# CERTIFICATION TEST REPORT

**Report Number. :** 11616858-E2V5

| | | |
|---|---|---|
| **Applicant** | : | Verifone, Inc.<br>1400 West Stanford Ranch Road<br>Rocklin, CA 95765, U.S.A. |
| **Model** | : | V200t Plus 3G/D/E |
| **FCC ID** | : | B32V200TPLUS |
| **IC** | : | 787C-V200TPLUS |
| **EUT Description** | : | Point of Sale Terminal |
| **Test Standard(s)** | : | FCC 47 CFR PART 15 SUBPART C<br>INDUSTRY CANADA RSS - 247 ISSUE 2<br>INDUSTRY CANADA RSS-GEN ISSUE 4 |

**Date Of Issue:**

April 03, 2018

**Prepared by:**

UL Verification Services Inc.
47173 Benicia Street
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NVLAP TESTING

NVLAP LAB CODE 200065-0

## Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| V1 | 12/07/17 | Initial Issue | -- |
| V2 | 01/30/18 | Revised Test Methodology section.<br>Revised Description of EUT section.<br>Revised Scope of Testing section. | Frank Ibrahim |
| V3 | 02/26/18 | Revised antenna gain section | Frank Ibrahim |
| V4 | 03/02/18 | Revised Test Methodology section. | Frank Ibrahim |
| V5 | 04/03/18 | Revised Scope of Testing section | Glenn Escano |

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Verifone, Inc.
1400 West Stanford Ranch Road Suite 200
Rocklin, CA 95765, U.S.A.

**EUT DESCRIPTION:** Point of Sale Terminal

**MODEL:** V200t Plus 3G/D/E

**SERIAL NUMBER:** 401-431-539

**DATE TESTED:** November 27 – 28, 2017

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| FCC 47 CFR 47 PART 15 SUBPART C | Pass |
| INDUSTRY CANADA RSS-247 ISSUE 2 | Pass |
| INDUSTRY CANADA RSS-GEN ISSUE 4 | 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:

FRANK IBRAHIM
CONSUMER TECHNOLOGY DIVISION
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UL VERIFICATION SERVICES INC

Prepared By:

GLENN ESCANO
CONSUMER TECHNOLOGY DIVISION
TEST ENGINEER
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, KDB 558074 D01 v04, ANSI C63.10-2013, IC RSS-GEN Issue 4, and IC RSS-247 ISSUE 2.

# 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 (IC:2324B-1) | ☐ Chamber D (IC:22541-1) |
| ☒ Chamber B (IC:2324B-2) | ☐ Chamber E (IC:22541-2) |
| ☐ Chamber C (IC:2324B-3) | ☐ Chamber F (IC:22541-3) |
| | ☐ Chamber G (IC:22541-4) |
| | ☐ Chamber H (IC:22541-5) |

The above test sites and facilities are covered under FCC Test Firm Registration # 208313.
UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

Chambers A through C are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively and Chambers D through H are covered under Industry Canada company address code 22541 with site numbers 22541 -1 through 22541-5, respectively.

# 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.

## 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 |
|---|---|
| Worst Case Conducted Disturbance, 9KHz to 0.15 MHz | 3.84 dB |
| Worst Case Conducted Disturbance, 0.15 to 30 MHz | 3.65 dB |
| Worst Case Radiated Disturbance, 9KHz to 30 MHz | 3.15 dB |
| Worst Case Radiated Disturbance, 30 to 1000 MHz | 5.36 dB |
| Worst Case Radiated Disturbance, 1000 to 18000 MHz | 4.32 dB |
| Worst Case Radiated Disturbance, 18000 to 26000 MHz | 4.45 dB |
| Worst Case Radiated Disturbance, 26000 to 40000 MHz | 5.24 dB |

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

# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

The EUT is a Mobile Point of Sale Terminal which supports the following technologies WLAN 2.4 GHz and 5 GHz, Bluetooth, GSM 850 / GSM 1900, WCDMA Band II / WCDMA Band V, and NFC.

## 5.2. SCOPE OF TESTING

This report covers radiated emissions portion. For antenna port data refer to report number 11631998-E1V1 (FCC ID: B32V240MPLUS, IC 787C-V240MPLUS) that covered model V240m Plus 3GBW as the Bluetooth radio module covered by this report is identical to the Bluetooth radio module of model V240m Plus 3GBW with same output power values. Output power was confirmed prior to making radiated spurious measurements.

## 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Chip Multilayer Antenna with the following gains:

| Frequency Band (GHz) | Antenna Gain (dBi) |
|---|---|
| 2402-2480 | 1.90 |

## 5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was VOS2 30640XXX.

## 5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT was 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, and it was determined that X-Axis orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X-Axis orientation.

Worst-case data rates as provided by the client were:

GFSK: 1Mbps (1-DH5)
8PSK: 3Mbps (3-DH5)

## 5.6. DESCRIPTION OF TEST SETUP

**SUPPORT EQUIPMENT**

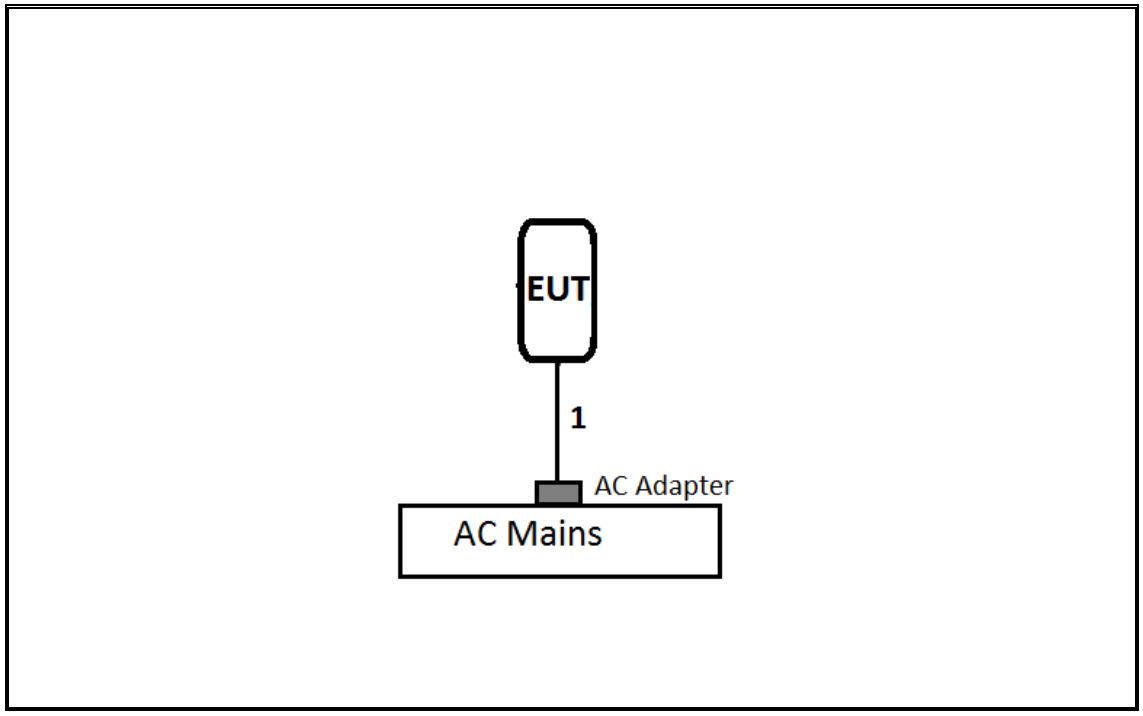
| Support Equipment List | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model** | **Serial Number** |
| AC Adapter | Verifone | PSA18A-082A | 5A00170801207 |

**I/O CABLES (RADIATED EMISSIONS)**

| I/O Cable List | | | | | | |
|---|---|---|---|---|---|---|
| **Cable No** | **Port** | **# of identical ports** | **Connector Type** | **Cable Type** | **Cable Length (m)** | **Remarks** |
| 1 | DC | 1 | AC | Un-shielded | 2 | N/A |

**TEST SETUP**

**RADIATED EMISSIONS SETUP DIAGRAM**



# 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** |
| Antenna, Broadband Hybrid, 30MHz to 2000MHz w/4dB Pad | Sunol Sciences Corp. | JB3 | T899 | 06/15/2018 |
| Antenna, Active Loop 9kHz-30MHz | Com-Power Corp. | AL-130R | T1866 | 10/10/2018 |
| Antenna, Horn 1-18GHz | ETS-Lindgren | 3117 | T863 | 06/09/2018 |
| Antenna, Horn 18-26.5GHz | ARA | MWH-1826/B | T449 | 06/12/2018 |
| Amplifier, 1-26.5GHz | MITEQ | AFS42-00101800-25-S-42 | T1165 | 08/01/2018 |
| Amplifier, 1-26.5GHz | Agilent (Keysight) Technologies | 8449B | T404 | 06/12/2018 |
| Amplifier, 10kHz-1GHz | HP | 8447D | T10 | 02/15/2018 |
| Amplifier, 1-8 GHz | MITEQ | AFS42-00101800-25-S-42 | T931 | 08/26/2018 |
| Spectrum Analyzer, PXA, 3Hz to 44GHz | Agilent (Keysight) Technologies | N9030A | T1454 | 12/15/2017 |
| Spectrum Analyzer, PXA, 3Hz to 44GHz | Agilent (Keysight) Technologies | E9030A | T907 | 01/23/2018 |
| Bluetooth Tester | Rohde & Schwarz | CBT | T258 | 07/25/2018 |

| Test Software List | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model** | **Version** |
| Radiated Software | UL | UL EMC | Ver 9.5, Dec 01, 2016 |

# 7. RADIATED TEST RESULTS

## 7.1. ON TIME AND DUTY CYCLE

**LIMITS**

None; for reporting purposes only.

**PROCEDURE**

KDB 558074 Zero-Span Spectrum Analyzer Method.

**ON TIME AND DUTY CYCLE RESULTS**

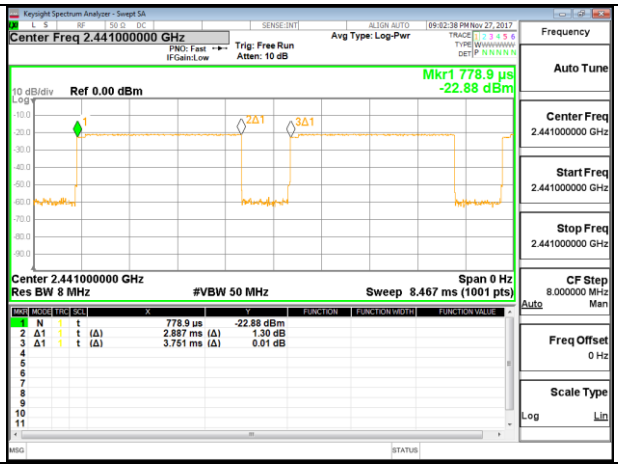
ON TIME AND DUTY CYCLE RESULTS

| Mode | ON Time B (msec) | Period (msec) | Duty Cycle x (linear) | Duty Cycle (%) | Duty Cycle Correction Factor (dB) | 1/T Minimum VBW (kHz) |
|---|---|---|---|---|---|---|
| GFSK | 2.887 | 3.751 | 0.770 | 76.97% | 1.14 | 0.346 |
| 8PSK | 2.887 | 3.751 | 0.770 | 76.97% | 1.14 | 0.346 |

DUTY CYCLE PLOTS

GFSK


8PSK




NOTE: HOPPING OFF

## 7.2. LIMITS AND PROCEDURE

**LIMITS**

FCC §15.205 and §15.209
IC RSS-GEN, Section 8.9 and 8.10.

| Frequency Range (MHz) | Field Strength Limit (uV/m) at 3 m | Field Strength Limit (dBuV/m) at 3 m |
|---|---|---|
| 0.009-0.490 | 2400/F(kHz) @ 300m | 2400/F(kHz) @ 300m |
| 0.490-1.705 | 24000/F(kHz) @ 30m | 24000/F(kHz) @ 30m |
| 1.705-30.0 | 30 @ 30m | 30 @ 30m |
| 30 - 88 | 100 | 40 |
| 88 - 216 | 150 | 43.5 |
| 216 - 960 | 200 | 46 |
| Above 960 | 500 | 54 |

**NOTE: KDB 414788 D01 OATS and Chamber Correlation Justification**

- Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.
- OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

**TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements for the 30-1000 MHz range, kHz for peak detection measurements or 9 kHz for quasi-peak detection measurements for the 0.15-30 MHz range and 200 Hz for peak detection measurements or 200 Hz for quasi-peak detection measurements for the 9 to 150 kHz range. Peak detection is used unless otherwise noted as quasi-peak.

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

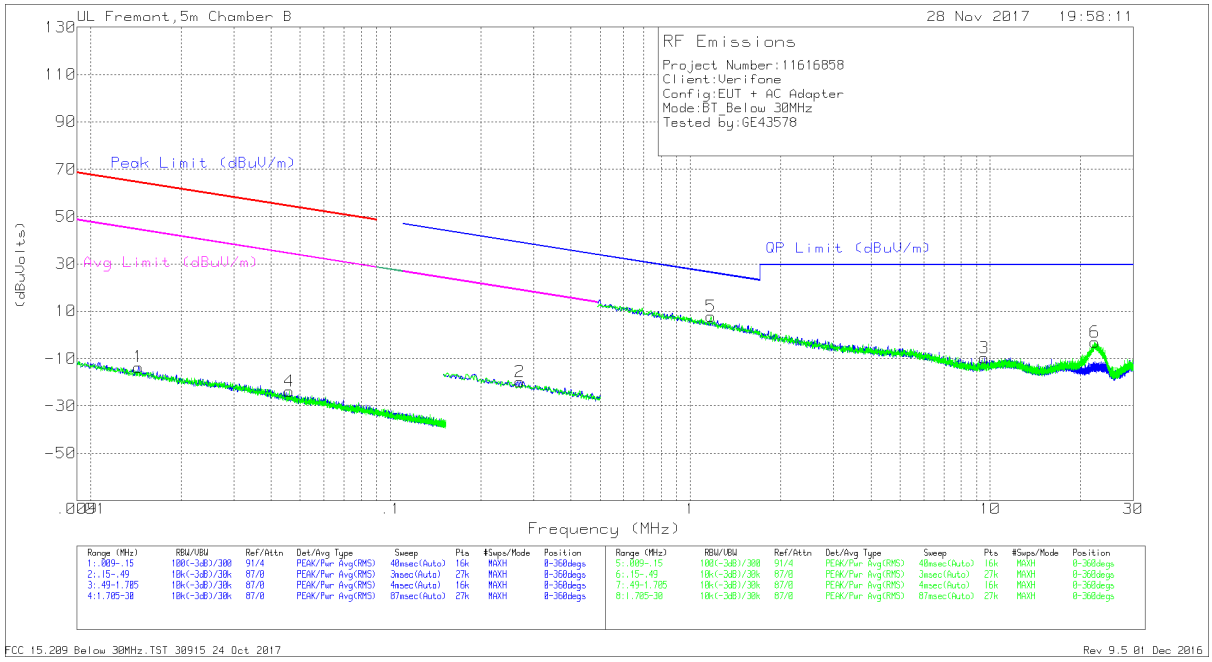
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

**RESULTS**

## 7.3. WORST-CASE BELOW 30 MHz

**SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)**

HORIZONTAL AND VERTICAL PLOTS




NOTE: KDB 414788 D01 OATS and Chamber Correlation Justification
- Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.
- OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

## Trace Markers

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | Loop Antenna (dB/m) | Cbl (dB) | Dist Corr 300m | Corrected Reading (dBuVolts) | Peak Limit (dBuV/m) | Margin (dB) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Avg Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .01446 | 49.73 | Pk | 15.3 | 1.4 | -80 | -13.57 | 64.38 | -77.95 | 44.38 | -57.95 | - | - | - | - | 0-360 |
| 4 | .04588 | 40.36 | Pk | 14.5 | 1.4 | -80 | -23.74 | 54.35 | -78.09 | 34.35 | -58.09 | - | - | - | - | 0-360 |
| 2 | .27013 | 44.76 | Pk | 13.8 | 1.5 | -80 | -19.94 | - | - | - | - | 38.98 | -58.92 | 18.98 | -38.92 | 0-360 |

Pk - Peak detector

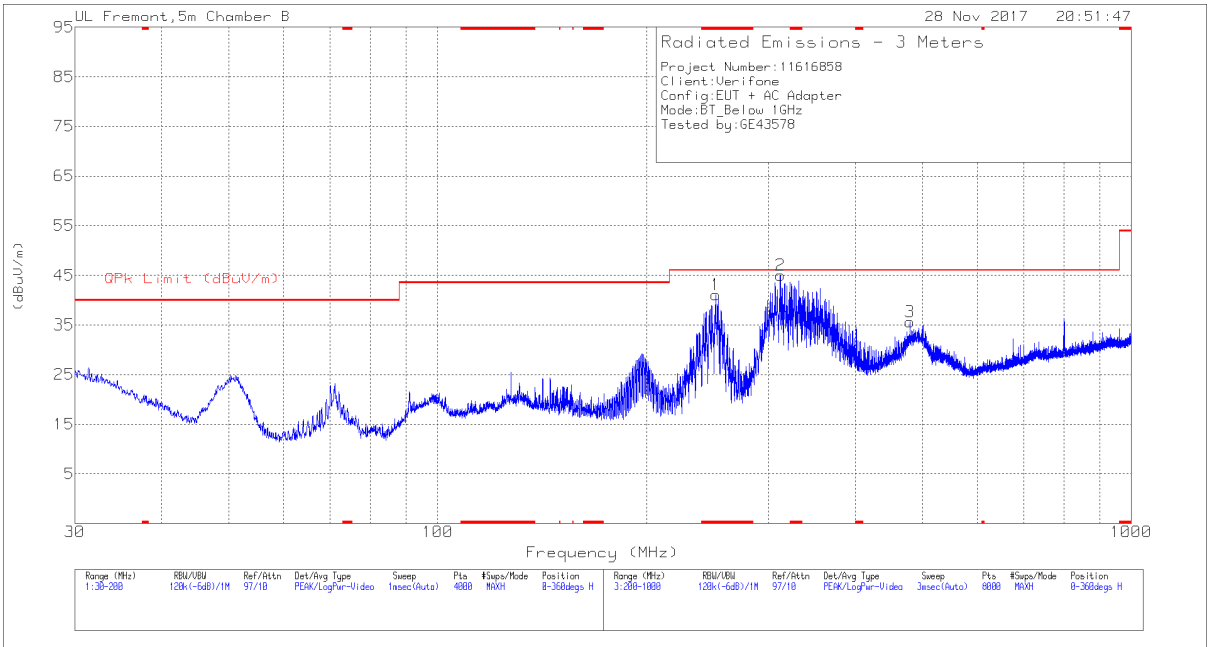
| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | Loop Antenna (dB/m) | Cbl (dB) | Dist Corr (dB) 40Log | Corrected Reading (dBuVolts) | QP Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Avg Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 1.1713 | 31.97 | Pk | 14.3 | 1.5 | -40 | 7.77 | 26.25 | -18.48 | - | - | - | - | 0-360 |
| 3 | 9.56814 | 14.29 | Pk | 14.6 | 1.5 | -40 | -9.61 | 29.5 | -39.11 | - | - | - | - | 0-360 |
| 6 | 22.33855 | 21.15 | Pk | 14 | 1.7 | -40 | -3.15 | 29.5 | -32.65 | - | - | - | - | 0-360 |

Pk - Peak detector

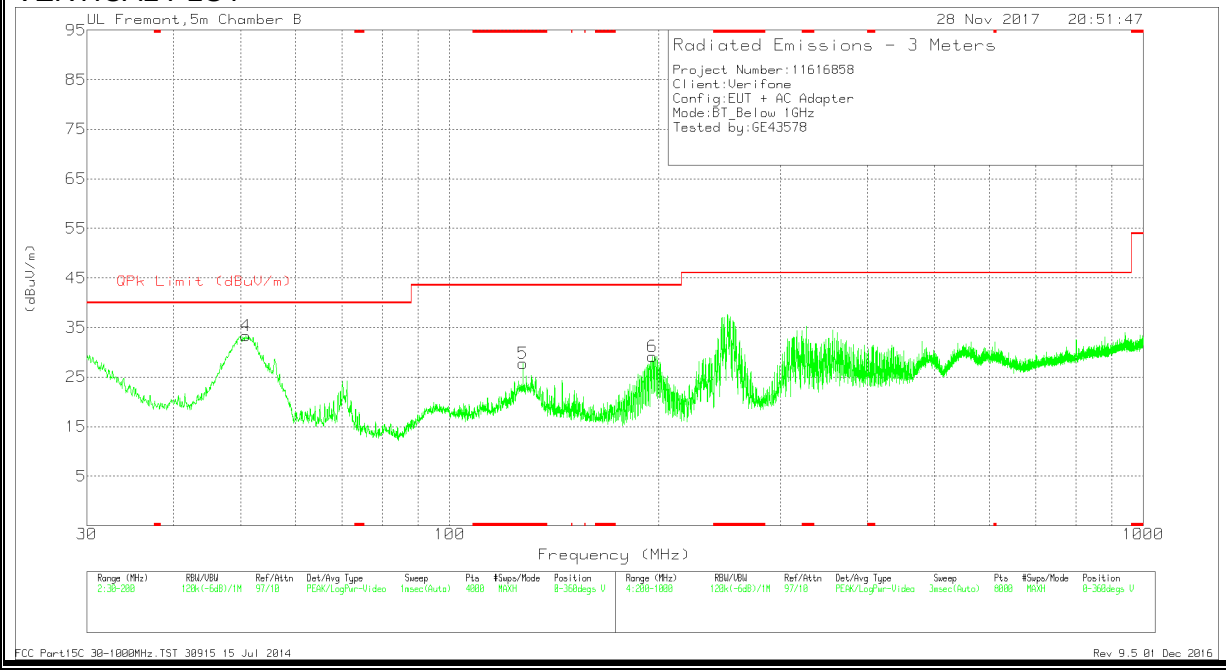
## 7.4. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT




VERTICAL PLOT



**DATA**

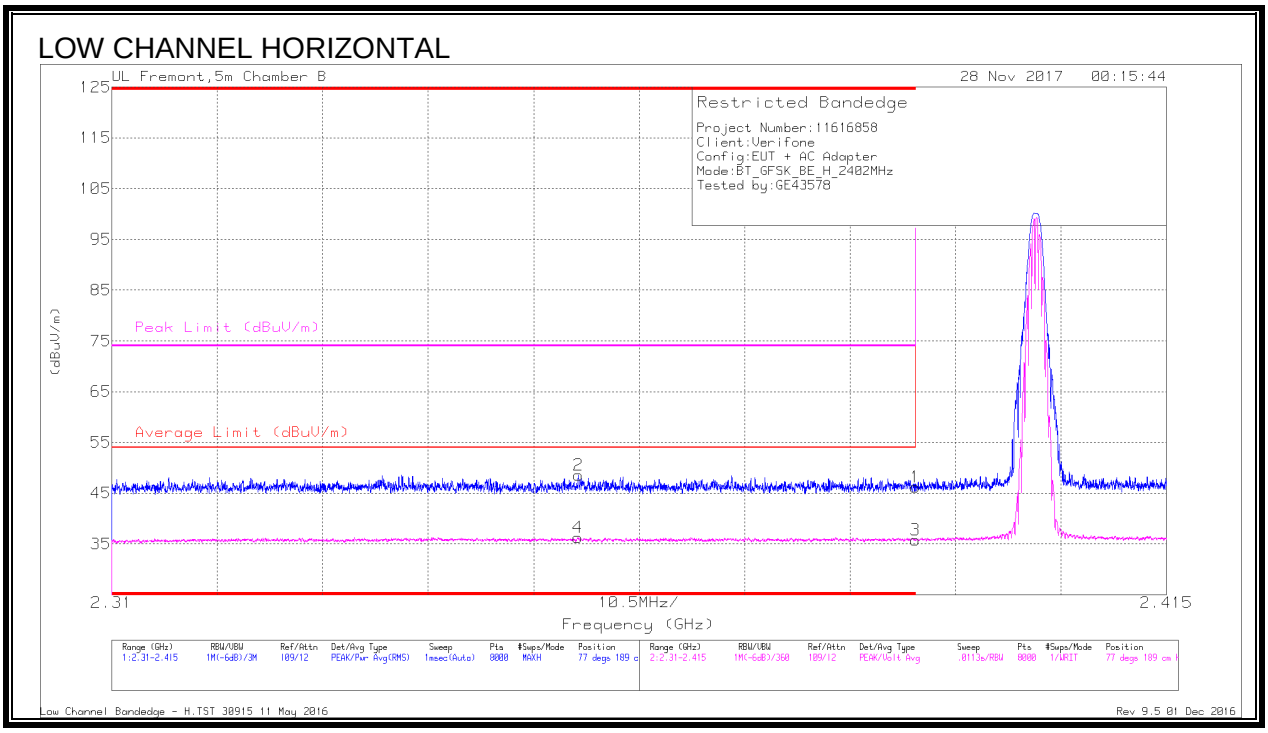
| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T899 (dB/m) | Amp/Cbl (dB) | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | * 127.5627 | 37.66 | Pk | 17.7 | -27.6 | 27.76 | 43.52 | -15.76 | 0-360 | 100 | V |
| 1 | * 251.8691 | 49.04 | Qp | 15.5 | -26.3 | 38.24 | 46.02 | -7.78 | 243 | 136 | H |
| 4 | 50.8304 | 50.6 | Pk | 11.2 | -28.5 | 33.3 | 40 | -6.7 | 0-360 | 100 | V |
| 6 | 196.218 | 39.99 | Pk | 16 | -26.8 | 29.19 | 43.52 | -14.33 | 0-360 | 100 | V |
| 2 | 311.879 | 47.74 | Qp | 17.7 | -25.8 | 39.64 | 46.02 | -6.38 | 269 | 101 | H |
| 3 | 480.0364 | 40.07 | Pk | 21.5 | -25.9 | 35.67 | 46.02 | -10.35 | 0-360 | 200 | H |

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

# 7.5. TRANSMITTER ABOVE 1 GHz

## 7.5.1. BASIC DATA RATE GFSK MODULATION

**BANDEDGE (LOW CHANNEL)**

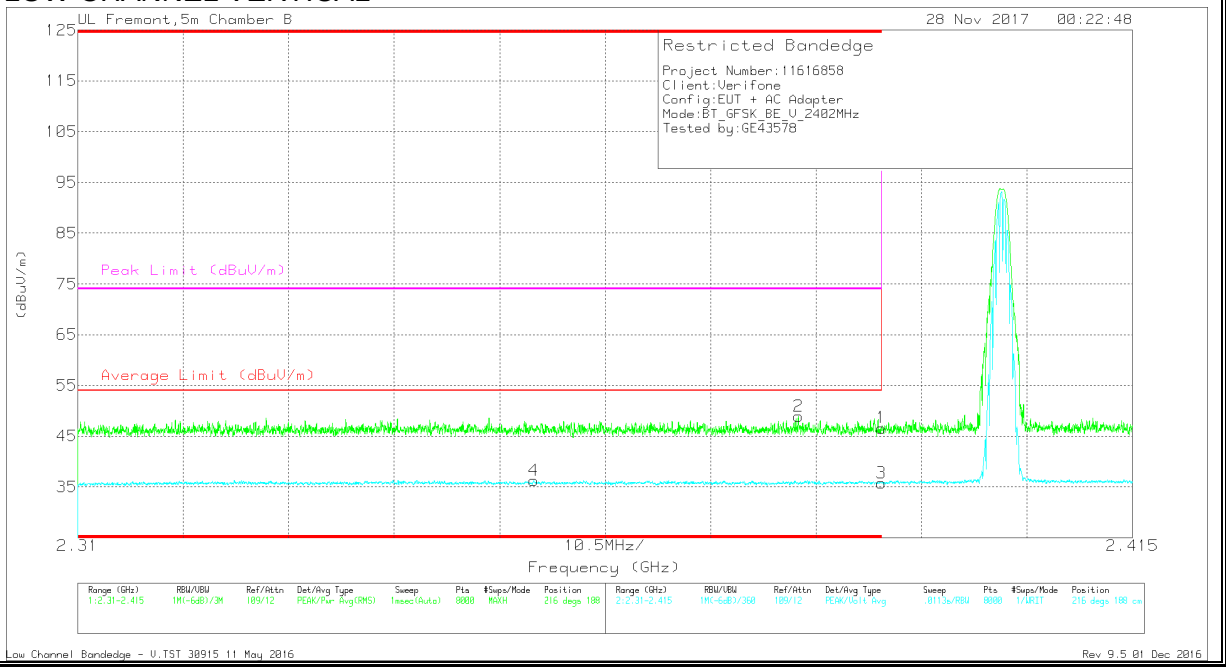



Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.39 | 35.41 | Pk | 32 | -21.2 | 46.21 | - | - | 74 | -27.79 | 77 | 189 | H |
| 2 | * 2.356 | 37.64 | Pk | 31.9 | -21 | 48.54 | - | - | 74 | -25.46 | 77 | 189 | H |
| 3 | * 2.39 | 24.99 | VA1T | 32 | -21.2 | 35.79 | 54 | -18.21 | - | - | 77 | 189 | H |
| 4 | * 2.356 | 25.4 | VA1T | 31.9 | -21 | 36.3 | 54 | -17.7 | - | - | 77 | 189 | H |

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

LOW CHANNEL VERTICAL



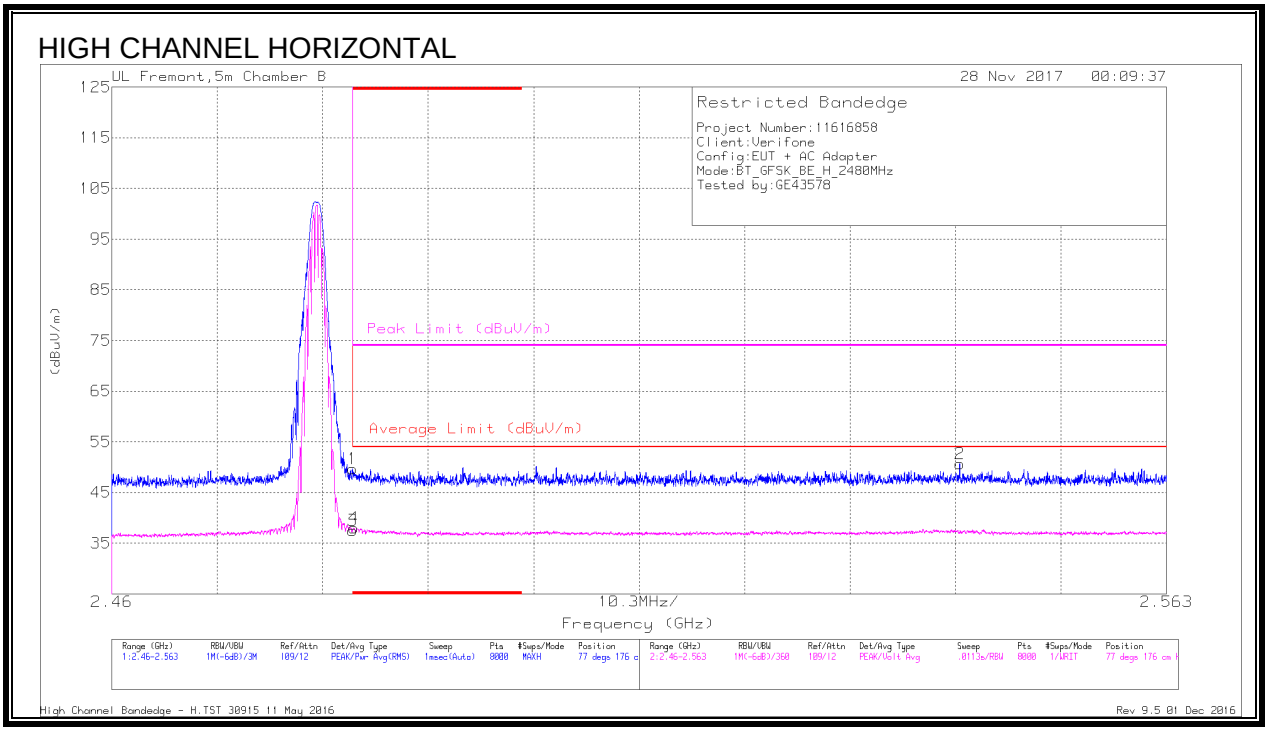

## Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.39 | 35.83 | Pk | 32 | -21.2 | 46.63 | - | - | 74 | -27.37 | 216 | 188 | V |
| 2 | * 2.382 | 37.97 | Pk | 32 | -21.1 | 48.87 | - | - | 74 | -25.13 | 216 | 188 | V |
| 3 | * 2.39 | 24.91 | VA1T | 32 | -21.2 | 35.71 | 54 | -18.29 | - | - | 216 | 188 | V |
| 4 | * 2.355 | 25.39 | VA1T | 31.9 | -21 | 36.29 | 54 | -17.71 | - | - | 216 | 188 | V |

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

**BANDEDGE (HIGH CHANNEL)**

HIGH CHANNEL HORIZONTAL

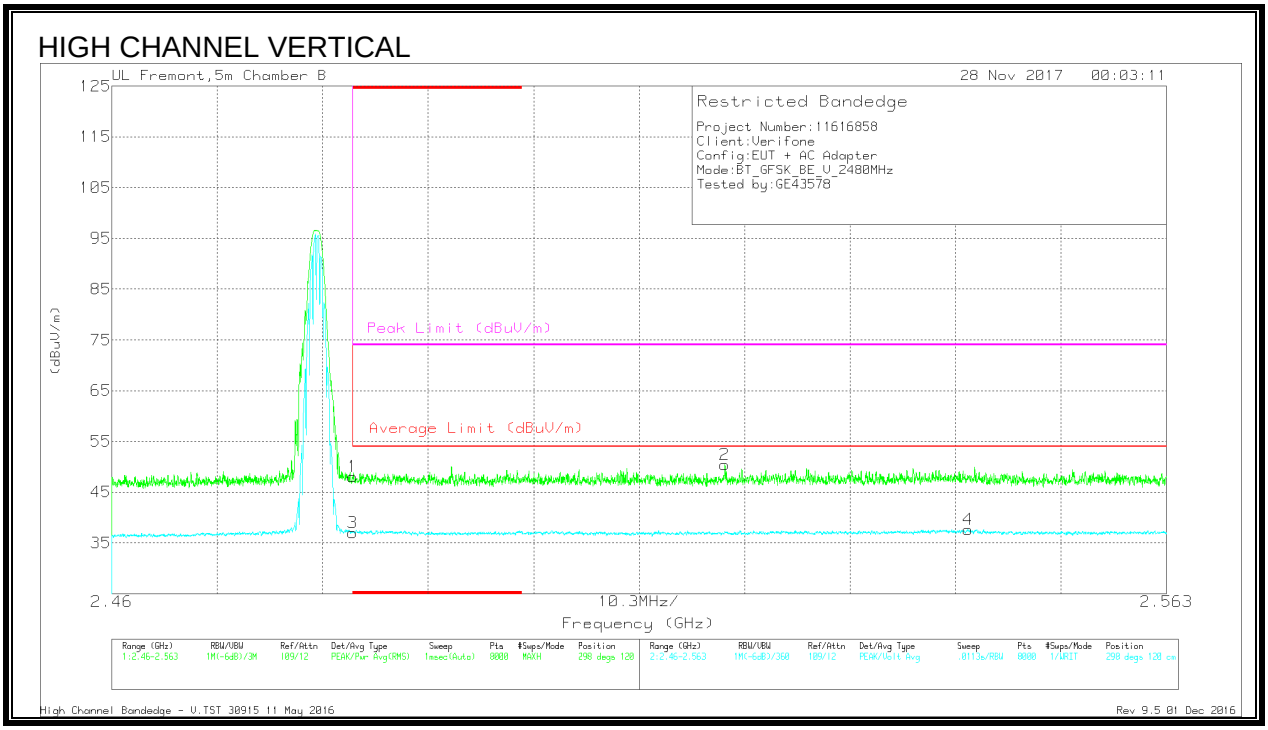



Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.484 | 38.09 | Pk | 32.5 | -20.9 | 49.69 | - | - | 74 | -24.31 | 77 | 176 | H |
| 3 | * 2.484 | 25.89 | VA1T | 32.5 | -20.9 | 37.49 | 54 | -16.51 | - | - | 77 | 176 | H |
| 4 | * 2.484 | 26.42 | VA1T | 32.5 | -20.9 | 38.02 | 54 | -15.98 | - | - | 77 | 176 | H |
| 2 | 2.543 | 38.8 | Pk | 32.5 | -20.6 | 50.7 | - | - | 74 | -23.3 | 77 | 176 | H |

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HIGH CHANNEL VERTICAL



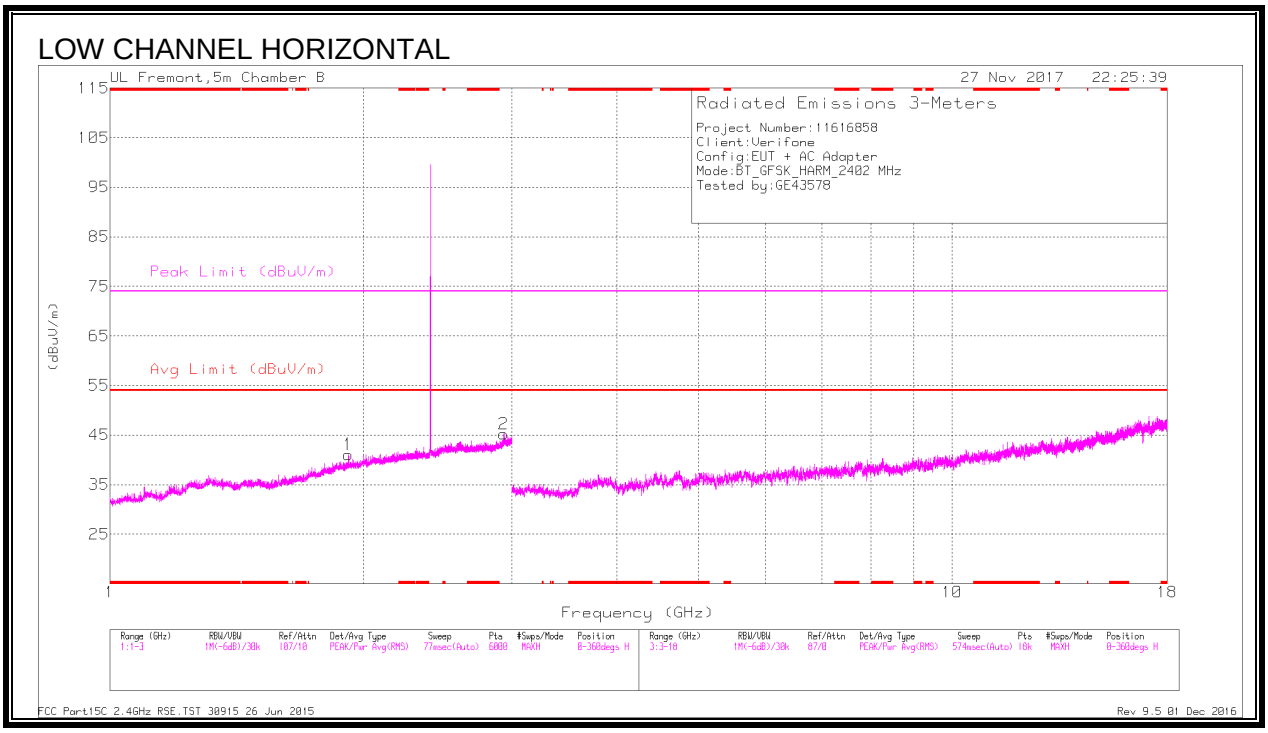

## Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.484 | 36.41 | Pk | 32.5 | -20.9 | 48.01 | - | - | 74 | -25.99 | 298 | 120 | V |
| 3 | * 2.484 | 25.41 | VA1T | 32.5 | -20.9 | 37.01 | 54 | -16.99 | - | - | 298 | 120 | V |
| 2 | 2.52 | 38.81 | Pk | 32.6 | -21 | 50.41 | - | - | 74 | -23.59 | 298 | 120 | V |
| 4 | 2.544 | 25.78 | VA1T | 32.5 | -20.6 | 37.68 | 54 | -16.32 | - | - | 298 | 120 | V |

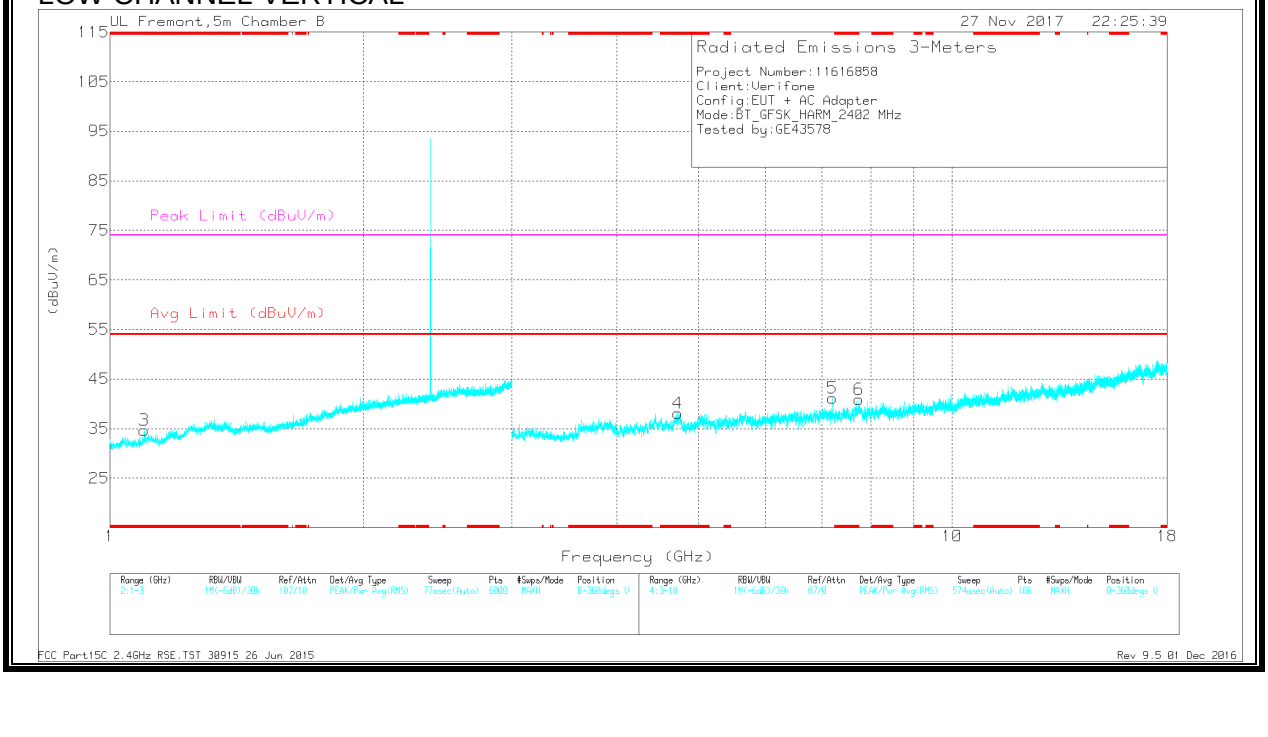
* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

**HARMONICS AND SPURIOUS EMISSIONS**

LOW CHANNEL HORIZONTAL




LOW CHANNEL VERTICAL



Radiated Emissions

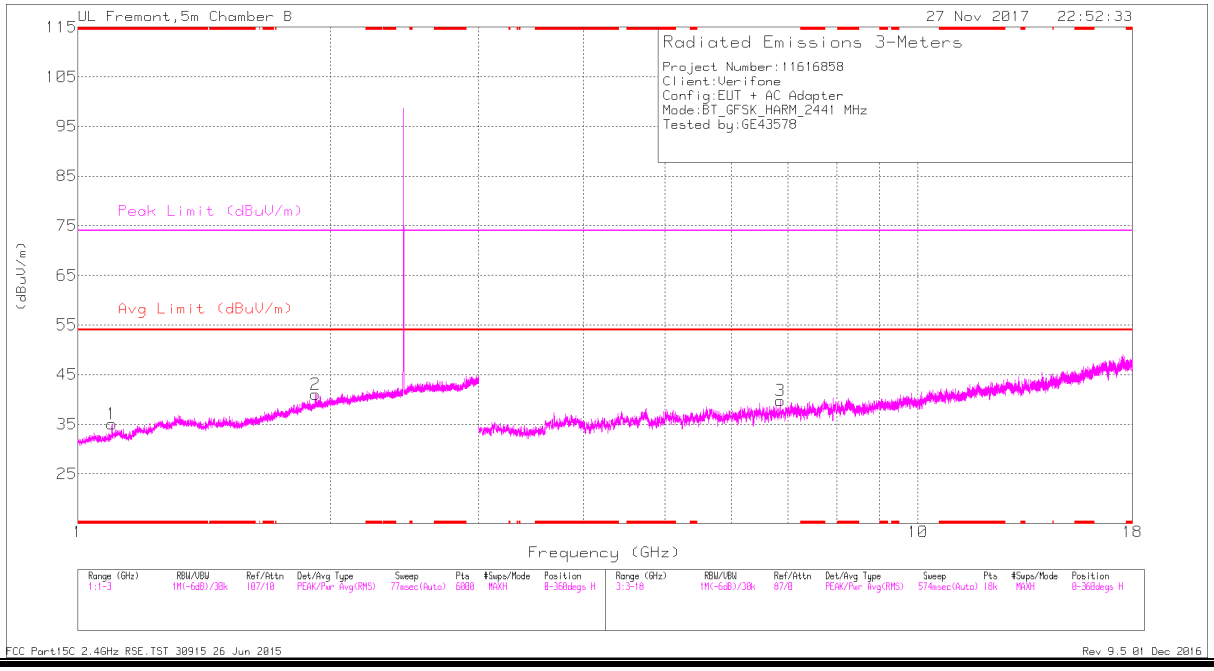
| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | * 1.098 | 34.04 | PKFH | 27.6 | -22.9 | 38.74 | - | - | 74 | -35.26 | 301 | 199 | V |
| | * 1.098 | 24.14 | VA1T | 27.6 | -23 | 28.74 | 54 | -25.26 | - | - | 301 | 199 | V |
| 4 | * 4.722 | 36.81 | PKFH | 34.2 | -28.7 | 42.31 | - | - | 74 | -31.69 | 212 | 104 | V |
| | * 4.724 | 25.83 | VA1T | 34.2 | -28.7 | 31.33 | 54 | -22.67 | - | - | 212 | 104 | V |
| 1 | 1.92 | 34.98 | PKFH | 31 | -20.9 | 45.08 | - | - | - | - | 243 | 101 | H |
| | 1.92 | 27.45 | VA1T | 31 | -20.9 | 37.55 | - | - | - | - | 243 | 101 | H |
| 2 | 2.932 | 34.95 | PKFH | 32.6 | -19.6 | 47.95 | - | - | - | - | 285 | 199 | H |
| | 2.933 | 23.77 | VA1T | 32.6 | -19.6 | 36.77 | - | - | - | - | 285 | 199 | H |
| 5 | 7.206 | 35.19 | PKFH | 35.8 | -27.2 | 43.79 | - | - | - | - | 195 | 104 | V |
| | 7.206 | 24.21 | VA1T | 35.8 | -27.2 | 32.81 | - | - | - | - | 195 | 104 | V |
| 6 | 7.754 | 23.18 | VA1T | 36 | -25.6 | 33.58 | - | - | - | - | 202 | 200 | V |
| | 7.756 | 34.14 | PKFH | 36 | -25.8 | 44.34 | - | - | - | - | 202 | 200 | V |

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

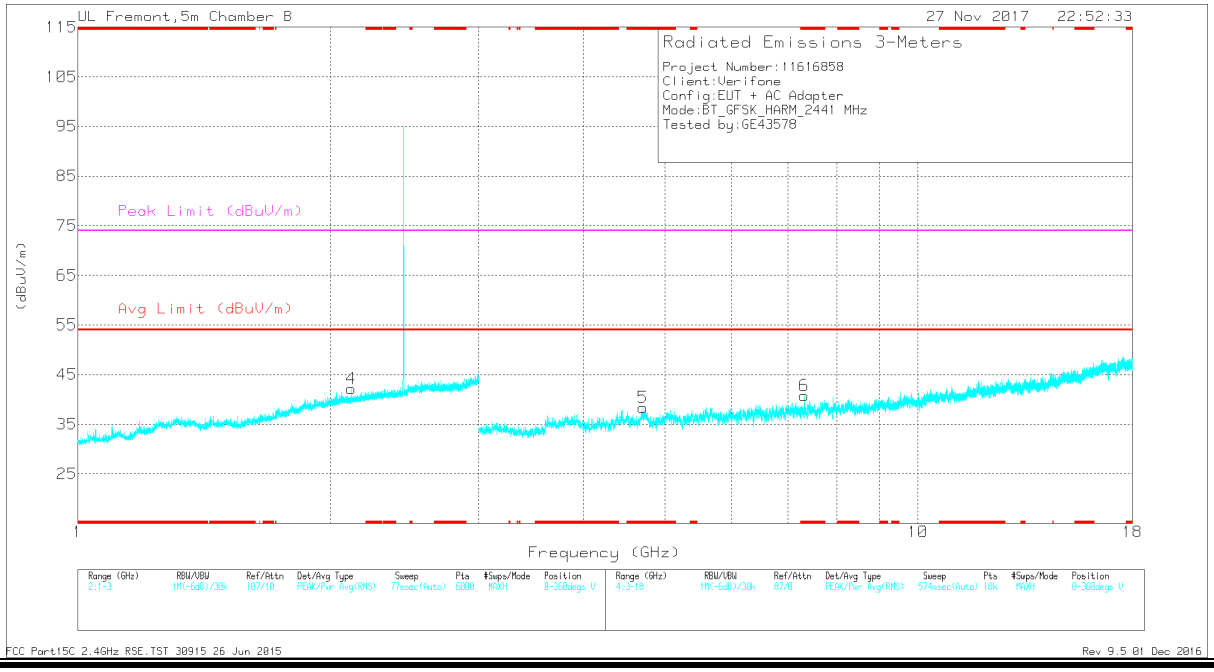
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

## MID CHANNEL HORIZONTAL




## MID CHANNEL VERTICAL



## Radiated Emissions

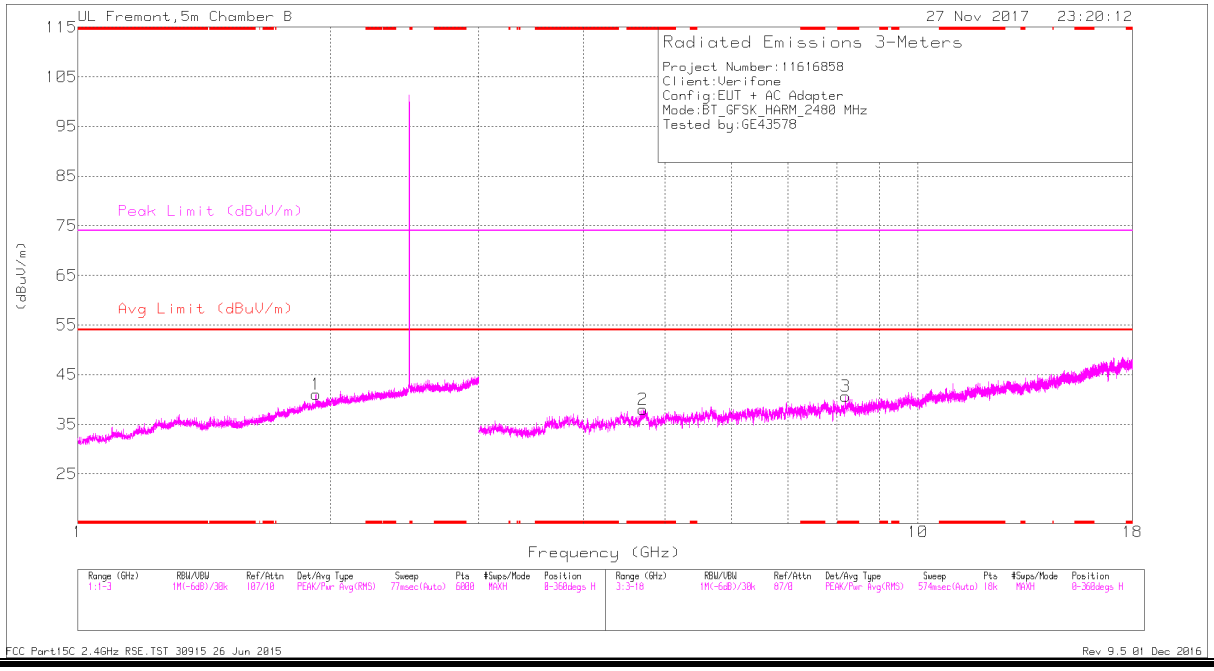
| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.098 | 34.84 | PKFH | 27.6 | -22.9 | 39.54 | - | - | 74 | -34.46 | 174 | 199 | H |
| | * 1.098 | 25.52 | VA1T | 27.6 | -23 | 30.12 | 54 | -23.88 | - | - | 174 | 199 | H |
| 5 | * 4.703 | 36.82 | PKFH | 34.2 | -29.5 | 41.52 | - | - | 74 | -32.48 | 92 | 104 | V |
| | * 4.705 | 25.99 | VA1T | 34.2 | -29.3 | 30.89 | 54 | -23.11 | - | - | 92 | 104 | V |
| 6 | * 7.322 | 34.58 | PKFH | 35.9 | -27.5 | 42.98 | - | - | 74 | -31.02 | 115 | 104 | V |
| | * 7.323 | 24.06 | VA1T | 35.9 | -27.4 | 32.56 | 54 | -21.44 | - | - | 115 | 104 | V |
| 2 | 1.92 | 35.3 | PKFH | 31 | -20.9 | 45.4 | - | - | - | - | 239 | 104 | H |
| | 1.92 | 27.59 | VA1T | 31 | -20.9 | 37.69 | - | - | - | - | 239 | 104 | H |
| 4 | 2.114 | 36.14 | PKFH | 31.4 | -21 | 46.54 | - | - | - | - | 202 | 104 | V |
| | 2.116 | 23.2 | VA1T | 31.4 | -21 | 33.6 | - | - | - | - | 202 | 104 | V |
| 3 | 6.859 | 34.81 | PKFH | 35.8 | -27.1 | 43.51 | - | - | - | - | 121 | 199 | H |
| | 6.859 | 23.98 | VA1T | 35.8 | -27.1 | 32.68 | - | - | - | - | 121 | 199 | H |

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

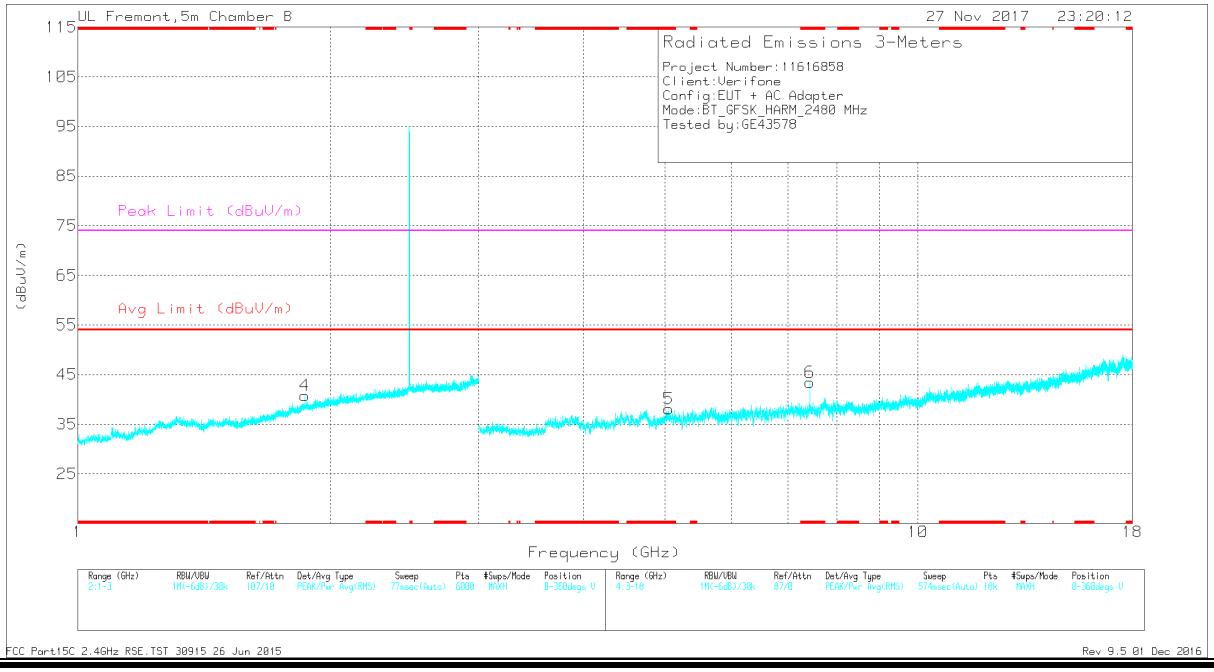
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

## HIGH CHANNEL HORIZONTAL




## HIGH CHANNEL VERTICAL



## Radiated Emissions

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 4.708 | 36.68 | PKFH | 34.2 | -29.1 | 41.78 | - | - | 74 | -32.22 | 171 | 104 | H |
| | * 4.709 | 25.62 | VA1T | 34.2 | -29 | 30.82 | 54 | -23.18 | - | - | 171 | 104 | H |
| 3 | * 8.203 | 34.71 | PKFH | 36 | -26.5 | 44.21 | - | - | 74 | -29.79 | 212 | 104 | H |
| | * 8.201 | 23.7 | VA1T | 36 | -26.4 | 33.3 | 54 | -20.7 | - | - | 212 | 104 | H |
| 5 | * 5.05 | 36.13 | PKFH | 34.4 | -28.2 | 42.33 | - | - | 74 | -31.67 | 265 | 104 | V |
| | * 5.05 | 25.15 | VA1T | 34.4 | -28.2 | 31.35 | 54 | -22.65 | - | - | 265 | 104 | V |
| 6 | * 7.439 | 34.2 | PKFH | 35.9 | -26.5 | 43.6 | - | - | 74 | -30.4 | 231 | 104 | V |
| | * 7.44 | 24.09 | VA1T | 35.9 | -26.5 | 33.49 | 54 | -20.51 | - | - | 231 | 104 | V |
| 4 | 1.861 | 22.76 | VA1T | 30.8 | -20.9 | 32.66 | - | - | - | - | 195 | 104 | V |
| | 1.862 | 33.62 | PKFH | 30.8 | -20.9 | 43.52 | - | - | - | - | 195 | 104 | V |
| 1 | 1.92 | 36.13 | PKFH | 31 | -20.9 | 46.23 | - | - | - | - | 241 | 199 | H |
| | 1.92 | 26.72 | VA1T | 31 | -20.9 | 36.82 | - | - | - | - | 241 | 199 | H |

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

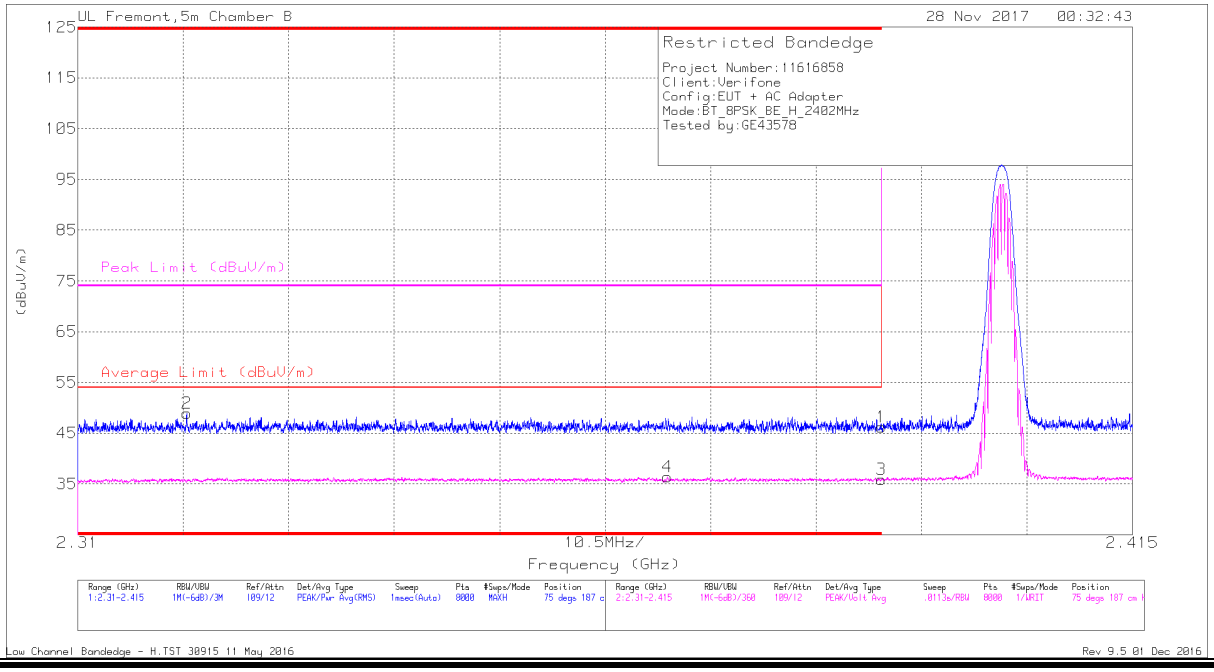
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

## 7.5.2. ENHANCED DATA RATE 8PSK MODULATION

**BANDEDGE (LOW CHANNEL)**

LOW CHANNEL HORIZONTAL

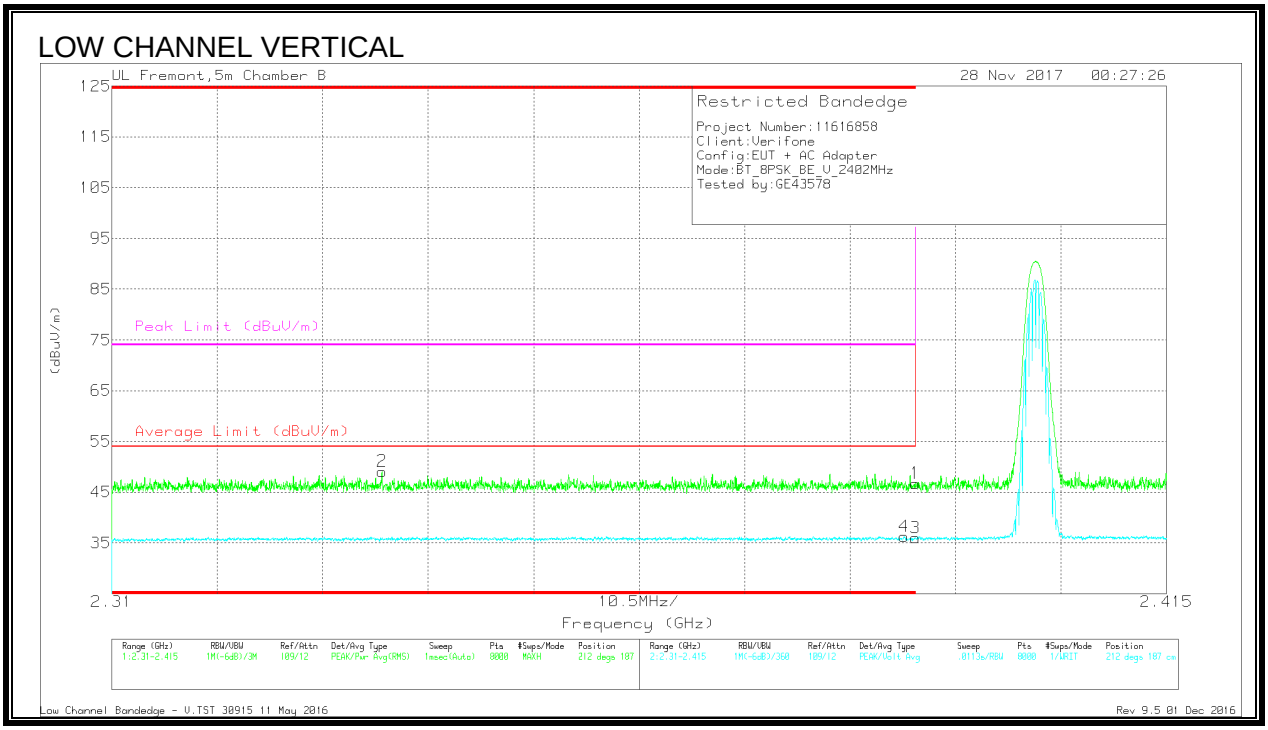



Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.39 | 35.38 | Pk | 32 | -21.2 | 46.18 | - | - | 74 | -27.82 | 75 | 187 | H |
| 2 | * 2.321 | 38.08 | Pk | 31.9 | -21.1 | 48.88 | - | - | 74 | -25.12 | 75 | 187 | H |
| 3 | * 2.39 | 25.08 | VA1T | 32 | -21.2 | 35.88 | 54 | -18.12 | - | - | 75 | 187 | H |
| 4 | * 2.369 | 25.54 | VA1T | 31.9 | -21.1 | 36.34 | 54 | -17.66 | - | - | 75 | 187 | H |

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

LOW CHANNEL VERTICAL



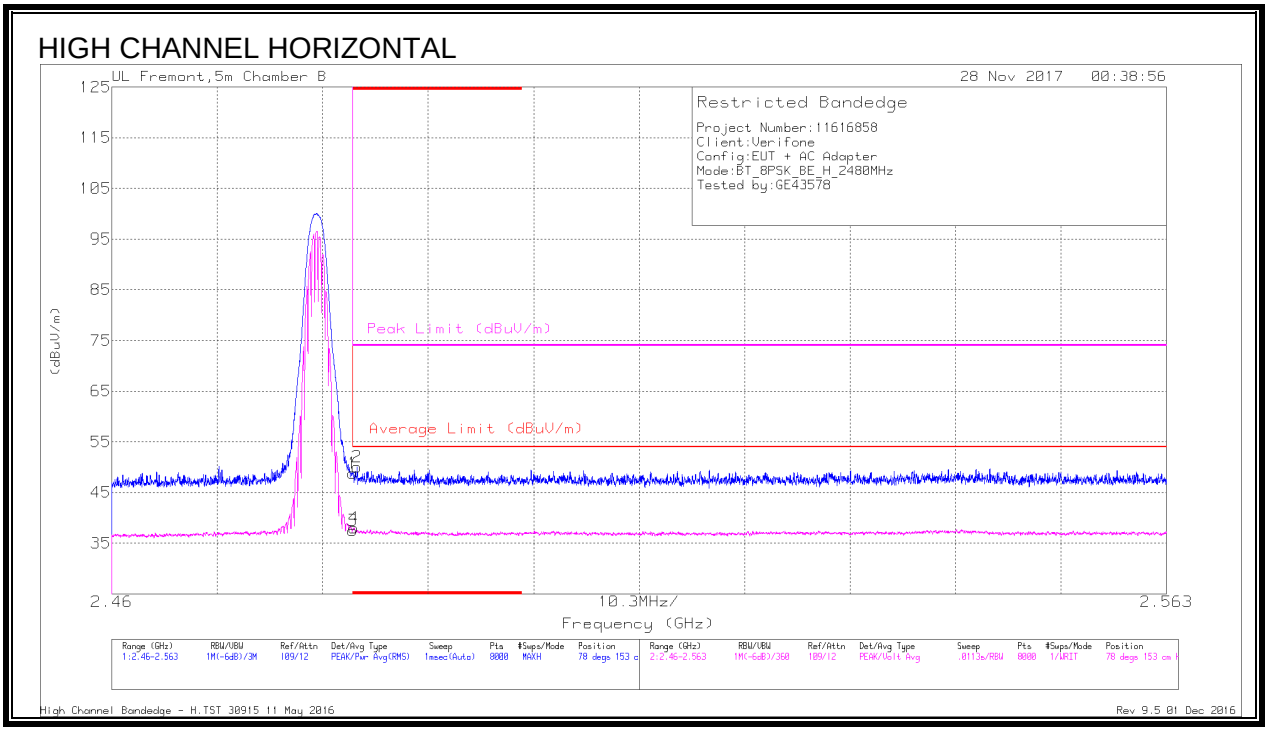

## Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.39 | 35.95 | Pk | 32 | -21.2 | 46.75 | - | - | 74 | -27.25 | 212 | 187 | V |
| 2 | * 2.337 | 38.31 | Pk | 31.9 | -21.1 | 49.11 | - | - | 74 | -24.89 | 212 | 187 | V |
| 3 | * 2.39 | 25.23 | VA1T | 32 | -21.2 | 36.03 | 54 | -17.97 | - | - | 212 | 187 | V |
| 4 | * 2.389 | 25.48 | VA1T | 32 | -21.2 | 36.28 | 54 | -17.72 | - | - | 212 | 187 | V |

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

**BANDEDGE (HIGH CHANNEL)**

HIGH CHANNEL HORIZONTAL

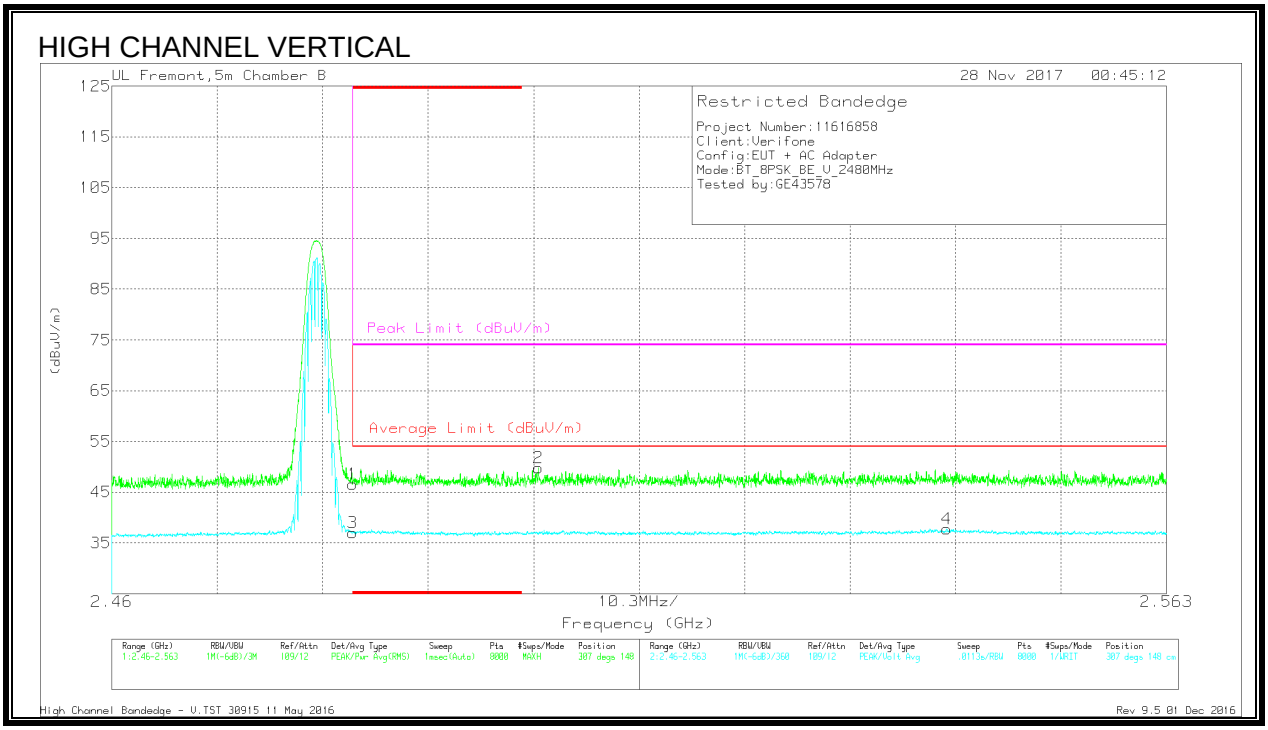



Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.484 | 37.17 | Pk | 32.5 | -20.9 | 48.77 | - | - | 74 | -25.23 | 78 | 153 | H |
| 2 | * 2.484 | 38.48 | Pk | 32.5 | -20.9 | 50.08 | - | - | 74 | -23.92 | 78 | 153 | H |
| 3 | * 2.484 | 25.87 | VA1T | 32.5 | -20.9 | 37.47 | 54 | -16.53 | - | - | 78 | 153 | H |
| 4 | * 2.484 | 26.45 | VA1T | 32.5 | -20.9 | 38.05 | 54 | -15.95 | - | - | 78 | 153 | H |

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HIGH CHANNEL VERTICAL



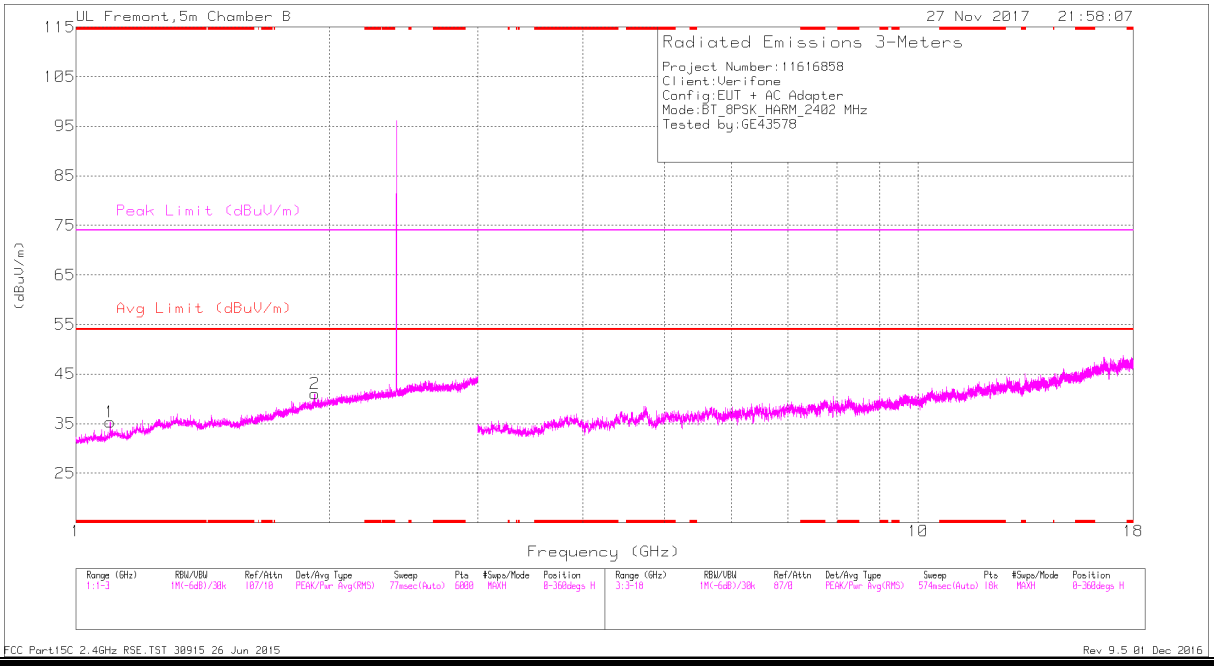

## Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.484 | 34.96 | Pk | 32.5 | -20.9 | 46.56 | - | - | 74 | -27.44 | 307 | 148 | V |
| 3 | * 2.484 | 25.36 | VA1T | 32.5 | -20.9 | 36.96 | 54 | -17.04 | - | - | 307 | 148 | V |
| 2 | 2.502 | 38.15 | Pk | 32.6 | -21 | 49.75 | - | - | 74 | -24.25 | 307 | 148 | V |
| 4 | 2.542 | 25.87 | VA1T | 32.5 | -20.6 | 37.77 | 54 | -16.23 | - | - | 307 | 148 | V |

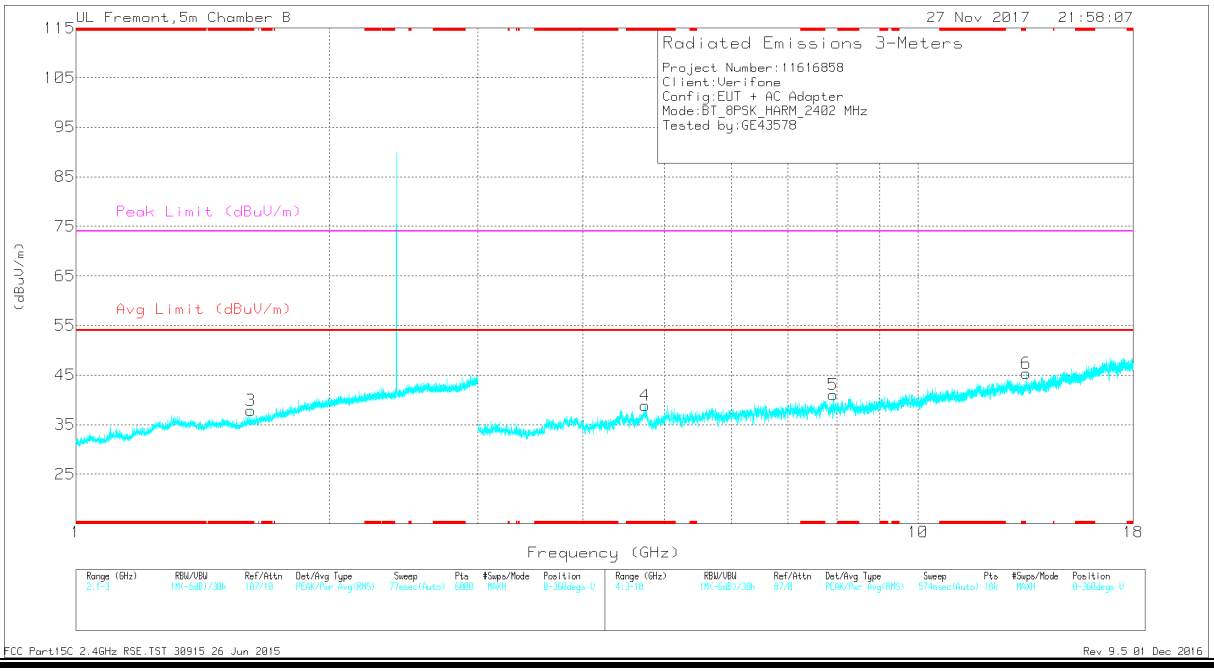
* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

**HARMONICS AND SPURIOUS EMISSIONS**

LOW CHANNEL HORIZONTAL




LOW CHANNEL VERTICAL



## Radiated Emissions

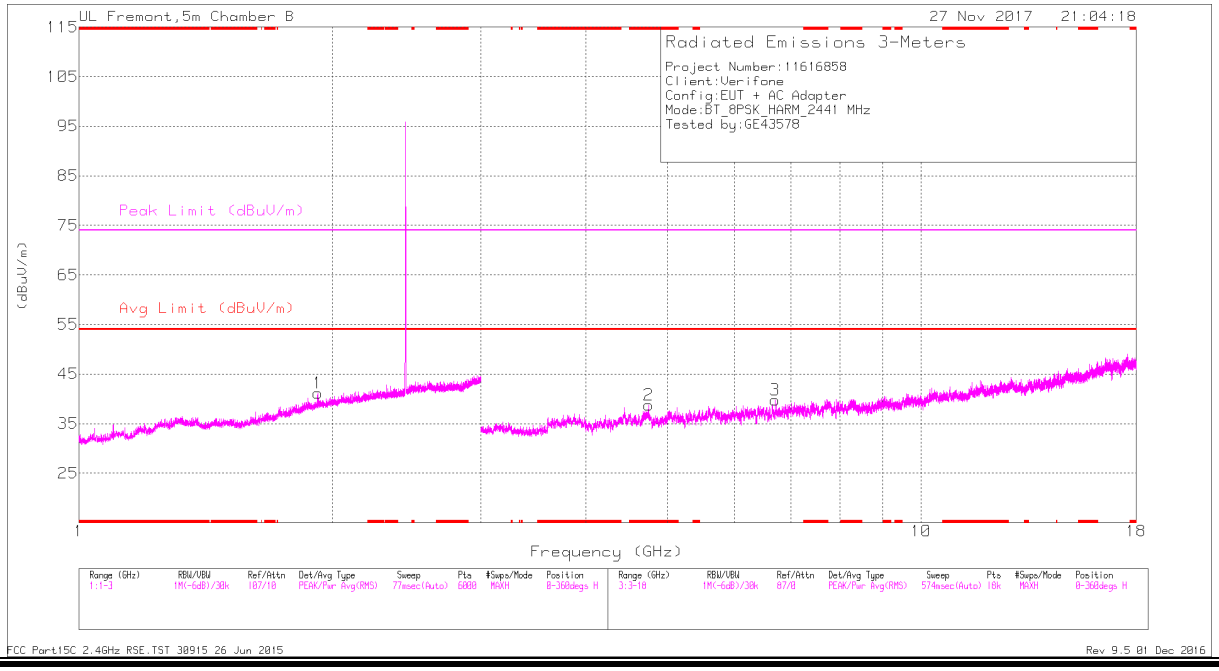
| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.098 | 34.57 | PKFH | 27.6 | -23 | 39.17 | - | - | 74 | -34.83 | 196 | 199 | H |
| | * 1.098 | 25.88 | VA1T | 27.6 | -23 | 30.48 | 54 | -23.52 | - | - | 196 | 199 | H |
| 3 | * 1.613 | 32.96 | PKFH | 28.4 | -21.4 | 39.96 | - | - | 74 | -34.04 | 241 | 200 | V |
| | * 1.613 | 22.48 | VA1T | 28.4 | -21.4 | 29.48 | 54 | -24.52 | - | - | 241 | 200 | V |
| 4 | * 4.74 | 37.92 | PKFH | 34.2 | -28.3 | 43.82 | - | - | 74 | -30.18 | 212 | 200 | V |
| | * 4.742 | 26.62 | VA1T | 34.2 | -28.3 | 32.52 | 54 | -21.48 | - | - | 212 | 200 | V |
| 2 | 1.919 | 33.8 | PKFH | 31 | -20.9 | 43.9 | - | - | - | - | 275 | 104 | H |
| | 1.92 | 23.54 | VA1T | 31 | -20.9 | 33.64 | - | - | - | - | 275 | 104 | H |
| 5 | 7.926 | 34.15 | PKFH | 36 | -25.1 | 45.05 | - | - | - | - | 152 | 200 | V |
| | 7.929 | 23.37 | VA1T | 36 | -25.3 | 34.07 | - | - | - | - | 152 | 200 | V |
| 6 | 13.426 | 30.17 | PKFH | 39.3 | -20.5 | 48.97 | - | - | - | - | 88 | 200 | V |
| | 13.427 | 19.15 | VA1T | 39.3 | -20.6 | 37.85 | - | - | - | - | 88 | 200 | V |

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

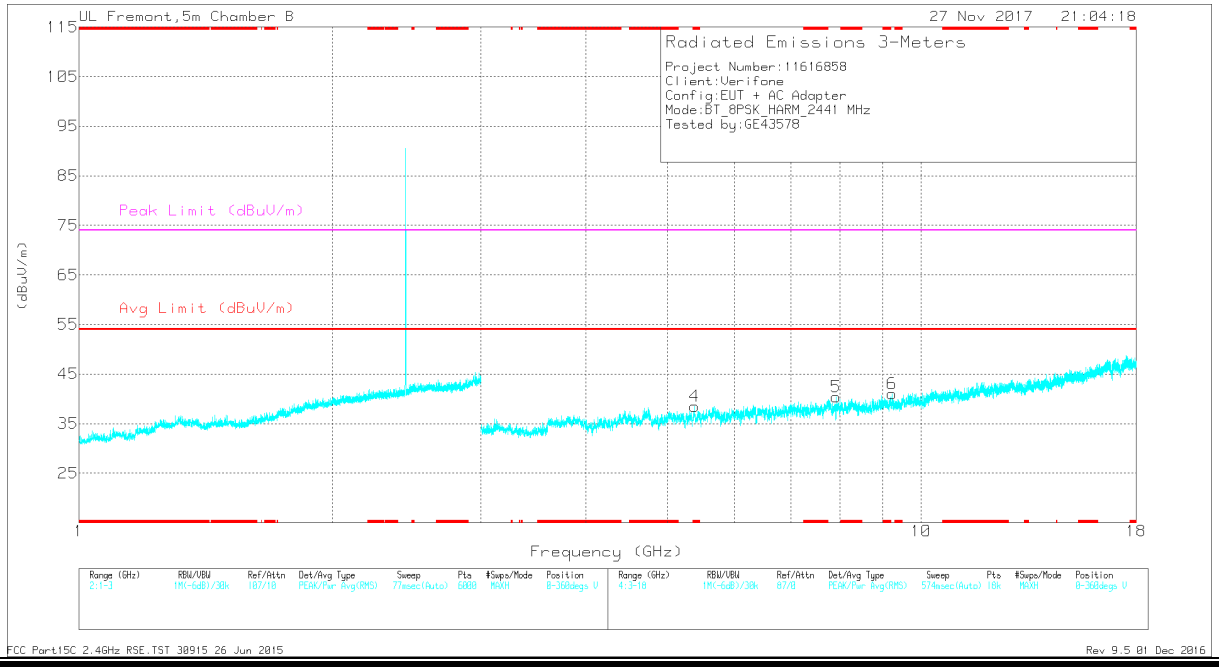
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

## MID CHANNEL HORIZONTAL




## MID CHANNEL VERTICAL



## Radiated Emissions

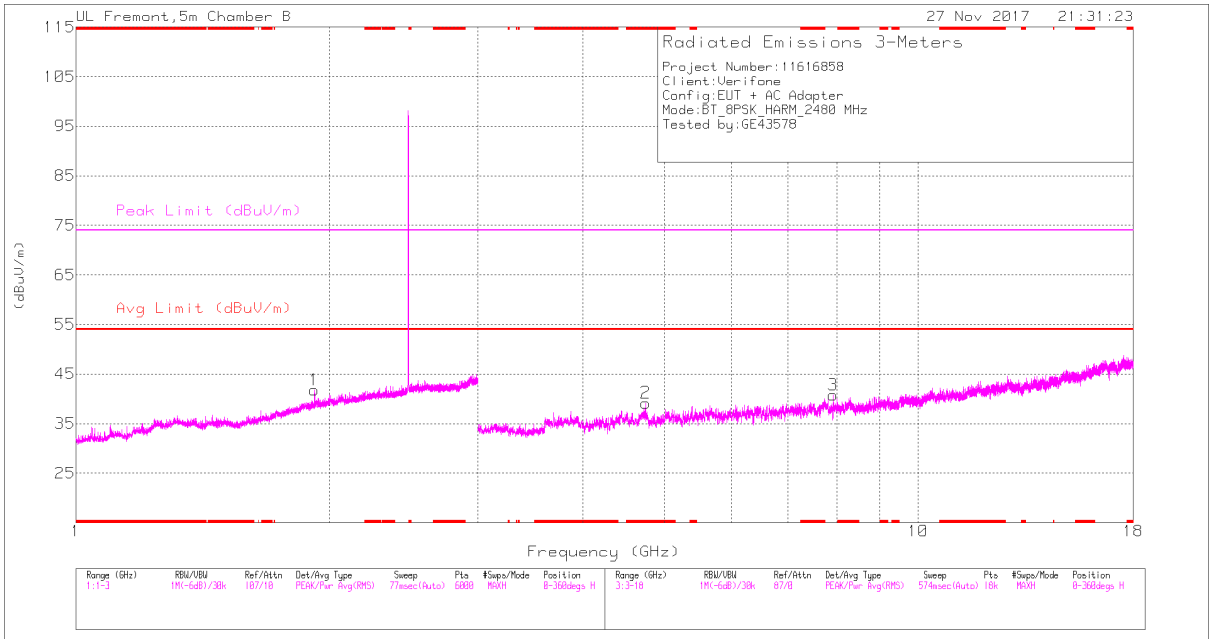
| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | * 4.743 | 37.35 | PKFH | 34.2 | -28.4 | 43.15 | - | - | 74 | -30.85 | 301 | 100 | H |
| | * 4.742 | 26.67 | VA1T | 34.2 | -28.4 | 32.47 | 54 | -21.53 | - | - | 301 | 100 | H |
| 4 | * 5.385 | 36.26 | PKFH | 35 | -28.4 | 42.86 | - | - | 74 | -31.14 | 286 | 100 | V |
| | * 5.385 | 24.98 | VA1T | 35 | -28.4 | 31.58 | 54 | -22.42 | - | - | 286 | 100 | V |
| 1 | 1.92 | 37.01 | PKFH | 31 | -20.9 | 47.11 | - | - | - | - | 325 | 100 | H |
| | 1.92 | 27.92 | VA1T | 31 | -20.9 | 38.02 | - | - | - | - | 325 | 100 | H |
| 3 | 6.712 | 35 | PKFH | 35.7 | -28 | 42.7 | - | - | - | - | 277 | 100 | H |
| | 6.712 | 24.5 | VA1T | 35.7 | -28 | 32.2 | - | - | - | - | 277 | 100 | H |
| 5 | 7.927 | 33.83 | PKFH | 36 | -25.1 | 44.73 | - | - | - | - | 212 | 200 | V |
| | 7.927 | 23.28 | VA1T | 36 | -25 | 34.28 | - | - | - | - | 212 | 200 | V |
| 6 | 9.23 | 32.35 | PKFH | 36.4 | -24.1 | 44.65 | - | - | - | - | 151 | 104 | V |
| | 9.231 | 21.42 | VA1T | 36.4 | -24.1 | 33.72 | - | - | - | - | 151 | 104 | V |

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

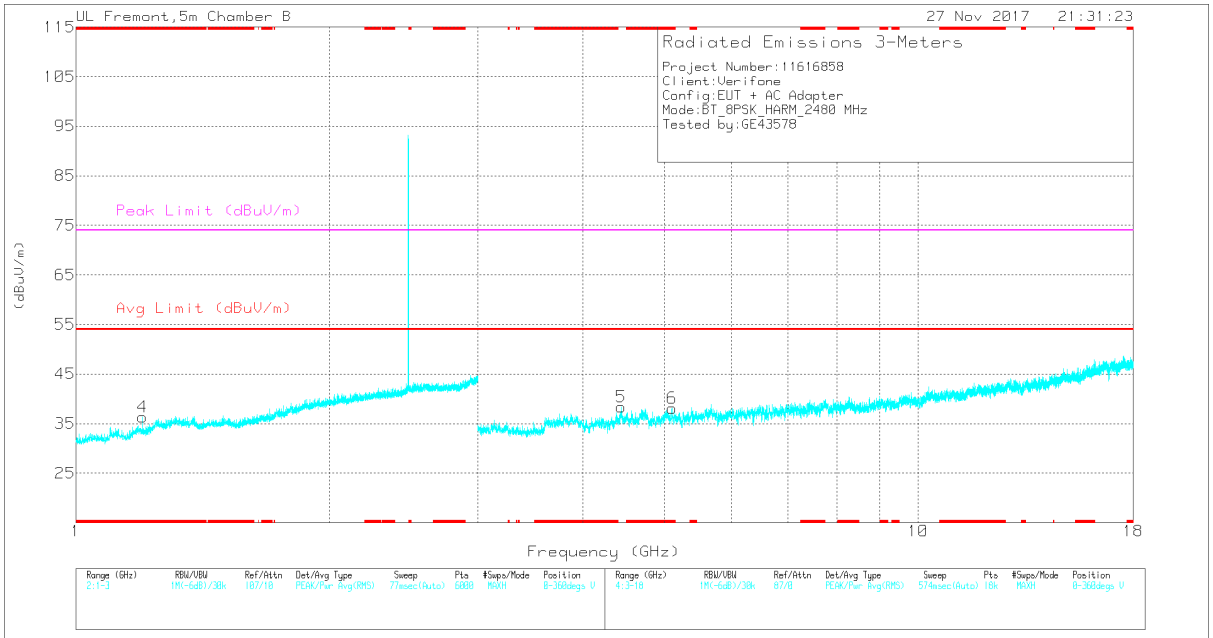
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

## HIGH CHANNEL HORIZONTAL




## HIGH CHANNEL VERTICAL



Radiated Emissions

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T863 (dB/m) | Amp/Cbl/Fltr/Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | * 1.201 | 33.94 | PKFH | 28 | -22.3 | 39.64 | - | - | 74 | -34.36 | 345 | 200 | V |
| | * 1.2 | 22.67 | VA1T | 28 | -22.4 | 28.27 | 54 | -25.73 | - | - | 345 | 200 | V |
| 2 | * 4.742 | 37.79 | PKFH | 34.2 | -28.3 | 43.69 | - | - | 74 | -30.31 | 284 | 200 | H |
| | * 4.742 | 26.65 | VA1T | 34.2 | -28.4 | 32.45 | 54 | -21.55 | - | - | 284 | 200 | H |
| 6 | * 5.101 | 36.67 | PKFH | 34.3 | -28.8 | 42.17 | - | - | 74 | -31.83 | 74 | 200 | V |
| | * 5.099 | 25.95 | VA1T | 34.3 | -28.6 | 31.65 | 54 | -22.35 | - | - | 74 | 200 | V |
| 1 | 1.92 | 35.55 | PKFH | 31 | -20.9 | 45.65 | - | - | - | - | 318 | 101 | H |
| | 1.92 | 27.99 | VA1T | 31 | -20.9 | 38.09 | - | - | - | - | 318 | 101 | H |
| 5 | 4.44 | 37.53 | PKFH | 33.8 | -28.2 | 43.13 | - | - | - | - | 155 | 104 | V |
| | 4.442 | 26.01 | VA1T | 33.8 | -28.2 | 31.61 | - | - | - | - | 155 | 104 | V |
| 3 | 7.929 | 34.53 | PKFH | 36 | -25.4 | 45.13 | - | - | - | - | 201 | 200 | H |
| | 7.929 | 23.41 | VA1T | 36 | -25.2 | 34.21 | - | - | - | - | 201 | 200 | H |

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

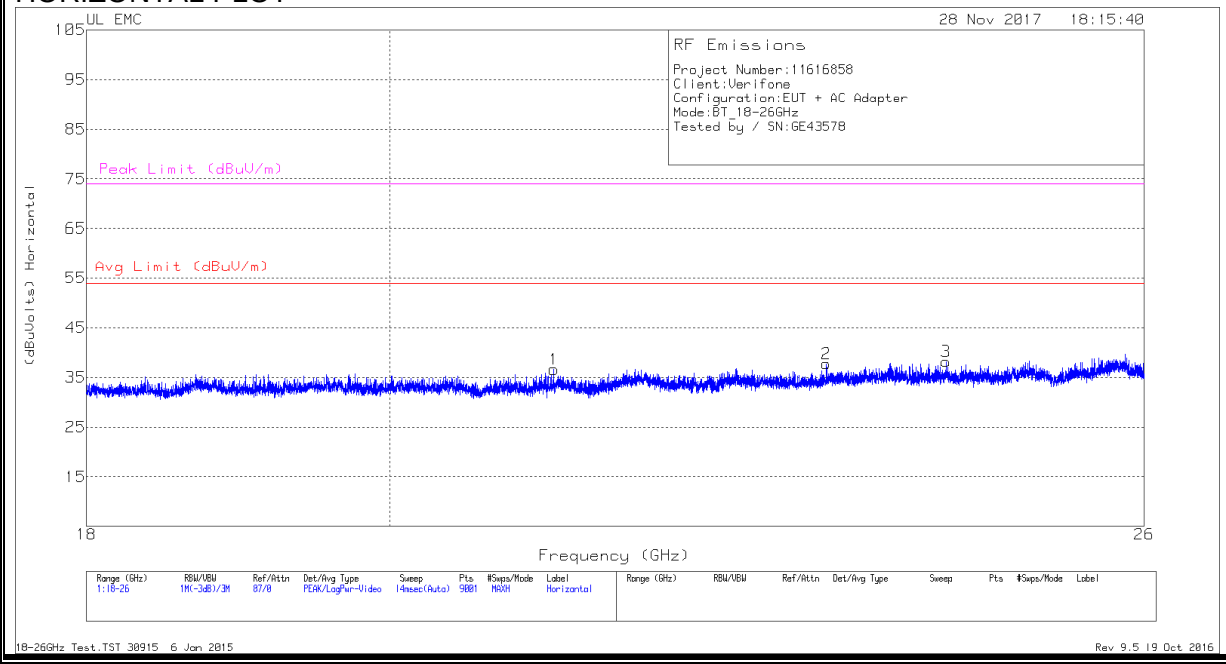
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

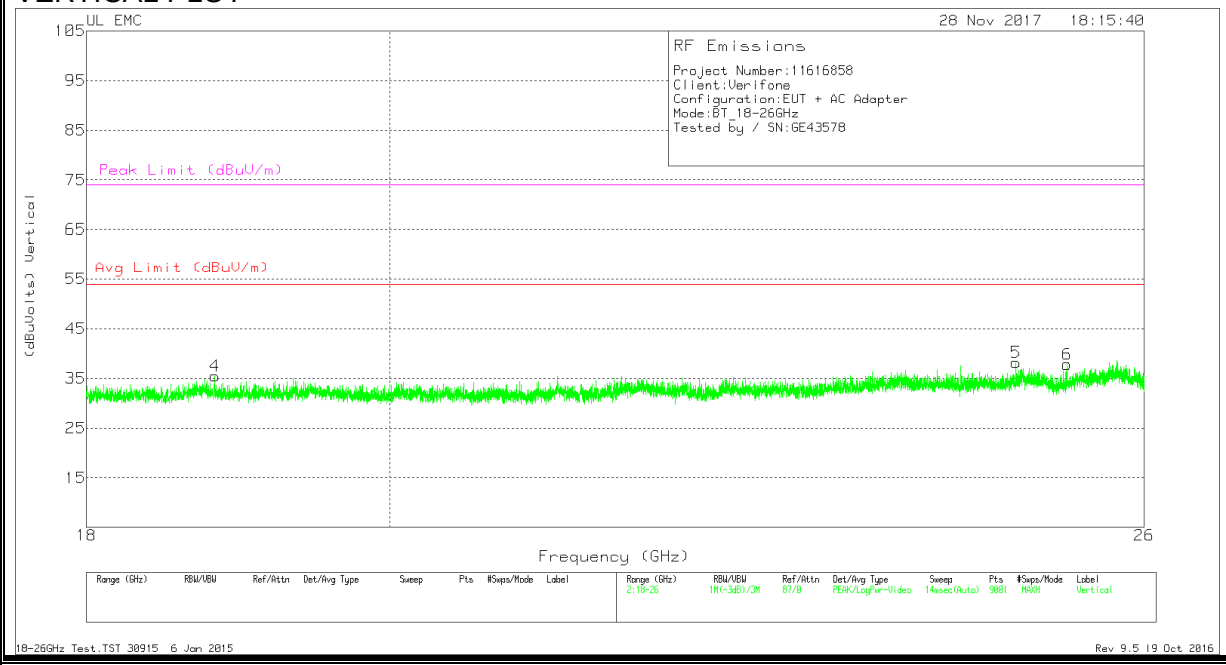
## 7.6. WORST-CASE ABOVE 18 GHz

**SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION)**

HORIZONTAL PLOT




VERTICAL PLOT



**Data**

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | T89 AF (dB/m) | Amp/Cbl (dB) | Dist Corr (dB) | Corrected Reading (dBuVolts) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 21.175 | 38.32 | Pk | 33 | -25.2 | -9.5 | 36.62 | 54 | -17.38 | 74 | -37.38 |
| 2 | 23.279 | 38.47 | Pk | 33.5 | -24.7 | -9.5 | 37.77 | 54 | -16.23 | 74 | -36.23 |
| 3 | 24.268 | 38.28 | Pk | 33.6 | -24.2 | -9.5 | 38.18 | 54 | -15.82 | 74 | -35.82 |
| 4 | 18.821 | 37.57 | Pk | 32.4 | -25 | -9.5 | 35.47 | 54 | -18.53 | 74 | -38.53 |
| 5 | 24.866 | 38.28 | Pk | 34 | -24.6 | -9.5 | 38.18 | 54 | -15.82 | 74 | -35.82 |
| 6 | 25.312 | 38.23 | Pk | 33.6 | -24.5 | -9.5 | 37.83 | 54 | -16.17 | 74 | -36.17 |

Pk - Peak detector