

# TEST REPORT



## CTK Co., Ltd.

(Ho-dong), 113, Yejik-ro, Cheoin-gu,  
Yongin-si, Gyeonggi-do, Korea  
Tel: +82-31-339-9970  
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Report No.:  
CTK-2020-00263  
Page (1) / (43) Pages

### 1. Client

- Name : Samsung SDS Co., Ltd.
- Address : 125, Olympic-ro 35-gil, Songpa-gu, Seoul, Korea
- Date of Receipt : 2019-12-20

### 2. Manufacturer

- Name : SEONG JI SAI GON COMPANY LIMITED
- Address : No.2, Road 3A, Bien Hoa 2 IP, Long Binh Tan Ward, Bien Hoa City,  
Dong Nai, VIETNAM

**3. Use of Report** : For FCC Certification

**4. Test Sample / Model** : Digital Doorlock / SHP-A30

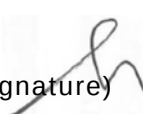
**5. Date of Test** : 2019-12-31 to 2020-01-14

**6. Test Standard(method) used** : FCC 47 CFR part 15 subpart C 15.247

**7. Testing Environment** : Temp.: (23 ± 1) °C, Humidity: (48 ± 5) % R.H.

**8. Test Results** : Compliance

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

|             |                                                                                                                |                                                                                                                   |
|-------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Affirmation | Tested by                                                                                                      | Technical Manager                                                                                                 |
|             | Bong-seok Kim: (Signature)  | Young-taek Lee: (Signature)  |

2020-01-14

Republic of KOREA **CTK Co., Ltd.**

|                                                                                  |                                                                                                                                               |                                                       |  |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--|
|  | <b>CTK Co., Ltd.</b><br>(Ho-dong), 113, Yejik-ro, Cheoin-gu,<br>Yongin-si, Gyeonggi-do, Korea<br>Tel: +82-31-339-9970<br>Fax: +82-31-624-9501 | Report No.:<br>CTK-2020-00263<br>Page (2) / (43)Pages |  |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--|

## REPORT REVISION HISTORY

| Date       | Revision                | Page No |
|------------|-------------------------|---------|
| 2020-01-14 | Issued (CTK-2020-00263) | all     |
|            |                         |         |

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## 1. General Product Description

### 1.1 Client Information

|                       |                                                                                    |
|-----------------------|------------------------------------------------------------------------------------|
| <b>Company</b>        | Samsung SDS Co., Ltd.                                                              |
| <b>Contact Point</b>  | 125, Olympic-ro 35-gil, Songpa-gu, Seoul, Korea                                    |
| <b>Contact Person</b> | Name : Yu, Seungkwan<br>E-mail : seungkwan.yu@samsung.com<br>Tel : +82-2-6155-6381 |

### 1.2 Product Information

|                                    |                                                                                                            |
|------------------------------------|------------------------------------------------------------------------------------------------------------|
| <b>FCC ID</b>                      | P4YSHP-A30                                                                                                 |
| <b>Certification Number ISED</b>   | Digital Doorlock                                                                                           |
| <b>Variant Model name</b>          | -                                                                                                          |
| <b>Operating Frequency</b>         | 2 412 MHz – 2 462 MHz                                                                                      |
| <b>RF Output Power</b>             | 802.11b : 17.44 dBm (55.463 mW)<br>802.11g : 17.63 dBm (57.943 mW)<br>802.11n-HT20 : 15.99 dBm (39.719 mW) |
| <b>Antenna type</b>                | PCB Antenna                                                                                                |
| <b>Antenna gain</b>                | 1.408 dBi                                                                                                  |
| <b>Number of channels</b>          | 11                                                                                                         |
| <b>Type of Modulation</b>          | 802.11b : DSSS<br>802.11g/n : OFDM                                                                         |
| <b>Power Source</b>                | DC 6 V (AA Battery * 4)                                                                                    |
| <b>RF Power setting in Test SW</b> | Initial value                                                                                              |

### 1.3 Peripheral Devices

- For Conducted Measurement

| Device            | Manufacturer | Model No.         | Serial No. |
|-------------------|--------------|-------------------|------------|
| Notebook Computer | HP           | HP Probook 650 G1 | 5CG5114K13 |
| AC Adapter        | HP           | PPP012D-S         | 677777-003 |

- For Radiated Measurement

| Device                       | Manufacturer | Model No.         | Serial No. |
|------------------------------|--------------|-------------------|------------|
| WIRELESS CONNECTIVITY TESTER | R&S          | CMW270            | 101366     |
| Notebook Computer            | HP           | HP Probook 650 G1 | 5CG5114K13 |
| AC Adapter                   | HP           | PPP012D-S         | 677777-003 |

## 2.0 Facility and Accreditations

### 2.1 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea.

### 2.2 Laboratory Accreditations and Listings

| Country | Agency | Registration Number |
|---------|--------|---------------------|
| USA     | FCC    | 805871              |
| CANADA  | ISED   | 8737A-2             |
| KOREA   | NRRA   | KR0025              |

### 2.3 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

## 3.0 Test Specifications

### 3.1 Standards

| Section in FCC                                                                                                   | Requirement(s)                      | Status (Note 1) | Test Condition |
|------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------|----------------|
| 15.247(a)                                                                                                        | 6 dB Bandwidth                      | C               | Conducted      |
| 15.247(e)                                                                                                        | Transmitter power spectral density  | C               |                |
| 15.247(b)                                                                                                        | Maximum peak conducted output power | C               |                |
| 15.247(d)                                                                                                        | Unwanted emission                   | C               |                |
| 15.209                                                                                                           | Transmitter emission                | C               | Radiated       |
| 15.207(a)                                                                                                        | AC Conducted Emission               | NA(Note 3)      | Line Conducted |
| <u>Note 1:</u> C=Complies    NC=Not Complies    NT=Not Tested    NA=Not Applicable                               |                                     |                 |                |
| <u>Note 2:</u> The data in this test report are traceable to the national or international standards.            |                                     |                 |                |
| <u>Note 3:</u> The equipment is operated on battery power only.                                                  |                                     |                 |                |
| <u>Note 4:</u> The sample was tested according to the following specification: FCC Part 15.247, ANSI C63.10-2013 |                                     |                 |                |
| <u>Note 5:</u> The tests were performed according to the method of measurements prescribed in KDB No.558074.     |                                     |                 |                |

### 3.2 Mode of operation during the test

The UUT is operated in a manner representative of the typical of the equipments.  
During at testing, system components were manipulated within the confines of typical usage to maximize each emission. The results are only attached worst cases.

#### Test mode & Worst case

| Mode         | Worst case(Data rate) |
|--------------|-----------------------|
| 802.11b      | 1 Mbps                |
| 802.11g      | 6 Mbps                |
| 802.11n-HT20 | MCS 0                 |

#### Test Frequency & Bandwidth

| Bandwidth | Lowest channel | Middle channel | Highest channel |
|-----------|----------------|----------------|-----------------|
| 20 MHz    | 2 412 MHz      | 2 437 MHz      | 2 462 MHz       |

#### Duty cycle

| Mode         | Duty cycle ( % ) |
|--------------|------------------|
| 802.11b      | 97.0             |
| 802.11g      | 95.0             |
| 802.11n-HT20 | 95.3             |

### 3.3 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.  
Coverage factor  $k = 2$ , Confidence levels of 95 %

| Description                          | Uncertainty   |
|--------------------------------------|---------------|
| Conducted RF Output Power            | $\pm 1.5$ dB  |
| Power Spectral Density               | $\pm 1.5$ dB  |
| Occupied Bandwidth                   | $\pm 0.1$ MHz |
| Unwanted Emission(conducted)         | $\pm 3.0$ dB  |
| Radiated Emissions ( $f \leq 1$ GHz) | $\pm 5.0$ dB  |
| Radiated Emissions ( $f > 1$ GHz)    | $\pm 5.0$ dB  |

## 4.0 Technical Characteristic Test

### 4.1 6dB Bandwidth

#### Test Procedures (ANSI C63.10-2013 6.9.2)

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### Test Procedures (ANSI C63.10-2013 6.9.3)

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

#### Test Settings :

Center frequency = the highest, middle and the lowest channels

- a) RBW = 100 kHz (6dB Bandwidth)
- b) RBW = 1% to 5% of the OBW  
(99 % Bandwidth)
- c) VBW  $\geq 3 \times$  RBW
- d) Detector = peak
- e) Trace mode = Max hold
- f) Sweep = auto couple
- g) Allow trace to fully stabilize
- h) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### **Limit : 6dB Bandwidth**

6 dB Bandwidth > 500kHz

#### **Limit : 99 % Bandwidth**

N/A

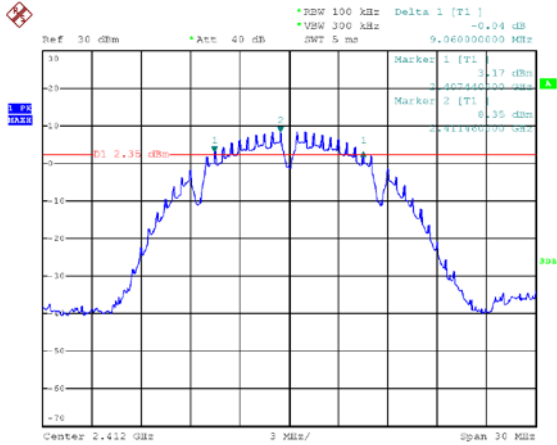
**Test Data:**

| Mode             | Channel | Frequency [MHz] | 6 dB Bandwidth [MHz] | Result   |
|------------------|---------|-----------------|----------------------|----------|
| 802.11b          | Low     | 2 412           | 9.06                 | Complies |
|                  | Middle  | 2 437           | 9.12                 |          |
|                  | High    | 2 462           | 9.54                 |          |
| 802.11g          | Low     | 2 412           | 15.60                |          |
|                  | Middle  | 2 437           | 15.54                |          |
|                  | High    | 2 462           | 15.54                |          |
| 802.11n<br>-HT20 | Low     | 2 412           | 16.26                |          |
|                  | Middle  | 2 437           | 16.32                |          |
|                  | High    | 2 462           | 16.32                |          |

See next pages for actual measured spectrum plots.

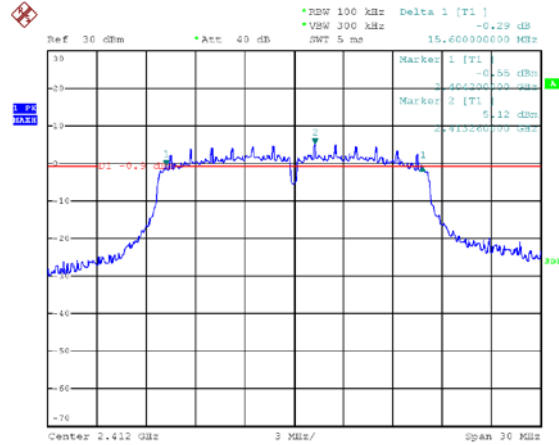
## 6 dB Bandwidth

### Test Mode : 802.11b Low channel



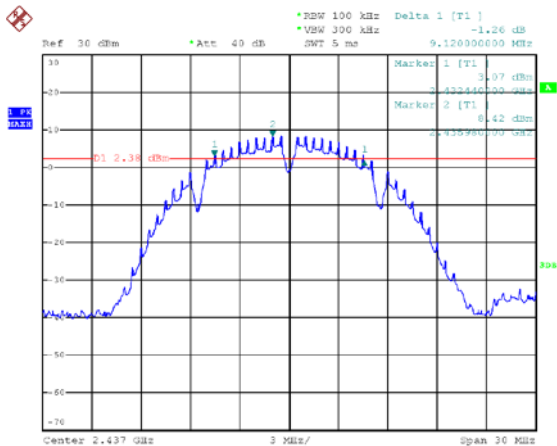
Date: 6.JAN.2020 13:17:36

### Test Mode : 802.11g Low channel



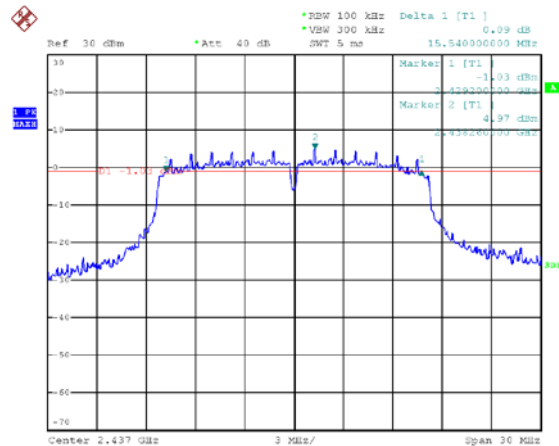
Date: 6.JAN.2020 13:39:21

### Middle channel



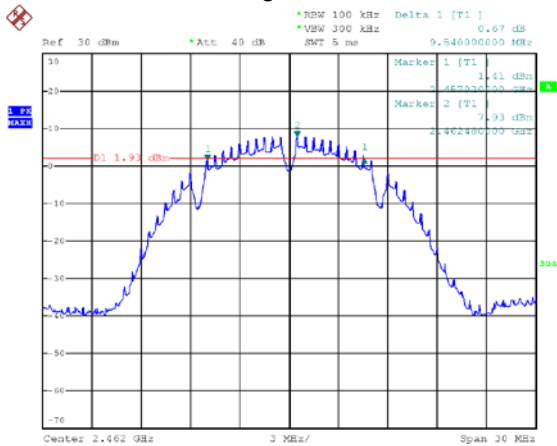
Date: 6.JAN.2020 13:28:02

### Middle channel



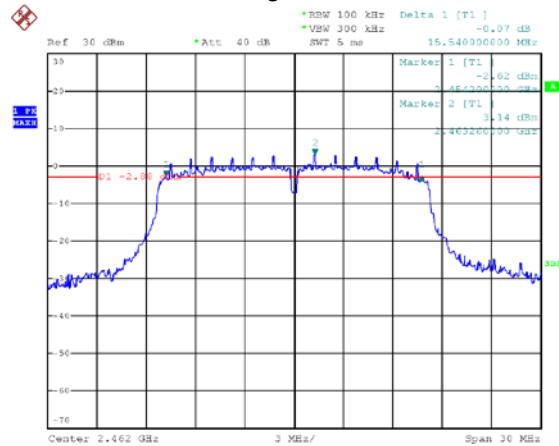
Date: 6.JAN.2020 13:43:01

### High channel



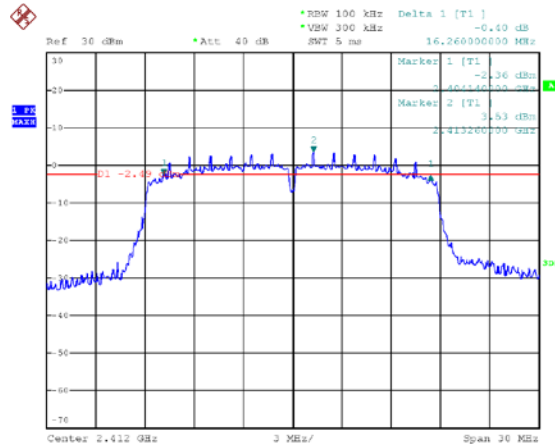
Date: 6.JAN.2020 13:32:38

### High channel



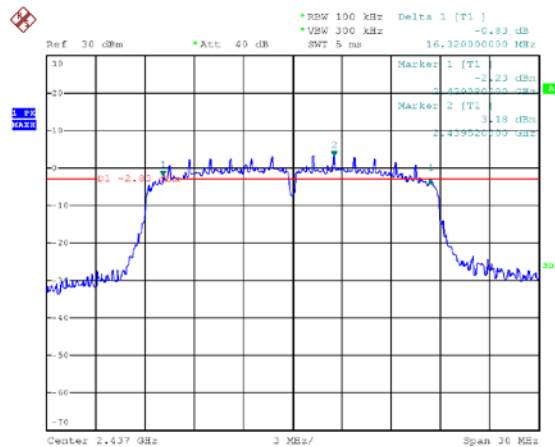
Date: 6.JAN.2020 13:47:22

**Test Mode : 802.11n-HT20**  
**Low channel**



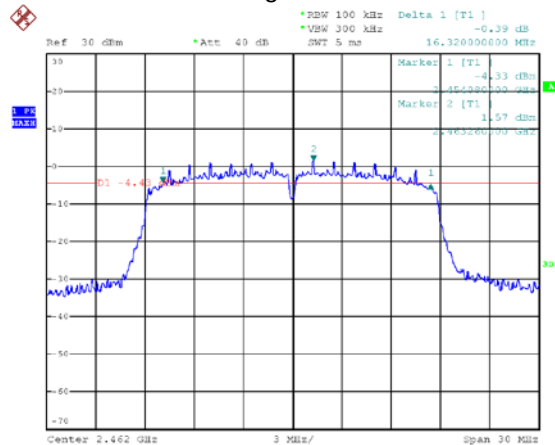
Date: 6.JAN.2020 13:53:37

**Middle channel**



Date: 6.JAN.2020 13:56:50

**High channel**

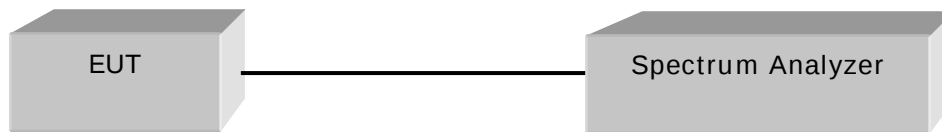


Date: 6.JAN.2020 14:01:47

## 4.2 Maximum peak Conducted Output Power

### Test Procedures(ANSI C63.10-2013 11.9.2.2.2)

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.



#### Test Settings:

Center frequency = the highest, middle and the lowest channels

- a) span  $\geq 1.5 \times \text{OBW}$
- b) RBW = 1% to 5% of the OBW, not to exceed 1 MHz
- c) VBW  $\geq 3 \times \text{RBW}$
- d) Sweep point  $\geq (2 \times \text{SPAN} / \text{RBW})$
- e) Detector = RMS
- f) Sweep time = auto
- g) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges.

#### Limit

Maximum Output Power < 1 W (30 dBm)

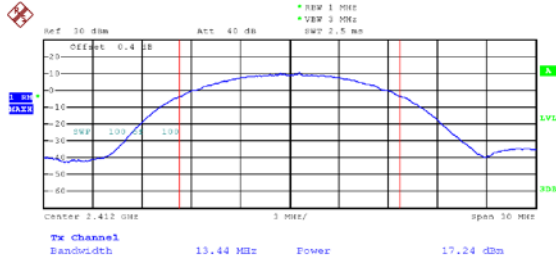
#### Test Data

| Mode         | Channel | Frequency [MHz] | Measurement data [dBm] | Limit [dBm] | Result   |
|--------------|---------|-----------------|------------------------|-------------|----------|
| 802.11b      | Low     | 2 412           | 17.24                  | 30          | Complies |
|              | Middle  | 2 437           | 17.44                  |             |          |
|              | High    | 2 462           | 16.77                  |             |          |
| 802.11g      | Low     | 2 412           | 17.63                  |             |          |
|              | Middle  | 2 437           | 17.51                  |             |          |
|              | High    | 2 462           | 15.79                  |             |          |
| 802.11n-HT20 | Low     | 2 412           | 15.99                  |             |          |
|              | Middle  | 2 437           | 15.91                  |             |          |
|              | High    | 2 462           | 14.11                  |             |          |

See next pages for actual measured spectrum plots.

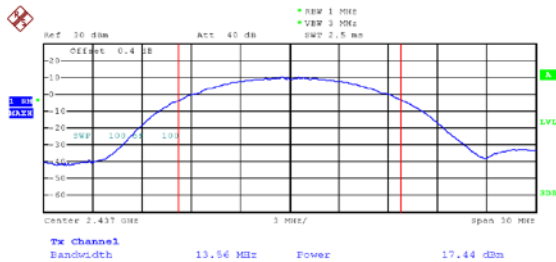
## Output Power

### Test Mode : 802.11b Low channel



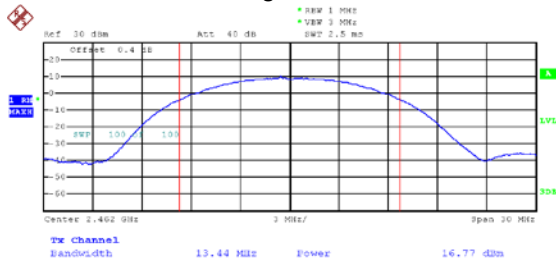
Date: 6.JAN.2020 13:25:25

### Middle channel



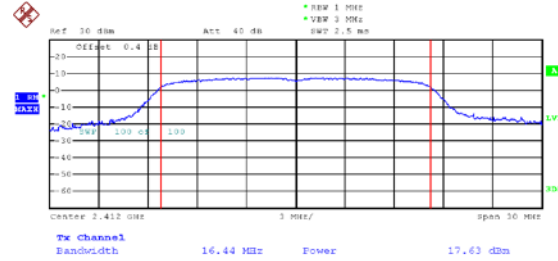
Date: 6.JAN.2020 13:28:37

### High channel



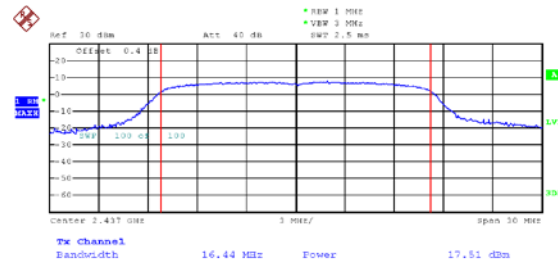
Date: 6.JAN.2020 13:33:13

### Test Mode : 802.11g Low channel



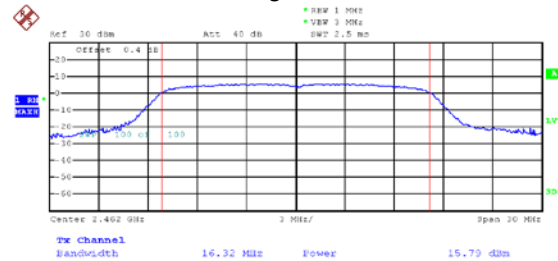
Date: 6.JAN.2020 13:39:56

### Middle channel



Date: 6.JAN.2020 13:43:37

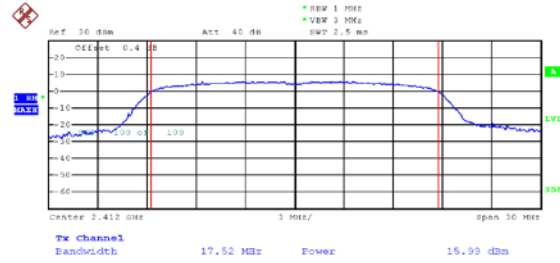
### High channel



Date: 6.JAN.2020 13:47:58

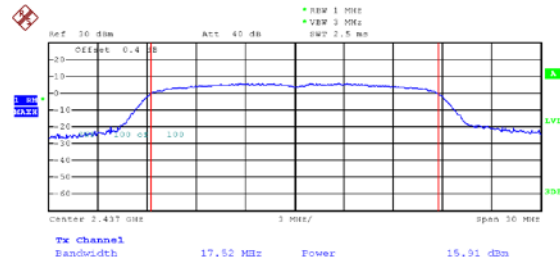
### Test Mode : 802.11n-HT20

#### Low channel



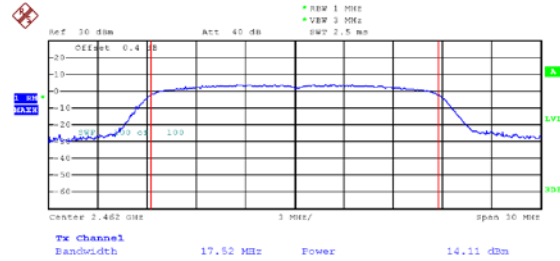
Date: 6.JAN.2020 13:54:12

#### Middle channel



Date: 6.JAN.2020 13:57:34

#### High channel



Date: 6.JAN.2020 14:02:22

## 4.3 Power Spectral Density

### Test Procedures(ANSI C63.10-2013 11.10.2)

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance.

#### Test Settings:

Center frequency = the highest, middle and the lowest channels

- a) RBW :  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
- b) VBW  $\geq 3 \times \text{RBW}$
- c) span  $\geq 1.5 \times \text{DTS bandwidth}$
- d) Sweep time = auto couple
- e) Detector = peak
- f) Trace mode= max hold
- g) Allow trace to fully stabilize
- h) Use the peak marker function to determine the maximum amplitude level within the RBW.

#### **Limit :**

---

Power Spectral Density < 8 dBm @ 3 kHz BW

---

#### **Test Data**

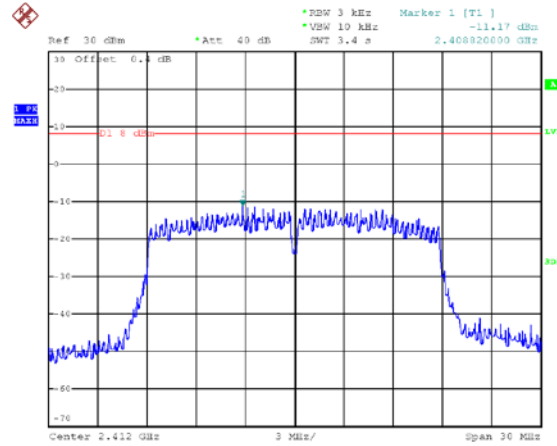
| Mode             | Channel | Frequency [MHz] | Measurement data [dBm] | Limit [dBm] | Result   |
|------------------|---------|-----------------|------------------------|-------------|----------|
| 802.11b          | Low     | 2 412           | -6.31                  | 8           | Complies |
|                  | Middle  | 2 437           | -6.05                  |             |          |
|                  | High    | 2 462           | -2.34                  |             |          |
| 802.11g          | Low     | 2 412           | -9.15                  |             |          |
|                  | Middle  | 2 437           | -8.78                  |             |          |
|                  | High    | 2 462           | -11.00                 |             |          |
| 802.11n<br>-HT20 | Low     | 2 412           | -11.17                 |             |          |
|                  | Middle  | 2 437           | -11.41                 |             |          |
|                  | High    | 2 462           | -14.15                 |             |          |

See next pages for actual measured spectrum plots.



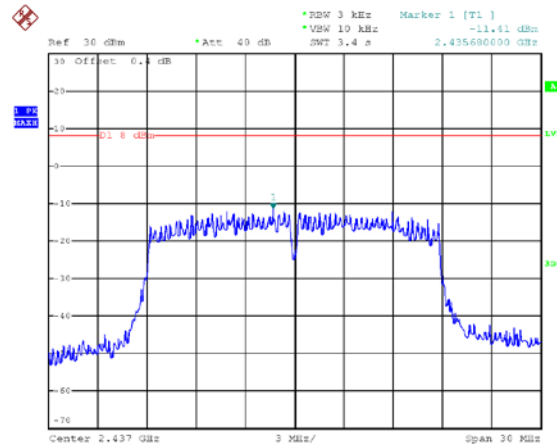
### Test Mode : 802.11n-HT20

#### Low channel



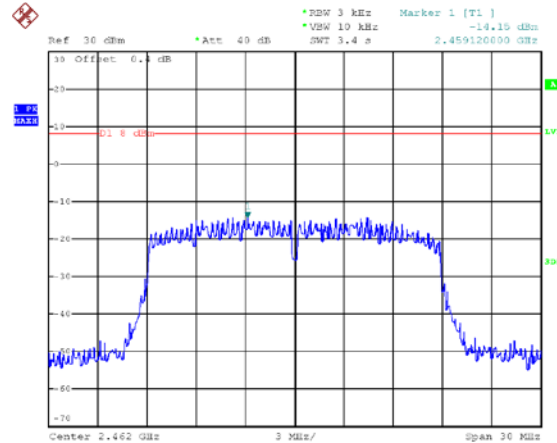
Date: 6.JAN.2020 13:52:35

#### Middle channel



Date: 6.JAN.2020 13:56:11

#### High channel



Date: 6.JAN.2020 13:59:19

## 4.4 Band Edge & Conducted Spurious emission

### Test Procedures(ANSI C63.10-2013 11.11.3)

The Unwanted emission from the EUT were measured according to the dictates PKPSD measurement procedure in section 11.11 of ANSI C63.10-2013.

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB.

#### Test Settings:

Center frequency = the highest, middle and the lowest channels

- a) RBW = 100 kHz
- b) VBW  $\geq 3 \times$  RBW
- c) Detector = peak
- d) Sweep time = auto couple
- e) Trace mode= max hold
- f) Allow trace to fully stabilize
- g) Use the peak marker function to determine the maximum amplitude level.

#### **Limit :**

---

Emission level < 30 dBc

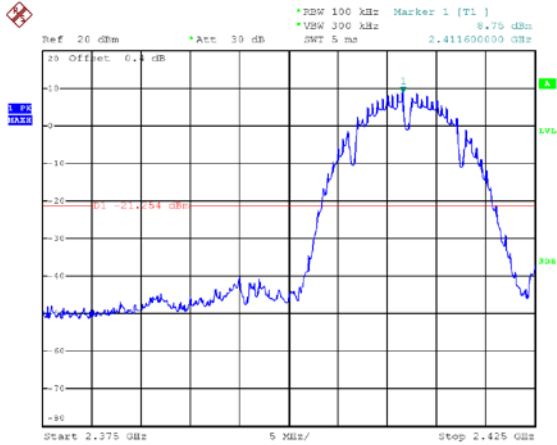
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#### **Test Data: Complies**

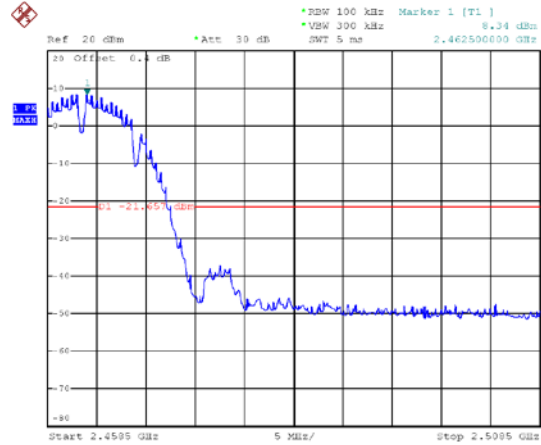
- All conducted emission in any 100 kHz bandwidth outside of the spread spectrum band was at least 30dB lower than the highest in-band spectral density. Therefore the applying equipment meets the requirement.

See next pages for actual measured spectrum plots.

**Band-edge  
Test Mode : 802.11b**

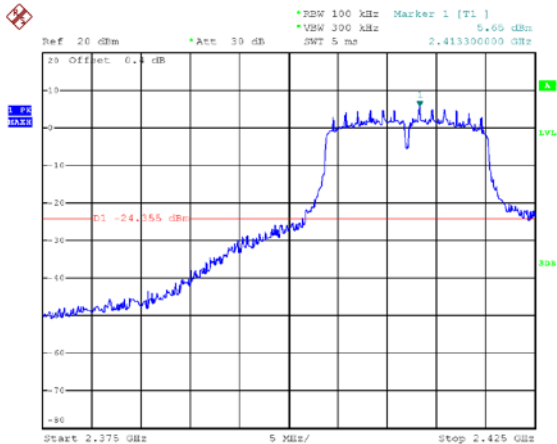


Date: 6.JAN.2020 13:18:54

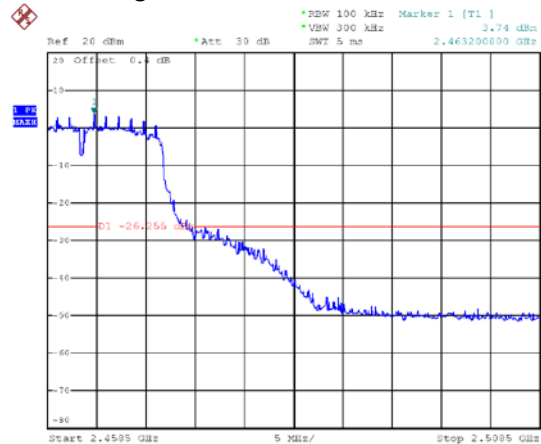


Date: 6.JAN.2020 13:34:01

**Test Mode : 802.11g**

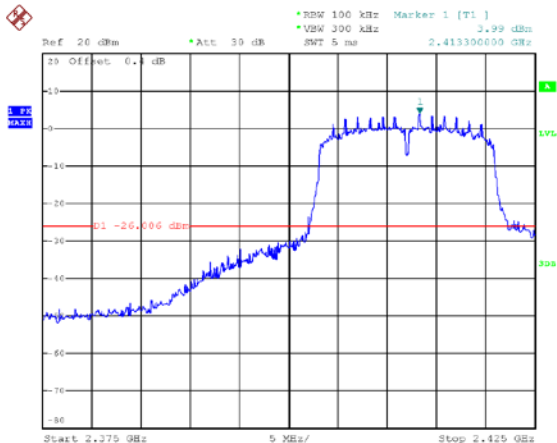


Date: 6.JAN.2020 13:40:45

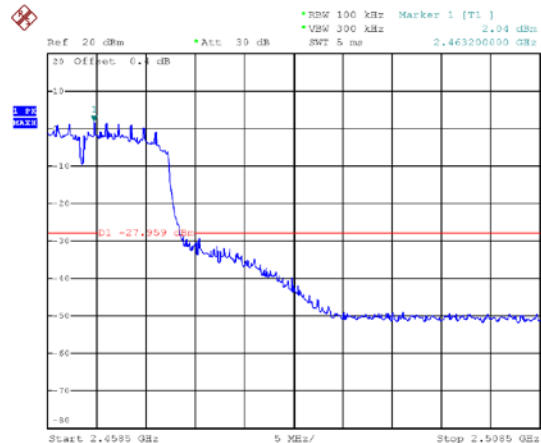


Date: 6.JAN.2020 13:40:47

**Test Mode : 802.11n-HT20**

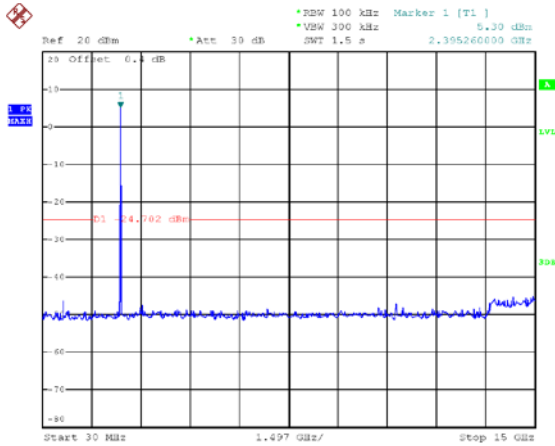


Date: 6.JAN.2020 13:55:00

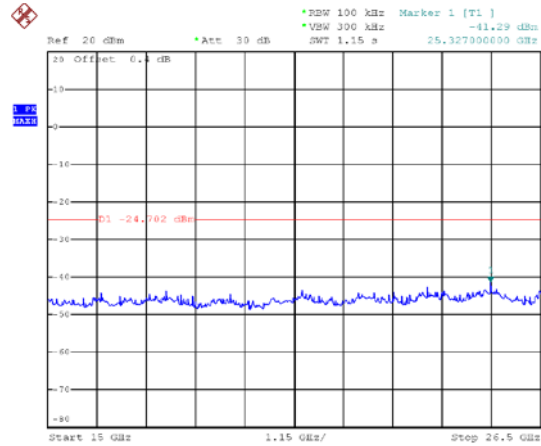


Date: 6.JAN.2020 14:03:11

## Spurious Test Mode : 802.11b Low channel

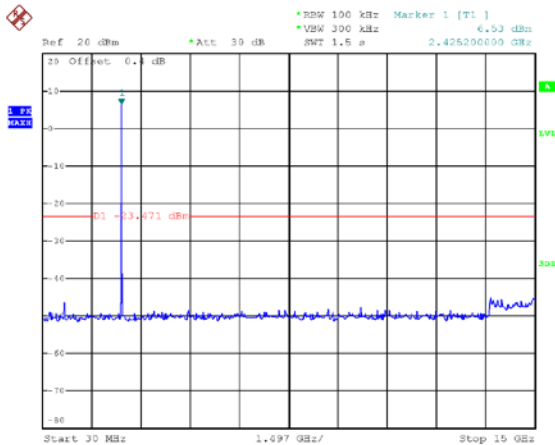


Date: 6.JAN.2020 13:18:24

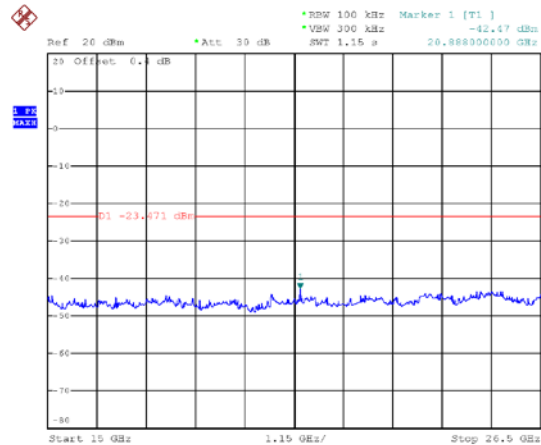


Date: 6.JAN.2020 13:18:30

## Middle channel

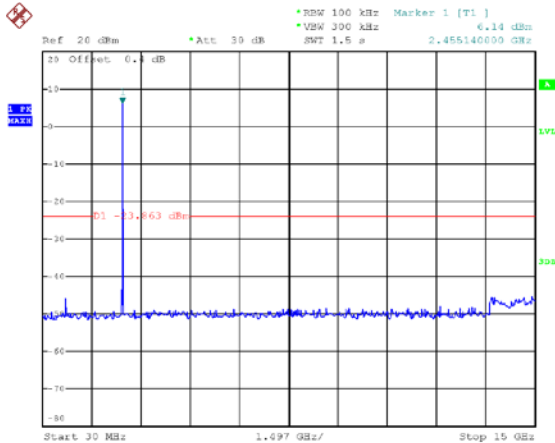


Date: 6.JAN.2020 13:28:54

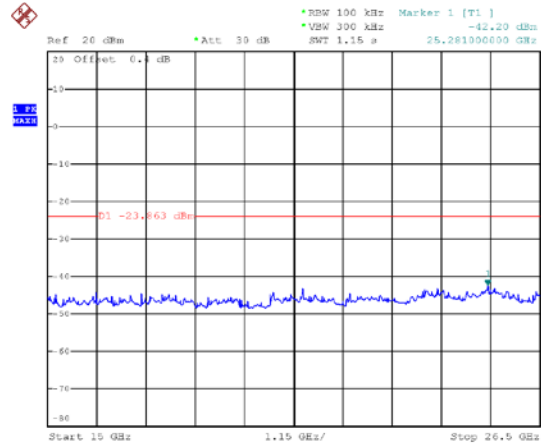


Date: 6.JAN.2020 13:29:09

## High channel

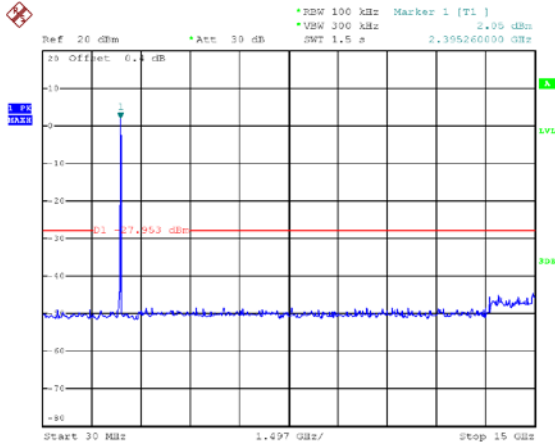


Date: 6.JAN.2020 13:33:30

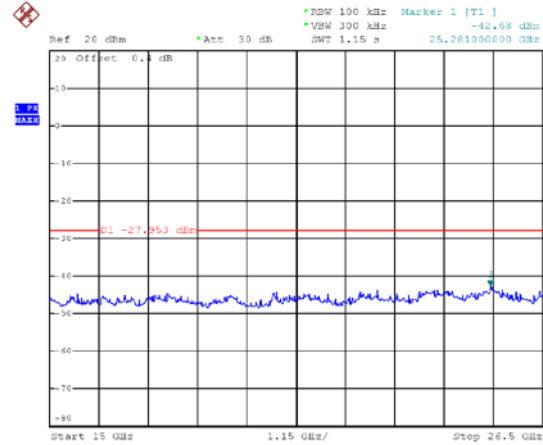


Date: 6.JAN.2020 13:33:45

**Test Mode : 802.11g**  
**Low channel**

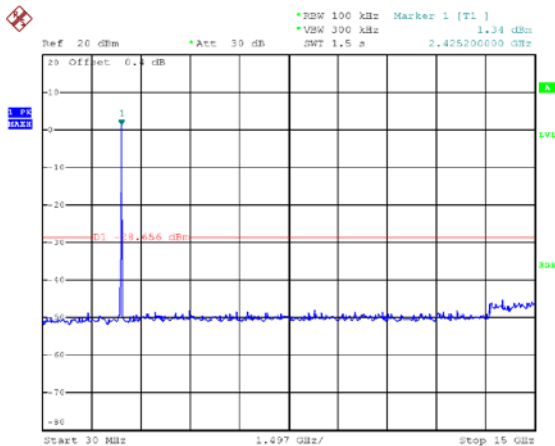


Date: 6.JAN.2020 13:40:13

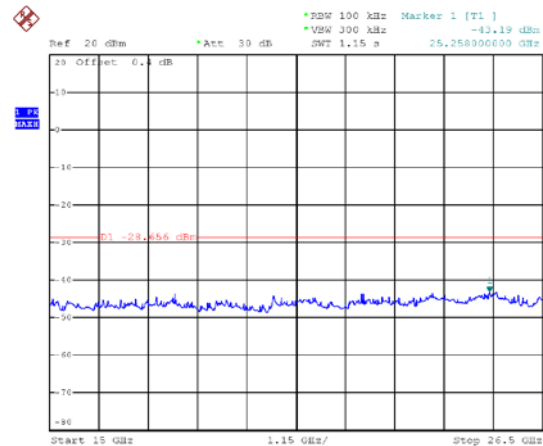


Date: 6.JAN.2020 13:40:20

**Middle channel**

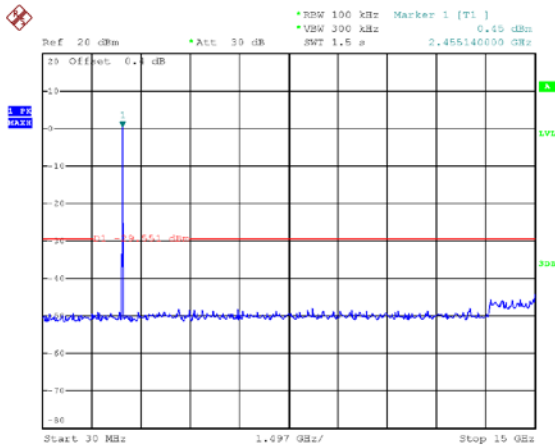


Date: 6.JAN.2020 13:43:54

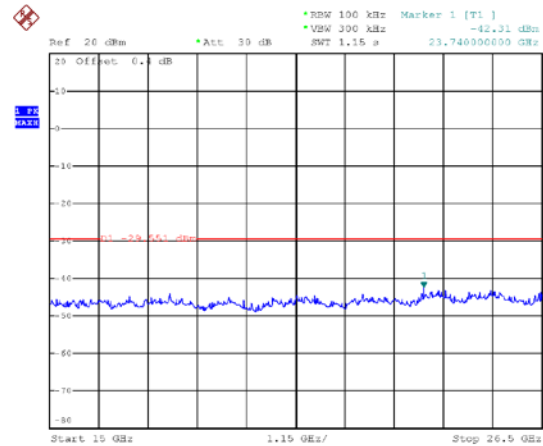


Date: 6.JAN.2020 13:44:09

**High channel**

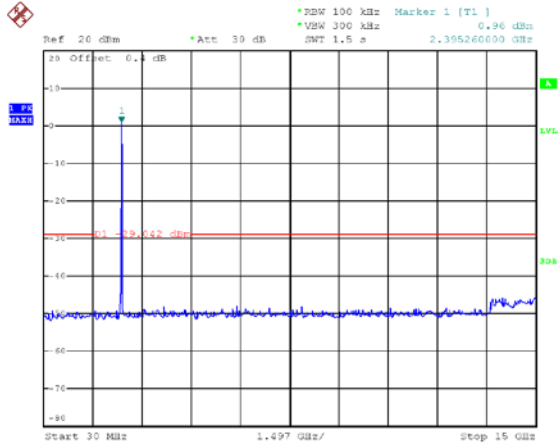


Date: 6.JAN.2020 13:48:15

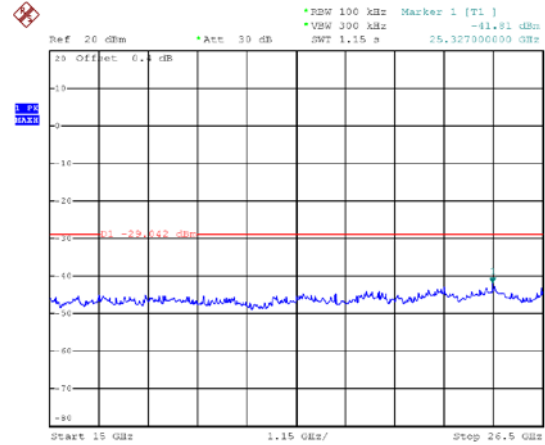


Date: 6.JAN.2020 13:48:30

**Test Mode : 802.11n-HT20**  
Low channel

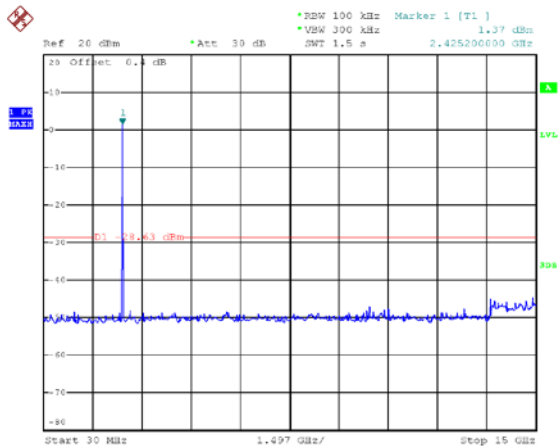


Date: 6.JAN.2020 13:54:29

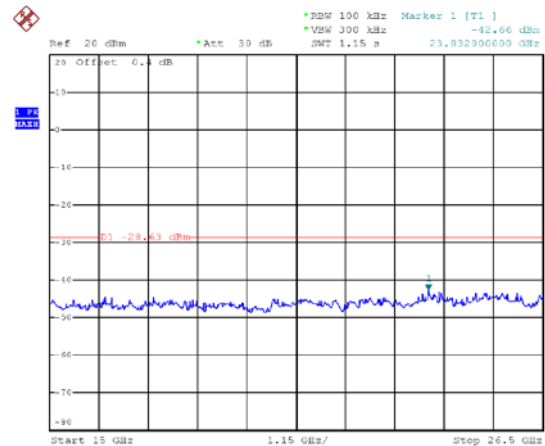


Date: 6.JAN.2020 13:54:43

**Middle channel**

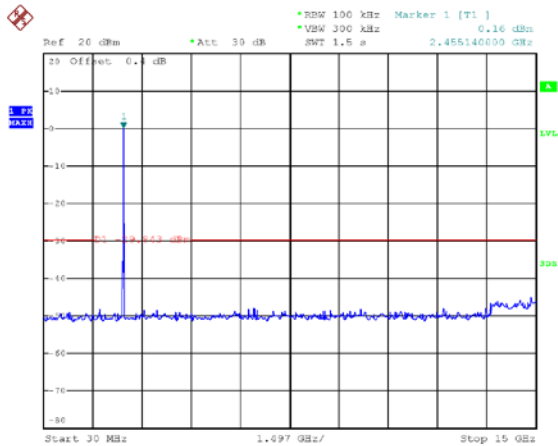


Date: 6.JAN.2020 13:57:51

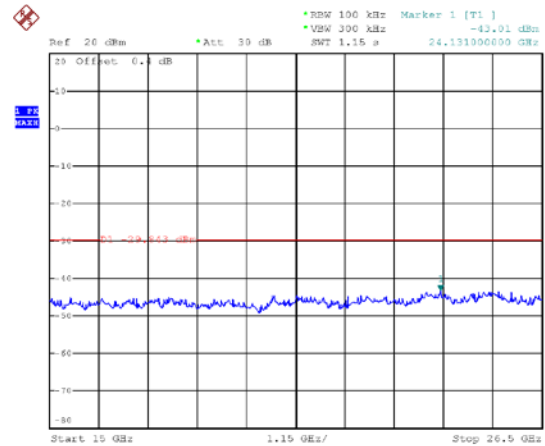


Date: 6.JAN.2020 13:58:05

**High channel**



Date: 6.JAN.2020 14:02:39



Date: 6.JAN.2020 14:02:54

## 4.5 Radiated Emissions

### Test Location

- ☒ 10 m SAC (test distance : ☐ 10 m, ☒ 3 m)  
☒ 3 m SAC (test distance : 3 m)

### Test Procedures

- 1) In the frequency range of 9 kHz to 30 MHz, magnetic field is measured with Loop Antenna. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- 2) In the frequency range above 30 MHz, Bi-Log Test Antenna(30 MHz to 1 GHz) and Horn Test Antenna(above 1 GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.

### Instrument Settings

Frequency Range = 9 kHz ~ 26.5 GHz (2.4 GHz 10<sup>th</sup> harmonic)

- a) RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz, 9 kHz for  $f < 30$  MHz
- b) VBW  $\geq$  RBW
- c) Sweep time = auto couple

## Limit :

FCC Part 15 § 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

**Table 1. Restricted Frequency Bands\***

| MHz                      | MHz               | MHz                 | MHz           | MHz         | GHz                     |
|--------------------------|-------------------|---------------------|---------------|-------------|-------------------------|
| 0.09-0.11                | 8.37626-8.38675   | 73-74.6             | 399.9-410     | 2690-2900   | 10.6-12.7               |
| <sup>1</sup> 0.495-0.505 | 8.41425-8.41475   | 74.8-75.2           | 608-614       | 3260-3267   | 13.25-13.4              |
| 2.1735-2.1905            | 12.29-12.293      | 108-121.94          | 960-1240      | 3332-3339   | 14.47-14.5              |
| 4.125-4.128              | 12.51975-12.52025 | 123-138             | 1300-1427     | 3345.8-3358 | 15.35-16.2              |
| 4.17725-4.17775          | 12.57675-12.57725 | 149.9-150.05        | 1435-1626.5   | 3600-4400   | 17.7-21.4               |
| 4.20725-4.20775          | 13.36-13.41       | 156.52475-156.52525 | 1645.5-1646.5 | 4500-5150   | 22.01-23.12             |
| 6.215-6.218              | 16.42-16.423      | 156.7-156.9         | 1660-1710     | 5350-5460   | 23.6-24                 |
| 6.26775-6.26825          | 16.69475-16.69525 | 162.0125-167.17     | 1718.8-1722.2 | 7250-7750   | 31.2-31.8               |
| 6.31175-6.31225          | 16.80425-16.80475 | 167.72-173.2        | 2200-2300     | 8025-8500   | 36.43-36.5              |
| 8.291-8.294              | 25.5-25.67        | 240-285             | 2310-2390     | 9000-9200   | <sup>2</sup> Above 38.6 |
| 8.362-8.366              | 37.5-38.25        | 322-335.4           | 2483.5-2500   | 9300-9500   |                         |

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

§ 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

\*Certain frequency bands listed in Table 6 and in band above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in the 200- and 300-series of RSSs, such as RSS-210 and RSS-310, which contain the requirements that apply to licence-exempt radio apparatus.

FCC Part 15 § 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

| Frequency(MHz) | Field Strength uV/m | Field Strength dBuV/m | Deasurement Distance (meters) |
|----------------|---------------------|-----------------------|-------------------------------|
| 0.009-0.490    | 2400/F(kHz)         | -                     | 300                           |
| 0.490-1.705    | 24000/F(kHz)        | -                     | 30                            |
| 1.705-30       | 30                  | 49.5                  | 30                            |
| 30-88          | 100**               | 40                    | 3                             |
| 88-216         | 150**               | 43.5                  | 3                             |
| 216-960        | 200**               | 46                    | 3                             |
| Above 960      | 500                 | 54                    | 3                             |

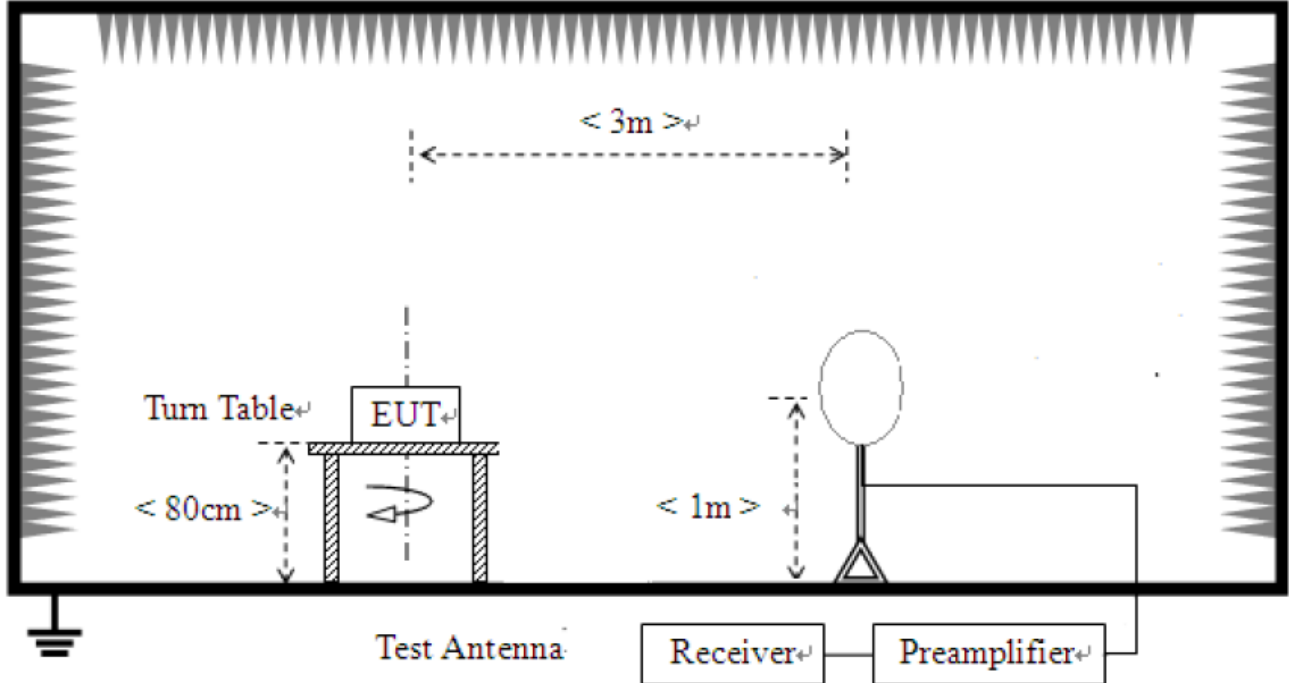
\*\* Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

Note :

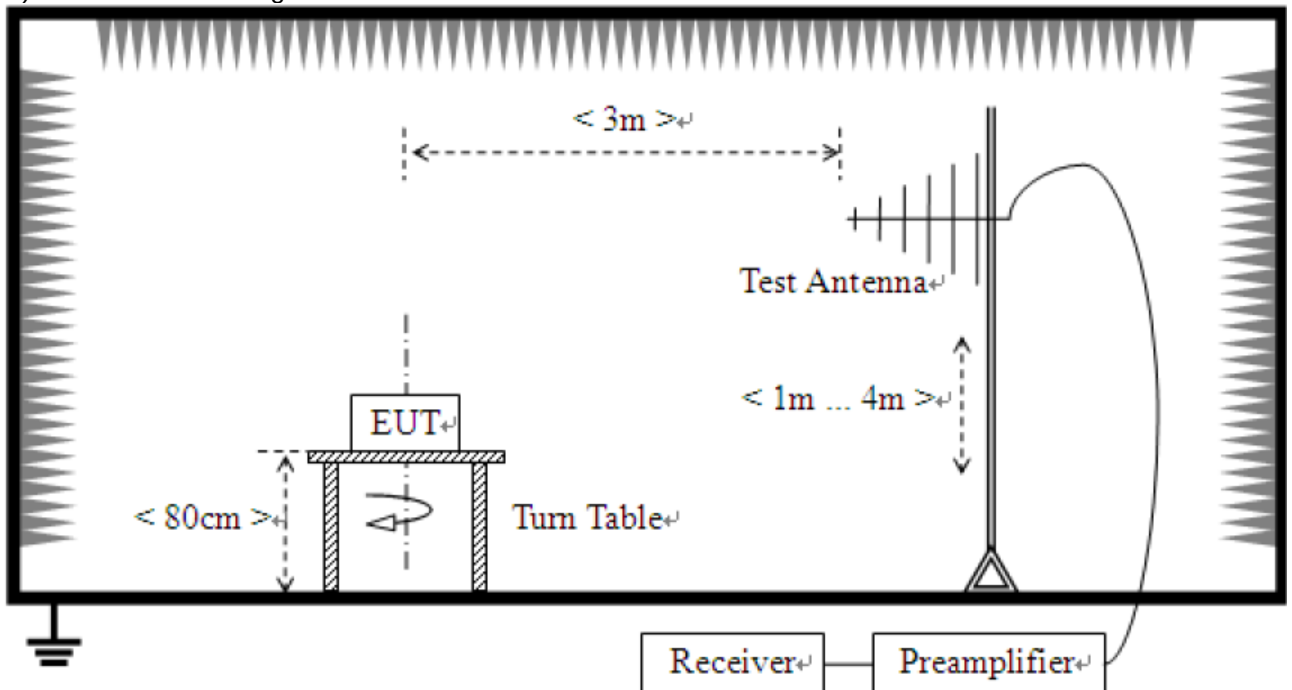
- 1) For above 1 GHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
- 2) For above 1 GHz, limit field strength of harmonics : 54 dBuV/m@3m (AV) and 74 dBuV/m@3m (PK)
- 3) For measurement above 1GHz, the resolution bandwidth is set to 1 MHz and video bandwidth is set to 3 MHz for peak measurement.

### Test Setup:

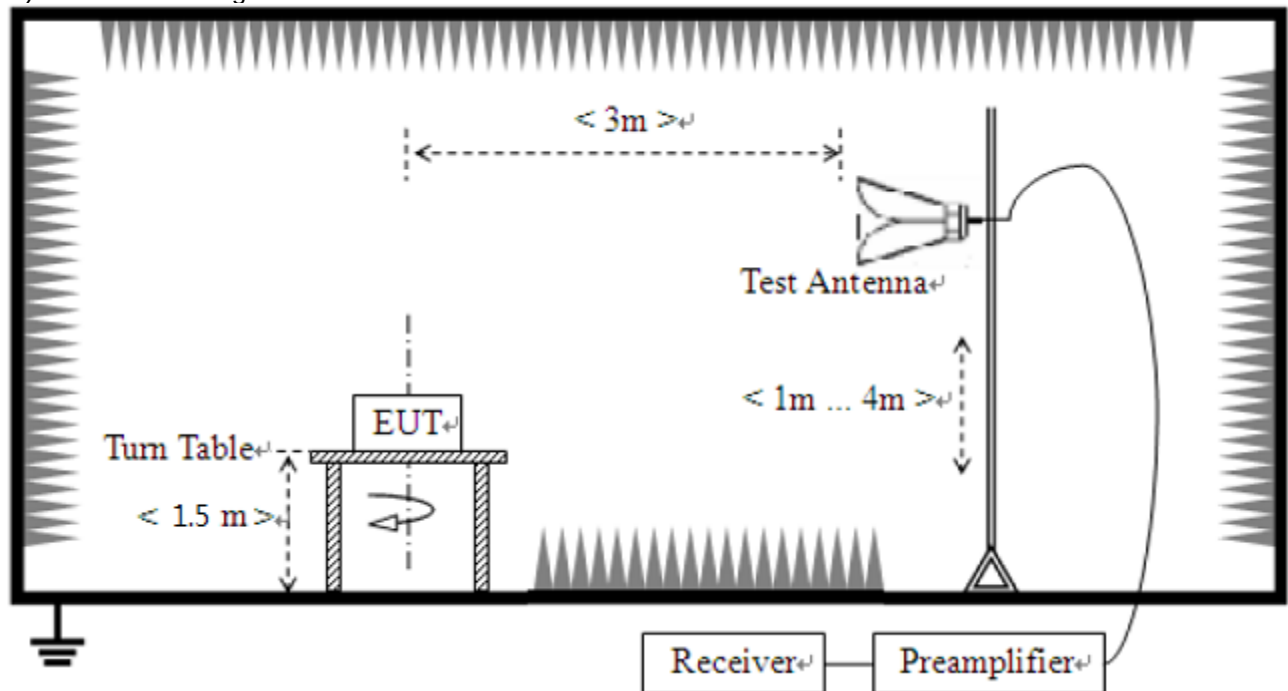
- 1) For field strength of emissions from 9 kHz to 30 MHz



- 2) For field strength of emissions from 30 MHz to 1 GHz



3) For field strength of emissions above 1 GHz

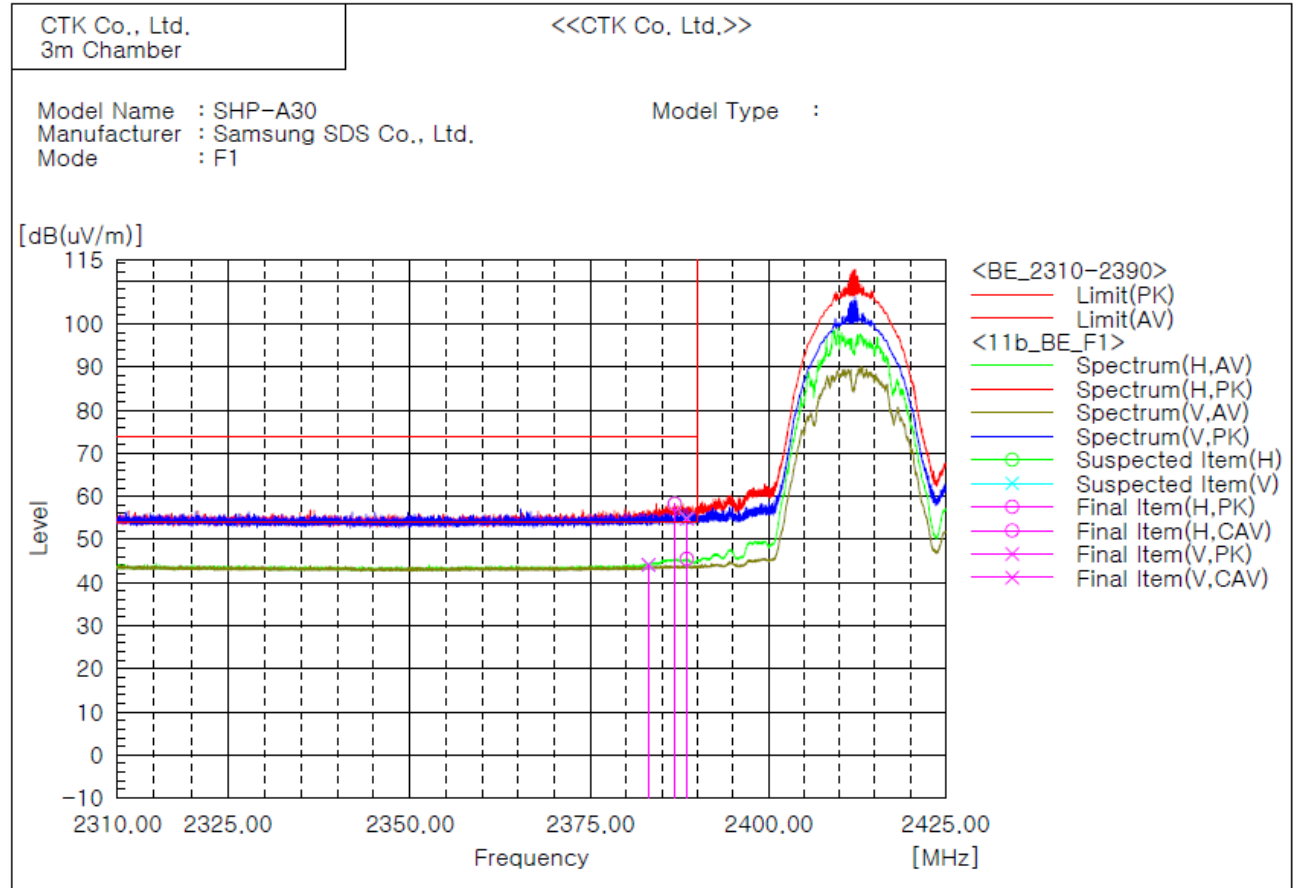


## Test results

### 1) Restricted Frequency Bands

#### 1. 2 310 MHz to 2 390 MHz

Test mode : 802.11b, Low channel



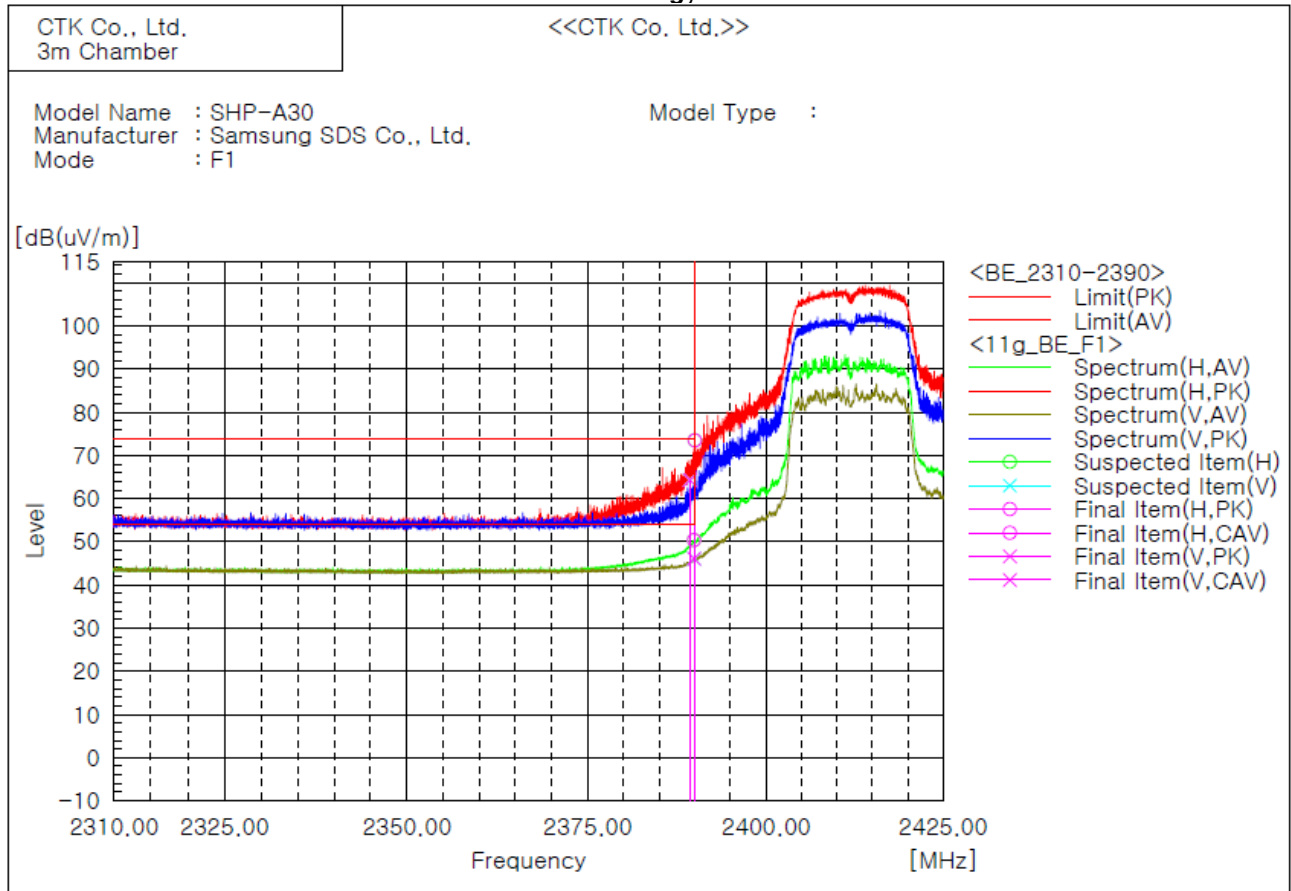
#### Final Result

| No. | Frequency [MHz] | (P) | Reading PK [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB(1/m)] | Result PK [dB(uV/m)] | Result CAV [dB(uV/m)] | Limit PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Margin PK [dB] | Margin CAV [dB] | Height [cm] | Angle [deg] |
|-----|-----------------|-----|---------------------|----------------------|---------------|----------------------|-----------------------|---------------------|---------------------|----------------|-----------------|-------------|-------------|
| 1   | 2386.806        | H   | 53.4                |                      | 4.9           | 58.3                 |                       | 74.0                | 54.0                | 15.7           |                 | 236.0       | 207.8       |
| 2   | 2388.488        | V   | 49.9                |                      | 4.9           | 54.8                 |                       | 74.0                | 54.0                | 19.2           |                 | 224.5       | 244.8       |
| 3   | 2388.488        | H   |                     | 40.6                 | 4.9           |                      | 45.5                  | 74.0                | 54.0                |                | 8.5             | 236.0       | 126.3       |
| 4   | 2383.126        | V   |                     | 39.2                 | 4.9           |                      | 44.1                  | 74.0                | 54.0                |                | 9.9             | 224.5       | 0.0         |

## Remarks

1. The Unwanted emission was measured in the following position:  
EUT stand-up position(X axis).
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

**Test mode : 802.11g, Low channel**



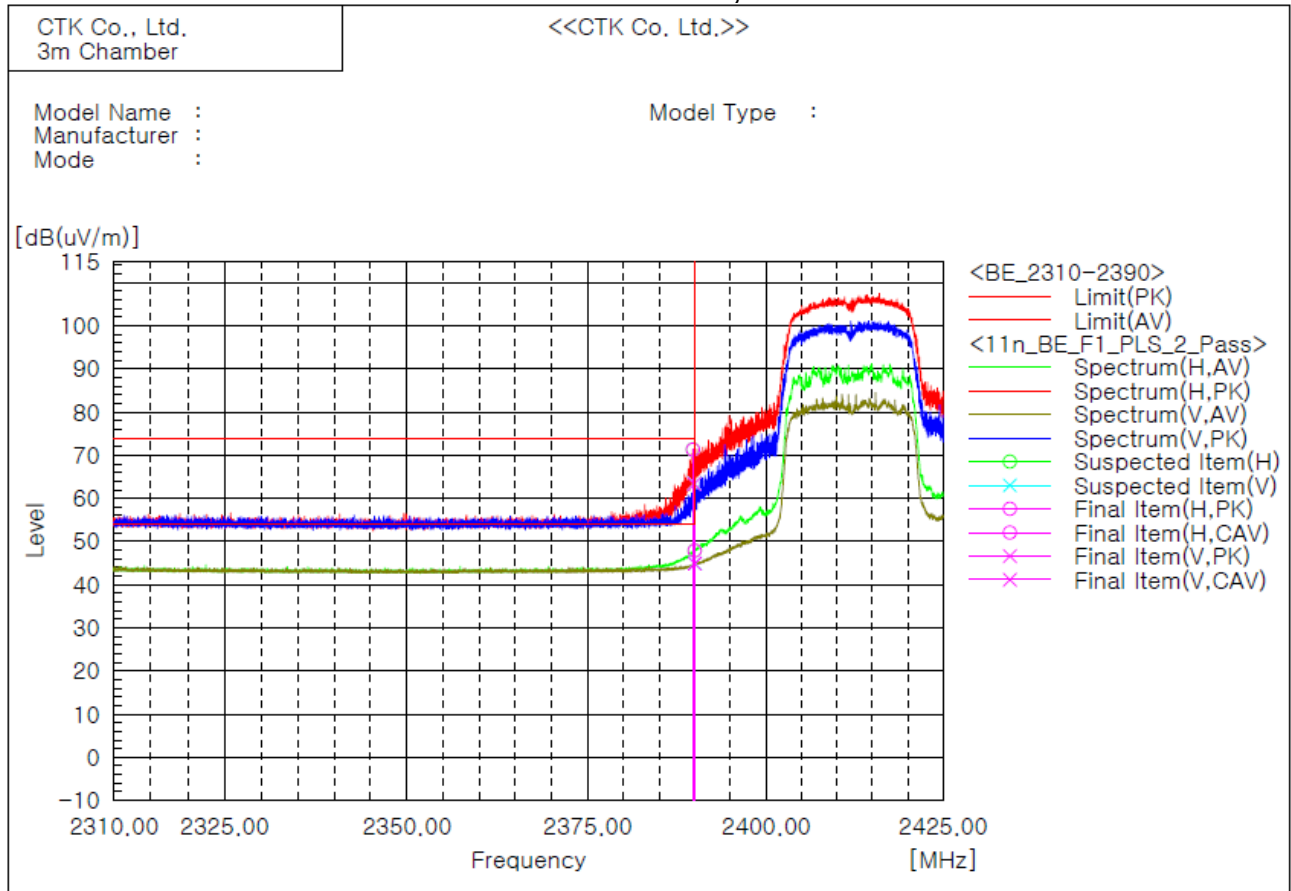
**Final Result**

| No. | Frequency [MHz] | (P) | Reading PK [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB(1/m)] | Result PK [dB(uV/m)] | Result CAV [dB(uV/m)] | Limit PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Margin PK [dB] | Margin CAV [dB] | Height [cm] | Angle [deg] |
|-----|-----------------|-----|---------------------|----------------------|---------------|----------------------|-----------------------|---------------------|---------------------|----------------|-----------------|-------------|-------------|
| 1   | 2389.997        | H   | 68.5                |                      | 5.0           | 73.5                 |                       | 74.0                | 54.0                | 0.5            |                 | 355.0       | 185.2       |
| 2   | 2389.307        | V   | 59.4                |                      | 4.9           | 64.3                 |                       | 74.0                | 54.0                | 9.7            |                 | 100.0       | 257.5       |
| 3   | 2389.882        | H   |                     | 45.4                 | 5.0           |                      | 50.4                  | 74.0                | 54.0                |                | 3.6             | 100.0       | 277.3       |
| 4   | 2389.896        | V   |                     | 41.1                 | 5.0           |                      | 46.1                  | 74.0                | 54.0                |                | 7.9             | 100.0       | 0.0         |

**Remarks**

1. The Unwanted emission was measured in the following position:  
EUT stand-up position(X axis).
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

**Test mode : 802.11n-HT20, Low channel**



**Final Result**

| No. | Frequency [MHz] | (P) | Reading PK [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB(1/m)] | Result PK [dB(uV/m)] | Result CAV [dB(uV/m)] | Limit PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Margin PK [dB] | Margin CAV [dB] | Height [cm] | Angle [deg] |
|-----|-----------------|-----|---------------------|----------------------|---------------|----------------------|-----------------------|---------------------|---------------------|----------------|-----------------|-------------|-------------|
| 1   | 2389.738        | H   | 66.3                |                      | 5.0           | 71.3                 |                       | 74.0                | 54.0                | 2.7            |                 | 234.7       | 193.4       |
| 2   | 2389.925        | V   | 58.4                |                      | 5.0           | 63.4                 |                       | 74.0                | 54.0                | 10.6           |                 | 225.6       | 135.8       |
| 3   | 2389.968        | H   |                     | 42.9                 | 5.0           |                      | 47.9                  | 74.0                | 54.0                |                | 6.1             | 99.8        | 146.8       |
| 4   | 2389.997        | V   |                     | 39.9                 | 5.0           |                      | 44.9                  | 74.0                | 54.0                |                | 9.1             | 464.0       | 246.5       |

**Remarks**

1. The Unwanted emission was measured in the following position:  
EUT stand-up position(X axis).
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

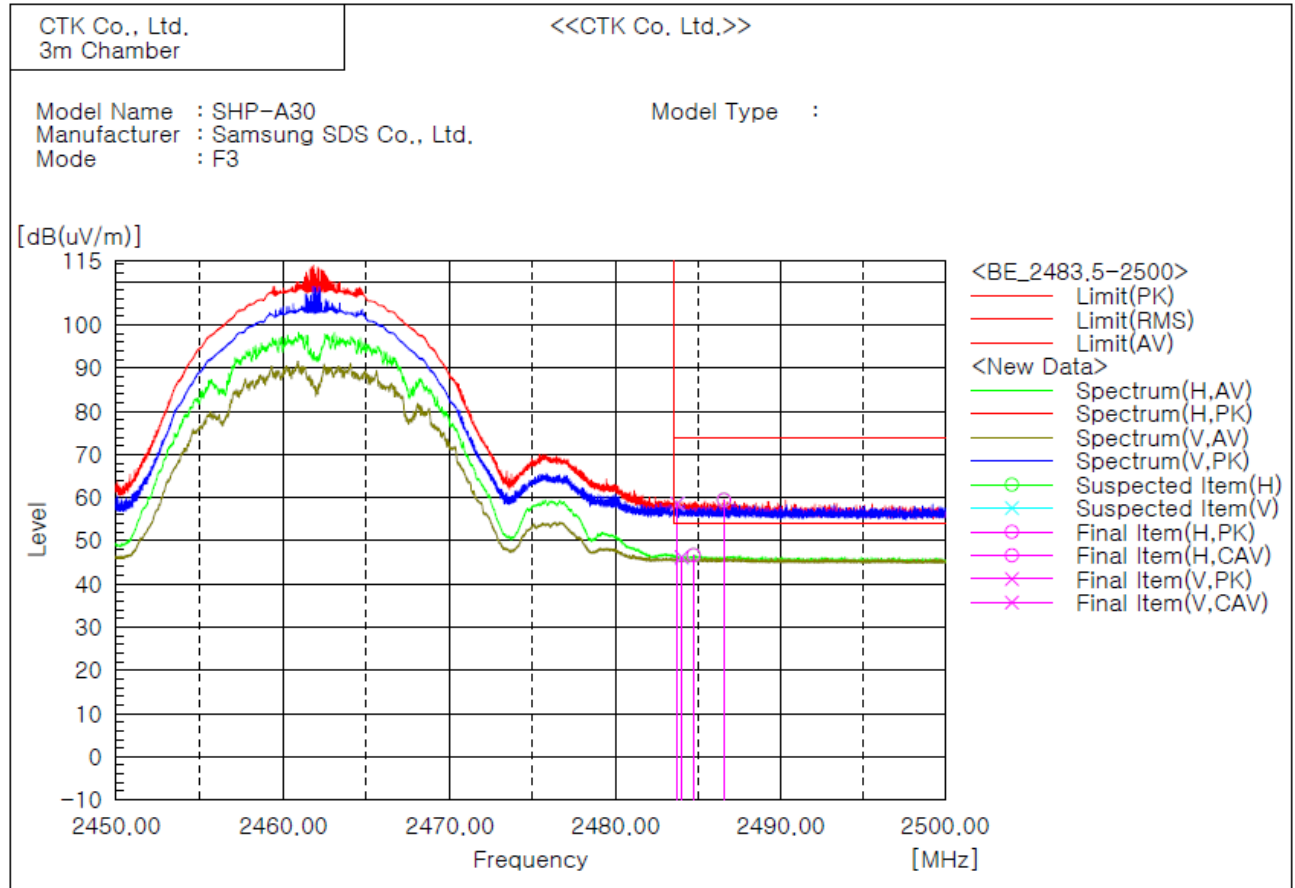
## 2. 2 483.5 MHz – 2 500 MHz

Test mode : 802.11b, High Channel

The requirements are:

☒ Complies

### Test Data



### Final Result

| No. | Frequency [MHz] | (P) | Reading PK [dB(uV)] | Reading CAV [dB(uV)] | c.f. [dB(1/m)] | Result PK [dB(uV/m)] | Result CAV [dB(uV/m)] | Limit PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Margin PK [dB] | Margin CAV [dB] | Height [cm] | Angle [deg] |
|-----|-----------------|-----|---------------------|----------------------|----------------|----------------------|-----------------------|---------------------|---------------------|----------------|-----------------|-------------|-------------|
| 1   | 2486.569        | H   | 52.8                |                      | 6.7            | 59.5                 |                       | 74.0                | 54.0                | 14.5           |                 | 99.8        | 204.8       |
| 2   | 2483.744        | V   | 51.9                |                      | 6.7            | 58.6                 |                       | 74.0                | 54.0                | 15.4           |                 | 484.1       | 69.7        |
| 3   | 2484.731        | H   |                     | 40.0                 | 6.7            |                      | 46.7                  | 74.0                | 54.0                |                | 7.3             | 484.1       | 359.9       |
| 4   | 2484.006        | V   |                     | 39.5                 | 6.7            |                      | 46.2                  | 74.0                | 54.0                |                | 7.8             | 484.1       | 0.0         |

### Remarks

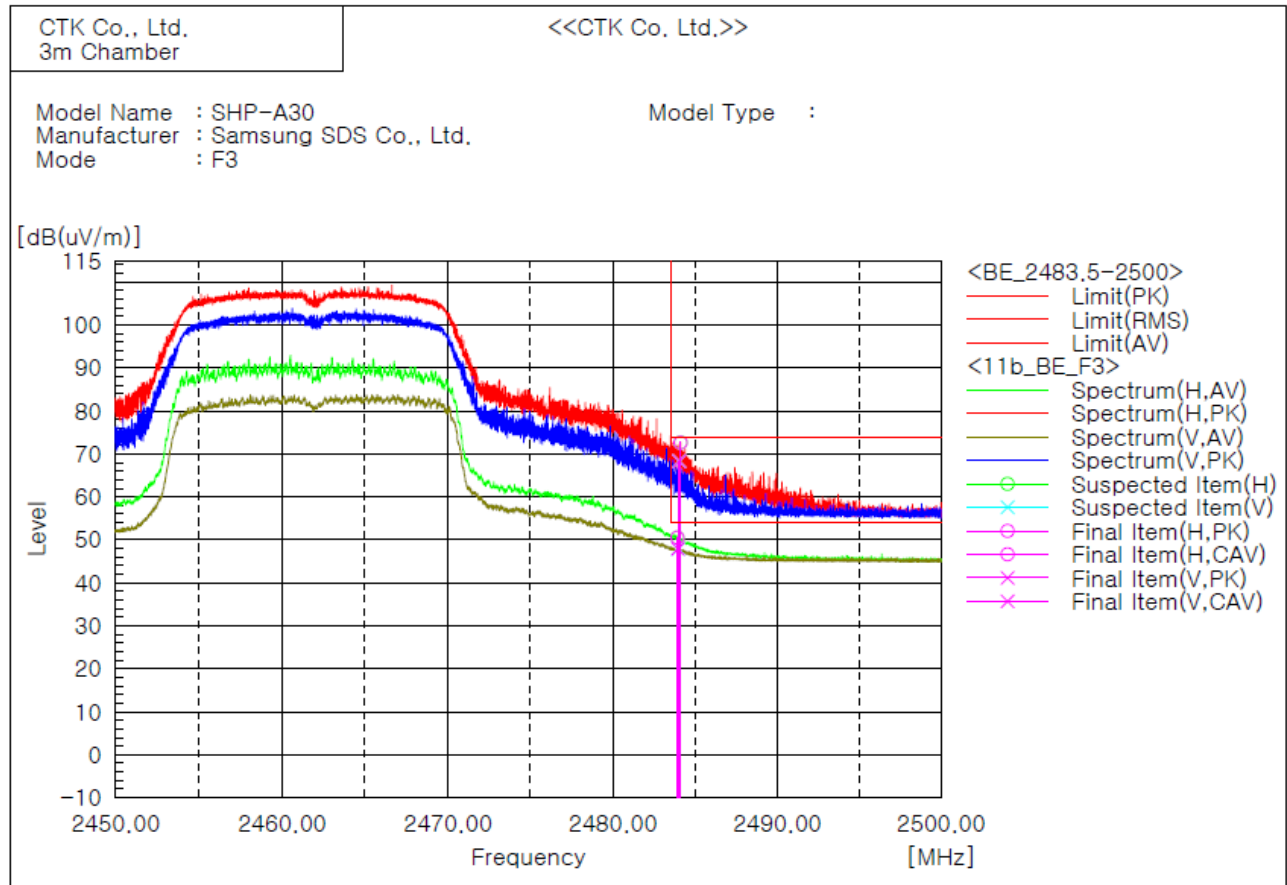
1. The Unwanted emission was measured in the following position:  
EUT stand-up position(X axis).
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

**Test mode : 802.11g, High Channel**

The requirements are:

☒ Complies

**Test Data**



**Final Result**

| No. | Frequency [MHz] | (P) | Reading PK [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB(1/m)] | Result PK [dB(uV/m)] | Result CAV [dB(uV/m)] | Limit PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Margin PK [dB] | Margin CAV [dB] | Height [cm] | Angle [deg] |
|-----|-----------------|-----|---------------------|----------------------|---------------|----------------------|-----------------------|---------------------|---------------------|----------------|-----------------|-------------|-------------|
| 1   | 2484.125        | H   | 65.9                |                      | 6.7           | 72.6                 |                       | 74.0                | 54.0                | 1.4            |                 | 234.0       | 208.6       |
| 2   | 2484.031        | V   | 61.6                |                      | 6.7           | 68.3                 |                       | 74.0                | 54.0                | 5.7            |                 | 464.1       | 339.2       |
| 3   | 2483.925        | H   |                     | 43.8                 | 6.7           |                      | 50.5                  | 74.0                | 54.0                |                | 3.5             | 464.1       | 359.9       |
| 4   | 2483.962        | V   |                     | 41.2                 | 6.7           |                      | 47.9                  | 74.0                | 54.0                |                | 6.1             | 464.1       | 339.2       |

**Remarks**

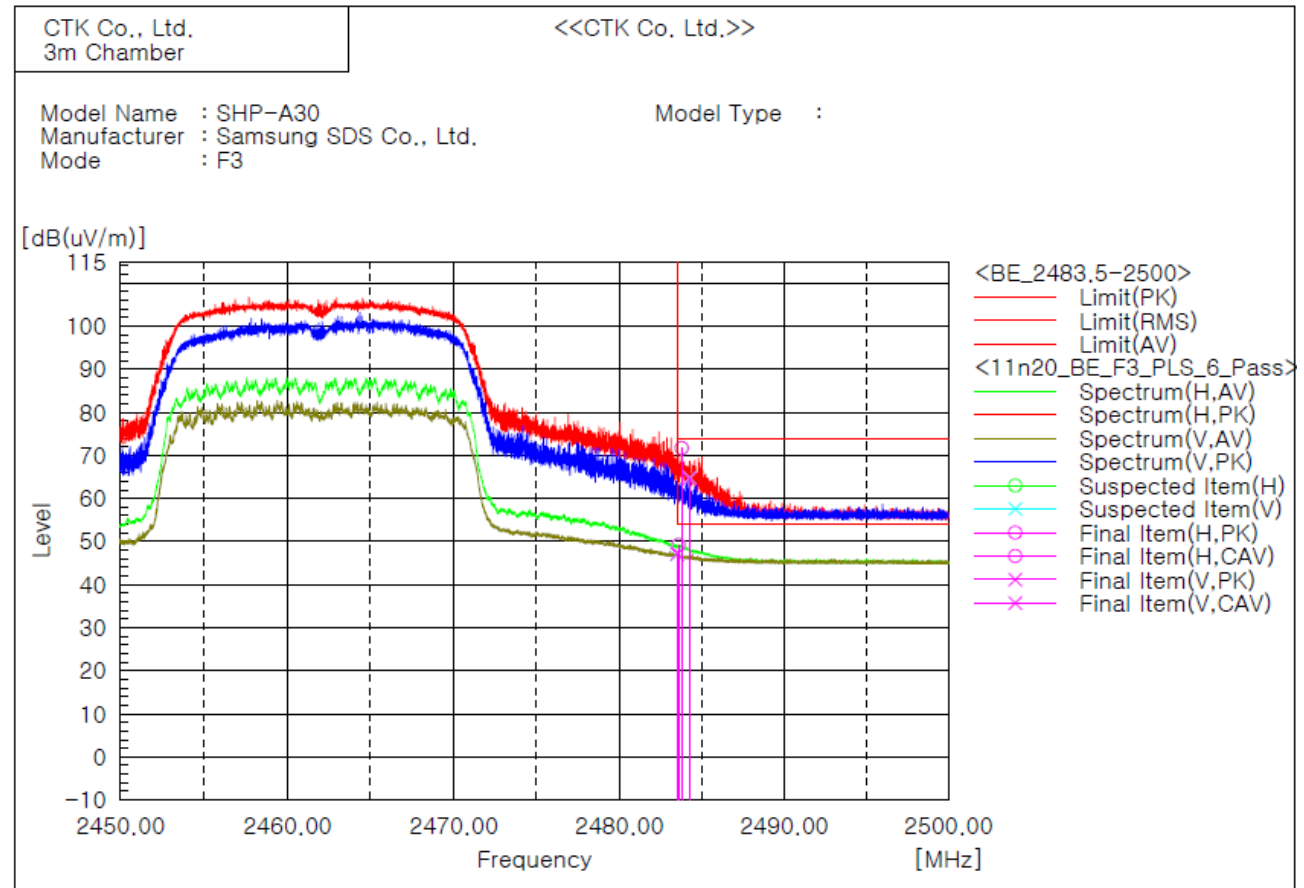
1. The Unwanted emission was measured in the following position:  
EUT stand-up position(X axis).
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

**Test mode : 802.11n-HT20, High channel**

The requirements are:

☒ Complies

**Test Data**



**Final Result**

| No. | Frequency [MHz] | (P) | Reading PK [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB(1/m)] | Result PK [dB(uV/m)] | Result CAV [dB(uV/m)] | Limit PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Margin PK [dB] | Margin CAV [dB] | Height [cm] | Angle [deg] |
|-----|-----------------|-----|---------------------|----------------------|---------------|----------------------|-----------------------|---------------------|---------------------|----------------|-----------------|-------------|-------------|
| 1   | 2483.788        | H   | 65.0                | —                    | 6.7           | 71.7                 | —                     | 74.0                | 54.0                | 2.3            | —               | 99.8        | 212.8       |
| 2   | 2484.256        | V   | 58.0                | —                    | 6.7           | 64.7                 | —                     | 74.0                | 54.0                | 9.3            | —               | 99.8        | 236.7       |
| 3   | 2483.600        | H   | —                   | 42.5                 | 6.7           | —                    | 49.2                  | 74.0                | 54.0                | —              | 4.8             | 484.2       | 143.6       |
| 4   | 2483.519        | V   | —                   | 40.4                 | 6.7           | —                    | 47.1                  | 74.0                | 54.0                | —              | 6.9             | 484.2       | 0.0         |

**Remarks**

1. The Unwanted emission was measured in the following position:  
EUT stand-up position(X axis).
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

## 2) Spurious

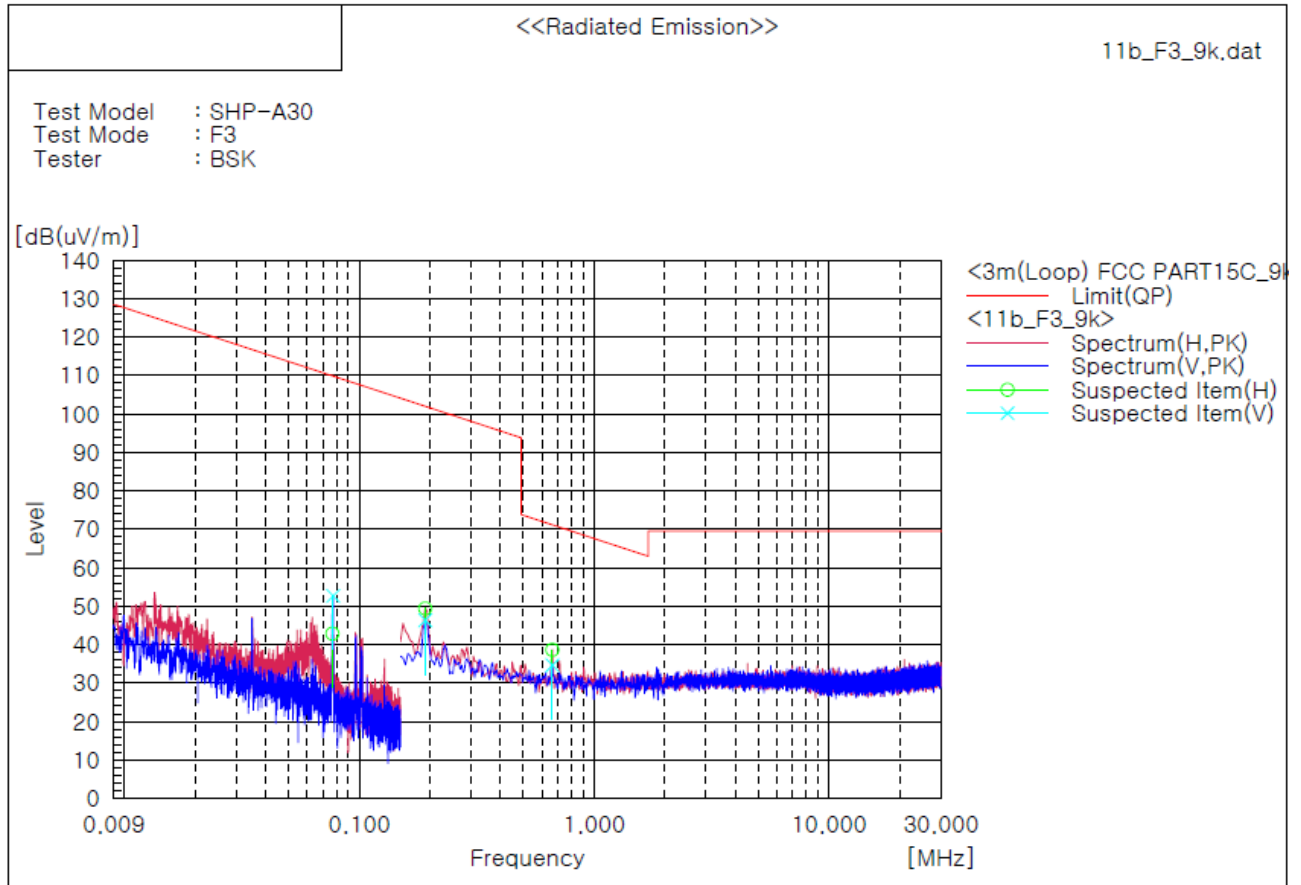
### 1. 9 kHz to 30 MHz

**Test mode : 802.11b, High channel (Worst case)**

The requirements are:

☒ Complies

### Test Data



**Result :** There are more than 20 dB of margin compared to the limit.

### Remark :

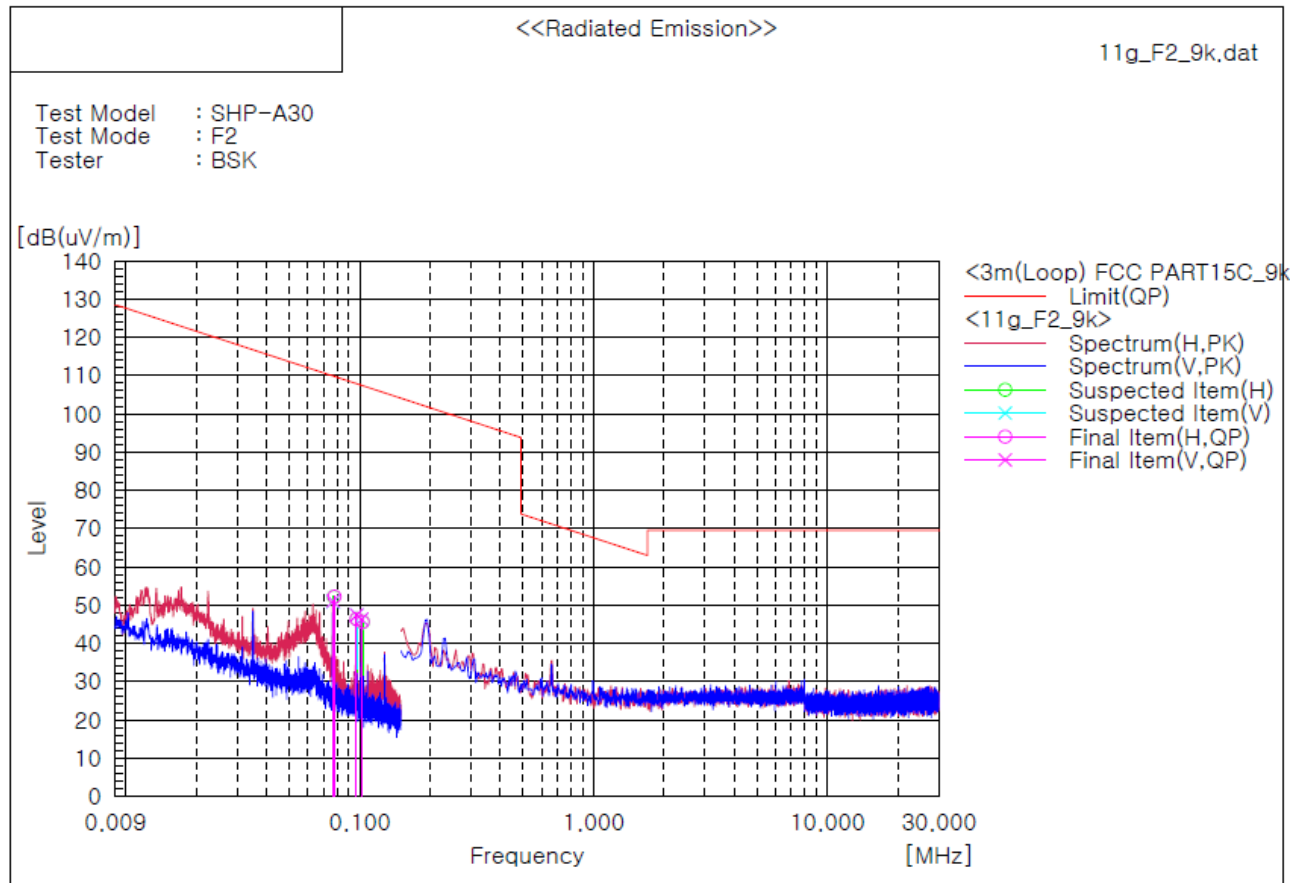
1. The Unwanted emission was measured in the following position:  
EUT stand-up position(X axis).
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator
4. Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB)
5. This data is the Peak(PK) value.

**Test mode : 802.11g, Middle channel (Worst case)**

The requirements are:

☒ Complies

**Test Data**



**Result :** There are more than 20 dB of margin compared to the limit.

**Remark :**

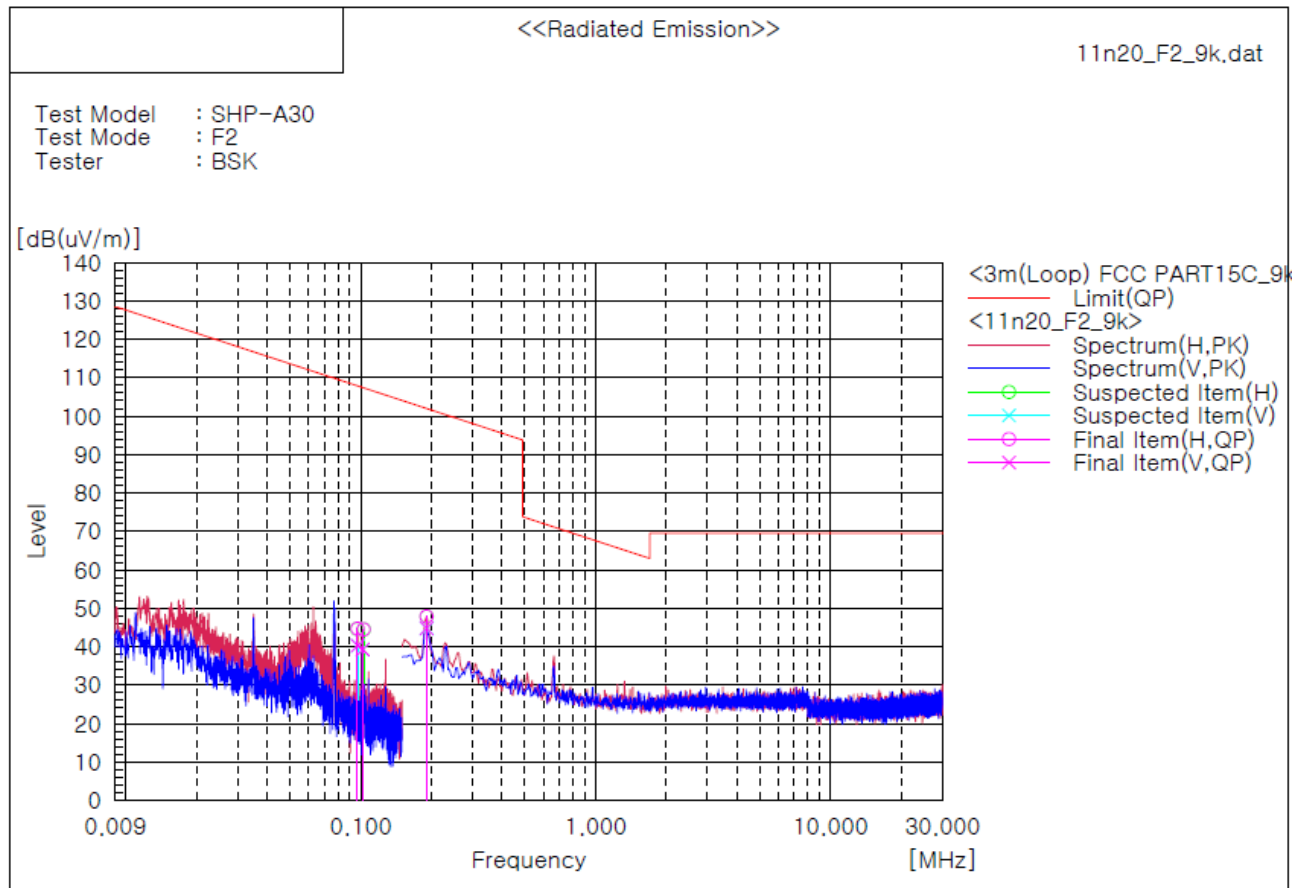
1. The Unwanted emission was measured in the following position:  
EUT stand-up position(X axis).
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator
4. Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB)
5. This data is the Peak(PK) value.

**Test mode : 802.11n-HT20, Middle channel (Worst case)**

The requirements are:

☒ Complies

**Test Data**



**Result :** There are more than 20 dB of margin compared to the limit.

**Remark :** ✖

1. The Unwanted emission was measured in the following position:  
EUT stand-up position(X axis).
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator
4. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
5. This data is the Peak(PK) value.

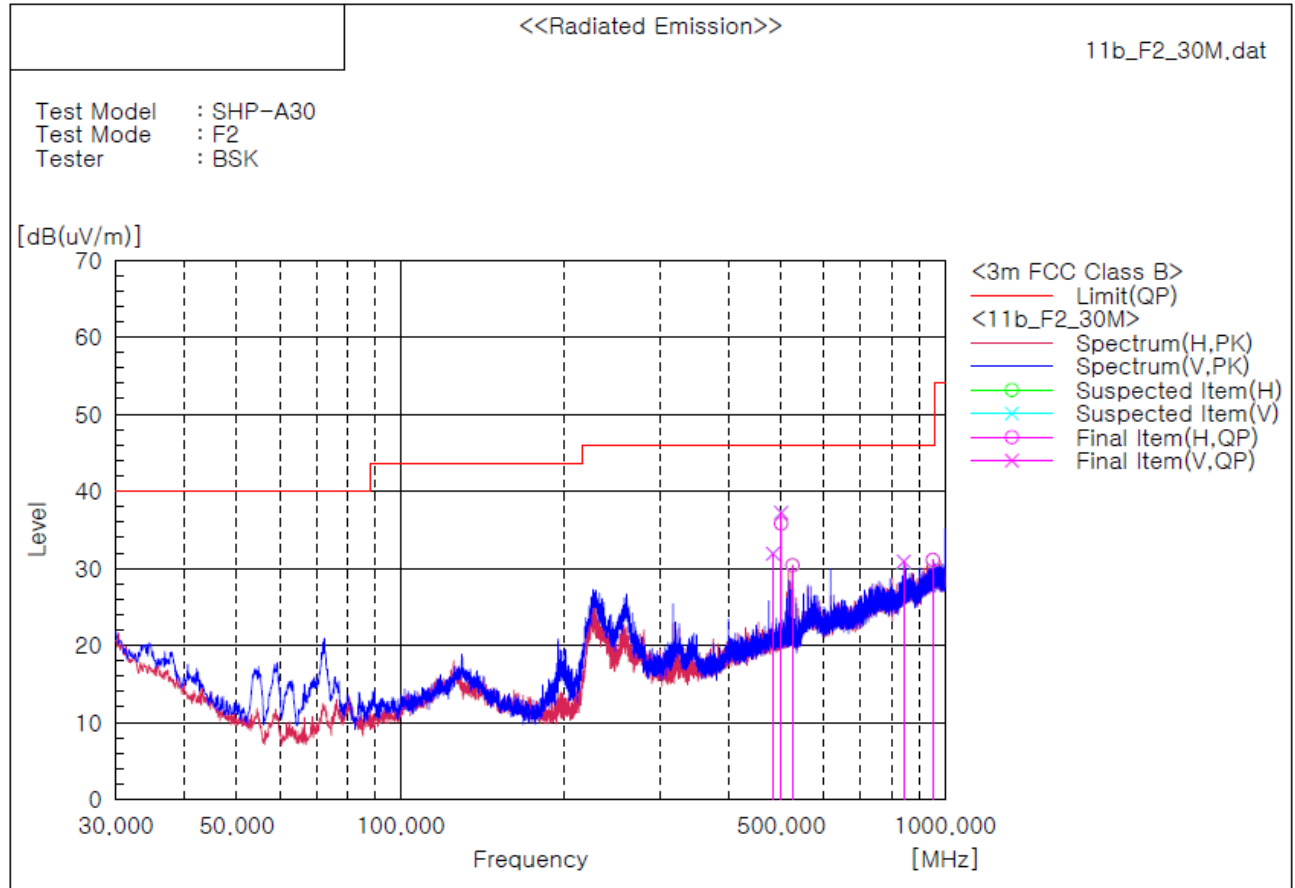
## 2. 30 MHz to 1 GHz

Test mode : 802.11b, Middle channel (Worst case)

The requirements are:

☒ Complies

### Test Data



### Final Result

| No. | Frequency<br>[MHz] | (P) | Reading<br>QP<br>[dB(uV)] | c.f<br>[dB(1/m)] | Result<br>QP<br>[dB(uV/m)] | Limit<br>QP<br>[dB(uV/m)] | Margin<br>QP<br>[dB] | Height<br>[cm] | Angle<br>[deg] |
|-----|--------------------|-----|---------------------------|------------------|----------------------------|---------------------------|----------------------|----------------|----------------|
| 1   | 483.354            | V   | 34.7                      | -2.8             | 31.9                       | 46.0                      | 14.1                 | 101.0          | 177.0          |
| 2   | 499.965            | V   | 39.7                      | -2.5             | 37.2                       | 46.0                      | 8.8                  | 101.0          | 53.0           |
| 3   | 499.965            | H   | 38.3                      | -2.5             | 35.8                       | 46.0                      | 10.2                 | 205.0          | 325.0          |
| 4   | 525.064            | H   | 32.7                      | -2.3             | 30.4                       | 46.0                      | 15.6                 | 205.0          | 258.0          |
| 5   | 840.071            | V   | 26.6                      | 4.3              | 30.9                       | 46.0                      | 15.1                 | 191.0          | 163.0          |
| 6   | 949.924            | H   | 24.0                      | 7.1              | 31.1                       | 46.0                      | 14.9                 | 399.0          | 77.0           |

### Remark :

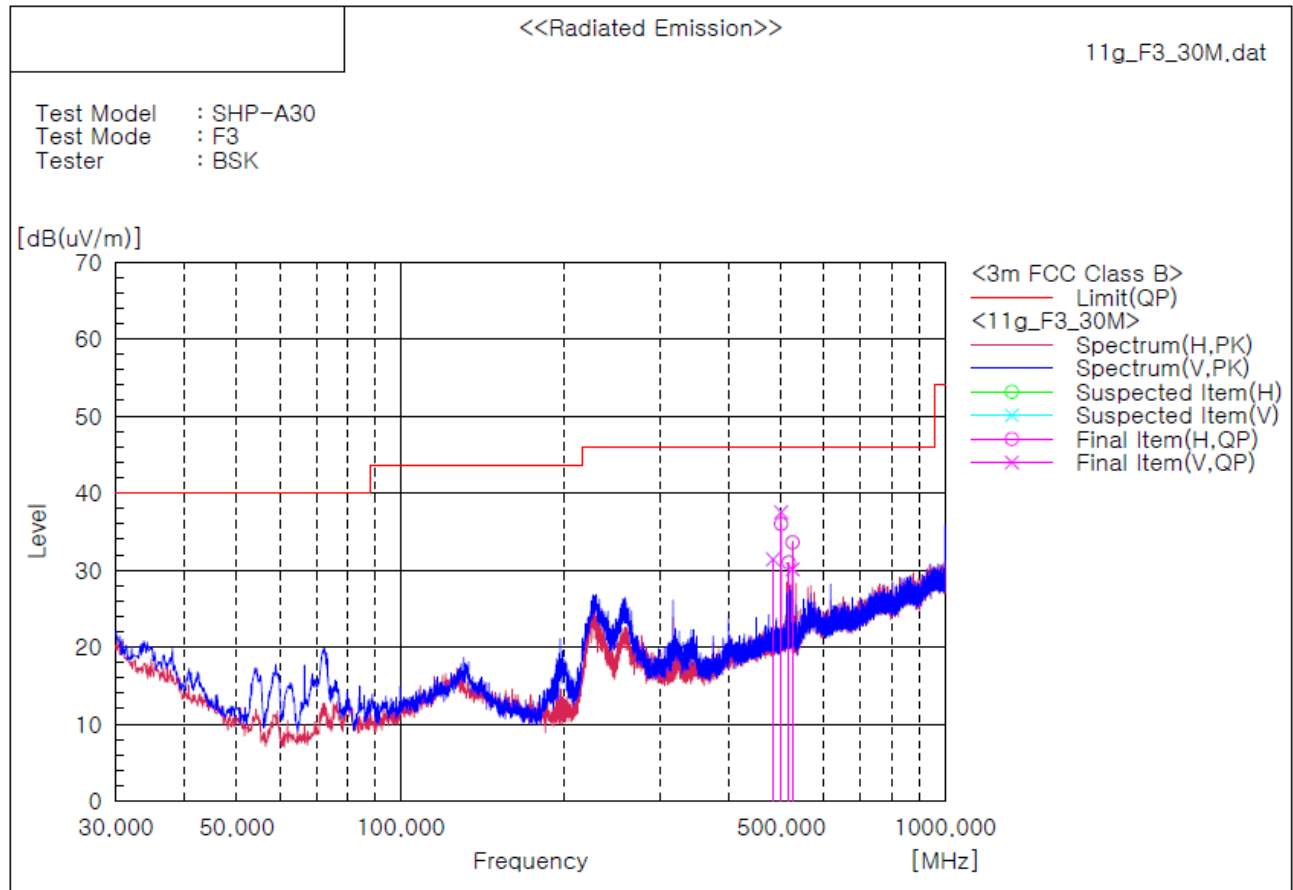
- The Unwanted emission was measured in the following position:  
EUT stand-up position(X axis).
- Result = Reading + c.f(Correction factor)
- Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain
- This data is the Peak(PK) value.

**Test mode : 802.11g, High channel (Worst case)**

The requirements are:

☒ Complies

**Test Data**



**Final Result**

| No. | Frequency [MHz] | (P) | Reading QP [dB(uV)] | c.f [dB(1/m)] | Result QP [dB(uV/m)] | Limit QP [dB(uV/m)] | Margin QP [dB] | Height [cm] | Angle [deg] |
|-----|-----------------|-----|---------------------|---------------|----------------------|---------------------|----------------|-------------|-------------|
| 1   | 483.354         | V   | 34.2                | -2.8          | 31.4                 | 46.0                | 14.6           | 101.0       | 70.0        |
| 2   | 499.965         | V   | 40.0                | -2.5          | 37.5                 | 46.0                | 8.5            | 101.0       | 93.0        |
| 3   | 499.965         | H   | 38.5                | -2.5          | 36.0                 | 46.0                | 10.0           | 209.0       | 275.0       |
| 4   | 516.698         | H   | 33.3                | -2.3          | 31.0                 | 46.0                | 15.0           | 209.0       | 251.0       |
| 5   | 525.064         | H   | 35.9                | -2.3          | 33.6                 | 46.0                | 12.4           | 209.0       | 258.0       |
| 6   | 525.064         | V   | 32.4                | -2.3          | 30.1                 | 46.0                | 15.9           | 101.0       | 357.0       |

Remark :

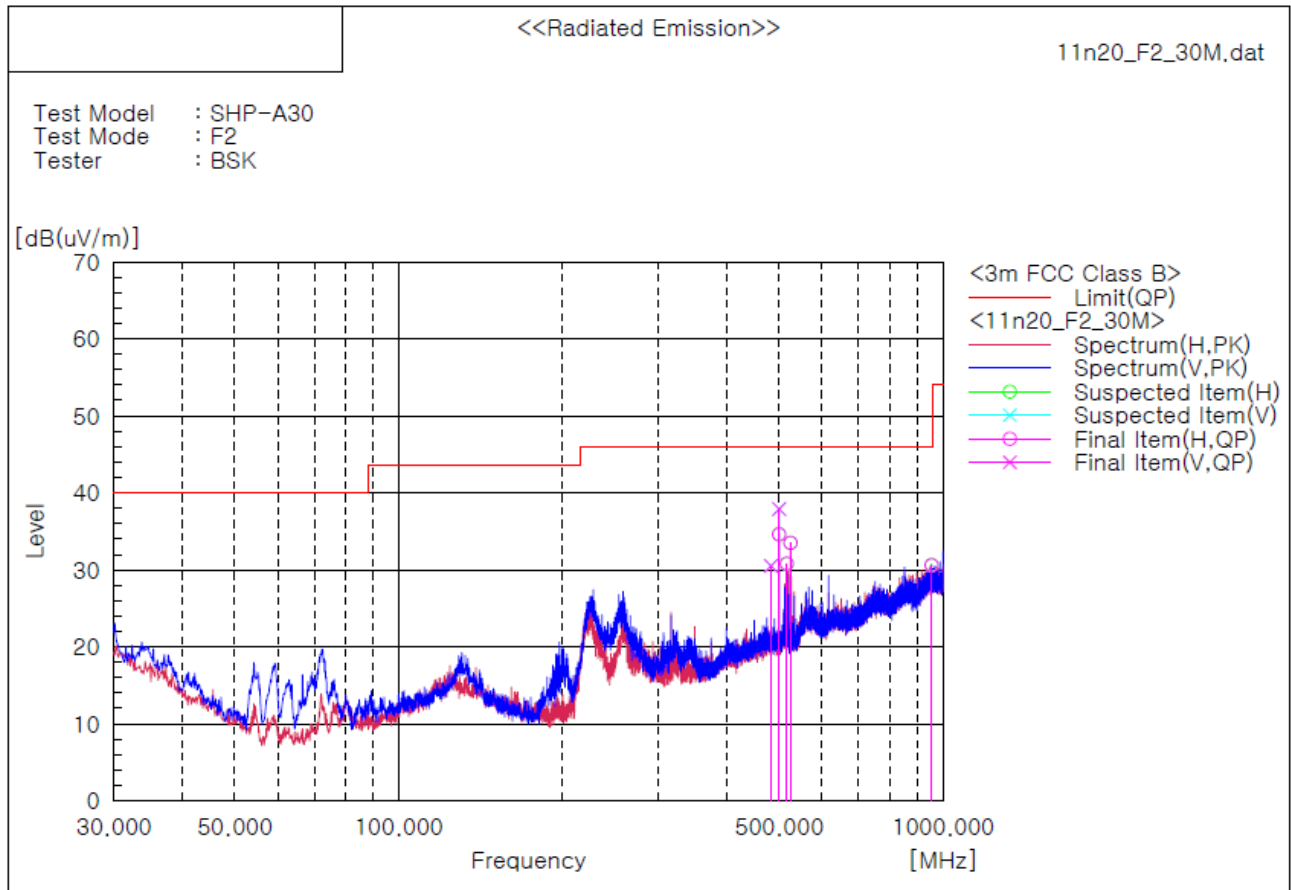
1. The Unwanted emission was measured in the following position:  
EUT stand-up position(X axis).
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain
4. This data is the Peak(PK) value.

**Test mode : 802.11n-HT20, Middle channel (Worst case)**

The requirements are:

☒ Complies

**Test Data**



**Final Result**

| No. | Frequency [MHz] | (P) | Reading QP [dB(uV)] | c.f [dB(1/m)] | Result QP [dB(uV/m)] | Limit QP [dB(uV/m)] | Margin QP [dB] | Height [cm] | Angle [deg] |
|-----|-----------------|-----|---------------------|---------------|----------------------|---------------------|----------------|-------------|-------------|
| 1   | 483.354         | V   | 33.3                | -2.8          | 30.5                 | 46.0                | 15.5           | 101.0       | 77.0        |
| 2   | 499.965         | V   | 40.4                | -2.5          | 37.9                 | 46.0                | 8.1            | 101.0       | 161.0       |
| 3   | 499.965         | H   | 37.1                | -2.5          | 34.6                 | 46.0                | 11.4           | 209.0       | 258.0       |
| 4   | 516.698         | H   | 33.1                | -2.3          | 30.8                 | 46.0                | 15.2           | 209.0       | 268.0       |
| 5   | 525.064         | H   | 35.8                | -2.3          | 33.5                 | 46.0                | 12.5           | 209.0       | 252.0       |
| 6   | 953.319         | H   | 23.5                | 7.1           | 30.6                 | 46.0                | 15.4           | 209.0       | 292.0       |

**Remark :**

1. The Unwanted emission was measured in the following position:  
EUT stand-up position(X axis).
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain
4. This data is the Peak(PK) value.

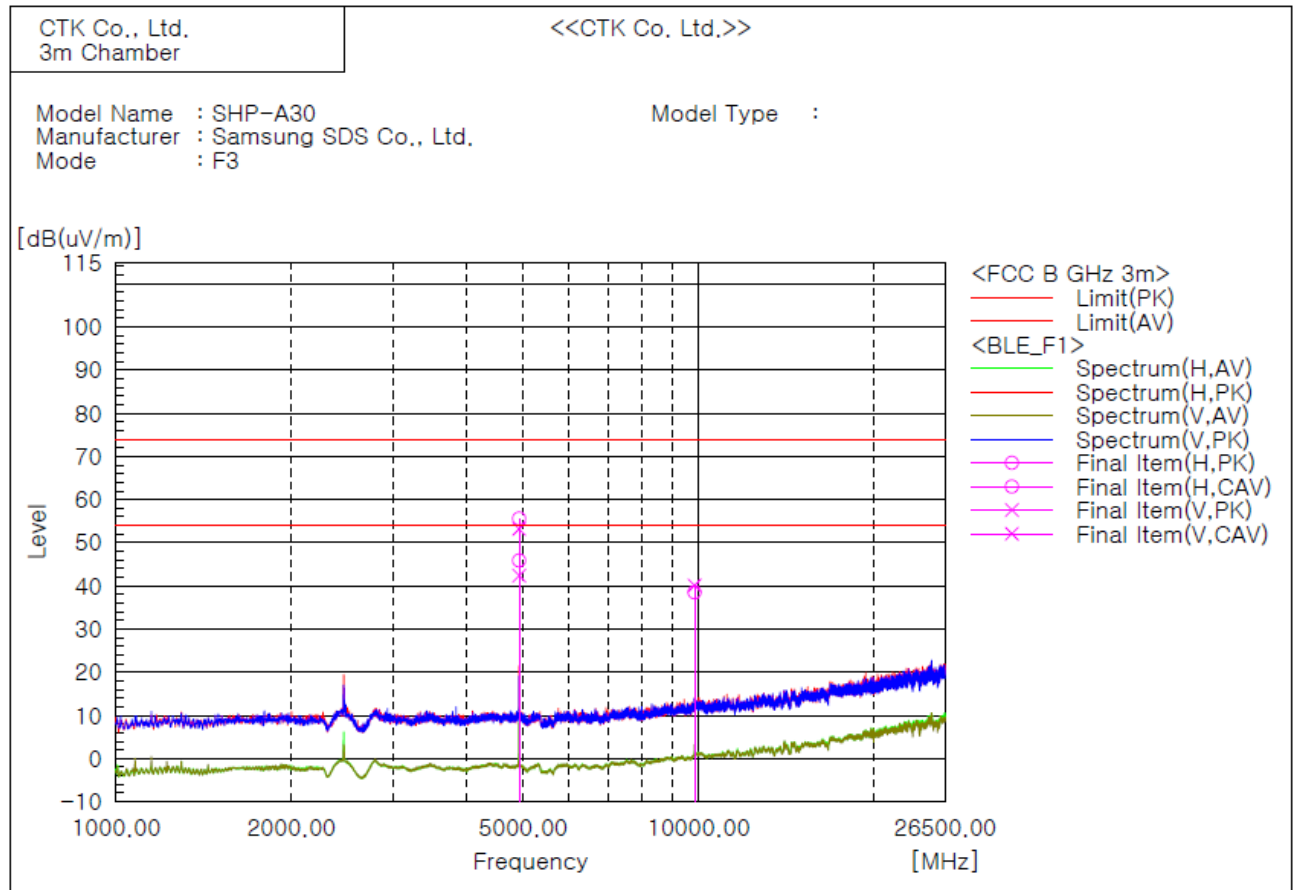
### 3. 1 GHz to 26.5 GHz

Test mode : 802.11b, High Channel (Worst case)

The requirements are:

☒ Complies

#### Test Data



#### Final Result

| No. | Frequency [MHz] | (P) | Reading PK [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB(1/m)] | Result PK [dB(uV/m)] | Result CAV [dB(uV/m)] | Limit PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Margin PK [dB] | Margin CAV [dB] | Height [cm] | Angle [deg] |
|-----|-----------------|-----|---------------------|----------------------|---------------|----------------------|-----------------------|---------------------|---------------------|----------------|-----------------|-------------|-------------|
| 1   | 4922.750        | H   | 54.2                | —                    | 1.4           | 55.6                 | —                     | 74.0                | 54.0                | 18.4           | —               | 344.9       | 163.0       |
| 2   | 4922.750        | V   | 51.8                | —                    | 1.4           | 53.2                 | —                     | 74.0                | 54.0                | 20.8           | —               | 464.1       | 221.3       |
| 3   | 4922.750        | H   | —                   | 44.5                 | 1.4           | —                    | 45.9                  | 74.0                | 54.0                | —              | 8.1             | 99.8        | 355.3       |
| 4   | 4922.750        | V   | —                   | 41.0                 | 1.4           | —                    | 42.4                  | 74.0                | 54.0                | —              | 11.6            | 464.1       | 359.9       |
| 5   | 9848.499        | V   | —                   | 34.7                 | 5.4           | —                    | 40.1                  | 74.0                | 54.0                | —              | 13.9            | 354.9       | 4.9         |
| 6   | 9848.499        | H   | —                   | 33.1                 | 5.4           | —                    | 38.5                  | 74.0                | 54.0                | —              | 15.5            | 464.2       | 49.0        |

#### Remarks

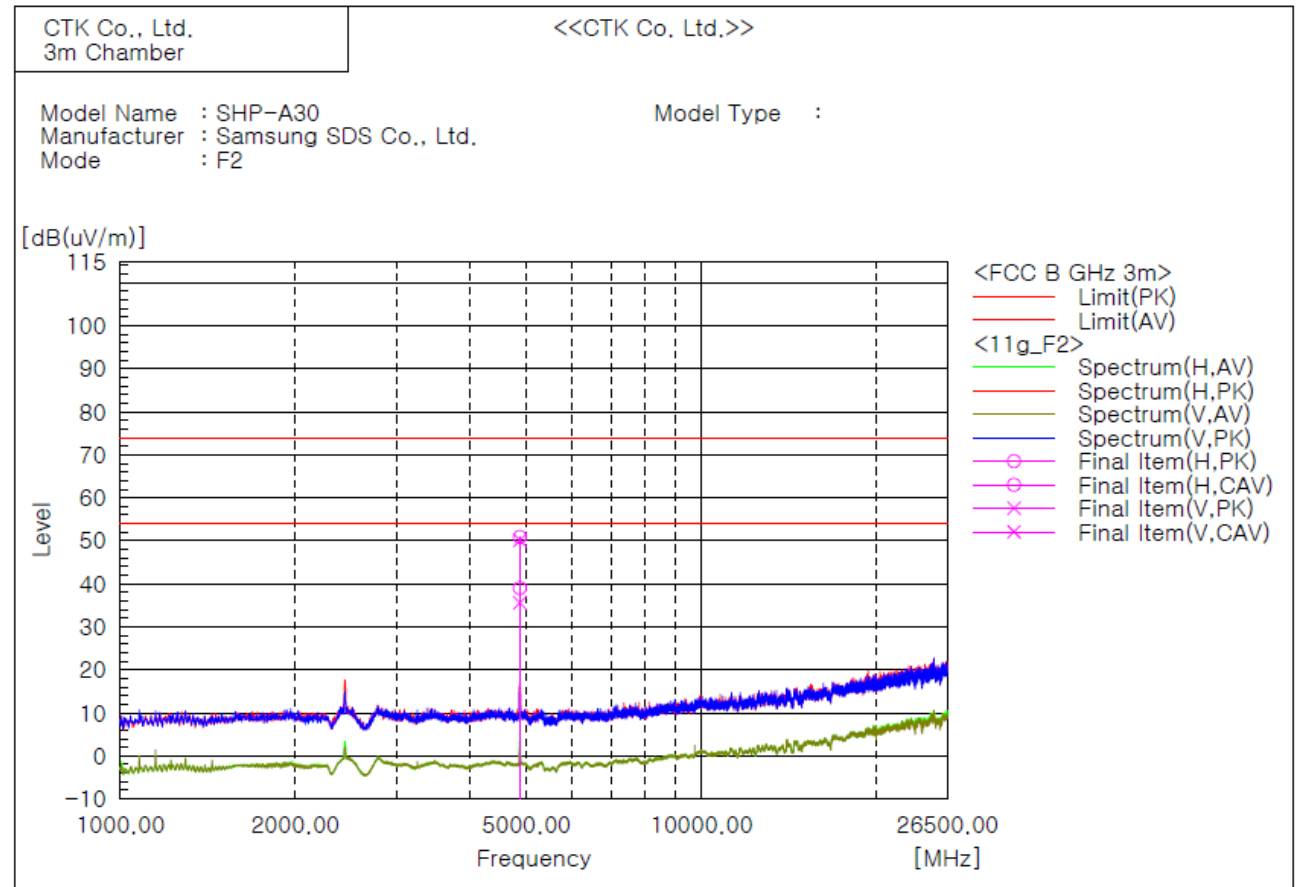
1. The Unwanted emission was measured in the following position:  
EUT stand-up position(X axis).
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

**Test mode : 802.11g, Middle channel (Worst case)**

The requirements are:

☒ Complies

**Test Data**



**Final Result**

| No. | Frequency [MHz] | (P) | Reading PK [dB(uV)] | Reading CAV [dB(uV)] | c.f. [dB(1/m)] | Result PK [dB(uV/m)] | Result CAV [dB(uV/m)] | Limit PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Margin PK [dB] | Margin CAV [dB] | Height [cm] | Angle [deg] |
|-----|-----------------|-----|---------------------|----------------------|----------------|----------------------|-----------------------|---------------------|---------------------|----------------|-----------------|-------------|-------------|
| 1   | 4873.875        | V   |                     | 34.5                 | 1.1            |                      | 35.6                  | 74.0                | 54.0                |                | 18.4            | 235.1       | 359.9       |
| 2   | 4873.875        | H   |                     | 37.9                 | 1.1            |                      | 39.0                  | 74.0                | 54.0                |                | 15.0            | 99.9        | 359.9       |
| 3   | 4871.750        | V   | 49.0                |                      | 1.1            | 50.1                 |                       | 74.0                | 54.0                | 23.9           |                 | 464.3       | 214.3       |
| 4   | 4873.875        | H   | 49.8                |                      | 1.1            | 50.9                 |                       | 74.0                | 54.0                | 23.1           |                 | 345.5       | 163.0       |

**Remarks**

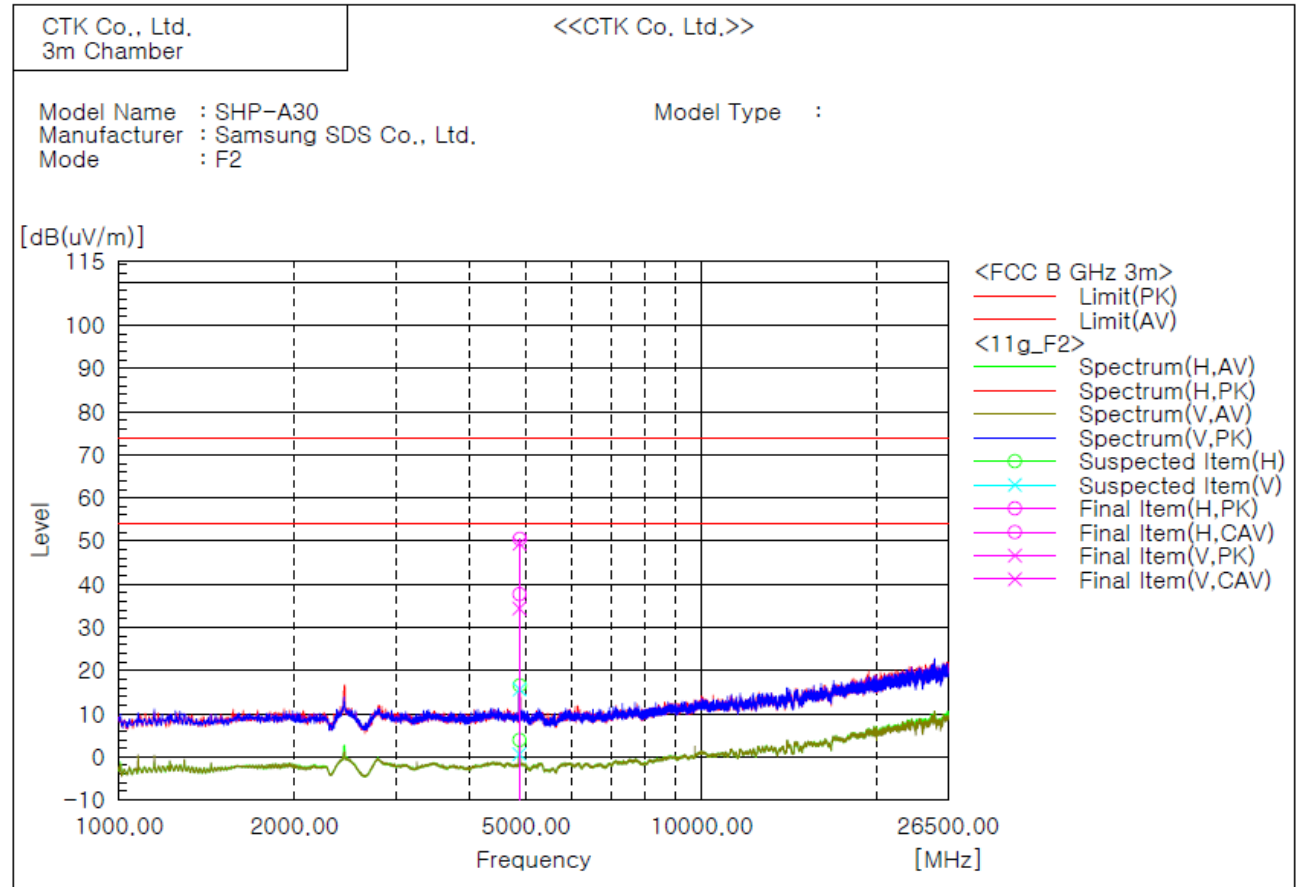
1. The Unwanted emission was measured in the following position:  
EUT stand-up position(X axis).
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

**Test mode : 802.11n-HT20, Middle channel (Worst case)**

The requirements are:

☒ Complies

**Test Data**



**Final Result**

| No. | Frequency [MHz] | (P) | Reading PK [dB(uV)] | Reading CAV [dB(uV)] | c.f. [dB(1/m)] | Result PK [dB(uV/m)] | Result CAV [dB(uV/m)] | Limit PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Margin PK [dB] | Margin CAV [dB] | Height [cm] | Angle [deg] |
|-----|-----------------|-----|---------------------|----------------------|----------------|----------------------|-----------------------|---------------------|---------------------|----------------|-----------------|-------------|-------------|
| 1   | 4869.625        | V   | 33.3                | 33.3                 | 1.1            | 34.4                 | 34.4                  | 74.0                | 54.0                | 19.6           | 19.6            | 234.7       | 354.8       |
| 2   | 4871.750        | H   | 36.6                | 36.6                 | 1.1            | 37.7                 | 37.7                  | 74.0                | 54.0                | 16.3           | 16.3            | 99.8        | 359.9       |
| 3   | 4873.875        | V   | 48.3                | 48.3                 | 1.1            | 49.4                 | 49.4                  | 74.0                | 54.0                | 24.6           | 24.6            | 464.1       | 213.1       |
| 4   | 4878.125        | H   | 49.3                | 49.3                 | 1.2            | 50.5                 | 50.5                  | 74.0                | 54.0                | 23.5           | 23.5            | 226.2       | 186.7       |

**Remarks**

1. The Unwanted emission was measured in the following position:  
EUT stand-up position(X axis).
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

## APPENDIX A – Test Equipment Used For Tests

| No. | Name of Equipment           | Manufacturer    | Model No. | Serial No.    | Cal Date   | Due Date   |
|-----|-----------------------------|-----------------|-----------|---------------|------------|------------|
| 1   | SPECTRUM ANALYZER           | R&S             | FSP-30    | 100994        | 2019-10-16 | 2020-10-16 |
| 2   | EMI Test Receiver           | Rohde & Schwarz | ESCI7     | 100814        | 2019-10-22 | 2020-10-22 |
| 3   | Active Loop Antenna         | SCHWARZBECK     | FMZB 1513 | 1513-126      | 2019-01-17 | 2021-01-17 |
| 4   | Bilog Antenna               | Schaffner       | CBL6111C  | 2551          | 2019-04-17 | 2021-04-17 |
| 5   | AMPLIFIER                   | SONOMA          | 310       | 291721        | 2019-01-28 | 2020-01-28 |
| 6   | 6dB Attenuator              | R&S             | DNF       | 272.4110.50-2 | 2019-10-25 | 2020-10-25 |
| 7   | EMI Test Receiver           | Rohde & Schwarz | ESU40     | 100336        | 2019-01-29 | 2020-01-29 |
| 8   | Double Ridged Guide Antenna | ETS-Lindgren    | 3117      | 00154525      | 2019-02-22 | 2021-02-22 |
| 9   | Double Ridged Guide Antenna | ETS-Lindgren    | 3116      | 00062916      | 2019-04-22 | 2021-04-22 |
| 10  | Preamplifier                | Agilent         | 8449B     | 3008A02011    | 2018-11-25 | 2020-11-25 |
| 11  | Band Reject Filter          | Micro Tronics   | BRM50702  | G233          | 2019-01-28 | 2020-01-28 |
| 12  | Signal Generator            | R&S             | SMB100A   | 175528        | 2019-10-16 | 2020-10-16 |
| 13  | DC Power Supply             | Agilent         | E3632A    | MY40011638    | 2019-10-15 | 2020-10-15 |