



DATE: 17 May 2012

I.T.L. (PRODUCT TESTING) LTD.

FCC Radio Test Report
for
Precyse Technologies Inc

Equipment under test:

Base Station

BS91/103000

Written by:

D. Shidlowsky, Documentation

Approved by:

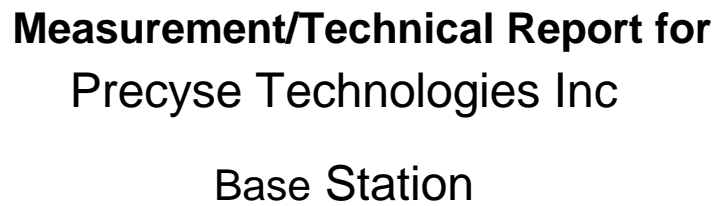
I. Siboni, Test Engineer

Approved by:

I. Raz, EMC Laboratory Manager

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This report relates only to items tested.



BS91/103000

FCC ID: WONBS91103000

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 18 January 2012.

Application for Certification
prepared by:
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1. General Information

1.1 Administrative Information

Manufacturer:	Precyse Technologies Inc
Manufacturer's Address:	94 Em Hamoshavot St. Petach Tikva 41930 Israel Tel: +972-3-922-7093 Fax: +972-3-922-7515
Manufacturer's Representative:	Lior Bilia
Equipment Under Test (E.U.T):	Base Station
Equipment Model No.:	BS91/103000
Equipment Serial No.:	Not Designated
Date of Receipt of E.U.T:	22.11.2011
Start of Test:	22.11.2011
End of Test:	28.11.2011
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 - 24Vdc, up to 500mA.

1.4 Test Methodology

Radiated testing was performed according to the procedures in KDB 558074 D01 18 January 2012. 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

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.

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

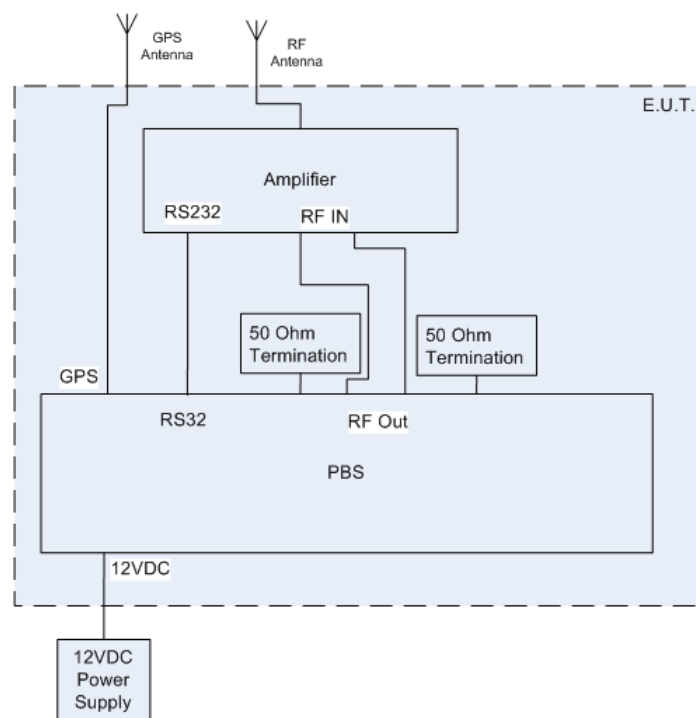


Figure 1. Configuration of Tested System

3. Test Setup Photos

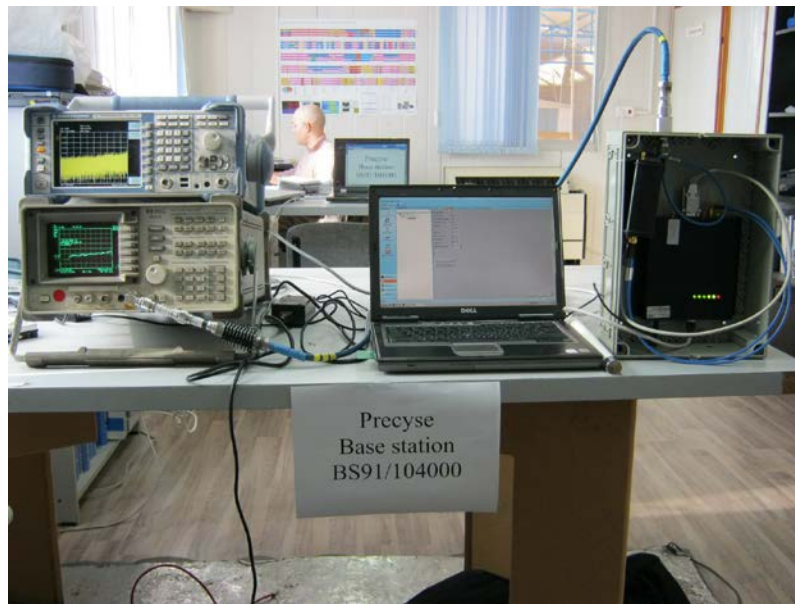


Figure 2. Conducted Emission From Antenna Ports Tests



Figure 3. Radiated Emission Test



4. 6 dB Minimum Bandwidth

4.1 Test Specification

FCC Part 15, Subpart C Section 15.247-a2

4.2 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 (30 dB) and an appropriate coaxial cable (cable loss = 1 dB). 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.

4.3 Test Results


Operation Frequency (MHz)	Reading (MHz)	Specification (MHz)
904.9	0.507	0.5
911.4	0.507	0.5
917.3	0.515	0.5

Figure 4 6 dB Minimum Bandwidth Test Results Table

See additional information in Figure 5 to Figure 7.

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: 

Date: 17.05.12

Typed/Printed Name: I. Siboni

6 dB Minimum Bandwidth

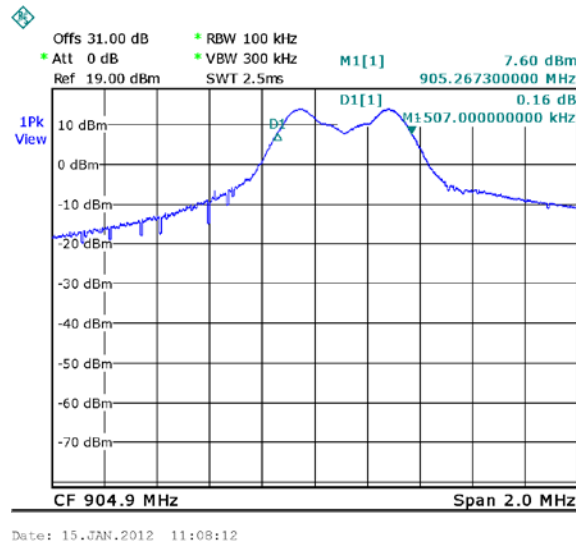


Figure 5 — 904.9 MHz

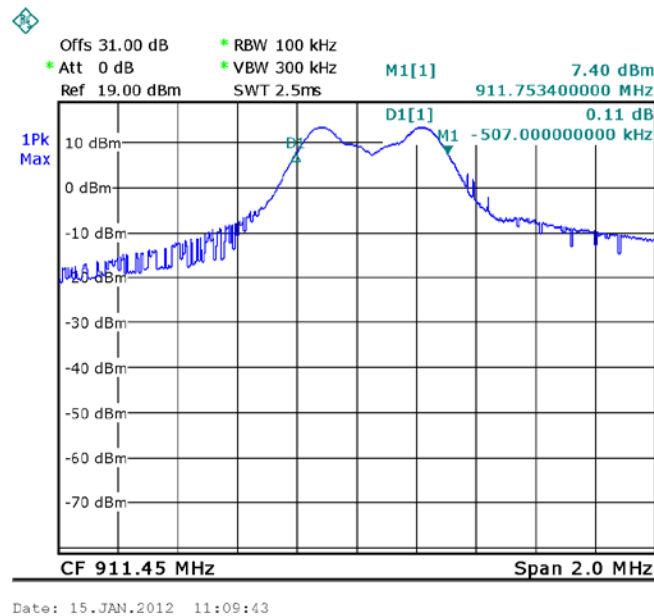


Figure 6 — 911.4 MHz

6 dB Minimum Bandwidth

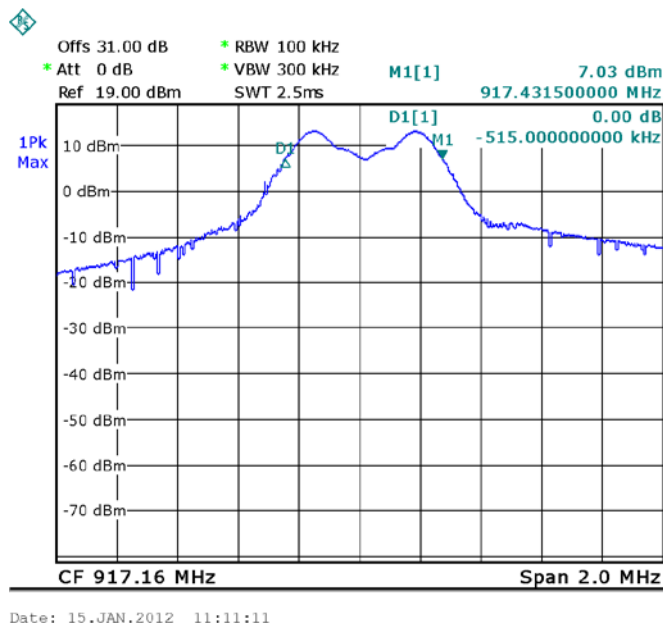


Figure 7 — 917.3 MHz

4.4 6 dB Minimum Bandwidth Test Equipment

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibration Date	Period
Spectrum Analyzer	ROHDE & SCHWARZ	FSL	10-300191865	October 31, 2011	1 year
Attenuator	MCL	Bw-s30w5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	CBL-4FT-SNMN+	30084	February 10, 2011	1 year

Figure 8 Test Equipment Used

5. Maximum Transmitted Peak Power Output

5.1 Test Specification

FCC Part 15, Subpart C Section 15.247(b)

5.2 Test Procedure

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (30 dB) and an appropriate coaxial cable (cable loss = 1 dB). 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.

5.3 Test Results


Operation Frequency (MHz)	Power (dBm)	Specification (dBm)	Margin (dB)
904.9	15.82	30.0	-14.18
911.4	15.42	30.0	-14.58
917.3	15.09	30.0	-14.91

Figure 9 Maximum Peak Power Output

See additional information in Figure 10 to Figure 12.

JUDGEMENT: Passed by 14.18 dB

TEST PERSONNEL:

Tester Signature: 

Date: 17.05.2012

Typed/Printed Name: I. Siboni

Maximum Transmitted Peak Power Output

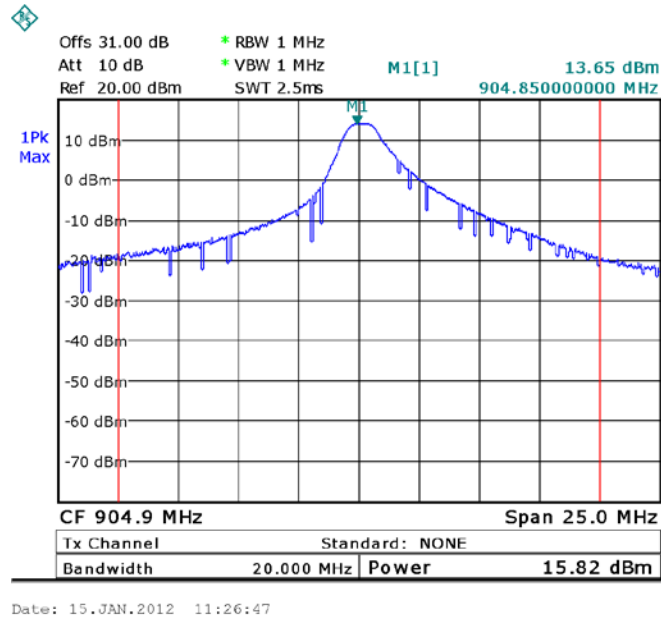


Figure 10 — 904.9 MHz

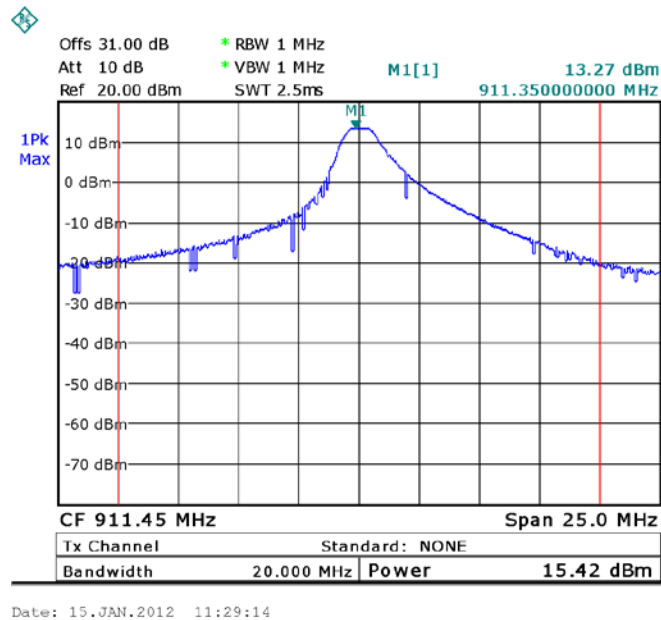


Figure 11 — 911.4 MHz



Maximum Transmitted Peak Power Output

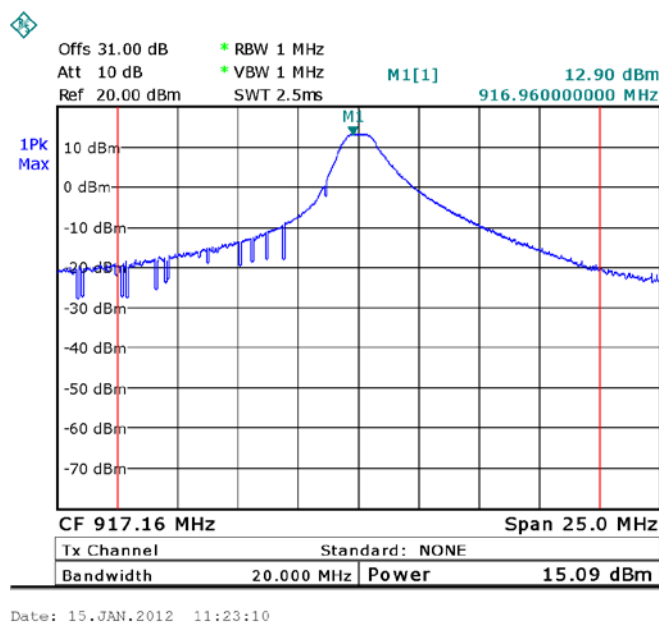


Figure 12 — 917.3 MHz

5.1 Maximum Transmitted Peak Output Power Test Equipment

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibration Date	Period
Spectrum Analyzer	ROHDE & SCHWARZ	FSL	10-300191865	October 31, 2011	1 year
Attenuator	MCL	Bw-s30w5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	CBL-4FT-SMNM+	30084	February 10, 2011	1 year

Figure 13 Test Equipment Used

6. Peak Power Output Out of 902-918 MHz Band

6.1 Test Specification

FCC Part 15, Subpart C, Section 15.247

6.2 Test Procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (30 dB) and an appropriate coaxial cable (cable loss = 1 dB). 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 902-928 MHz was measured at the 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)	Reading (dBm)	Specification (dBm)	Margin (dB)
904.9	-24.93	-10.3	-14.63
911.4	-26.52	-10.3	-16.22
917.3	-23.79	-10.8	-12.99

Figure 14 Peak Power Output of 902-928 MHz Band Test results Table

See additional information in Figure 15 to Figure 35.

JUDGEMENT: Passed by 12.99 dB

TEST PERSONNEL:

Tester Signature: 

Date: 17.05.2012

Typed/Printed Name: I. Siboni

Peak Power Output Out of 902-918 MHz Band

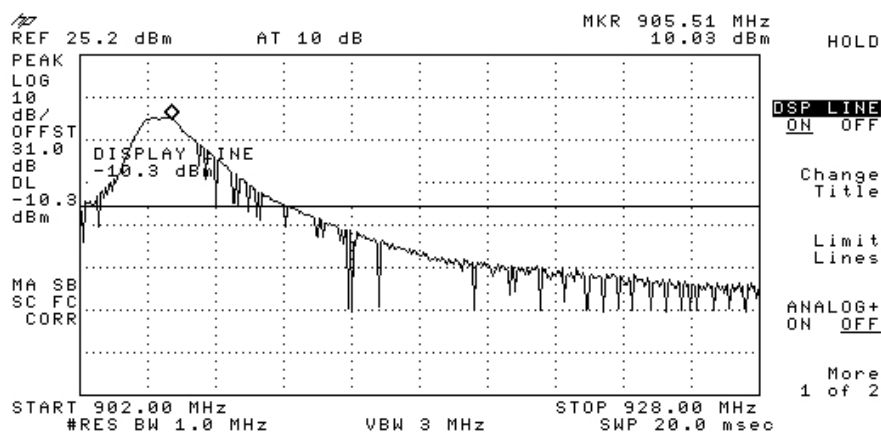


Figure 15 — 904.9 MHz

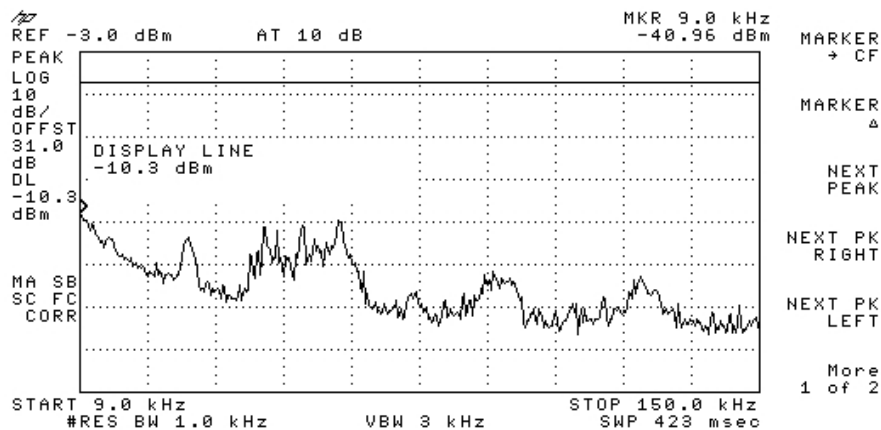


Figure 16 — 904.9 MHz

Peak Power Output Out of 902-918 MHz Band

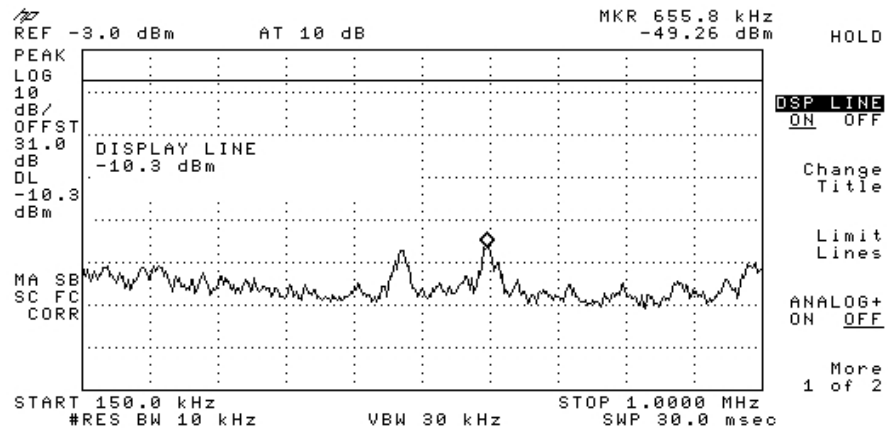


Figure 17 — 904.9 MHz

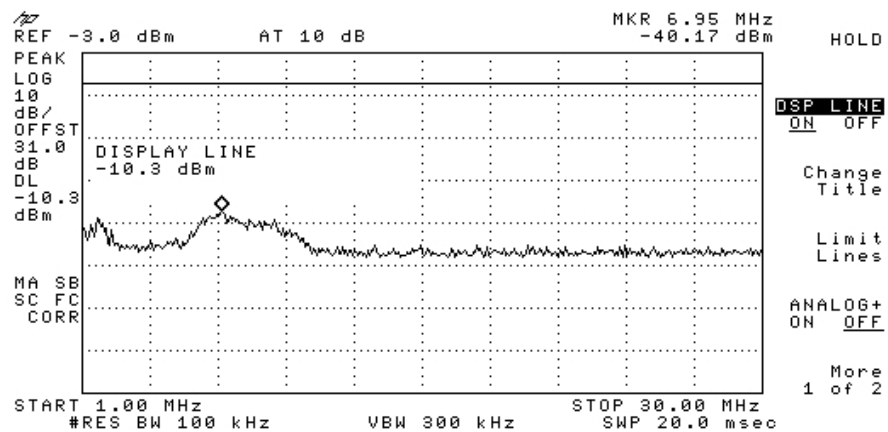


Figure 18 — 904.9 MHz

Peak Power Output Out of 902-918 MHz Band

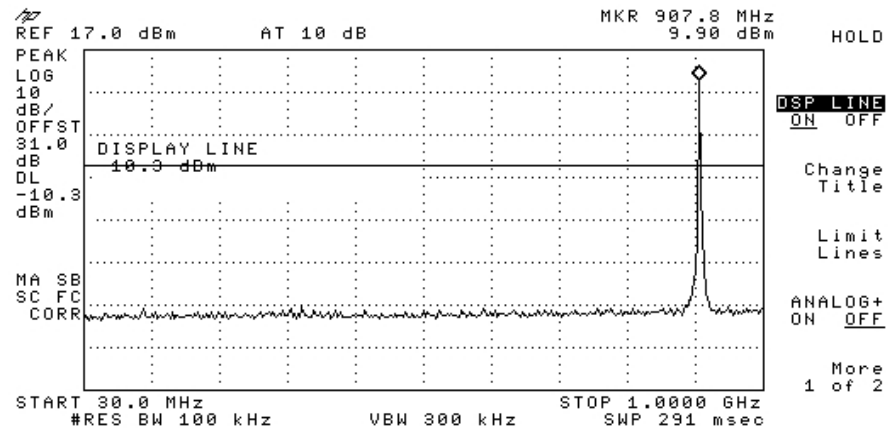


Figure 19 — 904.9 MHz

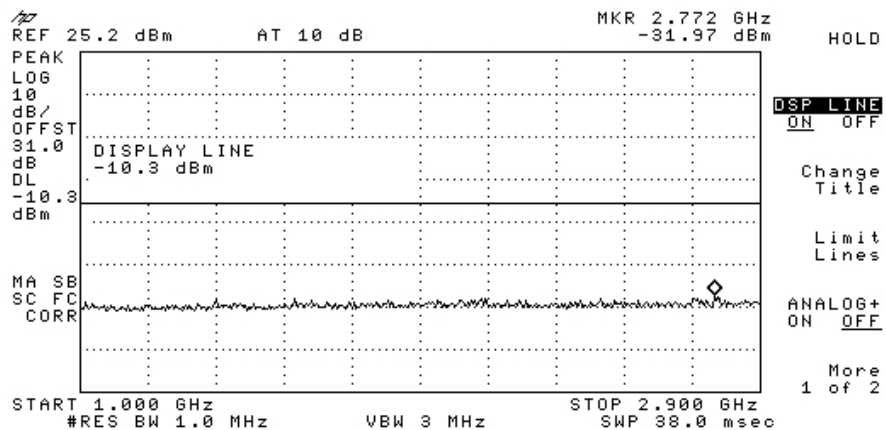


Figure 20 — 904.9 MHz

Peak Power Output Out of 902-918 MHz Band

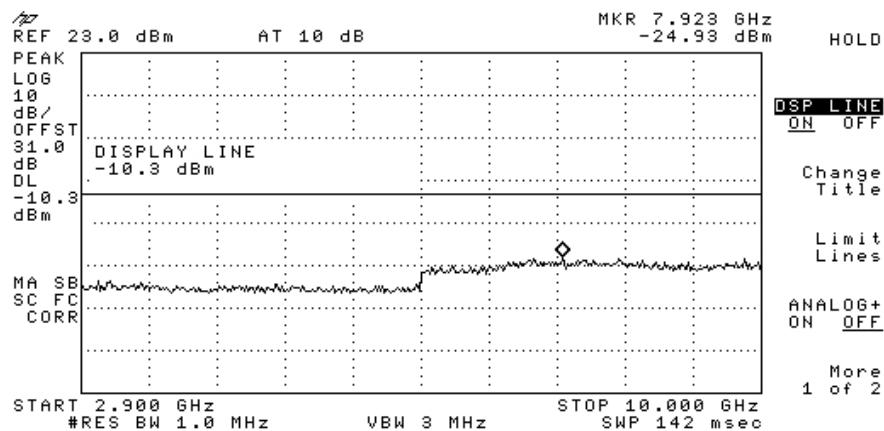


Figure 21 — 904.9 MHz

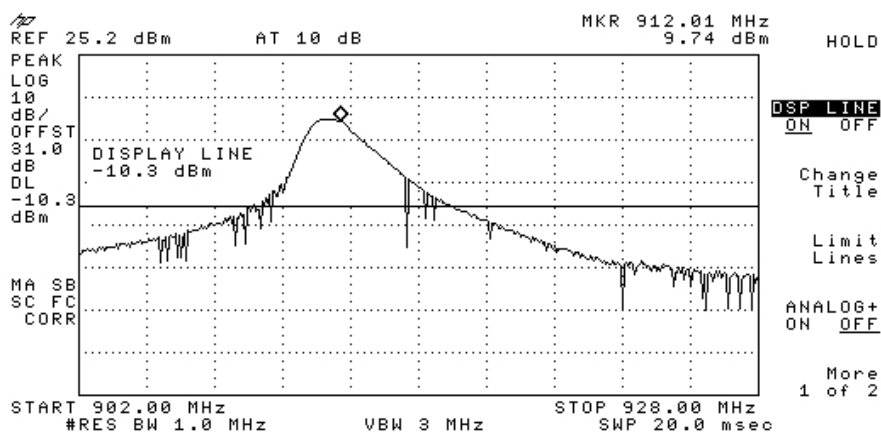


Figure 22 — 911.4 MHz

Peak Power Output Out of 902-918 MHz Band

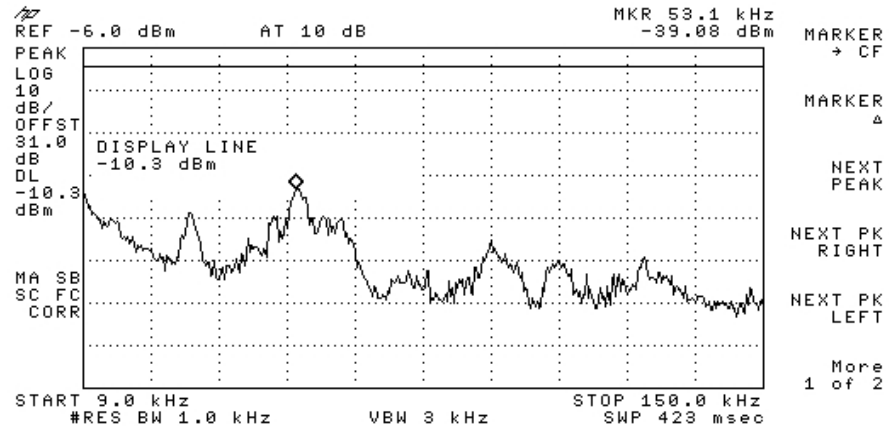


Figure 23 — 911.4 MHz

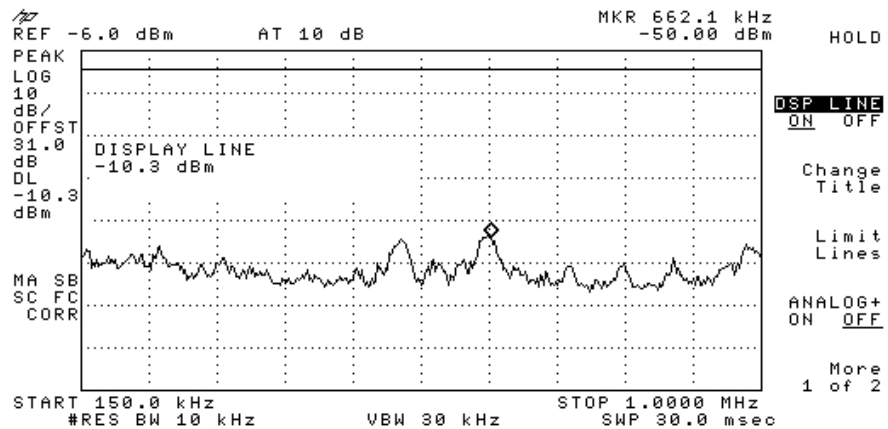


Figure 24 — 911.4 MHz

Peak Power Output Out of 902-918 MHz Band

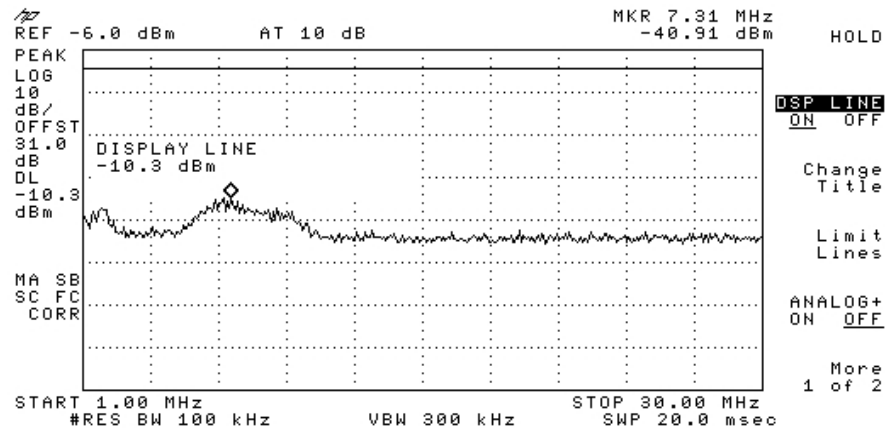


Figure 25 — 911.4 MHz

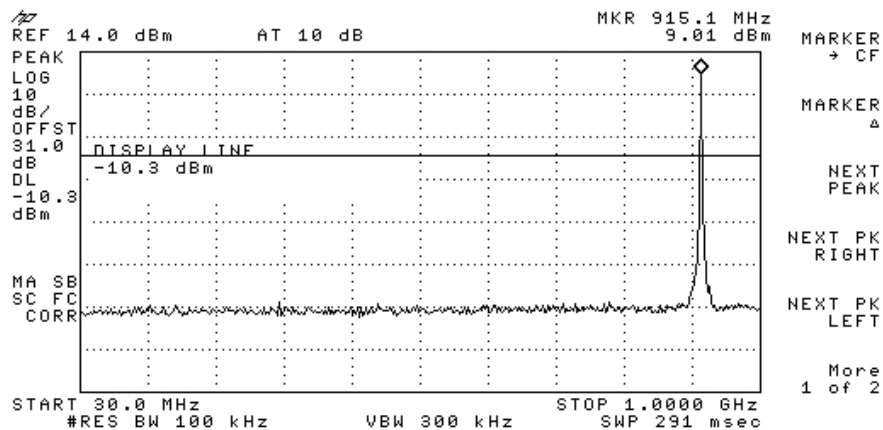


Figure 26 — 911.4 MHz

Peak Power Output Out of 902-918 MHz Band

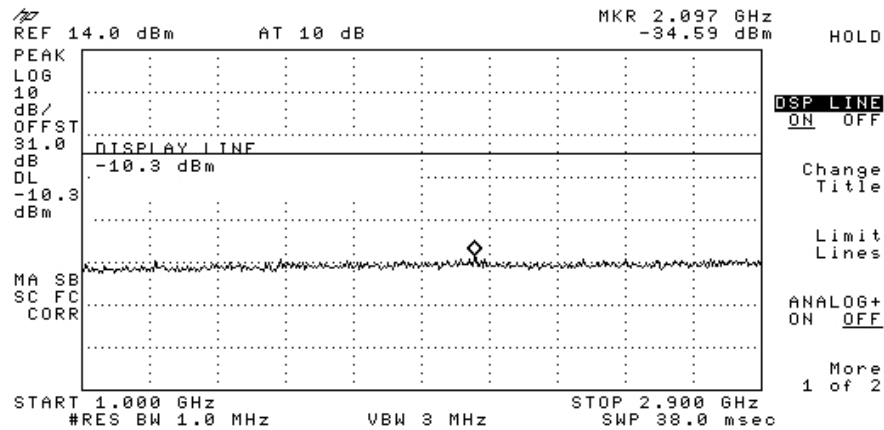


Figure 27 — 911.4 MHz

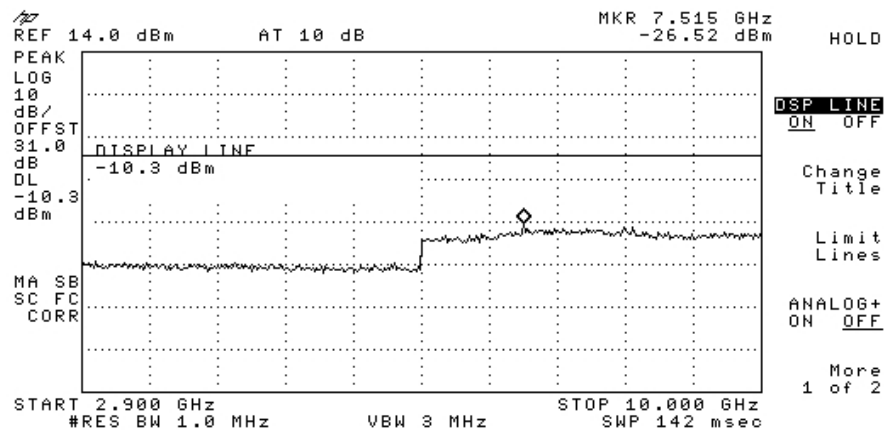


Figure 28 — 911.4 MHz

Peak Power Output Out of 902-918 MHz Band

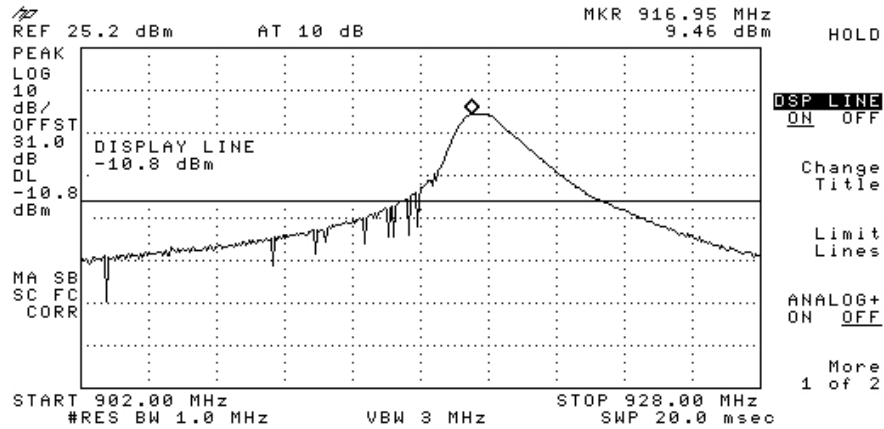


Figure 29 — 917.3 MHz

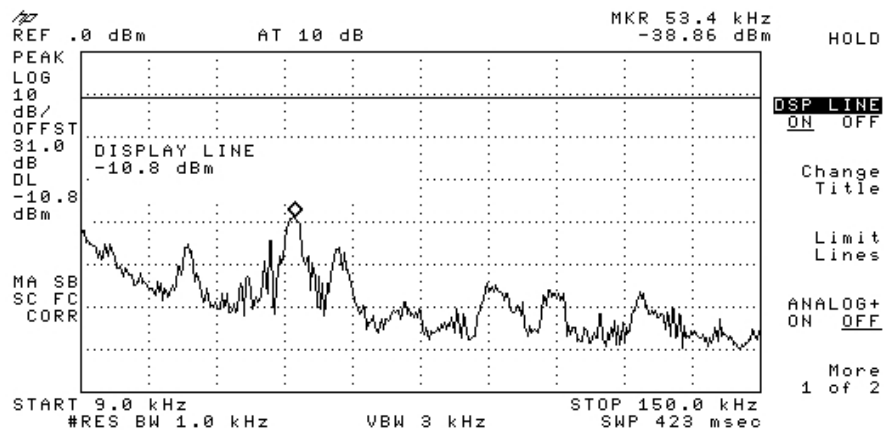


Figure 30 — 917.3 MHz

Peak Power Output Out of 902-918 MHz Band

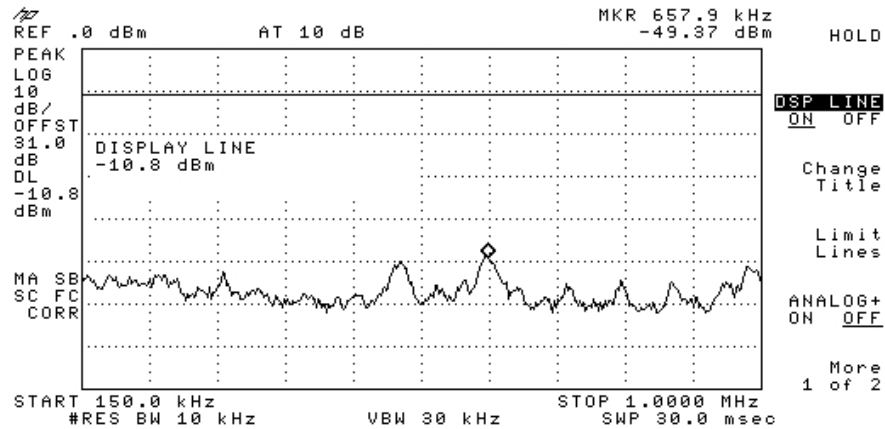


Figure 31 — 917.3 MHz

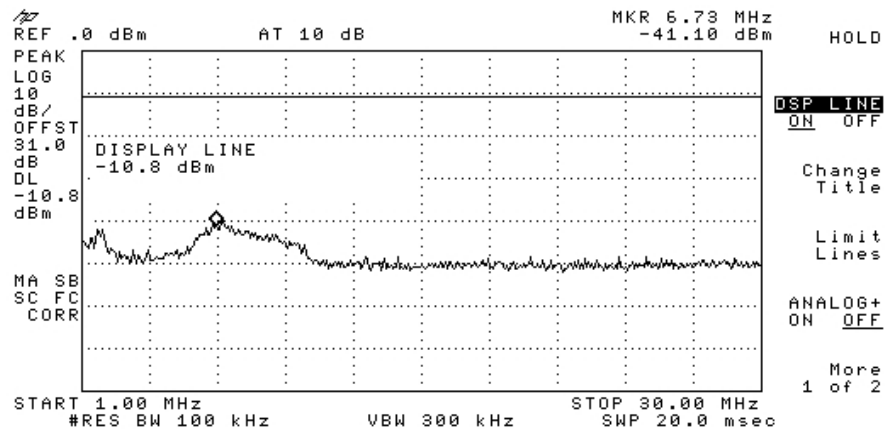


Figure 32 — 917.3 MHz

Peak Power Output Out of 902-918 MHz Band

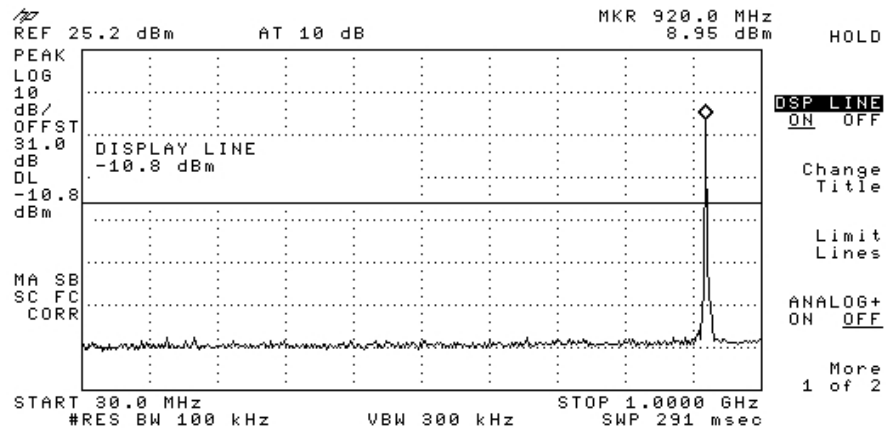


Figure 33 — 917.3 MHz

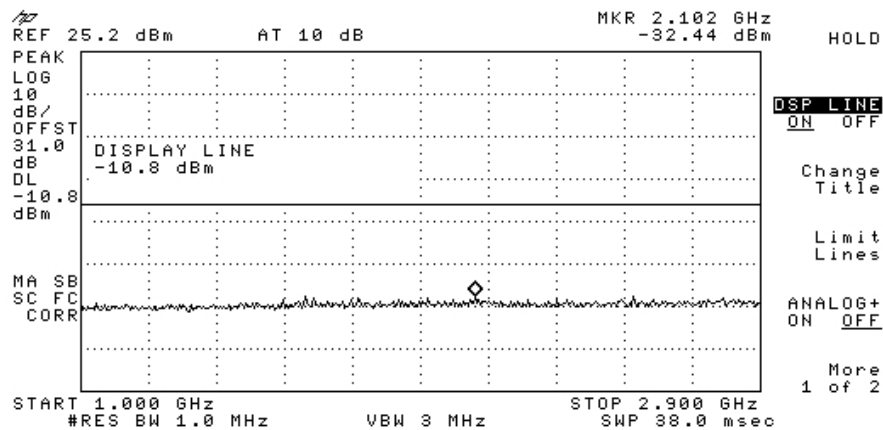


Figure 34 — 917.3 MHz



Peak Power Output Out of 902-918 MHz Band

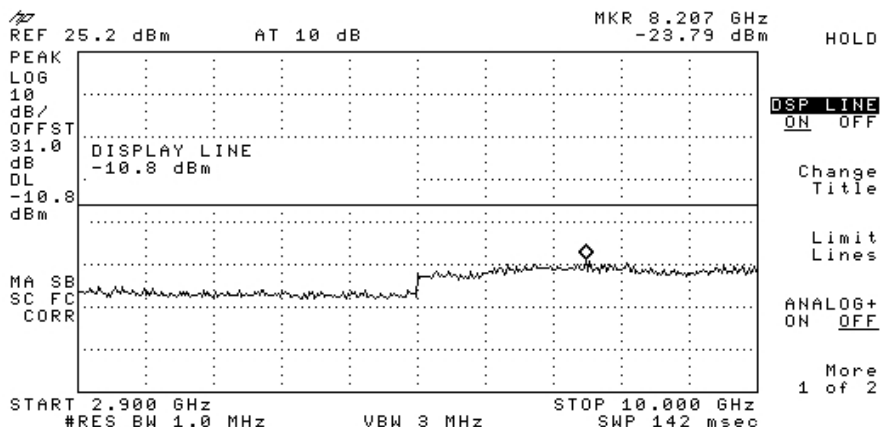


Figure 35 — 917.3 MHz

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

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibration Date	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 21, 2011	1 year
Attenuator	MCL	Bw-s30w5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	CBL-4FT-SMNM+	30084	February 10, 2011	1 year

Figure 36 Test Equipment Used

7. Band Edge Spectrum

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 (30 dB) and an appropriate coaxial cable (cable loss = 1 dB). 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.

7.3 Test Results

Operation Frequency (MHz)	Band Edge Frequency (MHz)	Spectrum Level (dBm)	Specification (dBm)	Margin (dB)
904.9	902	-27.76	-6.45	-21.31
917.3	928	-39.57	-7.10	-32.47

Figure 37 Band Edge Spectrum Test Results Table

See additional information in Figure 38 to Figure 39.

JUDGEMENT: Passed by 20.3 dB

TEST PERSONNEL:

Tester Signature: 

Date: 17.05.12

Typed/Printed Name: I. Siboni

Band Edge Spectrum

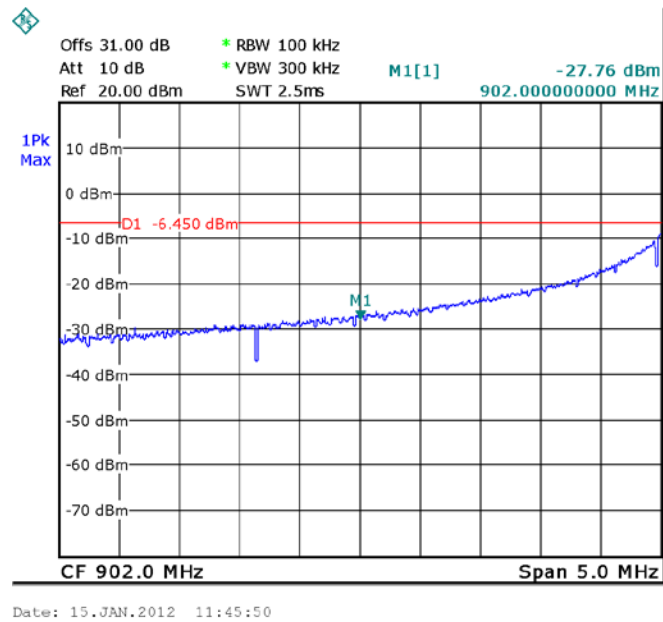


Figure 38 — 904.9 MHz

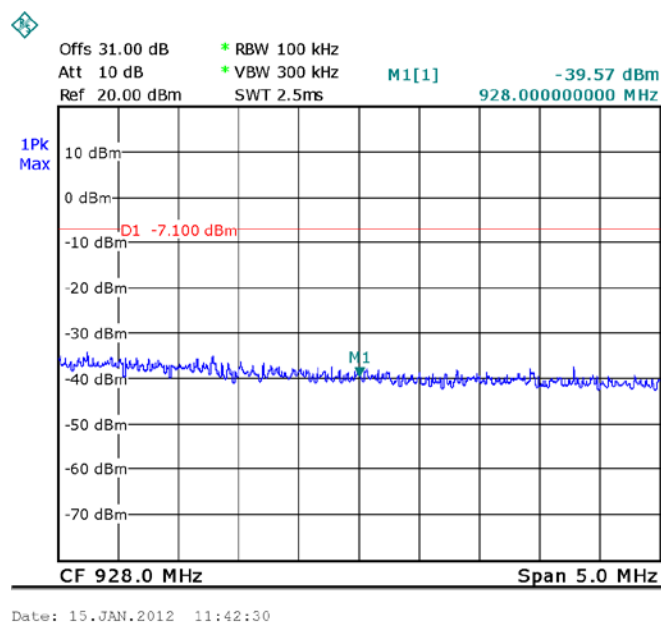


Figure 39 — 917.3 MHz



Band Edge Spectrum

7.4 Band Edge Spectrum Test Equipment

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibration Date	Period
Spectrum Analyzer	ROHDE & SCHWARZ	FSL	10-300191865	October 31, 2011	1 year
Attenuator	MCL	Bw-s30w5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	CBL-4FT-SMNM+	30084	February 10, 2011	1 year

Figure 40 Test Equipment Used



8. Spurious Radiated Emission, 9 kHz – 30 MHz

8.1 Test Specification

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

8.2 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 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 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.

8.3 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: 17.05.12

Typed/Printed Name: I. Siboni

Spurious Radiated Emission, 9 kHz – 30 MHz

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

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 24, 2010*	1 year
RF Section	HP	85420E	3705A00248	November 24, 2010*	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 19, 2011	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 41 Test Equipment Used

* Calibration valid until 30 November 2011.

8.5 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 [dBμV/m]
 RA: Receiver Amplitude [dBμV]
 AF: Receiving Antenna Correction Factor [dB/m]
 CF: Cable Attenuation Factor [dB]

No external pre-amplifiers are used.

9. Spurious Radiated Emission 30 – 10000 MHz

9.1 Test Specification

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

9.2 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

9.3 Test Results

JUDGEMENT: Passed by 2.1 dB

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 2.1 dB in the worst case at the frequency of 1809.80 MHz, vertical polarization.

For the operation frequency of 911.4 MHz, the margin between the emission level and the specification limit is 6.4 dB in the worst case at the frequency of 1828.80 MHz, vertical polarization.

For the operation frequency of 917.3 MHz, the margin between the emission level and the specification limit is 11.1 dB in the worst case at the frequency of 1834.60 MHz, vertical polarization.

The details of the highest emissions are given in Figure 42 to Figure 43.

TEST PERSONNEL:

Tester Signature: 

Date: 17.05.12

Typed/Printed Name: I. Siboni



Spurious Radiated Emission 30 – 10000 MHz

E.U.T Description 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 25.0 GHz
Test Distance: 3 meters Detector: Peak

Operation Frequency (MHz)	Freq. (MHz)	Polarity (H/V)	Peak Reading (dBμV/m)	Peak Specification (dB μV/m)	Margin (dB)
904.9	1809.80	H	61.1	74.0	-12.9
904.9	1809.80	V	71.9	74.0	-2.1
911.4	1828.80	H	57.7	74.0	-16.3
911.4	1828.80	V	59.8	74.0	-14.2
917.3	1834.60	H	57.8	74.0	-16.2
917.3	1834.60	V	60.2	74.0	-13.8

**Figure 42. 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 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 25.0 GHz

Test Distance: 3 meters

Detector: Average

Operation Frequency: MHz

Operation Frequency (MHz)	Freq. (MHz)	Polarity (H/V)	Average Reading (dB μ V/m)	Average Specification (dB μ V/m)	Margin (dB)
904.9	1809.80	H	47.2	54.0	-6.8
904.9	1809.80	V	48.4	54.0	-5.6
911.4	1828.80	H	45.3	54.0	-8.7
911.4	1828.80	V	47.6	54.0	-6.4
917.3	1834.60	H	41.4	54.0	-12.6
917.3	1834.60	V	42.9	54.0	-11.1

**Figure 43. 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

9.4 Spurious Radiated Emission 30 – 10000 MHz Test Equipment

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	November 24, 2010*	1 Year
RF Filter Section	HP	85420E	3705A00248	November 24, 2010*	1 Year
Antenna Biconical	ARA	BCD 235/B	1041	November 12, 2011	1 Year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 29, 2011	1 Year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 Years
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 5, 2011	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 11, 2011	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	JPKG19982	N/A	N/A

Figure 44 Test Equipment Used

* Calibration valid until 30 November 2011.

9.5 **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:

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

- 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: $\text{FS} = 30.7 \text{ dB}\mu\text{V (RA)} + 14.0 \text{ dB (AF)} + 0.9 \text{ dB (CF)} = 45.6 \text{ dB}\mu\text{V}$

No external pre-amplifiers are used.

10. Transmitted Power Density

10.1 Test Specification

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

10.2 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (30dB) and an appropriate coaxial cable (cable loss = 1 dB). 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.

10.3 Test Results


Operation Frequency (MHz)	Reading Spectrum Analyzer (dBm)	Specification (dBm)	Margin (dB)
904.9	7.85	8.0	-0.15
911.4	7.46	8.0	-0.54
917.3	7.11	8.0	-0.89

Figure 45 Test Results Table

See additional information in Figure 46 to Figure 48.

JUDGEMENT: Passed by 0.15dB

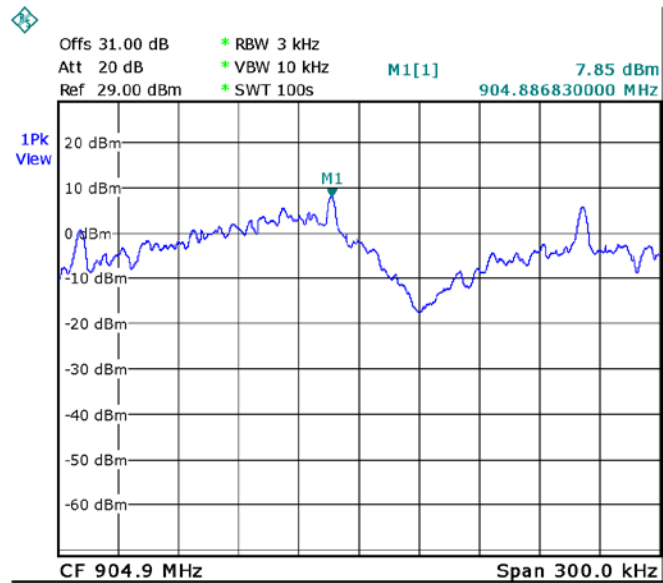
TEST PERSONNEL:

Tester Signature: 

Date: 17.05.12

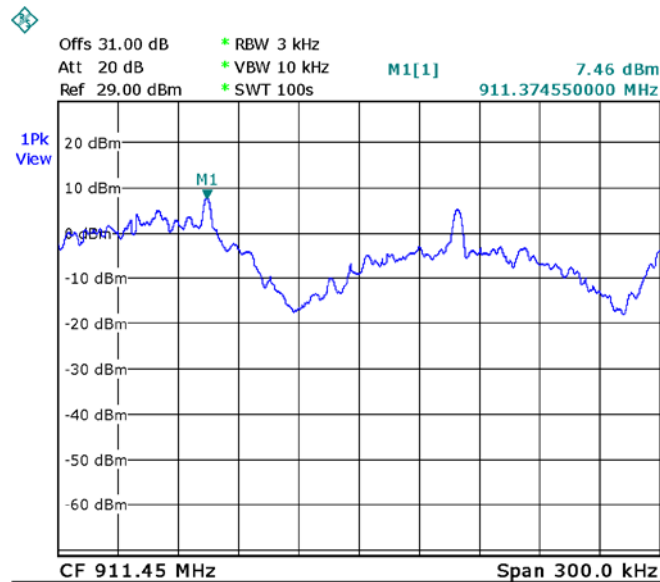
Typed/Printed Name: I. Siboni

Transmitted Power Density



Date: 15.JAN.2012 11:03:05

Figure 46 — 904.9 MHz



Date: 15.JAN.2012 10:53:28

Figure 47 — 911.4 MHz

Transmitted Power Density

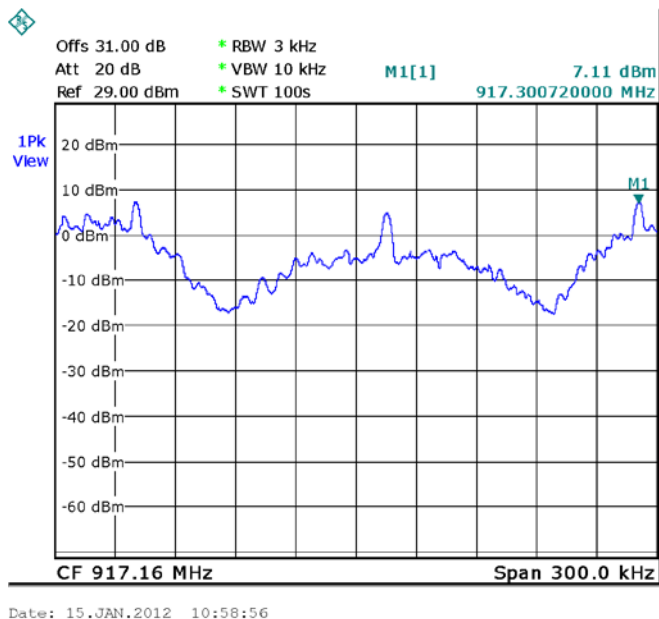


Figure 48 — 917.3 MHz

10.4 Test Equipment Used.

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibration Date	Period
Spectrum Analyzer	ROHDE & SCHWARZ	FSL	10-300191865	October 31, 2011	1 year
Attenuator	MCL	Bw-s30w5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	CBL-4FT-SMNM+	30084	February 10, 2011	1 year

Figure 49 Test Equipment Used



11. Antenna Gain/Information

The antenna gain is 5 dBi.

12. 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 1 m.

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1307(b)(1) Requirements

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

FCC limits at 911.4 MHz is: $\frac{f}{1500} = 0.608 \frac{mW}{cm^2}$

FCC limits at 917.3 MHz is: $\frac{f}{1500} = 0.611 \frac{mW}{cm^2}$

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

G_T- Antenna Gain

R- Distance from Transmitter

(c) Transmitter peak power using source based time averaging of 0.5 % maximum, 5 msec “ON” time, “OFF” + “ON” time 1sec:

Frequency MHz	Pt dBm	Pt mW	Pt Source Based Time Averaging mW
904.90	15.82	38.2	0.191
911.46	15.42	34.8	0.174
917.16	15.09	32.3	0.161

(d) The peak power density (time averaging) is :

Frequency (MHz)	Pt (mW)	Antenna type	G _T (dBi)	R (cm)	S _{AV} (mW/cm ²)	Spec (mW/cm ²)
904.90	0.191	External	5	100	4.8×10^{-6}	0.603
911.46	0.174	External	5	100	4.4×10^{-6}	0.608
917.16	0.161	External	5	100	4.1×10^{-6}	0.611

(e) The above are below the FCC limits.

13. APPENDIX A - CORRECTION FACTORS

13.1 Correction factors for CABLE from EMI receiver to test antenna at 3 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)	FREQUENCY (MHz)	CORRECTION FACTOR (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".

13.2 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.*

13.3 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".

13.4 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".

**13.5 Correction factors for BICONICAL ANTENNA
Type BCD-235/B,
at 3 meter range**

FREQUENCY (MHz)	APE (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".



13.6 Correction factors for ACTIVE LOOP ANTENNA

Model 6502

S/N 9506-2950

FREQUENCY	Magnetic Antenna Factor	Electric Antenna Factor
(MHz)	(dB)	(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