



FCC TEST REPORT

The product was received on Aug. 05, 2022, and testing was started from Aug. 26, 2022 and completed on Jan. 11, 2022. We, SPORTON INTERNATIONAL INC. Hsinhua Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Hsinhua Laboratory, the test report shall not be reproduced except in full.

Jackson Tsai
Approved by: Jackson Tsai

SPORTON INTERNATIONAL INC. Hsinhua Laboratory

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Table of Contents

| | | |
|----------|--|-----------|
| 1 | GENERAL DESCRIPTION | 5 |
| 1.1 | Information | 5 |
| 1.2 | Testing Applied Standards | 6 |
| 1.3 | Testing Location Information | 6 |
| 1.4 | Measurement Uncertainty | 6 |
| 2 | TEST CONFIGURATION OF EUT | 7 |
| 2.1 | Test Condition | 7 |
| 2.2 | The Worst Case Configuration | 7 |
| 2.3 | The Worst Case Measurement Configuration | 7 |
| 2.4 | Support Equipment..... | 8 |
| 2.5 | Test Setup Diagram | 9 |
| 3 | TRANSMITTER TEST RESULT | 10 |
| 3.1 | Transmitter Radiated Emissions..... | 10 |
| 3.2 | Emission Bandwidth..... | 13 |
| 4 | TEST EQUIPMENT AND CALIBRATION DATA | 14 |

APPENDIX A. TEST RESULT OF TRANSMITTER RADIATED EMISSIONS**APPENDIX B. TEST RESULT OF EMISSION BANDWIDTH****APPENDIX C. TEST PHOTOS****PHOTOGRAPHS OF EUT v01**



History of this test report



Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---------------|-----------------|-----------------------------------|--------------------|----------------------------|
| 1.1.2 | 15.203 | Antenna Requirement | PASS | - |
| - | 15.207 | AC Power-line Conducted Emissions | PASS | Only employ battery power. |
| 3.1 | 15.209 | Transmitter Radiated Emissions | PASS | - |
| 3.2 | 15.215(c) | Emission Bandwidth | PASS | - |

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

None.

Reviewed by: Barry Hsiao

Report Producer: Amber Chiu



1 General Description

1.1 Information

1.1.1 RF General Information

| RF General Information | | | |
|------------------------|--------------------|----------------|-------------------------|
| Modulation | Ch. Frequency(kHz) | Channel Number | Field Strength (dBuV/m) |
| OOK | 125 | 1 | 95.02 |

Note 1: Field strength performed peak level at 3m.

1.1.2 Antenna Information

| Ant. | Brand | Model Name | Antenna Type | Connector |
|------|-------------------|-------------------|--------------|-----------|
| 1 | YaFai Intelligent | LF65M491J-125K-BW | PKE Antenna | N/A |

Note 1: The antenna mentioned above will not be sold with the EUT in the market.

1.1.3 Type of EUT

| Operational Condition | |
|-------------------------------------|---|
| EUT Power Type | From DC Power Supply |
| Type of EUT | |
| <input checked="" type="checkbox"/> | Stand-alone |
| <input type="checkbox"/> | Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.: ... |
| <input type="checkbox"/> | Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.: ... |
| <input type="checkbox"/> | Other: |

1.1.4 Test Signal Duty Cycle

| Operated Mode for Worst Duty Cycle | |
|-------------------------------------|---|
| <input type="checkbox"/> | Operated normal mode for worst duty cycle |
| <input checked="" type="checkbox"/> | Operated test mode for worst duty cycle |
| Test Signal Duty Cycle (x) | |
| <input checked="" type="checkbox"/> | 100.00% |



1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR FCC Part 15
- ♦ ANSI C63.10-2013

The following reference test guidance is not within the scope of accreditation of TAF:

- ♦ KDB 414788 D01 v01r01

1.3 Testing Location Information

| Test Lab. : Sporton International Inc. Hsinhua Laboratory | | | | |
|--|--|----------------------------|----------------------|-------------------------|
| <input checked="" type="checkbox"/> Hsinhua (TAF: 3785) | ADD: No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.) | | | |
| | TEL: 886-3-327-3456 | FAX: 886-3-327-0973 | | |
| Test site Designation No. TW3785 with FCC. | | | | |
| Test Condition | Test Site No. | Test Engineer | Test Environment | Test Date |
| RF Conducted | TH01-HY | XieXun | 21.5~26.9°C / 50~60% | 22/Aug/2022 |
| Radiated | 03CH02-HY | Jack Tang | 21.5~23.2°C / 56~58% | 08/Aug/2022~26/Aug/2022 |
| <input type="checkbox"/> Wen 33rd.St. (TAF: 3785) | ADD: No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) | | | |
| | TEL: 886-3-318-0787 | FAX: 886-3-318-0287 | | |
| Test site Designation No. TW0008 with FCC. | | | | |

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

| Test Items | Uncertainty | Remark |
|--------------------------------|-------------|--------------------------|
| Transmitter Radiated Emissions | 4.8 dB | Confidence levels of 95% |
| Bandwidth | 0.005 MHz | Confidence levels of 95% |
| Temperature | 0.41 °C | Confidence levels of 95% |
| Humidity | 3.4 % | Confidence levels of 95% |



2 Test Configuration of EUT

2.1 Test Condition

| Condition Item | Abbreviation/Remark | Remark |
|------------------------------------|---------------------|--------|
| T _{nom} /V _{nom} | T _{nom} | 20°C |
| - | V _{nom} | 12V |

2.2 The Worst Case Configuration

| Mode | Test Channel Frequencies(kHz) | Field Strength (dBuV/m@3m) |
|------|-------------------------------|----------------------------|
| RFID | 125 | 95.02 |

2.3 The Worst Case Measurement Configuration

| The Worst Case Mode for Following Conformance Tests | | |
|---|--|--|
| Tests Item | Emission Bandwidth, Field Strength of Fundamental Emissions Transmitter Radiated Unwanted Emissions | |
| Test Condition | Radiated measurement | |
| User Position | <input type="checkbox"/> EUT will be placed in fixed position. <input checked="" type="checkbox"/> EUT will be placed in mobile position and operating multiple positions. EUT shall be performed three orthogonal planes. <input type="checkbox"/> EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. | |
| Operating Mode | CTX | |
| 1 | DC Power Supply | |
| Orthogonal Planes of EUT | X Plane  | Y Plane  |
| Worst Planes of EUT | | Z Plane  |



2.4 Support Equipment

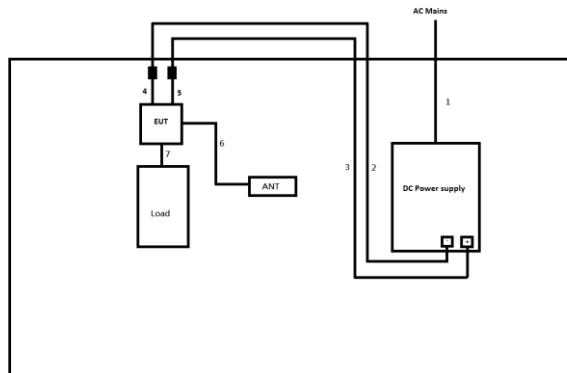
| Support Equipment – Conducted | | | | | |
|-------------------------------|------------------|------------|------------------------------|--------|--------|
| No. | Equipment | Brand Name | Model Name | FCC ID | Remark |
| 1 | Notebook | DELL | E5410 | - | - |
| 2 | Adapter for NB | DELL | HA65NM130 | - | - |
| 3 | locker-connector | inf-switch | YAMAHA VP9 Keyless System | - | - |
| 4 | DC Power Supply | GW | GPS-3030DD | - | - |

| Support Equipment – Radiated | | | | | |
|------------------------------|-------------------|------------|-------------------|--------|--------|
| No. | Equipment | Brand Name | Model Name | FCC ID | Remark |
| 1 | DC Power Supply | GW | GPS-3030DD | - | - |
| 2 | DC power cable(-) | MiSUMi | WTN1229-BLACK | - | - |
| 3 | DC power cable(+) | MiSUMi | WTN1229-RED | - | - |
| 4 | AC Power Cable | Power Sync | PW-GPC180-3 | - | - |
| 5 | antenna for SRD | SunBright | LF65M491J-125K-BW | - | - |



2.5 Test Setup Diagram

Test Setup Diagram - Radiated Test



| Item | Connection | Shielded | Length(m) | Remark |
|------|-------------------|----------|-----------|--------|
| 1 | AC Power cable | No | 1.8 | - |
| 2 | DC Power cable(+) | No | 1.0 | - |
| 3 | DC Power cable(-) | No | 1.0 | - |
| 4 | DC Power cable(+) | No | 0.2 | - |
| 5 | DC Power cable(-) | No | 0.3 | - |
| 6 | RF cable | No | 0.2 | - |
| 7 | Antenna cable | No | 0.3 | - |



3 Transmitter Test Result

3.1 Transmitter Radiated Emissions

3.1.1 Transmitter Radiated Emissions Limit

| Transmitter Radiated Emissions Limit | | | |
|--------------------------------------|-----------------------|-------------------------|----------------------|
| Frequency Range (MHz) | Field Strength (uV/m) | Field Strength (dBuV/m) | Measure Distance (m) |
| 0.009~0.490 | 2400/F(kHz) | 48.5 - 13.8 | 300 |
| 0.490~1.705 | 24000/F(kHz) | 33.8 - 23 | 30 |
| 1.705~30.0 | 30 | 29 | 30 |
| 30~88 | 100 | 40 | 3 |
| 88~216 | 150 | 43.5 | 3 |
| 216~960 | 200 | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: the frequency bands 9-90 kHz, 110-490 kHz measurements employing an average detector and other below 1GHz measurements employing a CISPR quasi-peak detector.

3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.



3.1.3 Test Procedures

| Test Method | |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1 GHz and test distance is 3m. |
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz. The frequency bands 9-90 kHz, 110-490 kHz measurements employing an average detector and other below 30MHz measurements employing a CISPR quasi-peak detector. Test distance is 3m. |
| <input checked="" type="checkbox"/> | At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the requirements; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be following below methods. Note: If fundamental emission level is smaller than noise at 3m , we will change distance to 1m. |
| <input type="checkbox"/> | The results shall be extrapolated to the specified distance by making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor. |
| <input checked="" type="checkbox"/> | The results shall be by using the square of an inverse linear distance extrapolation factor (40 dB/decade). |
| <input checked="" type="checkbox"/> | For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level. |
| <input checked="" type="checkbox"/> | The any unwanted emissions level shall not exceed the fundamental emission level. |
| <input checked="" type="checkbox"/> | All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported. |
| <input checked="" type="checkbox"/> | KDB 414788 Open-Field Test Sites and Chamber Correlation Justification. |
| | <ul style="list-style-type: none">▪ Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in regulations; however, an attempt should be made to avoid making measurements in the near field. |
| | <ul style="list-style-type: none">▪ Open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result. |

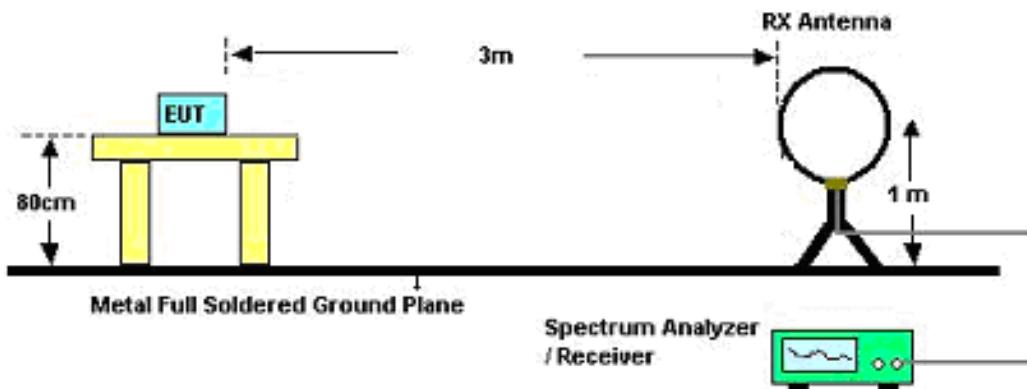
3.1.4 Measurement Results Calculation

The measured Level is calculated using:

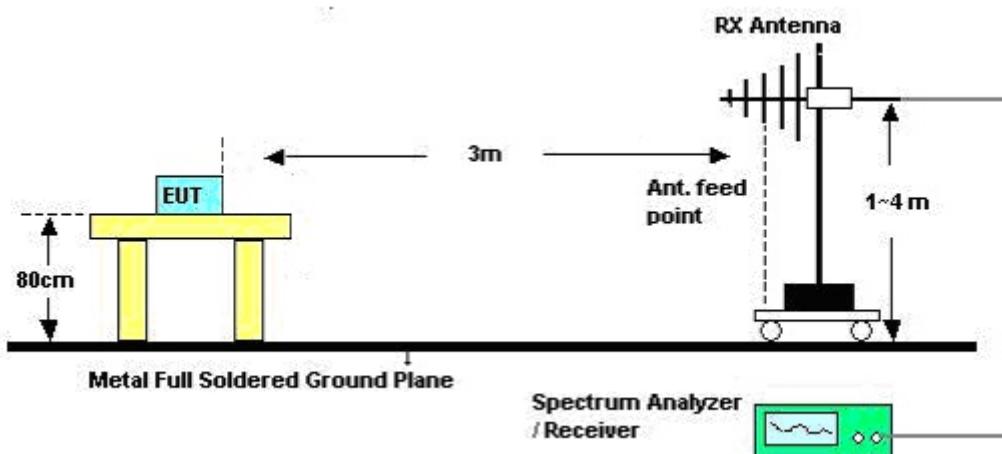
Corrected Reading: Raw(Read Level) + AF(Antenna Factor) + CL(Cable Loss) - PA(Preamp Factor)

3.1.5 Test Setup

Transmitter Radiated Emissions



Magnetic field tests shall be performed in the frequency range of 9 kHz to 30 MHz using a calibrated loop antenna. The center of the loop shall be 1 m above the ground.



Electric field tests shall be performed in the frequency range of 30 MHz to 1000 MHz using a calibrated bi-log antenna. the antenna height shall be varied from 1 m to 4 m.

3.1.6 Test Result of Transmitter Radiated Emissions (Below 30MHz)

Refer as Appendix A

3.2 Emission Bandwidth

3.2.1 Emission Bandwidth Limit

| Emission Bandwidth Limit |
|--------------------------|
| N/A |

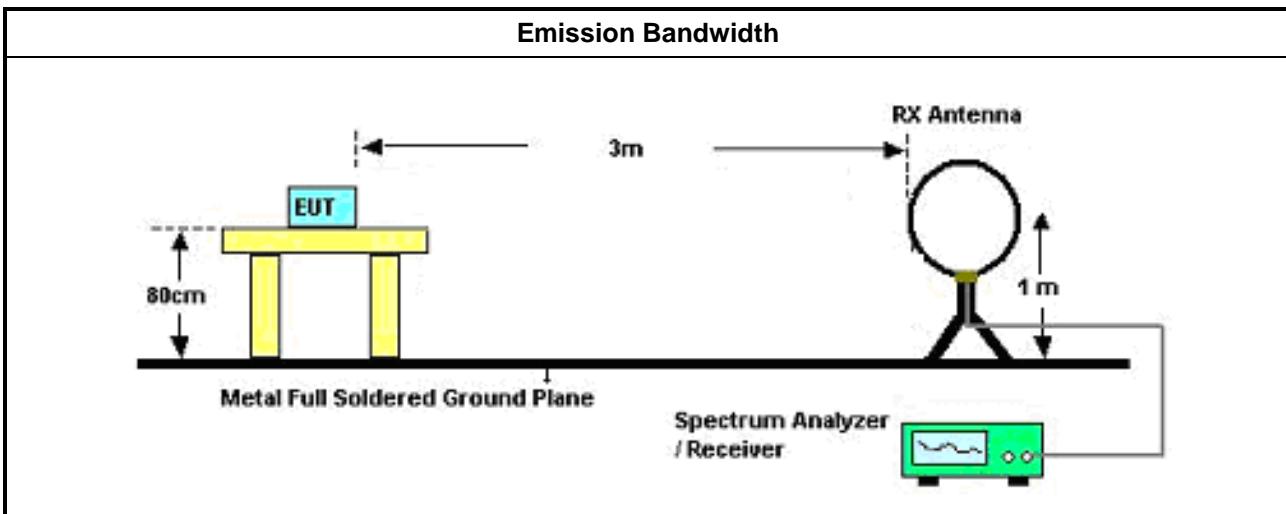
3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

| Test Method |
|---|
| <input checked="" type="checkbox"/> Because the measured signal is CW or CW-like adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW. |
| <input checked="" type="checkbox"/> For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level. |

3.2.4 Test Setup



3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B



4 Test Equipment and Calibration Data

Instrument for Conducted Test

| Instrument | Manufacturer / Brand | Model No. | Serial No. | Characteristics | Calibration Date | Calibration Due Date |
|--------------------------|----------------------|-----------|------------|-----------------|------------------|----------------------|
| Signal Analyzer | R&S | FSV 40 | 101013 | 10Hz~40GHz | 01/Apr/2022 | 31/Mar/2023 |
| SMB100A Signal Generator | R&S | SMB100A | 181147 | 100kHz~40GHz | 21/Oct/2021 | 20/Oct/2022 |
| Pulse Sensor | Anritsu | MA2411B | 0917017 | 300MHz~40GHz | 21/Febr/2022 | 20/Febr/2023 |
| Power Meter | Anritsu | ML2495A | 0949003 | 300MHz~40GHz | 21/Febr/2022 | 20/Febr/2023 |
| SENSE-NFC | Sporton | V5.11.0 | N/A | N/A | N/A | N/A |

Instrument for Radiated Test

| Instrument | Manufacturer / Brand | Model No. | Serial No. | Characteristics | Calibration Date | Calibration Due Date |
|--------------------------------|----------------------|------------------------|------------|------------------|------------------|----------------------|
| 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH02-HY | 30MHz~1GHz 3m | 31/Jul/2022 | 30/Jul/2023 |
| 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH02-HY | 1GHz~18GHz 3m | 30/Jul/2022 | 29/Jul/2023 |
| Signal Analyzer | R&S | FSP40 | 100305 | 9kHz~40GHz | 21/Mar/2022 | 20/Mar/2023 |
| Amplifier | Agilent | 8447D | 2944A11149 | 100kHz~1.3GHz | 28/Jun/2022 | 27/Jun/2023 |
| Bilog Antenna & 5dB Attenuator | SCHAFFNER / MTJ | CBL 6112B / MTJ6102-05 | 2723 / 2 | 30MHz~1GHz | 04/Sep/2021 | 03/Sep/2022 |
| RF Cable | MVE | 400LL | MVE-1-0802 | 9kHz~30MHz | 04/May/2022 | 03/May/2023 |
| RF Cable | MVE | 400LL | MVE-1-0802 | 30MHz~1GHz | 04/May/2022 | 03/May/2023 |
| Loop Antenna | TESEQ | HLA 6120 | 31244 | 9kHz~30MHz | 18/Mar/2022 | 17/Mar/2023 |
| EMI Test Receiver | R&S | ESR3 | 102052 | 9kHz~3.6GHz | 13/May/2022 | 12/May/2023 |
| SENSE-303417 | Sporton | V5.10.4 | N/A | N/A | N/A | N/A |

**Summary**

| Mode | Result | Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Factor (dB) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comments |
|------------|--------|------|-----------|----------------|----------------|-------------|-------------|----------|------------|-------------|------------|----------|
| 110-495kHz | - | - | - | - | - | - | - | - | - | - | - | - |
| SRD | Pass | PK | 125k | 95.02 | 105.65 | -10.63 | 20.10 | 3 | Horizontal | 360 | 1.00 | - |

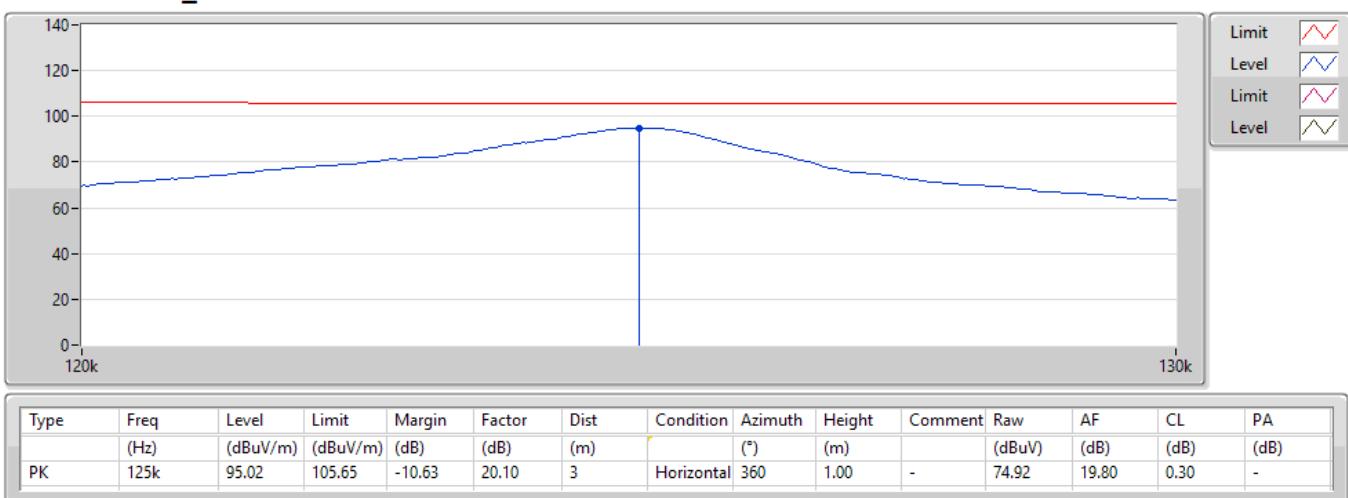
**Result**

| Mode | Result | Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Factor (dB) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comments |
|-------------|--------|------|-----------|----------------|----------------|-------------|-------------|----------|------------|-------------|------------|----------|
| SRD | - | - | - | - | - | - | - | - | - | - | - | - |
| 0.125MHz_TX | Pass | PK | 125k | 95.02 | 105.65 | -10.63 | 20.10 | 3 | Horizontal | 360 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 10.41k | 71.55 | 127.24 | -55.69 | 19.19 | 3 | Horizontal | 0 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 20.28k | 67.98 | 121.44 | -53.46 | 20.86 | 3 | Horizontal | 0 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 35.226k | 75.36 | 116.65 | -41.29 | 21.59 | 3 | Horizontal | 0 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 329.1k | 60.94 | 97.26 | -36.32 | 20.18 | 3 | Horizontal | 360 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 627.6k | 51.41 | 71.65 | -20.24 | 20.57 | 3 | Horizontal | 360 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 2.18M | 45.04 | 69.50 | -24.46 | 20.26 | 3 | Horizontal | 360 | 1.00 | - |

SRD

0.125MHz_TX

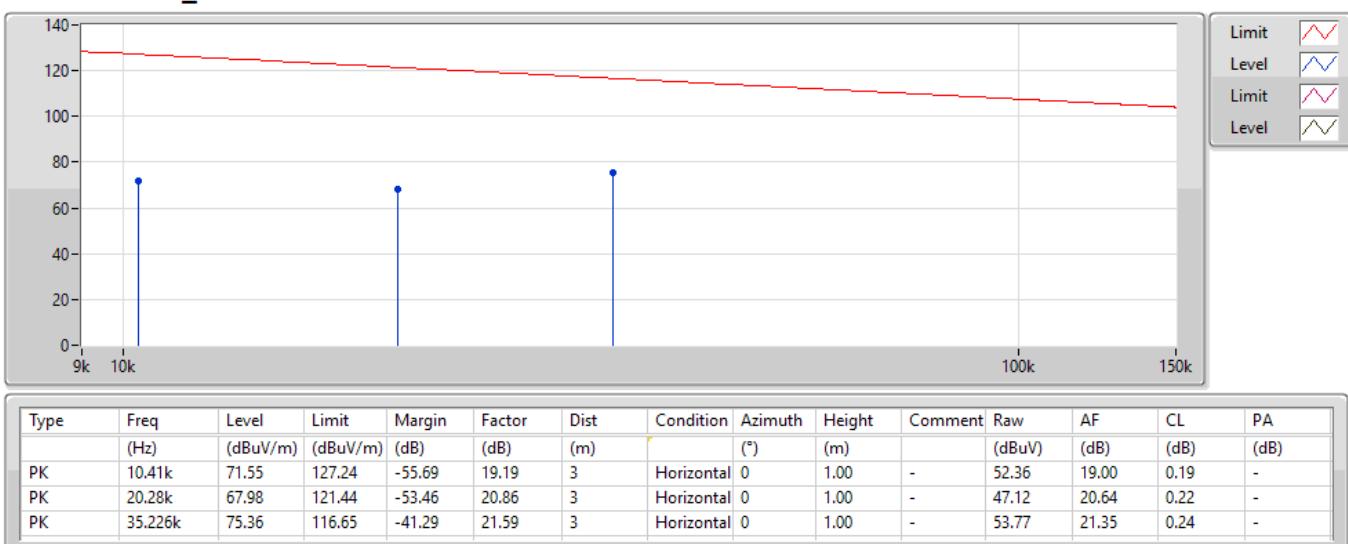
08/08/2022



SRD

0.125MHz_TX

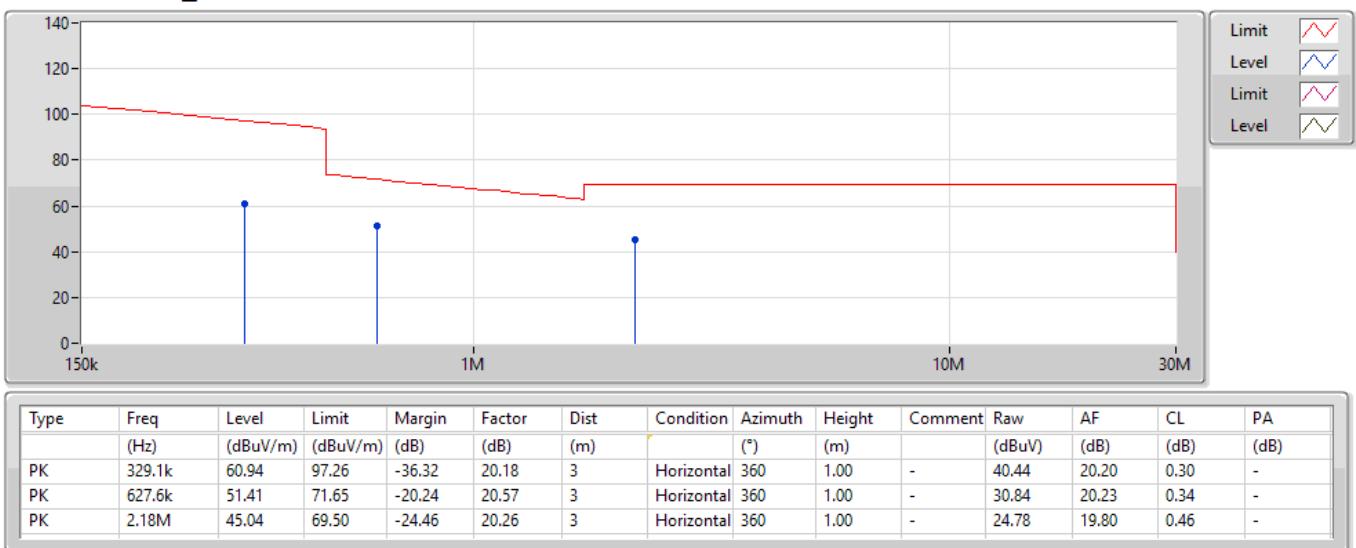
08/08/2022



SRD

0.125MHz_TX

08/08/2022



**Summary**

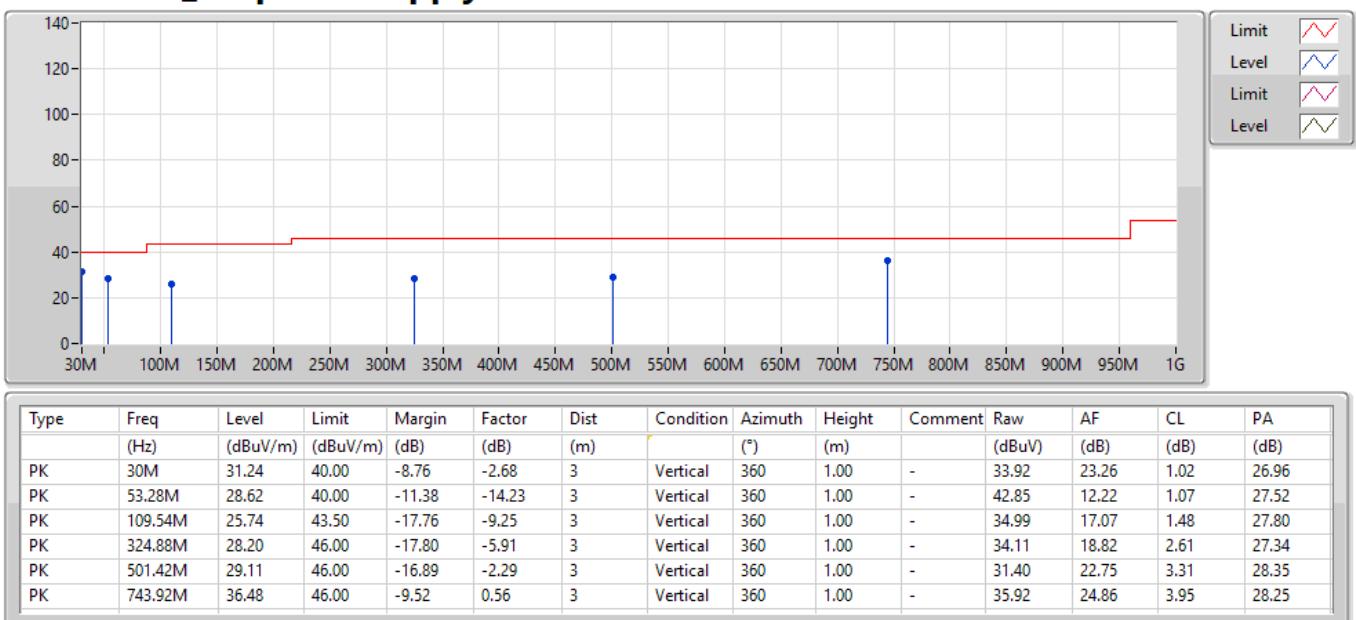
| Mode | Result | Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Factor (dB) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comments |
|------------|--------|------|-----------|----------------|----------------|-------------|-------------|----------|-----------|-------------|------------|----------|
| 110-495kHz | - | - | - | - | - | - | - | - | - | - | - | - |
| SRD | Pass | PK | 30M | 31.24 | 40.00 | -8.76 | -2.68 | 3 | Vertical | 360 | 1.00 | - |

**Result**

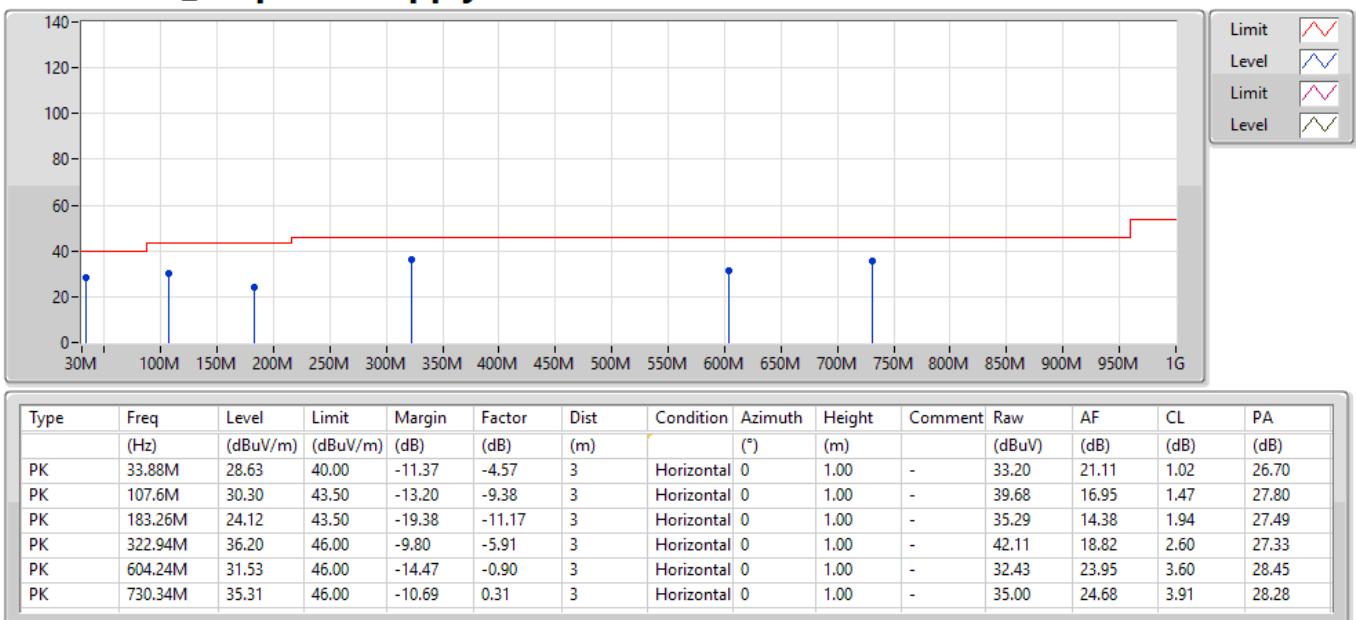
| Mode | Result | Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Factor (dB) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comments |
|-------------|--------|------|-----------|----------------|----------------|-------------|-------------|----------|------------|-------------|------------|----------|
| SRD | - | - | - | - | - | - | - | - | - | - | - | - |
| 0.125MHz_TX | Pass | PK | 30M | 31.24 | 40.00 | -8.76 | -2.68 | 3 | Vertical | 360 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 53.28M | 28.62 | 40.00 | -11.38 | -14.23 | 3 | Vertical | 360 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 109.54M | 25.74 | 43.50 | -17.76 | -9.25 | 3 | Vertical | 360 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 324.88M | 28.20 | 46.00 | -17.80 | -5.91 | 3 | Vertical | 360 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 501.42M | 29.11 | 46.00 | -16.89 | -2.29 | 3 | Vertical | 360 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 743.92M | 36.48 | 46.00 | -9.52 | 0.56 | 3 | Vertical | 360 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 33.88M | 28.63 | 40.00 | -11.37 | -4.57 | 3 | Horizontal | 0 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 107.6M | 30.30 | 43.50 | -13.20 | -9.38 | 3 | Horizontal | 0 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 183.26M | 24.12 | 43.50 | -19.38 | -11.17 | 3 | Horizontal | 0 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 322.94M | 36.20 | 46.00 | -9.80 | -5.91 | 3 | Horizontal | 0 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 604.24M | 31.53 | 46.00 | -14.47 | -0.90 | 3 | Horizontal | 0 | 1.00 | - |
| 0.125MHz_TX | Pass | PK | 730.34M | 35.31 | 46.00 | -10.69 | 0.31 | 3 | Horizontal | 0 | 1.00 | - |

SRD
0.125MHz_DC power supply

08/08/2022


SRD
0.125MHz_DC power supply

08/08/2022



**Summary**

| Mode | 20dB (Hz) | Fl-20dB (Hz) | Fh-20dB (Hz) | OBW (Hz) | Limit (Range) |
|------------|--------------|-----------------|-----------------|-------------|------------------|
| 110-495kHz | - | - | - | - | - |
| SRD | 5.189k | 121.40375k | 126.59250k | 6.183k | -- |

Result

| Mode | Result | 20dB (Hz) | Fl-20dB (Hz) | Fh-20dB (Hz) | OBW (Hz) | Fl-OBW (Hz) | Fh-OBW (Hz) | Limit (Range) |
|-------------------|--------|--------------|-----------------|-----------------|-------------|----------------|----------------|------------------|
| SRD | - | - | - | - | - | - | - | - |
| 0.125MHz_TnomVnom | Pass | 5.189k | 121.40375k | 126.59250k | 6.183k | 121.30060k | 127.48376k | -- |

SRD

EBW

0.125MHz_TnomVnom

22/08/2022

