

Maiden Rock Communications

ADDENDUM TO TEST REPORT 95510-15

**Packet Data Radio
Model: MRC565-47-50**

Tested To The Following Standards:

FCC Part 90I

Report No.: 95510-15A

Date of issue: July 18, 2014



This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Maiden Rock Communications
586 Double Arrow Road
Seeley Lake, MT 59868

REPRESENTATIVE: Fred Cleveland
Customer Reference Number: CKC 04152014

DATE OF EQUIPMENT RECEIPT:**DATE(S) OF TESTING:****REPORT PREPARED BY:**

Morgan Tramontin
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 95510

April 14, 2014

April 14 -16, 2014

Revision History

Original: Testing of Packet Data Radio Model: MRC565-47-50 to FCC Part 90I.

Addendum A: To correct the test conditions for section 2.1046 / 90.205 RF Power Output and to correct the test equipment and test conditions for section 2.1053 / 90.210(c) Field Strength of Spurious Radiation.

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
22116 23rd Drive S.E., Suite A
Bothell, WA 98021-4413

Software Versions

| CKC Laboratories Proprietary Software | Version |
|---------------------------------------|---------|
| EMITest Emissions | 5.00.14 |

Site Registration & Accreditation Information

| Location | CB # | TAIWAN | CANADA | FCC | JAPAN |
|----------|--------|----------------|---------|--------|--------|
| Bothell | US0081 | SL2-IN-E-1145R | 3082C-1 | 318736 | A-0148 |

SUMMARY OF RESULTS

Standard / Specification: FCC Part(s) 2 / 90I

| Test Procedure/Method | Description | Results |
|-----------------------|---|-----------------|
| 2.1046 / 90.205 | RF Power Output | Pass |
| 2.1047 | Modulation Characteristics | NA ¹ |
| 2.1049 / 90.209 | Occupied Bandwidth | Pass |
| 2.1051 / 90.210(c) | Spurious Emissions at Antenna Terminals | Pass |
| 2.1053 / 90.210(c) | Field Strength of Spurious Radiation | Pass |
| 2.1055 / 90.213 | Frequency Stability | Pass |

NA¹ = Not applicable. See the section in the report for the reason.

Conditions During Testing

This list is a summary of the conditions noted for or modifications made to the equipment during testing.

| Summary of Conditions |
|-----------------------|
| None |

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

Packet Data Radio

Manuf: Maiden Rock Communications

Model: MRC565-47-50

Serial: 1007

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Laptop

Manuf: Dell

Model: Inspiration N5110

Serial: 56ZMQR1

EUT power Supply

Manuf: Precision

Model: 1901

Serial: None

30dB Attenuator

Manuf: BIRD

Model: 50-A-FFN-30

Serial: None

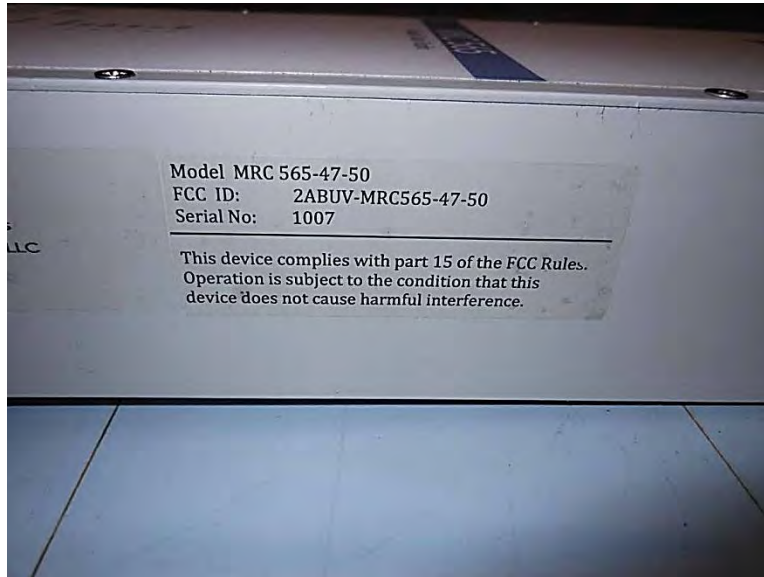
10 dB Attenuator 50 Ohm

Manuf: None

Model: None

Serial: None

General Setup Photo



FCC PART(S) 2 / 90I

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) requirements for 47 CFR Part 2: Frequency Allocations and Radio Treaty Matters, General Rules and Regulations and Licensed Device falling under Part 90: Private Land Mobile Radio Services.

2.1046 / 90.205 RF Power Output

| Test Equipment | | | | | |
|----------------|-------------------|----------------------|--------------|------------|------------|
| Asset # | Description | Model | Manufacturer | Cal Date | Cal Due |
| P05749 | Attenuator | PE7010-20 | Pasternack | 1/27/2014 | 1/27/2016 |
| P05759 | Attenuator | PE7010-20 | Pasternack | 1/27/2014 | 1/27/2016 |
| P05979 | Attenuator | 40-6-34 | Weinschel | 2/13/2014 | 2/13/2016 |
| P06505 | Cable | 32026-29080-29080-84 | Astrolab | 10/18/2013 | 10/18/2015 |
| 2871 | Spectrum Analyzer | E4440A | Agilent | 7/19/2013 | 7/19/2015 |

Test Conditions / Setup

TX OUTPUT POWER

| | | | |
|--------------------|----------------------------|-------|--|
| Customer: | Maiden Rock Communications | | |
| WO#: | 95510 | | |
| Date: | 14-Apr-14 | | |
| Test Engineer: | S. Pittsford | | |
| Test Specification | 2.1046/90.205 | | |
| Device Model #: | MRC565-47-50 | | |
| Operating Voltage: | 12 | VDC | |
| Power Limit | 300 | Watts | |
| | 54.7 | dBm | |

| Channel | Frequency | Power (dBm) | Result |
|-----------|-----------|-------------|--------|
| Low BPSK | 47MHz | 50.5 | PASS |
| Mid BPSK | 48.5MHz | 50.4 | PASS |
| High BPSK | 50MHz | 50.2 | PASS |
| Low GMSK | 47MHz | 50.5 | PASS |
| Mid GMSK | 48.5MHz | 50.4 | PASS |
| High GMSK | 50MHz | 50.2 | PASS |

Temp: 21°C

Humidity: 32%

Pressure: 102.6kPa

EUT is located on a table.

EUT is connected to a support laptop through a CAT 5 cable.

Antenna port is connected to the Spectrum analyzer through 45.6dB of attenuation.

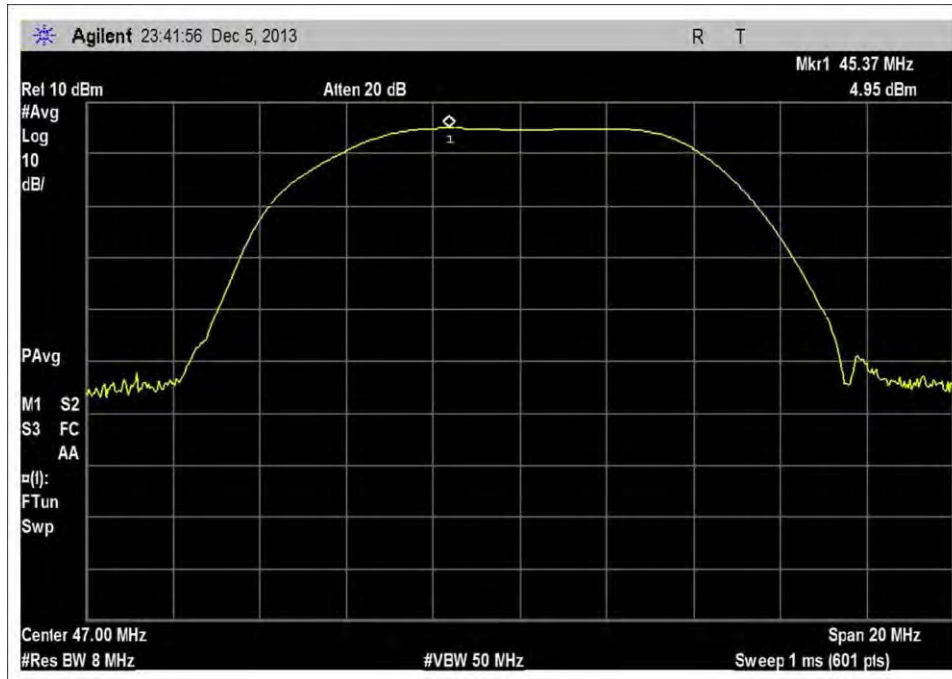
The measured power in the table has this 45.6dB of measurement system loss added to the plot readings.

EUT is connected to a DC power supply.

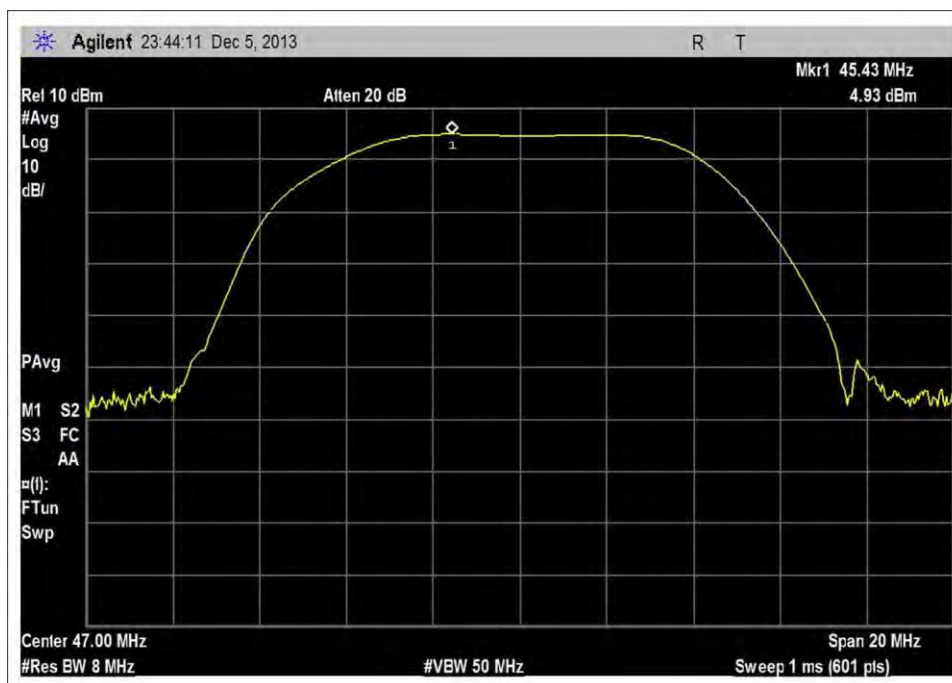
EUT will be in transmit mode.

Testing performed per TIA-603C

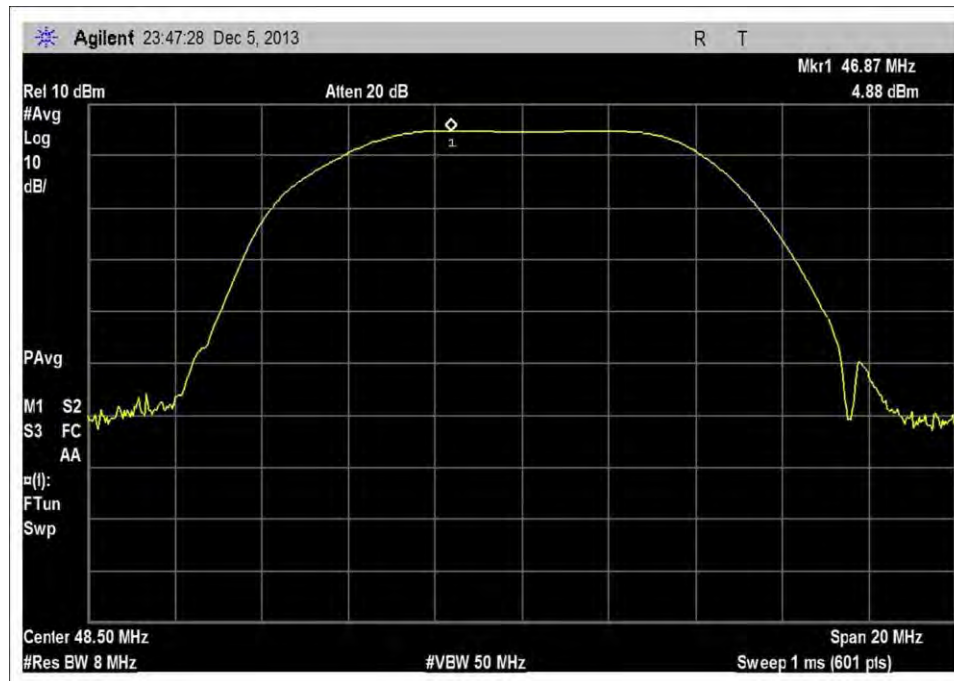
Test Data



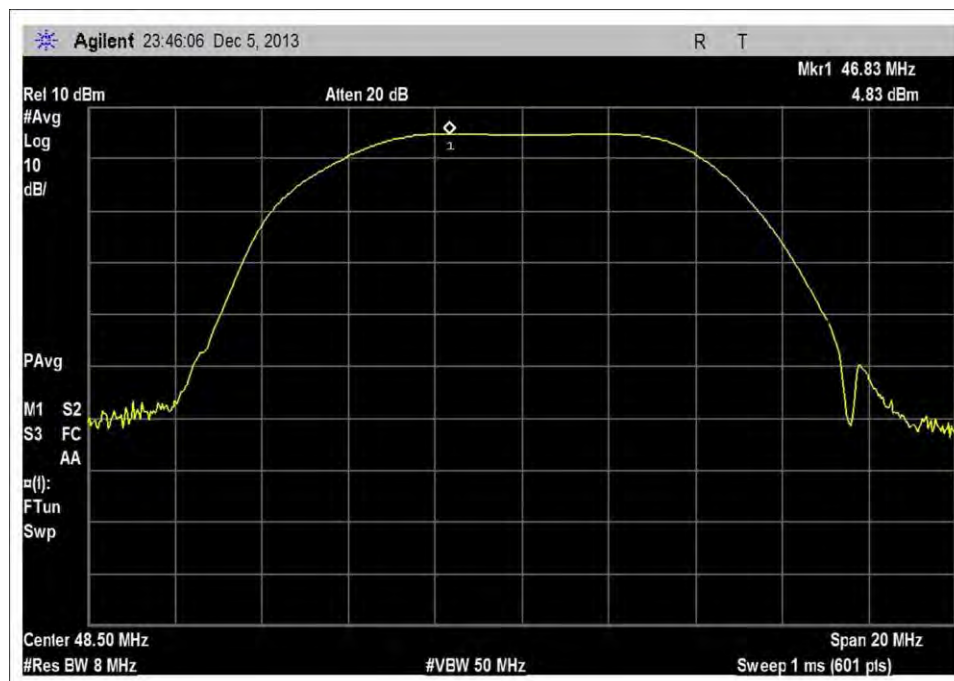
47MHz, BPSK



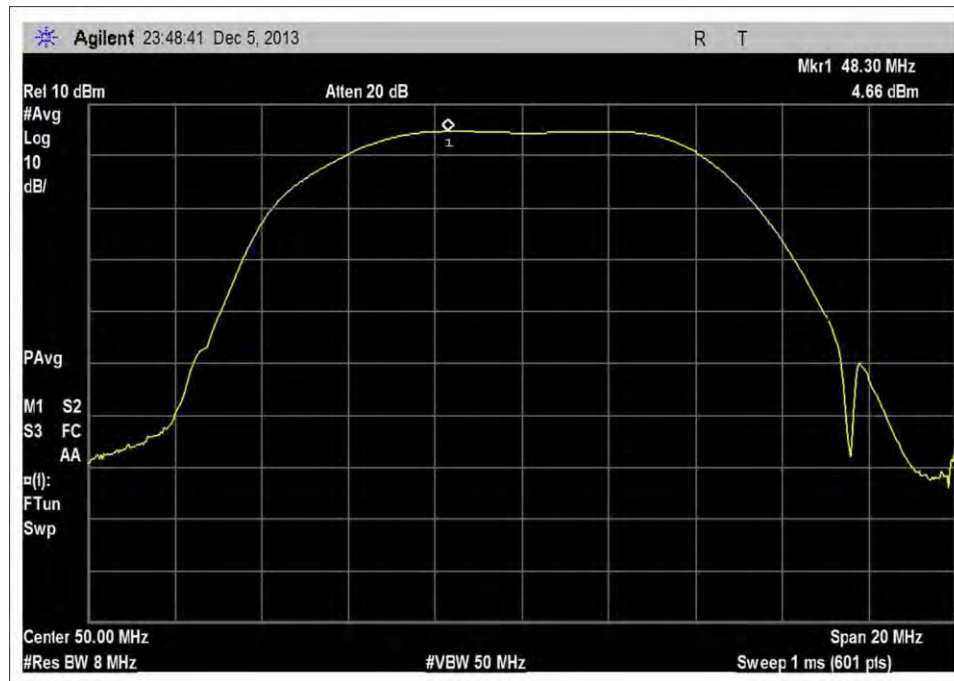
47MHz, GMSK



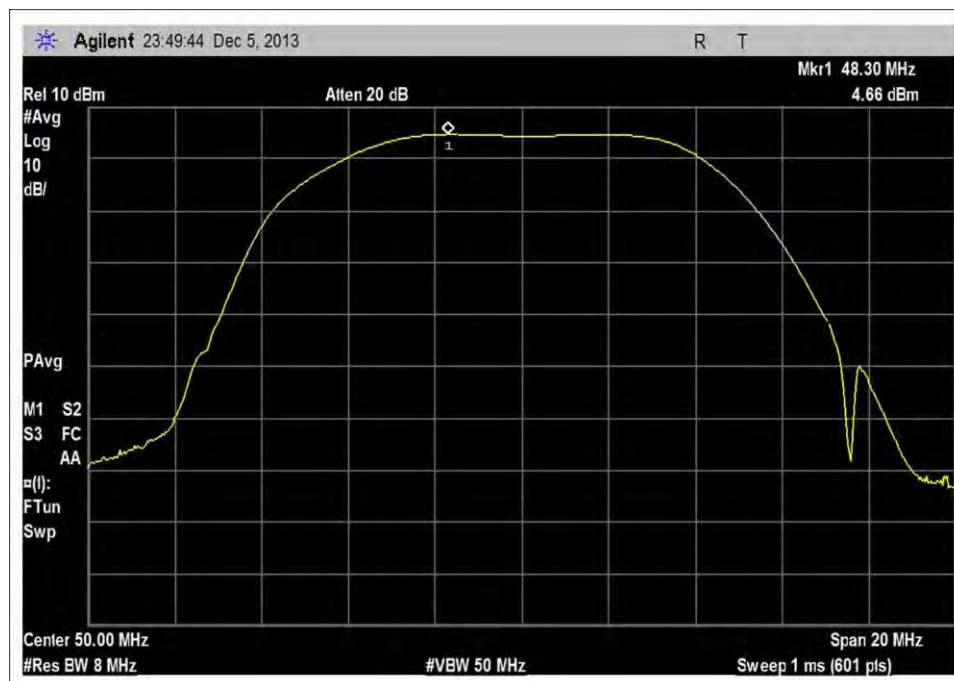
48.5MHz, BPSK



48.5MHz, GMSK



50MHz, BPSK



50MHz, GMSK

Test Setup Photo



2.1047 Modulation Characteristics

Not applicable because the software that generates the digital modulation types emitted by the EUT implements modulation limiting.

2.1049 / 90.209 Occupied Bandwidth

Test Equipment

| Asset # | Description | Model | Manufacturer | Cal Date | Cal Due |
|---------|-------------------|----------------------|--------------|------------|------------|
| P05749 | Attenuator | PE7010-20 | Pasternack | 1/27/2014 | 1/27/2016 |
| P05759 | Attenuator | PE7010-20 | Pasternack | 1/27/2014 | 1/27/2016 |
| P05979 | Attenuator | 40-6-34 | Weinschel | 2/13/2014 | 2/13/2016 |
| P06505 | Cable | 32026-29080-29080-84 | Astrolab | 10/18/2013 | 10/18/2015 |
| 2871 | Spectrum Analyzer | E4440A | Agilent | 7/19/2013 | 7/19/2015 |

Test Conditions / Setup

BW Limitations

| | |
|--------------------|----------------------------|
| Customer: | Maiden Rock Communications |
| WO#: | 95510 |
| Date: | 14-Apr-14 |
| Test Engineer: | S. Pittsford |
| Test Specification | 2.1049/90.209 |
| Device Model #: | MRC565-47-50 |
| Operating Voltage: | 12 VDC |
| BW Limit | 20 kHz |

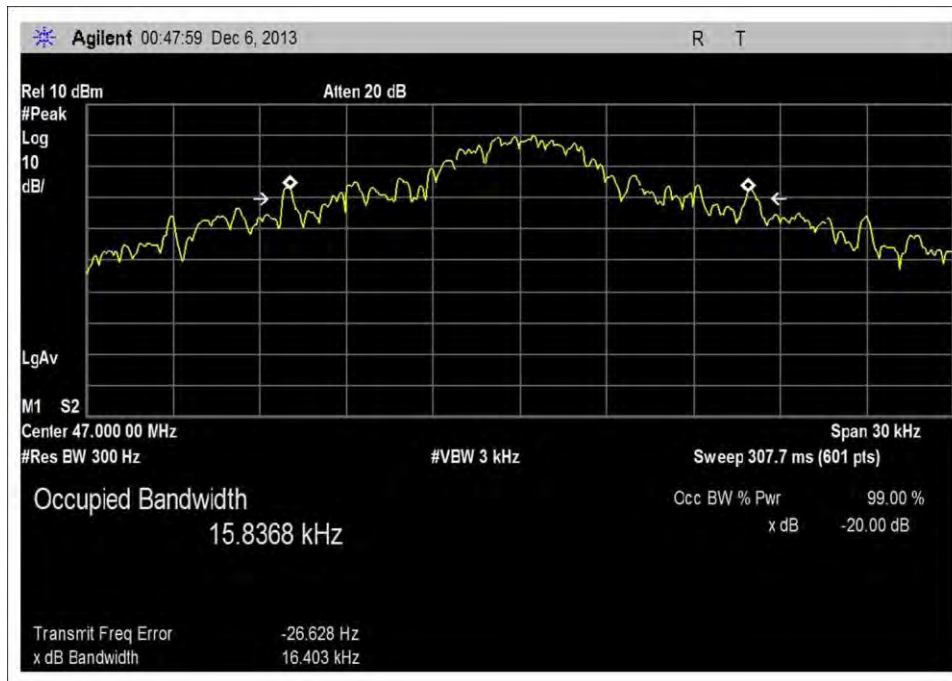
| Channel | Frequency | BW (kHz) | Result |
|-----------|-----------|----------|--------|
| Low BPSK | 47MHz | 16.4 | PASS |
| Mid BPSK | 48.5MHz | 16.28 | PASS |
| High BPSK | 50MHz | 16.38 | PASS |
| Low GMSK | 47MHz | 11.21 | PASS |
| Mid GMSK | 48.5MHz | 11.99 | PASS |
| High GMSK | 50MHz | 11.59 | PASS |

Temp: 24°C
Humidity: 31%
Pressure: 102.3kPa

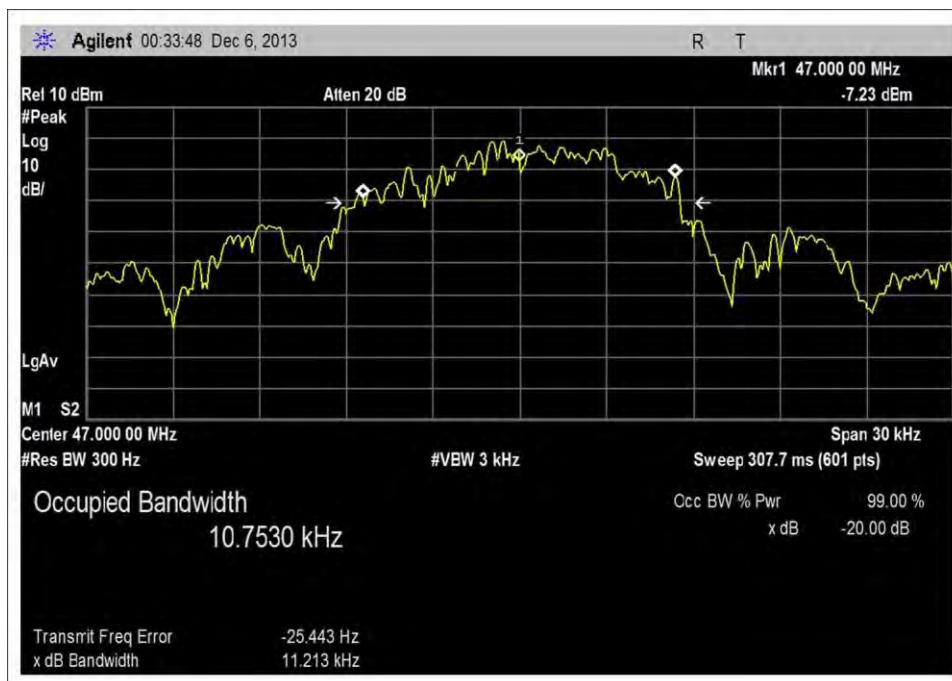
EUT is located on a table.
EUT is connected to a support laptop through a CAT 5 cable.
Antenna port is connected to the Spectrum analyser through 45.6dB of attenuation.
EUT is connected to a DC power supply.
EUT will be in transmit mode.

Testing performed per TIA-603C

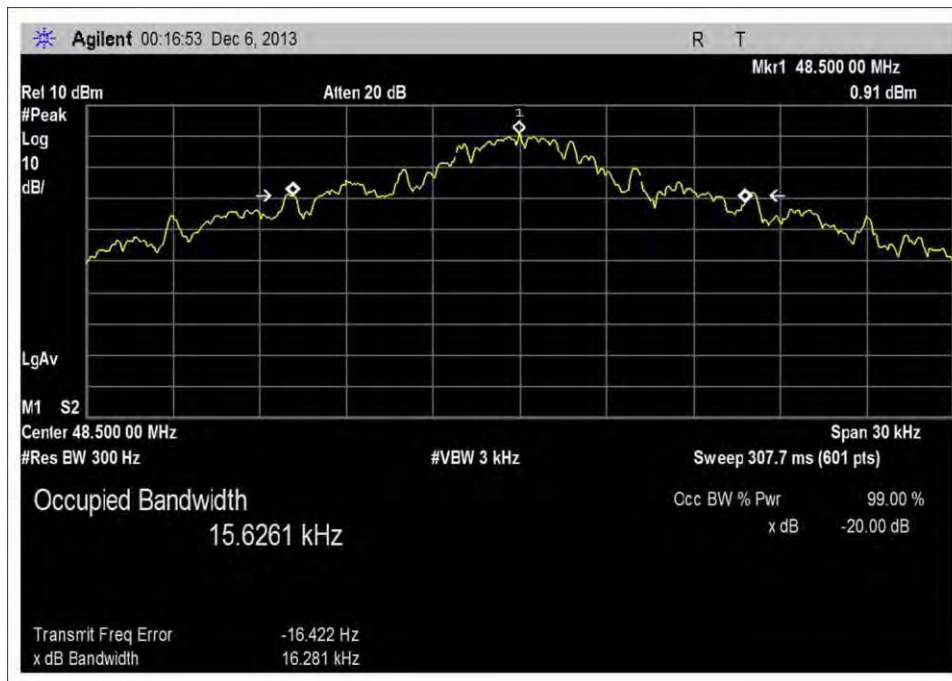
Test Data



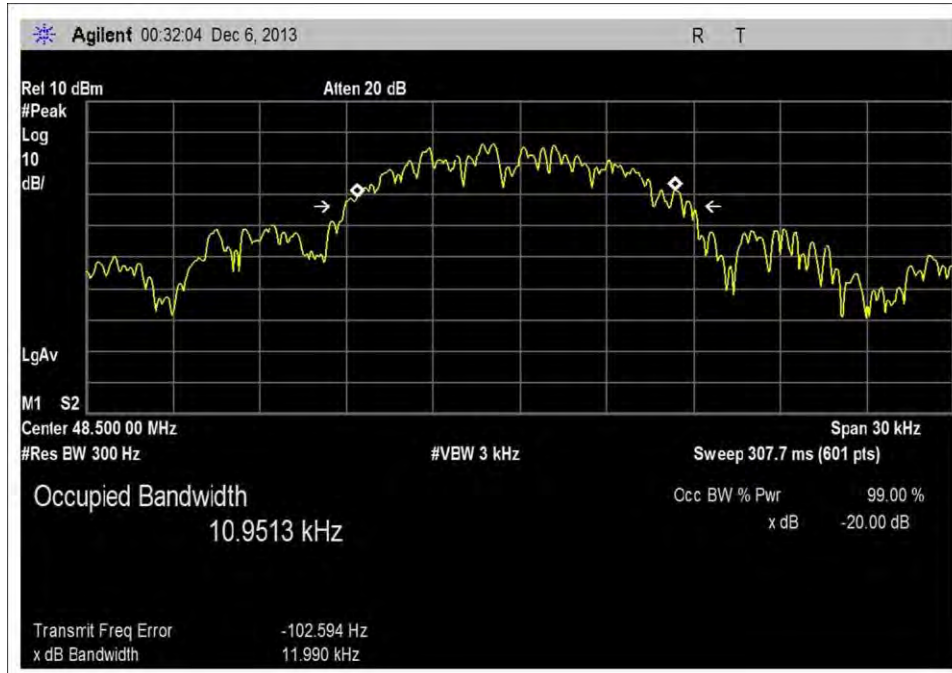
47MHz, BPSK



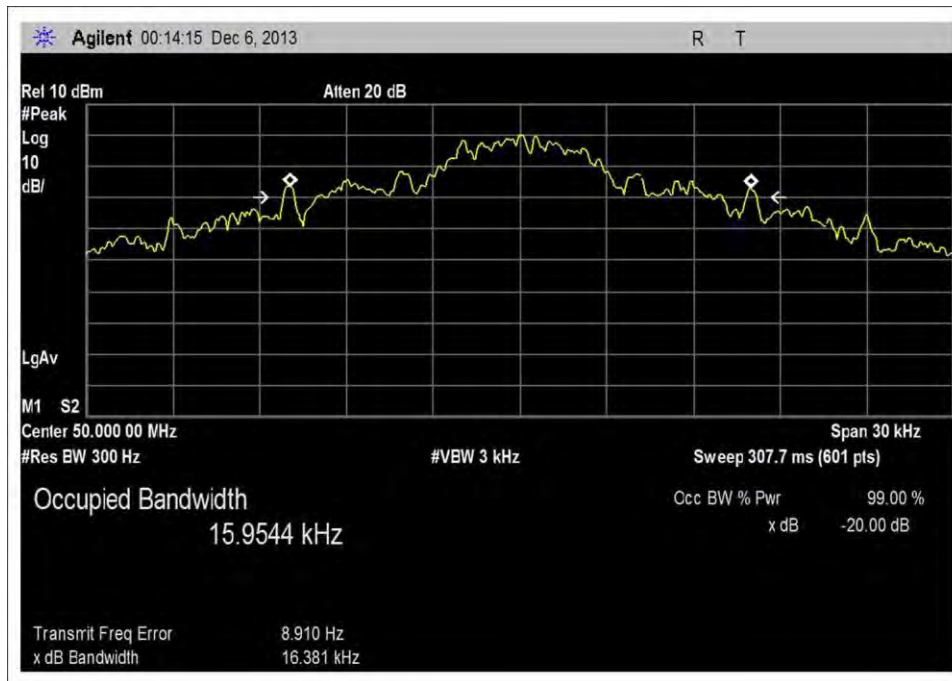
47MHz, GMSK



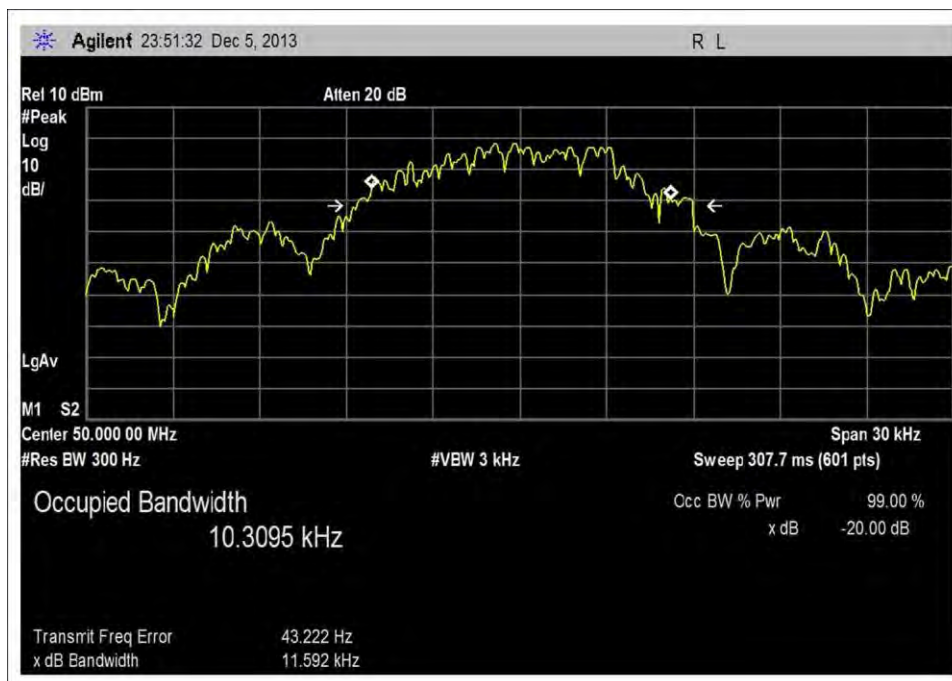
48.5, BPSK



48.5MHz, GMSK



50MHz, BPSK



50MHz, GMSK

Test Setup Photo



2.1051 / 90.210(c) Spurious Emissions at Antenna Terminals

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Maiden Rock Communications**

Specification: **47 CFR 2.1051/§90.210(c) Spurious Emissions**

Work Order #: **95510**

Date: 4/15/2014

Test Type: **Conducted Emissions**

Time: 10:48:35

Equipment: **Packet Data Radio**

Sequence#: 27

Manufacturer: Maiden Rock Communications

Tested By: Steven Pittsford

Model: MRC565-47-50

120V 60Hz

S/N: 1007

Test Equipment:

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|----|----------|-------------------|--------------------------|------------------|--------------|
| T1 | ANP05749 | Attenuator | PE7010-20 | 1/27/2014 | 1/27/2016 |
| T2 | ANP05759 | Attenuator | PE7010-20 | 1/27/2014 | 1/27/2016 |
| T3 | ANP05979 | Attenuator | 40-6-34 | 2/13/2014 | 2/13/2016 |
| T4 | ANP06505 | Cable | 32026-29080- 29080-84 | 10/18/2013 | 10/18/2015 |
| | AN02871 | Spectrum Analyzer | E4440A | 4/11/2013 | 4/11/2015 |

Equipment Under Test (* = EUT):

| Function | Manufacturer | Model # | S/N |
|--------------------|----------------------------|--------------|------|
| Packet Data Radio* | Maiden Rock Communications | MRC565-47-50 | 1007 |

Support Devices:

| Function | Manufacturer | Model # | S/N |
|------------------|--------------|-------------------|---------|
| Laptop | Dell | Inspiration N5110 | 56ZMQR1 |
| EUT power Supply | Precision | 1901 | |

Test Conditions / Notes:

Temperature: 21°C

Pressure: 101.9kPa

Humidity: 32%

Freq: 9k-1GHz

Transmit mode only at 47, 48.5 & 50MHz. GMSK & BPSK

Support laptop is connected through a shielded cat5 and wrapped 3 times through a ferrite bead

Antenna port is terminated through a characteristic load.

100W 10% duty cycle

Ext Attn: 0 dB

Measurement Data:

Reading listed by margin.

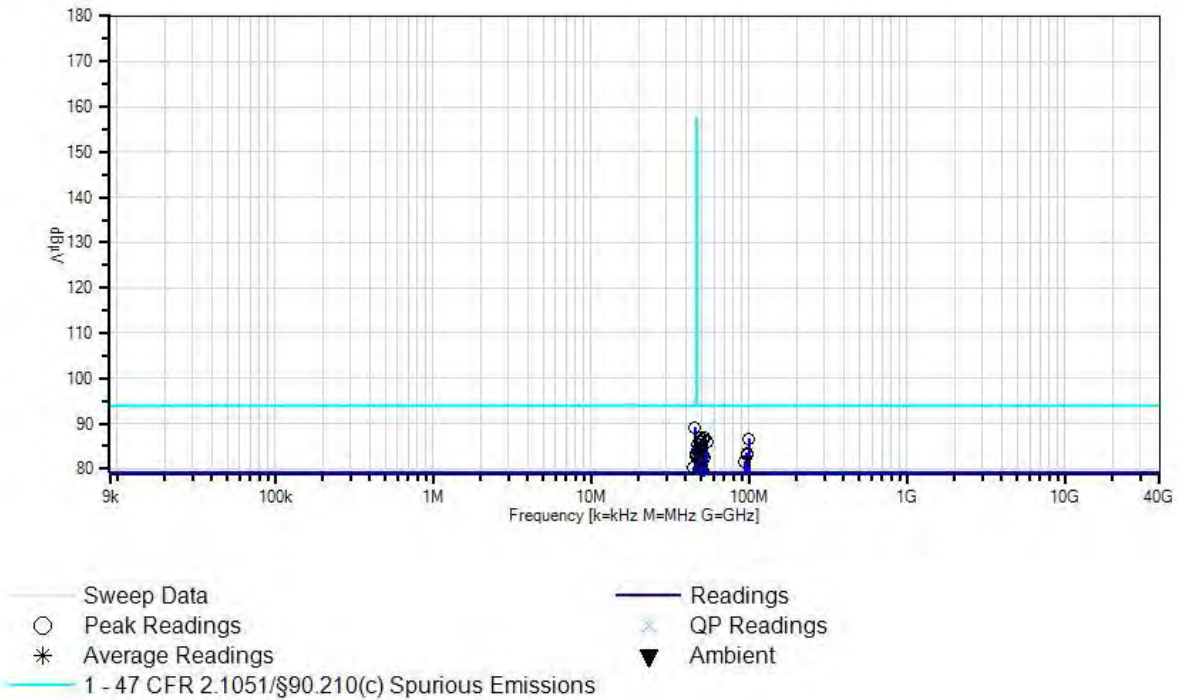
Test Lead: Antenna

| # | Freq MHz | Rdng dBμV | T1 dB | T2 dB | T3 dB | T4 dB | Dist Table | Corr dBμV | Spec dBμV | Margin dB | Polar Ant |
|----|-------------|--------------|----------|----------|----------|----------|---------------|--------------|--------------|--------------|--------------|
| 1 | 45.767M | 43.5 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 89.1 | 94.1 | -5.0 | Anten |
| | | | | | | | | | 50MHz BPSK | | |
| 2 | 52.950M | 41.3 | +19.5 | +20.3 | +5.6 | +0.3 | +0.0 | 87.0 | 94.1 | -7.1 | Anten |
| | | | | | | | | | 50MHz BPSK | | |
| 3 | 49.492M | 41.2 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 86.8 | 94.1 | -7.3 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 4 | 100.000M | 40.9 | +19.5 | +20.3 | +5.6 | +0.3 | +0.0 | 86.6 | 94.1 | -7.5 | Anten |
| | | | | | | | | | 50MHz BPSK | | |
| 5 | 50.900M | 40.9 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 86.5 | 94.1 | -7.6 | Anten |
| | | | | | | | | | 48.5MHZ BPSK | | |
| 6 | 99.995M | 40.7 | +19.5 | +20.3 | +5.6 | +0.3 | +0.0 | 86.4 | 94.1 | -7.7 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 7 | 48.992M | 40.6 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 86.2 | 94.1 | -7.9 | Anten |
| | | | | | | | | | 48.5MHZ BPSK | | |
| 8 | 50.508M | 40.4 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 86.0 | 94.1 | -8.1 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 9 | 54.283M | 40.2 | +19.5 | +20.3 | +5.6 | +0.3 | +0.0 | 85.9 | 94.1 | -8.2 | Anten |
| | | | | | | | | | 50MHz BPSK | | |
| 10 | 49.500M | 39.8 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 85.4 | 94.1 | -8.7 | Anten |
| | | | | | | | | | 50MHz BPSK | | |
| 11 | 47.483M | 39.7 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 85.3 | 94.1 | -8.8 | Anten |
| | | | | | | | | | 47MHz BPSK | | |
| 12 | 50.517M | 39.5 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 85.1 | 94.1 | -9.0 | Anten |
| | | | | | | | | | 50MHz BPSK | | |
| 13 | 47.500M | 38.5 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 84.1 | 94.1 | -10.0 | Anten |
| | | | | | | | | | 47MHz GMSK | | |
| 14 | 49.000M | 38.5 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 84.1 | 94.1 | -10.0 | Anten |
| | | | | | | | | | 48.5MHZ GMSK | | |
| 15 | 47.975M | 38.3 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 83.9 | 94.1 | -10.2 | Anten |
| | | | | | | | | | 48.5MHZ GMSK | | |
| 16 | 97.001M | 37.8 | +19.5 | +20.3 | +5.6 | +0.3 | +0.0 | 83.5 | 94.1 | -10.6 | Anten |
| | | | | | | | | | 48.5MHZ BPSK | | |
| 17 | 46.100M | 37.8 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 83.4 | 94.1 | -10.7 | Anten |
| | | | | | | | | | 48.5MHZ BPSK | | |
| 18 | 97.005M | 37.4 | +19.5 | +20.3 | +5.6 | +0.3 | +0.0 | 83.1 | 94.1 | -11.0 | Anten |
| | | | | | | | | | 48.5MHZ GMSK | | |
| 19 | 46.500M | 37.4 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 83.0 | 94.1 | -11.1 | Anten |
| | | | | | | | | | 47MHz GMSK | | |
| 20 | 46.483M | 37.3 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 82.9 | 94.1 | -11.2 | Anten |
| | | | | | | | | | 47MHz BPSK | | |
| 21 | 51.308M | 37.2 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 82.8 | 94.1 | -11.3 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 22 | 52.400M | 37.0 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 82.6 | 94.1 | -11.5 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 23 | 48.683M | 36.5 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 82.1 | 94.1 | -12.0 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 24 | 94.002M | 35.9 | +19.5 | +20.3 | +5.6 | +0.3 | +0.0 | 81.6 | 94.1 | -12.5 | Anten |
| | | | | | | | | | 47MHz BPSK | | |

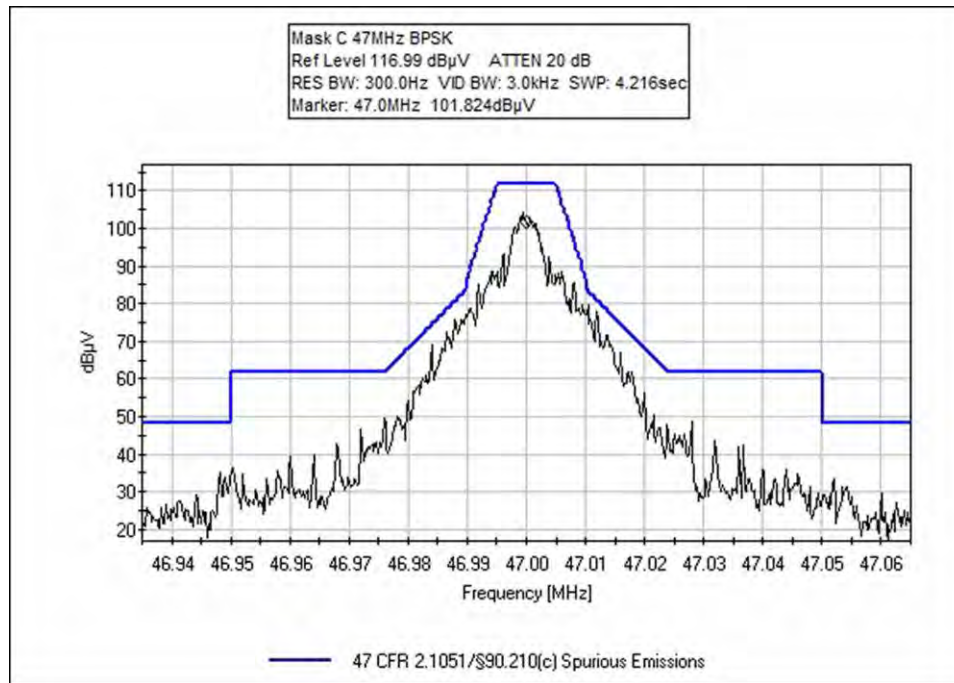
| | | | | | | | | | | | |
|----|----------|------|-------|-------|------|------|------|------|--------------|-------|-------|
| 25 | 93.997M | 35.7 | +19.5 | +20.3 | +5.6 | +0.3 | +0.0 | 81.4 | 94.1 | -12.7 | Anten |
| | | | | | | | | | 47MHz GMSK | | |
| 26 | 49.400M | 35.1 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 80.7 | 94.1 | -13.4 | Anten |
| | | | | | | | | | 47MHz BPSK | | |
| 27 | 44.600M | 34.8 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 80.4 | 94.1 | -13.7 | Anten |
| | | | | | | | | | 47MHz BPSK | | |
| 28 | 50.900M | 34.1 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 79.7 | 94.1 | -14.4 | Anten |
| | | | | | | | | | 48.5MHz GMSK | | |
| 29 | 47.600M | 31.5 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 77.1 | 94.1 | -17.0 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 30 | 46.100M | 31.4 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 77.0 | 94.1 | -17.1 | Anten |
| | | | | | | | | | 48.5MHz GMSK | | |
| 31 | 150.001M | 31.2 | +19.4 | +20.3 | +5.6 | +0.4 | +0.0 | 76.9 | 94.1 | -17.2 | Anten |
| | | | | | | | | | 50MHz BPSK | | |
| 32 | 51.500M | 30.6 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 76.2 | 94.1 | -17.9 | Anten |
| | Ave | | | | | | | | 50MHz BPSK | | |
| ^ | 51.500M | 54.1 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 99.7 | 94.1 | +5.6 | Anten |
| | | | | | | | | | 50MHz BPSK | | |
| 34 | 150.006M | 30.3 | +19.4 | +20.3 | +5.6 | +0.4 | +0.0 | 76.0 | 94.1 | -18.1 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 35 | 48.558M | 29.1 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 74.7 | 94.1 | -19.4 | Anten |
| | Ave | | | | | | | | 50MHz BPSK | | |
| ^ | 48.517M | 53.3 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 98.9 | 94.1 | +4.8 | Anten |
| | | | | | | | | | 50MHz BPSK | | |
| 37 | 47.550M | 28.9 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 74.5 | 94.1 | -19.6 | Anten |
| | | | | | | | | | 48.5MHz BPSK | | |
| 38 | 11.590M | 28.4 | +19.4 | +20.3 | +5.6 | +0.1 | +0.0 | 73.8 | 94.1 | -20.3 | Anten |
| | | | | | | | | | 50MHz BPSK | | |
| 39 | 47.200M | 27.8 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 73.4 | 94.1 | -20.7 | Anten |
| | Ave | | | | | | | | 50MHz BPSK | | |
| ^ | 47.200M | 48.9 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 94.5 | 94.1 | +0.4 | Anten |
| | | | | | | | | | 50MHz BPSK | | |
| 41 | 145.492M | 27.1 | +19.4 | +20.3 | +5.6 | +0.4 | +0.0 | 72.8 | 94.1 | -21.3 | Anten |
| | | | | | | | | | 48.5MHz GMSK | | |
| 42 | 145.500M | 27.1 | +19.4 | +20.3 | +5.6 | +0.4 | +0.0 | 72.8 | 94.1 | -21.3 | Anten |
| | | | | | | | | | 48.5MHz BPSK | | |
| 43 | 187.988M | 25.1 | +19.5 | +20.3 | +5.6 | +0.4 | +0.0 | 70.9 | 94.1 | -23.2 | Anten |
| | | | | | | | | | 47MHz GMSK | | |
| 44 | 188.001M | 25.1 | +19.5 | +20.3 | +5.6 | +0.4 | +0.0 | 70.9 | 94.1 | -23.2 | Anten |
| | | | | | | | | | 47MHz BPSK | | |
| 45 | 549.999M | 24.1 | +19.5 | +20.4 | +5.7 | +0.7 | +0.0 | 70.4 | 94.1 | -23.7 | Anten |
| | | | | | | | | | 50MHz BPSK | | |
| 46 | 650.021M | 23.6 | +19.5 | +20.4 | +5.7 | +0.8 | +0.0 | 70.0 | 94.1 | -24.1 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 47 | 449.990M | 23.8 | +19.5 | +20.3 | +5.7 | +0.6 | +0.0 | 69.9 | 94.1 | -24.2 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 48 | 600.001M | 23.6 | +19.5 | +20.3 | +5.7 | +0.7 | +0.0 | 69.8 | 94.1 | -24.3 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 49 | 235.023M | 23.4 | +19.5 | +20.3 | +5.6 | +0.5 | +0.0 | 69.3 | 94.1 | -24.8 | Anten |
| | | | | | | | | | 47MHz BPSK | | |
| 50 | 193.993M | 23.4 | +19.5 | +20.3 | +5.6 | +0.4 | +0.0 | 69.2 | 94.1 | -24.9 | Anten |
| | | | | | | | | | 48.5MHz GMSK | | |

| | | | | | | | | | | | |
|----|----------|------|-------|-------|------|------|------|------|--------------|-------|-------|
| 51 | 849.979M | 22.5 | +19.6 | +20.4 | +5.7 | +0.9 | +0.0 | 69.1 | 94.1 | -25.0 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 52 | 749.997M | 22.7 | +19.5 | +20.4 | +5.7 | +0.8 | +0.0 | 69.1 | 94.1 | -25.0 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 53 | 200.035M | 23.0 | +19.5 | +20.3 | +5.6 | +0.4 | +0.0 | 68.8 | 94.1 | -25.3 | Anten |
| | | | | | | | | | 50MHz BPSK | | |
| 54 | 141.043M | 23.1 | +19.4 | +20.3 | +5.6 | +0.4 | +0.0 | 68.8 | 94.1 | -25.3 | Anten |
| | | | | | | | | | 47MHz GMSK | | |
| 55 | 400.026M | 22.6 | +19.5 | +20.3 | +5.6 | +0.6 | +0.0 | 68.6 | 94.1 | -25.5 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 56 | 193.992M | 22.7 | +19.5 | +20.3 | +5.6 | +0.4 | +0.0 | 68.5 | 94.1 | -25.6 | Anten |
| | | | | | | | | | 48.5MHz BPSK | | |
| 57 | 350.041M | 22.5 | +19.5 | +20.3 | +5.6 | +0.6 | +0.0 | 68.5 | 94.1 | -25.6 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 58 | 329.001M | 22.4 | +19.5 | +20.3 | +5.6 | +0.6 | +0.0 | 68.4 | 94.1 | -25.7 | Anten |
| | | | | | | | | | 47MHz BPSK | | |
| 59 | 250.018M | 22.4 | +19.5 | +20.3 | +5.6 | +0.5 | +0.0 | 68.3 | 94.1 | -25.8 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 60 | 200.040M | 22.4 | +19.5 | +20.3 | +5.6 | +0.4 | +0.0 | 68.2 | 94.1 | -25.9 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 61 | 38.420M | 22.3 | +19.5 | +20.3 | +5.6 | +0.2 | +0.0 | 67.9 | 94.1 | -26.2 | Anten |
| | | | | | | | | | 50MHz BPSK | | |
| 62 | 300.027M | 21.7 | +19.5 | +20.3 | +5.6 | +0.5 | +0.0 | 67.6 | 94.1 | -26.5 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 63 | 141.002M | 20.9 | +19.4 | +20.3 | +5.6 | +0.4 | +0.0 | 66.6 | 94.1 | -27.5 | Anten |
| | | | | | | | | | 47MHz BPSK | | |
| 64 | 999.979M | 19.1 | +19.6 | +20.3 | +5.7 | +0.9 | +0.0 | 65.6 | 94.1 | -28.5 | Anten |
| | | | | | | | | | 50MHz GMSK | | |
| 65 | 590.000k | 17.8 | +19.5 | +20.4 | +5.6 | +0.0 | +0.0 | 63.3 | 94.1 | -30.8 | Anten |
| | | | | | | | | | 50MHz BPSK | | |

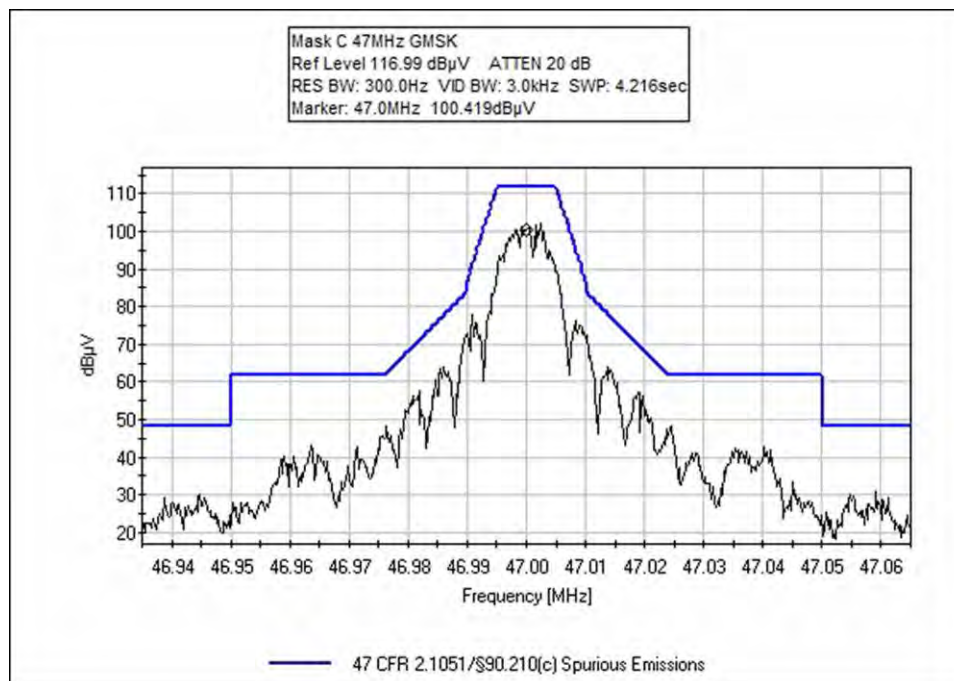
CKC Laboratories, Inc. Date: 4/15/2014 Time: 10:48:35 Maiden Rock Communications WO#: 95510
 Test Lead: Antenna 120V 60Hz Sequence#: 27 Antenna
 Maiden Rock Communications Packet Data Radio P/N: MRC565-47-50



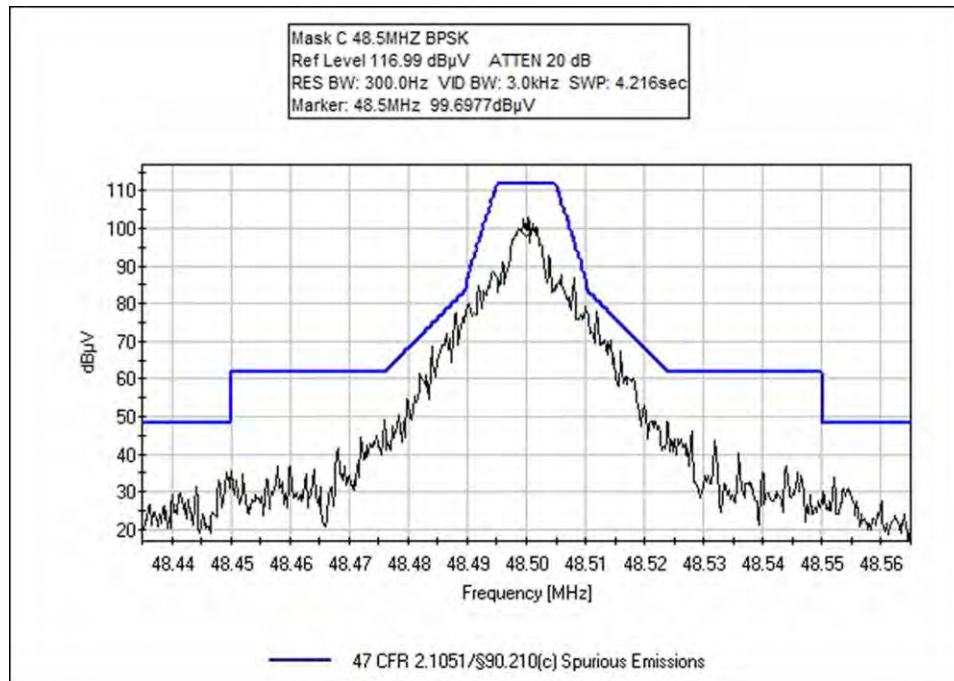
Test Data



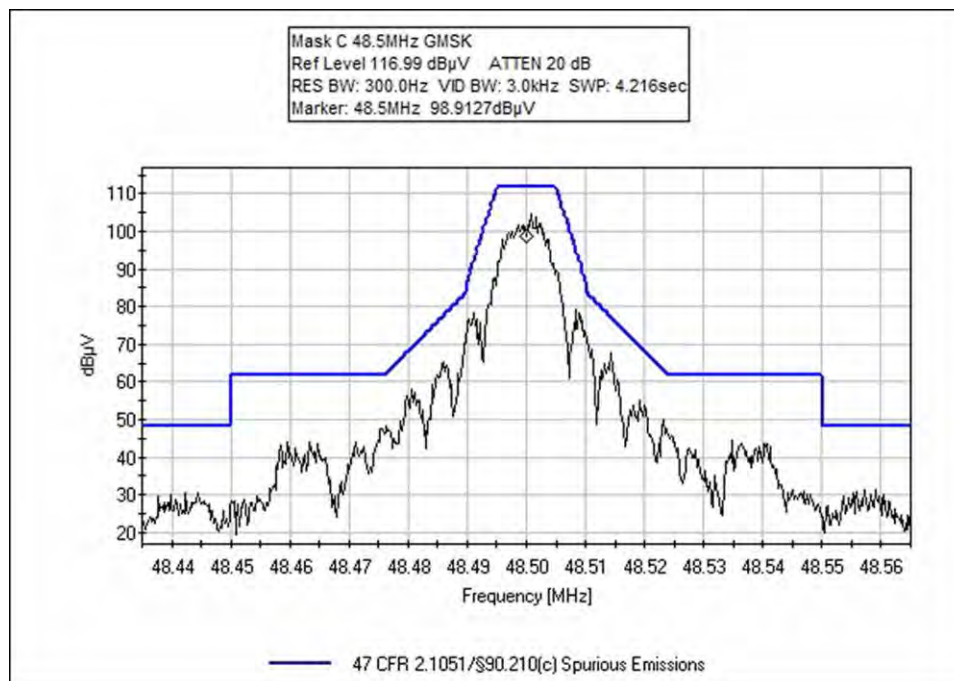
47MHz, BPSK



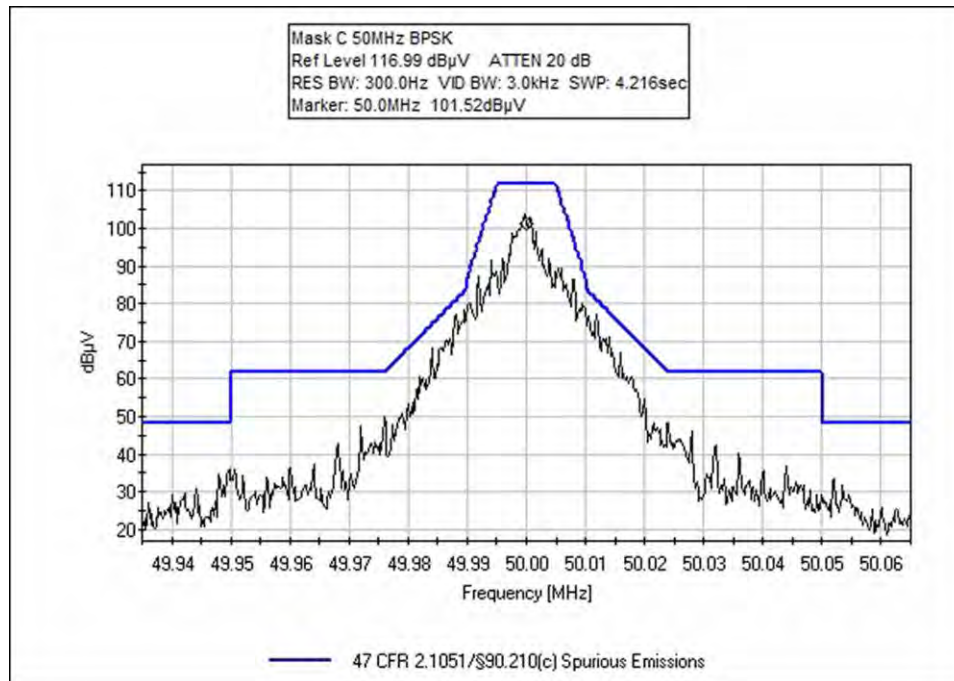
47MHz, GMSK



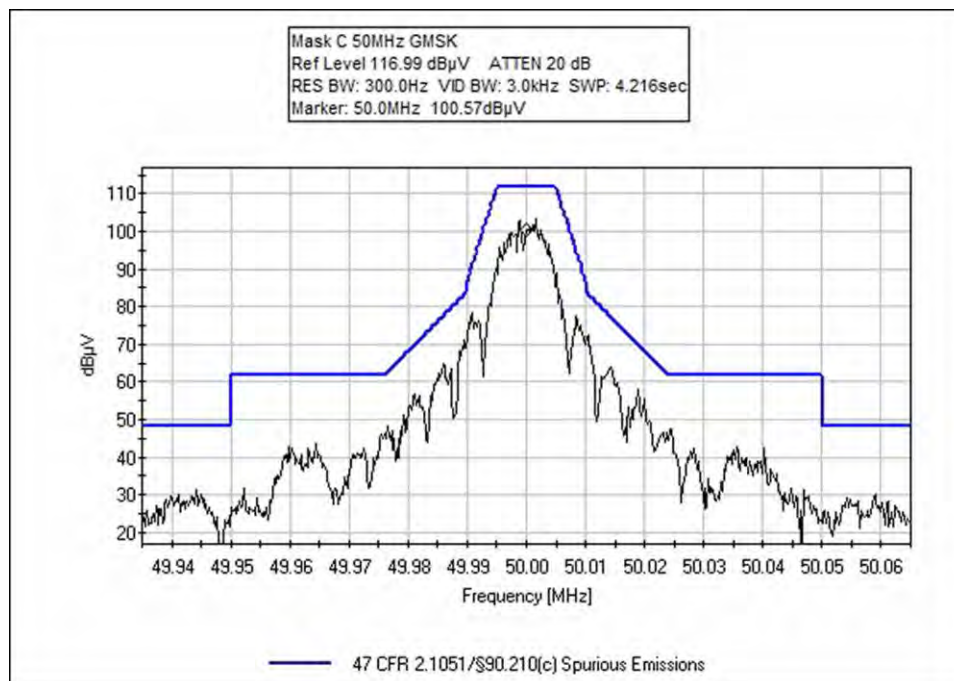
48.5MHz, BPSK



48.5MHz, GMSK



50MHz, BPSK



50MHz, GMSK

Test Setup Photo



2.1053 / 90.210(c) Field Strength of Spurious Radiation

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Maiden Rock Communications**
 Specification: **47 CFR §90.210(c) Spurious Emissions**
 Work Order #: **95510** Date: 4/15/2014
 Test Type: **Maximized Emissions** Time: 11:11:36
 Equipment: **Packet Data Radio** Sequence#: 4
 Manufacturer: Maiden Rock Communications Tested By: Steven Pittsford
 Model: MRC565-47-50
 S/N: 1007

Test Equipment:

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|----|----------|-------------------|----------------------|------------------|--------------|
| T1 | AN02307 | Preamplifier | 8447D | 3/14/2014 | 3/14/2016 |
| T2 | AN01993 | Biconilog Antenna | CBL6111C | 3/7/2014 | 3/7/2016 |
| T3 | ANP05360 | Cable | RG214 | 12/3/2012 | 12/3/2014 |
| T4 | ANP05963 | Cable | RG-214 | 2/21/2014 | 2/21/2016 |
| T5 | ANP06505 | Cable | 32026-29080-29080-84 | 10/18/2013 | 10/18/2015 |
| T6 | AN02872 | Spectrum Analyzer | E4440A | 7/19/2013 | 7/19/2015 |
| | AN00052 | Loop Antenna | 6502 | 5/20/2014 | 5/20/2016 |

Equipment Under Test (* = EUT):

| Function | Manufacturer | Model # | S/N |
|--------------------|----------------------------|--------------|------|
| Packet Data Radio* | Maiden Rock Communications | MRC565-47-50 | 1007 |

Support Devices:

| Function | Manufacturer | Model # | S/N |
|-------------------------|--------------|-------------------|---------|
| Laptop | Dell | Inspiration N5110 | 56ZMQR1 |
| 30dB Attenuator | BIRD | 50-A-FFN-30 | |
| EUT power Supply | Precision | 1901 | |
| 10 dB Attenuator 50 Ohm | | | |

Test Conditions / Notes:

Temperature: 21°C
 Pressure: 101.9kPa
 Humidity: 32%

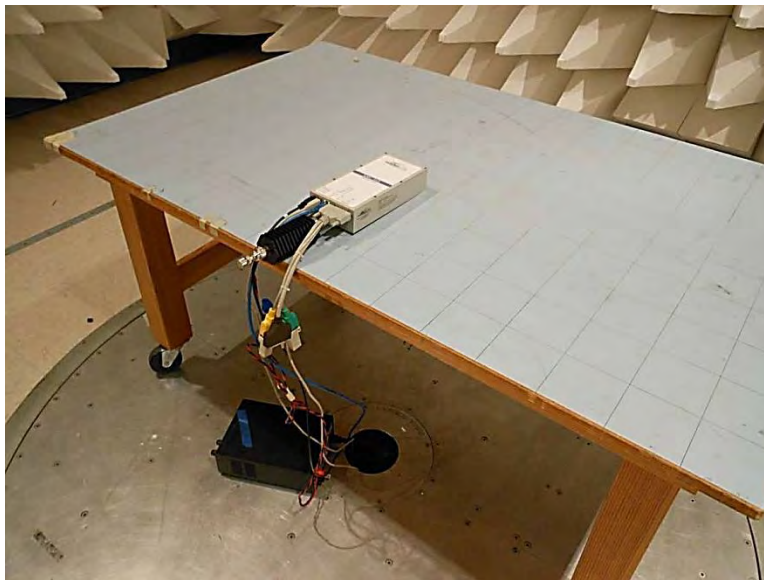
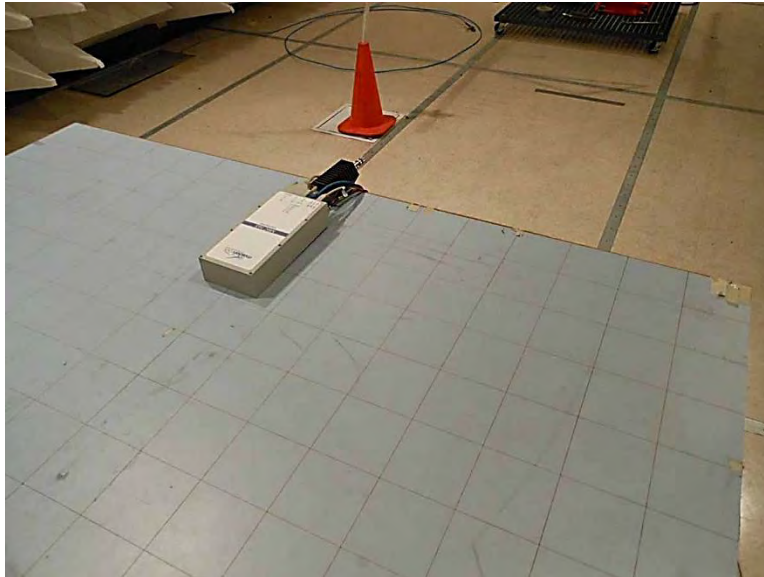
Freq: 9k-1000MHz
 No Emissions were observed within 20dB of the limit from 9k-30MHz.

Notes:
 Transmit mode only at 47, 48.5 & 50MHz. GMSK & BPSK Investigated. (BPSK is worst case)
 Support laptop is connected through a shielded cat5 and wrapped 3 times through a ferrite bead
 Antenna port is terminated through a characteristic load.
 100W 10% duty cycle

Operating Frequency(ies): 47, 48.5 & 50MHz

| | | | | |
|--------------------------------|------------------------------|---------------------------------|--------------------------|-------------------------|
| Operational Mode(s): | | GMSK & BPSK(BPSK is worst case) | | |
| Highest Measured Power: | | 50.5 | dBm | |
| Measurement Distance: | | 3 | meters | |
| | | | | |
| Limit Definition: | | | | |
| Frequency Range | | Limit (dBc) | Limit Calculation | |
| 9kHz - 1GHz | | 63.5 | 43+10*LOG(P) | |
| | | | | |
| Frequency (MHz) | Reference Level (dBm) | Measured (dBc) | Margin | Antenna Polarity |
| 47.002 | -18.3 | 68.8 | -5.3 | Horizontal |
| 49.990 | -26.1 | 76.6 | -13.1 | Vertical |
| 94.028 | -31.6 | 82.1 | -18.6 | Horizontal |
| 48.517 | -33.2 | 83.7 | -20.2 | Horizontal |
| 99.994 | -33.6 | 84.1 | -20.6 | Horizontal |
| 100.004 | -33.8 | 84.3 | -20.8 | Horizontal |
| 150.048 | -35.2 | 85.7 | -22.2 | Horizontal |
| 93.995 | -36.7 | 87.2 | -23.7 | Horizontal |
| 96.960 | -37.6 | 88.1 | -24.6 | Horizontal |
| 141.049 | -37.9 | 88.4 | -24.9 | Vertical |
| 96.995 | -38.6 | 89.1 | -25.6 | Vertical |
| 141.008 | -41.5 | 92.0 | -28.5 | Horizontal |
| 150.009 | -42.0 | 92.5 | -29.0 | Horizontal |
| 500.249 | -42.2 | 92.7 | -29.2 | Horizontal |
| 145.498 | -44.3 | 94.8 | -31.3 | Horizontal |
| 611.175 | -47.0 | 97.5 | -34.0 | Vertical |
| 145.493 | -47.3 | 97.8 | -34.3 | Vertical |
| 900.167 | -50.4 | 100.9 | -37.4 | Horizontal |
| 475.145 | -52.6 | 103.1 | -39.6 | Horizontal |
| 600.083 | -54.3 | 104.8 | -41.3 | Vertical |
| 339.399 | -55.3 | 105.8 | -42.3 | Horizontal |
| 549.874 | -55.3 | 105.8 | -42.3 | Horizontal |
| 194.101 | -56.1 | 106.6 | -43.1 | Vertical |
| 949.791 | -56.3 | 106.8 | -43.3 | Vertical |
| 574.978 | -56.9 | 107.4 | -43.9 | Vertical |
| 423.185 | -57.0 | 107.5 | -44.0 | Vertical |
| 625.187 | -57.7 | 108.2 | -44.7 | Horizontal |
| 987.156 | -58.8 | 109.3 | -45.8 | Horizontal |

Test Setup Photos



2.1055 / 90.213 Frequency Stability

Frequency stability does not apply to this type of equipment.

| Test Equipment | | | | | |
|----------------|-------------------------------|------------|--------------|-----------|-----------|
| Asset # | Description | Model | Manufacturer | Cal Date | Cal Due |
| 2757 | Temperature Chamber | F100/350-8 | Bemco | 1/22/2013 | 1/22/2015 |
| 2871 | Spectrum Analyzer | E4440A | Agilent | 7/19/2013 | 7/19/2015 |
| 3029 | Thermometer, Digital Infrared | 566 | Fluke | 2/1/2013 | 2/1/2015 |
| P05749 | Attenuator | PE7010-20 | Pasternack | 1/27/2014 | 1/27/2016 |
| P05759 | Attenuator | PE7010-20 | Pasternack | 1/27/2014 | 1/27/2016 |
| P05979 | Attenuator | 40-6-34 | Weinschel | 2/13/2014 | 2/13/2016 |

Test Conditions / Setup

| Frequency Stability | | | | | | | |
|---|----------------------------|-----------------|------------|----------------------------|------------|-----------------|------------|
| Customer: | Maiden Rock Communications | | | | | | |
| WO#: | 95510 | | | | | | |
| Date: | 15-Apr-14 | | | | | | |
| Test Engineer: | S. Pittsford | | | | | | |
| Test Specification | 90.213 | | | | | | |
| Device Model #: | MRC565-47-50 | | | | | | |
| Operating Voltage: | 12 VDC/VAC | | | | | | |
| Frequency Limit: | 20 PPM | | | | | | |
| Temperature Variations | | | | | | | |
| Channel Frequency: | | Channel 1 (MHz) | Dev. (PPM) | Channel 2 (MHz) | Dev. (PPM) | Channel 3 (MHz) | Dev. (PPM) |
| Temp (C) Voltage | | 47 | | 48.5 | | 50 | |
| -30 | 12 | 47.00002 | 0.46809 | 48.50002 | 0.35052 | 50.00002 | 0.46000 |
| -20 | 12 | 47.00003 | 0.68085 | 48.50003 | 0.68041 | 50.00003 | 0.66000 |
| -10 | 12 | 47.00004 | 0.89362 | 48.50004 | 0.88660 | 50.00004 | 0.86000 |
| 0 | 12 | 47.00004 | 0.76596 | 48.50004 | 0.76289 | 50.00004 | 0.74000 |
| 10 | 12 | 47.00003 | 0.61702 | 48.50003 | 0.61856 | 50.00003 | 0.60000 |
| 20 | 12 | 47.00001 | 0.27660 | 48.50002 | 0.35052 | 50.00001 | 0.26000 |
| 30 | 12 | 47.00001 | 0.27660 | 48.50001 | 0.26804 | 50.00001 | 0.26000 |
| 40 | 12 | 47.00001 | 0.19149 | 48.50001 | 0.18557 | 50.00001 | 0.18000 |
| 50 | 12 | 47.00001 | 0.10638 | 48.50001 | 0.12371 | 50.00001 | 0.10000 |
| Voltage Variations (±15%) | | | | | | | |
| 20 | 10.2 | 47.00002 | 0.36170 | 48.50001 | 0.26804 | 50.00001 | 0.26000 |
| 20 | 12 | 47.00001 | 0.27660 | 48.50002 | 0.35052 | 50.00001 | 0.26000 |
| 20 | 13.8 | 47.00002 | 0.36170 | 48.50002 | 0.35052 | 50.00001 | 0.26000 |
| Max Deviation (PPM) | | | 0.89362 | Max Deviation (PPM) | | | 0.88660 |
| | | | PASS | | | | PASS |
| Test Conditions: | | | | | | | |
| Three EUTs are located inside the temperature chamber. Each has its own power cord to the power supply. The EUTs are connected to the support laptop via cat 5 cables that are routed through a CISCO ethernet hub. Each EUT's antenna port will be connected to the spectrum analyser via 46dB of attenuation. | | | | | | | |

Test Setup Photos



Inside Temperature



Outside Temperature

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

| Uncertainty Value | Parameter |
|-------------------|---------------------------|
| 4.73 dB | Radiated Emissions |
| 3.34 dB | Mains Conducted Emissions |
| 3.30 dB | Disturbance Power |

The reported measurement uncertainties are calculated based on the worst case of all laboratory environments from CKC Laboratories, Inc. test sites. Only those parameters which require estimation of measurement uncertainty are reported. The reported worst case measurement uncertainty is less than the maximum values derived in CISPR 16-4-2. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k=2$. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dB μ V/m, the spectrum analyzer reading in dB μ V was corrected by using the following formula. This reading was then compared to the applicable specification limit.

| SAMPLE CALCULATIONS | | |
|---------------------|---------------------|----------|
| | Meter reading | (dBμV) |
| + | Antenna Factor | (dB) |
| + | Cable Loss | (dB) |
| - | Distance Correction | (dB) |
| - | Preamplifier Gain | (dB) |
| = | Corrected Reading | (dBμV/m) |

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

| MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE | | | |
|--|---------------------|------------------|-------------------|
| TEST | BEGINNING FREQUENCY | ENDING FREQUENCY | BANDWIDTH SETTING |
| CONDUCTED EMISSIONS | 150 kHz | 30 MHz | 9 kHz |
| RADIATED EMISSIONS | 9 kHz | 150 kHz | 200 Hz |
| RADIATED EMISSIONS | 150 kHz | 30 MHz | 9 kHz |
| RADIATED EMISSIONS | 30 MHz | 1000 MHz | 120 kHz |
| RADIATED EMISSIONS | 1000 MHz | >1 GHz | 1 MHz |

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or carrot ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.