TÜVRheinland®
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# Emissions
# Test Report

**EUT Name:** RFID Tag

**Model No.:** View 4

CFR 47, Part 15.231 and RSS-210 Issue 9 August 2016

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| | |
|---|---|
| *Report/Issue Date:* | October 2,2019 |
| *Job #* | 234110203-120 |
| *Report Number:* | 31964010.001 |

# Revisions

| Revision No. | Date MM/DD/YYYY | Reason for Change | Author |
|---|---|---|---|
| 0 | 10/2/2019 | Original Document | AJS |
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Note: Latest revision report will replace all previous reports.

# Statement of Compliance

| | |
|---|---|
| *Manufacturer:* | Panasonic Corporation of North America<br>28 East Main Street, Suite 2100<br>Rochester NY 14614<br>U.S.A |
| *Requester / Applicant:* | Igor Orlovich |
| *Name of Equipment:* | RFID Tag |
| *Model No.* | View 4 |
| *Type of Equipment:* | Intentional Radiator |
| *Application of Regulations:* | CFR 47 Part 15.231 and RSS 210 Issue 9 August 2016 |
| *Test Dates:* | August 11, 2019 to August 29, 2019 |

*Guidance Documents:*

CFR 47 Part 15.231 and RSS 210 Issue 9 August 2016

*Test Methods:*

Emissions: CFR 47 Part 15.231 and RSS Gen Issue 5 March 2019

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that the equipment described above has been shown to be compliant with the EMC requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in the Executive Summary of this report.

This report must not be used to claim product endorsement by A2LA or any agency of the U.S. Government. This report shall not be reproduced except in full, without the written authorization of TUV Rheinland of North America.

| | | | |
|---|---|---|---|
| Alexander Sowinski | October 2, 2019 | Josie Sabado | October 2, 2019 |
| Test Engineer | Date | A2LA Signatory | Date |

**Testing Cert #3331.02** **US1131** **US0185**

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# Table of Contents

# 1 Executive Summary

## *1.1 Scope*

This report is intended to document the status of conformance with the requirements of the CFR 47 Part 15.231 and RSS 210 Annex A based on the results of testing performed from August 11, 2019 through August 29, 2019, on the RFID Tag Model View 4 manufactured by Panasonic Corporation of North America. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

## *1.2 Purpose*

Testing was performed to evaluate the EMC performance of the EUT in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.

This test report documents the 433MHz radio implementation of the RFID Tag, which is based on 2-GFSK communication technology.

## 1.3 Summary of Test Results

**Table 1:** Summary of Test Results

| Test | Standards | Limit | Worse Case (Measured) | Result |
|---|---|---|---|---|
| Occupied Bandwidth | FCC part 15.231(c) and RSS-210 Annex A | 20 dB BW ≤ 0.25% of center freq.<br>99% BW ≤ 0.25% of center freq. | 250.80 kHz<br>217.20 kHz | **Complied** |
| Type of Momentary Signal | FCC part 15.231(a)(3) and RSS-210 A.1.1(c) | Total transmission time shall not exceed two seconds per hour | 1.056<br>sec /h r. | **Complied** |
| Radiated Output Power for Fundamental and Harmonic Frequencies | FCC part 15.231(a)(2) and RSS-210 A.1.2(a) | Below the applicable limits | 61.85<br>dBµV /m<br><br>25.38<br>dBµV/m | **Complied** |
| Out-of-Band Spurious Emissions and Band Edges (EUT in Transmit Mode) | FCC part 15.231(b)(3) and RSS-210 A.1.2(b) | Below the applicable limits | 43.05<br>dBµV/m | **Complied** |

## 1.4 Special Accessories

No special accessories were necessary in order to achieve compliance.

## 1.5 Equipment Modifications

None

# 2 Laboratory Information

## *2.1 Accreditations & Endorsements*

### 2.1.1 US Federal Communications Commission

TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct, Fremont, CA 94538, are recognized by the Commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (Registration No. US1131). The laboratory Scopes of Accreditation include Title 47 CFR Parts 15, 18 and 90. The accreditations are updated every three years.

### 2.1.2 NIST / A2LA

TUV Rheinland of North America is accredited by the National Voluntary Laboratory Accreditation Program, which is administered under the auspices of the National Institute of Standards and Technology. The laboratory has been assessed and accredited in accordance with ISO Guide 17025:2017. The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

### 2.1.3 ISED

The Pleasanton 5-meter Semi-Anechoic Chamber, has been accepted by ISED to perform testing to 3 and 5 meters based on the test procedures described in ANSI C63.4-2014. The Fremont 10-meter Semi-Anechoic Chamber, has been accepted by ISED to perform testing to 3 and 10 meters based on the test procedures described in ANSI C63.4-2014. Under US0185

### 2.1.4 VCCI

The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct, Fremont, CA 94538, have been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Pleasanton: A-0326

VCCI Registration No. for Fremont: A-0327

### 2.1.5 Acceptance by Mutual Recognition Arrangement

The United States has an established agreement with specific countries under the Asia Pacific Laboratory Accreditation Corporation (APLAC) Mutual Recognition Arrangement. Under this agreement, all TUV Rheinland at 1279 Quarry Ln, Pleasanton, CA 94566 test results and test reports within the scope of the laboratory NIST / A2LA accreditation will be accepted by each member country.

## *2.2 Test Facilities*

Test facilities are located at 5015 Brandin Ct, Fremont, California, 94538, USA and 1279 Quarry Lane, Pleasanton, California 94566, USA (Fremont is the Pleasanton Annex).

### 2.2.1 Emission Test Facility

The Semi-Anechoic Chambers and AC Line Conducted measurement facilities used to collect radiated and conducted emissions data have been constructed in accordance with ANSI C63.7:1992. The Fremont 10 meter semi-anechoic chamber has been measured in accordance with and verified to comply with the theoretical volumetric normalized site attenuation of ANSI C63.4:2014 and SVSWR requirements of CISPR 16-1-4 Consol. Ed. 3.0 (2010-04), at test distances of 3 and 10 meters. This site has been described in reports dated November 1st, 2006, submitted to the FCC, and accepted by letter dated November 28, 2006. The site is listed with the FCC and accredited by A2LA (Testing Certificate #3331.02). The Pleasanton 5 meter semi-anechoic chamber has been verified to comply with the theoretical volumetric normalized site attenuation of ANSI C63.4:2009 and SVSWR requirements of CISPR 16-1-4 Consol. Ed. 3.0 (2010-04) at a test distance of 3 meters. This site has been described in reports dated November 1st, 2006, submitted to the FCC, and accepted by letter dated November 28, 2006. The site is listed with the FCC and accredited by A2LA (Testing Certificate #3331.02).

## *2.3 Measurement Uncertainty*

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

*The Combined Standard Uncertainty* is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities; it is equal to the positive square root of the sum of the variances or co-variances of these other quantities, weighted according to how the measurement result varies with changes in these quantities. The term *standard uncertainty* is the result of a measurement expressed as a standard deviation.

*The Expanded Uncertainty* defines an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurement and the fraction may be viewed as the coverage probability or level of confidence of the interval.

### 2.3.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dBμV/m) = RAW - AMP + CBL + ACF

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu V/m = 10^{\frac{dB\mu V/m}{20}}$$

**Sample radiated emissions calculation @ 30 MHz**

**Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)**

25 dBuV/m + 17.5 dB – 20 dB + 1.0 dB = 23.5 dBuV/m

### 2.3.2 Measurement Uncertainty

| **Per CISPR 16-4-2** | **$U_{lab}$** | **$U_{cispr}$** |
|---|---|---|
| **Radiated Disturbance @ 10 meters** | | |
| 30 – 1,000 MHz | 2.25 dB | 4.51 dB |
| **Radiated Disturbance @ 3 meters** | | |
| 30 – 1,000 MHz | 2.26 dB | 4.52 dB |
| 1 – 6 GHz | 2.12 dB | 4.25 dB |
| 6 – 18 GHz | 2.47 dB | 4.93 dB |
| **Conducted Disturbance @ Mains Terminals** | | |
| 150 kHz – 30 MHz | 1.09 dB | 2.18 dB |
| **Disturbance Power** | | |
| 30 MHz – 300 MHz | 3.92 dB | 4.3 dB |

## 2.4 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2005. Equipment calibration records are kept on file at the test facility.

# 3 Product Information

## *3.1 Product Description*

The View 4 is a RFID tag that operates at 433 MHz band. It consists of an RFID transmitter/receiver and an e-paper display processor. A button is incorporated that can initiate a manual RFID transmit cycle. The View 4 uses a 4" diagonal display. The View 4 RFID tag has an FCC ID under the Panasonic North American Grantee of ACJ-VT04-G3, and an Industry Canada ID of 216A-VT04-G3.

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## *3.2 Equipment Configuration*

A description of the equipment configuration is given in the Test Plan Section. The EUT was tested as called for in the test standard and was configured and operated in a manner consistent with the testes standard. The EUT was connected to rated power and allowed to reach intended operating conditions. The placement of the EUT system components was guided by the test standard and selected to represent typical installation conditions.

In the case of a EUT that can operate in more than one configuration, preliminary testing was performed to determine the configuration that produced maximum radiation.

The final configuration was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

## *3.3 Operating Mode*

A description of the operation mode is given in the Test Plan Section. In the case of a EUT that can operate in more than one state, preliminary testing was performed to determine the operating mode that produced maximum radiation.

The final operating mode was selected to produce the worst case radiation for emissions testing.

## *3.4 EUT Photos*

See “View4 Tag Front.jpg”

**Figure 1** - Photo of the EUT – Front

See “View4 Edge1.jpg”

**Figure 2** - Photo of the EUT – Front & Sides

See “View4 Edge2.jpg”

**Figure 3** – Photo of the EUT – Back & Sides

See “View4 PCBA Back.jpg”

**Figure 4** – Photo of the EUT – PCB detail – Back

See “View4 PCBA.jpg”

**Figure 5** – Photo of the EUT – PCB detail – Front

See “View4 Antenna.jpg”

**Figure 6** – Photo of the EUT – Detail – EUT with temporary SMA connector

# 4 Radiated Emissions in Transmit Mode

## *4.1 20 dB Bandwidth and 99% Bandwidth*

### 4.1.1 Overview of Test

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Results** | **Complies** (as tested per this report) | | | | **Date** | 08/20/19 | |
| **Product** | RFID Tag View 4 | | | **Serial#** | 01AF, 0195, 0194 | | |
| **EUT Powered By** | 3V | **Temp** | 24º C | **Humidity** | 45% | **Pressure** | 996 mbar |
| **Frequency Range** | 433.164 MHz to 434.676 MHz | | | | | | |
| **Perf. Criteria** | (Below Limit) | | **Test Performed By** | | Alexander Sowinski | | |

### 4.1.2 Test Specifications

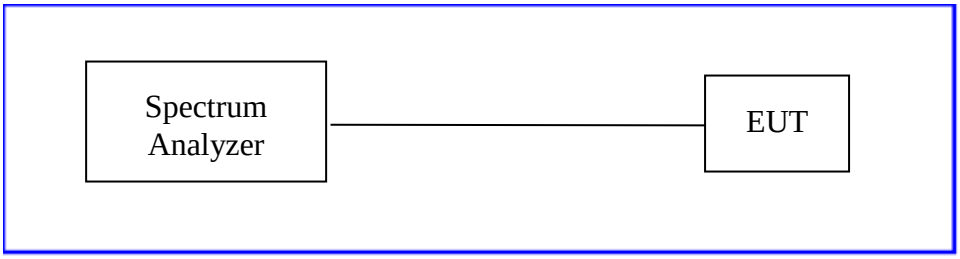
15.231(c)

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

A.1.3 Bandwidth of Momentary Signals

The 99% bandwidth of momentarily operated devices shall be less or equal to 0.25% of the centre frequency for devices operating between 70 MHz and 900 MHz. For devices operating above 900 MHz, the 99% bandwidth shall be less or equal to 0.5% of the centre frequency.

### 4.1.3 Test Setup



### 4.1.4 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

**Table 2:** Occupied Bandwidth – Test Results

| **Bandwidth (MHz)** | | | |
|---|---|---|---|
| **Data Rate** | **Freq. (MHz)** | **20dB Bandwidth (KHz)** | **99% Bandwidth (KHz)** |
| **200 kb/s** | 433.272 | 250.80 | 216.00 |
| | 433.704 | 250.80 | 216.00 |
| | 434.568 | 250.80 | 217.20 |
| | **Note:** None | | |

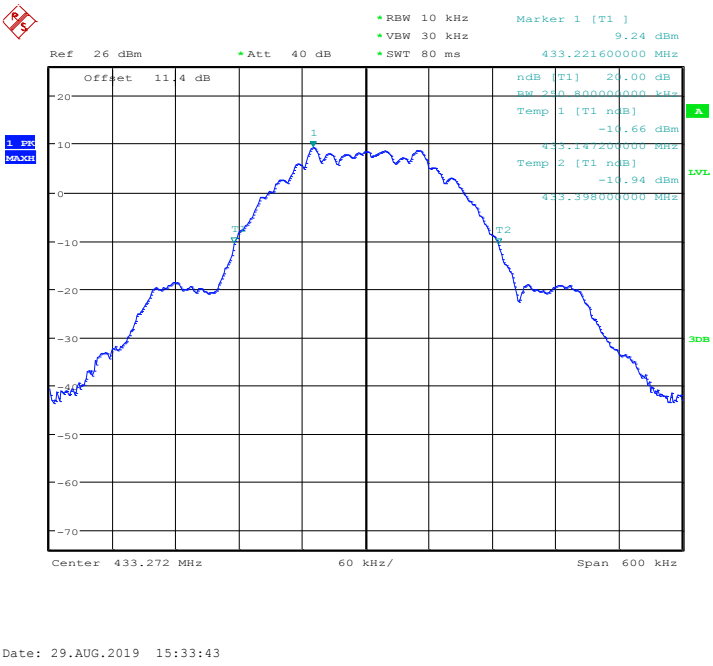



**Figure 7:** 433.272MHz, 20dB Bandwidth

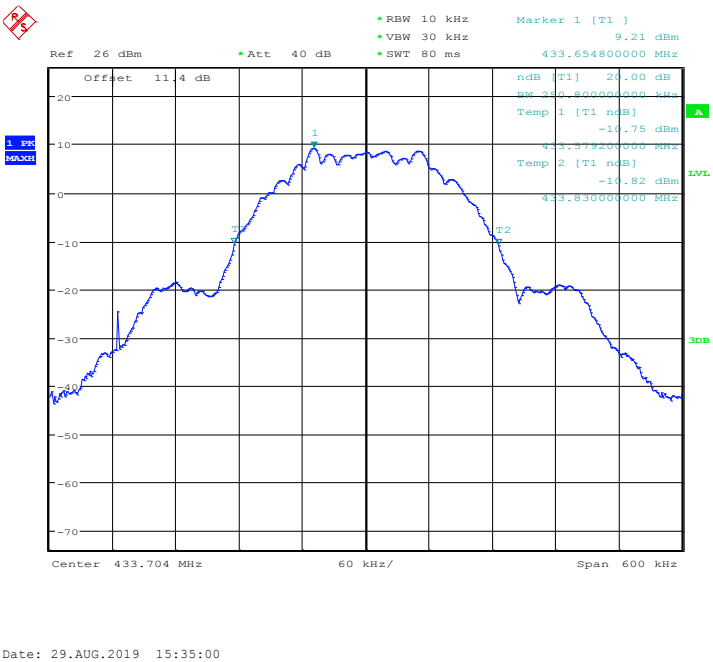



**Figure 8:** 433.704MHz, 20dB Bandwidth

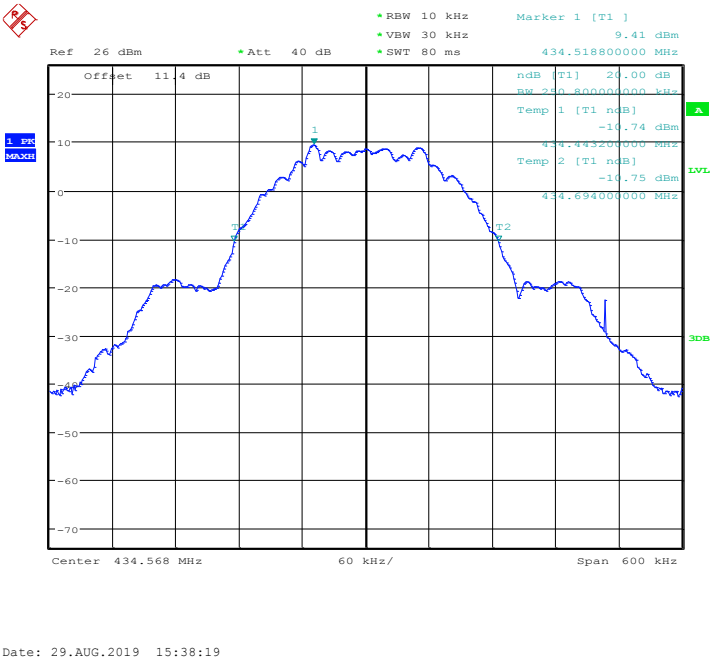



**Figure 9:** 434.568MHz, 20dB Bandwidth

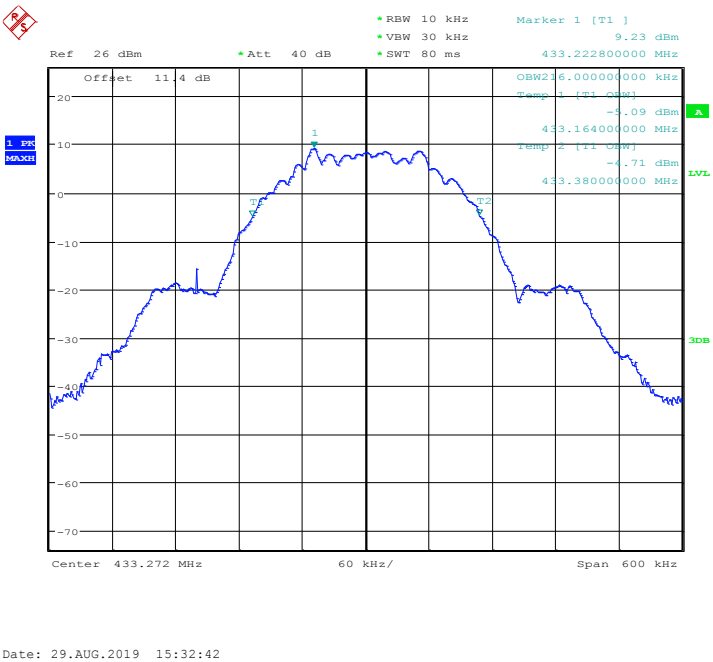



**Figure 10:** 433.272MHz, 99% Occupied Bandwidth

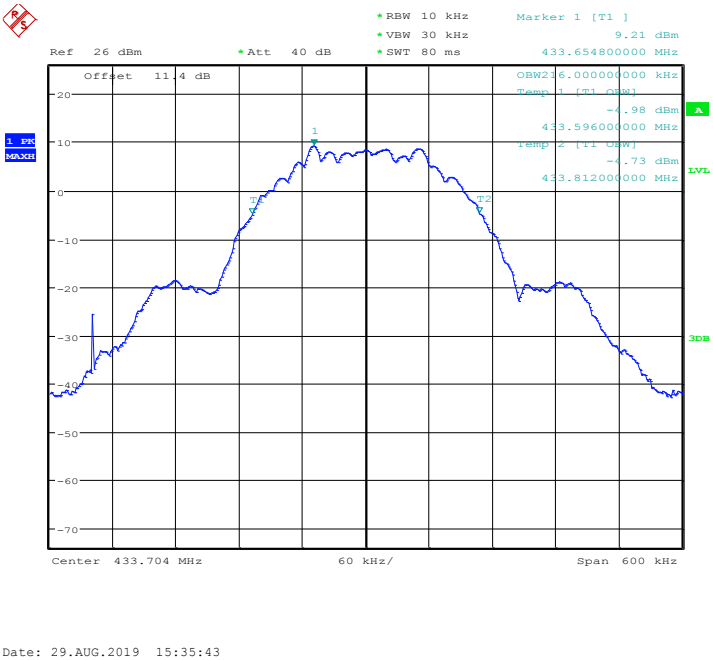



**Figure 11:** 433.704MHz, 99% Occupied Bandwidth

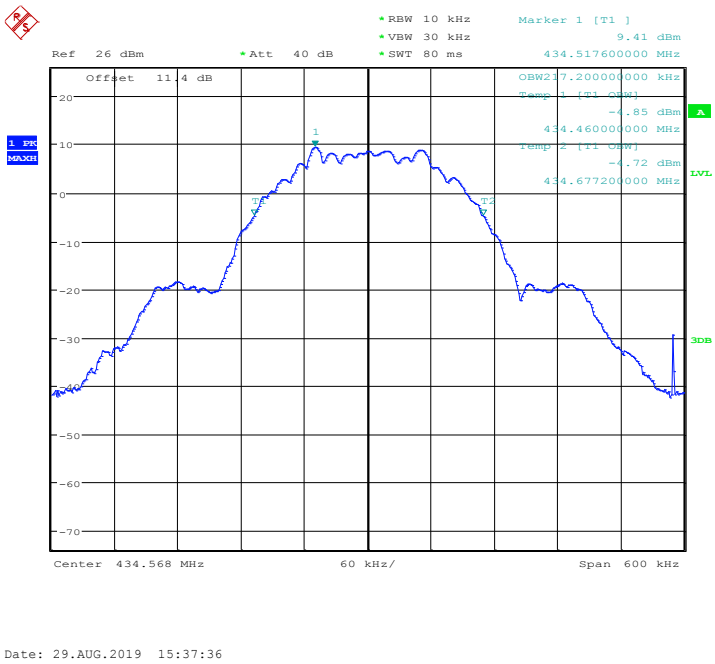



**Figure 12:** 433.568MHz, 99% Occupied Bandwidth

## 4.2 Peak Type of Momentary Signal

### 4.2.1 Overview of Test

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Results** | **Complies** (as tested per this report) | | | | | **Date** | 08/20/2019 | |
| **Product** | View 4 | | | **Serial#** | | 0196 | | |
| **EUT Powered By** | 3V | **Temp** | 24º C | **Humidity** | 45% | **Pressure** | 996 mbar | |
| **Frequency Range** | 433.164 MHz to 434.676 MHz | | | | | | | |
| **Perf. Criteria** | (Below Limit) | | **Test Performed By** | | Alexander Sowinski | | | |

### 4.2.2 Test Specifications

15.231(a) 3

Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

A.1.1 (c)

Periodic transmissions at regular, predetermined intervals are not permitted, except as (c) specified in Section A.1.4. However, polling or supervision transmissions that determine system integrity of transmitters used in security or safety applications are permitted, provided the total duration of transmission does not exceed 2 seconds per hour for each transmitter

### 4.2.3 Results

Based on the following information from the customer, the EUT was found to be compliant to the requirements of the test standard(s).

Each periodic announce is 0.88ms long, every 3sec. For a one (1) hour observation period, that translates to just over one second (1.056s) on-the-air time.

## 4.3 Radiated Output Power for Fundamental and Harmonic Frequencies

### 4.3.1 Overview of Test

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Results** | **Complies** (as tested per this report) | | | | **Date** | 08/15/2019 | |
| **Product** | View 4 | | | **Serial#** | 0196 | | |
| **EUT Powered By** | 3V | **Temp** | 23º C | **Humidity** | 41% | **Pressure** | 998 mbar |
| **Frequency Range** | 433.164 MHz to 434.676 MHz | | | | | | |
| **Perf. Criteria** | (Below Limit) | | **Test Performed By** | | Alexander Sowinski | | |

### 4.3.2 Test Specifications

15.231(b) 2

The field strength of emissions from intentional radiators operated under this section shall not exceed the following:

| Fundamental frequency (MHz) | Field strength of fundamental (microvolts/meter) | Field strength of spurious emissions (microvolts/meter) |
|---|---|---|
| 40.66-40.70 | 2250 | 225 |
| 70-130 | 1,250 | 125 |
| 130-174 | [1]1,250 to 3,750 | [1]125 to 375 |
| 174-260 | 3,750 | 375 |
| 260-470 | [1]3,750 to 12,500 | [1]375 to 1,250 |
| Above 470 | 12,500 | 1,250 |

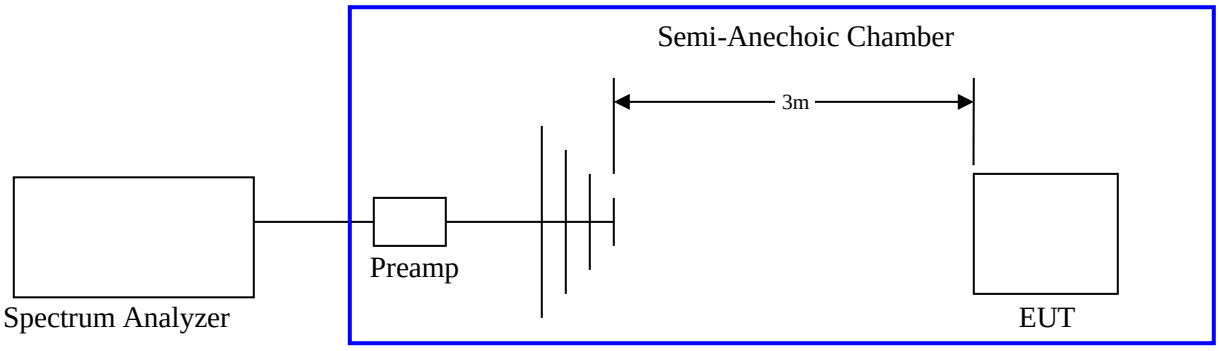
[1] Linear interpolations.

Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions as shown in above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization.

A.1.2 (a)

The field strength of emissions from momentarily operated intentional radiators shall (a) not exceed the limits outlined in Table, based on the average value of the measured emissions. The requirements of the Pulsed Operation section of RSS-Gen apply for averaging pulsed emissions and limiting peak emissions. Alternatively, compliance with the limits in Table A1 may be demonstrated using an International Special Committee on Radio Interference (CISPR) quasi-peak detector.

### 4.3.3 Test Setup:




### 4.3.4 Limits

| Standard | Fundamental frequency (MHz) | Field strength of fundamental (microvolts/meter) | Field strength of spurious emissions (microvolts/meter) |
|---|---|---|---|
| CFR 47, Part 15, Subpart C | 260-470 | [1]3,750 to 12,500 | [1]375 to 1,250 |
| RSS-210 Issue 9 | 260-470 | [1]3,750 to 12,500 | [1]375 to 1,250 |
| | | | |
| CFR 47, Part 15, Subpart C | 433.272 | 80.80 | 60.80 |
| CFR 47, Part 15, Subpart C | 433.704 | 80.82 | 60.82 |
| CFR 47, Part 15, Subpart C | 434.568 | 80.85 | 60.85 |

[1]Linear interpolations.

### 4.3.5 Deviations from Standard

The duty cycle correction is calculated as follows.

$\delta(\text{dB}) = 20\log(\Delta)$ where

$\delta$ is the duty cycle correction factor (dB)

$\Delta$ is the duty cycle (dimensionless) (100 * ((.88mS)/(.88mS+3sec)))

$\delta(\text{dB}) = -30.66$

### 4.3.6 Test results:

The EUT is Compliant to the requirements of this test.

### 4.3.7 Test Data

| Frequency (MHz) | Quasi Peak (dBuv/m) | Polarity (V/H) | Height (cm) | Azimuth (degree) | δ(dB) Duty cycle correction | Corrected Value (dBuv/m) |
|---|---|---|---|---|---|---|
| 433.272 | 76.7 | V | 400 | 0 | -30.66 | 46.04 |
| 866.544 | 56.04 | H | 300 | 0 | -30.66 | 25.38 |

| Frequency (MHz) | Quasi Peak (dBuv/m) | Polarity (V/H) | Height (cm) | Azimuth (degree) | δ(dB) Duty cycle correction | Corrected Value (dBuv/m) |
|---|---|---|---|---|---|---|
| 433.704 | 91.29 | H | 400 | 0 | -30.66 | 60.63 |
| 867.408 | 31.84 | V | 200 | 0 | -30.66 | 1.18 |

| Frequency (MHz) | Quasi Peak (dBuv/m) | Polarity (V/H) | Height (cm) | Azimuth (degree) | δ(dB) Duty cycle correction | Corrected Value (dBuv/m) |
|---|---|---|---|---|---|---|
| 434.568 | 92.51 | V | 300 | 0 | -30.66 | 61.85 |
| 869.136 | 31.98 | H | 400 | 0 | -30.66 | 1.32 |

## 4.4 Spurious Emissions

### 4.4.1 Overview of Test

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Results** | **Complies** (as tested per this report) | | | | **Date** | 08/15/2019 | |
| **Product** | View 4 | | | **Serial#** | 0196 | | |
| **EUT Powered By** | 3V | **Temp** | 23º C | **Humidity** | 41% | **Pressure** | 998 mbar |
| **Frequency Range** | 433.164 MHz to 434.568 MHz | | | | | | |
| **Perf. Criteria** | (Below Limit) | | **Test Performed By** | | Alexander Sowinski | | |

### 4.4.2 Test Specifications

15.231 (b) 3

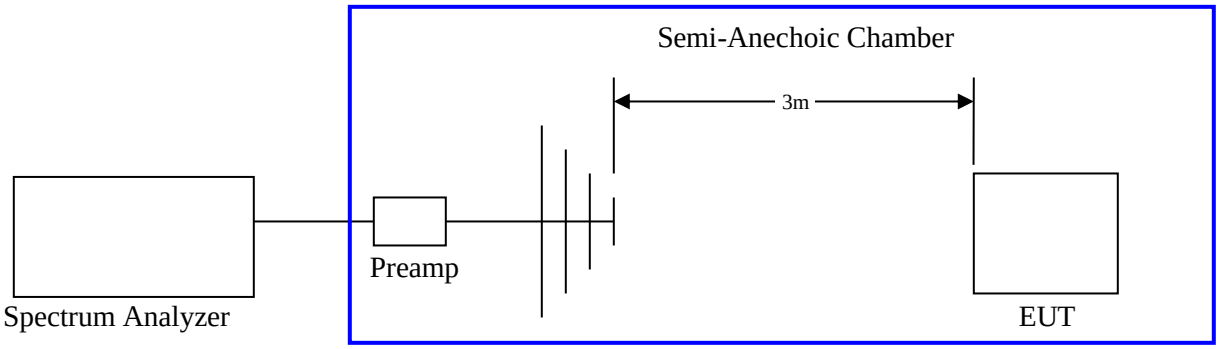
The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

A.1.2 (b)

Unwanted emissions shall be 10 times below the fundamental emissions field strength (b) limits in Table A1 or comply with the limits specified in RSS-Gen, whichever is less stringent.

### 4.4.3 Test Setup

Normal Conditions Test Setup:



### 4.4.4 Limits

| Standard | Fundamental Frequency (MHz) | Field strength of fundamental (microvolts/meter) | Field strength of spurious emissions (microvolts/meter) |
|---|---|---|---|
| CFR 47, Part 15, Subpart C | 260-470 | [1]3,750 to 12,500 | [1]375 to 1,250 |
| | | | |
| RSS-210 Issue 9 | 260-470 | [1]3,750 to 12,500 | [1]375 to 1,250 |

[1]Linear interpolations.

### 4.4.5 Deviations

A Quasi-Peak detector was used to measure the emissions < 1000MHz.

### 4.4.6 Results

| Frequency MHz | Level dBuV/m | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB |
|---|---|---|---|---|---|---|
| 1.561225 | 50.11 | PE | 125 | 0 | 63.74 | -13.62 |
| 12.89745 | 46.8 | PE | 125 | 0 | 69.5 | -22.7 |
| 0.409963 | 53.48 | PE | 125 | 0 | 76.24 | -22.76 |
| 0.159284 | 65.5 | PE | 125 | 0 | 89.18 | -23.68 |
| 25.08914 | 45.75 | PE | 125 | 0 | 69.5 | -23.75 |
| 0.242844 | 58.5 | PE | 125 | 0 | 83.41 | -24.91 |

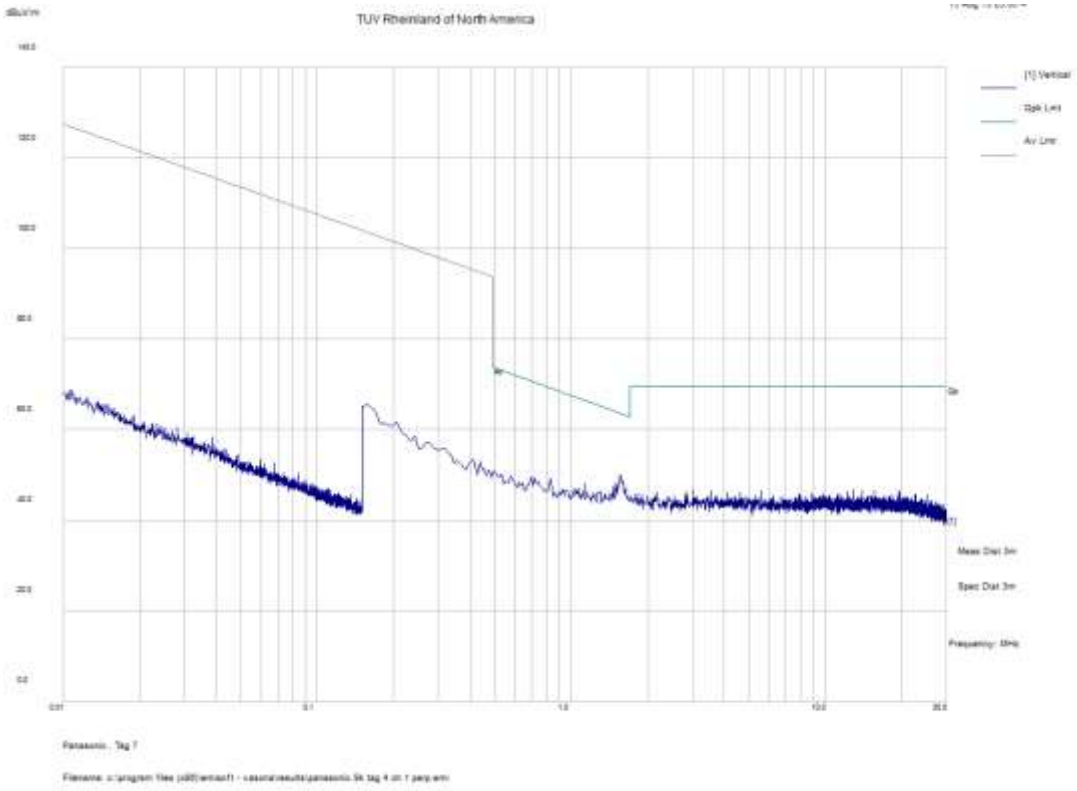



**Figure 13**: 9 – 30,000 kHz, Perpendicular, 433.272 MHz

| Frequency MHz | Level dBuV/m | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB |
|---|---|---|---|---|---|---|
| 0.669925 | 49.89 | PA | 125 | 0 | 71.09 | -21.2 |
| 8.496653 | 47.12 | PA | 125 | 0 | 69.5 | -22.38 |
| 21.97768 | 45.99 | PA | 125 | 0 | 69.5 | -23.51 |
| 0.242844 | 59.86 | PA | 125 | 0 | 83.41 | -23.54 |
| 0.335688 | 54.73 | PA | 125 | 0 | 78.98 | -24.25 |
| 0.15 | 65.12 | PA | 125 | 0 | 90 | -24.88 |

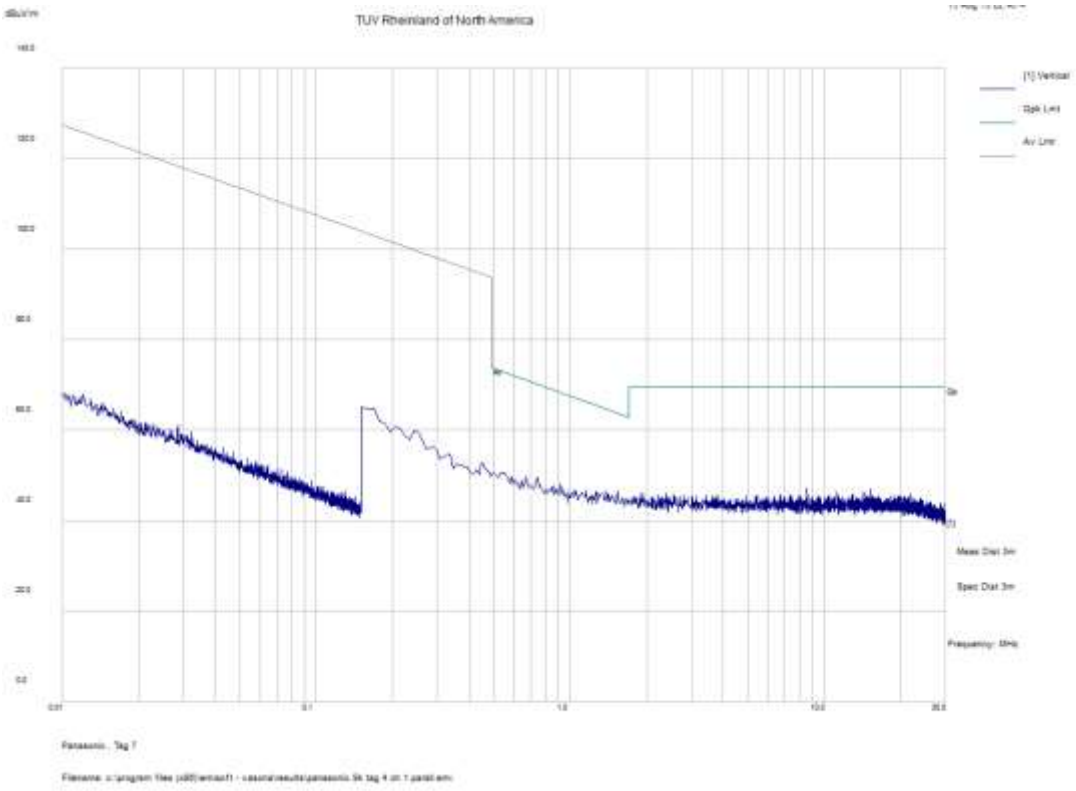



**Figure 14**: 9 – 30,000 kHz, Parallel, 433.272 MHz

| Frequency MHz | Level dBuV/m | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB |
|---|---|---|---|---|---|---|
| 1.589078 | 49.74 | PE | 125 | 0 | 63.58 | -13.84 |
| 0.716347 | 49.74 | PE | 125 | 0 | 70.5 | -20.76 |
| 18.55694 | 46.57 | PE | 125 | 0 | 69.5 | -22.93 |
| 0.279981 | 58.52 | PE | 125 | 0 | 81.46 | -22.94 |
| 0.400678 | 52.85 | PE | 125 | 0 | 76.55 | -23.7 |
| 25.97947 | 44.72 | PE | 125 | 0 | 69.5 | -24.78 |

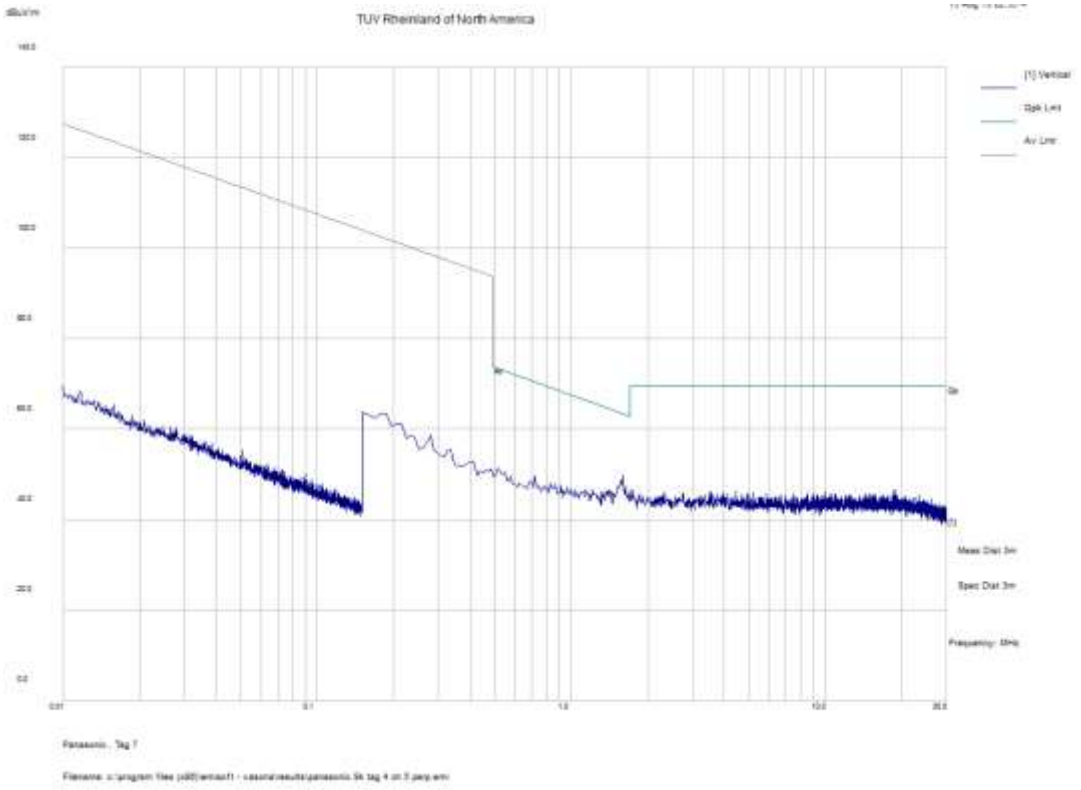



**Figure 15**: 9 – 30,000 kHz, Perpendicular, 433.704 MHz

| Frequency MHz | Level dBuV/m | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB |
|---|---|---|---|---|---|---|
| 8.422378 | 47.75 | PA | 125 | 0 | 69.5 | -21.75 |
| 0.642072 | 49.5 | PA | 125 | 0 | 71.46 | -21.96 |
| 18.2383 | 46.68 | PA | 125 | 0 | 69.5 | -22.82 |
| 0.177853 | 64.53 | PA | 125 | 0 | 87.67 | -23.14 |
| 27.01974 | 45.41 | PA | 125 | 0 | 69.5 | -24.09 |
| 0.242844 | 59.27 | PA | 125 | 0 | 83.41 | -24.14 |

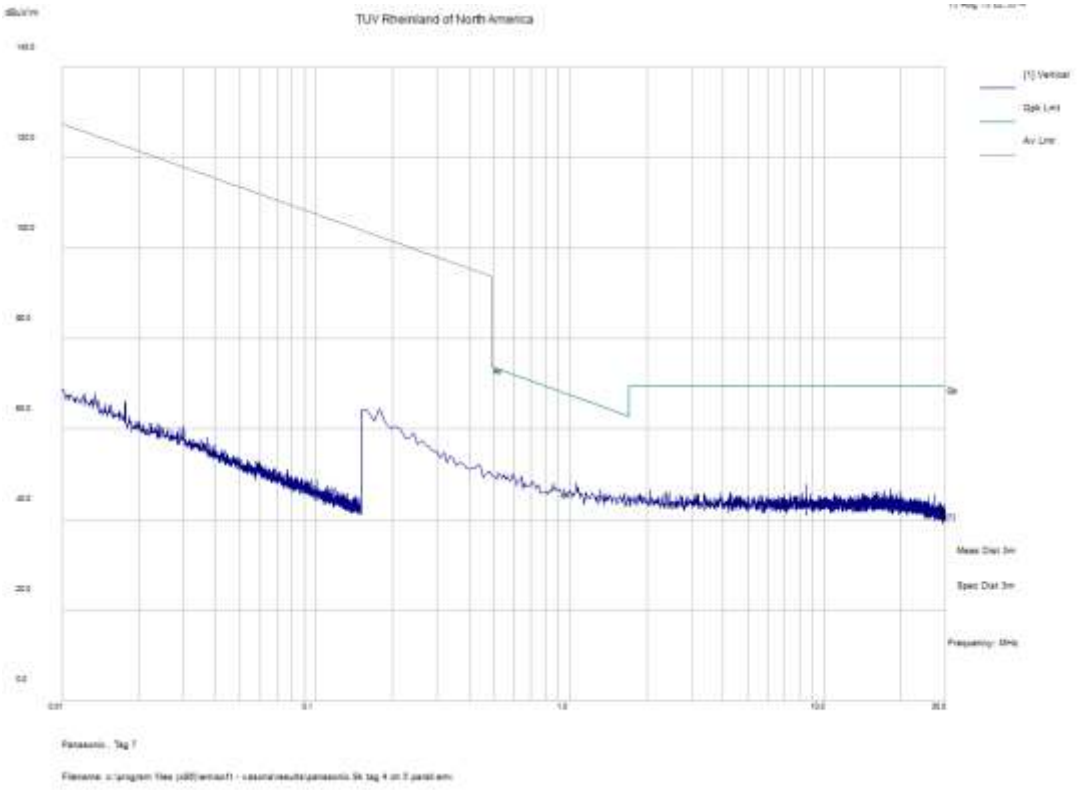



**Figure 16**: 9 – 30,000 kHz, Parallel, 433.704 MHz

| Frequency MHz | Level dBuV/m | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB |
|---|---|---|---|---|---|---|
| 1.570509 | 49.68 | PE | 125 | 0 | 63.68 | -14 |
| 0.493522 | 51.67 | PE | 125 | 0 | 73.74 | -22.07 |
| 8.552359 | 47.31 | PE | 125 | 0 | 69.5 | -22.19 |
| 18.52883 | 46.03 | PE | 125 | 0 | 69.5 | -23.48 |
| 0.15 | 65.57 | PE | 125 | 0 | 90 | -24.43 |
| 27.50708 | 43.87 | PE | 125 | 0 | 69.5 | -25.63 |

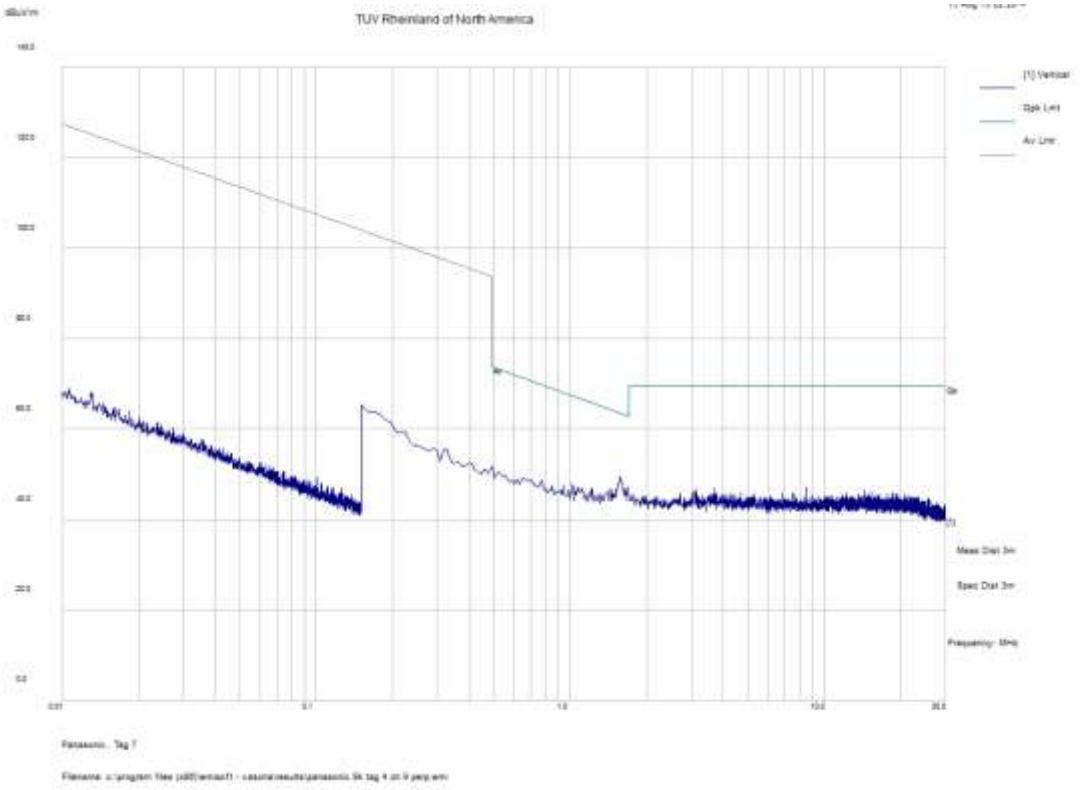



**Figure 17**: 9 – 30,000 kHz, Perpendicular, 434.568 MHz

| Frequency MHz | Level dBuV/m | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB |
|---|---|---|---|---|---|---|
| 0.948456 | 48.22 | PA | 125 | 0 | 68.07 | -19.84 |
| 0.493522 | 51.17 | PA | 125 | 0 | 73.74 | -22.58 |
| 3.770906 | 46.76 | PA | 125 | 0 | 69.5 | -22.74 |
| 0.15 | 66.42 | PA | 125 | 0 | 90 | -23.58 |
| 0.307834 | 55.81 | PA | 125 | 0 | 80.16 | -24.35 |
| 0.214991 | 60.13 | PA | 125 | 0 | 85.07 | -24.95 |

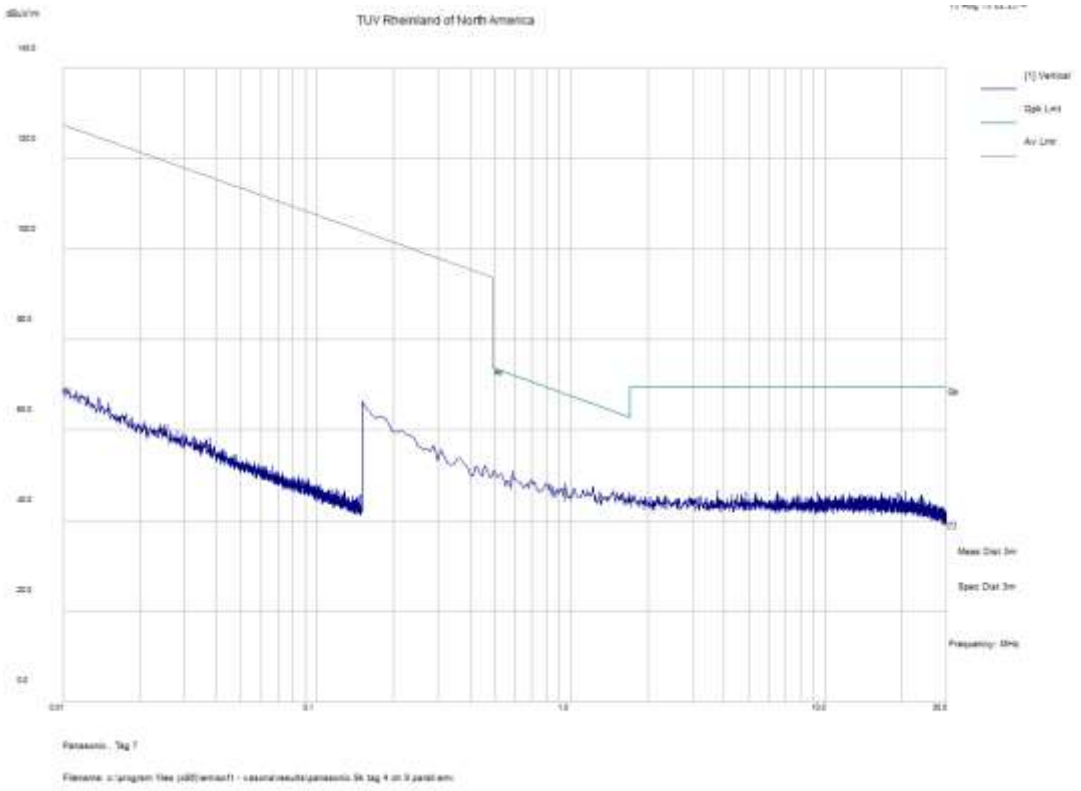



**Figure 18**: 9 – 30,000 kHz, Parallel, 434.568 MHz

| Frequency MHz | QPeak Level dBuV | Pol | Hgt cm | Azt Deg | Limit dBuV | Margin dB |
|---|---|---|---|---|---|---|
| 433.1563 | 76.7 | V | 400 | 0 | N/A* | N/A* |
| 866.625 | 56.04 | H | 300 | 0 | N/A* | N/A* |
| 951.8031 | 32.04 | H | 200 | 0 | 60.8 | -28.76 |
| 431.3375 | 32.04 | H | 300 | 0 | 60.8 | -28.77 |
| 427.3969 | 28.8 | H | 300 | 0 | 60.8 | -32 |
| 30.30313 | 24.26 | H | 200 | 0 | 60.8 | -36.54 |
| 38.79063 | 18.36 | H | 100 | 0 | 60.8 | -42.44 |

*Note: Fundamental frequency band & first harmonic excluded from spurious emissions measurements.

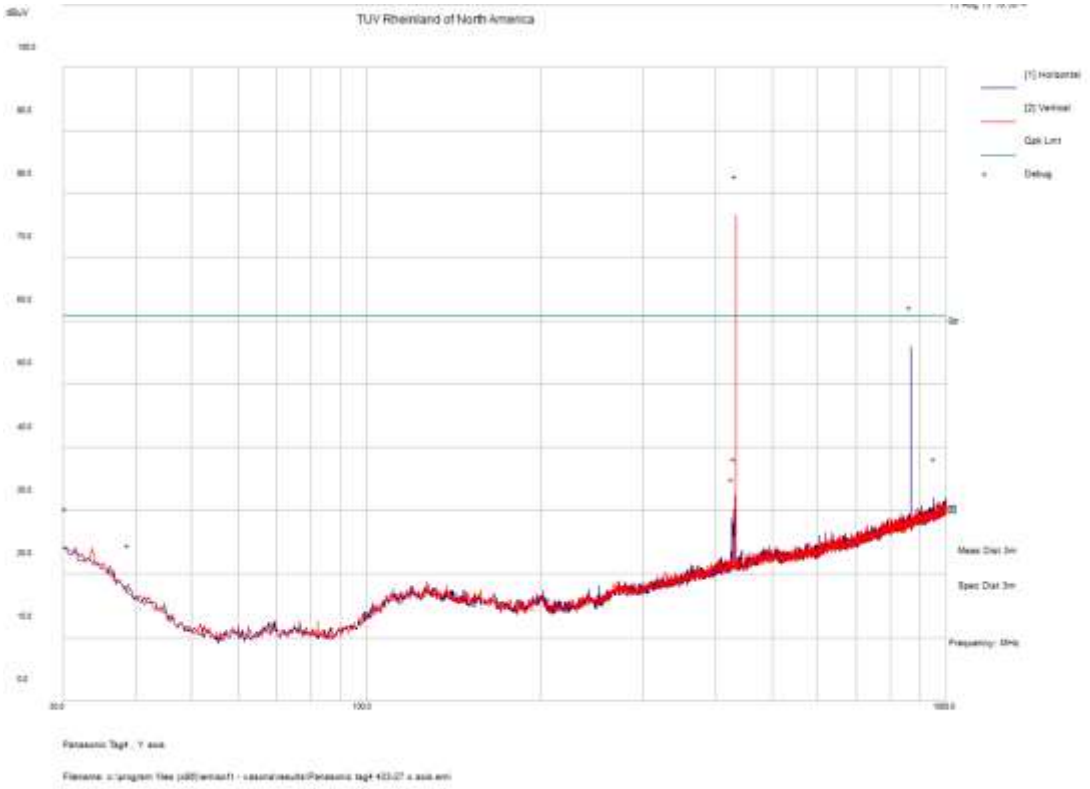



**Figure 19:** 30MHz-1000MHz, 433.272 MHz

| Frequency MHz | Peak Level dBuV | Pol | Hgt cm | Azt Deg | Limit dBuV | Margin dB |
|---|---|---|---|---|---|---|
| 2166.406 | 41.7 | V | 100 | 247 | 60.8 | -19.1 |
| 5513.281 | 40.63 | H | 100 | 216 | 60.8 | -20.17 |
| 5553.906 | 40.6 | V | 200 | 114 | 60.8 | -20.2 |
| 5782.813 | 40.2 | V | 200 | 153 | 60.8 | -20.6 |
| 5817.969 | 40.14 | H | 200 | 38 | 60.8 | -20.67 |
| 5249.219 | 40.09 | H | 100 | 296 | 60.8 | -20.71 |

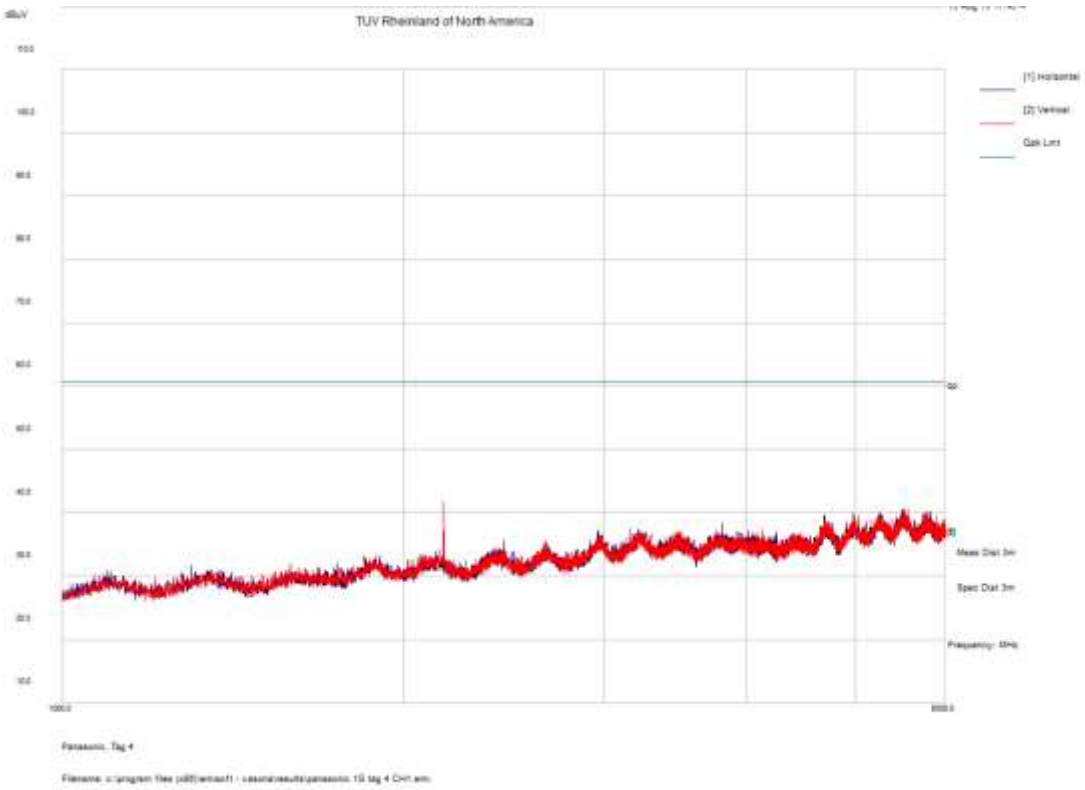



**Figure 20:** 1-6GHz, 433.272 MHz

| Frequency MHz | QPeak Level dBuV | Pol | Hgt cm | Azt Deg | Limit dBuV | Margin dB |
|---|---|---|---|---|---|---|
| 433.7625 | 91.29 | H | 400 | 0 | N/A* | N/A* |
| 990.3 | 31.84 | V | 200 | 0 | 60.8 | -28.97 |
| 30.30313 | 25.14 | H | 400 | 0 | 60.8 | -35.67 |
| 249.1594 | 21.33 | V | 300 | 0 | 60.8 | -39.47 |
| 46.67188 | 20.56 | V | 300 | 0 | 60.8 | -40.24 |
| 37.57813 | 19.2 | H | 300 | 0 | 60.8 | -41.6 |

*Note: Fundamental frequency band & first harmonic excluded from spurious emissions measurements.

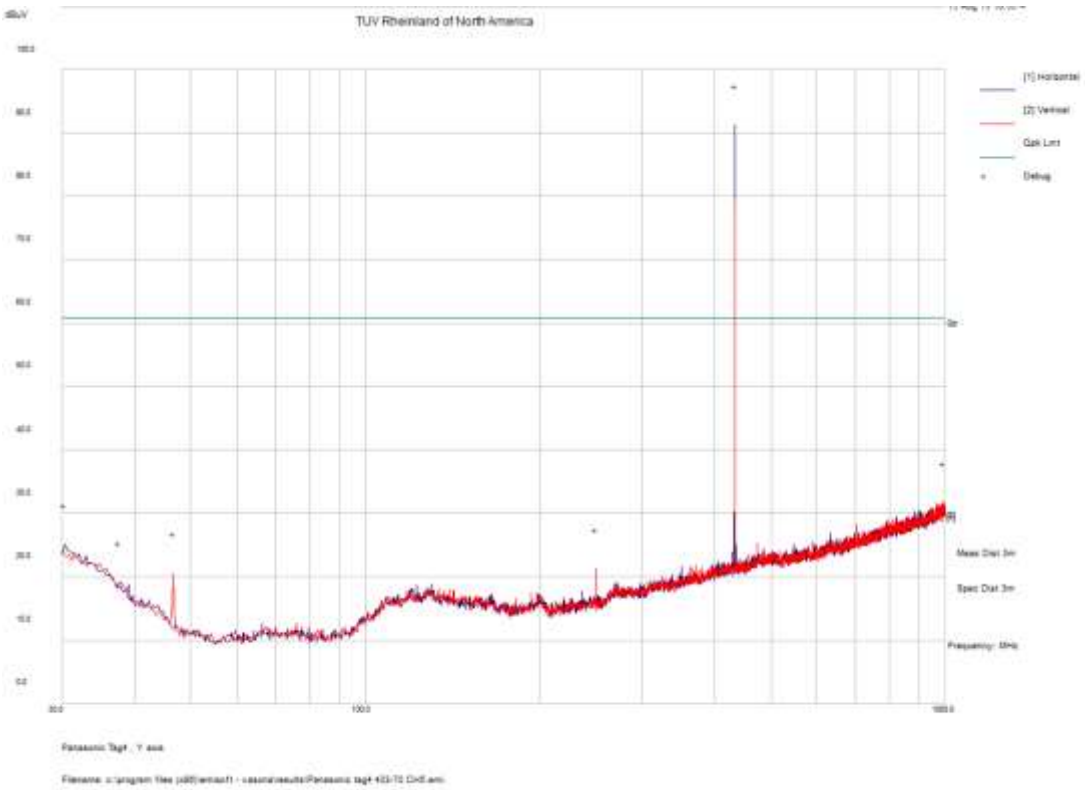



**Figure 21:** 30-1000 MHz, 433.704 MHz

| Frequency MHz | Peak Level dBuV | Pol | Hgt cm | Azt Deg | Limit dBuV | Margin dB |
|---|---|---|---|---|---|---|
| 5514.844 | 41.16 | H | 100 | 319 | 60.8 | -19.64 |
| 5215.625 | 40.73 | V | 100 | 2 | 60.8 | -20.07 |
| 5567.188 | 40.53 | H | 100 | 2 | 60.8 | -20.27 |
| 5260.156 | 40.5 | H | 200 | 122 | 60.8 | -20.3 |
| 5292.969 | 40.35 | H | 100 | 88 | 60.8 | -20.45 |
| 5762.5 | 40.32 | H | 200 | 2 | 60.8 | -20.48 |

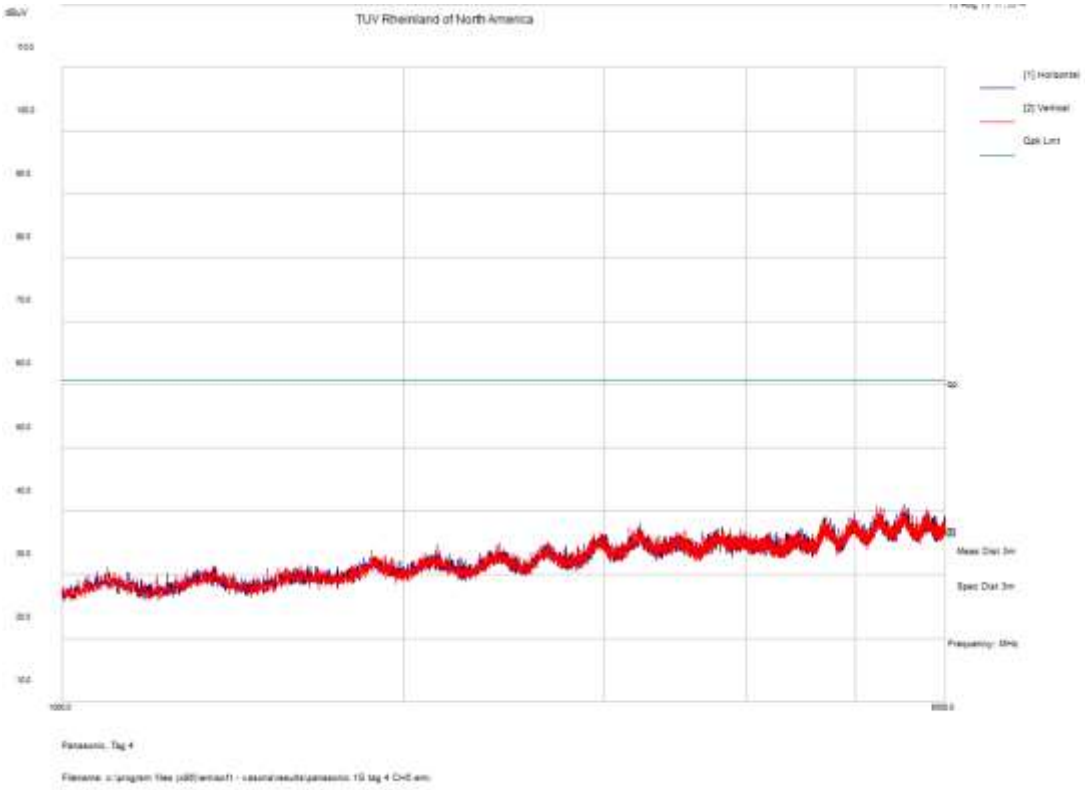



**Figure 22:** 1-6GHz, 433.704 MHz

| Frequency MHz | QPeak Level dBuV | Pol | Hgt cm | Azt Deg | Limit dBuV | Margin dB |
|---|---|---|---|---|---|---|
| 434.0656 | 92.51 | V | 300 | 0 | N/A* | N/A* |
| 967.5656 | 31.98 | H | 400 | 0 | 60.8 | -28.82 |
| 30 | 25.96 | V | 300 | 0 | 60.8 | -34.84 |
| 37.57813 | 19.18 | H | 400 | 0 | 60.8 | -41.62 |

*Note: Fundamental frequency band & first harmonic excluded from spurious emissions measurements.

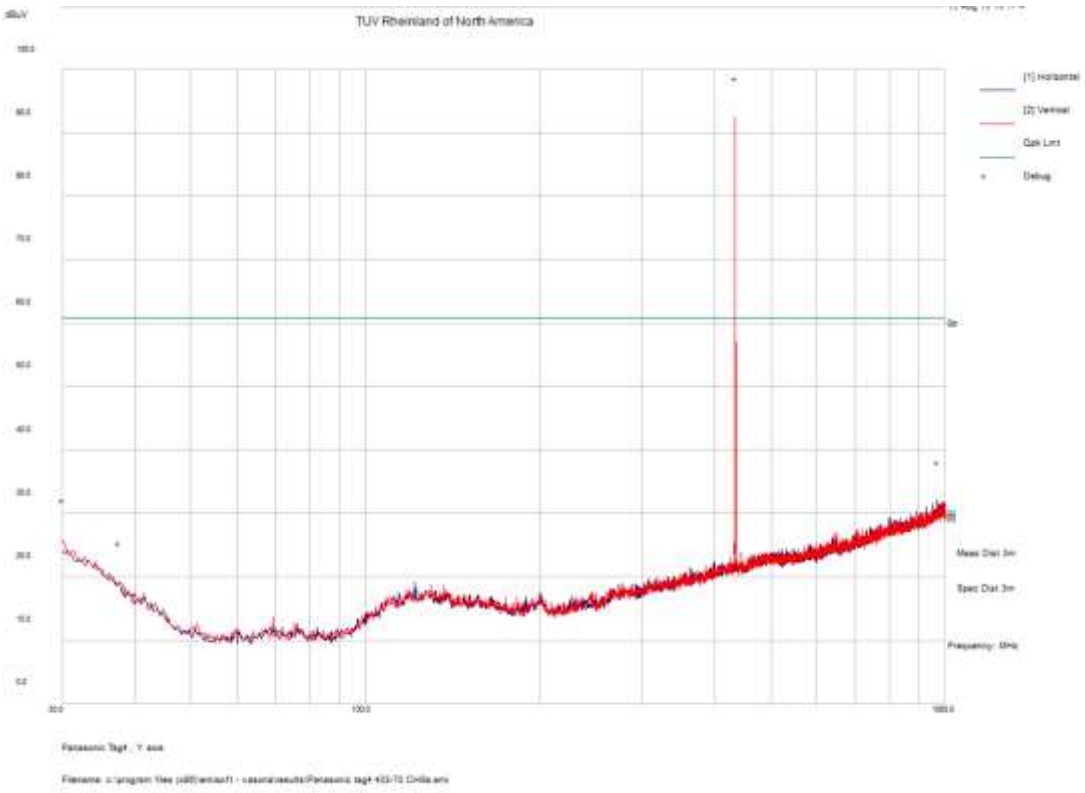



**Figure 23:** 30-1000 MHz, 434.568 MHz

| Frequency MHz | Peak Level dBuV | Pol | Hgt cm | Azt Deg | Limit dBuV | Margin dB |
|---|---|---|---|---|---|---|
| 2170.313 | 43.05 | H | 200 | 344 | 60.8 | -17.75 |
| 5517.969 | 40.43 | V | 100 | 349 | 60.8 | -20.37 |
| 5279.688 | 40.34 | H | 100 | 0 | 60.8 | -20.46 |
| 5314.063 | 40.08 | H | 200 | 355 | 60.8 | -20.72 |
| 5784.375 | 39.83 | H | 200 | 280 | 60.8 | -20.97 |
| 4950.781 | 39.64 | V | 100 | 76 | 60.8 | -21.16 |

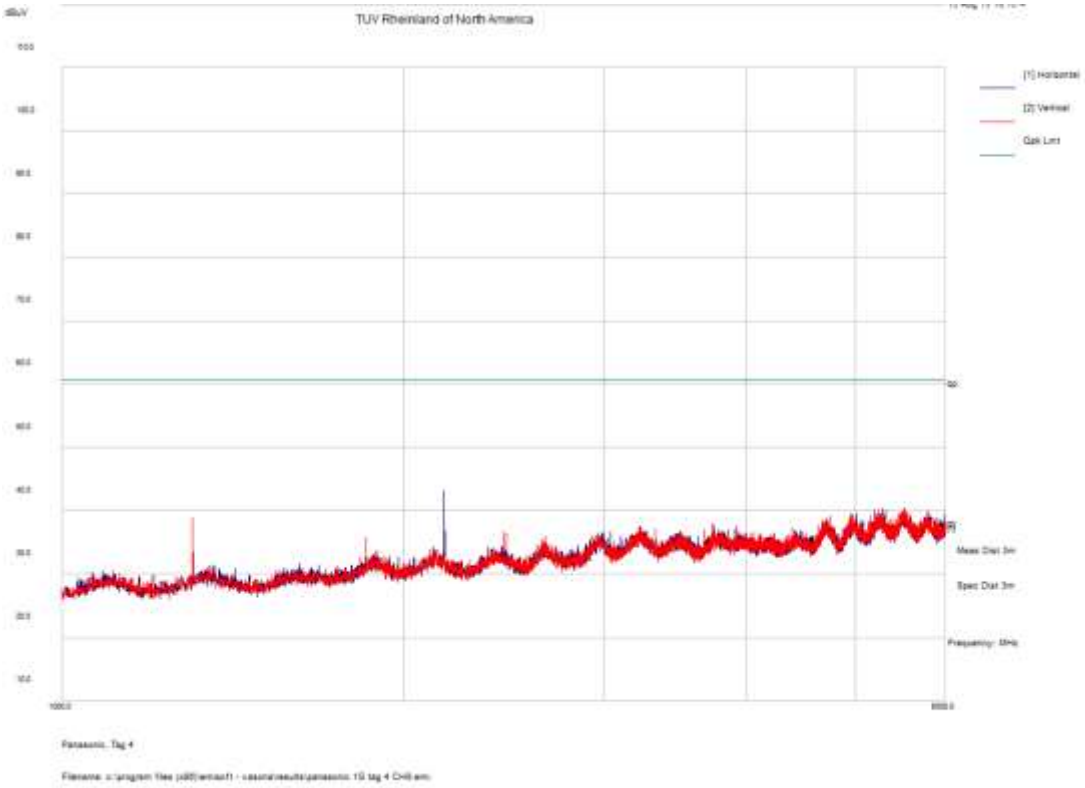



**Figure 24:** 1-6 GHz, 434.568 MHz

# 5 Setup Photos

## *5.1 Conducted Setup*

See "Conducted Tabletop Setup.jpg"
**Figure 25**: Photo of Conducted Tabletop Setup

## *5.2 Radiated Setup*

See "View4 9kRE Setup1.jpg"

**Figure 26**: 9 – 30,000 kHz Radiated Emission Test Setup – Rear View

See "View4 9kRE Setup2.jpg"

**Figure 27**: 9 – 30,000 kHz Radiated Emission Test Setup – Front View

See "View4 RE Low Setup1.jpg"

**Figure 28**: 30 - 1000 MHz Radiated Emission Test Setup – Rear View

See "View4 RE Low Setup2.jpg"

**Figure 29**: 30 - 1000 MHz Radiated Emission Test Setup – Front View

See "View4 RE High Setup1.jpg"

**Figure 30**: 1 GHz – 6 GHz Radiated Emission Test Setup – Front View

See "View4 RE High Setup2.jpg"

**Figure 31**: 1 GHz – 6GHz Radiated Emission Test Setup – Rear View

# 6 EMC Test Plan

## 6.1 Introduction

This section provides a description of the Equipment Under Test (EUT), configurations, operating conditions, and performance acceptance criteria. It is an overview of information provided by the manufacturer so that the test laboratory may perform the requested testing.

## 6.2 Customer

**Table 3:** Customer Information

| | |
|---|---|
| **Company Name** | Panasonic Corporation of North America |
| **Address** | 28 East Main Street, Suite 2100 |
| **City, State, Zip** | Rochester NY 14614 |
| **Country** | United States of America |

**Table 4:** Technical Contact Information

| | |
|---|---|
| **Name** | Igor Orlovich |
| **E-mail** | Igor.Orlovich@us.panasonic.com |
| **Phone** | 1 (585) 713-1027 |

## 6.3 Equipment Under Test (EUT)

The information provided in the following table should be listed as it should appear in the final report. For those products that have only a model name, list the model number as *non-applicable* and vice-versa.

**Table 5**: EUT Designation

| | |
|---|---|
| Product Name | RFID Tag |
| Model Number | View 4 |
| Product Description | RFID Tag for tracking pallets in warehouse environments |
| FCC ID | ACJ-VT04-G3 |
| IC ID | 216A-VT04-G3 |

## 6.4 Product Specifications

**Table 6:** EUT Specifications

| EUT specifications | |
|---|---|
| Dimensions | 5.85” (148.5mm) x 4.04” (102.4mm) x 0.56” (14.1mm) |
| AC Input | N/A |
| Environment | indoor |
| Operating Temperature Range: | -20 to +55 degrees Celsius |
| Multiple Feeds: | ☐ Yes and how many<br>☒ No |
| Hardware Version | View 4 |
| Software Version | 01.01.08.01 |
| Operating Mode | N/A |
| Transmitter Frequency Band | 433.05 - 434.79 |
| Max. Rated Power Output | 11 dBm (E.R.P.) |
| Power Setting @ Operating Channel | N/A |
| Antenna Type | Internal pcb print Antenna |
| Declared Antenna Gain | -5.1 dBi |
| Modulation Type | ☐ AM ☐ FM ☐ DSSS ☐ OFDM<br>☒ Other describe: GFSK |
| Data Rate | 200 kbits/s |
| TX/RX Chain (s) | Single Transmitter; no beam forming; |
| Directional Gain Type | ☐ Correlated ☐ Beam-Forming<br>☒ Other describe: N/A |
| Type of Equipment | ☐ Table Top ☒ Wall-mount ☐ Floor standing cabinet<br>☐ Other: Door or Window mounted |

## 6.5 Interface Specifications

**Table 7:** Interface Specifications

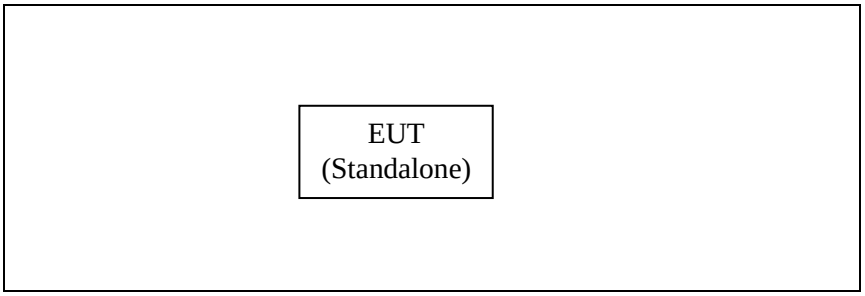
| Interface Type | Cabled with what type of cable? | Is the cable shielded? | Maximum potential length of the cable? | Metallic (M), Coax (C), Fiber (F), or Not Applicable? |
|---|---|---|---|---|
| N/A | N/A | ☐ No | ☐ Metric: 2 m | ☐ N/A |
| Note: None. | | | | |

**Table 8**: Supported Equipment

| Equipment | Manufacturer | Model | Serial | Used for |
|---|---|---|---|---|
| - | - | - | - | - |
| **Note:** None. | | | | |

## 6.6 Configuration(s)

Radiated Test Setup:




Conducted Test Setup:

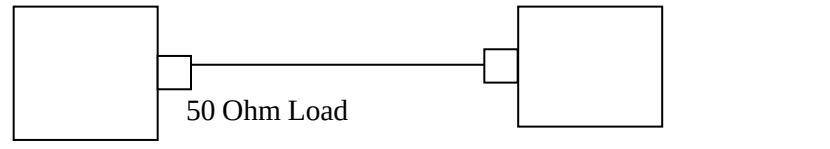


**Table 9:** Description of Sample used for Testing

| Device | I.D. | Configuration | Used For |
|---|---|---|---|
| View 4 PCBA "CH1" | 01AF | Continuous Modulated Tx Temporary SMA connnector | All conducted test cases |
| View 4 PCBA "CH5" | 0195 | Continuous Modulated Tx Temporary SMA connnector | All conducted test cases |
| View 4 PCBA "CH13" | 0194 | Continuous Modulated Tx Temporary SMA connnector | All conducted test cases |
| **Note:** None | | | |

**Table 10:** Description of Test Configuration used for Radiated Measurement.

| Device | I.D. | Antenna | Mode | Setup Description |
|---|---|---|---|---|
| View 4 Tag | 0196 | Internal | Continuous Modulated Tx/Rx | Positioned along Y-axis as worst case. |
| **Note:** None | | | | |

## *6.7 Test Specifications*

**Table 11:** Test Specifications

| Emissions and Immunity | |
|---|---|
| **Standard** | **Requirement** |
| CFR 47 Part 15.231 | All |
| RSS 210 Issue 9 August 2016 | All |

# END OF REPORT