



**FCC 47 CFR PART 15 SUBPART C  
INDUSTRY CANADA RSS-247 ISSUE 2**

**CERTIFICATION TEST C2PC REPORT**

**FOR**

**RF ID Reader**

**MODEL NUMBER: HD5000**

**FCC ID: YGP5000-01  
IC: 9016A-HD5000A**

**REPORT NUMBER: 1160223-E4**

**ISSUE DATE: 2017-04-19**

*Prepared for*  
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NEW BREMEN, OH 45869 USA**

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**NVLAP LAB CODE 200246-0**

Revision History

| <u>Ver.</u> | <u>Issue Date</u> | <u>Revisions</u>                                                                                                                                   | <u>Revised By</u>        |
|-------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <u>1</u>    | <u>2017-03-31</u> | <u>Initial Issue</u>                                                                                                                               | <u>Richard Jankovics</u> |
|             |                   | Updated IC company number.<br>Updated Class II Permissive Change section. Updated company address.<br>Added excerpt for below 30 MHz measurements. |                          |
| <u>2</u>    | <u>2017-04-19</u> | <u>Updated KDB referenced for below 30 MHz to 414788.</u>                                                                                          | <u>Richard Jankovics</u> |
| <u>3</u>    | <u>2017-05-11</u> |                                                                                                                                                    | <u>Richard Jankovics</u> |

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## 1. CLASS II PERMISSIVE CHANGE

### 1.1. INTRODUCTION

The following changes have been made to the HD5000 under FCC ID: YGP5000-01. Based on the changes made by the manufacturer, only radiated spurious emissions was performed under this evaluation. The 15.215 antenna port conducted data for FCC ID: YGP5000-01 is represented by the results of the original grant, test report 10766018B.

Crown Equipment Corp takes full responsibility that the data as referenced in FCC ID: YGP5000-01, test report 10766018B represent compliance for this model.

### 1.2. DIFFERENCES

According to manufacturer, changes to FCC ID: YGP5000-01 include:

#### RFID board

- The transmit section has not changed since last certification.
- The receive side has changed some resistor values to help with Reverse power detection.

#### Control board

- Board has power supply pads that were not populated and removed to allow room.
- Jumper wire for input power was removed and input protection circuitry was added to allow for protection against voltage spikes and mis-wiring
- CAN circuitry was changed to allow less loading on the CAN communication lines.
- Circuitry added to be able to drive confidence tags separately of either antenna. Currently not being used.
- Connection to frame capacitor was removed to help reduce truck noise effecting diagnostics.

#### Antenna

- Antenna material was changed to a Rodgers 4835 from a Rodgers 3035 to allow for easier manufacturing.
- Patch size was changed slightly to allow for the difference in dielectric constant of the new material.
- Additional resistor was added to help with impedance matching to RFID radio board with the new material.
- Two capacitors were added to help with antenna tuning with the new material.
- Two sides of the antenna were changed to allow for better communication with the passive RFID tags internal to the antenna

Confidence tag

- Confidence tag ground plane was connected to truck frame to allow for more consistent reading of the confidence tag in presence of truck electrical noise generated by the electrical system.

No changes to the power output level of the system was done.

### **1.3. TESTING PERFORMED**

Testing performed under this report for FCC ID: YGP5000-01 contains radiated spurious emissions.

## 2. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** CROWN EQUIPMENT CORP  
44 SOUTH WASHINGTON STREET  
NEW BREMEN, OH 45869 USA

**EUT DESCRIPTION:** RF ID Reader

**MODEL:** HD5000

**SERIAL NUMBER:** 20170109-001

**DATE TESTED:** 2017-03-09 - 2017-03-10

| APPLICABLE STANDARDS            |              |
|---------------------------------|--------------|
| STANDARD                        | TEST RESULTS |
| CFR 47 Part 15 Subpart C        | Pass         |
| INDUSTRY CANADA RSS-247 Issue 2 | Pass         |
| INDUSTRY CANADA RSS-GEN Issue 4 | Pass         |

UL LLC 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 LLC 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.

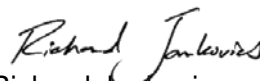
**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC 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, or any agency of the U.S. Government.

Approved & Released  
For UL LLC By:

Prepared By:



Jeff Moser  
EMC Program Manager  
UL – Consumer Technology Division



Richard Jankovics  
WiSE Engineer  
UL – Consumer Technology Division

### 3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 15, ANSI C63.10-2013, RSS-GEN Issue 4, RSS-247 Issue 2.

### 4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Dr., Research Triangle Park, NC 27709, USA and 2800 Suite B, Perimeter Park Drive, Morrisville, NC 27560.

|                                  |           |
|----------------------------------|-----------|
| 12 Laboratory Dr., RTP, NC 27709 |           |
| <input type="checkbox"/>         | Chamber A |
| <input type="checkbox"/>         | Chamber C |

|                                                           |               |
|-----------------------------------------------------------|---------------|
| 2800 Suite B Perimeter Park Dr.,<br>Morrisville, NC 27560 |               |
| <input checked="" type="checkbox"/>                       | Chamber NORTH |
| <input type="checkbox"/>                                  | Chamber SOUTH |

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0. The full scope of accreditation can be viewed at <http://www.nist.gov/nvlap/>.

### 5. CALIBRATION AND UNCERTAINTY

#### 5.1. 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.

#### 5.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

### 5.3. MEASUREMENT UNCERTAINTY

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

| PARAMETER                            | UNCERTAINTY   |
|--------------------------------------|---------------|
| All emissions, radiated up to 10 GHz | $\pm 5.36$ dB |

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

## 6. EQUIPMENT UNDER TEST

### 6.1. DESCRIPTION OF EUT

The EUT is an RF ID reader with two radios and two antennas. Simultaneous operation is possible when both radios happen to hop to the same channels. It is used to read tags built into warehouse aisles to allow for automation in steering warehouse forklift trucks.

The radio module is manufactured by Crown Equipment.

### 6.2. 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 Ant1           | DSB  | 26.16                   | 413.05               |
| 902 - 928 Ant2           | DSB  | 27.50                   | 562.34               |

\* Per report 10766018A

### 6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes two patch antennas. Each antenna has maximum gain of 5.0 dBi.

### 6.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 156190-900-03.

The EUT driver software installed in the host support equipment during testing was Indy\_Mac\_Firmware\_2.6.0.

The test utility software used during testing was RFID\_PC\_4.3.0.0.

The software power setting was at 251.

## 6.5. WORST-CASE CONFIGURATION AND MODE

The EUT in normal use will be installed in single orientation with antennas pointing down. Radiated emissions measurements were conducted in simulated setup – see photos.

## 6.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| Support Equipment List    |                     |             |                          |
|---------------------------|---------------------|-------------|--------------------------|
| Description               | Manufacturer        | Model       | Serial Number            |
| PCAN USB Adapter          | PEAK-System Technik | IPEH-002022 | 79233                    |
| DC Regulated Power Supply | Circuit Specialists | CSI3005X5   | NA                       |
| Laptop                    | Dell                | E5430       | 211641                   |
| Power Adapter             | Dell                | LA90PS1-00  | CN-0DF315-71615-95G-0DD1 |

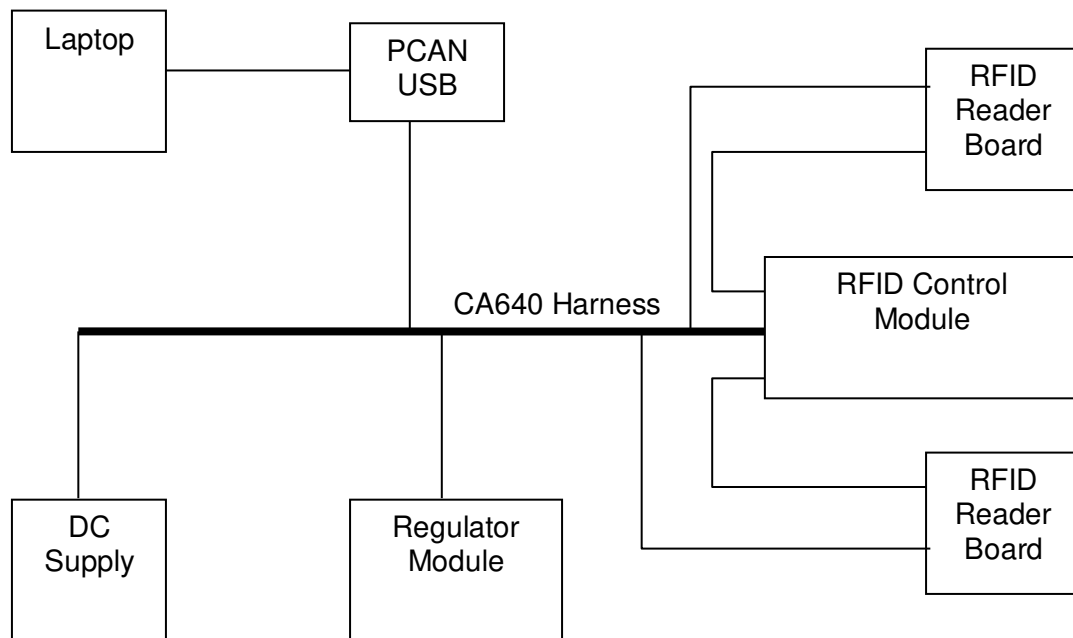
### I/O CABLES

| I/O Cable List |                   |                      |                |                  |                  |                                                                               |
|----------------|-------------------|----------------------|----------------|------------------|------------------|-------------------------------------------------------------------------------|
| Cable No       | Port              | # of identical ports | Connector Type | Cable Type       | Cable Length (m) | Remarks                                                                       |
| 1              | CA640 port        | 1                    | custom         | stranded         | 4.6              | Wiring Harness to power supply, RFID Reader Boards, Regulator Module, CAN bus |
| 2              | CA641/CA642       | 2                    | custom         | stranded         | 0.2              | To Antenna Interface of RFID Reader Board                                     |
| 4              | Antenna Interface | 2                    | SMA            | 50 $\Omega$ coax | 0.6              | To CA641 or CA642 of RFID Control Module                                      |
| 5              | JC611/JC616       | 2                    | custom         | stranded         | 0.3 / 0.6        | To CA640 port of RFID Control Module                                          |

### TEST SETUP

The EUT connected to a computer via the CAN to USB to a laptop computer. The laptop computer is running software exercising the radio.

**SETUP DIAGRAM FOR TESTS**



## 7. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - North Chamber)

| Equip. ID     | Description                                       | Manufacturer         | Model Number           | Last Cal.  | Next Cal.  |
|---------------|---------------------------------------------------|----------------------|------------------------|------------|------------|
|               | <b>30-1000 MHz</b>                                |                      |                        |            |            |
| AT0073        | Hybrid Broadband Antenna                          | Sunol Sciences Corp. | JB3                    | 2016-06-27 | 2017-06-30 |
|               | <b>1-18 GHz</b>                                   |                      |                        |            |            |
| AT0072        | Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz | ETS Lindgren         | 3117                   | 2016-03-07 | 2017-03-31 |
|               | <b>Tuned Dipole Set</b>                           |                      |                        |            |            |
| AT0013-AT0016 | Four Dipole Antenna Set, 30 to 1000 MHz           | EMCO                 | 3121C-DB-1, -2, -3, -4 | 2016-06-14 | 2017-06-30 |
|               | <b>Gain-Loss Chains</b>                           |                      |                        |            |            |
| N-SAC02       | Gain-loss string: 30-1000MHz                      | Various              | Various                | 2016-06-26 | 2017-06-30 |
| N-SAC03       | Gain-loss string: 1-18GHz                         | Various              | Various                | 2016-08-28 | 2017-08-28 |
|               | <b>Receiver &amp; Software</b>                    |                      |                        |            |            |
| SA0026        | Spectrum Analyzer                                 | Agilent              | N9030A                 | 2017-02-17 | 2018-07-28 |
| SOFTEMI       | EMI Software                                      | UL                   | Version 9.5            | NA         | NA         |

## 8. RADIATED TEST RESULTS

### 8.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.205 and §15.209

IC RSS-GEN Clause 8.9 (Transmitter)

IC RSS-GEN Clause 7.1.2 (Receiver)

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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

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

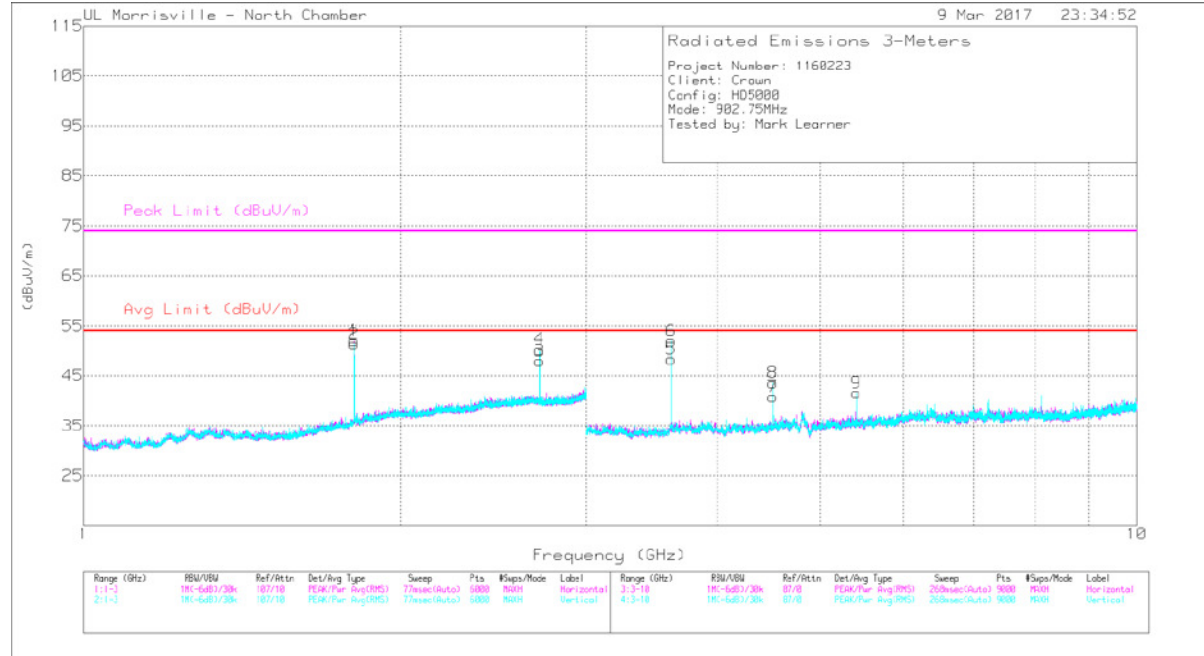
§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the field strength from µV/m to dBuV/m is:

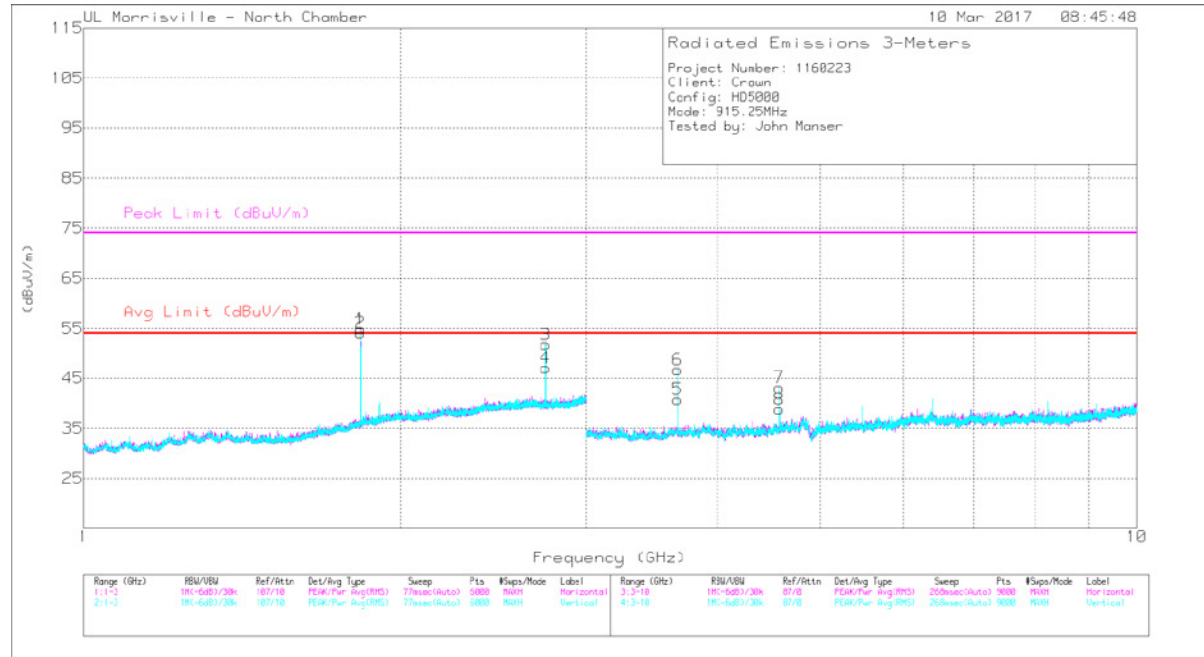
Limit (dBuV/m) = 20 log limit (µV/m)

## 8.2. RADIATED EMISSIONS ABOVE 1 GHz

### Low Channel



## Middle Channel



| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF AT0072 (dB/m) | Amp/Cbl/ Ftr/Pad (dB) | HPF (dB) | DCCF (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|------------------|-----------------------|----------|-----------|----------------------------|--------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 4      | * 2.746         | 41.8                 | Pk  | 32.1             | -23.9                 | 0.6      | 0         | 50.6                       | -                  | -           | 74                  | -23.4          | 256            | 113         | H        |
|        | * 2.746         | 41.8                 | Av  | 32.1             | -23.9                 | 0.6      | -8.4      | 42.2                       | 54                 | -11.8       | -                   | -              | 256            | 113         | H        |
| 3      | * 2.746         | 46.26                | Pk  | 32.1             | -23.9                 | 0.6      | 0         | 55.06                      | -                  | -           | 74                  | -18.94         | 134            | 148         | V        |
|        | * 2.746         | 46.26                | Av  | 32.1             | -23.9                 | 0.6      | -8.4      | 46.66                      | 54                 | -7.34       | -                   | -              | 134            | 148         | V        |
| 5      | * 3.661         | 45.14                | Pk  | 33.1             | -31.7                 | 0.4      | 0         | 46.94                      | -                  | -           | 74                  | -27.06         | 205            | 115         | H        |
|        | * 3.661         | 45.14                | Av  | 33.1             | -31.7                 | 0.4      | -8.4      | 38.54                      | 54                 | -15.46      | -                   | -              | 205            | 115         | H        |
| 8      | * 4.576         | 44.66                | Pk  | 34               | -32.4                 | 0.4      | 0         | 46.66                      | -                  | -           | 74                  | -27.34         | 160            | 312         | H        |
|        | * 4.576         | 44.66                | Av  | 34               | -32.4                 | 0.4      | -8.4      | 38.26                      | 54                 | -15.74      | -                   | -              | 160            | 312         | H        |
| 6      | * 3.661         | 49.07                | Pk  | 33.1             | -31.7                 | 0.4      | 0         | 50.87                      | -                  | -           | 74                  | -23.13         | 154            | 235         | V        |
|        | * 3.661         | 49.07                | Av  | 33.1             | -31.7                 | 0.4      | -8.4      | 42.47                      | 54                 | -11.53      | -                   | -              | 154            | 235         | V        |
| 7      | * 4.576         | 45.71                | Pk  | 34               | -32.4                 | 0.4      | 0         | 47.71                      | -                  | -           | 74                  | -26.29         | 176            | 106         | V        |
|        | * 4.576         | 45.71                | Av  | 34               | -32.4                 | 0.4      | -8.4      | 39.31                      | 54                 | -14.69      | -                   | -              | 176            | 106         | V        |
| 1      | 1.83            | 48.25                | Pk  | 30.6             | -24.5                 | 0.5      |           | 54.85                      | -                  | -           | -                   | -              | 0-360          | 102         | H        |
| 2      | 1.83            | 47.46                | Pk  | 30.6             | -24.5                 | 0.5      |           | 54.06                      | -                  | -           | -                   | -              | 0-360          | 199         | V        |

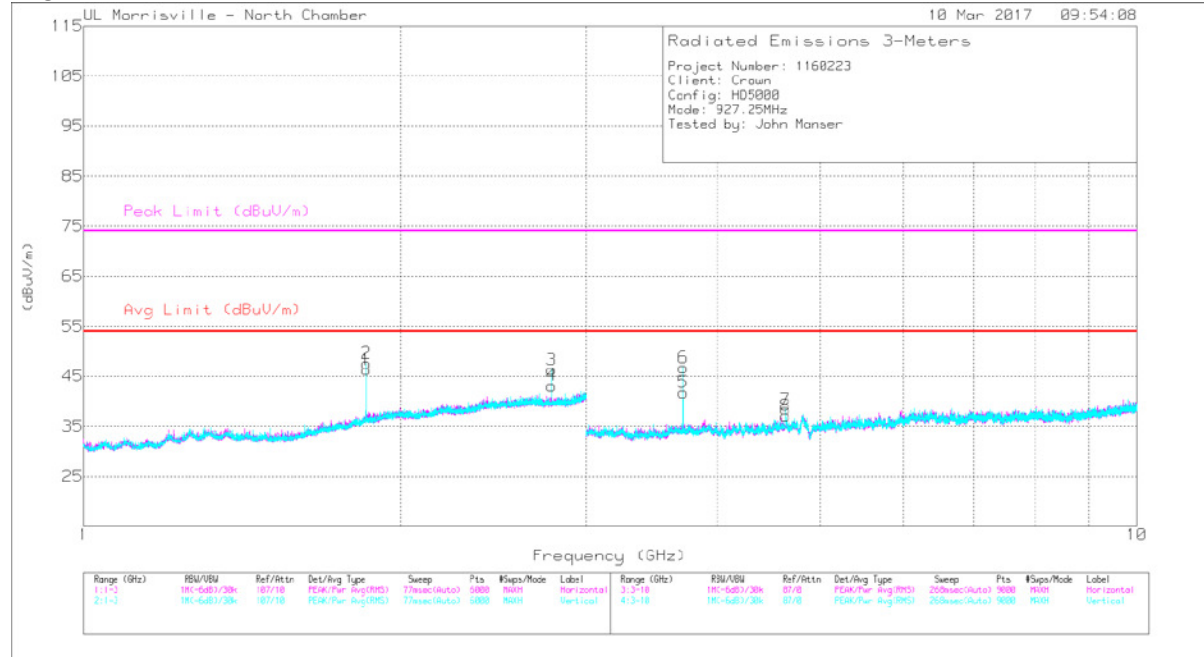
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Av - Average value computed per FCC 15.35(c) based on dwell time measured in section 7.5 of UL report 10766018A, dated 10/09/2015. The average value is computed as follows:

$$Av = Pk + 20 \cdot \log(\text{dwell-time}/100\text{ms}) = Pk + 20 \cdot \log(37.98\text{ms}/100\text{ms}) = Pk - 8.4\text{dB}$$

## High Channel



| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF AT0072 (dB/m) | Amp/Cbl/ Fltr/Pad (dB) | HPF (dB) | DCCF (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|------------------|------------------------|----------|-----------|----------------------------|--------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 4      | * 2.782         | 39.31                | Pk  | 32.1             | -23.9                  | 0.6      | 0         | 48.11                      | -                  | -           | 74                  | -25.89         | 262            | 104         | H        |
|        | * 2.782         | 39.31                | Av  | 32.1             | -23.9                  | 0.6      | -8.4      | 39.71                      | 54                 | -14.29      | -                   | -              | 262            | 104         | H        |
| 3      | * 2.782         | 42.54                | Pk  | 32.1             | -23.9                  | 0.6      | 0         | 51.34                      | -                  | -           | 74                  | -22.66         | 127            | 110         | V        |
|        | * 2.782         | 42.54                | Av  | 32.1             | -23.9                  | 0.6      | -8.4      | 42.94                      | 54                 | -11.06      | -                   | -              | 127            | 110         | V        |
| 5      | * 3.709         | 45.52                | Pk  | 33.3             | -32.4                  | 0.4      | 0         | 46.82                      | -                  | -           | 74                  | -27.18         | 199            | 398         | H        |
|        | * 3.709         | 45.52                | Av  | 33.3             | -32.4                  | 0.4      | -8.4      | 38.42                      | 54                 | -15.58      | -                   | -              | 199            | 398         | H        |
| 8      | * 4.636         | 42.88                | Pk  | 34.1             | -32.8                  | 0.4      | 0         | 44.58                      | -                  | -           | 74                  | -29.42         | 175            | 258         | H        |
|        | * 4.636         | 42.88                | Av  | 34.1             | -32.8                  | 0.4      | -8.4      | 36.18                      | 54                 | -17.82      | -                   | -              | 175            | 258         | H        |
| 6      | * 3.709         | 48.16                | Pk  | 33.3             | -32.4                  | 0.4      | 0         | 49.46                      | -                  | -           | 74                  | -24.54         | 153            | 262         | V        |
|        | * 3.709         | 48.16                | Av  | 33.3             | -32.4                  | 0.4      | -8.4      | 41.06                      | 54                 | -12.94      | -                   | -              | 153            | 262         | V        |
| 7      | * 4.636         | 42.25                | Pk  | 34.1             | -32.8                  | 0.4      | 0         | 43.95                      | -                  | -           | 74                  | -30.05         | 171            | 106         | V        |
|        | * 4.636         | 42.25                | Av  | 34.1             | -32.8                  | 0.4      | -8.4      | 35.55                      | 54                 | -18.45      | -                   | -              | 171            | 106         | V        |
| 1      | 1.854           | 39.31                | Pk  | 30.9             | -24.4                  | 0.5      |           | 46.31                      | -                  | -           | -                   | -              | 0-360          | 199         | H        |
| 2      | 1.854           | 40.63                | Pk  | 30.9             | -24.4                  | 0.5      |           | 47.63                      | -                  | -           | -                   | -              | 0-360          | 199         | V        |

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

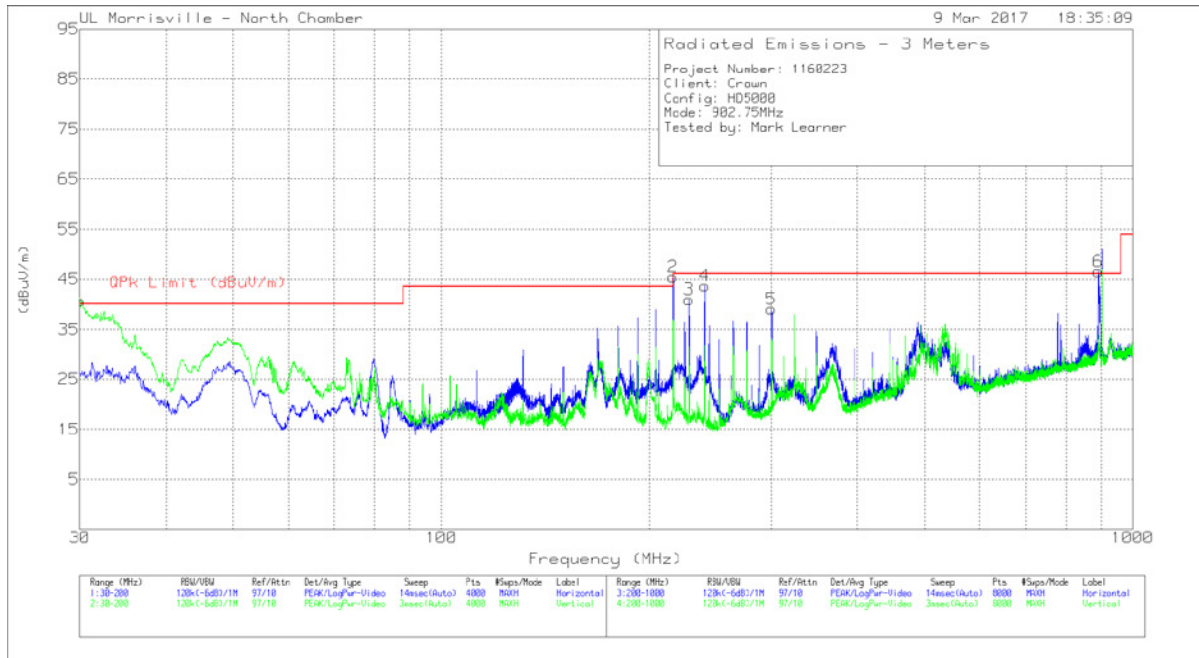
Pk - Peak detector

Av – Average value computed per FCC 15.35(c) based on dwell time measured in section 7.5 of UL report 10766018A, dated 10/09/2015. The average value is computed as follows:

$$Av = Pk + 20 \cdot \log(\text{dwell-time}/100\text{ms}) = Pk + 20 \cdot \log(37.98\text{ms}/100\text{ms}) = Pk - 8.4\text{dB}$$

### 8.3. RADIATED EMISSIONS BELOW 1 GHz

#### SPURIOUS EMISSIONS 30 TO 1000 MHz Low Channel



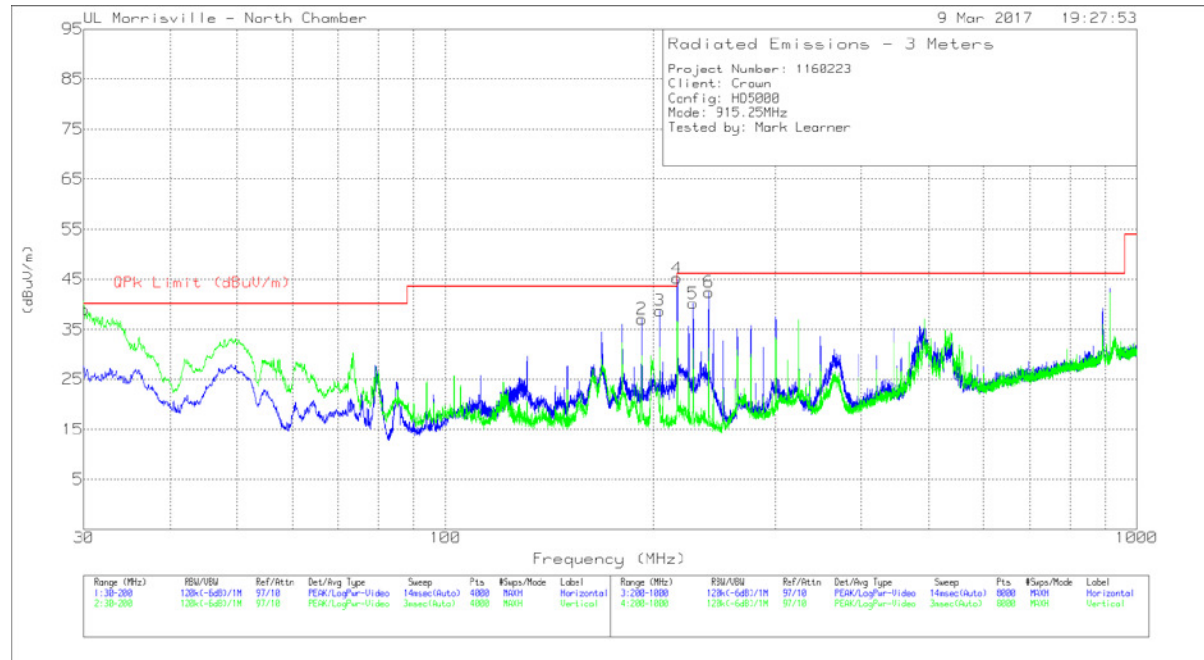
| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AT0073 AF (dB/m) | Amp/Cbl (dB) | BRF902-928MHz | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|------------------|--------------|---------------|----------------------------|--------------------|-------------|----------------|-------------|----------|
| 4      | * 240.2641      | 55.93                | Qp  | 16.2             | -29.8        | .3            | 42.63                      | 46.02              | -3.39       | 153            | 115         | H        |
| 1      | 33.4063         | 43.37                | Qp  | 23.5             | -31.7        | .1            | 35.27                      | 40                 | -4.73       | 41             | 103         | V        |
| 2      | 216.2338        | 60.1                 | Qp  | 15.3             | -30          | .3            | 45.7                       | 46.02              | -.32        | 271            | 157         | H        |
| 3      | 228.2521        | 53.82                | Qp  | 15.7             | -29.9        | .3            | 39.92                      | 46.02              | -6.1        | 81             | 160         | H        |
| 5      | 300.313         | 50.16                | Pk  | 18               | -29.4        | .3            | 39.06                      | 46.02              | -6.96       | 0-360          | 102         | H        |
| 6      | 891.7741        | 32.22                | Qp  | 26.6             | -26.5        | 2.5           | 34.82                      | 46.02              | -11.2       | 255            | 102         | H        |

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

Pk - Peak detector

Qp - Quasi-Peak detector

# **SPURIOUS EMISSIONS 30 TO 1000 MHz Middle Channel**



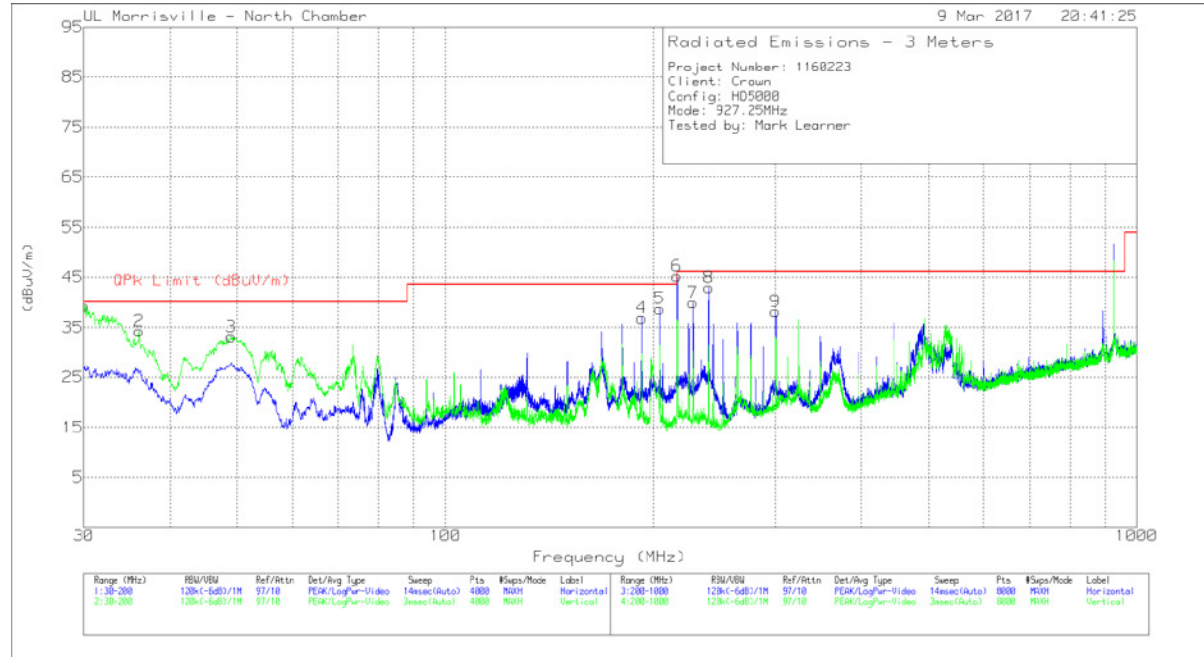
| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AT0073 AF (dB/m) | Amp/Cbl (dB) | BRF902-928MHz | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|------------------|--------------|---------------|----------------------------|--------------------|-------------|----------------|-------------|----------|
| 6      | * 240.2568      | 55.75                | Qp  | 16.2             | -29.8        | .3            | 42.45                      | 46.02              | -3.57       | 159            | 127         | H        |
| 1      | 32.6726         | 42.19                | Qp  | 24               | -31.7        | .1            | 34.59                      | 40                 | -5.41       | 18             | 103         | V        |
| 2      | 192.222         | 50.54                | Pk  | 16.3             | -30.1        | .3            | 37.04                      | 43.52              | -6.48       | 0-360          | 102         | H        |
| 3      | 204.2283        | 52.25                | Qp  | 16               | -30.1        | .3            | 38.45                      | 43.52              | -5.07       | 280            | 128         | H        |
| 4      | 216.2367        | 59.73                | Qp  | 15.3             | -30          | .3            | 45.33                      | 46.02              | -.69        | 283            | 132         | H        |
| 5      | 228.2567        | 53.5                 | Qp  | 15.7             | -29.9        | .3            | 39.6                       | 46.02              | -6.42       | 88             | 153         | H        |

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

Pk - Peak detector

Qp - Quasi-Peak detector

## SPURIOUS EMISSIONS 30 TO 1000 MHz High Channel

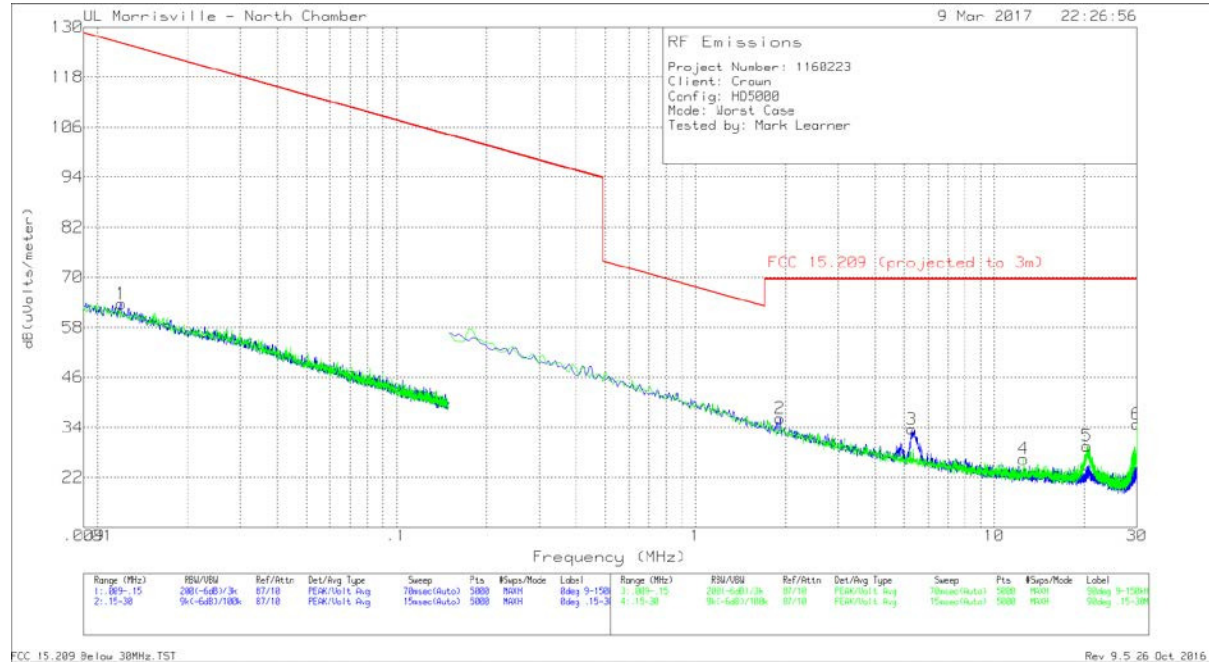


| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AT0073 AF (dB/m) | Amp/Cbl (dB) | BRF902-928MHz | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|------------------|--------------|---------------|----------------------------|--------------------|-------------|----------------|-------------|----------|
| 8      | * 240.2666      | 56.17                | Qp  | 16.2             | -29.8        | .3            | 42.87                      | 46.02              | -3.15       | 147            | 130         | H        |
| 1      | 33.145          | 42.33                | Qp  | 23.7             | -31.7        | .1            | 34.43                      | 40                 | -5.57       | 68             | 104         | V        |
| 2      | 36.0406         | 40.11                | Qp  | 21.5             | -31.7        | .1            | 30.01                      | 40                 | -9.99       | 96             | 106         | V        |
| 3      | 49.0024         | 51.48                | Pk  | 13               | -31.5        | .1            | 33.08                      | 40                 | -6.92       | 0-360          | 102         | V        |
| 4      | 192.1795        | 50.34                | Pk  | 16.3             | -30.1        | .3            | 36.84                      | 43.52              | -6.68       | 0-360          | 102         | H        |
| 5      | 204.2283        | 52.3                 | Qp  | 16               | -30.1        | .3            | 38.5                       | 43.52              | -5.02       | 277            | 140         | H        |
| 6      | 216.2422        | 59.87                | Qp  | 15.3             | -30          | .3            | 45.47                      | 46.02              | -.55        | 280            | 137         | H        |
| 7      | 228.2037        | 53.77                | Pk  | 15.7             | -29.9        | .3            | 39.87                      | 46.02              | -6.15       | 0-360          | 102         | H        |
| 9      | 300.313         | 49.26                | Pk  | 18               | -29.4        | .3            | 38.16                      | 46.02              | -7.86       | 0-360          | 102         | H        |

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

Pk - Peak detector Qp - Quasi-Peak detector

## SPURIOUS EMISSIONS 0.009 to 30 MHz Worst-Case



## Trace Markers

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AT0079 AF (dB/m) | Cbl (dB) | Corrected Reading dB(uVolts/meter) | FCC 15.209 (projected to 3m) | Margin (dB) | Azimuth (Degs) | Polarity |
|--------|-----------------|----------------------|-----|------------------|----------|------------------------------------|------------------------------|-------------|----------------|----------|
| 1      | .012            | 46.14                | Pk  | 17.4             | .1       | 63.64                              | 126.02                       | -62.38      | 0-360          | Face On  |
| 2      | 1.9204          | 24.91                | Pk  | 11               | .2       | 36.11                              | 69.54                        | -33.43      | 0-360          | Face On  |
| 3      | 5.28805         | 22.18                | Pk  | 11               | .4       | 33.58                              | 69.54                        | -35.96      | 0-360          | Face On  |
| 4      | 12.53385        | 15.43                | Pk  | 10.4             | .6       | 26.43                              | 69.54                        | -43.11      | 0-360          | Face Off |
| 5      | 20.42155        | 18.87                | Pk  | 9.9              | .8       | 29.57                              | 69.54                        | -39.97      | 0-360          | Face Off |
| 6      | 30              | 25.86                | Pk  | 8                | .9       | 34.76                              | 69.54                        | -34.78      | 0-360          | Face Off |

Pk - Peak detector

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