

FCC Radio Test Report

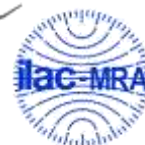
FCC ID: 2AB9W-PP120XP

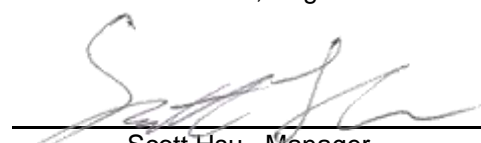
Report No. : BTL-FCCP-2-1911T047
Equipment : 3D Printer
Model Name : PartPro120 xP
Brand Name : XYZprinting
Applicant : XYZprinting, Inc.
Address : 10F., No.99, Sec. 5, Nanjing E. Rd., Songshan Dist., Taipei City 10571, Taiwan (R.O.C.)
Manufacturer : Cal-Comp Electronics (Thailand) Public Company Limited
Address : 138, Moo 4, Phechkasem Road, Sapang, Koawoyoi, Petchaburi 76140, Thailand.
Factory : Cal-Comp Electronics (Thailand) Public Company Limited
Address : 138, Moo 4, Phechkasem Road, Sapang, Koawoyoi, Petchaburi 76140, Thailand.
Radio Function : NFC (13.56 MHz)
FCC Rule Part(s) : FCC Part 15, Subpart C (15.225)
Measurement Procedure(s) : ANSI C63.10-2013
Date of Receipt : 2019/11/27
Date of Test : 2019/11/27 ~ 2019/12/30
Issued Date : 2020/1/8

The above equipment has been tested and found in compliance with the requirement of the above standards by BTL Inc.

Prepared by


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**Approved by**


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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

The report must not be used by the client to claim product certification, approval, or endorsement by NIST, A2LA, or any agency of the U.S. Government.

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BTL's laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

| Report Version | Description | Issued Date |
|----------------|-----------------|-------------|
| R00 | Original Issue. | 2020/1/8 |

1 SUMMARY OF TEST RESULTS

Test procedures according to the technical standards.

| FCC Part 15, Subpart C (15.225) | | | | |
|-------------------------------------|-----------------------------------|--|-----------|--------|
| Standard(s) Section | Description | Test Result | Judgement | Remark |
| 15.207 | AC Power Line Conducted Emissions | APPENDIX A | Pass | ----- |
| 15.35 15.205 15.209 15.225 | Radiated Emissions | APPENDIX B APPENDIX C APPENDIX D | Pass | ----- |
| 15.225(e) | Frequency Stability | APPENDIX E | Pass | ----- |
| 15.203 | Antenna Requirement | ----- | Pass | ----- |
| 15.215(c) | 20 dB Bandwidth | APPENDIX F | Pass | ----- |

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report.
- (2) The report format version is TP.1.1.1.

1.1 TEST FACILITY

The test facilities used to collect the test data in this report:

No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

The test sites and facilities are covered under FCC RN: 355421 and DN: TW1099.

☒ C05 ☐ CB08 ☐ CB11 ☐ CB15 ☐ CB16
☒ SR06

No.18, Ln. 171, Sec. 2, Jiuzong Rd., Neihu Dist., Taipei City 114, Taiwan

The test sites and facilities are covered under FCC RN: 325517 and DN: TW1115.

☐ C03 ☒ CB18 ☐ CB19

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k = 2$, providing a level of confidence of approximately **95 %**. The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{CISPR} requirement.

A. AC power line conducted emissions test:

| Test Site | Method | Measurement Frequency Range | U (dB) |
|-----------|--------|-----------------------------|--------|
| C05 | CISPR | 150 kHz ~ 30MHz | 3.44 |

B. Radiated emissions below 1 GHz test :

| Test Site | Method | Measurement Frequency Range | Ant. H / V | U,(dB) |
|--------------|--------|-----------------------------|---------------|--------|
| CB18 (3m) | CISPR | 30MHz ~ 200MHz | V | 4.20 |
| | | 30MHz ~ 200MHz | H | 3.64 |
| | | 200MHz ~ 1,000MHz | V | 4.56 |
| | | 200MHz ~ 1,000MHz | H | 3.90 |

C. Conducted test :

| Test Item | U,(dB) |
|------------------------------|--------|
| Bandwidth | 1.13 |
| Output power | 1.06 |
| Power Spectral Density | 1.20 |
| Conducted Spurious emissions | 1.14 |
| Conducted Band edges | 1.13 |

NOTE:

Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3 TEST ENVIRONMENT CONDITIONS

| Test Item | Environment Condition | Tested by |
|---------------------------------------|-----------------------|---------------|
| AC Power Line Conducted Emissions | 20 °C, 51 % | Jay Kao |
| Radiated emissions (9KHz-30MHz) | 23 °C, 59 % | Hunter Chiang |
| Radiated emissions (30MHz TO 1000MHz) | 23 °C, 59 % | Hunter Chiang |
| Frequency Stability | 23.5 °C, 49 % | William Wei |
| 20 dB Bandwidth | 23.5 °C, 49 % | William Wei |

2 GENERAL INFORMATION

2.1 DESCRIPTION OF EUT

| | |
|----------------------|--|
| Equipment | 3D Printer |
| Model Name | PartPro120 xP |
| Brand Name | XYZprinting |
| Model Difference | N/A |
| Power Source | DC voltage supplied from AC/DC Adapter. |
| Power Rating | I/P: 100-240V~, 1.8A, 50-60Hz / O/P: 24.0V --- 5A |
| Products Covered | 1 * Power cable 1 * Adapter: FSP / FSP120-AAAN3 |
| Frequency Range | 13.56 MHz |
| Antenna Designation | LOOP Antenna |
| Max H-field strength | 38.46 dBuV/m |
| Test Model | PartPro120 xP |
| Sample Status | Engineering Sample |
| EUT Modification(s) | N/A |

NOTE:

(1) For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

(2) Channel List:

| Channel | Frequency (MHz) |
|---------|-----------------|
| 01 | 13.56 |

(3) Table for Filed Antenna:

| Ant. | Brand | Model Name | Antenna Type | Connector | Gain (dBi) |
|------|-------|------------|--------------|-----------|------------|
| 1 | N/A | N/A | Coil | N/A | N/A |

2.2 TEST MODES

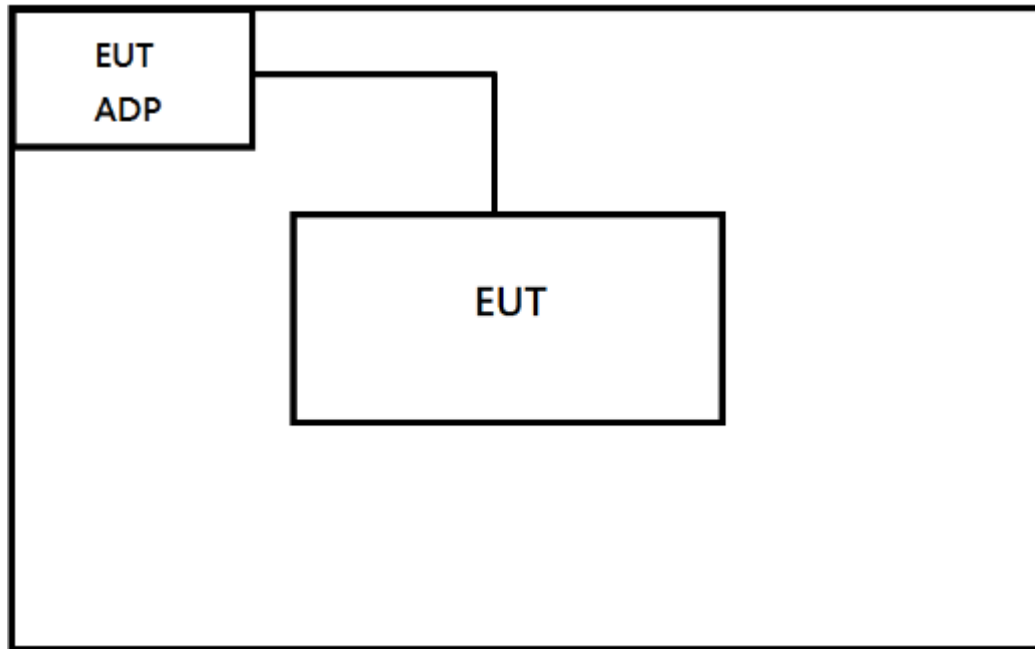
| Test Items | Test mode | Channel | Note |
|---------------------------------------|------------|---------|------|
| AC power line conducted emissions | NFC_Normal | - | - |
| Radiated emissions (9KHz-30MHz) | Transmit | 01 | - |
| Radiated emissions (30MHz TO 1000MHz) | Transmit | 01 | |
| Frequency Stability | Transmit | 01 | - |
| 20 dB Bandwidth | Transmit | 01 | - |

NOTE:

(1) The Radiated emissions test was verified based on the worst conducted power and Bandwidth test results reported in the original report.

2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Equipment letters and Cable numbers refer to item numbers described in the tables of clause 2.4.



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2.4 SUPPORT UNITS

| Item | Equipment | Brand | Model No. | Series No. | Remarks |
|------|-----------|-------|-----------|------------|---------|
| - | - | - | - | - | - |

| Item | Shielded | Ferrite Core | Length | Cable Type | Remarks |
|------|----------|--------------|--------|------------|---------|
| - | - | - | - | - | - |

3 AC POWER LINE CONDUCTED EMISSIONS TEST

3.1 LIMIT

| Frequency (MHz) | Limit (dBμV) | |
|--------------------|--------------|-----------|
| | Quasi-peak | Average |
| 0.15 - 0.5 | 66 - 56 * | 56 - 46 * |
| 0.50 - 5.0 | 56 | 46 |
| 5.0 - 30.0 | 60 | 50 |

NOTE:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.
- (3) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor (if use)
 Margin Level = Measurement Value – Limit Value
 Calculation example:

| Reading Level | | Correct Factor | | Measurement Value |
|---------------|---|----------------|---|-------------------|
| 38.22 | + | 3.45 | = | 41.67 |

| Measurement Value | | Limit Value | | Margin Level |
|-------------------|---|-------------|---|--------------|
| 41.67 | - | 60 | = | -18.33 |

The following table is the setting of the receiver.

| Receiver Parameter | Setting |
|--------------------|----------|
| Attenuation | 10 dB |
| Start Frequency | 0.15 MHz |
| Stop Frequency | 30 MHz |
| IF Bandwidth | 9 KHz |

3.2 TEST PROCEDURE

- a. The EUT was placed 0.8 m above the horizontal ground plane with the EUT being connected to the power mains through a line impedance stabilization network (LISN).
 All other support equipment were powered from an additional LISN(s).
 The LISN provides 50 Ohm/50uH of impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle to keep the cable above 40 cm.
- c. Excess I/O cables that are not connected to a peripheral shall be bundled in the center.
 The end of the cable will be terminated, using the correct terminating impedance.
 The overall length shall not exceed 1 m.
- d. The LISN is spaced at least 80 cm from the nearest part of the EUT chassis.
- e. For the actual test configuration, please refer to the related Item - EUT TEST PHOTO.

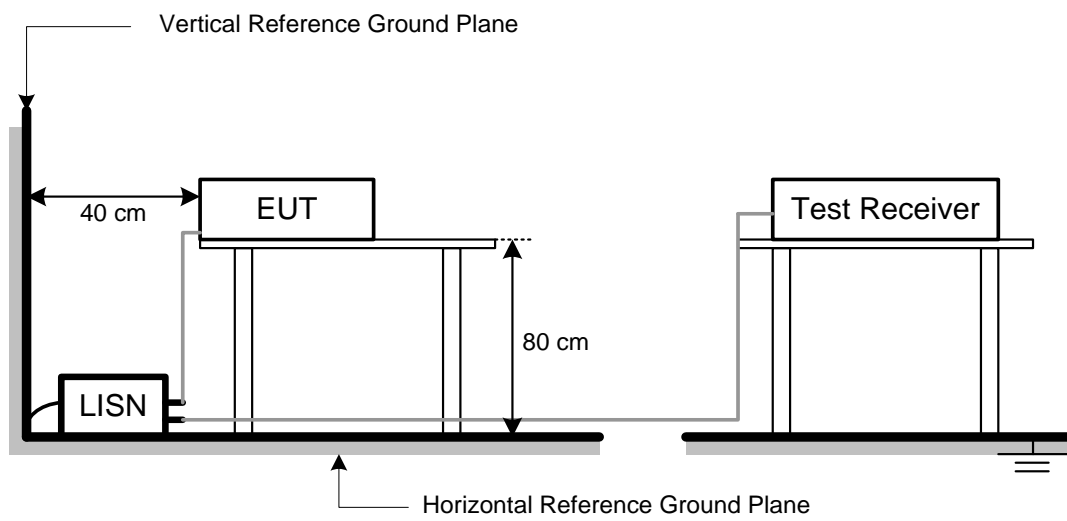
NOTE:

- (1) In the results, each reading is marked as Peak, QP or AVG per the detector used.
 BW=9 kHz (6 dB Bandwidth)
- (2) All readings are Peak unless otherwise stated QP or AVG in column of Note. Both the QP and the AVG readings must be less than the limit for compliance.

3.3 DEVIATION FROM TEST STANDARD

No deviation.

3.4 TEST SETUP



3.5 TEST RESULT

Please refer to the APPENDIX A.

4 RADIATED EMISSIONS TEST

4.1 LIMIT

| FCC Part 15.209 | | | | |
|------------------------------------|---------------------------|------|--|-------------------------|
| Frequency (MHz) | Field Strength Limitation | | Field Strength Limitation at 3m Measurement Dist | |
| | (uV/m) | Dist | (uV/m) | (dBuV/m) |
| 0.009 – 0.490 | 2400 / F(KHz) | 300m | 10000 * 2400/F(KHz) | 20log 2400/F(KHz) + 80 |
| 0.490 – 1.705 | 24000 / F(KHz) | 30m | 100 * 24000/F(KHz) | 20log 24000/F(KHz) + 40 |
| 1.705 – 30.00 | 30 | 30m | 100* 30 | 20log 30 + 40 |
| 30.0 – 88.0 | 100 | 3m | 100 | 20log 100 |
| 88.0 – 216.0 | 150 | 3m | 150 | 20log 150 |
| 216.0 – 960.0 | 200 | 3m | 200 | 20log 200 |
| Above 960.0 | 500 | 3m | 500 | 20log 500 |
| FCC Part 15.225(a)/(b)/(c) | | | | |
| Frequency (MHz) | Field Strength Limitation | | Field Strength Limitation at 3m Measurement Dist | |
| | (uV/m) | Dist | (uV/m) | (dBuV/m) |
| 13.553 – 13.567 | 15,848 | 30 m | 15,848*100 | 124 |
| 13.567 – 13.710 | 334 | 30 m | 334*100 | 90.5 |
| 13.110 – 13.410 13.710 – 14.010 | 106 | 30 m | 106*100 | 80.5 |

NOTE:

- (1) The tighter limit shall apply at the boundary between two frequency range.
- (2) Limitation expressed in dBuV/m is calculated by 20log Emission Level (uV/m).
- (3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of $L_{d1} = L_{d2} * (d_2/d_1)^2$.
Example:
F.S Limit at 30m distance is 30uV/m , then F.S Limitation at 3m distance is adjusted as $L_{d1} = L_1 = 30uV/m * (10)^2 = 100 * 30 uV/m$
- (4) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
Margin Level = Measurement Value – Limit Value

4.2 TEST PROCEDURE

- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz).
- The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

NOTE: (FCC PART 15.209)

- Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode with Detector BW=120 kHz.
- All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.

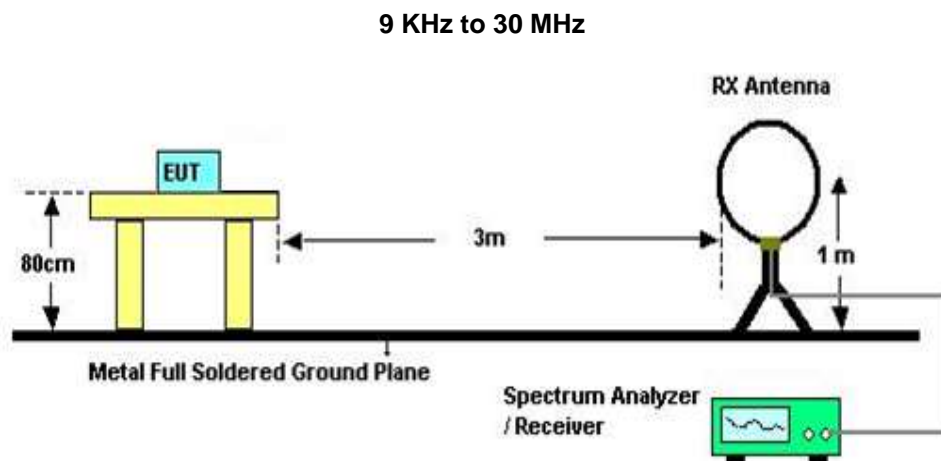
NOTE: (FCC PART 15.225)

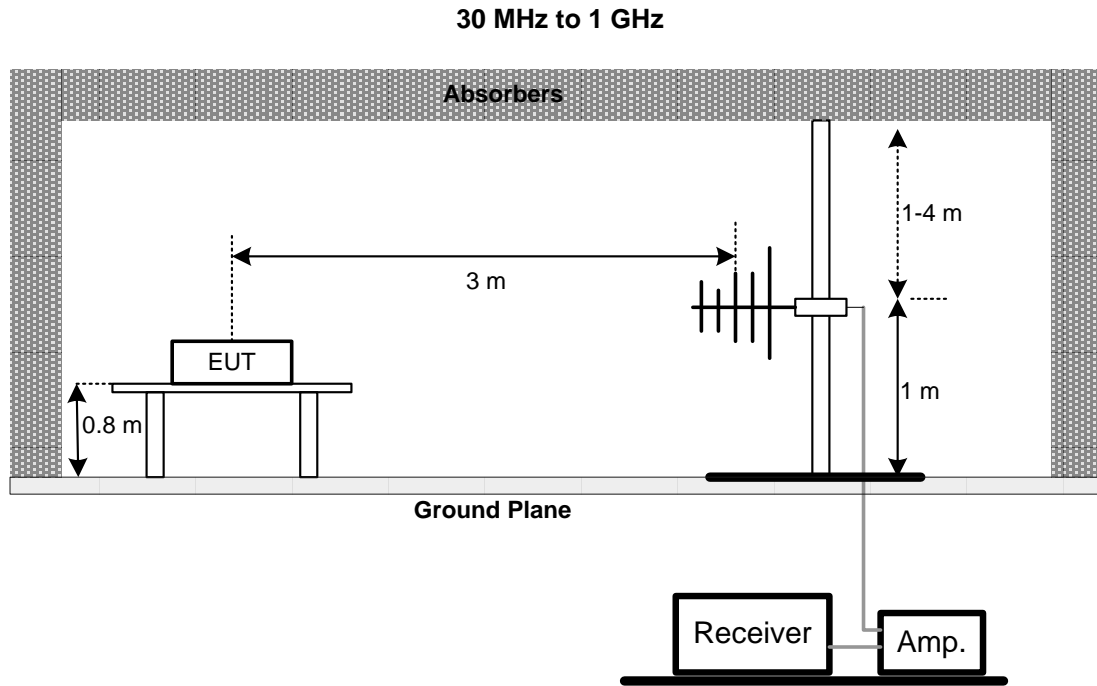
- Spectrum Setting:
9 KHz – 150 KHz, RBW= 200Hz, VBW=200Hz, Sweep time = 200 ms.
150 K Hz – 30 MHz, RBW= 10 KHz, VBW=10 KHz, Sweep time = 200 ms.
30 MHz – 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
- All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- The Log-Bicon Antenna will use to test frequency range from 30MHz to 1000MHz and the Loop Antenna will use to test frequency below 30MHz.

4.3 DEVIATION FROM TEST STANDARD

No deviation.

4.4 TEST SETUP





4.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

4.6 TEST RESULT – 9 KHZ TO 30 MHZ– FCC PART 15.209

Please refer to the APPENDIX B

4.7 TEST RESULT – 30 MHZ TO 1 GHZ – FCC PART 15.209

Please refer to the APPENDIX C.

4.8 TEST RESULT – FCC PART 15.225

Please refer to the APPENDIX D.

NOTE:

- (1) No limit: This is fundamental signal, the judgment is not applicable.
For fundamental signal judgment was referred to Peak output test.

5 FREQUENCY STABILITY

5.1 LIMIT

FCC Part 15.225(e)

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.

5.2 TEST PROCEDURE

- a. 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.
- b. 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.

5.3 DEVIATION FROM TEST STANDARD

No deviation.

5.4 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

5.5 TEST RESULT

Please refer to the APPENDIX E.

6 20 DB BANDWIDTH

6.1 LIMIT

FCC Part 15.215(c)

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, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

6.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 1 kHz, VBW=1 kHz, Sweep time = 20 ms.

6.3 DEVIATION FROM TEST STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

6.6 TEST RESULT

Please refer to the APPENDIX F.

7 LIST OF MEASURING EQUIPMENTS

| AC Power Line Conducted Emissions | | | | | | |
|-----------------------------------|----------------------|--------------|-------------------------|------------|-----------------|------------------|
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated Date | Calibrated Until |
| 1 | TWO-LINE V-NETWORK | R&S | ENV216 | 101050 | 2019/3/18 | 2020/3/17 |
| 2 | Test Cable | EMCI | EMCCFD300-BM-BMR-6000 | 170715 | 2019/8/7 | 2020/8/6 |
| 3 | EMI Test Receiver | R&S | ESCI | 100080 | 2019/6/14 | 2020/6/13 |
| 4 | Measurement Software | EZ | EZ EMC (Version NB-03A) | N/A | N/A | N/A |

| Radiated Emissions | | | | | | |
|--------------------|--------------------------|--------------|-------------------|------------|-----------------|------------------|
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated Date | Calibrated Until |
| 1 | Preamplifier | EMCI | EMC001340 | 980555 | 2019/4/12 | 2020/4/11 |
| 2 | Preamplifier | EMCI | EMC02325B | 980217 | 2019/4/12 | 2020/4/11 |
| 3 | Test Cable | EMCI | EMC104-SM-SM-800 | 150207 | 2019/4/12 | 2020/4/11 |
| 4 | Test Cable | EMCI | EMC104-SM-SM-3000 | 151205 | 2019/4/12 | 2020/4/11 |
| 5 | Test Cable | EMCI | EMC-SM-SM-7000 | 180408 | 2019/4/12 | 2020/4/11 |
| 6 | MXE EMI Receiver | Agilent | N9038A | MY55420127 | 2019/3/26 | 2020/3/25 |
| 7 | Loop Ant | EMCO | EMCI-LPA600 | 274 | 2019/5/31 | 2020/5/30 |
| 8 | Trilog-Broadband Antenna | Schwarzbeck | VULB 9168 | 000992 | 2019/5/29 | 2020/5/28 |
| 9 | 5dB Attenuator | EMCI | EMCI-N-6-05 | AT-N0508 | 2019/5/29 | 2020/5/28 |

| Frequency Stability Measurement | | | | | | |
|---------------------------------|-------------------|--------------|------------|---------------|-----------------|------------------|
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated Date | Calibrated Until |
| 1 | Spectrum Analyzer | R&S | FSP40 | 100129 | 2019/5/23 | 2020/5/22 |
| 2 | Thermal Chamber | HOLINK | H-TH-2SP-B | H1/EK04101902 | 2019/7/26 | 2020/7/25 |

| 20 dB Bandwidth Measurement | | | | | | |
|-----------------------------|-------------------|--------------|----------|------------|-----------------|------------------|
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated Date | Calibrated Until |
| 1 | Spectrum Analyzer | R&S | FSP40 | 100129 | 2019/5/23 | 2020/5/22 |

Remark: "N/A" denotes no model name, no serial no. or no calibration specified.
All calibration period of equipment list is one year.

8 EUT TEST PHOTO

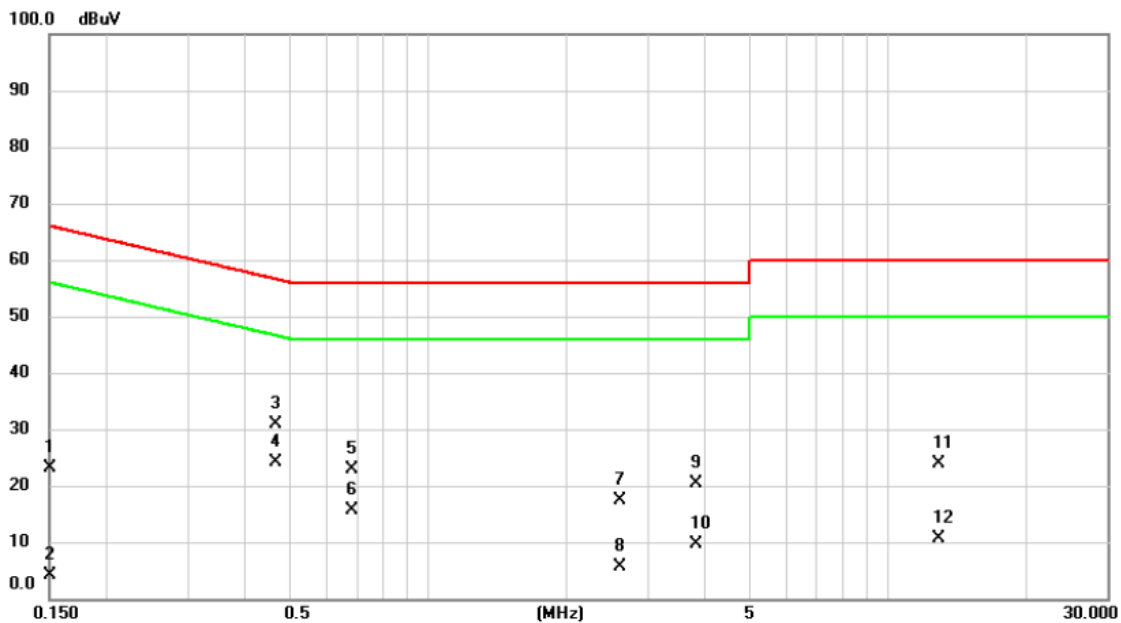
Please refer to document Appendix No.: TP-1911T047-FCCP-2 (APPENDIX-TEST PHOTOS).

9 EUT PHOTOS

Please refer to document Appendix No.: EP-1911T047-1 (APPENDIX-EUT PHOTOS).

APPENDIX A AC POWER LINE CONDUCTED EMISSIONS

| | | | |
|--------------|--------------|-------------|-----------|
| Test Mode | NFC_Normal | Tested Date | 2019/12/4 |
| Test Voltage | AC 120V/60Hz | Phase | Line |

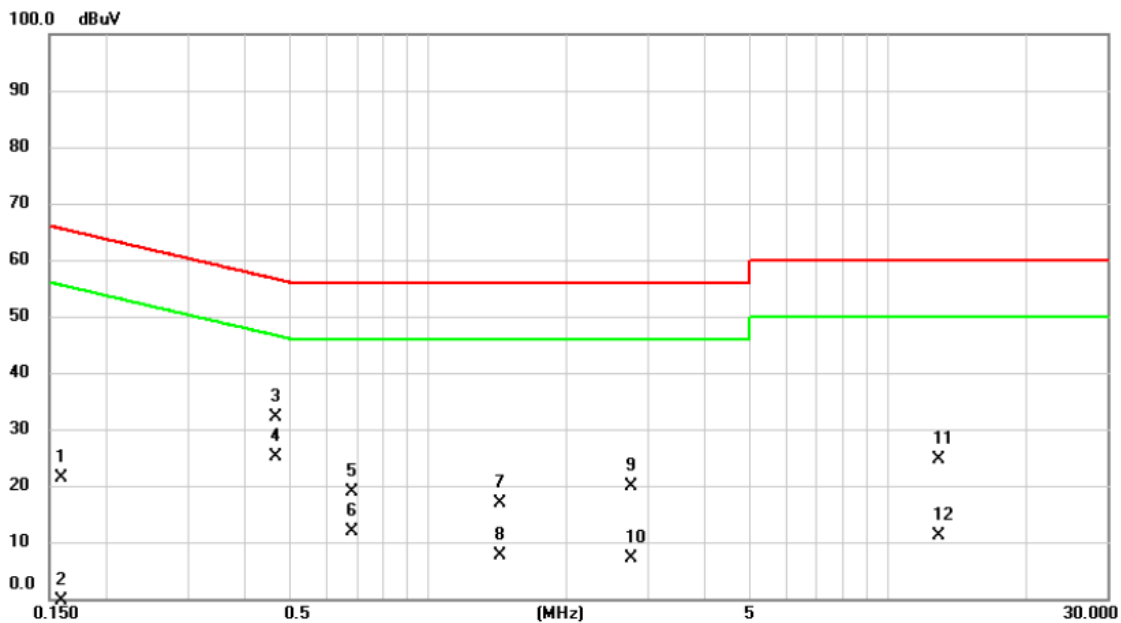


| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV | Limit dBuV | Over dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1 | | 0.1500 | 23.09 | 0.00 | 23.09 | 66.00 | -42.91 | QP | |
| 2 | | 0.1500 | 4.08 | 0.00 | 4.08 | 56.00 | -51.92 | AVG | |
| 3 | | 0.4650 | 30.93 | 0.06 | 30.99 | 56.60 | -25.61 | QP | |
| 4 | * | 0.4650 | 23.99 | 0.06 | 24.05 | 46.60 | -22.55 | AVG | |
| 5 | | 0.6810 | 22.73 | 0.08 | 22.81 | 56.00 | -33.19 | QP | |
| 6 | | 0.6810 | 15.51 | 0.08 | 15.59 | 46.00 | -30.41 | AVG | |
| 7 | | 2.6137 | 17.19 | 0.11 | 17.30 | 56.00 | -38.70 | QP | |
| 8 | | 2.6137 | 5.61 | 0.11 | 5.72 | 46.00 | -40.28 | AVG | |
| 9 | | 3.8310 | 20.29 | 0.13 | 20.42 | 56.00 | -35.58 | QP | |
| 10 | | 3.8310 | 9.40 | 0.13 | 9.53 | 46.00 | -36.47 | AVG | |
| 11 | | 12.9232 | 23.62 | 0.24 | 23.86 | 60.00 | -36.14 | QP | |
| 12 | | 12.9232 | 10.27 | 0.24 | 10.51 | 50.00 | -39.49 | AVG | |

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

| | | | |
|--------------|--------------|-------------|-----------|
| Test Mode | NFC_Normal | Tested Date | 2019/12/4 |
| Test Voltage | AC 120V/60Hz | Phase | Neutral |



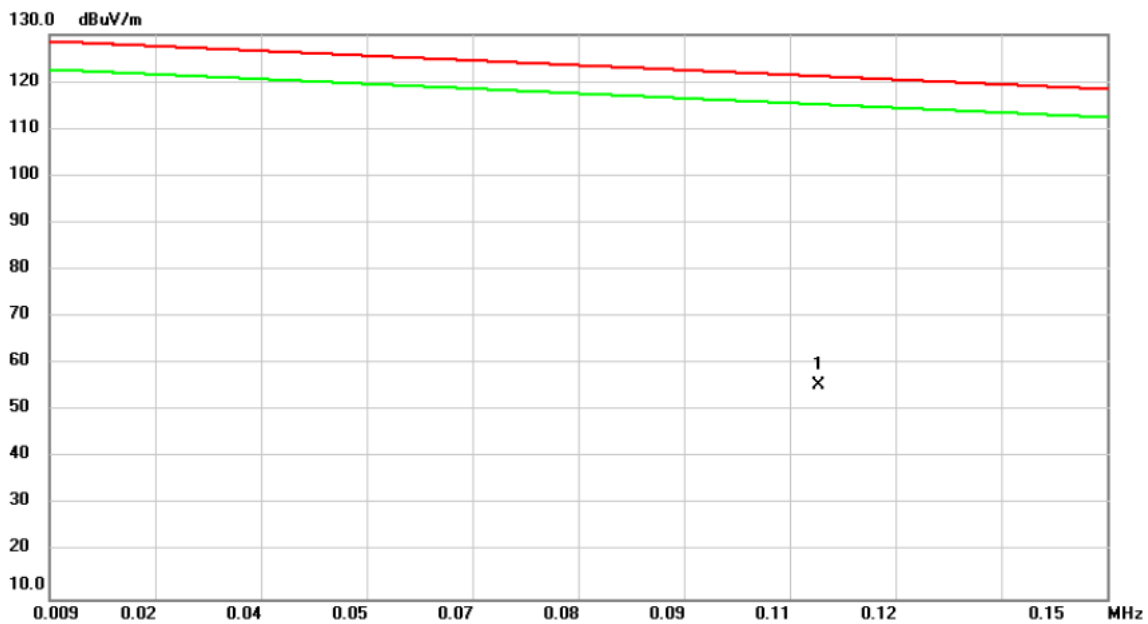
| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV | Limit dBuV | Over dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1 | | 0.1590 | 21.40 | 0.00 | 21.40 | 65.52 | -44.12 | QP | |
| 2 | | 0.1590 | -0.36 | 0.00 | -0.36 | 55.52 | -55.88 | AVG | |
| 3 | | 0.4650 | 31.99 | 0.06 | 32.05 | 56.60 | -24.55 | QP | |
| 4 | * | 0.4650 | 24.98 | 0.06 | 25.04 | 46.60 | -21.56 | AVG | |
| 5 | | 0.6810 | 18.91 | 0.08 | 18.99 | 56.00 | -37.01 | QP | |
| 6 | | 0.6810 | 11.76 | 0.08 | 11.84 | 46.00 | -34.16 | AVG | |
| 7 | | 1.4325 | 16.75 | 0.08 | 16.83 | 56.00 | -39.17 | QP | |
| 8 | | 1.4325 | 7.56 | 0.08 | 7.64 | 46.00 | -38.36 | AVG | |
| 9 | | 2.7578 | 19.75 | 0.11 | 19.86 | 56.00 | -36.14 | QP | |
| 10 | | 2.7578 | 6.95 | 0.11 | 7.06 | 46.00 | -38.94 | AVG | |
| 11 | | 12.9233 | 24.29 | 0.24 | 24.53 | 60.00 | -35.47 | QP | |
| 12 | | 12.9233 | 10.86 | 0.24 | 11.10 | 50.00 | -38.90 | AVG | |

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

APPENDIX B RADIATED EMISSIONS - 9 KHZ TO 30 MHZ

| | | | |
|--------------|-------------------|---------------|------------|
| Test Mode | Transmit 13.56MHz | Tested Date | 2019/12/23 |
| Test Voltage | AC 120V/60Hz | Azimuth Angle | 90° |

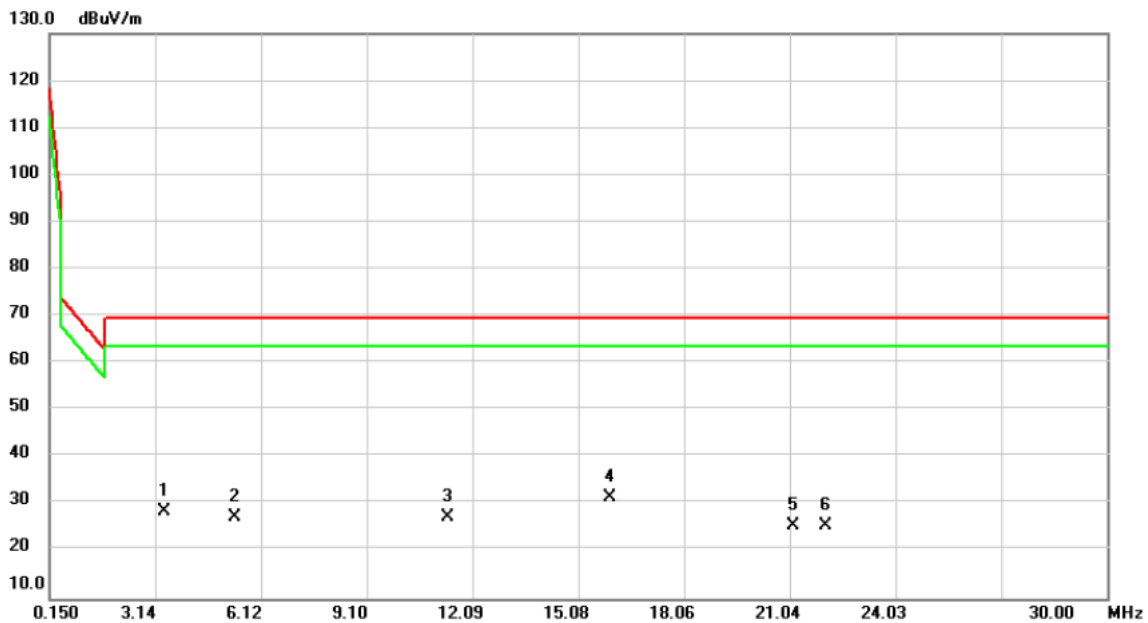


| No. | Mk. | Freq. | Reading Level | Correct Factor | Measurement | Limit | Margin | | |
|-----|-----|--------|---------------|----------------|-------------|--------|--------|----------|---------|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | * | 0.1115 | 39.62 | 15.94 | 55.56 | 121.12 | -65.56 | AVG | |

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

| | | | |
|--------------|-------------------|---------------|------------|
| Test Mode | Transmit 13.56MHz | Tested Date | 2019/12/23 |
| Test Voltage | AC 120V/60Hz | Azimuth Angle | 90° |

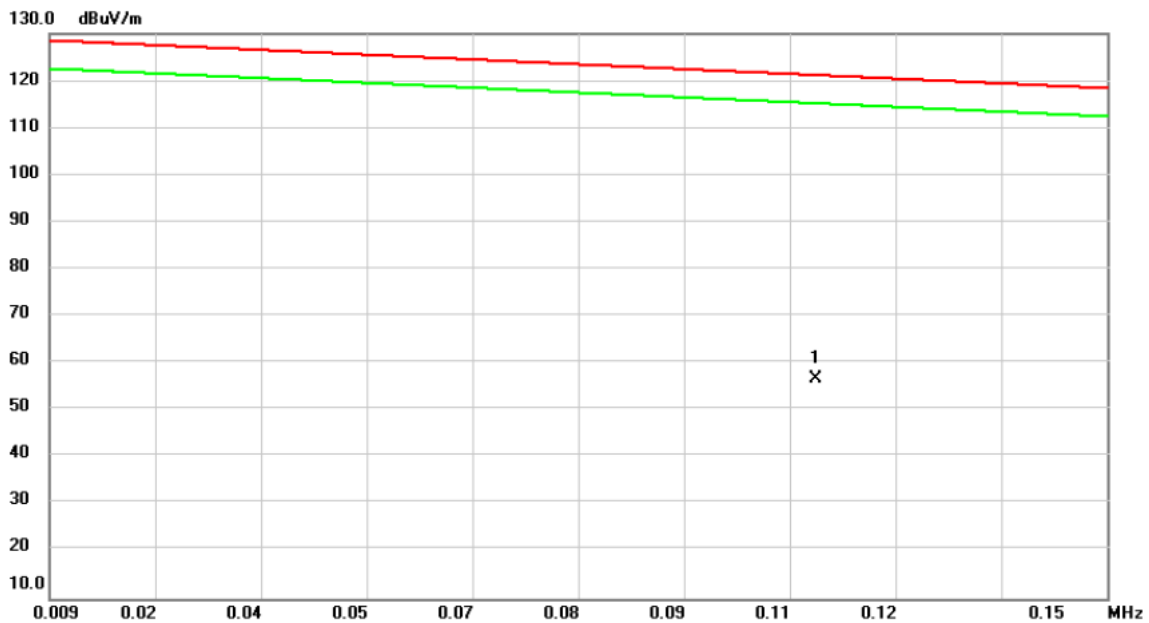


| No. Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dBuV/m | Margin dB | Detector | Comment |
|---------|--------------|--------------------------|-------------------------|----------------------------|-----------------|--------------|----------|---------|
| 1 | 3.4036 | 31.75 | -3.20 | 28.55 | 69.54 | -40.99 | QP | |
| 2 | 5.3738 | 30.81 | -3.57 | 27.24 | 69.54 | -42.30 | QP | |
| 3 | 11.3736 | 31.48 | -4.08 | 27.40 | 69.54 | -42.14 | QP | |
| 4 * | 15.9705 | 35.79 | -4.28 | 31.51 | 69.54 | -38.03 | QP | |
| 5 | 21.1345 | 30.63 | -5.25 | 25.38 | 69.54 | -44.16 | QP | |
| 6 | 22.0600 | 30.74 | -5.39 | 25.35 | 69.54 | -44.19 | QP | |

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

| | | | |
|--------------|-------------------|---------------|------------|
| Test Mode | Transmit 13.56MHz | Tested Date | 2019/12/23 |
| Test Voltage | AC 120V/60Hz | Azimuth Angle | 0° |

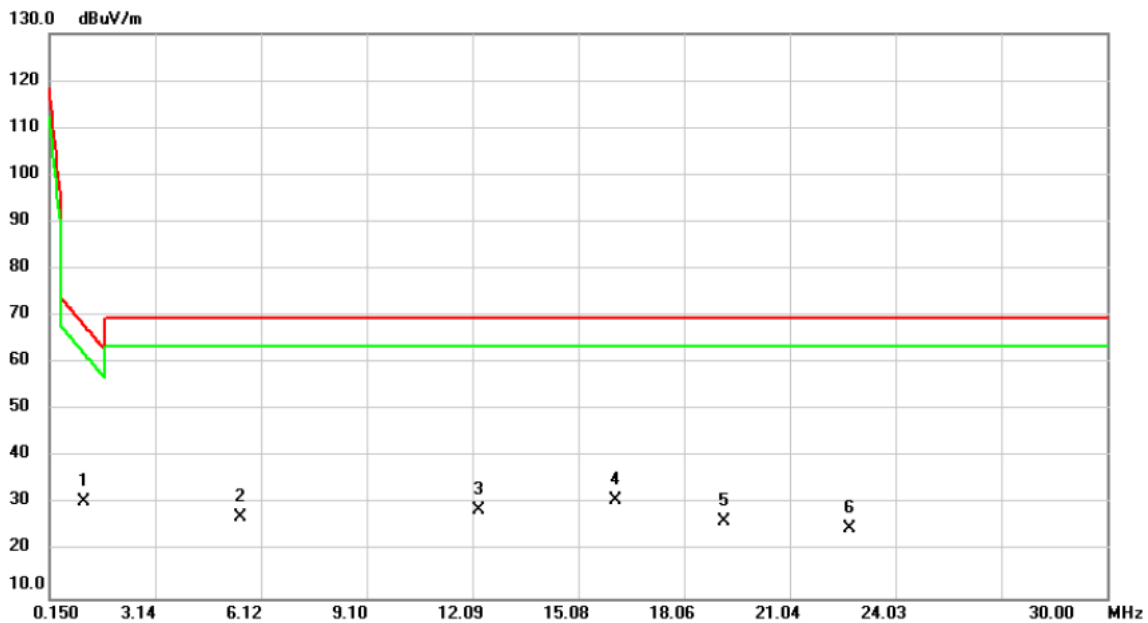


| No. | Mk. | Freq. | Reading Level | Correct Factor | Measurement | Limit | Margin | | |
|-----|-----|--------|---------------|----------------|-------------|--------|--------|----------|---------|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | * | 0.1111 | 40.66 | 15.97 | 56.63 | 121.15 | -64.52 | AVG | |

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

| | | | |
|--------------|-------------------|---------------|------------|
| Test Mode | Transmit 13.56MHz | Tested Date | 2019/12/23 |
| Test Voltage | AC 120V/60Hz | Azimuth Angle | 0° |



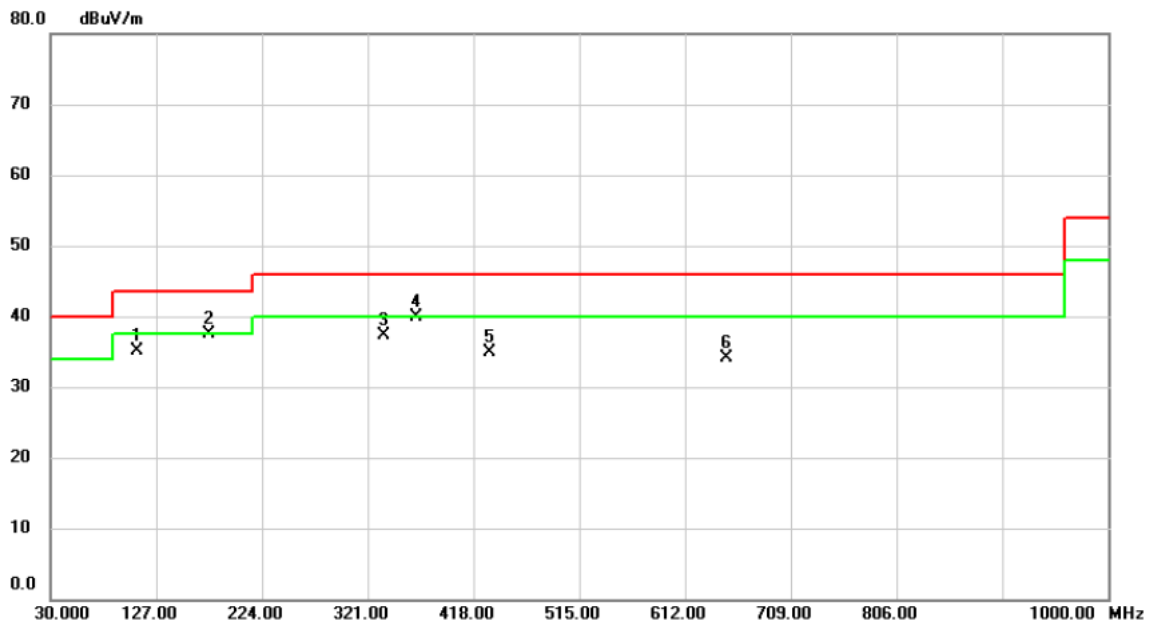
| No. Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measurement dBuV/m | Limit dBuV/m | Margin dB | Detector | Comment |
|---------|-----------|--------------------|-------------------|--------------------|--------------|-----------|----------|---------|
| 1 * | 1.1350 | 30.57 | -0.14 | 30.43 | 68.05 | -37.62 | QP | |
| 2 | 5.5530 | 30.79 | -3.57 | 27.22 | 69.54 | -42.32 | QP | |
| 3 | 12.2691 | 32.75 | -4.03 | 28.72 | 69.54 | -40.82 | QP | |
| 4 | 16.1197 | 35.20 | -4.34 | 30.86 | 69.54 | -38.68 | QP | |
| 5 | 19.1943 | 31.51 | -5.20 | 26.31 | 69.54 | -43.23 | QP | |
| 6 | 22.7463 | 30.52 | -5.81 | 24.71 | 69.54 | -44.83 | QP | |

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

APPENDIX C RADIATED EMISSIONS - 30 MHZ TO 1 GHZ

| | | | |
|--------------|-------------------|--------------|------------|
| Test Mode | Transmit 13.56MHz | Tested Date | 2019/12/20 |
| Test Voltage | AC 120V/60Hz | Polarization | Vertical |

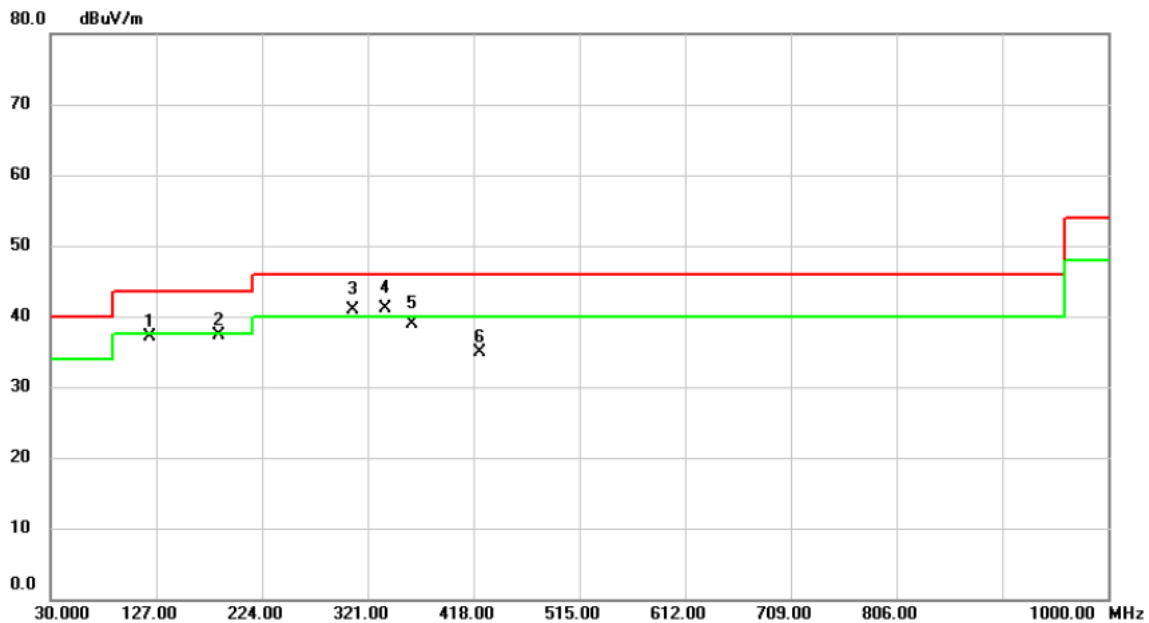


| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dBuV/m | Margin dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|--------------|----------|---------|
| 1 | | 109.6000 | 49.79 | -14.69 | 35.10 | 43.50 | -8.40 | peak | |
| 2 | * | 175.6600 | 49.73 | -12.30 | 37.43 | 43.50 | -6.07 | peak | |
| 3 | | 335.8000 | 47.09 | -9.78 | 37.31 | 46.00 | -8.69 | peak | |
| 4 | | 366.1300 | 48.83 | -8.98 | 39.85 | 46.00 | -6.15 | peak | |
| 5 | | 432.7100 | 41.98 | -7.09 | 34.89 | 46.00 | -11.11 | peak | |
| 6 | | 649.6400 | 37.11 | -3.06 | 34.05 | 46.00 | -11.95 | peak | |

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

| | | | |
|--------------|-------------------|--------------|------------|
| Test Mode | Transmit 13.56MHz | Tested Date | 2019/12/20 |
| Test Voltage | AC 120V/60Hz | Polarization | Horizontal |



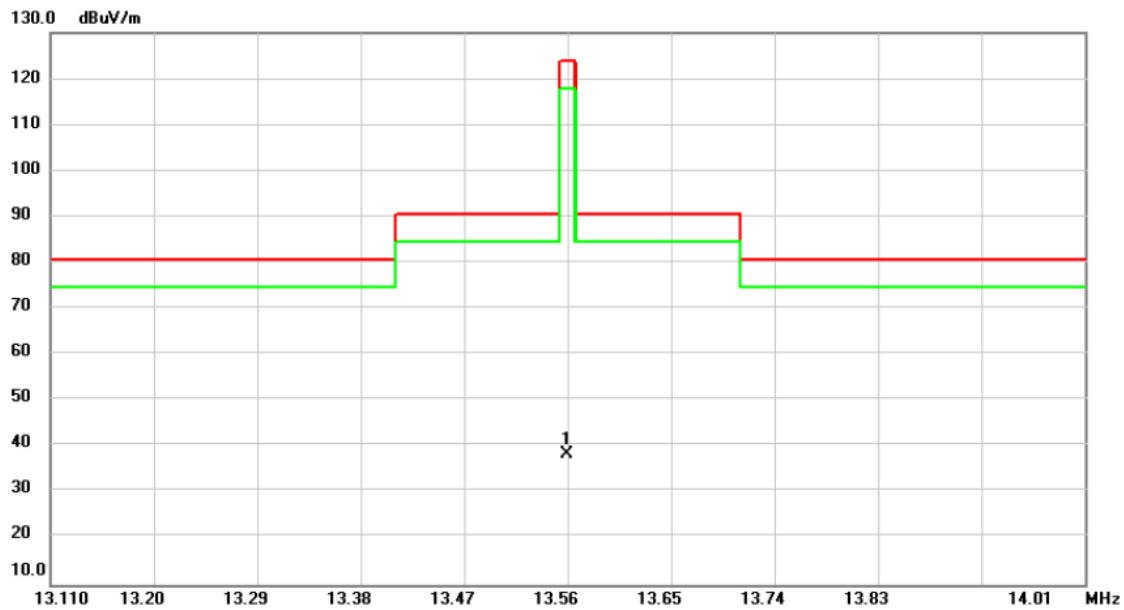
| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dBuV/m | Margin dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|--------------|----------|---------|
| 1 | | 121.1800 | 50.69 | -13.52 | 37.17 | 43.50 | -6.33 | peak | |
| 2 | | 184.1200 | 50.47 | -13.20 | 37.27 | 43.50 | -6.23 | peak | |
| 3 | ! | 307.9800 | 51.43 | -10.51 | 40.92 | 46.00 | -5.08 | QP | |
| 4 | * | 337.2200 | 50.97 | -9.80 | 41.17 | 46.00 | -4.83 | QP | |
| 5 | | 361.5900 | 48.11 | -9.15 | 38.96 | 46.00 | -7.04 | QP | |
| 6 | | 423.9900 | 42.05 | -7.09 | 34.96 | 46.00 | -11.04 | peak | |

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

APPENDIX D RADIATED EMISSIONS - FCC PART 15.225

| | | | |
|--------------|-------------------|--------------|------------|
| Test Mode | Transmit 13.56MHz | Tested Date | 2019/12/24 |
| Test Voltage | AC 120V/60Hz | Polarization | Vertical |

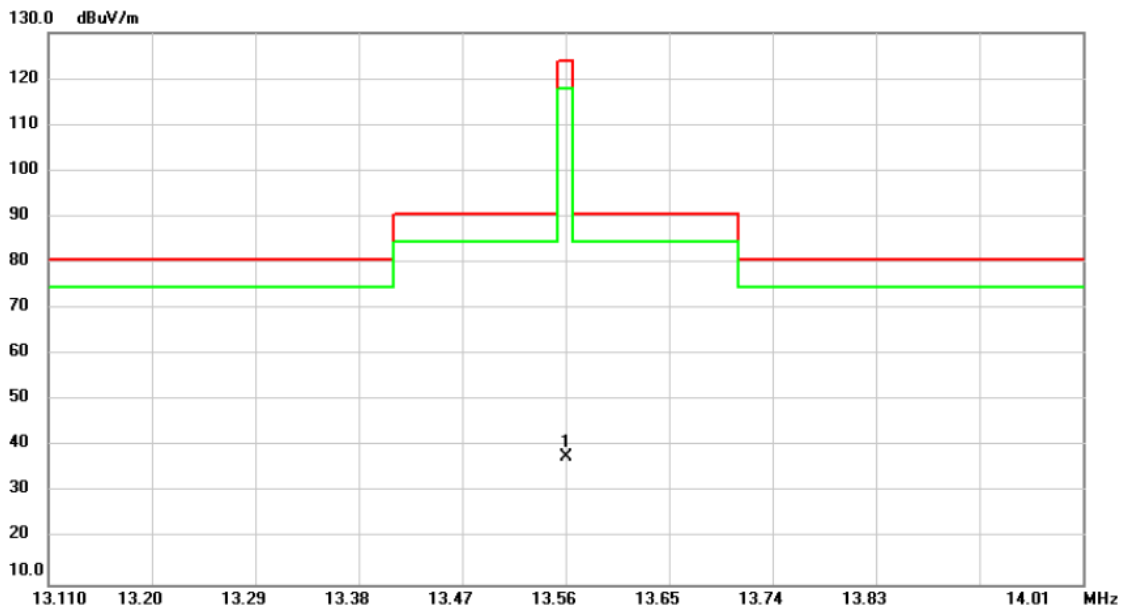


| No. | Mk. | Freq. | Reading Level | Correct Factor | Measurement | Limit | Margin | | |
|-----|-----|---------|---------------|----------------|-------------|--------|--------|----------|---------|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | * | 13.5591 | 42.40 | -3.94 | 38.46 | 123.99 | -85.53 | peak | |

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

| | | | |
|--------------|-------------------|--------------|------------|
| Test Mode | Transmit 13.56MHz | Tested Date | 2019/12/24 |
| Test Voltage | AC 120V/60Hz | Polarization | Horizontal |



| No. | Mk. | Freq. | Reading Level | Correct Factor | Measurement | Limit | Margin | | |
|-----|-----|---------|---------------|----------------|-------------|--------|--------|----------|---------|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | * | 13.5600 | 41.77 | -3.94 | 37.83 | 123.99 | -86.16 | peak | |

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

APPENDIX E FREQUENCY STABILITY MEASUREMENT

| | | | |
|--------------|-------------------|-------------|-----------|
| Test Mode | Transmit 13.56MHz | Tested Date | 2019/12/4 |
| Test Voltage | AC 120V/60Hz | | |

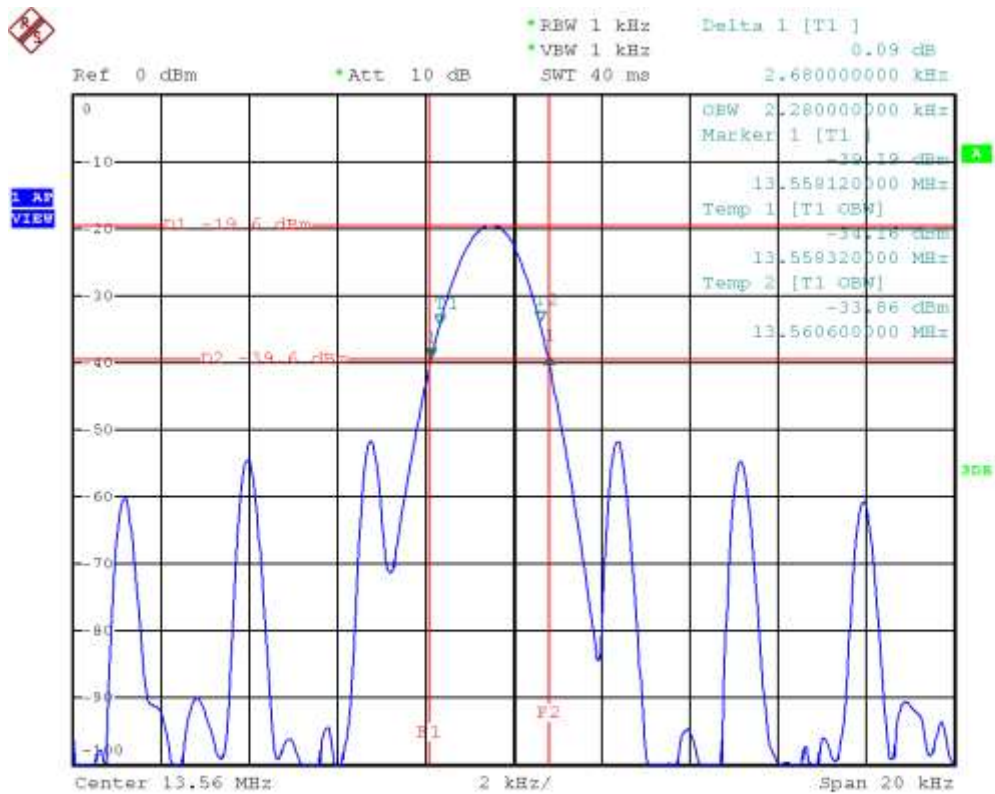
| Condition | | | Frequency Error (ppm) | | | | | | | | | | |
|------------------------------------|-----------------|------------|-----------------------|-----------|-----------|-----------|--------|--------|--------|--------|-------------|--------|--|
| Temperature | Modulation Mode | Test Freq. | 0 min | 2 min | 5 min | 10 min | 0 min | 2 min | 5 min | 10 min | Limit (ppm) | Result | |
| | | | Normal | | | | | | | | | | |
| T _{20°C} V _{max} | CW | 13.56 | 13.559480 | 13.559480 | 13.559480 | 13.559480 | -38.35 | -38.35 | -38.35 | -38.35 | 100 | Pass | |
| T _{20°C} V _{min} | CW | 13.56 | 13.559480 | 13.559480 | 13.559480 | 13.559480 | -38.35 | -38.35 | -38.35 | -38.35 | | Pass | |
| | | | Extreme | | | | | | | | | | |
| T _{85°C} V _{nom} | CW | 13.56 | 13.559480 | 13.559480 | 13.559480 | 13.559480 | -38.35 | -38.35 | -38.35 | -38.35 | 100 | Pass | |
| T _{80°C} V _{nom} | CW | 13.56 | 13.559480 | 13.559480 | 13.559480 | 13.559480 | -38.35 | -38.35 | -38.35 | -38.35 | | Pass | |
| T _{70°C} V _{nom} | CW | 13.56 | 13.559480 | 13.559480 | 13.559480 | 13.559480 | -38.35 | -38.35 | -38.35 | -38.35 | | Pass | |
| T _{60°C} V _{nom} | CW | 13.56 | 13.559480 | 13.559480 | 13.559480 | 13.559480 | -38.35 | -38.35 | -38.35 | -38.35 | | Pass | |
| T _{50°C} V _{nom} | CW | 13.56 | 13.559480 | 13.559480 | 13.559480 | 13.559480 | -38.35 | -38.35 | -38.35 | -38.35 | | Pass | |
| T _{40°C} V _{nom} | CW | 13.56 | 13.559480 | 13.559480 | 13.559480 | 13.559480 | -38.35 | -38.35 | -38.35 | -38.35 | | Pass | |
| T _{30°C} V _{nom} | CW | 13.56 | 13.559480 | 13.559480 | 13.559480 | 13.559480 | -38.35 | -38.35 | -38.35 | -38.35 | | Pass | |
| T _{20°C} V _{nom} | CW | 13.56 | 13.559480 | 13.559480 | 13.559480 | 13.559480 | -38.35 | -38.35 | -38.35 | -38.35 | | Pass | |
| T _{10°C} V _{nom} | CW | 13.56 | 13.559440 | 13.559440 | 13.559440 | 13.559440 | -41.30 | -41.30 | -41.30 | -41.30 | | Pass | |
| T _{0°C} V _{nom} | CW | 13.56 | 13.559440 | 13.559440 | 13.559440 | 13.559440 | -41.30 | -41.30 | -41.30 | -41.30 | | Pass | |

NOTE: 0.01 % = 100 ppm.

APPENDIX F 20 DB BANDWIDTH

| | | | |
|--------------|-------------------|-------------|-----------|
| Test Mode | Transmit 13.56MHz | Tested Date | 2019/12/4 |
| Test Voltage | AC 120V/60Hz | | |

| Frequency (MHz) | 20 dB Bandwidth (kHz) | Operated Frequency Range (MHz) | Designated Frequency Band (MHz) | Result |
|-----------------|-----------------------|--------------------------------|---------------------------------|----------|
| 13.56 | 2.64 | 0.002 | 0.014 | Complied |



End of Test Report