



# **CERTIFICATION TEST REPORT**

**Report Number. :** 12193631-E1V4

**Applicant :** PSIKICK  
2348 WALSH AVE,  
SANTA CLARA, CA 95051

**Model :** IPN-100-1007

**FCC ID :** 2AO7CIPN-100-1007

**ISED ID :** 23743-IPN1001007

**EUT Description :** CONTROL NODE TRANSMITTER MODULE

**Test Standard(s) :** FCC 47 CFR PART 15 SUBPART C  
ISED RSS-247 ISSUE 2  
ISED RSS-GEN ISSUE 4

**Date Of Issue:**  
May 23, 2018

**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        |
|------|------------|---------------------------------------|-------------------|
| V1   | 03/12/2018 | Initial Issue                         | ---               |
| V2   | 04/17/2018 | Revised ISED ID and antenna gain      | Grace Rincand     |
| V3   | 05/9/2018  | Updated section 10                    | Francisco de Anda |
| V4   | 05/23/2018 | Updated cover page, added section 8.3 | Francisco de Anda |

## TABLE OF CONTENTS

|                                                |           |
|------------------------------------------------|-----------|
| <b>REVISION HISTORY .....</b>                  | <b>2</b>  |
| <b>TABLE OF CONTENTS .....</b>                 | <b>3</b>  |
| <b>1. ATTESTATION OF TEST RESULTS .....</b>    | <b>5</b>  |
| <b>2. TEST METHODOLOGY .....</b>               | <b>6</b>  |
| <b>3. FACILITIES AND ACCREDITATION .....</b>   | <b>6</b>  |
| <b>4. CALIBRATION AND UNCERTAINTY .....</b>    | <b>7</b>  |
| 4.1. MEASURING INSTRUMENT CALIBRATION .....    | 7         |
| 4.2. SAMPLE CALCULATION .....                  | 7         |
| 4.3. MEASUREMENT UNCERTAINTY.....              | 7         |
| <b>5. EQUIPMENT UNDER TEST .....</b>           | <b>8</b>  |
| 5.1. EUT DESCRIPTION .....                     | 8         |
| 5.2. MAXIMUM OUTPUT POWER.....                 | 8         |
| 5.3. DESCRIPTION OF AVAILABLE ANTENNAS .....   | 8         |
| 5.4. SOFTWARE AND FIRMWARE.....                | 8         |
| 5.5. WORST-CASE CONFIGURATION AND MODE.....    | 8         |
| 5.6. DESCRIPTION OF TEST SETUP.....            | 9         |
| <b>6. TEST AND MEASUREMENT EQUIPMENT .....</b> | <b>12</b> |
| <b>7. MEASUREMENT METHODS .....</b>            | <b>13</b> |
| <b>8. ANTENNA PORT TEST RESULTS .....</b>      | <b>14</b> |
| 8.1. ON TIME AND DUTY CYCLE.....               | 14        |
| 8.2. 20 dB AND 99% BANDWIDTH .....             | 15        |
| 8.2.1. 99% OCCUPIED BANDWIDTH .....            | 16        |
| 8.2.2. 20dB BANDWIDTH.....                     | 17        |
| 8.3. HOPPING FREQUENCY SEPARATION .....        | 18        |
| 8.4. NUMBER OF HOPPING CHANNELS.....           | 19        |
| 8.5. AVERAGE TIME OF OCCUPANCY.....            | 20        |
| 8.5.1. OOK MODULATION .....                    | 21        |
| 8.6. OUTPUT POWER.....                         | 22        |
| 8.7. CONDUCTED SPURIOUS EMISSIONS.....         | 24        |
| 8.7.1. OOK MODULATION .....                    | 25        |
| <b>9. RADIATED TEST RESULTS.....</b>           | <b>27</b> |
| 9.1. TRANSMITTER ABOVE 1 GHz .....             | 29        |

|        |                                                                     |    |
|--------|---------------------------------------------------------------------|----|
| 9.1.1. | OOK MODULATION .....                                                | 29 |
| 9.2.   | TRANSMITTER BELOW 1 GHz.....                                        | 35 |
| 9.2.1. | OOK MODULATION .....                                                | 35 |
| 9.3.   | WORST CASE BELOW 30 MHz.....                                        | 45 |
| 9.3.1. | SPURIOUS EMISSIONS 9 kHz TO 30 MHz (WORST-CASE CONFIGURATION)<br>45 |    |
| 10.    | AC POWER LINE CONDUCTED EMISSIONS .....                             | 46 |
| 11.    | SETUP PHOTOS .....                                                  | 49 |

## 1. ATTESTATION OF TEST RESULTS

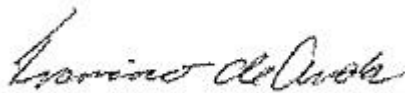
**COMPANY NAME:** PSIKICK  
**EUT DESCRIPTION:** CONTROL NODE TRANSMITTER MODULE  
**MODEL:** IPN-100-1007  
**SERIAL NUMBER:** 28  
**DATE TESTED:** MARCH 01 - 02, 2018

| APPLICABLE STANDARDS     |              |
|--------------------------|--------------|
| STANDARD                 | TEST RESULTS |
| CFR 47 Part 15 Subpart C | Pass         |
| ISED RSS-247 Issue 2     | Pass         |
| ISED 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 the U.S. government.

Approved & Released For  
UL Verification Services Inc. By:



Francisco de Anda  
CONSUMER TECHNOLOGY DIVISION  
Operations Leader  
UL Verification Services Inc.

Prepared By:



Jason Qian  
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, ANSI C63.10-2013, RSS-GEN Issue 4, and 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                              |
|--------------------------------------------------------------|---------------------------------------------------|
| <input checked="" type="checkbox"/> Chamber A (ISED:2324B-1) | <input type="checkbox"/> Chamber D (ISED:22541-1) |
| <input type="checkbox"/> Chamber B (ISED:2324B-2)            | <input type="checkbox"/> Chamber E (ISED:22541-2) |
| <input type="checkbox"/> Chamber C (ISED:2324B-3)            | <input type="checkbox"/> Chamber F (ISED:22541-3) |
|                                                              | <input type="checkbox"/> Chamber G (ISED:22541-4) |
|                                                              | <input type="checkbox"/> Chamber H (ISED:22541-5) |

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through C are covered under ISED company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under ISED Canada company address code 22541 with site numbers 22541 -1 through 22541-5, respectively.

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.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

### 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. EUT DESCRIPTION

The EUT is a control node transmitter module that operates in the 902-928 MHz band. Device uses hopping technology and is categorized as an Frequency Hopping System(FHS).

### 5.2. MAXIMUM OUTPUT POWER

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

| Frequency Range<br>(MHz) | Mode   | Output Power<br>(dBm) | Output Power<br>(mW) |
|--------------------------|--------|-----------------------|----------------------|
| 902-928                  | Normal | 26.04                 | 401.79               |

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a dipole antenna, with a maximum gain of 2.19 dBi.

### 5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was WakeupDevice\_0000004.

### 5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 30MHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emissions from 30MHz to 1GHz were performed with the EUT set to transmit at low middle and high channels.

Band edge and radiated emissions between 30MHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

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



## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| Support Equipment List |              |             |               |           |
|------------------------|--------------|-------------|---------------|-----------|
| Description            | Manufacturer | Model       | Serial Number | FCC ID    |
| Laptop                 | Lenovo       | X1 Carbon   | W1KS72210YY   | PD98260NG |
| Laptop Adapter         | Lenovo       | ADLX65NCC2A | 45N0263       | -         |

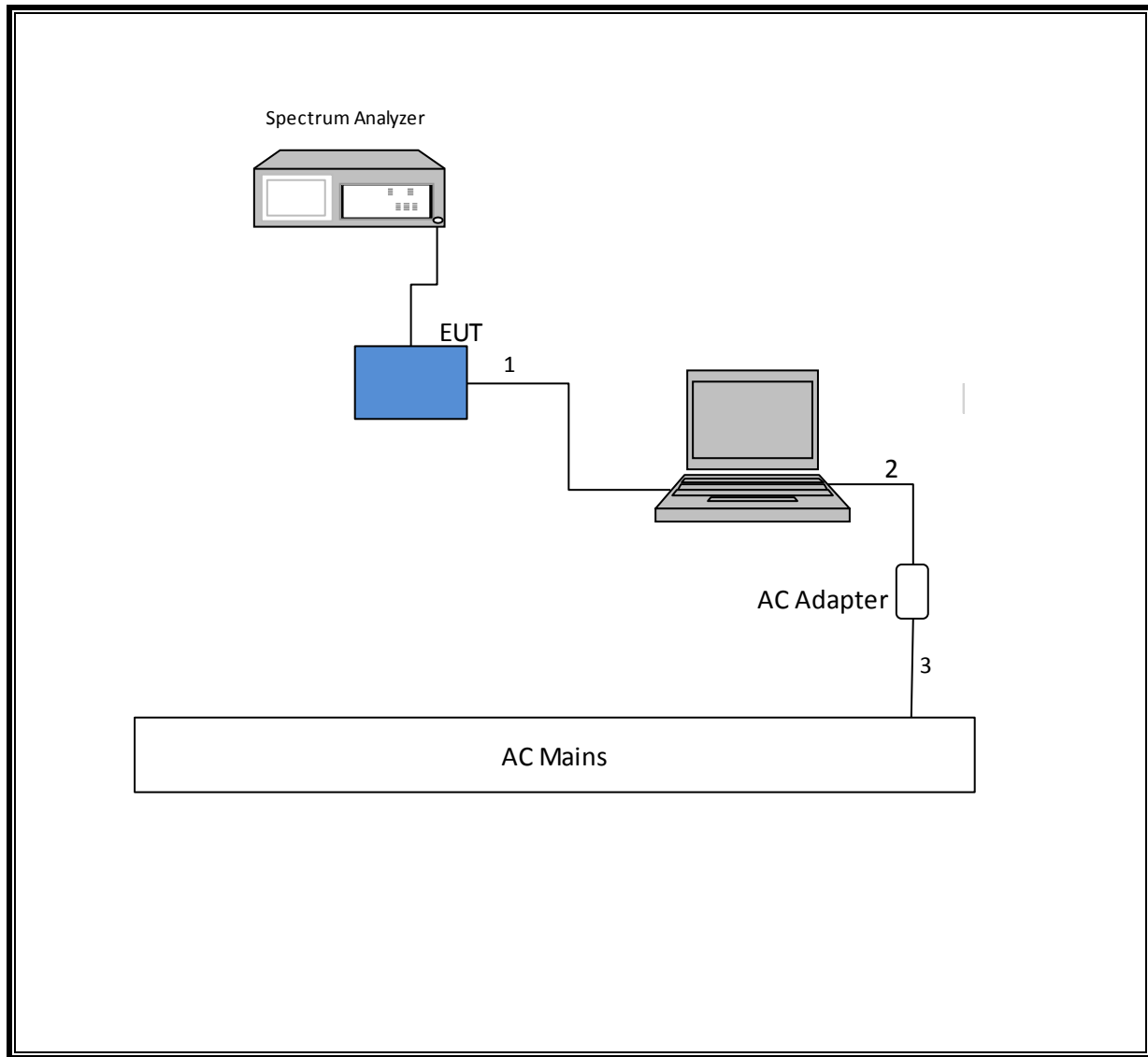
### I/O CABLES

| I/O Cable List |      |                      |                |            |                  |         |
|----------------|------|----------------------|----------------|------------|------------------|---------|
| Cable No       | Port | # of identical ports | Connector Type | Cable Type | Cable Length (m) | Remarks |
| 1              | USB  | 1                    | USB            | Shielded   | 1                |         |
| 2              | DC   | 1                    | DC             | Shielded   | 1                |         |
| 3              | AC   | 1                    | 3-Prong        | Unshielded | 0.8              |         |

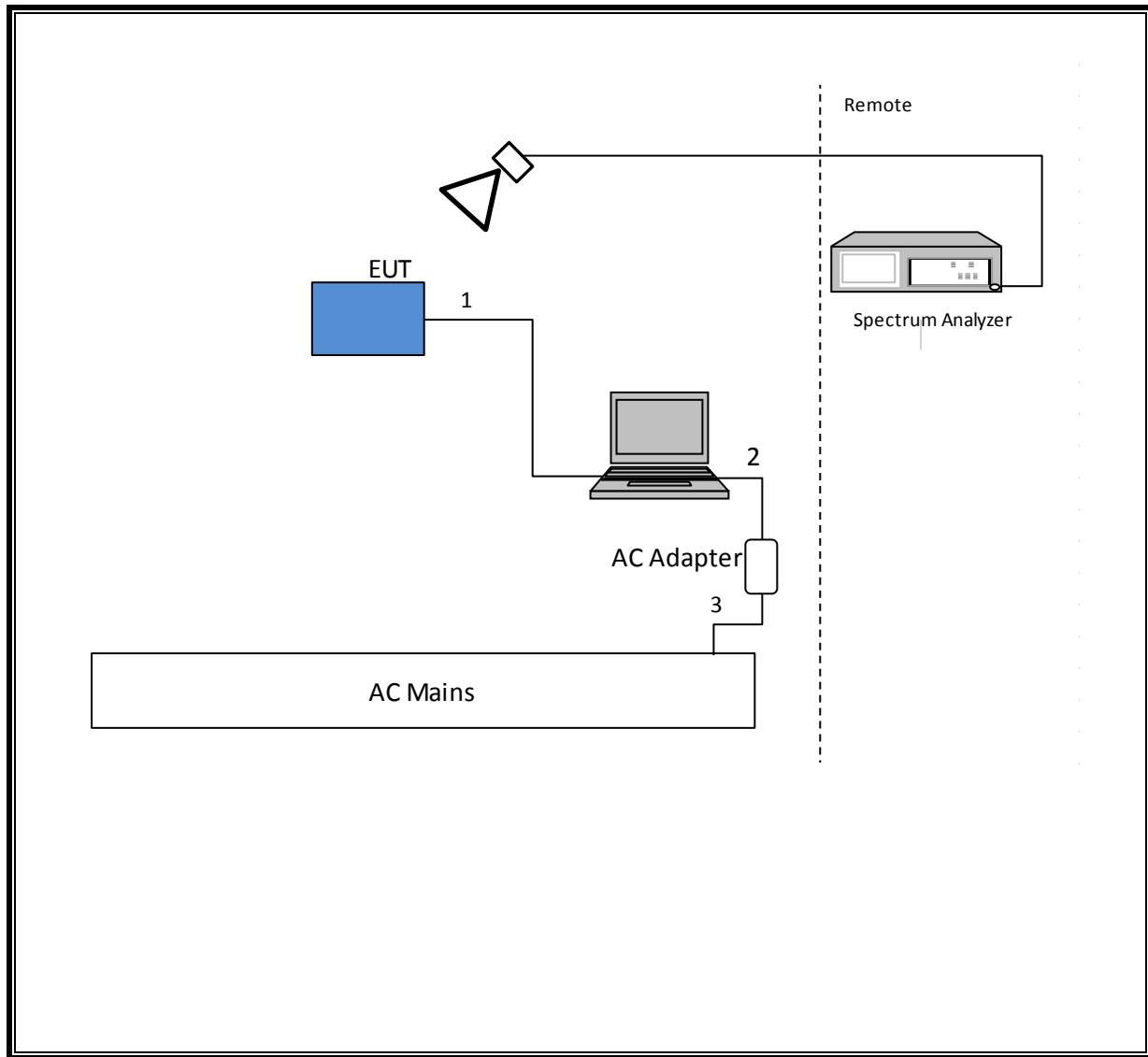
### TEST SETUP

The EUT is connected to a test laptop during the tests. Test software exercised the radio card.

**SETUP DIAGRAM FOR CONDUCTED TESTS**



**SETUP DIAGRAM FOR RADIATED TESTS**



## 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                   | ID Num | Cal Due    | Last Cal   |
| Antenna, Broadband Hybrid, 30MHz to 2000MHz        | Sunol Sciences Corp.            | JB1                     | T130   | 10/16/2018 | 10/16/2017 |
| Antenna, Horn 1-18GHz                              | ETS-Lindgren                    | 3117                    | T862   | 06/09/2018 | 06/09/2017 |
| Power Meter, P-series single channel               | Agilent (Keysight) Technologies | N1911A                  | T1269  | 03/29/2018 | 03/29/2017 |
| Amplifier, 1 - 18GHz                               | MITEQ                           | AFS42-00101800-25-S-42  | T931   | 09/20/2018 | 09/20/2017 |
| Amplifier, 1-8GHz                                  | MITEQ                           | AMF-4D-01000800-30-29P  | T1156  | 06/24/2018 | 06/24/2017 |
| Power Sensor, P - series, 50MHz to 18GHz, Wideband | All                             | N1921A                  | T1224  | 03/29/2018 | 03/29/2017 |
| Amplifier, 10KHz to 1GHz, 32dB                     | Agilent (Keysight) Technologies | 8447D                   | T10    | 02/14/2019 | 02/14/2018 |
| Spectrum Analyzer PSA                              | Agilent (Keysight) Technologies | E4446A                  | T146   | 03/21/2018 | 03/21/2017 |
| Spectrum Analyzer, PXA, 3Hz to 44GHz               | Agilent (Keysight) Technologies | N9030A                  | T1466  | 04/11/2018 | 04/11/2017 |
| Antenna, Active Loop 9kHz-30MHz                    | Com-Power Corp.                 | AL-130R                 | T1866  | 10/10/2018 | 10/10/2017 |
| Test Receiver, EMI, 10Hz-7GHz                      | Rhode&Schwarz                   | ESR                     | T1436  | 01/06/2019 | 01/06/2018 |
| LISN                                               | FISCHER                         | FCC-LISN-50/250-25-2-01 | T1310  | 01/17/2019 | 01/17/2018 |

| Test Software List    |              |        |                           |
|-----------------------|--------------|--------|---------------------------|
| Description           | Manufacturer | Model  | Version                   |
| Radiated Software     | UL           | UL EMC | Ver 9.5, December 1, 2016 |
| Antenna Port Software | UL           | UL RF  | Ver 9.1, January 25, 2018 |

## 7. MEASUREMENT METHODS

On Time and Duty Cycle: ANSI C63.10-2013 Section 11.6

Occupied BW (20dB): ANSI C63.10-2013 Section 6.9.2

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Number of Hopping Frequencies: ANSI C63.10-2013 Section 7.8.3

Time of Occupancy (Dwell Time): ANSI C63.10-2013 Section 7.8.4

Peak Output Power: ANSI C63.10-2013 Section 7.8.5

Conducted Spurious Emissions: ANSI C63.10-2013 Section 7.8.8

Conducted Band-Edge: ANSI C63.10-2013 Section 6.10.4

Radiated Spurious Emissions 30-1000MHz: ANSI C63.10-2013 Section 6.3 and 6.5

Radiated Spurious Emissions above 1GHz: ANSI C63.10-2013 Section 6.3 and 6.6

Radiated Band-edge: ANSI C63.10-2013 Section 6.10.5

AC Power-line conducted emissions: ANSI C63.10-2013, Section 6.2.

## 8. ANTENNA PORT TEST RESULTS

### 8.1. ON TIME AND DUTY CYCLE

#### LIMITS

None; for reporting purposes only.

#### ON TIME AND DUTY CYCLE RESULTS

| One Period<br>(ms) | Pulse Numbers in 100ms | Long Pulse Width<br>(ms) | # of Long Pulses | Medium Pulse 1 Width<br>(ms) | # of Medium 1 Pulses | Medium Pulse 2 Width<br>(ms) | # of Medium 2 Pulses | Short Pulse Width<br>(ms) | # of Short Pulses | Duty Cycle | 20*Log Duty Cycle (dB) |
|--------------------|------------------------|--------------------------|------------------|------------------------------|----------------------|------------------------------|----------------------|---------------------------|-------------------|------------|------------------------|
| 100                | 2                      | 0.610                    | 3                | 0.38                         | 3                    | 0.24                         | 6                    | 0.120                     | 28                | 0.155      | -16.17                 |

#### DUTY CYCLE PLOTS



## **8.2. 20 dB AND 99% BANDWIDTH**

### **LIMITS**

FCC §15.247 (a) (1)(i)

RSS-247 (5.1) (c)

(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

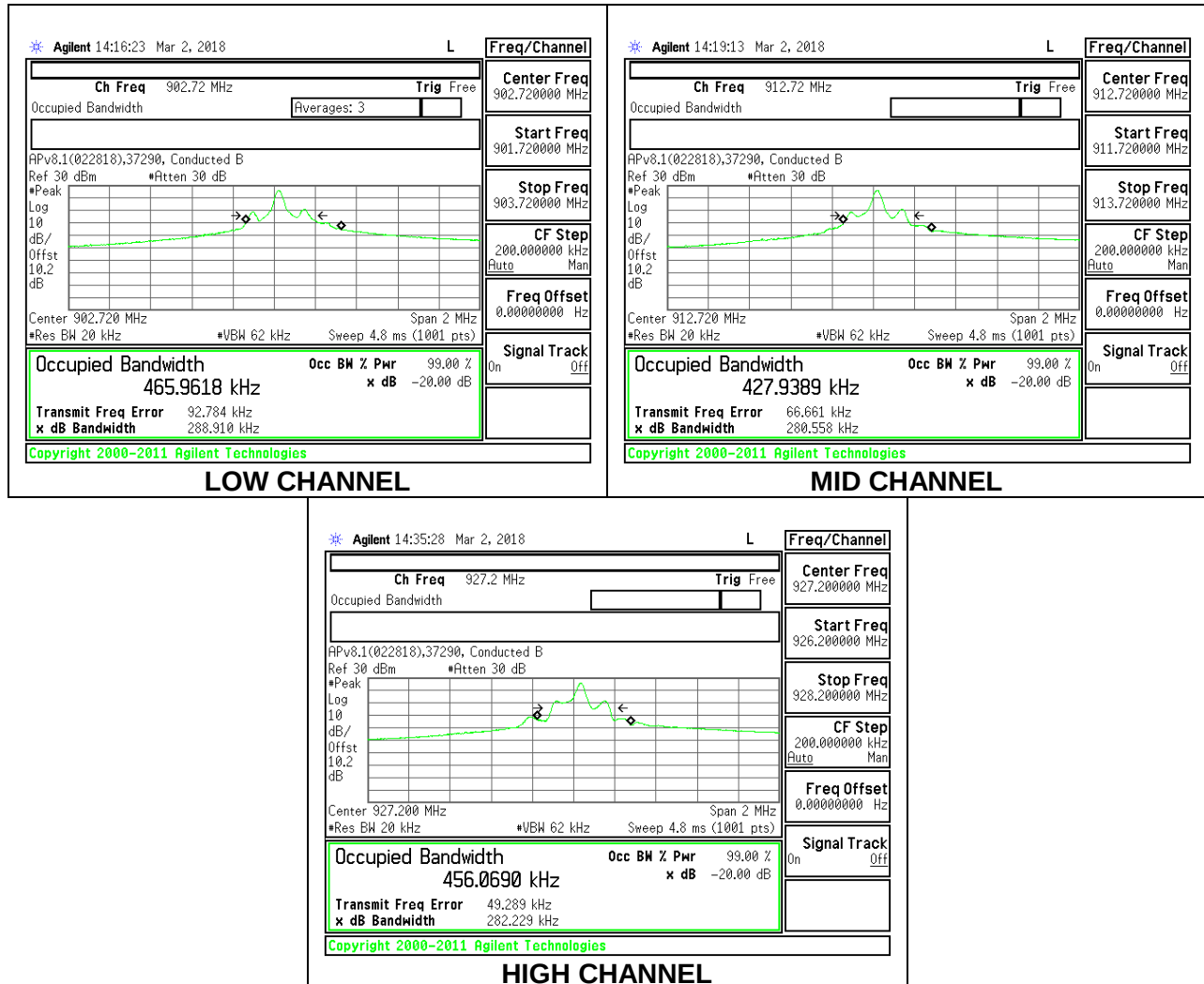
### **TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq 1\%$  of the 20 dB bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.

### **RESULTS**

## 8.2.1. 99% OCCUPIED BANDWIDTH

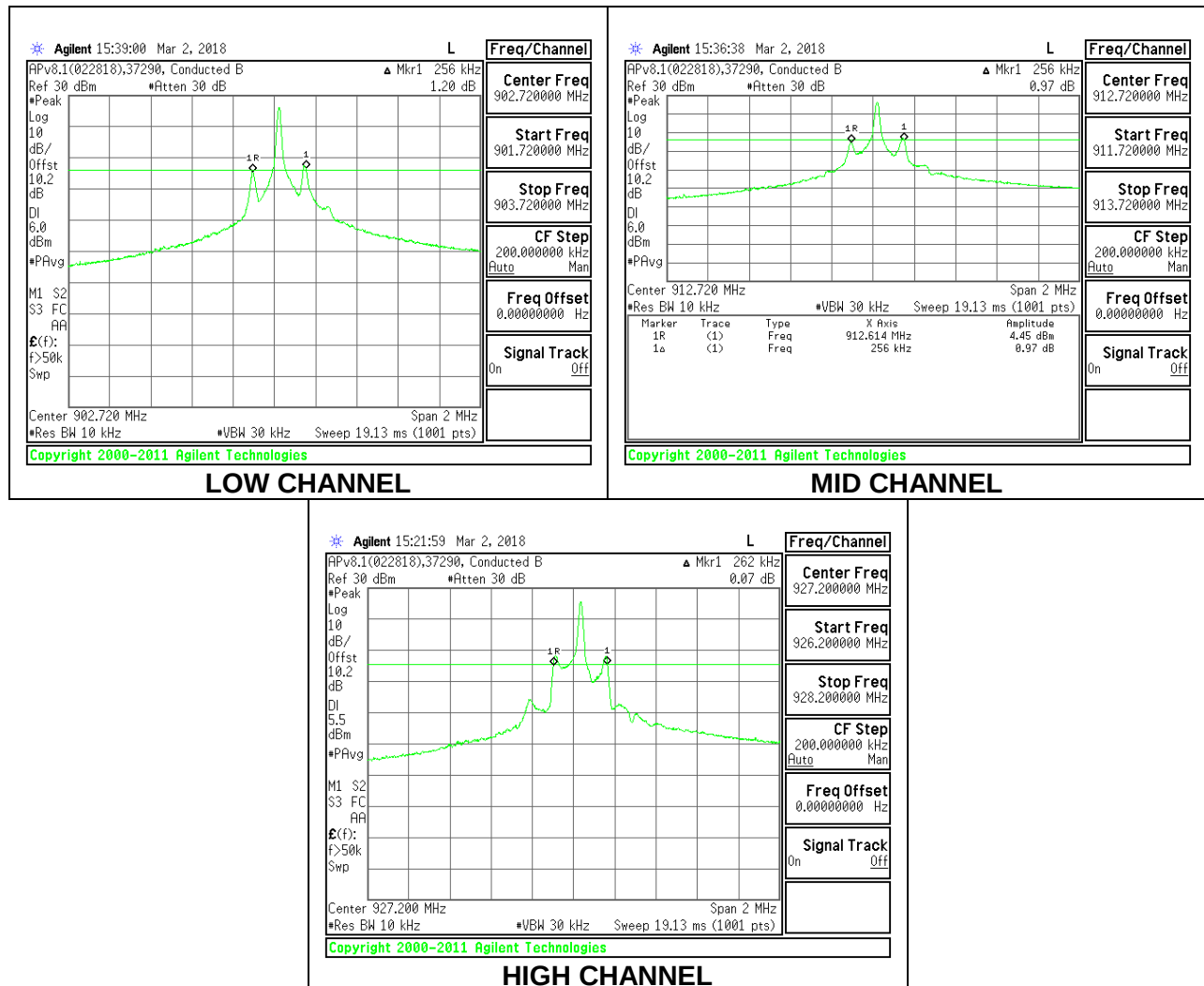
| Channel | Frequency (MHz) | 99% Bandwidth (kHz) |
|---------|-----------------|---------------------|
| Low     | 902.72          | 465.96              |
| Mid     | 912.72          | 427.94              |
| High    | 927.20          | 456.07              |





## 8.2.2. 20dB BANDWIDTH

| Channel | Frequency (MHz) | 20dB Bandwidth (kHz) | Limit (kHz) |
|---------|-----------------|----------------------|-------------|
| Low     | 902.72          | 256                  | 500         |
| Mid     | 912.72          | 256                  | 500         |
| High    | 927.20          | 262                  | 500         |



### 8.3. HOPPING FREQUENCY SEPARATION

#### LIMIT

FCC §15.247 (a) (1)

RSS-247 (5.1) (c)

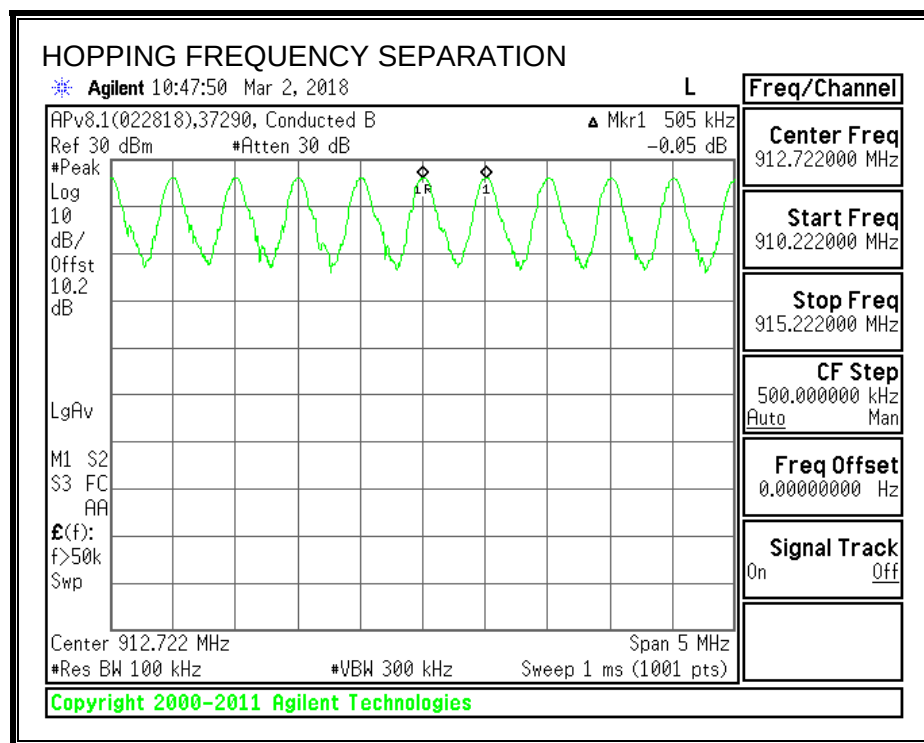
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

#### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

#### RESULTS

##### HOPPING FREQUENCY SEPARATION





## **8.5. AVERAGE TIME OF OCCUPANCY**

### **LIMITS**

FCC §15.247 (a) (1) (i)

RSS-247 (5.1) (c)

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

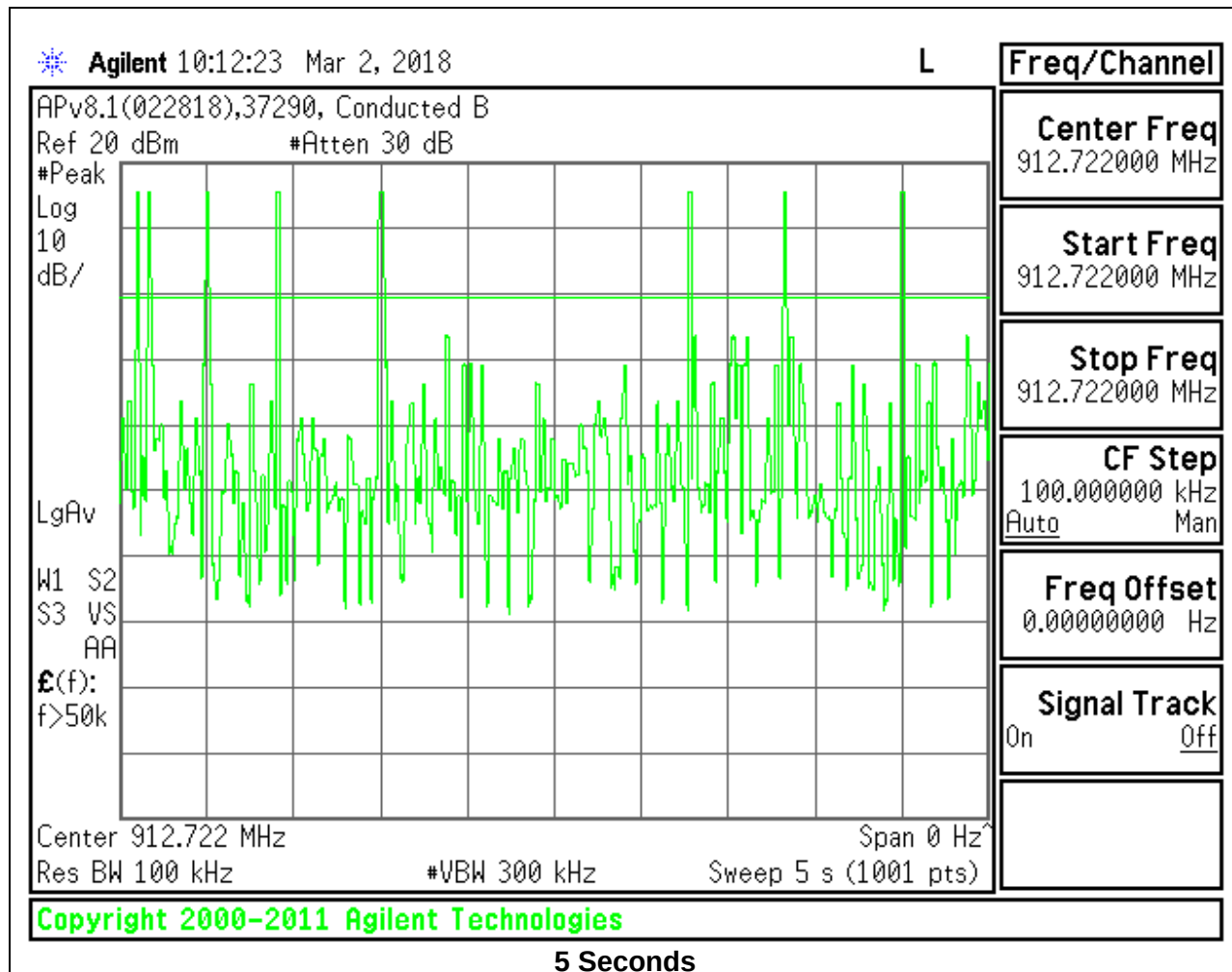
### **TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 5 second scan, to enable resolution of each occurrence.

### **RESULTS**

### 8.5.1. OOK MODULATION

| DH Packet | Pulse Width (msec) | Number of Pulses in 5 seconds | Average Time of Occupancy in 10 seconds (sec) | Limit (sec) | Margin (sec) |
|-----------|--------------------|-------------------------------|-----------------------------------------------|-------------|--------------|
| Normal    | 7.75               | 8                             | 0.1240                                        | 0.4         | -0.2760      |



## 8.6. OUTPUT POWER

### LIMITS

§15.247 (b) (2)

RSS-247 (5.4) (a)

(2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels as permitted under paragraph (a)(1)(i) of this section.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1 MHz, and the VBW is set to 3 MHz. The detector is peak and max hold.

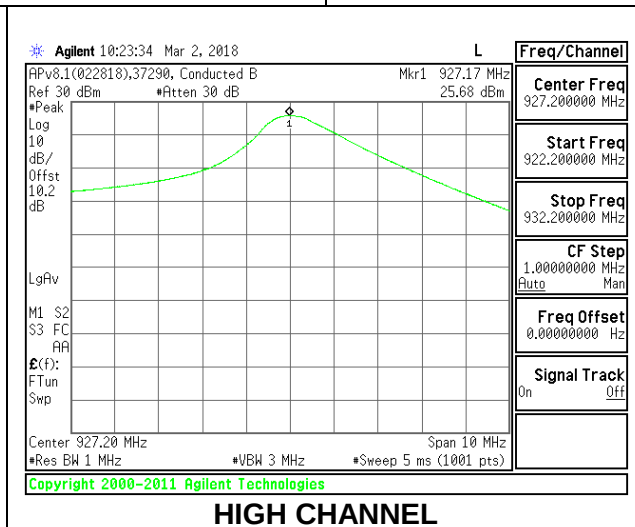
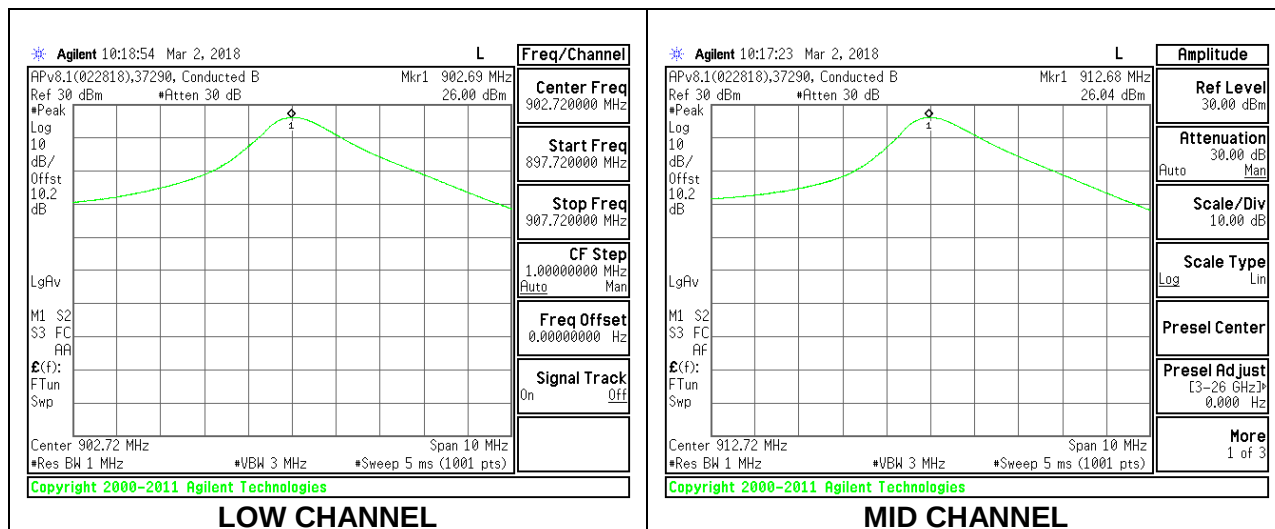
The cable assembly insertion loss of 10.2 dB (including 10 dB pad and 0.2 dB cable) was entered as an offset in the spectrum analyzer to allow for a peak reading of power.

### RESULTS

#### OOK MODULATION

|            |          |
|------------|----------|
| Tested By: | 37290 RZ |
| Date:      | 3/2/2018 |

| Channel | Frequency<br>(MHz) | Output Power<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|---------|--------------------|-----------------------|----------------|----------------|
| Low     | 902.72             | 26                    | 30             | -4             |
| Middle  | 912.72             | 26.04                 | 30             | -3.96          |
| High    | 927.20             | 25.68                 | 30             | -4.32          |



## **8.7. CONDUCTED SPURIOUS EMISSIONS**

### **LIMITS**

FCC §15.247 (d)

IC RSS-247 5.5

Limit = -20 dBc

### **TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

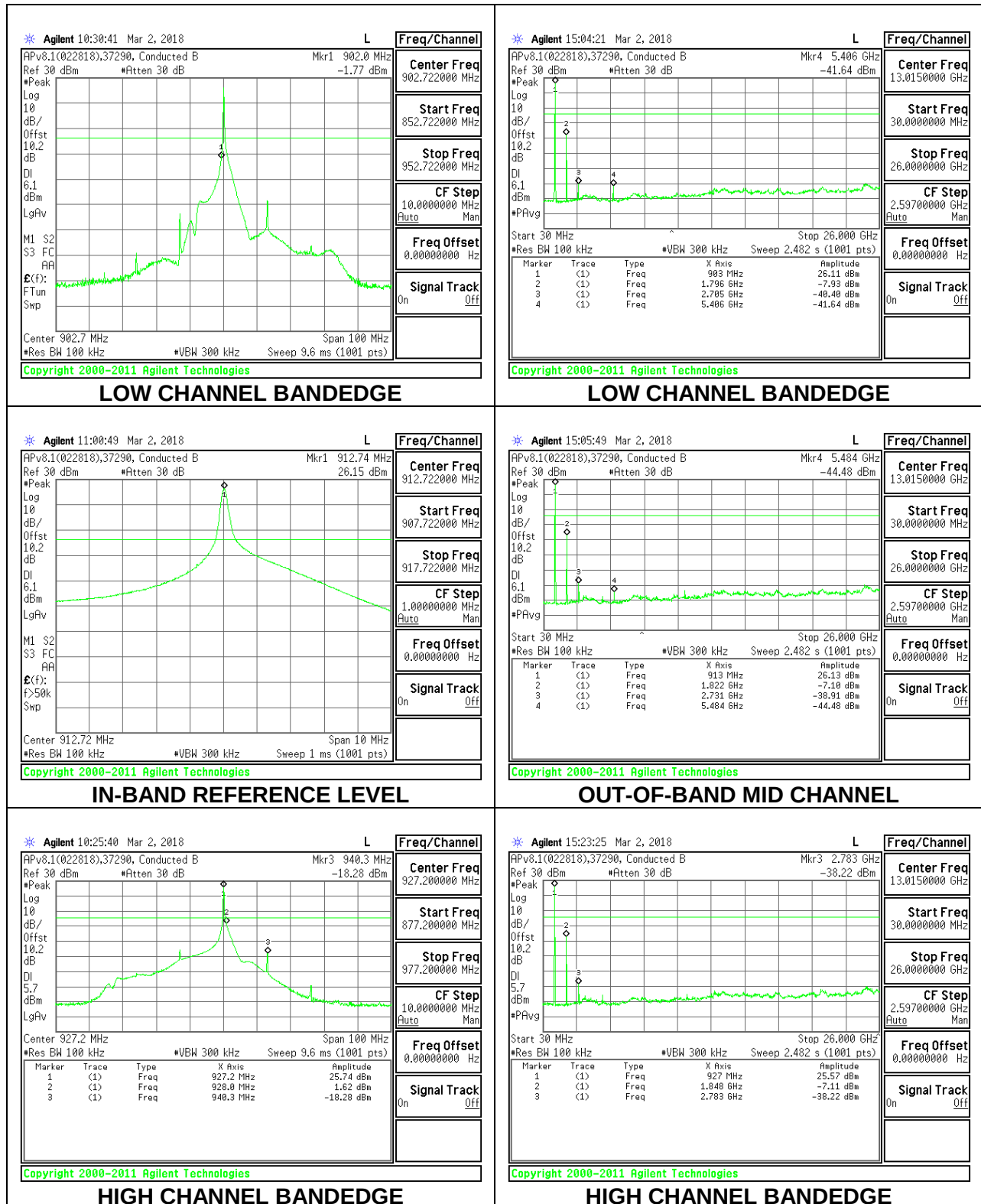
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 902MHz and 928MHz are investigated with the transmitter set to the normal hopping mode.

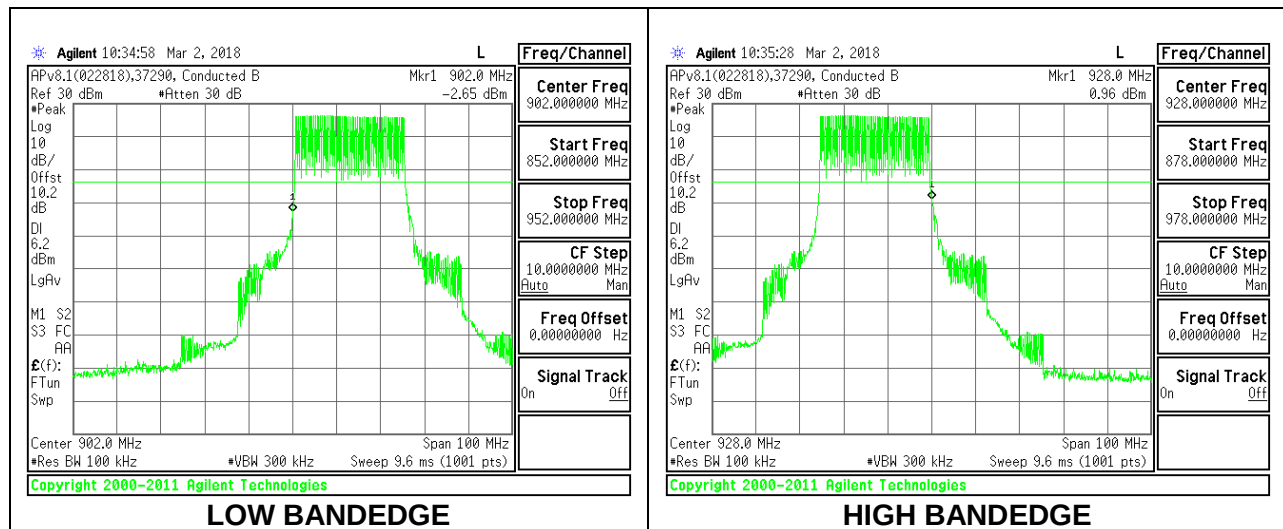
### **RESULTS**



# **8.7.1. OOK MODULATION** **SPURIOUS EMISSIONS, NON-HOPPING**



### SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



## 9. RADIATED TEST RESULTS

### LIMITS

FCC §15.205 and §15.209

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) @ 300 m                | -                                    |
| 0.490-1.705           | 24000/F(kHz) @ 30 m                | -                                    |
| 1.705 - 30            | 30 @ 30m                           | -                                    |
| 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 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 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 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.

**KDB 414788 OATS and Chamber Correlation Justification**

Base 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.

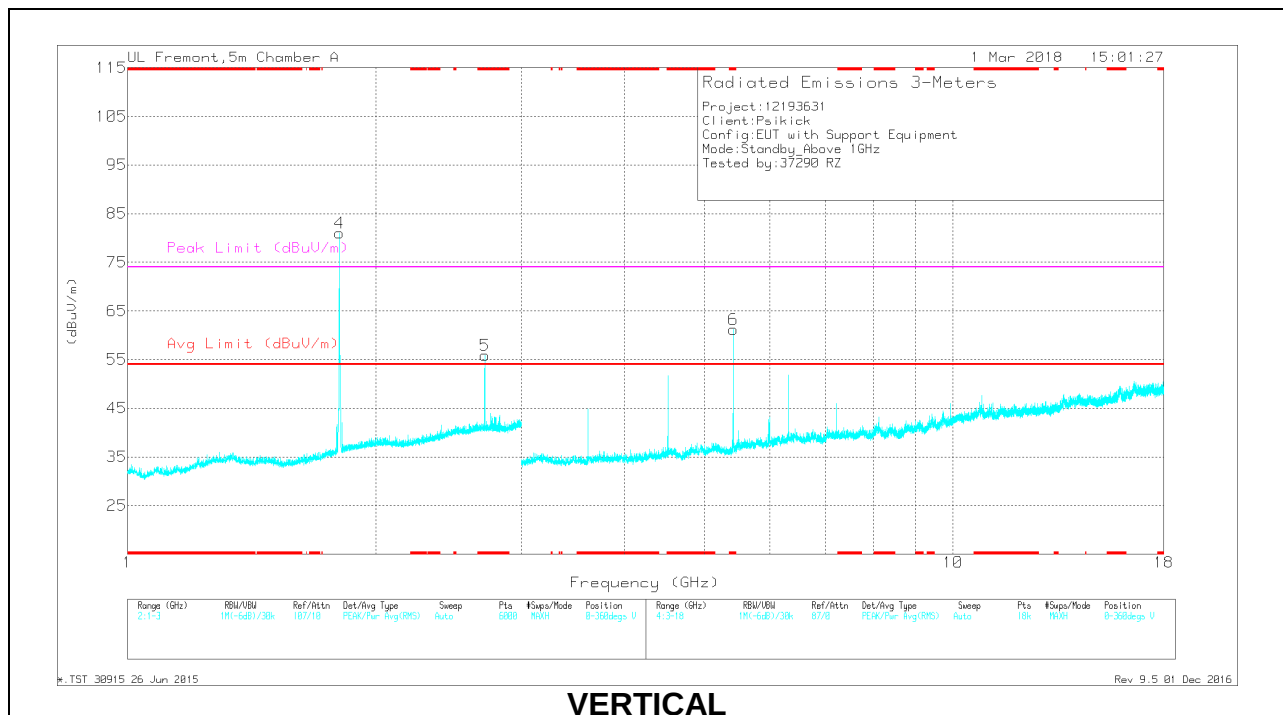
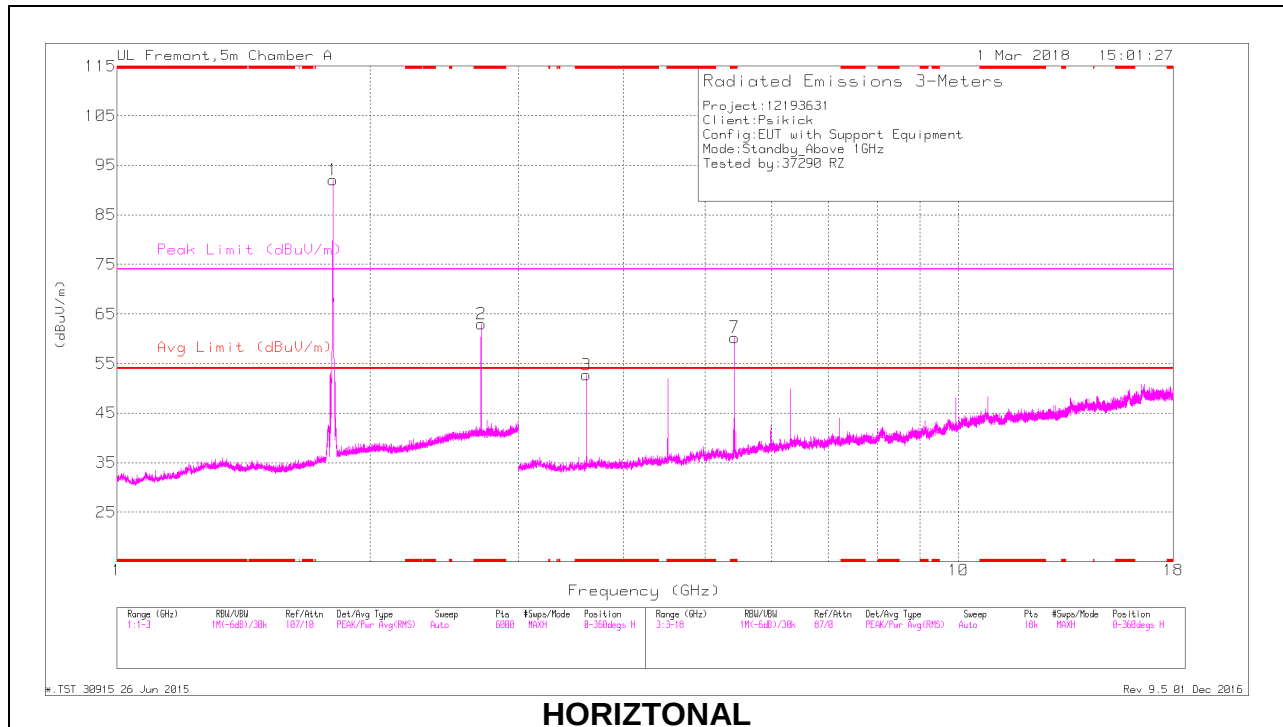
OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

## 9.1. TRANSMITTER ABOVE 1 GHz

### 9.1.1. OOK MODULATION

#### HARMONICS AND SPURIOUS EMISSIONS

##### LOW CHANNEL RESULTS



## RADIATED EMISSIONS

### Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl/Filtr/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      | * 2.708         | 53.26                | Pk  | 32.5           | -22.8                  | 62.96                      | -                  | -           | 74                  | -11.04         | 0-360          | 101         | H        |
| 5      | * 2.708         | 46.22                | Pk  | 32.5           | -22.8                  | 55.92                      | -                  | -           | 74                  | -18.08         | 0-360          | 200         | V        |
| 3      | * 3.611         | 49.02                | Pk  | 33             | -29.3                  | 52.72                      | -                  | -           | 74                  | -21.28         | 0-360          | 101         | H        |
| 7      | * 5.416         | 52.36                | Pk  | 34.7           | -26.8                  | 60.26                      | -                  | -           | 74                  | -13.74         | 0-360          | 101         | H        |
| 6      | * 5.416         | 53.26                | Pk  | 34.7           | -26.8                  | 61.16                      | -                  | -           | 74                  | -12.84         | 0-360          | 101         | V        |
| 1      | 1.805           | 85.19                | Pk  | 30.3           | -23.4                  | 92.09                      | -                  | -           | -                   | -              | 0-360          | 101         | H        |
| 4      | 1.805           | 74.08                | Pk  | 30.3           | -23.4                  | 80.98                      | -                  | -           | -                   | -              | 0-360          | 101         | V        |

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

### Radiated Emissions

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl/Filtr/Pad (dB) | 1GHz HPF Loss (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|-----------------|----------------------|-----|----------------|------------------------|--------------------|----------------------------|--------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| * 2.708         | 53.97                | PK2 | 32.5           | -22.8                  | 0.40               | 64.07                      | -                  | -           | 74                  | -10.33         | 18             | 102         | H        |
|                 |                      | Avg |                |                        |                    | 47.90                      | 54                 | -6.1        |                     |                |                |             |          |
| * 2.708         | 49.26                | PK2 | 32.5           | -22.8                  | 0.40               | 59.36                      | -                  | -           | 74                  | -15.04         | 333            | 242         | V        |
|                 |                      | Avg |                |                        |                    | 43.19                      | 54                 | -10.81      |                     |                |                |             |          |
| * 3.611         | 47.56                | PK2 | 33             | -29.3                  | 0.35               | 51.61                      | -                  | -           | 74                  | -22.74         | 359            | 127         | H        |
|                 |                      | Avg |                |                        |                    | 35.44                      | 54                 | -18.56      |                     |                |                |             |          |
| * 5.416         | 53.38                | PK2 | 34.7           | -26.8                  | 0.32               | 61.6                       | -                  | -           | 74                  | -12.72         | 6              | 104         | H        |
|                 |                      | Avg |                |                        |                    | 45.43                      | 54                 | -8.57       |                     |                |                |             |          |
| * 5.416         | 54.06                | PK2 | 34.7           | -26.8                  | 0.32               | 62.28                      | -                  | -           | 74                  | -12.04         | 39             | 107         | V        |
|                 |                      | Avg |                |                        |                    | 46.11                      | 54                 | -7.89       |                     |                |                |             |          |

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

\* Average Reading = Peak Reading (dBuV/m) + 20log (Duty Cycle), Where Duty Cycle is -16.17dB

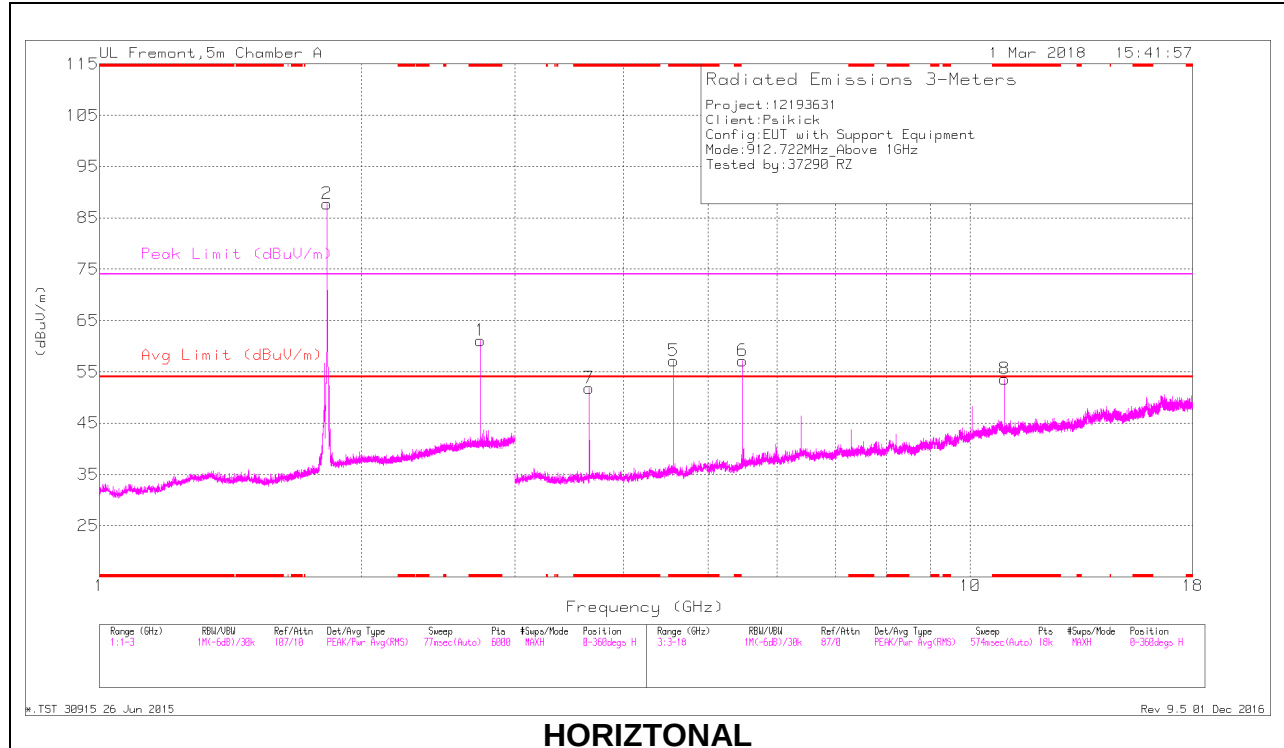
Pulse number in 100ms \* ((# of long pulses \* long pulse width) + (# of medium pulses 1 \* medium pulse width) + (# of medium pulses 2 \* medium pulse width) + (# of short pulses \* short pulse width)) / 100 or T

Refer to section 8.1 for duty cycle factor calculation (-16.17dB)

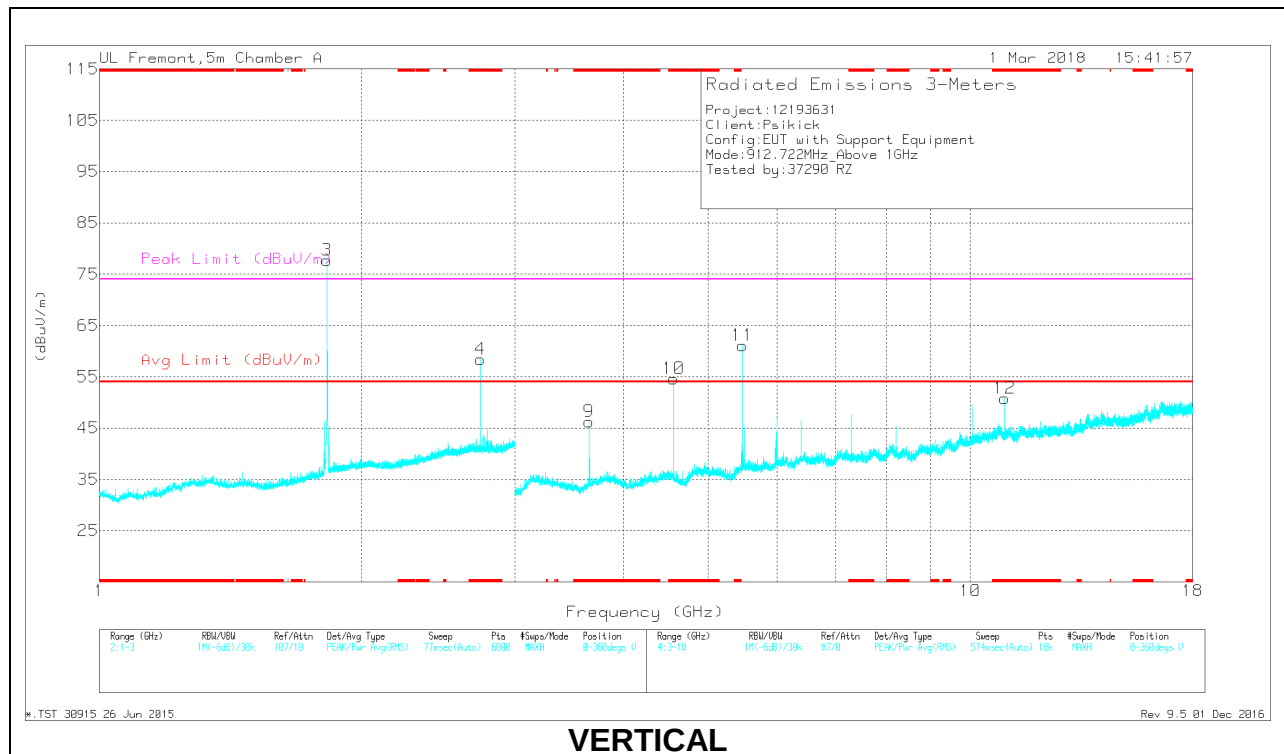
Note: Radiated peak result is based on 100% duty cycle sample; average reading = peak reading + DCCC

\*\* Harmonics of fundamental 902.72MHz

## MID CHANNEL RESULTS



## HORIZONTAL



## VERTICAL

## RADIATED EMISSIONS

### Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl/Filtr/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**    | * 2.738         | 51.34                | Pk  | 32.4           | -22.7                  | 61.04                      | -                  | -           | 74                  | -12.96         | 0-360          | 102         | H        |
| 4**    | * 2.738         | 48.68                | Pk  | 32.4           | -22.7                  | 58.38                      | -                  | -           | 74                  | -15.62         | 0-360          | 101         | V        |
| 5      | * 4.563         | 50.94                | Pk  | 34             | -27.8                  | 57.14                      | -                  | -           | 74                  | -16.86         | 0-360          | 101         | H        |
| 7      | * 3.651         | 47.77                | Pk  | 32.9           | -28.8                  | 51.87                      | -                  | -           | 74                  | -22.13         | 0-360          | 101         | H        |
| 8      | * 10.954        | 34.96                | Pk  | 37.9           | -19.3                  | 53.56                      | -                  | -           | 74                  | -20.44         | 0-360          | 101         | H        |
| 9**    | * 3.651         | 42.19                | Pk  | 32.9           | -28.8                  | 46.29                      | -                  | -           | 74                  | -27.71         | 0-360          | 200         | V        |
| 10**   | * 4.563         | 48.42                | Pk  | 34             | -27.8                  | 54.62                      | -                  | -           | 74                  | -19.38         | 0-360          | 101         | V        |
| 12**   | * 10.953        | 32.24                | Pk  | 37.9           | -19.3                  | 50.84                      | -                  | -           | 74                  | -23.16         | 0-360          | 200         | V        |
| 2**    | 1.825           | 80.7                 | Pk  | 30.6           | -23.5                  | 87.8                       | -                  | -           | -                   | -              | 0-360          | 102         | H        |
| 3**    | 1.825           | 70.67                | Pk  | 30.6           | -23.5                  | 77.77                      | -                  | -           | -                   | -              | 0-360          | 200         | V        |
| 6      | 5.476           | 48.3                 | Pk  | 34.8           | -26                    | 57.1                       | -                  | -           | -                   | -              | 0-360          | 101         | H        |
| 11     | 5.476           | 52.24                | Pk  | 34.8           | -26                    | 61.04                      | -                  | -           | -                   | -              | 0-360          | 101         | V        |

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

Pk - Peak detector

### Radiated Emissions

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl/Filtr/Pad (dB) | 1GHz HPF Loss (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|-----------------|----------------------|-----|----------------|------------------------|--------------------|----------------------------|--------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| * 2.738         | 52.47                | PK2 | 32.4           | -22.7                  | 0.44               | 62.61                      | -                  | -           | 74                  | -11.83         | 99             | 134         | H        |
|                 |                      | Avg |                |                        |                    | 46.00                      | 54                 | -8          | -                   | -              |                |             |          |
| * 2.738         | 50.03                | PK2 | 32.4           | -22.7                  | 0.44               | 60.17                      | -                  | -           | 74                  | -14.27         | 270            | 101         | V        |
|                 |                      | Avg |                |                        |                    | 43.56                      | 54                 | -10.44      | -                   | -              |                |             |          |
| * 4.564         | 52.57                | PK2 | 34             | -27.8                  | 0.26               | 59.03                      | -                  | -           | 74                  | -15.23         | 181            | 101         | H        |
|                 |                      | Avg |                |                        |                    | 42.60                      | 54                 | -11.4       | -                   | -              |                |             |          |
| * 3.651         | 48.84                | PK2 | 32.9           | -28.8                  | 0.34               | 53.28                      | -                  | -           | 74                  | -21.06         | 0              | 108         | H        |
|                 |                      | Avg |                |                        |                    | 36.77                      | 54                 | -17.23      | -                   | -              |                |             |          |
| * 10.953        | 39.05                | PK2 | 37.9           | -19.3                  | 0.30               | 57.95                      | -                  | -           | 74                  | -16.35         | 164            | 120         | H        |
|                 |                      | Avg |                |                        |                    | 41.48                      | 54                 | -12.52      | -                   | -              |                |             |          |
| * 3.651         | 44.91                | PK2 | 32.9           | -28.8                  | 0.34               | 49.35                      | -                  | -           | 74                  | -24.99         | 326            | 224         | V        |
|                 |                      | Avg |                |                        |                    | 32.84                      | 54                 | -21.16      | -                   | -              |                |             |          |
| * 4.564         | 50.52                | PK2 | 34             | -27.8                  | 0.26               | 56.98                      | -                  | -           | 74                  | -17.28         | 168            | 111         | V        |
|                 |                      | Avg |                |                        |                    | 40.55                      | 54                 | -13.45      | -                   | -              |                |             |          |
| * 10.953        | 38.99                | PK2 | 37.9           | -19.3                  | 0.30               | 57.89                      | -                  | -           | 74                  | -16.41         | 124            | 238         | V        |
|                 |                      | Avg |                |                        |                    | 41.42                      | 54                 | -12.58      | -                   | -              |                |             |          |

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

Pk - Peak detector

Avg – Average detector

\* Average Reading = Peak Reading (dBuV/m) + 20log (Duty Cycle), Where Duty Cycle is -16.17dB

Pulse number in 100ms \* ((# of long pulses \* long pulse width) + (# of medium pulses 1 \* medium pulse width) + (# of medium pulses 2 \* medium pulse width) + (# of short pulses \* short pulse width)) / 100 or T

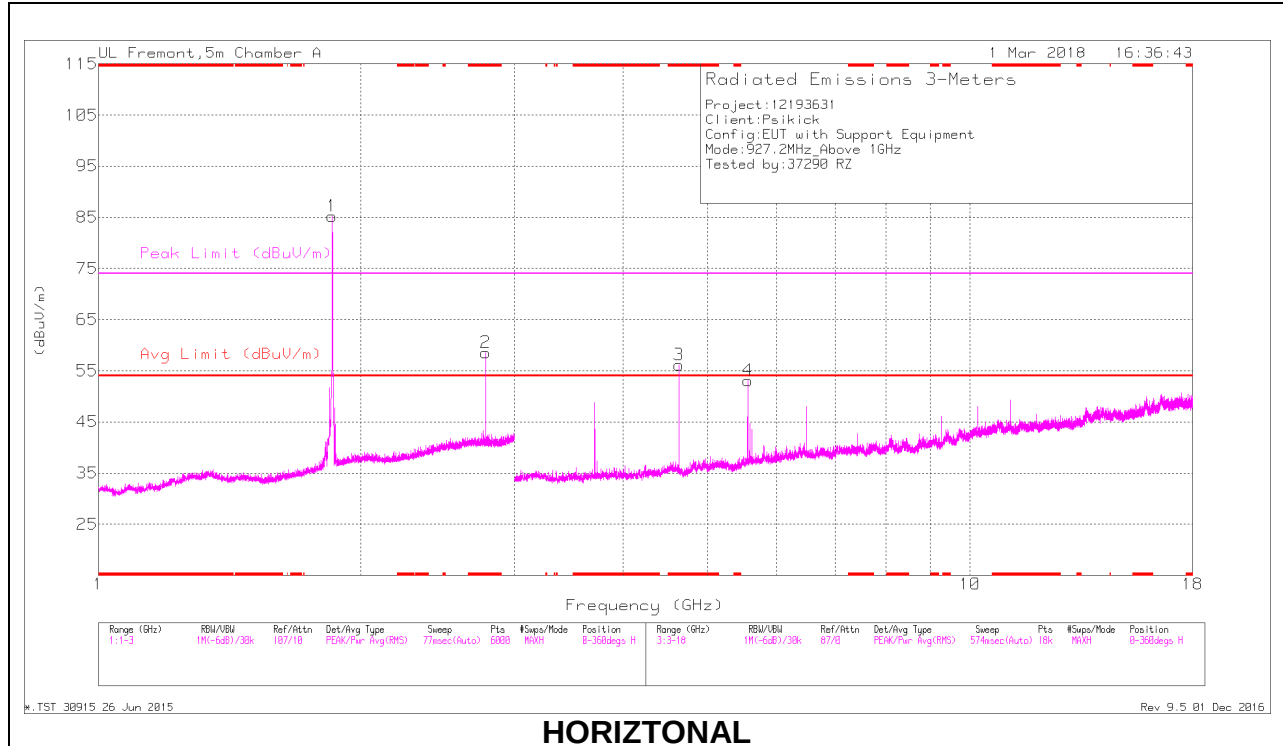
Refer to section 8.1 for duty cycle factor calculation (-16.17dB)

Note: Radiated peak result is based on 100% duty cycle sample; average reading = peak reading + DCCF

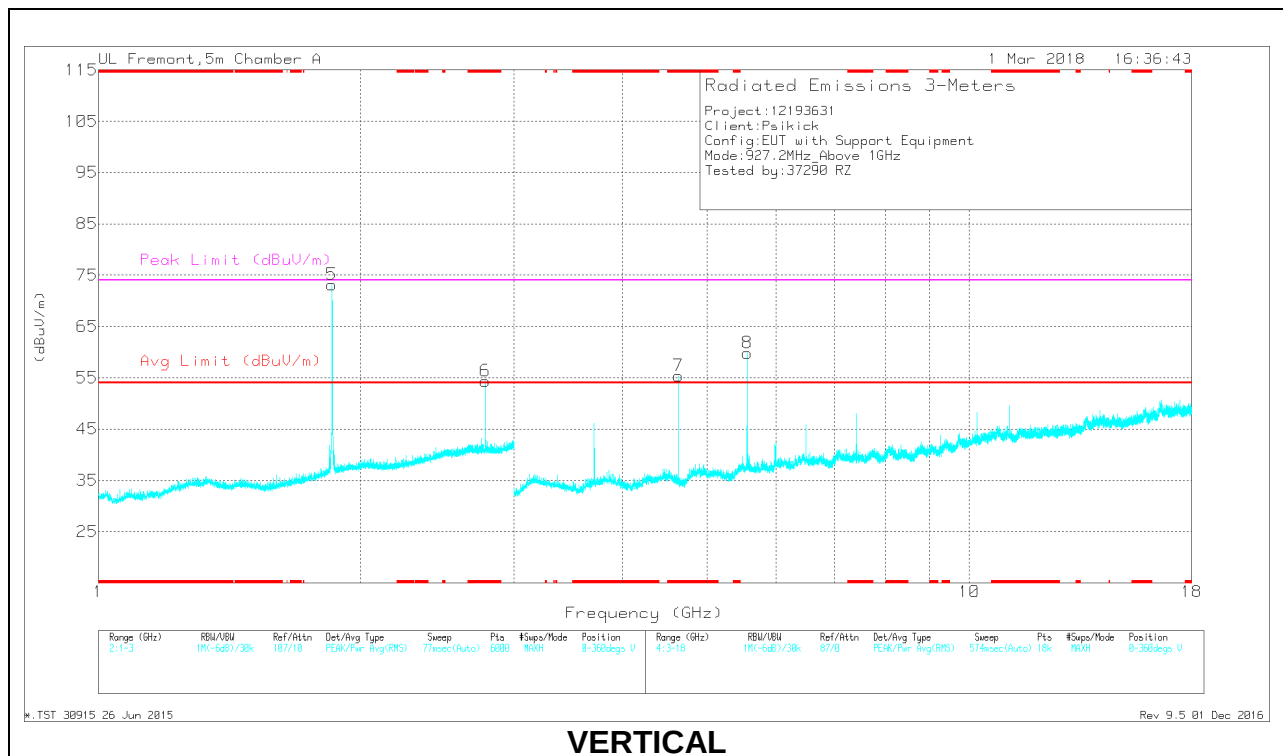
\*\* Harmonics of fundamental 912.72MHz



## HIGH CHANNEL RESULTS



## HORIZONTAL



## VERTICAL

## RADIATED EMISSIONS

### Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl/Filtr/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**    | * 2.782         | 48.72                | Pk  | 32.3           | -22.5                  | 58.52                      | -                  | -           | 74                  | -15.48         | 0-360          | 199         | H        |
| 6**    | * 2.782         | 44.55                | Pk  | 32.3           | -22.5                  | 54.35                      | -                  | -           | 74                  | -19.65         | 0-360          | 101         | V        |
| 3      | * 4.636         | 50.21                | Pk  | 34             | -28.1                  | 56.11                      | -                  | -           | 74                  | -17.89         | 0-360          | 199         | H        |
| 7**    | * 4.636         | 49.42                | Pk  | 34             | -28.1                  | 55.32                      | -                  | -           | 74                  | -18.68         | 0-360          | 200         | V        |
| 1**    | 1.854           | 77.7                 | Pk  | 30.9           | -23.4                  | 85.2                       | -                  | -           | -                   | -              | 0-360          | 101         | H        |
| 5**    | 1.854           | 65.64                | Pk  | 30.9           | -23.4                  | 73.14                      | -                  | -           | -                   | -              | 0-360          | 101         | V        |
| 4      | 5.563           | 44.59                | Pk  | 35             | -26.5                  | 53.09                      | -                  | -           | -                   | -              | 0-360          | 199         | H        |
| 8**    | 5.563           | 51.33                | Pk  | 35             | -26.5                  | 59.83                      | -                  | -           | -                   | -              | 0-360          | 200         | V        |

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

### Radiated Emissions

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl/Filtr/Pad (dB) | 1GHz HPF Loss (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|-----------------|----------------------|-----|----------------|------------------------|--------------------|----------------------------|--------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| * 2.782         | 50.42                | PK2 | 32.3           | -22.5                  | 0.36               | 60.58                      | -                  | 60.58       | 74                  | -13.78         | 106            | 198         | H        |
|                 |                      | Avg |                |                        |                    | 44.05                      | 54                 | 44.05       |                     |                |                |             |          |
| * 2.782         | 47.34                | PK2 | 32.3           | -22.5                  | 0.36               | 57.50                      | -                  | 57.50       | 74                  | -16.86         | 272            | 107         | V        |
|                 |                      | Avg |                |                        |                    | 40.97                      | 54                 | 40.97       |                     |                |                |             |          |
| * 4.636         | 51.85                | PK2 | 34             | -28.1                  | 0.32               | 58.07                      | -                  | 58.07       | 74                  | -16.25         | 178            | 254         | H        |
|                 |                      | Avg |                |                        |                    | 41.58                      | 54                 | 41.58       |                     |                |                |             |          |
| * 4.636         | 50.84                | PK2 | 34             | -28.1                  | 0.32               | 57.06                      | -                  | 57.06       | 74                  | -17.26         | 262            | 202         | V        |
|                 |                      | Avg |                |                        |                    | 40.57                      | 54                 | 40.57       |                     |                |                |             |          |

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

\* Average Reading = Peak Reading (dBuV/m) + 20log (Duty Cycle), Where Duty Cycle is -16.17dB

Pulse number in 100ms \* ((# of long pulses \* long pulse width) + (# of medium pulses 1 \* medium pulse width) + (# of medium pulses 2 \* medium pulse width) + (# of short pulses \* short pulse width)) / 100 or T

Refer to section 8.1 for duty cycle factor calculation (-16.17dB)

Note: Radiated peak result is based on 100% duty cycle sample; average reading = peak reading + DCCC

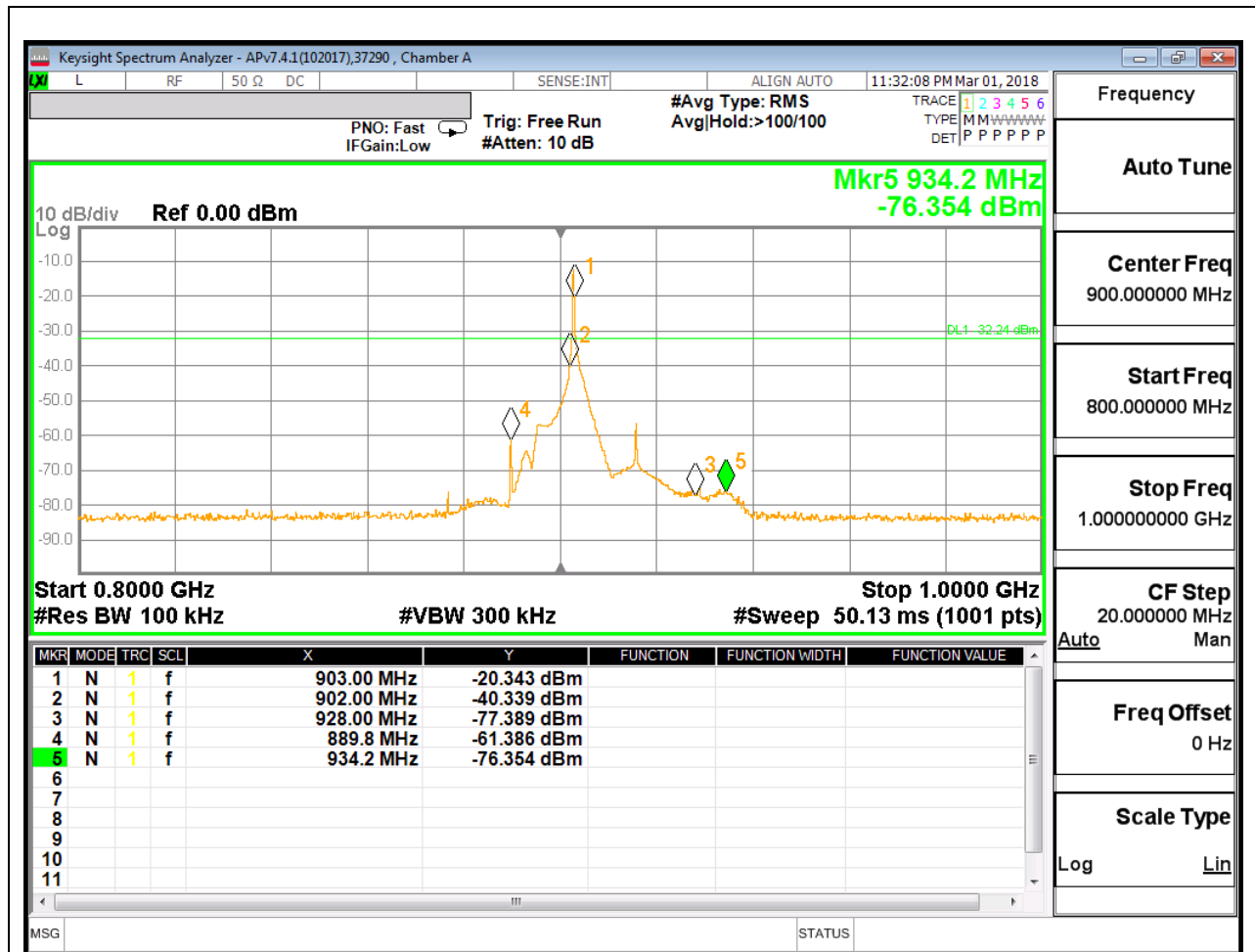
\*\* Harmonics of fundamental 927.2MHz

## 9.2. TRANSMITTER BELOW 1 GHz

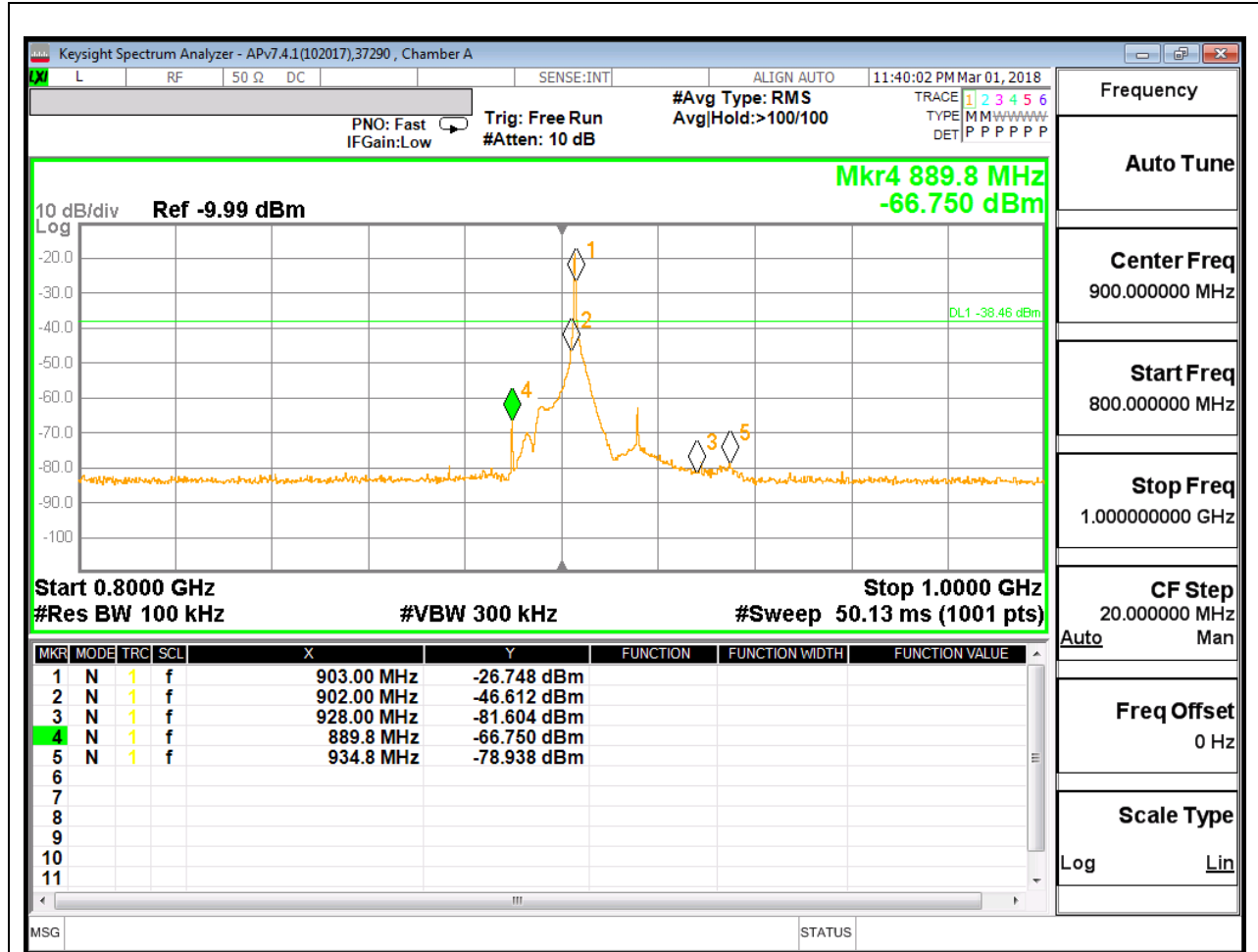
### 9.2.1. OOK MODULATION

-20 dBc BANDEDGE WITHOUT NOTCH FILTER AND PRE-AMPLIFIER  
(LOW CHANNEL)

#### HORIZONTAL RESULT

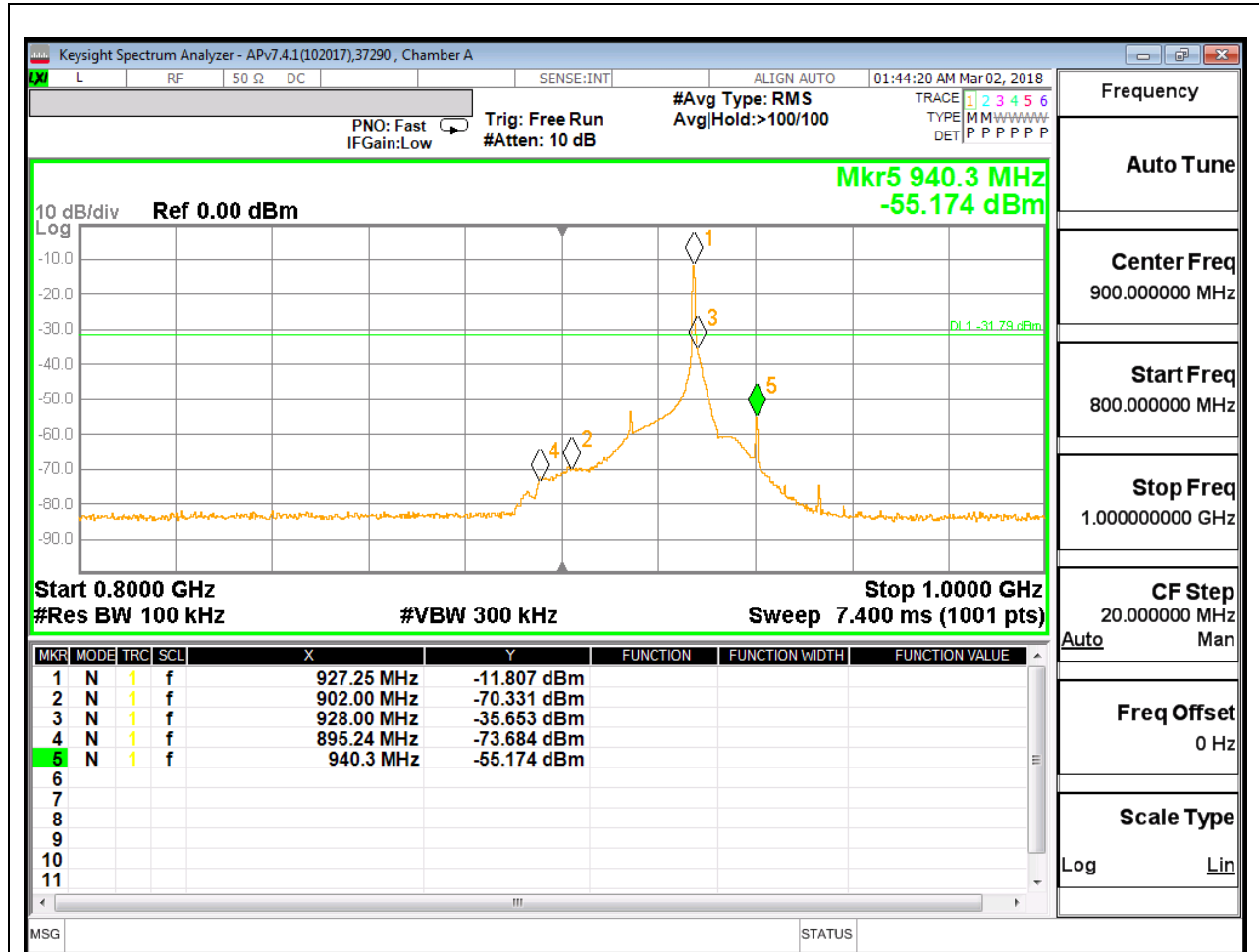


## VERTICAL RESULT

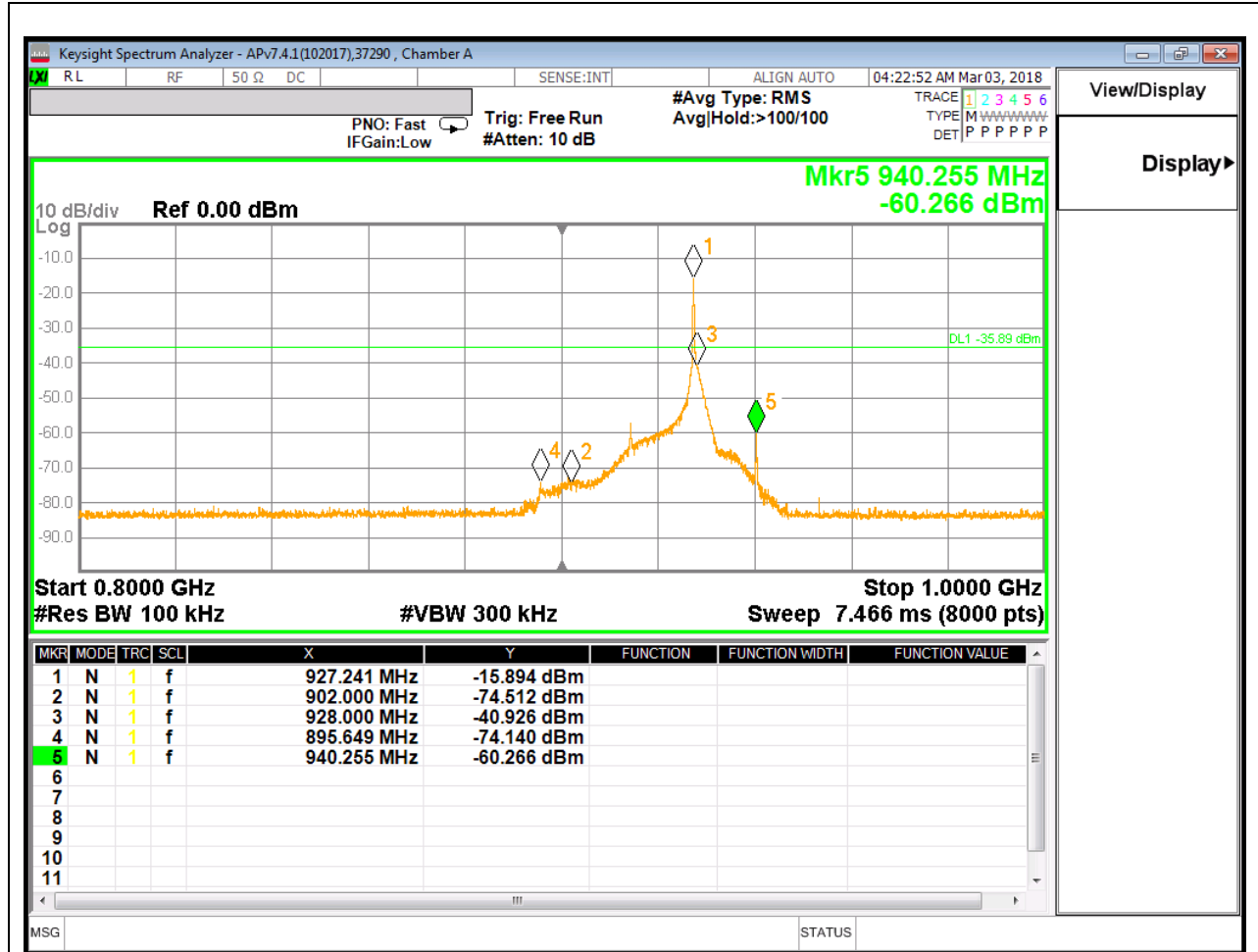


# **-20 dBc BANDEDGE WITHOUT NOTCH FILTER AND PRE-AMPLIFIER (HIGH CHANNEL)**

## **HORIZONTAL RESULT**

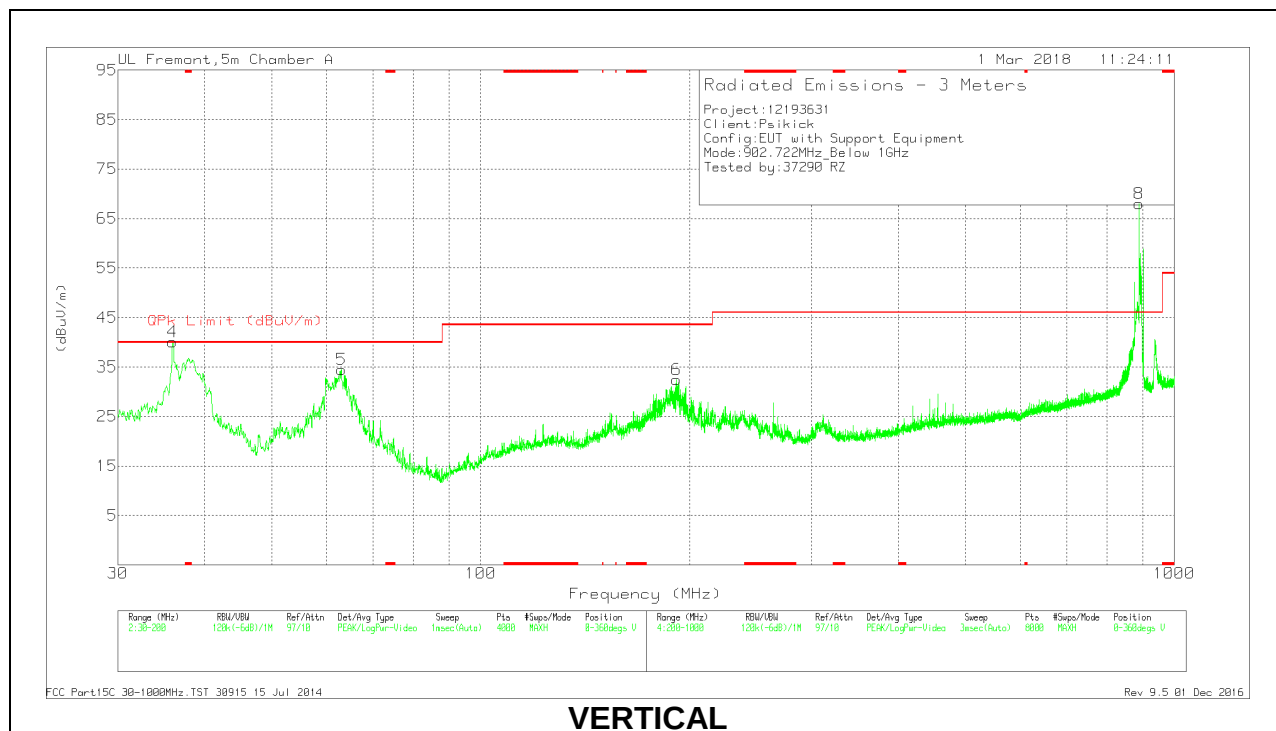
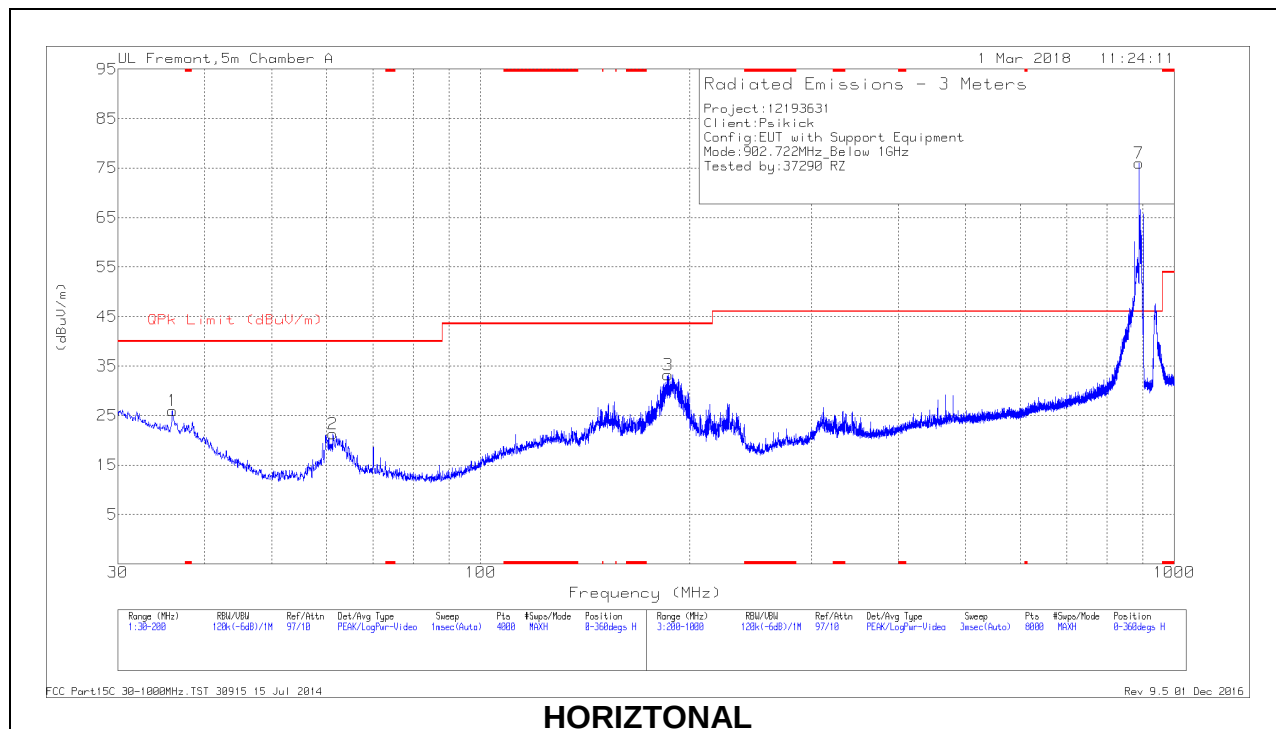


## VERTICAL RESULT



## HARMONICS AND SPURIOUS EMISSIONS WITH A NOTCH FILTER

### LOW CHANNEL RESULTS



## RADIATED EMISSIONS

### Trace Markers

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T130 (dB/m) | Amp/Cbl (dB/m) | Notch Filter loss (dB) | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|----------------|----------------|------------------------|----------------------------|--------------------|-------------|----------------|-------------|----------|
| 1      | 35.9515         | 32.26                | Pk  | 20.9           | -27.2          | 0.04                   | 26.00                      | 40                 | -14.00      | 0-360          | 200         | H        |
| 4      | 35.9941         | 46.41                | Pk  | 20.9           | -27.2          | 0.04                   | 40.15                      | 40                 | 0.15        | 0-360          | 100         | V        |
|        | 36.0321         | 39.13                | Qp  | 20.9           | -27.2          | 0.04                   | 32.87                      | 40                 | -7.13       | 317            | 119         | V        |
| 2      | 61.2456         | 36.44                | Pk  | 11.7           | -26.9          | 0.15                   | 21.39                      | 40                 | -18.61      | 0-360          | 400         | H        |
| 5      | 62.9885         | 49.43                | Pk  | 11.9           | -26.8          | 0.16                   | 34.69                      | 40                 | -5.31       | 0-360          | 100         | V        |
|        | 61.4735         | 43.73                | Qp  | 11.7           | -26.9          | 0.15                   | 28.68                      | 40                 | -11.32      | 221            | 105         | V        |
| 3      | 186.2704        | 43.47                | Pk  | 15.2           | -25.5          | 0.21                   | 33.38                      | 43.52              | -10.14      | 0-360          | 200         | H        |
| 6      | 191.6693        | 42.37                | Pk  | 15.5           | -25.4          | 0.22                   | 32.69                      | 43.52              | -10.83      | 0-360          | 100         | V        |
| *7     | 889.6896        | 72.72                | Pk  | 26.3           | -23            | 1.96                   | 77.98                      | -                  | -           | 0-360          | 101         | H        |
| *8     | 889.6896        | 64.64                | Pk  | 26.3           | -23            | 1.96                   | 69.90                      | -                  | -           | 0-360          | 101         | V        |

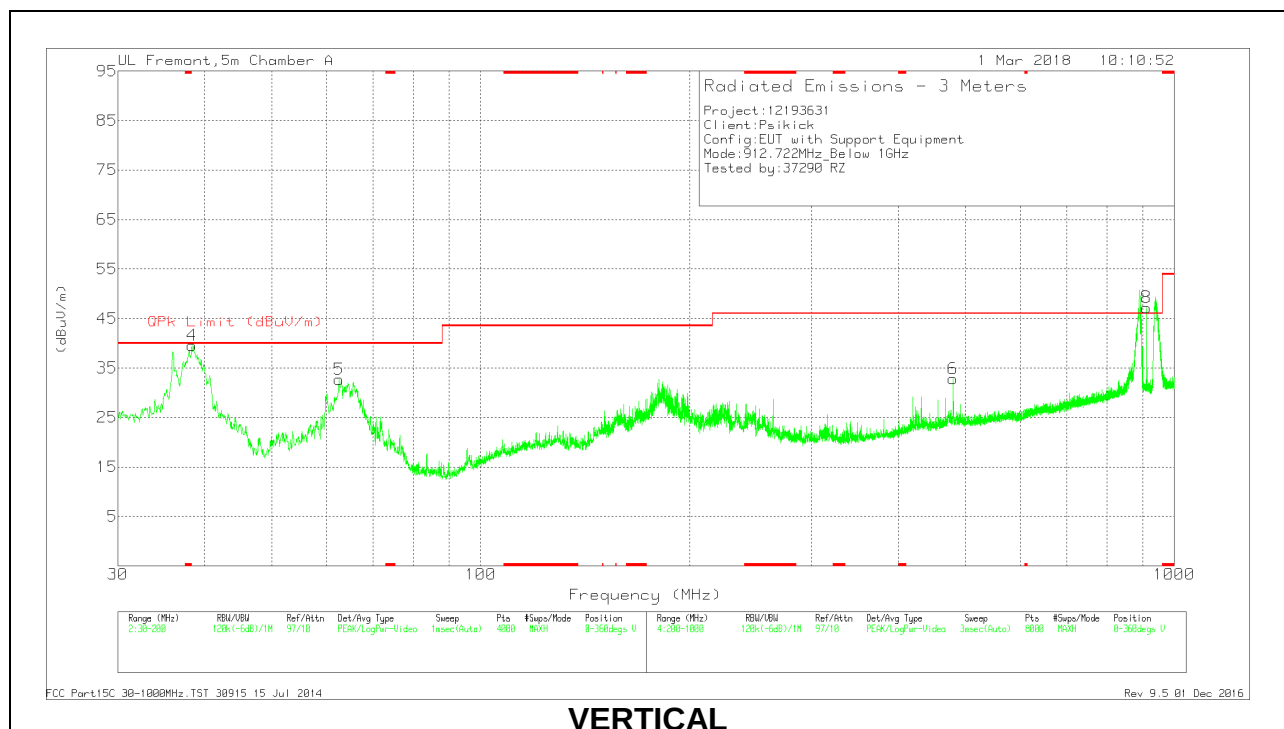
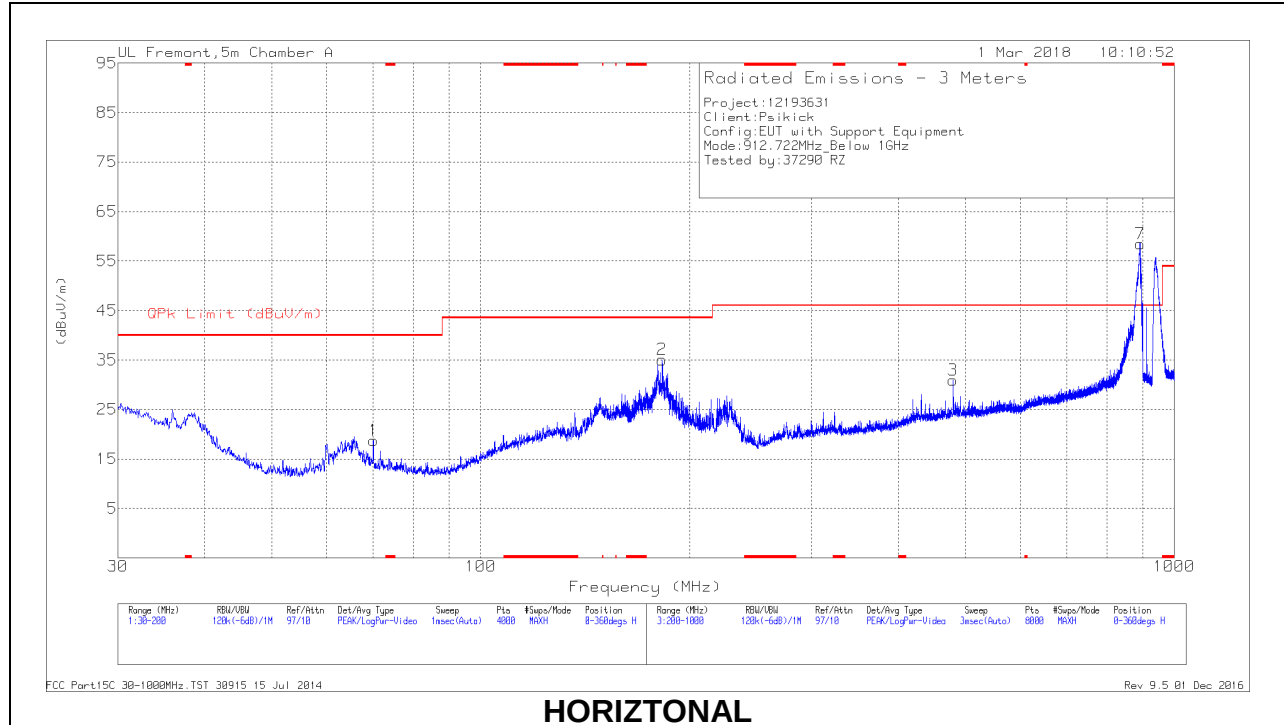
Pk - Peak detector

Qp - Quasi-Peak detector

\* Harmonics of fundamental 902.72MHz



## MID CHANNEL RESULTS



## RADIATED EMISSIONS

### Trace Markers

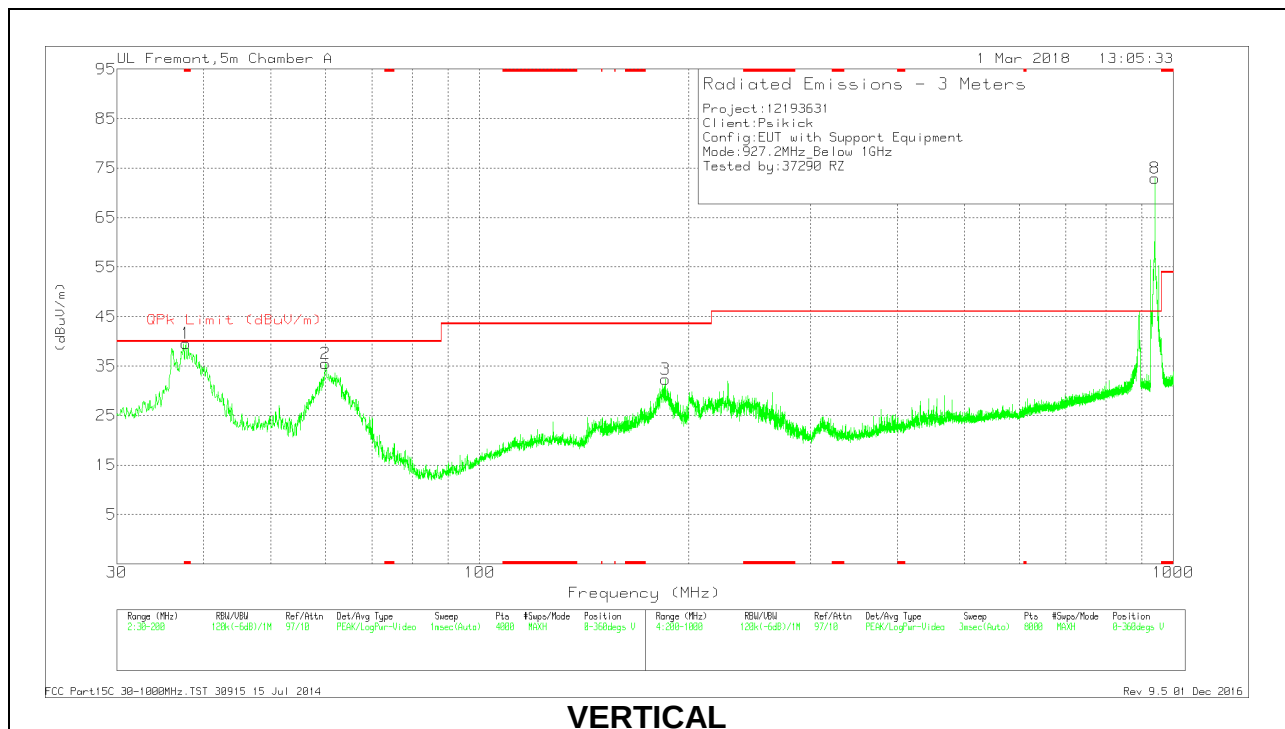
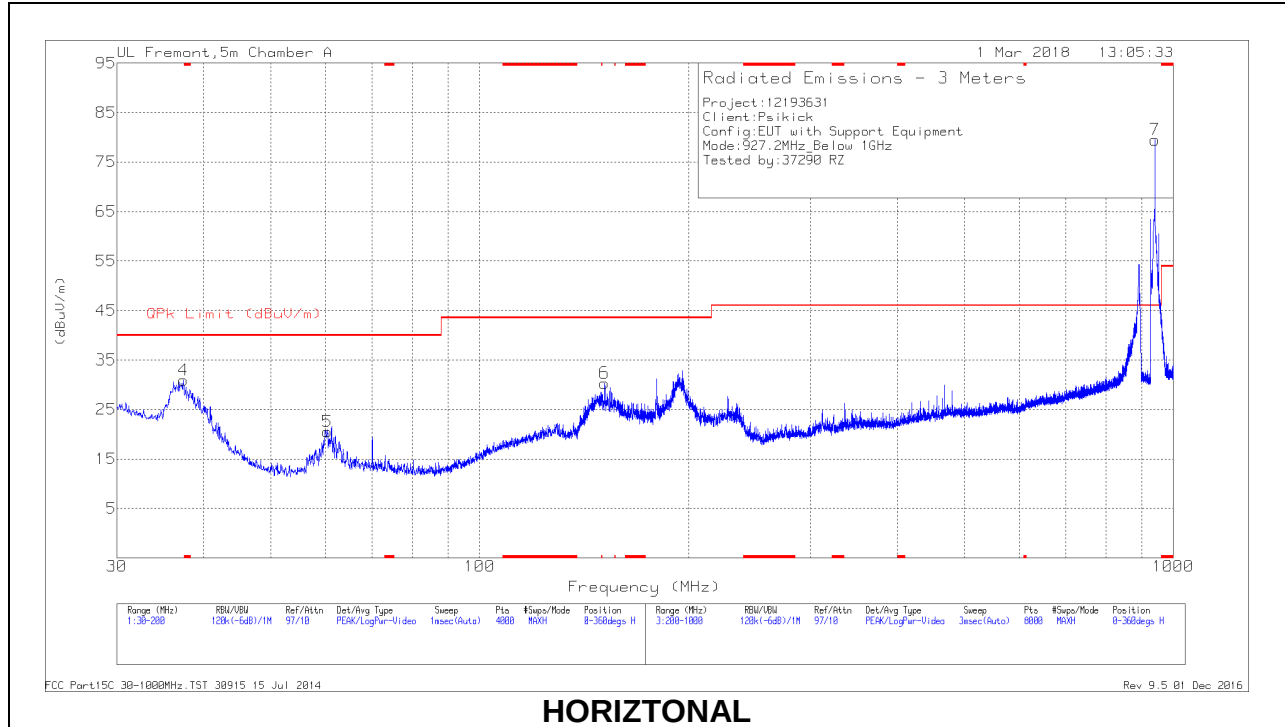
| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T130 (dB/m) | Amp/Cbl (dB/m) | Notch Filter loss (dB) | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|----------------|----------------|------------------------|----------------------------|--------------------|-------------|----------------|-------------|----------|
| 4      | 38.3322         | 47.54                | Pk  | 19.2           | -27.2          | 0.05                   | 39.59                      | 40                 | -0.41       | 0-360          | 100         | V        |
|        | 38.3742         | 42.97                | Qp  | 19.1           | -27.2          | 0.05                   | 34.92                      | 40                 | -5.08       | 334            | 102         | V        |
| 5      | 62.5209         | 47.63                | Pk  | 11.9           | -26.8          | 0.16                   | 32.89                      | 40                 | -7.11       | 0-360          | 100         | V        |
| 1      | 70.0454         | 33.35                | Pk  | 12.1           | -26.7          | 0.16                   | 18.91                      | 40                 | -21.09      | 0-360          | 101         | H        |
| 2      | 182.7845        | 45.36                | Pk  | 15.2           | -25.5          | 0.19                   | 35.25                      | 43.52              | -8.27       | 0-360          | 200         | H        |
| 3      | 479.9364        | 34.64                | Pk  | 21.6           | -25.3          | 0.23                   | 31.17                      | 46.02              | -14.85      | 0-360          | 200         | H        |
| 6      | 480.0364        | 36.54                | Pk  | 21.6           | -25.3          | 0.23                   | 33.07                      | 46.02              | -12.95      | 0-360          | 200         | V        |
| *7     | 892.49          | 55.18                | Pk  | 26.4           | -23.1          | 2.70                   | 61.18                      | -                  | -           | 0-360          | 101         | H        |
| *8     | 912.6926        | 43.64                | Pk  | 26.6           | -23            | 2.64                   | 49.88                      | -                  | -           | 0-360          | 200         | V        |

Pk - Peak detector

Qp - Quasi-Peak detector

\* Harmonics of fundamental 912.72MHz

## HIGH CHANNEL RESULTS



## RADIATED EMISSIONS

### Trace Markers

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T130 (dB/m) | Amp/Cbl (dB/m) | Notch Filter loss (dB) | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|----------------|----------------|------------------------|----------------------------|--------------------|-------------|----------------|-------------|----------|
| 1      | 37.6945         | 47.13                | Pk  | 19.6           | -27.2          | 0.05                   | 39.58                      | 40                 | -0.42       | 0-360          | 100         | V        |
|        | 38.4765         | 39.43                | Qp  | 19.1           | -27.2          | 0.05                   | 31.38                      | 40                 | -8.62       | 152            | 111         | V        |
| 4      | 37.3969         | 38.33                | Pk  | 19.8           | -27.2          | 0.05                   | 30.98                      | 40                 | -9.02       | 0-360          | 300         | H        |
| 2      | 59.9703         | 50.77                | Pk  | 11.6           | -26.9          | 0.15                   | 35.62                      | 40                 | -4.38       | 0-360          | 100         | V        |
|        | 59.7543         | 44.43                | Qp  | 11.6           | -26.9          | 0.15                   | 29.28                      | 40                 | -10.72      | 108            | 110         | V        |
| 5      | 60.3529         | 35.88                | Pk  | 11.6           | -26.9          | 0.15                   | 20.73                      | 40                 | -19.27      | 0-360          | 400         | H        |
| 6      | 151.4964        | 39.76                | Pk  | 16.4           | -25.8          | 0.21                   | 30.57                      | 43.52              | -12.95      | 0-360          | 200         | H        |
| 3      | 185.2502        | 42.72                | Pk  | 15.1           | -25.5          | 0.20                   | 32.52                      | 43.52              | -11.00      | 0-360          | 100         | V        |
| *7     | 940.1962        | 75.69                | Pk  | 26.5           | -22.7          | 1.38                   | 80.87                      | -                  | -           | 0-360          | 101         | H        |
| *8     | 940.1962        | 69.15                | Pk  | 26.5           | -22.7          | 1.38                   | 74.33                      | -                  | -           | 0-360          | 101         | V        |

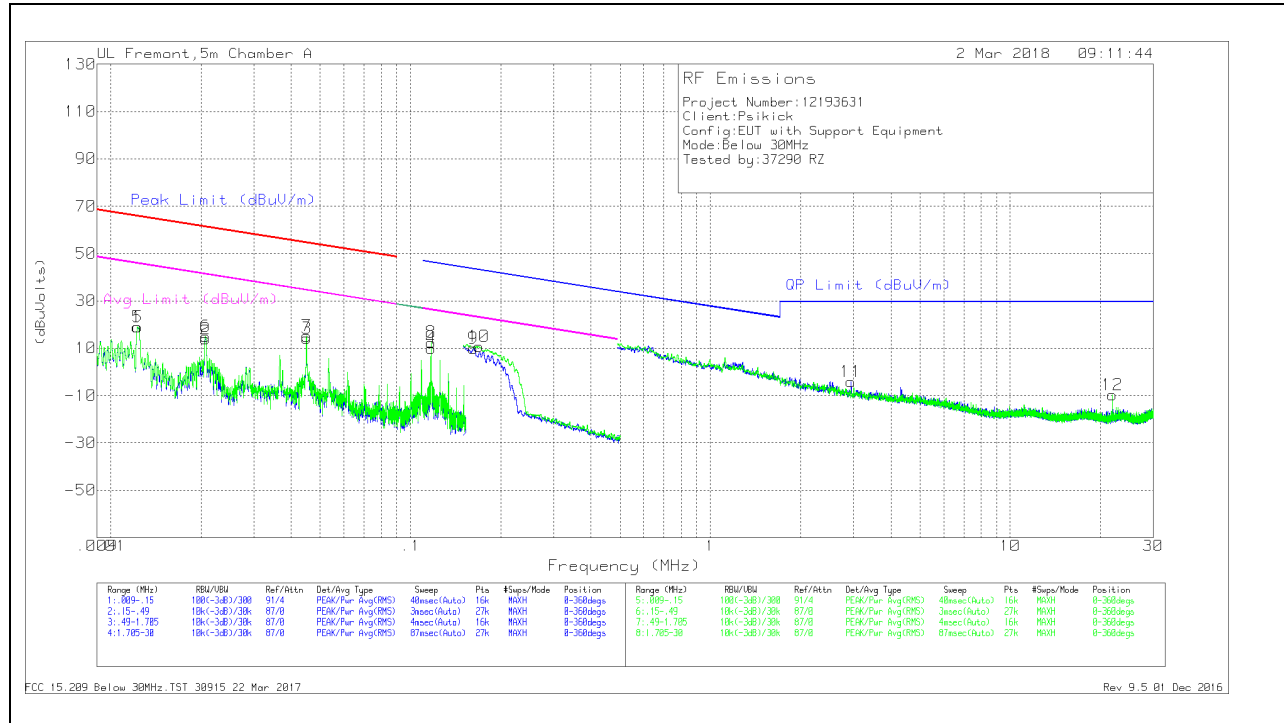
Pk - Peak detector

Qp - Quasi-Peak detector

\* Harmonics of fundamental 927.2MHz

### 9.3. WORST CASE BELOW 30 MHz

#### 9.3.1. SPURIOUS EMISSIONS 9 kHz TO 30 MHz (WORST-CASE CONFIGURATION)



#### Below 30MHz Data

##### 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) | Azimuth (Degs) |
|--------|-----------------|----------------------|-----|---------------------|----------|----------------|------------------------------|---------------------|-------------|--------------------|-------------|----------------|
| 1      | .01228          | 81.08                | Pk  | 17.7                | .1       | -80            | 18.88                        | 65.8                | -46.92      | 45.8               | -26.92      | 0-360          |
| 5      | .01229          | 81.12                | Pk  | 17.7                | .1       | -80            | 18.92                        | 65.79               | -46.87      | 45.79              | -26.87      | 0-360          |
| 2      | .02073          | 79.74                | Pk  | 14.2                | .1       | -80            | 14.04                        | 61.25               | -47.21      | 41.25              | -27.21      | 0-360          |
| 6      | .02073          | 80.68                | Pk  | 14.2                | .1       | -80            | 14.98                        | 61.25               | -46.27      | 41.25              | -26.27      | 0-360          |
| 7      | .04499          | 82.74                | Pk  | 12.3                | .1       | -80            | 15.14                        | 54.52               | -39.38      | 34.52              | -19.38      | 0-360          |
| 3      | .045            | 81.81                | Pk  | 12.3                | .1       | -80            | 14.21                        | 54.52               | -40.31      | 34.52              | -20.31      | 0-360          |
| 4      | .11696          | 78.78                | Pk  | 11.1                | .1       | -80            | 9.98                         | 46.27               | -36.29      | 26.27              | -16.29      | 0-360          |
| 8      | .11698          | 81.27                | Pk  | 11.1                | .1       | -80            | 12.47                        | 46.26               | -33.79      | 26.26              | -13.79      | 0-360          |
| 9      | .16199          | 78.84                | Pk  | 11                  | .1       | -80            | 9.94                         | 43.43               | -33.49      | 23.43              | -13.49      | 0-360          |
| 10     | .16906          | 79.67                | Pk  | 11                  | .1       | -80            | 10.77                        | 43.06               | -32.29      | 23.06              | -12.29      | 0-360          |

Pk - Peak detector

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | Loop Antenna (dB/m) | Cbl (dB) | Dist Corr 30m | Corrected Reading (dBuVolts) | QP Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) |
|--------|-----------------|----------------------|-----|---------------------|----------|---------------|------------------------------|-------------------|-------------|----------------|
| 11     | 2.94426         | 24.34                | Pk  | 11.3                | .3       | -40           | -4.06                        | 29.5              | -33.56      | 0-360          |
| 12     | 21.91987        | 18.72                | Pk  | 10.8                | .7       | -40           | -9.78                        | 29.5              | -39.28      | 0-360          |

Pk - Peak detector

## 10. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

| Frequency of Emission (MHz) | Conducted Limit (dBμV) |            |
|-----------------------------|------------------------|------------|
|                             | 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

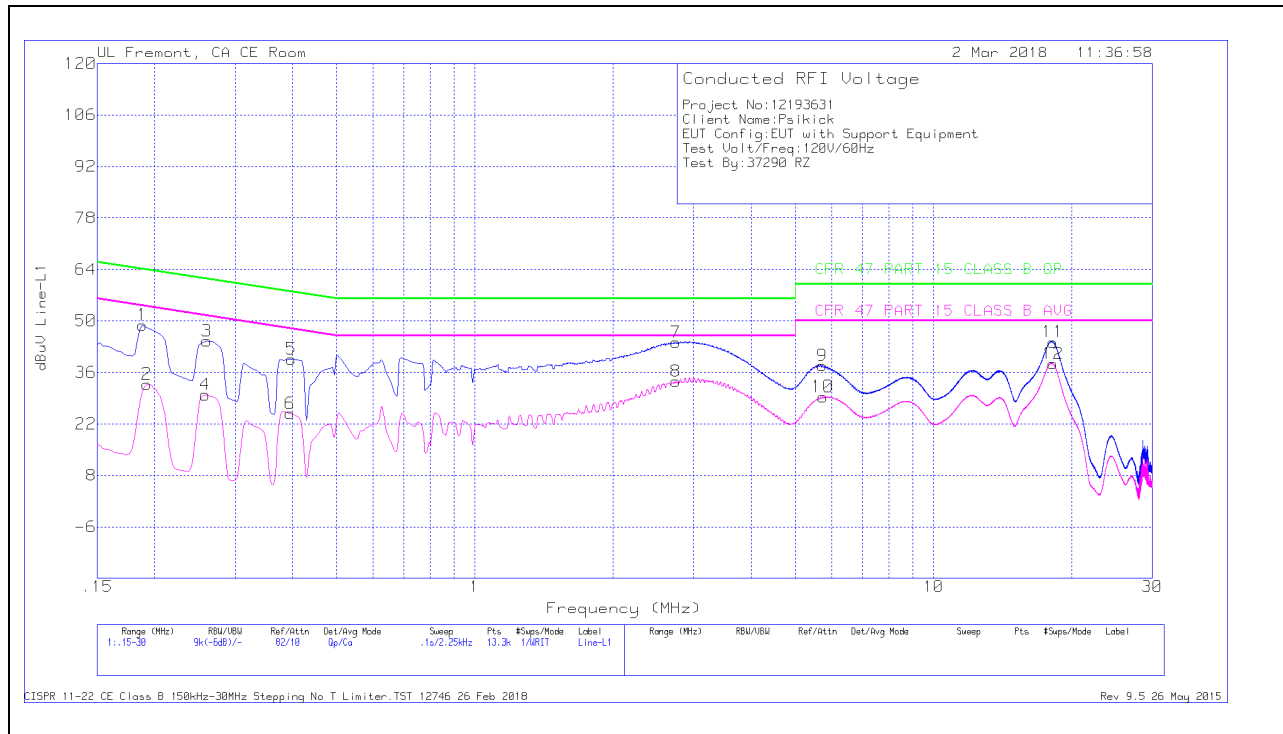
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

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

## LINE 1 RESULTS

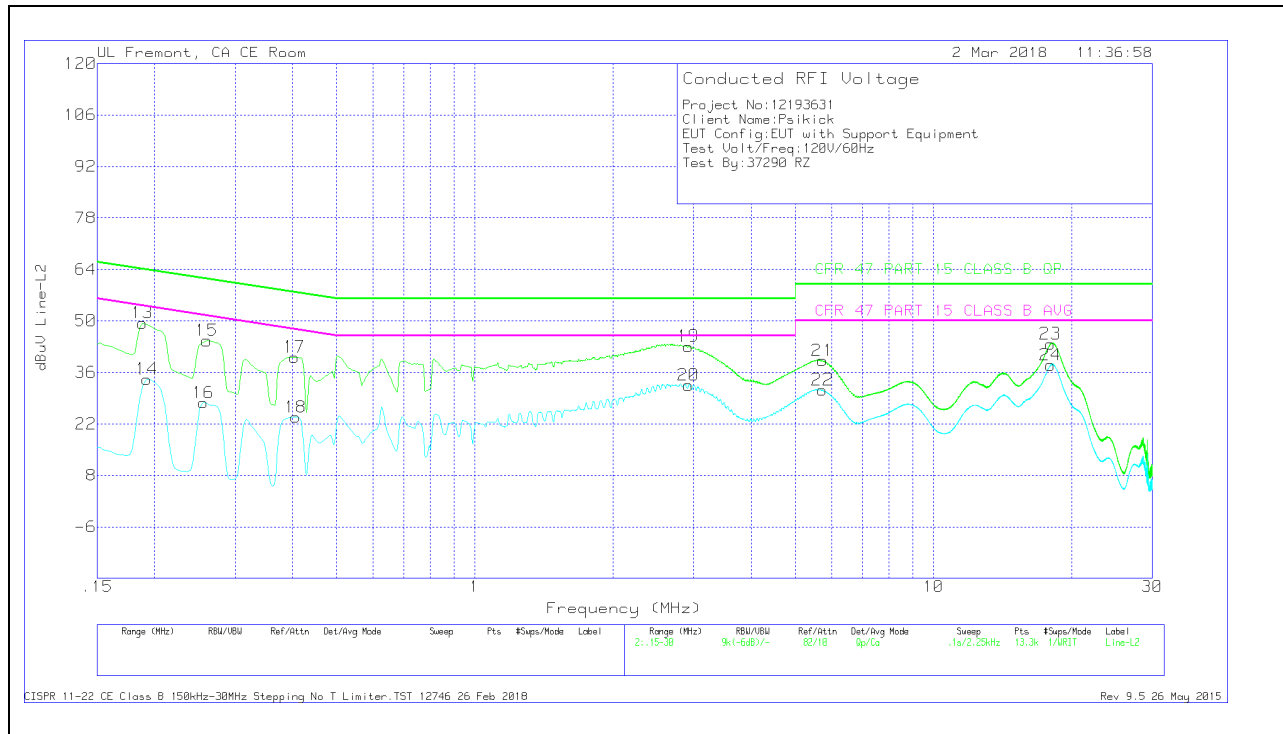


## Trace Markers

| Range 1: Line-L1 .15 - 30MHz |                 |                      |     |         |                 |                        |                           |             |                            |             |
|------------------------------|-----------------|----------------------|-----|---------|-----------------|------------------------|---------------------------|-------------|----------------------------|-------------|
| Marker                       | Frequency (MHz) | Meter Reading (dBuV) | Det | LISN L1 | LC Cables C1&C3 | Corrected Reading dBuV | CFR 47 PART 15 CLASS B QP | Margin (dB) | CFR 47 PART 15 CLASS B AVG | Margin (dB) |
| 1                            | .18825          | 48.88                | Qp  | 0       | 0               | 48.88                  | 64.11                     | -15.23      | -                          | -           |
| 2                            | .19275          | 32.78                | Ca  | 0       | 0               | 32.78                  | -                         | -           | 53.92                      | -21.14      |
| 3                            | .26025          | 44.5                 | Qp  | 0       | 0               | 44.5                   | 61.42                     | -16.92      | -                          | -           |
| 4                            | .258            | 29.92                | Ca  | 0       | 0               | 29.92                  | -                         | -           | 51.5                       | -21.58      |
| 5                            | .3975           | 39.64                | Qp  | 0       | 0               | 39.64                  | 57.91                     | -18.27      | -                          | -           |
| 6                            | .39525          | 24.82                | Ca  | 0       | 0               | 24.82                  | -                         | -           | 47.95                      | -23.13      |
| 7                            | 2.742           | 44.09                | Qp  | 0       | .1              | 44.19                  | 56                        | -11.81      | -                          | -           |
| 8                            | 2.742           | 33.45                | Ca  | 0       | .1              | 33.55                  | -                         | -           | 46                         | -12.45      |
| 9                            | 5.72775         | 37.63                | Qp  | 0       | .2              | 37.83                  | 60                        | -22.17      | -                          | -           |
| 10                           | 5.7345          | 29.18                | Ca  | 0       | .2              | 29.38                  | -                         | -           | 50                         | -20.62      |
| 11                           | 18.2265         | 43.97                | Qp  | 0       | .3              | 44.27                  | 60                        | -15.73      | -                          | -           |
| 12                           | 18.20513        | 38.07                | Ca  | 0       | .3              | 38.37                  | -                         | -           | 50                         | -11.63      |

Qp - Quasi-Peak detector  
Ca - CISPR average detection

## LINE 2 RESULTS



## Trace Markers

| Range 2: Line-L2 .15 - 30MHz |                 |                      |     |         |                 |                        |                           |             |                            |             |
|------------------------------|-----------------|----------------------|-----|---------|-----------------|------------------------|---------------------------|-------------|----------------------------|-------------|
| Marker                       | Frequency (MHz) | Meter Reading (dBuV) | Det | LISN L2 | LC Cables C2&C3 | Corrected Reading dBuV | CFR 47 PART 15 CLASS B QP | Margin (dB) | CFR 47 PART 15 CLASS B AVG | Margin (dB) |
| 13                           | .18825          | 49.42                | Qp  | 0       | 0               | 49.42                  | 64.11                     | -14.69      | -                          | -           |
| 14                           | .19275          | 34.14                | Ca  | 0       | 0               | 34.14                  | -                         | -           | 53.92                      | -19.78      |
| 15                           | .26025          | 44.64                | Qp  | 0       | 0               | 44.64                  | 61.42                     | -16.78      | -                          | -           |
| 16                           | .25575          | 27.76                | Ca  | 0       | 0               | 27.76                  | -                         | -           | 51.57                      | -23.81      |
| 17                           | .40425          | 40.14                | Qp  | 0       | 0               | 40.14                  | 57.77                     | -17.63      | -                          | -           |
| 18                           | .4065           | 23.81                | Ca  | 0       | 0               | 23.81                  | -                         | -           | 47.72                      | -23.91      |
| 19                           | 2.92425         | 42.95                | Qp  | 0       | .1              | 43.05                  | 56                        | -12.95      | -                          | -           |
| 20                           | 2.92425         | 32.39                | Ca  | 0       | .1              | 32.49                  | -                         | -           | 46                         | -13.51      |
| 21                           | 5.73            | 39                   | Qp  | 0       | .2              | 39.2                   | 60                        | -20.8       | -                          | -           |
| 22                           | 5.72888         | 31.02                | Ca  | 0       | .2              | 31.22                  | -                         | -           | 50                         | -18.78      |
| 23                           | 17.9835         | 43.44                | Qp  | 0       | .3              | 43.74                  | 60                        | -16.26      | -                          | -           |
| 24                           | 17.98575        | 37.66                | Ca  | 0       | .3              | 37.96                  | -                         | -           | 50                         | -12.04      |

Qp - Quasi-Peak detector  
Ca - CISPR average detection