



## SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

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Report No.: SHEM180300162601

Page: 1 of 21

### 1 Cover Page

# RF Test Report

|   |   |
|---|---|
| Application No.:  | SHEM1803001626CR  |
| Applicant:  | Hangzhou Hikvision Digital Technology Co., Ltd.   |
| FCC ID:   | 2ADTD-K1T604  |
| <b>Equipment Under Test (EUT):</b><br><b>NOTE:</b> The following sample(s) was/were submitted and identified by the client as |   |
| EUT Name:   | Face Recognition Terminal   |
| Model No.:  | DS-K1T604MF, DS-K1T604M, DS-K1T604SF, DS-K1T604S,<br>DS-K1T604XYZ-UVW, DS-K1T604XYZF-UVW  |
| □   | Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical. |
| Standards:  | 47 CFR Part 15, Subpart C   |
| Date of Receipt:  | 2018-03-05  |
| Date of Test:   | 2018-03-07 to 2018-03-14  |
| Date of Issue:  | 2018-03-19  |
| Test Result:  | Pass*   |

\*In the configuration tested, the EUT detailed in this report complied with the standards specified above.



Parlam Zhan  
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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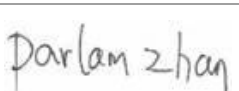


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Report No.: SHEM180300162601

Page: 2 of 21

| Revision Record |             |            |        |
|-----------------|-------------|------------|--------|
| Version         | Description | Date       | Remark |
| 00              | Original    | 2018-03-19 | /      |
|                 |             |            |        |
|                 |             |            |        |

|                             |  |   |  |  |
|-----------------------------|--|---|--|--|
| Authorized for issue<br>by: |  |   |  |  |
|                             |  |   |  |  |
|                             |  | <hr/>   |  |  |
|                             |  | Vincent Zhu /Project Engineer   |  |  |
|                             |  |  |  |  |
|                             |  | <hr/>   |  |  |
|                             |  | Parlam zhan /Reviewer   |  |  |



## 2 Test

## Summary

| Test Item                           | Test Requirement                                       | Test Method                           | Result |
|-------------------------------------|--|---------------------------------------|--------|
| Antenna Requirement                 | 47 CFR Part 15, Subpart C<br>Section 15.203            | /                                     | PASS   |
| AC Power Line Conducted<br>Emission | 47 CFR Part 15, Subpart C<br>Section 15.207            | ANSI C63.10 (2013)<br>Section 6.2     | PASS   |
| Emission Mask                       | 47 CFR Part 15, Subpart C<br>Section 15.225(a)/(b)/(c) | ANSI C63.10 (2013)<br>Section 6.4     | PASS*  |
| Radiated Emissions                  | 47 CFR Part 15, Subpart C<br>Section 15.225(d)/15.209  | ANSI C63.10 (2013)<br>Section 6.4&6.5 | PASS   |
| Frequency tolerance                 | 47 CFR Part 15, Subpart C<br>Section 15.225(e)         | ANSI C63.10 (2013)<br>Section 6.8     | PASS   |
| 20dB Bandwidth                      | 47 CFR Part 15, Subpart C<br>Section 15.215            | ANSI C63.10 (2013)<br>Section 6.9     | PASS   |

Remark: \* The test level of the fundamental signal is below the limit of general spurious emission, so the test no performs.

Note: There are series models mentioned in this report, and they are the identical in electrical and electronic characters. Only the model DS-K1T604MF was tested since their differences were the model number and appearance.



### 3 Contents

|  | Page      |
|--|-----------|
| <b>1 COVER PAGE.....</b>                         | <b>1</b>  |
| <b>2 TEST SUMMARY.....</b>                       | <b>3</b>  |
| <b>3 CONTENTS .....</b>                          | <b>4</b>  |
| <b>4 GENERAL INFORMATION.....</b>                | <b>5</b>  |
| 4.1 CLIENT INFORMATION .....                     | 5         |
| 4.2 GENERAL DESCRIPTION OF E.U.T. ....           | 5         |
| 4.3 TECHNICAL SPECIFICATIONS .....               | 5         |
| 4.4 E.U.T OPERATION MODE .....                   | 5         |
| 4.1 DESCRIPTION OF SUPPORT UNITS .....           | 5         |
| 4.2 TEST LOCATION .....                          | 6         |
| 4.3 TEST FACILITY .....                          | 6         |
| 4.4 MEASUREMENT UNCERTAINTY .....                | 7         |
| <b>5 EQUIPMENTS LIST .....</b>                   | <b>8</b>  |
| <b>6 TEST RESULTS AND MEASUREMENT DATA .....</b> | <b>9</b>  |
| 6.1 ANTENNA REQUIREMENT .....                    | 9         |
| 6.2 CONDUCTED EMISSIONS.....                     | 10        |
| 6.3 RADIATED EMISSIONS .....                     | 14        |
| 6.4 FREQUENCY TOLERANCE.....                     | 19        |
| 6.5 20dB BANDWIDTH .....                         | 20        |
| <b>7 TEST SETUP PHOTOGRAPHS .....</b>            | <b>21</b> |
| <b>8 EUT CONSTRUCTIONAL DETAILS .....</b>        | <b>21</b> |

## 4 General Information

### 4.1 Client Information

|                          |   |
|--------------------------|---|
| Applicant:               | Hangzhou Hikvision Digital Technology Co., Ltd.   |
| Address of Applicant:    | No. 555 Qianmo Road, Binjiang District, Hangzhou 310052, China  |
| Manufacturer:            | Hangzhou Hikvision Digital Technology Co.   |
| Address of Manufacturer: | No. 555 Qianmo Road, Binjiang District, Hangzhou 310052, China  |
| Factory:                 | 1. Hangzhou Hikvision Technology Co., Ltd.<br>2. Hangzhou Hikvision Electronics Co., Ltd.   |
| Address of Factory:      | 1. No.700, Dongliu Road, Binjiang District, Hangzhou City,Zhejiang, 310052, China<br>2. No.299, Qiushi Road,Tonglu Economic Development Zone,Tonglu County, Hangzhou,Zhejiang,310052,China. |

### 4.2 General Description of E.U.T.

|                      |  |
|----------------------|--|
| Product Description: | Fixed product with 13.56MHz RF ID function |
| Rated Input:         | DC 12V                                     |
| Test Voltage:        | AC 120V 60Hz for adapter                   |

### 4.3 Technical Specifications

|                      |                       |
|----------------------|-----------------------|
| Operation Frequency: | 13.56MHz              |
| Modulation Type:     | ASK                   |
| Antenna Type         | Integral Loop Antenna |

### 4.4 E.U.T Operation Mode

| Test Mode         | Description of Test Mode                         |
|-------------------|--|
| Engineering mode: | Keep EUT working in continuous transmitting mode |

### 4.1 Description of Support Units

The EUT has been tested with support equipments as below.

| Description | Manufacturer  | Model No.          | Supplied By |
|-------------|---------------|--------------------|-------------|
| Adapter     | SHENZHEN HONO | ADS-24S-12 1224GPG | Client      |

Parameter of adapter:

|          |               |                               |          |
|----------|---------------|-------------------------------|----------|
| Adapter: | Rated Input:  | AC 100~240V, 50/60Hz max 0.7A |          |
|          | Rated Output: | DC 12V 2.0A                   |          |
|          | Cable length: | AC port:                      | AC port: |
|          |               | DC port:                      | DC port: |



## **4.2 Test Location**

All tests were performed at:  
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab  
588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China  
Tel: +86 21 6191 5666  
Fax: +86 21 6191 5678  
No tests were sub-contracted.

## **4.3 Test Facility**

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

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **NVLAP (Certificate No. 201034-0)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the National Voluntary Laboratory Accreditation Program(NVLAP). Certificate No. 201034-0.

- **FCC –Designation Number: CN5033**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

Designation Number: CN5033. Test Firm Registration Number: 479755.

- **Industry Canada (IC) – IC Assigned Code: 8617A**

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A-1.

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3868, C-4336, T-12221, G-10830 respectively.



#### 4.4 Measurement Uncertainty

| No. | Parameter                     | Measurement Uncertainty  |
|-----|-------------------------------|--|
| 1   | Radio Frequency               | $< \pm 1 \times 10^{-5}$   |
| 2   | Total RF power, conducted     | $< \pm 1.5 \text{ dB}$   |
| 3   | RF power density, conducted   | $< \pm 3 \text{ dB}$   |
| 4   | Spurious emissions, conducted | $< \pm 3 \text{ dB}$   |
| 5   | All emissions, radiated       | $< \pm 6 \text{ dB}$ (Below 1GHz)<br>$< \pm 6 \text{ dB}$ (Above 1GHz) |
| 6   | Temperature                   | $< \pm 1^{\circ}\text{C}$  |
| 7   | Humidity                      | $< \pm 5 \%$   |
| 8   | DC and low frequency voltages | $< \pm 3 \%$   |



## 5 Equipments List

| Equipment                                  | Manufacturer | Model No           | Inventory No | Cal Date   | Cal Due Date |
|--|--------------|--------------------|--------------|------------|--------------|
| <b>Conducted Emission at AC Power Line</b> |              |                    |              |            |              |
| EMI test receiver                          | R&S          | ESR7               | SHEM162-1    | 2017-12-20 | 2018-12-19   |
| LISN                                       | Schwarzbeck  | NSLK8127           | SHEM061-1    | 2017-12-20 | 2018-12-19   |
| LISN                                       | EMCO         | 3816/2             | SHEM019-1    | 2017-12-20 | 2018-12-19   |
| Pulse limiter                              | R&S          | ESH3-Z2            | SHEM029-1    | 2017-12-20 | 2018-12-19   |
| CE test Cable                              | /            | CE01               | /            | 2017-12-26 | 2018-12-25   |
| <b>Conducted Test</b>                      |              |                    |              |            |              |
| Spectrum Analyzer                          | R&S          | FSP-30             | SHEM002-1    | 2017-12-20 | 2018-12-19   |
| Spectrum Analyzer                          | Agilent      | N9020A             | SHEM181-1    | 2017-09-26 | 2018-09-25   |
| Power meter                                | R&S          | NRP                | SHEM057-1    | 2017-12-26 | 2018-12-25   |
| Power Sensor                               | R&S          | NRP-Z22            | SHEM136-1    | 2017-07-22 | 2018-07-21   |
| Power Sensor                               | R&S          | NRP-Z91            | SHEM057-2    | 2017-12-26 | 2018-12-25   |
| Signal Generator                           | R&S          | SMR40              | SHEM058-1    | 2017-07-03 | 2018-07-02   |
| Signal Generator                           | Agilent      | N5182A             | SHEM182-1    | 2017-09-26 | 2018-09-25   |
| Communication Tester                       | R&S          | CMW270             | SHEM183-1    | 2017-10-22 | 2018-10-21   |
| Switcher                                   | Tonscend     | JS0806             | SHEM184-1    | 2017-09-26 | 2018-09-25   |
| Splitter                                   | Anritsu      | MA1612A            | SHEM185-1    | /          | /            |
| Coupler                                    | e-meca       | 803-S-1            | SHEM186-1    | /          | /            |
| High-low Temp Cabinet                      | Suzhou Zhihe | TL-40              | SHEM087-1    | 2017-09-26 | 2018-09-25   |
| AC Power Stabilizer                        | WOCEN        | 6100               | SHEM045-1    | 2017-12-26 | 2018-12-25   |
| DC Power Supply                            | QJE          | QJ30003SII         | SHEM046-1    | 2017-12-26 | 2018-12-25   |
| Conducted test Cable                       | /            | RF01, RF 02        | /            | 2017-12-26 | 2018-12-25   |
| <b>Radiated Test</b>                       |              |                    |              |            |              |
| EMI test receiver                          | R&S          | ESU40              | SHEM051-1    | 2017-12-20 | 2018-12-19   |
| Spectrum Analyzer                          | R&S          | FSP-30             | SHEM002-1    | 2017-12-20 | 2018-12-19   |
| Loop Antenna (9kHz-30MHz)                  | Schwarzbeck  | FMZB1519           | SHEM135-1    | 2017-04-10 | 2020-04-09   |
| Antenna (25MHz-2GHz)                       | Schwarzbeck  | VULB9168           | SHEM048-1    | 2017-02-28 | 2020-02-27   |
| Antenna (25MHz-3GHz)                       | Schwarzbeck  | HL562              | SHEM010-1    | 2017-02-28 | 2020-02-27   |
| Horn Antenna (1-8GHz)                      | Schwarzbeck  | HF906              | SHEM009-1    | 2017-10-24 | 2020-10-23   |
| Horn Antenna (1-18GHz)                     | Schwarzbeck  | BBHA9120D          | SHEM050-1    | 2017-01-14 | 2020-01-13   |
| Horn Antenna (14-40GHz)                    | Schwarzbeck  | BBHA 9170          | SHEM049-1    | 2017-12-03 | 2020-12-02   |
| Pre-amplifier (9kHz-2GHz)                  | CLAVIIO      | BDLNA-0001-412010  | SHEM164-1    | 2017-08-22 | 2018-08-21   |
| Pre-amplifier (1-18GHz)                    | CLAVIIO      | BDLNA-0118-352810  | SHEM050-2    | 2017-08-22 | 2018-08-21   |
| High-amplifier (14-40GHz)                  | Schwarzbeck  | 10001              | SHEM049-2    | 2017-12-20 | 2018-12-19   |
| Band filter                                | LORCH        | 9BRX-875/X150-SR   | SHEM156-1    | /          | /            |
| Band filter                                | LORCH        | 13BRX-1950/X500-SR | SHEM083-2    | /          | /            |
| Band filter                                | LORCH        | 5BRX-2400/X200-SR  | SHEM155-1    | /          | /            |
| Band filter                                | LORCH        | 5BRX-5500/X1000-SR | SHEM157-2    | /          | /            |
| High pass Filter                           | Wainwright   | WHK3.0/18G-100SS   | SHEM157-1    | /          | /            |
| High pass Filter                           | Wainwright   | WHKS1700-3SS       | SHEM157-3    | /          | /            |
| Semi/Fully Anechoic                        | ST           | 11*6*6M            | SHEM078-2    | 2017-07-22 | 2020-07-21   |
| RE test Cable                              | /            | RE01, RE02, RE06   | /            | 2017-12-26 | 2018-12-25   |



## 6 Test results and Measurement Data

### 6.1 Antenna Requirement

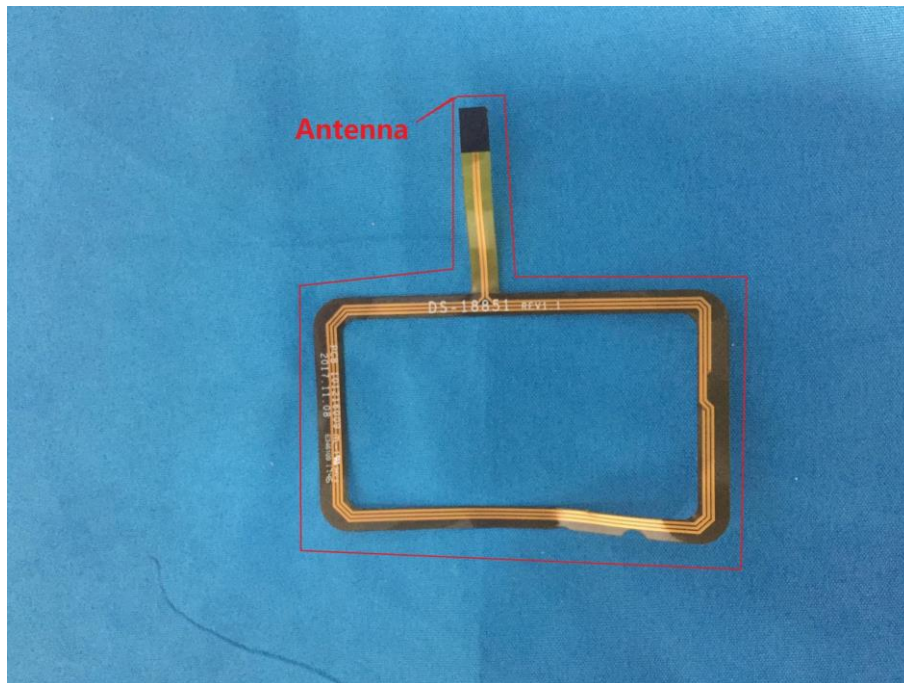
**Standard requirement:** 47 CFR Part 15C Section 15.203

**15.203 Requirement:** An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

**EUT Antenna:**

The antenna is Integral Loop Antenna on the main PCB and no consideration of replacement.

**Antenna Configuration:**



## 6.2 Conducted Emissions

**Frequency Range:** 150 KHz to 30 MHz

**Class/Severity:** Class B

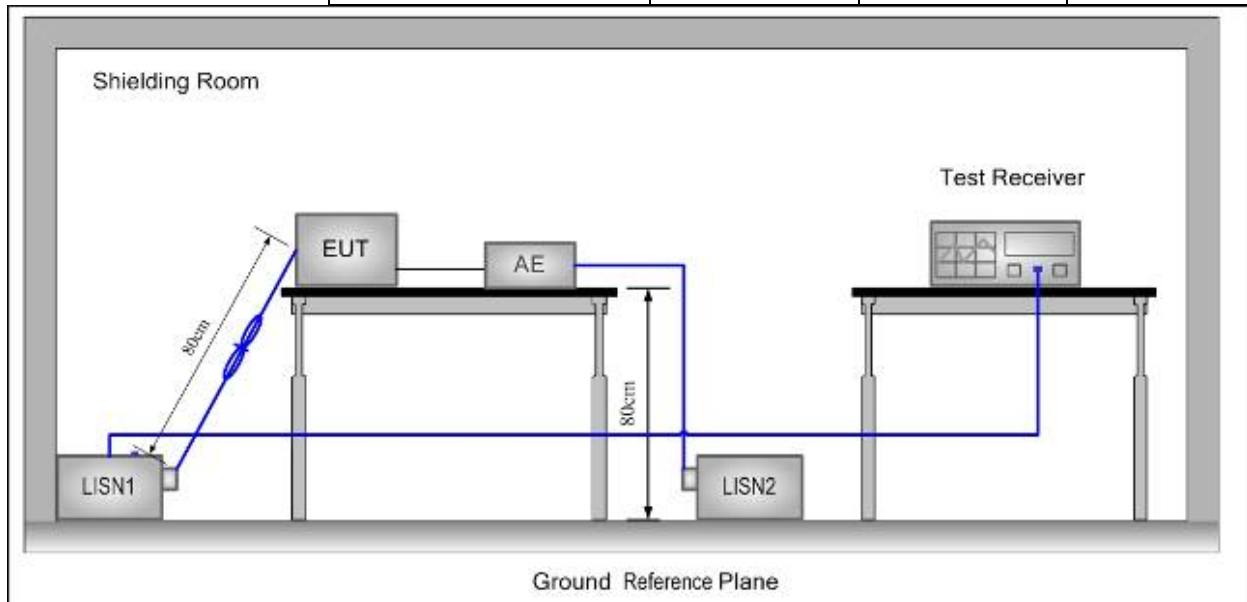
**Limit:**

| Frequency range<br>MHz | Class B Limits: dB (μV) |          |
|------------------------|-------------------------|----------|
|                        | Quasi-peak              | Average  |
| 0.15 to 0.50           | 66 to 56                | 56 to 46 |
| 0.50 to 5              | 56                      | 46       |
| 5 to 30                | 60                      | 50       |

Note1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz.  
Note2: The lower limit is applicable at the transition frequency.

**Test site/setup:** Test instrumentation set-up:

| Frequency Range | Detector   | RBW   | VBW   |
|-----------------|------------|-------|-------|
| 9KHz to 150Hz   | Quasi-peak | 200Hz | 500Hz |
| 150KHz to 30MHz | Quasi-peak | 9kHz  | 30kHz |



### Test Procedure:

1. The mains terminal disturbance voltage was measured with the EUT in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN, which was bonded to the ground reference plane in the same way as the LISN for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference



plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.

4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance was between the closest points of the LISN and the EUT. The mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m. All other units of the EUT and associated equipment were at least 0.8 m from the LISN.

Remark: Pre-scan was performed with peak detected on all ports, Quasi-peak & average measurements were performed at the frequencies at which maximum peak emission level were detected. Please see the attached Quasi-peak and Average test results.

**Test Result:** Pass



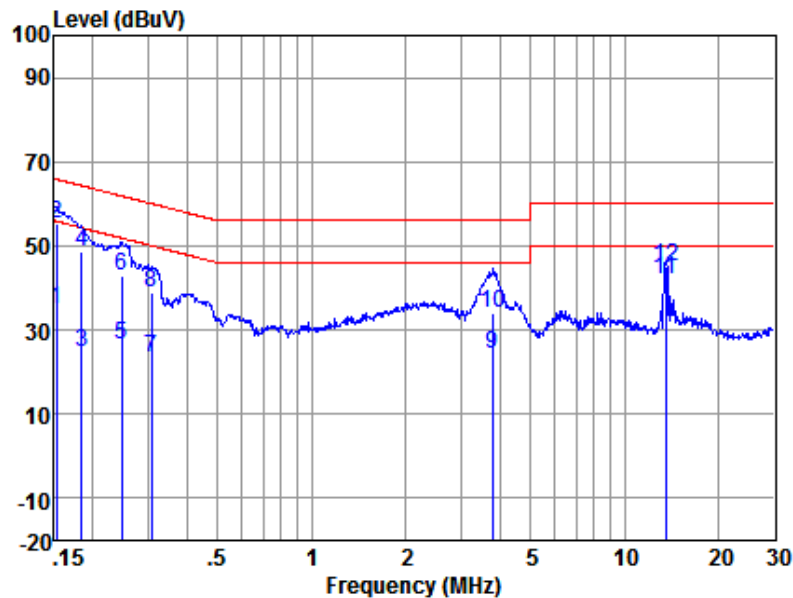
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(Shanghai) Co., Ltd.

Report No.: SHEM180300162601

Page: 12 of 21

Test data:

Live Line:



LISN : LINE  
EUT/Project No : 1622CR  
Test Mode : a

|    | Freq<br>(MHz) | Read<br>level<br>(dBUV) | LISN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Emission<br>Level<br>(dBUV) | Limit<br>(dBUV) | Over<br>Limit<br>(dB) | Remark  |
|----|---------------|-------------------------|------------------------|-----------------------|-----------------------------|-----------------|-----------------------|---------|
| 1  | 0.15          | 25.18                   | 0.11                   | 9.81                  | 35.10                       | 55.87           | -20.77                | Average |
| 2  | 0.15          | 45.33                   | 0.11                   | 9.81                  | 55.25                       | 65.87           | -10.62                | QP      |
| 3  | 0.18          | 14.96                   | 0.11                   | 9.81                  | 24.88                       | 54.33           | -29.45                | Average |
| 4  | 0.18          | 38.90                   | 0.11                   | 9.81                  | 48.82                       | 64.33           | -15.51                | QP      |
| 5  | 0.25          | 16.42                   | 0.11                   | 9.81                  | 26.34                       | 51.86           | -25.52                | Average |
| 6  | 0.25          | 32.97                   | 0.11                   | 9.81                  | 42.89                       | 61.86           | -18.97                | QP      |
| 7  | 0.31          | 13.51                   | 0.11                   | 9.81                  | 23.43                       | 50.06           | -26.63                | Average |
| 8  | 0.31          | 29.05                   | 0.11                   | 9.81                  | 38.97                       | 60.06           | -21.09                | QP      |
| 9  | 3.80          | 14.27                   | 0.12                   | 9.85                  | 24.24                       | 46.00           | -21.76                | Average |
| 10 | 3.80          | 24.04                   | 0.12                   | 9.85                  | 34.01                       | 56.00           | -21.99                | QP      |
| 11 | 13.56         | 31.74                   | 0.14                   | 9.98                  | 41.86                       | 50.00           | -8.14                 | Average |
| 12 | 13.56         | 34.88                   | 0.14                   | 9.98                  | 45.00                       | 60.00           | -15.00                | QP      |

Notes: Emission Level = Read Level + LISN Factor + Cable loss

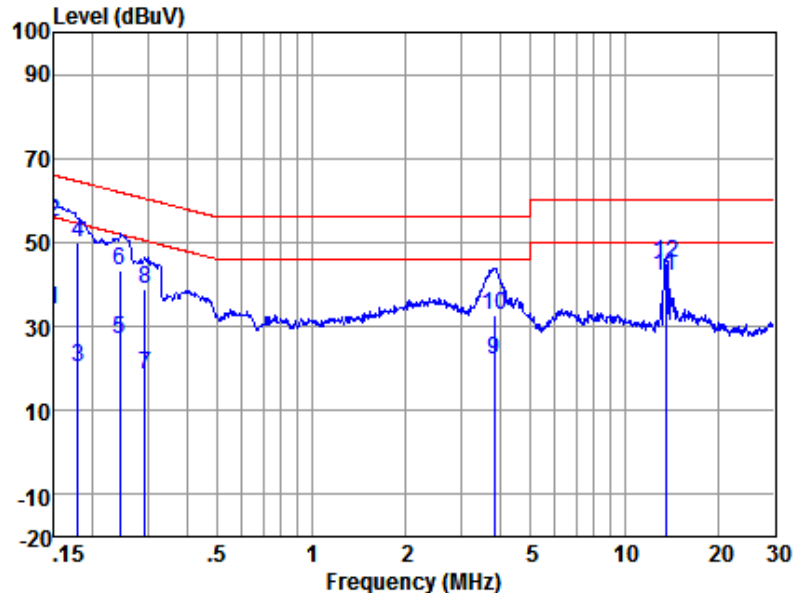


**SGS-CSTC Standards Technical Services  
(Shanghai) Co., Ltd.**

Report No.: SHEM180300162601

Page: 13 of 21

Neutral Line:



LISN : NEUTRAL  
EUT/Project No : 1622CR  
Test Mode : a

|    | Freq<br>(MHz) | Read<br>level<br>(dBUV) | LISN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Emission<br>Level<br>(dBUV) | Limit<br>(dBUV) | Over<br>Limit<br>(dB) | Remark  |
|----|---------------|-------------------------|------------------------|-----------------------|-----------------------------|-----------------|-----------------------|---------|
| 1  | 0.15          | 24.17                   | 0.12                   | 9.81                  | 34.10                       | 56.00           | -21.90                | Average |
| 2  | 0.15          | 44.77                   | 0.12                   | 9.81                  | 54.70                       | 66.00           | -11.30                | QP      |
| 3  | 0.18          | 10.16                   | 0.12                   | 9.81                  | 20.09                       | 54.55           | -34.46                | Average |
| 4  | 0.18          | 40.02                   | 0.12                   | 9.81                  | 49.95                       | 64.55           | -14.60                | QP      |
| 5  | 0.24          | 16.83                   | 0.11                   | 9.81                  | 26.75                       | 51.95           | -25.20                | Average |
| 6  | 0.24          | 33.30                   | 0.11                   | 9.81                  | 43.22                       | 61.95           | -18.73                | QP      |
| 7  | 0.29          | 8.72                    | 0.11                   | 9.81                  | 18.64                       | 50.46           | -31.82                | Average |
| 8  | 0.29          | 28.99                   | 0.11                   | 9.81                  | 38.91                       | 60.46           | -21.55                | QP      |
| 9  | 3.84          | 12.03                   | 0.13                   | 9.85                  | 22.01                       | 46.00           | -23.99                | Average |
| 10 | 3.84          | 22.79                   | 0.13                   | 9.85                  | 32.77                       | 56.00           | -23.23                | QP      |
| 11 | 13.56         | 31.85                   | 0.16                   | 9.98                  | 41.99                       | 50.00           | -8.01                 | Average |
| 12 | 13.56         | 34.98                   | 0.16                   | 9.98                  | 45.12                       | 60.00           | -14.88                | QP      |

Notes: Emission Level = Read Level + LISN Factor + Cable loss

### 6.3 Radiated Emissions

**Test frequency range:** 9KHz – 1GHz

**Test Site:** Measurement Distance: 3m

**Receiver Setup:**

| Frequency (MHz) | RBW     | VBW    | Detector   |
|-----------------|---------|--------|------------|
| 0.009-0.015     | 200Hz   | 1KHz   | Quasi-peak |
| 0.015-30        | 9kHz    | 30KHz  | Quasi-peak |
| 30-1000         | 120 kHz | 300KHz | Quasi-peak |

Note: The emission limits shown in the above table are based on measurement instrumentation employing a CISPR quasi-peak detector. For the frequency bands 9~90 kHz, 110~490 kHz and above 1000 MHz, the radiated emission limits are based on measurements employing an average detector.

**Limit:**

| Frequency (MHz) | Field strength (μV/m) | Measurement distance (m) | Limit @3m (dBμV/m ) |
|-----------------|-----------------------|--------------------------|---------------------|
| 0.009-0.490     | 2400/F(kHz)           | 300                      | 128.5 ~ 93.8        |
| 0.490-1.705     | 24000/F(kHz)          | 30                       | 73.8 ~63.0          |
| 1.705-30        | 30                    | 30                       | 69.5                |
| 30-88           | 100                   | 3                        | 40.0                |
| 88-216          | 150                   | 3                        | 43.5                |
| 216-960         | 200                   | 3                        | 46.0                |
| 960-1000        | 500                   | 3                        | 54.0                |

NOTE:

(1) For test distance other than what is specified, but fulfilling the requirements of section 15.31(f) (2) the field strength is calculated by adding additionally an extrapolation factor of 40dB/decade (inverse linear distance for field strength measurements).

So the Distance Extrapolation Factor in dB is  $40 \cdot \log(D_{TEST} / D_{SPEC})$

where  $D_{TEST}$  = Test Distance and  $D_{SPEC}$  = Specified Distance.

Field strength limit (dBμV/m)@test distance= Field strength limit (dBμV/m)@specified distance -Distance Extrapolation Factor

(2) The lower limit shall apply at the transition frequencies.

**Limit:  
(Fundamental signal)**

| Frequency | Limit (dBuV/m @3m) | Remark           |
|-----------|--------------------|------------------|
| 13.56MHz  | 124                | Quasi-peak Value |

**Test Procedure:**

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for



the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

### Test Setup:

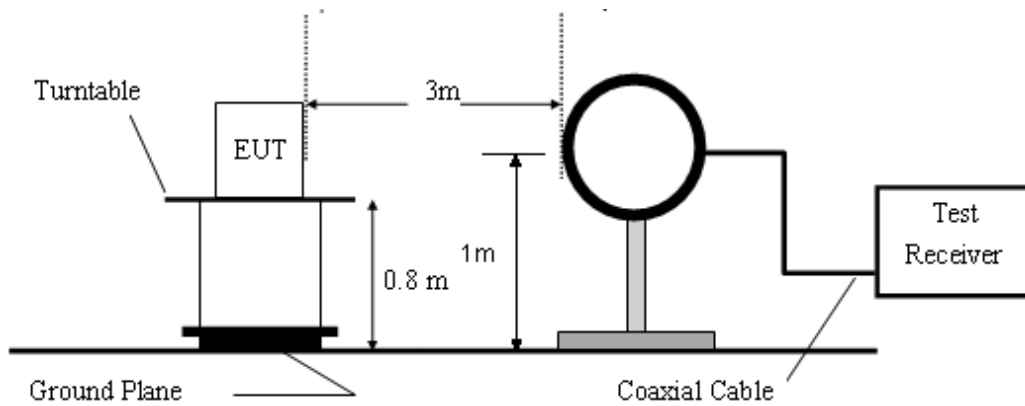


Figure 1. Below 30MHz

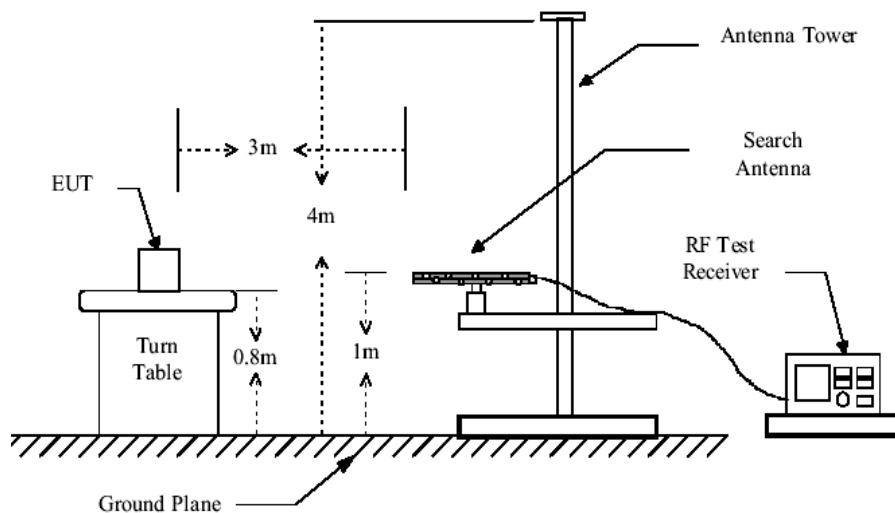
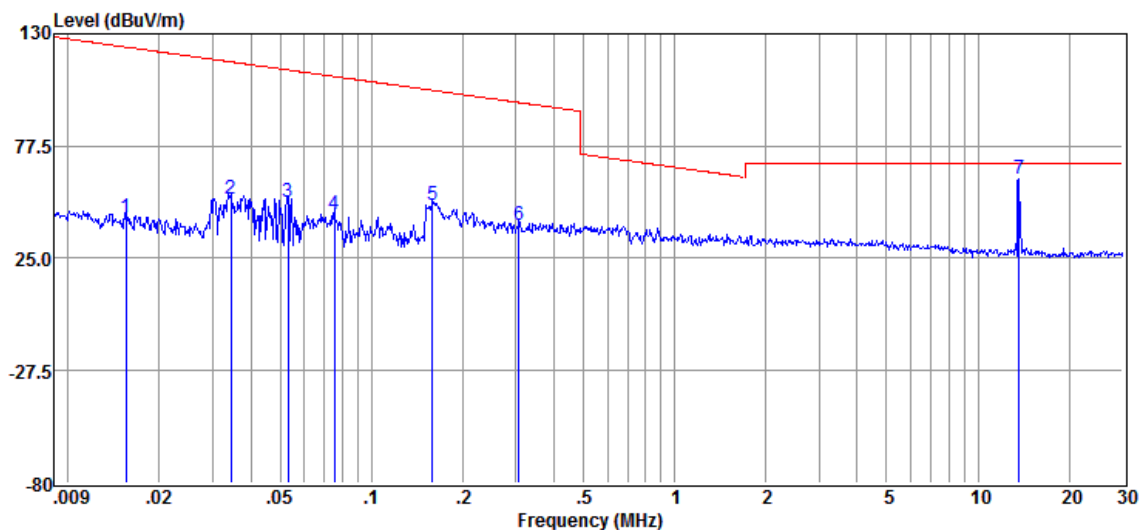


Figure 2. 30MHz to 1GHz

**Test Results:** Pass

Below 30MHz:



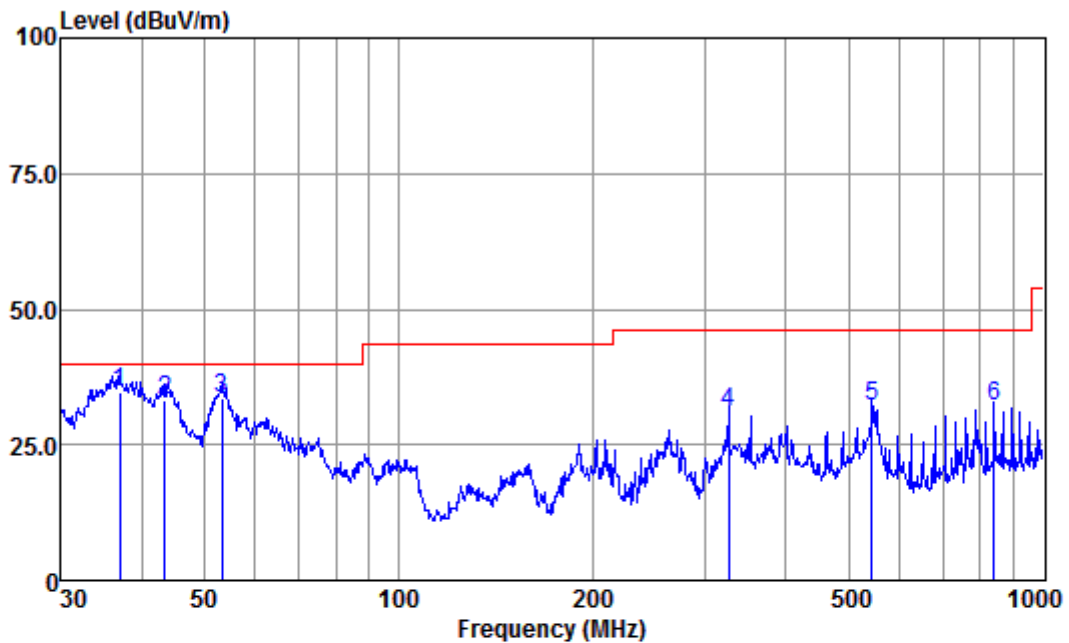
| Item   | Freq.  | Read Level | Antenna Factor | Cable Loss | Result Level | Limit Line | Over Limit | Detector |
|--------|--------|------------|----------------|------------|--------------|------------|------------|----------|
| (Mark) | (MHz)  | (dBμV)     | (dB/m)         | (dB)       | (dBUV/m)     | (dBUV/m)   | (dB)       |          |
| 1      | 0.016  | 23.54      | 20.57          | 0.03       | 44.14        | 123.78     | -79.64     | QP       |
| 2      | 0.034  | 32.64      | 20.20          | 0.04       | 52.88        | 116.88     | -64.00     | QP       |
| 3      | 0.053  | 31.39      | 19.98          | 0.04       | 51.41        | 113.08     | -61.67     | QP       |
| 4      | 0.075  | 25.85      | 19.88          | 0.05       | 45.78        | 110.05     | -64.27     | QP       |
| 5      | 0.159  | 29.81      | 19.98          | 0.05       | 49.84        | 103.57     | -53.73     | QP       |
| 6      | 0.307  | 20.45      | 19.80          | 0.06       | 40.31        | 97.87      | -57.56     | QP       |
| 7      | 13.658 | 42.73      | 19.30          | 0.12       | 62.15        | 69.50      | -7.35      | QP       |





30MHz-1GHz:

Vertical



Antenna Polarity :VERTICAL

EUT/Project :1622CR

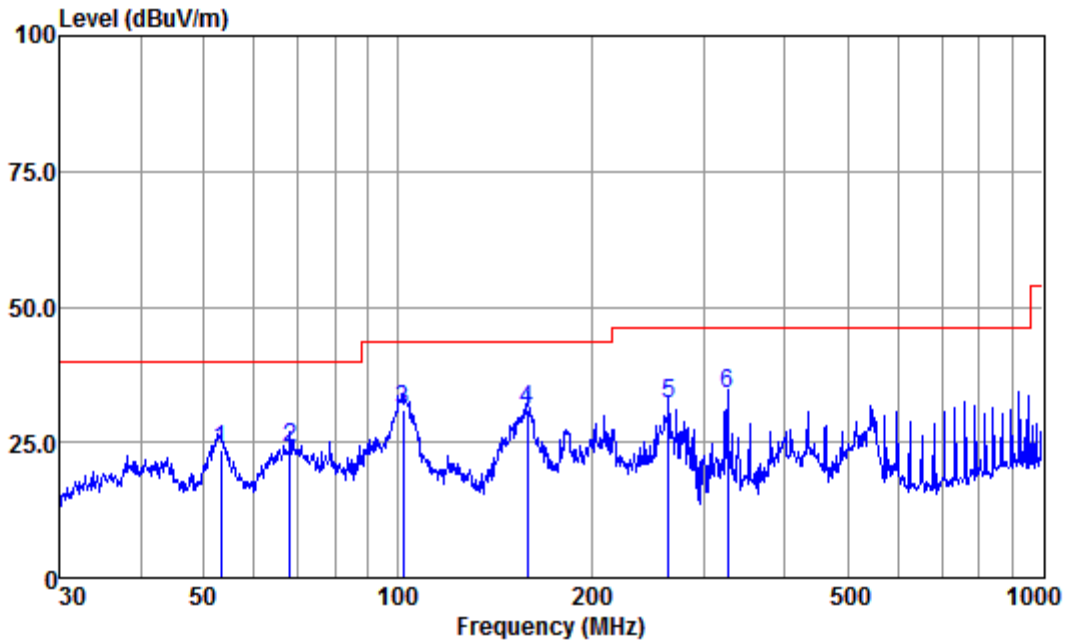
Test mode :a

|   | Freq   | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limit Line | Over Limit | Remark |
|---|--------|------------|----------------|------------|---------------|----------------|------------|------------|--------|
|   | MHz    | dBuv       | dB/m           | dB         | dB            | dBuv/m         | dBuv/m     | dB         |        |
| 1 | 37.02  | 61.1       | 16.0           | 0.2        | 42.6          | 34.7           | 40.0       | -5.3       | QP     |
| 2 | 43.51  | 61.4       | 14.2           | 0.2        | 42.6          | 33.2           | 40.0       | -6.8       | QP     |
| 3 | 53.32  | 64.5       | 11.3           | 0.3        | 42.6          | 33.5           | 40.0       | -6.5       | QP     |
| 4 | 325.60 | 58.7       | 13.7           | 0.9        | 42.3          | 31.0           | 46.0       | -15.0      | QP     |
| 5 | 543.27 | 55.0       | 18.2           | 1.3        | 42.2          | 32.3           | 46.0       | -13.7      | QP     |
| 6 | 842.13 | 49.7       | 22.3           | 2.2        | 42.3          | 31.9           | 46.0       | -14.1      | QP     |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



Horizontal



Antenna Polarity :HORIZONTAL  
EUT/Project :1622CR  
Test mode :a

|   | Freq   | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limit Line | Over Limit | Remark |
|---|--------|------------|----------------|------------|---------------|----------------|------------|------------|--------|
|   | MHz    | dBuv       | dB/m           | dB         | dB            | dBuv/m         | dBuv/m     | dB         |        |
| 1 | 53.32  | 54.6       | 11.3           | 0.3        | 42.6          | 23.6           | 40.0       | -16.4      | QP     |
| 2 | 68.15  | 54.7       | 11.6           | 0.3        | 42.7          | 23.9           | 40.0       | -16.1      | QP     |
| 3 | 102.36 | 63.6       | 9.5            | 0.5        | 42.7          | 30.9           | 43.5       | -12.6      | QP     |
| 4 | 159.23 | 60.1       | 13.0           | 0.6        | 42.6          | 31.1           | 43.5       | -12.4      | QP     |
| 5 | 263.82 | 61.6       | 12.0           | 0.8        | 42.4          | 32.0           | 46.0       | -14.0      | QP     |
| 6 | 325.60 | 61.5       | 13.7           | 0.9        | 42.3          | 33.8           | 46.0       | -12.2      | QP     |

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

## 6.4 Frequency tolerance

**Requirements:** The frequency tolerance of the carrier signal shall be maintained within +/- 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. For battery operated equipment, the equipment tests shall be performed using a new battery.

**Test Procedure:** The EUT was placed in an environmental test chamber and powered such that control element received normal voltage and the transmitter provided maximum RF output.

**Frequency Range:** Operation within the band 13.110-14.010 MHz

**Test Result:** Pass

### Test Data:

Nominal Operation Frequency: 13.56MHz

| Test Conditions        |                        | Test Result<br>(MHz) | Deviation<br>(kHz) | Limit<br>(kHz)        | Result |
|------------------------|------------------------|----------------------|--------------------|-----------------------|--------|
| Temp (°C)              | Volt (V AC)            |                      |                    |                       |        |
| T <sub>nom</sub> (20)  | V <sub>nom</sub> (120) | 13.56010             | 0.10               | ±0.01%<br>(1.3560kHz) | Pass   |
| T <sub>nom</sub> (20)  | V <sub>min</sub> (102) | 13.56011             | 0.11               |                       | Pass   |
|                        | V <sub>max</sub> (138) | 13.56008             | 0.08               |                       | Pass   |
| T <sub>min</sub> (-20) | V <sub>nom</sub> (120) | 13.56009             | 0.09               |                       | Pass   |
| T <sub>min</sub> (-10) |                        | 13.56006             | 0.06               |                       | Pass   |
| T <sub>min</sub> (0)   |                        | 13.56001             | 0.01               |                       | Pass   |
| T <sub>min</sub> (10)  |                        | 13.56010             | 0.10               |                       | Pass   |
| T <sub>min</sub> (20)  |                        | 13.56009             | 0.09               |                       | Pass   |
| T <sub>min</sub> (30)  |                        | 13.56008             | 0.08               |                       | Pass   |
| T <sub>min</sub> (40)  |                        | 13.56008             | 0.10               |                       | Pass   |
| T <sub>max</sub> (+50) |                        | 13.56010             | 0.10               |                       | Pass   |

Note: Deviation (KHz) = (Test Result-13.56MHz)\*1000

## 6.5 20dB Bandwidth

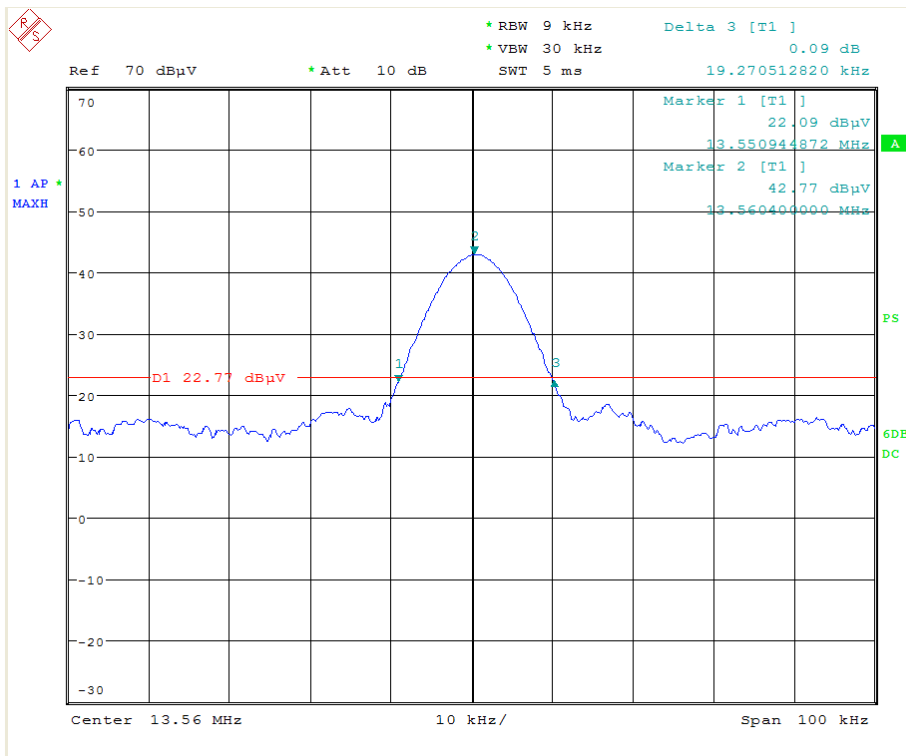
**Frequency Range:** Operation within the band 13.110 – 14.010 MHz

**Requirements:** Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §15.217 through §15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the 20 dB bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

### Test Data:

| 20dB bandwidth (kHz) | F <sub>L</sub> (MHz) | F <sub>H</sub> (MHz) | Limit(MHz)      | Result |
|----------------------|----------------------|----------------------|-----------------|--------|
| 19.27                | 13.5509              | 13.5604              | 13.110 – 14.010 | Pass   |

### Test plot as follows:





## **7 Test Setup Photographs**

Refer to the < Test Setup Photos-FCC >

## **8 EUT Constructional Details**

Refer to the < External Photos > & < Internal Photos >.

**--End of the Report--**