



DATE: 7 November 2013

I.T.L. (PRODUCT TESTING) LTD.
FCC Radio Test Report
for
Precyse Technologies Inc

Equipment under test:
PBS Base Station

BS91/103000

Written by:

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Approved by:

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A. Sharabi, Test Engineer

Approved by:

I. Raz

I. Raz, EMC Laboratory Manager

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This report relates only to items tested.



Measurement/Technical Report for Precyse Technologies Inc

PBS Base Station

BS91/103000

FCC ID: WONBS91103001

This report concerns: Original Grant: X

Class I Change:

Class II Change:

Equipment type: Digital Transmission System

Limits used: 47CFR15 Section 15.247

Measurement procedure used is KDB 558074 D01 09 April 2013 and ANSI 6.34: 2003.

Application for Certification
prepared by:

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ITL (Product Testing) Ltd.

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D.N. Shimshon 99780

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Applicant for this device:
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1. General Information

1.1 Administrative Information

Manufacturer: Precyse Technologies Inc

Manufacturer's Address: Ha'amal 11
Rosh Ha'ayin, 48092
Israel
Tel: +972-3-922-7093
Fax: +972-3-922-7515

Manufacturer's Representative: Yossi Nurok

Equipment Under Test (E.U.T): PBS Base Station

Equipment Model No.: BS91/103000

Equipment Serial No.: Not Designated

Date of Receipt of E.U.T: 27.10.2013

Start of Test: 27.10.2013

End of Test: 07.11.2013

Test Laboratory Location: I.T.L (Product Testing) Ltd.
Kfar Bin Nun,
ISRAEL 99780

Test Specifications: 47CFR15 Section 15.247



1.2 *List of Accreditations*

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), IC File No.: 46405-4025; Site No. IC 4025B-1.
6. TUV Product Services, England, ASLLAS No. 97201.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.



1.3 Product Description

The PBS is used to communicate between the asset agents and a personal computer. It also provides synchronization signal for the system.

It uses the iLocate proprietary protocol which provides a 2 way, half duplex communication with the tags and beacons.

The unit is DC powered, 12 VDC, up to 1A.

1.4 Test Methodology

Radiated testing was performed according to the procedures in KDB 558074 D01 09 April 2013 and ANSI 6.34: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing September 3, 2009).

I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Conducted Emission

Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) 0.15 – 30 MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 3.6 dB

Note: See ITL Procedure No. PM 198.

Radiated Emission

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site 30-1000MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 4.96 dB

2. System Test Configuration

2.1 **Justification**

The E.U.T. is a wall-mounted unit and was tested in the vertical position simulating wall-mounting.

Modulation is 2-FSK

2.2 **EUT Exercise Software**

The Transmission mode facilitated higher packet rate (higher transmission duty cycle) in order to save tester time and effort. The normal duty cycle is 0.5%, 5msec out of 1sec of transmission time.

2.3 **Special Accessories**

No special accessories were needed to achieve compliance.

2.4 **Equipment Modifications**

No modifications were necessary in order to achieve compliance.

2.5 **Configuration of Tested System**

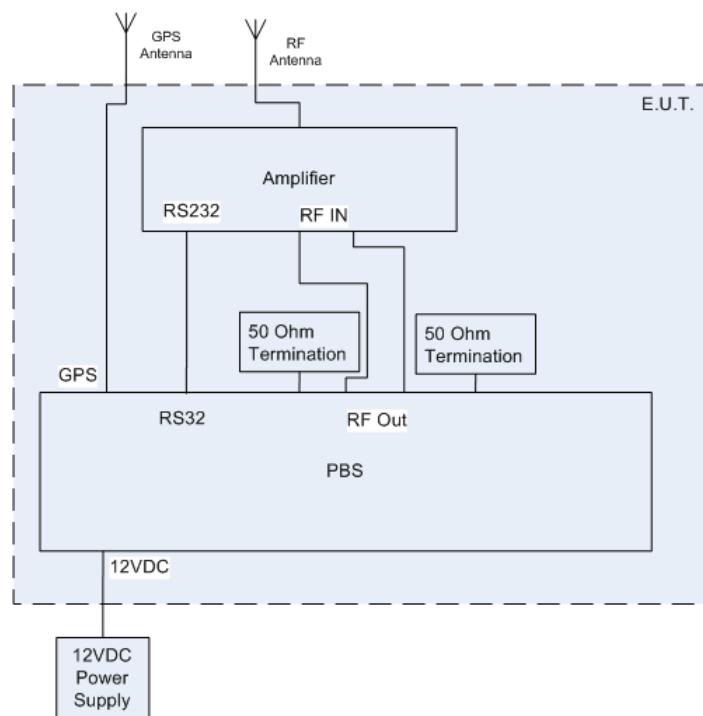


Figure 1. Configuration of Tested System



3. Test Setup Photos

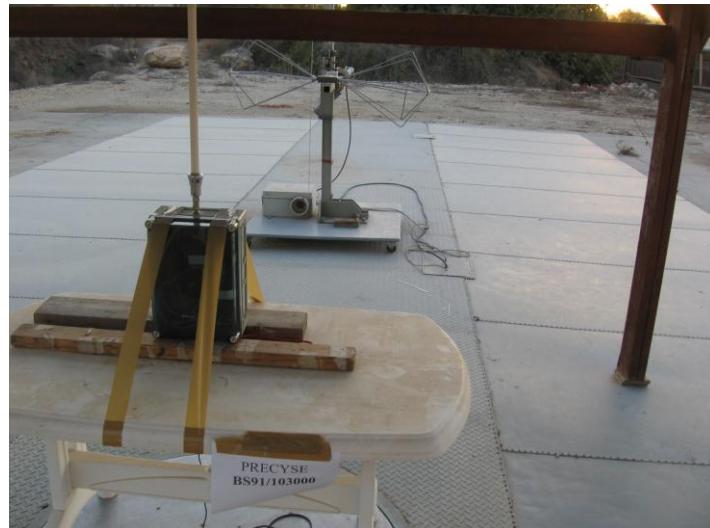


Figure 2. Radiated Emission Test



Figure 3. Radiated Emission Test

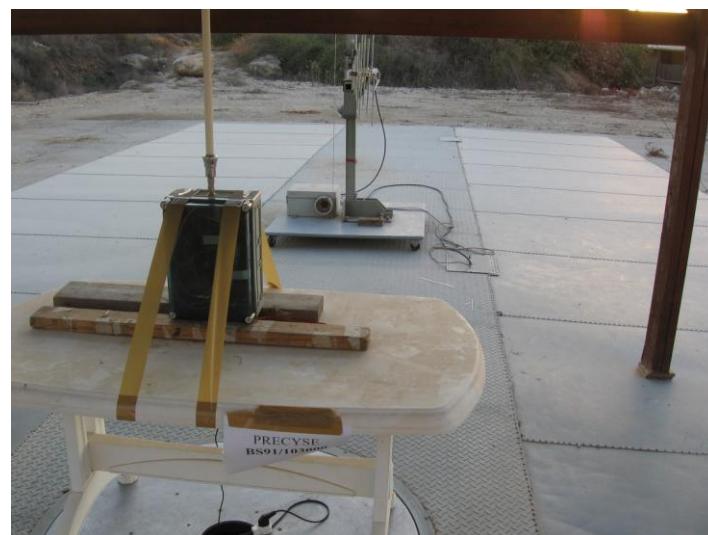


Figure 4. Radiated Emission Test



Figure 5. Conducted Emission From AC Mains



Figure 6. Conducted Emission From Antenna Ports Tests



4. Conducted Emission From AC Mains

4.1 Test Specification

F.C.C., Part 15, Subpart C

4.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 3.1. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room, with the E.U.T placed on an 0.8 meter high wooden table, 0.4 meter from the room's vertical wall.

The E.U.T was powered from 115 V AC via a 50 Ohm / 50 μ Hn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T

The center of the E.U.T AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are loaded to the receiver via a 3.5" floppy disk and are displayed on the receiver's spectrum display.

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, and using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector.

4.3 Measured Data

JUDGEMENT: Passed by 19.55dB

The margin between the emission levels and the specification limit is, in the worst case, 20.76dB for the phase line at 0.482MHz and 19.55dB at 4.778MHz for the neutral line.

The EUT met the F.C.C. Part 15, Subpart C specification requirements.

The details of the highest emissions are given in *Figure 7* to

Figure 10.

TEST PERSONNEL:

Tester Signature:  _____

Date:07.11.13

Typed/Printed Name: A.Sharabi



Conducted Emission

E.U.T Description PBS Base Station
Type BS91/103000
Serial Number: Not Designated

Specification: F.C.C., Part 15, Subpart C
Lead: Phase
Detectors: Quasi-peak, Average

| EDIT PEAK LIST (Final Measurement Results) | | | | |
|--|------------|-----------|-------------------------|----------------|
| Trace1: | CE22BQP | | | |
| Trace2: | CE22BAP | | | |
| Trace3: | --- | | | |
| | TRACE | FREQUENCY | LEVEL dB _μ V | DELTA LIMIT dB |
| 1 | Quasi Peak | 150 kHz | 43.86 | -22.13 |
| 2 | Average | 150 kHz | 28.83 | -27.16 |
| 1 | Quasi Peak | 190 kHz | 40.64 | -23.39 |
| 2 | Average | 190 kHz | 28.08 | -25.94 |
| 1 | Quasi Peak | 238 kHz | 36.05 | -26.11 |
| 2 | Average | 242 kHz | 27.17 | -24.85 |
| 2 | Average | 386 kHz | 27.34 | -20.80 |
| 1 | Quasi Peak | 398 kHz | 32.98 | -24.90 |
| 1 | Quasi Peak | 426 kHz | 32.98 | -24.34 |
| 2 | Average | 430 kHz | 25.34 | -21.91 |
| 1 | Quasi Peak | 478 kHz | 32.29 | -24.07 |
| 2 | Average | 482 kHz | 25.54 | -20.76 |
| 2 | Average | 526 kHz | 23.88 | -22.11 |
| 1 | Quasi Peak | 1.158 MHz | 29.94 | -26.05 |
| 2 | Average | 3.098 MHz | 21.48 | -24.51 |
| 2 | Average | 3.338 MHz | 19.84 | -26.15 |
| 1 | Quasi Peak | 3.346 MHz | 26.41 | -29.59 |
| 2 | Average | 5.082 MHz | 22.85 | -27.14 |
| 1 | Quasi Peak | 5.178 MHz | 27.24 | -32.75 |
| 1 | Quasi Peak | 6.498 MHz | 27.26 | -32.73 |

Date: 7.NOV.2013 14:27:29

Figure 7. Detectors: Quasi-peak, AVERAGE .

Note: QP Delta/Av Delta refer to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.



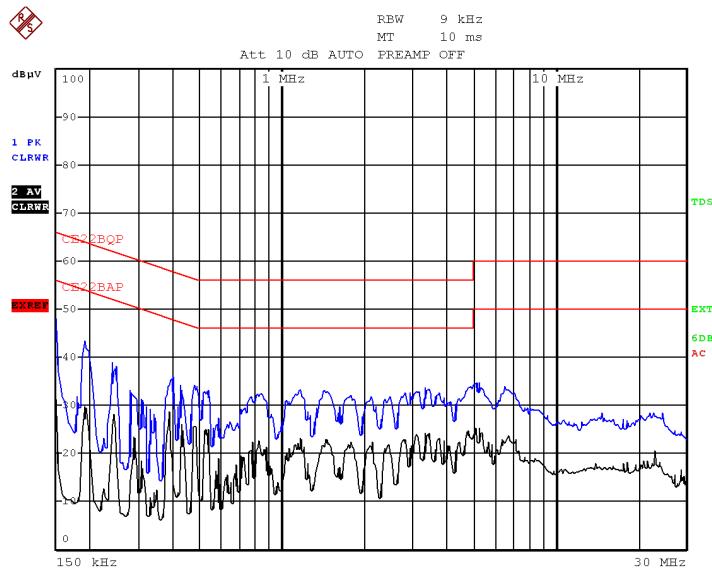
Conducted Emission

E.U.T Description PBS Base Station
Type BS91/103000
Serial Number: Not Designated

Specification: F.C.C., Part 15, Subpart C

Lead: Phase

Detectors: Quasi-peak, Average



Date: 7.NOV.2013 14:21:07

Figure 8. Detectors: Quasi-peak, Average



Conducted Emission

E.U.T Description PBS Base Station
Type BS91/103000
Serial Number: Not Designated

Specification: F.C.C., Part 15, Subpart C

Lead: Neutral

Detectors: Quasi-peak, Average

| EDIT PEAK LIST (Final Measurement Results) | | | | |
|--|--------------------|------------------|--------|----------|
| Trace1: | CE22BQP | | | |
| Trace2: | CE22BAP | | | |
| Trace3: | --- | | | |
| TRACE | FREQUENCY | LEVEL dB μ V | DELTA | LIMIT dB |
| 1 | Quasi Peak 150 kHz | 42.53 | -23.46 | |
| 1 | Quasi Peak 190 kHz | 39.83 | -24.20 | |
| 2 | Average 190 kHz | 25.21 | -28.82 | |
| 2 | Average 390 kHz | 25.59 | -22.47 | |
| 2 | Average 426 kHz | 25.11 | -22.21 | |
| 2 | Average 486 kHz | 24.05 | -22.18 | |
| 1 | Quasi Peak 514 kHz | 30.26 | -25.73 | |
| 2 | Average 526 kHz | 24.54 | -21.45 | |
| 1 | Quasi Peak 566 kHz | 24.25 | -31.74 | |
| 1 | Quasi Peak 598 kHz | 21.20 | -34.79 | |
| 1 | Quasi Peak 622 kHz | 23.26 | -32.73 | |
| 1 | Quasi Peak 666 kHz | 25.04 | -30.95 | |
| 1 | Quasi Peak 778 kHz | 29.05 | -26.94 | |
| 1 | Quasi Peak 810 kHz | 30.58 | -25.41 | |
| 1 | Quasi Peak 838 kHz | 30.16 | -25.83 | |
| 2 | Average 3.458 MHz | 24.96 | -21.03 | |
| 2 | Average 3.642 MHz | 21.62 | -24.37 | |
| 2 | Average 4.778 MHz | 26.44 | -19.55 | |
| 2 | Average 5.082 MHz | 26.75 | -23.24 | |
| 2 | Average 5.558 MHz | 20.00 | -29.99 | |

Date: 7.NOV.2013 14:50:16

Figure 9. Detectors: Quasi-peak, AVERAGE

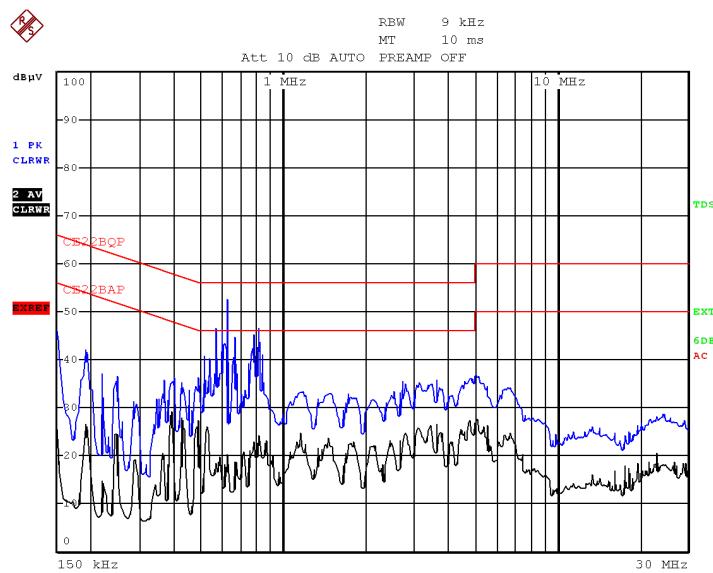
Note: QP Delta/Av Delta refer to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.



Conducted Emission

E.U.T Description PBS Base Station
Type BS91/103000
Serial Number: Not Designated

Specification: F.C.C., Part 15, Subpart C
Lead: Neutral
Detectors: Quasi-peak, Average



Date: 7.NOV.2013 14:31:21

Figure 10 Conducted Emission: NEUTRAL
Detectors: Quasi-peak, Average



4.4 **Test Instrumentation Used, Conducted Measurement**

| Instrument | Manufacturer | Model | Serial No. | Last Calibration Date | Period |
|-------------------|-----------------|-------------|----------------|-----------------------|--------|
| LISN | Fischer | FCC-LISN-2A | 127 | December 9, 2012 | 1 Year |
| Transient Limiter | HP | 11947A | 3107A030 41 | February 25, 2013 | 1 Year |
| EMI Receiver | Rohde & Schwarz | ESCI7 | 100724 | December 27, 2012 | 1 Year |



5. 6 dB Minimum Bandwidth

5.1 ***Test Specification***

FCC Part 15, Subpart C Section 15.247-a2

5.2 ***Test Procedure***

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable. The spectrum analyzer was set to 100 kHz resolution BW. The spectrum bandwidth of the E.U.T. at the point of 6 dB below maximum peak power was measured and recorded.

The E.U.T. was tested at 904.9, 911.4, and 917.3 MHz.

5.3 ***Test Results***

| Operation Frequency (MHz) | Reading (MHz) | Specification (MHz) |
|---------------------------|---------------|---------------------|
| 904.9 | 0.625 | 0.5 |
| 911.4 | 0.640 | 0.5 |
| 917.3 | 0.645 | 0.5 |

Figure 11 6 dB Minimum Bandwidth Test Results Table

See additional information in Figure 12 to Figure 14.

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature:  Date: 05.11.13

Typed/Printed Name: A.Sharabi



6 dB Minimum Bandwidth

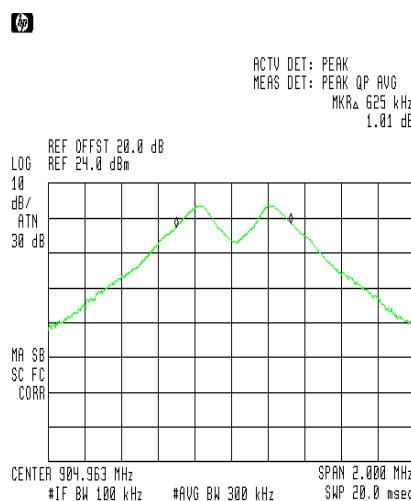


Figure 12 — 904.9 MHz

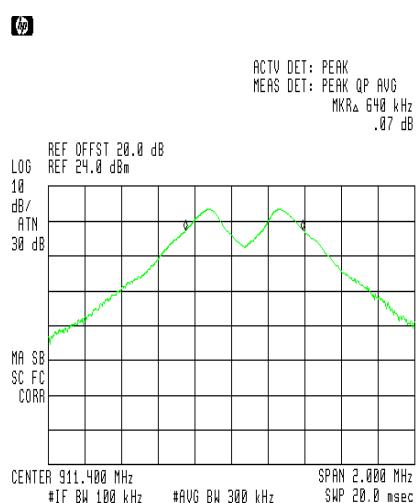


Figure 13 — 911.4 MHz



6 dB Minimum Bandwidth

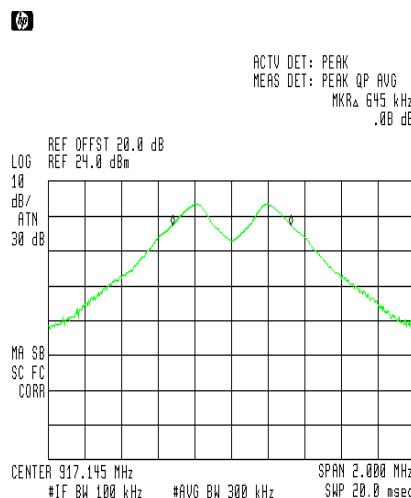


Figure 14 — 917.3 MHz

5.4 6 dB Minimum Bandwidth Test Equipment

| Instrument | Manufacturer | Model | Serial/Part Number | Calibration | |
|-------------------|---------------|---------------|--------------------|-----------------------|--------|
| | | | | Last Calibration Date | Period |
| Spectrum Analyzer | HP | 8542E | 3705A00248 | February 27, 2013 | 1 year |
| Attenuator | Mini-Circuits | 20dB | - | October 27, 2013 | 1 year |
| Cable | Mini-Circuits | CBL-4FT-SMNM+ | 30084 | October 27, 2013 | 1 year |

Figure 15 Test Equipment Used



6. Maximum Transmitted Peak Power Output

6.1 ***Test Specification***

FCC Part 15, Subpart C Section 15.247(b)

6.2 ***Test Procedure***

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (20 dB) and an appropriate coaxial cable. The Spectrum Analyzer was set to 1.0 MHz resolution BW. Peak power level was measured at selected operation frequencies.

The E.U.T. was tested at 904.9, 911.4, and 917.3 MHz.

6.3 ***Test Results***

| Operation Frequency (MHz) | Power (dBm) | Specification (dBm) | Margin (dB) |
|---------------------------|-------------|---------------------|-------------|
| 904.9 | 17.20 | 30.0 | -12.80 |
| 911.4 | 16.87 | 30.0 | -13.13 |
| 917.3 | 17.03 | 30.0 | -12.97 |

Figure 16 Maximum Peak Power Output

See additional information in Figure 17 to Figure 19.

JUDGEMENT: Passed by 12.80dB

TEST PERSONNEL:

Tester Signature: 

Date: 05.11.13

Typed/Printed Name: A.Sharabi



Maximum Transmitted Peak Power Output

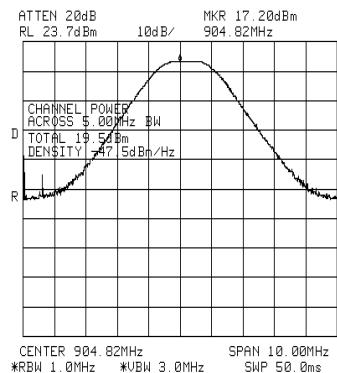


Figure 17 — 904.9 MHz

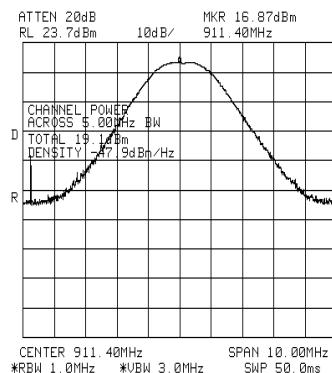


Figure 18 — 911.4 MHz



Maximum Transmitted Peak Power Output

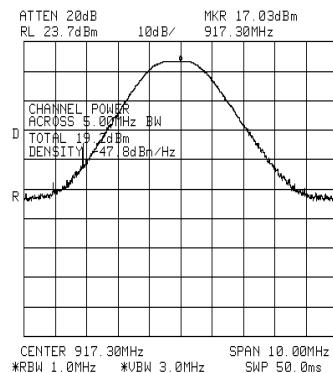


Figure 19 — 917.3 MHz

6.1 Maximum Transmitted Peak Output Power Test Equipment

| Instrument | Manufacturer | Model | Serial/Part Number | Calibration | |
|-------------------|---------------|---------------|--------------------|-----------------------|--------|
| | | | | Last Calibration Date | Period |
| Spectrum Analyzer | HP | 8564E | 3442A002 | February 27, 2013 | 1 year |
| Attenuator | Mini-Circuits | 30dB | | October 27, 2013 | 1 year |
| Cable | Mini-Circuits | CBL-4FT-SMNM+ | 30084 | October 27, 2013 | 1 year |

Figure 20 Test Equipment Used



7. Peak Power Output Out of Band

7.1 Test Specification

FCC Part 15, Subpart C, Section 15.247

7.2 Test Procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable. The spectrum analyzer was set to 1 MHz resolution BW except for the frequency range 9 kHz - 150 kHz where the RBW was set to 1 kHz, the frequency range 150 kHz-10 MHz where the RBW was set to 10 kHz, and the frequency range 1 MHz -1 GHz where the RBW was set to 100 kHz. The frequency range from 9 kHz to 10 GHz was scanned. Level of spectrum components out of the 904-918 MHz was measured at the selected operation frequencies.

The E.U.T. was tested at 904.9, 911.4, and 917.3 MHz.

7.3 Test Results

| Operation Frequency (MHz) | Frequency (MHz) | Reading (dBm) | Specification (dBm) | Margin (dB) |
|---------------------------|-----------------|---------------|---------------------|-------------|
| 904.9 | 2123.0 | -39.0 | -3.0 | -36.0 |
| 911.4 | 2157.0 | -39.0 | -3.0 | -36.0 |
| 917.3 | 2132.0 | -39.0 | -3.0 | -36.0 |

Figure 21 Peak Power Output of 904-918 MHz Band Test results Table

See additional information in *Figure 22* to *Figure 24*.

JUDGEMENT: Passed by 36.0dB

TEST PERSONNEL:

Tester Signature: 

Date: 05.11.13

Typed/Printed Name: A.Sharabi



Peak Power Output Out of 902-918 MHz Band

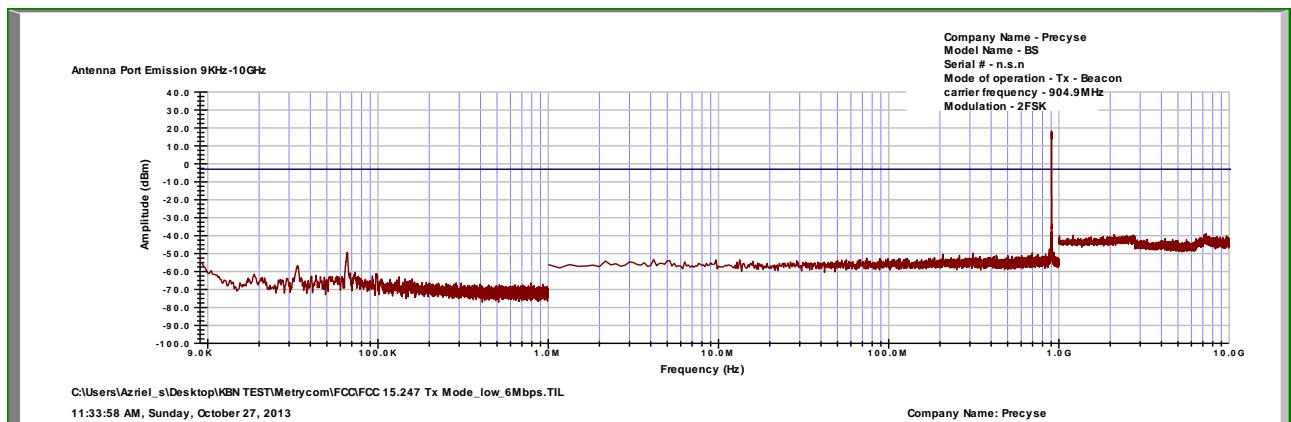


Figure 22 — 904.9 MHz

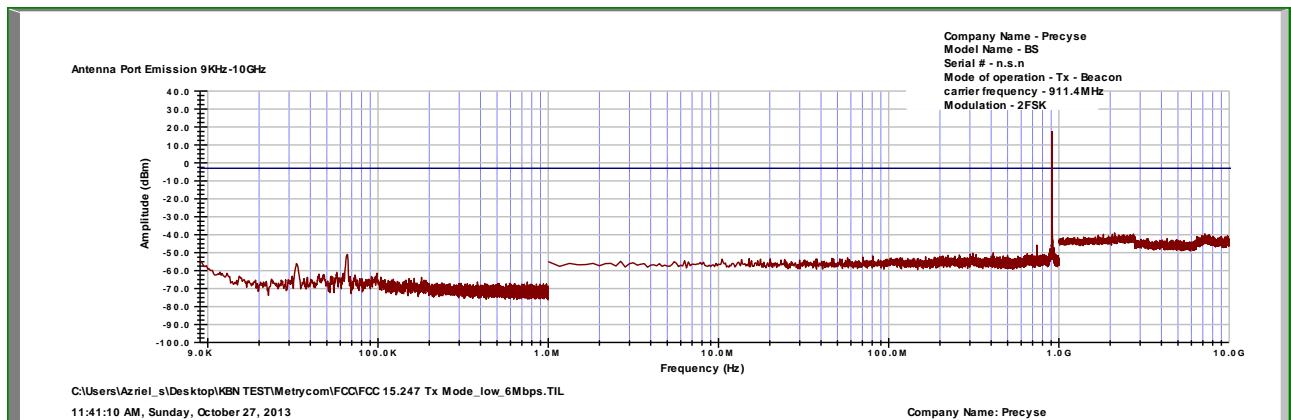


Figure 23 — 911.4 MHz

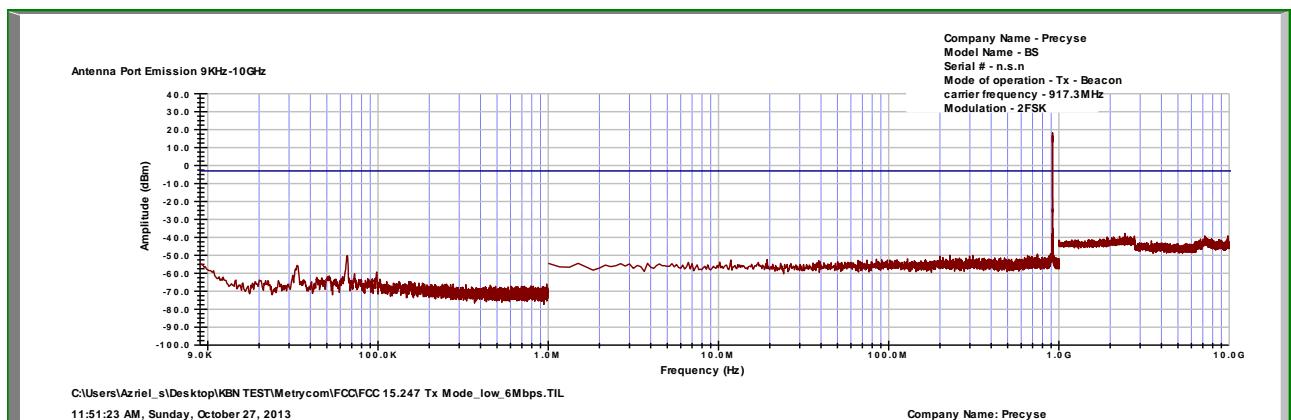


Figure 24 — 917.3 MHz



7.4 Peak Power Output of 902-918 MHz Band Test Equipment

| Instrument | Manufacturer | Model | Serial/Part Number | Calibration | |
|-------------------|---------------|---------------|--------------------|-----------------------|--------|
| | | | | Last Calibration Date | Period |
| Spectrum Analyzer | HP | 8564E | 3442A002 | February 27, 2013 | 1 year |
| Attenuator | Mini-Circuits | 30dB | | October 27, 2013 | 1 year |
| Cable | Mini-Circuits | CBL-4FT-SMNM+ | 30084 | October 27, 2013 | 1 year |

Figure 25 Test Equipment Used



8. Band Edge Spectrum

8.1 Test Specification

FCC Part 15, Subpart C, Section 15.247

8.2 Test Procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable. The spectrum analyzer was set to 100 kHz resolution BW. Maximum power level below 902 MHz and above 928 MHz was measured relative to power level at 904.9 MHz, and 917.3 MHz correspondingly.

8.3 Test Results

| Operation Frequency (MHz) | Band Edge Frequency (MHz) | Spectrum Level (dBm) | Specification (dBm) | Margin (dB) |
|---------------------------|---------------------------|----------------------|---------------------|-------------|
| 904.9 | 902 | -37.38 | -3.0 | -34.38 |
| 917.3 | 928 | -46.05 | -3.0 | -43.05 |

Figure 26 Band Edge Spectrum Test Results Table

See additional information in Figure 27 to Figure 28.

JUDGEMENT: Passed by 34.38dB

TEST PERSONNEL:

Tester Signature:

Date: 05.11.13

Typed/Printed Name: A.Sharabi



Band Edge Spectrum

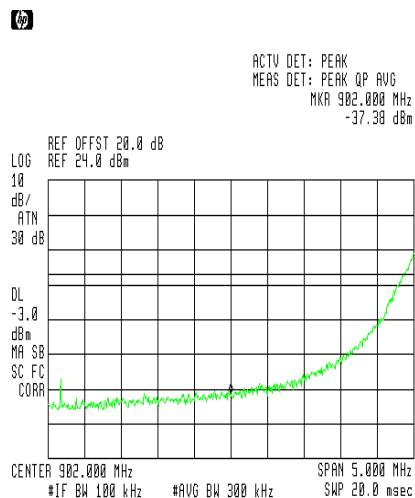


Figure 27 — 904.9 MHz

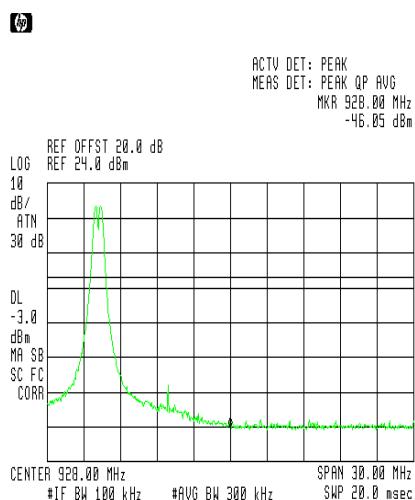


Figure 28 — 917.3 MHz



Band Edge Spectrum

8.4 ***Band Edge Spectrum Test Equipment***

| Instrument | Manufacturer | Model | Serial/Part Number | Calibration | |
|-------------------|---------------|---------------|--------------------|-----------------------|--------|
| | | | | Last Calibration Date | Period |
| Spectrum Analyzer | HP | 8542E | 3705A00248 | February 27, 2013 | 1 year |
| Attenuator | Mini-Circuits | 20dB | - | October 27, 2013 | 1 year |
| Cable | Mini-Circuits | CBL-4FT-SMNM+ | 30084 | October 27, 2013 | 1 year |

Figure 29 Test Equipment Used



9. Spurious Radiated Emission, 9 kHz – 30 MHz

9.1 ***Test Specification***

9 kHz-30 MHz, FCC, Part 15, Subpart C, Section 209

9.2 ***Test Procedure***

The E.U.T. operation mode and test set-up are as described in Section 3.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 1.

The frequency range 9 kHz-30 MHz was scanned.

The emissions were measured using a computerized EMI receiver complying with CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter at a distance of 3 meters.

The E.U.T. was tested at the operating frequencies of 904.9, 911.4, and 917.3 MHz.

9.3 ***Test Results***

JUDGEMENT: Passed

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 209 specification.

The results for all three operating frequencies were the same.

No signals were detected in the frequency range of 9 kHz – 30 MHz.

TEST PERSONNEL:

Tester Signature:

Date: 05.11.13

Typed/Printed Name: A.Sharabi



Spurious Radiated Emission, 9 kHz – 30 MHz

9.4 Spurious Radiated Emission, 9 kHz – 30 MHz Test Equipment

| Instrument | Manufacturer | Model | Serial Number | Calibration | Period |
|-------------------------|--------------|---------------|---------------|-------------------|--------|
| EMI Receiver | HP | 85422E | 3906A00276 | February 26, 2013 | 1 year |
| RF Section | HP | 85420E | 3705A00248 | February 26, 2013 | 1 year |
| Active Loop Antenna | EMCO | 6502 | 9506-2950 | October 21,2013 | 1 year |
| Antenna Mast | ARA | AAM-4A | 1001 | N/A | N/A |
| Turntable | ARA | ART-1001/4 | 1001 | N/A | N/A |
| Mast & Table Controller | ARA | ACU-2/5 | 1001 | N/A | N/A |
| Printer | HP | LaserJet 2200 | JPKGC19982 | N/A | N/A |

Figure 30 Test Equipment Used

9.5 Field Strength Calculation

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$FS = RA + AF + CF$$

FS: Field Strength [dB μ v/m]
RA: Receiver Amplitude [dB μ v]
AF: Receiving Antenna Correction Factor [dB/m]
CF: Cable Attenuation Factor [dB]

No external pre-amplifiers are used.



10. Spurious Radiated Emission 30 – 10000 MHz

10.1 ***Test Specification***

30 MHz-10000 MHz, F.C.C., Part 15, Subpart C

10.2 ***Test Procedure***

The E.U.T. operation mode and test set-up are as described in Section 3.

See Section 2.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 1.

The frequency range 30 MHz-1000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

In the frequency range of 30 MHz – 2.9 MHz, the emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 2.9-10.0 GHz, a spectrum analyzer including a low noise amplifier was used. During average measurements, the IF bandwidth was 1 MHz and the video bandwidth was 100 Hz. During peak measurements, the IF bandwidth was 1 MHz and the video bandwidth was 3 MHz.

The test distance was 3 meters.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

The E.U.T. was tested at the operating frequencies of 904.9, 911.4, and 917.3 MHz.



Spurious Radiated Emission 30 – 10000 MHz

10.3 Test Results

JUDGEMENT: Passed by 3.3dB

No signals were detected in the frequency range of 30 – 1000 MHz in all three operating frequencies.

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification.

For all three operating frequencies, no signals were detected below 1 GHz.

For the operation frequency of 904.9 MHz, the margin between the emission level and the specification limit is 3.3dB in the worst case at the frequency of 2715.61 MHz, horizontal polarization.

For the operation frequency of 911.4 MHz, the margin between the emission level and the specification limit is 9.5dB in the worst case at the frequency of 2733.90 MHz, horizontal polarization.

For the operation frequency of 917.3 MHz, the margin between the emission level and the specification limit is 3.7dB in the worst case at the frequency of 1833.82 MHz, vertical polarization.

The details of the highest emissions are given in Figure 31 to Figure 32.

TEST PERSONNEL:

Tester Signature: 

Date: 05.11.13

Typed/Printed Name: A.Sharabi



Spurious Radiated Emission 30 – 10000 MHz

E.U.T Description PBS Base Station
Part Number BS91/103000
Serial Number: Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 10.0 GHz
Test Distance: 3 meters Detector: Peak

| Operation Frequency (MHz) | Freq. (MHz) | Polarity (H/V) | Peak Reading (dB μ V/m) | Peak Specification (dB μ V/m) | Margin (dB) |
|---------------------------|-------------|----------------|-----------------------------|-----------------------------------|-------------|
| 904.9 | 1810.99 | H | 56.4 | 74.0 | -17.6 |
| 904.9 | 1810.00 | V | 54.3 | 74.0 | -19.7 |
| 904.9 | 2715.61 | H | 59.6 | 74.0 | -14.4 |
| 904.9 | 2715.19 | V | 56.7 | 74.0 | -17.3 |
| 911.4 | 1822.80 | H | 55.1 | 74.0 | -18.9 |
| 911.4 | 1822.80 | V | 53.4 | 74.0 | -20.6 |
| 911.4 | 2733.90 | H | 55.5 | 74.0 | -18.5 |
| 911.4 | 2724.67 | V | 55.1 | 74.0 | -18.9 |
| 917.3 | 1834.34 | H | 57.0 | 74.0 | -17.0 |
| 917.3 | 1833.82 | V | 61.5 | 74.0 | -12.5 |
| 917.3 | 2751.12 | H | 55.1 | 74.0 | -18.9 |
| 917.3 | 2751.91 | V | 56.1 | 74.0 | -17.9 |

**Figure 31. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL.
Detector: Peak**

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Reading” includes correction factor.

“Correction Factor” = Antenna Factor + Cable Loss- Low Noise Amplifier Gain



Spurious Radiated Emission 30 – 10000 MHz

E.U.T Description PBS Base Station
Part Number BS91/103000
Serial Number: Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 10.0 GHz
Test Distance: 3 meters Detector: Average

| Operation Frequency (MHz) | Freq. (MHz) | Polarity (H/V) | Avg. Reading (dB μ V/m) | Avg. Specification (dB μ V/m) | Margin (dB) |
|---------------------------|-------------|----------------|-----------------------------|-----------------------------------|-------------|
| 904.9 | 1810.99 | H | 43.2 | 54.0 | -10.8 |
| 904.9 | 1810.00 | V | 45.2 | 54.0 | -8.8 |
| 904.9 | 2715.61 | H | 50.7 | 54.0 | -3.3 |
| 904.9 | 2715.19 | V | 45.7 | 54.0 | -8.3 |
| 911.4 | 1822.80 | H | 41.1 | 54.0 | -12.9 |
| 911.4 | 1822.80 | V | 41.3 | 54.0 | -12.7 |
| 911.4 | 2733.90 | H | 44.5 | 54.0 | -9.5 |
| 911.4 | 2724.67 | V | 43.4 | 54.0 | -10.6 |
| 917.3 | 1834.34 | H | 46.7 | 54.0 | -7.3 |
| 917.3 | 1833.82 | V | 50.3 | 54.0 | -3.7 |
| 917.3 | 2751.12 | H | 41.4 | 54.0 | -12.6 |
| 917.3 | 2751.91 | V | 45.3 | 54.0 | -8.7 |

**Figure 32. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL.
Detector: Average**

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Average Reading” includes correction factor.

* Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain



Spurious Radiated Emission 30 – 10000 MHz

10.4 Spurious Radiated Emission 30 – 10000 MHz Test Equipment

| Instrument | Manufacturer | Model | Serial No. | Last Calibration Date | Period |
|-------------------------|---------------|------------------|------------|-----------------------|---------|
| EMI Receiver | HP | 85422E | 3906A00276 | February 26, 2013 | 1 Year |
| RF Filter Section | HP | 85420E | 3705A00248 | February 26, 2013 | 1 Year |
| Antenna Biconical | EMCO | 3104 | 2606 | August 30, 2013 | 1 Year |
| Antenna Log Periodic | ARA | LPD-2010/A | 1038 | April 2, 2013 | 1 Year |
| Horn Antenna | ETS | 3115 | 29845 | March 14, 2012 | 2 Years |
| Low Noise Amplifier | DBS MICROWAVE | LNA-DBS-0411N313 | 013 | August 21, 2013 | 1 Year |
| Spectrum Analyzer | HP | 8592L | 3826A01204 | February 28, 2013 | 1 Year |
| Antenna Mast | ARA | AAM-4A | 1001 | N/A | N/A |
| Turntable | ARA | ART-1001/4 | 1001 | N/A | N/A |
| Mast & Table Controller | ARA | ACU-2/5 | 1001 | N/A | N/A |
| Printer | HP | LaserJet 2200 | JPKGC19982 | N/A | N/A |

Figure 33 Test Equipment Used



10.5 **Field Strength Calculation 30 – 1000 MHz**

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$[\text{dB}\mu\text{v}/\text{m}] \text{ FS} = \text{RA} + \text{AF} + \text{CF}$$

FS: Field Strength [dB μ v/m]

RA: Receiver Amplitude [dB μ v]

AF: Receiving Antenna Correction Factor [dB/m]

CF: Cable Attenuation Factor [dB]

Example: FS = 30.7 dB μ V (RA) + 14.0 dB (AF) + 0.9 dB (CF) = 45.6 dB μ V

No external pre-amplifiers are used.



11. Transmitted Power Density

11.1 **Test Specification**

FCC Part 15, Subpart C, section 15.247(d)

11.2 **Test procedure**

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20dB) and an appropriate coaxial cable. The spectrum analyzer was set to 3 kHz resolution BW and sweep time of 1 second for each 3 kHz "window". The spectrum peaks were located at each of the 3 operating frequencies.

11.3 **Test Results**

| Operation Frequency (MHz) | Reading Spectrum Analyzer (dBm) | Specification (dBm) | Margin (dB) |
|---------------------------|---------------------------------|---------------------|-------------|
| 904.9 | 7.37 | 8.0 | -0.63 |
| 911.4 | 7.53 | 8.0 | -0.47 |
| 917.3 | 7.87 | 8.0 | -0.13 |

Figure 34 Test Results Table

See additional information in Figure 35 to Figure 37.

JUDGEMENT: Passed by 0.13dB

TEST PERSONNEL:

Tester Signature: 

Date: 05.11.13

Typed/Printed Name: A.Sharabi



Transmitted Power Density

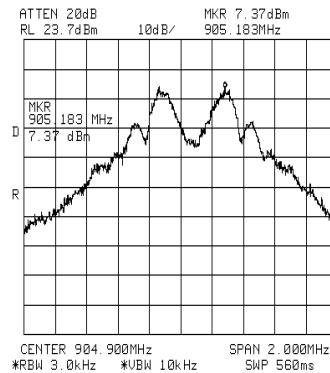


Figure 35 — 904.9 MHz

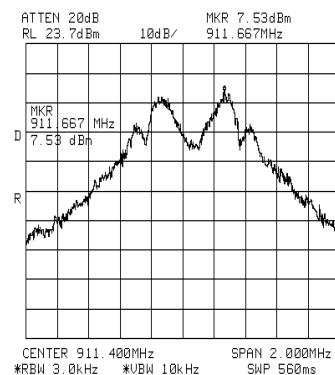


Figure 36 — 911.4 MHz



Transmitted Power Density

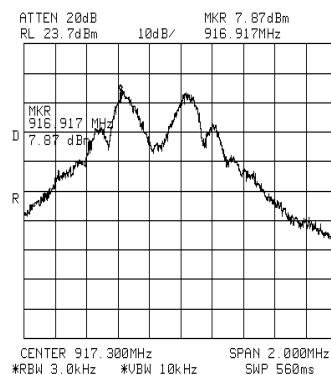


Figure 37 — 917.3 MHz

11.4 Test Equipment Used.

| Instrument | Manufacturer | Model | Serial/Part Number | Calibration | |
|-------------------|---------------|---------------|--------------------|-----------------------|--------|
| | | | | Last Calibration Date | Period |
| Spectrum Analyzer | HP | 8564E | 3442A00275 | February 28, 2013 | 1 year |
| Attenuator | Mini-Circuits | 20dB | | October 27, 2013 | 1 year |
| Cable | Mini-Circuits | CBL-4FT-SMNM+ | 30084 | October 27, 2013 | 1 year |

Figure 38 Test Equipment Used



12. Antenna Gain/Information

Antenna for the PBS is Pasternack 51028

Specifications:

Type: Half wave dipole

Gain: 5dBi

Impedance: 50Ohm

VSWR: < 2.0:1

Polarization: Vertical

Radiation pattern: Omni



13. R.F Exposure/Safety

Typical use of the E.U.T. is defining a location zone. The typical placement of the E.U.T. is wall mounted. The typical distance between the E.U.T. and the user is 20cm.

Calculation of Maximum Permissible Exposure (MPE) Based on Section 1.1310 Requirements

(a) FCC limits at 904.9 MHz is: $\frac{f}{1500} = 0.603 \frac{mW}{cm^2}$

Using table 1 of Section 1.1310 limit for general population/uncontrolled exposures, the above level is an average over 30 minutes.

(b) The power density produced by the E.U.T. is

$$S = \frac{P_t G_t}{4\pi R^2}$$

P_t- Transmitted Power: 17.20 dBm Peak = 52.5 mw

G_T- Antenna Gain: 5dBi= 3.16 numeric

R- Distance from Transmitter = 20 cm

(c) The peak power density is:

$$S_p = \frac{52.5 \times 3.16}{4\pi(20)^2} = 0.03 \frac{mW}{cm^2}$$

(e) This is below the FCC limit.



14. APPENDIX A - CORRECTION FACTORS

14.1 Correction factors for

CABLE

from EMI receiver
to test antenna
at 3 meter range.

| FREQUENCY CORRECTION FACTOR | | FREQUENCY CORRECTION FACTOR | |
|-----------------------------|------|-----------------------------|------|
| (MHz) | (dB) | (MHz) | (dB) |
| 10.0 | 0.3 | 1200.0 | 7.3 |
| 20.0 | 0.6 | 1400.0 | 7.8 |
| 30.0 | 0.8 | 1600.0 | 8.4 |
| 40.0 | 0.9 | 1800.0 | 9.1 |
| 50.0 | 1.1 | 2000.0 | 9.9 |
| 60.0 | 1.2 | 2300.0 | 11.2 |
| 70.0 | 1.3 | 2600.0 | 12.2 |
| 80.0 | 1.4 | 2900.0 | 13.0 |
| 90.0 | 1.6 | | |
| 100.0 | 1.7 | | |
| 150.0 | 2.0 | | |
| 200.0 | 2.3 | | |
| 250.0 | 2.7 | | |
| 300.0 | 3.1 | | |
| 350.0 | 3.4 | | |
| 400.0 | 3.7 | | |
| 450.0 | 4.0 | | |
| 500.0 | 4.3 | | |
| 600.0 | 4.7 | | |
| 700.0 | 5.3 | | |
| 800.0 | 5.9 | | |
| 900.0 | 6.3 | | |
| 1000.0 | 6.7 | | |

NOTES:

1. The cable type is RG-214.
2. The overall length of the cable is 27 meters.
3. The above data is located in file 27MO3MO.CBL on the disk marked "Radiated Emission Tests EMI Receiver".



14.2 Correction factors for

CABLE

from EMI receiver
to test antenna
at 3 meter range.

| FREQUENCY (GHz) | CORRECTION FACTOR (dB) |
|-----------------|------------------------|
| 1.0 | 1.2 |
| 2.0 | 1.6 |
| 3.0 | 2.0 |
| 4.0 | 2.4 |
| 5.0 | 3.0 |
| 6.0 | 3.4 |
| 7.0 | 3.8 |
| 8.0 | 4.2 |
| 9.0 | 4.6 |
| 10.0 | 5.0 |
| 12.0 | 5.8 |

NOTES:

1. The cable type is RG-8.
2. The overall length of the cable is 10 meters.



14.3 Correction factors for

CABLE from spectrum analyzer to test antenna above 2.9 GHz

| FREQUENCY (GHz) | CORRECTION FACTOR (dB) | FREQUENCY (GHz) | CORRECTION FACTOR (dB) |
|--------------------|------------------------------|--------------------|------------------------------|
| 1.0 | 1.9 | 14.0 | 9.1 |
| 2.0 | 2.7 | 15.0 | 9.5 |
| 3.0 | 3.5 | 16.0 | 9.9 |
| 4.0 | 4.2 | 17.0 | 10.2 |
| 5.0 | 4.9 | 18.0 | 10.4 |
| 6.0 | 5.5 | 19.0 | 10.7 |
| 7.0 | 6.0 | 20.0 | 10.9 |
| 8.0 | 6.5 | 21.0 | 11.2 |
| 9.0 | 7.0 | 22.0 | 11.6 |
| 10.0 | 7.5 | 23.0 | 11.9 |
| 11.0 | 7.9 | 24.0 | 12.3 |
| 12.0 | 8.3 | 25.0 | 12.6 |
| 13.0 | 8.7 | 26.0 | 13.0 |

NOTES:

1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.
2. The cable is used for measurements above 2.9 GHz.
3. The overall length of the cable is 10 meters.



12.6 Correction factors for LOG PERIODIC ANTENNA
Type LPD 2010/A
at 3 and 10 meter ranges.

Distance of 3 meters

| FREQUENCY (MHz) | AFE (dB/m) |
|--------------------|---------------|
| 200.0 | 9.1 |
| 250.0 | 10.2 |
| 300.0 | 12.5 |
| 400.0 | 15.4 |
| 500.0 | 16.1 |
| 600.0 | 19.2 |
| 700.0 | 19.4 |
| 800.0 | 19.9 |
| 900.0 | 21.2 |
| 1000.0 | 23.5 |

Distance of 10 meters

| FREQUENCY (MHz) | AFE (dB/m) |
|--------------------|---------------|
| 200.0 | 9.0 |
| 250.0 | 10.1 |
| 300.0 | 11.8 |
| 400.0 | 15.3 |
| 500.0 | 15.6 |
| 600.0 | 18.7 |
| 700.0 | 19.1 |
| 800.0 | 20.2 |
| 900.0 | 21.1 |
| 1000.0 | 23.2 |

NOTES:

1. Antenna serial number is 1038.
2. The above lists are located in file number 38M30.ANT for a 3 meter range, and file number 38M100.ANT for a 10 meter range.
3. The files mentioned above are located on the disk marked "Radiated Emission Test EMI Receiver".



14.4 Correction factors for

LOG PERIODIC ANTENNA

Type SAS-200/511
at 3 meter range.

| FREQUENCY (GHz) | ANTENNA FACTOR (dB) |
|--------------------|---------------------------|
| 1.0 | 24.9 |
| 1.5 | 27.8 |
| 2.0 | 29.9 |
| 2.5 | 31.2 |
| 3.0 | 32.8 |
| 3.5 | 33.6 |
| 4.0 | 34.3 |
| 4.5 | 35.2 |
| 5.0 | 36.2 |
| 5.5 | 36.7 |
| 6.0 | 37.2 |
| 6.5 | 38.1 |

| FREQUENCY (GHz) | ANTENNA FACTOR (dB) |
|--------------------|---------------------------|
| 7.0 | 38.6 |
| 7.5 | 39.2 |
| 8.0 | 39.9 |
| 8.5 | 40.4 |
| 9.0 | 40.8 |
| 9.5 | 41.1 |
| 10.0 | 41.7 |
| 10.5 | 42.4 |
| 11.0 | 42.5 |
| 11.5 | 43.1 |
| 12.0 | 43.4 |
| 12.5 | 44.4 |
| 13.0 | 44.6 |

NOTES:

1. Antenna serial number is 253.
2. The above lists are located in file number SAS3M0.ANT for a 3 meter range.
3. The files mentioned above are located on the disk marked "Antenna Factors".



14.5 Correction factors for

**BICONICAL ANTENNA
Type BCD-235/B,
at 3 meter range**

| FREQUENCY (MHz) | AFE (dB/m) |
|--------------------|---------------|
| 20.0 | 19.4 |
| 30.0 | 14.8 |
| 40.0 | 11.9 |
| 50.0 | 10.2 |
| 60.0 | 9.1 |
| 70.0 | 8.5 |
| 80.0 | 8.9 |
| 90.0 | 9.6 |
| 100.0 | 10.3 |
| 110.0 | 11.0 |
| 120.0 | 11.5 |
| 130.0 | 11.7 |
| 140.0 | 12.1 |
| 150.0 | 12.6 |
| 160.0 | 12.8 |
| 170.0 | 13.0 |
| 180.0 | 13.5 |
| 190.0 | 14.0 |
| 200.0 | 14.8 |
| 210.0 | 15.3 |
| 220.0 | 15.8 |
| 230.0 | 16.2 |
| 240.0 | 16.6 |
| 250.0 | 17.6 |
| 260.0 | 18.2 |
| 270.0 | 18.4 |
| 280.0 | 18.7 |
| 290.0 | 19.2 |
| 300.0 | 19.9 |
| 310 | 20.7 |
| 320 | 21.9 |
| 330 | 23.4 |
| 340 | 25.1 |
| 350 | 27.0 |

NOTES:

1. Antenna serial number is 1041.
2. The above list is located in file 19BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".



14.6 Correction factors for ACTIVE LOOP ANTENNA

**Model 6502
S/N 9506-2950**

| FREQUENCY (MHz) | Magnetic Antenna Factor (dB) | Electric Antenna Factor (dB) |
|--------------------|---------------------------------------|---------------------------------------|
| .009 | -35.1 | 16.4 |
| .010 | -35.7 | 15.8 |
| .020 | -38.5 | 13.0 |
| .050 | -39.6 | 11.9 |
| .075 | -39.8 | 11.8 |
| .100 | -40.0 | 11.6 |
| .150 | -40.0 | 11.5 |
| .250 | -40.0 | 11.6 |
| .500 | -40.0 | 11.5 |
| .750 | -40.1 | 11.5 |
| 1.000 | -39.9 | 11.7 |
| 2.000 | -39.5 | 12.0 |
| 3.000 | -39.4 | 12.1 |
| 4.000 | -39.7 | 11.9 |
| 5.000 | -39.7 | 11.8 |
| 10.000 | 40.2 | 11.3 |
| 15.000 | -40.7 | 10.8 |
| 20.000 | -40.5 | 11.0 |
| 25.000 | -41.3 | 10.2 |
| 30.000 | 42.3 | 9.2 |