

# FCC Radio Test Report

**FCC ID** : 2APXN-HSCL03WC  
**Equipment** : Wireless Charger Module  
**Brand Name** : hp  
**Model Name** : HSC-L03WC  
**Applicant** : ASAP Technology(Jiangxi) Co., Ltd  
Ji'an Industrial Park, Ji'anJiangxi, 343100, China  
**Manufacturer** : ASAP Technology(Jiangxi) Co., Ltd  
Ji'an Industrial Park, Ji'anJiangxi, 343100, China  
**Standard** : 47 CFR FCC Part 15.209

The product was received on Nov. 05, 2021, and testing was started from Nov. 15, 2021 and completed on Nov. 17, 2021. 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.



Approved by: Allen Lin

**SPORTON INTERNATIONAL INC. Hsinhua Laboratory**

No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)



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[illegible]



## Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items                        | Result (PASS/FAIL) | Remark |
|---------------|-----------------|-----------------------------------|--------------------|--------|
| 1.1.2         | 15.203          | Antenna Requirement               | PASS               | -      |
| 3.1           | 15.207          | AC Power-line Conducted Emissions | PASS               | -      |
| 3.2           | 15.209          | Transmitter Radiated Emissions    | PASS               | -      |
| 3.3           | 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: Sam Tsai**

**Report Producer: Jenny Yang**

# 1 General Description

## 1.1 Information

### 1.1.1 General Information

| Wireless Power Transfer General Information        |                                     |                                      |                         |
|----------------------------------------------------|-------------------------------------|--------------------------------------|-------------------------|
| Frequency Range                                    | Modulation                          | Operating Freq. (kHz)                | Field Strength (dBuV/m) |
| 120-130 kHz                                        | ASK                                 | 120                                  | 83.94                   |
| Power Transfer Method                              | Output power from each primary coil | That may have multiple primary coils | Operating Method        |
| Magnetic induction and only single primary coil    | ≤ 15W                               | No                                   | Client directly contact |
| Note 1: Field strength performed peak level at 3m. |                                     |                                      |                         |

### 1.1.2 Antenna Information

| Ant. | Brand | Model Name             | Antenna Type | Connector |
|------|-------|------------------------|--------------|-----------|
| 1    | ARK   | FZ-T50X5.3X0.802-7089A | coils        | N/A       |

### 1.1.3 EUT Information

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

### 1.1.5 Table for Multiple Listing

The model names in the following table are all refer to the identical product.

| Model Name | Sample | Description                                                    |
|------------|--------|----------------------------------------------------------------|
| HSC-L03WC  | 1      | All the samples are identical, the difference is size of case. |
|            | 2      |                                                                |

Note: There are two Samples and Sample 2 was used to perform the worst configuration and result of that was recorded as the final test result.

## 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 680106 D01 RF Exposure Wireless Charging Apps v03r01
- ♦ KDB 414788 D01 v01r01

## 1.3 Testing Location Information

| Test Lab. : Sporton International Inc. Hsinhua Laboratory  |                                                                                         |               |                      |                         |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------|---------------|----------------------|-------------------------|
| <input checked="" type="checkbox"/> Hsinhua<br>(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               |
| AC Conduction                                              | CO04-HY                                                                                 | Daniel Lin    | 21.7~22.1°C / 52~55% | 16/Nov/2021~17/Nov/2021 |
| RF Conducted                                               | TH06-HY                                                                                 | Alan Chien    | 20.1~25.6°C / 51~60% | 16/Nov/2021             |
| Radiated                                                   | 03CH03-HY                                                                               | Justin Pan    | 20.1~24.9°C / 50~53% | 15/Nov/2021             |
| <input type="checkbox"/> Wen 33rd.<br>St.<br>(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                   |
|--------------------------------------|-------------|--------------------------|
| Conducted Emission (150kHz ~ 30MHz)  | 0.9 dB      | Confidence levels of 95% |
| Radiated Emission (9kHz ~ 30MHz)     | 2.4 dB      | Confidence levels of 95% |
| Radiated Emission (30MHz ~ 1,000MHz) | 3.7 dB      | Confidence levels of 95% |
| Radiated Emission (1GHz ~ 18GHz)     | 3.6 dB      | Confidence levels of 95% |
| Radiated Emission (18GHz ~ 40GHz)    | 3.5 dB      | Confidence levels of 95% |
| Conducted Emission                   | 1.0 dB      | 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 Channel Mode

|                              |     |
|------------------------------|-----|
| <b>Test Software Version</b> | N/A |
|------------------------------|-----|

Note: The EUT transmits RF signal continuously by itself.

|             |                      |
|-------------|----------------------|
| <b>Mode</b> | <b>Power Setting</b> |
| WPC         | -                    |
| 0.12MHz     | default              |

### 2.2 The Worst Case Configuration

|             |                                           |                                  |
|-------------|-------------------------------------------|----------------------------------|
| <b>Mode</b> | <b>Field Strength<br/>(dBuV/m at 3 m)</b> | <b>Charger Frequencies (kHz)</b> |
| WPC         | 83.94                                     | 120                              |

Note.1: Wireless charger were performed all charging conditions including variable loading and non-charging operation, the worst mode is full charging loading.

Note.2: Wireless charger frequencies are variable frequency range (120-130 kHz) and depend on charging loading.

## 2.3 The Worst Case Measurement Configuration

| The Worst Case Mode for Following Conformance Tests |                                                                                         |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------|
| <b>Tests Item</b>                                   | AC power-line conducted emissions                                                       |
| <b>Condition</b>                                    | AC power-line conducted measurement for line and neutral<br>Test Voltage: 120Vac / 60Hz |
| <b>Operating Mode</b>                               | CTX                                                                                     |
|                                                     | 1. Adapter Mode                                                                         |

| The Worst Case Mode for Following Conformance Tests |                                                                                     |
|-----------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Tests Item</b>                                   | Transmitter Radiated Emissions, Emission Bandwidth                                  |
| <b>Test Condition</b>                               | Radiated measurement                                                                |
| <b>Operating Mode</b>                               | CTX                                                                                 |
|                                                     | 1. Adapter Mode                                                                     |
| <b>Orthogonal Planes of EUT</b>                     | Z Plane                                                                             |
|                                                     |  |

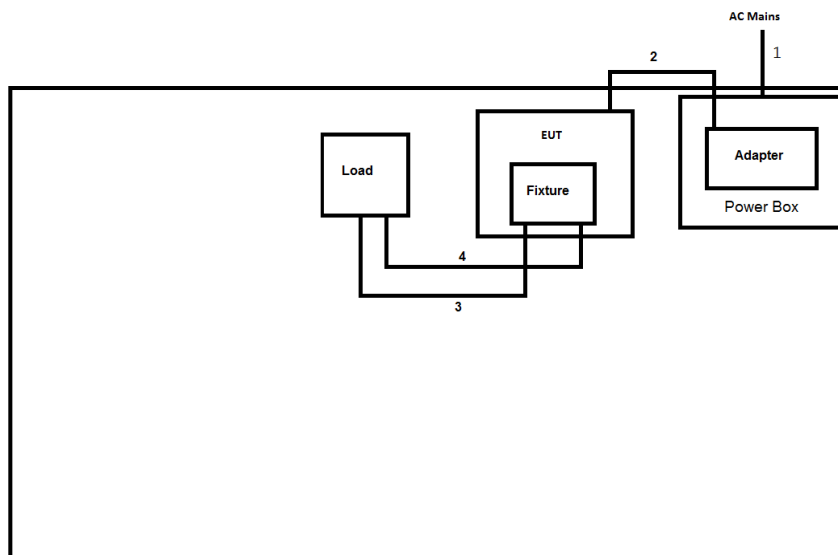
## 2.4 Support Equipment

| Support Equipment – AC Conduction, Conducted and Radiated |           |                         |            |        |        |
|-----------------------------------------------------------|-----------|-------------------------|------------|--------|--------|
| No.                                                       | Equipment | Brand Name              | Model Name | FCC ID | Remark |
| 1                                                         | Adapter   | ASAP Technology Jiangxi | LACW012    | -      | Note 1 |
| 2                                                         | Load      | luxshare                | 002        | -      | Note 1 |
| 3                                                         | Fixture   | luxshare                | RX001      | -      | Note 1 |

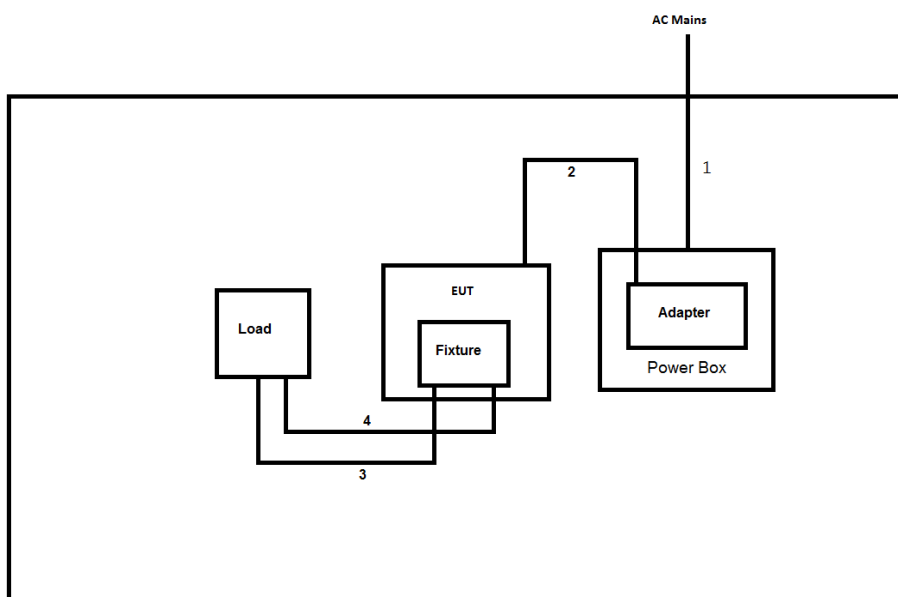
Note 1: Provided by Customer.

## 2.5 Test Setup Diagram

**Test Setup Diagram – AC Line Conducted Emission Test**



| Item | Connection               | Shielded | Length(m) | Remark |
|------|--------------------------|----------|-----------|--------|
| 1    | AC Power cable           | No       | 1.8       | -      |
| 2    | DC Power cable           | No       | 0.42      | -      |
| 3    | Fixture to Load cable(+) | No       | 0.5       | -      |
| 4    | Fixture to Load cable(-) | No       | 0.5       | -      |

**Test Setup Diagram - Radiated Test**


| Item | Connection               | Shielded | Length(m) | Remark |
|------|--------------------------|----------|-----------|--------|
| 1    | AC Power cable           | No       | 1.8       | -      |
| 2    | DC Power cable           | No       | 0.42      | -      |
| 3    | Fixture to Load cable(+) | No       | 0.5       | -      |
| 4    | Fixture to Load cable(-) | No       | 0.5       | -      |

### 3 Transmitter Test Result

#### 3.1 AC Power-line Conducted Emissions

##### 3.1.1 AC Power-line Conducted Emissions Limit

| AC Power-line Conducted Emissions Limit |            |           |
|-----------------------------------------|------------|-----------|
| Frequency Emission (MHz)                | Quasi-Peak | Average   |
| 0.15-0.5                                | 66 - 56 *  | 56 - 46 * |
| 0.5-5                                   | 56         | 46        |
| 5-30                                    | 60         | 50        |

Note 1: \* Decreases with the logarithm of the frequency.

##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedures

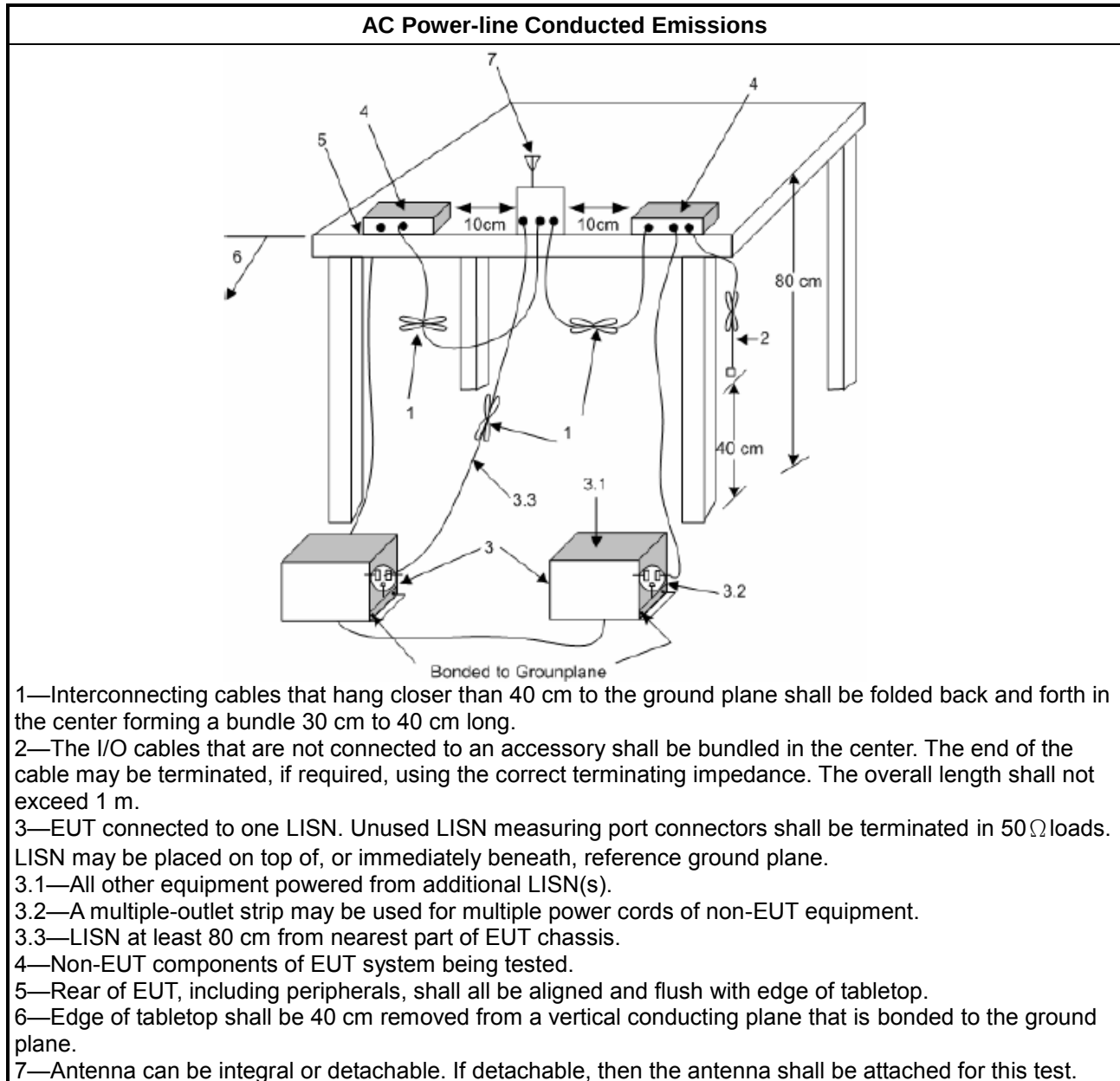
| Test Method                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <input checked="" type="checkbox"/> | If AC conducted emissions fall in operating band, then following below test method confirm final result.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <input type="checkbox"/>            | Accept measurements done with a suitable dummy load replacing the antenna under the following conditions:<br>(1) Perform the AC line conducted tests with the antenna connected to determine compliance with FCC 15.207 limits outside the transmitter's fundamental emission band;<br>(2) Retest with a dummy load to determine compliance with FCC 15.207 limits within the transmitter's fundamental emission band.                                                                                                                          |
| <input checked="" type="checkbox"/> | For a device with a permanent antenna operating at or below 30 MHz, accept measurements done with a suitable dummy load, in lieu of the permanent antenna under the following conditions:<br>(1) Perform the AC line conducted tests with the permanent antenna to determine compliance with the FCC 15.207 limits outside the transmitter's fundamental emission band;<br>(2) Retest with a dummy load in lieu of the permanent antenna to determine compliance with the FCC 15.207 limits within the transmitter's fundamental emission band. |

##### 3.1.4 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Raw(Read Level) + LISN(LISN Factor) + CL(Cable Loss) + AT(Attenuator).

### 3.1.5 Test Setup



### 3.1.6 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

## 3.2 Transmitter Radiated Emissions

### 3.2.1 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.

### 3.2.2 Measuring Instruments

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

**3.2.3 Test Procedures**

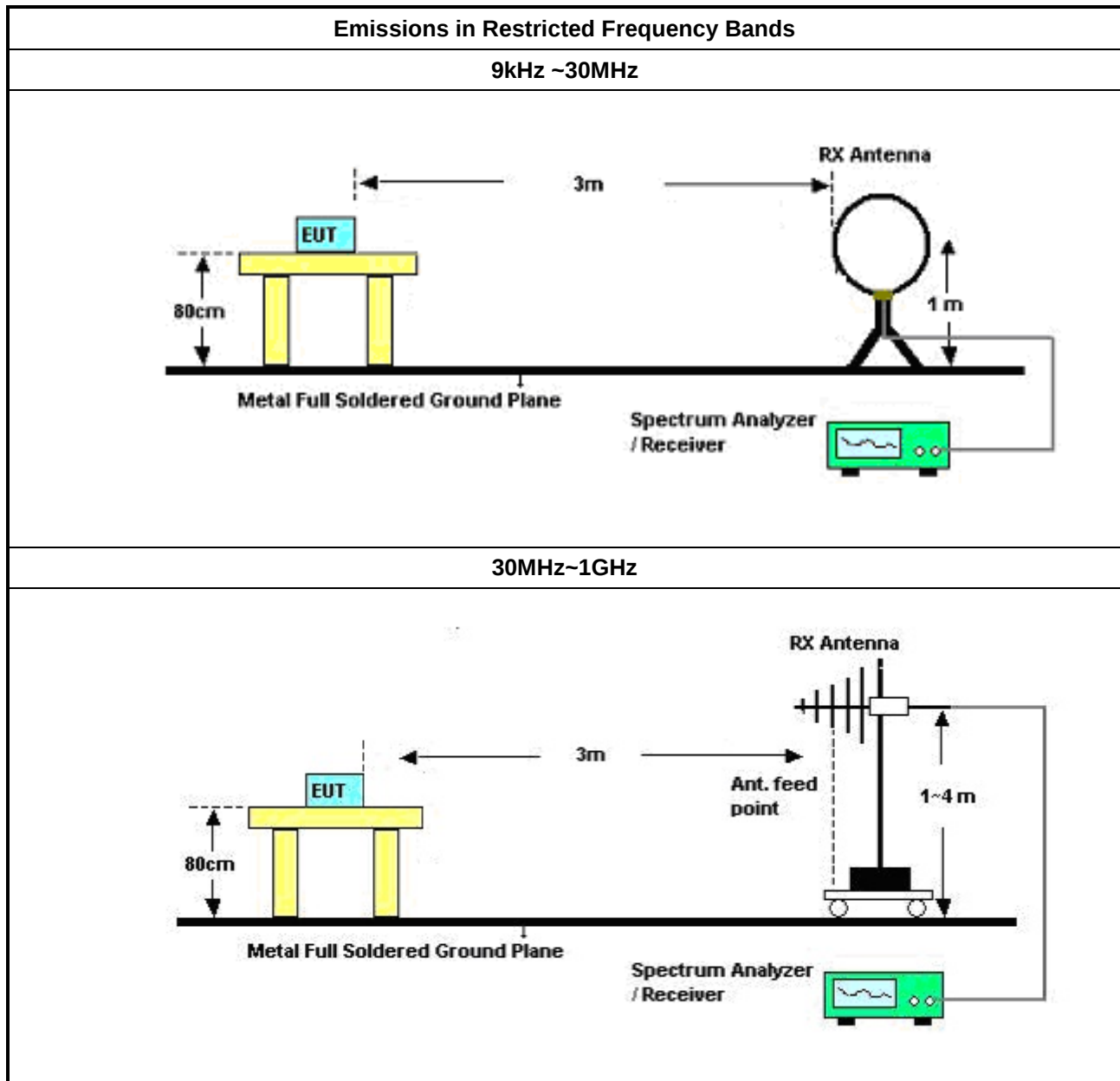
| Test Method                         |                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | 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 3 m.                                                                                                                                                                       |
| <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. |
| <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.                                                                                                                                                                                                                                                                                                                                                              |
| <input checked="" type="checkbox"/> | 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.                                                                                                                                                                                                                                  |
| <input checked="" type="checkbox"/> | Open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result.                                                                                                                                                                                                                                                                                                   |

**3.2.4 Measurement Results Calculation**

The measured Level is calculated using:

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

### 3.2.5 Test Setup



### 3.2.6 Transmitter Radiated Emissions (Below 30MHz)

Refer as Appendix B

### 3.2.7 Transmitter Radiated Emissions (Above 30MHz)

Refer as Appendix B

### 3.3 Emission Bandwidth

#### 3.3.1 Emission Bandwidth Limit

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

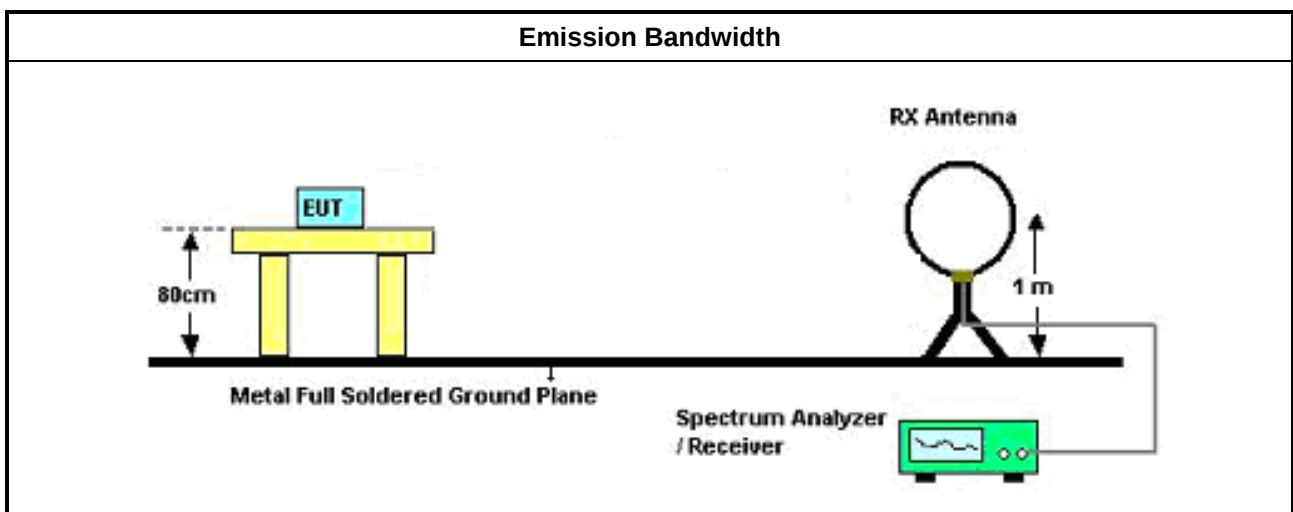
#### 3.3.2 Measuring Instruments

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

#### 3.3.3 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. |

#### 3.3.4 Test Setup



#### 3.3.5 Test Result of Emission Bandwidth

Refer as Appendix C

## 4 Test Equipment and Calibration Data

### Instrument for AC Conduction

| Instrument                     | Manufacturer / Brand | Model No.   | Serial No.    | Spec.         | Calibration Date | Calibration Due Date |
|--------------------------------|----------------------|-------------|---------------|---------------|------------------|----------------------|
| EMI Test Receiver              | R&S                  | ESR3        | 102051        | 9kHz ~ 3.6GHz | 21/May/2021      | 20/May/2022          |
| LISN                           | R&S                  | ENV216      | 100003        | 9kHz ~ 30MHz  | 15/Dec/2020      | 14/Dec/2021          |
| RF Cable 5m                    | TITAN                | TITAN       | CO04-cable-01 | 9kHz~200MHz   | 03/Mar/2021      | 02/Mar/2022          |
| Impuls Begrenzer Pulse Limiter | SCHWARZBECK          | VTSD 9561-F | 9561-F041     | 9kHz ~ 30MHz  | 26/Oct/2021      | 25/Oct/2022          |

### Instrument for Conducted Test

| Instrument      | Manufacturer / Brand | Model No. | Serial No. | Spec.      | Calibration Date | Calibration Due Date |
|-----------------|----------------------|-----------|------------|------------|------------------|----------------------|
| Signal Analyzer | R&S                  | FSV 40    | 101029     | 10Hz~40GHz | 20/Oct/2021      | 19/Oct/2022          |

### Instrument for Radiated Test

| Instrument                     | Manufacturer / Brand | Model No.         | Serial No.                | Spec.            | Calibration Date | Calibration Due Date |
|--------------------------------|----------------------|-------------------|---------------------------|------------------|------------------|----------------------|
| 3m Semi Anechoic Chamber       | SIDT FRANKONIA       | SAC-3M            | 03CH03-HY                 | 30MHz~1GHz<br>3m | 03/Aug/2021      | 02/Aug/2022          |
| Signal Analyzer                | R&S                  | FSV40             | 101500                    | 10Hz~40GHz       | 12/Oct/2021      | 11/Oct/2022          |
| Amplifier                      | HP                   | 8447D             | 2944A08033                | 10kHz~1.3GHz     | 13/Apr/2021      | 12/Apr/2022          |
| Bilog Antenna & 6dB Attenuator | SCHAFFNER / EMC      | CBL6112B / N-6-05 | 22237 / AT-N-0603         | 30MHz~1GHz       | 17/Oct/2021      | 16/Oct/2022          |
| RF Cable-R03m                  | Jye Bao              | RG142             | CB021                     | 9kHz~30MHz       | 16/Jun/2021      | 15/Jun/2022          |
| RF Cable-R03m                  | Jye Bao              | RG142             | MY37335/4+CB021-1+CB021-2 | 30MHz~1GHz       | 17/Mar/2021      | 16/Mar/2022          |
| Loop Antenna                   | TESEQ                | HLA 6120          | 31244                     | 9kHz~30MHz       | 16/Mar/2021      | 15/Mar/2022          |
| EMI Test Receiver              | R&S                  | ESR3              | 102052                    | 9kHz~3.6GHz      | 19/Apr/2021      | 18/Apr/2022          |



## Conducted Emissions at Powerline

## Appendix A

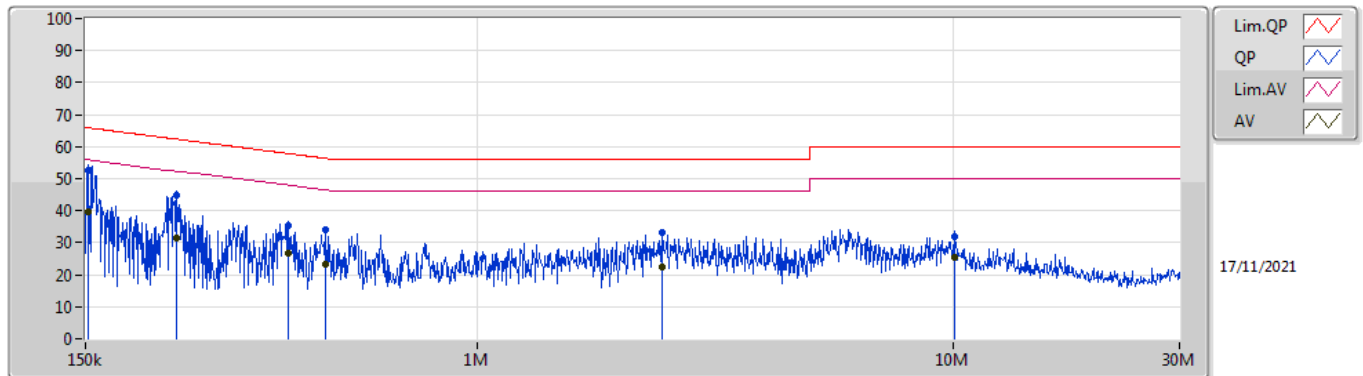
### Summary

| Mode   | Result | Type | Freq<br>(Hz) | Level<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Condition |
|--------|--------|------|--------------|-----------------|-----------------|----------------|-----------|
| Mode 1 | Pass   | QP   | 151.807k     | 52.73           | 65.90           | -13.17         | Line      |

**Result**

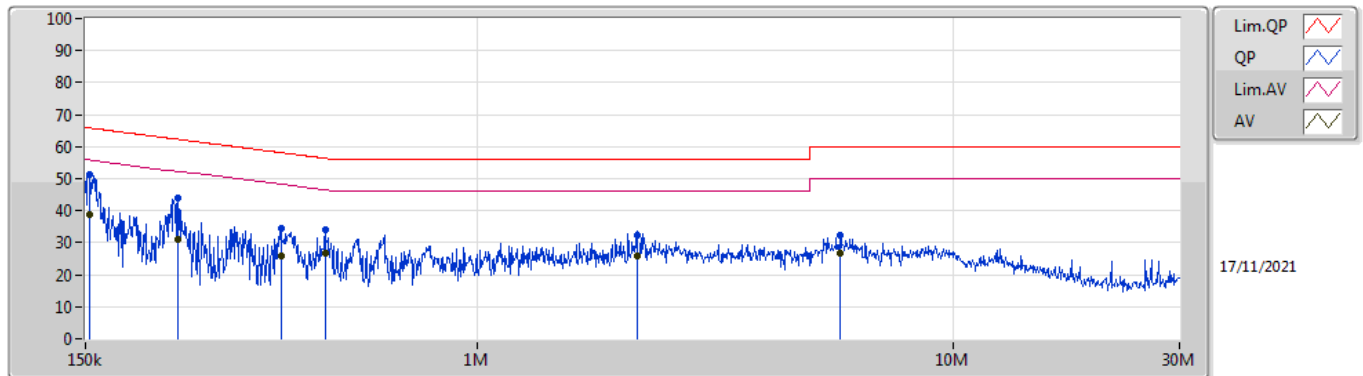
| Mode   | Result | Type | Freq<br>(Hz) | Level<br>(dBUV) | Limit<br>(dBUV) | Margin<br>(dB) | Condition | Comments |
|--------|--------|------|--------------|-----------------|-----------------|----------------|-----------|----------|
| Mode 1 | Pass   | QP   | 151.807k     | 52.73           | 65.90           | -13.17         | Line      | -        |
| Mode 1 | Pass   | AV   | 151.807k     | 39.87           | 55.90           | -16.03         | Line      | -        |
| Mode 1 | Pass   | QP   | 233.633k     | 44.87           | 62.31           | -17.44         | Line      | -        |
| Mode 1 | Pass   | AV   | 233.633k     | 31.56           | 52.31           | -20.75         | Line      | -        |
| Mode 1 | Pass   | QP   | 400.483k     | 35.46           | 57.84           | -22.38         | Line      | -        |
| Mode 1 | Pass   | AV   | 400.483k     | 26.60           | 47.84           | -21.24         | Line      | -        |
| Mode 1 | Pass   | QP   | 479.294k     | 33.86           | 56.34           | -22.48         | Line      | -        |
| Mode 1 | Pass   | AV   | 479.294k     | 23.24           | 46.34           | -23.10         | Line      | -        |
| Mode 1 | Pass   | QP   | 2.443M       | 32.99           | 56.00           | -23.01         | Line      | -        |
| Mode 1 | Pass   | AV   | 2.443M       | 22.62           | 46.00           | -23.38         | Line      | -        |
| Mode 1 | Pass   | QP   | 10.079M      | 31.69           | 60.00           | -28.31         | Line      | -        |
| Mode 1 | Pass   | AV   | 10.079M      | 25.54           | 50.00           | -24.46         | Line      | -        |
| Mode 1 | Pass   | QP   | 153.024k     | 51.43           | 65.83           | -14.40         | Neutral   | -        |
| Mode 1 | Pass   | AV   | 153.024k     | 38.96           | 55.83           | -16.87         | Neutral   | -        |
| Mode 1 | Pass   | QP   | 234.567k     | 43.76           | 62.29           | -18.53         | Neutral   | -        |
| Mode 1 | Pass   | AV   | 234.567k     | 30.88           | 52.29           | -21.41         | Neutral   | -        |
| Mode 1 | Pass   | QP   | 386.35k      | 34.41           | 58.14           | -23.73         | Neutral   | -        |
| Mode 1 | Pass   | AV   | 386.35k      | 25.89           | 48.14           | -22.25         | Neutral   | -        |
| Mode 1 | Pass   | QP   | 479.294k     | 33.91           | 56.34           | -22.43         | Neutral   | -        |
| Mode 1 | Pass   | AV   | 479.294k     | 26.64           | 46.34           | -19.70         | Neutral   | -        |
| Mode 1 | Pass   | QP   | 2.167M       | 32.45           | 56.00           | -23.55         | Neutral   | -        |
| Mode 1 | Pass   | AV   | 2.167M       | 25.97           | 46.00           | -20.03         | Neutral   | -        |
| Mode 1 | Pass   | QP   | 5.81M        | 32.49           | 60.00           | -27.51         | Neutral   | -        |
| Mode 1 | Pass   | AV   | 5.81M        | 26.57           | 50.00           | -23.43         | Neutral   | -        |

### Conducted Emissions at Powerline\_Mode 1



| Type | Freq<br>(Hz) | Level<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Factor<br>(dB) | Condition | Comment | Raw<br>(dBuV) | LISN<br>(dB) | CL<br>(dB) | AT<br>(dB) |  |  |  |
|------|--------------|-----------------|-----------------|----------------|----------------|-----------|---------|---------------|--------------|------------|------------|--|--|--|
| QP   | 151.807k     | 52.73           | 65.90           | -13.17         | 19.64          | Line      | -       | 33.09         | 9.69         | 0.04       | 9.91       |  |  |  |
| AV   | 151.807k     | 39.87           | 55.90           | -16.03         | 19.64          | Line      | -       | 20.23         | 9.69         | 0.04       | 9.91       |  |  |  |
| QP   | 233.633k     | 44.87           | 62.31           | -17.44         | 19.63          | Line      | -       | 25.24         | 9.68         | 0.04       | 9.91       |  |  |  |
| AV   | 233.633k     | 31.56           | 52.31           | -20.75         | 19.63          | Line      | -       | 11.93         | 9.68         | 0.04       | 9.91       |  |  |  |
| QP   | 400.483k     | 35.46           | 57.84           | -22.38         | 19.64          | Line      | -       | 15.82         | 9.67         | 0.06       | 9.91       |  |  |  |
| AV   | 400.483k     | 26.60           | 47.84           | -21.24         | 19.64          | Line      | -       | 6.96          | 9.67         | 0.06       | 9.91       |  |  |  |
| QP   | 479.294k     | 33.86           | 56.34           | -22.48         | 19.64          | Line      | -       | 14.22         | 9.67         | 0.06       | 9.91       |  |  |  |
| AV   | 479.294k     | 23.24           | 46.34           | -23.10         | 19.64          | Line      | -       | 3.60          | 9.67         | 0.06       | 9.91       |  |  |  |
| QP   | 2.443M       | 32.99           | 56.00           | -23.01         | 19.72          | Line      | -       | 13.27         | 9.69         | 0.11       | 9.92       |  |  |  |
| AV   | 2.443M       | 22.62           | 46.00           | -23.38         | 19.72          | Line      | -       | 2.90          | 9.69         | 0.11       | 9.92       |  |  |  |
| QP   | 10.079M      | 31.69           | 60.00           | -28.31         | 19.92          | Line      | -       | 11.77         | 9.79         | 0.20       | 9.93       |  |  |  |
| AV   | 10.079M      | 25.54           | 50.00           | -24.46         | 19.92          | Line      | -       | 5.62          | 9.79         | 0.20       | 9.93       |  |  |  |

### Conducted Emissions at Powerline\_Mode 1



| Type | Freq<br>(Hz) | Level<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Factor | Condition | Comment | Raw<br>(dBuV) | LISN<br>(dB) | CL<br>(dB) | AT<br>(dB) |  |  |  |
|------|--------------|-----------------|-----------------|----------------|--------|-----------|---------|---------------|--------------|------------|------------|--|--|--|
| QP   | 153.024k     | 51.43           | 65.83           | -14.40         | 19.64  | Neutral   | -       | 31.79         | 9.69         | 0.04       | 9.91       |  |  |  |
| AV   | 153.024k     | 38.96           | 55.83           | -16.87         | 19.64  | Neutral   | -       | 19.32         | 9.69         | 0.04       | 9.91       |  |  |  |
| QP   | 234.567k     | 43.76           | 62.29           | -18.53         | 19.63  | Neutral   | -       | 24.13         | 9.68         | 0.04       | 9.91       |  |  |  |
| AV   | 234.567k     | 30.88           | 52.29           | -21.41         | 19.63  | Neutral   | -       | 11.25         | 9.68         | 0.04       | 9.91       |  |  |  |
| QP   | 386.35k      | 34.41           | 58.14           | -23.73         | 19.64  | Neutral   | -       | 14.77         | 9.67         | 0.06       | 9.91       |  |  |  |
| AV   | 386.35k      | 25.89           | 48.14           | -22.25         | 19.64  | Neutral   | -       | 6.25          | 9.67         | 0.06       | 9.91       |  |  |  |
| QP   | 479.294k     | 33.91           | 56.34           | -22.43         | 19.64  | Neutral   | -       | 14.27         | 9.67         | 0.06       | 9.91       |  |  |  |
| AV   | 479.294k     | 26.64           | 46.34           | -19.70         | 19.64  | Neutral   | -       | 7.00          | 9.67         | 0.06       | 9.91       |  |  |  |
| QP   | 2.167M       | 32.45           | 56.00           | -23.55         | 19.70  | Neutral   | -       | 12.75         | 9.68         | 0.10       | 9.92       |  |  |  |
| AV   | 2.167M       | 25.97           | 46.00           | -20.03         | 19.70  | Neutral   | -       | 6.27          | 9.68         | 0.10       | 9.92       |  |  |  |
| QP   | 5.81M        | 32.49           | 60.00           | -27.51         | 19.83  | Neutral   | -       | 12.66         | 9.75         | 0.16       | 9.92       |  |  |  |
| AV   | 5.81M        | 26.57           | 50.00           | -23.43         | 19.83  | Neutral   | -       | 6.74          | 9.75         | 0.16       | 9.92       |  |  |  |



**Summary**

| Mode       | Result | Type | Freq<br>(Hz) | Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Factor<br>(dB) | Dist<br>(m) | Condition | Azimuth<br>(°) | Height<br>(m) | Comments |
|------------|--------|------|--------------|-------------------|-------------------|----------------|----------------|-------------|-----------|----------------|---------------|----------|
| WPT        | -      | -    | -            | -                 | -                 | -              | -              | -           | -         | -              | -             | -        |
| 100-300kHz | Pass   | PK   | 51.34M       | 20.75             | 40.00             | -19.25         | -13.67         | 3           | Vertical  | 0              | 1.00          | -        |

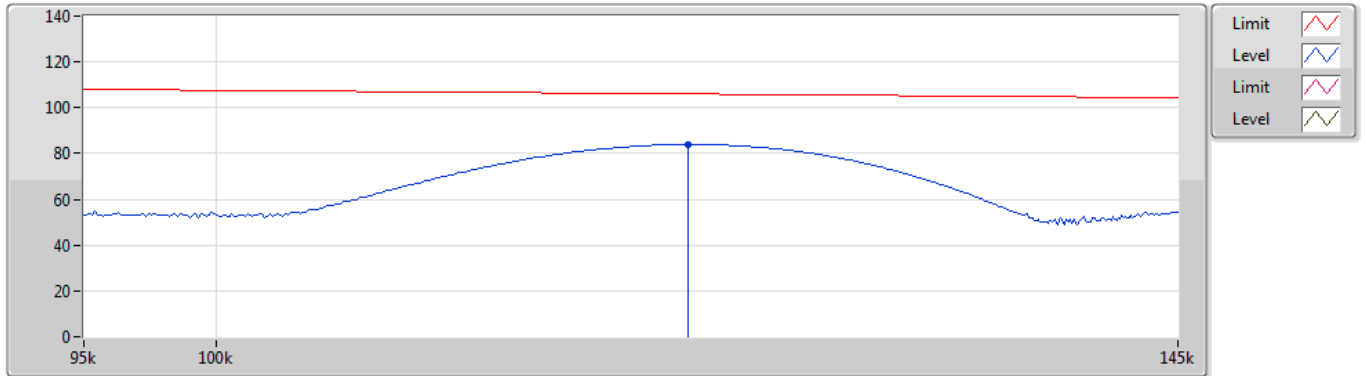
**Result**

| Mode       | Result | Type | Freq<br>(Hz) | Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Factor<br>(dB) | Dist<br>(m) | Condition  | Azimuth<br>(°) | Height<br>(m) | Comments |
|------------|--------|------|--------------|-------------------|-------------------|----------------|----------------|-------------|------------|----------------|---------------|----------|
| 100-300kHz | -      | -    | -            | -                 | -                 | -              | -              | -           | -          | -              | -             | -        |
| 0.12MHz_TX | Pass   | PK   | 120k         | 83.94             | 106.01            | -22.07         | 20.06          | 3           | Horizontal | 0              | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 77.244k      | 66.25             | 109.83            | -43.58         | 20.36          | 3           | Horizontal | 360            | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 98.676k      | 41.85             | 107.71            | -65.86         | 19.97          | 3           | Horizontal | 360            | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 104.034k     | 42.08             | 107.25            | -65.17         | 19.98          | 3           | Horizontal | 360            | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 3.016M       | 41.39             | 69.50             | -28.11         | 20.34          | 3           | Horizontal | 0              | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 8.986M       | 40.28             | 69.50             | -29.22         | 22.44          | 3           | Horizontal | 0              | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 12.747M      | 39.66             | 69.50             | -29.84         | 23.10          | 3           | Horizontal | 0              | 1.00          | -        |

100-300kHz

15/11/2021

0.12MHz\_TX

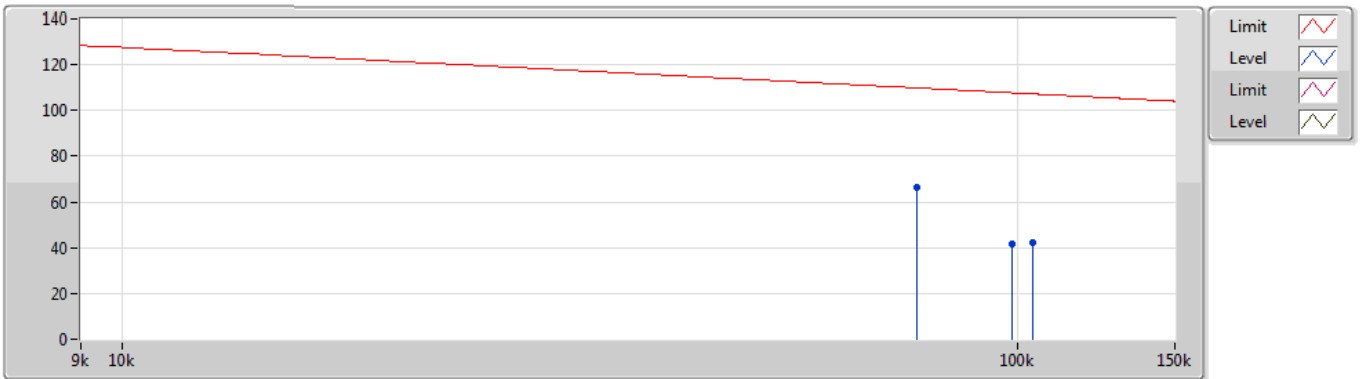


| Type | Freq | Level    | Limit    | Margin | Factor | Dist | Condition  | Azimuth | Height | Comment | Raw    | AF    | CL   | PA   |
|------|------|----------|----------|--------|--------|------|------------|---------|--------|---------|--------|-------|------|------|
|      | (Hz) | (dBuV/m) | (dBuV/m) | (dB)   | (dB)   | (m)  |            | (°)     | (m)    |         | (dBuV) | (dB)  | (dB) | (dB) |
| PK   | 120k | 83.94    | 106.01   | -22.07 | 20.06  | 3    | Horizontal | 0       | 1.00   | -       | 63.88  | 20.00 | 0.06 | -    |

## 100-300kHz

15/11/2021

## 0.12MHz\_TX

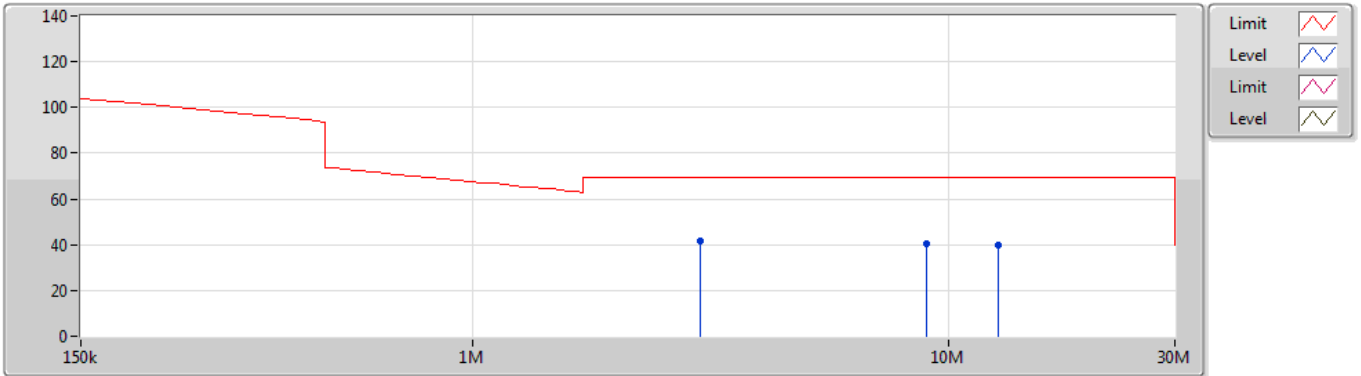


| Type | Freq<br>(Hz) | Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Factor<br>(dB) | Dist<br>(m) | Condition  | Azimuth<br>(°) | Height<br>(m) | Comment | Raw<br>(dBuV) | AF<br>(dB) | CL<br>(dB) | PA<br>(dB) |
|------|--------------|-------------------|-------------------|----------------|----------------|-------------|------------|----------------|---------------|---------|---------------|------------|------------|------------|
| PK   | 77.244k      | 66.25             | 109.83            | -43.58         | 20.36          | 3           | Horizontal | 360            | 1.00          | -       | 45.89         | 20.31      | 0.05       | -          |
| PK   | 98.676k      | 41.85             | 107.71            | -65.86         | 19.97          | 3           | Horizontal | 360            | 1.00          | -       | 21.88         | 19.92      | 0.05       | -          |
| PK   | 104.034k     | 42.08             | 107.25            | -65.17         | 19.98          | 3           | Horizontal | 360            | 1.00          | -       | 22.10         | 19.92      | 0.06       | -          |

## 100-300kHz

15/11/2021

## 0.12MHz\_TX



| Type | Freq<br>(Hz) | Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Factor<br>(dB) | Dist<br>(m) | Condition  | Azimuth<br>(°) | Height<br>(m) | Comment | Raw<br>(dBuV) | AF<br>(dB) | CL<br>(dB) | PA<br>(dB) |
|------|--------------|-------------------|-------------------|----------------|----------------|-------------|------------|----------------|---------------|---------|---------------|------------|------------|------------|
| PK   | 3.016M       | 41.39             | 69.50             | -28.11         | 20.34          | 3           | Horizontal | 0              | 1.00          | -       | 21.05         | 20.10      | 0.24       | -          |
| PK   | 8.986M       | 40.28             | 69.50             | -29.22         | 22.44          | 3           | Horizontal | 0              | 1.00          | -       | 17.84         | 22.01      | 0.43       | -          |
| PK   | 12.747M      | 39.66             | 69.50             | -29.84         | 23.10          | 3           | Horizontal | 0              | 1.00          | -       | 16.56         | 22.58      | 0.52       | -          |



**Summary**

| Mode       | Result | Type | Freq<br>(Hz) | Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Factor<br>(dB) | Dist<br>(m) | Condition  | Azimuth<br>(°) | Height<br>(m) | Comments |
|------------|--------|------|--------------|-------------------|-------------------|----------------|----------------|-------------|------------|----------------|---------------|----------|
| WPT        | -      | -    | -            | -                 | -                 | -              | -              | -           | -          | -              | -             | -        |
| 100-300kHz | Pass   | PK   | 158.04M      | 33.30             | 43.50             | -10.20         | -10.10         | 3           | Horizontal | 360            | 1.00          | -        |

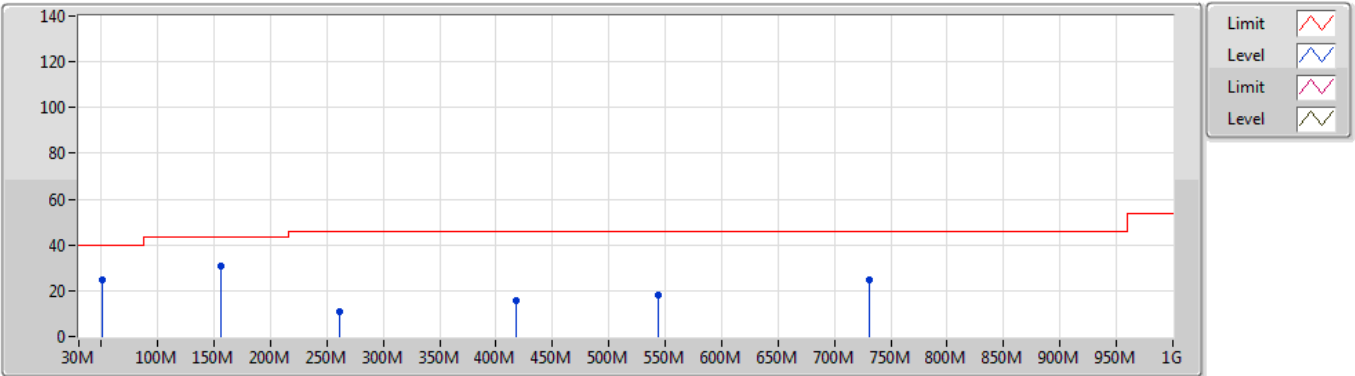
**Result**

| Mode       | Result | Type | Freq<br>(Hz) | Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Factor<br>(dB) | Dist<br>(m) | Condition  | Azimuth<br>(°) | Height<br>(m) | Comments |
|------------|--------|------|--------------|-------------------|-------------------|----------------|----------------|-------------|------------|----------------|---------------|----------|
| 100-300kHz | -      | -    | -            | -                 | -                 | -              | -              | -           | -          | -              | -             | -        |
| 0.12MHz_TX | Pass   | PK   | 51.34M       | 24.88             | 40.00             | -15.12         | -13.67         | 3           | Vertical   | 0              | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 156.1M       | 30.53             | 43.50             | -12.97         | -10.06         | 3           | Vertical   | 0              | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 260.86M      | 11.14             | 46.00             | -34.86         | -5.40          | 3           | Vertical   | 0              | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 418M         | 15.90             | 46.00             | -30.10         | -2.10          | 3           | Vertical   | 0              | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 544.1M       | 18.00             | 46.00             | -28.00         | 0.25           | 3           | Vertical   | 0              | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 730.34M      | 24.95             | 46.00             | -21.05         | 1.48           | 3           | Vertical   | 0              | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 57.16M       | 17.07             | 40.00             | -22.93         | -14.56         | 3           | Horizontal | 360            | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 158.04M      | 33.30             | 43.50             | -10.20         | -10.10         | 3           | Horizontal | 360            | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 258.92M      | 12.10             | 46.00             | -33.90         | -5.45          | 3           | Horizontal | 360            | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 418M         | 16.87             | 46.00             | -29.13         | -2.10          | 3           | Horizontal | 360            | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 538.28M      | 19.88             | 46.00             | -26.12         | 0.04           | 3           | Horizontal | 360            | 1.00          | -        |
| 0.12MHz_TX | Pass   | PK   | 722.58M      | 24.46             | 46.00             | -21.54         | 1.23           | 3           | Horizontal | 360            | 1.00          | -        |

## 100-300kHz

15/11/2021

## 0.12MHz\_TX

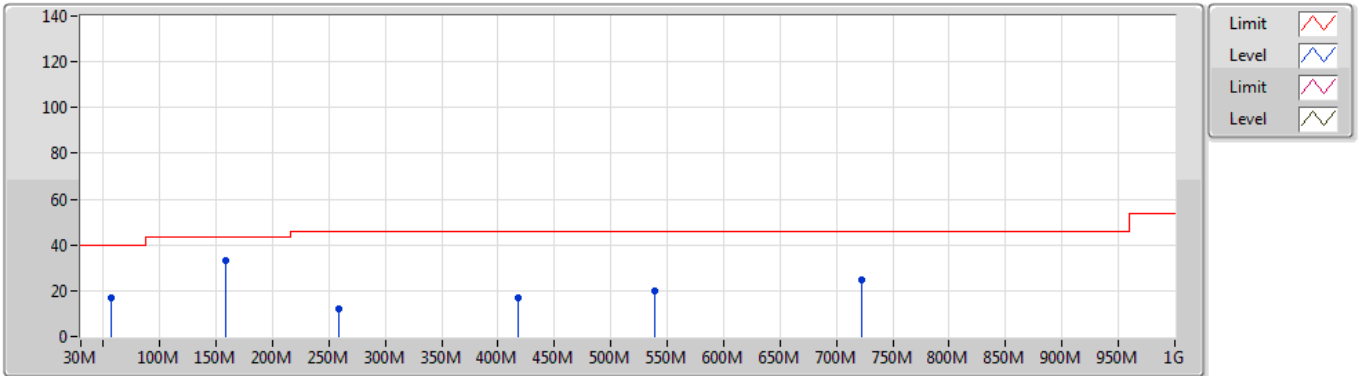


| Type | Freq<br>(Hz) | Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Factor<br>(dB) | Dist<br>(m) | Condition | Azimuth<br>(°) | Height<br>(m) | Comment | Raw<br>(dBuV) | AF<br>(dB) | CL<br>(dB) | PA<br>(dB) |
|------|--------------|-------------------|-------------------|----------------|----------------|-------------|-----------|----------------|---------------|---------|---------------|------------|------------|------------|
| PK   | 51.34M       | 24.88             | 40.00             | -15.12         | -13.67         | 3           | Vertical  | 0              | 1.00          | -       | 38.55         | 12.79      | 1.16       | 27.62      |
| PK   | 156.1M       | 30.53             | 43.50             | -12.97         | -10.06         | 3           | Vertical  | 0              | 1.00          | -       | 40.59         | 15.06      | 2.10       | 27.22      |
| PK   | 260.86M      | 11.14             | 46.00             | -34.86         | -5.40          | 3           | Vertical  | 0              | 1.00          | -       | 16.54         | 18.62      | 2.72       | 26.74      |
| PK   | 418M         | 15.90             | 46.00             | -30.10         | -2.10          | 3           | Vertical  | 0              | 1.00          | -       | 18.00         | 21.80      | 3.53       | 27.43      |
| PK   | 544.1M       | 18.00             | 46.00             | -28.00         | 0.25           | 3           | Vertical  | 0              | 1.00          | -       | 17.75         | 24.28      | 4.06       | 28.09      |
| PK   | 730.34M      | 24.95             | 46.00             | -21.05         | 1.48           | 3           | Vertical  | 0              | 1.00          | -       | 23.47         | 24.76      | 4.73       | 28.01      |

## 100-300kHz

15/11/2021

## 0.12MHz\_TX



| Type | Freq<br>(Hz) | Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Factor<br>(dB) | Dist<br>(m) | Condition  | Azimuth<br>(°) | Height<br>(m) | Comment | Raw<br>(dBuV) | AF<br>(dB) | CL<br>(dB) | PA<br>(dB) |
|------|--------------|-------------------|-------------------|----------------|----------------|-------------|------------|----------------|---------------|---------|---------------|------------|------------|------------|
| PK   | 57.16M       | 17.07             | 40.00             | -22.93         | -14.56         | 3           | Horizontal | 360            | 1.00          | -       | 31.63         | 11.81      | 1.24       | 27.61      |
| PK   | 158.04M      | 33.30             | 43.50             | -10.20         | -10.10         | 3           | Horizontal | 360            | 1.00          | -       | 43.40         | 14.99      | 2.12       | 27.21      |
| PK   | 258.92M      | 12.10             | 46.00             | -33.90         | -5.45          | 3           | Horizontal | 360            | 1.00          | -       | 17.55         | 18.57      | 2.71       | 26.73      |
| PK   | 418M         | 16.87             | 46.00             | -29.13         | -2.10          | 3           | Horizontal | 360            | 1.00          | -       | 18.97         | 21.80      | 3.53       | 27.43      |
| PK   | 538.28M      | 19.88             | 46.00             | -26.12         | 0.04           | 3           | Horizontal | 360            | 1.00          | -       | 19.84         | 24.04      | 4.03       | 28.03      |
| PK   | 722.58M      | 24.46             | 46.00             | -21.54         | 1.23           | 3           | Horizontal | 360            | 1.00          | -       | 23.23         | 24.54      | 4.71       | 28.02      |

**Summary**

| Mode  | 15dB<br>(Hz) | FI-15dB<br>(Hz) | Fh-15dB<br>(Hz) | OBW<br>(Hz) | Limit<br>(Range) |
|-------|--------------|-----------------|-----------------|-------------|------------------|
| 0.12M | -            | -               | -               | -           | -                |
| WPC   | 2.418k       | 118.78000k      | 121.19750k      | 2.734k      | -                |

**Result**

| Mode             | Result | 15dB<br>(Hz) | FI-15dB<br>(Hz) | Fh-15dB<br>(Hz) | OBW<br>(Hz) | FI-OBW<br>(Hz) | Fh-OBW<br>(Hz) | Limit<br>(Range) |
|------------------|--------|--------------|-----------------|-----------------|-------------|----------------|----------------|------------------|
| WPC              | -      | -            | -               | -               | -           | -              | -              | -                |
| 0.12MHz_TnomVnom | Pass   | 2.418k       | 118.78000k      | 121.19750k      | 2.734k      | 118.73563k     | 121.46927k     | -                |

## WPC

### 0.12MHz\_TnomVnom

Ch Freq  
120kHz

Span  
5kHz

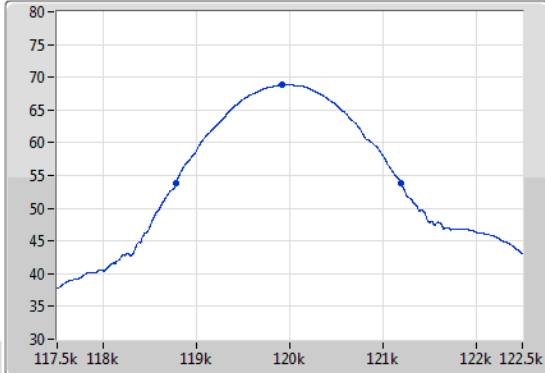
RBW  
1kHz

VBW  
3kHz

Sweep Time  
10ms

Detector Type  
Peak

Port 1 



Ch Freq  
120kHz

Span  
5kHz

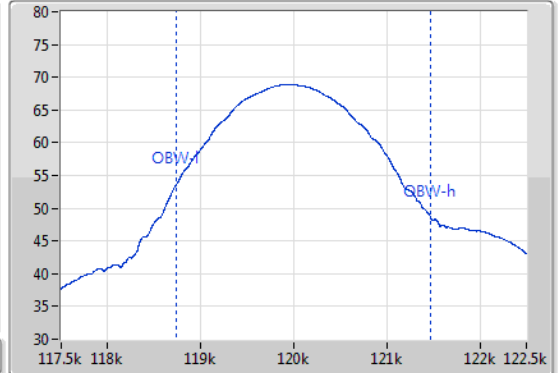
RBW  
1kHz

VBW  
3kHz

Sweep Time  
10ms

Detector Type  
Peak

Port 1 



| 15dB(Hz) | Fl-15dB(Hz) | Fh-15dB(Hz) | OBW(Hz) | Fl-OBW(Hz) | Fh-OBW(Hz) | Limit(Range) |
|----------|-------------|-------------|---------|------------|------------|--------------|
| 2.418k   | 118.78000k  | 121.19750k  | 2.734k  | 118.73563k | 121.46927k | -            |

## EBW