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# TEST REPORT

## FCC PART 15.225

Report Reference No. .... : CTL2103112031-WF

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Ivan Xie

Product Name ..... : HF RFID MODULE

Model/Type reference ..... : IDT305MT

List Model(s)..... : IDT301MT, OEM-DES-M900

Trade Mark..... : N/A

FCC ID..... : S6A-IDT305MT

Applicant's name ..... : iDTRONIC GmbH

Address of applicant ..... : Donnersbergweg 1, 67059 Ludwigshafen am Rhein, Germany

Test Firm..... : Shenzhen CTL Testing Technology Co., Ltd.

Address of Test Firm ..... : Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road,  
Nanshan District, Shenzhen, China 518055

Test specification..... :

Standard ..... : FCC Part 15.225: Operation within the band 13.110–14.010 MHz.

TRF Originator ..... : Shenzhen CTL Testing Technology Co., Ltd.

Master TRF..... : Dated 2011-01

Date of receipt of test item ..... : Apr. 06, 2021

Date of sampling ..... : Apr. 06, 2021

Date of Test Date..... : Apr. 06, 2021-Apr. 20, 2021

Data of Issue ..... : Apr. 21, 2021

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# TEST REPORT

|                          |                         |                                |
|--------------------------|-------------------------|--------------------------------|
| <b>Test Report No. :</b> | <b>CTL2103112031-WF</b> | Apr. 21, 2021<br>Date of issue |
|--------------------------|-------------------------|--------------------------------|

Equipment under Test : HF RFID MODULE

Sample No : CTL210311203-1-S001

Model /Type : IDT305MT

Listed Models : IDT301MT, OEM-DES-M900

**Applicant** : **iDTRONIC GmbH**

Address : Donnersbergweg 1, 67059 Ludwigshafen am Rhein,  
Germany

**Manufacturer** : **iDTRONIC GmbH**

Address : Donnersbergweg 1, 67059 Ludwigshafen am Rhein,  
Germany

|                    |               |
|--------------------|---------------|
| <b>Test result</b> | <b>Pass *</b> |
|--------------------|---------------|

\* In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

## **\*\* Modified History \*\***

[illegible]

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## 1. SUMMARY

### 1.1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.225](#): Operation within the band 13.110–14.010 MHz

[ANSI C63.10:2013](#) : American National Standard for Testing Unlicensed Wireless Devices

### 1.2. Test Description

| FCC PART 15 .225           |                               |      |
|----------------------------|-------------------------------|------|
| FCC Part 15.207            | AC Power Conducted Emission   | PASS |
| FCC Part 2.1049            | 20dB Bandwidth                | PASS |
| FCC Part 15.225(a) (b) (c) | In-band Emissions             | PASS |
| FCC Part 15.225(d)/15.207  | Out-of-band Emissions         | PASS |
| FCC Part 15.225(e)         | Frequency Stability Tolerance | PASS |

Remark: The measurement uncertainty is not included in the test result.

### 1.3. Test Facility

#### 1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

#### 1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

##### **CNAS-Lab Code: L7497**

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

##### **A2LA-Lab Cert. No. 4343.01**

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

##### **IC Registration No.: 9618B**

##### **CAB identifier: CN0041**

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9618B on Jan. 22, 2019.

##### **FCC-Registration No.: 399832**

##### **Designation No.: CN1216**

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 399832, December 08, 2017.

### 1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

| Test                                    | Measurement Uncertainty | Notes |
|-----------------------------------------|-------------------------|-------|
| Transmitter power conducted             | ±0.57 dB                | (1)   |
| Transmitter power Radiated              | ±2.20 dB                | (1)   |
| Conducted spurious emission 9KHz-40 GHz | ±2.20 dB                | (1)   |
| Occupied Bandwidth                      | ±0.01ppm                | (1)   |
| Radiated Emission 30~1000MHz            | ±4.10dB                 | (1)   |
| Radiated Emission Above 1GHz            | ±4.32dB                 | (1)   |
| Conducted Disturbance0.15~30MHz         | ±3.20dB                 | (1)   |

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

## 2. GENERAL INFORMATION

### 2.1. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

|                     |         |
|---------------------|---------|
| Normal Temperature: | 25°C    |
| Relative Humidity:  | 55 %    |
| Air Pressure:       | 101 kPa |

### 2.2. General Description of EUT

|                       |                  |
|-----------------------|------------------|
| Product Name:         | HF RFID MODULE   |
| Model/Type reference: | IDT305MT         |
| Power supply:         | DC 3.3V~5.0V     |
| <b>RFID</b>           |                  |
| Operation frequency:  | 13.56MHz         |
| Modulation :          | ASK              |
| No. of Channel :      | 1                |
| Antenna type:         | External Antenna |

Note1: For more details, please refer to the user's manual of the EUT.

## 2.3. Equipments Used during the Test

| Test Equipment                  | Manufacturer         | Model No. | Serial No.   | Calibration Date | Calibration Due Date |
|---------------------------------|----------------------|-----------|--------------|------------------|----------------------|
| LISN                            | R&S                  | ESH2-Z5   | 860014/010   | 2020/05/21       | 2021/05/20           |
| Double cone logarithmic antenna | Schwarzbeck          | VULB 9168 | 824          | 2020/05/23       | 2021/05/22           |
| Horn Antenna                    | Ocean Microwave      | OBH100400 | 26999002     | 2019/11/28       | 2022/11/27           |
| EMI Test Receiver               | R&S                  | ESCI      | 1166.5950.03 | 2020/05/21       | 2021/05/20           |
| Spectrum Analyzer               | Agilent              | E4407B    | MY41440676   | 2020/05/20       | 2021/05/19           |
| Spectrum Analyzer               | Agilent              | N9020A    | US46220290   | 2020/05/20       | 2021/05/19           |
| Spectrum Analyzer               | Keysight             | N9020A    | MY53420874   | 2020/05/20       | 2021/05/19           |
| Controller                      | EM Electronics       | EM 1000   | 060859       | 2020/05/21       | 2021/05/20           |
| Horn Antenna                    | Sunol Sciences Corp. | DRH-118   | A062013      | 2020/05/23       | 2021/05/22           |
| Active Loop Antenna             | Da Ze                | ZN30900A  | /            | 2020/05/23       | 2021/05/22           |
| Amplifier                       | Agilent              | 8449B     | 3008A02306   | 2020/05/21       | 2021/05/20           |
| Amplifier                       | Agilent              | 8447D     | 2944A10176   | 2020/05/21       | 2021/05/20           |
| Amplifier                       | Brief&Smart          | LNA-4018  | 2104197      | 2020/05/20       | 2021/05/19           |
| Temperature/Humidity Meter      | Gangxing             | CTH-608   | 02           | 2020/05/22       | 2021/05/21           |
| Power Sensor                    | Agilent              | U2021XA   | MY55130004   | 2020/05/20       | 2021/05/19           |
| Power Sensor                    | Agilent              | U2021XA   | MY55130006   | 2020/05/20       | 2021/05/19           |
| Power Sensor                    | Agilent              | U2021XA   | MY54510008   | 2020/05/20       | 2021/05/19           |
| Power Sensor                    | Agilent              | U2021XA   | MY55060003   | 2020/05/20       | 2021/05/19           |
| Spectrum Analyzer               | RS                   | FSP       | 1164.4391.38 | 2020/05/20       | 2021/05/19           |
| Test Software                   |                      |           |              |                  |                      |
| Name of Software                |                      |           | Version      |                  |                      |
| TST-PASS                        |                      |           | 1.0.5        |                  |                      |
| ES-K1(Below 1GHz)               |                      |           | V1.71        |                  |                      |
| e3(Above 1GHz)                  |                      |           | 6.111221a    |                  |                      |

The calibration interval was one year

## 2.4. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: S6A-IDT305MT filing to comply with Section 15.225 of the FCC Part 15, Subpart C Rules.

## 2.5. Modifications

No modifications were implemented to meet testing criteria.

### 3. TEST CONDITIONS AND RESULTS

#### 3.1. Conducted Emissions Test

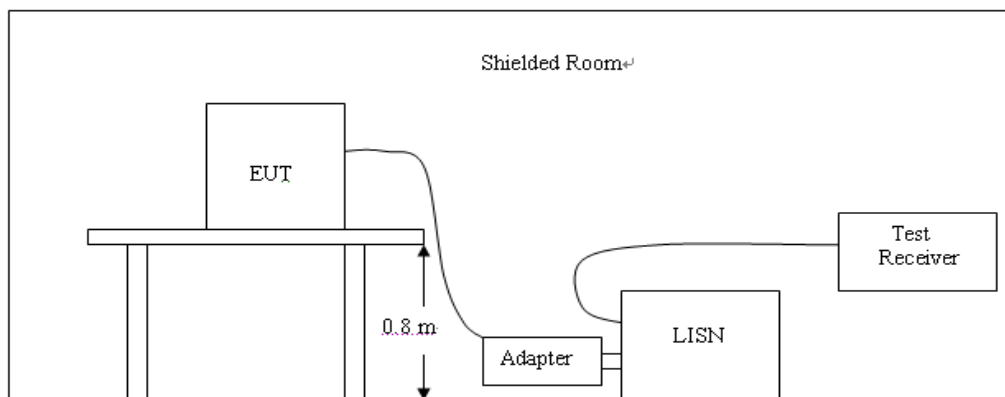
##### LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

| Frequency range (MHz) | Limit (dBuV) |           |
|-----------------------|--------------|-----------|
|                       | Quasi-peak   | Average   |
| 0.15-0.5              | 66 to 56*    | 56 to 46* |
| 0.5-5                 | 56           | 46        |
| 5-30                  | 60           | 50        |

\* Decreases with the logarithm of the frequency.

##### TEST CONFIGURATION

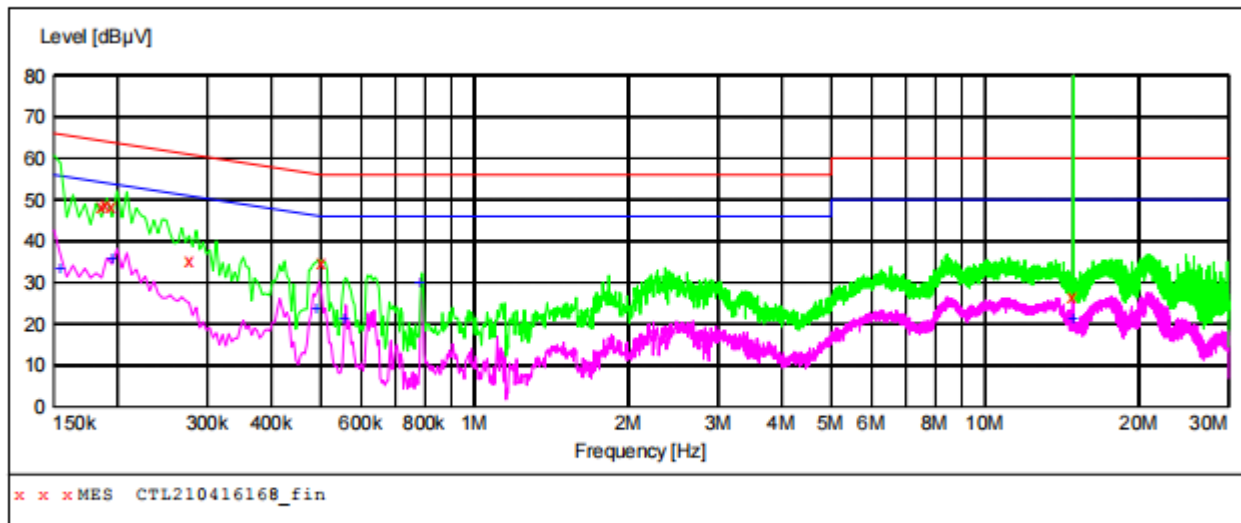


##### TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

**TEST RESULTS****SCAN TABLE: "Voltage (9K-30M)FIN"**

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "CTL210416168\_fin"**

4/16/2021 1:40PM

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.186000         | 48.60         | 10.0         | 64            | 15.6         | QP       | L1   | GND |
| 0.190500         | 48.80         | 10.0         | 64            | 15.2         | QP       | L1   | GND |
| 0.195000         | 48.30         | 10.0         | 64            | 15.5         | QP       | L1   | GND |
| 0.276000         | 35.40         | 10.0         | 61            | 25.5         | QP       | L1   | GND |
| 0.501000         | 34.80         | 10.1         | 56            | 21.2         | QP       | L1   | GND |
| 14.851500        | 26.50         | 11.1         | 60            | 33.5         | QP       | L1   | GND |

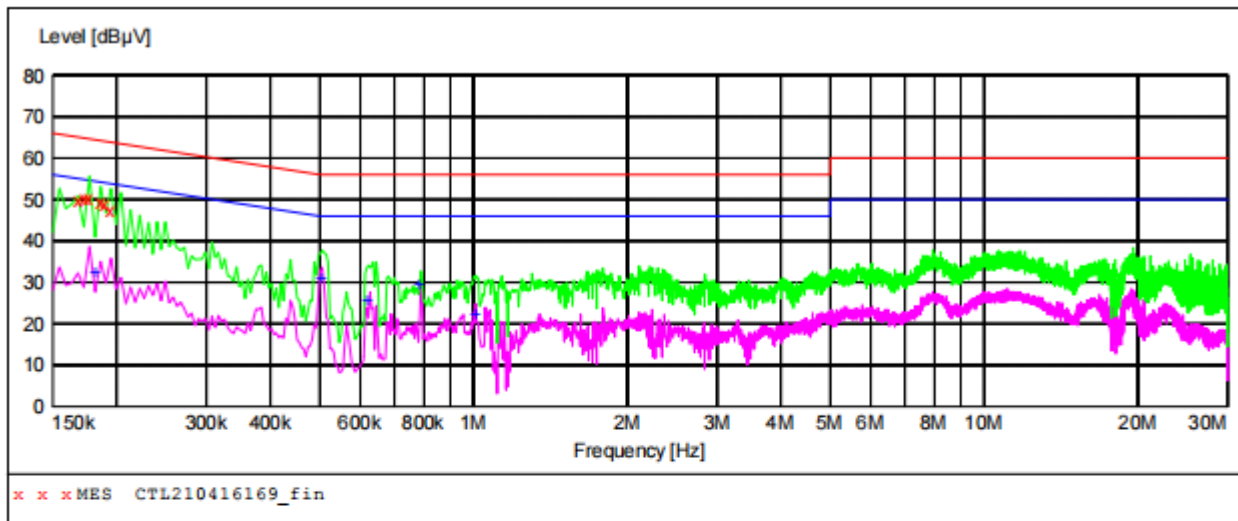
**MEASUREMENT RESULT: "CTL210416168\_fin2"**

4/16/2021 1:40PM

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.154500         | 33.20         | 10.0         | 56            | 22.6         | AV       | L1   | GND |
| 0.195000         | 35.70         | 10.0         | 54            | 18.1         | AV       | L1   | GND |
| 0.492000         | 23.50         | 10.0         | 46            | 22.6         | AV       | L1   | GND |
| 0.559500         | 21.50         | 10.1         | 46            | 24.5         | AV       | L1   | GND |
| 0.789000         | 30.10         | 10.1         | 46            | 15.9         | AV       | L1   | GND |
| 14.914500        | 21.20         | 11.1         | 50            | 28.8         | AV       | L1   | GND |

**SCAN TABLE: "Voltage (9K-30M)FIN"**

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "CTL210416169\_fin"**

4/16/2021 1:44PM

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.168000         | 49.80         | 10.0         | 65            | 15.3         | QP       | N    | GND |
| 0.172500         | 50.10         | 10.0         | 65            | 14.7         | QP       | N    | GND |
| 0.177000         | 50.50         | 10.0         | 65            | 14.1         | QP       | N    | GND |
| 0.186000         | 49.60         | 10.0         | 64            | 14.6         | QP       | N    | GND |
| 0.190500         | 48.80         | 10.0         | 64            | 15.2         | QP       | N    | GND |
| 0.195000         | 47.40         | 10.0         | 64            | 16.4         | QP       | N    | GND |

**MEASUREMENT RESULT: "CTL210416169\_fin2"**

4/16/2021 1:44PM

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.181500         | 32.60         | 10.0         | 54            | 21.8         | AV       | N    | GND |
| 0.505500         | 31.20         | 10.1         | 46            | 14.8         | AV       | N    | GND |
| 0.622500         | 25.50         | 10.1         | 46            | 20.5         | AV       | N    | GND |
| 0.789000         | 29.50         | 10.1         | 46            | 16.5         | AV       | N    | GND |
| 1.009500         | 22.40         | 10.2         | 46            | 23.6         | AV       | N    | GND |

### 3.2. Radiated Emissions and Band Edge

#### Limit

- The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.
- Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- The field strength of any emissions appearing outside of the 13.110– 14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

| Frequency (MHz) | Distance (Meters) | Radiated (dBuV/m)                           | Radiated (µV/m)       |
|-----------------|-------------------|---------------------------------------------|-----------------------|
| 0.009-0.49      | 3                 | $20\log(2400/F(\text{KHz}))+40\log(300/3)$  | $2400/F(\text{KHz})$  |
| 0.49-1.705      | 3                 | $20\log(24000/F(\text{KHz}))+ 40\log(30/3)$ | $24000/F(\text{KHz})$ |
| 1.705-13.110    | 3                 | 69.54                                       | 30                    |
| 13.110-13.410   | 3                 | 80.50                                       | 106                   |
| 13.410-13.553   | 3                 | 90.47                                       | 334                   |
| 13.553-13.567   | 3                 | 124.00                                      | 15848                 |
| 13.567-13.710   | 3                 | 90.47                                       | 334                   |
| 13.710-14.010   | 3                 | 80.50                                       | 106                   |
| 14.010-30.0     | 3                 | 69.54                                       | 30                    |
| 30-88           | 3                 | 40.0                                        | 100                   |
| 88-216          | 3                 | 43.5                                        | 150                   |
| 216-960         | 3                 | 46.0                                        | 200                   |
| Above 960       | 3                 | 54.0                                        | 500                   |

#### Test Procedure

- The EUT was placed on 80cm wooden desk above ground plane which on a turn table.
- Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT
- And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- Repeat above procedures until all frequency measurements have been completed.

#### **Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

|                           |                                            |
|---------------------------|--------------------------------------------|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude    | AG = Amplifier Gain                        |
| AF = Antenna Factor       |                                            |

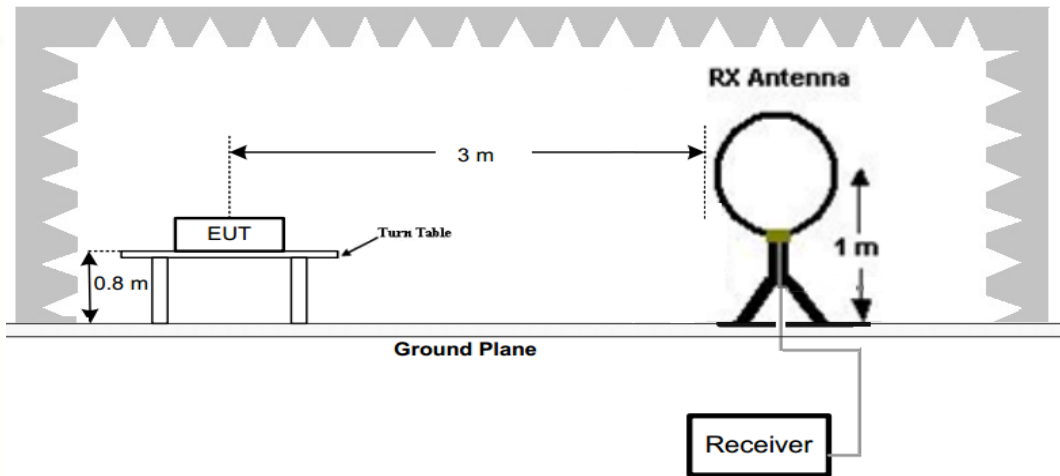
For example

| Frequency (MHz) | FS (dBuV/m) | RA (dBuV/m) | AF (dB) | CL (dB) | AG (dB) | Transd (dB) |
|-----------------|-------------|-------------|---------|---------|---------|-------------|
| 150.00          | 40          | 58.1        | 12.2    | 1.6     | 31.90   | -18.1       |

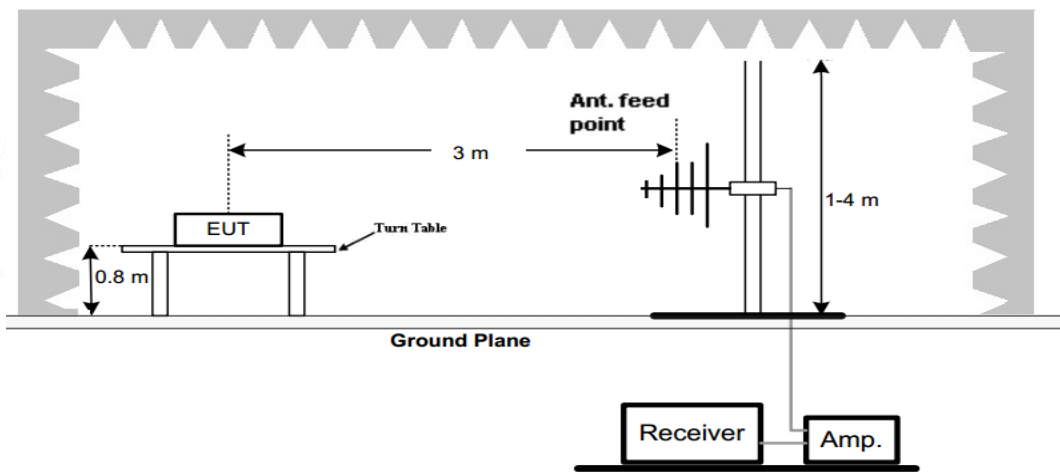
$$\text{Transd} = \text{AF} + \text{CL} - \text{AG}$$

**Test Configuration**

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



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



**Test Results****3.2.1 In-band Emissions**

| Frequency(MHz): |                 |                         | 13.56    |                |             | Polarity:        |                       | HORIZONTAL        |                          |
|-----------------|-----------------|-------------------------|----------|----------------|-------------|------------------|-----------------------|-------------------|--------------------------|
| No.             | Frequency (MHz) | Emission Level (dBuV/m) | Detector | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Correction Factor (dB/m) |
| 1               | 13.15           | 44.05                   | PK       | 80.50          | 36.45       | 39.35            | 5.26                  | -0.56             | 4.70                     |
| 2               | 13.55           | 46.95                   | PK       | 90.47          | 43.52       | 42.16            | 5.36                  | -0.57             | 4.79                     |
| 3               | 13.56           | 87.41                   | PK       | 124.00         | 36.59       | 82.53            | 5.45                  | -0.57             | 4.88                     |
| 4               | 13.57           | 47.63                   | PK       | 90.47          | 42.84       | 42.49            | 5.49                  | -0.35             | 5.14                     |
| 5               | 13.75           | 41.98                   | PK       | 80.50          | 38.52       | 36.65            | 5.63                  | -0.30             | 5.33                     |

| Frequency(MHz): |                 |                         | 13.56    |                |             | Polarity:        |                       | VERTICAL          |                          |
|-----------------|-----------------|-------------------------|----------|----------------|-------------|------------------|-----------------------|-------------------|--------------------------|
| No.             | Frequency (MHz) | Emission Level (dBuV/m) | Detector | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Correction Factor (dB/m) |
| 1               | 13.15           | 42.84                   | PK       | 80.50          | 37.66       | 38.14            | 5.26                  | -0.56             | 4.70                     |
| 2               | 13.55           | 48.16                   | PK       | 90.47          | 42.31       | 43.37            | 5.36                  | -0.57             | 4.79                     |
| 3               | 13.56           | 88.66                   | PK       | 124.00         | 35.34       | 83.78            | 5.45                  | -0.57             | 4.88                     |
| 4               | 13.57           | 48.83                   | PK       | 90.47          | 41.64       | 43.69            | 5.49                  | -0.35             | 5.14                     |
| 5               | 13.75           | 41.79                   | PK       | 80.50          | 38.71       | 36.46            | 5.63                  | -0.30             | 5.33                     |

**REMARKS:**

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)
3. Margin value = Limit value- Emission level.
4. The other emission levels were very low against the limit.

### 3.2.2 Out-of-band Emissions

| Frequency(MHz): |                 |                         | 13.56    |                |             | Polarity:        |                       | HORIZONTAL        |                          |
|-----------------|-----------------|-------------------------|----------|----------------|-------------|------------------|-----------------------|-------------------|--------------------------|
| No.             | Frequency (MHz) | Emission Level (dBuV/m) | Detector | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Correction Factor (dB/m) |
| 1               | 27.12           | 36.77                   | PK       | 69.54          | 32.77       | 29.27            | 7.25                  | 0.25              | 7.50                     |
| 2               | 40.68           | 35.33                   | PK       | 40.00          | 4.67        | 26.52            | 8.25                  | 0.56              | 8.81                     |
| 3               | 54.24           | 30.40                   | PK       | 40.00          | 9.60        | 21.36            | 8.30                  | 0.74              | 9.04                     |
| 4               | 67.80           | 28.98                   | PK       | 40.00          | 11.02       | 19.45            | 8.55                  | 0.98              | 9.53                     |

| Frequency(MHz): |                 |                         | 13.56    |                |             | Polarity:        |                       | VERTICAL          |                          |
|-----------------|-----------------|-------------------------|----------|----------------|-------------|------------------|-----------------------|-------------------|--------------------------|
| No.             | Frequency (MHz) | Emission Level (dBuV/m) | Detector | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Correction Factor (dB/m) |
| 1               | 27.12           | 37.96                   | PK       | 69.54          | 31.58       | 30.46            | 7.25                  | 0.25              | 7.50                     |
| 2               | 40.68           | 35.52                   | PK       | 40.00          | 4.48        | 26.71            | 8.25                  | 0.56              | 8.81                     |
| 3               | 54.24           | 31.58                   | PK       | 40.00          | 8.42        | 22.54            | 8.30                  | 0.74              | 9.04                     |
| 4               | 67.80           | 30.19                   | PK       | 40.00          | 9.81        | 20.66            | 8.55                  | 0.98              | 9.53                     |

#### REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)
3. Margin value = Limit value- Emission level.
4. The other emission levels were very low against the limit.

### 3.3. 20dB Bandwidth

#### Limit

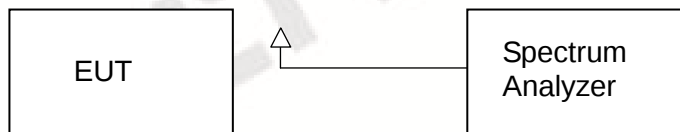
No limit for 20dB bandwidth.

#### Test Procedure

The 20dB bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

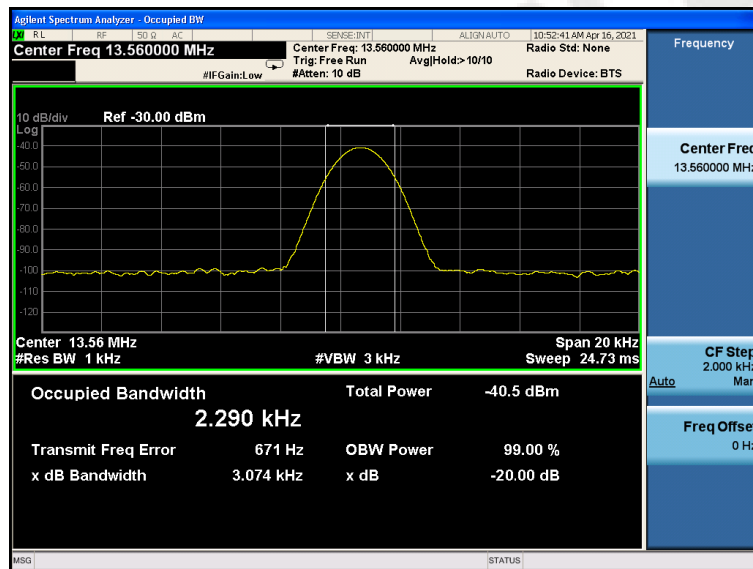
The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

#### Test Configuration



#### Test Results

| Modulation | Frequency(MHz) | 20dB bandwidth (KHz) | Result |
|------------|----------------|----------------------|--------|
| ASK        | 13.56          | 3.074                | Pass   |

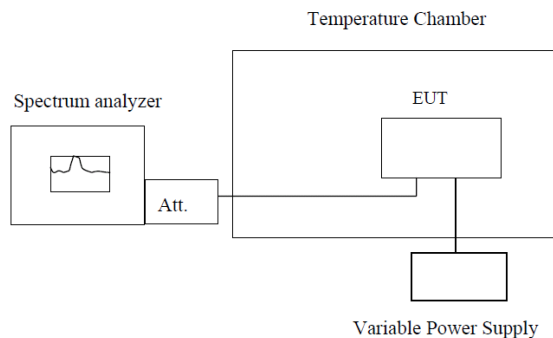


### 3.4. Frequency Stability Test Data

#### LIMIT

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

#### TEST CONFIGURATION



**Note :** Measurement setup for testing on Antenna connector

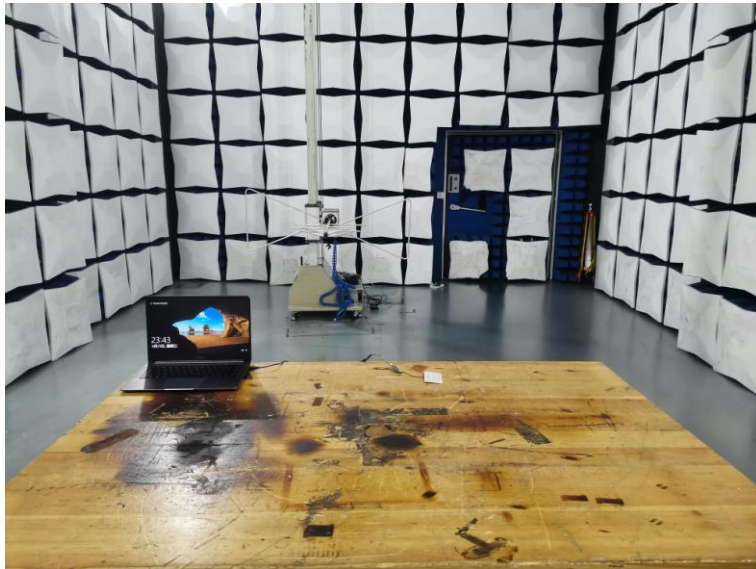
#### TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT  $20^{\circ}\text{C}$  operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to  $-20^{\circ}\text{C}$ . After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with  $10^{\circ}\text{C}$  increased per stage until the highest temperature of  $+50^{\circ}\text{C}$  reached.
7. Reduce the input voltage to specified extreme voltage variation ( $\pm 15\%$ ) or endpoint, record the maximum frequency change.

#### TEST RESULTS

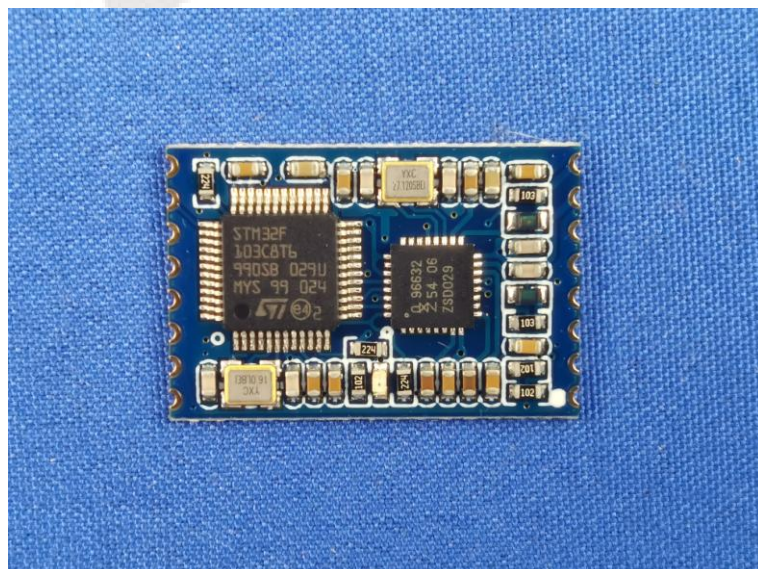
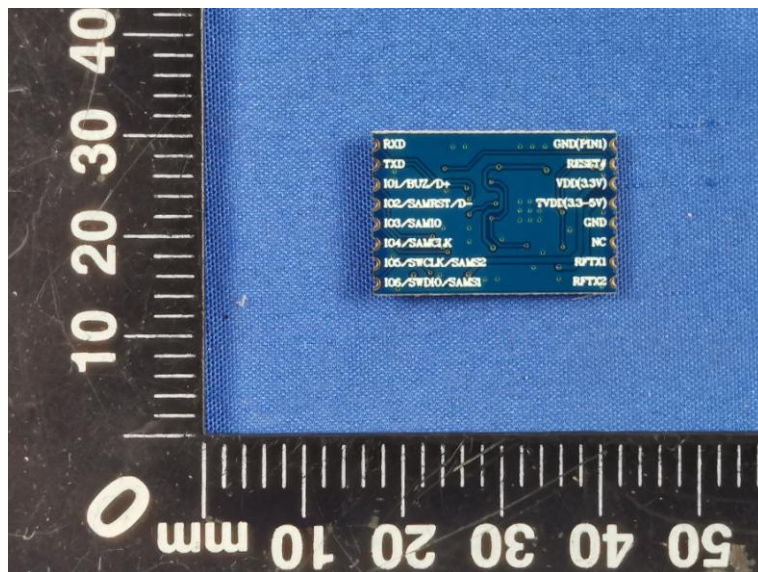
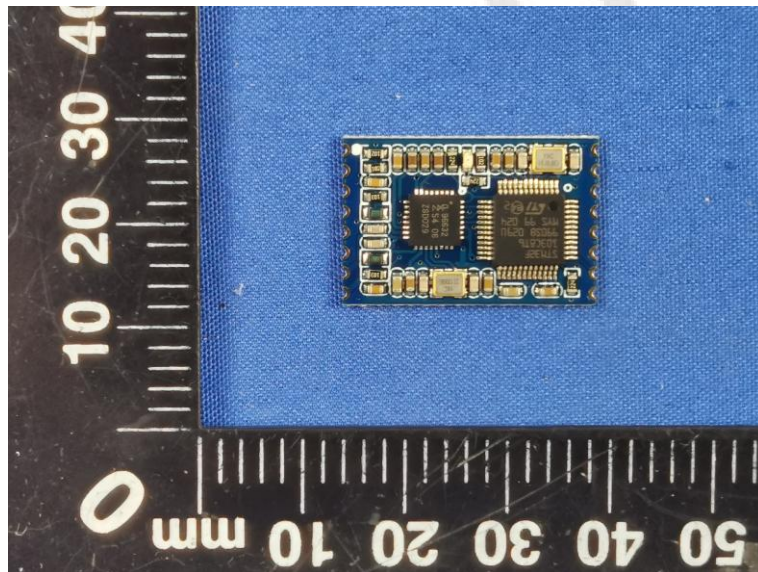
| Reference Frequency: 13.56MHz |                  |                |                         |               |
|-------------------------------|------------------|----------------|-------------------------|---------------|
| Voltage ( V )                 | Temperature (°C) | Frequency (Hz) | Frequency Deviation(Hz) | Deviation (%) |
| 3.3                           | +20(Ref)         | 13,560,064     | 64                      | 0.000472      |
|                               | -20              | 13,560,047     | 47                      | 0.000347      |
|                               | -10              | 13,560,056     | 56                      | 0.000413      |
|                               | 0                | 13,560,064     | 64                      | 0.000472      |
|                               | +10              | 13,560,036     | 36                      | 0.000265      |
|                               | +20              | 13,560,020     | 20                      | 0.000147      |
|                               | +25              | 13,560,028     | 28                      | 0.000206      |
|                               | +30              | 13,560,081     | 81                      | 0.000597      |
|                               | +40              | 13,560,027     | 27                      | 0.000199      |
|                               | +50              | 13,560,032     | 32                      | 0.000236      |
| 3.795                         | +20              | 13,560,017     | 17                      | 0.000125      |
| 2.805                         | +20              | 13,560,043     | 43                      | 0.000317      |

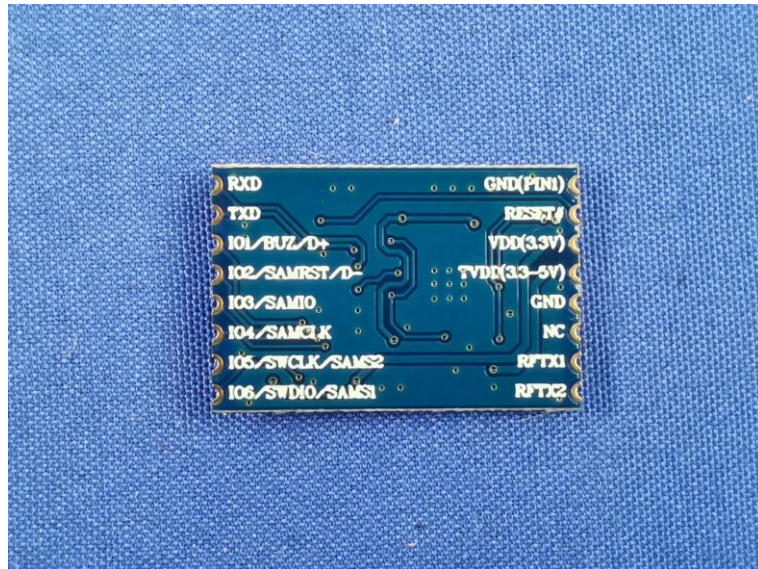
#### 4. Test Setup Photos of the EUT



## 5. External and Internal Photos of the EUT

### External and Internal Photos of EUT





\*\*\*\*\* End of Report \*\*\*\*\*