# TEST REPORT

| | | |
|---|---|---|
| Report Number | | RAPA15-O-026 |
| Type of Equipment | | Keyless Entry System |
| Model Name | | 1WG13R-SH |
| FCC ID | | VA5REF301-1W433 |
| IC Number | | 7087A-1WREF301433 |
| Applicant | Name | SEGI LIMITED |
| | Logo | SEGI |
| | Address | UNIT F, 7/F, CENTURY INDUSTRIAL CENTER, 33-35 AU PUI WAN STREET, SHANTIN, NT, HONGKONG |
| Manufacturer | Name | SEGI ELECTRONICS CO., LTD. |
| | Address | Chenjiapucun, Liaobu Town, Dongguan City, Guangdong Province, P.R.China |
| Test duration | | July 20, 2015 to July 24, 2015 |
| Issuance date of report | | July 27, 2015 |
| Total Page | | 13 pages (including this page) |

## SUMMARY

The equipment complies with FCC CFR 47 Part 15 Subpart C Section 15.231 and IC RSS-210 Issue8 Annex 1-2010.

This test report contains only the results of a single test of the sample supplied for the examination.
It is not a general valid assessment of the features of the respective products of the mass-production.

Date: July 27, 2015

Prepared and tested by SangHoon Lee
Assistant Manager

Date: July 27, 2015

Reviewed by Sukil Park
Executive Managing Director

# CONTENTS

# 1. General description of EUT

## 1.1 Applicant

- Company name : SEGI LIMITED
- Address : UNIT F, 7/F, CENTURY INDUSTRIAL CENTER, 33-35 AU PUI WAN STREET, SHANTIN, NT, HONGKONG
- Contact person : Eui Seok, Chung
- Phone/Fax : 82-32-623-5550 / 82-32-623-6667

## 1.2 Manufacturer

- Company name : SEGI ELECTRONICS CO., LTD
- Address : Chenjiapucun, Liaobu Town, Dongguan City, Guangdong Province, P.R.China
- Contact person : Eui Seok, Chung
- Phone / Fax : 82-32-623-5550 / 82-32-623-6667

## 1.3 Basic description of EUT

- Product name : Keyless Entry System
- Model name : 1WG13R-SH
- Serial number : Not available(Proto Type)
- Frequency : 433.92 MHz(Tx)
- Channel number : 1 Channel
- Modulation method : ASK
- FCC Rule Part(s) : FCC CFR47 Part 15 Subpart C Section 15.231
- IC Rule Part(s) : IC RSS-210 Issue8 Annex 1-2010
- FCC classification : DSC / Part 15 Security/Remote control Transmitter
- IC classification : Annex 1 / Momentarily Operated Devices and Remote Control
- Date of test : July 20, 2015 to July 24, 2015
- Date of issue : July 27, 2015
- Place of test : Head office
  #101 & B104 Anyang Megavalley, 268, Hagui-ro, Dongan-gu, Anyang-si, Gyeonggi-do, 431-767, Korea

  Open area test site
  103, Anseok-gil, 138beon-gil, Hwaseong-si, Gyeonggi-do, Korea

  (FCC Registration Number : 931589)
  (IC Submission Number : 9355B)
  (KCC Designation Number : KR0027)

## 1.4 Technical specification of EUT

| | |
|---|---|
| **Model Name** | 1WG13R-SH |
| **Product Name** | Keyless Entry System |
| **Size(mm)** | 30 x 70 x 13 (W x L x H) |
| **Battery Size** | 6.0 Vdc (CR2016 * 2) |
| **Transmit Frequency** | 433.92 MHz |
| **Modulation Method** | ASK |

# 2. General information of test

## 2.1 Standard for measurement methods

| Applied Standard : FCC CFR47 Part 15 Subpart C and IC RSS-210 Issue8 Annex 1-2010 | | | | |
|---|---|---|---|---|
| **FCC** | **IC** | **Description of Test** | **Limit** | **Result** |
| 15.231(a) | A1.1.1 | Transmission Time(s) | 5 | Pass |
| 15.231(b) | A1.1.2 | Field Strength of Fundamental (dBμV/m) | 100.8(Peak) / 80.8(AVG) | Pass |
| 15.231(b) & 15.209 | A1.1.2 | Radiated Emission(dBμV/m) | 80.8(Peak) / 60.8(AVG) | Pass |
| 15.231(c) | A1.1.3 | Occupied Bandwidth(MHz) | 1.085 | Pass |

## 2.2 Description of EUT modification

During the test, there was no mechanical or circuitry modification to improve RF and spurious characteristic, and any RF and spurious suppression device(s) was not added against the device tested.

## 2.3 Test configuration

**• Type of peripheral equipment used**

| Description | Model Name | Serial No. | Manufacturer | FCC ID | IC Number |
|---|---|---|---|---|---|
| EUT | 1WG1R-SH | N/A | SEGI Electronics Co., Ltd. | VA5REF301-1W433 | 7087A-1WREF301433 |

**• Type of cable used**

| Device from | Device to | Type of Cable | Cable Number | Length |
|---|---|---|---|---|
| - | - | - | - | - |

# 3. Measurement data

## 3.1 Transmission time

### 3.1.1 Definitions

A transmission time is a switching time that will automatically deactivate the transmission of transmitter.

### 3.1.2 Specification

• FCC Rules Part 15 Subpart C Section 15.231(a)(1)
• IC Rules RSS-210 Issue8 Annex 1-2010 A1.1.1

### 3.1.3 Measurement method

The device output is connected to the spectrum analyzer.

### 3.1.4 Set-Up


### 3.1.5 Test equipment list

| Equipment | Model Name | Manufacturer |
|---|---|---|
| EUT | 1WG1R-SH | SEGI Electronics Co., Ltd. |
| Spectrum Analyzer | FSV | R&S |

### 3.1.6 Test procedure

• **Spectrum analyzer setting;**

- Center Frequency: 433.92 MHz
- Span: Zero
- RBW: 100 kHz
- VBW: 100 kHz
- Sweep time: 5 s
- Detect Mode: Peak

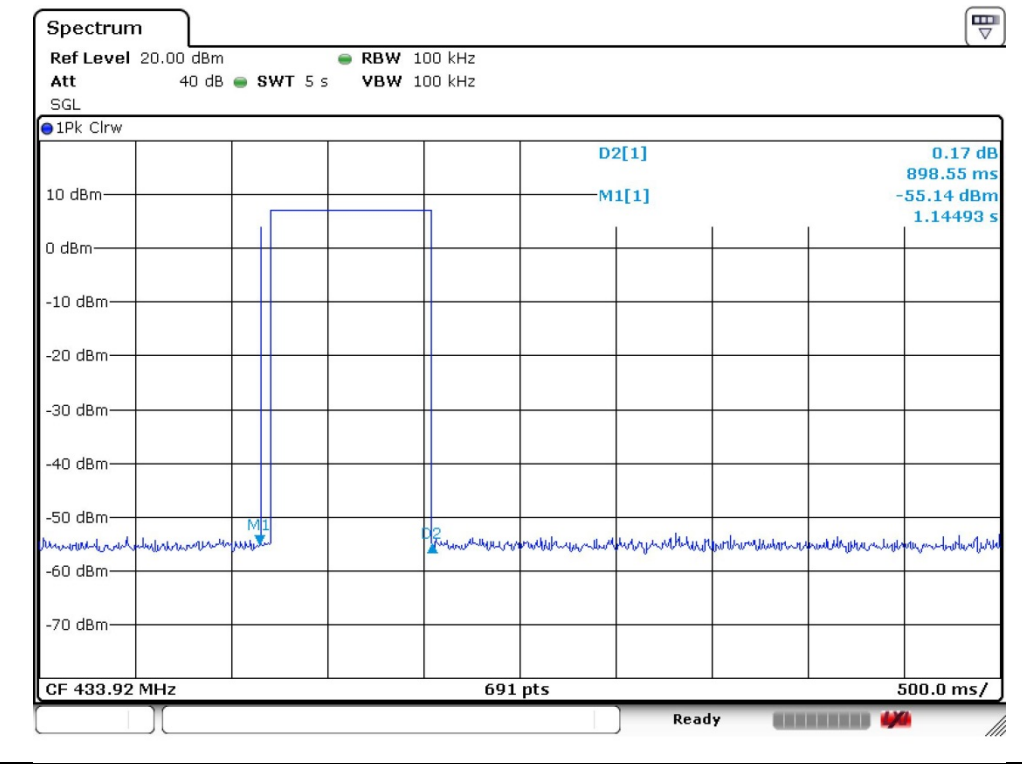
### 3.1.7 Test condition

• Test place: Shield Room
• Test mode: Normal Operation
• Test environment: 25 °C, 54 % R.H.

### 3.1.8 Limit and test result

| Frequency (MHz) | Transmission Time (s) | Limit (s) |
|---|---|---|
| 433.92 | 0.898 | 5.00 |

### 3.1.9 Plots of transmission time



## 3.2 Field strength of fundamental and spurious emission

### 3.2.1 Definitions

A field strength emission is a emission from the equipment when transmitting into a non-radiating load on fundamental frequency and frequencies that are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desired.

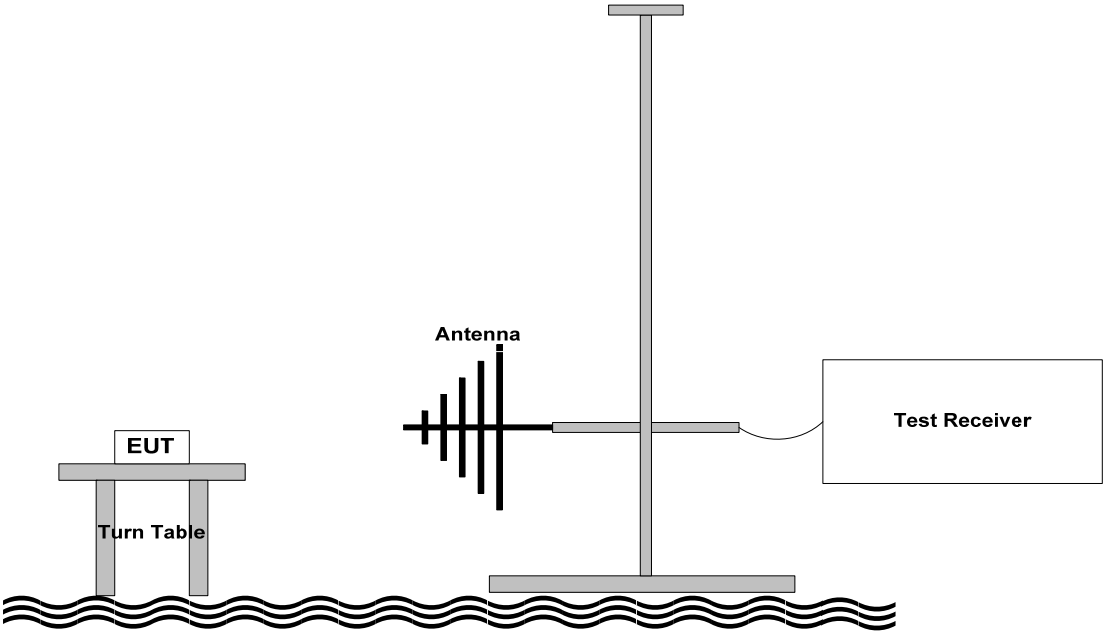
### 3.2.2 Specification

• FCC Rules Part 15 Subpart C Section 15.231(b)
• IC Rules RSS-210 Issue8 Annex 1-2010 A1.1.2

### 3.2.3 Measurement method

• ANSI Standard C63.4-2009 8.3

### 3.2.4 Set-Up




### 3.2.5 Test equipment list

| Equipment | Model Name | Manufacturer |
|---|---|---|
| EUT | 1WG1R-SH | SEGI Electronics Co., Ltd. |
| Test Receiver | ESCI | Rohde & Schwarz |
| Bi-conical Antenna | VHA9103 | Schwarzbeck |
| Log Periodic Antenna | VULP9118A | Schwarzbeck |
| Horn Antenna | 3115 | EMCO |

### 3.2.6 Test procedure

The EUT is placed on a turntable, which is 0.8 meter high above ground. The turntable rotates 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, broadband antenna, which is mounted on an antenna mast.

The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level form the EUT. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find out the maximum emission levels, all of the EUT location were manipulated according to ANSI 63.4 during the radiated emission measurement. The EUT was tested in 3 orthogonal planes.

The bandwidth of test receiver is set at 120 kHz between 30 to 1000 MHz, and 1 MHz between 1 to 5 GHz.

### 3.2.7 Test condition

**• Below 1 GHz**

- Test place: Open area test site
- Test mode: Continuous Transmitting Mode
- Test environment: 27 °C, 62 % R.H.

**• Above 1 GHz**

- Test place: 3 m Chamber
- Test mode: Continuous Transmitting Mode
- Test environment: 24 °C, 49 % R.H.

### 3.2.8 Test result

| Freq. [MHz] | Pol. [H/V] | plane [X/Y/Z] | Detect Mode [Peak/QP/AVG] | Reading [dBμV] | ANT. Factor [dB/m] | Cable Loss [dB] | AVG Factor [dB] | Pre-Amp Gain [dB] | Emission Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 433.92 | H | Y | Peak | 65.94 | 16.31 | 3.04 | 0 | - | 85.29 | 100.80 | 15.51 |
| | | | **AVG | | | | -9.24 | | 76.05 | 80.80 | 4.75 |
| 867.84 | H | Y | Peak | 32.43 | 22.85 | 4.07 | 0 | - | 59.35 | 80.80 | 21.45 |
| | | | **AVG | | | | -9.24 | | 50.11 | 60.80 | 10.69 |
| *1 301.76 | H | Y | Peak | 51.79 | 25.17 | 1.58 | 0 | 33.69 | 44.85 | 73.98 | 29.13 |
| | | | **AVG | | | | -9.24 | | 35.61 | 53.98 | 18.37 |
| 1 735.68 | H | Y | Peak | 62.79 | 26.35 | 2.08 | 0 | 32.85 | 58.37 | 80.80 | 22.43 |
| | | | **AVG | | | | -9.24 | | 49.13 | 60.80 | 11.67 |
| 2 169.60 | H | Y | Peak | 70.85 | 22.77 | 2.47 | 0 | 33.11 | 62.98 | 80.80 | 17.82 |
| | | | **AVG | | | | -9.24 | | 53.74 | 60.80 | 7.06 |
| 2 603.52 | H | Y | Peak | 59.05 | 28.87 | 2.88 | 0 | 32.13 | 58.67 | 80.80 | 22.13 |
| | | | **AVG | | | | -9.24 | | 49.43 | 60.80 | 11.37 |
| 3 037.44 | H | Y | Peak | 56.70 | 30.10 | 3.28 | 0 | 32.49 | 57.59 | 80.80 | 23.21 |
| | | | **AVG | | | | -9.24 | | 48.35 | 60.80 | 12.45 |
| 3 471.36 | H | Y | Peak | 58.45 | 30.91 | 3.77 | 0 | 33.75 | 59.38 | 80.80 | 21.42 |
| | | | **AVG | | | | -9.24 | | 50.14 | 60.80 | 10.66 |
| *3 905.28 | H | Y | Peak | 46.63 | 32.18 | 4.30 | 0 | 35.15 | 47.96 | 73.98 | 26.02 |
| | | | **AVG | | | | -9.24 | | 38.72 | 53.98 | 15.26 |
| *4 339.20 | H | Y | Peak | 44.10 | 32.27 | 4.71 | 0 | 36.23 | 44.85 | 73.98 | 29.13 |
| | | | **AVG | | | | -9.24 | | 35.61 | 53.98 | 18.37 |

Here, * is restricted frequency, ** is the average value applied with average factor.

### 3.2.9 Limit

**• Fundamental (Average)**

| Fundamental Frequency (MHz) | Field Strength of Fundamental (μV/m) | Field Strength of Fundamental (dBμV/m) |
|---|---|---|
| 40.66 – 40.70 | 2 250 | 67.04 |
| 70 – 130 | 1 250 | 61.94 |
| 130 – 174 | 1 250 to 3 750 | 61.94 to 71.48 |
| 174 – 260 | 3 750 | 71.48 |
| 260 – 470 | 3 750 to 12 500 | 71.48 to 81.94 |
| Above 470 | 12 500 | 81.94 |

**• Spurious emission**

| Fundamental Frequency (MHz) | Field Strength of Spurious Emission (μV/m) | Field Strength of Spurious Emission (dBμV/m) |
|---|---|---|
| 40.66 – 40.70 | 225 | 47.04 |
| 70 – 130 | 125 | 41.94 |
| 130 – 174 | 125 to 375 | 41.94 to 51.48 |
| 174 – 260 | 375 | 51.48 |
| 260 – 470 | 375 to 1 250 | 51.48 to 61.94 |
| Above 470 | 1 250 | 61.94 |

**• Spurious emission at restricted band**

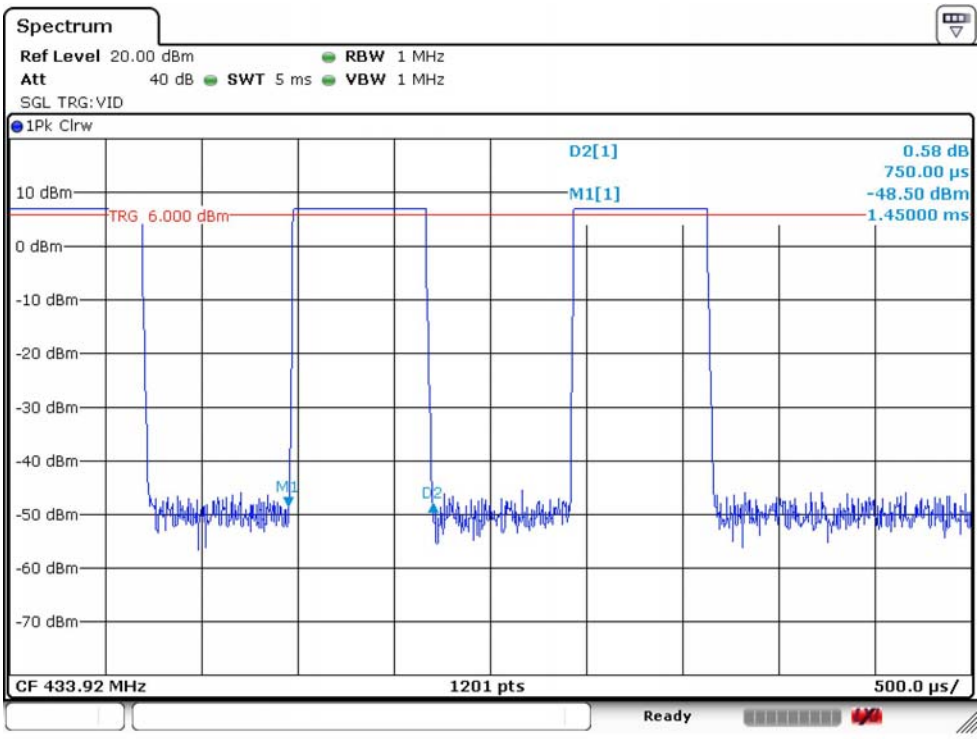
| Frequency (MHz) | Field Strength (μV/m) | Field Strength (dBμV/m) | Measurement Distance (m) |
|---|---|---|---|
| 0.009 – 0.490 | 2 400 / F(kHz) | 48.52 to 13.80 | 300 |
| 0.490 – 1.705 | 24 000 / F(kHz) | 33.80 to 22.97 | 30 |
| 1.705 – 30.0 | 30 | 29.54 | 30 |
| 30 – 88 | 100 | 40.00 | 3 |
| 88 – 216 | 150 | 43.52 | 3 |
| 216 – 960 | 200 | 46.02 | 3 |
| Above 960 | 500 | 53.98 | 3 |

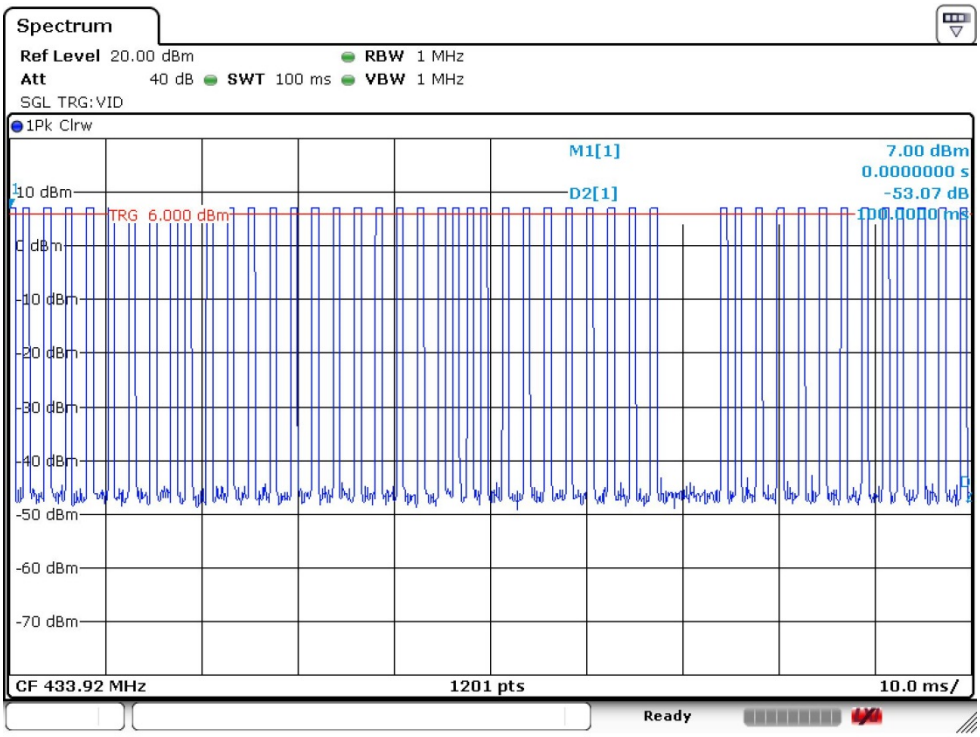
Here, restricted bands are 1 300 MHz to 1 427 MHz and 3 600 MHz to 4 400 MHz.

### 3.2.10 Duty Cycle

| ON time[ms] | Cycle[ms] | Duty[ON time / Cycle] | Average Factor[dB] |
|---|---|---|---|
| 0.75 X 46 = 34.5 | 100 | 0.345 | -9.24 |

* Average Factor : 20 log(34.5 ms / 100 ms) = -9.24 dB



## 3.3 20 dB Bandwidth

### 3.3.1 Definitions

A 20 dB Bandwidth is width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each lower 20 dB of the total mean power of a given emission

### 3.3.2 Specification

• FCC Rules Part 15, Subpart C, Section 15.231(c)

### 3.3.3 Measurement methods

• ANSI Standard C63.4-2009 10.1.8.8

### 3.3.4 Set-Up


### 3.3.5 Test equipment list

| Equipment | Model Name | Manufacturer |
|---|---|---|
| EUT | 1WG1R-SH | SEGI Electronics Co., Ltd. |
| Spectrum Analyzer | FSV | R&S |

### 3.3.6 Test procedure

**• Spectrum Analyzer setting**

- Center Frequency: 433.92 MHz
- Span: 1 MHz
- RBW: 30 kHz
- VBW: 100 kHz
- Detect Mode: Peak, Max Hold

### 3.3.7 Test condition

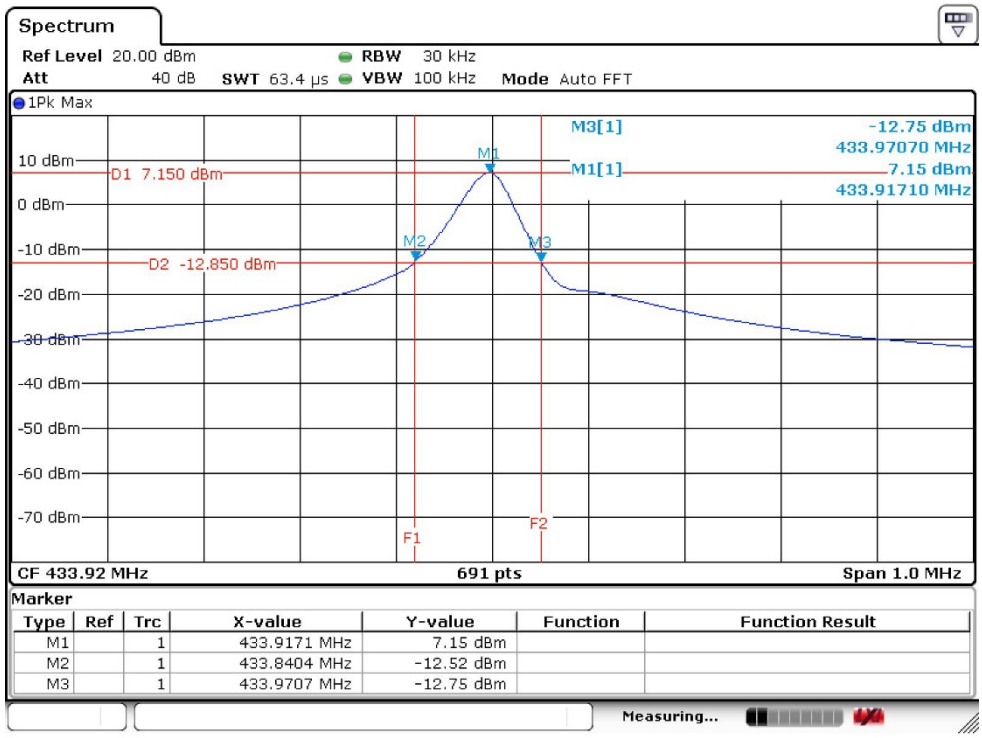
• Test Place: Shield Room
• Test Mode: Normal Operation
• Test environment: 25 °C, 54 %R.H.

### 3.3.8 Limit and test result

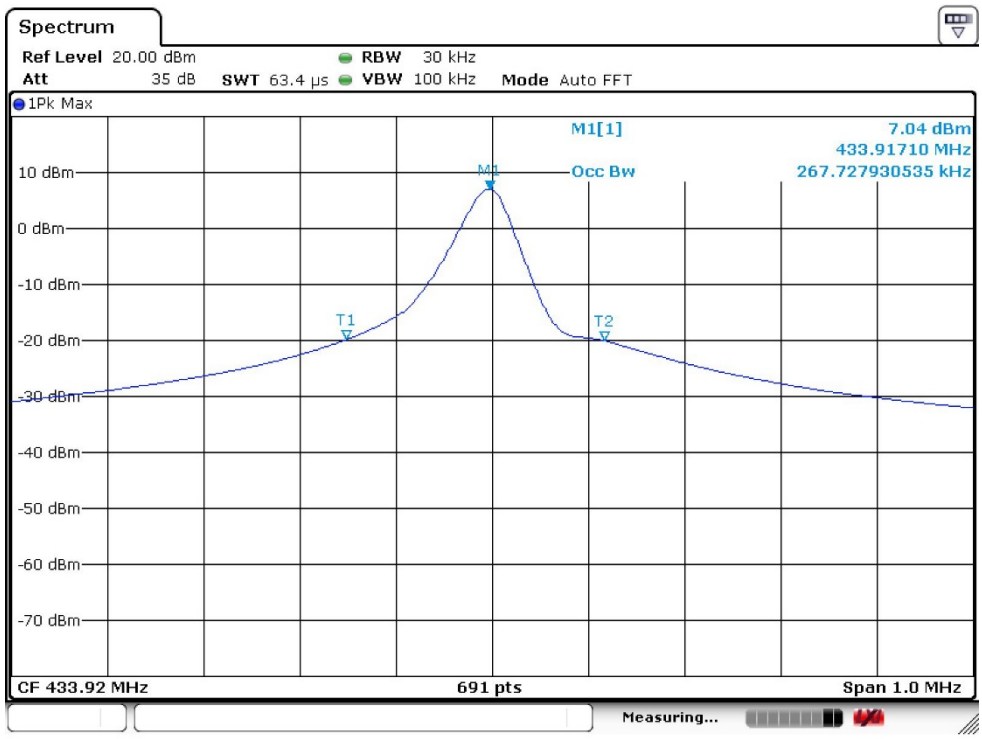
| Frequency (MHz) | RBW (MHz) | 20 dB Bandwidth (MHz) | 99% Bandwidth (MHz) | Limit (MHz) |
|---|---|---|---|---|
| 433.92 | 30 kHz | 0.130 | 0.267 | 1.085 |

## 3.3.9 Plots of 20 dB bandwidth and 99% bandwidth

### 3.3.9.1 20 dB bandwidth




### 3.3.9.2 99 % bandwidth



## 4. Test equipment list

The listing below denotes the test equipment for the test(s).

| No. | Equipment | Model | Manufacturer | Serial Number | Calibration Due date |
|---|---|---|---|---|---|
| 1 | Spectrum Analyzer | FSV | R&S | 101673 | 01/20/16 |
| 2 | EMI Test Receiver | ESPI | R&S | 101002 | 09/02/15 |
| 3 | Biconical Antenna | VHA9103 | Schwarzbeck | 2217 | 11/15/15 |
| 4 | Log-Periodic Antenna | VULP9118A | Schwarzbeck | 382 | 11/15/15 |
| 5 | Horn Antenna | 3115 | EMCO | 9402-4229 | 07/15/16 |
| 6 | Broadband Pre-AMP | AMP 1000-6000 | Infinitetech | 2013 05 00002/1 | 01/19/16 |
| 7 | Turn Table | DS 1500 S-1t-O | Innco GmbH | N/A | N/A |
| 8 | Turn Table | ALL1.5TT | Airlinklab | N/A | N/A |
| 9 | Antenna Mast | ALL2.2MA | Airlinklab | N/A | N/A |
| 10 | Antenna Mast | MA4000-O | Innco GmbH | N/A | N/A |