

# TEST REPORT

**Product Name** : RFID Reader Module  
**Model Number** : EC-UHF-A-2, EC-UHF-A, EC-UHF-B,  
EC-UHF-B-2  
**FCC ID** : 2A83H-ECUHFA2

**Prepared for** : EC-LINK AUTOMATION(SHENZHEN) CO., LTD.  
**Address** : Room 2206, Block B, Shixia Xintian Century Business Center,  
Futian District

**Prepared by** : EMTEK (SHENZHEN) CO., LTD.  
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**Report Number** : ENS2304120145W00201R  
**Date(s) of Tests** : April 4, 2023 to May 15, 2023  
**Date of issue** : May 16, 2023

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## 1 TEST RESULT CERTIFICATION

|                      |                                                                             |
|----------------------|-----------------------------------------------------------------------------|
| Applicant:           | EC-LINK AUTOMATION(SHENZHEN) CO., LTD.                                      |
| Address:             | Room 2206, Block B, Shixia Xintian Century Business Center, Futian District |
| Manufacturer:        | EC-LINK AUTOMATION(SHENZHEN) CO., LTD.                                      |
| Address:             | Room 2206, Block B, Shixia Xintian Century Business Center, Futian District |
| Product Description: | RFID Controller                                                             |
| Model Number:        | EC-UHF-A-2, EC-UHF-A, EC-UHF-B, EC-UHF-B-2                                  |
| Trademark:           | N/A                                                                         |

Measurement Procedure Used:

| APPLICABLE STANDARDS                                          |             |
|---------------------------------------------------------------|-------------|
| STANDARD                                                      | TEST RESULT |
| FCC 47 CFR Part 2, Subpart J<br>FCC 47 CFR Part 15, Subpart C | PASS        |

The above equipment was tested by EMTEK(SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2 and Part 15.247

The test results of this report relate only to the tested sample identified in this report

Date of Test : April 4, 2023 to May 15, 2023

Prepared by :   
Luo peiye/Editor

Reviewer :   
Joe Xia/Supervisor

Approved & Authorized Signer :   
Lisa Wang/Manager

## 2 EUT TECHNICAL DESCRIPTION

| Characteristics              | Description                                                                                                                                                                                                                                  |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product :</b>             | RFID Reader Module                                                                                                                                                                                                                           |
| <b>Model Number :</b>        | EC-UHF-A-2, EC-UHF-A, EC-UHF-B, EC-UHF-B-2<br>(Note: All models are only different for software and communication protocols, which not affect the power, the other are the same. The main test model applied for this report is EC-UHF-A-2.) |
| <b>Modulation:</b>           | ASK                                                                                                                                                                                                                                          |
| <b>Operating Frequency :</b> | 902.75MHz~927.25MHz                                                                                                                                                                                                                          |
| <b>Number of Channels:</b>   | 50                                                                                                                                                                                                                                           |
| <b>Transmit Power Max:</b>   | 15.60 dBm                                                                                                                                                                                                                                    |
| <b>Antenna Type :</b>        | External Antenna                                                                                                                                                                                                                             |
| <b>Antenna Gain:</b>         | -28.41dBi                                                                                                                                                                                                                                    |
| <b>Power supply:</b>         | Modular power supply. Support 3.6 -5.5 V powers                                                                                                                                                                                              |
| <b>Testing Voltage:</b>      | DC 5V Power Supply                                                                                                                                                                                                                           |
| <b>Date of Received:</b>     | April 4, 2023                                                                                                                                                                                                                                |
| <b>Temperature Range:</b>    | -25°C ~ +70°C                                                                                                                                                                                                                                |

**Note:** for more details, please refer to the User's manual of the EUT.

### 3 SUMMARY OF TEST RESULT

| FCC Part Clause            | Test Parameter                         | Verdict | Remark |
|----------------------------|----------------------------------------|---------|--------|
| 15.247(a)(1)               | 20 dB Bandwidth                        | PASS    |        |
| 15.247(a)(1)               | Carrier Frequency Separation           | PASS    |        |
| 15.247(a)(1)               | Number of Hopping Frequencies          | PASS    |        |
| 15.247(a)(1)               | Average Time of Occupancy (Dwell Time) | PASS    |        |
| 15.247(b)(1)               | Maximum Peak Conducted Output Power    | PASS    |        |
| 15.247(d)                  | Conducted Spurious Emissions           | PASS    |        |
| 15.247(d)<br>15.209        | Radiated Spurious Emissions            | PASS    |        |
| 15.207                     | Conducted Emission                     | PASS    |        |
| 15.203                     | Antenna Application                    | PASS    |        |
| NOTE: N/A (Not Applicable) |                                        |         |        |

#### RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID:2A83H-ECUHFA2 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

## 4 TEST METHODOLOGY

### 4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 47 CFR Part 2, Subpart J

FCC 47 CFR Part 15, Subpart C

KDB 558074: D01 15.247 Meas Guidance v05r02

### 4.2 MEASUREMENT EQUIPMENT USED

#### Conducted Emission Test Equipment

| Equipment         | Manufacturer    | Model No. | Serial No. | Last Cal. | Cal. Interval |
|-------------------|-----------------|-----------|------------|-----------|---------------|
| EMI Test Receiver | Rohde & Schwarz | ESCI      | 101384     | 2023/5/13 | 1Year         |
| AMN               | Rohde & Schwarz | ENV216    | 101161     | 2023/5/13 | 1Year         |
| AMN               | Kyoritsu        | KNW-407   | 8-1492-9   | 2023/5/11 | 1Year         |

#### For Spurious Emissions Test:

| Equipment                | Manufacturer    | Model No.                | Serial No.         | Last Cal.  | Cal. Interval |
|--------------------------|-----------------|--------------------------|--------------------|------------|---------------|
| Pre-Amplifier            | Bonn            | BLMA 011001N             | 2213967A           | 2022/10/31 | 1Year         |
| EMI Test Receiver        | Rohde & Schwarz | ESR7                     | 102551             | 2022/10/31 | 1Year         |
| Bilog Antenna            | Schwarzbeck     | VULB9163                 | 9163142            | 2022/7/24  | 2 Year        |
| Horn antenna             | Schwarzbeck     | BBHA9120D                | 9120D-1198         | 2021/6/15  | 2 Year        |
| Pre-Amplifier            | Bonn            | BLMA 0118-5G             | 2213967B-01        | 2022/10/31 | 1Year         |
| Spectrum Analyzer        | Rohde & Schwarz | FSV3044                  | 101290             | 2022/10/31 | 1Year         |
| Horn antenna             | Schwarzbeck     | BBHA9170                 | 9170-399           | 2023/5/12  | 2 Year        |
| Pre-Amplifier            | Lunar EM        | LNA18G26-40              | J101213101000<br>1 | 2023/5/10  | 2 Year        |
| Pre-Amplifier            | Lunar EM        | LNA26G40-40              | J101313102800<br>1 | 2023/5/10  | 1 Year        |
| Loop Antenna             | Schwarzbeck     | FMZB1519                 | 1519-012           | 2023/5/12  | 1 Year        |
| Band reject Filter(50dB) | WI/DE           | WRCGV-2400(2400-2485MHz) | 2                  | 2023/5/10  | 1 Year        |

#### For Other Test Items:

| Equipment                    | Manufacturer | Model No.      | Serial No. | Last Cal. | Cal. Interval |
|------------------------------|--------------|----------------|------------|-----------|---------------|
| Signal Analyzer              | Agilent      | N9010A         | MY53470879 | 2023/5/10 | 1Year         |
| Vector Signal Generater      | Agilent      | N5182B         | MY53050878 | 2023/5/10 | 1Year         |
| Analog Signal Generator      | Agilent      | N5171B         | MY53050553 | 2023/5/10 | 1Year         |
| Power Meter                  | Agilent      | PS-X10-100     | \          | 2023/5/13 | 1Year         |
| Switchgroup                  | THEDA        | ETF-025(VASC6) | TW5451008  | N/A       | 1Year         |
| MIMO Matrix Switch           | THEDA        | 4P5TM18        | TW5451009  | N/A       | N/A           |
| Temperature&Humidity Chamber | ESPEC        | EL-02KA        | 12107166   | 2023/5/10 | N/A           |

### 4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those channels (902.75MHz, 915.25MHz, 927.25MHz) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list for the EUT:

| Channel                                                                                               | Frequency (MHz) | Channel   | Frequency (MHz) | Channel   | Frequency (MHz) |
|-------------------------------------------------------------------------------------------------------|-----------------|-----------|-----------------|-----------|-----------------|
| <b>1</b>                                                                                              | <b>902.75</b>   | 24        | 914.25          | 47        | 925.75          |
| 2                                                                                                     | 903.25          | 25        | 914.75          | 48        | 926.25          |
| 3                                                                                                     | 903.75          | <b>26</b> | <b>915.25</b>   | 49        | 926.75          |
| ...                                                                                                   | ...             | ...       | ...             | <b>50</b> | <b>927.25</b>   |
| Note: $f_c = 902.75\text{MHz} + k \times 0.5\text{MHz}$ $k(\text{Channel Number}) = 1 \text{ to } 50$ |                 |           |                 |           |                 |

Test Frequency and channel for the EUT:

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 01               | 902.75          | 26               | 915.25          | 50                | 927.25          |

## 5 FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

Building 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

### 5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab.

: **Accredited by CNAS**

The Certificate Registration Number is L2291.

The Laboratory has been assessed and proved to be in compliance with CNAS-CL01 (identical to ISO/IEC 17025:2017)

**Accredited by FCC**

Designation Number: CN1204

Test Firm Registration Number: 882943

**Accredited by A2LA**

The Certificate Number is 4321.01.

**Accredited by Industry Canada**

The Conformity Assessment Body Identifier is CN0008

Name of Firm

: EMTEK (SHENZHEN) CO., LTD.

Site Location

: Building 69, Majialong Industry Zone,  
Nanshan District, Shenzhen, Guangdong, China

## 6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Parameter                      | Uncertainty             |
|--------------------------------|-------------------------|
| Radio Frequency                | $\pm 1 \times 10^{-5}$  |
| Maximum Peak Output Power Test | $\pm 1.0\text{dB}$      |
| Conducted Emissions Test       | $\pm 2.0\text{dB}$      |
| Radiated Emission Test         | $\pm 2.0\text{dB}$      |
| Occupied Bandwidth Test        | $\pm 1.0\text{dB}$      |
| Band Edge Test                 | $\pm 3\text{dB}$        |
| All emission, radiated         | $\pm 3\text{dB}$        |
| Antenna Port Emission          | $\pm 3\text{dB}$        |
| Temperature                    | $\pm 0.5^\circ\text{C}$ |
| Humidity                       | $\pm 3\%$               |

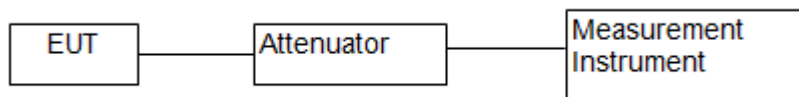
Measurement Uncertainty for a level of Confidence of 95%



## 7 SETUP OF EQUIPMENT UNDER TEST

### 7.1 RADIO FREQUENCY TEST SETUP 1

The RFID component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



### 7.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

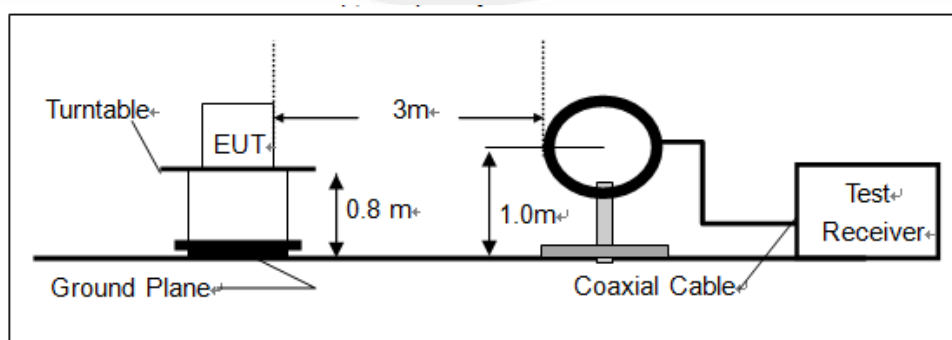
Above 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

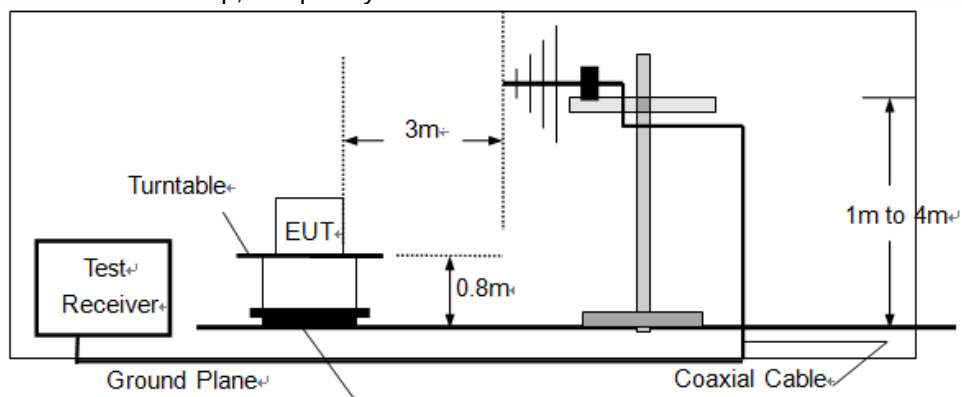
Above 1GHz:

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

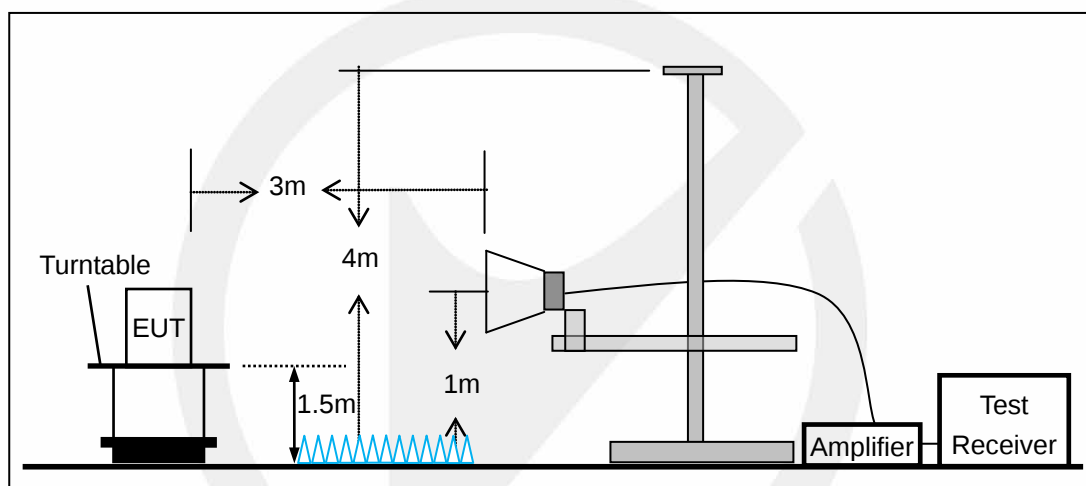
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz

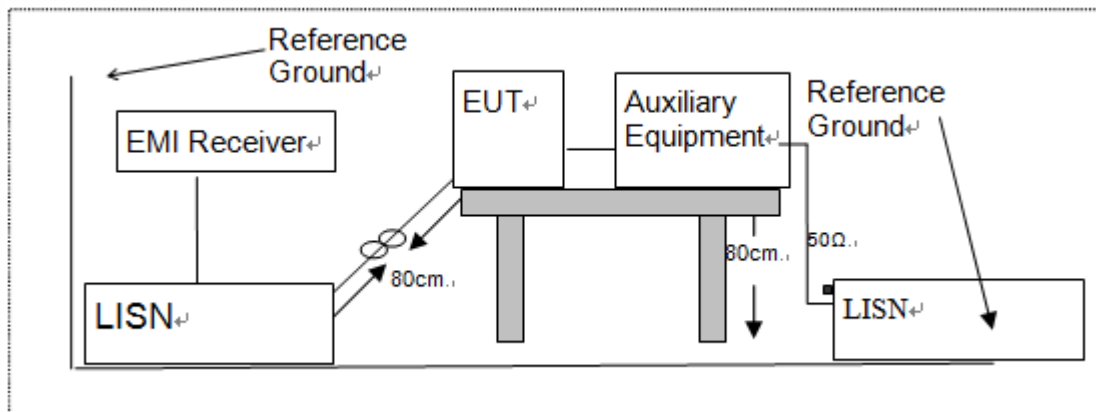


(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

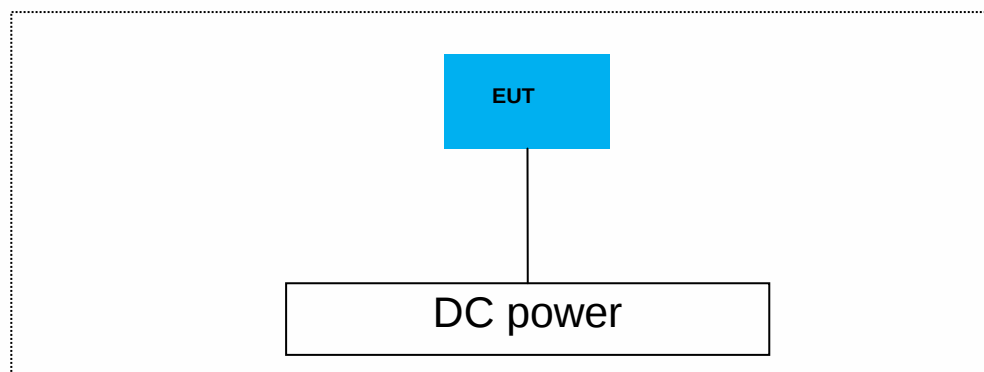


The mains cable of the EUT (UHF RFID Reader Module) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



#### 7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



#### 7.5 SUPPORT EQUIPMENT

| EUT Cable List and Details |            |                     |                        |
|----------------------------|------------|---------------------|------------------------|
| Cable Description          | Length (m) | Shielded/Unshielded | With / Without Ferrite |
| /                          | /          | /                   | /                      |

| Auxiliary Cable List and Details |            |                     |                        |
|----------------------------------|------------|---------------------|------------------------|
| Cable Description                | Length (m) | Shielded/Unshielded | With / Without Ferrite |
| /                                | /          | /                   | /                      |

| Auxiliary Equipment List and Details |              |       |               |
|--------------------------------------|--------------|-------|---------------|
| Description                          | Manufacturer | Model | Serial Number |
| /                                    | /            | /     | /             |

##### Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

## 8 TEST REQUIREMENTS

### 8.1 20DB BANDWIDTH

#### 8.1.1 Applicable Standard

According to FCC Part 15.247(a)(1) and KDB 558074: D01 15.247 Meas Guidance v05r02

#### 8.1.2 Conformance Limit

No limit requirement.

#### 8.1.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

#### 8.1.4 Test Procedure

The EUT was operating in RFID mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW  $\geq 1\%$  of the 20 dB bandwidth(3KHz)

Set the video bandwidth (VBW)  $\geq$  RBW(10KHz).

Set Span= approximately 2 to 3 times the 20 dB bandwidth

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the markerdelta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

Measure and record the results in the test report.

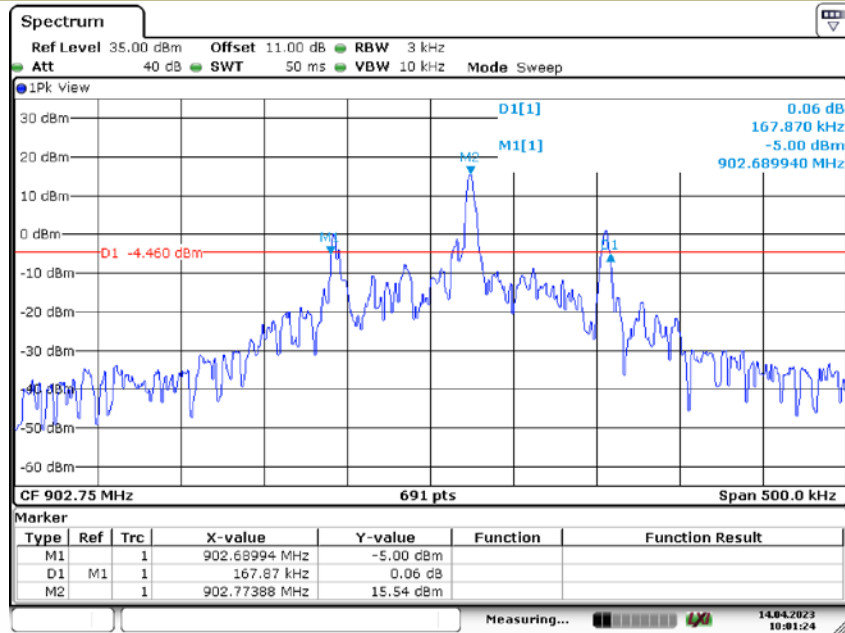
#### Test Results

|                    |           |
|--------------------|-----------|
| Temperature:       | 26° C     |
| Relative Humidity: | 54%       |
| ATM Pressure:      | 1011 mbar |

| Modulation Mode | Channel Number | Channel Frequency (MHz) | Measurement Bandwidth (kHz) | Limit (kHz) | Verdict |
|-----------------|----------------|-------------------------|-----------------------------|-------------|---------|
| ASK             | 01             | 902.75                  | 167.87                      | $\leq 250$  | PASS    |
|                 | 26             | 915.25                  | 167.87                      | $\leq 250$  | PASS    |
|                 | 50             | 927.25                  | 167.15                      | $\leq 250$  | PASS    |

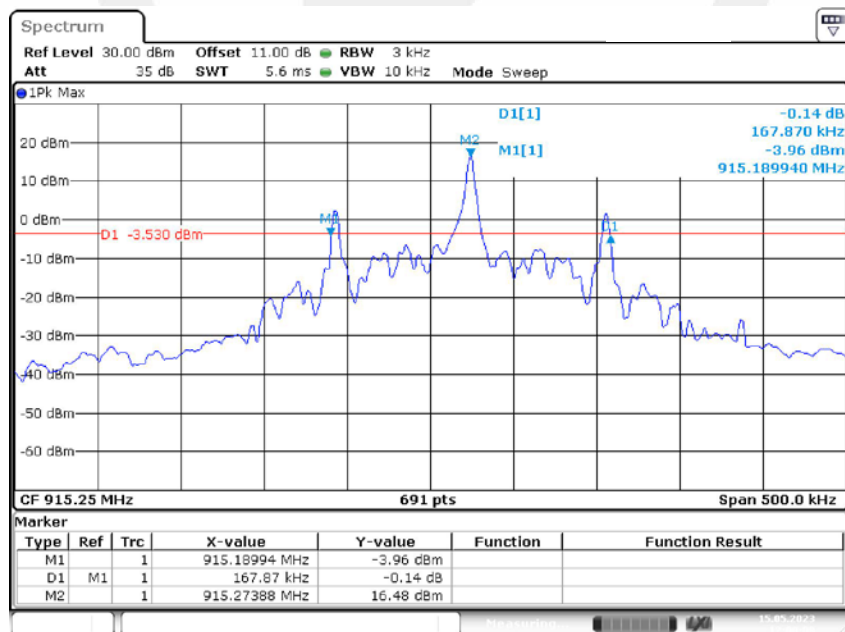
Note: N/A (Not Applicable).

Test Model 20dB Bandwidth  
RFID  
Channel 1: 902.75MHz



Date: 14 APR 2023 10:01:24

Test Model 20dB Bandwidth  
RFID  
Channel 26: 915.25MHz



Date: 15 MAY 2023 12:00:08

Test Model

20dB Bandwidth  
RFID  
Channel 50: 927.25MHz



Date: 15 MAY.2023 11:58:09

## 8.2 CARRIER FREQUENCY SEPARATION

### 8.2.1 Applicable Standard

According to FCC Part 15.247(a)(1) and KDB 558074: D01 15.247 Meas Guidance v05r02

### 8.2.2 Conformance Limit

Frequency hopping systems operating in the 902-928MHz band shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. In case of an output power less than 125mW, the frequency hopping system may have channels separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

### 8.2.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

### 8.2.4 Test Procedure

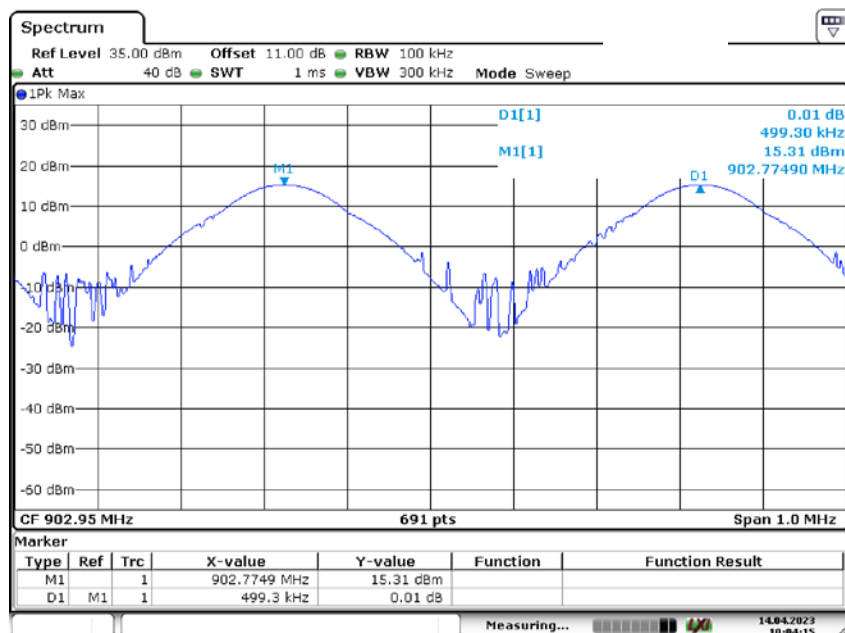
■ According to FCC Part 15.247(a)(1)  
The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:  
Set the RBW  $\geq 1\%$  of the span (100kHz).  
Set the VBW  $\geq$  RBW (300kHz).  
Set the span = wide enough to capture the peaks of two adjacent channels  
Set Sweep time = auto couple.  
Set Detector = peak.  
Set Trace mode = max hold.  
Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

### Test Results

|                    |           |
|--------------------|-----------|
| Temperature:       | 26° C     |
| Relative Humidity: | 54%       |
| ATM Pressure:      | 1011 mbar |

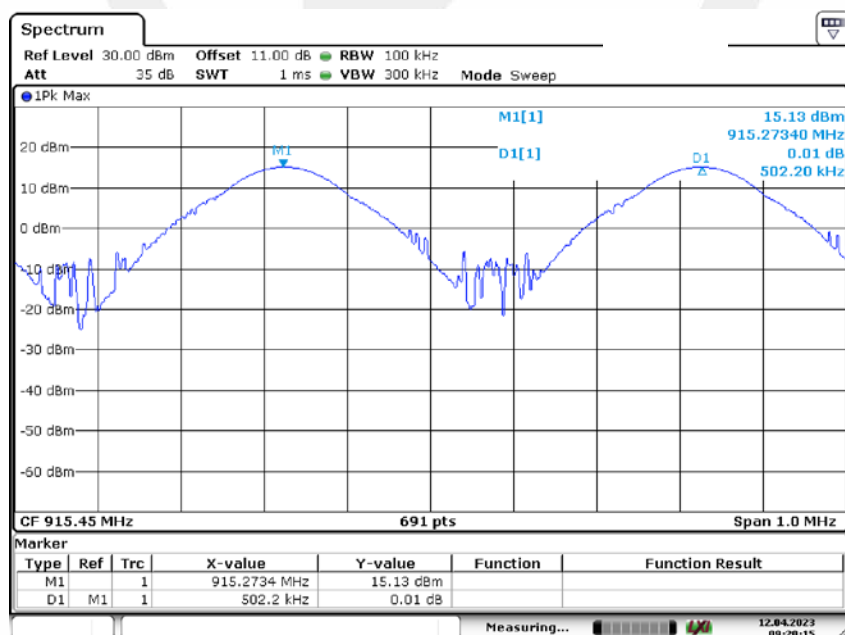
| Modulation Mode               | Channel Number | Channel Frequency (MHz) | Measurement Bandwidth (kHz) | Limit (kHz) | Verdict |
|-------------------------------|----------------|-------------------------|-----------------------------|-------------|---------|
| ASK                           | 01             | 902.75                  | 494.90                      | >167.87     | PASS    |
|                               | 26             | 915.25                  | 502.20                      | >167.15     | PASS    |
|                               | 50             | 927.25                  | 497.80                      | >167.87     | PASS    |
| Note: Limit = 20dB bandwidth. |                |                         |                             |             |         |

Test Model Carrier Frequency Separation  
RFID  
Channel 1: 902.75MHz



Date: 14 APR 2023 10:04:14

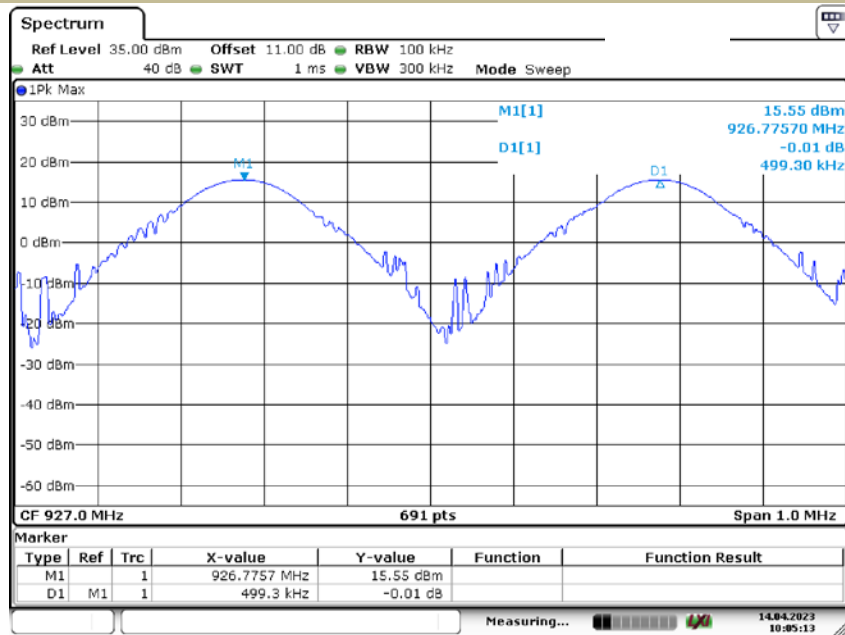
Test Model Carrier Frequency Separation  
RFID  
Channel 26: 915.25MHz



Date: 12 APR 2023 09:20:15

Test Model

Carrier Frequency Separation  
RFID  
Channel 50: 927.25MHz



Date: 14 APR 2023 10:05:13

### 8.3 NUMBER OF HOPPING FREQUENCIES

#### 8.3.1 Applicable Standard

According to FCC Part 15.247(a)(1) (i) and KDB 558074: D01 15.247 Meas Guidance v05r02

#### 8.3.2 Conformance Limit

Frequency hopping systems operating in the 902-928MHz band shall use at least 50 channels.

#### 8.3.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

#### 8.3.4 Test Procedure

■ According to FCC Part 15.247(a)(1)(iii)

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW  $\geq$  1% of the span (100KHz).

VBW  $\geq$  RBW (300KHz).

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies.

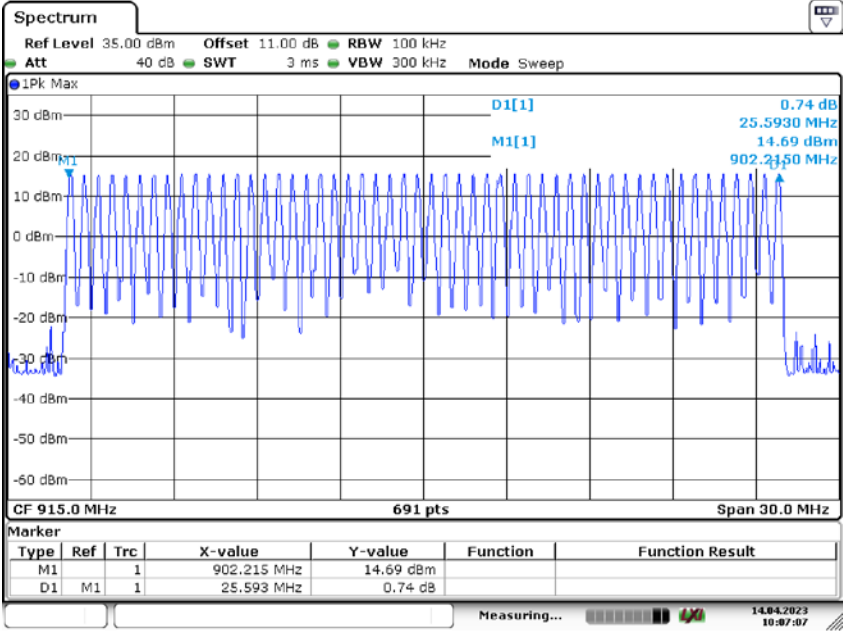
#### Test Results

|                    |           |
|--------------------|-----------|
| Temperature:       | 26° C     |
| Relative Humidity: | 54%       |
| ATM Pressure:      | 1011 mbar |

| Hopping Channel Frequency Range | Quantity of Hopping Channel | Quantity of Hopping Channel limit |
|---------------------------------|-----------------------------|-----------------------------------|
| 902-928                         | 50                          | $\geq 50$                         |

Test Model

Number Of Hopping Frequencies  
RFID



Date: 14 APR 2023 10:07:07



## 8.4 AVERAGE TIME OF OCCUPANCY (DWELL TIME)

### 8.4.1 Applicable Standard

According to FCC Part 15.247(a)(1)(i) and KDB 558074: D01 15.247 Meas Guidance v05r02

### 8.4.2 Conformance Limit

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz..

### 8.4.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

### 8.4.4 Test Procedure

#### ■ According to FCC Part 15.247(a)(1)(iii)

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = zero span, centered on a hopping channel

RBW = 100 KHz

VBW ≥ RBW

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

Trace = max hold

If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section.

### 8.4.5 Test Results

#### PASS.

All modes (low, mid, high channels) were tested, the data of the worst mode are described in the following pages.

|                    |           |
|--------------------|-----------|
| Temperature:       | 26° C     |
| Relative Humidity: | 54%       |
| ATM Pressure:      | 1011 mbar |

| Modulation Mode | Frequency (MHz) | occupied time for each channel | dwell time (ms) | Limit(ms) | Verdict |
|-----------------|-----------------|--------------------------------|-----------------|-----------|---------|
| ASK             | 915.25          | 3.170 ms                       | 31.70 ms        | <400      | PASS    |

Note:

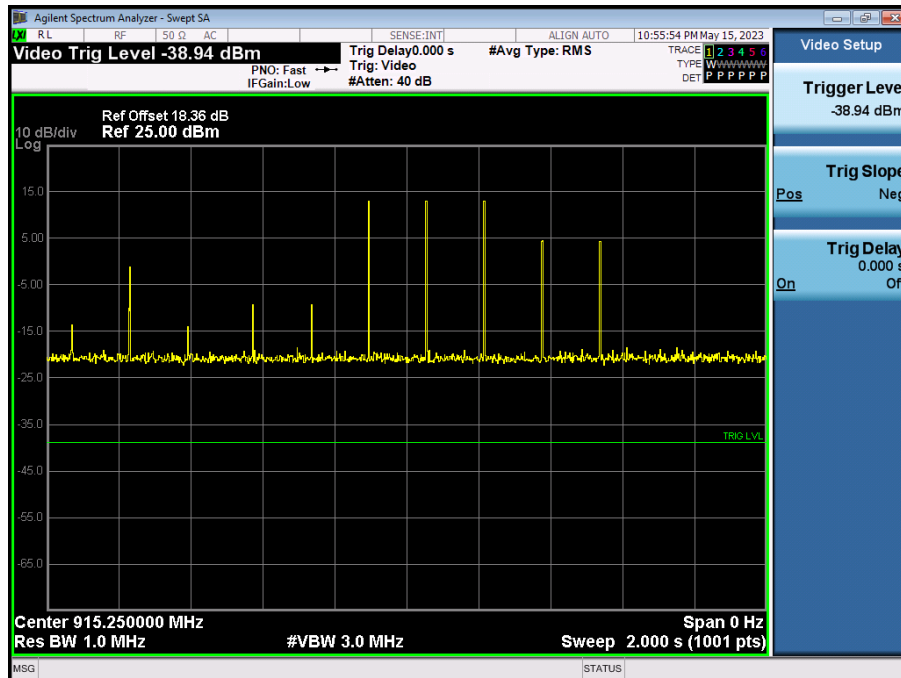
occupied time for each channel

3.170ms

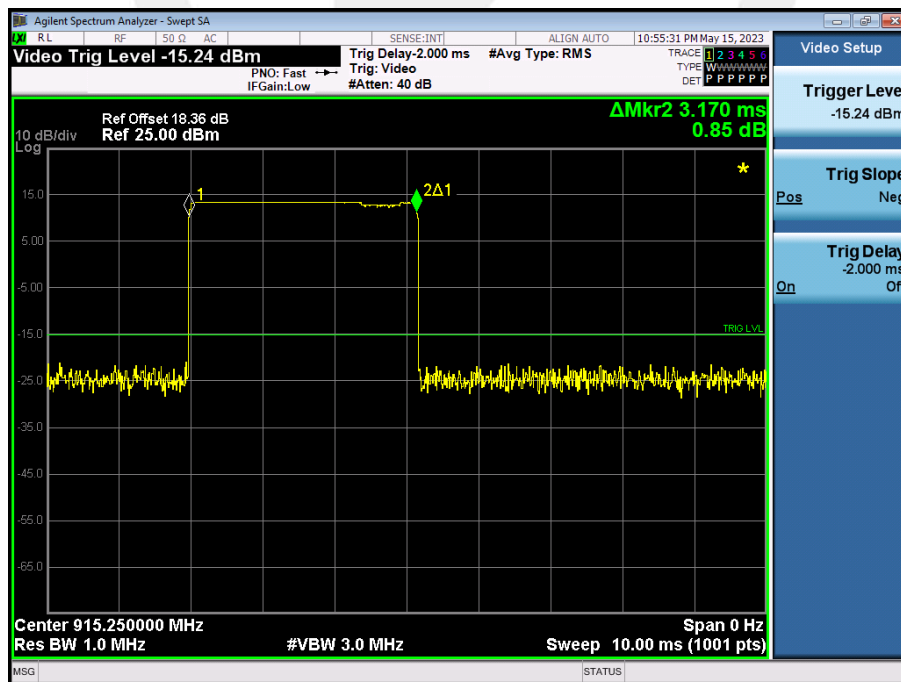
Dwell time per 20 seconds

3.170\*10=31.70 ms

|                  |                                               |
|------------------|-----------------------------------------------|
| Test Model       | Average Time Of Occupancy (Dwell Time)        |
|                  | RFID                                          |
| CH 26: 915.25MHz | The number of occupied channels per 2 seconds |



|                  |                                        |
|------------------|----------------------------------------|
| Test Model       | Average Time Of Occupancy (Dwell Time) |
|                  | RFID                                   |
| CH 26: 915.25MHz | occupied time for each channel         |



## 8.5 MAXIMUM PEAK CONDUCTED OUTPUT POWER

### 8.5.1 Applicable Standard

According to FCC Part 15.247(b)(1) and KDB 558074: D01 15.247 Meas Guidance v05r02

### 8.5.2 Conformance Limit

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

### 8.5.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

### 8.5.4 Test Procedure

#### ■ According to FCC Part 15.247(b)(1)

As an alternative to a peak power measurement, compliance with the limit can be based on a measurement of the maximum conducted output power.

Use the following spectrum analyzer settings:

Set Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel (about 10MHz)

Set RBW > the 20 dB bandwidth of the emission being measured (about 1MHz)

Set VBW  $\geq$  RBW

Set Sweep = auto

Set Detector function = peak

Set Trace = max hold

Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission to determine the peak amplitude level.

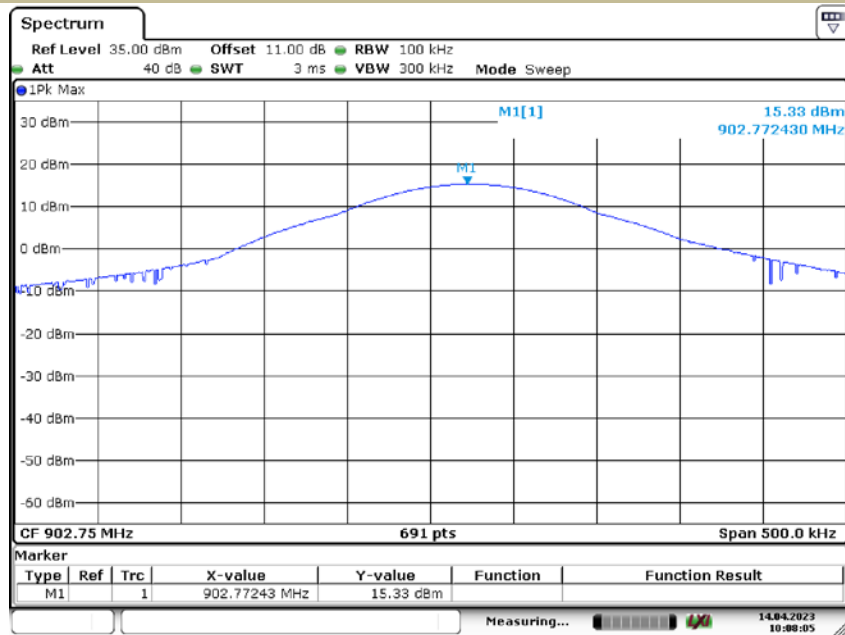
### Test Results

|                    |           |
|--------------------|-----------|
| Temperature:       | 26° C     |
| Relative Humidity: | 54%       |
| ATM Pressure:      | 1011 mbar |

| Operation Mode | Channel Number | Channel Frequency (MHz) | Measurement Level (dBm) | Limit (dBm) | Verdict |
|----------------|----------------|-------------------------|-------------------------|-------------|---------|
| ASK            | 01             | 902.75                  | 15.33                   | 27          | PASS    |
|                | 26             | 915.25                  | 15.50                   | 27          | PASS    |
|                | 50             | 927.25                  | 15.60                   | 27          | PASS    |
| Note: N/A      |                |                         |                         |             |         |

Test Model

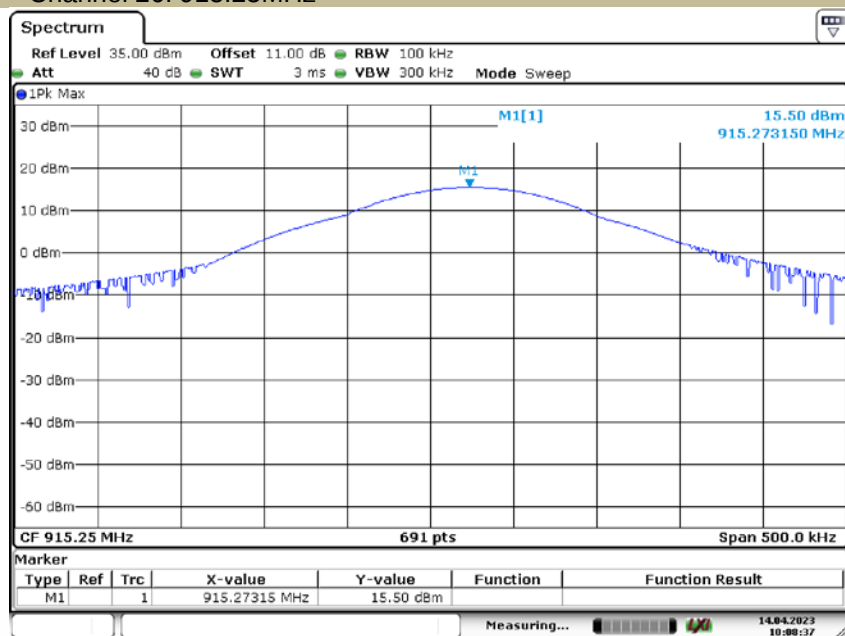
Maximum Peak Conducted Output Power  
RFID  
Channel 01: 902.75MHz



Date: 14 APR 2023 10:08:04

Test Model

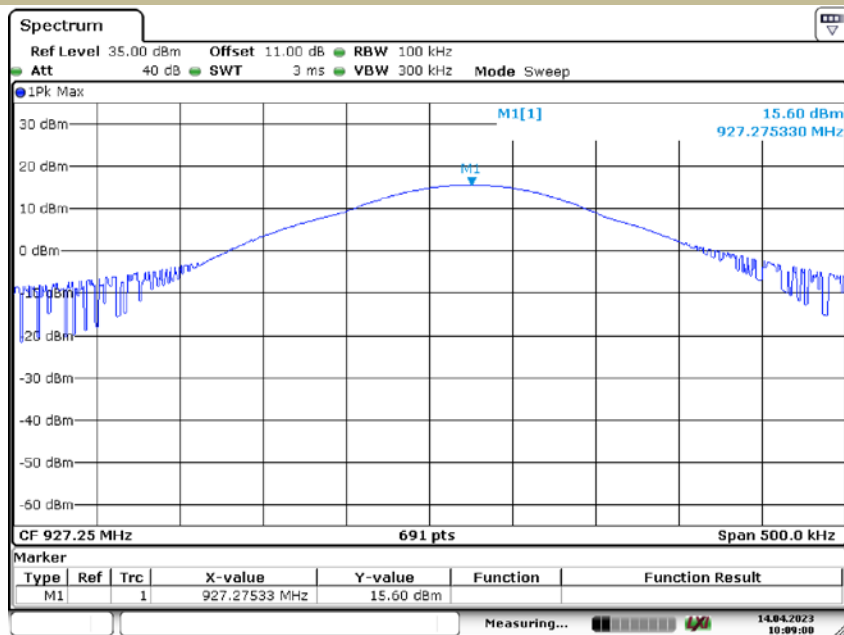
Maximum Peak Conducted Output Power  
RFID  
Channel 26: 915.25MHz



Date: 14 APR 2023 10:08:38

Test Model

Maximum Peak Conducted Output Power  
RFID  
Channel 50: 927.25MHz



Date: 14 APR 2023 10:08:59

## 8.6 CONDUCTED SUPRIIOUS EMISSION

### 8.6.1 Applicable Standard

According to FCC Part 15.247(d) and KDB 558074: D01 15.247 Meas Guidance v05r02

### 8.6.2 Conformance Limit

According to FCC Part 15.247(d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted, provided the transmitter demonstrates compliance with the peak conducted power limits.

### 8.6.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

### 8.6.4 Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer

#### ■ Reference level measurement

Establish a reference level by using the following procedure:

Set instrument center frequency to DSS channel center frequency.

Set Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel.

Set the RBW = 100 kHz. Set the VBW  $\geq 3 \times$  RBW.

Set Detector = peak. Set Sweep time = auto couple.

Set Trace mode = max hold. Allow trace to fully stabilize.

Use the peak marker function to determine the maximum Maximum conduceted level.

Note that the channel found to contain the maximum conduceted level can be used to establish the reference level.

#### ■ Band-edge Compliance of RF Conducted Emissions

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation

Set RBW  $\geq 1\%$  of the span=100kHz Set VBW  $\geq$  RBW

Set Sweep = auto Set Detector function = peak Set Trace = max hold

Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-delta value now displayed must comply with the limit specified in this Section.

Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

#### ■ Conduceted Spurious RF Conducted Emission

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic.(30MHz to 25GHz).Set RBW = 100 kHzSet VBW  $\geq$  RBW

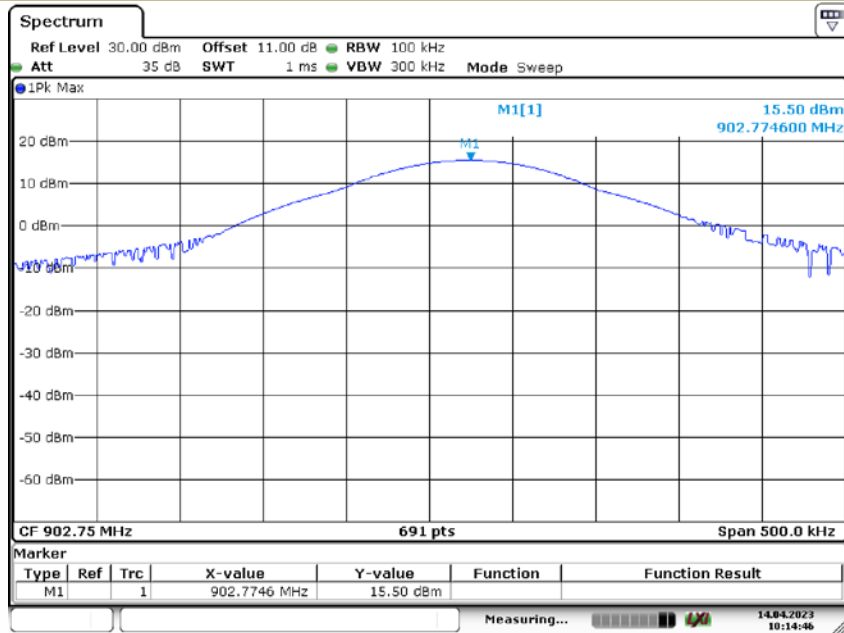
Set Sweep = autoSet Detector function = peakSet Trace = max hold

Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this Section.

### 8.6.5 Test Results

Test Model

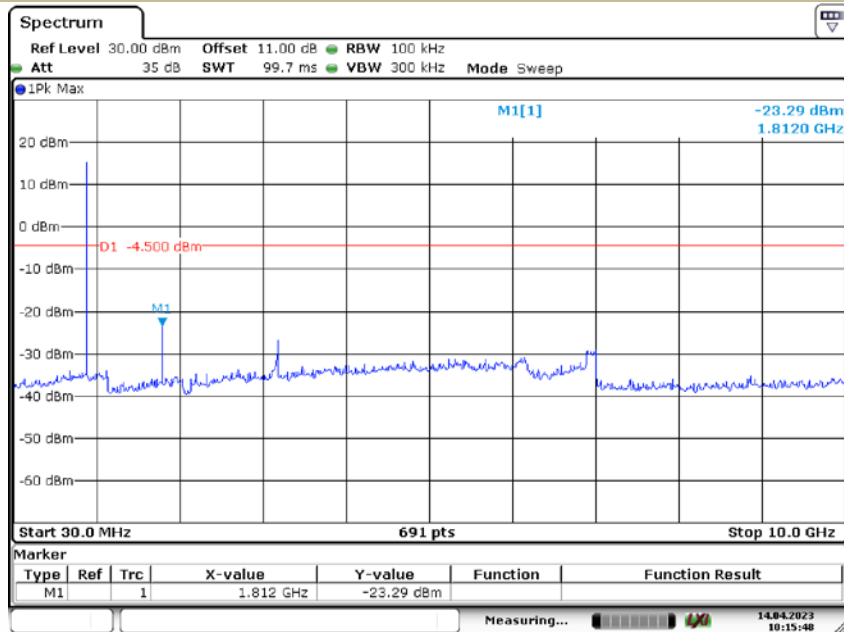
Maximum Conduceted Level RBW=100kHz  
RFID  
Channel 01: 902.75MHz



Date: 14 APR 2023 10:14:46

Test Model

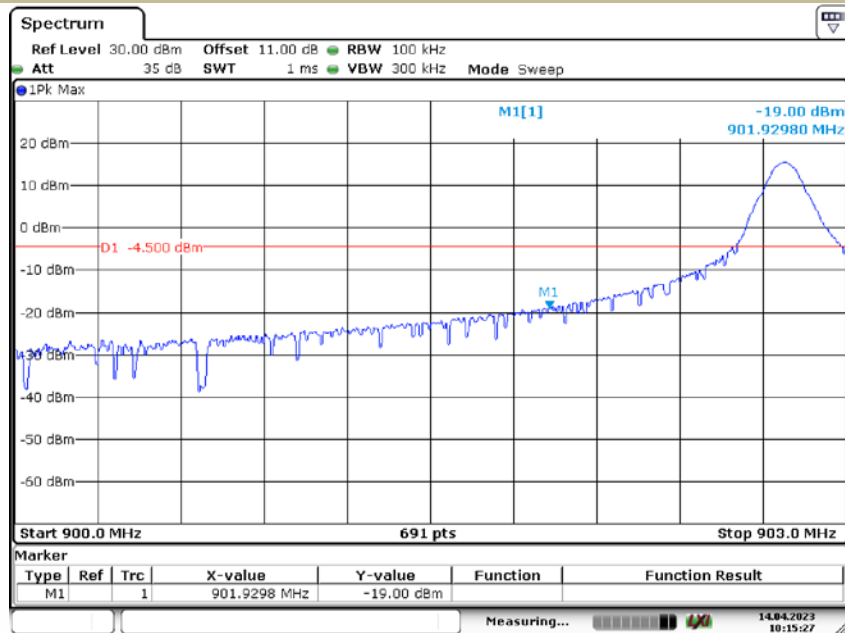
Conduceted Spurious RF Conducted Emission  
RFID  
Channel 01: 902.75MHz



Date: 14 APR 2023 10:15:48

Test Model

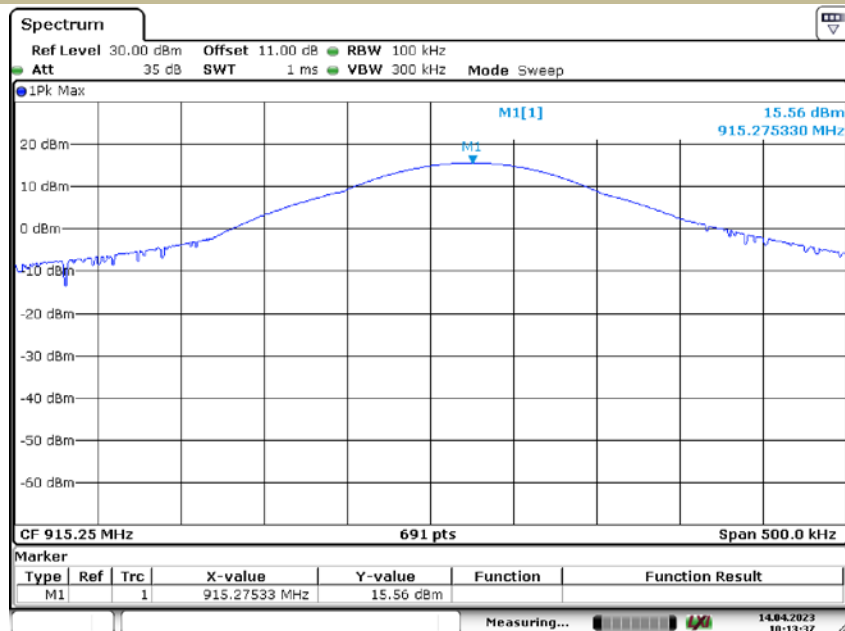
Band-edge Conducted Emissions  
RFID  
Channel 01: 902.75MHz



Date: 14 APR 2023 10:15:27

Test Model

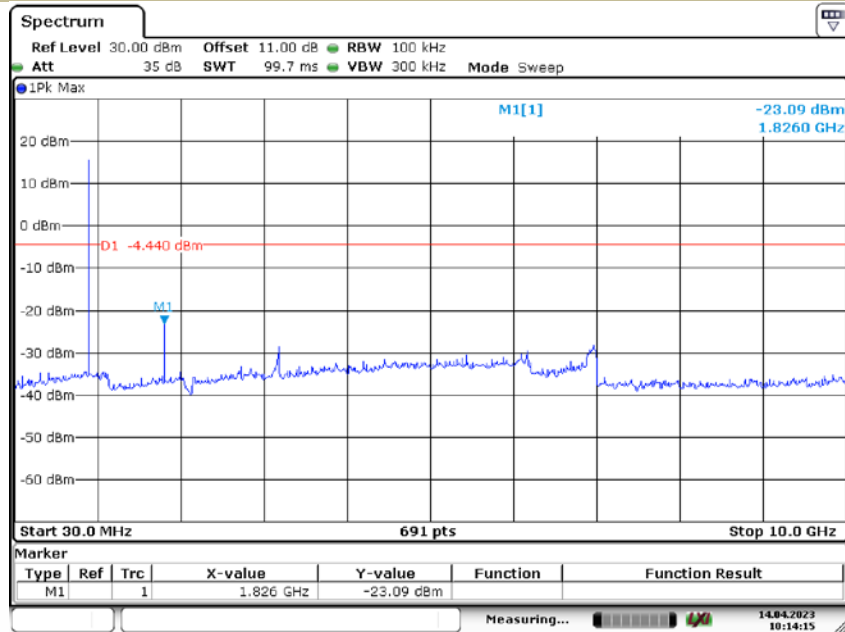
Maximum Conducted Level RBW=100kHz  
RFID  
Channel 26: 915.25MHz



Date: 14 APR 2023 10:13:37

Test Model

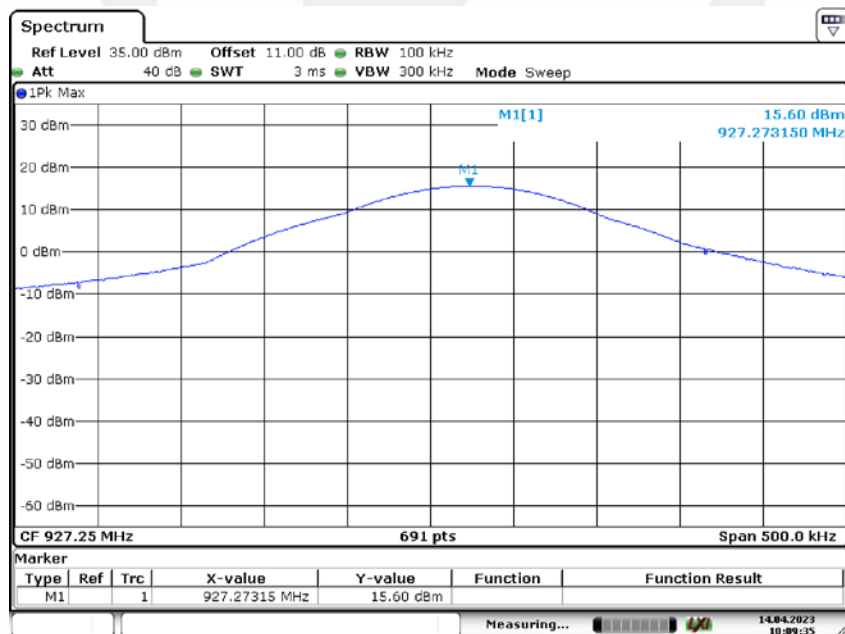
Conduceted Spurious RF Conducted Emission  
RFID  
Channel 26: 915.25MHz



Date: 14 APR 2023 10:14:15

Test Model

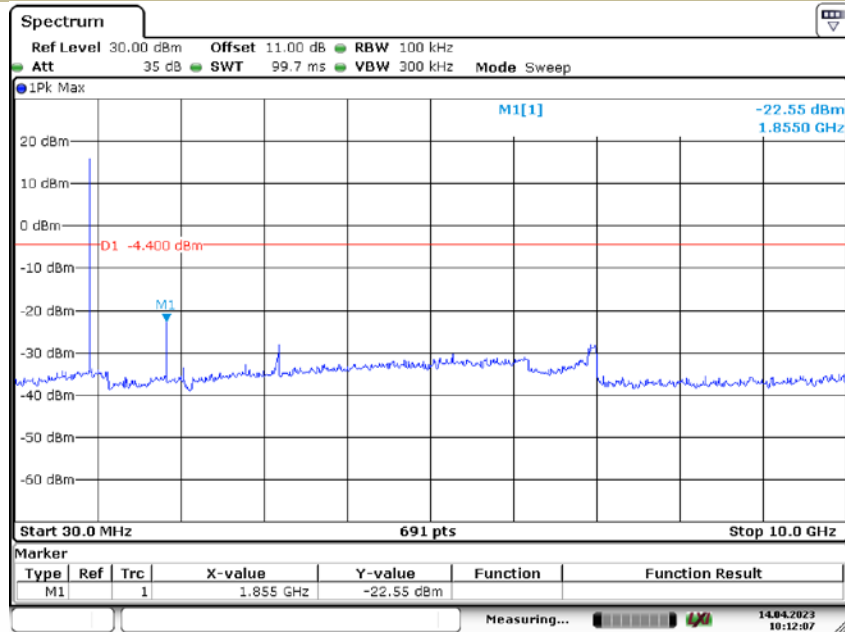
Maximum Conduceted Level RBW=100kHz  
RFID  
Channel 50: 927.25MHz



Date: 14 APR 2023 10:09:35

Test Model

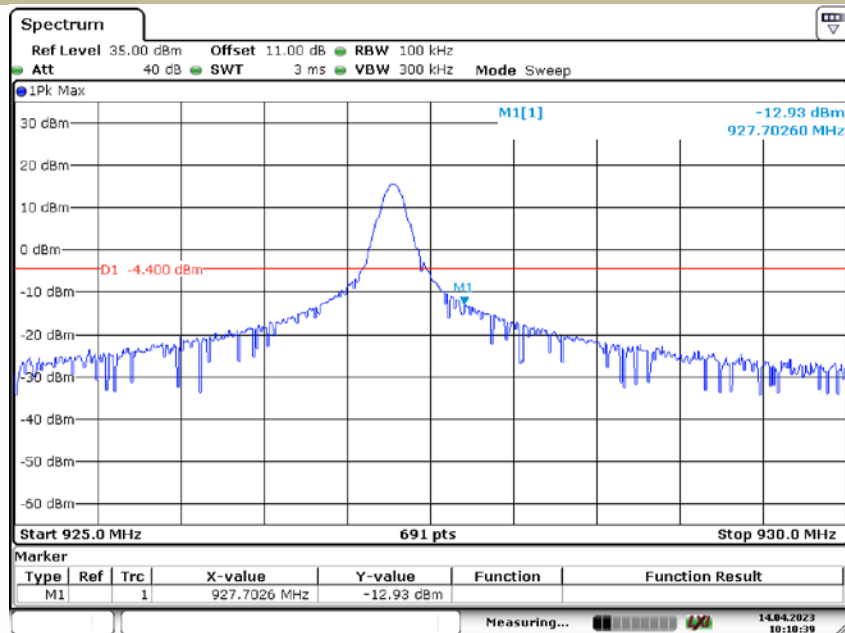
Conducted Spurious RF Conducted Emission  
RFID  
Channel 50: 927.25MHz



Date: 14 APR 2023 10:12:08

Test Model

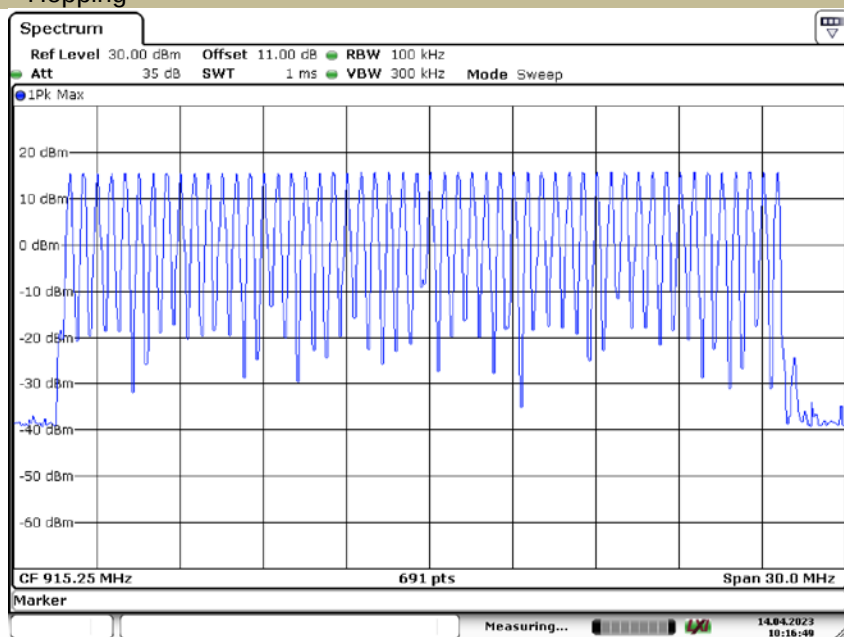
Band-edge Conducted Emissions  
RFID  
Channel 50: 927.25MHz



Date: 14 APR 2023 10:10:39

Test Model

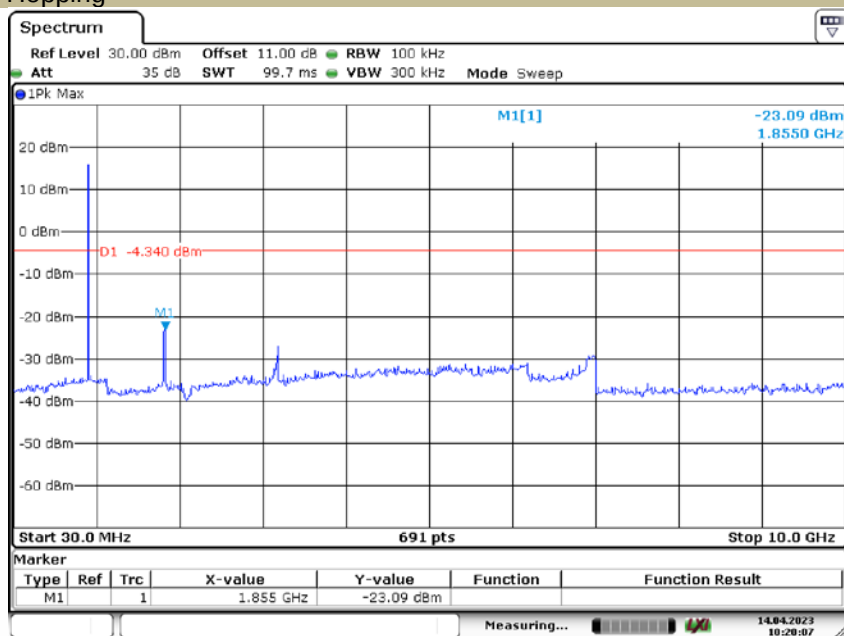
Maximum Conducted Level RBW=100kHz  
RFID  
Hopping



Date: 14 APR 2023 10:16:49

Test Model

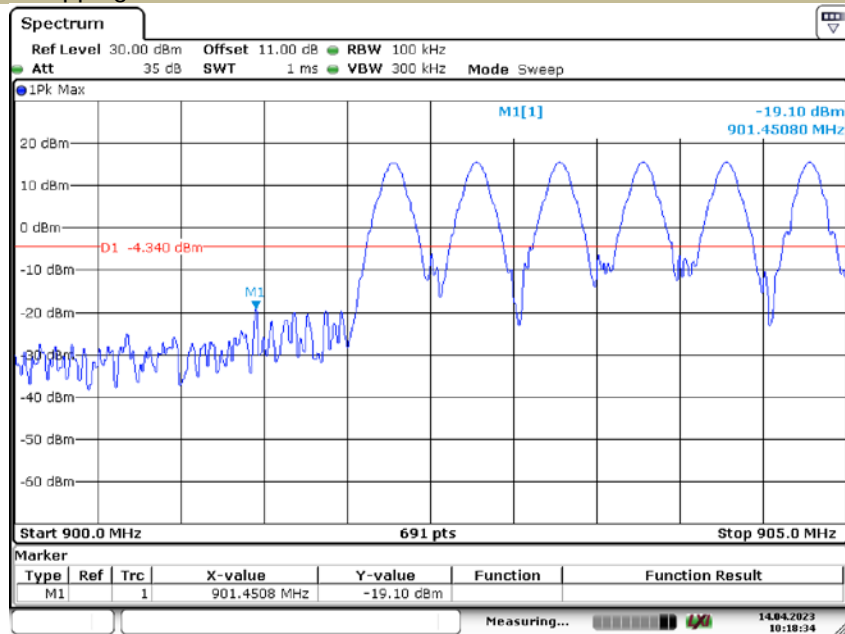
Conducted Spurious RF Conducted Emission  
RFID  
Hopping



Date: 14 APR 2023 10:20:07

Test Model

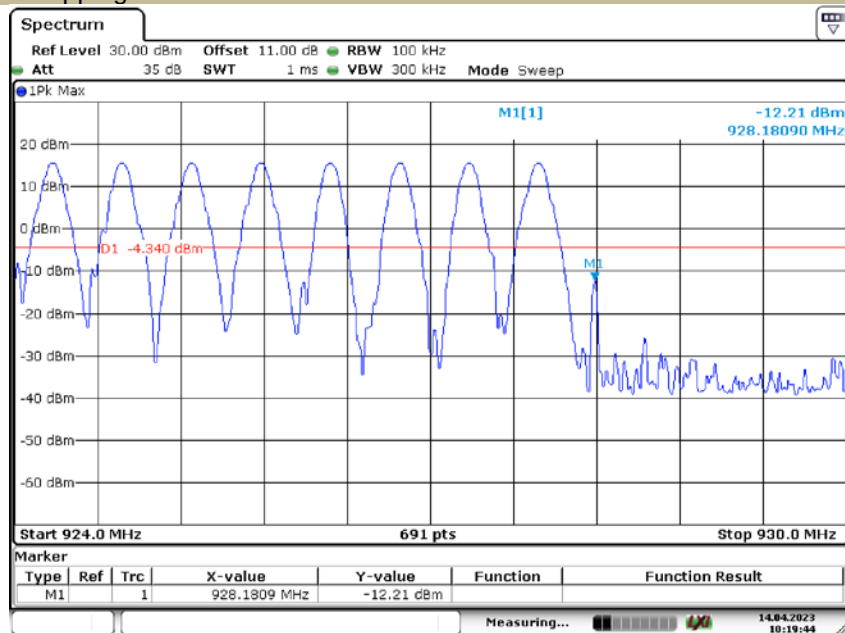
Band-edge Conducted Emissions  
RFID  
Hopping



Date: 14 APR 2023 10:18:33

Test Model

Band-edge Conducted Emissions  
RFID  
Hopping



Date: 14 APR 2023 10:19:44

## 8.7 RADIATED SPURIOUS EMISSION

### 8.7.1 Applicable Standard

According to FCC Part 15.247(d) and 15.209 and KDB 558074: D01 15.247 Meas Guidance v05r02

### 8.7.2 Conformance Limit

According to FCC Part 15.247(d): 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)).

According to FCC Part 15.205, Restricted bands

| MHz               | MHz                 | MHz           | GHz         |
|-------------------|---------------------|---------------|-------------|
| 0.090-0.110       | 16.42-16.423        | 399.9-410     | 4.5-5.15    |
| 10.495-0.505      | 16.69475-16.69525   | 608-614       | 5.35-5.46   |
| 2.1735-2.1905     | 16.80425-16.80475   | 960-1240      | 7.25-7.75   |
| 4.125-4.128       | 25.5-25.67          | 1300-1427     | 8.025-8.5   |
| 4.17725-4.17775   | 37.5-38.25          | 1435-1626.5   | 9.0-9.2     |
| 4.20725-4.20775   | 73-74.6             | 1645.5-1646.5 | 9.3-9.5     |
| 6.215-6.218       | 74.8-75.2           | 1660-1710     | 10.6-12.7   |
| 6.26775-6.26825   | 123-138             | 2200-2300     | 14.47-14.5  |
| 8.291-8.294       | 149.9-150.05        | 2310-2390     | 15.35-16.2  |
| 8.362-8.366       | 156.52475-156.52525 | 2483.5-2500   | 17.7-21.4   |
| 8.37625-8.38675   | 156.7-156.9         | 2690-2900     | 22.01-23.12 |
| 8.41425-8.41475   | 162.0125-167.17     | 3260-3267     | 23.6-24.0   |
| 12.29-12.293      | 167.72-173.2        | 3332-3339     | 31.2-31.8   |
| 12.51975-12.52025 | 240-285             | 3345.8-3358   | 36.43-36.5  |
| 12.57675-12.57725 | 322-335.4           | 3600-4400     | (2)         |
| 13.36-13.41       |                     |               |             |

According to FCC Part 15.205, the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table

| Restricted Frequency(MHz) | Field Strength (μV/m) | Field Strength (dBμV/m) | Measurement Distance |
|---------------------------|-----------------------|-------------------------|----------------------|
| 0.009-0.490               | 2400/F(KHz)           | 20 log (uV/m)           | 300                  |
| 0.490-1.705               | 24000/F(KHz)          | 20 log (uV/m)           | 30                   |
| 1.705-30                  | 30                    | 29.5                    | 30                   |
| 30-88                     | 100                   | 40                      | 3                    |
| 88-216                    | 150                   | 43.5                    | 3                    |
| 216-960                   | 200                   | 46                      | 3                    |
| Above 960                 | 500                   | 54                      | 3                    |

Remark :1. Emission level in dBuV/m=20 log (uV/m)

2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

3. Distance extrapolation factor =40log(Specific distance/ test distance)( dB);

Limit line=Specific limits(dBuV) + distance extrapolation factor.

for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where RBWCF [dB] =10\*lg(100 [kHz]/narrower RBW [kHz]). , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

### 8.7.3 Test Configuration

Test according to clause 7.2 radio frequency test setup 2

### 8.7.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

For Above 1GHz:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

For Below 1GHz:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 100 kHz for

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

For Below 30MHz:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 9kHz

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

For Below 150KHz:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 200Hz

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.

Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from  $20\log(\text{dwell time}/100 \text{ ms})$ , in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Repeat above procedures until all frequency measured was complete.

### 8.7.5 Test Results

■ Spurious Emission below 30MHz (9KHz to 30MHz)

|                    |           |
|--------------------|-----------|
| Temperature:       | 26° C     |
| Relative Humidity: | 54%       |
| ATM Pressure:      | 1011 mbar |

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission<br>Level(dBuV/m) |    | Limit 3m(dBuV/m) |    | Over(dB) |    |
|----------------|-----------------|---------------------------|----|------------------|----|----------|----|
|                |                 | PK                        | AV | PK               | AV | PK       | AV |
| --             | --              | --                        | -- | --               | -- | --       | -- |

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor =  $40\log(\text{Specific distance/ test distance})$  (dB);

Limit line=Specific limits(dBuV) + distance extrapolation factor.



# Spurious Emission Above 1GHz (1GHz to 10GHz)

Test mode: ASK Frequency: Channel 01: 902.75MHz

| Freq.<br>(MHz) | Ant.P<br>ol.<br>H/V | Emission<br>Level(dBuV/m) |       | Limit 3m(dBuV/m) |    | Over(dB) |        |
|----------------|---------------------|---------------------------|-------|------------------|----|----------|--------|
|                |                     | PK                        | AV    | PK               | AV | PK       | AV     |
| 1834.8348      | V                   | 61.79                     | 38.23 | 74               | 54 | -12.21   | -15.77 |
| 3413.4134      | V                   | 56.16                     | 38.57 | 74               | 54 | -17.84   | -15.43 |
| 9964.965       | V                   | 57.24                     | 45.45 | 74               | 54 | -16.76   | -8.55  |
| 1842.8428      | H                   | 64.98                     | 48.61 | 74               | 54 | -9.02    | -5.39  |
| 3413.4134      | H                   | 56.91                     | 43.64 | 74               | 54 | -17.09   | -10.36 |
| 9964.965       | H                   | 57.13                     | 45.41 | 74               | 54 | -16.87   | -8.59  |

Test mode: ASK Frequency: Channel 25: 915.75MHz

| Freq.<br>(MHz) | Ant.P<br>ol.<br>H/V | Emission<br>Level(dBuV/m) |       | Limit 3m(dBuV/m) |    | Over(dB) |        |
|----------------|---------------------|---------------------------|-------|------------------|----|----------|--------|
|                |                     | PK                        | AV    | PK               | AV | PK       | AV     |
| 1840.8408      | V                   | 64.21                     | 43.30 | 74               | 54 | -9.79    | -10.70 |
| 2527.5275      | V                   | 51.04                     | 32.18 | 74               | 54 | -22.96   | -21.82 |
| 5760.7608      | V                   | 53.99                     | 50.70 | 74               | 54 | -20.01   | -3.30  |
| 1840.8408      | H                   | 67.98                     | 46.20 | 74               | 54 | -6.02    | -7.80  |
| 2777.7778      | H                   | 53.93                     | 42.52 | 74               | 54 | -20.07   | -11.48 |
| 5753.7538      | H                   | 58.87                     | 33.88 | 74               | 54 | -15.13   | -20.12 |

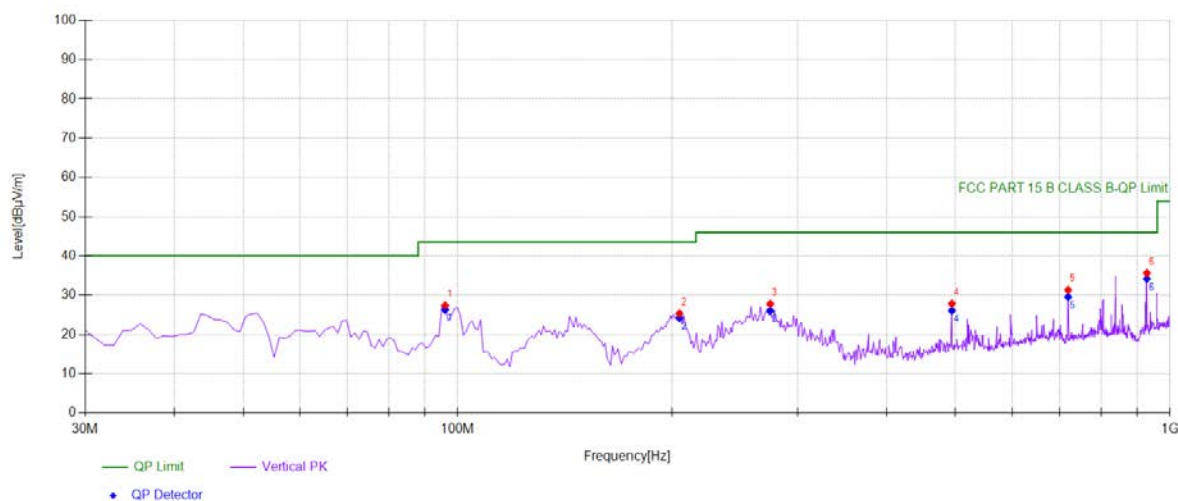
Test mode: ASK Frequency: Channel 50: 927.25MHz

| Freq.<br>(MHz) | Ant.P<br>ol.<br>H/V | Emission<br>Level(dBuV/m) |       | Limit 3m(dBuV/m) |    | Over(dB) |        |
|----------------|---------------------|---------------------------|-------|------------------|----|----------|--------|
|                |                     | PK                        | AV    | PK               | AV | PK       | AV     |
| 1838.8388      | V                   | 65.43                     | 48.84 | 74               | 54 | -8.57    | -5.16  |
| 2759.7598      | V                   | 50.45                     | 27.61 | 74               | 54 | -23.55   | -26.39 |
| 9964.965       | V                   | 57.55                     | 50.41 | 74               | 54 | -16.45   | -3.59  |
| 1842.8428      | H                   | 64.90                     | 45.99 | 74               | 54 | -9.10    | -8.01  |
| 8052.0521      | H                   | 54.99                     | 46.13 | 74               | 54 | -19.01   | -7.87  |
| 9292.2923      | H                   | 57.03                     | 46.90 | 74               | 54 | -16.97   | -7.10  |

- Note:**
- (1) All Readings are Peak Value (VBW=3MHz) and Peak Value (VBW=10Hz).
  - (2) Emission Level= Reading Level+Probe Factor +Cable Loss.
  - (3)The reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
  - (4) R\* is short for Restricted band, F\* is short for Fundamental frequency.

## ■ Spurious Emission below 1GHz (30MHz to 1GHz)

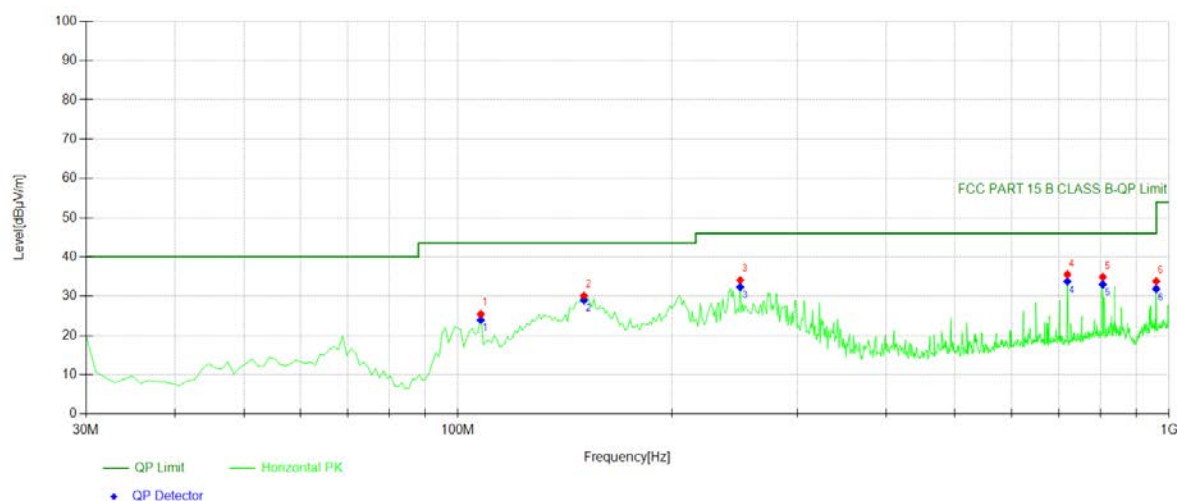
|       |        |
|-------|--------|
| Mode: | 902.75 |
|-------|--------|



### Suspected Data List

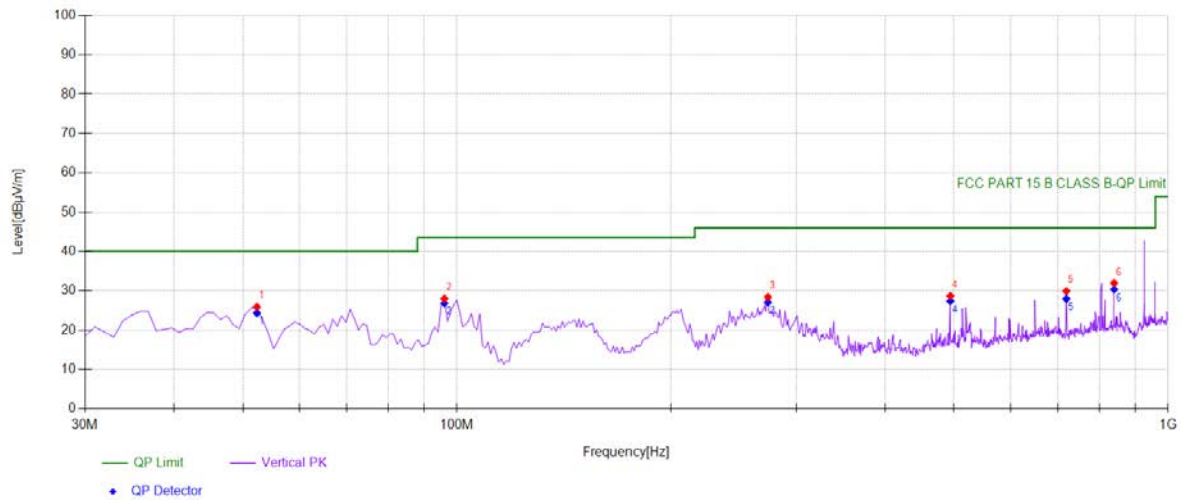
| NO. | Freq. [MHz]  | Reading [dBμV] | Factor [dB/m] | Level [dBμV/m] | Detector | Limit [dBμV/m] | Margin [dB] | Polarity |
|-----|--------------|----------------|---------------|----------------|----------|----------------|-------------|----------|
| 1   | 96.026       | 51.08          | -23.67        | 27.41          | PK       | 43.50          | 16.09       | Vertical |
| 2   | 204.774<br>8 | 48.24          | -22.91        | 25.33          | PK       | 43.50          | 18.17       | Vertical |
| 3   | 274.684<br>7 | 48.03          | -20.23        | 27.80          | PK       | 46.00          | 18.20       | Vertical |
| 4   | 494.124<br>1 | 43.36          | -15.51        | 27.85          | PK       | 46.00          | 18.15       | Vertical |
| 5   | 719.389<br>4 | 42.62          | -11.28        | 31.34          | PK       | 46.00          | 14.66       | Vertical |
| 6   | 928.148<br>1 | 43.30          | -7.68         | 35.62          | PK       | 46.00          | 10.38       | Vertical |

|       |        |
|-------|--------|
| Mode: | 902.75 |
|-------|--------|



| Suspected Data List |              |                |               |                |          |                |             |            |
|---------------------|--------------|----------------|---------------|----------------|----------|----------------|-------------|------------|
| NO.                 | Freq. [MHz]  | Reading [dBμV] | Factor [dB/m] | Level [dBμV/m] | Detector | Limit [dBμV/m] | Margin [dB] | Polarity   |
| 1                   | 107.677<br>7 | 48.53          | -23.10        | 25.43          | PK       | 43.50          | 18.07       | Horizontal |
| 2                   | 150.400<br>4 | 55.72          | -25.58        | 30.14          | PK       | 43.50          | 13.36       | Horizontal |
| 3                   | 249.439<br>4 | 55.12          | -21.02        | 34.10          | PK       | 46.00          | 11.90       | Horizontal |
| 4                   | 719.389<br>4 | 46.83          | -11.28        | 35.55          | PK       | 46.00          | 10.45       | Horizontal |
| 5                   | 806.776<br>8 | 44.75          | -9.84         | 34.91          | PK       | 46.00          | 11.09       | Horizontal |
| 6                   | 959.219<br>2 | 41.53          | -7.71         | 33.82          | PK       | 46.00          | 12.18       | Horizontal |

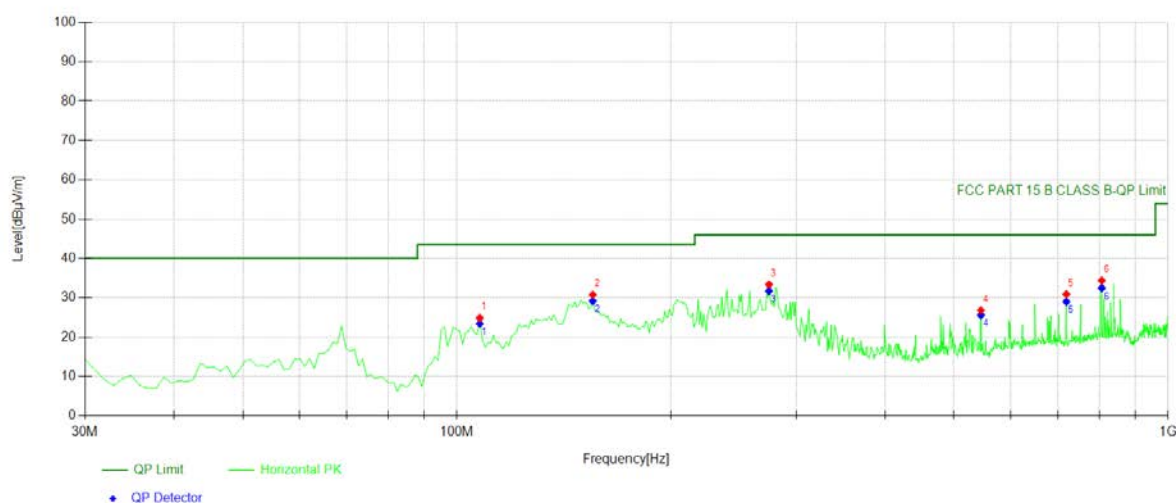
|       |        |
|-------|--------|
| Mode: | 915.25 |
|-------|--------|



## Suspected Data List

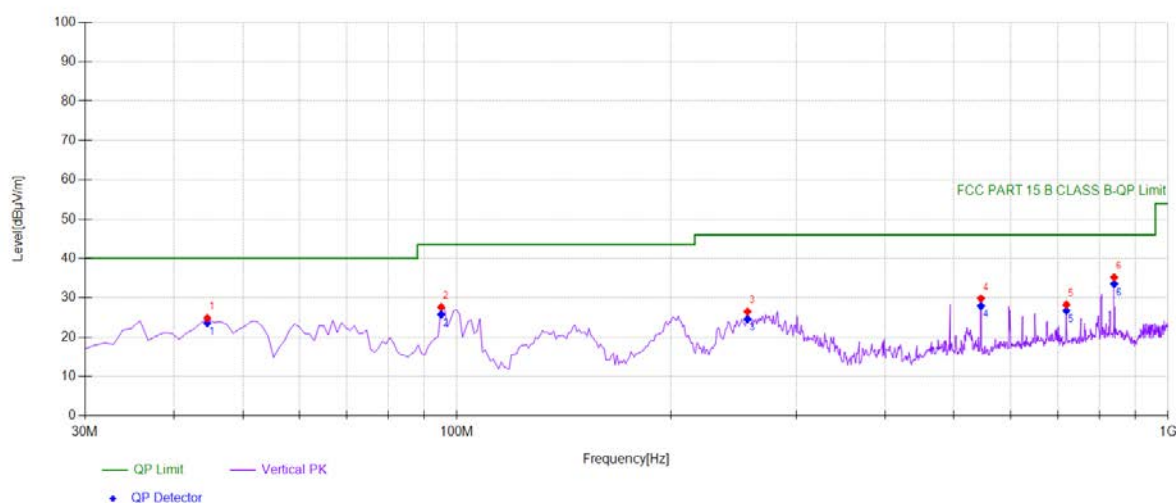
| NO. | Freq. [MHz]  | Reading [dBμV] | Factor [dB/m] | Level [dBμV/m] | Detector | Limit [dBμV/m] | Margin [dB] | Polarity |
|-----|--------------|----------------|---------------|----------------|----------|----------------|-------------|----------|
| 1   | 52.3323      | 49.21          | -23.33        | 25.88          | PK       | 40.00          | 14.12       | Vertical |
| 2   | 96.026       | 51.67          | -23.67        | 28.00          | PK       | 43.50          | 15.50       | Vertical |
| 3   | 273.713<br>7 | 48.68          | -20.27        | 28.41          | PK       | 46.00          | 17.59       | Vertical |
| 4   | 494.124<br>1 | 44.21          | -15.51        | 28.70          | PK       | 46.00          | 17.30       | Vertical |
| 5   | 719.389<br>4 | 41.21          | -11.28        | 29.93          | PK       | 46.00          | 16.07       | Vertical |
| 6   | 839.789<br>8 | 41.48          | -9.51         | 31.97          | PK       | 46.00          | 14.03       | Vertical |

|       |        |
|-------|--------|
| Mode: | 915.25 |
|-------|--------|



| Suspected Data List |              |                |               |                |          |                |             |            |
|---------------------|--------------|----------------|---------------|----------------|----------|----------------|-------------|------------|
| NO.                 | Freq. [MHz]  | Reading [dBμV] | Factor [dB/m] | Level [dBμV/m] | Detector | Limit [dBμV/m] | Margin [dB] | Polarity   |
| 1                   | 107.677<br>7 | 47.95          | -23.10        | 24.85          | PK       | 43.50          | 18.65       | Horizontal |
| 2                   | 155.255<br>3 | 56.34          | -25.57        | 30.77          | PK       | 43.50          | 12.73       | Horizontal |
| 3                   | 274.684<br>7 | 53.60          | -20.23        | 33.37          | PK       | 46.00          | 12.63       | Horizontal |
| 4                   | 545.585<br>6 | 41.67          | -14.85        | 26.82          | PK       | 46.00          | 19.18       | Horizontal |
| 5                   | 719.389<br>4 | 42.19          | -11.28        | 30.91          | PK       | 46.00          | 15.09       | Horizontal |
| 6                   | 806.776<br>8 | 44.22          | -9.84         | 34.38          | PK       | 46.00          | 11.62       | Horizontal |

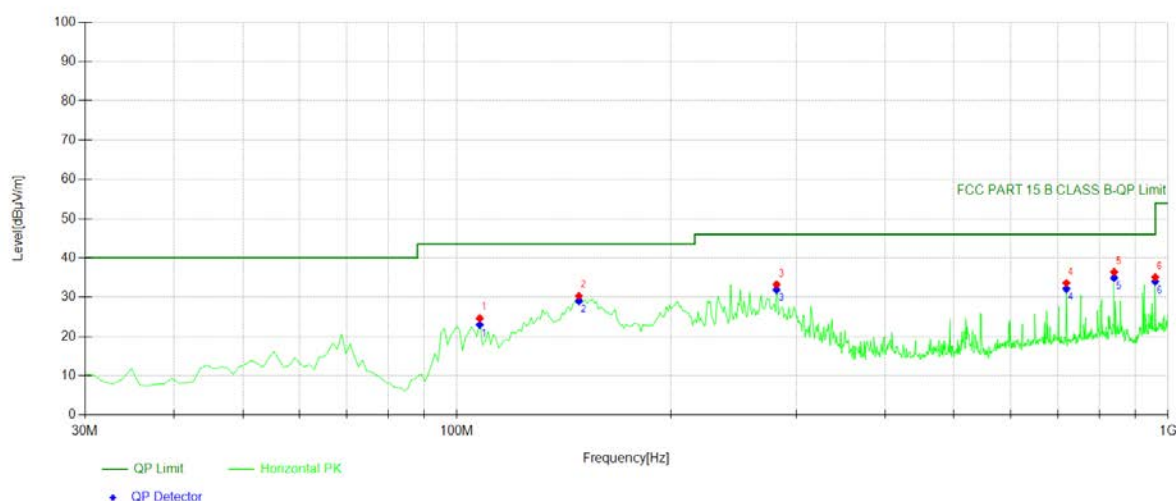
|       |        |
|-------|--------|
| Mode: | 927.25 |
|-------|--------|



## Suspected Data List

| NO. | Freq. [MHz]  | Reading [dBμV] | Factor [dB/m] | Level [dBμV/m] | Detector | Limit [dBμV/m] | Margin [dB] | Polarity |
|-----|--------------|----------------|---------------|----------------|----------|----------------|-------------|----------|
| 1   | 44.5646      | 48.21          | -23.39        | 24.82          | PK       | 40.00          | 15.18       | Vertical |
| 2   | 95.0551      | 51.55          | -23.90        | 27.65          | PK       | 43.50          | 15.85       | Vertical |
| 3   | 256.236<br>2 | 47.47          | -20.98        | 26.49          | PK       | 46.00          | 19.51       | Vertical |
| 4   | 545.585<br>6 | 44.69          | -14.85        | 29.84          | PK       | 46.00          | 16.16       | Vertical |
| 5   | 719.389<br>4 | 39.55          | -11.28        | 28.27          | PK       | 46.00          | 17.73       | Vertical |
| 6   | 839.789<br>8 | 44.73          | -9.51         | 35.22          | PK       | 46.00          | 10.78       | Vertical |

|       |        |
|-------|--------|
| Mode: | 927.25 |
|-------|--------|



## Suspected Data List

| NO. | Freq. [MHz]  | Reading [dBμV] | Factor [dB/m] | Level [dBμV/m] | Detector | Limit [dBμV/m] | Margin [dB] | Polarity   |
|-----|--------------|----------------|---------------|----------------|----------|----------------|-------------|------------|
| 1   | 107.677<br>7 | 47.74          | -23.10        | 24.64          | PK       | 43.50          | 18.86       | Horizontal |
| 2   | 148.458<br>5 | 55.93          | -25.60        | 30.33          | PK       | 43.50          | 13.17       | Horizontal |
| 3   | 281.481<br>5 | 53.18          | -19.95        | 33.23          | PK       | 46.00          | 12.77       | Horizontal |
| 4   | 719.389<br>4 | 44.89          | -11.28        | 33.61          | PK       | 46.00          | 12.39       | Horizontal |
| 5   | 839.789<br>8 | 45.91          | -9.51         | 36.40          | PK       | 46.00          | 9.60        | Horizontal |
| 6   | 959.219<br>2 | 42.80          | -7.71         | 35.09          | PK       | 46.00          | 10.91       | Horizontal |

## 8.8 CONDUCTED EMISSION TEST

### 8.8.1 Applicable Standard

According to FCC Part 15.207(a)

### 8.8.2 Conformance Limit

| Conducted Emission Limit                                                                                                                                                  |            |         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------|
| Frequency(MHz)                                                                                                                                                            | Quasi-peak | Average |
| 0.15-0.5                                                                                                                                                                  | 66-56      | 56-46   |
| 0.5-5.0                                                                                                                                                                   | 56         | 46      |
| 5.0-30.0                                                                                                                                                                  | 60         | 50      |
| Note: 1. The lower limit shall apply at the transition frequencies<br>2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz. |            |         |

### 8.8.3 Test Configuration

Test according to clause 7.3 conducted emission test setup

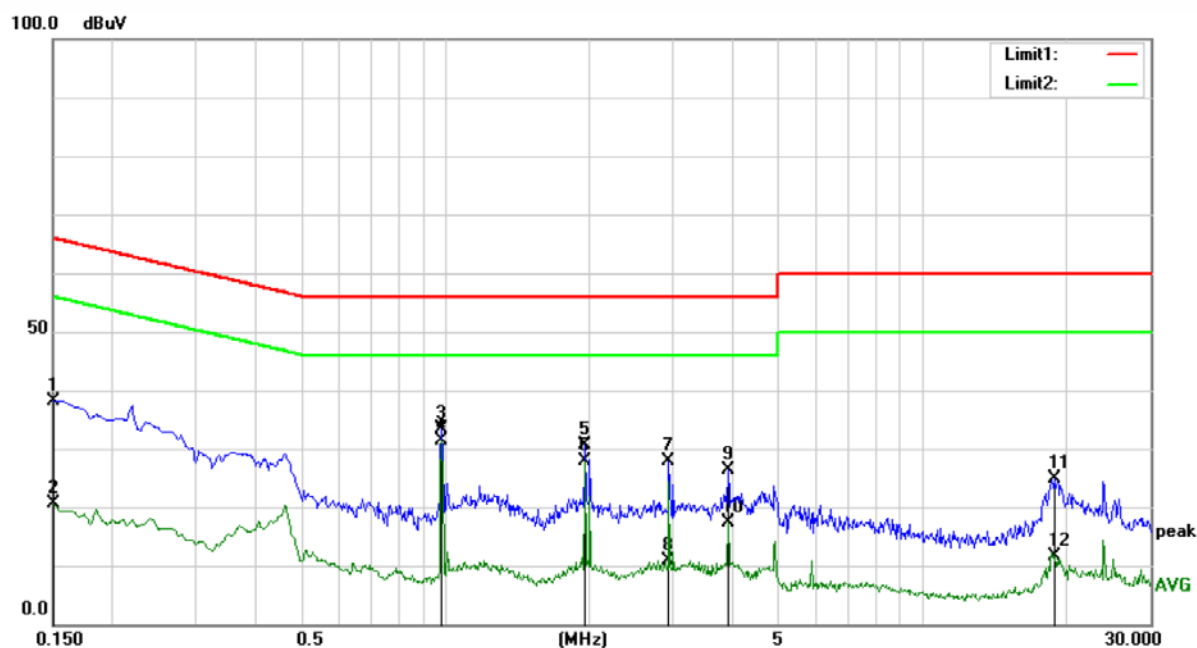
### 8.8.4 Test Procedure

The EUT was placed on a table which is 0.8m above ground plane.  
Maximum procedure was performed on the highest emissions to ensure EUT compliance.  
Repeat above procedures until all frequency measured were complete.

### 8.8.5 Test Results

**PASS.**

Please refer to the following pages.



Site Conduction #1

Phase: **N**

Temperature: 21.9

Limit: (CE)FCC PART 15 class B\_QP

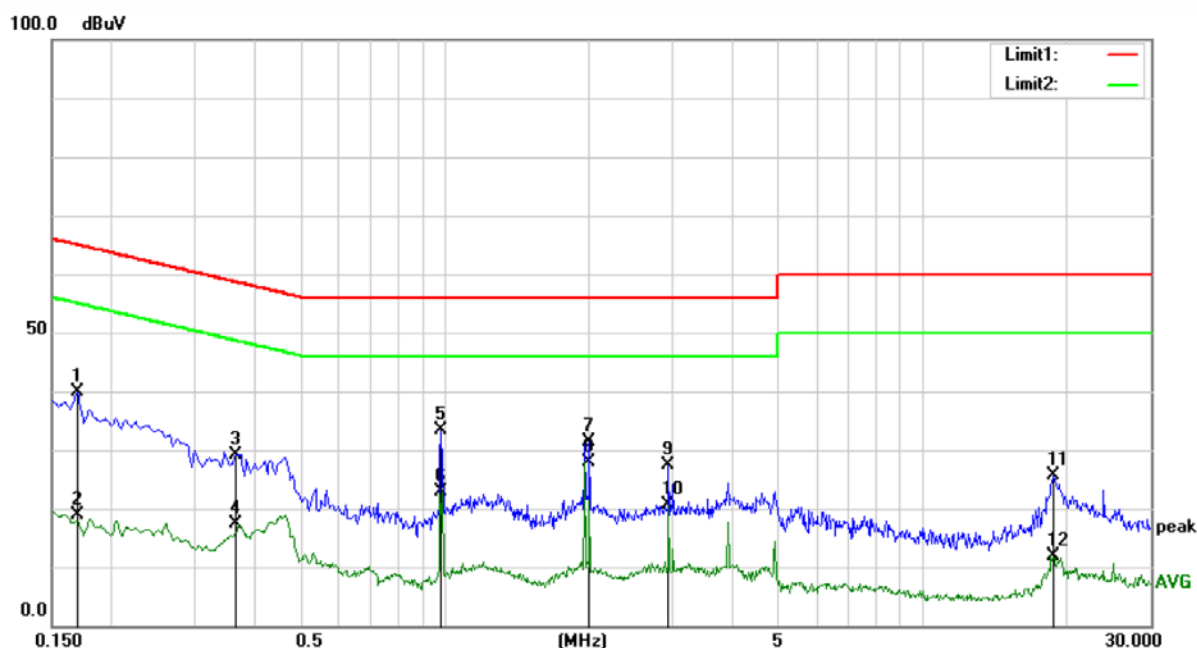
Power: AC 120V/60Hz

Humidity: 58 %

Mode: RFID mode

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.1500       | 28.69                    | 9.53                    | 38.22                    | 66.00         | -27.78     | QP       |         |
| 2   |     | 0.1500       | 11.22                    | 9.53                    | 20.75                    | 56.00         | -35.25     | AVG      |         |
| 3   |     | 0.9800       | 23.83                    | 9.55                    | 33.38                    | 56.00         | -22.62     | QP       |         |
| 4   | *   | 0.9800       | 21.76                    | 9.55                    | 31.31                    | 46.00         | -14.69     | AVG      |         |
| 5   |     | 1.9600       | 21.05                    | 9.55                    | 30.60                    | 56.00         | -25.40     | QP       |         |
| 6   |     | 1.9600       | 18.29                    | 9.55                    | 27.84                    | 46.00         | -18.16     | AVG      |         |
| 7   |     | 2.9400       | 18.23                    | 9.56                    | 27.79                    | 56.00         | -28.21     | QP       |         |
| 8   |     | 2.9400       | 1.33                     | 9.56                    | 10.89                    | 46.00         | -35.11     | AVG      |         |
| 9   |     | 3.9150       | 16.90                    | 9.56                    | 26.46                    | 56.00         | -29.54     | QP       |         |
| 10  |     | 3.9150       | 7.86                     | 9.56                    | 17.42                    | 46.00         | -28.58     | AVG      |         |
| 11  |     | 18.8550      | 15.08                    | 9.92                    | 25.00                    | 60.00         | -35.00     | QP       |         |
| 12  |     | 18.8550      | 1.78                     | 9.92                    | 11.70                    | 50.00         | -38.30     | AVG      |         |



Site Conduction #1

Phase: **L1**

Temperature: 21.9

Limit: (CE)FCC PART 15 class B\_QP

Power: AC 120V/60Hz

Humidity: 58 %

Mode: RFID mode

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.1700       | 30.43                    | 9.53                    | 39.96                    | 64.96         | -25.00     | QP       |         |
| 2   |     | 0.1700       | 9.25                     | 9.53                    | 18.78                    | 54.96         | -36.18     | AVG      |         |
| 3   |     | 0.3650       | 19.60                    | 9.54                    | 29.14                    | 58.61         | -29.47     | QP       |         |
| 4   |     | 0.3650       | 7.81                     | 9.54                    | 17.35                    | 48.61         | -31.26     | AVG      |         |
| 5   |     | 0.9800       | 23.75                    | 9.55                    | 33.30                    | 56.00         | -22.70     | QP       |         |
| 6   |     | 0.9800       | 13.21                    | 9.55                    | 22.76                    | 46.00         | -23.24     | AVG      |         |
| 7   |     | 2.0100       | 21.79                    | 9.55                    | 31.34                    | 56.00         | -24.66     | QP       |         |
| 8   | *   | 2.0100       | 18.43                    | 9.55                    | 27.98                    | 46.00         | -18.02     | AVG      |         |
| 9   |     | 2.9400       | 17.83                    | 9.56                    | 27.39                    | 56.00         | -28.61     | QP       |         |
| 10  |     | 2.9400       | 11.13                    | 9.56                    | 20.69                    | 46.00         | -25.31     | AVG      |         |
| 11  |     | 18.7300      | 15.69                    | 9.92                    | 25.61                    | 60.00         | -34.39     | QP       |         |
| 12  |     | 18.7300      | 1.99                     | 9.92                    | 11.91                    | 50.00         | -38.09     | AVG      |         |

## 8.9 ANTENNA APPLICATION

### 8.9.1 Antenna Requirement

| Standard            | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FCC CRF Part 15.203 | An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded. |

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### 8.9.2 Result

**PASS.**

The EUT antenna is External Antenna, the antenna gain is 0.07 dBi.

- Note:
- ☐ Use of permanent, industrial epoxy, "Loctite" or solder to make the connection permanent prior to shipping.
  - ☒ Allow use of standard connector if the transmitter has a sensing circuitry that disables the transmitter if an unauthorized antenna is used. An application should detail how this is accomplished.
  - ☐ Use of a standard connect is also allowed if the connectors is within the transmitter enclosure and can only be accessed by disassembly of the transmitter, where such disassembly is not normally required. The user manual must not show that user has access to the connector.
  - ☐ BIOS lock-Radio card and host (e.g., laptop computer) exchange code to ensure only the authorized transmission system works in the host.

which in accordance to section 15.203, please refer to the EUT photos.

----- End of Report -----