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| | |
|---|---|
| Job Number: | 1001510344 |
| Project Number: | 12CA27273B |
| File Number: | MC15343 |
| Date: | May 25, 2012 |
| Model: | PPK3PH |

# Electromagnetic Compatibility Test Report

## For

## Chamberlain Group Inc.

# Test Report Details

| | |
|---|---|
| Tests Performed By: | **UL LLC**<br>**333 Pfingsten Rd.**<br>**Northbrook, IL 60062** |
| Tests Performed For: | **Chamberlain Group Inc.**<br>**845 Larch Av**<br>**Elmhurst, IL 60126** |
| Applicant Contact:<br>Phone:<br>E-mail: | **Hank Sieradzki**<br>**(630) 993-6564**<br>**Hank.Sieradzki@chamberlaingroup.com** |
| Test Report Date: | **May 25, 2012** |
| Product Type: | **Periodic Transmitter** |
| Product standards | **FCC Part 15, Subpart C, 15.231 & RSS-210** |
| Model Number: | **PPK3PH** |
| EUT Category: | **Wireless Device** |
| Testing Start Date: | **May 10, 2012** |
| Date Testing Complete: | **May 23, 2012** |
| **Overall Results:** | **Compliant** |

UL LLC reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. UL LLC shall have no liability for any deductions, inferences or generalizations drawn by the client or others from UL LLC issued reports. 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.

This report may contain test results that are not covered by the NVLAP or A2LA accreditation. The scope of accreditation is limited to the specific tests that are listed on the NVLAP and/or A2LA websites referenced at the end of this report.

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Report Revision History

| Revision Date | Description | Revised By | Revision Reviewed By |
|---|---|---|---|
| none | | | |

# 1.0 G E N E R A L - Product Description

## 1.1 Equipment Description

The equipment under test is a multiple channel portable periodic transmitter operating at 310MHz, 315MHz and 390MHz. The transmitter comes with internal passive proximity card access module HID.

## 1.2 Device Configuration During Test

### 1.2.1 Equipment Used During Test:

| Use | Product Type | Manufacturer | Model | Comments |
|---|---|---|---|---|
| **EUT** | Periodic Transmitter | Chamberlain Group Inc. | PPK3PH | During testing this device was referenced to by sample number starting with SMP32443 |

Note: **EUT** - Equipment Under Test, **AE** - Auxiliary/Associated Equipment, or **SIM** - Simulator (Not Subjected to Test)

### 1.2.2 Input/Output Ports:

| Port # | Name | Type* | Cable Max. >3m (Y/N) | Cable Shielded (Y/N) | Comments |
|---|---|---|---|---|---|
| 0 | Enclosure | N/E | — | — | None |

Note:
AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
TP = Telecommunication Ports

### 1.2.3 Power Interface:

| Mode # /Rated | Voltage (V) | Current (A) | Power (W) | Frequency (DC/AC-Hz) | Phases (#) | Comments |
|---|---|---|---|---|---|---|
| 1 | 3 | - | - | dc | - | Battery Operated |

### 1.3 EUT Configurations

| Mode # | Description |
|---|---|
| 1 | EUT with fresh batteries set to transmit. |

### 1.4 EUT Operation Modes

| Mode # | Description |
|---|---|
| 1 | EUT transmitting on 310MHz, 315MHz, and 390MHz. |

### 1.5 Rational for EUT Configuration

| Mode # | Description |
|---|---|
| 1 | The Fundamental frequencies were measured in various axis (X, Y, and Z) and worst case axis was established – Z Axis. All harmonics were measured based on the worst case axis found. |

## 2.0 Summary

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by UL LLC in accordance with the procedures stated in each test requirement and specification. The applicant determined the list of tests performed were applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

### 2.1 Deviations from standard test methods

| |
|---|
| None |

### 2.2 Device Modifications Necessary for Compliance

| |
|---|
| None |

### 2.3 Reference Standards

| Standard Number | Standard Name | Standard Date |
|---|---|---|
| FCC Part 15, Subpart C, 15.231 | Code of Federal Regulations, Part 15, Radio Frequency Devices | 2010 |
| RSS-210 | License - exempt Radio Apparatus (All Frequency Bands): Category I Equipment | Issue 8 |

### 2.4 Results Summary

This product is considered Class B

| Requirement – Test | Result (Compliant / Non-Compliant)* |
|---|---|
| Line Conducted Emissions | N/A – EUT is battery operated only |
| Occupied Bandwidth | Compliant |
| Cease Operation | Compliant |
| Pulse Train and Duty Cycle | Compliant |
| Fundamental Frequency & Spurious Radiated Emissions | Compliant |

Test Engineer:

Bartlomiej Mucha (Ext.41216)
Staff Engineer
International EMC Services
Conformity Assessment Services

Reviewer:

Michael Ferrer(Ext.41312)
Senior Project Engineer
International EMC Services
Conformity Assessment Services

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

## 3.0 Calibration of Equipment Used for Measurement

All test equipment and test accessories are calibrated on a regular basis. The maximum time between calibrations is one year or the manufacturers' recommendation, whichever is less.

All test equipment calibrations are traceable to the National Institute of Standards and Technology (NIST); therefore, all test data recorded in this report is traceable to NIST.

## 4.0 EMISSIONS TEST RESULTS

The emissions tests were performed according to following regulations:

| | |
|---|---|
| FCC | 47 CFR Part 15 – Intentional Radiators |
| IC | RSS-210 and RSS-Gen License - exempt Radio Apparatus |

Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be verified at the time the test is conducted.

| | | | | | |
|---|---|---|---|---|---|
| Ambient Temperature, °C | 22.5 ± 2.5 | Relative Humidity, % | 45 ± 15 | Barometric Pressure, mBar | 950 ± 150 |

**Sample Calculations**
Radiated Field Strength and Conducted Emissions data contained within this report is calculated on the following basis:

Field Strength (dBuV/m) = Meter Reading (dBuV) + AF (dB/m) - Gain (dB) + Cable Loss (dB)
Conducted Voltage (dBuV) = Meter Reading (dBuV) + Cable Loss (dB) + LISN IL (dB)
Conducted Current (dBuA) = Meter Reading (dBuV) + Cable Loss (dB) - Transducer Factor (dBohms)

### 4.1 Test Conditions and Results – Occupied Bandwidth

| | |
|---|---|
| Test Description | Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the spectrum analyzer resolution bandwidth set per the appropriate standard. |
| Basic Standard | 47 CFR Part 15.231(c) |
| **Occupied Bandwidth Limits** | |
| 0.25% of Center Frequency (310MHz: 775.0kHz, 315MHz: 787.5kHz, 390MHz: 975.0kHz) | |

**Table 1 Occupied Bandwidth Configuration Settings**

| Power Interface Mode # | EUT Configurations Mode # | EUT Operation Mode # |
|---|---|---|
| 1 | 1 | 1 |
| Supplementary information: None | | |

**Table 2 Occupied Bandwidth Spectrum Analyzer Settings**

| Resolution Bandwidth | Occupied Bandwidth Requirements | |
|---|---|---|
| | dBc | % PWR |
| 10kHz | -20 | 99 |
| Supplementary information: None | | |

**Table 3 Occupied Bandwidth Test Result Summary**

| Center Frequency | 20dB BW Measured (kHz) | 99% BW Measured (kHz) |
|---|---|---|
| 310MHz | 50.8 | 92.0 |
| 315MHz | 49.6 | 90.4 |
| 390MHz | 49.6 | 98.4 |

**Table 4 Occupied Bandwidth Test Equipment**

| Test Equipment Used | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal Date | Cal Due Date |
| EMI Test Receiver | Rohde & Schwarz | ESU | EMC4323 | Dec 28 2011 | Dec 31 2012 |
| Generic Near Field Loop Antenna | - | - | - | - | - |

**Figure 1 – 20dB Bandwidth Graph for 310MHz**

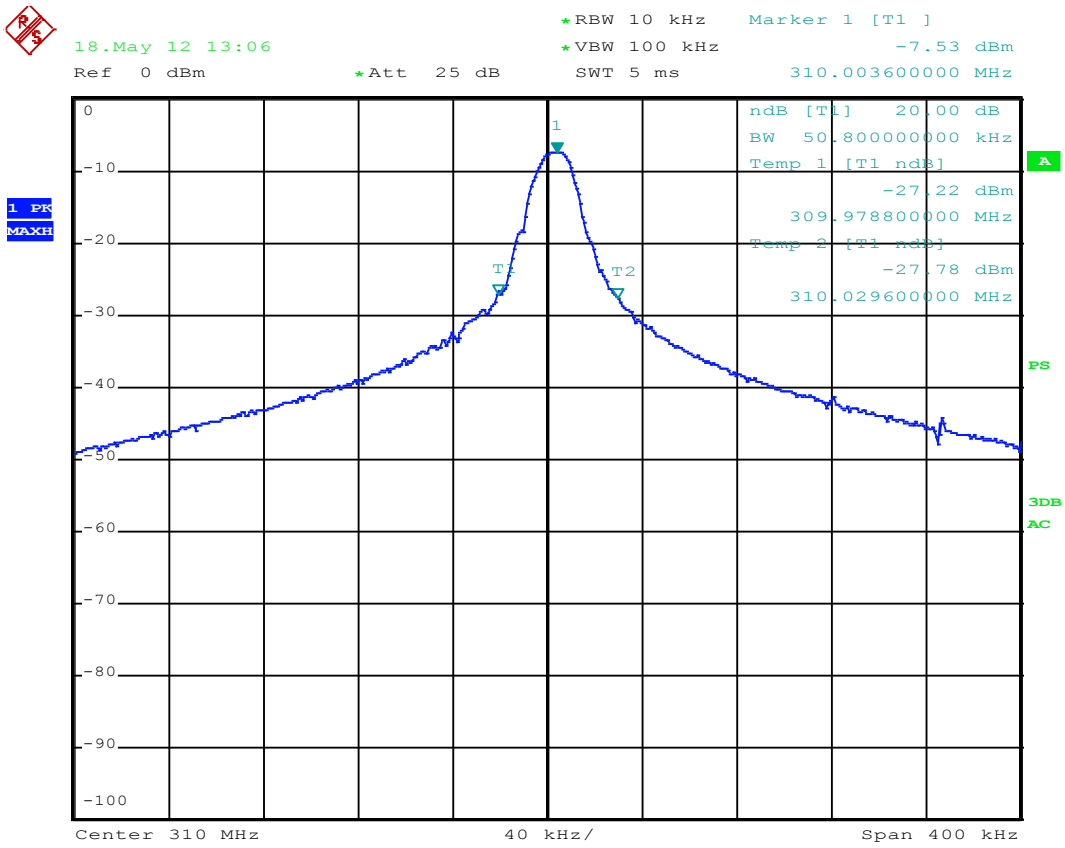


**Figure 2 – 20dB Bandwidth Graph for 315MHz**

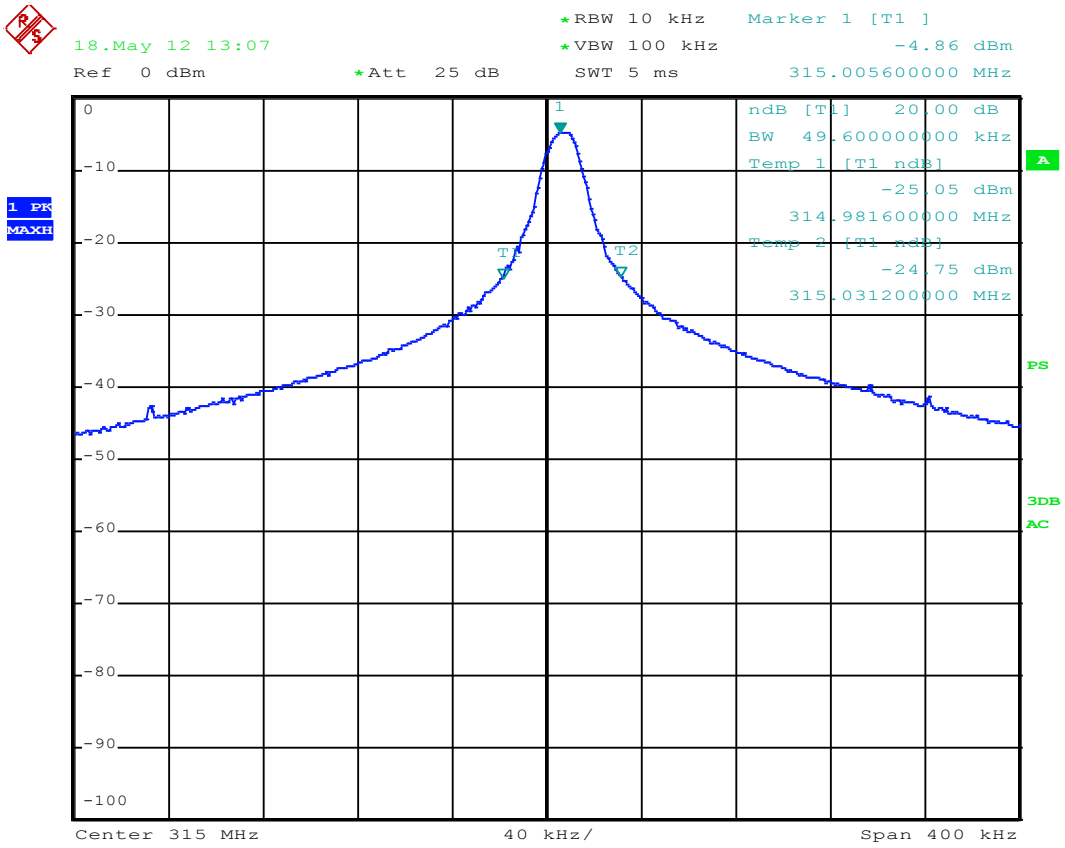


**Figure 3 – 20dB Bandwidth Graph for 390MHz**

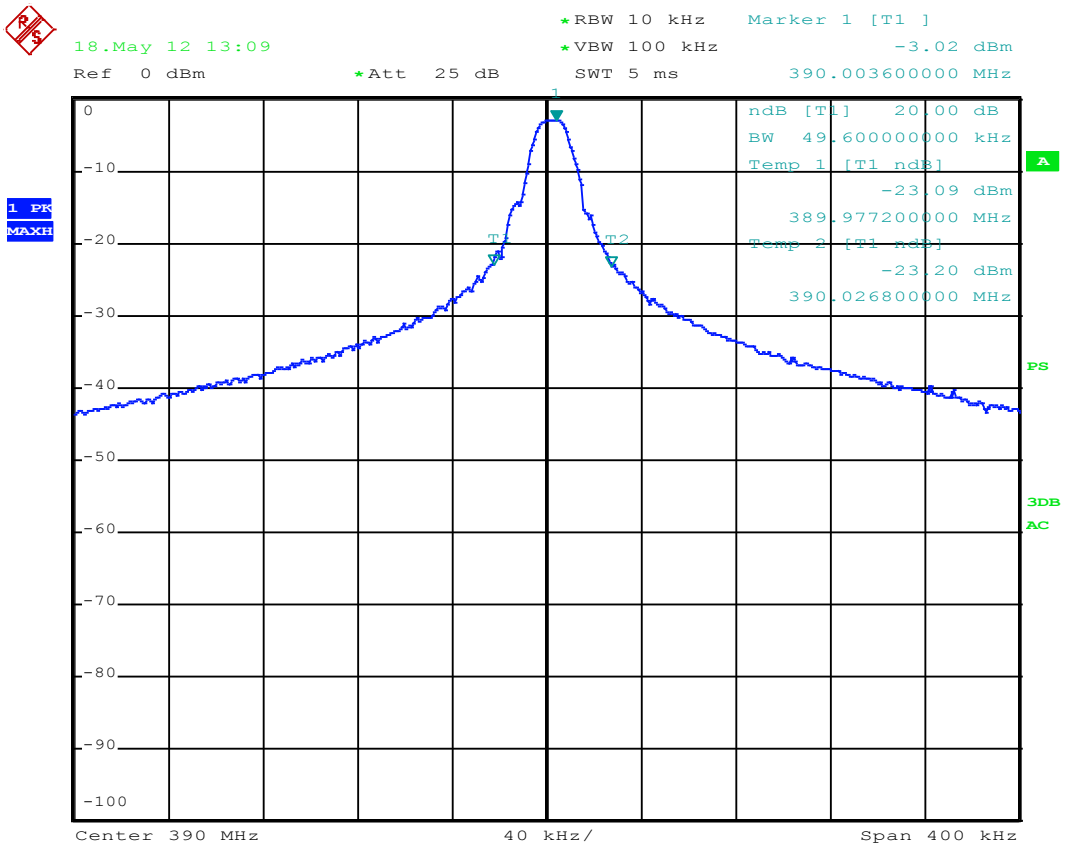


**Figure 4 – 99% Bandwidth Graph for 310MHz**

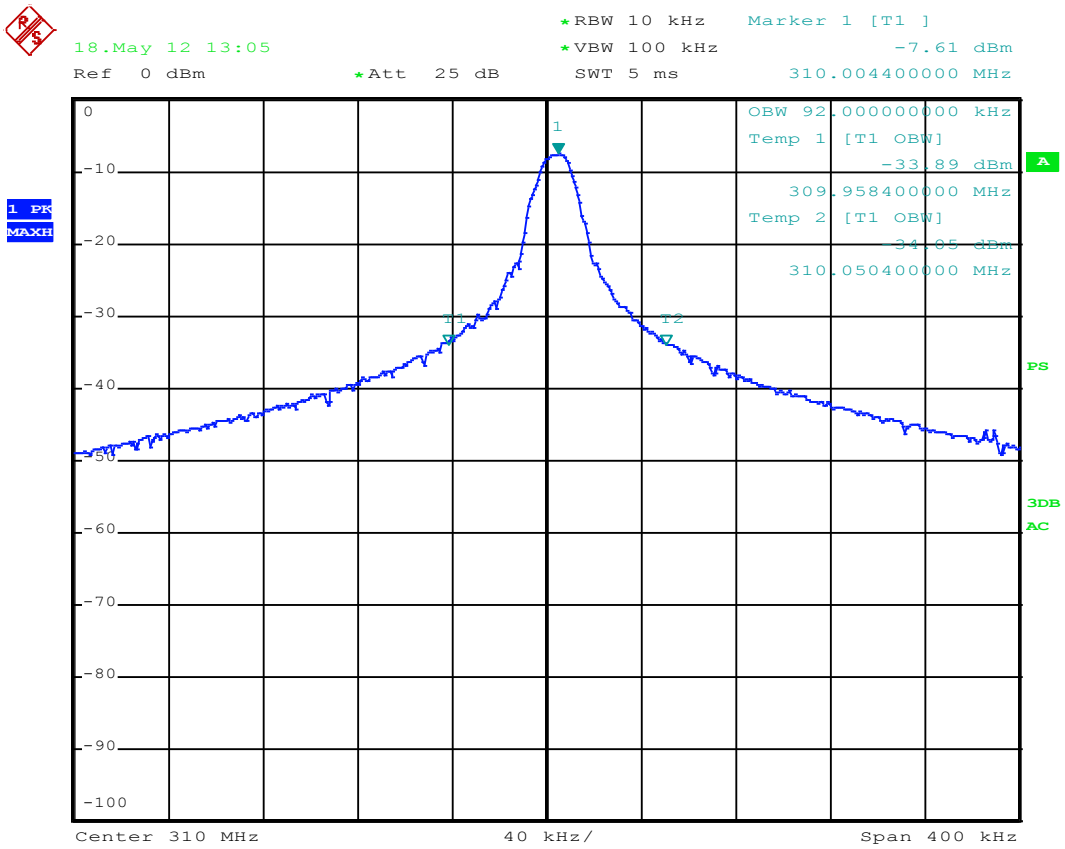


**Figure 5 – 99% Bandwidth Graph for 315MHz**

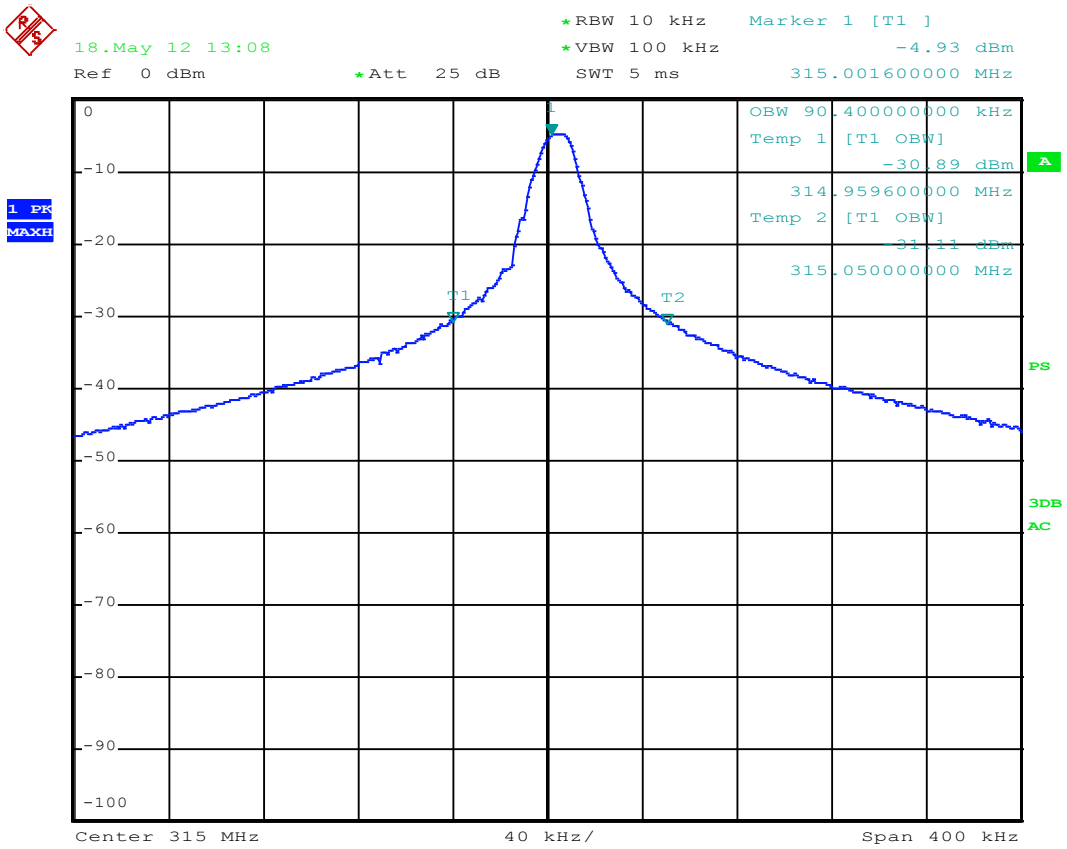
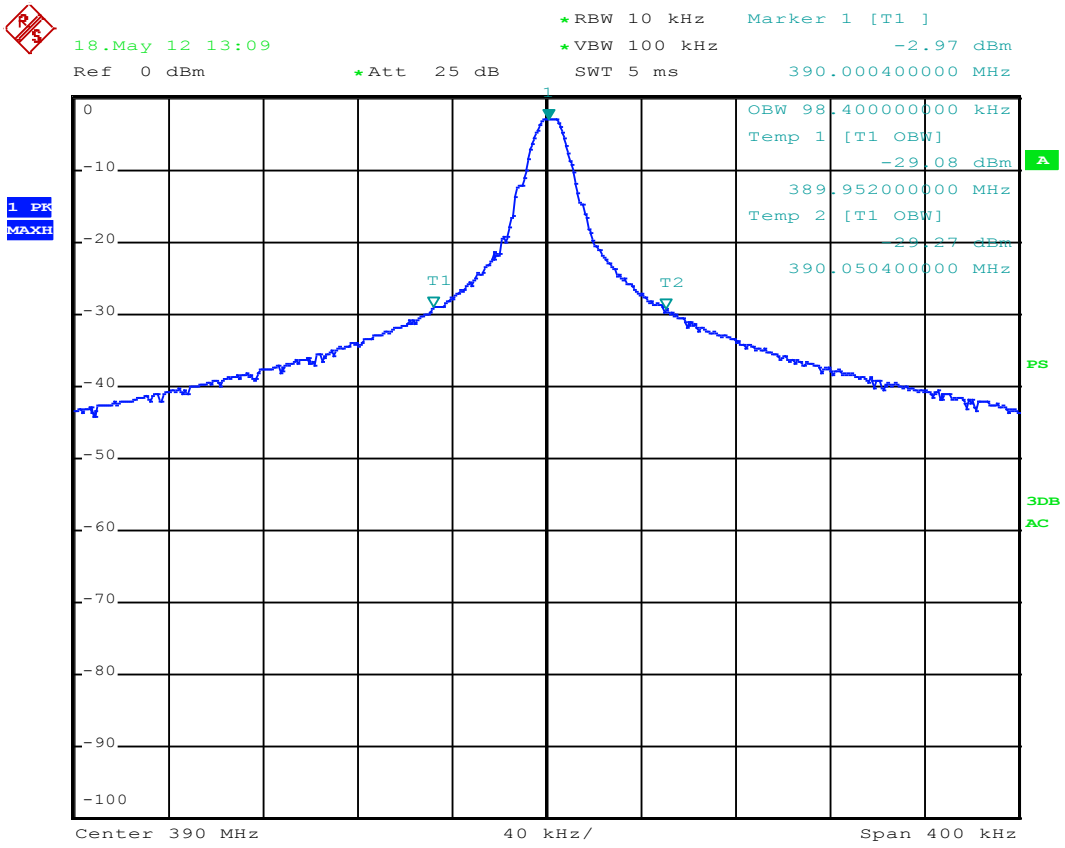


**Figure 6 – 99% Bandwidth Graph for 390MHz**



## 4.2 Test Conditions and Results – Cease Operation

| | |
|---|---|
| Test Description | Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the transmission time measured with the spectrum analyzer set to zero span at the fundamental frequency. |
| Basic Standard | 47 CFR Part 15.231(a) |
| **Cease Operation Limits** | |
| The transmissions shall stop within 5 seconds of either a button being released or if automatically controlled transmissions shall be stopped 5 seconds after transmissions begin. | |

**Table 5 Cease Operation Configuration Settings**

| Power Interface Mode # | EUT Configurations Mode # | EUT Operation Mode # |
|---|---|---|
| 1 | 1 | 1 |
| Supplementary information: None | | |

**Table 6 Cease Operation Test Equipment**

| **Test Equipment Used** | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal Date | Cal Due Date |
| EMI Test Receiver | Rohde & Schwarz | ESU | EMC4323 | Dec 28 2011 | Dec 31 2012 |
| Generic Near Filed Loop Antenna | - | - | - | - | - |

**Figure 7 Cease Operation Graph for 310MHz**

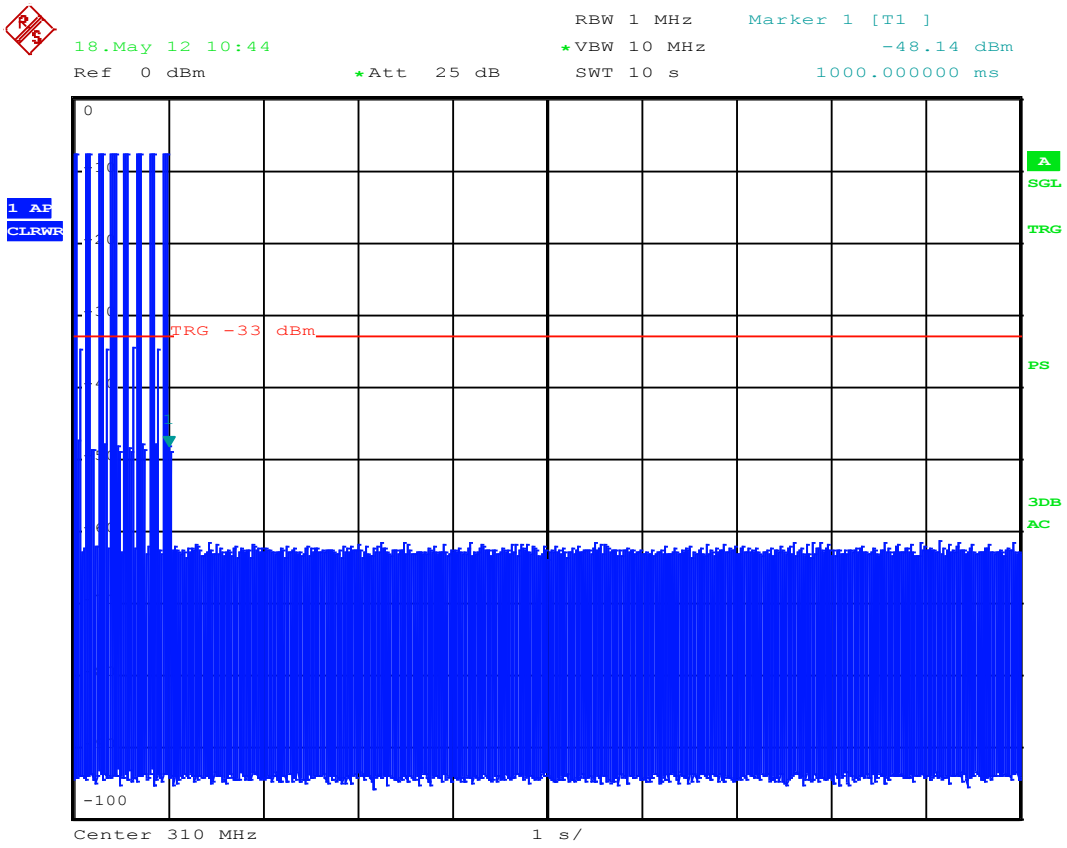


**Figure 8 Cease Operation Graph for 315MHz**

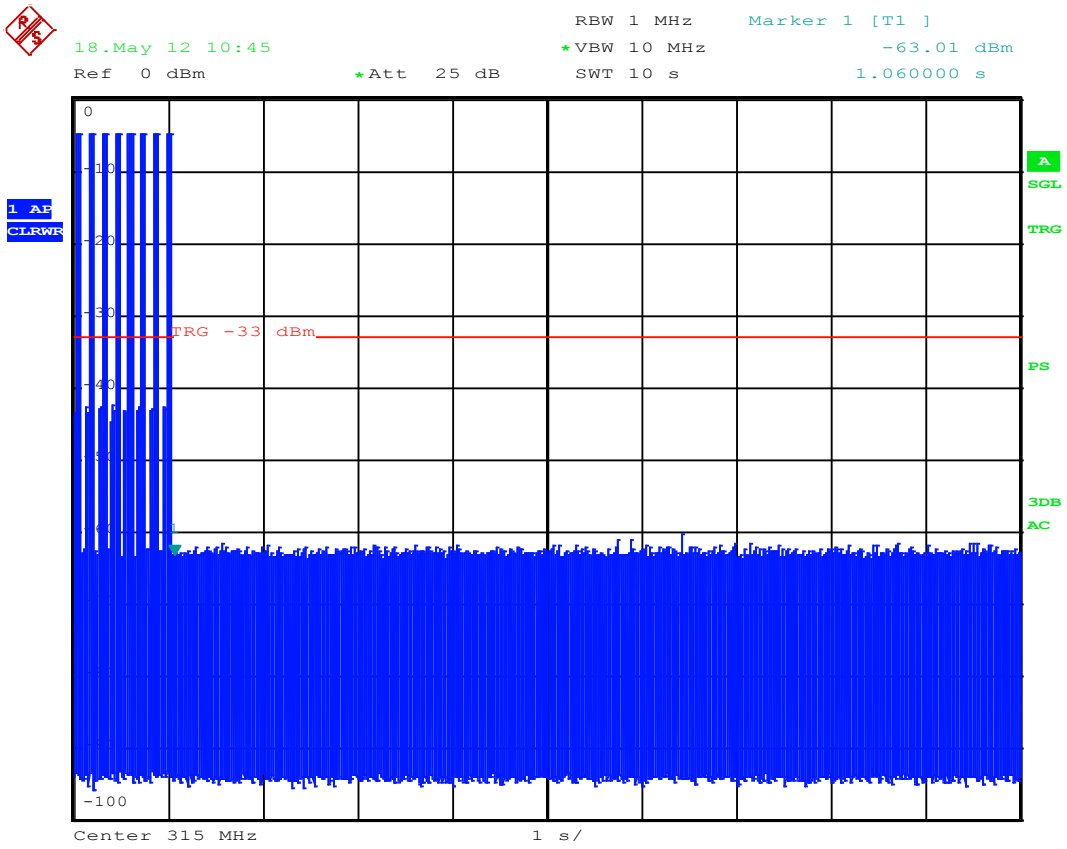
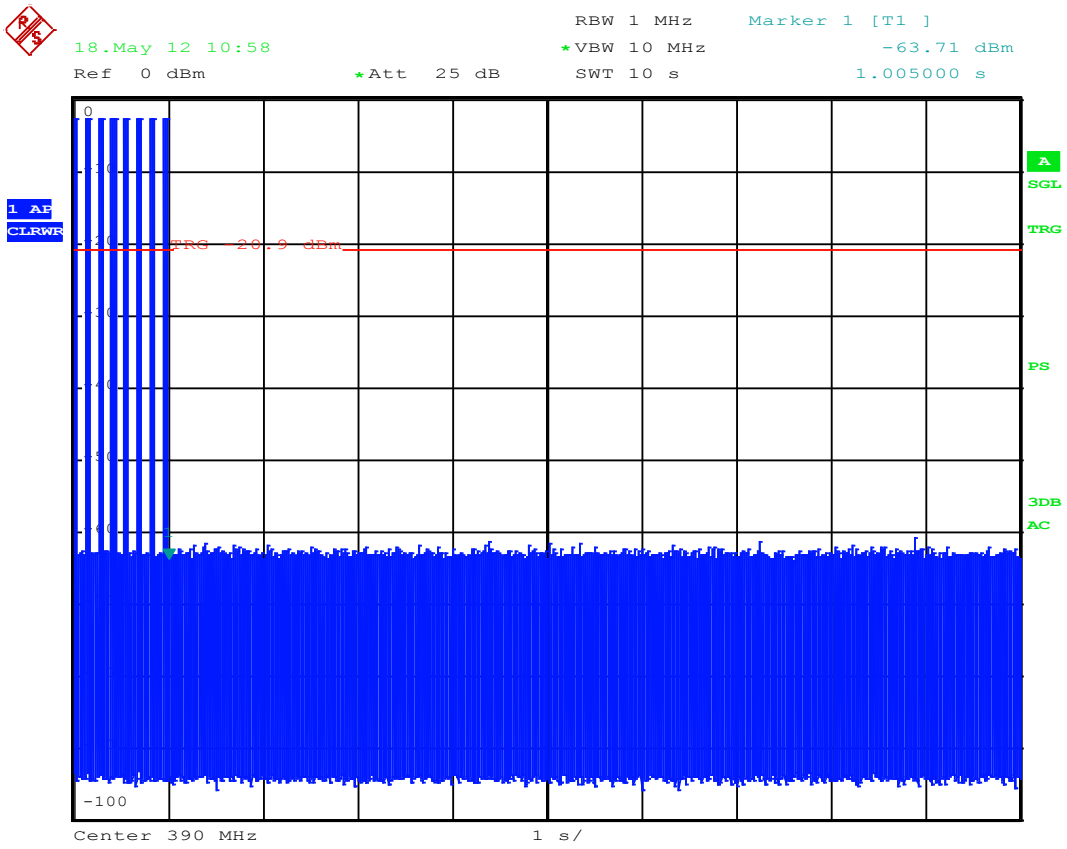


**Figure 9 Cease Operation Graph for 390MHz**



### 4.3 Test Conditions and Results – Pulse Train

| | |
|---|---|
| Test Description | Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The pulse train was measured with the spectrum analyzer set to zero span at the fundamental frequency. |
| Basic Standard | FCC Part 15 Subpart A, 15.35 |
| **Pulse Train Limits** | |
| There are no limits for this test. This data is used to calculate the averaging correction factor that is applied to the measured peak radiated emissions results. | |

**Table 7 Pulse Train Configuration Settings**

| Power Interface Mode # | EUT Configurations Mode # | EUT Operation Mode # |
|---|---|---|
| 1 | 1 | 1 |
| Supplementary information: None | | |

**Table 8 Pulse Train Calculation**

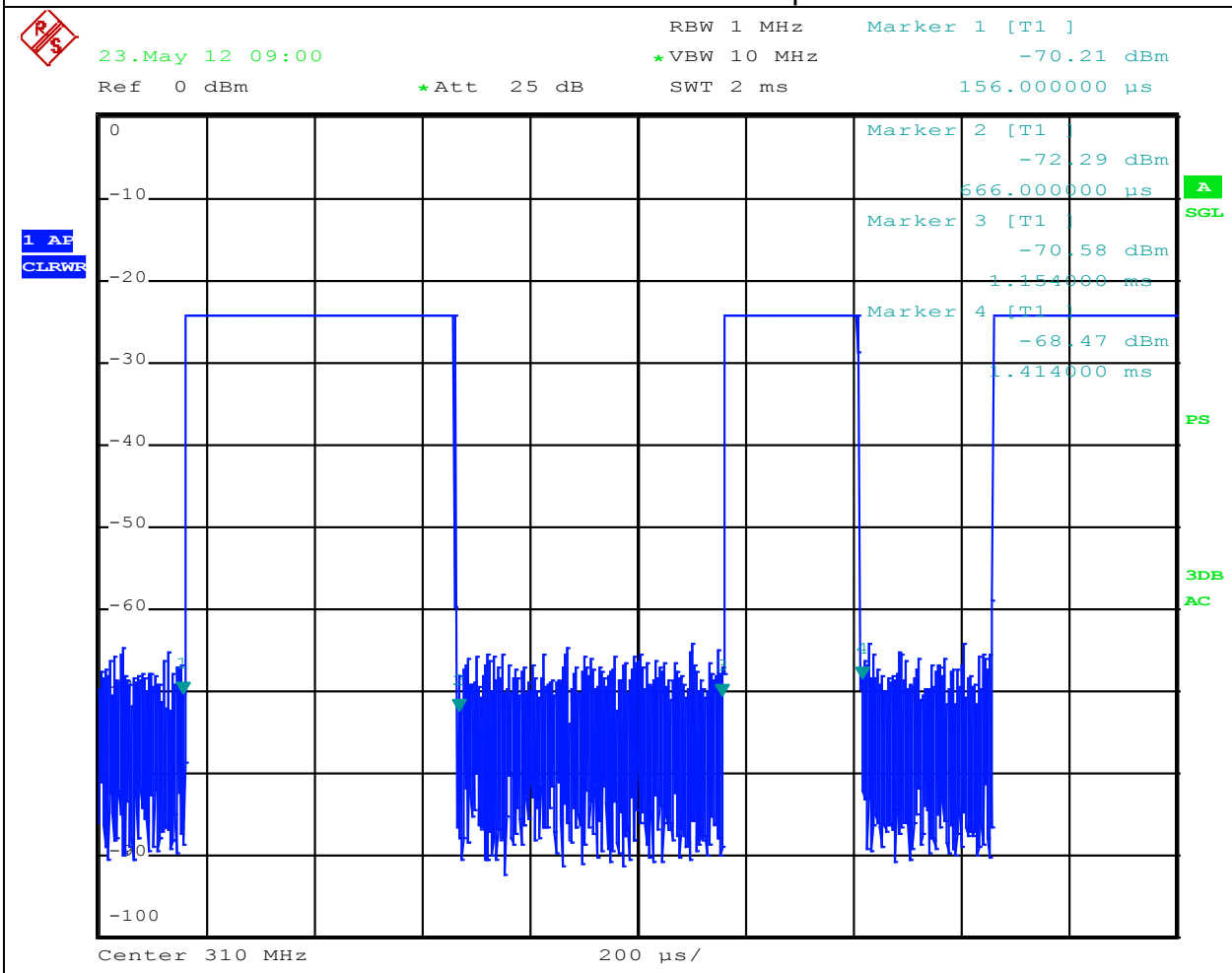
| TX Frequency | Total TX time | Total Transmission time or 100ms whichever is lesser | DC Correction Factor (dB) $20\log\left(\frac{PulseWidth}{Period}\right)$ |
|---|---|---|---|
| 310MHz | (47x0.260)+(20x0.510) | 100ms | -12.99 |
| 315MHz | (47x0.260)+(20x0.510) | 100ms | -12.99 |
| 390MHz | (53x0.260)+(17x0.508) | 100ms | -12.99 |
| Worst Case Duty Cycle: -12.99dB | | | |

**Table 9 Pulse Train Test Equipment**

| Test Equipment Used | | | | | |
|---|---|---|---|---|---|
| Description | Manufacturer | Model | Identifier | Cal Date | Cal Due Date |
| EMI Test Receiver | Rohde & Schwarz | ESU | EMC4323 | Dec 28 2011 | Dec 31 2012 |
| Generic Loop Near Field Antenna | - | - | - | - | - |

**Figure 10 Pulse Train Graphs for 310MHz**

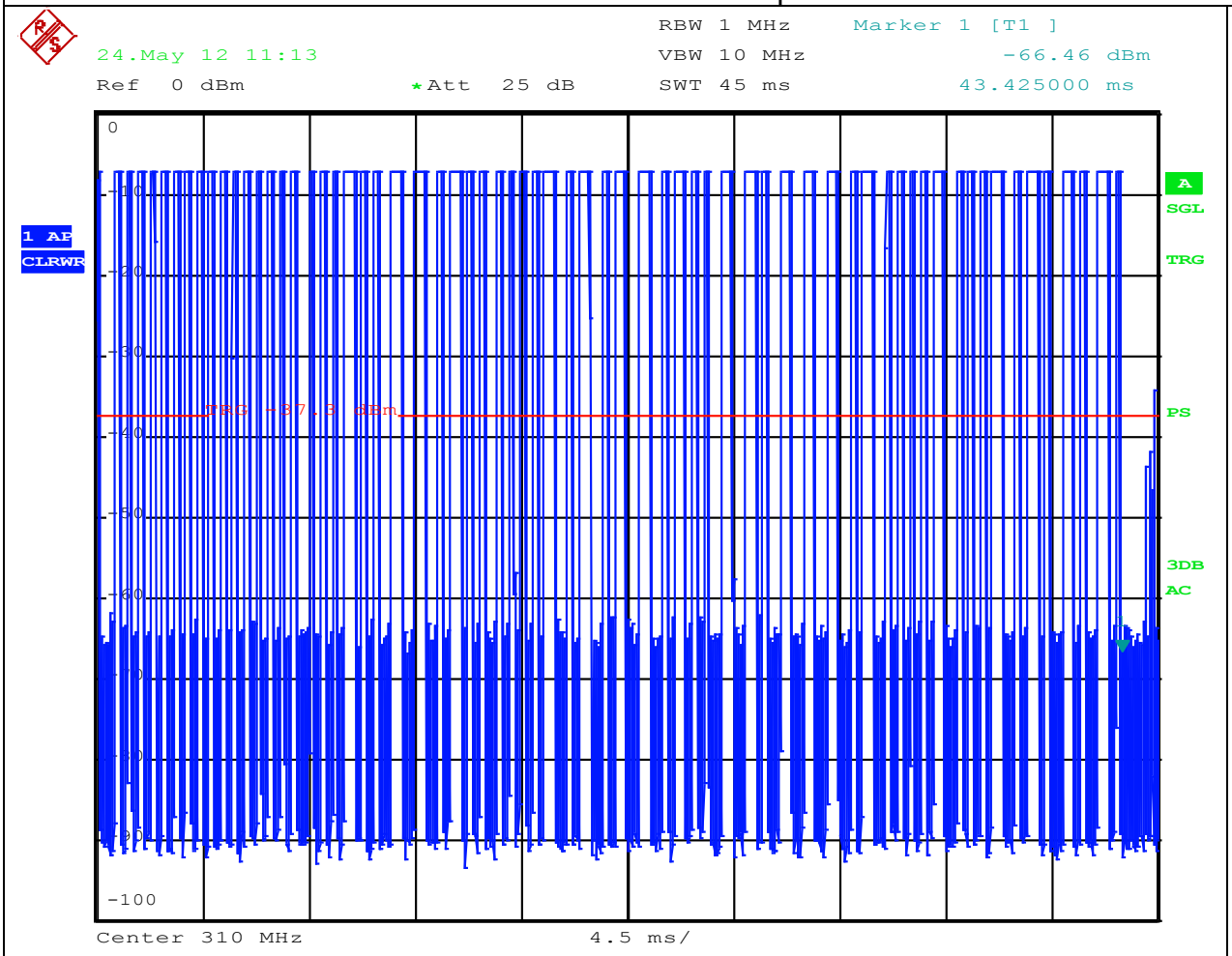
310MHz Pulse Capture




Short Pulse: 0.260mS, Long Pulse: 0.510mS

Pulse Duration mS

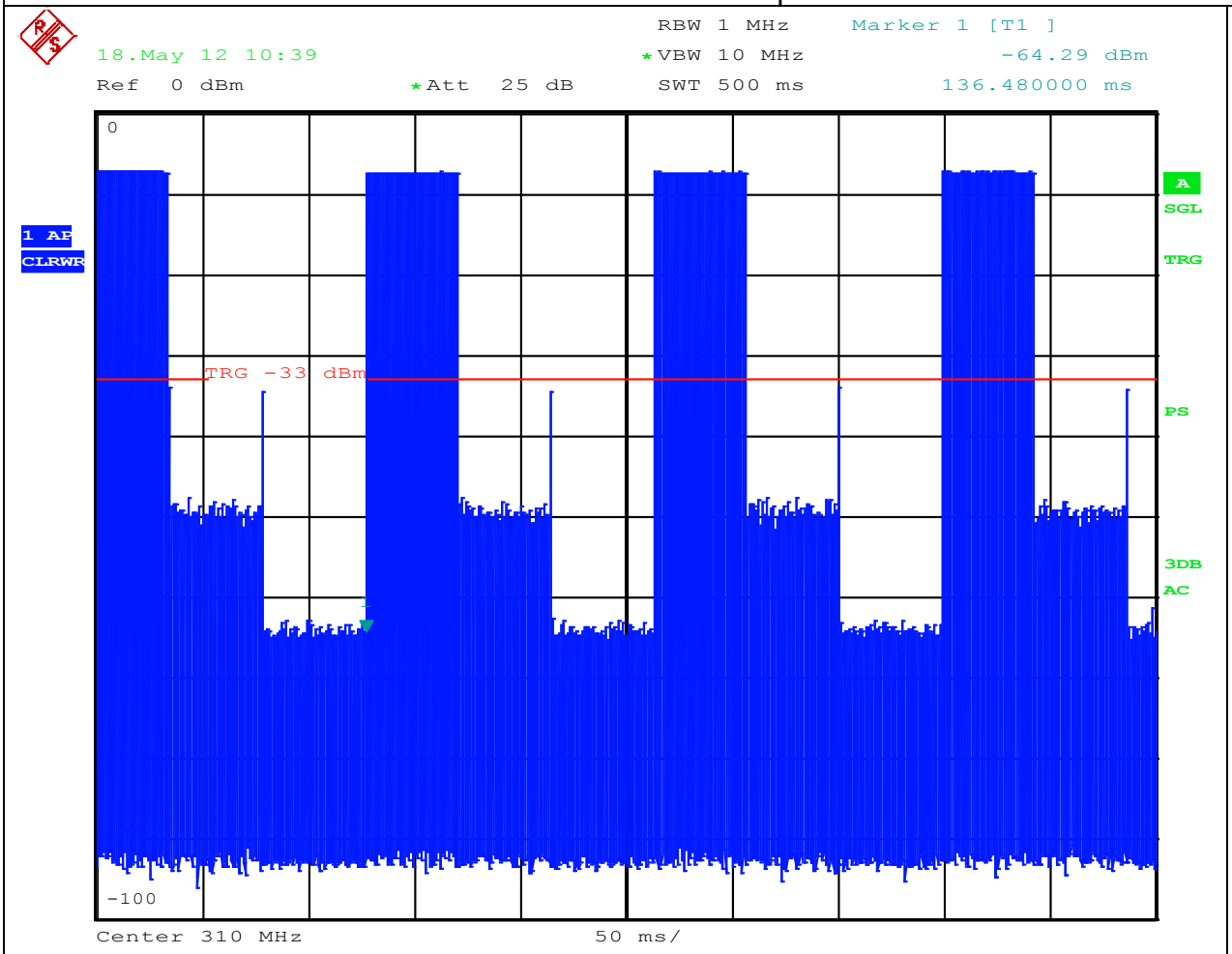
## 310MHz Pulse Capture




# of Short Pulses: 47, # of Long Pulses: 20

Number of Pulses

310MHz Pulse Capture

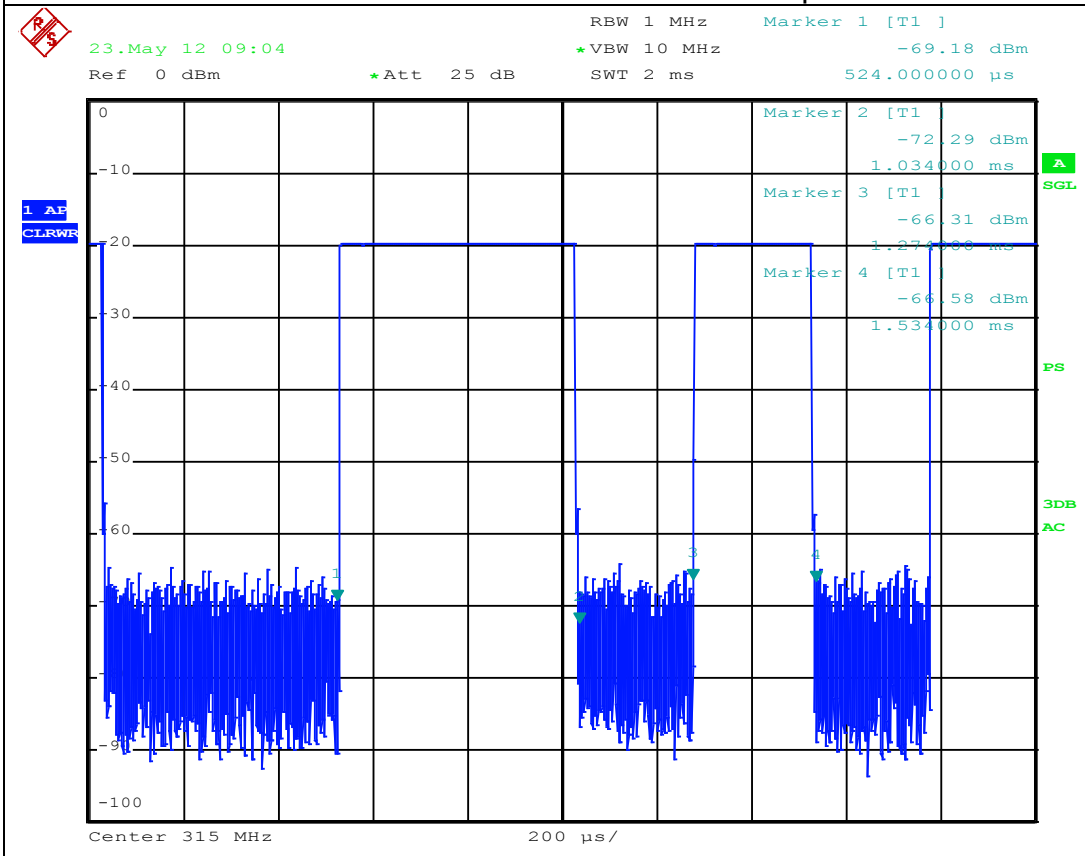



Period

Period:136.48mS, use 100mS for DC calculation

**Figure 11 Pulse Train Graphs for 315MHz**

315MHz Pulse Capture




Short Pulse: 0.260mS, Long Pulse: 0.510mS

Pulse Duration mS

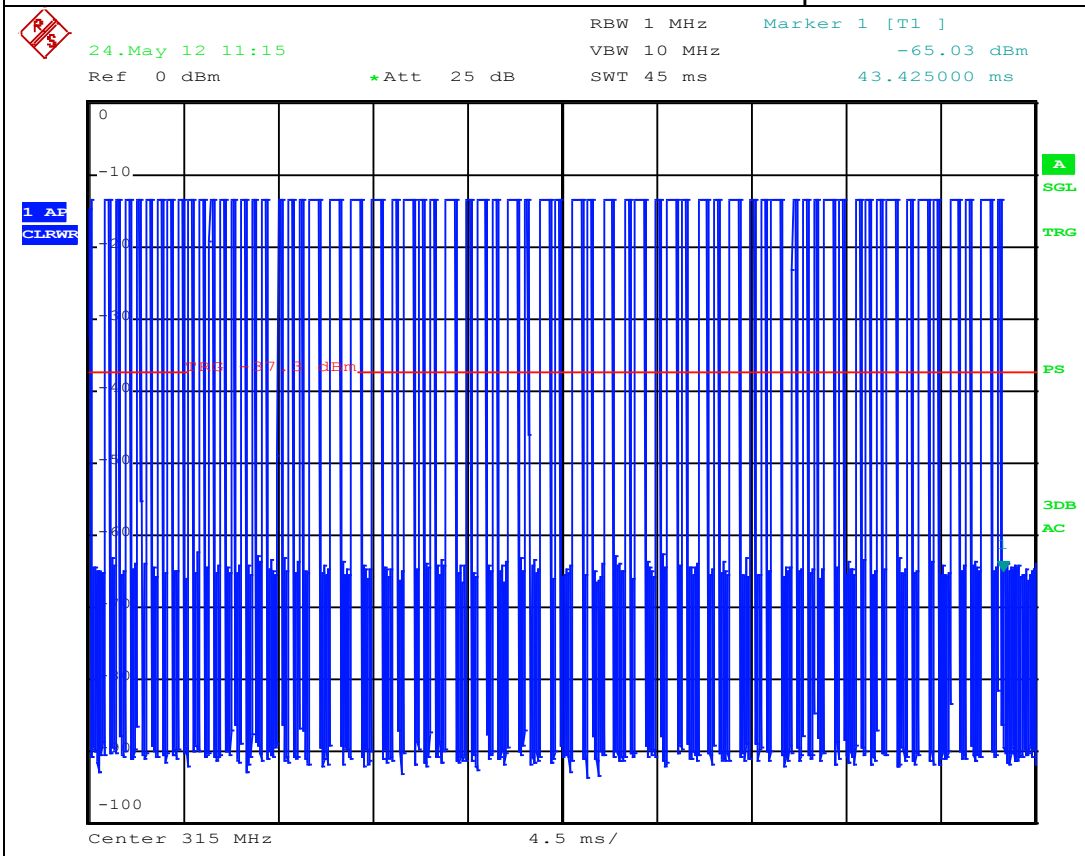
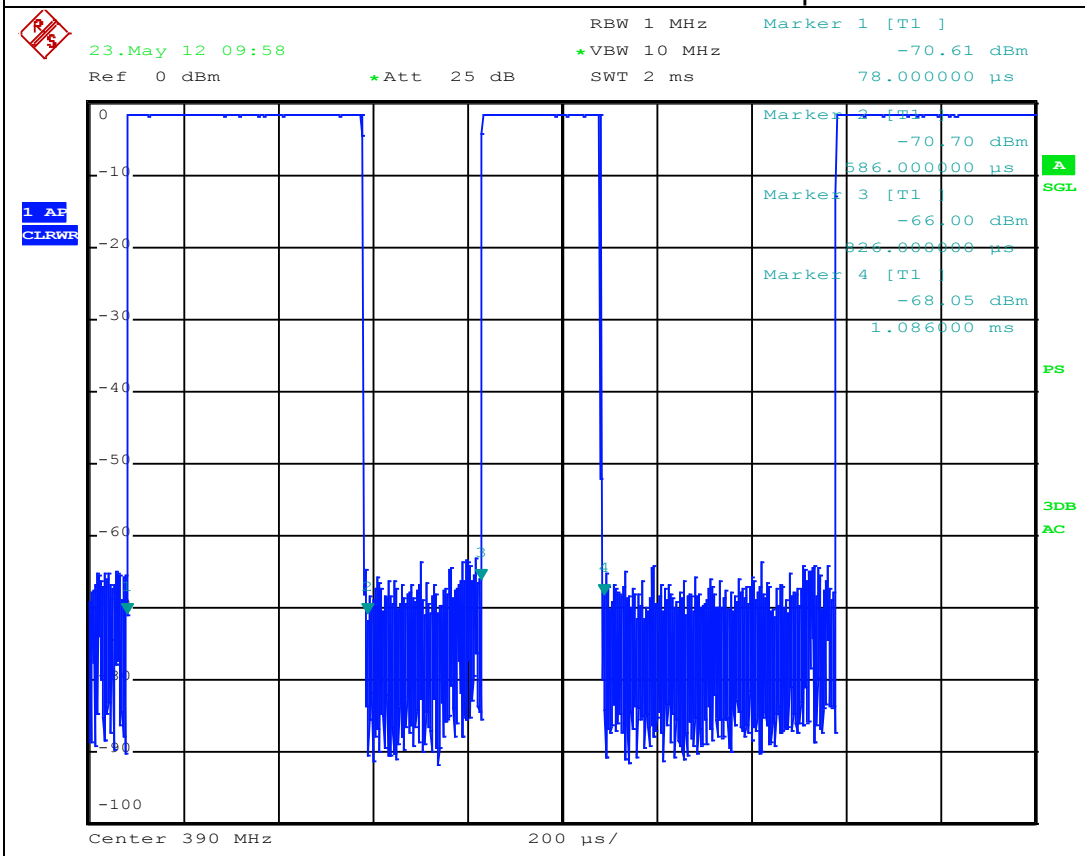
| 315MHz Pulse Capture | |
|---|---|
|  <br># of Short Pulses: 47 , # of Long Pulses: 20 | Number of Pulses |
| Period is the same as for 310MHz, (use 100mS for DC calculation) | Period |

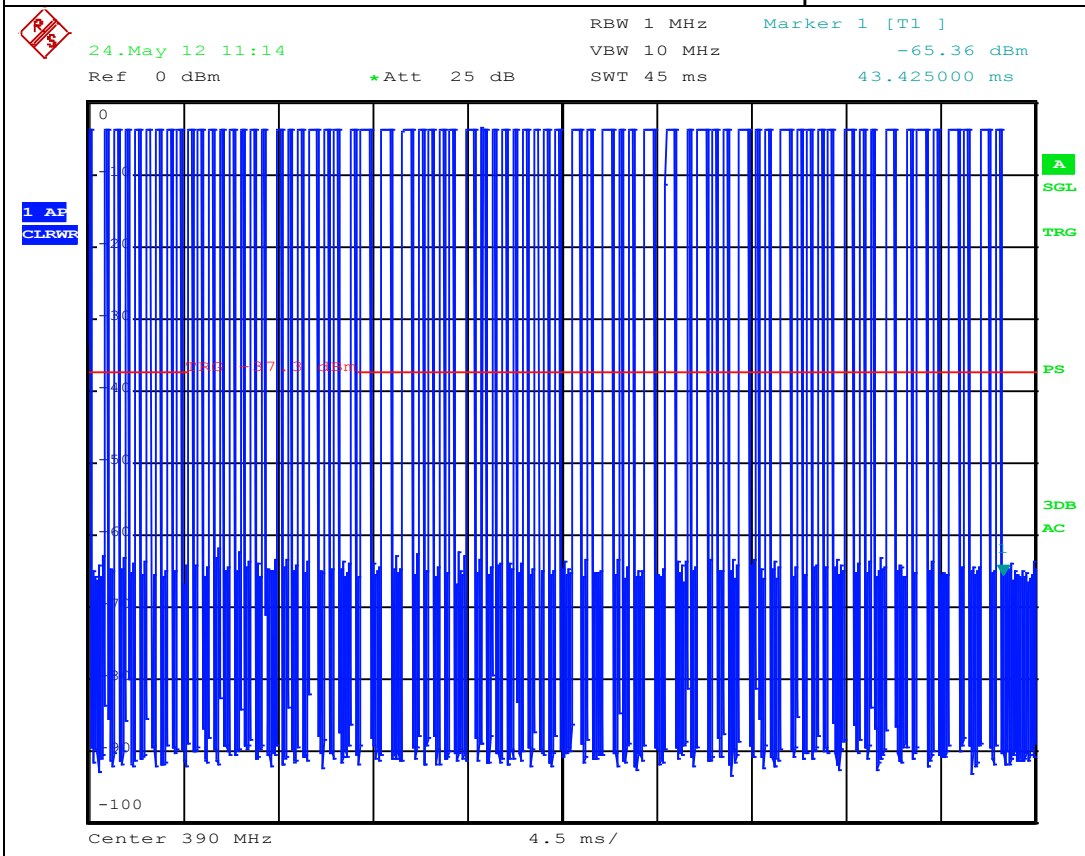
**Figure 12 Pulse Train Graphs for 390MHz**

390MHz Pulse Capture




Short Pulse: 0.260mS, Long Pulse: 0.508mS

Pulse Duration mS

| 390MHz Pulse Capture | |
|---|---|
|  <br># of Short Pulses: 53, # of Long Pulses: 17 | Number of Pulses |
| Period is the same as for 310MHz, (use 100mS for DC calculation) | Period |

### 4.4 Test Conditions and Results – RADIATED EMISSIONS Fundamental and Spurious

| | | | |
|---|---|---|---|
| Test Description | Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable. | | |
| Basic Standard | 47 CFR Part 15 subpart C, and RSS-210 | | |
| UL LPG | 80-EM-S0029 | | |
| | Frequency range | Measurement Point | |
| Fully configured sample scanned over the following frequency range | 30MHz – 1GHz | 3 meter distance | |
| | 1GHz – 4GHz | 3 meter distance | |

**Restricted Band Limits**

| Frequency (MHz) | Limit (dBµV/m) | |
|---|---|---|
| | Quasi-Peak | Peak |
| 30 - 88 | 40.00 | NA |
| 88 - 216 | 43.52 | NA |
| 216 - 960 | 46.02 | NA |
| 960 - 1000 | 54 | NA |
| Above 1000 (FCC) | NA | *54 (at 3-meter) |

**Fundamental Frequency Limits and Non-restricted band Harmonic Limits**

| Frequency (MHz) | Limit (dBµV/m) @ 3m distance | |
|---|---|---|
| | Average - Fundamental | Peak - Fundamental |
| 310 | 75.32 | 95.32 |
| 315 | 75.62 | 95.62 |
| 390 | 79.24 | 99.24 |

Supplementary information: *See section 4.3 for duty cycle information.

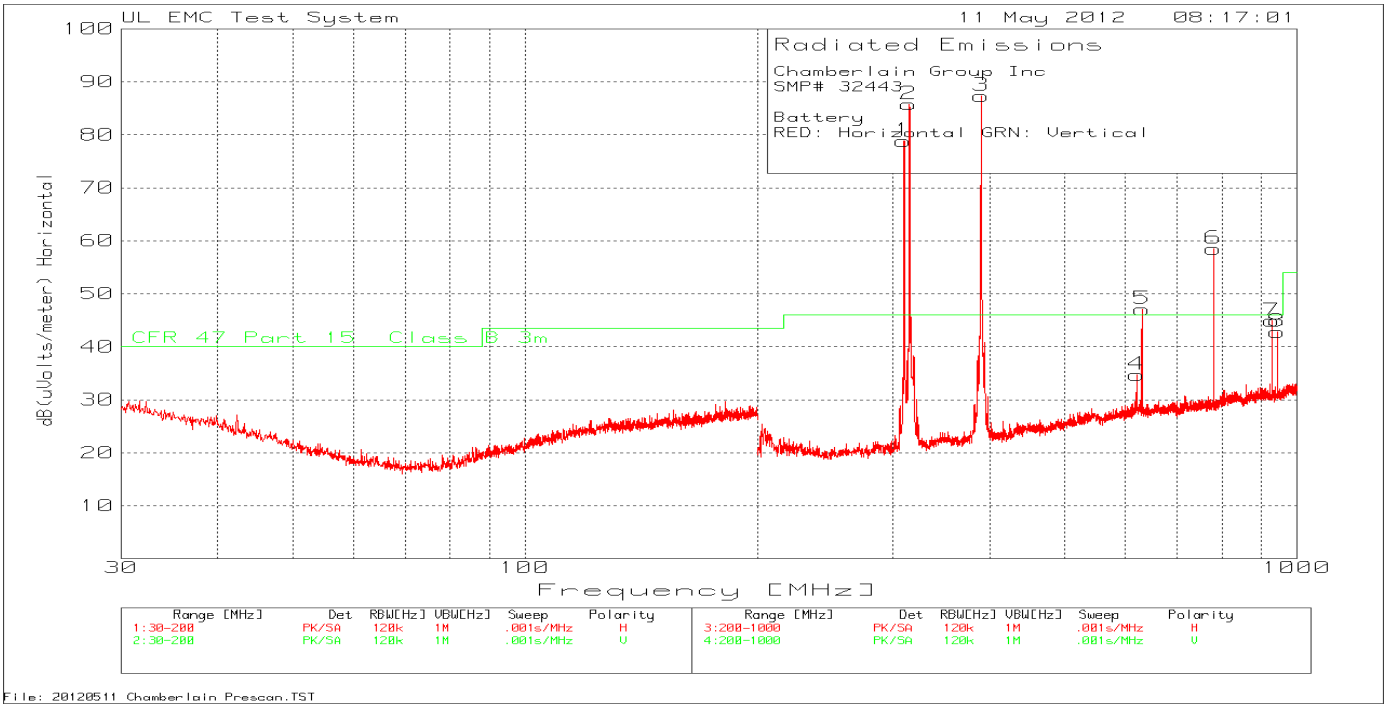
**Table 10 Radiated Emissions EUT Configuration Settings**

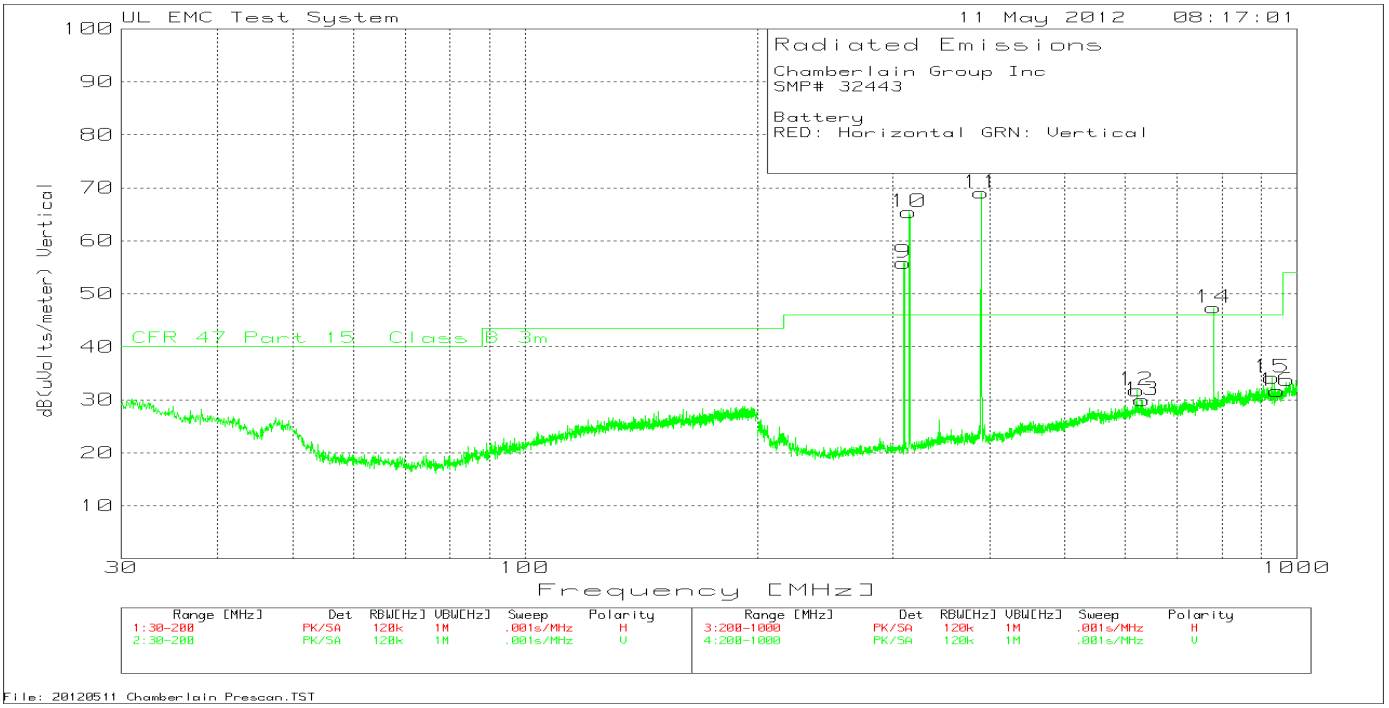
| Power Interface Mode # | EUT Configurations Mode # | EUT Operation Mode # |
|---|---|---|
| 1 | 1 | 1 |
| Supplementary information: None | | |

**Table 11 Radiated Emissions Test Equipment**

| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due Date |
|---|---|---|---|---|---|
| EMI Test Receiver | Rohde & Schwarz | ESU | EMC4323 | 20111228 | 20121231 |
| Bicon Antenna | Chase | VBA6106A | EMC4078 | 20120117 | 20130131 |
| Log-P Antenna | Chase | UPA6109 | EMC4313 | 20110929 | 20120629 |
| Spectrum Analyzer | Rhode & Schwarz | FSEK | EMC4182 | 20111227 | 20121231 |
| Antenna Array | UL | BOMS | EMC4276 | 20111227 | 20121231 |

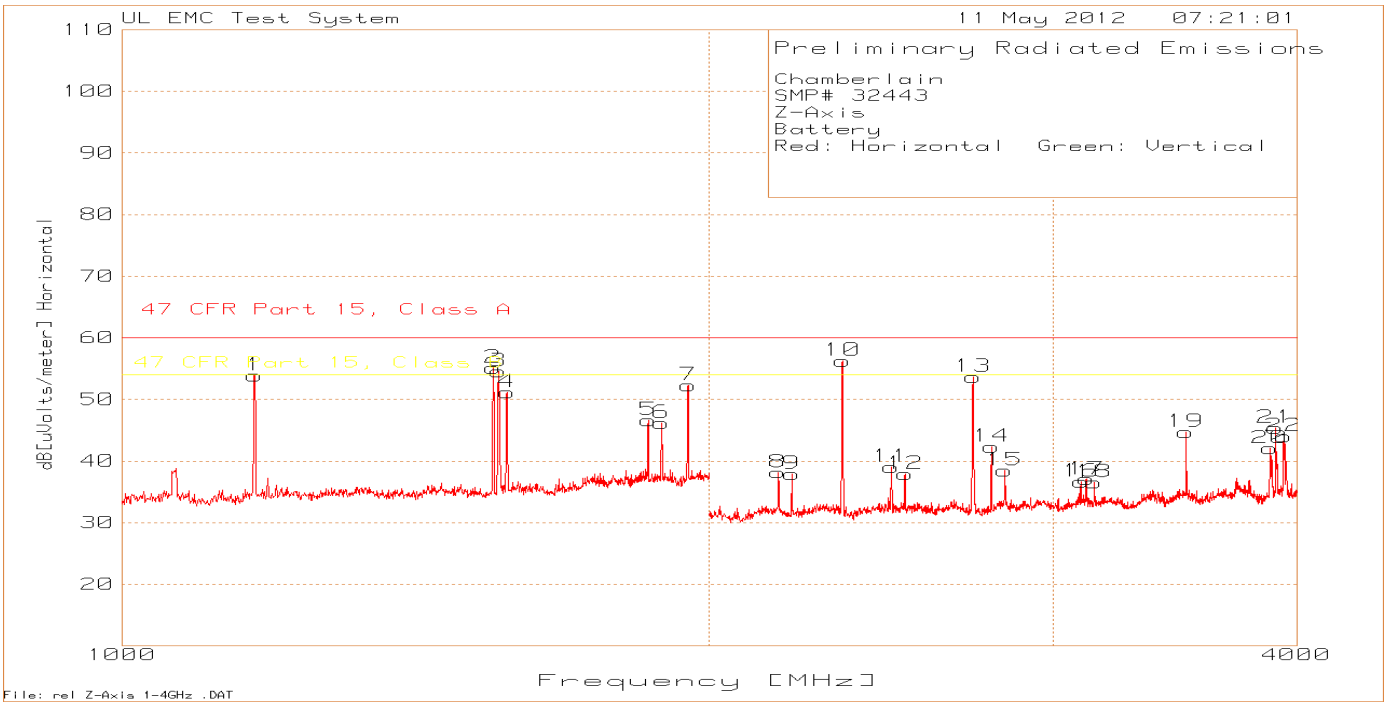
**Figure 13 Radiated Emissions Graph (Below 1GHz) for 310MHz, 315MHz, and 390MHz**

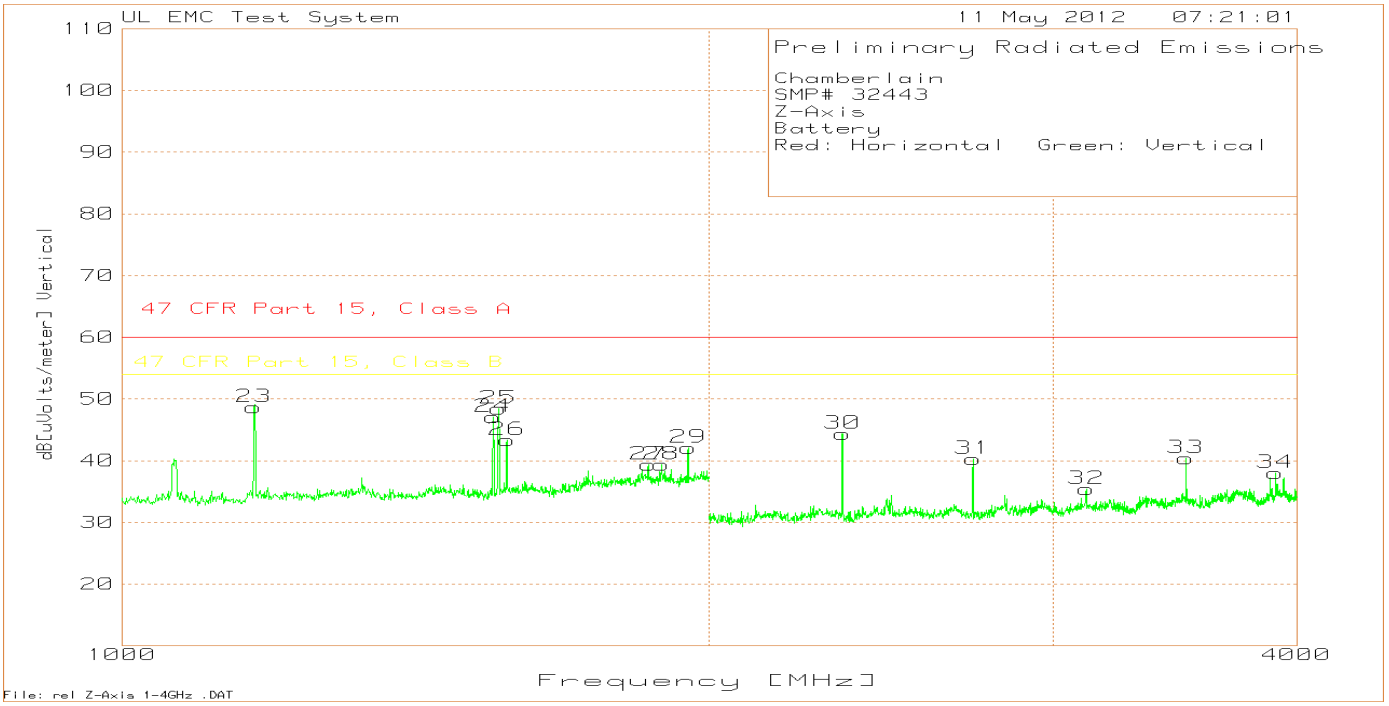



* Plots are included for visual reference only.

**Figure 14 Radiated Emissions Graph (Above 1GHz) for 310MHz, 315MHz, and 390MHz**




* Plots are included for visual reference only.

**Table 12- Maximized Worst Case Radiated Emissions Data Points**

| Test Frequency MHz | Meter Reading dBuV | Detector | Antenna Factor dB | Path Loss/Gain dB | Attenuator dB | Level dBuV/m | Duty Cycle Factor dB | Level with Duty Cycle dBuV/m | Limit dBuV/m | Margin | Azimuth [Degs] | Height [cm] | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 310.008803 | 52.16 | QP | 13.7 | 2.1 | 10 | 77.96 | -12.99 | 64.97 | 75.32 | -10.35 | 154 | 103 | Horz |
| 310.008803 | 52.66 | PK | 13.7 | 2.1 | 10 | 78.46 | -12.99 | 65.47 | 75.32 | -9.85 | 154 | 103 | Horz |
| 310.008803 | 30.3 | QP | 13.7 | 2.1 | 10 | 56.1 | -12.99 | 43.11 | 75.32 | -32.21 | 150 | 104 | Vert |
| 310.008803 | 31.54 | PK | 13.7 | 2.1 | 10 | 57.34 | -12.99 | 44.35 | 75.32 | -30.97 | 150 | 104 | Vert |
| 315.005597 | 58.94 | QP | 14 | 2.1 | 10 | 85.04 | -12.99 | 72.05 | 75.62 | -3.57 | 159 | 103 | Horz |
| 315.005597 | 59.4 | PK | 14 | 2.1 | 10 | 85.5 | -12.99 | 72.51 | 75.62 | -3.11 | 159 | 103 | Horz |
| 315.005597 | 36.87 | QP | 14 | 2.1 | 10 | 62.97 | -12.99 | 49.98 | 75.62 | -25.64 | 149 | 105 | Vert |
| 315.005597 | 37.75 | PK | 14 | 2.1 | 10 | 63.85 | -12.99 | 50.86 | 75.62 | -24.76 | 149 | 105 | Vert |
| 390.006395 | 57.55 | QP | 16 | 2.3 | 10 | 85.85 | -12.99 | 72.86 | 79.24 | -6.38 | 26 | 102 | Horz |
| 390.006395 | 58.01 | PK | 16 | 2.3 | 10 | 86.31 | -12.99 | 73.32 | 79.24 | -5.92 | 26 | 102 | Horz |
| 390.006395 | 34.82 | QP | 16 | 2.3 | 10 | 63.12 | -12.99 | 50.13 | 79.24 | -29.11 | 209 | 112 | Vert |
| 390.006395 | 35.74 | PK | 16 | 2.3 | 10 | 64.04 | -12.99 | 51.05 | 79.24 | -28.19 | 209 | 112 | Vert |
| 620.011218 | 1.08 | QP | 20.2 | 3 | 10.1 | 34.38 | -12.99 | 21.39 | 55.32 | -33.93 | 166 | 141 | Horz |
| 620.011218 | 6.25 | PK | 20.2 | 3 | 10.1 | 39.55 | -12.99 | 26.56 | 55.32 | -28.76 | 166 | 141 | Horz |
| 620.011218 | 0.69 | QP | 20.2 | 3 | 10.1 | 33.99 | -12.99 | 21 | 55.32 | -34.32 | 239 | 104 | Vert |
| 620.011218 | 6.09 | PK | 20.2 | 3 | 10.1 | 39.39 | -12.99 | 26.4 | 55.32 | -28.92 | 239 | 104 | Vert |
| 630.007292 | 0.58 | QP | 20.4 | 3 | 10.1 | 34.08 | -12.99 | 21.09 | 55.62 | -34.53 | 177 | 147 | Horz |
| 630.007292 | 6.76 | PK | 20.4 | 3 | 10.1 | 40.26 | -12.99 | 27.27 | 55.62 | -28.35 | 177 | 147 | Horz |
| 630.007292 | 0.6 | QP | 20.4 | 3 | 10.1 | 34.1 | -12.99 | 21.11 | 55.62 | -34.51 | 195 | 102 | Vert |
| 630.007292 | 6.63 | PK | 20.4 | 3 | 10.1 | 40.13 | -12.99 | 27.14 | 55.62 | -28.48 | 195 | 102 | Vert |
| 780.011013 | 21.69 | QP | 21.9 | 3.4 | 10.1 | 57.09 | -12.99 | 44.1 | 59.24 | -15.14 | 331 | 108 | Horz |
| 780.011013 | 22.94 | PK | 21.9 | 3.4 | 10.1 | 58.34 | -12.99 | 45.35 | 59.24 | -13.89 | 331 | 108 | Horz |
| 780.011013 | 13.34 | QP | 21.9 | 3.4 | 10.1 | 48.74 | -12.99 | 35.75 | 59.24 | -23.49 | 53 | 195 | Vert |
| 780.011013 | 15.48 | PK | 21.9 | 3.4 | 10.1 | 50.88 | -12.99 | 37.89 | 59.24 | -21.35 | 53 | 195 | Vert |
| 930.016018 | 7.47 | QP | 23.4 | 3.8 | 10.1 | 44.77 | -12.99 | 31.78 | 55.32 | -23.54 | 75 | 156 | Horz |
| 930.016018 | 10.94 | PK | 23.4 | 3.8 | 10.1 | 48.24 | -12.99 | 35.25 | 55.32 | -20.07 | 75 | 156 | Horz |
| 930.016018 | 1.39 | QP | 23.4 | 3.8 | 10.1 | 38.69 | -12.99 | 25.7 | 55.32 | -29.62 | 165 | 121 | Vert |
| 930.016018 | 6.57 | PK | 23.4 | 3.8 | 10.1 | 43.87 | -12.99 | 30.88 | 55.32 | -24.44 | 165 | 121 | Vert |
| 945.012703 | 5.3 | QP | 23.5 | 3.8 | 10.1 | 42.7 | -12.99 | 29.71 | 55.62 | -25.91 | 83 | 151 | Horz |
| 945.012703 | 9.29 | PK | 23.5 | 3.8 | 10.1 | 46.69 | -12.99 | 33.7 | 55.62 | -21.92 | 83 | 151 | Horz |
| 945.012703 | 0.44 | QP | 23.5 | 3.8 | 10.1 | 37.84 | -12.99 | 24.85 | 55.62 | -30.77 | 159 | 119 | Vert |
| 945.012703 | 6.25 | PK | 23.5 | 3.8 | 10.1 | 43.65 | -12.99 | 30.66 | 55.62 | -24.96 | 159 | 119 | Vert |
| 1170.015 | 90.14 | PK | 24.8 | -57.24 | 0 | 57.7 | -12.99 | 44.71 | 54 | -9.29 | 99 | 132 | Horz |
| 1550.0451 | 82.62 | PK | 25.2 | -56.02 | 0 | 51.8 | -12.99 | 38.81 | 54 | -15.19 | 268 | 142 | Horz |
| 1560.2615 | 85.79 | PK | 25.2 | -55.65 | 0 | 55.34 | -12.99 | 42.35 | 54 | -11.65 | 62 | 100 | Horz |
| 1559.9008 | 88.15 | PK | 25.2 | -55.67 | 0 | 57.68 | -12.99 | 44.69 | 54 | -9.31 | 62 | 104 | Horz |
| 1575.021 | 80.6 | PK | 25.3 | -55.29 | 0 | 50.61 | -12.99 | 37.62 | 54 | -16.38 | 75 | 102 | Horz |
| 1949.9489 | 81.34 | PK | 27.4 | -54.39 | 0 | 54.35 | -12.99 | 41.36 | 54 | -12.64 | 161 | 115 | Horz |
| 1170.015 | 84.58 | PK | 24.8 | -57.24 | 0 | 52.14 | -12.99 | 39.15 | 54 | -14.85 | 164 | 175 | Vert |
| 1560.3337 | 81.98 | PK | 25.2 | -55.65 | 0 | 51.53 | -12.99 | 38.54 | 54 | -15.46 | 334 | 167 | Vert |
| 2340.003 | 88.37 | PK | 21.7 | -52.86 | 0 | 57.21 | -12.99 | 44.22 | 54 | -9.78 | 157 | 100 | Horz |
| 2729.8347 | 84.39 | PK | 22.1 | -52.27 | 0 | 54.22 | -12.99 | 41.23 | 54 | -12.77 | 344 | 100 | Horz |

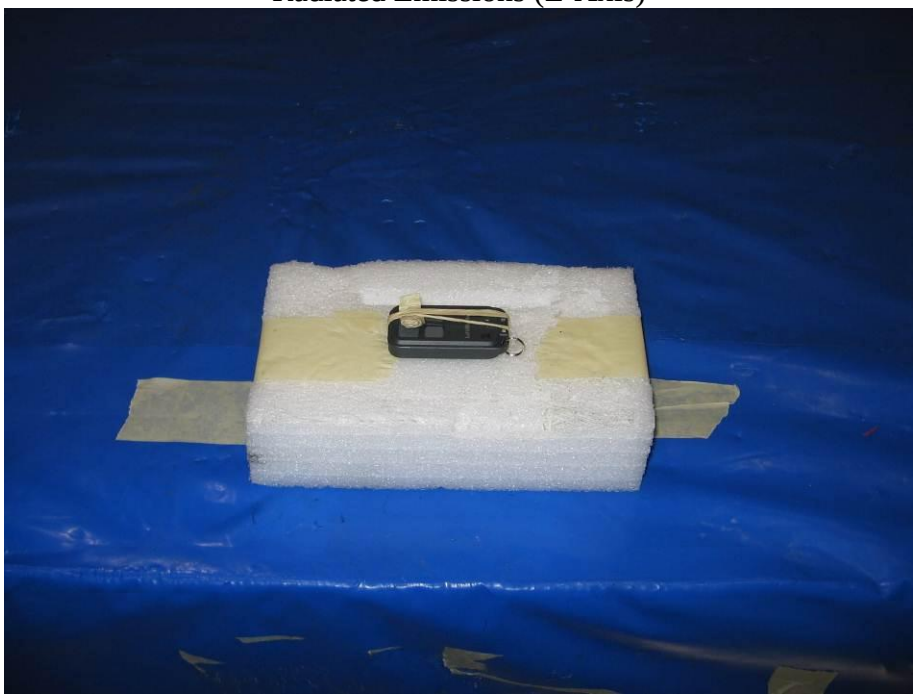
**Table 13- Above 1GHz Marker peak data (all points with less than 6dB margin were maximized above).**

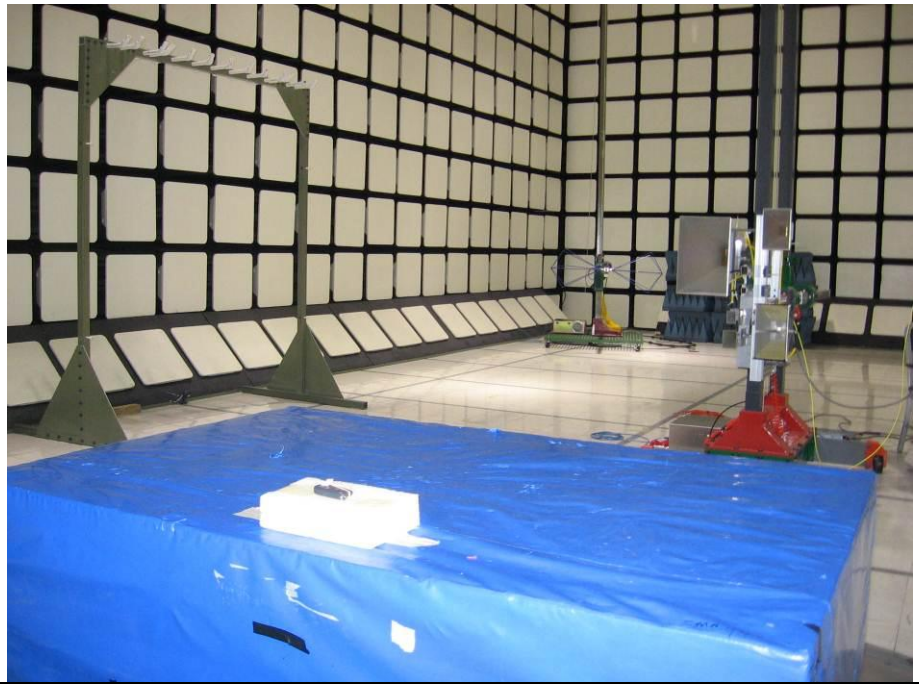
| Test Frequency MHz | Meter Reading dBuV | Detector | Antenna Factor dB | Path Loss/Gain dB | Level dBuV/m | Duty Cycle Factor dB | Level with Duty Cycle dBuV/m | Limit dBuV/m | Margin | Height [cm] | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1170.17 | 86.34 | PK | 24.8 | -57.23 | 53.91 | -12.99 | 40.92 | 54 | -13.08 | 150 | Horz |
| 1550.551 | 85.91 | PK | 25.2 | -56.02 | 55.09 | -12.99 | 42.1 | 54 | -11.9 | 100 | Horz |
| 1560.561 | 84.96 | PK | 25.2 | -55.64 | 54.52 | -12.99 | 41.53 | 54 | -12.47 | 100 | Horz |
| 1575.576 | 81.15 | PK | 25.3 | -55.28 | 51.17 | -12.99 | 38.18 | 54 | -15.82 | 100 | Horz |
| 1860.861 | 73.87 | PK | 27.2 | -54.44 | 46.63 | -12.99 | 33.64 | 54 | -20.36 | 150 | Horz |
| 1889.89 | 73.07 | PK | 27.4 | -54.3 | 46.17 | -12.99 | 33.18 | 54 | -20.82 | 150 | Horz |
| 1950.951 | 79.28 | PK | 27.4 | -54.39 | 52.29 | -12.99 | 39.3 | 54 | -14.7 | 150 | Horz |
| 2169.446 | 69.02 | PK | 21.7 | -52.53 | 38.19 | -12.99 | 25.2 | 54 | -28.8 | 100 | Horz |
| 2204.136 | 69.37 | PK | 21.8 | -53.23 | 37.94 | -12.99 | 24.95 | 54 | -29.05 | 100 | Horz |
| 2340.227 | 87.46 | PK | 21.7 | -52.86 | 56.3 | -12.99 | 43.31 | 54 | -10.69 | 100 | Horz |
| 2478.986 | 69.26 | PK | 22 | -52.2 | 39.06 | -12.99 | 26.07 | 54 | -27.93 | 100 | Horz |
| 2520.347 | 68.14 | PK | 22.1 | -52.34 | 37.9 | -12.99 | 24.91 | 54 | -29.09 | 100 | Horz |
| 2729.82 | 83.88 | PK | 22.1 | -52.27 | 53.71 | -12.99 | 40.72 | 54 | -13.28 | 100 | Horz |
| 2789.86 | 71.72 | PK | 22.2 | -51.64 | 42.28 | -12.99 | 29.29 | 54 | -24.71 | 100 | Horz |
| 2835.223 | 67.3 | PK | 22.3 | -51.13 | 38.47 | -12.99 | 25.48 | 54 | -28.52 | 100 | Horz |
| 3100.734 | 64.89 | PK | 22.6 | -50.84 | 36.65 | -12.99 | 23.66 | 54 | -30.34 | 100 | Horz |
| 3120.747 | 65.6 | PK | 22.7 | -51.24 | 37.06 | -12.99 | 24.07 | 54 | -29.93 | 100 | Horz |
| 3150.1 | 65.56 | PK | 22.9 | -51.9 | 36.56 | -12.99 | 23.57 | 54 | -30.43 | 100 | Horz |
| 3510.34 | 71.99 | PK | 23.5 | -50.73 | 44.76 | -12.99 | 31.77 | 54 | -22.23 | 100 | Horz |
| 3875.917 | 70.18 | PK | 23.9 | -52.03 | 42.05 | -12.99 | 29.06 | 54 | -24.94 | 100 | Horz |
| 3901.268 | 73.74 | PK | 23.8 | -52.14 | 45.4 | -12.99 | 32.41 | 54 | -21.59 | 100 | Horz |
| 3938.626 | 72.02 | PK | 24 | -52.03 | 43.99 | -12.99 | 31 | 54 | -23 | 100 | Horz |
| 1169.169 | 81.05 | PK | 24.8 | -57.22 | 48.63 | -12.99 | 35.64 | 54 | -18.36 | 100 | Vert |
| 1550.551 | 77.89 | PK | 25.2 | -56.02 | 47.07 | -12.99 | 34.08 | 54 | -19.92 | 100 | Vert |
| 1560.561 | 78.87 | PK | 25.2 | -55.64 | 48.43 | -12.99 | 35.44 | 54 | -18.56 | 100 | Vert |
| 1575.576 | 73.28 | PK | 25.3 | -55.28 | 43.3 | -12.99 | 30.31 | 54 | -23.69 | 100 | Vert |
| 1860.861 | 66.58 | PK | 27.2 | -54.44 | 39.34 | -12.99 | 26.35 | 54 | -27.65 | 100 | Vert |
| 1889.89 | 66.25 | PK | 27.4 | -54.3 | 39.35 | -12.99 | 26.36 | 54 | -27.64 | 100 | Vert |
| 1950.951 | 69.08 | PK | 27.4 | -54.39 | 42.09 | -12.99 | 29.1 | 54 | -24.9 | 100 | Vert |
| 2340.227 | 75.53 | PK | 21.7 | -52.86 | 44.37 | -12.99 | 31.38 | 54 | -22.62 | 150 | Vert |
| 2729.82 | 70.49 | PK | 22.1 | -52.27 | 40.32 | -12.99 | 27.33 | 54 | -26.67 | 150 | Vert |
| 3120.747 | 63.91 | PK | 22.7 | -51.24 | 35.37 | -12.99 | 22.38 | 54 | -31.62 | 101 | Vert |
| 3510.34 | 67.59 | PK | 23.5 | -50.73 | 40.36 | -12.99 | 27.37 | 54 | -26.63 | 150 | Vert |
| 3901.268 | 66.34 | PK | 23.8 | -52.14 | 38 | -12.99 | 25.01 | 54 | -28.99 | 101 | Vert |

## Appendix A

### Test Setup Photos

Radiated Emissions (Z-Axis)





Near Field Measurements

## Appendix B

**Accreditations and Authorizations**

NVLAP Lab code: 100414-0

NVLAP: The National Institute of Standards and Technology (NIST) administers the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP is comprised of laboratory accreditation programs (LAPs) which are established on the basis of requests and demonstrated need. Each LAP includes specific calibration and/or test standards and related methods and protocols assembled to satisfy the unique needs for accreditation in a field of testing or calibration. NVLAP accredits public and private laboratories based on evaluation of their technical qualifications and competence to carry out specific calibrations or tests. Accreditation criteria are established in accordance with the U.S. Code of Federal Regulations (CFR, Title 15, Part 285), NVLAP Procedures and General Requirements, and encompass the requirements of ISO/IEC 17025. For a full scope listing see http://ts.nist.gov/standards/scopes/1004140.htm

FCC: Details of the measurement facilities used for these tests have been filed with the Federal Communications Commission's Laboratory in Columbia, Maryland (Ref. No. 91044).

Industry Canada Industrie Canada

Industry of Canada: Accredited by Industry Canada for performance of radiated measurements. Our test site complies with RSP 100, Issue 7, Section 3.3. File #: IC 2180

VCCI: Accepted as an Associate Member to the VCCI. The measurement facilities detailed in this test report have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. Registration Nos.: Radiated Emissions R-621, Conducted Emissions C-642.

ICASA: ICASA (Independent Communications Authority of South Africa) has appointed UL as a Designated Test Laboratory to test Telecommunications equipment for type approval in compliance with CISPR 22 to assist in fulfilling its mandate under section 54(1) of the Telecommunications Act, 1996 (Act 103 of 1996).

NIST/CAB: Validated by the European Commission as a U.S. Conformity Assessment Body (CAB) of the U.S.-EU Mutual Recognition Agreement (MRA) for the Electromagnetic Compatibility - Council Directive 2004/108/EC, Annex III (2-3). Also validated for the Telecommunication Equipment-Council Directive 99/5/EC, Annex III and IV, Identification Number: 0983.
NIST/CAB: Provisioned to act as a U.S. Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the Asia Pacific Economic Cooperation (APEC) MRA between the American Institute in Taiwan (AIT) and the United States. Our laboratory is considered qualified to test equipment subject to the applicable EMC regulations of the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) which require testing to CNS 13438 (CISPR 22).
NIST/CAB: Recognized by the Infocomm Development Authority of Singapore (IDA) under the Asia Pacific Economic Cooperation Mutual Recognition Agreement (APEC MRA). Our laboratory is provisionally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA. Our scope of designation includes IDA TS EMC (CISPR 22), IEC 61000-4-2, -4-3, -4-4, -4-5, and -4-6