



## FCC/IC- TEST REPORT

Report Number : **709502306120-00D** Date of Issue: March 12, 2024

Model : AccuFab-CEL

Product Type : 3D Printer

Applicant : SHINING 3D Tech. Co., Ltd.

Address : No.1398, Xiangbin Road, Wenyan, Xiaoshan, Hangzhou, Zhejiang, China

Manufacturer : SHINING 3D Tech Co., Ltd.

Address : No.1398, Xiangbin Road, Wenyan, Xiaoshan, Hangzhou, Zhejiang, China

Test Result : **■ Positive**  Negative

Total pages including Appendices : 28

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch is a subcontractor to TÜV SÜD Product Service GmbH according to the principles outlined in ISO 17025.

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch reports apply only to the specific samples tested under stated test conditions. Construction of the actual test samples has been documented. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. The manufacturer/importer is responsible to the Competent Authorities in Europe for any modifications made to the production units which result in non-compliance to the relevant regulations. TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval.  
dc



## 1 Table of Contents

1	Table of Contents .....	2
2	Details about the Test Laboratory .....	3
3	Description of the Equipment Under Test.....	4
4	Summary of Test Standards.....	7
5	Summary of Test Results.....	8
6	General Remarks .....	9
7	Systems test configuration .....	10
8	Test Setups .....	11
9	Test Methodology.....	12
9.1	Conducted Emission.....	12
9.2	Radiated Emission.....	15
9.3	20dB Bandwidth Measurement & 99% Occupied Bandwidth .....	22
9.4	FREQUENCY STABILITY .....	24
10	Test Equipment List .....	25
11	System Measurement Uncertainty .....	26
12	Photographs of Test Set-ups .....	27
13	Photographs of EUT .....	28



## 2 Details about the Test Laboratory

### Details about the Test Laboratory

#### Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch  
No.16 Lane, 1951 Du Hui Road,  
Shanghai 201108,  
P.R. China

Telephone: +86 21 6141 0123

Fax: +86 21 6140 8600

FCC Registration No.: 820234

FCC Designation Number: CN1183

ISED CAB identifier: CN0101

IC Registration No.: 31668



### 3 Description of the Equipment Under Test

#### Description of the Equipment Under Test

Product: 3D Printer

Model no.: AccuFab-CEL

#### Hardware Version

Identification No. (HVIN): AccuFab-CEL

Product Marketing Name (PMN): AccuFab-CEL

FCC ID: 2AMG4-CEL

IC: 24652-CEL

Rating: AC 110-240V, 50/60Hz

RF Transmission Frequency: For NFC: 13.56 MHz

For 2.4G Wi-Fi:

For 802.11b/g/n-HT20: 2412~2462 MHz

For 5G Wi-Fi:

Band (GHz)	Operating Channel Number	Channel center frequencies for 20MHz bandwidth (MHz)
5.15GHz~5.25GHz	36	5180
	40	5200
	44	5220
	48	5240
5.25GHz~5.35GHz	52	5260
	56	5280
	60	5300
	64	5320
5.5GHz~5.7GHz	100	5500
	104	5520
	108	5540
	112	5560
	116	5580
	132	5660
	136	5680
	140	5700



5.725GHz~5.825GHz	149	5745
	153	5765
	157	5785
	161	5805
	165	5825

Band (GHz)	Operating Channel Number	Channel center frequencies for 40MHz bandwidth (MHz)
5.15GHz~5.25GHz	38	5190
	46	5230
5.25GHz~5.35GHz	54	5270
	62	5310
5.5GHz~5.7GHz	102	5510
	110	5550
	118	5590
	134	5670
5.725GHz~5.825GHz	151	5755
	159	5795

Band (GHz)	Operating Channel Number	Channel center frequencies for 80MHz bandwidth (MHz)
5.15GHz~5.25GHz	42	5210
5.25GHz~5.35GHz	58	5290
5.5GHz~5.7GHz	106	5530
5.725GHz~5.825GHz	155	5775

The device shall not be capable of transmitting in the 5600-5650 MHz band.

Modulation:

For NFC: ASK

For 2.4G Wi-Fi:

SISO: Direct Sequence Spread Spectrum (DSSS) for 802.11b  
Orthogonal Frequency Division Multiplexing (OFDM) for 802.11g

MIMO: Orthogonal Frequency Division Multiplexing (OFDM) for 802.11n

For 5G Wi-Fi:

MIMO: Orthogonal Frequency Division Multiplexing (OFDM) for 802.11a/n/ac

Antenna Type:

For NFC: PCB loop



For 2.4GHz & 5GHz: FPC

Antenna Gain:

For NFC: 2dBi

Antenna1: 5.39 dBi for 2.4GWi-Fi, Antenna2: 3.23 dBi for 2.4GWi-Fi

Directional gain:

Antenna1: 4.3 dBi for 5GWi-Fi, Antenna2: 5.72 dBi for 5GWi-Fi  
For 2.4GHz Wi-Fi output power & power spectral density: 7.39 dBi

Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$  dBi

$G1 = 5.39$  dBi,  $G2 = 3.23$  dBi,  $N_{ANT} = 2$

So Directional gain =

$10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$  dBi =  $10 \log[(10^{5.39/20} + 10^{3.23/20})^2 / 2]$  dBi = 7.39 dBi

For 5GHz Wi-Fi output power & power spectral density: 8.05 dBi

Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$  dBi

$G1 = 4.3$  dBi,  $G2 = 5.72$  dBi,  $N_{ANT} = 2$

So Directional gain =

$10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$  dBi =  $10 \log[(10^{4.3/20} + 10^{5.72/20})^2 / 2]$  dBi = 8.05 dBi

The Equipment supports MIMO and does not support beamforming and CDD modulation, and all antennas have the different gain,

According to KDB662911 D01 chapter F d) (i) :

Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$  dBi

[Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

Description of the EUT: The Equipment Under Test (EUT) is a 3D Printer with NFC and Wi-Fi Module. The EUT support NFC operated at 13.56MHz and Wi-Fi operated at 2.4GHz and 5GHz.

Test sample no.: SHA-748811-1 (Radiated sample)

The sample's mentioned in this report is/are submitted/ supplied/ manufactured by client. The laboratory therefore assumes no responsibility for accuracy of information on the brand name, model number, origin of manufacture, consignment, antenna gain or any information supplied.



## 4 Summary of Test Standards

<b>Test Standards</b>	
FCC Part 15 Subpart C 10-1-2021 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 5 Amendment 2 February 2021	General Requirements for the Certification of Radio Apparatus
RSS-210 Issue 10 December 2019	RSS-210 - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

All the test methods were according to ANSI C63.10-2013.



## 5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C & RSS-210 Issue 10/RSS-Gen Issue 5				
Test Condition		Pages	Test Site	Test Result
§15.207 & RSS-GEN 8.8	Conducted emission AC power port	12-14	Test Site 1	Pass
§15.225 (a, b) & RSS-210 B.6 & RSS-GEN 8.9	Radiated Emission, 9KHz to 1000MHz	15-21	Test Site 1	Pass
§15.215 (c) & RSS-Gen 6.7	20dB Bandwidth Measurement & 99% Occupied Bandwidth	22-23	Test Site 1	Pass
§15.225(e) & RSS-210 B.6	Frequency Stability	24	Test Site 1	Pass
§15.203 & RSS-Gen 6.8	Antenna requirement	--	See Note 2	Pass

Note 1: N/A=Not Applicable. Conducted emission is not apply for battery operated device.

Note 2: The EUT uses a PCB loop antenna and two FPC antenna, which PCB gain is 2dBi and FPC gain is Antenna1: 5.39 dBi for 2.4GWi-Fi, Antenna2: 3.23 dBi for 2.4GWi-Fi, Antenna1: 4.3 dBi for 5GWi-Fi, Antenna2: 5.72 dBi for 5GWi-Fi. In accordance to §15.203 and RSS-Gen 6.8, It is considered sufficiently to comply with the provisions of this section.



## 6 General Remarks

### Remarks

This submittal(s) (test report) is intended for FCC ID: 2AMG4-CEL, IC: 24652-CEL complies with Section 15.205, 15.207, 15.209, 15.225 of the FCC Part 15, Subpart C Rules and RSS-210, RSS-GEN.

This report is only for 13.56MHz NFC test report, for the 2.4GHz Wi-Fi test report please refer to 709502306120-00A, for the 5GHz Wi-Fi test report please refer to 709502306120-00B.

We tested it and listed the worst data in this report.

### SUMMARY:

All tests according to the regulations cited on page 5 were

- Performed

- **Not** Performed

The Equipment Under Test

- **Fulfills** the general approval requirements.

- **Does not** fulfill the general approval requirements.

Sample Received Date: January 2, 2024

Testing Start Date: January 2, 2024

Testing End Date: March 8, 2024

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch

Reviewed by:

Prepared by:

Tested by:

A handwritten signature in blue ink, appearing to read "Hui TONG".

---

Hui TONG  
EMC Section Manager

A handwritten signature in blue ink, appearing to read "Chengjie GUO".

---

Chengjie GUO  
EMC Test Engineer



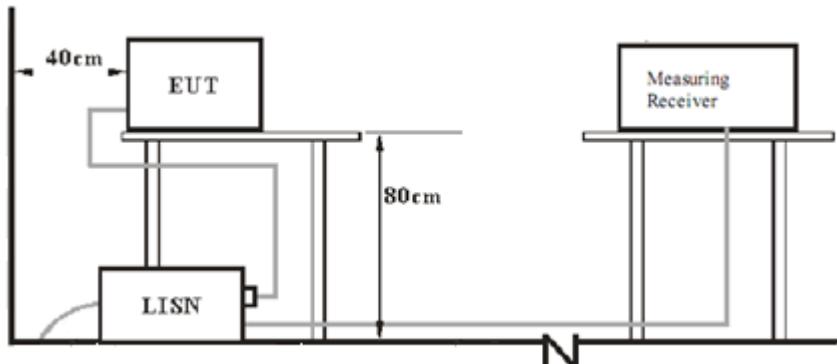
## 7 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
--	--	--	--

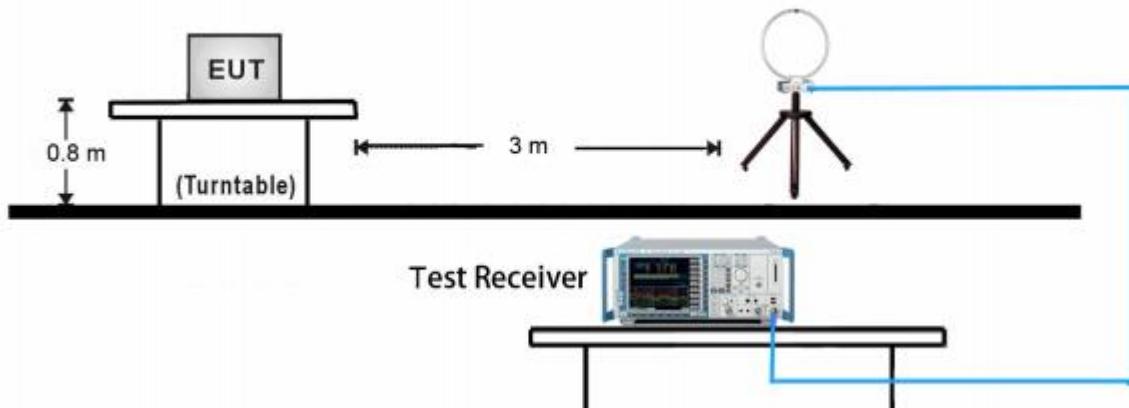
## 8 Test Setups

### 8.1 AC Power Line Conducted Emission test setups

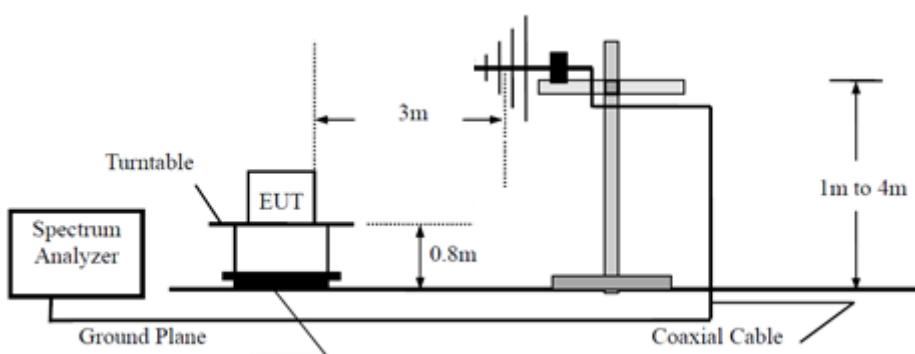


### 8.2 Radiated test setups

9kHz ~ 30MHz Test Setup:



30MHz ~ 1GHz Test- Setup





## 9 Test Methodology

### 9.1 Conducted Emission

#### Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

#### Limit

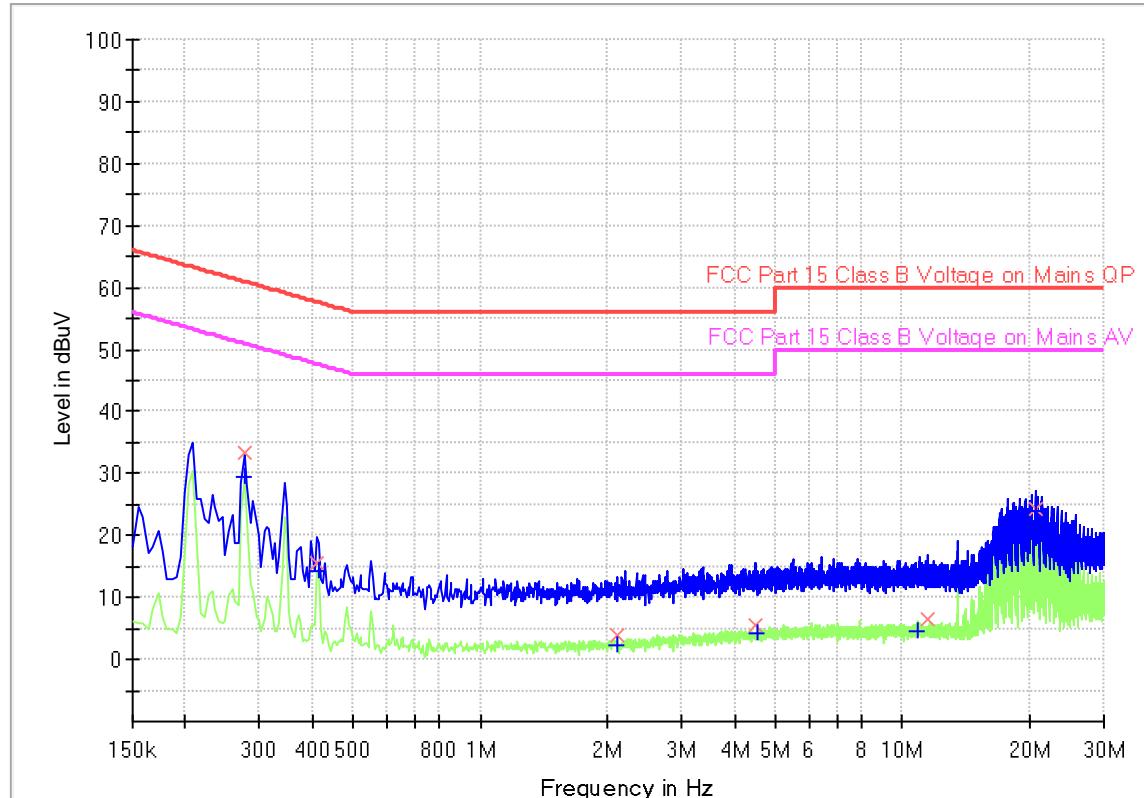
Frequency MHz	QP Limit dB $\mu$ V	AV Limit dB $\mu$ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency



## Conducted Emission

Product Type : 3D Printer  
 M/N : AccuFab-CEL  
 Operating Condition : Mode 1: Transmit at 13.56MHz  
 Test Specification : L-line  
 Comment : AC 120V/60Hz



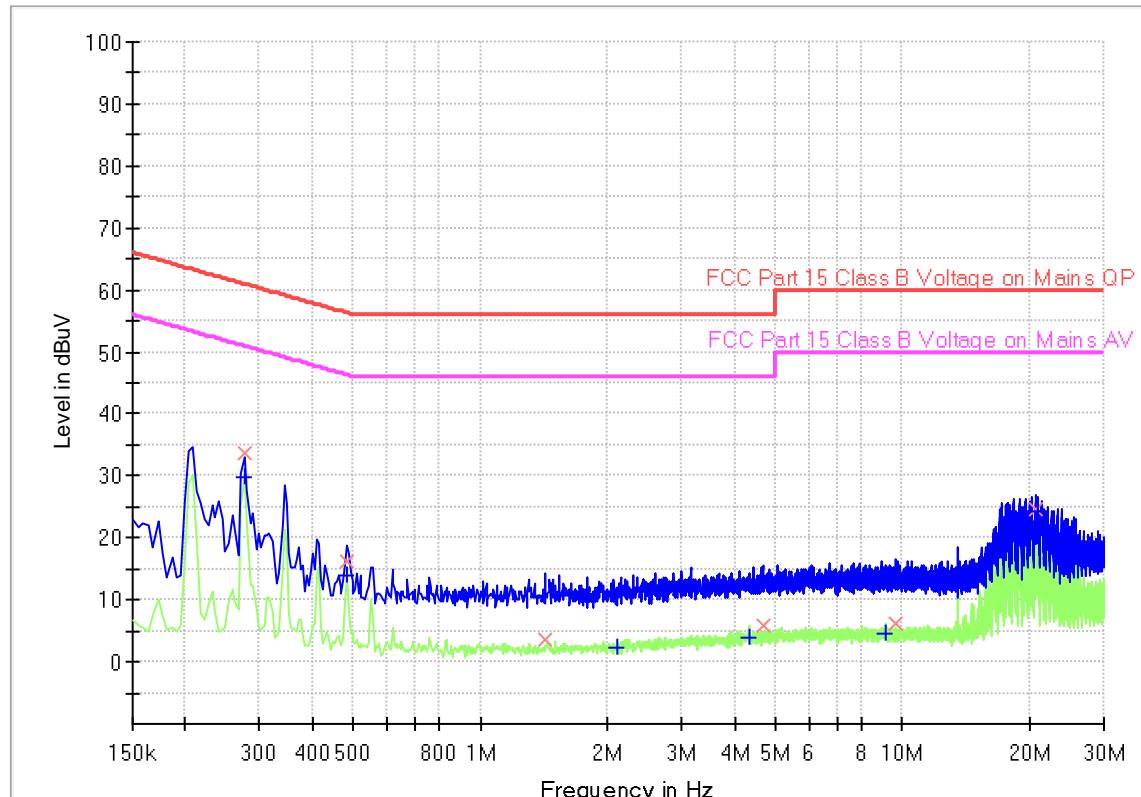
## Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.276000	---	29.45	50.94	21.49	1000.0	9.000	L1	19.5
0.276000	33.37	---	60.94	27.57	1000.0	9.000	L1	19.5
0.411000	15.48	---	57.63	42.15	1000.0	9.000	L1	19.5
0.415500	---	14.39	47.54	33.15	1000.0	9.000	L1	19.5
2.112000	---	2.43	46.00	43.57	1000.0	9.000	L1	19.5
2.116500	3.87	---	56.00	52.13	1000.0	9.000	L1	19.5
4.497000	5.66	---	56.00	50.34	1000.0	9.000	L1	19.6
4.546500	---	4.09	46.00	41.91	1000.0	9.000	L1	19.6
10.828500	---	4.59	50.00	45.41	1000.0	9.000	L1	19.8
11.418000	6.49	---	60.00	53.51	1000.0	9.000	L1	19.9
20.782500	---	24.10	50.00	25.90	1000.0	9.000	L1	20.4
20.782500	24.31	---	60.00	35.69	1000.0	9.000	L1	20.4

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)  
 Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator



Product Type : 3D Printer  
 M/N : AccuFab-CEL  
 Operating Condition : Mode 1: Transmit at 13.56MHz  
 Test Specification : N-line  
 Comment : AC 120V/60Hz



## Final\_Results

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.276000	---	29.74	50.94	21.20	1000.0	9.000	N	19.5
0.276000	33.77	---	60.94	27.17	1000.0	9.000	N	19.5
0.483000	---	13.96	46.29	32.33	1000.0	9.000	N	19.5
0.483000	16.32	---	56.29	39.97	1000.0	9.000	N	19.5
1.423500	3.70	---	56.00	52.30	1000.0	9.000	N	19.5
2.103000	---	2.44	46.00	43.56	1000.0	9.000	N	19.5
4.317000	---	3.92	46.00	42.08	1000.0	9.000	N	19.6
4.659000	5.73	---	56.00	50.27	1000.0	9.000	N	19.6
9.136500	---	4.50	50.00	45.50	1000.0	9.000	N	19.7
9.649500	6.23	---	60.00	53.77	1000.0	9.000	N	19.7
20.760000	24.59	---	60.00	35.41	1000.0	9.000	N	20.2
20.832000	---	24.34	50.00	25.66	1000.0	9.000	N	20.2

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)  
 Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator



## 9.2 Radiated Emission

### Test Method

1. The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
4. The height of antenna 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.
5. 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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
6. Use the following spectrum analyzer settings According to C63.10:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW=100 kHz for  $f < 1$  GHz; VBW RBW; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz, VBW= 3MHz for  $f \geq 1$  GHz for peak measurement.
- For average measurement:
 

VBW = 10 Hz, when duty cycle is no less than 98 percent.

VBW  $\geq 1/T$ , when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
7. Repeat above procedures until all frequencies measured were complete.

### Limit

According to §15.225 (a, b, c) & RSS-210 B.6, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Frequency (MHz)	Field Strength Limitation		Field Strength Limitation at 3m Distance	
	(uV/m)	Distance	dBuv/m	Distance
13.553-13.567	15.848	30m	124	3m
13.110-13.410	106	30m	90.5	3m
13.710-14.010				
13.410-13.553	334	30m	80.5	3m
13.567-13.710				



Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

**Limits for 15.209 & RSS -GEN Radiated emission limits; general requirements**

Frequency	Limit at 3m (dBuV/m)
0.009 MHz – 0.490 MHz	128.5 to 93.8 <sup>1</sup>
0.490 MHz – 1.705 MHz	73.8 to 63 <sup>1</sup>
1.705 MHz – 30 MHz	69.5 <sup>1</sup>
30 MHz – 88 MHz	40.0 <sup>1</sup>
88 MHz – 216 MHz	43.5 <sup>1</sup>
216 MHz – 960 MHz	46.0 <sup>1</sup>
Above 960 MHz	54.0 <sup>1</sup>
Above 1000 MHz	54.0 <sup>2</sup>
Above 1000 MHz	74.0 <sup>3</sup>

<sup>1</sup>Limit is with detector with bandwidths as defined in CISPR-16-1-1 except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz where an Average detector is used.

<sup>2</sup>Limit is with 1 MHz measurement bandwidth and using an Average detector

<sup>3</sup>Limit is with 1 MHz measurement bandwidth and using a Peak detector

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

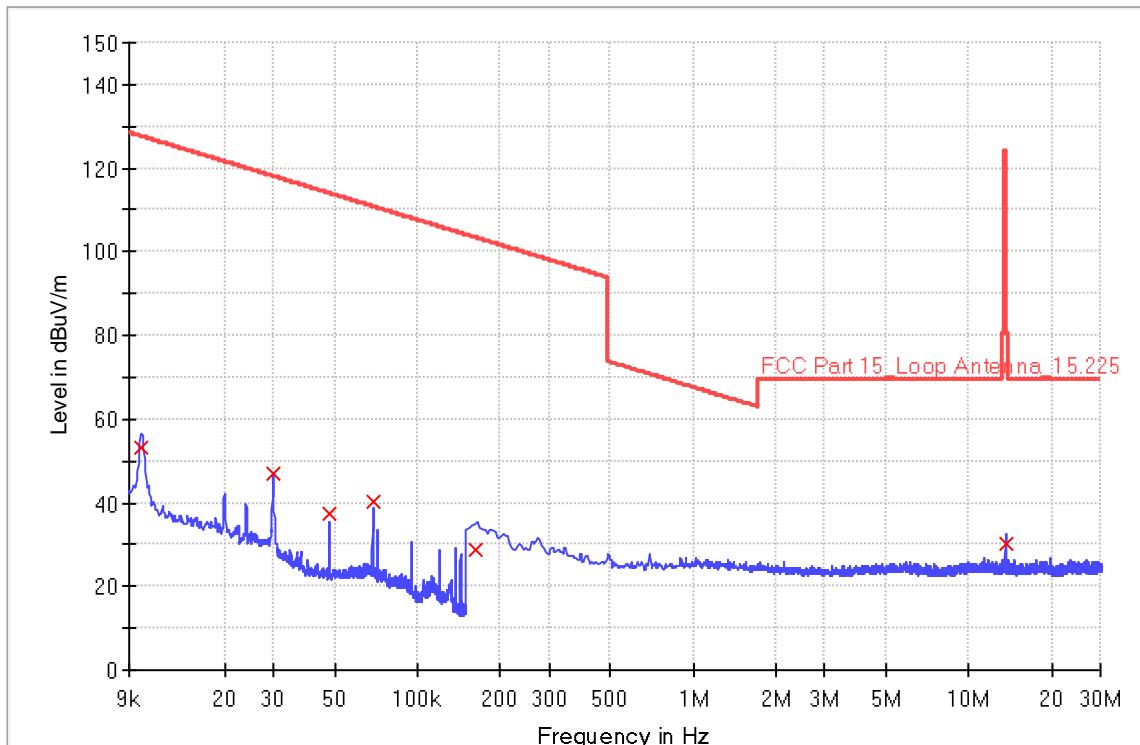
$$\begin{aligned}
 \text{Example: } 13.56 \text{ MHz} &= 15848 \text{ uV/m} & 30\text{m} \\
 &= 84 \text{ dBuV/m} & 30\text{m} \\
 &= 84 + 20\log(30/3)^2 & 3\text{m} \\
 &= 124 \text{ dBuV/m}
 \end{aligned}$$



## Spurious radiated emissions for transmitter

Site: 3 meter chamber	Time: 2024/03/07 - 15:01
Limit: FCC_Part15.209_RE(3m)	Engineer: Chengjie GUO
Probe: HFH2-Z2	Polarity: X
EUT: 3D Printer	Power: AC 120V,60Hz
Note: Transmit at 13.56MHz.	

RE\_Loop E\_pre

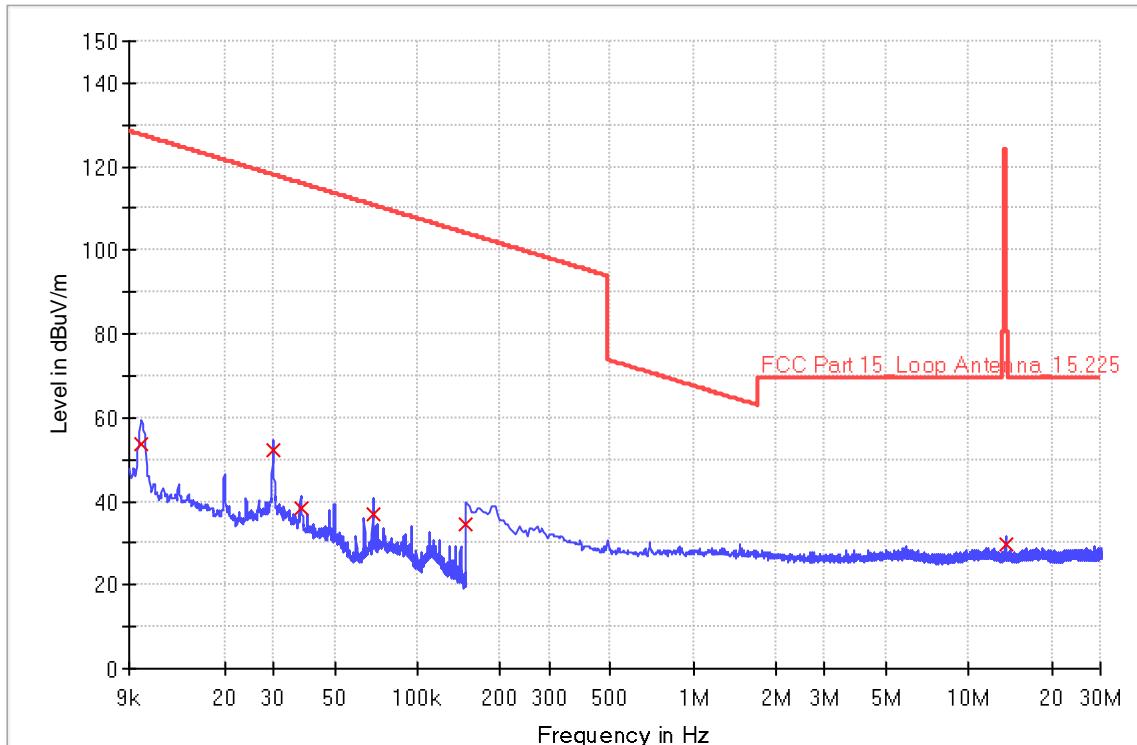


Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
0.009880	53.1	1000.0	0.200	155.0	H	153.0	19.6	74.629	127.709
0.029960	47.1	1000.0	0.200	155.0	H	175.0	18.9	70.953	118.073
0.047800	37.4	1000.0	0.200	155.0	H	226.0	18.9	76.665	114.015
0.068840	40.2	1000.0	0.200	155.0	H	186.0	18.8	70.647	110.847
0.162000	28.7	1000.0	9.000	155.0	H	343.0	18.8	74.754	103.414
13.562000	30.3	1000.0	9.000	155.0	H	286.0	18.8	93.720	124.000



Site: 3 meter chamber	Time: 2024/03/07 - 16:15
Limit: FCC_Part15.209_RE(3m)	Engineer: Chengjie GUO
Probe: HFH2-Z2	Polarity: Y
EUT: 3D Printer	Power: AC 120V,60Hz
Note: Transmit at 13.56MHz.	

RE\_Loop E\_pre



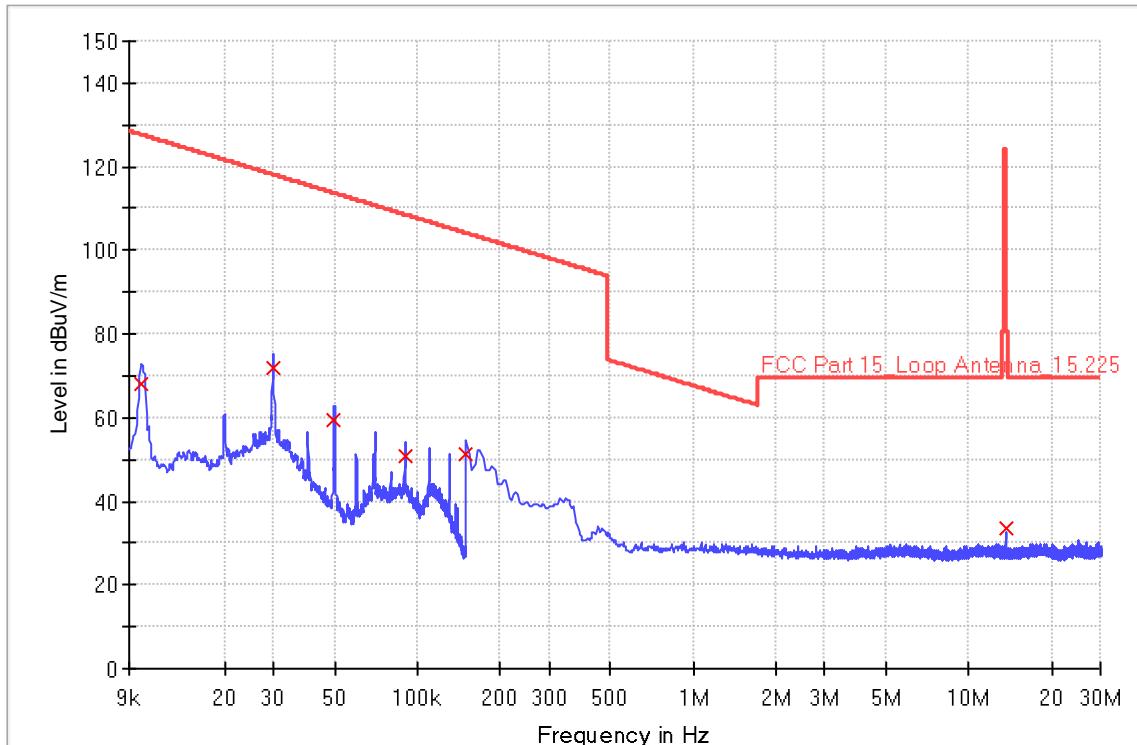
## Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
0.009960	53.5	1000.0	0.200	155.0	H	143.0	19.6	74.099	127.639
0.029960	52.1	1000.0	0.200	155.0	H	343.0	18.9	66.023	118.073
0.037880	38.3	1000.0	0.200	155.0	H	115.0	18.9	77.726	116.036
0.068760	37.0	1000.0	0.200	155.0	H	345.0	18.8	73.897	110.857
0.150000	34.7	1000.0	9.000	155.0	H	231.0	18.8	69.432	104.082
13.562000	29.6	1000.0	9.000	155.0	H	153.0	18.8	94.450	124.000



Site: 3 meter chamber	Time: 2024/03/07 - 17:29
Limit: FCC_Part15.209_RE(3m)	Engineer: Chengjie GUO
Probe: HFH2-Z2	Polarity: Z
EUT: 3D Printer	Power: AC 120V,60Hz
Note: Transmit at 13.56MHz.	

RE\_Loop E\_pre



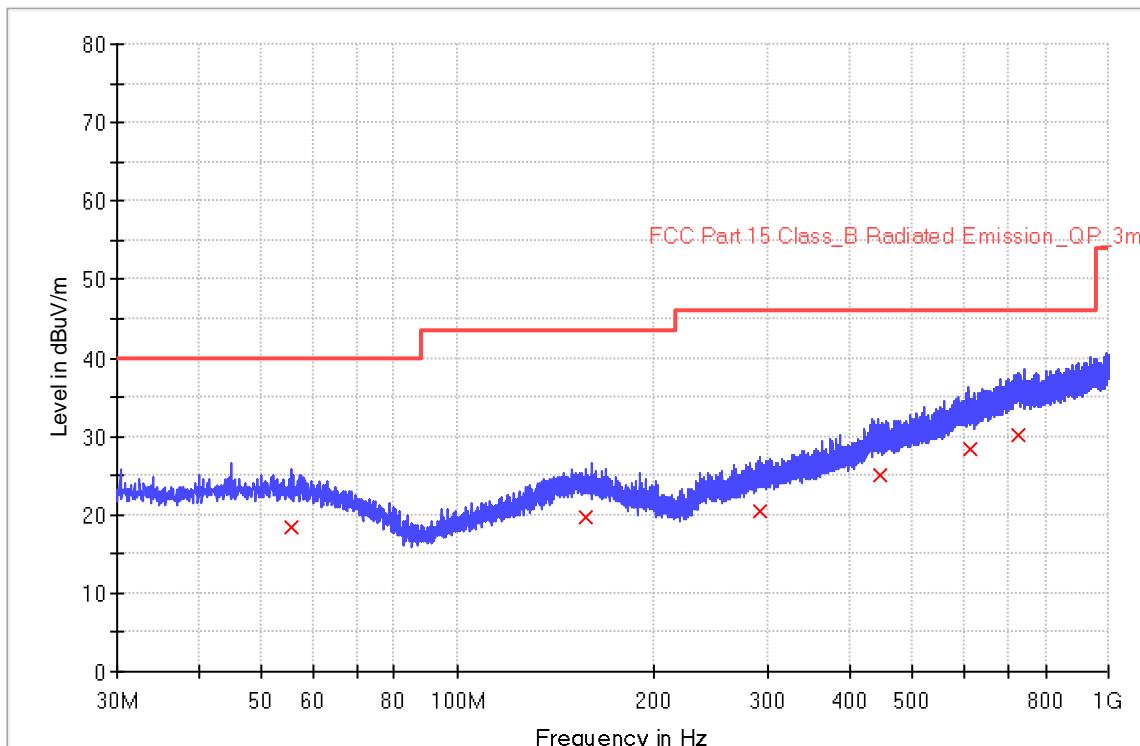
## Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
0.009960	68.1	1000.0	0.200	155.0	H	133.0	19.6	59.499	127.639
0.030040	71.8	1000.0	0.200	155.0	H	132.0	18.9	46.210	118.050
0.049960	59.6	1000.0	0.200	155.0	H	114.0	18.9	54.061	113.631
0.090040	50.9	1000.0	0.200	155.0	H	253.0	18.8	57.575	108.515
0.150000	51.2	1000.0	9.000	155.0	H	243.0	18.8	52.882	104.082
13.562000	33.4	1000.0	9.000	155.0	H	164.0	18.8	90.600	124.000



Site: 3 meter chamber	Time: 2024/03/07 - 18:22
Limit: FCC_Part15.209_RE(3m)	Engineer: Chengjie GUO
Probe: VULB 9168	Polarity: Horizontal
EUT: 3D Printer	Power: AC 120V,60Hz
Note: Transmit at 13.56MHz.	

RE\_VULB9168\_pre\_Cont\_30-1000



### Limit and Margin (30-1000MHz)

Frequency (MHz)	QuasiPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBm)
55.520000	18.4	1000.0	120.000	100.0	H	224.0	20.4	21.6	40.0
157.760000	19.6	1000.0	120.000	224.0	H	44.0	20.9	23.9	43.5
292.080000	20.5	1000.0	120.000	100.0	H	196.0	21.3	25.5	46.0
446.480000	25.1	1000.0	120.000	118.0	H	131.0	25.8	20.9	46.0
611.280000	28.4	1000.0	120.000	308.0	H	90.0	29.3	17.6	46.0
727.520000	30.2	1000.0	120.000	330.0	H	173.0	31.3	15.8	46.0

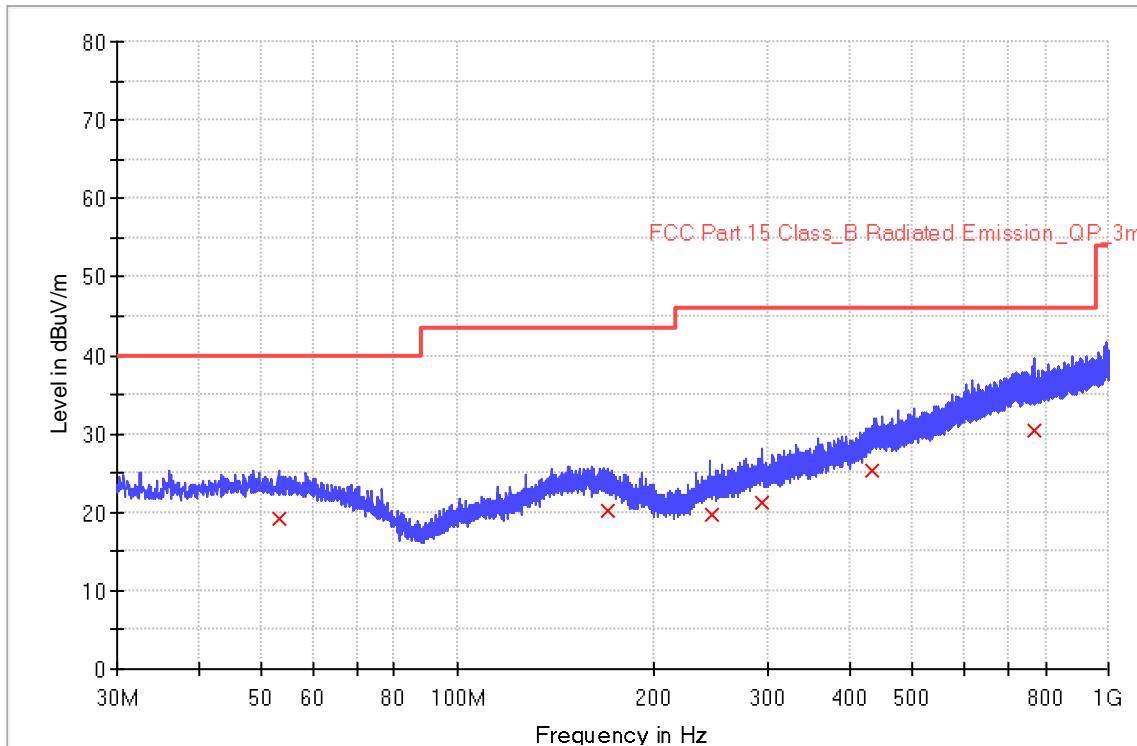
#### Remark:

1. The test frequency range and limit refer to FCC Rule Part 15.209 (f) and Part 15.33(5) & RSS-GEN
2. This device will be used in a commercial environment (hospital) and it defined as Class A digital device, whose highest frequency is less than 108MHz. So, the radiated emission range is 30MHz to 1000MHz.



Site: 3 meter chamber	Time: 2024/03/07 - 19:16
Limit: FCC_Part15.209_RE(3m)	Engineer: Chengjie GUO
Probe: VULB 9168	Polarity: Vertical
EUT: 3D Printer	Power: AC 120V,60Hz
Note: Transmit at 13.56MHz.	

RE\_VULB9168\_pre\_Cont\_30-1000



### Limit and Margin (30-1000MHz)

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
53.080000	19.1	1000.0	120.000	100.0	V	119.0	20.4	20.9	40.0
169.880000	20.2	1000.0	120.000	202.0	V	45.0	20.4	23.3	43.5
245.760000	19.6	1000.0	120.000	128.0	V	83.0	19.8	26.4	46.0
292.680000	21.2	1000.0	120.000	200.0	V	223.0	21.3	24.8	46.0
433.720000	25.3	1000.0	120.000	100.0	V	124.0	25.4	20.7	46.0
769.880000	30.4	1000.0	120.000	185.0	V	182.0	31.9	15.6	46.0

#### Remark:

- 1.The test frequency range and limit refer to FCC Rule Part 15.209 (f) and Part 15.33(5) & RSS-GEN
- 2.This device will be used in a commercial environment (hospital) and it defined as Class A digital device, whose highest frequency is less than 108MHz. So, the radiated emission range is 30MHz to 1000MHz.



## 9.3 20dB Bandwidth Measurement & 99% Occupied Bandwidth

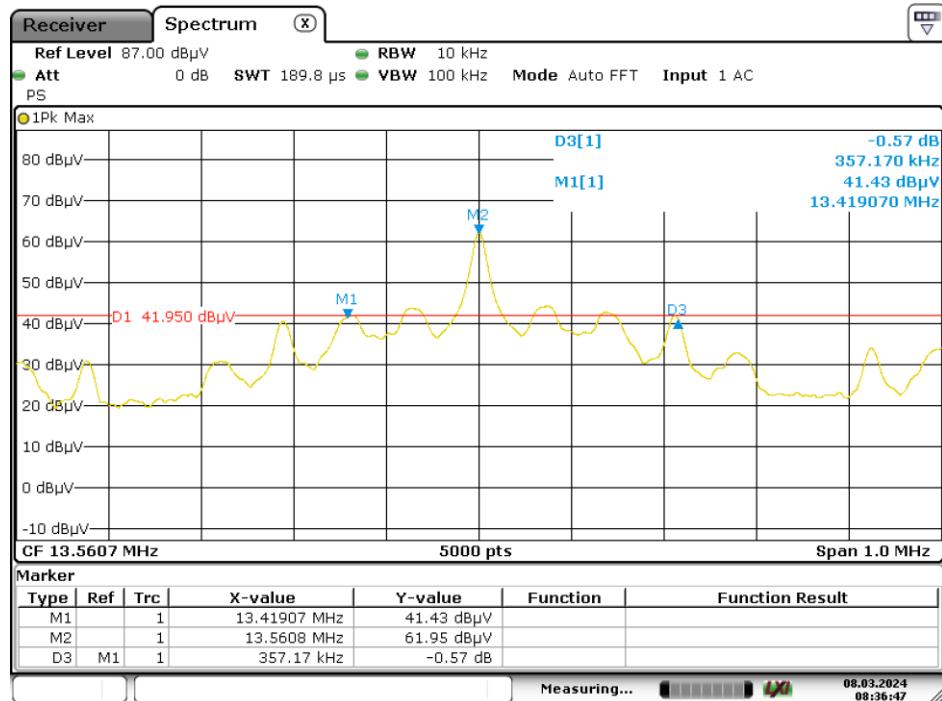
### Test Method

1. Set to the maximum power setting and enable the EUT transmit continuously.
2. Use the following test receiver settings:  
Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel  
RBW = 1% to 5% of the 20dB bandwidth of the emission being measured,  $VBW \geq RBW$ ,  
Sweep = auto, Detector function = peak, Trace = max hold
3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth. Record the results.
4. Repeat above procedures until all frequencies measured were complete.

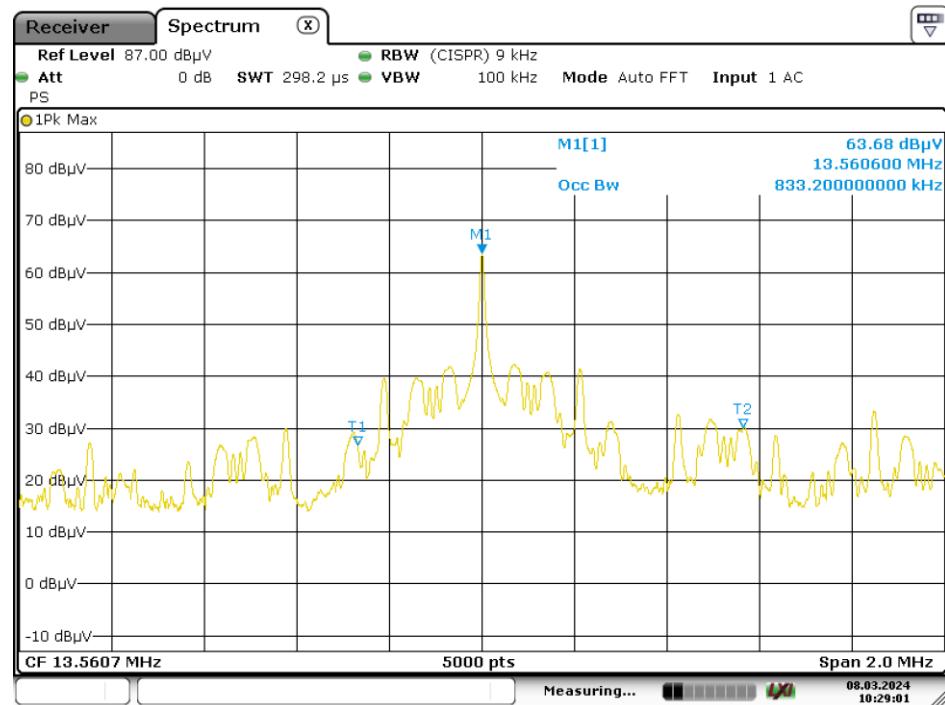
### Test Result

Channel	20dB Bandwidth (kHz)	Limit (KHz)
13.56MHz	357.17kHz	NA

Channel	99% Occupied Bandwidth (Hz)	Limit (KHz)
13.56MHz	257.6Hz	NA



Date: 8.MAR.2024 08:36:47



Date: 8.MAR.2024 10:29:01



## 9.4 FREQUENCY STABILITY

### Test Method

1. The equipment under test was connected to an external AC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber.
2. After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the counter.
3. At room temperature ( $25\pm5^{\circ}\text{C}$ ), an external variable AC power supply was connected to the EUT. The frequency of the transmitter was measured for 115%, 100% and 85% of the nominal operating input voltage.

### Limit

The frequency tolerance of the carrier signal shall be maintained within  $+\text{-}0.01\%$  of the operating frequency over a temperature variation of 20 degrees to 35 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 25 degrees C.

For battery operated equipment, the equipment tests shall be performed using a new battery.

### Test Result

Frequency Stability: Temperature variation					
Temperature (°C)	Voltage (AC)	Frequency (MHz)	Frequency Error (kHz)	Limit (kHz)	Result
25	120V	13.56065	0.65	within $+\text{-} 1.356$	Pass
35	120V	13.56063	0.63	within $+\text{-} 1.356$	Pass
20	120V	13.56058	0.58	within $+\text{-} 1.356$	Pass

Frequency Stability: Voltage variation					
Temperature (°C)	Voltage (AC)	Frequency (MHz)	Frequency Error (kHz)	Limit (kHz)	Result
25	102V	13.56065	0.65	within $+\text{-} 1.356$	Pass
25	120V	13.56065	0.65	within $+\text{-} 1.356$	Pass
25	138V	13.56065	0.65	within $+\text{-} 1.356$	Pass



## 10 Test Equipment List

### List of Test Instruments

USED	Equipment Name	Model	Manufacturer	Equipment ID.	Calibration Date	Calibration Due
<input checked="" type="checkbox"/>	EMI test receiver	ESR3	R&S	S1503109-YQ-EMC	2023-8-1	2024-7-31
<input checked="" type="checkbox"/>	Trilog super broadband test antenna	SCHWARZBECK	VULB9168	S1808296-YQ-EMC	2021.9.23	2024.9.22
<input checked="" type="checkbox"/>	Temperature Chamber	HTT-100AP	Shanghai HUCAN	S2201430b-YQ-EMC	2023-3-3	2024-3-2
<input checked="" type="checkbox"/>	Loop antenna	HFH2-Z2	R&S	S1503013-YQ-EMC	2023-6-15	2024-6-14
<input checked="" type="checkbox"/>	EMI test receiver	R & S	ESR3	S1503001-YQ-EMC	2023-8-1	2024-7-31
<input checked="" type="checkbox"/>	2-Line V-network	R & S	ENV216	S1503103-YQ-EMC	2023-8-1	2024-7-31



## 11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

Items	Extended Uncertainty
Radiated Disturbance	30MHz to 1GHz, $\pm 5.03\text{dB}$ (Horizontal) $\pm 5.11\text{dB}$ (Vertical) 1GHz to 18GHz, $\pm 5.15\text{dB}$ (Horizontal) $\pm 5.12\text{dB}$ (Vertical)

Measurement Uncertainty Decision Rule:

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2021, clause 4.4.3 and 4.5.1.



## 12 Photographs of Test Set-ups

Refer to the < Test Setup photos >.



## 13 Photographs of EUT

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

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