**FCC 47 CFR PART 15 SUBPART E**

**CERTIFICATION TEST REPORT**

**FOR**

**Tablet with Bluetooth, DTS/UNII a/b/g/n, ANT+ & NFC**

**MODEL NUMBER: SM-T360**
**FCC ID: A3LSMT360**

**REPORT NUMBER: 14U18495-E4, REVISION B**
**ISSUE DATE: SEP 2, 2014**

*Prepared for*
**SAMSUNG ELECTRONICS CO., LTD.**
**416, MAETAN 3-DONG, YEONGTONG-GU**
**SUWON-CITY, GYEONGGI-DO 443-742, SOUTH KOREA**

*Prepared by*
**UL VERIFICATION SERVICES INC.**
**47173 BENICIA STREET**
**FREMONT, CA 94538, U.S.A.**
**TEL: (510) 771-1000**
**FAX: (510) 661-0888**

NVLAP LAB CODE 200065-0

## Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| - | 08/22/13 | Initial Issue | P. Zhang |
| A | 8/29/14 | Updated page 14, 20, 24, 26, 29 | P. Zhang |
| B | 9/2/14 | Updated statement | P. Zhang |


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# TABLE OF CONTENTS

**1. ATTESTATION OF TEST RESULTS ..... 6**

**2. TEST METHODOLOGY ..... 7**

**3. FACILITIES AND ACCREDITATION ..... 7**

**4. CALIBRATION AND UNCERTAINTY ..... 7**

*4.1. MEASURING INSTRUMENT CALIBRATION ..... 7*

*4.2. SAMPLE CALCULATION ..... 8*

*4.3. MEASUREMENT UNCERTAINTY ..... 8*

**5. EQUIPMENT UNDER TEST ..... 9**

*5.1. DESCRIPTION OF EUT ..... 9*

*5.2. MAXIMUM OUTPUT POWER ..... 9*

*5.3. DESCRIPTION OF AVAILABLE ANTENNAS ..... 9*

*5.4. WORST-CASE CONFIGURATION AND MODE ..... 10*

*5.5. DESCRIPTION OF TEST SETUP ..... 11*

**6. TEST AND MEASUREMENT EQUIPMENT ..... 13**

**7. SUMMARY TABLE ..... 14**

**8. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS ..... 15**

*8.1. ON TIME AND DUTY CYCLE RESULTS ..... 15*

*8.2. DUTY CYCLE PLOTS ..... 16*

**9. MEASUREMENT METHOD ..... 19**

**10. ANTENNA PORT TEST RESULTS ..... 20**

*10.1. 26 dB BANDWIDTH ..... 20*

10.1.1. 802.11a MODE IN THE 5.2 GHz BAND ..... 20
10.1.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND ..... 20
10.1.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND ..... 20
10.1.1. 802.11a MODE IN THE 5.3 GHz BAND ..... 21
10.1.1. 802.11n HT20 MODE IN THE 5.3 GHz BAND ..... 21
10.1.2. 802.11n HT40 MODE IN THE 5.3 GHz BAND ..... 21
10.1.3. 802.11a MODE IN THE 5.5 GHz BAND ..... 21
10.1.4. 802.11n HT20 MODE IN THE 5.5 GHz BAND ..... 22
10.1.5. 802.11n HT40 MODE IN THE 5.5 GHz BAND ..... 22
10.1.6. 802.11a MODE IN THE 5.8 GHz BAND ..... 22
10.1.7. 802.11n HT20 MODE IN THE 5.8 GHz BAND ..... 22
10.1.8. 802.11n HT40 MODE IN THE 5.8 GHz BAND ..... 23



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

10.1.1. 26 dB BANDWIDTH PLOTS ..... 24

*10.2. 99% BANDWIDTH ..... 26*
10.2.1. 802.11a MODE IN THE 5.2 GHz BAND ..... 26
10.2.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND ..... 26
10.2.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND ..... 26
10.2.4. 802.11a MODE IN THE 5.3 GHz BAND ..... 27
10.2.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND ..... 27
10.2.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND ..... 27
10.2.7. 802.11a MODE IN THE 5.5 GHz BAND ..... 27
10.2.8. 802.11n HT20 MODE IN THE 5.5 GHz BAND ..... 28
10.2.9. 802.11n HT40 MODE IN THE 5.5 GHz BAND ..... 28
10.2.10. 802.11a MODE IN THE 5.8 GHz BAND ..... 28
10.2.11. 802.11n HT20 MODE IN THE 5.8 GHz BAND ..... 28
10.2.12. 802.11n HT40 MODE IN THE 5.8 GHz BAND ..... 29
10.2.1. 99% BANDWIDTH PLOTS ..... 30

*10.3. AVERAGE POWER ..... 32*
10.3.1. 802.11a MODE IN THE 5.2 GHz BAND ..... 32
10.3.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND ..... 32
10.3.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND ..... 33
10.3.4. 802.11a MODE IN THE 5.3 GHz BAND ..... 33
10.3.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND ..... 33
10.3.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND ..... 33
10.3.7. 802.11a MODE IN THE 5.5 GHz BAND ..... 34
10.3.8. 802.11n HT20 MODE IN THE 5.5 GHz BAND ..... 34
10.3.9. 802.11n HT40 MODE IN THE 5.5 GHz BAND ..... 34
10.3.10. 802.11a MODE IN THE 5.8 GHz BAND ..... 34
10.3.11. 802.11n HT20 MODE IN THE 5.8 GHz BAND ..... 35
10.3.12. 802.11n HT40 MODE IN THE 5.8 GHz BAND ..... 35

*10.4. OUTPUT POWER AND PPSD ..... 36*
10.4.1. 802.11a MODE IN THE 5.2 GHz BAND ..... 37
10.4.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND ..... 38
10.4.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND ..... 39
10.4.4. 802.11a MODE IN THE 5.3 GHz BAND ..... 40
10.4.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND ..... 41
10.4.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND ..... 42
10.4.7. 802.11a MODE IN THE 5.5 GHz BAND ..... 43
10.4.8. 802.11n HT20 MODE IN THE 5.5 GHz BAND ..... 44
10.4.9. 802.11n HT40 MODE IN THE 5.5 GHz BAND ..... 45
10.4.10. 802.11a MODE IN THE 5.8 GHz BAND ..... 46
10.4.11. 802.11n HT20 MODE IN THE 5.8 GHz BAND ..... 47
10.4.12. 802.11n HT40 MODE IN THE 5.8 GHz BAND ..... 48
10.4.1. OUTPUT POWER AND PPSD PLOTS, Chain 0 ..... 49

*10.1. PEAK EXCURSION ..... 51*
10.1.1. 802.11a MODE IN THE 5.2 GHz BAND ..... 52
10.1.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND ..... 53
10.1.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND ..... 54



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**11. TRANSMITTER ABOVE 1 GHz ..... 55**

*11.1. 5.2 GHz ..... 56*
11.1.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.2 GHz BAND ..... 56
11.1.2. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.2 GHz BAND ..... 67
11.1.3. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.2 GHz BAND ..... 78

*11.2. 5.3 GHz ..... 86*
11.2.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.3 GHz BAND ..... 86
11.2.2. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.3 GHz BAND ..... 97
11.2.3. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.3 GHz BAND ..... 108

*11.3. 5.5-5.6 GHz ..... 116*
11.3.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.5 GHz BAND ..... 116
11.3.2. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.5 GHz BAND ..... 129
11.3.3. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.5 GHz BAND ..... 142

*11.4. 5.8 GHz ..... 155*
11.4.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.8 GHz BAND ..... 155
11.4.2. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.8 GHz BAND ..... 168
11.4.3. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.8 GHz BAND ..... 181

**12. WORST-CASE BELOW 1 GHz (in the 5.3 GHz Band) ..... 191**

**13. AC POWER LINE CONDUCTED EMISSIONS ..... 194**

**14. DYNAMIC FREQUENCY SELECTION ..... 199**

*14.1. OVERVIEW ..... 199*
14.1.1. LIMITS ..... 199
14.1.2. TEST AND MEASUREMENT SYSTEM ..... 204
14.1.3. SETUP OF EUT ..... 208
14.1.4. DESCRIPTION OF EUT ..... 210

*14.1. RESULTS FOR 20 MHz BANDWIDTH ..... 213*
14.1.1. TEST CHANNEL ..... 213
14.1.2. RADAR WAVEFORM AND TRAFFIC ..... 213
14.1.3. OVERLAPPING CHANNEL TESTS ..... 215
14.1.4. MOVE AND CLOSING TIME ..... 215

*14.2. RESULTS FOR 40 MHz BANDWIDTH ..... 220*
14.2.1. TEST CHANNEL ..... 220
14.2.2. RADAR WAVEFORM AND TRAFFIC ..... 220
14.2.3. OVERLAPPING CHANNEL TESTS ..... 223
14.2.4. MOVE AND CLOSING TIME ..... 223
14.2.5. NON-OCCUPANCY PERIOD ..... 228

**15. SETUP PHOTOS ..... 229**



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.

**EUT DESCRIPTION:** Tablet with Bluetooth, DTS/UNII a/b/g/n, ANT+ & NFC

**MODEL:** SM-T360

**SERIAL NUMBER:** 1934661 (Radiated) and 1934663(Conducted)

**DATE TESTED:** AUGUST 8-22, 2014

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| CFR 47 Part 15 Subpart E | Pass |

UL Verification Services Inc. 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 Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Verification Services Inc. By:

PENG ZHANG
CONSUMER TECHNOLOGY DIVISION
PROJECT LEAD
UL Verification Services Inc.

Tested By:

STEVEN TRAN
CONSUMER TECHNOLOGY DIVISION
TEST ENGINEER
UL Verification Services Inc.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, and ANSI C63.4-2009, FCC 06-96, FCC KDB 789033.

U-NII procedures and limits were applied for operations in the frequency band from 5.725-5.850 GHz in accordance with FCC KDB publication 644545 D02 to demonstrate compliance with 15.247 requirements in that band.

# 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 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.

| 47173 Benicia Street | 47266 Benicia Street |
|---|---|
| ☒ Chamber A | ☐ Chamber D |
| ☒ Chamber B | ☒ Chamber E |
| ☒ Chamber C | ☐ Chamber F |
| | ☒ Chamber G |

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

# 4. CALIBRATION AND UNCERTAINTY

## 4.1. MEASURING INSTRUMENT CALIBRATION

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.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

## 4.3. 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 | 3.52 dB |
| Radiated Disturbance, 30 to 40000 MHz | 4.94 dB |

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


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

The EUT is a Tablet with Bluetooth, DTS/UNII a/b/g/n, ANT+ & NFC.

## 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

| Frequency Range (MHz) | Mode | Total Output Power (dBm) | Total Output Power (mW) |
|---|---|---|---|
| 5180 - 5240 | 802.11a | 11.14 | 13.00 |
| 5180 - 5240 | 802.11n HT20 | 11.11 | 12.91 |
| 5190 - 5230 | 802.11n HT40 | 10.68 | 11.69 |
| 5260 - 5320 | 802.11a | 10.96 | 12.47 |
| 5260 - 5320 | 802.11n HT20 | 10.97 | 12.50 |
| 5270 - 5310 | 802.11n HT40 | 10.62 | 11.53 |
| 5500 - 5700 | 802.11a | 10.60 | 11.48 |
| 5500 - 5700 | 802.11n HT20 | 10.64 | 11.59 |
| 5510 - 5670 | 802.11n HT40 | 11.16 | 13.06 |
| 5745 - 5825 | 802.11a | 11.12 | 12.94 |
| 5745 - 5825 | 802.11n HT20 | 11.11 | 12.91 |
| 5755 - 5795 | 802.11n HT40 | 11.23 | 13.27 |

## 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -0.67dBi.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 5.4. WORST-CASE CONFIGURATION AND MODE

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

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

Both standalone and with back cover configuration investigated through preliminary scanning and final measurement based on worst case configuration with EUT standalone with.

Based on the baseline scan, the worst-case data rates were:

802.11a mode: 6 Mbps

802.11n HT20mode: MCS0

802.11n HT40mode: MCS0



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 5.5. DESCRIPTION OF TEST SETUP

**SUPPORT EQUIPMENT**

| Support Equipment List | | | | |
|---|---|---|---|---|
| **Description** | **Manufacturer** | **Model** | **Serial Number** | **FCC ID** |
| AC Adapter | SAMSUNG | EP-TA10EWE | N/A | N/A |
| Earphone | SAMSUNG | N/A | N/A | N/A |
| Back cover with touch pen | SAMSUNG | N/A | N/A | N/A |

**I/O CABLES**

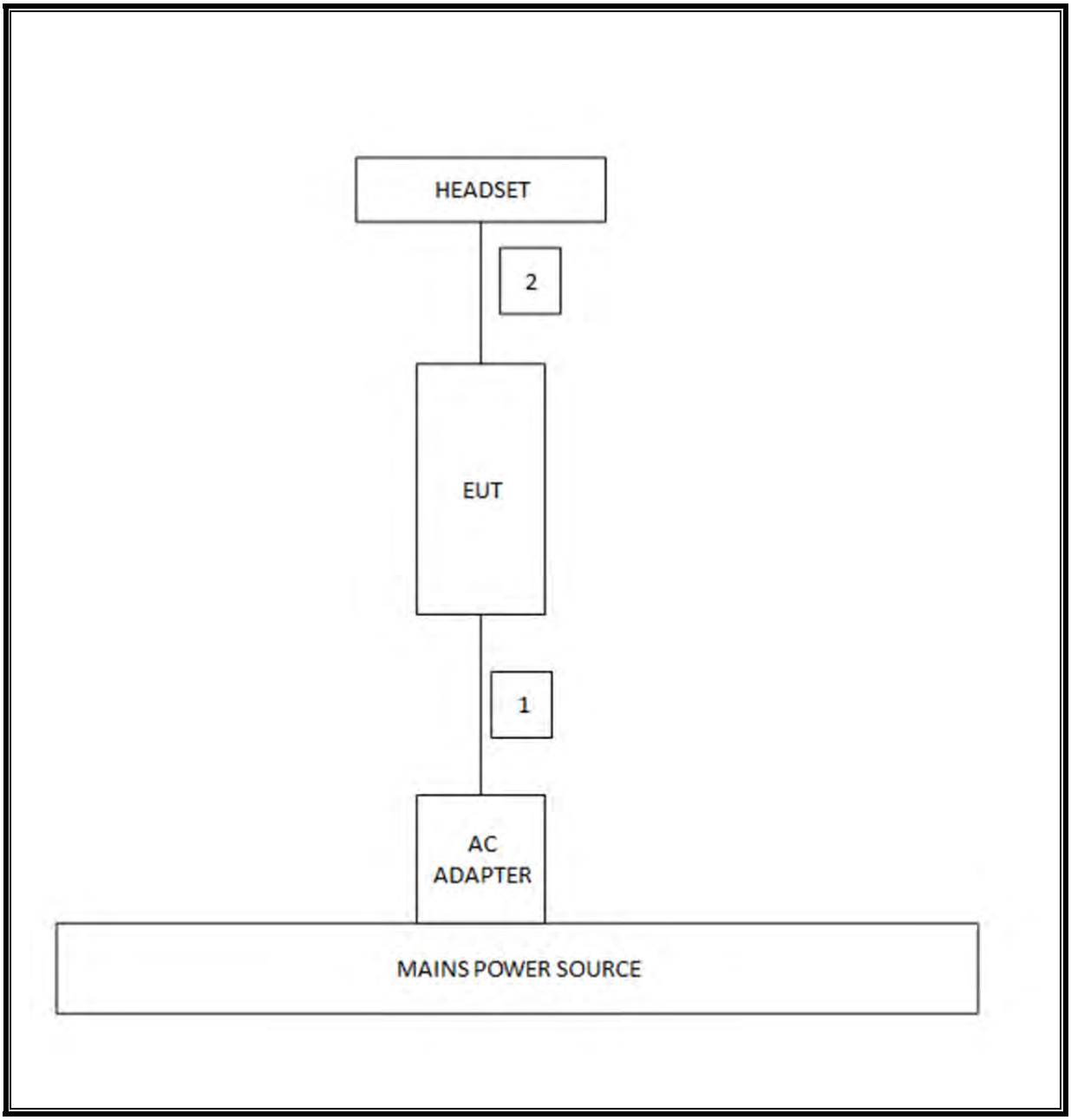
| I/O Cable List | | | | | | |
|---|---|---|---|---|---|---|
| **Cable No** | **Port** | **# of identical ports** | **Connector Type** | **Cable Type** | **Cable Length (m)** | **Remarks** |
| 1 | DC Power | 1 | Mini-USB | Shielded | 1.2m | N/A |
| 2 | Audio | 1 | Mini-Jack | Unshielded | 1.0m | N/A |

**TEST SETUP**

The EUT is setup as a stand-alone device.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## SETUP DIAGRAM FOR TESTS





UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# 6. 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** | **Asset** | **Cal Due** |
| Spectrum Analyzer, 44 GHz | Agilent / HP | E4446A | C01069 | 12/20/14 |
| Spectrum Analyzer,9KHz-40GHz | HP | 8564E | C00986 | 04/01/15 |
| EMI Test Receiver, 9 kHz-7 GHz | R & S | ESCI 7 | 1000741 | 08/13/15 |
| EMI Test Receiver, 30 MHz | R & S | ESHS 20 | N02396 | 08/18/14 |
| Peak Power Meter | Agilent / HP | E4416A | C00963 | 12/13/14 |
| Peak / Average Power Sensor | Agilent / HP | E9327A | C00964 | 12/13/14 |
| Antenna, Horn, 1-18 GHz | ETS | 3117 | C01022 | 02/21/15 |
| Antenna, Horn,18- 26 GHz | ARA | MWH-1826/B | C00946 | 11/12/14 |
| Antenna, Horn, 26-40 GHz | ARA | MWH-2640 | C00891 | 06/28/15 |
| Antenna, Bilog, 30MHz-1 GHz | Sunol Sciences | JB1 | T243 | 03/06/15 |
| RF Preamplifier, 100KHz -> 1300MHz | HP | TBD | C00825 | 06/01/15 |
| RF Preamplifier, 1GHz - 18GHz | Miteq | NSP4000-SP2 | 924343 | 03/23/15 |
| RF Preamplifier, 1GHz - 26.5GHz | HP | 8449B | F00351 | 06/27/15 |
| AC Power Supply, 2,500VA 45-500Hz | Elgar-Ametek | CW2501M | F00013 | CNR |
| RF Preamplifier, 1GHz - 40GHz | Miteq | NSP4000-SP2 | C00990 | 08/20/15 |
| Attenuator / Switch driver | HP | 11713A | F00204 | CNR |
| Low Pass Filter 3GHz | Micro-Tronics | LPS17541 | F00219 | 05/23/15 |
| High Pass Filter 5GHz | Micro-Tronics | HPS17542 | F00222 | 05/22/15 |
| High Pass Filter 6GHz | Micro-Tronics | HPM17543 | F00224 | 05/22/15 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# 7. SUMMARY TABLE

The model FCC ID: A3LSMT360 shares the same enclosure and circuit board as mode FCC ID: A3LSMT365. The WLAN/Bluetooth circuitry and layout, including antenna, are almost identical between the two units. The WLAN/Bluetooth antenna and surrounding circuitry is the same between these two units.

After confirming through preliminary radiated emissions that the performance of the A3LSMT365 WLAN remains representative of this model (FCC ID: A3LSMT360) test data for FCC ID: A3LSMT365 is being submitted for this application.

Only different between these two models is A3LSMT360 don't have WWAN radio module which is loaded on A3LSMT365.

| FCC Part Section | Test Description | Test Limit | Test Condition | Test Result | Worst Case |
|---|---|---|---|---|---|
| 15.407 (a) | Occupied Band width (26dB) | N/A | Conducted | Pass | 54.64 MHz |
| 15.407 (a)(1) | TX Cond. Power5.15-5.25 | <17dBm or 4+10Log(OBW) | | Pass | 11.14dBm |
| 15.407 (a)(2) | TX Cond. Power5.25-5.35 & 5.47-5.725 | <24dBm or 11+10Log(OBW) | | Pass | 11.16 dBm |
| 15.407 (a)(3) | TX Cond. Power 5.725-5.825 | < 30dBm or 17+10Log(OBW) | | Pass | 11.23 dBm |
| 15.407 (a)(5) | PSD (5.2<4dBm,5.3,5.5,5.8GHz<11dBm) | <11dBm | | Pass | 0.22 dBm |
| FCC §15.407 (a) (6) | Peak Excursion | 13 dBm | | Pass | 8.04 dBm |
| 15.207 (a) | AC Power Line conducted emissions | Section 10 | Radiated | Pass | 56.9 dBuV (AV) |
| 15.407 (b) & 15.209 | Radiated Spurious Emission | < 54dBuV/m | | Pass | 27.24 dBuV/m |
| 15.407 (h)(2) | Dynamic Frequency Selection | N/A | Radiated / Conducted | Pass | N/A |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# 8. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

**LIMITS**

None; for reporting purposes only.

**PROCEDURE**

KDB 789033 Zero-Span Spectrum Analyzer Method.

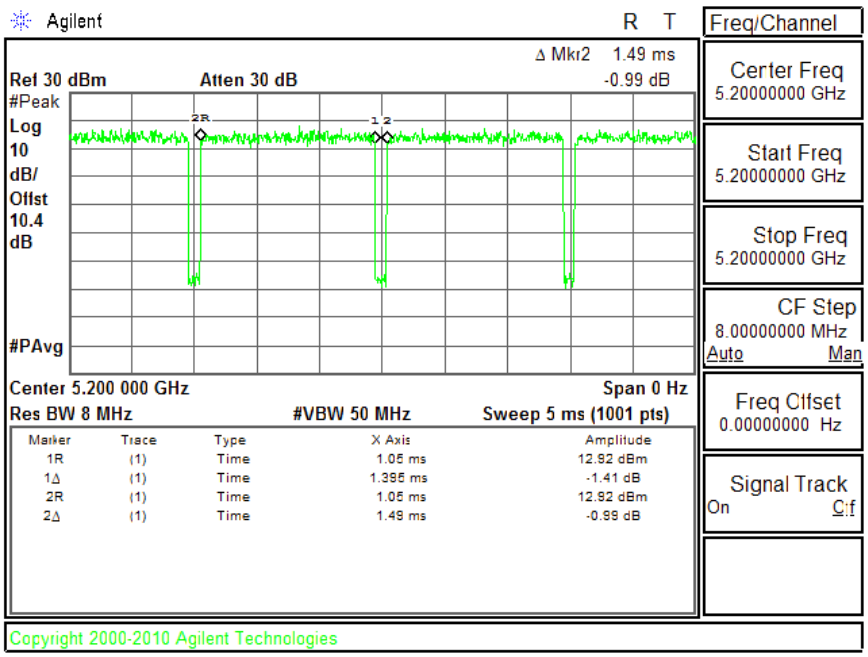
## 8.1. ON TIME AND DUTY CYCLE RESULTS

| Mode | ON Time B (msec) | Period (msec) | Duty Cycle x (linear) | Duty Cycle (%) | Duty Cycle Correction Factor (dB) | 1/T Minimum VBW (kHz) |
|---|---|---|---|---|---|---|
| 802.11a | 1.395 | 1.490 | 0.936 | 93.6% | 0.29 | 0.717 |
| 802.11n HT20 | 1.295 | 1.395 | 0.928 | 92.8% | 0.32 | 0.772 |
| 802.11n HT40 | 0.636 | 0.736 | 0.864 | 86.4% | 0.63 | 1.572 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 8.2. DUTY CYCLE PLOTS

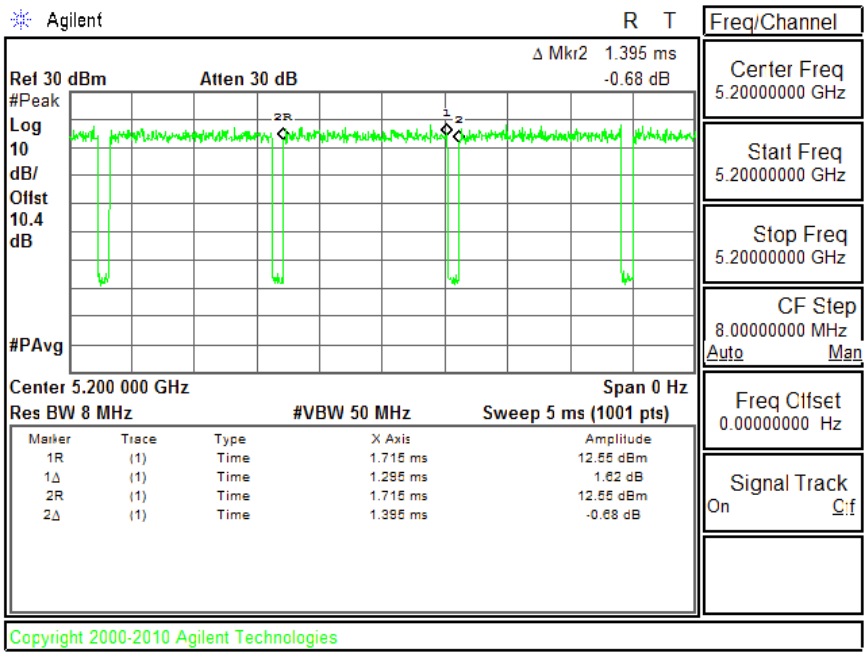
DUTY CYCLE 802.11a MODE





*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

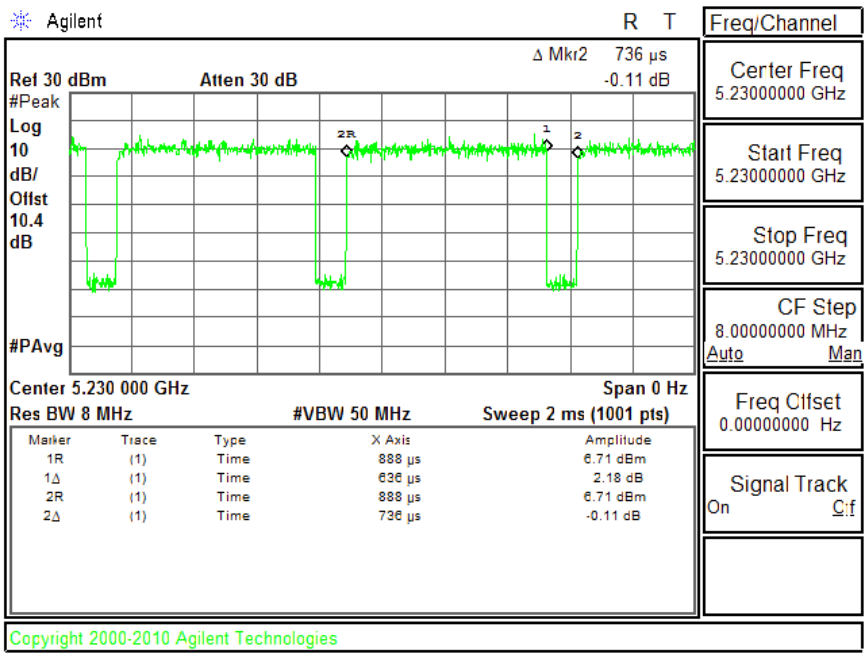
DUTY CYCLE 802.11n HT20 MODE





*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

DUTY CYCLE 802.11n HT40 MODE





*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# 9. MEASUREMENT METHOD

789033 D01 General UNII Test Procedures v01r03

644545 D02 Alternative Guidance for 802.11ac v01

644545 D01 Guidance for IEEE 802.11ac v01r01 1

The Duty Cycle is less than 98% and consistent therefore KDB 789033 Method SA-2 is used for power and PPSD

The Duty Cycle is less than 98% and consistent, KDB 789033 Method AD with Power RMS Averaging and duty cycle correction is used.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# 10. ANTENNA PORT TEST RESULTS

## 10.1. 26 dB BANDWIDTH

**LIMITS**

None; for reporting purposes only.

**RESULTS**

### 10.1.1. 802.11a MODE IN THE 5.2 GHz BAND

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| Low | 5180 | 28.20 |
| Mid | 5200 | 29.04 |
| High | 5240 | 26.32 |
| Worst | | 29.04 |

### 10.1.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| Low | 5180 | 28.36 |
| Mid | 5200 | 27.76 |
| High | 5240 | 26.32 |
| Worst | | 28.36 |

### 10.1.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| Low | 5190 | 51.600 |
| Mid | 5230 | 53.680 |
| Worst | | 53.680 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 10.1.1. 802.11a MODE IN THE 5.3 GHz BAND

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| Low | 5260 | 26.40 |
| Mid | 5300 | 26.40 |
| High | 5320 | 27.48 |
| Worst | | 27.48 |

### 10.1.1. 802.11n HT20 MODE IN THE 5.3 GHz BAND

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| Low | 5260 | 29.28 |
| Mid | 5300 | 26.12 |
| High | 5320 | 27.76 |
| Worst | | 29.28 |

### 10.1.2. 802.11n HT40 MODE IN THE 5.3 GHz BAND

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| Low | 5270 | 54.64 |
| High | 5310 | 53.28 |
| Worst | | 54.64 |

### 10.1.3. 802.11a MODE IN THE 5.5 GHz BAND

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| Low | 5500 | 22.24 |
| Mid | 5580 | 22.72 |
| High | 5700 | 22.48 |
| Worst | | 22.72 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 10.1.4. 802.11n HT20 MODE IN THE 5.5 GHz BAND

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| Low | 5500 | 22.92 |
| Mid | 5580 | 22.92 |
| High | 5700 | 23.24 |
| Worst | | 23.24 |

### 10.1.5. 802.11n HT40 MODE IN THE 5.5 GHz BAND

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| Low | 5510 | 44.40 |
| Mid | 5550 | 44.00 |
| High | 5670 | 44.24 |
| Worst | | 44.4 |

### 10.1.6. 802.11a MODE IN THE 5.8 GHz BAND

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| Low | 5745 | 22.52 |
| Mid | 5785 | 22.56 |
| High | 5825 | 22.40 |
| Worst | | 22.56 |

### 10.1.7. 802.11n HT20 MODE IN THE 5.8 GHz BAND

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| Low | 5745 | 22.84 |
| Mid | 5785 | 22.84 |
| High | 5825 | 23.04 |
| Worst | | 23.04 |


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

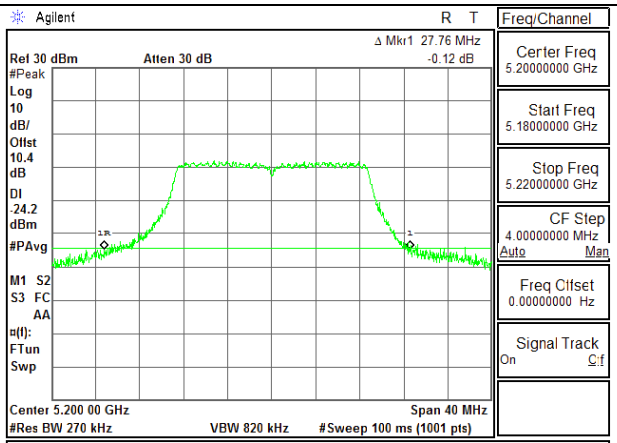
### 10.1.8. 802.11n HT40 MODE IN THE 5.8 GHz BAND

| Channel | Frequency (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|
| Low | 5755 | 44.08 |
| High | 5795 | 43.92 |
| Worst | | 44.08 |

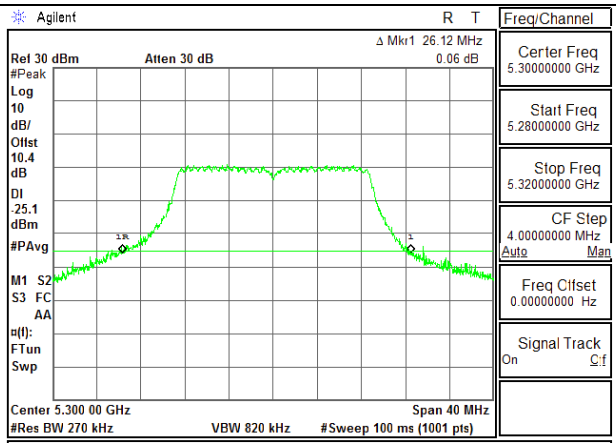

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.1.1. 26 dB BANDWIDTH PLOTS

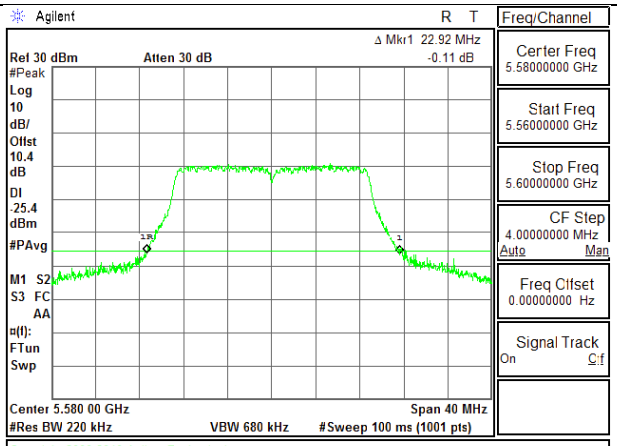
11n HT20 5.2 Mid Ch



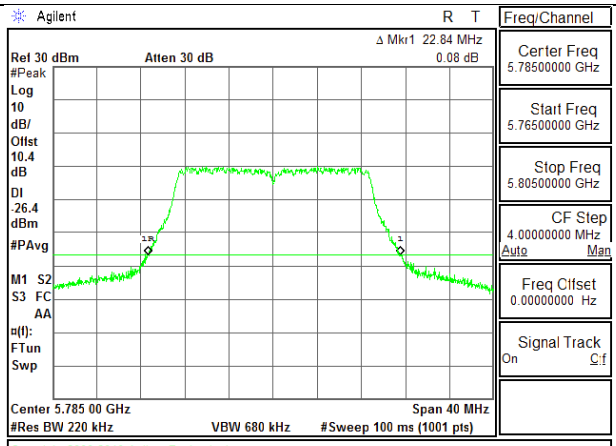

11n HT20 5.3 Mid Ch



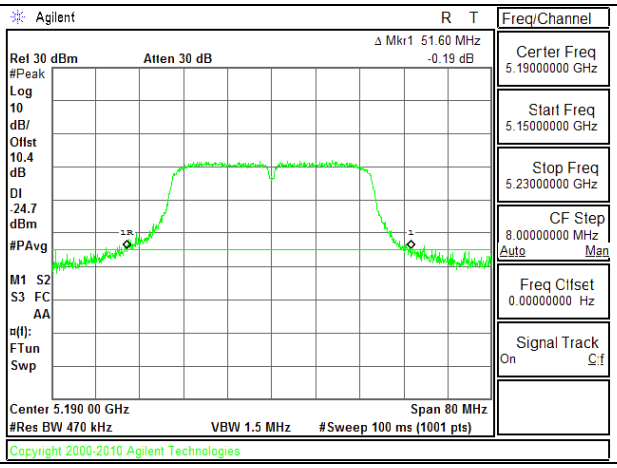

11n HT20 5.5 Mid Ch



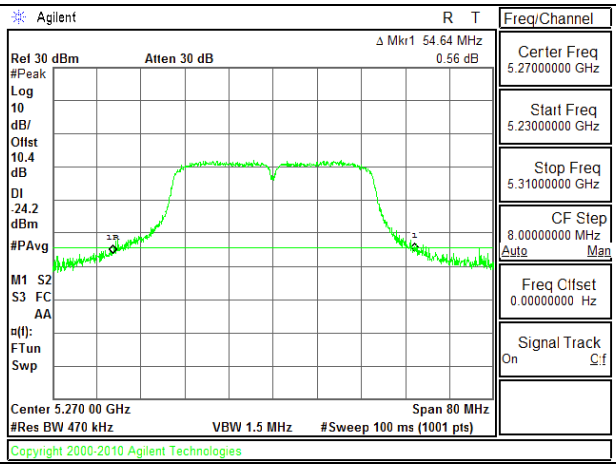

11n HT20 5.8 Mid Ch




11n HT40 5.2 Low Ch




11n HT40 5.3 Low Ch

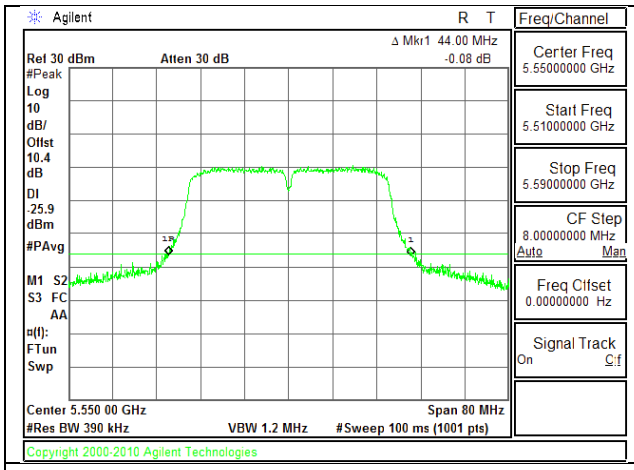



11n HT40 5.5 Mid Ch

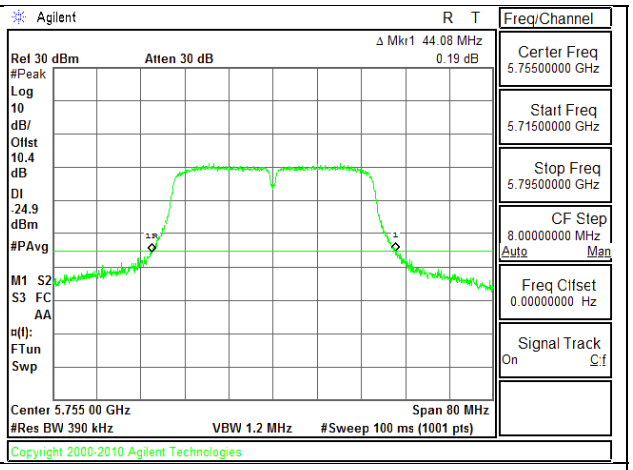
11n HT40 5.8 Low Ch



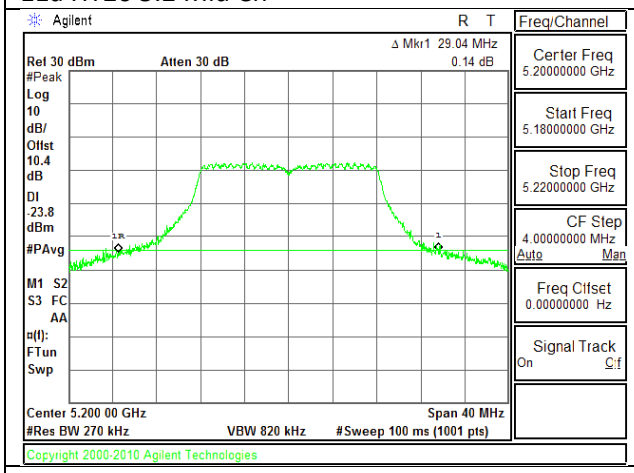

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*



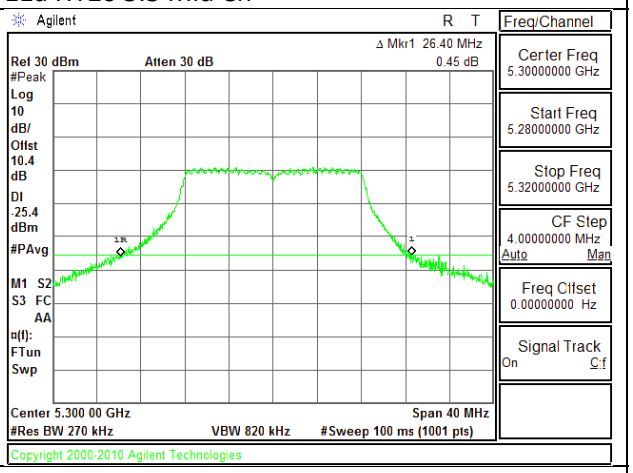

11a HT20 5.2 Mid Ch



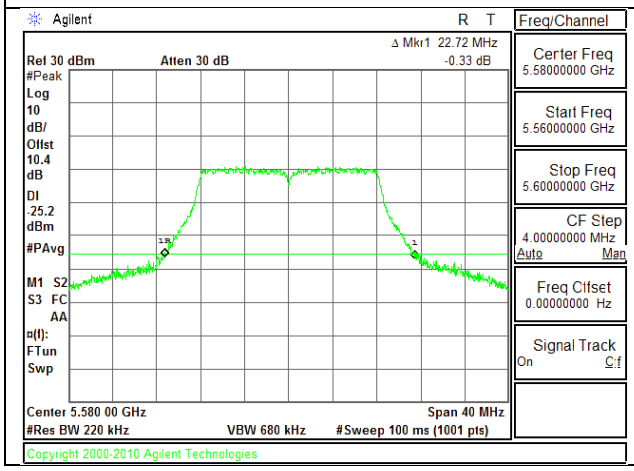

11a HT20 5.3 Mid Ch



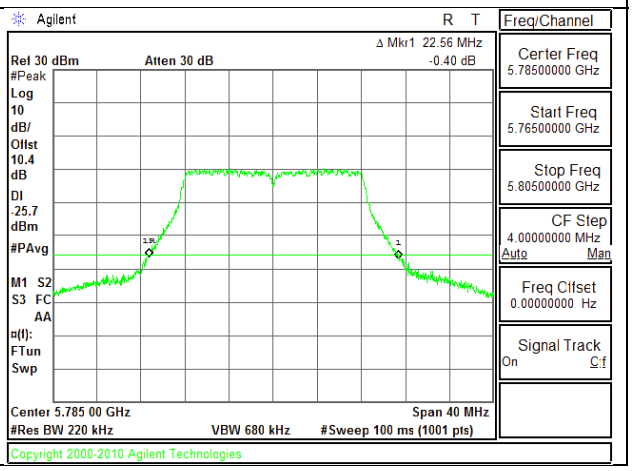

11a HT20 5.2 Mid Ch




11a HT20 5.3 Mid Ch




11a HT20 5.5 Mid Ch




11a HT20 5.8 Mid Ch



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.2. 99% BANDWIDTH

**LIMITS**

None; for reporting purposes only.

**RESULTS**

### 10.2.1. 802.11a MODE IN THE 5.2 GHz BAND

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 5180 | 16.54 |
| Mid | 5200 | 16.53 |
| High | 5240 | 16.52 |
| Worst | | 16.54 |

### 10.2.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 5180 | 17.72 |
| Mid | 5200 | 17.72 |
| High | 5240 | 17.71 |
| Worst | | 17.72 |

### 10.2.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 5190 | 36.047 |
| Mid | 5230 | 36.068 |
| Worst | | 36.068 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 10.2.4. 802.11a MODE IN THE 5.3 GHz BAND

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 5260 | 16.54 |
| Mid | 5300 | 16.52 |
| High | 5320 | 16.54 |
| Worst | | 16.54 |

### 10.2.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 5260 | 17.71 |
| Mid | 5300 | 17.70 |
| High | 5320 | 17.72 |
| Worst | | 17.72 |

### 10.2.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 5270 | 36.05 |
| High | 5310 | 36.07 |
| Worst | | 36.07 |

### 10.2.7. 802.11a MODE IN THE 5.5 GHz BAND

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 5500 | 16.492 |
| Mid | 5580 | 16.495 |
| High | 5700 | 16.489 |
| Worst | | 16.495 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 10.2.8. 802.11n HT20 MODE IN THE 5.5 GHz BAND

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 5500 | 17.682 |
| Mid | 5580 | 17.677 |
| High | 5700 | 17.685 |
| Worst | | 17.685 |

### 10.2.9. 802.11n HT40 MODE IN THE 5.5 GHz BAND

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 5510 | 35.98 |
| Mid | 5550 | 35.99 |
| High | 5670 | 35.99 |
| Worst | | 35.99 |

### 10.2.10. 802.11a MODE IN THE 5.8 GHz BAND

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 5745 | 16.492 |
| Mid | 5785 | 16.496 |
| High | 5825 | 16.496 |
| Worst | | 16.496 |

### 10.2.11. 802.11n HT20 MODE IN THE 5.8 GHz BAND

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 5745 | 17.685 |
| Mid | 5785 | 17.687 |
| High | 5825 | 17.693 |
| Worst | | 17.693 |


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

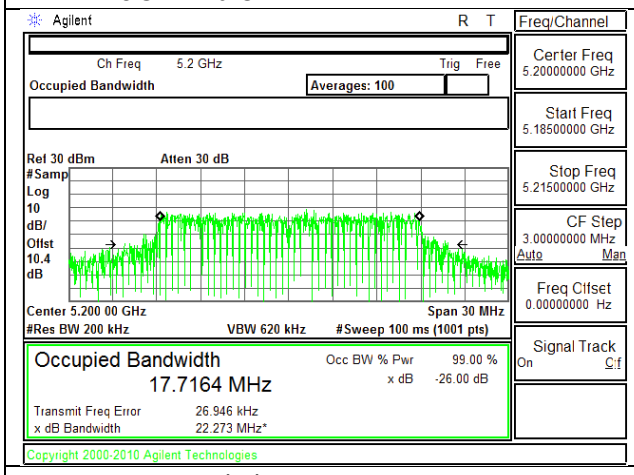
### 10.2.12. 802.11n HT40 MODE IN THE 5.8 GHz BAND

| Channel | Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low | 5755 | 35.99 |
| High | 5795 | 35.99 |
| Worst | | 35.99 |

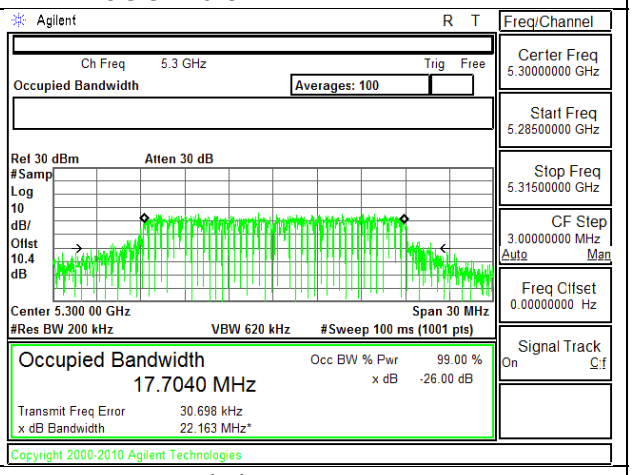

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.2.1. 99% BANDWIDTH PLOTS

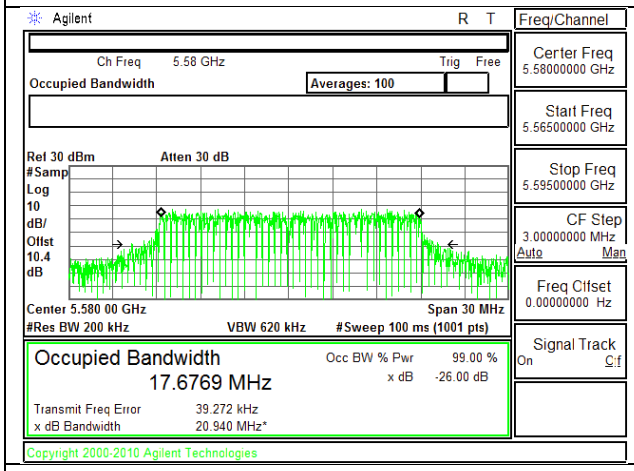
11n HT20 5.2 Mid Ch



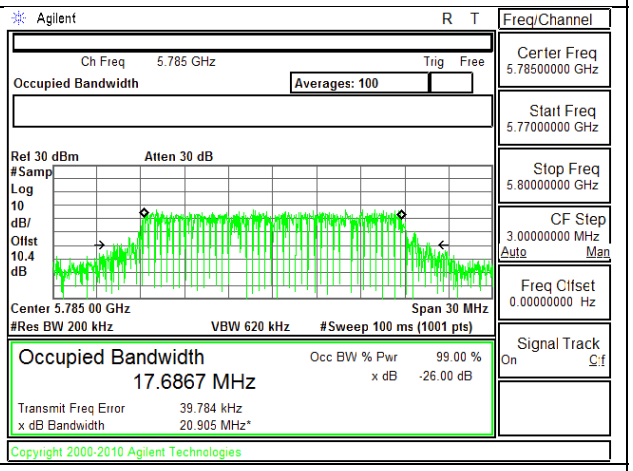

11n HT20 5.3 Mid Ch



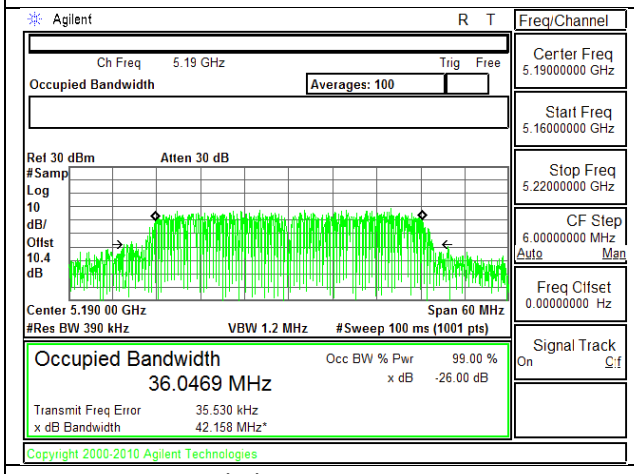

11n HT20 5.5 Mid Ch



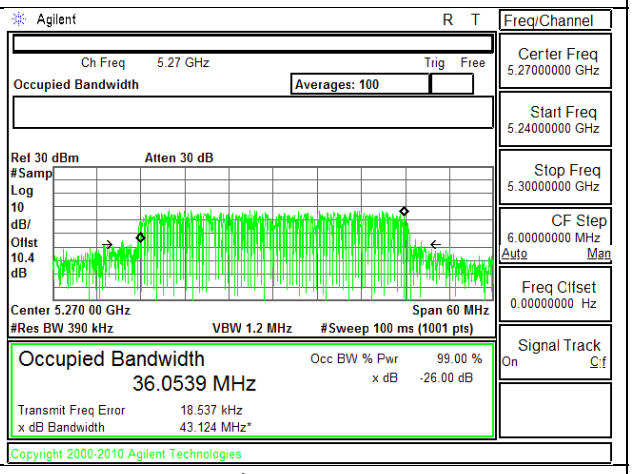

11n HT20 5.8 Mid Ch




11n HT40 5.2 Low Ch



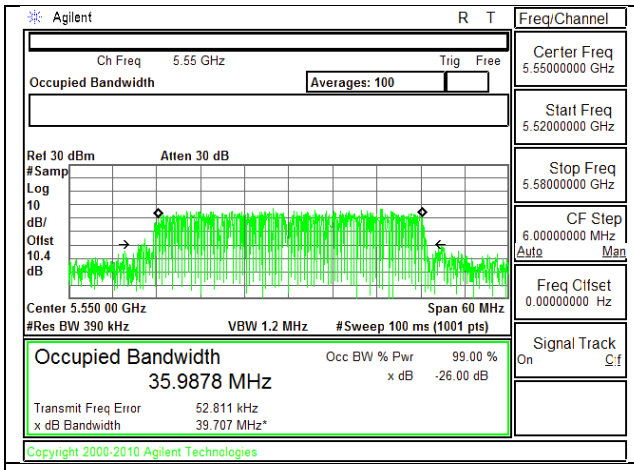

11n HT40 5.3 Low Ch



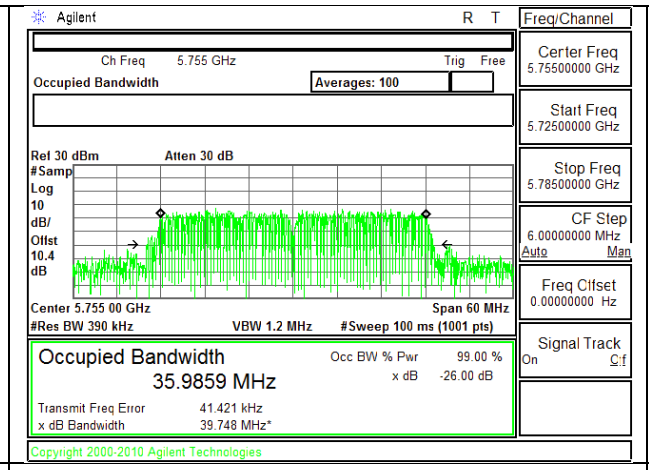

11n HT40 5.5 Mid Ch

11n HT40 5.8 Low Ch

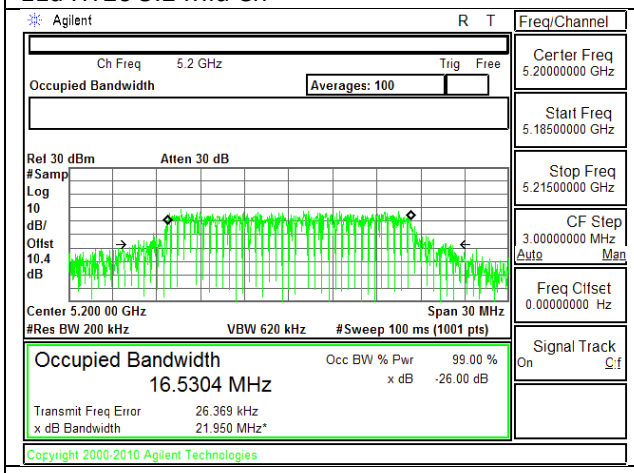

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*



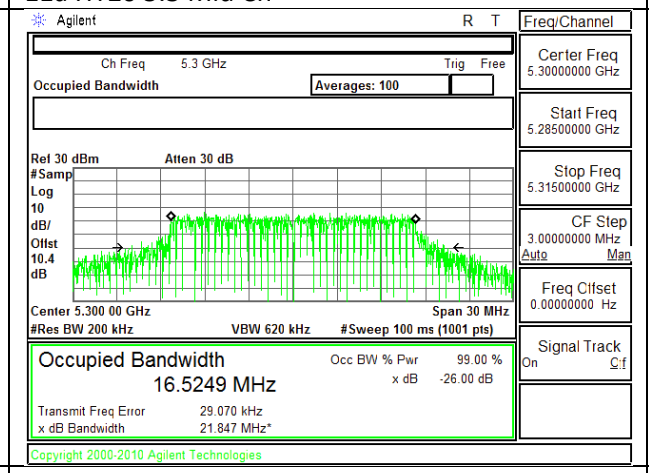

11a HT20 5.2 Mid Ch



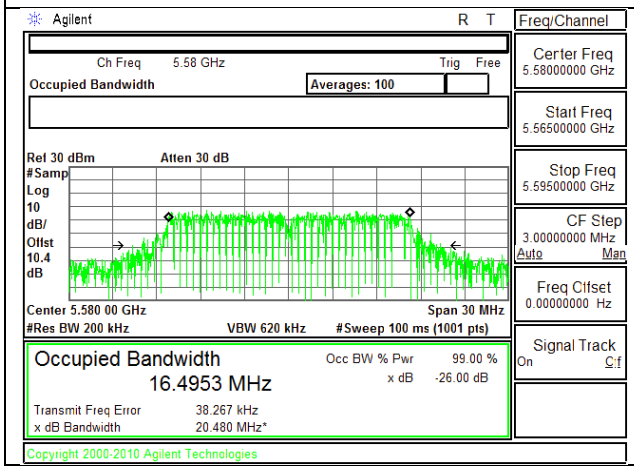

11a HT20 5.3 Mid Ch



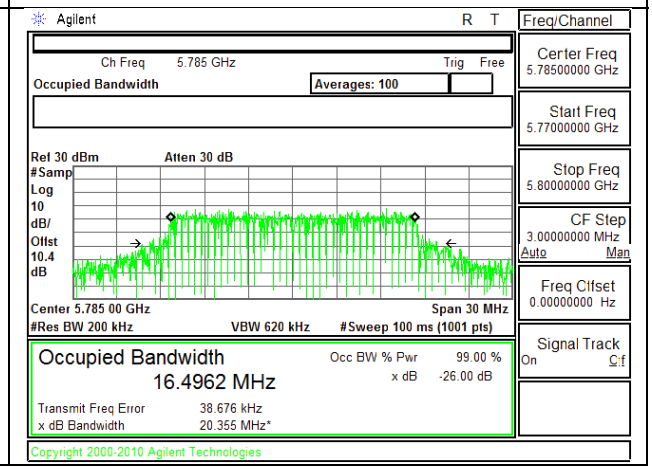

11a HT20 5.5 Mid Ch




11a HT20 5.8 Mid Ch




11a HT20 5.5 Mid Ch




11a HT20 5.8 Mid Ch



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.3. AVERAGE POWER

**LIMITS**

None; for reporting purposes only.

**TEST PROCEDURE**

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

**RESULTS**

### 10.3.1. 802.11a MODE IN THE 5.2 GHz BAND

| Channel | Frequency (MHz) | Avg Power (dBm) |
|---|---|---|
| Low | 5180 | 10.50 |
| Mid | 5200 | 9.80 |
| High | 5240 | 9.70 |
| Worst | | 10.50 |

### 10.3.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

| Channel | Frequency (MHz) | Avg Power (dBm) |
|---|---|---|
| Low | 5180 | 10.40 |
| Mid | 5200 | 9.90 |
| High | 5240 | 9.80 |
| Worst | | 10.40 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 10.3.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

| Channel | Frequency (MHz) | Avg Power (dBm) |
|---|---|---|
| Low | 5190 | 9.800 |
| Mid | 5230 | 10.500 |
| Worst | | 10.500 |

### 10.3.4. 802.11a MODE IN THE 5.3 GHz BAND

| Channel | Frequency (MHz) | Avg Power (dBm) |
|---|---|---|
| Low | 5260 | 10.50 |
| Mid | 5300 | 10.00 |
| High | 5320 | 10.40 |
| Worst | | 10.50 |

### 10.3.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND

| Channel | Frequency (MHz) | Avg Power (dBm) |
|---|---|---|
| Low | 5260 | 10.50 |
| Mid | 5300 | 10.00 |
| High | 5320 | 10.50 |
| Worst | | 10.50 |

### 10.3.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND

| Channel | Frequency (MHz) | Avg Power (dBm) |
|---|---|---|
| Low | 5270 | 10.5 |
| High | 5310 | 10.5 |
| Worst | | 10.5 |


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 10.3.7. 802.11a MODE IN THE 5.5 GHz BAND

| Channel | Frequency (MHz) | Avg Power (dBm) |
|---|---|---|
| Low | 5500 | 9.700 |
| Mid | 5580 | 10.300 |
| High | 5700 | 10.400 |
| Worst | | 10.400 |

### 10.3.8. 802.11n HT20 MODE IN THE 5.5 GHz BAND

| Channel | Frequency (MHz) | Avg Power (dBm) |
|---|---|---|
| Low | 5500 | 9.800 |
| Mid | 5580 | 10.300 |
| High | 5700 | 10.500 |
| Worst | | 10.500 |

### 10.3.9. 802.11n HT40 MODE IN THE 5.5 GHz BAND

| Channel | Frequency (MHz) | Avg Power (dBm) |
|---|---|---|
| Low | 5510 | 10.5 |
| Mid | 5550 | 10.0 |
| High | 5670 | 10.0 |
| Worst | | 10.5 |

### 10.3.10. 802.11a MODE IN THE 5.8 GHz BAND

| Channel | Frequency (MHz) | Avg Power (dBm) |
|---|---|---|
| Low | 5745 | 10.000 |
| Mid | 5785 | 10.000 |
| High | 5825 | 10.500 |
| Worst | | 10.500 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 10.3.11. 802.11n HT20 MODE IN THE 5.8 GHz BAND

| Channel | Frequency (MHz) | Avg Power (dBm) |
|---|---|---|
| Low | 5745 | 10.000 |
| Mid | 5785 | 10.000 |
| High | 5825 | 10.000 |
| Worst | | 10.000 |

### 10.3.12. 802.11n HT40 MODE IN THE 5.8 GHz BAND

| Channel | Frequency (MHz) | Avg Power (dBm) |
|---|---|---|
| Low | 5755 | 10.4 |
| High | 5795 | 10.4 |
| Worst | | 10.4 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.4. OUTPUT POWER AND PPSD

**LIMITS**

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

**DIRECTIONAL ANTENNA GAIN**

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

**Test Methodology**

**RESULTS**



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 10.4.1. 802.11a MODE IN THE 5.2 GHz BAND

**Bandwidth and Antenna Gain**

| Channel | Frequency (MHz) | Min 26 dB BW (MHz) | Min 99% BW (MHz) | Directional Gain (dBi) |
|---|---|---|---|---|
| Low | 5180 | 28.20 | 16.54 | -0.67 |
| Mid | 5200 | 29.04 | 16.53 | -0.67 |
| High | 5240 | 27.04 | 16.52 | -0.67 |

**Limits**

| Channel | Frequency (MHz) | FCC Power Limit (dBm) | IC EIRP Limit (dBm) | Max IC Power (dBm) | Power Limit (dBm) | FCC PPSD Limit (dBm) | IC eirp PSD Limit (dBm) | PPSD Limit (dBm) |
|---|---|---|---|---|---|---|---|---|
| Low | 5180 | 17.00 | 22.18 | 22.85 | 17.00 | 4.00 | 10.00 | 4.00 |
| Mid | 5200 | 17.00 | 22.18 | 22.85 | 17.00 | 4.00 | 10.00 | 4.00 |
| High | 5240 | 17.00 | 22.18 | 22.85 | 17.00 | 4.00 | 10.00 | 4.00 |

| | | |
|---|---|---|
| Duty Cycle CF (dB) | 0.29 | Included in Calculations of Corr'd Power & PPSD |

**Output Power Results**

| Channel | Frequency (MHz) | Chain 0 Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Power Margin (dB) |
|---|---|---|---|---|---|
| Low | 5180 | 10.854 | 11.14 | 17.00 | -5.86 |
| Mid | 5200 | 10.313 | 10.60 | 17.00 | -6.40 |
| High | 5240 | 10.220 | 10.51 | 17.00 | -6.49 |

**PPSD Results**

| Channel | Frequency (MHz) | Chain 0 Meas PPSD (dBm) | Total Corr'd PPSD (dBm) | PPSD Limit (dBm) | PPSD Margin (dB) |
|---|---|---|---|---|---|
| Low | 5180 | -0.340 | -0.05 | 4.00 | -4.05 |
| Mid | 5200 | -0.390 | -0.10 | 4.00 | -4.10 |
| High | 5240 | -0.590 | -0.30 | 4.00 | -4.30 |


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.4.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

**Bandwidth and Antenna Gain**

| Channel | Frequency (MHz) | Min 26 dB BW (MHz) | Min 99% BW (MHz) | Directional Gain (dBi) |
|---|---|---|---|---|
| Low | 5180 | 28.36 | 17.72 | -0.67 |
| Mid | 5200 | 27.76 | 17.72 | -0.67 |
| High | 5240 | 26.32 | 17.71 | -0.67 |

**Limits**

| Channel | Frequency (MHz) | FCC Power Limit (dBm) | IC EIRP Limit (dBm) | Max IC Power (dBm) | Power Limit (dBm) | FCC PPSD Limit (dBm) | IC eirp PSD Limit (dBm) | PPSD Limit (dBm) |
|---|---|---|---|---|---|---|---|---|
| Low | 5180 | 17.00 | 22.48 | 23.15 | 17.00 | 4.00 | 10.00 | 4.00 |
| Mid | 5200 | 17.00 | 22.48 | 23.15 | 17.00 | 4.00 | 10.00 | 4.00 |
| High | 5240 | 17.00 | 22.48 | 23.15 | 17.00 | 4.00 | 10.00 | 4.00 |

| | | |
|---|---|---|
| **Duty Cycle CF (dB)** | 0.32 | **Included in Calculations of Corr'd Power & PPSD** |

**Output Power Results**

| Channel | Frequency (MHz) | Chain 0 Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Power Margin (dB) |
|---|---|---|---|---|---|
| Low | 5180 | 10.789 | 11.11 | 17.00 | -5.89 |
| Mid | 5200 | 10.352 | 10.67 | 17.00 | -6.33 |
| High | 5240 | 10.251 | 10.57 | 17.00 | -6.43 |

**PPSD Results**

| Channel | Frequency (MHz) | Chain 0 Meas PPSD (dBm) | Total Corr'd PPSD (dBm) | PPSD Limit (dBm) | PPSD Margin (dB) |
|---|---|---|---|---|---|
| Low | 5180 | -0.190 | 0.13 | 4.00 | -3.87 |
| Mid | 5200 | -0.540 | -0.22 | 4.00 | -4.22 |
| High | 5240 | -0.790 | -0.47 | 4.00 | -4.47 |


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 10.4.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

**Bandwidth and Antenna Gain**

| Channel | Frequency (MHz) | Min 26 dB BW (MHz) | Min 99% BW (MHz) | Directional Gain (dBi) |
|---|---|---|---|---|
| Low | 5190 | 51.6 | 36.047 | -0.67 |
| Mid | 5230 | 53.68 | 36.068 | -0.67 |

**Limits**

| Channel | Frequency (MHz) | FCC Power Limit (dBm) | IC EIRP Limit (dBm) | Max IC Power (dBm) | Power Limit (dBm) | FCC PPSD Limit (dBm) | IC eirp PSD Limit (dBm) | PPSD Limit (dBm) |
|---|---|---|---|---|---|---|---|---|
| Low | 5190 | 17.00 | 23.00 | 23.67 | 17.00 | 4.00 | 10.00 | 4.00 |
| Mid | 5230 | 17.00 | 23.00 | 23.67 | 17.00 | 4.00 | 11.00 | 4.00 |
| | | | | | | | | |
| Duty Cycle CF (dB) | | 0.63 | Included in Calculations of Corr'd Power & PPSD | | | | | |

**Output Power Results**

| Channel | Frequency (MHz) | Chain 0 Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Power Margin (dB) |
|---|---|---|---|---|---|
| Low | 5190 | 10.048 | 10.68 | 17.00 | -6.32 |
| Mid | 5230 | 9.894 | 10.52 | 17.00 | -6.48 |

**PPSD Results**

| Channel | Frequency (MHz) | Chain 0 Meas PPSD (dBm) | Total Corr'd PPSD (dBm) | PPSD Limit (dBm) | PPSD Margin (dB) |
|---|---|---|---|---|---|
| Low | 5190 | -3.970 | -3.34 | 4.00 | -7.34 |
| Mid | 5230 | -4.040 | -3.41 | 4.00 | -7.41 |


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.4.4. 802.11a MODE IN THE 5.3 GHz BAND

**Bandwidth and Antenna Gain**

| Channel | Frequency (MHz) | Min 26 dB BW (MHz) | Min 99% BW (MHz) | Directional Gain (dBi) |
|---|---|---|---|---|
| Low | 5260 | 26.4 | 16.5 | -0.67 |
| Mid | 5300 | 26.4 | 16.5 | -0.67 |
| High | 5320 | 27.5 | 16.5 | -0.67 |

**Limits**

| Channel | Frequency (MHz) | FCC Power Limit (dBm) | IC Power Limit (dBm) | IC EIRP Limit (dBm) | Power Limit (dBm) | FCC PPSD Limit (dBm) | IC PSD Limit (dBm) | PPSD Limit (dBm) |
|---|---|---|---|---|---|---|---|---|
| Low | 5260 | 24.00 | 23.19 | 29.19 | 23.19 | 11.00 | 11.00 | 11.00 |
| Mid | 5300 | 24.00 | 23.18 | 29.18 | 23.18 | 11.00 | 11.00 | 11.00 |
| High | 5320 | 24.00 | 23.18 | 29.18 | 23.18 | 11.00 | 11.00 | 11.00 |

| | | |
|---|---|---|
| Duty Cycle CF (dB) | 0.29 | Included in Calculations of Corr'd Power & PPSD |

**Output Power Results**

| Channel | Frequency (MHz) | Chain 0 Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Power Margin (dB) |
|---|---|---|---|---|---|
| Low | 5260 | 10.250 | 10.54 | 23.19 | -12.65 |
| Mid | 5300 | 10.261 | 10.55 | 23.18 | -12.63 |
| High | 5320 | 10.670 | 10.96 | 23.18 | -12.22 |

**PPSD Results**

| Channel | Frequency (MHz) | Chain 0 Meas PPSD (dBm) | Total Corr'd PPSD (dBm) | PPSD Limit (dBm) | PPSD Margin (dB) |
|---|---|---|---|---|---|
| Low | 5260 | -0.560 | -0.27 | 11.00 | -11.27 |
| Mid | 5300 | -1.650 | -1.36 | 11.00 | -12.36 |
| High | 5320 | -1.340 | -1.05 | 11.00 | -12.05 |


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.4.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND

**Bandwidth and Antenna Gain**

| Channel | Frequency (MHz) | Min 26 dB BW (MHz) | Min 99% BW (MHz) | Directional Gain (dBi) |
|---|---|---|---|---|
| Low | 5260 | 29.28 | 17.715 | -0.67 |
| Mid | 5300 | 26.12 | 17.704 | -0.67 |
| High | 5320 | 27.76 | 17.720 | -0.67 |

**Limits**

| Channel | Frequency (MHz) | FCC Power Limit (dBm) | IC Power Limit (dBm) | IC EIRP Limit (dBm) | Power Limit (dBm) | FCC PPSD Limit (dBm) | IC PSD Limit (dBm) | PPSD Limit (dBm) |
|---|---|---|---|---|---|---|---|---|
| Low | 5260 | 24.00 | 23.48 | 29.48 | 23.48 | 11.00 | 11.00 | 11.00 |
| Mid | 5300 | 24.00 | 23.48 | 29.48 | 23.48 | 11.00 | 11.00 | 11.00 |
| High | 5320 | 24.00 | 23.48 | 29.48 | 23.48 | 11.00 | 11.00 | 11.00 |

| | | |
|---|---|---|
| **Duty Cycle CF (dB)** | 0.32 | **Included in Calculations of Corr'd Power & PPSD** |

**Output Power Results**

| Channel | Frequency (MHz) | Chain 0 Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Power Margin (dB) |
|---|---|---|---|---|---|
| Low | 5260 | 10.311 | 10.63 | 23.48 | -12.85 |
| Mid | 5300 | 10.178 | 10.50 | 23.48 | -12.98 |
| High | 5320 | 10.652 | 10.97 | 23.48 | -12.51 |

**PPSD Results**

| Channel | Frequency (MHz) | Chain 0 Meas PPSD (dBm) | Total Corr'd PPSD (dBm) | PPSD Limit (dBm) | PPSD Margin (dB) |
|---|---|---|---|---|---|
| Low | 5260 | -0.850 | -0.53 | 11.00 | -11.53 |
| Mid | 5300 | -2.060 | -1.74 | 11.00 | -12.74 |
| High | 5320 | -1.740 | -1.42 | 11.00 | -12.42 |



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.4.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND

**Bandwidth and Antenna Gain**

| Channel | Frequency (MHz) | Min 26 dB BW (MHz) | Min 99% BW (MHz) | Directional Gain (dBi) |
|---|---|---|---|---|
| Low | 5270 | 54.6 | 36.1 | -0.67 |
| High | 5310 | 53.3 | 36.1 | -0.67 |

**Limits**

| Channel | Frequency (MHz) | FCC Power Limit (dBm) | IC Power Limit (dBm) | IC EIRP Limit (dBm) | Power Limit (dBm) | FCC PPSD Limit (dBm) | IC PSD Limit (dBm) | PPSD Limit (dBm) |
|---|---|---|---|---|---|---|---|---|
| Low | 5270 | 24.00 | 24.00 | 30.00 | 24.00 | 11.00 | 11.00 | 11.00 |
| High | 5310 | 24.00 | 24.00 | 30.00 | 24.00 | 11.00 | 11.00 | 11.00 |

| | | |
|---|---|---|
| Duty Cycle CF (dB) | 0.63 | Included in Calculations of Corr'd Power & PPSD |

**Output Power Results**

| Channel | Frequency (MHz) | Chain 0 Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Power Margin (dB) |
|---|---|---|---|---|---|
| Low | 5270 | 9.99 | 10.62 | 24.00 | -13.38 |
| High | 5310 | 9.83 | 10.46 | 24.00 | -13.54 |

**PPSD Results**

| Channel | Frequency (MHz) | Chain 0 Meas PPSD (dBm) | Total Corr'd PPSD (dBm) | PPSD Limit (dBm) | PPSD Margin (dB) |
|---|---|---|---|---|---|
| Low | 5270 | -3.89 | -3.26 | 11.00 | -14.26 |
| High | 5310 | -4.16 | -3.53 | 11.00 | -14.53 |


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.4.7. 802.11a MODE IN THE 5.5 GHz BAND

**Bandwidth and Antenna Gain**

| Channel | Frequency (MHz) | Min 26 dB BW (MHz) | Min 99% BW (MHz) | Directional Gain (dBi) |
|---|---|---|---|---|
| Low | 5500 | 22.24 | 16.492 | -0.67 |
| Mid | 5580 | 22.72 | 16.495 | -0.67 |
| High | 5700 | 22.48 | 16.489 | -0.67 |

**Limits**

| Channel | Frequency (MHz) | FCC Power Limit (dBm) | IC Power Limit (dBm) | IC EIRP Limit (dBm) | Power Limit (dBm) | FCC PPSD Limit (dBm) | IC PSD Limit (dBm) | PPSD Limit (dBm) |
|---|---|---|---|---|---|---|---|---|
| Low | 5500 | 24.00 | 23.17 | 29.17 | 23.17 | 11.00 | 11.00 | 11.00 |
| Mid | 5580 | 24.00 | 23.17 | 29.17 | 23.17 | 11.00 | 11.00 | 11.00 |
| High | 5700 | 24.00 | 23.17 | 29.17 | 23.17 | 11.00 | 11.00 | 11.00 |

| | | |
|---|---|---|
| **Duty Cycle CF (dB)** | 0.29 | **Included in Calculations of Corr'd Power & PPSD** |

**Output Power Results**

| Channel | Frequency (MHz) | Chain 0 Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Power Margin (dB) |
|---|---|---|---|---|---|
| Low | 5500 | 10.308 | 10.60 | 23.17 | -12.57 |
| Mid | 5580 | 10.023 | 10.31 | 23.17 | -12.86 |
| High | 5700 | 9.935 | 10.23 | 23.17 | -12.95 |

**PPSD Results**

| Channel | Frequency (MHz) | Chain 0 Meas PPSD (dBm) | Total Corr'd PPSD (dBm) | PPSD Limit (dBm) | PPSD Margin (dB) |
|---|---|---|---|---|---|
| Low | 5500 | -1.540 | -1.25 | 11.00 | -12.25 |
| Mid | 5580 | -0.840 | -0.55 | 11.00 | -11.55 |
| High | 5700 | -0.870 | -0.58 | 11.00 | -11.58 |


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.4.8. 802.11n HT20 MODE IN THE 5.5 GHz BAND

**Bandwidth and Antenna Gain**

| Channel | Frequency (MHz) | Min 26 dB BW (MHz) | Min 99% BW (MHz) | Directional Gain (dBi) |
|---|---|---|---|---|
| Low | 5500 | 22.92 | 17.682 | -0.67 |
| Mid | 5580 | 22.92 | 17.677 | -0.67 |
| High | 5700 | 23.24 | 17.685 | -0.67 |

**Limits**

| Channel | Frequency (MHz) | FCC Power Limit (dBm) | IC Power Limit (dBm) | IC EIRP Limit (dBm) | Power Limit (dBm) | FCC PPSD Limit (dBm) | IC PSD Limit (dBm) | PPSD Limit (dBm) |
|---|---|---|---|---|---|---|---|---|
| Low | 5500 | 24.00 | 23.48 | 29.48 | 23.48 | 11.00 | 11.00 | 11.00 |
| Mid | 5580 | 24.00 | 23.47 | 29.47 | 23.47 | 11.00 | 11.00 | 11.00 |
| High | 5700 | 24.00 | 23.48 | 29.48 | 23.48 | 11.00 | 11.00 | 11.00 |

| | | |
|---|---|---|
| Duty Cycle CF (dB) | 0.32 | Included in Calculations of Corr'd Power & PPSD |

**Output Power Results**

| Channel | Frequency (MHz) | Chain 0 Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Power Margin (dB) |
|---|---|---|---|---|---|
| Low | 5500 | 10.322 | 10.64 | 23.48 | -12.83 |
| Mid | 5580 | 10.118 | 10.44 | 23.47 | -13.04 |
| High | 5700 | 10.134 | 10.45 | 23.48 | -13.02 |

**PPSD Results**

| Channel | Frequency (MHz) | Chain 0 Meas PPSD (dBm) | Total Corr'd PPSD (dBm) | PPSD Limit (dBm) | PPSD Margin (dB) |
|---|---|---|---|---|---|
| Low | 5500 | -1.780 | -1.46 | 11.00 | -12.46 |
| Mid | 5580 | -1.070 | -0.75 | 11.00 | -11.75 |
| High | 5700 | -0.820 | -0.50 | 11.00 | -11.50 |


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.4.9. 802.11n HT40 MODE IN THE 5.5 GHz BAND

**Bandwidth and Antenna Gain**

| Channel | Frequency (MHz) | Min 26 dB BW (MHz) | Min 99% BW (MHz) | Directional Gain (dBi) |
|---|---|---|---|---|
| Low | 5510 | 44.4 | 35.983 | -0.67 |
| Mid | 5550 | 44.0 | 35.988 | -0.67 |
| High | 5670 | 44.2 | 35.990 | -0.67 |

**Limits**

| Channel | Frequency (MHz) | FCC Power Limit (dBm) | IC Power Limit (dBm) | IC EIRP Limit (dBm) | Power Limit (dBm) | FCC PPSD Limit (dBm) | IC PSD Limit (dBm) | PPSD Limit (dBm) |
|---|---|---|---|---|---|---|---|---|
| Low | 5510 | 24.00 | 24.00 | 30.00 | 24.00 | 11.00 | 11.00 | 11.00 |
| Mid | 5550 | 24.00 | 24.00 | 30.00 | 24.00 | 11.00 | 11.00 | 11.00 |
| High | 5670 | 24.00 | 24.00 | 30.00 | 24.00 | 11.00 | 11.00 | 11.00 |

| | | |
|---|---|---|
| **Duty Cycle CF (dB)** | 0.63 | **Included in Calculations of Corr'd Power & PPSD** |

**Output Power Results**

| Channel | Frequency (MHz) | Chain 0 Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Power Margin (dB) |
|---|---|---|---|---|---|
| Low | 5510 | 10.526 | 11.16 | 24.00 | -12.84 |
| Mid | 5550 | 9.427 | 10.06 | 24.00 | -13.94 |
| High | 5670 | 10.496 | 11.13 | 24.00 | -12.87 |

**PPSD Results**

| Channel | Frequency (MHz) | Chain 0 Meas PPSD (dBm) | Total Corr'd PPSD (dBm) | PPSD Limit (dBm) | PPSD Margin (dB) |
|---|---|---|---|---|---|
| Low | 5510 | -3.960 | -3.33 | 11.00 | -14.33 |
| Mid | 5550 | -4.500 | -3.87 | 11.00 | -14.87 |
| High | 5670 | -4.570 | -3.94 | 11.00 | -14.94 |


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.4.10. 802.11a MODE IN THE 5.8 GHz BAND

**Bandwidth and Antenna Gain**

| Channel | Frequency (MHz) | Min 26 dB BW (MHz) | Min 99% BW (MHz) | Directional Gain (dBi) |
|---|---|---|---|---|
| Low | 5745 | 22.5 | 16.5 | -0.67 |
| Mid | 5785 | 22.6 | 16.5 | -0.67 |
| High | 5825 | 22.4 | 16.5 | -0.67 |

**Limits**

| Channel | Frequency (MHz) | FCC Power Limit (dBm) | IC Power Limit (dBm) | IC EIRP Limit (dBm) | Power Limit (dBm) | FCC PPSD Limit (dBm) | IC PSD Limit (dBm) | PPSD Limit (dBm) |
|---|---|---|---|---|---|---|---|---|
| Low | 5745 | 30.00 | 29.17 | 35.17 | 29.17 | 30.00 | 17.00 | 17.00 |
| Mid | 5785 | 30.00 | 29.17 | 35.17 | 29.17 | 30.00 | 17.00 | 17.00 |
| High | 5825 | 30.00 | 29.17 | 35.17 | 29.17 | 30.00 | 17.00 | 17.00 |

| | | |
|---|---|---|
| **Duty Cycle CF (dB)** | 0.29 | **Included in Calculations of Corr'd Power & PPSD** |

**Output Power Results**

| Channel | Frequency (MHz) | Chain 0 Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Power Margin (dB) |
|---|---|---|---|---|---|
| Low | 5745 | 9.72 | 10.01 | 29.17 | -19.16 |
| Mid | 5785 | 10.32 | 10.61 | 29.17 | -18.57 |
| High | 5825 | 10.83 | 11.12 | 29.17 | -18.05 |

**PPSD Results**

| Channel | Frequency (MHz) | Chain 0 Meas PPSD (dBm) | Total Corr'd PPSD (dBm) | PPSD Limit (dBm) | PPSD Margin (dB) |
|---|---|---|---|---|---|
| Low | 5745 | -1.25 | -0.96 | 17.00 | -17.96 |
| Mid | 5785 | -1.33 | -1.04 | 17.00 | -18.04 |
| High | 5825 | 0.22 | 0.51 | 17.00 | -16.49 |


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.4.11. 802.11n HT20 MODE IN THE 5.8 GHz BAND

**Bandwidth and Antenna Gain**

| Channel | Frequency (MHz) | Min 26 dB BW (MHz) | Min 99% BW (MHz) | Directional Gain (dBi) |
|---|---|---|---|---|
| Low | 5745 | 22.8 | 17.7 | -0.67 |
| Mid | 5785 | 22.8 | 17.7 | -0.67 |
| High | 5825 | 23.0 | 17.7 | -0.67 |

**Limits**

| Channel | Frequency (MHz) | FCC Power Limit (dBm) | IC Power Limit (dBm) | IC EIRP Limit (dBm) | Power Limit (dBm) | FCC PPSD Limit (dBm) | IC PSD Limit (dBm) | PPSD Limit (dBm) |
|---|---|---|---|---|---|---|---|---|
| Low | 5745 | 30.00 | 29.48 | 35.48 | 29.48 | 30.00 | 17.00 | 17.00 |
| Mid | 5785 | 30.00 | 29.48 | 35.48 | 29.48 | 30.00 | 17.00 | 17.00 |
| High | 5825 | 30.00 | 29.48 | 35.48 | 29.48 | 30.00 | 17.00 | 17.00 |

| Duty Cycle CF (dB) | 0.32 | Included in Calculations of Corr'd Power & PPSD |
|---|---|---|

**Output Power Results**

| Channel | Frequency (MHz) | Chain 0 Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Power Margin (dB) |
|---|---|---|---|---|---|
| Low | 5745 | 9.78 | 10.10 | 29.48 | -19.37 |
| Mid | 5785 | 10.57 | 10.89 | 29.48 | -18.59 |
| High | 5825 | 10.79 | 11.11 | 29.48 | -18.37 |

**PPSD Results**

| Channel | Frequency (MHz) | Chain 0 Meas PPSD (dBm) | Total Corr'd PPSD (dBm) | PPSD Limit (dBm) | PPSD Margin (dB) |
|---|---|---|---|---|---|
| Low | 5745 | -1.29 | -0.97 | 17.00 | -17.97 |
| Mid | 5785 | -1.60 | -1.28 | 17.00 | -18.28 |
| High | 5825 | -0.28 | 0.04 | 17.00 | -16.96 |


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.4.12. 802.11n HT40 MODE IN THE 5.8 GHz BAND

**Bandwidth and Antenna Gain**

| Channel | Frequency (MHz) | Min 26 dB BW (MHz) | Min 99% BW (MHz) | Directional Gain (dBi) |
|---|---|---|---|---|
| Low | 5755 | 44.1 | 36.0 | -0.67 |
| High | 5795 | 43.9 | 36.0 | -0.67 |

**Limits**

| Channel | Frequency (MHz) | FCC Power Limit (dBm) | IC Power Limit (dBm) | IC EIRP Limit (dBm) | Power Limit (dBm) | FCC PPSD Limit (dBm) | IC PSD Limit (dBm) | PPSD Limit (dBm) |
|---|---|---|---|---|---|---|---|---|
| Low | 5755 | 30.00 | 30.00 | 36.00 | 30.00 | 30.00 | 17.00 | 17.00 |
| High | 5795 | 30.00 | 30.00 | 36.00 | 30.00 | 30.00 | 17.00 | 17.00 |

| | | |
|---|---|---|
| Duty Cycle CF (dB) | 0.63 | Included in Calculations of Corr'd Power & PPSD |

**Output Power Results**

| Channel | Frequency (MHz) | Chain 0 Meas Power (dBm) | Total Corr'd Power (dBm) | Power Limit (dBm) | Power Margin (dB) |
|---|---|---|---|---|---|
| Low | 5755 | 9.76 | 10.39 | 30.00 | -19.62 |
| High | 5795 | 10.60 | 11.23 | 30.00 | -18.77 |

**PPSD Results**

| Channel | Frequency (MHz) | Chain 0 Meas PPSD (dBm) | Total Corr'd PPSD (dBm) | PPSD Limit (dBm) | PPSD Margin (dB) |
|---|---|---|---|---|---|
| Low | 5755 | -3.94 | -3.31 | 17.00 | -20.31 |
| High | 5795 | -4.47 | -3.84 | 17.00 | -20.84 |

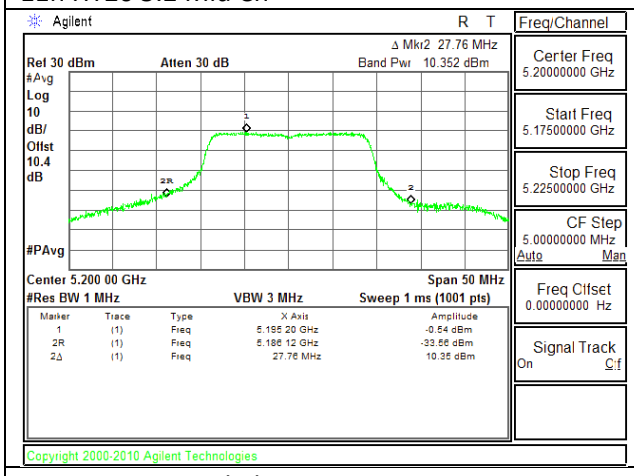


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

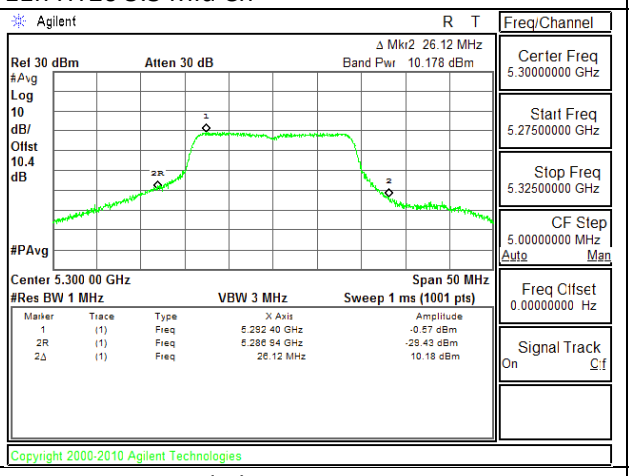
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.4.1. OUTPUT POWER AND PPSD PLOTS, Chain 0

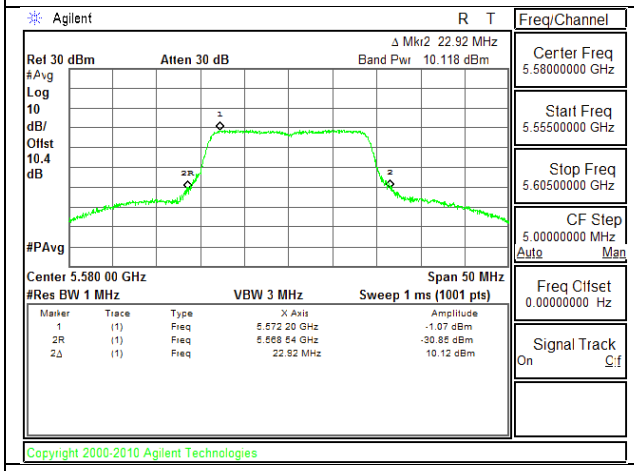
11n HT20 5.2 Mid Ch



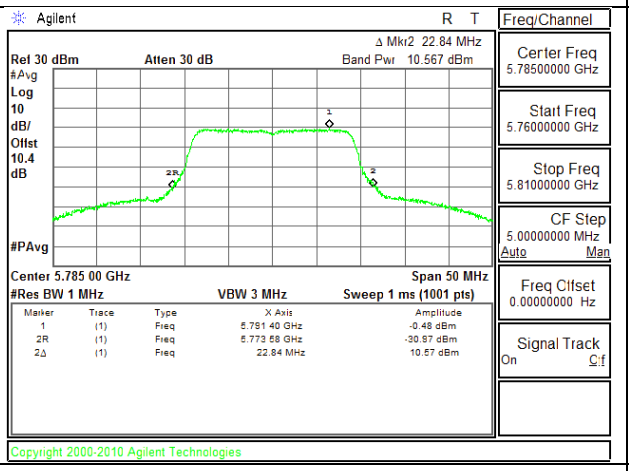

11n HT20 5.3 Mid Ch



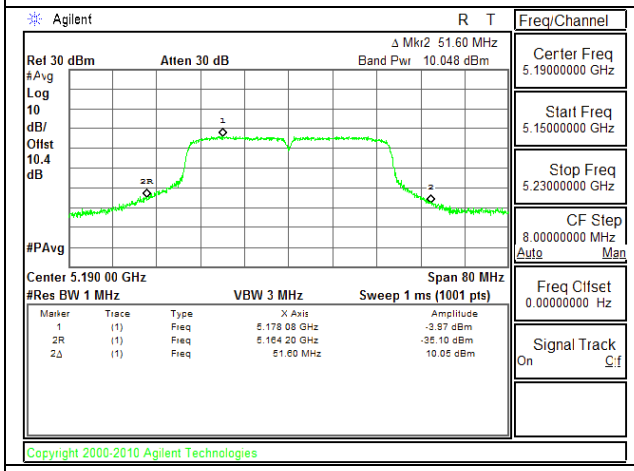

11n HT20 5.5 Mid Ch



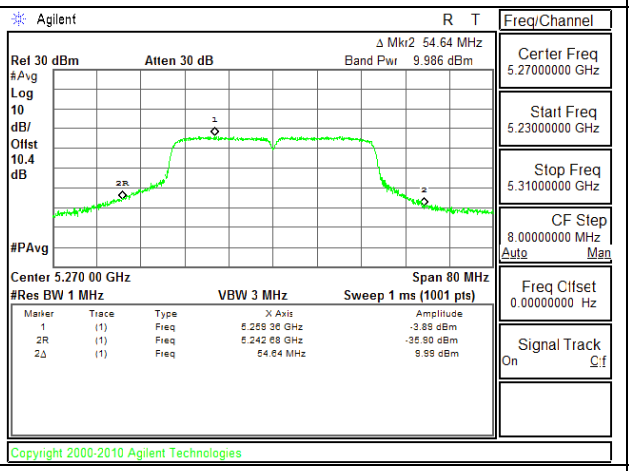

11n HT20 5.8 Mid Ch




11n HT40 5.2 Low Ch



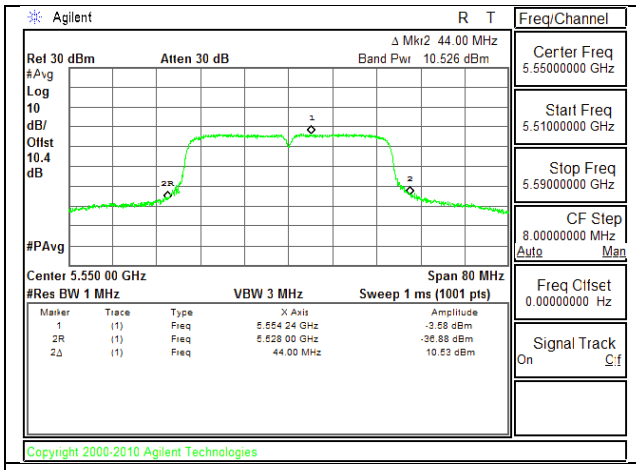

11n HT40 5.3 Low Ch



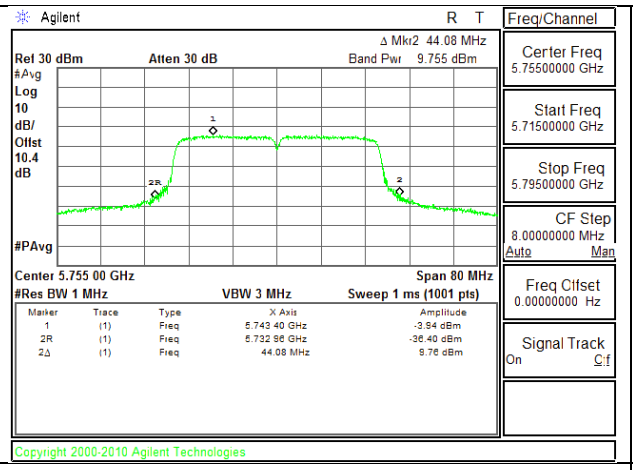

11n HT40 5.5 Mid Ch

11n HT40 5.8 Low Ch

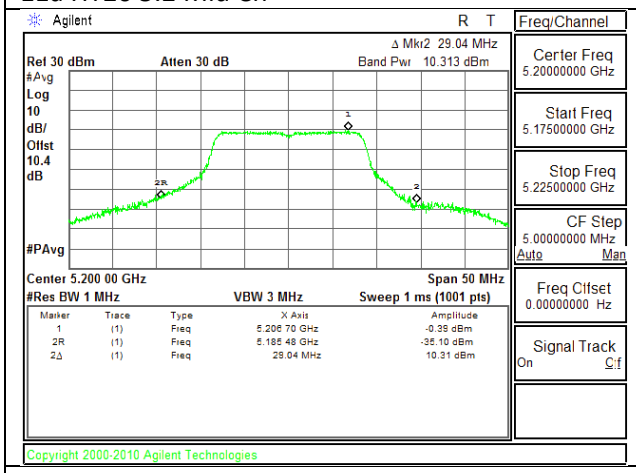

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*



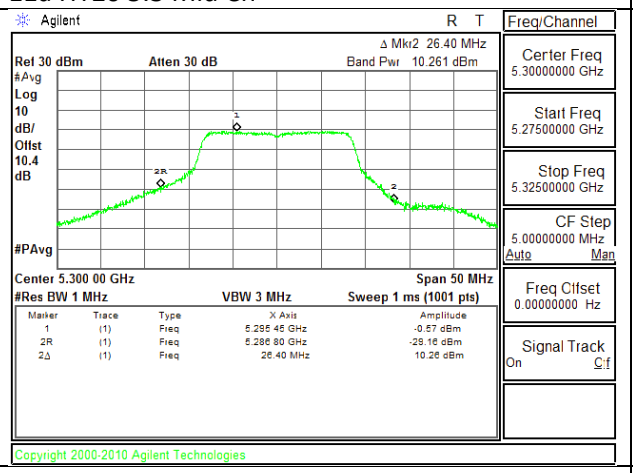

11a HT20 5.2 Mid Ch



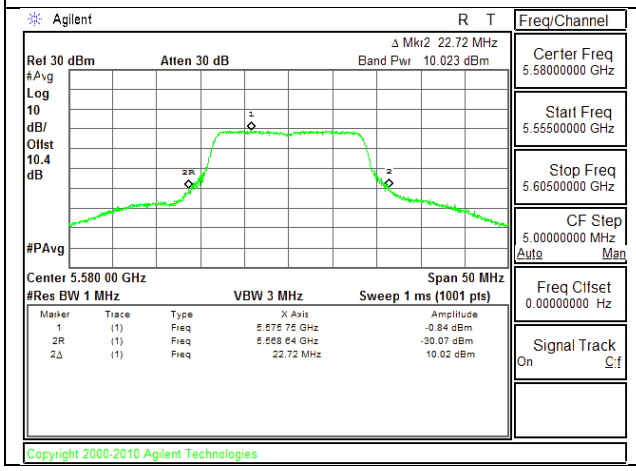

11a HT20 5.3 Mid Ch

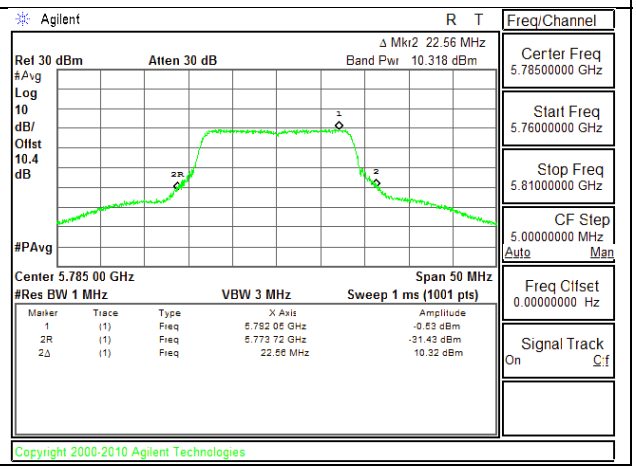



11a HT20 5.5 Mid Ch




11a HT20 5.8 Mid Ch





*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 10.1. PEAK EXCURSION

**LIMITS**

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

**RESULTS**



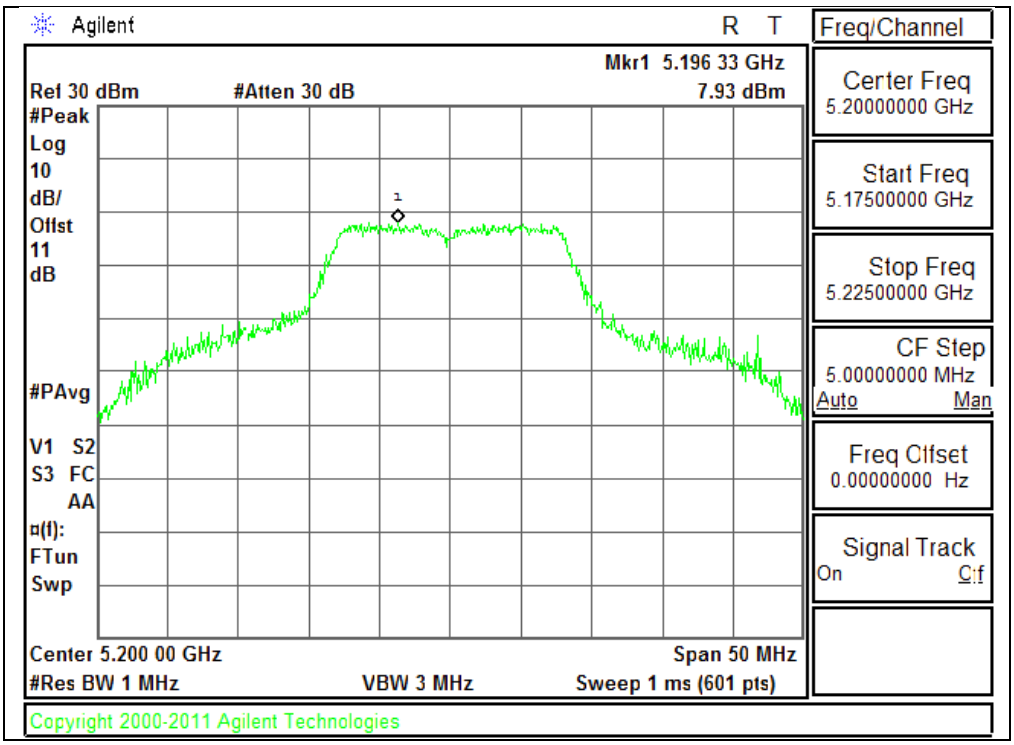
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 10.1.1. 802.11a MODE IN THE 5.2 GHz BAND

| Channel | Frequency (MHz) | PK Level (dBm) | PSD (dBm) | DCCF (dB) | Peak Excursion (dB) | Limit (dB) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Mid | 5200 | 7.93 | -0.39 | 0.29 | 8.03 | 13 | -4.97 |

**PEAK EXCURSION**



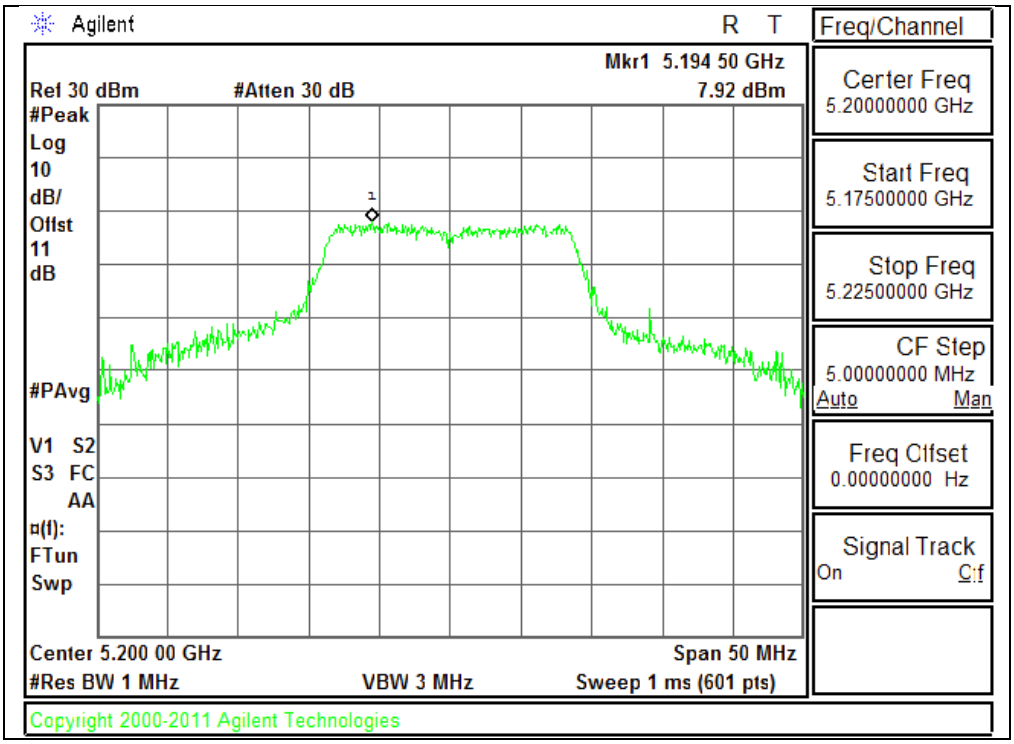


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 10.1.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

| Channel | Frequency (MHz) | PK Level (dBm) | PSD (dBm) | DCCF (dB) | Peak Excursion (dB) | Limit (dB) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Mid | 5200 | 7.92 | -0.54 | 0.32 | 8.14 | 13 | -4.86 |

**PEAK EXCURSION**



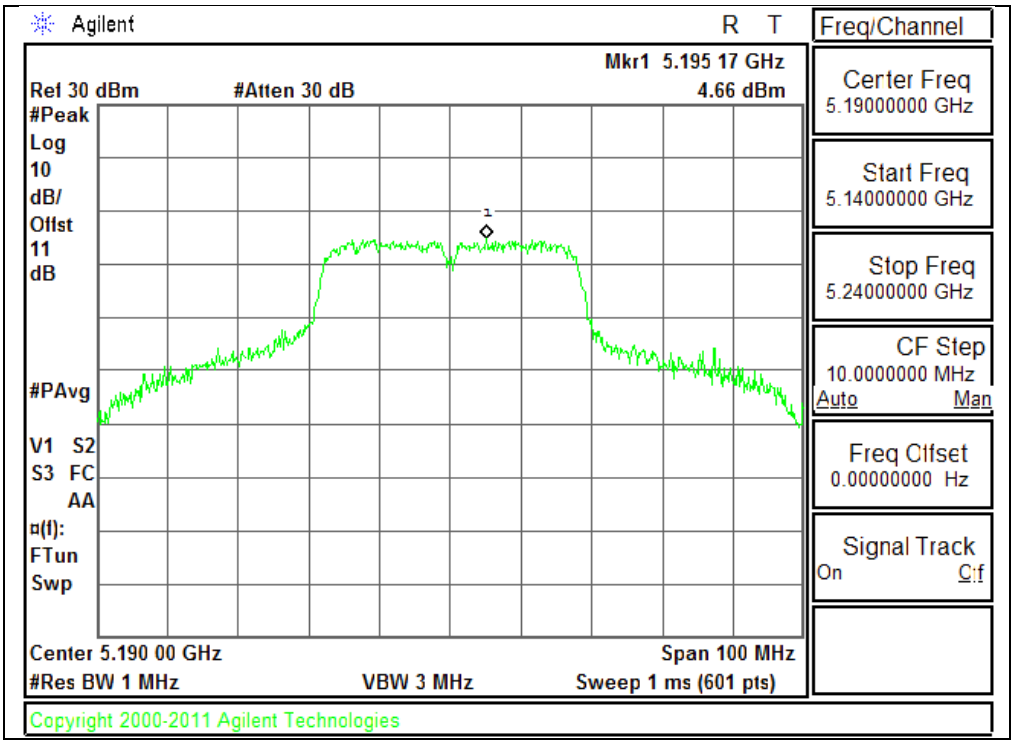


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 10.1.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

| Channel | Frequency (MHz) | PK Level (dBm) | PSD (dBm) | DCCF (dB) | Peak Excursion (dB) | Limit (dB) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Mid | 5190 | 4.660 | -3.97 | 0.63 | 8.00 | 13 | -5.00 |

**PEAK EXCURSION**





*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# 11. TRANSMITTER ABOVE 1 GHz

## LIMITS

FCC §15.205 and §15.209

| Frequency Range (MHz) | Field Strength Limit (uV/m) at 3 m | Field Strength Limit (dBuV/m) at 3 m |
|---|---|---|
| 30 - 88 | 100 | 40 |
| 88 - 216 | 150 | 43.5 |
| 216 - 960 | 200 | 46 |
| Above 960 | 500 | 54 |

## TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters.

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; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor to the reading offset for average measurements.

The spectrum from 1GHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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.

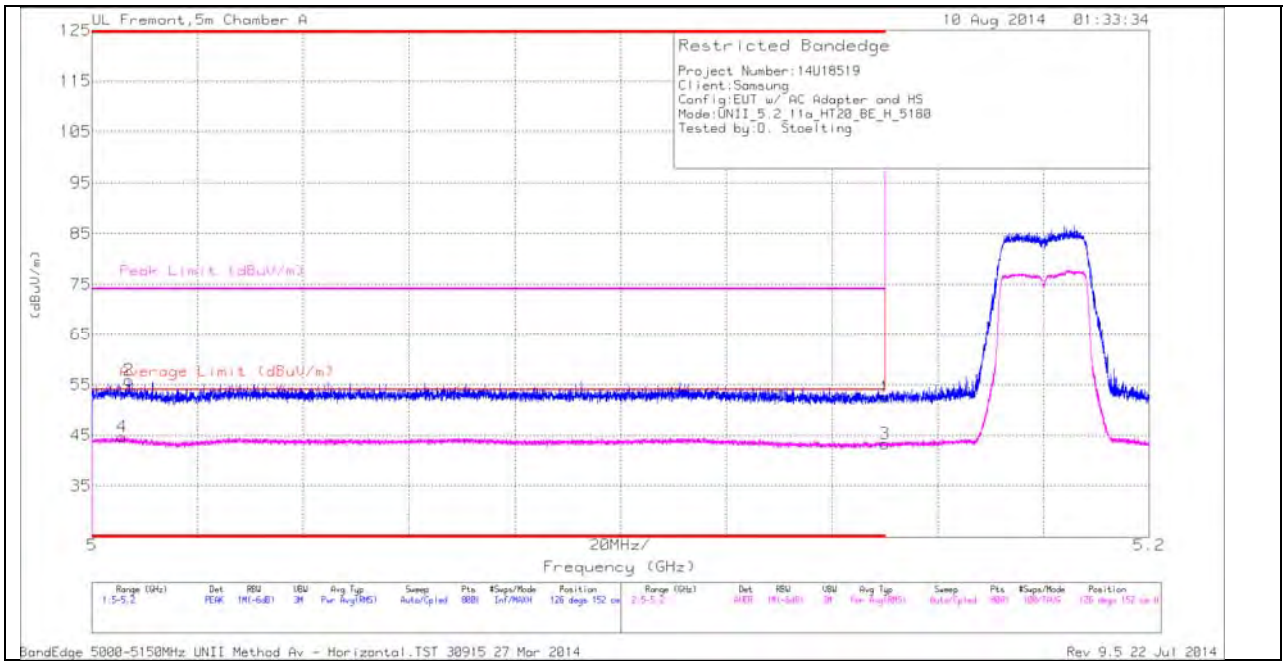

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 11.1. 5.2 GHz

### 11.1.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.2 GHz BAND

### RESTRICTED BANDEDGE (LOW CHANNEL)

#### HORIZONTAL PEAK AND AVERAGE PLOT



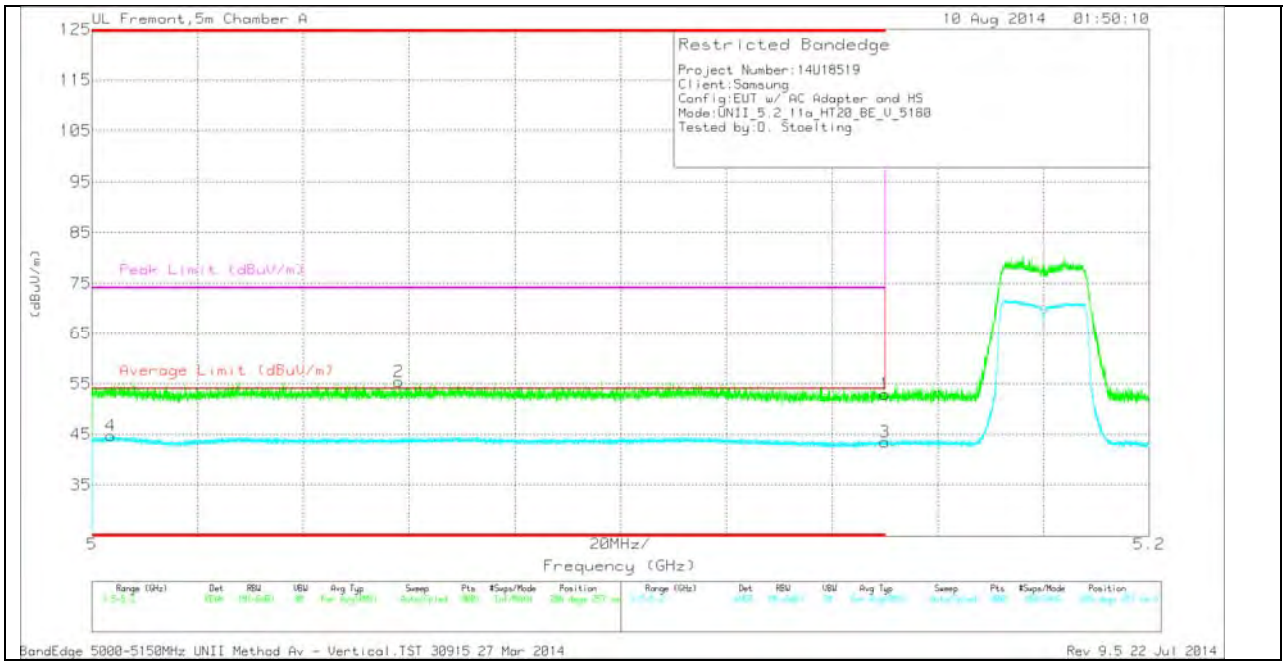

#### HORIZONTAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 | * 5.15 | 38.98 | PK | 34 | -20.5 | 0 | 52.48 | - | - | 74 | -21.52 | 126 | 152 | H |
| 2 | * 5.007 | 41.83 | PK | 33.9 | -19.8 | 0 | 55.93 | - | - | 74 | -18.07 | 126 | 152 | H |
| 3 | * 5.15 | 29.54 | RMS | 34 | -20.5 | .29 | 43.36 | 54 | -10.64 | - | - | 126 | 152 | H |
| 4 | * 5.006 | 30.06 | RMS | 33.9 | -19.6 | .29 | 44.68 | 54 | -9.32 | - | - | 126 | 152 | H |



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT



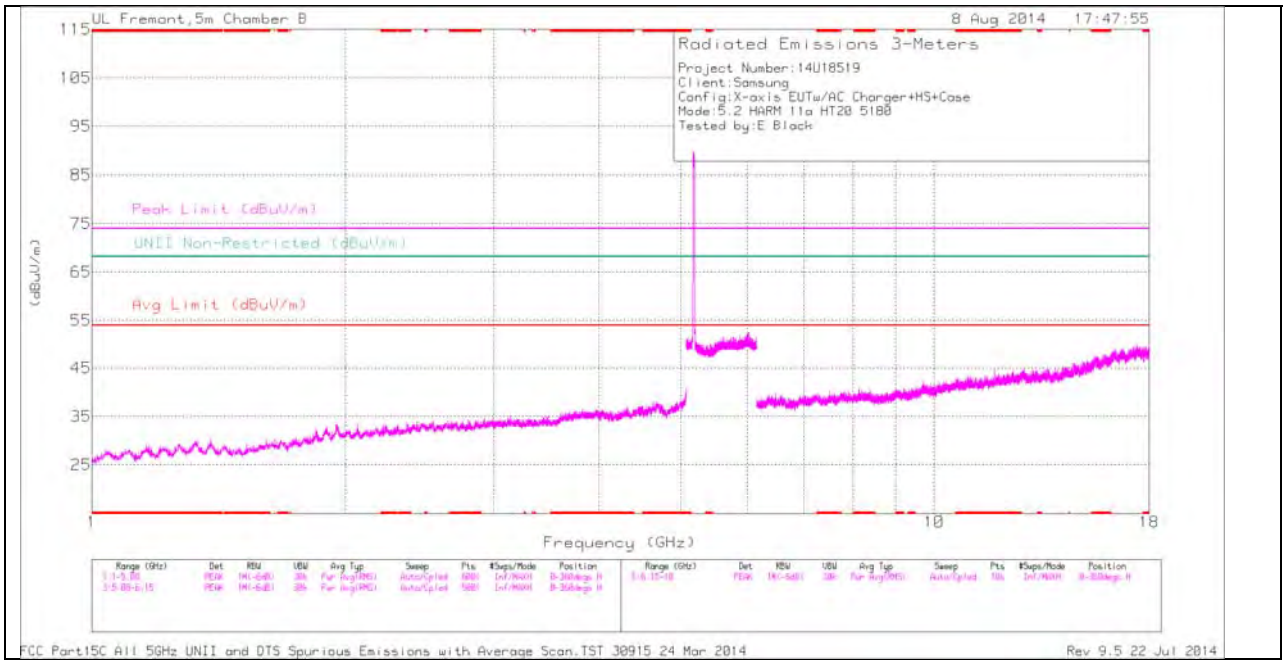

## VERTICAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 | * 5.15 | 39.37 | PK | 34 | -20.5 | 0 | 52.87 | - | - | 74 | -21.13 | 286 | 257 | V |
| 2 | * 5.058 | 41.92 | PK | 33.8 | -20.3 | 0 | 55.42 | - | - | 74 | -18.58 | 286 | 257 | V |
| 3 | * 5.15 | 29.64 | RMS | 34 | -20.5 | .29 | 43.46 | 54 | -10.54 | - | - | 286 | 257 | V |
| 4 | * 5.004 | 30.19 | RMS | 33.9 | -19.7 | .29 | 44.71 | 54 | -9.29 | - | - | 286 | 257 | V |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL HORIZONTAL



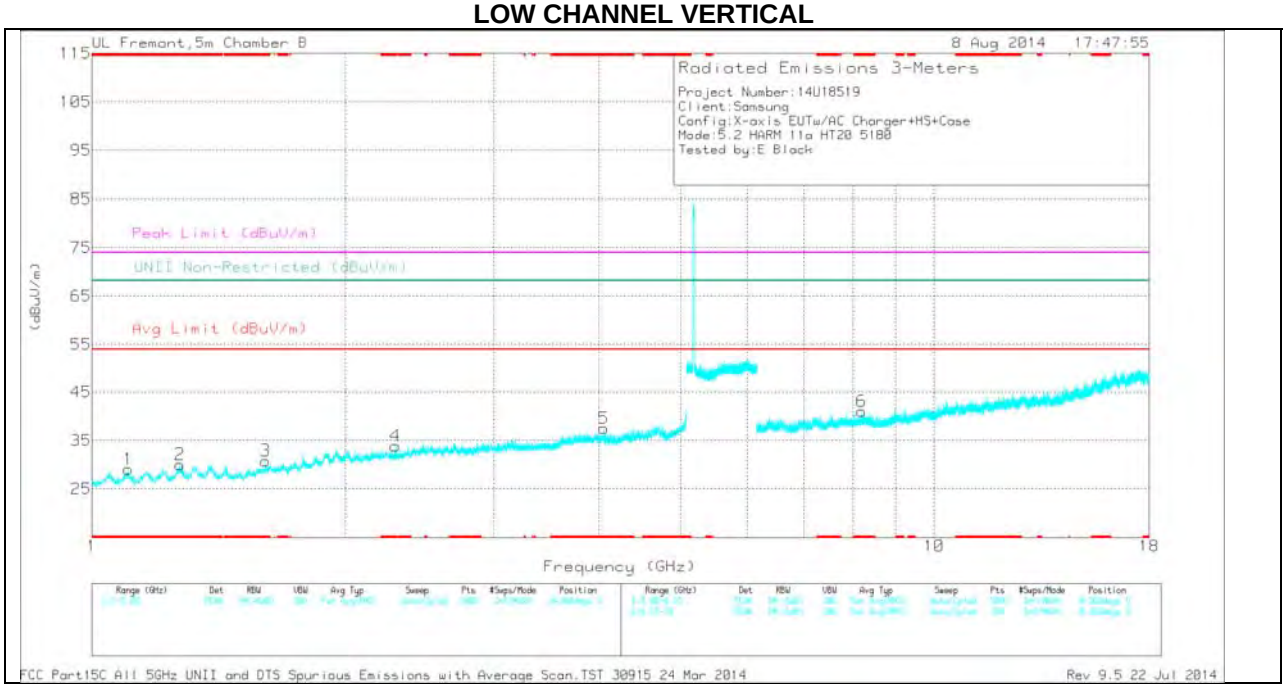

Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**LOW CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## LOW CHANNEL DATA

TRACE MARKERS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr /Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.105 | 35.74 | PK | 27.4 | -34 | 29.14 | - | - | 74 | -44.86 | - | - | 0-360 | 101 | V |
| 2 | * 1.271 | 35.45 | PK | 28.7 | -34.1 | 30.05 | - | - | 74 | -43.95 | - | - | 0-360 | 101 | V |
| 3 | * 1.608 | 35.03 | PK | 28.5 | -32.7 | 30.83 | - | - | 74 | -43.17 | - | - | 0-360 | 101 | V |
| 4 | * 2.292 | 34.94 | PK | 31.6 | -32.7 | 33.84 | - | - | 74 | -40.16 | - | - | 0-360 | 101 | V |
| 5 | * 4.05 | 33.18 | PK | 33.6 | -29.2 | 37.58 | - | - | 74 | -36.42 | - | - | 0-360 | 101 | V |
| 6 | * 8.206 | 30.5 | PK | 35.7 | -25.2 | 41 | - | - | 74 | -33 | - | - | 0-360 | 200 | V |

PK - Peak detector

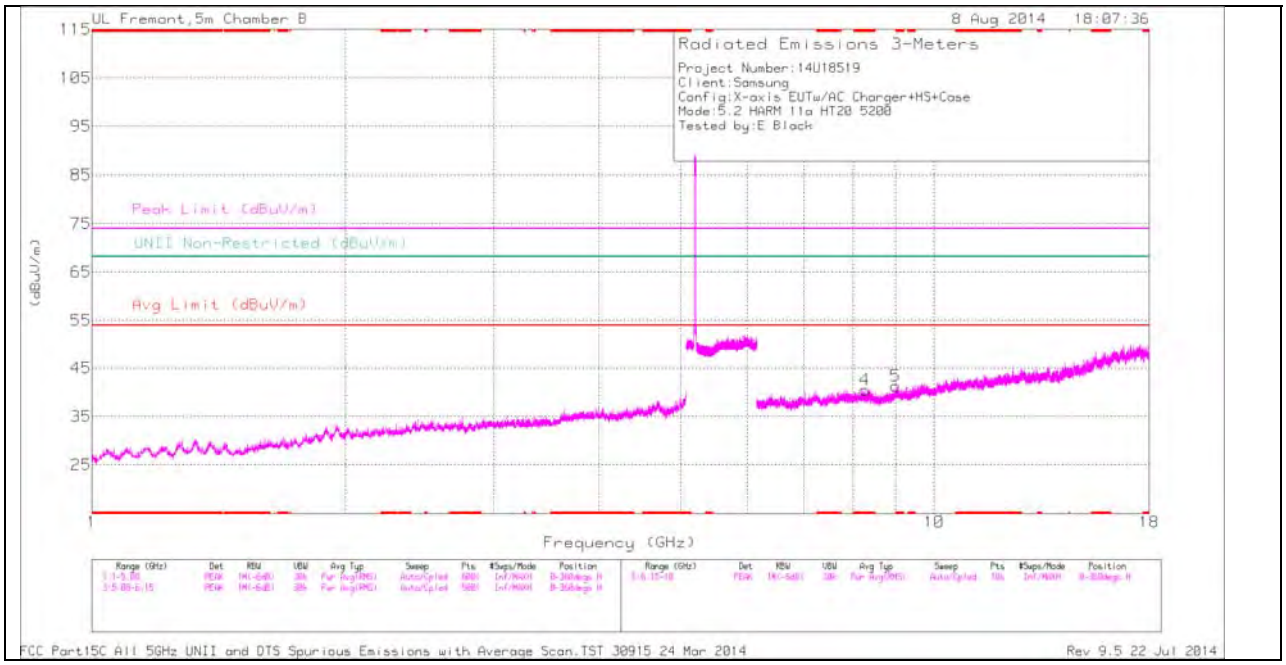
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL HORIZONTAL

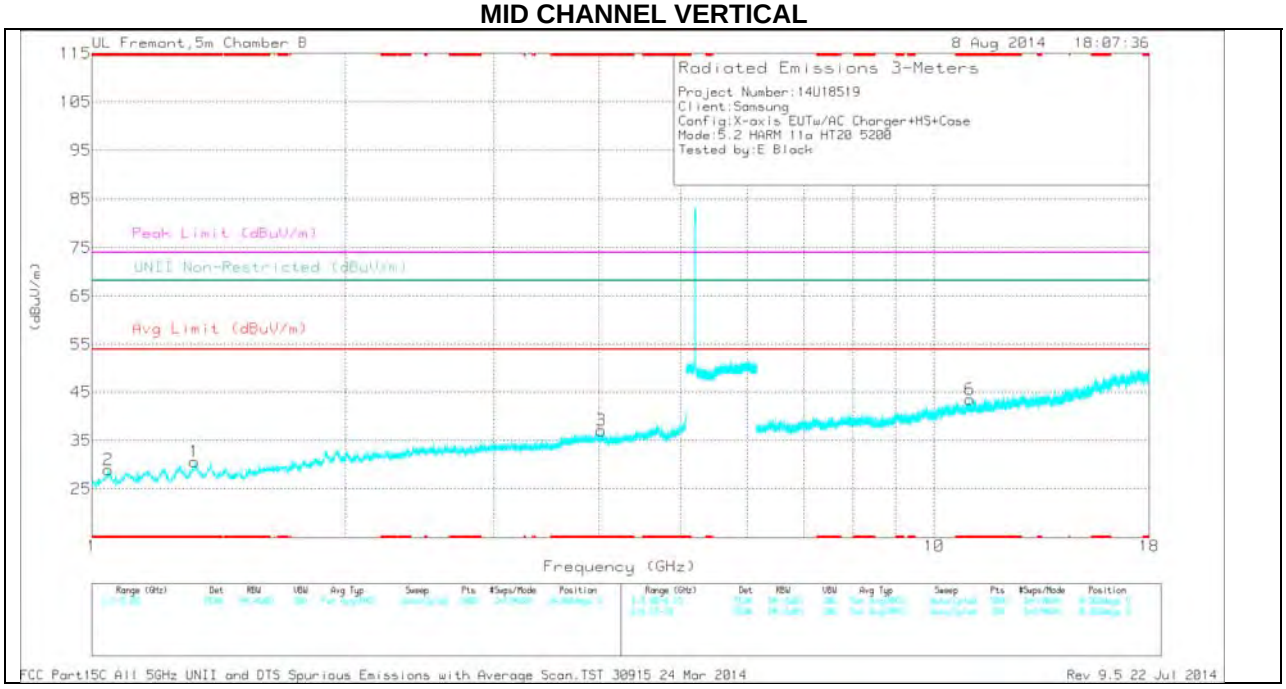



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**MID CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL DATA

TRACE MARKERS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr /Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.323 | 35.54 | PK | 28.8 | -33.7 | 30.64 | - | - | 74 | -43.36 | - | - | 0-360 | 199 | V |
| 2 | * 1.046 | 35.81 | PK | 27.2 | -34.1 | 28.91 | - | - | 74 | -45.09 | - | - | 0-360 | 199 | V |
| 3 | * 4.027 | 32.47 | PK | 33.6 | -29 | 37.07 | - | - | 74 | -36.93 | - | - | 0-360 | 101 | V |
| 4 | * 8.277 | 30.6 | PK | 35.7 | -25.8 | 40.5 | - | - | 74 | -33.5 | - | - | 0-360 | 200 | H |
| 5 | * 9.004 | 29.74 | PK | 36.2 | -24.7 | 41.24 | - | - | 74 | -32.76 | - | - | 0-360 | 101 | H |
| 6 | * 11.032 | 27.85 | PK | 37.8 | -22.1 | 43.55 | - | - | 74 | -30.45 | - | - | 0-360 | 101 | V |

PK - Peak detector

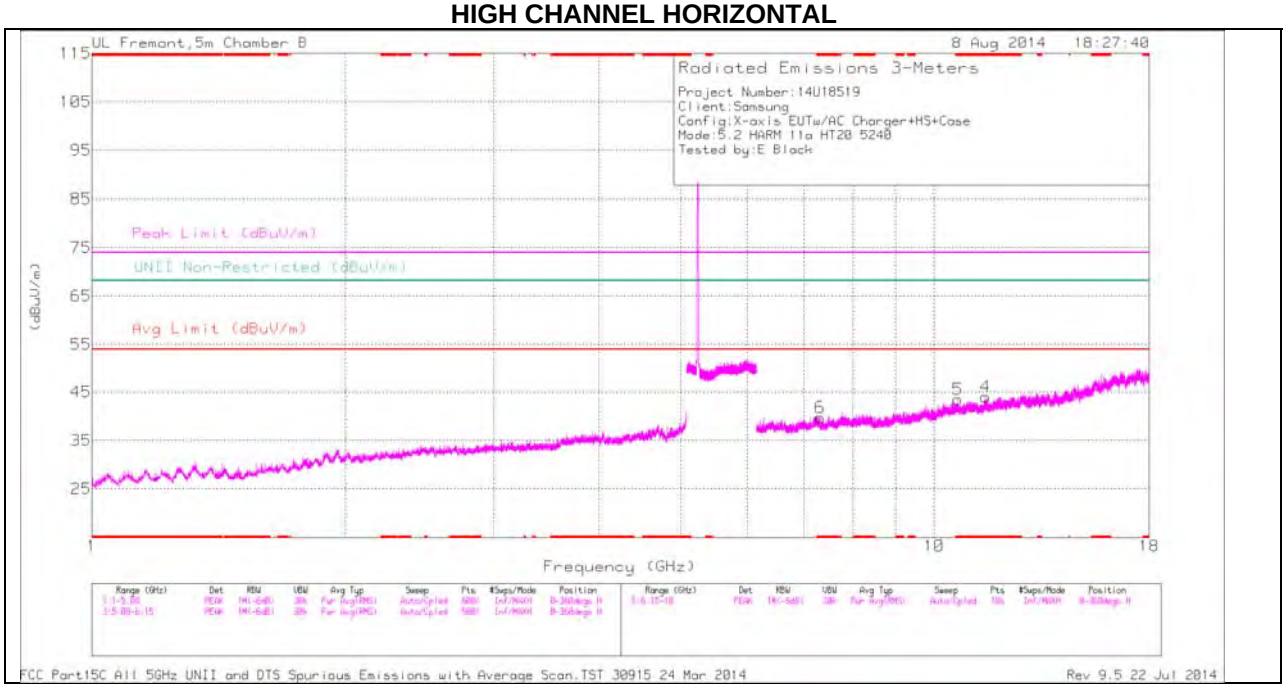
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL HORIZONTAL

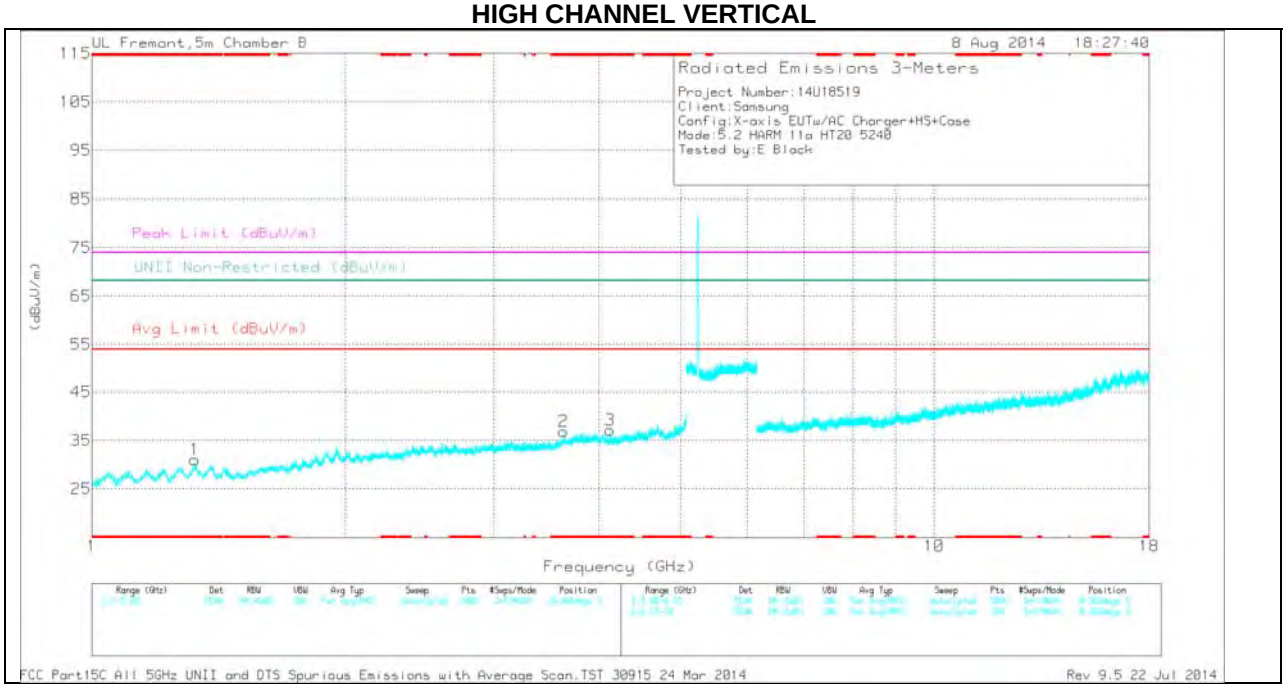



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**HIGH CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL DATA

TRACE MARKERS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr /Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.324 | 35.88 | PK | 28.8 | -33.7 | 30.98 | - | - | 74 | -43.02 | - | - | 0-360 | 200 | V |
| 5 | * 10.666 | 27.48 | PK | 37.7 | -21.7 | 43.48 | - | - | 74 | -30.52 | - | - | 0-360 | 101 | H |
| 4 | * 11.505 | 27.36 | PK | 38.1 | -21.5 | 43.96 | - | - | 74 | -30.04 | - | - | 0-360 | 199 | H |
| 2 | * 3.63 | 34.33 | PK | 33.2 | -30.7 | 36.83 | - | - | 74 | -37.17 | - | - | 0-360 | 200 | V |
| 3 | * 4.123 | 34.11 | PK | 33.6 | -30.6 | 37.11 | - | - | 74 | -36.89 | - | - | 0-360 | 101 | V |
| 6 | * 7.317 | 31.49 | PK | 35.6 | -27.4 | 39.69 | - | - | 74 | -34.31 | - | - | 0-360 | 199 | H |

PK - Peak detector

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

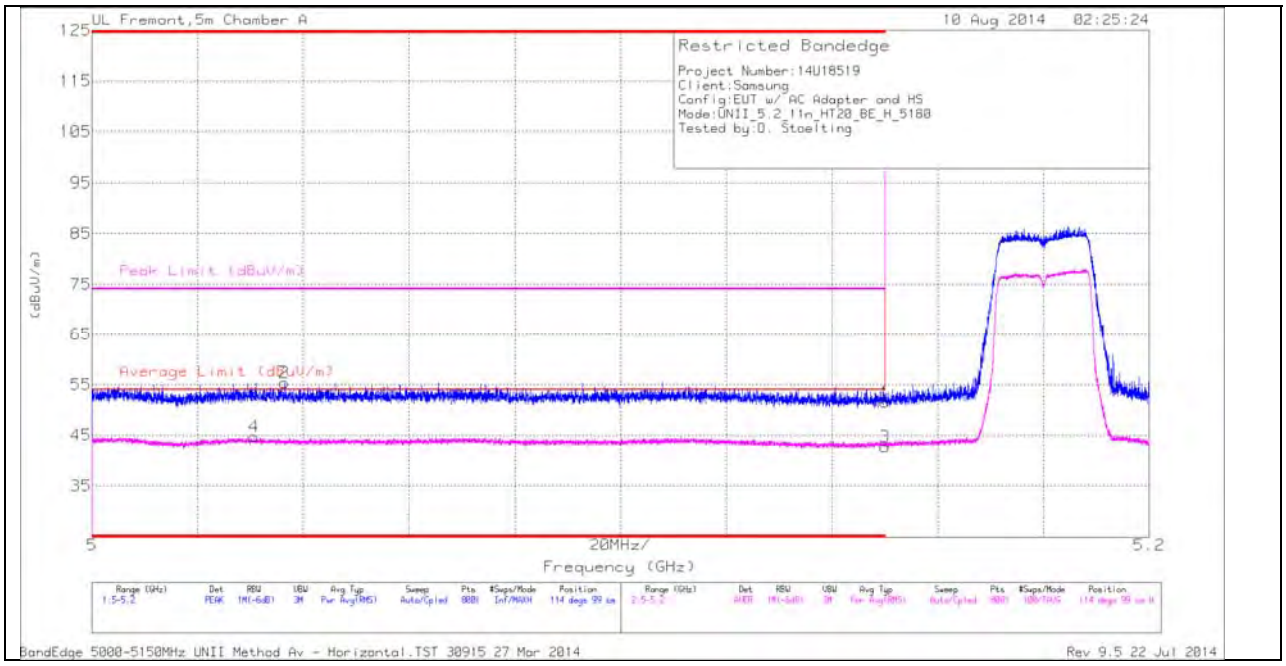


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 11.1.2. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.2 GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

### HORIZONTAL PEAK AND AVERAGE PLOT

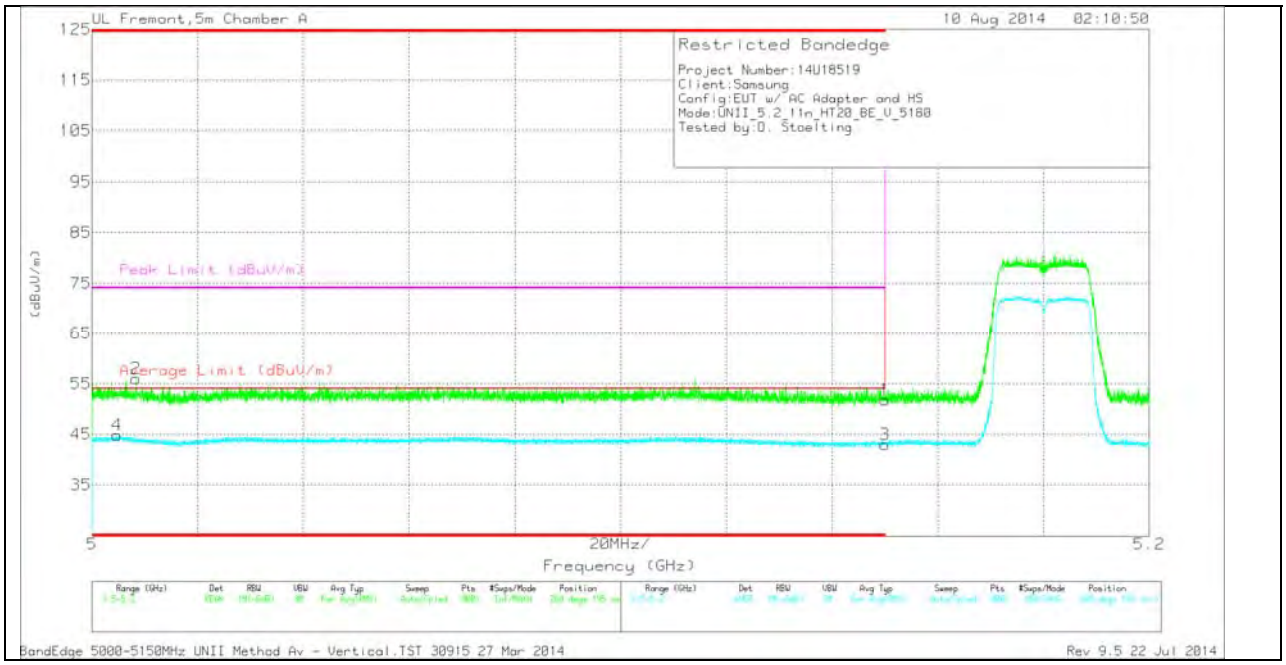



### HORIZONTAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 | * 5.15 | 37.99 | PK | 34 | -20.5 | 0 | 51.49 | - | - | 74 | -22.51 | 114 | 99 | H |
| 2 | * 5.036 | 41.82 | PK | 33.8 | -20.2 | 0 | 55.42 | - | - | 74 | -18.58 | 114 | 99 | H |
| 3 | * 5.15 | 28.85 | RMS | 34 | -20.5 | .32 | 42.7 | 54 | -11.3 | - | - | 114 | 99 | H |
| 4 | * 5.031 | 30.65 | RMS | 33.8 | -20.1 | .32 | 44.7 | 54 | -9.3 | - | - | 114 | 99 | H |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT




## VERTICAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 | * 5.15 | 38.33 | PK | 34 | -20.5 | 0 | 51.83 | - | - | 74 | -22.17 | 268 | 195 | V |
| 2 | * 5.008 | 42.02 | PK | 33.9 | -19.9 | 0 | 56.02 | - | - | 74 | -17.98 | 268 | 195 | V |
| 3 | * 5.15 | 29.1 | RMS | 34 | -20.5 | .32 | 42.95 | 54 | -11.05 | - | - | 268 | 195 | V |
| 4 | * 5.005 | 30.3 | RMS | 33.9 | -19.7 | .32 | 44.85 | 54 | -9.15 | - | - | 268 | 195 | V |

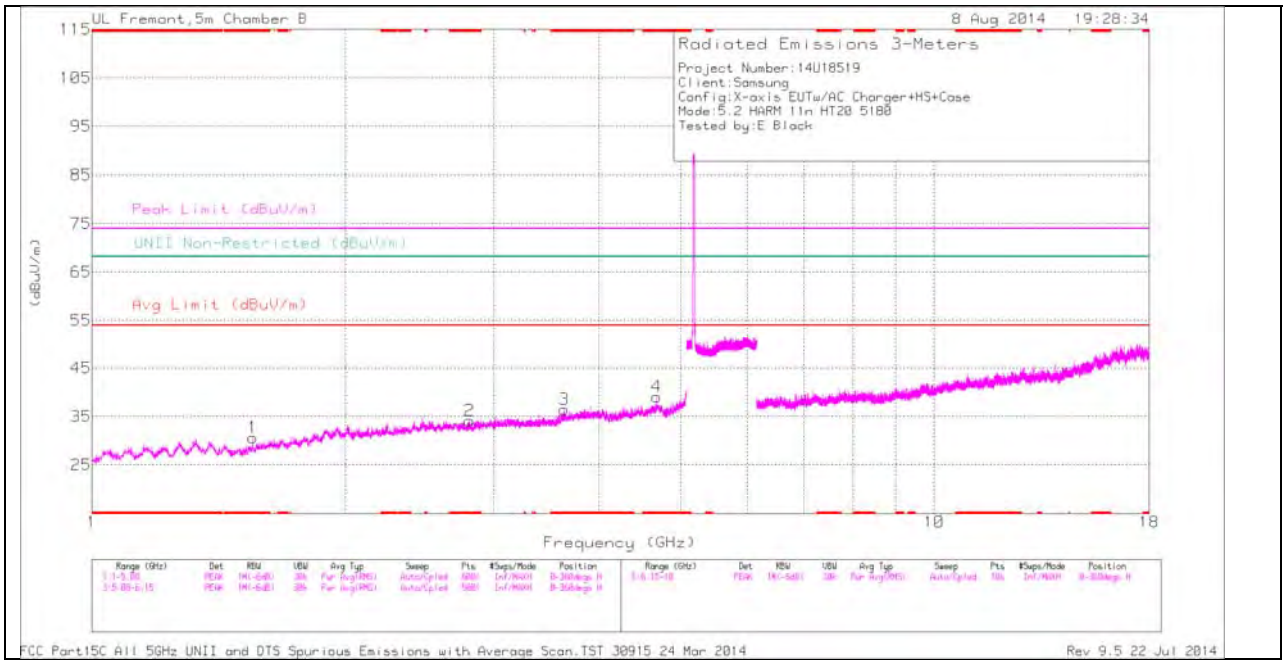


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# HARMONICS AND SPURIOUS EMISSIONS

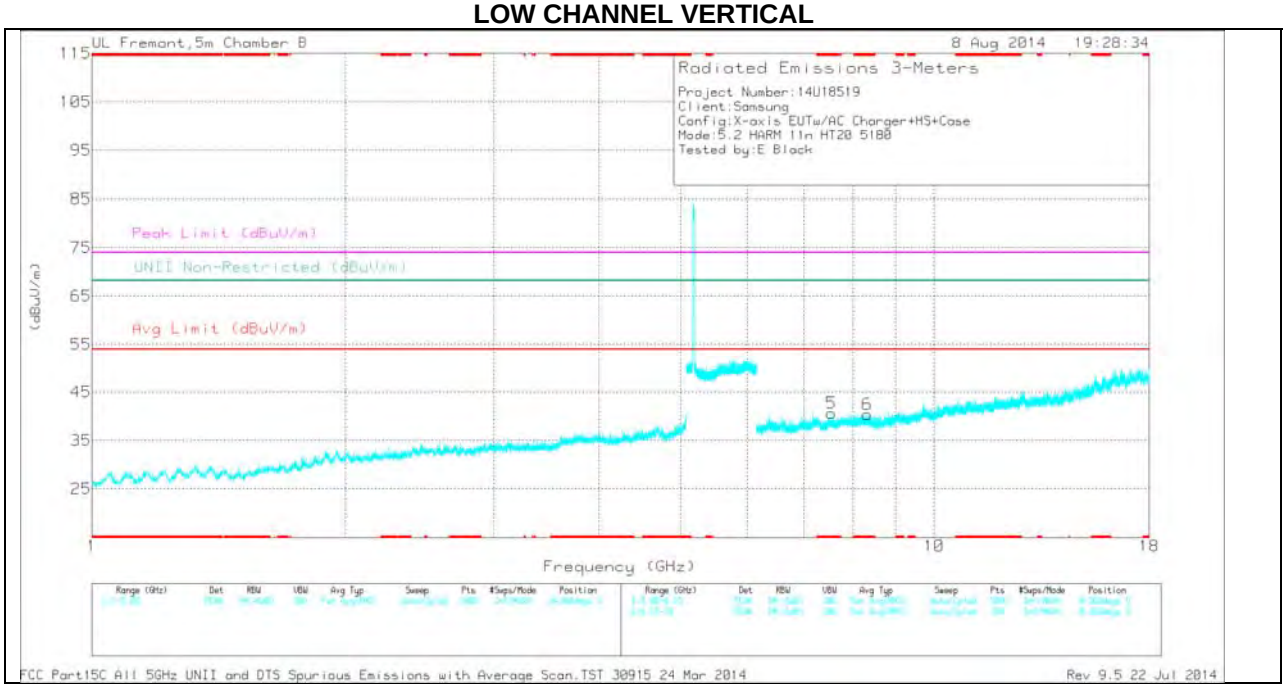
## LOW CHANNEL HORIZONTAL




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**LOW CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## LOW CHANNEL DATA

TRACE MARKERS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr /Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.553 | 36.01 | PK | 28.2 | -33.6 | 30.61 | - | - | 74 | -43.39 | - | - | 0-360 | 199 | H |
| 2 | * 2.807 | 33.97 | PK | 32.3 | -32.1 | 34.17 | - | - | 74 | -39.83 | - | - | 0-360 | 100 | H |
| 3 | * 3.638 | 34.2 | PK | 33.2 | -30.9 | 36.5 | - | - | 74 | -37.5 | - | - | 0-360 | 199 | H |
| 4 | * 4.681 | 34.35 | PK | 34.2 | -29.5 | 39.05 | - | - | 74 | -34.95 | - | - | 0-360 | 199 | H |
| 5 | * 7.554 | 30.56 | PK | 35.6 | -25.5 | 40.66 | - | - | 74 | -33.34 | - | - | 0-360 | 199 | V |
| 6 | * 8.326 | 29.83 | PK | 35.7 | -25.2 | 40.33 | - | - | 74 | -33.67 | - | - | 0-360 | 101 | V |

PK - Peak detector

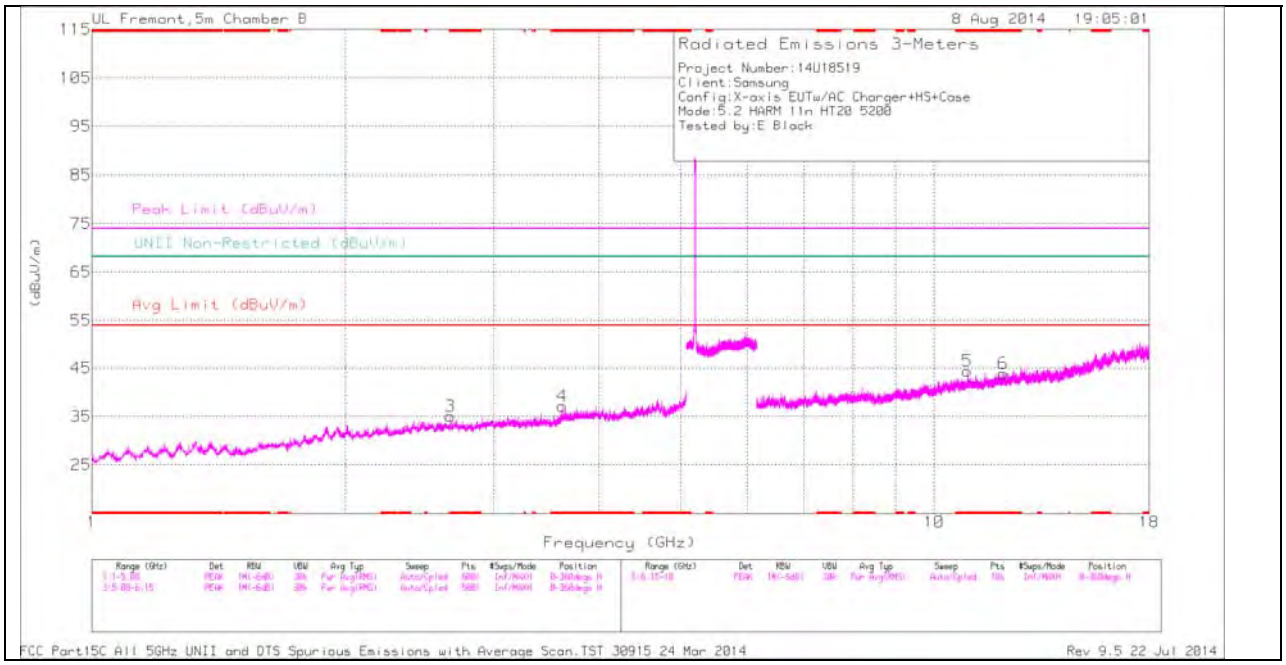
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL HORIZONTAL

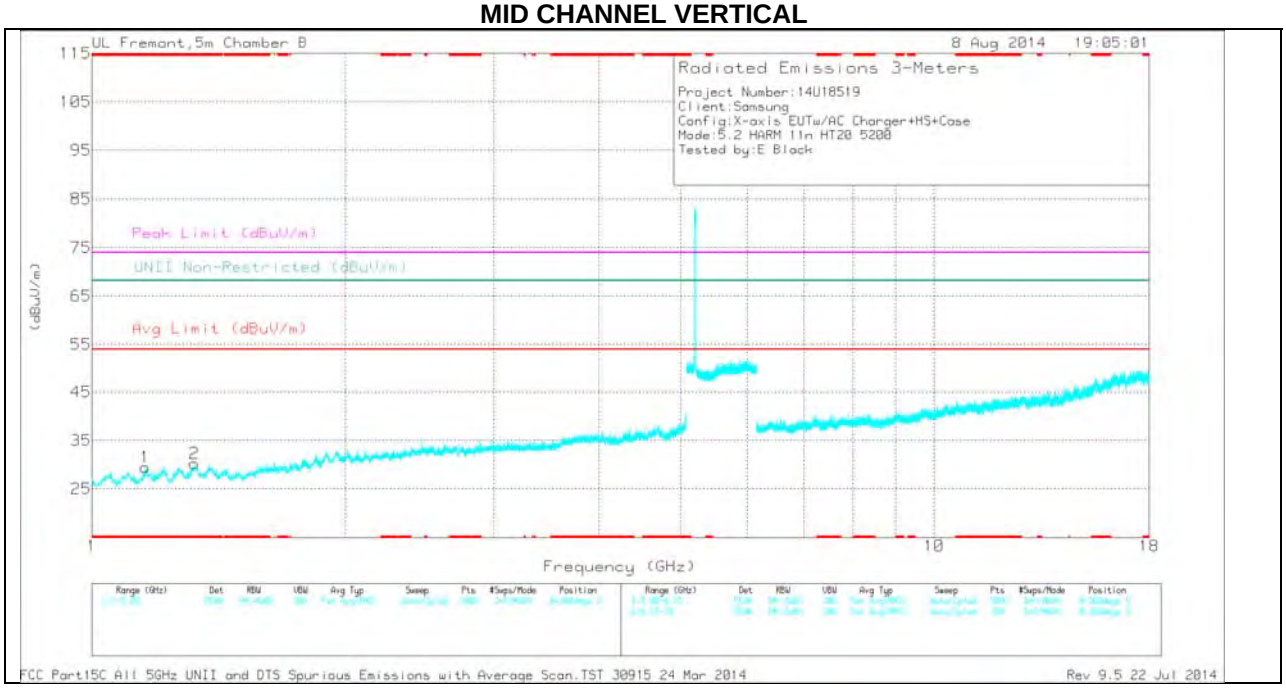



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**MID CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL DATA

TRACE MARKERS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr /Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.156 | 35.92 | PK | 27.8 | -34.2 | 29.52 | - | - | 74 | -44.48 | - | - | 0-360 | 101 | V |
| 2 | * 1.322 | 35.09 | PK | 28.8 | -33.7 | 30.19 | - | - | 74 | -43.81 | - | - | 0-360 | 101 | V |
| 5 | * 10.948 | 28.75 | PK | 37.8 | -22.2 | 44.35 | - | - | 74 | -29.65 | - | - | 0-360 | 199 | H |
| 6 | * 12.076 | 26.91 | PK | 38.8 | -21.8 | 43.91 | - | - | 74 | -30.09 | - | - | 0-360 | 101 | H |
| 3 | * 2.663 | 34.57 | PK | 32.3 | -31.8 | 35.07 | - | - | 74 | -38.93 | - | - | 0-360 | 199 | H |
| 4 | * 3.62 | 34.62 | PK | 33.2 | -30.7 | 37.12 | - | - | 74 | -36.88 | - | - | 0-360 | 100 | H |

PK - Peak detector

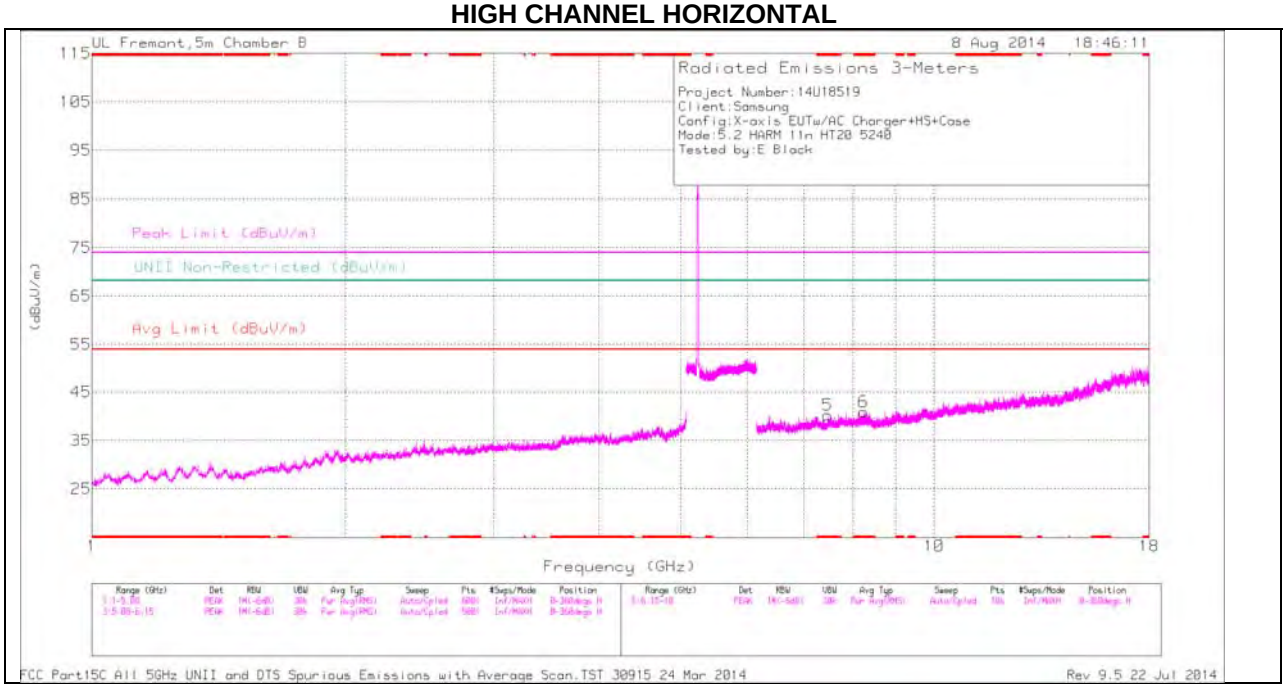
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

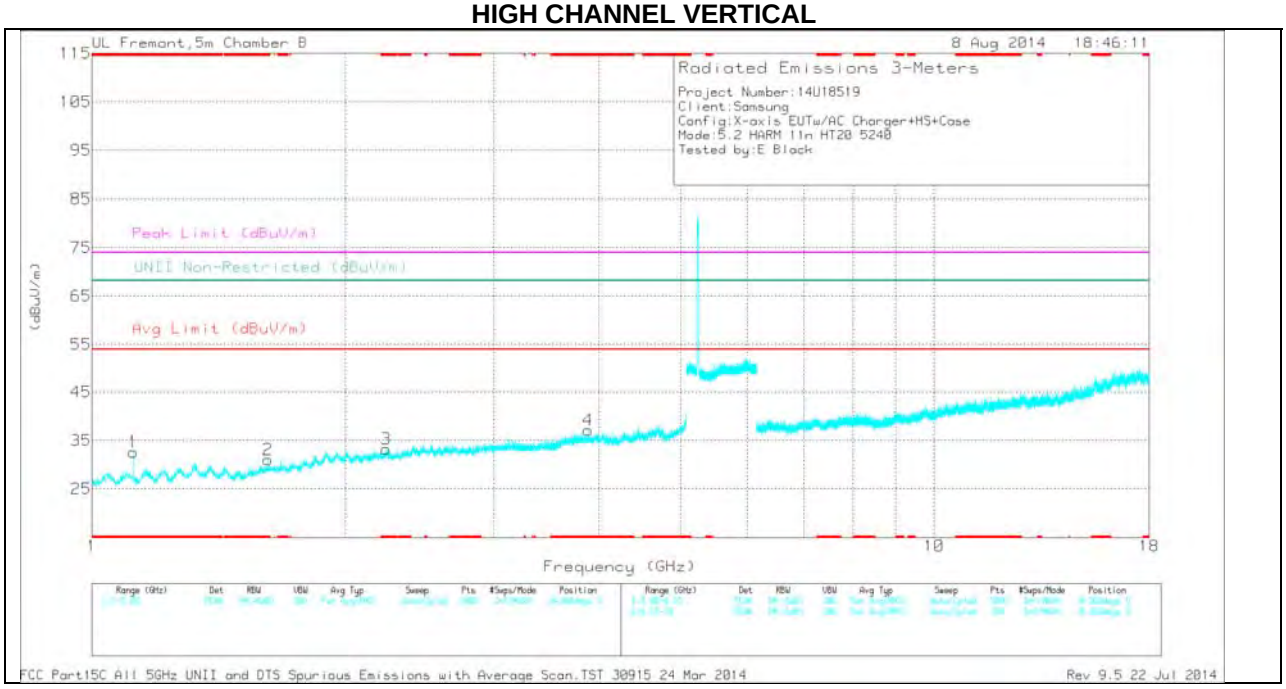
**HIGH CHANNEL HORIZONTAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**HIGH CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL DATA

TRACE MARKERS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr /Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.12 | 39.23 | PK | 27.5 | -34.2 | 32.53 | - | - | 74 | -41.47 | - | - | 0-360 | 101 | V |
| 2 | * 1.618 | 35.08 | PK | 28.6 | -32.6 | 31.08 | - | - | 74 | -42.92 | - | - | 0-360 | 200 | V |
| 3 | * 2.236 | 33.64 | PK | 31.4 | -31.8 | 33.24 | - | - | 74 | -40.76 | - | - | 0-360 | 200 | V |
| 4 | * 3.879 | 34.48 | PK | 33.8 | -31.2 | 37.08 | - | - | 74 | -36.92 | - | - | 0-360 | 200 | V |
| 5 | * 7.473 | 31.08 | PK | 35.6 | -26.4 | 40.28 | - | - | 74 | -33.72 | - | - | 0-360 | 200 | H |
| 6 | * 8.243 | 30.83 | PK | 35.7 | -25.6 | 40.93 | - | - | 74 | -33.07 | - | - | 0-360 | 200 | H |

PK - Peak detector

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

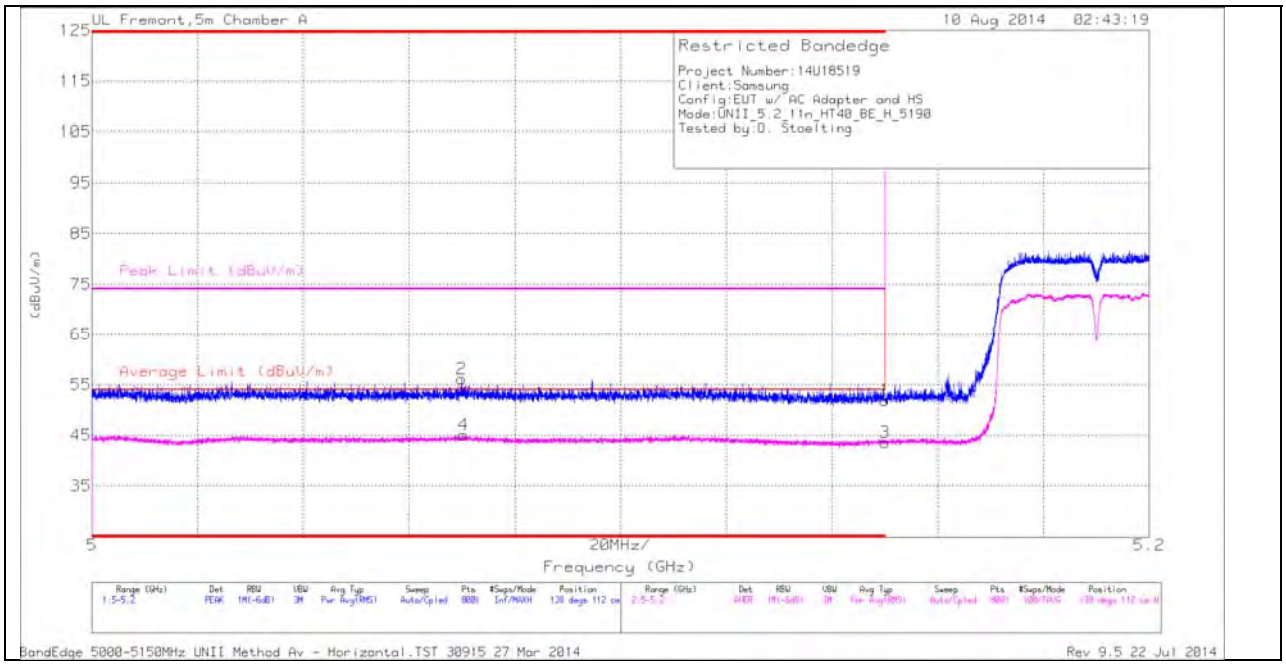


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 11.1.3. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.2 GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

### HORIZONTAL PEAK AND AVERAGE PLOT

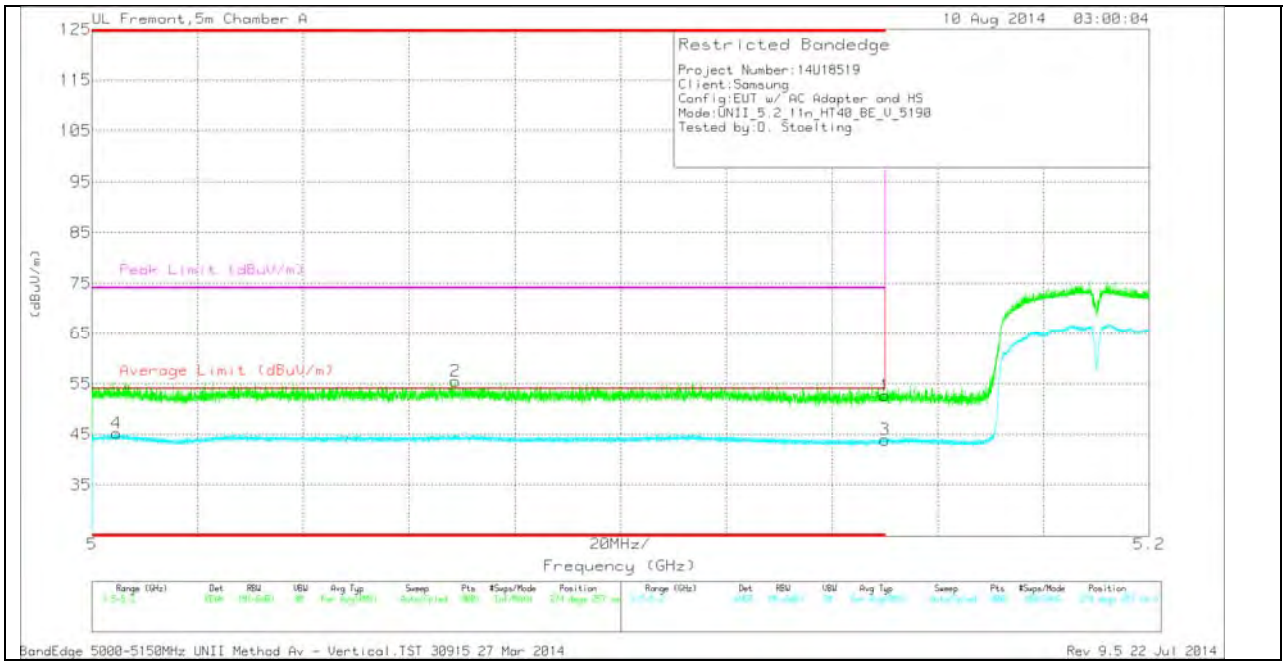



### HORIZONTAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 | * 5.15 | 38.42 | PK | 34 | -20.5 | 0 | 51.92 | - | - | 74 | -22.08 | 138 | 112 | H |
| 2 | * 5.07 | 42.31 | PK | 33.8 | -20 | 0 | 56.11 | - | - | 74 | -17.89 | 138 | 112 | H |
| 3 | * 5.15 | 29.45 | RMS | 34 | -20.5 | .63 | 43.64 | 54 | -10.36 | - | - | 138 | 112 | H |
| 4 | * 5.07 | 30.59 | RMS | 33.8 | -20 | .63 | 45.08 | 54 | -8.92 | - | - | 138 | 112 | H |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT



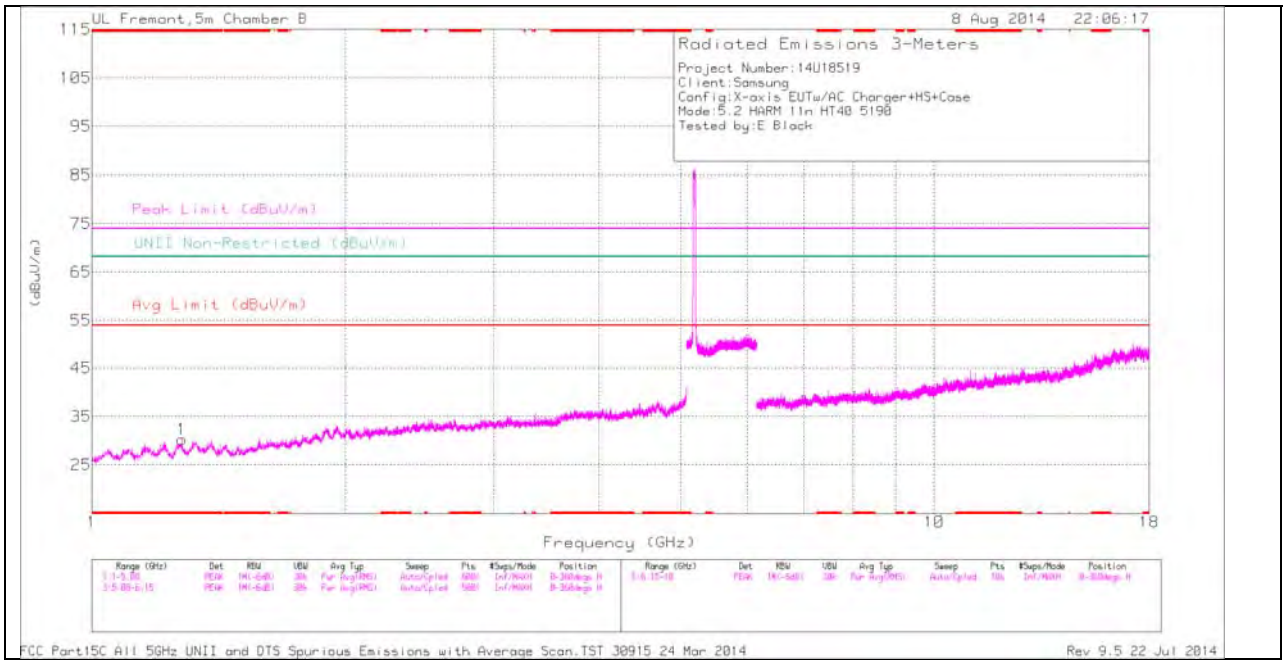

## VERTICAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 | * 5.15 | 39.1 | PK | 34 | -20.5 | 0 | 52.6 | - | - | 74 | -21.4 | 274 | 257 | V |
| 2 | * 5.069 | 41.65 | PK | 33.8 | -20 | 0 | 55.45 | - | - | 74 | -18.55 | 274 | 257 | V |
| 3 | * 5.15 | 29.71 | RMS | 34 | -20.5 | .63 | 43.9 | 54 | -10.1 | - | - | 274 | 257 | V |
| 4 | * 5.005 | 30.29 | RMS | 33.9 | -19.7 | .63 | 45.18 | 54 | -8.82 | - | - | 274 | 257 | V |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL HORIZONTAL



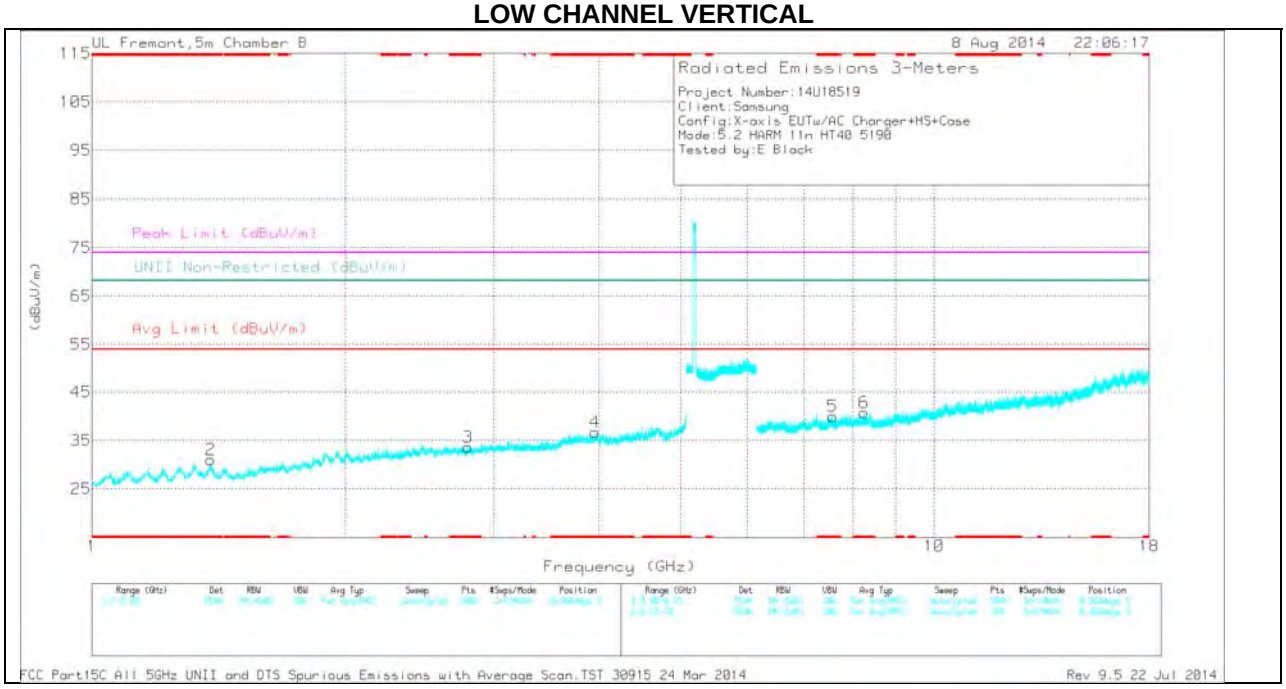

Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**LOW CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## LOW CHANNEL DATA

TRACE MARKERS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr /Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.277 | 35.62 | PK | 28.7 | -34.1 | 30.22 | - | - | 74 | -43.78 | - | - | 0-360 | 100 | H |
| 2 | * 1.384 | 35.87 | PK | 28.6 | -33.5 | 30.97 | - | - | 74 | -43.03 | - | - | 0-360 | 200 | V |
| 3 | * 2.796 | 33.67 | PK | 32.3 | -32.3 | 33.67 | - | - | 74 | -40.33 | - | - | 0-360 | 200 | V |
| 4 | * 3.957 | 33.19 | PK | 33.7 | -30.2 | 36.69 | - | - | 74 | -37.31 | - | - | 0-360 | 200 | V |
| 5 | * 7.573 | 29.86 | PK | 35.6 | -25.5 | 39.96 | - | - | 74 | -34.04 | - | - | 0-360 | 200 | V |
| 6 | * 8.262 | 30.57 | PK | 35.7 | -25.5 | 40.77 | - | - | 74 | -33.23 | - | - | 0-360 | 200 | V |

PK - Peak detector

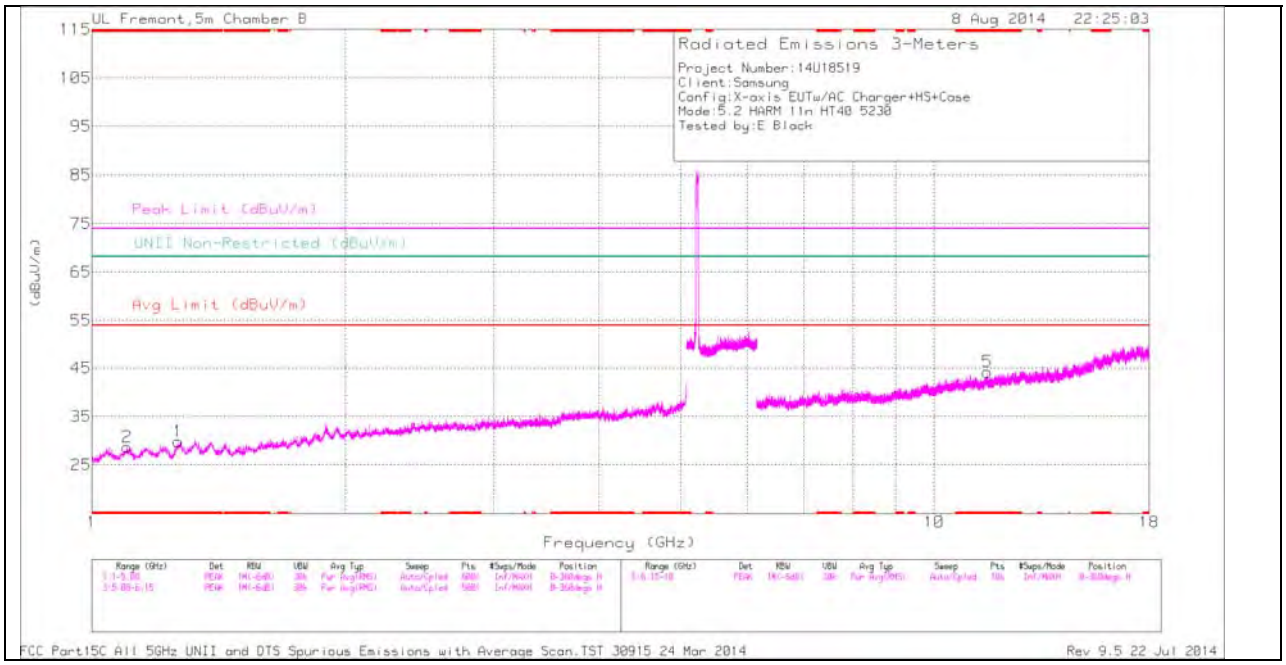
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL HORIZONTAL

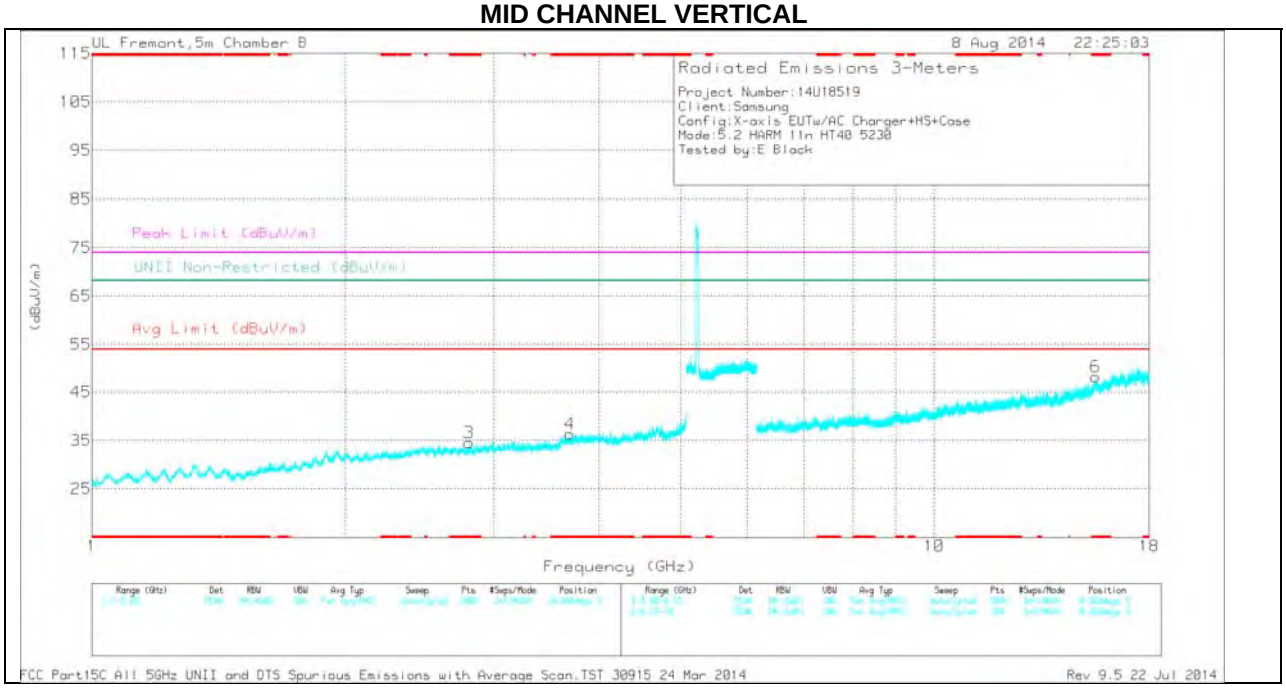



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**MID CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL DATA

TRACE MARKERS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr /Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.265 | 35.41 | PK | 28.6 | -34.2 | 29.81 | - | - | 74 | -44.19 | - | - | 0-360 | 200 | H |
| 2 | * 1.101 | 35.43 | PK | 27.4 | -34.1 | 28.73 | - | - | 74 | -45.27 | - | - | 0-360 | 101 | H |
| 3 | * 2.803 | 34.42 | PK | 32.3 | -32.2 | 34.52 | - | - | 74 | -39.48 | - | - | 0-360 | 101 | V |
| 4 | * 3.691 | 34.24 | PK | 33.3 | -31.2 | 36.34 | - | - | 74 | -37.66 | - | - | 0-360 | 101 | V |
| 5 | * 11.561 | 27.81 | PK | 38.1 | -21.7 | 44.21 | - | - | 74 | -29.79 | - | - | 0-360 | 101 | H |
| 6 | * 15.543 | 25.98 | PK | 40.5 | -18.3 | 48.18 | - | - | 74 | -25.82 | - | - | 0-360 | 101 | V |

PK - Peak detector

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



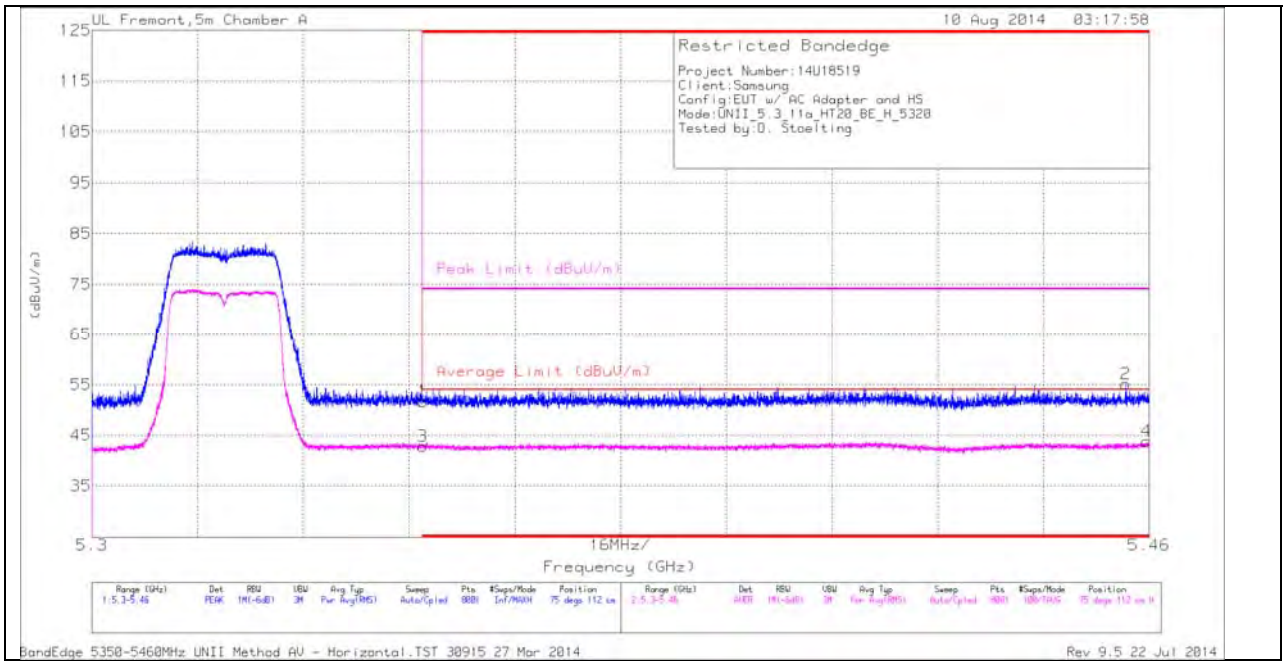
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 11.2. 5.3 GHz

### 11.2.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.3 GHz BAND AUTHORIZED BANDEDGE (HIGH CHANNEL)

**HORIZONTAL PEAK AND AVERAGE PLOT**

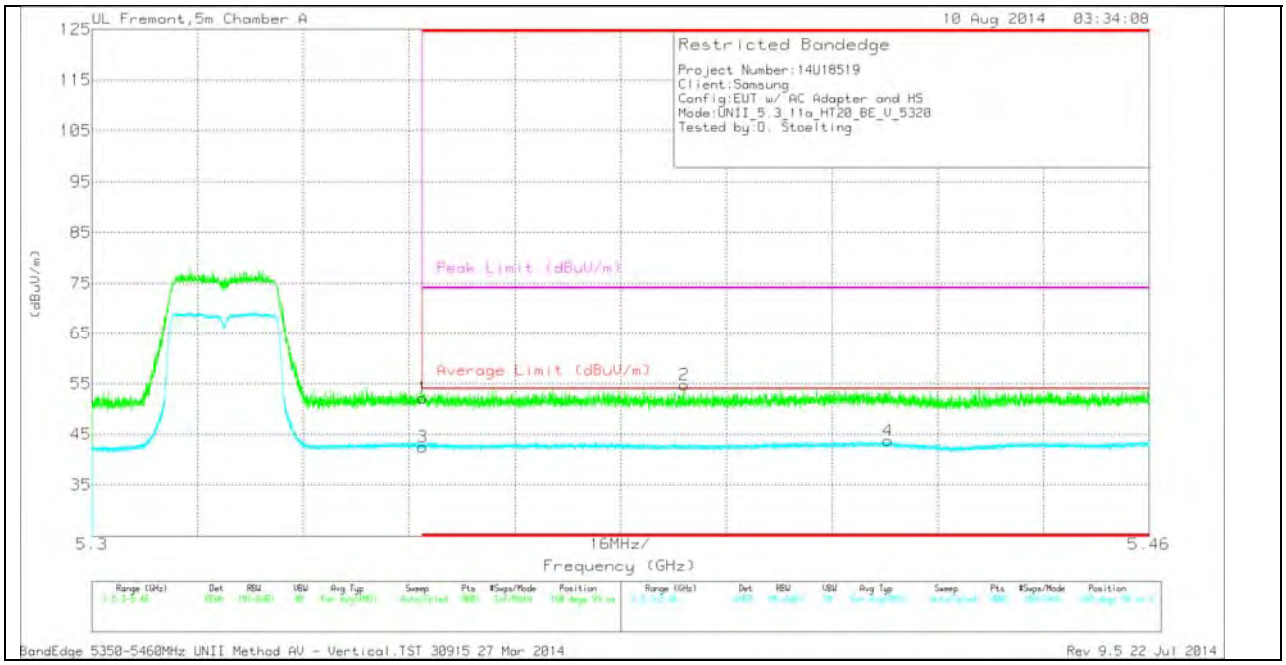



**HORIZONTAL DATA**

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 | * 5.35 | 36.92 | PK | 34.3 | -19.6 | 0 | 51.62 | - | - | 74 | -22.38 | 75 | 112 | H |
| 2 | * 5.456 | 40.6 | PK | 34.4 | -19.9 | 0 | 55.1 | - | - | 74 | -18.9 | 75 | 112 | H |
| 3 | * 5.35 | 27.81 | RMS | 34.3 | -19.6 | .29 | 42.83 | 54 | -11.17 | - | - | 75 | 112 | H |
| 4 | * 5.46 | 28.95 | RMS | 34.4 | -19.8 | .29 | 43.87 | 54 | -10.13 | - | - | 75 | 112 | H |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT



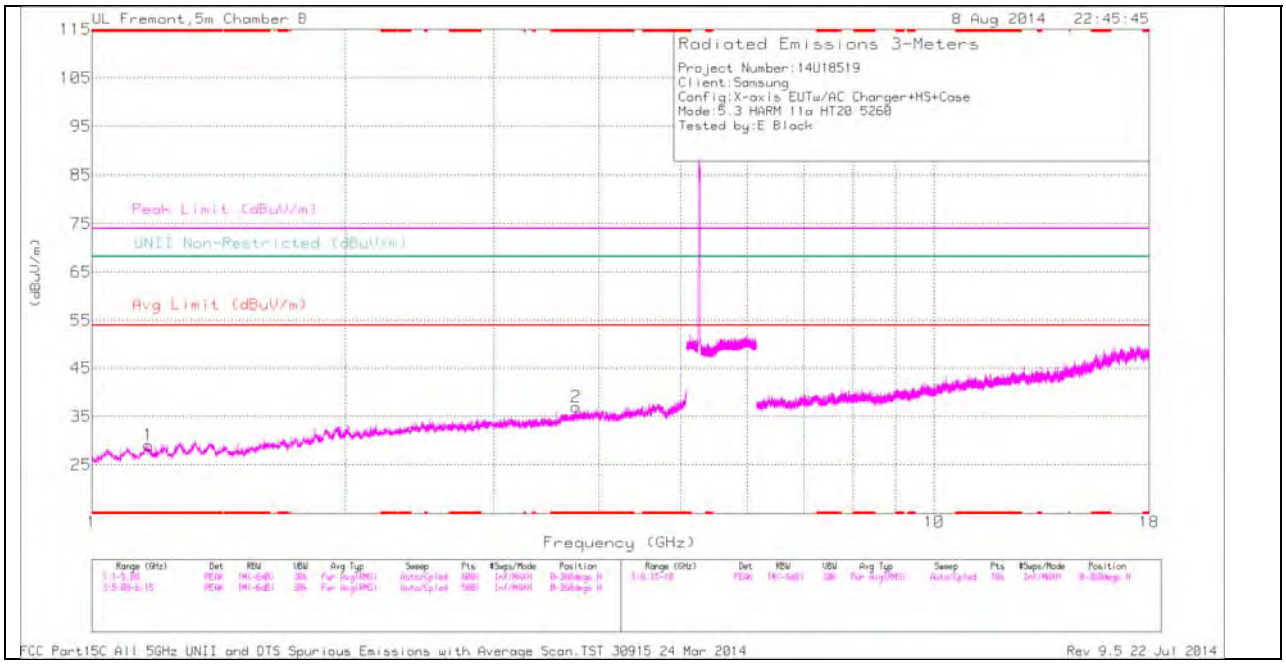

## VERTICAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 | * 5.35 | 37.45 | PK | 34.3 | -19.6 | 0 | 52.15 | - | - | 74 | -21.85 | 160 | 99 | V |
| 2 | * 5.39 | 40.36 | PK | 34.3 | -19.9 | 0 | 54.76 | - | - | 74 | -19.24 | 160 | 99 | V |
| 3 | * 5.35 | 27.45 | RMS | 34.3 | -19.6 | .29 | 42.47 | 54 | -11.53 | - | - | 160 | 99 | V |
| 4 | * 5.42 | 28.62 | RMS | 34.4 | -19.6 | .29 | 43.74 | 54 | -10.26 | - | - | 160 | 99 | V |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# HARMONICS AND SPURIOUS EMISSIONS

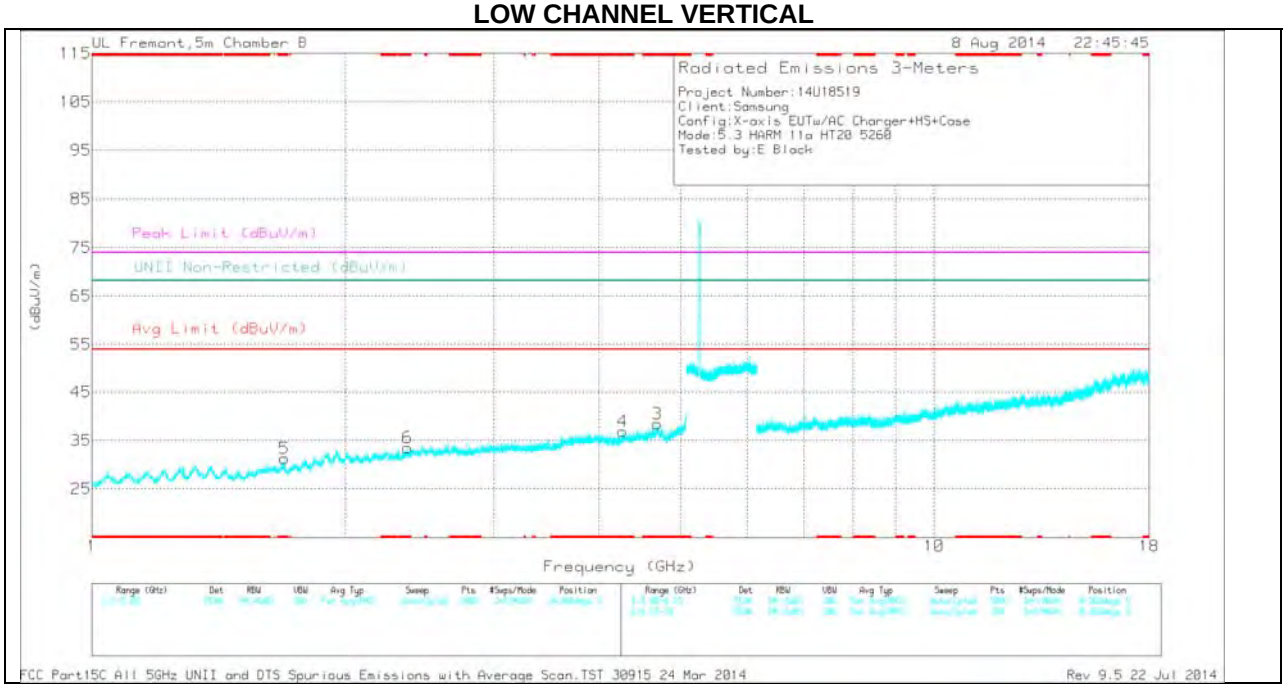
## LOW CHANNEL HORIZONTAL




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**LOW CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## LOW CHANNEL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr /Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.167 | 35.54 | PK | 27.9 | -34.3 | 29.14 | - | - | 74 | -44.86 | - | - | 0-360 | 200 | H |
| 2 | * 3.757 | 34.16 | PK | 33.5 | -30.7 | 36.96 | - | - | 74 | -37.04 | - | - | 0-360 | 200 | H |
| 3 | * 4.69 | 33.88 | PK | 34.2 | -29.7 | 38.38 | - | - | 74 | -35.62 | - | - | 0-360 | 200 | V |
| 4 | * 4.266 | 32.85 | PK | 33.6 | -29.6 | 36.85 | - | - | 74 | -37.15 | - | - | 0-360 | 200 | V |
| 5 | * 1.693 | 35.23 | PK | 29 | -33 | 31.23 | - | - | 74 | -42.77 | - | - | 0-360 | 200 | V |
| 6 | * 2.37 | 34.05 | PK | 32 | -32.5 | 33.55 | - | - | 74 | -40.45 | - | - | 0-360 | 200 | V |

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

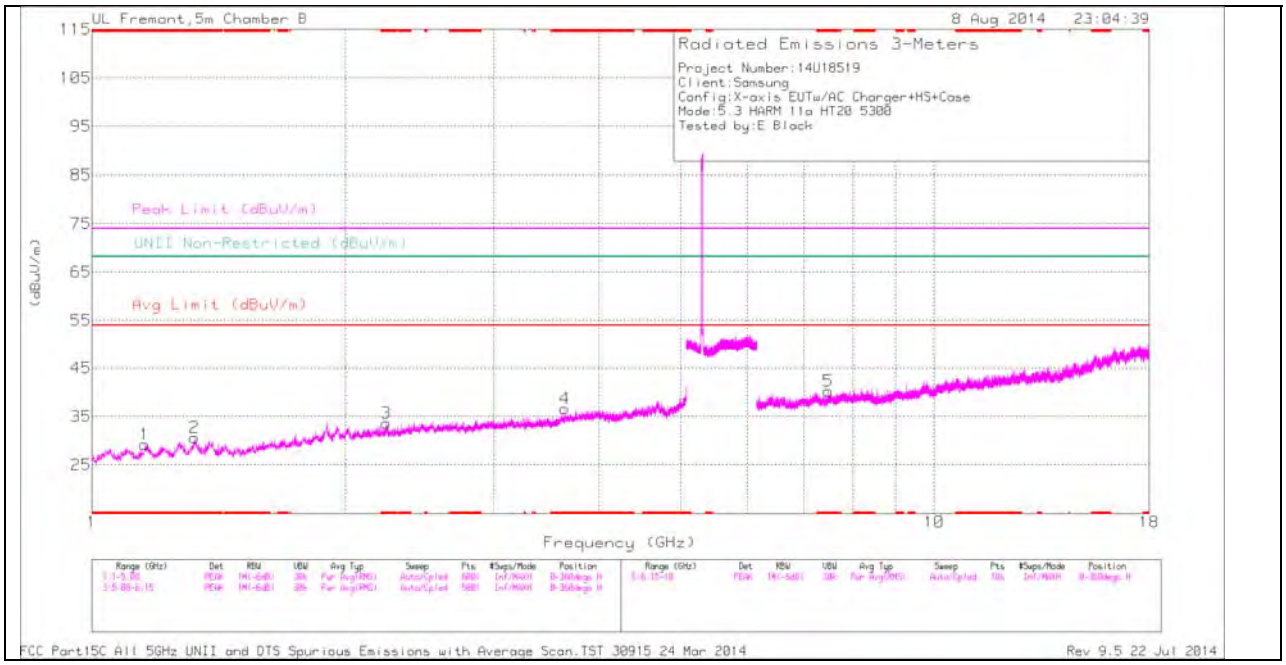
PK - Peak detector



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL HORIZONTAL

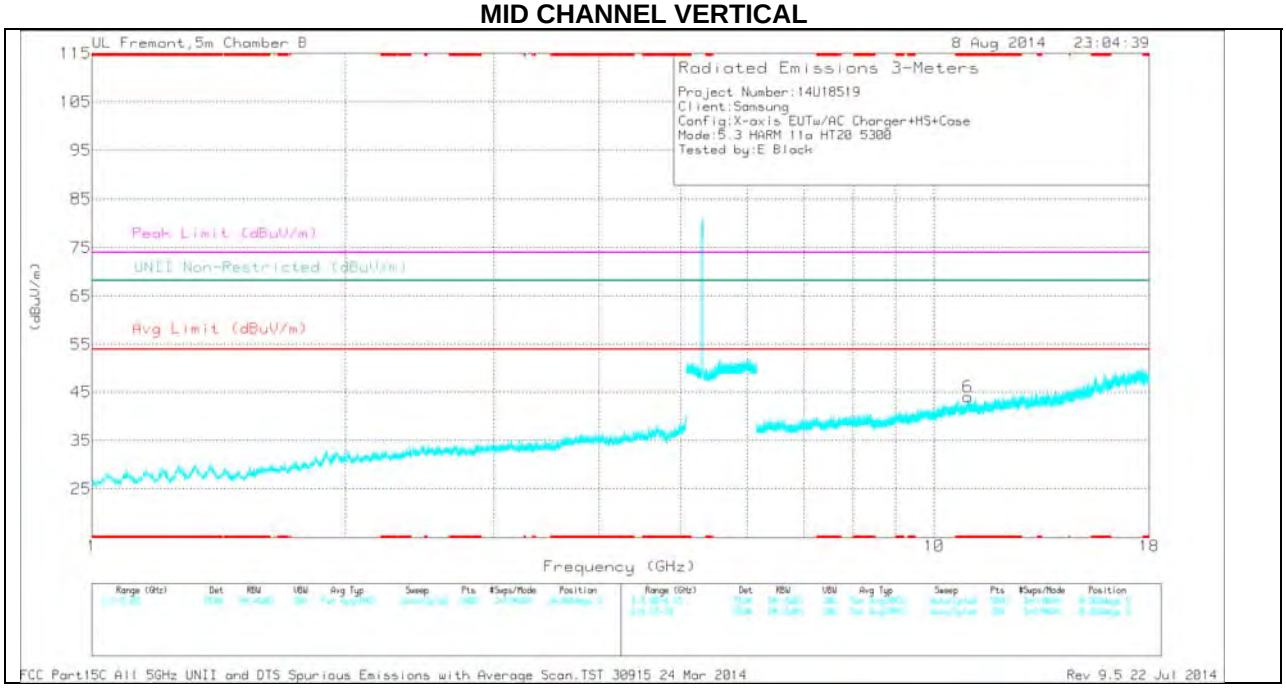



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**MID CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr /Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.155 | 35.67 | PK | 27.8 | -34.2 | 29.27 | - | - | 74 | -44.73 | - | - | 0-360 | 100 | H |
| 2 | * 1.322 | 35.56 | PK | 28.8 | -33.7 | 30.66 | - | - | 74 | -43.34 | - | - | 0-360 | 100 | H |
| 3 | * 2.237 | 33.99 | PK | 31.4 | -31.8 | 33.59 | - | - | 74 | -40.41 | - | - | 0-360 | 100 | H |
| 4 | * 3.641 | 34.19 | PK | 33.2 | -30.8 | 36.59 | - | - | 74 | -37.41 | - | - | 0-360 | 100 | H |
| 5 | * 7.488 | 30.44 | PK | 35.6 | -25.8 | 40.24 | - | - | 74 | -33.76 | - | - | 0-360 | 200 | H |
| 6 | * 10.965 | 28.16 | PK | 37.8 | -22 | 43.96 | - | - | 74 | -30.04 | - | - | 0-360 | 101 | V |

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

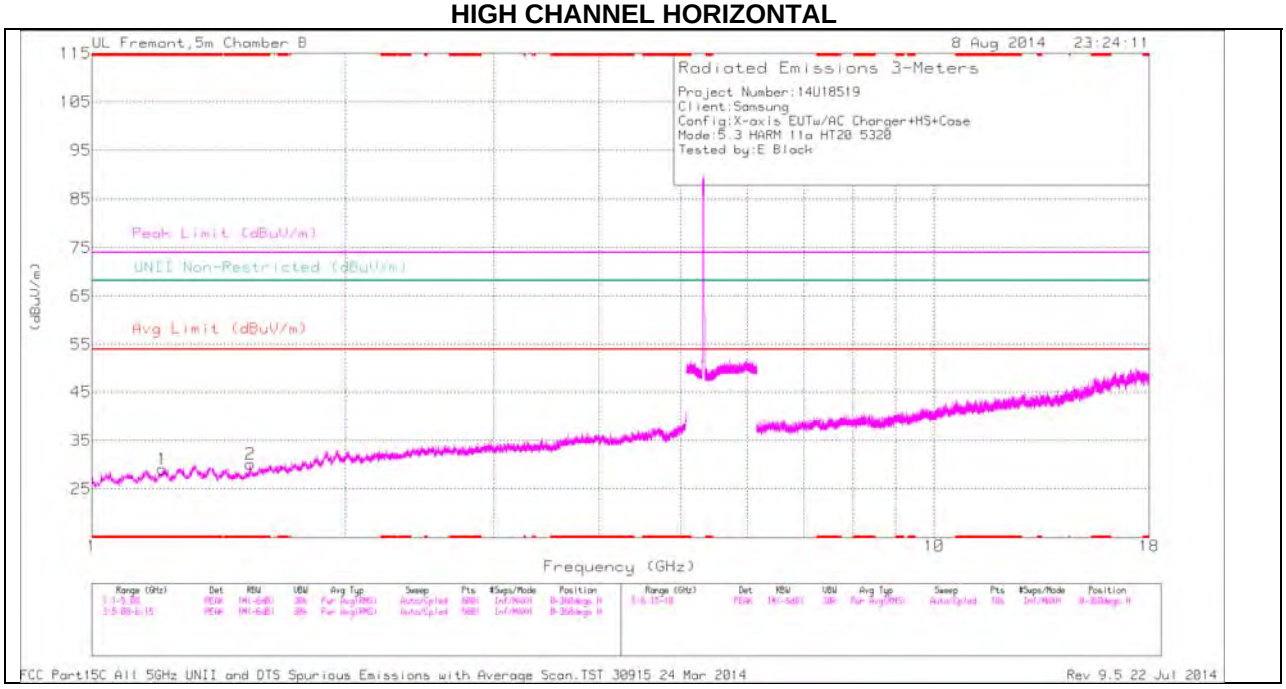
PK - Peak detector



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL HORIZONTAL



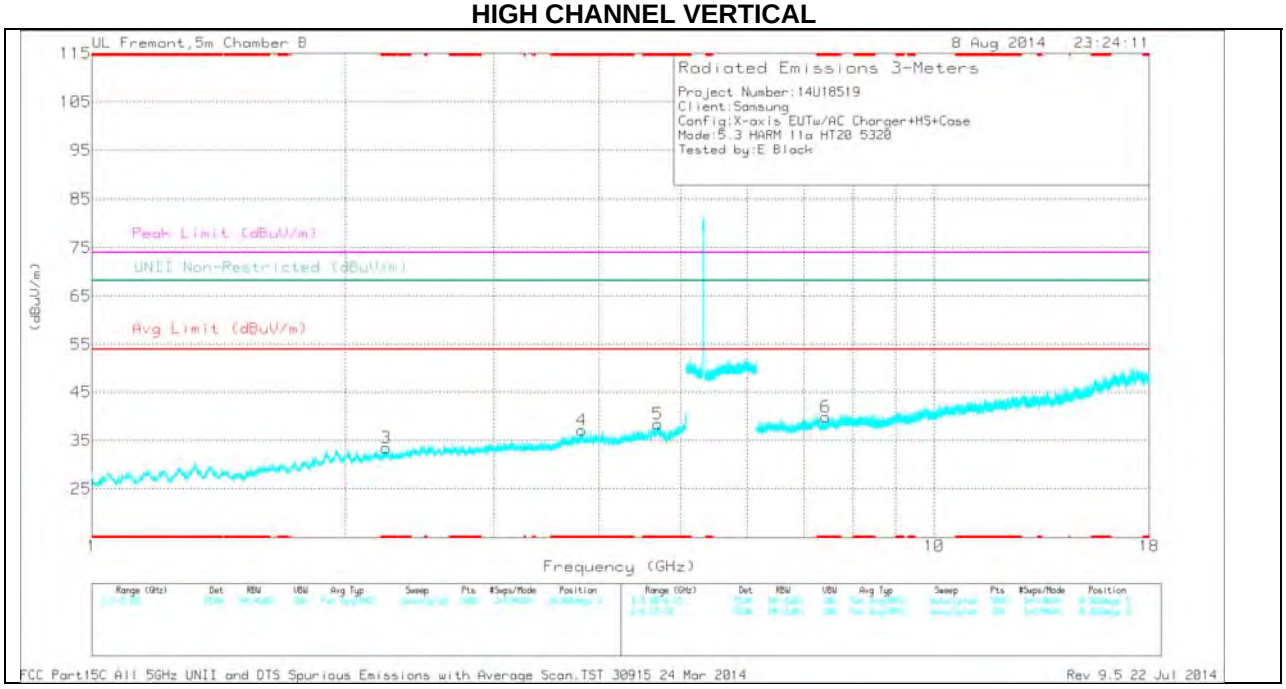

Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**HIGH CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr /Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.212 | 35.13 | PK | 28.3 | -34.4 | 29.03 | - | - | 74 | -44.97 | - | - | 0-360 | 101 | H |
| 2 | * 1.543 | 35.6 | PK | 28.2 | -33.7 | 30.1 | - | - | 74 | -43.9 | - | - | 0-360 | 200 | H |
| 3 | * 2.235 | 33.93 | PK | 31.4 | -31.8 | 33.53 | - | - | 74 | -40.47 | - | - | 0-360 | 101 | V |
| 4 | * 3.817 | 34.27 | PK | 33.7 | -30.8 | 37.17 | - | - | 74 | -36.83 | - | - | 0-360 | 101 | V |
| 5 | * 4.701 | 33.84 | PK | 34.2 | -29.6 | 38.44 | - | - | 74 | -35.56 | - | - | 0-360 | 101 | V |
| 6 | * 7.436 | 30.61 | PK | 35.6 | -26.4 | 39.81 | - | - | 74 | -34.19 | - | - | 0-360 | 199 | V |

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector



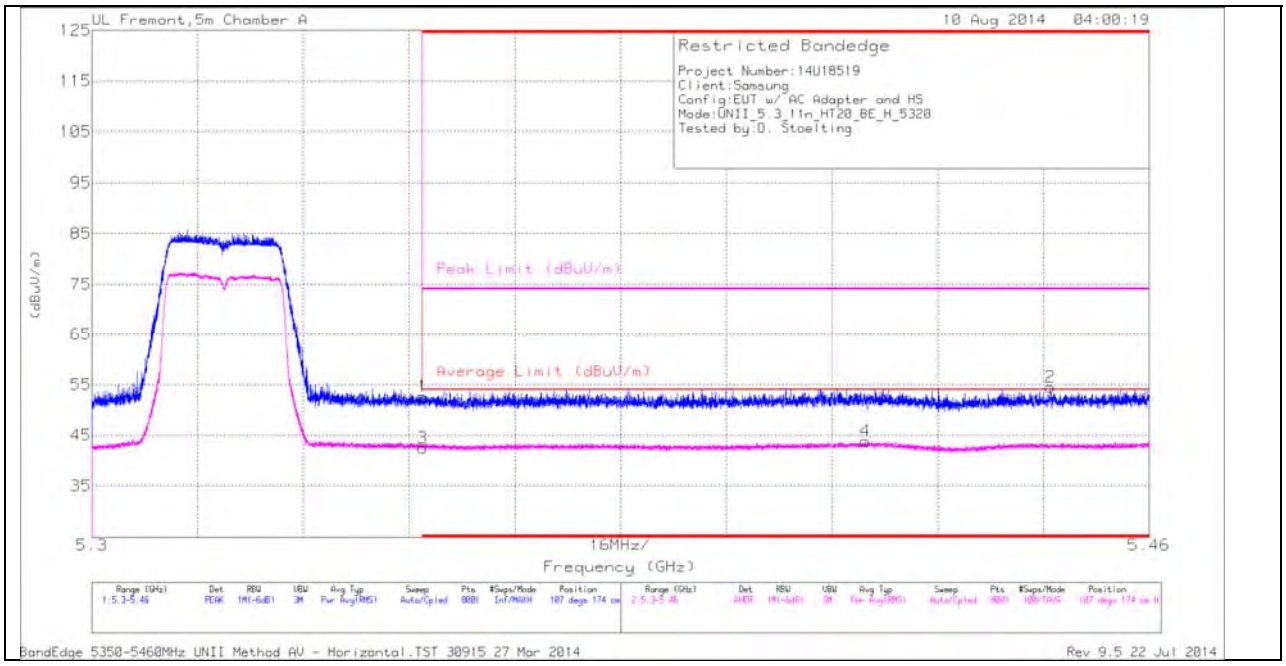
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 11.2.2. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.3 GHz BAND

## AUTHORIZED BANDEDGE (HIGH CHANNEL)

### HORIZONTAL PEAK AND AVERAGE PLOT

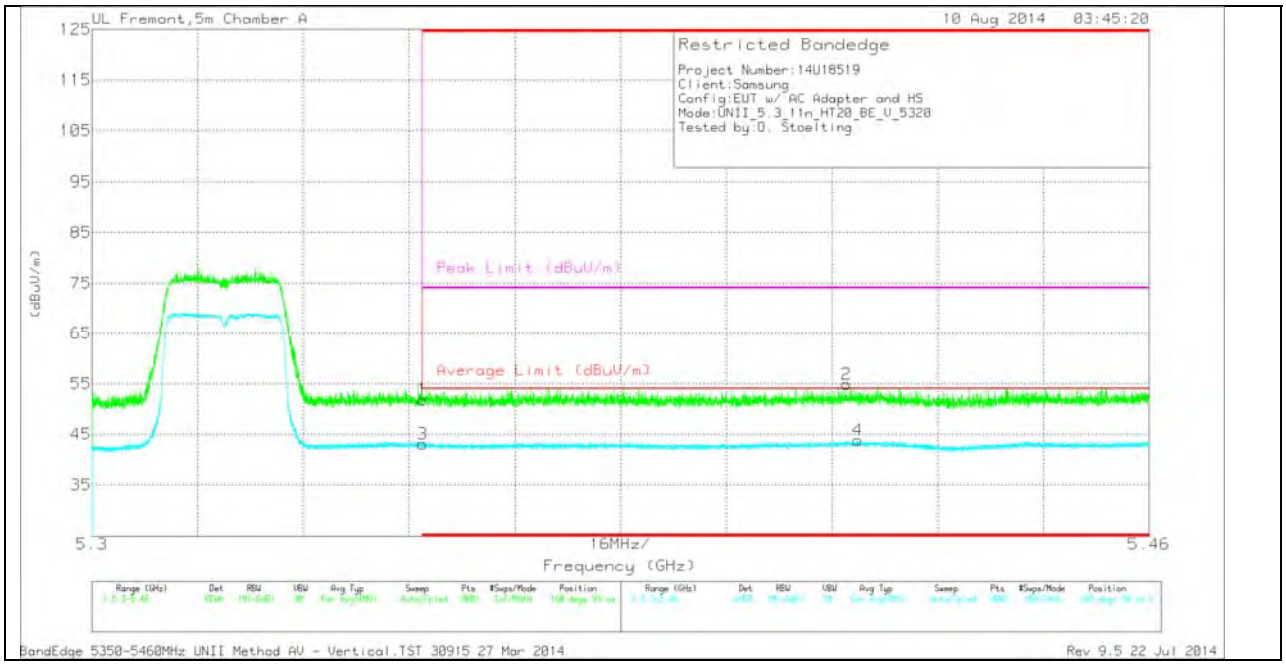



### HORIZONTAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 | * 5.35 | 37.98 | PK | 34.3 | -19.6 | 0 | 52.68 | - | - | 74 | -21.32 | 107 | 174 | H |
| 3 | * 5.35 | 27.46 | RMS | 34.3 | -19.6 | .32 | 42.51 | 54 | -11.49 | - | - | 107 | 174 | H |
| 4 | * 5.417 | 28.64 | RMS | 34.4 | -19.6 | .32 | 43.79 | 54 | -10.21 | - | - | 107 | 174 | H |
| 2 | * 5.445 | 39.98 | PK | 34.4 | -19.9 | 0 | 54.48 | - | - | 74 | -19.52 | 107 | 174 | H |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT



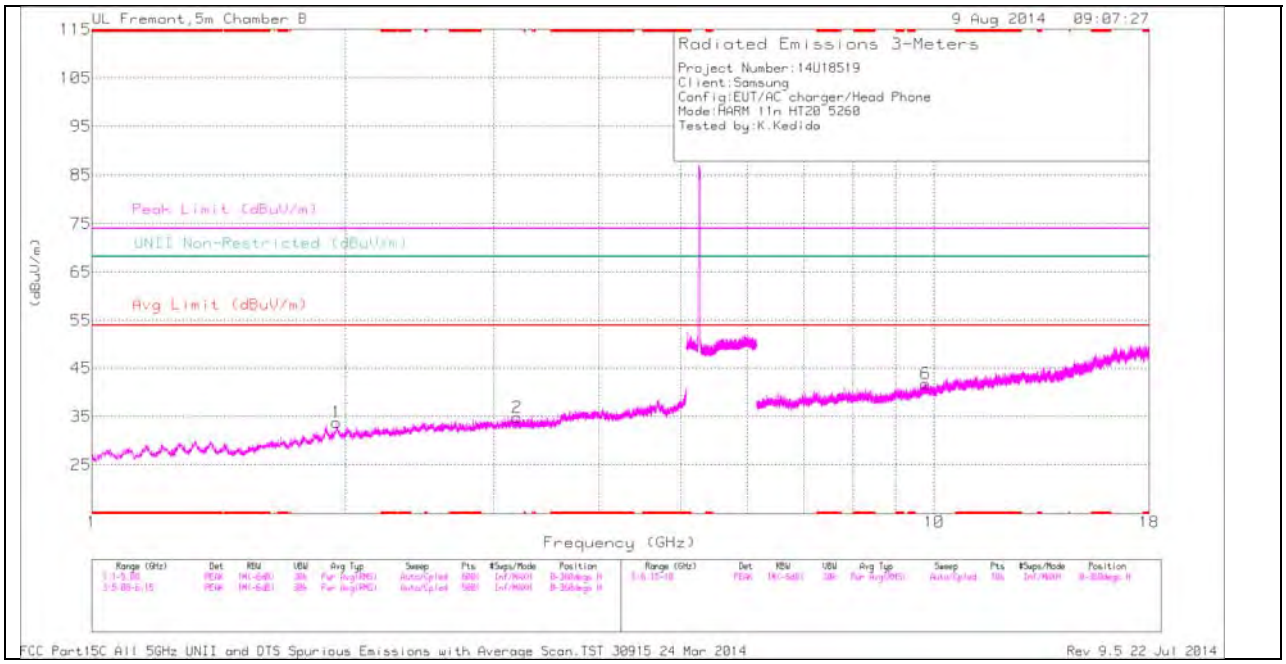

## VERTICAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 | * 5.35 | 37.14 | PK | 34.3 | -19.6 | 0 | 51.84 | - | - | 74 | -22.16 | 160 | 99 | V |
| 3 | * 5.35 | 28 | RMS | 34.3 | -19.6 | .32 | 43.05 | 54 | -10.95 | - | - | 160 | 99 | V |
| 2 | * 5.414 | 40.09 | PK | 34.4 | -19.6 | 0 | 54.89 | - | - | 74 | -19.11 | 160 | 99 | V |
| 4 | * 5.416 | 28.72 | RMS | 34.4 | -19.6 | .32 | 43.87 | 54 | -10.13 | - | - | 160 | 99 | V |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL HORIZONTAL



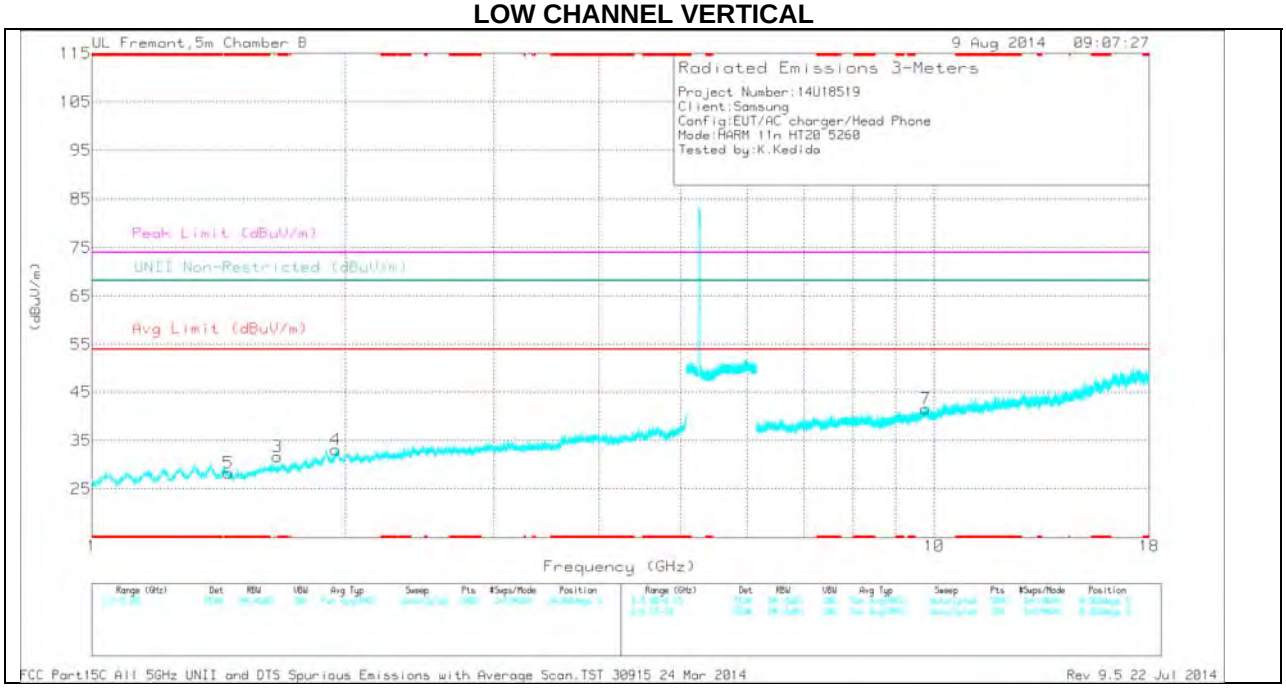

Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**LOW CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## LOW CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr /Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.167 | 35.54 | PK | 27.9 | -34.3 | 29.14 | - | - | 74 | -44.86 | - | - | 0-360 | 200 | H |
| 2 | * 3.757 | 34.16 | PK | 33.5 | -30.7 | 36.96 | - | - | 74 | -37.04 | - | - | 0-360 | 200 | H |
| 3 | * 4.69 | 33.88 | PK | 34.2 | -29.7 | 38.38 | - | - | 74 | -35.62 | - | - | 0-360 | 200 | V |
| 4 | * 4.266 | 32.85 | PK | 33.6 | -29.6 | 36.85 | - | - | 74 | -37.15 | - | - | 0-360 | 200 | V |
| 5 | * 1.693 | 35.23 | PK | 29 | -33 | 31.23 | - | - | 74 | -42.77 | - | - | 0-360 | 200 | V |
| 6 | * 2.37 | 34.05 | PK | 32 | -32.5 | 33.55 | - | - | 74 | -40.45 | - | - | 0-360 | 200 | V |

PK - Peak detector

*RADIATED EMISSIONS*

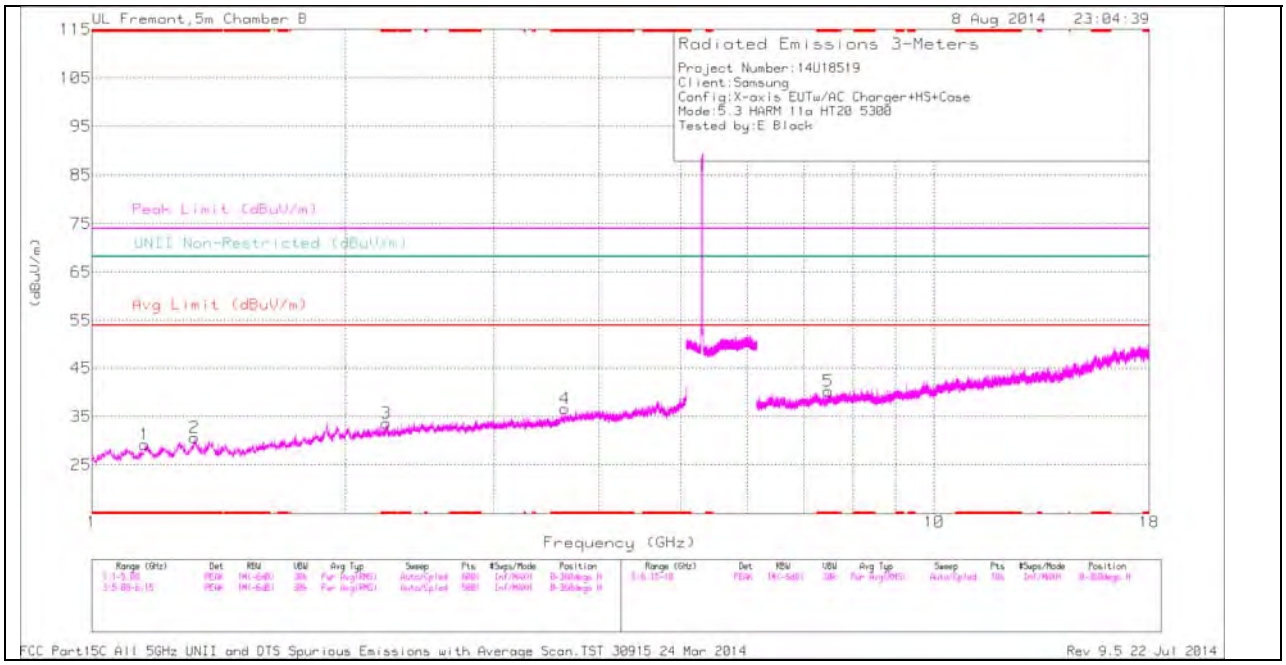
| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 1.662 | 25.84 | PK1 | 28.8 | -32.7 | 21.94 | 54 | -32.06 | - | - | - | - | 360 | 200 | V |
| * 1.662 | 27.61 | PK1 | 28.8 | -32.7 | 23.71 | 54 | -30.29 | - | - | - | - | 360 | 102 | V |
| 9.769 | 20.14 | PK1 | 36.9 | -23 | 34.04 | - | - | - | - | - | - | 360 | 198 | H |
| 9.769 | 18.76 | PK1 | 36.9 | -23 | 32.66 | - | - | - | - | - | - | 360 | 103 | V |

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL HORIZONTAL

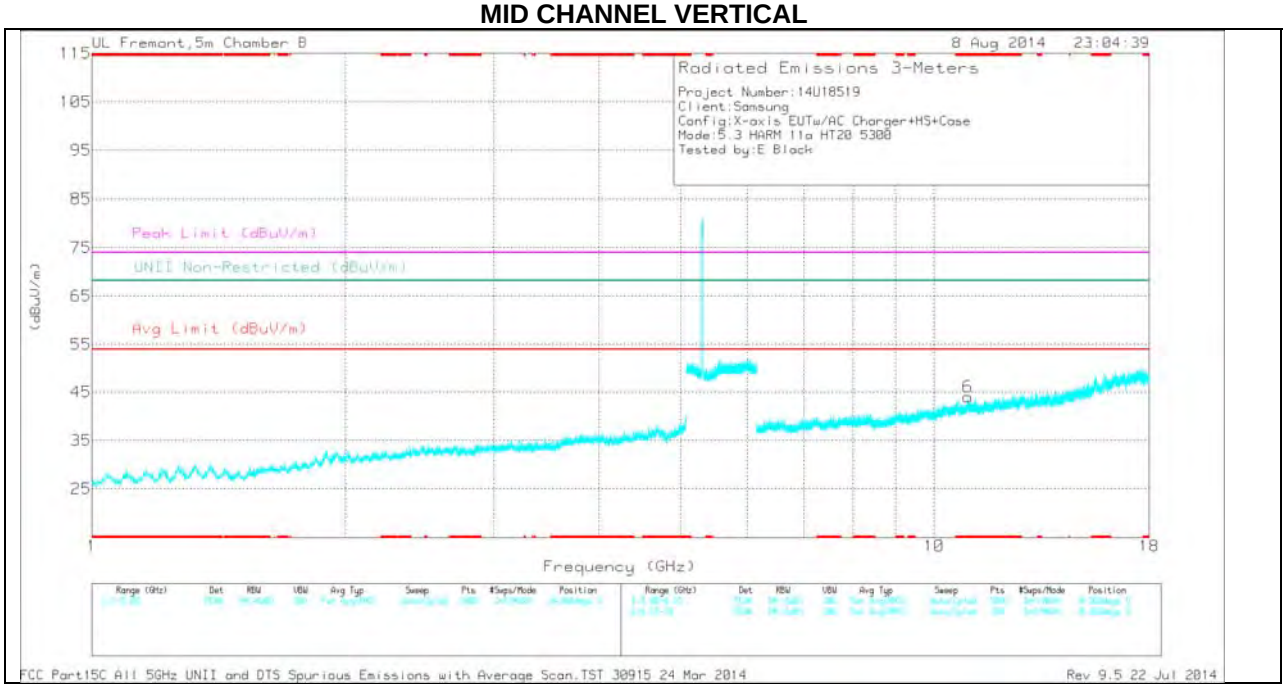



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**MID CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL DATA

### *TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr /Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.155 | 35.67 | PK | 27.8 | -34.2 | 29.27 | - | - | 74 | -44.73 | - | - | 0-360 | 100 | H |
| 2 | * 1.322 | 35.56 | PK | 28.8 | -33.7 | 30.66 | - | - | 74 | -43.34 | - | - | 0-360 | 100 | H |
| 3 | * 2.237 | 33.99 | PK | 31.4 | -31.8 | 33.59 | - | - | 74 | -40.41 | - | - | 0-360 | 100 | H |
| 4 | * 3.641 | 34.19 | PK | 33.2 | -30.8 | 36.59 | - | - | 74 | -37.41 | - | - | 0-360 | 100 | H |
| 5 | * 7.488 | 30.44 | PK | 35.6 | -25.8 | 40.24 | - | - | 74 | -33.76 | - | - | 0-360 | 200 | H |
| 6 | * 10.965 | 28.16 | PK | 37.8 | -22 | 43.96 | - | - | 74 | -30.04 | - | - | 0-360 | 101 | V |

PK - Peak detector

### *RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 3.815 | 40.76 | PK1 | 33.7 | -30.8 | 0 | 43.66 | - | - | 74 | -30.34 | - | - | 359 | 200 | H |
| * 4.318 | 40.02 | PK1 | 33.7 | -29.7 | 0 | 44.02 | - | - | 74 | -29.98 | - | - | 359 | 200 | V |
| 9.759 | 35.87 | PK1 | 36.9 | -23.2 | 0 | 49.57 | - | - | - | - | 68.2 | -18.63 | 359 | 200 | V |
| 9.765 | 35.71 | PK1 | 36.9 | -23.1 | 0 | 49.51 | - | - | - | - | 68.2 | -18.69 | 359 | 200 | H |

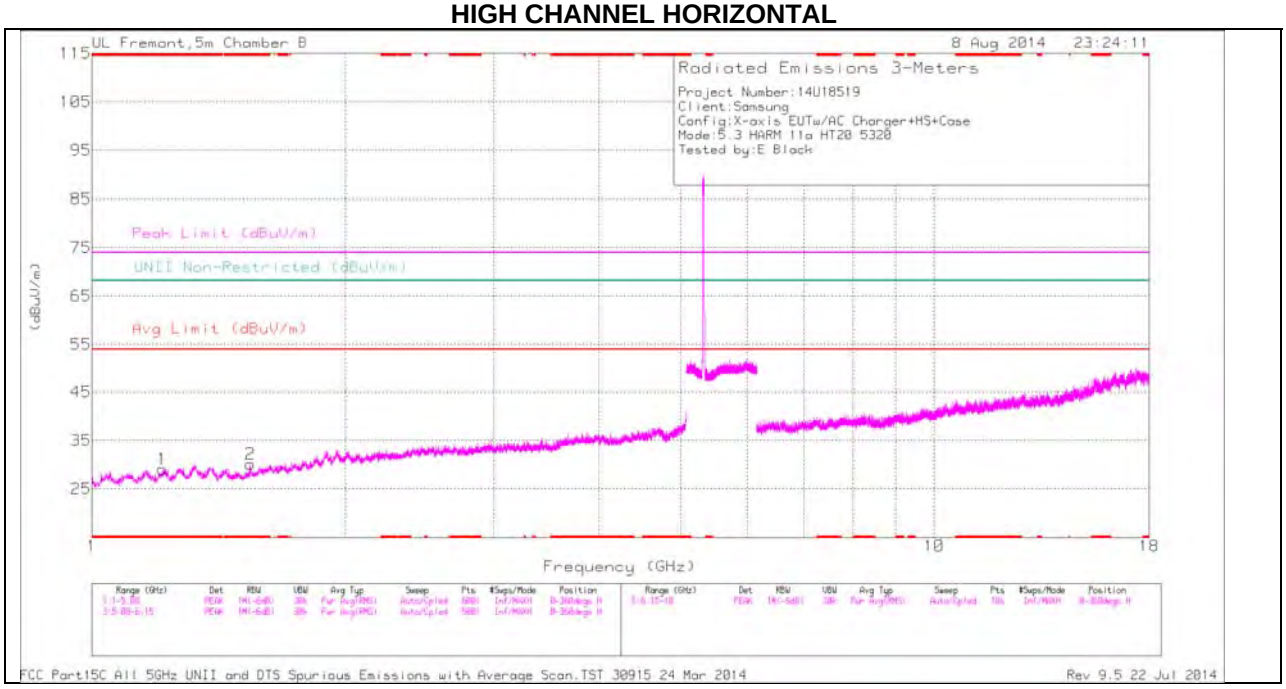
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL HORIZONTAL



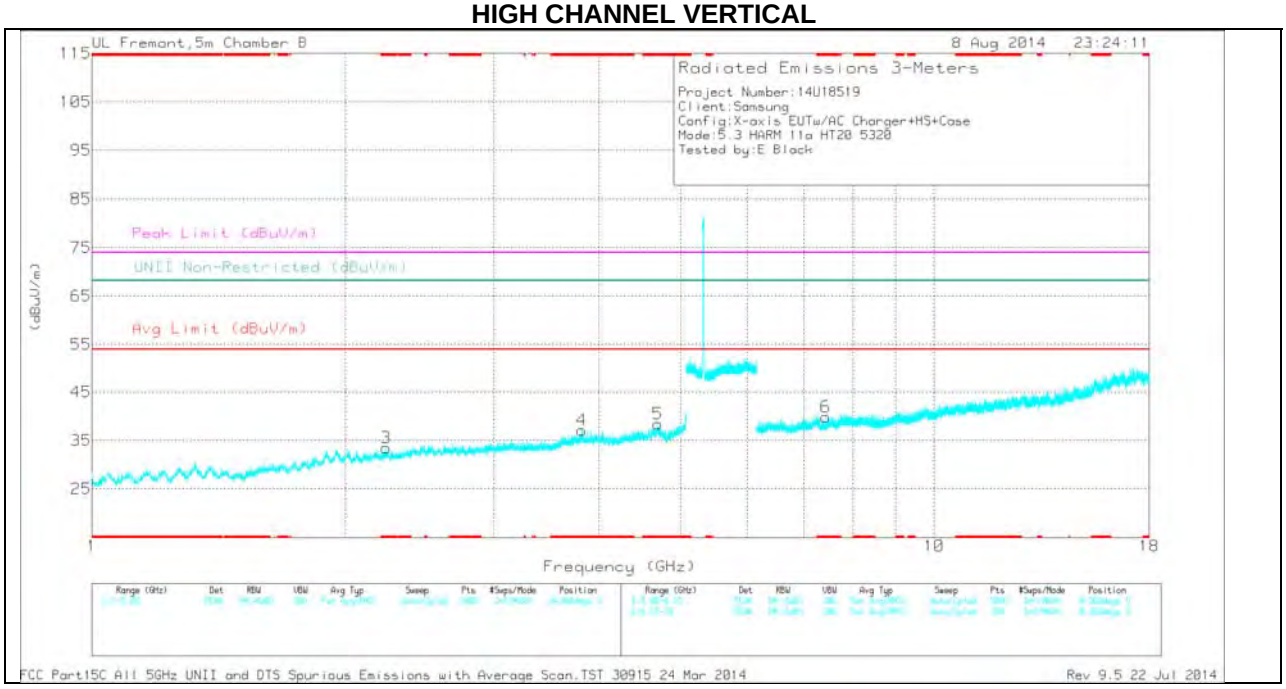

Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**HIGH CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr /Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.212 | 35.13 | PK | 28.3 | -34.4 | 29.03 | - | - | 74 | -44.97 | - | - | 0-360 | 101 | H |
| 2 | * 1.543 | 35.6 | PK | 28.2 | -33.7 | 30.1 | - | - | 74 | -43.9 | - | - | 0-360 | 200 | H |
| 3 | * 2.235 | 33.93 | PK | 31.4 | -31.8 | 33.53 | - | - | 74 | -40.47 | - | - | 0-360 | 101 | V |
| 4 | * 3.817 | 34.27 | PK | 33.7 | -30.8 | 37.17 | - | - | 74 | -36.83 | - | - | 0-360 | 101 | V |
| 5 | * 4.701 | 33.84 | PK | 34.2 | -29.6 | 38.44 | - | - | 74 | -35.56 | - | - | 0-360 | 101 | V |
| 6 | * 7.436 | 30.61 | PK | 35.6 | -26.4 | 39.81 | - | - | 74 | -34.19 | - | - | 0-360 | 199 | V |

PK - Peak detector

*RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 2.697 | 41.2 | PK1 | 32.2 | -31.3 | 0 | 42.1 | - | - | 74 | -31.9 | - | - | 360 | 199 | H |
| * 3.725 | 40.61 | PK1 | 33.4 | -31 | 0 | 43.01 | - | - | 74 | -30.99 | - | - | 360 | 107 | V |
| 9.766 | 35.67 | PK1 | 36.9 | -23.1 | 0 | 49.47 | - | - | - | - | 68.2 | -18.73 | 360 | 199 | V |
| 9.775 | 35.7 | PK1 | 36.9 | -23.1 | 0 | 49.5 | - | - | - | - | 68.2 | -18.7 | 360 | 199 | H |

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

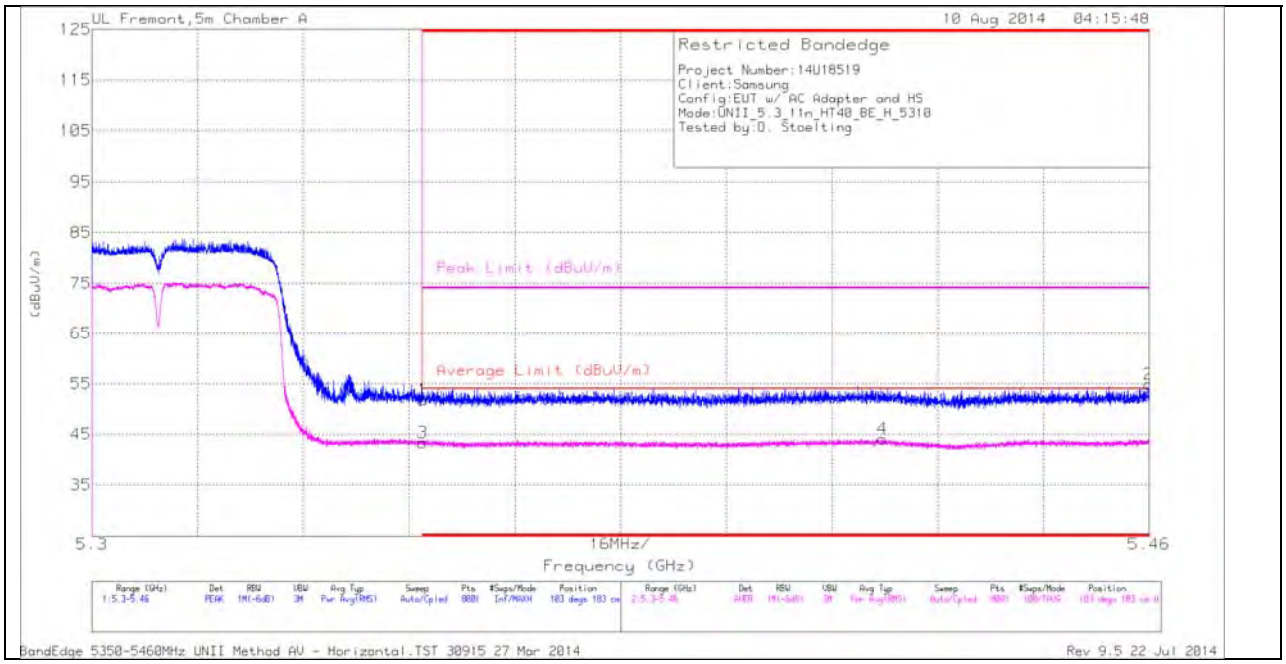


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 11.2.3. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.3 GHz BAND AUTHORIZED BANDEDGE (HIGH CHANNEL)

### HORIZONTAL PEAK AND AVERAGE PLOT

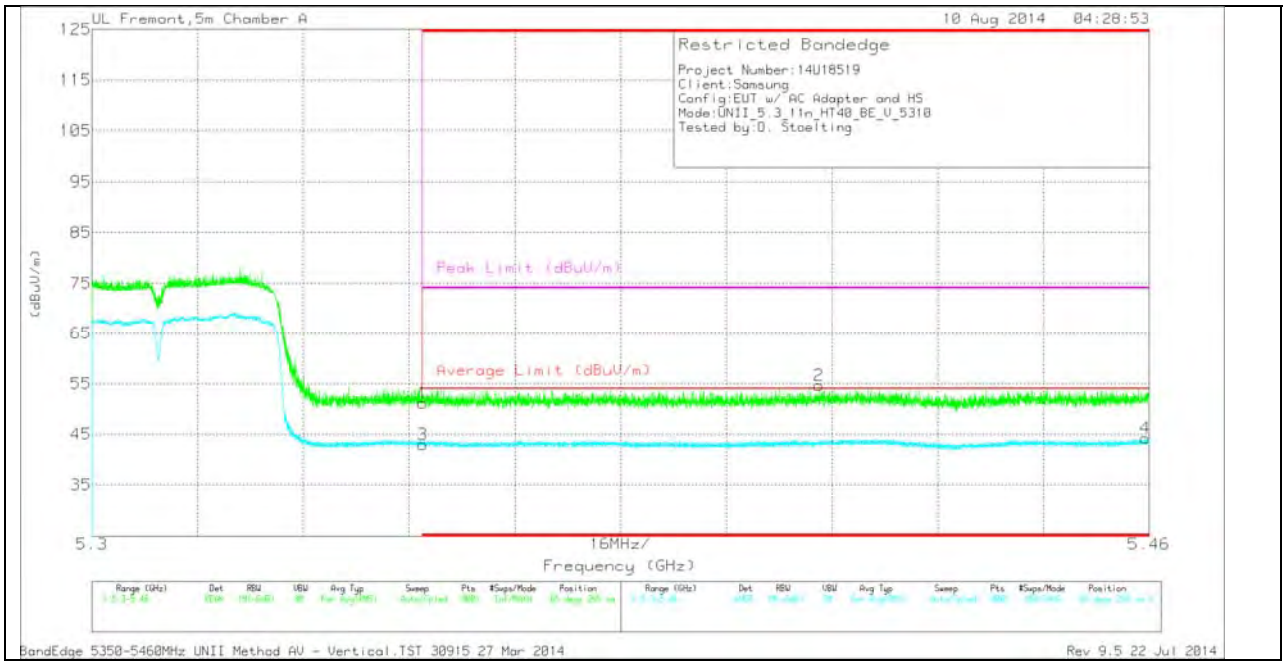



### HORIZONTAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Fltr/Pad (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 | * 5.35 | 37.09 | PK | 34.3 | -19.6 | 0 | 51.79 | - | - | 74 | -22.21 | 103 | 183 | H |
| 3 | * 5.35 | 28 | RMS | 34.3 | -19.6 | .63 | 43.39 | 54 | -10.61 | - | - | 103 | 183 | H |
| 4 | * 5.42 | 28.54 | RMS | 34.4 | -19.5 | .63 | 44.13 | 54 | -9.87 | - | - | 103 | 183 | H |
| 2 | * 5.46 | 40.26 | PK | 34.4 | -19.8 | 0 | 54.86 | - | - | 74 | -19.14 | 103 | 183 | H |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT



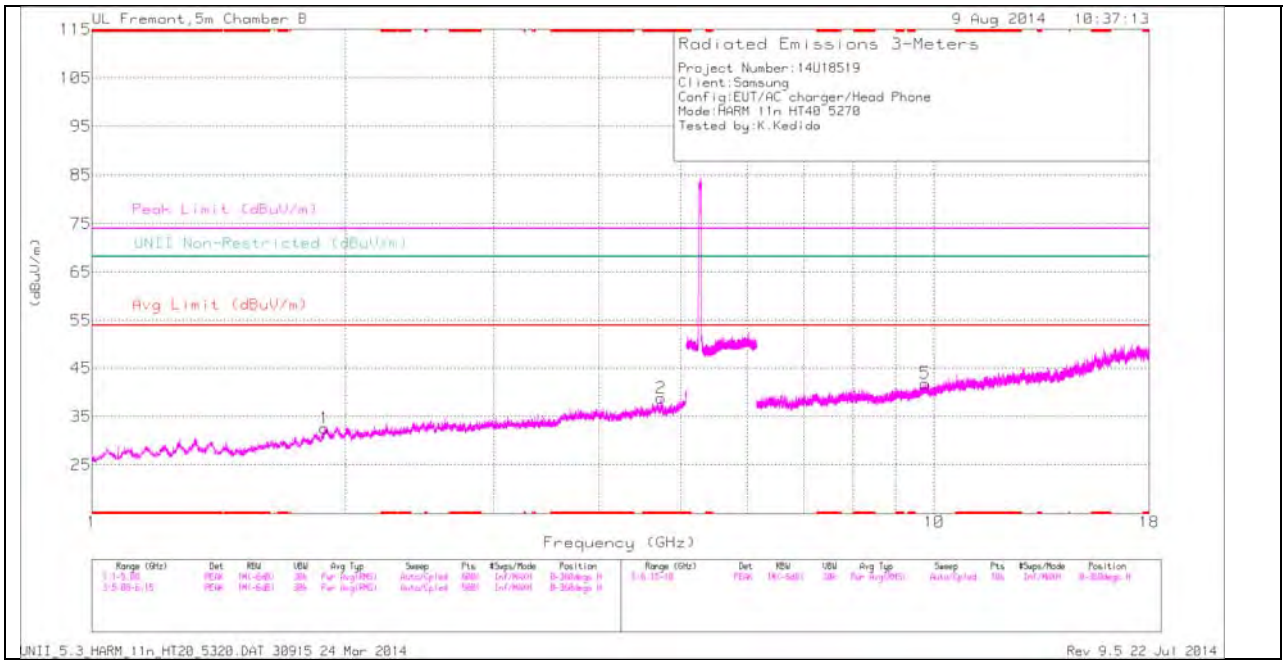

## VERTICAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 | * 5.35 | 36.49 | PK | 34.3 | -19.6 | 0 | 51.19 | - | - | 74 | -22.81 | 65 | 265 | V |
| 3 | * 5.35 | 27.52 | RMS | 34.3 | -19.6 | .63 | 42.91 | 54 | -11.09 | - | - | 65 | 265 | V |
| 2 | * 5.41 | 39.89 | PK | 34.4 | -19.6 | 0 | 54.69 | - | - | 74 | -19.31 | 65 | 265 | V |
| 4 | * 5.459 | 28.94 | RMS | 34.4 | -19.8 | .63 | 44.23 | 54 | -9.77 | - | - | 65 | 265 | V |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL HORIZONTAL



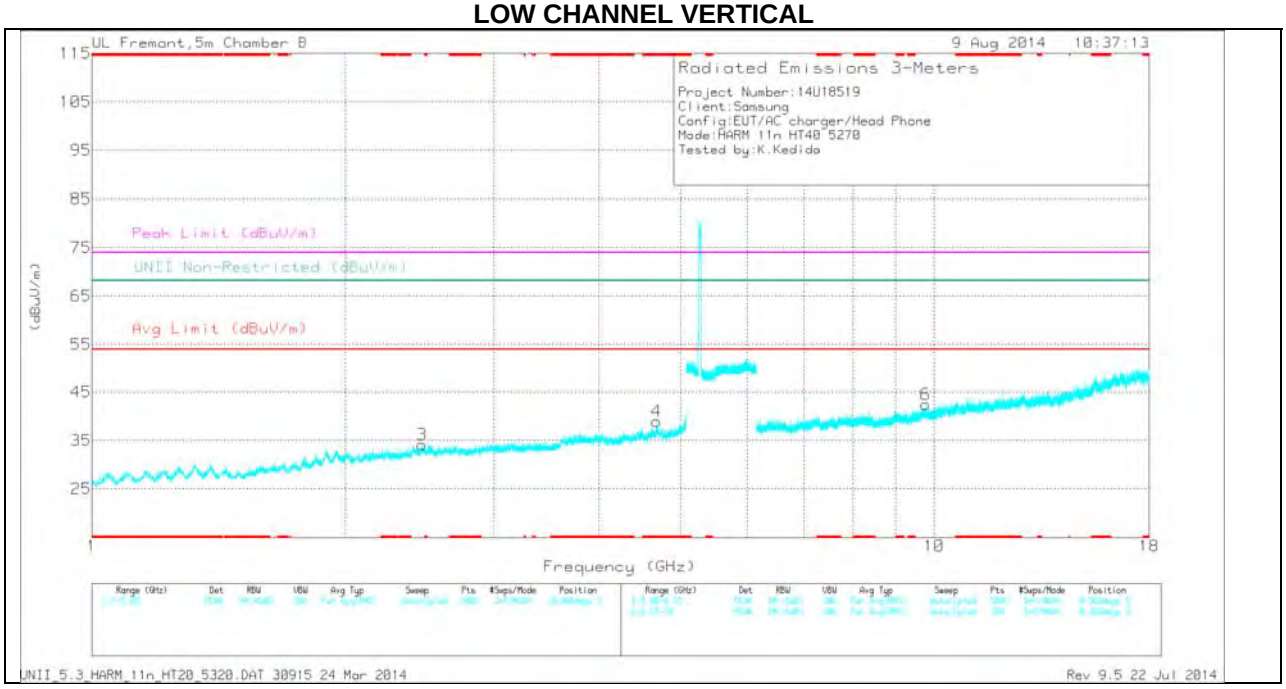

Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**LOW CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## LOW CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 4.74 | 34 | PK | 34.2 | -29.4 | 0 | 38.8 | - | - | 74 | -35.2 | - | - | 0-360 | 101 | H |
| 4 | * 4.679 | 34.29 | PK | 34.2 | -29.5 | 0 | 38.99 | - | - | 74 | -35.01 | - | - | 0-360 | 200 | V |
| 1 | 1.889 | 34.08 | PK | 31 | -32.5 | 0 | 32.58 | - | - | - | - | 68.2 | -35.62 | 0-360 | 101 | H |
| 3 | 2.466 | 33.8 | PK | 32.3 | -31.9 | 0 | 34.2 | - | - | - | - | 68.2 | -34 | 0-360 | 101 | V |
| 5 | 9.763 | 28.07 | PK | 36.9 | -23.1 | 0 | 41.87 | - | - | - | - | 68.2 | -26.33 | 0-360 | 199 | H |
| 6 | 9.775 | 28.63 | PK | 36.9 | -23.1 | 0 | 42.43 | - | - | - | - | 68.2 | -25.77 | 0-360 | 199 | V |

PK - Peak detector

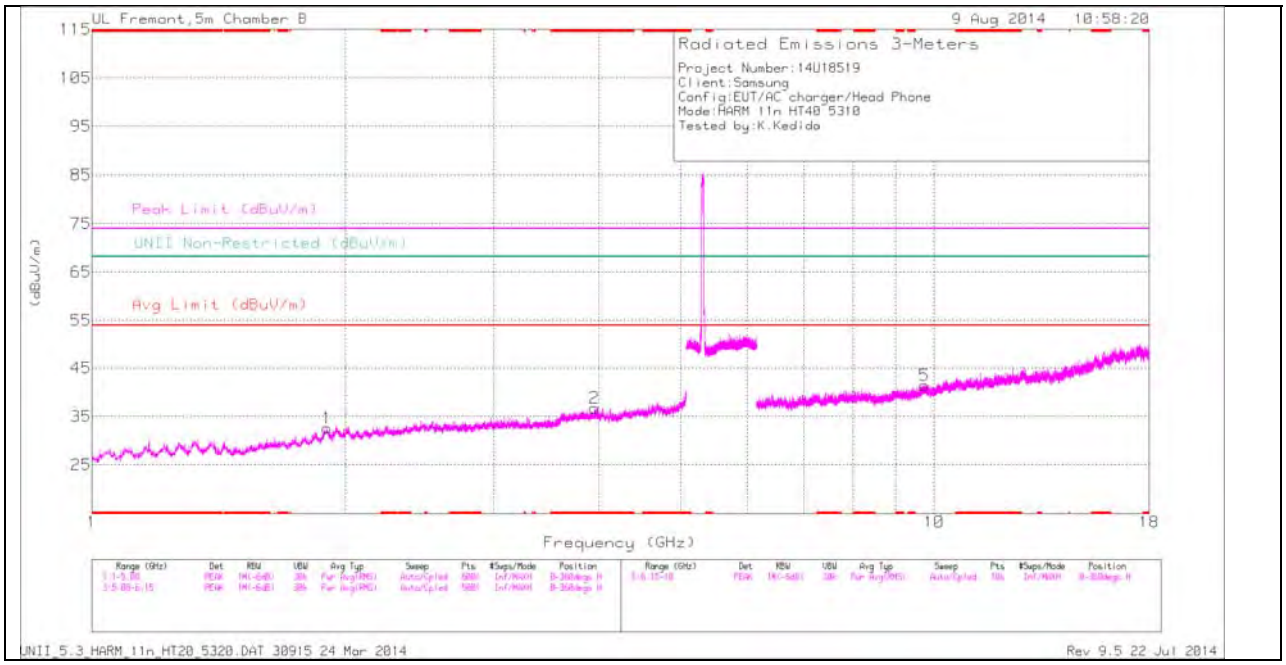
*RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 4.74 | 40.78 | PK1 | 34.2 | -29.5 | 0 | 45.48 | - | - | 74 | -28.52 | - | - | 359 | 101 | H |
| * 4.681 | 41.33 | PK1 | 34.2 | -29.5 | 0 | 46.03 | - | - | 74 | -27.97 | - | - | 359 | 200 | V |
| 9.763 | 35.39 | PK1 | 36.9 | -23.1 | 0 | 49.19 | - | - | - | - | 68.2 | -19.01 | 359 | 200 | H |
| 9.775 | 36.1 | PK1 | 36.9 | -23.1 | 0 | 49.9 | - | - | - | - | 68.2 | -18.3 | 359 | 200 | V |

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL HORIZONTAL



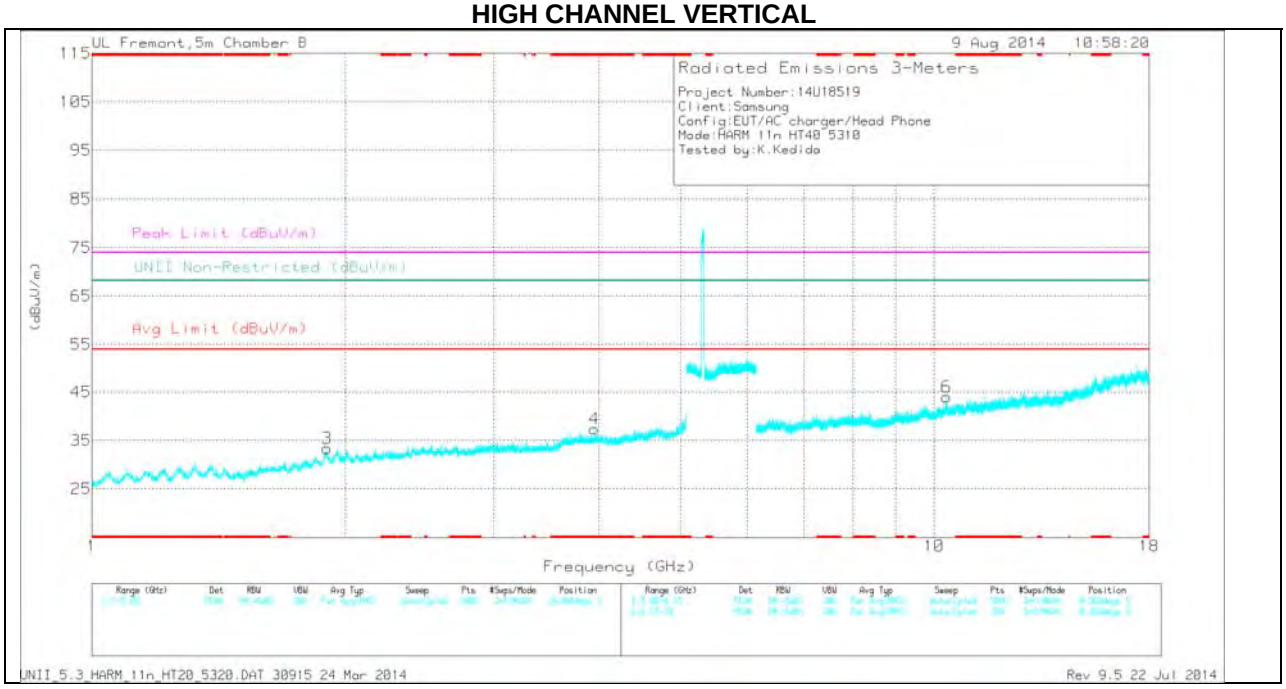

Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**HIGH CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 3.948 | 33.22 | PK | 33.7 | -30.2 | 0 | 36.72 | - | - | 74 | -37.28 | - | - | 0-360 | 200 | H |
| 4 | * 3.948 | 33.9 | PK | 33.7 | -30.2 | 0 | 37.4 | - | - | 74 | -36.6 | - | - | 0-360 | 200 | V |
| 3 | 1.901 | 34.92 | PK | 31.1 | -32.6 | 0 | 33.42 | - | - | - | - | 68.2 | -34.78 | 0-360 | 200 | V |
| 1 | 1.903 | 34.04 | PK | 31.1 | -32.6 | 0 | 32.54 | - | - | - | - | 68.2 | -35.66 | 0-360 | 101 | H |
| 5 | 9.733 | 28 | PK | 36.9 | -23.5 | 0 | 41.4 | - | - | - | - | 68.2 | -26.8 | 0-360 | 199 | H |
| 6 | 10.348 | 29.41 | PK | 37.2 | -22.6 | 0 | 44.01 | - | - | - | - | 68.2 | -24.19 | 0-360 | 199 | V |

PK - Peak detector

*RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 3.946 | 40.72 | PK1 | 33.7 | -30.3 | 0 | 44.12 | - | - | 74 | -29.88 | - | - | 360 | 200 | H |
| * 3.948 | 40.97 | PK1 | 33.7 | -30.2 | 0 | 44.47 | - | - | 74 | -29.53 | - | - | 360 | 200 | V |
| * 3.948 | 33.31 | PK1 | 33.7 | -30.2 | 0 | 36.81 | - | - | 74 | -37.19 | - | - | 360 | 200 | V |
| 9.735 | 35.61 | PK1 | 36.9 | -23.5 | 0 | 49.01 | - | - | - | - | 68.2 | -19.19 | 360 | 200 | H |
| 10.347 | 35.18 | PK1 | 37.2 | -22.6 | 0 | 49.78 | - | - | - | - | 68.2 | -18.42 | 360 | 200 | V |

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

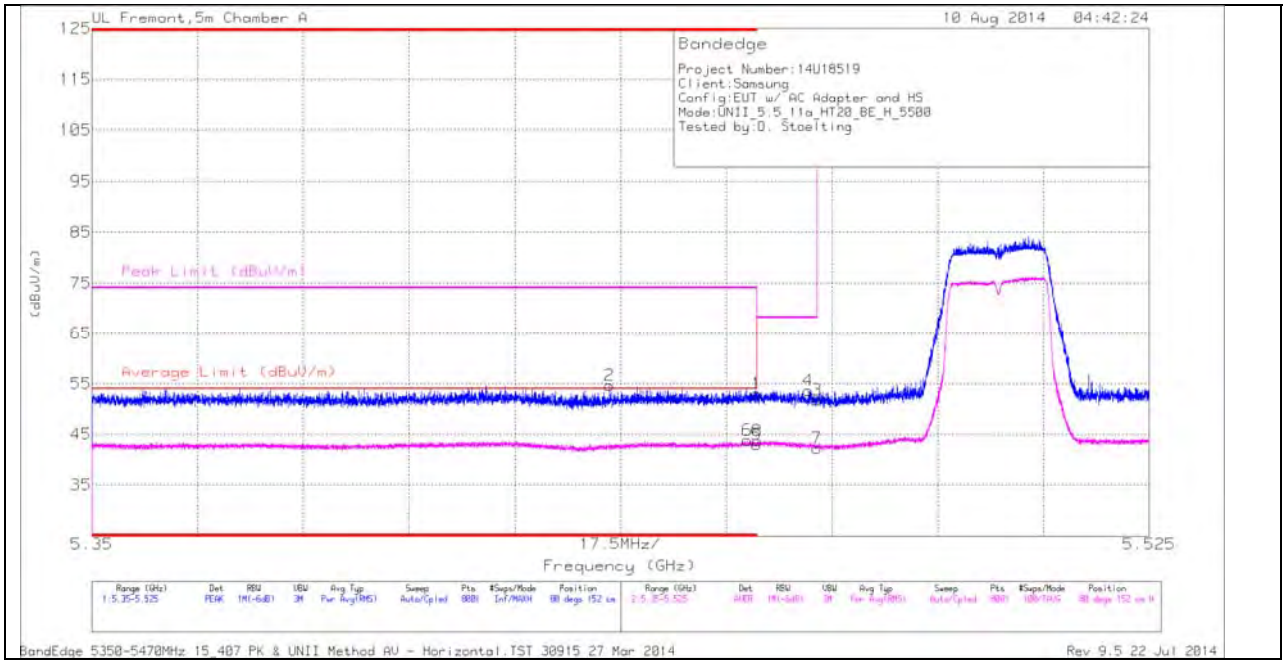

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 11.3. 5.5-5.6 GHz

### 11.3.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.5 GHz BAND

### RESTRICTED BANDEDGE (LOW CHANNEL)

#### HORIZONTAL PEAK AND AVERAGE PLOT

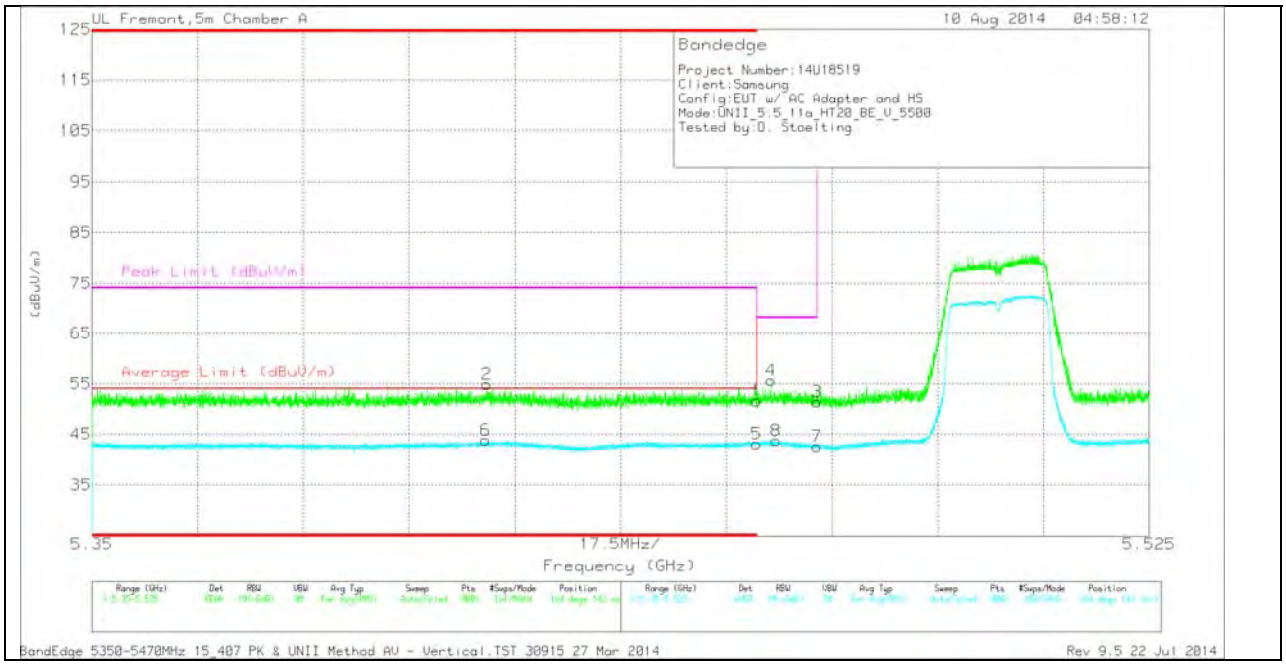



#### HORIZONTAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 5.436 | 40.44 | PK | 34.4 | -20.2 | 0 | 54.64 | - | - | 74 | -19.36 | 80 | 152 | H |
| 6 | * 5.459 | 28.87 | RMS | 34.4 | -19.8 | .29 | 43.79 | 54 | -10.21 | - | - | 80 | 152 | H |
| 1 | * 5.46 | 38.42 | PK | 34.4 | -19.8 | 0 | 53.02 | - | - | 74 | -20.98 | 80 | 152 | H |
| 5 | * 5.46 | 28.01 | RMS | 34.4 | -19.8 | .29 | 42.93 | 54 | -11.07 | - | - | 80 | 152 | H |
| 8 | 5.46 | 28.8 | RMS | 34.4 | -19.8 | .29 | 43.72 | - | - | - | - | 80 | 152 | H |
| 4 | 5.469 | 39.49 | PK | 34.4 | -20.2 | 0 | 53.69 | - | - | 68.2 | -14.51 | 80 | 152 | H |
| 3 | 5.47 | 37.72 | PK | 34.4 | -20.3 | 0 | 51.82 | - | - | 68.2 | -16.38 | 80 | 152 | H |
| 7 | 5.47 | 27.8 | RMS | 34.4 | -20.3 | .29 | 42.22 | - | - | - | - | 80 | 152 | H |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT



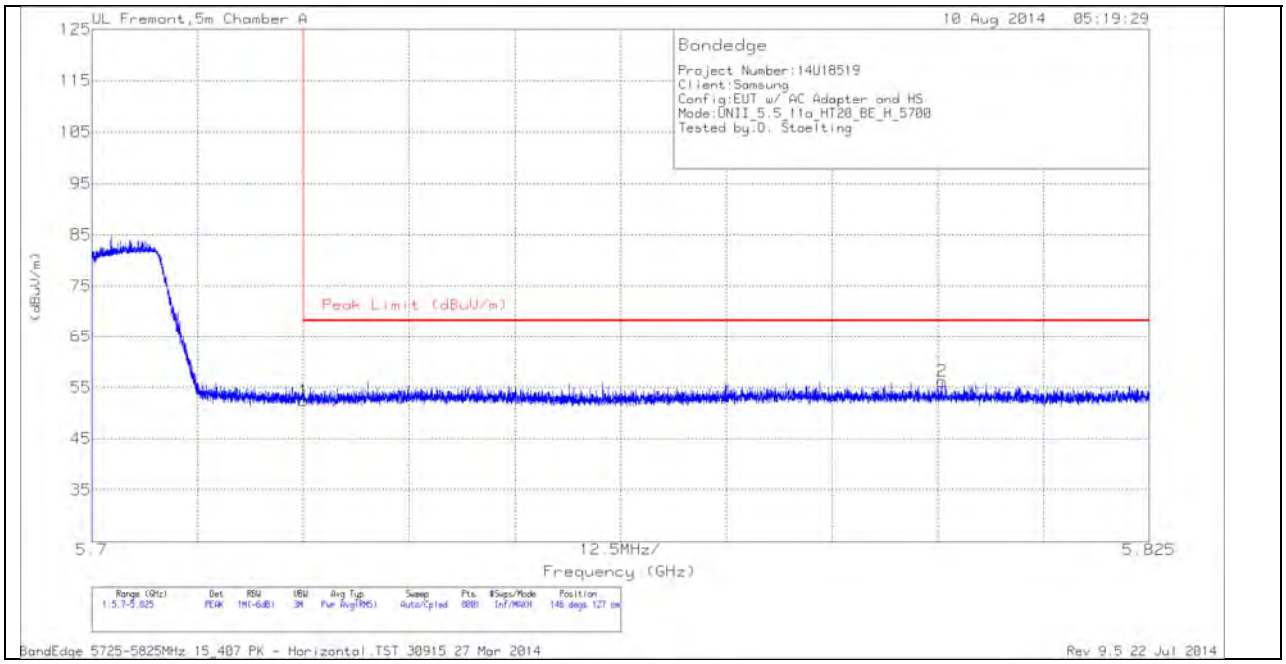

## VERTICAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 5.415 | 40.12 | PK | 34.4 | -19.6 | 0 | 54.92 | - | - | 74 | -19.08 | 164 | 142 | V |
| 6 | * 5.415 | 28.69 | RMS | 34.4 | -19.6 | .29 | 43.81 | 54 | -10.19 | - | - | 164 | 142 | V |
| 1 | * 5.46 | 37 | PK | 34.4 | -19.8 | 0 | 51.6 | - | - | 74 | -22.4 | 164 | 142 | V |
| 5 | * 5.46 | 28.14 | RMS | 34.4 | -19.8 | .29 | 43.06 | 54 | -10.94 | - | - | 164 | 142 | V |
| 4 | 5.462 | 40.94 | PK | 34.4 | -19.7 | 0 | 55.64 | - | - | 68.2 | -12.56 | 164 | 142 | V |
| 8 | 5.463 | 28.73 | RMS | 34.4 | -19.7 | .29 | 43.75 | - | - | - | - | 164 | 142 | V |
| 3 | 5.47 | 37.27 | PK | 34.4 | -20.3 | 0 | 51.37 | - | - | 68.2 | -16.83 | 164 | 142 | V |
| 7 | 5.47 | 28.23 | RMS | 34.4 | -20.3 | .29 | 42.65 | - | - | - | - | 164 | 142 | V |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# AUTHORIZED BANDEDGE (HIGH CHANNEL)

## HORIZONTAL PEAK AND AVERAGE PLOT




## HORIZONTAL DATA

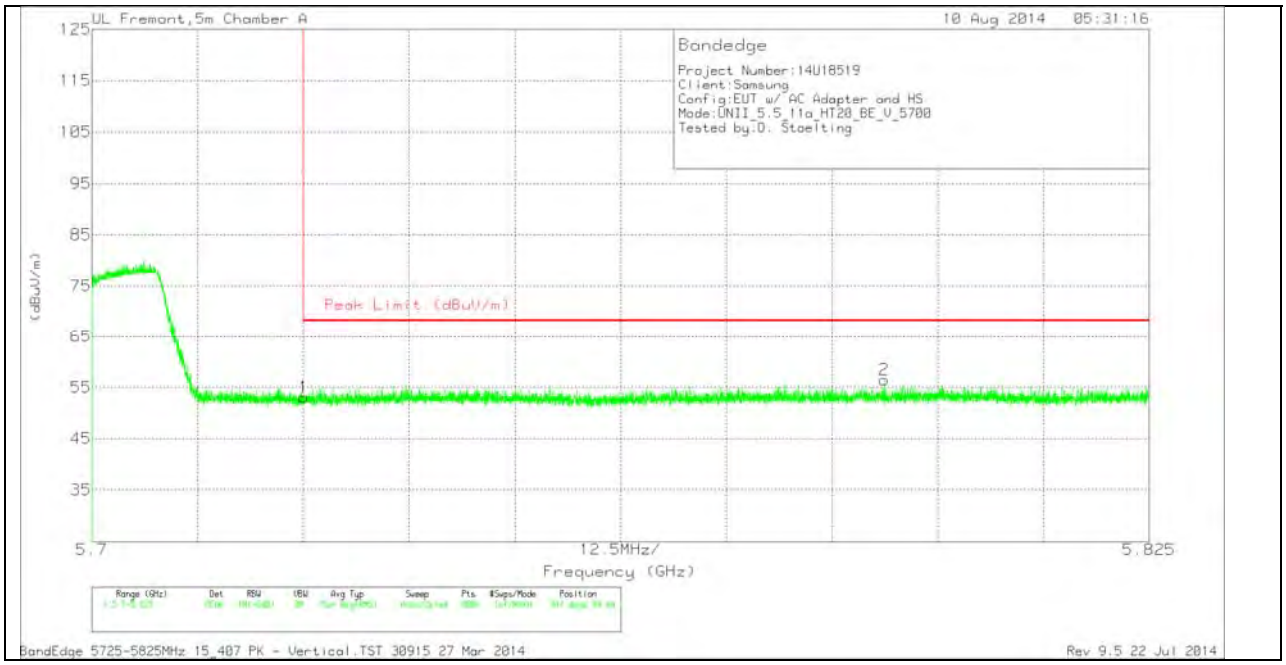
| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.725 | 37.44 | PK | 34.6 | -19.6 | 0 | 52.44 | 68.2 | -15.76 | 146 | 127 | H |
| 2 | 5.801 | 40.7 | PK | 34.8 | -19.3 | 0 | 56.2 | 68.2 | -12 | 146 | 127 | H |



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT




## VERTICAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.725 | 38.09 | PK | 34.6 | -19.6 | 0 | 53.09 | 68.2 | -15.11 | 347 | 99 | V |
| 2 | 5.794 | 41.08 | PK | 34.7 | -19.3 | 0 | 56.48 | 68.2 | -11.72 | 347 | 99 | V |

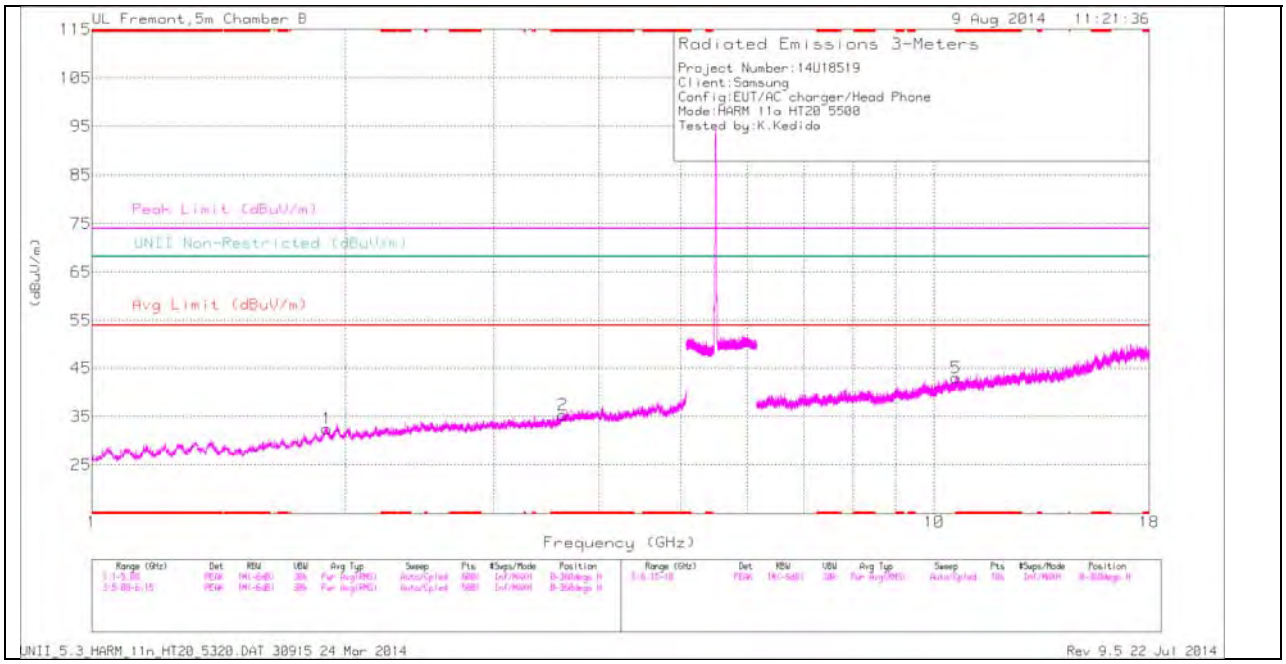


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL HORIZONTAL



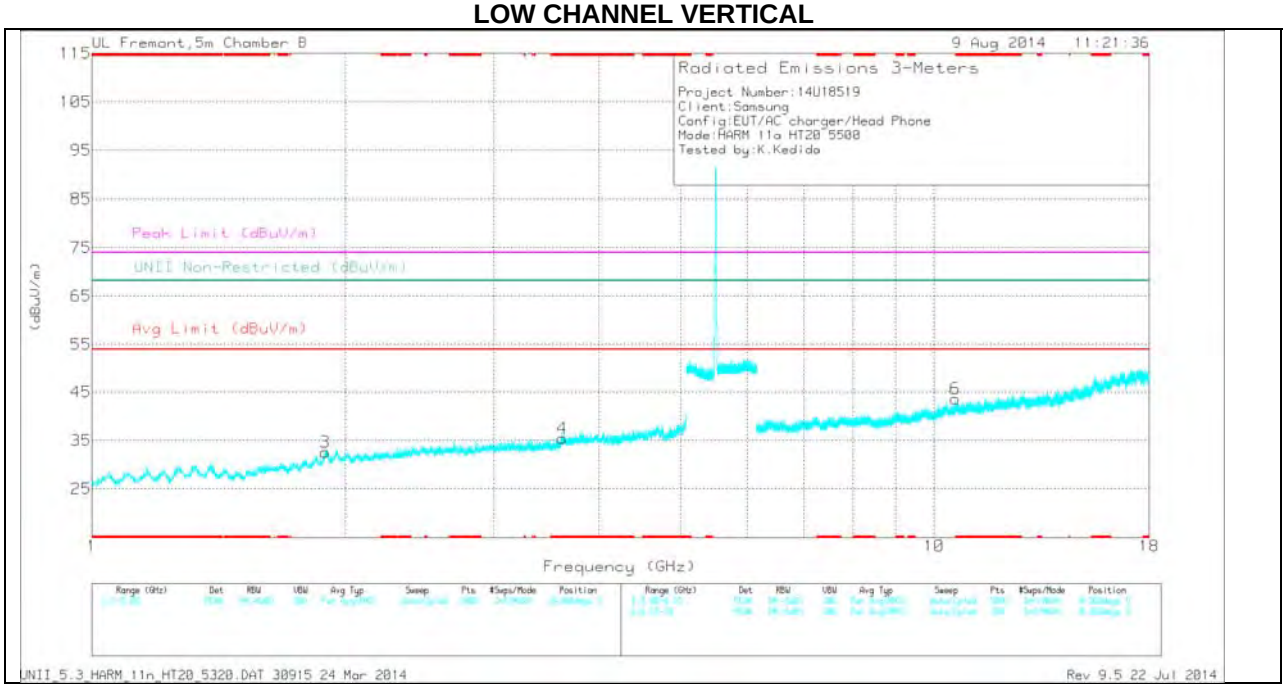

Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**LOW CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## LOW CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 3.624 | 32.85 | PK | 33.2 | -30.7 | 0 | 35.35 | - | - | 74 | -38.65 | - | - | 0-360 | 101 | H |
| 4 | * 3.621 | 32.96 | PK | 33.2 | -30.7 | 0 | 35.46 | - | - | 74 | -38.54 | - | - | 0-360 | 200 | V |
| 5 | * 10.61 | 27.33 | PK | 37.7 | -22 | 0 | 43.03 | - | - | 74 | -30.97 | - | - | 0-360 | 101 | H |
| 6 | * 10.603 | 28.16 | PK | 37.7 | -22.2 | 0 | 43.66 | - | - | 74 | -30.34 | - | - | 0-360 | 200 | V |
| 3 | 1.893 | 34.19 | PK | 31 | -32.6 | 0 | 32.59 | - | - | - | - | 68.2 | -35.61 | 0-360 | 101 | V |
| 1 | 1.9 | 34.01 | PK | 31.1 | -32.6 | 0 | 32.51 | - | - | - | - | 68.2 | -35.69 | 0-360 | 200 | H |

PK - Peak detector

*RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 3.623 | 40.03 | PK1 | 33.2 | -30.7 | 0 | 42.53 | - | - | 74 | -31.47 | - | - | 359 | 101 | H |
| * 3.62 | 40.68 | PK1 | 33.2 | -30.7 | 0 | 43.18 | - | - | 74 | -30.82 | - | - | 359 | 200 | V |
| * 10.608 | 34.32 | PK1 | 37.7 | -22.1 | 0 | 49.92 | - | - | 74 | -24.08 | - | - | 359 | 102 | H |
| * 10.608 | 23.33 | PK1 | 37.7 | -22.1 | 0 | 38.93 | - | - | 74 | -35.07 | - | - | 359 | 102 | H |
| * 10.605 | 34.59 | PK1 | 37.7 | -22.2 | 0 | 50.09 | - | - | 74 | -23.91 | - | - | 359 | 199 | V |

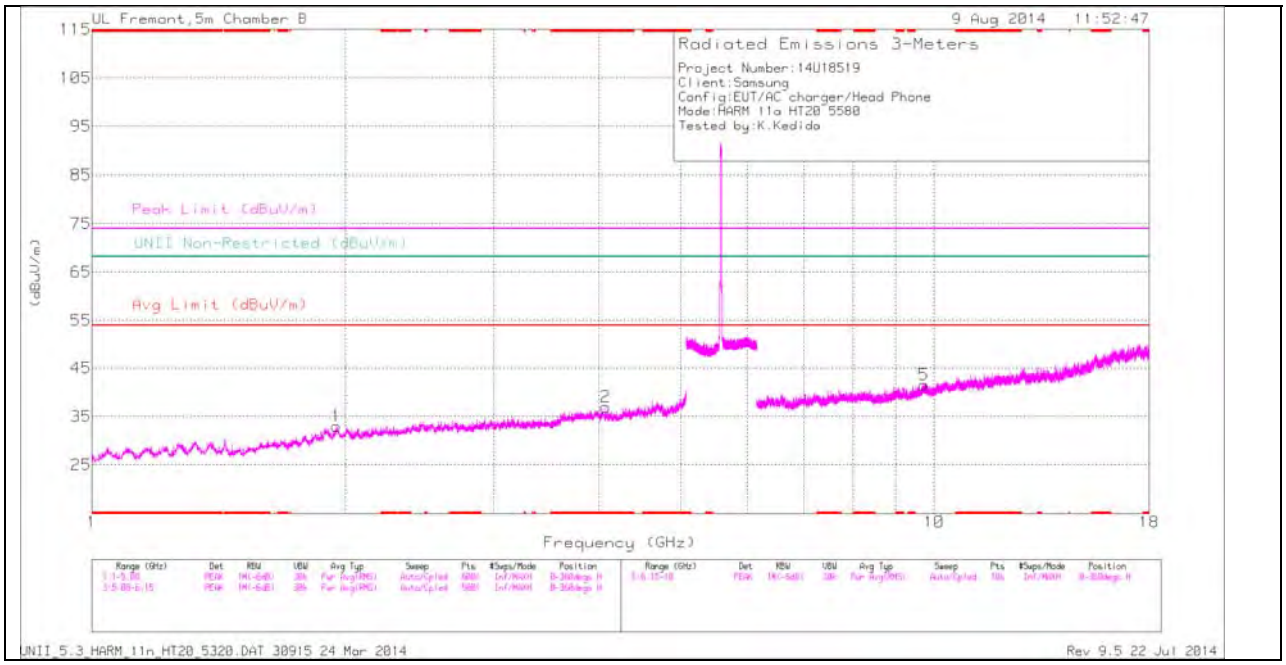
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL HORIZONTAL



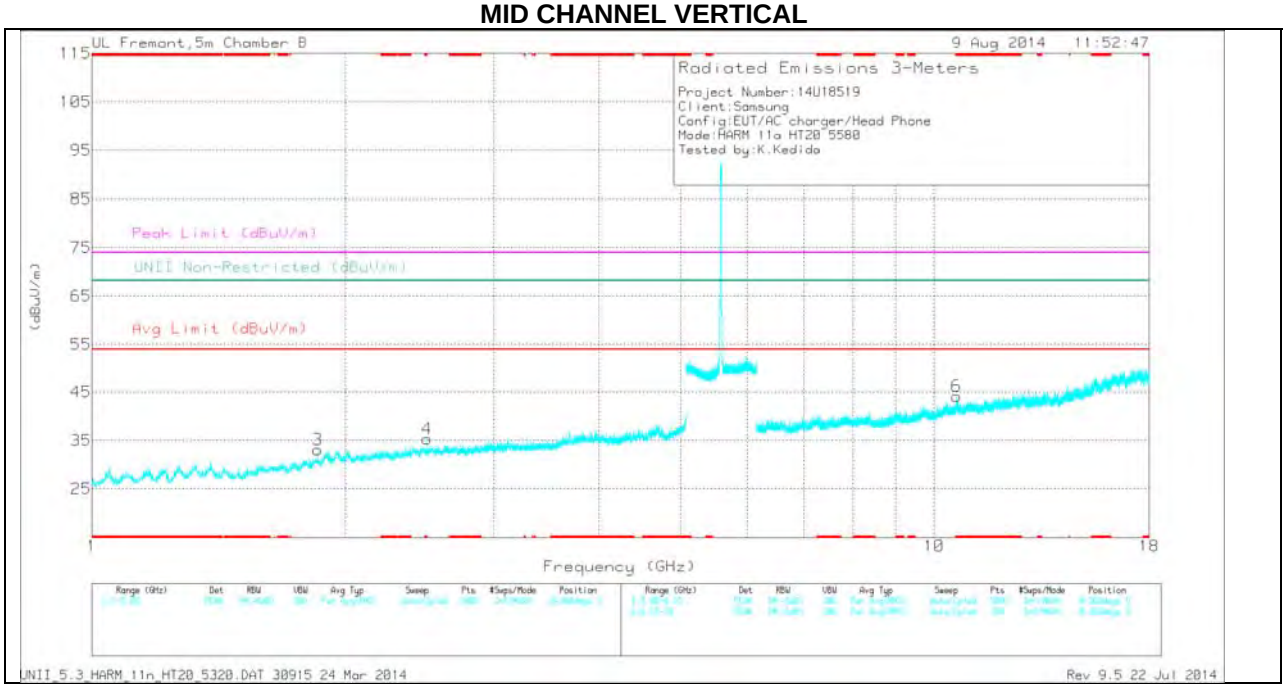

Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**MID CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL DATA

### *TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 4.071 | 33.24 | PK | 33.6 | -29.9 | 0 | 36.94 | - | - | 74 | -37.06 | - | - | 0-360 | 101 | H |
| 6 | * 10.634 | 28.4 | PK | 37.7 | -21.9 | 0 | 44.2 | - | - | 74 | -29.8 | - | - | 0-360 | 101 | V |
| 3 | 1.853 | 35.65 | PK | 30.6 | -33.2 | 0 | 33.05 | - | - | - | - | 68.2 | -35.15 | 0-360 | 101 | V |
| 1 | 1.953 | 34.03 | PK | 31.2 | -32.3 | 0 | 32.93 | - | - | - | - | 68.2 | -35.27 | 0-360 | 101 | H |
| 4 | 2.5 | 35.12 | PK | 32.4 | -32.2 | 0 | 35.32 | - | - | - | - | 68.2 | -32.88 | 0-360 | 101 | V |
| 5 | 9.727 | 28.11 | PK | 36.9 | -23.5 | 0 | 41.51 | - | - | - | - | 68.2 | -26.69 | 0-360 | 200 | H |

PK - Peak detector

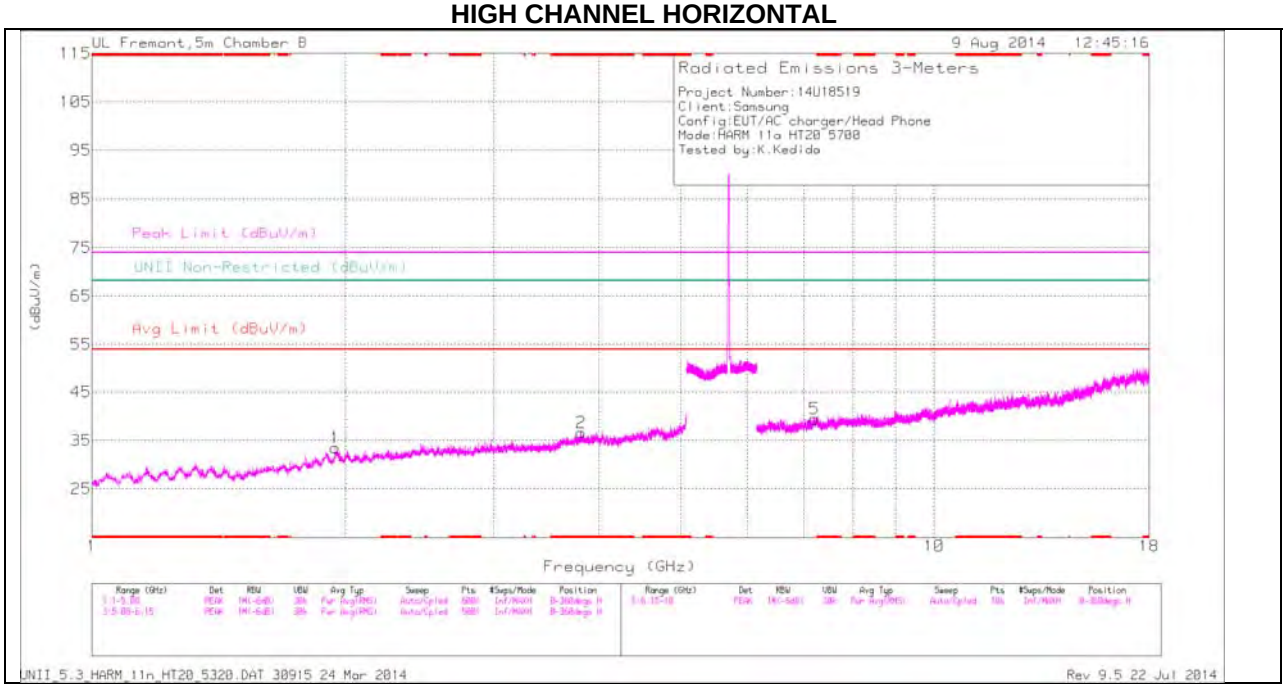
### *RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 4.072 | 40.26 | PK1 | 33.6 | -29.9 | 0 | 43.96 | - | - | 74 | -30.04 | - | - | 359 | 101 | H |
| * 10.633 | 34.26 | PK1 | 37.7 | -21.9 | 0 | 50.06 | - | - | 74 | -23.94 | - | - | 359 | 102 | V |
| 2.503 | 33.48 | PK1 | 32.4 | -32.1 | 0 | 33.78 | - | - | - | - | 68.2 | -34.42 | 359 | 101 | V |
| 9.726 | 35.38 | PK1 | 36.9 | -23.5 | 0 | 48.78 | - | - | - | - | 68.2 | -19.42 | 359 | 200 | H |
| 9.726 | 21.01 | Avg | 36.9 | -23.5 | .29 | 34.70 | - | - | - | - | - | - | 359 | 102 | V |

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

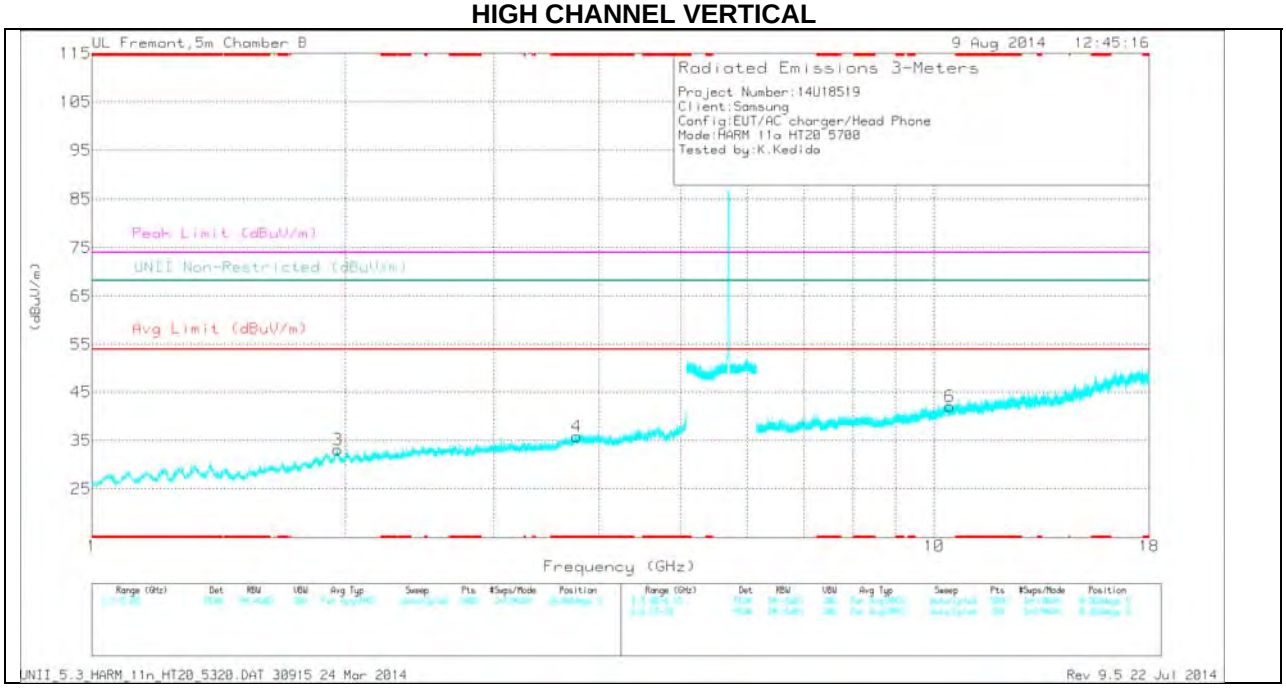
**HIGH CHANNEL HORIZONTAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**HIGH CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 3.809 | 33.56 | PK | 33.7 | -30.7 | 0 | 36.56 | - | - | 74 | -37.44 | - | - | 0-360 | 199 | H |
| 4 | * 3.761 | 32.91 | PK | 33.5 | -30.6 | 0 | 35.81 | - | - | 74 | -38.19 | - | - | 0-360 | 199 | V |
| 1 | 1.946 | 34.56 | PK | 31.2 | -32.3 | 0 | 33.46 | - | - | - | - | 68.2 | -34.74 | 0-360 | 102 | H |
| 3 | 1.958 | 34.35 | PK | 31.2 | -32.4 | 0 | 33.15 | - | - | - | - | 68.2 | -35.05 | 0-360 | 101 | V |
| 5 | 7.214 | 29.26 | PK | 35.5 | -25.3 | 0 | 39.46 | - | - | - | - | 68.2 | -28.74 | 0-360 | 200 | H |
| 6 | 10.438 | 27.8 | PK | 37.4 | -23.1 | 0 | 42.1 | - | - | - | - | 68.2 | -26.1 | 0-360 | 101 | V |

PK - Peak detector

*RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 3.809 | 40.52 | PK1 | 33.7 | -30.7 | 0 | 43.52 | - | - | 74 | -30.48 | - | - | 360 | 199 | H |
| * 3.81 | 40.95 | PK1 | 33.7 | -30.7 | 0 | 43.95 | - | - | 74 | -30.05 | - | - | 360 | 198 | H |
| * 3.761 | 40.77 | PK1 | 33.5 | -30.6 | 0 | 43.67 | - | - | 74 | -30.33 | - | - | 360 | 198 | V |
| 7.213 | 36.73 | PK1 | 35.5 | -25.3 | 0 | 46.93 | - | - | - | - | 68.2 | -21.27 | 360 | 199 | H |
| 10.438 | 35.08 | PK1 | 37.4 | -23.1 | 0 | 49.38 | - | - | - | - | 68.2 | -18.82 | 360 | 102 | V |

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

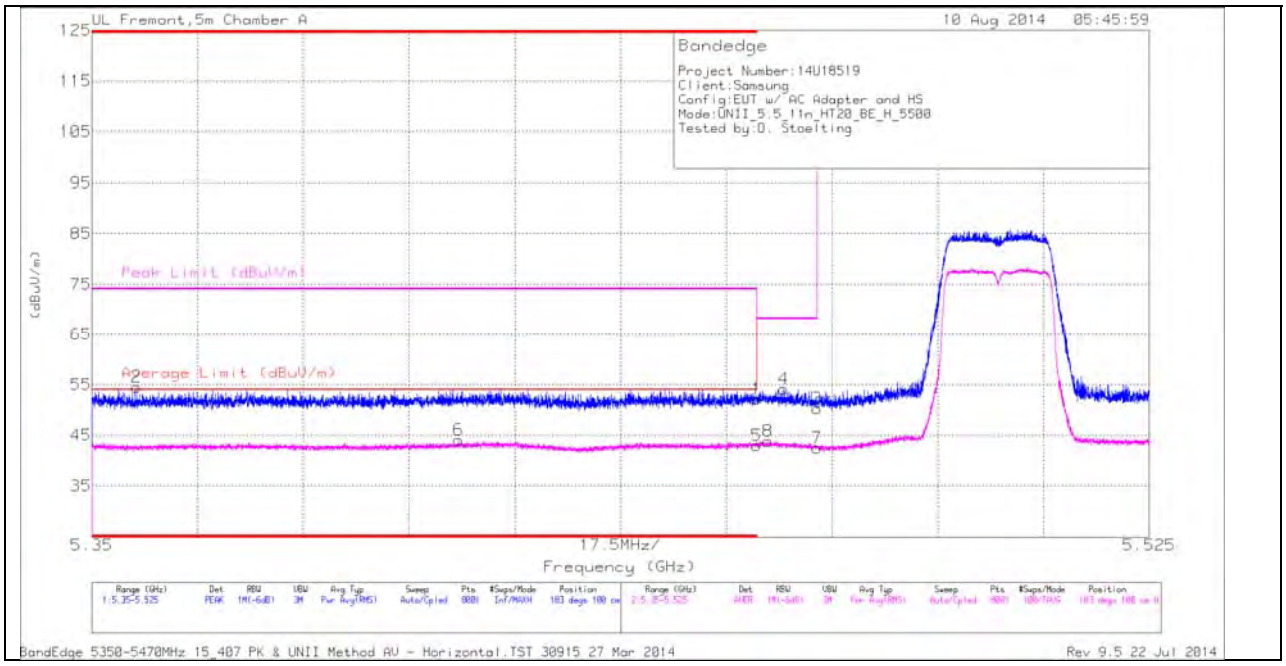


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 11.3.2. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.5 GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

### HORIZONTAL PEAK AND AVERAGE PLOT

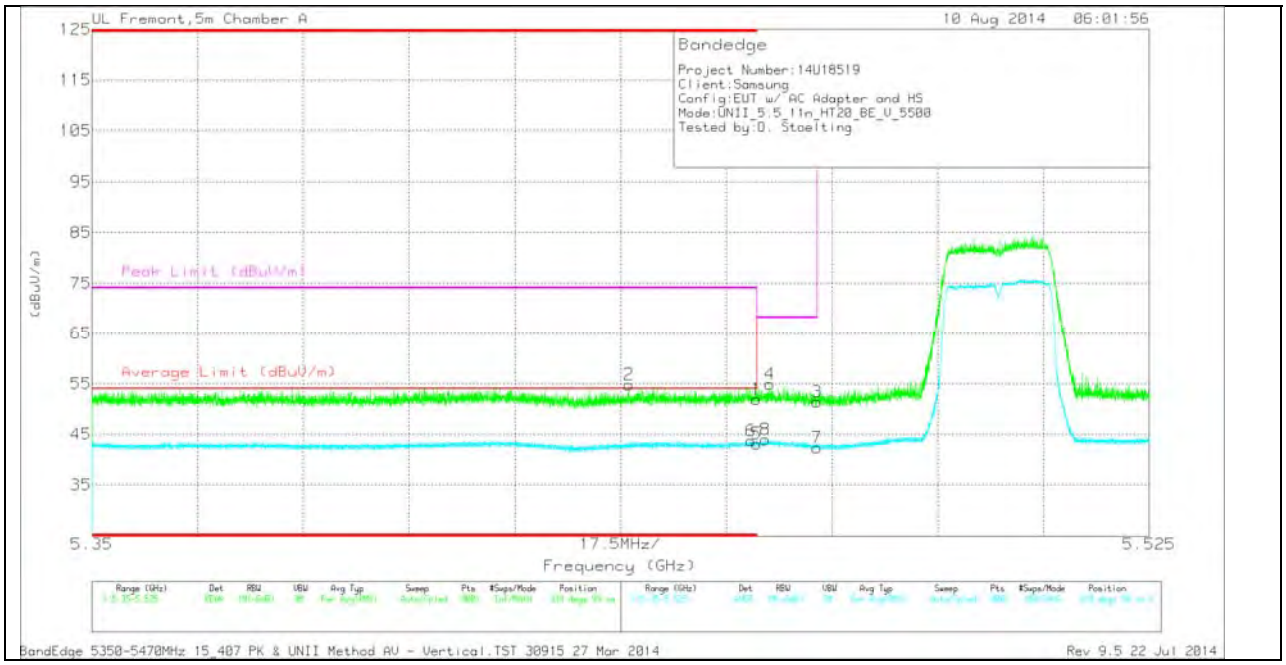



### HORIZONTAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 5.357 | 40.07 | PK | 34.3 | -19.8 | 0 | 54.57 | - | - | 74 | -19.43 | 183 | 100 | H |
| 6 | * 5.411 | 28.9 | RMS | 34.4 | -19.6 | .32 | 44.05 | 54 | -9.95 | - | - | 183 | 100 | H |
| 1 | * 5.46 | 37.58 | PK | 34.4 | -19.8 | 0 | 52.18 | - | - | 74 | -21.82 | 183 | 100 | H |
| 5 | * 5.46 | 28.05 | RMS | 34.4 | -19.8 | .32 | 43 | 54 | -11 | - | - | 183 | 100 | H |
| 8 | 5.462 | 28.78 | RMS | 34.4 | -19.7 | .32 | 43.83 | - | - | - | - | 183 | 100 | H |
| 4 | 5.465 | 39.69 | PK | 34.4 | -19.9 | 0 | 54.19 | - | - | 68.2 | -14.01 | 183 | 100 | H |
| 3 | 5.47 | 36.24 | PK | 34.4 | -20.3 | 0 | 50.34 | - | - | 68.2 | -17.86 | 183 | 100 | H |
| 7 | 5.47 | 28.02 | RMS | 34.4 | -20.3 | .32 | 42.47 | - | - | - | - | 183 | 100 | H |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT



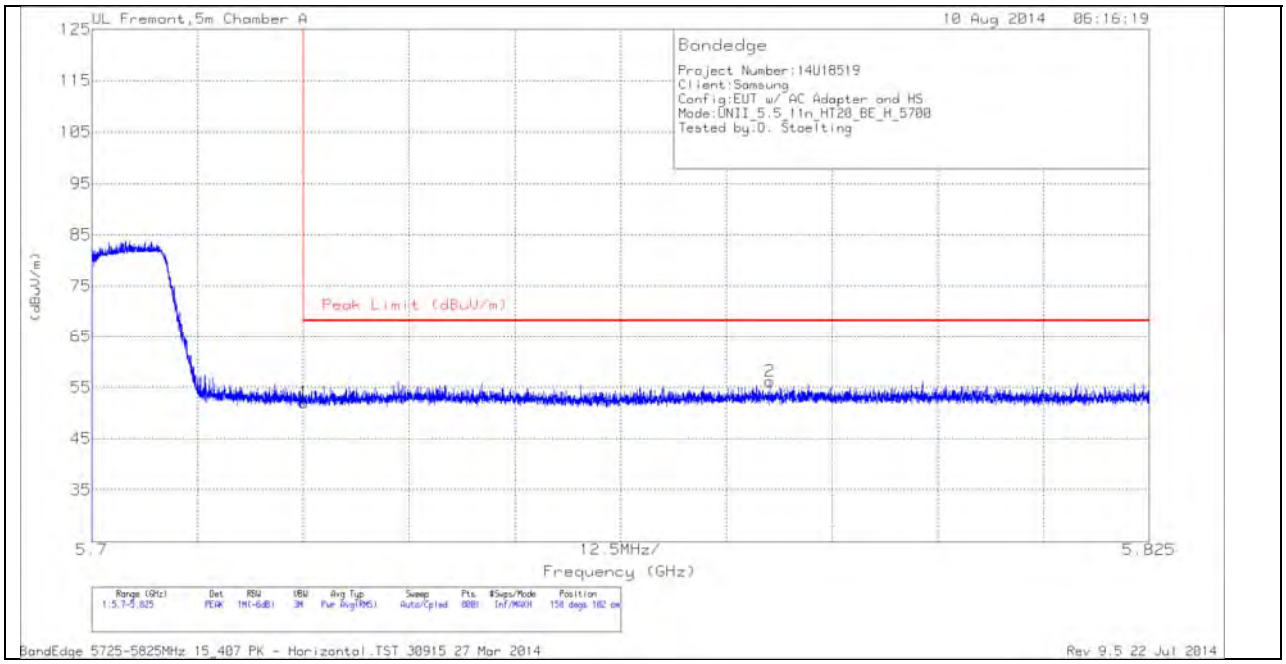

## VERTICAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 5.439 | 40.42 | PK | 34.4 | -20 | 0 | 54.82 | - | - | 74 | -19.18 | 318 | 99 | V |
| 6 | * 5.459 | 28.79 | RMS | 34.4 | -19.8 | .32 | 43.74 | 54 | -10.26 | - | - | 318 | 99 | V |
| 1 | * 5.46 | 37.3 | PK | 34.4 | -19.8 | 0 | 51.9 | - | - | 74 | -22.1 | 318 | 99 | V |
| 5 | * 5.46 | 28.2 | RMS | 34.4 | -19.8 | .32 | 43.15 | 54 | -10.85 | - | - | 318 | 99 | V |
| 8 | 5.461 | 28.92 | RMS | 34.4 | -19.7 | .32 | 43.97 | - | - | - | - | 318 | 99 | V |
| 4 | 5.462 | 40.21 | PK | 34.4 | -19.7 | 0 | 54.91 | - | - | 68.2 | -13.29 | 318 | 99 | V |
| 3 | 5.47 | 37.26 | PK | 34.4 | -20.3 | 0 | 51.36 | - | - | 68.2 | -16.84 | 318 | 99 | V |
| 7 | 5.47 | 27.95 | RMS | 34.4 | -20.3 | .32 | 42.4 | - | - | - | - | 318 | 99 | V |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# AUTHORIZED BANDEDGE (HIGH CHANNEL)

## HORIZONTAL PEAK AND AVERAGE PLOT




## HORIZONTAL DATA

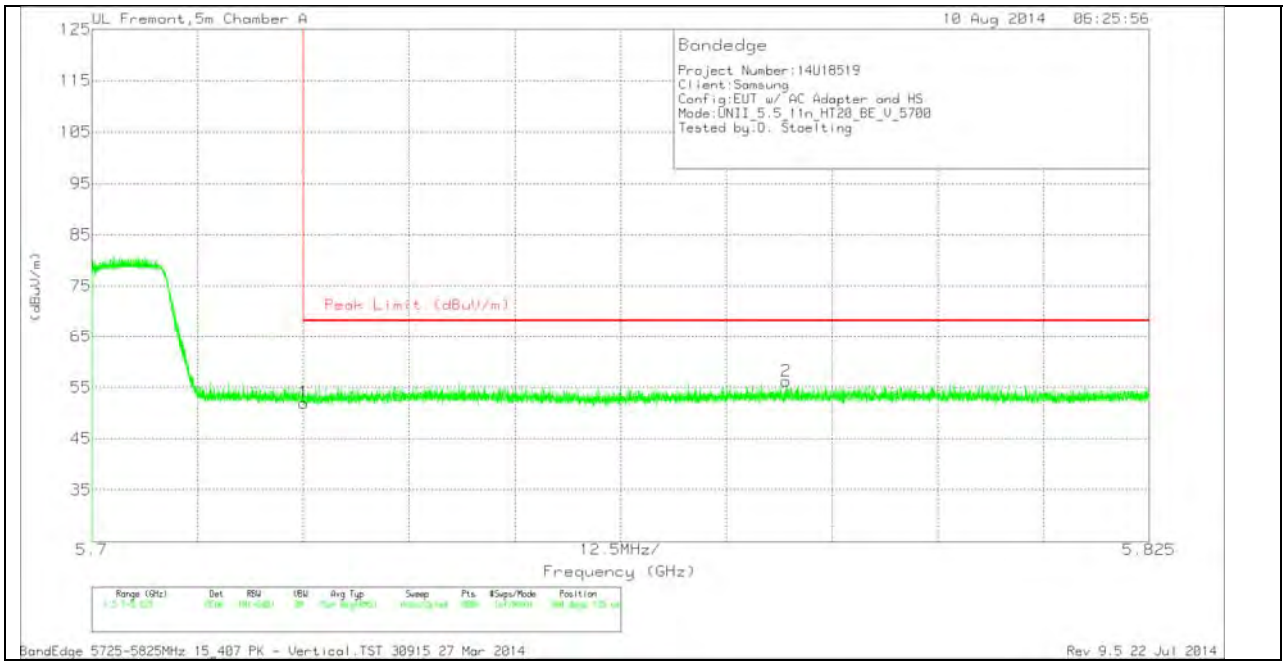
| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.725 | 37.1 | PK | 34.6 | -19.6 | 0 | 52.1 | 68.2 | -16.1 | 158 | 102 | H |
| 2 | 5.78 | 40.86 | PK | 34.7 | -19.3 | 0 | 56.26 | 68.2 | -11.94 | 158 | 102 | H |



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT




## VERTICAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.725 | 37.02 | PK | 34.6 | -19.6 | 0 | 52.02 | 68.2 | -16.18 | 340 | 135 | V |
| 2 | 5.782 | 40.87 | PK | 34.7 | -19.3 | 0 | 56.27 | 68.2 | -11.93 | 340 | 135 | V |

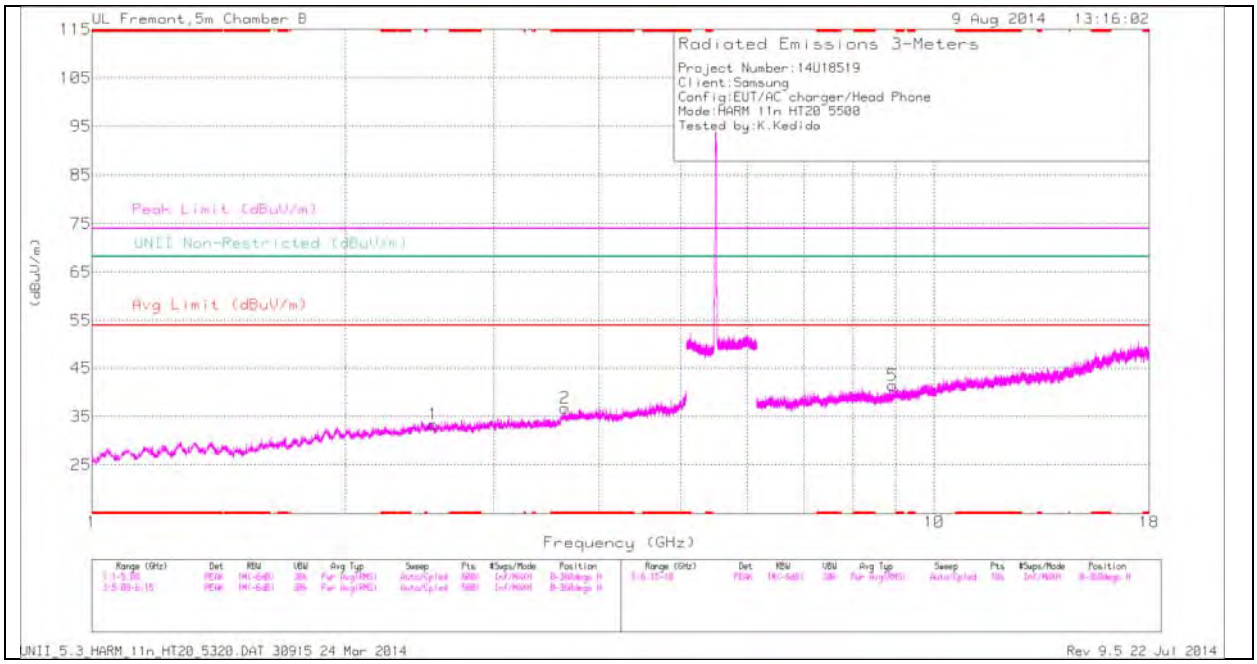


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL HORIZONTAL

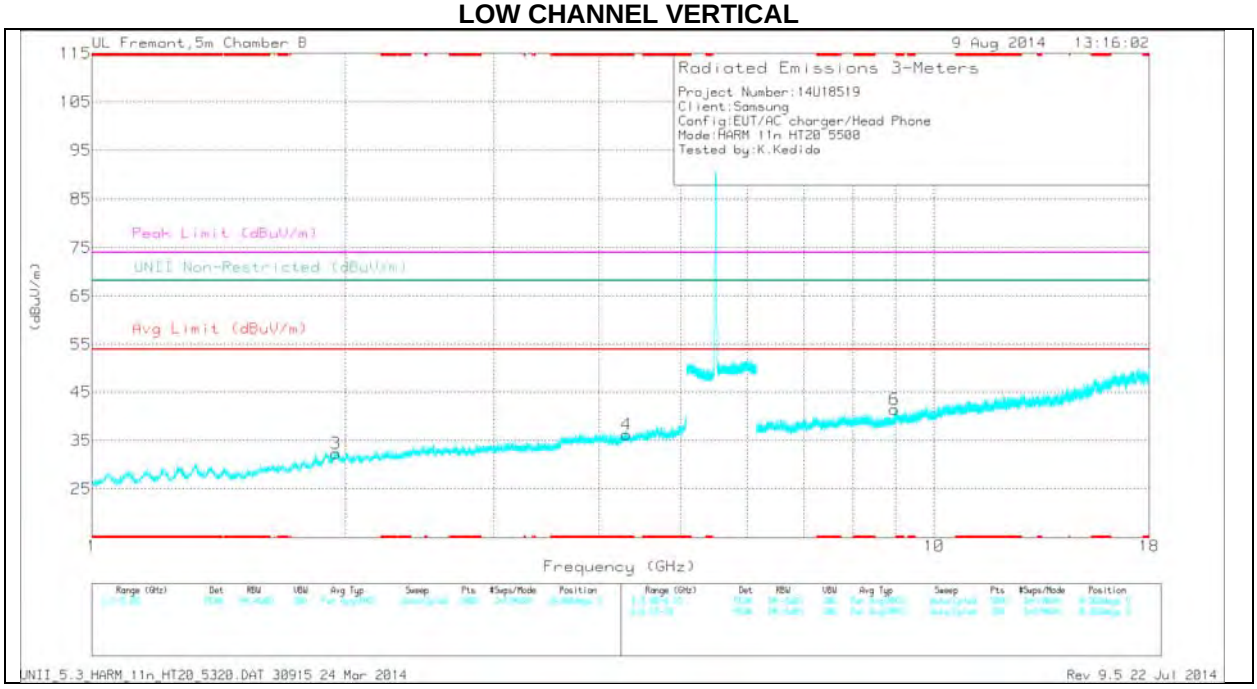



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**LOW CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## LOW CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 3.645 | 34.49 | PK | 33.2 | -30.9 | 0 | 36.79 | - | - | 74 | -37.21 | - | - | 0-360 | 101 | H |
| 4 | * 4.308 | 32.07 | PK | 33.7 | -29.5 | 0 | 36.27 | - | - | 74 | -37.73 | - | - | 0-360 | 101 | V |
| 3 | 1.948 | 33.43 | PK | 31.2 | -32.3 | 0 | 32.33 | - | - | - | - | 68.2 | -35.87 | 0-360 | 199 | V |
| 1 | 2.543 | 33.03 | PK | 32.5 | -32.2 | 0 | 33.33 | - | - | - | - | 68.2 | -34.87 | 0-360 | 199 | H |
| 5 | 8.92 | 30.27 | PK | 36.1 | -24.9 | 0 | 41.47 | - | - | - | - | 68.2 | -26.73 | 0-360 | 200 | H |
| 6 | 8.974 | 29.85 | PK | 36.2 | -24.6 | 0 | 41.45 | - | - | - | - | 68.2 | -26.75 | 0-360 | 101 | V |

PK - Peak detector

*RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 3.644 | 41.75 | PK1 | 33.2 | -30.9 | 0 | 44.05 | - | - | 74 | -29.95 | - | - | 360 | 101 | H |
| * 4.308 | 39.73 | PK1 | 33.7 | -29.5 | 0 | 43.93 | - | - | 74 | -30.07 | - | - | 360 | 101 | V |
| 8.921 | 36.36 | PK1 | 36.1 | -25 | 0 | 47.46 | - | - | - | - | 68.2 | -20.74 | 360 | 200 | H |
| 8.976 | 36.76 | PK1 | 36.2 | -24.7 | 0 | 48.26 | - | - | - | - | 68.2 | -19.94 | 360 | 102 | V |

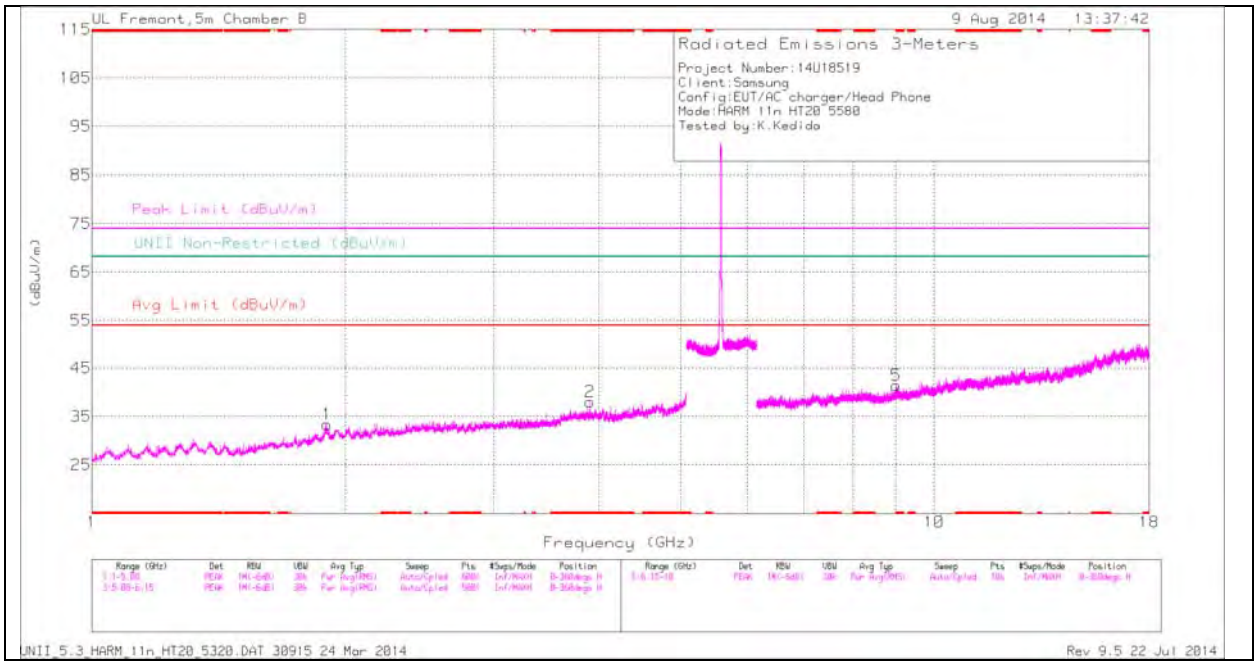
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL HORIZONTAL

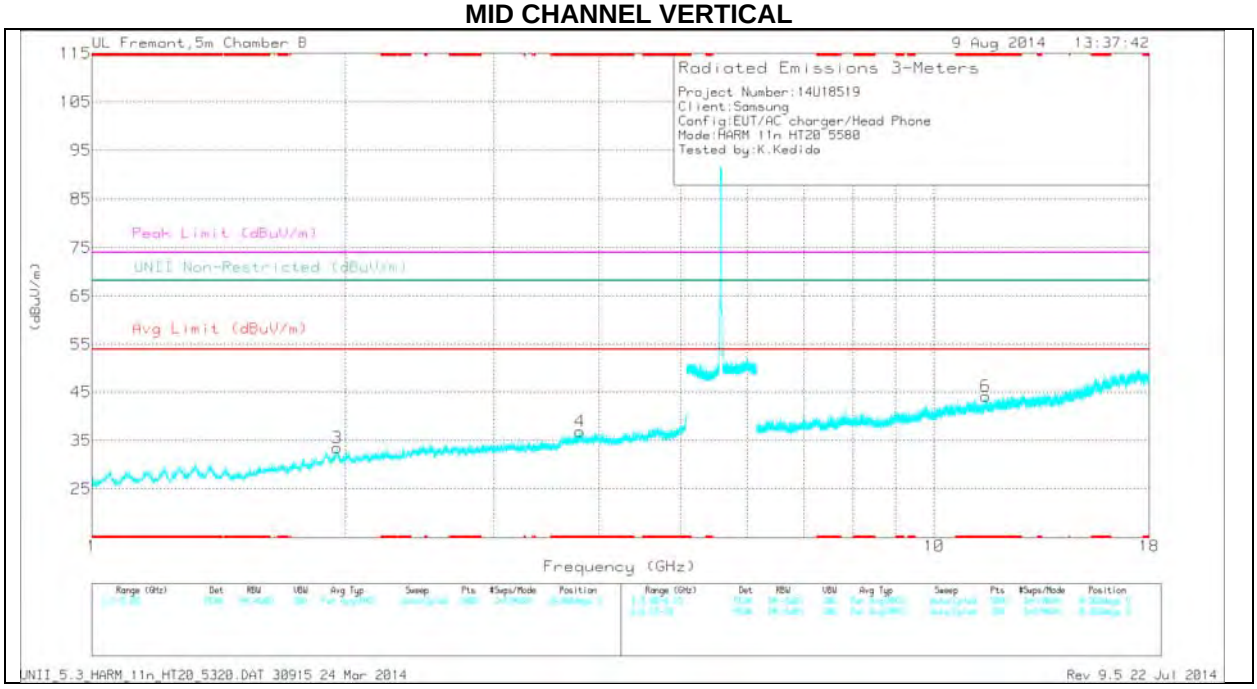



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**MID CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL DATA

### *TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 3.9 | 35.29 | PK | 33.8 | -31.1 | 0 | 37.99 | - | - | 74 | -36.01 | - | - | 0-360 | 102 | H |
| 4 | * 3.798 | 34.01 | PK | 33.6 | -30.7 | 0 | 36.91 | - | - | 74 | -37.09 | - | - | 0-360 | 200 | V |
| 5 | * 9.021 | 29.79 | PK | 36.2 | -24.6 | 0 | 41.39 | - | - | 74 | -32.61 | - | - | 0-360 | 101 | H |
| 6 | * 11.508 | 27.46 | PK | 38.1 | -21.4 | 0 | 44.16 | - | - | 74 | -29.84 | - | - | 0-360 | 199 | V |
| 1 | 1.902 | 34.9 | PK | 31.1 | -32.6 | 0 | 33.4 | - | - | - | - | 68.2 | -34.8 | 0-360 | 200 | H |
| 3 | 1.955 | 34.56 | PK | 31.2 | -32.3 | 0 | 33.46 | - | - | - | - | 68.2 | -34.74 | 0-360 | 101 | V |

PK - Peak detector

### *RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 3.901 | 41.9 | PK1 | 33.8 | -31.1 | 0 | 44.6 | - | - | 74 | -29.4 | - | - | 359 | 101 | H |
| * 3.798 | 41.36 | PK1 | 33.6 | -30.7 | 0 | 44.26 | - | - | 74 | -29.74 | - | - | 359 | 199 | V |
| * 9.02 | 37.45 | PK1 | 36.2 | -24.6 | 0 | 49.05 | - | - | 74 | -24.95 | - | - | 359 | 102 | H |
| * 11.506 | 34.53 | PK1 | 38.1 | -21.5 | 0 | 51.13 | - | - | 74 | -22.87 | - | - | 359 | 198 | V |

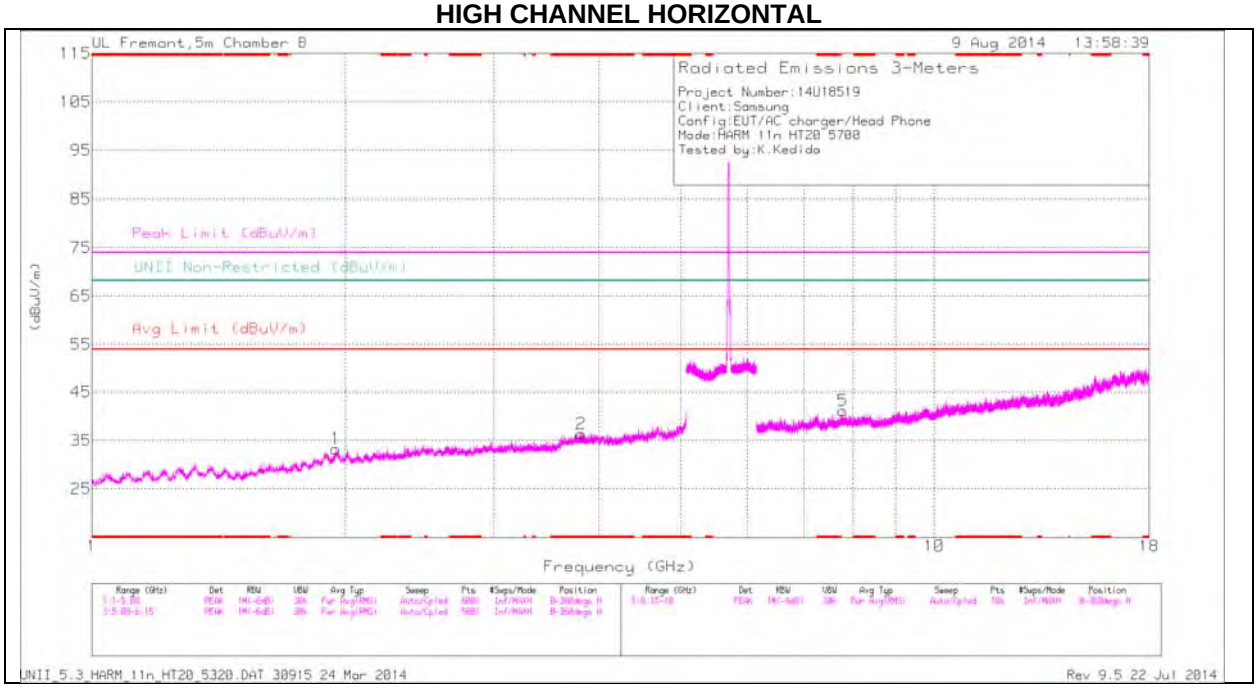
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

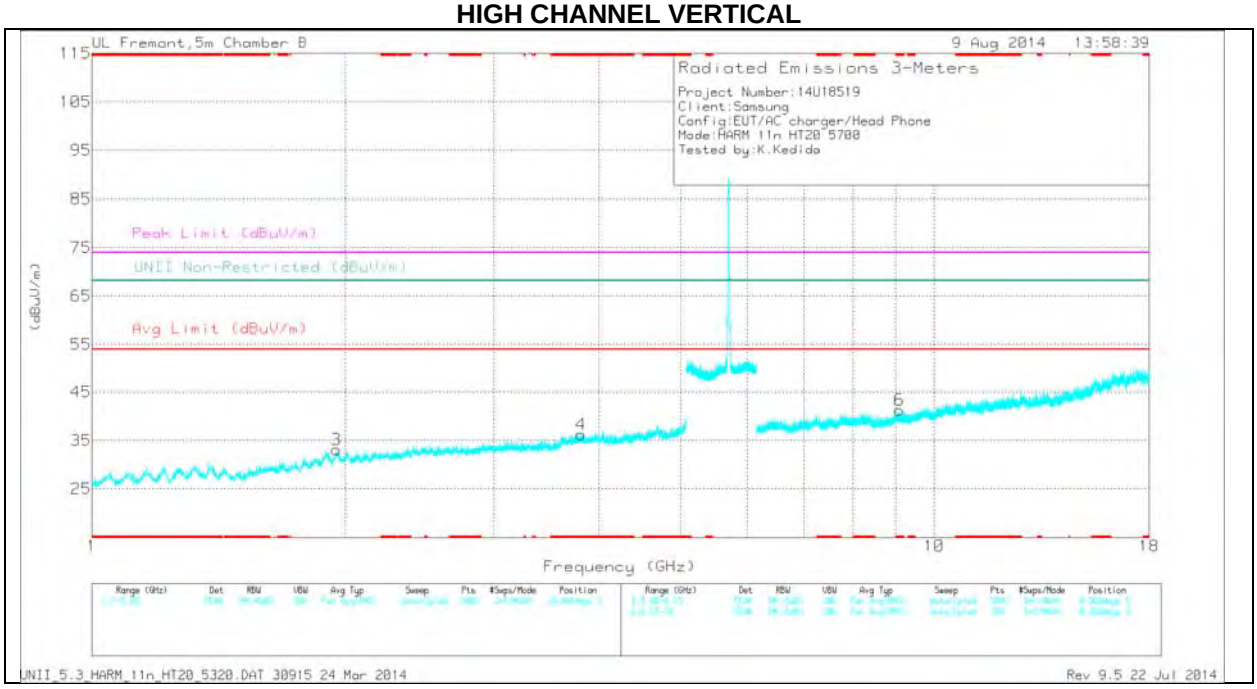
**HIGH CHANNEL HORIZONTAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**HIGH CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 3.808 | 33.31 | PK | 33.7 | -30.7 | 0 | 36.31 | - | - | 74 | -37.69 | - | - | 0-360 | 101 | H |
| 4 | * 3.808 | 33.21 | PK | 33.7 | -30.7 | 0 | 36.21 | - | - | 74 | -37.79 | - | - | 0-360 | 200 | V |
| 6 | * 9.093 | 29.25 | PK | 36.3 | -24.3 | 0 | 41.25 | - | - | 74 | -32.75 | - | - | 0-360 | 199 | V |
| 1 | 1.949 | 34.4 | PK | 31.2 | -32.3 | 0 | 33.3 | - | - | - | - | 68.2 | -34.9 | 0-360 | 200 | H |
| 3 | 1.951 | 34.16 | PK | 31.2 | -32.3 | 0 | 33.06 | - | - | - | - | 68.2 | -35.14 | 0-360 | 101 | V |
| 5 | 7.792 | 30.8 | PK | 35.7 | -25.4 | 0 | 41.1 | - | - | - | - | 68.2 | -27.1 | 0-360 | 199 | H |

PK - Peak detector

*RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 3.81 | 40.6 | PK1 | 33.7 | -30.7 | 0 | 43.6 | - | - | 74 | -30.4 | - | - | 359 | 101 | H |
| * 3.807 | 40.95 | PK1 | 33.7 | -30.7 | 0 | 43.95 | - | - | 74 | -30.05 | - | - | 359 | 199 | V |
| * 9.091 | 36.41 | PK1 | 36.3 | -24.3 | 0 | 48.41 | - | - | 74 | -25.59 | - | - | 359 | 199 | V |

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

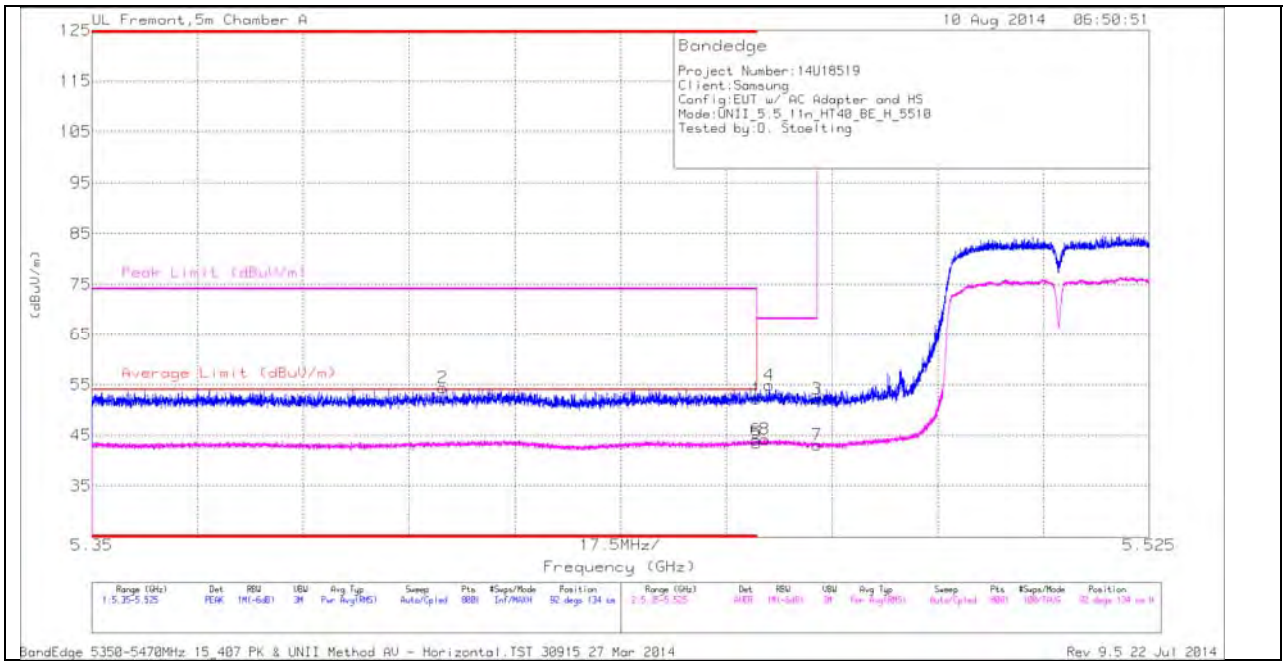


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 11.3.3. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.5 GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

### HORIZONTAL PEAK AND AVERAGE PLOT

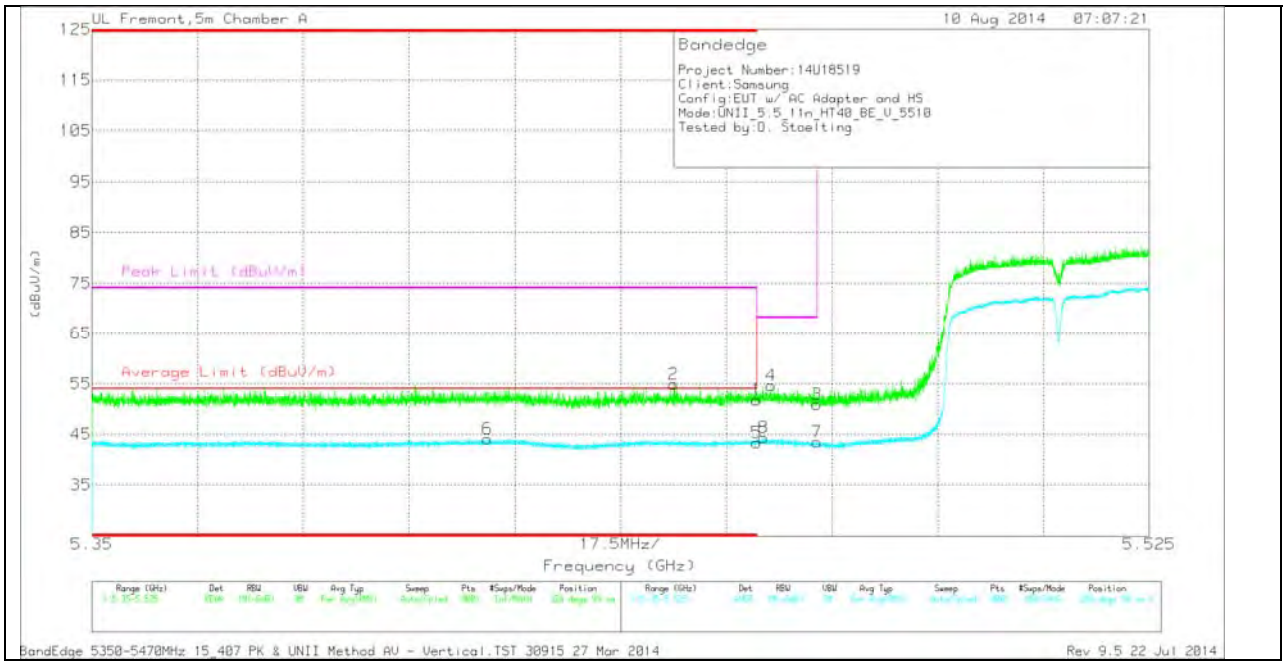



### HORIZONTAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 5.408 | 39.64 | PK | 34.4 | -19.6 | 0 | 54.44 | - | - | 74 | -19.56 | 92 | 134 | H |
| 1 | * 5.46 | 37.56 | PK | 34.4 | -19.8 | 0 | 52.16 | - | - | 74 | -21.84 | 92 | 134 | H |
| 5 | * 5.46 | 28.15 | RMS | 34.4 | -19.8 | .63 | 43.44 | 54 | -10.56 | - | - | 92 | 134 | H |
| 6 | * 5.46 | 28.74 | RMS | 34.4 | -19.8 | .63 | 44.03 | 54 | -9.97 | - | - | 92 | 134 | H |
| 8 | 5.461 | 28.79 | RMS | 34.4 | -19.7 | .63 | 44.18 | - | - | - | - | 92 | 134 | H |
| 4 | 5.462 | 40.17 | PK | 34.4 | -19.7 | 0 | 54.87 | - | - | 68.2 | -13.33 | 92 | 134 | H |
| 3 | 5.47 | 38 | PK | 34.4 | -20.3 | 0 | 52.1 | - | - | 68.2 | -16.1 | 92 | 134 | H |
| 7 | 5.47 | 28.31 | RMS | 34.4 | -20.3 | .63 | 43.1 | - | - | - | - | 92 | 134 | H |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT



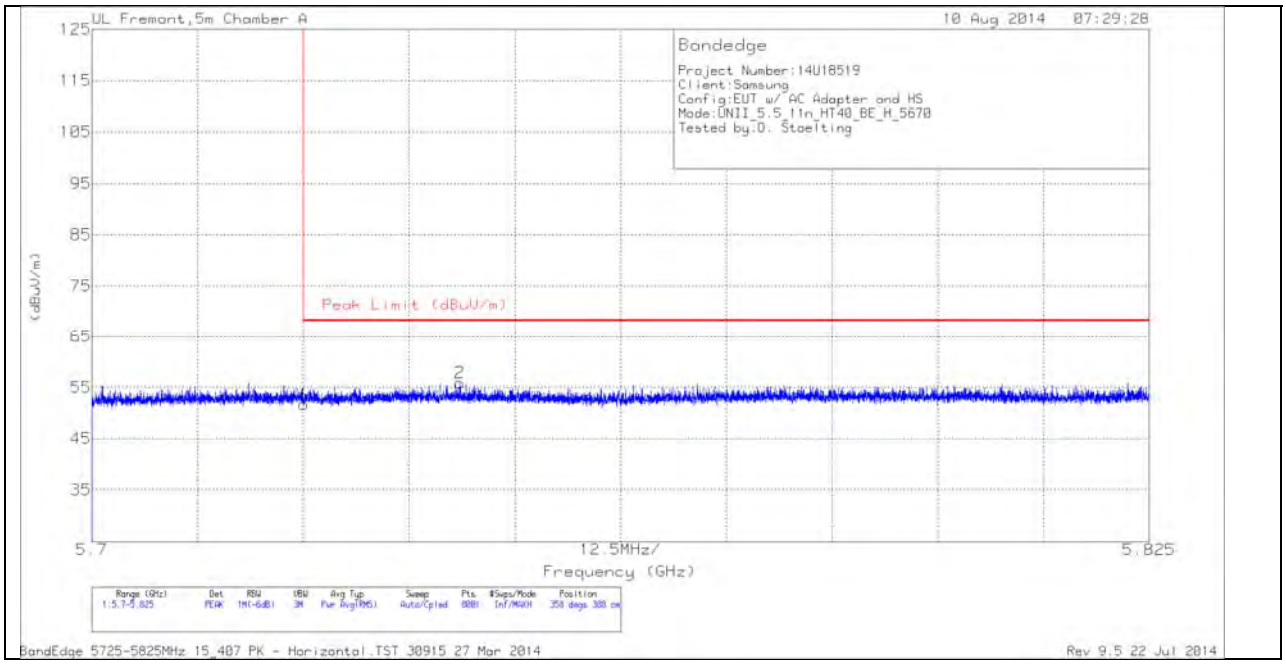

## VERTICAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Flt r/Pad (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | * 5.415 | 28.57 | RMS | 34.4 | -19.6 | .63 | 44.06 | 54 | -9.94 | - | - | 326 | 99 | V |
| 2 | * 5.446 | 40.44 | PK | 34.4 | -20 | 0 | 54.84 | - | - | 74 | -19.16 | 326 | 99 | V |
| 1 | * 5.46 | 37.14 | PK | 34.4 | -19.8 | 0 | 51.74 | - | - | 74 | -22.26 | 326 | 99 | V |
| 5 | * 5.46 | 28.05 | RMS | 34.4 | -19.8 | .63 | 43.34 | 54 | -10.66 | - | - | 326 | 99 | V |
| 8 | 5.461 | 28.95 | RMS | 34.4 | -19.7 | .63 | 44.34 | - | - | - | - | 326 | 99 | V |
| 4 | 5.462 | 39.95 | PK | 34.4 | -19.7 | 0 | 54.65 | - | - | 68.2 | -13.55 | 326 | 99 | V |
| 3 | 5.47 | 36.78 | PK | 34.4 | -20.3 | 0 | 50.88 | - | - | 68.2 | -17.32 | 326 | 99 | V |
| 7 | 5.47 | 28.67 | RMS | 34.4 | -20.3 | .63 | 43.46 | - | - | - | - | 326 | 99 | V |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# AUTHORIZED BANDEDGE (HIGH CHANNEL)

## HORIZONTAL PEAK AND AVERAGE PLOT




## HORIZONTAL DATA

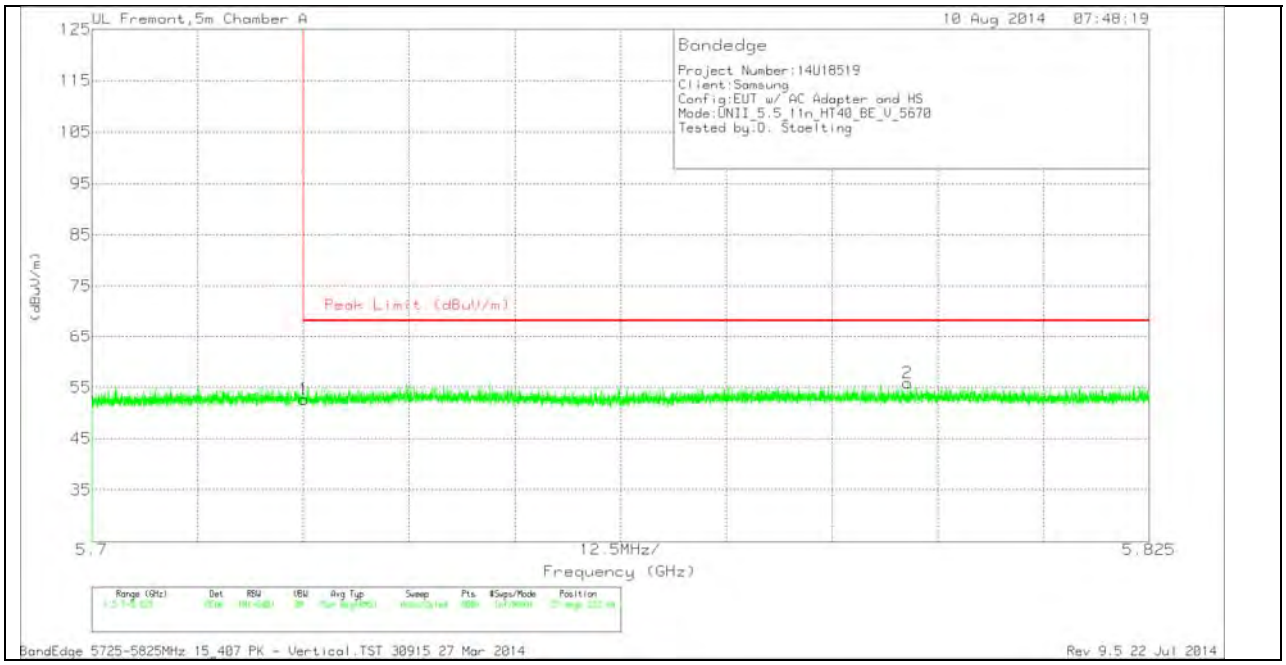
| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.725 | 36.69 | PK | 34.6 | -19.6 | 0 | 51.69 | 68.2 | -16.51 | 358 | 388 | H |
| 2 | 5.744 | 40.72 | PK | 34.6 | -19.4 | 0 | 55.92 | 68.2 | -12.28 | 358 | 388 | H |



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT




## VERTICAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.725 | 37.69 | PK | 34.6 | -19.6 | 0 | 52.69 | 68.2 | -15.51 | 27 | 222 | V |
| 2 | 5.796 | 40.49 | PK | 34.7 | -19.3 | 0 | 55.89 | 68.2 | -12.31 | 27 | 222 | V |

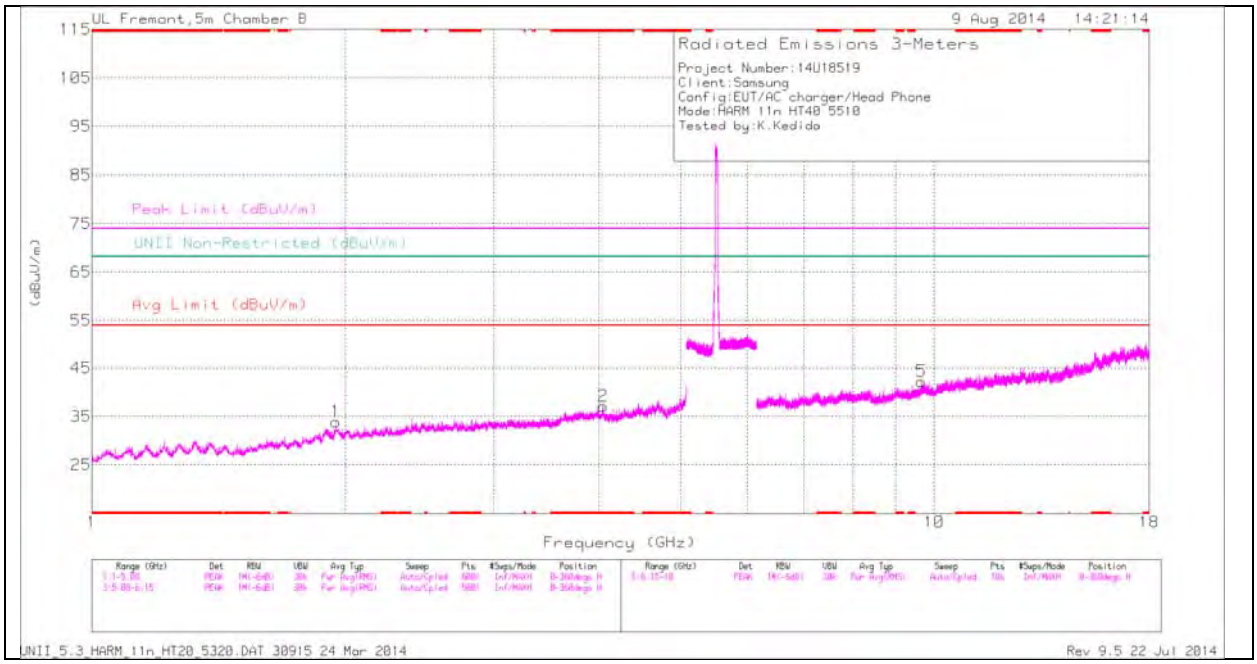


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL HORIZONTAL

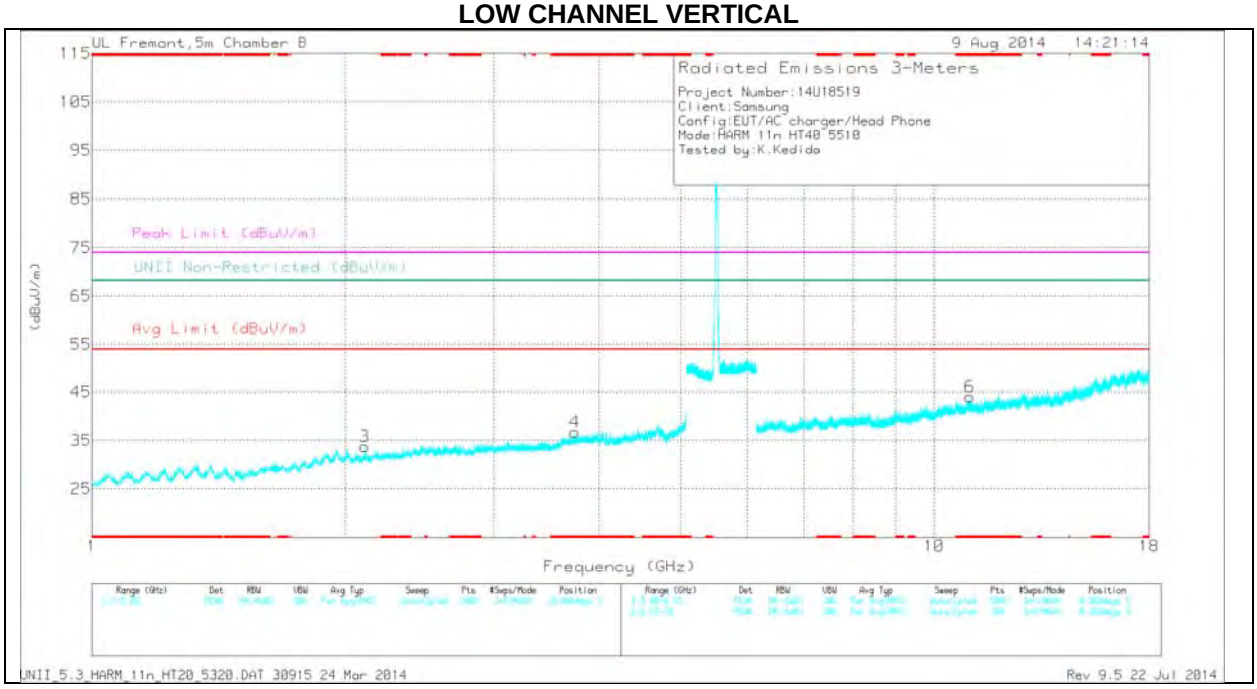



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**LOW CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## LOW CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 4.044 | 32.51 | PK | 33.6 | -29 | 0 | 37.11 | - | - | 74 | -36.89 | - | - | 0-360 | 199 | H |
| 4 | * 3.745 | 34.02 | PK | 33.5 | -30.8 | 0 | 36.72 | - | - | 74 | -37.28 | - | - | 0-360 | 101 | V |
| 6 | * 11.019 | 28.59 | PK | 37.8 | -22.4 | 0 | 43.99 | - | - | 74 | -30.01 | - | - | 0-360 | 101 | V |
| 1 | 1.949 | 35.05 | PK | 31.2 | -32.3 | 0 | 33.95 | - | - | - | - | 68.2 | -34.25 | 0-360 | 199 | H |
| 3 | 2.11 | 35.56 | PK | 31.3 | -33.1 | 0 | 33.76 | - | - | - | - | 68.2 | -34.44 | 0-360 | 199 | V |
| 5 | 9.656 | 29.16 | PK | 36.8 | -23.7 | 0 | 42.26 | - | - | - | - | 68.2 | -25.94 | 0-360 | 199 | H |

PK - Peak detector

*RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 4.042 | 40 | PK1 | 33.6 | -29 | 0 | 44.6 | - | - | 74 | -29.4 | - | - | 359 | 199 | H |
| * 3.744 | 40.99 | PK1 | 33.5 | -30.7 | 0 | 43.79 | - | - | 74 | -30.21 | - | - | 359 | 102 | V |
| * 11.02 | 34.62 | PK1 | 37.8 | -22.4 | 0 | 50.02 | - | - | 74 | -23.98 | - | - | 359 | 102 | V |

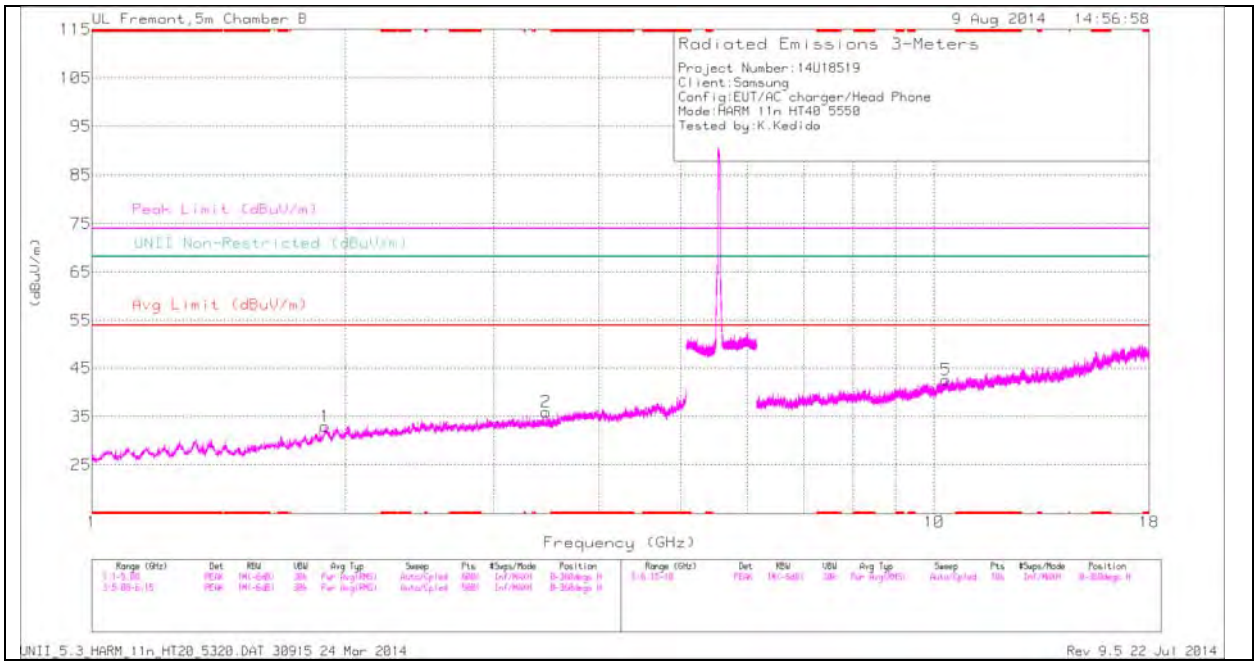
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL HORIZONTAL

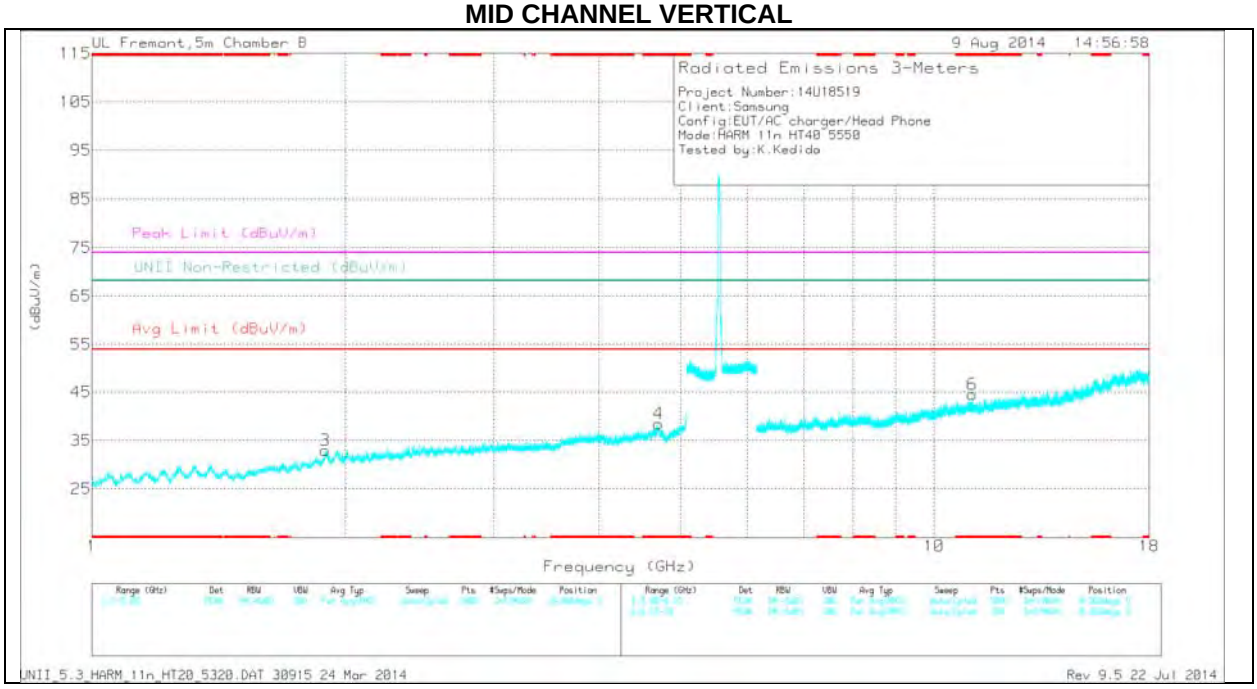



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**MID CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL DATA

### *TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | * 4.707 | 33.79 | PK | 34.2 | -29.5 | 0 | 38.49 | - | - | 74 | -35.51 | - | - | 0-360 | 200 | V |
| 6 | * 11.1 | 29.52 | PK | 37.8 | -22.8 | 0 | 44.52 | - | - | 74 | -29.48 | - | - | 0-360 | 199 | V |
| 1 | 1.891 | 34.43 | PK | 31 | -32.5 | 0 | 32.93 | - | - | - | - | 68.2 | -35.27 | 0-360 | 200 | H |
| 3 | 1.891 | 34.49 | PK | 31 | -32.5 | 0 | 32.99 | - | - | - | - | 68.2 | -35.21 | 0-360 | 200 | V |
| 2 | 3.46 | 33.83 | PK | 32.8 | -30.7 | 0 | 35.93 | - | - | - | - | 68.2 | -32.27 | 0-360 | 102 | H |
| 5 | 10.321 | 27.58 | PK | 37.2 | -22.2 | 0 | 42.58 | - | - | - | - | 68.2 | -25.62 | 0-360 | 199 | H |

PK - Peak detector

### *RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 4.709 | 40.81 | PK1 | 34.2 | -29.4 | 0 | 45.61 | - | - | 74 | -28.39 | - | - | 359 | 200 | V |
| * 11.102 | 36.05 | PK1 | 37.8 | -22.8 | 0 | 51.05 | - | - | 74 | -22.95 | - | - | 359 | 200 | V |

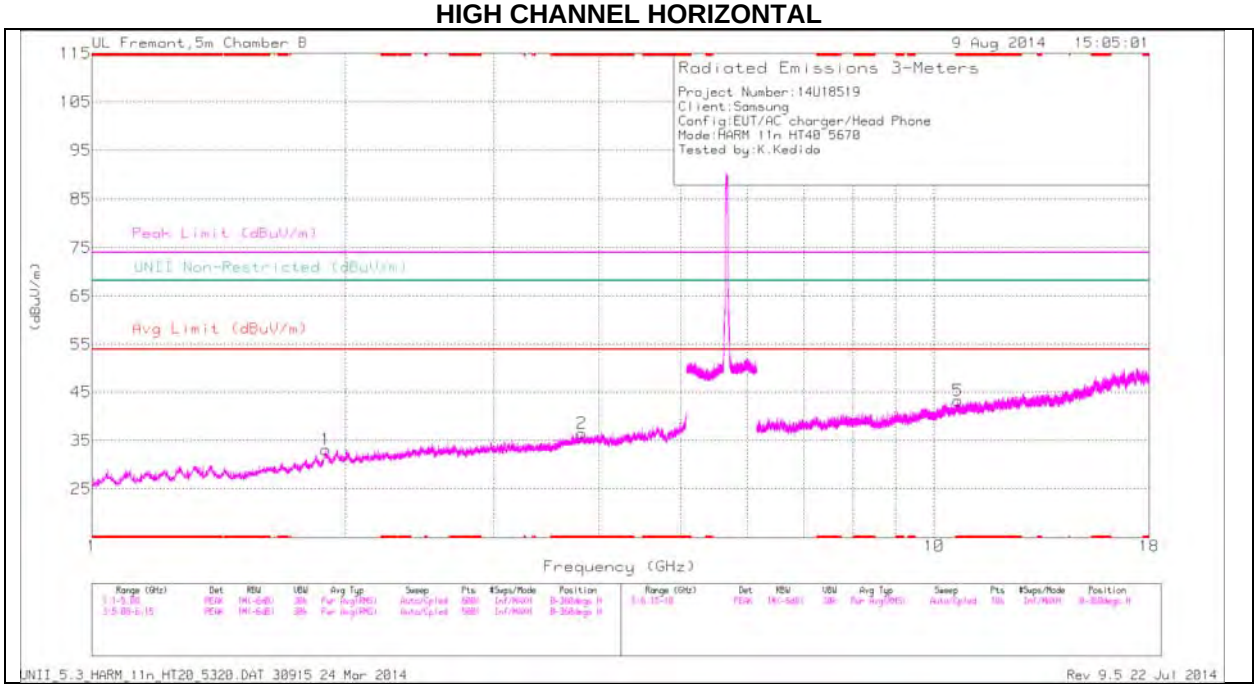
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

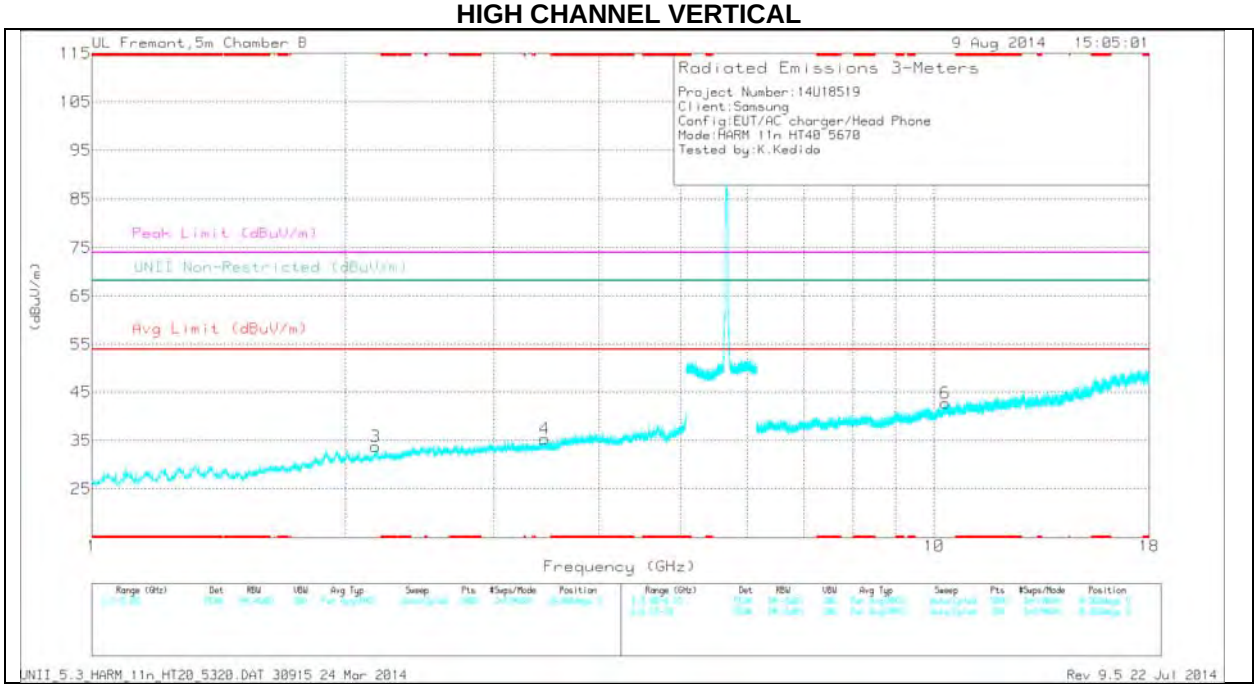
## HIGH CHANNEL HORIZONTAL




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**HIGH CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 3.814 | 33.61 | PK | 33.7 | -30.8 | 0 | 36.51 | - | - | 74 | -37.49 | - | - | 0-360 | 101 | H |
| 5 | * 10.677 | 27.08 | PK | 37.7 | -21.5 | 0 | 43.28 | - | - | 74 | -30.72 | - | - | 0-360 | 199 | H |
| 1 | 1.896 | 34.55 | PK | 31 | -32.5 | 0 | 33.05 | - | - | - | - | 68.2 | -35.15 | 0-360 | 200 | H |
| 3 | 2.172 | 34.59 | PK | 31.3 | -32.1 | 0 | 33.79 | - | - | - | - | 68.2 | -34.41 | 0-360 | 200 | V |
| 4 | 3.449 | 33.06 | PK | 32.8 | -30.6 | 0 | 35.26 | - | - | - | - | 68.2 | -32.94 | 0-360 | 101 | V |
| 6 | 10.31 | 27.81 | PK | 37.2 | -22.3 | 0 | 42.71 | - | - | - | - | 68.2 | -25.49 | 0-360 | 101 | V |

PK - Peak detector

*RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 3.813 | 40.7 | PK1 | 33.7 | -30.7 | 0 | 43.7 | - | - | 74 | -30.3 | - | - | 360 | 102 | H |
| * 10.675 | 34.06 | PK1 | 37.7 | -21.5 | 0 | 50.26 | - | - | 74 | -23.74 | - | - | 360 | 198 | H |

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



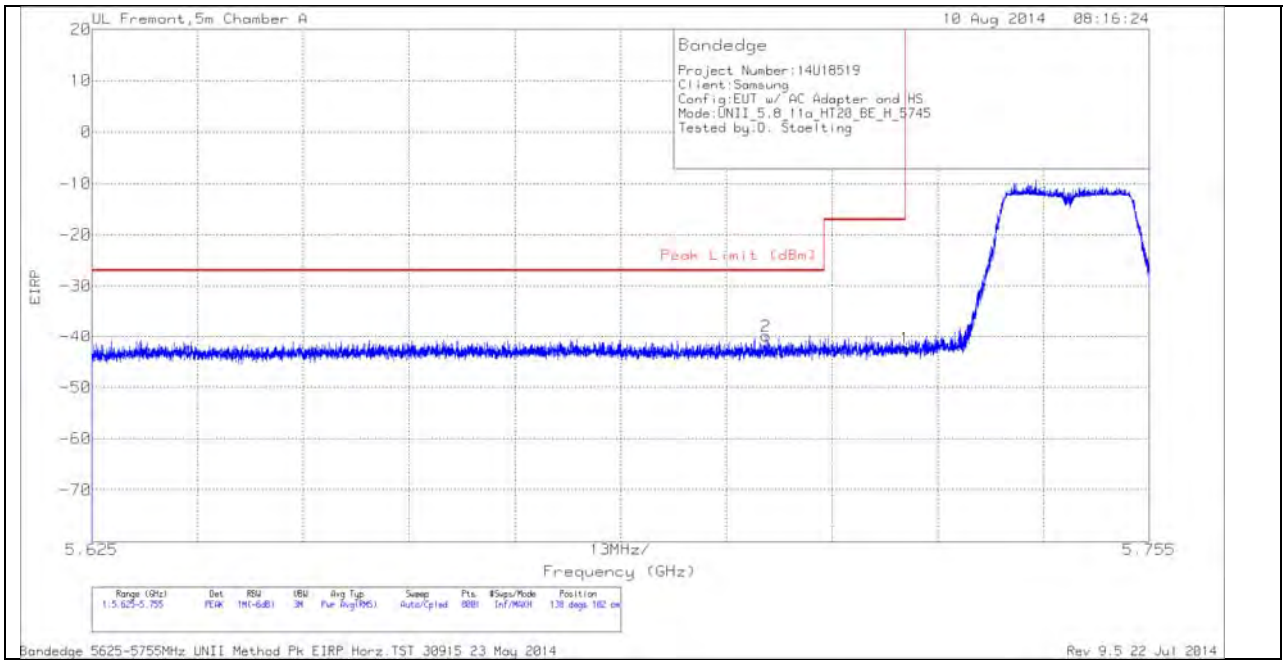
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 11.4. 5.8 GHz

### 11.4.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.8 GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

#### HORIZONTAL PEAK AND AVERAGE PLOT




#### HORIZONTAL DATA

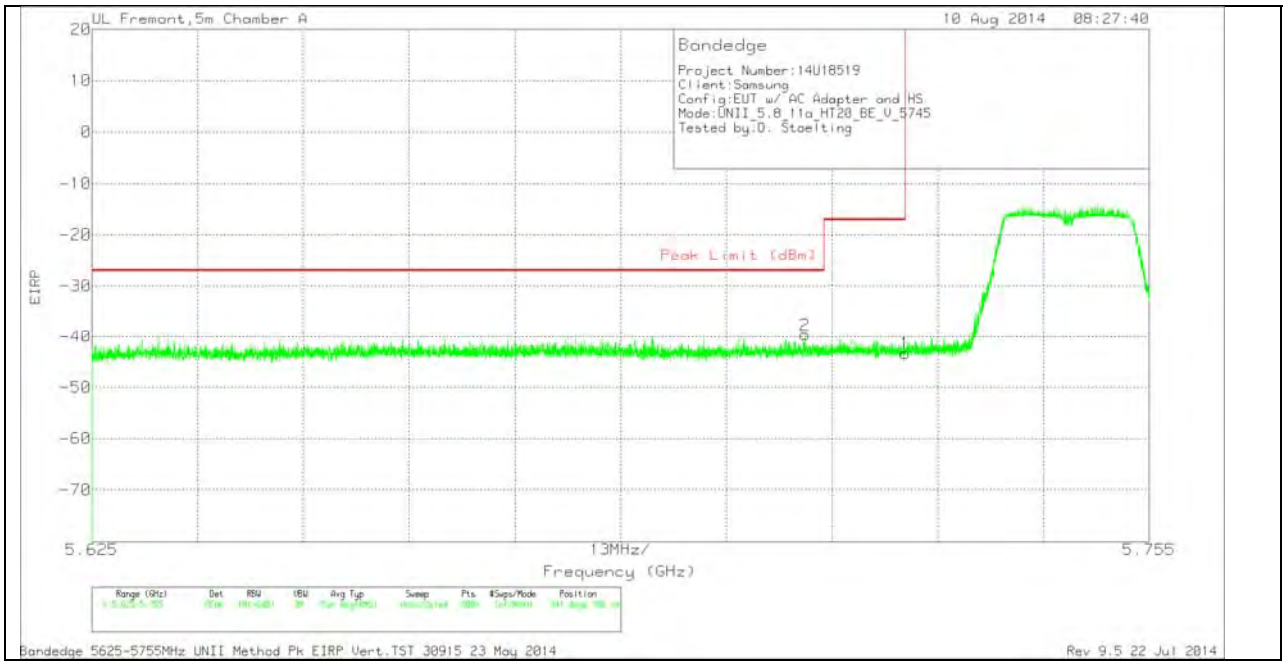
| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | AF T136 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Conversion Factor (dB) | DC Corr (dB) | Corrected Reading EIRP | Peak Limit (dBm) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 5.708 | -66.35 | PK | 34.5 | -19.8 | 11.8 | 0 | -39.85 | -27 | -12.85 | 138 | 102 | H |
| 1 | 5.725 | -69.16 | PK | 34.6 | -19.6 | 11.8 | 0 | -42.36 | -17 | -25.36 | 138 | 102 | H |

PK - Peak detector




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT




## VERTICAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | AF T136 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Conversion Factor (dB) | DC Corr (dB) | Corrected Reading EIRP | Peak Limit (dBm) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 5.713 | -66.37 | PK | 34.5 | -19.6 | 11.8 | 0 | -39.67 | -27 | -12.67 | 341 | 186 | V |
| 1 | 5.725 | -70.09 | PK | 34.6 | -19.6 | 11.8 | 0 | -43.29 | -17 | -26.29 | 341 | 186 | V |

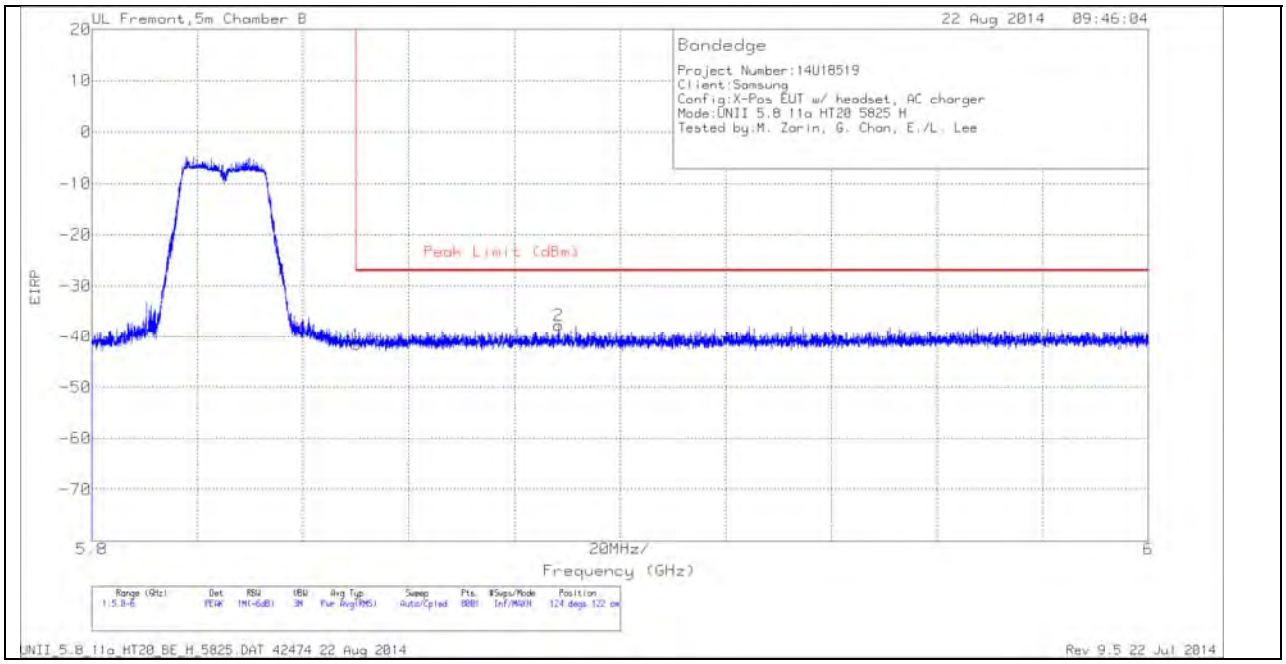
PK - Peak detector




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# AUTHORIZED BANDEDGE (HIGH CHANNEL)

## HORIZONTAL PEAK AND AVERAGE PLOT




## HORIZONTAL DATA

Trace Markers

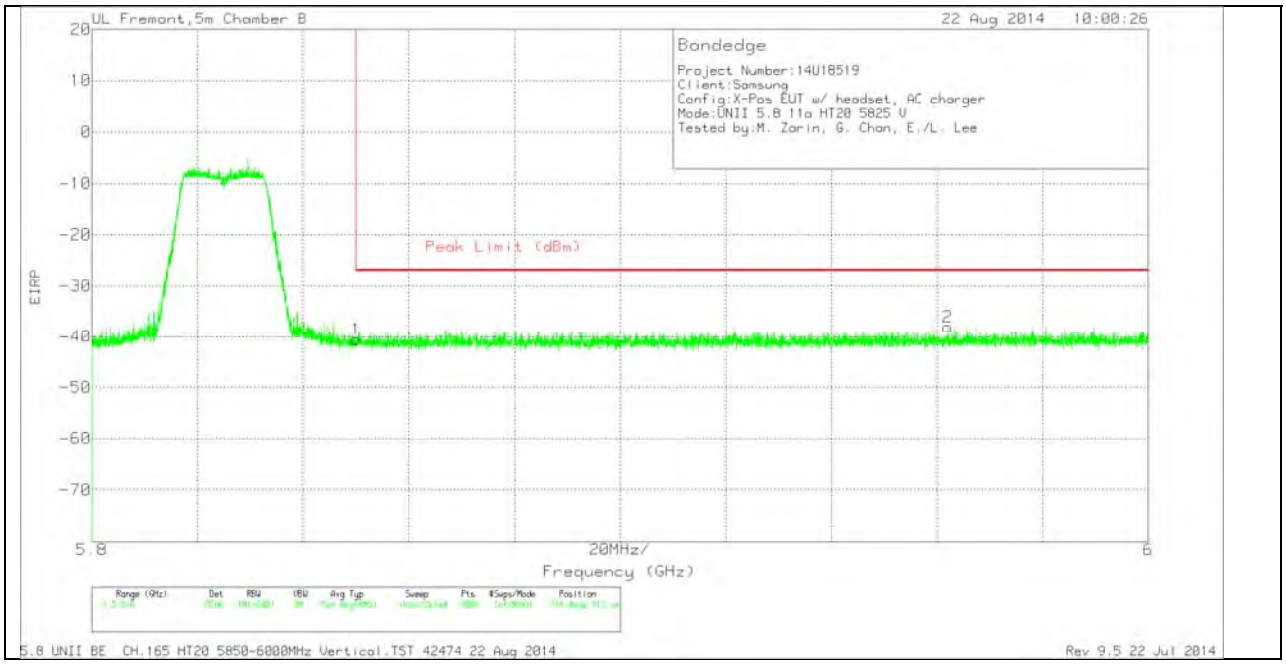
| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Conversion Factor (dB) | Corrected Reading EIRP | Peak Limit (dBm) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.85 | -68.85 | PK | 34.8 | -19.4 | 11.8 | -41.65 | -27 | -14.65 | 124 | 122 | H |
| 2 | 5.888 | -65.09 | PK | 34.9 | -19.3 | 11.8 | -37.69 | -27 | -10.69 | 124 | 122 | H |

PK - Peak detector




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT




## VERTICAL DATA

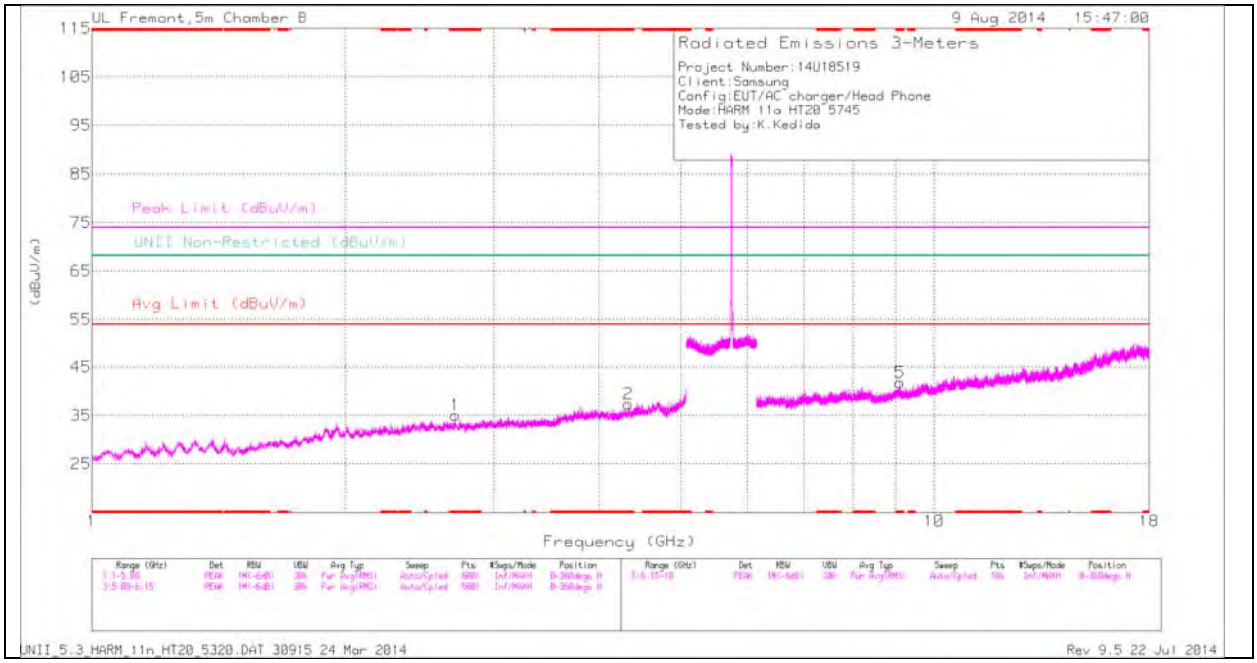
| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | AF T345 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Conversion Factor (dB) | Corrected Reading EIRP | Peak Limit (dBm) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.85 | -67.68 | PK | 34.8 | -19.4 | 11.8 | -40.48 | -27 | -13.48 | 218 | 112 | V |
| 2 | 5.962 | -65.83 | PK | 35.1 | -19.1 | 11.8 | -38.03 | -27 | -11.03 | 218 | 112 | V |

PK - Peak detector


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# HARMONICS AND SPURIOUS EMISSIONS

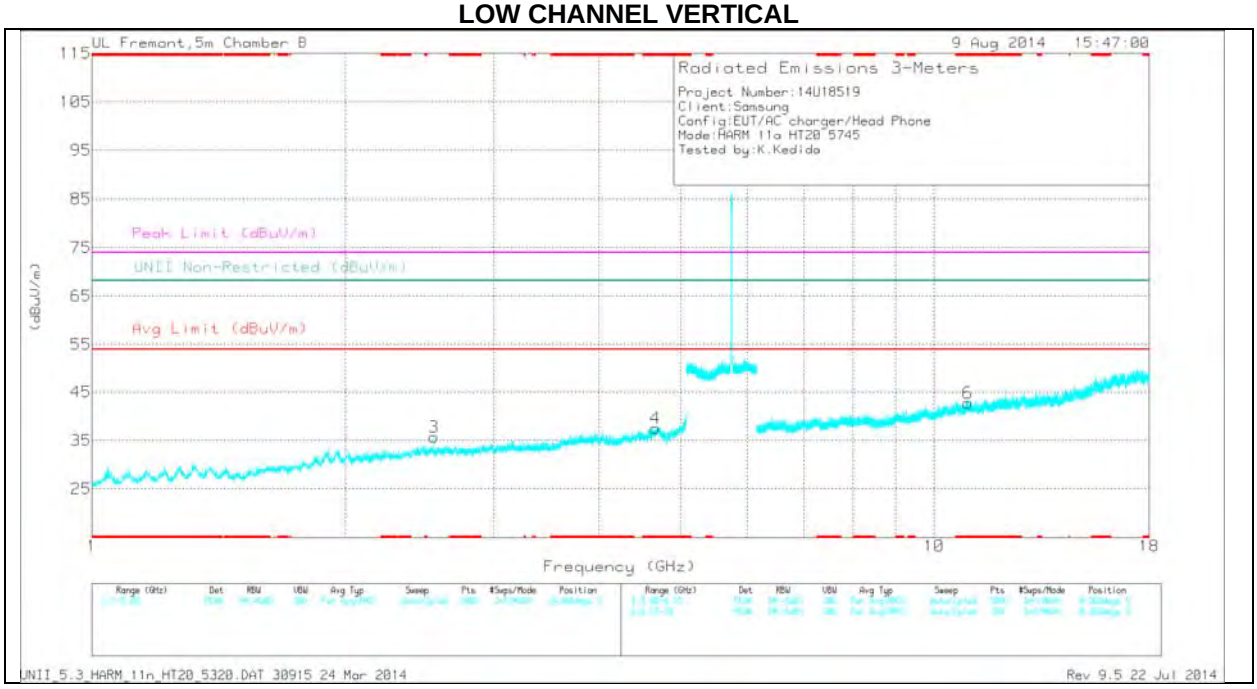
## LOW CHANNEL HORIZONTAL




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**LOW CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## LOW CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.699 | 34.1 | PK | 32.2 | -31.2 | 0 | 35.1 | - | - | 74 | -38.9 | - | - | 0-360 | 200 | H |
| 2 | * 4.331 | 33.92 | PK | 33.7 | -30.2 | 0 | 37.42 | - | - | 74 | -36.58 | - | - | 0-360 | 200 | H |
| 4 | * 4.668 | 32.53 | PK | 34.2 | -29.2 | 0 | 37.53 | - | - | 74 | -36.47 | - | - | 0-360 | 200 | V |
| 5 | * 9.103 | 29.98 | PK | 36.3 | -24.5 | 0 | 41.78 | - | - | 74 | -32.22 | - | - | 0-360 | 101 | H |
| 6 | * 10.975 | 27.05 | PK | 37.8 | -22.1 | 0 | 42.75 | - | - | 74 | -31.25 | - | - | 0-360 | 200 | V |
| 3 | 2.546 | 35.35 | PK | 32.5 | -32.2 | 0 | 35.65 | - | - | - | - | 68.2 | -32.55 | 0-360 | 101 | V |

PK - Peak detector

*RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 2.698 | 41.46 | PK1 | 32.2 | -31.2 | 0 | 42.46 | - | - | 74 | -31.54 | - | - | 359 | 200 | H |
| * 2.698 | 25.95 | Avg | 32.2 | -31.2 | .29 | 27.24 | 54 | -26.76 | - | - | - | - | 359 | 200 | H |
| * 4.332 | 40.48 | PK1 | 33.7 | -30.3 | 0 | 43.88 | - | - | 74 | -30.12 | - | - | 359 | 200 | H |
| * 4.67 | 40.33 | PK1 | 34.2 | -29.2 | 0 | 45.33 | - | - | 74 | -28.67 | - | - | 359 | 200 | V |
| * 9.101 | 36.32 | PK1 | 36.3 | -24.5 | 0 | 48.12 | - | - | 74 | -25.88 | - | - | 359 | 102 | H |

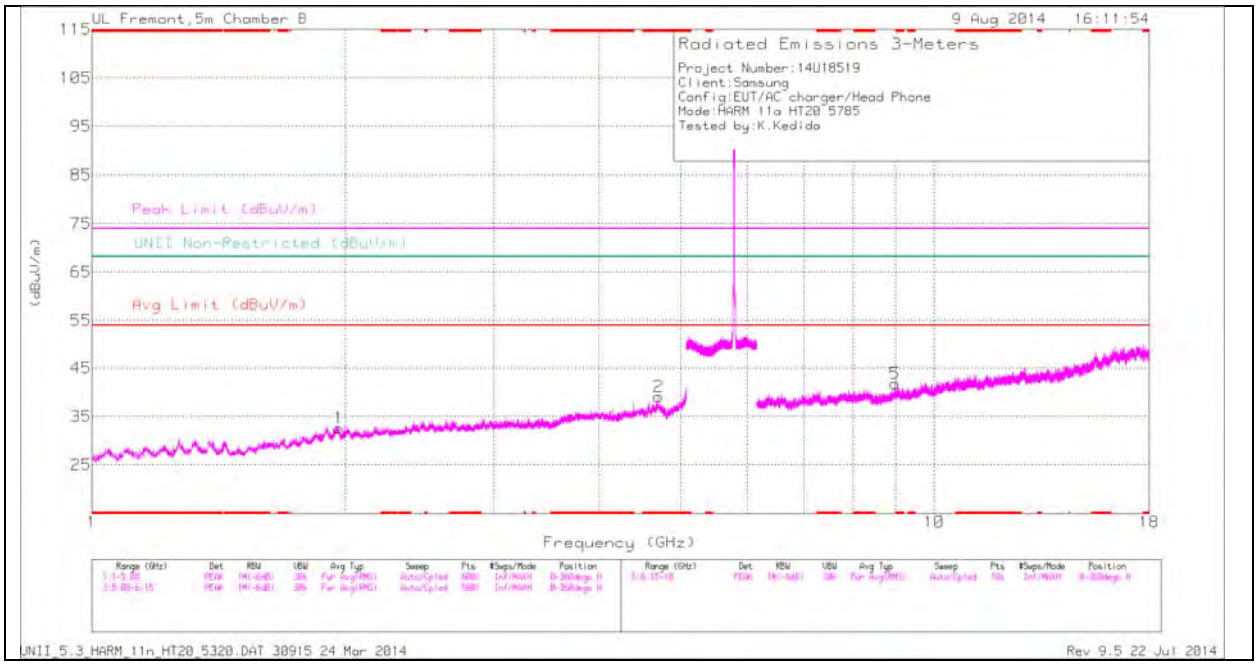
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL HORIZONTAL

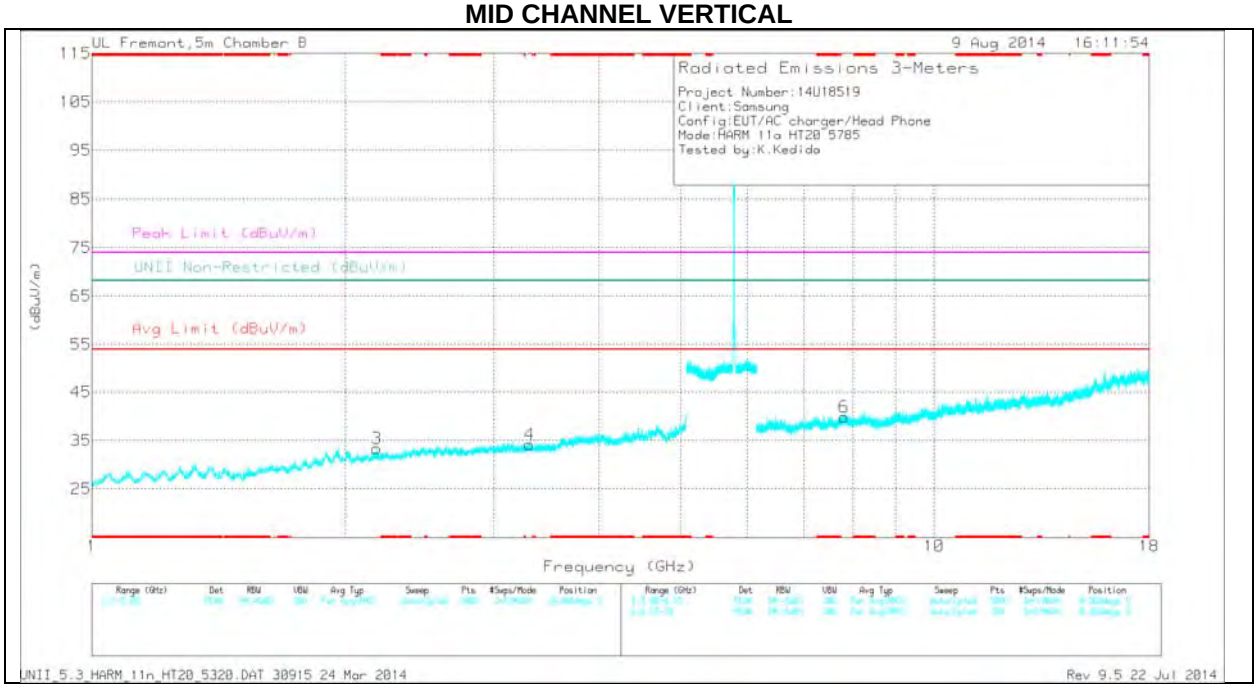



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**MID CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL DATA

### *TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 4.703 | 34.42 | PK | 34.2 | -29.6 | 0 | 39.02 | - | - | 74 | -34.98 | - | - | 0-360 | 199 | H |
| 1 | 1.964 | 33.79 | PK | 31.2 | -32.4 | 0 | 32.59 | - | - | - | - | 68.2 | -35.61 | 0-360 | 100 | H |
| 3 | 2.177 | 34.11 | PK | 31.3 | -32.1 | 0 | 33.31 | - | - | - | - | 68.2 | -34.89 | 0-360 | 200 | V |
| 4 | 3.307 | 32.77 | PK | 32.8 | -31.4 | 0 | 34.17 | - | - | - | - | 68.2 | -34.03 | 0-360 | 101 | V |
| 6 | 7.812 | 29.81 | PK | 35.7 | -25.7 | 0 | 39.81 | - | - | - | - | 68.2 | -28.39 | 0-360 | 101 | V |
| 5 | 8.99 | 30.6 | PK | 36.2 | -25 | 0 | 41.8 | - | - | - | - | 68.2 | -26.4 | 0-360 | 199 | H |

PK - Peak detector

### *RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 4.705 | 40.94 | PK1 | 34.2 | -29.5 | 0 | 45.64 | - | - | 74 | -28.36 | - | - | 360 | 199 | H |
| 8.99 | 36.62 | PK1 | 36.2 | -24.9 | 0 | 47.92 | - | - | - | - | 68.2 | -20.28 | 360 | 199 | H |

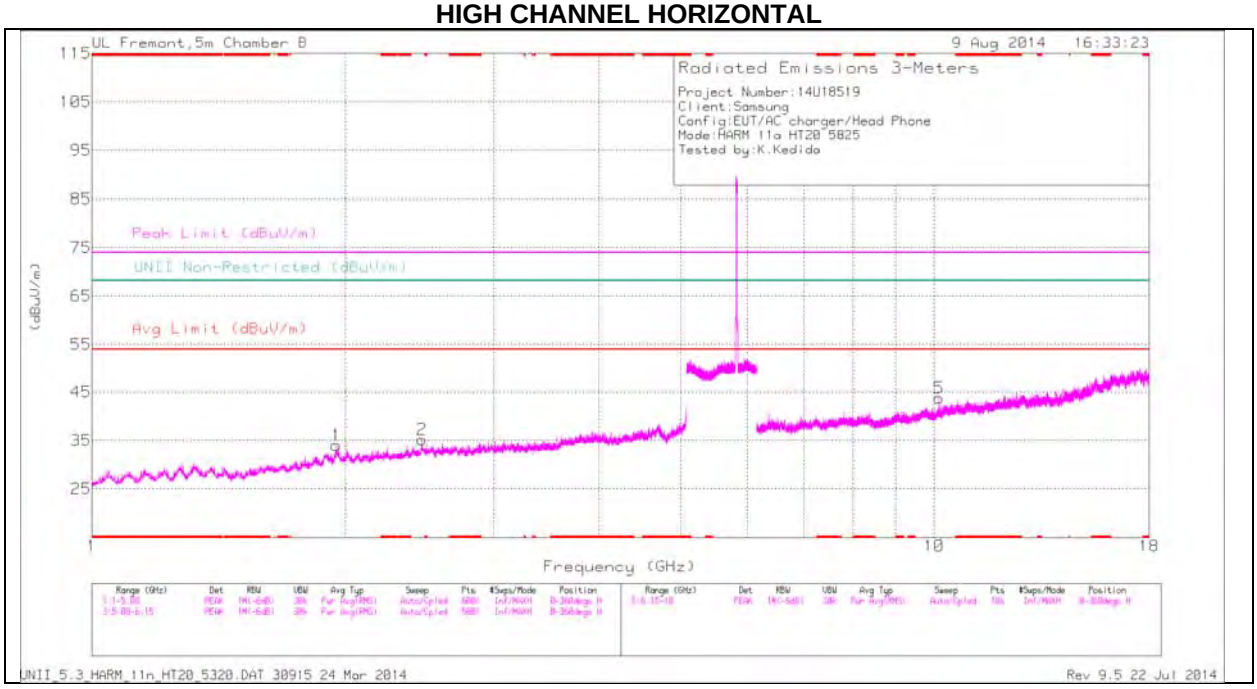
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

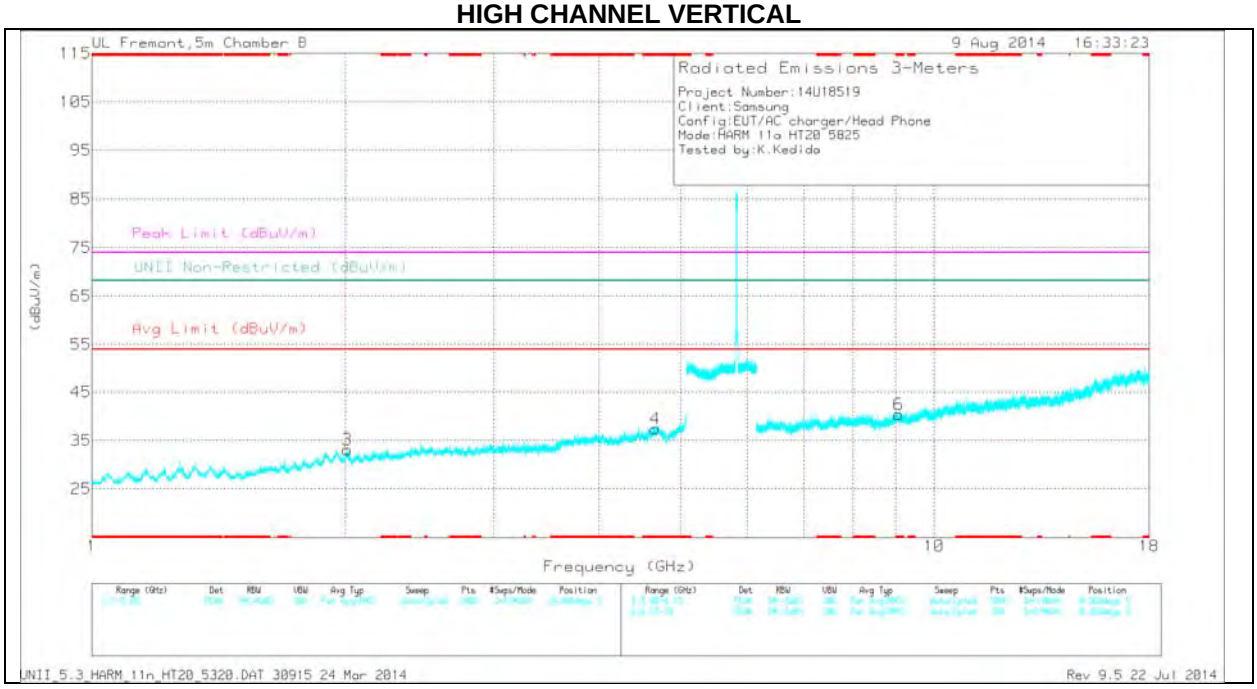
## HIGH CHANNEL HORIZONTAL




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**HIGH CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | * 4.663 | 32.29 | PK | 34.2 | -29.1 | 0 | 37.39 | - | - | 74 | -36.61 | - | - | 0-360 | 199 | V |
| 6 | * 9.079 | 28.54 | PK | 36.3 | -24.5 | 0 | 40.34 | - | - | 74 | -33.66 | - | - | 0-360 | 101 | V |
| 1 | 1.95 | 35.09 | PK | 31.2 | -32.3 | 0 | 33.99 | - | - | - | - | 68.2 | -34.21 | 0-360 | 101 | H |
| 3 | 2.009 | 34.71 | PK | 31.3 | -32.9 | 0 | 33.11 | - | - | - | - | 68.2 | -35.09 | 0-360 | 199 | V |
| 2 | 2.464 | 34.75 | PK | 32.3 | -31.9 | 0 | 35.15 | - | - | - | - | 68.2 | -33.05 | 0-360 | 101 | H |
| 5 | 10.137 | 29.5 | PK | 37.1 | -22.8 | 0 | 43.8 | - | - | - | - | 68.2 | -24.4 | 0-360 | 200 | H |

PK - Peak detector

*RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 4.664 | 39.59 | PK1 | 34.2 | -29.1 | 0 | 44.69 | - | - | 74 | -29.31 | - | - | 360 | 200 | V |
| * 9.081 | 36.47 | PK1 | 36.3 | -24.4 | 0 | 48.37 | - | - | 74 | -25.63 | - | - | 360 | 102 | V |

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

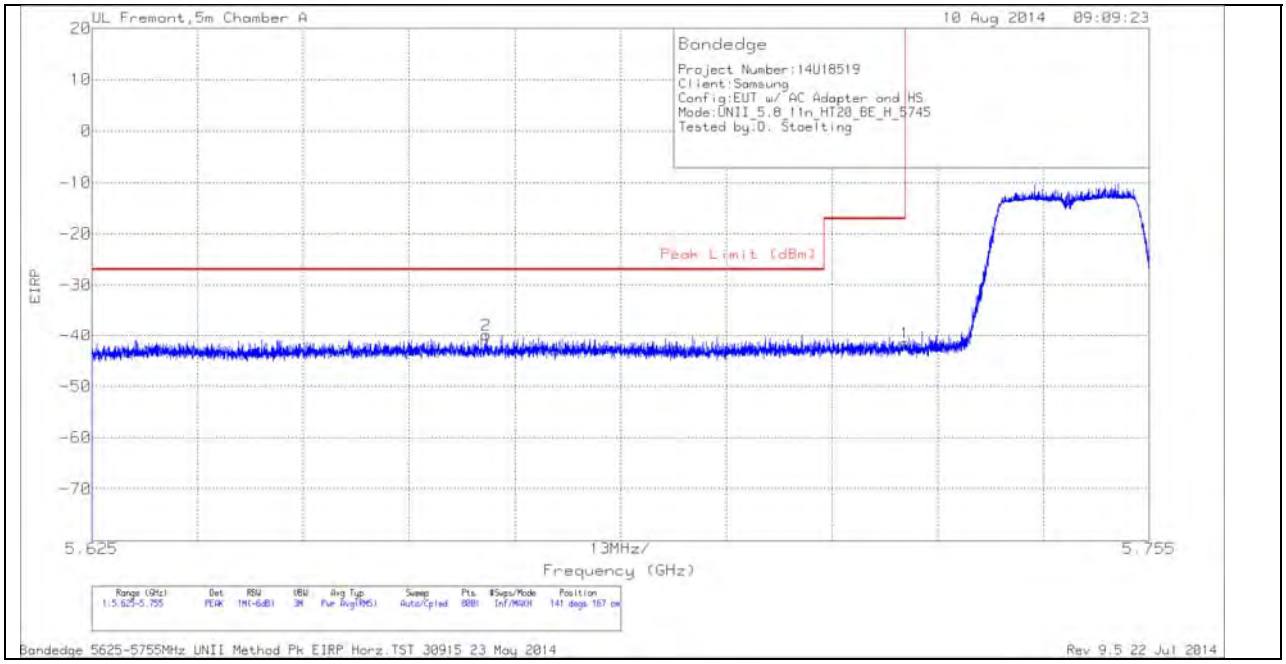


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 11.4.2. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.8 GHz BAND HARMONICS AND SPURIOUS EMISSIONS

### HORIZONTAL PEAK AND AVERAGE PLOT




### HORIZONTAL DATA

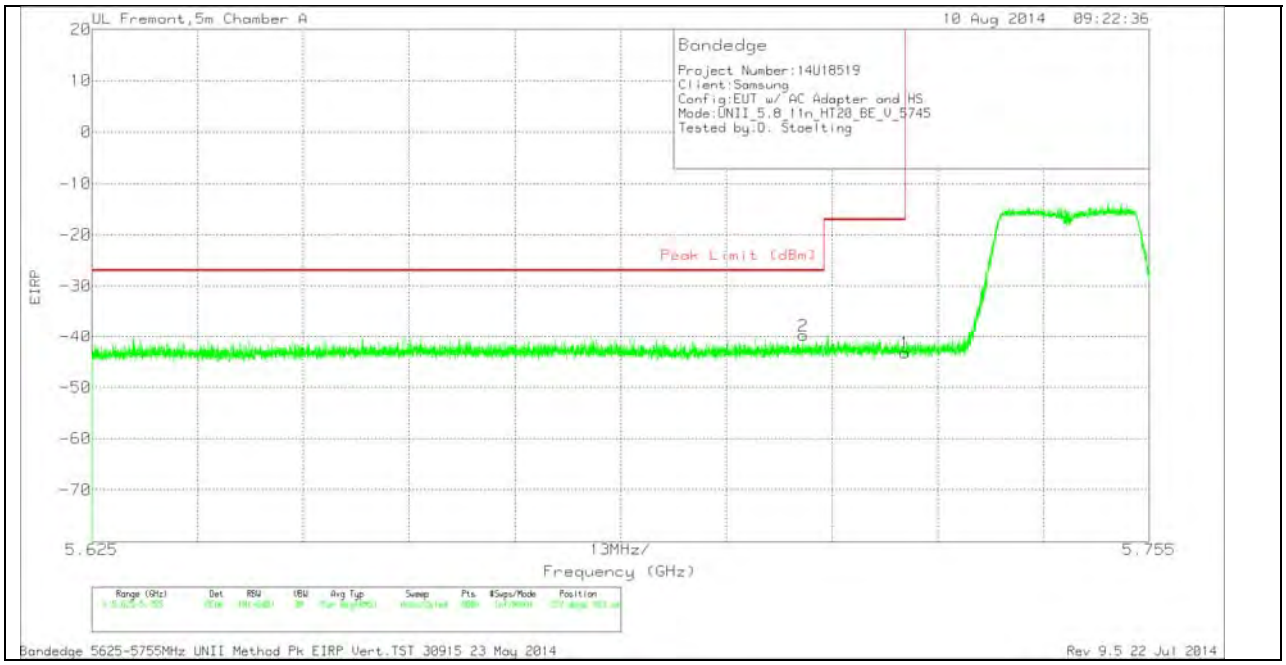
| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | AF T136 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Conversion Factor (dB) | DC Corr (dB) | Corrected Reading EIRP | Peak Limit (dBm) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 5.673 | -66.33 | PK | 34.5 | -19.9 | 11.8 | 0 | -39.93 | -27 | -12.93 | 141 | 167 | H |
| 1 | 5.725 | -68.34 | PK | 34.6 | -19.6 | 11.8 | 0 | -41.54 | -17 | -24.54 | 141 | 167 | H |

PK - Peak detector




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT




## VERTICAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | AF T136 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Conversion Factor (dB) | DC Corr (dB) | Corrected Reading EIRP | Peak Limit (dBm) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 5.712 | -66.52 | PK | 34.5 | -19.6 | 11.8 | 0 | -39.82 | -27 | -12.82 | 272 | 183 | V |
| 1 | 5.725 | -69.96 | PK | 34.6 | -19.6 | 11.8 | 0 | -43.16 | -17 | -26.16 | 272 | 183 | V |

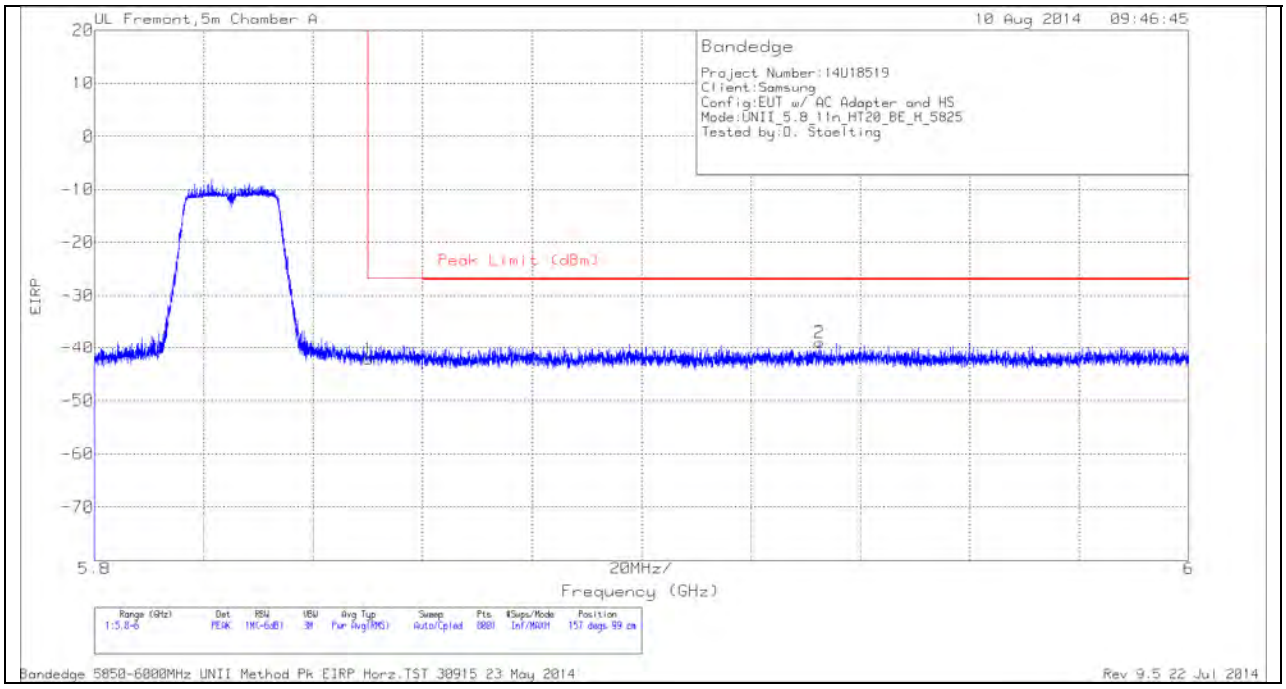
PK - Peak detector




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# AUTHORIZED BANDEDGE (HIGH CHANNEL)

## HORIZONTAL PEAK AND AVERAGE PLOT



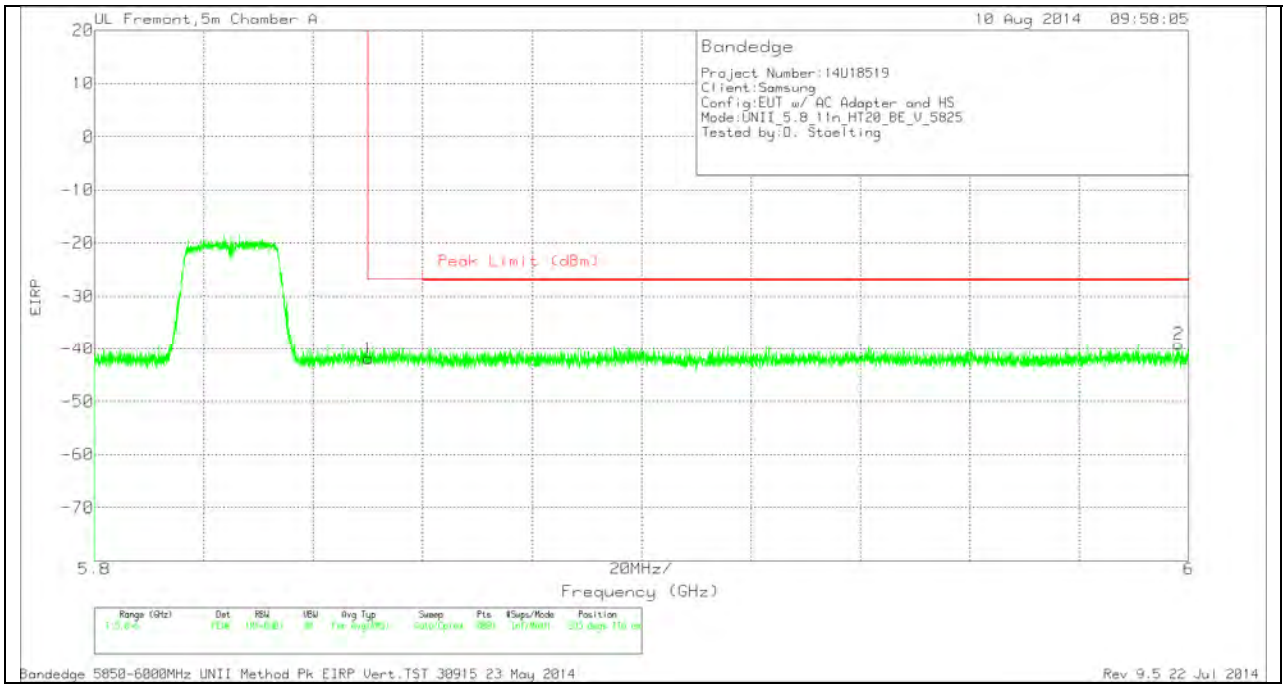

## HORIZONTAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | AF T136 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Conversion Factor (dB) | DC Corr (dB) | Corrected Reading EIRP | Peak Limit (dBm) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.85 | -69.55 | PK | 34.9 | -19.2 | 11.8 | 0 | -42.05 | -27 | -15.05 | 157 | 99 | H |
| 2 | 5.932 | -66.44 | PK | 35.1 | -19.4 | 11.8 | 0 | -38.94 | -27 | -11.94 | 157 | 99 | H |

PK - Peak detector


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT




## VERTICAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | AF T136 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Conversion Factor (dB) | DC Corr (dB) | Corrected Reading EIRP | Peak Limit (dBm) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.85 | -69.36 | PK | 34.9 | -19.2 | 11.8 | 0 | -41.86 | -27 | -14.86 | 335 | 116 | V |
| 2 | 5.998 | -67.1 | PK | 35.3 | -19.1 | 11.8 | 0 | -39.1 | -27 | -12.1 | 335 | 116 | V |

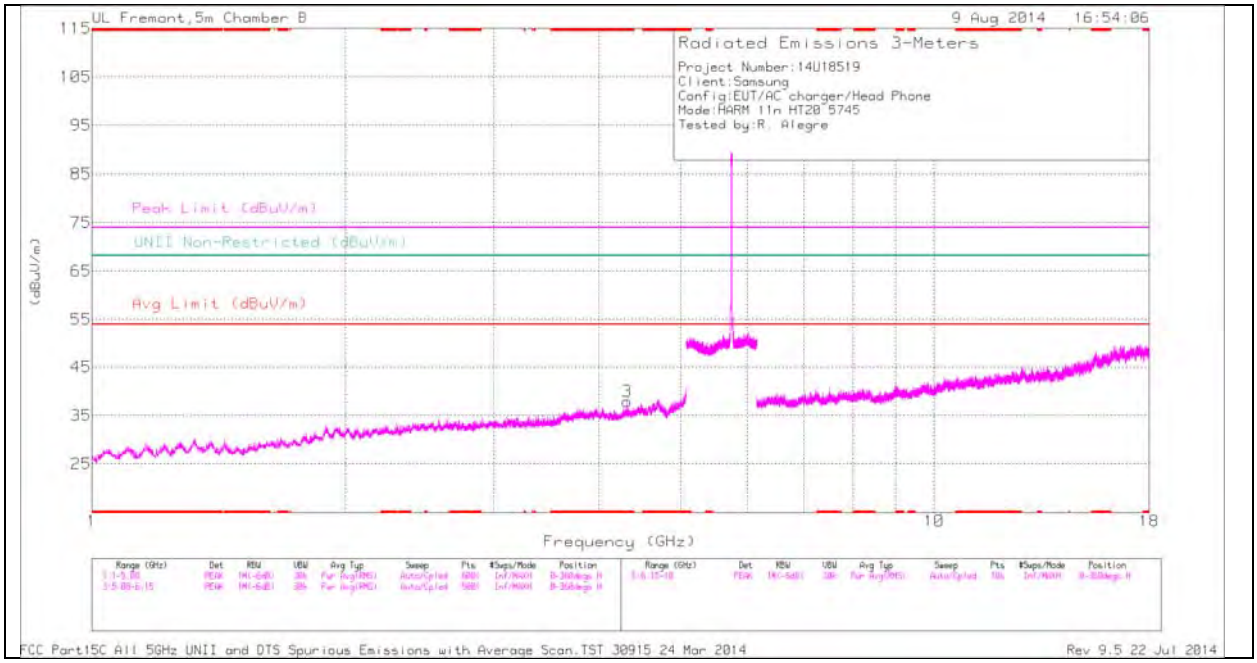
PK - Peak detector




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL HORIZONTAL



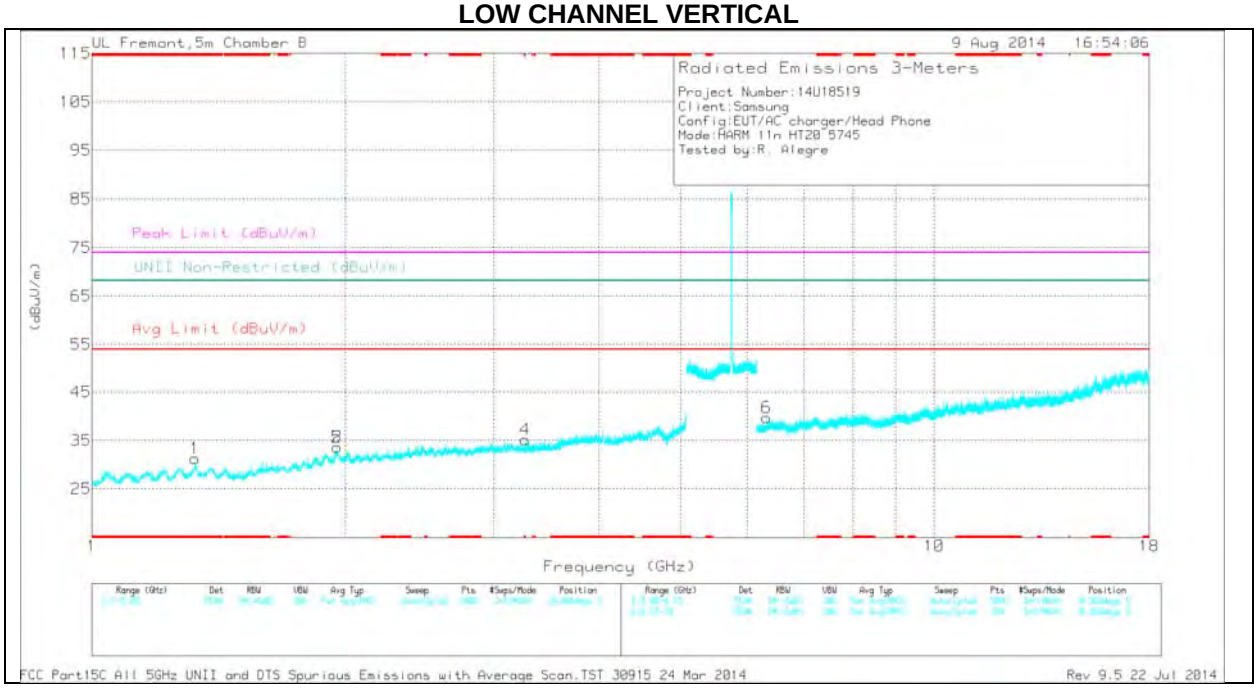

Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**LOW CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## LOW CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | * 4.318 | 33.87 | PK | 33.7 | -29.7 | 0 | 37.87 | - | - | 74 | -36.13 | - | - | 0-360 | 200 | H |
| 1 | * 1.325 | 36.18 | PK | 28.8 | -33.7 | 0 | 31.28 | - | - | 74 | -42.72 | - | - | 0-360 | 200 | V |
| 2 | 1.954 | 34.75 | PK | 31.2 | -32.3 | 0 | 33.65 | - | - | - | - | 68.2 | -34.55 | 0-360 | 101 | V |
| 5 | 1.954 | 34.75 | PK | 31.2 | -32.3 | 0 | 33.65 | - | - | - | - | 68.2 | -34.55 | 0-360 | 101 | V |
| 4 | 3.267 | 33.83 | PK | 32.8 | -31.5 | 0 | 35.13 | - | - | - | - | 68.2 | -33.07 | 0-360 | 200 | V |
| 6 | 6.324 | 32.2 | PK | 35.5 | -28 | 0 | 39.7 | - | - | - | - | 68.2 | -28.5 | 0-360 | 101 | V |

PK - Peak detector

*RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 4.319 | 40.84 | PK1 | 33.7 | -29.7 | 0 | 44.84 | - | - | 74 | -29.16 | - | - | 359 | 200 | H |
| * 1.326 | 44.13 | PK1 | 28.8 | -33.7 | 0 | 39.23 | - | - | 74 | -34.77 | - | - | 359 | 200 | V |

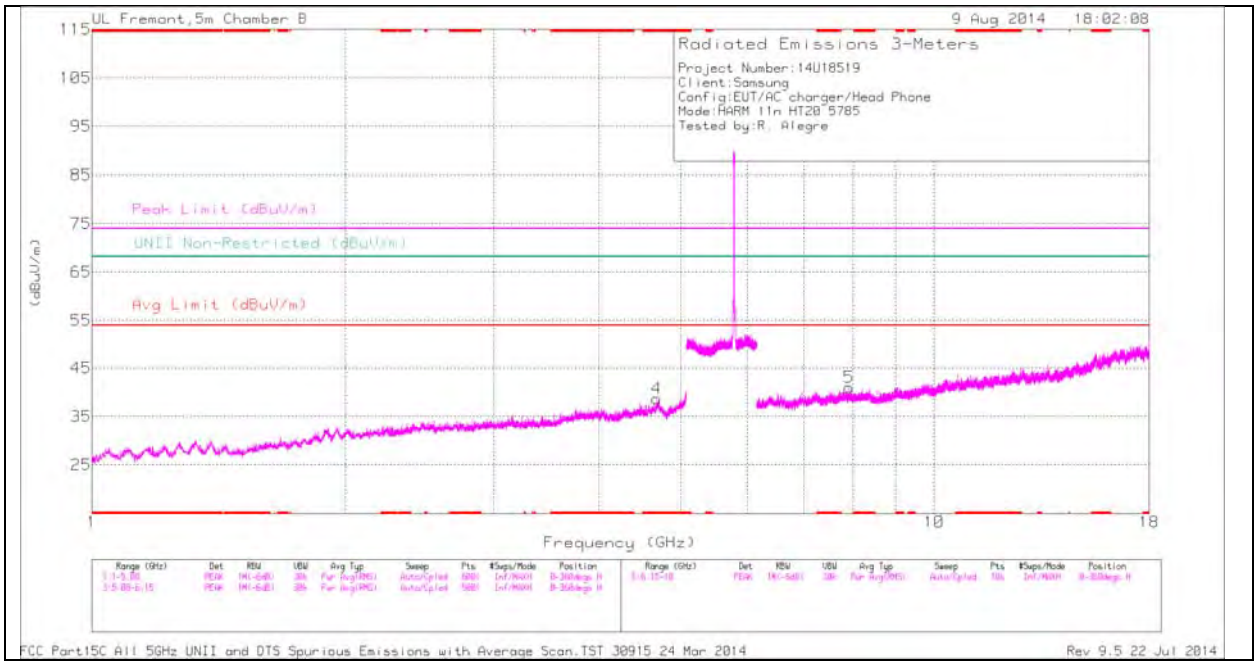
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL HORIZONTAL



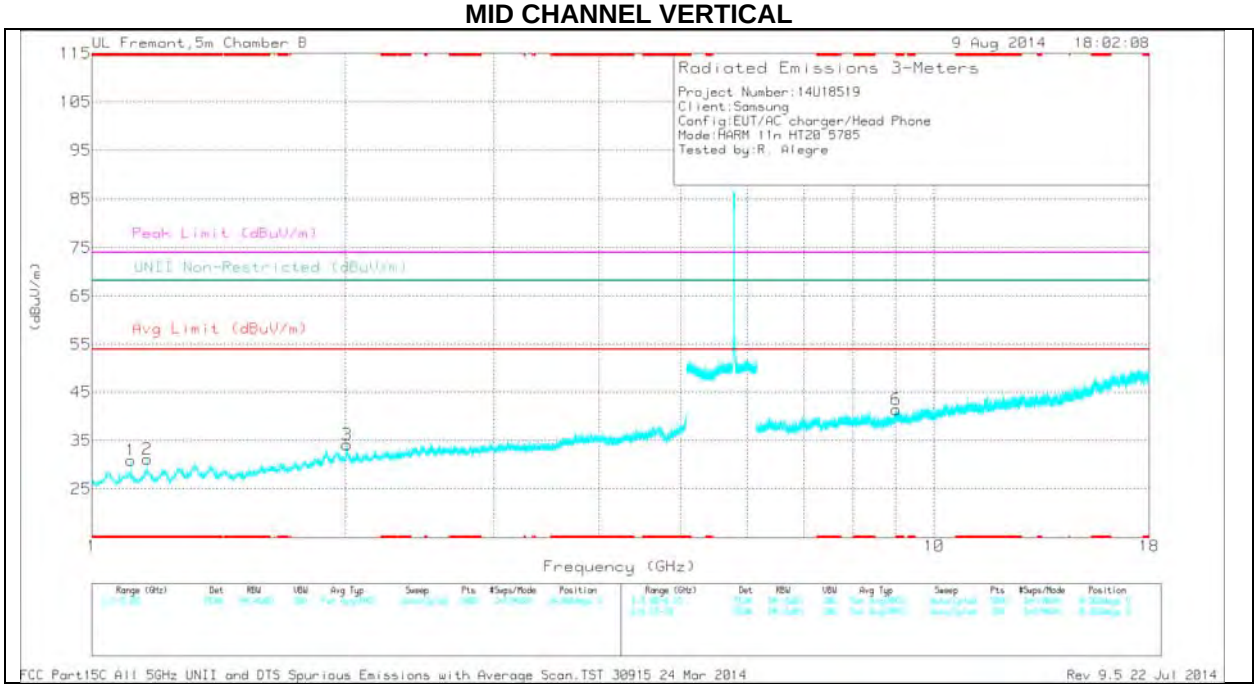

Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**MID CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## MID CHANNEL DATA

### *TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | * 4.681 | 34.04 | PK | 34.2 | -29.5 | 0 | 38.74 | - | - | 74 | -35.26 | - | - | 0-360 | 101 | H |
| 1 | * 1.112 | 37.65 | PK | 27.5 | -34.2 | 0 | 30.95 | - | - | 74 | -43.05 | - | - | 0-360 | 199 | V |
| 2 | * 1.163 | 37.51 | PK | 27.9 | -34.3 | 0 | 31.11 | - | - | 74 | -42.89 | - | - | 0-360 | 199 | V |
| 6 | * 9.009 | 29.95 | PK | 36.2 | -24.7 | 0 | 41.45 | - | - | 74 | -32.55 | - | - | 0-360 | 199 | V |
| 3 | 2.008 | 35.75 | PK | 31.3 | -32.9 | 0 | 34.15 | - | - | - | - | 68.2 | -34.05 | 0-360 | 101 | V |
| 5 | 7.927 | 31.53 | PK | 35.7 | -26.2 | 0 | 41.03 | - | - | - | - | 68.2 | -27.17 | 0-360 | 199 | H |

PK - Peak detector

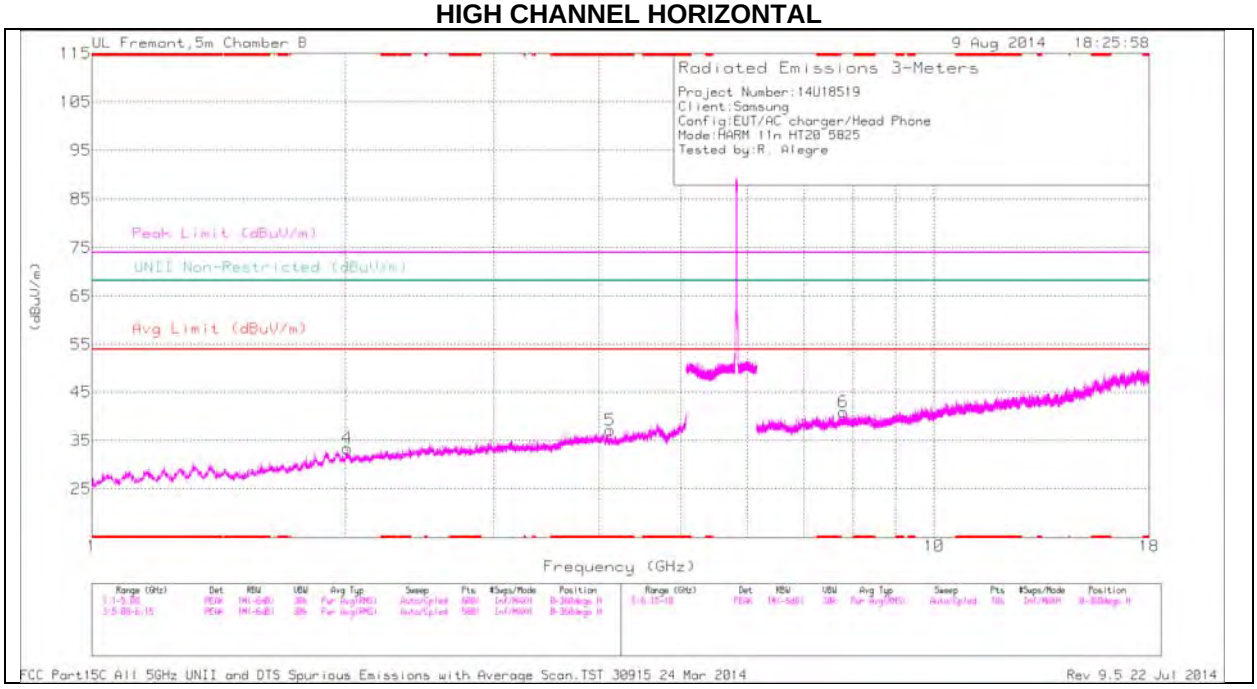
### *RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 4.682 | 41.29 | PK1 | 34.2 | -29.5 | 0 | 45.99 | - | - | 74 | -28.01 | - | - | 360 | 101 | H |
| * 1.11 | 43.42 | PK1 | 27.5 | -34.2 | 0 | 36.72 | - | - | 74 | -37.28 | - | - | 360 | 199 | V |
| * 1.164 | 43.92 | PK1 | 27.9 | -34.3 | 0 | 37.52 | - | - | 74 | -36.48 | - | - | 360 | 199 | V |
| * 9.01 | 36.07 | PK1 | 36.2 | -24.6 | 0 | 47.67 | - | - | 74 | -26.33 | - | - | 360 | 199 | V |

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL HORIZONTAL

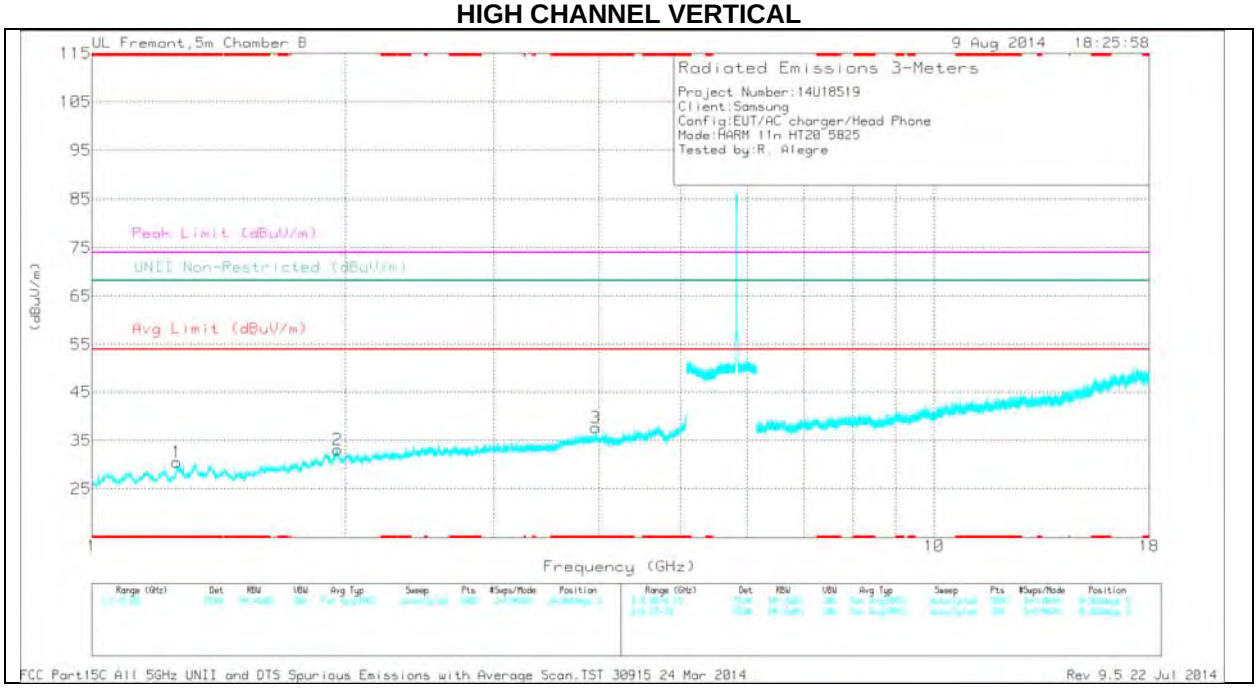



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**HIGH CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | * 4.122 | 34.18 | PK | 33.6 | -30.7 | 0 | 37.08 | - | - | 74 | -36.92 | - | - | 0-360 | 101 | H |
| 1 | * 1.26 | 36.06 | PK | 28.6 | -34.2 | 0 | 30.46 | - | - | 74 | -43.54 | - | - | 0-360 | 199 | V |
| 3 | * 3.965 | 34.01 | PK | 33.7 | -30.1 | 0 | 37.61 | - | - | 74 | -36.39 | - | - | 0-360 | 101 | V |
| 2 | 1.957 | 34.19 | PK | 31.2 | -32.3 | 0 | 33.09 | - | - | - | - | 68.2 | -35.11 | 0-360 | 101 | V |
| 4 | 2.01 | 35.03 | PK | 31.3 | -32.9 | 0 | 33.43 | - | - | - | - | 68.2 | -34.77 | 0-360 | 199 | H |
| 6 | 7.806 | 30.8 | PK | 35.7 | -25.6 | 0 | 40.9 | - | - | - | - | 68.2 | -27.3 | 0-360 | 101 | H |

PK - Peak detector

*RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 4.121 | 40.66 | PK1 | 33.6 | -30.7 | 0 | 43.56 | - | - | 74 | -30.44 | - | - | 359 | 100 | H |
| * 1.26 | 42.92 | PK1 | 28.6 | -34.2 | 0 | 37.32 | - | - | 74 | -36.68 | - | - | 359 | 199 | V |
| * 3.965 | 40.75 | PK1 | 33.7 | -30.1 | 0 | 44.35 | - | - | 74 | -29.65 | - | - | 359 | 102 | V |

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



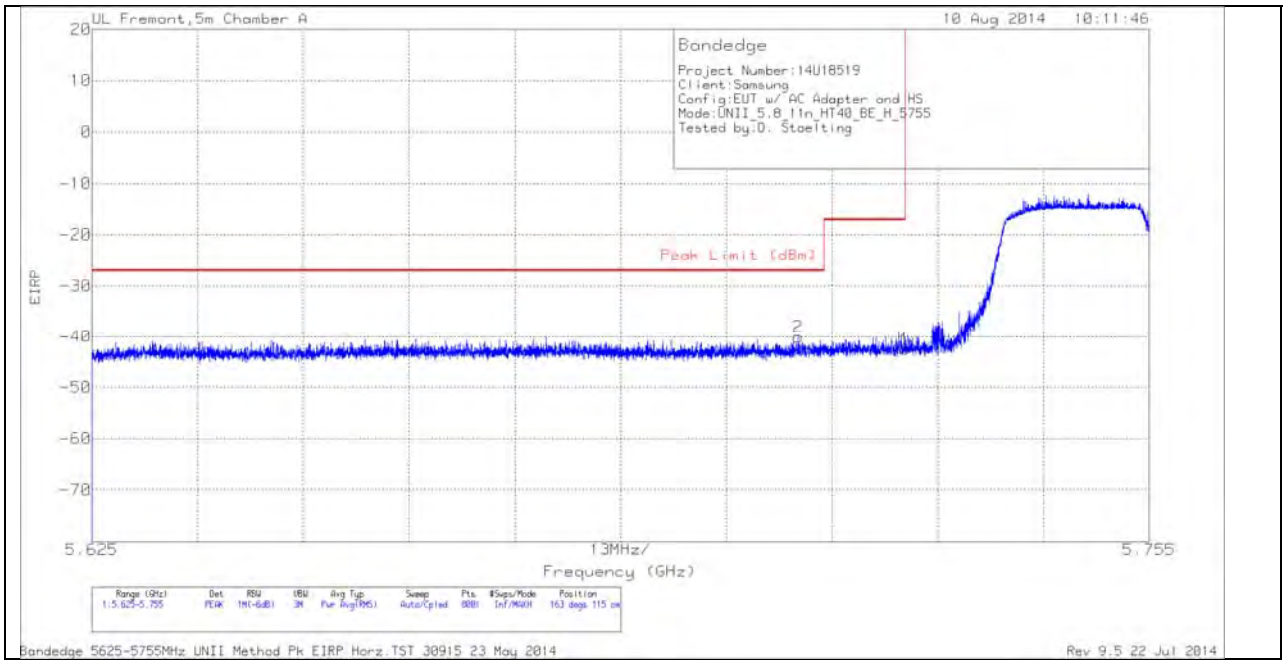
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 11.4.3. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.8 GHz BAND

## HARMONICS AND SPURIOUS EMISSIONS

### HORIZONTAL PEAK AND AVERAGE PLOT



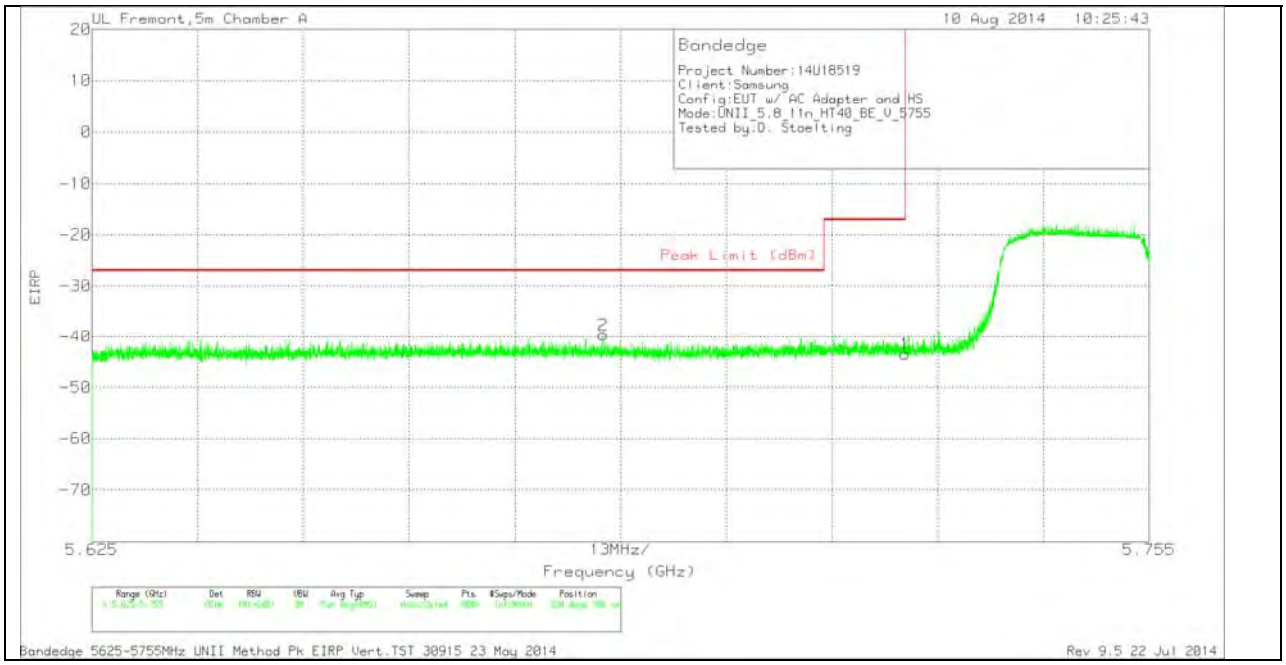

### HORIZONTAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | AF T136 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Conversion Factor (dB) | DC Corr (dB) | Corrected Reading EIRP | Peak Limit (dBm) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 5.712 | -66.68 | PK | 34.5 | -19.7 | 11.8 | 0 | -40.08 | -27 | -13.08 | 163 | 115 | H |
| 1 | 5.725 | -69.25 | PK | 34.6 | -19.6 | 11.8 | 0 | -42.45 | -17 | -25.45 | 163 | 115 | H |

PK - Peak detector


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT




## VERTICAL DATA

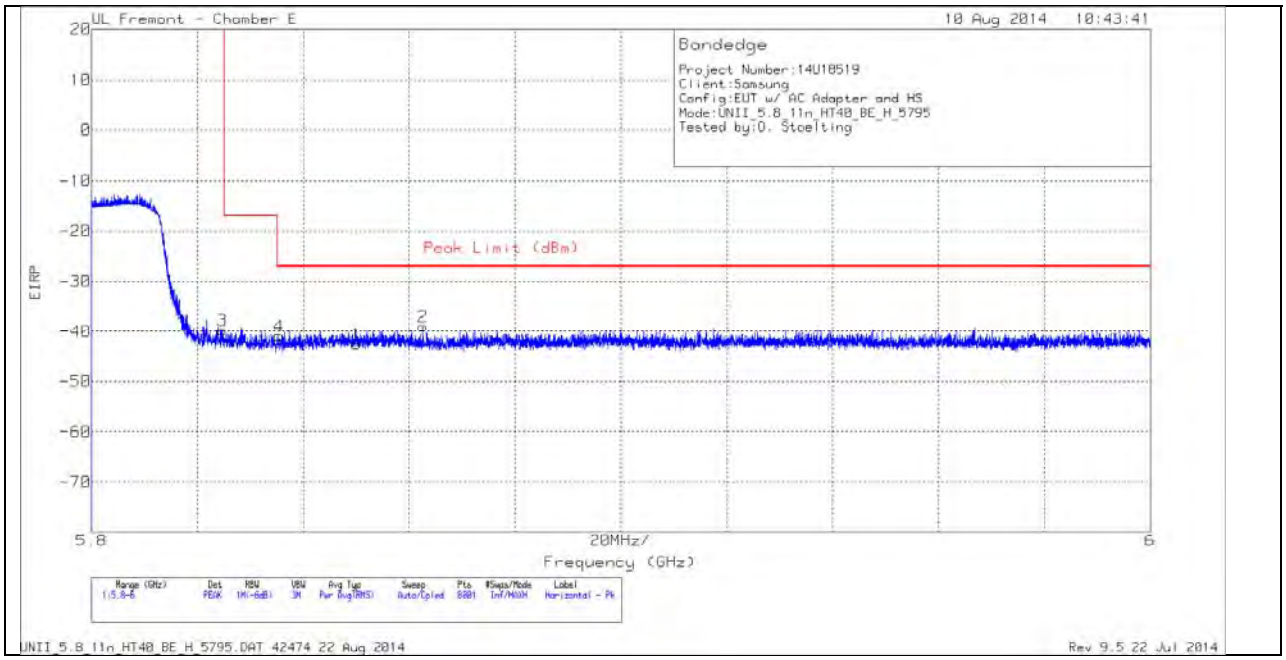
| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | AF T136 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Conversion Factor (dB) | DC Corr (dB) | Corrected Reading EIRP | Peak Limit (dBm) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 5.688 | -66.27 | PK | 34.5 | -19.7 | 11.8 | 0 | -39.67 | -27 | -12.67 | 339 | 186 | V |
| 1 | 5.725 | -70.21 | PK | 34.6 | -19.6 | 11.8 | 0 | -43.41 | -17 | -26.41 | 339 | 186 | V |

PK - Peak detector


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# AUTHORIZED BANDEDGE (HIGH CHANNEL)

## HORIZONTAL PEAK AND AVERAGE PLOT



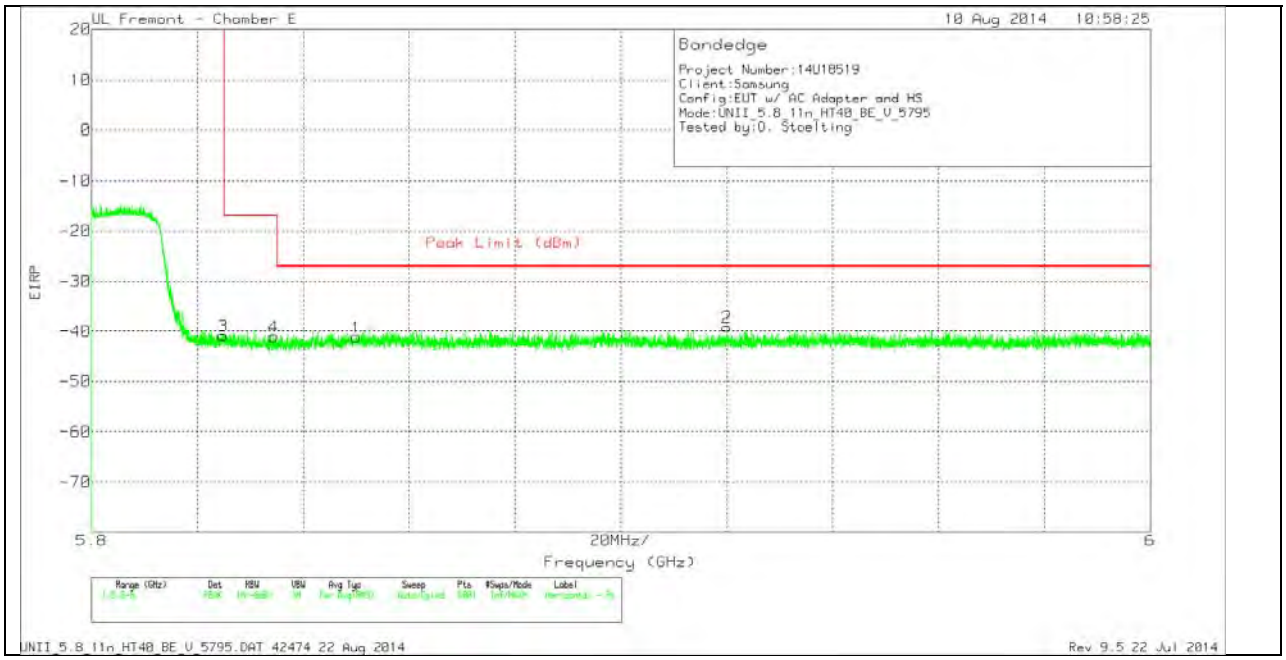

## HORIZONTAL DATA

| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | AF T136 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Conversion Factor (dB) | DC Corr (dB) | Corrected Reading EIRP | Peak Limit (dBm) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.85 | -70.12 | PK | 34.9 | -19.2 | 11.8 | 0 | -42.62 | -27 | -15.62 | 166 | 165 | H |
| 2 | 5.863 | -66.11 | PK | 34.9 | -19.6 | 11.8 | 0 | -39.01 | -27 | -12.01 | 166 | 165 | H |
| 3 | 5.825 | -66.79 | PK | 34.8 | -19.5 | 11.8 | 0 | -39.69 | - | - | 166 | 165 | H |
| 4 | 5.835 | -67.54 | PK | 34.8 | -20 | 11.8 | 0 | -40.94 | -27 | -13.94 | 166 | 165 | H |

PK - Peak detector


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## VERTICAL PEAK AND AVERAGE PLOT




## VERTICAL DATA

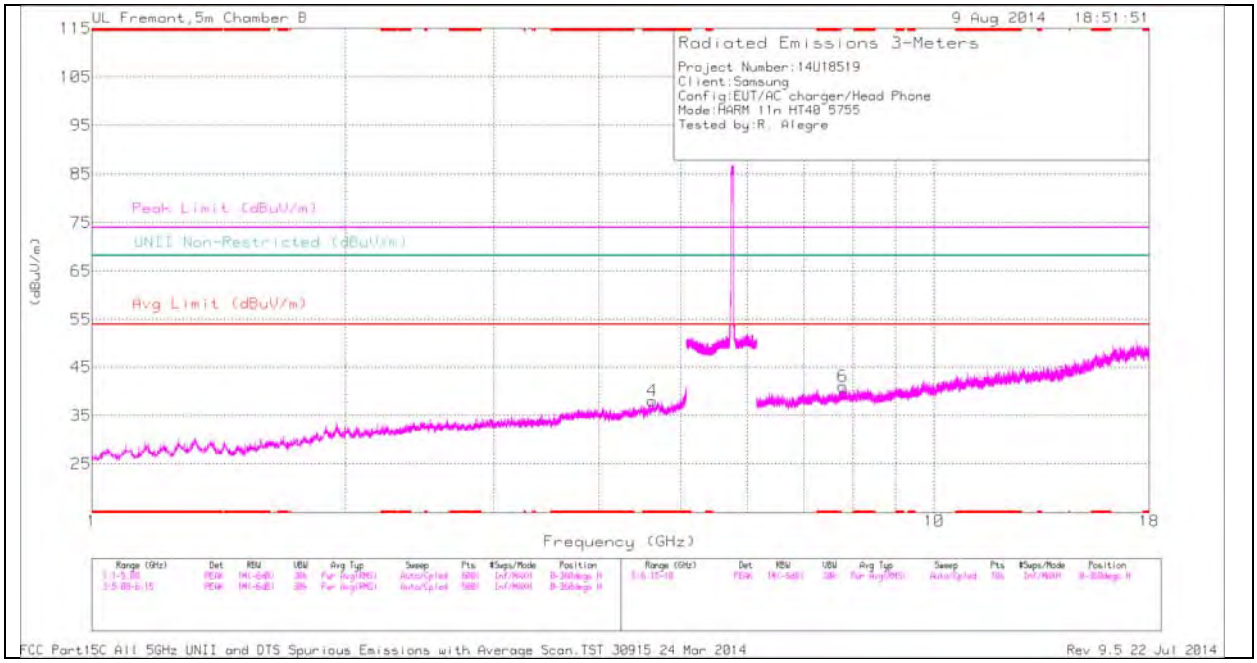
| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | AF T136 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | Conversion Factor (dB) | DC Corr (dB) | Corrected Reading EIRP | Peak Limit (dBm) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.85 | -68.68 | PK | 34.9 | -19.2 | 11.8 | 0 | -41.18 | -27 | -14.18 | 273 | 201 | V |
| 2 | 5.92 | -66.45 | PK | 35.1 | -19.6 | 11.8 | 0 | -39.15 | -27 | -12.15 | 273 | 201 | V |
| 3 | 5.825 | -68 | PK | 34.8 | -19.5 | 11.8 | 0 | -40.9 | - | - | 273 | 201 | V |
| 4 | 5.834 | -67.64 | PK | 34.8 | -20 | 11.8 | 0 | -41.04 | -17 | -24.04 | 273 | 201 | V |

PK - Peak detector


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL HORIZONTAL



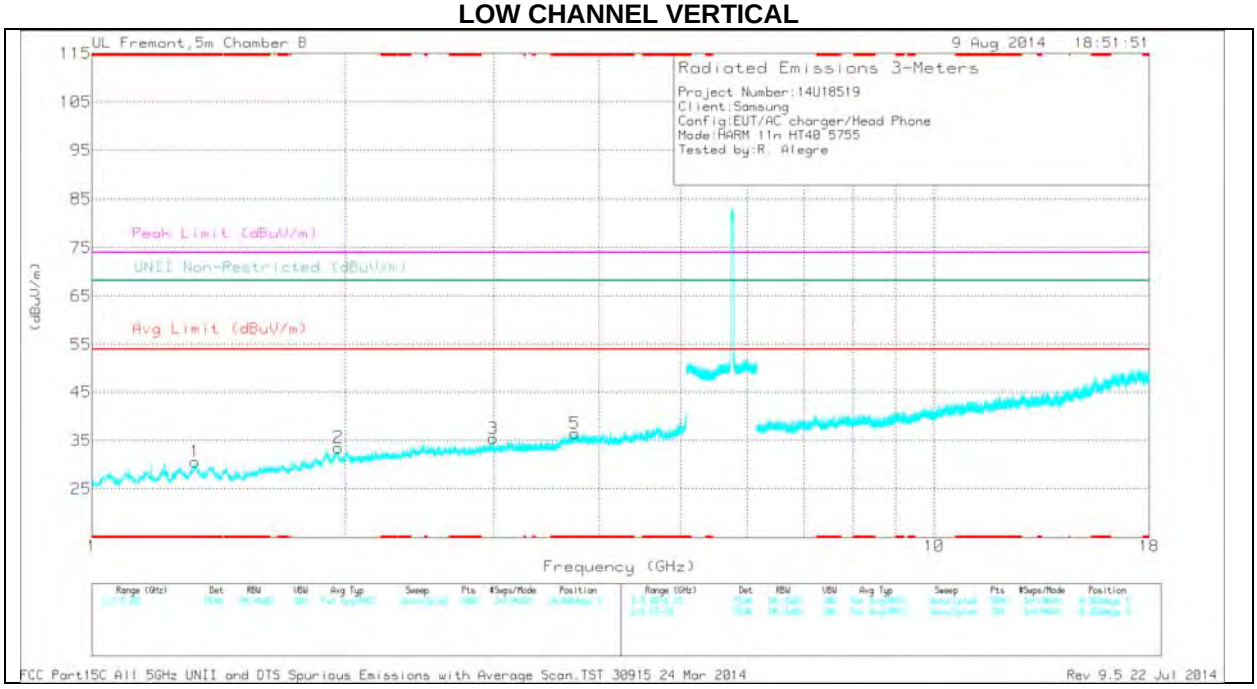

Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**LOW CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## LOW CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | * 4.627 | 32.79 | PK | 34.2 | -29 | 0 | 37.99 | - | - | 74 | -36.01 | - | - | 0-360 | 199 | H |
| 1 | * 1.326 | 35.57 | PK | 28.8 | -33.7 | 0 | 30.67 | - | - | 74 | -43.33 | - | - | 0-360 | 199 | V |
| 5 | * 3.743 | 33.74 | PK | 33.5 | -30.7 | 0 | 36.54 | - | - | 74 | -37.46 | - | - | 0-360 | 101 | V |
| 2 | 1.962 | 34.76 | PK | 31.2 | -32.4 | 0 | 33.56 | - | - | - | - | 68.2 | -34.64 | 0-360 | 199 | V |
| 3 | 2.993 | 34.09 | PK | 32.8 | -31.4 | 0 | 35.49 | - | - | - | - | 68.2 | -32.71 | 0-360 | 199 | V |
| 6 | 7.784 | 30.98 | PK | 35.7 | -25.6 | 0 | 41.08 | - | - | - | - | 68.2 | -27.12 | 0-360 | 199 | H |

PK - Peak detector

*RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 4.626 | 39.88 | PK1 | 34.2 | -28.9 | 0 | 45.18 | - | - | 74 | -28.82 | - | - | 360 | 199 | H |
| * 1.324 | 42.73 | PK1 | 28.8 | -33.7 | 0 | 37.83 | - | - | 74 | -36.17 | - | - | 360 | 199 | V |
| * 3.743 | 41.04 | PK1 | 33.5 | -30.7 | 0 | 43.84 | - | - | 74 | -30.16 | - | - | 360 | 102 | V |

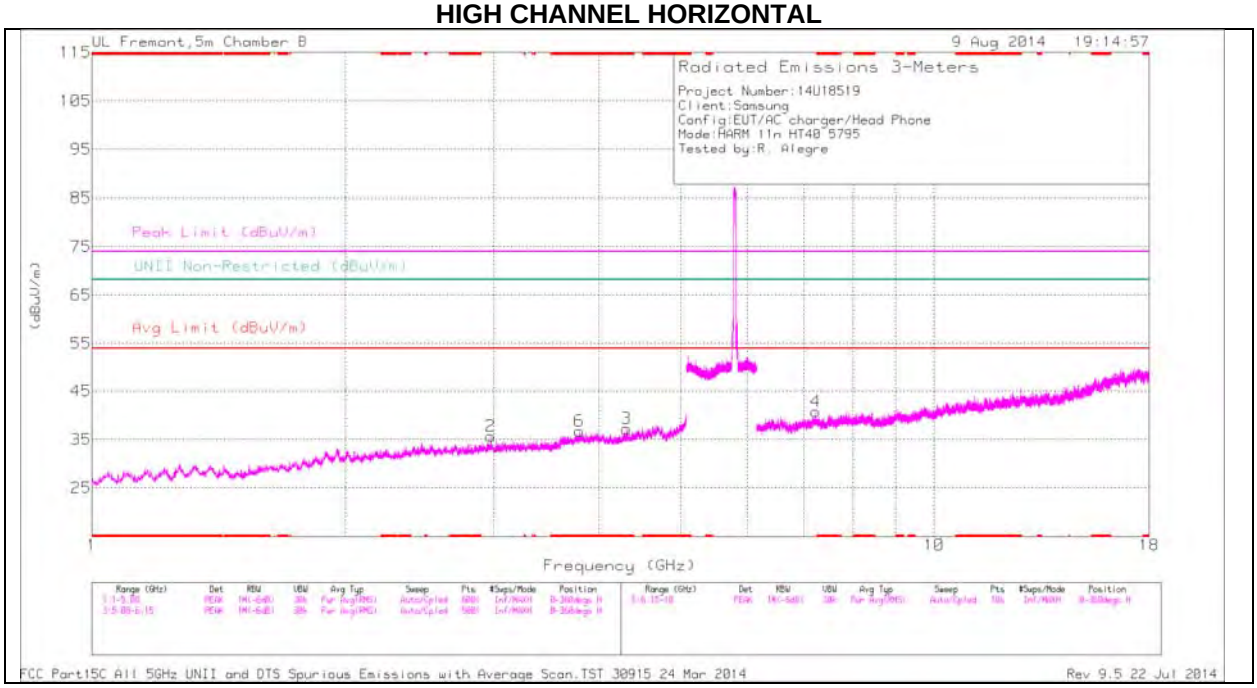
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**HIGH CHANNEL HORIZONTAL**

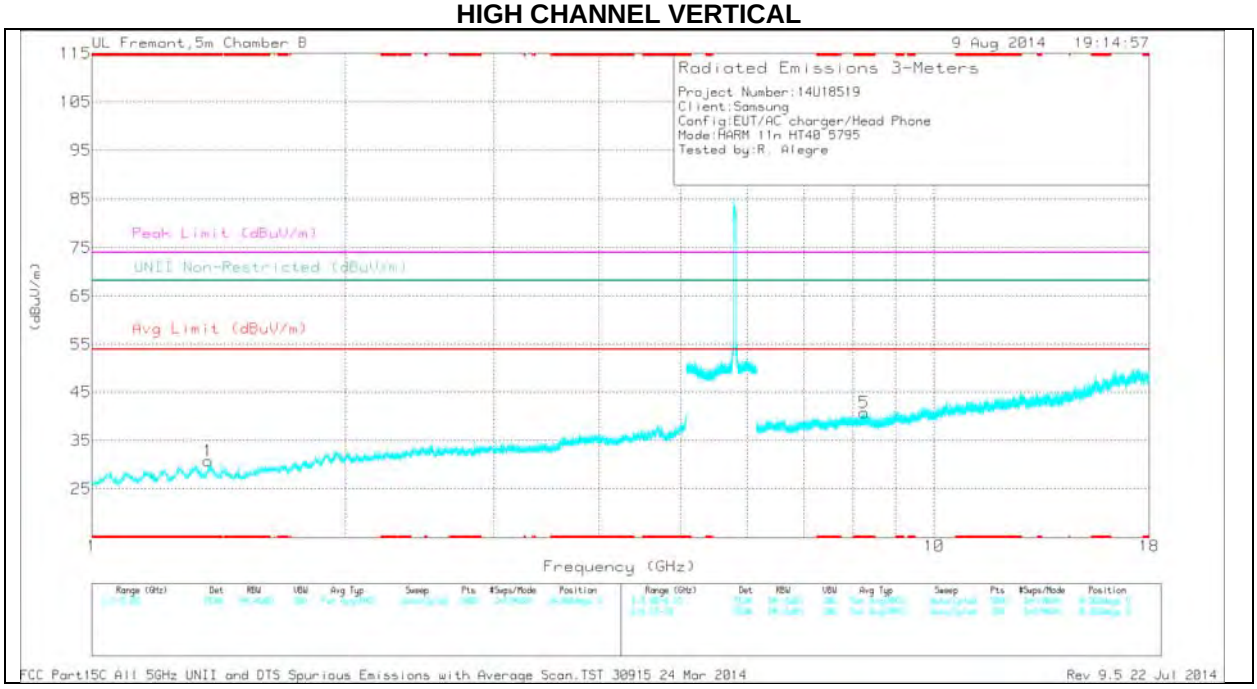



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**HIGH CHANNEL VERTICAL**




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## HIGH CHANNEL DATA

*TRACE MARKERS*

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | * 4.313 | 33 | PK | 33.7 | -29.5 | 0 | 37.2 | - | - | 74 | -36.8 | - | - | 0-360 | 102 | H |
| 6 | * 3.791 | 33.87 | PK | 33.6 | -30.7 | 0 | 36.77 | - | - | 74 | -37.23 | - | - | 0-360 | 200 | H |
| 1 | * 1.375 | 35.79 | PK | 28.6 | -33.6 | 0 | 30.79 | - | - | 74 | -43.21 | - | - | 0-360 | 101 | V |
| 5 | * 8.262 | 30.55 | PK | 35.7 | -25.5 | 0 | 40.75 | - | - | 74 | -33.25 | - | - | 0-360 | 199 | V |
| 2 | 2.973 | 34.5 | PK | 32.7 | -31.5 | 0 | 35.7 | - | - | - | - | 68.2 | -32.5 | 0-360 | 102 | H |
| 4 | 7.239 | 31.02 | PK | 35.6 | -25.8 | 0 | 40.82 | - | - | - | - | 68.2 | -27.38 | 0-360 | 199 | H |

PK - Peak detector

*RADIATED EMISSIONS*

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T345 (dB/m) | Amp/Cbl/Flt r/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 4.311 | 39.8 | PK1 | 33.7 | -29.5 | 0 | 44 | - | - | 74 | -30 | - | - | 359 | 101 | H |
| * 3.79 | 40.83 | PK1 | 33.6 | -30.7 | 0 | 43.73 | - | - | 74 | -30.27 | - | - | 359 | 199 | H |
| * 1.376 | 43.17 | PK1 | 28.6 | -33.6 | 0 | 38.17 | - | - | 74 | -35.83 | - | - | 359 | 102 | V |
| * 8.263 | 38.02 | PK1 | 35.7 | -25.5 | 0 | 48.22 | - | - | 74 | -25.78 | - | - | 359 | 199 | V |

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

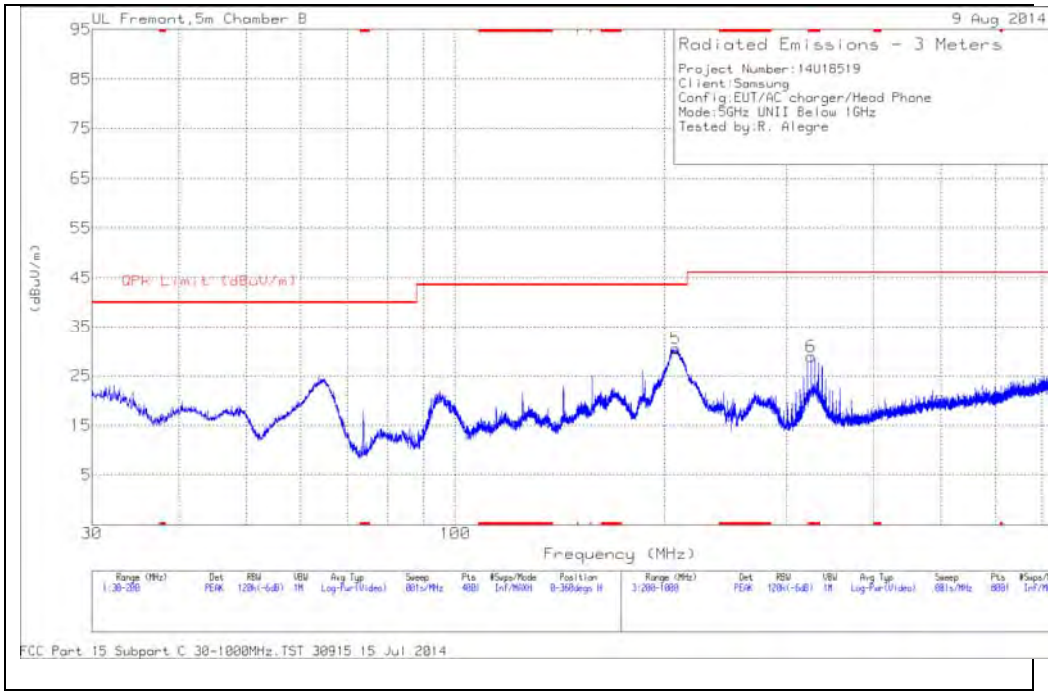


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# 12. WORST-CASE BELOW 1 GHz (in the 5.3 GHz Band)

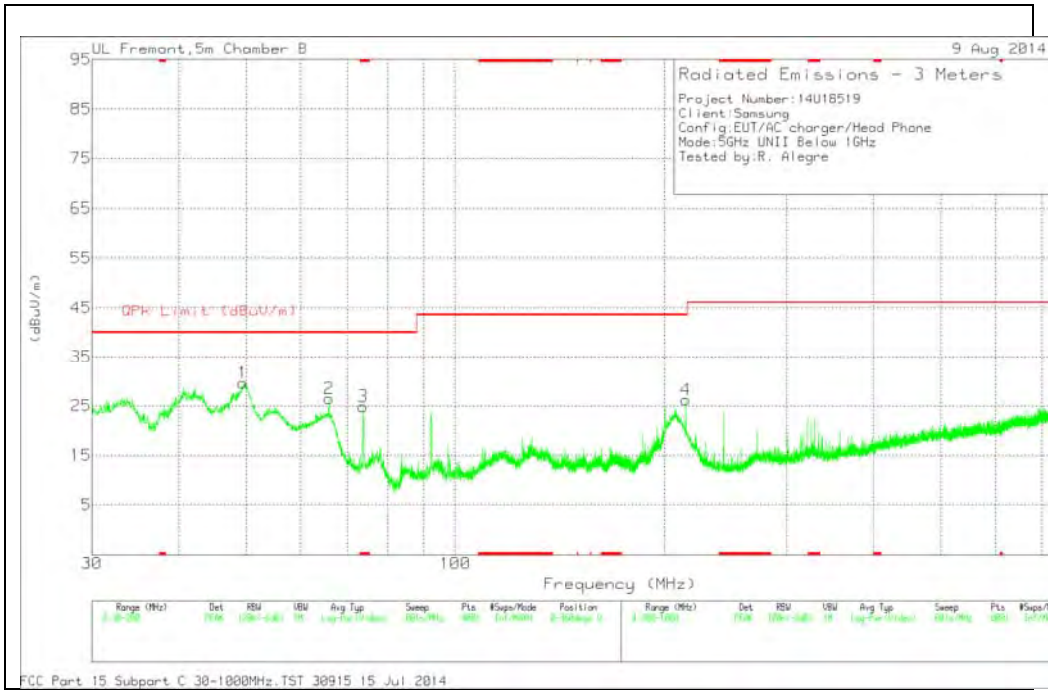
**SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)**





*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

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





*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**Below 1G Data**

Trace Markers

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T243 (dB/m) | Amp/Cbl (dB) | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | * 73.7325 | 45.1 | PK | 8.1 | -28.3 | 24.9 | 40 | -15.1 | 0-360 | 101 | V |
| 6 | * 325.5 | 40.76 | PK | 13.9 | -25.8 | 28.86 | 46.02 | -17.16 | 0-360 | 101 | H |
| 1 | 49.5075 | 50.07 | PK | 8.2 | -28.6 | 29.67 | 40 | -10.33 | 0-360 | 101 | V |
| 2 | 65.785 | 47.01 | PK | 7.9 | -28.4 | 26.51 | 40 | -13.49 | 0-360 | 101 | V |
| 5 | 207.9 | 46.79 | PK | 10.6 | -26.8 | 30.59 | 43.52 | -12.93 | 0-360 | 101 | H |
| 4 | 214.8 | 42.48 | PK | 10.6 | -26.8 | 26.28 | 43.52 | -17.24 | 0-360 | 200 | V |

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# 13. AC POWER LINE CONDUCTED EMISSIONS

## LIMITS

FCC §15.207 (a)

| 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.

## TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

## RESULTS

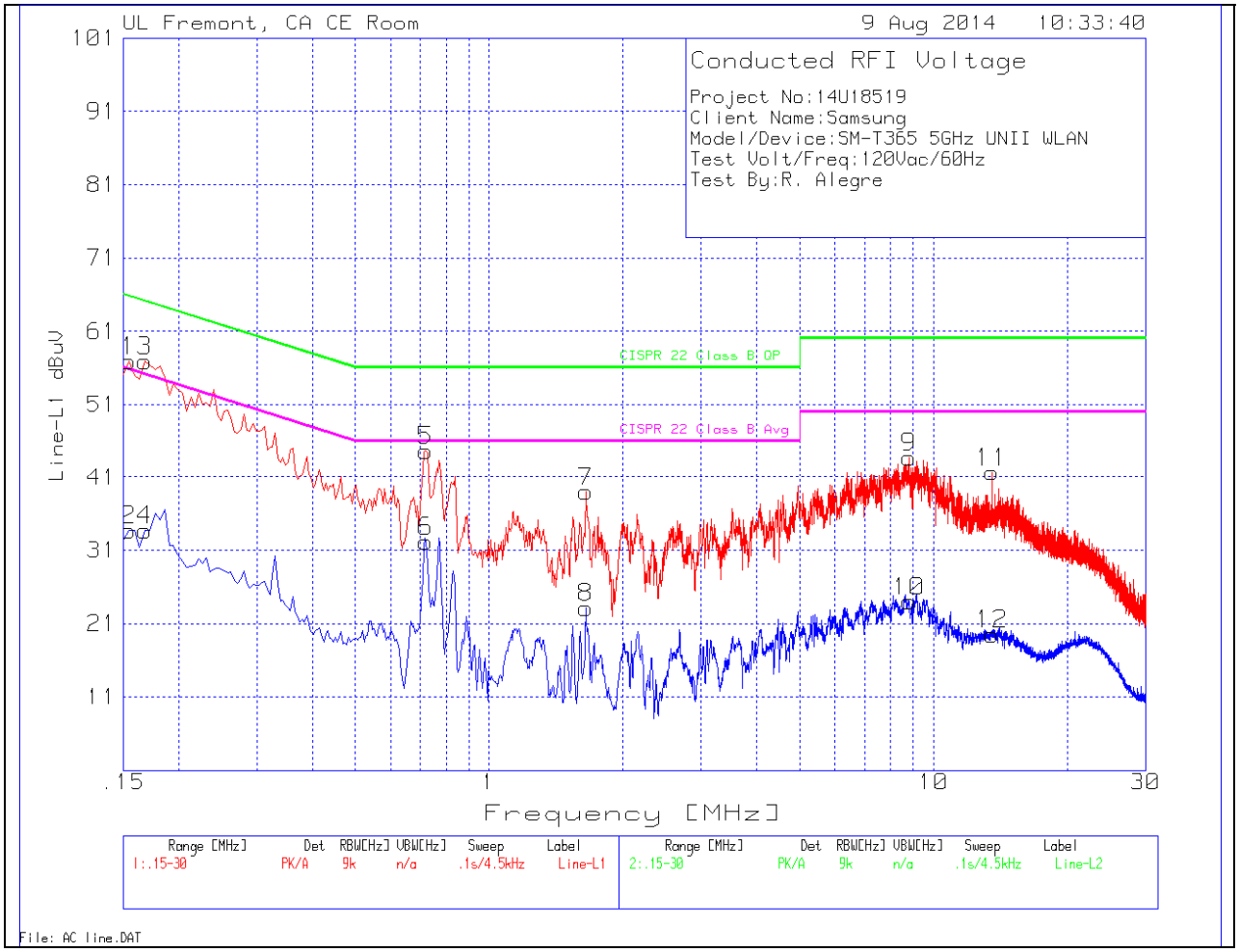


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 6 WORST EMISSIONS

# LINE 1 PLOT







*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# LINE 1 RESULTS

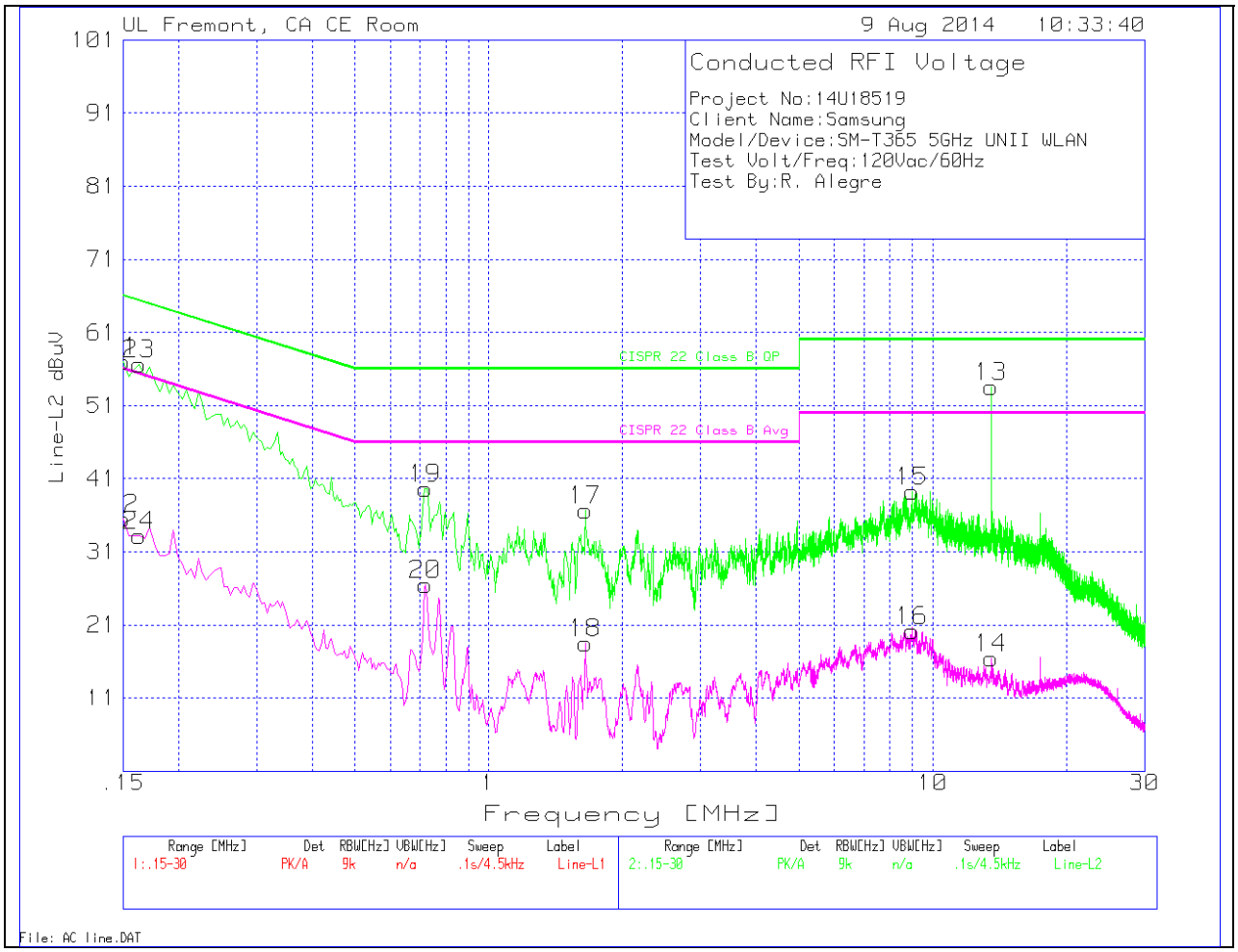
## Line-L1 .15 - 30MHz

### Trace Markers

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | T24 IL L1 (dB) | LC Cables 1&3 (dB) | Corrected Reading dBuV | CISPR 22 Class B QP | Margin to Limit (dB) | CISPR 22 Class B Avg | Margin to Limit (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .1545 | 55.62 | PK | 1.3 | 0 | 56.92 | 65.8 | -8.88 | - | - |
| 2 | .1545 | 32.39 | Av | 1.3 | 0 | 33.69 | - | - | 55.8 | -22.11 |
| 3 | .168 | 55.65 | PK | 1.2 | 0 | 56.85 | 65.1 | -8.25 | - | - |
| 4 | .168 | 32.55 | Av | 1.2 | 0 | 33.75 | - | - | 55.1 | -21.35 |
| 5 | .7215 | 44.41 | PK | .3 | 0 | 44.71 | 56 | -11.29 | - | - |
| 6 | .7215 | 31.89 | Av | .3 | 0 | 32.19 | - | - | 46 | -13.81 |
| 7 | 1.6485 | 38.63 | PK | .2 | .1 | 38.93 | 56 | -17.07 | - | - |
| 8 | 1.6485 | 22.89 | Av | .2 | .1 | 23.19 | - | - | 46 | -22.81 |
| 9 | 8.7945 | 43.42 | PK | .2 | .1 | 43.72 | 60 | -16.28 | - | - |
| 10 | 8.7945 | 23.67 | Av | .2 | .1 | 23.97 | - | - | 50 | -26.03 |
| 11 | 13.551 | 41.35 | PK | .2 | .2 | 41.75 | 60 | -18.25 | - | - |
| 12 | 13.551 | 19.11 | Av | .2 | .2 | 19.51 | - | - | 50 | -30.49 |


UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# LINE 2 PLOT







*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# LINE 2 RESULTS

Line-L2 .15 - 30MHz

**Trace Markers**

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | T24 IL L2 (dB) | LC Cables 2&3 (dB) | Corrected Reading dBuV | CISPR 22 Class B QP | Margin to Limit (dB) | CISPR 22 Class B Avg | Margin to Limit (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 8.9925 | 38.94 | PK | .2 | .1 | 39.24 | 60 | -20.76 | - | - |
| 16 | 8.9925 | 19.88 | Av | .2 | .1 | 20.18 | - | - | 50 | -29.82 |
| 17 | 1.6485 | 36.4 | PK | .2 | .1 | 36.7 | 56 | -19.3 | - | - |
| 18 | 1.6485 | 18.18 | Av | .2 | .1 | 18.48 | - | - | 46 | -27.52 |
| 19 | .7215 | 39.36 | PK | .3 | 0 | 39.66 | 56 | -16.34 | - | - |
| 20 | .7215 | 26.23 | Av | .3 | 0 | 26.53 | - | - | 46 | -19.47 |
| 21 | .15 | 55.54 | PK | 1.5 | 0 | 57.04 | 66 | -8.96 | - | - |
| 22 | .15 | 34.06 | Av | 1.5 | 0 | 35.56 | - | - | 56 | -20.44 |
| 23 | .1635 | 55.38 | PK | 1.3 | 0 | 56.68 | 65.3 | -8.62 | - | - |
| 24 | .1635 | 31.83 | Av | 1.3 | 0 | 33.13 | - | - | 55.3 | -22.17 |
| 13 | 13.56 | 53.02 | PK | .3 | .2 | 53.52 | 60 | -6.48 | - | - |
| 14 | 13.56 | 15.94 | Av | .3 | .2 | 16.44 | - | - | 50 | -33.56 |

PK - Peak detector

Av - average detection



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

# 14. DYNAMIC FREQUENCY SELECTION

## 14.1. OVERVIEW

### 14.1.1. LIMITS

**INDUSTRY CANADA**

IC RSS-210 is closely harmonized with FCC Part 15 DFS rules. The deviations are as follows:

RSS-210 Issue 7 A9.4 (b) (ii) **Channel Availability Check Time:** …

**Additional requirements for the band 5600-5650 MHz**: Until further notice, devices subject to this Section shall not be capable of transmitting in the band 5600-5650 MHz, so that Environment Canada weather radars operating in this band are protected.

**FCC**

§15.407 (h) and FCC 06-96 APPENDIX "COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVCIES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION".



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**Table 1: Applicability of DFS requirements prior to use of a channel**

| Requirement | Operational Mode | | |
|---|---|---|---|
| | Master | Client (without radar detection) | Client (with radar detection) |
| Non-Occupancy Period | Yes | Not required | Yes |
| DFS Detection Threshold | Yes | Not required | Yes |
| Channel Availability Check Time | Yes | Not required | Not required |
| Uniform Spreading | Yes | Not required | Not required |

**Table 2: Applicability of DFS requirements during normal operation**

| Requirement | Operational Mode | | |
|---|---|---|---|
| | Master | Client **(without DFS)** | Client **(with DFS)** |
| DFS Detection Threshold | Yes | Not required | Yes |
| Channel Closing Transmission Time | Yes | Yes | Yes |
| Channel Move Time | Yes | Yes | Yes |

**Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring**

| Maximum Transmit Power | Value (see note) |
|---|---|
| ≥ 200 milliwatt | -64 dBm |
| < 200 milliwatt | -62 dBm |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna

Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**Table 4: DFS Response requirement values**

| Parameter | Value |
|---|---|
| *Non-occupancy period* | 30 minutes |
| *Channel Availability Check Time* | 60 seconds |
| *Channel Move Time* | 10 seconds |
| *Channel Closing Transmission Time* | 200 milliseconds + approx. 60 milliseconds over remaining 10 second period |

The instant that the *Channel Move Time* and the *Channel Closing Transmission Time* begins is as follows:

For the Short pulse radar Test Signals this instant is the end of the *Burst*.

For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated.

For the Long Pulse radar Test Signal this instant is the end of the 12-second period defining the radar transmission.

The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate channel changes (an aggregate of approximately 60 milliseconds) during the remainder of the 10-second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

**Table 5 – Short Pulse Radar Test Waveforms**

| Radar Type | Pulse Width (Microseconds) | PRI (Microseconds) | Pulses | Minimum Percentage of Successful Detection | Minimum Trials |
|---|---|---|---|---|---|
| 1 | 1 | 1428 | 18 | 60% | 30 |
| 2 | 1-5 | 150-230 | 23-29 | 60% | 30 |
| 3 | 6-10 | 200-500 | 16-18 | 60% | 30 |
| 4 | 11-20 | 200-500 | 12-16 | 60% | 30 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

| | | |
|---|---|---|
| Aggregate (Radar Types 1-4) | 80% | 120 |

**Table 6 – Long Pulse Radar Test Signal**

| Radar Waveform | Bursts | Pulses per Burst | Pulse Width (µsec) | Chirp Width (MHz) | PRI (µsec) | Minimum Percentage of Successful Detection | Minimum Trials |
|---|---|---|---|---|---|---|---|
| 5 | 8-20 | 1-3 | 50-100 | 5-20 | 1000-2000 | 80% | 30 |

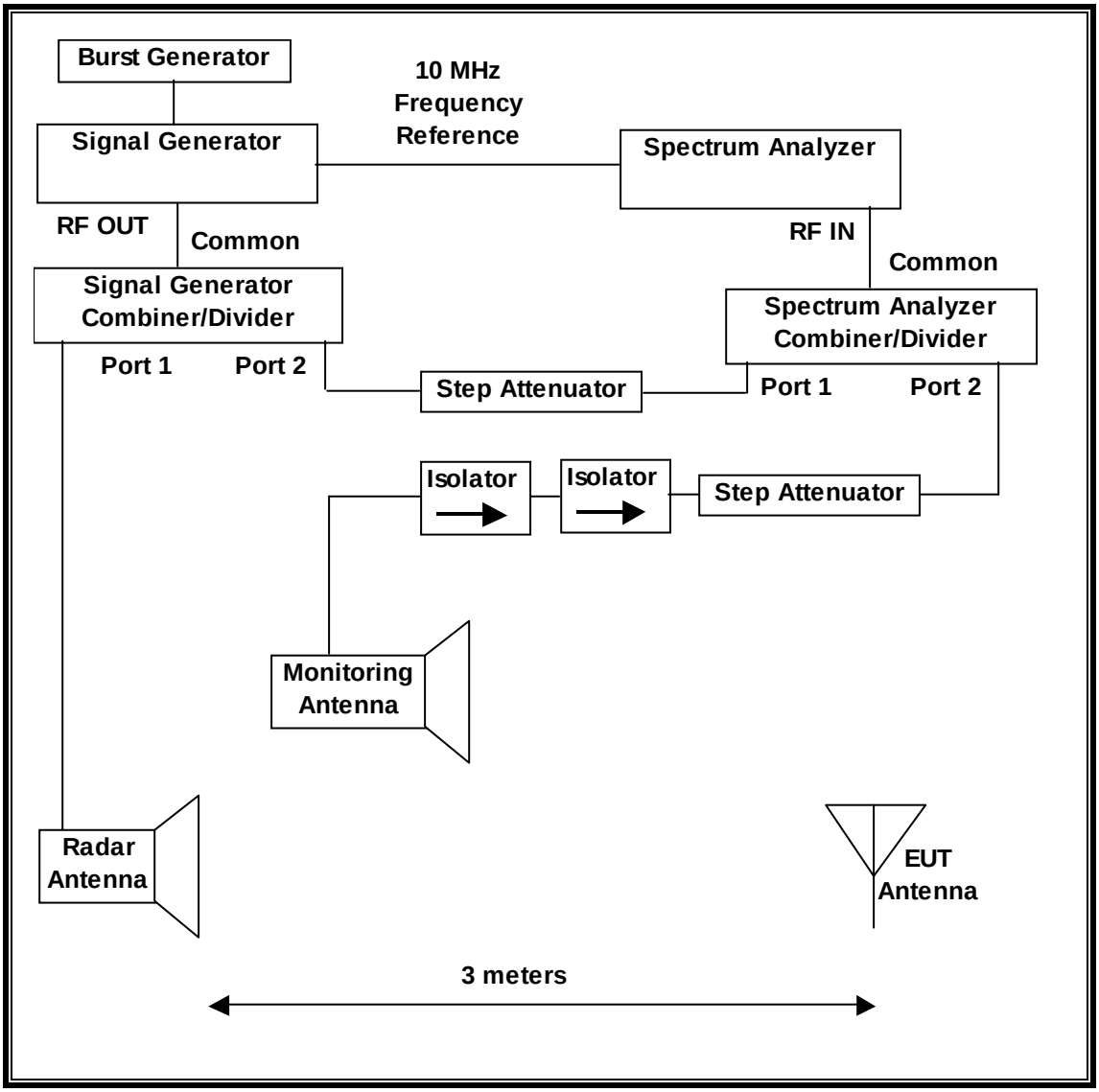
**Table 7 – Frequency Hopping Radar Test Signal**

| Radar Waveform | Pulse Width (µsec) | PRI (µsec) | Burst Length (ms) | Pulses per Hop | Hopping Rate (kHz) | Minimum Percentage of Successful Detection | Minimum Trials |
|---|---|---|---|---|---|---|---|
| 6 | 1 | 333 | 300 | 9 | .333 | 70% | 30 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 14.1.2. TEST AND MEASUREMENT SYSTEM

**RADIATED METHOD SYSTEM BLOCK DIAGRAM**





*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## SYSTEM OVERVIEW

The short pulse and long pulse signal generating system utilizes the NTIA software. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

The short pulse types 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Frequency Hopping Radar Waveform Generating Subsystem of FCC 06-96 APPENDIX. The frequency of the signal generator is incremented in 1 MHz steps from $F_L$ to $F_H$ for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

## SYSTEM CALIBRATION

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a horn antenna via a coaxial cable, with the reference level offset set to (horn antenna gain – coaxial cable loss). The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –64 dBm as measured on the spectrum analyzer.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. The Reference Level Offset of the spectrum analyzer is adjusted so that the displayed amplitude of the signal is –64 dBm.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of –64 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

A link is established between the Master and Slave and the distance between the units is adjusted as needed to provide a suitable received level at the Master and Slave devices. The video test file is streamed to generate WLAN traffic. The monitoring antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

## TEST AND MEASUREMENT EQUIPMENT

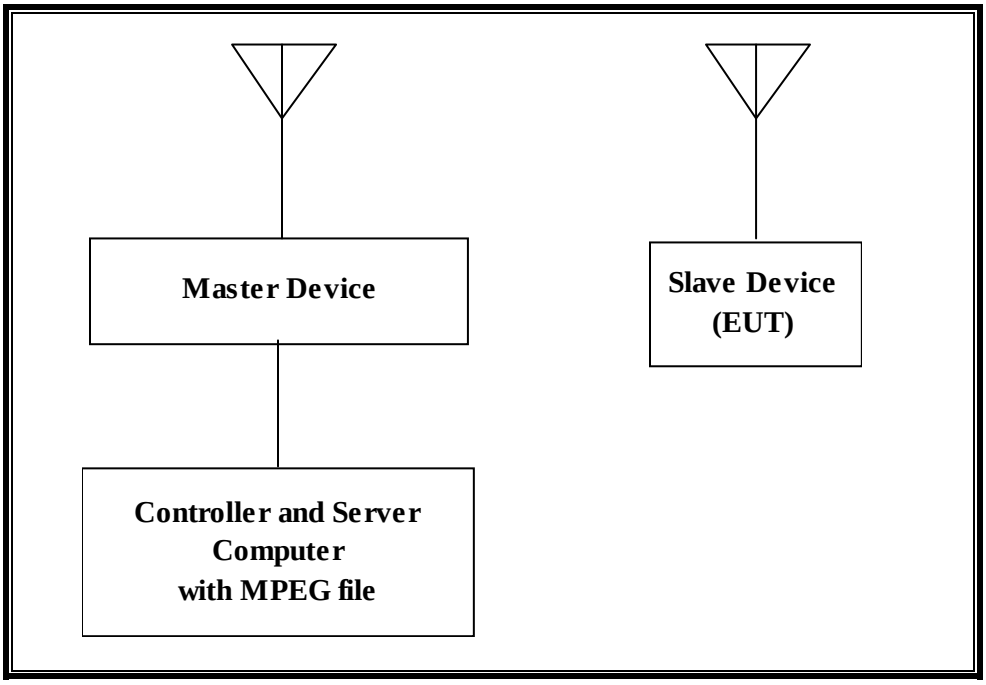
The following test and measurement equipment was utilized for the DFS tests documented in this report:

| TEST EQUIPMENT LIST | | | | |
|---|---|---|---|---|
| **Description** | **Manufacturer** | **Model** | **Asset Number** | **Cal Due** |
| Spectrum Analyzer, 26.5 GHz | Agilent / HP | E4440A | C01178 | 09/10/14 |
| Vector Signal Generator, 20GHz | Agilent / HP | E8267C | C01066 | 09/12/14 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 14.1.3. SETUP OF EUT

**RADIATED METHOD EUT TEST SETUP**




**SUPPORT EQUIPMENT**

The following support equipment was utilized for the DFS tests documented in this report:


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

| PERIPHERAL SUPPORT EQUIPMENT LIST | | | | |
|---|---|---|---|---|
| **Description** | **Manufacturer** | **Model** | **Serial Number** | **FCC ID** |
| Wireless Access Point | Cisco | AIR-AP1252AG-A-K9 | FTX120690N2 | LDK102061 |
| AC Adapter (AP) | Delta Electronics | EADP-45BB B | DTH112490BD | DoC |
| Notebook PC (Controller/Server) | Dell | PP18L | 10657517725 | DoC |
| AC Adapter (Controller/Server PC) | Dell | LA65SN0-00 | CN-ODF263-71615-6AU-1019 | DoC |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 14.1.4. DESCRIPTION OF EUT

The EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges excluding the 5600-5650 MHz range.

The EUT is a Slave Device without Radar Detection.

The highest power level within these bands is 10.96 dBm EIRP in the 5250-5350 MHz band and 11.16 dBm EIRP in the 5470-5725 MHz band.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is –64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is –64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

The EUT uses one transmitter/receiver chain connected to an antenna to perform radiated tests.

The Slave device associated with the EUT during these tests does not have radar detection capability.

WLAN traffic is generated by streaming the video file TestFile.mp2 “6 ½ Magic Hours” from the Master to the Slave in full motion video mode using the media player with the V2.61 Codec package.

TPC is not required since the maximum EIRP is less than 500 mW (27 dBm).

The EUT utilizes the 802.11a/n architecture. Two nominal channel bandwidths are implemented: 20 MHz and 40 MHz.

The software installed in the access point is xxxx revision yyyy.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## UNIFORM CHANNEL SPREADING

This requirement is not applicable to Slave radio devices.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## OVERVIEW OF MASTER DEVICE WITH RESPECT TO §15.407 (h) REQUIREMENTS

The Master Device is a Cisco Access Point, FCC ID: LDK102061. The minimum antenna gain for the Master Device is 3.5 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is –64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is –64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides a margin to the limit.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 14.1. RESULTS FOR 20 MHz BANDWIDTH

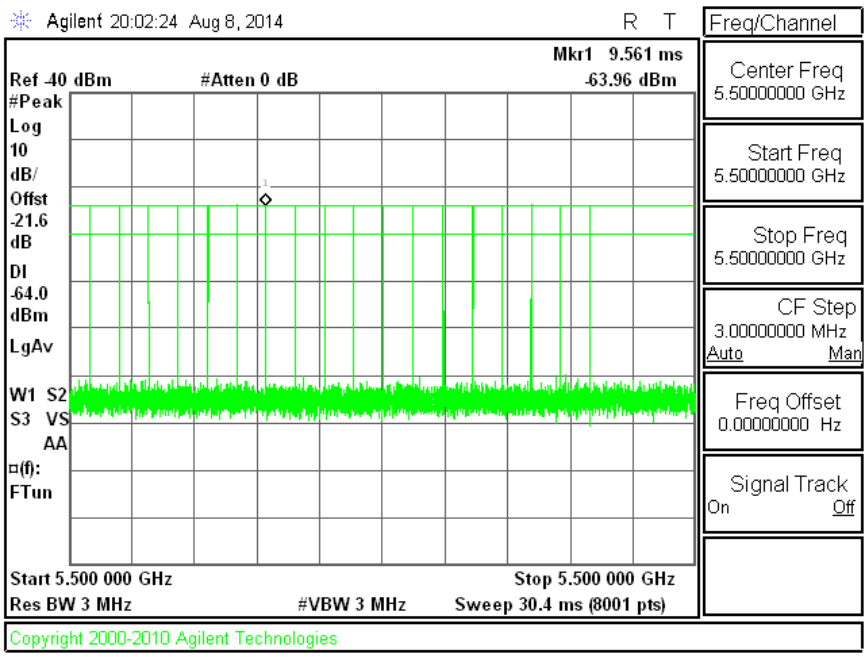
### 14.1.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5500 MHz.

### 14.1.2. RADAR WAVEFORM AND TRAFFIC

**RADAR WAVEFORM**

SHORT PULSE RADAR TYPE 1 AT MASTER

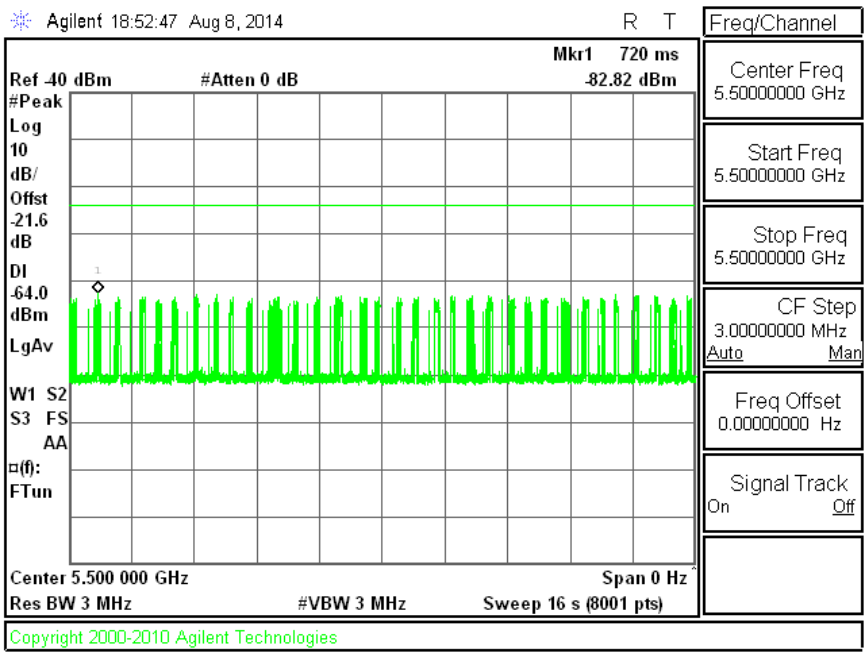




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**TRAFFIC**

SLAVE TRAFFIC





*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 14.1.3. OVERLAPPING CHANNEL TESTS

**RESULTS**

These tests are not applicable.

### 14.1.4. MOVE AND CLOSING TIME

**REPORTING NOTES**

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =

(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

**RESULTS**

| Channel Move Time (sec) | Limit (sec) |
|---|---|
| 0.000 | 10 |

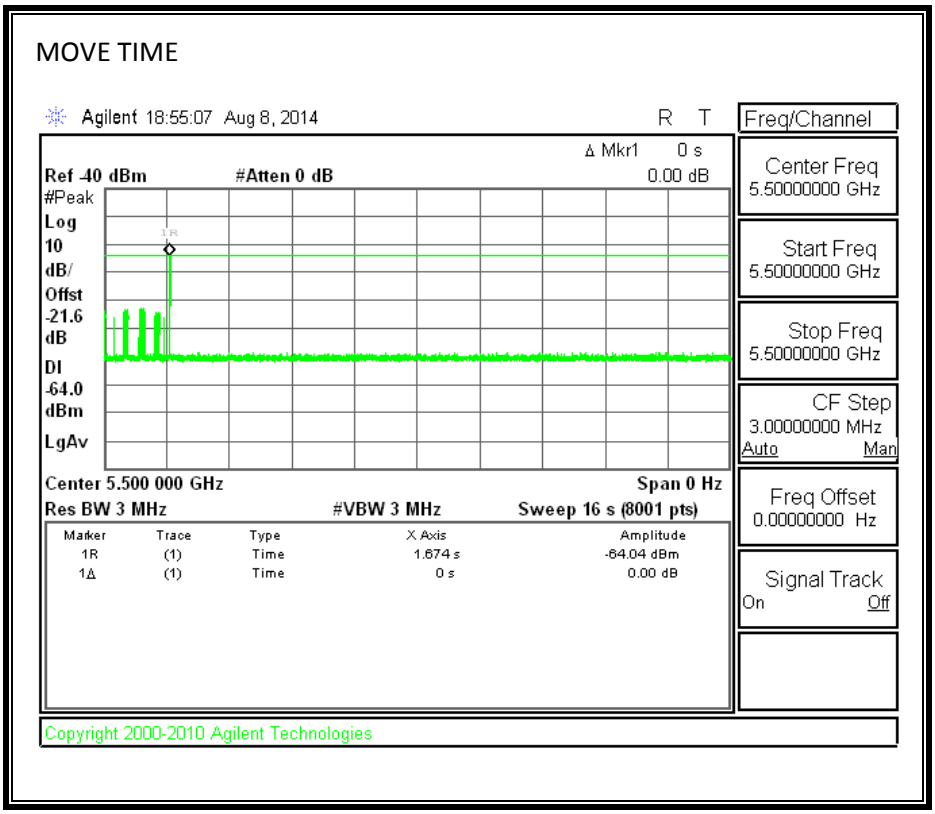
| Aggregate Channel Closing Transmission Time (msec) | Limit (msec) |
|---|---|
| 0.0 | 60 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

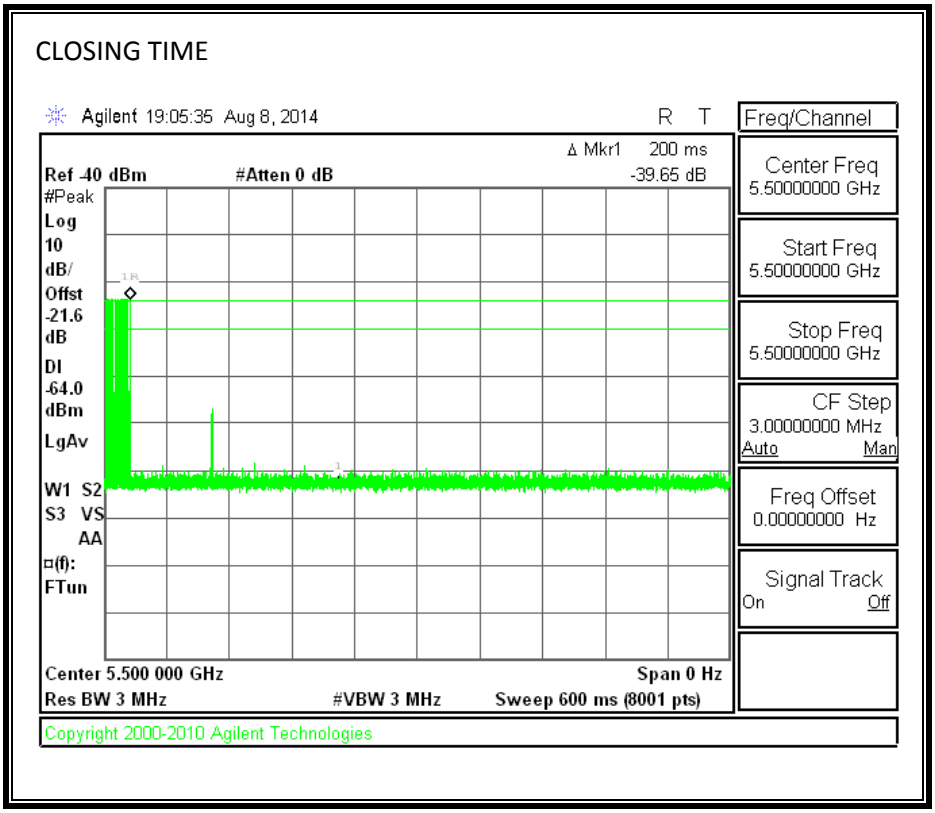
**MOVE TIME**





*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## CHANNEL CLOSING TIME



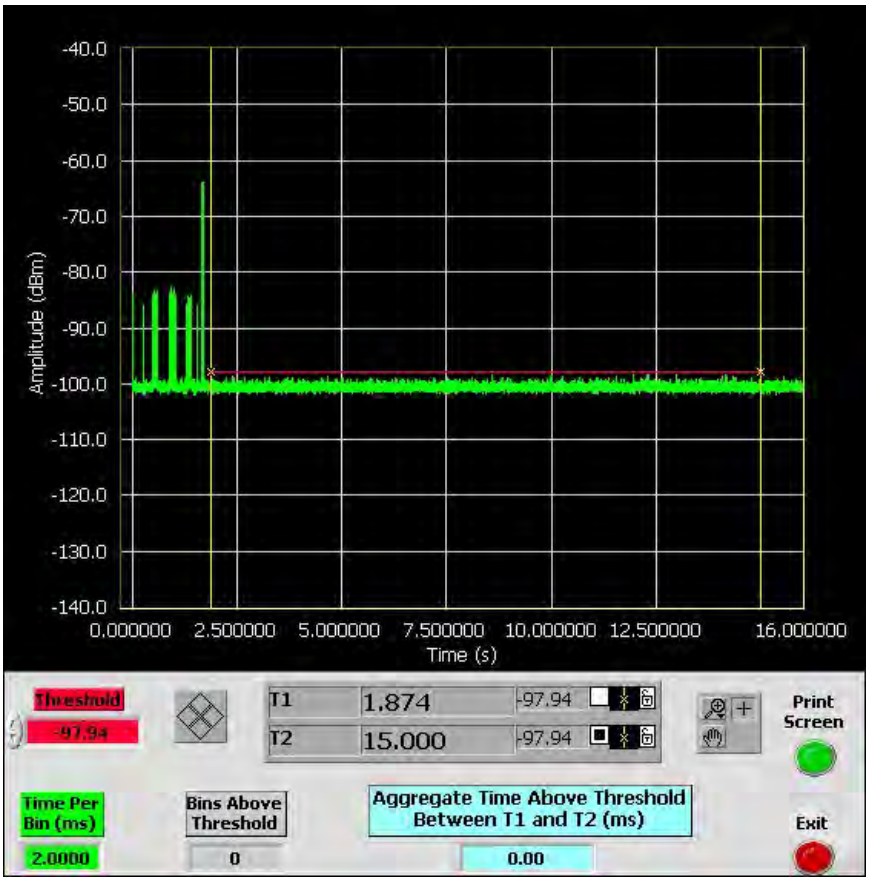


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the aggregate monitoring period.

AGGREGATE CLOSING TIME






UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 14.2. RESULTS FOR 40 MHz BANDWIDTH

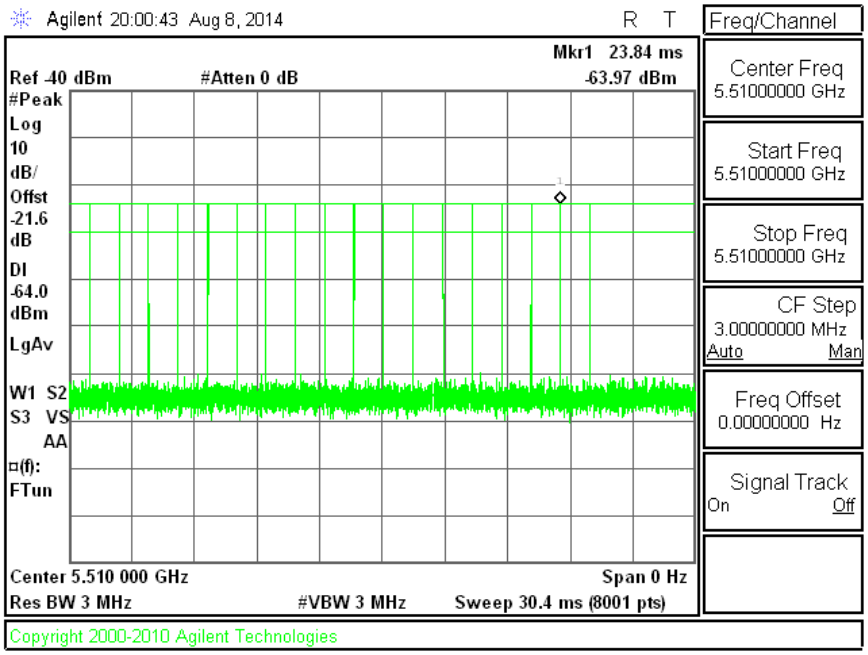
### 14.2.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5510 MHz.

### 14.2.2. RADAR WAVEFORM AND TRAFFIC

**RADAR WAVEFORM**

SHORT PULSE RADAR TYPE 1 AT MASTER





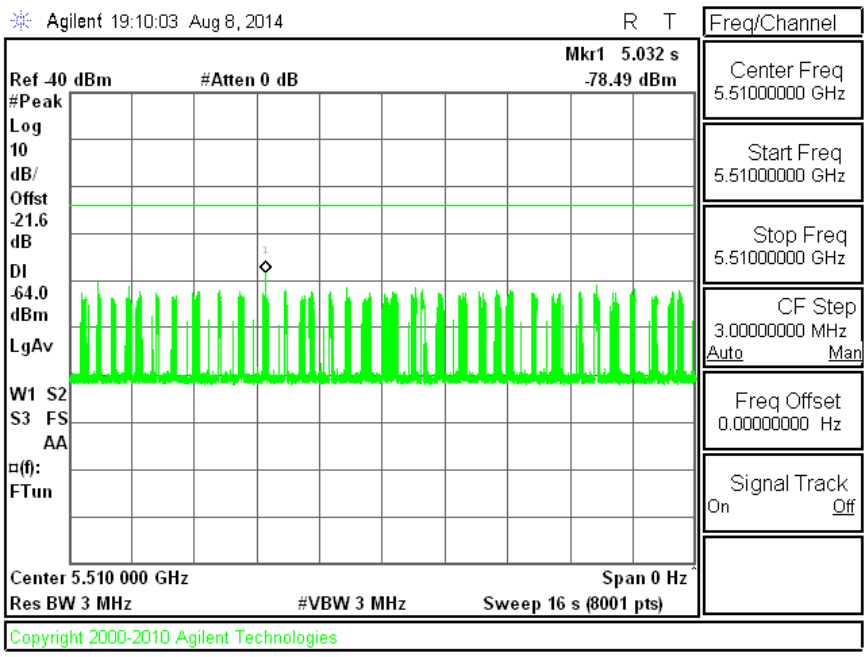
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**TRAFFIC**

SLAVE TRAFFIC





*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

### 14.2.3. OVERLAPPING CHANNEL TESTS

**RESULTS**

These tests are not applicable.

### 14.2.4. MOVE AND CLOSING TIME

**REPORTING NOTES**

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =

(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

**RESULTS**

| Channel Move Time (sec) | Limit (sec) |
|---|---|
| 0.070 | 10 |

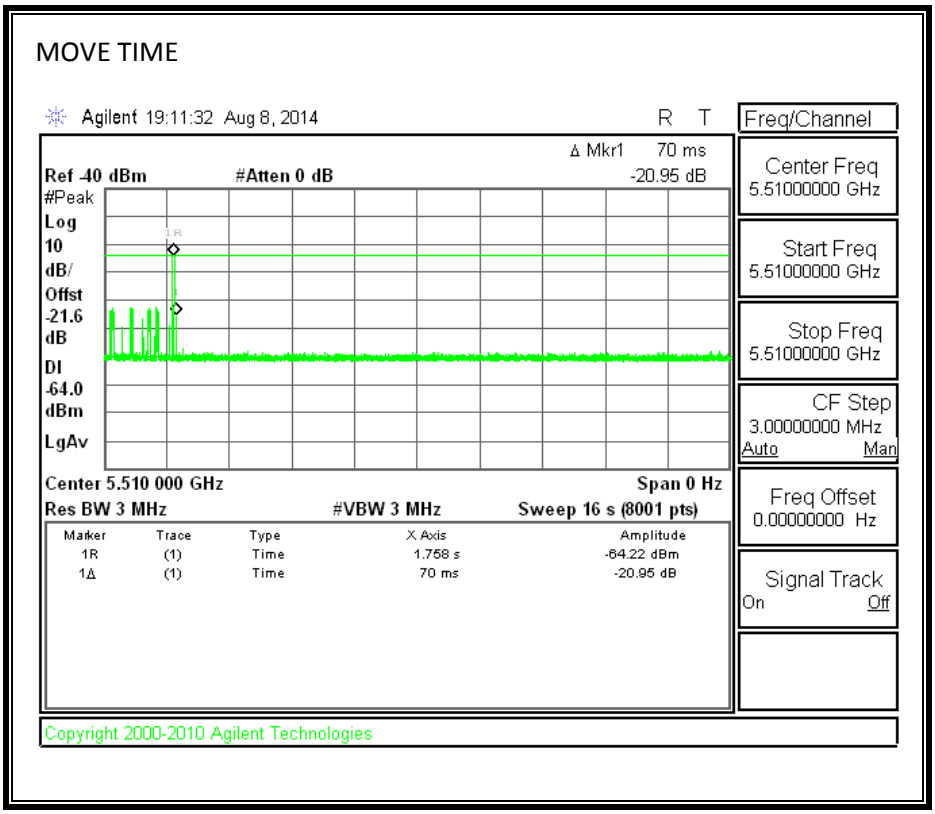
| Aggregate Channel Closing Transmission Time (msec) | Limit (msec) |
|---|---|
| 0.0 | 60 |


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

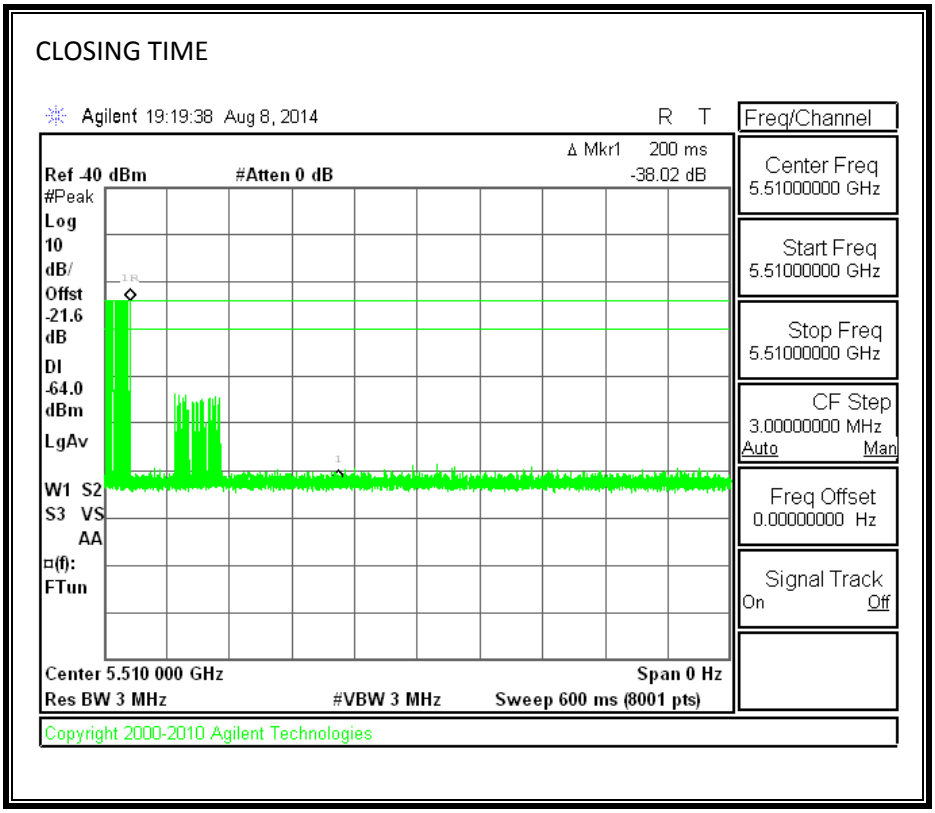
**MOVE TIME**





*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## CHANNEL CLOSING TIME



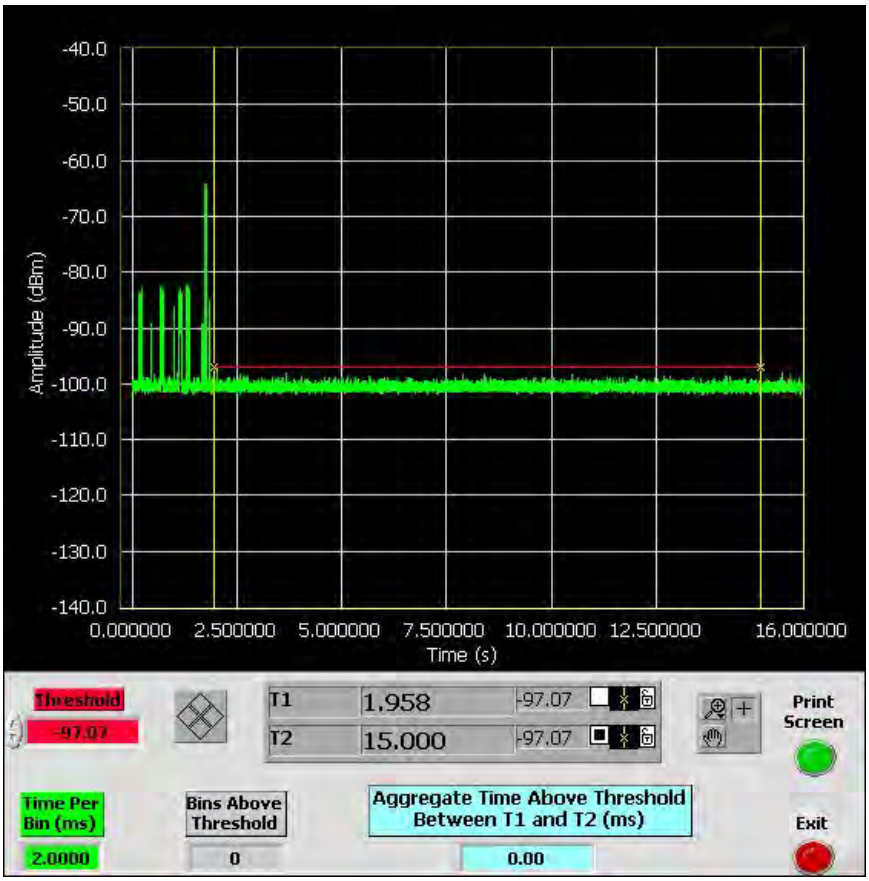


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the aggregate monitoring period.

AGGREGATE CLOSING TIME






UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

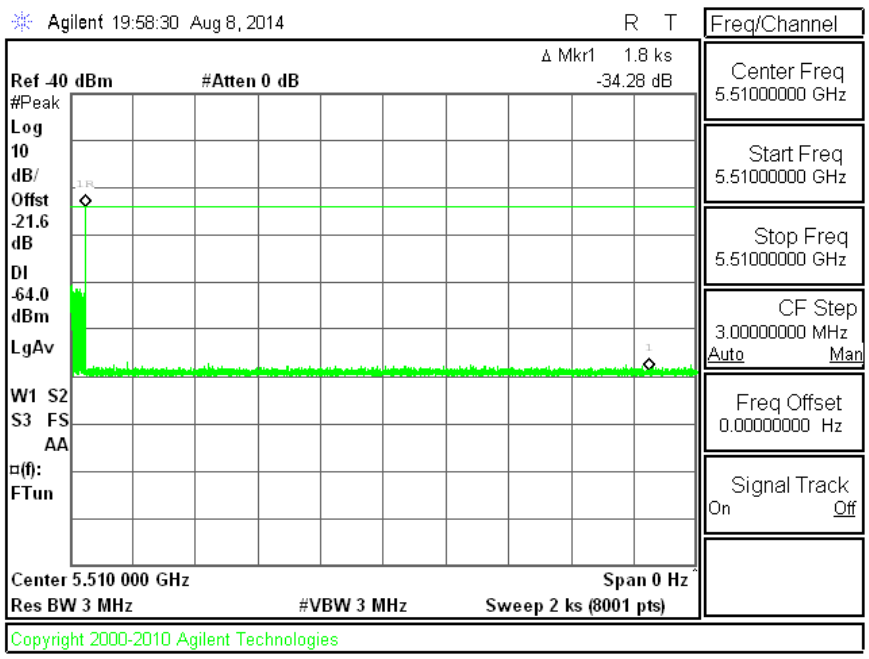
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 14.2.5. NON-OCCUPANCY PERIOD

**RESULTS**

No EUT transmissions were observed on the test channel during the 30-minute observation time.

NON-OCCUPANCY PERIOD





*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*