



CERTIFICATION TEST REPORT

Report Number. : 4789633488-E4V2

Applicant : SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Model : SM-G996B/DS, SM-G996B

FCC ID : A3LSMG996B

EUT Description : GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax,
UWB, WPT and NFC

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C

Date Of Issue:

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Revision History

| <u>Rev.</u> | <u>Issue Date</u> | <u>Revisions</u> | <u>Revised By</u> |
|-------------|-------------------|-----------------------------------|-------------------|
| V1 | 11/16/20 | Initial issue | Hyunsik Yun |
| V2 | 11/25/20 | Updated to address TCB's question | Hyunsik Yun |

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, UWB, WPT and NFC

MODEL: SM-G996B/DS, SM-G996B

SERIAL NUMBER: R3CN80DETHN, R3CN80DETVA (CONDUCTED)
R3CN811PKAF (RADIATED);

DATE TESTED: OCT 07, 2020 – NOV 25, 2020;

| APPLICABLE STANDARDS | |
|--------------------------|--------------|
| STANDARD | TEST RESULTS |
| CFR 47 Part 15 Subpart C | Complies |

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:



Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



Hyunsik Yun
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 558074 D01 15.247 Meas Guidance v05r02.
4. ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

| 218 Maeyeong-ro | |
|-------------------------------------|-----------|
| <input checked="" type="checkbox"/> | Chamber 1 |
| <input checked="" type="checkbox"/> | Chamber 2 |
| <input type="checkbox"/> | Chamber 3 |

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf>.

4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. METROLOGICAL TRACEABILITY

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 28.9 \text{ dBuV/m} &= 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} \end{aligned}$$

4.3. DECISION RULES

Decision rule for statement(s) of conformity is based on Procedure 1, Clause 4.4.2 in IEC Guide 115:2007.

4.4. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| PARAMETER | UNCERTAINTY |
|--|-------------|
| Conducted Disturbance, 0.15 to 30 MHz | 3.01 dB |
| Radiated Disturbance, 30 MHz to 1 GHz | 4.26 dB |
| Radiated Disturbance, 1 GHz to 18 GHz | 5.90 dB |
| Radiated Disturbance, 18 GHz to 40 GHz | 5.49 dB |

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, UWB, WPT and NFC. This test report addresses the DTS (BLE) operational mode.

This report covers the Samsung models SM-G996B/DS and SM-G996B. These models are identical in hardware except SM-G996B has single SIM tray. With some pre-scan, model SM-G996B/DS was set for final test.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

| Frequency Range [MHz] | Mode | Power Mode | Output Power [dBm] | Output Power [mW] |
|-----------------------|-------|------------|--------------------|-------------------|
| 2 402 ~ 2 480 | 1Mbps | Peak | 6.716 | 4.695 |
| | | Average | 5.905 | 3.895 |
| | 2Mbps | Peak | 7.693 | 5.879 |
| | | Average | 6.742 | 4.723 |

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

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 internal antenna was Permanently attached.
 Therefore this E.U.T Complies with the requirement of §15.203.**

The radio utilizes an internal antenna, with a maximum gain of -2.12 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

Note : All radiated and power line conducted tests were performed attached with travel adapter for the worst case condition mode.

Power verification

The Output Power of all data rate are all investigated, the 1 Mbps(37 pkt) and 2 Mbps(37 pkt) power is the worst case for symbol rate. All tests were performed in these two modes.

| Symbol Rate [Ms/s] | Mode | Frequency [MHz] | Conducted Burst Avg [dBm] | Symbol Rate [Ms/s] | Mode | Frequency [MHz] | Conducted Burst Avg [dBm] |
|--------------------|--------------------|-----------------|---------------------------|--------------------|-----------------|-----------------|---------------------------|
| 1 | 1Mbps (37 pkt) | 2402 | 5.703 | 2 | 2Mbps (37 pkt) | 2402 | 6.600 |
| | | 2440 | 5.905 | | | 2440 | 6.742 |
| | | 2480 | 4.790 | | | 2480 | 5.721 |
| | 1Mbps (255 pkt) | 2402 | 5.661 | | 2Mbps (255 pkt) | 2402 | 6.564 |
| | | 2440 | 5.660 | | | 2440 | 6.712 |
| | | 2480 | 4.620 | | | 2480 | 5.696 |
| 1 | 125 kbps (37 pkt) | 2402 | 5.579 | | | | |
| | | 2440 | 5.662 | | | | |
| | | 2480 | 4.639 | | | | |
| | 125 kbps (255 pkt) | 2402 | 5.616 | | | | |
| | | 2440 | 5.691 | | | | |
| | | 2480 | 4.654 | | | | |
| | 500 kbps (37 pkt) | 2402 | 5.545 | | | | |
| | | 2440 | 5.665 | | | | |
| | | 2480 | 4.627 | | | | |
| | 500 kbps (255 pkt) | 2402 | 5.547 | | | | |
| | | 2440 | 5.643 | | | | |
| | | 2480 | 4.609 | | | | |

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

| Support Equipment List | | | | |
|------------------------|--------------|----------|----------------|--------|
| Description | Manufacturer | Model | Serial Number | FCC ID |
| Charger | SAMSUNG | EP-TA800 | R37N39603S8SE3 | N/A |
| Data Cable | SAMSUNG | EP-DN980 | N/A | N/A |

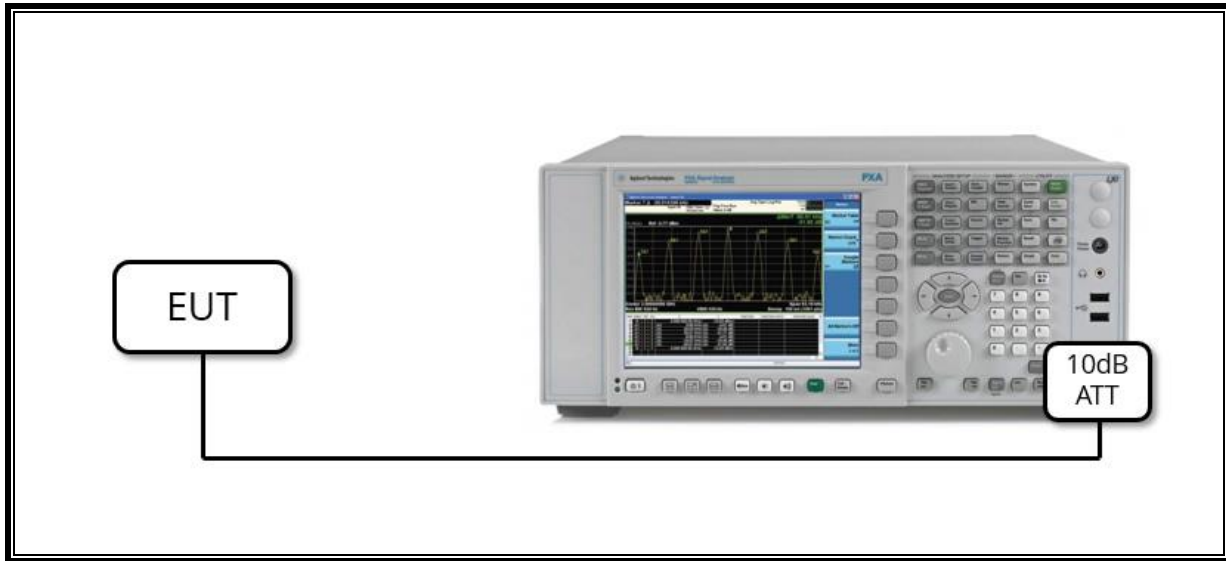
I/O CABLE

| I/O Cable List | | | | | | |
|----------------|----------|----------------------|----------------|------------|------------------|---------|
| Cable No. | Port | # of identical ports | Connector Type | Cable Type | Cable Length (m) | Remarks |
| 1 | DC Power | 1 | C Type | Shielded | 1.0 m | N/A |

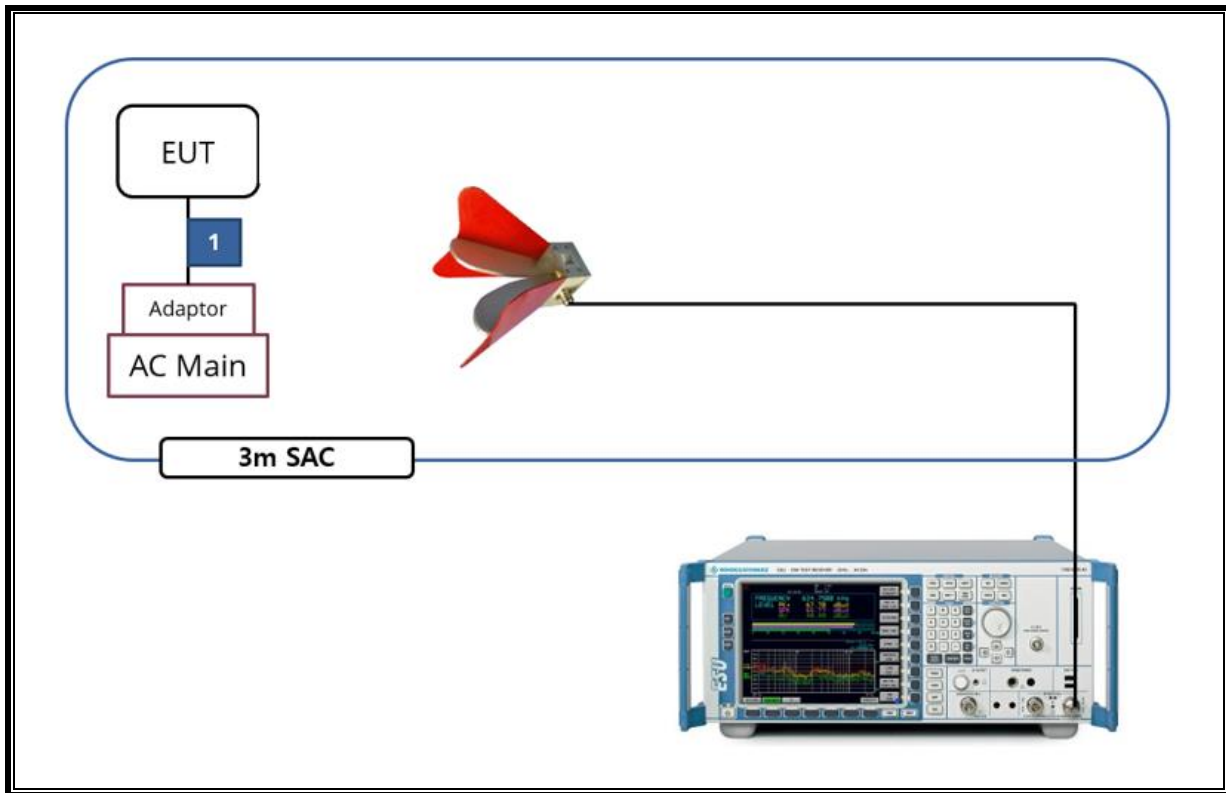
TEST SETUP

The EUT is a stand-alone unit during the tests.
Test software in hidden menu exercised the EUT to enable BLE mode.

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. MEASUREMENT METHOD

6 dB BW : KDB 558074 D01 v05r02, Section 8.2.

OUTPUT POWER : KDB 558074 D01 v05r02, Section 8.3.1.1

POWER SPECTRAL DENSITY : KDB 558074 D01 v05r02, Section 8.4.

Out-of-band Emissions (Conducted) : KDB 558074 D01 v05r02, Section 8.5.

Out-of-band Emissions in Non-restricted Bands: KDB 558074 D01 v05r02, Section 8.5.

Out-of-band Emissions in Restricted Bands : KDB 558074 D01 v05r02, Section 8.6.

AC Power Line Conducted Emission : ANSI C63.10-2013, Section 6.2

7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

| Test Equipment List | | | | |
|-----------------------------|---------------|------------------------|------------|----------|
| Description | Manufacturer | Model | S/N | Cal Due |
| Antenna, Bilog, 30MHz-1GHz | SCHWARZBECK | VULB9163 | 750 | 08-19-22 |
| Antenna, Bilog, 30MHz-1GHz | SCHWARZBECK | VULB9163 | 749 | 08-13-22 |
| Antenna, Bilog, 30MHz-1GHz | SCHWARZBECK | VULB9163 | 845 | 08-13-22 |
| Antenna, Horn, 18 GHz | ETS | 3115 | 00167211 | 07-27-22 |
| Antenna, Horn, 18 GHz | ETS | 3115 | 00161451 | 08-15-22 |
| Antenna, Horn, 18 GHz | ETS | 3117 | 00168724 | 07-27-22 |
| Antenna, Horn, 18 GHz | ETS | 3117 | 00168717 | 08-15-22 |
| Antenna, Horn, 40 GHz | ETS | 3116C | 00166155 | 08-04-22 |
| Antenna, Horn, 40 GHz | ETS | 3116C | 00168645 | 10-02-21 |
| Preamplifier | ETS | 3116C-PA | 00168841 | 08-06-21 |
| Preamplifier, 1000 MHz | Sonoma | 310N | 341282 | 08-03-21 |
| Preamplifier, 1000 MHz | Sonoma | 310N | 351741 | 08-03-21 |
| Preamplifier, 1000 MHz | Sonoma | 310N | 370599 | 08-06-21 |
| Preamplifier, 18 GHz | Miteq | AFS42-00101800-25-S-42 | 1876511 | 08-03-21 |
| Preamplifier, 18 GHz | Miteq | AFS42-00101800-25-S-42 | 1896138 | 08-03-21 |
| Preamplifier, 18 GHz | Miteq | AFS42-00101800-25-S-42 | 2029169 | 08-04-21 |
| Spectrum Analyzer, 44 GHz | Keysight | N9030B | MY57143717 | 01-20-21 |
| Spectrum Analyzer, 44 GHz | Agilent / HP | N9030A | MY54170614 | 08-05-21 |
| Spectrum Analyzer, 44 GHz | Agilent / HP | N9030A | MY54490312 | 08-05-21 |
| Spectrum Analyzer, 43.5 GHz | R&S | FSW43 | 104089 | 08-06-21 |
| Average Power Sensor | Agilent / HP | U2000 | MY54270007 | 08-05-21 |
| Attenuator | PASTERNAK | PE7087-10 | A001 | 08-03-21 |
| Attenuator | PASTERNAK | PE7087-10 | A008 | 08-03-21 |
| Attenuator | PASTERNAK | PE7004-10 | 2 | 08-04-21 |
| Attenuator | PASTERNAK | PE7087-10 | A009 | 08-03-21 |
| EMI Test Receive, 40 GHz | R&S | ESU40 | 100439 | 08-03-21 |
| EMI Test Receive, 40 GHz | R&S | ESU40 | 100457 | 08-03-21 |
| EMI Test Receive, 3 GHz | R&S | ESR3 | 101832 | 08-03-21 |
| Low Pass Filter 5GHz | Micro-Tronics | LPS17541 | 009 | 08-03-21 |
| Low Pass Filter 5GHz | Micro-Tronics | LPS17541 | 015 | 08-03-21 |
| Low Pass Filter 5GHz | Micro-Tronics | LPS17541 | 020 | 08-04-21 |
| High Pass Filter 3GHz | Micro-Tronics | HPM17543 | 010 | 08-03-21 |
| High Pass Filter 3GHz | Micro-Tronics | HPM17543 | 015 | 08-03-21 |
| High Pass Filter 3GHz | Micro-Tronics | HPM17543 | 020 | 08-04-21 |
| High Pass Filter 6GHz | Micro-Tronics | HPS17542 | 009 | 08-03-21 |
| High Pass Filter 6GHz | Micro-Tronics | HPS17542 | 016 | 08-03-21 |
| High Pass Filter 6GHz | Micro-Tronics | HPS17542 | 021 | 08-04-21 |
| LISN | R&S | ENV-216 | 101837 | 08-06-21 |
| Antenna, Loop, 9kHz-30MHz | R&S | HFH2-Z2 | 100418 | 10-02-21 |
| UL Software | | | | |
| Description | Manufacturer | Model | Version | |
| Radiated software | UL | UL EMC | Ver 9.5 | |
| AC Line Conducted software | UL | UL EMC | Ver 9.5 | |

8. TEST RESULTS SUMMARY

| FCC Part Section | Test Description | Test Limit | Test Condition | Test Result |
|--------------------|---|----------------|----------------------|-------------|
| 15.247 (a)(2) | Occupied Band width (6dB) | >500KHz | Conducted | Pass |
| 2.1051, 15.247 (d) | Band Edge / Conducted Spurious Emission | -20dBc | | Pass |
| 15.247 (b)(3) | TX conducted output power | <30dBm | | Pass |
| 15.247 (e) | PSD | <8dBm | | Pass |
| 15.207 (a) | AC Power Line conducted emissions | Section 10 | Power Line conducted | Pass |
| 15.205, 15.209 | Radiated Spurious Emission | < 54dBuV/m(Av) | Radiated | Pass |

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

| Mode | On time [msec] | Period [msec] | Duty cycle x [Linear] | Duty Cycle [%] | Duty Cycle Correction Factor [dB] | 1/T Minimum CBW [kHz] |
|---------------------------|----------------|---------------|-----------------------|----------------|-----------------------------------|-----------------------|
| 2 400 ~ 2 483.5 MHz Bands | | | | | | |
| BLE 1 Mbps [37pkt] | 0.377 | 0.625 | 0.60 | 60.34 | 2.19 | 2.65 |
| BLE 2 Mbps [37pkt] | 0.193 | 0.625 | 0.31 | 30.94 | 5.09 | 5.17 |



1 Mbps(37 pkt)



2 Mbps(37 pkt)

9.2. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

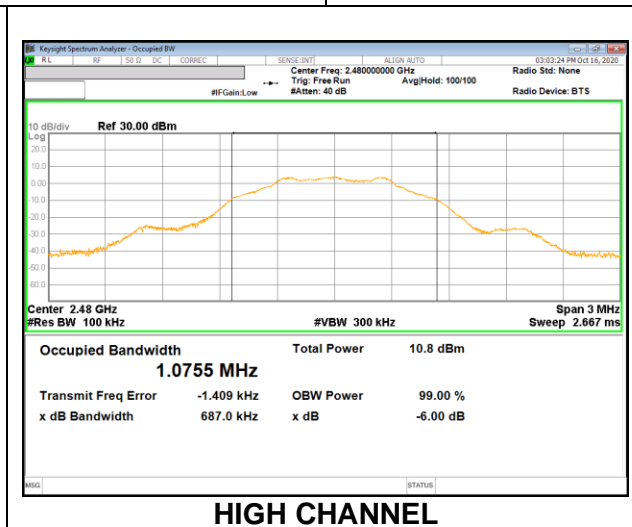
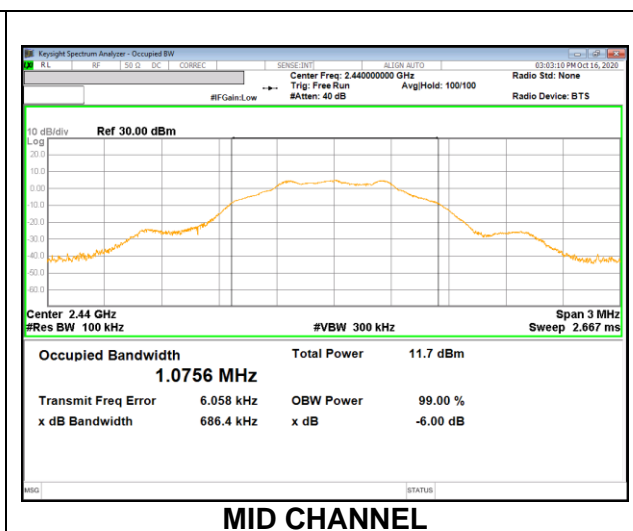
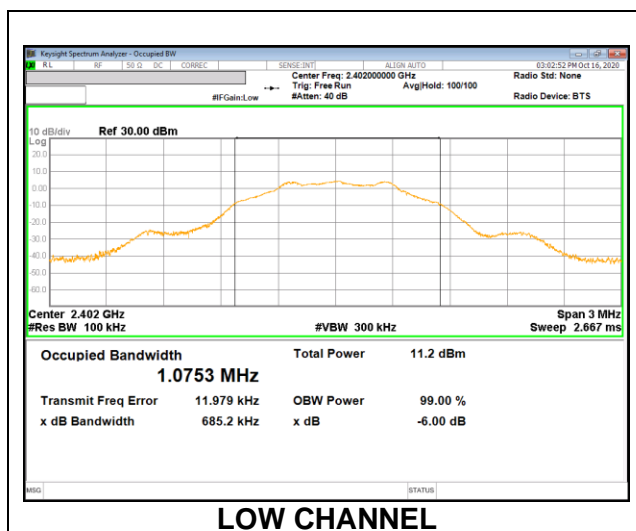
RSS-247 5.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

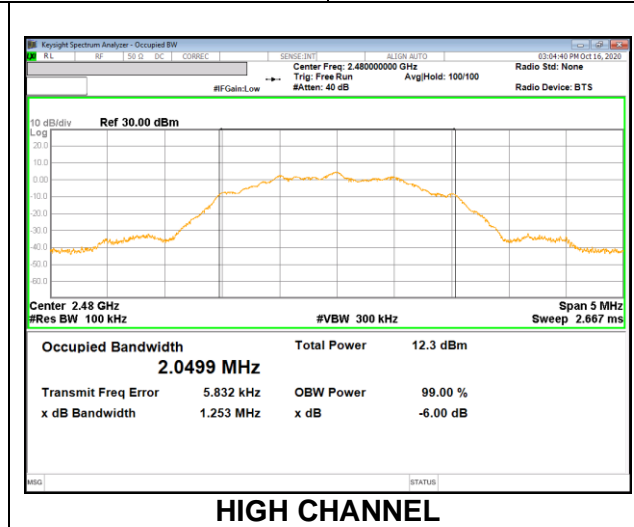
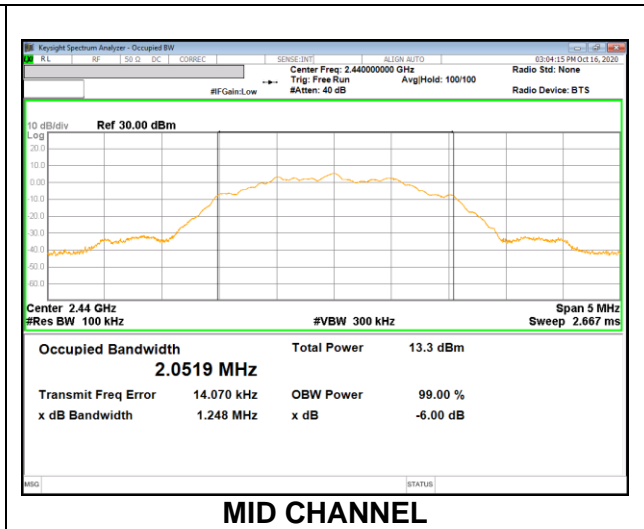
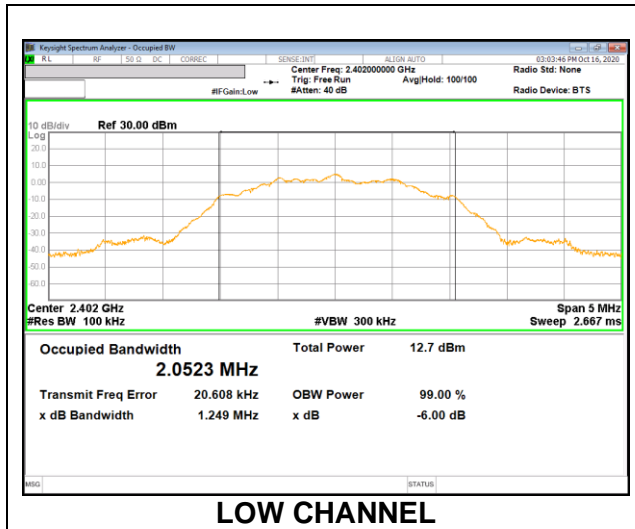
9.2.1. BLE (1 Mbps)

| Channel | Frequency [MHz] | 6 dB Bandwidth [kHz] | Minimum Limit [kHz] |
|---------|-----------------|----------------------|---------------------|
| Low | 2 402 | 685.2 | 500.0 |
| Mid | 2 440 | 686.4 | 500.0 |
| High | 2 480 | 687.0 | 500.0 |
| Worst | | 685.2 | 500.0 |



9.2.2. BLE (2Mbps)

| Channel | Frequency [MHz] | 6 dB Bandwidth [kHz] | Minimum Limit [kHz] |
|---------|-----------------|----------------------|---------------------|
| Low | 2 402 | 1249.0 | 500.0 |
| Mid | 2 440 | 1248.0 | 500.0 |
| High | 2 480 | 1253.0 | 500.0 |
| Worst | | 1248.0 | 500.0 |



9.3. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

Peak power is measured using ANSI C63.10(2013) under section 11.9.1.1 utilizing spectrum analyzer.

RESULTS

- 1 Mbps

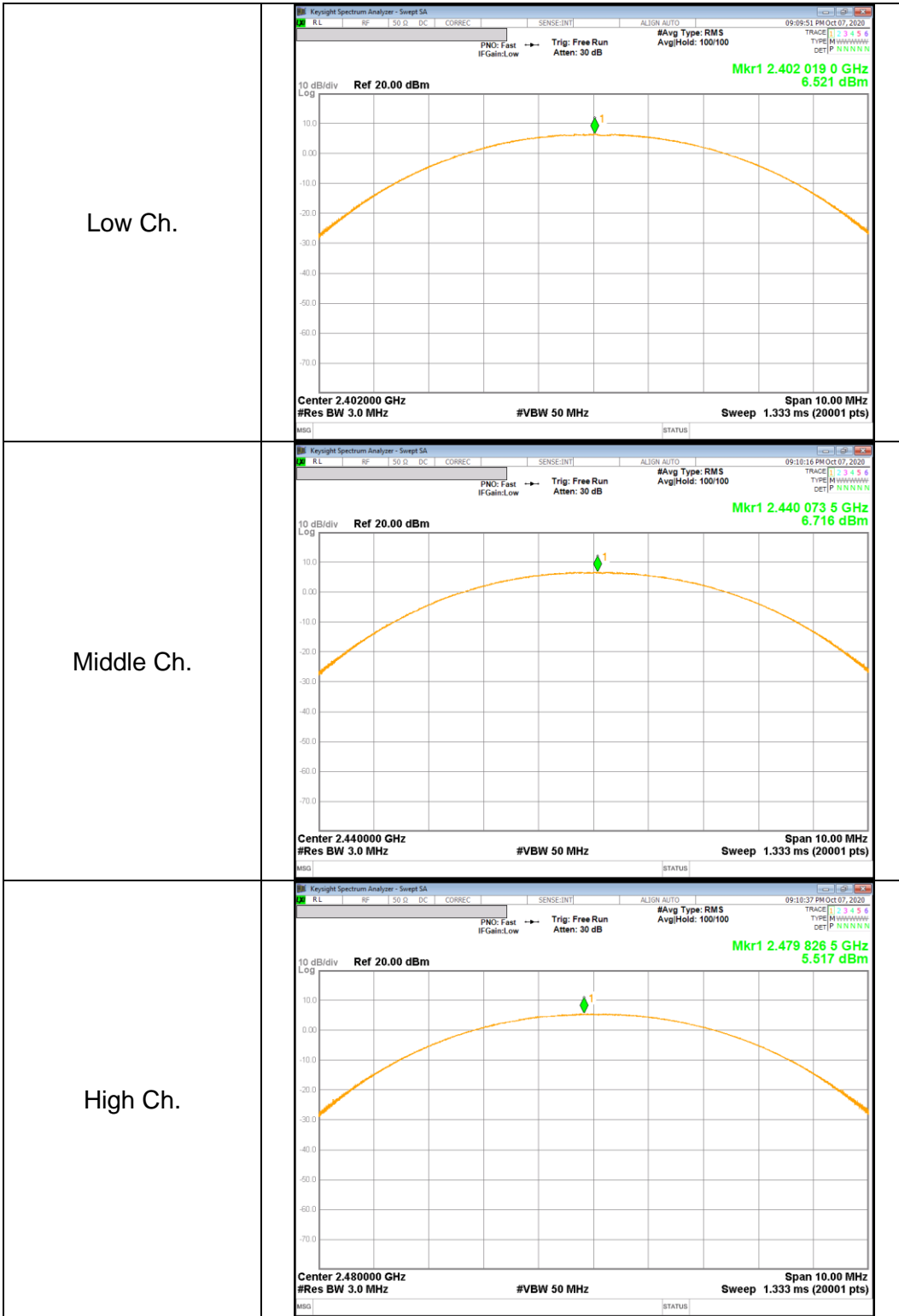
| Channel | Frequency [MHz] | Peak Power [dBm] | Limit [dBm] | Margin [dB] |
|---------|-----------------|------------------|---------------|----------------|
| Low | 2402 | 6.521 | 30.000 | -23.479 |
| Mid | 2440 | 6.716 | 30.000 | -23.284 |
| High | 2480 | 5.517 | 30.000 | -24.483 |
| Worst | | 6.716 | 30.000 | -23.284 |

- 2 Mbps

| Channel | Frequency [MHz] | Peak Power [dBm] | Limit [dBm] | Margin [dB] |
|---------|-----------------|------------------|---------------|----------------|
| Low | 2402 | 7.492 | 30.000 | -22.508 |
| Mid | 2440 | 7.693 | 30.000 | -22.307 |
| High | 2480 | 6.738 | 30.000 | -23.262 |
| Worst | | 7.693 | 30.000 | -22.307 |

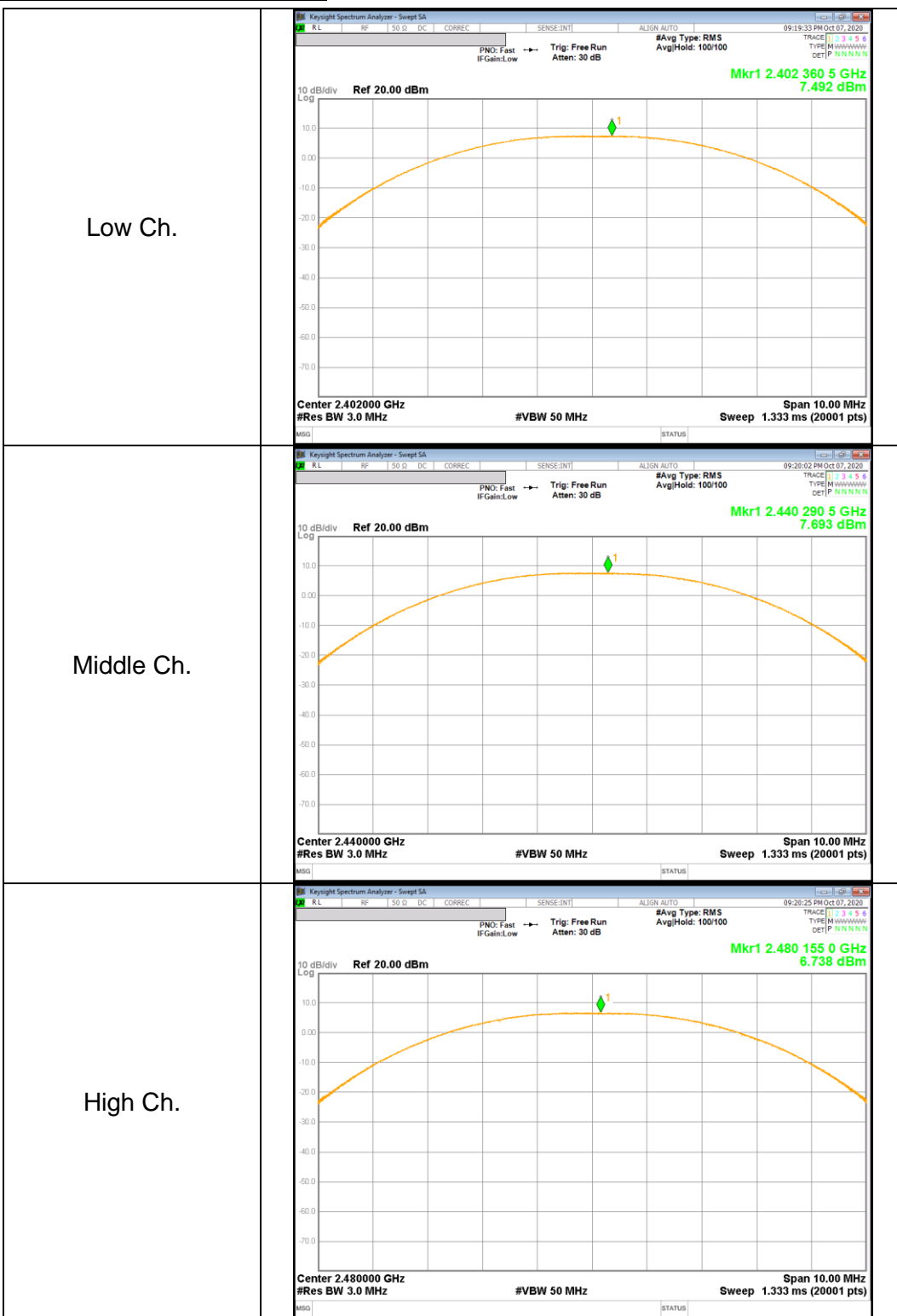
9.3.1. BLE (1 Mbps)

PEAK OUTPUT POWER PLOTS



9.3.2. BLE (2 Mbps)

PEAK OUTPUT POWER PLOTS



9.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss was entered as an offset in the power meter to allow for direct reading of power. The duty factor already has been added.

- 1 Mbps

| Channel | Frequency [MHz] | AV Power [dBm] | AV Power [mW] |
|---------|-----------------|----------------|---------------|
| Low | 2402 | 5.703 | 3.718 |
| Mid | 2440 | 5.905 | 3.895 |
| High | 2480 | 4.790 | 3.013 |

- 2 Mbps

| Channel | Frequency [MHz] | AV Power [dBm] | AV Power [mW] |
|---------|-----------------|----------------|---------------|
| Low | 2402 | 6.600 | 4.571 |
| Mid | 2440 | 6.742 | 4.723 |
| High | 2480 | 5.721 | 3.733 |

9.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

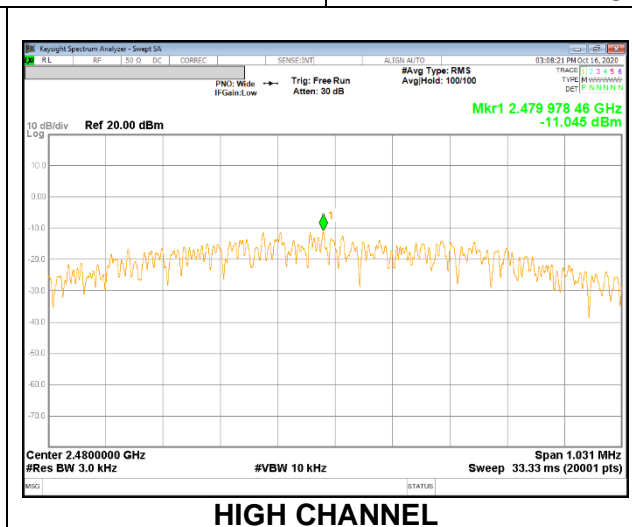
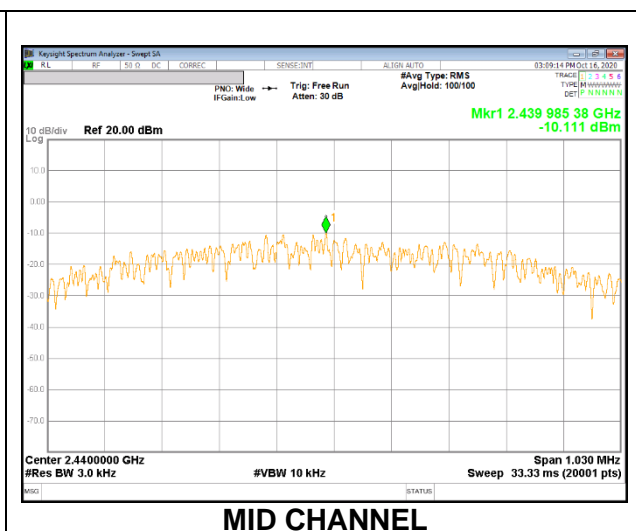
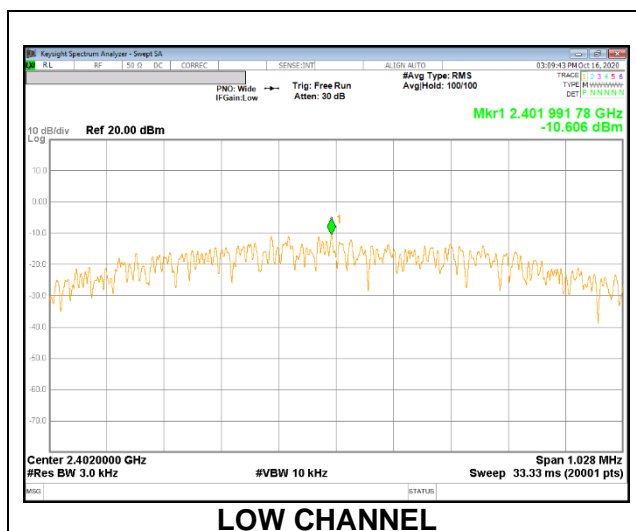
RSS-247 (5.2) (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

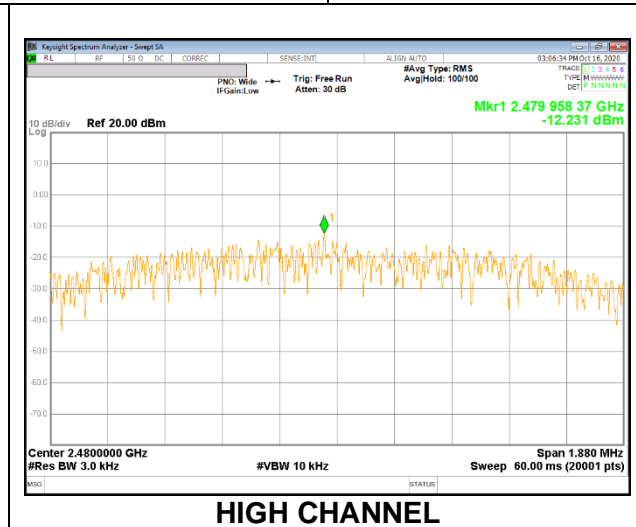
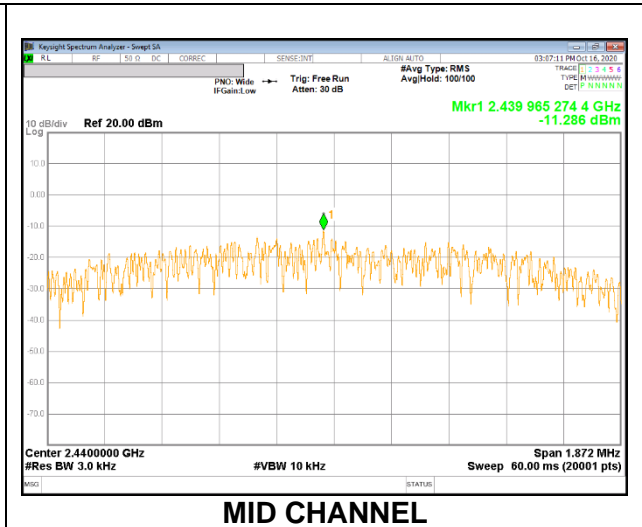
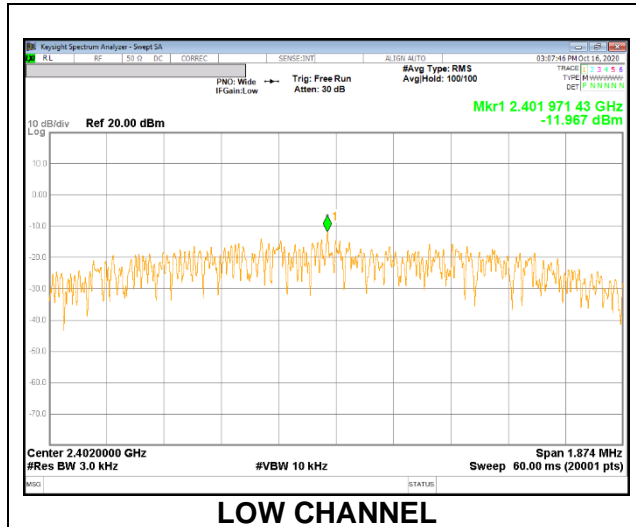
9.5.1. BLE (1 Mbps)

| Channel | Frequency [MHz] | PSD [dBm/3kHz] | Limit [dBm/3kHz] | Margin [dB] |
|---------|-----------------|----------------|------------------|-------------|
| Low | 2402 | -10.606 | 8.000 | -18.606 |
| Mid | 2440 | -10.111 | 8.000 | -18.111 |
| High | 2480 | -11.045 | 8.000 | -19.045 |



9.5.2. BLE (2Mbps)

| Channel | Frequency [MHz] | PSD [dBm/3kHz] | Limit [dBm/3kHz] | Margin [dB] |
|---------|-----------------|----------------|------------------|-------------|
| Low | 2402 | -11.967 | 8.000 | -19.967 |
| Mid | 2440 | -11.286 | 8.000 | -19.286 |
| High | 2480 | -12.231 | 8.000 | -20.231 |



9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

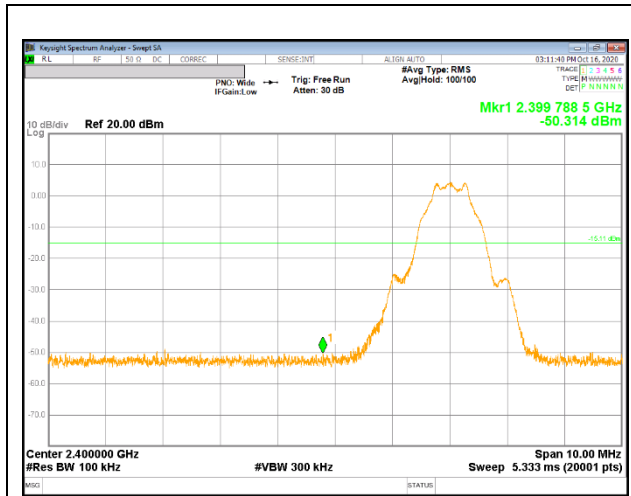
FCC §15.247 (d)

RSS-247 5.5

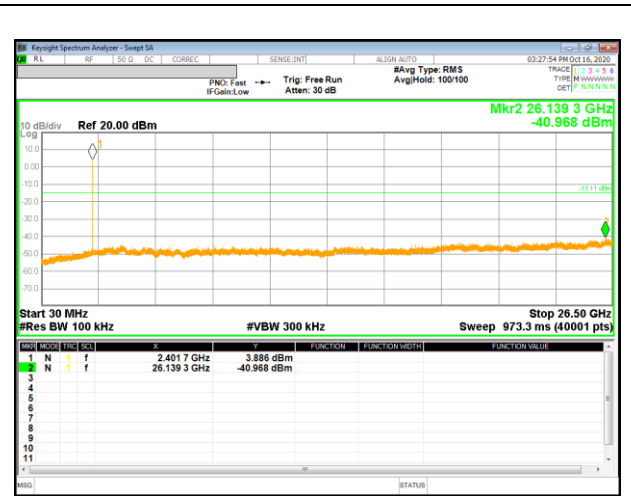
Output power was measured based on the use of a peak measurement. Therefore, spurious emissions are required to be 20 dBc.

RESULTS

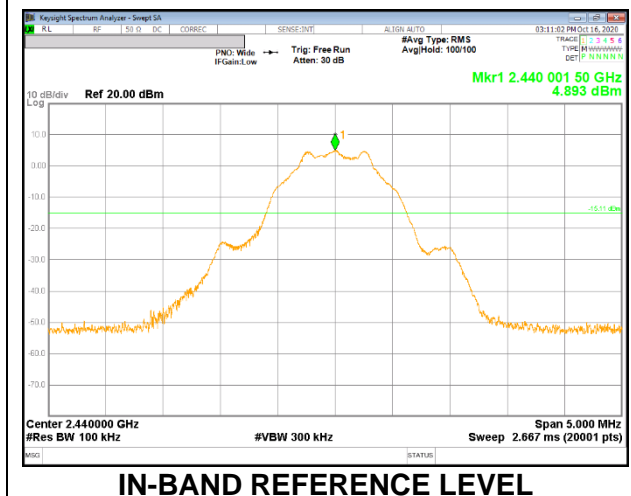
9.6.1. BLE (1 Mbps)



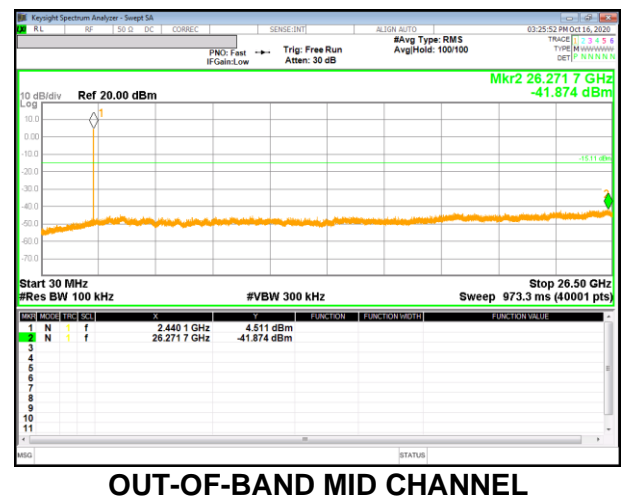
LOW CHANNEL BANDEDGE



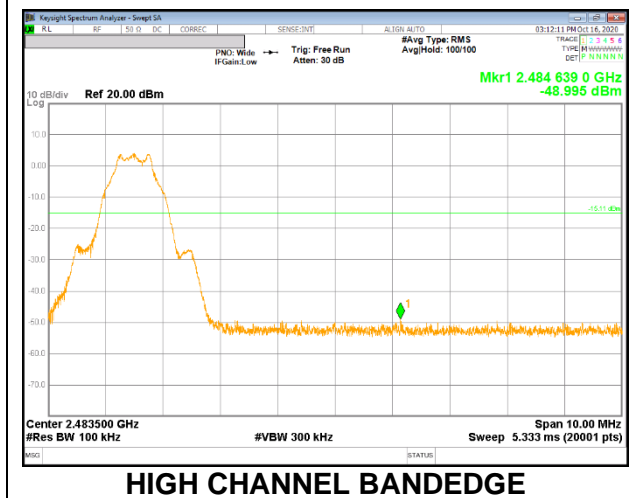
OUT-OF-BAND LOW CHANNEL



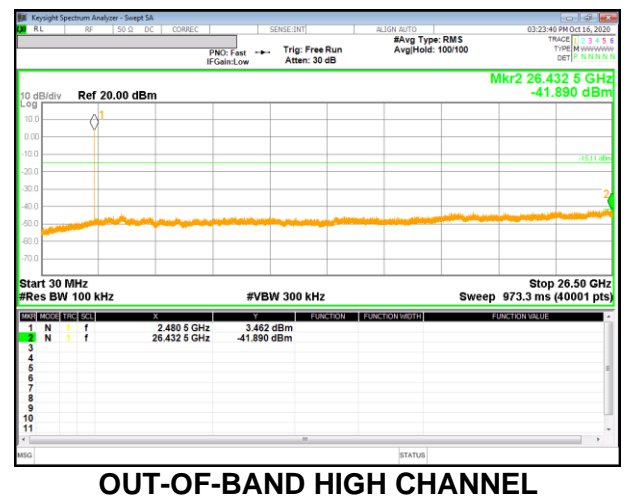
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

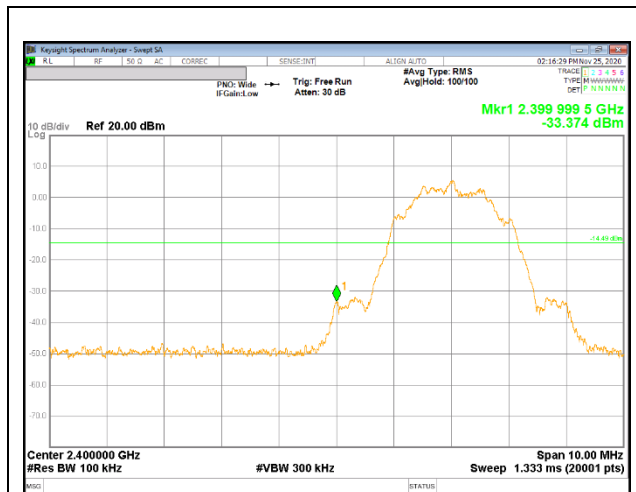


HIGH CHANNEL BANDEDGE

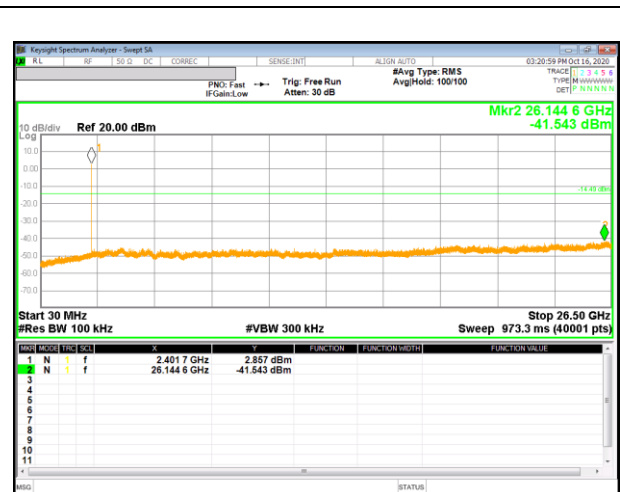


OUT-OF-BAND HIGH CHANNEL

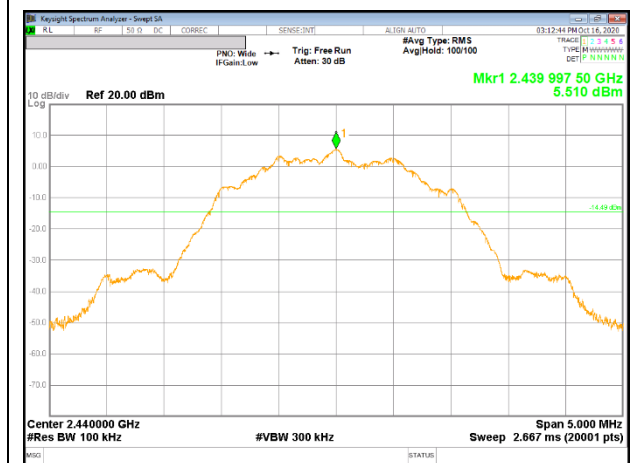
9.6.2. BLE (2 Mbps)



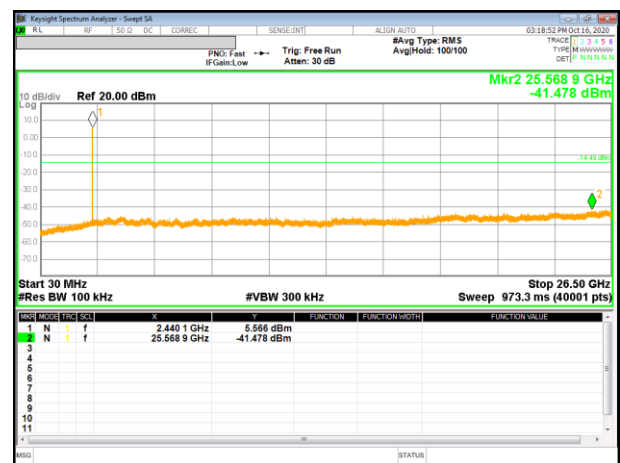
LOW CHANNEL BANDEDGE



OUT-OF-BAND LOW CHANNEL



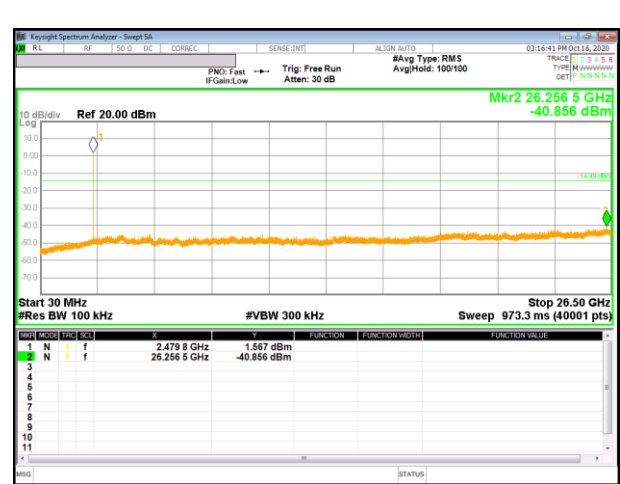
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

| Limits for radiated disturbance of an intentional radiator | | |
|--|-----------------|--------------------------|
| Frequency range (MHz) | Limits (µV/m) | Measurement Distance (m) |
| 0.009 – 0.490 | 2400 / F (kHz) | 300 |
| 0.490 – 1.705 | 24000 / F (kHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |
| 30 – 88 | 100** | 3 |
| 88 - 216 | 150** | 3 |
| 216 – 960 | 200** | 3 |
| Above 960 | 500 | 3 |

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150 cm for above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor for average measurements. (Restricted bandedge, Final detection of spurious harmonic emissions) Duty cycle factor = $10 \log(1/x)$. For this sample: For 1 Mbps, DCF = $10 \log(1/0.603) = 2.194$ dB (Spectrum Analyzer round it up to 2.2 dB) and for 2Mbps, DCF = $10 \log(1/0.309) = 5.094$ dB (Spectrum Analyzer round it up to 5.1 dB)

Pre-scans to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.

The spectrum from 1 GHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

Note : Emission was pre-scanned from 9kHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

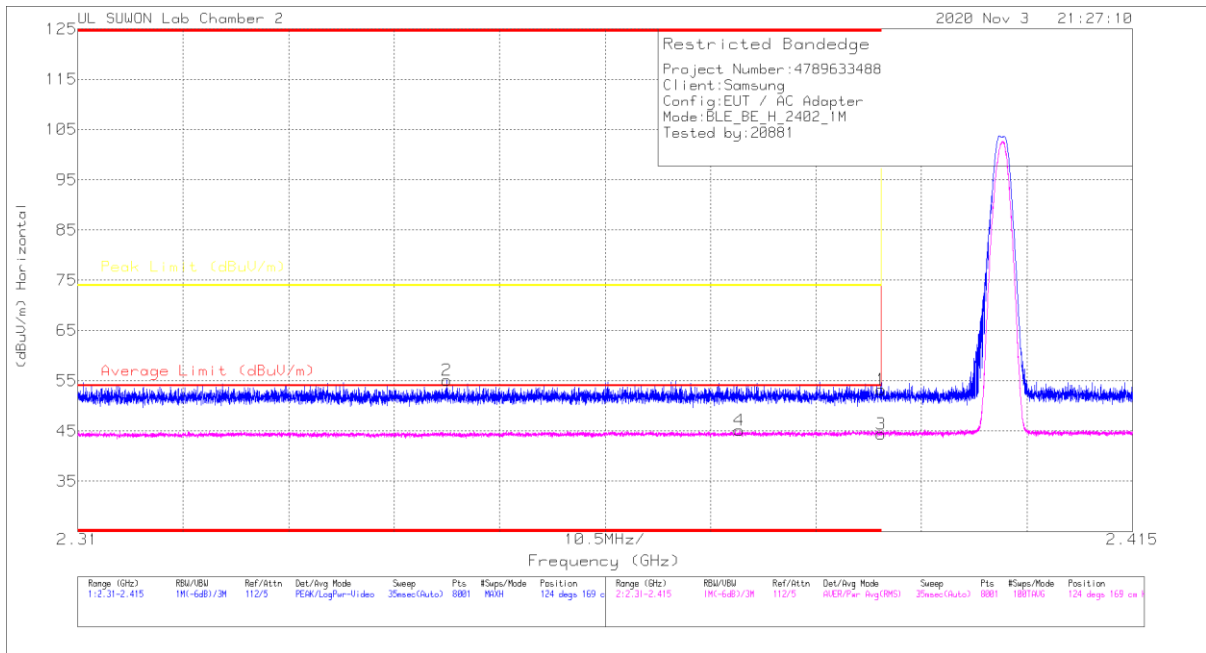
Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.

10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BLE (1 Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

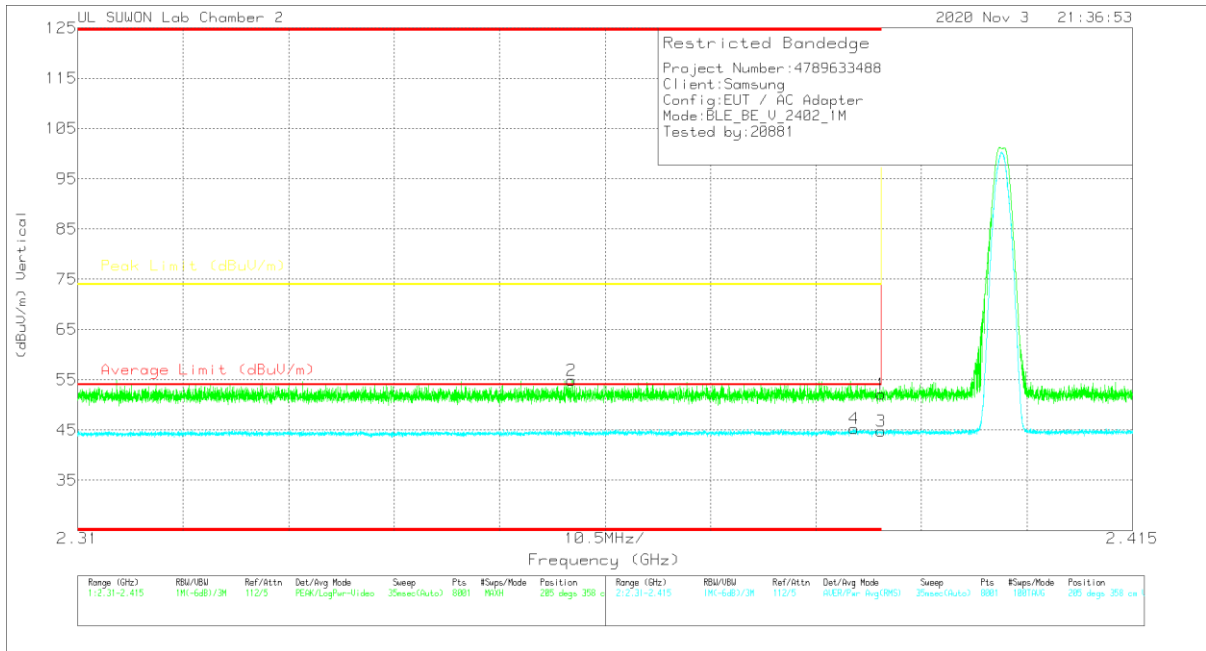


Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 10dB_ATT[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|---------------|--------------|--------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1 | * 2.39 | 41.68 | Pk | 31.9 | -20.3 | 0 | 53.28 | - | - | 74 | -20.72 | 124 | 169 | H |
| 2 | * 2.34676 | 43.85 | Pk | 31.8 | -20.5 | 0 | 55.15 | - | - | 74 | -18.85 | 124 | 169 | H |
| 3 | * 2.39 | 30.56 | RMS | 31.9 | -20.3 | 2.2 | 44.36 | 54 | -9.64 | - | - | 124 | 169 | H |
| 4 | * 2.37585 | 31.47 | RMS | 31.9 | -20.4 | 2.2 | 45.17 | 54 | -8.83 | - | - | 124 | 169 | H |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 RMS - RMS detection

VERTICAL RESULT



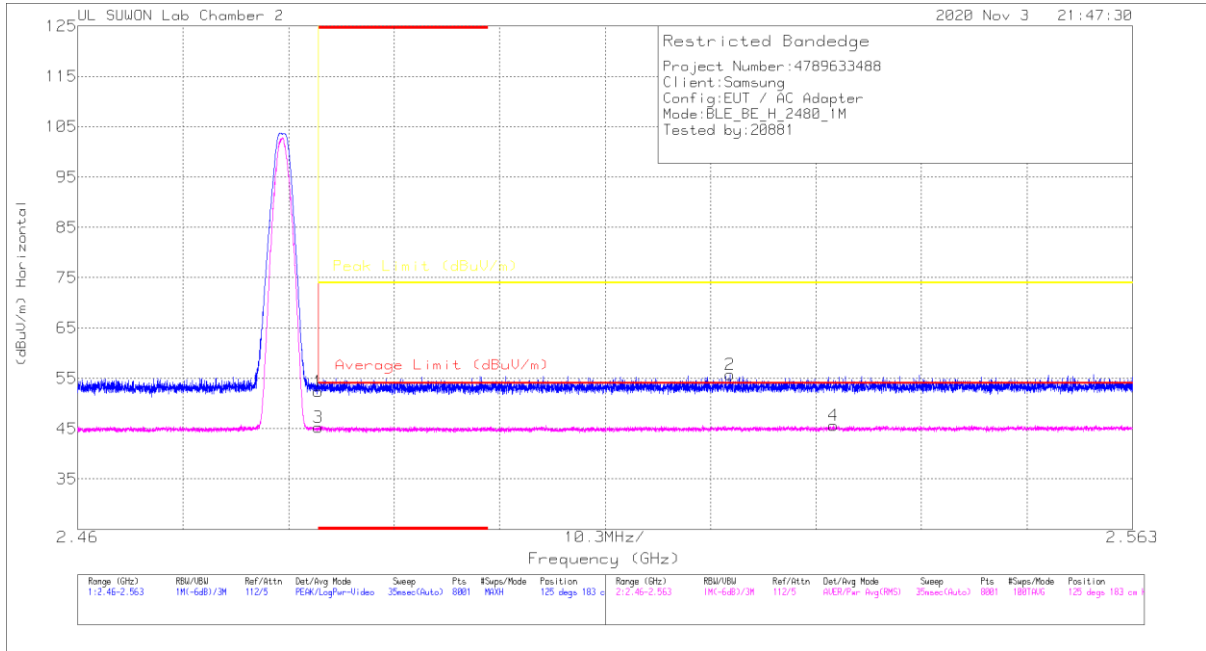
Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 10dB_ATT[dB] | DC Cor (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|---------------|--------------|-------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1 | * 2.39 | 40.55 | Pk | 31.9 | -20.3 | 0 | 52.15 | - | - | 74 | -21.85 | 205 | 358 | V |
| 2 | * 2.35915 | 43.51 | PK | 31.8 | -20.4 | 0 | 54.91 | - | - | 74 | -19.09 | 205 | 358 | V |
| 3 | * 2.39 | 30.93 | RMS | 31.9 | -20.3 | 2.2 | 44.73 | 54 | -9.27 | - | - | 205 | 358 | V |
| 4 | * 2.38732 | 31.4 | RMS | 31.9 | -20.2 | 2.2 | 45.3 | 54 | -8.7 | - | - | 205 | 358 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

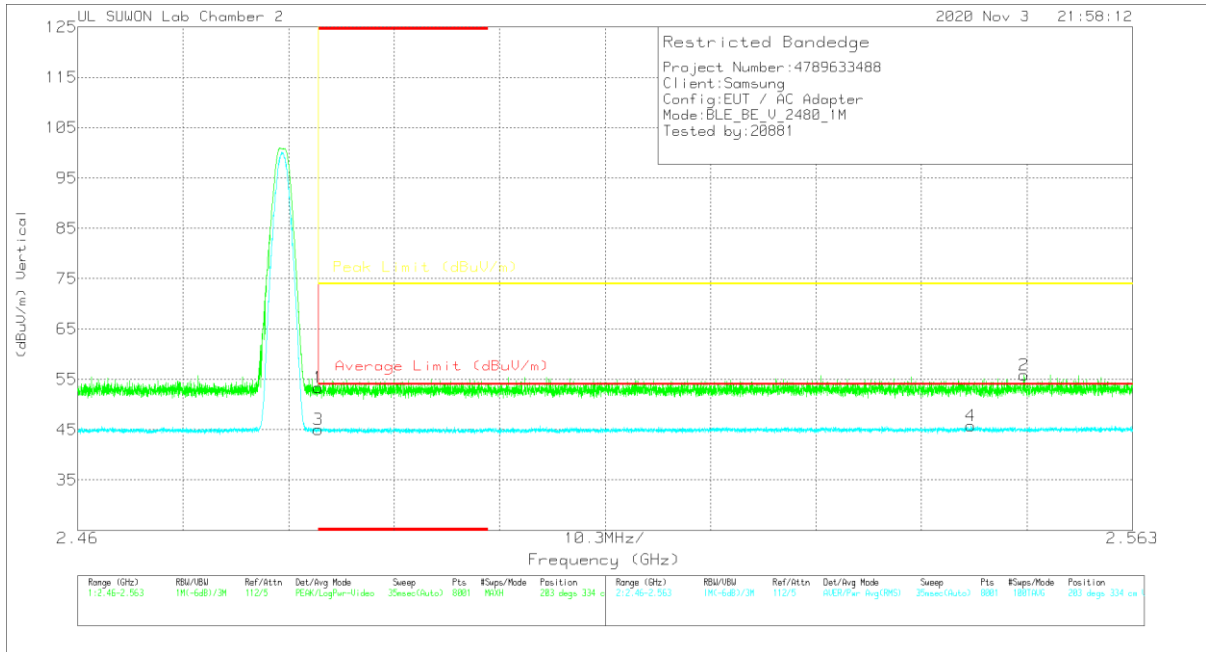


Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 10dB_ATT[dB] | DC Cor (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|---------------|--------------|-------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1 | * 2.48351 | 40.59 | PK | 32 | -20.2 | 0 | 52.39 | - | - | 74 | -21.61 | 125 | 183 | H |
| 2 | 2.52371 | 43.78 | PK | 32.1 | -20.1 | 0 | 55.78 | - | - | 74 | -18.22 | 125 | 183 | H |
| 3 | * 2.48351 | 31.26 | RMS | 32 | -20.2 | 2.2 | 45.26 | 54 | -8.74 | - | - | 125 | 183 | H |
| 4 | 2.53381 | 31.4 | RMS | 32.1 | -20 | 2.2 | 45.7 | 54 | -8.3 | - | - | 125 | 183 | H |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 RMS - RMS detection

VERTICAL RESULT



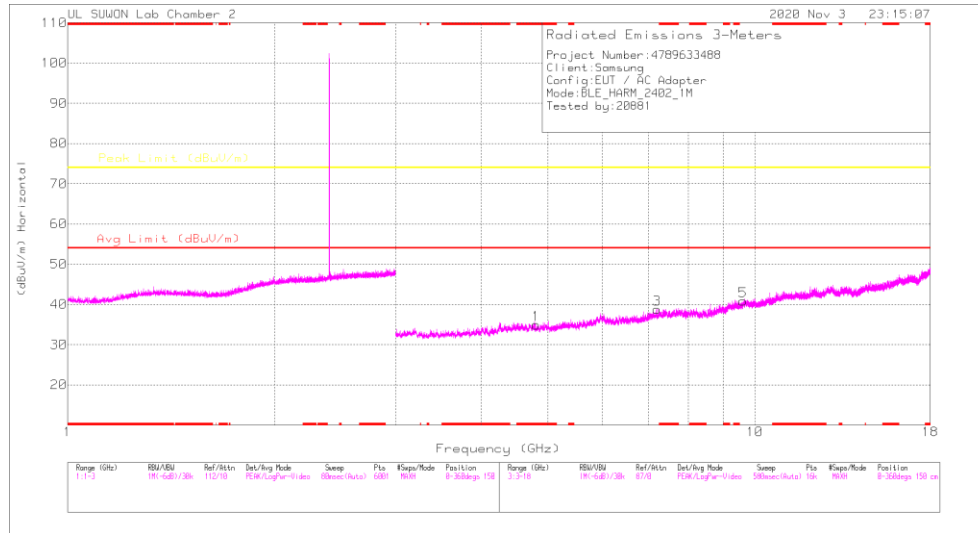
Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 10dB_ATT[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|---------------|--------------|--------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1 | * 2.48351 | 41.57 | Pk | 32 | -20.2 | 0 | 53.97 | - | - | 74 | -20.63 | 203 | 334 | V |
| 2 | 2.55239 | 43.8 | Pk | 32.2 | -20.1 | 0 | 55.9 | - | - | 74 | -18.1 | 203 | 334 | V |
| 3 | * 2.48351 | 31.03 | RMS | 32 | -20.2 | 2.2 | 45.03 | 54 | -8.97 | - | - | 203 | 334 | V |
| 4 | 2.54722 | 31.51 | RMS | 32.1 | -20 | 2.2 | 45.81 | 54 | -8.19 | - | - | 203 | 334 | V |

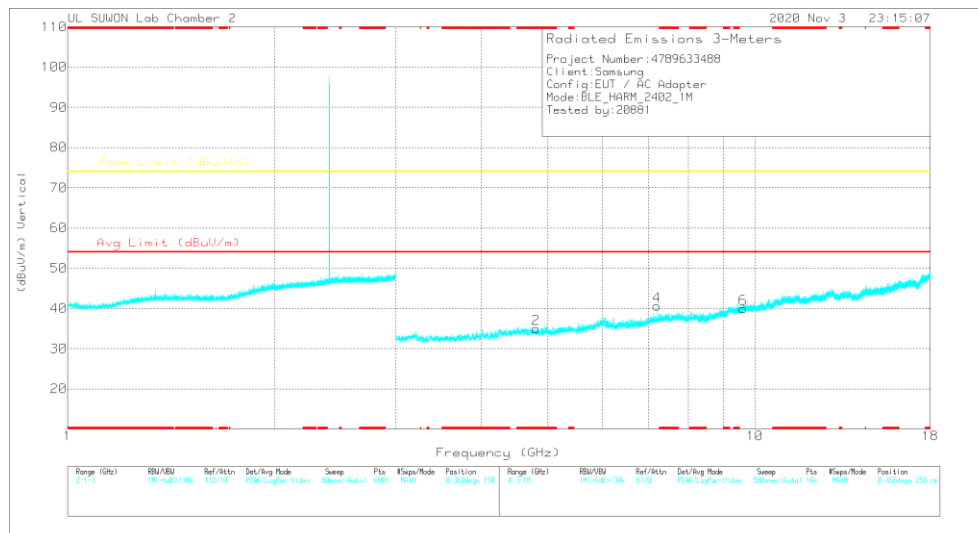
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK - Peak detector
 RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



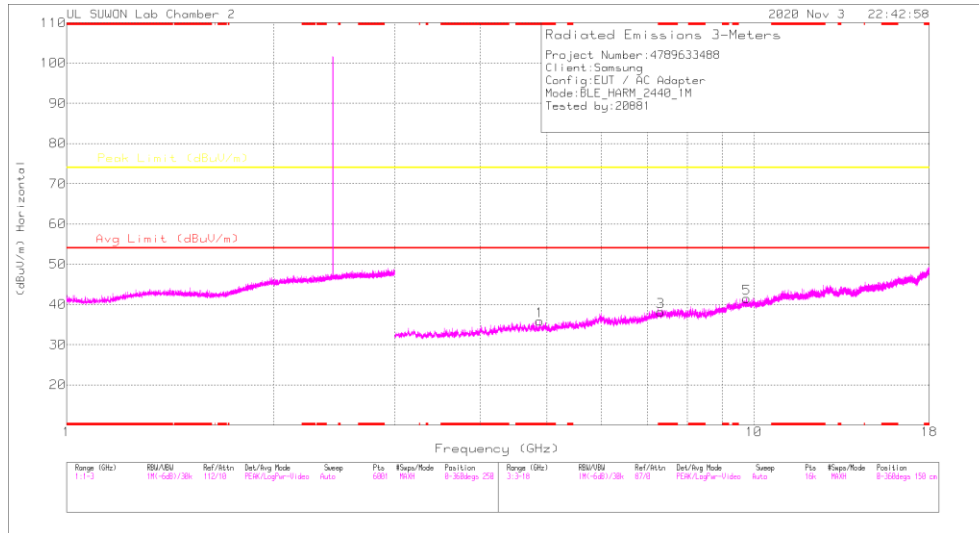
VERTICAL

RADIATED EMISSIONS

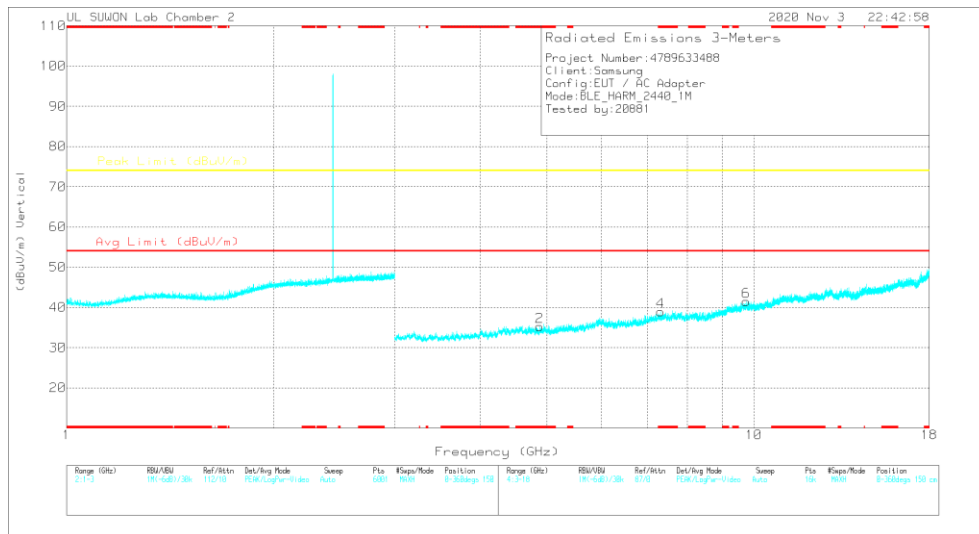
| Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 3GHz_HP[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|-----------------|----------------------|-----|---------------|-------------|--------------|----------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|----------|
| * 4.80449 | 37.58 | PK2 | 34.1 | -27.7 | 0 | 43.98 | - | - | 74 | -30.02 | 360 | 100 | H |
| * 4.81264 | 36.81 | PK2 | 34.1 | -27.8 | 0 | 43.11 | - | - | 74 | -30.89 | 0 | 101 | V |
| 7.20668 | 37.23 | PK2 | 36.2 | -24.9 | 0 | 48.53 | - | - | 74 | -25.47 | 158 | 109 | H |
| 7.2066 | 38.81 | PK2 | 36.2 | -24.9 | 0 | 50.11 | - | - | 74 | -23.89 | 93 | 101 | V |
| 9.60428 | 33.13 | PK2 | 37 | -20.9 | 0 | 49.23 | - | - | 74 | -24.77 | 0 | 100 | H |
| 9.61716 | 33.11 | PK2 | 37 | -20.8 | 0 | 49.31 | - | - | 74 | -24.69 | 0 | 100 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

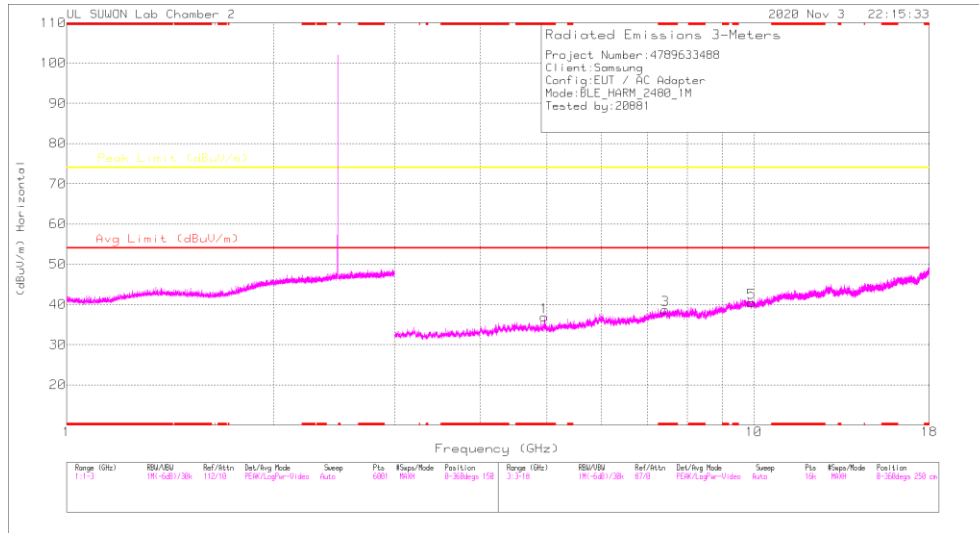
| Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_0016872_4 | 3GHz_HP[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|-----------------|----------------------|------|----------------|-------------|--------------|----------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|----------|
| * 4.87923 | 38.84 | PK2 | 34.1 | -27.7 | 0 | 45.24 | - | - | 74 | -28.76 | 31 | 100 | H |
| * 4.87963 | 27.23 | MAV1 | 34.1 | -27.7 | 2.2 | 35.83 | 54 | -18.17 | - | - | 31 | 100 | H |
| * 4.88057 | 38.75 | PK2 | 34.1 | -27.6 | 0 | 45.25 | - | - | 74 | -28.75 | 287 | 100 | V |
| * 4.87977 | 27.53 | MAV1 | 34.1 | -27.6 | 2.2 | 36.23 | 54 | -17.77 | - | - | 287 | 100 | V |
| * 7.31815 | 35.68 | PK2 | 36.1 | -24.6 | 0 | 47.18 | - | - | 74 | -26.82 | 360 | 100 | H |
| * 7.31976 | 35.54 | PK2 | 36.1 | -24.6 | 0 | 47.04 | - | - | 74 | -26.96 | 360 | 100 | V |
| 9.75915 | 33.05 | PK2 | 37.2 | -20.5 | 0 | 49.75 | - | - | 74 | -24.25 | 360 | 100 | H |
| 9.75858 | 32.81 | PK2 | 37.2 | -20.5 | 0 | 49.51 | - | - | 74 | -24.49 | 360 | 100 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

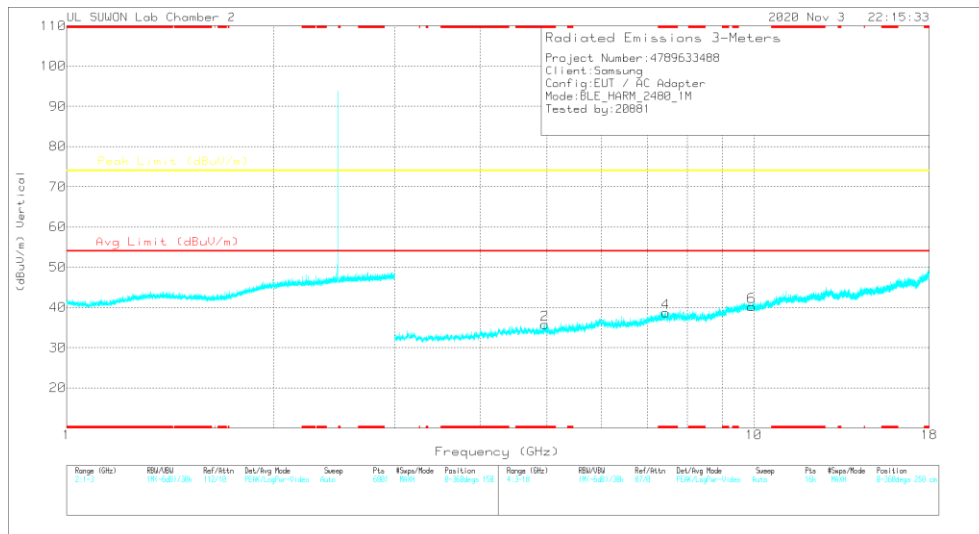
PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

| Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_0016872_4 | 3GHz_HP[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|-----------------|----------------------|------|----------------|-------------|--------------|----------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|----------|
| * 4.95937 | 38.08 | PK2 | 34.1 | -26.8 | 0 | 45.38 | - | - | 74 | -28.62 | 39 | 103 | H |
| * 4.95955 | 26.78 | MAV1 | 34.1 | -26.8 | 2.2 | 36.28 | 54 | -17.72 | - | - | 39 | 103 | H |
| * 4.96063 | 37.81 | PK2 | 34.1 | -26.8 | 0 | 45.11 | - | - | 74 | -28.89 | 285 | 106 | V |
| * 4.95953 | 27.23 | MAV1 | 34.1 | -26.8 | 2.2 | 36.73 | 54 | -17.27 | - | - | 285 | 106 | V |
| * 7.43381 | 34.72 | PK2 | 36 | -23.5 | 0 | 47.22 | - | - | 74 | -26.78 | 360 | 100 | H |
| * 7.43521 | 35.04 | PK2 | 36 | -23.5 | 0 | 47.54 | - | - | 74 | -26.46 | 360 | 100 | V |
| 9.92557 | 32.09 | PK2 | 37.4 | -20.4 | 0 | 49.09 | - | - | 74 | -24.91 | 360 | 100 | H |
| 9.92545 | 32.62 | PK2 | 37.4 | -20.3 | 0 | 49.72 | - | - | 74 | -24.28 | 360 | 100 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

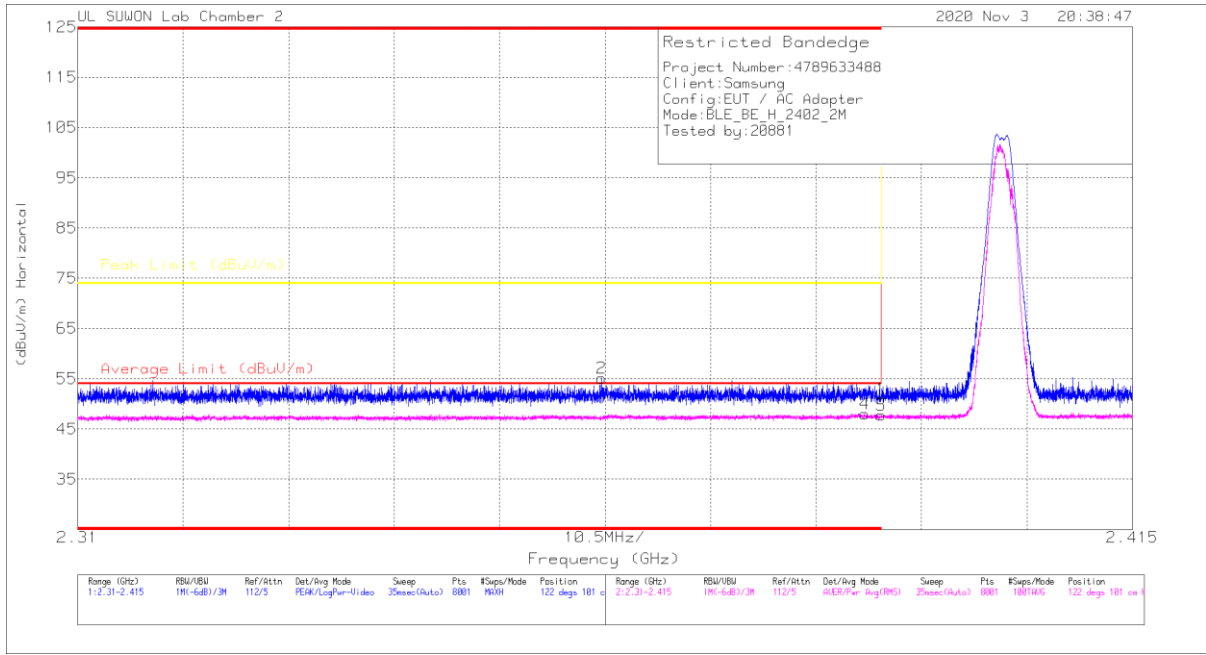
PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

10.2.2. BLE (2 Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

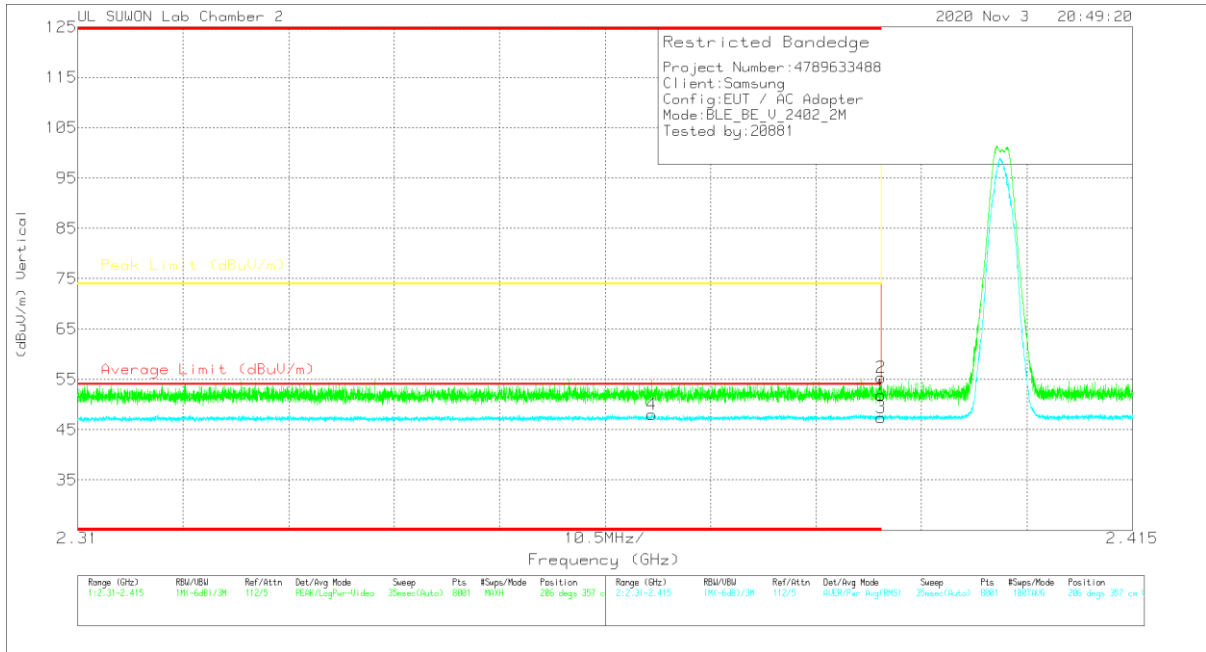


Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | 3117_00168724 | 10dB_ATT[dB] | DC Corr (dB) | Corrected Reading (dBm) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|---------------------|-----|---------------|--------------|--------------|-------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1 | * 2.39 | 39.45 | Pk | 31.9 | -20.3 | 0 | 51.05 | - | - | 74 | -22.95 | 122 | 101 | H |
| 2 | * 2.36217 | 43.78 | Pk | 31.8 | -20.5 | 0 | 55.08 | - | - | 74 | -18.92 | 122 | 101 | H |
| 3 | * 2.39 | 31.03 | RMS | 31.9 | -20.3 | 5.1 | 47.73 | 54 | -6.27 | - | - | 122 | 101 | H |
| 4 | * 2.38838 | 31.35 | RMS | 31.9 | -20.3 | 5.1 | 48.05 | 54 | -5.95 | - | - | 122 | 101 | H |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 RMS - RMS detection

VERTICAL RESULT



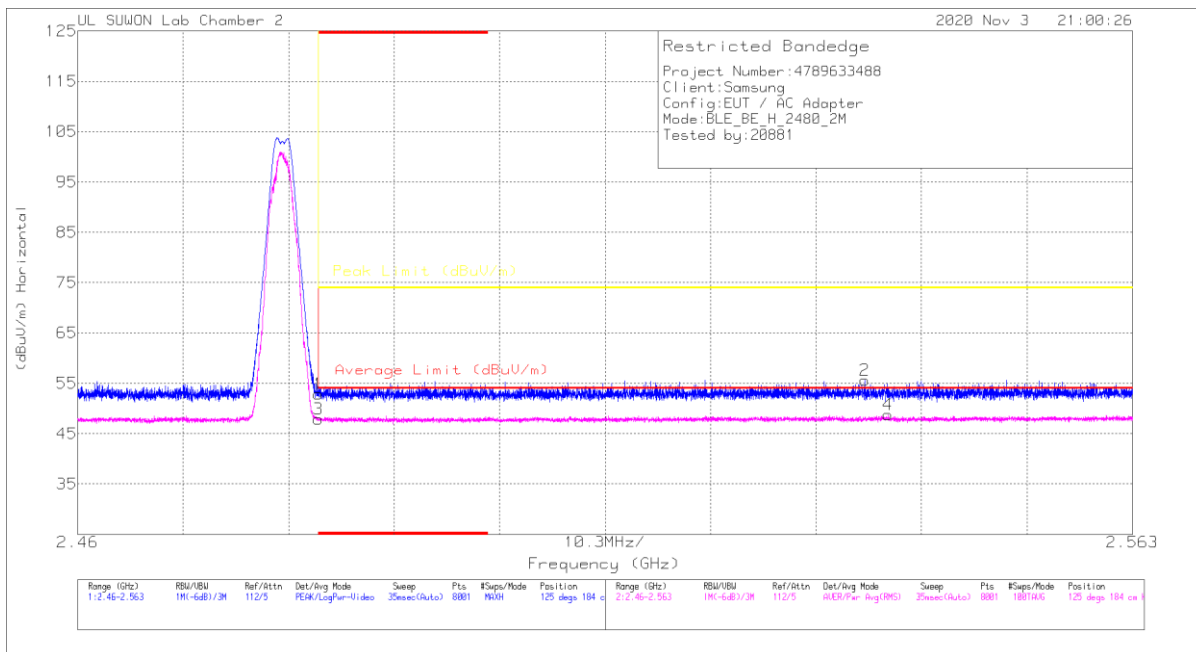
Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 10dB_ATT[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|---------------|--------------|--------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1 | * 2.339 | 40.24 | Pk | 31.9 | -20.3 | 0 | 51.94 | - | - | 74 | -22.16 | 206 | 357 | V |
| 2 | * 2.38996 | 43.75 | Pk | 31.9 | -20.3 | 0 | 55.35 | - | - | 74 | -18.65 | 206 | 357 | V |
| 3 | * 2.339 | 30.75 | RMS | 31.9 | -20.3 | 5.1 | 47.45 | 54 | -6.55 | - | - | 206 | 357 | V |
| 4 | * 2.36712 | 31.46 | RMS | 31.8 | -20.3 | 5.1 | 48.06 | 54 | -5.94 | - | - | 206 | 357 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK - Peak detector
 RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

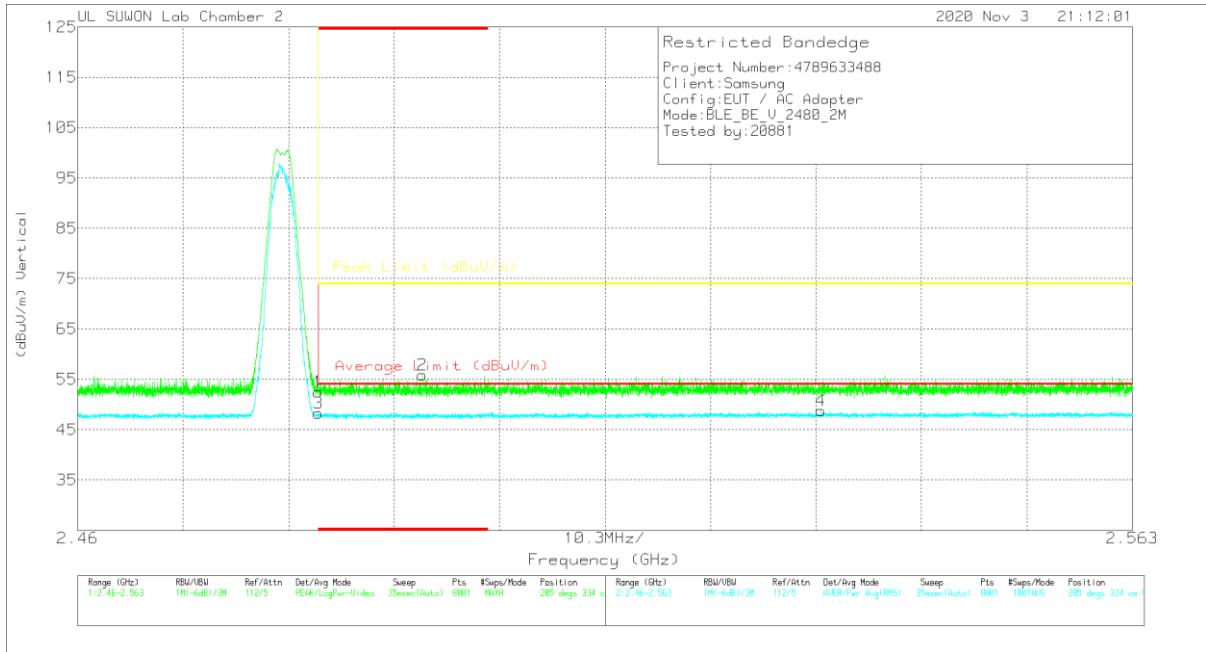


Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 10dB_ATT[dB] | DC Cor (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|---------------|--------------|-------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1 | * 2.48351 | 41.06 | Pk | 32 | -20.2 | 0 | 52.86 | - | - | 74 | -21.14 | 125 | 184 | H |
| 2 | 2.53686 | 43.61 | Pk | 32.1 | -20.1 | 0 | 55.61 | - | - | 74 | -18.39 | 125 | 184 | H |
| 3 | * 2.48351 | 30.96 | RMS | 32 | -20.2 | 5.1 | 47.86 | 54 | -6.14 | - | - | 125 | 184 | H |
| 4 | 2.53913 | 31.6 | RMS | 32.1 | -20 | 5.1 | 48.8 | 54 | -5.2 | - | - | 125 | 184 | H |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 RMS - RMS detection

VERTICAL RESULT

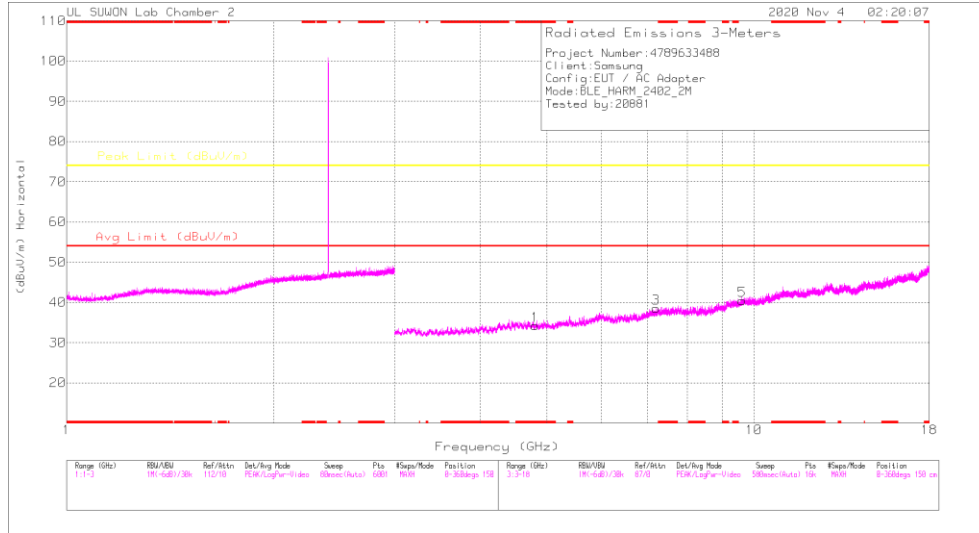


Trace Markers

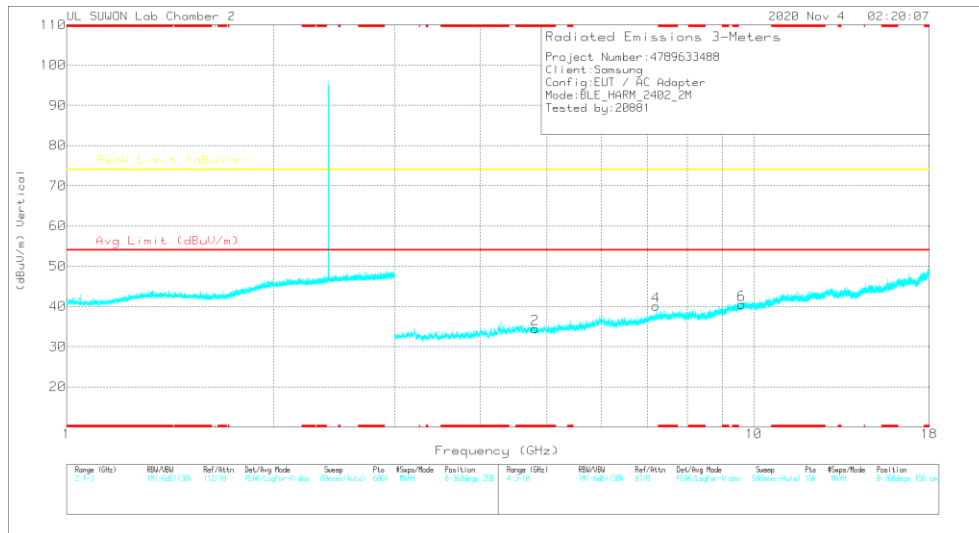
| Marker | Frequency (GHz) | Meter Reading (dBu/m) | Det | 3117_00168724 | 10dB_ATT[dB] | DC Corr (dB) | Corrected Reading (dBu/m) | Average Limit (dBu/m) | Margin (dB) | Peak Limit (dBu/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|-----------------------|-----|---------------|--------------|--------------|---------------------------|-----------------------|-------------|--------------------|----------------|----------------|-------------|----------|
| 1 | * 2.48351 | 40.66 | Pk | 32 | -20.2 | 0 | 52.46 | - | - | 74 | -21.54 | 205 | 334 | V |
| 2 | * 2.49366 | 43.98 | Pk | 32.1 | -20.2 | 0 | 55.88 | - | - | 74 | -18.12 | 205 | 334 | V |
| 3 | * 2.48351 | 31.36 | RMS | 32 | -20.2 | 5.1 | 48.26 | 54 | -5.74 | - | - | 205 | 334 | V |
| 4 | 2.53258 | 31.64 | RMS | 32.1 | -20.1 | 5.1 | 48.74 | 54 | -5.26 | - | - | 205 | 334 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK - Peak detector
 RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS LOW CHANNEL RESULTS



HORIZONTAL



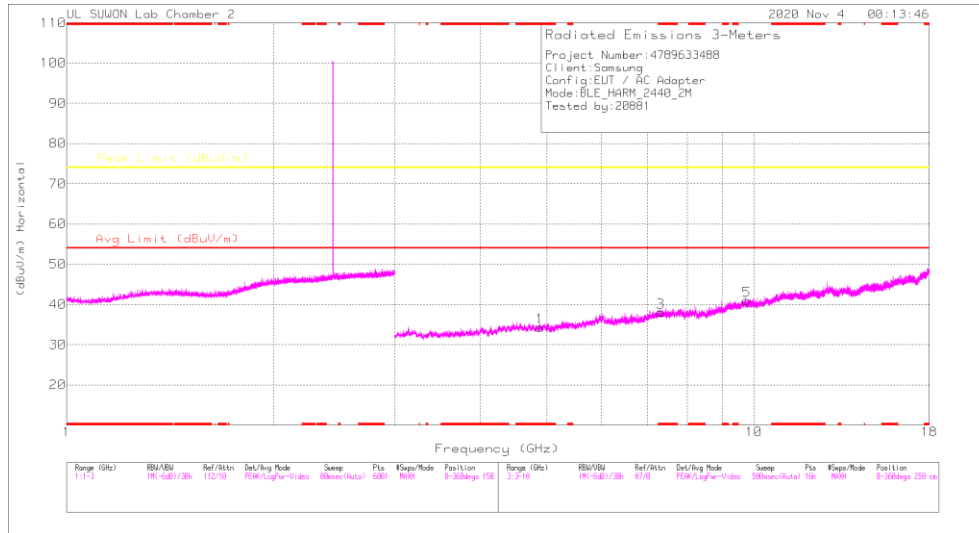
VERTICAL

RADIATED EMISSIONS

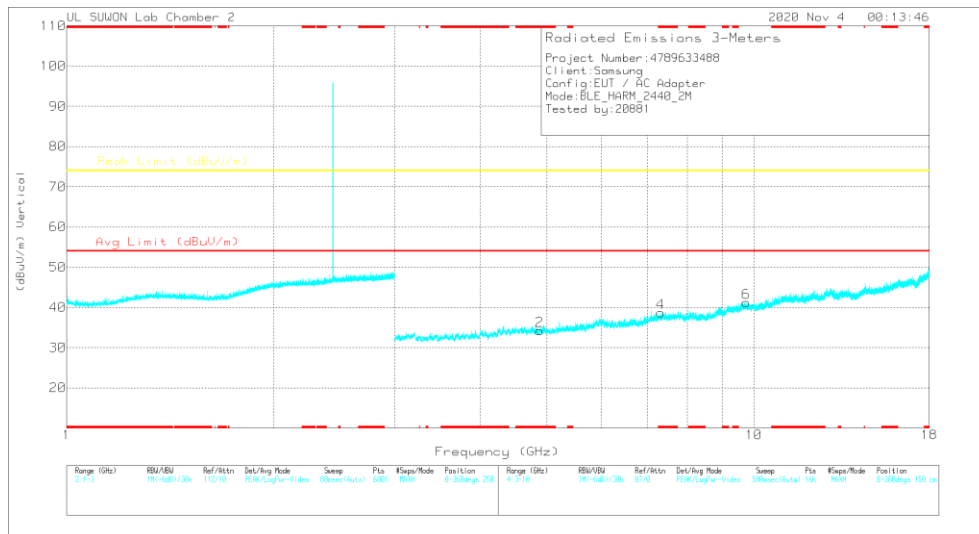
| Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 3GHz_HP[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|-----------------|----------------------|-----|---------------|-------------|--------------|----------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|----------|
| * 4.80425 | 38.24 | PK2 | 34.1 | -27.7 | 0 | 44.64 | - | - | 74 | -29.36 | 360 | 100 | H |
| * 4.80521 | 37.1 | PK2 | 34.1 | -27.7 | 0 | 43.5 | - | - | 74 | -30.5 | 0 | 100 | V |
| 7.20478 | 36.05 | PK2 | 36.2 | -25 | 0 | 47.25 | - | - | 74 | -26.75 | 156 | 109 | H |
| 7.20444 | 39.12 | PK2 | 36.2 | -25 | 0 | 50.32 | - | - | 74 | -23.68 | 93 | 100 | V |
| 9.6078 | 33.12 | PK2 | 37 | -20.9 | 0 | 49.22 | - | - | 74 | -24.78 | 0 | 100 | H |
| 9.60753 | 32.9 | PK2 | 37 | -20.9 | 0 | 49 | - | - | 74 | -25 | 0 | 100 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak

MID CHANNEL RESULTS



HORIZONTAL



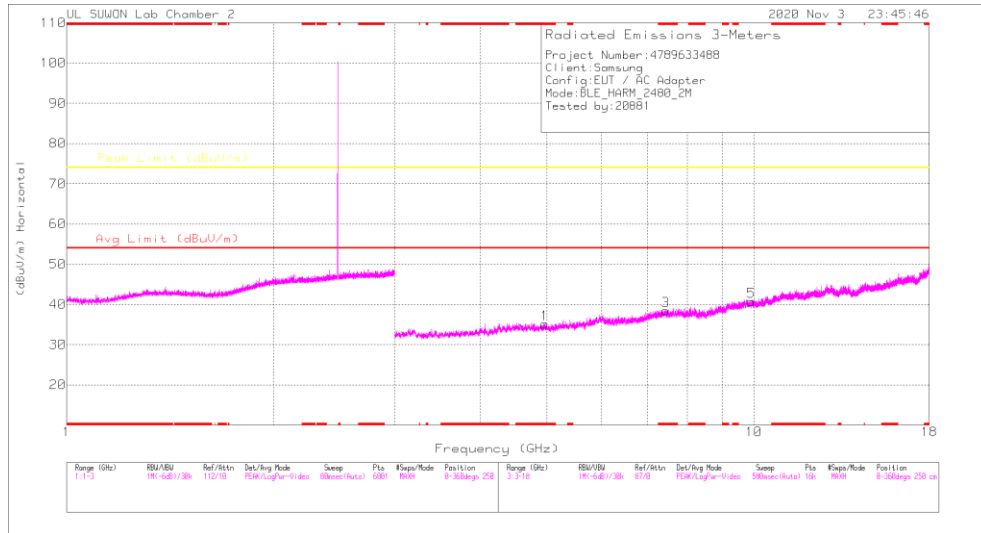
VERTICAL

RADIATED EMISSIONS

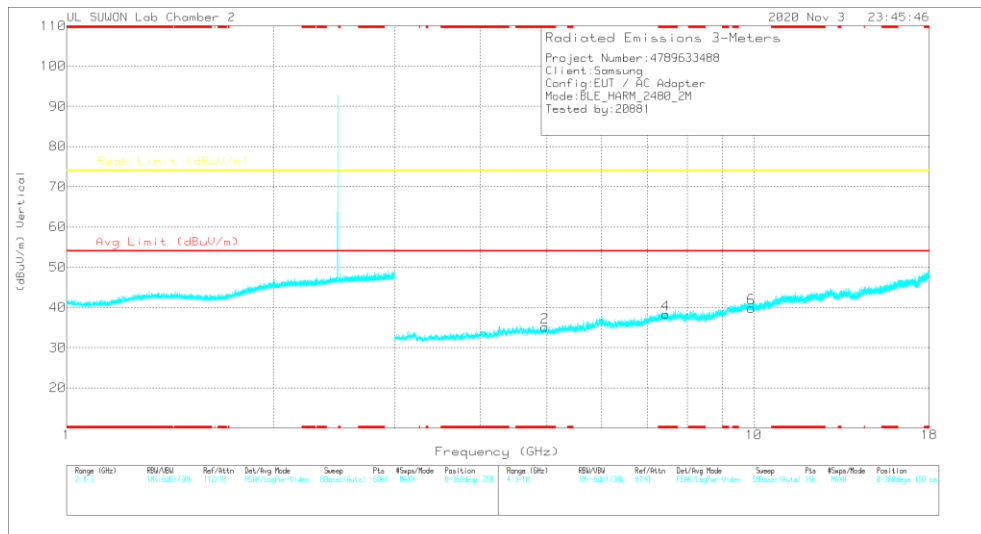
| Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 3GHz_HP[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|-----------------|----------------------|-----|---------------|-------------|--------------|----------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|----------|
| * 4.88038 | 37.22 | PK2 | 34.1 | -27.6 | 0 | 43.72 | - | - | 74 | -30.28 | 0 | 100 | H |
| * 4.8795 | 37.03 | PK2 | 34.1 | -27.7 | 0 | 43.43 | - | - | 74 | -30.57 | 0 | 100 | V |
| * 7.31899 | 35.54 | PK2 | 36.1 | -24.6 | 0 | 47.04 | - | - | 74 | -26.96 | 0 | 100 | H |
| * 7.32109 | 36.32 | PK2 | 36.1 | -24.6 | 0 | 47.82 | - | - | 74 | -26.18 | 0 | 100 | V |
| 9.75862 | 33.31 | PK2 | 37.2 | -20.5 | 0 | 50.01 | - | - | 74 | -23.99 | 0 | 100 | H |
| 9.75827 | 32.34 | PK2 | 37.2 | -20.5 | 0 | 49.04 | - | - | 74 | -24.96 | 0 | 100 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

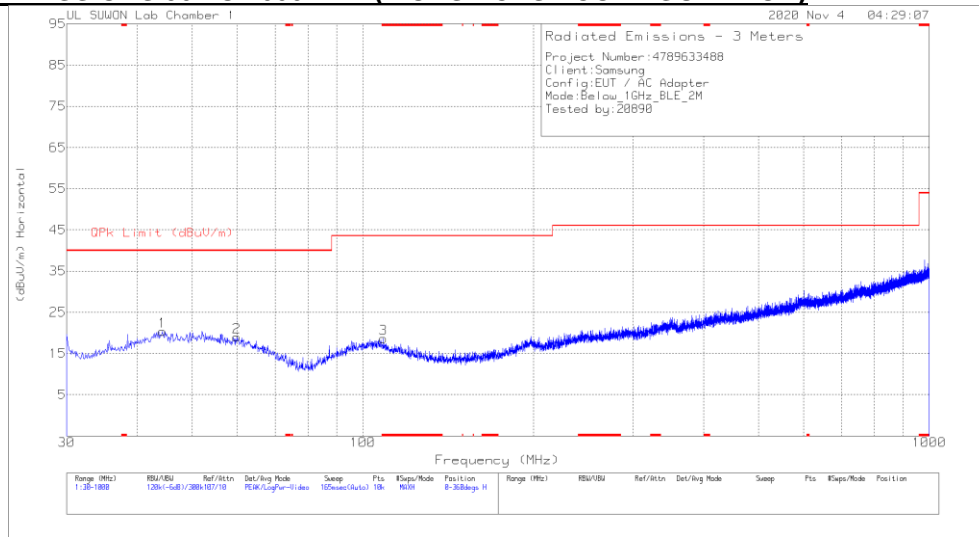
RADIATED EMISSIONS

| Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 3GHz_HP[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|-----------------|----------------------|-----|---------------|-------------|--------------|----------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|----------|
| * 4.96945 | 35.88 | PK2 | 34.1 | -26.7 | 0 | 43.28 | - | - | 74 | -30.72 | 0 | 100 | H |
| * 4.95908 | 37.09 | PK2 | 34.1 | -26.8 | 0 | 44.39 | - | - | 74 | -29.61 | 0 | 100 | V |
| * 7.44161 | 34.89 | PK2 | 36 | -23.6 | 0 | 47.29 | - | - | 74 | -26.71 | 0 | 100 | H |
| * 7.43886 | 34.86 | PK2 | 36 | -23.7 | 0 | 47.16 | - | - | 74 | -26.84 | 0 | 100 | V |
| 9.91885 | 32.21 | PK2 | 37.4 | -20.4 | 0 | 49.21 | - | - | 74 | -24.79 | 0 | 100 | H |
| 9.92189 | 32.44 | PK2 | 37.4 | -20.3 | 0 | 49.54 | - | - | 74 | -24.46 | 0 | 100 | V |

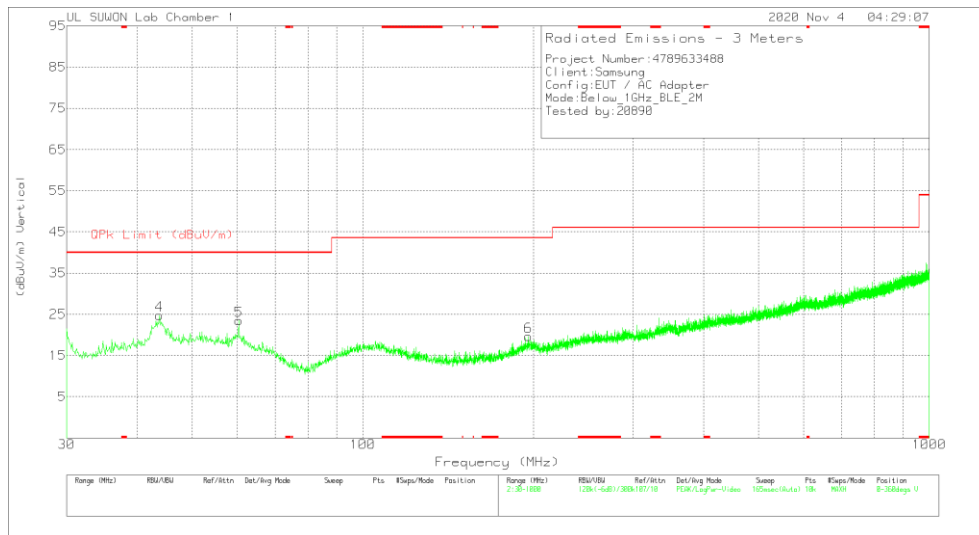
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak

10.3. WORST CASE BELOW 1 GHZ

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



HORIZONTAL



VERTICAL

Below 1GHz Data

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | VULB9163_750 | Below_1G[dB] | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|--------------|--------------|----------------------------|--------------------|-------------|----------------|-------------|----------|
| 1 | 44.259 | 31.26 | Pk | 19.6 | -30.5 | 20.36 | 40 | -19.64 | 0-360 | 400 | H |
| 2 | 59.876 | 30.64 | Pk | 18.6 | -30.2 | 19.04 | 40 | -20.96 | 0-360 | 100 | H |
| 3 | * 108.764 | 30.73 | Pk | 17.4 | -29.5 | 18.63 | 43.52 | -24.89 | 0-360 | 300 | H |
| 4 | 43.774 | 36 | Pk | 19.5 | -30.7 | 24.8 | 40 | -15.2 | 0-360 | 100 | V |
| 5 | 60.361 | 35.42 | Pk | 18.5 | -30.4 | 23.52 | 40 | -16.48 | 0-360 | 100 | V |
| 6 | 195.87 | 30.75 | Pk | 17.5 | -28.6 | 19.65 | 43.52 | -23.87 | 0-360 | 400 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

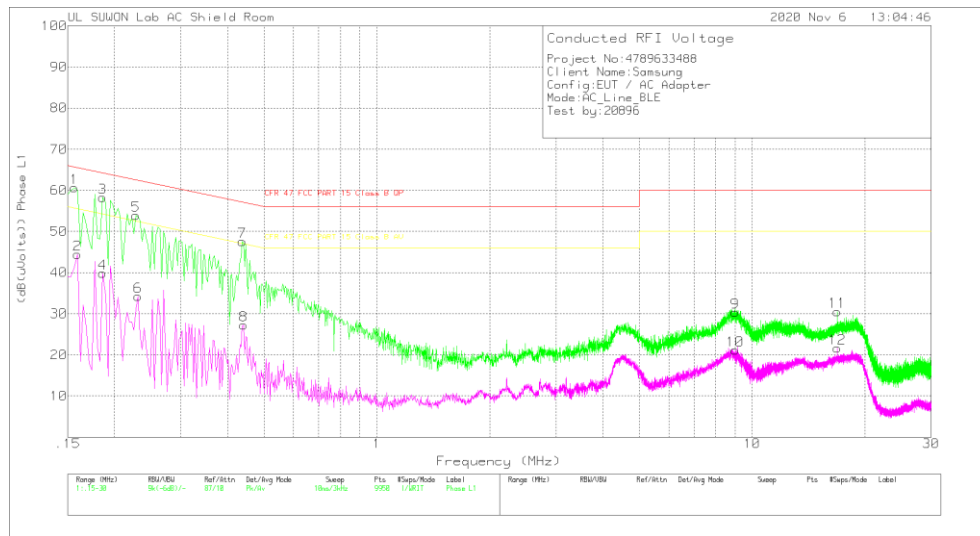
| Frequency of Emission (MHz) | Conducted Limit (dBuV) | |
|-----------------------------|------------------------|----------|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56 | 56 to 46 |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

RESULTS

11.1.1. AC Power Line

LINE 1 RESULTS



Trace Markers

Range 1: Phase L1 .15 - 30MHz

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | 101836_Wit h EX_L1[dB] | CABLELOS S(dB) | Corrected Reading (dB(uVolts)) | CFR 47 FCC PART 15 Class B QP | Margin (dB) | CFR 47 FCC PART 15 Class B AV | Margin (dB) |
|--------|-----------------|----------------------|-----|------------------------|----------------|--------------------------------|-------------------------------|-------------|-------------------------------|-------------|
| 1 | .156 | 50.68 | Pk | 9.9 | .1 | 60.68 | 65.67 | -4.99 | - | - |
| 2 | .159 | 34.48 | Av | 9.9 | .1 | 44.48 | - | - | 55.52 | -11.04 |
| 3 | .186 | 48.04 | Pk | 10 | .2 | 58.24 | 64.21 | -5.97 | - | - |
| 4 | .186 | 29.67 | Av | 10 | .2 | 39.87 | - | - | 54.21 | -14.34 |
| 5 | .228 | 43.93 | Pk | 9.8 | .2 | 53.93 | 62.52 | -8.59 | - | - |
| 6 | .231 | 24.26 | Av | 9.8 | .2 | 34.26 | - | - | 52.41 | -18.15 |
| 7 | .438 | 37.5 | Pk | 9.9 | .2 | 47.6 | 57.1 | -9.5 | - | - |
| 8 | .441 | 17.17 | Av | 9.9 | .2 | 27.27 | - | - | 47.04 | -19.77 |
| 9 | 9.006 | 20.09 | Pk | 9.9 | .4 | 30.39 | 60 | -29.61 | - | - |
| 10 | 9.018 | 10.8 | Av | 9.9 | .4 | 21.1 | - | - | 50 | -28.9 |
| 11 | 16.857 | 20.05 | Pk | 10.1 | .4 | 30.55 | 60 | -29.45 | - | - |
| 12 | 16.86 | 11.13 | Av | 10.1 | .4 | 21.63 | - | - | 50 | -28.37 |

Pk - Peak detector

Av - Average detection

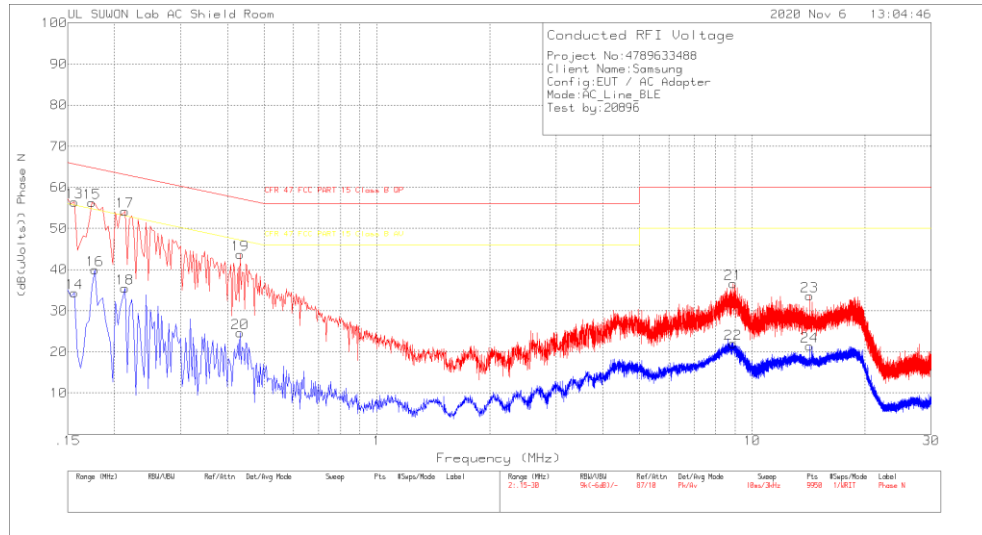
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

| Frequency (MHz) | Meter Reading (dBuV) | Det | 101836_Wit h EX_L1[dB] | CABLELOS S(dB) | Corrected Reading (dB(uVolts)) | CFR 47 FCC PART 15 Class B QP | Margin (dB) | CFR 47 FCC PART 15 Class B AV | Margin (dB) |
|-----------------|----------------------|-----|------------------------|----------------|--------------------------------|-------------------------------|-------------|-------------------------------|-------------|
| .15615 | 43.29 | Qp | 9.9 | .1 | 53.29 | 65.67 | -12.38 | - | - |
| .18675 | 40.73 | Qp | 10 | .2 | 50.93 | 64.18 | -13.25 | - | - |
| .22875 | 37.53 | Qp | 9.8 | .2 | 47.53 | 62.49 | -14.96 | - | - |
| .43725 | 27.31 | Qp | 9.9 | .2 | 37.41 | 57.11 | -19.7 | - | - |

Qp - Quasi-Peak detector

LINE 2 RESULTS



Trace Markers

Range 2: Phase N .15 - 30MHz

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | 101836_Wit h EX_N[dB] | CABLELOS S(dB) | Corrected Reading (dB(uVolts)) | CFR 47 FCC PART 15 Class B QP | Margin (dB) | CFR 47 FCC PART 15 Class B AV | Margin (dB) |
|--------|-----------------|----------------------|-----|-----------------------|----------------|--------------------------------|-------------------------------|-------------|-------------------------------|-------------|
| 13 | .156 | 46.41 | Pk | 9.9 | .1 | 56.41 | 65.67 | -9.26 | - | - |
| 14 | .156 | 24.31 | Av | 9.9 | .1 | 34.31 | - | - | 55.67 | -21.36 |
| 15 | .174 | 45.96 | Pk | 10.1 | .2 | 56.26 | 64.77 | -8.51 | - | - |
| 16 | .177 | 29.8 | Av | 10 | .2 | 40 | - | - | 54.63 | -14.63 |
| 17 | .213 | 44.14 | Pk | 9.8 | .2 | 54.14 | 63.09 | -8.95 | - | - |
| 18 | .213 | 25.47 | Av | 9.8 | .2 | 35.47 | - | - | 53.09 | -17.62 |
| 19 | .432 | 33.64 | Pk | 9.9 | .2 | 43.74 | 57.21 | -13.47 | - | - |
| 20 | .432 | 14.56 | Av | 9.9 | .2 | 24.66 | - | - | 47.21 | -22.55 |
| 21 | 8.889 | 26.26 | Pk | 9.9 | .4 | 36.56 | 60 | -23.44 | - | - |
| 22 | 8.892 | 11.74 | Av | 9.9 | .4 | 22.04 | - | - | 50 | -27.96 |
| 23 | 14.235 | 23.12 | Pk | 10.1 | .4 | 33.62 | 60 | -26.38 | - | - |
| 24 | 14.235 | 10.93 | Av | 10.1 | .4 | 21.43 | - | - | 50 | -28.57 |

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

Range 2: Phase N .15 - 30MHz

| Frequency (MHz) | Meter Reading (dBuV) | Det | 101836_Wit h EX_N[dB] | CABLELOS S(dB) | Corrected Reading (dB(uVolts)) | CFR 47 FCC PART 15 Class B QP | Margin (dB) | CFR 47 FCC PART 15 Class B AV | Margin (dB) |
|-----------------|----------------------|-----|-----------------------|----------------|--------------------------------|-------------------------------|-------------|-------------------------------|-------------|
| .15615 | 42.24 | Qp | 9.9 | .1 | 52.24 | 65.67 | -13.43 | - | - |
| .17325 | 40.71 | Qp | 10.1 | .2 | 51.01 | 64.8 | -13.79 | - | - |
| .21315 | 37.79 | Qp | 9.8 | .2 | 47.79 | 63.08 | -15.29 | - | - |

Qp - Quasi-Peak detector

END OF TEST REPORT