

# FCC Test Report

Product Name : WEL-3750/WEL7750/WEL3790/  
WEL7790 RFID Electronic Lock  
Model No. : L375, L775, WEL-7750, REP7001,  
WEL-3750, RAP3001, WEL-3790, L379,  
RAF3002, WEL-7790, L779, REF7002  
FCC ID. : 2AMWX-L00005

Applicant : WFE TECHNOLOGY CORP  
Address : 4F-8, NO.238, Chin-Hua N.Rd Taichung City 404, Taiwan

Date of Receipt : Jul. 17, 2017  
Issued Date : Aug. 10, 2017  
Report No. : 1770215R-RFUSP14V00  
Report Version : V1.0



The declaration results relate only to the samples calculated.  
The declaration shall not be reproduced except in full without the written approval of DEKRA Testing and Certification Co., Ltd.

# Test Report Certification

Issued Date : Aug. 10, 2017

Report No. : 1770215R-RFUSP14V00



Product Name : WEL-3750/WEL7750/WEL3790/WEL7790 RFID Electronic Lock

Applicant : WFE TECHNOLOGY CORP

Address : 4F-8, NO.238, Chin-Hua N.Rd Taichung City 404, Taiwan

Manufacturer : WFE TECHNOLOGY CORP

Model No. : L375, L775, WEL-7750, REP7001, WEL-3750, RAP3001, WEL-3790, L379, RAF3002, WEL-7790, L779, REF7002

FCC ID. : 2AMWX-L00005

EUT Voltage : DC 6V (Power by Battery)

Testing Voltage : DC 6V (Power by Battery)

Trade Name : **WAFFERLOCK®**

Applicable Standard : FCC 15 Subpart C Section 15.231: 2015

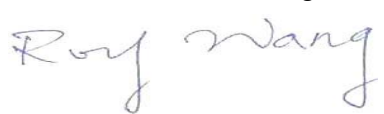
Laboratory Name : Hsin Chu Laboratory

Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C.  
TEL: +886-3-582-8001 / FAX: +886-3-582-8958

Test Result : Complied

Documented By :   
( Carol Tsai / Senior Engineering Adm. Specialist )

Tested By :   
( Carter Hsu / Senior Engineer )

Approved By :   
( Roy Wang / Director )

### Revision History

| Report No.          | Version | Description              | Issued Date   |
|---------------------|---------|--------------------------|---------------|
| 1770215R-RFUSP14V00 | V1.0    | Initial issue of report. | Aug. 10, 2017 |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |
|                     |         |                          |               |

## Laboratory Information

We, **DEKRA Testing and Certification Co., Ltd.**, are an independent RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025 specified testing scopes:

|                      |          |                                                                                            |
|----------------------|----------|--------------------------------------------------------------------------------------------|
| <b>Taiwan R.O.C.</b> | <b>:</b> | <b>TAF, Accreditation Number: 3024</b>                                                     |
| <b>USA</b>           | <b>:</b> | <b>FCC, Registration Number: 0007939127</b>                                                |
| <b>Canada</b>        | <b>:</b> | <b>IC, Submission No: 181665 /<br/>IC Registration Number: 22397-1 / 22397-2 / 22397-3</b> |

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site :

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site : [http://www.dekra.com.tw/index\\_en.aspx](http://www.dekra.com.tw/index_en.aspx)

If you have any comments, Please don't hesitate to contact us. Our test sites as below:

- <sup>1</sup> No. 75-2, 3rd Lin, WangYe Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan (R.O.C.)  
TEL:+886-3-592-8858 / FAX:+886-3-592-8859 E-Mail : [info.tw@dekra.com](mailto:info.tw@dekra.com)
- <sup>2</sup> No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C.  
TEL: +886-3-582-8001 / FAX: +886-3-582-8958 E-Mail : [info.tw@dekra.com](mailto:info.tw@dekra.com)
- <sup>3</sup> No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C.  
TEL: +886-3-582-8001 / FAX: +886-3-582-8958 E-Mail : [info.tw@dekra.com](mailto:info.tw@dekra.com)

## TABLE OF CONTENTS

| Description                               | Page |
|-------------------------------------------|------|
| 1. General Information.....               | 7    |
| 1.1. EUT Description .....                | 7    |
| 1.2. Test Mode .....                      | 8    |
| 1.3. Tested System Details .....          | 9    |
| 1.4. Configuration of tested System ..... | 9    |
| 1.5. EUT Exercise Software .....          | 9    |
| 1.6. Test Facility .....                  | 10   |
| 2. Conducted Emission .....               | 11   |
| 2.1. Test Equipment.....                  | 11   |
| 2.2. Test Setup .....                     | 11   |
| 2.3. Limits .....                         | 11   |
| 2.4. Test Procedure .....                 | 12   |
| 2.5. Test Specification.....              | 12   |
| 2.6. Uncertainty .....                    | 12   |
| 2.7. Test Result.....                     | 12   |
| 3. Radiated Emission .....                | 13   |
| 3.1. Test Equipment.....                  | 13   |
| 3.2. Test Setup .....                     | 14   |
| 3.3. Limits .....                         | 15   |
| 3.4. Test Procedure .....                 | 16   |
| 3.5. Test Specification.....              | 16   |
| 3.6. Uncertainty .....                    | 16   |
| 3.7. Test Result.....                     | 17   |
| 4. Occupied Bandwidth.....                | 24   |
| 4.1. Test Equipment.....                  | 24   |
| 4.2. Test Setup .....                     | 24   |
| 4.3. Limits .....                         | 24   |
| 4.4. Test Specification.....              | 24   |
| 4.5. Uncertainty .....                    | 24   |
| 4.6. Test Result.....                     | 25   |
| 5. Duty cycle .....                       | 26   |
| 5.1. Test Equipment.....                  | 26   |
| 5.2. Test Setup .....                     | 26   |
| 5.3. Limits .....                         | 26   |
| 5.4. Test Specification.....              | 26   |
| 5.5. Uncertainty .....                    | 26   |
| 5.6. Test Result.....                     | 27   |
| 6. Transmitter time.....                  | 28   |
| 6.1. Test Equipment.....                  | 28   |
| 6.2. Test Setup .....                     | 28   |
| 6.3. Limits .....                         | 28   |
| 6.4. Test Specification.....              | 28   |
| 6.5. Uncertainty .....                    | 28   |

---

|                  |                              |    |
|------------------|------------------------------|----|
| 6.6.             | Test Result.....             | 29 |
| Attachment 1...  | .....                        | 30 |
|                  | Test Setup Photograph.....   | 30 |
| Attachment 2.... | .....                        | 33 |
|                  | EUT External Photograph..... | 33 |
| Attachment 3.... | .....                        | 35 |
|                  | EUT Internal Photograph..... | 35 |

## 1. General Information

### 1.1. EUT Description

|                    |                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------|
| Product Name       | WEL-3750/WEL7750/WEL3790/WEL7790 RFID Electronic Lock                                              |
| Trade Name         | <b>WAFFERLOCK®</b>                                                                                 |
| Model No.          | L375, L775, WEL-7750, REP7001, WEL-3750, RAP3001, WEL-3790, L379, RAF3002, WEL-7790, L779, REF7002 |
| Frequency Range    | 315MHz                                                                                             |
| Channel Number     | 1                                                                                                  |
| Type of Modulation | ASK                                                                                                |

| Antenna Information |         |
|---------------------|---------|
| Antenna Type        | Printed |
| Antenna Gain        | 0dBi    |

| Working Frequency of Each Channel |           |
|-----------------------------------|-----------|
| Channel                           | Frequency |
| Channel 1                         | 315MHz    |

Note:

1. This device is a WEL-3750/WEL7750/WEL3790/WEL7790 RFID Electronic Lock including BT function/315MHz/13.56MHz transmitting and receiving function.
2. The different of the each model is shown as below:
  1. Different firmware. L375,WEL-3750, RAP3001, L379,WEL-3790, RAF3002, L775, WEL-7750, REP7001, L779, WEL-7790, REF7002
  2. Different mortise. L375 WEL-3750, RAP3001 / L379,WEL-3790, RAF3002, is using ANSI profile mortise, and L775, WEL-7750, REP7001/ L779, WEL-7790, REF7002 is using European profile mortise.
  3. Adding finger print sensor handle on model L379, WEL-3790,RAF3002/ L779,WEL-7790, REF7002 including finger print sensor modulars and mTouch sensors on handles.  
Reader PCB, mTouch panel, antenna PCB, and main control PCB are same on all models.
3. These tests are conducted on a sample for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.231.
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

## 1.2. Test Mode

DEKRA verified the construction and function in typical operation. All the test modes are performed in normal operation and are defined as:

| Test Mode |                  |
|-----------|------------------|
| TX        | Mode 1: Transmit |

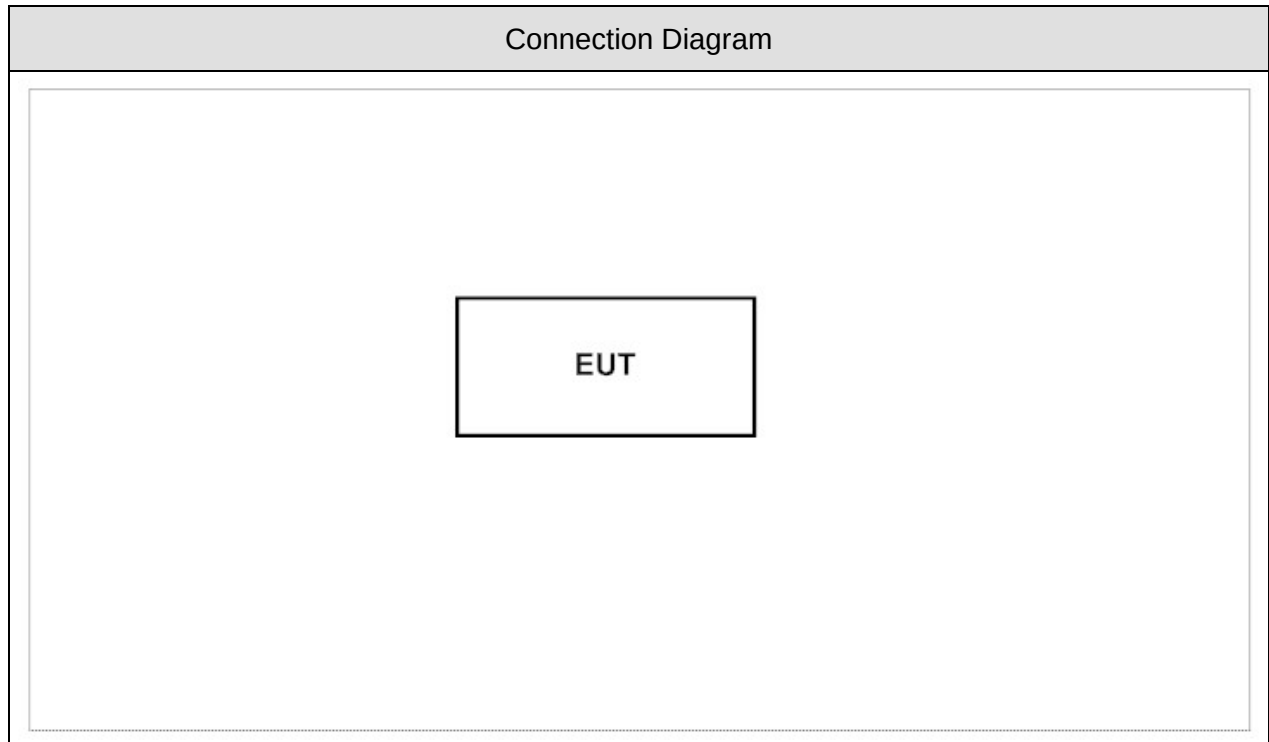
| Performed Item     | Mode 1 |
|--------------------|--------|
| Conducted Emission | No     |
| Radiated Emission  | Yes    |
| Occupied Bandwidth | Yes    |
| Duty cycle         | Yes    |
| Transmitter time   | Yes    |

### 1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

| Product | Manufacturer | Model No. | Serial No. | FCC ID | Power Cord |
|---------|--------------|-----------|------------|--------|------------|
| N/A     |              |           |            |        |            |

### 1.4. Configuration of tested System



### 1.5. EUT Exercise Software

|   |                                                               |
|---|---------------------------------------------------------------|
| 1 | Setup the EUT as shown in Section 1.4.                        |
| 2 | Turn on the EUT power.                                        |
| 3 | Configure the test mode, the test channel, and the data rate. |
| 4 | Press "Start TX" to start the continuous transmitting.        |
| 5 | Verify that the EUT works properly.                           |

## 1.6. Test Facility

Ambient conditions in the laboratory:

| Items                      | Test Item                                     | Required<br>(IEC 68-1) | Actual   | Test Site |
|----------------------------|-----------------------------------------------|------------------------|----------|-----------|
| Temperature (°C)           | FCC PART 15 C 15.231(b)<br>Conducted Emission | 15 - 35                | 25°C     | --        |
| Humidity (%RH)             |                                               | 25 - 75                | 45%RH    |           |
| Barometric pressure (mbar) |                                               | 860 - 1060             | 950-1000 |           |
| Temperature (°C)           | FCC PART 15 C 15.231(b)<br>Radiated Emission  | 15 - 35                | 25°C     | 1/2       |
| Humidity (%RH)             |                                               | 25 - 75                | 45%RH    |           |
| Barometric pressure (mbar) |                                               | 860 - 1060             | 950-1000 |           |
| Temperature (°C)           | FCC PART 15 C 15.231(b)<br>Occupied Bandwidth | 15 - 35                | 25°C     | 1         |
| Humidity (%RH)             |                                               | 25 - 75                | 65%RH    |           |
| Barometric pressure (mbar) |                                               | 860 - 1060             | 950-1000 |           |
| Temperature (°C)           | FCC PART 15 C 15.231(b)<br>Duty cycle         | 15 - 35                | 25°C     | 3         |
| Humidity (%RH)             |                                               | 25 - 75                | 45%RH    |           |
| Barometric pressure (mbar) |                                               | 860 - 1060             | 950-1000 |           |
| Temperature (°C)           | FCC PART 15 C 15.231(b)<br>Transmitter time   | 15 - 35                | 25°C     | 1         |
| Humidity (%RH)             |                                               | 25 - 75                | 48%RH    |           |
| Barometric pressure (mbar) |                                               | 860 - 1060             | 950-1000 |           |

Note: Test Site information refers to Laboratory Information.

## 2. Conducted Emission

### 2.1. Test Equipment

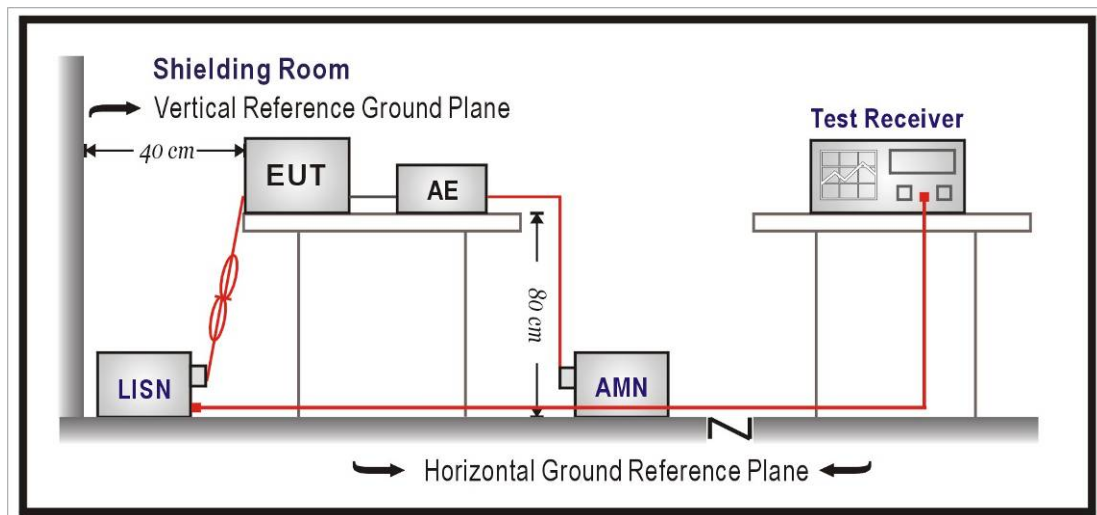
The following test equipment are used during the test:

#### Conducted Emission / SR2-H

| Instrument               | Manufacturer | Model No. | Serial No  | Next Cal. Date |
|--------------------------|--------------|-----------|------------|----------------|
| Artificial Mains Network | R&S          | ENV4200   | 848411/010 | 2018/02/05     |
| LISN                     | R&S          | ENV216    | 100092     | 2017/08/16     |
| Test Receiver            | R&S          | ESCS 30   | 836858/022 | 2018/04/11     |

Note: All equipment that need to calibrate are with calibration period of 1 year.

### 2.2. Test Setup



### 2.3. Limits

| FCC Part 15 Subpart C Paragraph 15.207 Limits (dBuV) |         |         |
|------------------------------------------------------|---------|---------|
| Frequency<br>MHz                                     | QP      | AV      |
| 0.15 - 0.50                                          | 66 - 56 | 56 - 46 |
| 0.50 - 5.0                                           | 56      | 46      |
| 5.0 - 30                                             | 60      | 50      |

Remarks: In the above table, the tighter limit applies at the band edges.

## **2.4. Test Procedure**

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs.)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

## **2.5. Test Specification**

According to FCC Part 15 Subpart C Paragraph 15.207: 2014

## **2.6. Uncertainty**

The measurement uncertainty is defined as  $\pm 2.26$  dB.

## **2.7. Test Result**

EUT using DC input voltage, so the project does not have to test for testing.

### 3. Radiated Emission

#### 3.1. Test Equipment

The following test equipment are used during the test:

##### Radiated Emission (Fundamental/ Above 1GHz) / CB1

| Instrument    | Manufacturer | Model No.  | Serial No.  | Next Cal. Date |
|---------------|--------------|------------|-------------|----------------|
| Bilog Antenna | Schaffner    | CBL6112B   | 2895        | 2016/08/14     |
| Horn Antenna  | Schwarzbeck  | BBHA 9120  | D743        | 2017/01/14     |
| Pre-Amplifier | EMCI         | EMC0031835 | 980233      | 2017/01/26     |
| Pre-Amplifier | QuieTek      | AP-025C    | CHM-0706049 | 2017/01/03     |
| Spectrum      | Agilent      | E4440A     | MY46187335  | 2016/12/24     |
| k Type Cable  | Huber+Suhner | SF 102     | 25623/2     | 2017/01/11     |

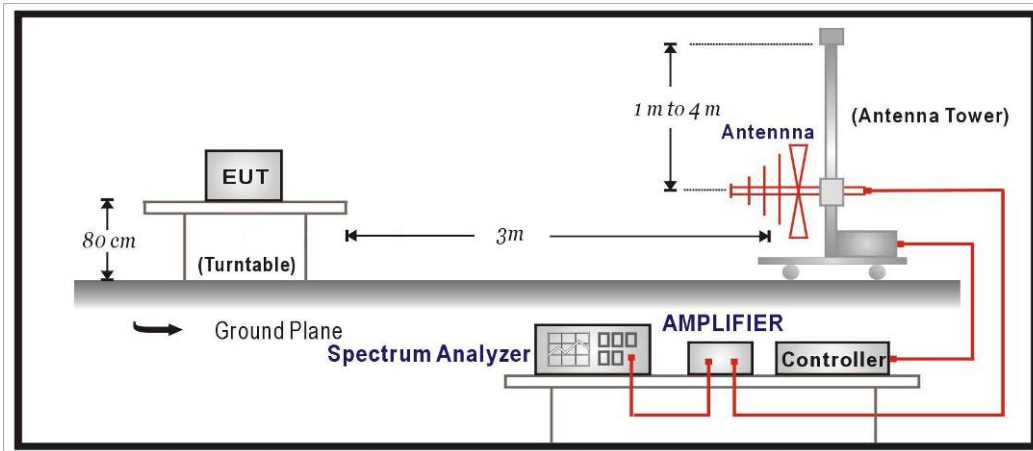
##### Radiated Emission (30MHz~1GHz) / CB4-H

| Instrument                 | Manufacturer | Model No.            | Serial No. | Next Cal. Date |
|----------------------------|--------------|----------------------|------------|----------------|
| Bilog Antenna              | Schaffner    | CBL6112B             | 2891       | 2017/08/14     |
| Horn Antenna               | Schwarzbeck  | BBHA 9120            | D312       | 2017/10/25     |
| Horn Antenna               | Schwarzbeck  | BBHA 9170            | 203        | 2017/08/28     |
| Signal & Spectrum Analyzer | R&S          | FSV40                | 101049     | 2018/01/22     |
| Pre-Amplifier              | EMCI         | EMC0031835           | 980233     | 2018/02/02     |
| Pre-Amplifier              | Schwarzbeck  | DBL-1840N506         | 013        | 2017/09/29     |
| Pre-Amplifier              | Miteq        | JS41-001040000-58-5P | 1573954    | 2017/10/04     |
| k Type Cable               | Huber+Suhner | SF 102               | 25623/2    | 2018/01/19     |

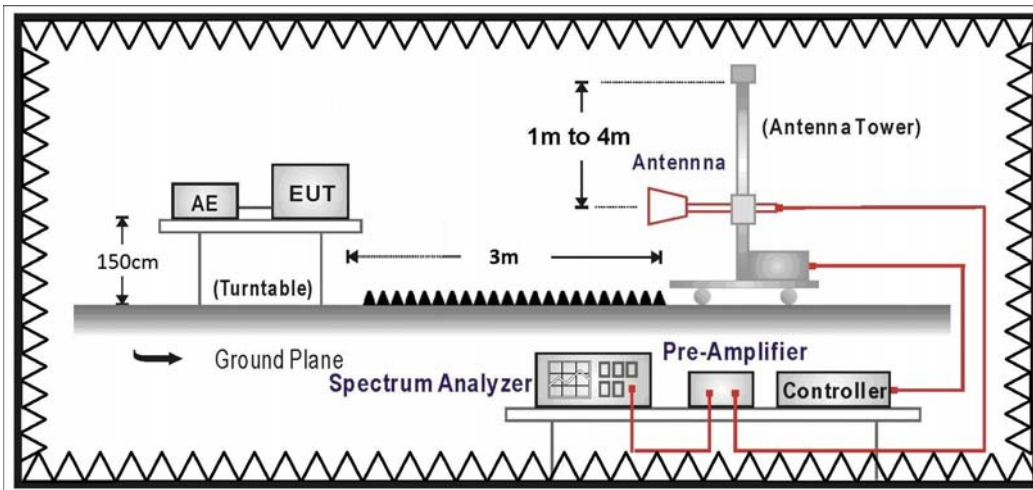
Note: All equipment that need to calibrate are with calibration period of 1 year.

### 3.2. Test Setup

Under 1GHz Test Setup:



Above 1GHz Test Setup:



### 3.3. Limits

#### ➤ Fundamental and Harmonics Emission Limits

| FCC Part 15 Subpart C Paragraph 15.231(b) Limits |                                  |               |                                |               |
|--------------------------------------------------|----------------------------------|---------------|--------------------------------|---------------|
| Fundamental Frequency<br>MHz                     | Field Strength of<br>Fundamental |               | Field Strength of<br>Harmonics |               |
|                                                  | uV/m                             | dBuV/m        | uV/m                           | dBuV/m        |
| 40.66 - 40.70                                    | 2250                             | 67.04         | 225                            | 47.04         |
| 70 - 130                                         | 1250                             | 61.94         | 125                            | 41.94         |
| 130 - 174                                        | 1250 - 3750                      | 61.94 - 71.48 | 125 - 375                      | 41.94 - 51.48 |
| 174 - 260                                        | 3750                             | 71.48         | 375                            | 51.48         |
| 260 - 470                                        | 3750 - 12500                     | 71.48 - 81.94 | 375 - 1250                     | 51.48 - 61.94 |
| above 470                                        | 12500                            | 81.94         | 1250                           | 61.94         |

Remarks: 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)  
 2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.  
 3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

#### ➤ Spurious electric field strength limits

| FCC Part 15 Subpart C Paragraph 15.209 Limits |              |                         |                                 |
|-----------------------------------------------|--------------|-------------------------|---------------------------------|
| Frequency<br>MHz                              | uV/m         | dBuV/m                  | Measurement<br>distance (meter) |
| 0.009 - 0.490                                 | 2400/F(kHz)  | See Remark <sup>1</sup> | 300                             |
| 0.490 - 1.705                                 | 24000/F(kHz) | See Remark <sup>1</sup> | 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                               |

Remarks : 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)  
 2. In the Above Table, the tighter limit applies at the band edges.  
 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

### **3.4. Test Procedure**

The EUT and its simulators are placed on a turn table which is 0.8 and 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB beamwidth of the antenna.

The worst radiated emission is measured on the Final Measurement.

The frequency range from 30MHz to 10th harmonics is checked.

### **3.5. Test Specification**

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2015

### **3.6. Uncertainty**

± 3.8 dB below 1GHz

± 3.9 dB above 1GHz

### 3.7. Test Result

|              |                                                       |           |     |
|--------------|-------------------------------------------------------|-----------|-----|
| Product      | WEL-3750/WEL7750/WEL3790/WEL7790 RFID Electronic Lock |           |     |
| Test Item    | Fundamental Radiated Emission                         |           |     |
| Test Mode    | Mode 1: Transmit                                      |           |     |
| Date of Test | 2016/07/20                                            | Test Site | CB1 |

#### Fundamental Power

| Frequency<br>(MHz) | Correct<br>Factor<br>(dB) | Reading<br>Level<br>(dBuV) | Peak<br>Measurement<br>Level<br>(dBuV/m) | Average<br>Measurement<br>Level<br>(dBuV/m) | Peak Limit<br>(dBuV/m) | Average Limit<br>(dBuV/m) |
|--------------------|---------------------------|----------------------------|------------------------------------------|---------------------------------------------|------------------------|---------------------------|
| Horizontal         |                           |                            |                                          |                                             |                        |                           |
| 315 (X-axis)       | 14.023                    | 62.696                     | 76.719                                   | 66.448                                      | 95.623                 | 75.623                    |
| Vertical           |                           |                            |                                          |                                             |                        |                           |
| 315 (X-axis)       | 14.023                    | 64.905                     | 78.928                                   | 68.657                                      | 95.623                 | 75.623                    |

Note :

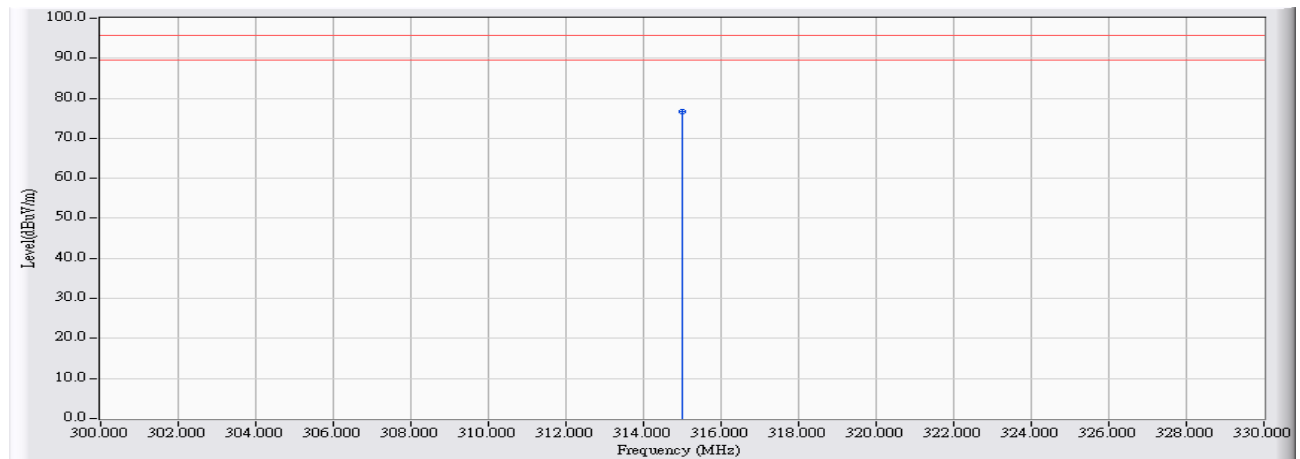
Peak Measurement Level = Reading Level + Correct Factor

Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)

Duty Cycle =  $(T_{ON2} / (T_{ON2} + T_{OFF2})) = 0.306$

20\*Log(Duty Cycle) = -10.271

|                                                                |                                  |
|----------------------------------------------------------------|----------------------------------|
| Site : CB1                                                     | Time : 2016/07/20 - 11:48        |
| Limit : FCC_SpartC_15.231(B)_F_315MHz_03M_PK                   | Margin : 6                       |
| Probe : CB1_FCC_30M-1G-4_9161 - HORIZONTAL                     | Power : DC 6V (Power by Battery) |
| EUT : WEL-3750/WEL7750/WEL3790/WEL7790 RFID<br>Electronic Lock | Note : X-axis                    |

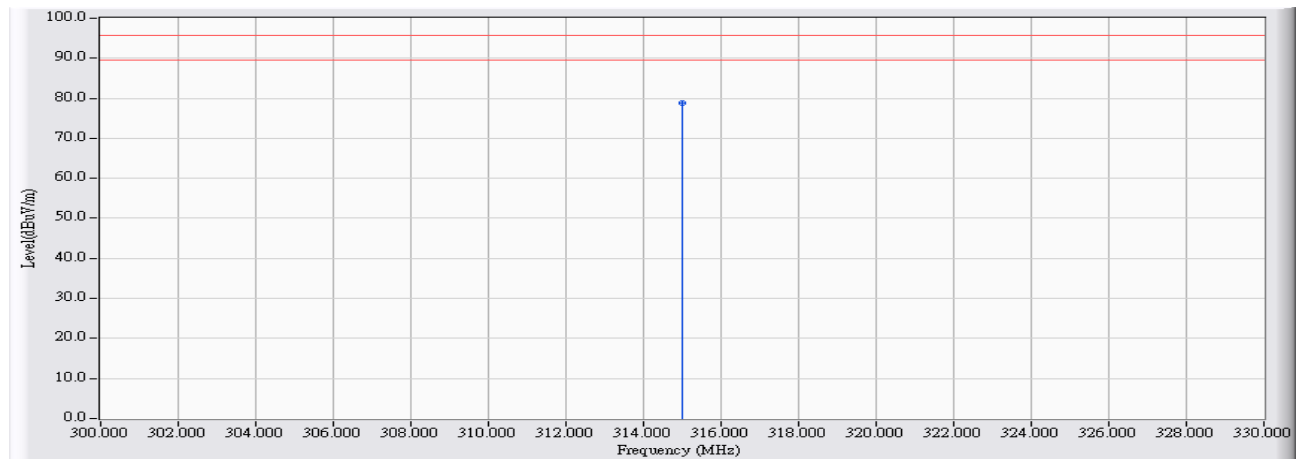


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | * | 314.993            | 14.023                 | 62.696                  | 76.719                    | -18.904        | 95.623            | PEAK          |

Note:

1. All Reading Levels are Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

|                                                                |                                  |
|----------------------------------------------------------------|----------------------------------|
| Site : CB1                                                     | Time : 2016/07/20 - 11:48        |
| Limit : FCC_SpartC_15.231(B)_F_315MHz_03M_PK                   | Margin : 6                       |
| Probe : CB1_FCC_30M-1G-4_9161 - VERTICAL                       | Power : DC 6V (Power by Battery) |
| EUT : WEL-3750/WEL7750/WEL3790/WEL7790 RFID<br>Electronic Lock | Note : X-axis                    |



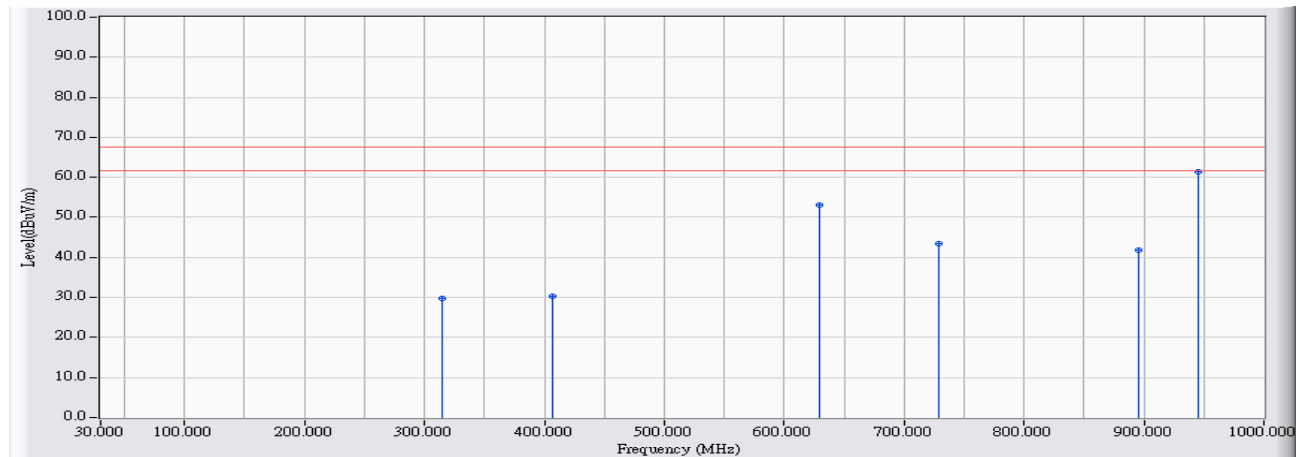
|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | * | 314.996            | 14.023                 | 64.905                  | 78.928                    | -16.695        | 95.623            | PEAK          |

Note:

1. All Reading Levels are Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

**Spurious Emission (30MHz~1GHz)**

|                                                                |                                  |
|----------------------------------------------------------------|----------------------------------|
| Site : CB4-H                                                   | Time : 2017/03/01                |
| Limit : NCC_3.4.2_H_315MHz_03M_PK                              | Margin : 6                       |
| Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 -<br>HORIZONTAL         | Power : DC 6V (Power by Battery) |
| EUT : WEL-3750/WEL7750/WEL3790/WEL7790 RFID<br>Electronic Lock | Note : X-axis                    |

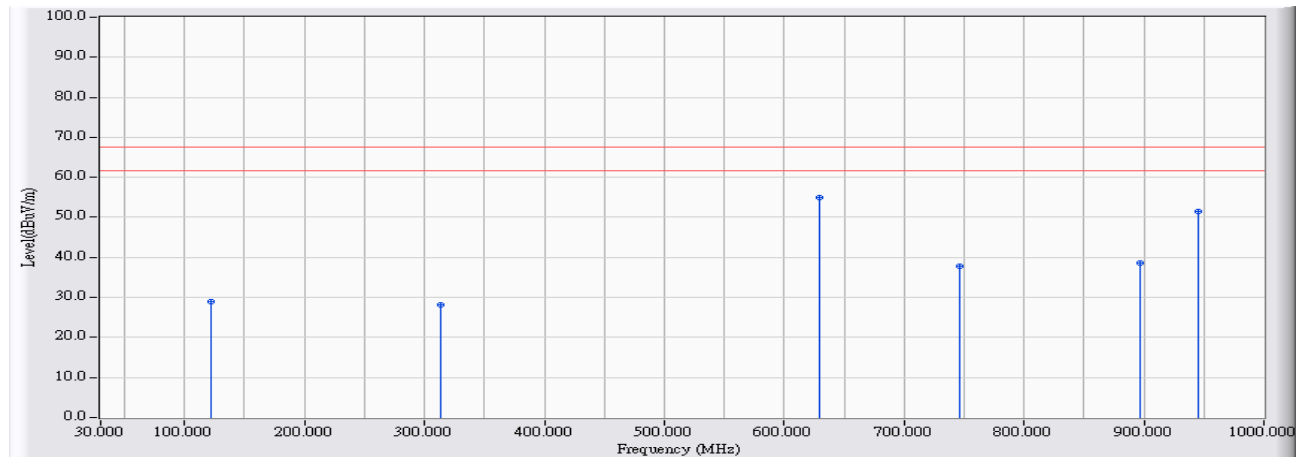


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 |   | 314.958            | -19.079                | 48.971                  | 29.892                    | -37.768        | 67.660            | PEAK          |
| 2 |   | 406.807            | -15.588                | 45.785                  | 30.197                    | -37.463        | 67.660            | PEAK          |
| 3 |   | 629.885            | -12.150                | 65.136                  | 52.986                    | -14.674        | 67.660            | PEAK          |
| 4 |   | 729.106            | -10.596                | 54.159                  | 43.563                    | -24.097        | 67.660            | PEAK          |
| 5 |   | 896.026            | -8.620                 | 50.488                  | 41.867                    | -25.793        | 67.660            | PEAK          |
| 6 | * | 944.813            | -7.203                 | 68.581                  | 61.378                    | -6.282         | 67.660            | PEAK          |

Note:

1. All Reading Levels are Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

|                                                                |                                  |
|----------------------------------------------------------------|----------------------------------|
| Site : CB4-H                                                   | Time : 2017/03/01                |
| Limit : NCC_3.4.2_H_315MHz_03M_PK                              | Margin : 6                       |
| Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 -<br>VERTICAL           | Power : DC 6V (Power by Battery) |
| EUT : WEL-3750/WEL7750/WEL3790/WEL7790 RFID<br>Electronic Lock | Note : X-axis                    |



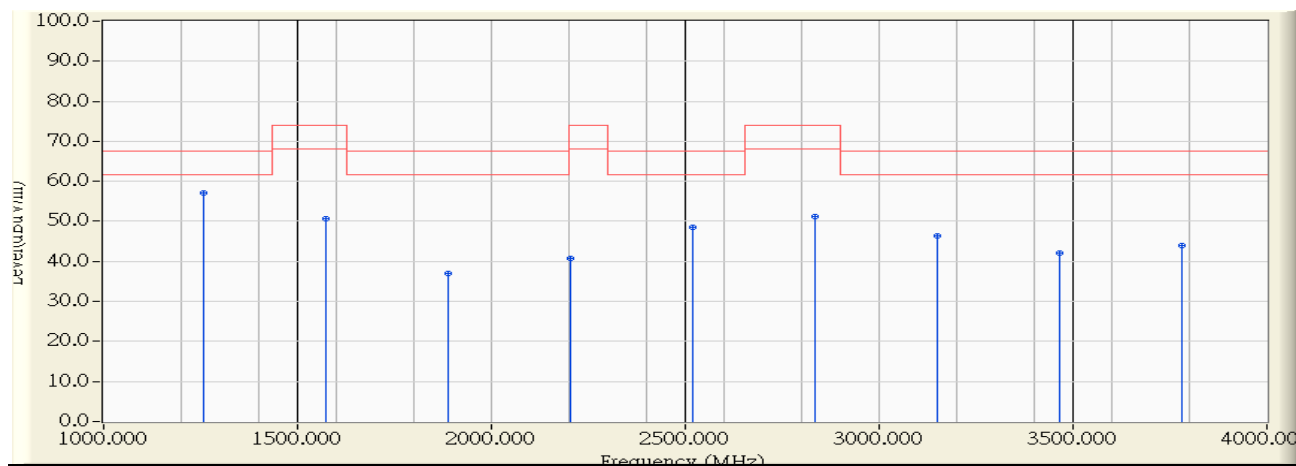
|   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | 122.335            | -21.164                | 50.042                  | 28.878                    | -38.782        | 67.660            | PEAK          |
| 2 | 313.600            | -19.122                | 47.252                  | 28.130                    | -39.530        | 67.660            | PEAK          |
| 3 | * 629.885          | -12.150                | 66.976                  | 54.826                    | -12.834        | 67.660            | PEAK          |
| 4 | 746.855            | -11.146                | 48.961                  | 37.815                    | -29.845        | 67.660            | PEAK          |
| 5 | 896.899            | -8.667                 | 47.244                  | 38.577                    | -29.083        | 67.660            | PEAK          |
| 6 | 944.813            | -7.203                 | 58.700                  | 51.497                    | -16.163        | 67.660            | PEAK          |

Note:

1. All Reading Levels are Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

**Spurious Emission (Above 1GHz)**

|                                                             |                                  |
|-------------------------------------------------------------|----------------------------------|
| Site : CB1                                                  | Time : 2016/07/04 - 17:48        |
| Limit : NCC_3.4.2_H_315MHz_03M_PK                           | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2_Ant3 - HORIZONTAL              | Power : DC 6V (Power by Battery) |
| EUT : WEL-3750/WEL7750/WEL3790/WEL7790 RFID Electronic Lock | Note : X-axis                    |

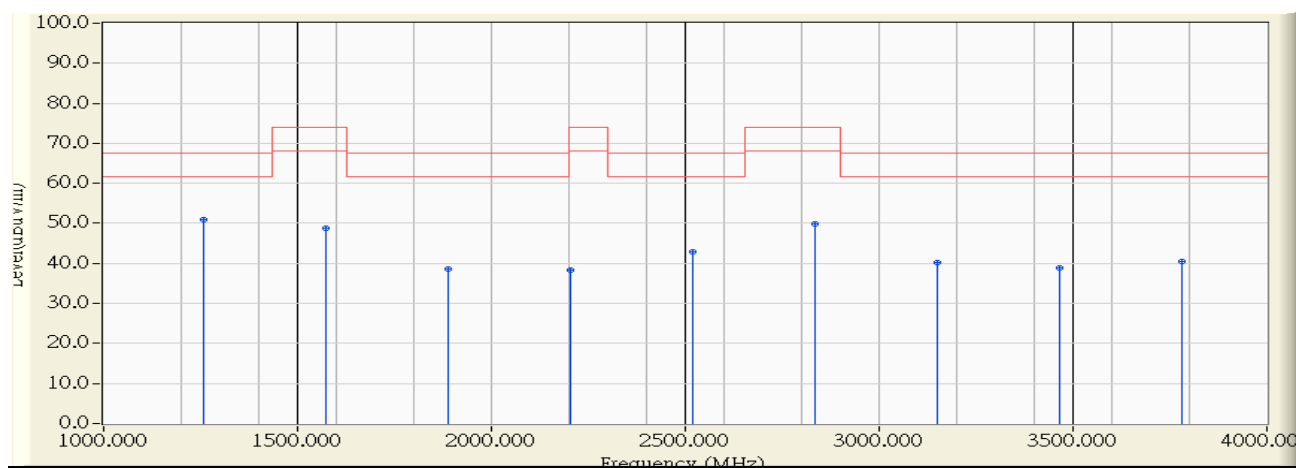


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | * | 1259.500           | -10.323                | 67.336                  | 57.013                    | -10.647        | 67.660            | PEAK          |
| 2 |   | 1574.500           | -10.152                | 60.689                  | 50.537                    | -23.463        | 74.000            | PEAK          |
| 3 |   | 1889.500           | -11.772                | 48.760                  | 36.987                    | -30.673        | 67.660            | PEAK          |
| 4 |   | 2204.500           | -9.365                 | 50.101                  | 40.736                    | -33.264        | 74.000            | PEAK          |
| 5 |   | 2519.500           | -5.843                 | 54.480                  | 48.636                    | -19.024        | 67.660            | PEAK          |
| 6 |   | 2834.500           | -6.803                 | 57.961                  | 51.157                    | -22.843        | 74.000            | PEAK          |
| 7 |   | 3149.500           | -7.410                 | 53.859                  | 46.449                    | -21.211        | 67.660            | PEAK          |
| 8 |   | 3464.500           | -7.701                 | 49.903                  | 42.202                    | -25.458        | 67.660            | PEAK          |
| 9 |   | 3779.500           | -7.185                 | 51.228                  | 44.042                    | -23.618        | 67.660            | PEAK          |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. " \* ", means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)  
 Duty Cycle(Only Ton)= Ton/ (Ton+off)=8.45/100=0.0845  
 20\*Log(Duty Cycle) = -21.463
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

|                                              |                                  |
|----------------------------------------------|----------------------------------|
| Site : CB1                                   | Time : 2016/07/04 - 17:51        |
| Limit : NCC_3.4.2_H_315MHz_03M_PK            | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2_Ant3 - VERTICAL | Power : DC 6V (Power by Battery) |
| EUT : WEL-3750/WEL7750/WEL3790/WEL7790 RFID  | Note : X-axis                    |
| Electronic Lock                              |                                  |



|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | * | 1259.500           | -9.599                 | 60.547                  | 50.948                    | -16.712        | 67.660            | PEAK          |
| 2 |   | 1574.500           | -9.743                 | 58.528                  | 48.785                    | -25.215        | 74.000            | PEAK          |
| 3 |   | 1889.500           | -11.679                | 50.378                  | 38.699                    | -28.961        | 67.660            | PEAK          |
| 4 |   | 2204.500           | -8.922                 | 47.261                  | 38.339                    | -35.661        | 74.000            | PEAK          |
| 5 |   | 2519.500           | -4.770                 | 47.642                  | 42.871                    | -24.789        | 67.660            | PEAK          |
| 6 |   | 2834.500           | -5.100                 | 54.955                  | 49.854                    | -24.146        | 74.000            | PEAK          |
| 7 |   | 3149.500           | -5.244                 | 45.539                  | 40.296                    | -27.364        | 67.660            | PEAK          |
| 8 |   | 3464.500           | -5.220                 | 43.975                  | 38.756                    | -28.904        | 67.660            | PEAK          |
| 9 |   | 3779.500           | -4.389                 | 44.990                  | 40.601                    | -27.059        | 67.660            | PEAK          |

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. " \* ", means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)  
Duty Cycle(Only Ton)= Ton/ (Ton+off)=8.45/100=0.0845  
20\*Log(Duty Cycle) = -21.463
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

#### 4. Occupied Bandwidth

##### 4.1. Test Equipment

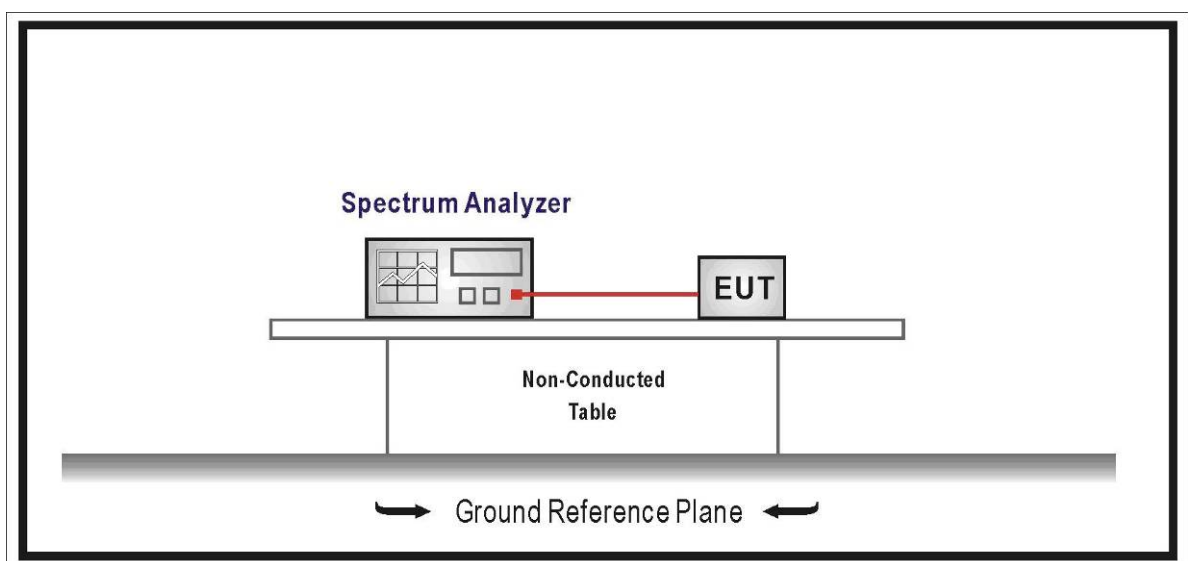
The following test equipment are used during the radiated emission tests:

Occupied Bandwidth / SR7

| Instrument        | Manufacturer | Model No. | Serial No | Next Cal. Date |
|-------------------|--------------|-----------|-----------|----------------|
| Spectrum Analyzer | R&S          | FSP       | 100561    | 2016/12/28     |

Note: All equipment that need to calibrate are with calibration period of 1 year.

##### 4.2. Test Setup



##### 4.3. Limits

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

##### 4.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(C): 2015

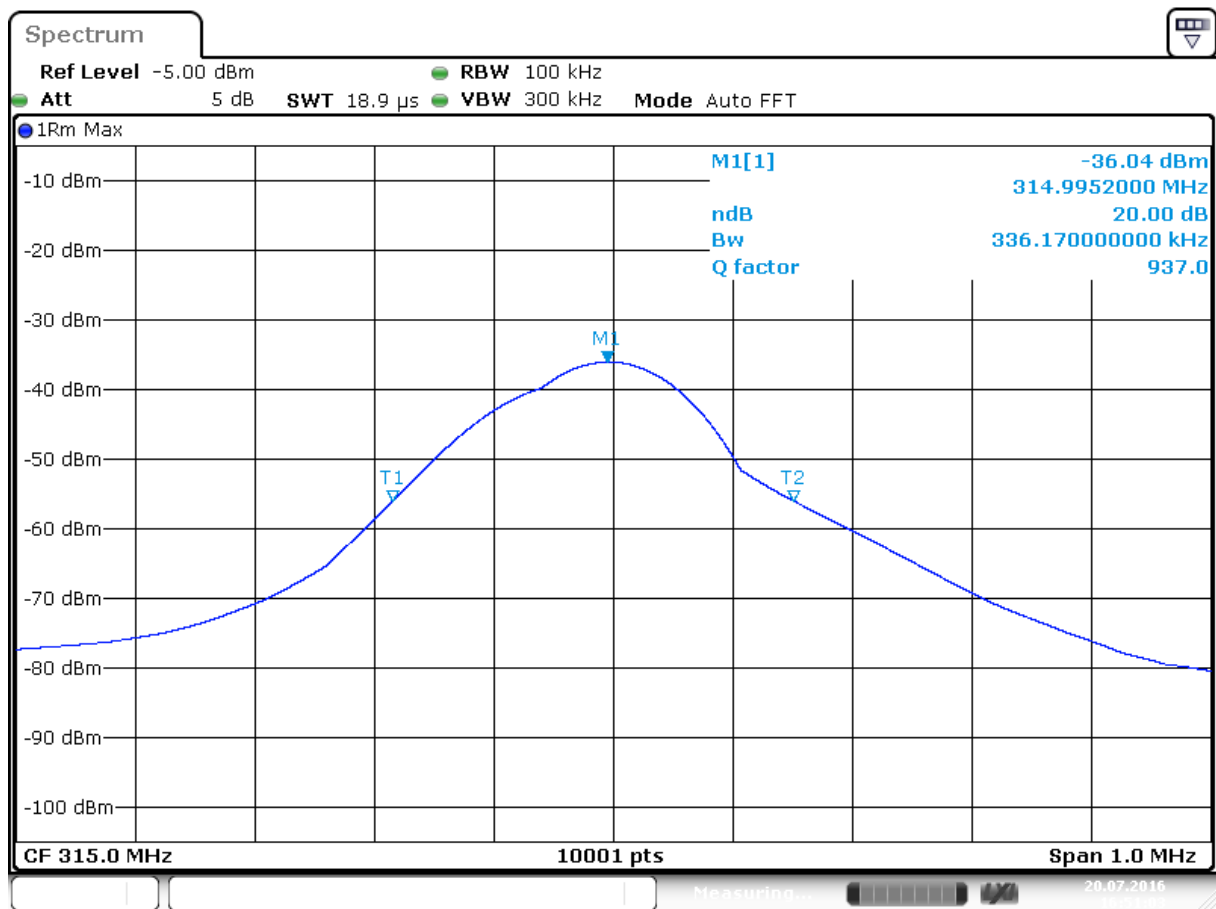
##### 4.5. Uncertainty

$\pm 150\text{Hz}$

#### 4.6. Test Result

|              |                                                       |           |     |
|--------------|-------------------------------------------------------|-----------|-----|
| Product      | WEL-3750/WEL7750/WEL3790/WEL7790 RFID Electronic Lock |           |     |
| Test Item    | Occupied Bandwidth                                    |           |     |
| Test Mode    | Mode 1: Transmit                                      |           |     |
| Date of Test | 2016/07/20                                            | Test Site | SR7 |

| Frequency<br>(MHz) | Occupied Bandwidth<br>(KHz) | Limit<br>(KHz) |
|--------------------|-----------------------------|----------------|
| 315                | 336.170                     | 787.5          |



Date: 20 JUL 2016 16:51:03

## 5. Duty cycle

### 5.1. Test Equipment

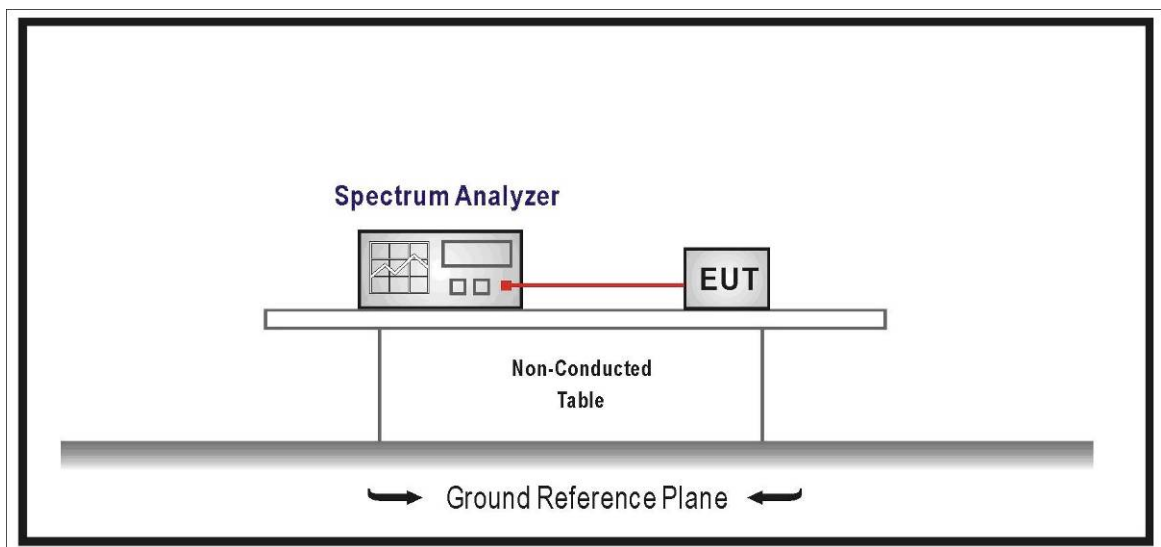
The following test equipment are used during the radiated emission tests:

Duty cycle / SR7

| Instrument          | Manufacturer | Model No. | Serial No  | Next Cal. Date |
|---------------------|--------------|-----------|------------|----------------|
| EXA Signal Analyzer | Keysight     | N9010A    | MY51440132 | 2018/03/12     |

Note: All equipment that need to calibrate are with calibration period of 1 year.

### 5.2. Test Setup



### 5.3. Limits

N/A

### 5.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2015

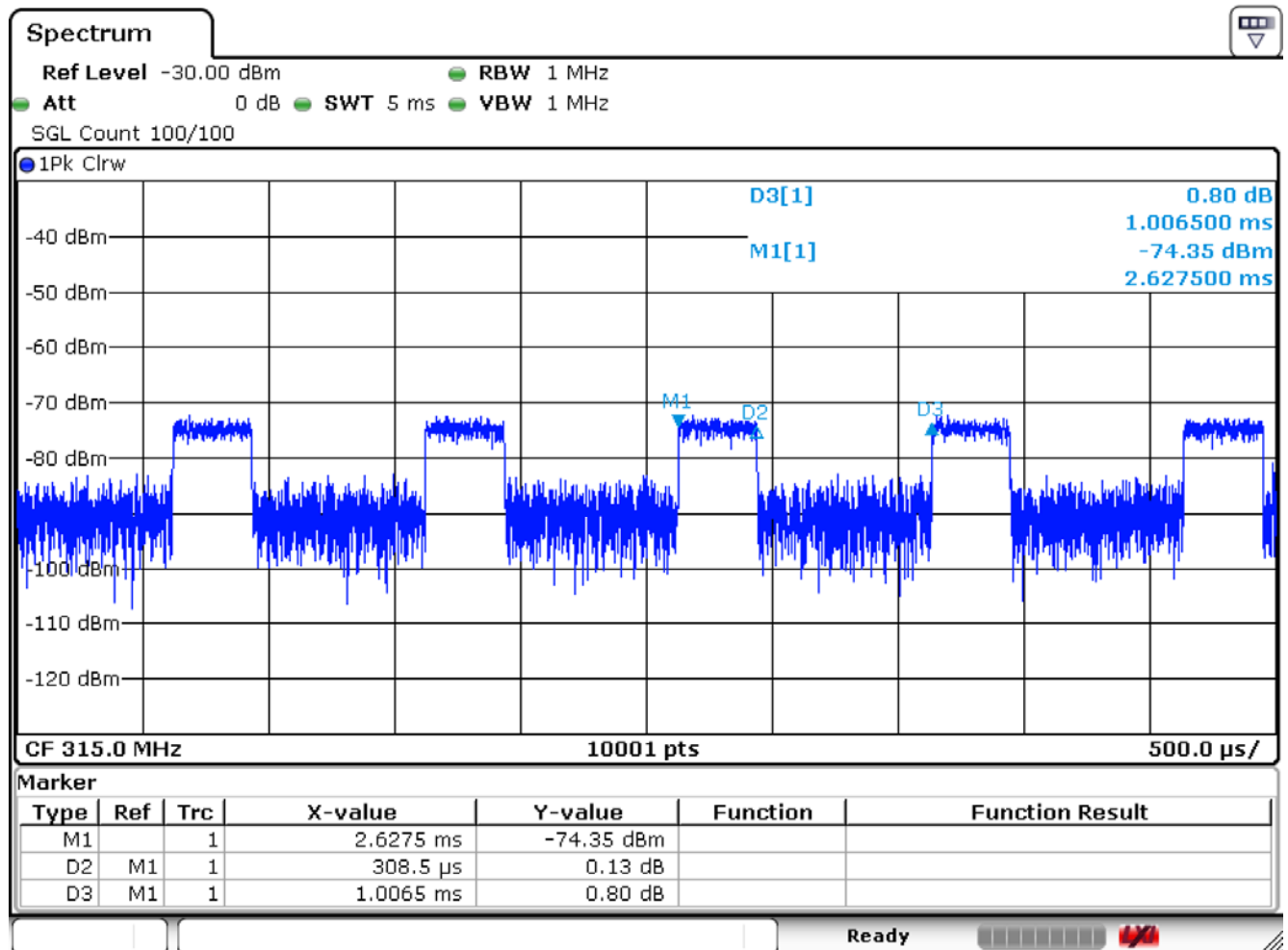
### 5.5. Uncertainty

± 25msec

## 5.6. Test Result

|              |                                                       |           |     |
|--------------|-------------------------------------------------------|-----------|-----|
| Product      | WEL-3750/WEL7750/WEL3790/WEL7790 RFID Electronic Lock |           |     |
| Test Item    | Duty Cycle                                            |           |     |
| Test Mode    | Mode 1: Transmit                                      |           |     |
| Date of Test | 2017/08/02                                            | Test Site | SR7 |

| Mode   | On Time(ms) | On+Off Time(ms) | Duty Cycle(%) | Duty Factor(dB) |
|--------|-------------|-----------------|---------------|-----------------|
| 315MHz | 0.3085      | 1.0065          | 30.65         | 10.271          |



Date: 2.AUG.2017 01:15:18

## 6. Transmitter time

### 6.1. Test Equipment

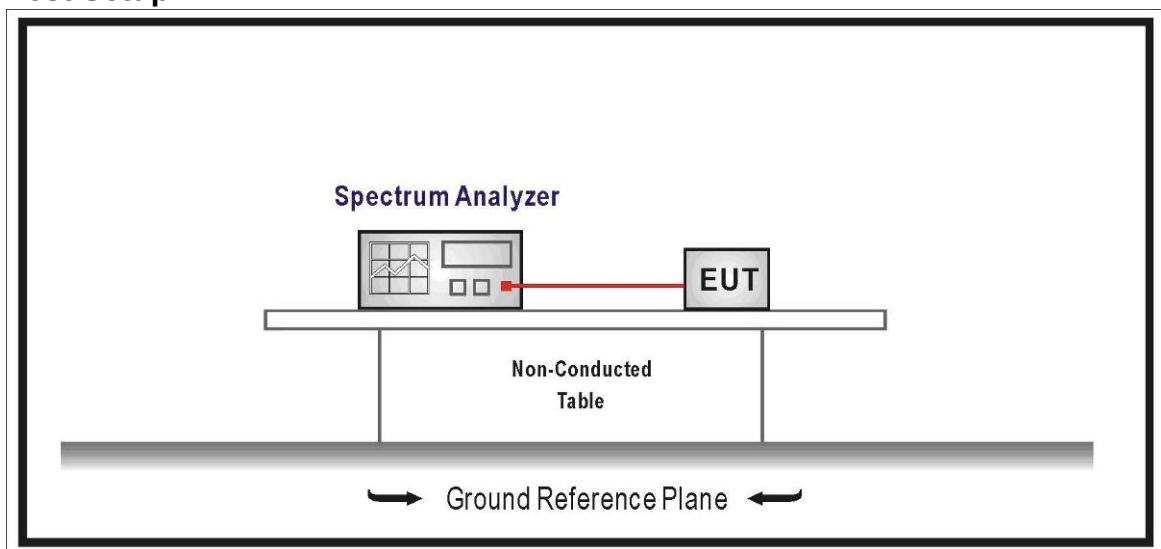
The following test equipment are used during the radiated emission tests:

Transmitter time / SR7

| Instrument        | Manufacturer | Model No. | Serial No | Next Cal. Date |
|-------------------|--------------|-----------|-----------|----------------|
| Spectrum Analyzer | R&S          | FSP       | 100561    | 2016/12/28     |

Note: All equipment that need to calibrate are with calibration period of 1 year.

### 6.2. Test Setup



### 6.3. Limits

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. A transmitter activated automatically shall cease transmission within 5 seconds after activation.

### 6.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(a): 2015

### 6.5. Uncertainty

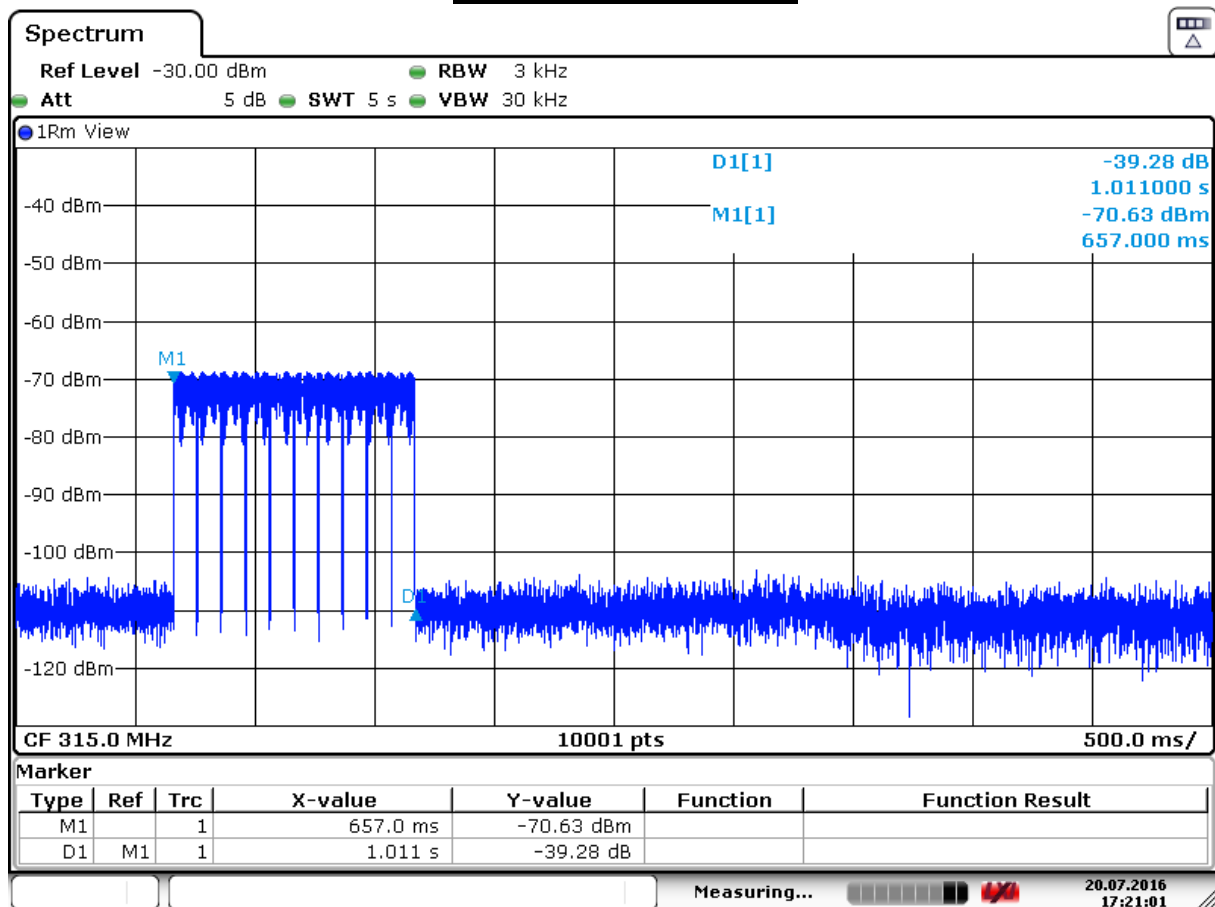
± 25msec

## 6.6. Test Result

|              |                                                       |           |     |
|--------------|-------------------------------------------------------|-----------|-----|
| Product      | WEL-3750/WEL7750/WEL3790/WEL7790 RFID Electronic Lock |           |     |
| Test Item    | Transmitter time                                      |           |     |
| Test Mode    | Mode 1: Transmit                                      |           |     |
| Date of Test | 2016/07/20                                            | Test Site | SR7 |

|                           |             |
|---------------------------|-------------|
| Center Frequency          | 315MHz      |
| Transmitter time =1.011 s | Below 5 sec |

### Transmitter time in 6sec.



Date: 20.JUL.2016 17:21:01