



IrriGreen, Inc.

IrriGreen Genius Irrigation System

FCC 15.207:2014

FCC 15.231:2014

Report #: IRRI0001 Rev.1



Report Prepared By Northwest EMC Inc.

NORTHWEST EMC – (888) 364-2378 – www.nwemc.com

California – Minnesota – Oregon – New York – Washington

CERTIFICATE OF TEST

Last Date of Test: May 20, 2014
 IrriGreen, Inc.
 Model: IrriGreen Genius Irrigation System

Emissions

| Test Description | Specification | Test Method | Pass/Fail |
|-------------------------------|-----------------|------------------|-----------|
| Duty Cycle | FCC 15.231:2014 | ANSI C63.10:2009 | Pass |
| Occupied Bandwidth | FCC 15.231:2014 | ANSI C63.10:2009 | Pass |
| Field of Strength Fundamental | FCC 15.231:2014 | ANSI C63.10:2009 | Pass |
| Spurious Radiated Emissions | FCC 15.231:2014 | ANSI C63.10:2009 | Pass |
| Powerline Conducted Emissions | FCC 15.207:2014 | ANSI C63.10:2009 | Pass |

Deviations From Test Standards

None

Approved By:



Tim O'Shea, Operations Manager



NVLAP Lab Code: 200881-0

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.

REVISION HISTORY

| Revision Number | Description | Date | Page Number |
|-----------------|--------------------------------|-----------|-----------------------------------|
| 00 | None | | |
| 01 | Updated last date | 5/27/2014 | 2, 7, 9 |
| 01 | Updated functional description | 5/27/2014 | 7 |
| 01 | Added High Channel Data | 5/27/2014 | 13-15, 19-21, 24-25, 29-30, 31-41 |

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC Guide 65 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

European Union

European Commission – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

KCC / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Hong Kong

OFTA – Recognized by OFTA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

Russia

GOST – Accredited by Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC to perform EMC and Hygienic testing for Information Technology products to GOST standards.

SCOPE

For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/accreditations/>

Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is listed below. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-1 as applicable), and are available upon request.

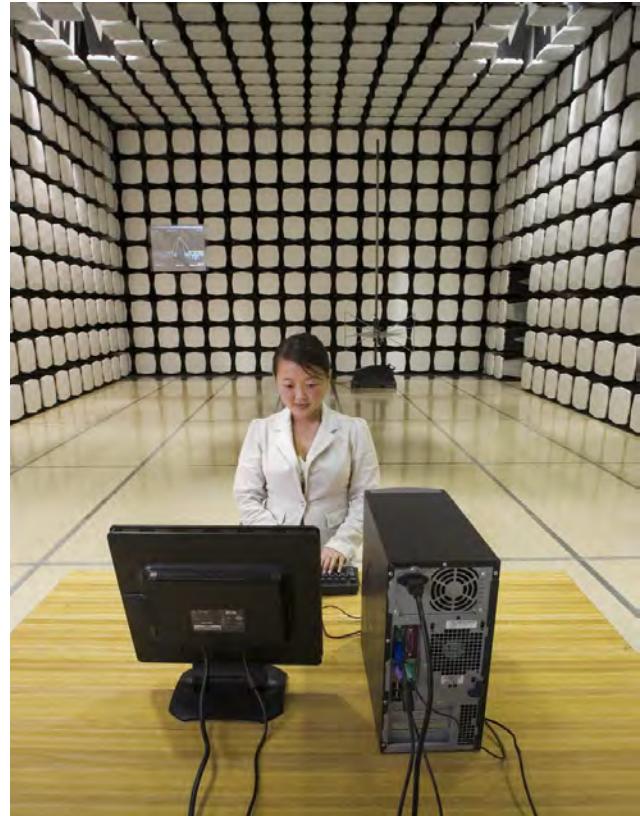
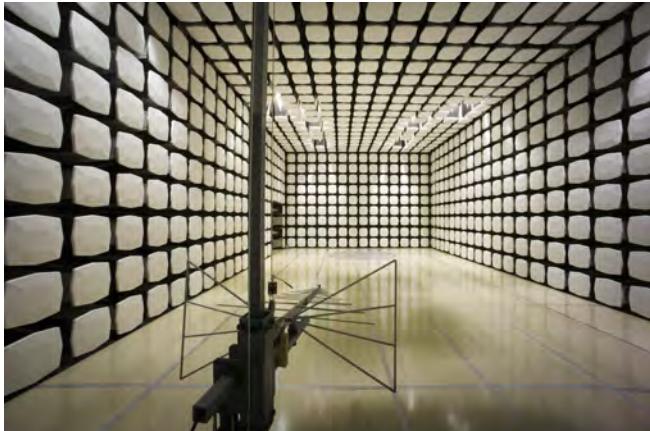
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

| Test | + MU | - MU |
|---------------------------------------|------|-------|
| Frequency Accuracy (Hz) | 0.12 | -0.01 |
| Amplitude Accuracy (dB) | 0.49 | -0.49 |
| Conducted Power (dB) | 0.41 | -0.41 |
| Radiated Power via Substitution (dB) | 0.69 | -0.68 |
| Temperature (degrees C) | 0.81 | -0.81 |
| Humidity (% RH) | 2.89 | -2.89 |
| Field Strength (dB) | 3.80 | -3.80 |
| AC Powerline Conducted Emissions (dB) | 2.94 | -2.94 |

FACILITIES



| | | | | |
|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Oregon Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066 | California Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918 | New York Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 685-0796 | Minnesota Labs MN01-08 9349 W Broadway Ave. Brooklyn Park, MN 55445 (763) 425-2281 | Washington Labs NC01-05, SU02, SU07 19201 120 th Ave. NE Bothell, WA 98011 (425) 984-6600 |
| VCCI | | | | |
| A-0108 | A-0029 | | A-0109 | A-0110 |
| Industry Canada | | | | |
| 2834D-1, 2834D-2 | 2834B-1, 2834B-2, 2834B-3 | | 2834E-1 | 2834C-1 |
| NVLAP | | | | |
| NVLAP Lab Code: 200630-0 | NVLAP Lab Code: 200676-0 | NVLAP Lab Code: 200761-0 | NVLAP Lab Code: 200881-0 | NVLAP Lab Code: 200629-0 |





PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

| | |
|---------------------------------|------------------------------------|
| Company Name: | IrriGreen, Inc |
| Address: | 5250 W. 73rd Street, Suite 1 |
| City, State, Zip: | Edina, MN 55439 |
| Test Requested By: | Gary Klinefelter |
| Model: | IrriGreen Genius Irrigation System |
| First Date of Test: | January 14, 2014 |
| Last Date of Test: | May 20, 2014 |
| Receipt Date of Samples: | January 14, 2014 |
| Equipment Design Stage: | Production |
| Equipment Condition: | No Damage |

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):

Low power transceiver operating in the range of 433.92 - 443.92 MHz.

Testing Objective:

To demonstrate compliance to FCC 15.231 specifications.

Configuration IRRI0001- 1

| EUT | | | |
|--------------------|---------------------|--------------------------|----------------------|
| Description | Manufacturer | Model/Part Number | Serial Number |
| Genius Server | IrriGreen, Inc. | 500101 | 2456532-0035 |

| Peripherals in test setup boundary | | | |
|-------------------------------------------|---------------------|--------------------------|----------------------|
| Description | Manufacturer | Model/Part Number | Serial Number |
| Genius Sprinkler | IrriGreen, Inc. | 400101 | 2456532 |
| Irrigation Controller | Hunter | PC-3001 | None |
| AC Adapter | Hunter | WT57-2401000AU | None |

| Cables | | | | | |
|-------------------|---------------|-------------------|----------------|-----------------------|-----------------------|
| Cable Type | Shield | Length (m) | Ferrite | Connection 1 | Connection 2 |
| Irrigation | No | 3.2m | No | Genius Sprinkler | Genius Server |
| Irrigation | No | 0.5m | No | Genius Server | Irrigation Controller |
| DC Power | No | 1.6m | No | Irrigation Controller | AC Adapter |

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

Equipment Modifications

| Item | Date | Test | Modification | Note | Disposition of EUT |
|------|-----------|-------------------------------------|----------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------|
| 1 | 1/14/2014 | Spurious Radiated Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 2 | 5/19/2014 | Field Strength of Fundamental | Modified from delivered configuration. | Lowered Power and raised Baud rate. Modification authorized by Gary. | EUT remained at Northwest EMC following the test. |
| 3 | 5/19/2014 | Occupied Bandwidth | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 4 | 5/19/2014 | Duty Cycle | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 5 | 5/20/2014 | Powerline Conducted Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | Scheduled testing was completed. |

DUTY CYCLE

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|-------------------|-----------------|--------------|-----|------------|----------|
| MN05 Cables | ESM Cable Corp. | Bilog Cables | MNH | 5/20/2013 | 12 mo |
| Antenna, Bilog | Teseq | CBL 6141B | AYD | 12/17/2013 | 12 mo |
| Spectrum Analyzer | Agilent | N9010A | AFI | 1/27/2013 | 24 mo |

TEST DESCRIPTION

For software controlled or pre-programmed devices, the manufacturer shall declare the duty cycle class or classes for the equipment under test. For manually operated or event dependant devices, with or without software controlled functions, the manufacturer shall declare whether the device once triggered, follows a pre-programmed cycle, or whether the transmission is constant until the trigger is released or manually reset. The manufacturer shall also give a description of the application for the device and include a typical usage pattern. The typical usage pattern as declared by the manufacturer shall be used to determine the duty cycle and hence the duty class.

Where an acknowledgement is required, the additional transmitter on-time shall be included and declared by the manufacturer.

To derive average emission measurements, a duty cycle correction factor per 15.35(c) was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where "On time" = $N1L1 + N2L2 + \dots$

Where $N1$ is the number of type 1 pulses, $L1$ is length of type 1 pulses, $N2$ is the number of type 2 pulses, $L2$ is the length of type 2 pulses, etc.

Therefore, Duty Cycle = $(N1L1 + N2L2 + \dots) / 100\text{mS}$ or T , whichever is less. Where T is the period of the pulse train.

The measured values for the EUT's pulse train are as follows:

Period = 100 mSec

Pulsewidth of Type 1 Pulse = 8.183 mSec

Number of Type 1 Pulses = 1

Duty Cycle = $20 \log [((1)(8.183))/100] = -21.7 \text{ dB}$

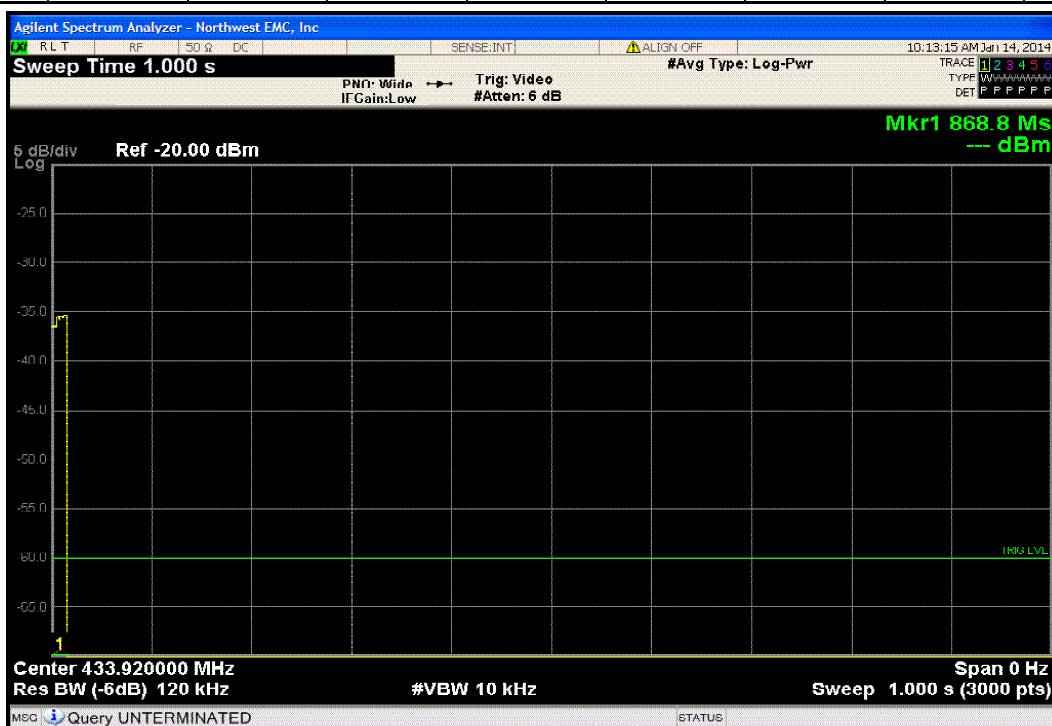
The duty cycle correction factor of -21.7 dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 100kHz and a video bandwidth of 300kHz.

The field strength of the fundamental (transmit) frequency meets the limits as defined in 47 CFR 15.231(b). It also meets the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions.

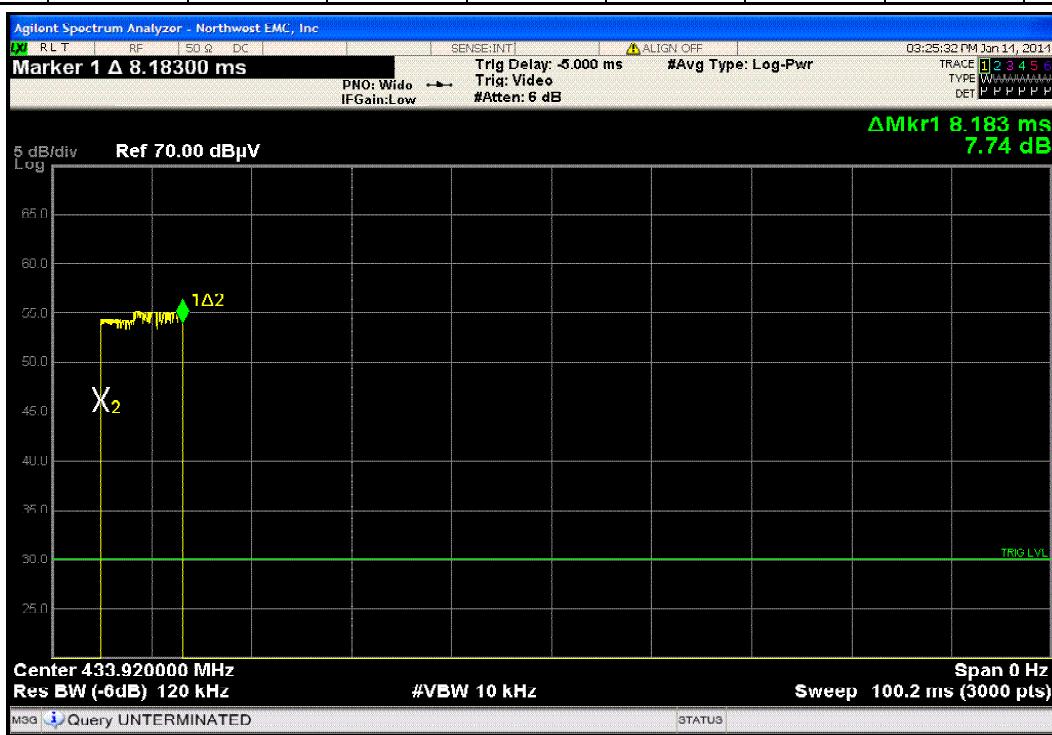
DUTY CYCLE

| EUT: IrriGreen Genius Irrigation System | | Work Order: IRR10001 | | | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------|--------|-------|-------|--------|-----------------|-----|-----|-----|---------------|----------|-----|-----|
| Serial Number: 2456532-0035 | | Date: 01/14/14 | | | | | | | | | | | | |
| Customer: IrriGreen, Inc | | Temperature: 23°C | | | | | | | | | | | | |
| Attendees: Gary Klinefelter | | Humidity: 16% | | | | | | | | | | | | |
| Project: None | | Barometric Pres.: 1016.5 | | | | | | | | | | | | |
| Tested by: Trevor Buls | Power: 110VAC/60Hz | Job Site: MN05 | | | | | | | | | | | | |
| TEST SPECIFICATIONS | | | | | | | | | | | | | | |
| FCC 15.231:2014 | | Test Method: ANSI C63.10:2009 | | | | | | | | | | | | |
| COMMENTS | | | | | | | | | | | | | | |
| A Operating at low channel 433.92 MHz. | | | | | | | | | | | | | | |
| DEVIATIONS FROM TEST STANDARD | | | | | | | | | | | | | | |
| None | | | | | | | | | | | | | | |
| Configuration # | 1 | Signature:  | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th></th> <th>Value</th> <th>Limit</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>1 Second Window</td> <td>N/A</td> <td>N/A</td> <td>N/A</td> </tr> <tr> <td>100 mS Window</td> <td>8.183 mS</td> <td>N/A</td> <td>N/A</td> </tr> </tbody> </table> | | | | Value | Limit | Result | 1 Second Window | N/A | N/A | N/A | 100 mS Window | 8.183 mS | N/A | N/A |
| | Value | Limit | Result | | | | | | | | | | | |
| 1 Second Window | N/A | N/A | N/A | | | | | | | | | | | |
| 100 mS Window | 8.183 mS | N/A | N/A | | | | | | | | | | | |

| 1 Second Window | | | |
|-----------------|-------|-------|--------|
| | Value | Limit | Result |
| | N/A | N/A | N/A |



| 100 mS Window | | | |
|---------------|----------|-------|--------|
| | Value | Limit | Result |
| | 8.183 mS | N/A | N/A |



DUTY CYCLE

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|-------------------|-----------------|--------------|-----|------------|----------|
| MN05 Cables | ESM Cable Corp. | Bilog Cables | MNH | 5/20/2013 | 12 |
| Antenna, Bilog | Teseq | CBL 6141B | AYD | 12/17/2013 | 12 |
| Spectrum Analyzer | Agilent | N9010A | AFI | 1/27/2013 | 24 |

TEST DESCRIPTION

For software controlled or pre-programmed devices, the manufacturer shall declare the duty cycle class or classes for the equipment under test. For manually operated or event dependant devices, with or without software controlled functions, the manufacturer shall declare whether the device once triggered, follows a pre-programmed cycle, or whether the transmission is constant until the trigger is released or manually reset. The manufacturer shall also give a description of the application for the device and include a typical usage pattern. The typical usage pattern as declared by the manufacturer shall be used to determine the duty cycle and hence the duty class.

Where an acknowledgement is required, the additional transmitter on-time shall be included and declared by the manufacturer.

To derive average emission measurements, a duty cycle correction factor per 15.35(c) was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where "On time" = $N1L1 + N2L2 + \dots$

Where $N1$ is the number of type 1 pulses, $L1$ is length of type 1 pulses, $N2$ is the number of type 2 pulses, $L2$ is the length of type 2 pulses, etc.

Therefore, Duty Cycle = $(N1L1 + N2L2 + \dots)/100mS$ or T , whichever is less. Where T is the period of the pulse train.

The measured values for the EUT's pulse train are as follows:

Period = 100 mSec

Pulsewidth of Type 1 Pulse = 8.183 mSec

Number of Type 1 Pulses = 1

Duty Cycle = $20 \log [((1)(8.183))/100] = -21.7 \text{ dB}$

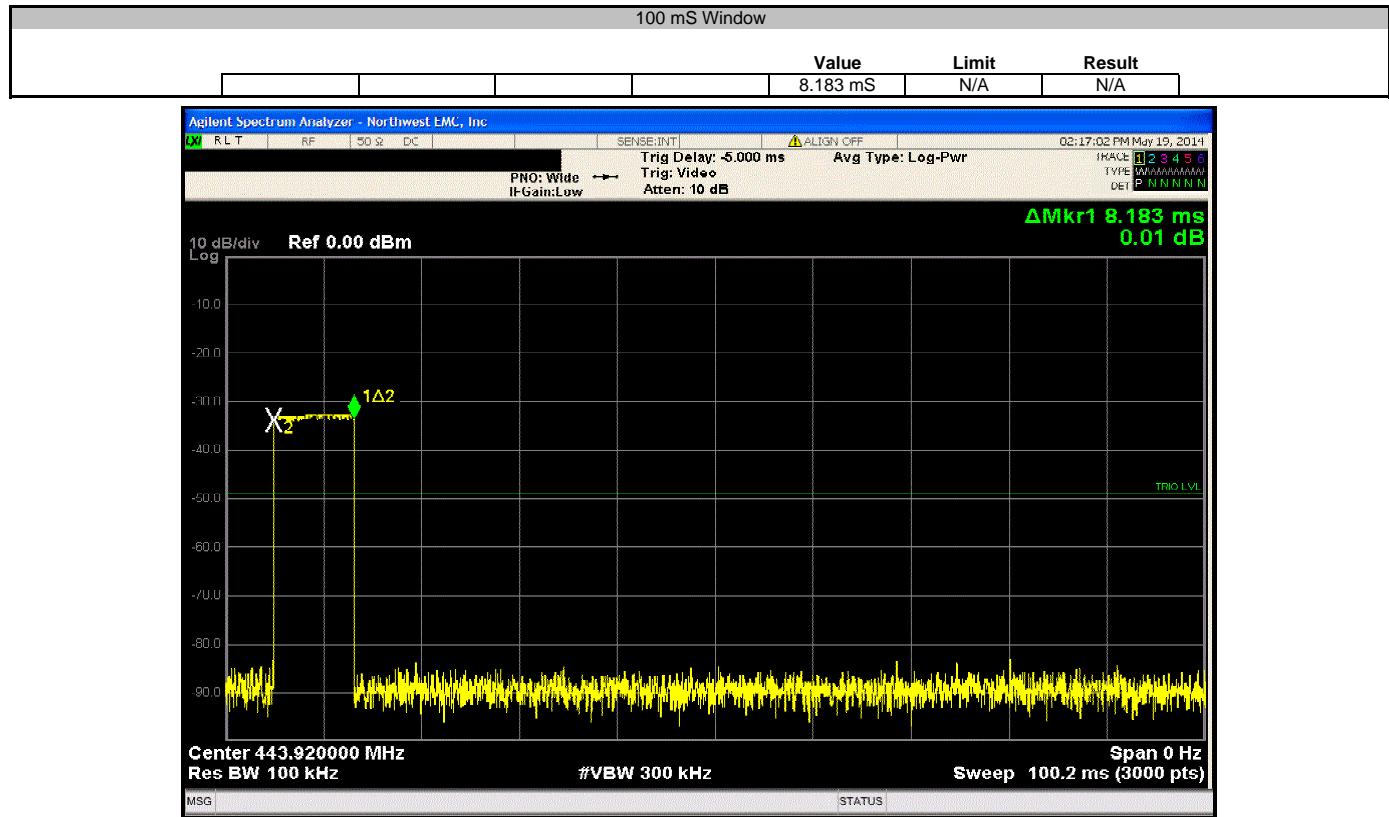
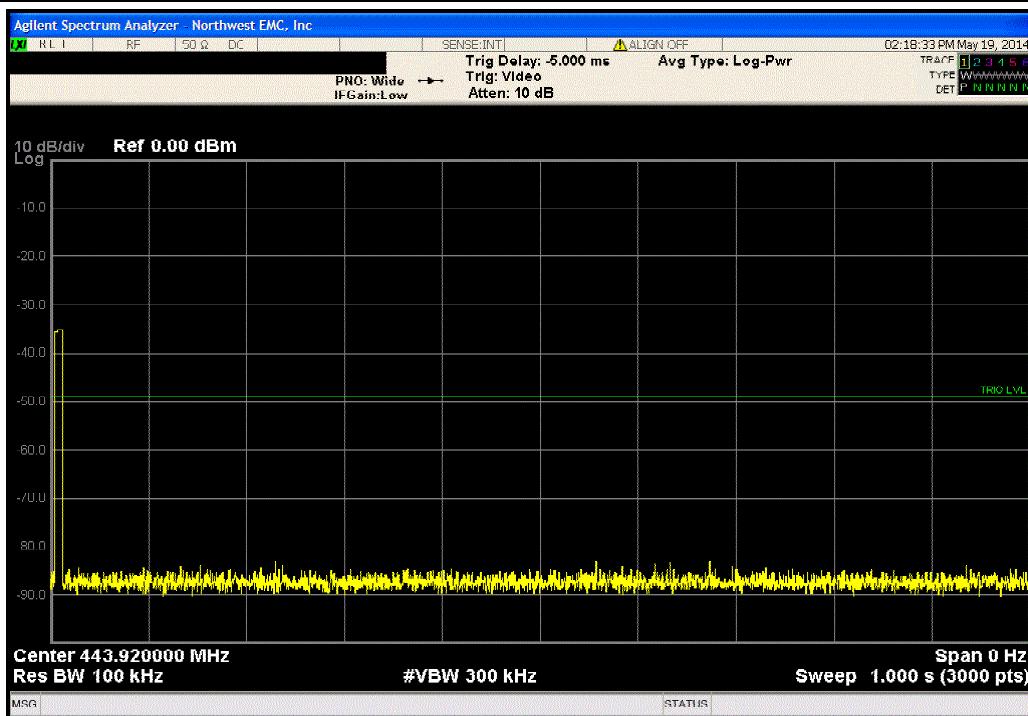
The duty cycle correction factor of -21.7 dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 100kHz and a video bandwidth of 300kHz.

The field strength of the fundamental (transmit) frequency meets the limits as defined in 47 CFR 15.231(b). It also meets the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions.

DUTY CYCLE

| EUT: IrriGreen Genius Irrigation System | | Work Order: IRR10005 | | | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------|--------|-------|-------|--------|-----------------|-----|-----|-----|---------------|----------|-----|-----|
| Serial Number: 2456532-0035 | | Date: 05/19/14 | | | | | | | | | | | | |
| Customer: IrriGreen, Inc | | Temperature: 23.3 °C | | | | | | | | | | | | |
| Attendees: Gary Klinefelter | | Humidity: 33.1% RH | | | | | | | | | | | | |
| Project: None | | Barometric Pres.: 1016.2 mbar | | | | | | | | | | | | |
| Tested by: Trevor Buls | Power: 110VAC/60Hz | Job Site: MN05 | | | | | | | | | | | | |
| TEST SPECIFICATIONS | | | | | | | | | | | | | | |
| FCC 15.231:2014 | | Test Method: ANSI C63.10:2009 | | | | | | | | | | | | |
| COMMENTS | | | | | | | | | | | | | | |
| None | | | | | | | | | | | | | | |
| DEVIATIONS FROM TEST STANDARD | | | | | | | | | | | | | | |
| None | | | | | | | | | | | | | | |
| Configuration # | IRRI0001 - 1 | Signature:  | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th></th> <th>Value</th> <th>Limit</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>1 Second Window</td> <td>N/A</td> <td>N/A</td> <td>N/A</td> </tr> <tr> <td>100 mS Window</td> <td>8.183 mS</td> <td>N/A</td> <td>N/A</td> </tr> </tbody> </table> | | | | Value | Limit | Result | 1 Second Window | N/A | N/A | N/A | 100 mS Window | 8.183 mS | N/A | N/A |
| | Value | Limit | Result | | | | | | | | | | | |
| 1 Second Window | N/A | N/A | N/A | | | | | | | | | | | |
| 100 mS Window | 8.183 mS | N/A | N/A | | | | | | | | | | | |

| 1 Second Window | | | | | |
|-----------------|--|-------|-------|--------|--|
| | | Value | Limit | Result | |
| | | N/A | N/A | N/A | |



OCCUPIED BANDWIDTH

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|-------------------|-----------------|--------------|-----|------------|----------|
| MN05 Cables | ESM Cable Corp. | Bilog Cables | MNH | 5/20/2013 | 12 mo |
| Antenna, Bilog | Teseq | CBL 6141B | AYD | 12/17/2013 | 12 mo |
| Spectrum Analyzer | Agilent | N9010A | AFI | 1/27/2013 | 24 mo |

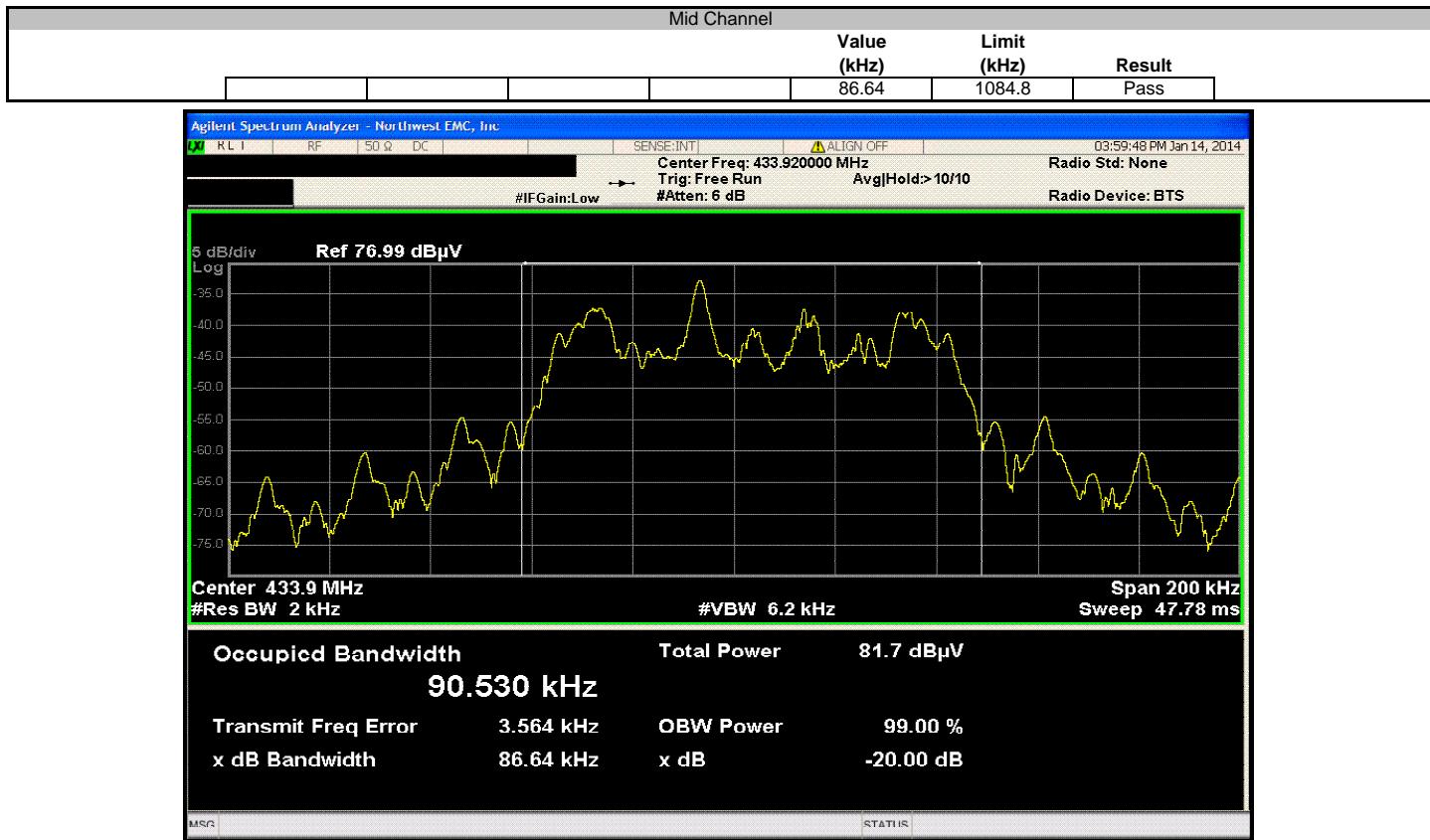
TEST DESCRIPTION

The occupied bandwidth was measured with the EUT configured for continuous modulated operation at its single transmit frequency. The spectrum analyzer's resolution bandwidth was $\geq 1\%$ of the 20dB bandwidth and the video bandwidth was greater than or equal to the resolution bandwidth.

The 20 dB bandwidth of the transmit frequency is less than 0.25% of the center frequency.

OCCUPIED BANDWIDTH

| | | |
|-----------------------------------------|--------------------|---------------------------------------------------------------------------------------------|
| EUT: IrriGreen Genius Irrigation System | | Work Order: IRR10001 |
| Serial Number: 2456532-0035 | | Date: 01/14/14 |
| Customer: IrriGreen, Inc | | Temperature: 23°C |
| Attendees: Gary Klinefelter | | Humidity: 16% |
| Project: None | | Barometric Pres.: 1016.5 |
| Tested by: Trevor Buls | Power: 110VAC/60Hz | Job Site: MN05 |
| TEST SPECIFICATIONS | | Test Method |
| FCC 15.231:2014 | | ANSI C63.10:2009 |
| COMMENTS | | |
| Operating at low channel 433.92 MHz. | | |
| DEVIATIONS FROM TEST STANDARD | | |
| None | | |
| Configuration # | 1 | Signature  |
| | | Value (kHz) Limit (kHz) Result |
| Low Channel | | 86.64 1084.8 Pass |



OCCUPIED BANDWIDTH

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|-------------------|-----------------|--------------|-----|------------|----------|
| MN05 Cables | ESM Cable Corp. | Bilog Cables | MNH | 5/20/2013 | 12 |
| Antenna, Bilog | Teseq | CBL 6141B | AYD | 12/17/2013 | 12 |
| Spectrum Analyzer | Agilent | N9010A | AFI | 1/27/2013 | 24 |

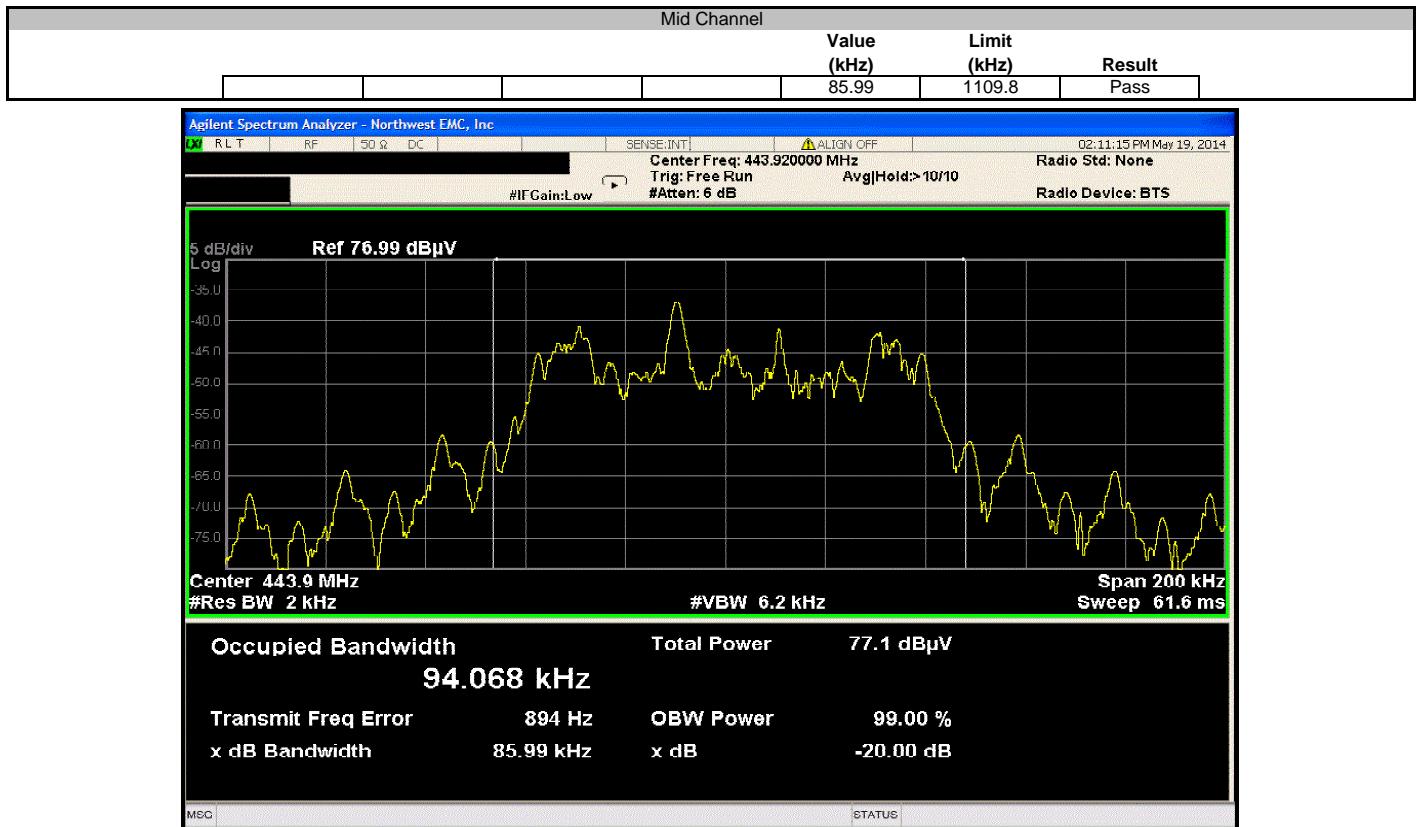
TEST DESCRIPTION

The occupied bandwidth was measured with the EUT configured for continuous modulated operation at its single transmit frequency. The spectrum analyzer's resolution bandwidth was $\geq 1\%$ of the 20dB bandwidth and the video bandwidth was greater than or equal to the resolution bandwidth.

The 20 dB bandwidth of the transmit frequency is less than 0.25% of the center frequency.

OCCUPIED BANDWIDTH

| | | |
|-----------------------------------------|--------------------|---------------------------------------------------------------------------------------------|
| EUT: IrriGreen Genius Irrigation System | | Work Order: IRR10005 |
| Serial Number: 2456532-0035 | | Date: 05/19/14 |
| Customer: IrriGreen, Inc | | Temperature: 23.3 °C |
| Attendees: Gary Klinefelter | | Humidity: 33.1% RH |
| Project: None | | Barometric Pres.: 1016.2 mbar |
| Tested by: Trevor Buls | Power: 110VAC/60Hz | Job Site: MN05 |
| TEST SPECIFICATIONS | | |
| FCC 15.231:2014 | Test Method | |
| ANSI C63.10:2009 | | |
| COMMENTS | | |
| None | | |
| DEVIATIONS FROM TEST STANDARD | | |
| None | | |
| Configuration # | IRRI0001 - 1 | Signature  |
| | | Value (kHz) Limit (kHz) Result |
| High Channel | | 85.99 1109.8 Pass |



Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting semi-continuously at 433.92 MHz, modulated.

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

IRRI0001 - 1

FREQUENCY RANGE INVESTIGATED

| | | | |
|-----------------|---------|----------------|---------|
| Start Frequency | 433 MHz | Stop Frequency | 435 MHz |
|-----------------|---------|----------------|---------|

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|--------------------------|-----------------|--------------|-----|------------|----------|
| Antenna, Bilog | Teseq | CBL 6141B | AYD | 12/17/2013 | 12 mo |
| Attenuator, 20 dB, 'SMA' | SM Electronics | SA6-20 | REO | 5/20/2013 | 12 mo |
| MN05 Cables | ESM Cable Corp. | Bilog Cables | MNH | 5/20/2013 | 12 mo |
| Spectrum Analyzer | Agilent | N9010A | AFI | 1/27/2013 | 24 mo |

MEASUREMENT BANDWIDTHS

| Frequency Range (MHz) | Peak Data (kHz) | Quasi-Peak Data (kHz) | Average Data (kHz) |
|-----------------------|-----------------|-----------------------|--------------------|
| 0.01 - 0.15 | 1.0 | 0.2 | 0.2 |
| 0.15 - 30.0 | 10.0 | 9.0 | 9.0 |
| 30.0 - 1000 | 100.0 | 120.0 | 120.0 |
| Above 1000 | 1000.0 | N/A | 1000.0 |

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was configured for continuous modulated operation at its single transmit frequency. The field strength of the transmit frequency was maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT in 3 orthogonal planes (per ANSI C63.10:2009).

To derive average emission measurements, a duty cycle correction factor per 15.35(c) was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where "On time" = N1L1 +N2L2 +....

Where N1 is the number of type 1 pulses, L1 is length of type 1 pulses, N2 is the number of type 2 pulses, L2 is the length of type 2 pulses, etc.

Therefore, Duty Cycle = (N1L1 +N2L2 +...)/100mS or T, whichever is less. Where T is the period of the pulse train.

The measured values for the EUT's pulse train are as follows:

Period = 100 mSec

Pulsewidth of Type 1 Pulse = 8.183 mSec

Number of Type 1 Pulses = 1

Duty Cycle = $20 \log [((1)(8.183))/100] = -21.7 \text{ dB}$

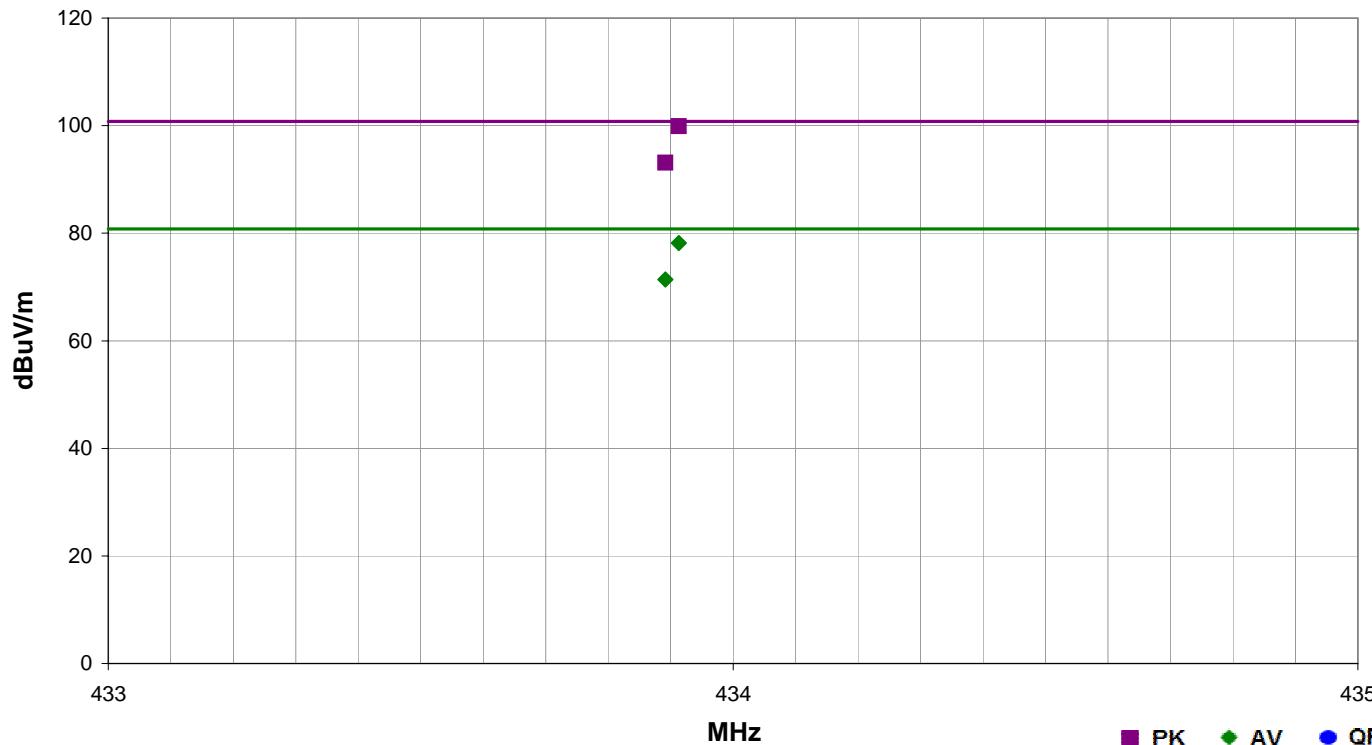
The duty cycle correction factor of -21.7 dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 100kHz and a video bandwidth of 300kHz.

The field strength of the fundamental (transmit) frequency meets the limits as defined in 47 CFR 15.231(b). It also meets the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions.

| | | | | |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------|-------------------------------------------------------------------------------------|
| Work Order: | IRRI0001 | Date: | 01/14/14 |  |
| Project: | None | Temperature: | 23.6 °C | |
| Job Site: | MN05 | Humidity: | 17.2% RH | |
| Serial Number: | 2456532-0035 | Barometric Pres.: | 1004.1 mbar | Tested by: Trevor Buls |
| EUT: | IrriGreen Genius Irrigation System | | | |
| Configuration: | 1 | | | |
| Customer: | IrriGreen, Inc | | | |
| Attendees: | Gary Klinefelter | | | |
| EUT Power: | 110VAC/60Hz | | | |
| Operating Mode: | Transmitting semi-continuously at 433.92 MHz, modulated. | | | |
| Deviations: | None | | | |
| Comments: | Operating at low channel 433.92 MHz. Normal installation is in the upright position (EUT Vertical), so that was the only position tested. | | | |

| Test Specifications | | Test Method | |
|---------------------|--|------------------|--|
| FCC 15.231:2014 | | ANSI C63.10:2009 | |

| Run # | 11 | Test Distance (m) | 3 | Antenna Height(s) | 1-4m | Results | Pass |
|-------|----|-------------------|---|-------------------|------|---------|------|
| | | | | | | | |



| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Duty Cycle Correction Factor (dB) | External Attenuation (dB) | Polarity/Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) |
|------------|------------------|-------------|-------------------------|-------------------|-----------------------------------|---------------------------|--------------------------|----------|--------------------------|-------------------|----------------------|------------------------|
| 433.913 | 57.4 | 22.5 | 1.0 | 97.0 | 20.0 | Vert | PK | 0.0 | 99.9 | 100.8 | -0.9 | |
| 433.913 | 57.4 | 22.5 | 1.0 | 97.0 | -21.7 | 20.0 | Vert | AV | 0.0 | 78.2 | 80.8 | -2.6 |
| 433.892 | 50.6 | 22.5 | 1.0 | 122.0 | 20.0 | Horz | PK | 0.0 | 93.1 | 100.8 | -7.7 | |
| 433.892 | 50.6 | 22.5 | 1.0 | 122.0 | -21.7 | 20.0 | Horz | AV | 0.0 | 71.4 | 80.8 | -9.4 |

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting semi-continuously at 443.92 MHz, modulated.

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

IRRI0001 - 1

FREQUENCY RANGE INVESTIGATED

| | |
|---------------------------|--------------------------|
| Start Frequency 443 MHz | Stop Frequency 435 MHz |
|---------------------------|--------------------------|

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|-------------------|-----------------|--------------|-----|------------|----------|
| MN05 Cables | ESM Cable Corp. | Bilog Cables | MNH | 3/14/2014 | 12 mo |
| Antenna, Bilog | Teseq | CBL 6141B | AYD | 12/17/2013 | 12 mo |
| Spectrum Analyzer | Agilent | N9010A | AFI | 1/27/2013 | 24 mo |

MEASUREMENT BANDWIDTHS

| Frequency Range (MHz) | Peak Data (kHz) | Quasi-Peak Data (kHz) | Average Data (kHz) |
|-----------------------|-----------------|-----------------------|--------------------|
| 0.01 - 0.15 | 1.0 | 0.2 | 0.2 |
| 0.15 - 30.0 | 10.0 | 9.0 | 9.0 |
| 30.0 - 1000 | 100.0 | 120.0 | 120.0 |
| Above 1000 | 1000.0 | N/A | 1000.0 |

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was configured for continuous modulated operation at its single transmit frequency. The field strength of the transmit frequency was maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT in 3 orthogonal planes (per ANSI C63.10:2009).

To derive average emission measurements, a duty cycle correction factor per 15.35(c) was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where "On time" = $N1L1 + N2L2 + \dots$

Where $N1$ is the number of type 1 pulses, $L1$ is length of type 1 pulses, $N2$ is the number of type 2 pulses, $L2$ is the length of type 2 pulses, etc.

Therefore, Duty Cycle = $(N1L1 + N2L2 + \dots)/100mS$ or T , whichever is less. Where T is the period of the pulse train.

The measured values for the EUT's pulse train are as follows:

Period = 100 mSec

Pulsewidth of Type 1 Pulse = 8.183 mSec

Number of Type 1 Pulses = 1

Duty Cycle = $20 \log [((1)(8.183))/100] = -21.7 \text{ dB}$

The duty cycle correction factor of -21.7 dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 100kHz and a video bandwidth of 300kHz.

The field strength of the fundamental (transmit) frequency meets the limits as defined in 47 CFR 15.231(b). It also meets the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions.



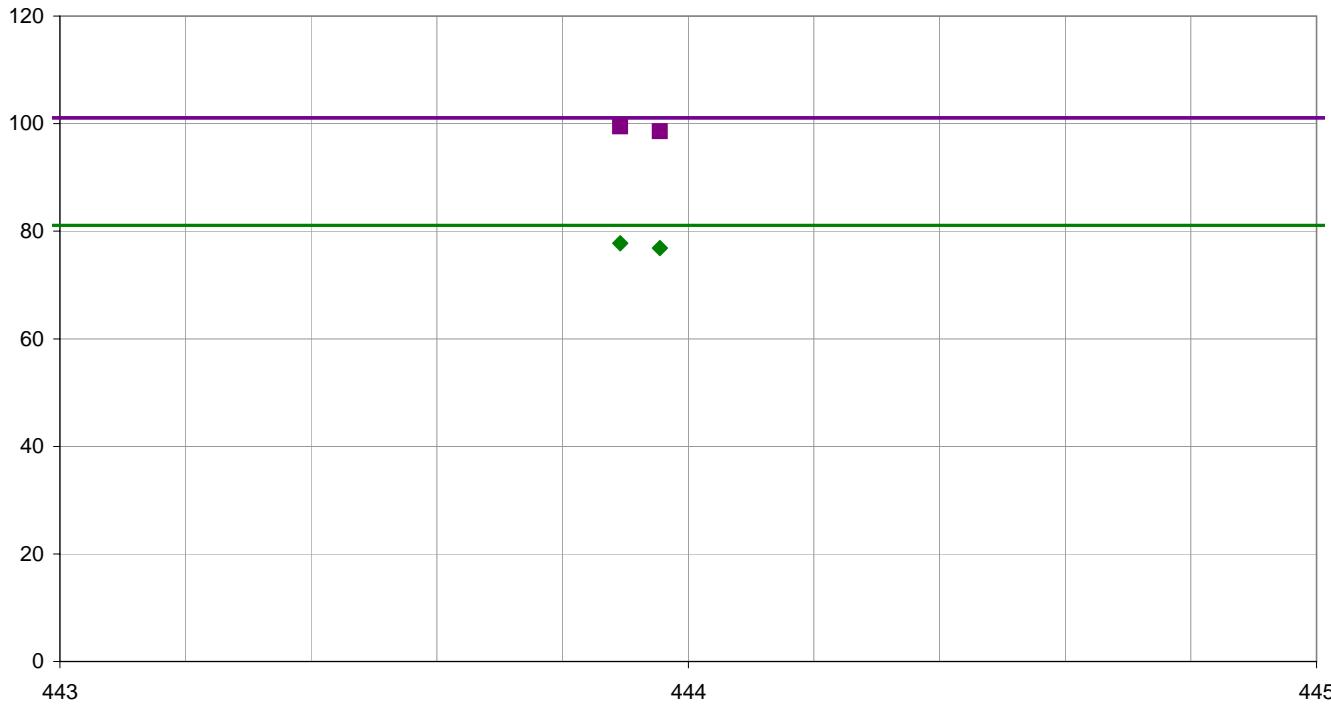
FIELD STRENGTH OF FUNDAMENTAL

PSA-ESCI 2014.02.19
EmiR5 2014.03.06

| | | | | |
|-----------------|------------------------------------------------------------------------------------------------------|-------------------|-------------|-------------------------------------------------------------------------------------|
| Work Order: | IRRI0005 | Date: | 05/19/14 |  |
| Project: | None | Temperature: | 23.3 °C | |
| Job Site: | MN05 | Humidity: | 33.1% RH | |
| Serial Number: | 2456532-0035 | Barometric Pres.: | 1016.2 mbar | Tested by: Trevor Buls |
| EUT: | IrriGreen Genius Irrigation System | | | |
| Configuration: | IRRI0001 - 1 | | | |
| Customer: | IrriGreen, Inc | | | |
| Attendees: | Gary Klinefelter | | | |
| EUT Power: | 110VAC/60Hz | | | |
| Operating Mode: | Transmitting semi-continuously at 443.92 MHz, modulated. | | | |
| Deviations: | None | | | |
| Comments: | Normal installation is in the upright position (EUT Vertical), so that was the only position tested. | | | |

| Test Specifications | | Test Method | |
|---------------------|--|------------------|--|
| FCC 15.231:2014 | | ANSI C63.10:2009 | |

| Run # | 2 | Test Distance (m) | 3 | Antenna Height(s) | 1-4m | Results | Pass |
|-------|---|-------------------|---|-------------------|------|---------|------|
| | | | | | | | |



| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Duty Cycle Correction Factor (dB) | External Attenuation (dB) | Polarity/Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) |
|------------|------------------|-------------|-------------------------|-------------------|-----------------------------------|---------------------------|--------------------------|----------|--------------------------|-------------------|----------------------|------------------------|
| 443.892 | 76.5 | 23.0 | 1.0 | 322.0 | | 0.0 | Vert | PK | 0.0 | 99.5 | 101.1 | -1.6 |
| 443.955 | 75.6 | 23.0 | 1.0 | 201.0 | | 0.0 | Horz | PK | 0.0 | 98.6 | 101.1 | -2.5 |
| 443.892 | 76.5 | 23.0 | 1.0 | 322.0 | -21.7 | 0.0 | Vert | AV | 0.0 | 77.8 | 81.1 | -3.3 |
| 443.955 | 75.6 | 23.0 | 1.0 | 201.0 | -21.7 | 0.0 | Horz | AV | 0.0 | 76.9 | 81.1 | -4.2 |

SPURIOUS RADIATED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting semi-continuously at 433.92 MHz, modulated.

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

IRRI0001 - 1

FREQUENCY RANGE INVESTIGATED

| | | | |
|-----------------|--------|----------------|-------|
| Start Frequency | 30 MHz | Stop Frequency | 5 GHz |
|-----------------|--------|----------------|-------|

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|-------------------------|------------------|--------------------------------|-----|------------|----------|
| Attenuator, 10db, 'SMA' | S.M. Electronics | SA18H-10 | REN | 5/20/2013 | 12 mo |
| Pre-Amplifier | Miteq | AMF-3D-00100800-32-13P | AVX | 5/20/2013 | 12 mo |
| MN05 Cables | ESM Cable Corp. | Double Ridge Guide Horn Cables | MNI | 8/12/2013 | 12 mo |
| Antenna, Horn (DRG) | ETS Lindgren | 3115 | AIP | 6/29/2011 | 36 mo |
| Pre-Amplifier | Miteq | AM-1616-1000 | PAD | 5/20/2013 | 12 mo |
| Antenna, Bilog | Teseq | CBL 6141B | AYD | 12/17/2013 | 12 mo |
| MN05 Cables | ESM Cable Corp. | Bilog Cables | MNH | 5/20/2013 | 12 mo |
| Spectrum Analyzer | Agilent | N9010A | AFI | 1/27/2013 | 24 mo |

MEASUREMENT BANDWIDTHS

| Frequency Range (MHz) | Peak Data (kHz) | Quasi-Peak Data (kHz) | Average Data (kHz) |
|-----------------------|-----------------|-----------------------|--------------------|
| 0.01 - 0.15 | 1.0 | 0.2 | 0.2 |
| 0.15 - 30.0 | 10.0 | 9.0 | 9.0 |
| 30.0 - 1000 | 100.0 | 120.0 | 120.0 |
| Above 1000 | 1000.0 | N/A | 1000.0 |

TEST DESCRIPTION

The single, integral antenna to be used with the EUT was tested. The EUT was configured for un-modulated, CW operation at its single transmit frequency. The field strength of the transmit frequency was maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT in 3 orthogonal planes (per ANSI C63.10:2009).

A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

To derive average emission measurements, a duty cycle correction factor per 15.35(c) was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where "On time" = $N1L1 + N2L2 + \dots$

Where $N1$ is the number of type 1 pulses, $L1$ is length of type 1 pulses, $N2$ is the number of type 2 pulses, $L2$ is the length of type 2 pulses, etc.

Therefore, Duty Cycle = $(N1L1 + N2L2 + \dots)/100\text{mS}$ or T , whichever is less. Where T is the period of the pulse train.

The measured values for the EUT's pulse train are as follows:

Period = 100 mSec

Pulsewidth of Type 1 Pulse = 8.183 mSec

Number of Type 1 Pulses = 1

Duty Cycle = $20 \log [((1)(8.183))/100] = -21.7 \text{ dB}$

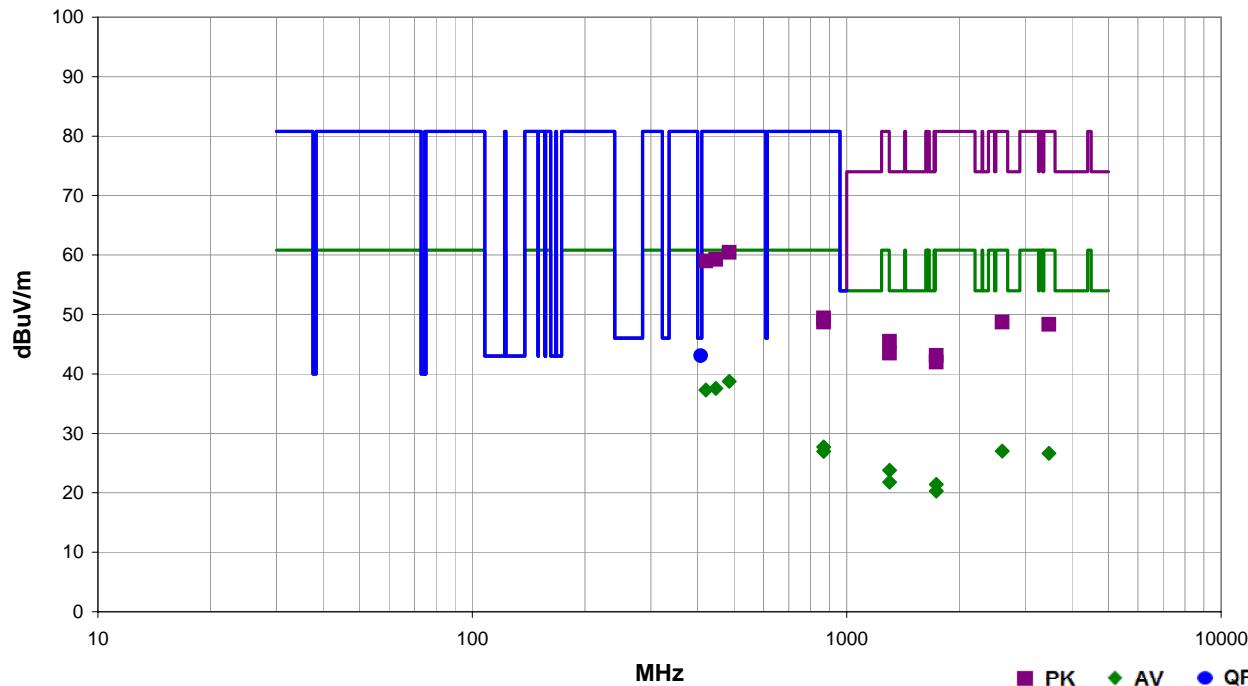
The duty cycle correction factor of -21.7 dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 100kHz and a video bandwidth of 300kHz for measurements at or below 1GHz. Above 1GHz, a resolution bandwidth of 1MHz and a video bandwidth of 3MHz was used.

The field strength of the spurious emissions meet the limits as defined in 47 CFR 15.231(b). The spurious emissions also meet the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions. Further, spurious emissions meet the provisions of 15.205 using the measurement instrumentation specified in that section.

| | | | | |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------|------------------------|
| Work Order: | IRRI0001 | Date: | 01/14/14 | Trevor Buls |
| Project: | None | Temperature: | 23.6 °C | |
| Job Site: | MN05 | Humidity: | 17.2% RH | |
| Serial Number: | 2456532-0035 | Barometric Pres.: | 1004.1 mbar | Tested by: Trevor Buls |
| EUT: | IrriGreen Genius Irrigation System | | | |
| Configuration: | 1 | | | |
| Customer: | IrriGreen, Inc | | | |
| Attendees: | Gary Klinefelter | | | |
| EUT Power: | 110VAC/60Hz | | | |
| Operating Mode: | Transmitting semi-continuously at 433.92 MHz, modulated. | | | |
| Deviations: | None | | | |
| Comments: | Operating at low channel 433.92 MHz. Normal installation is in the upright position (EUT Vertical), so that was the only position tested. | | | |

| Test Specifications | | Test Method |
|---------------------|--|------------------|
| FCC 15.231(b):2014 | | ANSI C63.10:2009 |

| Run # | 13 | Test Distance (m) | 3 | Antenna Height(s) | 1-4m | Results | Pass |
|-------|----|-------------------|---|-------------------|------|---------|------|
| | | | | | | | |



| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Duty Cycle Correction Factor (dB) | External Attenuation (dB) | Polarity/Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments |
|------------|------------------|-------------|-------------------------|-------------------|-----------------------------------|---------------------------|--------------------------|----------|--------------------------|-------------------|----------------------|------------------------|------------------|
| 407.959 | 32.6 | 0.5 | 1.0 | 241.0 | | 10.0 | Vert | QP | 0.0 | 43.1 | 46.0 | -2.9 | Normal operation |
| 485.909 | 48.8 | 1.7 | 1.0 | 241.0 | | 10.0 | Vert | PK | 0.0 | 60.5 | 80.8 | -20.3 | |
| 446.933 | 48.1 | 1.1 | 1.0 | 89.0 | | 10.0 | Vert | PK | 0.0 | 59.2 | 80.8 | -21.6 | |
| 420.941 | 48.2 | 0.8 | 1.0 | 248.0 | | 10.0 | Vert | PK | 0.0 | 59.0 | 80.8 | -21.8 | |
| 485.909 | 48.8 | 1.7 | 1.0 | 241.0 | -21.7 | 10.0 | Vert | AV | 0.0 | 38.8 | 60.8 | -22.0 | |
| 446.933 | 48.1 | 1.1 | 1.0 | 89.0 | -21.7 | 10.0 | Vert | AV | 0.0 | 37.5 | 60.8 | -23.3 | |
| 420.941 | 48.2 | 0.8 | 1.0 | 248.0 | -21.7 | 10.0 | Vert | AV | 0.0 | 37.3 | 60.8 | -23.5 | |
| 1301.750 | 51.4 | -5.9 | 1.8 | 233.0 | | 0.0 | Vert | PK | 0.0 | 45.5 | 74.0 | -28.5 | |
| 1301.750 | 51.4 | -5.9 | 1.8 | 233.0 | -21.7 | 0.0 | Vert | AV | 0.0 | 23.8 | 54.0 | -30.2 | |
| 1301.842 | 49.4 | -5.9 | 1.0 | 329.0 | | 0.0 | Horz | PK | 0.0 | 43.5 | 74.0 | -30.5 | |
| 867.910 | 30.3 | 9.1 | 1.0 | 224.0 | | 10.0 | Vert | PK | 0.0 | 49.4 | 80.8 | -31.4 | |
| 2603.465 | 50.8 | -2.1 | 1.0 | 191.0 | | 0.0 | Horz | PK | 0.0 | 48.7 | 80.8 | -32.1 | |
| 867.780 | 29.6 | 9.1 | 1.0 | 10.0 | | 10.0 | Horz | PK | 0.0 | 48.7 | 80.8 | -32.1 | |
| 1301.842 | 49.4 | -5.9 | 1.0 | 329.0 | -21.7 | 0.0 | Horz | AV | 0.0 | 21.8 | 54.0 | -32.2 | |
| 3471.600 | 47.7 | 0.6 | 1.2 | 0.0 | | 0.0 | Horz | PK | 0.0 | 48.3 | 80.8 | -32.5 | |

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Duty Cycle Correction Factor (dB) | External Attenuation (dB) | Polarity/Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments |
|------------|------------------|-------------|-------------------------|-------------------|-----------------------------------|---------------------------|--------------------------|----------|--------------------------|-------------------|----------------------|------------------------|----------|
| 867.910 | 30.3 | 9.1 | 1.0 | 224.0 | -21.7 | 10.0 | Vert | AV | 0.0 | 27.7 | 60.8 | -33.1 | |
| 2603.465 | 50.8 | -2.1 | 1.0 | 191.0 | -21.7 | 0.0 | Horz | AV | 0.0 | 27.0 | 60.8 | -33.8 | |
| 867.780 | 29.6 | 9.1 | 1.0 | 10.0 | -21.7 | 10.0 | Horz | AV | 0.0 | 27.0 | 60.8 | -33.8 | |
| 3471.600 | 47.7 | 0.6 | 1.2 | 0.0 | -21.7 | 0.0 | Horz | AV | 0.0 | 26.6 | 60.8 | -34.2 | |
| 1735.883 | 47.9 | -4.8 | 1.0 | 0.0 | | 0.0 | Horz | PK | 0.0 | 43.1 | 80.8 | -37.7 | |
| 1735.675 | 46.8 | -4.8 | 3.3 | 256.0 | | 0.0 | Vert | PK | 0.0 | 42.0 | 80.8 | -38.8 | |
| 1735.883 | 47.9 | -4.8 | 1.0 | 0.0 | -21.7 | 0.0 | Horz | AV | 0.0 | 21.4 | 60.8 | -39.4 | |
| 1735.675 | 46.8 | -4.8 | 3.3 | 256.0 | -21.7 | 0.0 | Vert | AV | 0.0 | 20.3 | 60.8 | -40.5 | |

SPURIOUS RADIATED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting semi-continuously at 443.92 MHz, modulated.

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

IRRI0001 - 1

FREQUENCY RANGE INVESTIGATED

| | | | |
|-----------------|--------|----------------|-------|
| Start Frequency | 30 MHz | Stop Frequency | 5 GHz |
|-----------------|--------|----------------|-------|

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|-------------------------|------------------|--------------------------------|-----|------------|----------|
| Pre-Amplifier | Miteq | AMF-3D-00100800-32-13P | AVX | 3/14/2014 | 12 mo |
| MN05 Cables | ESM Cable Corp. | Double Ridge Guide Horn Cables | MNI | 3/14/2014 | 12 mo |
| Antenna, Horn (DRG) | ETS Lindgren | 3115 | AIP | 6/29/2011 | 36 mo |
| Attenuator, 10db, 'SMA' | S.M. Electronics | SA18H-10 | REN | 5/15/2014 | 12 mo |
| Pre-Amplifier | Miteq | AM-1616-1000 | PAD | 3/14/2014 | 12 mo |
| Antenna, Biog | Teseq | CBL 6141B | AYD | 12/17/2013 | 12 mo |
| MN05 Cables | ESM Cable Corp. | Biog Cables | MNH | 3/14/2014 | 12 mo |
| Spectrum Analyzer | Agilent | N9010A | AFI | 1/27/2013 | 24 mo |

MEASUREMENT BANDWIDTHS

| Frequency Range (MHz) | Peak Data (kHz) | Quasi-Peak Data (kHz) | Average Data (kHz) |
|-----------------------|-----------------|-----------------------|--------------------|
| 0.01 - 0.15 | 1.0 | 0.2 | 0.2 |
| 0.15 - 30.0 | 10.0 | 9.0 | 9.0 |
| 30.0 - 1000 | 100.0 | 120.0 | 120.0 |
| Above 1000 | 1000.0 | N/A | 1000.0 |

TEST DESCRIPTION

The single, integral antenna to be used with the EUT was tested. The EUT was configured for un-modulated, CW operation at its single transmit frequency. The field strength of the transmit frequency was maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT in 3 orthogonal planes (per ANSI C63.10:2009).

A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

To derive average emission measurements, a duty cycle correction factor per 15.35(c) was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where "On time" = $N1L1 + N2L2 + \dots$

Where $N1$ is the number of type 1 pulses, $L1$ is length of type 1 pulses, $N2$ is the number of type 2 pulses, $L2$ is the length of type 2 pulses, etc.

Therefore, Duty Cycle = $(N1L1 + N2L2 + \dots)/100mS$ or T , whichever is less. Where T is the period of the pulse train.

The measured values for the EUT's pulse train are as follows:

Period = 100 mSec

Pulsewidth of Type 1 Pulse = 8.183 mSec

Number of Type 1 Pulses = 1

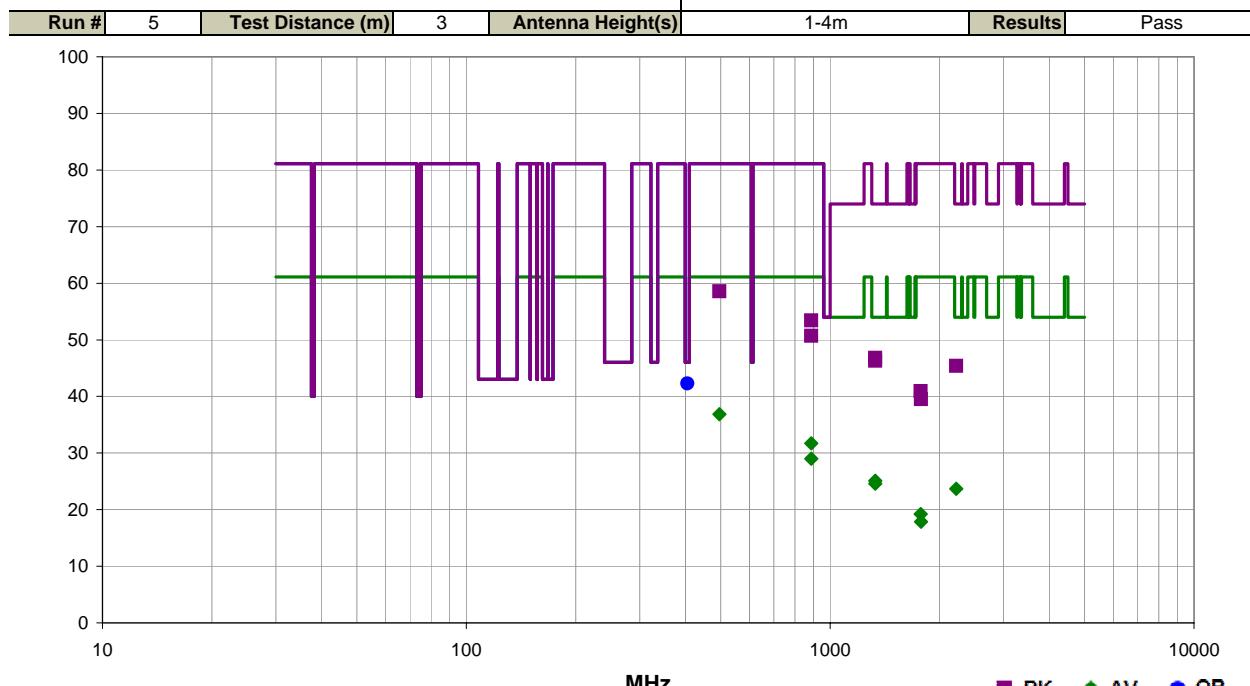
Duty Cycle = $20 \log [((1)(8.183))/100] = -21.7 \text{ dB}$

The duty cycle correction factor of -21.7 dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 100kHz and a video bandwidth of 300kHz for measurements at or below 1GHz. Above 1GHz, a resolution bandwidth of 1MHz and a video bandwidth of 3MHz was used.

The field strength of the spurious emissions meet the limits as defined in 47 CFR 15.231(b). The spurious emissions also meet the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions. Further, spurious emissions meet the provisions of 15.205 using the measurement instrumentation specified in that section.

| | | | | |
|-----------------|------------------------------------------------------------------------------------------------------|-------------------|-------------|------------------------|
| Work Order: | IRRI0005 | Date: | 05/19/14 | <i>Trevor Buls</i> |
| Project: | None | Temperature: | 23.3 °C | |
| Job Site: | MN05 | Humidity: | 33.1% RH | |
| Serial Number: | 2456532-0035 | Barometric Pres.: | 1016.2 mbar | Tested by: Trevor Buls |
| EUT: | IrriGreen Genius Irrigation System | | | |
| Configuration: | IRRI0001 - 1 | | | |
| Customer: | IrriGreen, Inc | | | |
| Attendees: | Gary Klinefelter | | | |
| EUT Power: | 110VAC/60Hz | | | |
| Operating Mode: | Transmitting semi-continuously at 443.92 MHz, modulated. | | | |
| Deviations: | None | | | |
| Comments: | Normal installation is in the upright position (EUT Vertical), so that was the only position tested. | | | |

| Test Specifications | Test Method |
|---------------------|------------------|
| FCC 15.231(b):2014 | ANSI C63.10:2009 |



| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Duty Cycle Correction Factor (dB) | External Attenuation (dB) | Polarity/Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) |
|------------|------------------|-------------|-------------------------|-------------------|-----------------------------------|---------------------------|--------------------------|----------|--------------------------|-------------------|----------------------|------------------------|
| 404.952 | 31.4 | 0.8 | 1.0 | 5.0 | | 10.0 | Vert | QP | 0.0 | 42.3 | 46.0 | -3.7 |
| 495.910 | 46.2 | 2.3 | 1.0 | 359.0 | | 10.0 | Vert | PK | 0.0 | 58.5 | 81.1 | -22.6 |
| 495.910 | 46.2 | 2.3 | 1.0 | 359.0 | -21.7 | 10.0 | Vert | AV | 0.0 | 36.8 | 61.1 | -24.3 |
| 1331.792 | 52.3 | -5.5 | 1.0 | 111.0 | | 0.0 | Horz | PK | 0.0 | 46.8 | 74.0 | -27.2 |
| 887.910 | 33.6 | 9.8 | 1.0 | 27.0 | | 10.0 | Horz | PK | 0.0 | 53.4 | 81.1 | -27.7 |
| 1331.733 | 51.8 | -5.5 | 1.1 | 51.0 | | 0.0 | Vert | PK | 0.0 | 46.3 | 74.0 | -27.7 |
| 2219.615 | 47.3 | -1.9 | 1.0 | 116.0 | | 0.0 | Vert | PK | 0.0 | 45.4 | 74.0 | -28.6 |
| 1331.792 | 52.3 | -5.5 | 1.0 | 111.0 | -21.7 | 0.0 | Horz | AV | 0.0 | 25.1 | 54.0 | -28.9 |
| 887.910 | 33.6 | 9.8 | 1.0 | 27.0 | -21.7 | 10.0 | Horz | AV | 0.0 | 31.7 | 61.1 | -29.4 |
| 1331.733 | 51.8 | -5.5 | 1.1 | 51.0 | -21.7 | 0.0 | Vert | AV | 0.0 | 24.6 | 54.0 | -29.4 |
| 2219.615 | 47.3 | -1.9 | 1.0 | 116.0 | -21.7 | 0.0 | Vert | AV | 0.0 | 23.7 | 54.0 | -30.3 |
| 887.780 | 30.9 | 9.8 | 1.0 | 160.0 | | 10.0 | Vert | PK | 0.0 | 50.7 | 81.1 | -30.4 |
| 887.780 | 30.9 | 9.8 | 1.0 | 160.0 | -21.7 | 10.0 | Vert | AV | 0.0 | 29.0 | 61.1 | -32.1 |
| 1775.517 | 45.8 | -4.9 | 1.0 | 186.0 | | 0.0 | Horz | PK | 0.0 | 40.9 | 81.1 | -40.2 |
| 1775.683 | 44.4 | -4.9 | 1.0 | 116.0 | | 0.0 | Vert | PK | 0.0 | 39.5 | 81.1 | -41.6 |
| 1775.517 | 45.8 | -4.9 | 1.0 | 186.0 | -21.7 | 0.0 | Horz | AV | 0.0 | 19.2 | 61.1 | -41.9 |
| 1775.683 | 44.4 | -4.9 | 1.0 | 116.0 | -21.7 | 0.0 | Vert | AV | 0.0 | 17.8 | 61.1 | -43.3 |

POWERLINE CONDUCTED EMISSIONS

TEST DESCRIPTION

The EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the AC input of the EUT, or on the AC input of the device used to power the EUT. The AC power line conducted emissions were measured with the EUT operating at the lowest, the highest, and a middle channel in the operational band. The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.10-2009.

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|----------------------|--------------------|------------------|-----|------------|----------|
| Receiver | Rohde & Schwarz | ESCI | ARG | 04/01/2013 | 12 mo |
| High Pass Filter | TTE | H97-100K-50-720B | HGN | 05/31/2012 | 24 mo |
| Attenuator 20dB, BNC | Fairview Microwave | SA01B-20 | AQP | 08/09/2013 | 12 mo |
| MN03 Cables | ESM Cable Corp. | Conducted Cables | MNC | 12/05/2013 | 12 mo |
| LISN | Solar Electronics | 9252-50-R-24-BNC | LIY | 05/24/2013 | 12 mo |

MEASUREMENT UNCERTAINTY

| Description |
|--------------|
| Expanded k=2 |

2.94 dB

-2.94 dB

CONFIGURATIONS INVESTIGATED

IRRI0001-1

MODES INVESTIGATED

Transmitting Semi-Continuously, modulated at 433.92 MHz.

POWERLINE CONDUCTED EMISSIONS

| | | | |
|-------------------|------------------------------------|--------------------|------------|
| EUT: | IrriGreen Genius Irrigation System | Work Order: | IRRI0001 |
| Serial Number: | 2456532-0035 | Date: | 01/15/2014 |
| Customer: | IrriGreen, Inc | Temperature: | 22.9°C |
| Attendees: | Gary Klinefelter | Relative Humidity: | 12.4% |
| Customer Project: | None | Bar. Pressure: | 1021.5 mb |
| Tested By: | Trevor Buls | Job Site: | MN03 |
| Power: | 110VAC/60Hz | Configuration: | IRRI0001-1 |

TEST SPECIFICATIONS

| | |
|-----------------|------------------|
| Specification: | Method: |
| FCC 15.207:2014 | ANSI C63.10:2009 |

TEST PARAMETERS

| | | | | | |
|--------|---|-------|---------|------------------------|----|
| Run #: | 4 | Line: | Neutral | Ext. Attenuation (dB): | 20 |
|--------|---|-------|---------|------------------------|----|

COMMENTS

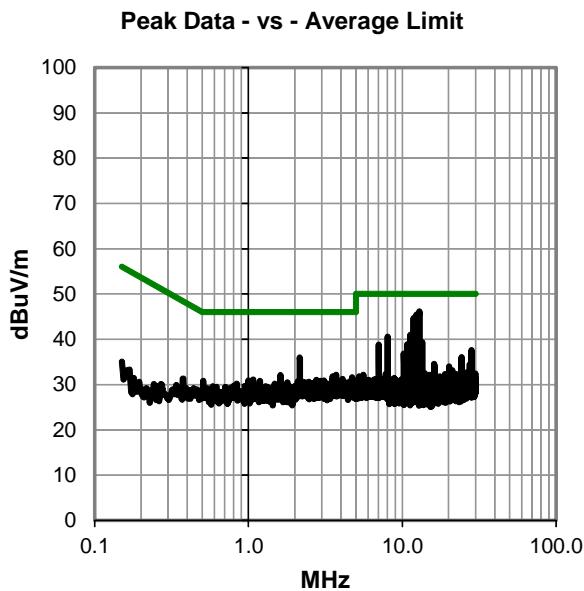
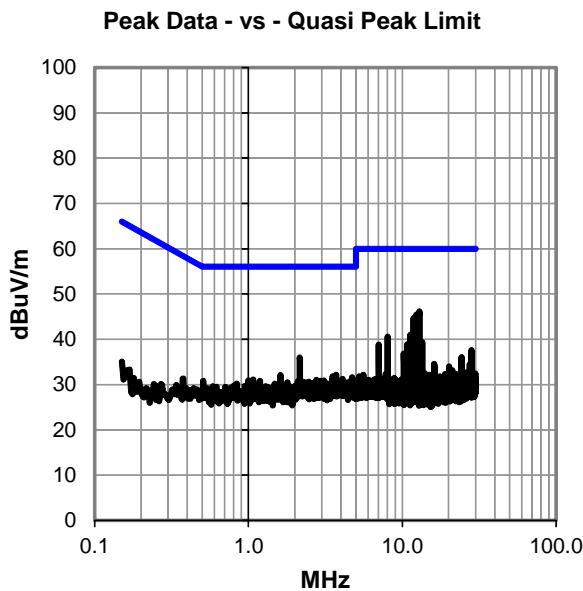
None

EUT OPERATING MODES

Transmitting Semi-Continuously, modulated at 433.92 MHz.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #4

Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Margin (dB) |
|------------|-------------|-------------|-------------------|----------------------|-------------|
| 12.928 | 25.3 | 20.9 | 46.2 | 60.0 | -13.8 |
| 12.394 | 24.6 | 20.8 | 45.4 | 60.0 | -14.6 |
| 11.857 | 23.9 | 20.8 | 44.7 | 60.0 | -15.3 |
| 12.133 | 22.1 | 20.8 | 42.9 | 60.0 | -17.1 |
| 12.096 | 21.6 | 20.8 | 42.4 | 60.0 | -17.6 |
| 11.320 | 20.2 | 20.8 | 41.0 | 60.0 | -19.0 |
| 12.171 | 19.9 | 20.8 | 40.7 | 60.0 | -19.3 |
| 8.041 | 20.0 | 20.6 | 40.6 | 60.0 | -19.4 |
| 2.153 | 15.7 | 20.3 | 36.0 | 56.0 | -20.0 |
| 13.476 | 18.5 | 20.9 | 39.4 | 60.0 | -20.6 |
| 10.775 | 18.1 | 20.7 | 38.8 | 60.0 | -21.2 |
| 7.037 | 18.3 | 20.5 | 38.8 | 60.0 | -21.2 |
| 12.062 | 18.0 | 20.8 | 38.8 | 60.0 | -21.2 |
| 28.224 | 15.5 | 22.1 | 37.6 | 60.0 | -22.4 |
| 28.314 | 15.1 | 22.1 | 37.2 | 60.0 | -22.8 |
| 10.234 | 16.1 | 20.7 | 36.8 | 60.0 | -23.2 |
| 3.717 | 11.8 | 20.4 | 32.2 | 56.0 | -23.8 |
| 1.616 | 11.8 | 20.3 | 32.1 | 56.0 | -23.9 |
| 24.270 | 14.4 | 21.7 | 36.1 | 60.0 | -23.9 |
| 3.530 | 11.5 | 20.4 | 31.9 | 56.0 | -24.1 |
| 4.713 | 11.2 | 20.4 | 31.6 | 56.0 | -24.4 |
| 3.694 | 11.2 | 20.4 | 31.6 | 56.0 | -24.4 |
| 3.627 | 11.0 | 20.4 | 31.4 | 56.0 | -24.6 |
| 4.086 | 10.9 | 20.4 | 31.3 | 56.0 | -24.7 |
| 24.191 | 13.5 | 21.7 | 35.2 | 60.0 | -24.8 |
| 1.075 | 10.8 | 20.3 | 31.1 | 56.0 | -24.9 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Margin (dB) |
|------------|-------------|-------------|-------------------|----------------------|-------------|
| 12.928 | 25.3 | 20.9 | 46.2 | 50.0 | -3.8 |
| 12.394 | 24.6 | 20.8 | 45.4 | 50.0 | -4.6 |
| 11.857 | 23.9 | 20.8 | 44.7 | 50.0 | -5.3 |
| 12.133 | 22.1 | 20.8 | 42.9 | 50.0 | -7.1 |
| 12.096 | 21.6 | 20.8 | 42.4 | 50.0 | -7.6 |
| 11.320 | 20.2 | 20.8 | 41.0 | 50.0 | -9.0 |
| 12.171 | 19.9 | 20.8 | 40.7 | 50.0 | -9.3 |
| 8.041 | 20.0 | 20.6 | 40.6 | 50.0 | -9.4 |
| 2.153 | 15.7 | 20.3 | 36.0 | 46.0 | -10.0 |
| 13.476 | 18.5 | 20.9 | 39.4 | 50.0 | -10.6 |
| 10.775 | 18.1 | 20.7 | 38.8 | 50.0 | -11.2 |
| 7.037 | 18.3 | 20.5 | 38.8 | 50.0 | -11.2 |
| 12.062 | 18.0 | 20.8 | 38.8 | 50.0 | -11.2 |
| 28.224 | 15.5 | 22.1 | 37.6 | 50.0 | -12.4 |
| 28.314 | 15.1 | 22.1 | 37.2 | 50.0 | -12.8 |
| 10.234 | 16.1 | 20.7 | 36.8 | 50.0 | -13.2 |
| 3.717 | 11.8 | 20.4 | 32.2 | 46.0 | -13.8 |
| 1.616 | 11.8 | 20.3 | 32.1 | 46.0 | -13.9 |
| 24.270 | 14.4 | 21.7 | 36.1 | 50.0 | -13.9 |
| 3.530 | 11.5 | 20.4 | 31.9 | 46.0 | -14.1 |
| 4.713 | 11.2 | 20.4 | 31.6 | 46.0 | -14.4 |
| 3.694 | 11.2 | 20.4 | 31.6 | 46.0 | -14.4 |
| 3.627 | 11.0 | 20.4 | 31.4 | 46.0 | -14.6 |
| 4.086 | 10.9 | 20.4 | 31.3 | 46.0 | -14.7 |
| 24.191 | 13.5 | 21.7 | 35.2 | 50.0 | -14.8 |
| 1.075 | 10.8 | 20.3 | 31.1 | 46.0 | -14.9 |

CONCLUSION

Pass

Trevor Buls

Tested By

POWERLINE CONDUCTED EMISSIONS

| | | | |
|-------------------|------------------------------------|--------------------|------------|
| EUT: | IrriGreen Genius Irrigation System | Work Order: | IRRI0001 |
| Serial Number: | 2456532-0035 | Date: | 01/15/2014 |
| Customer: | IrriGreen, Inc | Temperature: | 22.9°C |
| Attendees: | Gary Klinefelter | Relative Humidity: | 12.4% |
| Customer Project: | None | Bar. Pressure: | 1021.5 mb |
| Tested By: | Trevor Buls | Job Site: | MN03 |
| Power: | 110VAC/60Hz | Configuration: | IRRI0001-1 |

TEST SPECIFICATIONS

| | |
|-----------------|------------------|
| Specification: | Method: |
| FCC 15.207:2014 | ANSI C63.10:2009 |

TEST PARAMETERS

| | | | | | |
|--------|---|-------|-----------|------------------------|----|
| Run #: | 6 | Line: | High Line | Ext. Attenuation (dB): | 20 |
|--------|---|-------|-----------|------------------------|----|

COMMENTS

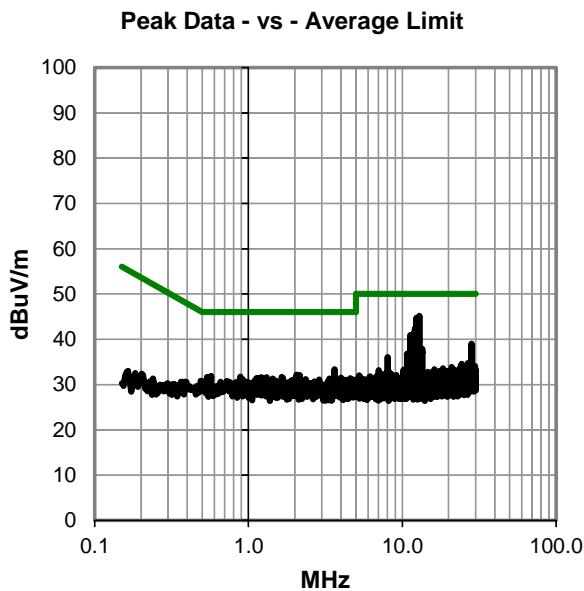
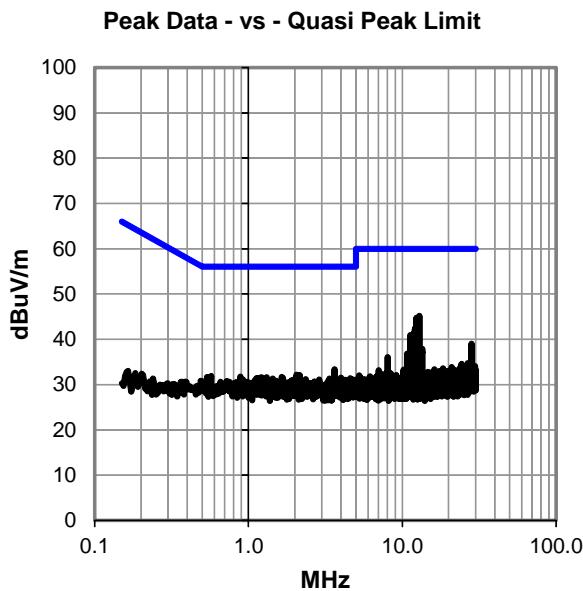
None

EUT OPERATING MODES

Transmitting Semi-Continuously, modulated at 433.92 MHz.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #6

Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Margin (dB) |
|------------|-------------|-------------|-------------------|----------------------|-------------|
| 12.935 | 24.3 | 20.9 | 45.2 | 60.0 | -14.8 |
| 12.391 | 23.9 | 20.8 | 44.7 | 60.0 | -15.3 |
| 12.133 | 21.7 | 20.8 | 42.5 | 60.0 | -17.5 |
| 12.096 | 21.4 | 20.8 | 42.2 | 60.0 | -17.8 |
| 11.861 | 20.5 | 20.8 | 41.3 | 60.0 | -18.7 |
| 11.316 | 20.1 | 20.8 | 40.9 | 60.0 | -19.1 |
| 12.171 | 19.5 | 20.8 | 40.3 | 60.0 | -19.7 |
| 28.220 | 16.9 | 22.1 | 39.0 | 60.0 | -21.0 |
| 28.310 | 16.1 | 22.1 | 38.2 | 60.0 | -21.8 |
| 12.062 | 17.4 | 20.8 | 38.2 | 60.0 | -21.8 |
| 13.476 | 17.0 | 20.9 | 37.9 | 60.0 | -22.1 |
| 3.631 | 13.0 | 20.4 | 33.4 | 56.0 | -22.6 |
| 10.775 | 16.1 | 20.7 | 36.8 | 60.0 | -23.2 |
| 28.399 | 14.7 | 22.1 | 36.8 | 60.0 | -23.2 |
| 2.053 | 11.9 | 20.3 | 32.2 | 56.0 | -23.8 |
| 2.153 | 11.8 | 20.3 | 32.1 | 56.0 | -23.9 |
| 8.044 | 15.5 | 20.6 | 36.1 | 60.0 | -23.9 |
| 0.572 | 11.7 | 20.2 | 31.9 | 56.0 | -24.1 |
| 0.885 | 11.5 | 20.3 | 31.8 | 56.0 | -24.2 |
| 0.538 | 11.5 | 20.2 | 31.7 | 56.0 | -24.3 |
| 1.646 | 11.4 | 20.3 | 31.7 | 56.0 | -24.3 |
| 1.213 | 11.3 | 20.3 | 31.6 | 56.0 | -24.4 |
| 1.310 | 11.3 | 20.3 | 31.6 | 56.0 | -24.4 |
| 3.989 | 11.2 | 20.4 | 31.6 | 56.0 | -24.4 |
| 1.176 | 11.2 | 20.3 | 31.5 | 56.0 | -24.5 |
| 1.668 | 11.2 | 20.3 | 31.5 | 56.0 | -24.5 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Margin (dB) |
|------------|-------------|-------------|-------------------|----------------------|-------------|
| 12.935 | 24.3 | 20.9 | 45.2 | 50.0 | -4.8 |
| 12.391 | 23.9 | 20.8 | 44.7 | 50.0 | -5.3 |
| 12.133 | 21.7 | 20.8 | 42.5 | 50.0 | -7.5 |
| 12.096 | 21.4 | 20.8 | 42.2 | 50.0 | -7.8 |
| 11.861 | 20.5 | 20.8 | 41.3 | 50.0 | -8.7 |
| 11.316 | 20.1 | 20.8 | 40.9 | 50.0 | -9.1 |
| 12.171 | 19.5 | 20.8 | 40.3 | 50.0 | -9.7 |
| 28.220 | 16.9 | 22.1 | 39.0 | 50.0 | -11.0 |
| 28.310 | 16.1 | 22.1 | 38.2 | 50.0 | -11.8 |
| 12.062 | 17.4 | 20.8 | 38.2 | 50.0 | -11.8 |
| 13.476 | 17.0 | 20.9 | 37.9 | 50.0 | -12.1 |
| 3.631 | 13.0 | 20.4 | 33.4 | 46.0 | -12.6 |
| 10.775 | 16.1 | 20.7 | 36.8 | 50.0 | -13.2 |
| 28.399 | 14.7 | 22.1 | 36.8 | 50.0 | -13.2 |
| 2.053 | 11.9 | 20.3 | 32.2 | 46.0 | -13.8 |
| 2.153 | 11.8 | 20.3 | 32.1 | 46.0 | -13.9 |
| 8.044 | 15.5 | 20.6 | 36.1 | 50.0 | -13.9 |
| 0.572 | 11.7 | 20.2 | 31.9 | 46.0 | -14.1 |
| 0.885 | 11.5 | 20.3 | 31.8 | 46.0 | -14.2 |
| 0.538 | 11.5 | 20.2 | 31.7 | 46.0 | -14.3 |
| 1.646 | 11.4 | 20.3 | 31.7 | 46.0 | -14.3 |
| 1.213 | 11.3 | 20.3 | 31.6 | 46.0 | -14.4 |
| 1.310 | 11.3 | 20.3 | 31.6 | 46.0 | -14.4 |
| 3.989 | 11.2 | 20.4 | 31.6 | 46.0 | -14.4 |
| 1.176 | 11.2 | 20.3 | 31.5 | 46.0 | -14.5 |
| 1.668 | 11.2 | 20.3 | 31.5 | 46.0 | -14.5 |

CONCLUSION

Pass

Trevor Buls

Tested By

POWERLINE CONDUCTED EMISSIONS

TEST DESCRIPTION

The EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the AC input of the EUT, or on the AC input of the device used to power the EUT. The AC power line conducted emissions were measured with the EUT operating at the lowest, the highest, and a middle channel in the operational band. The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.10-2009.

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|----------------------|--------------------|------------------|-----|------------|----------|
| Receiver | Rohde & Schwarz | ESR7 | ARI | 05/06/2014 | 12 mo |
| MN03 Cables | ESM Cable Corp. | Conducted Cables | MNC | 12/05/2013 | 12 mo |
| LISN | Solar Electronics | 9252-50-R-24-BNC | LIY | 05/15/2014 | 12 mo |
| High Pass Filter | TTE | H97-100K-50-720B | HGN | 05/31/2012 | 24 mo |
| Attenuator 20dB, BNC | Fairview Microwave | SA01B-20 | AQP | 08/09/2013 | 12 mo |

MEASUREMENT UNCERTAINTY

| Description | | |
|--------------|---------|----------|
| Expanded k=2 | 2.94 dB | -2.94 dB |

CONFIGURATIONS INVESTIGATED

IRRI0001-1

MODES INVESTIGATED

Transmitting modulated at 443.92 MHz

| | | | |
|-------------------|------------------------------------|--------------------|------------|
| EUT: | IrriGreen Genius Irrigation System | Work Order: | IRRI0005 |
| Serial Number: | 2456532-0035 | Date: | 05/20/2014 |
| Customer: | IrriGreen, Inc. | Temperature: | 23.8°C |
| Attendees: | None | Relative Humidity: | 42.5% |
| Customer Project: | None | Bar. Pressure: | 1014.2 mb |
| Tested By: | Trevor Buls | Job Site: | MN03 |
| Power: | 110VAC/60Hz | Configuration: | IRRI0001-1 |

TEST SPECIFICATIONS

| | |
|-----------------|------------------|
| Specification: | Method: |
| FCC 15.207:2014 | ANSI C63.10:2009 |

TEST PARAMETERS

| | | | | | |
|--------|---|-------|---------|------------------------|----|
| Run #: | 3 | Line: | Neutral | Ext. Attenuation (dB): | 20 |
|--------|---|-------|---------|------------------------|----|

COMMENTS

None

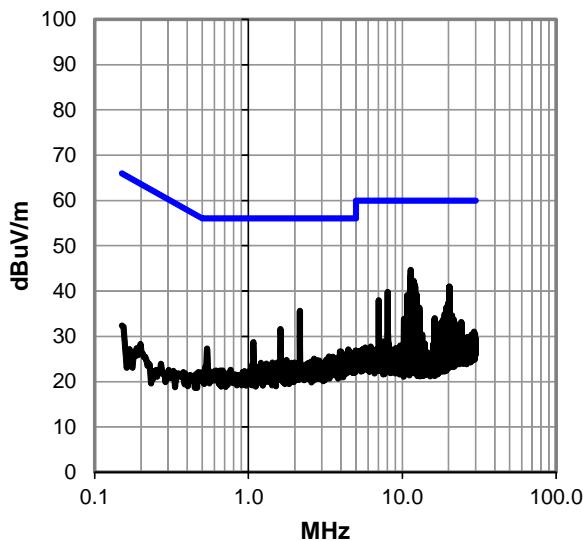
EUT OPERATING MODES

Transmitting modulated at 443.92 MHz

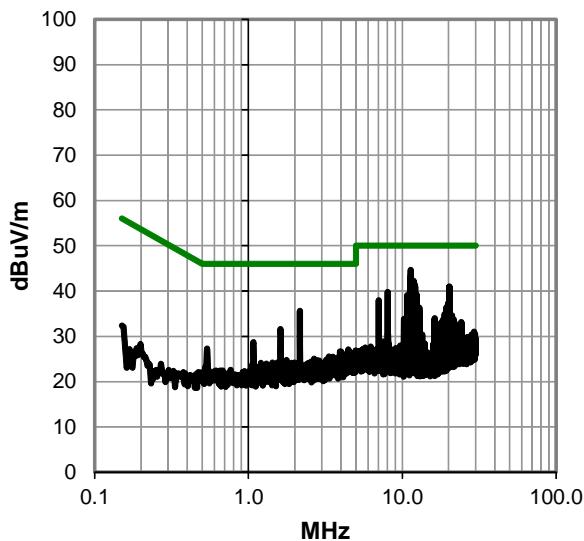
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #3

Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Margin (dB) |
|------------|-------------|-------------|-------------------|----------------------|-------------|
| 11.327 | 23.9 | 20.8 | 44.7 | 60.0 | -15.3 |
| 11.868 | 21.5 | 20.8 | 42.3 | 60.0 | -17.7 |
| 12.100 | 20.6 | 20.8 | 41.4 | 60.0 | -18.6 |
| 12.144 | 20.2 | 20.8 | 41.0 | 60.0 | -19.0 |
| 20.240 | 19.5 | 21.5 | 41.0 | 60.0 | -19.0 |
| 20.166 | 19.5 | 21.5 | 41.0 | 60.0 | -19.0 |
| 8.037 | 19.2 | 20.6 | 39.8 | 60.0 | -20.2 |
| 2.157 | 15.3 | 20.3 | 35.6 | 56.0 | -20.4 |
| 12.409 | 18.3 | 20.8 | 39.1 | 60.0 | -20.9 |
| 10.786 | 18.3 | 20.8 | 39.1 | 60.0 | -20.9 |
| 20.304 | 17.5 | 21.5 | 39.0 | 60.0 | -21.0 |
| 12.182 | 17.9 | 20.8 | 38.7 | 60.0 | -21.3 |
| 7.033 | 17.4 | 20.5 | 37.9 | 60.0 | -22.1 |
| 19.964 | 16.0 | 21.4 | 37.4 | 60.0 | -22.6 |
| 12.059 | 16.1 | 20.8 | 36.9 | 60.0 | -23.1 |
| 19.420 | 15.1 | 21.4 | 36.5 | 60.0 | -23.5 |
| 12.943 | 15.5 | 20.9 | 36.4 | 60.0 | -23.6 |
| 1.616 | 11.3 | 20.3 | 31.6 | 56.0 | -24.4 |
| 20.501 | 13.5 | 21.5 | 35.0 | 60.0 | -25.0 |
| 18.871 | 13.6 | 21.3 | 34.9 | 60.0 | -25.1 |
| 21.039 | 13.1 | 21.5 | 34.6 | 60.0 | -25.4 |
| 16.245 | 12.9 | 21.1 | 34.0 | 60.0 | -26.0 |
| 10.246 | 13.1 | 20.8 | 33.9 | 60.0 | -26.1 |
| 21.583 | 12.2 | 21.6 | 33.8 | 60.0 | -26.2 |
| 16.189 | 12.5 | 21.1 | 33.6 | 60.0 | -26.4 |
| 18.338 | 12.3 | 21.3 | 33.6 | 60.0 | -26.4 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Margin (dB) |
|------------|-------------|-------------|-------------------|----------------------|-------------|
| 11.327 | 23.9 | 20.8 | 44.7 | 50.0 | -5.3 |
| 11.868 | 21.5 | 20.8 | 42.3 | 50.0 | -7.7 |
| 12.100 | 20.6 | 20.8 | 41.4 | 50.0 | -8.6 |
| 12.144 | 20.2 | 20.8 | 41.0 | 50.0 | -9.0 |
| 20.240 | 19.5 | 21.5 | 41.0 | 50.0 | -9.0 |
| 20.166 | 19.5 | 21.5 | 41.0 | 50.0 | -9.0 |
| 8.037 | 19.2 | 20.6 | 39.8 | 50.0 | -10.2 |
| 2.157 | 15.3 | 20.3 | 35.6 | 46.0 | -10.4 |
| 12.409 | 18.3 | 20.8 | 39.1 | 50.0 | -10.9 |
| 10.786 | 18.3 | 20.8 | 39.1 | 50.0 | -10.9 |
| 20.304 | 17.5 | 21.5 | 39.0 | 50.0 | -11.0 |
| 12.182 | 17.9 | 20.8 | 38.7 | 50.0 | -11.3 |
| 7.033 | 17.4 | 20.5 | 37.9 | 50.0 | -12.1 |
| 19.964 | 16.0 | 21.4 | 37.4 | 50.0 | -12.6 |
| 12.059 | 16.1 | 20.8 | 36.9 | 50.0 | -13.1 |
| 19.420 | 15.1 | 21.4 | 36.5 | 50.0 | -13.5 |
| 12.943 | 15.5 | 20.9 | 36.4 | 50.0 | -13.6 |
| 1.616 | 11.3 | 20.3 | 31.6 | 46.0 | -14.4 |
| 20.501 | 13.5 | 21.5 | 35.0 | 50.0 | -15.0 |
| 18.871 | 13.6 | 21.3 | 34.9 | 50.0 | -15.1 |
| 21.039 | 13.1 | 21.5 | 34.6 | 50.0 | -15.4 |
| 16.245 | 12.9 | 21.1 | 34.0 | 50.0 | -16.0 |
| 10.246 | 13.1 | 20.8 | 33.9 | 50.0 | -16.1 |
| 21.583 | 12.2 | 21.6 | 33.8 | 50.0 | -16.2 |
| 16.189 | 12.5 | 21.1 | 33.6 | 50.0 | -16.4 |
| 18.338 | 12.3 | 21.3 | 33.6 | 50.0 | -16.4 |

CONCLUSION

Pass

Trevor Buls

Tested By

| | | | |
|-------------------|------------------------------------|--------------------|------------|
| EUT: | IrriGreen Genius Irrigation System | Work Order: | IRRI0005 |
| Serial Number: | 2456532-0035 | Date: | 05/20/2014 |
| Customer: | IrriGreen, Inc. | Temperature: | 23.8°C |
| Attendees: | None | Relative Humidity: | 42.5% |
| Customer Project: | None | Bar. Pressure: | 1014.2 mb |
| Tested By: | Trevor Buls | Job Site: | MN03 |
| Power: | 110VAC/60Hz | Configuration: | IRRI0001-1 |

TEST SPECIFICATIONS

| | |
|-----------------|------------------|
| Specification: | Method: |
| FCC 15.207:2014 | ANSI C63.10:2009 |

TEST PARAMETERS

| | | | | | |
|--------|---|-------|-----------|------------------------|----|
| Run #: | 4 | Line: | High Line | Ext. Attenuation (dB): | 20 |
|--------|---|-------|-----------|------------------------|----|

COMMENTS

None

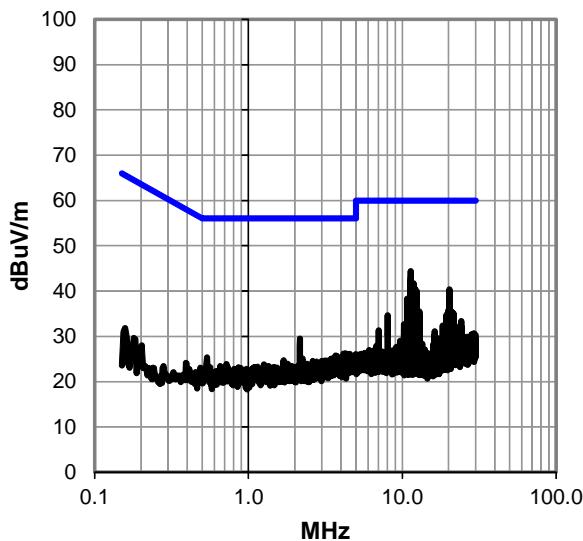
EUT OPERATING MODES

Transmitting modulated at 443.92 MHz

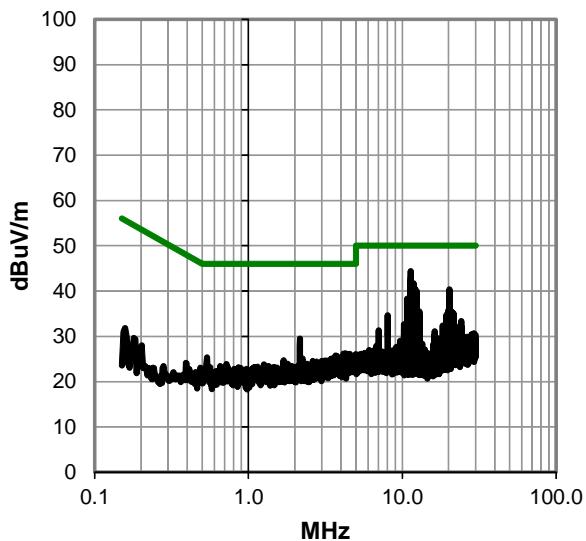
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #4

Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Margin (dB) |
|------------|-------------|-------------|-------------------|----------------------|-------------|
| 11.327 | 23.6 | 20.8 | 44.4 | 60.0 | -15.6 |
| 11.868 | 20.9 | 20.8 | 41.7 | 60.0 | -18.3 |
| 12.100 | 19.7 | 20.8 | 40.5 | 60.0 | -19.5 |
| 12.144 | 19.6 | 20.8 | 40.4 | 60.0 | -19.6 |
| 20.240 | 18.9 | 21.5 | 40.4 | 60.0 | -19.6 |
| 12.186 | 19.3 | 20.8 | 40.1 | 60.0 | -19.9 |
| 12.409 | 19.1 | 20.8 | 39.9 | 60.0 | -20.1 |
| 20.166 | 18.2 | 21.5 | 39.7 | 60.0 | -20.3 |
| 20.304 | 17.5 | 21.5 | 39.0 | 60.0 | -21.0 |
| 10.783 | 17.5 | 20.8 | 38.3 | 60.0 | -21.7 |
| 12.059 | 15.7 | 20.8 | 36.5 | 60.0 | -23.5 |
| 19.964 | 14.3 | 21.4 | 35.7 | 60.0 | -24.3 |
| 12.947 | 14.6 | 20.9 | 35.5 | 60.0 | -24.5 |
| 21.054 | 13.9 | 21.5 | 35.4 | 60.0 | -24.6 |
| 21.580 | 13.5 | 21.6 | 35.1 | 60.0 | -24.9 |
| 20.501 | 13.5 | 21.5 | 35.0 | 60.0 | -25.0 |
| 19.427 | 13.4 | 21.4 | 34.8 | 60.0 | -25.2 |
| 8.037 | 14.0 | 20.6 | 34.6 | 60.0 | -25.4 |
| 21.035 | 12.2 | 21.5 | 33.7 | 60.0 | -26.3 |
| 2.157 | 9.2 | 20.3 | 29.5 | 56.0 | -26.5 |
| 24.199 | 11.6 | 21.8 | 33.4 | 60.0 | -26.6 |
| 10.246 | 11.9 | 20.8 | 32.7 | 60.0 | -27.3 |
| 18.341 | 11.1 | 21.3 | 32.4 | 60.0 | -27.6 |
| 22.113 | 10.7 | 21.6 | 32.3 | 60.0 | -27.7 |
| 18.882 | 10.8 | 21.4 | 32.2 | 60.0 | -27.8 |
| 24.292 | 10.3 | 21.8 | 32.1 | 60.0 | -27.9 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Margin (dB) |
|------------|-------------|-------------|-------------------|----------------------|-------------|
| 11.327 | 23.6 | 20.8 | 44.4 | 50.0 | -5.6 |
| 11.868 | 20.9 | 20.8 | 41.7 | 50.0 | -8.3 |
| 12.100 | 19.7 | 20.8 | 40.5 | 50.0 | -9.5 |
| 12.144 | 19.6 | 20.8 | 40.4 | 50.0 | -9.6 |
| 20.240 | 18.9 | 21.5 | 40.4 | 50.0 | -9.6 |
| 12.186 | 19.3 | 20.8 | 40.1 | 50.0 | -9.9 |
| 12.409 | 19.1 | 20.8 | 39.9 | 50.0 | -10.1 |
| 20.166 | 18.2 | 21.5 | 39.7 | 50.0 | -10.3 |
| 20.304 | 17.5 | 21.5 | 39.0 | 50.0 | -11.0 |
| 10.783 | 17.5 | 20.8 | 38.3 | 50.0 | -11.7 |
| 12.059 | 15.7 | 20.8 | 36.5 | 50.0 | -13.5 |
| 19.964 | 14.3 | 21.4 | 35.7 | 50.0 | -14.3 |
| 12.947 | 14.6 | 20.9 | 35.5 | 50.0 | -14.5 |
| 21.054 | 13.9 | 21.5 | 35.4 | 50.0 | -14.6 |
| 21.580 | 13.5 | 21.6 | 35.1 | 50.0 | -14.9 |
| 20.501 | 13.5 | 21.5 | 35.0 | 50.0 | -15.0 |
| 19.427 | 13.4 | 21.4 | 34.8 | 50.0 | -15.2 |
| 8.037 | 14.0 | 20.6 | 34.6 | 50.0 | -15.4 |
| 21.035 | 12.2 | 21.5 | 33.7 | 50.0 | -16.3 |
| 2.157 | 9.2 | 20.3 | 29.5 | 46.0 | -16.5 |
| 24.199 | 11.6 | 21.8 | 33.4 | 50.0 | -16.6 |
| 10.246 | 11.9 | 20.8 | 32.7 | 50.0 | -17.3 |
| 18.341 | 11.1 | 21.3 | 32.4 | 50.0 | -17.6 |
| 22.113 | 10.7 | 21.6 | 32.3 | 50.0 | -17.7 |
| 18.882 | 10.8 | 21.4 | 32.2 | 50.0 | -17.8 |
| 24.292 | 10.3 | 21.8 | 32.1 | 50.0 | -17.9 |

CONCLUSION

Pass

Trevor Buls

Tested By