power | 250 mW or 11 dBm + 10 log B <sup>Note1</sup> |
|                      | E.I.R.P.             | 1.0 W or 17dBm + 10 log B <sup>Note1</sup>   |
| 5725 to 5850         | Maximum output power | 1 W(30 dBm)                                  |

Note 1: B is the 99% emission bandwidth, which presented in section 7 and appendix A.1.

### 8.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 and KDB 291074 D02 EMC Measurement v01:

■ **Method AVGPM (Measurement using an RF average power meter):**

EUT is connected to power sensor and record the maximum average output power and duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

□ **Method AVGSA-2 (Spectrum channel power)**

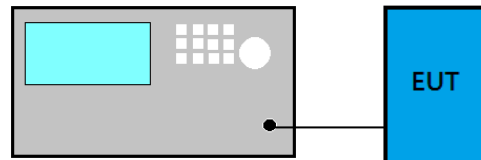
- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 MHz
- (3) Set the video bandwidth (VBW)  $\geq 3$  MHz.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.
- (8) Duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

### 8.4. Test Results

Please refer to Appendix A

## 9. POWER SPECTRAL DENSITY

### 9.1. Block Diagram of Test Setup



### 9.2. Specification Limits

#### For FCC 15.407 U-NII

| Frequency Band (MHz) | Category                          | Limit               |
|----------------------|-----------------------------------|---------------------|
| 5150 to 5250         | Outdoor Access Point              | 17dBm/MHz           |
|                      | Fixed point-to-point Access Point |                     |
|                      | Indoor Access Point               |                     |
|                      | Mobile and Portable client device | 11 dBm/MHz          |
| 5250 to 5350         | N/A                               | 11 dBm/MHz          |
| 5470 to 5725         |                                   | 11 dBm/MHz          |
| 5725 to 5850         |                                   | 30 dBm/500kHz       |
| 5850 to 5895         | indoor access point               | 20dBm/MHz(e.i.r.p.) |
|                      | client devices                    | 14dBm/MHz(e.i.r.p.) |
|                      | subordinate device                | 20dBm/MHz(e.i.r.p.) |

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| Frequency Band (MHz) | Limit         |
|----------------------|---------------|
| 5150 to 5250         | 10 dBm/MHz    |
| 5250 to 5350         | 11 dBm/MHz    |
| 5470 to 5725         | 11 dBm/MHz    |
| 5725 to 5850         | 30dBm/500 kHz |

### 9.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v02r01:

#### ■ Method AVGSA-2

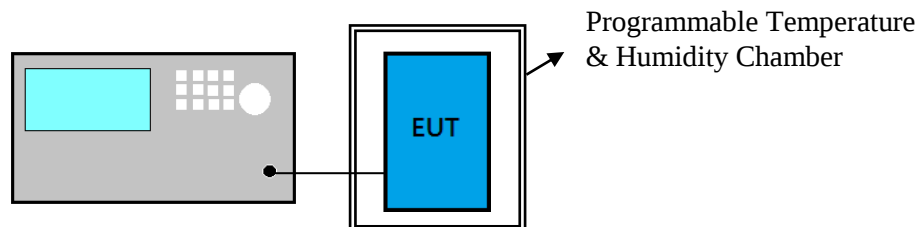
- (1) Set span to encompass the EBW ( or 99% OBW) of the signal.
- (2) Set RBW = 1 MHz (Applicable to all bands except to 5725 MHz- 5850 MHz )/  
Set RBW=100 KHz(when EUT operate at 5725 MHz- 5850 MHz)
- (3) Set the video bandwidth (VBW)  $\geq 3$  RBW.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Use peak search function to find out the maximum power density.
- (8) Duty cycle factor is added when duty cycle presented in section 3.7 is  $< 98\%$ .
- (9) Offset BWCF (7dB) when EUT operate at 5725 MHz –5850 MHz.

### 9.4. Test Results

Please refer to Appendix A

## 10. FREQUENCY STABILITY

### 10.1. Block Diagram of Test Setup



### 10.2. Specification Limits

NONE

### 10.3. Test Procedure

- (1) Frequency: Test frequency.
- (2) Span: enough to cover the complete power envelope
- (3) RBW: 1MHz(modulation ON) ; 10KHz(CW)
- (4) VBW: 1MHz(modulation ON) ; 10KHz(CW)
- (5) Detector Mode: Positive Peak
- (6) Indication mode: Max hold
- (7) Find the peak frequency and take calculate by the formula:  
(Measurement Value-declaration frequency)/ declaration frequency)

### 10.4. Test Results

Please refer to Appendix A

## 11.DEVIATION TO TEST SPECIFICATIONS

【NONE】



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# APPDNDIX A

## TEST DATA AND PLOTS

(Model: WL1BKR23)

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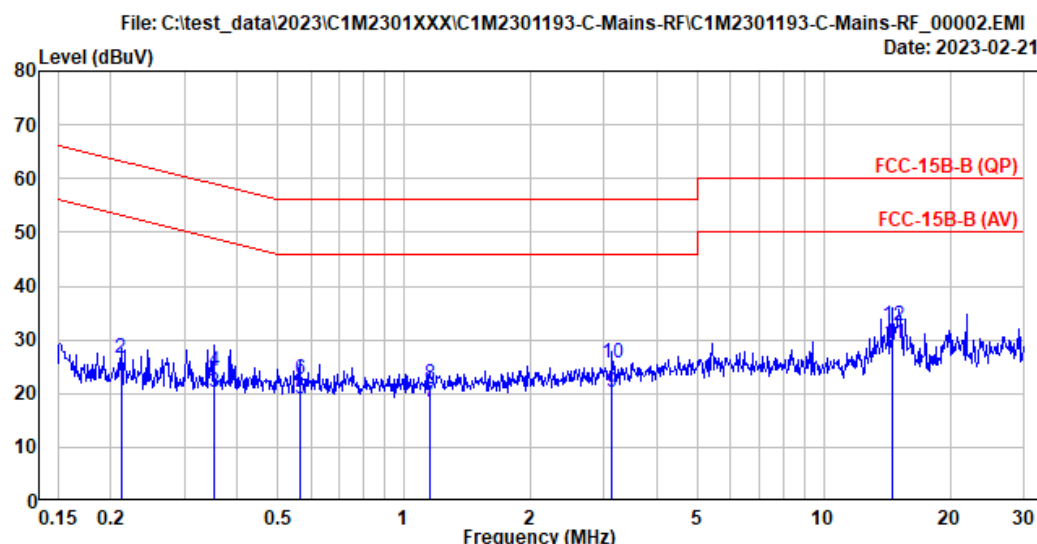
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## A.1 CONDUCTED EMISSION

|              |            |            |          |
|--------------|------------|------------|----------|
| Test Date    | 2023/02/21 | Temp./Hum. | 22°C/50% |
| Test Voltage | DC 3.3V    | Tested By  | Joe Kuo  |



|              |                                       |             |           |
|--------------|---------------------------------------|-------------|-----------|
| Site No.     | : No.8 Shielded Room                  | Data No.    | : 2       |
| Instrument 1 | : Receiver ESR(774)                   |             |           |
| Instrument 2 | : ENV432 (567)(A) CE-08 ESH3-Z2 (354) |             |           |
| Limit        | : FCC-15B-B (QP)                      | Phase       | : Neutral |
| Environment  | : 22°C/50%                            | Test Rating | : DC 3.3V |
| EUT Model    | : WL1BKR23                            | Engineer    | : Joe_kuo |
| Test Mode    | : Operating                           |             |           |

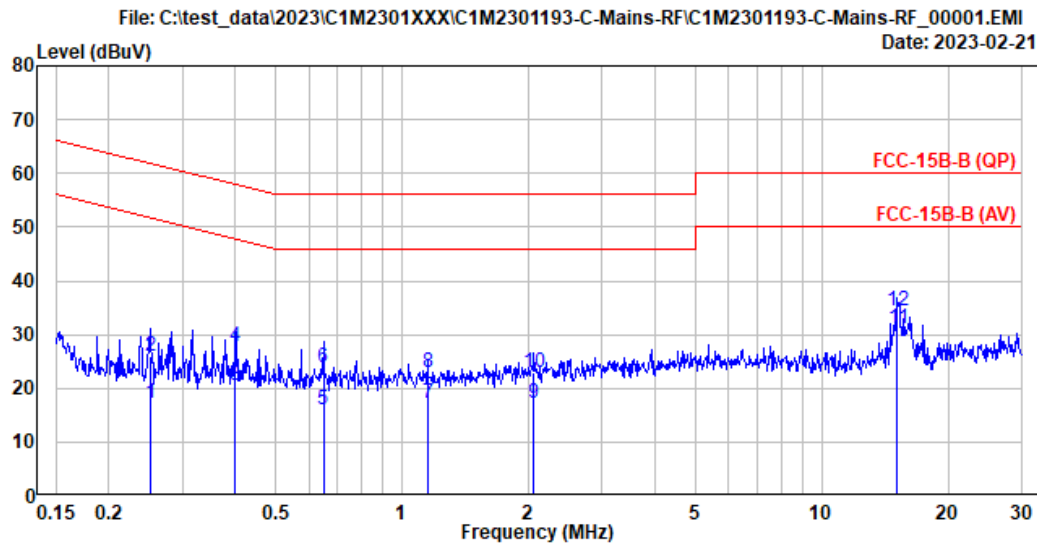
|    | Freq.<br>(MHz) | AMN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Pulse<br>Att.<br>(dB) | Reading<br>(dBμV) | Emission<br>Level<br>(dBμV) | Limits<br>(dBμV) | Margin<br>(dB) | Remark  |
|----|----------------|-----------------------|-----------------------|-----------------------|-------------------|-----------------------------|------------------|----------------|---------|
| 1  | 0.212          | 10.32                 | 0.03                  | 9.85                  | 1.29              | 21.49                       | 53.14            | 31.65          | Average |
| 2  | 0.212          | 10.32                 | 0.03                  | 9.85                  | 6.48              | 26.68                       | 63.14            | 36.46          | QP      |
| 3  | 0.352          | 10.32                 | 0.03                  | 9.85                  | 0.16              | 20.36                       | 48.92            | 28.56          | Average |
| 4  | 0.352          | 10.32                 | 0.03                  | 9.85                  | 4.08              | 24.28                       | 58.92            | 34.64          | QP      |
| 5  | 0.565          | 10.33                 | 0.03                  | 9.85                  | -1.19             | 19.02                       | 46.00            | 26.98          | Average |
| 6  | 0.565          | 10.33                 | 0.03                  | 9.85                  | 2.35              | 22.56                       | 56.00            | 33.44          | QP      |
| 7  | 1.152          | 10.34                 | 0.04                  | 9.85                  | -1.86             | 18.37                       | 46.00            | 27.63          | Average |
| 8  | 1.152          | 10.34                 | 0.04                  | 9.85                  | 1.60              | 21.83                       | 56.00            | 34.17          | QP      |
| 9  | 3.137          | 10.39                 | 0.07                  | 9.86                  | -0.13             | 20.19                       | 46.00            | 25.81          | Average |
| 10 | 3.137          | 10.39                 | 0.07                  | 9.86                  | 5.39              | 25.71                       | 56.00            | 30.29          | QP      |
| 11 | 14.636         | 10.86                 | 0.17                  | 9.91                  | 8.23              | 29.17                       | 50.00            | 20.83          | Average |
| 12 | 14.636         | 10.86                 | 0.17                  | 9.91                  | 11.79             | 32.73                       | 60.00            | 27.27          | QP      |

Remarks: 1. Emission Level(dBμV)= AMN Factor(dB) + Cable Loss(dB) + Pulse Att.(dB) + Reading(dBμV).

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|              |            |            |          |
|--------------|------------|------------|----------|
| Test Date    | 2023/02/21 | Temp./Hum. | 22°C/50% |
| Test Voltage | DC 3.3V    | Tested By  | Joe Kuo  |



Site No. : No.8 Shielded Room  
Instrument 1 : Receiver ESR(774)  
Instrument 2 : ENV432 (567)(A)|CE-08|ESH3-Z2 (354)  
Limit : FCC-15B-B (QP)  
Environment : 22°C/50%  
EUT Model : WL1BKR23  
Test Mode : Operating

Data No. : 1  
Phase : Line  
Test Rating : DC 3.3V  
Engineer : Joe\_kuo

|    | Freq.<br>(MHz) | AMN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Pulse<br>Att.<br>(dB) | Reading<br>(dBμV) | Emission<br>Level<br>(dBμV) | Limits<br>(dBμV) | Margin<br>(dB) | Remark  |
|----|----------------|-----------------------|-----------------------|-----------------------|-------------------|-----------------------------|------------------|----------------|---------|
| 1  | 0.251          | 10.22                 | 0.03                  | 9.85                  | -2.93             | 17.17                       | 51.74            | 34.57          | Average |
| 2  | 0.251          | 10.22                 | 0.03                  | 9.85                  | 5.94              | 26.04                       | 61.74            | 35.70          | QP      |
| 3  | 0.400          | 10.22                 | 0.03                  | 9.85                  | 0.43              | 20.53                       | 47.84            | 27.31          | Average |
| 4  | 0.400          | 10.22                 | 0.03                  | 9.85                  | 7.62              | 27.72                       | 57.84            | 30.12          | QP      |
| 5  | 0.649          | 10.23                 | 0.04                  | 9.85                  | -4.10             | 16.02                       | 46.00            | 29.98          | Average |
| 6  | 0.649          | 10.23                 | 0.04                  | 9.85                  | 3.59              | 23.71                       | 56.00            | 32.29          | QP      |
| 7  | 1.152          | 10.23                 | 0.04                  | 9.85                  | -2.78             | 17.34                       | 46.00            | 28.66          | Average |
| 8  | 1.152          | 10.23                 | 0.04                  | 9.85                  | 2.86              | 22.98                       | 56.00            | 33.02          | QP      |
| 9  | 2.064          | 10.25                 | 0.06                  | 9.86                  | -2.82             | 17.35                       | 46.00            | 28.65          | Average |
| 10 | 2.064          | 10.25                 | 0.06                  | 9.86                  | 2.89              | 23.06                       | 56.00            | 32.94          | QP      |
| 11 | 15.155         | 10.55                 | 0.17                  | 9.91                  | 10.37             | 31.00                       | 50.00            | 19.00          | Average |
| 12 | 15.155         | 10.55                 | 0.17                  | 9.91                  | 13.92             | 34.55                       | 60.00            | 25.45          | QP      |

Remarks: 1. Emission Level(dBμV)= AMN Factor(dB) + Cable Loss(dB) + Pulse Att.(dB) + Reading(dBμV).

## A.2 RADIATED EMISSION

|              |                    |            |                |
|--------------|--------------------|------------|----------------|
| Test Date    | 2023/01/30 ~ 03/07 | Temp./Hum. | 17~20°C/58~68% |
| Test Voltage | DC 3.3V            | Tested By  | Brian Hsieh    |

### A.2.1 Emissions within Restricted Frequency Bands

#### A.2.1.1 Frequency 9kHz~30MHz

**The emissions (9kHz~30MHz) not reported for there is no emission be found.**

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|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 1 | Frequency  | TX 5845MHz |

**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Gain (dB) | Read Level (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|------------------------|-------------------|-------------------------|-----------------|-------------|----------|
| 35.820                   | 21.75                 | 1.55            | 26.48                  | 34.19             | 31.01                   | 40.00           | 8.99        | Peak     |
| 108.570                  | 17.38                 | 2.72            | 26.23                  | 38.07             | 31.94                   | 43.50           | 11.56       | Peak     |
| 234.670                  | 17.61                 | 4.10            | 25.72                  | 41.40             | 37.39                   | 46.00           | 8.61        | Peak     |
| 669.230                  | 24.63                 | 7.47            | 27.42                  | 32.13             | 36.81                   | 46.00           | 9.19        | Peak     |
| 764.290                  | 25.09                 | 8.01            | 27.33                  | 30.62             | 36.39                   | 46.00           | 9.61        | Peak     |
| 984.480                  | 26.96                 | 9.22            | 26.69                  | 28.86             | 38.35                   | 54.00           | 15.65       | Peak     |

**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Gain (dB) | Read Level (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|------------------------|-------------------|-------------------------|-----------------|-------------|----------|
| 43.580                   | 17.37                 | 1.70            | 26.47                  | 41.75             | 34.35                   | 40.00           | 5.65        | Peak     |
| 102.750                  | 17.02                 | 2.65            | 26.27                  | 39.35             | 32.75                   | 43.50           | 10.75       | Peak     |
| 237.580                  | 17.75                 | 4.13            | 25.71                  | 25.81             | 21.98                   | 46.00           | 24.02       | Peak     |
| 616.850                  | 24.45                 | 7.20            | 27.41                  | 28.06             | 32.30                   | 46.00           | 13.70       | Peak     |
| 842.860                  | 25.61                 | 8.45            | 27.15                  | 26.97             | 33.88                   | 46.00           | 12.12       | Peak     |
| 981.570                  | 26.93                 | 9.20            | 26.72                  | 27.41             | 36.82                   | 54.00           | 17.18       | Peak     |

|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 2 | Frequency  | TX 5790MHz |

**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Gain (dB) | Read Level (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|------------------------|-------------------|-------------------------|-----------------|-------------|----------|
| 35.820                   | 21.75                 | 1.55            | 26.48                  | 34.52             | 31.34                   | 40.00           | 8.66        | Peak     |
| 95.960                   | 16.20                 | 2.56            | 26.30                  | 46.37             | 38.83                   | 43.50           | 4.67        | Peak     |
| 216.240                  | 16.43                 | 3.89            | 25.75                  | 43.68             | 38.25                   | 46.00           | 7.75        | Peak     |
| 378.230                  | 21.18                 | 5.69            | 26.28                  | 37.74             | 38.33                   | 46.00           | 7.67        | Peak     |
| 600.360                  | 24.39                 | 7.10            | 27.40                  | 32.48             | 36.57                   | 46.00           | 9.43        | Peak     |
| 984.480                  | 26.96                 | 9.22            | 26.69                  | 29.28             | 38.77                   | 54.00           | 15.23       | Peak     |

**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Gain (dB) | Read Level (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|------------------------|-------------------|-------------------------|-----------------|-------------|----------|
| 40.670                   | 18.91                 | 1.65            | 26.47                  | 41.74             | 35.83                   | 40.00           | 4.17        | Peak     |
| 108.570                  | 17.38                 | 2.72            | 26.23                  | 42.02             | 35.89                   | 43.50           | 7.61        | Peak     |
| 323.910                  | 19.93                 | 5.02            | 25.82                  | 35.81             | 34.94                   | 46.00           | 11.06       | Peak     |
| 533.430                  | 23.81                 | 6.88            | 27.23                  | 34.65             | 38.11                   | 46.00           | 7.89        | Peak     |
| 865.170                  | 25.78                 | 8.58            | 27.08                  | 29.52             | 36.80                   | 46.00           | 9.20        | Peak     |
| 972.840                  | 26.82                 | 9.15            | 26.75                  | 29.45             | 38.67                   | 54.00           | 15.33       | Peak     |

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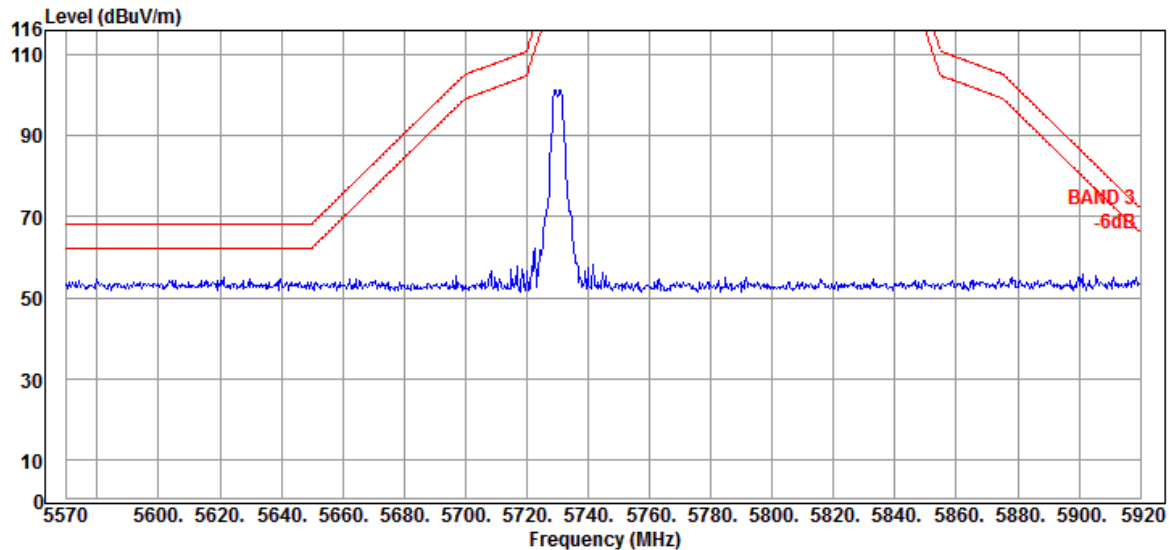
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### A.2.1.3 Frequency Above 1 GHz to 10<sup>th</sup> harmonics

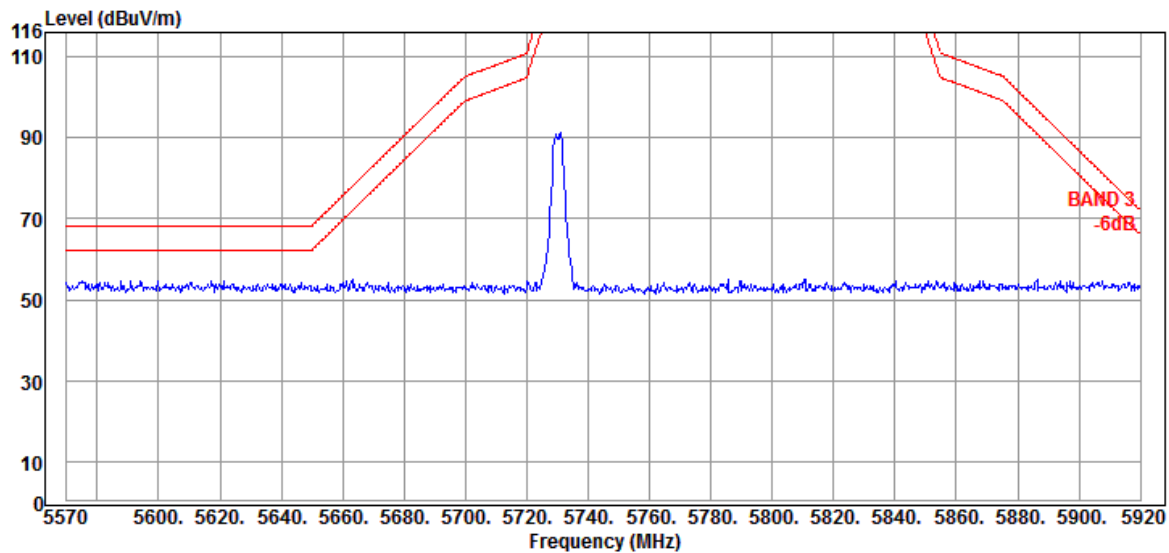
#### Band Edge:

|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 1 | Frequency  | TX 5730MHz |

Antenna at Horizontal Polarization



Antenna at Vertical Polarization

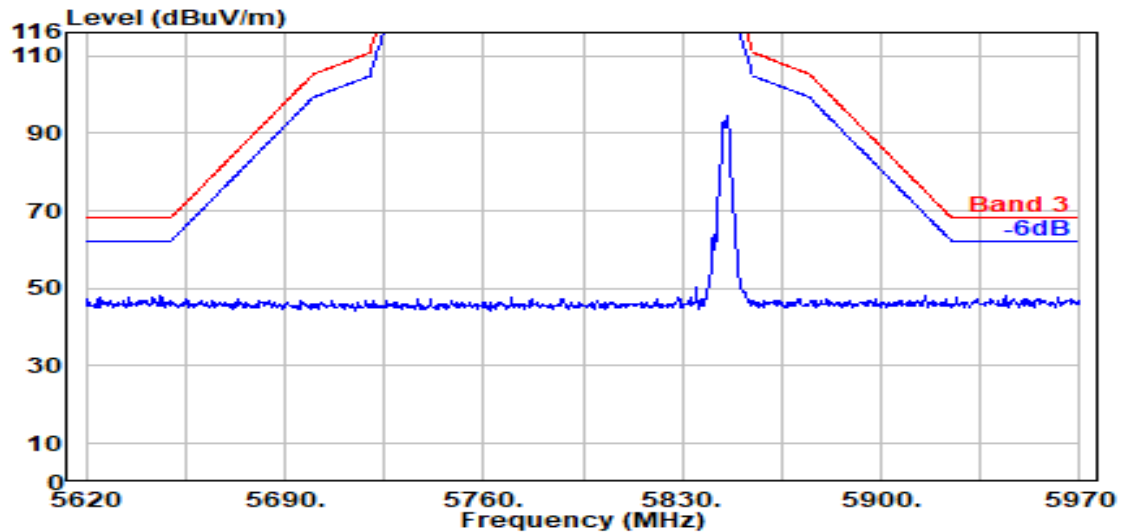


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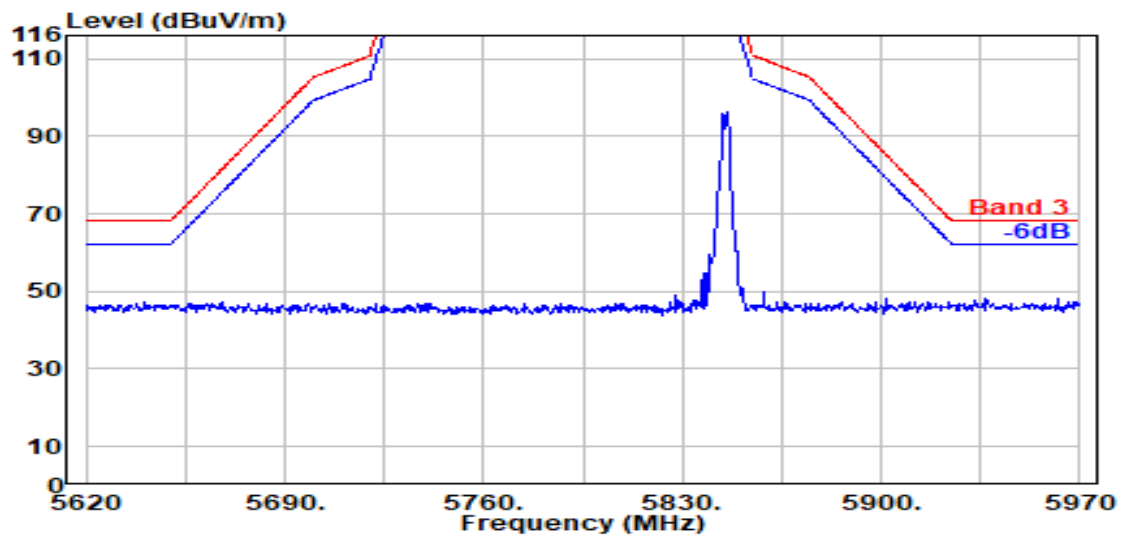
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|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 1 | Frequency  | TX 5845MHz |

Antenna at Horizontal Polarization



Antenna at Vertical Polarization

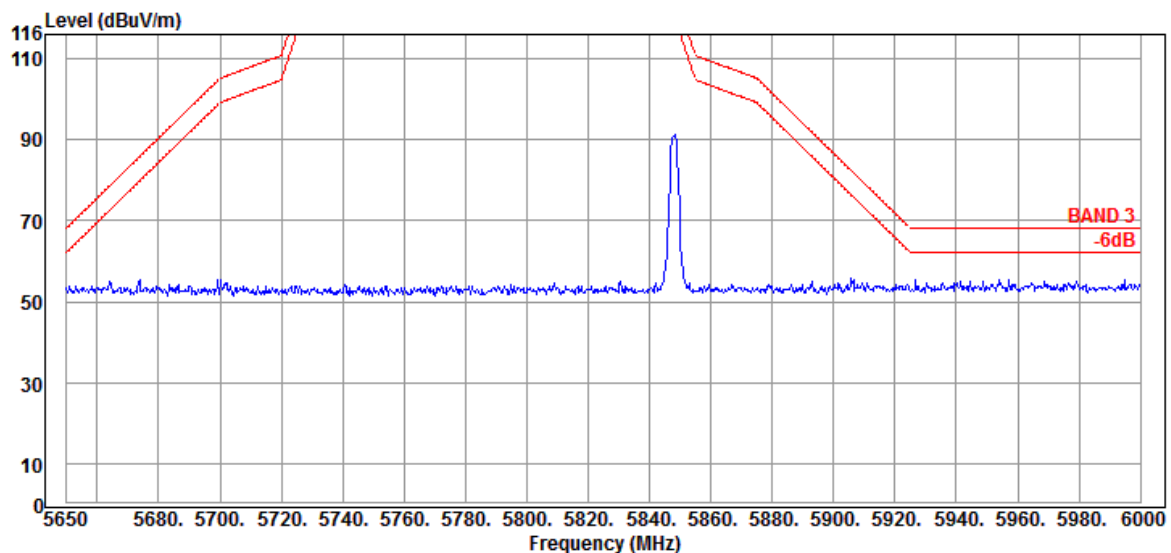


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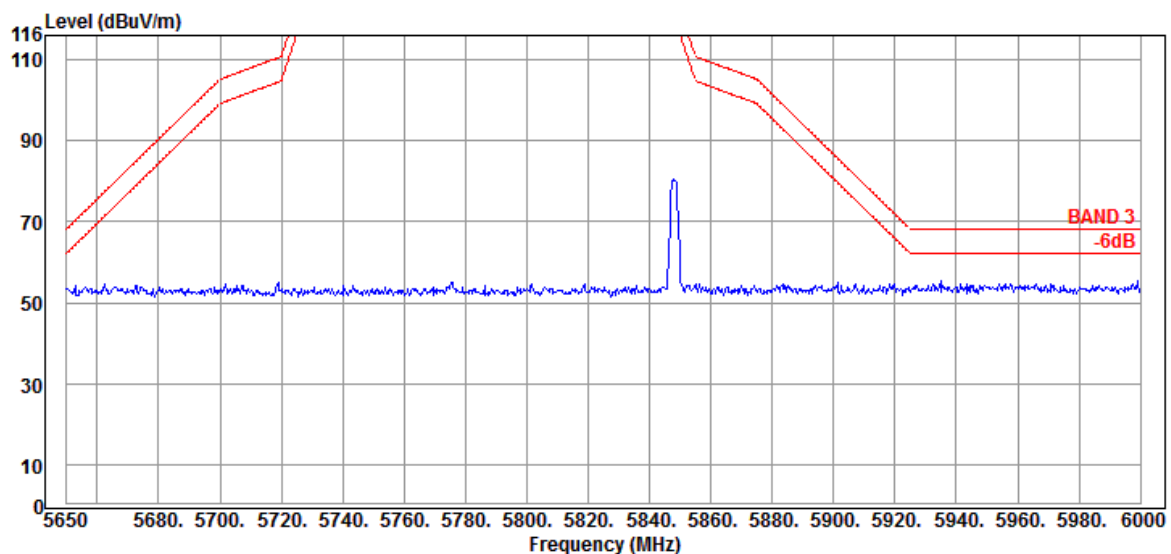
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|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 1 | Frequency  | TX 5848MHz |

Antenna at Horizontal Polarization



Antenna at Vertical Polarization

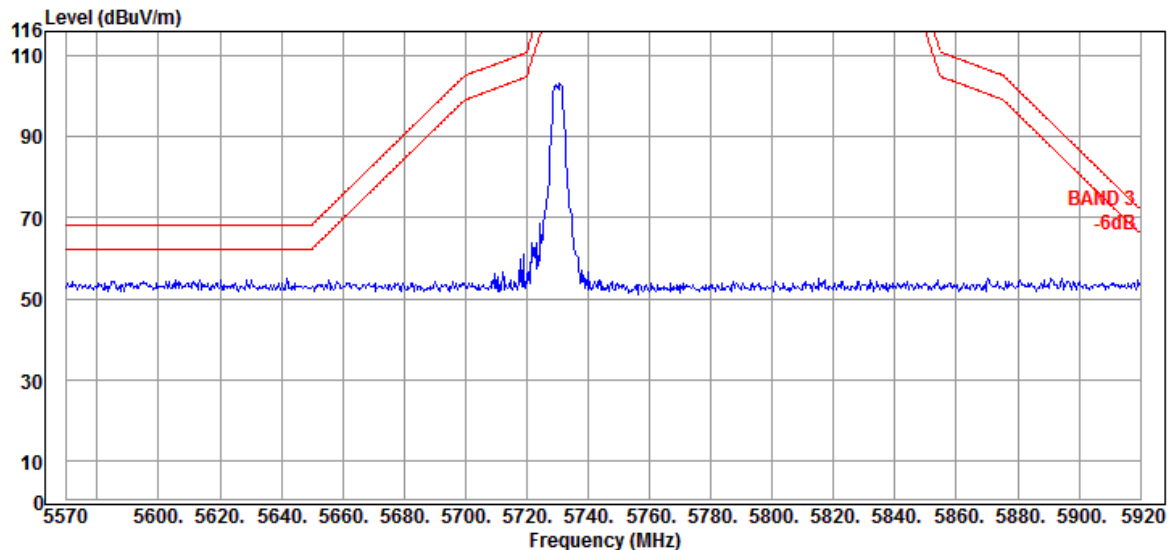


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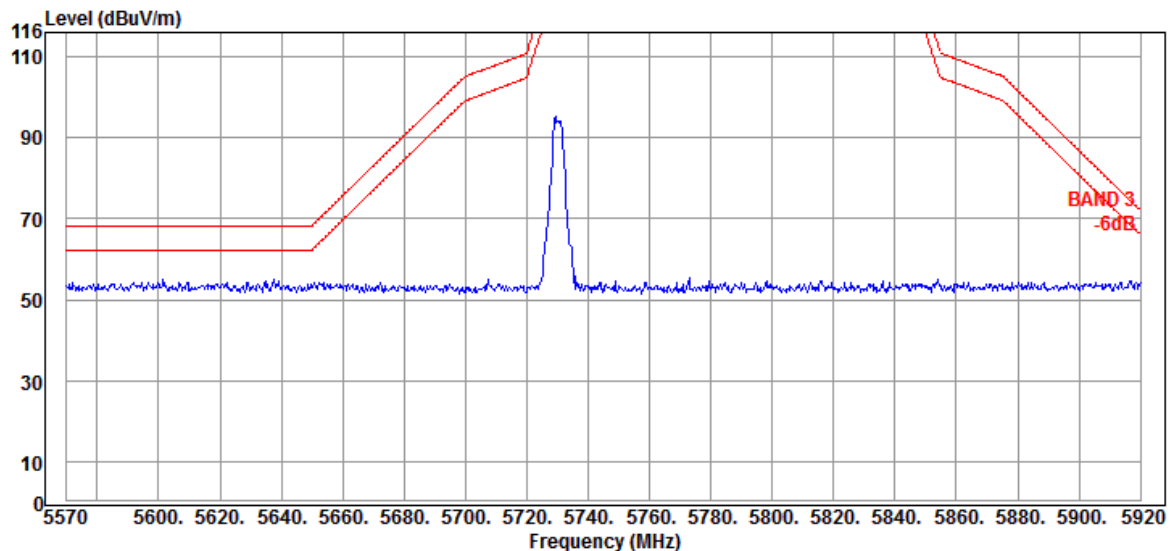
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|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 2 | Frequency  | TX 5730MHz |

Antenna at Horizontal Polarization



Antenna at Vertical Polarization

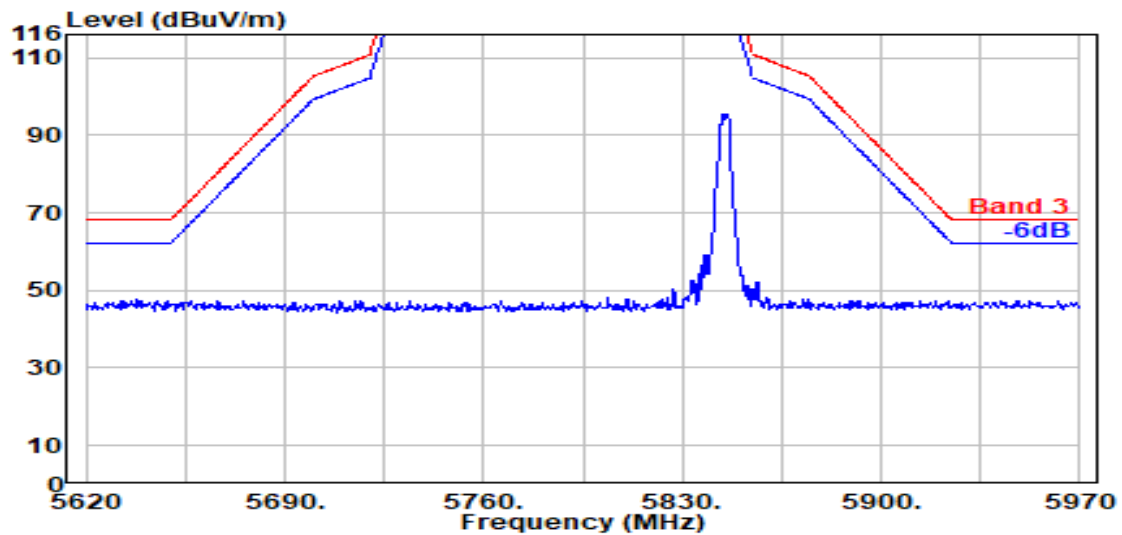


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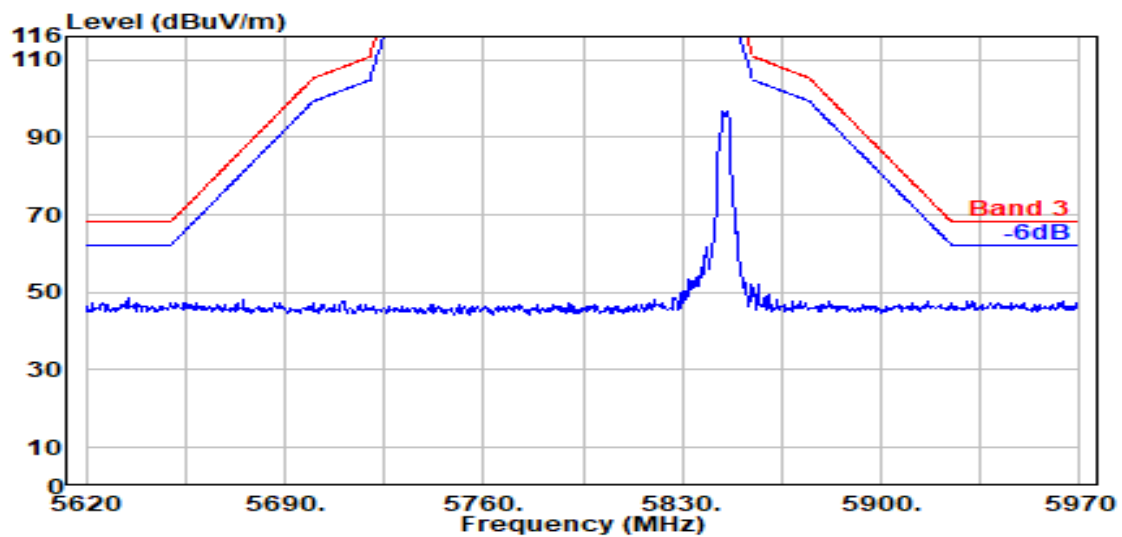
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|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 2 | Frequency  | TX 5845MHz |

Antenna at Horizontal Polarization



Antenna at Vertical Polarization



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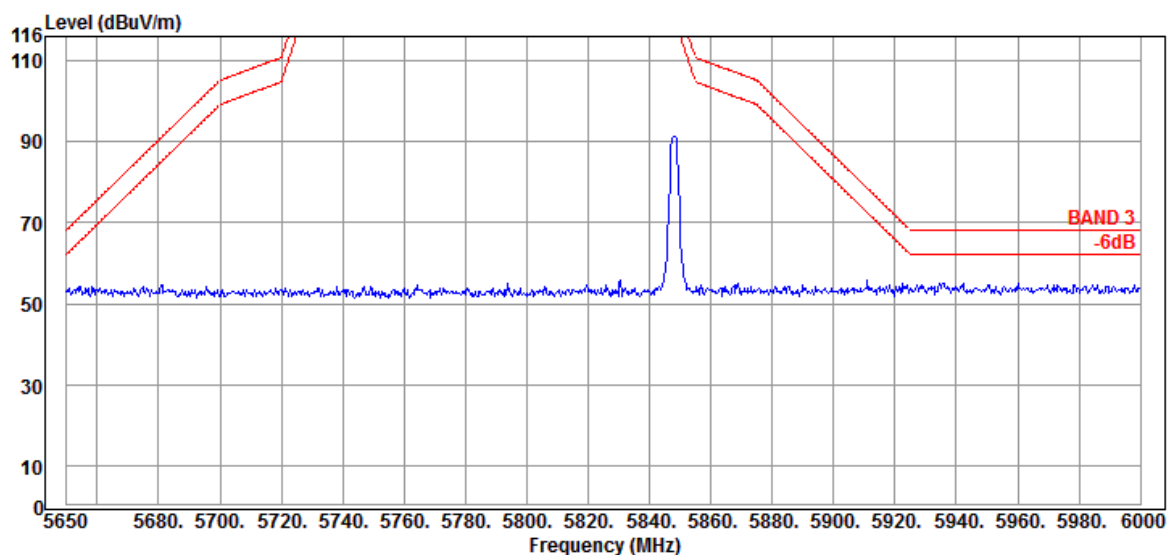
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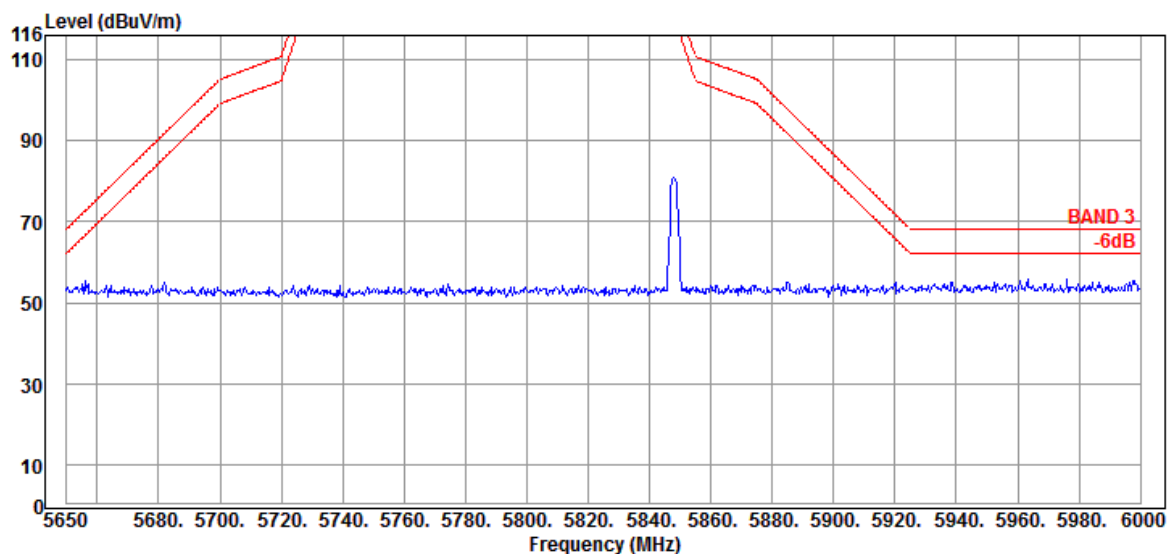
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|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 2 | Frequency  | TX 5848MHz |

Antenna at Horizontal Polarization



Antenna at Vertical Polarization



**A.2.2 Emissions outside the frequency band**

The emissions (up to 40GHz) not reported for there is no emission be found.

|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 1 | Frequency  | TX 5730MHz |

**Antenna at Horizontal Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Gain<br>(dB) | Read<br>Level<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|------------------------|-------------------------|-------------------------------|--------------------|----------------|----------|
| 11460.000                      | 39.03                       | 13.58                 | 39.13                  | 36.60                   | 50.08                         | 54.00              | 3.92           | Peak     |

**Antenna at Vertical Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Gain<br>(dB) | Read<br>Level<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|------------------------|-------------------------|-------------------------------|--------------------|----------------|----------|
| 11460.000                      | 39.03                       | 13.58                 | 39.13                  | 35.79                   | 49.27                         | 54.00              | 4.73           | Peak     |

|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 1 | Frequency  | TX 5790MHz |

**Antenna at Horizontal Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Gain<br>(dB) | Read<br>Level<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|------------------------|-------------------------|-------------------------------|--------------------|----------------|----------|
| 11580.000                      | 39.17                       | 13.69                 | 39.18                  | 36.33                   | 50.01                         | 54.00              | 3.99           | Peak     |

**Antenna at Vertical Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Gain<br>(dB) | Read<br>Level<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|------------------------|-------------------------|-------------------------------|--------------------|----------------|----------|
| 11580.000                      | 39.17                       | 13.69                 | 39.18                  | 36.35                   | 50.03                         | 54.00              | 3.97           | Peak     |

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|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 1 | Frequency  | TX 5845MHz |

**Antenna at Horizontal Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Gain<br>(dB) | Read<br>Level<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|------------------------|-------------------------|-------------------------------|--------------------|----------------|----------|
| 11690.000                      | 39.38                       | 13.53                 | 39.23                  | 36.88                   | 50.57                         | 54.00              | 3.43           | Peak     |

**Antenna at Vertical Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Gain<br>(dB) | Read<br>Level<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|------------------------|-------------------------|-------------------------------|--------------------|----------------|----------|
| 11690.000                      | 39.38                       | 13.53                 | 39.23                  | 37.03                   | 50.71                         | 54.00              | 3.29           | Peak     |

|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 1 | Frequency  | TX 5848MHz |

**Antenna at Horizontal Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Gain<br>(dB) | Read<br>Level<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|------------------------|-------------------------|-------------------------------|--------------------|----------------|----------|
| 11700.000                      | 39.40                       | 13.83                 | 39.25                  | 36.68                   | 50.66                         | 54.00              | 3.34           | Peak     |

**Antenna at Vertical Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Gain<br>(dB) | Read<br>Level<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|------------------------|-------------------------|-------------------------------|--------------------|----------------|----------|
| 11700.000                      | 39.40                       | 13.83                 | 39.25                  | 36.51                   | 50.49                         | 54.00              | 3.51           | Peak     |

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|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 2 | Frequency  | TX 5730MHz |

**Antenna at Horizontal Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Gain<br>(dB) | Read<br>Level<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|------------------------|-------------------------|-------------------------------|--------------------|----------------|----------|
| 11460.000                      | 39.03                       | 13.58                 | 39.13                  | 36.38                   | 49.86                         | 54.00              | 4.14           | Peak     |

**Antenna at Vertical Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Gain<br>(dB) | Read<br>Level<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|------------------------|-------------------------|-------------------------------|--------------------|----------------|----------|
| 11460.000                      | 39.03                       | 13.58                 | 39.13                  | 35.74                   | 49.22                         | 54.00              | 4.78           | Peak     |

|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 2 | Frequency  | TX 5790MHz |

**Antenna at Horizontal Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Gain<br>(dB) | Read<br>Level<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|------------------------|-------------------------|-------------------------------|--------------------|----------------|----------|
| 11580.000                      | 39.17                       | 13.69                 | 39.18                  | 36.95                   | 50.63                         | 54.00              | 3.37           | Peak     |

**Antenna at Vertical Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Gain<br>(dB) | Read<br>Level<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|------------------------|-------------------------|-------------------------------|--------------------|----------------|----------|
| 11580.000                      | 39.17                       | 13.69                 | 39.18                  | 35.88                   | 49.56                         | 54.00              | 4.44           | Peak     |

|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 2 | Frequency  | TX 5845MHz |

**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Gain (dB) | Read Level (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|------------------------|-------------------|-------------------------|-----------------|-------------|----------|
| 11690.000                | 39.38                 | 13.53           | 39.23                  | 36.32             | 50.00                   | 54.00           | 4.00        | Peak     |

**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Gain (dB) | Read Level (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|------------------------|-------------------|-------------------------|-----------------|-------------|----------|
| 11690.000                | 39.38                 | 13.53           | 39.23                  | 36.52             | 50.20                   | 54.00           | 3.80        | Peak     |

|         |       |            |            |
|---------|-------|------------|------------|
| Mode    | GFSK  | U-NII Band | 3          |
| Antenna | ANT 2 | Frequency  | TX 5848MHz |

**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Gain (dB) | Read Level (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|------------------------|-------------------|-------------------------|-----------------|-------------|----------|
| 11700.000                | 39.40                 | 13.83           | 39.25                  | 36.68             | 50.66                   | 54.00           | 3.34        | Peak     |

**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Gain (dB) | Read Level (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|------------------------|-------------------|-------------------------|-----------------|-------------|----------|
| 11700.000                | 39.40                 | 13.83           | 39.25                  | 36.31             | 50.29                   | 54.00           | 3.71        | Peak     |

**A.2.3 Emissions in Non-restricted Frequency Bands**

Pursuant to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 that emission levels below the 15.209/ RSS-Gen Section 8.9 table 4 general radiated emissions limits is not required.

### A.3 MAXIMUM OUTPUT POWER AND EMISSION/OCCUPIED BANDWIDTH

|              |                    |            |                |
|--------------|--------------------|------------|----------------|
| Test Date    | 2023/01/30 ~ 03/07 | Temp./Hum. | 17-20°C/52-58% |
| Cable Loss   | 1.60dB             | Tested By  | Brian Hsieh    |
| Test Voltage | DC 3.3V            |            |                |

#### A.3.1 Average Output Power and Emission/Occupied Bandwidth

| Mode<br>(GFSK) | Centre<br>Frequency<br>(MHz) | Bandwidth(MHz)              |        |                             |        | Average Output<br>Power (dBm) |       | Duty Cycle<br>Factor (dB)<br>10log(1/X) | Max<br>Average<br>Output<br>Power<br>(dBm)<br>Note 3 &4 | Limit<br>(dBm) | Limit(11dBm<br>+10 log B)<br>Note 4 |
|----------------|------------------------------|-----------------------------|--------|-----------------------------|--------|-------------------------------|-------|-----------------------------------------|---------------------------------------------------------|----------------|-------------------------------------|
|                |                              | Emission (6dB)<br>Bandwidth |        | Occupied (99%)<br>Bandwidth |        |                               |       |                                         |                                                         |                |                                     |
|                |                              | ANT1                        | ANT2   | ANT1                        | ANT2   | ANT1                          | ANT2  |                                         |                                                         |                |                                     |
| U-NII Band 3   | 5730                         | 1.9490                      | 2.1760 | 3.7731                      | 3.7565 | -2.25                         | -0.93 | 6.459                                   | 5.53                                                    | 30             | N/A                                 |
|                | 5790                         | 2.0240                      | 2.1300 | 3.6897                      | 3.8152 | -1.15                         | 0.07  | 6.459                                   | 6.53                                                    |                |                                     |
|                | 5845                         | 1.9370                      | 2.2050 | 3.9505                      | 3.9592 | -0.52                         | -1.61 | 6.459                                   | 5.94                                                    |                |                                     |
|                | 5846                         | 0.9129                      | 0.9199 | 1.2227                      | 1.3118 | -8.11                         | -8.95 | N/A                                     | -8.11                                                   |                |                                     |
|                | 5847                         | 0.9257                      | 0.9393 | 1.3159                      | 1.5784 | -7.92                         | -8.94 | N/A                                     | -7.92                                                   |                |                                     |
|                | 5848                         | 0.9391                      | 0.9149 | 1.2365                      | 1.3391 | -8.41                         | -6.41 | N/A                                     | -6.41                                                   |                |                                     |

Note: 1. The results have been included cable loss.

2. Max Average Output Power (dBm) = Max of each average output power (dBm)+ Duty Cycle Factor (dB) when duty cycle is less than 98%.

3. N/A represent the duty cycle is 100%, TX<sub>on</sub> and TX<sub>on+off</sub> cannot be measured.

4. B is the 26 dB emission bandwidth.

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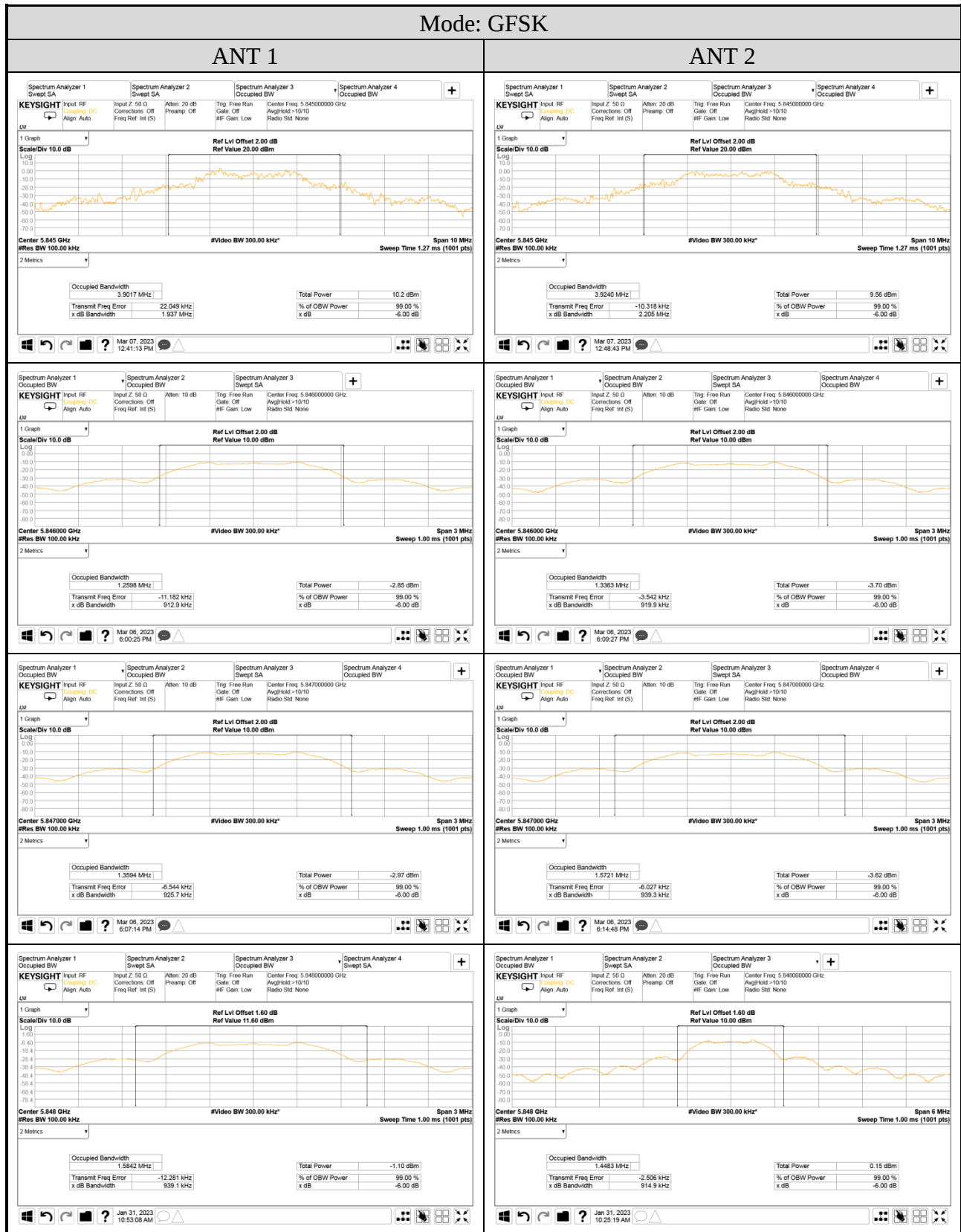
### A.3.2 Measurement Plots

#### ● Emission (6dB) Bandwidth



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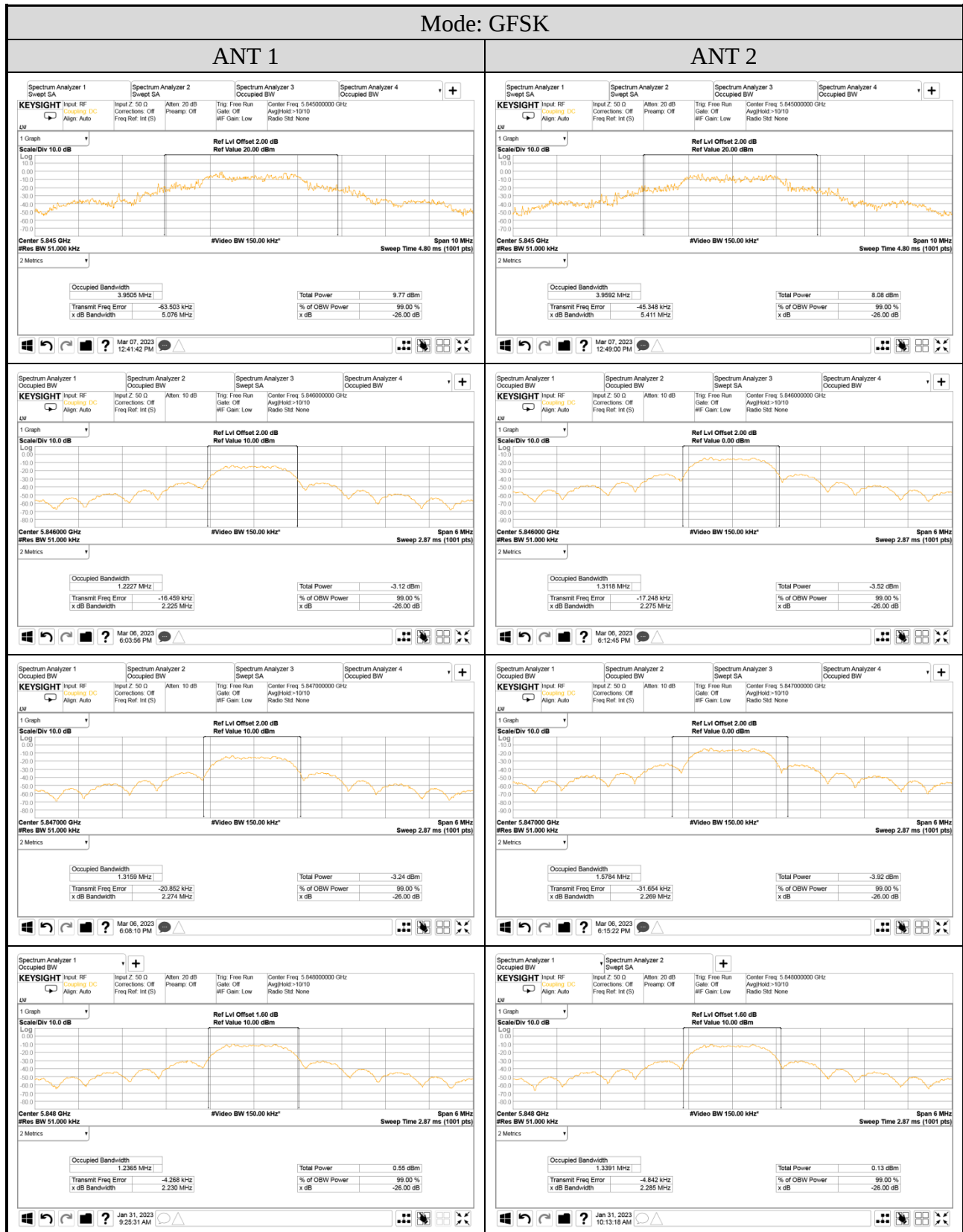
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## ● Occupied (99%) Bandwidth



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## A.4 POWER SPECTRAL DENSITY

|              |                    |            |                |
|--------------|--------------------|------------|----------------|
| Test Date    | 2023/01/30 ~ 03/07 | Temp./Hum. | 17-22°C/52-42% |
| Cable Loss   | 1.60dB             | Tested By  | Brian Hsieh    |
| Test Voltage | DC 3.3V            |            |                |

### A.4.1 Power Spectral Density Result

| Mode<br>(GFSK) | Centre<br>Frequency<br>(MHz) | Power Spectral Density<br>(dBm/500kHz) |         | Duty Cycle<br>Factor (dB)<br>10log(1/X) | Max. Power Spectral Density<br>(dBm/500kHz)<br>Note 3 | Limit         |
|----------------|------------------------------|----------------------------------------|---------|-----------------------------------------|-------------------------------------------------------|---------------|
|                |                              | ANT1                                   | ANT2    |                                         |                                                       |               |
| U-NII Band 3   | 5730                         | -7.536                                 | -4.099  | 6.459                                   | 2.360                                                 | 30dBm/500 kHz |
|                | 5790                         | -6.858                                 | -4.060  | 6.459                                   | 2.399                                                 |               |
|                | 5845                         | -6.956                                 | -6.750  | 6.459                                   | -0.291                                                |               |
|                | 5846                         | -9.375                                 | -10.983 | N/A                                     | -9.375                                                |               |
|                | 5847                         | -9.705                                 | -11.208 | N/A                                     | -9.705                                                |               |
|                | 5848                         | -9.821                                 | -8.130  | N/A                                     | -8.130                                                |               |

Note :1. All results have been included cable loss.

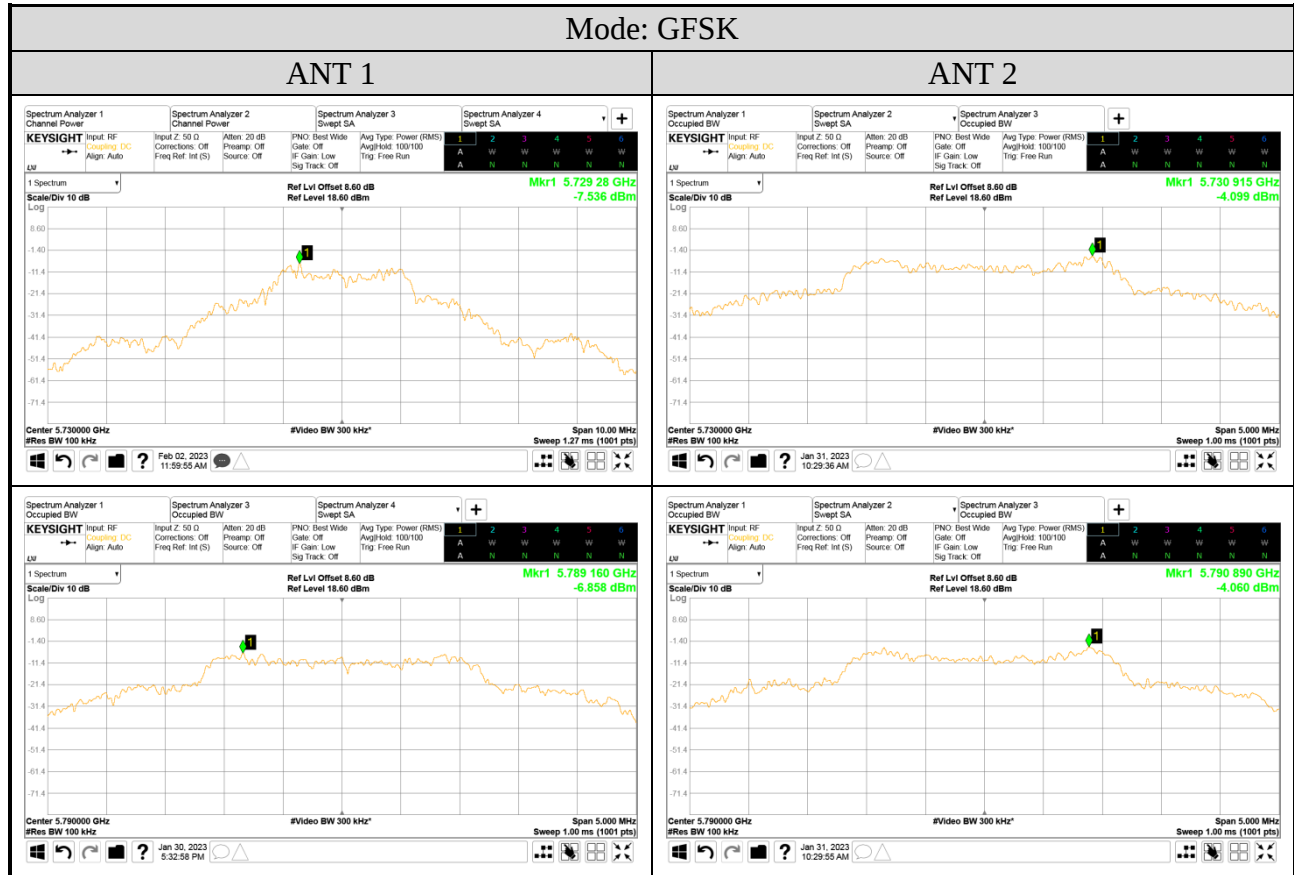
2. BWCF 7dB (100kHz converted to 500kHz) has been included in the test result.

3. Max. Power Spectral Density (dBm/500kHz) = Max of each PSD (dBm/500kHz) + Duty Cycle Factor(dB)  
when duty cycle is less than 98%.

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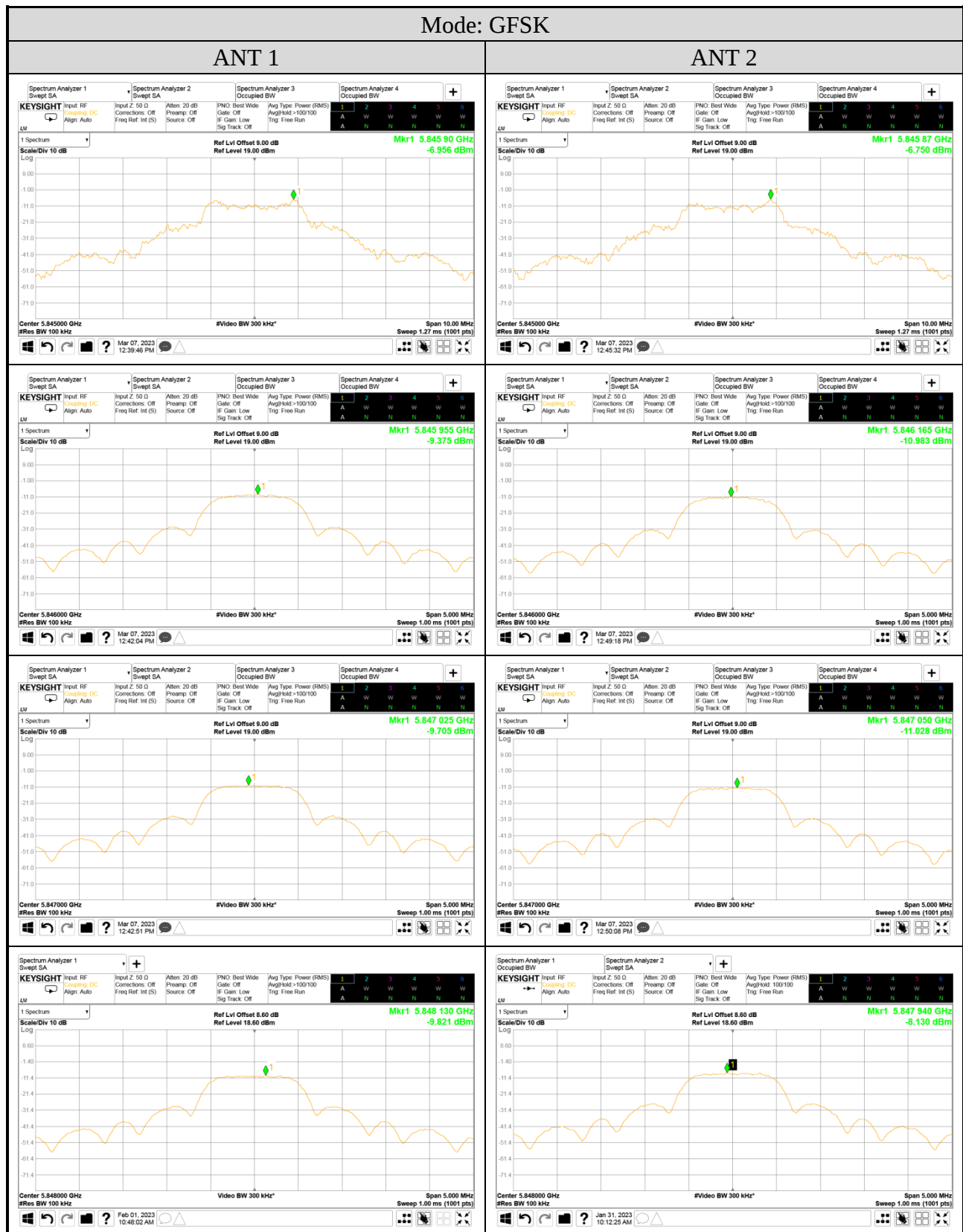
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## A.4.2 Measurement Plots



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## A.5 FREQUENCY STABILITY

|              |            |            |             |
|--------------|------------|------------|-------------|
| Test Date    | 2023/02/01 | Temp./Hum. | 20°C/53%    |
| Test Voltage | DC 3.3V    | Tested By  | Brian Hsieh |

### A.5.1 Frequency stability Result

#### ANT 1

| Temperature (°C) | Voltage (Vdc) | Centre Frequency (MHz) | Measurement Value (MHz) | Frequency Stability (ppm) |
|------------------|---------------|------------------------|-------------------------|---------------------------|
| 25               | 3.30          | 5730                   | 5730.024                | 4.188                     |
| -30              | 3.15          |                        | 5730.011                | 1.920                     |
|                  | 3.45          |                        | 5730.015                | 2.618                     |
| -20              | 3.15          |                        | 5729.97                 | -5.236                    |
|                  | 3.45          |                        | 5729.984                | -2.792                    |
| -10              | 3.15          |                        | 5730                    | 0.000                     |
|                  | 3.45          |                        | 5730.003                | 0.524                     |
| 0                | 3.15          |                        | 5729.983                | -2.967                    |
|                  | 3.45          |                        | 5730.026                | 4.538                     |
| 10               | 3.15          |                        | 5729.996                | -0.698                    |
|                  | 3.45          |                        | 5730.01                 | 1.745                     |
| 20               | 3.15          |                        | 5729.973                | -4.712                    |
|                  | 3.45          |                        | 5729.978                | -3.839                    |
| 30               | 3.15          |                        | 5730.021                | 3.665                     |
|                  | 3.45          |                        | 5730.013                | 2.269                     |
| 40               | 3.15          |                        | 5730.007                | 1.222                     |
|                  | 3.45          |                        | 5730.022                | 3.839                     |
| 50               | 3.15          |                        | 5729.998                | -0.349                    |
|                  | 3.45          |                        | 5729.975                | -4.363                    |

#### ANT 2

| Temperature (°C) | Voltage (Vdc) | Centre Frequency (MHz) | Measurement Value (MHz) | Frequency Stability (ppm) |
|------------------|---------------|------------------------|-------------------------|---------------------------|
| 25               | 3.30          | 5730                   | 5730.000                | 0.000                     |
| -30              | 3.15          |                        | 5729.992                | -1.396                    |
|                  | 3.45          |                        | 5729.984                | -2.792                    |
| -20              | 3.15          |                        | 5729.996                | -0.698                    |
|                  | 3.45          |                        | 5730.006                | 1.047                     |
| -10              | 3.15          |                        | 5730.012                | 2.094                     |
|                  | 3.45          |                        | 5730.03                 | 5.236                     |
| 0                | 3.15          |                        | 5729.991                | -1.571                    |
|                  | 3.45          |                        | 5729.979                | -3.665                    |
| 10               | 3.15          |                        | 5730.017                | 2.967                     |
|                  | 3.45          |                        | 5729.99                 | -1.745                    |
| 20               | 3.15          |                        | 5730.004                | 0.698                     |
|                  | 3.45          |                        | 5729.999                | -0.175                    |
| 30               | 3.15          |                        | 5729.981                | -3.316                    |
|                  | 3.45          |                        | 5729.978                | -3.839                    |
| 40               | 3.15          |                        | 5730.015                | 2.618                     |
|                  | 3.45          |                        | 5729.971                | -5.061                    |
| 50               | 3.15          |                        | 5729.993                | -1.222                    |
|                  | 3.45          |                        | 5729.982                | -3.141                    |

Note: The extreme Voltage is declared by manufacturer.