

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

**Product Name:** SmartSense Staff Tag

**Brand Name:** SmartSense Staff Tag

**Model No.:** STG-821(919), STG-821(925)

**Model Difference:** Different in frequency (919.8MHz & 925MHz)

**FCC ID:** VPE-STG-821

**Report No.:** E2/2016/90060

**Issue Date:** Nov. 15, 2016

**FCC Rule Part:** §15.249

**Prepared for:** CADI SCIENTIC PTE LTD  
31, Ubi Road 1, Aztech Building, #07-01A,  
408694, Singapore

**Prepared by:** SGS Taiwan Ltd.  
Electronics & Communication Laboratory  
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## VERIFICATION OF COMPLIANCE

**Applicant:** CADI SCIENTIC PTE LTD  
31, Ubi Road 1, Aztech Building, #07-01A, 408694, Singapore

**Product Description:** SmartSense Staff Tag

**Brand Name:** SmartSense Staff Tag

**FCC ID:** VPE-STG-821

**Model No.:** STG-821(919), STG-821(925)

**Model Difference:** Different in frequency (919.8MHz & 925MHz)

**File Number:** E2/2016/90060

**Date of test:** Sep. 23, 2016 ~ Nov. 9, 2016

**Date of EUT Received:** Sep. 23, 2016

**We hereby certify that:**

The above equipment was tested by SGS Taiwan Ltd., Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.249. The test results of this report relate only to the tested sample identified in this report.

**Test By:****Date:**

Nov. 15, 2016

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*Jerry Lu / Asst. Supervisor***Prepared By:****Date:**

Nov. 15, 2016

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*Violetta Tang / Clerk***Approved By:****Date:**

Nov. 15, 2016

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*Jim Chang / Asst. Manager*

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## Revision History

| Report Number | Revision | Description                  | Issue Date    |
|---------------|----------|------------------------------|---------------|
| E2/2016/90060 | Rev.00   | Initial creation of document | Nov. 15, 2016 |
|               |          |                              |               |
|               |          |                              |               |

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## 1. GENERAL INFORMATION

### 1.1 Product Description

|                   |  |                               |
|-------------------|--|-------------------------------|
| Product Name:     | SmartSense Staff Tag   |                               |
| Brand Name:       | SmartSense Staff Tag   |                               |
| Model No.:        | STG-821(919), STG-821(925)   |                               |
| Model Difference: | Different in frequency (919.8MHz & 925MHz)                                 |                               |
| Hardware Version: | V3.1   |                               |
| Software Version  | V6   |                               |
| Power Supply:     | 3.7Vdc from Rechargeable Lithium Ion Polymer Battery or 5Vdc from USB Port |                               |
|                   | Battery:   | Model No.: N/A; Supplier: N/A |

#### Transmitter:

|                      |                             |
|----------------------|-----------------------------|
| Operating Frequency: | 919.8MHz and 925.0MHz       |
| Transmit Power:      | 80.03dBuV/m and 80.67dBuV/m |
| Number of Channels:  | 1                           |
| Operating Mode:      | Point-to-Point              |

This report complies with FCC 15.249

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## 1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.249

ANSI C63.10:2013

Note:

1. All test items have been performed and record as per the above standards.
2. The composite system is compliance with FCC Subpart B is authorized under the certification procedure.
3. The EUT was placed 1.5m height for frequency above 1GHz in accordance with ANSI C63.10:2013.

## 1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333. (TAF code 0513)

FCC Registration Numbers are: 735305

Canada Registration Number: 4620A-5

## 1.4 Special Accessories

There are no special accessories used while test was conducted.

## 1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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## 2. System Test Configuration

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz,. The CISPR Quasi-Peak and Average detector mode is employed according to §15.107. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

#### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

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## 2.4 Limitation

### (1) Conducted Emission

According to section 15.207(a) Conducted Emission Limits is as following.

| Frequency (MHz) | Conducted Limit (dBuV) |         |
|-----------------|------------------------|---------|
|                 | Quasi-Peak             | Average |
| 0.15 – 0.5      | 66 - 56                | 56 - 46 |
| 0.5 – 5         | 56                     | 46      |
| 5 - 30          | 60                     | 50      |

### (2) Radiated Emission 15.249(a)

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following.

| Frequency (MHz)  | Field strength of Fundamental | Field strength of Harmonics | Distance (m) |
|------------------|-------------------------------|-----------------------------|--------------|
| 902 - 928        | 50 mV/m<br>(94dBuV/m)         | 500 uV/m<br>(54dBuV/m)      | 3            |
| 2400 – 2483.5    | 50 mV/m<br>(94dBuV/m)         | 500 uV/m<br>(54dBuV/m)      | 3            |
| 5725 – 5875      | 50 mV/m<br>(94dBuV/m)         | 500 uV/m<br>(54dBuV/m)      | 3            |
| 24.0 – 24.25 GHz | 250 mV/m<br>(107.95dBuV/m)    | 2500 uV/m<br>(67.95dBuV/m)  | 3            |

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### (3) Radiated Emission 15.249 (d)

Emission Radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in Section 15.209 as below, whichever is the lesser attenuation.

| Frequency (MHz) | Field strength $\mu\text{V/m}$ | Distance (m) | Field strength at 3m dB $\mu\text{V/m}$ |
|-----------------|--------------------------------|--------------|---|
| 1.705-30        | 30                             | 30           | 69.54                                   |
| 30-88           | 100                            | 3            | 40                                      |
| 88-216          | 150                            | 3            | 43.5                                    |
| 216-960         | 200                            | 3            | 46                                      |
| Above 960       | 500                            | 3            | 54                                      |

### (4) Radiated Emission 15.249(e)

For frequencies above 1000MHz, the above field strength limits are based on average limits. The peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20dB under any condition of modulation.

Remark 1. Emission level in dB $\mu\text{V/m}$  = 20 log ( $\mu\text{V/m}$ )

- :
- Measurement was performed at an antenna to the closed point of EUT distance of meters.
  - Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of  $\xi$  15.205
  - Emission spurious frequency which appearing within the Restricted Bands specified in provision of  $\xi$  15.205, then the general radiated emission limits in  $\xi$  15.209 apply.

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## 2.5 Configuration of Tested System

Fig. 2-1 Configuration of Tested System



Table 2-2 Equipment Used in Tested System

| Item | Equipment     | Mfr/Brand | Model/<br>Type No. | Series<br>No. | Data<br>Cable | Power Cord |
|------|---------------|-----------|--------------------|---------------|---------------|------------|
| 1    | Test Software | N/A       | N/A                | N/A           | N/A           | N/A        |

**Note:** All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

**Grounding:** Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

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### 3. Summary of Test Results

| FCC Rules     | Description Of Test              | Result    |
|---------------|----------------------------------|-----------|
| §15.207 (a)   | AC Power Line Conducted Emission | Compliant |
| §15.249(a)(e) | Radiated Emission                | Compliant |
| §15.249(d)    | 20dB band width Measurement      | Compliant |

### 4. Description of test modes

The EUT has been tested under operating condition.  
The EUT is staying in continuous transmitting mode.

919.8MHz and 925MHz with highest data rate are chosen for full testing.

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## 5. MEASUREMENT UNCERTAINTY

| Test Items                       | Uncertainty                 |
|----------------------------------|-----------------------------|
| AC Power Line Conducted Emission | +/- 2.586 dB                |
| Temperature                      | +/- 0.65 °C                 |
| Humidity                         | +/- 4.6 %                   |
| DC / AC Power Source             | DC= +/- 0.13%, AC= +/- 0.2% |

Radiated Spurious Emission:

|  |                            |
|--|----------------------------|
| Measurement uncertainty<br>(Polarization : <b>Vertical</b> ) | 9kHz - 30MHz: +/- 2.3dB    |
|  | 30MHz - 180MHz: +/- 3.37dB |
|  | 180MHz -417MHz: +/- 3.19dB |
|  | 0.417GHz-1GHz: +/- 3.19dB  |
|  | 1GHz - 18GHz: +/- 4.04dB   |
|  | 18GHz - 40GHz: +/- 4.04dB  |

|  |                            |
|--|----------------------------|
| Measurement uncertainty<br>(Polarization : <b>Horizontal</b> ) | 9kHz - 30MHz: +/- 2.3dB    |
|  | 30MHz - 167MHz: +/- 4.22dB |
|  | 167MHz -500MHz: +/- 3.44dB |
|  | 0.5GHz-1GHz: +/- 3.39dB    |
|  | 1GHz - 18GHz: +/- 4.08dB   |
|  | 18GHz - 40GHz: +/- 4.08dB  |

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

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## 6. Conducted Emissions Test

### 6.1 Standard Applicable:

Frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

| Frequency range<br>MHz  | Limits<br>dB(uV) |          |
|---|------------------|----------|
|   | Quasi-peak       | Average  |
| 0.15 to 0.50  | 66 to 56         | 56 to 46 |
| 0.50 to 5   | 56               | 46       |
| 5 to 30   | 60               | 50       |
| <b>Note</b><br>1.The lower limit shall apply at the transition frequencies<br>2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz. |                  |          |

### 6.2 Measurement Equipment Used:

| Conducted Emission Test Site |              |                   |                  |                  |                 |
|------------------------------|--------------|-------------------|------------------|------------------|-----------------|
| Name of Equipment            | Manufacturer | Model             | Serial Number    | Calibration Date | Calibration Due |
| EMI Test Receiver            | R&S          | ESCI 7            | 100950           | 12/12/2015       | 12/11/2016      |
| Coaxial Cables               | N/A          | N30N30-1042-150cm | N/A              | 02/07/2016       | 02/06/2017      |
| LISN                         | Schwarzbeck  | NSLK 8127         | 8127-648         | 03/11/2016       | 03/10/2017      |
| Test Software                | Farad        | EZ-EMC            | Ver.<br>SGS-03A2 | N.C.R.           | N.C.R.          |

### 6.3 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

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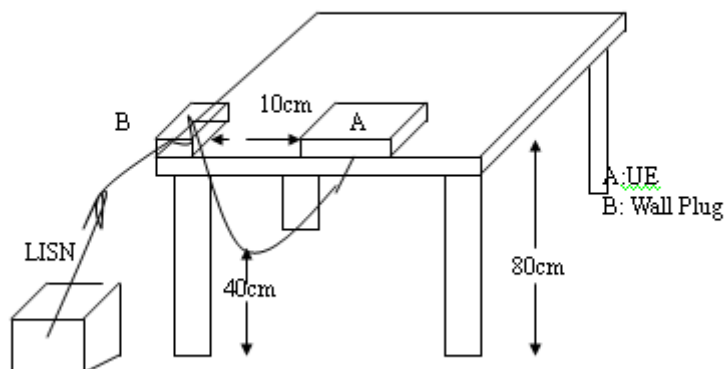
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#### 6.4 Test SET-UP (Block Diagram of Configuration)



#### 6.5 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed.

#### 6.6 Measurement Result:

Note: Refer to next page for measurement data and plots.

Note2: The \* reveals the worst-case results that closet to the limit.

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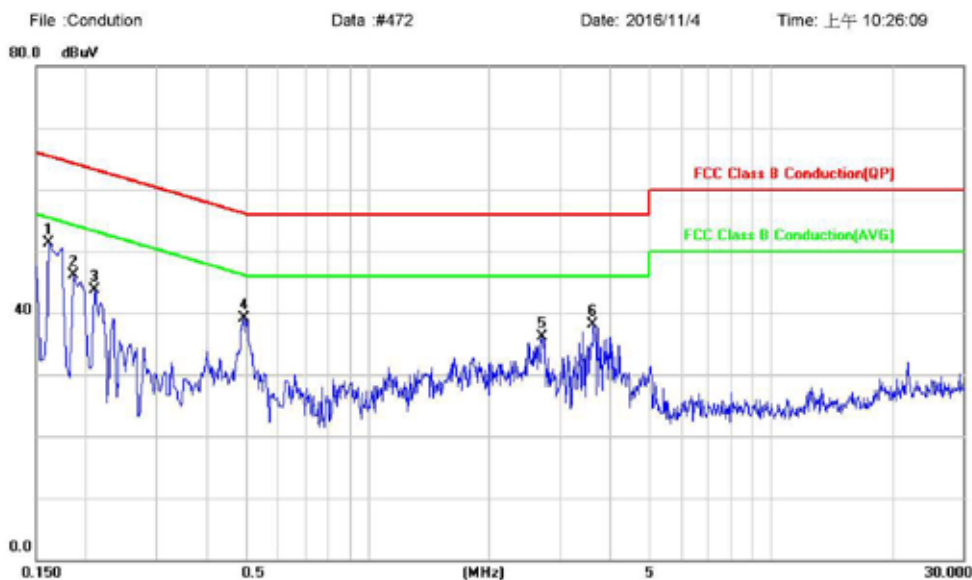
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### AC POWER LINE CONDUCTED EMISSION TEST DATA

|                 |                |           |      |            |               |
|-----------------|----------------|-----------|------|------------|---------------|
| Operation Mode: | Operation Mode |           |      | Test Date: | Nov. 04, 2016 |
| Temperature:    | 23             | Humidity: | 60 % | Test By:   | Jerry         |
| Probe:          | L1 / N         |           |      |            |               |

Site : Conduction Room      Phase: **L1**      Temperature: 23 °C  
Limit: FCC Class B Conduction(QP)      Power: AC 120V/60Hz      Humidity: 60 %  
Mode: CADI  
Note:

### Conducted Emission



| No. | Mk. | Freq.  | Reading Level | Correct Factor | Measurement | Limit | Over   | Detector | Comment |
|-----|-----|--------|---------------|----------------|-------------|-------|--------|----------|---------|
|     |     | MHz    | dBuV          | dB             | dBuV        | dBuV  | dB     |          |         |
| 1   | *   | 0.1620 | 31.64         | 19.72          | 51.36       | 65.36 | -14.00 | peak     |         |
| 2   |     | 0.1860 | 26.36         | 19.71          | 46.07       | 64.21 | -18.14 | peak     |         |
| 3   |     | 0.2100 | 24.03         | 19.72          | 43.75       | 63.21 | -19.46 | peak     |         |
| 4   |     | 0.4940 | 19.27         | 19.90          | 39.17       | 56.10 | -16.93 | peak     |         |
| 5   |     | 2.7180 | 16.24         | 19.94          | 36.18       | 56.00 | -19.82 | peak     |         |
| 6   |     | 3.6380 | 18.20         | 19.95          | 38.15       | 56.00 | -17.85 | peak     |         |

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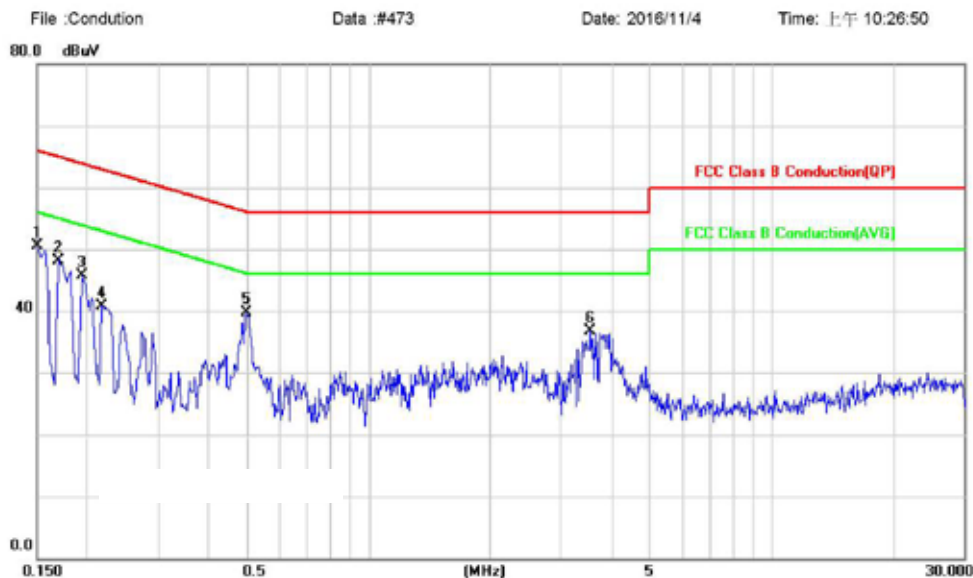
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Site : Conduction Room  
Limit: FCC Class B Conduction(QP)  
Mode: CADI  
Note:

Phase: **N**  
Power: AC 120V/60Hz

Temperature: 23 °C  
Humidity: 60 %

## Conducted Emission



| No. | Mk. | Freq.  | Reading Level | Correct Factor | Measurement | Limit | Over   | Detector | Comment |
|-----|-----|--------|---------------|----------------|-------------|-------|--------|----------|---------|
|     |     | MHz    | dBuV          | dB             | dBuV        | dBuV  | dB     |          |         |
| 1   | *   | 0.1500 | 30.83         | 19.73          | 50.56       | 66.00 | -15.44 | peak     |         |
| 2   |     | 0.1700 | 28.47         | 19.73          | 48.20       | 64.96 | -16.76 | peak     |         |
| 3   |     | 0.1940 | 26.05         | 19.72          | 45.77       | 63.86 | -18.09 | peak     |         |
| 4   |     | 0.2180 | 20.95         | 19.73          | 40.68       | 62.89 | -22.21 | peak     |         |
| 5   |     | 0.4980 | 19.82         | 19.91          | 39.73       | 56.03 | -16.30 | peak     |         |
| 6   |     | 3.5620 | 16.71         | 19.96          | 36.67       | 56.00 | -19.33 | peak     |         |

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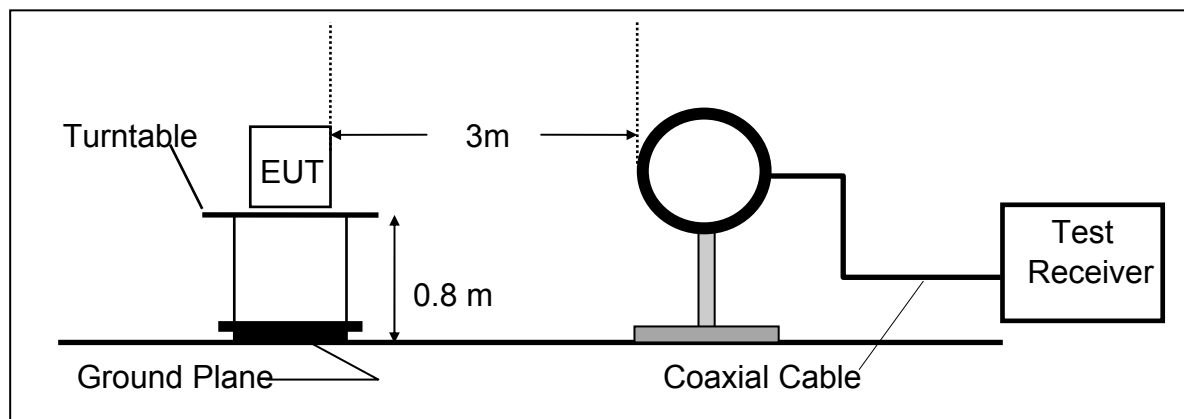
## 7. Radiated Emission Test

### 7.1 Measurement Procedure

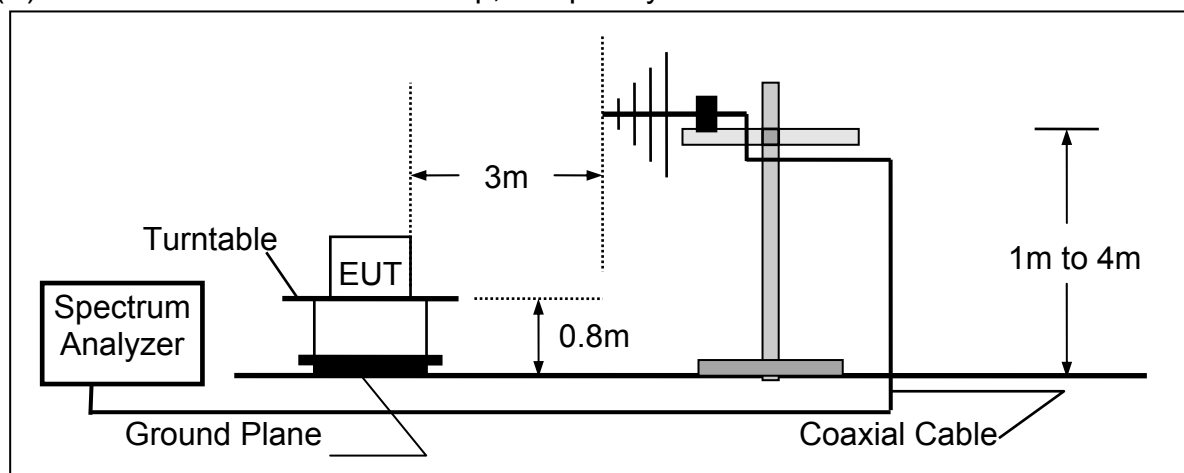
1. The EUT was placed on a turntable that is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

### 7.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



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### 7.3 Measurement Equipment Used:

| 966 Chamber       |                 |                             |                  |            |            |
|-------------------|-----------------|-----------------------------|------------------|------------|------------|
| EQUIPMENT TYPE    | MFR             | MODEL NUMBER                | SERIAL NUMBER    | LAST CAL.  | CAL DUE.   |
| EMI Test Receiver | R&S             | ESU 40                      | 100363           | 04/12/2016 | 04/11/2017 |
| Loop Antenna      | ETS-Lindgren    | 6502                        | 00143303         | 12/23/2015 | 12/22/2016 |
| Broadband Antenna | TESEQ           | CBL 6112D                   | 35240            | 10/28/2016 | 10/27/2017 |
| Horn Antenna      | ETS-Lindgren    | 3117                        | 00143272         | 12/16/2015 | 12/15/2016 |
| Horn Antenna      | Schwarzbeck     | BBHA9170                    | 185              | 07/18/2016 | 07/17/2017 |
| Pre Amplifier     | EMC Instruments | EMC330                      | 980096           | 12/12/2015 | 12/11/2016 |
| Pre Amplifier     | EMC Instruments | EMC0011830                  | 980199           | 12/12/2015 | 12/11/2016 |
| Pre Amplifier     | R&S             | SCU-18                      | 10204            | 12/12/2015 | 12/11/2016 |
| Pre Amplifier     | R&S             | SCU-26                      | 100780           | 12/12/2015 | 12/11/2016 |
| Coaxial Cable     | Huber+Suhner    | RG 214/U                    | 966Rx<br>9K-30M  | 12/12/2015 | 12/11/2016 |
| Coaxial Cable     | Huber+Suhner    | RG 214/U<br>SUCOFLEX 104    | 966Rx<br>30M-3G  | 12/12/2015 | 12/11/2016 |
| Coaxial Cable     | Huber+Suhner    | SUCOFLEX 104                | 966Rx<br>1G-18G  | 12/12/2015 | 12/11/2016 |
| Coaxial Cable     | Huber+Suhner    | mini 141-12<br>SUCOFLEX 104 | 966Rx<br>18G-40G | 12/12/2015 | 12/11/2016 |
| Coaxial Cable     | Huber+Suhner    | SUCOFLEX 104                | 966Tx<br>30M-18G | 12/12/2015 | 12/11/2016 |
| Coaxial Cable     | Huber+Suhner    | SUCOFLEX 102                | 966Tx<br>18G-40G | 12/12/2015 | 12/11/2016 |
| Attenuator        | WOKEN           | 218FS-10                    | RF27             | 12/12/2015 | 12/11/2016 |
| Site NSA          | SGS             | 966 Chamber C               | SAC-C            | 03/04/2016 | 03/03/2017 |
| Site VSWR         | SGS             | 966 Chamber C               | SAC-C            | 03/04/2016 | 03/03/2017 |
| DC Power Supply   | HOLA            | DP-3003                     | D7070035         | 05/04/2016 | 05/03/2017 |
| Controller        | MF              | MF-7802                     | N/A              | N.C.R.     | N.C.R.     |
| Antenna Master    | MF              | N/A                         | N/A              | N.C.R.     | N.C.R.     |
| Turn Table        | MF              | N/A                         | N/A              | N.C.R.     | N.C.R.     |
| Test Software     | World-Pallas    | Dr. E                       | V 3.0 Lite       | N.C.R.     | N.C.R.     |

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#### 7.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

|                           |  |
|---------------------------|--|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude    | AG = Amplifier Gain                        |
| AF = Antenna Factor       |  |

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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## 7.5 Measurement Result

|                         |             |                            |                |
|-------------------------|-------------|----------------------------|----------------|
| Operation Mode :        | 919.8 MHz   | Test Date :                | 2016/11/2      |
| Fundamental Frequency : | 919.8 MHz   | Temp. / Humi. :            | 22.7deg_C/57RH |
| Operation Band :        | Main CH Mid | Test Engineer :            | Ashton         |
| EUT Pol. :              | E2          | Measurement Antenna Pol. : | Vertical       |

| Freq.  | Note    | Detector Mode | Spectrum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|--------|---------|---------------|------------------------|--------|-----------|-----------|--------|
| MHz    | F/H/E/S | PK/QP/AV      | dBμV                   | dB     | dBμV/m    | dBμV/m    | dB     |
| 919.70 | F       | Peak          | 70.58                  | -1.82  | 68.76     | 114       | -45.24 |
| 919.70 | F       | Average       | 70.45                  | -1.82  | 68.63     | 94        | -25.37 |

|                         |             |                            |                |
|-------------------------|-------------|----------------------------|----------------|
| Operation Mode :        | 919.8 MHz   | Test Date :                | 2016/11/2      |
| Fundamental Frequency : | 919.8 MHz   | Temp. / Humi. :            | 22.7deg_C/57RH |
| Operation Band :        | Main CH Mid | Test Engineer :            | Ashton         |
| EUT Pol. :              | E2          | Measurement Antenna Pol. : | Horizontal     |

| Freq.  | Note    | Detector Mode | Spectrum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|--------|---------|---------------|------------------------|--------|-----------|-----------|--------|
| MHz    | F/H/E/S | PK/QP/AV      | dBμV                   | dB     | dBμV/m    | dBμV/m    | dB     |
| 919.81 | F       | Peak          | 81.85                  | -1.82  | 80.03     | 114       | -33.97 |
| 919.81 | F       | Average       | 81.77                  | -1.82  | 79.95     | 94        | -14.05 |

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|                         |             |                            |                |
|-------------------------|-------------|----------------------------|----------------|
| Operation Mode :        | 925 MHz     | Test Date :                | 2016/11/2      |
| Fundamental Frequency : | 925 MHz     | Temp. / Humi. :            | 22.7deg_C/57RH |
| Operation Band :        | Main CH Mid | Test Engineer :            | Ashton         |
| EUT Pol. :              | E2          | Measurement Antenna Pol. : | Vertical       |

| Freq.  | Note    | Detector Mode | Spectrum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|--------|---------|---------------|------------------------|--------|-----------|-----------|--------|
| MHz    | F/H/E/S | PK/QP/AV      | dBμV                   | dB     | dBμV/m    | dBμV/m    | dB     |
| 925.01 | F       | Peak          | 70.68                  | -1.63  | 69.05     | 114       | -44.95 |
| 925.01 | F       | Average       | 70.56                  | -1.63  | 68.93     | 94        | -25.07 |

|                         |             |                            |                |
|-------------------------|-------------|----------------------------|----------------|
| Operation Mode :        | 925 MHz     | Test Date :                | 2016/11/2      |
| Fundamental Frequency : | 925 MHz     | Temp. / Humi. :            | 22.7deg_C/57RH |
| Operation Band :        | Main CH Mid | Test Engineer :            | Ashton         |
| EUT Pol. :              | E2          | Measurement Antenna Pol. : | Horizontal     |

| Freq.  | Note    | Detector Mode | Spectrum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|--------|---------|---------------|------------------------|--------|-----------|-----------|--------|
| MHz    | F/H/E/S | PK/QP/AV      | dBμV                   | dB     | dBμV/m    | dBμV/m    | dB     |
| 925.01 | F       | Peak          | 82.30                  | -1.63  | 80.67     | 114       | -33.33 |
| 925.01 | F       | Average       | 82.22                  | -1.63  | 80.59     | 94        | -13.41 |

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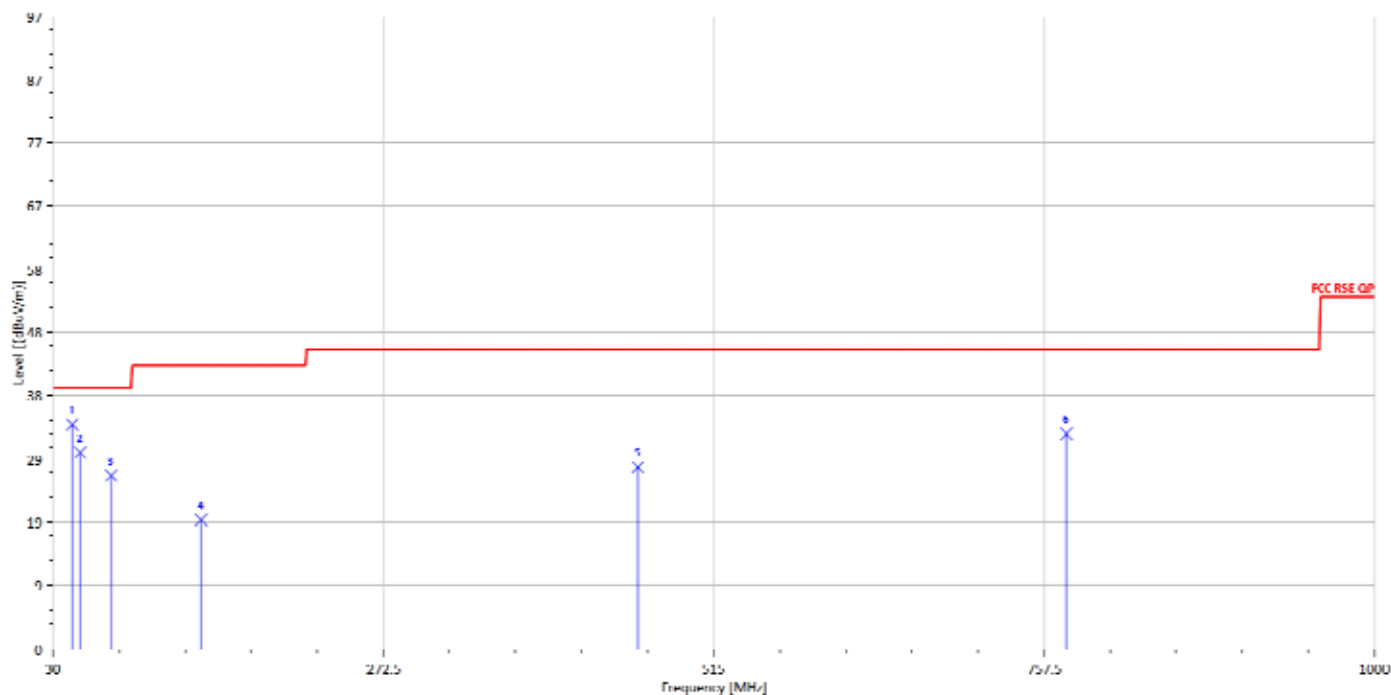
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## (30MHz~1GHz)

|                         |           |                            |                |
|-------------------------|-----------|----------------------------|----------------|
| Operation Mode :        | 919.8 MHz | Test Date :                | 2016/10/14     |
| Fundamental Frequency : | 919.8 MHz | Temp. / Humi. :            | 22.7deg_C/57RH |
| Operation Band :        | Tx CH Mid | Test Engineer :            | Ashton         |
| EUT Pol. :              | E2        | Measurement Antenna Pol. : | Vertical       |



| Freq.  | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|--------|---------|----------|---------------|--------|--------|--------|--------|
| MHz    | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|        |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 44.55  | S       | Peak     | 50.41         | -16.05 | 34.36  | 40     | -5.64  |
| 50.37  | S       | Peak     | 49.70         | -19.55 | 30.15  | 40     | -9.85  |
| 72.68  | S       | Peak     | 48.12         | -21.55 | 26.57  | 40     | -13.43 |
| 138.64 | S       | Peak     | 35.73         | -15.97 | 19.76  | 43.5   | -23.74 |
| 459.71 | S       | Peak     | 36.02         | -8.13  | 27.90  | 46     | -18.10 |
| 773.99 | S       | Peak     | 37.70         | -4.72  | 32.98  | 46     | -13.02 |

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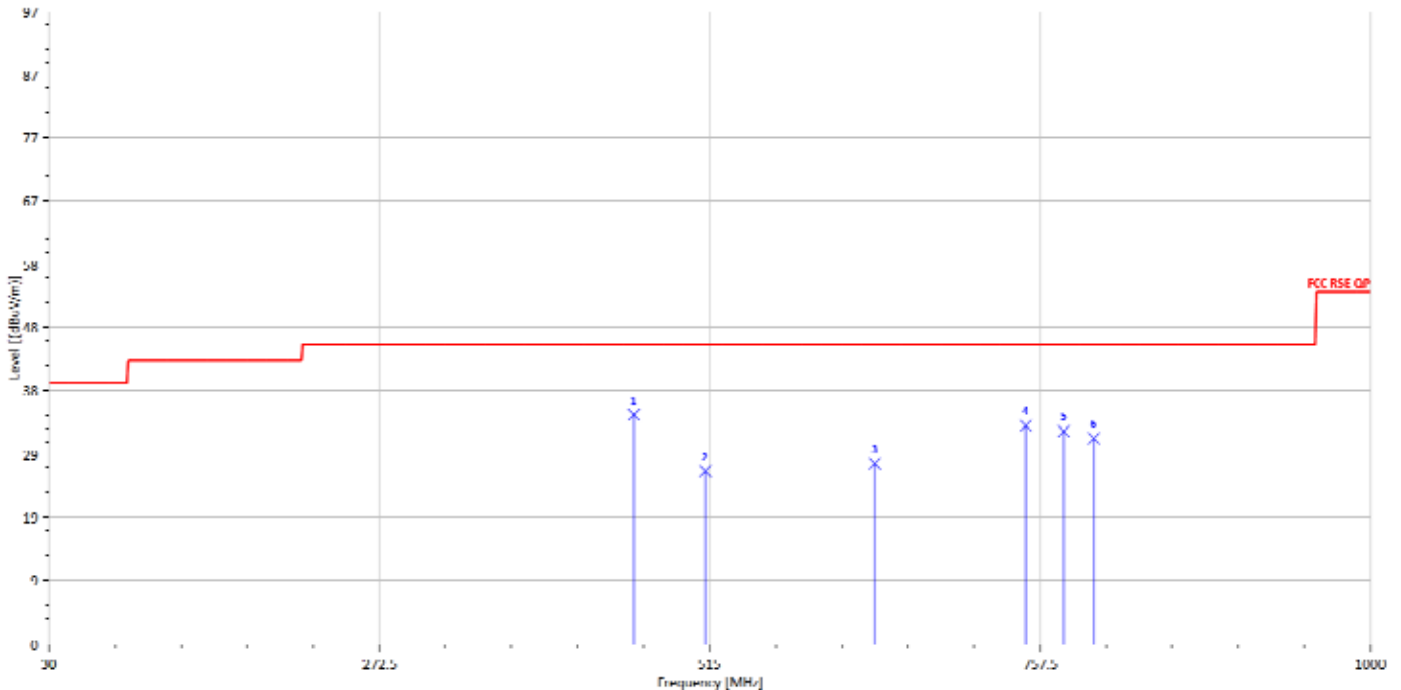
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Operation Mode : 919.8 MHz Test Date : 2016/10/14  
Fundamental Frequency : 919.8 MHz Temp. / Humi. : 22.7deg\_C/57RH  
Operation Band : Tx CH Mid Test Engineer : Ashton  
EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



| Freq.<br>MHz | Note<br>F/H/E/S | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|-----------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 459.71       | S               | Peak                         | 43.23                             | -8.13        | 35.10                  | 46                     | -10.90       |
| 512.09       | S               | Peak                         | 34.01                             | -7.51        | 26.50                  | 46                     | -19.50       |
| 636.25       | S               | Peak                         | 32.92                             | -5.25        | 27.68                  | 46                     | -18.32       |
| 746.83       | S               | Peak                         | 37.69                             | -4.23        | 33.45                  | 46                     | -12.55       |
| 774.96       | S               | Peak                         | 37.36                             | -4.75        | 32.61                  | 46                     | -13.39       |
| 797.27       | S               | Peak                         | 35.57                             | -4.01        | 31.56                  | 46                     | -14.44       |

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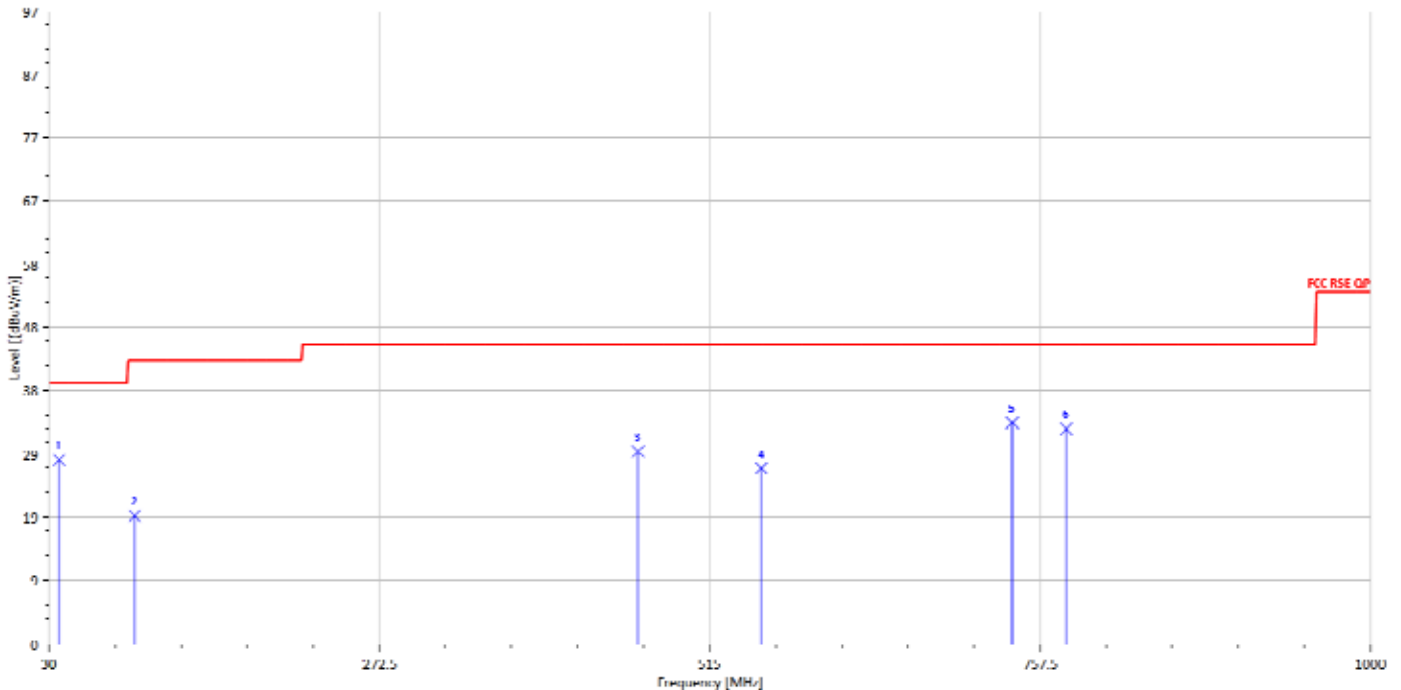
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Operation Mode : 925 MHz Test Date : 2016/10/14  
Fundamental Frequency : 925 MHz Temp. / Humi. : 22.7deg\_C/57RH  
Operation Band : Tx CH Mid Test Engineer : Ashton  
EUT Pol. : E2 Measurement Antenna Pol. : Vertical



| Freq.  | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|--------|---------|----------|---------------|--------|--------|--------|--------|
| MHz    | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|        |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 37.76  | S       | Peak     | 39.75         | -11.49 | 28.26  | 40     | -11.74 |
| 93.05  | S       | Peak     | 38.56         | -18.95 | 19.61  | 43.5   | -23.89 |
| 462.62 | S       | Peak     | 37.67         | -8.14  | 29.53  | 46     | -16.47 |
| 552.83 | S       | Peak     | 33.73         | -6.78  | 26.94  | 46     | -19.06 |
| 737.13 | S       | Peak     | 38.32         | -4.42  | 33.90  | 46     | -12.10 |
| 776.90 | S       | Peak     | 37.74         | -4.77  | 32.97  | 46     | -13.03 |

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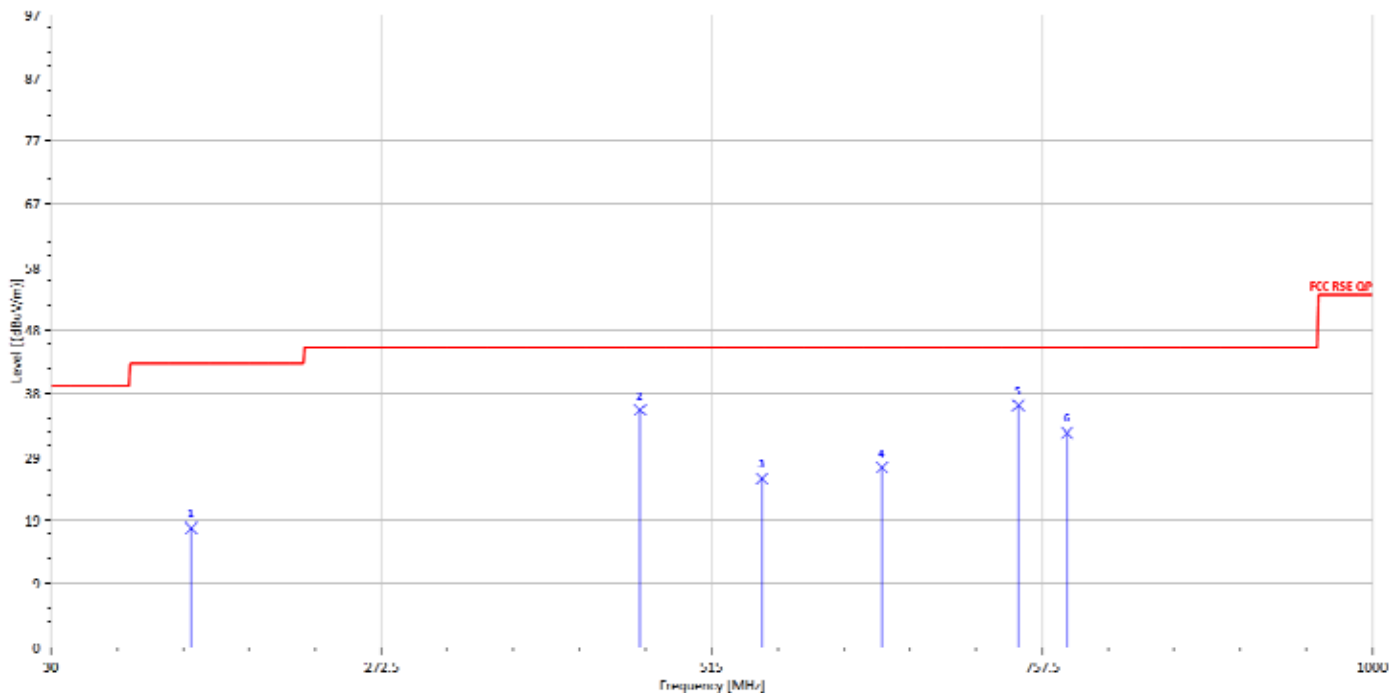
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Operation Mode : 925 MHz Test Date : 2016/10/14  
Fundamental Frequency : 925 MHz Temp. / Humi. : 22.7deg\_C/57RH  
Operation Band : Tx CH Mid Test Engineer : Ashton  
EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



| Freq.  | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|--------|---------|----------|---------------|--------|--------|--------|--------|
| MHz    | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|        |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 132.82 | S       | Peak     | 34.01         | -15.76 | 18.25  | 43.5   | -25.25 |
| 462.62 | S       | Peak     | 44.44         | -8.14  | 36.30  | 46     | -9.70  |
| 551.86 | S       | Peak     | 32.45         | -6.66  | 25.79  | 46     | -20.21 |
| 640.13 | S       | Peak     | 32.90         | -5.37  | 27.53  | 46     | -18.47 |
| 740.04 | S       | Peak     | 41.12         | -4.09  | 37.03  | 46     | -8.97  |
| 775.93 | S       | Peak     | 37.62         | -4.80  | 32.82  | 46     | -13.18 |

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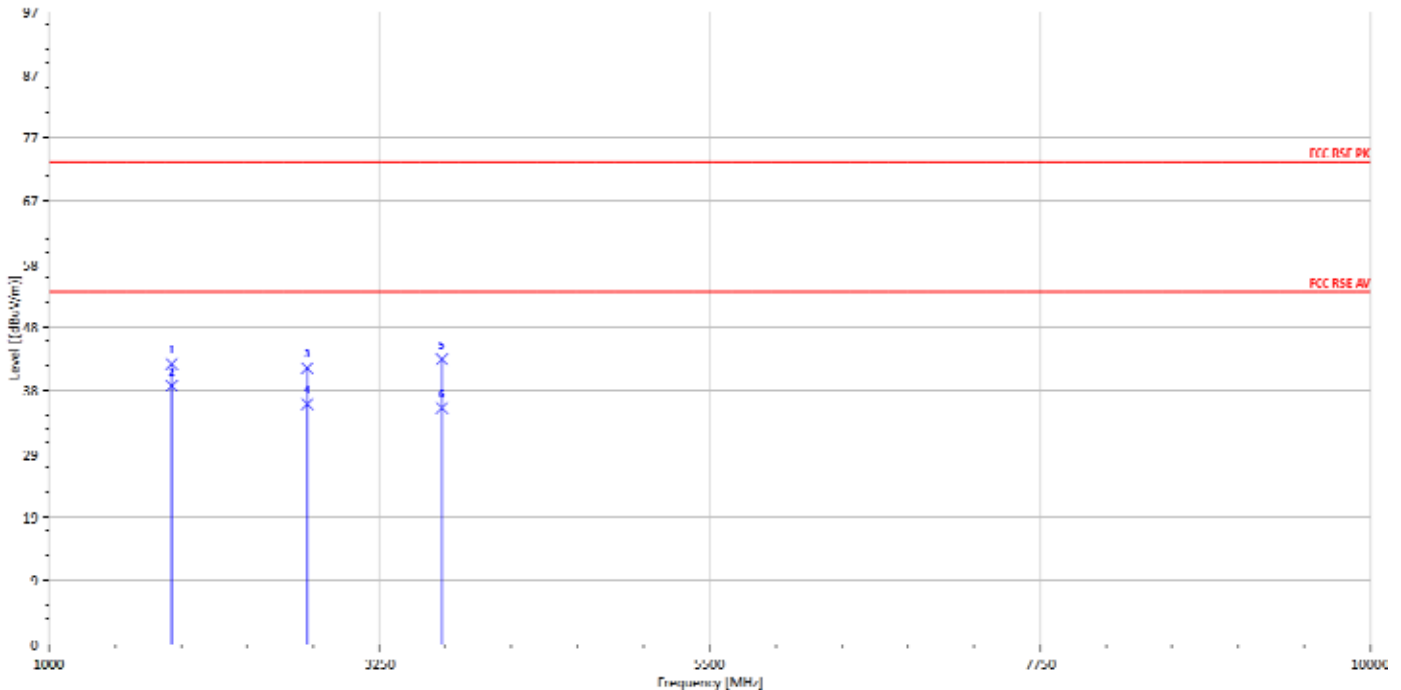
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## (1GHz~10GHz)

|                         |           |                            |                |
|-------------------------|-----------|----------------------------|----------------|
| Operation Mode :        | 919.8 MHz | Test Date :                | 2016/11/2      |
| Fundamental Frequency : | 919.8 MHz | Temp. / Humi. :            | 22.7deg_C/57RH |
| Operation Band :        | Tx CH Mid | Test Engineer :            | Ashton         |
| EUT Pol. :              | E2        | Measurement Antenna Pol. : | Vertical       |



| Freq.   | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|---------|---------|----------|---------------|--------|--------|--------|--------|
| MHz     | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|         |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 1839.60 | H       | Peak     | 44.15         | -1.19  | 42.96  | 74     | -31.04 |
| 1839.60 | H       | Average  | 40.76         | -1.19  | 39.57  | 54     | -14.43 |
| 2759.40 | H       | Peak     | 39.84         | 2.48   | 42.32  | 74     | -31.68 |
| 2759.40 | H       | Average  | 34.26         | 2.48   | 36.74  | 54     | -17.26 |
| 3679.20 | H       | Peak     | 38.98         | 4.71   | 43.69  | 74     | -30.31 |
| 3679.20 | H       | Average  | 31.43         | 4.71   | 36.14  | 54     | -17.86 |

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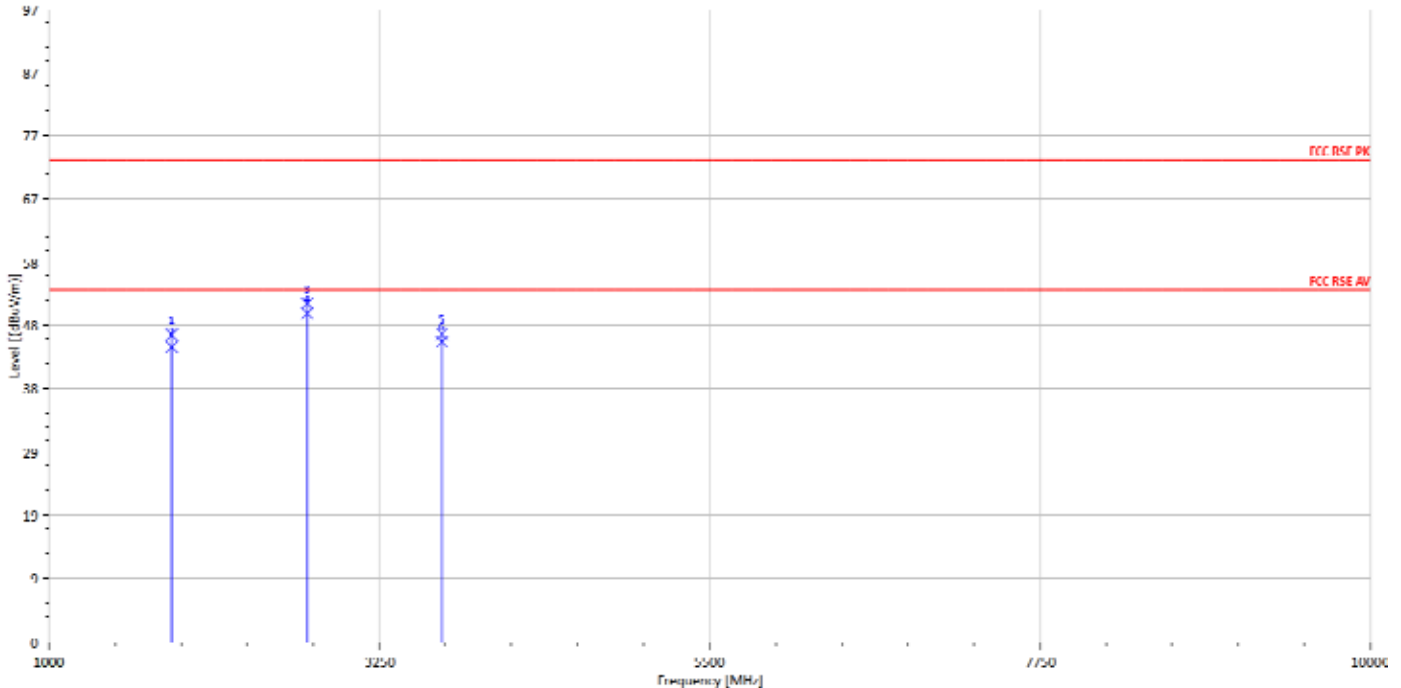
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Operation Mode : 919.8 MHz Test Date : 2016/11/2  
Fundamental Frequency : 919.8 MHz Temp. / Humi. : 22.7deg\_C/57RH  
Operation Band : Tx CH Mid Test Engineer : Ashton  
EUT Pol. : E2 Measurement Antenna Pol. : Horizontal



| Freq.   | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|---------|---------|----------|---------------|--------|--------|--------|--------|
| MHz     | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|         |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 1839.60 | H       | Peak     | 48.28         | -1.19  | 47.09  | 74     | -26.91 |
| 1839.60 | H       | Average  | 46.46         | -1.19  | 45.27  | 54     | -8.73  |
| 2759.40 | H       | Peak     | 49.40         | 2.48   | 51.88  | 74     | -22.12 |
| 2759.40 | H       | Average  | 47.87         | 2.48   | 50.35  | 54     | -3.65  |
| 3679.20 | H       | Peak     | 42.51         | 4.71   | 47.22  | 74     | -26.78 |
| 3679.20 | H       | Average  | 41.37         | 4.71   | 46.08  | 54     | -7.92  |

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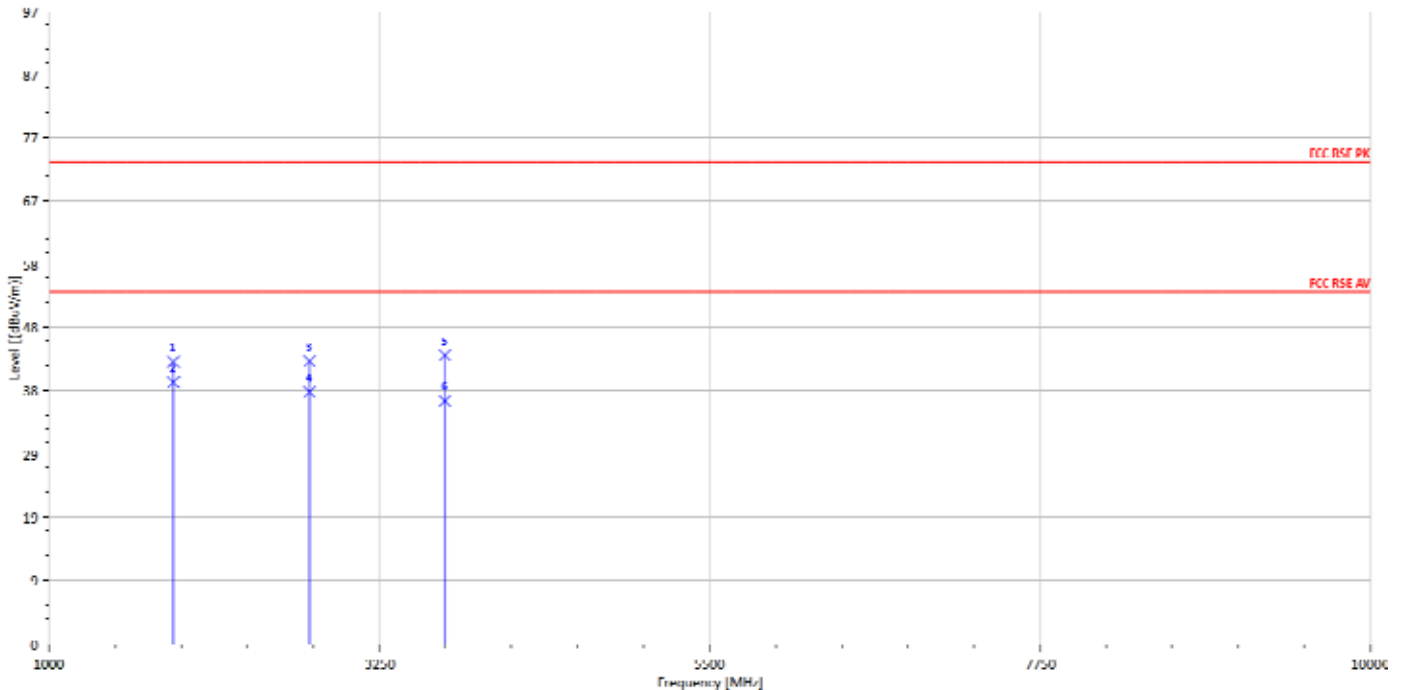
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Operation Mode : 925 MHz      Test Date : 2016/11/2  
 Fundamental Frequency : 925 MHz      Temp. / Humi. : 22.7deg\_C/57RH  
 Operation Band : Tx CH Mid      Test Engineer : Ashton  
 EUT Pol. : E2      Measurement Antenna Pol. : Vertical



| Freq.   | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|---------|---------|----------|---------------|--------|--------|--------|--------|
| MHz     | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|         |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 1850.00 | H       | Peak     | 44.35         | -1.05  | 43.30  | 74     | -30.70 |
| 1850.00 | H       | Average  | 41.16         | -1.05  | 40.11  | 54     | -13.89 |
| 2775.00 | H       | Peak     | 40.79         | 2.60   | 43.39  | 74     | -30.61 |
| 2775.00 | H       | Average  | 36.02         | 2.60   | 38.62  | 54     | -15.38 |
| 3700.00 | H       | Peak     | 39.61         | 4.71   | 44.32  | 74     | -29.68 |
| 3700.00 | H       | Average  | 32.52         | 4.71   | 37.23  | 54     | -16.77 |

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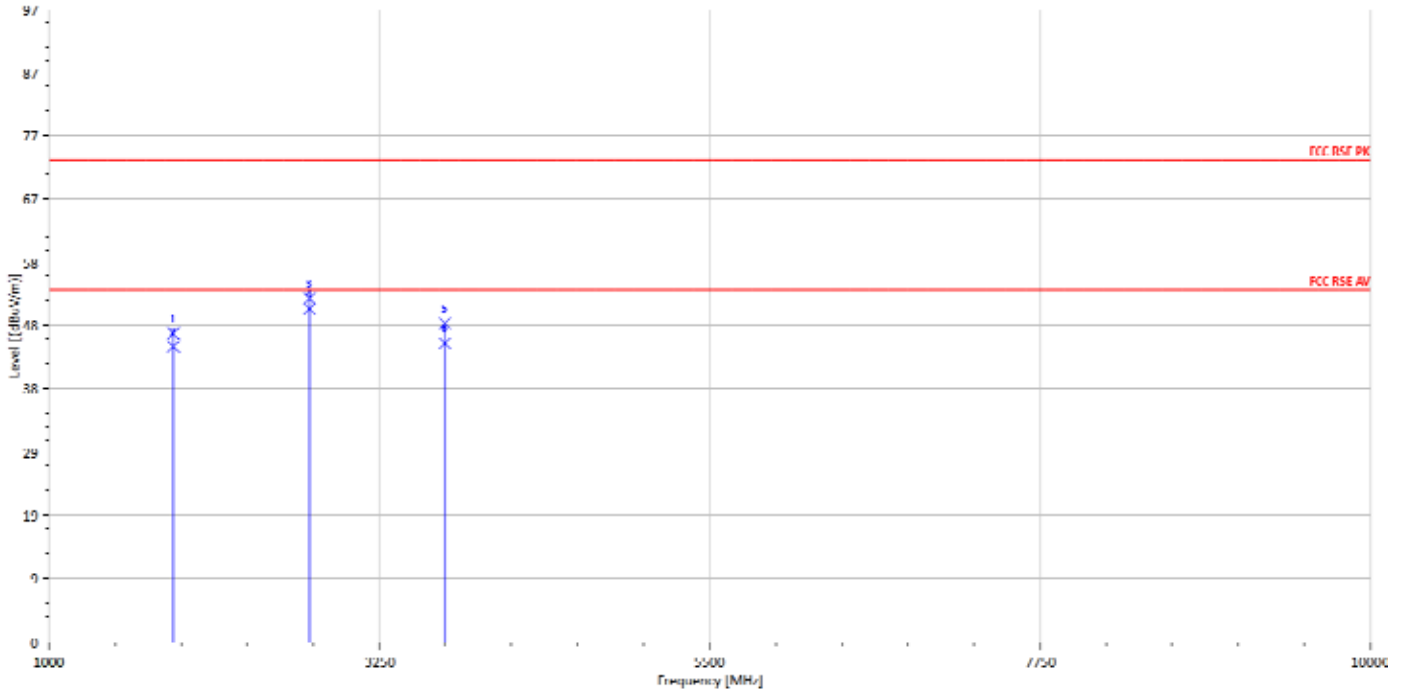
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Operation Mode : 925 MHz      Test Date : 2016/11/2  
Fundamental Frequency : 925 MHz      Temp. / Humi. : 22.7deg\_C/57RH  
Operation Band : Tx CH Mid      Test Engineer : Ashton  
EUT Pol. : E2      Measurement Antenna Pol. : Horizontal



| Freq.   | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Margin |
|---------|---------|----------|---------------|--------|--------|--------|--------|
| MHz     | F/H/E/S | Mode     | Reading Level |        | FS     | @3m    |        |
|         |         | PK/QP/AV | dBμV          | dB     | dBμV/m | dBμV/m | dB     |
| 1850.00 | H       | Peak     | 48.34         | -1.05  | 47.29  | 74     | -26.71 |
| 1850.00 | H       | Average  | 46.40         | -1.05  | 45.35  | 54     | -8.65  |
| 2775.00 | H       | Peak     | 50.07         | 2.60   | 52.67  | 74     | -21.33 |
| 2775.00 | H       | Average  | 48.45         | 2.60   | 51.05  | 54     | -2.95  |
| 3700.00 | H       | Peak     | 44.10         | 4.71   | 48.81  | 74     | -25.19 |
| 3700.00 | H       | Average  | 41.15         | 4.71   | 45.86  | 54     | -8.14  |

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## 8. 20 dB Band Width Measurement

### 8.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set ETU normal operating mode.
3. Set SPA Center Frequency = fundamental frequency, RBW = 100kHz, VBW = 300kHz, Span = 1MHz.
4. Set SPA Max hold. Mark peak, -20dB.

### 8.2 Test SET-UP (Block Diagram of Configuration)

Refer to section 7.2 for the plots.

### 8.3 Measurement Equipment Used:

| Conducted Emission Test Site |              |                |               |                  |                 |
|------------------------------|--------------|----------------|---------------|------------------|-----------------|
| Name of Equipment            | Manufacturer | Model          | Serial Number | Calibration Date | Calibration Due |
| Spectrum Analyzer            | KEYSIGHT     | N9010A         | MY54510568    | 04/14/2016       | 04/13/2017      |
| Power Meter                  | Anritsu      | ML2496A        | 1326001       | 06/23/2016       | 06/22/2017      |
| Power Sensor                 | Anritsu      | MA2411B        | 1315048       | 06/23/2016       | 06/22/2017      |
| Power Sensor                 | Anritsu      | MA2411B        | 1315049       | 06/23/2016       | 06/22/2017      |
| Coaxial Cable 30cm           | WOKEN        | 00100A1F1A195C | RF01          | 12/12/2015       | 12/11/2016      |
| DC Block                     | PASTERNAK    | PE8210         | RF29          | 12/12/2015       | 12/11/2016      |
| Splitter                     | RF-LAMBDA    | RFLT2W1G18G    | RF35          | 12/12/2015       | 12/11/2016      |
| Attenuator                   | WOKEN        | 218FS-10       | RF23          | 12/12/2015       | 12/11/2016      |
| DC Power Supply              | Agilent      | E3640A         | MY53140006    | 05/04/2016       | 05/03/2017      |

### 8.4 Measurement Results:

191.8 MHz = 372.4 kHz

925.0 MHz = 375.5 kHz

Refer to attached data chart.

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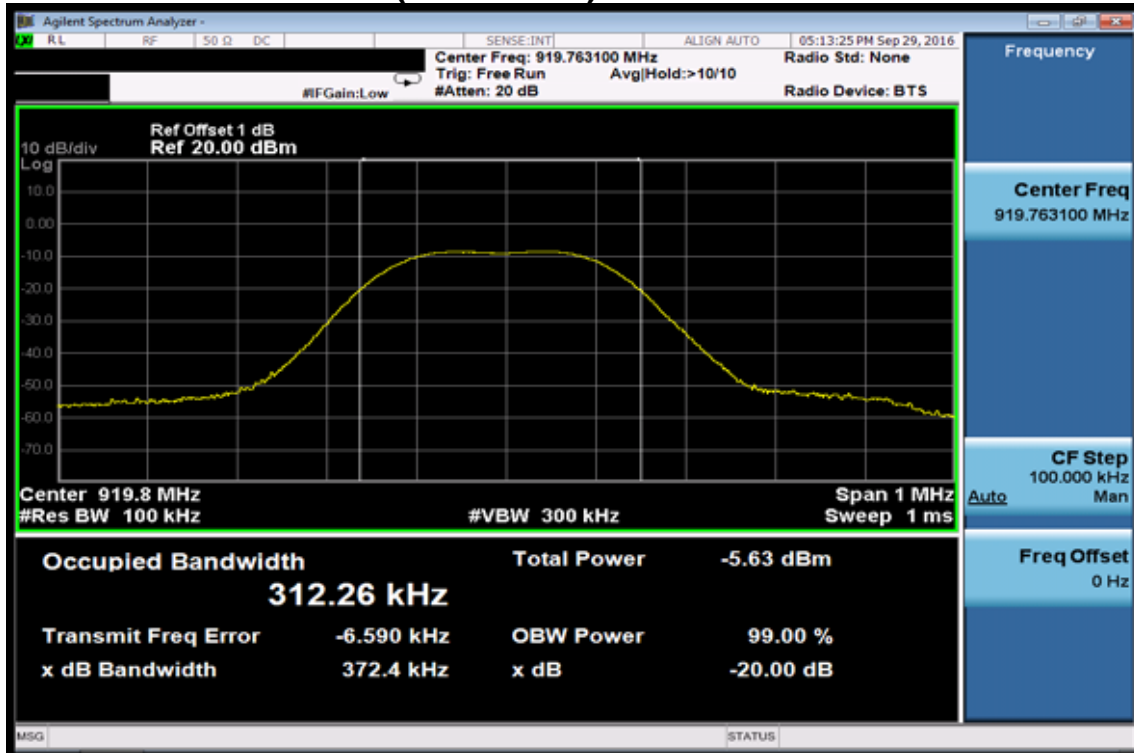
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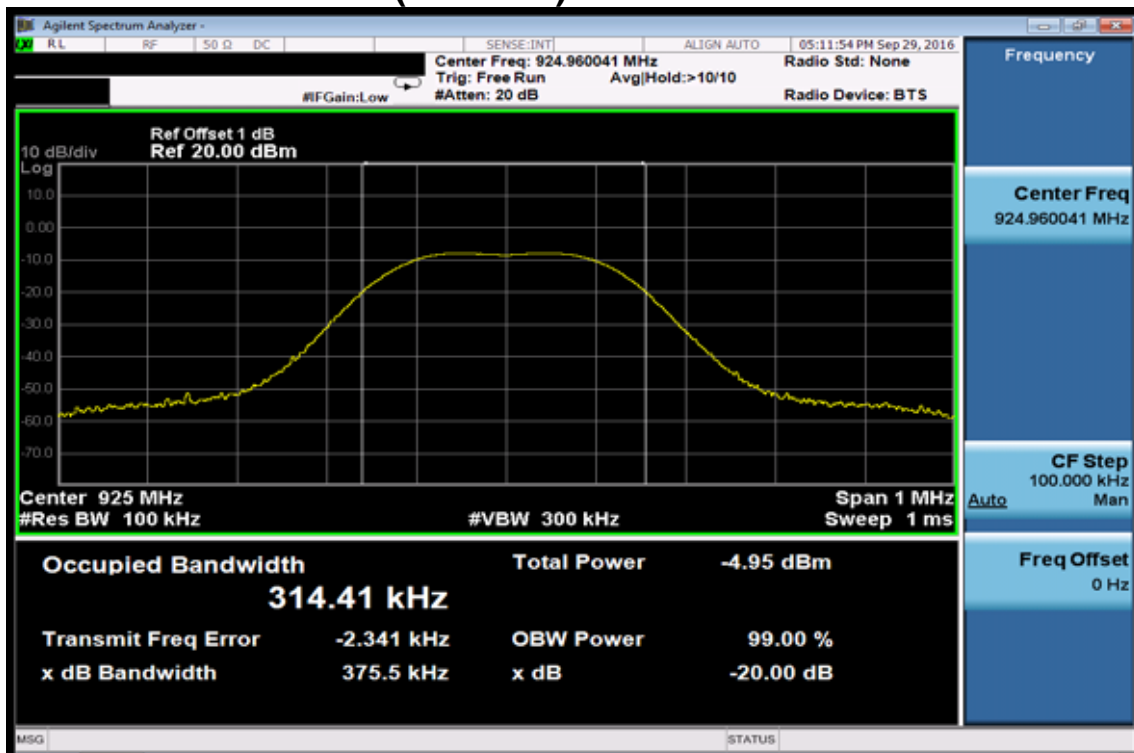
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## 20dB Band Width Test Plot (919.8 MHz)



## 20dB Band Width Test Plot (925 MHz)



~ End of Report ~

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