

## FCC PART 22 and 90 TEST REPORT

For

**Sepura plc**

Radio House, St. Andrews Road, Cambridge CB4 1GR UK

**FCC ID: XX6SEP8050**

|                                                     |                                                                                                                                                                                                                                                         |
|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Report Type:</b><br>Class II permissive change   | <b>Product Type:</b><br>DMR Two Way Radio                                                                                                                                                                                                               |
| <b>Test Engineer:</b> <u>Dean Liu</u>               | <i>Dean Liu</i>                                                                                                                                                                                                                                         |
| <b>Report Number:</b> <u>RDG150808003-00A1</u>      |                                                                                                                                                                                                                                                         |
| <b>Report Date:</b> <u>2015-12-21</u>               |                                                                                                                                                                                                                                                         |
| <b>Reviewed By:</b> <u>Sula Huang<br/>RF Leader</u> | <i>Sula Huang</i>                                                                                                                                                                                                                                       |
| <b>Test Laboratory:</b>                             | Bay Area Compliance Laboratories Corp. (Dongguan)<br>No.69 Pulongcun, Puxinhu Industrial Zone,<br>Tangxia, Dongguan, Guangdong, China<br>Tel: +86-769-86858888<br>Fax: +86-769-86858891<br><a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a> |

**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

## **TABLE OF CONTENTS**

|                                                                                   |          |
|-----------------------------------------------------------------------------------|----------|
| <b>GENERAL INFORMATION.....</b>                                                   | <b>3</b> |
| PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....                          | 3        |
| OBJECTIVE .....                                                                   | 3        |
| RELATED SUBMITTAL(S)/GRANT(S).....                                                | 3        |
| TEST METHODOLOGY .....                                                            | 3        |
| TEST FACILITY .....                                                               | 4        |
| <b>SYSTEM TEST CONFIGURATION.....</b>                                             | <b>5</b> |
| DESCRIPTION OF TEST CONFIGURATION .....                                           | 5        |
| SUPPORT EQUIPMENT LIST AND DETAILS .....                                          | 5        |
| BLOCK DIAGRAM OF TEST SETUP .....                                                 | 5        |
| <b>SUMMARY OF TEST RESULTS .....</b>                                              | <b>6</b> |
| <b>FCC §1.1310 &amp; §2.1093 - RF EXPOSURE.....</b>                               | <b>7</b> |
| APPLICABLE STANDARD .....                                                         | 7        |
| TEST RESULT .....                                                                 | 7        |
| <b>FCC §2.1053 &amp; §22.861 &amp; §90.210 - RADIATED SPURIOUS EMISSIONS.....</b> | <b>8</b> |
| APPLICABLE STANDARD .....                                                         | 8        |
| TEST EQUIPMENT LIST AND DETAILS.....                                              | 8        |
| TEST PROCEDURE .....                                                              | 8        |
| TEST DATA .....                                                                   | 9        |

---

## GENERAL INFORMATION

---

### Product Description for Equipment under Test (EUT)

The *Sepura plc*'s product, model: *SEP8350* (FCC ID: *XX6SEP8050*) (the "EUT") in this report is a *DMR Two Way Radio*, which was measured approximately: 15 cm (L) x 6.3cm (H) x 3.7 cm (T), rated input voltage: 7.4 VDC from battery.

*\* All measurement and test data in this report was gathered from production sample serial number: 7PR101525GC0001. The EUT was received on 2015-08-05.*

### Objective

This test report is prepared on behalf of *Sepura plc* in accordance with Part 2, Part22 and Part 90 of the Federal Communications Commission rules.

This is the CIIPC application of the device. The differences between the original device and new device are the enclosure shape and model name. Please refer to the Permissive Change Declaration Letter.

According to the changes, it will impact the test results of spurious radiated emissions, so in this report, we update the test data of spurious radiated emissions, and the EUT photo.

### Related Submittal(s)/Grant(s)

Original submission with FCC ID: *XX6SEP8050* which is granted on 2015-12-20.

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, Sub-part J as well as the following individual parts:

Part 22 – Public Mobile Service

Part 90 – Private Land Mobile Radio Service

Applicable Standards: TIA-603-D.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## **Test Facility**

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 06, 2015. 2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing in a test mode.

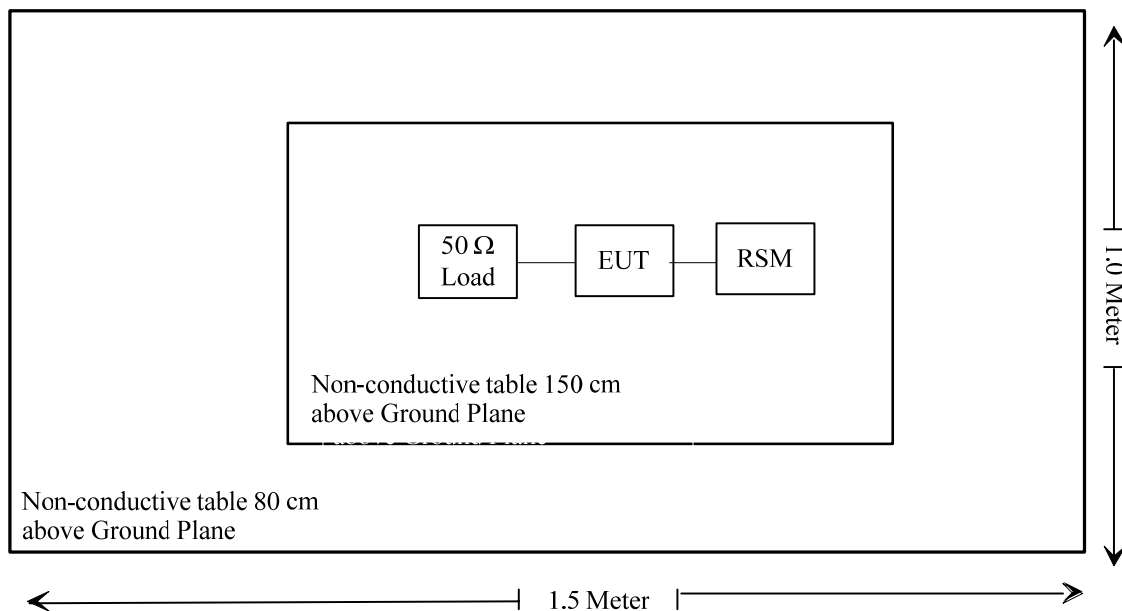
#### EUT Specification:

|                          |                                               |
|--------------------------|-----------------------------------------------|
| Operating Frequency Band | 450-520MHz                                    |
| Modulation Mode          | FM/4FSK                                       |
| Channel Spacing          | 12.5 kHz                                      |
| Rated Output Power       | High power level: 4 W<br>Low power level: 1 W |

### Support Equipment List and Details

| Manufacturer | Description                    | Model     | Serial Number |
|--------------|--------------------------------|-----------|---------------|
| Sepura       | RSM(Remote Speaker Microphone) | 300-00389 | /             |

### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

| FCC Rules                                 | Description of Test                   | Results     |
|-------------------------------------------|---------------------------------------|-------------|
| §1.1310, §2.1093                          | RF Exposure                           | Compliance  |
| §2.1046;<br>§ 22.727;§90.205              | RF Output Power                       | Compliance* |
| §2.1047;§90.207                           | Modulation Characteristic             | Compliance* |
| §2.1049;§22.357;§ 22.731;§90.209; §90.210 | Occupied Bandwidth & Emission Mask    | Compliance* |
| §2.1051;<br>§22.861;§90.210               | Spurious Emission at Antenna Terminal | Compliance* |
| §2.1053;<br>§22.861;§90.210               | Spurious Radiated Emissions           | Compliance  |
| §2.1055; §<br>22.355;§90.213              | Frequency Stability                   | Compliance* |
| §90.214                                   | Transient Frequency Behavior          | Compliance* |

Compliance\*: Please refer to the report number RDG150804003-00 granted on 2015-12-20, with FCC ID: XX6SEP8050.

---

## **FCC §1.1310 & §2.1093 - RF EXPOSURE**

---

### **Applicable Standard**

FCC§1.1310 and §2.1093.

### **Test Result**

Compliant, please refer to the SAR report: R15082522-FCC SAR.

## FCC §2.1053 & §22.861 & §90.210 - RADIATED SPURIOUS EMISSIONS

### Applicable Standard

FCC §2.1053, §22.861 and §90.210

### Test Equipment List and Details

| Manufacturer   | Description               | Model No.  | Serial No.  | Calibration Date | Calibration Due Date |
|----------------|---------------------------|------------|-------------|------------------|----------------------|
| HP             | Signal Generator          | 8648A      | 3426A00831  | 2014-11-06       | 2015-11-06           |
| Sunol Sciences | Antenna                   | JB3        | A060611-1   | 2014-09-06       | 2017-09-05           |
| EMCO           | Adjustable Dipole Antenna | 3121C      | 9109-753    | N/A              | N/A                  |
| HP             | Amplifier                 | 8447E      | 2434A02181  | 2014-09-06       | 2015-09-06           |
| R&S            | EMI Test Receiver         | ESCI       | 100224      | 2015-05-09       | 2016-05-09           |
| Agilent        | Signal Generator          | E8247C     | MY43321350  | 2014-10-15       | 2015-10-15           |
| Mini-Circuit   | Amplifier                 | ZVA-213-S+ | 054201245   | 2015-02-19       | 2016-02-19           |
| TDK RF         | Horn Antenna              | HRN-0118   | 130 084     | 2012-09-06       | 2015-09-06           |
| ETS LINDGREN   | Horn Antenna              | 3115       | 000 527 35  | 2012-09-06       | 2015-09-06           |
| R&S            | Spectrum Analyzer         | FSEM       | DE31388     | 2015-05-09       | 2016-05-09           |
| N/A            | Coaxial Cable             | 14m        | N/A         | 2015-05-06       | 2016-05-06           |
| N/A            | Coaxial Cable             | 8m         | N/A         | 2015-05-06       | 2016-05-06           |
| Mini-Circuits  | HIGH PASS FILTER          | BHP-550+   | YZU15801121 | 2015-05-06       | 2016-05-06           |
| Weinschel Corp | Terminal Load(100W)       | 1440-3     | MD447       | /                | /                    |

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

**Test Data****Environmental Conditions**

|                           |         |
|---------------------------|---------|
| <b>Temperature:</b>       | 26.9 °C |
| <b>Relative Humidity:</b> | 56 %    |
| <b>ATM Pressure:</b>      | 99.1kPa |

The testing was performed by Dean Liu from 2015-08-25.

**Power by battery 2500mAh**

Test Mode: Transmitting (FM mode, high power level)

| Frequency                                      | Polar | S.A.<br>Reading | S.G.<br>Level | Antenna<br>Gain | Cable<br>Loss | Absolute<br>Level | Limit | Margin |
|------------------------------------------------|-------|-----------------|---------------|-----------------|---------------|-------------------|-------|--------|
| MHz                                            | H/V   | dBμV            | dBm           | dBd/dBi         | dB            | dBm               | dBm   | dB     |
| <b>Frequency:485 MHz, for FCC PART 90</b>      |       |                 |               |                 |               |                   |       |        |
| 1455.000                                       | H     | 47.83           | -53.3         | 9.3             | 1.3           | -45.3             | -20.0 | 25.3   |
| 1455.000                                       | V     | 44.93           | -56.2         | 9.3             | 1.3           | -48.2             | -20.0 | 28.2   |
| 1940.000                                       | H     | 44.62           | -54.2         | 11.9            | 1.4           | -43.7             | -20.0 | 23.7   |
| 1940.000                                       | V     | 42.85           | -55.1         | 11.9            | 1.4           | -44.6             | -20.0 | 24.6   |
| 2425.000                                       | H     | 34.27           | -63.1         | 12.5            | 2.7           | -53.3             | -20.0 | 33.3   |
| 2425.000                                       | V     | 33.46           | -62.7         | 12.5            | 2.7           | -52.9             | -20.0 | 32.9   |
| 2910.000                                       | H     | 31.96           | -66.1         | 13.9            | 2.2           | -54.4             | -20.0 | 34.4   |
| 2910.000                                       | V     | 31.43           | -66.7         | 13.9            | 2.2           | -55.0             | -20.0 | 35.0   |
| 970.000                                        | H     | 19.39           | -53           | 0.0             | 1             | -54.0             | -20.0 | 34.0   |
| 970.000                                        | V     | 18.68           | -50.5         | 0.0             | 1             | -51.5             | -20.0 | 31.5   |
| <b>Frequency:454.0125 MHz, for FCC PART 22</b> |       |                 |               |                 |               |                   |       |        |
| 1362.038                                       | H     | 53.50           | -46.9         | 8.7             | 1.4           | -39.6             | -13.0 | 26.6   |
| 1362.038                                       | V     | 49.17           | -51.2         | 8.7             | 1.4           | -43.9             | -13.0 | 30.9   |
| 1816.050                                       | H     | 44.19           | -55.8         | 11.2            | 1.3           | -45.9             | -13.0 | 32.9   |
| 1816.050                                       | V     | 40.97           | -59.3         | 11.2            | 1.3           | -49.4             | -13.0 | 36.4   |
| 2270.063                                       | H     | 37.50           | -58.6         | 11.1            | 2.2           | -49.7             | -13.0 | 36.7   |
| 2270.063                                       | V     | 37.36           | -58.4         | 11.1            | 2.2           | -49.5             | -13.0 | 36.5   |
| 3632.100                                       | H     | 36.38           | -59.1         | 14.1            | 2.2           | -47.2             | -13.0 | 34.2   |
| 3632.100                                       | V     | 36.25           | -58.8         | 14.1            | 2.2           | -46.9             | -13.0 | 33.9   |
| 908.025                                        | H     | 19.98           | -54.2         | 0.0             | 1             | -55.2             | -13.0 | 42.2   |
| 908.025                                        | V     | 19.84           | -51.1         | 0.0             | 1             | -52.1             | -13.0 | 39.1   |

Test Mode: Transmitting (4FSK mode, high power level)

| Frequency                                     | Polar | S.A. Reading | S.G. Level | Antenna Gain | Cable Loss | Absolute Level | Limit | Margin |
|-----------------------------------------------|-------|--------------|------------|--------------|------------|----------------|-------|--------|
| MHz                                           | H/V   | dBμV         | dBm        | dBd/dBi      | dB         | dBm            | dBm   | dB     |
| <b>Frequency:485MHz, for FCC PART 90</b>      |       |              |            |              |            |                |       |        |
| 1455.000                                      | H     | 47.23        | -53.9      | 9.3          | 1.3        | -45.9          | -20.0 | 25.9   |
| 1455.000                                      | V     | 44.35        | -56.8      | 9.3          | 1.3        | -48.8          | -20.0 | 28.8   |
| 1940.000                                      | H     | 45.83        | -53        | 11.9         | 1.4        | -42.5          | -20.0 | 22.5   |
| 1940.000                                      | V     | 43.86        | -54.1      | 11.9         | 1.4        | -43.6          | -20.0 | 23.6   |
| 2425.000                                      | H     | 35.40        | -62        | 12.5         | 2.7        | -52.2          | -20.0 | 32.2   |
| 2425.000                                      | V     | 34.59        | -61.6      | 12.5         | 2.7        | -51.8          | -20.0 | 31.8   |
| 2910.000                                      | H     | 32.72        | -65.4      | 13.9         | 2.2        | -53.7          | -20.0 | 33.7   |
| 2910.000                                      | V     | 31.76        | -66.4      | 13.9         | 2.2        | -54.7          | -20.0 | 34.7   |
| 970.000                                       | H     | 19.67        | -52.8      | 0.0          | 1          | -53.8          | -20.0 | 33.8   |
| 970.000                                       | V     | 18.91        | -50.2      | 0.0          | 1          | -51.2          | -20.0 | 31.2   |
| <b>Frequency:454.0125MHz, for FCC PART 22</b> |       |              |            |              |            |                |       |        |
| 1362.038                                      | H     | 53.07        | -47.3      | 8.7          | 1.4        | -40.0          | -13.0 | 27.0   |
| 1362.038                                      | V     | 48.70        | -51.6      | 8.7          | 1.4        | -44.3          | -13.0 | 31.3   |
| 1816.050                                      | H     | 46.08        | -53.9      | 11.2         | 1.3        | -44.0          | -13.0 | 31.0   |
| 1816.050                                      | V     | 41.82        | -58.5      | 11.2         | 1.3        | -48.6          | -13.0 | 35.6   |
| 2270.063                                      | H     | 38.70        | -57.4      | 11.1         | 2.2        | -48.5          | -13.0 | 35.5   |
| 2270.063                                      | V     | 37.84        | -57.9      | 11.1         | 2.2        | -49.0          | -13.0 | 36.0   |
| 3632.100                                      | H     | 37.12        | -58.3      | 14.1         | 2.2        | -46.4          | -13.0 | 33.4   |
| 3632.100                                      | V     | 36.43        | -58.6      | 14.1         | 2.2        | -46.7          | -13.0 | 33.7   |
| 908.025                                       | H     | 22.09        | -52.1      | 0.0          | 1          | -53.1          | -13.0 | 40.1   |
| 908.025                                       | V     | 24.54        | -46.4      | 0.0          | 1          | -47.4          | -13.0 | 34.4   |

#### Power by battery 2000mAh

Test Mode: Transmitting (FM mode, high power level)

| Frequency                                     | Polar | S.A. Reading | S.G. Level | Antenna Gain | Cable Loss | Absolute Level | Limit | Margin |
|-----------------------------------------------|-------|--------------|------------|--------------|------------|----------------|-------|--------|
| MHz                                           | H/V   | dBμV         | dBm        | dBd/dBi      | dB         | dBm            | dBm   | dB     |
| <b>Frequency:485MHz, for FCC PART 90</b>      |       |              |            |              |            |                |       |        |
| 1455.000                                      | H     | 47.93        | -53.2      | 9.3          | 1.3        | -45.2          | -20.0 | 25.2   |
| 1455.000                                      | V     | 45.27        | -55.9      | 9.3          | 1.3        | -47.9          | -20.0 | 27.9   |
| 1940.000                                      | H     | 45.37        | -53.5      | 11.9         | 1.4        | -43.0          | -20.0 | 23.0   |
| 1940.000                                      | V     | 43.23        | -54.7      | 11.9         | 1.4        | -44.2          | -20.0 | 24.2   |
| 2425.000                                      | H     | 34.61        | -62.8      | 12.5         | 2.7        | -53.0          | -20.0 | 33.0   |
| 2425.000                                      | V     | 33.89        | -62.3      | 12.5         | 2.7        | -52.5          | -20.0 | 32.5   |
| 2910.000                                      | H     | 32.45        | -65.6      | 13.9         | 2.2        | -53.9          | -20.0 | 33.9   |
| 2910.000                                      | V     | 31.81        | -66.3      | 13.9         | 2.2        | -54.6          | -20.0 | 34.6   |
| 970.000                                       | H     | 19.39        | -53        | 0.0          | 1          | -54.0          | -20.0 | 34.0   |
| 970.000                                       | V     | 18.78        | -50.4      | 0.0          | 1          | -51.4          | -20.0 | 31.4   |
| <b>Frequency:454.0125MHz, for FCC PART 22</b> |       |              |            |              |            |                |       |        |
| 1362.038                                      | H     | 53.70        | -46.7      | 8.7          | 1.4        | -39.4          | -13.0 | 26.4   |
| 1362.038                                      | V     | 49.51        | -50.8      | 8.7          | 1.4        | -43.5          | -13.0 | 30.5   |
| 1816.050                                      | H     | 44.66        | -55.4      | 11.2         | 1.3        | -45.5          | -13.0 | 32.5   |
| 1816.050                                      | V     | 41.27        | -59        | 11.2         | 1.3        | -49.1          | -13.0 | 36.1   |
| 2270.063                                      | H     | 37.94        | -58.1      | 11.1         | 2.2        | -49.2          | -13.0 | 36.2   |
| 2270.063                                      | V     | 37.81        | -58        | 11.1         | 2.2        | -49.1          | -13.0 | 36.1   |
| 3632.100                                      | H     | 36.80        | -58.7      | 14.1         | 2.2        | -46.8          | -13.0 | 33.8   |
| 3632.100                                      | V     | 36.60        | -58.4      | 14.1         | 2.2        | -46.5          | -13.0 | 33.5   |
| 908.025                                       | H     | 26.52        | -47.7      | 0.0          | 1          | -48.7          | -13.0 | 35.7   |
| 908.025                                       | V     | 25.94        | -45        | 0.0          | 1          | -46.0          | -13.0 | 33.0   |

Test Mode: Transmitting (4FSK mode, high power level)

| Frequency                                     | Polar | S.A.<br>Reading | S.G.<br>Level | Antenna<br>Gain | Cable<br>Loss | Absolute<br>Level | Limit | Margin |
|-----------------------------------------------|-------|-----------------|---------------|-----------------|---------------|-------------------|-------|--------|
| MHz                                           | H/V   | dBμV            | dBm           | dBd/dBi         | dB            | dBm               | dBm   | dB     |
| <b>Frequency:485MHz, for FCC PART 90</b>      |       |                 |               |                 |               |                   |       |        |
| 1455.000                                      | H     | 47.44           | -53.7         | 9.3             | 1.3           | -45.7             | -20.0 | 25.7   |
| 1455.000                                      | V     | 44.81           | -56.4         | 9.3             | 1.3           | -48.4             | -20.0 | 28.4   |
| 1940.000                                      | H     | 46.13           | -52.7         | 11.9            | 1.4           | -42.2             | -20.0 | 22.2   |
| 1940.000                                      | V     | 44.27           | -53.7         | 11.9            | 1.4           | -43.2             | -20.0 | 23.2   |
| 2425.000                                      | H     | 35.75           | -61.6         | 12.5            | 2.7           | -51.8             | -20.0 | 31.8   |
| 2425.000                                      | V     | 34.92           | -61.2         | 12.5            | 2.7           | -51.4             | -20.0 | 31.4   |
| 2910.000                                      | H     | 33.06           | -65           | 13.9            | 2.2           | -53.3             | -20.0 | 33.3   |
| 2910.000                                      | V     | 32.25           | -65.9         | 13.9            | 2.2           | -54.2             | -20.0 | 34.2   |
| 970.000                                       | H     | 19.43           | -53           | 0.0             | 1             | -54.0             | -20.0 | 34.0   |
| 970.000                                       | V     | 18.82           | -50.3         | 0.0             | 1             | -51.3             | -20.0 | 31.3   |
| <b>Frequency:454.0125MHz, for FCC PART 22</b> |       |                 |               |                 |               |                   |       |        |
| 1362.038                                      | H     | 53.30           | -47.1         | 8.7             | 1.4           | -39.8             | -13.0 | 26.8   |
| 1362.038                                      | V     | 49.12           | -51.2         | 8.7             | 1.4           | -43.9             | -13.0 | 30.9   |
| 1816.050                                      | H     | 46.43           | -53.6         | 11.2            | 1.3           | -43.7             | -13.0 | 30.7   |
| 1816.050                                      | V     | 42.12           | -58.2         | 11.2            | 1.3           | -48.3             | -13.0 | 35.3   |
| 2270.063                                      | H     | 39.04           | -57           | 11.1            | 2.2           | -48.1             | -13.0 | 35.1   |
| 2270.063                                      | V     | 38.15           | -57.6         | 11.1            | 2.2           | -48.7             | -13.0 | 35.7   |
| 3632.100                                      | H     | 37.44           | -58           | 14.1            | 2.2           | -46.1             | -13.0 | 33.1   |
| 3632.100                                      | V     | 36.84           | -58.2         | 14.1            | 2.2           | -46.3             | -13.0 | 33.3   |
| 908.025                                       | H     | 21.56           | -52.6         | 0.0             | 1             | -53.6             | -13.0 | 40.6   |
| 908.025                                       | V     | 24.70           | -46.2         | 0.0             | 1             | -47.2             | -13.0 | 34.2   |

Note1: For radiated spurious emissions were tested at high rated power, which was the worst case.

Note2: The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.

Note3: Absolute Level = SG Level - Cable loss + Antenna Gain  
Margin = Limit-Absolute Level

**\*\*\*\*\* END OF REPORT \*\*\*\*\***