

FCC Radio Test Report

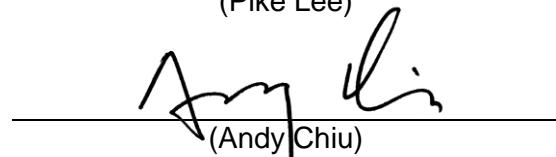
FCC ID: 2ATZF-PH4404XXA

Project No. : 1905T002
Equipment : 4-Port RJ45 and 4-Port RJ11 Connectors PanL Hub
Test Model : PH440700A
Series Model : PH440400A, PH440500A, PH440600A
Applicant : Bridgetek Pte. Ltd.
Address : 178 Paya Lebar Road, #07-03 Singapore 409030

Date of Receipt : 2019/5/23
Date of Test : 2019/5/23 ~ 2019/8/19
Issued Date : 2019/11/13
Tested by : BTL Inc.

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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 | 2019/10/23 |
| R01 | Revised report to address TCB's comments. | 2019/11/13 |

1. CERTIFICATION

Equipment : 4-Port RJ45 and 4-Port RJ11 Connectors PanL Hub
Brand Name : Bridgetek, PanL
Test Model : PH440700A
Series Model : PH440400A, PH440500A, PH440600A
Applicant : Bridgetek Pte. Ltd.
Manufacturer : Bridgetek Pte. Ltd.
Address : 178 Paya Lebar Road, #07-03 Singapore 409030
Factory : Bridgetek Pte. Ltd.
Address : 178 Paya Lebar Road, #07-03 Singapore 409030
Date of Test : 2019/5/23 ~ 2019/8/19
Test Sample : Enginnering Sample No.:
Standard(s) : FCC Part15, Subpart C(15.231)
ANSI C63.10-2013

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

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-1-1905T002) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO/IEC 17025 quality assessment standard and technical standard(s).

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

| FCC Part15, Subpart C (15.231) | | | |
|---------------------------------------|----------------------------|----------|--------|
| Standard(s) Section | Test Item | Judgment | Remark |
| 15.207 | Conducted Emission | PASS | |
| 15.209 & 15.231(e) | Radiated Spurious Emission | PASS | |
| 15.231(c) | 20 dB Occupied Bandwidth | PASS | |
| 15.231(e) | Timing Testing | PASS | |

Note:

(1) "N/A" denotes test is not applicable to this device.

2.1 TEST FACILITY

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

C05: (FCC RN:674415; FCC DN:TW0659)
No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)

CB15: (VCCI RN: R-20020; FCC RN:674415; FCC DN:TW0659; ISED Assigned Code:20088-5)
No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)

2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cisp} requirement.

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 %.

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) |
|--------------|--------|-----------------------------|---------------|----------|
| CB15 (3m) | CISPR | 30 MHz ~ 200 MHz | V | 4.20 |
| | | 30 MHz ~ 200 MHz | H | 3.64 |
| | | 200 MHz ~ 1,000 MHz | V | 4.56 |
| | | 200 MHz ~ 1,000 MHz | H | 3.90 |

C. Radiated emissions above 1 GHz test:

| Test Site | Method | Measurement Frequency Range | Ant. H / V | U (dB) |
|--------------|--------|-----------------------------|---------------|----------|
| CB15 (3m) | CISPR | 1 GHz ~ 6 GHz | V | 4.46 |
| | | 1 GHz ~ 6 GHz | H | 4.40 |
| | | 6 GHz ~18 GHz | V | 3.88 |
| | | 6 GHz ~18 GHz | H | 4.00 |

| Test Site | Method | Measurement Frequency Range | U (dB) |
|--------------|--------|-----------------------------|----------|
| CB15 (1m) | CISPR | 18 GHz ~ 26.5 GHz | 4.62 |
| | | 26.5 GHz ~ 40 GHz | 5.12 |

NOTE:

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

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above. These are our U_{lab} values in CISPR 16-4-2 terminology.

Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called U_{CISPR} , as follows:

Conducted Disturbance (mains port) – 150 kHz – 30 MHz : 3.6 dB

Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz – 1000 MHz : 5.2 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

| | |
|---------------------|--|
| Equipment | 4-Port RJ45 and 4-Port RJ11 Connectors PanL Hub |
| Brand Name | Bridgetek, PanL |
| Test Model | PH440700A |
| Series Model | PH440400A, PH440500A, PH440600A |
| Model Difference | Different model distribute to different area. |
| Power Source | DC Voltage supplied from AC/DC adapter. |
| Power Rating | I/P: AC 100-240V~2A, 50/60Hz O/P: DC 24V— 2.5A, 60W Max |
| Products Covered | 1 * Adapter: SSA-0601HE-24 |
| Operation Frequency | 433.92 MHz |
| Modulation Type | OOK |
| Number Of Channel | 1CH, please see note 2. |
| Antenna Designation | Spring Antenna |
| Field Strength | 71.43dBuV/m (AV Max.) |

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 | 433.92 |

3. Table for Filed Antenna:

| Ant. | Brand | Model Name | Antenna Type | Connector | Gain (dBi) |
|------|---|------------|----------------|-----------|------------|
| 1 |  | TT01-2 | Spring Antenna | Pad | 2 |

3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Pretest Mode | Description |
|--------------|------------------|
| Mode 1 | TX CH 433.92 MHz |
| Mode 2 | Normal |

The EUT system operated these modes were found to be the worst case during the pre-scanning test as following:

| For Conducted Emission | |
|------------------------|-------------|
| Final Test Mode | Description |
| Mode 2 | Normal |

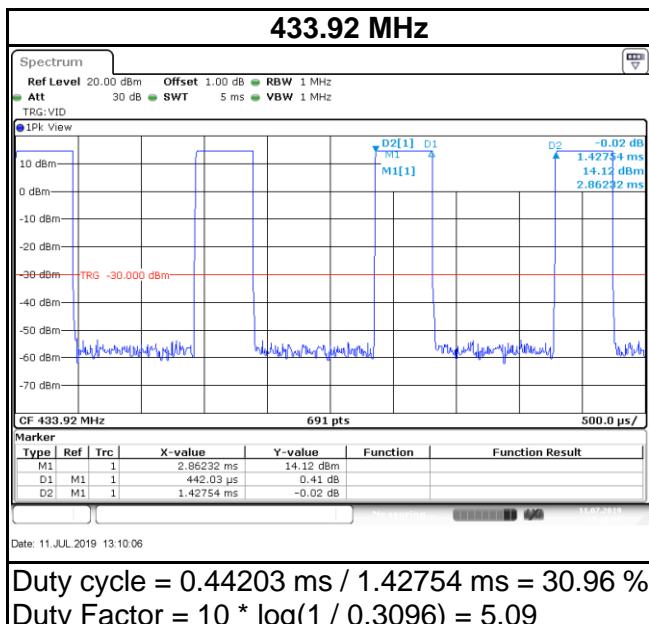
| For Radiated Emission | |
|-----------------------|------------------|
| Final Test Mode | Description |
| Mode 1 | TX CH 433.92 MHz |

Note:

- (1) The EUT is used new battery.
- (2) The EUT is considered a portable unit, it was pre-tested on the positioned of each 3 axis. The worst case was found positioned on Z-plane. Therefore only the test data of this Z-plane was used for radiated emission measurement test.

3.3 DUTY CYCLE

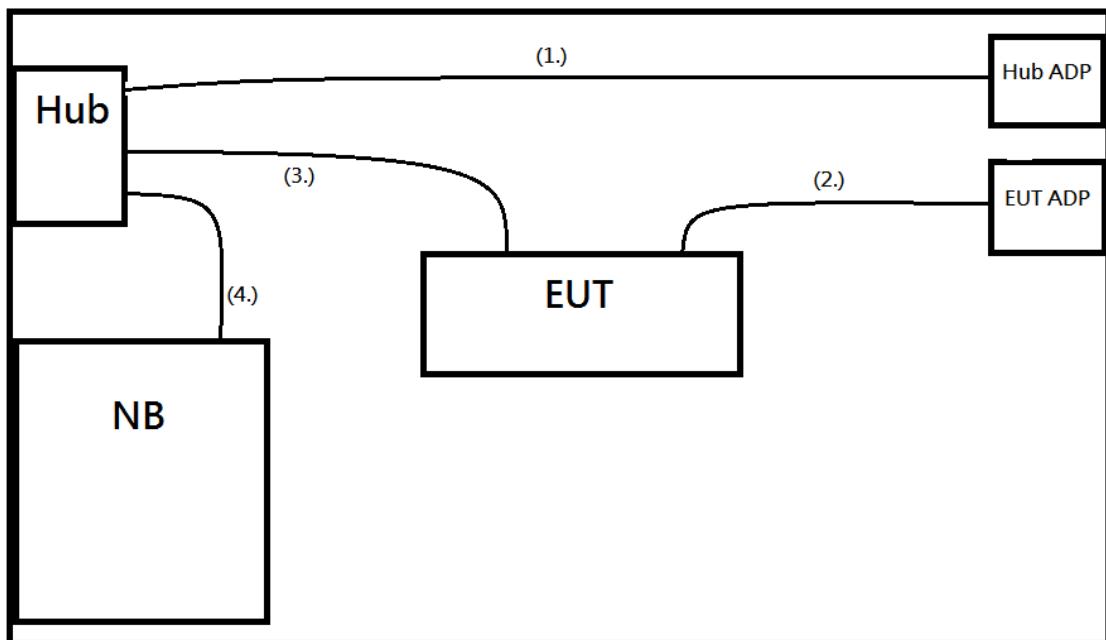
If duty cycle is $\geq 98\%$, duty factor is not required.
 If duty cycle is $< 98\%$, duty factor shall be considered.



NOTE:

For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1 kHz (Duty cycle $< 98\%$).

3.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Item | Equipment | Mfr/Brand | Model/Type No. | FCC ID | Series No. |
|------|-----------|-----------|----------------|--------|--------------|
| - | NB | HP | 240 G5 | NA | NA |
| - | Hub | ASUS | RT-AC66U | NA | D6IAGGPB000C |

| Item | Shielded Type | Ferrite Core | Length | Note |
|------|---------------|--------------|--------|-------------|
| 1 | NO | NO | 1.2 M | Hub Adapter |
| 2 | NO | YES | 1.5 M | EUT Adapter |
| 3 | NO | NO | 45 CM | RJ45 |
| 4 | NO | NO | 45 CM | RJ45 |

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 POWER LINE CONDUCTED EMISSION LIMITS (Frequency Range 150 kHz-30 MHz)

| Frequency of Emission (MHz) | Conducted Limit (dB μ V) | |
|-----------------------------|------------------------------|-----------|
| | Quasi-peak | Average |
| 0.15 - 0.5 | 66 to 56* | 56 to 46* |
| 0.50 - 5.0 | 56 | 46 |
| 5.0 - 30.0 | 60 | 50 |

Note:

(1) The limit of " * " decreases with the logarithm of the frequency

(2) 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

The following table is the setting of the receiver

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

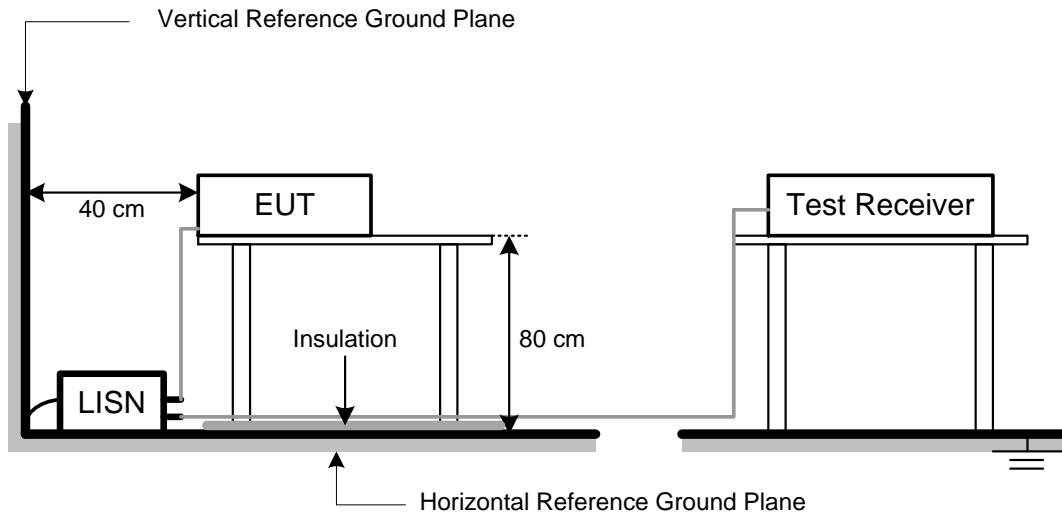
4.1.2 TEST PROCEDURE

- The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the groundplane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

4.1.6 EUT TEST CONDITIONS

Temperature: 25°C

Relative Humidity: 45%

Test Voltage: AC 120V/60Hz

4.1.7 TEST RESULTS

Please refer to the Appendix A.

Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of [†]Note. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a “*” marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150 kHz to 30 MHz.
- (3) “N/A” denotes test is not applicable to this device.

4.2 RADIATED EMISSION MEASUREMENT**4.2.1 FIELD STRENGTH OF FUNDAMENTAL EMISSIONS MEASUREMENT LIMIT**

| Frequency Band (MHz) | Fundamental Emissions Limit(µV/m) at 3m |
|----------------------|---|
| 40.66-40.70 | 1000 |
| 70-130 | 500 |
| 130-174 | 500-1500(**) |
| 174-260 | 1500 |
| 260-470 | 1500-5000(**) |
| Above 470 | 5000 |

**1. Linear interpolations, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

- (1) For the band 130 - 174 MHz, $\mu\text{V/m}$ at 3 meters = $22.72727 \times (\text{operating frequency, MHz}) - 2454.545$.
- (2) For the band 260 - 470 MHz, $\mu\text{V/m}$ at 3 meters = $16.6667 \times (\text{operating frequency, MHz}) - 2833.3333$.

So the field strength of emission limits has been calculated in below table.

| Carrier Frequency (MHz) | Fundamental Emissions Limit(dBuV/m) at 3m |
|-------------------------|---|
| 433.92 MHz | 72.87 (Average) |
| 433.92 MHz | 92.87 (Peak) |

4.2.2 MEASURING INSTRUMENTS AND SETTING (FIELD STRENGTH OF FUNDAMENTAL EMISSIONS)

| | |
|--------------------|-----------------------|
| Receiver Parameter | Setting |
| Attenuation | Auto |
| Center Frequency | Fundamental Frequency |
| RBW | 120 kHz |
| Detector | Peak / Average |

4.2.3 RADIATED EMISSIONS MEASUREMENT

Devices complying with 47 CFR FCC part 15 subpart C, section 15.231(e). The field strength of emissions from intentional radiators at 3 meters operated under this Section shall not exceed the following:

| Frequency Band (MHz) | Spurious Emissions Limit(μ V/m) at 3m |
|----------------------|--|
| 40.66-40.70 | 100 |
| 70-130 | 50 |
| 130-174 | 50-150(**) |
| 174-260 | 150 |
| 260-470 | 150-500(**) |
| Above 470 | 500 |

**1. Linear interpolations, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

- (1) For the band 130 - 174 MHz, μ V/m at 3 meters = $22.72727 \times (\text{operating frequency, MHz}) - 2454.545$.
- (2) For the band 260 - 470 MHz, μ V/m at 3 meters = $16.6667 \times (\text{operating frequency, MHz}) - 2833.333$.
- (3) The maximum permitted unwanted emissions level is 20 dB below the maximum permitted fundamental level. In addition field strength of any emissions which appear inside of the restriction band shall not exceed the general radiated emissions limits in Section 15.209(a).

| Frequencies (MHz) | Field Strength (microvolt/meter) | Measurement Distance (meters) |
|-------------------|----------------------------------|-------------------------------|
| 0.009~0.490 | $2400/F(\text{KHz})$ | 300 |
| 0.490~1.705 | $24000/F(\text{KHz})$ | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

| Receiver Parameter | Setting |
|------------------------|-------------------------------------|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9 kHz~90 kHz for PK/AVG detector |
| Start ~ Stop Frequency | 90 kHz~110 kHz for QP detector |
| Start ~ Stop Frequency | 110 kHz~490 kHz for PK/AVG detector |
| Start ~ Stop Frequency | 490 kHz~30 MHz for QP detector |
| Start ~ Stop Frequency | 30 MHz~1000MHz for QP detector |

| Spectrum Parameter | Setting |
|---------------------------------------|---|
| Attenuation | Auto |
| Start Frequency | 1000 MHz |
| Stop Frequency | 10th carrier harmonic |
| RB / VB (emission in restricted band) | 1 MHz / 1 MHz for Peak, AV Mode with Dwell time |

4.2.5 TEST PROCEDURE

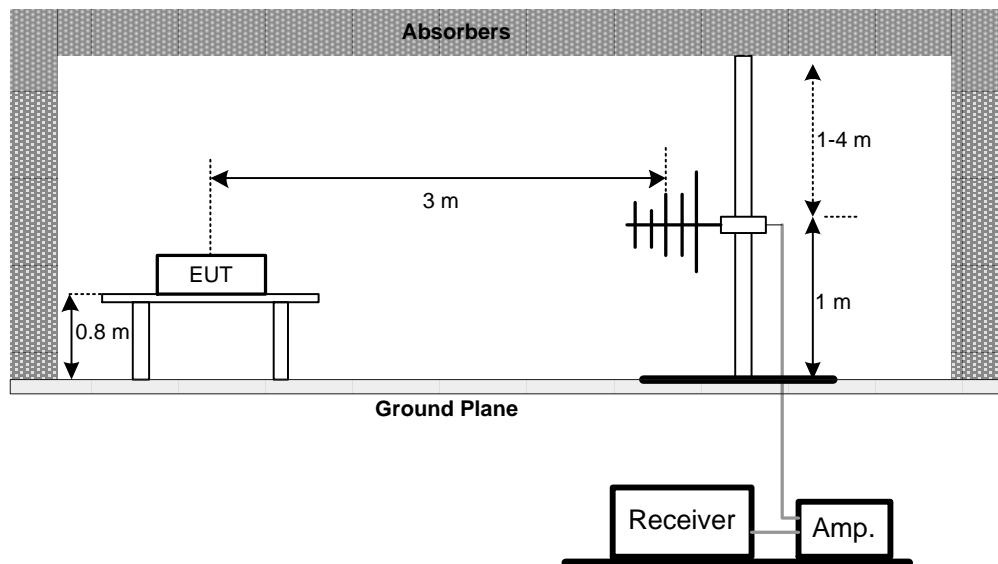
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)
- b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 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.(above 1 GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5 m, 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.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- f. 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.
- g. 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. (below 1 GHz)
- h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1 GHz)
- i. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.6 DEVIATION FROM TEST STANDARD

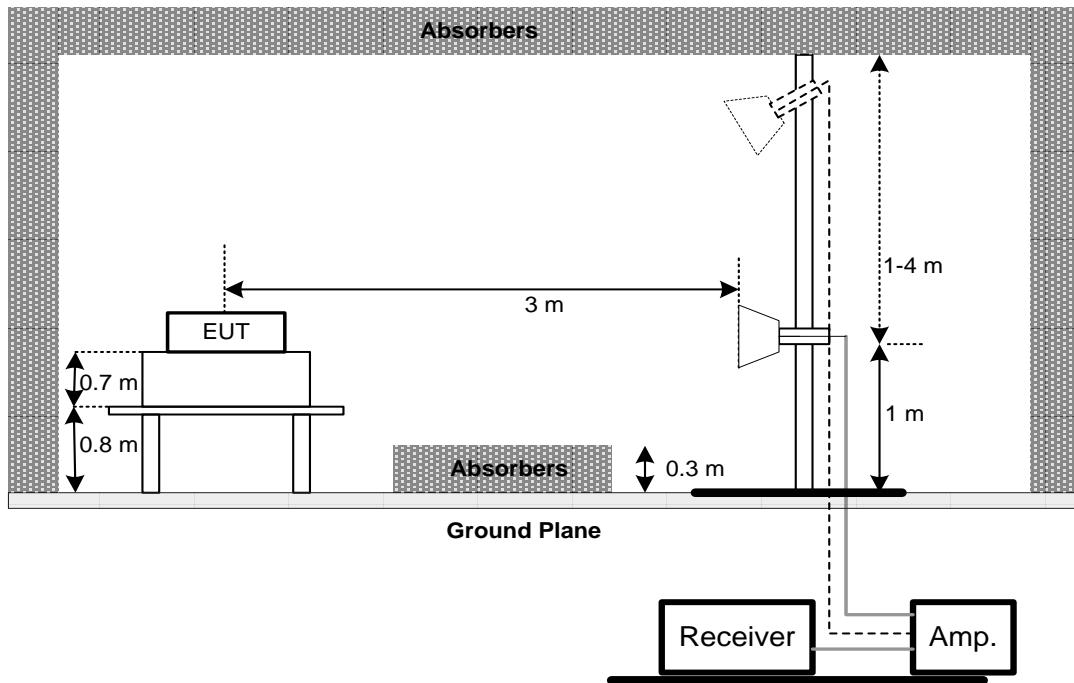
No deviation

4.2.7 TEST SETUP

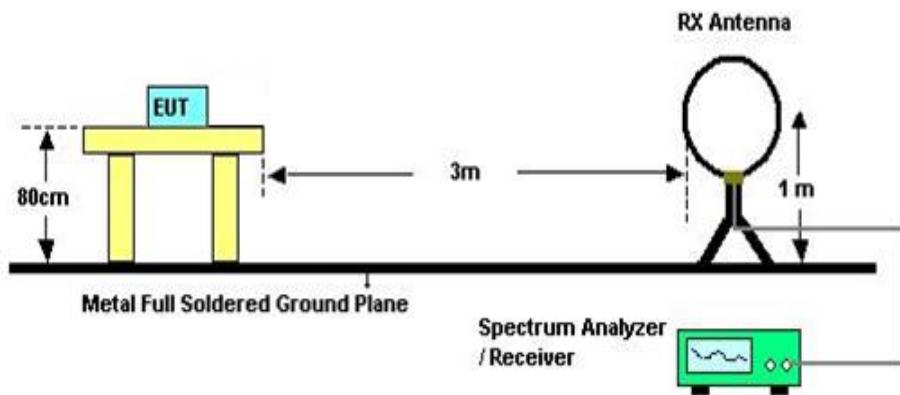
(A) Radiated Emission Test Set-Up Frequency 30 MHz-1000 MHz



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



(C) For Radiated Emissions 9 kHz-30 MHz



4.2.8 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

4.2.9 EUT TEST CONDITIONS

Temperature: 23°C

Relative Humidity: 70%

Test Voltage: AC 120V/60z

4.2.10 TEST RESULTS (9 kHz to 30 MHz)

Please refer to the Appendix B.

Remark:

- (1) The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
- (2) Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB).
- (3) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.2.11 TEST RESULTS (30 MHz to 1000 MHz)

Please refer to the Appendix C.

Remark:

- (1) Radiated emissions measured in frequency range above 1000 MHz were made with an instrument using Peak detector mode and AV detector mode of the emission.
- (2) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (3) EUT Orthogonal Axis:
“X” - denotes Laid on Table; “Y” - denotes Vertical Stand; “Z” - denotes Side Stand.
- (4) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna.

4.2.12 TEST RESULTS (Above 1000 MHz)

Please refer to the Appendix D.

Remark:

- (1) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission.
- (2) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (3) EUT Orthogonal Axis:
“X” - denotes Laid on Table; “Y” - denotes Vertical Stand; “Z” - denotes Side Stand.
- (4) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna.

5. 20 dB SPECTRUM BANDWIDTH MEASUREMENT

Limit

The bandwidth of the emissions shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. So the emission bandwidth limits have been calculated in below table.

| Fundamental Frequency | 20 dB Bandwidth Limits (MHz) |
|-----------------------|------------------------------|
| 433.92 MHz | 1.0848 |

5.1 MEASURING INSTRUMENTS AND SETTING

Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting |
|---------------------|------------------|
| Attenuation | Auto |
| Span Frequency | > 20dB Bandwidth |
| RB | 10 kHz |
| VB | 10 kHz |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

5.2 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 10 kHz and the video bandwidth of 10 kHz were used.
3. Measured the spectrum width with power higher than 20 dB below carrier.

5.3 TEST SETUP LAYOUT



5.4 TEST DEVIATION

There is no deviation with the original standard.

5.5 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously transmitting mode.

5.6 EUT TEST CONDITIONS

Temperature: 23°C
Relative Humidity: 55%
Test Voltage: AC 120V/60z

5.7 TESTRESULTS

Please refer to the Appendix E.

6. TIMING TESTING

Limit

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

6.1 MEASURING INSTRUMENTS AND SETTING

Please refer to section 6 in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting |
|---------------------|-------------|
| Attenuation | Auto |
| Span Frequency | Zero Span |
| RB | 1 MHz |
| VB | 1 MHz |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | 100 seconds |

6.2 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 1 MHz and the video bandwidth of 1 MHz were used.

6.3 TEST SETUP LAYOUT



6.4 TEST DEVIATION

There is no deviation with the original standard.

6.5 EUT OPERATION DURING TEST

The EUT was programmed to be in normal mode.

6.6 EUT OPERATION DURING TEST

Temperature: 23°C
Relative Humidity: 55%
Test Voltage: AC 120V/60z

6.7 TEST RESULTS

Please refer to the Appendix F.

7. MEASUREMENT INSTRUMENTS LIST AND SETTING

| Conducted Emissions Measurement | | | | | |
|---------------------------------|----------------------|--------------|-------------------------|------------|------------------|
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1 | TWO-LINE V-NETWORK | R&S | ENV216 | 101050 | 2020/3/16 |
| 2 | Test Cable | EMCI | EMCCFD300-BM-BMR-6000 | 170715 | 2020/8/14 |
| 3 | EMI Test Receiver | R&S | ESR7 | 101433 | 2019/12/4 |
| 4 | Measurement Software | EZ | EZ_EMC (Version NB-03A) | N/A | N/A |

| Radiated Emission Measurement | | | | | |
|-------------------------------|--------------------------|--------------|--------------------|------------|------------------|
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1 | Preamplifier | EMCI | 012645B | 980267 | 2020/4/10 |
| 2 | Preamplifier | EMCI | EMC02325 | 980217 | 2020/4/10 |
| 3 | Preamplifier | EMCI | EMC2654045 | 980030 | 2020/4/10 |
| 4 | Test Cable | EMCI | EMC104-SM-SM-8000 | 8m | 2020/4/10 |
| 5 | Test Cable | EMCI | EMC104-SM-SM-800 | 150207 | 2020/4/10 |
| 6 | Test Cable | EMCI | EEMC104-SM-SM-3000 | 151205 | 2020/4/10 |
| 7 | MXE EMI Receiver | Agilent | N9038A | MY55420127 | 2020/3/24 |
| 8 | Signal Analyzer | Agilent | N9010A | MY52220990 | 2020/4/15 |
| 9 | Loop Ant | EMCO | 6502 | 274 | 2019/7/5 |
| 10 | Horn Ant | SCHWARZBECK | BBHA 9120D | 9120D-1342 | 2020/5/1 |
| 11 | Trilog-Broadband Antenna | Schwarzbeck | VULB 9168 | 9168-548 | 2020/3/20 |
| 12 | 5dB Attenuator | EMCI | EMCI-N-6-05 | AT-N0623 | 2020/3/20 |

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

| Timing Testing | | | | | |
|----------------|-------------------|--------------|----------|------------|------------------|
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1 | Spectrum Analyzer | R&S | FSP40 | 100129 | 2020/5/22 |

Remark: "N/A" denotes no model name, serial no. or calibration specified.

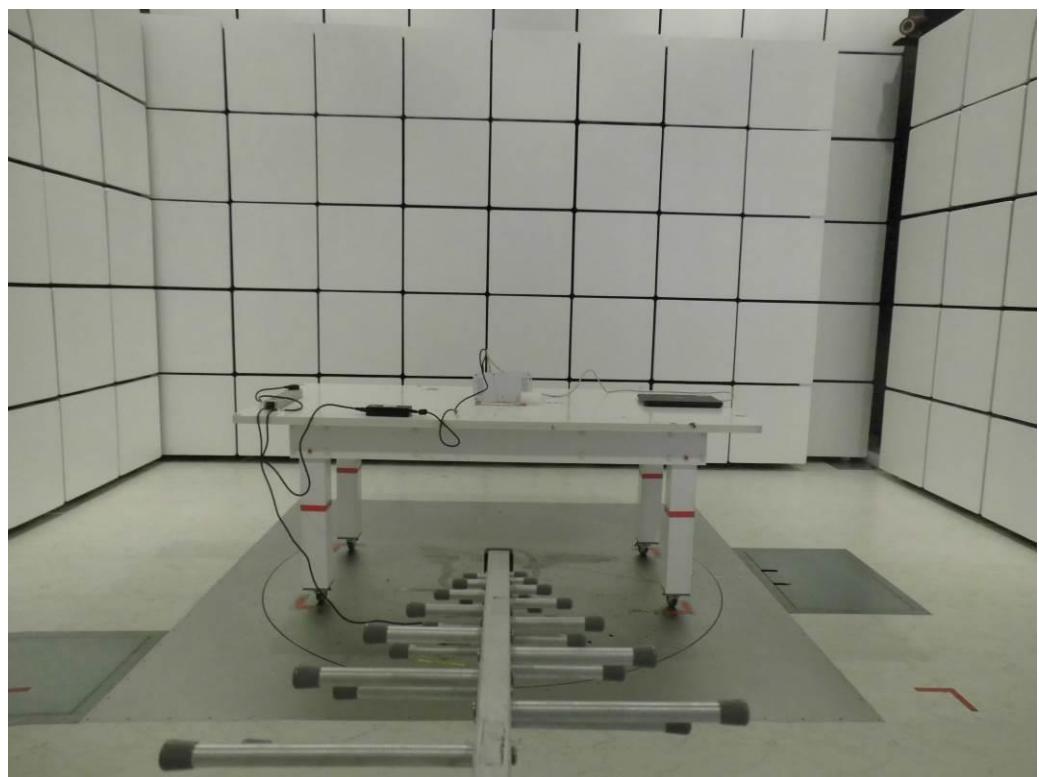
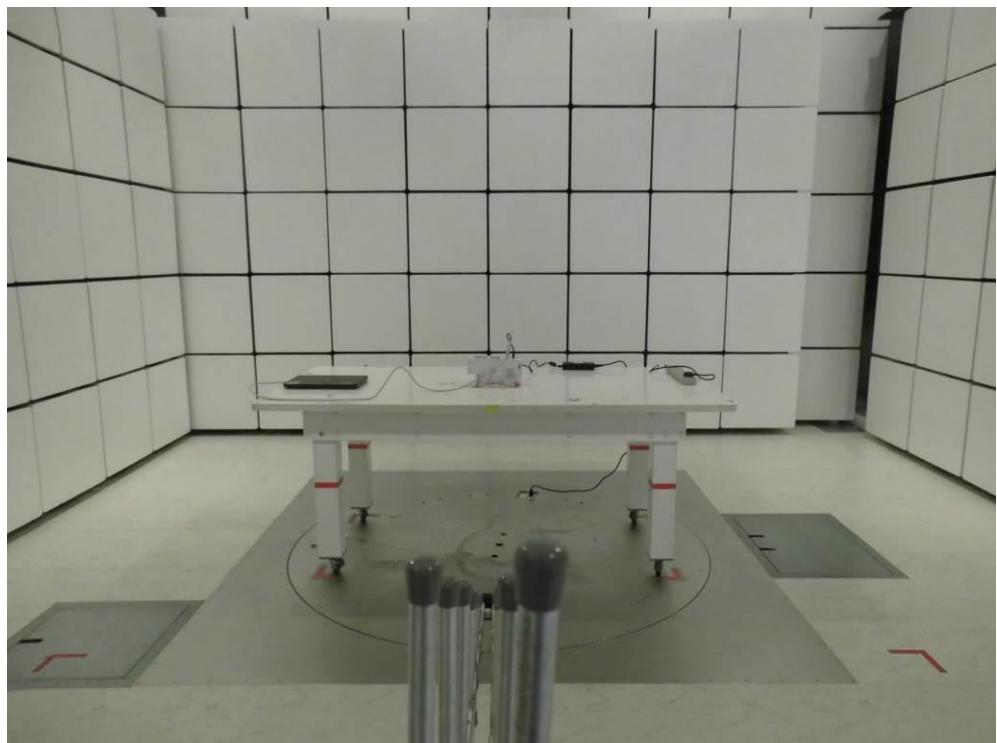
All calibration period of equipment list is one year.

8. EUT TEST PHOTO**Conducted Measurement Photos**

Radiated Measurement Photos**9 kHz to 30 MHz**

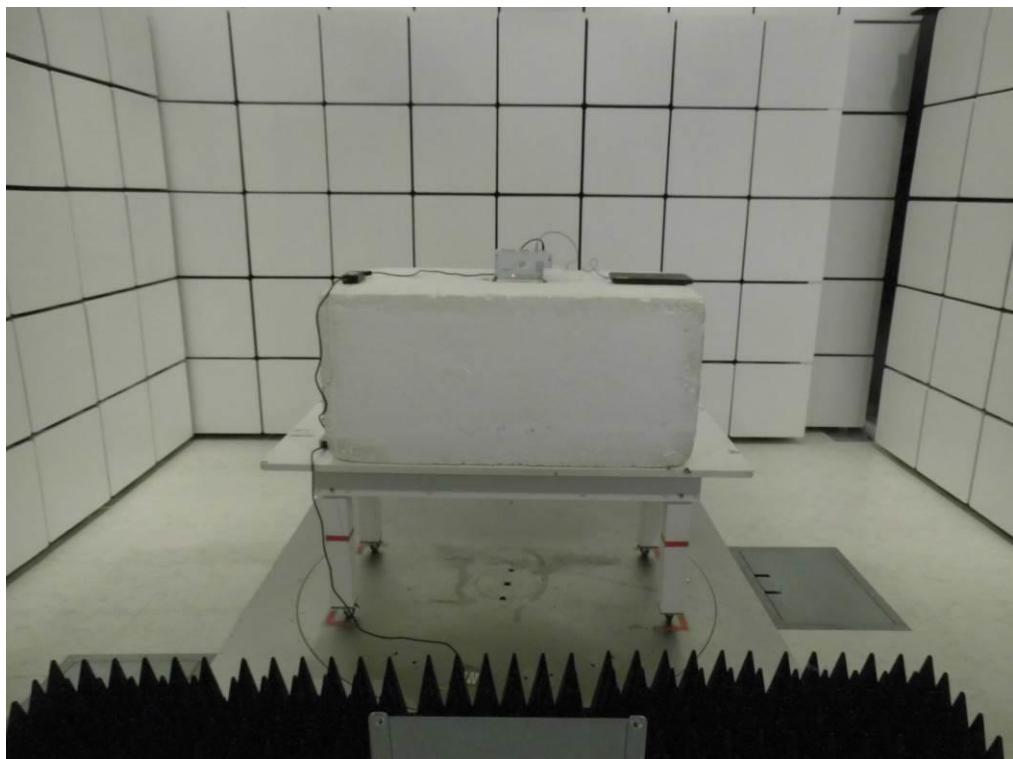
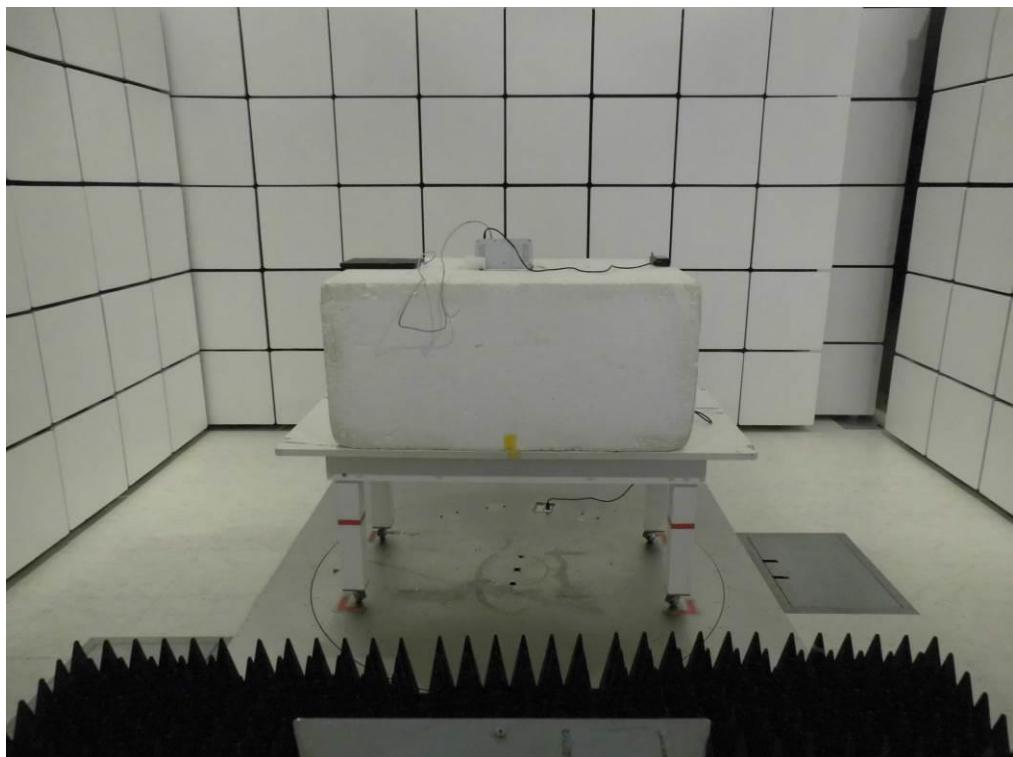
Radiated Measurement Photos

30 MHz to 1000 MHz



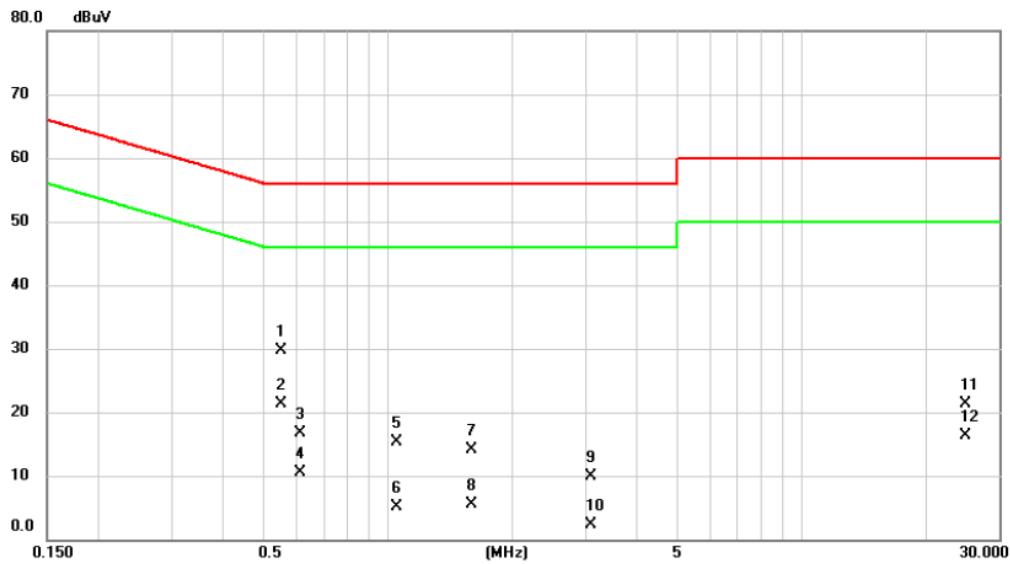
Radiated Measurement Photos

Above 1000 MHz



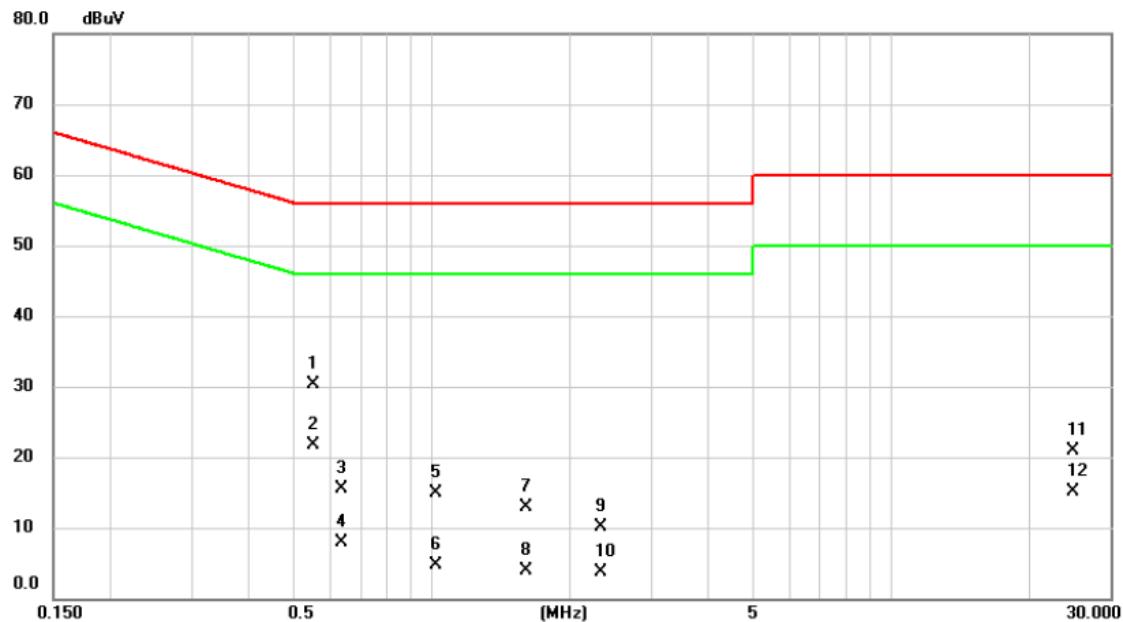
APPENDIX A - CONDUCTED EMISSION

| | | | |
|-----------|--------|-------|------|
| Test Mode | Normal | Phase | Line |
|-----------|--------|-------|------|



| No. | Mk. | Freq. | Reading | Correct | Measure- | Limit | Over | Detector | Comment |
|-----|-----|---------|---------|---------|----------|-------|--------|----------|---------|
| | | | Level | Factor | ment | | | | |
| MHz | | dBuV | dB | dBuV | dBuV | dB | | | |
| 1 | | 0.5527 | 29.64 | 0.02 | 29.66 | 56.00 | -26.34 | QP | |
| 2 | * | 0.5527 | 21.19 | 0.02 | 21.21 | 46.00 | -24.79 | AVG | |
| 3 | | 0.6134 | 16.70 | 0.03 | 16.73 | 56.00 | -39.27 | QP | |
| 4 | | 0.6134 | 10.48 | 0.03 | 10.51 | 46.00 | -35.49 | AVG | |
| 5 | | 1.0500 | 15.17 | 0.05 | 15.22 | 56.00 | -40.78 | QP | |
| 6 | | 1.0500 | 4.96 | 0.05 | 5.01 | 46.00 | -40.99 | AVG | |
| 7 | | 1.5945 | 14.01 | 0.07 | 14.08 | 56.00 | -41.92 | QP | |
| 8 | | 1.5945 | 5.34 | 0.07 | 5.41 | 46.00 | -40.59 | AVG | |
| 9 | | 3.0953 | 9.87 | 0.13 | 10.00 | 56.00 | -46.00 | QP | |
| 10 | | 3.0953 | 2.14 | 0.13 | 2.27 | 46.00 | -43.73 | AVG | |
| 11 | | 24.9427 | 21.09 | 0.27 | 21.36 | 60.00 | -38.64 | QP | |
| 12 | | 24.9427 | 16.03 | 0.27 | 16.30 | 50.00 | -33.70 | AVG | |

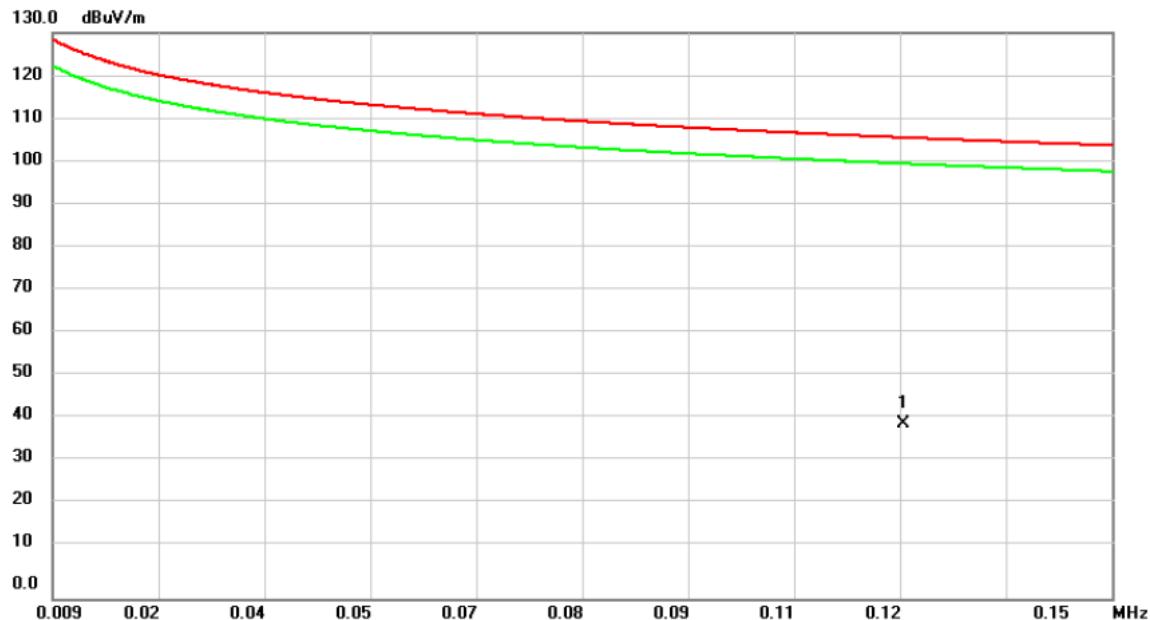
| | | | |
|-----------|--------|-------|---------|
| Test Mode | Normal | Phase | Neutral |
|-----------|--------|-------|---------|



| No. | Mk. | Freq. | Reading | Correct | Measure- | Limit | Over | Detector | Comment |
|-----|-----|---------|---------|---------|----------|-------|--------|----------|---------|
| | | | Level | Factor | ment | | | | |
| | | MHz | dBuV | dB | dBuV | dBuV | dB | | |
| 1 | | 0.5527 | 30.30 | 0.02 | 30.32 | 56.00 | -25.68 | QP | |
| 2 | * | 0.5527 | 21.76 | 0.02 | 21.78 | 46.00 | -24.22 | AVG | |
| 3 | | 0.6360 | 15.47 | 0.03 | 15.50 | 56.00 | -40.50 | QP | |
| 4 | | 0.6360 | 7.81 | 0.03 | 7.84 | 46.00 | -38.16 | AVG | |
| 5 | | 1.0230 | 14.86 | 0.05 | 14.91 | 56.00 | -41.09 | QP | |
| 6 | | 1.0230 | 4.71 | 0.05 | 4.76 | 46.00 | -41.24 | AVG | |
| 7 | | 1.6103 | 12.82 | 0.07 | 12.89 | 56.00 | -43.11 | QP | |
| 8 | | 1.6103 | 3.81 | 0.07 | 3.88 | 46.00 | -42.12 | AVG | |
| 9 | | 2.3348 | 10.08 | 0.10 | 10.18 | 56.00 | -45.82 | QP | |
| 10 | | 2.3348 | 3.66 | 0.10 | 3.76 | 46.00 | -42.24 | AVG | |
| 11 | | 24.9450 | 20.68 | 0.27 | 20.95 | 60.00 | -39.05 | QP | |
| 12 | | 24.9450 | 14.80 | 0.27 | 15.07 | 50.00 | -34.93 | AVG | |

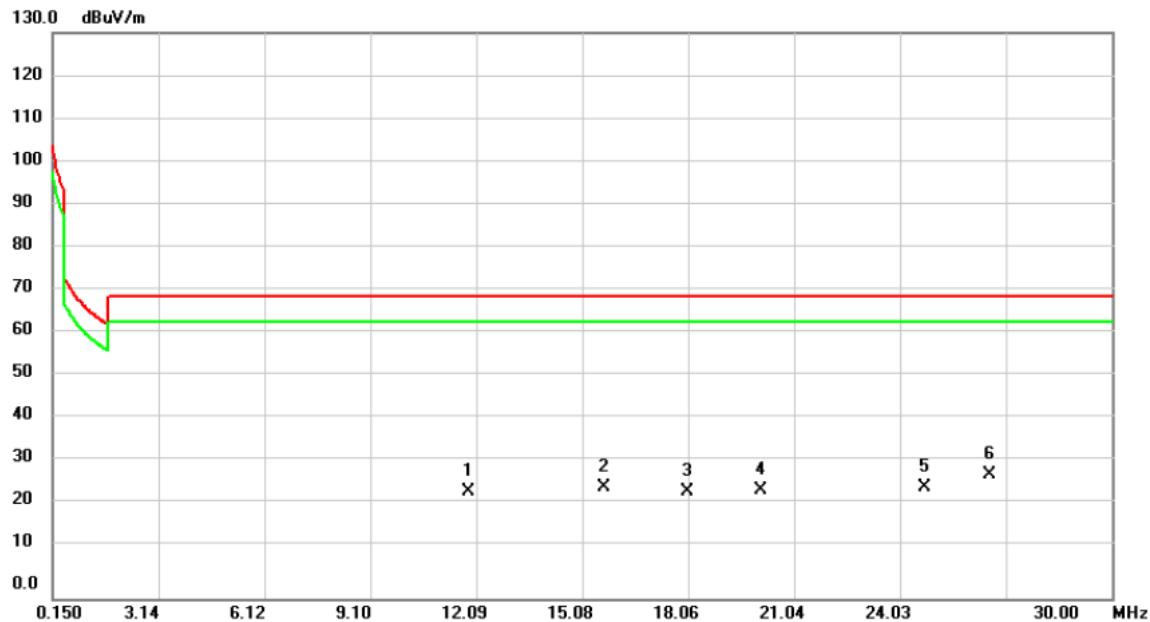
APPENDIX B - RADIATED EMISSION (9 KHZ TO 30 MHZ)

| | | | |
|-----------|------------------|---------------|-----|
| Test Mode | TX CH 433.92 MHz | Azimuth Angle | 90° |
|-----------|------------------|---------------|-----|



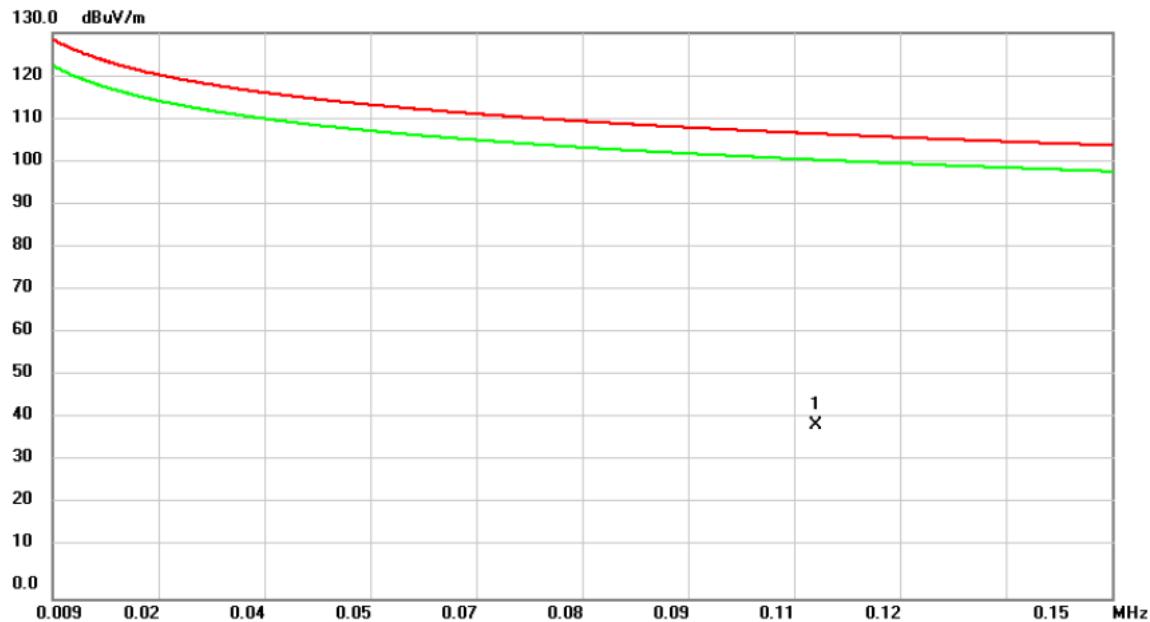
| No. | Mk. | Freq. | Reading | Correct | Measure- | Limit | Over | Comment | |
|-----|-----|--------|---------|---------|----------|--------|--------|----------|--|
| | | | Level | Factor | ment | | | | |
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | |
| 1 | * | 0.1222 | 25.29 | 15.01 | 40.30 | 105.86 | -65.56 | Avg | |

| | | | |
|-----------|------------------|---------------|-----|
| Test Mode | TX CH 433.92 MHz | Azimuth Angle | 90° |
|-----------|------------------|---------------|-----|



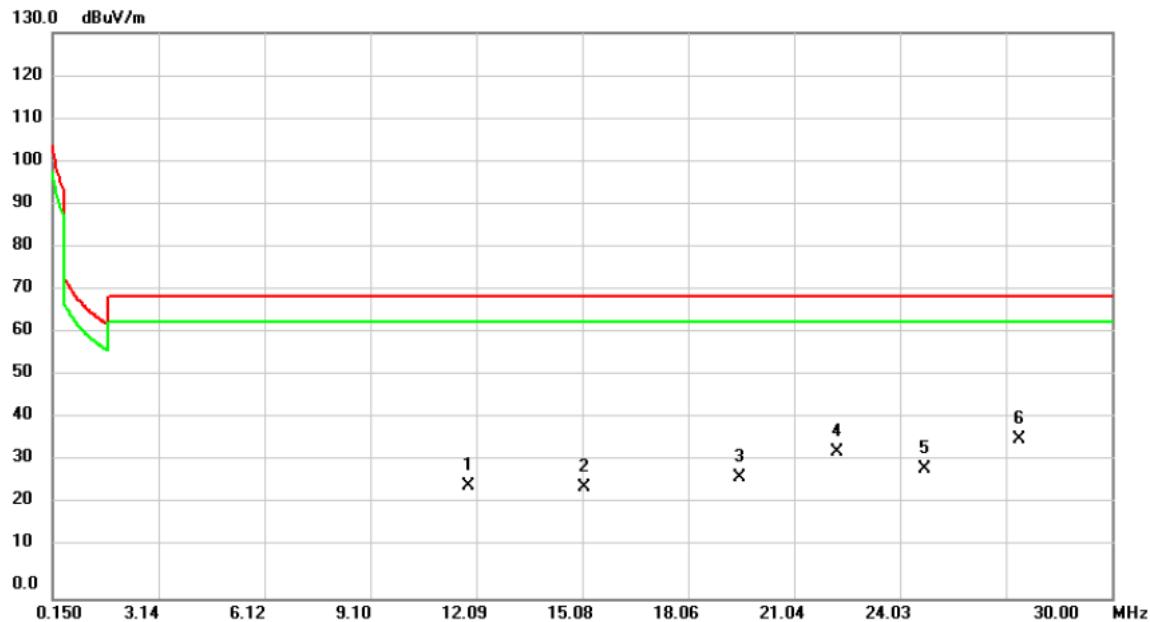
| No. | Mk. | Freq. | Reading | Correct | Measure- | Limit | Over | Comment |
|-----|-----|---------|---------|---------|----------|--------|--------|----------|
| | | | Level | Factor | ment | | | |
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 11.8811 | 29.02 | -4.41 | 24.61 | 69.54 | -44.93 | QP |
| 2 | | 15.7020 | 30.20 | -4.77 | 25.43 | 69.54 | -44.11 | QP |
| 3 | | 18.0600 | 30.44 | -5.74 | 24.70 | 69.54 | -44.84 | QP |
| 4 | | 20.1197 | 30.85 | -6.01 | 24.84 | 69.54 | -44.70 | QP |
| 5 | | 24.7463 | 33.52 | -7.97 | 25.55 | 69.54 | -43.99 | QP |
| 6 | * | 26.5673 | 36.29 | -7.89 | 28.40 | 69.54 | -41.14 | QP |

| | | | |
|-----------|------------------|---------------|----|
| Test Mode | TX CH 433.92 MHz | Azimuth Angle | 0° |
|-----------|------------------|---------------|----|



| No. | Mk. | Freq. | Reading | Correct | Measure- | Limit | Over | Comment |
|-----|-----|--------|---------|---------|----------|--------|--------|----------|
| | | | Level | Factor | ment | | | |
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | * | 0.1107 | 24.29 | 15.66 | 39.95 | 106.72 | -66.77 | AVG |

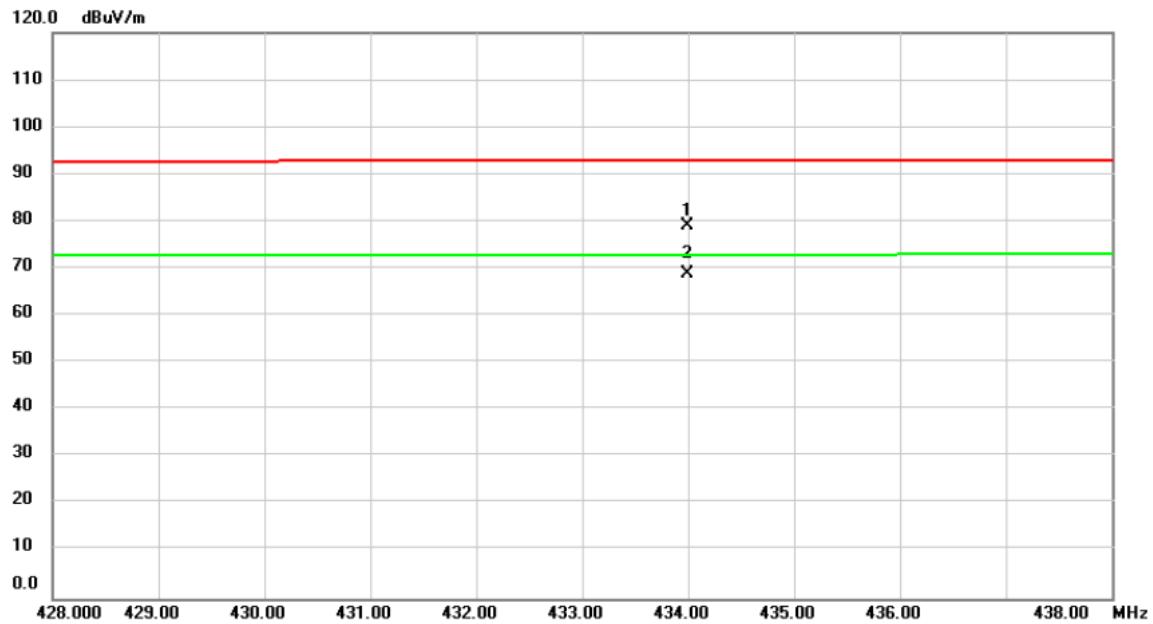
| | | | |
|-----------|------------------|---------------|----|
| Test Mode | TX CH 433.92 MHz | Azimuth Angle | 0° |
|-----------|------------------|---------------|----|



| No. | Mk. | Freq. | Reading | Correct | Measure- | Limit | Over | Comment |
|-----|-----|---------|---------|---------|----------|--------|--------|----------|
| | | | Level | Factor | ment | | | |
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 11.8512 | 30.14 | -4.41 | 25.73 | 69.54 | -43.81 | QP |
| 2 | | 15.1347 | 30.10 | -4.61 | 25.49 | 69.54 | -44.05 | QP |
| 3 | | 19.5226 | 33.77 | -5.97 | 27.80 | 69.54 | -41.74 | QP |
| 4 | | 22.2690 | 39.98 | -6.24 | 33.74 | 69.54 | -35.80 | QP |
| 5 | | 24.7463 | 37.74 | -7.97 | 29.77 | 69.54 | -39.77 | QP |
| 6 | * | 27.3732 | 43.69 | -7.25 | 36.44 | 69.54 | -33.10 | QP |

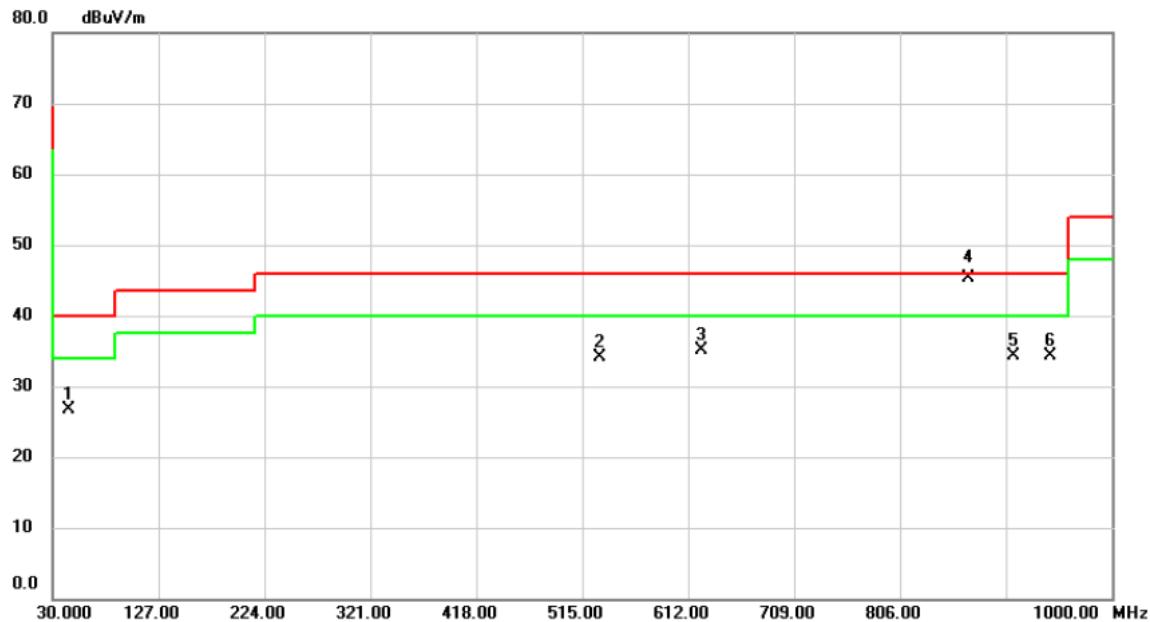
APPENDIX C - RADIATED EMISSION (30 MHZ TO 1000 MHZ)

| | | | |
|-----------|------------------|--------------|----------|
| Test Mode | TX CH 433.92 MHz | Polarization | Vertical |
|-----------|------------------|--------------|----------|



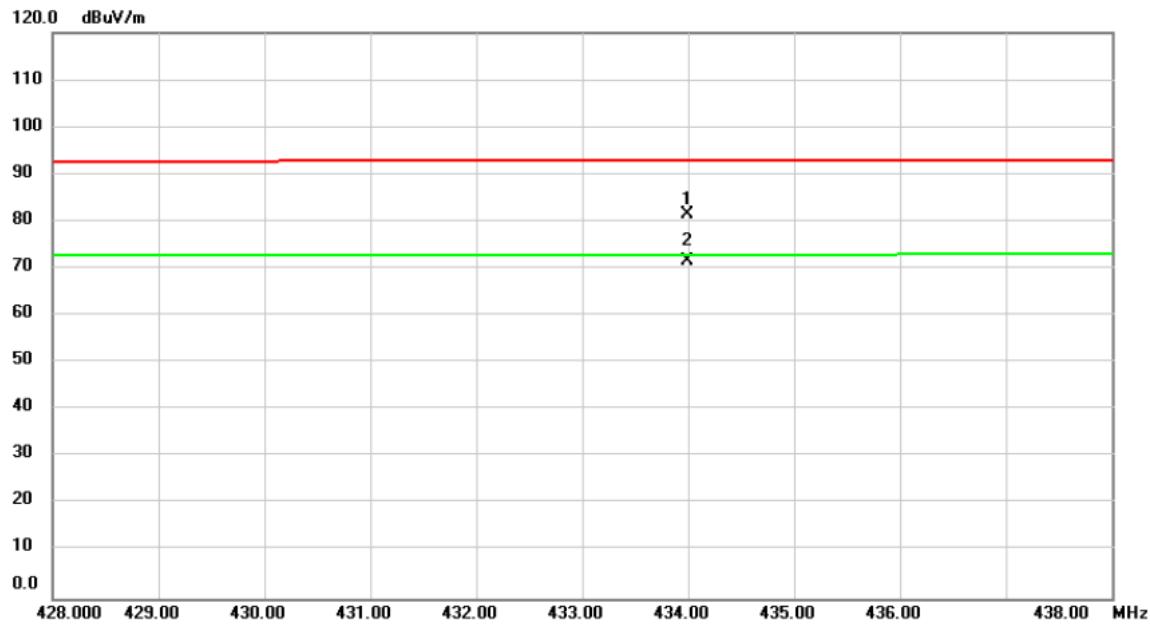
| No. | Mk. | Freq. | Reading | Correct | Measure- | Limit | Over | Comment |
|-----|-----|----------|---------|---------|----------|-------|--------|---------|
| | | | Level | Factor | ment | | | |
| 1 | | 433.9900 | 55.08 | 23.95 | 79.03 | 92.83 | -13.80 | peak |
| 2 | * | 433.9900 | 45.04 | 23.95 | 68.99 | 72.83 | -3.84 | AVG |

| | | | |
|-----------|------------------|--------------|----------|
| Test Mode | TX CH 433.92 MHz | Polarization | Vertical |
|-----------|------------------|--------------|----------|



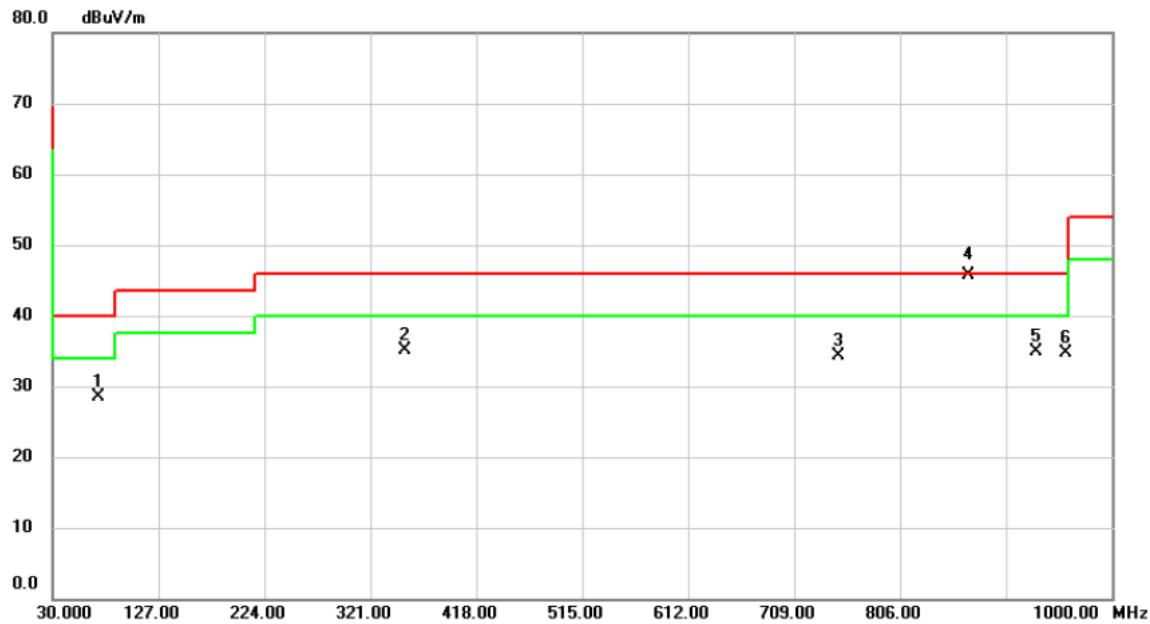
| No. | Mk. | Freq. | Reading | Correct | Measure- | Limit | Over | Comment | |
|-----|-----|----------|---------|---------|----------|--------|--------|---------|----------|
| | | | Level | Factor | ment | | | | |
| | | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 44.5500 | 35.01 | -8.25 | 26.76 | 40.00 | -13.24 | peak | |
| 2 | | 530.5200 | 36.45 | -2.37 | 34.08 | 46.00 | -11.92 | peak | |
| 3 | | 624.6100 | 35.19 | -0.11 | 35.08 | 46.00 | -10.92 | peak | |
| 4 | * | 868.0800 | 41.06 | 4.34 | 45.40 | 46.00 | -0.60 | QP | |
| 5 | | 909.7900 | 29.16 | 5.15 | 34.31 | 46.00 | -11.69 | peak | |
| 6 | | 943.7400 | 28.67 | 5.69 | 34.36 | 46.00 | -11.64 | peak | |

| | | | |
|-----------|------------------|--------------|------------|
| Test Mode | TX CH 433.92 MHz | Polarization | Horizontal |
|-----------|------------------|--------------|------------|



| No. | Mk. | Freq. | Reading | Correct | Measure- | Limit | Over | Comment | |
|-----|-----|----------|---------|---------|----------|--------|--------|----------|---------|
| | | | Level | Factor | ment | | | | |
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 433.9900 | 57.52 | 23.95 | 81.47 | 92.83 | -11.36 | peak | |
| 2 | * | 433.9900 | 47.48 | 23.95 | 71.43 | 72.83 | -1.40 | Avg | |

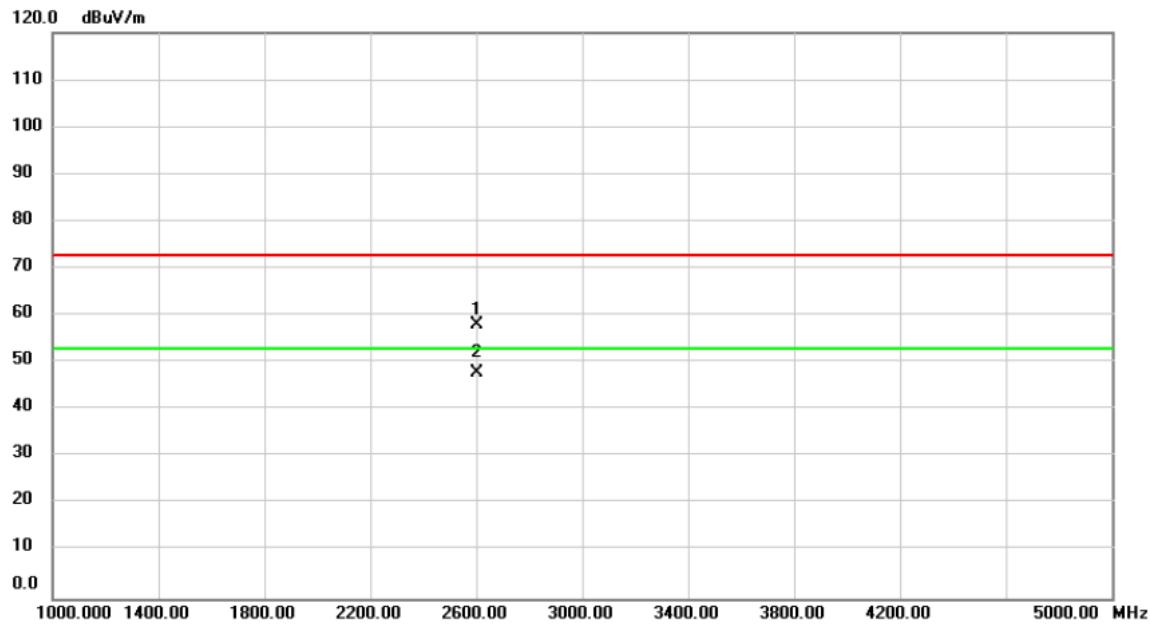
| | | | |
|-----------|------------------|--------------|------------|
| Test Mode | TX CH 433.92 MHz | Polarization | Horizontal |
|-----------|------------------|--------------|------------|



| No. | Mk. | Freq. | Reading | Correct | Measure- | Limit | Over | Comment |
|-----|-----|----------|---------|---------|----------|--------|--------|----------|
| | | | Level | Factor | ment | | | |
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 71.7100 | 39.59 | -11.01 | 28.58 | 40.00 | -11.42 | peak |
| 2 | | 352.0400 | 41.33 | -6.16 | 35.17 | 46.00 | -10.83 | peak |
| 3 | | 749.7400 | 32.09 | 2.31 | 34.40 | 46.00 | -11.60 | peak |
| 4 | * | 868.0800 | 41.44 | 4.34 | 45.78 | 46.00 | -0.22 | QP |
| 5 | | 930.1600 | 29.40 | 5.47 | 34.87 | 46.00 | -11.13 | peak |
| 6 | | 958.2900 | 28.76 | 5.86 | 34.62 | 46.00 | -11.38 | peak |

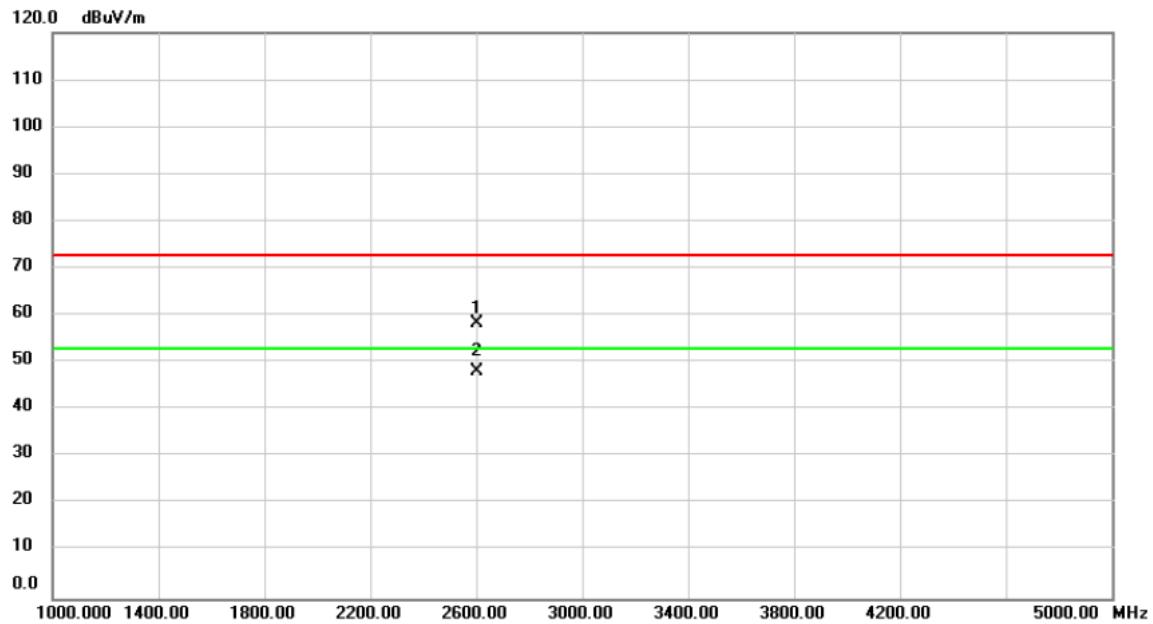
APPENDIX D - RADIATED EMISSION (ABOVE 1000 MHZ)

| | | | |
|-----------|------------------|--------------|----------|
| Test Mode | TX CH 433.92 MHz | Polarization | Vertical |
|-----------|------------------|--------------|----------|



| No. | Mk. | Freq. | Reading | Correct | Measure- | Limit | Over | Comment |
|-----|-----|----------|---------|---------|----------|--------|--------|----------|
| | | | Level | Factor | ment | | | |
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 2604.000 | 74.06 | -16.13 | 57.93 | 72.83 | -14.90 | peak |
| 2 | * | 2604.000 | 64.02 | -16.13 | 47.89 | 52.83 | -4.94 | AVG |

| | | | |
|-----------|------------------|--------------|------------|
| Test Mode | TX CH 433.92 MHz | Polarization | Horizontal |
|-----------|------------------|--------------|------------|



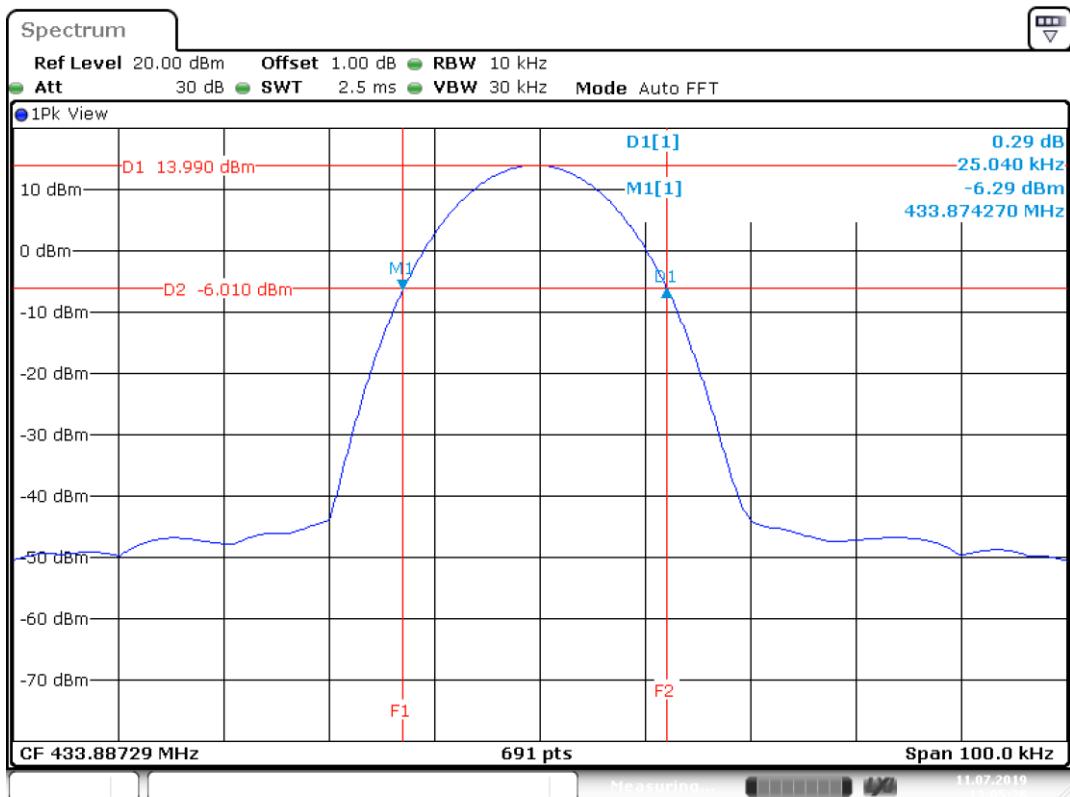
| No. | Mk. | Freq. | Reading | Correct | Measure- | Limit | Over | Comment | |
|-----|-----|----------|---------|---------|----------|--------|--------|----------|---------|
| | | | Level | Factor | ment | | | | |
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 2604.000 | 74.37 | -16.13 | 58.24 | 72.83 | -14.59 | peak | |
| 2 | * | 2604.000 | 64.33 | -16.13 | 48.20 | 52.83 | -4.63 | Avg | |

APPENDIX E – 20 dB SPECTRUM BANDWIDTH

Test Mode: TX CH 433.92 MHz

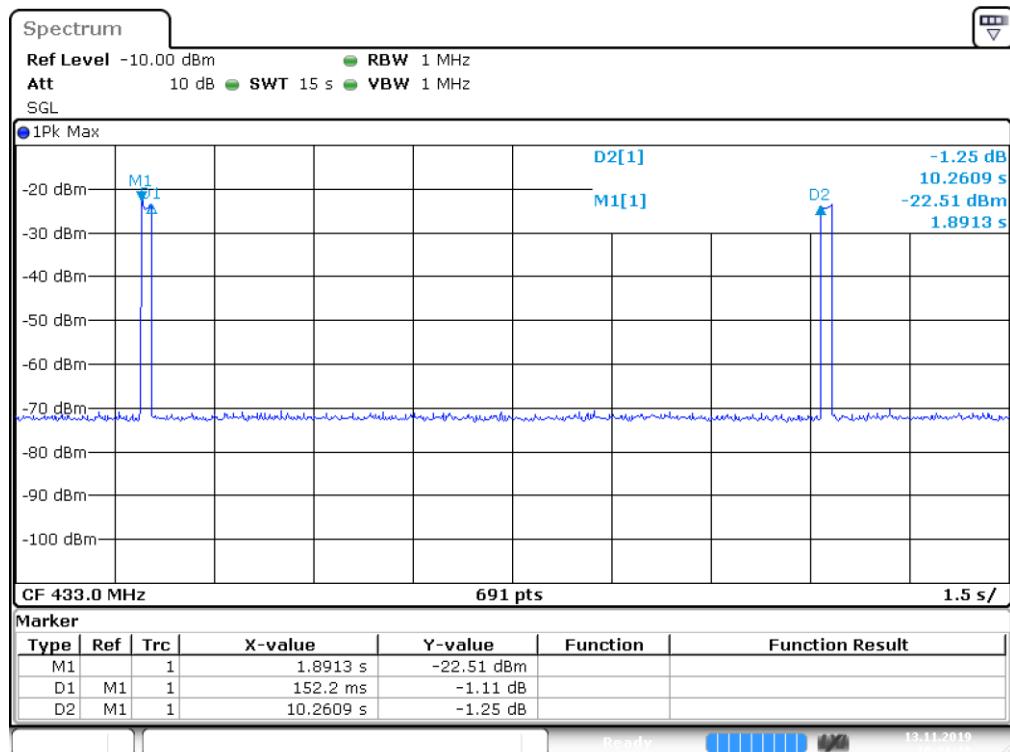
| Frequency (MHz) | 20 dB Bandwidth (kHz) | 20 dB BW Limits (MHz) |
|-----------------|-----------------------|-----------------------|
| 433.92 | 25.040 | 1.0848 |

TX CH01



APPENDIX F - TIMING TESTING

Test Mode: TX CH 433.92 MHz



Date: 13.NOV.2019 10:31:18

End of Test Report