
**Application for Certification**

**Per**

**Title 47 USC Part 2, Subpart J, Equipment Authorization Procedures, Paragraph 2.907, Certification and Part 15, Subpart C, Intentional Radiators, Paragraph 15.231, Periodic Operation in the band 40.66 MHz to 40.70 MHz and above 70 MHz**

**For the**

**HOPE RF**

**Model:**
**RFM12 Module**

**UST Project: 09-0126**
**Issue Date: September 15, 2009**

**Number of Pages in this report: 27**

**3505 Francis Circle Alpharetta, GA 30004**
**PH: 770-740-0717 Fax: 770-740-1508**
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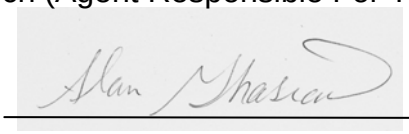
I certify that I am authorized to sign for the test facility and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

US Tech (Agent Responsible For Test):

By: 

Name: Alan Ghasiani

Title: President – Consulting Engineer

Date: August 31, 2009



**3505 Francis Circle Alpharetta, GA 30004**
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# MEASUREMENT/TECHNICAL REPORT

COMPANY NAME: **Valve Solutions Incorporated**

MODEL: **HOPE RF RFM12 Module**

FCC ID: **XRCVSI-FFZ2009**

DATE: **December 4, 2009**

This report concerns (check one): Original grant_X
Class II change_____

Equipment type: HOPE RF RFM12 Transceiver Module

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes_____ No_X

If yes, defer until:_____
date

__N.A.__ agrees to notify the Commission by__N.A.
date
of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

US Tech
3505 Francis Circle
Alpharetta, GA 30004

Phone Number: (770) 740-0717
Fax Number: (770) 740-1508

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## 1. General Information

The information contained in this report is presented for the FCC Equipment Authorization of Certification of the Equipment Under Test (EUT).

### 1.1 Product Description

The EUT is the HOPE RF Model: RFM12 Module. The EUT is a Low Power RF module Transceiver operating at 433.9 MHz. The RFM12 module is equipped in each of the three units that comprise the Flood Free Zone System. The individual units are the Actuator (ACT), the Hand Held Unit (HHU), and the Home Security Unit (HSU). For this test the HSU unit is being tested as a representative sample.

The RFM12 Module (EUT) only transmits when data is present in the absence of data the EUT is idle. The RFM12 Module (EUT) is programmed to transmit for 1.5 seconds. The transmitted signal length is 0.015625 seconds. The only time the signal will be sending out data is when the HHU's button is pushed or when the HSU contact is closed/ opened, and the signal will be sent out for a maximum of 10 seconds;10s/ 1.5s = 6.67 times, 6.67x0.015625s = 0.10417sec. This will be the total "ON' time per each operation which is less than the 2 seconds per hour allowance of paragraph 15.231 (a)(3). The HSU unit is manually operated and has a DIP switch that will automatically deactivate the transmitter in no more then 5 seconds per 15.231 (a)(1). Please the following Figure.

Because the periodic rate does not exceed the requirement of paragraph (a), paragraph (e) is not invoked.

### 1.2 Characterization of Test Sample

The sample used for testing was received by US Tech on September 10, 2009 in good operating condition.

### 1.3 Related Submittal(s)/Grant(s)

The EUT will be used to wirelessly send/receive data. The transceiver presented in this report will be used with other like transceivers:

### 1.4 The EUT is subject to the following authorizations:

a) Certification of the transmitter part of the transceiver module (with limited modular approval).
b) Verification of the non-transmitter part of the transceiver as a Digital Device.

# 2 Tests and Measurements

## 2.1 Configuration of Tested System

The Test sample was tested per *ANSI C63.4, Methods of Measurement from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2003).* Radiated emissions data were taken according to paragraph 8.0 with the test receiver or spectrum analyzer's resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer was off throughout the evaluation process. There were no interconnecting cables to manipulate in an attempt to maximize emissions; however, the physical position of the EUT was varied through the three mutually exclusive orthogonal planes in an attempt to maximize the emissions. The worse case position is the position used for final measurements and is gathered in this test report. A block diagram of the tested system is shown in Figure 1. All test configuration photographs are shown in the Test Configuration Annex.

## 2.2 Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA. This site has been fully described and registered with the FCC, under designation number US5117. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number 2982A-1 and is also a NVLAP accredited test lab; lab code 200162-0.

## 2.3 Test Equipment

**Table 1. EUT and Peripherals**

| PERIPHERAL AND MANUFACTURER | MODEL NUMBER | SERIAL NUMBER | FCC ID: | CABLES P/D |
|---|---|---|---|---|
| HOPE RF (EUT) | HOPE RF RFM12 | N/A | Pending: XRCVSI-FFZ2009 | N/A |
| Valve Solutions Incorporated (EUT) | Home Security Unit (HSU) | None | None | N/A |

**P = Power D = data S = Shielded U = Unshielded**

## Table 2. Test Instruments

| TYPE | MANUFACTURER | MODEL | SN. | Cal Date. |
|---|---|---|---|---|
| SPECTRUM ANALYZER | HEWLETT-PACKARD | 8566B | 3205A00124 | 10/10/08 |
| RF PREAMP | HEWLETT-PACKARD | 8447D | 2944A07436 | 9/08/09 |
| RF PREAMP | HEWLETT- PACKARD | 8449B | 3008A00480 | 9/11/09 |
| HORN ANTENNA | EMCO | 3115 | 9107-3723 | 11/04/08 2 Yr. |
| BICONICAL ANTENNA | EMCO | 3110B | 9307-1431 | 1/22/09 |
| LISN X 2 | Solar Electronics | 8028-50-TS24-BNC | 910495-910494 | 1/19/09 |
| LOG PERIODIC ANTENNA | EMCO | 3146 | 9110-3632 | 11/21/07 2 Yr. |
| Calculation Program | N/A | N/A | EMCCALC | N/A |

## 2.4 Modifications to Equipment

No modifications were needed to bring the EUT into compliance with the FCC Part 15.209, radiated emissions limits for an intentional radiator, 15.231, *Periodic Operation in the Band 40.66 – 40.70 MHz and above 70 MHz.*

## 2.5 Test Procedure

The EUT was configured as shown in the following block diagram(s) and photograph(s). The sample was tested per ANSI C63.4, Methods of Measurement for Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2003) following US Tech's procedures paragraph 7 for conducted and paragraph 8 for radiated. Conducted and radiated emissions data were taken with the test receiver or spectrum analyzer's resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements are peak unless stated otherwise. The video filter on the spectrum analyzer was OFF throughout the evaluation process. Interconnecting cables were manipulated as necessary to maximize emissions. The EUT was rotated 360 degrees with the turntable to maximize emissions. The physical position of the EUT was varied through the three mutually exclusive orthogonal planes in an attempt to maximize the emissions. The final setup description is found in the test section of this report.

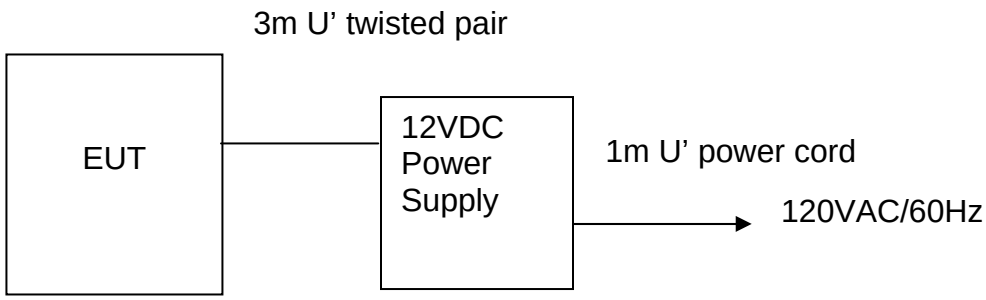


**Figure 1. Test Configuration**

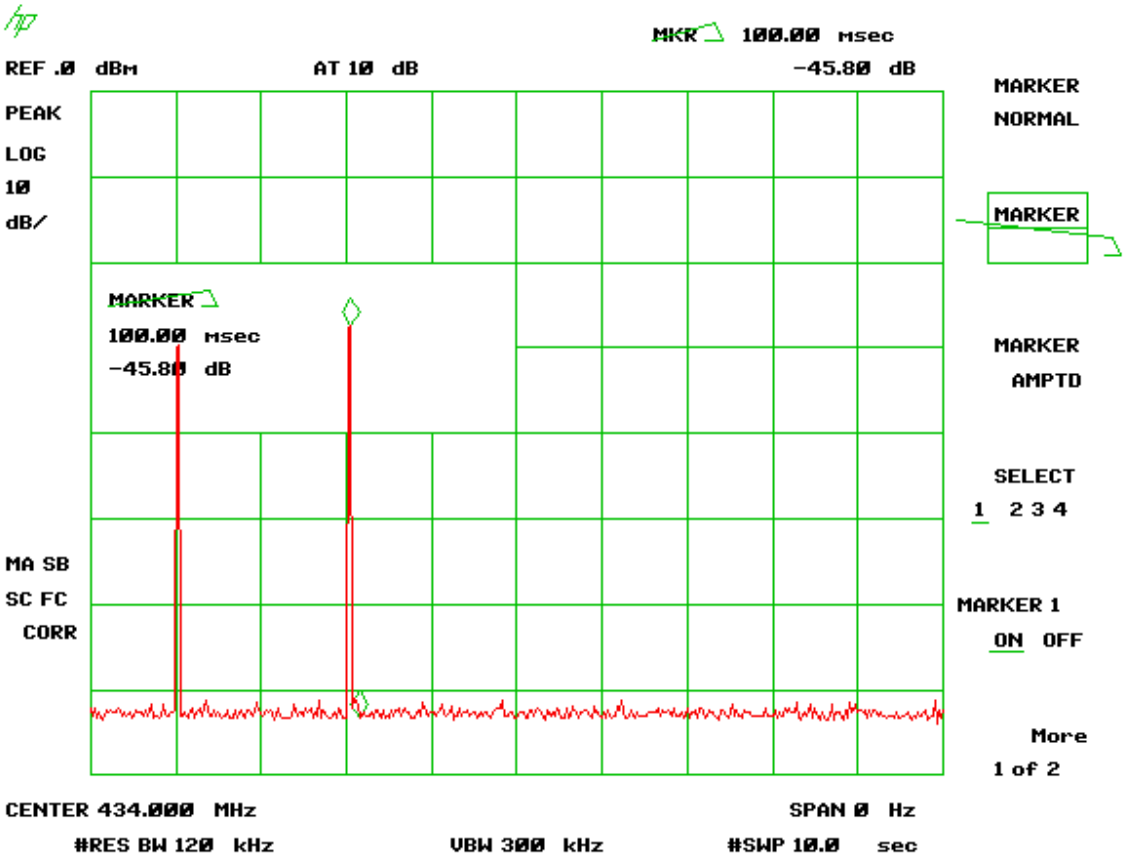


**Figure 2. Deactivation per 15.231(a)(1)**

## 2.6 EUT Antenna Description (FCC Sec. 15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Valve Solutions Incorporated Model: HOPE RF RFM12 incorporates the following antennas only.

**Table 3. Antenna description for Valve Solutions INC. Model: HOPE RF RFM12**

| MANUFACTURER | TYPE | MODEL | GAIN $dB_i$ |
|---|---|---|---|
| Valve Solutions Incorporated | Permanently attached coiled wire antenna | N/A | 0.5 |

## 2.7 Intentional Radiator, Power Lines Conducted Emissions (47 CFR 15.207)

The power line conducted voltage emission measurements have been carried out in accordance with CFR 15.207, per ANSI C63.4, Paragraph 7, with a spectrum analyzer connected to an LISN and the EUT placed into a continuous mode of transmission.

The worst-case results for conducted emissions was 6.4 dB with in the limit at 0.1584 MHz. All other conducted emissions measurements were at least 10.3 dB or more from the limits.

Table 4 – Transmitter Power Line Conducted Emissions Test Data (47 CFR 15.207)

| **CONDUCTED EMISSIONS** | | | | | | |
|---|---|---|---|---|---|---|
| Tested By: GY | Test: FCC Part 15.207 Class B | | Project No.: 09-0126 | Manufacturer: Valve Solutions Incorporated Model: HOPE RF/ RFM12 Module | | |
| Frequency (MHz) | Test Data (dBuV) | LISN+CL-PA (dB) | Corrected Results (dBuV) | Avg Limits (dBuV) | Margin (dB) | Detector |
| **120 VAC, 60 Hz, Supply Line** | | | | | | |
| 0.1721 | 43.20 | 1.37 | 44.57 | 54.9 | 10.3 | **QP** |
| 0.5110 | 30.00 | 0.44 | 30.44 | 46.0 | 15.6 | **PK** |
| 1.2600 | 23.40 | 0.30 | 23.70 | 46.0 | 22.3 | **PK** |
| 5.6300 | 20.60 | 0.27 | 20.87 | 50.0 | 29.1 | **PK** |
| 14.6700 | 19.90 | 0.27 | 20.17 | 50.0 | 29.8 | **PK** |
| 29.9900 | 25.40 | 0.30 | 25.70 | 50.0 | 24.3 | **PK** |
| **120 VAC, 60 Hz, Neutral Line** | | | | | | |
| 0.1584 | 47.70 | 1.44 | 49.14 | 55.5 | 6.4 | **PK** |
| 0.5005 | 22.40 | 0.45 | 22.85 | 46.0 | 23.2 | **PK** |
| 1.0240 | 20.20 | 0.34 | 20.54 | 46.0 | 25.5 | **PK** |
| 6.1850 | 19.70 | 0.27 | 19.97 | 50.0 | 30.0 | **PK** |
| 17.3300 | 20.10 | 0.27 | 20.37 | 50.0 | 29.6 | **PK** |
| 30.0000 | 28.60 | 0.25 | 28.85 | 50.0 | 21.2 | **PK** |

Tested from 150 kHz to 30 MHz
SAMPLE CALCULATIONS: At 0.1721 MHz 43.20 dBuV + (1.37) = 44.57 dBuV.
Test Date: September 11, 2009
Tested By
Signature: _____ Name: George Yang

## 2.8 Field Strength of Fundamental (47 CFR 15.231(b))

The results of the measurements for peak fundamental emissions are given in Table 5. The EUT emissions measurement was started by setting up the Log-periodic Antenna (L-pA) or generally, any antenna, in the vertical orientation at a distance of 3 meters from the EUT and at a height of 1.0 meters above the ground. The EUT packages' major axis was set normal to the direction of the measuring antenna.

The Spectrum Analyzer (SA) displays were set to: Channel A free-running, Channel B to Max-Hold. Choose a frequency or frequency range and scan it at a coupled rate. When a suspicious signal is found, center the signal on the screen and raise the L-pA to the 4-meter height while observing the SA display for changes to the max-hold and free-running display. Next, the antenna is lowered to 1 meter height above the ground plane while observing the channel A and B displays. The display having max-hold shows the maximum signal seen across the height range of 1 to 4 meters. The next action is to raise or lower the antenna until the free-running display matches the Max-hold display's magnitude on the SA screen. When this occurs, the signal is maximized for antenna height. Record the antenna height on the data sheet corresponding to the present frequency.

When the antenna height has been maximized, the next step in the measurement process is to maximize the EUT direction with respect to the receiving antenna. Rotate the turn-table through 360 degrees with one SA channel set for max-hold and the other channel in free-run mode. The object is to find that azimuth direction where the free-running indication just matches the greatest max-hold indication. This is the direction where the signal is peaked for azimuth. Record the direction on the data sheet next to the frequency.

2.8 Field Strength of Fundamental (47 CFR 15.231(b)) (cont'd)

When all signals have been maximized for antenna height and direction, the EUT case is carefully maneuvered in each of the three mutually exclusive orthogonal planes while observing the same Max-hold/free-running SA display indication. When the EUT position is found that allows a maximized signal to be read from the display, then that signals' magnitude is recorded on the data sheet for that particular frequency.

Next, re-orient the measurement antenna to Horizontal polarization at 1 meter height and repeat the above antenna and directional maximization processes for the greatest signals found across the frequency spectrum of interest. Record all signals within 6 dB of the limit.

Finally, Input the collected data into the calculation spread sheet. The spread sheet is designed to calculate for the true value that is collected. The spread sheet takes into account the SA reading, the antenna correction factor, cable losses and duty cycle factors. See the data tables herein.

2.9 Limits for Operation in the Band above 70 MHz (CFR15.231 (b))

This limit versus frequency table is as follows (test distance = 3.0 meters):

| Fundamental Frequency (MHz) | Limit Fundamental (Average ) uV/m | Limit Harmonics and other spurious (Average) uV/m |
|---|---|---|
| 260 to 470 | 3750 to 12500[*, 1] | 375 to 1250[*,2] |
| * Linear Interpolation | | |

Note: formula 1: $limit_1 = Y = 41.667X - 7083.5$
2: $limit_2 = Y = 4.1667X - 708.35$

The frequency spectrum above the fundamental to its $10^{th}$ harmonic shall be examined and measured for signals falling into the restricted bands of 15.205. If average emissions measurements are employed, the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions apply. Spurious and harmonics shall meet the requirements of the above table or the requirements of 15.209, whichever requirement permits a higher field strength.

2.10 Peak Radiated Spurious Emissions, 30 MHz to 1000 MHz (47 CFR 15.205, 15.209, 15.225)

The peak radiated spurious emissions were measured over the frequency range of 30 MHz to 5 GHz. The spurious emissions have been recorded and can be seen in the Test Table herein.

2.11 Transmitter Duty Cycle (47 CFR 15.35 (c))

The duty cycle de-rating factor used in the calculation of average radiated limits (per CFR 15.209 and 15.35(c)) is described below. This factor was calculated by first determining the worst case scenario for system operation. With the worst case operating scenario the transmission duty cycle is calculated as:

Under worst case conditions, the maximum duration of each transmission is 32.60mS (As shown in figure 3).
This is 32.60mS in a 100mS window (as shown in figures 3).
Total ON time: 32.60 milliseconds. Then (32.60 mS/100 mS)*100% = 32.6%
In terms of logarithmic voltage: dB = 20 log (0.326) = -9.74 this is the Duty Cycle

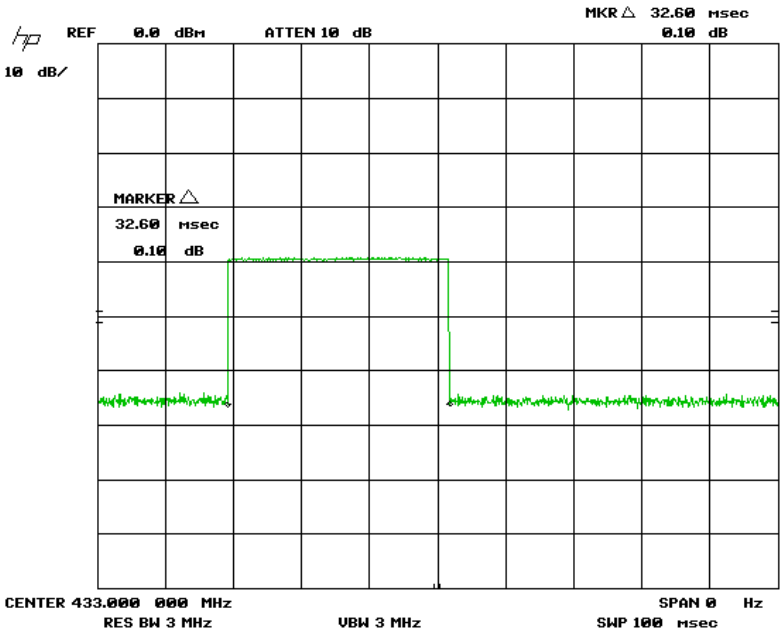


**Figure 3. Duty Cycle**

Table 5. Intentional Radiator Radiated Emissions

| Intentional Radiator Radiated Emissions | | | | | | | |
|---|---|---|---|---|---|---|---|
| Test By: GY | Test: Part 15B, Para 15.231 | | | Client: Valve Solutions Incorporated | | | |
| | Project: 09-0126 | Class: B | | Model: HOPE RF RFM12 Module | | | |
| Frequency (MHz) | Peak Test Data (dBuV) | AF+CL-PA (dB/m) | Peak Corrected Results (dBuV/m) | Limits (dBuV/m) | Application Test Distance/ Polarization | Margin (dB) | Detector Used |
| Measurements were made over the frequency range of fundamental to 10th harmonic | | | | | | | |
| 433.97 | 72.90 | 20.85 | 93.75 | 100.8 | 3m./HORZ | 7.1 | **PK** |
| 868.12 | 32.90 | 29.16 | 62.06 | 74.0 | 3m./HORZ | 11.9 | **PK** |
| 1302.25* | 63.50 | -11.25 | 52.25 | 74.0 | 3m./VERT | 21.7 | **PK** |
| 1735.91 | 66.00 | -8.66 | 57.34 | 74.0 | 3m./VERT | 16.7 | **PK** |
| 2169.79 | 60.20 | -6.22 | 53.98 | 74.0 | 3m./VERT | 20.0 | **PK** |
| 2604.47 | 52.60 | -4.40 | 38.70 | 74.0 | 1m./VERT | 35.3 | **PK** |
| 3037.61 | 49.50 | -2.75 | 37.25 | 74.0 | 1m./VERT | 36.7 | **PK** |
| 3473.47 | 44.70 | -0.74 | 34.46 | 74.0 | 1m./VERT | 39.5 | **PK** |

* frequency falls in restricted band of CFR 15.205.

Note: Measurements made at 1m were extrapolated back to 3m by subtracting 9.5.

Tested from Fundamental to 10th Harmonic

SAMPLE CALCULATIONS: At 433.97 MHz = 72.90 + (20.85) = 93.75 dBuV

Test Date: September 10, 2009

Tested By
Signature: _____ Name: George Yang

Table 6. Intentional Radiator Radiated Emissions (AVERAGE)

| Intentional Radiator Radiated Emissions (AVERAGE) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Test By: GY | Test: Part 15B, Para 15.231 | | | Client: Valve Solutions Incorporated | | | |
| | Project: 09-0126 | Class: B | | Model: HOPE RF RFM12 Module | | | |
| Frequency (MHz) | Peak Test Data (dBuV) | AF+CL-PA (dB/m) | Peak Corrected Results (dBuV/m) | Limits (dBuV/m) | Application Test Distance/ Polarization | Margin (dB) | Detector Used |
| Measurements were made over the frequency range of fundamental to 10th harmonic | | | | | | | |
| 433.97 | 62.97 | 11.09 | 74.06 | 80.8 | 3m./HORZ | 6.7 | **AVG** |
| 868.12 | 32.90 | 19.40 | 52.30 | 60.8 | 3m./HORZ | 8.5 | **PK** |
| 1302.25* | 63.50 | -21.01 | 42.49 | 54.0 | 3m./VERT | 11.5 | **PK** |
| 1735.91 | 66.00 | -18.42 | 47.58 | 54.0 | 3m./VERT | 6.4 | **PK** |
| 2169.79 | 60.20 | -15.98 | 44.22 | 54.0 | 3m./VERT | 9.8 | **PK** |
| 2604.47 | 52.60 | -14.16 | 28.94 | 54.0 | 1m./VERT | 25.1 | **PK** |
| 3037.61 | 49.50 | -12.51 | 27.49 | 54.0 | 1m./VERT | 26.5 | **PK** |
| 3473.47 | 44.70 | -10.50 | 24.70 | 54.0 | 1m./VERT | 29.3 | **PK** |

* frequency falls in restricted band of CFR 15.205.

Note: Measurements made at 1m were extrapolated back to 3m by subtracting 9.5.

Note: Duty Cycle factored into the calculation.
Tested from Fundamental to 10th Harmonic

SAMPLE CALCULATIONS: At 433.97 MHz = 62.97(-DC) + (11.09) = 74.06 dBuV

Test Date: September 10, 2009

Tested By
Signature: _____ Name: George Yang

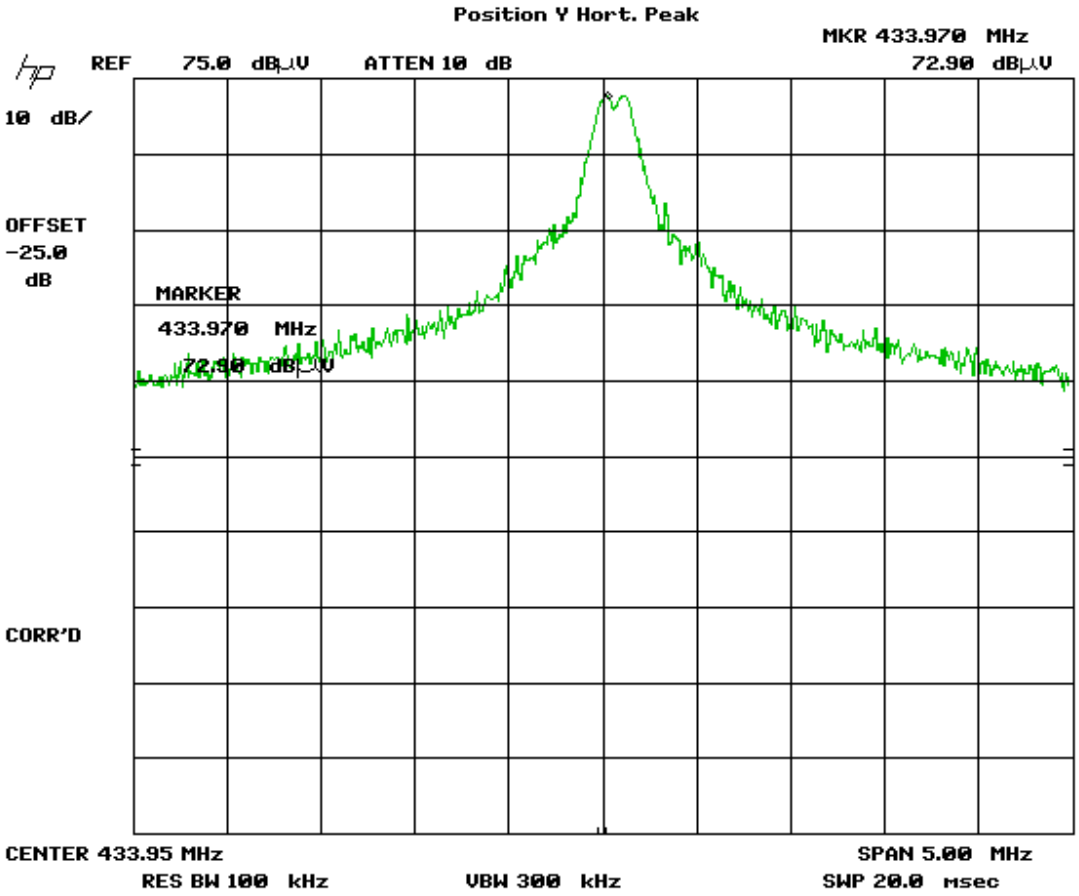


**Figure 4. Peak Value of Fundamental**

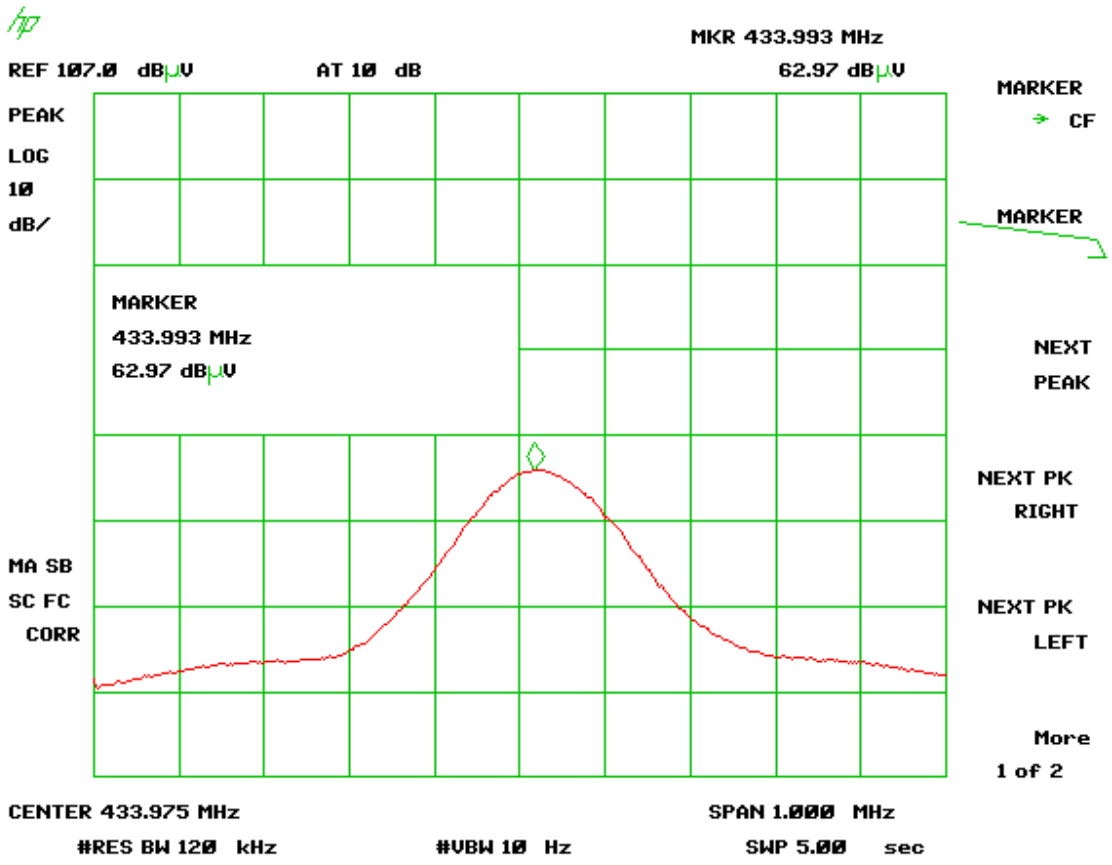


**Figure 5. Average Value of Fundamental.**

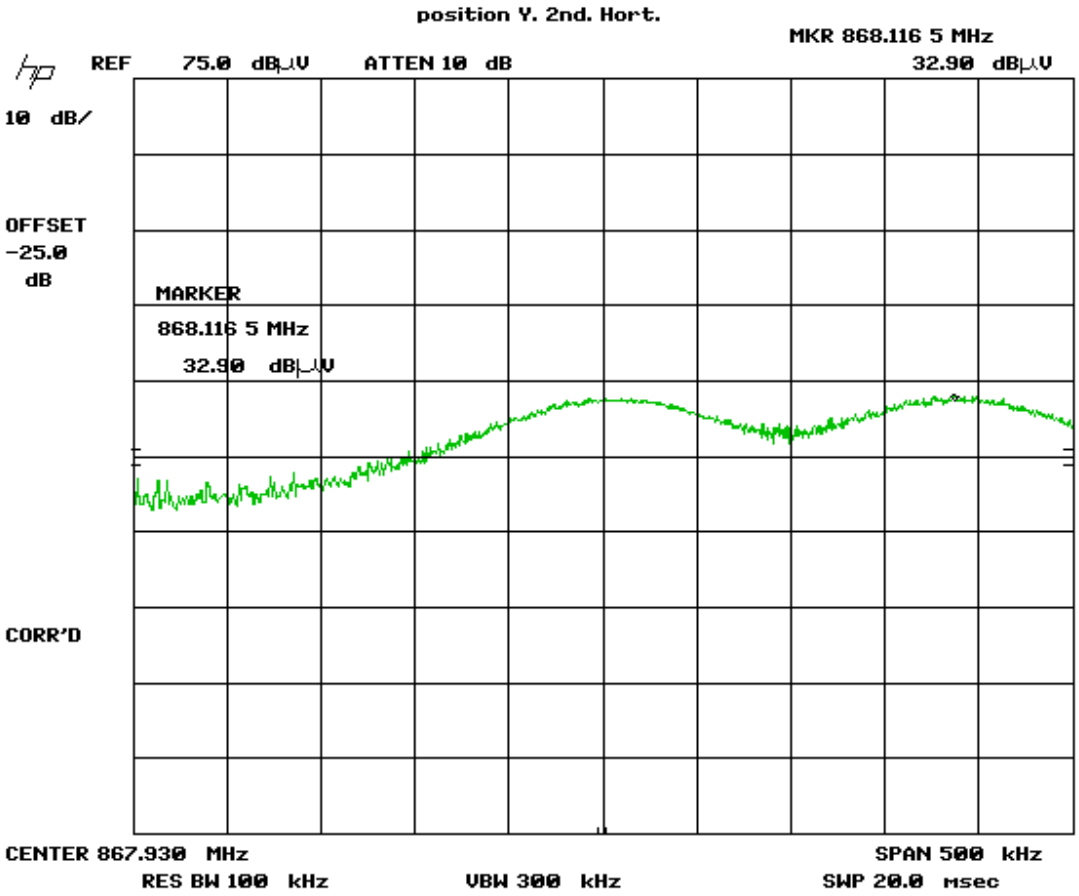


**Figure 6. Worse Case harmonic.**

## 2.12 Bandwidth of Fundamental (CFR15.231 (c))

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined by those frequencies that are at least 20 dB down on either side of the center frequency of the pulse.

0.0025 x 433,980,000.00 = 1.085 MHz

The measured bandwidth is 682.00 kHz, well within the limit. See Figure 8, below.

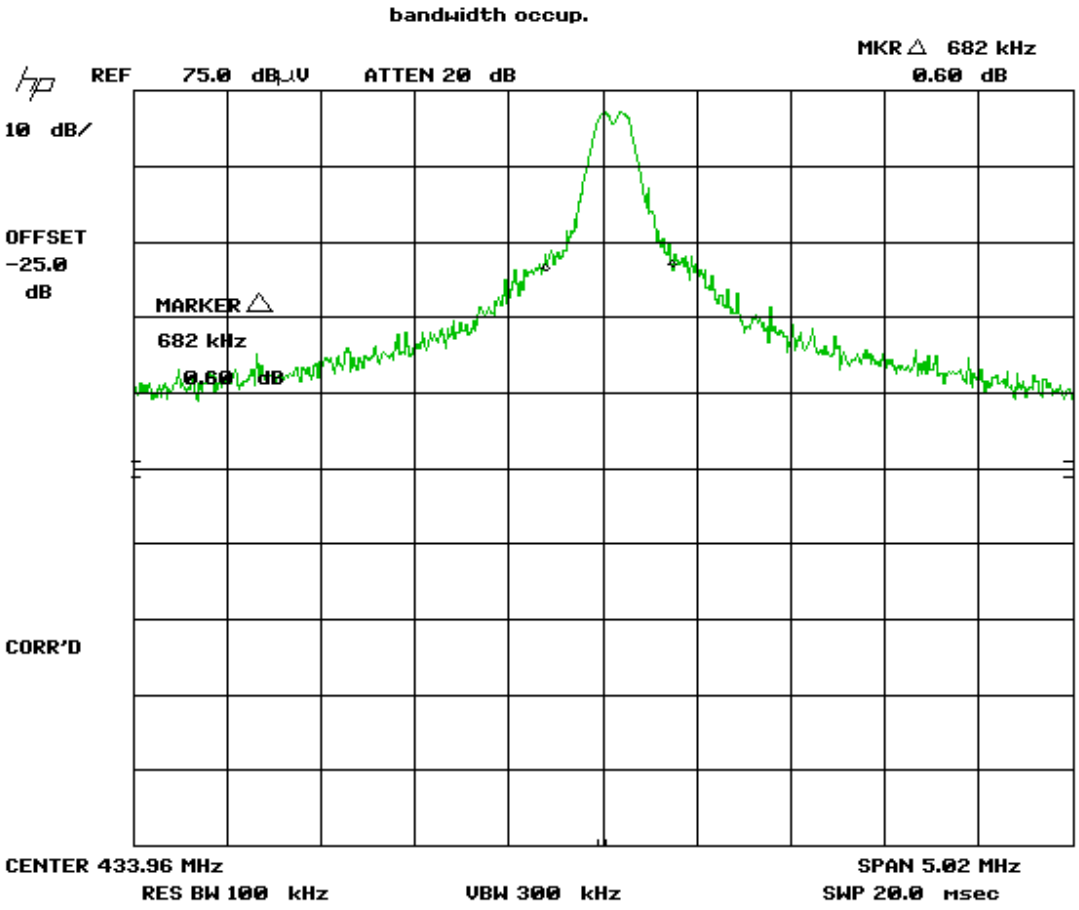


**Figure 7. Occupied Bandwidth (-20 dB) of Fundamental.**

Bandwidth = 682.00 kHz

## 2.13Power Line Conducted Emissions for Transmitter and Receiver/Digital Apparatus.(47 CFR 15.107)

The power line conducted voltage emission measurements have been carried out in accordance with CFR 15.207, per ANSI C63.4, Paragraph 7, with a spectrum analyzer connected to an LISN and the EUT placed into a continuous mode of transmission.

The worst-case results for conducted emissions was 11.0 dB with in the limit at 0.1528 MHz. All other conducted emissions measurements were at least 11.2 dB or more from the limits. Those results are given in Table 7.

Table 7. Unintentional Power Line Conducted Emissions Test Data (47 CFR 15.207)

| CONDUCTED EMISSIONS | | | | | | |
|---|---|---|---|---|---|---|
| Tested By: GY | Specification Requirement: FCC Part 15, Para 15.107 Class B | | Project No.: 09-0126 | Manufacturer: Valve Solutions Incorporated Model: HOPE RF/RFM12 Module | | |
| Frequency (MHz) | Test Data (dBuV) | LISN+CL-PA (dB) | Corrected Results (dBuV) | Avg Limits (dBuV) | Margin (dB) | Detector |
| **120 VAC, 60 Hz, Supply Line** | | | | | | |
| 0.1504 | 43.20 | 1.62 | 44.82 | 56.0 | 11.2 | **PK** |
| 0.5330 | 28.80 | 0.42 | 29.22 | 46.0 | 16.8 | **PK** |
| 1.1280 | 23.10 | 0.31 | 23.41 | 46.0 | 22.6 | **PK** |
| 5.5250 | 20.50 | 0.27 | 20.77 | 50.0 | 29.2 | **PK** |
| 10.3500 | 20.90 | 0.26 | 21.16 | 50.0 | 28.8 | **PK** |
| 29.9900 | 26.10 | 0.30 | 26.40 | 50.0 | 23.6 | **PK** |
| **120 VAC, 60 Hz, Neutral Line** | | | | | | |
| 0.1528 | 43.30 | 1.51 | 44.81 | 55.8 | 11.0 | **PK** |
| 0.5010 | 24.70 | 0.44 | 25.14 | 46.0 | 20.9 | **PK** |
| 2.9120 | 19.20 | 0.28 | 19.48 | 46.0 | 26.5 | **PK** |
| 10.0000 | 21.50 | 0.25 | 21.75 | 50.0 | 28.3 | **PK** |
| 17.5000 | 19.50 | 0.27 | 19.77 | 50.0 | 30.2 | **PK** |
| 30.0000 | 28.40 | 0.25 | 28.65 | 50.0 | 21.4 | **PK** |

Tested from 150 kHz to 30 MHz
SAMPLE CALCULATIONS: At 0.1504 MHz = 43.20 + (1.62) = 44.82 dBuV

Test Date: September 11, 2009
Tested By

Signature:  Name: George Yang

## 2.14 Unintentional Radiator Radiated Emissions (47 CFR 15.109(a))

These test data are provided herein to support the Verification requirement for digital devices. Radiated emissions coming from the EUT in a non-transmit state were evaluated from 30 MHz to 2 GHz per ANSI C63.4, Paragraph 8.

Measurements were made with the analyzer's resolution bandwidth set to 120 kHz for measurements made below 1 GHz and 1 MHz for measurements made above 1 GHz. The video bandwidth was set to three times the resolution bandwidth. The test data were maximized for magnitude by rotating the turn-table through 360 degrees and raising and lowering the receiving antenna between 1 to 4 meters in height as a part of the measurement procedure. All measured signals were at least 6 db below the specification limit.

Table 8. Unintentional Radiator Radiated Emissions Data (47 CFR 15.109 (a))

| Unintentional Radiator Radiated Emissions | | | | | | | |
|---|---|---|---|---|---|---|---|
| Test By: GY | Test: Part 15B, Para 15.109 | | | Client: Valve Solutions Incorporated | | | |
| | Project: 09-0126 | Class: B | | Model: HOPE RF RFM12 Module | | | |
| Frequency (MHz) | Peak Test Data (dBuV) | AF+CL-PA (dB/m) | Peak Corrected Results (dBuV/m) | Average Limits (dBuV/m) | Application Test Distance/ Polarization | Margin (dB) | Detector Used |
| Measurements were made over the frequency range of 30 MHz – 2 GHz | | | | | | | |
| 80.4090 | 10.60 | 10.92 | 21.52 | 40.0 | 3m./HORZ | 18.5 | **PK** |
| 557.5010 | 7.40 | 22.52 | 29.92 | 46.0 | 3m./VERT | 16.1 | **PK** |
| 602.6900 | 7.60 | 23.58 | 31.18 | 46.0 | 3m./VERT | 14.8 | **PK** |
| 701.8710 | 14.00 | 26.04 | 40.04 | 46.0 | 3m./VERT | 6.0 | **PK** |
| 749.0900 | 7.10 | 26.27 | 33.37 | 46.0 | 3m./VERT | 12.6 | **PK** |
| 1159.2900 | 47.40 | -12.11 | 35.29 | 54.0 | 3m./VERT | 18.7 | **PK** |
| 1742.3900 | 47.40 | -8.62 | 38.78 | 54.0 | 3m./VERT | 15.2 | **PK** |
| 1158.2100 | 48.00 | -12.01 | 35.99 | 54.0 | 3m./HORZ | 18.0 | **PK** |
| 1809.7900 | 47.70 | -8.08 | 39.62 | 54.0 | 3m./HORZ | 14.4 | **PK** |

Tested from 30MHz to 2000MHz
SAMPLE CALCULATIONS: At 80.4090 MHz = 10.60 + (10.92) = 21.52 dBuV

Test Date: September 10, 2009
Tested By

Signature: _____ Name: George Yang