



FCC / ISED Test Report

For:
Wire Pulse, Inc.

Model:
RSS300

Product Description:
Scout is an IoT device that creates real-time activity and location tracking of each individual asset in a company's inventory.

FCC ID: 2BBHT-RSS300

Applied Rules and Standards:
47 CFR Part 15.209 and 15.225
RSS-210 Issue 10 & RSS-Gen Issue 5

REPORT #: EMC_MPCON_007_23001_FCC_15_225_Rev1

DATE: 2023-08-29



A2LA Accredited

IC recognized #
3462B-1

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1 Assessment

The following device was evaluated against the applicable radiated emissions criteria specified in FCC rules Parts 15.209, and 15.225 of Title 47 of the Code of Federal Regulations and the relevant ISSED Canada standard RSS-210 Issue 10, and RSS-Gen Issue 5.

| Company | Description | Model # |
|------------------|---|---------|
| Wire Pulse, Inc. | Scout is an IoT device that creates real-time activity and location tracking of each individual asset in a company's inventory. | RSS300 |

Responsible for Testing Laboratory:

| Arndt Stoecker | | | |
|----------------|------------|-----------------------------------|-----------|
| 2023-08-29 | Compliance | (Director of Regulatory Services) | |
| Date | Section | Name | Signature |

Responsible for the Report:

| Cheng Song | | | |
|------------|------------|----------------|-----------|
| 2023-08-29 | Compliance | (EMC Engineer) | |
| Date | Section | Name | Signature |

The test results of this test report relate exclusively to the test item specified in Section 3.
CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

| | |
|------------------------------------|------------------------|
| Company Name: | CETECOM Inc. |
| Department: | Compliance |
| Street Address: | 411 Dixon Landing Road |
| City/Zip Code | Milpitas, CA 95035 |
| Country | USA |
| Telephone: | +1 (408) 586 6200 |
| Fax: | +1 (408) 586 6299 |
| EMC Lab Manager: | Arndt Stoecker |
| Responsible Project Leader: | Sangeetha Sivaraman |

2.2 Identification of the Client

| | |
|------------------------|------------------------|
| Client's Name: | MP Consulting, LLC |
| Street Address: | 501 West Colfax Street |
| City/Zip Code | Palatine, IL 60067 |
| Country | USA |

2.3 Identification of the Manufacturer

| | |
|-------------------------------|---------------------------|
| Manufacturer's Name: | A Making Company, LLC |
| Manufacturers Address: | 100 Oakwood Road, Suite H |
| City/Zip Code | Lake Zurich, IL 60047 |
| Country | USA |

3 Equipment Under Test (EUT)

3.1 EUT Specifications

| | |
|---|---|
| Model No: | RSS300 |
| HW Version : | 3.0 |
| SW Version : | 3.0.0 |
| FCC ID: | 2BBHT-RSS300 |
| PMN: | Scout |
| Product Description: | Scout is an IoT device that creates real-time activity and location tracking of each individual asset in a company's inventory. |
| Radio Information: | RFID: <ul style="list-style-type: none"> Module: STMicroelectronics ST25R95-VMD5T 13.56MHz, ASK |
| Antenna Information: | Molex 1462360001 |
| Power Supply/ Rated Operating Voltage Range: | 3.8VDC, 4900mAh/18.6Wh Lithium Polymer Battery (Rechargeable) |
| Operating Temperature Range | -20°C - +60°C |
| Sample Revision | <input type="checkbox"/> Prototype Unit; <input type="checkbox"/> Production Unit; <input checked="" type="checkbox"/> Pre-Production |

3.2 EUT Sample details

| EUT # | Model Number | HW Version | SW Version | Notes/Comments |
|-------|--------------|------------|------------|----------------|
| 1 | RSS300 | 3.0 | 3.0.0 | |

3.3 Accessory Equipment (AE) details

| AE # | Type | Manufacturer | Serial Number |
|------|------|--------------|---------------|
| 1 | | | |

3.3 Test Sample Configuration

| EUT Set-up # | EUT / AE used for set-up | Comments |
|--------------|--------------------------|----------|
| 1 | EUT#1 | |

3.4 Justification for Worst Case Mode of Operation

During the testing process, the EUT was tested with transmitter sets on single channel, and highest possible duty cycle. For radiated measurements, all data in this report shows the worst case between horizontal and vertical antenna polarizations and for all orientations of the EUT. The worst is with EUT in Y-axis and antenna in vertical polarization.

4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to assess the performance of the EUT according to the relevant radiated emissions requirements specified in FCC rules part 15.209 and 15.225 of Title 47 of the Code of Federal Regulations and Radio Standard Specification RSS-210 Issue 10 of ISED Canada.

5 Measurement Results Summary

| Test Specification | Test Case | Temperature and Voltage Conditions | Mode | PASS | NA | NP | Result |
|--|---------------------------------|---|------|------|----|----|----------|
| §15.225(d); §15.209 RSS-210 I10; RSS-Gen I5 8.9 | TX Spurious emissions- Radiated | Nominal | RFID | ■ | □ | □ | Complies |
| §15.225(a,b,c); RSS-210 I10 B6 a; | Field strength in band mask | Nominal | RFID | ■ | □ | □ | Complies |
| §15.225(e); RSS-210 I10 B6 b); | Frequency stability | Nominal and Extreme Voltage and Temperature | RFID | ■ | □ | □ | Complies |
| §15.207(a) RSS Gen I5 8.8 | AC Conducted Emissions | Nominal | RFID | □ | ■ | □ | Note 2 |

Note 1: NA= Not Applicable; NP= Not Performed.

Note 2: EUT does not draw power from public mains.

6 **Measurement Uncertainty**

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor $k=2$.

| Measurement System | EMC 1 | EMC 2 |
|----------------------------------|---------|---------|
| Conducted Emissions (mains port) | 1.12 dB | 0.46 dB |
| Radiated Emissions | | |
| (<30 MHz) | 3.66 dB | 3.88 dB |
| (30 MHz – 1 GHz) | 3.17 dB | 3.34 dB |
| (1 GHz – 3 GHz) | 5.01 dB | 4.45 dB |
| (> 3 GHz) | 4.0 dB | 4.79 dB |

6.1 **Environmental Conditions During Testing:**

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25° C
- Relative humidity: 40-60%

6.2 **Dates of Testing:**

6/19/2023

6.3 **Decision Rule:**

Cetecom advanced follows ILAC G8:2019 chapter 4.2.1 (Simple Acceptance Rule).

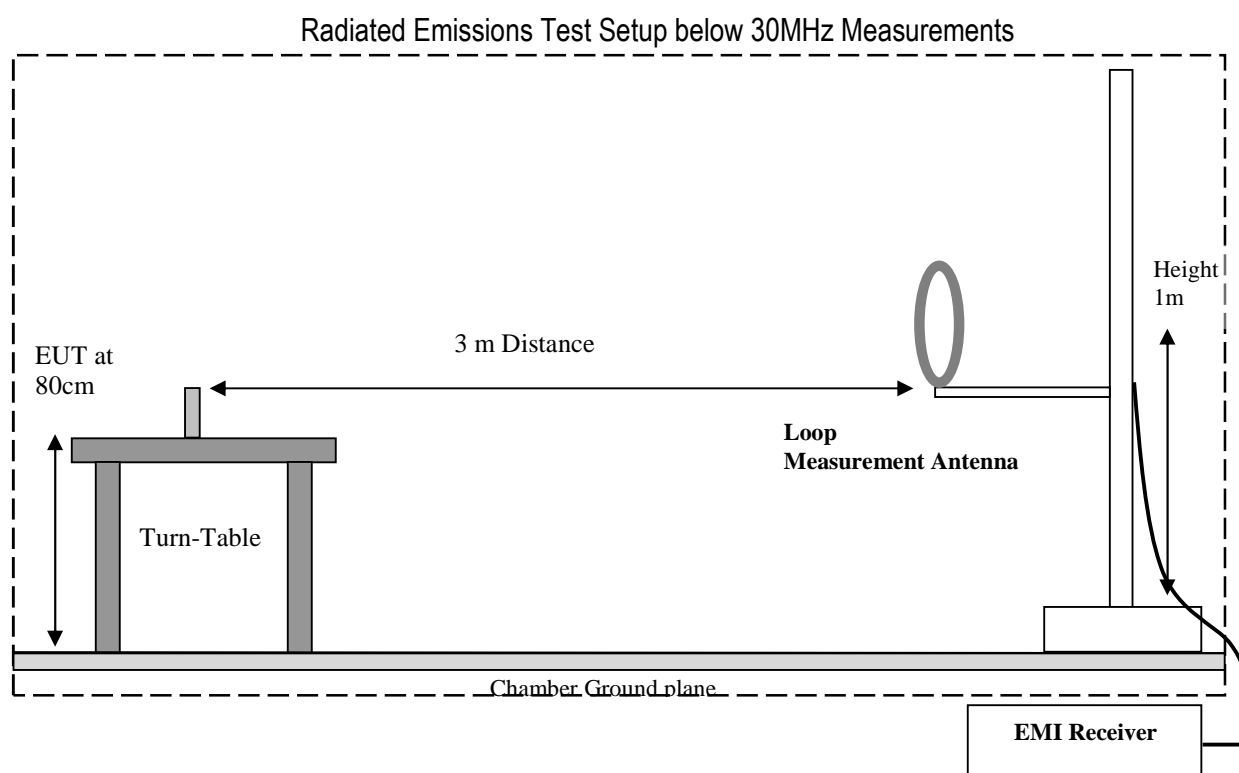
Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3. The measurement uncertainty is mentioned in this test report, See chapter 9, but is not taken into account – neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong.

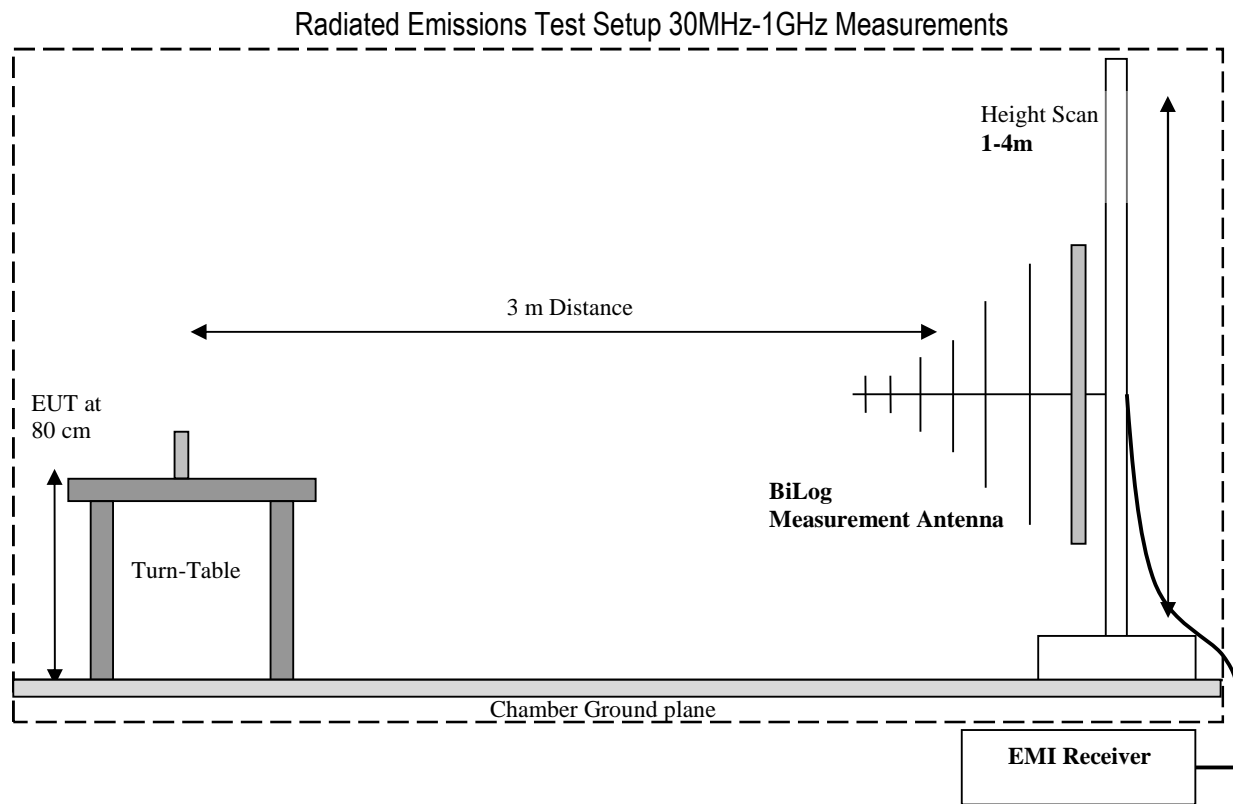
7 Measurement Procedures

7.1 Radiated Measurement

The radiated measurement is performed according to ANSI C63.10 (2013)

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.





7.1.1 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

1. Measured reading in dB μ V
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

$$FS \text{ (dB}\mu\text{V/m)} = \text{Measured Value on SA (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$$

Example:

| Frequency (MHz) | Measured SA (dB μ V) | Cable Loss (dB) | Antenna Factor Correction (dB) | Field Strength Result (dB μ V/m) |
|-----------------|--------------------------|-----------------|--------------------------------|--------------------------------------|
| 1000 | 80.5 | 3.5 | 14 | 98.0 |

To correct for distance when measuring at a distance other than the specification distance;

- For measurements below 30 MHz, Distance Factor = $40\log(\text{SpecDistance}/\text{TestDistance})$
- For measurements above 30 MHz, Distance Factor = $20\log(\text{SpecDistance}/\text{TestDistance})$.

Example:

| Frequency (MHz) | FCC 15.209 limit @ 30m (uV/m) | FCC 15.209 limit @ 30m (dBuV/m) | FCC 15.209 limit @ 3m (dBuV/m) |
|-----------------|-------------------------------|---------------------------------|--------------------------------|
| 10 | 30 | 29.54 | 69.54 |

8 Test Result Data

8.1 Radiated Transmitter Spurious Emissions and Restricted Bands

8.1.1 Measurement according to ANSI C63.10

Spectrum Analyzer Settings:

- Frequency = 9 KHz – 30 MHz
- RBW = 9 KHz
- Detector: Peak
- Frequency = 30 MHz – 1 GHz
- Detector = Peak / Quasi-Peak
- RBW= 120 KHz (<1GHz)
- Radiated spurious emissions shall be measured for the transmit frequencies, transmit power, and data rate for the lowest, middle and highest channel in each frequency band of operation and for the highest gain antenna for each antenna type, and using the appropriate parameters and test requirements.
- The highest (or worst-case) data rate shall be recorded for each measurement.
- For testing frequencies below 30 MHz at distance other than the specified in the standard, the limit conversion is calculated by using the FCC materials for the ANSI 63 committee issued on January, 27 1991.

8.1.2 Limits:

FCC §15.225

- The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

FCC §15.209 & RSS-210 / RSS-Gen 8.9

- Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency of emission (MHz) | Field strength (μV/m) | Measurement Distance (m) | Field strength @ 3m (dBμV/m) |
|-----------------------------|-----------------------|--------------------------|------------------------------|
| 0.009–0.490 | 2400/F(kHz) / ----- | 300 | - |
| 0.490–1.705 | 24000/F(kHz) / ----- | 30 | - |
| 1.705–30.0 | 30 / (29.5) | 30 | - |
| 30–88 | 100 | 3 | 40 dBμV/m |
| 88–216 | 150 | 3 | 43.5 dBμV/m |
| 216–960 | 200 | 3 | 46 dBμV/m |
| Above 960 | 500 | 3 | 54 dBμV/m |

FCC §15.205 & RSS-Gen 8.10

- Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|-------------------|---------------------|---------------|-------------|
| 0.090-0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.15 |
| 10.495-0.505 | 16.69475-16.69525 | 608-614 | 5.35-5.46 |
| 2.1735-2.1905 | 16.80425-16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 25.5-25.67 | 1300-1427 | 8.025-8.5 |
| 4.17725-4.17775 | 37.5-38.25 | 1435-1626.5 | 9.0-9.2 |
| 4.20725-4.20775 | 73-74.6 | 1645.5-1646.5 | 9.3-9.5 |
| 6.215-6.218 | 74.8-75.2 | 1660-1710 | 10.6-12.7 |
| 6.26775-6.26825 | 108-121.94 | 1718.8-1722.2 | 13.25-13.4 |
| 6.31175-6.31225 | 123-138 | 2200-2300 | 14.47-14.5 |
| 8.291-8.294 | 149.9-150.05 | 2310-2390 | 15.35-16.2 |
| 8.362-8.366 | 156.52475-156.52525 | 2483.5-2500 | 17.7-21.4 |
| 8.37625-8.38675 | 156.7-156.9 | 2690-2900 | 22.01-23.12 |
| 8.41425-8.41475 | 162.0125-167.17 | 3260-3267 | 23.6-24.0 |
| 12.29-12.293 | 167.72-173.2 | 3332-3339 | 31.2-31.8 |
| 12.51975-12.52025 | 240-285 | 3345.8-3358 | 36.43-36.5 |
| 12.57675-12.57725 | 322-335.4 | 3600-4400 | Above 38.6 |
| 13.36-13.41 | | | |

- Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

*PEAK LIMIT= 74 dBμV/m

*AVG. LIMIT= 54 dBμV/m

8.1.3 Test conditions and setup:

| Ambient Temperature | EUT Set-Up # | EUT operating mode | Power Input |
|---------------------|--------------|--------------------|-------------|
| 22° C | 1 | NFC | Battery |

8.1.4 Measurement result:

| Plot # | Scan Frequency | Limit | Result |
|--------|-------------------|---|--------|
| 1 | 9 kHz – 30 MHz | See section 8.1.2 | Pass |
| 2 | 30 MHz – 1 GHz | See section 8.1.2 | Pass |
| 3 | 13.11 – 14.01 MHz | 13.553-13.567 MHz: 15,848 uV/m @ 30 m 13.410-13.553 MHz: 334 uV/m @ 30 m 13.567-13.710 MHz: 334 uV/m @ 30 m 13.110-13.410 MHz: 106 uV/m @ 30 m 13.710-14.010 MHz: 106 uV/m @ 30 m | Pass |

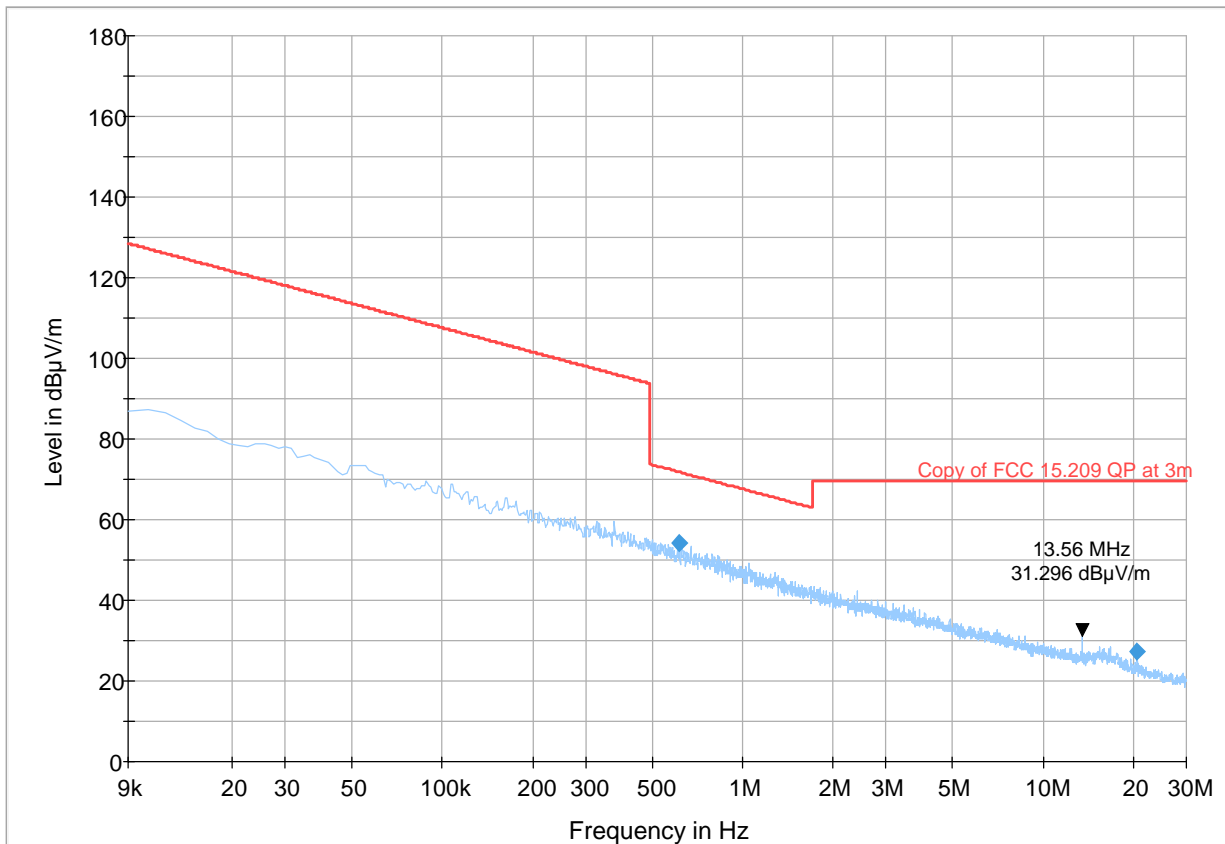
Test Report #: EMC_MPCON_007_23001_FCC_15_225_Rev1
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FCC ID: 2BBHT-RSS300

8.1.5 Measurement Plots:

Plot # 1

| Frequency (MHz) | MaxPeak (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Comment |
|-----------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|--------------|---------|
| 0.613 | 54.368 | 71.85 | 17.48 | 1000.0 | 3.000 | 150.0 | H | 11.0 | -16.7 | |
| 20.617 | 27.218 | 69.50 | 42.28 | 1000.0 | 3.000 | 150.0 | V | 90.0 | -18.3 | |



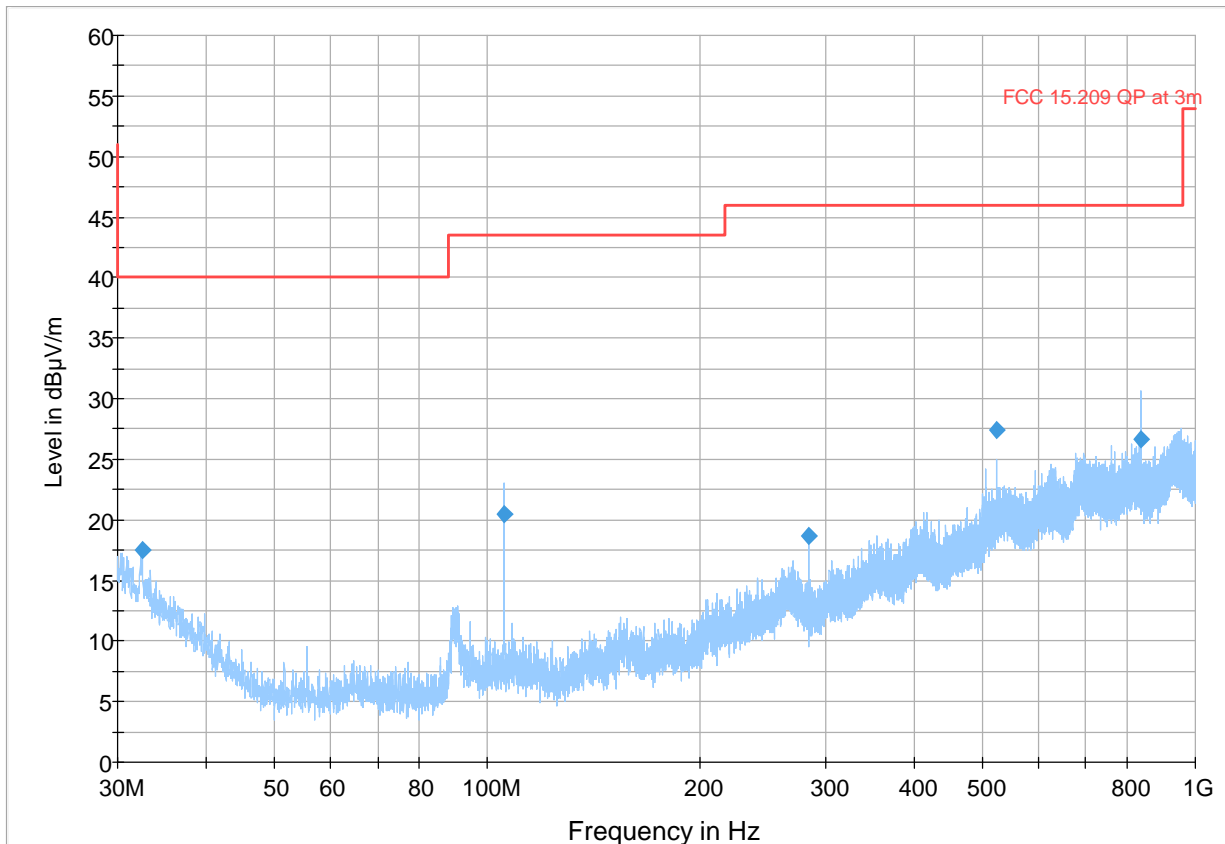
— Preview Result 1-PK+ * PK+ — Copy of FCC 15.209 QP at 3m ◆ Final_Result PK+

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Plot # 2

| Frequency (MHz) | MaxPeak (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Comment |
|-----------------|------------------------|----------------------|-------------|-----------------|-----------------|-------------|-----|---------------|--------------|---------|
| 32.490 | 17.535 | 40.00 | 22.47 | 1000.0 | 100.000 | 309.0 | V | 270.0 | -14.1 | |
| 105.692 | 20.470 | 43.50 | 23.03 | 1000.0 | 100.000 | 289.0 | H | 120.0 | -18.8 | |
| 284.754 | 18.692 | 46.02 | 27.33 | 1000.0 | 100.000 | 165.0 | H | 144.0 | -13.7 | |
| 524.312 | 27.431 | 46.02 | 18.59 | 1000.0 | 100.000 | 162.0 | V | 277.0 | -6.6 | |
| 836.005 | 26.638 | 46.02 | 19.38 | 1000.0 | 100.000 | 163.0 | V | -89.0 | -3.9 | |



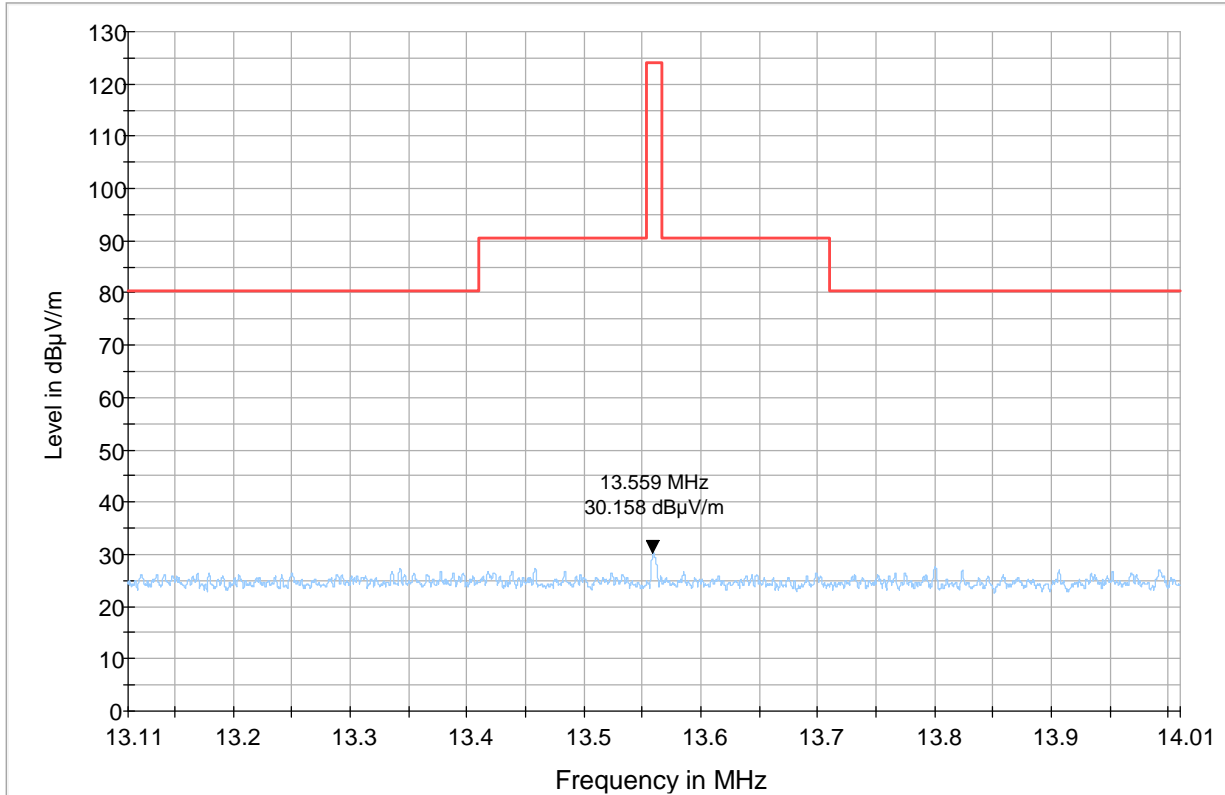
Preview Result 1-PK+ FCC 15.209 QP at 3m Final_Result PK+

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Plot # 3

| Frequency (MHz) | MaxPeak (dBμV/m) | QuasiPeak (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Comment |
|-----------------|------------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|--------------|---------|
| --- | --- | --- | --- | --- | --- | --- | --- | | --- | --- | |



— Preview Result 1-PK+ * Critical_Freqs PK+
— FCC 15.225 Fundamental converted to 3m ◆ Final_Result PK+
◆ Final_Result QPK

8.2 Frequency Stability

8.2.1 Measurement according to ANSI C63.10

8.2.2 Limits:

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

8.2.3 Test conditions and setup:

| Ambient Temperature | EUT Set-Up # | EUT operating mode | Power Input |
|---------------------|--------------|--------------------|-------------|
| 22° C | 1 | RFID | Battery |

8.2.4 Measurement Result:

| Temp (°C) | Measured Frequency (MHz) | Frequency Error (Hz) | Limit (+/- Hz) | Result |
|-----------|--------------------------|----------------------|----------------|--------|
| -20 | 13.559718 | 282 | 1356 | Pass |
| -10 | 13.559718 | 282 | 1356 | Pass |
| 0 | 13.559722 | 278 | 1356 | Pass |
| 10 | 13.559726 | 274 | 1356 | Pass |
| 20 | 13.559728 | 272 | 1356 | Pass |
| 30 | 13.559728 | 272 | 1356 | Pass |
| 40 | 13.559730 | 270 | 1356 | Pass |
| 50 | 13.559728 | 272 | 1356 | Pass |

Note: Internal battery can only be charged via wireless power transfer, testing with voltage variation is not applicable.

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9 Test setup photos

Setup photos are included in supporting file name: "EMC_MPCON_007_23001_FCC_Setup_Photos"

10 Test Equipment And Ancillaries Used For Testing

| Equipment Name/Type | Manufacturer | Model | Serial # | Calibration Cycle | Last Calibration Date |
|------------------------------|-----------------|-----------|--------------|-------------------|-----------------------|
| Biconilog Antenna | A.H. Systems | BiLA2G | 569343 | 3 years | 12/01/2020 |
| Active Loop Antenna | ETS Lindgren | 6507 | 161344 | 3 years | 10/30/2020 |
| Spectrum Analyzer | R&S | ESU40 | 100251 | 3 years | 09/13/2021 |
| Thermometer Humidity Monitor | CONTROL COMPANY | 36934-164 | 191871986 | 3 years | 10/20/2021 |
| Temperature Humidity Chamber | TestEquity | 123H | 246902000003 | - | - |

Note: Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.

Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

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Date of Report 2023-08-29

11 History

| Date | Report Name | Changes to report | Prepared by |
|------------|-------------------------------------|-----------------------|-------------|
| 2023-08-15 | EMC_MPCON_007_23001_FCC_15_225 | Initial Version | Cheng Song |
| 2023-08-29 | EMC_MPCON_007_23001_FCC_15_225_Rev1 | Updated section 8.1.5 | Cheng Song |

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