

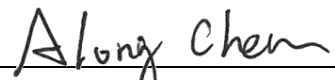
# FCC Co-Location Test Report

**FCC ID** : 2AQ68GEE810U-915U  
**Equipment** : Enterprise Gateway  
**Model No.** : GEE810U-915U  
**Brand Name** : UfiSpace  
**Applicant** : Hon Lin Technology Co Ltd.  
**Address** : 11th Fl 32 Jihu Rd Neihu District Taipei 114  
TAIWAN  
**Standard** : 47 CFR FCC Part 15.247  
**Received Date** : Dec. 03, 2020  
**Tested Date** : Apr. 18 ~ Apr. 29, 2020

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

Reviewed by:

  
Along Chen / Assistant Manager

Approved by:

  
Gary Chang / Manager



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## Release Record

| Report No.    | Version | Description   | Issued Date   |
|---------------|---------|---------------|---------------|
| FR882101-02CO | Rev. 01 | Initial issue | Jun. 18, 2020 |

## Summary of Test Results

| FCC Rules                        | Test Items         | Measured                                                 | Result |
|----------------------------------|--------------------|----------------------------------------------------------|--------|
| 15.247(d)<br>15.407(b)<br>15.209 | Radiated Emissions | [dBuV/m at 3m]: 714.82MHz<br>39.70 (Margin -6.30dB) - PK | Pass   |

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

# 1 General Description

## 1.1 Information

### 1.1.1 Specification of the Equipment under Test (EUT)

| WiFi                |                                                                                      |
|---------------------|--------------------------------------------------------------------------------------|
| Operating Frequency | 802.11b/g/n: 2412 MHz ~ 2462 MHz                                                     |
| Modulation Type     | 802.11b: DSSS (DBPSK / DQPSK / CCK)<br>802.11g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) |
| LoRa                |                                                                                      |
| Operating Frequency | 923.3 MHz ~ 927.5 MHz                                                                |
| Modulation Type     | LoRa                                                                                 |

### 1.1.2 Antenna Details of Platform

WiFi

| Ant. No. | Model            | Type   | Gain (dBi) | Connector |
|----------|------------------|--------|------------|-----------|
| 1        | ANTP2M1-CCG38-EH | Dipole | 3.51       | Ipex      |

LoRa

| Ant. No. | Brand | Model            | Type   | Connector | Gain (dBi) |
|----------|-------|------------------|--------|-----------|------------|
| 1        | FIT   | ANTP2M6-CZZ61-EH | Dipole | I-Pex     | 1.49       |

## 1.2 The Equipment List

|                                                                     |                             |                       |                         |                         |                          |
|---------------------------------------------------------------------|-----------------------------|-----------------------|-------------------------|-------------------------|--------------------------|
| <b>Test Item</b>                                                    | Radiated Emission           |                       |                         |                         |                          |
| <b>Test Site</b>                                                    | 966 chamber1 / (03CH03-0WS) |                       |                         |                         |                          |
| <b>Tested Date</b>                                                  | Apr. 18, 2020               |                       |                         |                         |                          |
| <b>Instrument</b>                                                   | <b>Manufacturer</b>         | <b>Model No.</b>      | <b>Serial No.</b>       | <b>Calibration Date</b> | <b>Calibration Until</b> |
| Spectrum Analyzer                                                   | R&S                         | FSV40                 | 101499                  | Jan. 09, 2020           | Jan. 08, 2021            |
| Receiver                                                            | R&S                         | ESR3                  | 101657                  | Feb. 14, 2020           | Feb. 13, 2021            |
| Bilog Antenna                                                       | SCHWARZBECK                 | VULB9168              | VULB9168-522            | Jul. 12, 2019           | Jul. 11, 2020            |
| Horn Antenna<br>1G-18G                                              | SCHWARZBECK                 | BBHA 9120 D           | BBHA 9120 D 1206        | Dec. 27, 2019           | Dec. 26, 2020            |
| Horn Antenna<br>18G-40G                                             | SCHWARZBECK                 | BBHA 9170             | BBHA 9170517            | Nov. 15, 2019           | Nov. 14, 2020            |
| Loop Antenna                                                        | R&S                         | HFH2-Z2               | 100330                  | Nov. 13, 2019           | Nov. 12, 2020            |
| Loop Antenna Cable                                                  | KOAX KABEL                  | 101354-BW             | 101354-BW               | Oct. 07, 2019           | Oct. 06, 2020            |
| Preamplifier                                                        | EMC                         | EMC02325              | 980187                  | Aug. 14, 2019           | Aug. 13, 2020            |
| Preamplifier                                                        | Agilent                     | 83017A                | MY53270014              | Aug. 07, 2019           | Aug. 06, 2020            |
| Preamplifier                                                        | EMC                         | EMC184045B            | 980192                  | Aug. 01, 2019           | Jul. 31, 2020            |
| RF cable-3M                                                         | HUBER+SUHNER                | SUCOFLEX104           | MY22620/4               | Sep. 27, 2019           | Sep. 26, 2020            |
| RF cable-8M                                                         | EMC                         | EMC104-SM-SM-80<br>00 | 181107                  | Sep. 27, 2019           | Sep. 26, 2020            |
| RF cable-1M                                                         | HUBER+SUHNER                | SUCOFLEX104           | MY22624/4               | Sep. 27, 2019           | Sep. 26, 2020            |
| LF cable-0.8M                                                       | EMC                         | EMC8D-NM-NM-800       | EMC8D-NM-NM-800<br>-001 | Sep. 27, 2019           | Sep. 26, 2020            |
| LF cable-3M                                                         | EMC                         | EMC8D-NM-NM-300<br>0  | 131103                  | Sep. 27, 2019           | Sep. 26, 2020            |
| LF cable-13M                                                        | EMC                         | EMC8D-NM-NM-130<br>00 | 131104                  | Sep. 27, 2019           | Sep. 26, 2020            |
| Measurement<br>Software                                             | AUDIX                       | e3                    | 6.120210g               | NA                      | NA                       |
| Note: Calibration Interval of instruments listed above is one year. |                             |                       |                         |                         |                          |

|                                                                     |                     |                  |                   |                         |                          |
|---------------------------------------------------------------------|---------------------|------------------|-------------------|-------------------------|--------------------------|
| <b>Test Item</b>                                                    | RF Conducted        |                  |                   |                         |                          |
| <b>Test Site</b>                                                    | (TH01-WS)           |                  |                   |                         |                          |
| <b>Tested Date</b>                                                  | Apr. 29, 2020       |                  |                   |                         |                          |
| <b>Instrument</b>                                                   | <b>Manufacturer</b> | <b>Model No.</b> | <b>Serial No.</b> | <b>Calibration Date</b> | <b>Calibration Until</b> |
| Spectrum Analyzer                                                   | R&S                 | FSV40            | 101499            | Jan. 09, 2020           | Jan. 08, 2021            |
| Power Meter                                                         | Anritsu             | ML2495A          | 1241002           | Oct. 23, 2019           | Oct. 22, 2020            |
| Power Sensor                                                        | Anritsu             | MA2411B          | 1207366           | Oct. 23, 2019           | Oct. 22, 2020            |
| DC POWER<br>SOURCE                                                  | GW INSTEK           | GPC-6030D        | GES855395         | Oct. 29, 2019           | Oct. 28, 2020            |
| AC POWER<br>SOURCE                                                  | APC                 | AFC-500W         | F312060012        | Dec. 02, 2019           | Dec. 01, 2020            |
| Measurement<br>Software                                             | Sporton             | Sporton_1        | 1.3.30            | NA                      | NA                       |
| Note: Calibration Interval of instruments listed above is one year. |                     |                  |                   |                         |                          |

### 1.3 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247

47 CFR FCC Part 15.407

ANSI C63.10-2013

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01

FCC KDB 412172 D01 Determining ERP and EIRP v01r01

### 1.4 Deviation from Test Standard and Measurement Procedure

None

### 1.5 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ( $k=2$ )).

| Measurement Uncertainty       |               |
|-------------------------------|---------------|
| Parameters                    | Uncertainty   |
| Radiated emission $\leq$ 1GHz | $\pm 3.96$ dB |
| Radiated emission $>$ 1GHz    | $\pm 4.51$ dB |

## 2 Test Configuration

### 2.1 Testing Condition

| Test Item           | Test Site | Ambient Condition | Tested By  |
|---------------------|-----------|-------------------|------------|
| Radiated Emissions  | 03CH03-WS | 25°C / 62%        | Brad Wu    |
| Conducted Emissions | TH01-WS   | 25°C / 67%        | Aska Huang |

- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- ISSED#: 10807A
- CAB identifier: TW2732

### 2.2 The Worst Test Modes and Channel Details

| Test item                                                                      | Modulation Mode       | Test Channel | Test Configuration |
|--------------------------------------------------------------------------------|-----------------------|--------------|--------------------|
| Radiated Emissions                                                             | 2.4G 11g + Lora 927.5 | CH6 + CH08   | ---                |
| Conducted Emissions                                                            |                       |              |                    |
| NOTE: The selected channel is the maximum power channel of Lora and Wi-Fi mode |                       |              |                    |

### 3 Transmitter Test Results

#### 3.1 Unwanted Emissions into Restricted Frequency Bands

##### 3.1.1 Limit of Unwanted Emissions into Restricted Frequency Bands

| Restricted Band Emissions Limit |                       |                         |                      |
|---------------------------------|-----------------------|-------------------------|----------------------|
| Frequency Range (MHz)           | Field Strength (uV/m) | Field Strength (dBuV/m) | Measure Distance (m) |
| 0.009~0.490                     | 2400/F(kHz)           | 48.5 - 13.8             | 300                  |
| 0.490~1.705                     | 24000/F(kHz)          | 33.8 - 23               | 30                   |
| 1.705~30.0                      | 30                    | 29                      | 30                   |
| 30~88                           | 100                   | 40                      | 3                    |
| 88~216                          | 150                   | 43.5                    | 3                    |
| 216~960                         | 200                   | 46                      | 3                    |
| Above 960                       | 500                   | 54                      | 3                    |

**Note 1:**  
Qusai-Peak value is measured for frequency below 1GHz except for 9~90 kHz, 110~490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

**Note 2:**  
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

##### 3.1.2 Test Procedures

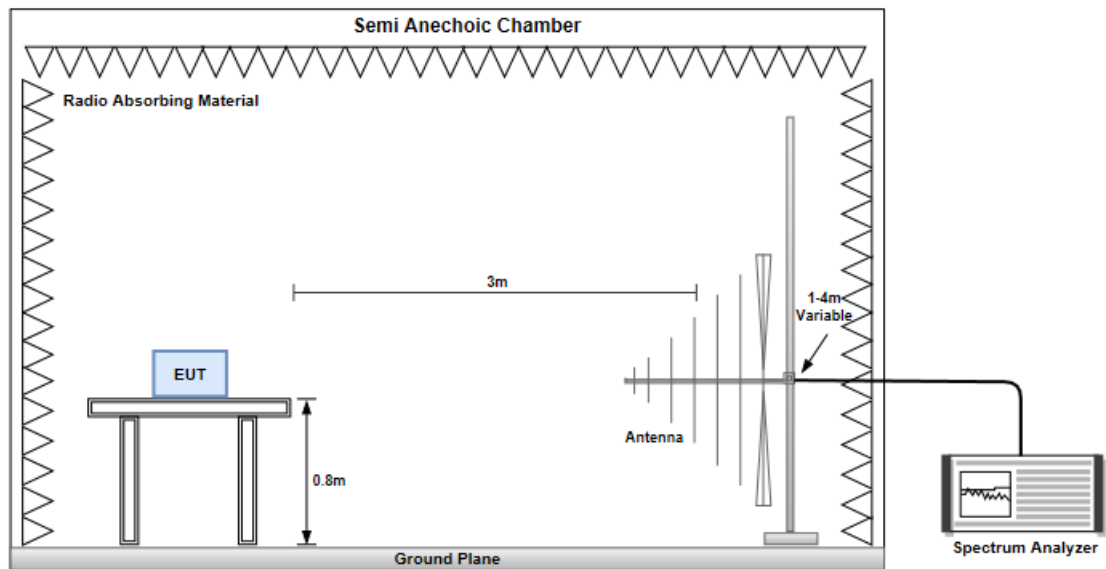
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

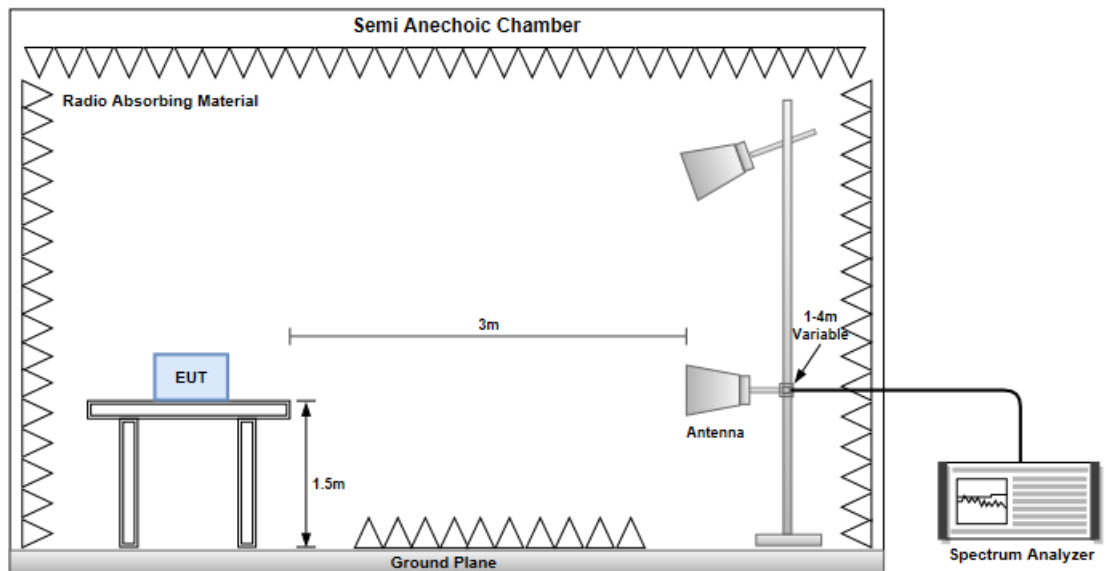
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

### 3.1.3 Test Setup

#### Radiated Emissions below 1 GHz

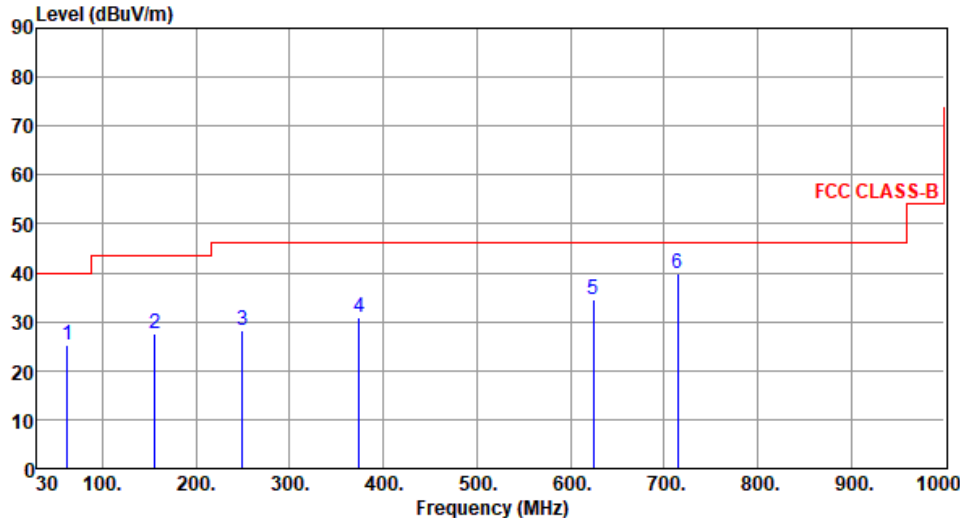


#### Radiated Emissions above 1 GHz



### 3.1.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

|              |                       |              |            |
|--------------|-----------------------|--------------|------------|
| Modulation   | 2.4G 11g + Lora 927.5 | Test Channel | CH6 + CH08 |
| Polarization | Horizontal            |              |            |

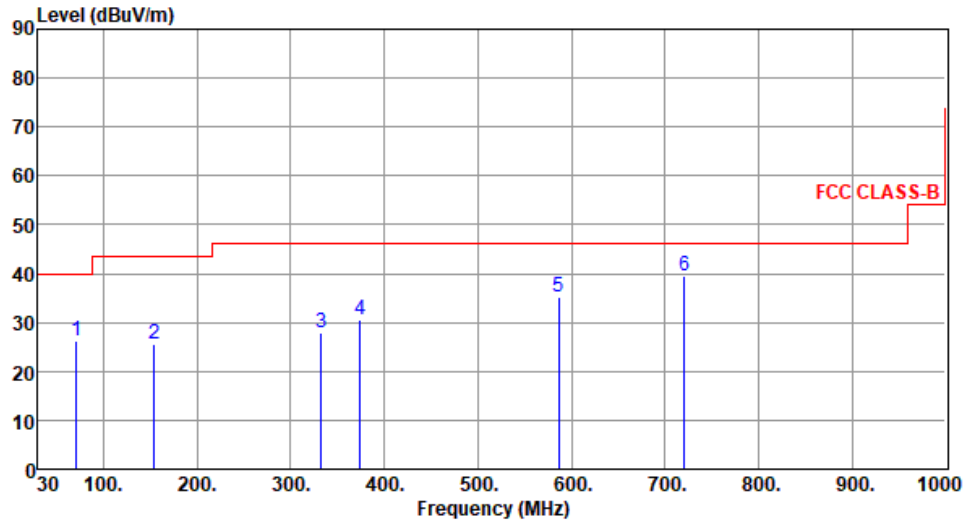
  


The graph displays the radiated unwanted emissions for a transmitter. The y-axis represents the Level in dBuV/m, ranging from 0 to 90. The x-axis represents the Frequency in MHz, ranging from 30 to 1000. A red line indicates the FCC CLASS-B limit, which is 40 dBuV/m from 30 to 100 MHz, 45 dBuV/m from 100 to 1000 MHz, and 55 dBuV/m from 1000 to 10000 MHz. Six measured peaks are shown as blue vertical lines, labeled 1 through 6. The peak levels are approximately 25.35, 27.56, 28.33, 30.88, 34.68, and 39.70 dBuV/m respectively.

|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|--------|-------------------|----------------------|
| 1 | 62.01        | 25.35                       | 40.00           | -14.65       | 34.57                 | -9.22        | Peak   | ---               | ---                  |
| 2 | 156.10       | 27.56                       | 43.50           | -15.94       | 35.90                 | -8.34        | Peak   | ---               | ---                  |
| 3 | 249.22       | 28.33                       | 46.00           | -17.67       | 38.08                 | -9.75        | Peak   | ---               | ---                  |
| 4 | 374.35       | 30.88                       | 46.00           | -15.12       | 36.63                 | -5.75        | Peak   | ---               | ---                  |
| 5 | 624.61       | 34.68                       | 46.00           | -11.32       | 34.33                 | 0.35         | Peak   | ---               | ---                  |
| 6 | 714.82       | 39.70                       | 46.00           | -6.30        | 38.10                 | 1.60         | Peak   | ---               | ---                  |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)  
\*Factor includes antenna factor , cable loss and amplifier gain  
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).  
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

|                     |                       |                     |            |
|---------------------|-----------------------|---------------------|------------|
| <b>Modulation</b>   | 2.4G 11g + Lora 927.5 | <b>Test Channel</b> | CH6 + CH08 |
| <b>Polarization</b> | Vertical              |                     |            |



|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|--------|-------------------|----------------------|
| 1 | 70.74        | 26.35                       | 40.00           | -13.65       | 37.10                 | -10.75       | Peak   | ---               | ---                  |
| 2 | 154.16       | 25.69                       | 43.50           | -17.81       | 34.02                 | -8.33        | Peak   | ---               | ---                  |
| 3 | 332.64       | 27.99                       | 46.00           | -18.01       | 34.84                 | -6.85        | Peak   | ---               | ---                  |
| 4 | 374.35       | 30.63                       | 46.00           | -15.37       | 36.38                 | -5.75        | Peak   | ---               | ---                  |
| 5 | 586.78       | 35.35                       | 46.00           | -10.65       | 35.95                 | -0.60        | Peak   | ---               | ---                  |
| 6 | 720.64       | 39.44                       | 46.00           | -6.56        | 37.77                 | 1.67         | Peak   | ---               | ---                  |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

### 3.1.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

|              |                       |              |            |
|--------------|-----------------------|--------------|------------|
| Modulation   | 2.4G 11g + Lora 927.5 | Test Channel | CH6 + CH08 |
| Polarization | Horizontal            |              |            |

|   | Freq.<br>MHz | Emission<br>level<br>dBUV/m | Limit<br>dBUV/m | Margin<br>dB | SA<br>reading<br>dBUV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 1509.50      | 29.10                       | 54.00           | -24.90       | 32.64                 | -3.54        | Average | 113               | 141                  |
| 2 | 1509.50      | 40.34                       | 74.00           | -33.66       | 43.88                 | -3.54        | Peak    | 113               | 141                  |
| 3 | 3364.50      | 30.30                       | 54.00           | -23.70       | 28.18                 | 2.12         | Average | 100               | 24                   |
| 4 | 3364.50      | 43.10                       | 74.00           | -30.90       | 40.98                 | 2.12         | Peak    | 100               | 24                   |

Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor\* (dB)  
\*Factor includes antenna factor , cable loss and amplifier gain  
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

|              |                       |  |  |  |              |            |  |  |  |
|--------------|-----------------------|--|--|--|--------------|------------|--|--|--|
| Modulation   | 2.4G 11g + Lora 927.5 |  |  |  | Test Channel | CH6 + CH08 |  |  |  |
| Polarization | Vertical              |  |  |  |              |            |  |  |  |

|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 1509.50      | 32.07                       | 54.00           | -21.93       | 35.61                 | -3.54        | Average | 121               | 111                  |
| 2 | 1509.50      | 42.98                       | 74.00           | -31.02       | 46.52                 | -3.54        | Peak    | 121               | 111                  |
| 3 | 3364.50      | 30.38                       | 54.00           | -23.62       | 28.26                 | 2.12         | Average | 100               | 14                   |
| 4 | 3364.50      | 42.96                       | 74.00           | -31.04       | 40.84                 | 2.12         | Peak    | 100               | 14                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)  
\*Factor includes antenna factor , cable loss and amplifier gain  
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

## 4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

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==END==