

# FCC Test Report

Product Name : GPS Data Recorder  
Trade Name : Qstarz  
Model No. : BT-Q1000XT, BT-Q1000EX, BT-Q818XT,  
BT-Q1000xx (xx=AA~ZZ)  
FCC ID. : WDYQ1051001

Applicant : Qstarz International Co. Ltd.  
Address : 6F-2, No. 160, Sec. 6, Ming-Chuan E. Rd., Nei-Hu,  
Taipei, Taiwan

Date of Receipt : Oct. 07, 2016  
Issued Date : Nov. 10, 2016  
Report No. : 16A0165R-RFUSP01V00  
Report Version : V1.0



The test results relate only to the samples tested.

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## Test Report Certification

Issued Date : Nov. 10, 2016

Report No. : 16A0165R-RFUSP01V00



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Applicant : Qstarz International Co. Ltd.  
Address : 6F-2, No. 160, Sec. 6, Ming-Chuan E. Rd., Nei-Hu, Taipei,  
Taiwan  
Manufacturer : Qstarz International Co. Ltd.  
Model No. : BT-Q1000XT, BT-Q1000EX, BT-Q818XT, BT-Q1000xx  
(xx=AA~ZZ)  
FCC ID. : WDYQ1051001  
EUT Voltage : DC 5V (Power by Charger)  
DC 3.7V (Power by battery)  
Trade Name : Qstarz  
Applicable Standard : FCC CFR Title 47 Part 15 Subpart C Section 15.247: 2015  
ANSI C63.10: 2013  
Test Lab : Hsin Chu Laboratory  
Test Result : Complied

The test results relate only to the samples tested.

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Documented By :



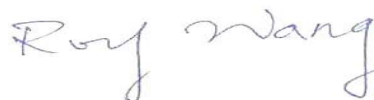
( Carol Tsai / Engineering Adm. Specialist )

Tested By :



( Ricky Lee / Engineer )

Approved By :



( Roy Wang / Director )

### Revision History

| Report No.          | Version | Description             | Issued Date   |
|---------------------|---------|-------------------------|---------------|
| 16A0165R-RFUSP01V00 | V1.0    | Initial issue of report | Nov. 10, 2016 |
|                     |         |                         |               |
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|                     |         |                         |               |

## Laboratory Information

We, **Quietek Corporation**, are an independent RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025 specified testing scopes:

|                      |                                                                      |
|----------------------|----------------------------------------------------------------------|
| <b>Taiwan R.O.C.</b> | <b>: TAF, Accreditation Number: 3024</b>                             |
| <b>USA</b>           | <b>: FCC, Registration Number: 834100</b>                            |
| <b>Canada</b>        | <b>: IC, Submission No: 181665 / IC Registration Number: 4075C-4</b> |

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site:<http://www.quietek.com/english/about/certificates.aspx?bval=5>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site :  
[http://www.quietek.com/index\\_en.aspx](http://www.quietek.com/index_en.aspx)

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## 1. General Information

### 1.1. EUT Description

|                                |                                                             |
|--------------------------------|-------------------------------------------------------------|
| Product Name                   | GPS Data Recorder                                           |
| Trade Name                     | Qstarz                                                      |
| Model No.                      | BT-Q1000XT, BT-Q1000EX, BT-Q818XT, BT-Q1000xx<br>(xx=AA~ZZ) |
| Frequency Range/Channel Number | 2402~2480MHz / 79 Channels                                  |
| Type of Modulation             | GFSK                                                        |

| Antenna Information |              |
|---------------------|--------------|
| Antenna Type        | Chip antenna |
| Antenna Gain        | 0 dBi        |

| Accessories Information |                           |
|-------------------------|---------------------------|
| USB Cable               | Non-Shielded, 1m          |
| Battery                 | HELIX / HX-N3650U-G, 3.7V |

| Working Frequency of Each Channel |           |            |           |            |           |            |           |
|-----------------------------------|-----------|------------|-----------|------------|-----------|------------|-----------|
| Channel                           | Frequency | Channel    | Frequency | Channel    | Frequency | Channel    | Frequency |
| Channel 00                        | 2402 MHz  | Channel 20 | 2422 MHz  | Channel 40 | 2442 MHz  | Channel 60 | 2462 MHz  |
| Channel 01                        | 2403 MHz  | Channel 21 | 2423 MHz  | Channel 41 | 2443 MHz  | Channel 61 | 2463 MHz  |
| Channel 02                        | 2404 MHz  | Channel 22 | 2424 MHz  | Channel 42 | 2444 MHz  | Channel 62 | 2464 MHz  |
| Channel 03                        | 2405 MHz  | Channel 23 | 2425 MHz  | Channel 43 | 2445 MHz  | Channel 63 | 2465 MHz  |
| Channel 04                        | 2406 MHz  | Channel 24 | 2426 MHz  | Channel 44 | 2446 MHz  | Channel 64 | 2466 MHz  |
| Channel 05                        | 2407 MHz  | Channel 25 | 2427 MHz  | Channel 45 | 2447 MHz  | Channel 65 | 2467 MHz  |
| Channel 06                        | 2408 MHz  | Channel 26 | 2428 MHz  | Channel 46 | 2448 MHz  | Channel 66 | 2468 MHz  |
| Channel 07                        | 2409 MHz  | Channel 27 | 2429 MHz  | Channel 47 | 2449 MHz  | Channel 67 | 2469 MHz  |
| Channel 08                        | 2410 MHz  | Channel 28 | 2430 MHz  | Channel 48 | 2450 MHz  | Channel 68 | 2470 MHz  |
| Channel 09                        | 2411 MHz  | Channel 29 | 2431 MHz  | Channel 49 | 2451 MHz  | Channel 69 | 2471 MHz  |
| Channel 10                        | 2412 MHz  | Channel 30 | 2432 MHz  | Channel 50 | 2452 MHz  | Channel 70 | 2472 MHz  |
| Channel 11                        | 2413 MHz  | Channel 31 | 2433 MHz  | Channel 51 | 2453 MHz  | Channel 71 | 2473 MHz  |
| Channel 12                        | 2414 MHz  | Channel 32 | 2434 MHz  | Channel 52 | 2454 MHz  | Channel 72 | 2474 MHz  |
| Channel 13                        | 2415 MHz  | Channel 33 | 2435 MHz  | Channel 53 | 2455 MHz  | Channel 73 | 2475 MHz  |
| Channel 14                        | 2416 MHz  | Channel 34 | 2436 MHz  | Channel 54 | 2456 MHz  | Channel 74 | 2476 MHz  |
| Channel 15                        | 2417 MHz  | Channel 35 | 2437 MHz  | Channel 55 | 2457 MHz  | Channel 75 | 2477 MHz  |
| Channel 16                        | 2418 MHz  | Channel 36 | 2438 MHz  | Channel 56 | 2458 MHz  | Channel 76 | 2478 MHz  |
| Channel 17                        | 2419 MHz  | Channel 37 | 2439 MHz  | Channel 57 | 2459 MHz  | Channel 77 | 2479 MHz  |
| Channel 18                        | 2420 MHz  | Channel 38 | 2440 MHz  | Channel 58 | 2460 MHz  | Channel 78 | 2480 MHz  |
| Channel 19                        | 2421 MHz  | Channel 39 | 2441 MHz  | Channel 59 | 2461 MHz  |            |           |

Note:

1. This device is a GPS Data Recorder including BT 1.2 transmitting and receiving function.
2. The variation of model number is for different strategy of marketing.

The different of the each model is shown as below:

| Model Number          | Color | Description                                       |
|-----------------------|-------|---------------------------------------------------|
| BT-Q1000XT            | Black | With Flash Memory.                                |
| BT-Q1000EX            | Red   | The difference is the software parameter setting. |
| BT-Q1000xx (xx=AA~ZZ) | N/A   |                                                   |
| BT-Q818XT             | Gray  | Without Flash Memory                              |

3. These test results on a sample of the device are for the purpose of demonstrating Compliance with Part 15 Subpart C Paragraph 15.247.
4. Regards to the frequency band operation; the lowest 、 middle and highest frequency of channel were selected to perform the test, and then shown on this report.
5. This device is a composite device in accordance with Part 15 regulations. The function of the receiving was tested and its test report number is 16A0165R-RFUSP12V00.

## 1.2. Test Mode

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

|                 |                  |
|-----------------|------------------|
| Pre-Test Mode   |                  |
| TX              | Mode 1: Transmit |
| Final Test Mode |                  |
| TX              | Mode 1: Transmit |

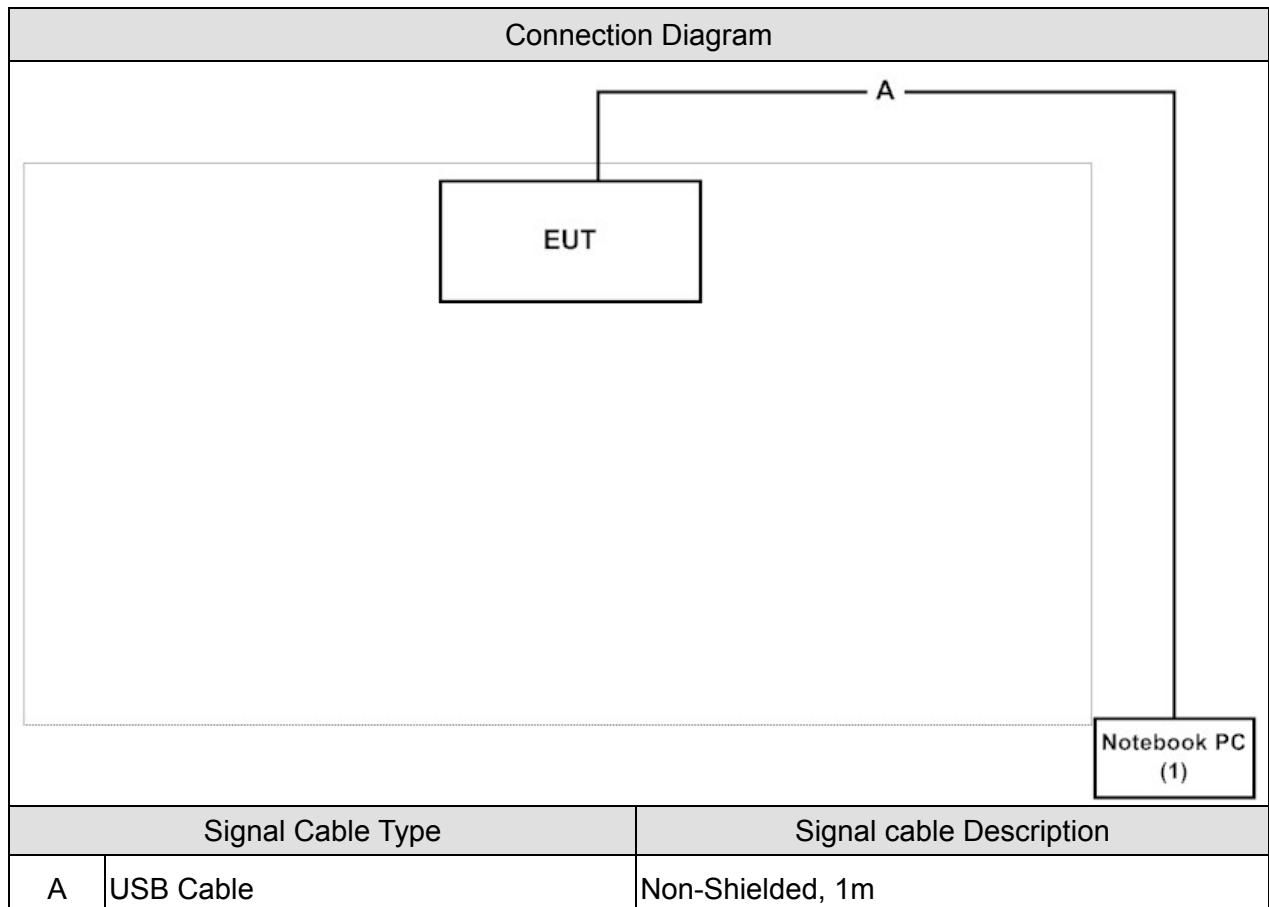
| Emission                     | Mode 1 |
|------------------------------|--------|
| Conducted Emission           | Yes    |
| Peak Power Output            | Yes    |
| Radiated Emission (Under 1G) | Yes    |
| Radiated Emission (Above 1G) | Yes    |
| RF antenna conducted test    | Yes    |
| Band Edge                    | Yes    |
| Number of hopping Frequency  | Yes    |
| Carrier Frequency Separation | Yes    |
| Occupied Bandwidth           | Yes    |
| Dwell Time                   | Yes    |

### 1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

| Product |             | Manufacturer | Model No. | Serial No.          | FCC ID | Power Cord                                     |
|---------|-------------|--------------|-----------|---------------------|--------|------------------------------------------------|
| 1       | Notebook PC | ASUS         | X522EP    | E5N0CV04<br>3264197 | DoC    | Non-Shielded, 1.8m,<br>one ferrite core bonded |

#### 1.4. Configuration of tested System



#### 1.5. EUT Exercise Software

|   |                                                                                   |
|---|-----------------------------------------------------------------------------------|
| 1 | Setup the EUT as shown in Section 1.4.                                            |
| 2 | Execute the “BT Tester” command on the EUT.                                       |
| 3 | Configure the test mode, select packet type, the test channel, and the data rate. |
| 4 | “Start TX to start the continuous transmitting                                    |
| 5 | Verify that the EUT works properly.                                               |

## 1.6. Test Facility

Ambient conditions in the laboratory:

| Items                      | Test Item                                                   | Required (IEC 68-1) | Actual   |
|----------------------------|-------------------------------------------------------------|---------------------|----------|
| Temperature (°C)           | FCC PART 15 C 15.207<br>Conducted Emission (FHSS)           | 15 - 35             | 23       |
| Humidity (%RH)             |                                                             | 25 - 75             | 50       |
| Barometric pressure (mbar) |                                                             | 860 - 1060          | 950-1000 |
| Temperature (°C)           | FCC PART 15 C 15.247<br>Peak Power Output (FHSS)            | 15 - 35             | 24       |
| Humidity (%RH)             |                                                             | 25 - 75             | 45       |
| Barometric pressure (mbar) |                                                             | 860 - 1060          | 950-1000 |
| Temperature (°C)           | FCC PART 15 C 15.247<br>Radiated Emission (FHSS)            | 15 - 35             | 25       |
| Humidity (%RH)             |                                                             | 25 - 75             | 54       |
| Barometric pressure (mbar) |                                                             | 860 - 1060          | 950-1000 |
| Temperature (°C)           | FCC PART 15 C 15.247<br>Band Edge (FHSS)                    | 15 - 35             | 25       |
| Humidity (%RH)             |                                                             | 25 - 75             | 50       |
| Barometric pressure (mbar) |                                                             | 860 - 1060          | 950-1000 |
| Temperature (°C)           | FCC PART 15 C 15.247<br>Number of hopping Frequency (FHSS)  | 15 - 35             | 24       |
| Humidity (%RH)             |                                                             | 25 - 75             | 45       |
| Barometric pressure (mbar) |                                                             | 860 - 1060          | 950-1000 |
| Temperature (°C)           | FCC PART 15 C 15.247<br>Carrier Frequency Separation (FHSS) | 15 - 35             | 24       |
| Humidity (%RH)             |                                                             | 25 - 75             | 45       |
| Barometric pressure (mbar) |                                                             | 860 - 1060          | 950-1000 |
| Temperature (°C)           | FCC PART 15 C 15.247<br>Occupied Bandwidth (FHSS)           | 15 - 35             | 24       |
| Humidity (%RH)             |                                                             | 25 - 75             | 45       |
| Barometric pressure (mbar) |                                                             | 860 - 1060          | 950-1000 |
| Temperature (°C)           | FCC PART 15 C 15.247<br>RF antenna conducted test (FHSS)    | 15 - 35             | 24       |
| Humidity (%RH)             |                                                             | 25 - 75             | 45       |
| Barometric pressure (mbar) |                                                             | 860 - 1060          | 950-1000 |
| Temperature (°C)           | FCC PART 15 C 15.247<br>Dwell Time (FHSS)                   | 15 - 35             | 24       |
| Humidity (%RH)             |                                                             | 25 - 75             | 45       |
| Barometric pressure (mbar) |                                                             | 860 - 1060          | 950-1000 |

## 2. Conducted Emission

### 2.1. Test Equipment

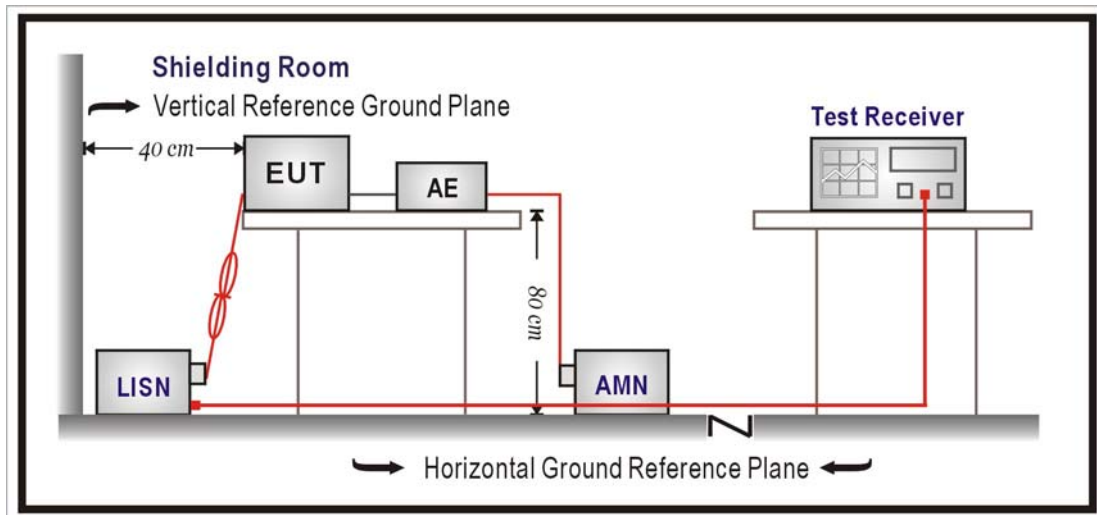
The following test equipments are used during the test:

Conducted Emission / SR2

| Instrument               | Manufacturer | Model No. | Serial No  | Next Cal. Date |
|--------------------------|--------------|-----------|------------|----------------|
| Artificial Mains Network | R&S          | ENV4200   | 848411/010 | 2017/01/20     |
| LISN                     | R&S          | ENV216    | 100092     | 2017/08/16     |
| Test Receiver            | R&S          | ESCS 30   | 825442/014 | 2017/06/29     |

Note: All equipments that need to calibrate are with calibration period of 1 year.

### 2.2. Test Setup



### 2.3. Limits

| FCC Part 15 Subpart C Paragraph 15.207 Limits (dBuV) |       |       |
|------------------------------------------------------|-------|-------|
| Frequency<br>MHz                                     | QP    | AV    |
| 0.15 - 0.50                                          | 66-56 | 56-46 |
| 0.50 - 5.0                                           | 56    | 46    |
| 5.0 - 30                                             | 60    | 50    |

Remarks: In the above table, the tighter limit applies at the band edges.

## **2.4. Test Procedure**

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs.)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

## **2.5. Test Specification**

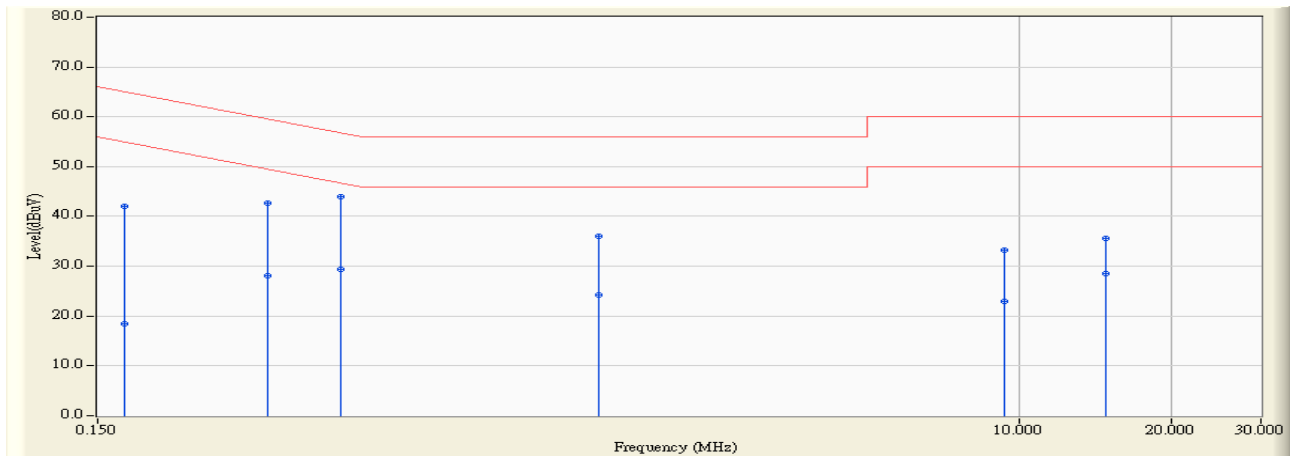
According to FCC Part 15 Subpart C Paragraph 15.207: 2015

## **2.6. Uncertainty**

The measurement uncertainty is defined as  $\pm 2.26$  dB.

## 2.7. Test Result

|                                      |                                  |
|--------------------------------------|----------------------------------|
| Site : SR2                           | Time : 2016/11/09 - 14:09        |
| Limit : CISPR_B_00M_QP               | Margin : 10                      |
| Probe : SR2_LISN(16A)-6_0712 - Line1 | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder              | Note : 2441MHz                   |

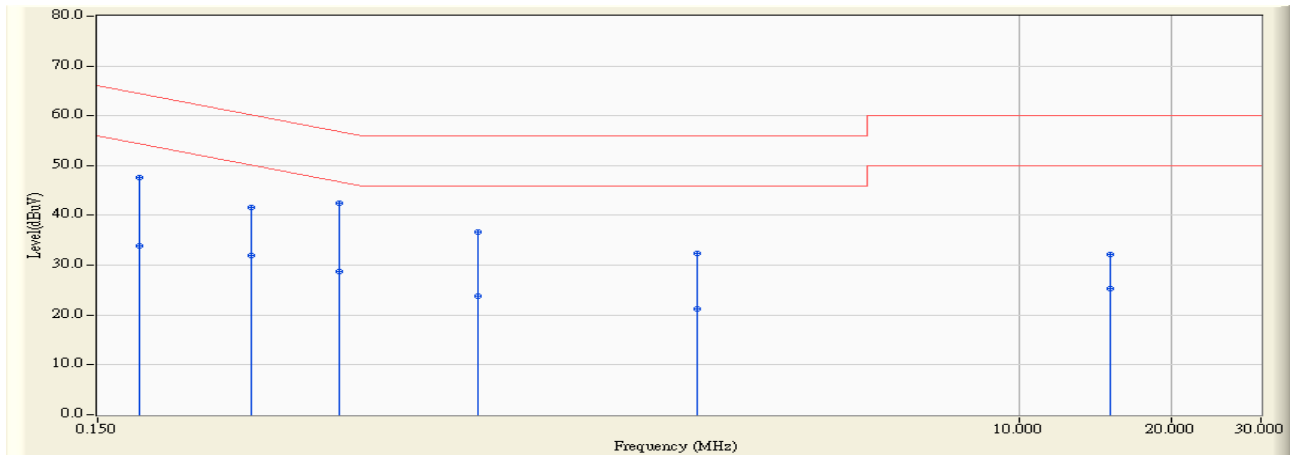


|    |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV) | Margin<br>(dB) | Limit<br>(dBuV) | Detector Type |
|----|---|--------------------|------------------------|-------------------------|-------------------------|----------------|-----------------|---------------|
| 1  |   | 0.170              | 9.753                  | 32.340                  | 42.093                  | -22.890        | 64.983          | QUASIPeAK     |
| 2  |   | 0.170              | 9.753                  | 8.630                   | 18.383                  | -36.600        | 54.983          | AVERAGE       |
| 3  |   | 0.326              | 9.737                  | 32.840                  | 42.577                  | -16.981        | 59.558          | QUASIPeAK     |
| 4  |   | 0.326              | 9.737                  | 18.430                  | 28.167                  | -21.391        | 49.558          | AVERAGE       |
| 5  | * | 0.455              | 9.729                  | 34.340                  | 44.069                  | -12.720        | 56.789          | QUASIPeAK     |
| 6  |   | 0.455              | 9.729                  | 19.620                  | 29.349                  | -17.440        | 46.789          | AVERAGE       |
| 7  |   | 1.466              | 9.839                  | 26.180                  | 36.019                  | -19.981        | 56.000          | QUASIPeAK     |
| 8  |   | 1.466              | 9.839                  | 14.320                  | 24.159                  | -21.841        | 46.000          | AVERAGE       |
| 9  |   | 9.326              | 10.102                 | 23.180                  | 33.282                  | -26.718        | 60.000          | QUASIPeAK     |
| 10 |   | 9.326              | 10.102                 | 12.830                  | 22.932                  | -27.068        | 50.000          | AVERAGE       |
| 11 |   | 14.818             | 10.216                 | 25.460                  | 35.677                  | -24.323        | 60.000          | QUASIPeAK     |
| 12 |   | 14.818             | 10.216                 | 18.350                  | 28.567                  | -21.433        | 50.000          | AVERAGE       |

### Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

|                                      |                                  |
|--------------------------------------|----------------------------------|
| Site : SR2                           | Time : 2016/11/09 - 14:10        |
| Limit : CISPR_B_00M_QP               | Margin : 10                      |
| Probe : SR2_LISN(16A)-6_0712 - Line2 | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder              | Note : 2441MHz                   |



|    |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV) | Margin<br>(dB) | Limit<br>(dBuV) | Detector Type |
|----|---|--------------------|------------------------|-------------------------|-------------------------|----------------|-----------------|---------------|
| 1  |   | 0.181              | 9.752                  | 37.760                  | 47.512                  | -16.916        | 64.428          | QUASIPeAK     |
| 2  |   | 0.181              | 9.752                  | 24.190                  | 33.942                  | -20.486        | 54.428          | AVERAGE       |
| 3  |   | 0.302              | 9.750                  | 31.780                  | 41.530                  | -18.648        | 60.178          | QUASIPeAK     |
| 4  |   | 0.302              | 9.750                  | 22.230                  | 31.980                  | -18.198        | 50.178          | AVERAGE       |
| 5  | * | 0.451              | 9.747                  | 32.760                  | 42.507                  | -14.353        | 56.861          | QUASIPeAK     |
| 6  |   | 0.451              | 9.747                  | 19.010                  | 28.757                  | -18.103        | 46.861          | AVERAGE       |
| 7  |   | 0.845              | 9.797                  | 26.960                  | 36.757                  | -19.243        | 56.000          | QUASIPeAK     |
| 8  |   | 0.845              | 9.797                  | 14.040                  | 23.837                  | -22.163        | 46.000          | AVERAGE       |
| 9  |   | 2.295              | 9.849                  | 22.520                  | 32.369                  | -23.631        | 56.000          | QUASIPeAK     |
| 10 |   | 2.295              | 9.849                  | 11.280                  | 21.129                  | -24.871        | 46.000          | AVERAGE       |
| 11 |   | 15.056             | 10.312                 | 21.760                  | 32.072                  | -27.928        | 60.000          | QUASIPeAK     |
| 12 |   | 15.056             | 10.312                 | 15.040                  | 25.352                  | -24.648        | 50.000          | AVERAGE       |

**Note:**

1. All Reading Levels are Quasi-Peak and average value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

### 3. Peak Power Output

#### 3.1. Test Equipment

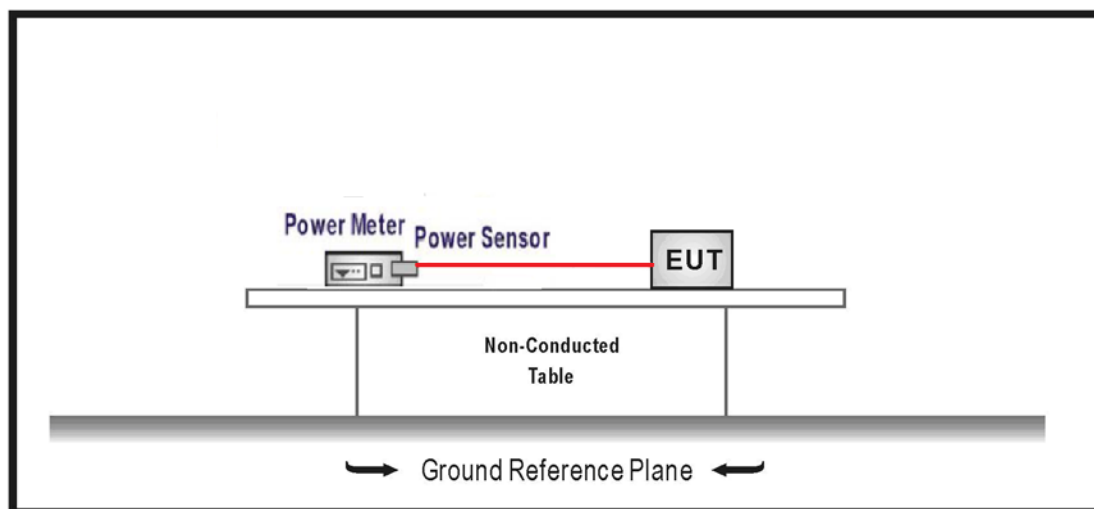
The following test equipment is used during the test:

Peak Power Output / SR7

| Instrument                     | Manufacturer | Model No. | Serial No  | Next Cal. Date |
|--------------------------------|--------------|-----------|------------|----------------|
| Power Meter                    | Agilent      | N1911A    | MY45101353 | 2017/09/29     |
| Power Sensor                   | Agilent      | N1921A    | MY45241670 | 2017/09/28     |
| USB Power Sensor               | Keysight     | U2021XA   | MY54070005 | NCR            |
| Temperature & Humidity Chamber | WIT          | TH-1S-B   | 1082101    | 2017/01/18     |

Note: All equipments that need to calibrate are with calibration period of 1 year.

#### 3.2. Test Setup



### **3.3. Test procedures**

The EUT was tested according to DTS test procedure section 9.1.2 of KDB558074 v03r05 measurement to FCC 47CFR 15.247 requirements.

### **3.4. Limits**

The maximum peak power shall be less 1 Watt.

### **3.5. Test Specification**

According to FCC Part 15 Subpart C Paragraph 15.247: 2015

### **3.6. Uncertainty**

The measurement uncertainty is defined as  $\pm 1.27$  dB.

### 3.7. Test Result

|              |                   |           |     |
|--------------|-------------------|-----------|-----|
| Product      | GPS Data Recorder |           |     |
| Test Item    | Peak Power Output |           |     |
| Test Mode    | Mode 1: Transmit  |           |     |
| Date of Test | 2016/10/17        | Test Site | SR7 |

#### GFSK

| Channel No. | Frequency<br>(MHz) | Measure Level<br>(dBm) | Limit<br>(dBm) | Result |
|-------------|--------------------|------------------------|----------------|--------|
| 00          | 2402               | -1.75                  | 30             | Pass   |
| 39          | 2441               | -0.83                  | 30             | Pass   |
| 78          | 2480               | -0.94                  | 30             | Pass   |

#### 4. Radiated Emission

##### 4.1. Test Equipment

The following test equipments are used during the test:

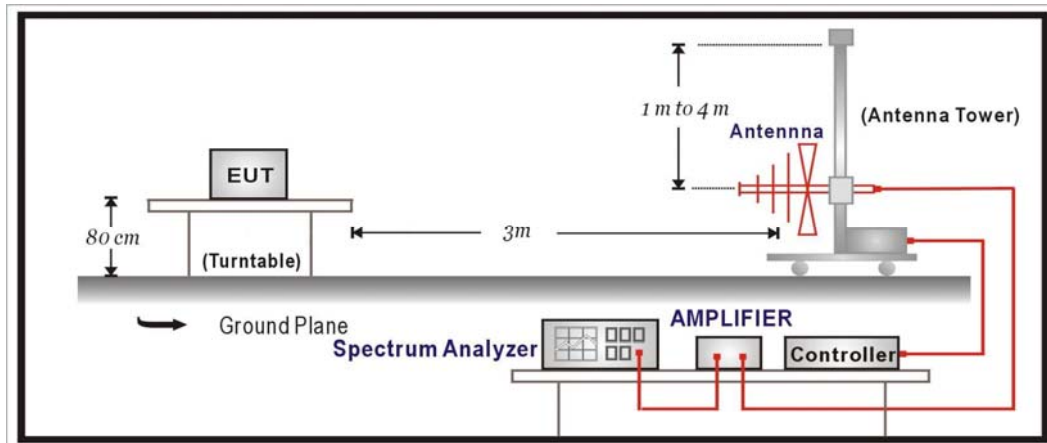
###### Radiated Emission / CB1

| Instrument                          | Manufacturer | Model No.  | Serial No   | Next Cal. Date |
|-------------------------------------|--------------|------------|-------------|----------------|
| Bilog Antenna                       | Schaffner    | CBL6112B   | 2895        | 2017/08/14     |
| Double Ridged Guide<br>Horn Antenna | Schwarzbeck  | BBHA 9120  | D743        | 2017/01/14     |
| Pre-Amplifier                       | EMCI         | EMC0031835 | 980233      | 2017/01/26     |
| Pre-Amplifier                       | QuieTek      | AP-025C    | CHM-0706049 | 2017/01/03     |
| Spectrum Analyzer                   | Agilent      | E4440A     | MY46187335  | 2016/12/24     |
| k Type Cable                        | Huber+Suhner | SF 102     | 25623/2     | 2017/01/11     |
| Horn Antenna                        | Schwarzbeck  | BBHA 9170  | 203         | 2017/08/28     |
| Magnetic Loop Antenna               | Teseq        | HLA 6121   | 44287       | 2017/10/25     |

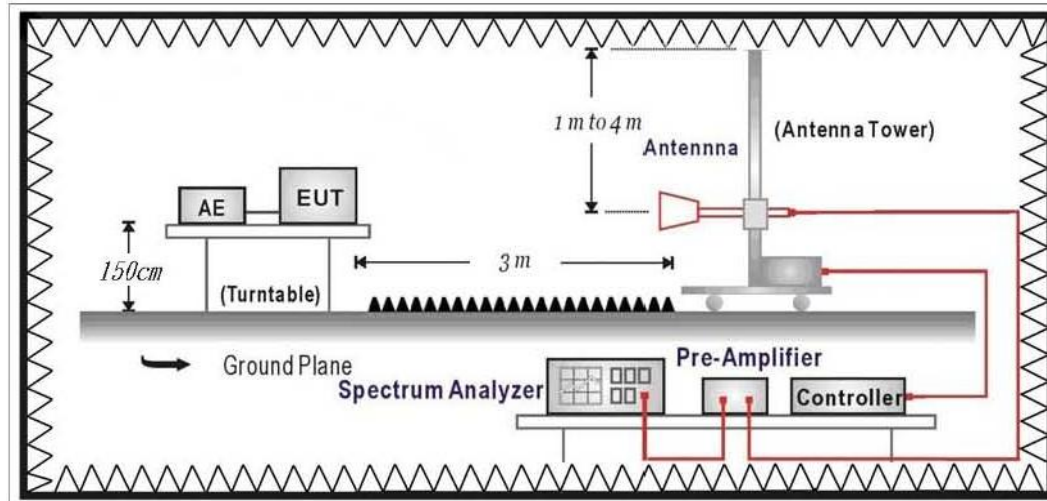
Note: All equipments that need to calibrate are with calibration period of 1 year.

## 4.2. Test Setup

Under 1GHz Test Setup:



Above 1GHz Test Setup:



## 4.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

| FCC Part 15 Subpart C Paragraph 15.209 Limits |        |        |
|-----------------------------------------------|--------|--------|
| Frequency<br>MHz                              | dBuV/m | dBuV/m |
| 30-88                                         | 100    | 40     |
| 88-216                                        | 150    | 43.5   |
| 216-960                                       | 200    | 46     |
| Above 960                                     | 500    | 54     |

Remark: E field strength (dBuV/m) = 20 log E field strength (uV/m)

#### **4.4. Test Procedure**

The EUT was setup according to ANSI C63.10: 213 and tested according to FHSS test procedure of KDB558074 v03r05 for compliance to FCC 47CFR 15.247 requirements.

The EUT and its simulators are placed on a turn table which is 0.8 and 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 213 on radiated measurement.

On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit. The bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

#### **4.5. Test Specification**

According to FCC Part 15 Subpart C Paragraph 15.247: 2015

#### **4.6. Uncertainty**

The measurement uncertainty

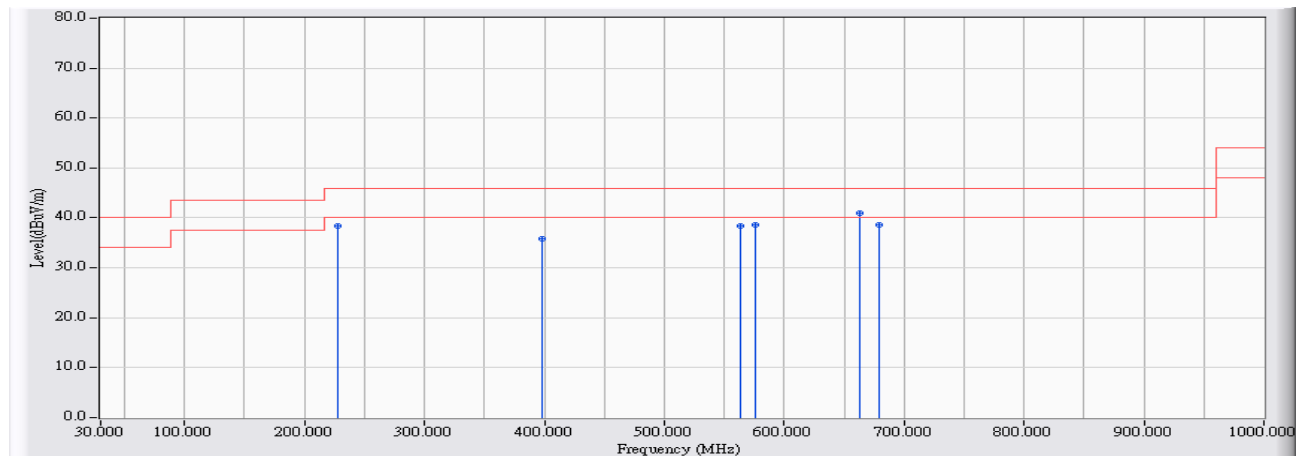
30MHz~1GHz as  $\pm 3.43\text{dB}$

1GHz~26.5Ghz as  $\pm 3.65\text{dB}$

## 4.7. Test Result

### 30MHz-1GHz Spurious

|                                            |                                    |
|--------------------------------------------|------------------------------------|
| Site : CB1                                 | Time : 2016/11/01 - 15:44          |
| Limit : FCC_CLASS_B_03M_QP                 | Margin : 6                         |
| Probe : CB1_FCC_30M-1G-4_9161 - HORIZONTAL | Power : : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                    | Note : 2402MHz                     |

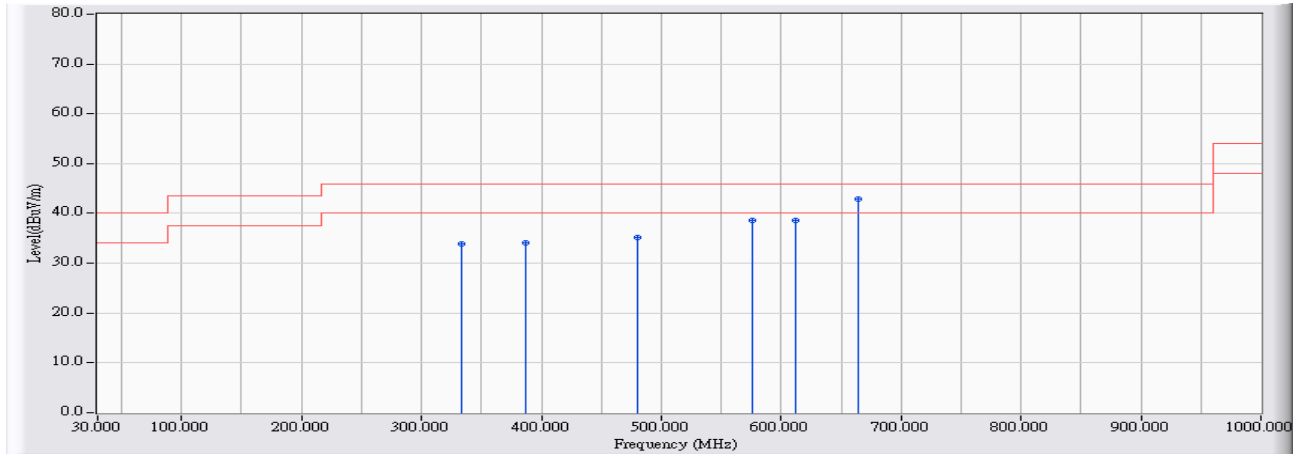


|   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | 227.860            | 12.161                 | 26.135                  | 38.296                    | -7.704         | 46.000            | QUASIPeAK     |
| 2 | 398.563            | 15.932                 | 19.851                  | 35.783                    | -10.217        | 46.000            | QUASIPeAK     |
| 3 | 563.932            | 19.000                 | 19.462                  | 38.462                    | -7.538         | 46.000            | QUASIPeAK     |
| 4 | 575.958            | 19.234                 | 19.288                  | 38.522                    | -7.478         | 46.000            | QUASIPeAK     |
| 5 | * 662.668          | 20.555                 | 20.309                  | 40.864                    | -5.136         | 46.000            | QUASIPeAK     |
| 6 | 678.962            | 20.777                 | 17.895                  | 38.672                    | -7.328         | 46.000            | QUASIPeAK     |

#### Note:

1. All Reading Levels are Quasi-Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

|                                          |                                    |
|------------------------------------------|------------------------------------|
| Site : CB1                               | Time : 2016/11/01 - 15:50          |
| Limit : FCC_CLASS_B_03M_QP               | Margin : 6                         |
| Probe : CB1_FCC_30M-1G-4_9161 - VERTICAL | Power : : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                  | Note : 2402MHz                     |

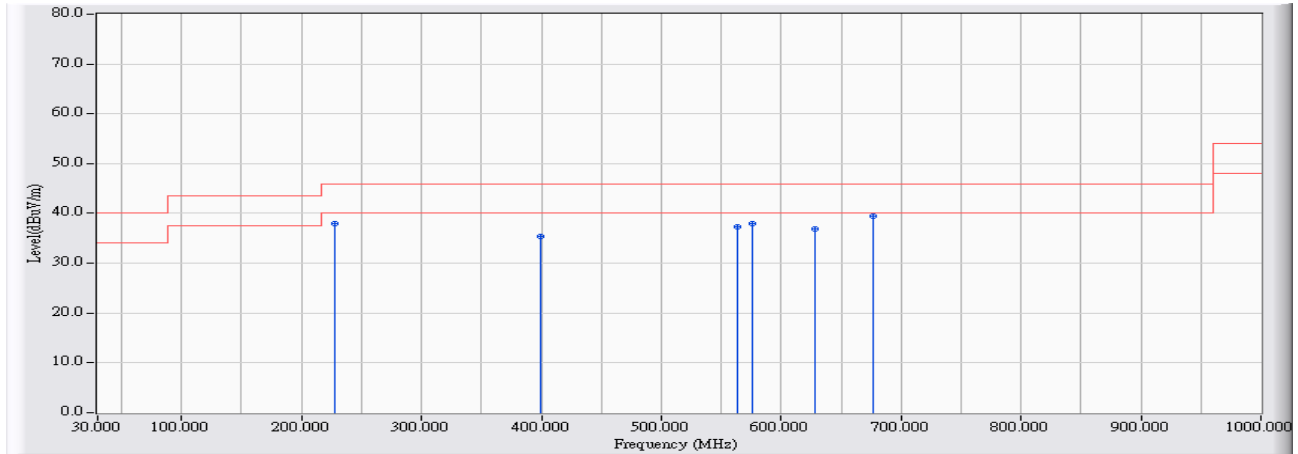


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 |   | 333.192            | 14.436                 | 19.467                  | 33.903                    | -12.097        | 46.000            | QUASIPeAK     |
| 2 |   | 386.536            | 15.656                 | 18.542                  | 34.198                    | -11.802        | 46.000            | QUASIPeAK     |
| 3 |   | 479.938            | 17.512                 | 17.639                  | 35.151                    | -10.849        | 46.000            | QUASIPeAK     |
| 4 |   | 575.958            | 19.234                 | 19.452                  | 38.686                    | -7.314         | 46.000            | QUASIPeAK     |
| 5 |   | 612.136            | 19.869                 | 18.682                  | 38.550                    | -7.450         | 46.000            | QUASIPeAK     |
| 6 | * | 663.832            | 20.571                 | 22.253                  | 42.824                    | -3.176         | 46.000            | QUASIPeAK     |

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

|                                            |                                    |
|--------------------------------------------|------------------------------------|
| Site : CB1                                 | Time : 2016/11/01 - 15:57          |
| Limit : FCC_CLASS_B_03M_QP                 | Margin : 6                         |
| Probe : CB1_FCC_30M-1G-4_9161 - HORIZONTAL | Power : : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                    | Note : 2441MHz                     |

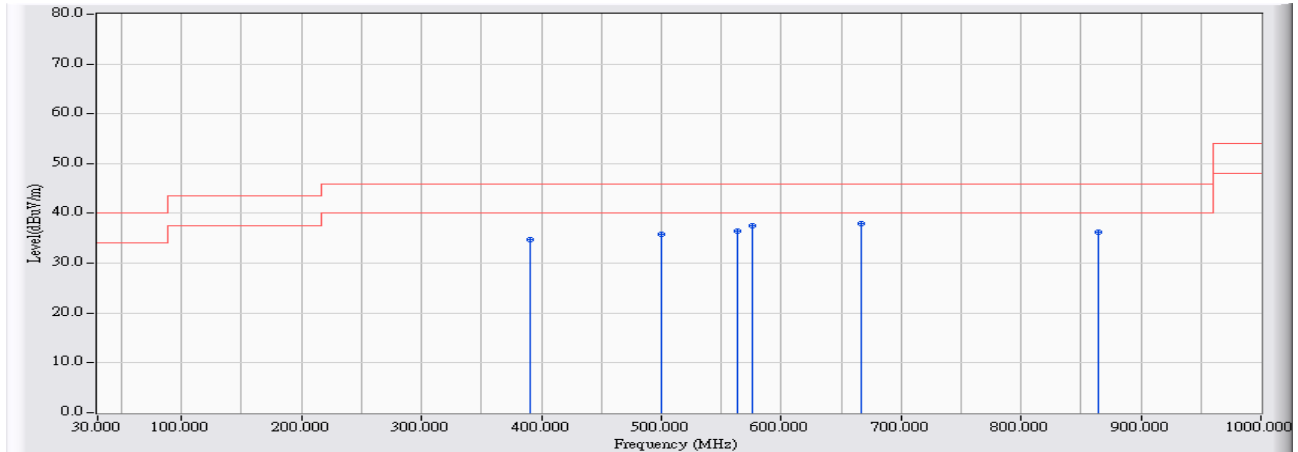


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 |   | 227.763            | 12.162                 | 25.738                  | 37.900                    | -8.100         | 46.000            | QUASIPeAK     |
| 2 |   | 399.824            | 15.960                 | 19.489                  | 35.450                    | -10.550        | 46.000            | QUASIPeAK     |
| 3 |   | 563.932            | 19.000                 | 18.222                  | 37.222                    | -8.778         | 46.000            | QUASIPeAK     |
| 4 |   | 575.958            | 19.234                 | 18.800                  | 38.034                    | -7.966         | 46.000            | QUASIPeAK     |
| 5 |   | 627.654            | 20.079                 | 16.786                  | 36.865                    | -9.135         | 46.000            | QUASIPeAK     |
| 6 | * | 677.119            | 20.752                 | 18.628                  | 39.380                    | -6.620         | 46.000            | QUASIPeAK     |

Note:

1. All Reading Levels are Quasi-Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

|                                          |                                    |
|------------------------------------------|------------------------------------|
| Site : CB1                               | Time : 2016/11/01 - 16:06          |
| Limit : FCC_CLASS_B_03M_QP               | Margin : 6                         |
| Probe : CB1_FCC_30M-1G-4_9161 - VERTICAL | Power : : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                  | Note : 2441MHz                     |

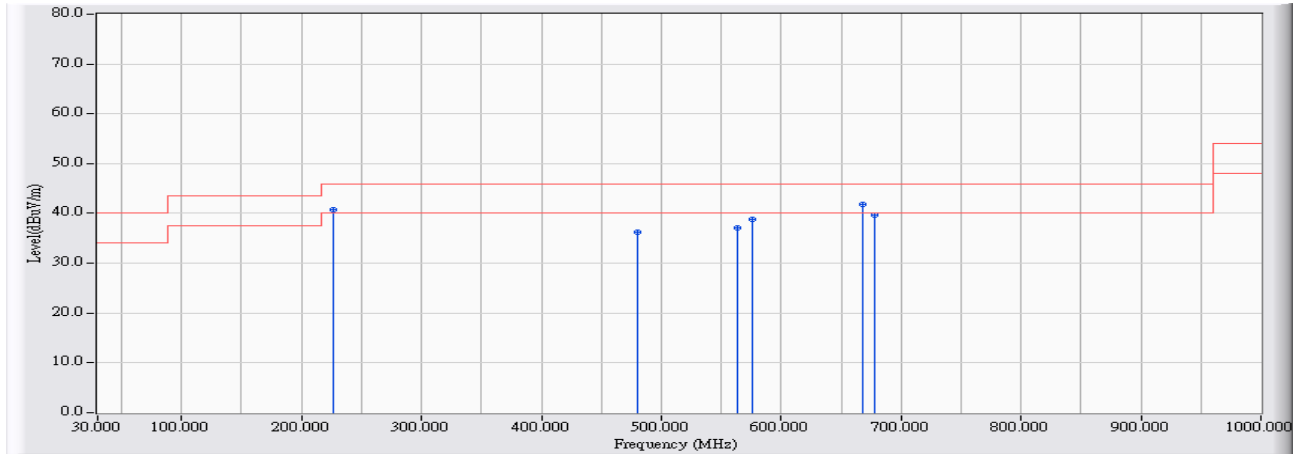


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 |   | 390.804            | 15.753                 | 19.089                  | 34.843                    | -11.157        | 46.000            | QUASIPeAK     |
| 2 |   | 500.209            | 17.758                 | 18.124                  | 35.882                    | -10.118        | 46.000            | QUASIPeAK     |
| 3 |   | 563.932            | 19.000                 | 17.372                  | 36.372                    | -9.628         | 46.000            | QUASIPeAK     |
| 4 |   | 575.958            | 19.234                 | 18.293                  | 37.527                    | -8.473         | 46.000            | QUASIPeAK     |
| 5 | * | 666.547            | 20.607                 | 17.321                  | 37.929                    | -8.071         | 46.000            | QUASIPeAK     |
| 6 |   | 864.020            | 23.046                 | 13.249                  | 36.295                    | -9.705         | 46.000            | QUASIPeAK     |

Note:

1. All Reading Levels are Quasi-Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

|                                            |                                    |
|--------------------------------------------|------------------------------------|
| Site : CB1                                 | Time : 2016/11/01 - 16:11          |
| Limit : FCC_CLASS_B_03M_QP                 | Margin : 6                         |
| Probe : CB1_FCC_30M-1G-4_9161 - HORIZONTAL | Power : : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                    | Note : 2480MHz                     |

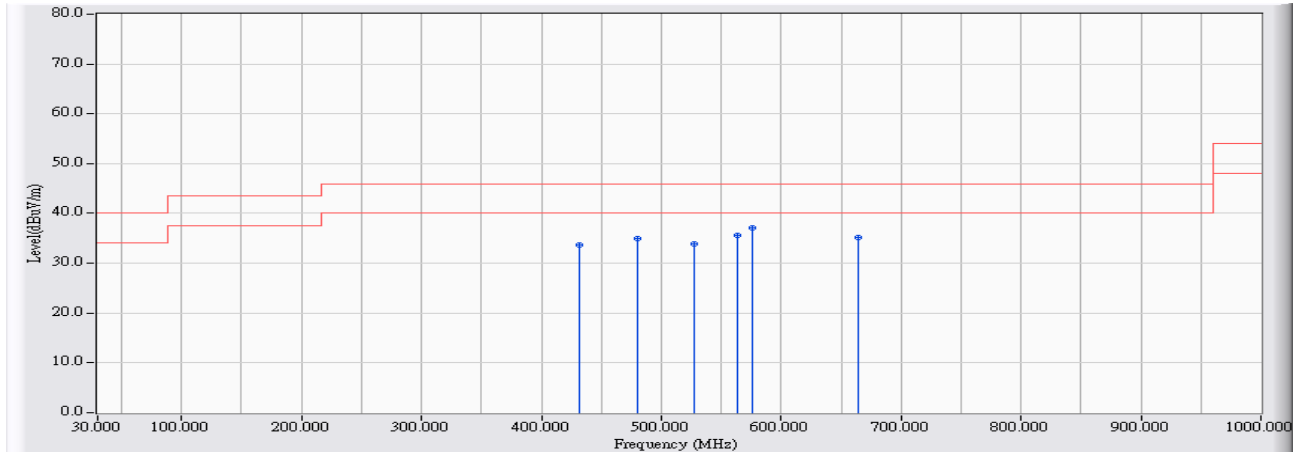


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 |   | 226.890            | 12.171                 | 28.540                  | 40.711                    | -5.289         | 46.000            | QUASIPeAK     |
| 2 |   | 480.035            | 17.513                 | 18.836                  | 36.350                    | -9.650         | 46.000            | QUASIPeAK     |
| 3 |   | 563.932            | 19.000                 | 18.111                  | 37.111                    | -8.889         | 46.000            | QUASIPeAK     |
| 4 |   | 575.958            | 19.234                 | 19.527                  | 38.761                    | -7.239         | 46.000            | QUASIPeAK     |
| 5 | * | 667.517            | 20.621                 | 21.275                  | 41.896                    | -4.104         | 46.000            | QUASIPeAK     |
| 6 |   | 677.313            | 20.754                 | 19.001                  | 39.755                    | -6.245         | 46.000            | QUASIPeAK     |

**Note:**

1. All Reading Levels are Quasi-Peak value.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

|                                          |                                  |
|------------------------------------------|----------------------------------|
| Site : CB1                               | Time : 2016/11/01 - 16:16        |
| Limit : FCC_CLASS_B_03M_QP               | Margin : 6                       |
| Probe : CB1_FCC_30M-1G-4_9161 - VERTICAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                  | Note : 2480MHz                   |



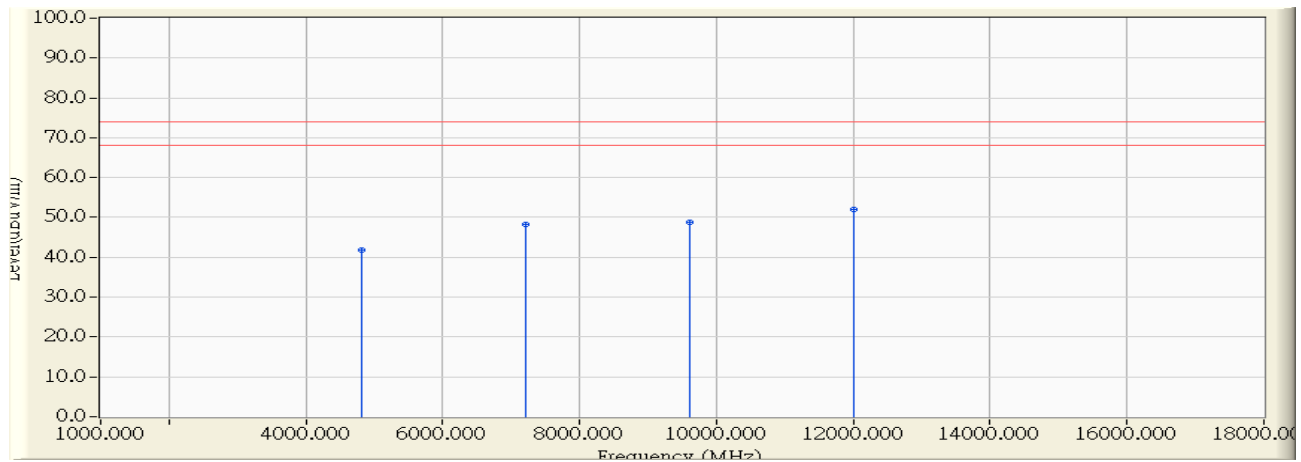
|   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | 431.928            | 16.724                 | 16.941                  | 33.665                    | -12.335        | 46.000            | QUASIPeAK     |
| 2 | 479.938            | 17.512                 | 17.507                  | 35.019                    | -10.981        | 46.000            | QUASIPeAK     |
| 3 | 527.948            | 18.298                 | 15.531                  | 33.829                    | -12.171        | 46.000            | QUASIPeAK     |
| 4 | 563.932            | 19.000                 | 16.601                  | 35.601                    | -10.399        | 46.000            | QUASIPeAK     |
| 5 | * 575.958          | 19.234                 | 17.831                  | 37.065                    | -8.935         | 46.000            | QUASIPeAK     |
| 6 | 664.123            | 20.575                 | 14.685                  | 35.260                    | -10.740        | 46.000            | QUASIPeAK     |

Note:

1. All Reading Levels are Quasi-Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

### Harmonic & Spurious:

|                                           |                                  |
|-------------------------------------------|----------------------------------|
| Site : CB1                                | Time : 2016/10/20 - 13:49        |
| Limit : FCC_SpartC_15.209_03M_PK          | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                   | Note : 2402MHz                   |

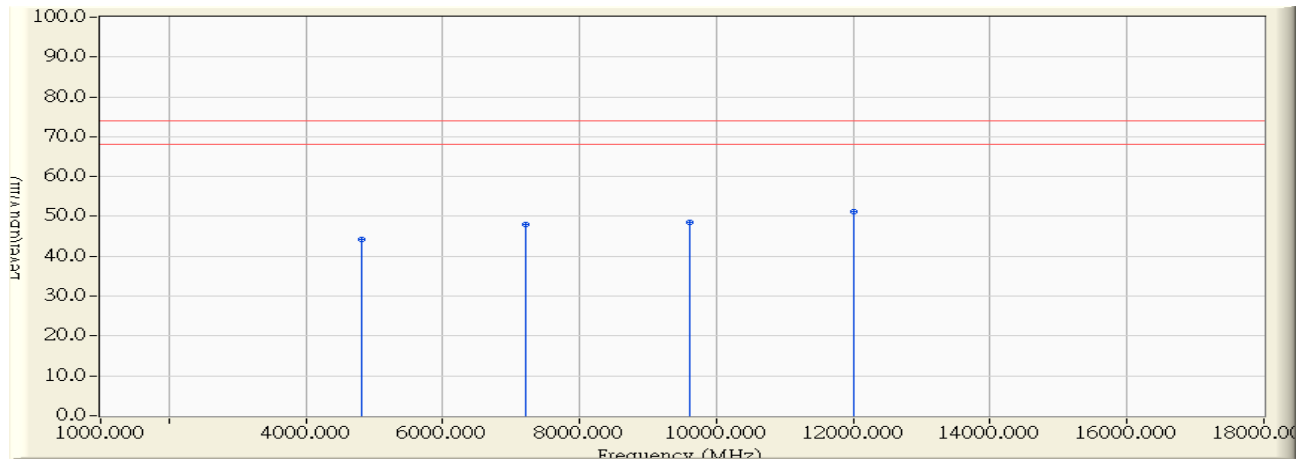


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 |   | 4804.000           | -1.624                 | 43.570                  | 41.946                    | -32.054        | 74.000            | PEAK          |
| 2 |   | 7206.000           | 6.917                  | 41.390                  | 48.307                    | -25.693        | 74.000            | PEAK          |
| 3 |   | 9608.000           | 8.452                  | 40.330                  | 48.782                    | -25.218        | 74.000            | PEAK          |
| 4 | * | 12010.000          | 11.618                 | 40.450                  | 52.067                    | -21.933        | 74.000            | PEAK          |

### Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

|                                         |                                  |
|-----------------------------------------|----------------------------------|
| Site : CB1                              | Time : 2016/10/20 - 14:02        |
| Limit : FCC_SpartC_15.209_03M_PK        | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                 | Note : 2402MHz                   |

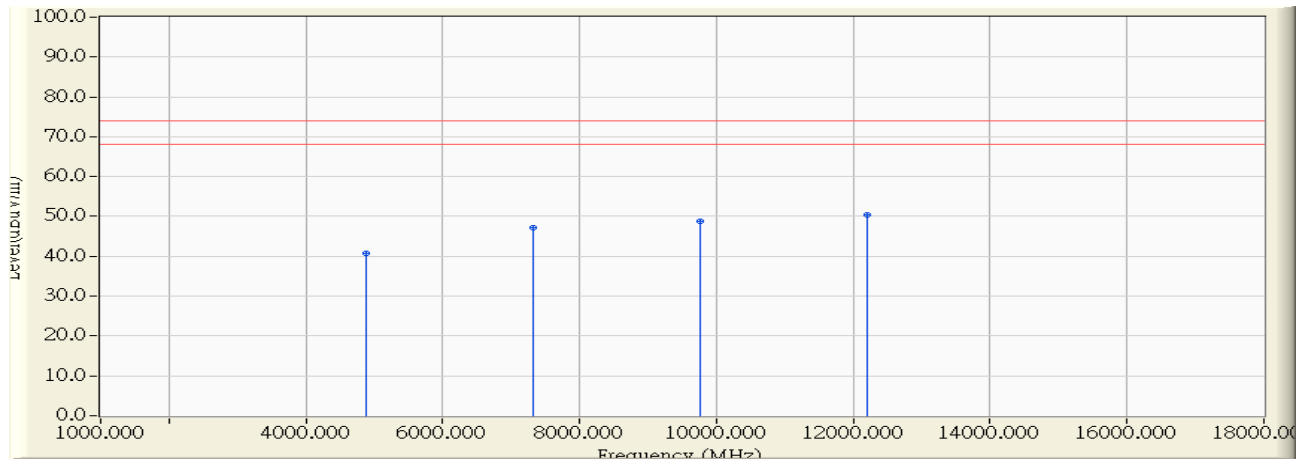


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 |   | 4804.000           | -0.677                 | 44.850                  | 44.174                    | -29.826        | 74.000            | PEAK          |
| 2 |   | 7206.000           | 6.417                  | 41.620                  | 48.037                    | -25.963        | 74.000            | PEAK          |
| 3 |   | 9608.000           | 8.014                  | 40.590                  | 48.604                    | -25.396        | 74.000            | PEAK          |
| 4 | * | 12010.000          | 11.145                 | 40.120                  | 51.264                    | -22.736        | 74.000            | PEAK          |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

|                                           |                                  |
|-------------------------------------------|----------------------------------|
| Site : CB1                                | Time : 2016/10/20 - 14:12        |
| Limit : FCC_SpartC_15.209_03M_PK          | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                   | Note : 2441MHz                   |

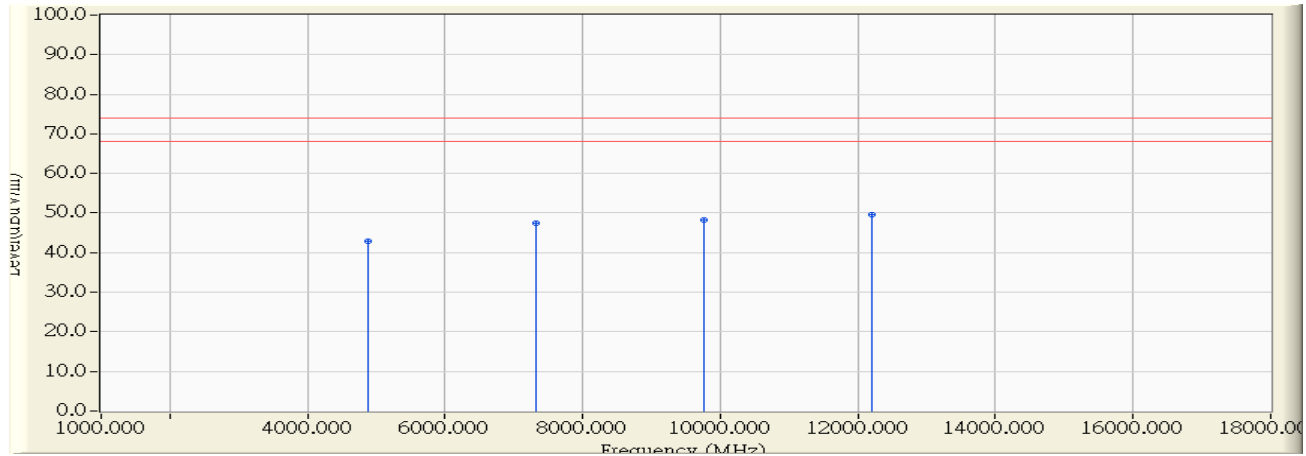


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 |   | 4882.000           | -1.434                 | 42.070                  | 40.636                    | -33.364        | 74.000            | PEAK          |
| 2 |   | 7323.000           | 7.170                  | 40.110                  | 47.280                    | -26.720        | 74.000            | PEAK          |
| 3 |   | 9764.000           | 9.305                  | 39.610                  | 48.916                    | -25.084        | 74.000            | PEAK          |
| 4 | * | 12205.000          | 11.431                 | 38.980                  | 50.410                    | -23.590        | 74.000            | PEAK          |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

|                                         |                                  |
|-----------------------------------------|----------------------------------|
| Site : CB1                              | Time : 2016/10/20 - 14:25        |
| Limit : FCC_SpartC_15.209_03M_PK        | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                 | Note : 2441MHz                   |

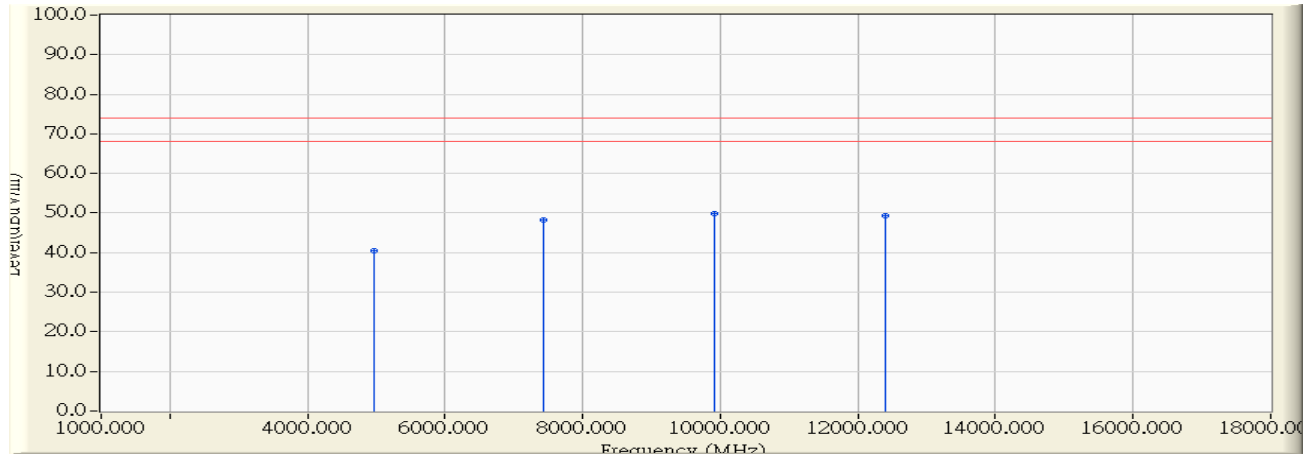


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 |   | 4882.000           | -0.681                 | 43.600                  | 42.919                    | -31.081        | 74.000            | PEAK          |
| 2 |   | 7323.000           | 6.670                  | 40.740                  | 47.410                    | -26.590        | 74.000            | PEAK          |
| 3 |   | 9764.000           | 8.633                  | 39.610                  | 48.244                    | -25.756        | 74.000            | PEAK          |
| 4 | * | 12205.000          | 11.153                 | 38.520                  | 49.672                    | -24.328        | 74.000            | PEAK          |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

|                                           |                                  |
|-------------------------------------------|----------------------------------|
| Site : CB1                                | Time : 2016/10/20 - 14:31        |
| Limit : FCC_SpartC_15.209_03M_PK          | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                   | Note : 2480MHz                   |

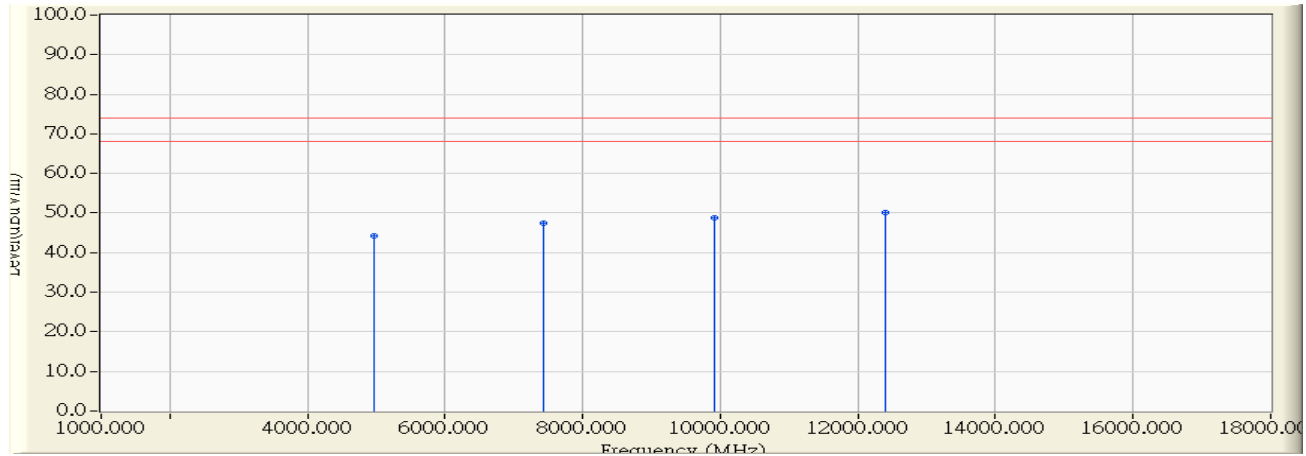


|   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | 4960.000           | -1.243                 | 41.850                  | 40.607                    | -33.393        | 74.000            | PEAK          |
| 2 | 7440.000           | 7.424                  | 40.780                  | 48.203                    | -25.797        | 74.000            | PEAK          |
| 3 | * 9920.000         | 10.160                 | 39.730                  | 49.890                    | -24.110        | 74.000            | PEAK          |
| 4 | 12400.000          | 11.245                 | 38.170                  | 49.414                    | -24.586        | 74.000            | PEAK          |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

|                                         |                                  |
|-----------------------------------------|----------------------------------|
| Site : CB1                              | Time : 2016/10/20 - 14:35        |
| Limit : FCC_SpartC_15.209_03M_PK        | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                 | Note : 2480MHz                   |



|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 |   | 4960.000           | -0.686                 | 44.880                  | 44.194                    | -29.806        | 74.000            | PEAK          |
| 2 |   | 7440.000           | 6.924                  | 40.530                  | 47.453                    | -26.547        | 74.000            | PEAK          |
| 3 |   | 9920.000           | 9.254                  | 39.460                  | 48.714                    | -25.286        | 74.000            | PEAK          |
| 4 | * | 12400.000          | 11.162                 | 38.890                  | 50.051                    | -23.949        | 74.000            | PEAK          |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

## 5. RF antenna conducted test

### 5.1. Test Equipment

The following test equipment is used during the test:

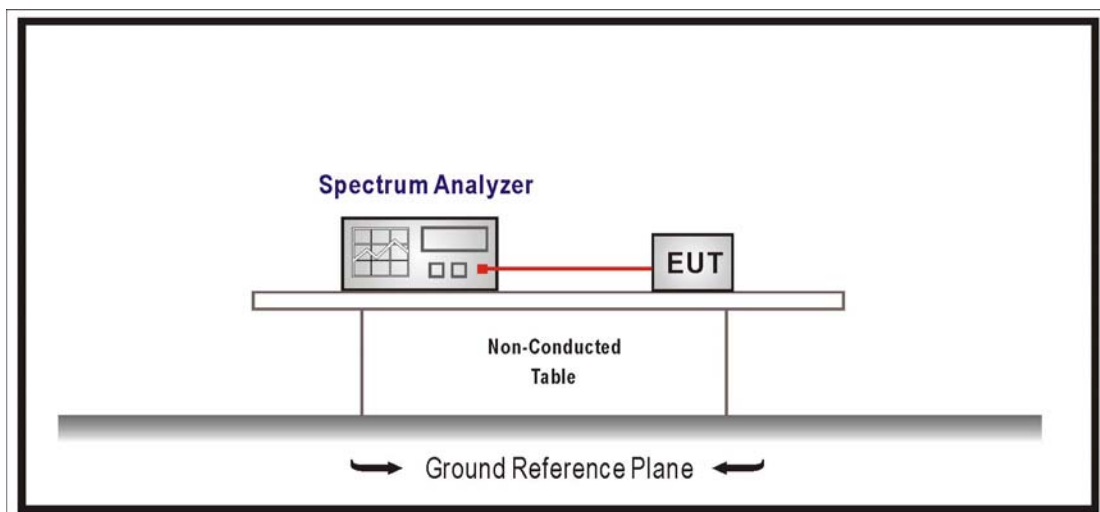
RF antenna conducted test / SR7

| Instrument                 | Manufacturer | Model No. | Serial No  | Next Cal. Date |
|----------------------------|--------------|-----------|------------|----------------|
| Spectrum Analyzer          | Agilent      | N9010A    | US47140172 | 2017/08/08     |
| Signal & Spectrum Analyzer | R&S          | FSV40     | 101049     | 2017/01/05     |
| Signal Analyzer            | R&S          | FSV7      | 101650     | 2016/11/30     |

Note: All equipments that need to calibrate are with calibration period of 1 year.

### 5.2. Test Setup

RF Conducted Measurement:



### **5.3. Limits**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on an RF conducted or radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

### **5.4. Test Procedure**

The EUT was setup according to ANSI C63.10: 213 and tested according to DTS test procedure section 11.2 of KDB558074 v03r05 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW> RBW, scan up through 10th harmonic.

### **5.5. Test Specification**

According to FCC Part 15 Subpart C Paragraph 15.247: 2015

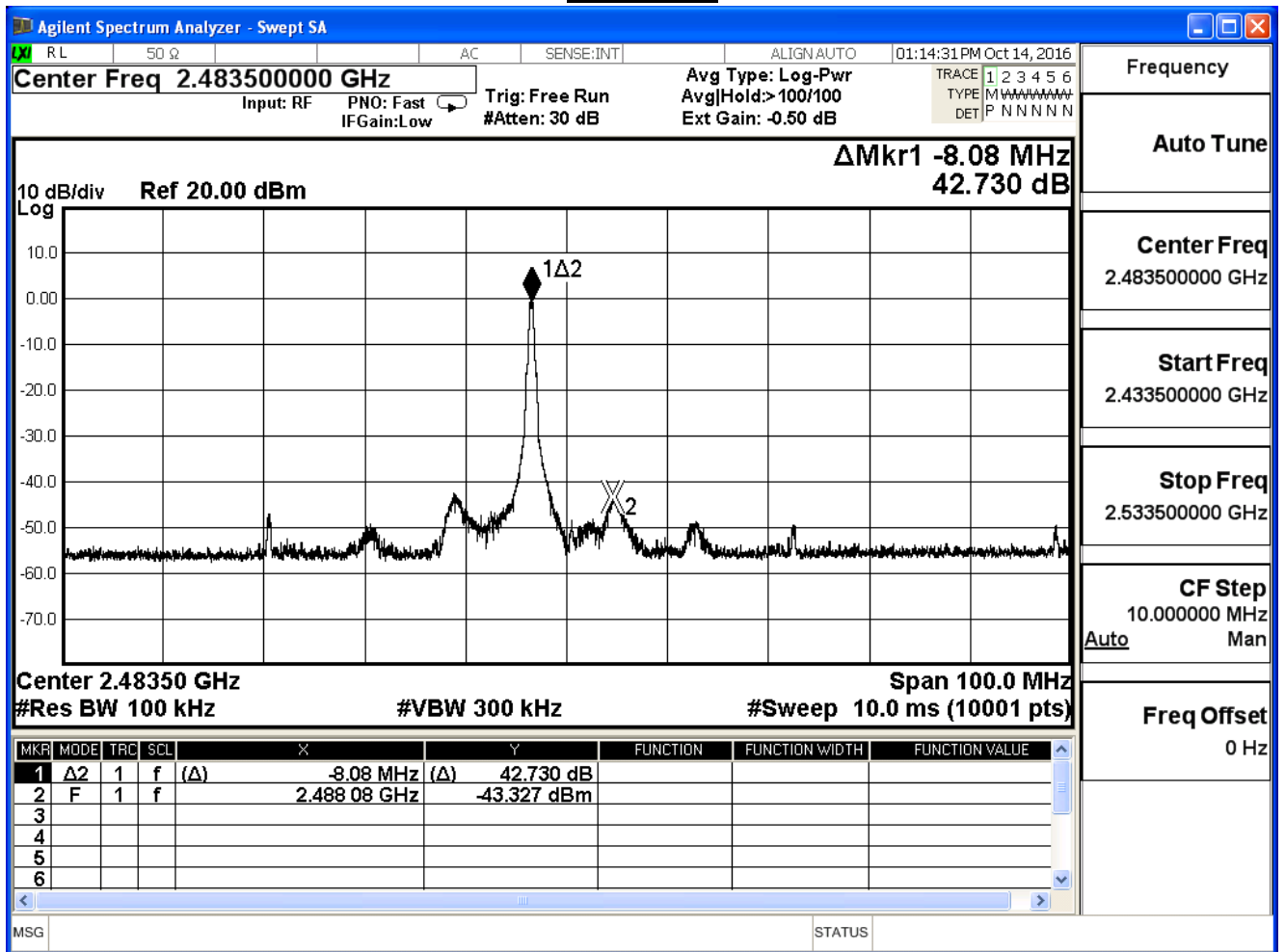
### **5.6. Uncertainty**

Conducted is defined as  $\pm 1.27\text{dB}$

|              |                           |           |     |
|--------------|---------------------------|-----------|-----|
| Product      | GPS Data Recorder         |           |     |
| Test Item    | RF antenna conducted test |           |     |
| Test Mode    | Mode 1: Transmit          |           |     |
| Date of Test | 2016/10/14                | Test Site | SR7 |

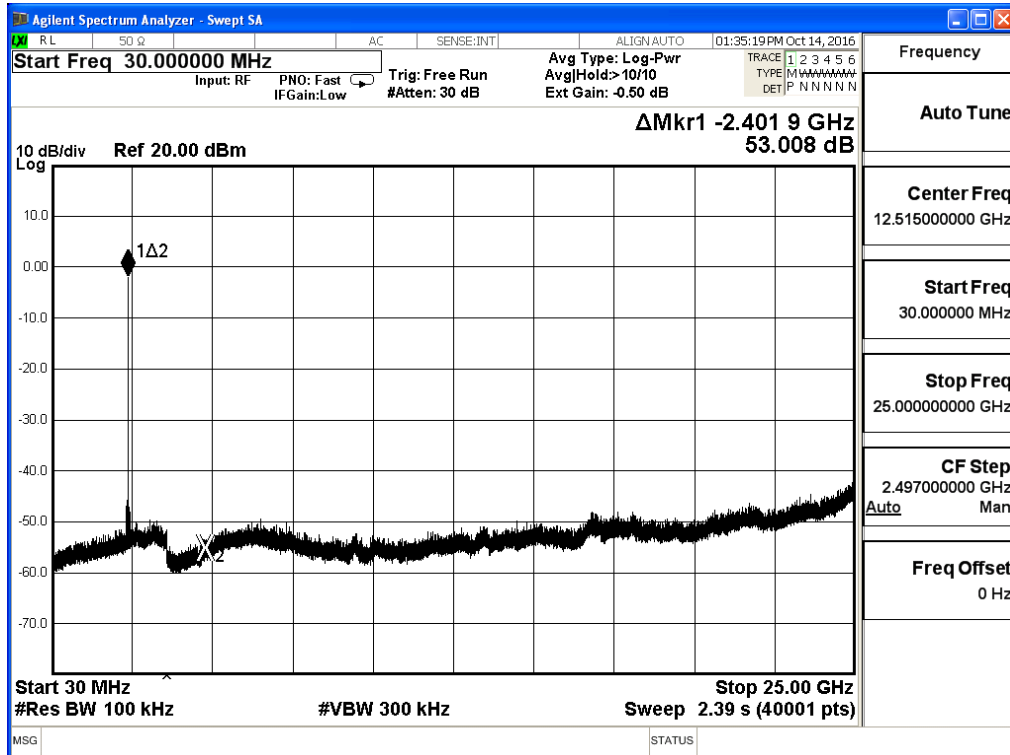
| Channel | Frequency<br>(MHz) | Measure Level<br>(dBc) | Limit<br>(dBc) | Result |
|---------|--------------------|------------------------|----------------|--------|
| 00      | 2402               | 42.513                 | $\geq 20$      | Pass   |
| 78      | 2480               | 42.730                 | $\geq 20$      | Pass   |

### Channel 78

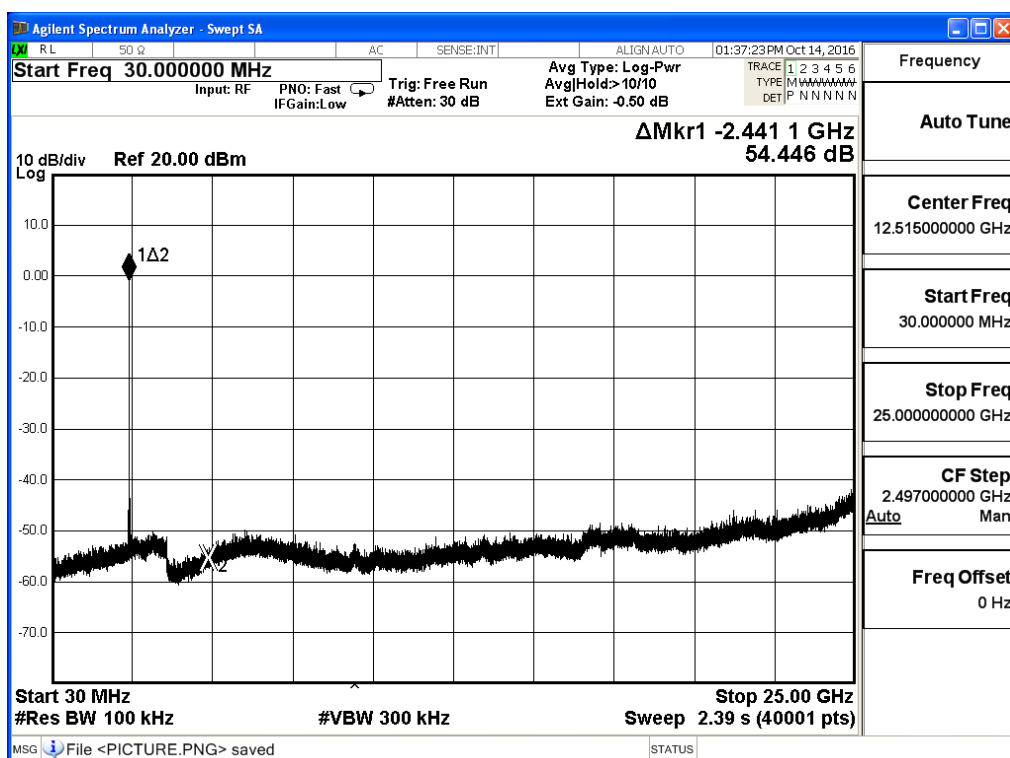


|              |                           |           |     |
|--------------|---------------------------|-----------|-----|
| Product      | GPS Data Recorder         |           |     |
| Test Item    | RF antenna conducted test |           |     |
| Test Mode    | Mode 1: Transmit          |           |     |
| Date of Test | 2016/10/14                | Test Site | SR7 |

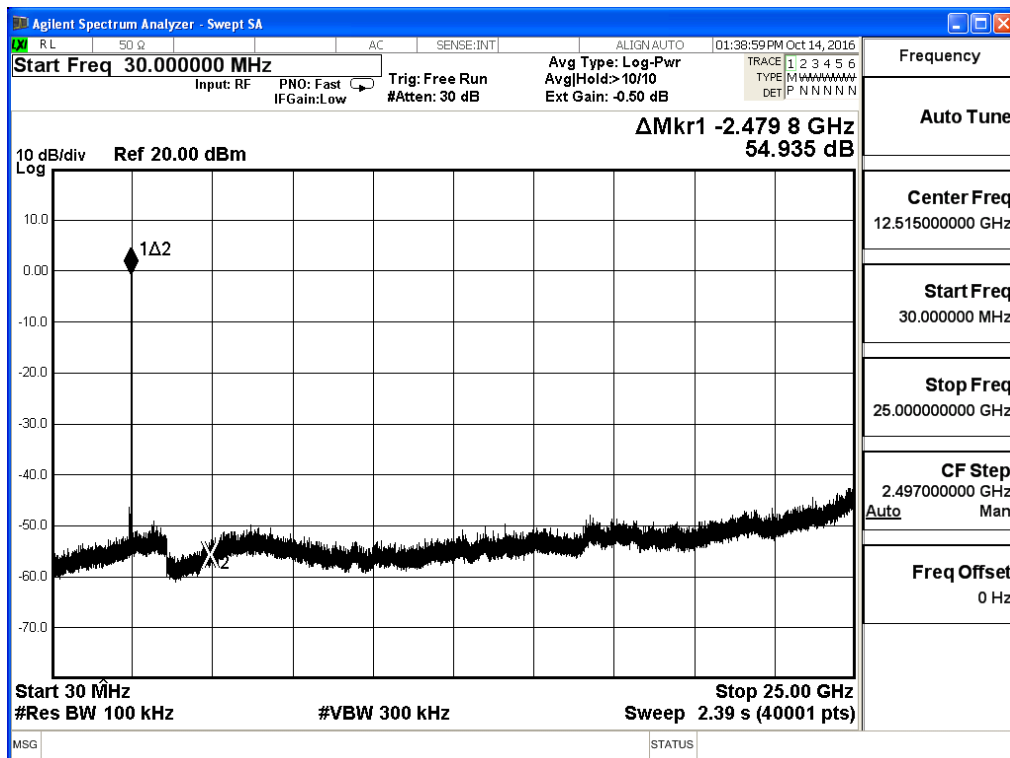
Channel 00 (30MHz-25GHz)- GFSK



Channel 39 (30MHz-25GHz)- GFSK



### Channel 78 (30MHz-25GHz)- GFSK



## 6. Band Edge

### 6.1. Test Equipment

The following test equipments are used during the test:

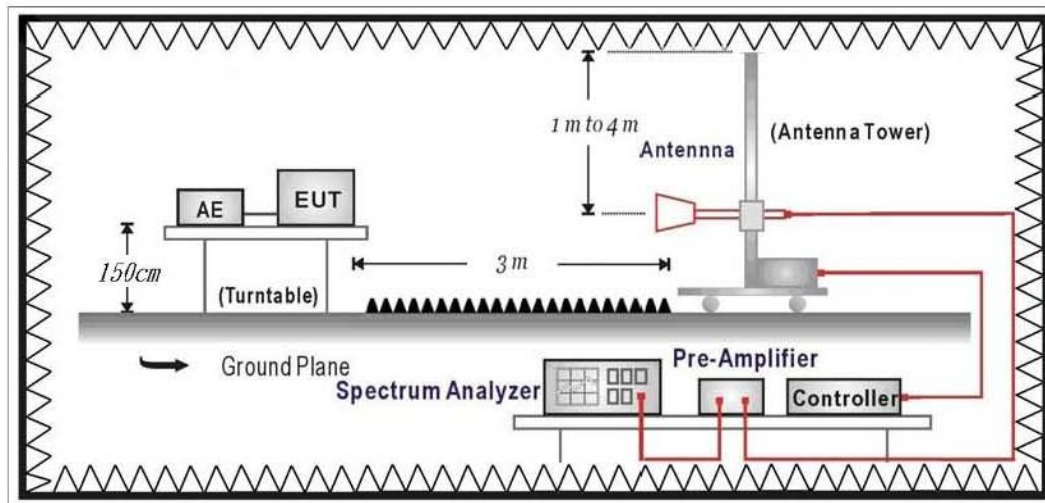
Band Edge / CB1

| Instrument                          | Manufacturer | Model No. | Serial No  | Next Cal. Date |
|-------------------------------------|--------------|-----------|------------|----------------|
| Double Ridged Guide<br>Horn Antenna | Schwarzbeck  | BBHA 9120 | D743       | 2017/01/14     |
| Spectrum Analyzer                   | Agilent      | E4440A    | MY46187335 | 2016/12/24     |
| k Type Cable                        | Huber+Suhner | SF 102    | 25623/2    | 2017/01/11     |
| Signal & Spectrum<br>Analyzer       | R&S          | FSV40     | 101049     | 2017/01/05     |

Note: All equipments that need to calibrate are with calibration period of 1 year.

### 6.2. Test Setup

RF Radiated Measurement:



### **6.3. Limits**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

### **6.4. Test Procedure**

The EUT was setup according to ANSI C63.10: 213 and tested according to DTS test procedure of KDB558074 v03r05 for compliance to FCC 47CFR 15.247 requirements.

The EUT and its simulators are placed on a turn table which is 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 213 on radiated measurement.

### **6.5. Test Specification**

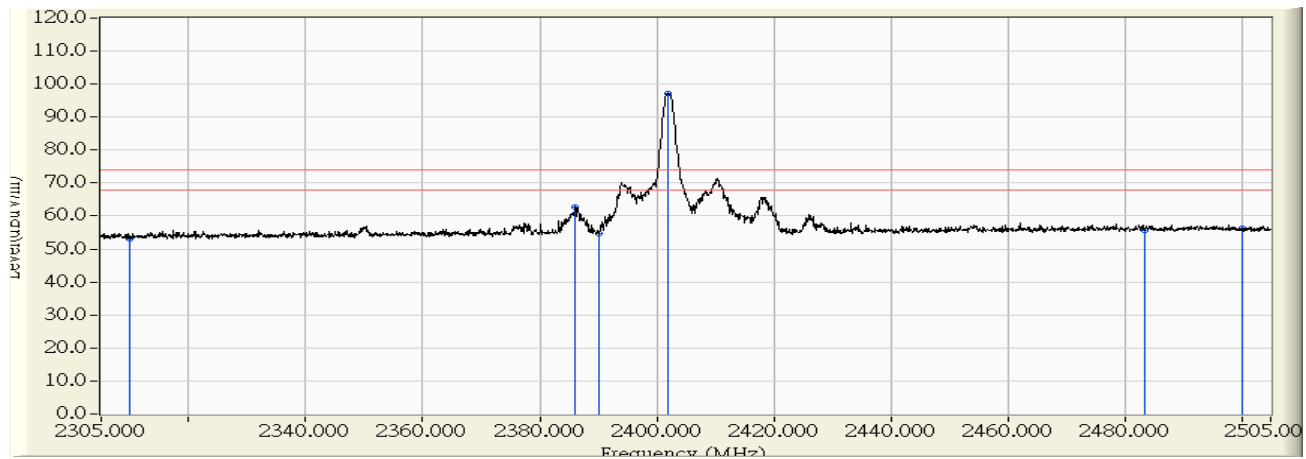
According to FCC Part 15 Subpart C Paragraph 15.247: 2015

### **6.6. Uncertainty**

The measurement uncertainty  
 $\pm 3.9$  dB above 1GHz

## 6.7. Test Result

|                                           |                                  |
|-------------------------------------------|----------------------------------|
| Site : CB1                                | Time : 2016/10/20 - 10:45        |
| Limit : FCC_SpartC_15.209_03M_PK          | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                   | Note : 2402MHz                   |

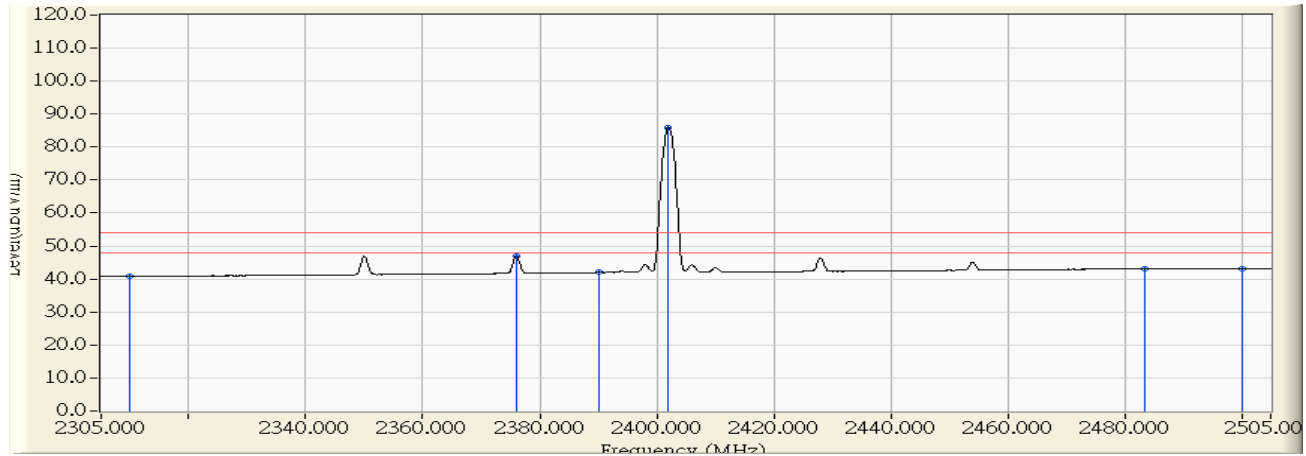


|   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | 2310.000           | 28.899                 | 24.061                  | 52.959                    | -21.041        | 74.000            | PEAK          |
| 2 | 2386.000           | 29.725                 | 33.077                  | 62.802                    | -11.198        | 74.000            | PEAK          |
| 3 | 2390.000           | 29.768                 | 24.855                  | 54.623                    | -19.377        | 74.000            | PEAK          |
| 4 | * 2401.900         | 29.897                 | 67.145                  | 97.042                    | 23.042         | 74.000            | PEAK          |
| 5 | 2483.500           | 30.738                 | 25.075                  | 55.814                    | -18.186        | 74.000            | PEAK          |
| 6 | 2500.000           | 30.740                 | 25.669                  | 56.408                    | -17.592        | 74.000            | PEAK          |

### Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

|                                           |                                  |
|-------------------------------------------|----------------------------------|
| Site : CB1                                | Time : 2016/10/20 - 10:46        |
| Limit : FCC_SpartC_15.209_03M_AV          | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                   | Note : 2402MHz                   |

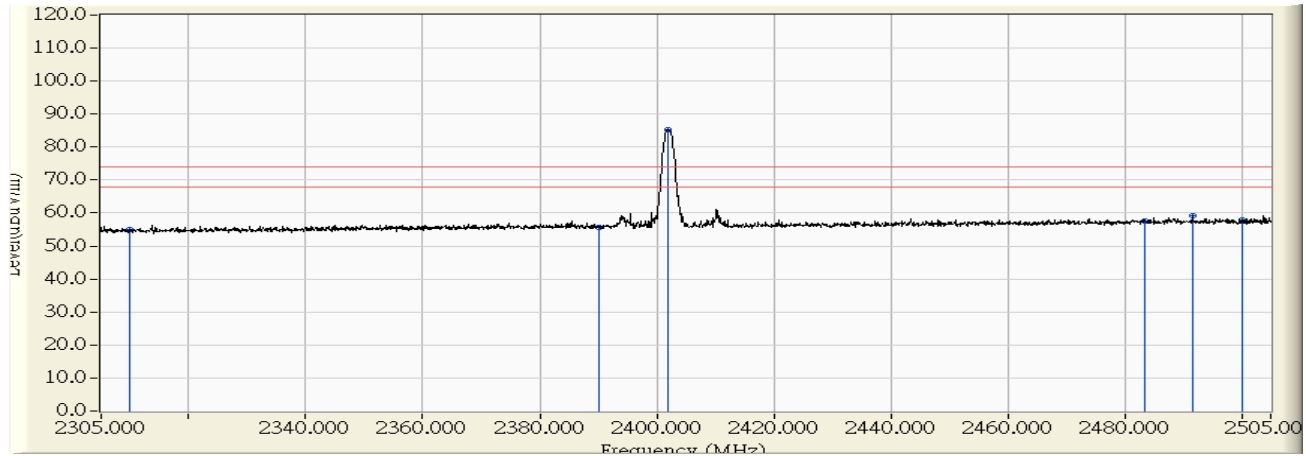


|   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | 2310.000           | 28.899                 | 11.914                  | 40.812                    | -13.188        | 54.000            | AVERAGE       |
| 2 | 2375.900           | 29.615                 | 17.241                  | 46.856                    | -7.144         | 54.000            | AVERAGE       |
| 3 | 2390.000           | 29.768                 | 12.277                  | 42.045                    | -11.955        | 54.000            | AVERAGE       |
| 4 | * 2402.000         | 29.898                 | 56.137                  | 86.036                    | 32.036         | 54.000            | AVERAGE       |
| 5 | 2483.500           | 30.738                 | 12.336                  | 43.075                    | -10.925        | 54.000            | AVERAGE       |
| 6 | 2500.000           | 30.740                 | 12.333                  | 43.072                    | -10.928        | 54.000            | AVERAGE       |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

|                                         |                                  |
|-----------------------------------------|----------------------------------|
| Site : CB1                              | Time : 2016/10/20 - 10:52        |
| Limit : FCC_SpartC_15.209_03M_PK        | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                 | Note : 2402MHz                   |

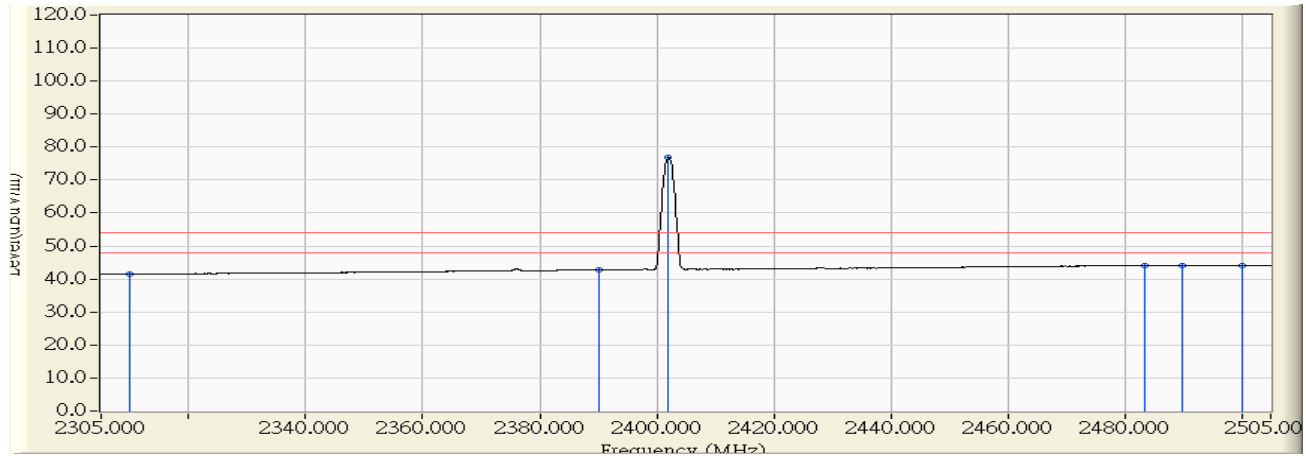


|   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | 2310.000           | 29.553                 | 25.580                  | 55.132                    | -18.868        | 74.000            | PEAK          |
| 2 | 2390.000           | 30.582                 | 25.129                  | 55.711                    | -18.289        | 74.000            | PEAK          |
| 3 | * 2402.000         | 30.736                 | 54.559                  | 85.296                    | 11.296         | 74.000            | PEAK          |
| 4 | 2483.500           | 31.739                 | 25.761                  | 57.501                    | -16.499        | 74.000            | PEAK          |
| 5 | 2491.600           | 31.762                 | 27.452                  | 59.214                    | -14.786        | 74.000            | PEAK          |
| 6 | 2500.000           | 31.774                 | 26.158                  | 57.931                    | -16.069        | 74.000            | PEAK          |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

|                                         |                                  |
|-----------------------------------------|----------------------------------|
| Site : CB1                              | Time : 2016/10/20 - 10:53        |
| Limit : FCC_SpartC_15.209_03M_AV        | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                 | Note : 2402MHz                   |

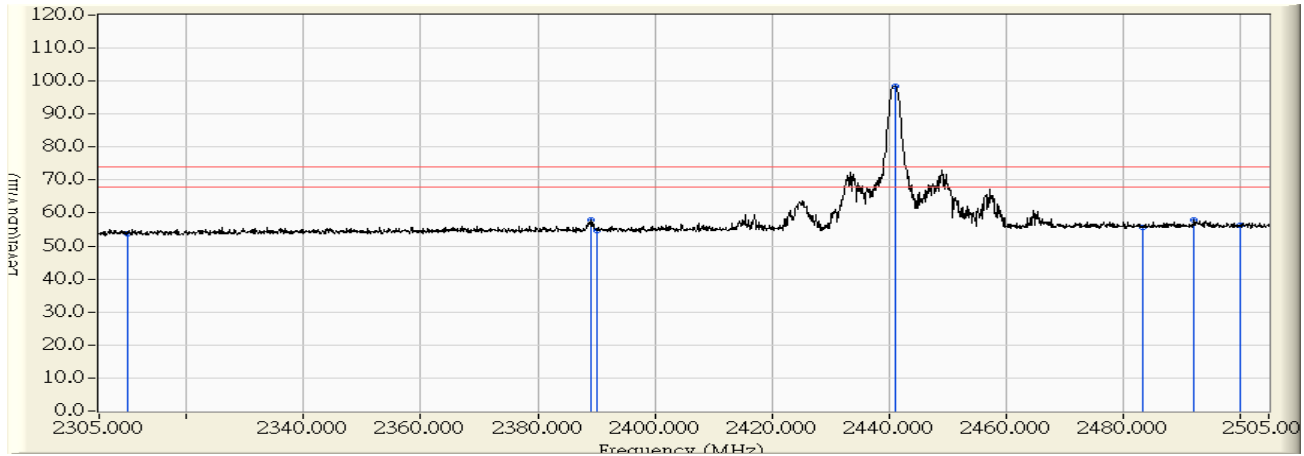


|   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | 2310.000           | 29.553                 | 11.905                  | 41.457                    | -12.543        | 54.000            | AVERAGE       |
| 2 | 2390.000           | 30.582                 | 12.176                  | 42.758                    | -11.242        | 54.000            | AVERAGE       |
| 3 | * 2402.000         | 30.736                 | 46.190                  | 76.927                    | 22.927         | 54.000            | AVERAGE       |
| 4 | 2483.500           | 31.739                 | 12.469                  | 44.209                    | -9.791         | 54.000            | AVERAGE       |
| 5 | 2489.800           | 31.757                 | 12.365                  | 44.122                    | -9.878         | 54.000            | AVERAGE       |
| 6 | 2500.000           | 31.774                 | 12.343                  | 44.116                    | -9.884         | 54.000            | AVERAGE       |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

|                                           |                                  |
|-------------------------------------------|----------------------------------|
| Site : CB1                                | Time : 2016/10/20 - 10:59        |
| Limit : FCC_SpartC_15.209_03M_PK          | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                   | Note : 2441MHz                   |

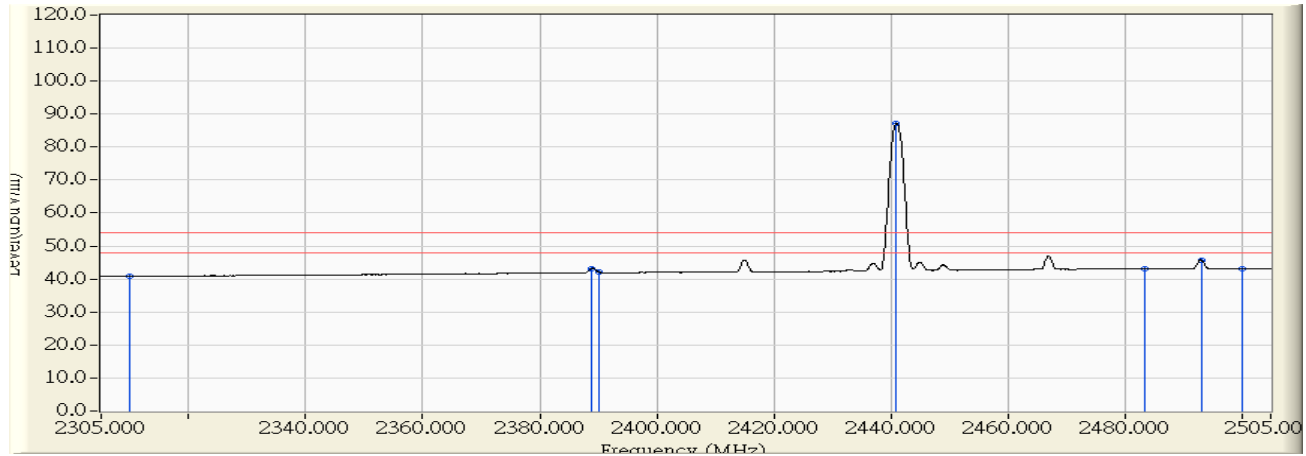


|   |   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 |   | 2310.000           | 28.899                 | 24.781                  | 53.679                    | -20.321        | 74.000            | PEAK          |
| 2 |   | 2389.000           | 29.757                 | 28.041                  | 57.798                    | -16.202        | 74.000            | PEAK          |
| 3 |   | 2390.000           | 29.768                 | 24.853                  | 54.621                    | -19.379        | 74.000            | PEAK          |
| 4 | * | 2441.100           | 30.324                 | 68.025                  | 98.349                    | 24.349         | 74.000            | PEAK          |
| 5 |   | 2483.500           | 30.738                 | 24.864                  | 55.603                    | -18.397        | 74.000            | PEAK          |
| 6 |   | 2492.100           | 30.745                 | 27.004                  | 57.749                    | -16.251        | 74.000            | PEAK          |
| 7 |   | 2500.000           | 30.740                 | 25.428                  | 56.167                    | -17.833        | 74.000            | PEAK          |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

|                                           |                                  |
|-------------------------------------------|----------------------------------|
| Site : CB1                                | Time : 2016/10/20 - 11:01        |
| Limit : FCC_SpartC_15.209_03M_AV          | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                   | Note : 2441MHz                   |

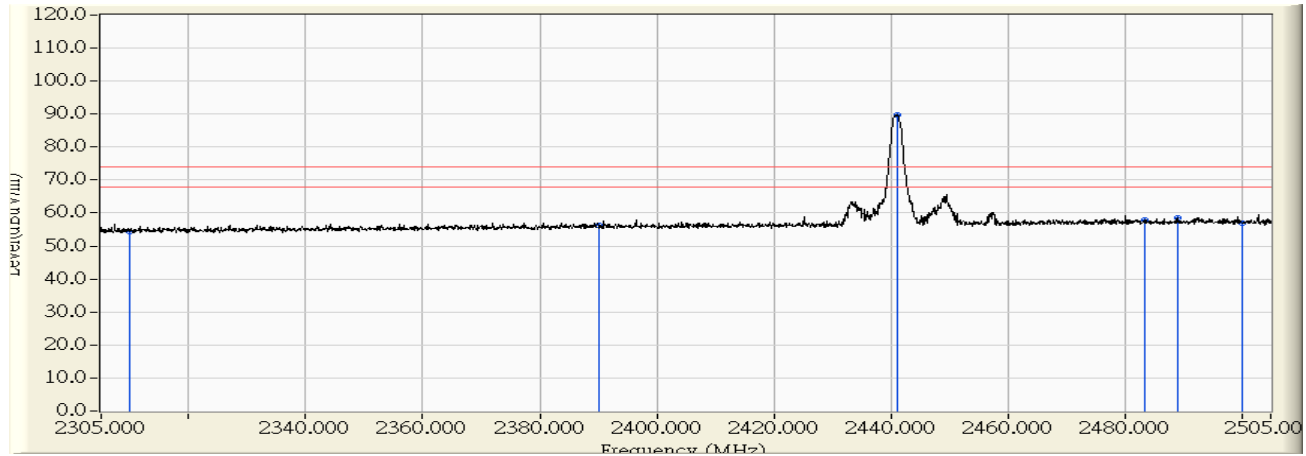


|   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | 2310.000           | 28.899                 | 11.909                  | 40.807                    | -13.193        | 54.000            | AVERAGE       |
| 2 | 2388.900           | 29.756                 | 13.508                  | 43.264                    | -10.736        | 54.000            | AVERAGE       |
| 3 | 2390.000           | 29.768                 | 12.313                  | 42.081                    | -11.919        | 54.000            | AVERAGE       |
| 4 | * 2441.000         | 30.323                 | 56.816                  | 87.139                    | 33.139         | 54.000            | AVERAGE       |
| 5 | 2483.500           | 30.738                 | 12.373                  | 43.112                    | -10.888        | 54.000            | AVERAGE       |
| 6 | 2493.100           | 30.746                 | 15.089                  | 45.835                    | -8.165         | 54.000            | AVERAGE       |
| 7 | 2500.000           | 30.740                 | 12.360                  | 43.099                    | -10.901        | 54.000            | AVERAGE       |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

|                                         |                                  |
|-----------------------------------------|----------------------------------|
| Site : CB1                              | Time : 2016/10/20 - 11:06        |
| Limit : FCC_SpartC_15.209_03M_PK        | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                 | Note : 2441MHz                   |

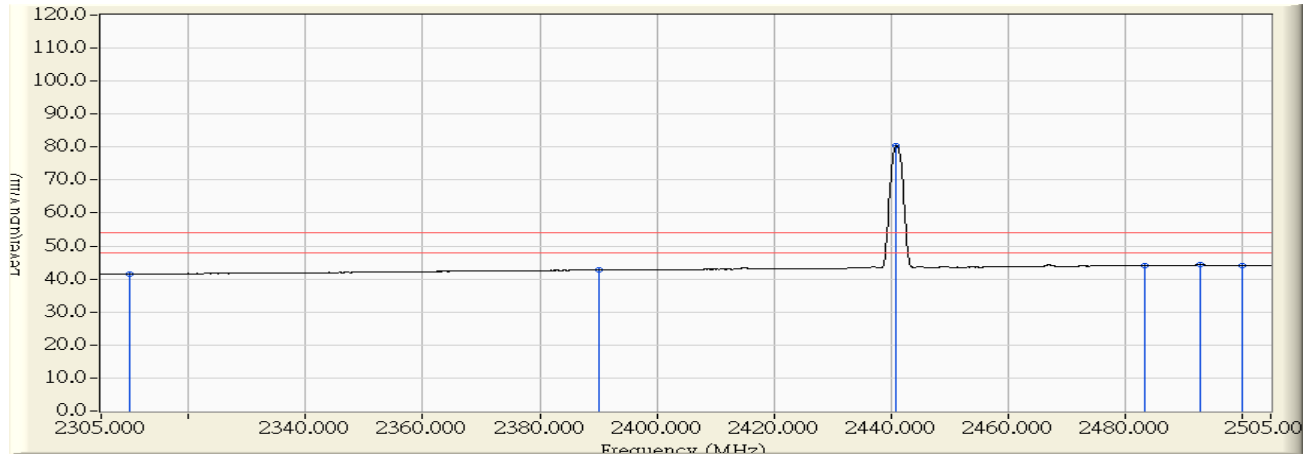


|   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | 2310.000           | 29.553                 | 24.925                  | 54.477                    | -19.523        | 74.000            | PEAK          |
| 2 | 2390.000           | 30.582                 | 25.744                  | 56.326                    | -17.674        | 74.000            | PEAK          |
| 3 | * 2441.100         | 31.240                 | 58.405                  | 89.645                    | 15.645         | 74.000            | PEAK          |
| 4 | 2483.500           | 31.739                 | 26.016                  | 57.756                    | -16.244        | 74.000            | PEAK          |
| 5 | 2489.000           | 31.755                 | 26.722                  | 58.477                    | -15.523        | 74.000            | PEAK          |
| 6 | 2500.000           | 31.774                 | 25.021                  | 56.794                    | -17.206        | 74.000            | PEAK          |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

|                                         |                                  |
|-----------------------------------------|----------------------------------|
| Site : CB1                              | Time : 2016/10/20 - 11:06        |
| Limit : FCC_SpartC_15.209_03M_AV        | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                 | Note : 2441MHz                   |

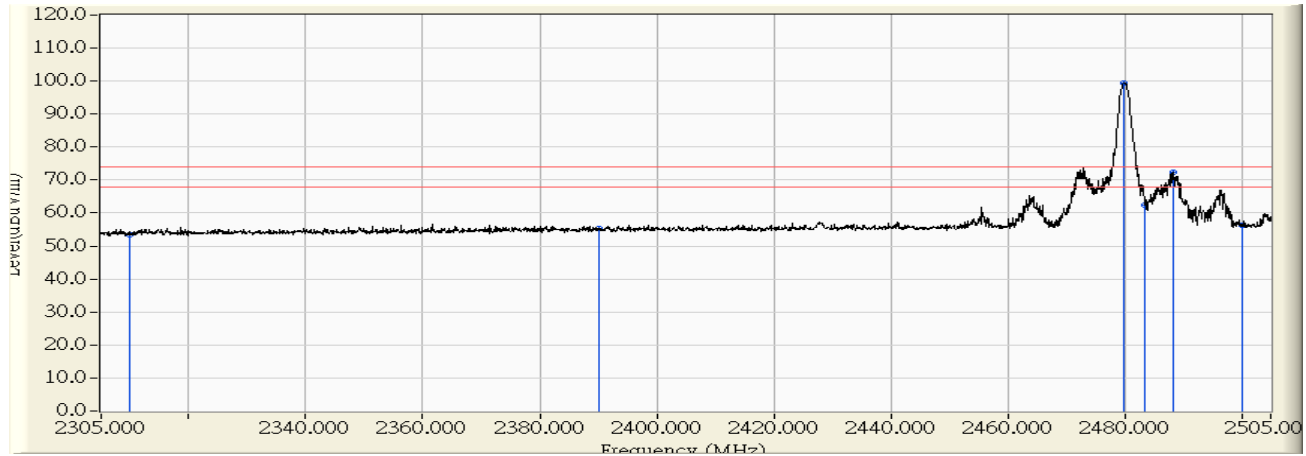


|   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | 2310.000           | 29.553                 | 11.946                  | 41.498                    | -12.502        | 54.000            | AVERAGE       |
| 2 | 2390.000           | 30.582                 | 12.155                  | 42.737                    | -11.263        | 54.000            | AVERAGE       |
| 3 | * 2441.000         | 31.239                 | 49.303                  | 80.542                    | 26.542         | 54.000            | AVERAGE       |
| 4 | 2483.500           | 31.739                 | 12.320                  | 44.060                    | -9.940         | 54.000            | AVERAGE       |
| 5 | 2492.900           | 31.766                 | 12.609                  | 44.375                    | -9.625         | 54.000            | AVERAGE       |
| 6 | 2500.000           | 31.774                 | 12.324                  | 44.097                    | -9.903         | 54.000            | AVERAGE       |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

|                                           |                                  |
|-------------------------------------------|----------------------------------|
| Site : CB1                                | Time : 2016/10/20 - 11:11        |
| Limit : FCC_SpartC_15.209_03M_PK          | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                   | Note : 2480MHz                   |

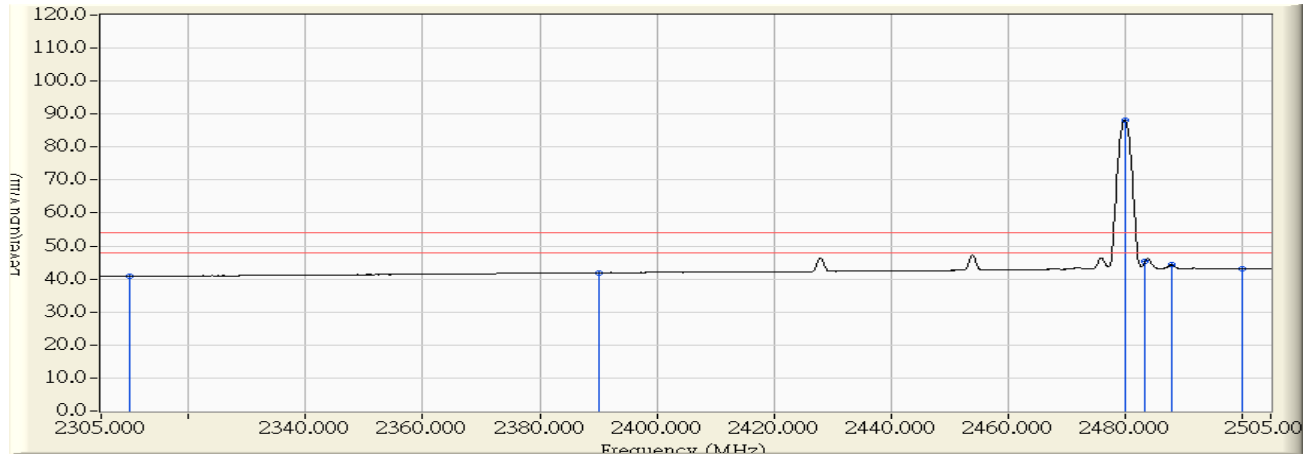


|   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | 2310.000           | 28.899                 | 24.662                  | 53.560                    | -20.440        | 74.000            | PEAK          |
| 2 | 2390.000           | 29.768                 | 25.519                  | 55.287                    | -18.713        | 74.000            | PEAK          |
| 3 | * 2479.900         | 30.736                 | 68.575                  | 99.311                    | 25.311         | 74.000            | PEAK          |
| 4 | 2483.500           | 30.738                 | 31.578                  | 62.317                    | -11.683        | 74.000            | PEAK          |
| 5 | 2488.300           | 30.743                 | 41.540                  | 72.282                    | -1.718         | 74.000            | PEAK          |
| 6 | 2500.000           | 30.740                 | 25.605                  | 56.344                    | -17.656        | 74.000            | PEAK          |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

|                                           |                                  |
|-------------------------------------------|----------------------------------|
| Site : CB1                                | Time : 2016/10/20 - 11:12        |
| Limit : FCC_SpartC_15.209_03M_AV          | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                   | Note : 2480MHz                   |

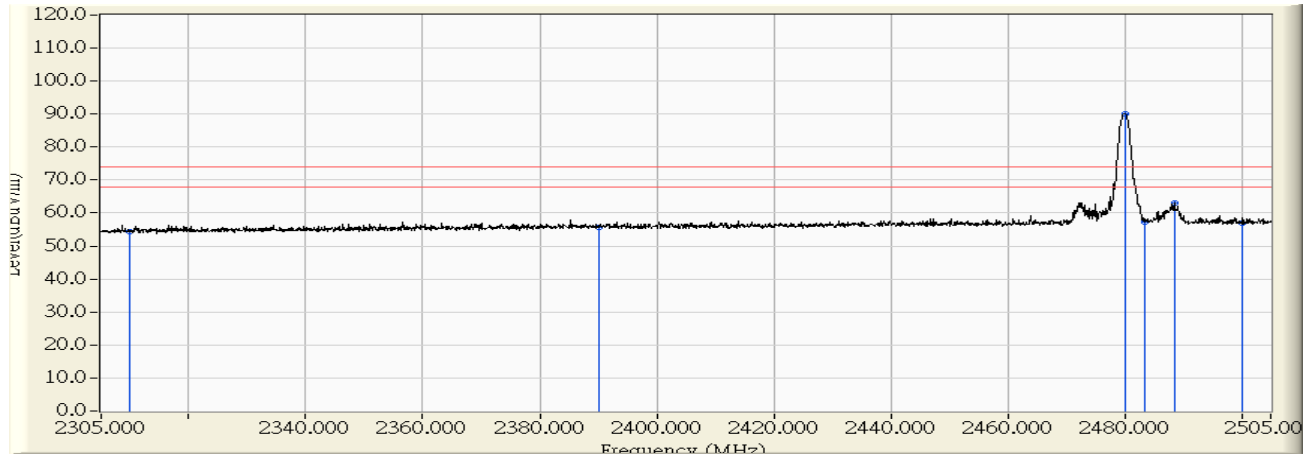


|   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | 2310.000           | 28.899                 | 11.974                  | 40.872                    | -13.128        | 54.000            | AVERAGE       |
| 2 | 2390.000           | 29.768                 | 12.157                  | 41.925                    | -12.075        | 54.000            | AVERAGE       |
| 3 | * 2480.100         | 30.736                 | 57.432                  | 88.168                    | 34.168         | 54.000            | AVERAGE       |
| 4 | 2483.500           | 30.738                 | 14.469                  | 45.208                    | -8.792         | 54.000            | AVERAGE       |
| 5 | 2488.000           | 30.742                 | 13.535                  | 44.277                    | -9.723         | 54.000            | AVERAGE       |
| 6 | 2500.000           | 30.740                 | 12.403                  | 43.142                    | -10.858        | 54.000            | AVERAGE       |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

|                                         |                                  |
|-----------------------------------------|----------------------------------|
| Site : CB1                              | Time : 2016/10/20 - 11:20        |
| Limit : FCC_SpartC_15.209_03M_PK        | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                 | Note : 2480MHz                   |

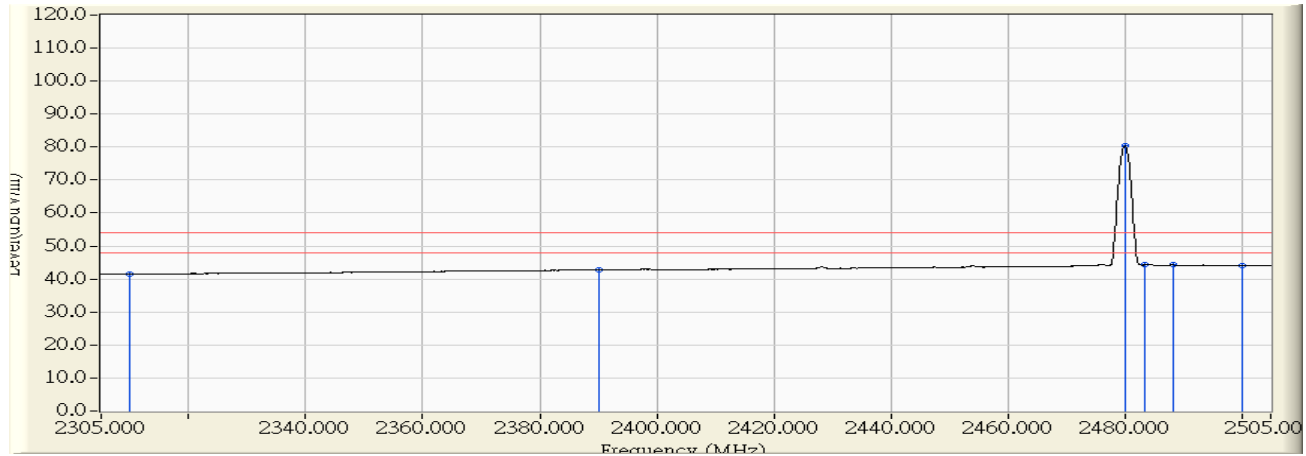


|   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | 2310.000           | 29.553                 | 24.938                  | 54.490                    | -19.510        | 74.000            | PEAK          |
| 2 | 2390.000           | 30.582                 | 25.235                  | 55.817                    | -18.183        | 74.000            | PEAK          |
| 3 | * 2480.100         | 31.730                 | 58.351                  | 90.082                    | 16.082         | 74.000            | PEAK          |
| 4 | 2483.500           | 31.739                 | 25.612                  | 57.352                    | -16.648        | 74.000            | PEAK          |
| 5 | 2488.600           | 31.754                 | 31.384                  | 63.138                    | -10.862        | 74.000            | PEAK          |
| 6 | 2500.000           | 31.774                 | 25.150                  | 56.923                    | -17.077        | 74.000            | PEAK          |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

|                                         |                                  |
|-----------------------------------------|----------------------------------|
| Site : CB1                              | Time : 2016/10/20 - 11:20        |
| Limit : FCC_SpartC_15.209_03M_AV        | Margin : 6                       |
| Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL | Power : DC 5V (Power by Charger) |
| EUT : GPS Data Recorder                 | Note : 2480MHz                   |



|   | Frequency<br>(MHz) | Correct Factor<br>(dB) | Reading Level<br>(dBuV) | Measure Level<br>(dBuV/m) | Margin<br>(dB) | Limit<br>(dBuV/m) | Detector Type |
|---|--------------------|------------------------|-------------------------|---------------------------|----------------|-------------------|---------------|
| 1 | 2310.000           | 29.553                 | 11.981                  | 41.533                    | -12.467        | 54.000            | AVERAGE       |
| 2 | 2390.000           | 30.582                 | 12.218                  | 42.800                    | -11.200        | 54.000            | AVERAGE       |
| 3 | * 2480.000         | 31.730                 | 48.556                  | 80.286                    | 26.286         | 54.000            | AVERAGE       |
| 4 | 2483.500           | 31.739                 | 12.565                  | 44.305                    | -9.695         | 54.000            | AVERAGE       |
| 5 | 2488.300           | 31.753                 | 12.535                  | 44.288                    | -9.712         | 54.000            | AVERAGE       |
| 6 | 2500.000           | 31.774                 | 12.343                  | 44.116                    | -9.884         | 54.000            | AVERAGE       |

**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " \* ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

## 7. Number of hopping frequency

### 7.1. Test Equipment

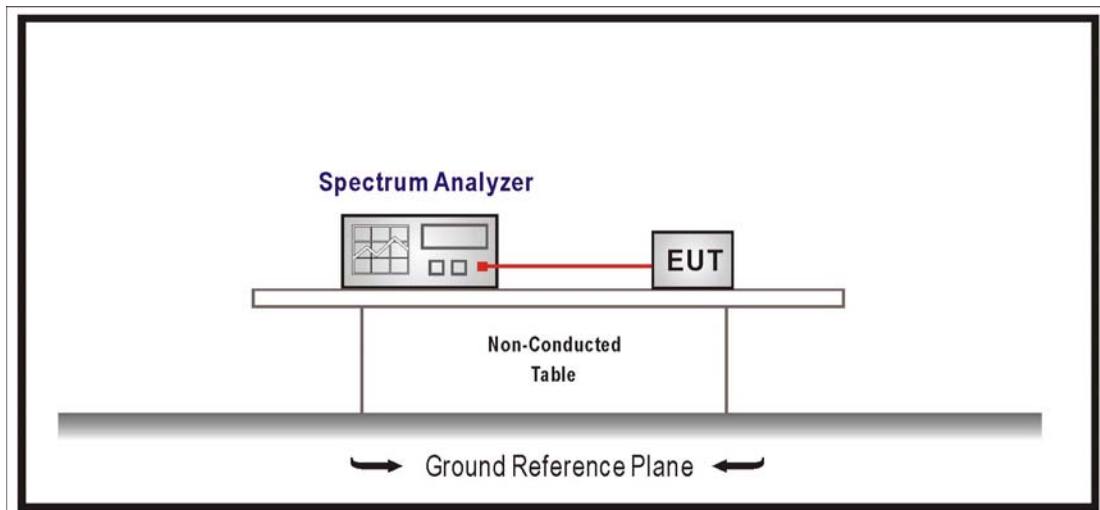
The following test equipment is used during the test:

Number of hopping frequency / SR7

| Instrument                 | Manufacturer | Model No. | Serial No  | Next Cal. Date |
|----------------------------|--------------|-----------|------------|----------------|
| Spectrum Analyzer          | Agilent      | N9010A    | US47140172 | 2017/08/08     |
| Signal & Spectrum Analyzer | R&S          | FSV40     | 101049     | 2017/01/05     |
| Signal Analyzer            | R&S          | FSV7      | 101650     | 2016/11/30     |

Note: All equipments that need to calibrate are with calibration period of 1 year.

### 7.2. Test Setup



### **7.3. Limits**

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

For frequency hopping systems operating in the 2400-2483.5 MHz bands, which use fewer than 75 hopping frequencies, may employ intelligent hopping techniques to avoid interference to other transmissions. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 non-overlapping channels are used.

For frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies.

### **7.4. Test Procedures**

The EUT was setup according to ANSI C63.10: 2013 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements ,

Span = the frequency band of operation ,RBW  $\geq$  1% of the span, VBW  $\geq$  RBW,

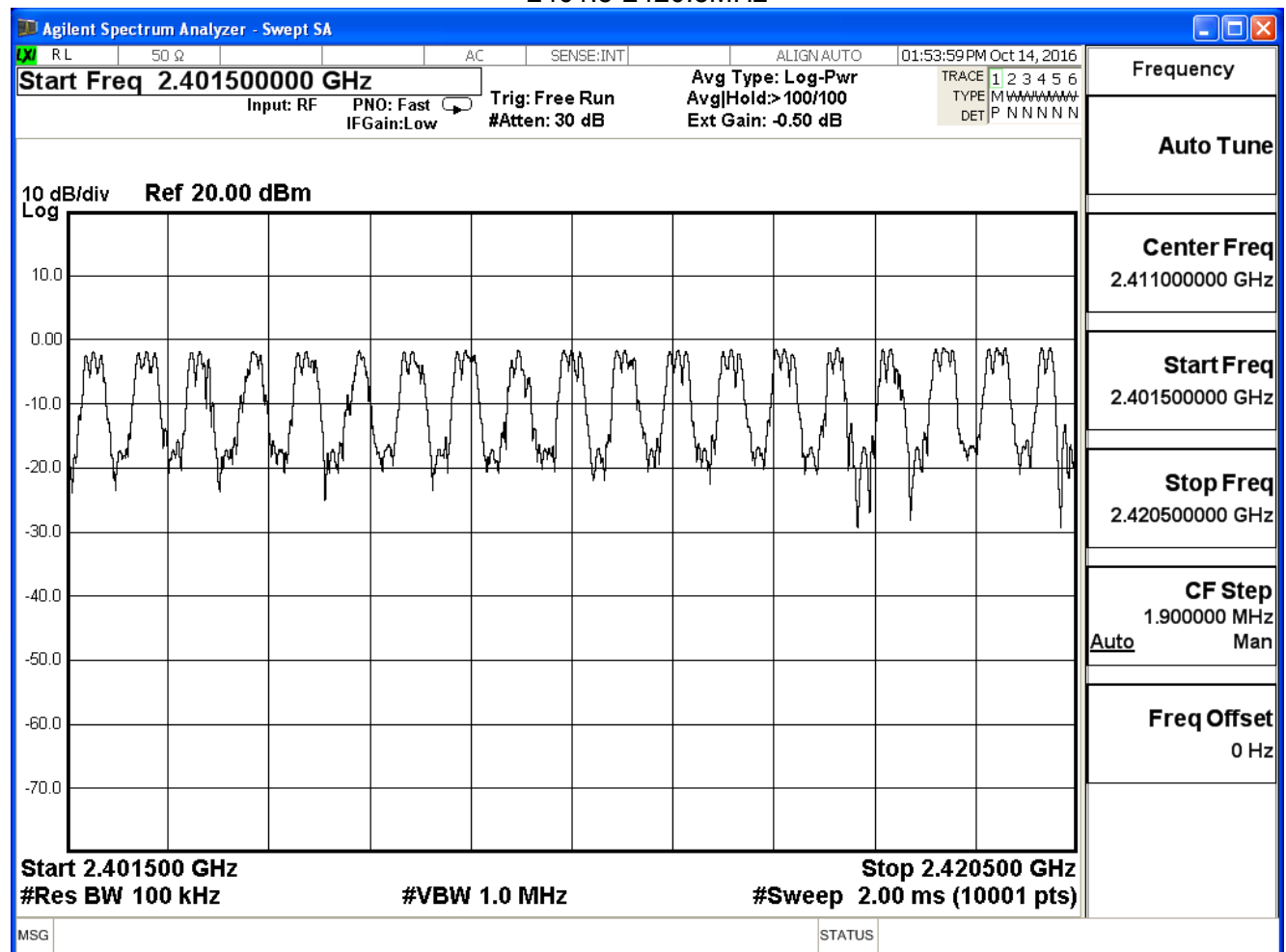
Sweep = auto, Detector function = peak, Trace = max hold.

### **7.5. Test Specification**

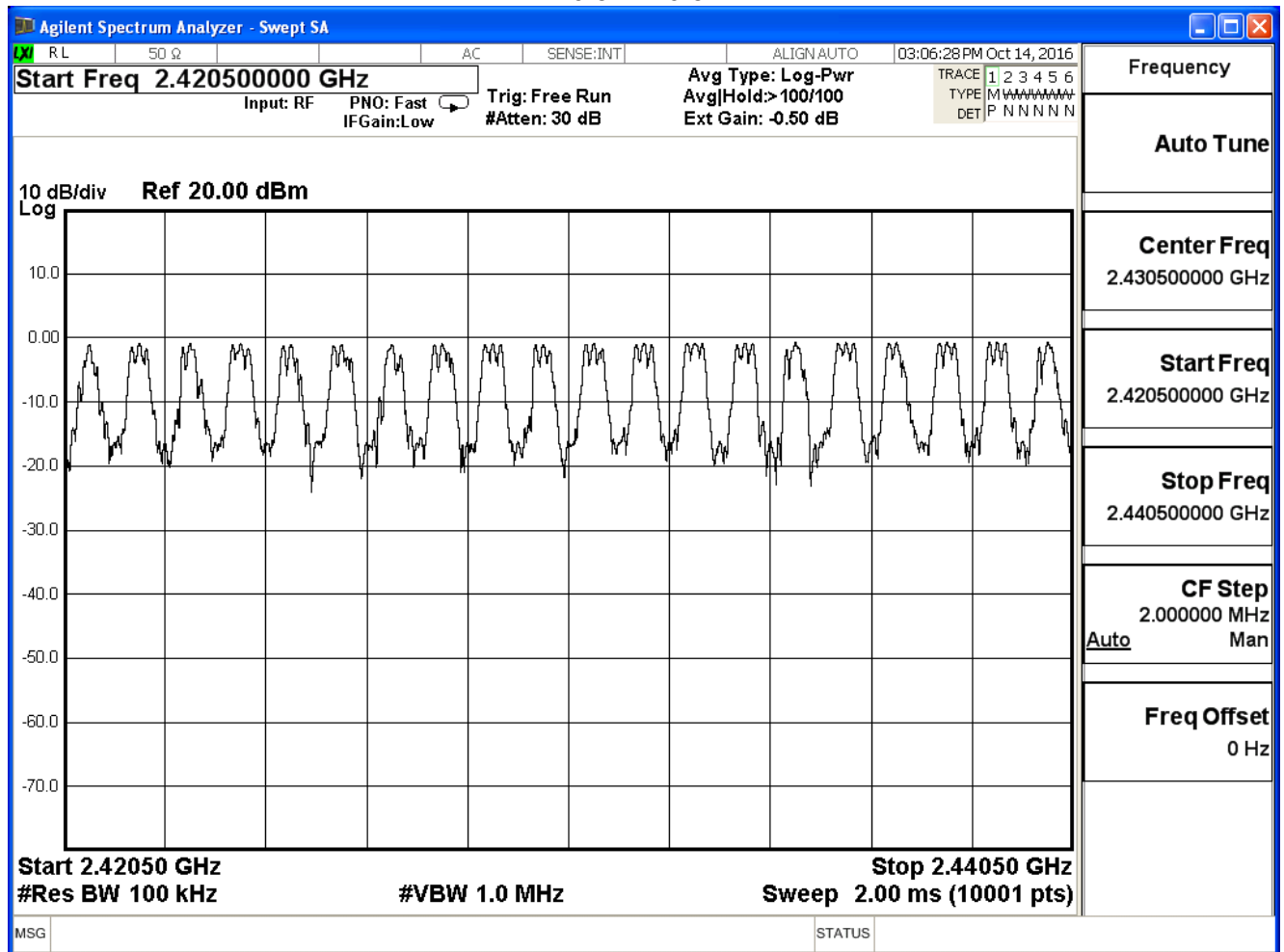
According to FCC Part 15 Subpart C Paragraph 15.247: 2015

|              |                             |           |     |
|--------------|-----------------------------|-----------|-----|
| Product      | GPS Data Recorder           |           |     |
| Test Item    | Number of hopping frequency |           |     |
| Test Mode    | Mode 1: Transmit            |           |     |
| Date of Test | 2016/10/14                  | Test Site | SR7 |

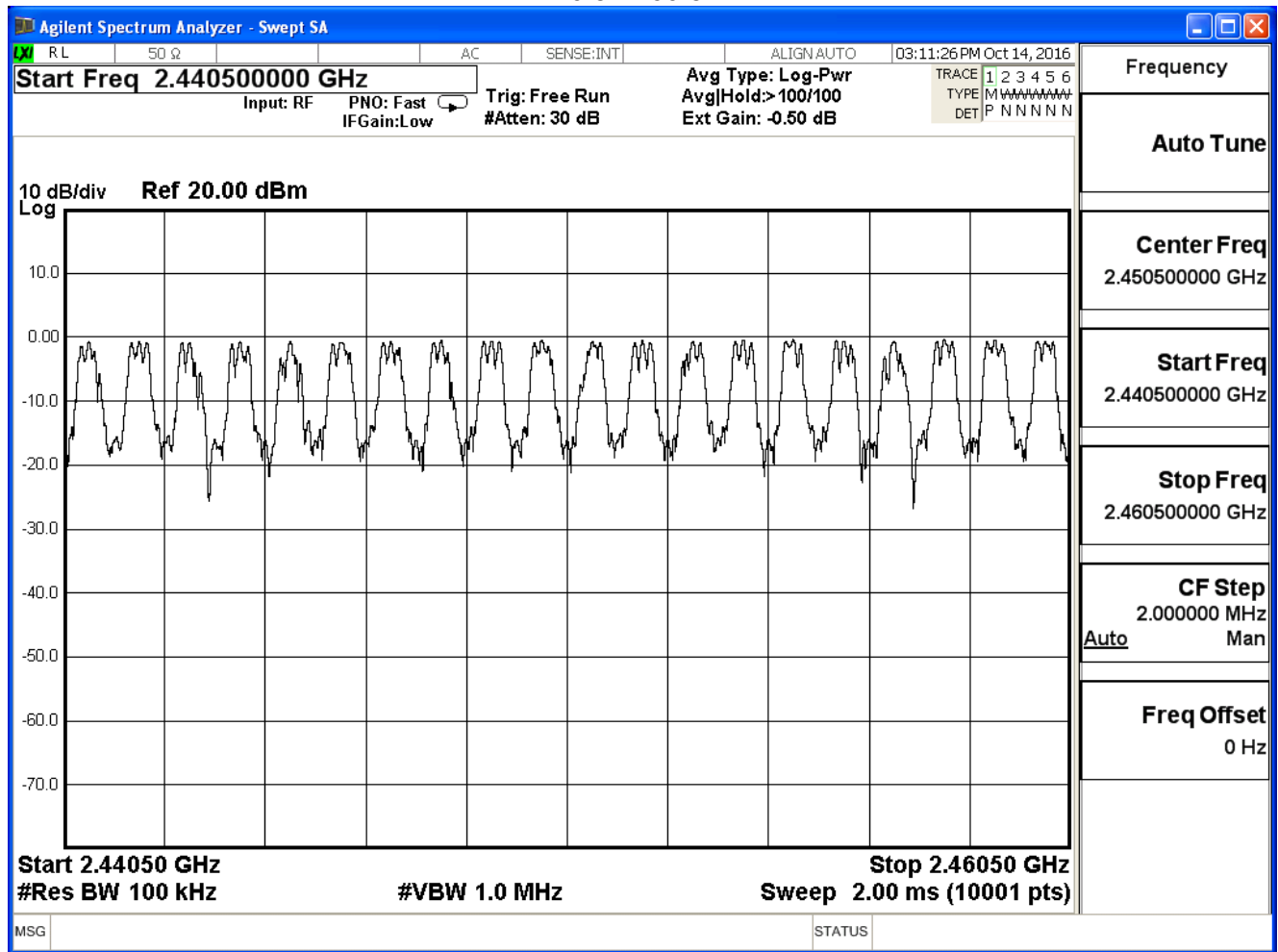
| Frequency Range<br>(MHz) | Measure Level<br>(Channels) | Limit<br>(Channels) | Result |
|--------------------------|-----------------------------|---------------------|--------|
| 2402 - 2480              | 79                          | $\geq 75$           | PASS   |



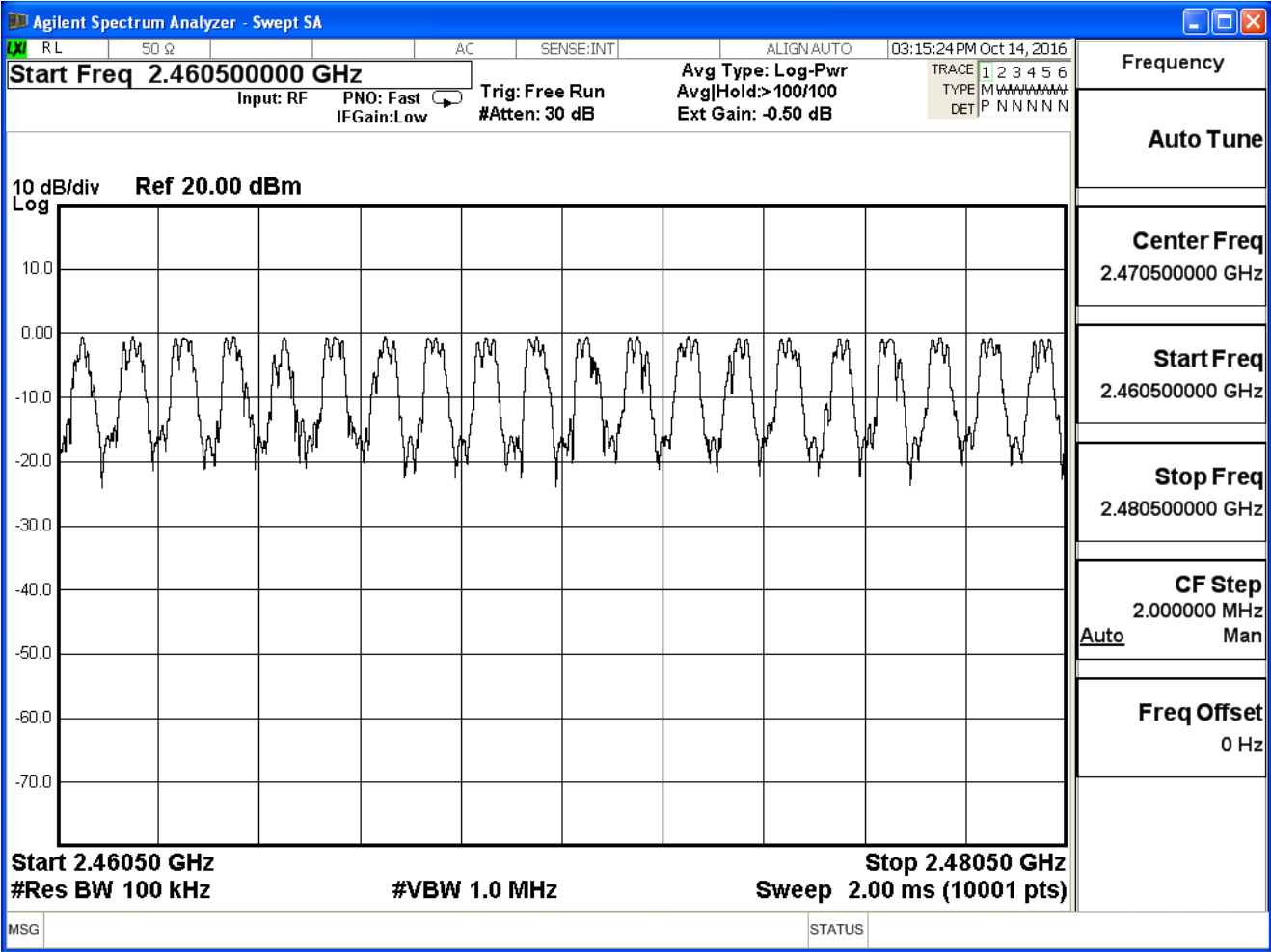
## 2420.5-2440.5MHz



2440.5-2460.5MHz



2460.5-2480.5MHz



## 8. Carrier Frequency Separation

### 8.1. Test Equipment

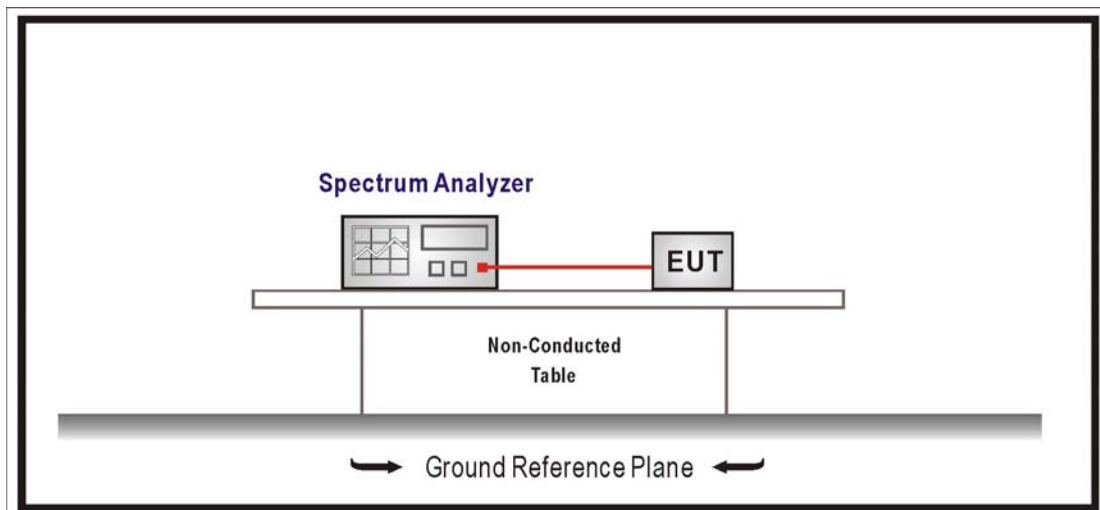
The following test equipment is used during the test:

Carrier Frequency Separation / SR7

| Instrument                 | Manufacturer | Model No. | Serial No  | Next Cal. Date |
|----------------------------|--------------|-----------|------------|----------------|
| Spectrum Analyzer          | Agilent      | N9010A    | US47140172 | 2017/08/08     |
| Signal & Spectrum Analyzer | R&S          | FSV40     | 101049     | 2017/01/05     |
| Signal Analyzer            | R&S          | FSV7      | 101650     | 2016/11/30     |

Note: All equipments that need to calibrate are with calibration period of 1 year.

### 8.2. Test Setup



### 8.3. Limits

For frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

#### **8.4. Test Procedures**

The EUT was setup according to ANSI C63.10: 2013 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

Span = wide enough to capture the peaks of two adjacent channels

Resolution Bandwidth (RBW)  $\geq$  1% of the span, VBW  $\geq$  RBW

Sweep = auto, Detector function = peak, Trace = max hold

#### **8.5. Test Specification**

According to FCC Part 15 Subpart C Paragraph 15.247: 2015

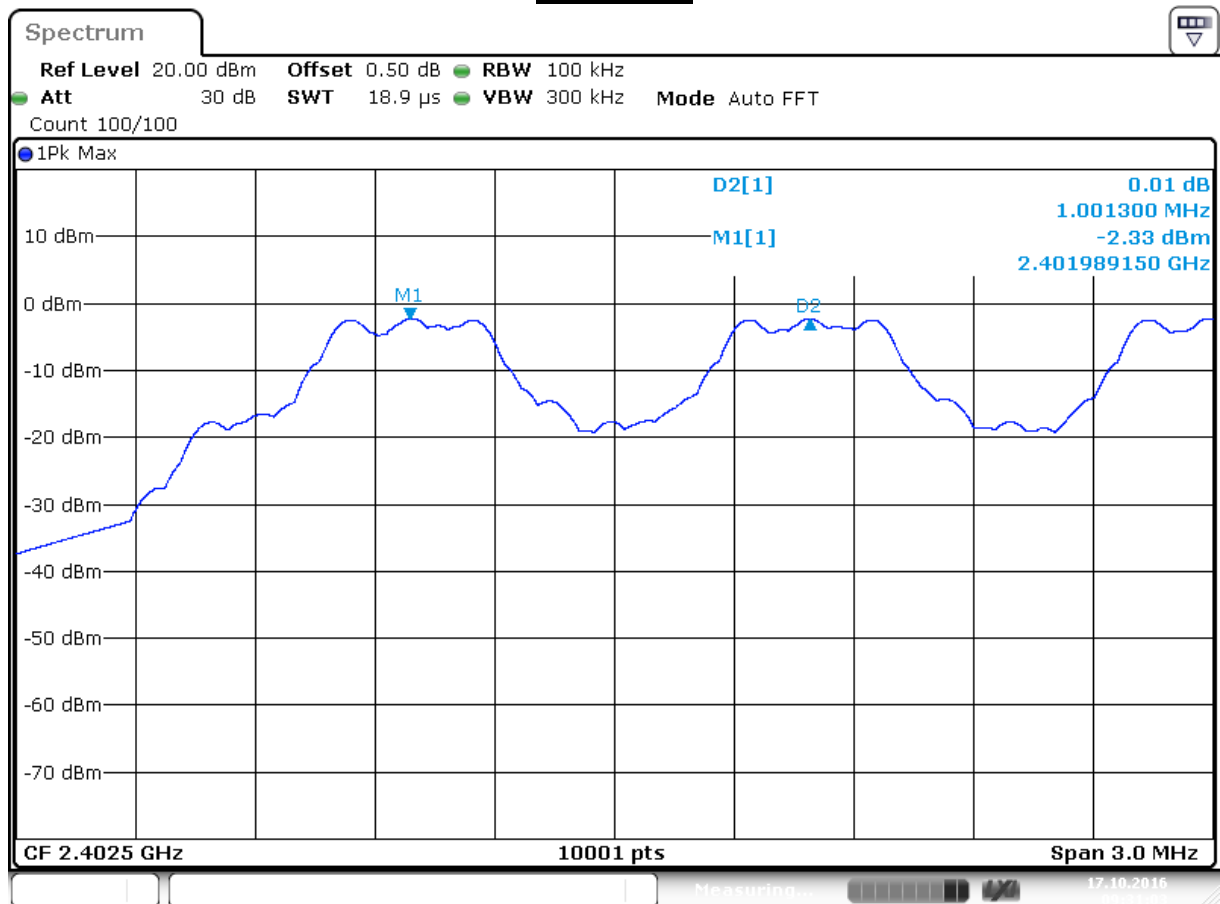
## 8.6. Test Result

|              |                              |           |     |
|--------------|------------------------------|-----------|-----|
| Product      | GPS Data Recorder            |           |     |
| Test Item    | Carrier Frequency Separation |           |     |
| Test Mode    | Mode 1: Transmit             |           |     |
| Date of Test | 2016/10/17                   | Test Site | SR7 |

GFSK

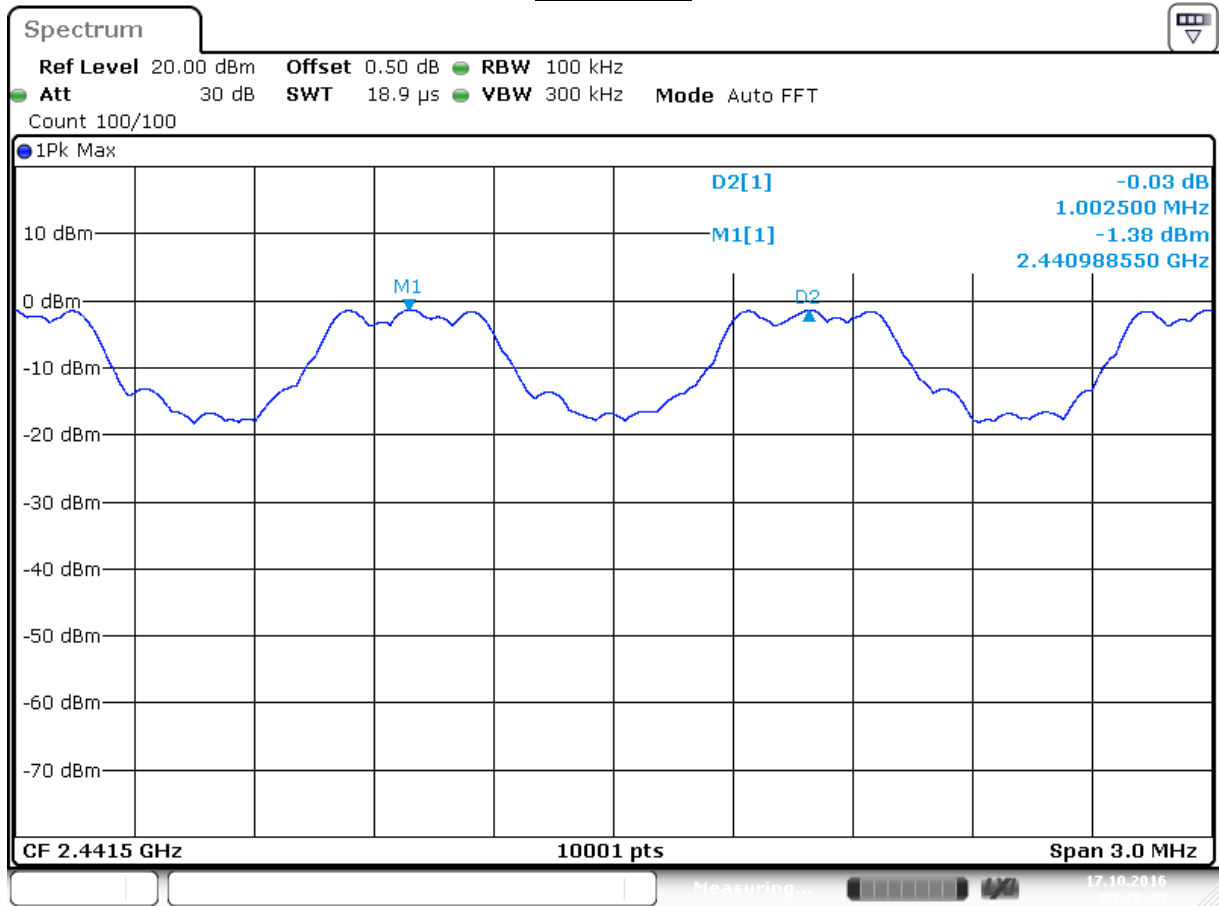
| Channel No. | Frequency (MHz) | Measure Level (MHz) | Limit (MHz) | Result |
|-------------|-----------------|---------------------|-------------|--------|
| 00          | 2402            | 1.0013              | $\geq 0.76$ | Pass   |
| 39          | 2441            | 1.0025              | $\geq 0.76$ | Pass   |
| 78          | 2480            | 1.0040              | $\geq 0.76$ | Pass   |

### Channel 00



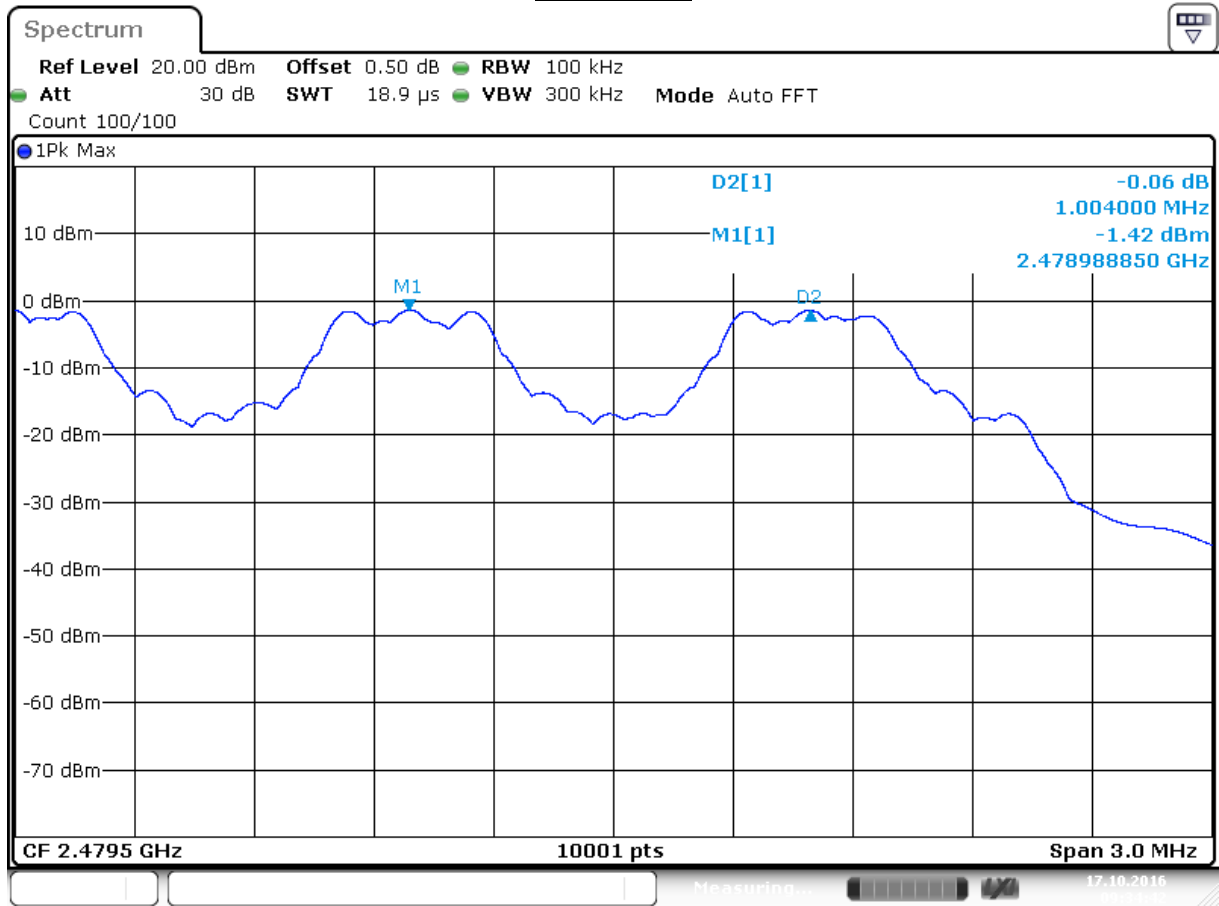
Date: 17.OCT.2016 09:31:03

### Channel 39



Date: 17.OCT.2016 09:26:35

### Channel 78



Date: 17.OCT.2016 09:34:43

## 9. Occupied Bandwidth

### 9.1. Test Equipment

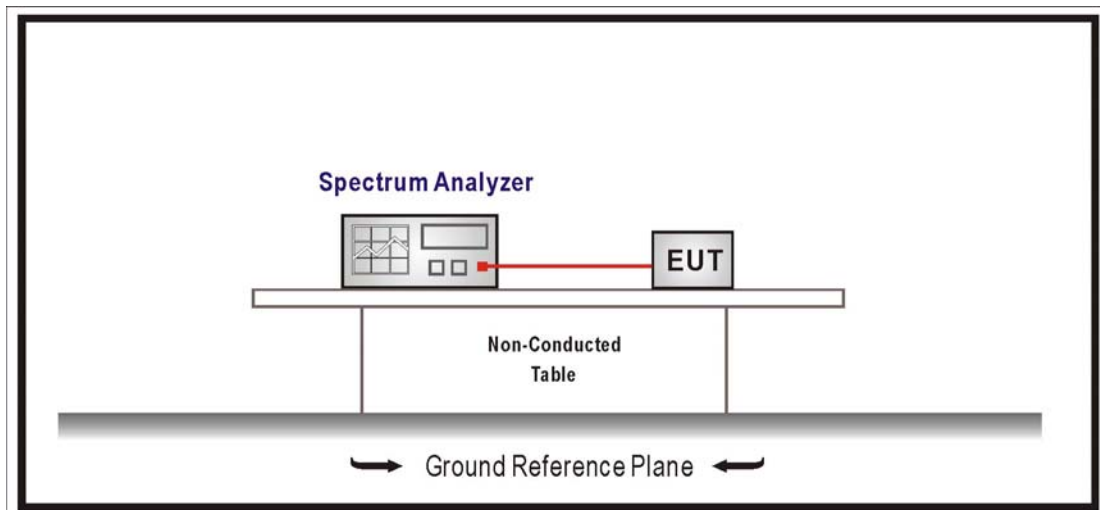
The following test equipment is used during the test:

Occupied Bandwidth / SR7

| Instrument                 | Manufacturer | Model No. | Serial No  | Next Cal. Date |
|----------------------------|--------------|-----------|------------|----------------|
| Spectrum Analyzer          | Agilent      | N9010A    | US47140172 | 2017/08/08     |
| Signal & Spectrum Analyzer | R&S          | FSV40     | 101049     | 2017/01/05     |
| Signal Analyzer            | R&S          | FSV7      | 101650     | 2016/11/30     |

Note: All equipments that need to calibrate are with calibration period of 1 year.

### 9.2. Test Setup



### **9.3. Limits**

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

For frequency hopping systems operating in the 5725-5850 MHz bands. The maximum 20 dB bandwidth of the hopping channel is 1 MHz.

For frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

### **9.4. Test Procedures**

The EUT was setup according to ANSI C63.10: 2013 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW  $\geq$  1% of the 20 dB bandwidth, VBW  $\geq$  RBW , Sweep = auto, Detector function = peak,

Trace = max hold , The EUT should be transmitting at its maximum data rate.

### **9.5. Test Specification**

According to FCC Part 15 Subpart C Paragraph 15.247: 2015

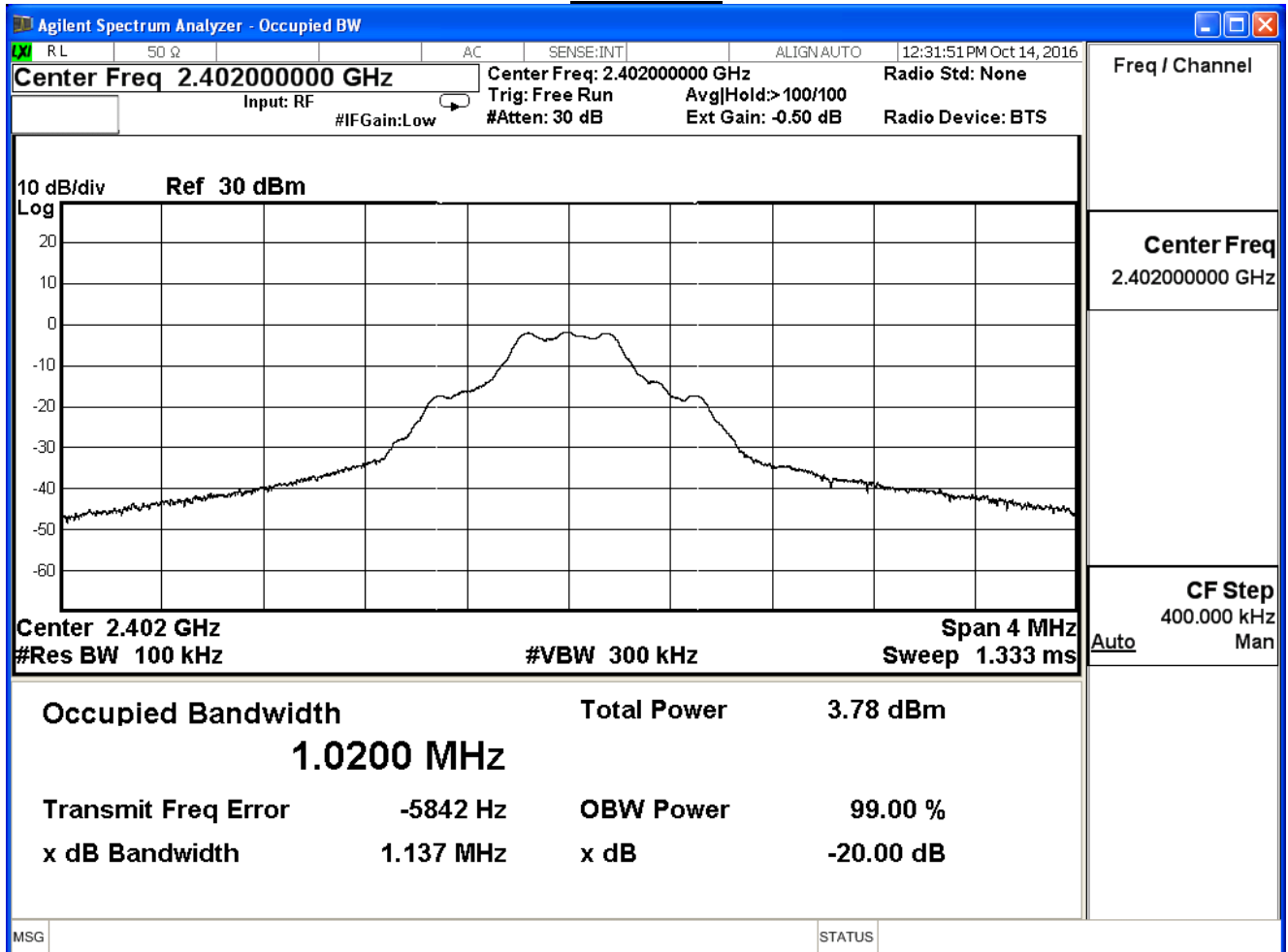
## 9.6. Test Result

|              |                    |           |     |
|--------------|--------------------|-----------|-----|
| Product      | GPS Data Recorder  |           |     |
| Test Item    | Occupied Bandwidth |           |     |
| Test Mode    | Mode 1: Transmit   |           |     |
| Date of Test | 2016/10/14         | Test Site | SR7 |

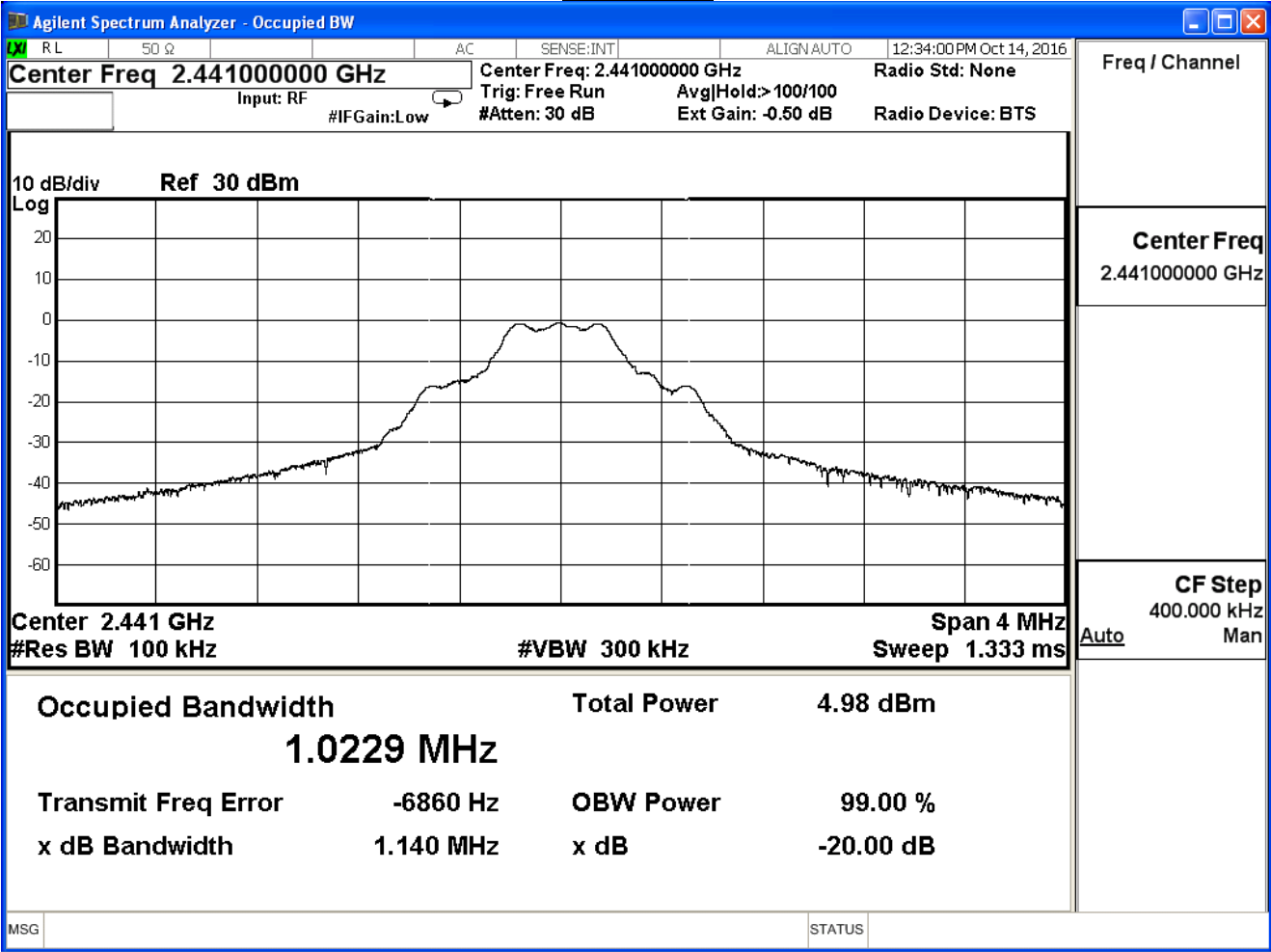
### GFSK

| Channel No. | Frequency (MHz) | Measure Level (MHz) | Limit (MHz) | Result |
|-------------|-----------------|---------------------|-------------|--------|
| 00          | 2402            | 1.137               | $\geq 0.5$  | Pass   |
| 39          | 2441            | 1.140               | $\geq 0.5$  | Pass   |
| 78          | 2480            | 1.136               | $\geq 0.5$  | Pass   |

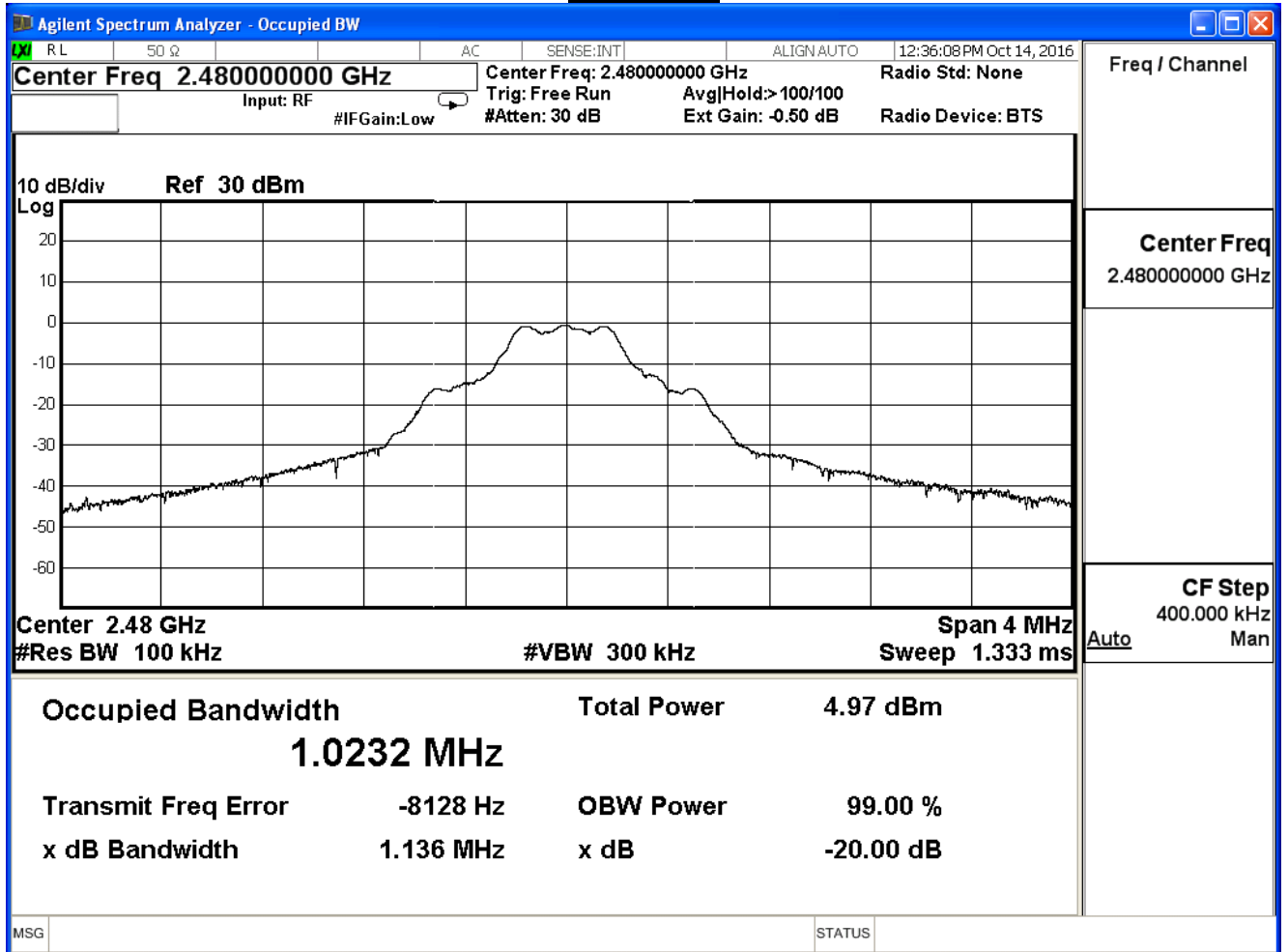
### Channel 00



**Channel 39**



### Channel 78



## 10. Dwell Time

### 10.1. Test Equipment

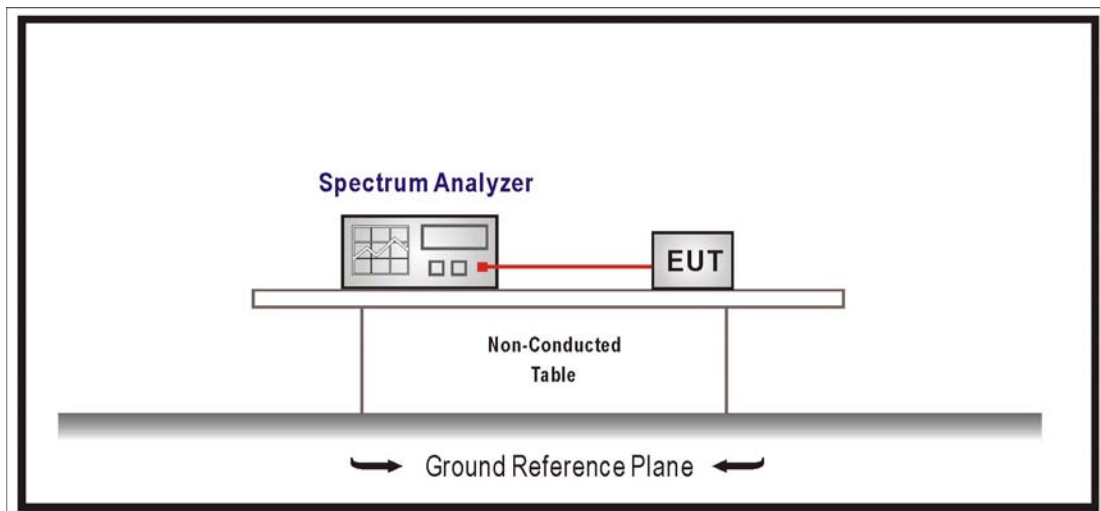
The following test equipment is used during the test:

Dwell Time / SR7

| Instrument                 | Manufacturer | Model No. | Serial No  | Next Cal. Date |
|----------------------------|--------------|-----------|------------|----------------|
| Spectrum Analyzer          | Agilent      | N9010A    | US47140172 | 2017/08/08     |
| Signal & Spectrum Analyzer | R&S          | FSV40     | 101049     | 2017/01/05     |
| Signal Analyzer            | R&S          | FSV7      | 101650     | 2016/11/30     |

Note: All equipments that need to calibrate are with calibration period of 1 year.

### 10.2. Test Setup



### **10.3. Limits**

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. For frequency hopping systems operating in the 2400-2483.5 MHz bands. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. For frequency hopping systems operating in the 5725-5850 MHz bands. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

### **10.4. Test Procedures**

The EUT was setup according to ANSI C63.10: 2013 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

Span = zero span, centered on a hopping channel , RBW = 1 MHz, VBW  $\geq$  RBW ,

Sweep = as necessary to capture the entire dwell time per hopping channel ,

Detector function = peak, Trace = max hold.

### **10.5. Test Specification**

According to FCC Part 15 Subpart C Paragraph 15.247: 2015

## 10.6. Test Result

|              |                   |           |     |
|--------------|-------------------|-----------|-----|
| Product      | GPS Data Recorder |           |     |
| Test Item    | Dwell Time        |           |     |
| Test Mode    | Mode 1: Transmit  |           |     |
| Date of Test | 2016/10/17        | Test Site | SR7 |

GFSK, DH5

Occupancy Time of Frequency Hopping System

A) 2402MHz Test Time Period:  $0.4 \times 79 = 31.60\text{sec}$  , Time slot length : 2.962 ms = 0.002962 sec

Dwell Time : 0.002962 \* (266.67/79) \* 31.60 = 0.3159sec °

B) 2441MHz Test Time Period:  $0.4 \times 79 = 31.60\text{sec}$  , Time slot length : 2.962ms = 0.002962 sec

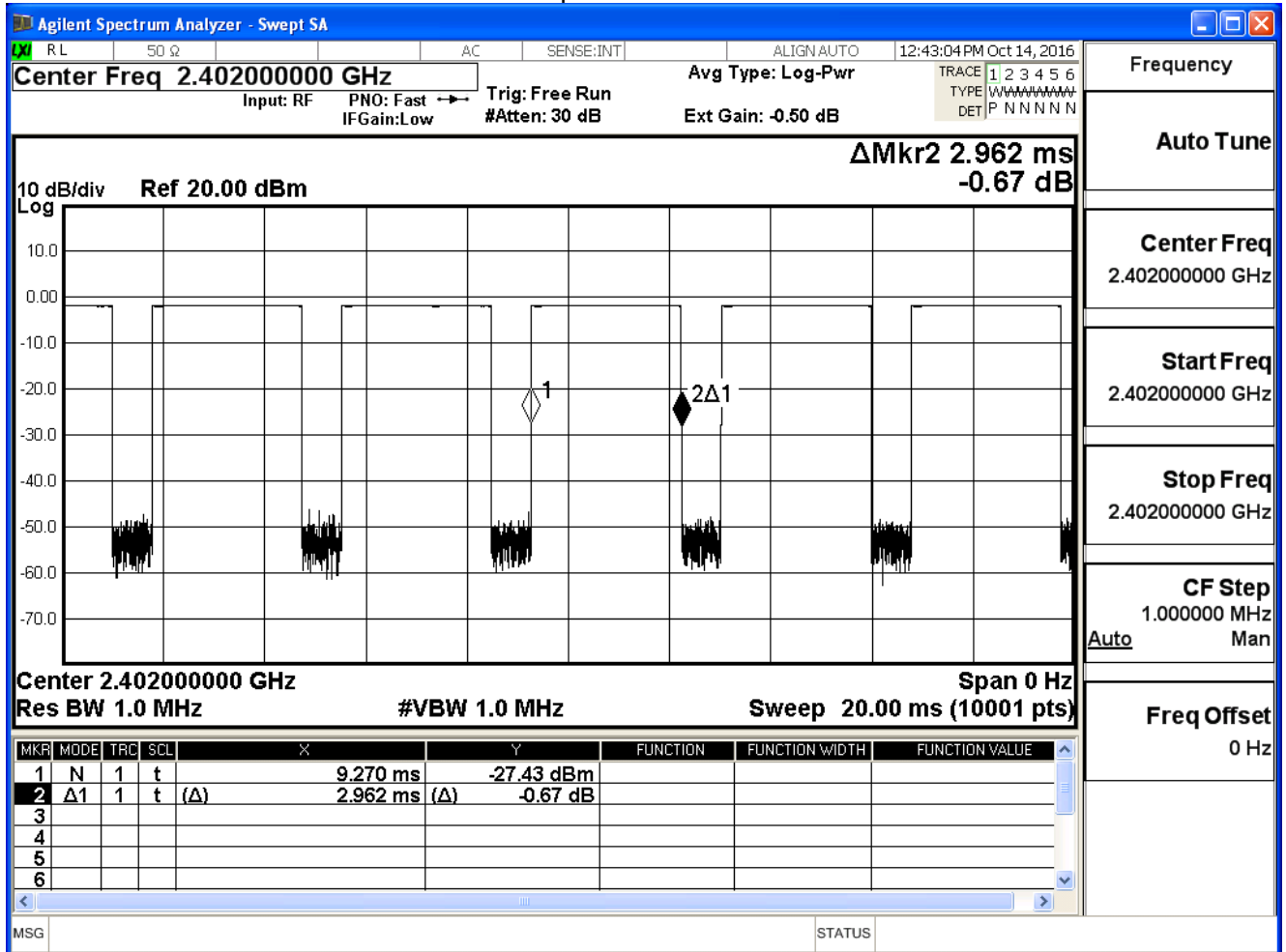
Dwell Time : 0.002962 \* (266.67/79) \* 31.60 = 0.3159sec °

C) 2480MHz Test Time Period:  $0.4 \times 79 = 31.60\text{sec}$  , Time slot length : 2.964ms = 0.002964 sec

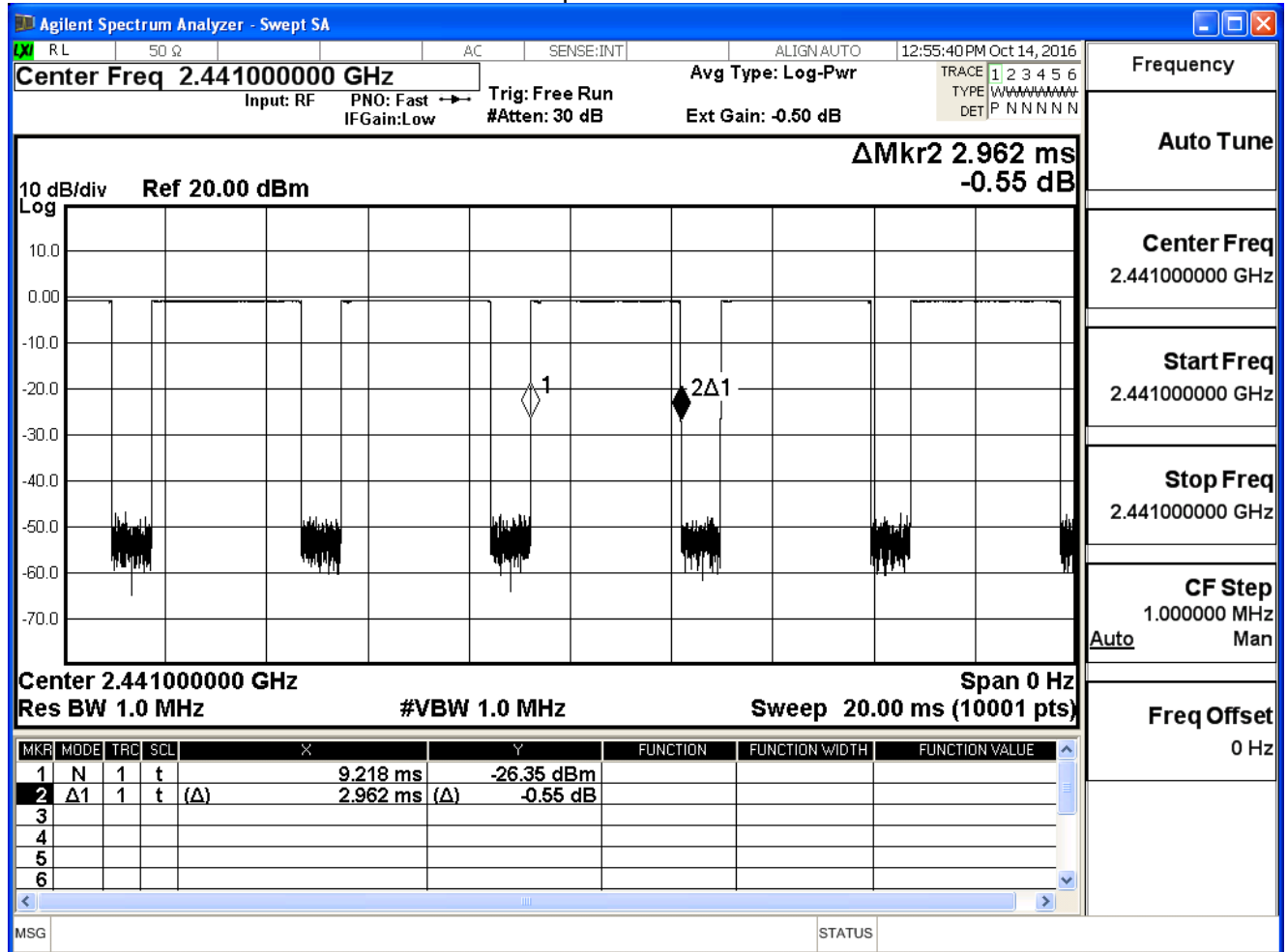
Dwell Time : 0.002964 \* (266.67/79) \* 31.60 = 0.3162sec °

Test Result: The Average Occupancy Time of Each Highest , Middle and Lowest Channel Is Less Than 0.4sec , And Corresponds to The Standard °

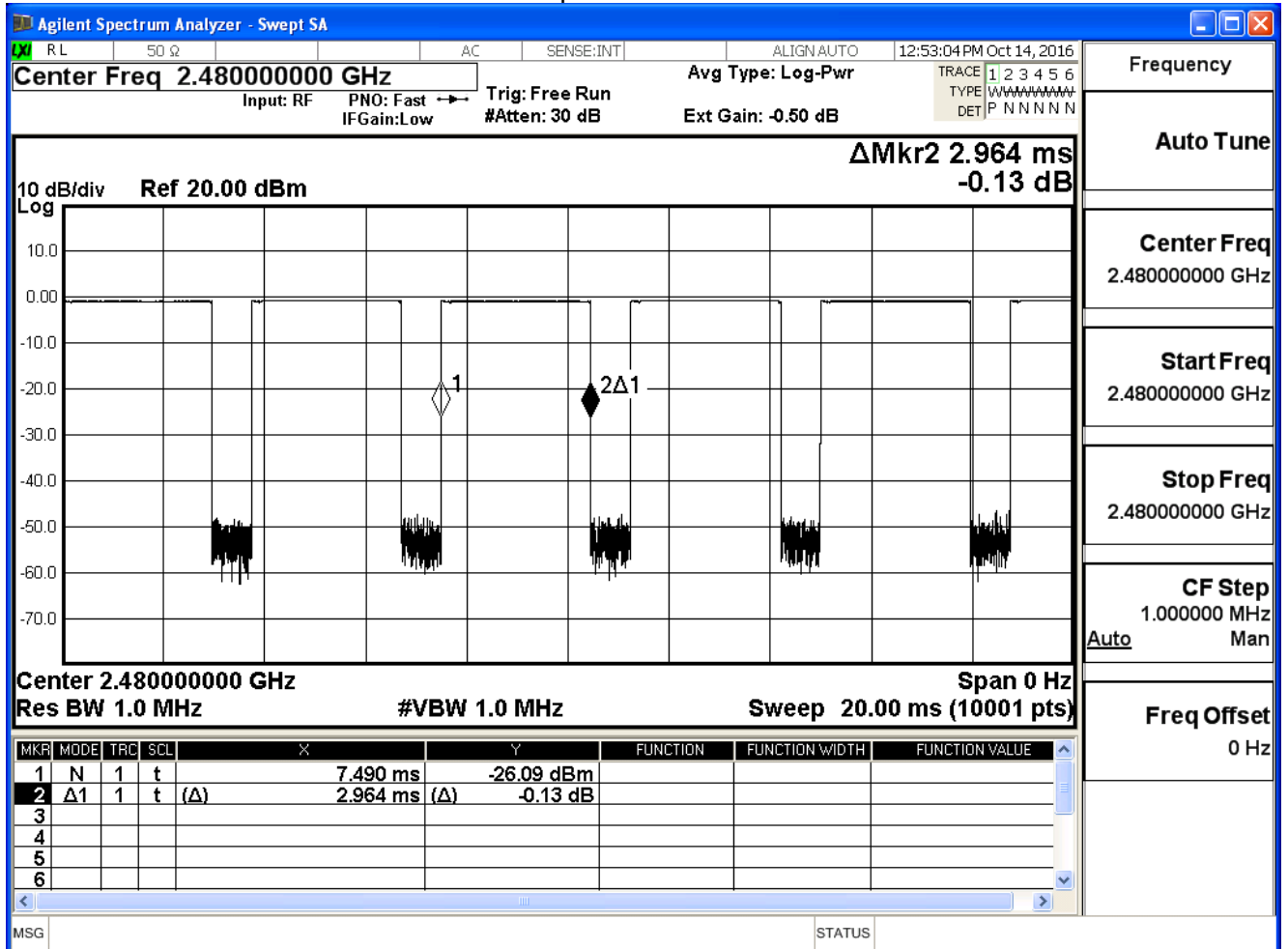
# Hop rate-2402MHz



# Hop rate-2441MHz



## Hop rate-2480MHz



Note: Dwell time = time slot length \* hop rate / number of hopping channels \* period