

TEST REPORT



Certification # 1367-01

Laboratory ID

PRODUCT SAFETY ENGINEERING, INC.

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Report Issue Date: 14 Nov 2006

Sample S/N: NA

Sample Receipt Date: 07/27/06

Sample Test Date: 08/15/06 - 09/28/06

Test Report Number: 06F271B1

Model Designation: 2220E

Product Description: Access BPL

Marketing Approval _____

Description of non-standard test method or test practice: *None*

Estimated Measurement Uncertainty: *Not Applicable*

Special limitations of use: *None*

Traceability: *reference standards of measurement have been calibrated by a competent body using standards traceable to the NIST.*

According to testing performed at Product Safety Engineering, Inc., the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in regulations indicated on page (3) of the test report. The test results contained herein relate only to the model(s) identified above. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics.

As the responsible EMC Project Engineer, I hereby declare that the equipment tested as specified above conforms to the requirements indicated on page (3) of the test report.

A handwritten signature in cursive script, appearing to read 'David Foerstner'.

Signature _____

Name David Foerstner

Title Engineering Group Leader

Date 14 Nov 2006

Reviewed by:

A handwritten signature in cursive script, appearing to read 'Steve E. Hohe'.

Approved Signatory _____ Date 14 Nov 2006

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EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

- ☐ - EN 61000-6-3:2001
- ☐ - EN 61000-6-4:2001
- ☐ - EN 55011 : 1998 / A1:1999
 - ☐ - Group 1
 - ☐ - Class A
- ☐ - EN 55013 : 1990 / A12:1994 / A13:1996 / A14:1999
 - ☐ - Group 2
 - ☐ - Class B
- ☐ - EN 55014 -1: 2001
 - ☐ - Household appliances and similar
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 - ☐ - Semiconductor devices
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 - ☐ - Class B
- ☐ -AS/NZS 3548:1995
 - ☐ - Class A
 - ☐ - Class B
- ☐ - ICES-003
 - ☐ - Class A
 - ☐ - Class B
- ☐ - CNS 13438
 - ☐ - Class A
 - ☐ - Class B
- ☐ - VCCI : 1999
 - ☐ - Class A
 - ☐ - Class B
- - FCC Part 15 Sub Part G
"General Technical Requirements"
 - ☐ - Class A
 - ☐ - Class B
 - - Certification
 - ☐ - Verification
 - ☐ - Declaration of Conformity
- ☐ - FCC Part 18

Environmental conditions during testing:

| | LAB | OATS |
|-----------------------|-------|---------|
| Temperature: * | _____ | : _____ |
| Relative Humidity: ** | _____ | : _____ |

* The ambient temperature during the testing was within the range of (50° - 104° F) unless indicted above.
** The humidity levels during the testing was within the range of (10% - 90%) relative humidity unless indicated above.

Power supply system : _____ 110 _____ Volts _____ 60 _____ Hz _____ SINGLE _____ phase

Sign Explanations:

- ☐ - not applicable
- ☒ - applicable

Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)

The *CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)* measurements were performed at the following test location:

☒ - Test not applicable

- ☐ - Darby Test Site (Open Area Test Site)
- ☐ - Darby Laboratory

Test equipment used :

| Model Number | Manufacturer | Description | Serial Number |
|---|--------------------|--------------------|----------------|
| <input type="checkbox"/> - 8028-50 | Solar | 50 Ω LISN | 829012, 829022 |
| <input type="checkbox"/> - 3825/2 | Solar | 50 Ω LISN | 924840 |
| <input type="checkbox"/> - EMC-30 | Electro-Metrics | EMI Receiver | 191 |
| <input type="checkbox"/> - 8566B | Hewlett-Packard | Spectrum Analyzer | 2421A00526 |
| <input type="checkbox"/> - 85650A | Hewlett-Packard | Quasi-Peak Adapter | 2043A00209 |
| <input type="checkbox"/> - 85662A | Hewlett Packard | Analyzer Display | 2403A07352 |
| <input type="checkbox"/> - 8028-50 | Solar | 50 Ω LISN | 903725, 903726 |
| <input type="checkbox"/> - FCC-TLISN-T4 | Fisher Custom Com. | Telecom ISN | 20072 |

Emissions Test Conditions: RADIATED EMISSIONS (Magnetic Field)

The *RADIATED EMISSIONS (MAGNETIC FIELD)* measurements were performed at the following test location:

- ☐ - Darby Test Site (Open Area Test Site)
- ☒ - In-Situ Testing (Vernon, NY & Valrico, FL)
- ☐ -

at a test distance of :

- ☐ - 3 meters
- ☒ - 10 meters

☐ - Test not applicable

Test equipment used :

| Model Number | Manufacturer | Description | Serial Number |
|---|------------------|----------------------|---------------|
| <input type="checkbox"/> - 96005 | Eaton | Log Periodic Antenna | 1099 |
| <input type="checkbox"/> - BIA-25 | Electro-Metrics | Biconical Antenna | 4283 |
| <input type="checkbox"/> - 8566B | Hewlett-Packard | Spectrum Analyzer | 2421A00526 |
| <input type="checkbox"/> - 85662A | Hewlett-Packard | Analyzer Display | 2403A07352 |
| <input type="checkbox"/> - 85650A | Hewlett-Packard | Quasi-Peak Adapter | 2043A00209 |
| <input checked="" type="checkbox"/> - ALR-30M | Electro-Metrics | Loop Antenna | 824 |
| <input checked="" type="checkbox"/> - E7402A | Hewlett Packard | Spectrum Analyzer | US39150137 |
| <input type="checkbox"/> - EMC-30 | Electro-Metrics | EMI Receiver | 191 |
| <input type="checkbox"/> - ALA-130/A | Antenna Research | Loop Antenna | 106 |

Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements, in the frequency range of 30 MHz - 1,000 MHz, were tested in a horizontal and vertical polarization at the following test location :

☐ - Test not applicable

- ☐ - Darby Site (Open Area Test Site)
- ☐ - Darby Lab
- ☒ - In-Situ Testing (Vernon, NY & Valrico, FL)

at a test distance of :

- ☐ - 3 meters
- ☒ - 10 meters
- ☐ - 30 meters

Test equipment used :

| Model Number | Manufacturer | Description | Serial Number |
|--|-----------------|----------------------|---------------|
| <input checked="" type="checkbox"/> - LPA30 | Electro-Metrics | Log Periodic Antenna | 2280 |
| <input checked="" type="checkbox"/> - BIA-30 | Electro-Metrics | Biconical Antenna | 3852 |
| <input type="checkbox"/> - 8566B | Hewlett-Packard | Spectrum Analyzer | 2421A00526 |
| <input type="checkbox"/> - 85662A | Hewlett-Packard | Analyzer Display | 2403A07352 |
| <input type="checkbox"/> - 85650A | Hewlett-Packard | Quasi-Peak Adapter | 2043A00209 |
| <input type="checkbox"/> - 8447D | Hewlett-Packard | Preamplifier (26dB) | 2944A06832 |
| <input type="checkbox"/> - EMC-30 | Electro-Metrics | EMI Receiver | 191 |
| <input checked="" type="checkbox"/> - E7402A | Hewlett Packard | Spectrum Analyzer | US39150137 |
| <input type="checkbox"/> - 85650A | Hewlett Packard | Quasi-Peak Adapter | 2043A00358 |
| <input type="checkbox"/> - 85662A | Hewlett Packard | Analyzer Display | 2340A05806 |
| <input type="checkbox"/> - 96005 | Eaton | Log Periodic | 1099 |
| <input type="checkbox"/> - BIA 25 | Electro-Metrics | Biconical Antenna | 4283 |

Emissions Test Conditions): INTERFERENCE MITIGATION

The *INTERFERENCE MITIGATION* measurements were performed by a direct connection between the EUT and the spectrum analyzer at the following test location :

☐ - Test not applicable

- ☒ - Bench Test
- ☐ -

Test equipment used :

| Model Number | Manufacturer | Description | Serial Number |
|--|-----------------|--------------------|---------------|
| <input type="checkbox"/> - MDS-21 | Rhode&Schwarz | Absorbing Clamp | 8608447020 |
| <input checked="" type="checkbox"/> - E7402A | Hewlett-Packard | Spectrum Analyzer | US39150137 |
| <input type="checkbox"/> - 85662A | Hewlett-Packard | Analyzer Display | 2403A07352 |
| <input type="checkbox"/> - 85650A | Hewlett-Packard | Quasi-Peak Adapter | 2043A00209 |
| <input type="checkbox"/> - 8447D | Hewlett-Packard | Amplifier (26 dB) | 2944A06832 |
| <input type="checkbox"/> - EMC-30 | Electro-Metrics | EMI Receiver | 191 |

The EQUIVALENT RADIATED EMISSIONS measurements in the frequency range GHz - GHz were performed in a horizontal and vertical polarization at the following test location :

- ☐ - Darby Test Site (Open Area Test Site)
- ☐ -
- ☐ -
- ☐ -

at a test distance of:

- ☐ - 1 meters
- ☐ - 3 meters
- ☐ - 10 meters

■ - Test not applicable

Test equipment used :

| Model Number | Manufacturer | Description | Serial Number |
|-----------------------------------|---------------------|-------------------------|----------------------|
| <input type="checkbox"/> - 8566B | Hewlett-Packard | Spectrum Analyzer | 2421A00526 |
| <input type="checkbox"/> - 85662A | Hewlett-Packard | Analyzer Display | 2403A07352 |
| <input type="checkbox"/> - 85650A | Hewlett-Packard | Quasi-Peak Adapter | 2043A00209 |
| <input type="checkbox"/> - 8449B | Hewlett-Packard | Preamplifier | 3008A00320 |
| <input type="checkbox"/> - 3115 | Electro-Mechanics | Double Ridge Guide Horn | 3810 |

The ANTENNA TERMINAL DISTURBANCE VOLTAGE in the frequency range 30 MHz - 1,000 MHz were performed.

- ☐ - Darby Test Site (Open Area Test Site)
- ☐ - Laboratory
- ☐ -
- ☐ -

■ - Test not applicable

| Model Number | Manufacturer | Description | Serial Number |
|--|---------------------|-----------------------------|----------------------|
| <input type="checkbox"/> - 2F9-3C4-3C5 | Wavecom | UHF PAL TV Modulator | 185879 |
| <input type="checkbox"/> - 2F1-3C4-3C5 | Wavecom | VHF PAL TV Modulator | 157728 |
| <input type="checkbox"/> - A-8000 | IFR | Spectrum Analyzer | 1306 |
| <input type="checkbox"/> - 8648B | Hewlett-Packard | Signal Generator | 3623A01433 |
| <input type="checkbox"/> - 8648B | Hewlett-Packard | Signal Generator | 3623A01477 |
| <input type="checkbox"/> - LMV-182A | Leader | RMS Milli-Voltmeter | 8010091 |
| <input type="checkbox"/> - 3202 | Krhon-Hite | Active filter | 5899 |
| <input type="checkbox"/> - FMT115 | Leaming | FM Modulator | NONE |
| <input type="checkbox"/> - 371 | UDT | Optical power meter | 06657 |
| <input type="checkbox"/> - TSG95 | Tektronix | PAL video / Audio generator | B028883 |
| <input type="checkbox"/> - | | | |

Equipment Under Test (EUT) Test Operation Mode - Emission tests :

The device under test was operated under the following conditions during emissions testing:

- ☐ - Standby
- ☐ - Test program (H - Pattern)
- ☐ - Test program (color bar)
- ☒ - Test program (customer specific)
- ☐ - Practice operation
- ☐ - Normal Operating Mode
- ☐ -

Configuration of the device under test:

- ☐ - See System Under Test Information in Appendix B

Rationale for EUT setup / configuration:

(1) Testing performed was made in accordance with the Guidelines for Access BPL systems specified by the Commission.

(2) Compliance with 15.611(c) (1) (i) were made on the bench per OET recommendations

Emission Test Results:

Conducted emissions 150 kHz - 30 MHz

The requirements are ☐ - MET ☐ - NOT MET
Minimum limit margin dB at MHz
Remarks: Not Applicable

Radiated emissions (magnetic field) 10 kHz - 30 MHz

The requirements are ☒ - MET ☐ - NOT MET
Minimum limit margin 0.1 dB at 11.7 MHz
Remarks: See Page A20

Radiated emissions (electric field) 30 MHz - 1,000 MHz

The requirements are ☒ - MET ☐ - NOT MET
Minimum limit margin 0.4 dB at 800 MHz
Remarks: See Page A13

Interference Mitigation / Excluded Bands

The requirements are ☒ - MET ☐ - NOT MET
Minimum limit margin >20 dB at MHz
Remarks: See Excluded Bands Plots Exhibit

Radiated emissions GHz - GHz

The requirements are ☐ - MET ☐ - NOT MET
Minimum limit margin dB at GHz
Remarks: Not Applicable

Antenna Terminal Disturbance Voltage 30 MHz - 1,000 MHz

The requirements are ☐ - MET ☐ - NOT MET
Minimum limit margin dB at MHz
Remarks: Not Applicable

GENERAL REMARKS:

SUMMARY:

The requirements according to the technical regulations are

- - met
- - **not** met.

The device under test does

- - fulfill the general approval requirements mentioned on page 3.
- - **not** fulfill the general approval requirements mentioned on page 3.

Testing Start Date 08/15/2006

Testing End Date: 09/28/2006

- PRODUCT SAFETY ENGINEERING INC -

APPENDIX

A

Test Equipment Calibration Information & Test Data Sheets

TEST EQUIPMENT CALIBRATION INFORMATION

| Manufacturer | Model | Description | Serial Number | Cal Due |
|-------------------|-----------|-------------------------|---------------|----------|
| Hewlett Packard | 8566B | Spectrum Analyzer | 2421A00526 | 07/18/06 |
| Hewlett Packard | 85662A | Display | 2403A07352 | 07/18/06 |
| Hewlett Packard | 85650A | Quasi-Peak Adapter | 2043A00209 | 07/18/06 |
| Hewlett Packard | 8447D | Preamp 0.1 - 1,000 MHz | 2944A06832 | 12/08/06 |
| Hewlett Packard | 8568B | Spectrum Analyzer | 2407A03213 | 08/03/06 |
| Hewlett Packard | 85662A | Display | 2340A05806 | 08/03/06 |
| Hewlett Packard | 85650A | Quasi-Peak Adapter | 2043A00358 | 08/03/06 |
| Hewlett Packard | 8447D | Preamp 0.1 - 1,000 MHz | 2944A06901 | 08/03/06 |
| Hewlett Packard | 8447D | Preamp 0.1 - 1,000 MHz | 1937A03247 | 08/03/06 |
| Hewlett Packard | 8449B | Preamp 1 - 26.5 GHz | 3008A00320 | 12/08/06 |
| Hewlett Packard | 8648B | Signal Generator | 3443U00312 | 05/26/06 |
| Hewlett Packard | E7402A | Spectrum Analyzer | US39150137 | 12/08/06 |
| EMCO | 3148 | Log Periodic Antenna | 00044783 | 03/24/07 |
| Electro-Metrics | LPA 30 | Log Periodic Antenna | 2280 | 12/14/06 |
| Electro-Metrics | BIA 30 | Biconical Antenna | 3852 | 12/12/06 |
| Electro-Metrics | BIA 25 | Biconical Antenna | 4283 | 04/10/07 |
| Electro-Mechanics | 3115 | Double Ridge Guide Ant. | 3810 | 11/28/07 |
| Electro-Metrics | ALR30M | Magnetic Loop Antenna | 824 | 12/12/06 |
| Solar | 8012 | LISN | 924840 | 04/06/07 |
| Solar | 8028 | LISN | 829012/809022 | 12/12/06 |
| Solar | 8028 | LISN | 903725/903726 | 11/22/06 |
| Schwartzbeck | MDS-21 | Absorbing Clamp | 02581 | 04/27/07 |
| Leader | LFG1310 | Function Generator | 8060233 | 05/26/06 |
| Electro-Metrics | EMC-30 | EMI Receiver | 191 | 05/26/06 |
| Antenna Research | ALA-130/A | Loop Antenna | 106 | 06/02/06 |
| Cole-Palmer | 9970-00 | Digital Barometer | 61493735 | 03/13/07 |

Description of Testing

1.0 Objective

2.0 Applicable Rules and Limits

2.1 - General Rules

2.2 - Rules for Equipment operating under (30) MHz

2.3 - Limits

3.0 Testing Methodologies

3.1 - General Guidelines

3.2 - Medium Voltage Overhead Lines

3.3 - Medium Voltage Underground Lines

3.4 - Low Voltage Lines

3.5 - Interference Mitigation / Excluded Bands

4.0 Description of Test Sites

5.0 Test Results Summary

5.1 - Radiated Emissions

5.2 - Excluded Bands

1.0 Objective

The purpose of the testing was to demonstrate that the system under test, operating below (30) MHz, is in compliance with 47 CFR Part 15, subpart G.

2.0 Applicable Rules and Limits

2.1 General Rules

15.605 Cross reference.

(a) The provisions of Subparts A and B of this part apply to Access BPL devices, except where specifically noted. The provisions of Subparts C through F of this part do not apply to Access BPL devices except where specifically noted.

(b) The requirements of this subpart apply only to the radio circuitry that is used to provide carrier current operation for the Access BPL device. Other aspects of the operation of an Access BPL device may be subject to requirements contained elsewhere in this chapter. In particular, an Access BPL device that includes digital circuitry that is not used solely to enable the operation of the radio frequency circuitry used to provide carrier current operation also is subject to the requirements for unintentional radiators in Subpart B of this part.

15.611 General Technical Requirements

(a) Conducted emission limits.

Access BPL is not subject to the conducted emission limits of §15.107

(b) Radiated emission limits.

(1) Medium voltage power lines.

(i) Access BPL systems that operate in the frequency range of 1.705 kHz to 30 MHz over medium voltage power lines shall comply with the radiated emission limits for intentional radiators provided in §15.209.

(ii) Access BPL systems that operate in the frequency range above 30 MHz over medium voltage power lines shall comply with the radiated emission limits provided in §15.109(b).

(2) Low voltage power lines.

Access BPL systems that operate over low-voltage power lines, including those that operate over low-voltage lines that are connected to the in-building wiring, shall comply with the radiated emission limits provided in §15.109(a) and (e).

(c) Interference Mitigation and Avoidance.

(1) Access BPL systems shall incorporate adaptive interference mitigation techniques to remotely reduce power and adjust operating frequencies, in order to avoid site-specific, local use of the same spectrum by licensed services. These techniques may include adaptive or “notch” filtering, or complete avoidance of frequencies, or bands of frequencies, locally used by licensed radio operations.

(i) For frequencies below 30 MHz, when a notch filter is used to avoid interference to a specific frequency band, the Access BPL system shall be capable of attenuating emissions within that band to a level at least 20 dB below the applicable Part 15 limits.

(ii) For frequencies above 30 MHz, when a notch filter is used to avoid interference to a specific frequency band, the Access BPL system shall be capable of attenuating emissions within that band to a level at least 10 dB below the applicable Part 15 limits.

15.613 Measurement procedures.

Compliance measurements for Access BPL shall be made in accordance with the Guidelines for Access BPL systems specified by the Commission.

2.2 - Rules for Equipment operating under (30) MHz

(a) Conducted emission limits.

Access BPL is not subject to the conducted emission limits of §15.107

(b) Radiated emission limits.

(1) Medium voltage power lines.

(i) Access BPL systems that operate in the frequency range of 1.705 kHz to 30 MHz over medium voltage power lines shall comply with the radiated emission limits for intentional radiators provided in §15.209.

(2) Low voltage power lines.

Access BPL systems that operate over low-voltage power lines, including those that operate over low-voltage lines that are connected to the in-building wiring, shall comply with the radiated emission limits provided in §15.109(a) and (e).

(c) Interference Mitigation and Avoidance.

(1) Access BPL systems shall incorporate adaptive interference mitigation techniques to remotely reduce power and adjust operating frequencies, in order to avoid site-specific, local use of the same spectrum by licensed services. These techniques may include adaptive or “notch” filtering, or complete avoidance of frequencies, or bands of frequencies, locally used by licensed radio operations.

(i) For frequencies below 30 MHz, when a notch filter is used to avoid interference to a specific frequency band, the Access BPL system shall be capable of attenuating emissions within that band to a level at least 20 dB below the applicable Part 15 limits.

15.613 Measurement procedures.

Compliance measurements for Access BPL shall be made in accordance with the Guidelines for Access BPL systems specified by the Commission.

2.3 Limits

15.209 Radiated emission limits, general requirements.

| Frequency | Field Strength | Measurement Distance |
|------------|--------------------|----------------------|
| (MHz) | (microvolts/meter) | (meters) |
| 1.705-30.0 | 30 | 30 |

15.109 Radiated emission limits.

(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

| Frequency of Emission (MHz) | Field Strength (microvolts/meter) |
|--------------------------------|--------------------------------------|
| 30 - 88 | 100 |
| 88 - 216 | 150 |
| 216 - 960 | 200 |

(b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

| Frequency of Emission (MHz) | Field Strength (microvolts/meter) |
|--------------------------------|--------------------------------------|
| 30 - 88 | 90 |
| 88 - 216 | 150 |
| 216 - 960 | 210 |

(e) Carrier current systems used as unintentional radiators or other unintentional radiators that are designed to conduct their radio frequency emissions via connecting wires or cables and that operate in the frequency range of 9 kHz to 30 MHz, including devices that deliver the radio frequency energy to transducers, such as ultrasonic devices not covered under Part 18 of this chapter, shall comply with the radiated emission limits for intentional radiators provided in §15.209 for the frequency range of 9 kHz to 30 MHz. As an alternative, carrier current systems used as unintentional radiators and operating in the frequency range of 525 kHz to 1705 kHz may comply with the radiated emission limits provided in §15.221(a). At frequencies above 30 MHz, the limits in paragraphs (a), (b) or (g) of this section, as appropriate, continue to apply.

3.0 Testing Methodologies

3.1 - General Guidelines

1) Testing shall be performed with the power settings of the Equipment Under Test (EUT) set at the maximum level.

The power level of the equipment under test is by default set to maximum. This maximum level was attenuated in overhead installations by applying a specific power mask as described in the operational description exhibit. All in-situ testing was performed with notches activated in the excluded bands.

2) Testing shall be performed using the maximum RF injection duty factor (burst rate). Test modes or test software may be used for uplink and downlink transmissions.

Throughout the emissions testing, the BPL signal injected into the network by the test software was set to simulate "peak traffic" as would be experienced by the network during the hour of peak usage. The burst rate of this test signal was verified to be greater than (100) bursts per second. We typically observed throughput between (5 - 20) Mbps.

3) Measurements should be made at a test site where the ambient signal level is 6 dB below the applicable limit. (See ANSI C63.4-2003, section 5.1.2 for alternatives, if this test condition cannot be achieved.)

The measured levels of ambient plus the EUT radio noise were not above the limit.

4) If the data communications burst rate is at least 20 burst per second, quasi-peak measurements shall be employed, as specified in Section 15.35(a). If the data communications burst rate is 20 bursts per second or less, measurements shall be made using a peak detector.

The burst rate was measured and found to be greater than (20) burst per second.

5) For frequencies above 30 MHz, an electric field sensing antenna, such as a biconical antenna is used. The signal shall be maximized for antenna heights from 1 to 4 meters, for both horizontal and vertical polarizations, in accordance to ANSI C63.4-2003 procedures. For Access BPL measurements only, as an alternative to varying antenna height from 1 to 4 meters, these measurements may be made at a height of 1 meter provided that the measured field strength values are increased by a factor of 5 dB to account for height effects.

Measurements made between (30-200) MHz were made with a biconical antenna. Measurements made between (200 - 1,00) MHz were made with a log periodic antenna. The antenna height was maintained at (1) meter, both vertical and horizontal polarities were observed and the values of measured emissions were increased by a factor of (5) dB.

6) For frequencies below 30 MHz, an active or passive magnetic loop is used. The magnetic loop antenna should be at 1 meter height with its plane oriented vertically and the emission maximized by rotating the antenna 180 degrees about its vertical axis. When using active magnetic loops, care should be taken to prevent ambient signals from overloading the spectrum analyzer or antenna pre-amplifier.

All measurements made below (30) MHz were performed with a passive magnetic loop antenna at a (1) meter height with its plane oriented vertically and the emission maximized by rotating the antenna 180 degrees about its vertical axis.

7) The six highest radiated emissions relative to the limit and independent of antenna polarization shall be reported as stated in ANSI C63.4-2003, section 10.1.8.2.

The six highest emissions relative to the limit and independent of antenna polarization are included in Appendix "A" of the test report.

8) All operational modes should be tested including all frequency bands of operation, as required by 47 CFR §15.31(i).

The system operates in various frequency modes. The entire frequency range of operation is (2-30) MHz. We tested the product first in mode (10) which operates between (2-12) MHz. We then repeated the testing while operating in mode (11) which operates between (7-30) MHz. Each test mode of operation was controlled by simulation software to simulate a normal operational mode.

9) The Equipment Under Test (EUT) includes all BPL electronic devices e.g., couplers, injectors, extractors, repeaters, boosters, concentrators, and electric utility overhead or underground medium voltage lines.

The EUT included all BPL electronic devices. There is one model with (2) associated overhead couplers and (1) unique coupler for underground installations. Both medium voltage and low voltage lines were independently tested.

10) In-situ testing shall be performed on three typical installations for overhead line(s) and three typical installations for underground line(s).

The in-situ testing was performed on three typical installations for overhead line(s) and three typical installations for underground line(s).

3.2 - Medium Voltage Overhead Lines

1) Measurements should normally be performed at a horizontal separation distance of 10 meters from the overhead line.

Measurements were performed at a horizontal separation distance of 10 meters from the overhead line.

2) Testing shall be performed at distances of 0, $\frac{1}{4}$, $\frac{1}{2}$, —, and 1 wavelength down the line from the BPL injection point on the power line. Wavelength spacing is based on the mid-band frequency used by the EUT. In addition, if the mid-band frequency exceeds the lowest frequency injected onto the power line by more than a factor of two, testing shall be extended in steps of $\frac{1}{2}$ wavelength of the mid-band frequency until the distance equals or exceeds $\frac{1}{2}$ wavelength of the lowest frequency injected.

The equipment under test operates between (2 - 30) MHz. The midband frequency is (16) MHz. Measurements were performed at distances of (0, 4.7, 9.4, 14.1, 18.8, 28.1, 37.5, 46.9, 56.3, 65.6 & 75) meters down the line. The testing was extended in steps of $\frac{1}{2}$ wavelength of the mid-band frequency until the distance exceeded $\frac{1}{2}$ wavelength of the lowest frequency injected.

3) Testing shall be repeated for each Access BPL component (injector, extractor, repeater, booster, concentrator, etc.)

There is only (1) model under test.

4) The distance correction for the overhead-line measurements shall be based on the slant range distance, which is the line-of-sight distance from the measurement antenna to the overhead line. Slant range distance corrections are to be made in accordance with Section 15.31(f) of the Rules.

Slant range distance corrections were calculated for each measurement location based on the height above ground of the utility company phase line used for coupling. For frequencies below (30) MHz, the calculations were based on $(40 \log 30/\text{distance})$. This correction factor was then added to the limit of (30) uV/m or (29.5) dBuV/m stated at (30) meters. For frequencies above (30) MHz, the calculations were based on $(20 \log (10/\text{distance}))$. This correction factor was then added to the appropriate limit.

3.3 - Medium Voltage Underground Lines

1) Underground line installations are those in which the BPL device is mounted in, or attached to, a pad-mounted transformer housing or a ground-mounted junction box and couples directly only to underground cables.

BPL devices were mounted in pad-mounted transformer housing.

2) Measurements should normally be performed at a separation distance of 10 meters from the in-ground power transformer that contains the BPL device(s). If necessary, due to ambient emissions, measurements may be performed a distance of 3 meters. Distance corrections are to be made in accordance with Section 15.31(f) of the Rules.

Measurements were performed at a distance of (10) meters.

3) Measurements shall be made at positions around the perimeter of the in-ground power transformer where the maximum emissions occur. ANSI C63.4-2003, section 8.1, specifies a minimum of 16 radial angles surrounding the EUT (In-ground transformer that contains the BPL device(s)). If directional radiation patterns are suspected, additional azimuth angles shall be examined.

Measurements were performed at (16) equidistant radials around the BPL device.

3.4 - Low Voltage Lines

In cases where Access BPL devices are coupled to low-voltage power lines (i.e., Home-Plug or modem boosters), apply the overhead-line procedures as stated above along the low-voltage lines.

Measurements were performed at a horizontal separation distance of 10 meters from the low voltage lines. Measurements were performed at distances of (0, 4.7, 9.4, 14.1, 18.8, 28.1, 37.5, 46.9, 56.3, 65.6 & 75) meters down the line unless the measuring antenna would have been positioned within (10) meters of the associated building.

There were a total of (3) underground locations and (3) overhead locations where the low voltage lines were tested which meets the requirements.

3.5 - Interference Mitigation / Excluded Bands

No in-situ measurements are required. The preferred methodology is to perform bench measurements showing the attenuation characteristics of any notching filters.

We connected the BPL output directly to the input of the spectrum analyzer. The power level of the EUT was set at maximum power. We set the EUT into an un-notched condition and measured each frequency band of interest. We recorded the peak amplitude of any signal found within that band. We then set the EUT into a notched state and recorded the peak amplitude of any signal found within the same band. We compared the two results and recorded the difference as the minimum attenuation achieved by the notch activation.

4.0 Description of Test Locations

The measurement guidelines require a total of (3) overhead medium voltage locations and (3) underground medium voltage locations. The (3) overhead test locations were located in Vernon, NY and the underground test locations were located in Valrico, FL. The overhead locations were separated by a minimum (700) meters which represents twice the typical operational separation between any two nodes.

5.0 Test Results Summary

5.1 - Radiated Emissions

The worst case results of the total (6) locations was observed at the location on Willow road in Vernon, NY at (11.7) MHz having a margin of (0.1) dB.

5.2 - Excluded Bands

The minimum measured notch attenuation for excluded bands was (25) dB as shown in the plots of exhibit excluded bands plots.pdf.

TEST DATA

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Overhead Location #1 with Artheche Coupler

Location: Indiantown Road

Test Description: Medium Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 16.2 | 0 m | 10 m | 43.9 | 14.8 | 0 | 29.1 | 29.5 | 0.4 |
| 20.5 | 4.7 m | 10 m | 43.4 | 14.8 | 0 | 28.6 | 29.5 | 0.9 |
| 18.6 | 9.4 m | 10 m | 41.3 | 14.8 | 0 | 26.5 | 29.5 | 3.0 |
| 14.9 | 14.1 m | 10 m | 42.0 | 14.8 | 0 | 27.2 | 29.5 | 2.3 |
| 17.4 | 18.8 m | 10 m | 40.0 | 14.8 | 0 | 25.2 | 29.5 | 4.3 |
| 17.4 | 28.1 m | 10 m | 40.4 | 14.8 | 0 | 25.6 | 29.5 | 3.9 |
| 16.3 | 37.5 m | 10 m | 38.8 | 14.8 | 0 | 24.0 | 29.5 | 5.5 |
| 14.7 | 46.9 m | 10 m | 38.0 | 14.8 | 0 | 23.2 | 29.5 | 6.3 |
| 13.7 | 56.3 m | 10 m | 37.1 | 14.8 | 0 | 22.3 | 29.5 | 7.2 |
| 16.1 | 65.6 m | 10 m | 37.1 | 14.8 | 0 | 22.3 | 29.5 | 7.2 |
| 16.1 | 75.0 m | 10 m | 37.5 | 14.8 | 0 | 22.7 | 29.5 | 6.8 |

1 (wire height above antenna height = 8.0 m) (slant distance = 12.8 m) (distance correction = $(40 \log 30/12.8)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Overhead Location #1 with Artheche Coupler

Location: Indiantown Road

Test Description: Low Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 4.2 | 0 m | 10 m | 45.0 | 15.7 | 0 | 29.3 | 29.5 | 0.2 |
| 2.3 | 4.7 m | 10 m | 44.7 | 15.7 | 0 | 29.0 | 29.5 | 0.5 |
| 12.0 | 9.4 m | 10 m | 43.9 | 15.7 | 0 | 28.2 | 29.5 | 1.3 |
| 12.5 | 14.1 m | 10 m | 43.1 | 15.7 | 0 | 27.4 | 29.5 | 2.1 |

1 (wire height above antenna height = 6.9 m) (slant distance = 12.15 m) (distance correction = $(40 \log 30/12.15)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Overhead Location #1 with Artheche Coupler

Location: Indiantown Road

Test Description: Medium Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position Worst Case | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 10m | Margin dB |
|------------------|--------------------------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 80 | * | 10 m | 28.5 | -2.1 | 5 | 35.6 | 39.1 | 3.5 |
| 160 | * | 10 m | 35.2 | -2.1 | 5 | 42.3 | 43.5 | 1.2 |
| 240 | * | 10 m | 35.0 | -2.1 | 5 | 42.1 | 46.4 | 4.3 |
| 400 | * | 10 m | 37.4 | -2.1 | 5 | 44.5 | 46.4 | 1.9 |
| 440 | * | 10 m | 35.7 | -2.1 | 5 | 42.8 | 46.4 | 3.6 |
| 480 | * | 10 m | 35.1 | -2.1 | 5 | 42.2 | 46.4 | 4.2 |
| 800 | * | 10 m | 39.1 | -2.1 | 5 | 46.2 | 46.4 | 0.4 |
| 900 | * | 10 m | 38.5 | -2.1 | 5 | 45.6 | 46.4 | 0.8 |

1 (wire height above antenna height = 8.0 m) (slant distance = 12.8 m) (distance correction = $(20 \log 10/12.8)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Overhead Location #1 with Artheche Coupler

Location: Indiantown Road

Test Description: Low Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position Worst Case | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 3m | Margin dB |
|------------------|--------------------------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|-----------------------|--------------|
| 80 | * | 10 m | 24.7 | -1.7 | 5 | 31.8 | 39.1 | 7.3 |
| 160 | * | 10 m | 33.0 | -1.7 | 5 | 40.1 | 43.5 | 3.4 |
| 240 | * | 10 m | 34.5 | -1.7 | 5 | 41.6 | 46.4 | 4.8 |
| 400 | * | 10 m | 36.1 | -1.7 | 5 | 43.2 | 46.4 | 3.2 |
| 440 | * | 10 m | 34.6 | -1.7 | 5 | 41.7 | 46.4 | 4.7 |
| 480 | * | 10 m | 35.9 | -1.7 | 5 | 43.0 | 46.4 | 3.4 |
| 800 | * | 10 m | 35.8 | -1.7 | 5 | 42.9 | 46.4 | 3.5 |
| 900 | * | 10 m | 37.8 | -1.7 | 5 | 44.9 | 46.4 | 1.5 |

1 (wire height above antenna height = 6.9 m) (slant distance = 12.15 m) (distance correction = $(20 \log 3/12.15)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Overhead Location # 2 with Artheche Coupler

Location: Willow Road

Test Description: Medium Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 17.5 | 0 m | 10 m | 42.2 | 13.0 | 0 | 29.2 | 29.5 | 0.3 |
| 17.5 | 4.7 m | 10 m | 42.3 | 13.0 | 0 | 29.3 | 29.5 | 0.2 |
| 19.2 | 9.4 m | 10 m | 41.6 | 13.0 | 0 | 28.6 | 29.5 | 0.9 |
| 14.5 | 14.1 m | 10 m | 40.6 | 13.0 | 0 | 27.6 | 29.5 | 1.9 |
| 16.6 | 18.8 m | 10 m | 39.2 | 13.0 | 0 | 26.2 | 29.5 | 3.3 |
| 12.1 | 28.1 m | 10 m | 39.9 | 13.0 | 0 | 26.9 | 29.5 | 2.6 |
| 14.9 | 37.5 m | 10 m | 38.5 | 13.0 | 0 | 25.5 | 29.5 | 4.0 |
| 12.4 | 46.9 m | 10 m | 39.8 | 13.0 | 0 | 26.8 | 29.5 | 2.7 |
| 2.2 | 56.3 m | 10 m | 38.1 | 13.0 | 0 | 25.1 | 29.5 | 4.4 |
| 14.5 | 65.6 m | 10 m | 37.6 | 13.0 | 0 | 24.6 | 29.5 | 4.9 |
| 18.4 | 75.0 m | 10 m | 39.6 | 13.0 | 0 | 26.6 | 29.5 | 2.9 |

1 (wire height above antenna height = 10.1 m) (slant distance = 14.2 m) (distance correction = $(40 \log 30/14.2)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Overhead Location # 2 with Artheche Coupler

Location: Willow Road

Test Description: Low Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 23.2 | 0 m | 10 m | 43.2 | 13.9 | 0 | 29.3 | 29.5 | 0.2 |
| 27.8 | 4.7 m | 10 m | 43.1 | 13.9 | 0 | 29.2 | 29.5 | 0.3 |
| 12.5 | 9.4 m | 10 m | 43.2 | 13.9 | 0 | 29.3 | 29.5 | 0.2 |
| | | | | | | | | |
| | | | | | | | | |

1 (wire height above antenna height = 9.1m) (slant distance = 13.5 m) (distance correction = $(40 \log 30/13.5)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Overhead Location # 2 with Artheche Coupler

Location: Willow Road

Test Description: Medium Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position Worst Case | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 10m | Margin dB |
|------------------|--------------------------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 80 | * | 10 m | 30.7 | -3.0 | 5 | 38.7 | 39.1 | 0.4 |
| 160 | * | 10 m | 33.7 | -3.0 | 5 | 41.7 | 43.5 | 1.8 |
| 240 | * | 10 m | 37.9 | -3.0 | 5 | 45.9 | 46.4 | 0.5 |
| 400 | * | 10 m | 36.8 | -3.0 | 5 | 44.8 | 46.4 | 1.6 |
| 440 | * | 10 m | 38.4 | -3.0 | 5 | 46.2 | 46.4 | 0.2 |
| 480 | * | 10 m | 35.7 | -3.0 | 5 | 43.7 | 46.4 | 2.7 |
| 600 | * | 10 m | 37.6 | -3.0 | 5 | 45.6 | 46.4 | 0.8 |
| 800 | * | 10 m | 37.0 | -3.0 | 5 | 45.0 | 46.4 | 1.4 |
| 900 | * | 10 m | 38.8 | -3.0 | 5 | 46.2 | 46.4 | 0.2 |

1 (wire height above antenna height = 10.1 m) (slant distance = 14.2 m) (distance correction = $(20 \log 10/14.2)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Overhead Location # 2 with Artheche Coupler

Location: Willow Road

Test Description: Low Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position Worst Case | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 3m | Margin dB |
|------------------|--------------------------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|-----------------------|--------------|
| 80 | * | 10 m | 28.4 | -2.6 | 5 | 36.0 | 39.1 | 3.1 |
| 160 | * | 10 m | 32.0 | -2.6 | 5 | 39.6 | 43.5 | 3.9 |
| 240 | * | 10 m | 36.7 | -2.6 | 5 | 44.3 | 46.4 | 2.1 |
| 400 | * | 10 m | 36.0 | -2.6 | 5 | 43.6 | 46.4 | 2.8 |
| 440 | * | 10 m | 35.9 | -2.6 | 5 | 43.5 | 46.4 | 2.9 |
| 480 | * | 10 m | 34.6 | -2.6 | 5 | 42.2 | 46.4 | 4.2 |
| 600 | * | 10 m | 35.7 | -2.6 | 5 | 43.3 | 46.4 | 3.1 |
| 800 | * | 10 m | 36.3 | -2.6 | 5 | 43.9 | 46.4 | 2.5 |
| 900 | * | 10 m | 36.6 | -2.6 | 5 | 44.2 | 46.4 | 2.2 |

1 (wire height above antenna height = 9.1m) (slant distance = 13.5 m) (distance correction = $(20 \log 10/13.5)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Overhead Location #3 with Artheche Coupler

Location: Marble Road

Test Description: Medium Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 16.6 | 0 m | 10 m | 43.5 | 14.4 | 0 | 29.1 | 29.5 | 0.4 |
| 19.3 | 4.7 m | 10 m | 43.4 | 14.4 | 0 | 29.0 | 29.5 | 0.5 |
| 2.4 | 9.4 m | 10 m | 43.5 | 14.4 | 0 | 29.1 | 29.5 | 0.4 |
| 11.1 | 14.1 m | 10 m | 42.0 | 14.4 | 0 | 27.6 | 29.5 | 1.9 |
| 2.4 | 18.8 m | 10 m | 42.8 | 14.4 | 0 | 28.4 | 29.5 | 1.1 |
| 19.4 | 28.1 m | 10 m | 40.8 | 14.4 | 0 | 26.4 | 29.5 | 3.1 |
| 18.5 | 37.5 m | 10 m | 40.0 | 14.4 | 0 | 25.6 | 29.5 | 3.9 |
| 18.5 | 46.9 m | 10 m | 38.2 | 14.4 | 0 | 23.8 | 29.5 | 5.7 |
| 10.5 | 56.3 m | 10 m | 39.6 | 14.4 | 0 | 25.2 | 29.5 | 4.3 |
| 16.5 | 65.6 m | 10 m | 39.9 | 14.4 | 0 | 25.5 | 29.5 | 4.0 |
| 2.2 | 75.0 m | 10 m | 37.6 | 14.4 | 0 | 23.2 | 29.5 | 6.3 |

1 (wire height above antenna height = 8.5 m) (slant distance = 13.1 m) (distance correction = $(40 \log 30/13.1)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Overhead Location #3 with Artheche Coupler

Location: Marble Road

Test Description: Low Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 2.3 | 0 m | 10 m | 44.0 | 15.2 | 0 | 28.8 | 29.5 | 0.7 |
| 16.2 | 4.7 m | 10 m | 43.8 | 15.2 | 0 | 28.6 | 29.5 | 0.9 |
| 2.4 | 9.4 m | 10 m | 43.5 | 15.2 | 0 | 28.3 | 29.5 | 1.2 |
| 16.1 | 14.1 m | 10 m | 44.0 | 15.2 | 0 | 28.8 | 29.5 | 0.7 |
| 13.5 | 18.8 m | 10 m | 43.6 | 15.2 | 0 | 28.4 | 29.5 | 1.1 |
| 13.5 | 28.1 m | 10 m | 42.6 | 15.2 | 0 | 27.4 | 29.5 | 2.1 |
| 13.6 | 37.5 m | 10 m | 41.9 | 15.2 | 0 | 26.7 | 29.5 | 2.8 |
| 13.6 | 46.9 m | 10 m | 40.7 | 15.2 | 0 | 25.5 | 29.5 | 4.0 |

1 (wire height above antenna height =7.5 m) (slant distance = 12.5 m) (distance correction = $(40 \log 30/12.5)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Overhead Location #3 with Artheche Coupler

Location: Marble Road

Test Description: Medium Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 10m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 80 | * | 10 m | 26.8 | -2.3 | 5 | 34.1 | 39.1 | 5.0 |
| 160 | * | 10 m | 32.0 | -2.3 | 5 | 39.3 | 43.5 | 4.2 |
| 240 | * | 10 m | 33.8 | -2.3 | 5 | 41.1 | 46.4 | 5.3 |
| 400 | * | 10 m | 35.6 | -2.3 | 5 | 42.9 | 46.4 | 3.5 |
| 440 | * | 10 m | 34.6 | -2.3 | 5 | 41.9 | 46.4 | 4.5 |
| 480 | * | 10 m | 37.0 | -2.3 | 5 | 44.3 | 46.4 | 2.1 |
| 600 | * | 10 m | 38.2 | -2.3 | 5 | 45.5 | 46.4 | 0.9 |
| 800 | * | 10 m | 36.9 | -2.3 | 5 | 42.2 | 46.4 | 2.2 |
| 900 | * | 10 m | 37.8 | -2.3 | 5 | 45.1 | 46.4 | 1.3 |

1 (wire height above antenna height = 8.5 m) (slant distance = 13.1 m) (distance correction = $(20 \log 10/13.1)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Overhead Location #3 with Artheche Coupler

Location: Marble Road

Test Description: Low Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 3m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|-----------------------|--------------|
| 80 | * | 10 m | 25.8 | -1.9 | 5 | 32.7 | 39.1 | 6.4 |
| 160 | * | 10 m | 30.1 | -1.9 | 5 | 37.0 | 43.5 | 6.5 |
| 240 | * | 10 m | 32.5 | -1.9 | 5 | 39.4 | 46.4 | 7.0 |
| 400 | * | 10 m | 34.8 | -1.9 | 5 | 41.7 | 46.4 | 4.7 |
| 440 | * | 10 m | 33.0 | -1.9 | 5 | 39.9 | 46.4 | 6.5 |
| 480 | * | 10 m | 34.8 | -1.9 | 5 | 41.7 | 46.4 | 4.7 |
| 600 | * | 10 m | 35.2 | -1.9 | 5 | 42.1 | 46.4 | 4.3 |
| 800 | * | 10 m | 34.9 | -1.9 | 5 | 41.8 | 46.4 | 4.6 |
| 900 | * | 10 m | 35.3 | -1.9 | 5 | 42.2 | 46.4 | 4.2 |

1 (wire height above antenna height = 7.5 m) (slant distance = 12.5 m) (distance correction = $(20 \log 10/12.5)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Overhead Location #1 with IBEC Coupler

Location: Indiantown Road

Test Description: Medium Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 24.1 | 0 m | 10 m | 42.9 | 14.8 | 0 | 28.1 | 29.5 | 1.4 |
| 17.5 | 4.7 m | 10 m | 43.8 | 14.8 | 0 | 29.0 | 29.5 | 0.5 |
| 16.3 | 9.4 m | 10 m | 41.9 | 14.8 | 0 | 27.1 | 29.5 | 2.4 |
| 15.7 | 14.1 m | 10 m | 42.1 | 14.8 | 0 | 27.3 | 29.5 | 2.2 |
| 8.3 | 18.8 m | 10 m | 39.2 | 14.8 | 0 | 24.4 | 29.5 | 5.1 |
| 18.6 | 28.1 m | 10 m | 38.6 | 14.8 | 0 | 23.8 | 29.5 | 5.7 |
| 2.3 | 37.5 m | 10 m | 37.9 | 14.8 | 0 | 23.1 | 29.5 | 6.4 |
| 14.9 | 46.9 m | 10 m | 36.9 | 14.8 | 0 | 22.1 | 29.5 | 7.4 |
| 2.1 | 56.3 m | 10 m | 38.3 | 14.8 | 0 | 23.5 | 29.5 | 6.0 |
| 6.3 | 65.6 m | 10 m | 38.3 | 14.8 | 0 | 23.5 | 29.5 | 6.0 |
| 2.2 | 75.0 m | 10 m | 37.3 | 14.8 | 0 | 22.5 | 29.5 | 7.0 |

1 (wire height above antenna height = 8.0 m) (slant distance = 12.8 m) (distance correction = (40 log 30/12.8.)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Overhead Location #1 with IBEC Coupler

Location: Indiantown Road

Test Description: Low Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 4.2 | 0 m | 10 m | 45.0 | 15.7 | 0 | 29.3 | 29.5 | 0.2 |
| 2.3 | 4.7 m | 10 m | 44.7 | 15.7 | 0 | 29.0 | 29.5 | 0.5 |
| 12.0 | 9.4 m | 10 m | 43.9 | 15.7 | 0 | 28.2 | 29.5 | 1.3 |
| 12.5 | 14.1 m | 10 m | 43.1 | 15.7 | 0 | 27.4 | 29.5 | 2.1 |

1 (wire height above antenna height = 6.9 m) (slant distance = 12.15 m) (distance correction = (40 log 30/12.15))

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Overhead Location #1 with IBEC Coupler

Location: Indiantown Road

Test Description: Medium Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position Worst Case | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 10m | Margin dB |
|------------------|--------------------------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 80 | * | 10 m | 28.5 | -2.1 | 5 | 35.6 | 39.1 | 3.5 |
| 160 | * | 10 m | 35.2 | -2.1 | 5 | 42.3 | 43.5 | 1.2 |
| 240 | * | 10 m | 35.0 | -2.1 | 5 | 42.1 | 46.4 | 4.3 |
| 400 | * | 10 m | 37.4 | -2.1 | 5 | 44.5 | 46.4 | 1.9 |
| 440 | * | 10 m | 35.7 | -2.1 | 5 | 42.8 | 46.4 | 3.6 |
| 480 | * | 10 m | 35.1 | -2.1 | 5 | 42.2 | 46.4 | 4.2 |
| 800 | * | 10 m | 39.1 | -2.1 | 5 | 46.2 | 46.4 | 0.4 |
| 900 | * | 10 m | 38.5 | -2.1 | 5 | 45.6 | 46.4 | 0.8 |

1 (wire height above antenna height = 8.0 m) (slant distance = 12.8 m) (distance correction = (20 log 10/12.8))

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Overhead Location #1 with IBEC Coupler

Location: Indiantown Road

Test Description: Low Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position Worst Case | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 3m | Margin dB |
|------------------|--------------------------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|-----------------------|--------------|
| 80 | * | 10 m | 24.7 | -1.7 | 5 | 31.8 | 39.1 | 7.3 |
| 160 | * | 10 m | 33.0 | -1.7 | 5 | 40.1 | 43.5 | 3.4 |
| 240 | * | 10 m | 34.5 | -1.7 | 5 | 41.6 | 46.4 | 4.8 |
| 400 | * | 10 m | 36.1 | -1.7 | 5 | 43.2 | 46.4 | 3.2 |
| 440 | * | 10 m | 34.6 | -1.7 | 5 | 41.7 | 46.4 | 4.7 |
| 480 | * | 10 m | 35.9 | -1.7 | 5 | 43.0 | 46.4 | 3.4 |
| 800 | * | 10 m | 35.8 | -1.7 | 5 | 42.9 | 46.4 | 3.5 |
| 900 | * | 10 m | 37.8 | -1.7 | 5 | 44.9 | 46.4 | 1.5 |

1 (wire height above antenna height = 6.9 m) (slant distance = 12.15 m) (distance correction = (20 log 10/12.15))

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Overhead Location # 2 with IBEC Coupler

Location: Willow Road

Test Description: Medium Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 9.9 | 0 m | 10 m | 42.2 | 13.0 | 0 | 29.2 | 29.5 | 0.3 |
| 19.2 | 4.7 m | 10 m | 42.3 | 13.0 | 0 | 29.3 | 29.5 | 0.2 |
| 11.7 | 9.4 m | 10 m | 42.4 | 13.0 | 0 | 29.4 | 29.5 | 0.1 |
| 19.4 | 14.1 m | 10 m | 42.1 | 13.0 | 0 | 29.1 | 29.5 | 0.4 |
| 7.6 | 18.8 m | 10 m | 42.3 | 13.0 | 0 | 29.3 | 29.5 | 0.2 |
| 9.1 | 28.1 m | 10 m | 41.8 | 13.0 | 0 | 28.8 | 29.5 | 0.7 |
| 7.7 | 37.5 m | 10 m | 41.4 | 13.0 | 0 | 28.4 | 29.5 | 1.1 |
| 5.3 | 46.9 m | 10 m | 41.3 | 13.0 | 0 | 28.3 | 29.5 | 1.2 |
| 11.9 | 56.3 m | 10 m | 41.6 | 13.0 | 0 | 28.6 | 29.5 | 0.9 |
| 5.9 | 65.6 m | 10 m | 41.0 | 13.0 | 0 | 28.0 | 29.5 | 1.5 |
| 8.3 | 75.0 m | 10 m | 40.4 | 13.0 | 0 | 27.4 | 29.5 | 2.1 |

1 (wire height above antenna height = 10.1 m) (slant distance = 14.2 m) (distance correction = $(40 \log 30/14.2)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Overhead Location # 2 with IBEC Coupler

Location: Willow Road

Test Description: Low Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 23.2 | 0 m | 10 m | 43.2 | 13.9 | 0 | 29.3 | 29.5 | 0.2 |
| 27.8 | 4.7 m | 10 m | 43.1 | 13.9 | 0 | 29.2 | 29.5 | 0.3 |
| 12.3 | 9.4 m | 10 m | 43.2 | 13.9 | 0 | 29.3 | 29.5 | 0.2 |
| | | | | | | | | |
| | | | | | | | | |

1 (wire height above antenna height = 9.1m) (slant distance = 13.5 m) (distance correction = $(40 \log 30/13.5)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Overhead Location # 2 with IBEC Coupler

Location: Willow Road

Test Description: Medium Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position Worst Case | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 10m | Margin dB |
|------------------|--------------------------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 80 | * | 10 m | 30.7 | -3.0 | 5 | 38.7 | 39.1 | 0.4 |
| 160 | * | 10 m | 33.7 | -3.0 | 5 | 41.7 | 43.5 | 1.8 |
| 240 | * | 10 m | 37.9 | -3.0 | 5 | 45.9 | 46.4 | 0.5 |
| 400 | * | 10 m | 36.8 | -3.0 | 5 | 44.8 | 46.4 | 1.6 |
| 440 | * | 10 m | 38.4 | -3.0 | 5 | 46.2 | 46.4 | 0.2 |
| 480 | * | 10 m | 35.7 | -3.0 | 5 | 43.7 | 46.4 | 2.7 |
| 600 | * | 10 m | 37.6 | -3.0 | 5 | 45.6 | 46.4 | 0.8 |
| 800 | * | 10 m | 37.0 | -3.0 | 5 | 45.0 | 46.4 | 1.4 |
| 900 | * | 10 m | 38.8 | -3.0 | 5 | 46.2 | 46.4 | 0.2 |

1 (wire height above antenna height = 10.1 m) (slant distance = 14.2 m) (distance correction = $(20 \log 10/14.2)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Overhead Location # 2 with IBEC Coupler

Location: Willow Road

Test Description: Low Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position Worst Case | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 3m | Margin dB |
|------------------|--------------------------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|-----------------------|--------------|
| 80 | * | 10 m | 28.4 | -2.6 | 5 | 36.0 | 39.1 | 3.1 |
| 160 | * | 10 m | 32.0 | -2.6 | 5 | 39.6 | 43.5 | 3.9 |
| 240 | * | 10 m | 36.7 | -2.6 | 5 | 44.3 | 46.4 | 2.1 |
| 400 | * | 10 m | 36.0 | -2.6 | 5 | 43.6 | 46.4 | 2.8 |
| 440 | * | 10 m | 35.9 | -2.6 | 5 | 43.5 | 46.4 | 2.9 |
| 480 | * | 10 m | 34.6 | -2.6 | 5 | 42.2 | 46.4 | 4.2 |
| 600 | * | 10 m | 35.7 | -2.6 | 5 | 43.3 | 46.4 | 3.1 |
| 800 | * | 10 m | 36.3 | -2.6 | 5 | 43.9 | 46.4 | 2.5 |
| 900 | * | 10 m | 36.6 | -2.6 | 5 | 44.2 | 46.4 | 2.2 |

1 (wire height above antenna height = 9.1m) (slant distance = 13.5 m) (distance correction = $(20 \log 10/13.5)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Overhead Location #3 with IBEC Coupler

Location: Marble Road

Test Description: Medium Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 27.7 | 0 m | 10 m | 43.4 | 14.4 | 0 | 29.0 | 29.5 | 0.5 |
| 27.4 | 4.7 m | 10 m | 43.5 | 14.4 | 0 | 29.1 | 29.5 | 0.4 |
| 19.7 | 9.4 m | 10 m | 43.2 | 14.4 | 0 | 28.8 | 29.5 | 0.7 |
| 23.4 | 14.1 m | 10 m | 43.5 | 14.4 | 0 | 29.1 | 29.5 | 0.4 |
| 23.4 | 18.8 m | 10 m | 43.3 | 14.4 | 0 | 28.9 | 29.5 | 0.6 |
| 17.7 | 28.1 m | 10 m | 42.2 | 14.4 | 0 | 27.8 | 29.5 | 1.7 |
| 13.0 | 37.5 m | 10 m | 41.2 | 14.4 | 0 | 26.8 | 29.5 | 2.7 |
| 19.5 | 46.9 m | 10 m | 40.3 | 14.4 | 0 | 29.5 | 29.5 | 3.6 |
| 19.5 | 56.3 m | 10 m | 40.0 | 14.4 | 0 | 25.6 | 29.5 | 3.9 |
| 20.2 | 65.6 m | 10 m | 39.6 | 14.4 | 0 | 25.2 | 29.5 | 4.3 |
| 10.5 | 75.0 m | 10 m | 39.9 | 14.4 | 0 | 25.5 | 29.5 | 4.0 |

1 (wire height above antenna height = 8.5 m) (slant distance = 13.1 m) (distance correction = $(40 \log 30/13.1)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Overhead Location #3 with IBEC Coupler

Location: Marble Road

Test Description: Low Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 2.3 | 0 m | 10 m | 44.0 | 15.2 | 0 | 28.8 | 29.5 | 0.7 |
| 16.2 | 4.7 m | 10 m | 43.8 | 15.2 | 0 | 28.6 | 29.5 | 0.9 |
| 2.4 | 9.4 m | 10 m | 43.5 | 15.2 | 0 | 28.3 | 29.5 | 1.2 |
| 16.1 | 14.1 m | 10 m | 44.0 | 15.2 | 0 | 28.8 | 29.5 | 0.7 |
| 13.5 | 18.8 m | 10 m | 43.6 | 15.2 | 0 | 28.4 | 29.5 | 1.1 |
| 13.5 | 28.1 m | 10 m | 42.6 | 15.2 | 0 | 27.4 | 29.5 | 2.1 |
| 13.6 | 37.5 m | 10 m | 41.9 | 15.2 | 0 | 26.7 | 29.5 | 2.8 |
| 13.6 | 46.9 m | 10 m | 40.7 | 15.2 | 0 | 25.5 | 29.5 | 4.0 |

1 (wire height above antenna height =7.5 m) (slant distance = 12.5 m) (distance correction = $(40 \log 30/12.5)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Overhead Location #3 with IBEC Coupler

Location: Marble Road

Test Description: Medium Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 10m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 80 | * | 10 m | 26.8 | -2.3 | 5 | 34.1 | 39.1 | 5.0 |
| 160 | * | 10 m | 32.0 | -2.3 | 5 | 39.3 | 43.5 | 4.2 |
| 240 | * | 10 m | 33.8 | -2.3 | 5 | 41.1 | 46.4 | 5.3 |
| 400 | * | 10 m | 35.6 | -2.3 | 5 | 42.9 | 46.4 | 3.5 |
| 440 | * | 10 m | 34.6 | -2.3 | 5 | 41.9 | 46.4 | 4.5 |
| 480 | * | 10 m | 37.0 | -2.3 | 5 | 44.3 | 46.4 | 2.1 |
| 600 | * | 10 m | 38.2 | -2.3 | 5 | 45.5 | 46.4 | 0.9 |
| 800 | * | 10 m | 36.9 | -2.3 | 5 | 42.2 | 46.4 | 2.2 |
| 900 | * | 10 m | 37.8 | -2.3 | 5 | 45.1 | 46.4 | 1.3 |

1 (wire height above antenna height = 8.5 m) (slant distance = 13.1 m) (distance correction = $(20 \log 10/13.1)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Overhead Location #3 with IBEC Coupler

Location: Marble Road

Test Description: Low Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 3m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|-----------------------|--------------|
| 80 | * | 10 m | 25.8 | -1.9 | 5 | 32.7 | 39.1 | 6.4 |
| 160 | * | 10 m | 30.1 | -1.9 | 5 | 37.0 | 43.5 | 6.5 |
| 240 | * | 10 m | 32.5 | -1.9 | 5 | 39.4 | 46.4 | 7.0 |
| 400 | * | 10 m | 34.8 | -1.9 | 5 | 41.7 | 46.4 | 4.7 |
| 440 | * | 10 m | 33.0 | -1.9 | 5 | 39.9 | 46.4 | 6.5 |
| 480 | * | 10 m | 34.8 | -1.9 | 5 | 41.7 | 46.4 | 4.7 |
| 600 | * | 10 m | 35.2 | -1.9 | 5 | 42.1 | 46.4 | 4.3 |
| 800 | * | 10 m | 34.9 | -1.9 | 5 | 41.8 | 46.4 | 4.6 |
| 900 | * | 10 m | 35.3 | -1.9 | 5 | 42.2 | 46.4 | 4.2 |

1 (wire height above antenna height = 7.5 m) (slant distance = 12.5 m) (distance correction = $(20 \log 3/12.5)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Underground Location #1 with Kaicom Coupler

Location: Summerlyn Drive #1

Test Description: Medium Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 15.0 | 3 | 10 m | 39.6 | 19.1 | 0 | 20.5 | 29.5 | 9.0 |
| 12.5 | 4 | 10 m | 41.5 | 19.1 | 0 | 22.4 | 29.5 | 7.1 |
| 5.2 | 5 | 10 m | 45.4 | 19.1 | 0 | 26.3 | 29.5 | 3.2 |
| 4.9 | 7 | 10 m | 40.9 | 19.1 | 0 | 20.8 | 29.5 | 7.7 |
| 4.9 | 9 | 10 m | 41.9 | 19.1 | 0 | 22.8 | 29.5 | 6.7 |
| 5.2 | 15 | 10 m | 46.2 | 19.1 | 0 | 27.1 | 29.5 | 2.4 |
| 5.2 | 16 | 10 m | 40.8 | 19.1 | 0 | 21.7 | 29.5 | 7.8 |

1 (distance correction = $(40 \log 30/10.0)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Underground Location #1 with Kaicom Coupler

Location: Summerlyn Drive #1

Test Description: Low Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Distance From vault | Antenna Distance From wire | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|--------------------------------------|-------------------------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 14.7 | 1 | 10 m | 46.1 | 19.1 | 0 | 27.0 | 29.5 | 2.5 |
| 14.8 | 2 | 10 m | 47.4 | 19.1 | 0 | 28.3 | 29.5 | 1.2 |
| 15.9 | 3 | 10 m | 43.6 | 19.1 | 0 | 24.5 | 29.5 | 5.0 |
| 16.0 | 4 | 10 m | 44.2 | 19.1 | 0 | 25.1 | 29.5 | 4.4 |
| | | | | | | | | |
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1 (distance correction = $(40 \log 30/10.0)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Underground Location #1 with Kaicom Coupler

Location: Summerlyn Drive #1

Test Description: Medium Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position From vault | Antenna Distance From wire | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 10m | Margin dB |
|------------------|--------------------------------------|-------------------------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 160 | 10 m | 10 m | 25.3 | 0 | 5 | 30.3 | 43.5 | 13.2 |
| 240 | 10 m | 10 m | 24.1 | 0 | 5 | 29.1 | 46.4 | 17.3 |
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1 (distance correction = NA)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Underground Location #1 with Kaicom Coupler

Location: Summerlyn Drive #1

Test Description: Low Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position From vault | Antenna Distance From wire | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 10m | Margin dB |
|------------------|--------------------------------------|-------------------------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 160 | 10 m | 10 m | 23.7 | 0 | 5 | 28.7 | 43.5 | 14.8 |
| 240 | 10 m | 10 m | 23.9 | 0 | 5 | 28.9 | 46.4 | 17.5 |
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1 (distance correction = NA)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Underground Location #2

Location: Summerlyn Drive #2

Test Description: Medium Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 2.4 | 1 | 10 m | 42.8 | 19.1 | 0 | 23.7 | 29.5 | 5.8 |
| 24.2 | 2 | 10 m | 44.4 | 19.1 | 0 | 25.3 | 29.5 | 4.2 |
| 19.1 | 4 | 10 m | 46.7 | 19.1 | 0 | 17.6 | 29.5 | 1.9 |
| 8.4 | 5 | 10 m | 48.5 | 19.1 | 0 | 29.4 | 29.5 | 0.1 |
| 16.4 | 12 | 10 m | 43.4 | 19.1 | 0 | 24.3 | 29.5 | 5.2 |
| 7.5 | 13 | 10 m | 47.9 | 19.1 | 0 | 28.8 | 29.5 | 0.7 |
| 9.7 | 14 | 10 m | 46.7 | 19.1 | 0 | 27.6 | 29.5 | 1.9 |

1 (distance correction = $(40 \log 30/10.0)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Underground Location #2

Location: Summerlyn Drive #2

Test Description: Low Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Distance From vault | Antenna Distance From wire | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|--------------------------------------|-------------------------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 24.2 | 1 | 10 m | 48.3 | 19.1 | 0 | 29.2 | 29.5 | 0.3 |
| 24.2 | 2 | 10 m | 47.9 | 19.1 | 0 | 28.8 | 29.5 | 0.7 |
| 25.5 | 3 | 10 m | 44.0 | 19.1 | 0 | 24.9 | 29.5 | 4.6 |
| 25.5 | 4 | 10 m | 41.5 | 19.1 | 0 | 22.4 | 29.5 | 7.1 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

1 (distance correction = $(40 \log 30/10.0)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Underground Location #2

Location: Summerlyn Drive #2

Test Description: Medium Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position From vault | Antenna Distance From wire | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 10m | Margin dB |
|------------------|--------------------------------------|-------------------------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 160 | 10 m | 10 m | 24.9 | 0 | 5 | 29.9 | 43.5 | 13.6 |
| 240 | 10 m | 10 m | 26.2 | 0 | 5 | 31.2 | 46.4 | 15.2 |
| | | | | | | | | |
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1 (distance correction = NA)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Underground Location #2

Location: Summerlyn Drive #2

Test Description: Low Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position From vault | Antenna Distance From wire | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 10m | Margin dB |
|------------------|--------------------------------------|-------------------------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 160 | 10 m | 10 m | 21.7 | 0 | 5 | 26.7 | 43.5 | 16.8 |
| 240 | 10 m | 10 m | 23.0 | 0 | 5 | 28.0 | 46.4 | 18.4 |
| | | | | | | | | |
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1 (distance correction = NA)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Underground Location #3

Location: Dunaway Drive

Test Description: Medium Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Position | Antenna Distance | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|---------------------|---------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 27.3 | 2 | 10 m | 48.5 | 19.1 | 0 | 29.4 | 29.5 | 0.1 |
| 27.3 | 4 | 10 m | 43.1 | 19.1 | 0 | 24.0 | 29.5 | 5.5 |
| 27.3 | 5 | 10 m | 40.7 | 19.1 | 0 | 21.6 | 29.5 | 7.9 |
| 26.3 | 11 | 10 m | 41.1 | 19.1 | 0 | 22.0 | 29.5 | 7.5 |
| 26.5 | 12 | 10 m | 44.3 | 19.1 | 0 | 25.2 | 29.5 | 4.3 |
| 27.3 | 15 | 10 m | 41.0 | 19.1 | 0 | 21.9 | 29.5 | 7.6 |
| 6.0 | 16 | 10 m | 39.4 | 19.1 | 0 | 20.3 | 29.5 | 9.2 |

1 (distance correction = $(40 \log 30/10.0)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Underground Location #3

Location: Dunaway Drive

Test Description: Low Voltage Emissions below 30 MHz

| Frequency MHz | Antenna Distance From vault | Antenna Distance From wire | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 30m | Margin dB |
|------------------|--------------------------------------|-------------------------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 15.5 | 1 | 10 m | 44.3 | 19.1 | 0 | 25.2 | 29.5 | 4.3 |
| 16.9 | 2 | 10 m | 44.3 | 19.1 | 0 | 25.2 | 29.5 | 4.3 |
| 16.8 | 3 | 10 m | 46.0 | 19.1 | 0 | 26.9 | 29.5 | 2.6 |
| 16.9 | 4 | 10 m | 44.0 | 19.1 | 0 | 24.9 | 29.5 | 4.6 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

1 (distance correction = $(40 \log 30/10.0)$)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Kaicom FCC ID: UGN-KPI-2220E
PSE Report 06F271B1

Type: Underground Location #3

Location: Dunaway Drive

Test Description: Medium Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position From vault | Antenna Distance From wire | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 10m | Margin dB |
|------------------|--------------------------------------|-------------------------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 160 | 10 m | 10 m | 26.6 | 0 | 5 | 31.6 | 43.5 | 11.9 |
| 240 | 10 m | 10 m | 27.0 | 0 | 5 | 32.0 | 46.4 | 14.4 |
| | | | | | | | | |
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1 (distance correction = NA)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)

Type: Underground Location #3

Location: Dunaway Drive

Test Description: Low Voltage Emissions above 30 MHz

| Frequency MHz | Antenna Position From vault | Antenna Distance From wire | Measured Amplitude dBuV/m | Distance Correction dB 1 | Fixed Height Correction dB | Corrected Amplitude dBuV/m 2 | Limit dBuV/m 10m | Margin dB |
|------------------|--------------------------------------|-------------------------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|------------------------|--------------|
| 160 | 10 m | 10 m | 27.5 | 0 | 5 | 32.5 | 43.5 | 11.0 |
| 240 | 10 m | 10 m | 28.1 | 0 | 5 | 33.1 | 46.4 | 13.3 |
| | | | | | | | | |
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1 (distance correction = NA)

2 (Corrected amplitude = measured amplitude – distance correction + fixed height correction)