*FCC PART 15, SUBPART B and C*
*TEST REPORT*

*for*

# INDUSTRIAL REMOTE TRANSMITTER

## Model: 9557

Prepared for

PRECISION GOVERNORS, LLC
2322 SEVENTH AVENUE
ROCKFORD, IL 61104

Prepared by:____

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DATE: OCTOBER 1, 2014

| | REPORT BODY | APPENDICES | | | | | TOTAL |
|---|---|---|---|---|---|---|---|
| | | ***A*** | ***B*** | ***C*** | ***D*** | ***E*** | |
| PAGES | 16 | 2 | 2 | 2 | 11 | 13 | **46** |

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# GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced without the written permission of Compatible Electronics, unless done so in full.

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

| | |
|---|---|
| Device Tested: | Industrial Remote Transmitter<br>Model: 9557<br>S/N: N/A |
| Product Description: | See Expository Statement. |
| Modifications: | The EUT was modified in order to comply with specifications. Please see the list of modifications in Appendix B. |
| Customer: | Precision Governors, LLC.<br>2322 Seventh Avenue<br>Rockford, IL 61104 |
| Test Dates: | September 5, 12 and 15, 2014 |
| Test Specifications: | Emissions requirements<br>CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.231 |
| Test Procedure: | ANSI C63.4 |
| Test Deviations: | The test procedure was not deviated from during the testing. |

# SUMMARY OF TEST RESULTS

| *TEST* | DESCRIPTION | RESULTS |
|---|---|---|
| 1 | Spurious Radiated RF Emissions,<br>10 kHz – 4.3392 GHz<br>(Transmitter and Digital portion) | The EUT complies with the **Class B** limits of CFR Title 47, Part 15 Subpart B; and the limits of CFR Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.231 |
| 2 | Conducted RF Emissions,<br>150 kHz to 30 MHz | This test was not performed because the EUT operates on battery power and does not connect to the AC mains. |
| 3 | -20 dB Bandwidth of the Fundamental | The EUT complies with the limits of CFR Title 47, Part 15, Subpart C, section 15.231 [c]. |

## 1. PURPOSE

This document is a qualification test report based on the emissions tests performed on the Industrial Remote Transmitter, Model: 9557. The emissions measurements were performed according to the measurement procedure described in ANSI C63.4. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the **Class B** specification limits defined by CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.231.

# 2. ADMINISTRATIVE DATA

## 2.1 Location of Testing

The emissions tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

## 2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

## 2.3 Cognizant Personnel

Precision Governors, LLC

| | |
|---|---|
| George Kuczenski | Executive Vice President and General Manager |

Compatible Electronics Inc.

| | |
|---|---|
| Kyle Fujimoto | Test Engineer |
| James Ross | Test Engineer |
| Kenneth Lee | Test Technician |

## 2.4 Date Test Sample was Received

The test sample was received on September 3, 2014.

## 2.5 Disposition of the Test Sample

The test sample has not been returned to Precision Governors as of the date of this test report.

## 2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

| | |
|---|---|
| RF | Radio Frequency |
| EMI | Electromagnetic Interference |
| EUT | Equipment Under Test |
| P/N | Part Number |
| S/N | Serial Number |
| HP | Hewlett Packard |
| ITE | Information Technology Equipment |
| CML | Corrected Meter Limit |
| LISN | Line Impedance Stabilization Network |
| N/A | Not Applicable |

## 3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this emissions Test Report.

| SPEC | TITLE |
|---|---|
| FCC Title 47, Part 15 Subpart C | FCC Rules - Radio frequency devices (including digital devices) – Intentional Radiators |
| FCC Title 47, Part 15 Subpart B | FCC Rules - Radio frequency devices (including digital devices) – Unintentional Radiators |
| ANSI C63.4 2009 | Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz |

# 4. DESCRIPTION OF TEST CONFIGURATION

## 4.1 Description of Test Configuration - Emissions

The Industrial Remote Transmitter, Model: 9557 (EUT) is a remote control that is powered by two AA 1.5 VDC batteries.

The EUT was tested for emissions while in the X, Y and Z axis. The EUT was continuously transmitting.

The final radiated data for the EUT as was taken in the mode described above. Please see Appendix E for the data sheets.

# 5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

## 5.1 EUT and Accessory List

| EQUIPMENT | MANUFACTURER | MODEL NUMBER | SERIAL NUMBER | FCC ID |
|---|---|---|---|---|
| INDUSTRIAL REMOTE TRANSMITTER | PRECISION GOVERNORS, LLC | 9557 | N/A | 2AC8S-9557 |

## 5.2 Emissions Test Equipment

| EQUIPMENT TYPE | MANU-FACTURER | MODEL NUMBER | SERIAL NUMBER | CALIBRATION DATE | CAL. CYCLE |
|---|---|---|---|---|---|
| **GENERAL TEST EQUIPMENT USED IN LAB B** | | | | | |
| Computer | Compaq | CQ5210F | CNX9360CF9 | N/A | N/A |
| Monitor | Hewlett Packard | HPs2031a | 3CQ046N3MD | N/A | N/A |
| EMI Receiver | Rohde & Schwarz | ESIB40 | 100194 | November 19, 2012 | 2 Year |
| **GENERAL TEST EQUIPMENT USED IN LAB D** | | | | | |
| Computer | Hewlett Packard | p6716f | MXX1030PX0 | N/A | N/A |
| LCD Monitor | Hewlett Packard | 52031a | 3CQ046N3MG | N/A | N/A |
| EMI Receiver, 20 Hz – 26.5 GHz | Agilent Technologies | N9038A | MY51100115 | March 6, 2014 | 2 Year |
| **RF RADIATED EMISSIONS TEST EQUIPMENT** | | | | | |
| CombiLog Antenna | Com-Power | AC-220 | 61060 | May 20, 2014 | 1 Year |
| Preamplifier | Com-Power | PA-118 | 181656 | January 13, 2014 | 1 Year |
| Loop Antenna | Com-Power | AL-130 | 17089 | January 29, 2013 | 2 Year |
| Horn Antenna | Com-Power | AH-118 | 071175 | February 26, 2014 | 2 Year |
| Antenna Mast | Com Power | AM-100 | N/A | N/A | N/A |
| System Controller | Sunol Sciences Corporation | SC110V | 112213-1 | N/A | N/A |
| Turntable | Sunol Sciences Corporation | 2011VS | N/A | N/A | N/A |
| Antenna-Mast | Sunol Sciences Corporation | TWR95-4 | 112213-3 | N/A | N/A |

# 6. TEST SITE DESCRIPTION

## 6.1 Test Facility Description

Please refer to section 2.1 and 7.1 of this report for emissions test location.

## 6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.

# 7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

## 7.1 RF Emissions

### 7.1.1 Radiated Emissions (Spurious and Harmonics) Test – Lab B

The EMI Receiver was used as a measuring meter. A preamplifier was used to increase the sensitivity of the instrument. The Com Power Microwave Preamplifier Model: PA-118 was used for frequencies above 1 GHz. The EMI Receiver was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the EMI Receiver records the highest measured reading over all the sweeps.

For frequencies above 1 GHz, the readings were averaged by a “duty cycle correction factor”, derived from 20 log (dwell time / one pulse train with blanking interval). This duty cycle correction factor was then subtracted from the peak reading.

The measurement bandwidth and transducers used for the radiated emissions test were:

| FREQUENCY RANGE | EFFECTIVE MEASUREMENT BANDWIDTH | TRANSDUCER |
|---|---|---|
| 1 GHz to 4.3392 GHz | 1 MHz | Horn Antenna |

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4: 2009. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT by the Radiated Emission Manual Test software. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna in order to ensure accurate results.

## Radiated Emissions (Spurious and Harmonics) Test -- Lab B (con't)

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 3 meter test distance from 1 GHz to 4.3392 GHz to obtain the final test data.

**Test Results:**

The EUT complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and the limits of CFR Title 47, Part 15, Subpart C, Sections 15.205, 15.209 and 15.231 for radiated emissions. Please see Appendix E for the data sheets.

### 7.1.2 Radiated Emissions (Spurious and Harmonics) Test – Lab D

The EMI Receiver was used as the measuring meter. A built-in, internal preamplifier was used to increase the sensitivity of the instrument. The EMI Receiver was initially used with the Analyzer mode feature activated. In this mode, the EMI receiver can then record the actual frequency to be measured. This final reading is then taken accurately in the EMI Receiver mode, which takes into account the cable loss, amplifier gain and antenna factors, so that a true reading is compared to the true limit. A quasi-peak reading was taken only for those readings, which are marked accordingly on the data sheets.

For frequencies above 1 GHz, the readings were averaged by a "duty cycle correction factor", derived from 20 log (dwell time / one pulse train with blanking interval). This duty cycle correction factor was then subtracted from the peak reading.

The EMI test chamber of Compatible Electronics, Inc. was used for radiated emissions testing. This test site is set up according to ANSI C63.4. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT.

The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength).

The measurement bandwidths and transducers used for the radiated emissions test were:

| FREQUENCY RANGE | EFFECTIVE MEASUREMENT BANDWIDTH | TRANSDUCER |
|---|---|---|
| 10 kHz to 150 kHz | 200 Hz | Active Loop Antenna |
| 150 kHz to 30 MHz | 9 kHz | Active Loop Antenna |
| 30 MHz to 1 GHz | 120 kHz | CombiLog Antenna |

The EUT was tested at a 3 meter test distance. The six highest emissions are listed in Table 1.0.

### 7.1.3 RF Emissions Test Results

Table 1.0 RADIATED EMISSION RESULTS
Industrial Remote Transmitter, Model: 9557

| Frequency MHz | Average Corrected Reading* dBuV | Specification Limit dBuV | Delta (Cor. Reading – Spec. Limit) dB |
|---|---|---|---|
| 433.92 (V) (Y-Axis) | 80.02 | 80.82 | -0.80 |
| 433.92 (H) (X-Axis) | 78.45 | 80.82 | -2.37 |
| 433.92 (H) (Z-Axis) | 76.96 | 80.82 | -3.86 |
| 1301.76 (V) (X-Axis) | 49.98 | 54 | -4.02 |
| 867.80 (H) (Z-Axis) | 37.46 | 46 | -8.36 |
| 870.20 (H) (Z-Axis) | 37.55 | 46 | -8.45 |

Notes:

(H) Horizontal
(V) Vertical
* The complete emissions data is given in Appendix E of this report.

### 7.1.4 Bandwidth of the Fundamental

The -20 dB bandwidth was checked to see that it was within 0.25% of the fundamental frequency for the EUT. Plots of the -20 dB bandwidth are located in Appendix E.

**Test Results:**

The EUT complies with the limits CFR Title 47, Part 15, Subpart C, section 15.231[c].

## 8. CONCLUSIONS

The Industrial Remote Transmitter, Model: 9557, as tested, meets all of the specification limits defined in FCC Title 47, Part 15, Subpart C, sections 15.205, 15.209, and 15.231.

# APPENDIX A

# *LABORATORY ACCREDITATIONS AND RECOGNITIONS*

# LABORATORY ACCREDITATIONS AND RECOGNITIONS

NVLAP LAB CODES 200063-0, 200528-0, 200527-0

For US, Canada, Australia/New Zealand, Japan, Taiwan, Korea, and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025. Please follow the link to the NIST/NVLAP site for each of our facilities' NVLAP certificate and scope of accreditation

**NVLAP listing links**

**Agoura Division / Brea Division / Silverado/Lake Forest Division**

.Quote from ISO-ILAC-IAF Communiqué on 17025:

"A laboratory's fulfilment of the requirements of ISO/IEC 17025:2005 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025:2005 (Section 4) are written in language relevant to laboratory operations and meet the principles of ISO 9001:2008 Quality Management Systems — Requirements."

**ANSI listing** CETCB

Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for EMC under the US/EU Mutual Recognition Agreement (MRA).
**US/EU MRA list** NIST MRA site

Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for Taiwan/BSMI under the US/APEC (Asia-Pacific Economic Cooperation) Mutual Recognition Agreement (MRA).
**APEC MRA list** NIST MRA site

We are also listed for IT products by the following country/agency:

**VCCI Support member: Please visit http://www.vcci.jp/vcci_e/**

**FCC Listing, from FCC OET site**
FCC test lab search https://fjallfoss.fcc.gov/oetcf/eas/reports/TestFirmSearch.cfm

Compatible Electronics IC listing can be found at:
http://www.ic.gc.ca/eic/site/ic1.nsf/eng/home

# APPENDIX B

# *MODIFICATIONS TO THE EUT*

# MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC Subpart B and FCC 15.231 specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

The resistor marked as R1 on the schematic was changed to an 820 ohm value.

# APPENDIX C

## *ADDITIONAL MODELS COVERED UNDER THIS REPORT*

# ADDITIONAL MODELS COVERED UNDER THIS REPORT

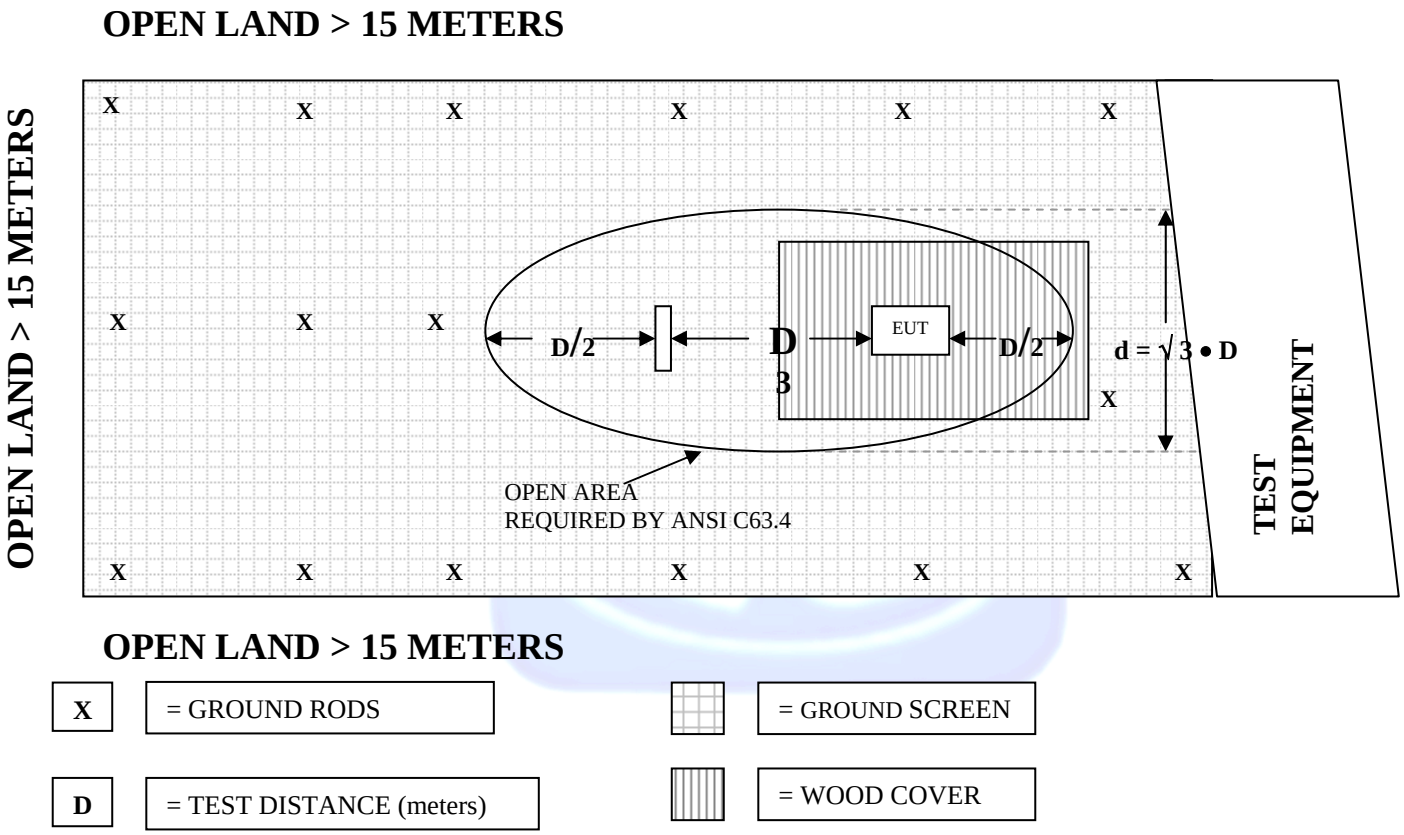
| | |
|---|---|
| USED FOR THE PRIMARY TEST | Industrial Remote Transmitter<br>Model: 9557<br>S/N: N/A |

There were no additional models covered under this report.

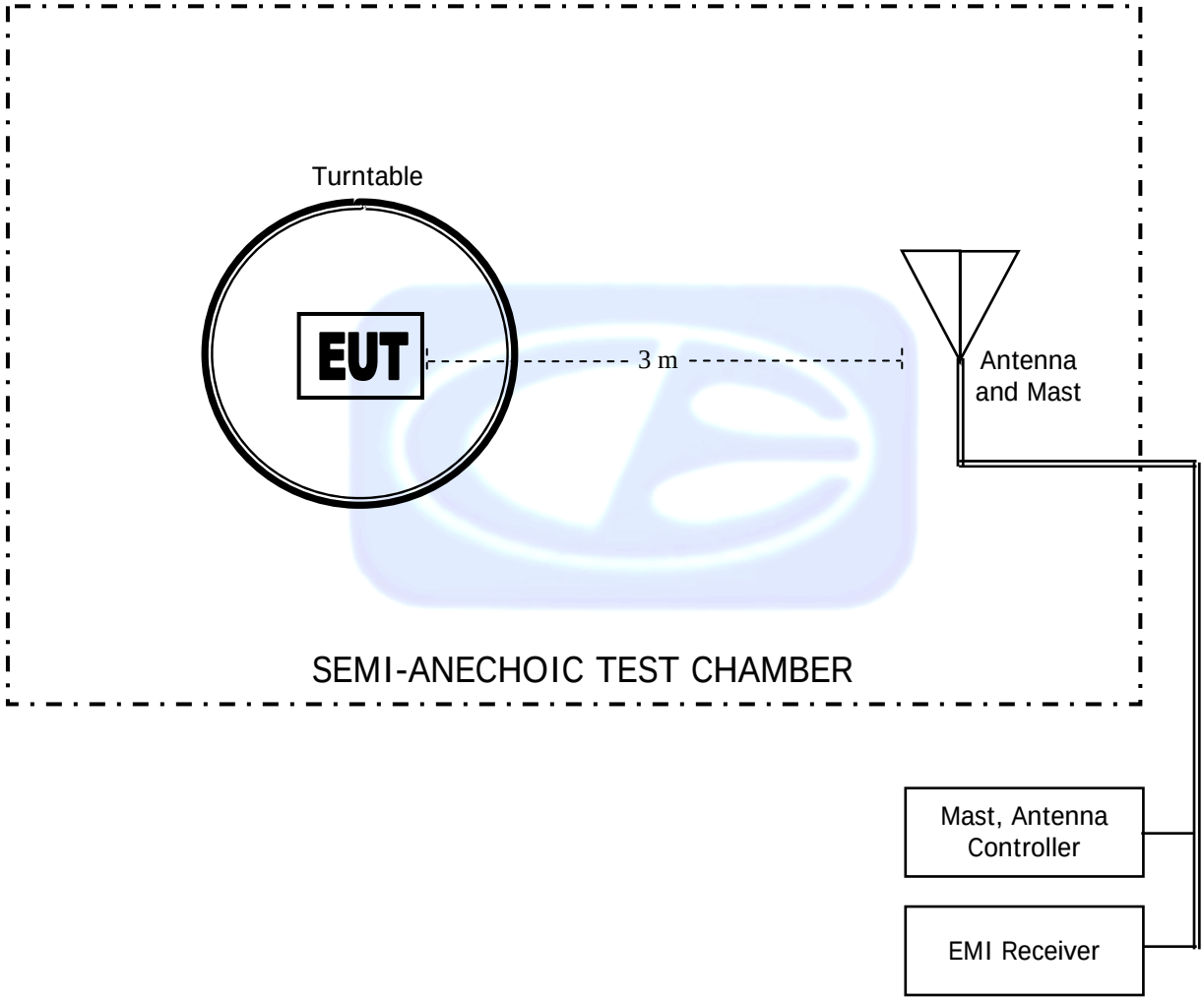
# APPENDIX D

# *DIAGRAMS AND CHARTS*

# *FIGURE 1: PLOT MAP AND LAYOUT OF RADIATED SITE*



# *FIGURE 2: LAYOUT OF THE SEMI-ANECHOIC TEST CHAMBER*



# COM-POWER AL-130

# LOOP ANTENNA

# S/N: 17089

# CALIBRATION DATE: JANUARY 29, 2013

| FREQUENCY (MHz) | MAGNETIC (dB/m) | ELECTRIC (dB/m) |
|---|---|---|
| 0.009 | -42.5 | 9 |
| 0.01 | -42.3 | 9.2 |
| 0.02 | -42.1 | 9.4 |
| 0.03 | -41.4 | 10.1 |
| 0.04 | -41.8 | 9.7 |
| 0.05 | -42.4 | 9.1 |
| 0.06 | -42.3 | 9.2 |
| 0.07 | -42.5 | 9 |
| 0.08 | -42.4 | 9.1 |
| 0.09 | -42.5 | 9 |
| 0.1 | -42.5 | 9 |
| 0.2 | -42.7 | 8.8 |
| 0.3 | -42.6 | 8.9 |
| 0.4 | -42.5 | 9 |
| 0.5 | -42.7 | 8.8 |
| 0.6 | -42.7 | 8.8 |
| 0.7 | -42.5 | 9 |
| 0.8 | -42.3 | 9.2 |
| 0.9 | -42.2 | 9.3 |
| 1 | -42.2 | 9.3 |
| 2 | -41.8 | 9.7 |
| 3 | -41.7 | 9.8 |
| 4 | -41.7 | 9.8 |
| 5 | -41.5 | 10 |
| 6 | -41.6 | 9.9 |
| 7 | -41.4 | 10.1 |
| 8 | -41 | 10.5 |
| 9 | -40.8 | 10.7 |
| 10 | -41.3 | 10.2 |
| 15 | -41.4 | 10.1 |
| 20 | -41.2 | 10.3 |
| 25 | -42.6 | 8.9 |
| 30 | -41.7 | 9.8 |

COM-POWER AC-220

COMBILOG ANTENNA

S/N: 61060

CALIBRATION DATE: MAY 20, 2014

| FREQUENCY (MHz) | FACTOR (dB) | FREQUENCY (MHz) | FACTOR (dB) |
|---|---|---|---|
| 30 | 23.40 | 200 | 14.40 |
| 35 | 23.70 | 250 | 16.40 |
| 40 | 24.20 | 300 | 17.90 |
| 45 | 22.60 | 350 | 15.60 |
| 50 | 22.10 | 400 | 19.90 |
| 60 | 17.90 | 450 | 20.40 |
| 70 | 12.70 | 500 | 21.60 |
| 80 | 11.60 | 550 | 21.50 |
| 90 | 12.20 | 600 | 22.30 |
| 100 | 13.20 | 650 | 23.50 |
| 120 | 15.70 | 700 | 23.70 |
| 125 | 15.80 | 750 | 25.90 |
| 140 | 13.60 | 800 | 25.90 |
| 150 | 16.90 | 850 | 26.40 |
| 160 | 14.20 | 900 | 27.00 |
| 175 | 14.90 | 950 | 27.70 |
| 180 | 15.00 | 1000 | 27.50 |

# COM POWER AH-118

# HORN ANTENNA

# S/N: 071175

# CALIBRATION DATE: FEBRUARY 26, 2014

| FREQUENCY (GHz) | FACTOR (dB) | FREQUENCY (GHz) | FACTOR (dB) |
|---|---|---|---|
| 1.0 | 24.23 | 10.0 | 38.43 |
| 1.5 | 25.84 | 10.5 | 40.19 |
| 2.0 | 28.14 | 11.0 | 40.49 |
| 2.5 | 29.51 | 11.5 | 41.39 |
| 3.0 | 31.20 | 12.0 | 42.02 |
| 3.5 | 32.17 | 12.5 | 43.30 |
| 4.0 | 31.40 | 13.0 | 42.77 |
| 4.5 | 31.86 | 13.5 | 40.18 |
| 5.0 | 34.82 | 14.0 | 42.59 |
| 5.5 | 34.38 | 14.5 | 41.74 |
| 6.0 | 36.31 | 15.0 | 41.84 |
| 6.5 | 34.81 | 15.5 | 38.48 |
| 7.0 | 37.48 | 16.0 | 39.52 |
| 7.5 | 36.98 | 16.5 | 37.85 |
| 8.0 | 36.66 | 17.0 | 41.33 |
| 8.5 | 38.47 | 17.5 | 44.96 |
| 9.0 | 37.22 | 18.0 | 48.50 |
| 9.5 | 37.86 | | |

# COM-POWER PA-118

# PREAMPLIFIER

# S/N: 181656

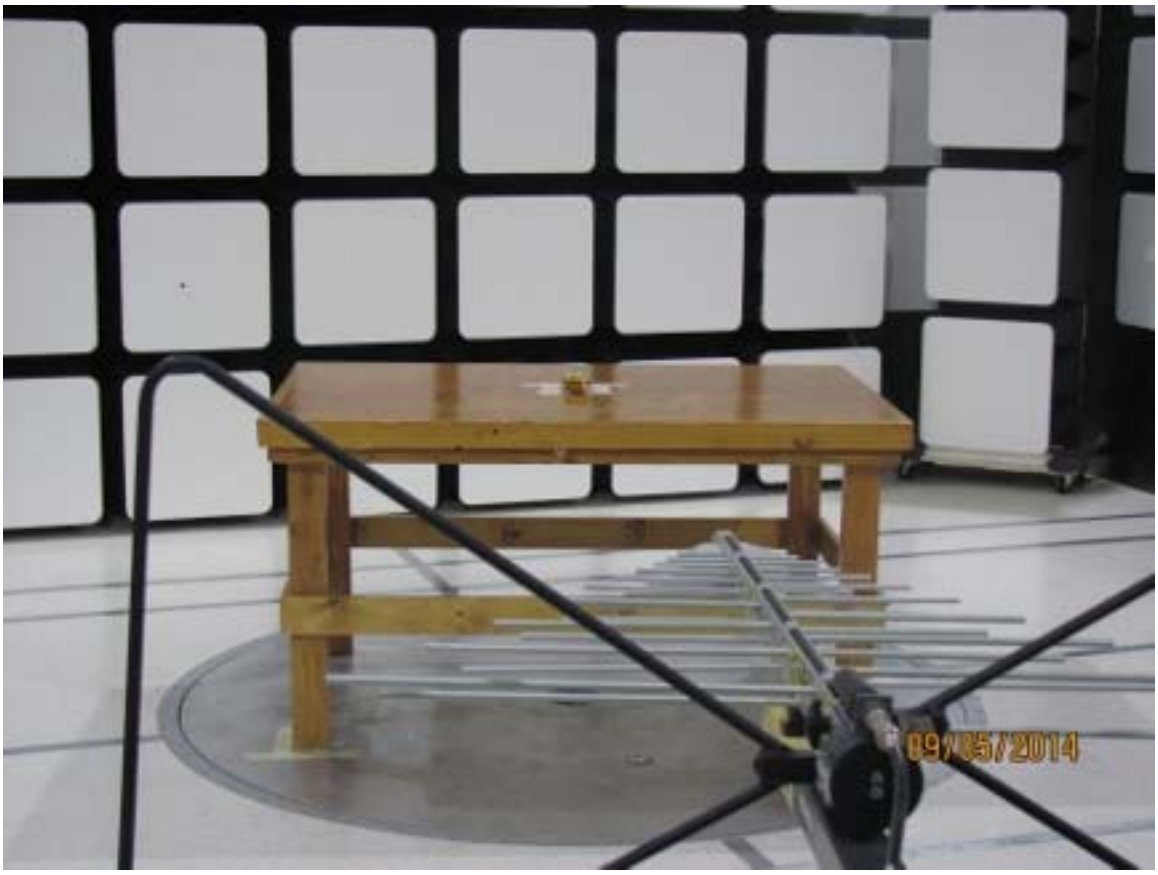
# CALIBRATION DATE: JANUARY 13, 2014

| FREQUENCY (GHz) | FACTOR (dB) | FREQUENCY (GHz) | FACTOR (dB) |
|---|---|---|---|
| 1.0 | 24.90 | 6.0 | 25.40 |
| 1.1 | 25.30 | 6.5 | 25.20 |
| 1.2 | 26.00 | 7.0 | 24.40 |
| 1.3 | 26.20 | 7.5 | 24.00 |
| 1.4 | 26.30 | 8.0 | 23.90 |
| 1.5 | 26.40 | 8.5 | 24.50 |
| 1.6 | 26.50 | 9.0 | 25.20 |
| 1.7 | 26.60 | 9.5 | 24.80 |
| 1.8 | 26.50 | 10.0 | 24.90 |
| 1.9 | 26.60 | 11.0 | 25.40 |
| 2.0 | 26.70 | 12.0 | 24.50 |
| 2.5 | 26.90 | 13.0 | 24.30 |
| 3.0 | 27.00 | 14.0 | 25.20 |
| 3.5 | 27.10 | 15.0 | 25.90 |
| 4.0 | 26.60 | 16.0 | 25.60 |
| 4.5 | 26.10 | 17.0 | 23.70 |
| 5.0 | 26.40 | 18.0 | 25.80 |
| 5.5 | 25.80 | | |

**FRONT VIEW**

PRECISION GOVERNORS, LLC
INDUSTRIAL REMOTE TRANSMITTER
Model: 9557
FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz

## PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS




**REAR VIEW**

PRECISION GOVERNORS, LLC
INDUSTRIAL REMOTE TRANSMITTER
Model: 9557
FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz

## PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

**FRONT VIEW**

PRECISION GOVERNORS, LLC
INDUSTRIAL REMOTE TRANSMITTER
Model: 9557
FCC SUBPART B AND C – RADIATED EMISSIONS – ABOVE 1 GHz

## PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

**REAR VIEW**

PRECISION GOVERNORS, LLC
INDUSTRIAL REMOTE TRANSMITTER
Model: 9557
FCC SUBPART B AND C – RADIATED EMISSIONS – ABOVE 1 GHz

## PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

# APPENDIX E

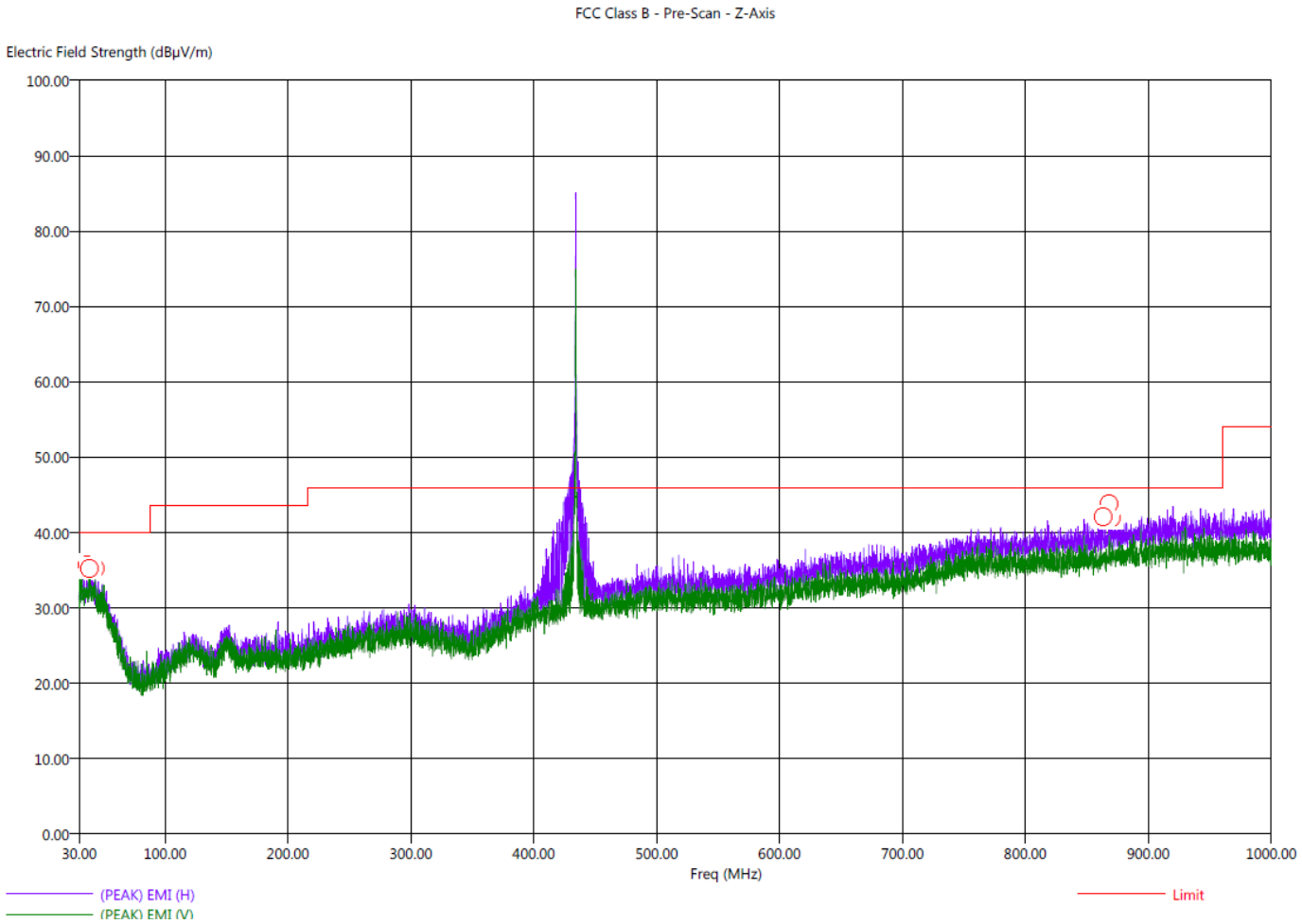
# *DATA SHEETS*

# *RADIATED EMISSIONS*

# *DATA SHEETS*

Title: Pre-Scan - FCC Class B - Z-Axis
File: Agilent - Pre-Scan - FCC Class B - Transmitter - Z-Axis - 09-12-2014.set
Operator: Kyle Fujimoto
EUT Type: Industrial Remote Transmitter
EUT Condition: Continuously Transmitting - Z-Axis
Comments: Customer: Precision Governors, LLC
Model: 9557

9/12/2014 3:16:28 PM
Sequence: Preliminary Scan



Title: Radiated Final - 30-1000 MHz - FCC Class B
File: Agilent - Final Scan - FCC Class B - Transmitter - Z-Axis - Worst Case - 09-12-2014.set
Operator: Kyle Fujimoto
EUT Type: Industrial Remote Transmitter
EUT Condition: Continuously Transmitting - Z-Axis
Comments: Customer: Precision Governors, LLC
Model: 9557

9/12/2014 3:32:59 PM
Sequence: Final Measurements

FCC Class B - Final Scan - Z-Axis Worst Case

| Freq (MHz) | Pol | (PEAK) EMI (dBµV/m) | (QP) EMI (dBµV/m) | Limit (dBµV/m) | (PEAK) Margin (dB) | (QP) Margin (dB) | Cable (dB) | Transducer (dB) | Twr Ht (cm) | Ttbl Aql (deg) |
|---|---|---|---|---|---|---|---|---|---|---|
| 36.10 | H | 35.14 | 30.75 | 40.00 | -4.86 | -9.25 | 0.40 | 23.74 | 366.35 | 221.25 |
| 38.80 | V | 35.38 | 31.17 | 40.00 | -4.62 | -8.83 | 0.42 | 24.09 | 398.71 | 111.75 |
| 43.20 | H | 34.77 | 30.29 | 40.00 | -5.23 | -9.71 | 0.45 | 23.17 | 350.53 | 189.25 |
| 863.30 | H | 41.31 | 37.43 | 46.00 | -4.69 | -8.57 | 2.55 | 26.56 | 334.35 | 1.75 |
| 867.80 | H | 41.62 | 37.64 | 46.00 | -4.38 | -8.36 | 2.56 | 26.62 | 174.65 | 245.75 |
| 870.20 | H | 41.80 | 37.55 | 46.00 | -4.20 | -8.45 | 2.57 | 26.64 | 270.35 | 120.25 |

**FCC 15.231**
Precision Governors, LLC
Industrial Remote Transmitter
Model: 9557

Date: 09/05/2014
Lab: B
Tested By: Kyle Fujimoto

**X-Axis - Vertical**

| Freq. (MHz) | Level (dBuV) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (cm) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 433.92 | 72.80 | V | 100.82 | -28.02 | Peak | 207.10 | 51.00 | |
| 433.92 | 66.48 | V | 80.82 | -14.34 | Avg | 207.10 | 51.00 | |
| | | | | | | | | |
| 867.84 | 41.69 | V | 80.82 | -39.13 | Peak | 335.22 | 42.50 | |
| 867.84 | 35.37 | V | 60.82 | -25.45 | Avg | 335.22 | 42.50 | |
| | | | | | | | | |
| 1301.76 | 56.30 | V | 74.00 | -17.70 | Peak | 200.00 | 135.00 | |
| 1301.76 | 49.98 | V | 54.00 | -4.02 | Avg | 200.00 | 135.00 | |
| | | | | | | | | |
| 1735.68 | 44.40 | V | 80.82 | -36.42 | Peak | 150.00 | 135.00 | |
| 1735.68 | 38.08 | V | 60.82 | -22.74 | Avg | 150.00 | 135.00 | |
| | | | | | | | | |
| 2169.6 | 48.70 | V | 80.82 | -32.12 | Peak | 175.00 | 200.00 | |
| 2169.6 | 42.38 | V | 60.82 | -18.44 | Avg | 175.00 | 200.00 | |
| | | | | | | | | |
| 2603.52 | 46.90 | V | 80.82 | -33.92 | Peak | 125.00 | 85.00 | |
| 2603.52 | 40.58 | V | 60.82 | -20.24 | Avg | 125.00 | 85.00 | |
| | | | | | | | | |
| 3037.44 | 47.70 | V | 80.82 | -33.12 | Peak | 125.00 | 135.00 | |
| 3037.44 | 41.38 | V | 60.82 | -19.44 | Avg | 125.00 | 135.00 | |
| | | | | | | | | |
| 3471.36 | 47.10 | V | 80.82 | -33.72 | Peak | 125.00 | 135.00 | |
| 3471.36 | 40.78 | V | 60.82 | -20.04 | Avg | 125.00 | 135.00 | |
| | | | | | | | | |
| 3905.28 | 46.30 | V | 74.00 | -27.70 | Peak | 135.00 | 125.00 | |
| 3905.28 | 39.98 | V | 54.00 | -14.02 | Avg | 135.00 | 125.00 | |
| | | | | | | | | |
| 4339.2 | 47.30 | V | 74.00 | -26.70 | Peak | 135.00 | 135.00 | |
| 4339.2 | 40.98 | V | 54.00 | -13.02 | Avg | 135.00 | 135.00 | |
| | | | | | | | | |

**FCC 15.231**
Precision Governors, LLC
Industrial Remote Transmitter
Model: 9557

Date: 09/05/2014
Lab: B
Tested By: Kyle Fujimoto

**X-Axis - Horizontal**

| Freq. (MHz) | Level (dBuV) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (cm) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 433.92 | 84.77 | H | 100.82 | -16.05 | Peak | 207.10 | 90.25 | |
| 433.92 | 78.45 | H | 80.82 | -2.37 | Avg | 207.10 | 90.25 | |
| | | | | | | | | |
| 867.84 | 45.67 | H | 80.82 | -35.15 | Peak | 175.16 | 239.00 | |
| 867.84 | 39.35 | H | 60.82 | -21.47 | Avg | 175.16 | 239.00 | |
| | | | | | | | | |
| 1301.76 | 40.80 | H | 74.00 | -33.20 | Peak | 100.00 | 265.00 | |
| 1301.76 | 34.48 | H | 54.00 | -19.52 | Avg | 100.00 | 265.00 | |
| | | | | | | | | |
| 1735.68 | 42.50 | H | 80.82 | -38.32 | Peak | 200.00 | 90.00 | |
| 1735.68 | 36.18 | H | 60.82 | -24.64 | Avg | 200.00 | 90.00 | |
| | | | | | | | | |
| 2169.6 | 43.20 | H | 80.82 | -37.62 | Peak | 100.00 | 135.00 | |
| 2169.6 | 36.88 | H | 60.82 | -23.94 | Avg | 100.00 | 135.00 | |
| | | | | | | | | |
| 2603.52 | 50.20 | H | 80.82 | -30.62 | Peak | 175.00 | 355.00 | |
| 2603.52 | 43.88 | H | 60.82 | -16.94 | Avg | 175.00 | 355.00 | |
| | | | | | | | | |
| 3037.44 | 46.60 | H | 80.82 | -34.22 | Peak | 100.00 | 325.00 | |
| 3037.44 | 40.28 | H | 60.82 | -20.54 | Avg | 100.00 | 325.00 | |
| | | | | | | | | |
| 3471.36 | 45.60 | H | 80.82 | -35.22 | Peak | 115.00 | 135.00 | |
| 3471.36 | 39.28 | H | 60.82 | -21.54 | Avg | 115.00 | 135.00 | |
| | | | | | | | | |
| 3905.28 | 44.50 | H | 74.00 | -29.50 | Peak | 100.00 | 80.00 | |
| 3905.28 | 38.18 | H | 54.00 | -15.82 | Avg | 100.00 | 80.00 | |
| | | | | | | | | |
| 4339.2 | 46.60 | H | 74.00 | -27.40 | Peak | 105.00 | 80.00 | |
| 4339.2 | 40.28 | H | 54.00 | -13.72 | Avg | 105.00 | 80.00 | |
| | | | | | | | | |

**FCC 15.231**
Precision Governors, LLC
Industrial Remote Transmitter
Model: 9557

Date: 09/05/2014
Lab: B
Tested By: Kyle Fujimoto

**Y-Axis - Vertical**

| Freq. (MHz) | Level (dBuV) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (cm) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 433.92 | 86.34 | V | 100.82 | -14.48 | Peak | 111.28 | 232.75 | |
| 433.92 | 80.02 | V | 80.82 | -0.80 | Avg | 111.28 | 232.75 | |
| | | | | | | | | |
| 867.84 | 42.81 | V | 80.82 | -38.01 | Peak | 111.10 | 296.25 | |
| 867.84 | 36.49 | V | 60.82 | -24.33 | Avg | 111.10 | 296.25 | |
| | | | | | | | | |
| 1301.76 | 39.60 | V | 74.00 | -34.40 | Peak | 300.00 | 110.00 | |
| 1301.76 | 33.28 | V | 54.00 | -20.72 | Avg | 300.00 | 110.00 | |
| | | | | | | | | |
| 1735.68 | 43.50 | V | 80.82 | -37.32 | Peak | 100.00 | 350.00 | |
| 1735.68 | 37.18 | V | 60.82 | -23.64 | Avg | 100.00 | 350.00 | |
| | | | | | | | | |
| 2169.6 | 43.70 | V | 80.82 | -37.12 | Peak | 150.00 | 190.00 | |
| 2169.6 | 37.38 | V | 60.82 | -23.44 | Avg | 150.00 | 190.00 | |
| | | | | | | | | |
| 2603.52 | 46.10 | V | 80.82 | -34.72 | Peak | 125.00 | 290.00 | |
| 2603.52 | 39.78 | V | 60.82 | -21.04 | Avg | 125.00 | 290.00 | |
| | | | | | | | | |
| 3037.44 | 46.10 | V | 80.82 | -34.72 | Peak | 175.00 | 45.00 | |
| 3037.44 | 39.78 | V | 60.82 | -21.04 | Avg | 175.00 | 45.00 | |
| | | | | | | | | |
| 3471.36 | 46.30 | V | 80.82 | -34.52 | Peak | 100.00 | 180.00 | |
| 3471.36 | 39.98 | V | 60.82 | -20.84 | Avg | 100.00 | 180.00 | |
| | | | | | | | | |
| 3905.28 | 46.98 | V | 74.00 | -27.02 | Peak | 115.00 | 82.00 | |
| 3905.28 | 40.66 | V | 54.00 | -13.34 | Avg | 115.00 | 82.00 | |
| | | | | | | | | |
| 4339.2 | 49.83 | V | 74.00 | -24.17 | Peak | 125.00 | 75.00 | |
| 4339.2 | 43.51 | V | 54.00 | -10.49 | Avg | 125.00 | 75.00 | |
| | | | | | | | | |

**FCC 15.231**
Precision Governors, LLC
Industrial Remote Transmitter
Model: 9557

Date: 09/05/2014
Lab: B
Tested By: Kyle Fujimoto

**Y-Axis - Horizontal**

| Freq. (MHz) | Level (dBuV) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (cm) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 433.92 | 68.48 | H | 100.82 | -32.34 | Peak | 223.46 | 318.50 | |
| 433.92 | 62.16 | H | 80.82 | -18.66 | Avg | 223.46 | 318.50 | |
| | | | | | | | | |
| 867.84 | 41.74 | H | 80.82 | -39.08 | Peak | 127.34 | 338.25 | |
| 867.84 | 35.42 | H | 60.82 | -25.40 | Avg | 127.34 | 338.25 | |
| | | | | | | | | |
| 1301.76 | 36.90 | H | 74.00 | -37.10 | Peak | 100.00 | 0.00 | |
| 1301.76 | 30.58 | H | 54.00 | -23.42 | Avg | 100.00 | 0.00 | |
| | | | | | | | | |
| 1735.68 | 40.60 | H | 80.82 | -40.22 | Peak | 100.00 | 200.00 | |
| 1735.68 | 34.28 | H | 60.82 | -26.54 | Avg | 100.00 | 200.00 | |
| | | | | | | | | |
| 2169.6 | 43.00 | H | 80.82 | -37.82 | Peak | 200.00 | 225.00 | |
| 2169.6 | 36.68 | H | 60.82 | -24.14 | Avg | 200.00 | 225.00 | |
| | | | | | | | | |
| 2603.52 | 45.20 | H | 80.82 | -35.62 | Peak | 225.00 | 115.00 | |
| 2603.52 | 38.88 | H | 60.82 | -21.94 | Avg | 225.00 | 115.00 | |
| | | | | | | | | |
| 3037.44 | 47.00 | H | 80.82 | -33.82 | Peak | 100.00 | 190.00 | |
| 3037.44 | 40.68 | H | 60.82 | -20.14 | Avg | 100.00 | 190.00 | |
| | | | | | | | | |
| 3471.36 | 45.50 | H | 80.82 | -35.32 | Peak | 125.00 | 170.00 | |
| 3471.36 | 39.18 | H | 60.82 | -21.64 | Avg | 125.00 | 170.00 | |
| | | | | | | | | |
| 3905.28 | 44.10 | H | 74.00 | -29.90 | Peak | 100.00 | 200.00 | |
| 3905.28 | 37.78 | H | 54.00 | -16.22 | Avg | 100.00 | 200.00 | |
| | | | | | | | | |
| 4339.2 | 46.90 | H | 74.00 | -27.10 | Peak | 110.00 | 270.00 | |
| 4339.2 | 40.58 | H | 54.00 | -13.42 | Avg | 110.00 | 270.00 | |
| | | | | | | | | |

**FCC 15.231**
Precision Governors, LLC
Industrial Remote Transmitter
Model: 9557

Date: 09/05/2014
Lab: B
Tested By: Kyle Fujimoto

**Z-Axis - Vertical**

| Freq. (MHz) | Level (dBuV) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (cm) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 433.92 | 77.25 | V | 100.82 | -23.57 | Peak | 159.34 | 0.00 | |
| 433.92 | 70.93 | V | 80.82 | -9.89 | Avg | 159.34 | 0.00 | |
| | | | | | | | | |
| 867.84 | 42.18 | V | 80.82 | -38.64 | Peak | 207.10 | 175.25 | |
| 867.84 | 35.86 | V | 60.82 | -24.96 | Avg | 207.10 | 175.25 | |
| | | | | | | | | |
| 1301.76 | 38.00 | V | 74.00 | -36.00 | Peak | 180.00 | 200.00 | |
| 1301.76 | 31.68 | V | 54.00 | -22.32 | Avg | 180.00 | 200.00 | |
| | | | | | | | | |
| 1735.68 | 46.90 | V | 80.82 | -33.92 | Peak | 125.00 | 120.00 | |
| 1735.68 | 40.58 | V | 60.82 | -20.24 | Avg | 125.00 | 120.00 | |
| | | | | | | | | |
| 2169.6 | 48.60 | V | 80.82 | -32.22 | Peak | 100.00 | 90.00 | |
| 2169.6 | 42.28 | V | 60.82 | -18.54 | Avg | 100.00 | 90.00 | |
| | | | | | | | | |
| 2603.52 | 52.50 | V | 80.82 | -28.32 | Peak | 125.00 | 45.00 | |
| 2603.52 | 46.18 | V | 60.82 | -14.64 | Avg | 125.00 | 45.00 | |
| | | | | | | | | |
| 3037.44 | 51.10 | V | 80.82 | -29.72 | Peak | 100.00 | 90.00 | |
| 3037.44 | 44.78 | V | 60.82 | -16.04 | Avg | 100.00 | 90.00 | |
| | | | | | | | | |
| 3471.36 | 50.20 | V | 80.82 | -30.62 | Peak | 115.00 | 95.00 | |
| 3471.36 | 43.88 | V | 60.82 | -16.94 | Avg | 115.00 | 95.00 | |
| | | | | | | | | |
| 3905.28 | 45.60 | V | 74.00 | -28.40 | Peak | 100.00 | 180.00 | |
| 3905.28 | 39.28 | V | 54.00 | -14.72 | Avg | 100.00 | 180.00 | |
| | | | | | | | | |
| 4339.2 | 45.00 | V | 74.00 | -29.00 | Peak | 200.00 | 180.00 | |
| 4339.2 | 38.68 | V | 54.00 | -15.32 | Avg | 200.00 | 180.00 | |
| | | | | | | | | |

**FCC 15.231**
Precision Governors, LLC
Industrial Remote Transmitter
Model: 9557

Date: 09/05/2014
Lab: B
Tested By: Kyle Fujimoto

**Z-Axis - Horizontal**

| Freq. (MHz) | Level (dBuV) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (cm) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 433.92 | 83.28 | H | 100.82 | -17.54 | Peak | 207.40 | 91.00 | |
| 433.92 | 76.96 | H | 80.82 | -3.86 | Avg | 207.40 | 91.00 | |
| | | | | | | | | |
| 867.84 | 42.16 | H | 80.82 | -38.66 | Peak | 143.04 | 114.50 | |
| 867.84 | 35.84 | H | 60.82 | -24.98 | Avg | 143.04 | 114.50 | |
| | | | | | | | | |
| 1301.76 | 41.30 | H | 74.00 | -32.70 | Peak | 100.00 | 135.00 | |
| 1301.76 | 34.98 | H | 54.00 | -19.02 | Avg | 100.00 | 135.00 | |
| | | | | | | | | |
| 1735.68 | 46.60 | H | 80.82 | -34.22 | Peak | 115.00 | 90.00 | |
| 1735.68 | 40.28 | H | 60.82 | -20.54 | Avg | 115.00 | 90.00 | |
| | | | | | | | | |
| 2169.6 | 46.70 | H | 80.82 | -34.12 | Peak | 150.00 | 170.00 | |
| 2169.6 | 40.38 | H | 60.82 | -20.44 | Avg | 150.00 | 170.00 | |
| | | | | | | | | |
| 2603.52 | 42.90 | H | 80.82 | -37.92 | Peak | 105.00 | 135.00 | |
| 2603.52 | 36.58 | H | 60.82 | -24.24 | Avg | 105.00 | 135.00 | |
| | | | | | | | | |
| 3037.44 | 45.00 | H | 80.82 | -35.82 | Peak | 200.00 | 45.00 | |
| 3037.44 | 38.68 | H | 60.82 | -22.14 | Avg | 200.00 | 45.00 | |
| | | | | | | | | |
| 3471.36 | 46.90 | H | 80.82 | -33.92 | Peak | 125.00 | 90.00 | |
| 3471.36 | 40.58 | H | 60.82 | -20.24 | Avg | 125.00 | 90.00 | |
| | | | | | | | | |
| 3905.28 | | | | | | | | No Emission |
| 3905.28 | | | | | | | | Detected |
| | | | | | | | | |
| 4339.2 | 48.90 | H | 74.00 | -25.10 | Peak | 105.00 | 15.00 | |
| 4339.2 | 42.58 | H | 54.00 | -11.42 | Avg | 105.00 | 15.00 | |
| | | | | | | | | |

**FCC 15.231 and FCC Class B**

Precision Governors, LLC
Industrial Remote Transmitter
Model: 9557

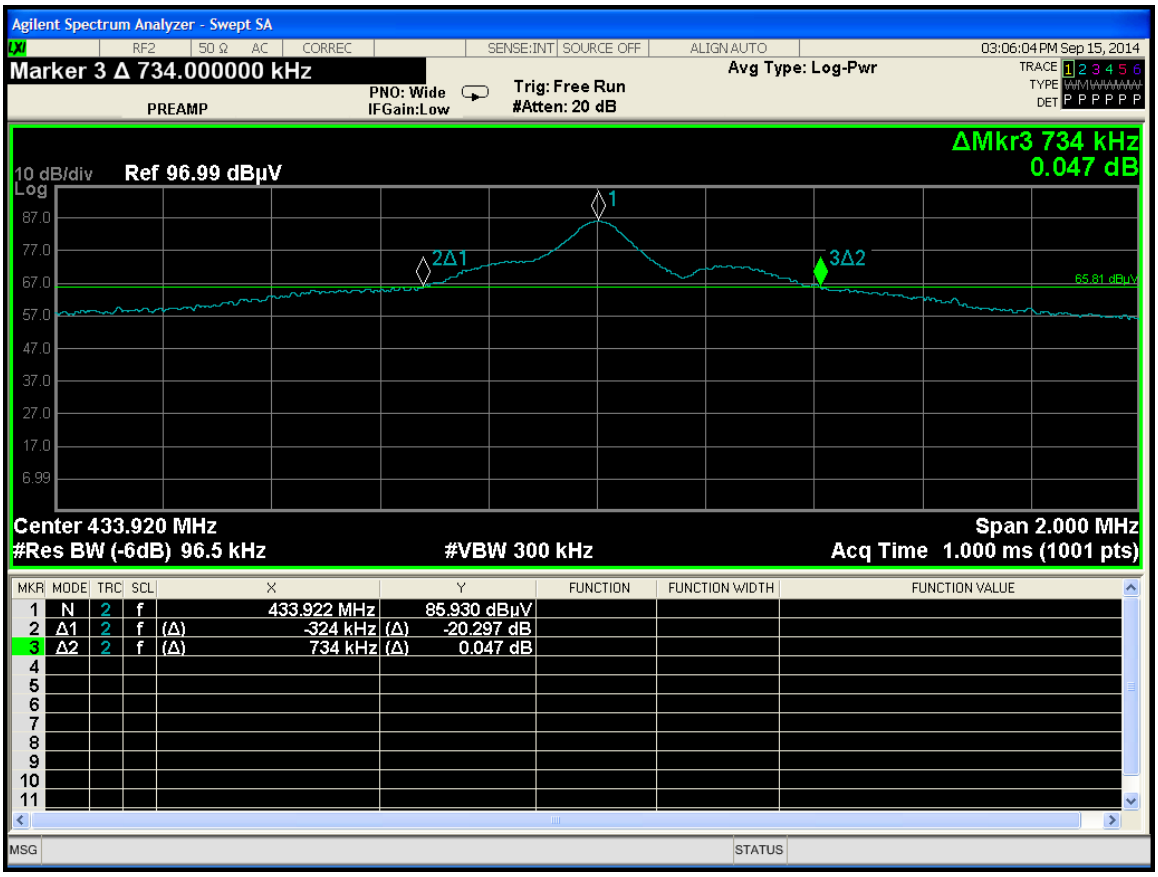
Dates: 09/05/2014 and 09/12/2014
Labs: B and D
Tested By: Kyle Fujimoto

**Digital Portion and Non-Harmonic Emissions of the Transmitter**
**Vertical and Horizontal Polarizations**

| Freq. (MHz) | Level (dBuV) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (m) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Emissions Detected |
| | | | | | | | | from 10 kHz to 30 MHz |
| | | | | | | | | for the Digital Portion |
| | | | | | | | | for both the Vertical and |
| | | | | | | | | Horizontal Polarizations. |
| | | | | | | | | |
| | | | | | | | | No Emissions Detected |
| | | | | | | | | from 10 kHz to 30 MHz |
| | | | | | | | | for the Non-Harmonic |
| | | | | | | | | Emissions from the Tx for the |
| | | | | | | | | EUT for both the Vertical and |
| | | | | | | | | Horizontal Polarizations. |
| | | | | | | | | |
| | | | | | | | | No Emissions Detected |
| | | | | | | | | from 1 GHz to 5 GHz |
| | | | | | | | | for the Digital Portion |
| | | | | | | | | for both the Vertical and |
| | | | | | | | | Horizontal Polarizations. |
| | | | | | | | | |
| | | | | | | | | No Emissions Detected |
| | | | | | | | | from 1 GHz to 5 GHz |
| | | | | | | | | for the Non-Harmonic |
| | | | | | | | | Emissions from the Tx for the |
| | | | | | | | | EUT for both the Vertical and |
| | | | | | | | | Horizontal Polarizations. |
| | | | | | | | | |
| | | | | | | | | Investigated in the |
| | | | | | | | | X, Y, and Z-Axis |
| | | | | | | | | |
| | | | | | | | | |

# *-20 dB BANDWIDTH*

# *DATA SHEET*




-20 dB of the Fundamental – 433.92 MHz