

# TEST REPORT

**Reference No.**..... : WTN23D07164977W  
**FCC ID** ..... : VJC-RW95CB  
**Applicant**..... : Ad Hoc Electronics, LLC  
**Address**..... : 115 S State St, Ste. B, Lindon, UT 84042, United States  
**Manufacturer** ..... : Ad Hoc Electronics, LLC  
**Address** ..... : 115 S State St, Ste. B, Lindon, UT 84042, United States  
**Product**..... : Basic Wireless Switch Kit  
**Model(s)** ..... : RW9-5C-B  
**Standards** ..... : FCC Part 15 Subpart B  
**Date of Receipt sample** .... : 2023-07-28  
**Date of Test** ..... : 2023-07-28 to 2023-08-01  
**Date of Issue**..... : 2023-09-26  
**Test Result**..... : **Pass**

**Remarks:**

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

**Prepared By:**

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## 2 Revision History

| Test Report No. | Date of Receipt sample | Date of Test                   | Date of Issue | Purpose  | Comment | Approved |
|-----------------|------------------------|--------------------------------|---------------|----------|---------|----------|
| WTN23D07164977W | 2023-07-28             | 2023-07-28<br>to<br>2023-08-01 | 2023-09-26    | Original | -       | Valid    |

### 3 General Information

#### 3.1 General Description of E.U.T.

Product ..... : Basic Wireless Switch Kit  
Model(s)..... : RW9-5C-B  
Model difference ..... : N/A  
Remark ..... : N/A

#### 3.2 Details of E.U.T.

Highest frequency generated ... : 902MHz  
Technical data ..... : AC 100-240V, 50/60Hz

#### 3.3 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test Lab: N/A

Lab address: N/A

Test items: N/A

#### 3.4 Abnormalities from Standard Conditions

None.

#### 3.5 Test Facility

The test facility has a test site registered with the following organizations:

ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A, October 15, 2016.

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.

Waltek Testing Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration number 523476, September 10, 2019.

## 4 Test Summary

| Test Item                                                          | Test Requirement      | Test Result |
|--------------------------------------------------------------------|-----------------------|-------------|
| AC Power Line Conducted Emission<br>(150kHz to 30MHz)              | FCC Part 15 Subpart B | Pass        |
| Disturbance voltage at the antenna<br>terminals (30MHz to 2150MHz) | FCC Part 15 Subpart B | N/A         |
| Radiated Emission<br>(30MHz to 1GHz)                               | FCC Part 15 Subpart B | Pass        |
| Radiated Emission<br>(Above 1GHz) <sup>1</sup>                     | FCC Part 15 Subpart B | Pass        |

Remark:

Pass     Test item meets the requirement

Fail     Test item does not meet the requirement

N/A     Test case does not apply to the test object

<sup>1</sup> according to 47 CFR 15.33(b), upper frequency of measurement range is 6GHz.

## 5 Equipment Used during Test

### 5.1 Equipment List

| Conducted emissions from the AC mains power ports  |                            |                      |              |            |                       |                      |
|----------------------------------------------------|----------------------------|----------------------|--------------|------------|-----------------------|----------------------|
| Item                                               | Equipment                  | Manufacturer         | Model No.    | Serial No. | Last Calibration Date | Calibration Due Date |
| 1                                                  | EMI Test Receiver          | R&S                  | ESCI         | 100947     | 2023-07-27            | 2024-07-26           |
| 2                                                  | LISN                       | R&S                  | ENV216       | 100115     | 2023-07-27            | 2024-07-26           |
| 3                                                  | Cable                      | Top                  | TYPE16(3.5M) | -          | 2023-07-27            | 2024-07-26           |
| 3m Semi-anechoic Chamber for Radiation (TDK)       |                            |                      |              |            |                       |                      |
| Item                                               | Equipment                  | Manufacturer         | Model No.    | Serial No. | Last Calibration Date | Calibration Due Date |
| 1                                                  | Test Receiver              | R&S                  | ESCI         | 101296     | 2023-04-24            | 2024-04-23           |
| 2                                                  | Trilog Broadband Antenna   | SCHWARZBECK          | VULB9160     | 9160-3325  | 2022-10-31            | 2023-10-30           |
| 3                                                  | Amplifier                  | ANRITSU              | MH648A       | M43381     | 2023-04-24            | 2024-04-23           |
| 4                                                  | Cable                      | HUBER+SUHNER         | CBL2         | 525178     | 2023-04-24            | 2024-04-23           |
| 3m Semi-anechoic Chamber for Radiation, Above 1GHz |                            |                      |              |            |                       |                      |
| Item                                               | Equipment                  | Manufacturer         | Model No.    | Serial No. | Last Calibration Date | Calibration Due Date |
| 1                                                  | Spectrum Analyzer          | R&S                  | FSP          | 100091     | 2023-04-24            | 2024-04-23           |
| 2                                                  | Broad-band Horn Antenna    | SCHWARZBECK          | BBHA 9120 D  | 667        | 2023-02-02            | 2024-02-01           |
| 3                                                  | Broadband Preamplifier     | COMPLIANCE DIRECTION | PAP-1G18     | 2004       | 2022-08-08            | 2023-08-07           |
| 4                                                  | Coaxial Cable (above 1GHz) | Top                  | 1GHz-18GHz   | NA         | 2023-02-02            | 2024-02-01           |

#### Test Software:

| Test Item                                       | Software name | Software version  |
|-------------------------------------------------|---------------|-------------------|
| Conduction disturbance<br>Radiated Emission(3m) | EZ-EMC        | EZ-EMC(RA-03A1-1) |

### 5.2 Description of Support Units

| Equipment | Manufacturer | Model No. | Series No. |
|-----------|--------------|-----------|------------|
| /         | /            | /         | /          |

### 5.3 Measurement Uncertainty

| Parameter                         | Uncertainty (Note 1)    |
|-----------------------------------|-------------------------|
| Temperature                       | $\pm 1^{\circ}\text{C}$ |
| Humidity                          | $\pm 5\%$               |
| DC and low frequency voltages     | $\pm 3\%$               |
| Conducted Emission (150kHz-30MHz) | $\pm 3.64\text{dB}$     |
| Radiated Emission (30MHz-1000MHz) | $\pm 5.03\text{dB}$     |

Note 1: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

### 5.4 Test Mode

| Test Item                                                        | Test Mode            | Test Voltage |
|------------------------------------------------------------------|----------------------|--------------|
| AC Power Line Conducted Emission<br>(150KHz-30MHz)               | Standby-120V         | AC 120V/60Hz |
|                                                                  | Standby-230V*        | AC 230V/50Hz |
|                                                                  | Half load mode-120V  | AC 120V/60Hz |
|                                                                  | Half load mode-230V  | AC 230V/50Hz |
|                                                                  | Full load mode-120V  | AC 120V/60Hz |
|                                                                  | Full load mode-230V  | AC 230V/50Hz |
| Radiated Emissions<br>(30MHz-1GHz)                               | Standby              | AC 120V/60Hz |
|                                                                  | Half load mode-120V  | AC 120V/60Hz |
|                                                                  | Half load mode-230V  | AC 230V/50Hz |
|                                                                  | Full load mode-120V* | AC 120V/60Hz |
|                                                                  | Full load mode-230V  | AC 230V/50Hz |
| Radiated Emissions<br>(Above1GHz)                                | Standby              | AC 120V/60Hz |
|                                                                  | Half load mode-120V  | AC 120V/60Hz |
|                                                                  | Half load mode-230V  | AC 230V/50Hz |
|                                                                  | Full load mode-120V* | AC 120V/60Hz |
|                                                                  | Full load mode-230V  | AC 230V/50Hz |
| ** shows the worst case mode which were recorded in this report. |                      |              |

## 6 Emission Test Results

### 6.1 AC Power Line Conducted Emission, 150kHz to 30MHz

Test Requirement..... : FCC Part 15 Subpart B

Test Method..... : ANSI C63.4

Test Result ..... : Pass

Frequency Range..... : 150kHz to 30MHz

Class..... : Class B

Limit..... :

| Frequency (MHz) | Limit (dB $\mu$ V) |          |
|-----------------|--------------------|----------|
|                 | Quasi- peak        | Average  |
| 0.15 to 0.5     | 66 to 56           | 56 to 46 |
| 0.5 to 5        | 56                 | 46       |
| 5 to 30         | 60                 | 50       |

#### 6.1.1 E.U.T. Operation

Operating Environment:

Temperature..... : 23.1°C

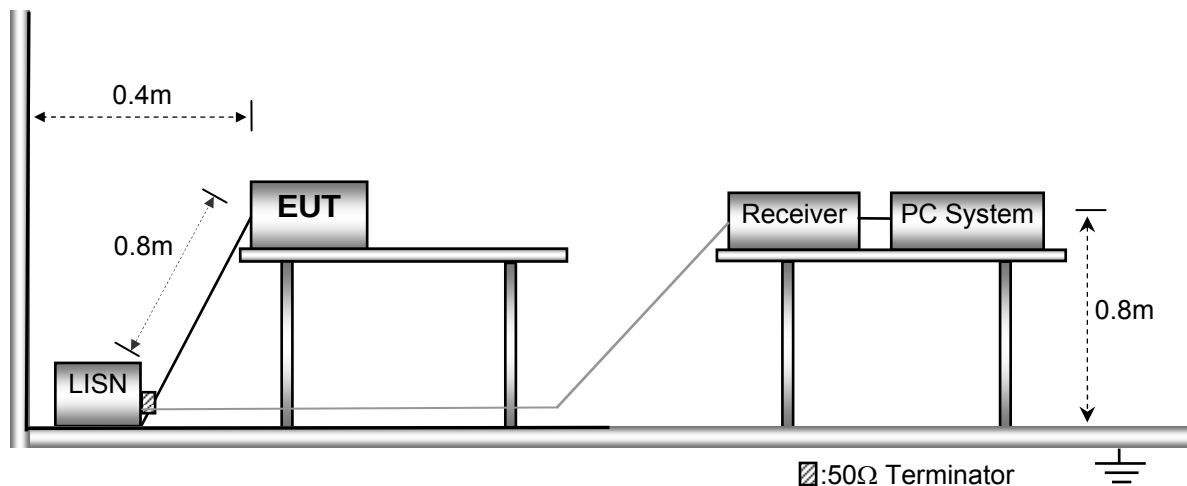
Humidity..... : 52.6%RH

Atmospheric Pressure ..... : 101.2kPa

EUT Operation ..... : Refer to section 5.4.

#### 6.1.2 Block Diagram of Test Setup

The AC Power Line Conducted Emissions tests were performed in accordance with the ANSI C63.4 .

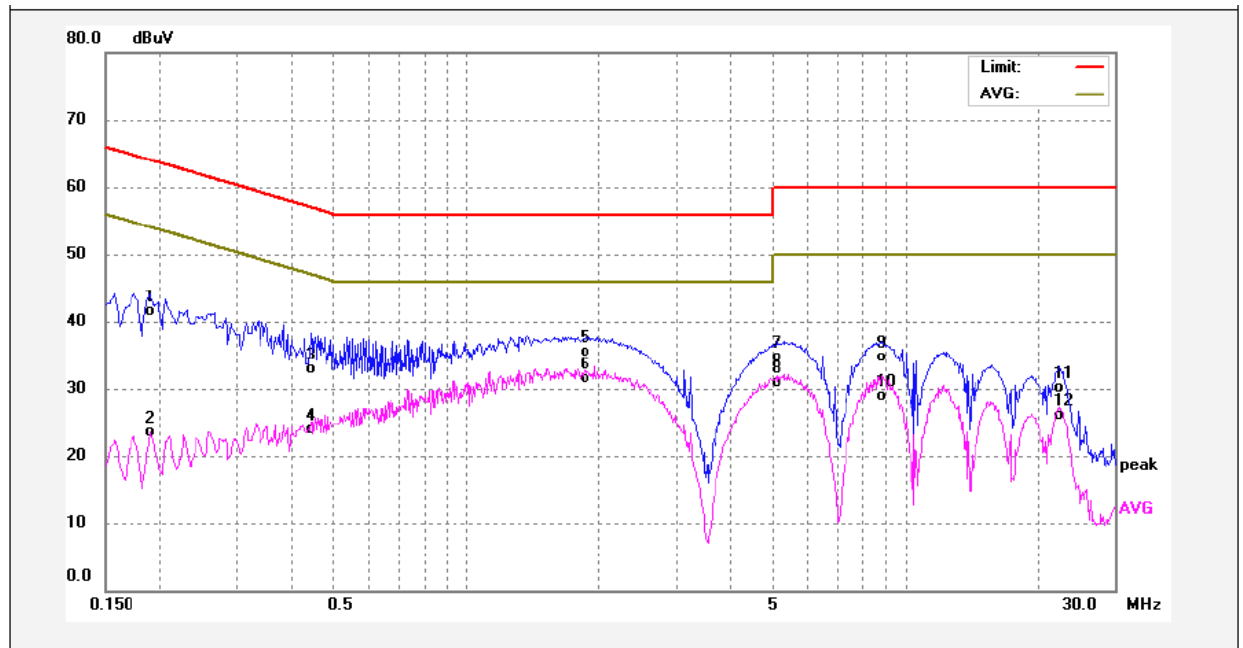


### 6.1.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line. According to the data in section 6.1.4, the EUT complied with the FCC PART 15, SUBPART B standards.

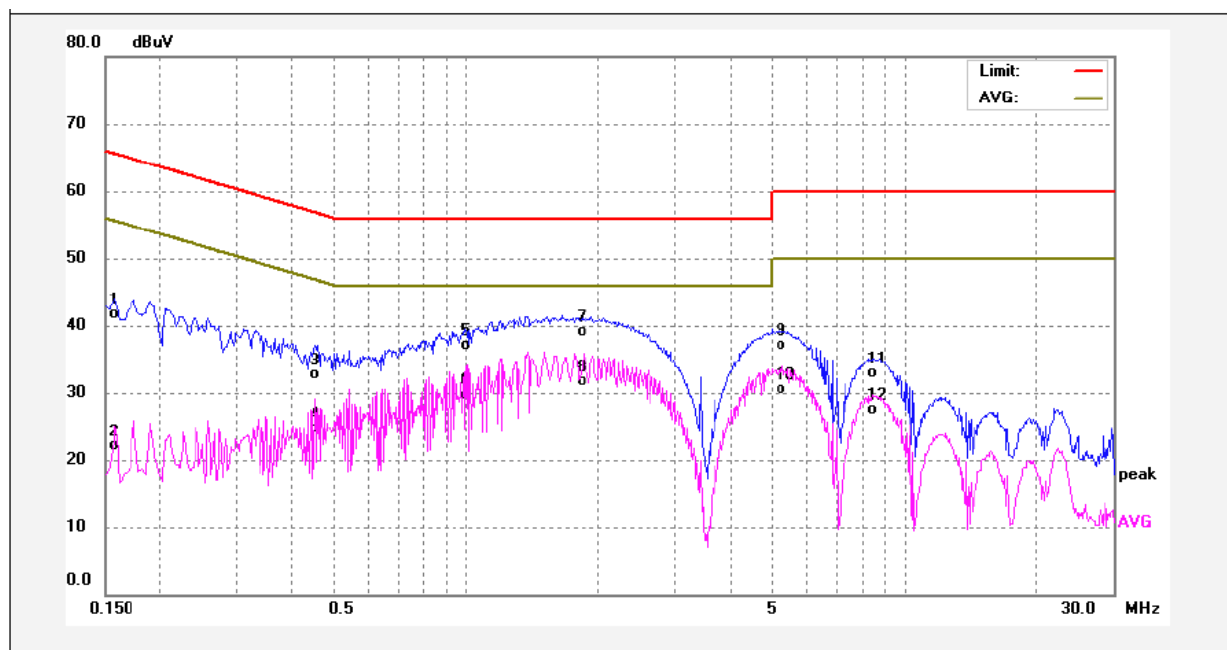
### 6.1.4 AC Power Line Conducted Emission Test Data

Live Line:



| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Detector | Remark |
|-----|-------------|----------------|-------------|---------------|--------------|-------------|----------|--------|
| 1   | 0.1900      | 31.78          | 9.63        | 41.41         | 64.03        | -22.62      | QP       |        |
| 2   | 0.1900      | 13.83          | 9.63        | 23.46         | 54.03        | -30.57      | AVG      |        |
| 3   | 0.4420      | 23.26          | 9.66        | 32.92         | 57.02        | -24.10      | QP       |        |
| 4   | 0.4420      | 14.20          | 9.66        | 23.86         | 47.02        | -23.16      | AVG      |        |
| 5   | 1.8660      | 25.86          | 9.72        | 35.58         | 56.00        | -20.42      | QP       |        |
| 6   | 1.8660      | 21.88          | 9.72        | 31.60         | 46.00        | -14.40      | AVG      |        |
| 7   | 5.0980      | 24.92          | 9.81        | 34.73         | 60.00        | -25.27      | QP       |        |
| 8   | 5.0980      | 21.08          | 9.81        | 30.89         | 50.00        | -19.11      | AVG      |        |
| 9   | 8.8660      | 24.75          | 9.96        | 34.71         | 60.00        | -25.29      | QP       |        |
| 10  | 8.8660      | 18.94          | 9.96        | 28.90         | 50.00        | -21.10      | AVG      |        |
| 11  | 22.4580     | 19.30          | 10.90       | 30.20         | 60.00        | -29.80      | QP       |        |
| 12  | 22.4580     | 15.26          | 10.90       | 26.16         | 50.00        | -23.84      | AVG      |        |

Neutral Line:



| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit dBuV | Margin (dB) | Detector | Remark |
|-----|-------------|----------------|-------------|---------------|------------|-------------|----------|--------|
| 1   | 0.1580      | 32.08          | 9.65        | 41.73         | 65.56      | -23.83      | QP       |        |
| 2   | 0.1580      | 12.53          | 9.65        | 22.18         | 55.56      | -33.38      | AVG      |        |
| 3   | 0.4500      | 23.10          | 9.67        | 32.77         | 56.87      | -24.10      | QP       |        |
| 4   | 0.4500      | 15.02          | 9.67        | 24.69         | 46.87      | -22.18      | AVG      |        |
| 5   | 1.0100      | 27.37          | 9.69        | 37.06         | 56.00      | -18.94      | QP       |        |
| 6   | 1.0100      | 19.97          | 9.69        | 29.66         | 46.00      | -16.34      | AVG      |        |
| 7   | 1.8580      | 29.45          | 9.73        | 39.18         | 56.00      | -16.82      | QP       |        |
| 8   | 1.8580      | 21.88          | 9.73        | 31.61         | 46.00      | -14.39      | AVG      |        |
| 9   | 5.2740      | 27.27          | 9.84        | 37.11         | 60.00      | -22.89      | QP       |        |
| 10  | 5.2740      | 20.63          | 9.84        | 30.47         | 50.00      | -19.53      | AVG      |        |
| 11  | 8.4180      | 22.98          | 9.96        | 32.94         | 60.00      | -27.06      | QP       |        |
| 12  | 8.4180      | 17.57          | 9.96        | 27.53         | 50.00      | -22.47      | AVG      |        |

## 6.2 Radiation Emission, 30MHz to 1000MHz

Test Requirement..... : FCC Part 15 Subpart B  
 Test Method..... : ANSI C63.4  
 Test Result ..... : Pass  
 Frequency Range..... : 30MHz to 1000MHz  
 Class..... : Class B  
 Limit ..... :

| Frequency (MHz) | Distance (Meter) | Limit (dB $\mu$ V/m) |
|-----------------|------------------|----------------------|
|                 |                  | Quasi-peak           |
| 30 to 88        | 3                | 40                   |
| 88 to 216       | 3                | 43.5                 |
| 216 to 960      | 3                | 46                   |
| 960 to 1000     | 3                | 54                   |

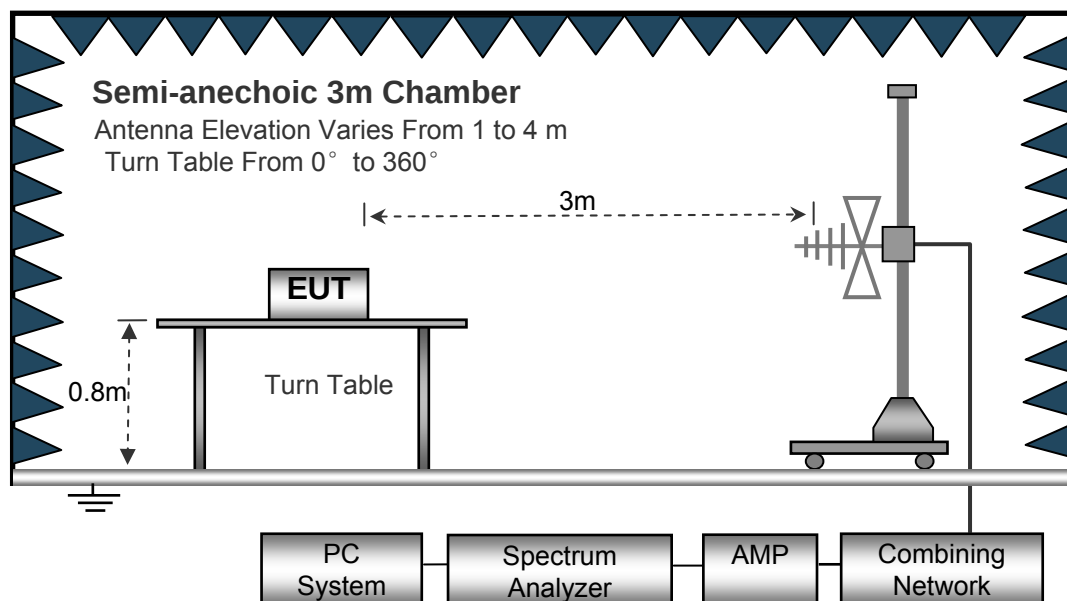
### 6.2.1 E.U.T. Operation

Operating Environment:

Temperature..... : 22.5°C  
 Humidity..... : 52.6%RH  
 Atmospheric Pressure ..... : 101.8kPa  
 EUT Operation ..... : Refer to section 5.4.

### 6.2.2 Block Diagram of Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4.

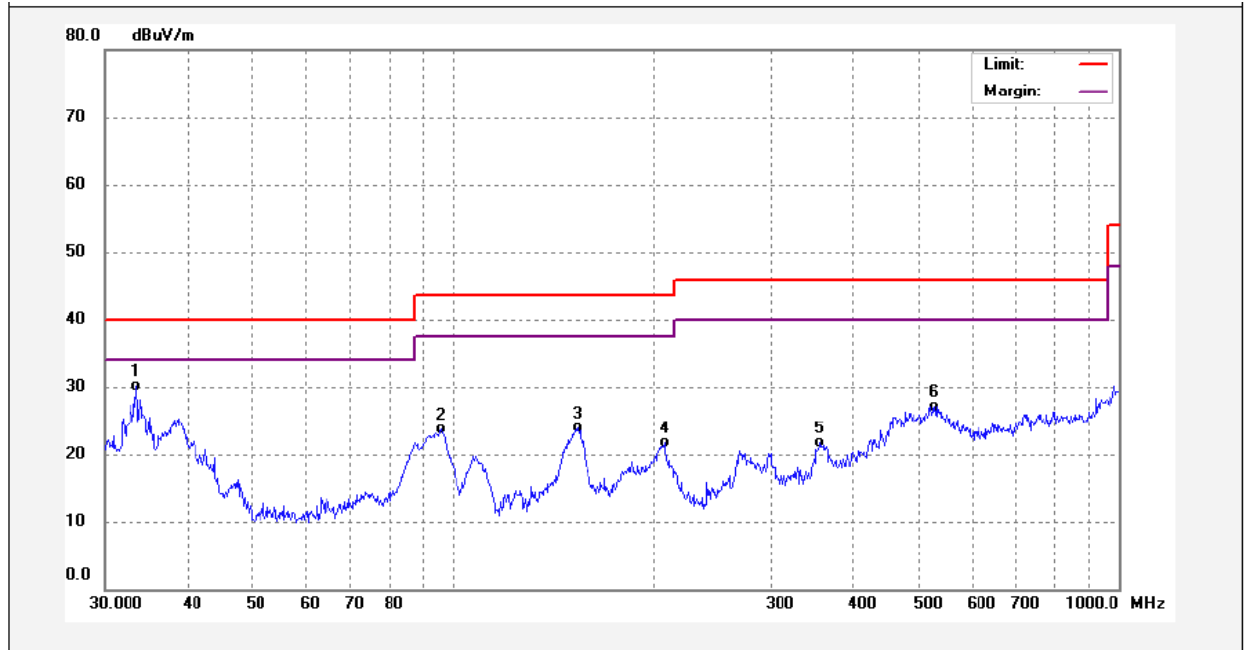


### 6.2.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for both the Antenna Vertical Polarization and Antenna Horizontal Polarization. Quasi-peak measurements were performed if peak emissions were within 6dB of the Quasi-peak limit line.

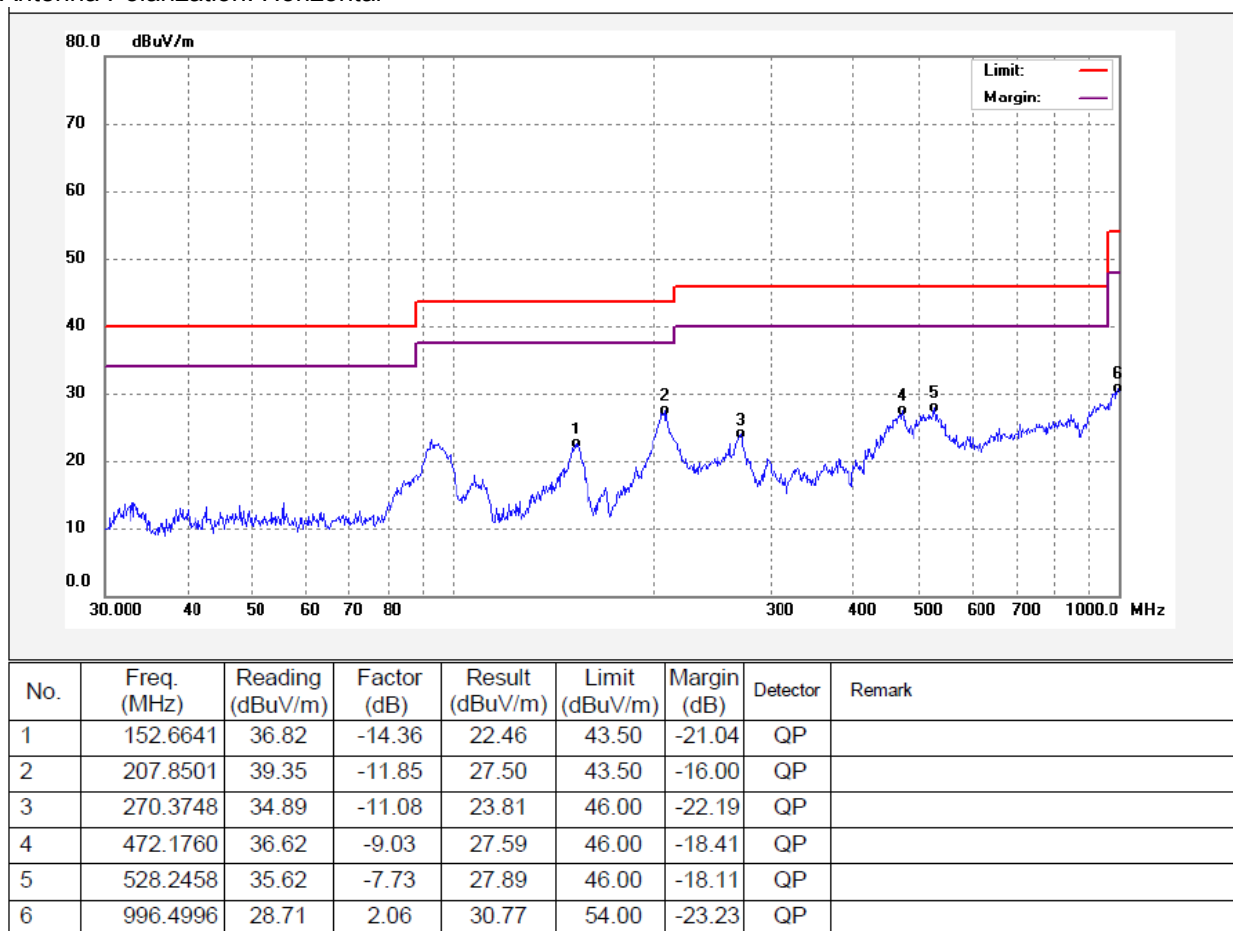
### 6.2.4 Radiated Emission Test Data, 30MHz to 1000MHz

Antenna Polarization: Vertical



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Remark |
|-----|-------------|------------------|-------------|-----------------|----------------|-------------|----------|--------|
| 1   | 33.4449     | 47.26            | -17.15      | 30.11           | 40.00          | -9.89       | QP       |        |
| 2   | 95.7622     | 42.87            | -19.22      | 23.65           | 43.50          | -19.85      | QP       |        |
| 3   | 153.7385    | 38.35            | -14.36      | 23.99           | 43.50          | -19.51      | QP       |        |
| 4   | 207.8501    | 38.33            | -16.55      | 21.78           | 43.50          | -21.72      | QP       |        |
| 5   | 355.4273    | 34.61            | -12.85      | 21.76           | 46.00          | -24.24      | QP       |        |
| 6   | 528.2458    | 34.91            | -7.73       | 27.18           | 46.00          | -18.82      | QP       |        |

Antenna Polarization: Horizontal



### 6.3 Radiation Emission, Above 1000MHz

Test Requirement..... : FCC Part 15 Subpart B  
 Test Method..... : ANSI C63.4  
 Test Result ..... : Pass  
 Frequency Range..... : Above 1GHz  
 Class. : Class B  
 Limit. .... :

| Frequency Range (MHz) | Distance (Meter) | Average Limit dB(uV/m) | Peak Limit (dBuV/m) |
|-----------------------|------------------|------------------------|---------------------|
| Above 1GHz            | 3                | 54                     | 74                  |

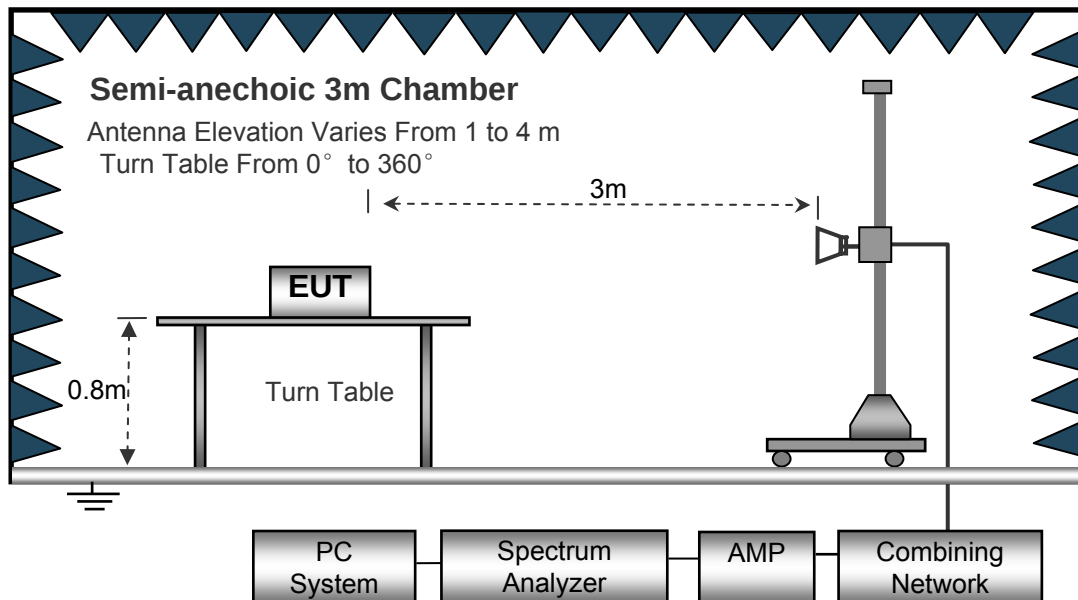
#### 6.3.1 E.U.T. Operation

Operating Environment:

Temperature ..... : 24°C  
 Humidity ..... : 55.3%RH  
 Atmospheric Pressure ..... : 101.8kPa  
 EUT Operation ..... : Refer to section 5.4.

#### 6.3.2 Block Diagram of Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4.

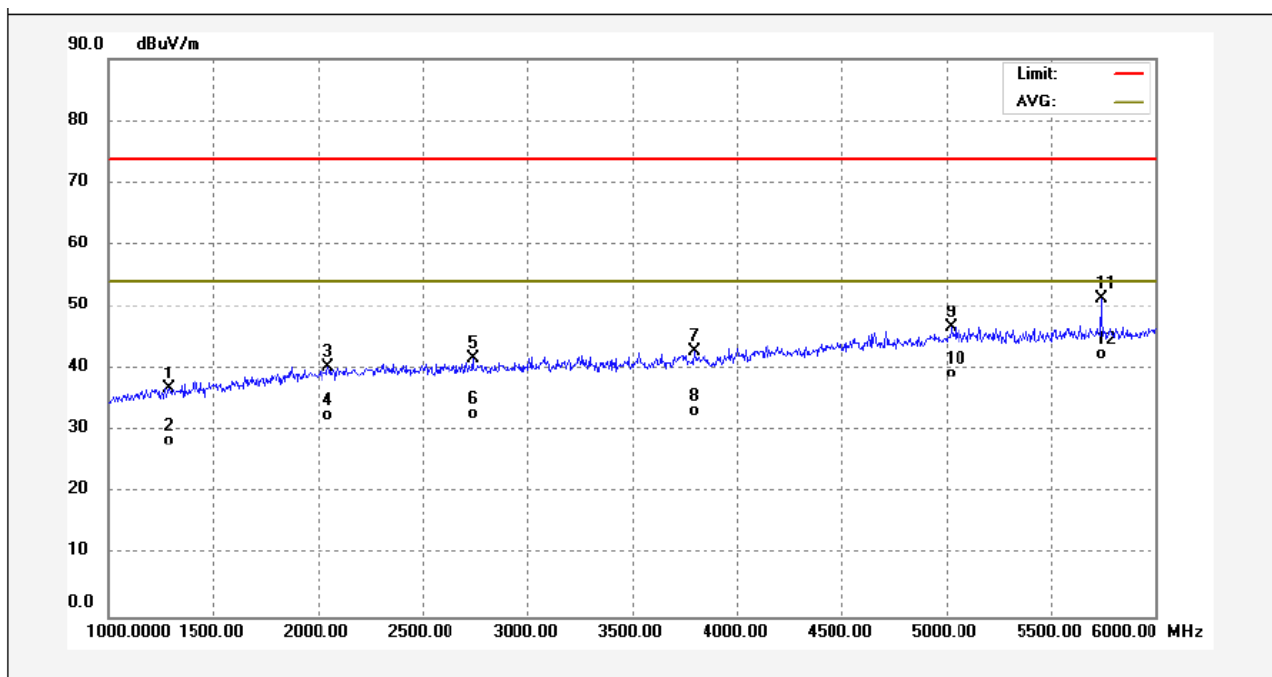


#### 6.3.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for both the Antenna Vertical Polarization and Antenna Horizontal Polarization. Average measurements were performed if peak emissions were within 6dB of the average limit line

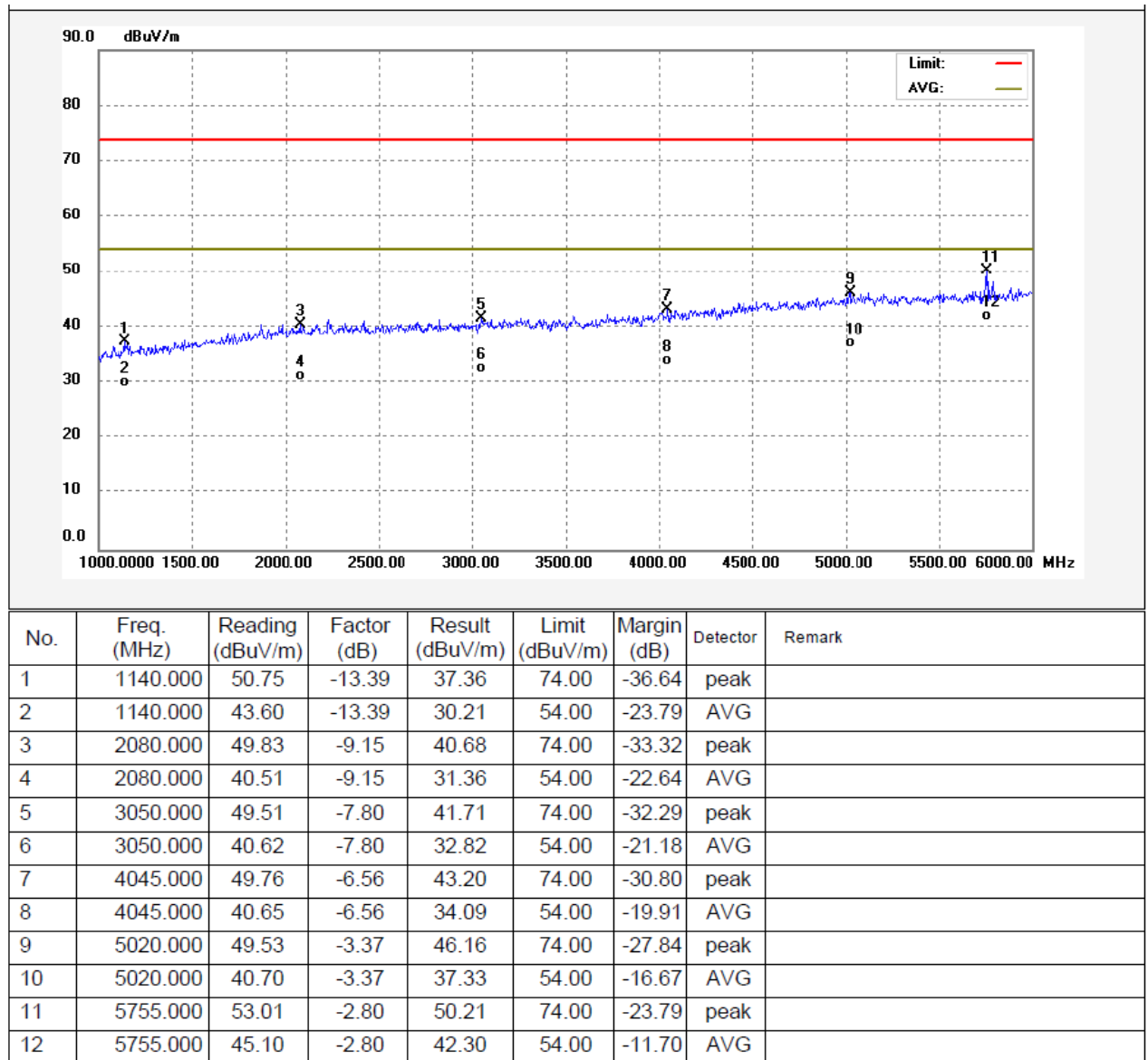
### 6.3.4 Radiated Emission test data, Above 1000MHz

Antenna Polarization: Vertical



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Remark |
|-----|-------------|------------------|-------------|-----------------|----------------|-------------|----------|--------|
| 1   | 1290.000    | 49.57            | -12.68      | 36.89           | 74.00          | -37.11      | peak     |        |
| 2   | 1290.000    | 41.03            | -12.68      | 28.35           | 54.00          | -25.65      | AVG      |        |
| 3   | 2050.000    | 49.65            | -9.20       | 40.45           | 74.00          | -33.55      | peak     |        |
| 4   | 2050.000    | 41.66            | -9.20       | 32.46           | 54.00          | -21.54      | AVG      |        |
| 5   | 2740.000    | 49.82            | -8.12       | 41.70           | 74.00          | -32.30      | peak     |        |
| 6   | 2740.000    | 40.86            | -8.12       | 32.74           | 54.00          | -21.26      | AVG      |        |
| 7   | 3795.000    | 49.86            | -7.10       | 42.76           | 74.00          | -31.24      | peak     |        |
| 8   | 3795.000    | 40.19            | -7.10       | 33.09           | 54.00          | -20.91      | AVG      |        |
| 9   | 5025.000    | 50.08            | -3.37       | 46.71           | 74.00          | -27.29      | peak     |        |
| 10  | 5025.000    | 42.65            | -3.37       | 39.28           | 54.00          | -14.72      | AVG      |        |
| 11  | 5740.000    | 54.15            | -2.82       | 51.33           | 74.00          | -22.67      | peak     |        |
| 12  | 5740.000    | 45.16            | -2.82       | 42.34           | 54.00          | -11.66      | AVG      |        |

Antenna Polarization: Horizontal



## **7 Photographs of Test Setup and EUT.**

Note: Please refer to appendix: Appendix-RW9-5C-B-Photos.

=====End of Report=====