



## TEST REPORT

Report Number: 3155890MIN-001

Project Number: 3155890

Testing performed on the  
DataGuard rf UHF Label Programming Station

FCC ID: PB4DGPRG220

Industry Canada ID: 6900A-DGPRG220

to  
47 CFR Part 15. 247:2007  
RSS- 210, Issue 7, 2007

For  
Imation Corp.

Test Performed by:  
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7250 Hudson Blvd., Suite 100  
Oakdale, MN 55128

Test Authorized by:  
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One Imation Place  
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Date: July 28, 2008

Reviewed by: Norman Shpilsher  
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Date: July 28, 2008

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## 1.0 GENERAL DESCRIPTION

|                                     |                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Model:</b>                       | DataGuard rf UHF Label Programming Station                                                                                                                                                                                                                                                                                |
| <b>Type of EUT:</b>                 | Bar Code Reader/Writer                                                                                                                                                                                                                                                                                                    |
| <b>Serial Number:</b>               | A001                                                                                                                                                                                                                                                                                                                      |
| <b>FCC ID:</b>                      | PB4DGPRG220                                                                                                                                                                                                                                                                                                               |
| <b>Industry Canada ID:</b>          | 6900A-DGPRG220                                                                                                                                                                                                                                                                                                            |
| <b>Related Submittal(s) Grants:</b> | None                                                                                                                                                                                                                                                                                                                      |
| <b>Company:</b>                     | Imation Corp.                                                                                                                                                                                                                                                                                                             |
| <b>Customer:</b>                    | Mr. Sanjay Gupta                                                                                                                                                                                                                                                                                                          |
| <b>Address:</b>                     | Discovery 2B-35<br>One Imation Place<br>304-2A-30<br>Oakdale, MN 55128                                                                                                                                                                                                                                                    |
| <b>Phone:</b>                       | 651-704-3965                                                                                                                                                                                                                                                                                                              |
| <b>Fax:</b>                         | 651-704-6032                                                                                                                                                                                                                                                                                                              |
| <b>Test Standards:</b>              | <input checked="" type="checkbox"/> 47 CFR, Part 15:2007, §15.247<br><input checked="" type="checkbox"/> RSS-210, Issue 7, 2007<br><input checked="" type="checkbox"/> RSS-Gen, Issue 2, 2007<br><input checked="" type="checkbox"/> 47 CFR, Part 15:2007, §15.107 and §15.109, Class A<br><input type="checkbox"/> Other |
| <b>Type of radio:</b>               | <input type="checkbox"/> Stand -alone <input type="checkbox"/> Module <input type="checkbox"/> Hybrid                                                                                                                                                                                                                     |
| <b>Date Sample Submitted:</b>       | July 22, 2008                                                                                                                                                                                                                                                                                                             |
| <b>Test Work Started:</b>           | July 22, 2008                                                                                                                                                                                                                                                                                                             |
| <b>Test Work Completed:</b>         | July 28, 2008                                                                                                                                                                                                                                                                                                             |
| <b>Test Sample Conditions:</b>      | <input type="checkbox"/> Damaged <input type="checkbox"/> Poor (Usable) <input checked="" type="checkbox"/> Good                                                                                                                                                                                                          |



## 1.1 Product Description; Test Facility

|                                  |                                                                                                                                                                         |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Description:             | RFID Transmitter                                                                                                                                                        |
| Transmitter Type:                | <input checked="" type="checkbox"/> FHSS <input type="checkbox"/> Digital Modulation <input type="checkbox"/> WiFi <input type="checkbox"/> Blue Tooth                  |
| Operating Frequency Range(s):    | From 902.3 to 927.7 MHz                                                                                                                                                 |
| Number of Channels:              | 128                                                                                                                                                                     |
| Modulation:                      | FSK                                                                                                                                                                     |
| Emission Designator:             | 200KA1D                                                                                                                                                                 |
| Antenna(s) Info:                 | Internal PCB    Gain: -8.8dBi    Connector Type: SMA                                                                                                                    |
| Power settings:                  | 27 dBm                                                                                                                                                                  |
| Antenna Installation:            | <input type="checkbox"/> User <input type="checkbox"/> Professional <input checked="" type="checkbox"/> Factory                                                         |
| Transmitter power configuration: | <input type="checkbox"/> Internal battery <input checked="" type="checkbox"/> External power source:<br>100-240VAC, 50-60Hz / 9VDC Adapter by Phihong Model: PSC30R-120 |
| Special Test Arrangement:        | N/A                                                                                                                                                                     |
| Test Facility Accreditation:     | A2LA (Certificate No. 1427.01)                                                                                                                                          |
| Test Methodology:                | Measurements performed according to the procedures in ANSI C63.4-2003 and FCC Public Notice DA 00-705                                                                   |

## 1.2 EUT Configuration

The equipment under test was operated during the measurement under the following conditions:

- ☐ - Standby
- ☒ - Continuous transmissions with hopping function enabled
- ☒ - Continuous transmissions with hopping function disabled, modulated signal (see details below)
- ☐ - Continuous transmissions with hopping function disabled (un-modulated signal)
- ☐ - Continuous receiving
- ☐ - Test program (customer specific)
- ☐ -

### Operating modes of the EUT:

| No. | Description                                                                                           |
|-----|-------------------------------------------------------------------------------------------------------|
| 1   | Test was performed at low channel (902.3MHz), middle channel (915.0MHz), and upper channel (927.7MHz) |
| 2   |                                                                                                       |

### Cables:

| No. | Type              | Length | Designation                 | Note |
|-----|-------------------|--------|-----------------------------|------|
| 1   | USB, not shielded | 1.5m   | USB connection to remote PC |      |
| 2   |                   |        |                             |      |

### Support equipment/Services:

| No. | Item            | Description |
|-----|-----------------|-------------|
| 1   | Laptop computer | Remote PC   |
| 2   |                 |             |

## 1.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

☒ Normal

|                              |                |
|------------------------------|----------------|
| <b>Temperature:</b>          | +15 to +35 ° C |
| <b>Humidity:</b>             | 20-75 %        |
| <b>Atmospheric pressure:</b> | 86-106 kPa     |

☐ Extreme

|                                                 |                |
|-------------------------------------------------|----------------|
| <input type="checkbox"/> <b>Temperature:</b>    | -20 to +50 ° C |
| <input type="checkbox"/> <b>Supply voltage:</b> | 85% to +115%   |

## 1.4 Measurement uncertainty

The expanded uncertainty ( $k = 2$ ) for radiated measurements has been determined to be:

$\pm 4$  dB at 10m and  $\pm 5.4$  dB at 3m

The expanded uncertainty ( $k = 2$ ) for conducted measurements at antenna terminal has been determined to be:

$\pm 1.0$  dB

The expanded uncertainty ( $k = 2$ ) for line conducted measurements has been determined to be:

$\pm 2.6$  dB

## 1.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured emissions reading on the EMI Receiver.

The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where: FS = Field Strength in dB( $\mu$ V/m)

RA = Receiver Amplitude in dB( $\mu$ V)

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB( $m^{-1}$ )

AG = Amplifier Gain in dB

Assume a receiver reading of 48.1 dB( $\mu$ V) is obtained. The antenna factor of 7.4 dB( $m^{-1}$ ) and cable factor of 1.6 dB is added and amplifier gain of 16.0 dB is subtracted giving field strength of 41.1 dB( $\mu$ V/m).

$$RA = 48.1 \text{ dB}(\mu\text{V})$$

$$AF = 7.4 \text{ dB}(m^{-1})$$

$$CF = 1.6 \text{ dB}$$

$$AG = 16.0 \text{ dB}$$

$$FS = RA + AF + CF - AG$$

$$FS = 48.1 + 7.4 + 1.6 - 16.0$$

$$FS = 41.1 \text{ dB}(\mu\text{V}/\text{m})$$

### General notes:

## 2.0 TEST SUMMARY

Referring to the performance criteria and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards.

| TEST SPECIFICATION            | TEST PARAMETERS                                | RESULT |
|-------------------------------|------------------------------------------------|--------|
| 15.247(b), (c) / RSS-210 A8.4 | Maximum peak output power                      | Pass   |
| 15.247(e) / RSS-210 A8.1      | Hopping channel carrier frequencies separation | Pass   |
| 15.247(a) / RSS-210 A8.1      | 20dB bandwidth of the hopping channel          | Pass   |
| 15.247(e) / RSS-210 A8.1      | Number of hopping frequencies                  | Pass   |
| 15.247(e) / RSS-210 A8.1      | Average time of occupancy of hopping frequency | Pass   |
| 15.247(d) / RSS-210 A8.5      | Antenna conducted spurious emissions           | Pass   |
| 15.247(d) / RSS-210 A8.5      | Radiated spurious emissions                    | Pass   |
| 15.247(i) / RSS- Gen 5.5      | RF Exposure Compliance                         | Pass   |
| 15.207 / RSS-Gen 7.2.2        | Transmitter Power Line conducted emissions     | Pass   |
| 15.109 / ICES-003             | Receiver/digital device radiated emissions     | Pass   |
| 15.107 / ICES-003             | Digital device conducted emissions             | Pass   |

### 3.0 TEST CONDITIONS AND RESULTS

#### 3.1 Maximum peak output power

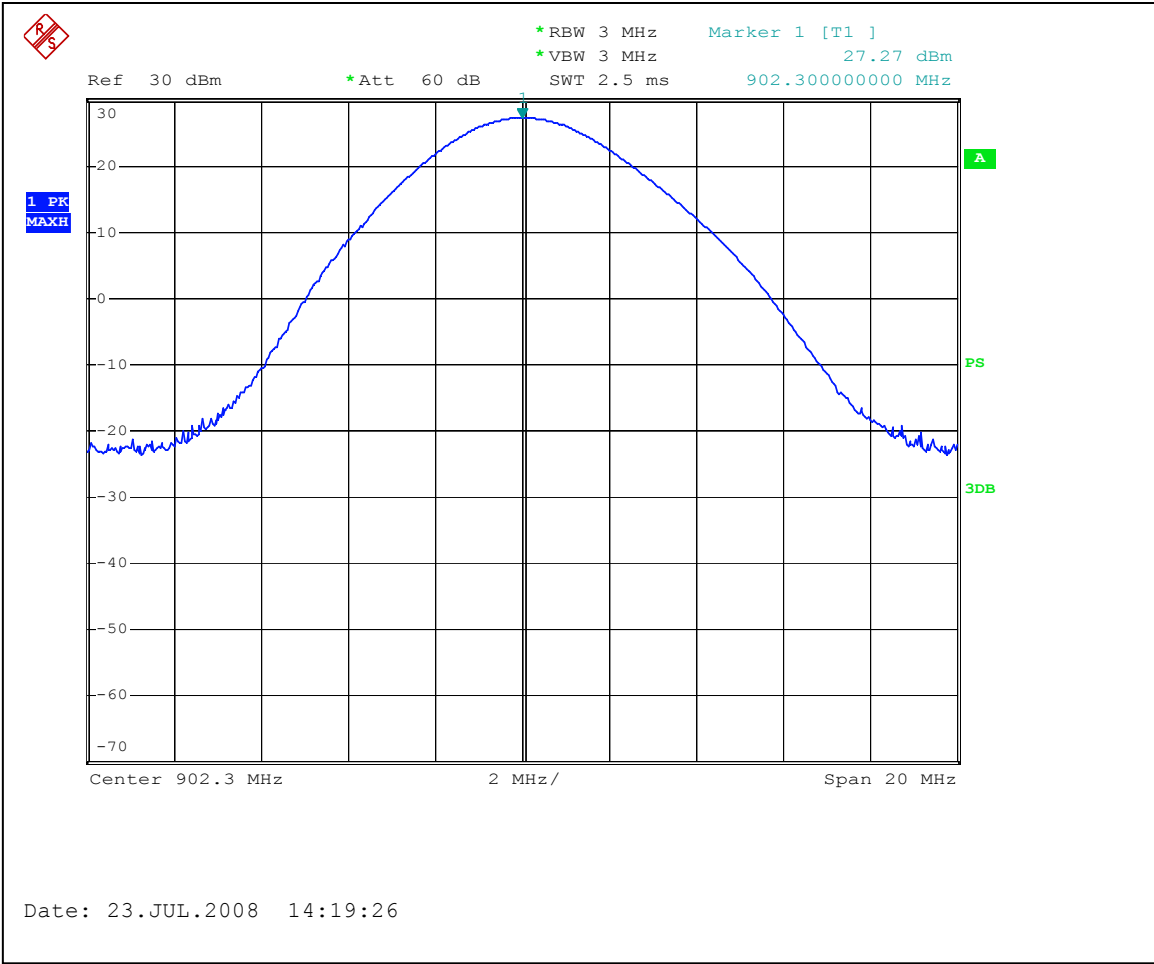
Test location: ☐ OATS ☐ Anechoic Chamber ☐ Other

Test result: **Pass**

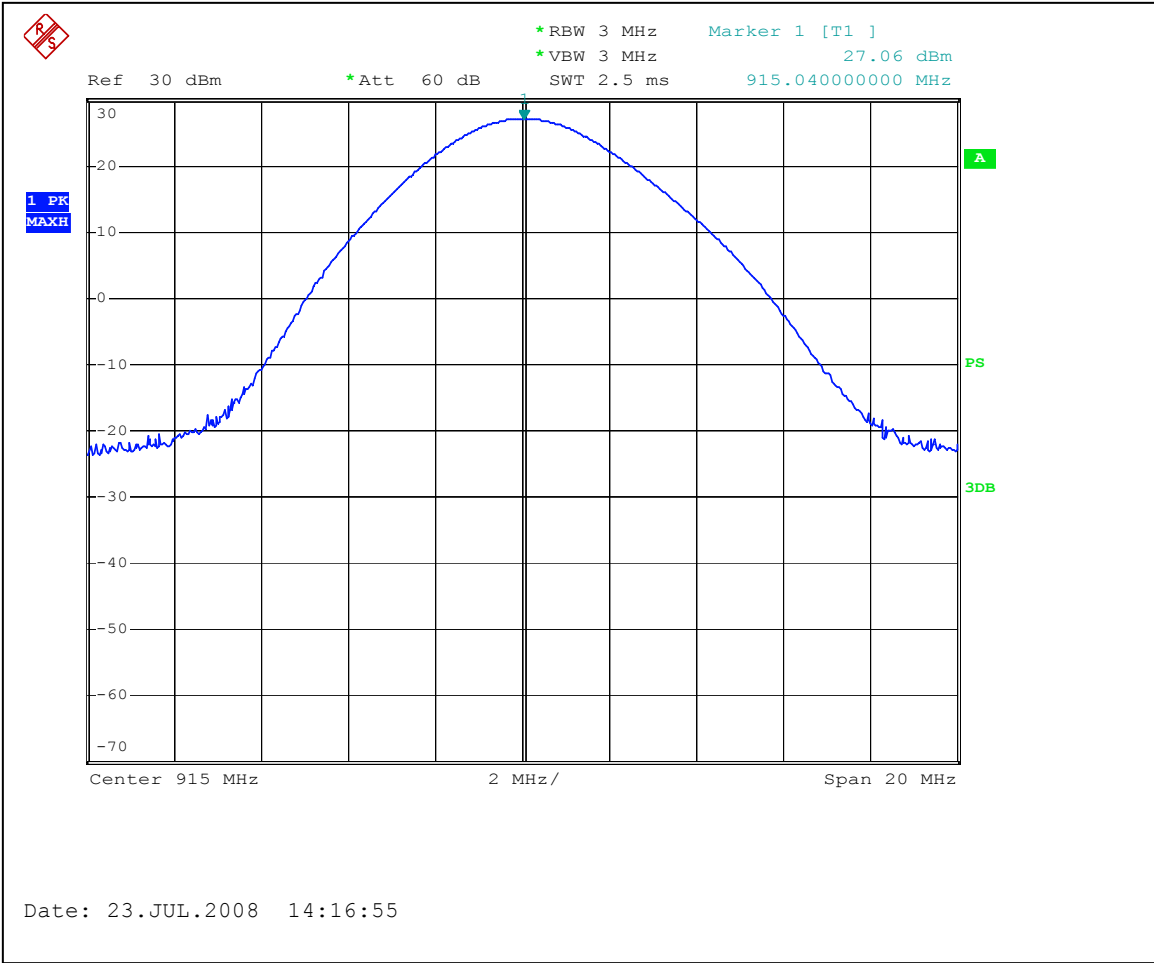
Max. Margin: 2.5 dB below the limits

| Power Output:        | Conducted                                                                                                                                                  |                |                      |           |                    |           |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------|-----------|--------------------|-----------|
| Frequency Range:     | <input checked="" type="checkbox"/> 902-928MHz <input type="checkbox"/> 2400-2483.5MHz <input type="checkbox"/> 5725-5850MHz                               |                |                      |           |                    |           |
| Low Frequency MHz    | Measured power dBm                                                                                                                                         | Attenuation dB | Power at Antenna dBm | Limit dBm | Limit Reduction dB | Margin dB |
| 902.3                | 27.27                                                                                                                                                      | 0.2            | 27.5                 | 30.0      | 0                  | -2.5      |
| Middle Frequency MHz |                                                                                                                                                            |                |                      |           |                    |           |
| 915.0                | 27.06                                                                                                                                                      | 0.2            | 27.3                 | 30.0      | 0                  | -2.7      |
| Upper Frequency MHz  |                                                                                                                                                            |                |                      |           |                    |           |
| 927.7                | 26.79                                                                                                                                                      | 0.2            | 27.0                 | 30.0      | 0                  | -3.0      |
| RBW:                 | <input type="checkbox"/> 1MHz <input checked="" type="checkbox"/> 3MHz <input type="checkbox"/> 10MHz                                                      |                |                      |           |                    |           |
| VBW:                 | <input type="checkbox"/> 1MHz <input checked="" type="checkbox"/> 3MHz <input type="checkbox"/> 10MHz                                                      |                |                      |           |                    |           |
| Antenna Gain:        | <input checked="" type="checkbox"/> < 6dBi <input type="checkbox"/> >6dBi and = <input type="text"/> dBi, Output power reduction = <input type="text"/> dB |                |                      |           |                    |           |

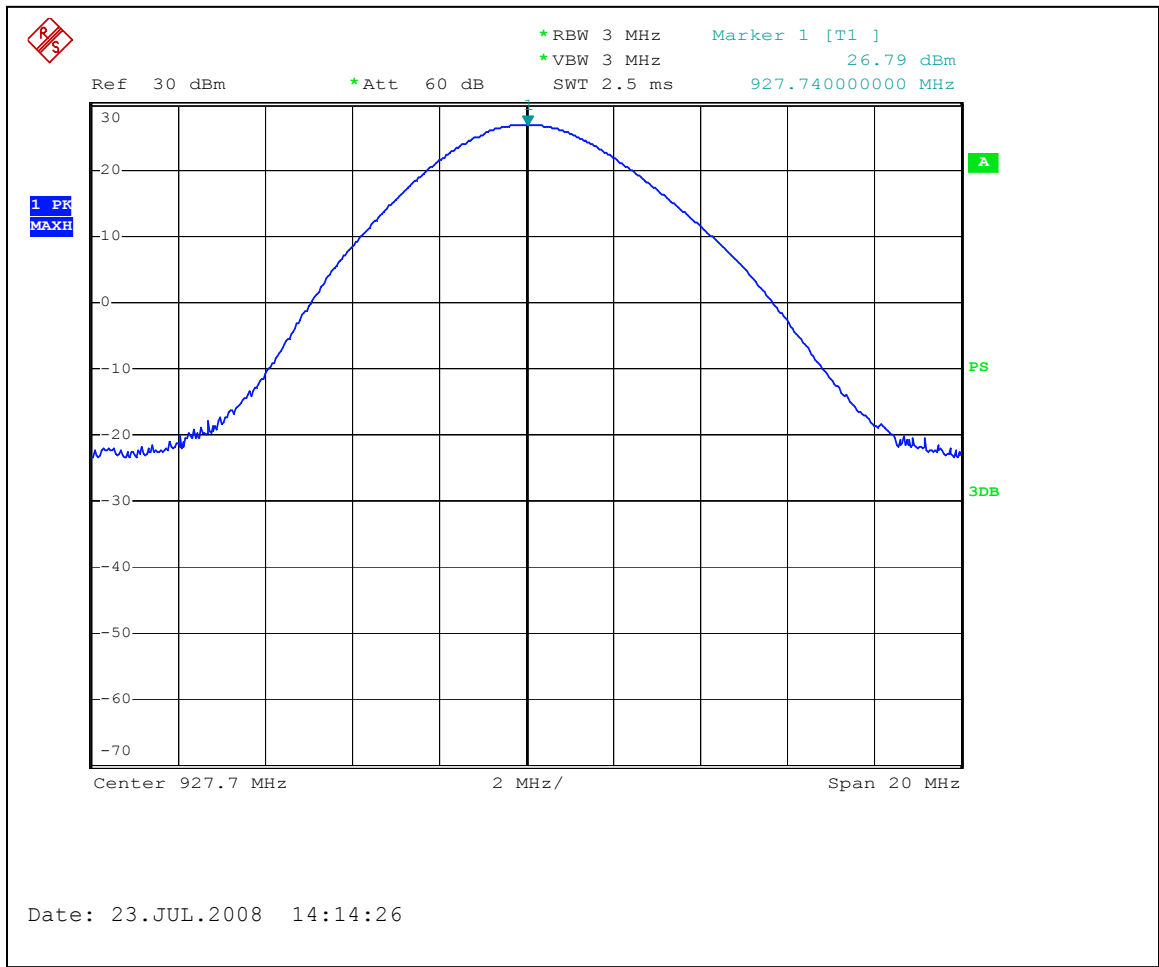
Notes: None



Graph 3.1.1



Graph 3.1.2



Graph 3.1.3

### 3.2 Hopping channel carrier frequencies separation

|                                  |                                                                                                                                                                 |               |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Frequency Range:</b>          | <input checked="" type="checkbox"/> 902-928MHz <input type="checkbox"/> 2400-2483.5MHz <input type="checkbox"/> 5725-5850MHz                                    |               |
| <b>Measured Separation (kHz)</b> | <b>Minimum Separation - Limit (kHz)</b>                                                                                                                         | <b>Result</b> |
| 203.4                            | 124.2                                                                                                                                                           | <b>Pass</b>   |
| <b>Limit:</b>                    | <input type="checkbox"/> 25kHz <input checked="" type="checkbox"/> 20dB channel bandwidth <input type="checkbox"/> 2/3 of 20dB channel bandwidth                |               |
| <b>Span:</b>                     | 300kHz                                                                                                                                                          |               |
| <b>RBW:</b>                      | <input checked="" type="checkbox"/> 3kHz <input type="checkbox"/> 10kHz <input type="checkbox"/> 100kHz <input type="checkbox"/> other <input type="text"/> kHz |               |
| <b>VBW:</b>                      | <input type="checkbox"/> 3kHz <input checked="" type="checkbox"/> 10kHz <input type="checkbox"/> 100kHz <input type="checkbox"/> other <input type="text"/> kHz |               |

**Notes:**      None

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Graph 3.2.1

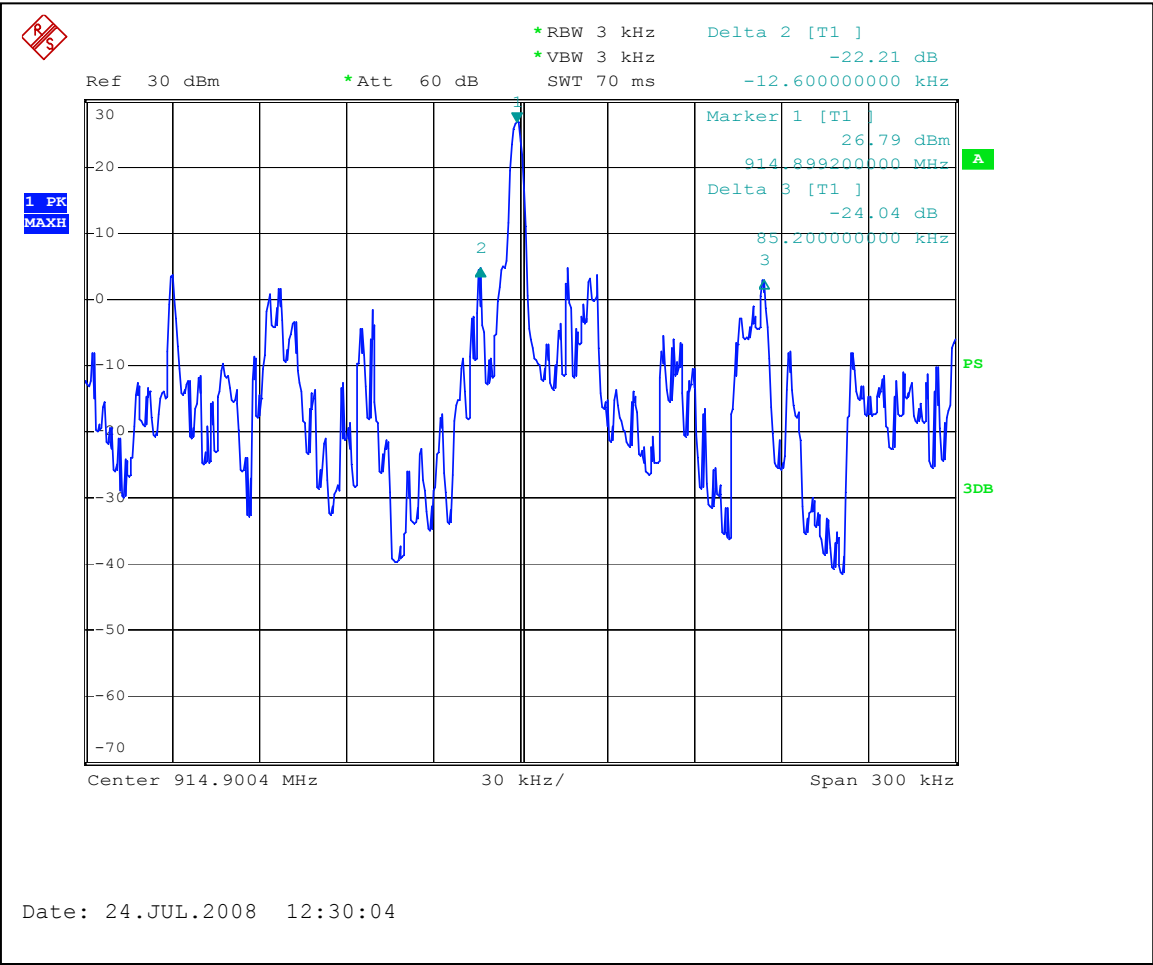
### 3.3 20dB bandwidth of the hopping channel

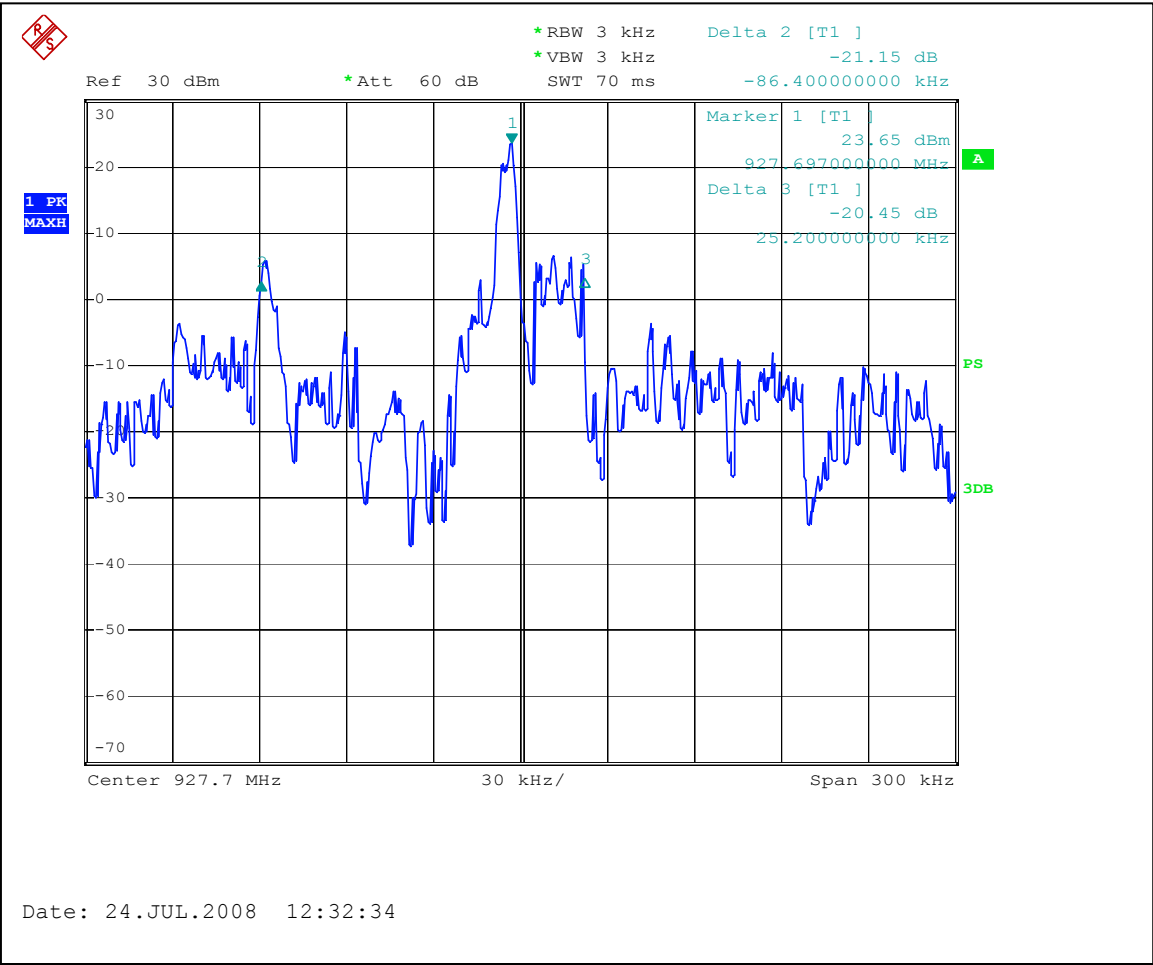
|                                    |                                                                                                                                        |                                      |                    |               |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------------------|---------------|
| <b>Frequency Range:</b>            | <input checked="" type="checkbox"/> 902-928MHz <input type="checkbox"/> 2400-2483.5MHz <input type="checkbox"/> 5725-5850MHz           |                                      |                    |               |
| <b>Low Frequency Channel (kHz)</b> | <b>Middle Frequency Channel (kHz)</b>                                                                                                  | <b>Upper Frequency Channel (kHz)</b> | <b>Limit (kHz)</b> | <b>Result</b> |
| 130.8                              | 97.8                                                                                                                                   | 111.6                                | 250.0              | <b>Pass</b>   |
| <b>Span:</b>                       | 300kHz                                                                                                                                 |                                      |                    |               |
| <b>RBW:</b>                        | <input checked="" type="checkbox"/> 3kHz <input type="checkbox"/> 10kHz <input type="checkbox"/> 100kHz <input type="checkbox"/> other | kHz                                  |                    |               |
| <b>VBW:</b>                        | <input checked="" type="checkbox"/> 3kHz <input type="checkbox"/> 10kHz <input type="checkbox"/> 100kHz <input type="checkbox"/> other | kHz                                  |                    |               |

**Notes:**      None

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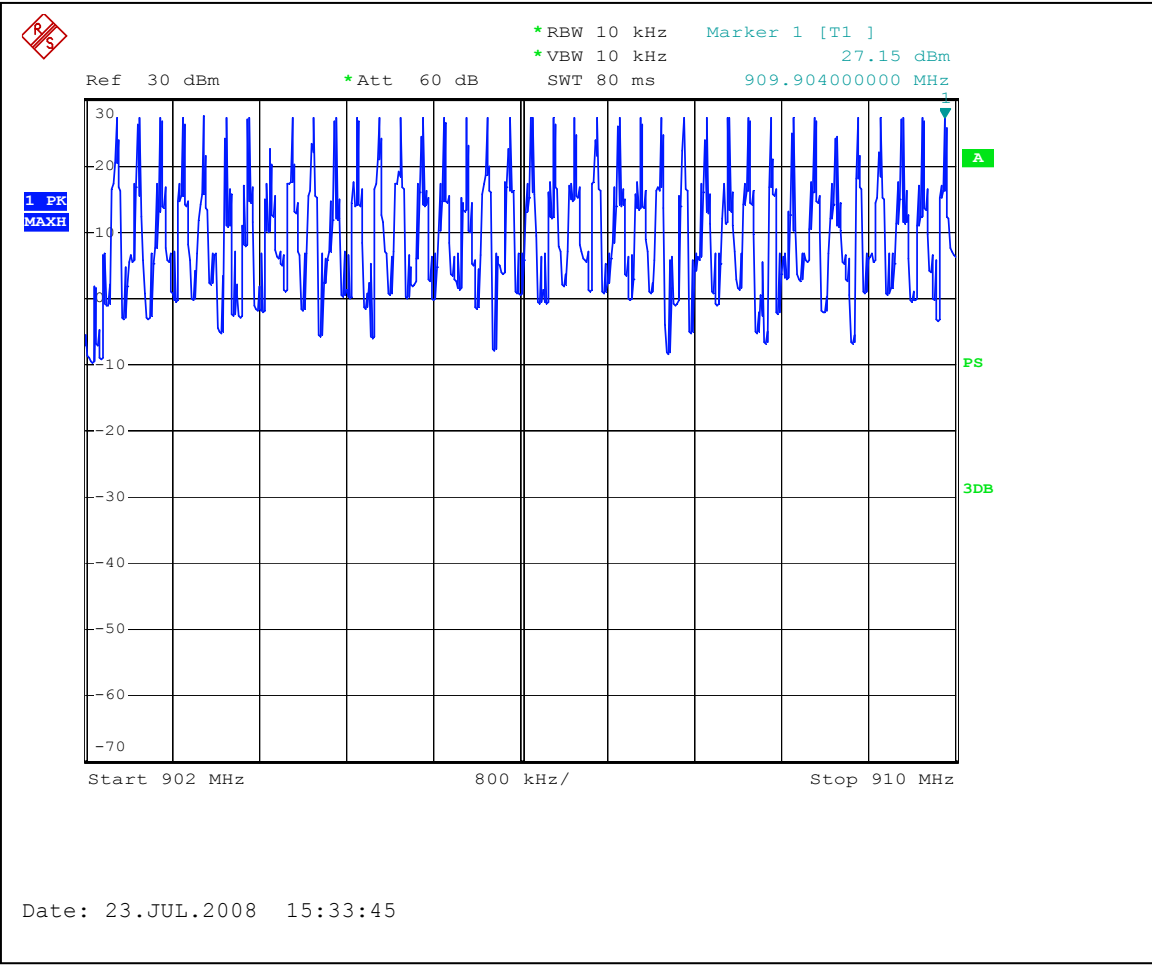


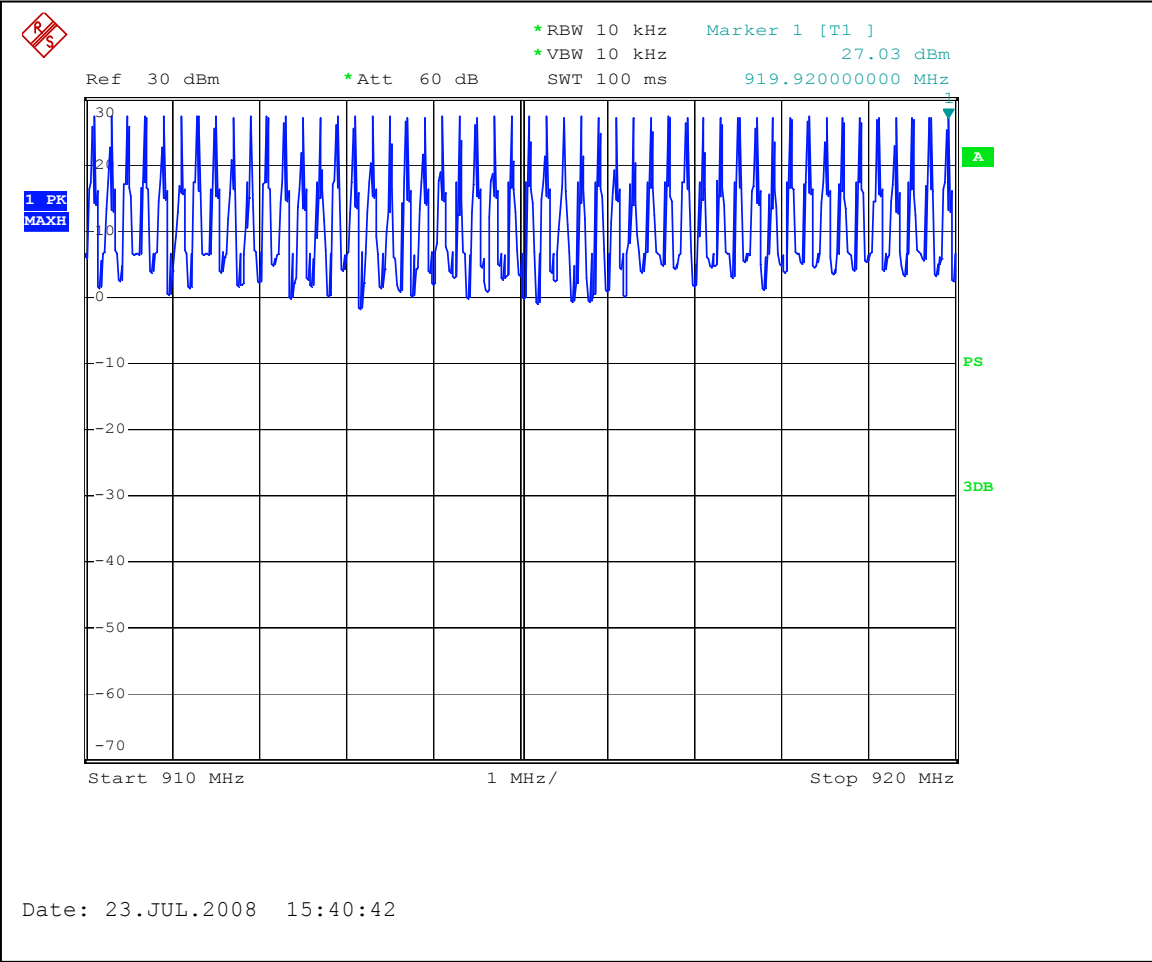
3.4      Number of hopping frequencies

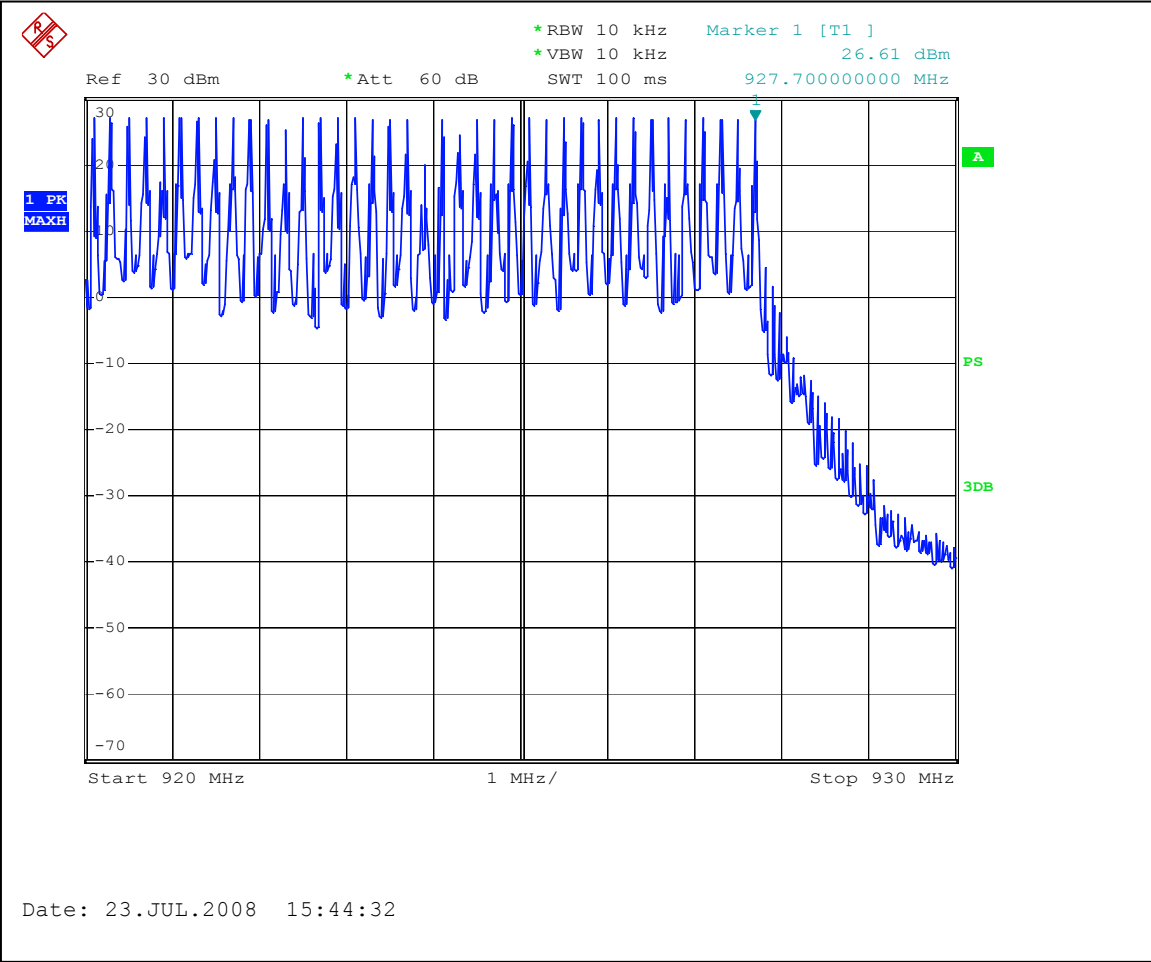
|                         |                                                                                                                              |        |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------|--------|
| Frequency Range:        | <input checked="" type="checkbox"/> 902-928MHz <input type="checkbox"/> 2400-2483.5MHz <input type="checkbox"/> 5725-5850MHz |        |
| Measured Number         | Requirements                                                                                                                 | Result |
| 128                     | 50                                                                                                                           | Pass   |
| Channel 20dB Bandwidth: | <input checked="" type="checkbox"/> <250kHz <input type="checkbox"/> ≥250kHz                                                 |        |

Notes:      None

---







### 3.5 Average time of occupancy of hopping frequency

|                                       |                                                                                                                                                                  |                  |               |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------|
| <b>Frequency Range:</b>               | <input checked="" type="checkbox"/> 902-928MHz <input type="checkbox"/> 2400-2483.5MHz <input type="checkbox"/> 5725-5850MHz                                     |                  |               |
| <b>Measured / Calculated Time sec</b> | <b>Period sec</b>                                                                                                                                                | <b>Limit sec</b> | <b>Result</b> |
| 0.0077                                | 20                                                                                                                                                               | 0.4              | <b>Pass</b>   |
| <b>Period:</b>                        | <input type="checkbox"/> 10s <input checked="" type="checkbox"/> 20s <input type="checkbox"/> 30s <input type="checkbox"/> 0.4s multiplied by the channel number |                  |               |
| <b>Channel 20dB Bandwidth:</b>        | <input checked="" type="checkbox"/> <250kHz <input type="checkbox"/> ≥250kHz                                                                                     |                  |               |

Time of occupancy calculation:

The minimum measured repetition of the channel occupancy (repetition) = 18 sec

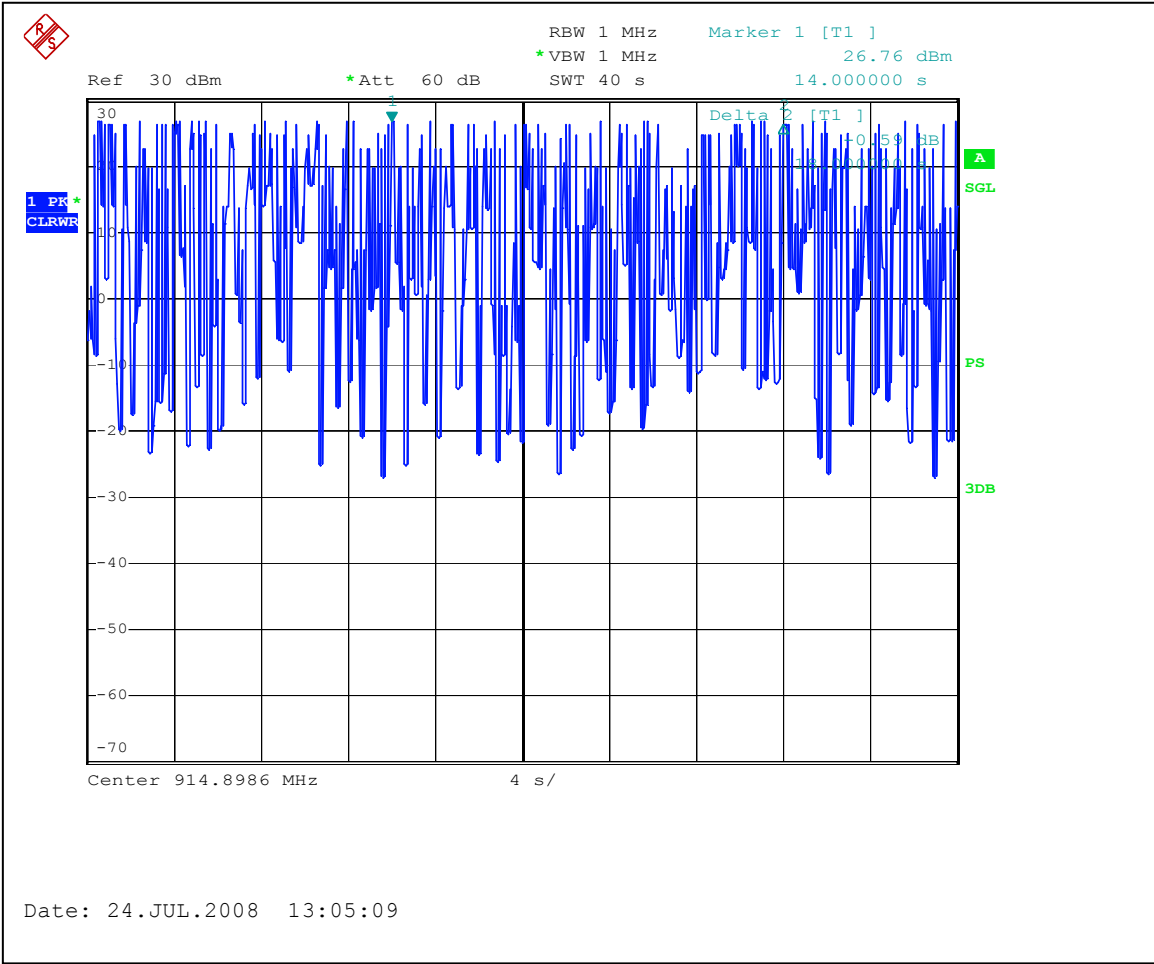
Single occupancy duration (single duration) = 0.007 sec

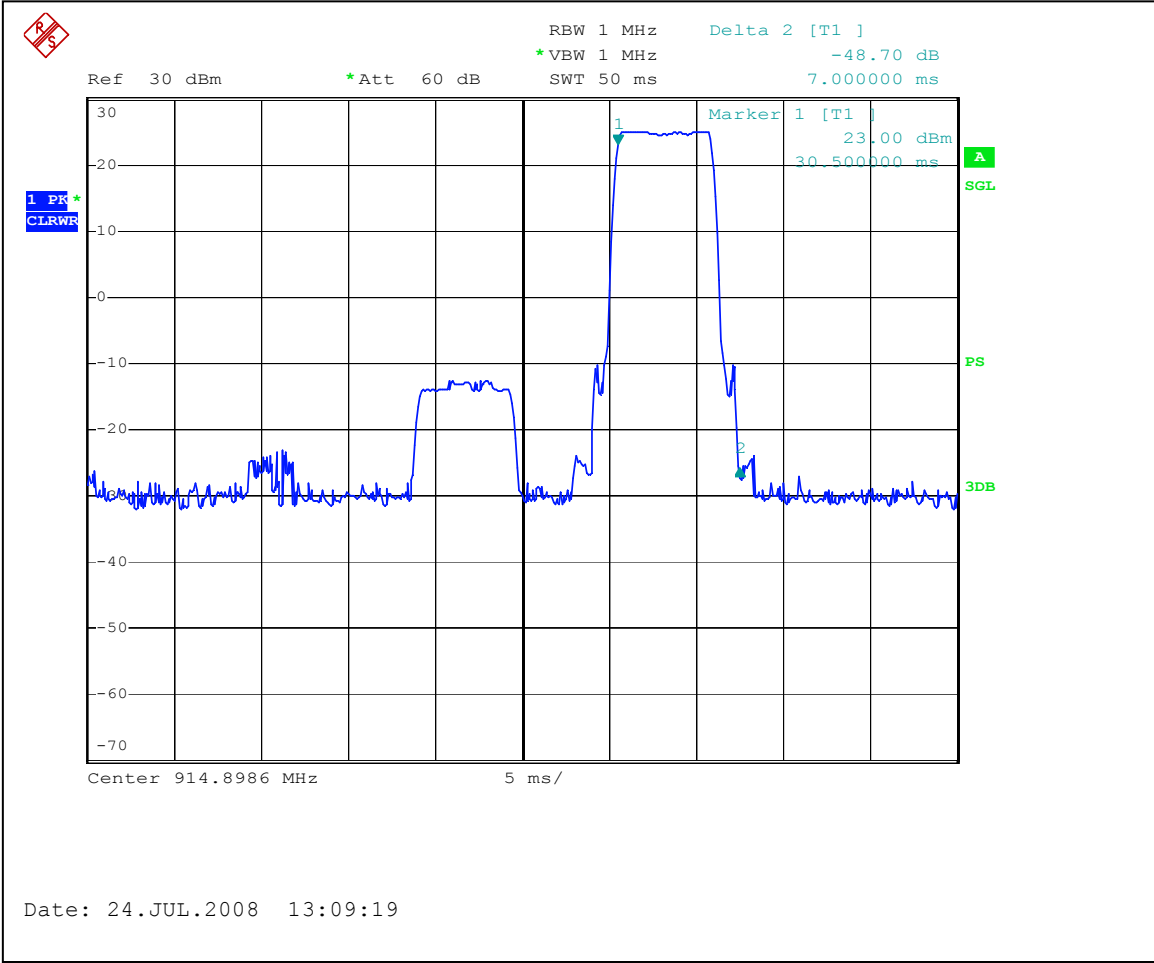
Period = 20 sec

Time of occupancy = (single duration) x (period) / (repetition) = 0.007 x 20 / 18 (sec) = 0.0077 sec

**Notes:**        None

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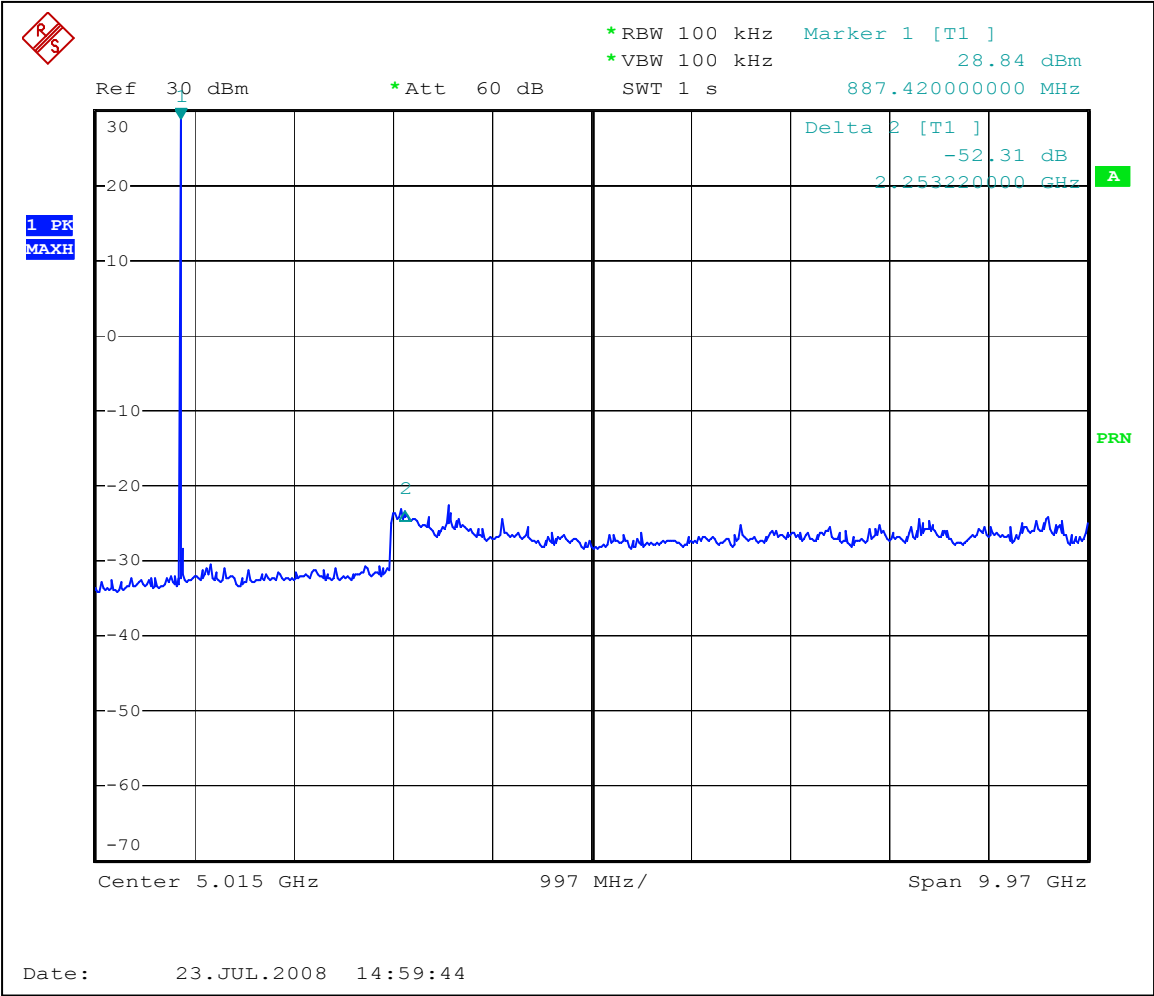


### 3.6 Antenna conducted spurious emissions

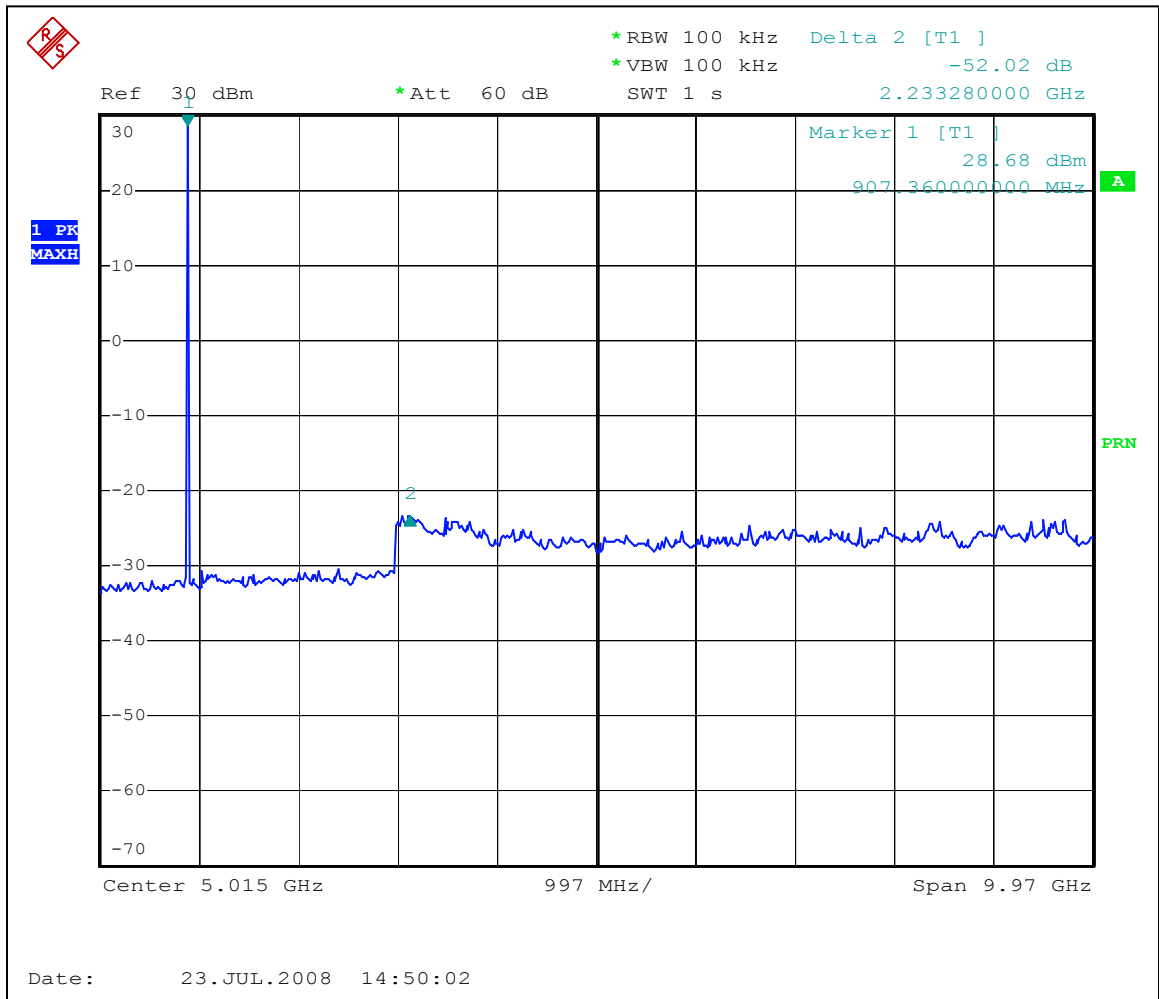
|                                     |                                                                                                                                                                        |                                       |                  |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------------------|
| <b>Frequency Range:</b>             | <input checked="" type="checkbox"/> 902-928MHz <input type="checkbox"/> 2400-2483.5MHz <input type="checkbox"/> 5725-5850MHz                                           |                                       |                  |
|                                     | <b>Minimum Measured Attenuation dB</b>                                                                                                                                 | <b>Minimum Allowed Attenuation dB</b> | <b>Margin dB</b> |
| <b>Low Frequency Channel</b>        | 52.31                                                                                                                                                                  | 20                                    | -32.3            |
| <b>Middle Frequency Channel</b>     | 52.02                                                                                                                                                                  | 20                                    | -32.0            |
| <b>Upper Frequency Channel</b>      | 52.46                                                                                                                                                                  | 20                                    | -32.5            |
| <b>Analyzer Settings:</b>           | <input checked="" type="checkbox"/> RBW=100KHz                                                                                                                         |                                       |                  |
| <b>Minimum Allowed Attenuation:</b> | <input checked="" type="checkbox"/> 20dB<br><input type="checkbox"/> 30dB (for digital systems with conducted power measured using RMS averaging over a time interval) |                                       |                  |

**Notes:**      None

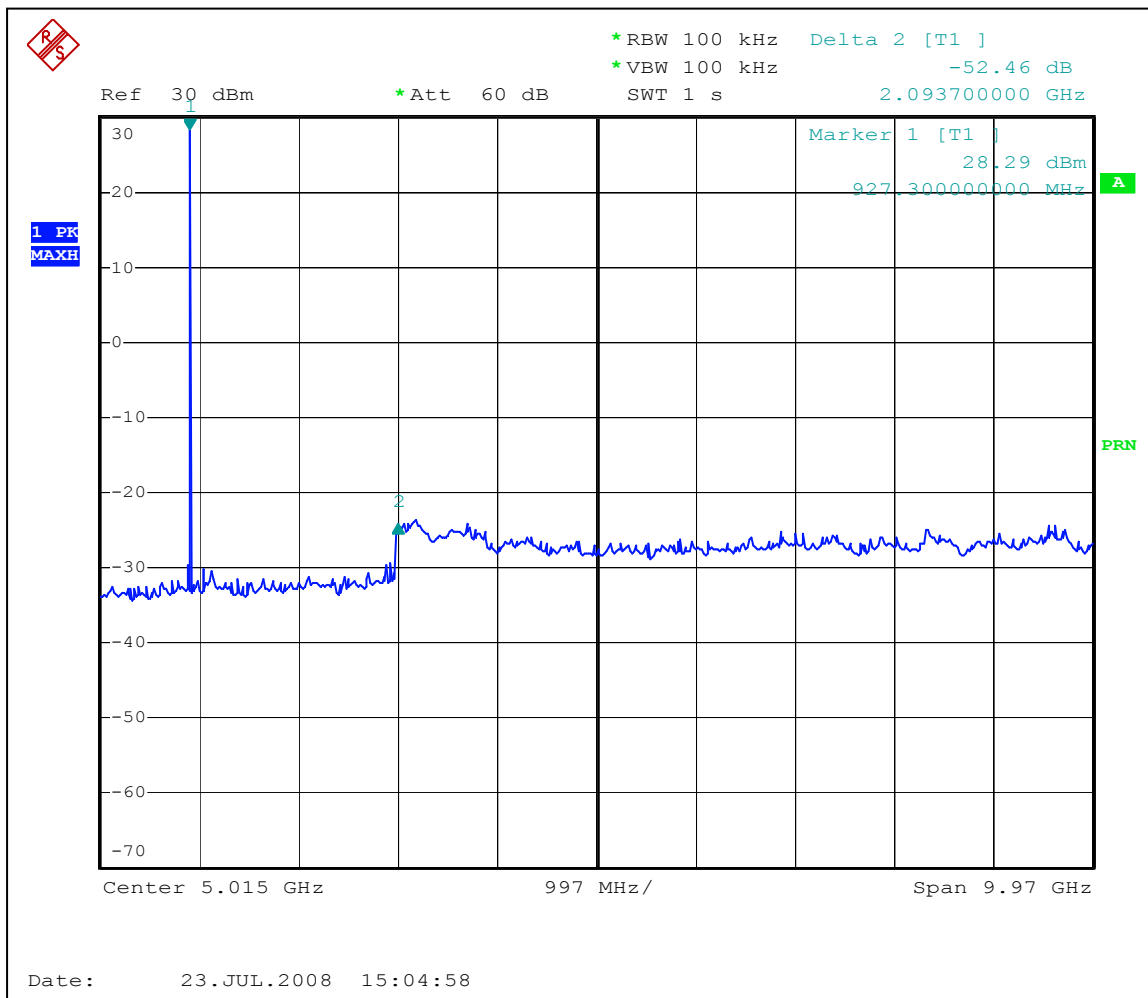
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Graph 3.6.1



Graph 3.6.2



Graph 3.6.3

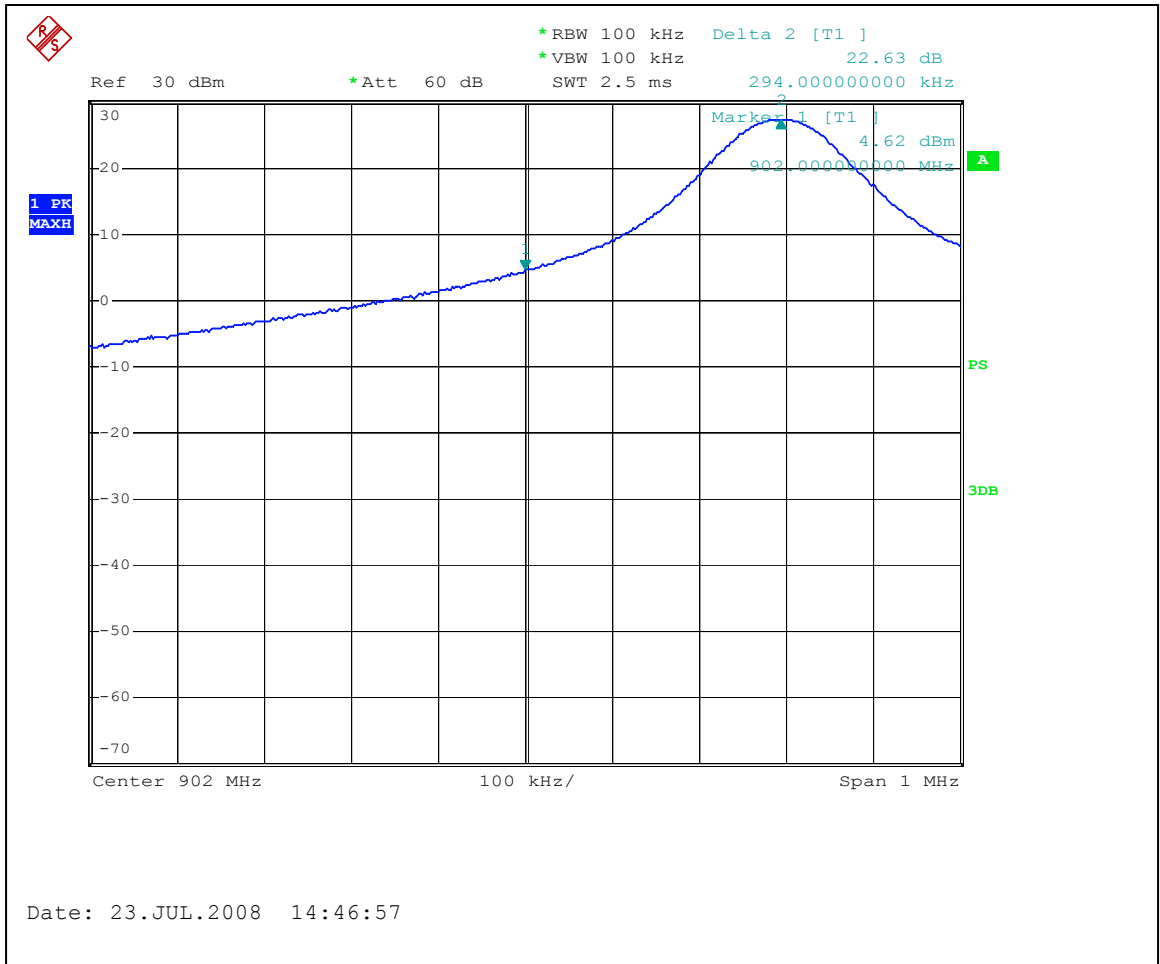


### 3.6.1 Antenna conducted band edge compliance

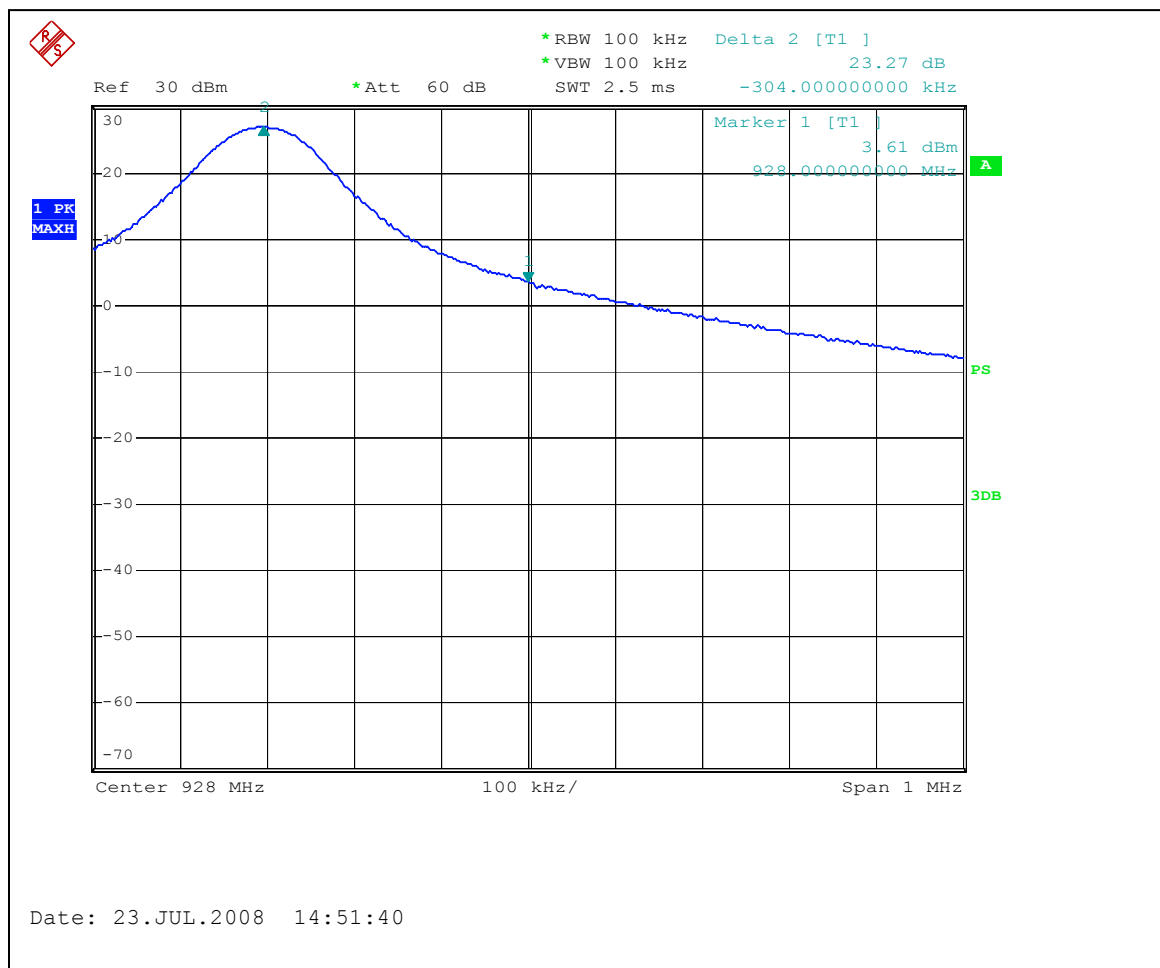
|                                     |                                                                                                                                                                        |                                       |                  |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------------------|
| <b>Frequency Range:</b>             | <input checked="" type="checkbox"/> 902-928MHz <input type="checkbox"/> 2400-2483.5MHz <input type="checkbox"/> 5725-5850MHz                                           |                                       |                  |
|                                     | <b>Minimum Measured Attenuation dB</b>                                                                                                                                 | <b>Minimum Allowed Attenuation dB</b> | <b>Margin dB</b> |
| <b>Low Frequency Channel</b>        | 22.63                                                                                                                                                                  | 20                                    | -2.6             |
| <b>Upper Frequency Channel</b>      | 23.27                                                                                                                                                                  | 20                                    | -3.3             |
| <b>Analyzer Settings:</b>           | <input checked="" type="checkbox"/> RBW=100KHz                                                                                                                         |                                       |                  |
| <b>Minimum Allowed Attenuation:</b> | <input checked="" type="checkbox"/> 20dB<br><input type="checkbox"/> 30dB (for digital systems with conducted power measured using RMS averaging over a time interval) |                                       |                  |

**Notes:**        None

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Graph 3.6.4



Graph 3.6.5



### 3.7 Radiated spurious emissions

**Test location:** ☐ OATS ☒ Anechoic Chamber ☐ Other

**Test distance:** ☐ 10 meters ☒ 3 meters

**Test result:** **Pass**

**Max. Margin:** 0.2 dB below the limits in the restricted bands of operation

**Note:** Tables 3.7.1-3.7.3 show the Average Value of the Harmonics and Spurious Emissions above 1GHz. No spurious radiated emissions related to transmitter were detected below 1GHz. Graphs 3.7.1-3.7.6 show Peaks of Harmonics and Spurious Emissions above 1GHz.

|                 |                                                                                                                                   |              |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------|
| Date:           | July 22, 2008                                                                                                                     | Result: Pass |
| Standard:       | FCC part 15.247(d)                                                                                                                |              |
| Tested by:      | Uri Spector                                                                                                                       |              |
| Test Point:     | Enclosure                                                                                                                         |              |
| Operation mode: | See Page 5                                                                                                                        |              |
| Note:           | Channel 902.3MHz. Frequency range 30MHz to 10GHz. No spurious radiated emissions related to transmitter were detected below 1GHz. |              |

**Table 3.7.1**

| Frequency MHz | Antenna Polarity | Reading dBμV | Total C.F. dB1/m | Pre-Amp. Gain (dB) | Total at 3m dBμV/m | QP Limit dBμV/m                  | Margin dB |
|---------------|------------------|--------------|------------------|--------------------|--------------------|----------------------------------|-----------|
| *1.198 GHz    | V                | 54.6         | 27.2             | 41.3               | 40.6               | 54.0                             | -13.4     |
| *1.396 GHz    | V                | 53.2         | 28.1             | 41.1               | 40.2               | 54.0                             | -13.8     |
| *1.4212 GHz   | V                | 52.8         | 28.2             | 41.1               | 39.9               | 54.0                             | -14.1     |
| *1.4392 GHz   | V                | 56.1         | 28.3             | 41.1               | 43.3               | 54.0                             | -10.7     |
| *1.594 GHz    | V                | 57.2         | 29.0             | 40.9               | 45.4               | 54.0                             | -8.6      |
| *1.8028 GHz   | V                | 56.9         | 30.1             | 40.6               | 46.4               | not restricted band of operation |           |
| *2.4976 GHz   | V                | 48.9         | 32.7             | 39.7               | 41.9               | 54.0                             | -12.1     |
| 2.71 GHz      | V                | 60.4         | 33.3             | 39.9               | 53.8               | 54.0                             | -0.2      |
| *3.61 GHz     | V                | 47.7         | 36.0             | 40.2               | 43.5               | 54.0                             | -10.5     |
| *4.5136 GHz   | V                | 51.3         | 38.7             | 39.9               | 50.1               | 54.0                             | -3.9      |
| *1.1944 GHz   | H                | 52.0         | 27.2             | 41.3               | 37.9               | 54.0                             | -16.1     |
| *1.4356 GHz   | H                | 48.6         | 28.3             | 41.1               | 35.8               | 54.0                             | -18.2     |
| *1.5976 GHz   | H                | 55.7         | 29.1             | 40.9               | 43.8               | 54.0                             | -10.1     |
| 1.8028 GHz    | H                | 59.3         | 30.1             | 40.6               | 48.8               | not restricted band of operation |           |
| 1.8964 GHz    | H                | 58.8         | 30.5             | 40.4               | 48.9               | not restricted band of operation |           |
| *2.4976 GHz   | H                | 47.6         | 32.7             | 39.7               | 40.7               | 54.0                             | -13.3     |
| 2.71 GHz      | H                | 56.6         | 33.3             | 39.9               | 50.0               | 54.0                             | -4.0      |
| *4.5136 GHz   | H                | 47.6         | 38.7             | 39.9               | 46.4               | 54.0                             | -7.6      |

Measurements above 1GHz were taken using an Average Value (RBW 1MHz, VBW 10Hz)

Measurements marked (\*) were taken using a Peak detector

|                 |                                                                                                                                    |              |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Date:           | July 22, 2008                                                                                                                      | Result: Pass |
| Standard:       | FCC part 15.247(d)                                                                                                                 |              |
| Tested by:      | Uri Spector                                                                                                                        |              |
| Test Point:     | Enclosure                                                                                                                          |              |
| Operation mode: | See Page 5                                                                                                                         |              |
| Note:           | Channel 915MHz. Frequency range 30MHz to 10GHz.<br>No spurious radiated emissions related to transmitter were detected below 1GHz. |              |

**Table 3.7.2**

| Frequency MHz | Antenna Polarity | Reading dBμV | Total C.F. dB1/m | Pre-Amp. Gain (dB) | Total at 3m dBμV/m | QP Limit dBμV/m                  | Margin dB |
|---------------|------------------|--------------|------------------|--------------------|--------------------|----------------------------------|-----------|
| *1.1935 GHz   | V                | 51.2         | 27.2             | 41.3               | 37.2               | 54.0                             | -16.8     |
| *1.396 GHz    | V                | 52.7         | 28.1             | 41.1               | 39.7               | 54.0                             | -14.3     |
| *1.594 GHz    | V                | 57.7         | 29.0             | 40.9               | 45.8               | 54.0                             | -8.2      |
| *1.828 GHz    | V                | 57.1         | 30.2             | 40.5               | 46.8               | not restricted band of operation |           |
| *2.494 GHz    | V                | 47.4         | 32.7             | 39.7               | 40.4               | 54.0                             | -13.6     |
| 2.746 GHz     | V                | 60.2         | 33.4             | 39.9               | 53.7               | 54.0                             | -0.3      |
| *3.6595 GHz   | V                | 46.7         | 36.2             | 40.2               | 42.7               | 54.0                             | -11.3     |
| *4.5775 GHz   | V                | 50.1         | 38.8             | 39.9               | 49.0               | 54.0                             | -4.9      |
| *1.1575 GHz   | H                | 50.8         | 27.1             | 41.3               | 36.5               | 54.0                             | -17.5     |
| *1.198 GHz    | H                | 53.2         | 27.2             | 41.3               | 39.2               | 54.0                             | -14.8     |
| *1.4005 GHz   | H                | 50.4         | 28.1             | 41.1               | 37.4               | 54.0                             | -16.6     |
| *1.5985 GHz   | H                | 52.7         | 29.1             | 40.9               | 40.8               | 54.0                             | -13.2     |
| *1.828 GHz    | H                | 58.5         | 30.2             | 40.5               | 48.2               | not restricted band of operation |           |
| 2.746 GHz     | H                | 58.5         | 33.4             | 39.9               | 52.0               | 54.0                             | -2.0      |
| *4.5775 GHz   | H                | 44.9         | 38.8             | 39.9               | 43.9               | 54.0                             | -10.1     |

Measurements above 1GHz were taken using an Average Value (RBW 1MHz, VBW 10Hz)

Measurements marked (\*) were taken using a Peak detector

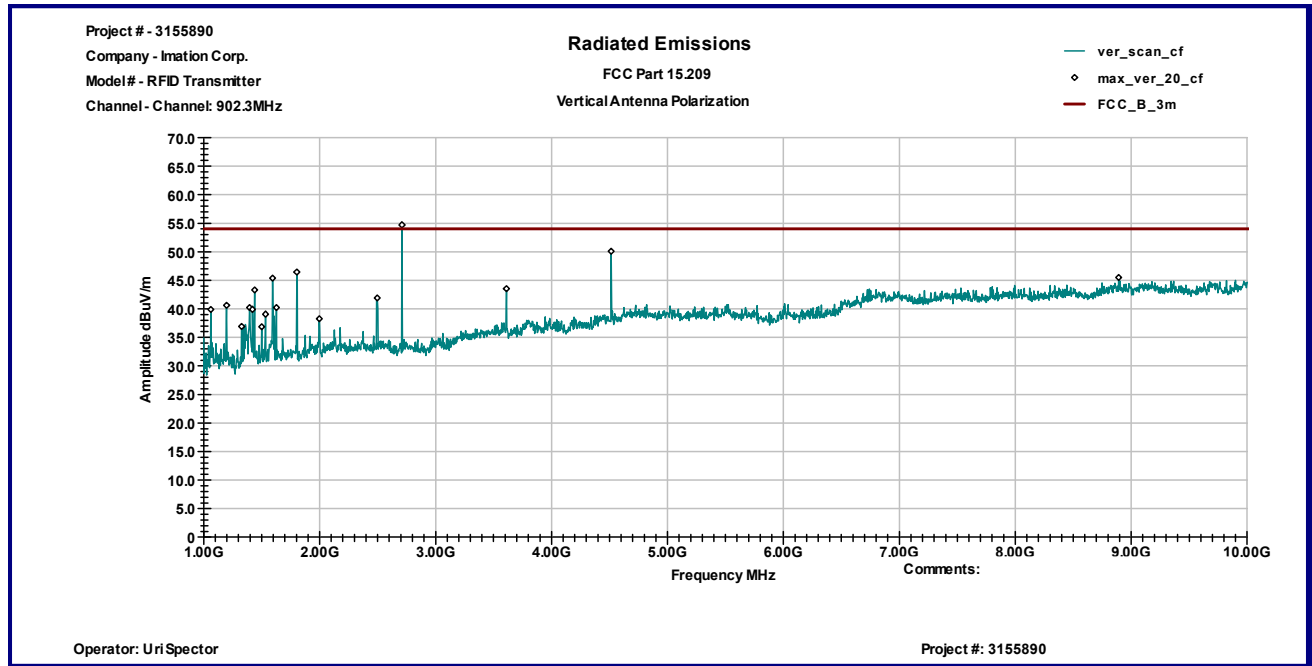
|                 |                                                                                                                                      |              |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Date:           | July 22, 2008                                                                                                                        | Result: Pass |
| Standard:       | FCC part 15.247(d)                                                                                                                   |              |
| Tested by:      | Uri Spector                                                                                                                          |              |
| Test Point:     | Enclosure                                                                                                                            |              |
| Operation mode: | See Page 5                                                                                                                           |              |
| Note:           | Channel 927.7MHz. Frequency range 30MHz to 10GHz.<br>No spurious radiated emissions related to transmitter were detected below 1GHz. |              |

**Table 3.7.3**

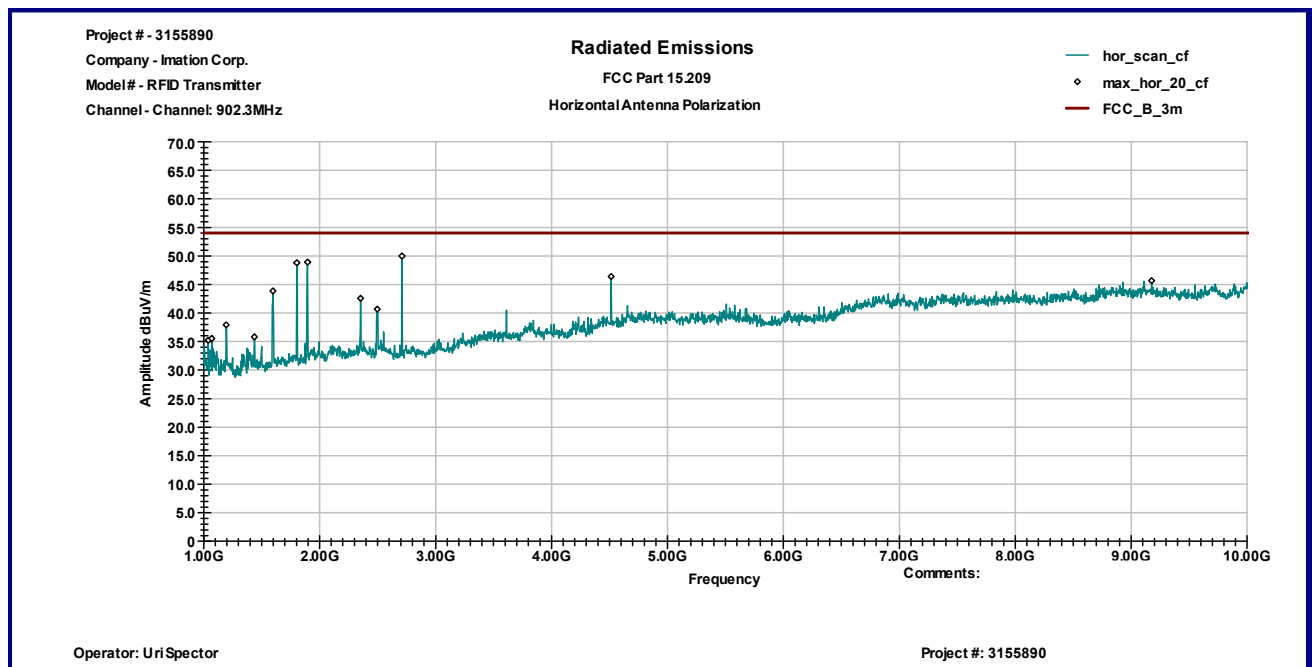
| Frequency MHz | Antenna Polarity | Reading dBμV | Total C.F. dB1/m | Pre-Amp. Gain (dB) | Total at 3m dBμV/m | QP Limit dBμV/m                  | Margin dB |
|---------------|------------------|--------------|------------------|--------------------|--------------------|----------------------------------|-----------|
| *1.198 GHz    | V                | 50.7         | 27.2             | 41.3               | 36.6               | 54.0                             | -17.4     |
| *1.378 GHz    | V                | 55.2         | 28.0             | 41.1               | 42.1               | 54.0                             | -11.9     |
| *1.5985 GHz   | V                | 58.0         | 29.1             | 40.9               | 46.2               | 54.0                             | -7.8      |
| *1.855 GHz    | V                | 57.5         | 30.3             | 40.5               | 47.3               | not restricted band of operation |           |
| *2.4985 GHz   | V                | 47.9         | 32.8             | 39.7               | 40.9               | 54.0                             | -13.0     |
| 2.7865 GHz    | V                | 58.1         | 33.5             | 40.0               | 51.6               | 54.0                             | -2.4      |
| *3.709 GHz    | V                | 45.4         | 36.3             | 40.2               | 41.5               | 54.0                             | -12.5     |
| *4.6405 GHz   | V                | 48.9         | 39.0             | 39.9               | 48.0               | 54.0                             | -6.0      |
| *1.198 GHz    | H                | 49.0         | 27.2             | 41.3               | 35.0               | 54.0                             | -19.0     |
| *1.369 GHz    | H                | 49.1         | 28.0             | 41.1               | 35.9               | 54.0                             | -18.0     |
| *1.5985 GHz   | H                | 49.8         | 29.1             | 40.9               | 37.9               | 54.0                             | -16.1     |
| *1.855 GHz    | H                | 56.2         | 30.3             | 40.5               | 46.0               | not restricted band of operation |           |
| *2.4985 GHz   | H                | 46.9         | 32.8             | 39.7               | 40.0               | 54.0                             | -14.0     |
| *2.521 GHz    | H                | 55.1         | 32.8             | 39.7               | 48.2               | not restricted band of operation |           |
| 2.7865 GHz    | H                | 55.8         | 33.5             | 40.0               | 49.3               | 54.0                             | -4.7      |
| *3.709 GHz    | H                | 45.2         | 36.3             | 40.2               | 41.3               | 54.0                             | -12.7     |
| *4.6405 GHz   | H                | 45.5         | 39.0             | 39.9               | 44.6               | 54.0                             | -9.4      |

Measurements above 1GHz were taken using an Average Value (RBW 1MHz, VBW 10Hz)

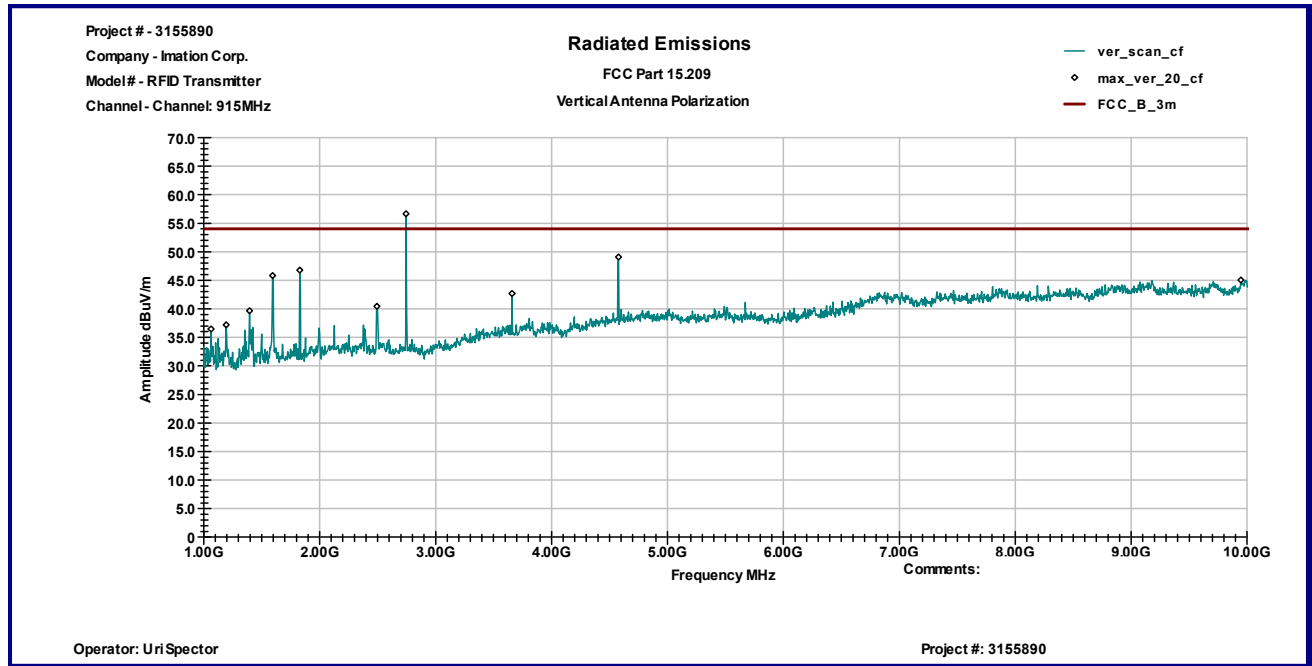
Measurements marked (\*) were taken using a Peak detector



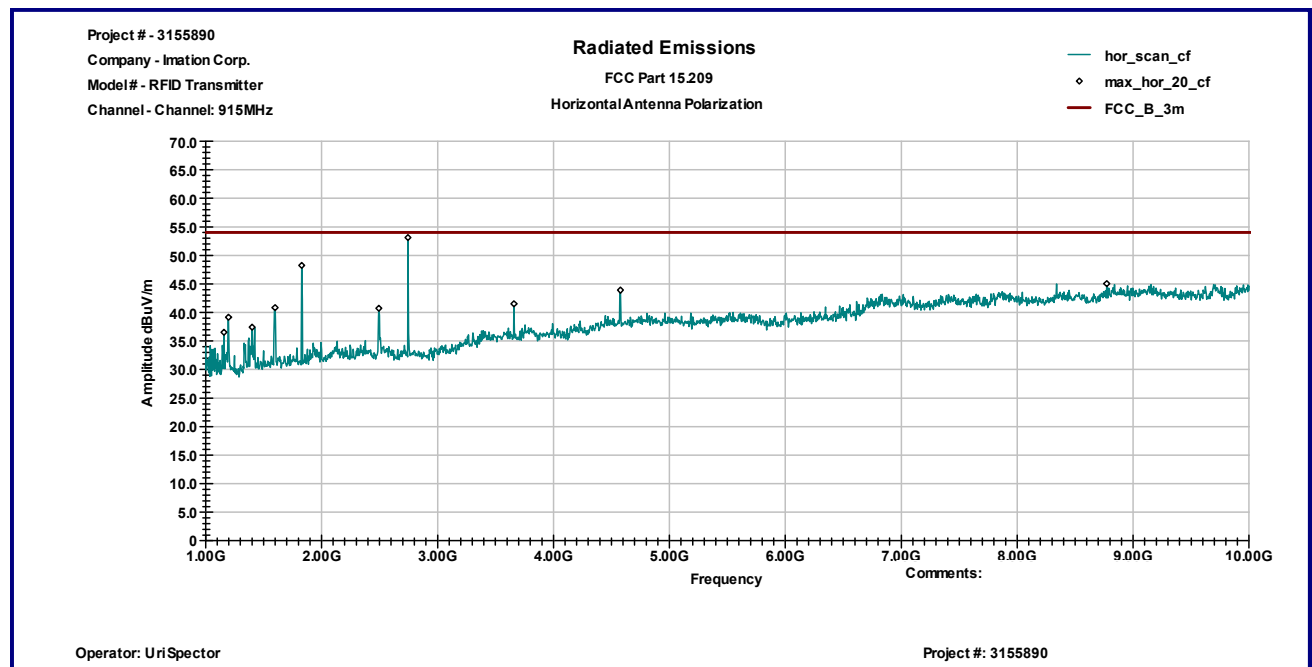
Graph 3.7.1



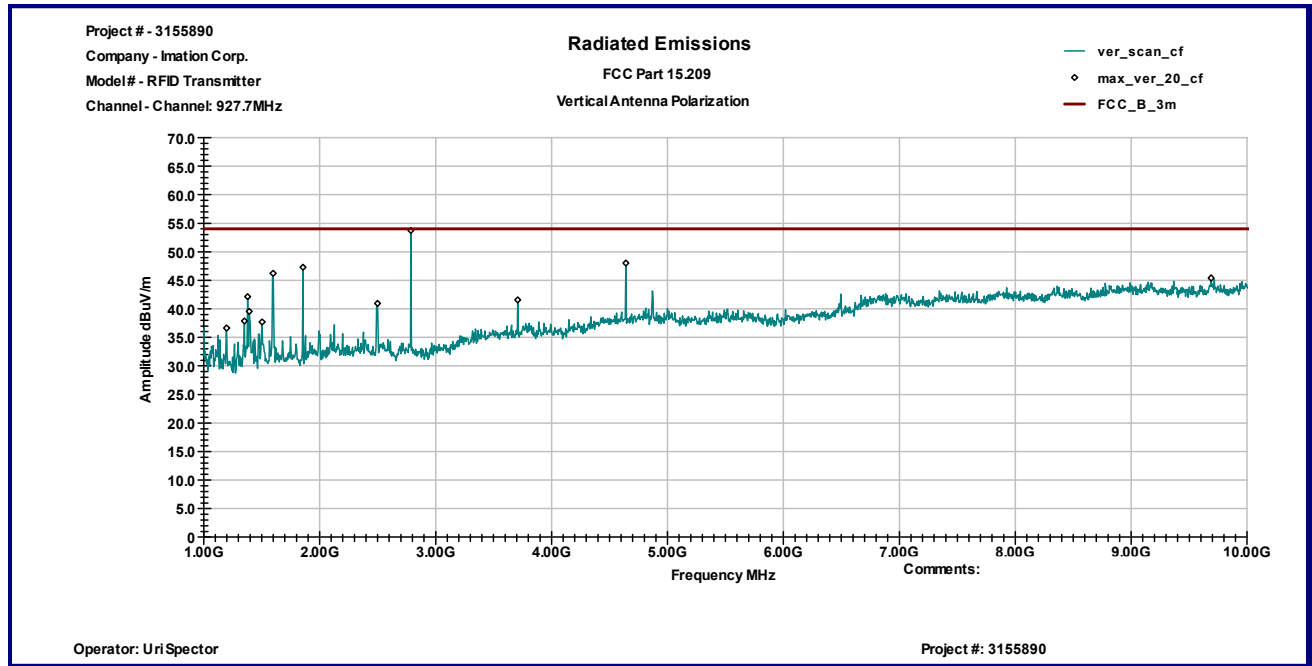
Graph 3.7.2



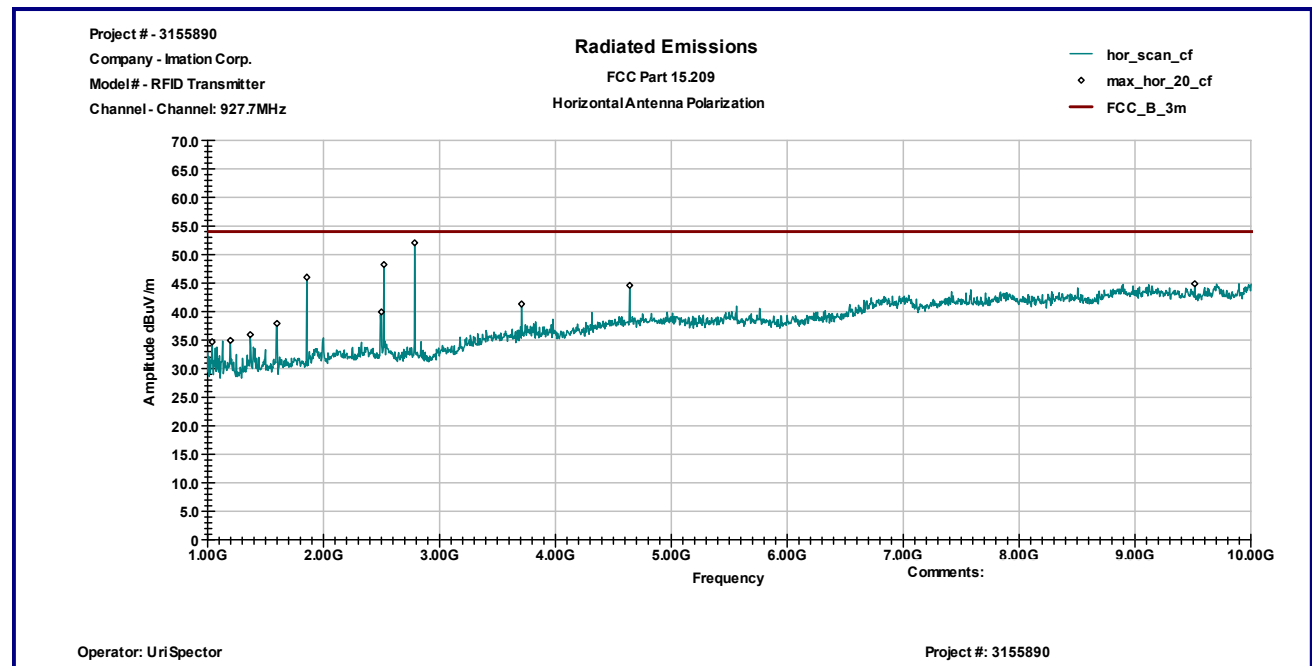
Graph 3.7.3



Graph 3.7.4



Graph 3.7.5



Graph 3.7.6

### 3.8 RF Exposure Compliance

The maximum measured antenna conducted power, P is 27.5dBm

The antenna gain, G is -8.8dBi

The maximum EIRP power is  $27.5 - 8.8 = 18.7\text{dBm}$ , or 0.074W

The limits for Maximum Permissible Exposure (MPE) for transmitter operating at 902-928MHz, MPE is  $928/300 = 3.093\text{mW/cm}^2$ , or  $31\text{W/m}^2$

The Power Density, S is related to EIRP with the equation:

$S = \text{EIRP} / 4\pi D^2$ , where D is the safe separation distance and = 0.2m, or 20cm

$$S = 0.074 / 4\pi 0.2^2$$

$S = 0.147\text{mW/cm}^2$ , or below the Maximum Permissible Exposure (MPE)



### 3.9 Transmitter power line conducted emissions

**Test location:** ☐ OATS ☒ Anechoic Chamber ☐ Other

**Test result:** **Pass**

**Frequency range:** 0.15MHz-30MHz

**Max. Emissions margin:** 2.4 dB below the limits for Peak readings

**Notes:** None

---

|                        |               |                     |
|------------------------|---------------|---------------------|
| <b>Date:</b>           | July 22, 2008 | <b>Result: Pass</b> |
| <b>Standard:</b>       | FCC 15.207    |                     |
| <b>Tested by:</b>      | Uri Spector   |                     |
| <b>Test Point:</b>     | Power Line    |                     |
| <b>Operation mode:</b> | See Page 5    |                     |
| <b>Note:</b>           |               |                     |

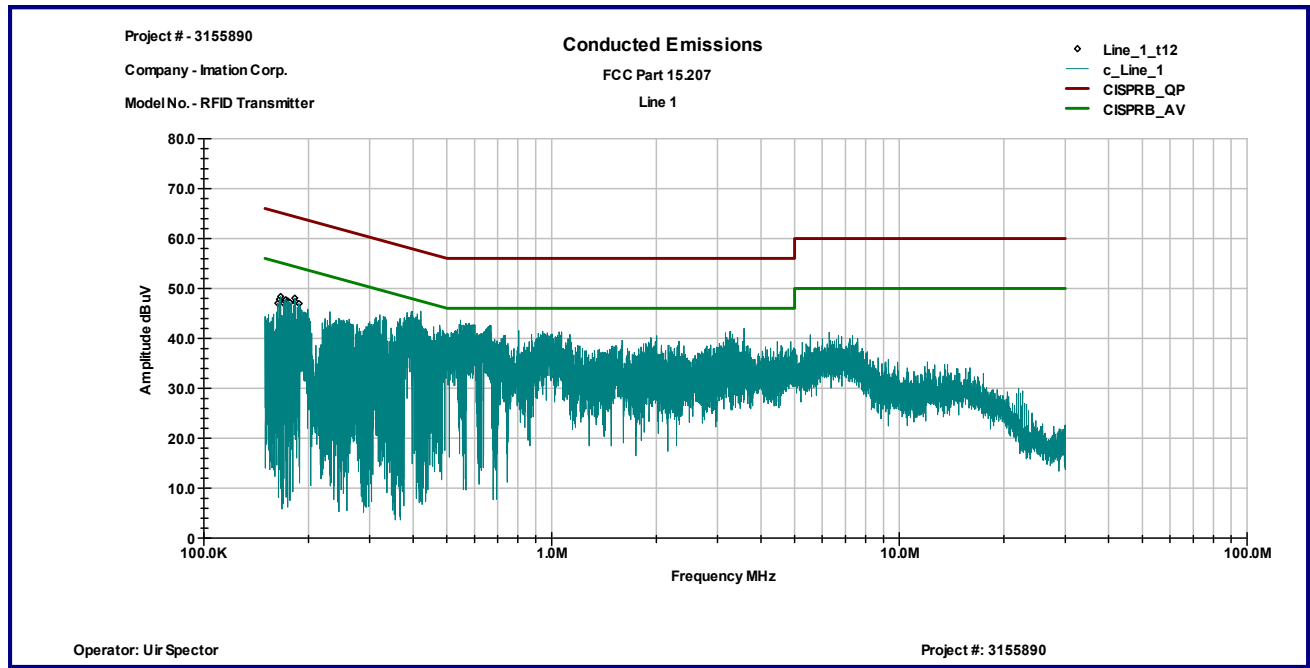
**Table 3.9.1**

**Line 1**

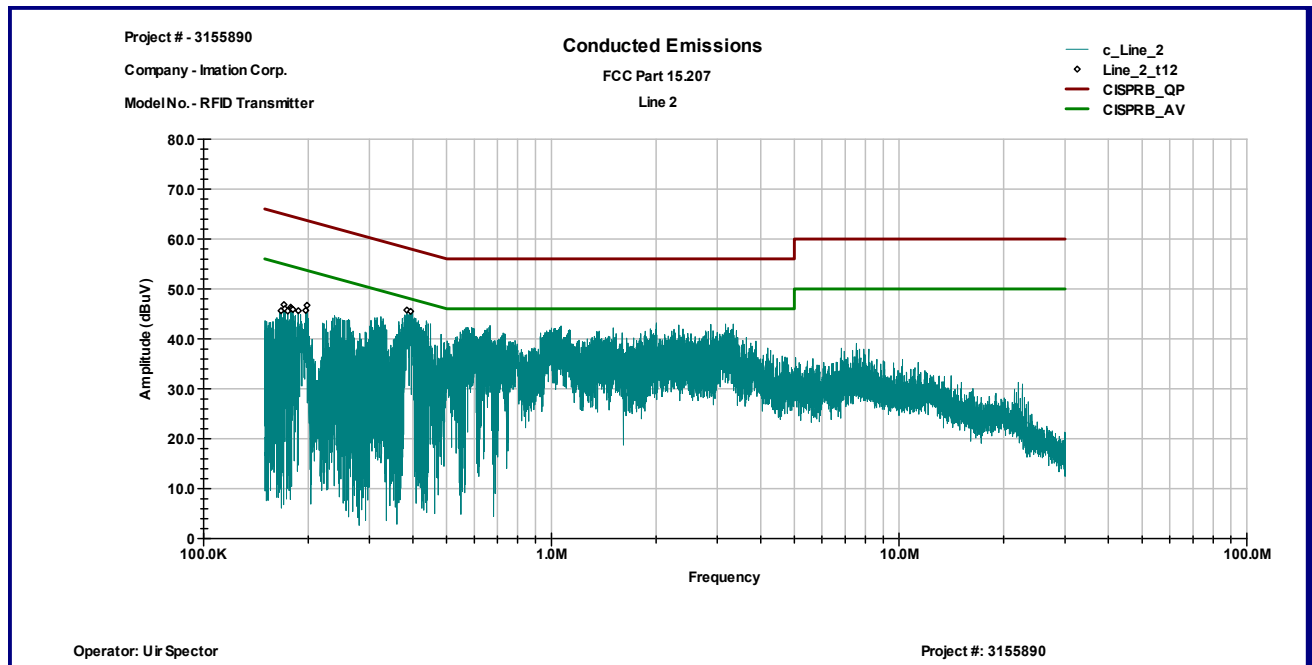
| Frequency  | Peak<br>dB $\mu$ V | QP Limit<br>dB $\mu$ V | AVG Limit<br>dB $\mu$ V | QP Margin<br>dB | AVG Margin<br>dB |
|------------|--------------------|------------------------|-------------------------|-----------------|------------------|
| 163.21 KHz | 47.1               | 65.3                   | 55.3                    | -18.2           | -8.2             |
| 164.99 KHz | 47.8               | 65.2                   | 55.2                    | -17.4           | -7.4             |
| 166.39 KHz | 48.4               | 65.1                   | 55.1                    | -16.8           | -6.8             |
| 169.57 KHz | 47.1               | 65.0                   | 55.0                    | -17.9           | -7.9             |
| 170.97 KHz | 47.5               | 64.9                   | 54.9                    | -17.4           | -7.4             |
| 172.22 KHz | 47.7               | 64.9                   | 54.9                    | -17.1           | -7.1             |
| 174.16 KHz | 47.5               | 64.8                   | 54.8                    | -17.3           | -7.3             |
| 175.4 KHz  | 47.3               | 64.7                   | 54.7                    | -17.4           | -7.4             |
| 176.8 KHz  | 47.2               | 64.6                   | 54.6                    | -17.5           | -7.5             |
| 182.7 KHz  | 48.0               | 64.4                   | 54.4                    | -16.3           | -6.3             |
| 183.32 KHz | 47.3               | 64.3                   | 54.3                    | -17.0           | -7.0             |
| 187.91 KHz | 47.0               | 64.1                   | 54.1                    | -17.2           | -7.2             |

**Line 2**

| Frequency  | Peak<br>dB $\mu$ V | QP Limit<br>dBmV | AVG Limit<br>dBmV | QP Margin<br>dB | AVG Margin<br>dB |
|------------|--------------------|------------------|-------------------|-----------------|------------------|
| 166.93 KHz | 45.6               | 65.1             | 55.1              | -19.5           | -9.5             |
| 170.2 KHz  | 46.8               | 65.0             | 55.0              | -18.1           | -8.1             |
| 171.44 KHz | 46.0               | 64.9             | 54.9              | -18.9           | -8.9             |
| 174.7 KHz  | 45.6               | 64.7             | 54.7              | -19.1           | -9.1             |
| 177.96 KHz | 46.3               | 64.6             | 54.6              | -18.3           | -8.3             |
| 179.28 KHz | 46.1               | 64.5             | 54.5              | -18.4           | -8.4             |
| 180.53 KHz | 45.9               | 64.5             | 54.5              | -18.6           | -8.6             |
| 187.13 KHz | 45.6               | 64.2             | 54.2              | -18.5           | -8.5             |
| 196.66 KHz | 45.7               | 63.8             | 53.8              | -18.0           | -8.0             |
| 198.23 KHz | 46.8               | 63.7             | 53.7              | -16.9           | -6.9             |
| 384.59 KHz | 45.8               | 58.2             | 48.2              | -12.4           | -2.4             |
| 394.34 KHz | 45.5               | 58.0             | 48.0              | -12.5           | -2.5             |



Graph 3.9.1



Graph 3.9.2



### 3.10 Receiver/digital device radiated emissions

**Test location:** ☐ OATS ☒ Anechoic Chamber

**Test distance:** ☐ 10 meters ☒ 3 meters

**Test result:** **Pass**

**Frequency range:** 30MHz-5.0GHz

**Max. Emissions margin:** 4.2 dB below the limits for Peak readings

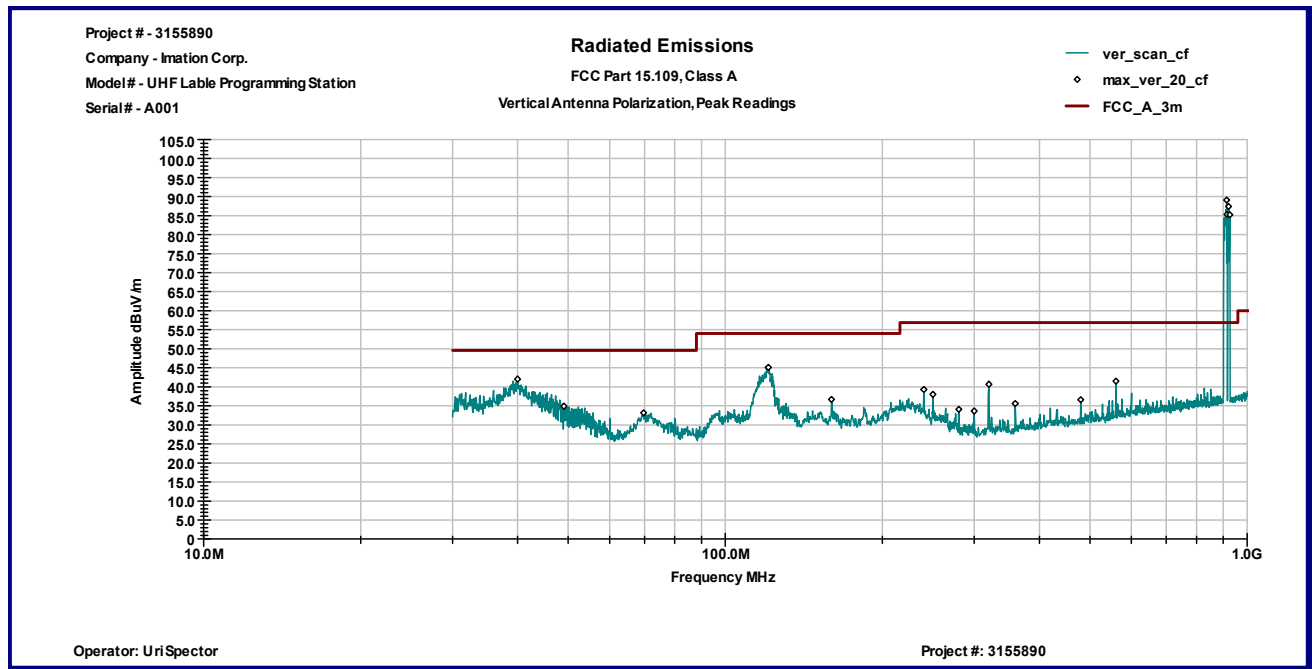
|                        |                          |                     |
|------------------------|--------------------------|---------------------|
| <b>Date:</b>           | July 22, 2008            | <b>Result: Pass</b> |
| <b>Standard:</b>       | FCC Part 15.109, Class A |                     |
| <b>Tested by:</b>      | Uri Spector              |                     |
| <b>Test Point:</b>     | Enclosure                |                     |
| <b>Operation mode:</b> | See Page 5               |                     |
| <b>Note:</b>           |                          |                     |

**Table 3.10.1**

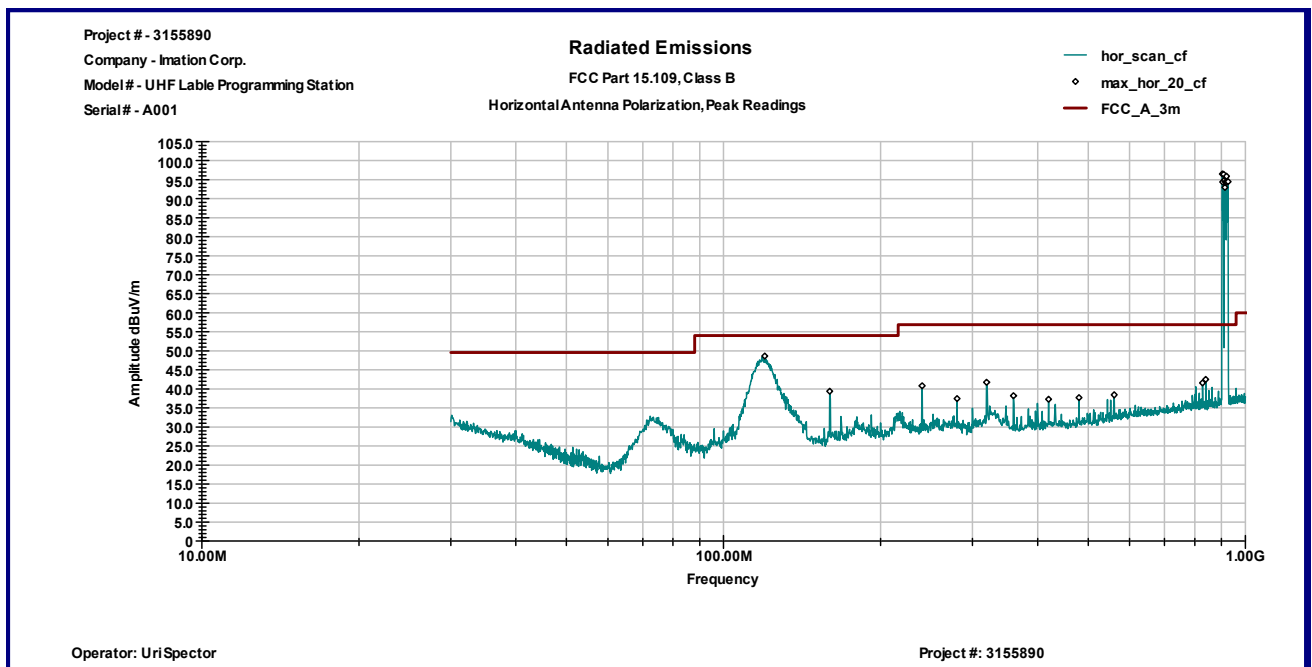
| Frequency  | Ant. Polarity | Peak Reading dBμV | Ant.Factor dB1/m | Total at 3m dBμV/m | QP Limit dBμV/m | Margin dB |
|------------|---------------|-------------------|------------------|--------------------|-----------------|-----------|
| 39.974 MHz | V             | 26.8              | 15.2             | 42.0               | 49.5            | -7.5      |
| 49.048 MHz | V             | 24.5              | 10.4             | 34.9               | 49.5            | -14.6     |
| 69.707 MHz | V             | 25.2              | 8.0              | 33.2               | 49.5            | -16.3     |
| 120.89 MHz | V             | 31.4              | 13.8             | 45.1               | 54.0            | -8.9      |
| 159.82 MHz | V             | 24.6              | 12.1             | 36.7               | 54.0            | -17.3     |
| 240.2 MHz  | V             | 25.9              | 13.4             | 39.3               | 56.9            | -17.6     |
| 250.17 MHz | V             | 23.6              | 14.4             | 38.0               | 56.9            | -18.9     |
| 280.39 MHz | V             | 19.0              | 15.1             | 34.1               | 56.9            | -22.8     |
| 300.0 MHz  | V             | 18.1              | 15.6             | 33.6               | 56.9            | -23.3     |
| 320.09 MHz | V             | 24.6              | 16.1             | 40.7               | 56.9            | -16.2     |
| 359.57 MHz | V             | 18.2              | 17.4             | 35.6               | 56.9            | -21.3     |
| 480.09 MHz | V             | 16.8              | 19.8             | 36.6               | 56.9            | -20.3     |
| 560.44 MHz | V             | 20.2              | 21.3             | 41.5               | 56.9            | -15.4     |
| 120.0 MHz  | H             | 34.9              | 13.8             | 48.7               | 54.0            | -5.3      |
| 159.82 MHz | H             | 27.3              | 12.1             | 39.4               | 54.0            | -14.6     |
| 240.2 MHz  | H             | 27.4              | 13.4             | 40.8               | 56.9            | -16.1     |
| 280.39 MHz | H             | 22.3              | 15.1             | 37.4               | 56.9            | -19.5     |
| 319.39 MHz | H             | 25.7              | 16.1             | 41.8               | 56.9            | -15.1     |
| 359.57 MHz | H             | 20.9              | 17.4             | 38.2               | 56.9            | -18.7     |
| 419.83 MHz | H             | 17.8              | 19.4             | 37.3               | 56.9            | -19.7     |
| 480.09 MHz | H             | 17.9              | 19.8             | 37.7               | 56.9            | -19.2     |
| 560.44 MHz | H             | 17.1              | 21.3             | 38.4               | 56.9            | -18.5     |
| 828.12 MHz | H             | 17.6              | 24.0             | 41.6               | 56.9            | -15.4     |
| 840.14 MHz | H             | 18.4              | 24.0             | 42.5               | 56.9            | -14.4     |

**Table 3.10.2**

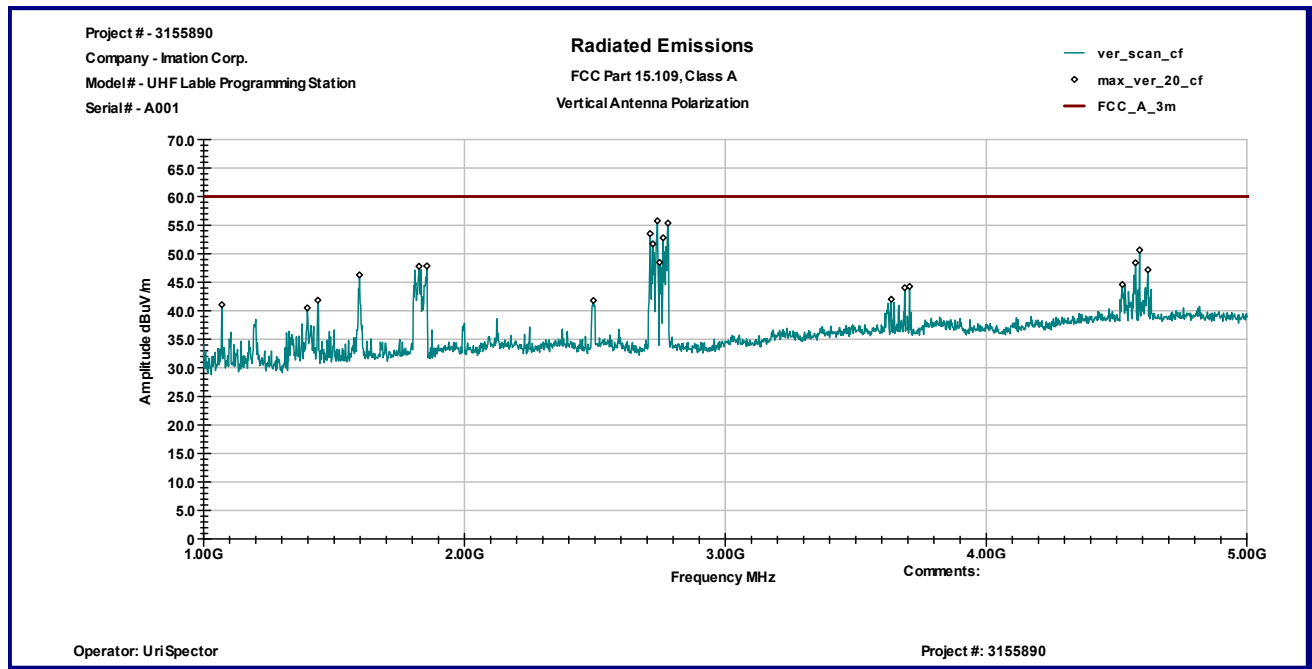
| Frequency<br>MHz | Antenna<br>Polarity | Reading<br>dB $\mu$ V | Total C.F.<br>dB1/m | Pre-Amp.<br>Gain (dB) | Total at 3m<br>dB $\mu$ V/m | QP Limit<br>dB $\mu$ V/m | Margin<br>dB |
|------------------|---------------------|-----------------------|---------------------|-----------------------|-----------------------------|--------------------------|--------------|
| 1.07 GHz         | V                   | 55.7                  | 26.7                | 41.3                  | 41.1                        | 60.0                     | -18.9        |
| 1.398 GHz        | V                   | 53.5                  | 28.1                | 41.1                  | 40.5                        | 60.0                     | -19.5        |
| 1.438 GHz        | V                   | 54.6                  | 28.3                | 41.1                  | 41.8                        | 60.0                     | -18.2        |
| 1.598 GHz        | V                   | 58.1                  | 29.1                | 40.9                  | 46.3                        | 60.0                     | -13.7        |
| 1.826 GHz        | V                   | 58.2                  | 30.2                | 40.5                  | 47.8                        | 60.0                     | -12.2        |
| 2.494 GHz        | V                   | 48.8                  | 32.7                | 39.7                  | 41.8                        | 60.0                     | -18.2        |
| 2.74 GHz         | V                   | 62.3                  | 33.4                | 39.9                  | 55.8                        | 60.0                     | -4.2         |
| 3.706 GHz        | V                   | 48.1                  | 36.3                | 40.2                  | 44.2                        | 60.0                     | -15.8        |
| 4.588 GHz        | V                   | 51.6                  | 38.9                | 39.9                  | 50.6                        | 60.0                     | -9.4         |
| 1.062 GHz        | H                   | 52.1                  | 26.6                | 41.3                  | 37.4                        | 60.0                     | -22.6        |
| 1.198 GHz        | H                   | 51.9                  | 27.2                | 41.3                  | 37.9                        | 60.0                     | -22.1        |
| 1.398 GHz        | H                   | 53.1                  | 28.1                | 41.1                  | 40.1                        | 60.0                     | -20.0        |
| 1.594 GHz        | H                   | 54.8                  | 29.0                | 40.9                  | 42.9                        | 60.0                     | -17.1        |
| 1.852 GHz        | H                   | 58.0                  | 30.3                | 40.5                  | 47.9                        | 60.0                     | -12.2        |
| 1.992 GHz        | H                   | 47.8                  | 31.0                | 40.3                  | 38.5                        | 60.0                     | -21.5        |
| 2.498 GHz        | H                   | 47.2                  | 32.7                | 39.7                  | 40.3                        | 60.0                     | -19.7        |
| 2.534 GHz        | H                   | 60.2                  | 32.8                | 39.7                  | 53.3                        | 60.0                     | -6.7         |
| 2.766 GHz        | H                   | 59.2                  | 33.5                | 39.9                  | 52.7                        | 60.0                     | -7.3         |
| 3.706 GHz        | H                   | 45.3                  | 36.3                | 40.2                  | 41.4                        | 60.0                     | -18.6        |
| 4.588 GHz        | H                   | 47.1                  | 38.9                | 39.9                  | 46.1                        | 60.0                     | -13.9        |



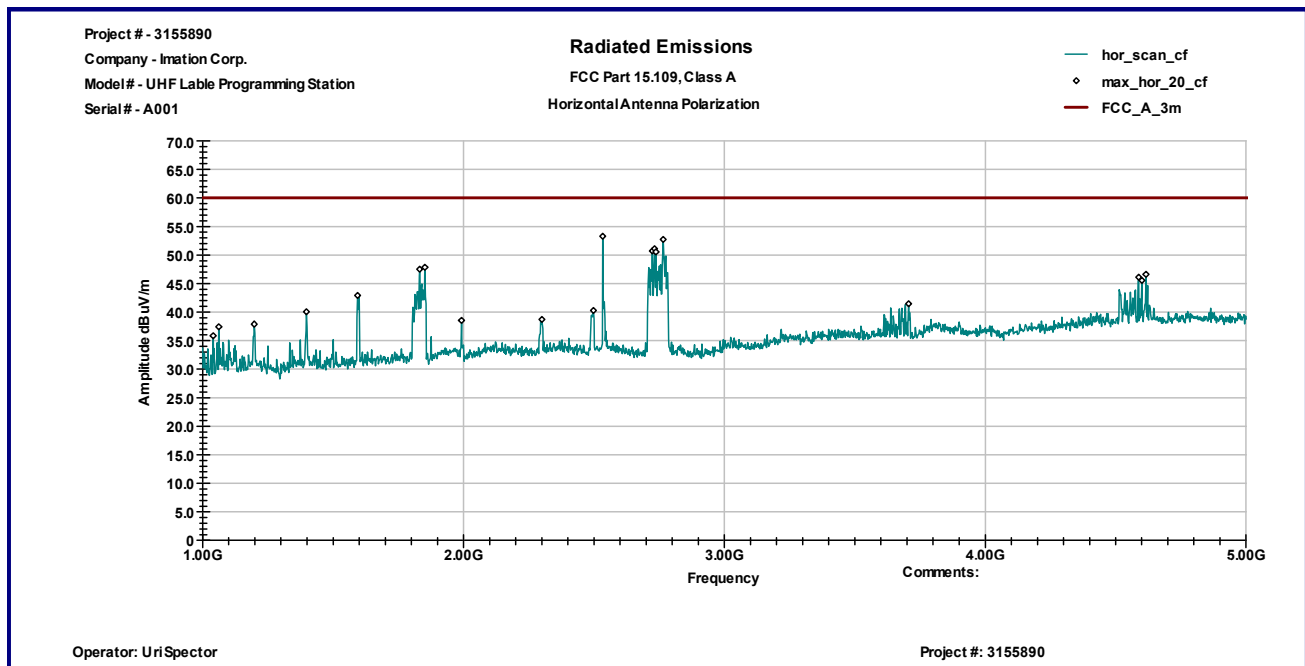
Graph 3.10.1



Graph 3.10.2



Graph 3.10.3



Graph 3.10.4

### 3.11 Digital device conducted emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: **Pass**

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: 15.2 dB below the limits for Peak readings

|                 |                          |                     |
|-----------------|--------------------------|---------------------|
| Date:           | July 22, 2008            | Result: <b>Pass</b> |
| Standard:       | FCC Part 15.107, Class A |                     |
| Tested by:      | Uri Spector              |                     |
| Test Point:     | Power Line               |                     |
| Operation mode: | See Page 5               |                     |
| Note:           |                          |                     |

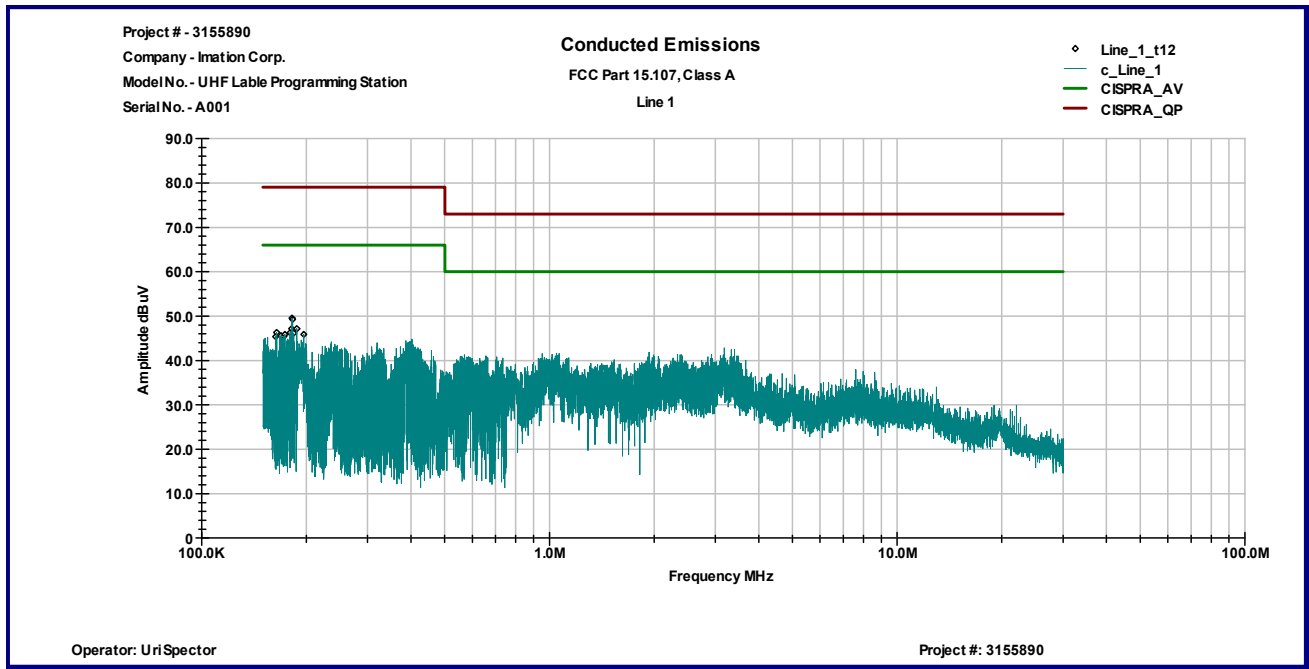
Table 3.11.1

#### Line 1

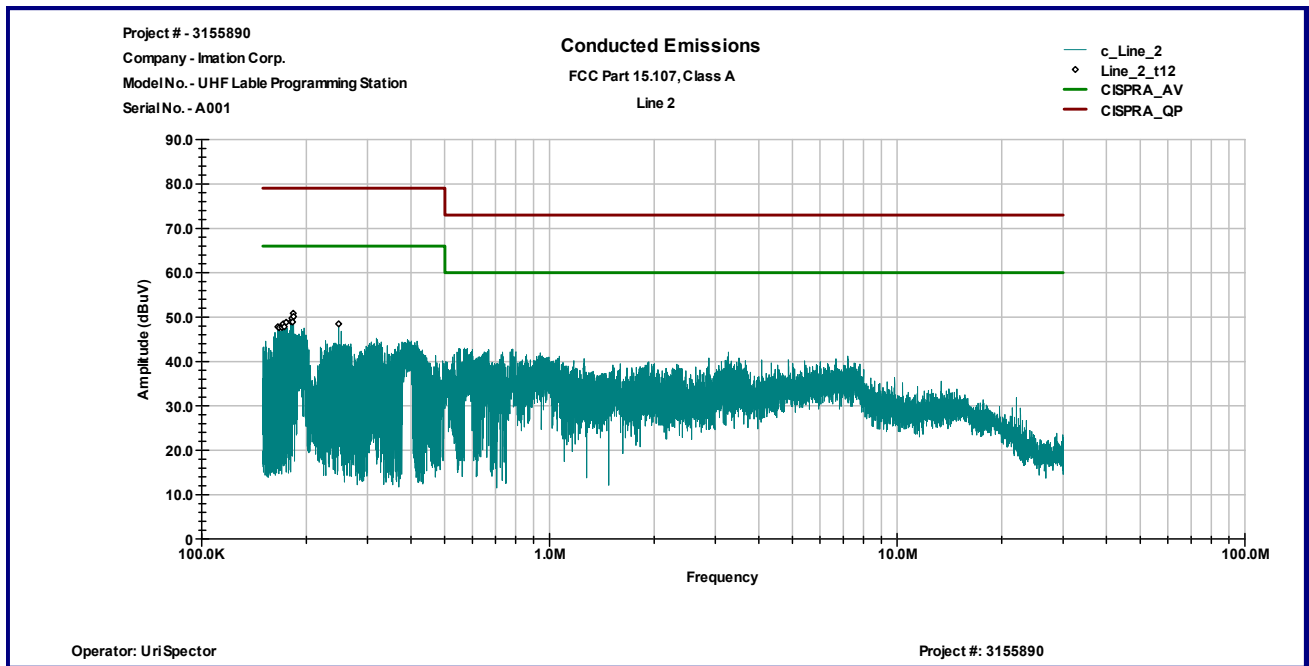
| Frequency  | Peak dBμV | QP Limit dBμV | AVG Limit dBμV | QP Margin dB | AVG Margin dB |
|------------|-----------|---------------|----------------|--------------|---------------|
| 163.13 KHz | 45.4      | 79.0          | 66.0           | -33.7        | -20.7         |
| 164.45 KHz | 46.3      | 79.0          | 66.0           | -32.7        | -19.7         |
| 169.03 KHz | 45.5      | 79.0          | 66.0           | -33.5        | -20.5         |
| 172.29 KHz | 45.4      | 79.0          | 66.0           | -33.6        | -20.6         |
| 173.54 KHz | 45.9      | 79.0          | 66.0           | -33.1        | -20.1         |
| 179.44 KHz | 46.3      | 79.0          | 66.0           | -32.8        | -19.8         |
| 181.38 KHz | 47.2      | 79.0          | 66.0           | -31.8        | -18.8         |
| 182.0 KHz  | 49.6      | 79.0          | 66.0           | -29.4        | -16.4         |
| 182.62 KHz | 49.2      | 79.0          | 66.0           | -29.8        | -16.8         |
| 183.95 KHz | 46.2      | 79.0          | 66.0           | -32.8        | -19.8         |
| 187.83 KHz | 47.1      | 79.0          | 66.0           | -31.9        | -18.9         |
| 196.56 KHz | 45.8      | 79.0          | 66.0           | -33.2        | -20.2         |

#### Line 2

| Frequency  | Peak dBμV | QP Limit dBmV | AVG Limit dBmV | QP Margin dB | AVG Margin dB |
|------------|-----------|---------------|----------------|--------------|---------------|
| 165.69 KHz | 47.8      | 79.0          | 66.0           | -31.2        | -18.2         |
| 167.01 KHz | 47.6      | 79.0          | 66.0           | -31.4        | -18.4         |
| 170.27 KHz | 47.7      | 79.0          | 66.0           | -31.3        | -18.3         |
| 171.59 KHz | 48.5      | 79.0          | 66.0           | -30.5        | -17.5         |
| 172.91 KHz | 47.8      | 79.0          | 66.0           | -31.2        | -18.2         |
| 174.86 KHz | 48.8      | 79.0          | 66.0           | -30.2        | -17.2         |
| 180.6 KHz  | 49.0      | 79.0          | 66.0           | -30.0        | -17.0         |
| 182.0 KHz  | 49.7      | 79.0          | 66.0           | -29.3        | -16.3         |
| 182.62 KHz | 48.9      | 79.0          | 66.0           | -30.1        | -17.1         |
| 183.32 KHz | 50.8      | 79.0          | 66.0           | -28.2        | -15.2         |
| 183.87 KHz | 50.1      | 79.0          | 66.0           | -28.9        | -15.9         |
| 247.71 KHz | 48.5      | 79.0          | 66.0           | -30.5        | -17.5         |



Graph 3.11.1



Graph 3.11.2



#### 4.0 TEST EQUIPMENT

| DESCRIPTION        | MANUFACTURER             | MODEL                  | SERIAL NO.    | CAL DUE    | USED                                |
|--------------------|--------------------------|------------------------|---------------|------------|-------------------------------------|
| Spectrum Analyzer  | R & S                    | FSP 40                 | 100024        | 08/23/2008 | <input checked="" type="checkbox"/> |
| Spectrum Analyzer  | R & S                    | ESCI                   | 100358        | 05/07/2009 | <input checked="" type="checkbox"/> |
| Bicono-Log Antenna | Schaffner-Chase          | CBL 6112 B             | 2468          | 07/30/2008 | <input checked="" type="checkbox"/> |
| Horn Antenna       | EMCO                     | 3115                   | 9507-4513     | 02/13/2009 | <input checked="" type="checkbox"/> |
| Pre-Amplifier      | MITEQ                    | AMF-5D-00501800-28-13P | 1122951       | 06/05/2009 | <input checked="" type="checkbox"/> |
| High Pass Filter   | Reactel                  | 7HS-1G-S12             | 0223          | VBU        | <input checked="" type="checkbox"/> |
| System             | TILE! Instrument Control |                        | Ver. 3.4.K.29 | VBU        | <input checked="" type="checkbox"/> |



## Test Setup Photos

