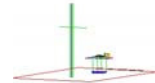


# PCTEST ENGINEERING LABORATORY, INC.

7185 Oakland Mills Road, Columbia, MD 21046 USA

Tel. 410.290.6652 / Fax 410.290.6654

<http://www.pctestlab.com>



## MEASUREMENT REPORT FCC Part 15.407 UNII 802.11a/n/ac

**Applicant Name:**

Samsung Electronics Co., Ltd.  
129, Samsung-ro,  
Yeongtong-gu, Suwon-si  
Gyeonggi-do, 16677, Korea

**Date of Testing:**

3/13 - 3/24/2017

**Test Site/Location:**

PCTEST Lab, Columbia, MD, USA

**Test Report Serial No.:**

1M1703100103-05.A3L

**FCC ID:**

A3LSMG950N

**APPLICANT:**

Samsung Electronics Co., Ltd.

**Application Type:**

Class II Permissive Change

**Model:**

SM-G950N

**EUT Type:**

Portable Handset

**FCC Classification:**

Unlicensed National Information Infrastructure (UNII)

**FCC Rule Part(s):**

Part 15.407

**Test Procedure(s):**

KDB 789033 D02 v01r03, KDB 648474 D03 v01r04, KDB 662911 D01 v02r01

**Class II Permissive Change:**

Please see FCC change document

**Original Grant Date:**

3/10/2017

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 789033 D02 v01r03. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

  
Randy Ortanez  
President



|                                         |                                 |                                                                                     |  |                                                                                       |                                 |
|-----------------------------------------|---------------------------------|-------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMG950N                      |                                 | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) |  |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017 | EUT Type:<br>Portable Handset                                                       |  | Page 1 of 51                                                                          |                                 |

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01/09/2016

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| <b>Test Report S/N:</b><br>1M1703100103-05.A3L | <b>Test Dates:</b><br>3/13 - 3/24/2017                                              | <b>EUT Type:</b><br>Portable Handset                                                        |                                                                                       | Page 2 of 51                           |



# MEASUREMENT REPORT

## FCC Part 15.407



### § 2.1033 General Information

**APPLICANT:** Samsung Electronics Co., Ltd.

**APPLICANT ADDRESS:** 129, Samsung-ro,  
Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea

**TEST SITE:** PCTEST ENGINEERING LABORATORY, INC.

**TEST SITE ADDRESS:** 7185 Oakland Mills Road, Columbia, MD 21046 USA

**FCC RULE PART(S):** Part 15.407

**BASE MODEL:** SM-G950N

**FCC ID:** A3LSMG950N

**FCC CLASSIFICATION:** Unlicensed National Information Infrastructure (UNII)

**Test Device Serial No.:** E3D05, E3D02 ☐ Production ☒ Pre-Production ☐ Engineering

**DATE(S) OF TEST:** 3/13 - 3/24/2017

**TEST REPORT S/N:** 1M1703100103-05.A3L

### Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.



- PCTEST facility is an FCC registered (PCTEST Reg. No. 159966) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (2451B-1).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (2451B-1) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.



|                                                |                                                                                     |                                                                                             |                                                                                       |                                        |
|------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMG950N                      |  | <b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br/>(CLASS II PERMISSIVE CHANGE)</b> |  | <b>Approved by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>1M1703100103-05.A3L | <b>Test Dates:</b><br>3/13 - 3/24/2017                                              | <b>EUT Type:</b><br>Portable Handset                                                        |                                                                                       | Page 3 of 51                           |

## 1.0 INTRODUCTION

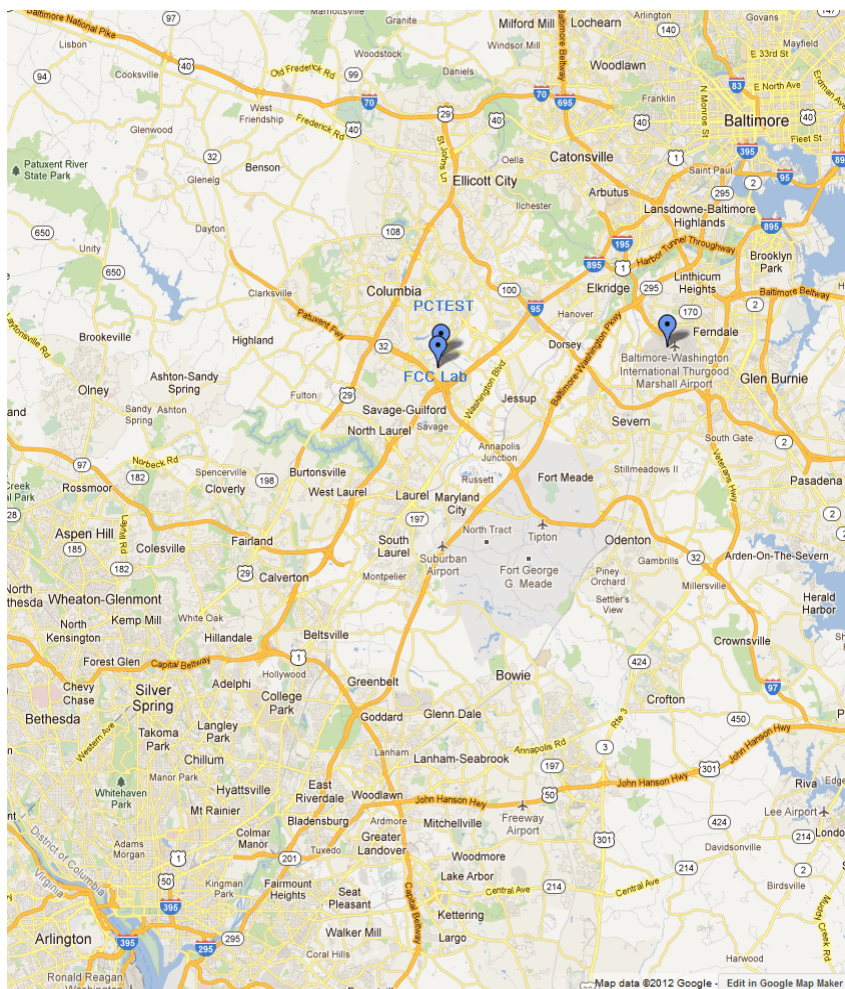
### 1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

### 1.2 PCTEST Test Location

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity, the Baltimore-Washington Intern'l (BWI) airport, the city of Baltimore and the Washington, DC area. (See Figure 1-1).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The site coordinates are 39° 10'23" N latitude and 76° 49'50" W longitude. The facility is 0.4 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2014 on January 22, 2015.



**Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 4 of 51                    |

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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMG950N**. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter.

### 2.2 Device Capabilities

This device contains the following capabilities:

1900 GSM/GPRS/EDGE, 850/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE), NFC, ANT+

| Band 1 |                 | Band 2A |                 | Band 2C |                 | Band 3 |                 |
|--------|-----------------|---------|-----------------|---------|-----------------|--------|-----------------|
| Ch.    | Frequency (MHz) | Ch.     | Frequency (MHz) | Ch.     | Frequency (MHz) | Ch.    | Frequency (MHz) |
| 36     | 5180            | 52      | 5260            | 100     | 5500            | 149    | 5745            |
| :      | :               | :       | :               | :       | :               | :      | :               |
| 42     | 5210            | 56      | 5280            | 120     | 5600            | 157    | 5785            |
| :      | :               | :       | :               | :       | :               | :      | :               |
| 48     | 5240            | 64      | 5320            | 144     | 5720            | 165    | 5825            |

Table 2-1. 802.11a (20MHz) Frequency / Channel Operations

| Band 1 |                 | Band 2A |                 | Band 2C |                 | Band 3 |                 |
|--------|-----------------|---------|-----------------|---------|-----------------|--------|-----------------|
| Ch.    | Frequency (MHz) | Ch.     | Frequency (MHz) | Ch.     | Frequency (MHz) | Ch.    | Frequency (MHz) |
| 38     | 5190            | 54      | 5270            | 102     | 5510            | 151    | 5755            |
| :      | :               | :       | :               | :       | :               | :      | :               |
| 46     | 5230            | 62      | 5310            | 118     | 5590            | 159    | 5795            |
|        |                 |         |                 | :       | :               |        |                 |
|        |                 |         |                 | 142     | 5710            |        |                 |

Table 2-2. 802.11n / 802.11ac (40MHz BW) Frequency / Channel Operations

| Band 1 |                 | Band 2A |                 | Band 2C |                 | Band 3 |                 |
|--------|-----------------|---------|-----------------|---------|-----------------|--------|-----------------|
| Ch.    | Frequency (MHz) | Ch.     | Frequency (MHz) | Ch.     | Frequency (MHz) | Ch.    | Frequency (MHz) |
| 42     | 5210            | 58      | 5290            | 106     | 5530            | 155    | 5775            |
|        |                 |         |                 | :       | :               |        |                 |
|        |                 |         |                 | 138     | 5690            |        |                 |

Table 2-3. 802.11ac (80MHz BW) Frequency / Channel Operations

|                                         |                                                                                     |                                                                                     |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMG950N                      |  | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017                                                     | EUT Type:<br>Portable Handset                                                       |                                                                                       | Page 5 of 51                    |

## Notes:

- 5GHz NII operation is possible in 20MHz channel bandwidth. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak per the guidance of Section B)2)b) of KDB 789033 D02 v01r03. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

| Maximum Achievable Duty Cycles |           |                |      |      |
|--------------------------------|-----------|----------------|------|------|
| 802.11 Mode/Band               |           | Duty Cycle [%] |      |      |
|                                |           | ANT1           | ANT2 | MIMO |
| 5GHz                           | a         | 99.2           | 99.0 | 99.1 |
|                                | n (HT20)  | 99.1           | 99.1 | 98.4 |
|                                | ac (HT20) | 99.1           | 98.9 | 98.7 |
|                                | n (HT40)  | 98.1           | 98.0 | 95.9 |
|                                | ac (HT40) | 98.3           | 98.2 | 96.2 |
|                                | ac (HT80) | 94.5           | 94.4 | 90.2 |

- The device employs MIMO technology. Below are the possible configurations.

| WiFi Configurations |              | SISO |      | SDM  |      | CDD  |      |
|---------------------|--------------|------|------|------|------|------|------|
|                     |              | ANT1 | ANT2 | ANT1 | ANT2 | ANT1 | ANT2 |
| 5GHz                | 11a          | ✓    | ✓    | ✗    | ✗    | ✓    | ✓    |
|                     | 11n (20MHz)  | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
|                     | 11n (40MHz)  | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
|                     | 11ac (80MHz) | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |

**Table 2-4. Frequency / Channel Operations**

✓ = Support ; ✗ = NOT Support

**SISO** = Single Input Single Output

**SDM** = Spatial Diversity Multiplexing – MIMO function

Data Rate(s) Tested: 6, 9, 12, 18, 24, 36, 48, 54Mbps (802.11a)

6.5/7.2, 13/14.4, 19.5/21.7, 26/28.9, 39/43.3, 52/57.8, 58.5/65, 65/72.2 (n – 20MHz)

13.5/15, 27/30, 40.5/45, 54/60, 81/90, 108/120, 121.5/135, 135/150 (n – 40MHz BW)

29.3/32.5, 58.5/65, 87.8/97.5, 117/130, 175.5/195, 234/260, 263.3/292.5, 292.5/325, 351/390, 390/433.3 (ac – 80MHz BW)

13/14.4, 26.28.9, 39/43.3, 52/57.8, 78/86.7, 104/115.6, 117/130, 130/144.4Mbps (MIMO n/ac – 20MHz)

156/173Mbps (MIMO ac – 20MHz)

27/30, 54/60, 81/90, 108/120, 162/180, 216/240, 243/270, 270/300Mbps (MIMO n/ac – 40MHz)

360/400Mbps (MIMO ac – 40MHz)

58.5/65, 117/130, 175.5/195, 234/260, 351/390, 468/520, 526.5/585, 585/650, 702/780, 780/866.7Mbps (MIMO ac – 80MHz)

|                                         |                                                                                     |                                                                                     |  |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMG950N                      |  | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) |  |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017                                                     | EUT Type:<br>Portable Handset                                                       |  |                                                                                       | Page 6 of 51                    |

3. This device supports simultaneous transmission operation, which allows for two SISO or two MIMO channels to operate independent of one another in the 2.4GHz and 5GHz bands simultaneously on each antenna. The following tables show the worst case configurations determined during testing.

**Scenario A – Config-1: ANT1 transmitting in 2.4GHz mode and ANT2 in 5GHz mode**

| Description              | 2.4 GHz Tx | 5 GHz Tx |
|--------------------------|------------|----------|
| Antenna                  | 1          | 2        |
| Channel                  | 11         | 100      |
| Operating Frequency(MHz) | 2462       | 5500     |
| Data Rate                | 1 Mbps     | 6 Mbps   |
| Mode                     | 802.11b    | 802.11a  |

**Table 2-5. Config-1 (ANT1 2.4GHz & ANT2 5GHz)**

**Scenario B – Config-2: ANT1 transmitting in 5GHz mode and ANT2 in 2.4GHz mode**

| Description              | 5 GHz Tx | 2.4 GHz Tx |
|--------------------------|----------|------------|
| Antenna                  | 1        | 2          |
| Channel                  | 100      | 11         |
| Operating Frequency(MHz) | 5500     | 2462       |
| Data Rate                | 6 Mbps   | 1 Mbps     |
| Mode                     | 802.11a  | 802.11b    |

**Table 2-6. Config-2 (ANT1 5GHz & ANT2 2.4GHz)**

**Configuration 3: ANT1 and ANT2 both transmitting in 2.4GHz and 5GHz modes simultaneously**

| Description              | 2.4 GHz Emission | 5 GHz Emission |
|--------------------------|------------------|----------------|
| Antenna                  | 1, 2             | 1, 2           |
| Channel                  | 1                | 64             |
| Operating Frequency(MHz) | 2412             | 5320           |
| Data Rate (Mbps)         | MCS0             | 6              |
| Mode                     | 802.11g/n        | 802.11a/n/ac   |

**Table 2-7. Config-3 (ANT1 MIMO & ANT2 MIMO)**

## 2.3 Test Configuration

The EUT was tested per the guidance of KDB 789033 D02 v01r03. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing. See Section 3.2 for radiated emissions test setups.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on a certified wireless charging pad (WCP) while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

## 2.4 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

|                                         |                                                                                     |                                                                                     |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMG950N                      |  | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017                                                     | EUT Type:<br>Portable Handset                                                       |                                                                                       | Page 7 of 51                    |

## 3.0 DESCRIPTION OF TESTS

### 3.1 Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and the guidance provided in KDB 789033 D02 v01r03 were used in the measurement of the EUT.

Deviation from measurement procedure.....None

### 3.2 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. A raised turntable is used for radiated measurement. It is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. A 72.4cm high PVC support structure is placed on top of the turntable. A 3" (~7.6cm) sheet of high density polystyrene is used as the table top and is placed on top of the PVC supports to bring the total height of the table to 80cm. For measurements above 1GHz, a high density expanded polystyrene block is placed on top of the test table to bring the total table height to 1.5m.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

### 3.3 Environmental Conditions

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

|                                         |                                                                                     |                                                                                     |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMG950N                      |  | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017                                                     | EUT Type:<br>Portable Handset                                                       |                                                                                       | Page 8 of 51                    |

## 4.0 ANTENNA REQUIREMENTS

### Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- The antennas of the EUT are **permanently attached**.
- There are no provisions for connection to an external antenna.

### Conclusion:

The EUT complies with the requirement of §15.203.

|                                         |                                                                                     |                                                                                     |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMG950N                      |  | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017                                                     | EUT Type:<br>Portable Handset                                                       |                                                                                       | Page 9 of 51                    |

## 5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of  $k = 2$  to indicate a 95% level of confidence. The measurement data shown herein meets or exceeds the  $U_{\text{CISPR}}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

| Contribution                     | Expanded Uncertainty ( $\pm$ dB) |
|----------------------------------|----------------------------------|
| Conducted Bench Top Measurements | 1.13                             |
| Line Conducted Disturbance       | 3.09                             |
| Radiated Disturbance (<1GHz)     | 4.98                             |
| Radiated Disturbance (>1GHz)     | 5.07                             |
| Radiated Disturbance (>18GHz)    | 5.09                             |

|                                         |                                                                                     |                                                                                     |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMG950N                      |  | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017                                                     | EUT Type:<br>Portable Handset                                                       |                                                                                       | Page 10 of 51                   |

## 6.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2006.

| Manufacturer    | Model              | Description                            | Cal Date  | Cal Interval | Cal Due   | Serial Number        |
|-----------------|--------------------|----------------------------------------|-----------|--------------|-----------|----------------------|
| -               | RE1                | Radiated Emissions Cable Set (UHF/EHF) | 7/11/2016 | Annual       | 7/11/2017 | RE1                  |
| Com-Power       | PAM-103            | Pre-Amplifier (1-1000MHz)              | 7/6/2016  | Annual       | 7/6/2017  | 441119               |
| Com-Power       | PAM-103            | Pre-Amplifier (1-1000MHz)              | 7/11/2016 | Annual       | 7/11/2017 | 441128               |
| Emco            | 3115               | Horn Antenna (1-18GHz)                 | 3/10/2016 | Biennial     | 3/10/2018 | 9704-5182            |
| Emco            | 6502               | Active Loop Antenna (10k - 30 MHz)     | 8/9/2016  | Biennial     | 8/9/2018  | 2936                 |
| EMCO            | 3160-09            | Small Horn (18 - 26.5GHz)              | 8/23/2016 | Biennial     | 8/23/2018 | 135427               |
| EMCO            | 3160-10            | Small Horn (26.5 - 40GHz)              | 8/23/2016 | Biennial     | 8/23/2018 | 130993               |
| Huber+Suhner    | Sucoflex 102A      | 40GHz Radiated Cable                   | 10/3/2016 | Annual       | 10/3/2017 | 251425001            |
| K & L           | 11SH10-6000/T18000 | High Pass Filter                       | 7/11/2016 | Annual       | 7/11/2017 | 11SH10-6000/T18000-1 |
| K & L           | 11SH10-3075/U18000 | High Pass Filter                       | 7/11/2016 | Annual       | 7/11/2017 | 11SH10-3075/U18000-2 |
| K & L           | 11SH10-3075/U18000 | High Pass Filter                       | 7/6/2016  | Annual       | 7/6/2017  | 11SH10-3075/U18000-1 |
| PCTEST          | -                  | EMC Switch System                      | 7/11/2016 | Annual       | 7/11/2017 | NM1                  |
| PCTEST          | -                  | EMC Switch System                      | 7/6/2016  | Annual       | 7/6/2017  | NM2                  |
| Rhode & Schwarz | TS-PR18            | Pre-Amplifier                          | 7/6/2016  | Annual       | 7/6/2017  | 101622               |
| Rohde & Schwarz | TS-PR18            | 1-18 GHz Pre-Amplifier                 | 7/11/2016 | Annual       | 7/11/2017 | 100071               |
| Rohde & Schwarz | TS-PR26            | 18-26.5 GHz Pre-Amplifier              | 4/7/2016  | Annual       | 4/7/2017  | 100040               |
| Rohde & Schwarz | ESU26              | EMI Test Receiver (26.5GHz)            | 5/16/2016 | Annual       | 5/16/2017 | 100342               |
| Rohde & Schwarz | TS-PR40            | 26.5-40 GHz Pre-Amplifier              | 4/7/2016  | Annual       | 4/7/2017  | 100037               |
| Rohde & Schwarz | ESU40              | EMI Test Receiver (40GHz)              | 7/15/2016 | Annual       | 7/15/2017 | 100348               |
| Seekonk         | NC-100             | Torque Wrench 5/16", 8" lbs            | 3/2/2016  | Biennial     | 3/2/2018  | N/A                  |
| Sunol           | DRH-118            | Horn Antenna (1-18GHz)                 | 7/30/2015 | Biennial     | 7/30/2017 | A050307              |
| Sunol           | JB5                | Bi-Log Antenna (30M - 5GHz)            | 3/14/2016 | Biennial     | 3/14/2018 | A051107              |

**Table 6-1. Annual Test Equipment Calibration Schedule**

|                                         |                                                                                     |                                                                                     |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMG950N                      |  | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017                                                     | EUT Type:<br>Portable Handset                                                       |                                                                                       | Page 11 of 51                   |

## 7.0 TEST RESULTS

### 7.1 Summary

Company Name: Samsung Electronics Co., Ltd.  
 FCC ID: A3LSMG950N  
 Method/System: Unlicensed National Information Infrastructure (UNII)

| FCC Part Section(s)                | Test Description                                                              | Test Limit                                                                     | Test Condition | Test Result | Reference        |
|------------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------|-------------|------------------|
| 15.407(b.1), (2), (3), (4)         | Undesirable Emissions                                                         | Undesirable emissions must meet the limits detailed in 15.407(b)               | RADIATED       | PASS        | Section 7.2      |
| 15.205, 15.407(b.1), (4), (5), (6) | General Field Strength Limits (Restricted Bands and Radiated Emission Limits) | Emissions in restricted bands must meet the radiated limits detailed in 15.209 |                | PASS        | Section 7.2, 7.3 |

**Table 7-1. Summary of Test Results**

#### Note:

All channels, modes, and modulations/data rates were investigated among all UNII bands. The test results shown in the following sections represent the worst case emissions.

|                                         |                                                                                     |                                                                                     |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMG950N                      |  | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017                                                     | EUT Type:<br>Portable Handset                                                       |                                                                                       | Page 12 of 51                   |

## 7.2 Radiated Spurious Emission Measurements – Above 1GHz

**§15.407(b) §15.205 §15.209**

### Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in KDB 789033 D02 v01r03, and at the appropriate frequencies. All channels, modes (e.g. 802.11a, 802.11n (20MHz BW), 802.11n (40MHz BW), and 802.11ac (80MHz)), and modulations/data rates were investigated among all UNII bands. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

***For transmitters operating in the 5.15-5.25 GHz and 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.***

***For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.***

***For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.***

***All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 7-2 per Section 15.209.***

| Frequency       | Field Strength<br>[μV/m] | Measured Distance<br>[Meters] |
|-----------------|--------------------------|-------------------------------|
| Above 960.0 MHz | 500                      | 3                             |

**Table 7-2. Radiated Limits**

### Test Procedures Used

KDB 789033 D02 v01r03 – Section G

### Test Settings

#### Average Measurements above 1GHz (Method AD)

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = power average (RMS)
5. Number of measurement points = 1001 (Number of points must be  $\geq 2 \times \text{span/RBW}$ )
6. Averaging type = power (RMS)
7. Sweep time = auto couple
8. Trace was averaged over 100 sweeps

|                                         |                                                                                     |                                                                                     |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMG950N                      |  | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017                                                     | EUT Type:<br>Portable Handset                                                       |                                                                                       | Page 13 of 51                   |

### Peak Measurements above 1GHz

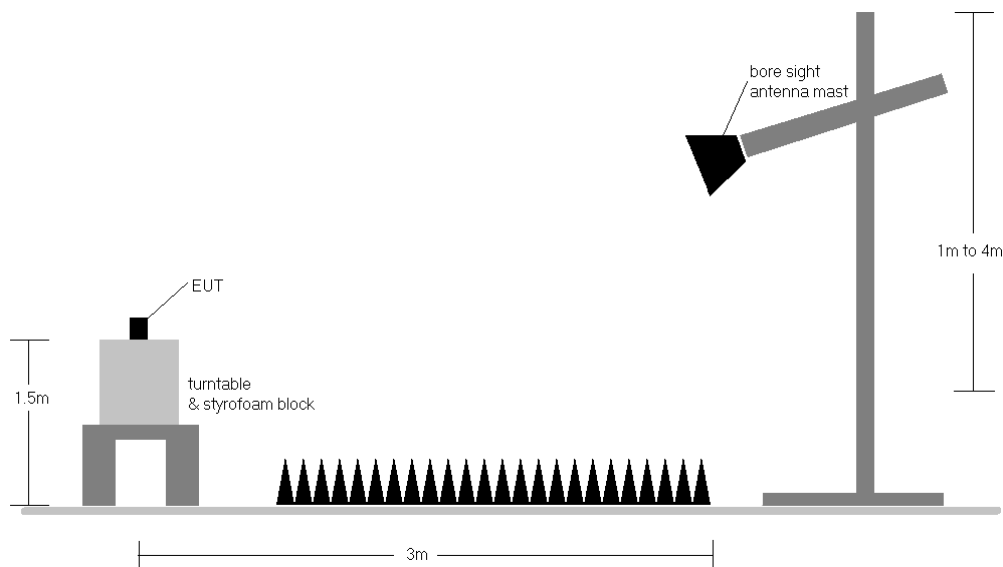
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

### Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = 120kHz
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



**Figure 7-1. Test Instrument & Measurement Setup**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 14 of 51                   |

## Test Notes

1. All radiated spurious emissions levels were measured in a radiated test setup per the guidance of KDB 789033 D02 v01r03 Section G.
2. All emissions that lie in the restricted bands (denoted by a \* next to the frequency) specified in §15.205 are below the limit shown in Table 7-2.
3. All spurious emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-2. All spurious emissions that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.
4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
5. This unit was tested with its standard battery.
6. The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
7. Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
8. Radiated spurious emissions were investigated while operating in MIMO mode, however, it was determined that single antenna operation produced the worst case emissions. Since the emissions produced from MIMO operation were found to be more than 20dB below the limit, the MIMO emissions are not reported.
9. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. Any emissions found to be within 20dB of the limit are fully investigated and the results are shown in this section. Rohde & Schwarz EMC32, Version 9.15.00 automated test software was used to perform the Radiated Spurious Emissions Pre-Scan testing.
10. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

|                                         |                                                                                     |                                                                                     |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMG950N                      |  | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017                                                     | EUT Type:<br>Portable Handset                                                       | Page 15 of 51                                                                         |                                 |

## Sample Calculations

### Determining Spurious Emissions Levels

- Field Strength Level  $[\text{dB}\mu\text{V/m}] = \text{Analyzer Level} [\text{dBm}] + 107 + \text{AFCL} [\text{dB/m}]$
- $\text{AFCL} [\text{dB/m}] = \text{Antenna Factor} [\text{dB/m}] + \text{Cable Loss} [\text{dB}]$
- $\text{Margin} [\text{dB}] = \text{Field Strength Level} [\text{dB}\mu\text{V/m}] - \text{Limit} [\text{dB}\mu\text{V/m}]$

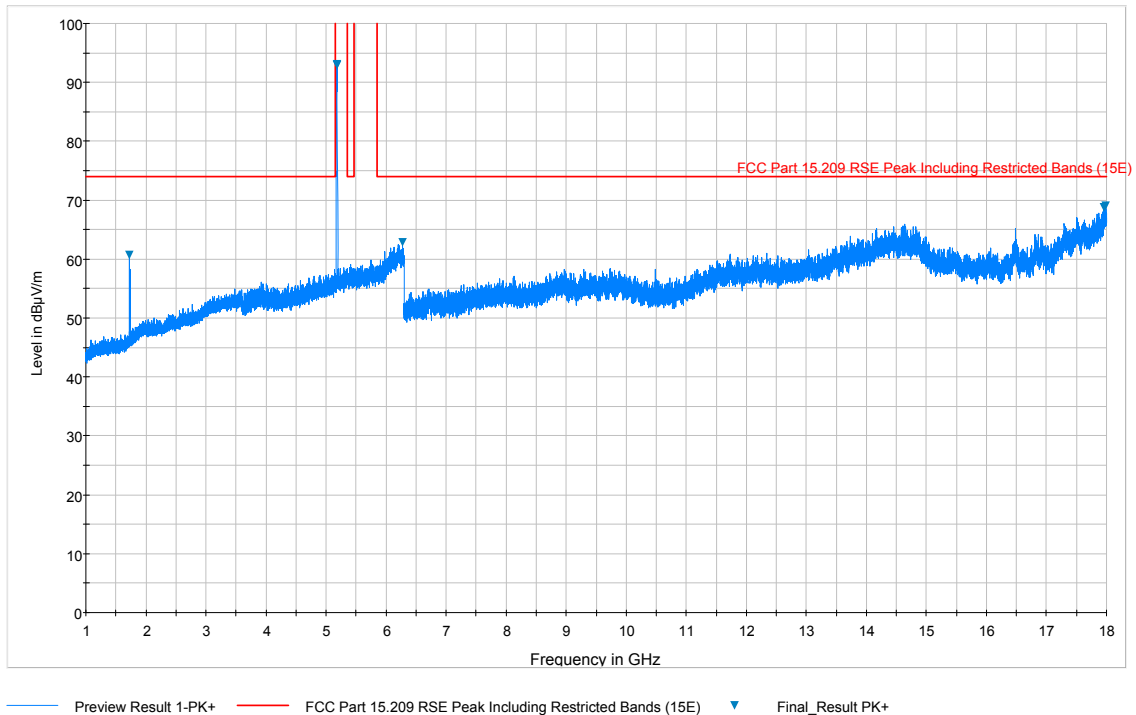
### Radiated Band Edge Measurement Offset

- The amplitude offset shown in the radiated restricted band edge plots in Section 7.2 was calculated using the formula:

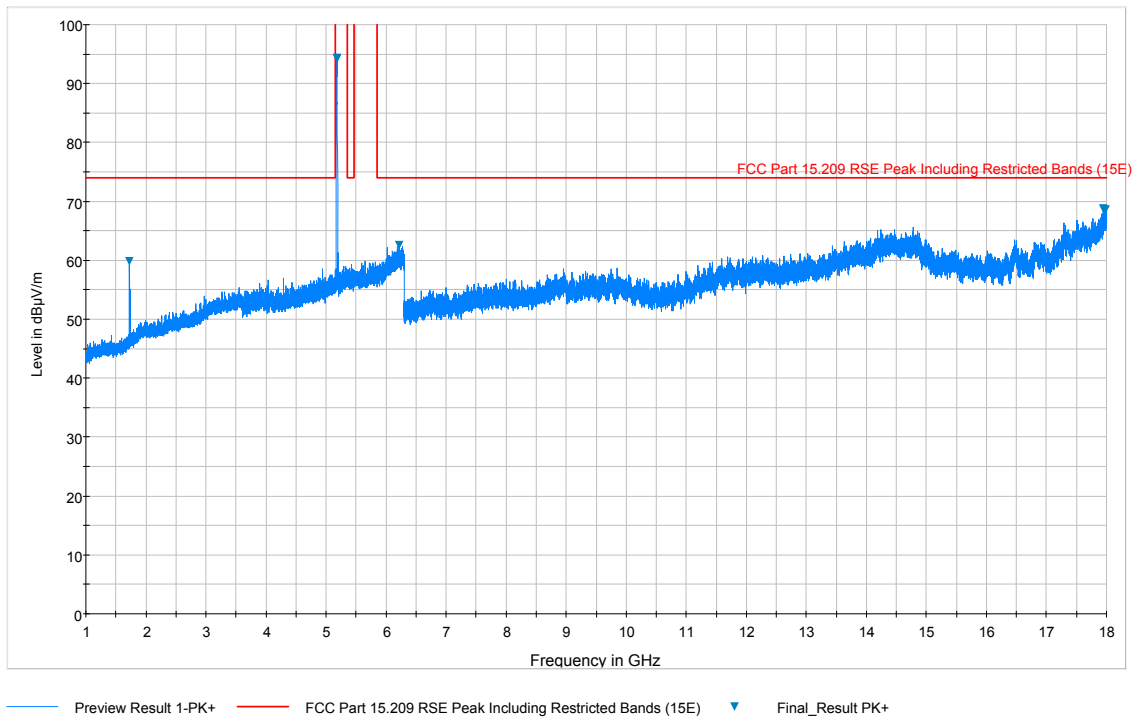
$$\text{Offset (dB)} = (\text{Antenna Factor} + \text{Cable Loss} + \text{Attenuator}) - \text{Preamplifier Gain}$$

|                                         |                                                                                     |                                                                                     |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMG950N                      |  | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017                                                     | EUT Type:<br>Portable Handset                                                       |                                                                                       | Page 16 of 51                   |

## 7.7.1 Antenna-1 Radiated Spurious Emission Measurements

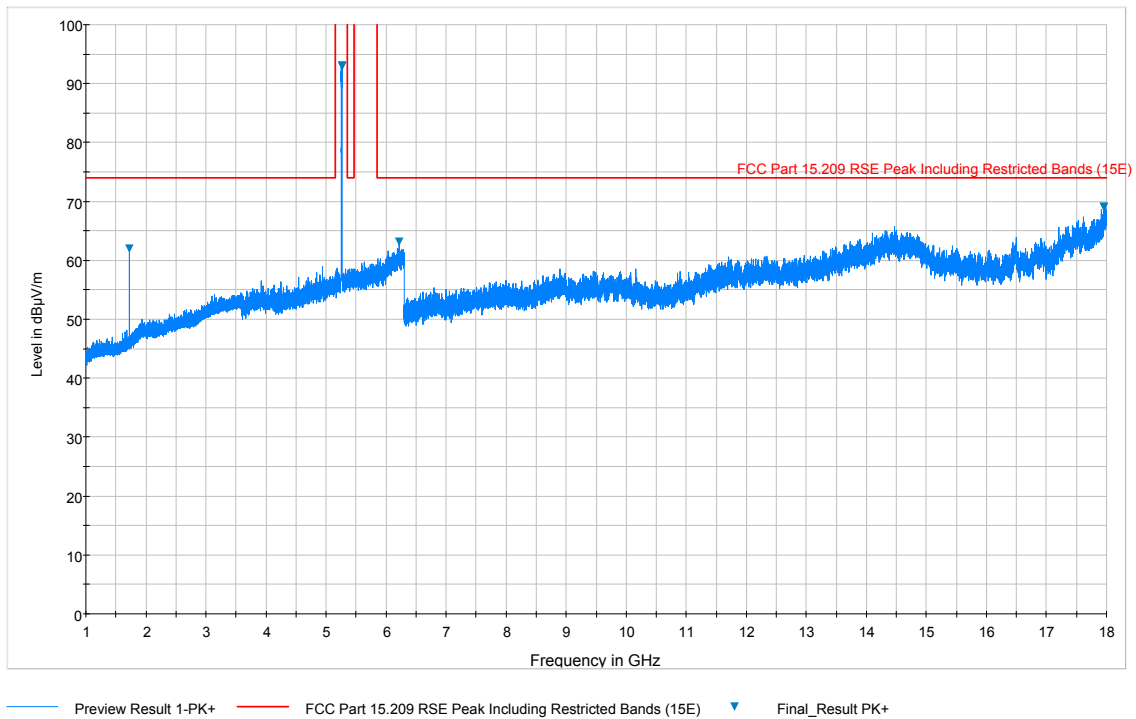


**Plot 7-1. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. H)**

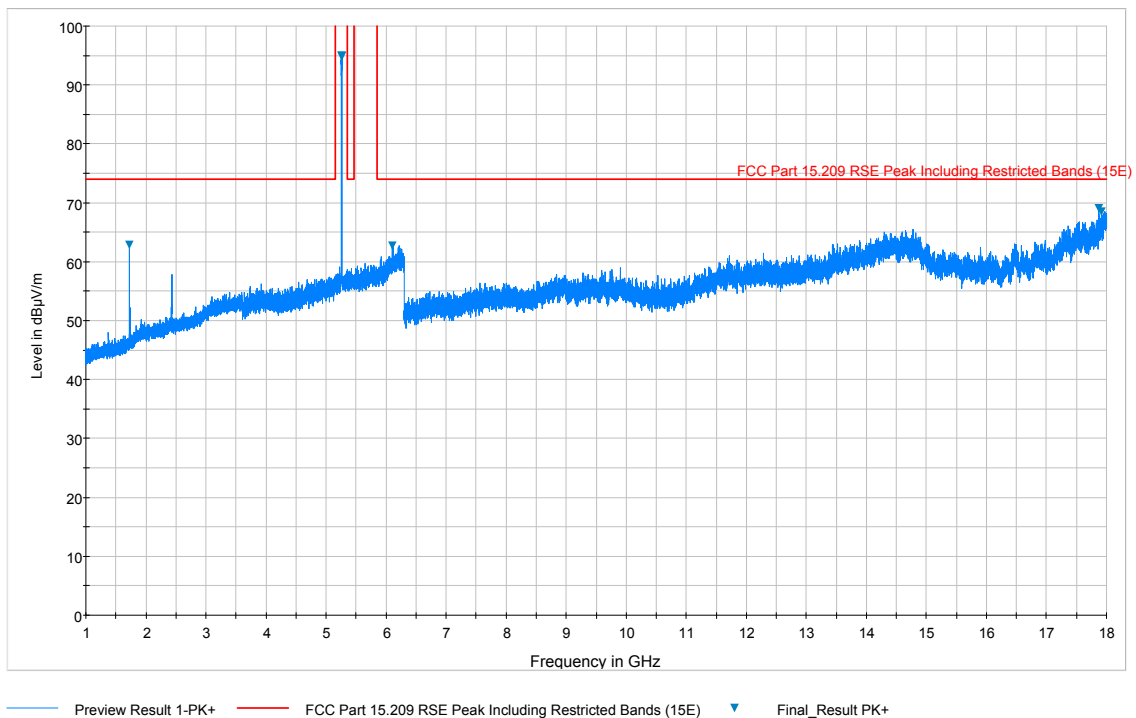


**Plot 7-2. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. V)**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 17 of 51                   |

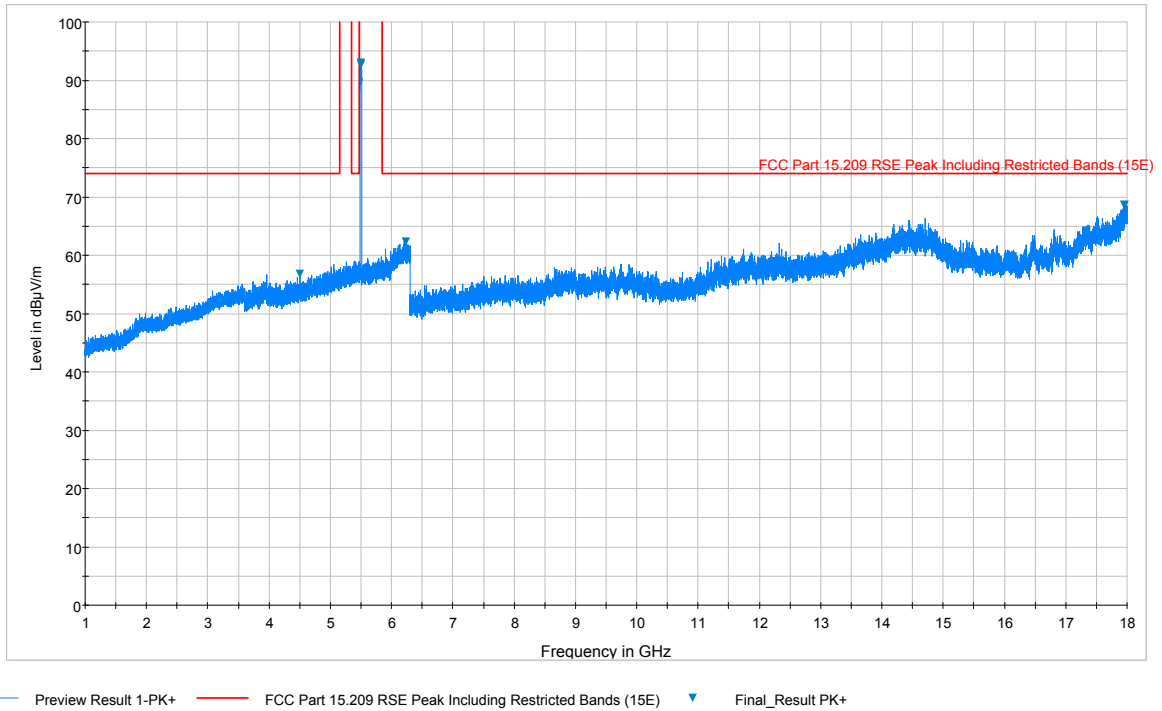


**Plot 7-3. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. H)**

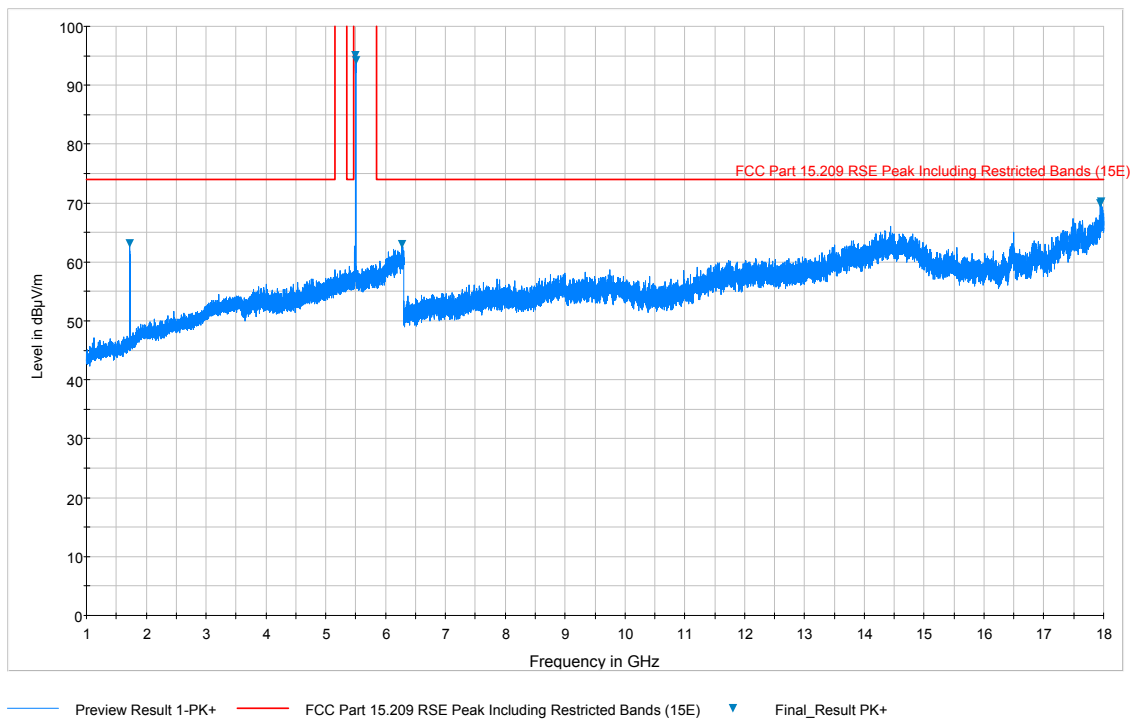


**Plot 7-4. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. V)**

|                                                |                                               |                                                                                            |                |                                        |
|------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------|----------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT</b><br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>1M1703100103-05.A3L | <b>Test Dates:</b><br>3/13 - 3/24/2017        | <b>EUT Type:</b><br>Portable Handset                                                       |                | Page 18 of 51                          |



**Plot 7-5. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 116, Ant. Pol. H)**



**Plot 7-6. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 116, Ant. Pol. V)**

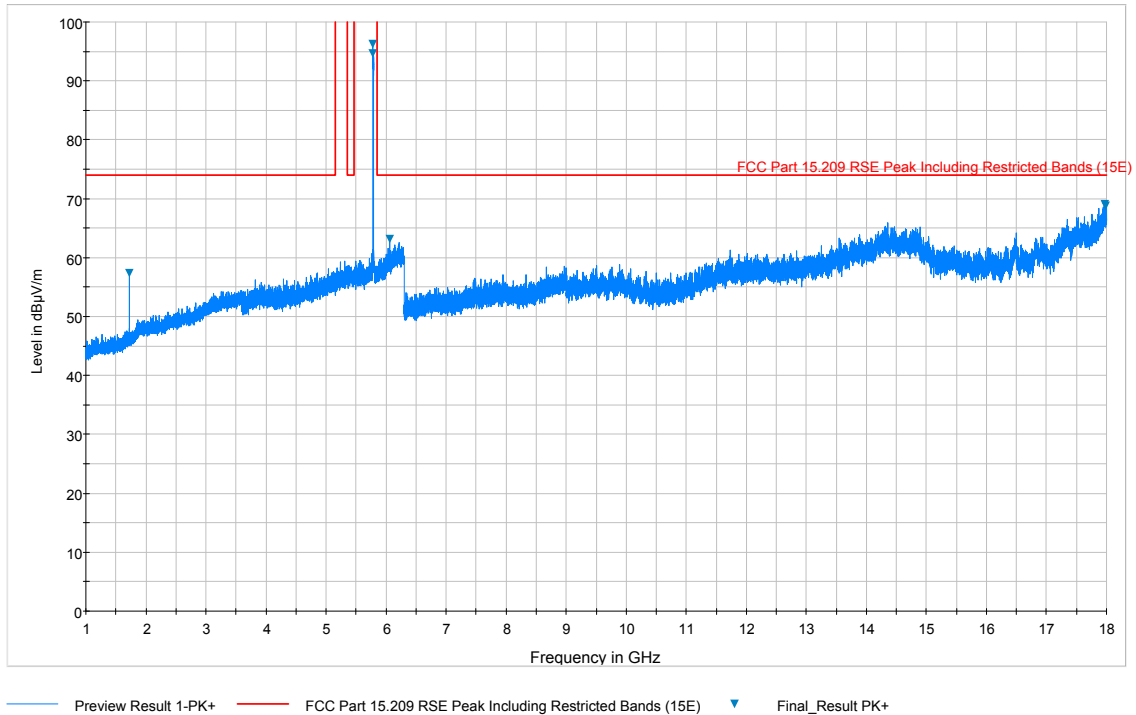
|                                                |                                               |                                                                                            |                |                                        |
|------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------|----------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT</b><br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>1M1703100103-05.A3L | <b>Test Dates:</b><br>3/13 - 3/24/2017        | <b>EUT Type:</b><br>Portable Handset                                                       |                | Page 19 of 51                          |

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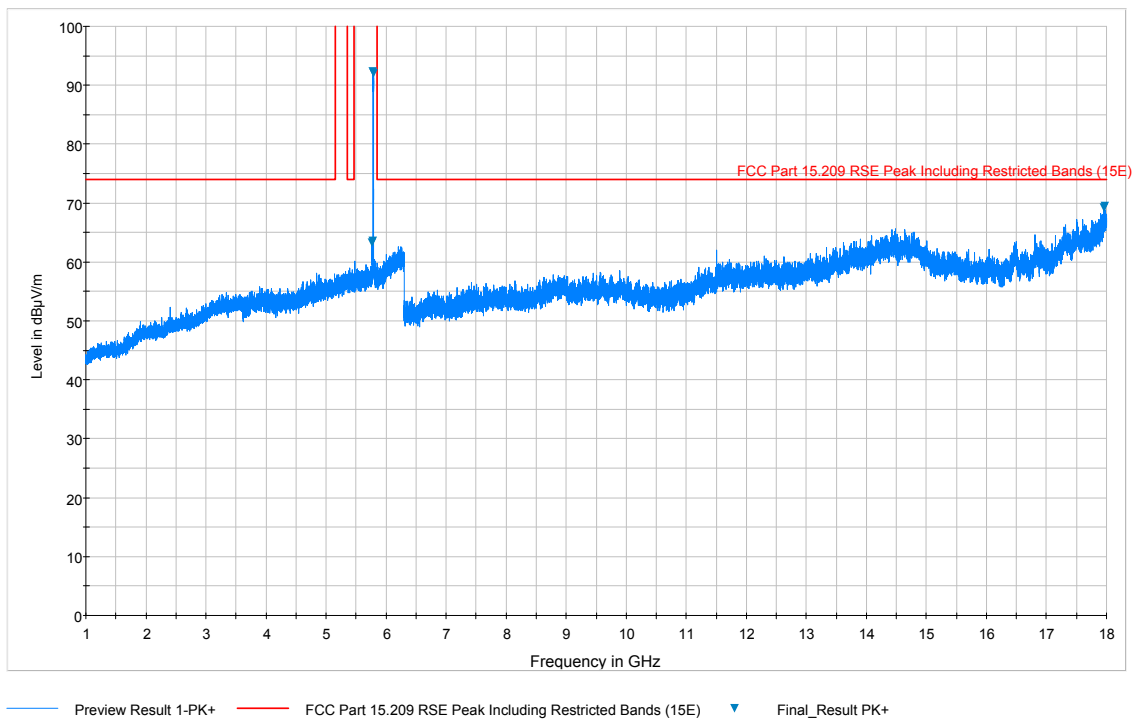
V 6.2

01/09/2016

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**Plot 7-7. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. H)**

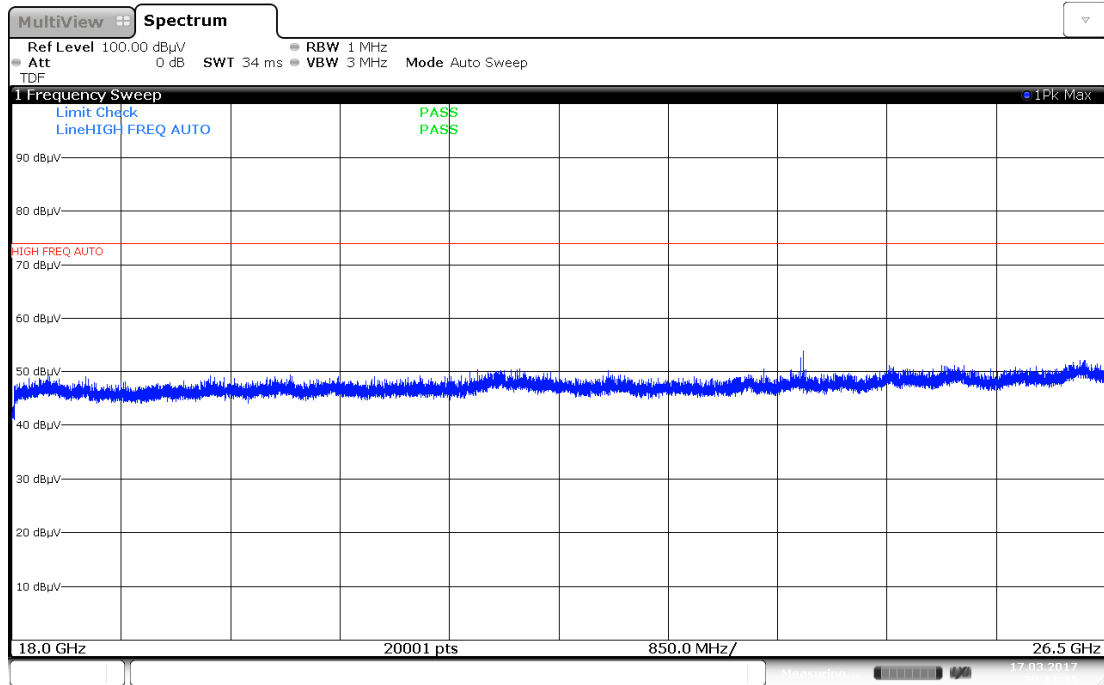


**Plot 7-8. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. V)**

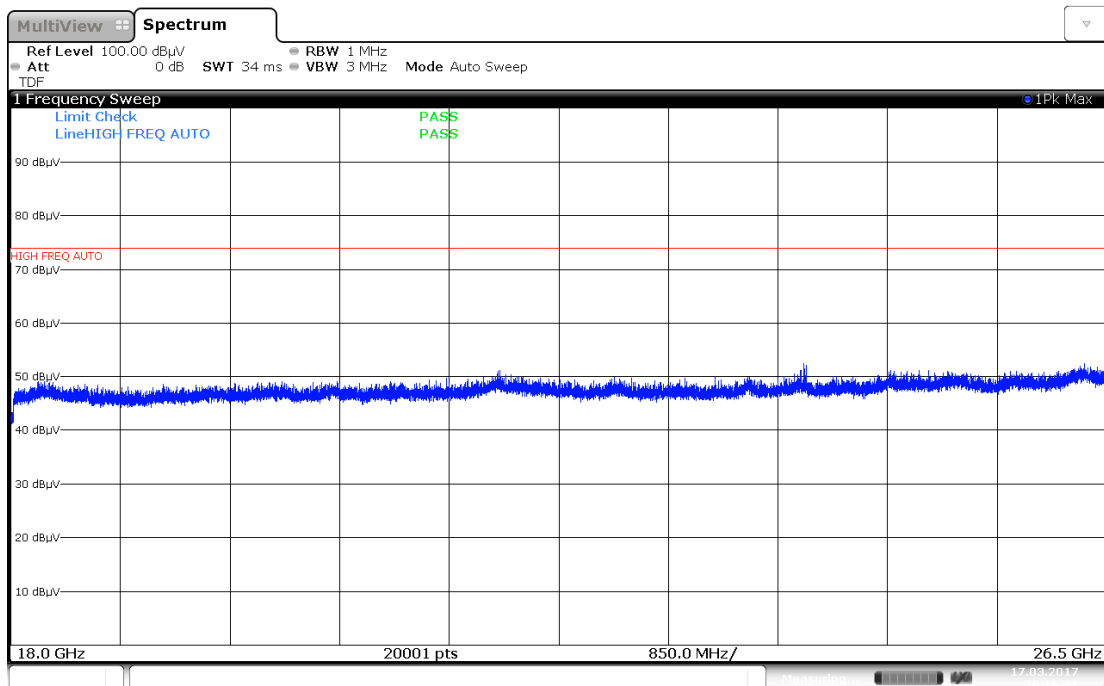
|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 20 of 51                   |

## Antenna-1 Radiated Spurious Emissions Measurements (Above 18GHz)

**\$15.209**



**Plot 7-9. Radiated Spurious Plot 18GHz - 26.5GHz (802.11a – Ant. Pol. H)**



**Plot 7-10. Radiated Spurious Plot above 18GHz - 26.5GHz (802.11a – Ant. Pol. V)**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 21 of 51                   |

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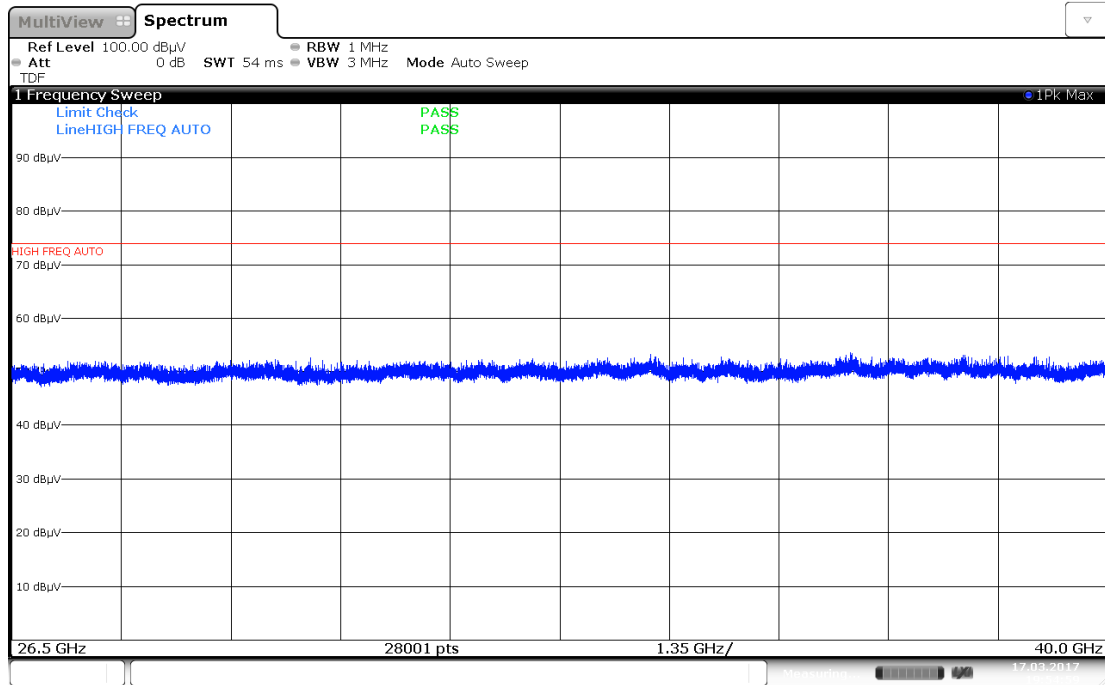
V 6.2

01/09/2016

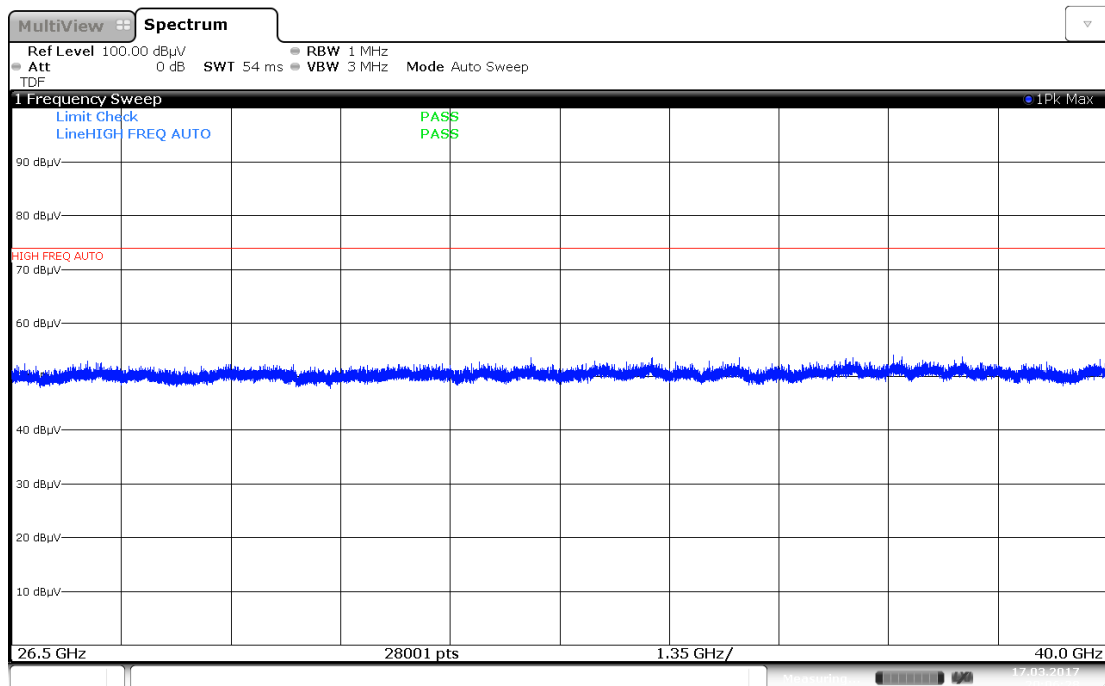
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## Antenna-1 Radiated Spurious Emissions Measurements (Above 18GHz)

**\$15.209**



**Plot 7-11. Radiated Spurious Plot 26.5GHz - 40GHz (802.11a – Ant. Pol. H)**



**Plot 7-12. Radiated Spurious Plot above 26.5GHz - 40GHz (802.11a – Ant. Pol. V)**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 22 of 51                   |

## Antenna-1 Radiated Spurious Emission Measurements

§15.247(d) §15.205 & §15.209

Worst Case Mode: 802.11a  
Worst Case Transfer Rate: 6 Mbps  
Distance of Measurements: 1 & 3 Meters  
Operating Frequency: 5500MHz  
Channel: 100

| Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Distance Correction Factor [dB] | Field Strength [dBμV/m] | Limit [dBμV/m] | Margin [dB] |
|-----------------|----------|-----------------|---------------------|----------------------------|----------------------|-------------|---------------------------------|-------------------------|----------------|-------------|
| * 11000.00      | Average  | H               | -                   | -                          | -73.15               | 12.94       | 0.00                            | 46.79                   | 53.98          | -7.19       |
| * 11000.00      | Peak     | H               | -                   | -                          | -58.13               | 12.94       | 0.00                            | 61.81                   | 73.98          | -12.17      |
| 16500.00        | Peak     | H               | -                   | -                          | -63.82               | 18.08       | 0.00                            | 61.26                   | 68.20          | -6.94       |
| 22000.00        | Peak     | H               | -                   | -                          | -57.01               | 8.35        | -9.54                           | 48.79                   | 68.20          | -19.41      |
| 27500.00        | Peak     | H               | -                   | -                          | -46.33               | -8.93       | -9.54                           | 42.20                   | 68.20          | -26.00      |

**Table 7-3. Radiated Measurements**

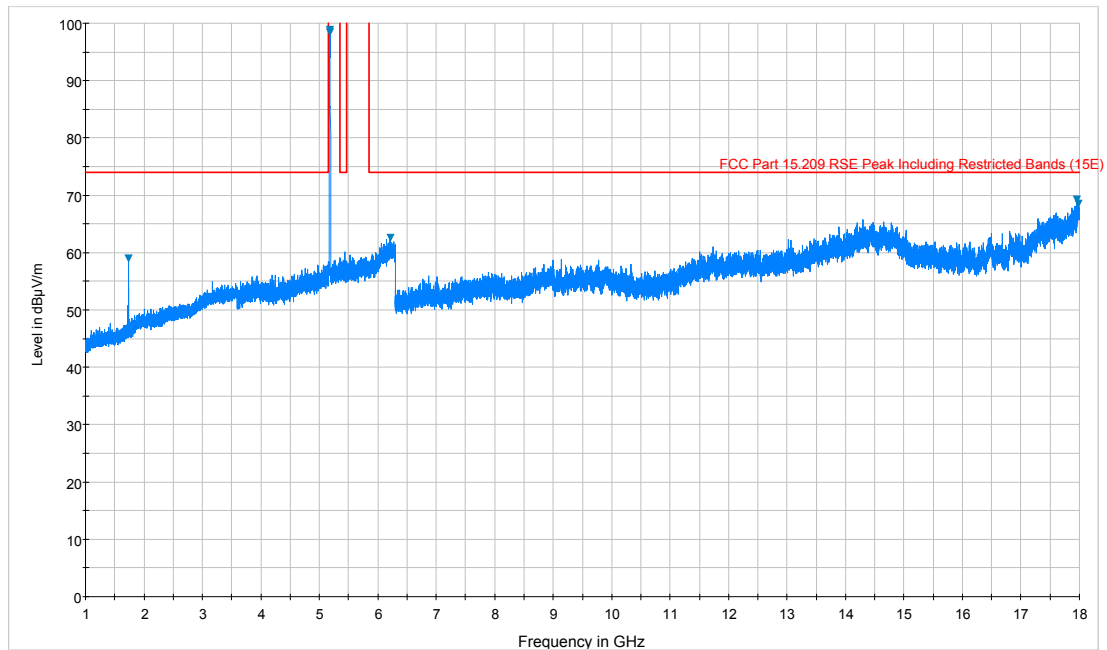
Worst Case Mode: 802.11a  
Worst Case Transfer Rate: 6 Mbps  
Distance of Measurements: 1 & 3 Meters  
Operating Frequency: 5500MHz  
Channel: 100

| Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Distance Correction Factor [dB] | Field Strength [dBμV/m] | Limit [dBμV/m] | Margin [dB] |
|-----------------|----------|-----------------|---------------------|----------------------------|----------------------|-------------|---------------------------------|-------------------------|----------------|-------------|
| * 11000.00      | Average  | H               | -                   | -                          | -71.78               | 12.94       | 0.00                            | 48.16                   | 53.98          | -5.82       |
| * 11000.00      | Peak     | H               | -                   | -                          | -59.33               | 12.94       | 0.00                            | 60.61                   | 73.98          | -13.37      |
| 16500.00        | Peak     | H               | -                   | -                          | -61.70               | 18.08       | 0.00                            | 63.38                   | 68.20          | -4.82       |
| 22000.00        | Peak     | H               | -                   | -                          | -58.31               | 8.35        | -9.54                           | 47.49                   | 68.20          | -20.71      |
| 27500.00        | Peak     | H               | -                   | -                          | -47.64               | -8.93       | -9.54                           | 40.89                   | 68.20          | -27.31      |

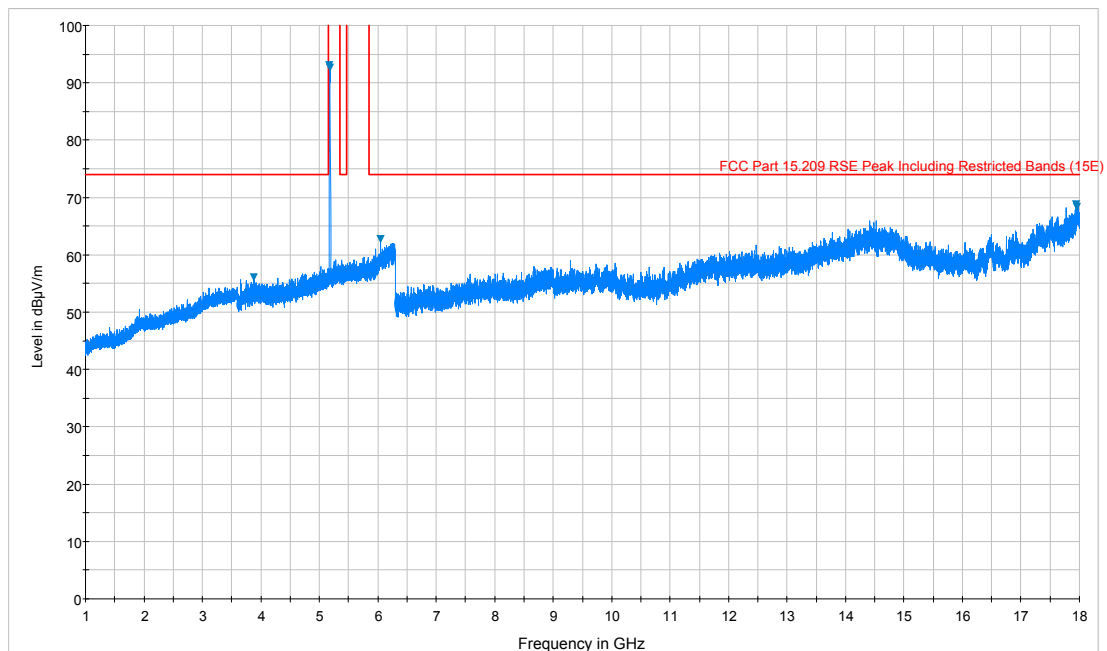
**Table 7-4. Radiated Measurements with WCP**

|                                         |                                                                                     |                                                                                     |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMG950N                      |  | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017                                                     | EUT Type:<br>Portable Handset                                                       |                                                                                       | Page 23 of 51                   |

## 7.7.2 Antenna-2 Radiated Spurious Emission Measurements

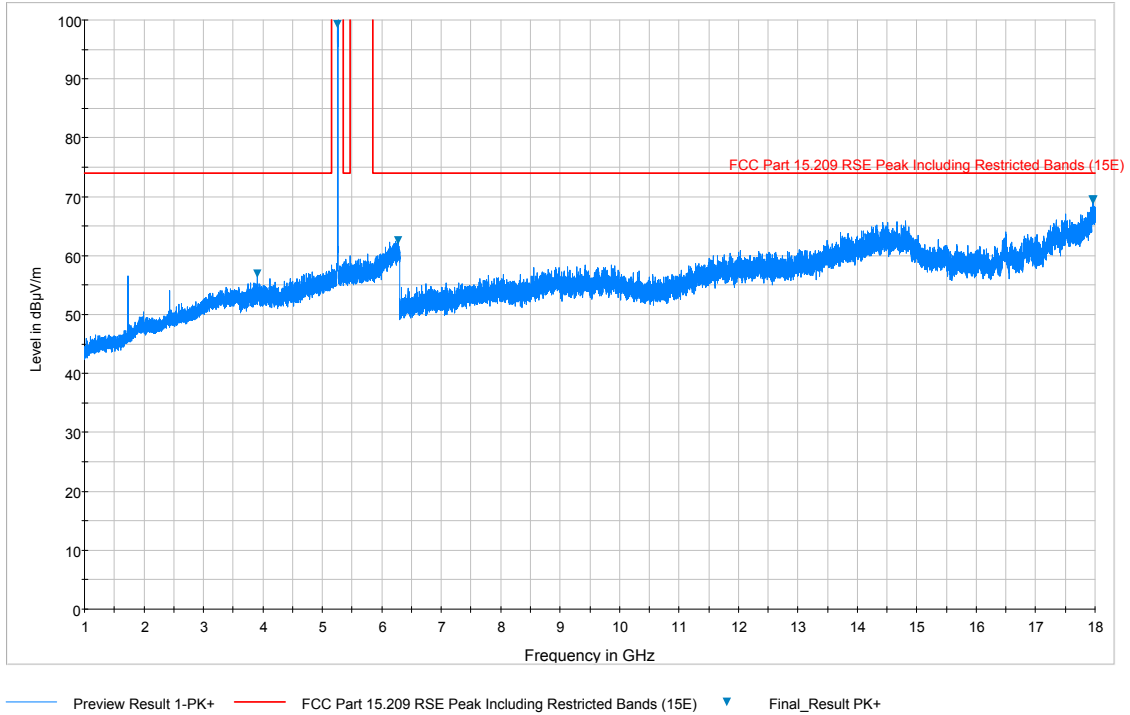


**Plot 7-13. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. H)**

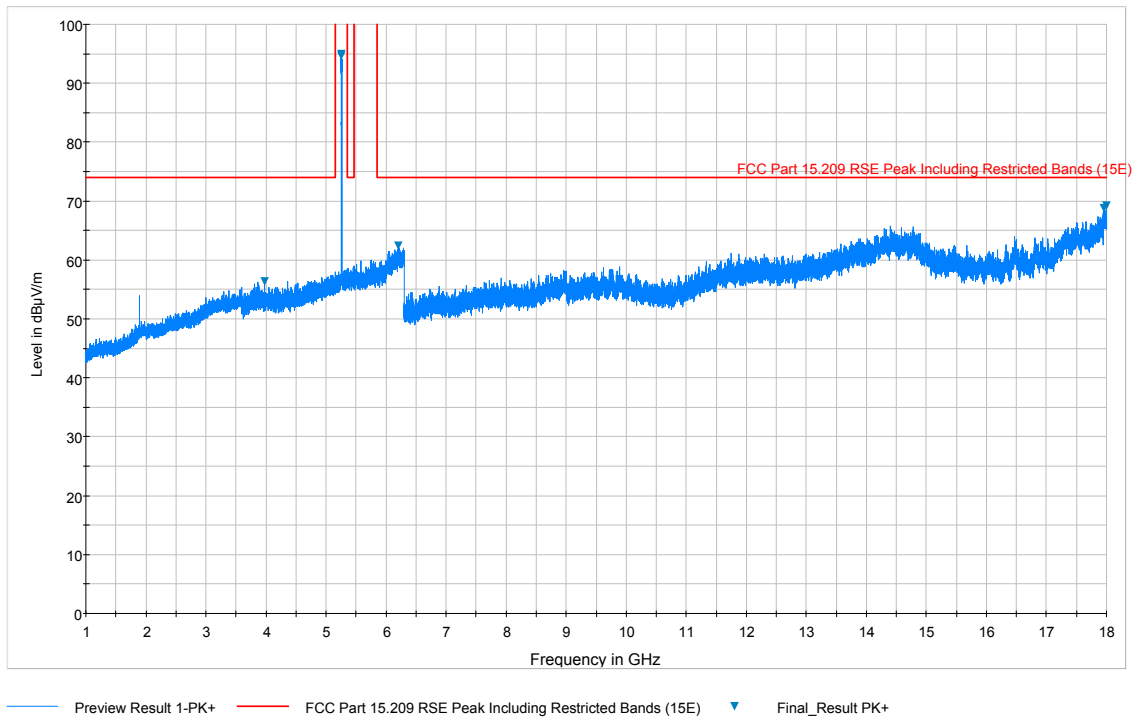


**Plot 7-14. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. V)**

|                                                |                                               |                                                                                            |                |                                        |
|------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------|----------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT</b><br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>1M1703100103-05.A3L | <b>Test Dates:</b><br>3/13 - 3/24/2017        | <b>EUT Type:</b><br>Portable Handset                                                       |                | Page 24 of 51                          |

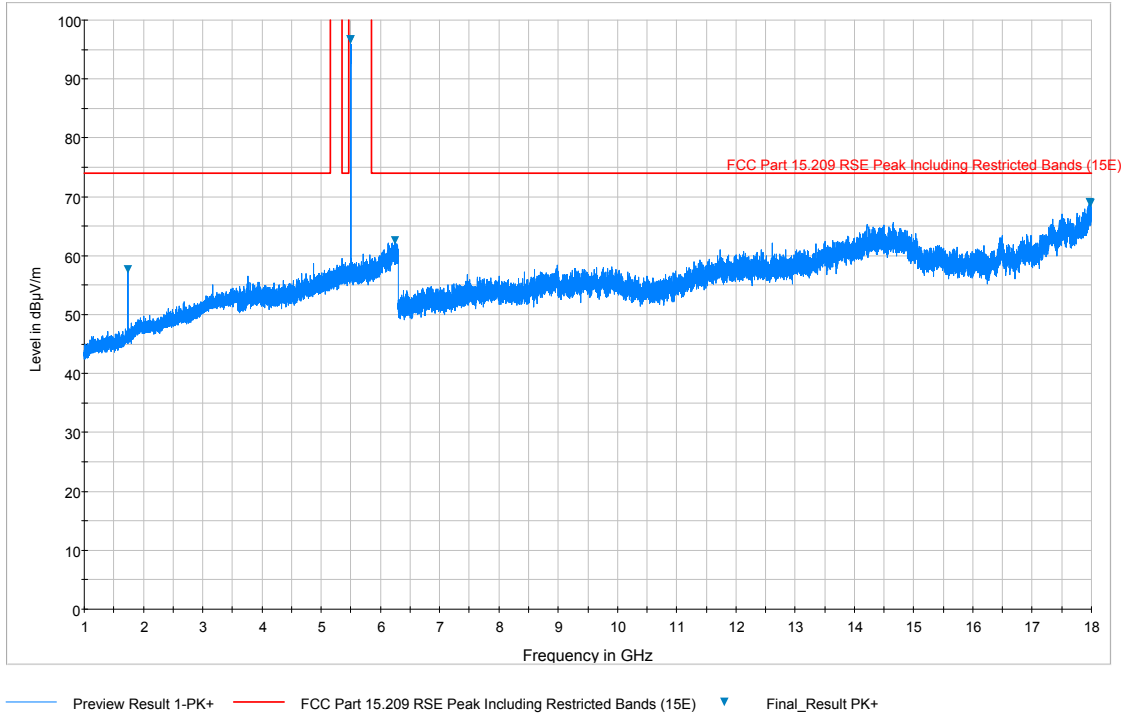


**Plot 7-15. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. H)**

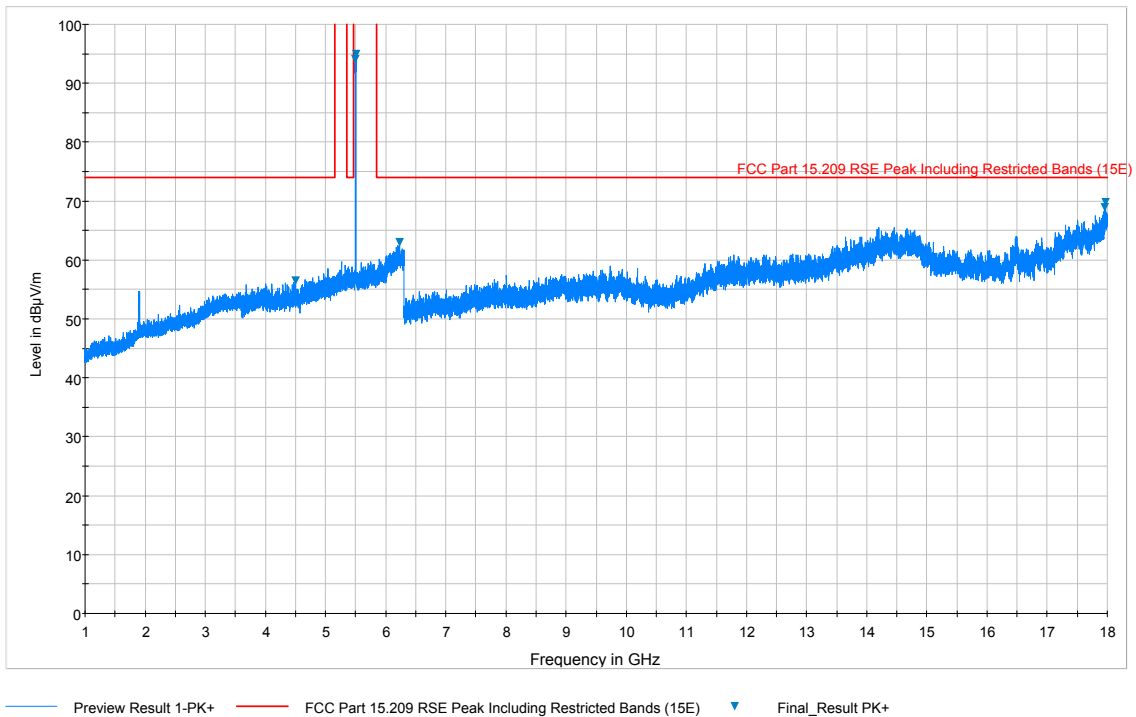


**Plot 7-16. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. V)**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 25 of 51                   |

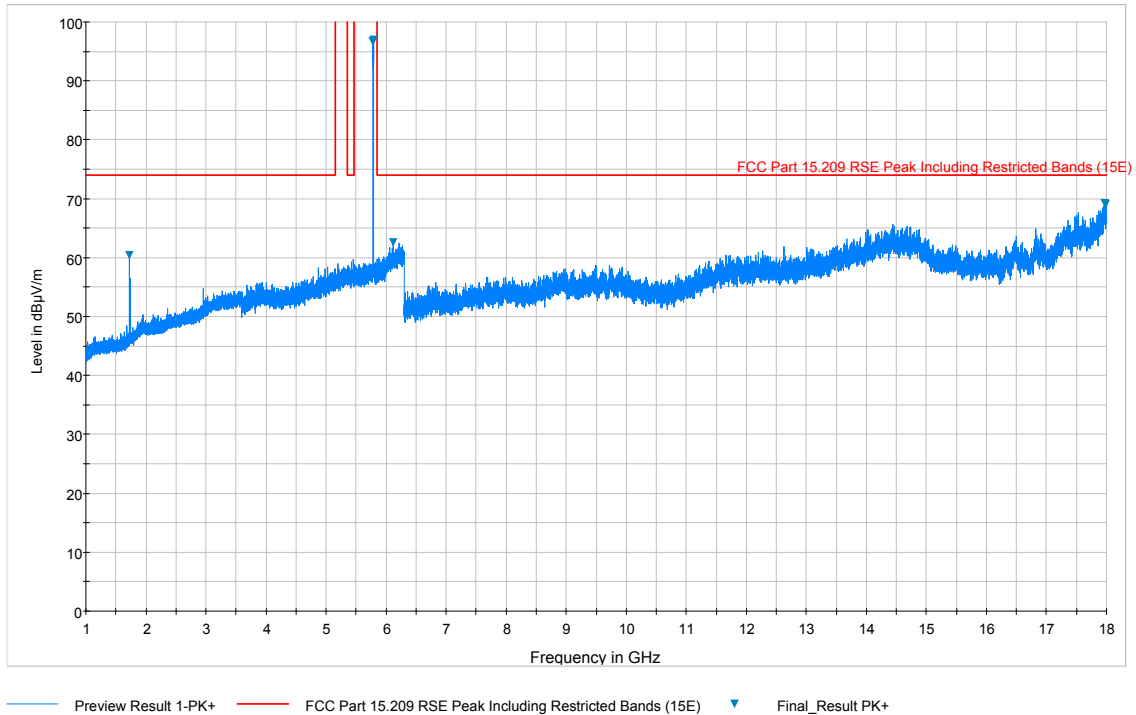


**Plot 7-17. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 116, Ant. Pol. H)**

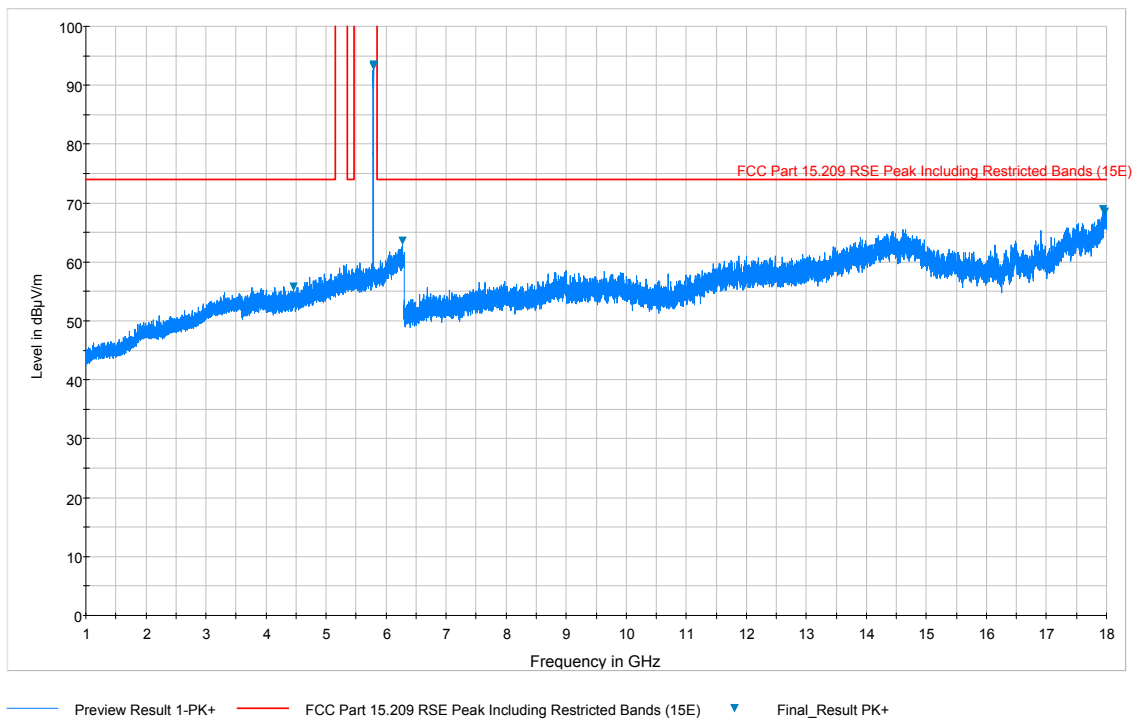


**Plot 7-18. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 116, Ant. Pol. V)**

|                                                |                                               |                                                                                            |                                        |
|------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT</b><br>(CLASS II PERMISSIVE CHANGE) | <b>Approved by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>1M1703100103-05.A3L | <b>Test Dates:</b><br>3/13 - 3/24/2017        | <b>EUT Type:</b><br>Portable Handset                                                       | Page 26 of 51                          |



**Plot 7-19. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. H)**

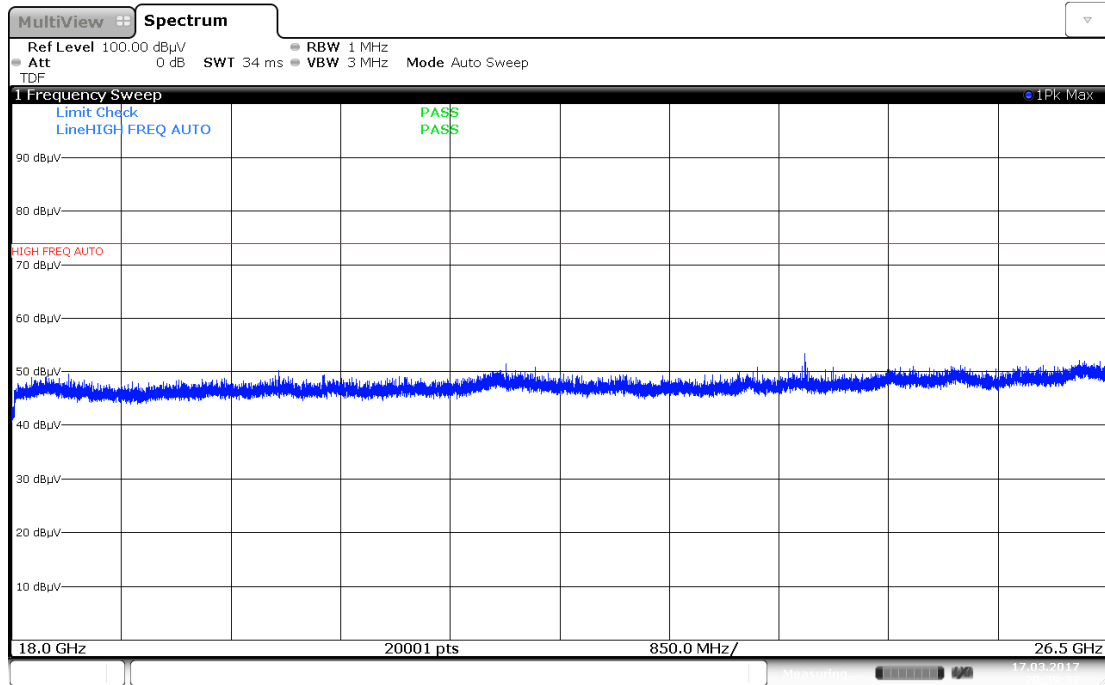


**Plot 7-20. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. V)**

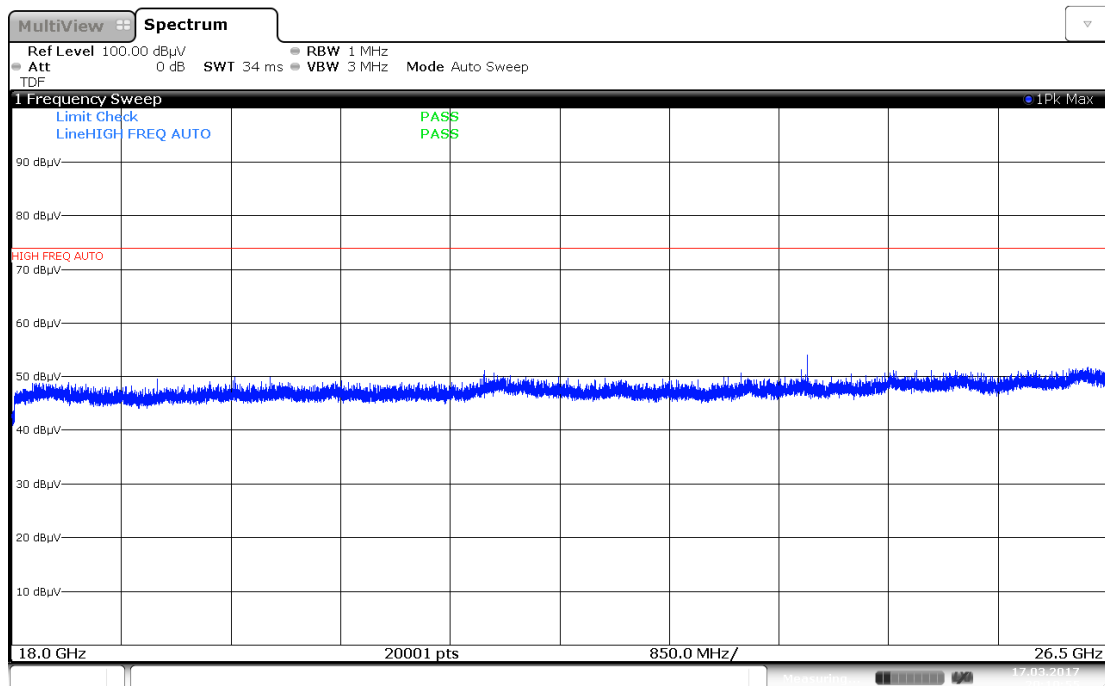
|                                                |                                               |                                                                                            |                |                                        |
|------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------|----------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT</b><br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>1M1703100103-05.A3L | <b>Test Dates:</b><br>3/13 - 3/24/2017        | <b>EUT Type:</b><br>Portable Handset                                                       |                | Page 27 of 51                          |

## Antenna-2 Radiated Spurious Emissions Measurements (Above 18GHz)

**\$15.209**



**Plot 7-21. Radiated Spurious Plot above 18GHz - 26.5GHz (802.11a – Ant. Pol. H)**



**Plot 7-22. Radiated Spurious Plot above 18GHz - 26.5GHz (802.11a – Ant. Pol. V)**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 28 of 51                   |

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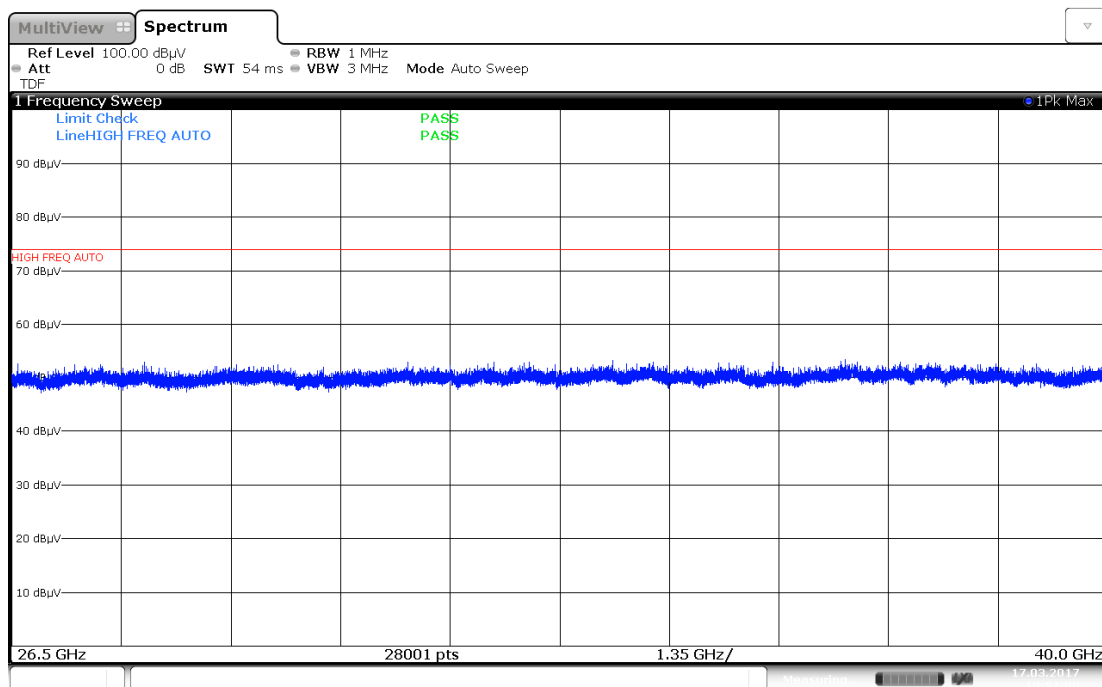
V 6.2

01/09/2016

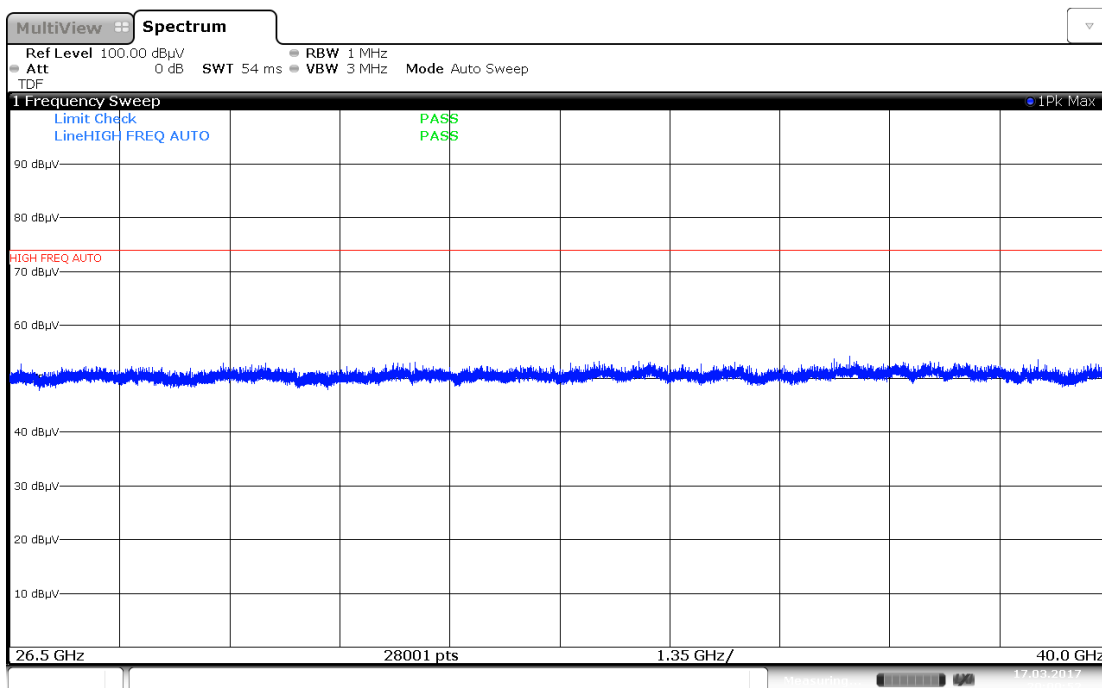
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## Antenna-2 Radiated Spurious Emissions Measurements (Above 18GHz)

**\$15.209**



**Plot 7-23. Radiated Spurious Plot 26.5GHz - 40GHz (802.11a – Ant. Pol. H)**



**Plot 7-24. Radiated Spurious Plot above 26.5GHz - 40GHz (802.11a – Ant. Pol. V)**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 29 of 51                   |

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V 6.2  
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## Antenna-2 Radiated Spurious Emission Measurements

§15.247(d) §15.205 & §15.209

Worst Case Mode: 802.11a  
Worst Case Transfer Rate: 6 Mbps  
Distance of Measurements: 1 & 3 Meters  
Operating Frequency: 5500MHz  
Channel: 100

| Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Distance Correction Factor [dB] | Field Strength [dBμV/m] | Limit [dBμV/m] | Margin [dB] |
|-----------------|----------|-----------------|---------------------|----------------------------|----------------------|-------------|---------------------------------|-------------------------|----------------|-------------|
| * 11000.00      | Average  | H               | -                   | -                          | -72.84               | 12.94       | 0.00                            | 47.10                   | 53.98          | -6.88       |
| * 11000.00      | Peak     | H               | -                   | -                          | -61.39               | 12.94       | 0.00                            | 58.55                   | 73.98          | -15.43      |
| 16500.00        | Peak     | H               | -                   | -                          | -59.91               | 18.08       | 0.00                            | 65.17                   | 68.20          | -3.03       |
| 22000.00        | Peak     | H               | -                   | -                          | -57.98               | 8.35        | -9.54                           | 47.82                   | 68.20          | -20.38      |
| 27500.00        | Peak     | H               | -                   | -                          | -46.31               | -8.93       | -9.54                           | 42.22                   | 68.20          | -25.98      |

**Table 7-5. Radiated Measurements**

Worst Case Mode: 802.11a  
Worst Case Transfer Rate: 6 Mbps  
Distance of Measurements: 1 & 3 Meters  
Operating Frequency: 5500MHz  
Channel: 100

| Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Distance Correction Factor [dB] | Field Strength [dBμV/m] | Limit [dBμV/m] | Margin [dB] |
|-----------------|----------|-----------------|---------------------|----------------------------|----------------------|-------------|---------------------------------|-------------------------|----------------|-------------|
| * 11000.00      | Average  | H               | -                   | -                          | -72.68               | 12.94       | 0.00                            | 47.26                   | 53.98          | -6.72       |
| * 11000.00      | Peak     | H               | -                   | -                          | -62.13               | 12.94       | 0.00                            | 57.81                   | 73.98          | -16.17      |
| 16500.00        | Peak     | H               | -                   | -                          | -60.14               | 18.08       | 0.00                            | 64.94                   | 68.20          | -3.26       |
| 22000.00        | Peak     | H               | -                   | -                          | -58.65               | 8.35        | -9.54                           | 47.15                   | 68.20          | -21.05      |
| 27500.00        | Peak     | H               | -                   | -                          | -47.25               | -8.93       | -9.54                           | 41.28                   | 68.20          | -26.92      |

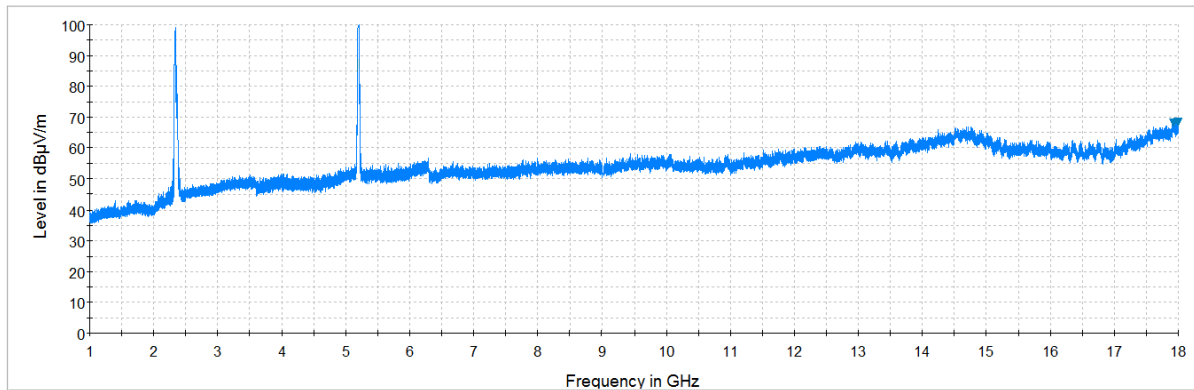
**Table 7-6. Radiated Measurements with WCP**

|                                         |                                                                                     |                                                                                     |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMG950N                      |  | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017                                                     | EUT Type:<br>Portable Handset                                                       |                                                                                       | Page 30 of 51                   |

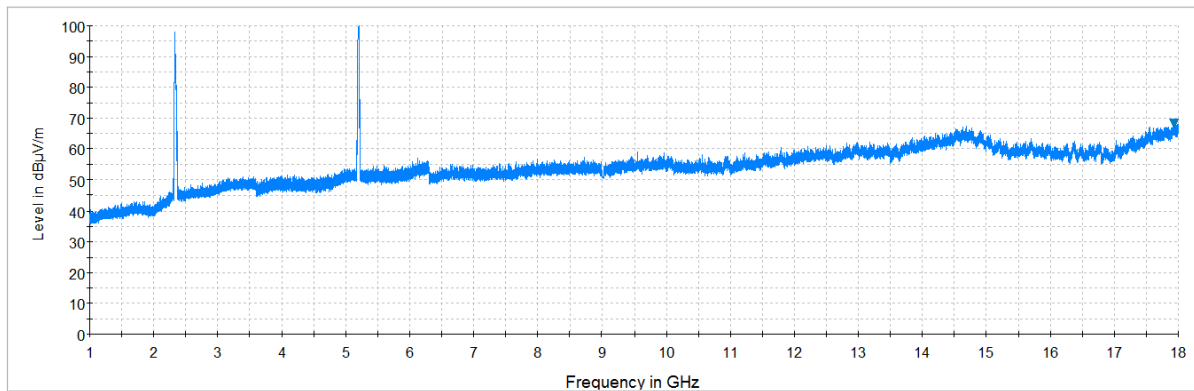
### 7.7.3 Simultaneous Tx Radiated Spurious Emissions Measurements §15.247(d) §15.205 & §15.209

| Description              | 2.4 GHz Emission | 5 GHz Emission |
|--------------------------|------------------|----------------|
| Antenna                  | 1                | 2              |
| Channel                  | 11               | 52             |
| Operating Frequency(MHz) | 2462             | 5260           |
| Data Rate (Mbps)         | 1                | 6              |
| Mode                     | 802.11b          | 802.11a        |

**Table 7-7. Simultaneous Transmission Config-1**

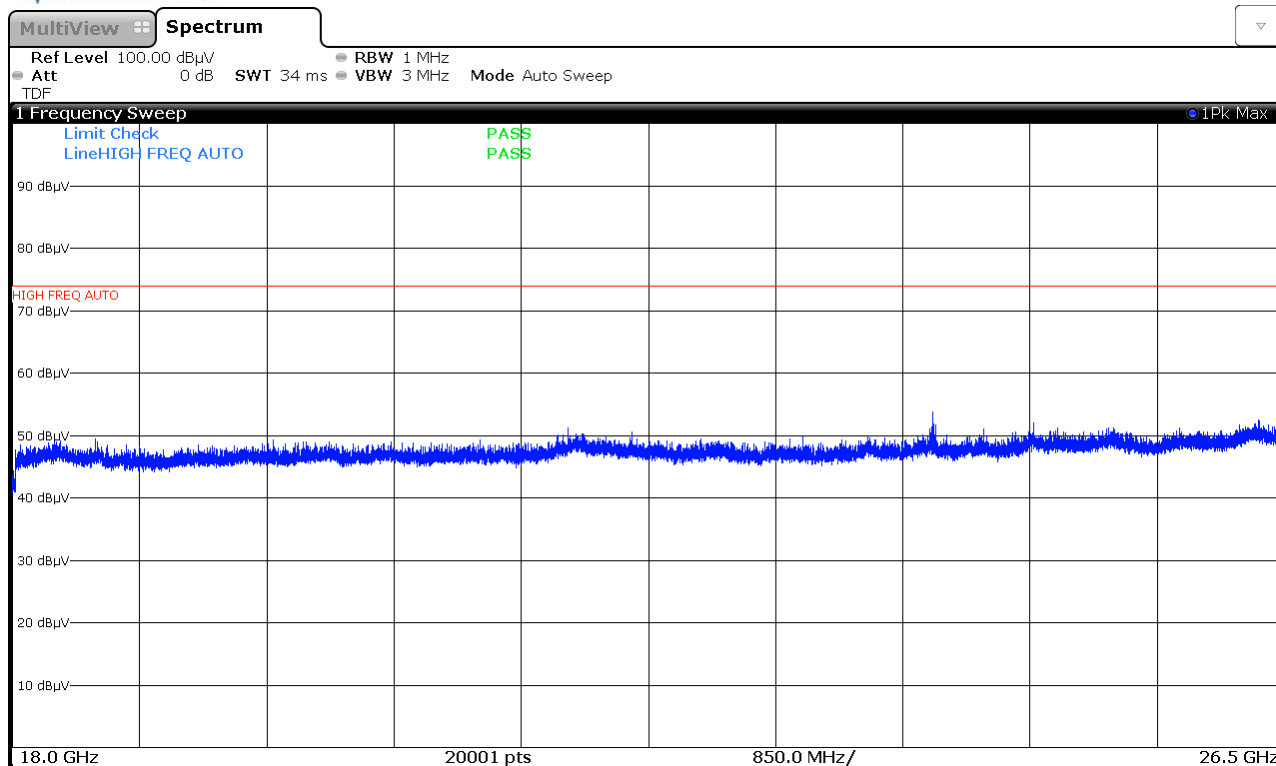


**Plot 7-25. Radiated Spurious Plot above 1GHz (2.4GHz – 5GHz, Ant. Pol. H)**

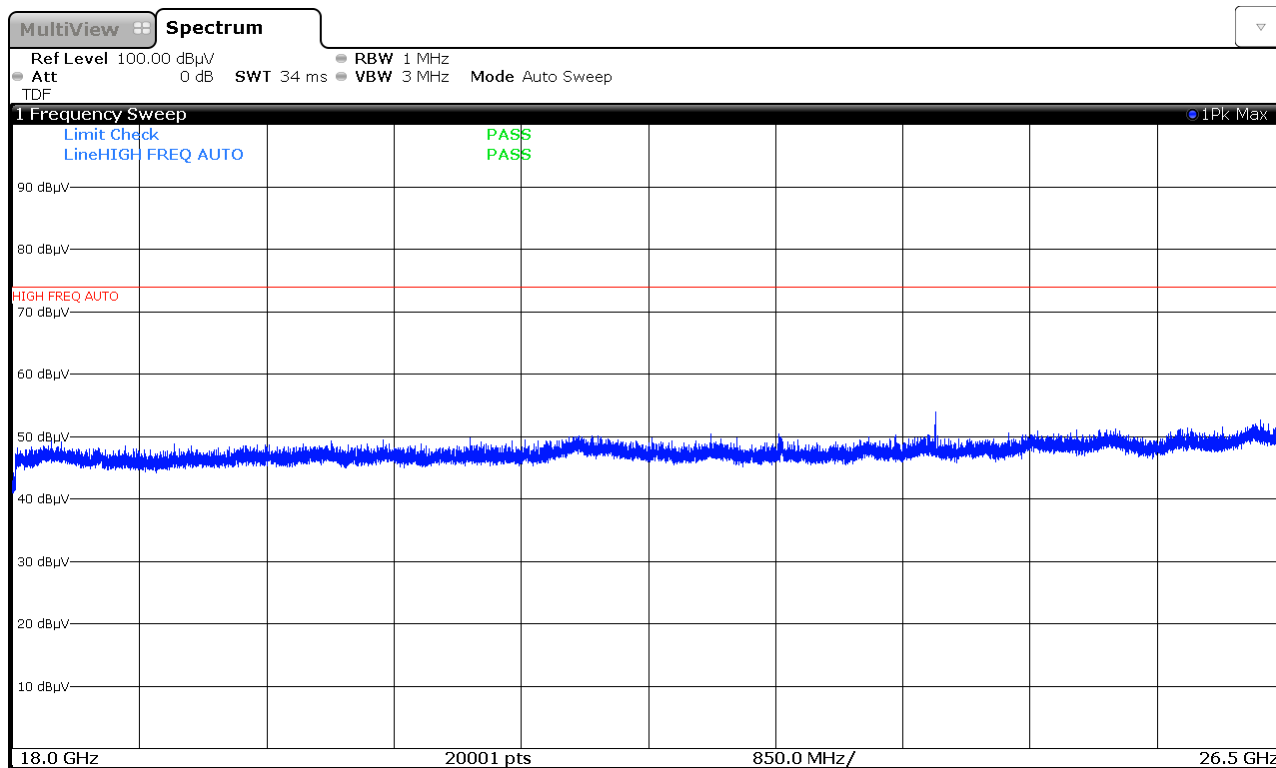


**Plot 7-26. Radiated Spurious Plot above 1GHz (2.4GHz – 5GHz, Ant. Pol. V)**

|                                                |                                               |                                                                                             |                |                                        |
|------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------|----------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br/>(CLASS II PERMISSIVE CHANGE)</b> | <b>SAMSUNG</b> | <b>Approved by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>1M1703100103-05.A3L | <b>Test Dates:</b><br>3/13 - 3/24/2017        | <b>EUT Type:</b><br>Portable Handset                                                        |                | Page 31 of 51                          |

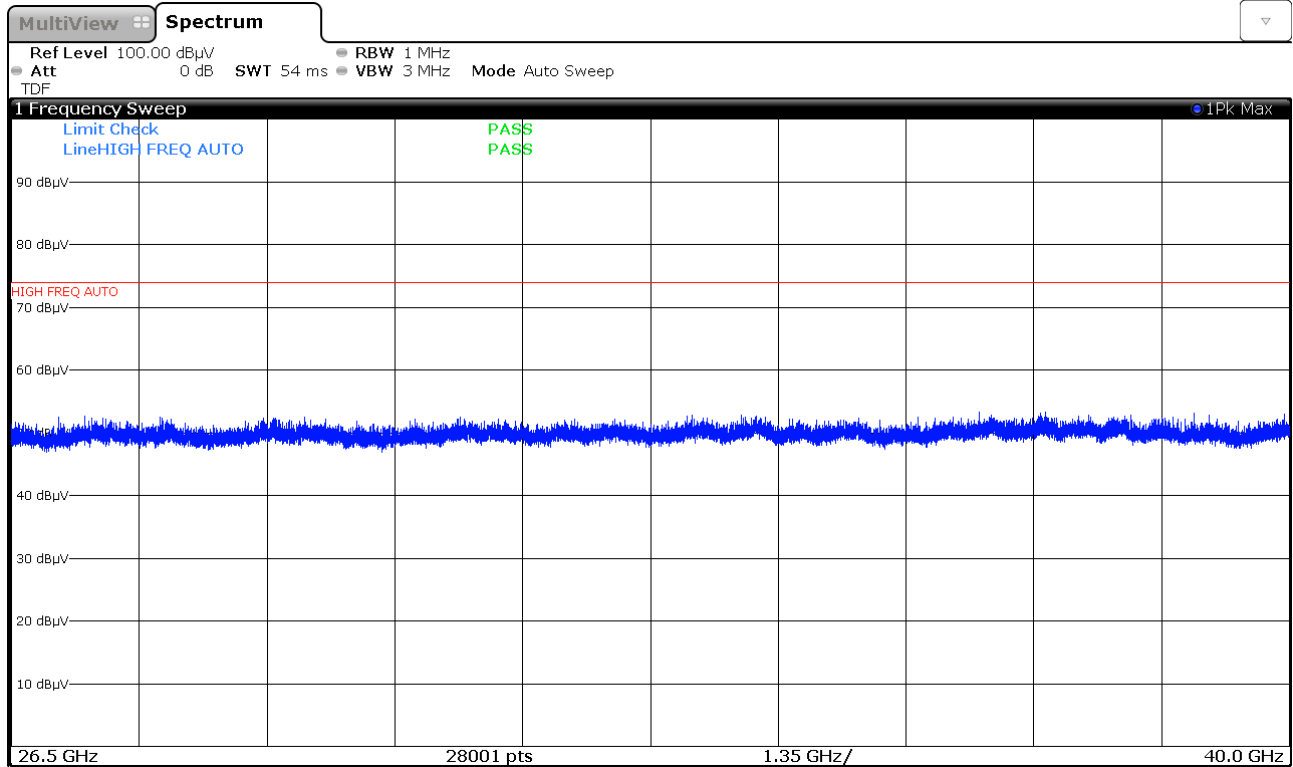


**Plot 7-27. Radiated Spurious Plot 18GHz – 26.5GHz (Config-1 RSDB, Ant. Pol. H)**

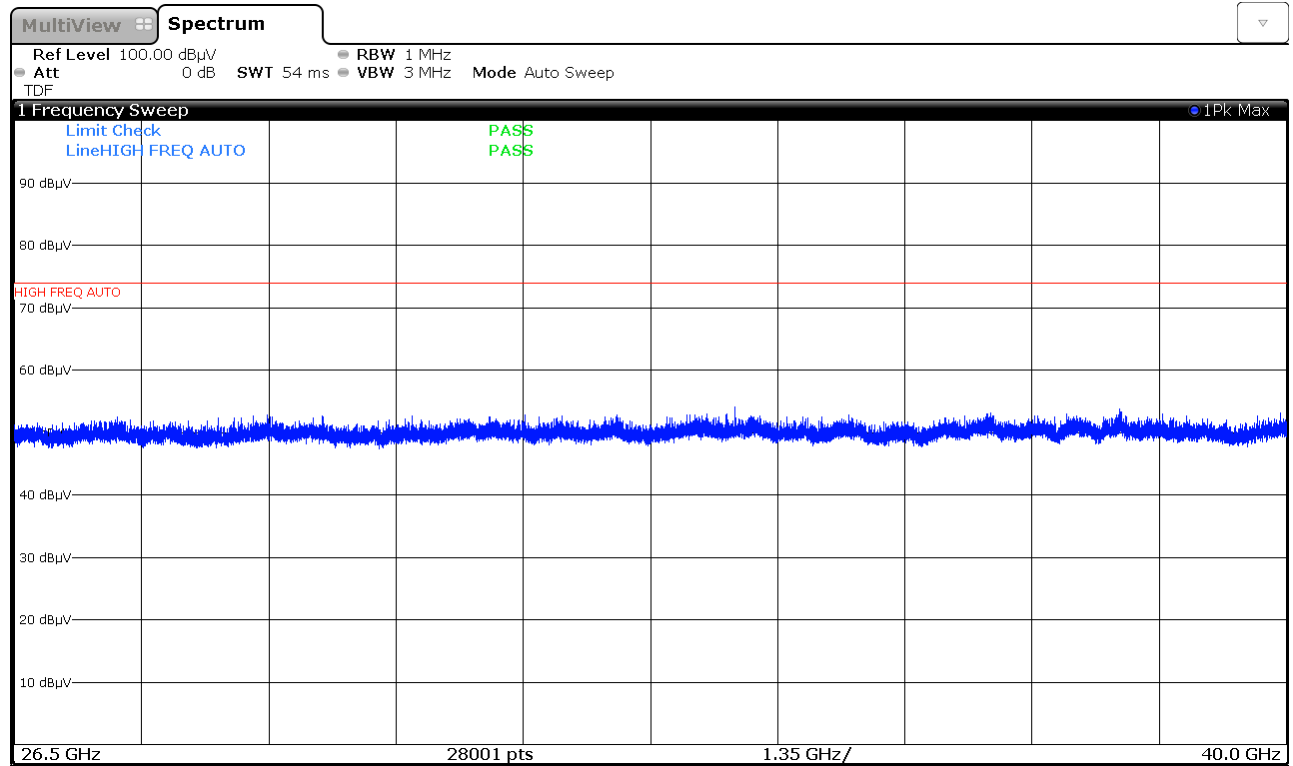


**Plot 7-28. Radiated Spurious Plot 18GHz – 26.5GHz (Config-1 RSDB, Ant. Pol. V)**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 32 of 51                   |



**Plot 7-29. Radiated Spurious Plot above 26.5GHz (Config-1 RSDB, Ant. Pol. H)**

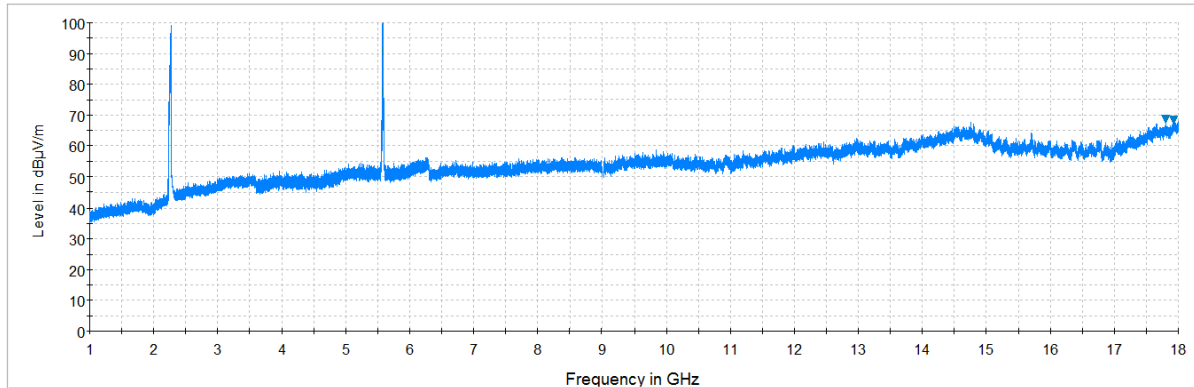


**Plot 7-30. Radiated Spurious Plot above 26.5GHz (Config-1 RSDB, Ant. Pol. V)**

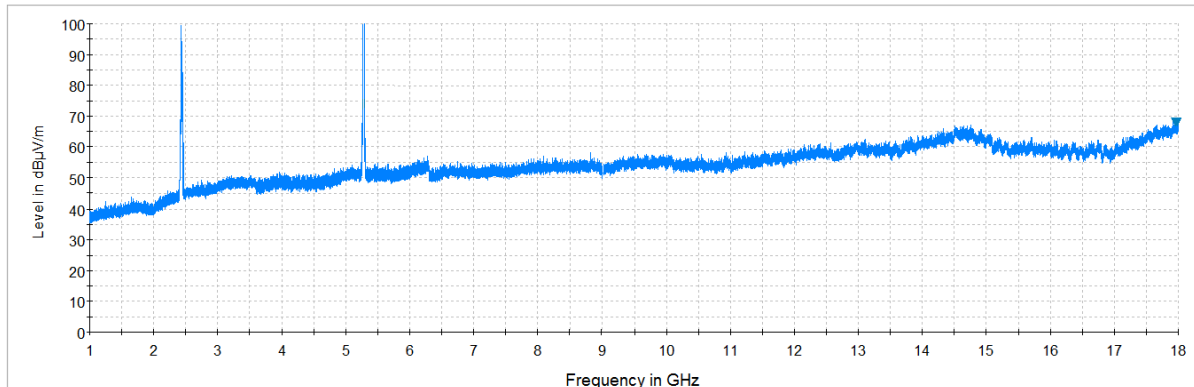
|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 33 of 51                   |

| Description              | 5 GHz Emission | 2.4 GHz Emission |
|--------------------------|----------------|------------------|
| Antenna                  | 1              | 2                |
| Channel                  | 120            | 6                |
| Operating Frequency(MHz) | 5600           | 2437             |
| Data Rate (Mbps)         | 6              | 1                |
| Mode                     | 802.11a        | 802.11b          |

**Table 7-8. Simultaneous Transmission Config-2**

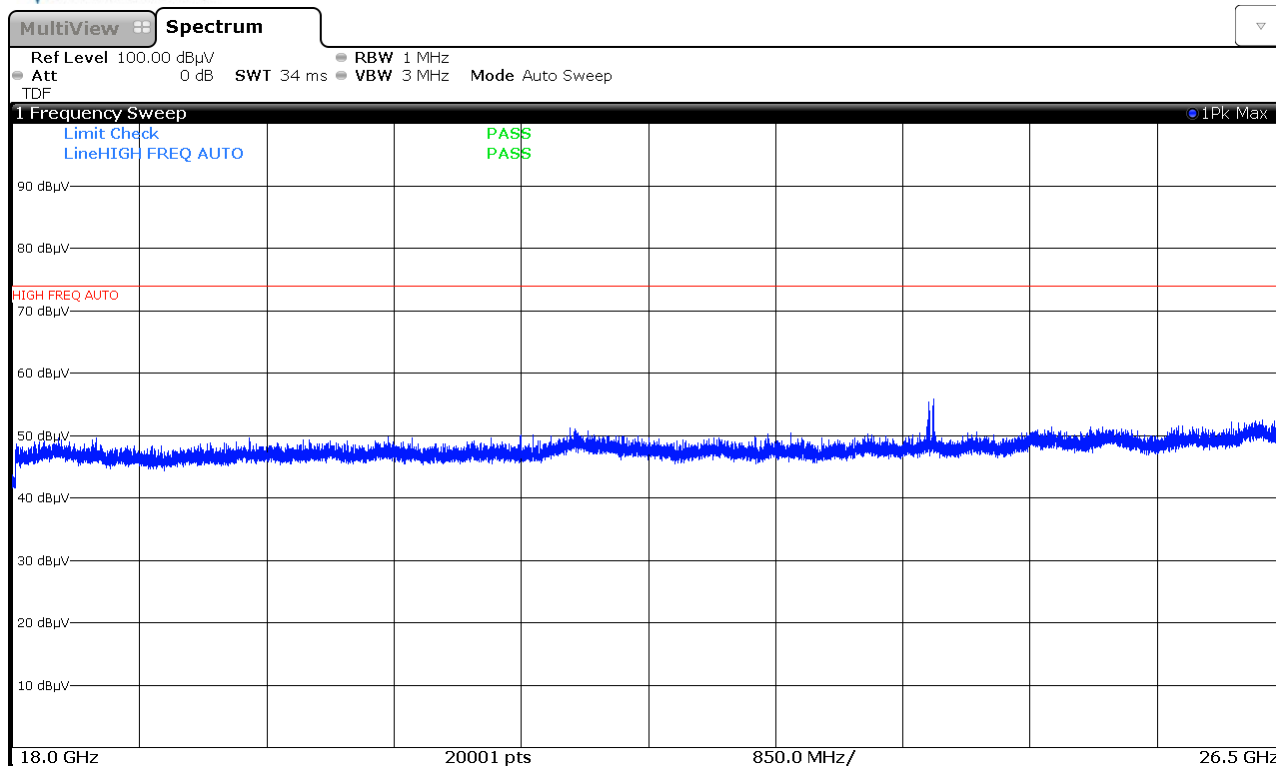


**Plot 7-31. Radiated Spurious Plot above 1GHz (5GHz – 2.4 GHz, Ant. Pol. H)**

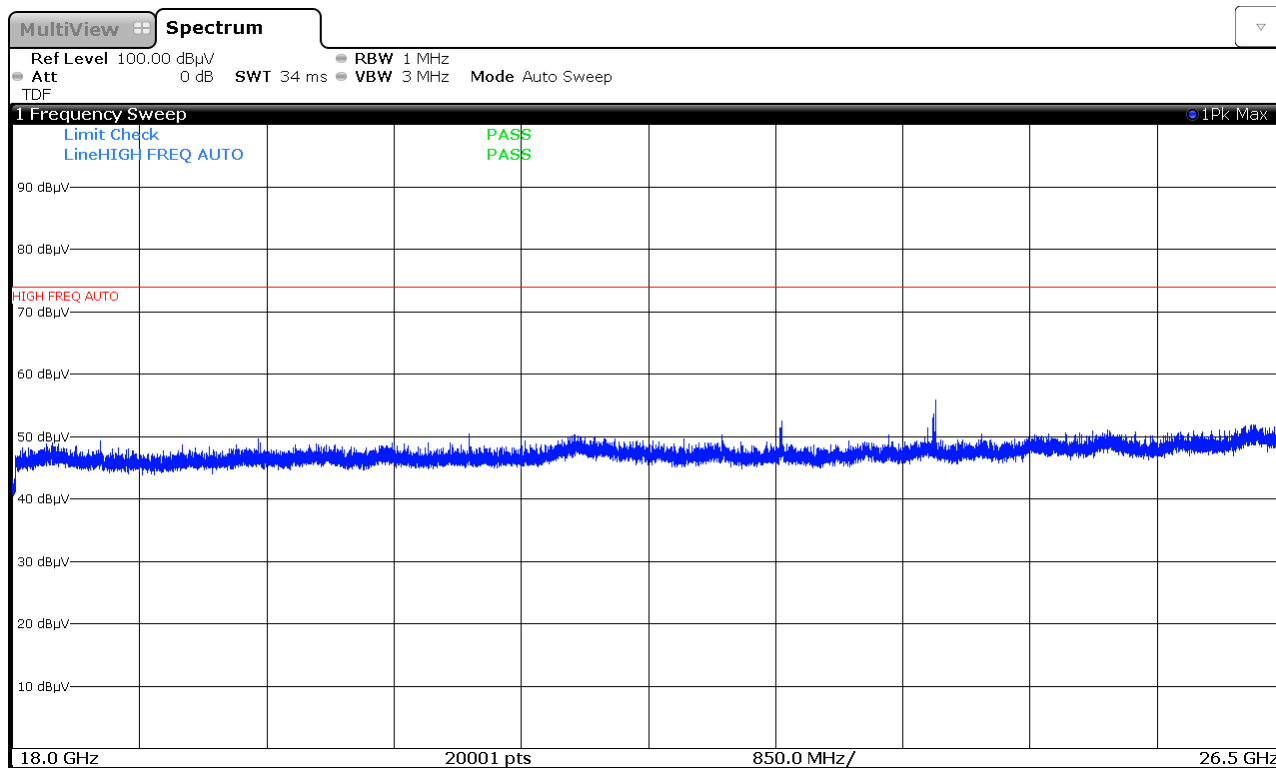


**Plot 7-32. Radiated Spurious Plot above 1GHz (5GHz – 2.4 GHz, Ant. Pol. V)**

|                                                |                                               |                                                                                             |                |                                        |
|------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------|----------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br/>(CLASS II PERMISSIVE CHANGE)</b> | <b>SAMSUNG</b> | <b>Approved by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>1M1703100103-05.A3L | <b>Test Dates:</b><br>3/13 - 3/24/2017        | <b>EUT Type:</b><br>Portable Handset                                                        |                | Page 34 of 51                          |

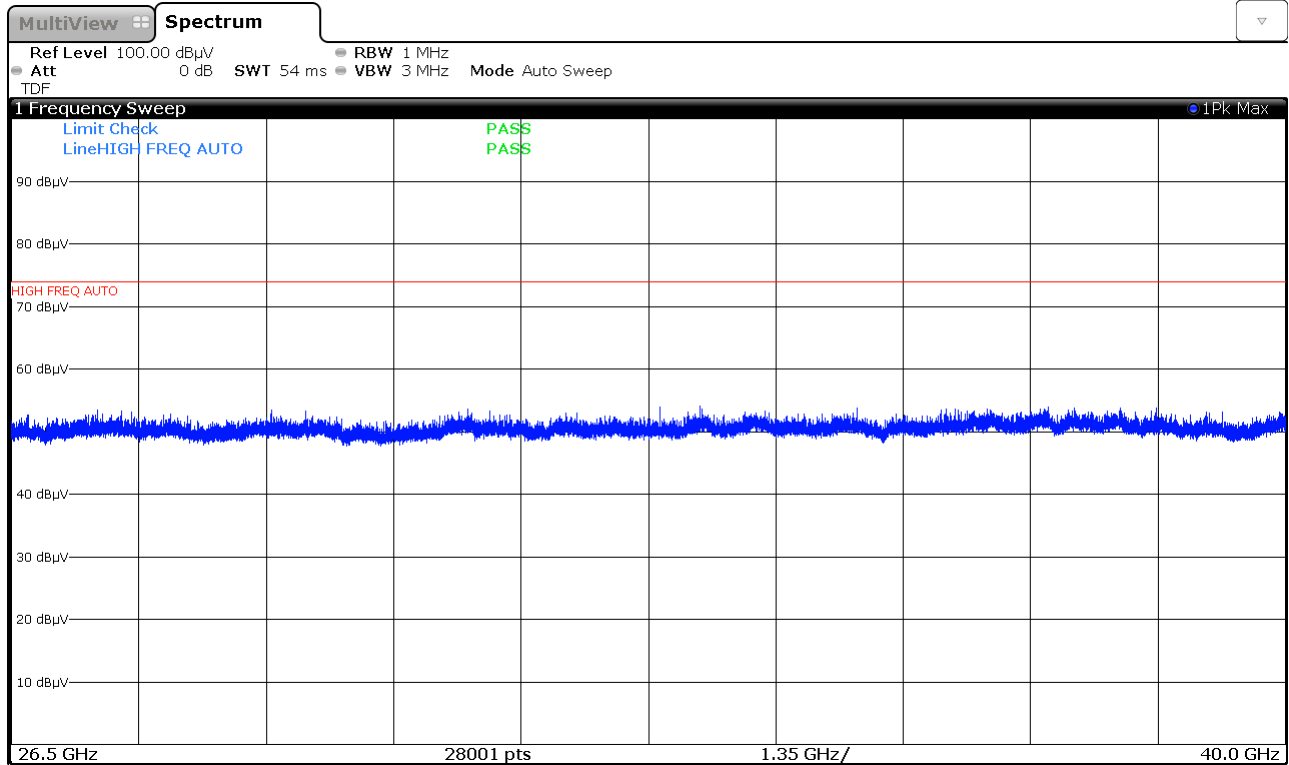


**Plot 7-33. Radiated Spurious Plot 18GHz – 26.5GHz (Config-2 RSDB, Ant. Pol. H)**

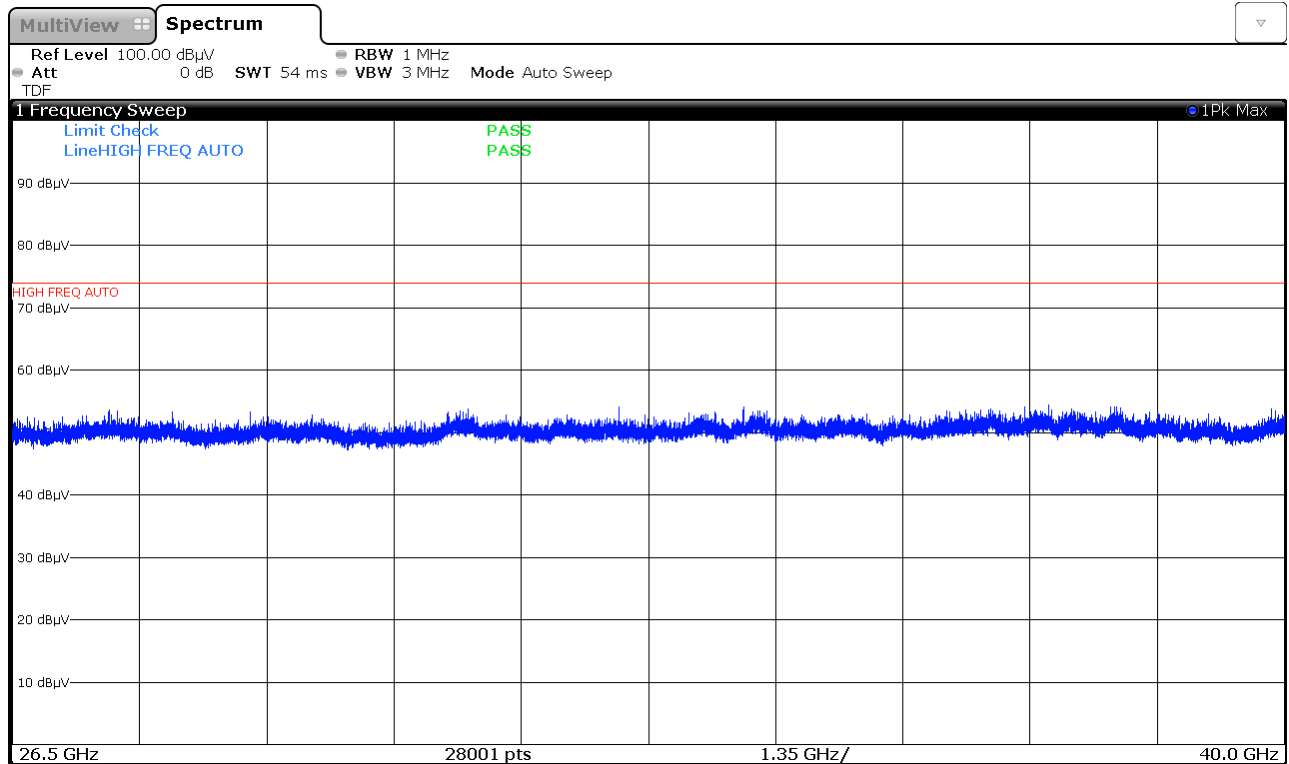


**Plot 7-34. Radiated Spurious Plot 18GHz – 26.5GHz (Config-2 RSDB, Ant. Pol. V)**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 35 of 51                   |



**Plot 7-35. Radiated Spurious Plot above 26.5GHz (Config-2 RSDB, Ant. Pol. H)**

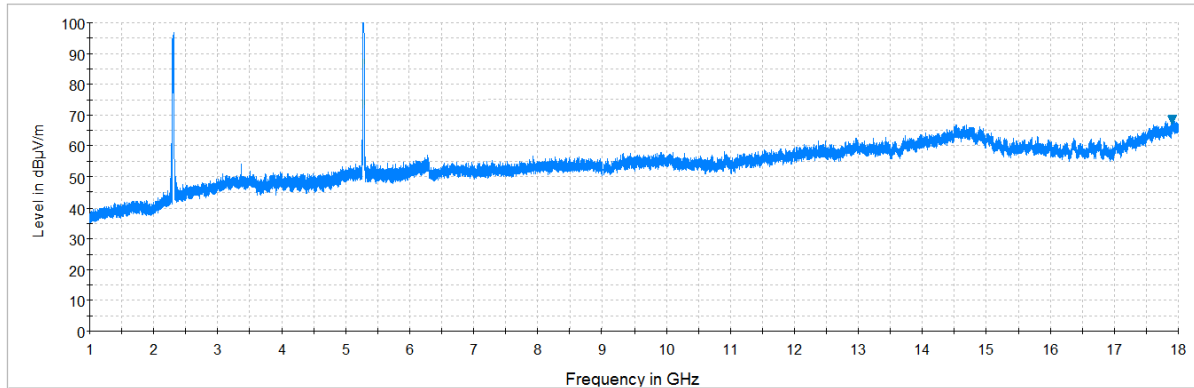


**Plot 7-36. Radiated Spurious Plot above 26.5GHz (Config-2 RSDB, Ant. Pol. V)**

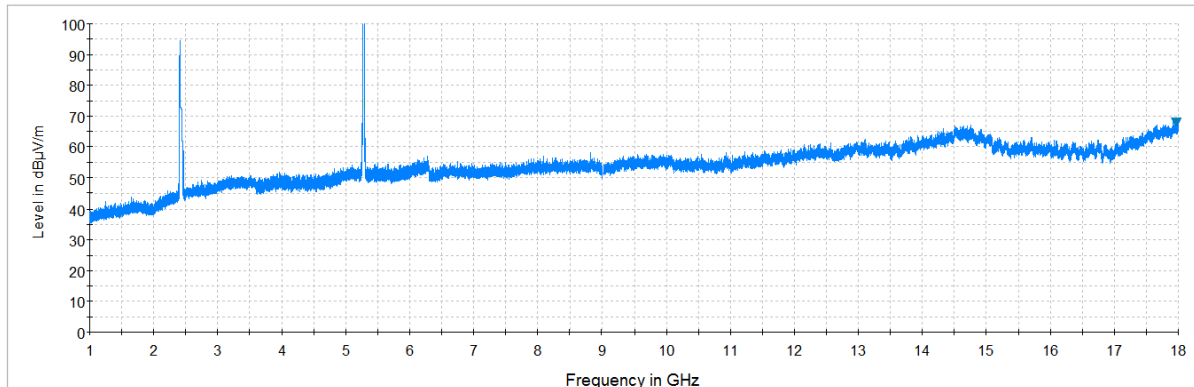
|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 36 of 51                   |

| Description              | 2.4 GHz Emission | 5 GHz Emission |
|--------------------------|------------------|----------------|
| Antenna                  | 1, 2             | 1, 2           |
| Channel                  | 1                | 64             |
| Operating Frequency(MHz) | 2412             | 5320           |
| Data Rate (Mbps)         | MCS0             | 6              |
| Mode                     | 802.11g/n        | 802.11a/n/ac   |

**Table 7-9. Simultaneous Transmission MIMO**

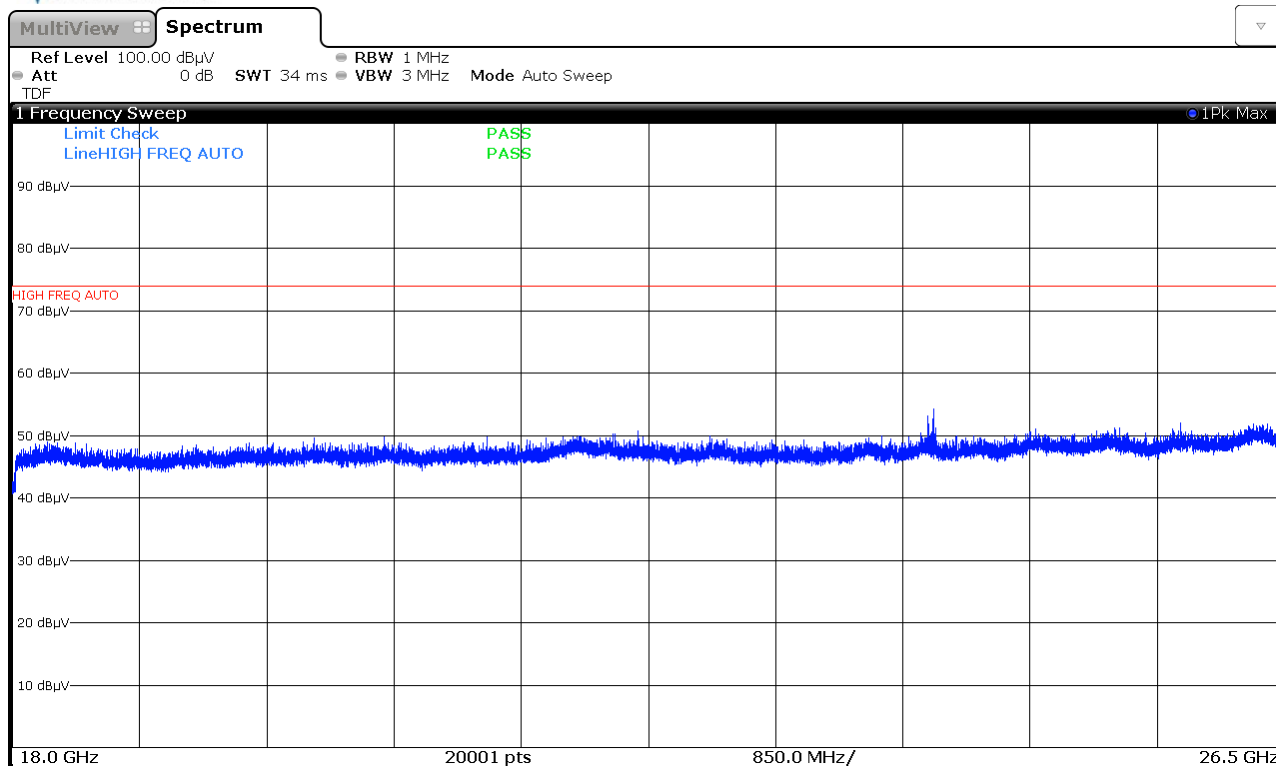


**Plot 7-37. Radiated Spurious Plot above 1GHz (MIMO RSDB, Ant. Pol. H)**

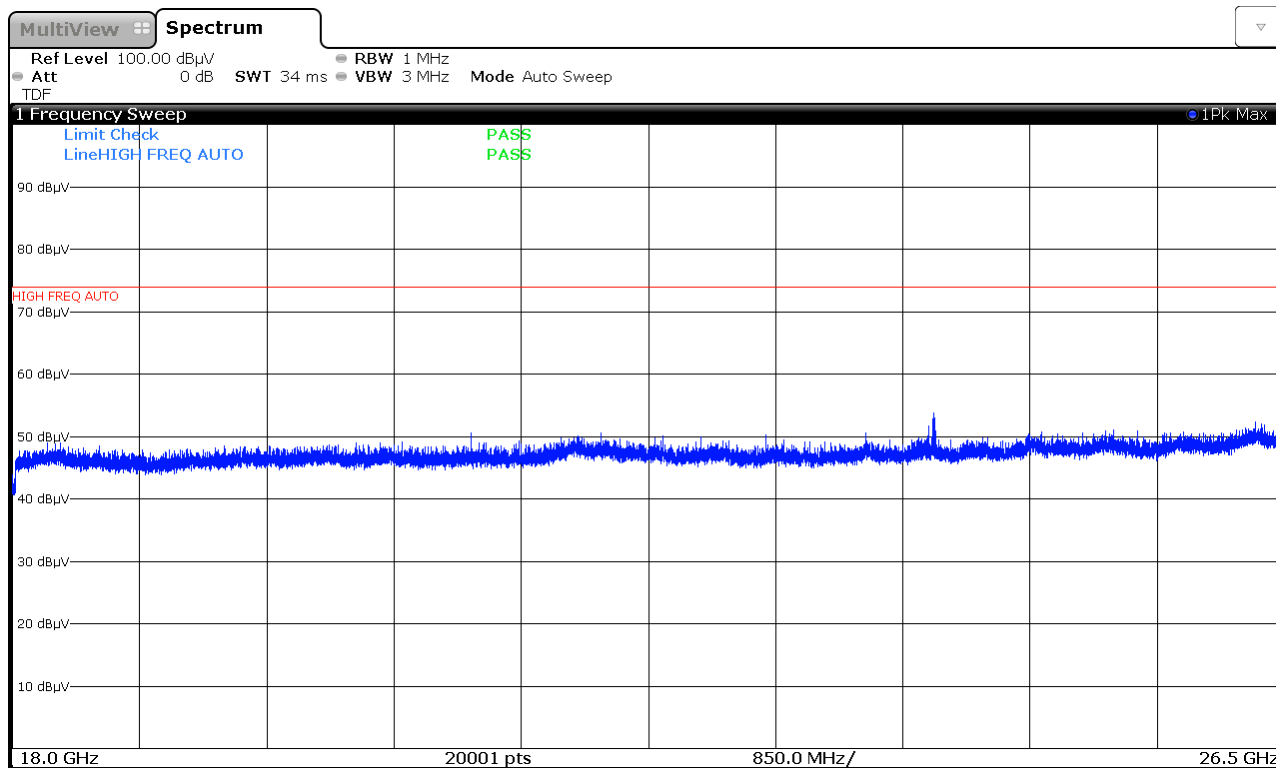


**Plot 7-38. Radiated Spurious Plot above 1GHz (MIMO RSDB, Ant. Pol. V)**

|                                                |                                               |                                                                                             |                |                                        |
|------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------|----------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br/>(CLASS II PERMISSIVE CHANGE)</b> | <b>SAMSUNG</b> | <b>Approved by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>1M1703100103-05.A3L | <b>Test Dates:</b><br>3/13 - 3/24/2017        | <b>EUT Type:</b><br>Portable Handset                                                        |                | Page 37 of 51                          |

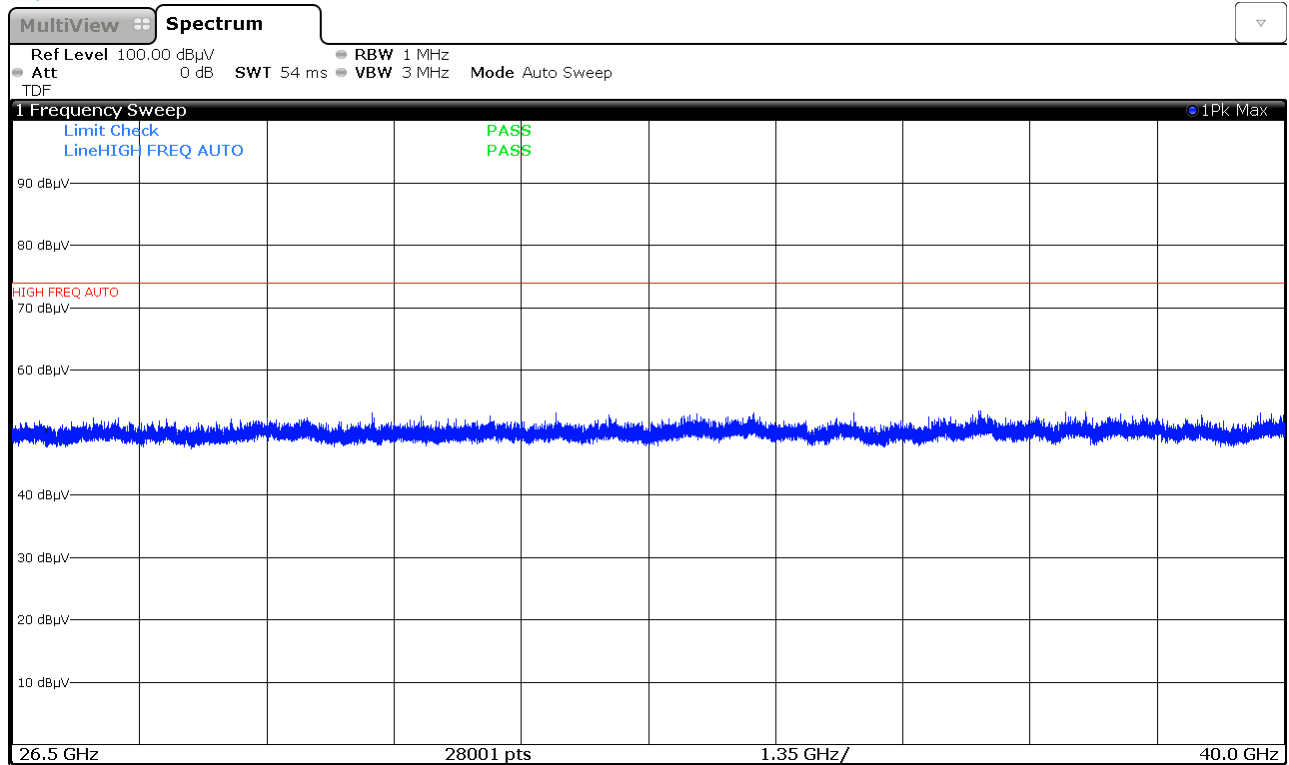


**Plot 7-39. Radiated Spurious Plot 18GHz – 26.5GHz (MIMO RSDB, Ant. Pol. H)**

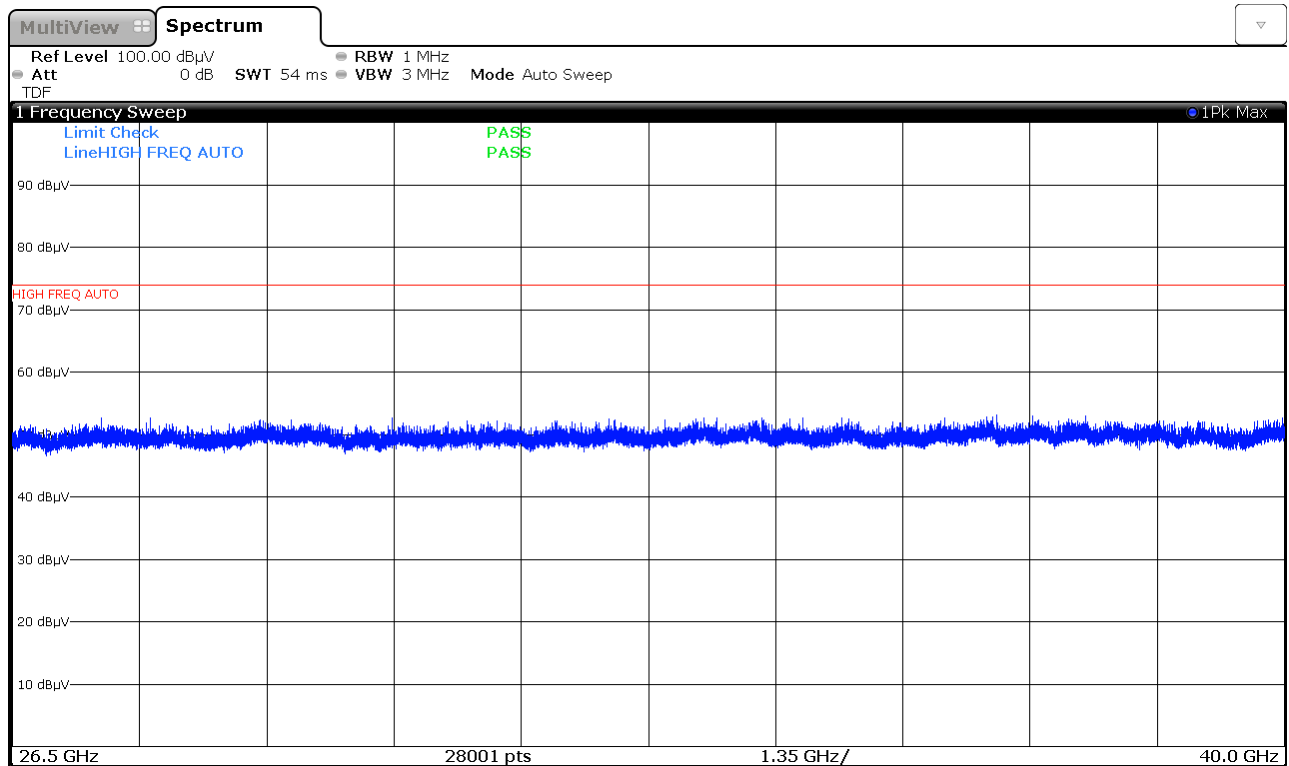


**Plot 7-40. Radiated Spurious Plot 18GHz – 26.5GHz (MIMO RSDB, Ant. Pol. V)**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 38 of 51                   |



**Plot 7-41. Radiated Spurious Plot above 26.5GHz (MIMO RSDB, Ant. Pol. H)**



**Plot 7-42. Radiated Spurious Plot above 26.5GHz (MIMO RSDB, Ant. Pol. V)**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 39 of 51                   |

## 7.7.4 Antenna-1 Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

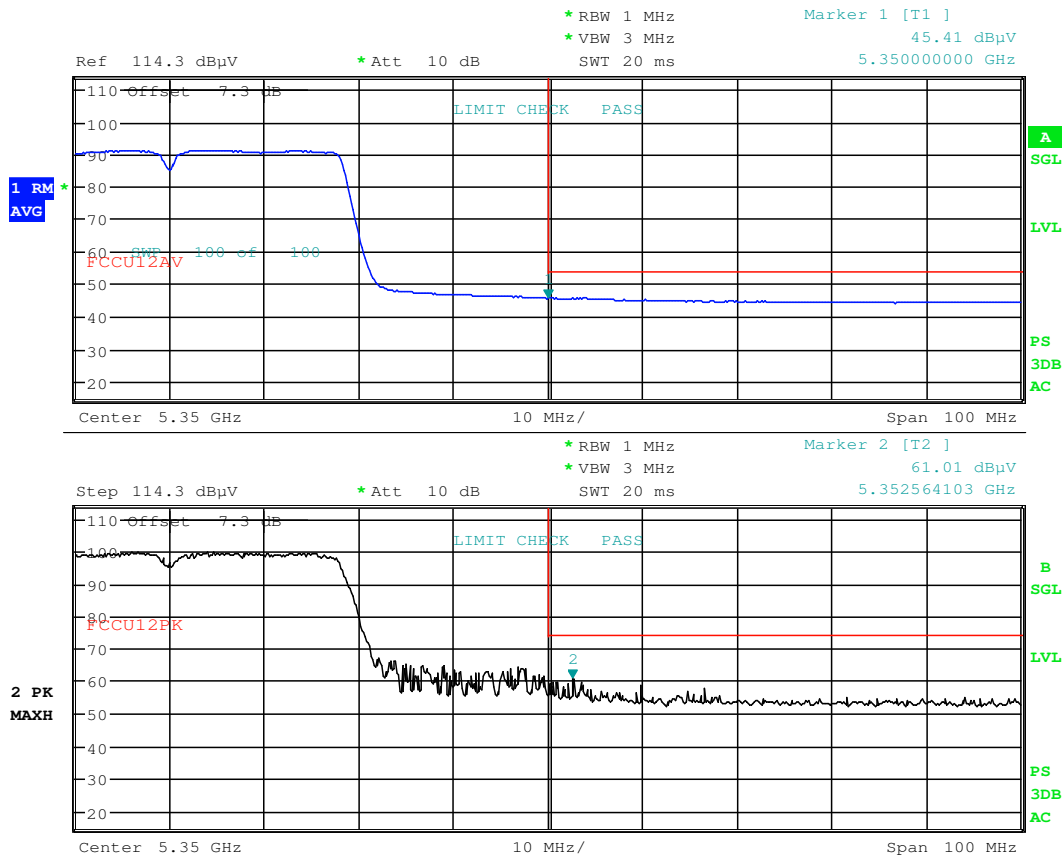
Worst Case Mode: 802.11n

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5310MHz

Channel: 62



Date: 15.MAR.2017 15:18:17

**Plot 7-43. Radiated Restricted Upper Band Edge Plot (Average & Peak – UNII Band 2A)**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 40 of 51                   |

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## Antenna-1 WCP Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

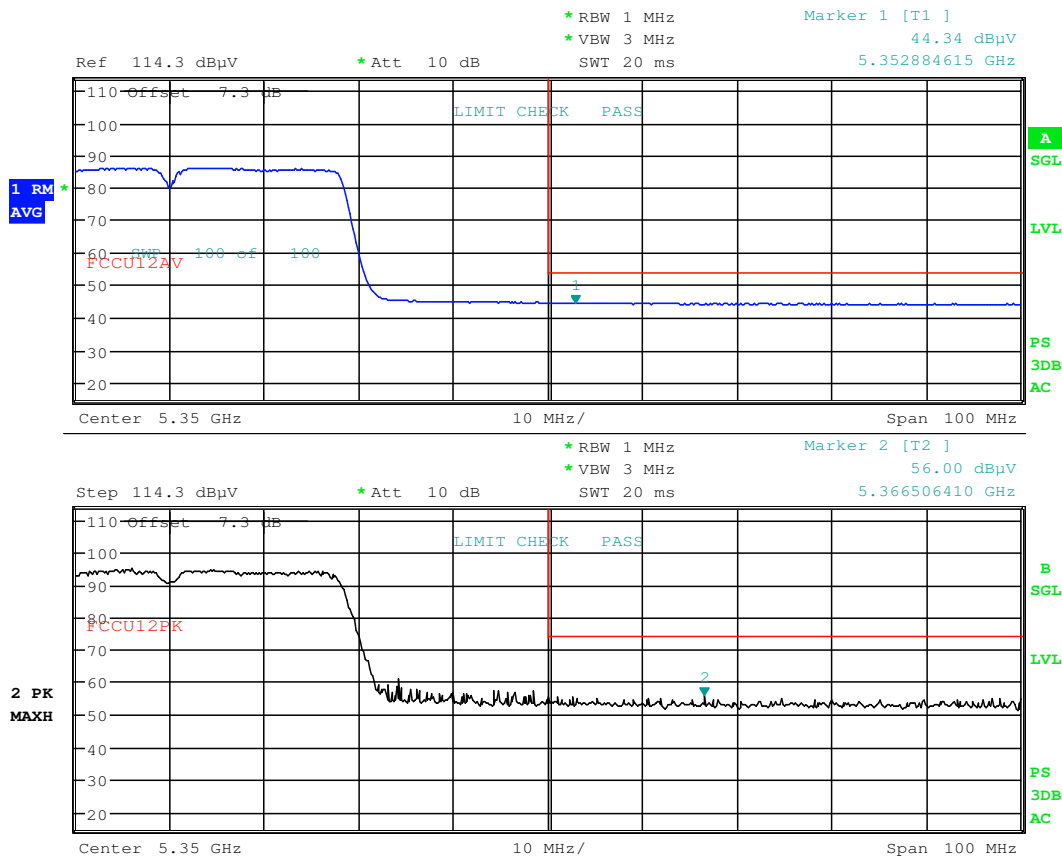
Worst Case Mode: 802.11n

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5310MHz

Channel: 62



Date: 15.MAR.2017 15:32:51

**Plot 7-44. Radiated Restricted Band Edge Plot with WCP**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 41 of 51                   |

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## 7.7.5 Antenna-2 Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

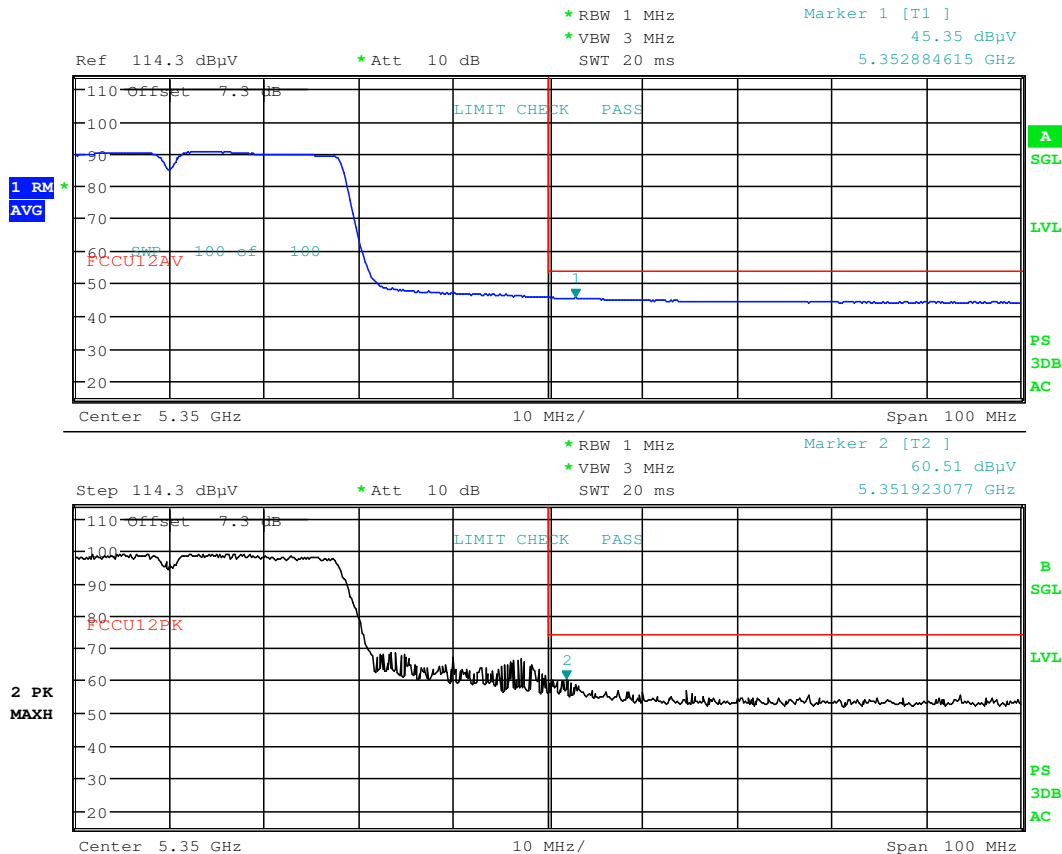
Worst Case Mode: 802.11n

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5310MHz

Channel: 62



Date: 15.MAR.2017 15:46:26

**Plot 7-45. Radiated Restricted Upper Band Edge Plot (Average & Peak – UNII Band 2A)**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 42 of 51                   |

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## Antenna-2 WCP Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

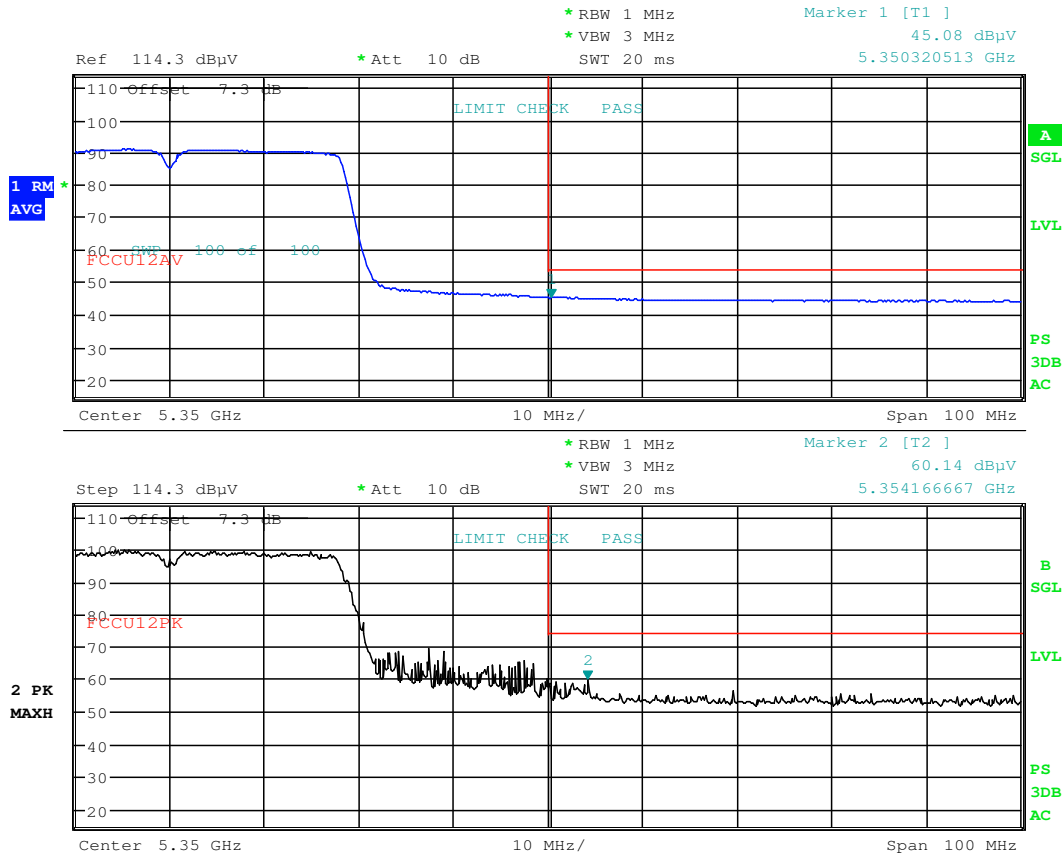
Worst Case Mode: 802.11n

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5310MHz

Channel: 62



Date: 15.MAR.2017 16:10:54

**Plot 7-46. Radiated Restricted Band Edge Plot with WCP**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 43 of 51                   |

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## 7.7.6 MIMO Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

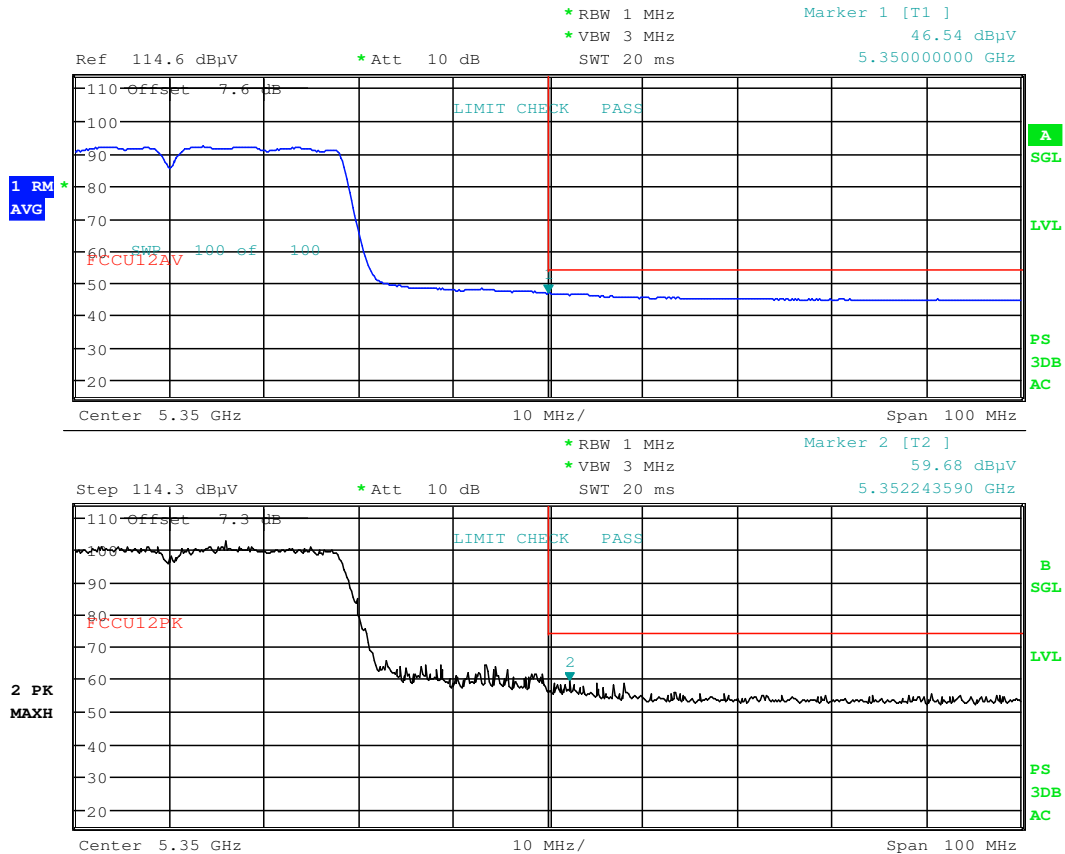
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS8

Distance of Measurements: 3 Meters

Operating Frequency: 5310MHz

Channel: 62



Date: 15.MAR.2017 16:26:09

**Plot 7-47. Radiated Restricted Upper Band Edge Plot (Average & Peak – UNII Band 2A)**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 44 of 51                   |

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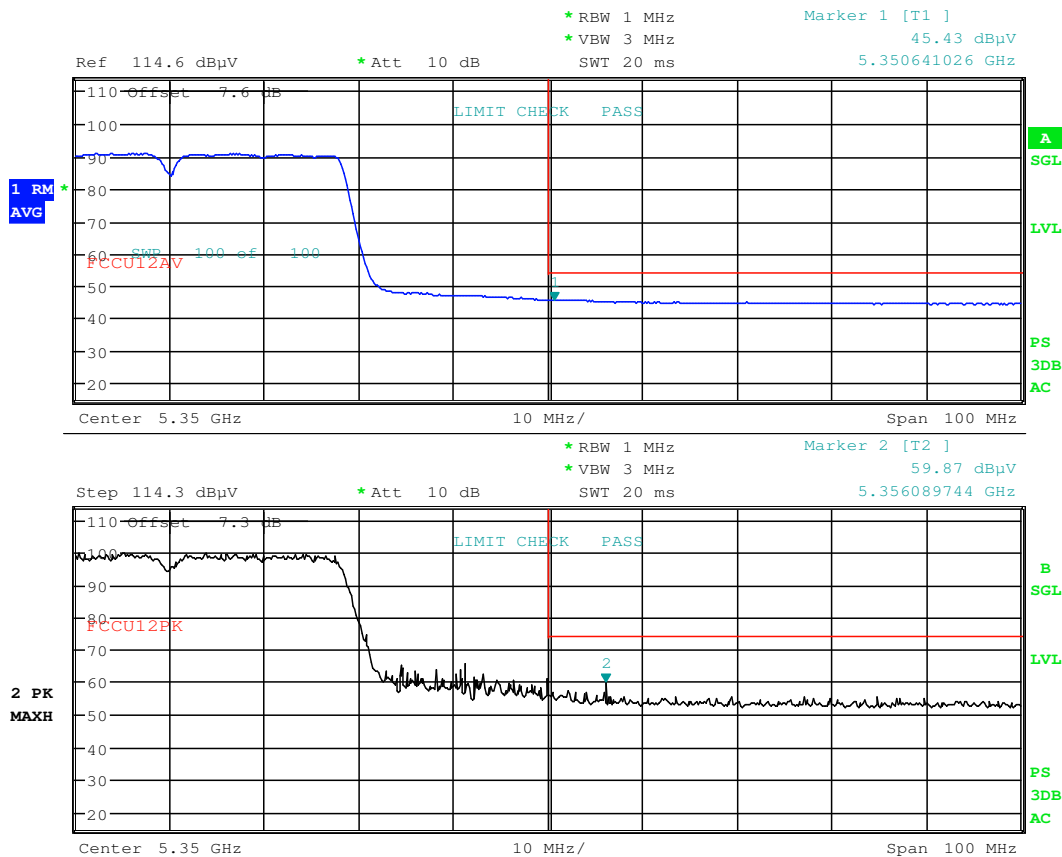
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**MIMO WCP Radiated Band Edge Measurements (40MHz BW)**  
§15.407(b.1)(b.2) §15.205 §15.209

|                           |                        |
|---------------------------|------------------------|
| Worst Case Mode:          | <u>802.11n (40MHz)</u> |
| Worst Case Transfer Rate: | <u>MCS8</u>            |
| Distance of Measurements: | <u>3 Meters</u>        |
| Operating Frequency:      | <u>5310MHz</u>         |
| Channel:                  | <u>62</u>              |



Date: 15.MAR.2017 16:37:30

### Plot 7-48. Radiated Restricted Band Edge Plot with WCP

|                                                |                                                                                                                                                                                       |                                      |                                                                                       |                                        |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSMG950N                             |  <b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT</b><br><b>(CLASS II PERMISSIVE CHANGE)</b> |                                      |  | <b>Approved by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>1M1703100103-05.A3L | <b>Test Dates:</b><br>3/13 - 3/24/2017                                                                                                                                                | <b>EUT Type:</b><br>Portable Handset | Page 45 of 51                                                                         |                                        |

## 7.3 Radiated Spurious Emissions Measurements – Below 1GHz

### §15.209

#### Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

***All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 7-10 per Section 15.209.***

| Frequency         | Field Strength<br>[ $\mu\text{V/m}$ ] | Measured Distance<br>[Meters] |
|-------------------|---------------------------------------|-------------------------------|
| 0.009 – 0.490 MHz | 2400/F (kHz)                          | 300                           |
| 0.490 – 1.705 MHz | 24000/F (kHz)                         | 30                            |
| 1.705 – 30.00 MHz | 30                                    | 30                            |
| 30.00 – 88.00 MHz | 100                                   | 3                             |
| 88.00 – 216.0 MHz | 150                                   | 3                             |
| 216.0 – 960.0 MHz | 200                                   | 3                             |
| Above 960.0 MHz   | 500                                   | 3                             |

**Table 7-10. Radiated Limits**

#### Test Procedures Used

ANSI C63.10-2013

#### Test Settings

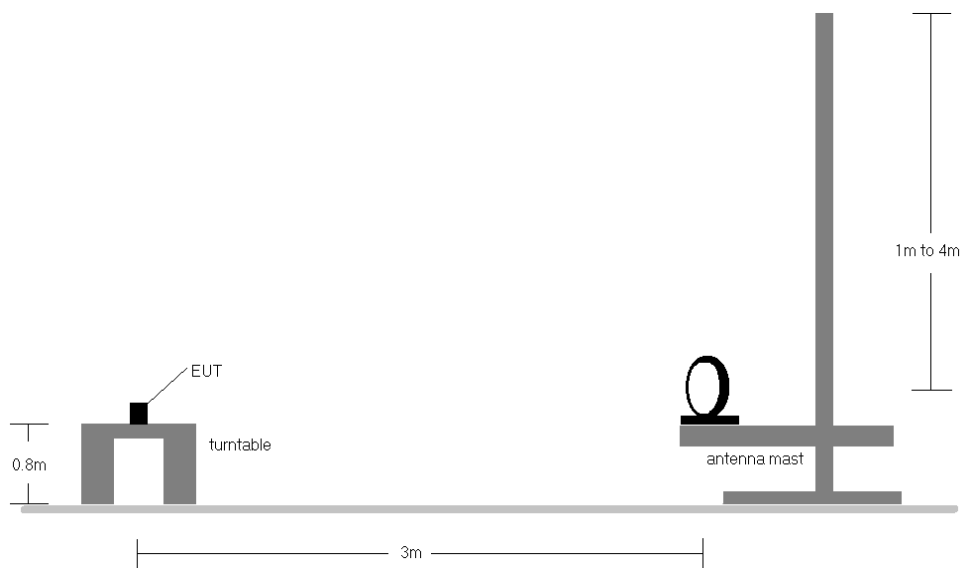
##### Quasi-Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 120kHz (for emissions from 30MHz – 1GHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

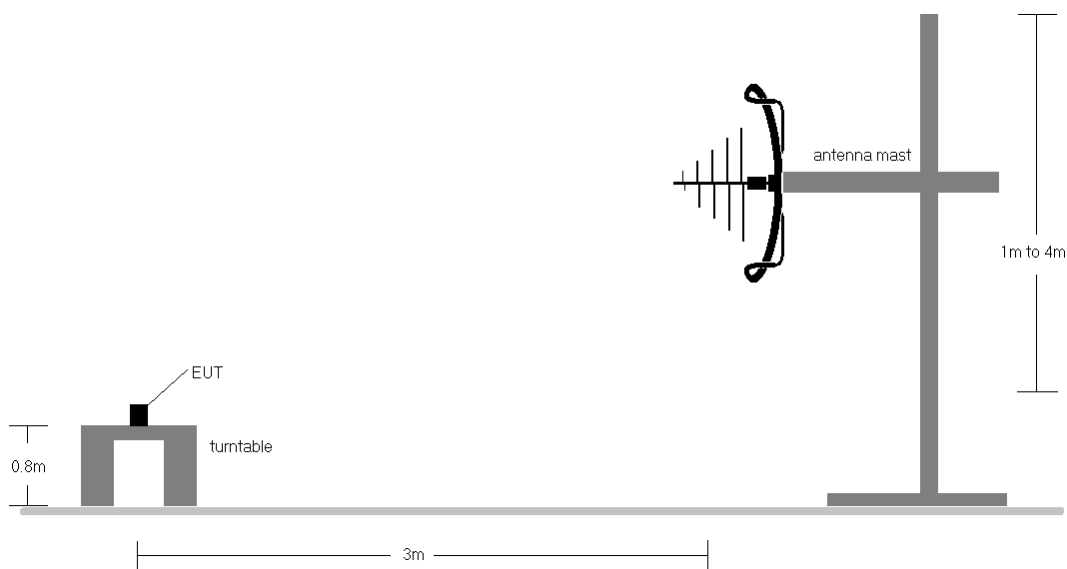
|                                         |                                                                                     |                                                                                     |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMG950N                      |  | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017                                                     | EUT Type:<br>Portable Handset                                                       |                                                                                       | Page 46 of 51                   |

## Test Setup

The EUT and measurement equipment were set up as shown in the diagrams below.



**Figure 7-2. Radiated Test Setup < 30MHz**



**Figure 7-3. Radiated Test Setup < 1GHz**

|                                                |                                               |                                                                                            |                |                                        |
|------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------|----------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT</b><br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | <b>Approved by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>1M1703100103-05.A3L | <b>Test Dates:</b><br>3/13 - 3/24/2017        | <b>EUT Type:</b><br>Portable Handset                                                       |                | Page 47 of 51                          |

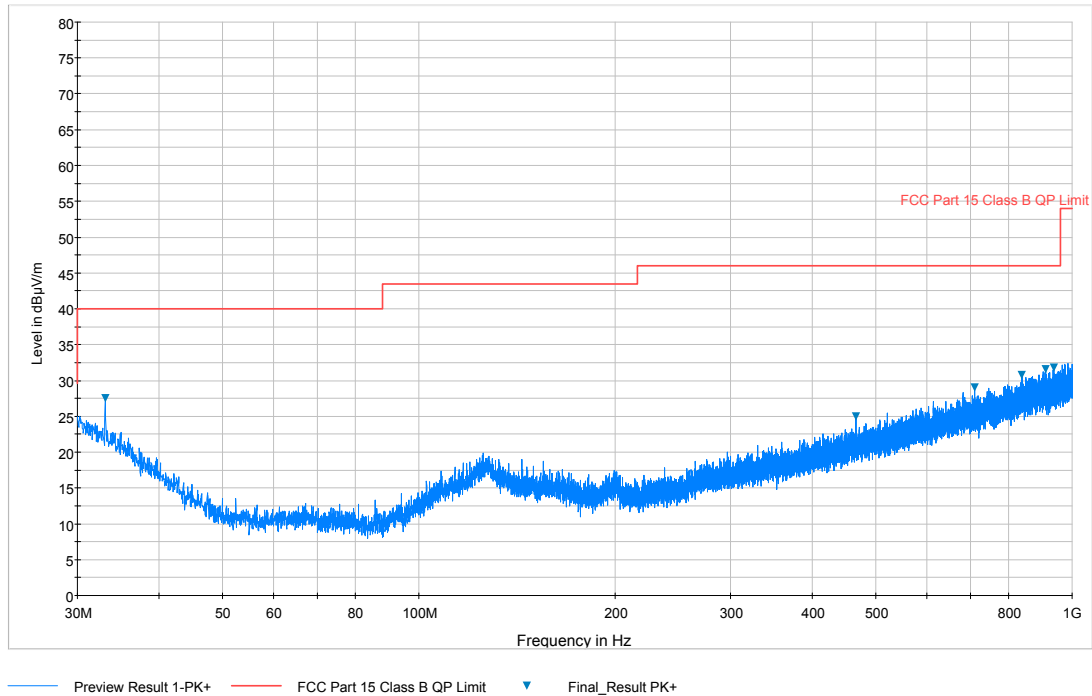
## **Test Notes**

1. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-10.
2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
3. This unit was tested with its standard battery.
4. The spectrum is investigated using a peak detector and final measurements are recorded using CISPR quasi peak detector. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
5. Emissions were measured at a 3 meter test distance.
6. Emissions are investigated while operating on the center channel of the mode, band, and modulation that produced the worst case results during the transmitter spurious emissions testing.
7. No spurious emissions were detected within 20dB of the limit below 30MHz.
8. The results recorded using the broadband antenna is known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.
9. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. There were no emissions detected in the 30MHz – 1GHz frequency range, as shown in the subsequent plots.

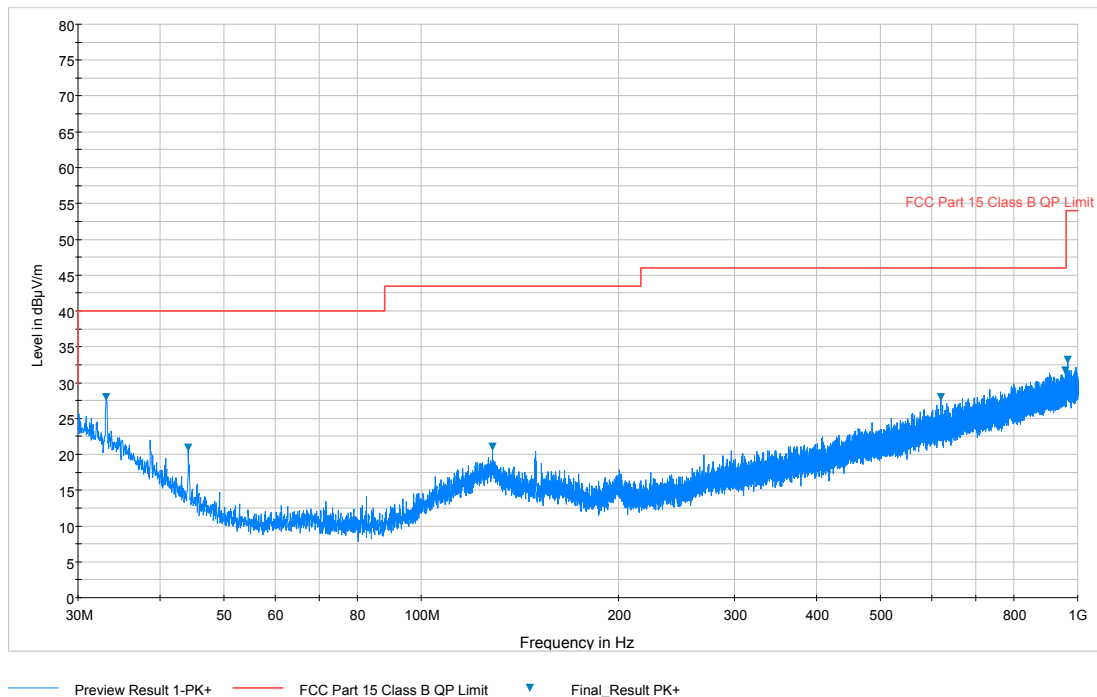
|                                                |                                                                                     |                                                                                             |                                                                                       |                                        |
|------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMG950N                      |  | <b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br/>(CLASS II PERMISSIVE CHANGE)</b> |  | <b>Approved by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>1M1703100103-05.A3L | <b>Test Dates:</b><br>3/13 - 3/24/2017                                              | <b>EUT Type:</b><br>Portable Handset                                                        |                                                                                       | Page 48 of 51                          |

## Antenna-1 Radiated Spurious Emissions Measurements (Below 1GHz)

§15.209



**Plot 7-49. Radiated Spurious Plot below 1GHz (802.11a – U3 Ch. 157, Ant. Pol. H)**

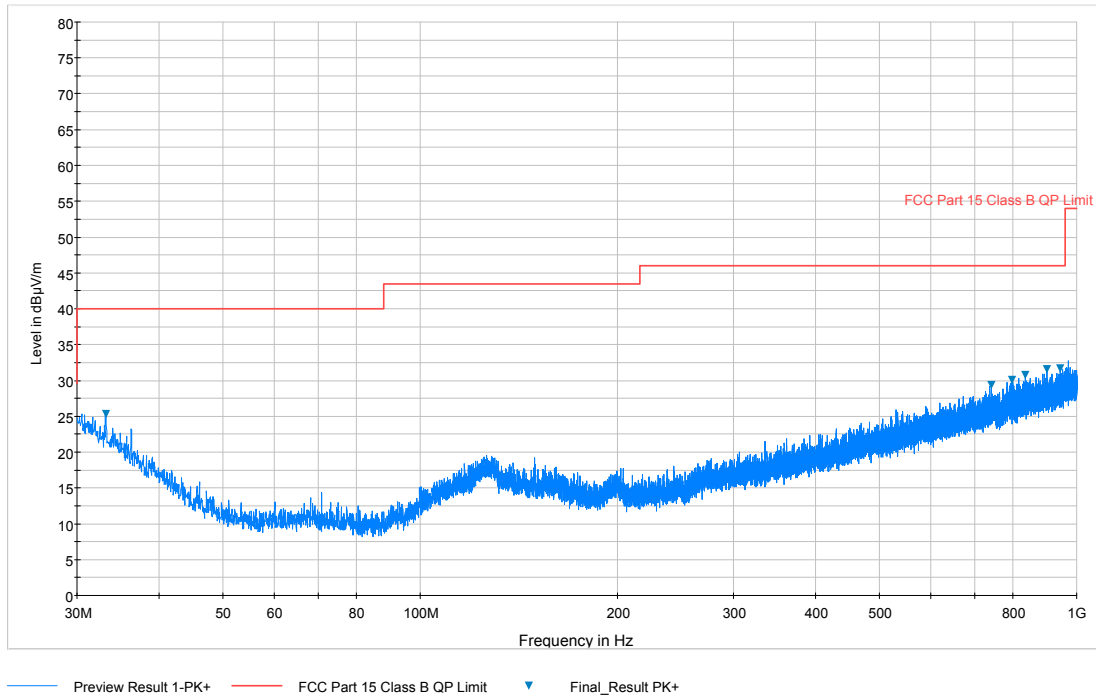


**Plot 7-50. Radiated Spurious Plot below 1GHz (802.11a – U3 Ch. 157, Ant. Pol. V)**

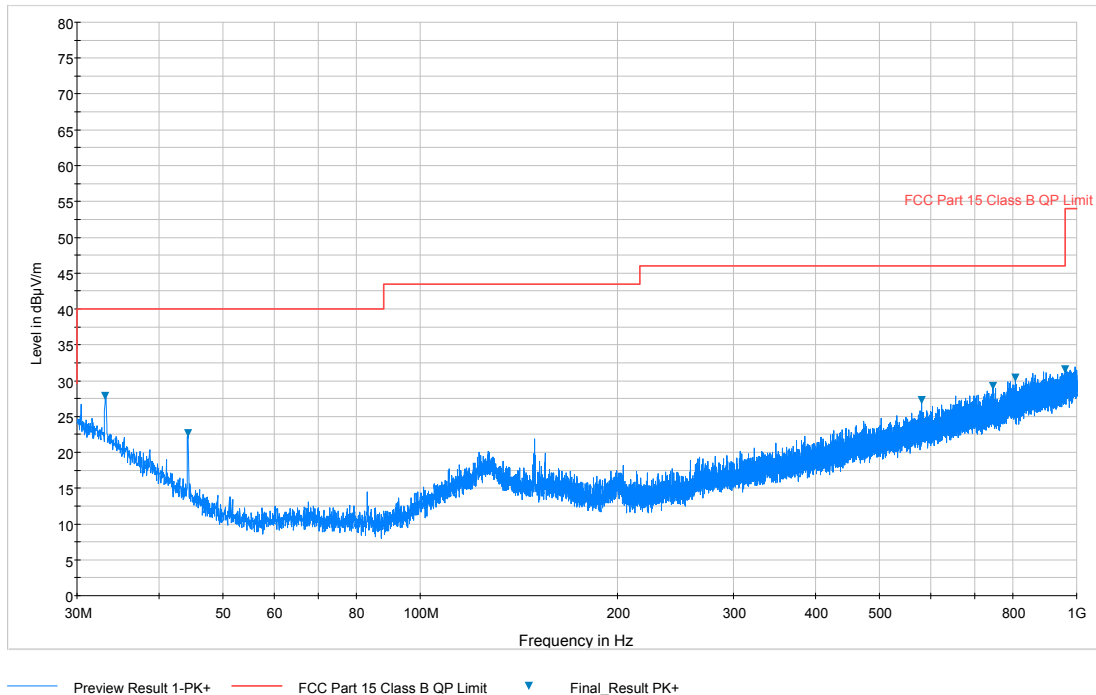
|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 49 of 51                   |

## Antenna-2 Radiated Spurious Emissions Measurements (Below 1GHz)

**§15.209**



**Plot 7-51. Radiated Spurious Plot below 1GHz (802.11a – U3 Ch. 157, Ant. Pol. H)**



**Plot 7-52. Radiated Spurious Plot below 1GHz (802.11a – U3 Ch. 157, Ant. Pol. V)**

|                                         |                                               |                                                                                     |                |                                 |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMG950N                      | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br>(CLASS II PERMISSIVE CHANGE) | <b>SAMSUNG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1703100103-05.A3L | Test Dates:<br>3/13 - 3/24/2017               | EUT Type:<br>Portable Handset                                                       |                | Page 50 of 51                   |

## 8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMG950N** is in compliance with Part 15E of the FCC Rules.

|                                                |                                                                                     |                                                                                             |                                                                                       |                                        |
|------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMG950N                      |  | <b>FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT<br/>(CLASS II PERMISSIVE CHANGE)</b> |  | <b>Approved by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>1M1703100103-05.A3L | <b>Test Dates:</b><br>3/13 - 3/24/2017                                              | <b>EUT Type:</b><br>Portable Handset                                                        |                                                                                       | Page 51 of 51                          |