



**Produkte**  
*Products*

|   |  |  |  |  |   |
|---|--|--|--|--|---|
| <b>Prüfbericht - Nr.:</b>   |  | <b>19660220 002</b>  |  | <b>Seite 1 von 30</b>                        |   |
| <i>Test Report No.:</i>   |  |  |  | <i>Page 1 of 30</i>                          |   |
| <b>Auftraggeber:</b><br><i>Client:</i>  |  | Camera Vision Solutions, Inc.<br>P.O Box 80249<br>Austin, TX 78708<br>United States  |  |  |   |
| <b>Gegenstand der Prüfung:</b><br><i>Test item:</i>   |  | On-board Video Vehicle Recorder  |  |  |   |
| <b>Bezeichnung:</b><br><i>Identification:</i>   |  | SentinelHDx  | <b>Serien-Nr.:</b><br><i>Serial No.</i>          | Sr # 02 & Sr #10                             |   |
| <b>Wareneingangs-Nr.:</b><br><i>Receipt No.:</i>  |  | 1803269422   | <b>Eingangsdatum:</b><br><i>Date of receipt:</i> | 06-11-2017                                   |   |
| <b>Prüfort:</b><br><i>Testing location:</i>   |  | Refer Page 5 of 30 for Test site details   |  |  |   |
| <b>Prüfgrundlage:</b><br><i>Test specification:</i>   |  | FCC Part 15 Subpart C 15.247<br>ANSI C63.10- 2013  |  |  |   |
| <b>Prüfergebnis:</b><br><i>Test Result:</i>   |  | Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).<br><i>The test items passed the test specification(s).</i>  |  |  |   |
| <b>Prüflaboratorium:</b><br><i>Testing Laboratory:</i>  |  | TÜV Rheinland (India) Pvt. Ltd.<br>82/A, 3rd Main, West Wing, Electronic City Phase 1<br>Hosur Road, Bangalore – 560 100. India<br>FCC Test Site Registration no.: <b>496599</b> |  |  |   |
| <b>geprüft / tested by:</b>   |  | <b>kontrolliert / reviewed by:</b>   |  |  |   |
| 08-11-2017  | Santhosh S K<br>Engineer                     |   | 17-11-2017                                       | Saibaba Siddapur<br>Assistant Manager        |  |
| <b>Datum</b><br><i>Date</i>   | <b>Name/Stellung</b><br><i>Name/Position</i> | <b>Unterschrift</b><br><i>Signature</i>  | <b>Datum</b><br><i>Date</i>                      | <b>Name/Stellung</b><br><i>Name/Position</i> | <b>Unterschrift</b><br><i>Signature</i>   |
| <b>Sonstiges / Other Aspects:</b>   |  | Class II Permissive change (FCC ID: 2AFS2-SHDX) and On receipt the equipment was in good condition.  |  |  |   |
| <b>Abkürzungen:</b>   |  | <b>Abbreviations:</b>  |  |  |   |
| P(ass) = entspricht Prüfgrundlage   |  | P(ass) = passed  |  |  |   |
| F(ail) = entspricht nicht Prüfgrundlage   |  | F(ail) = failed  |  |  |   |
| N/A = nicht anwendbar   |  | N/A = not applicable   |  |  |   |
| N/T = nicht getestet  |  | N/T = not tested   |  |  |   |
| <b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b><br><br><i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i> |  |  |  |  |   |

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## TEST SUMMARY

| Section                        | Test item   | Result | Remarks  |
|--------------------------------|---|--------|--|
| 15.247 (a) (1)                 | 20 dB Bandwidth   | N/T    | The Product is Certified with FCC ID: 2AFS2-SHDX from TÜV Rheinland India Private Limited with report number 19660221 001. |
| 15.247 (a) (1)(III)            | Number of Hopping frequencies                                 | N/T    |  |
| 15.247 (a)(1)                  | Carrier frequency separation                                  | N/T    |  |
| 15.247 (a)(1)(III)             | Time of Occupancy (Dwell Time)                                | N/T    |  |
| 15.247(d)                      | Band Edge of RF Conducted emission                            | N/T    |  |
| 15.407                         | Conducted emission on A.C power lines                         | N/T    |  |
| 15.247 (b)                     | Maximum Peak Conducted Output Power                           | PASS*  | -  |
| 15.247 (d) / (15.209 & 15.205) | Restricted bands of Emissions & Restricted Bands of Operation | PASS   | -  |

\*: maximum peak conducted output power was verified.

Note: Device exclusively used in vehicle only, it will operate on vehicle battery & internal back up battery only.

## DOCUMENT HISTORY:

| Version | Remarks  |
|---------|--|
| 1.0     | Issued for C2PC<br>(only Power verification & Radiated spurious emission was performed on product) |

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# 1 GENERAL REMARKS

## 1.1 Complimentary Materials

All attachments are integral part of this test report. This applies especially to the following appendix:

**APPENDIX 1:** TEST SETUP PHOTOS

**APPENDIX 2:** EUT EXTERNAL PHOTOS

**APPENDIX 3:** EUT INTERNAL PHOTOS

**APPENDIX 4:** SCHEMATIC DIAGRAMS

**APPENDIX 5:** BILL OF MATERIALS

## 2 TEST SITES

### 2.1 Testing Facilities

TUV Rheinland (India) Private Limited  
 108 , Beside ISBR Business School,  
 Electronic city Phase I  
 Bangalore - 560 100.

### 2.2 List of Test and Measurement Instruments

**Table 1: List of test and measurement instruments**

| Equipment                    | Manufacturer                | Model Name           | Serial Number | Calibration Due Date | Periodicity | Used for Test Items        |
|------------------------------|-----------------------------|----------------------|---------------|----------------------|-------------|----------------------------|
| EMI Test Receiver            | Rohde & Schwarz             | ESU 40               | 100288        | 24-10-2018           | Yearly      | Radiated Spurious Emission |
| Active loop antenna          | Frankonia                   | LAX-10               | LAX-10-800    | 22-12-17             | Yearly      |                            |
| Baloon and Biconical Antenna | Schwarzbeck mess-elektronik | VHBB-9124 / BBA-9106 | 9124-656      | 09-01-18             | Yearly      |                            |
| Log-Periodic Antenna         | Schwarzbeck mess-elektronik | VUSLP-9111B          | 9111B-111     | 10-01-18             | Yearly      |                            |
| Broadband Horn Antenna       | Frankonia                   | HAX-18               | HAX18-802     | 16-03-2018           | Yearly      |                            |
| Semi Anechoic Chamber        | Frankonia                   | -                    | -             | -                    | -           |                            |
| Signal Analyzer              | Rohde & Schwarz             | FSV7                 | 101644        | 01-12-17             | Yearly      | Antenna port Measurements  |

### 3 GENERAL PRODUCT INFORMATION

#### 3.1 Product Function and Intended Use

Sentinel HDx unit is a Dual Camera Event Recorder and will be installed on the windshield of the vehicle. This product is going to be installed inside the vehicles like cars, truck, taxi etc.

#### 3.2 Ratings and System Details

Table 2: Ratings and System Details

|                           |   |
|---------------------------|---|
| Operating Frequency Range | 2400 MHz – 2483.5 MHz;  |
| Radio Protocol            | Bluetooth ( BDR+EDR)  |
| Verified RF Power         | -2.41 dBm   |
| Channel Spacing           | 1 MHz   |
| Modulation                | BDR (GFSK),<br>EDR ( Pi/4-DQPSK, 8DQPSK)                                  |
| Number of antennas        | 2   |
| Antenna Gain & Type       | Refer Table 4 : Antenna Details   |
| Supply Voltage to Product | 9 to 17 VDC from Vehicle Battery;<br>3.0 to 4.2 VDC from Internal Battery |
| Environmental conditions  | Storage: -20 °C to +60 °C;<br>Operating: -10 °C to +50 °C;                |

### 3.3 Measurement Uncertainty:

**Table 3: Measurement Uncertainty**

| Parameter                         | Uncertainty |
|-----------------------------------|-------------|
| Occupied Channel Bandwidth        | ±5 %        |
| RF output power, conducted        | ±1.5 dB     |
| Power Spectral Density, conducted | ±3 dB       |
| Unwanted Emissions, conducted     | ±3 dB       |
| All emissions, radiated           | ±6 dB       |
| Temperature                       | ±3 °C       |
| Supply Voltages                   | ±3 %        |
| Time                              | ±5 %        |

### 3.4 Antenna Details

**Table 4 : Antenna Details**

|                     |   |   |
|---------------------|---|---|
| <b>Make</b>         | TAIYO YUDEN   | Laird   |
| <b>Model</b>        | AH 104N2450D1   | WTS 2450  |
| <b>Antenna Gain</b> | 2.1 dBi (2.4 GHz Band)<br>2.4 dBi (5 GHz Band)  | 2.1 dBi (2.45 GHz Band)<br>2.6 dBi (5.25 GHz) & 3.4 dBi (5.875 GHz)   |
| <b>Type</b>         | Chip  | External Two-Way Radio Antenna  |
| <b>Data Sheet</b>   | <a href="https://media.digikey.com/pdf/Data%20Sheets/Taiyo%20Yuden%20PDFs%20URL%20links/AH104N2450D1_Char.pdf">https://media.digikey.com/pdf/Data%20Sheets/Taiyo%20Yuden%20PDFs%20URL%20links/AH104N2450D1_Char.pdf</a> | <a href="https://assets.lairdtech.com/home/brand/world/files/ANT-DS-WTS%202450%20080114.pdf">https://assets.lairdtech.com/home/brand/world/files/ANT-DS-WTS%202450%20080114.pdf</a> |

## 4 TEST SET-UP AND OPERATION MODE

### 4.1 Principle of Configuration Selection

Transmission was enabled with hopping mode / highest possible duty cycle transmission on low, mid and high channel.

### 4.2 Test Operation and Test Software

Testing software was used to enable the continuous transmission on low/mid/high channels on the EUT for the tests in this report.

Software Simulator used: "Tera Term or Putty"

Firmware Version: "3.1.5 RC1"

Hardware Version: "4.0"

### 4.3 Special Accessories and Auxiliary Equipment

- Debugger Board, Vehicle Battery, Power Cable was used during testing.

### 4.4 Countermeasures to achieve EMC Compliance

- None

### 4.5 Test modes – data rates and modulations

For Radiated spurious emissions, the tests were performed for all data rates and only worst case results are reported in this report.

Antenna Port measurements are performed on the following paths

Path A – J7 Connector – ANT1

Path B – J8 Connector – ANT2

Bluetooth (EDR+BDR) & Bluetooth LE will transmit only on ANT2 & Wi-Fi (IEEE802.11abgnHT20/HT40) will transmit on both ANT1 & ANT2

Product also has GPS functionality with operating frequency 1575.42MHz

Sample used for testing as identified with below number.

Sample Serial No.02

Sample Serial No.10



## 4.6 List of frequencies

Table 5: List of Center Frequencies

| Frequency Band<br>(MHz)      | Channel No. | Channel Frequency<br>(MHz) |
|------------------------------|-------------|----------------------------|
| 2400 – 2483.5<br>BT(BDR+EDR) | 0           | 2402                       |
|                              | 1           | 2403                       |
|                              | 2           | 2404                       |
|                              | 3           | 2405                       |
|                              | :           | :                          |
|                              | :           | :                          |
|                              | :           | :                          |
|                              | 37          | 2439                       |
|                              | 38          | 2440                       |
|                              | 39          | 2441                       |
|                              | 40          | 2442                       |
|                              | :           | :                          |
|                              | :           | :                          |
|                              | :           | :                          |
|                              | 74          | 2476                       |
|                              | 75          | 2477                       |
|                              | 76          | 2478                       |
|                              | 77          | 2479                       |
|                              | 78          | 2480                       |

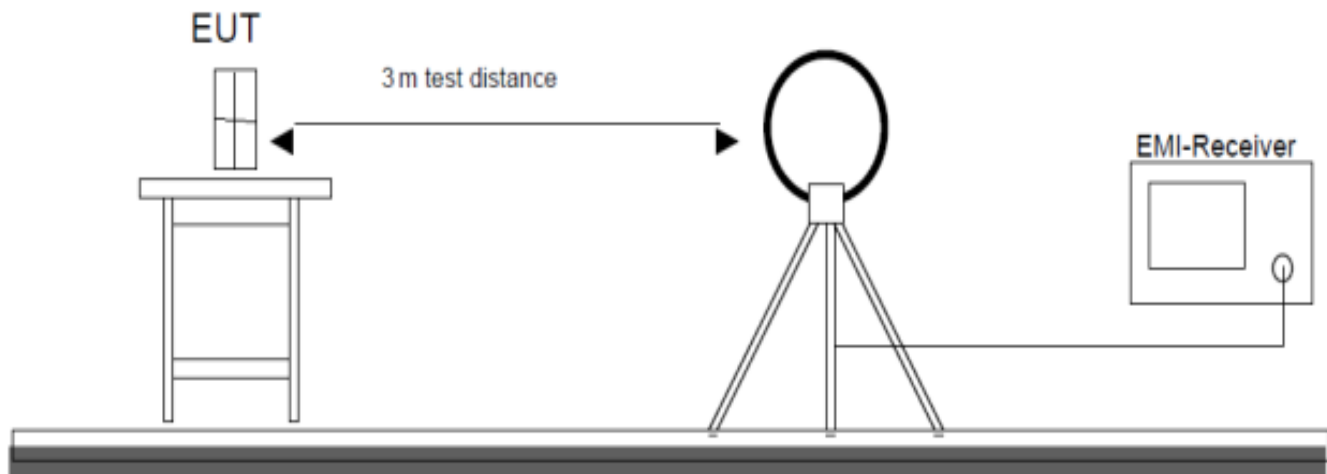
## 5 TEST METHODOLOGY

### 5.1 Radiated Emission Test

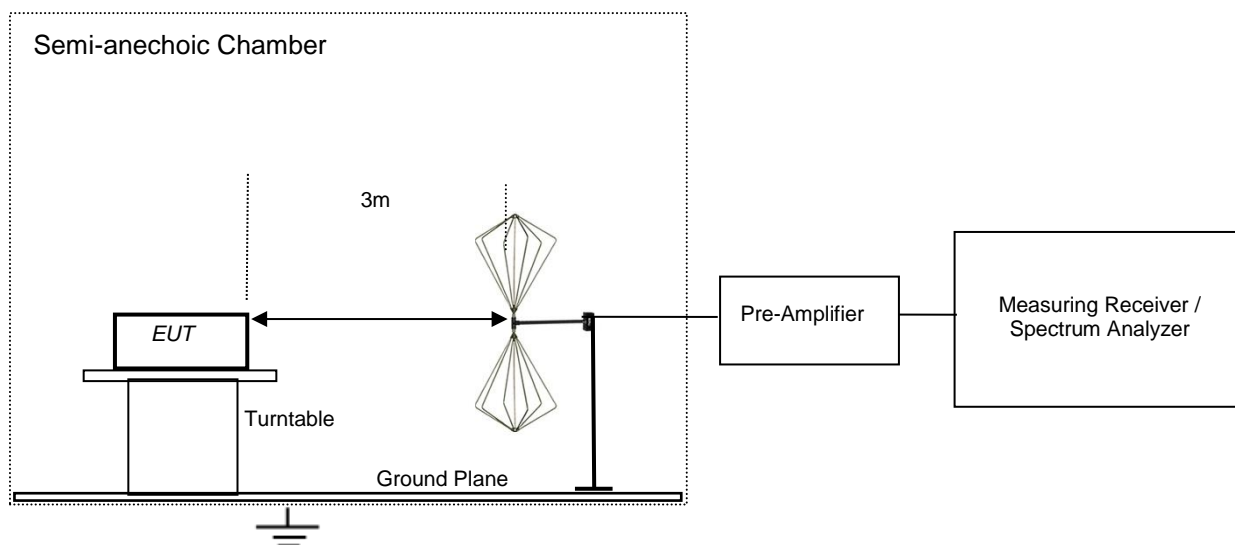
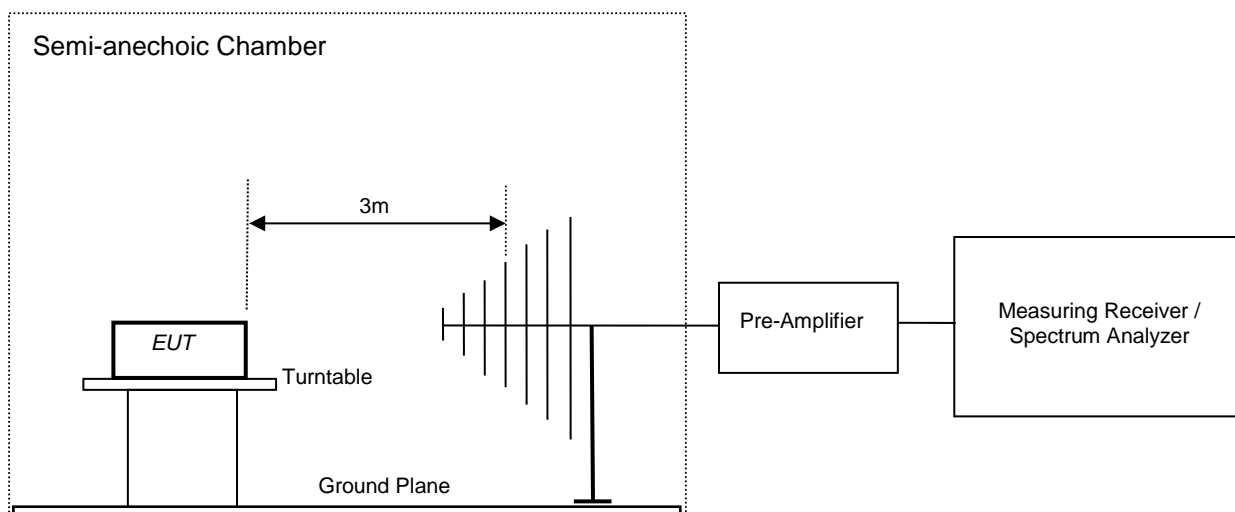
The radiated emission measurement was performed according to the procedures in ANSI C63.10-2013. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable for below 1 GHz & 1.5 m height for above 1 GHz measurement, and the EUT is 3 meters far from the measuring antenna. The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000 MHz was performed by horn antenna, The measurement below 30 MHz was performed by loop antenna, Measurement from 30 MHz to 200 MHz was performed by Baloon and Biconical Antenna, and measurement from 200 MHz to 1 GHz was performed by Log-Periodic Antenna.

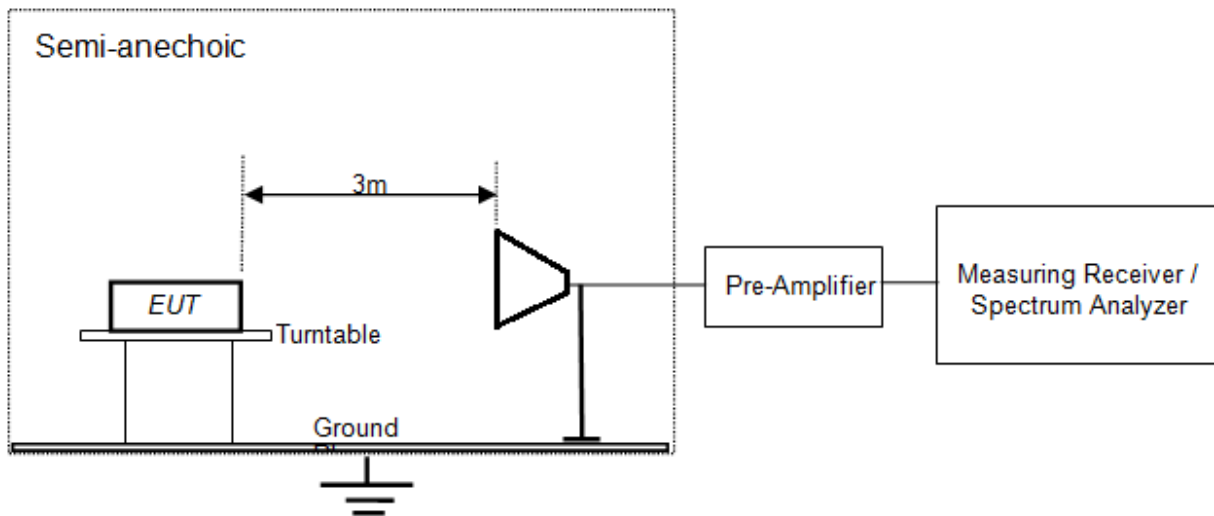
The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded.

#### 5.1.1 Test Setup Configuration



**Figure 1: Frequency Range 9 kHz- 30 MHz**


**Figure 2: Frequency Range 30 MHz – 200 MHz**

**Figure 3: Frequency Range 200 MHz - 1GHz**

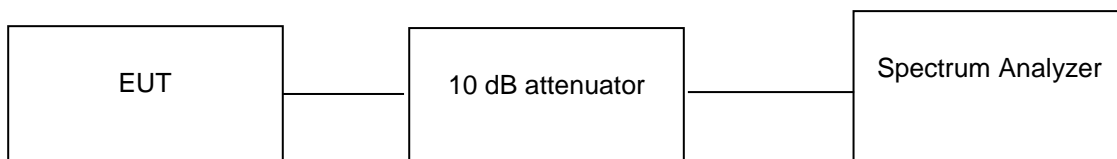
**Figure 4: Frequency Range above 1 GHz**

## 6 TEST RESULTS

### 6.1 Maximum Peak Conducted Output Power

**Result****Pass**

|                       |                                     |
|-----------------------|-------------------------------------|
| Test Specification    | FCC part 15 Subpart C 15.247 (b)(1) |
| Measurement Bandwidth | 1 / 3 MHz                           |
| Detector              | Peak                                |
| Requirement           | <125 mw                             |



Test results:

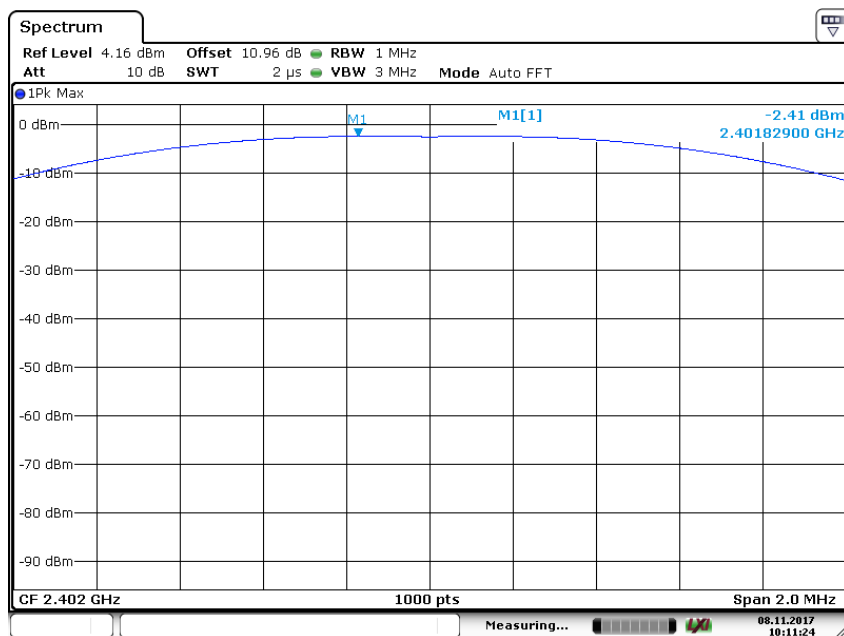
Note: Measurements are done as per FCC / DA-00-705, Filing and Measurement Guidelines for 15.247 Frequency Hopping Spread Spectrum (FHSS) Systems Mar.30, 2000 mentioned in ANSI C63.10-2013.

10 dB attenuator + 0.96 Cable loss = 10.96 dB offset is considered in below result

**Table 6: Maximum peak conducted output power verified Test Results**

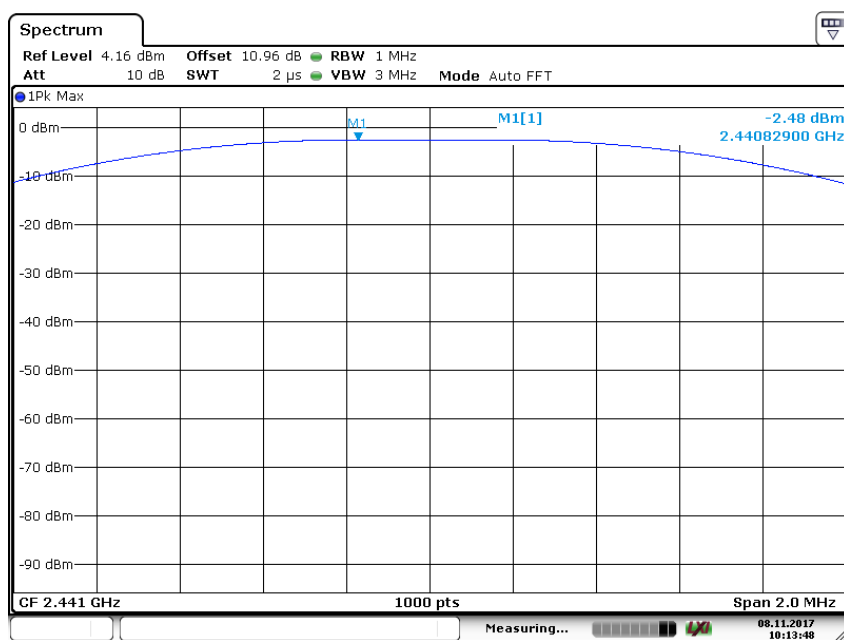
| Modulation Type | Channel Frequency (MHz) | Output power (dBm) | Limit (dBm) |
|-----------------|-------------------------|--------------------|-------------|
| 1 Mbps          | 2402                    | -2.41              | 20.96       |
|                 | 2441                    | -2.48              | 20.96       |
|                 | 2480                    | -2.69              | 20.96       |
| 2 Mbps          | 2402                    | -4.16              | 20.96       |
|                 | 2441                    | -4.21              | 20.96       |
|                 | 2480                    | -4.42              | 20.96       |
| 3 Mbps          | 2402                    | -4.25              | 20.96       |
|                 | 2441                    | -3.63              | 20.96       |
|                 | 2480                    | -3.85              | 20.96       |

## Test Graph 1: 1 Mbps Channel low Power



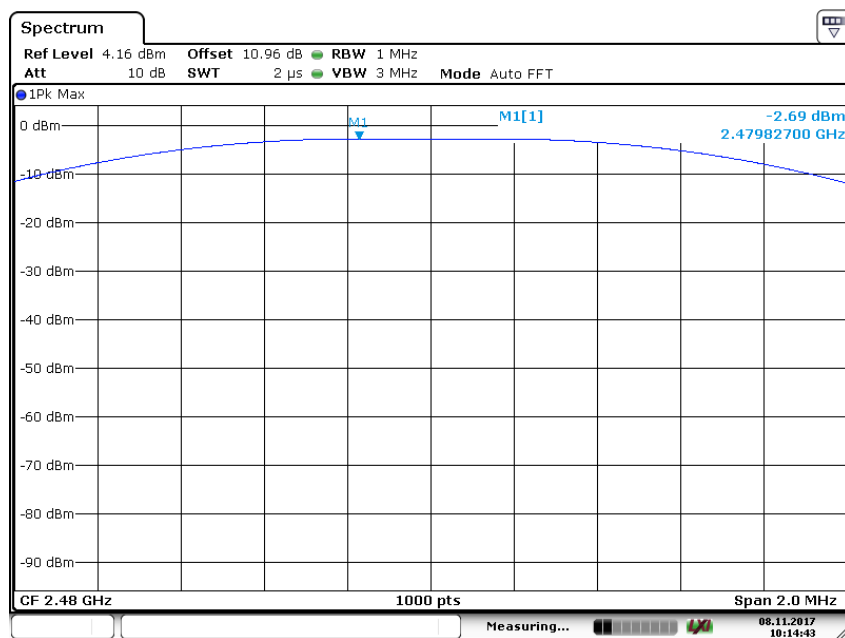
Date: 8 NOV 2017 10:11:23

## Test Graph 2: 1 Mbps Channel mid Power

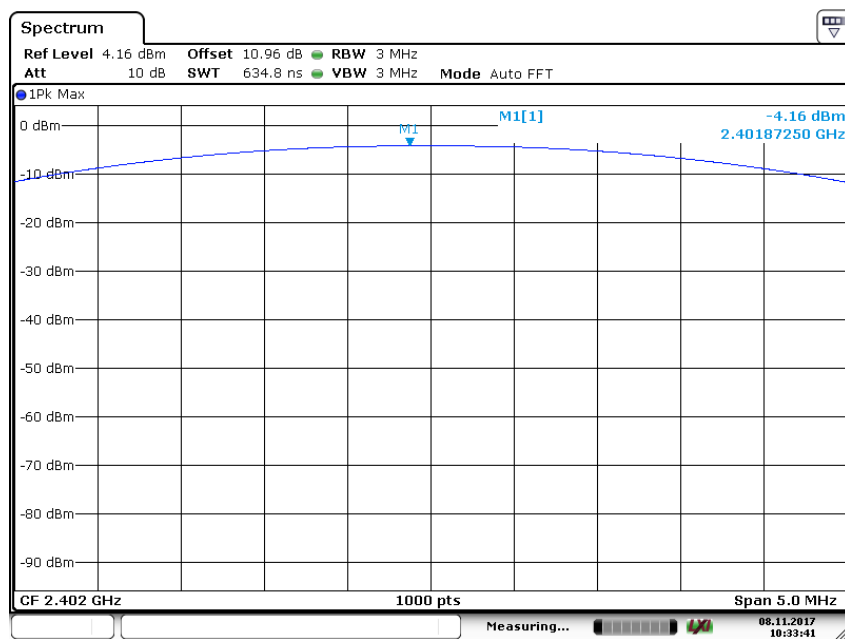


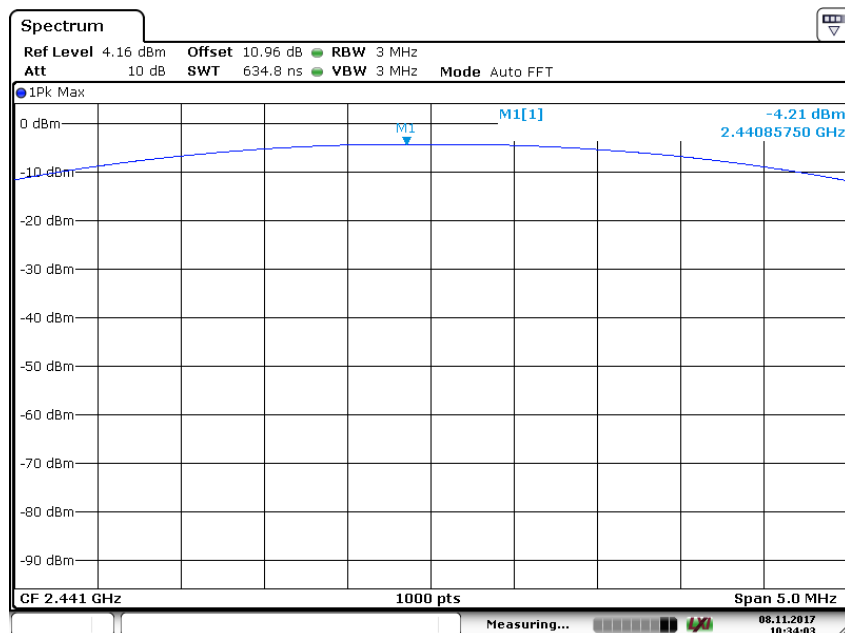
Date: 8 NOV 2017 10:13:48

## Test Graph 3: 1 Mbps Channel high Power

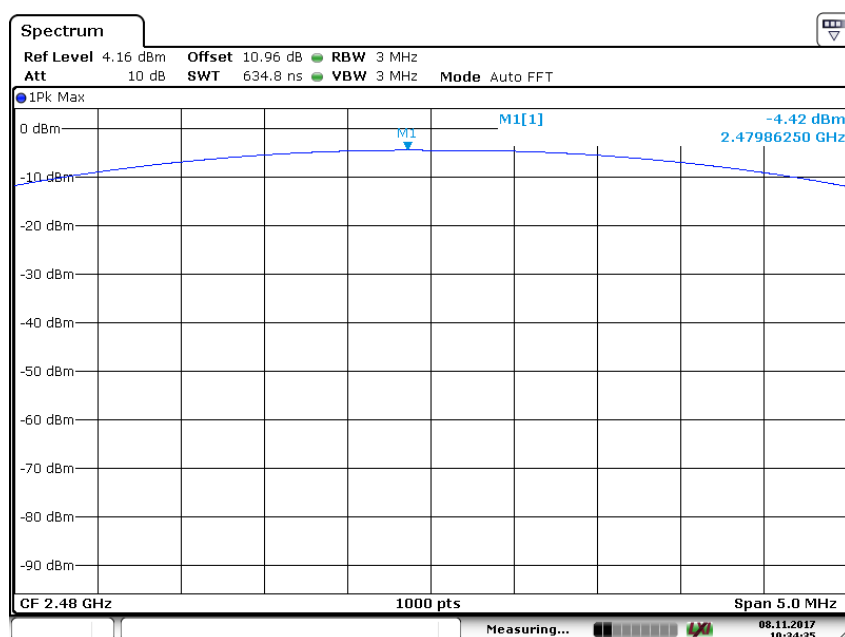


## Test Graph 4: 2 Mbps Channel low Power



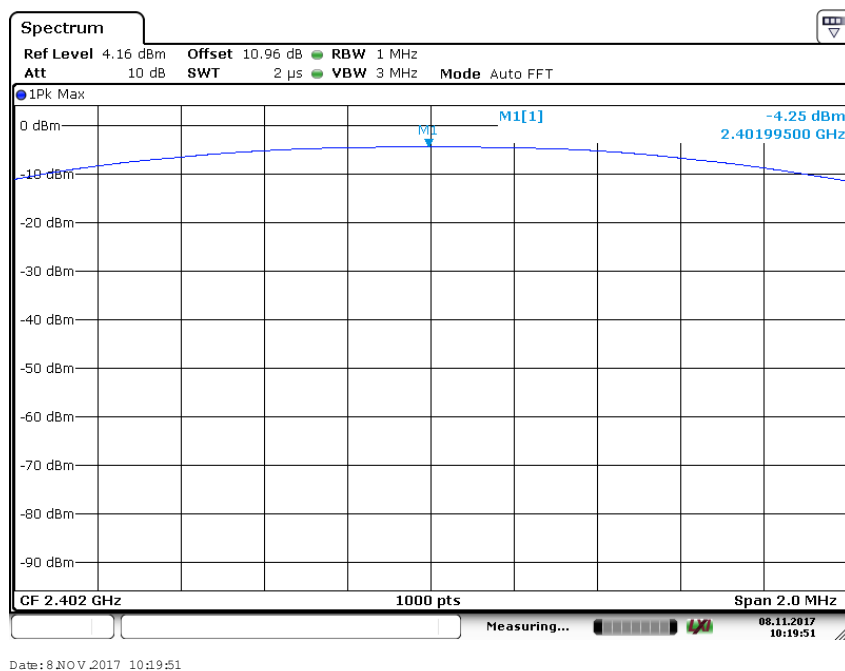
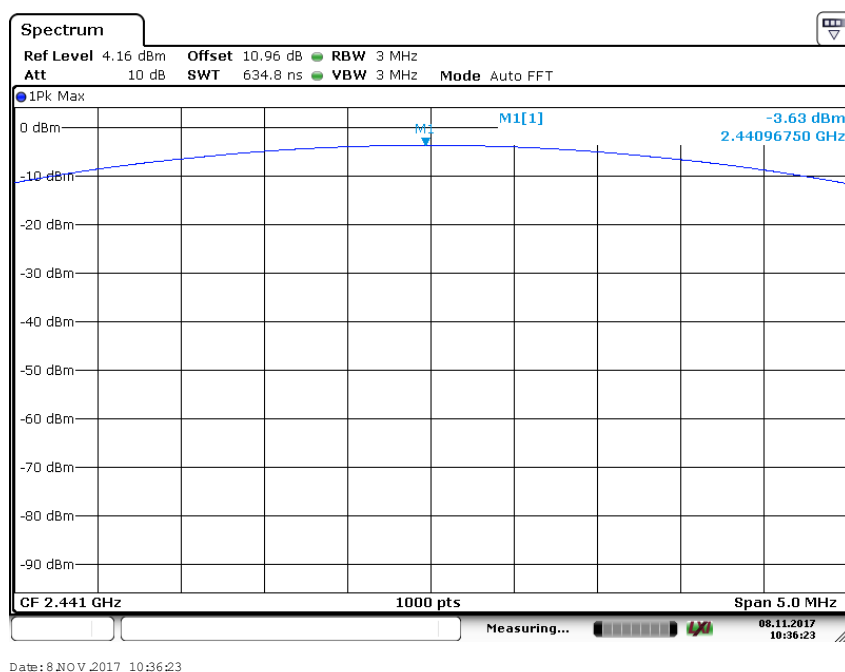
**Test Graph 5: 2 Mbps Channel mid Power**

Date: 8.NOV.2017 10:34:03

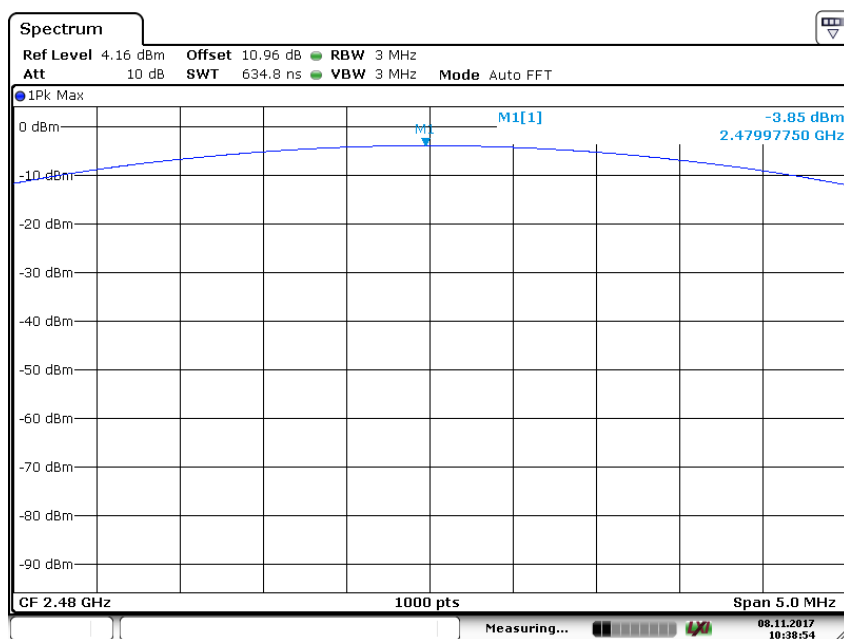
**Test Graph 6: 2 Mbps Channel high Power**

Date: 8.NOV.2017 10:34:35



**Test Graph 7: 3 Mbps Channel low Power****Test Graph 8: 3 Mbps Channel mid Power**

## Test Graph 9: 3 Mbps Channel high Power



Date: 8 NOV 2017 10:38:54

**6.2 Restricted bands of Emissions & Restricted Bands of Operation****Result****Pass**

|                      |   |
|----------------------|---|
| Test Specification   | FCC part 15 Subpart C Section 15.247 (d) / (15.209 & 15.205)    |
| Test Method          | ANSI C 63.10 - 2013   |
| Measurement Location | Semi Anechoic Chamber   |
| Measuring Distance   | 3 m   |
| Detector             | QP for frequency below 1 GHz, average for frequency above 1 GHz |
| Requirement          | As per the limits mentioned in the below table                  |

**Table 7: Transmitter limits for Radiated emission of Section 15.209**

| Frequency (MHz) | Field strength (μV/m) | Field strength (dBμV/m) | Distance of Measurement (m) |
|-----------------|-----------------------|-------------------------|-----------------------------|
| 0.009 – 0.490   | 2400/F(kHz)           | 48.50 – 13.80           | 300*                        |
| 0.490 – 1.705   | 24000/F(kHz)          | 33.80 – 23.00           | 30*                         |
| 1.705 -30       | 30                    | 29.54                   | 30*                         |
| 30-88           | 100                   | 40.0                    | 3                           |
| 88-216          | 150                   | 43.5                    | 3                           |
| 216-960         | 200                   | 46.0                    | 3                           |
| Above 960       | 500                   | 54.0                    | 3                           |

Remark: \* The limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 128.51 – 93.80, 73.80 – 62.96 and 69.54 dBμV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

**Test Conditions:**

Supply Voltage: 12 VDC from Vehicle Battery and 3 to 4.2 VDC from Internal Back-up Battery.

**Environmental conditions:**

Temperature: +25.9 °C      RH: 62.46 %

**Test results:**

No emissions found in frequency 9 kHz to 30 MHz

**Note:** The product has digital device (Camera interfaces, SD card, USB & GPI external Cable) which cannot control the functions of intentional radiator (Wi-Fi, BT(EDR+BDR), BLE)) in such condition Radiated spurious emission for the frequency range from 30MHz to 1GHz was performed as per FCC part 15 subpart B 15.109, Class A requirement & Product exclusively used in Vehicles. Only worst case test results are reported.

**Table 8: FCC Part 15 Subpart B 15.109 Class A limits**

| Frequency MHz | Field Strength dBµV/m | Measured Distance | Field Strength (dBµV/m) |
|---------------|-----------------------|-------------------|-------------------------|
| 30-88         | 90.00                 | 10.00             | 39.08                   |
| 88-216        | 150.00                | 10.00             | 43.52                   |
| 216-960       | 210.00                | 10.00             | 46.43                   |
| above 960     | 300.00                | 10.00             | 49.54                   |

**Table 9: Transmitter test results for the frequency 30 MHz – 200 MHz for Internal Battery**

| Frequency (MHz) | Polarization | Field Strength (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|-----------------|--------------|-------------------------|----------------|-------------|
| 45.67           | Vertical     | 17.56                   | 39.08          | -21.52      |
| 46.24           |              | 17.81                   | 39.08          | -21.27      |
| 70.12           |              | 15.74                   | 39.08          | -23.34      |
| 92.49           |              | 22.21                   | 43.52          | -21.31      |
| 106.37          |              | 24.34                   | 43.52          | -19.18      |
| 119.98          |              | 24.74                   | 43.52          | -18.78      |
| 135.18          |              | 26.70                   | 43.52          | -16.82      |
| 46.20           | Horizontal   | 20.13                   | 39.08          | -18.95      |
| 84.42           |              | 21.87                   | 39.08          | -17.21      |
| 96.30           |              | 20.44                   | 43.52          | -23.08      |
| 136.47          |              | 22.74                   | 43.52          | -20.78      |
| 192.01          |              | 21.82                   | 43.52          | -21.70      |

**Table 10: Transmitter test results for the frequency 30 MHz – 200 MHz for External Battery**

| Frequency (MHz) | Polarization | Field Strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|--------------|-------------------------------|----------------------|-------------|
| 41.28           | Vertical     | 27.18                         | 39.08                | -11.90      |
| 42.44           |              | 25.46                         | 39.08                | -13.62      |
| 62.93           |              | 32.96                         | 39.08                | -6.12       |
| 67.83           |              | 34.93                         | 39.08                | -4.15       |
| 96.43           |              | 26.85                         | 43.52                | -16.67      |
| 140.00          |              | 26.73                         | 43.52                | -16.79      |
| 41.53           | Horizontal   | 25.24                         | 39.08                | -13.84      |
| 67.53           |              | 20.37                         | 39.08                | -18.71      |
| 156.04          |              | 21.22                         | 43.52                | -22.30      |

**Table 11: Transmitter test results for the frequency 200 MHz – 1 GHz for Internal Battery**

| Frequency (MHz) | Polarization | Field Strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|--------------|-------------------------------|----------------------|-------------|
| 272.96          | Vertical     | 40.84                         | 46.43                | -5.59       |
| 360.00          |              | 36.74                         | 46.43                | -9.69       |
| 400.00          |              | 37.70                         | 46.43                | -8.73       |
| 800.00          |              | 41.38                         | 46.43                | -5.05       |
| 880.08          |              | 43.60                         | 46.43                | -2.83       |
| 272.96          | Horizontal   | 40.59                         | 46.43                | -5.84       |
| 400.00          |              | 41.36                         | 46.43                | -5.07       |
| 800.00          |              | 45.28                         | 46.43                | -1.15       |
| 960.00          |              | 40.70                         | 46.43                | -5.73       |

**Table 12: Transmitter test results for the frequency 200 MHz – 1 GHz for External Battery**

| Frequency (MHz) | Polarization | Field Strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|--------------|-------------------------|----------------|-------------|
| 272.96          | Vertical     | 38.97                   | 46.43          | -7.46       |
| 380.00          |              | 40.70                   | 46.43          | -5.73       |
| 900.40          |              | 41.10                   | 46.43          | -5.33       |
| 240.00          | Horizontal   | 41.94                   | 46.43          | -4.49       |
| 272.96          |              | 44.25                   | 46.43          | -2.18       |
| 400.00          |              | 43.18                   | 46.43          | -3.25       |
| 880.08          |              | 42.53                   | 46.43          | -3.90       |

Test results for the frequencies above 1 GHz are reported in below table.

**Table 13: 1 Mbps\_ Internal Antenna**

| Channel Frequency(MHz) | Polarization | Measured Frequency (MHz) | Field Strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|------------------------|--------------|--------------------------|-------------------------|----------------|-------------|
| 2402.00                | Vertical     | 2390(Pk)                 | 40.49                   | 74.00          | -33.51      |
|                        |              | 2390(Av)                 | 28.10                   | 54.00          | -25.90      |
|                        |              | 2402(Pk)                 | 89.15                   | -              | *           |
|                        |              | 2402(Av)                 | 87.01                   | -              | *           |
|                        |              | 4804(Pk)                 | 49.78                   | 74.00          | -24.22      |
|                        |              | 4804(Av)                 | 36.50                   | 54.00          | -17.50      |
|                        |              | 7206(Pk)                 | 57.34                   | 74.00          | -16.66      |
|                        |              | 7206(Av)                 | 44.13                   | 54.00          | -9.87       |

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|---------|------------|------------|-------|-------|--------|
| 2402.00 | Horizontal | 2390(Pk)   | 41.65 | 74.00 | -32.35 |
|         |            | 2390(Av)   | 29.01 | 54.00 | -24.99 |
|         |            | 2402(Pk)   | 90.78 | -     | *      |
|         |            | 2402(Av)   | 88.79 | -     | *      |
|         |            | 4804(Pk)   | 49.88 | 74.00 | -24.12 |
|         |            | 4804(Av)   | 36.51 | 54.00 | -17.49 |
|         |            | 7206(Pk)   | 58.23 | 74.00 | -15.77 |
|         |            | 7206(Av)   | 44.10 | 54.00 | -9.90  |
| 2441.00 | Vertical   | 2441(Pk)   | 89.67 | -     | *      |
|         |            | 2441(Av)   | 87.71 | -     | *      |
|         |            | 4882(Pk)   | 50.94 | 74.00 | -23.06 |
|         |            | 4882(Av)   | 36.92 | 54.00 | -17.08 |
|         |            | 7323(Pk)   | 57.69 | 74.00 | -16.31 |
|         |            | 7323(Av)   | 45.88 | 54.00 | -8.12  |
|         | Horizontal | 2441(Pk)   | 89.05 | -     | *      |
|         |            | 2441(Av)   | 86.43 | -     | *      |
|         |            | 4882(Pk)   | 50.74 | 74.00 | -23.26 |
|         |            | 4882(Av)   | 36.90 | 54.00 | -17.10 |
|         |            | 7323(Pk)   | 61.01 | 74.00 | -12.99 |
|         |            | 7323(Av)   | 45.47 | 54.00 | -8.53  |
| 2480.00 | Vertical   | 2480(Pk)   | 90.73 | -     | *      |
|         |            | 2480(Av)   | 88.77 | -     | *      |
|         |            | 2483.5(Pk) | 43.29 | 74.00 | -30.71 |
|         |            | 2483.5(Av) | 28.63 | 54.00 | -25.37 |
|         |            | 4960(Pk)   | 50.88 | 74.00 | -23.12 |
|         |            | 4960(Av)   | 37.04 | 54.00 | -16.96 |
|         |            | 7440(Pk)   | 59.40 | 74.00 | -14.60 |
|         |            | 7440(Av)   | 45.89 | 54.00 | -8.11  |

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|         |            |            |       |       |        |
|---------|------------|------------|-------|-------|--------|
| 2480.00 | Horizontal | 2480(Pk)   | 88.19 | -     | *      |
|         |            | 2480(Av)   | 84.30 | -     | *      |
|         |            | 2483.5(Pk) | 40.44 | 74.00 | -33.56 |
|         |            | 2483.5(Av) | 28.19 | 54.00 | -25.81 |
|         |            | 4960(Pk)   | 50.76 | 74.00 | -23.24 |
|         |            | 4960(Av)   | 37.04 | 54.00 | -16.96 |
|         |            | 7440(Pk)   | 59.81 | 74.00 | -14.19 |
|         |            | 7440(Av)   | 46.05 | 54.00 | -7.95  |

**Table 14: 2 Mbps\_Internal Antenna**

| Channel Frequency(MHz) | Polarization | Measured Frequency (MHz) | Field Strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|------------------------|--------------|--------------------------|-------------------------|----------------|-------------|
| 2402.00                | Vertical     | 2390(Pk)                 | 38.90                   | 74.00          | -35.10      |
|                        |              | 2390(Av)                 | 25.56                   | 54.00          | -28.44      |
|                        |              | 2402(Pk)                 | 85.48                   | -              | *           |
|                        |              | 2402(Av)                 | 80.77                   | -              | *           |
|                        |              | 4804(Pk)                 | 49.83                   | 74.00          | -24.17      |
|                        |              | 4804(Av)                 | 36.56                   | 54.00          | -17.44      |
|                        |              | 7206(Pk)                 | 57.98                   | 74.00          | -16.02      |
|                        |              | 7206(Av)                 | 44.10                   | 54.00          | -9.90       |
|                        | Horizontal   | 2390(Pk)                 | 39.04                   | 74.00          | -34.96      |
|                        |              | 2390(Av)                 | 25.51                   | 54.00          | -28.49      |
|                        |              | 2402(Pk)                 | 85.92                   | -              | *           |
|                        |              | 2402(Av)                 | 80.46                   | -              | *           |
|                        |              | 4804(Pk)                 | 50.06                   | 74.00          | -23.94      |
|                        |              | 4804(Av)                 | 36.53                   | 54.00          | -17.47      |
|                        |              | 7206(Pk)                 | 57.95                   | 74.00          | -16.05      |
|                        |              | 7206(Av)                 | 44.07                   | 54.00          | -9.93       |



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|---------|------------|------------|-------|-------|--------|
| 2441.00 | Vertical   | 2441(Pk)   | 86.29 | -     | *      |
|         |            | 2441(Av)   | 81.44 | -     | *      |
|         |            | 4882(Pk)   | 51.45 | 74.00 | -22.55 |
|         |            | 4882(Av)   | 36.85 | 54.00 | -17.15 |
|         |            | 7323(Pk)   | 58.49 | 74.00 | -15.51 |
|         |            | 7323(Av)   | 44.57 | 54.00 | -9.43  |
|         | Horizontal | 2441(Pk)   | 81.58 | -     | *      |
|         |            | 2441(Av)   | 80.11 | -     | *      |
|         |            | 4882(Pk)   | 50.67 | 74.00 | -23.33 |
|         |            | 4882(Av)   | 36.85 | 54.00 | -17.15 |
|         |            | 7323(Pk)   | 58.03 | 74.00 | -15.97 |
|         |            | 7323(Av)   | 44.59 | 54.00 | -9.41  |
| 2480.00 | Vertical   | 2480(Pk)   | 87.28 | -     | *      |
|         |            | 2480(Av)   | 82.14 | -     | *      |
|         |            | 2483.5(Pk) | 42.87 | 74.00 | -31.13 |
|         |            | 2483.5(Av) | 26.18 | 54.00 | -27.82 |
|         |            | 4960(Pk)   | 50.70 | 74.00 | -23.30 |
|         |            | 4960(Av)   | 37.06 | 54.00 | -16.94 |
|         |            | 7440(Pk)   | 59.03 | 74.00 | -14.97 |
|         |            | 7440(Av)   | 45.51 | 54.00 | -8.49  |
|         | Horizontal | 2480(Pk)   | 84.04 | -     | *      |
|         |            | 2480(Av)   | 79.18 | -     | *      |
|         |            | 2483.5(Pk) | 39.57 | 74.00 | -34.43 |
|         |            | 2483.5(Av) | 25.38 | 54.00 | -28.62 |
|         |            | 4960(Pk)   | 50.82 | 74.00 | -23.18 |
|         |            | 4960(Av)   | 37.04 | 54.00 | -16.96 |
|         |            | 7440(Pk)   | 58.99 | 74.00 | -15.01 |
|         |            | 7440(Av)   | 45.31 | 54.00 | -8.69  |

**Table 15: 3 Mbps\_ Internal Antenna**

| Channel Frequency(MHz) | Polarization | Measured Frequency (MHz) | Field Strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|------------------------|--------------|--------------------------|-------------------------|----------------|-------------|
| 2402.00                | Vertical     | 2390(Pk)                 | 38.83                   | 74.00          | -35.17      |
|                        |              | 2390(Av)                 | 25.52                   | 54.00          | -28.48      |
|                        |              | 2402(Pk)                 | 85.75                   | -              | *           |
|                        |              | 2402(Av)                 | 80.09                   | -              | *           |
|                        |              | 4804(Pk)                 | 50.15                   | 74.00          | -23.85      |
|                        |              | 4804(Av)                 | 36.55                   | 54.00          | -17.45      |
|                        |              | 7206(Pk)                 | 57.60                   | 74.00          | -16.40      |
|                        |              | 7206(Av)                 | 44.17                   | 54.00          | -9.83       |
|                        | Horizontal   | 2390(Pk)                 | 38.76                   | 74.00          | -35.24      |
|                        |              | 2390(Av)                 | 25.54                   | 54.00          | -28.46      |
|                        |              | 2402(Pk)                 | 87.55                   | -              | *           |
|                        |              | 2402(Av)                 | 82.13                   | -              | *           |
|                        |              | 4804(Pk)                 | 50.64                   | 74.00          | -23.36      |
|                        |              | 4804(Av)                 | 36.53                   | 54.00          | -17.47      |
|                        |              | 7206(Pk)                 | 58.07                   | 74.00          | -15.93      |
|                        |              | 7206(Av)                 | 44.12                   | 54.00          | -9.88       |
| 2441.00                | Vertical     | 2441(Pk)                 | 87.36                   | -              | *           |
|                        |              | 2441(Av)                 | 81.97                   | -              | *           |
|                        |              | 4882(Pk)                 | 50.69                   | 74.00          | -23.31      |
|                        |              | 4882(Av)                 | 36.96                   | 54.00          | -17.04      |
|                        |              | 7323(Pk)                 | 58.13                   | 74.00          | -15.87      |
|                        |              | 7323(Av)                 | 44.52                   | 54.00          | -9.48       |
|                        | Horizontal   | 2441(Pk)                 | 86.68                   | -              | *           |
|                        |              | 2441(Av)                 | 80.70                   | -              | *           |
|                        |              | 4882(Pk)                 | 50.69                   | 74.00          | -23.31      |
|                        |              | 4882(Av)                 | 36.91                   | 54.00          | -17.09      |
|                        |              | 7323(Pk)                 | 58.19                   | 74.00          | -15.81      |
|                        |              | 7323(Av)                 | 44.55                   | 54.00          | -9.45       |

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|         |            |            |       |       |        |
|---------|------------|------------|-------|-------|--------|
| 2480.00 | Vertical   | 2480(Pk)   | 88.57 | -     | *      |
|         |            | 2480(Av)   | 82.54 | -     | *      |
|         |            | 2483.5(Pk) | 45.19 | 74.00 | -28.81 |
|         |            | 2483.5(Av) | 27.70 | 54.00 | -26.30 |
|         |            | 4960(Pk)   | 50.63 | 74.00 | -23.37 |
|         |            | 4960(Av)   | 37.07 | 54.00 | -16.93 |
|         |            | 7440(Pk)   | 59.82 | 74.00 | -14.18 |
|         |            | 7440(Av)   | 45.40 | 54.00 | -8.60  |
|         | Horizontal | 2480(Pk)   | 85.52 | -     | *      |
|         |            | 2480(Av)   | 79.26 | -     | *      |
|         |            | 2483.5(Pk) | 42.84 | 74.00 | -31.16 |
|         |            | 2483.5(Av) | 26.21 | 54.00 | -27.79 |
|         |            | 4960(Pk)   | 51.03 | 74.00 | -22.97 |
|         |            | 4960(Av)   | 37.08 | 54.00 | -16.92 |
|         |            | 7440(Pk)   | 59.31 | 74.00 | -14.69 |
|         |            | 7440(Av)   | 45.33 | 54.00 | -8.67  |

**Table 16: 1 Mbps\_ External Antenna**

| Channel Frequency(MHz) | Polarization | Measured Frequency (MHz) | Field Strength (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|------------------------|--------------|--------------------------|-------------------------|----------------|-------------|
| 2402.00                | Vertical     | 2390(Pk)                 | 42.03                   | 74.00          | -31.97      |
|                        |              | 2390(Av)                 | 28.97                   | 54.00          | -25.03      |
|                        |              | 2402(Pk)                 | 92.53                   | -              | *           |
|                        |              | 2402(Av)                 | 90.27                   | -              | *           |
|                        |              | 4804(Pk)                 | 50.38                   | 74.00          | -23.62      |
|                        |              | 4804(Av)                 | 36.54                   | 54.00          | -17.46      |
|                        |              | 7206(Pk)                 | 57.76                   | 74.00          | -16.24      |
|                        |              | 7206(Av)                 | 45.67                   | 54.00          | -8.33       |

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|         |            |            |       |       |        |
|---------|------------|------------|-------|-------|--------|
| 2402.00 | Horizontal | 2390(Pk)   | 40.26 | 74.00 | -33.74 |
|         |            | 2390(Av)   | 26.95 | 54.00 | -27.05 |
|         |            | 2402(Pk)   | 88.74 | -     | *      |
|         |            | 2402(Av)   | 86.76 | -     | *      |
|         |            | 4804(Pk)   | 50.07 | 74.00 | -23.93 |
|         |            | 4804(Av)   | 36.45 | 54.00 | -17.55 |
|         |            | 7206(Pk)   | 57.62 | 74.00 | -16.38 |
|         |            | 7206(Av)   | 44.52 | 54.00 | -9.48  |
| 2441.00 | Vertical   | 2441(Pk)   | 94.88 | -     | *      |
|         |            | 2441(Av)   | 92.90 | -     | *      |
|         |            | 4882(Pk)   | 50.25 | 74.00 | -23.75 |
|         |            | 4882(Av)   | 36.87 | 54.00 | -17.13 |
|         |            | 7323(Pk)   | 58.55 | 74.00 | -15.45 |
|         |            | 7323(Av)   | 44.53 | 54.00 | -9.47  |
|         | Horizontal | 2441(Pk)   | 89.60 | -     | *      |
|         |            | 2441(Av)   | 87.63 | -     | *      |
|         |            | 4882(Pk)   | 50.47 | 74.00 | -23.53 |
|         |            | 4882(Av)   | 36.88 | 54.00 | -17.12 |
|         |            | 7323(Pk)   | 58.22 | 74.00 | -15.78 |
|         |            | 7323(Av)   | 44.68 | 54.00 | -9.32  |
| 2480.00 | Vertical   | 2480(Pk)   | 95.45 | -     | *      |
|         |            | 2480(Av)   | 92.55 | -     | *      |
|         |            | 2483.5(Pk) | 42.98 | 74.00 | -31.02 |
|         |            | 2483.5(Av) | 30.32 | 54.00 | -23.68 |
|         |            | 4960(Pk)   | 50.82 | 74.00 | -23.18 |
|         |            | 4960(Av)   | 37.13 | 54.00 | -16.87 |
|         |            | 7440(Pk)   | 59.25 | 74.00 | -14.75 |
|         |            | 7440(Av)   | 46.65 | 54.00 | -7.35  |

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|         |            |            |       |       |        |
|---------|------------|------------|-------|-------|--------|
| 2480.00 | Horizontal | 2480(Pk)   | 88.20 | -     | *      |
|         |            | 2480(Av)   | 85.65 | -     | *      |
|         |            | 2483.5(Pk) | 40.20 | 74.00 | -33.80 |
|         |            | 2483.5(Av) | 28.38 | 54.00 | -25.62 |
|         |            | 4960(Pk)   | 50.87 | 74.00 | -23.13 |
|         |            | 4960(Av)   | 37.37 | 54.00 | -16.63 |
|         |            | 7440(Pk)   | 59.69 | 74.00 | -14.31 |
|         |            | 7440(Av)   | 46.78 | 54.00 | -7.22  |

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