THE STANDARDS INSTITUTION OF ISRAEL Telematics Laboratory

Test Report No. 8412316053

For Alvarion Ltd.

Equipment Under Test:

Broadband Wireless Access
BreezeACCESS VL 5.3 System and
Point to Point BreezeNET B system

From The Standards Institution
Of Israel
Industry Division
Telematics Laboratory
EMC Section

ACCREDITED

Certificate No.1487-01

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Test Report No.: 8412316053 **Page 1 of 66 Pages**
Title: Test on Broadband Wireless Access
BreezeACCESS VL 5.3 System and Point to Point BreezeNET B system

Order placed by:	Alvarion Ltd.
Address:	21A Habarzel str, Tel-Aviv, 69710, Israel
Sample for test selected by:	The orderer
The date of test:	26/08 - 14/09/2004

Description of Equipment Under Test (EUT): BreezeACCESS VL 5.3 System and Point to Point BreezeNET B system

Manufactured by: Alvarion Ltd.

Reference Documents:

- CFR 47 FCC: Rules and Regulations; Part 15. “Radio frequency devices”; Subpart C: “Intentional radiators”, Subpart E: “UNII devices”

Test Results: The EUT was found meeting with the relevant requirements of CFR 47 FCC Part 15 Sections: 15.205,15.207,15.209,15.407

This Test Report contains 66 pages and may be used only in full.	This Test Report applies only to the specimen tested and may not be applied to other specimens of the same product.

Table of Contents

1. Scope

Test item: BreezeACCESS VL 5.3 System and Point to Point BreezeNET B system .

Manufacturer: Alvarion LTD

Types (Models): Base Station

IDU:	BS-SH-VL (Generic) shelf
BS-AU-VL	Plugged-in card
BS-PS-AC-VL	AC Power supply
ODU: AU-D-BS-5.3-ODU	Radio unit

Subscribe unit:
SU-A-5.3-6/54-B/1D-VL Complete system
IDU: Universal indoor unit, Model: PS1065/1073

Base station Stand-alone unit and Subscriber unit are identical hardware units and system construction. The two configurations are distinguished by software application only.

BreezeNET B system hardware configuration and system construction is identical to the following BreezeAccess VL units:

BU-B14/28D-5.3 system configuration is identical to subscriber unit SU-A-5.3-6/54-B/1D-VL.
The two systems are distinguished by software application only.
RB-B14/28D-5.3 system configuration is identical to subscriber unit SU-A-5.3-6/54-B/1D-VL.
The two systems are distinguished by software application only

2. System content

2.1. BreezeACCESS VL system and BreezeNETB system

Base station	
AU-D-BS-5.3-90/120-VL	Complete system
BS-SH-VL (Generic)	Shelf
BS-PS-AC-VL	Power supply AC
BS-PS-DC-VL	Power supply DC
BS-AU-VL	Indoor card
AU-D-BS-5.3 -ODU-90/120	Outdoor unit with detached antenna
Base station Stand alone	
AU-D-SA-5.3-60/90/120-VL	Complete system with detached antenna
Subscriber unit	
SU-A-5.3-6/54-B/1D-VL	Complete system with integrated antenna
BreezeNETB p-to-p system	
RB-B14/28D-5.3[1]	Remote bridge D: antenna detached
BU-B14/28D-5.3[1]	Base unit D: antenna detached

Comments:
[1] D can be blank or D

2.2. Applicant information

Company: Alvarion LTD
P.O.B.: 13139
Postal code: 61131
City: Tel Aviv
Country: Israel
Telephone number: +972 3 6456262
Telefax number: +972 3 6456222

2.3. Test performance

Location: SII EMC Section
Alvarion LTD
Purpose of test: Apparatus compliance verification in according with CFR 47 FCC Requirement
Test specification: CFR 47 FCC Part 15 Sections: 15.205,15.207,15.209,15.407

Test performed by: Mr. Michael Feldman, test technician

Test report approved by: Mr.Yuri Rozenberg, Head of EMC Branch

3. General description

BreezeACCESS VL is a high capacity, IP services oriented Broadband Wireless Access system.
The BreezeAccess VL is digital modulated TDD system operating in the 5250MHz up to 5350MHz band. The system contains a base station unit and a subscriber unit.
The base station and subscriber radio are identical radio hardware.
The basic system configuration is a two-box configuration that contains

1. Indoor unit that contains a power supply and an Ethernet 10Base-T bypass.
2. Outdoor unit containing the entire radio and digital section.
3. A single CAT5 cable connecting the indoor and outdoor unit carrying the DC power and the data.

The subscriber indoor unit is a single power supply (55VDC) and Ethernet 10Base-T bypass. The base station indoor unit is a 19" rack containing several indoor units cards were there is one main power supply for all units or a single power supply supporting only one outdoor unit.
The subscriber unit is typically supplied with a 21dBi antenna or a high gain antenna for point-to-point application.
The Base station unit is typically supplied with a 16dBi antenna for point to multi point application or with a high gain antenna for point-to-point application.
The measurements are done for the worst-case high output power for the subscriber and base station applications. For high gain antenna the output power is attenuated automatically by the software to maintain the 30dBm EIRP limit.

The operating frequency range is from 5280MHz center of first channel up to 5320MHz center of upper channel. The frequency range is restricted in software.

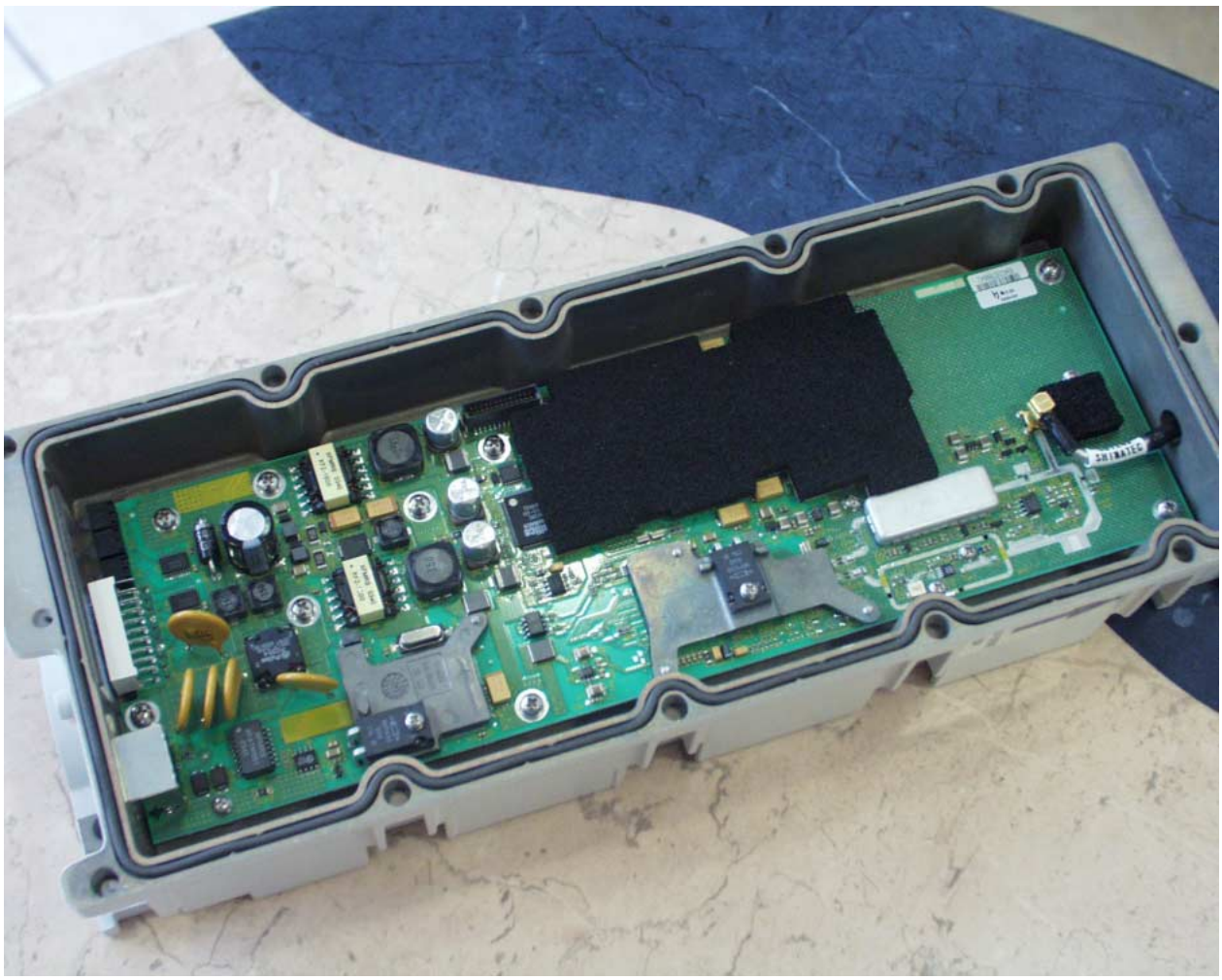


Photo # 1. Radio Unit. PWB component side

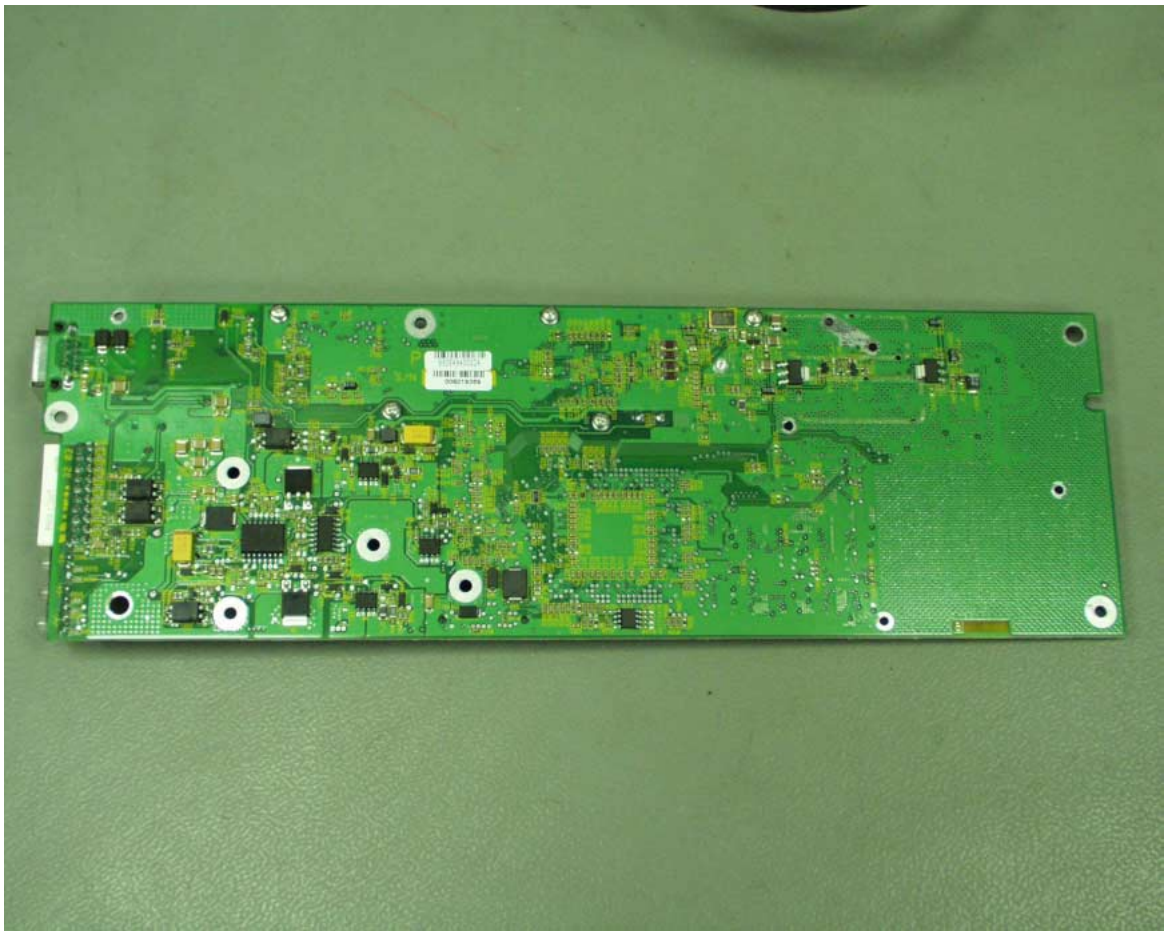


Photo # 2. Radio Unit. PWB print side

4. Test configuration:

1. For Radiated emission measurements per sec. 15.407 requirements the Subscriber Unit and the Base Station Unit were configured for tests as shown in Figures 1, 2.

2. For Radiated emission measurements per sec. 15.407 requirements the Radio unit was tested with three various antennas, as shown in table:

	Name	Freq. Range [GHz]	Gain dBi	P/N or Model	Type
1	MTI (AU)	5.15-5.875	16	AN 1152	Sector antenna MT-484033/NV
2	UNI-28-4 (SU)	5.15-5.875	28	AN 1230	Planar Array MT 4860001 Unidirectional antenna
3	MA-WA50-1X (SU)	5.15-5.875	21	AN 1248	Integrated antenna

Environmental evaluation and exposure limit according to FCC CFR 47part 1, §1.1307, §1.1310
Limit for power density for general population/uncontrolled exposure is 1 mW/cm2.
The power density P (mW/cm2) = $Pt/4\pi.r^2$
Where:

PT - The transmitted power (EIRP) (mW)
r - The distance from the unit. (cm)

The 1(mW/cm2) limit can be calculated from the above based on the following data:
Pt = 30dBm (maximum EIRP) 1000mW

$r = SQRT(1000/4\pi) = 8.92cm$

The allowed distance “r”, where RF exposure limits may not be exceeded, is 8.92 cm from the unit antenna main lobe.

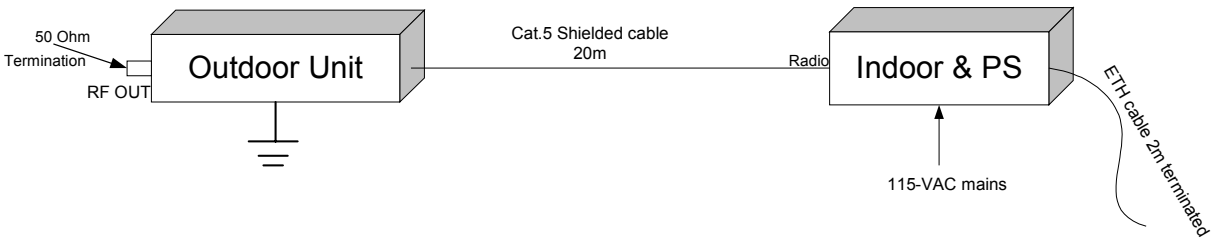


Figure 1. Subscriber Unit test setup

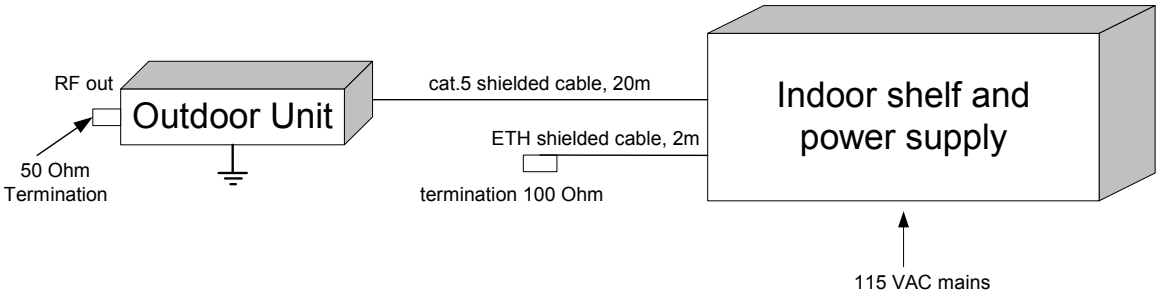


Figure 2. Base Station test setup

5. Test specification, Methods and Procedures

Test Specification:

- CFR 47 FCC: Rules and Regulations; Part 15. “Radio frequency devices”; Subpart E: “Intentional radiators” (2002)

Methods and Procedures:

- ANSI C63/4/1992: "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz”.

6. Measurements, examinations and derived results

6.1. Location of the Test Site:

The tests were conducted in the EMC laboratory of the Standards Institution of Israel in Tel-Aviv and at open test site located at Kibbutz Native Halamed Hai in Emek HaEla, Israel.

6.2. Normal test condition:

Temperature: 22 °C
Humidity: 50 %

6.3. Conducted emission test (per Section 15.207):

6.3.1. Requirements:

EUTs conducted emission within the band 150 kHz to 30 MHz shall not exceed value required in section 15.207 (a).

6.3.2. Tested units:

The measurements were performed on:
- Subscriber Unit - on Universal Indoor unit AC power adaptor PS 1073(1065).
- Base Station Unit - on AC input.

6.3.3. Test procedure:

Each EUT was placed on a non-metallic table in a shielded chamber at a height of 80 cm from the floor and 40 cm from the nearest wall.

The EUT was operated to transmitting through the customer software.
First, initial scans were performed. Final measurements were performed at the frequencies where emission exceeded the tolerance limit.

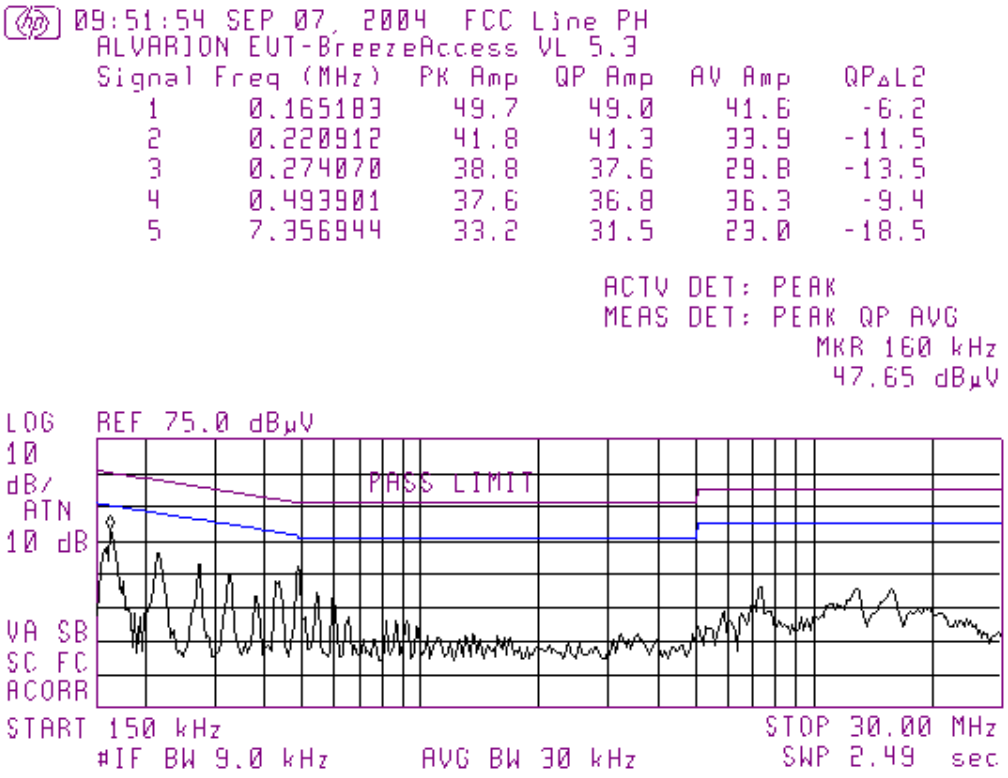
Test equipment (EMI receiver) setup was as follow:

Initial scan:	
Detector type	Peak
Mode	Max hold
Bandwidth	9 kHz
Step size	Continuous sweep
Sweep time	>100 msec
Measurements	
Detector type	Quasi-peak, Avg (CISPR)
Bandwidth	9 kHz
Measurement time	200 seconds/MHz
Observation	>15 seconds

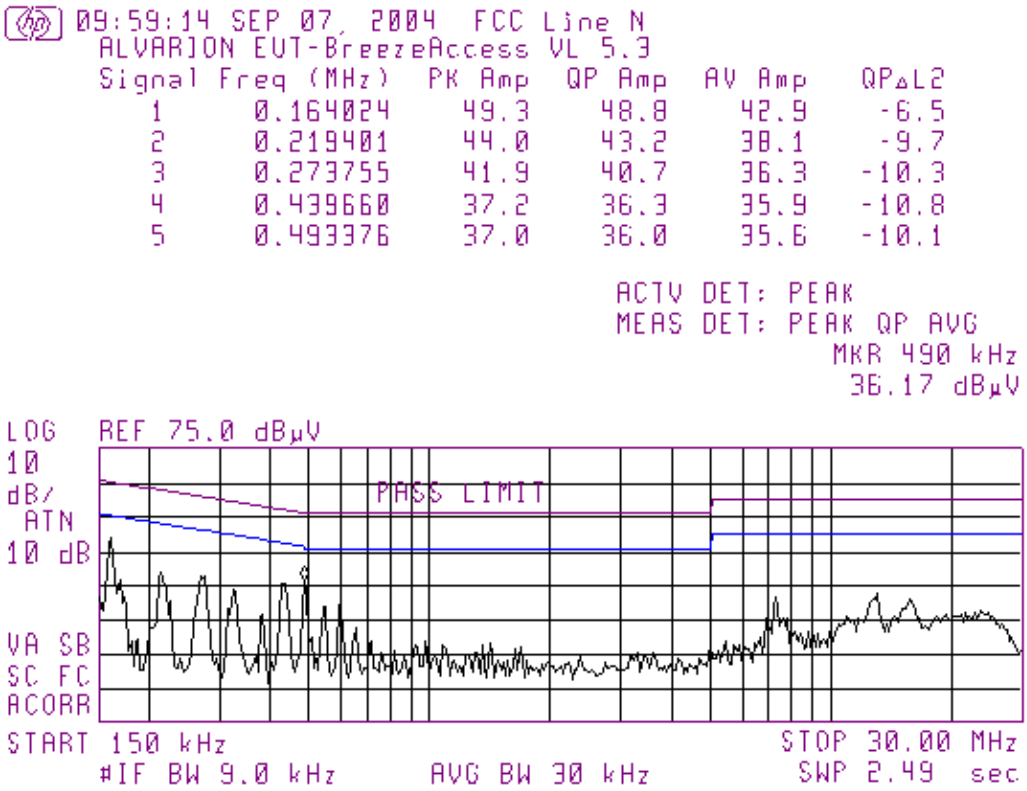
6.3.4. Test results:

Subscriber Unit. Test results are shown in Plots #1, 2.

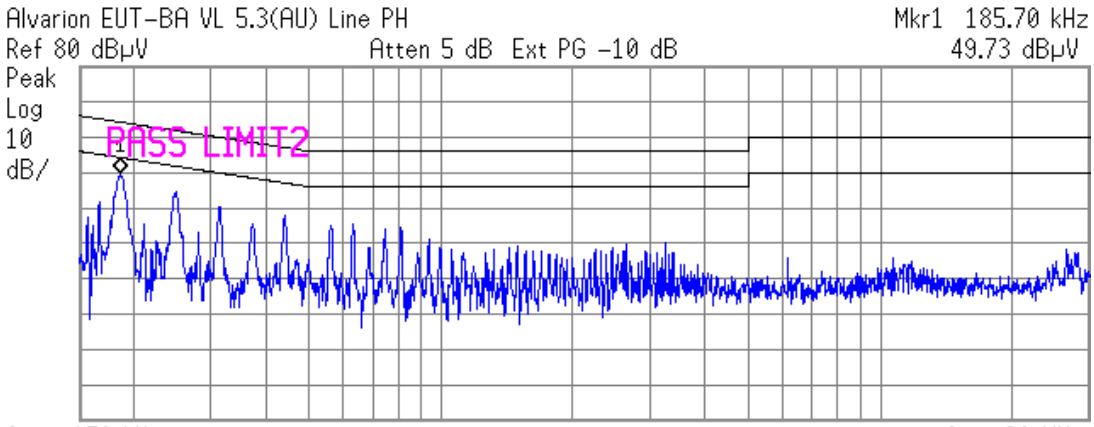
Base Station Unit. Test results are shown in Plots #3, 4.



Plot # 1. Subscriber Unit
Conducted emissions measurement result on 110 VAC power line: phase

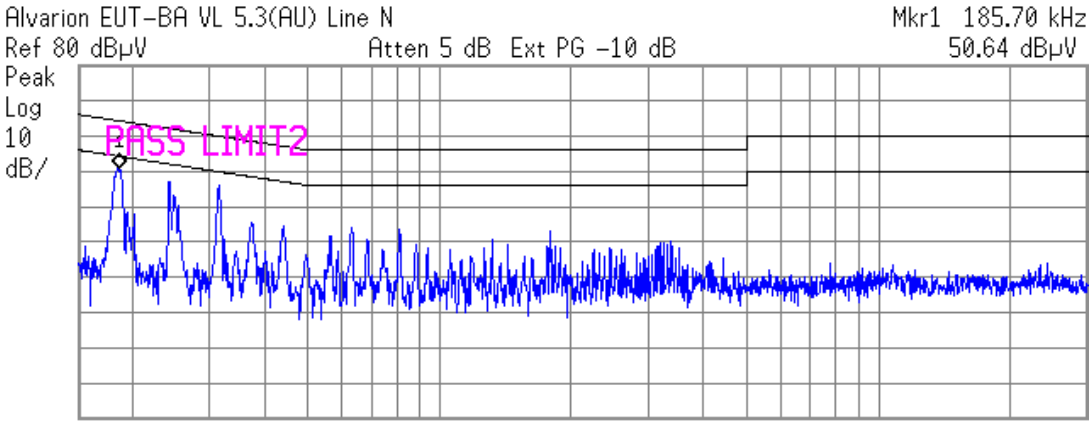


Plot # 2. Subscriber Unit
Conducted emissions measurement result on 110 VAC power line: neutral



Signal (6)	Freq	Peak Ampl dBµV	Qp Ampl dBµV	Avg Ampl dBµV	Avg Δ LL1 dB	Avg Δ LL2 dB
1	189.7 kHz	56.74	51.60	48.68		-5.36
2	251.1 kHz	58.75	53.05	46.56		-5.16
3	378 kHz	41.78	39.54	35.66		-12.66
4	567.2 kHz	40.22	37.02	34.28		-11.72
5	753.6 kHz	37.10	34.81	32.20		-13.80
6	944.8 kHz	34.94	32.70	30.36		-15.64

Plot # 3. Base Station Unit
Conducted emissions measurement result on 110 VAC power line: phase



Signal (6)	Freq	Peak Ampl dBµV	Qp Ampl dBµV	Avg Ampl dBµV	Avg Δ LL1 dB	Avg Δ LL2 dB
1	192.2 kHz	55.68	49.19	45.49		-8.45
2	249.2 kHz	56.29	51.38	44.74		-7.04
3	441.2 kHz	41.32	38.97	36.75		-10.29
4	629.2 kHz	38.95	35.99	33.90		-12.10
5	756.3 kHz	37.81	35.51	33.34		-12.66
6	943.2 kHz	34.91	33.12	30.75		-15.25

Plot # 4. Base Station Unit
Conducted emissions measurement result on 110 VAC power line: neutral

6.4. Radiated emission test, general requirements (per section 15.209):

6.4.1. Requirements:

EUT's radiated emission shall not exceed value required in section 15.209.

6.4.2. Test description:

The measurements were performed at the Open Area Test Site.
The test configuration is shown in Fig.1, 2.

The EUT was arranged on a non-metallic table 0.8 m placed on the turn-table.
The measurements were performed at a 10 m measurement distance.

The Biconilog 30 MHz-2 GHz antenna was used.

The frequency range was investigated from 30 MHz to 2GHz.

The measurements were performed at each frequency at which the signal was 10 dB below the limit or less.

The level were maximized by initially rotating turntable through 360°, varying the antenna height between 1 m and 4 m, rerouting EUT cables and changing antenna polarization from vertical to horizontal. The measuring equipment settings were:

Initial scan:	
Detector type	Peak
Mode	Max hold
Bandwidth	120 kHz
Step size	Continuous sweep
Sweep time	>1 seconds/MHz
Measurements:	
Detector type	Quasi-peak (CISPR 16)
Bandwidth	120 kHz
Measurement time	20 seconds/MHz
Observation	>15 seconds

6.4.3. Radiated emission test results:

Test results are presented in Table 1.

Table 1. Radiated emission test results

EUT: BreezeACCESS VL 5.3 System

Frequency (MHz)	Turn-table Angle (°)	Antenna Polariz.	Antenna Height (m)	Emission Level Note 1 (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin Note 2 (dB)	Results
32.4	318	V	1.20	26.1	40	13.9	Complies
121.2	103	V	1.20	29.1	43.5	14.4	Complies
122.9	15	V	1.20	28.0	43.5	15.5	Complies
250.0	67	V	1.20	36.2	46	9.8	Complies
375.0	232	H	2.57	37.6	46	8.4	Complies
400.0	226	H	2.53	40.0	46	6.0	Complies
500.0	293	H	1.60	41.0	46	5.0	Complies

Note 1: Emission level = E Reading (dBμV) + Cable loss (dB) + Antenna Factor (dB/m) + 10 dB

Where 10 dB is an extrapolation distance factor.
For Cable Loss and Antenna Factor refer to Appendix 2.

Note 2: Margin (dB) = Limit (dBμV/m) – Emission level (dBμV/m)

6.5. Radiated emission test on Radio Unit – spurious (per Section 15.209):

6.5.1. Requirements:

The levels of any unwanted emission shall not exceed value required in section 15.209.

6.5.2. EUT configuration:

The radio unit was tested with four various antennas (see sec.2.2)

- Sector antenna, AN 1152 for Base Station (AU)
- Unidirectional antenna AN 1230 for Subscriber unit (SU)
- Integrated antenna AN 1248 for Subscriber unit (SU).

6.5.3. Test procedure:

The measurements were performed in the anechoic chamber.
The EUT was arranged on a non-metallic table 0.8 m placed on the turntable.

Measuring antennas used: Up to 18 GHz - Double Ridge **EMCO** model 3115
above 18 GHz - Alpha TRG model A361

Antenna height = 1 m.
Polarization: Vertical/Horizontal
Measurement distance = 1m.
The frequency range was investigated up to 40 GHz.
The measurements were performed in vertical and horizontal polarization, the maximum reading recorded.

Measuring detector function and bandwidths:

Detector type	Peak
Resolution bandwidth	1MHz
Video bandwidth	1 MHz
Detector type	Average
Resolution bandwidth	1MHz
Video bandwidth	3 kHz*

6.5.4. Radiated emission test results and calculation ratio:

The test results are shown in Tables ## 2-4.

The emission level was calculated as:
E Reading (dBμV) + measuring cable loss (dB) + measuring antenna factor (dB/m) + Distance correction factor
For measuring cable loss and measuring antenna factor refer to Appendix 2.
Distance correction factor = -9.5 dB (an extrapolation reading from 1 m measuring distance to 3m specified distance)

Table 2. Spurious emissions test results

Antenna used: P/N: AN 1152

Frequency (GHz)	Emission Level (dBμV/m)		Limit @ 3m (dBμV/m)		Margin (dB)		Results
	Average	Peak	Average	Peak	Average	Peak	
LOW 5.260 GHz							
10.52	39.8	57.2	54	74	14.3	16.9	Complies
15.78	41.8	57.8			12.2	16.2	Complies
21.04	Noise floor	Noise floor			-	-	Complies
26.30	Noise floor	Noise floor			-	-	Complies
31.56	Noise floor	Noise floor			-	-	Complies
36.82	Noise floor	Noise floor			-	-	Complies
MIDDLE 5.290 GHz							
10.58	41.0	57.6	54	74	13.1	16.5	Complies
15.87	42.8	58.7			11.2	15.3	Complies
21.16	Noise floor	Noise floor			-	-	Complies
26.45	Noise floor	Noise floor			-	-	Complies
31.74	Noise floor	Noise floor			-	-	Complies
37.03	Noise floor	Noise floor			-	-	Complies
HIGH 5.320 GHz							
10.64	40.9	57.4	54	74	13.2	16.7	Complies
15.96	42.5	58.2			11.5	15.8	Complies
21.28	Noise floor	Noise floor			-	-	Complies
26.60	Noise floor	Noise floor			-	-	Complies
31.92	Noise floor	Noise floor			-	-	Complies
37.24	Noise floor	Noise floor			-	-	Complies

Table 3. Spurious emissions test results

Antenna used: P/N: AN 1230

Frequency (GHz)	Emission Level (dBμV/m)		Limit @ 3m (dBμV/m)		Margin (dB)		Results
	Average	Peak	Average	Peak	Average	Peak	
LOW 5.260 GHz							
10.52	40.1	57.3	54	74	14.0	16.7	Complies
15.78	41.7	58.3			12.3	15.7	Complies
21.04	Noise floor	Noise floor			-	-	Complies
26.30	Noise floor	Noise floor			-	-	Complies
31.56	Noise floor	Noise floor			-	-	Complies
36.82	Noise floor	Noise floor			-	-	Complies
MIDDLE 5.290 GHz							
10.58	41.0	57.8	54	74	13.1	16.3	Complies
15.87	42.1	58.9			11.9	15.1	Complies
21.16	Noise floor	Noise floor			-	-	Complies
26.45	Noise floor	Noise floor			-	-	Complies
31.74	Noise floor	Noise floor			-	-	Complies
37.03	Noise floor	Noise floor			-	-	Complies
HIGH 5.320 GHz							
10.64	41.3	57.6	54	74	12.8	16.5	Complies
15.96	42.6	58.8			11.4	15.2	Complies
21.28	Noise floor	Noise floor			-	-	Complies
26.60	Noise floor	Noise floor			-	-	Complies
31.92	Noise floor	Noise floor			-	-	Complies
37.24	Noise floor	Noise floor			-	-	Complies

Table 4. Spurious emissions test results

Antenna used: P/N: AN 1248

Frequency (GHz)	Emission Level (dBμV/m)		Limit @ 3m (dBμV/m)		Margin (dB)		Results
	Average	Peak	Average	Peak	Average	Peak	
LOW 5.260 GHz							
10.52	40.0	56.8	54	74	14.1	17.3	Complies
15.78	41.7	58.5			12.3	15.5	Complies
21.04	Noise floor	Noise floor			-	-	Complies
26.30	Noise floor	Noise floor			-	-	Complies
31.56	Noise floor	Noise floor			-	-	Complies
36.82	Noise floor	Noise floor			-	-	Complies
MIDDLE 5.290 GHz							
10.58	42.1	57.5	54	74	12.0	16.5	Complies
15.87	43.2	58.6			10.8	15.5	Complies
21.16	Noise floor	Noise floor			-	-	Complies
26.45	Noise floor	Noise floor			-	-	Complies
31.74	Noise floor	Noise floor			-	-	Complies
37.03	Noise floor	Noise floor			-	-	Complies
HIGH 5.320 GHz							
10.64	41.2	56.8	54	74	12.9	17.2	Complies
15.96	42.6	59.0			11.4	15.0	Complies
21.28	Noise floor	Noise floor			-	-	Complies
26.60	Noise floor	Noise floor			-	-	Complies
31.92	Noise floor	Noise floor			-	-	Complies
37.24	Noise floor	Noise floor			-	-	Complies

6.6. Radiated emission test on Radio Unit - restricted bands (per Section 15.205):

6.6.1. Requirements:

Radiated emission in restricted bands should meet the requirements sec. 15.205.
The following frequency bands should be measured:

	Frequency, GHz	Restricted band to be tested
LOW 5.260 GHz	15.78	15.35 – 16.2
	21.04	17.7 – 21.4
	31.56	31.2 – 31.8
MIDDLE 5.290 GHz	15.87	15.35 – 16.2
	21.16	17.7 – 21.4
	31.74	31.2 – 31.8
HIGH 5.320 GHz	10.64	10.6 – 12.7
	15.96	15.35 – 16.2
	21.28	17.7 – 21.4

6.6.2. EUT configuration:

The measurements were performed with four various antennas.

6.6.3. Test procedure:

The measurements were performed in the anechoic chamber.
The EUT was arranged on a non-metallic table 0.8 m placed on the turntable.
Measuring antennas used: Up to 18 GHz - Double Ridge **EMCO** model 3115
above 18 GHz - Alpha TRG model A361
Antenna height = 1 m.
Measurement distance = 1m.
Measuring detector function and bandwidths:

Detector type	Peak
RBW	1MHz
VBW	1 MHz

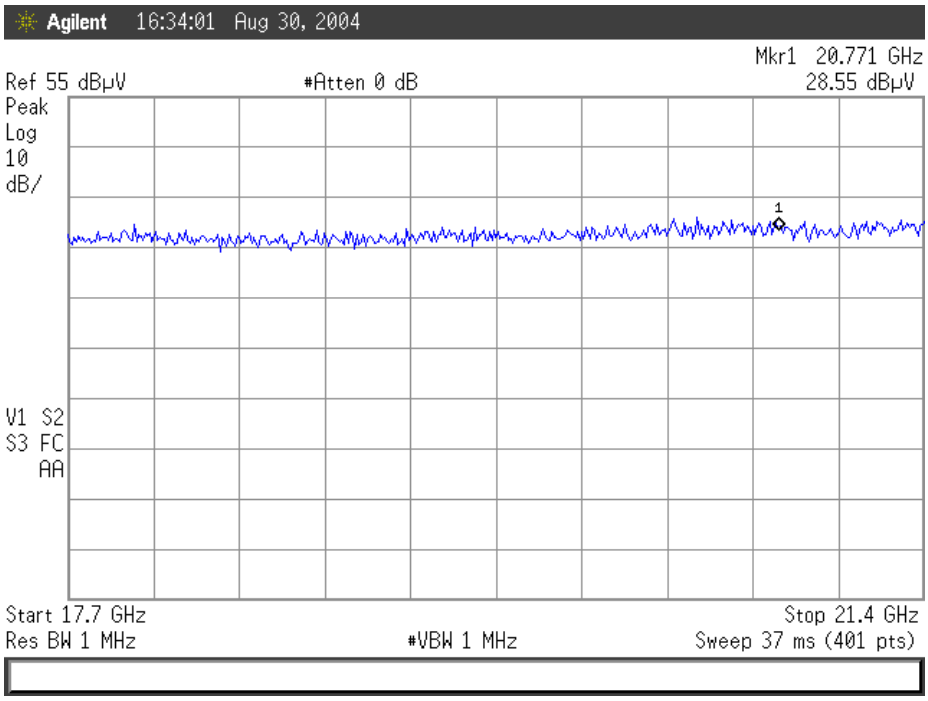
All measurements were taken with peak detector and the readings were compared with AVG limit line.

6.6.4. Test results and calculation ratio:

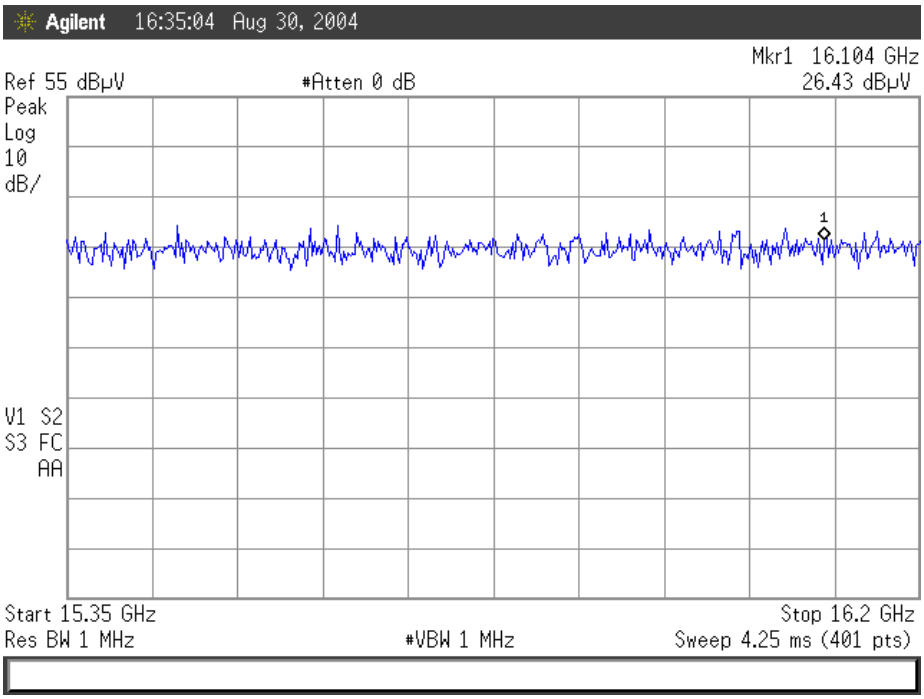
The test results are shown in Plots #5 to #20 , see table below:

	Frequency, GHz	Restricted band	Antenna name		
			AN 1152	AN 1230	AN 1248
LOW 5.260 GHz	15.78	15.35 – 16.2	#5	#12	#19
	21.04	17.7 – 21.4	#6	#13	#20
MIDDLE 5.290 GHz	15.87	15.35 – 16.2	#7	#14	#21
	21.16	17.7 – 21.4	#8	#15	#22
HIGH 5.320 GHz	10.64	10.6 – 12.7	#9	#16	#23
	15.96	15.35 – 16.2	#10	#17	#24
	21.28	17.7 – 21.4	#11	#18	#25

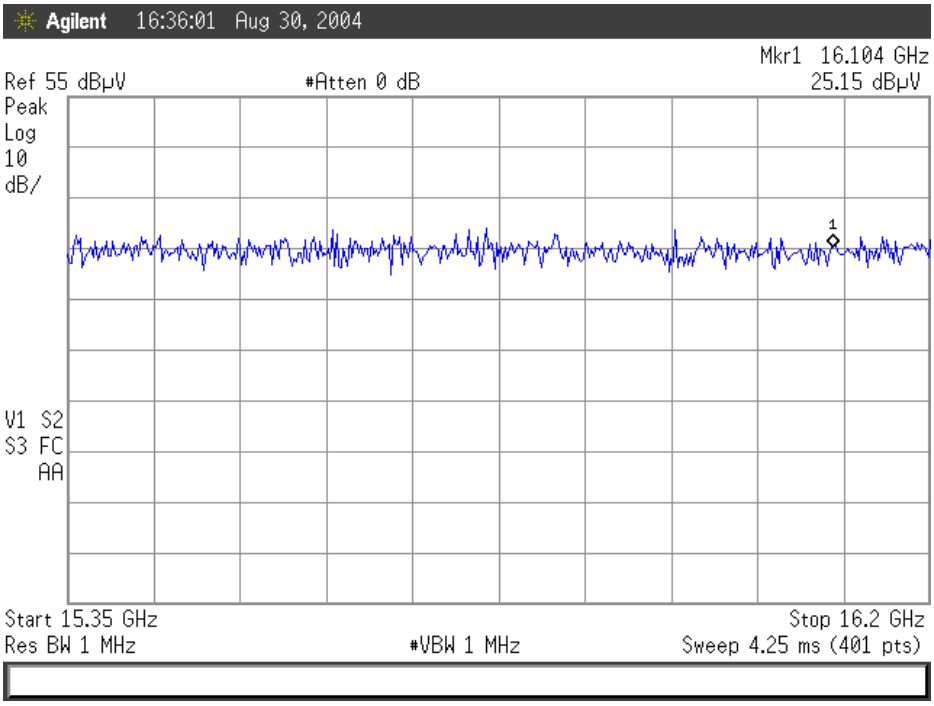
Notes: The AVG limit line 64 dBµV/m (at 1m distance) is not shown in the plots.
All measurements in restricted bands on frequency ranges above 21.5 GHz not exceed the SA noise floor level.



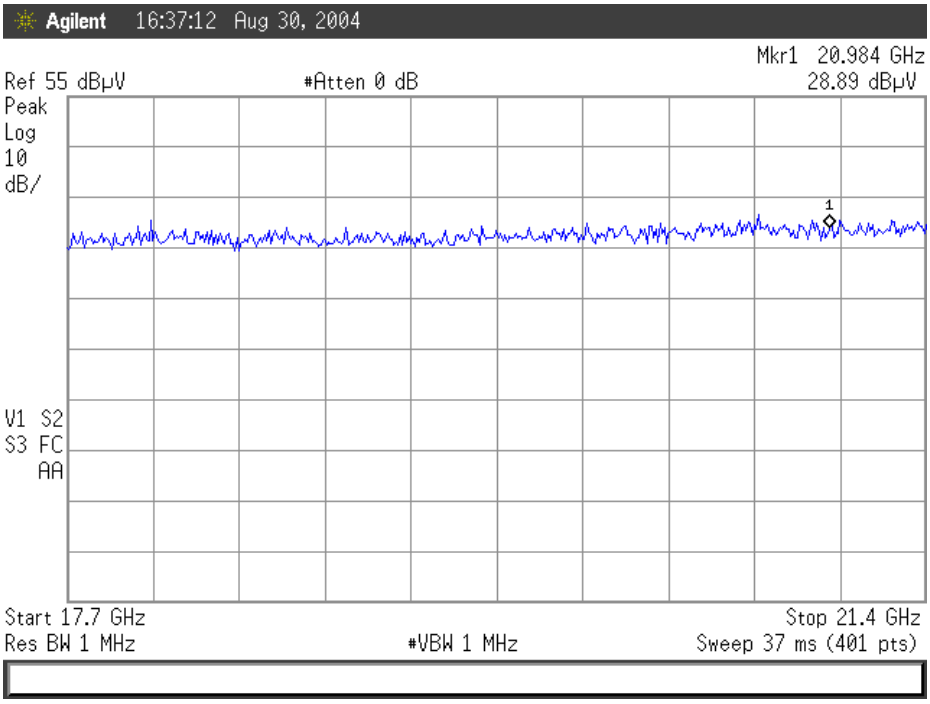
Plot # 5. Antenna: P/N AN1152, low frequency



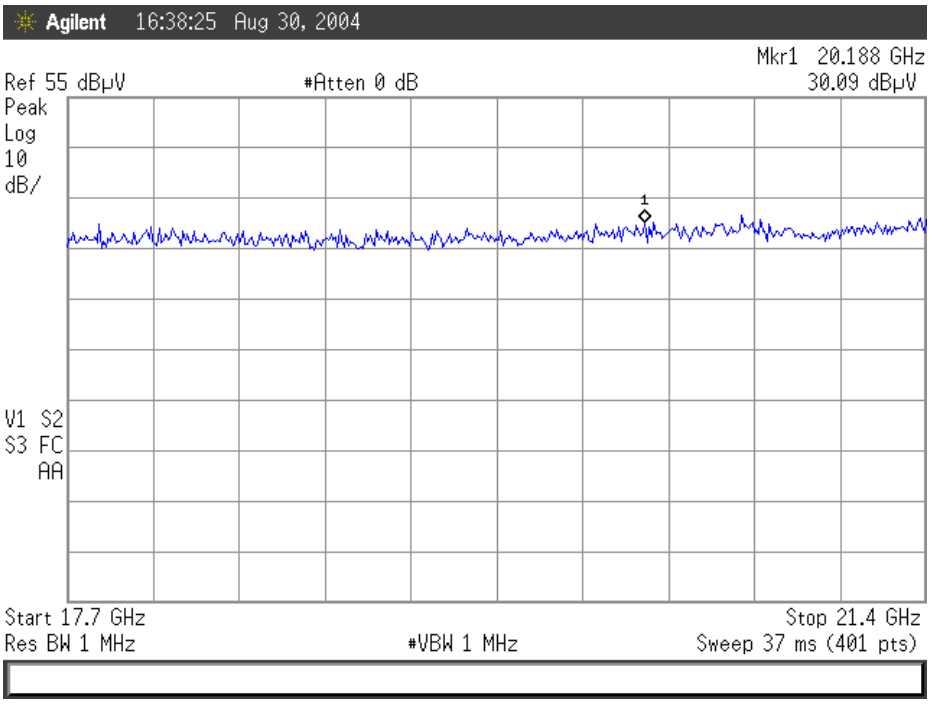
Plot # 6. Antenna: P/N AN1152, low frequency



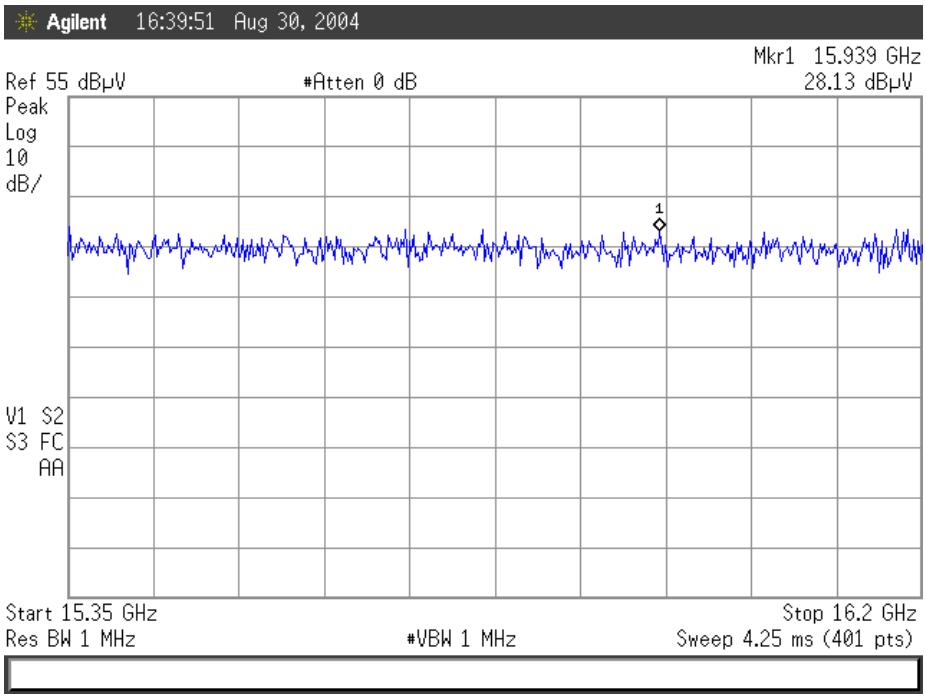
Plot # 7. Antenna: P/N AN1152, middle frequency



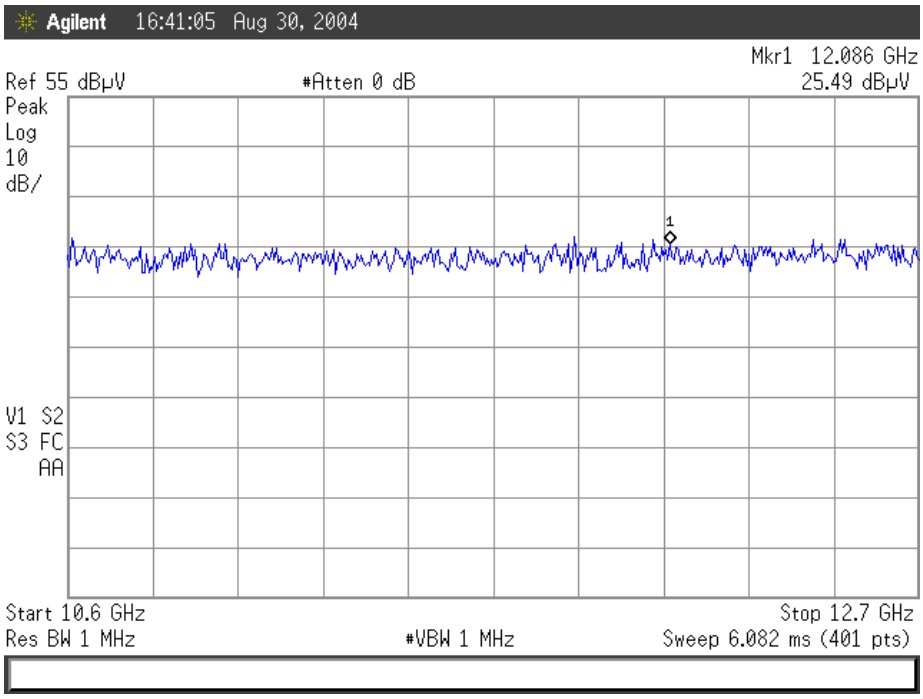
Plot # 8. Antenna: P/N AN1152, middle frequency



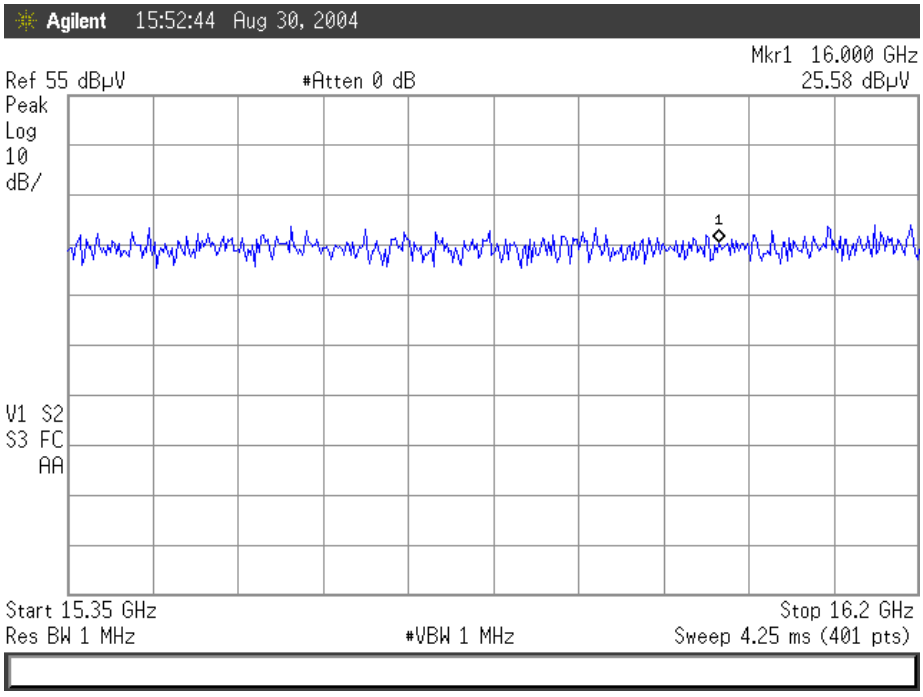
Plot # 9. Antenna: P/N AN1152, high frequency



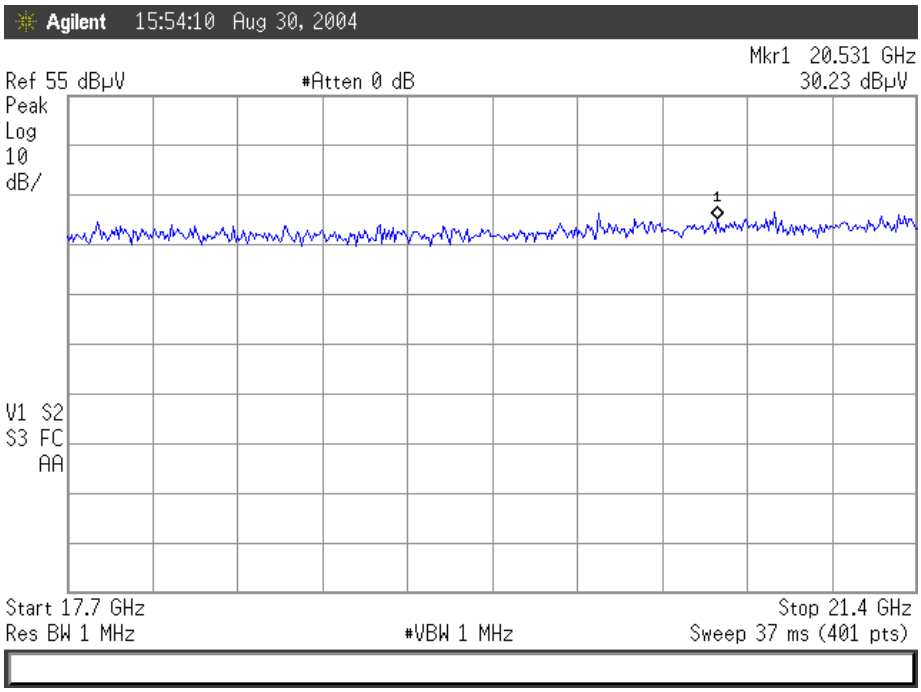
Plot # 10. Antenna: P/N AN1152, high frequency



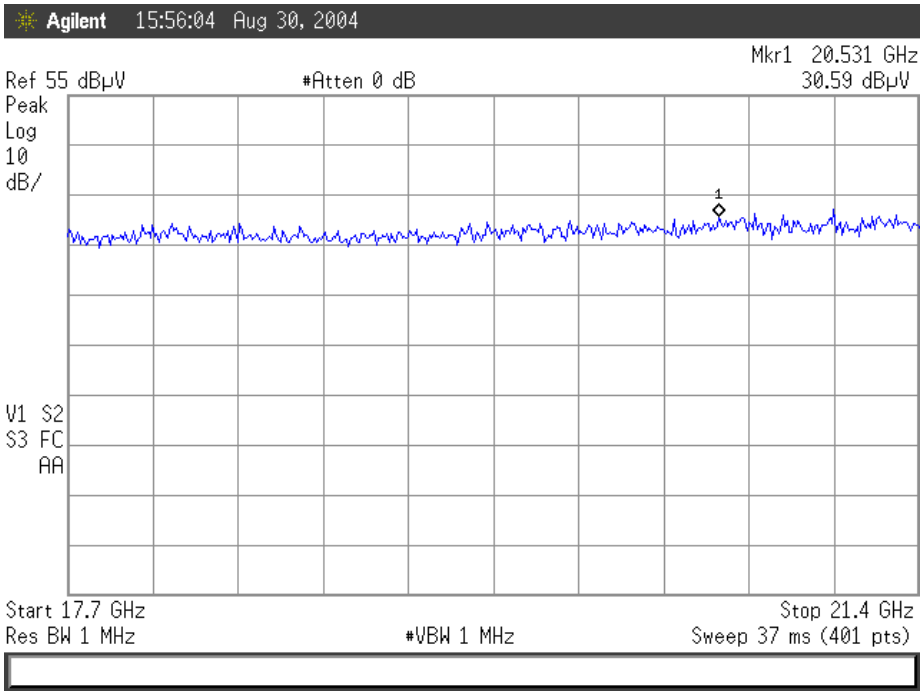
Plot # 11. Antenna: P/N AN1152, high frequency



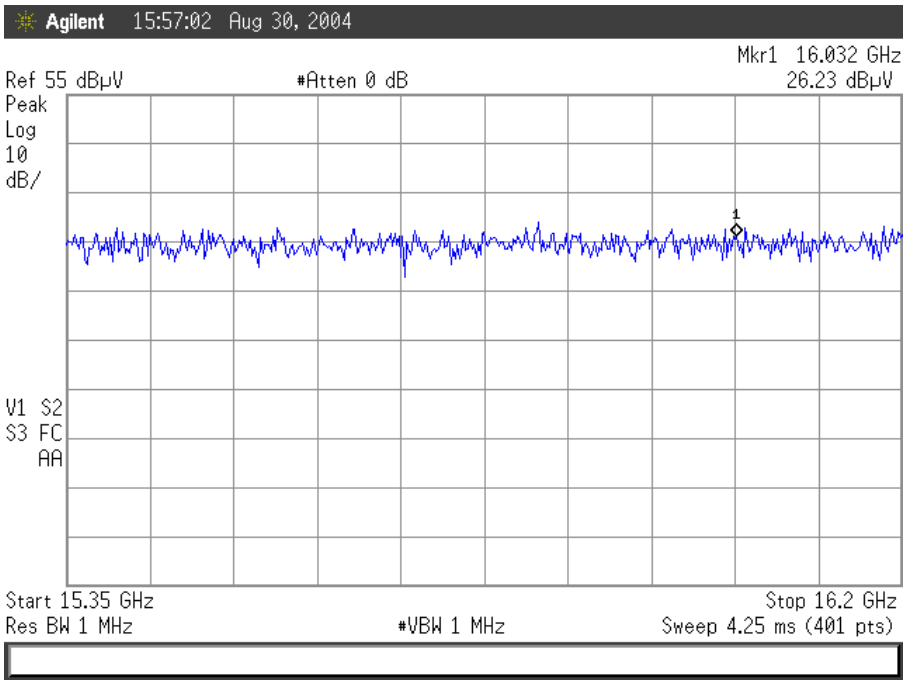
Plot # 12. Antenna: P/N AN1230, low frequency



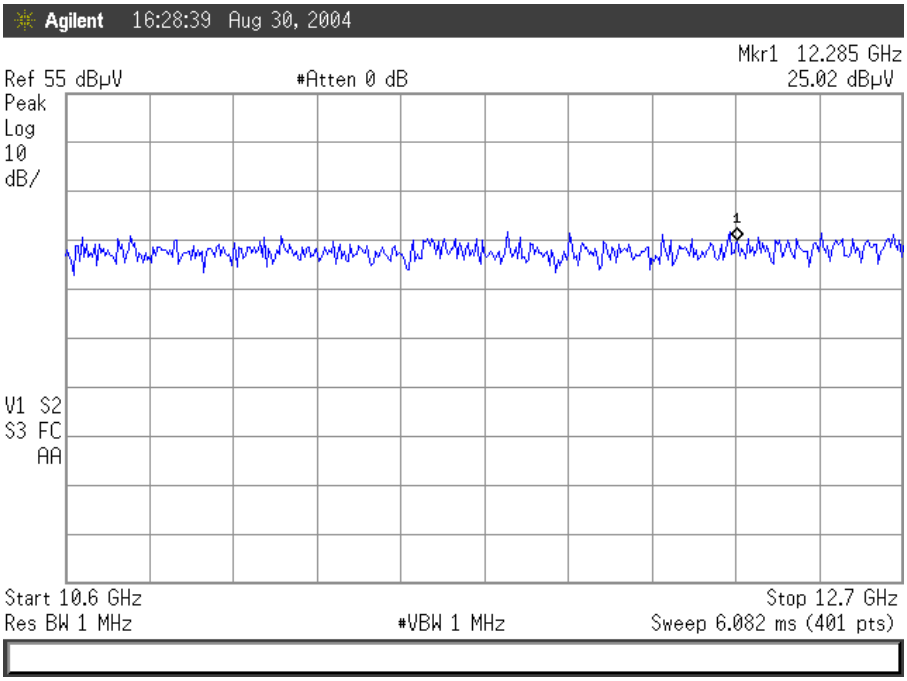
Plot # 13. Antenna: P/N AN1230, low frequency



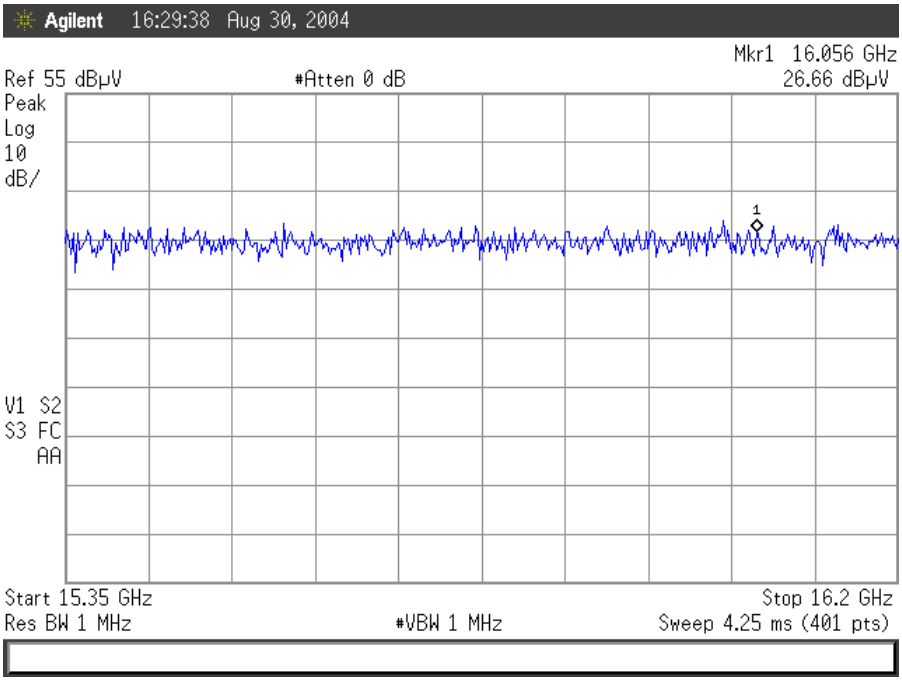
Plot # 14. Antenna: P/N AN 1230, middle frequency



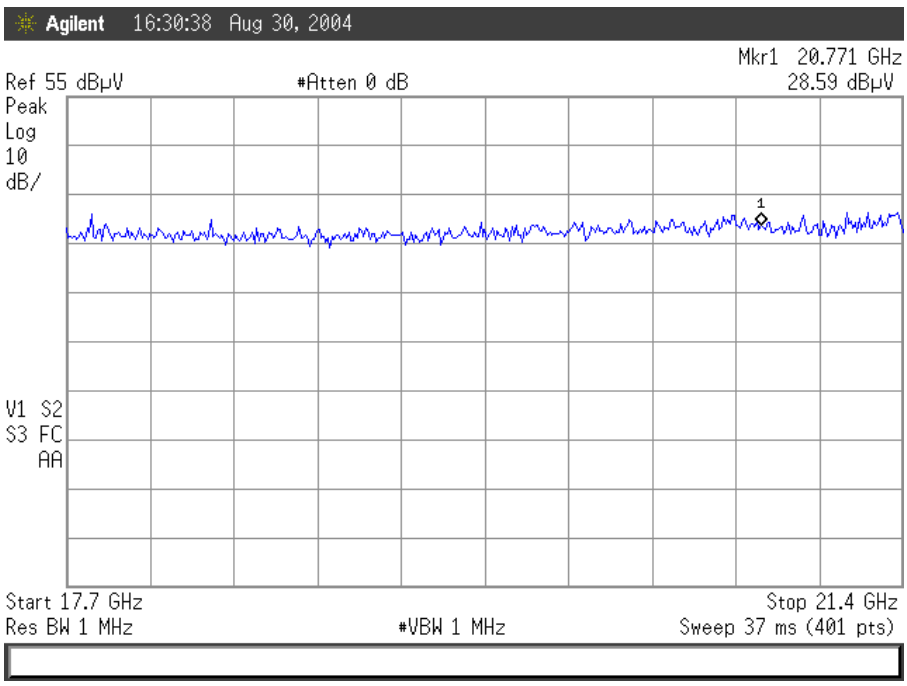
Plot # 15. Antenna: P/N AN1230, middle frequency



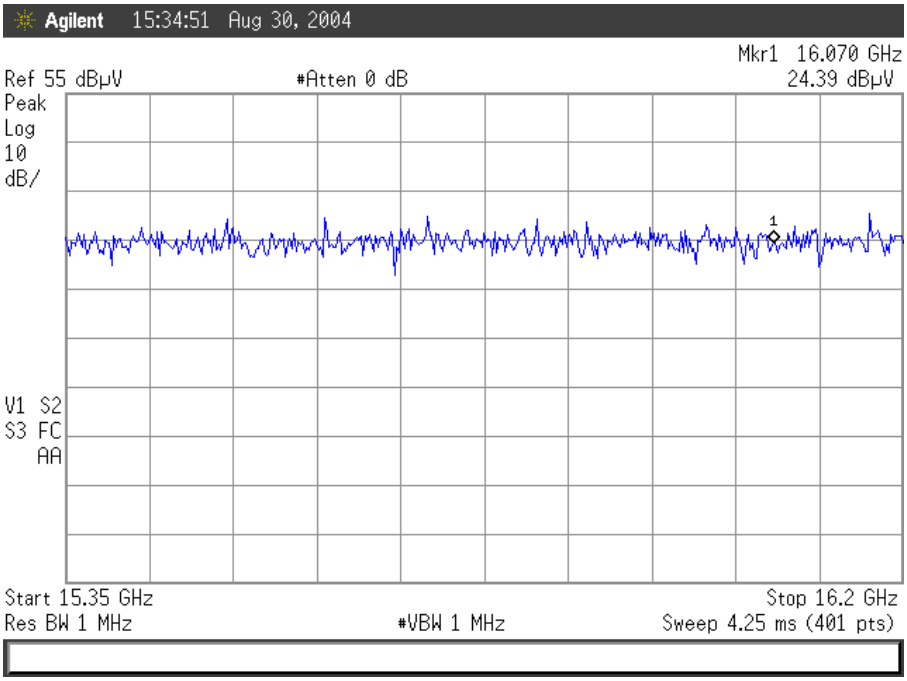
Plot # 16. Antenna: P/N AN1230, high frequency



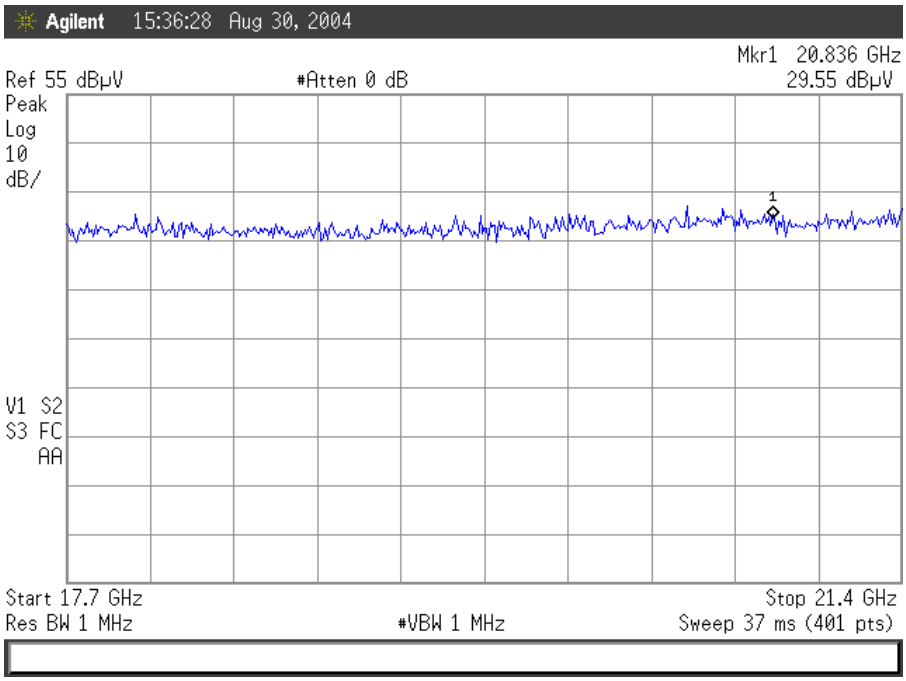
Plot # 17. Antenna: P/N AN1230, high frequency



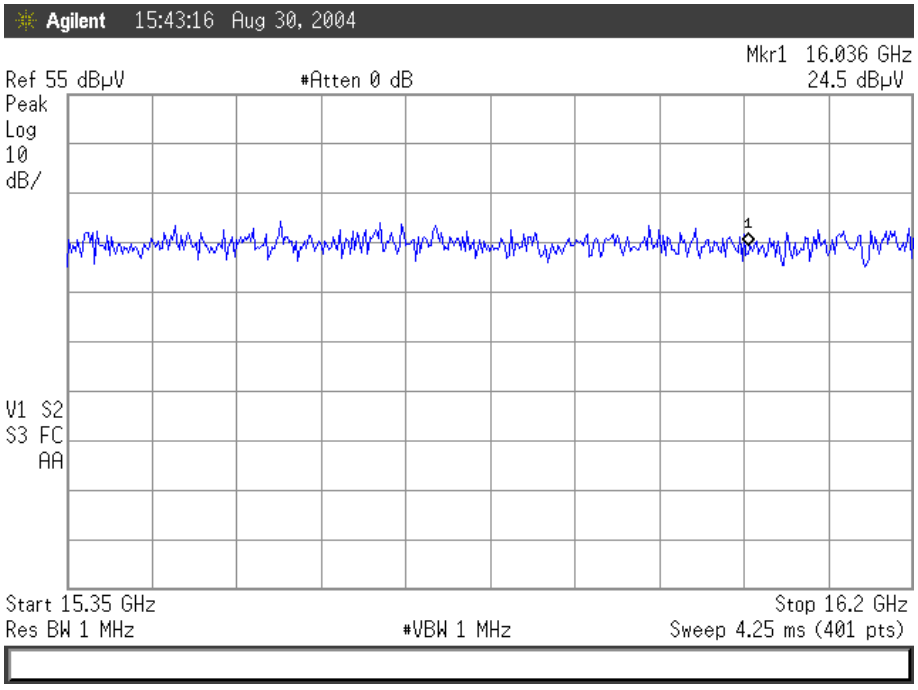
Plot # 18. Antenna: P/N AN1230, high frequency



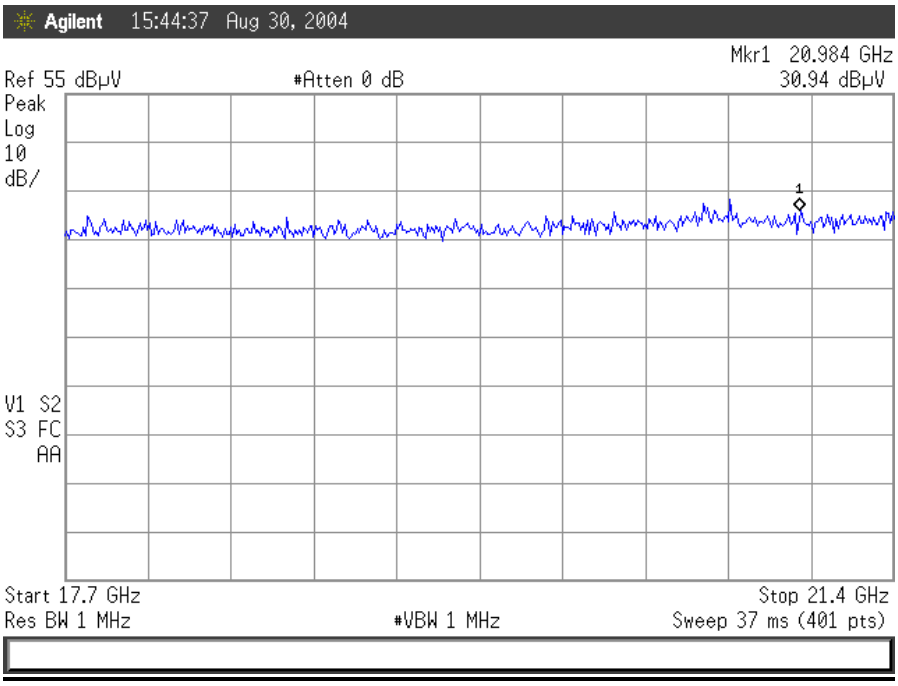
Plot # 19. Antenna: P/N AN1248, low frequency



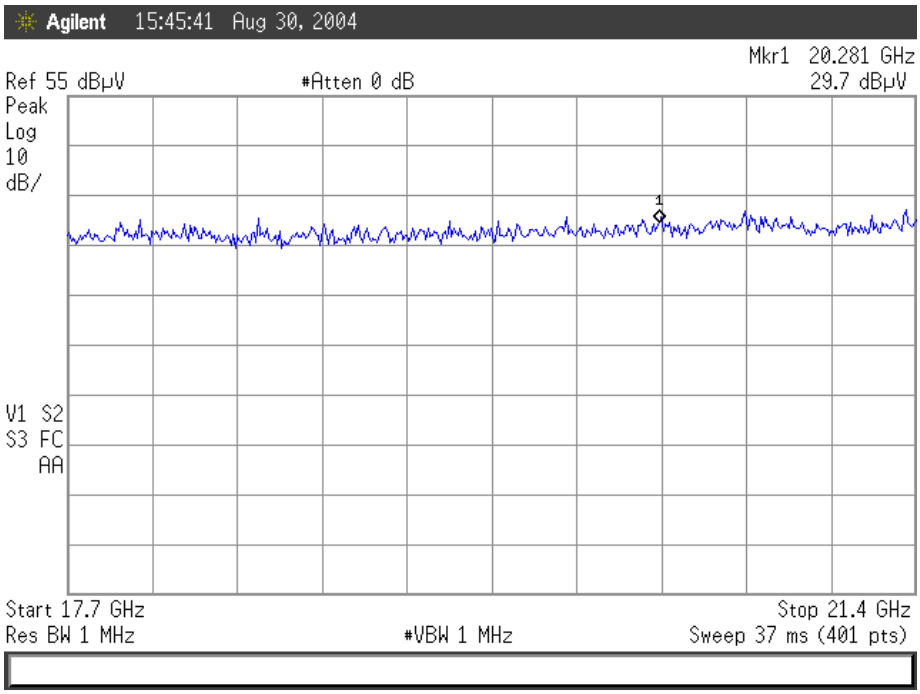
Plot # 20. Antenna: P/N AN1248, low frequency



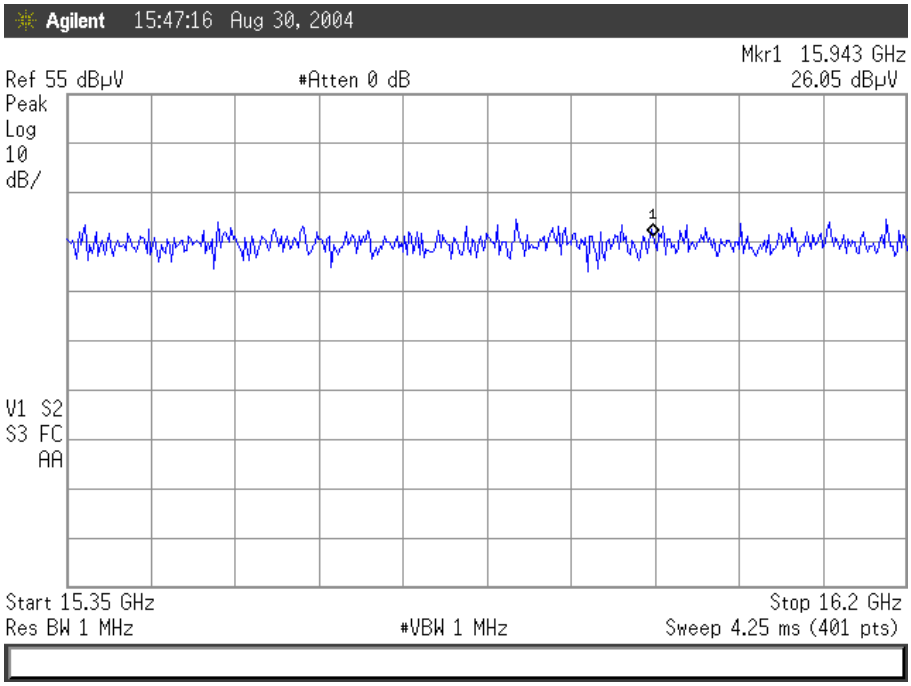
Plot # 21. Antenna: P/N AN1248, middle frequency



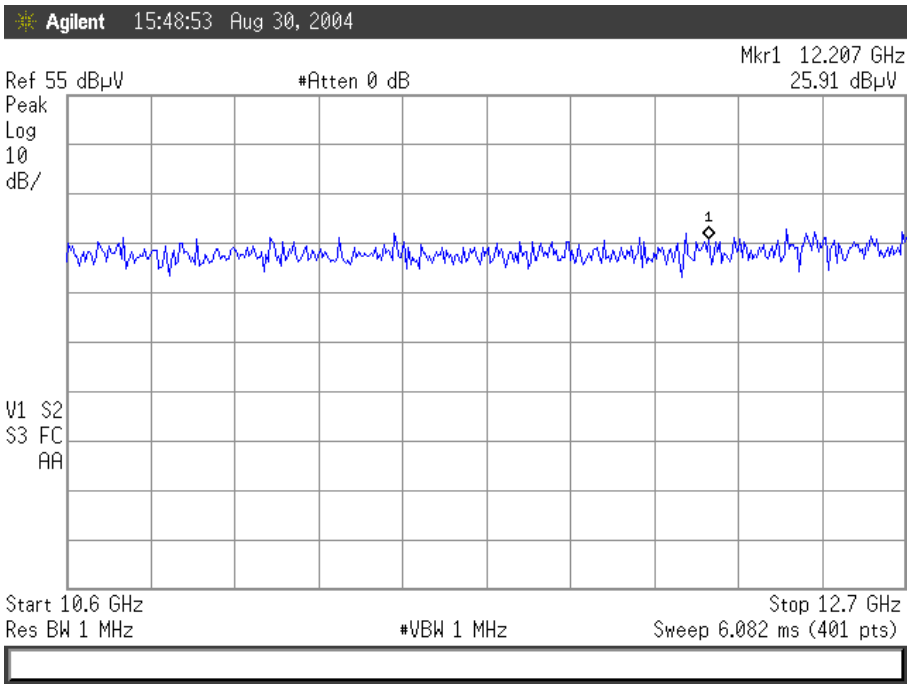
Plot # 22. Antenna: P/N AN1248, middle frequency



Plot # 23. Antenna: P/N AN1248, high frequency



Plot # 24. Antenna: P/N AN1248, high frequency



Plot # 25. Antenna: P/N AN1248, high frequency

7. Base station configuration measurements 15.407

7.1. Maximum peak transmit power

Requirements:

The peak transmit power shall not exceed the lesser of 250mW or 11dBm+10logB, where B is the 26-dB emission bandwidth in MHz. as required in sec. 15.407 (a) (2).

Test results:

The peak output power is measured according to method #3 as defined in the measurement procedure updated for peak transmit power in the unlicensed national information
Infrastructure (U-NII) bands; Public Notice Aut-30-2002.
The measured maximum peak power is:

Low channel (5260MHz): 14.2dBm
Middle channel (5290MHz):14.2dBm
High channel (5320MHz): 14.3dBm

Test results:

The measured results are shown in Plots #26 to #29.

7.2. The peak emissions outside of the frequency bands of operation.

Requirements:

All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz as required in sec. 15.407 (b)-(2)(4).

Test results:

The measured results are shown in Plots #30 to #35.

7.3. 26dB bandwidth

Requirements:

The signal bandwidth is defined at the –26dBc points from the signal peak in section 15.403 (c).

Test results:

The measured results are shown in Plots #36- #38

7.4. Peak power spectral density

Requirements:

The peak power spectral density shall not exceed 11dBm in any 1MHz band as required in section 15.407 (a) (2).

Test results:

The measured results are shown in Plots #39- #41

7.5. Frequency accuracy

Requirements:

The frequency accuracy must ensure that an emission is maintained within the band of operation under all conditions of normal operation.

Test results:

The table bellow summaries the frequency deviation measurements across the operating temperature range and supply voltage range (there was no difference in the measured frequency as function of supply voltage variation)

Channel	Nominal frequency [MHz]	Frequency deviation [Hz]		
		-50degC	+25degC	+55degC
Low channel	5260	24082	-6816Hz	5035
Middle channel	5290	24006	-6801Hz	4512
High channel	5320	25070	-7075Hz	2395

7.6. Peak excursion

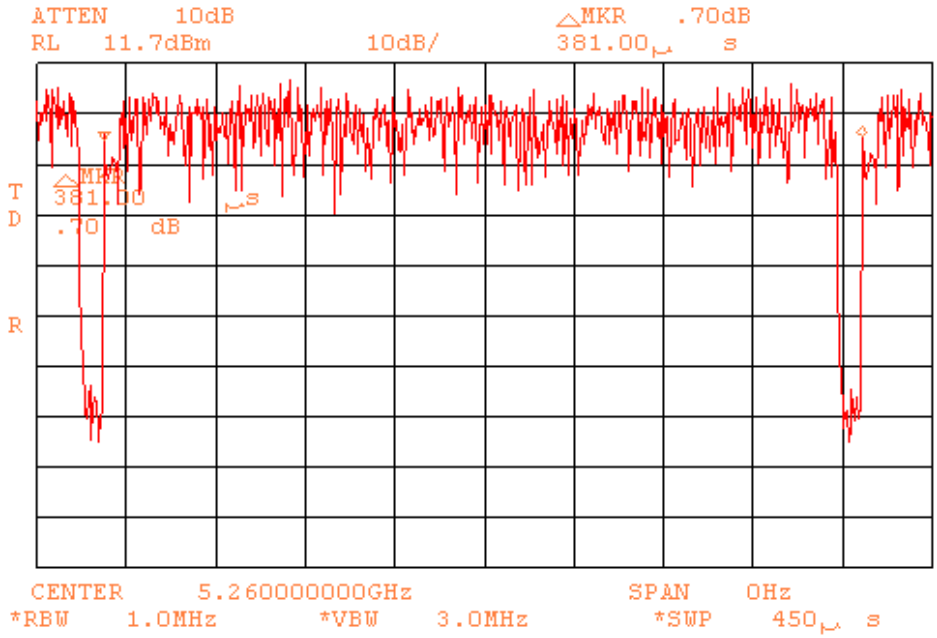
Requirements:

The ratio of the peak excursion of the modulation envelope to the peak transmit power shall not exceed 13dB across any 1MHz bandwidth or the emission bandwidth whichever is less. as required in sec. 15.407 (a) (6).

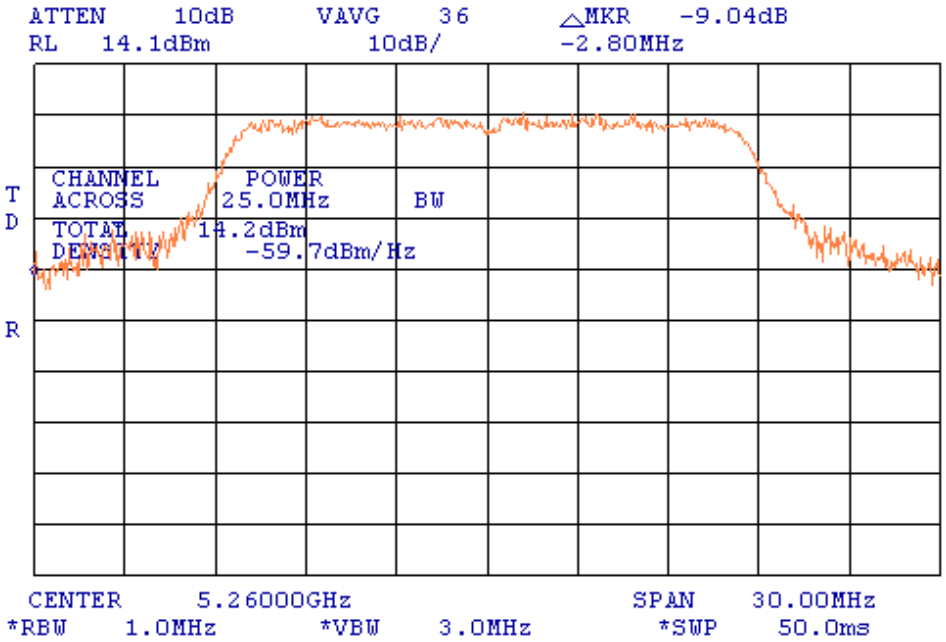
Test results:

The peak excursion is measured according to method #3 as defined in the guidelines for assessing unlicensed national information infrastructure (U-NII) Devices-part 15,subpart E

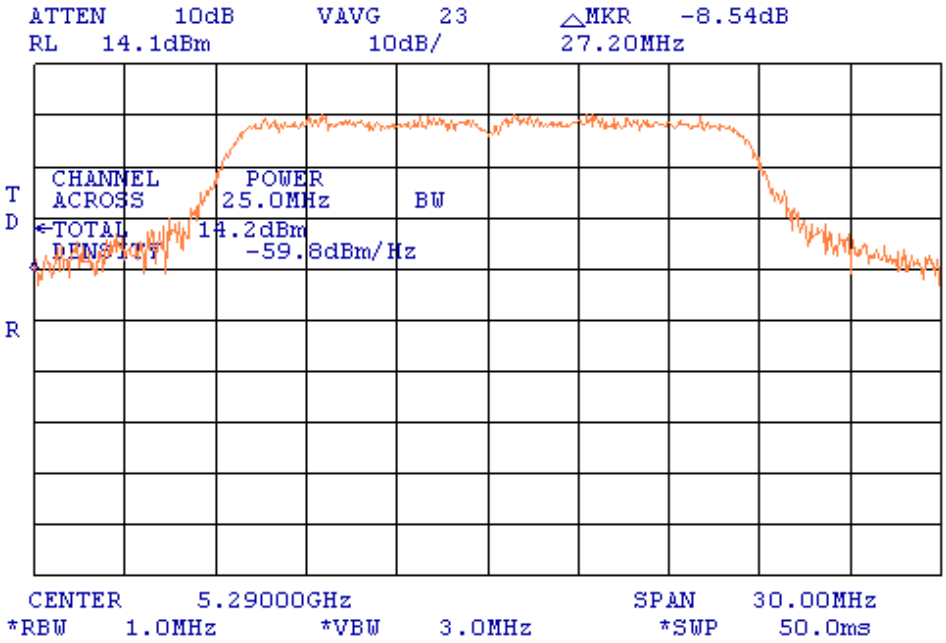
The measured results are shown in Plots #42 to #44.



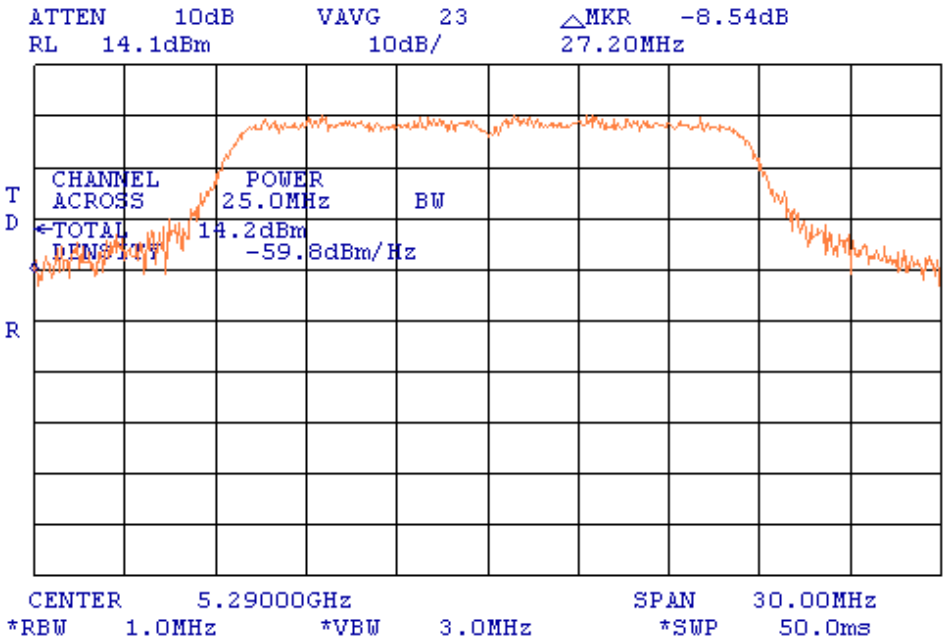
Plot # 26. VL time duration for output power measurement, Defined by chip producer to 99% duty cycle.



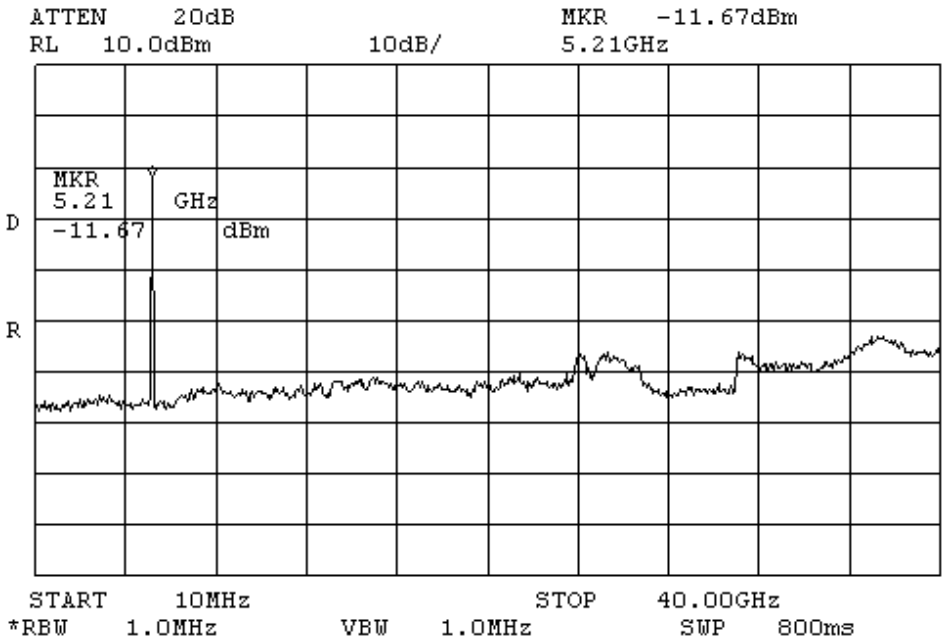
Plot # 27. Base station low channel output power measurement (method #3).



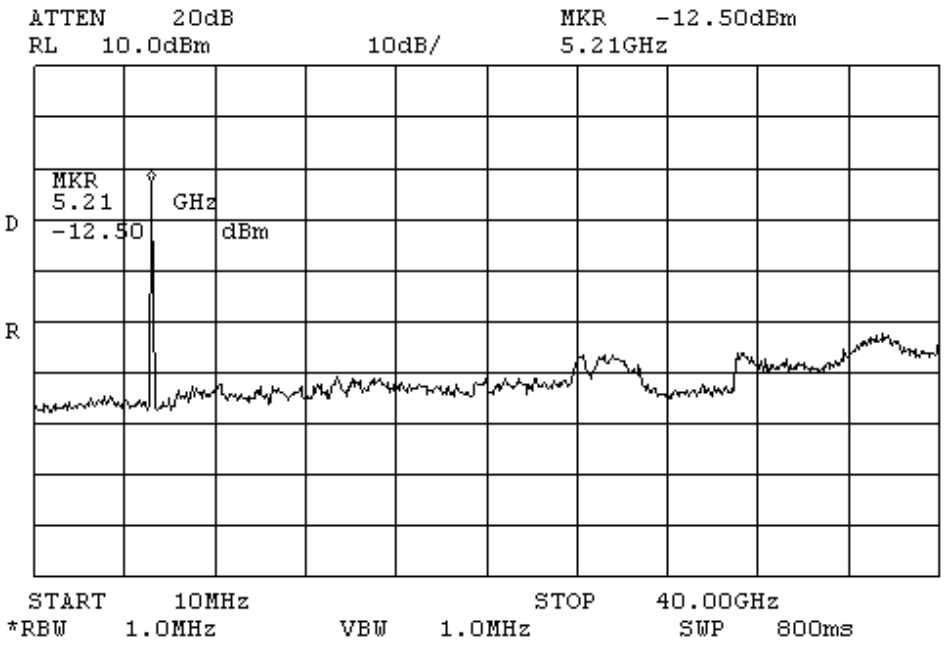
Plot # 28. Base station middle channel output power measurement (method #3).



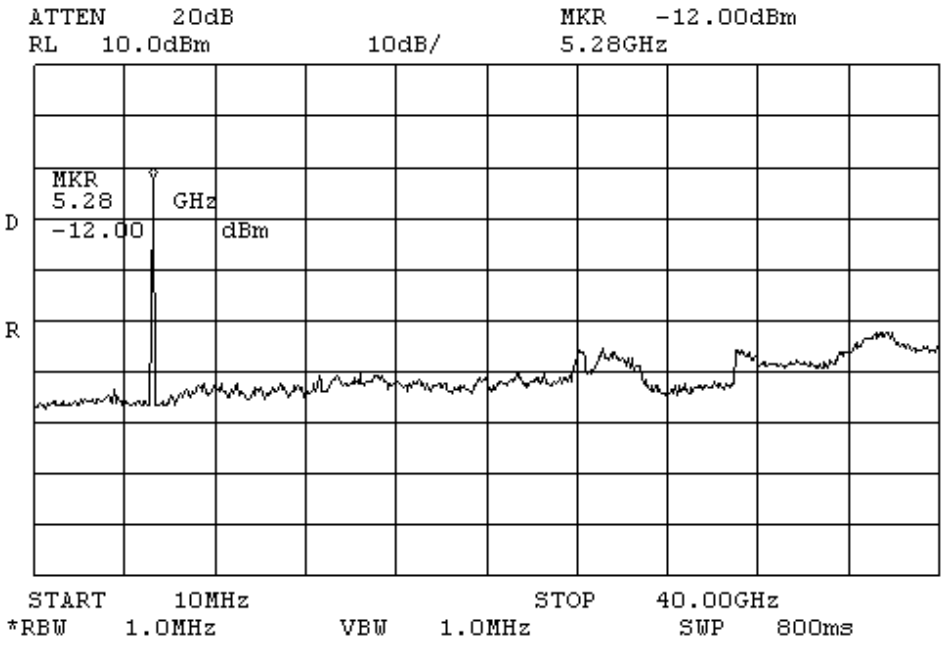
Plot # 29. Base station upper channel output power measurement (method #3).



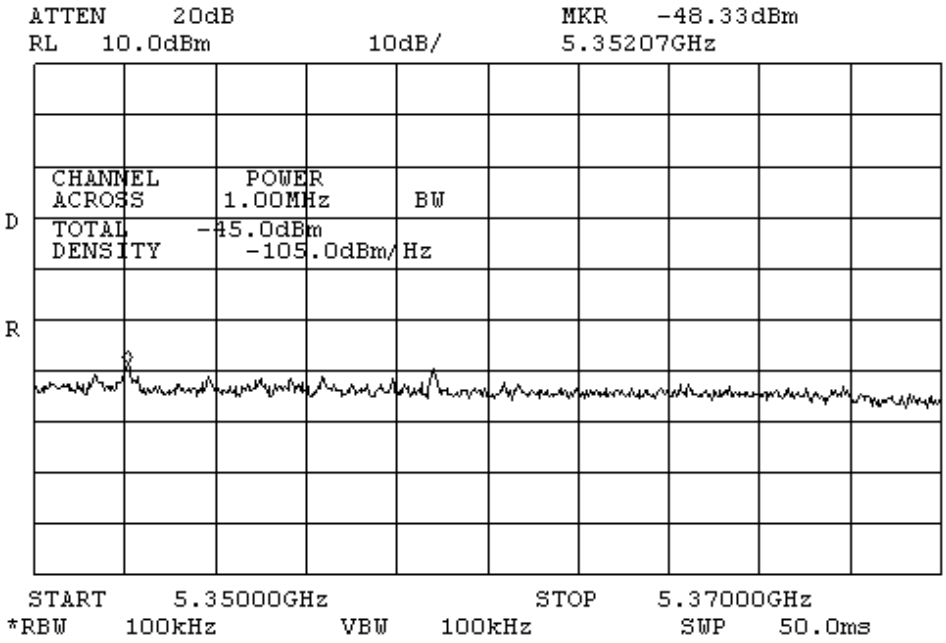
Plot # 30. Base station out of band emissions low band



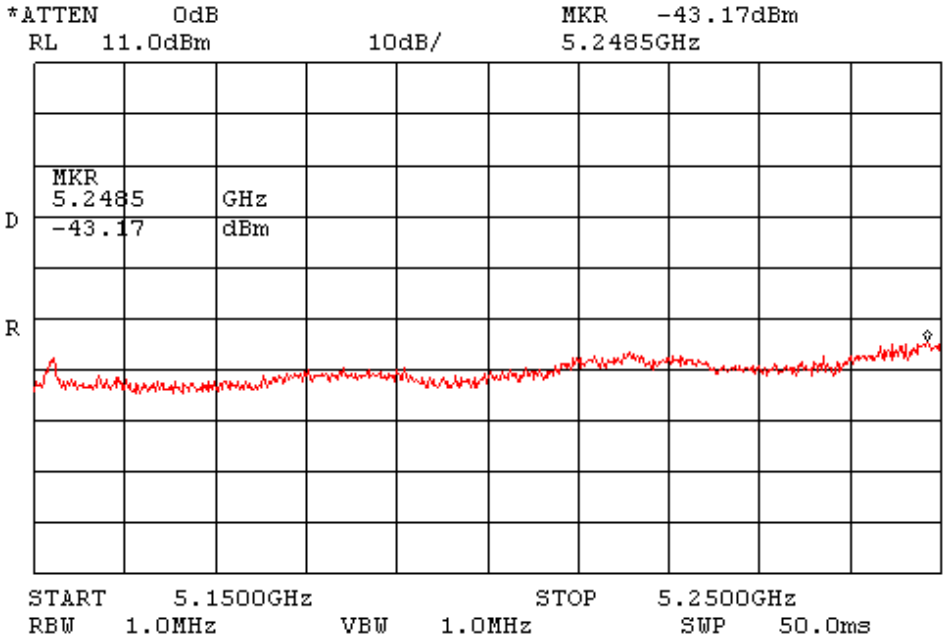
Plot # 31. Base station out of band emission middle band



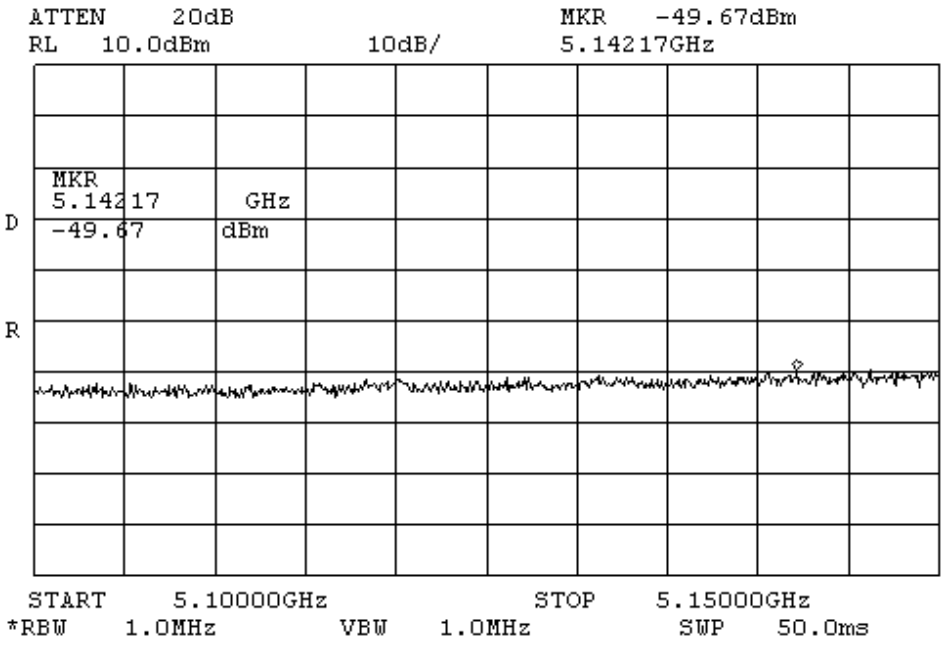
Plot # 32. Base station out of band emission high band



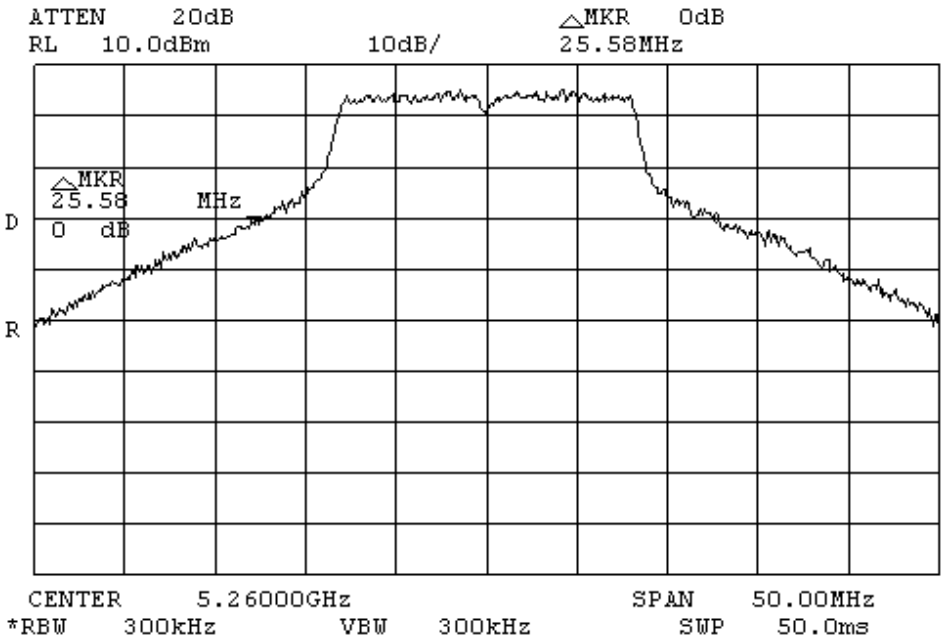
Plot # 33. Base station out of band emissions upper band zoom to next to channel edge from 5350-5370MHz



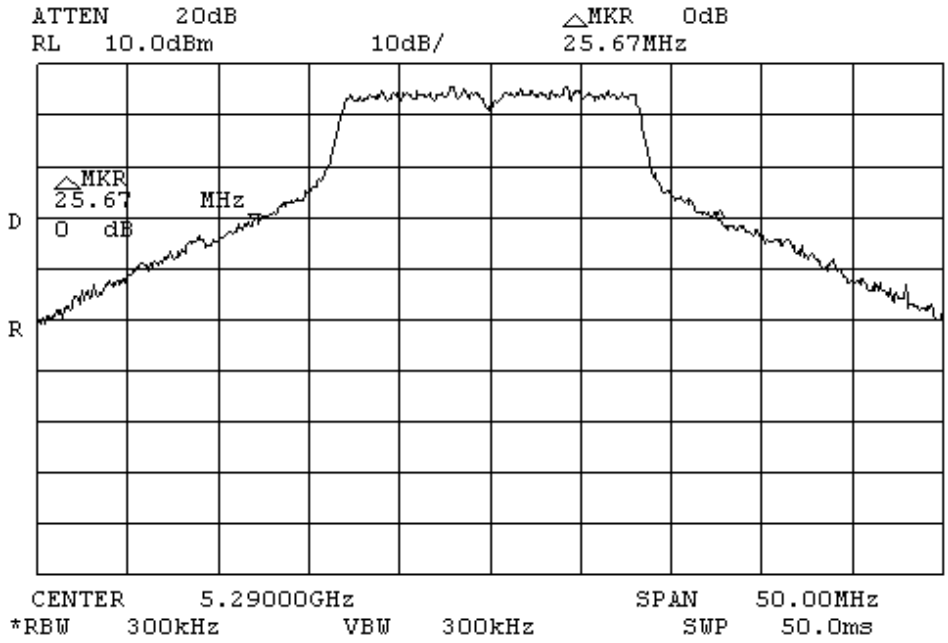
Plot # 34. Base station out of band emission low band zoom into 5150-5250-band



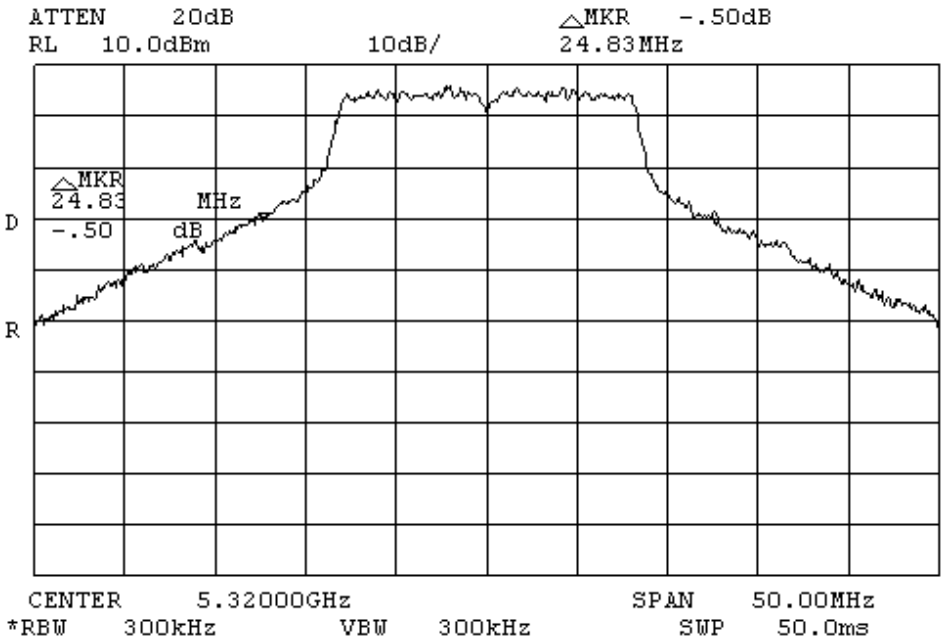
Plot # 35. Base station low band out of band emission zoom to 5100-5150MHz band



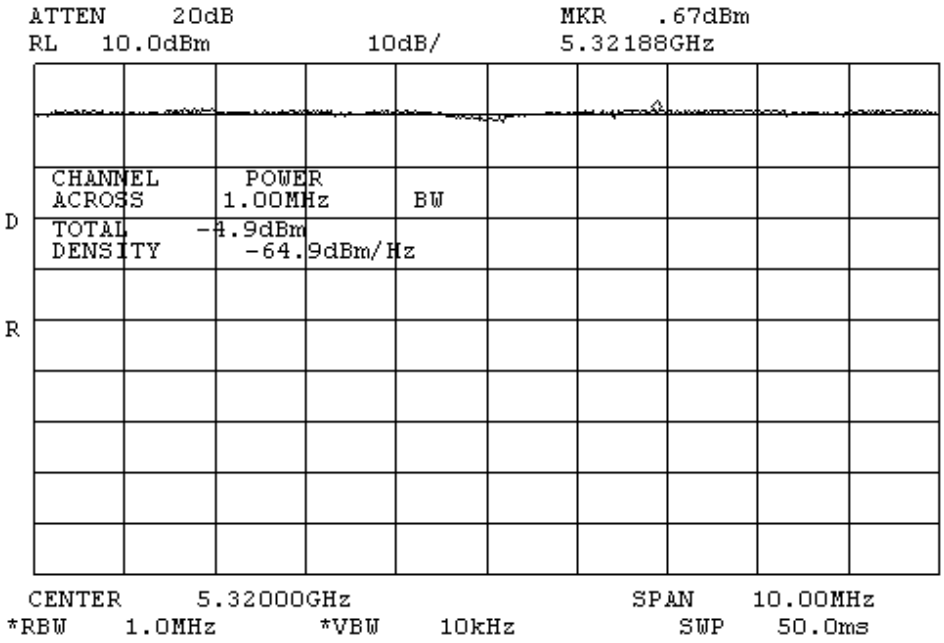
Plot # 36. Base station 26dB bandwidth low channel



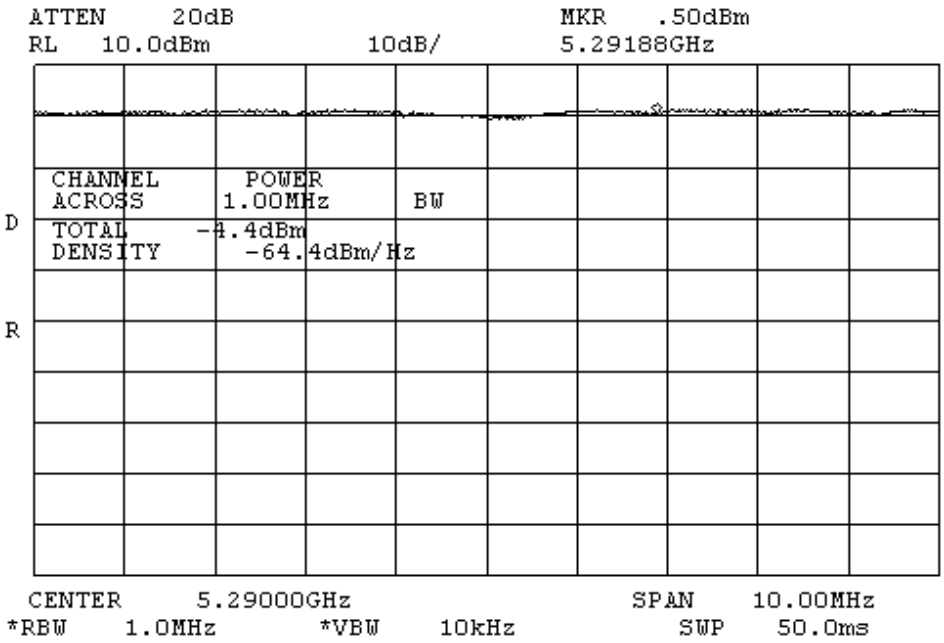
Plot # 37. Base station 26dB bandwidth middle channel



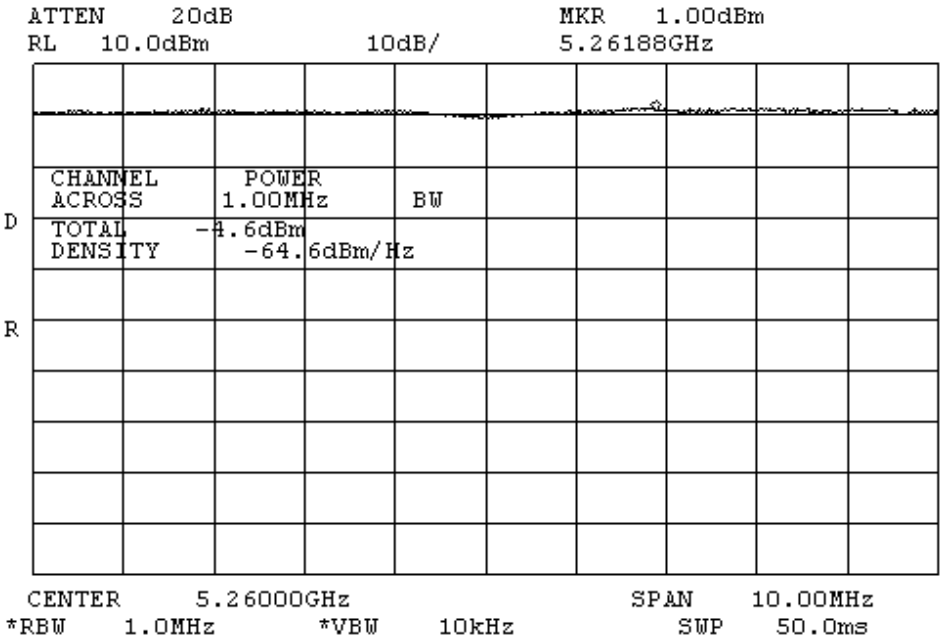
Plot # 38. Base station 26dB bandwidth upper channel



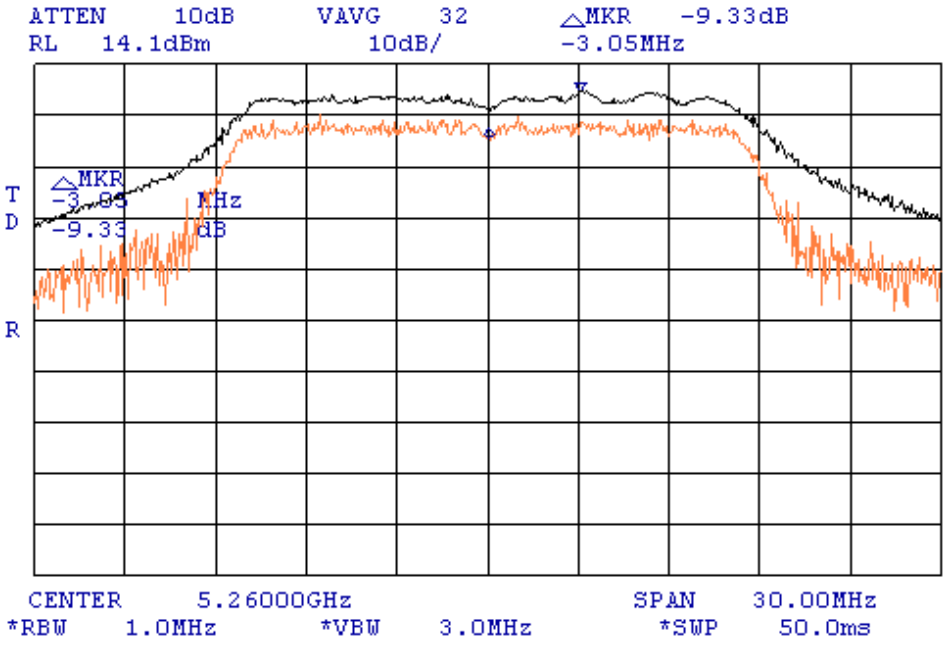
Plot # 39. Base station spectral density upper band



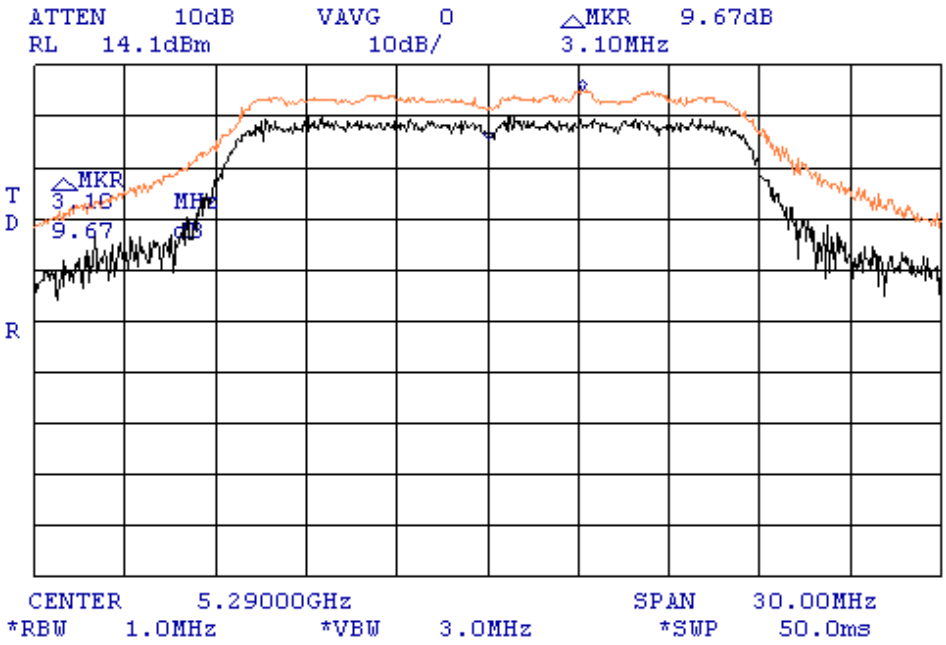
Plot # 40. Base station power spectral density mid channel



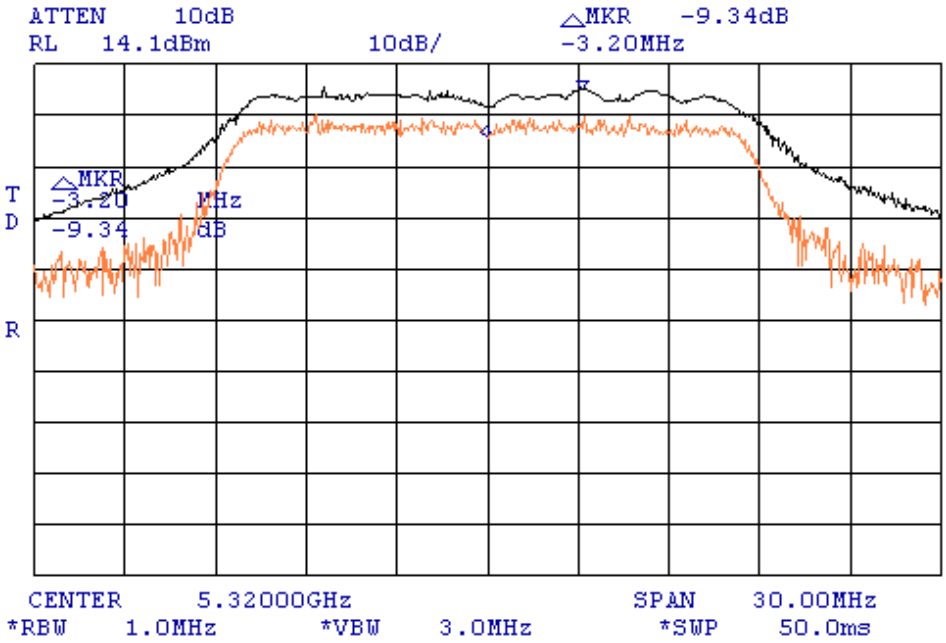
Plot # 41. Base station power spectral lower band



Plot # 42. Peak excursion low channel (#3 method)



Plot # 43. Peak excursion middle channel (#3 method)



Plot # 44. Peak excursion high channel (#3 method)

8. Subscriber unit configuration measurements 15.407

The base station and subscriber have an identical outdoor unit. The difference is the output power according to the antenna gain. This section repeats the measurements that are output power dependent for the 21dBi subscriber unit antenna gain.

8.1. Maximum peak transmit power

Requirements:

The peak transmit power shall not exceed the lesser of 250mW or 11dBm+10logB, where B is the 26-dB emission bandwidth in MHz. as required in sec. 15.407 (a) (2).

Test results:

The peak output power is measured according to method #3 as defined in the measurement procedure updated for peak transmit power in the unlicensed national information Infrastructure (U-NII) bands; Public Notice Aut-30-2002.
The measured maximum peak power is:

Low channel (5260MHz): 7.9dBm
Middle channel (5290MHz): 8.8dBm
High channel (5320MHz): 8.6dBm

Test results:

The measured results are shown in Plots #45 to #47.

8.2. The peak emissions outside of the frequency bands of operation.

Requirements:

All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz as required in sec. 15.407 (b)-(2)(4).

Test results:

The measured results are shown in Plots #48 to #53.

8.3. 26dB bandwidth

Requirements:

The signal bandwidth is defined at the –26dBc points from the signal peak in section 15.403 (c).

Test results:

The measured results are shown in Plots #54- #56

8.4. Peak power spectral density

Requirements:

The peak power spectral density shall not exceed 11dBm in any 1MHz band as required in section 15.407 (a) (2).

Test results:

The measured results are shown in Plots #57- #59

8.5. Frequency accuracy

Requirements:

The frequency accuracy must ensure that an emission is maintained within the band of operation under all conditions of normal operation

Test results:

The measured results are shown in 7.5

8.6. Peak excursion

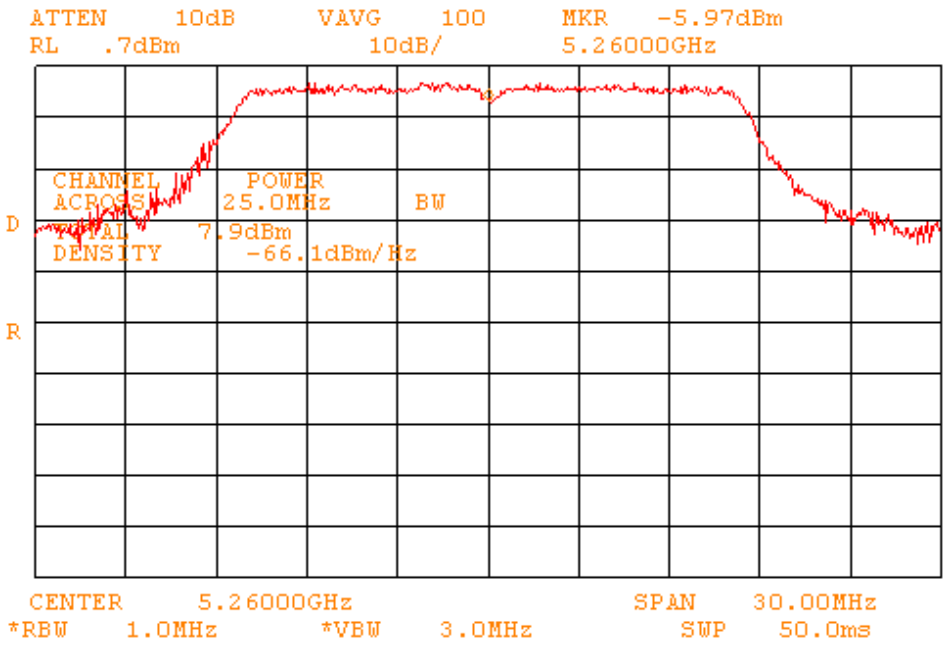
Requirements:

The ratio of the peak excursion of the modulation envelope to the peak transmit power shall not exceed 13dB across any 1MHz bandwidth or the emission bandwidth whichever is less as required in sec. 15.407 (a) (6).

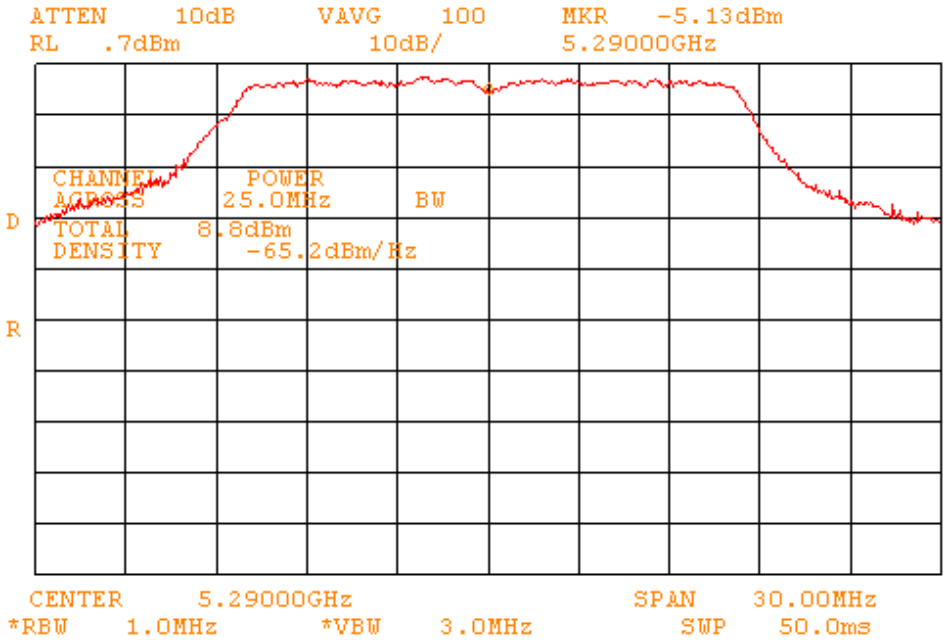
Test results:

The peak excursion is measured according to method #3 as defined in the guidelines for assessing unlicensed national information infrastructure (U-NII) Devices-part 15,subpart E. This measurement is modulation dependent

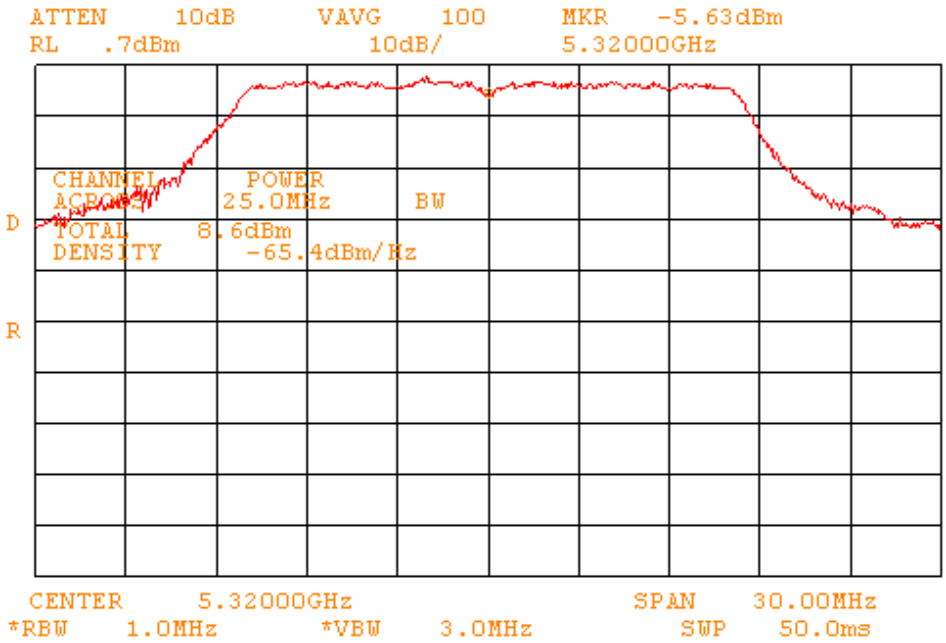
The measured results are shown in 7.6



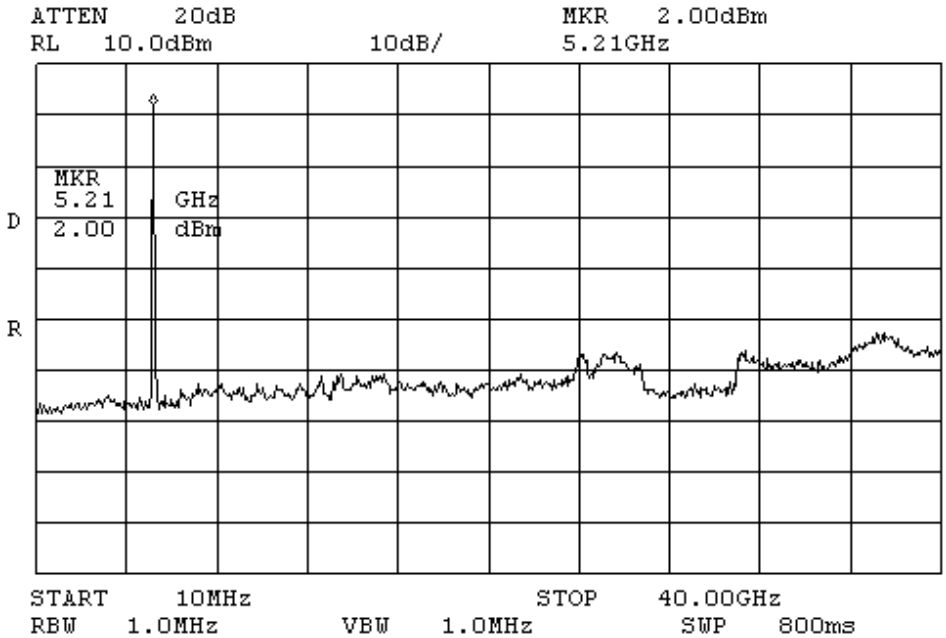
Plot # 45. Subscriber unit low channel output power measurement (method #3).



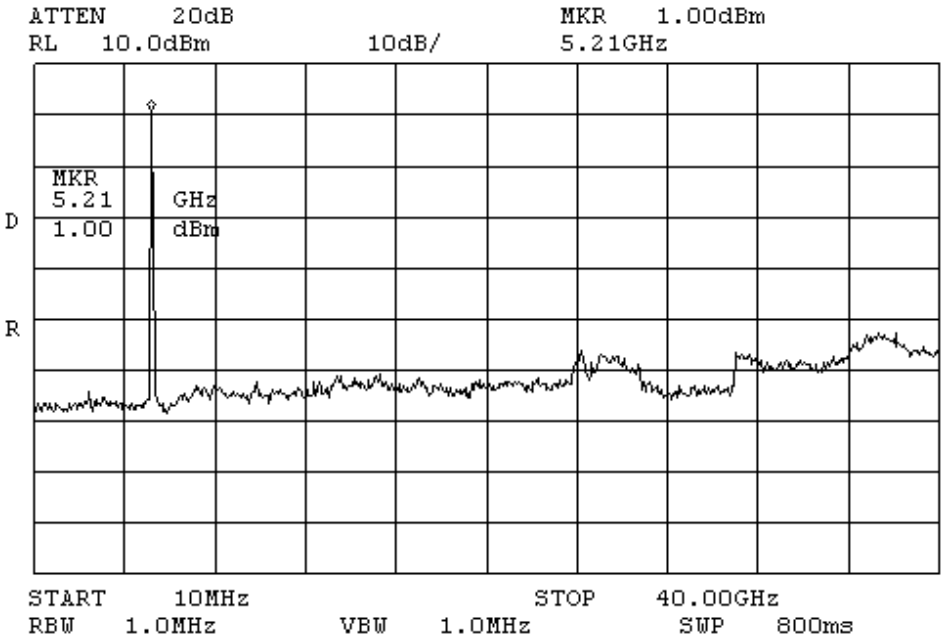
Plot # 46. Subscriber unit mid channel output power measurement (method #3).



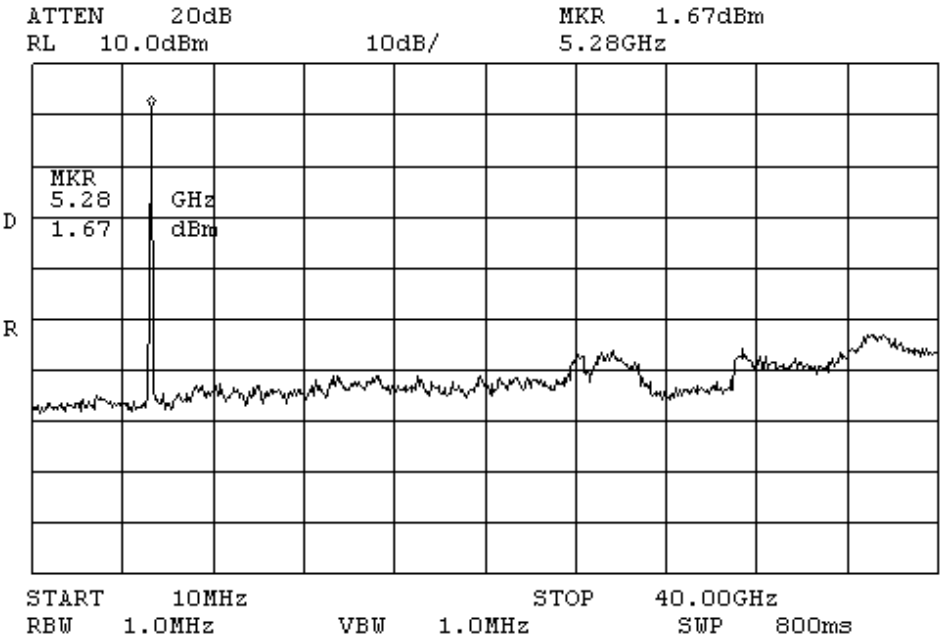
Plot # 47. Subscriber unit up channel output power measurement (method #3).



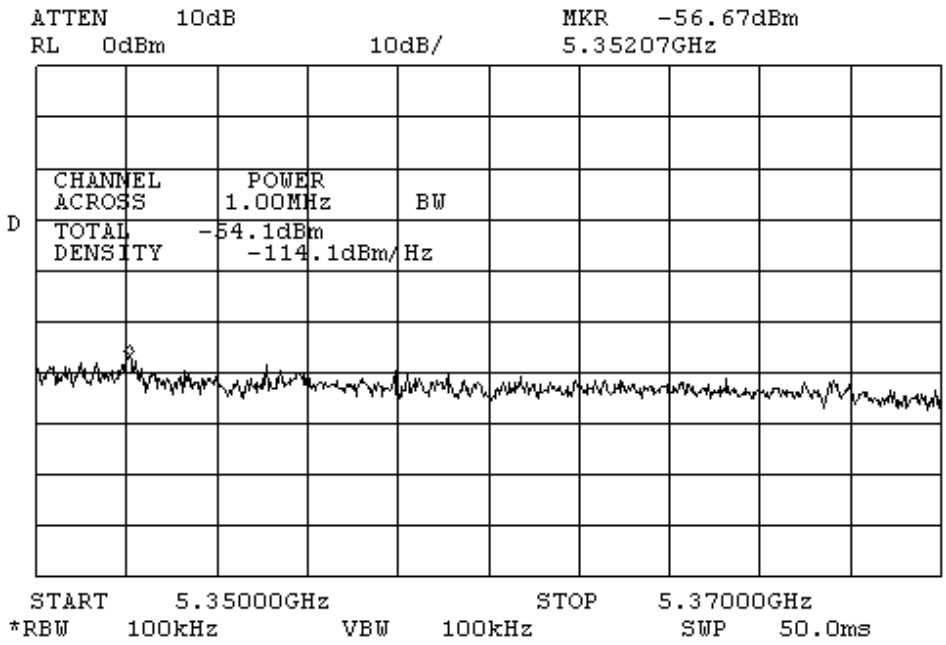
Plot # 48. Subscriber unit out of band emissions lower band



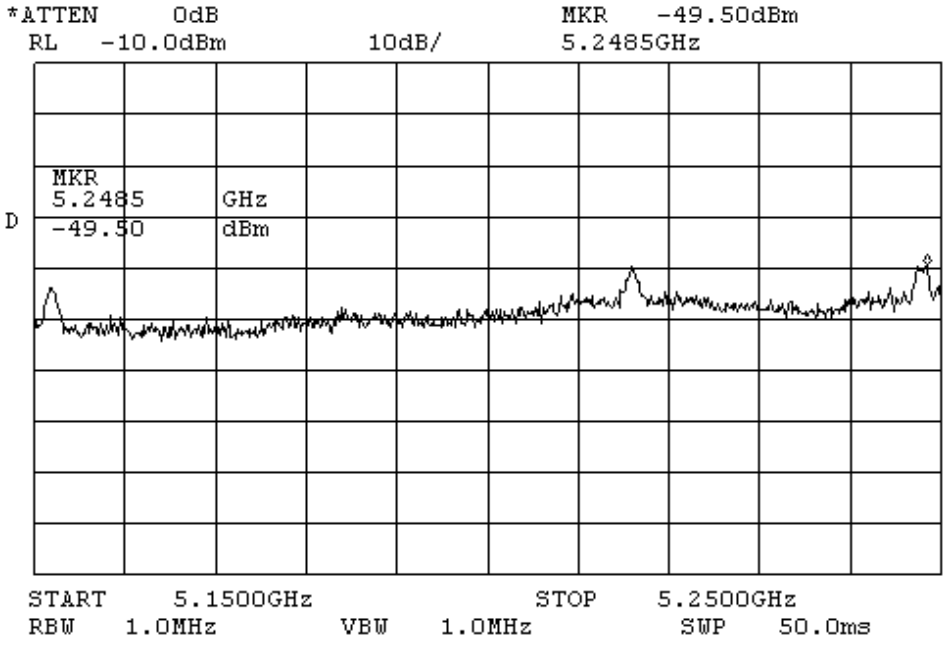
Plot # 49. Subscriber unit out of band emissions middle band



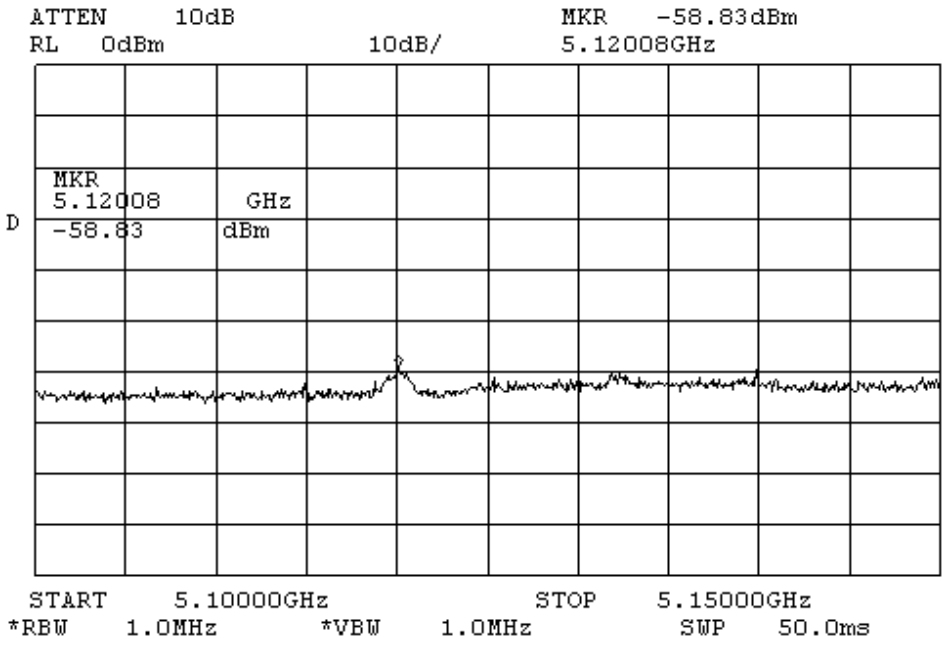
Plot # 50. Subscriber unit out of band emission upper band



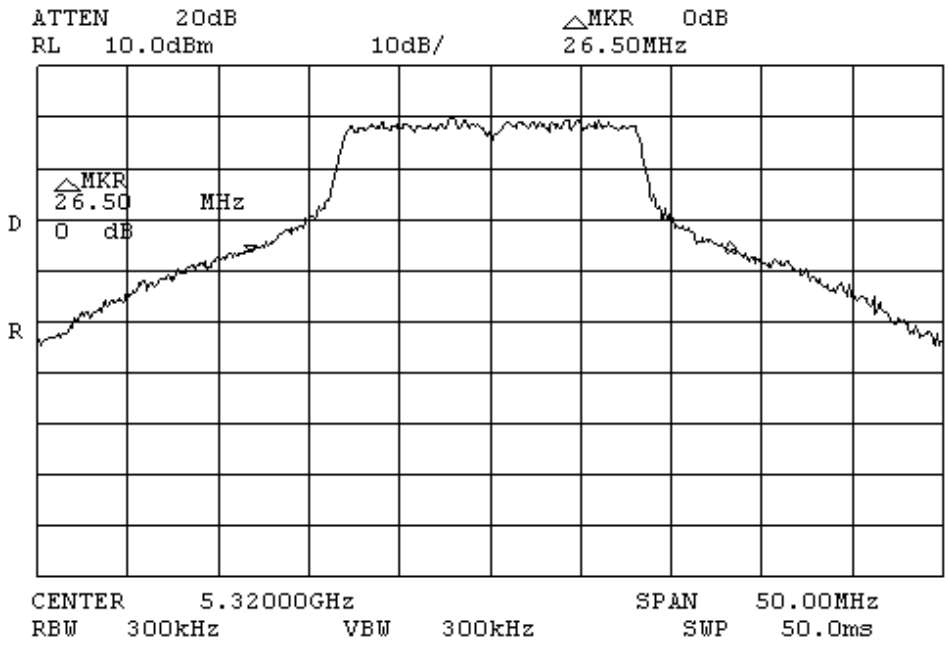
Plot # 51. Subscriber unit out of band emissions upper band zoom to next to channel edge from 5350-5370MHz



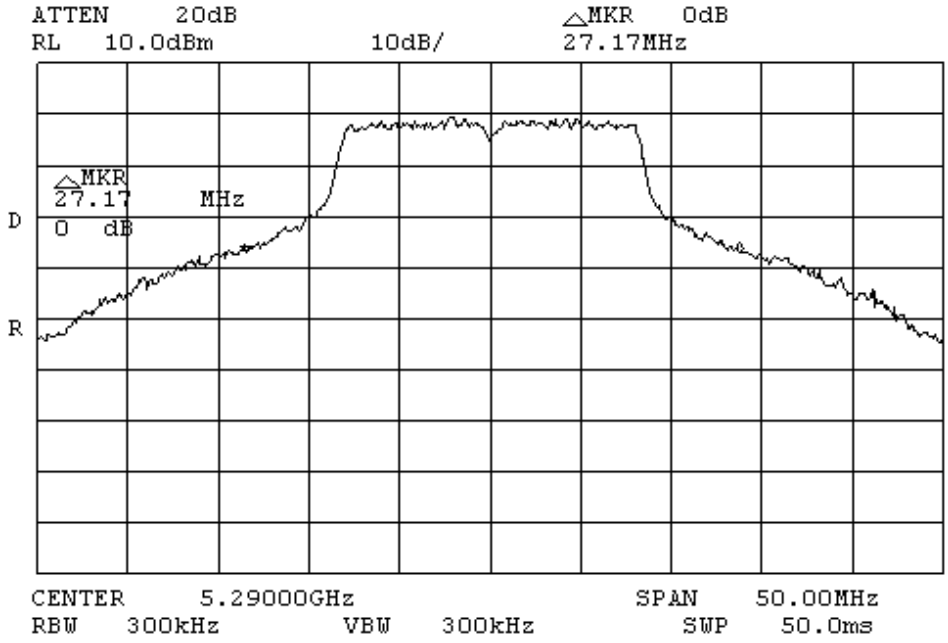
Plot # 52. Subscriber unit out of band emission low band zoom into 5150-5250 band limit.



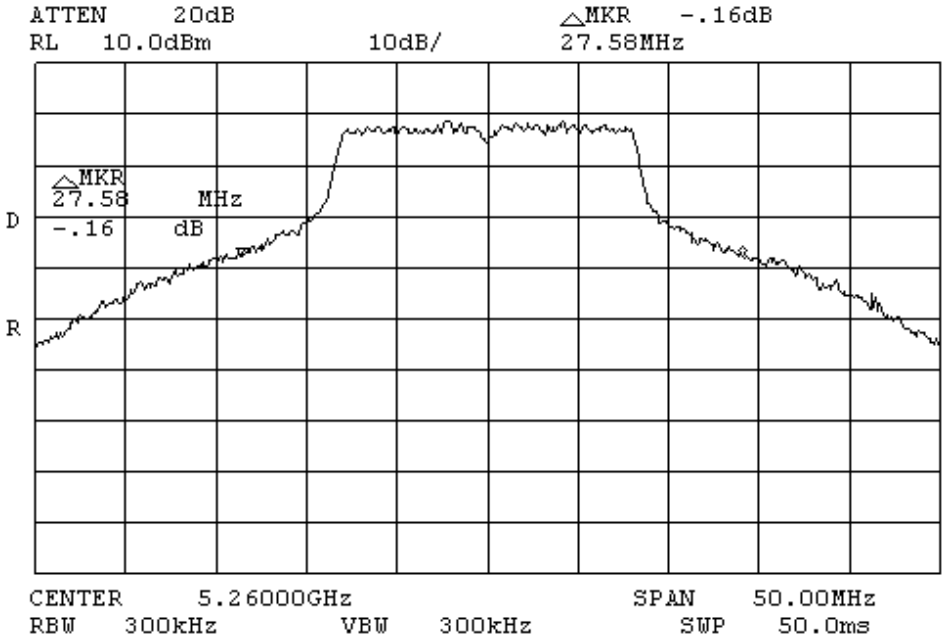
Plot # 53. Subscriber unit, low band out of band emission zoom to 5100-5150MHz band



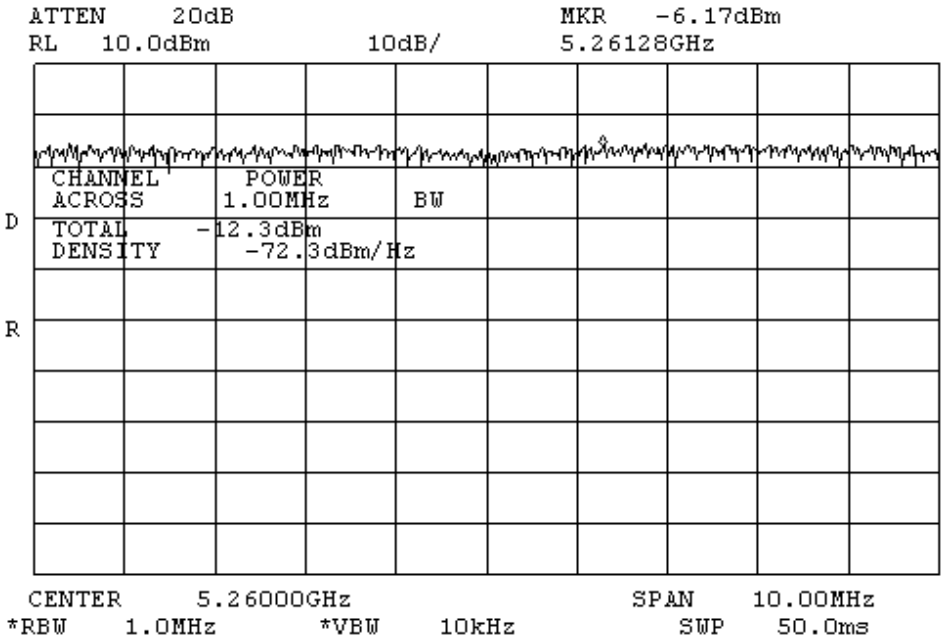
Plot # 54. Subscriber unit 26dB bandwidth upper band



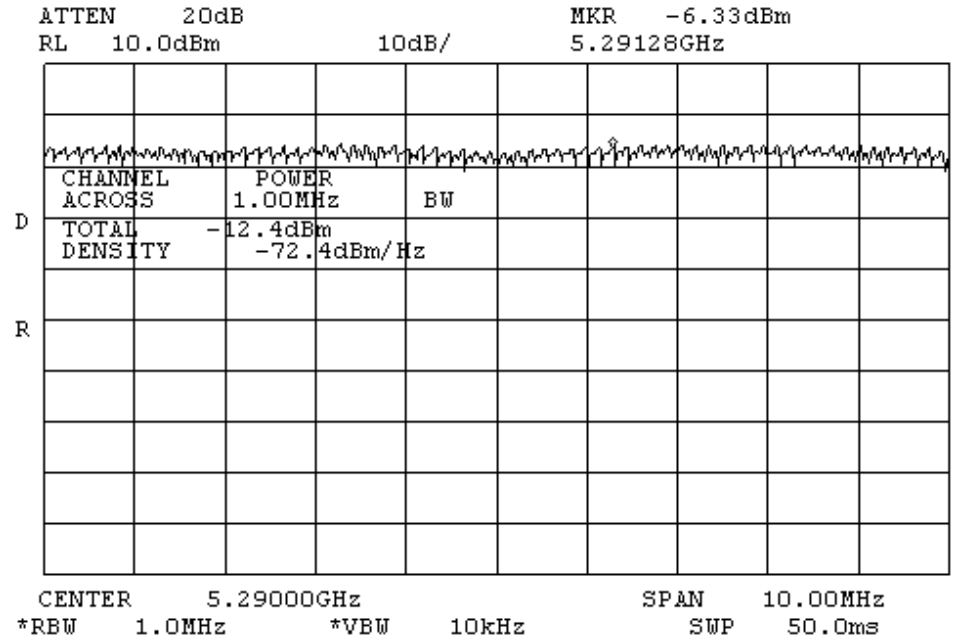
Plot # 55. Subscriber unit 26dB bandwidth middle band



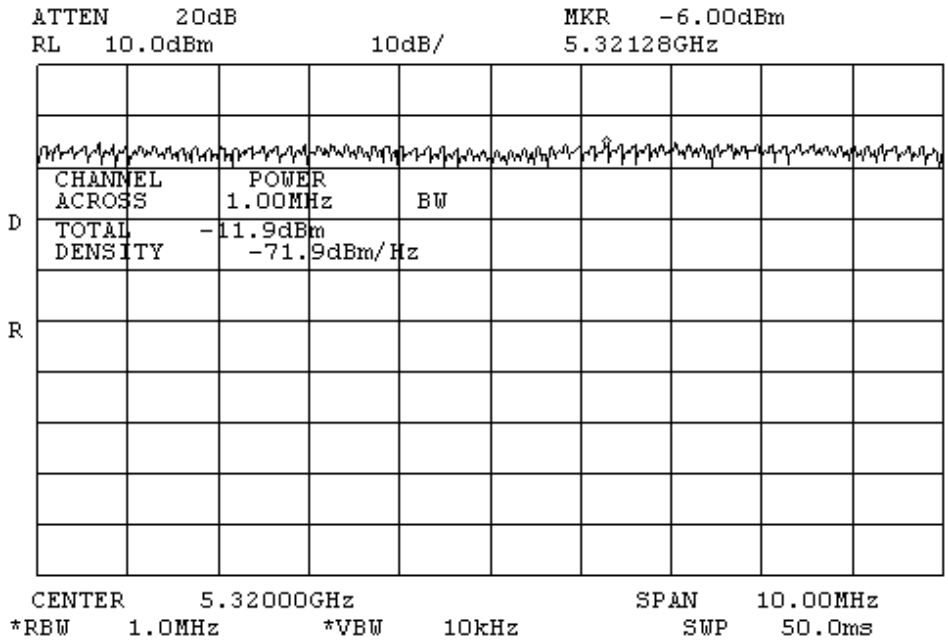
Plot # 56. Subscriber unit 26 dB bandwidth lower band



Plot # 57. Subscriber unit channel spectral density low channel



Plot # 58. Subscriber unit channel spectral density middle channel



Plot # 59. Subscriber unit channel spectral density upper channel

9. Compliance with specification

Test	FCC Part 15	Test result
Radiated emissions in restricted bands	Sec.15.205	Complies
Conducted emission	Sec.15.207	Complies
Radiated emission – general requirements	Sec.15.109,209	Complies
Maximum peak output power	Sec.15.407	Complies
Conducted spurious	Sec.15.407	Complies
Peak power density	Sec.15.407	Complies
Peak excursion	Sec 15.407	Complies

Telematics Laboratory
5 October 2004

Approved by: Yuri Rozenberg
Position: Head of EMC Branch

Tested by: Michael Feldman
Position: Testing Technician

10. Appendix 1: Test equipment used

All measurements equipment is on SII calibration schedule with a recalibration interval not exceeding one year.

Instrument	Manufac-turer	Model	Serial No.	Last calibration date	Next calibration date
Spectrum analyzer 10 KHz-26.5 GHz	HP	E7405a	SII 4944	04/04	04/05
Spectrum analyzer 9 KHz-50 GHz	HP	8565E	3517A00347	07/04	07/05
Antenna Double Ridge 1-18 GHz	EMCO	3115	SII4873	03/04	03/05
Antenna Standard Gain Horn 18-40 GHz	WILTRON	Alpha TRG A361	861A/590	01/04	01/05
LISN 9 kHz – 30 MHz	FCC	LISN-50/250-32-4-16	SII 5023	05/04	05/05
Transient limiter 0.009-200 MHz	HP	11947A	31074A3105	05/04	05/05
Attenuator 20 dB	HP	8491B	3929M50394	05/04	05/05

11. Appendix 2: Antenna Factor and Cable Loss

Antenna Factor
Standard Gain Horn 26 – 40 GHz Alpha TRG Model A361

Point	Frequency (MHz)	Antenna Factor (dB/m)
1	26000	35.22
2	27000	35.40
3	28000	35.52
4	29000	35.64
5	30000	35.76
6	31000	35.90
7	32000	36.07
8	33000	36.16
9	34000	36.31
10	35000	36.46
11	36000	36.60
12	37000	36.74
13	38000	36.93
14	39000	37.21
15	40000	37.28

ETS

Gain and Antenna Factors for Double Ridged Guide Antenna
Manufactured by EMC Test Systems
Model Number: 3115 Serial Number: 5802
1.0 Meter Calibration Polarization: Horizontal

Frequency (MHz)	Antenna Factor (dB/m)	Gain Numeric	Gain dBi
1000	24.3	3.86	5.9
1500	25.6	6.48	8.1
2000	27.9	6.83	8.3
2500	28.9	8.43	9.3
3000	30.7	7.97	9.0
3500	32.0	8.06	9.1
4000	33.0	8.38	9.2
4500	32.9	10.91	10.4
5000	34.1	10.16	10.1
5500	34.8	10.51	10.2
6000	35.2	11.38	10.6
6500	35.4	12.79	11.1
7000	36.4	11.83	10.7
7500	37.3	10.90	10.4
8000	37.5	12.05	10.8
8500	37.9	12.36	10.9
9000	38.2	12.86	11.1
9500	38.3	14.04	11.5
10000	38.7	14.25	11.5
10500	38.5	16.26	12.1
11000	38.8	16.87	12.3
11500	39.5	15.41	11.9
12000	39.3	17.96	12.5
12500	39.1	20.03	13.0
13000	40.2	16.83	12.3
13500	41.2	14.53	11.6
14000	41.9	13.20	11.2
14500	41.3	16.27	12.1
15000	39.6	26.07	14.2
15500	38.1	39.49	16.0
16000	38.4	39.12	15.9
16500	39.8	29.81	14.7
17000	41.6	20.97	13.2
17500	44.8	10.55	10.2
18000	46.5	7.57	8.8

Specification compliance testing factor (1.0 meter spacing) to be added to receiver meter reading in dBV to convert to field intensity in dBV/meter. Calibrated 07 Oct 02 (DD/MM/YYYY). Calibration per ARP 958.

ETS

Gain and Antenna Factors for Double Ridged Guide Antenna
Manufactured by EMC Test Systems
Model Number: 3115 Serial Number: 5802
1.0 Meter Calibration Polarization: Vertical

Frequency (MHz)	Antenna Factor (dB/m)	Gain Numeric	Gain dBi
1000	24.1	4.11	6.1
1500	25.6	6.48	8.1
2000	27.9	6.83	8.3
2500	28.9	8.47	9.3
3000	30.6	8.18	9.1
3500	31.9	8.24	9.2
4000	33.0	8.45	9.3
4500	32.8	11.14	10.5
5000	34.0	10.34	10.1
5500	34.8	10.40	10.2
6000	35.1	11.67	10.7
6500	35.4	12.86	11.1
7000	36.3	11.92	10.8
7500	37.3	10.95	10.4
8000	37.4	12.15	10.8
8500	37.8	12.58	11.0
9000	38.2	13.01	11.1
9500	38.2	14.21	11.5
10000	38.5	14.79	11.7
10500	38.6	16.05	12.1
11000	38.8	16.93	12.3
11500	39.3	16.19	12.1
12000	39.1	18.46	12.7
12500	39.1	20.28	13.1
13000	40.1	17.19	12.4
13500	41.1	14.85	11.7
14000	41.8	13.55	11.3
14500	41.3	16.25	12.1
15000	39.6	25.78	14.1
15500	38.0	39.54	16.0
16000	38.3	39.73	16.0
16500	39.6	31.52	15.0
17000	41.3	22.72	13.6
17500	44.5	11.49	10.6
18000	46.5	7.69	8.9

Specification compliance testing factor (1.0 meter spacing) to be added to receiver meter reading in dBV to conve
to field intensity in dBV/meter. Calibrated 07 Oct 02 (DD/MM/YYYY). Calibration per ARP 958.

12. Appendix 3: Test configuration illustration

Photo # 3.
Base Station + Subscriber Unit
Radiated emission test on open site

Photo # 4.
Base Station + Subscriber Unit
Radiated emission test on open site

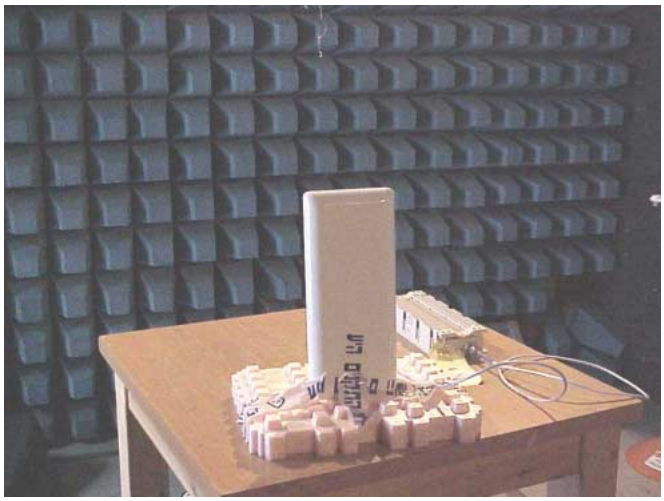


Photo # 5. P/N AN1152
Spurious emission test

Photo # 6.
Radio unit with MTI sector antenna P/N AN1152.
Spurious emission test

Photo # 7.
Radio unit with Unidirectional antenna UNI-28-4 P/N AN1230
Spurious emission test

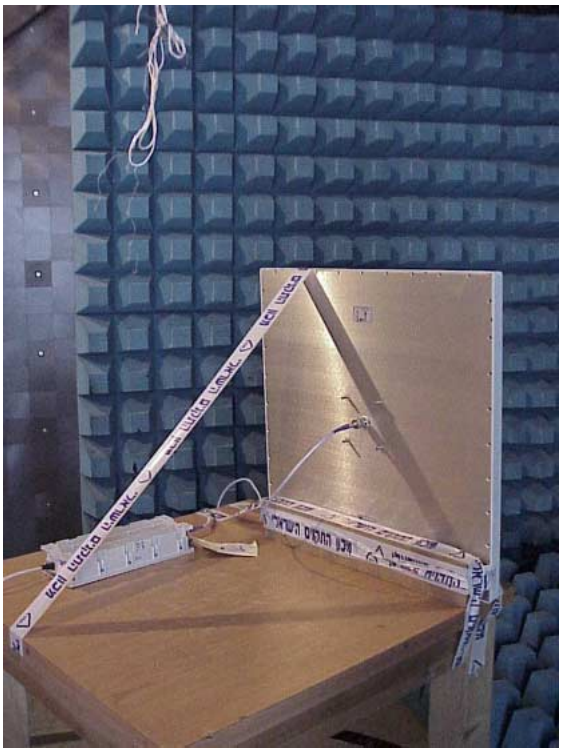


Photo # 8.
Radio unit with Unidirectional antenna UNI-28-4 P/N AN1230
Spurious emission test

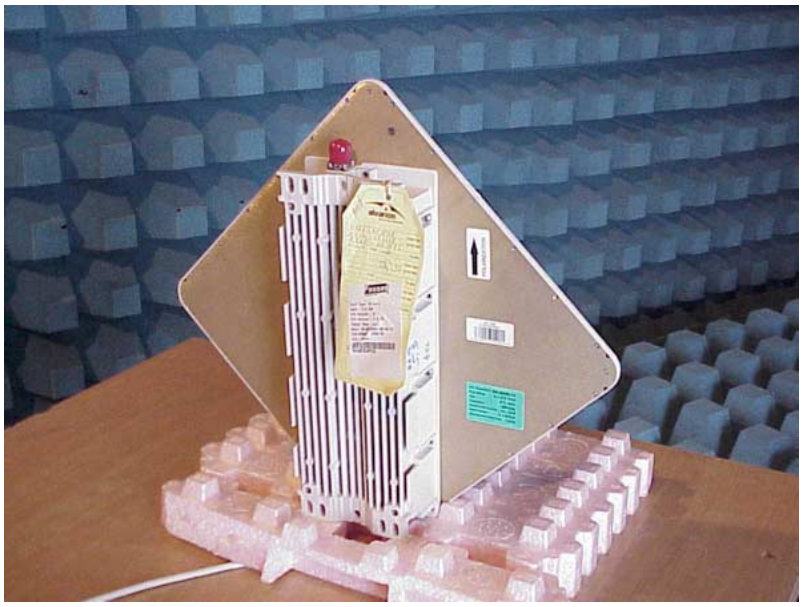


Photo # 9.
Radio unit with integrated antenna P/N AN1248
Spurious emission test

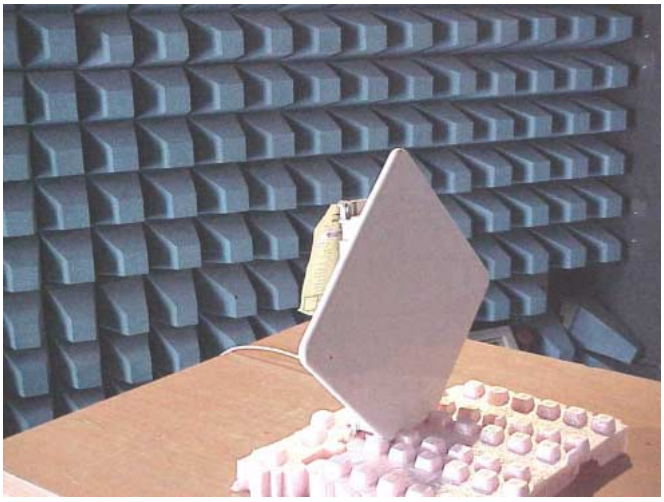


Photo # 10.
Radio unit with integrated antenna P/N AN1248
Spurious emission test