



Test Report No. 8912353202 Rev.3

Applicant: Alvarion Ltd

BreezeNETB 300

Model: BU/RB-B300-5X

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



ACCLASS Accreditation Services

Certificate Number: IT-1359



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1. Applicant information

Applicant:	Alvarion Ltd
Address:	21A Habarzel str, Tel-Aviv, 69710, Israel
Sample for test selected by:	The customer
The date of tests:	15 – 20 October, 15, 29 November 2009

Equipment under test information

Description of Equipment Under Test (EUT):	BreezeNETB 300
Model:	BU/RB-B300-5X
Serial Number:	NA
Manufactured by:	Alvarion Ltd

2. Test performance

Location:	SII EMC Section
Purpose of test:	Apparatus compliance verification in accordance with emission requirements
Test specifications:	47CFR part 15.207, 15.209 part 90. 210 – 90. 215 part 1 §1.1310

Reference Documents:

CFR 47 FCC:	Rules and Regulations; Part 15. “Radio frequency devices”; Part. 90. Private land mobile radio services.
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This Test Report contains 59 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.

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3. Summary of test

The EUT was found to be in compliance with requirements of: 47CFR Part 90, §§ 90.210, 90.213 and 90.1215. Part 15 §§ 15.207, 15.209.

Transmitter characteristics	Subclasses
Peak transmitter power	90.1215(a)
Peak power spectral density	90.1215(b)
Power spectral density mask	90.210(1)
Undesired conducted emissions test	90.210 L
Undesired radiated emissions test	90.210 L
Ratio of the peak excursion test	90.1215(e)
Frequency stability test	90.213
Conducted emissions on AC power line	15.207
Unwanted radiated emissions below 1 GHz	15.209

Test performed by:Mr. Michael Feldman
Test technicianTest report approved by:Mr. Yuri Rozenberg.
Head of EMC Branch

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*The customer provided description.

4.1 General description

The BNB-300 is designed as an adaptable platform, for high availability, high capacity and long range wireless services, in the unlicensed and licensed frequency spectrum. The platform architecture and software framework will enable various product configurations, providing a rich suite of applications and system deployment models.

The generic platform is based on a state-of-the-art 802.11n technology, with robust capabilities including Orthogonal Frequency Division Multiplexing (OFDM), Multiple-Input Multiple-Output (MIMO), Time Division Duplexing (TDD) and Spectrum Management, the BNB-300 will offer line-of-sight (LOS) as well as non-line-of-sight (NLOS) operation, such as for drive through trees, foliage and around buildings.

EUT technical characteristics

Transmitter technical characteristics.		Note	
Stand-alone/fixed use			
Assigned frequency range	4940 MHz – 4990 MHz		
Operating frequency range	4945 MHz – 4985 MHz	5MHz EBW	
	4950 MHz – 4980 MHz	10 MHz EBW	
	4960 MHz	20 MHz EBW	
RF channel spacing	5/10/20 MHz		
Maximum rated output power	9 dBm		
Antenna connection	N-type for external antenna	Professional installation	
Type of modulation	QPSK, 4QAM, 16QAM, 64QAM		
Type of multiplexing	OFDM		
Modulating test signal (baseband)	PRBS		
Antenna information			
Type	Manufacturer	Model	Gain, dBi
Flat panel , dual polarized	MTI	P/N 850102	23

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5. Environmental evaluation and exposure limit according to FCC part 1, §1.1307, §1.1310

Limit for power density for general population/uncontrolled exposure is $1(\text{mW}/\text{cm}^2)$ or $10 (\text{W}/\text{m}^2)$.

The power density calculation is $S = (Pt /4\pi r^2)$.

Where:

Pt - The transmitted power (EIRP) (mW)

r - The distance from the unit. (cm)

The limit $1(\text{mW}/\text{cm}^2)$ can be calculated from the above based on the following data:

Pt- the transmitted power which is equal to the peak output power 9.0 dBm plus external antenna gain 23 dBi . The maximum peak EIRP = 32 dBm = 1584.9 mW

Maximum allowed distance “r”, where RF exposure limits may not be exceeded,
 $r = \text{SQRT}(1584.9/4\pi)$ and is more than 11.2 cm from the antenna.

Peak power density at worse case distance 20 cm is $= Pt/4\pi r^2 = 1.58 \text{ W}/4\pi * 0.2^2 = 3.1 \text{ W}/\text{m}^2$
 That is less than $10 \text{ W}/\text{m}^2$ power density limit.

6. EUT test configuration

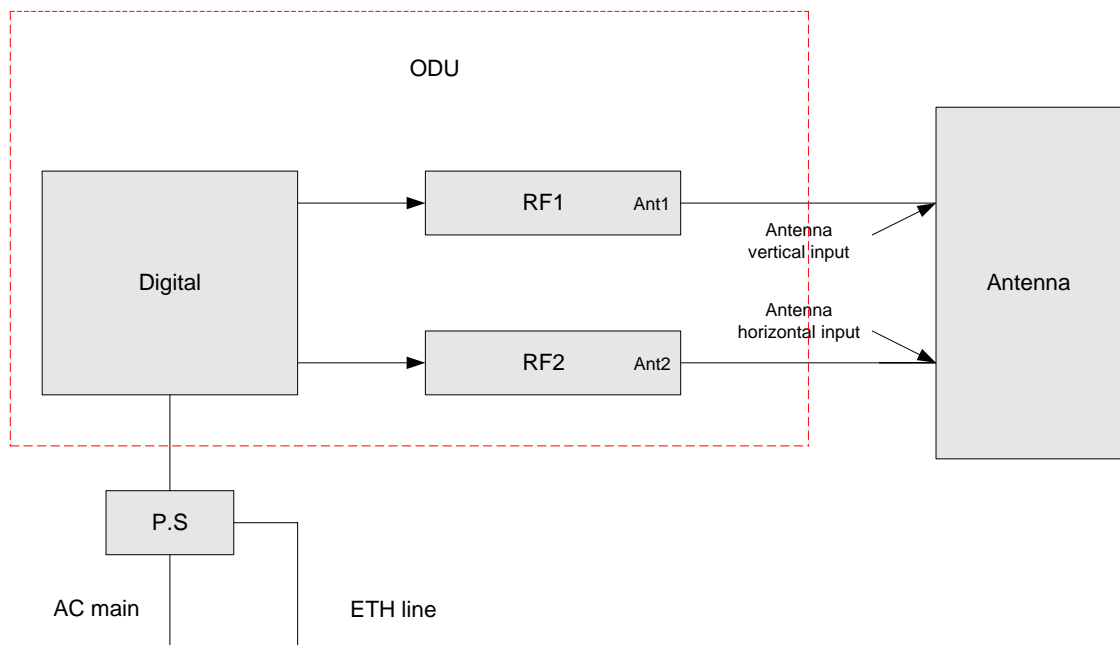


Fig. 1. EUT block diagram.



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7. Test results

7.1 Transmitter characteristics

7.1.1 Peak transmit power test according to §90.1215(a)(b).

Method of measurement FCC part 2.1049
 Operating Frequency Range 4945 - 4985 MHz
 Ambient Temperature 23⁰ C Relative Humidity 49% Air Pressure 1011 hPa

5 MHz emission bandwidth

Carrier frequency MHz	99% emission bandwidth MHz	Measured Peak output power, dBm	Calculated Peak output power, dBm	Reference to plots
4945	4.71	-0.62	0	#1, 4
4965	4.73	-0.37	0	#2, 5
4985	4.72	-0.51	0	#3, 6

10 MHz emission bandwidth

Carrier frequency MHz	99% emission bandwidth MHz	Measured Peak output power, dBm	Calculated Peak output power, dBm	Reference to plots
4950	8.95	2.41	3.0	#7, 10
4965	8.94	2.46	3.0	#8, 11
4980	8.95	2.71	3.0	#9, 12

20 MHz emission bandwidth

Carrier frequency MHz	99% emission bandwidth MHz	Measured Peak output power, dBm	Calculated Peak output power, dBm	Reference to plots
4960	17.99	5.21	6.0	#13, 14



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LIMIT

The peak power in table above is limited to 9 dBi antenna gain. The peak transmit power should be reduced by the amount in dB that the antenna gain exceed 9 dBi.

For used antenna 23 dBi peak transmit power was calculated as $P_{BW} - (23 - 9)$

Channel bandwidth, MHz	Low power transmitter limit, dBm	Calculated transmitter power limit, dBm
5	14	0
10	17	3.0
20	20	6.0

TEST PROCEDURE

The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at bottom, middle and the top of the 4940 - 4990 MHz frequency band under maximum data transfer bit rate. The EUT RF output was connected to the Spectrum Analyzer through appropriate attenuator and accounted with cable loss in SA settings. The 99% EBW measurements were performed with RBW = at least 1% of EBW and VBW>RBW.

TEST EQUIPMENT USED:

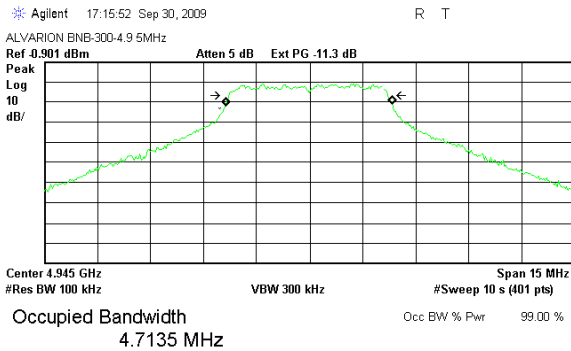
2	3	4	5			
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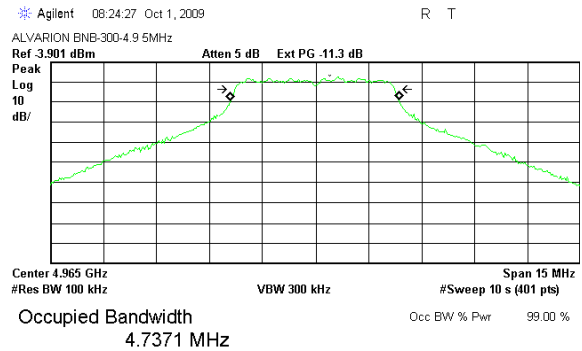
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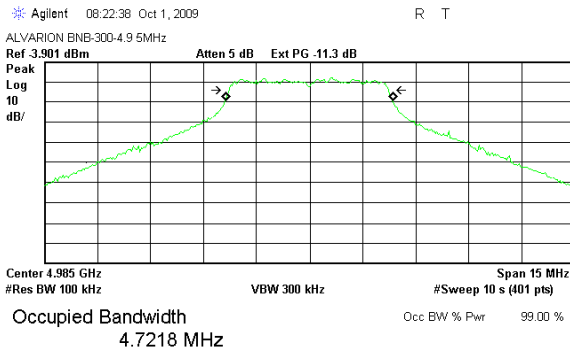
5 MHz EBW option, 99% bandwidth



Plot # 1



Plot # 2



Plot # 3

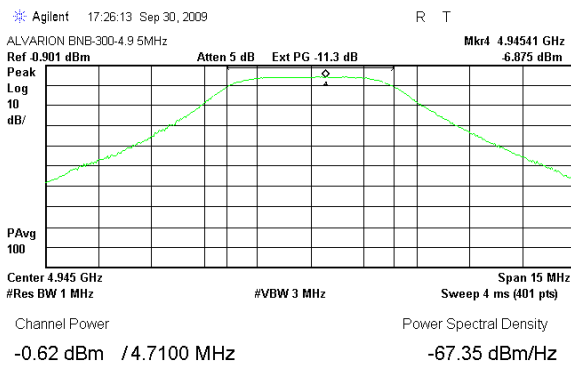


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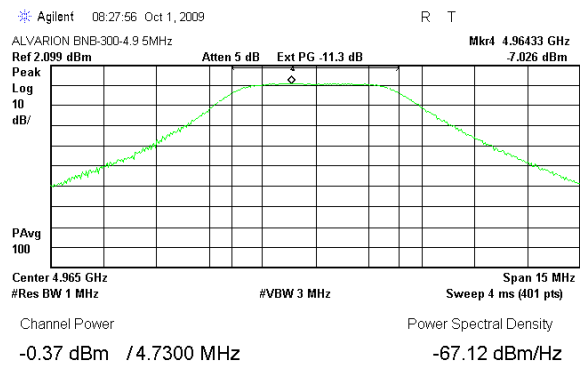
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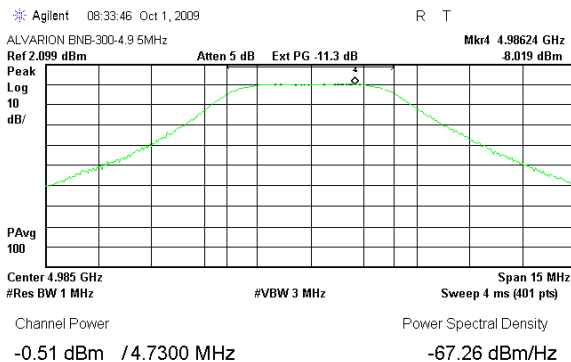
5 MHz EBW option. Peak output power results



Plot # 4



Plot # 5



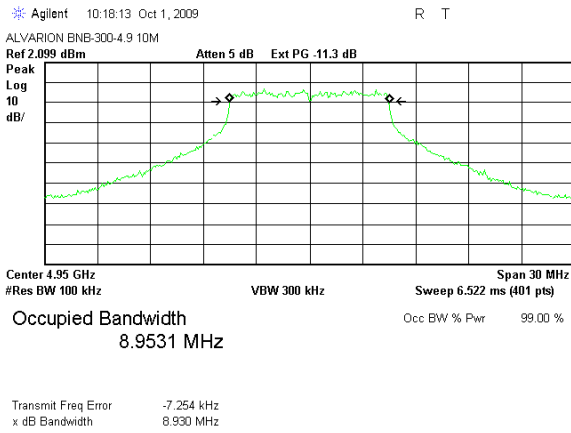
Plot # 6

Insertion loss of external attenuator, directional coupler and cable = 11.3 dB

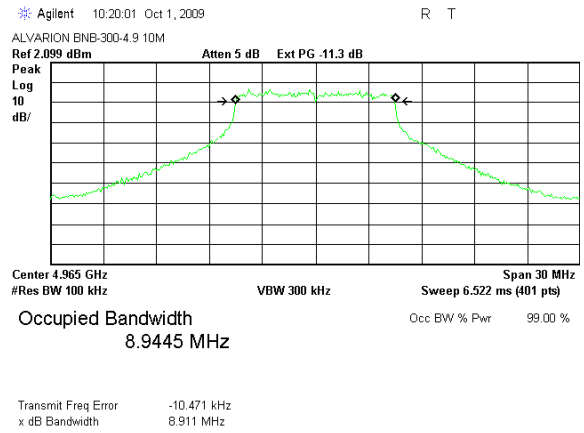


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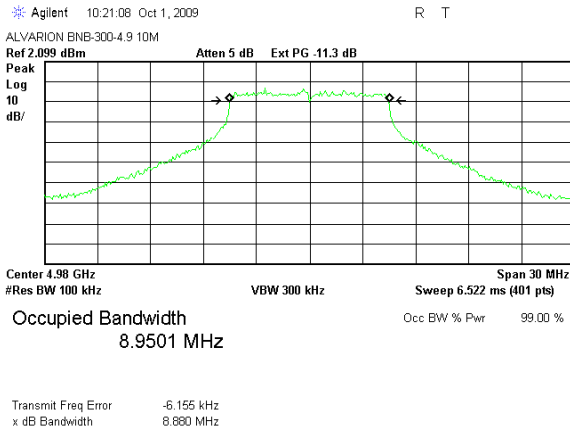
10 MHz EBW option, 99% bandwidth



Plot # 7



Plot # 8

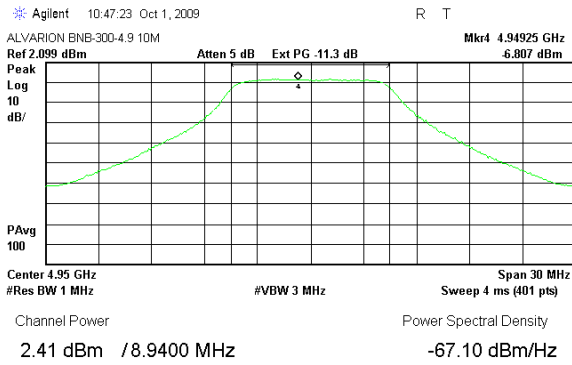


Plot # 9

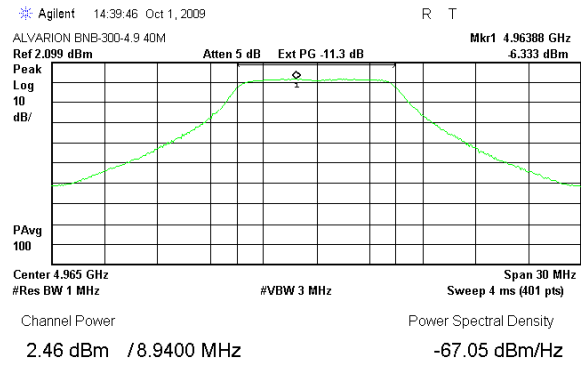


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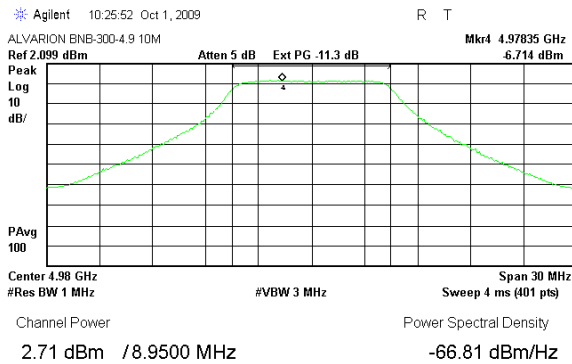
10 MHz EBW option. Peak output power results



Plot # 10



Plot # 11



Plot # 12

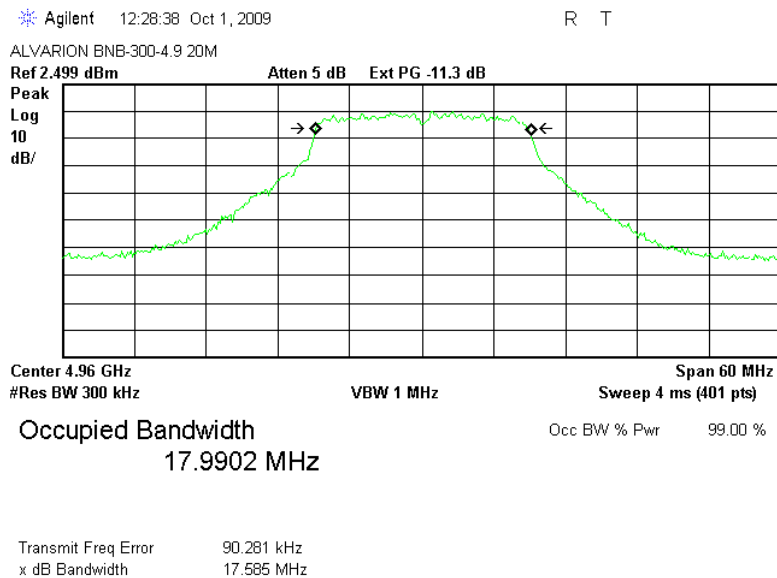


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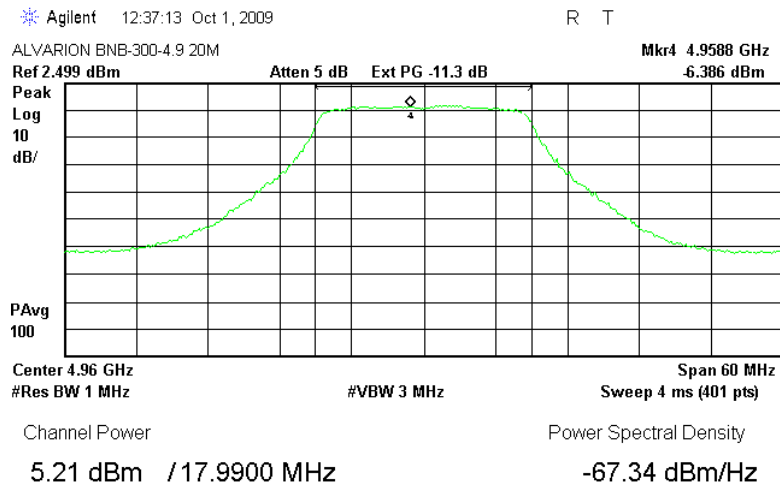
FCC ID: LKT-BNETB-49

20 MHz EBW option, 99% bandwidth



Plot # 13

20 MHz EBW option. Peak output power



Plot # 14

Insertion loss of external attenuator, directional coupler and cable = 11.3 dB

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Method of measurement FCC p.90.1215 (d)
 Operating Frequency Range 4945 - 4985 MHz
 Ambient Temperature 23⁰ C Relative Humidity 49% Air Pressure 1011 hPa

5 MHz emission bandwidth

Carrier frequency MHz	Measured PSD, dBm	Power spectral density limit dBm	Reference to plots
4945	-6.9	-6.0	#15
4965	-7.0	-6.0	#16
4985	-8.0	-6.0	#17

10 MHz emission bandwidth

Carrier frequency MHz	Measured PSD, dBm	Power spectral density limit dBm	Reference to plots
4950	-6.8	-6.0	#18
4965	-6.3	-6.0	#19
4980	-6.7	-6.0	#20

20 MHz emission bandwidth

Carrier frequency MHz	Measured PSD, dBm	Power spectral density limit dBm	Reference to plots
4960	-6.38	-6.0	#21



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LIMIT

The power spectral density is limited to 8 dBm/MHz. The power spectral density should be reduced by the amount in dB that the antenna gain exceeds 9 dBi.

For used antenna 23 dBi power spectral density limit was calculated as $PSD \text{ limit} - (23 - 9) = 8 - (23-9) = -6.0 \text{ dBm/MHz}$

TEST PROCEDURE

The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at bottom, middle and the top of the 4940 - 4990 MHz frequency band under maximum data transfer bit rate. The EUT RF output was connected to the Spectrum Analyzer through appropriate attenuator and accounted with cable loss in SA settings.

TEST EQUIPMENT USED:

2	3	4	5			
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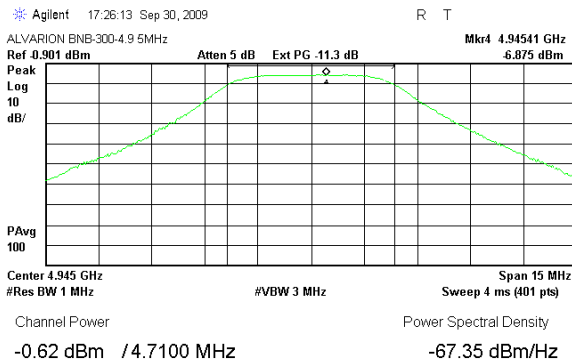


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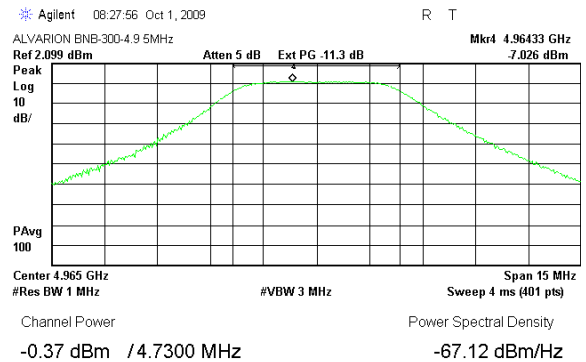
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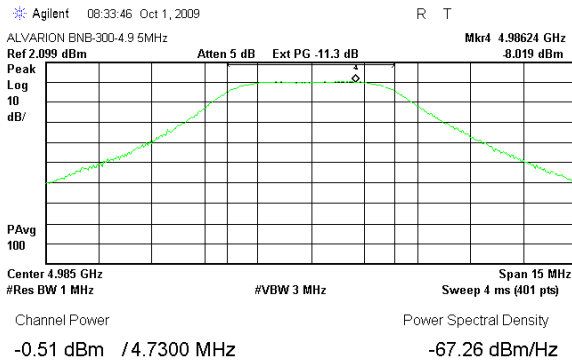
5 MHz emission bandwidth



Plot # 15. Carrier frequency 4945 MHz.



Plot # 16. Carrier frequency 4965 MHz.



Plot # 17. Carrier frequency 4985 MHz.

Insertion loss of external attenuator, directional coupler and cable = 11.3 dB

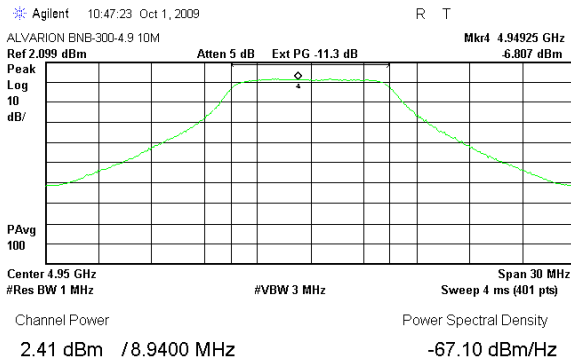


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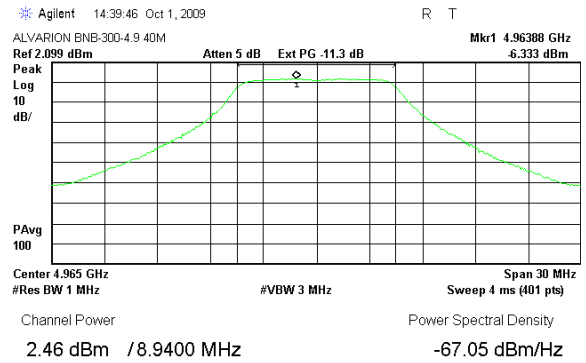
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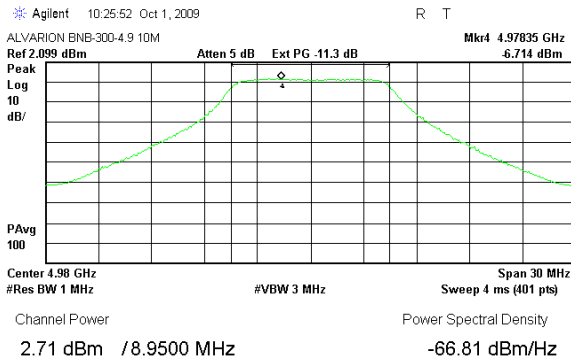
10 MHz emission bandwidth



Plot # 18. Carrier frequency 4950 MHz.



Plot # 19. Carrier frequency 4965 MHz.



Plot # 20. Carrier frequency 4980 MHz.

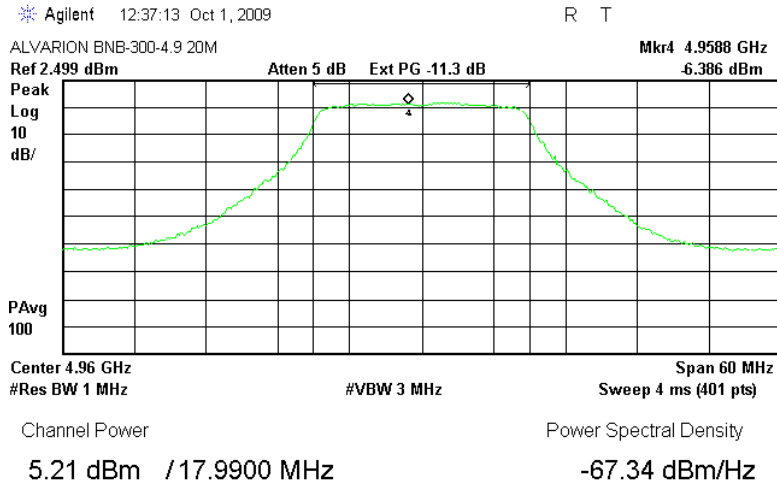


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20 MHz EBW option



Plot # 21. Carrier frequency 4960 MHz



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7.1.3 Power spectral density mask according to §90.210(1).

Method of measurement	FCC part 90.210 (1)(7)				
Operating Frequency Range	4945 - 4985 MHz				
Ambient Temperature	23 ⁰ C	Relative Humidity	49%	Air Pressure	1011 hPa

LIMIT

Test was performed according to limitation of part 90.210 emission mask L. The power spectral density of any emissions must be attenuated below the output power of the transmitter as follows:

- On any frequency removed from assigned frequency between 0 – 45% - 0 dB
- On any frequency removed from assigned frequency between 45 – 50% - 10 dB
- On any frequency removed from assigned frequency between 50 – 55% - 20 dB
- On any frequency removed from assigned frequency between 55 – 100% - 28 dB
- On any frequency removed from assigned frequency between 100 – 150% -40 dB
- On any frequency removed from assigned frequency above 150% - 40 dB.

TEST PROCEDURE

The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at bottom, middle and the top of the 4940 - 4990 MHz frequency band under maximum data transfer bit rate. The EUT RF output was connected to the Spectrum Analyzer through appropriate attenuator and accounted with cable loss in SA settings. The Emission mask measurements were performed with RBW = at least 1% of EBW and VBW = 30 kHz.

TEST EQUIPMENT USED:

2	3	4	5			
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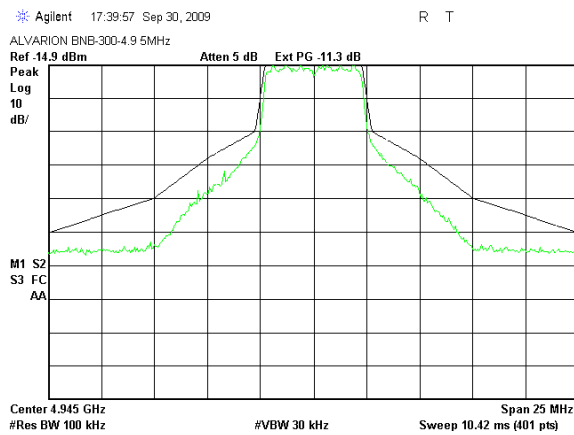


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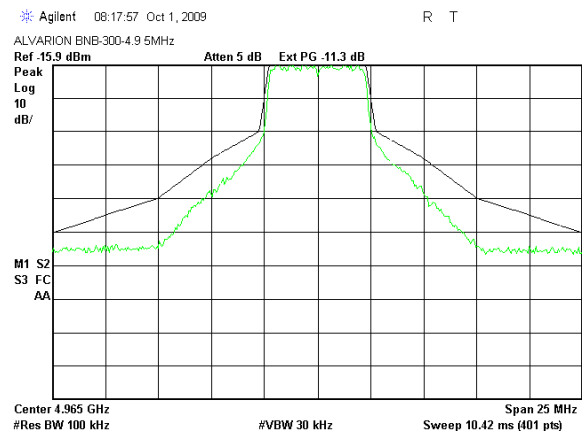
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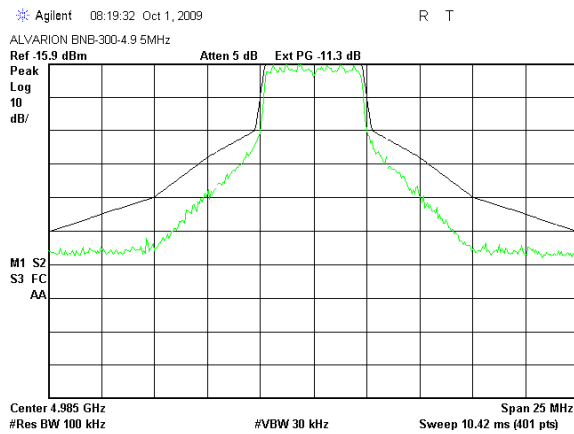
5 MHz emission bandwidth



Plot # 22. Carrier frequency 4945 MHz.



Plot # 23. Carrier frequency 4965 MHz.



Plot # 24. Carrier frequency 4985 MHz.

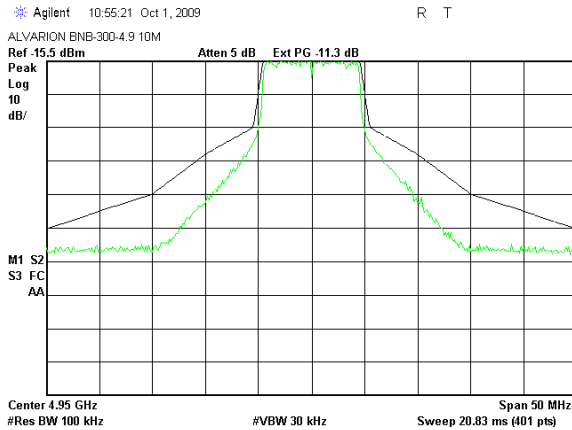


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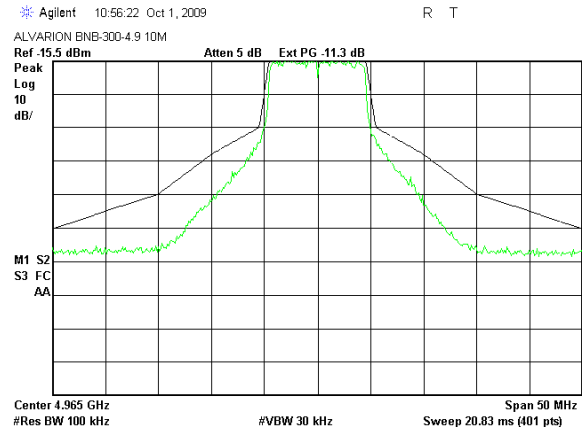
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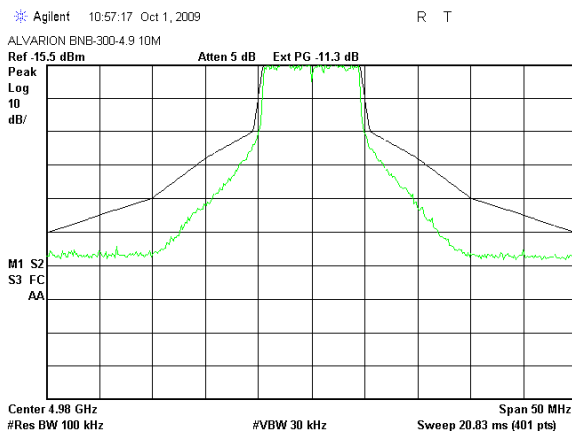
10 MHz emission bandwidth



Plot # 25. Carrier frequency 4945 MHz.



Plot # 26. Carrier frequency 4965 MHz.



Plot # 27. Carrier frequency 4980 MHz.

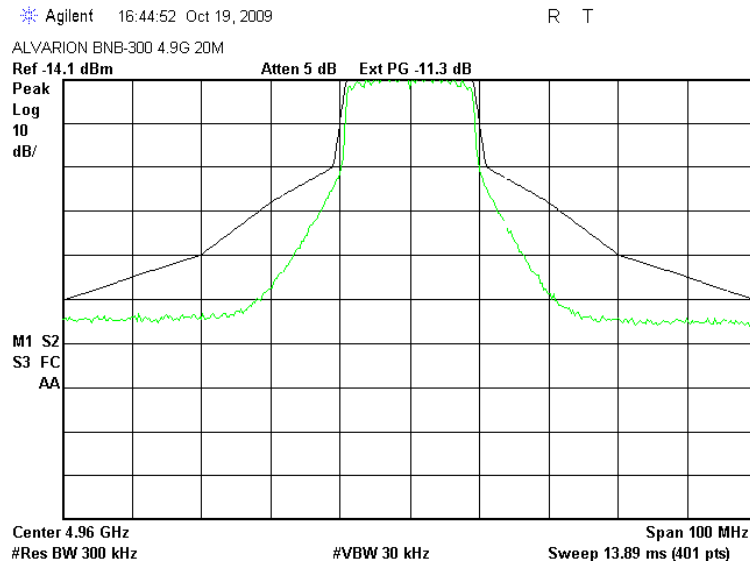


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20 MHz EBW option



Plot # 28. Carrier frequency 4960 MHz.

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7.1.4 Undesired conducted emissions test according to § 90.210 L

Method of measurement	FCC part 90.210 (1)(7)
Operating Frequency Range	4945 - 4985 MHz
Ambient Temperature	23 ⁰ C
Relative Humidity	49%
Air Pressure	1009 hPa

The frequency spectrum was investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz and up to 40 GHz. The emission levels of the EUT in peak mode more than 20 dB lower than the specified limit were not recorded in the table. For the test results refer to plots ## 29-61 in this section.

The worse case results were found:

For 5 MHz EBW:

4945 MHz carrier – at 4940 MHz = -54.2 dBm see plot # 30

4965 MHz carrier – at 4973 MHz = -51.7 dBm see plot # 36

4985 MHz carrier – at 4993 MHz = -53.2 dBm see plot # 41

For 10 MHz EBW:

4950 MHz carrier – at 4940 MHz = -56.0 dBm see plot # 45

4965 MHz carrier – at 37500 MHz = -61.5 dBm see plot # 51

4980 MHz carrier – at 4990 MHz = -51.0 dBm see plot # 55

For 20 MHz EBW:

4960 MHz carrier – at 4940 MHz = -51.2 dBm see plot # 59

LIMIT

The power spectral density of any emissions must be attenuated below the output power of the transmitter as follow:

On any frequency removed from assigned frequency above 150% - 40 dB.



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TEST PROCEDURE

The test was performed at worse case emission bandwidth and output power options. The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at bottom, middle and the top of the 4940 - 4990 MHz frequency band under maximum data transfer bit rate. The EUT RF output was connected to the Spectrum Analyzer through appropriate attenuator and accounted with cable loss in SA settings. The measurements were performed with RBW = at least 1% of EBW and VBW > RBW.

TEST EQUIPMENT USED:

1	3	4	5			
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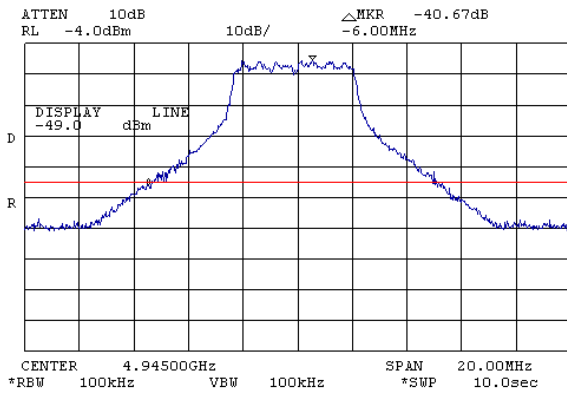


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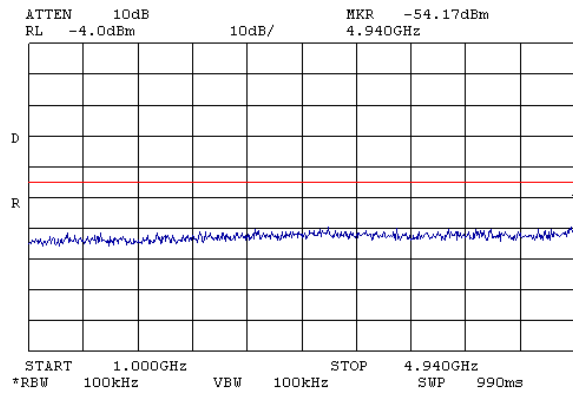
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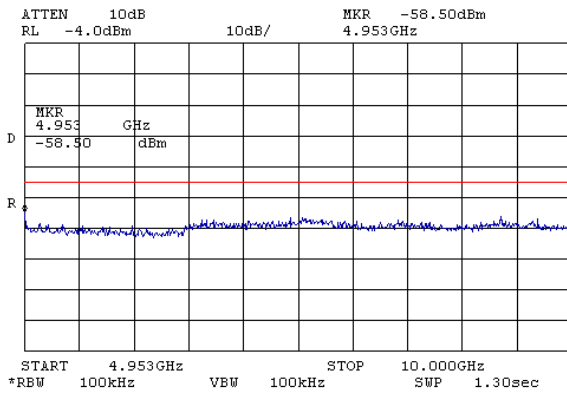
5 MHz emission bandwidth. Carrier frequency 4945 MHz.



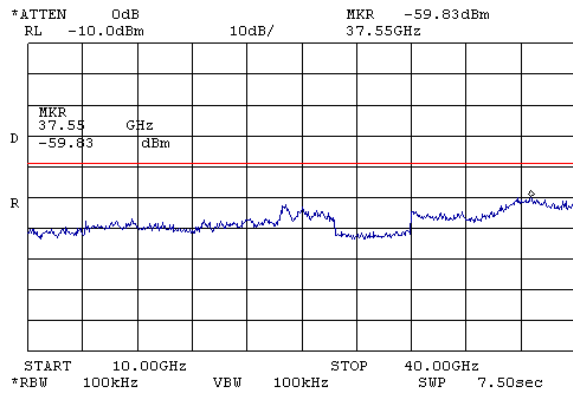
Plot # 29.



Plot # 30.



Plot # 31.



Plot # 32.

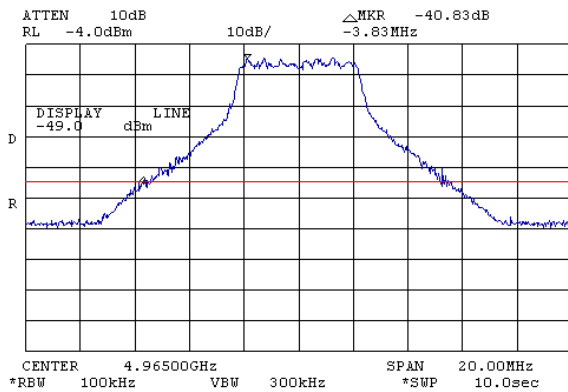


Test report N: 8912353202 Rev.3
Title: BreezeNETB 300
Model: BU/RB-B300-5X

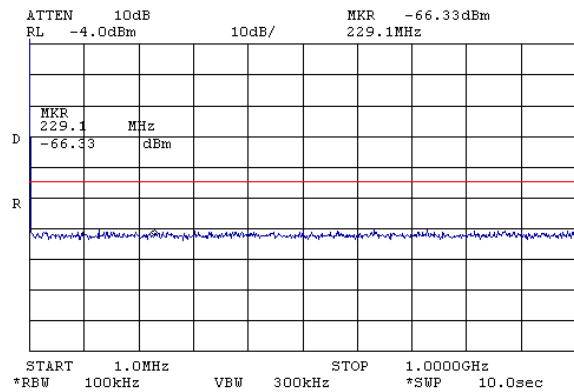
Page 25 of 59

FCC ID: LKT-BNETB-49

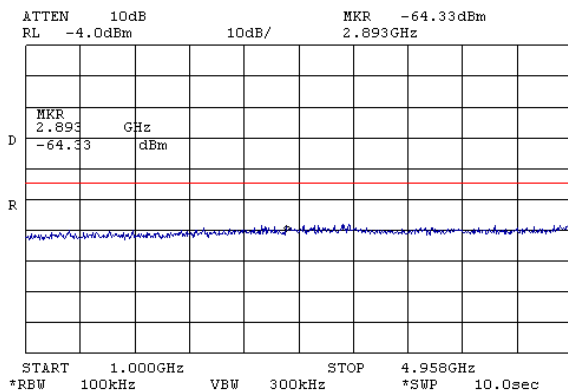
5 MHz emission bandwidth. Carrier frequency 4965 MHz.



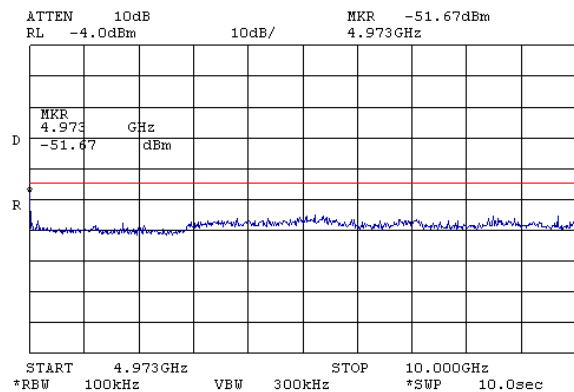
Plot # 33.



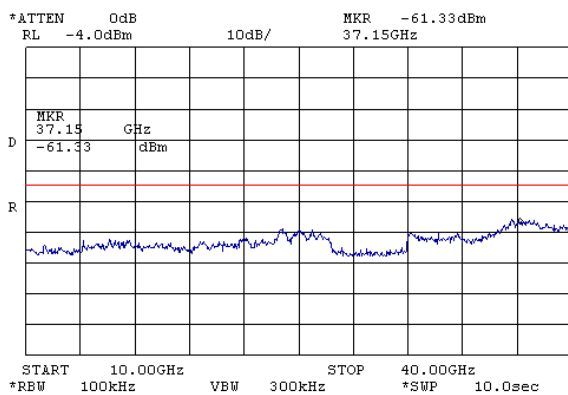
Plot # 34



Plot # 35.



Plot # 36.



Plot # 37.

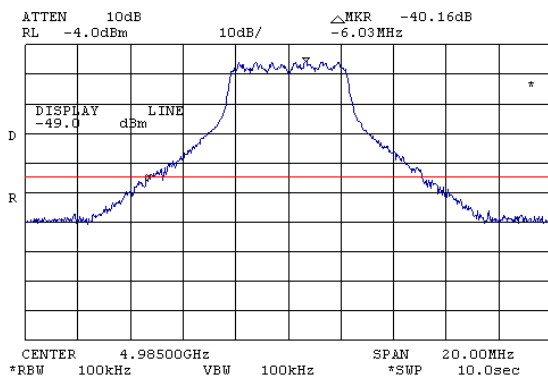


Test report N: 8912353202 Rev.3
Title: BreezeNETB 300
Model: BU/RB-B300-5X

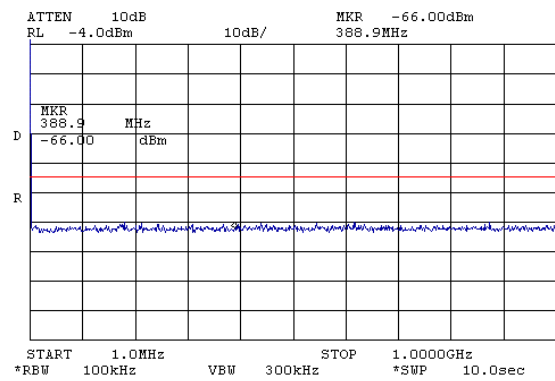
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FCC ID: LKT-BNETB-49

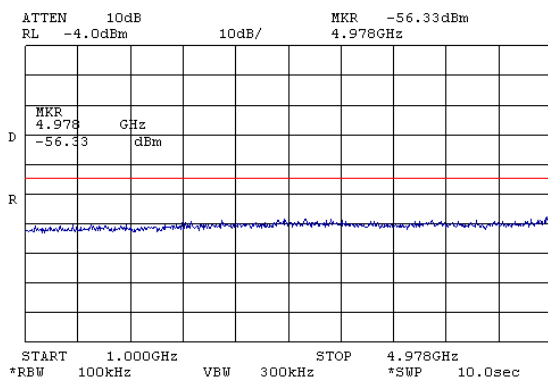
5 MHz emission bandwidth. Carrier frequency 4985 MHz



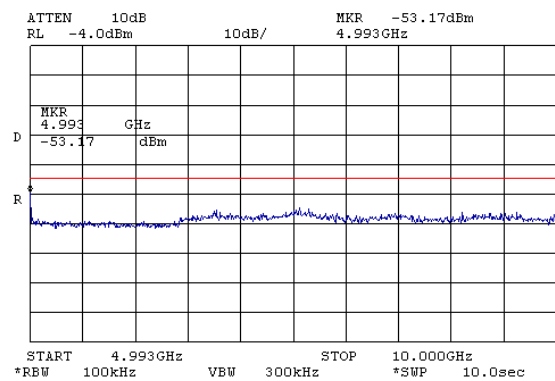
Plot # 38.



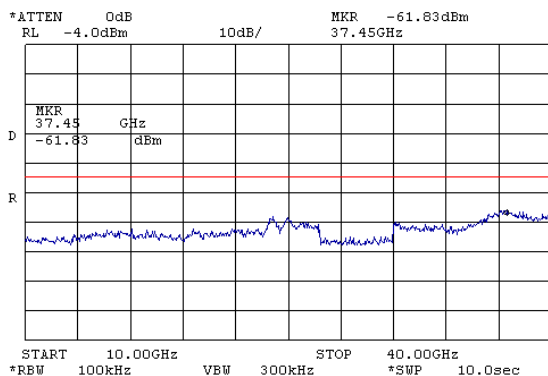
Plot # 39.



Plot # 40.



Plot # 41



Plot # 42.

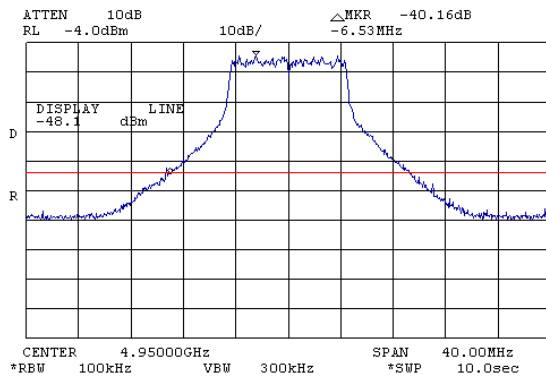


Test report N: 8912353202 Rev.3
Title: BreezeNETB 300
Model: BU/RB-B300-5X

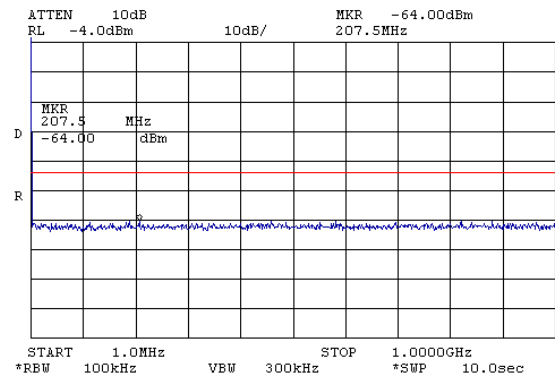
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FCC ID: LKT-BNETB-49

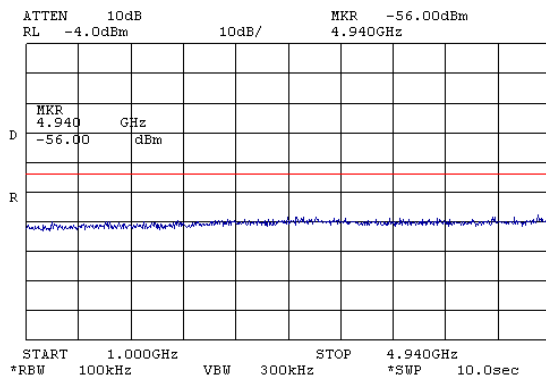
10 MHz emission bandwidth. Carrier frequency 4950 MHz



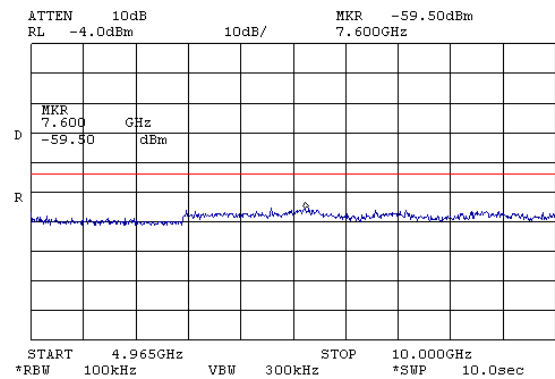
Plot # 43.



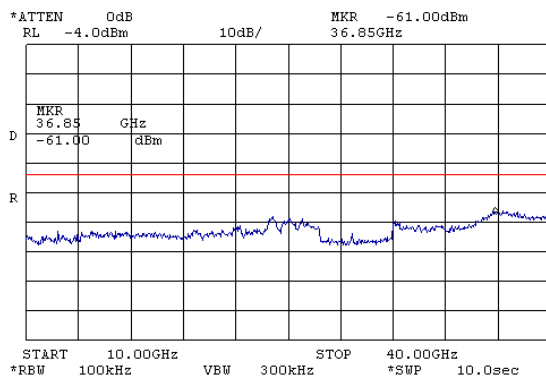
Plot # 44



Plot # 45



Plot # 46.



Plot # 47.



Test report N: 8912353202 Rev.3

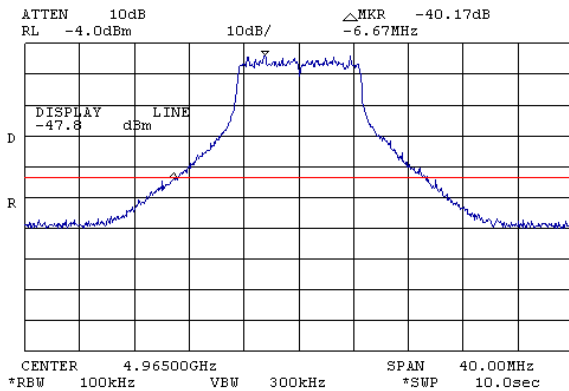
Page 28 of 59

Title: BreezeNETB 300

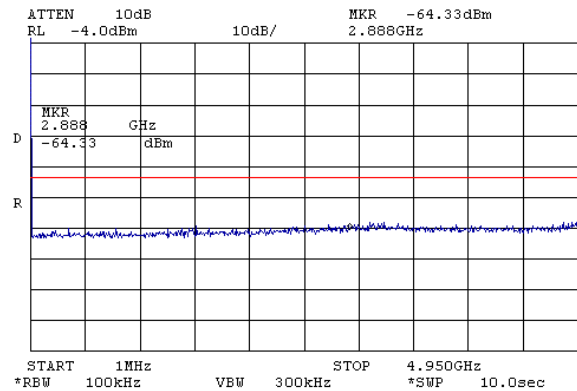
FCC ID: LKT-BNETB-49

Model: BU/RB-B300-5X

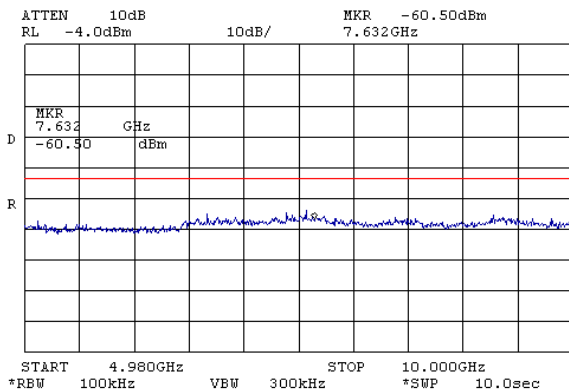
10 MHz emission bandwidth. Carrier frequency 4965 MHz



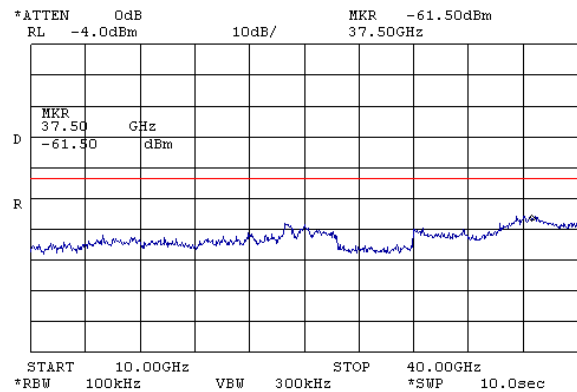
Plot # 48.



Plot # 49



Plot # 50



Plot # 51.

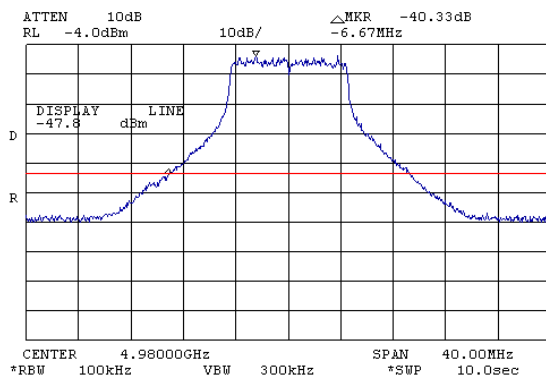


Test report N: 8912353202 Rev.3
Title: BreezeNETB 300
Model: BU/RB-B300-5X

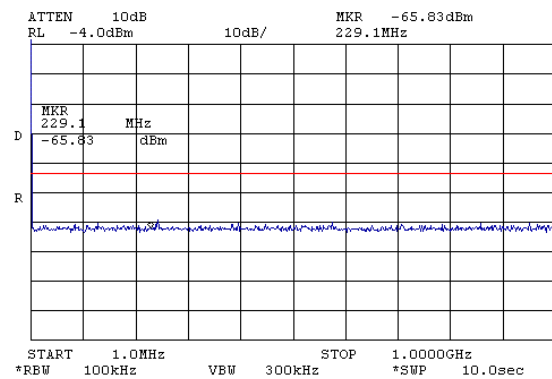
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FCC ID: LKT-BNETB-49

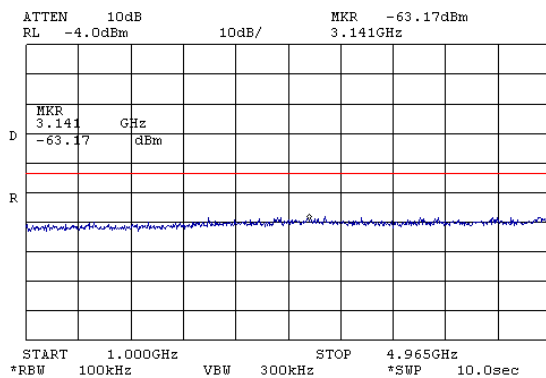
10 MHz emission bandwidth. Carrier frequency 4980 MHz



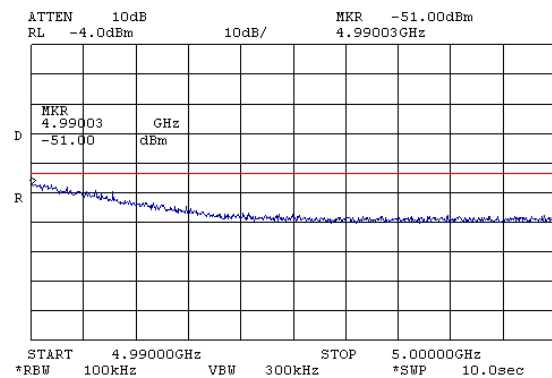
Plot # 52.



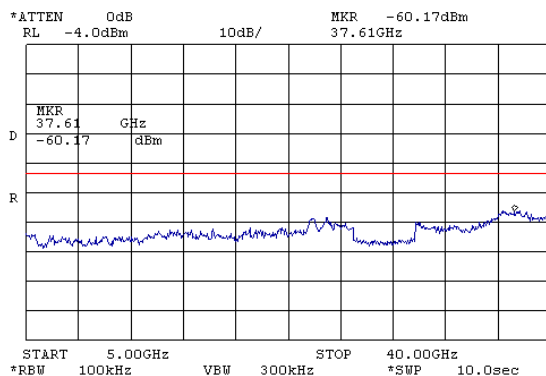
Plot # 53.



Plot # 54.



Plot # 55.



Plot # 56.



Test report N: 8912353202 Rev.3

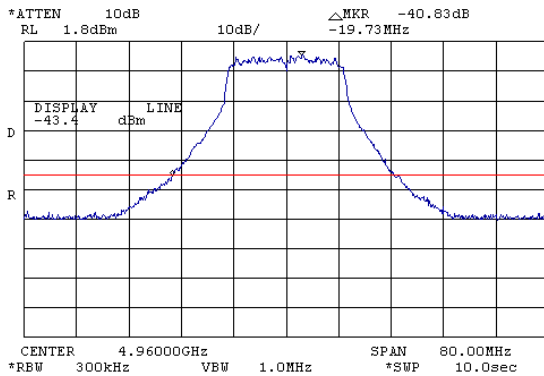
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Title: BreezeNETB 300

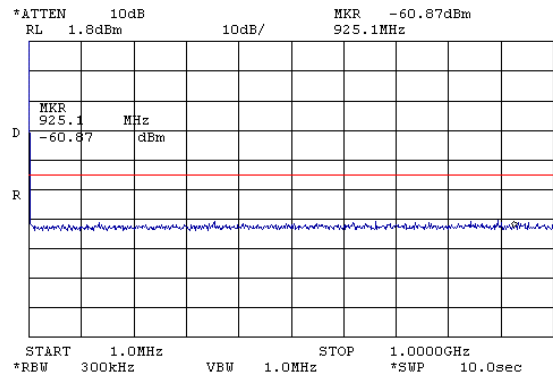
FCC ID: LKT-BNETB-49

Model: BU/RB-B300-5X

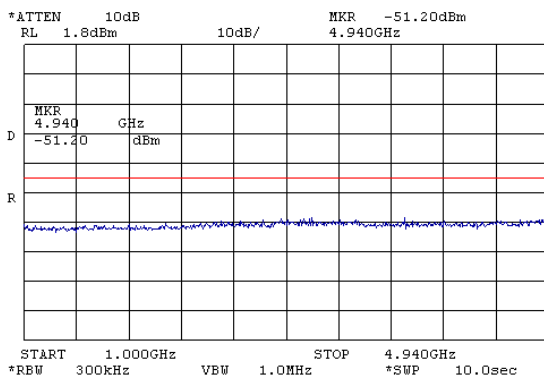
20 MHz emission bandwidth. Carrier frequency 4960 MHz



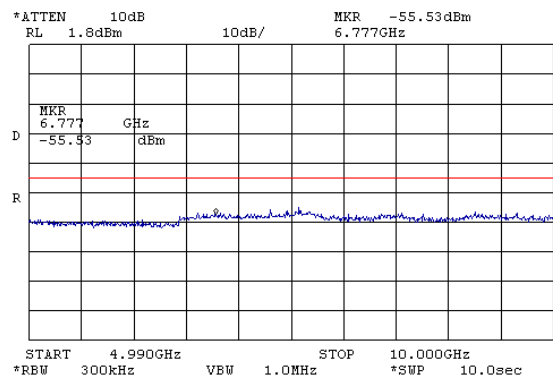
Plot # 57.



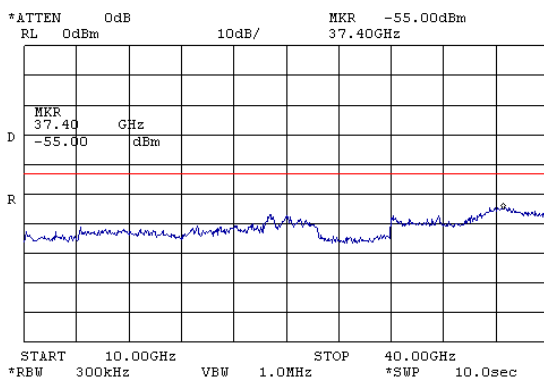
Plot # 58.



Plot # 59.



Plot # 60.



Plot # 61.



Test report N: 8912353202 Rev.3

Title: BreezeNETB 300

Model: BU/RB-B300-5X

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FCC ID: LKT-BNETB-49

7.1.5 Undesired radiated emissions according to § 90.210 L

Method of measurement	FCC part 90.210 (1)(7)
Operating Frequency Range	4945 - 4985 MHz
Ambient Temperature	23 ⁰ C
Relative Humidity	56%
Air Pressure	1011 hPa

The frequency spectrum was investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz and up to 40 GHz. The emission levels of the EUT more than 20 dB lower than the specified limit were not recorded in the test summary. For the test results refer to plots in this section. Test results in 30 – 1000 MHz frequency range are recorded in section 9.

LIMIT

The power spectral density of any emissions must be attenuated below the output power of the transmitter as follow: On any frequency removed from assigned frequency above 150% - 40 dBc. Relative limit for every carrier frequency was calculated as follow: Ucarrier peak – 40 dB.

TEST PROCEDURE

The test was performed 5 MHz, 10 MHz, 20 MHz emissions bandwidths that are worse case power and band-edge options with external sector antenna.

The measurements were performed at three transmitted carrier (channel) frequencies at bottom, middle and top of the 4940 - 4990 MHz frequency band under maximum data transfer bit rate. To find maximum radiation the turntable was rotated 360°, measuring antenna height was changed from 1 to 4 m, and the antenna polarization was changed from vertical to horizontal. The measurements were performed according to FCC part 90.210 L (1)(7) with RBW = at least 1% of EBW and VBW = 30 kHz.

The result was previously verified according to ANSI/TIA-603-C-2004 section 2.2.12 substitution test method. Investigation of transmitter spurious emissions was performed. EUT was replaced by generator and substitution antenna. Level calculated from generator output level, substitution antenna gain and connected cable loss was compared with the limit.



Test report N: 8912353202 Rev.3
Title: BreezeNETB 300
Model: BU/RB-B300-5X

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FCC ID: LKT-BNETB-49

TEST SUMMARY

EUT comply with FCC part 90.210 L (1) requirements.
The worse case results were found:

For 5 MHz EBW:

4945 MHz carrier – at 4939.9 MHz = 65.4 dBμV/m (-29.8 dBm) were 40 dBc limit is 66.8 dBμV/m
Margin = 1.2 dB - plot # 64
4965 MHz carrier – at 5511 MHz = 52.3 dBμV/m (-42.9 dBm) were 40 dBc limit is 65.1 dBμV/m.
Margin = 1.2 dB - plot # 70
4985 MHz carrier – at 4990 MHz = 62.1 dBμV/m (-33.1 dBm) were 40 dBc limit is 64.2 dBμV/m
Margin = 2.1 dB - plot # 75

For 10 MHz EBW:

4950 MHz carrier – at 4939.4 MHz = 61.1 dBμV/m (-34.1 dBm) were 40 dBc limit is 62.7 dBμV/m
Margin = 1.6 dB - plot # 81
4965 MHz carrier – at 5318 MHz = 53.0 dBμV/m (-42.2 dBm) were 40 dBc limit is 62.2.0 dBμV/m
Margin = 9.2 dB - plot # 87
4980 MHz carrier – at 4990.2 MHz = 60.0 dBμV/m (-35.2 dBm) were 40 dBc limit is 61.9 dBμV/m
Margin = 1.9 dB - plot # 92

For 20 MHz EBW:

4960 MHz carrier – at 4940 MHz = 66.1 dBμV/m (-29.1 dBm) were 40 dBc limit is 72.2 dBμV/m
Margin = 6.1 dB - plot # 98.

TEST EQUIPMENT USED:

1	5	6	7	9	14	
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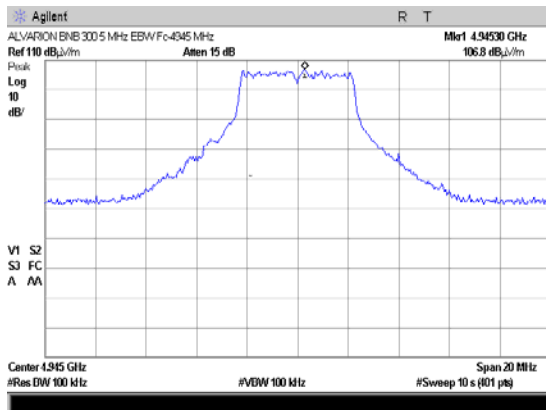
Test report N: 8912353202 Rev.3
Title: BreezeNETB 300
Model: BU/RB-B300-5X

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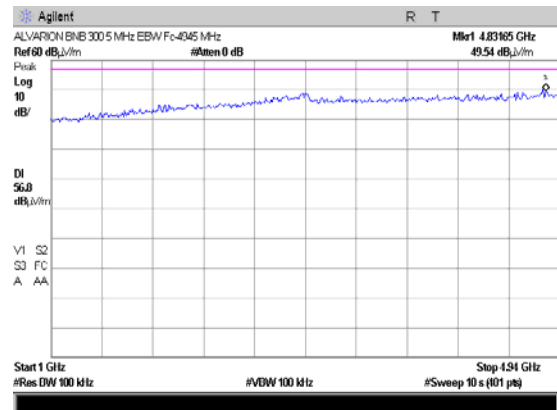
FCC ID: LKT-BNETB-49

5 MHz emission bandwidth

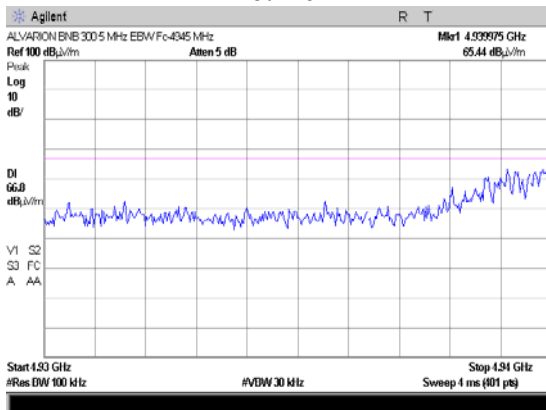
Carrier frequency – 4945 MHz



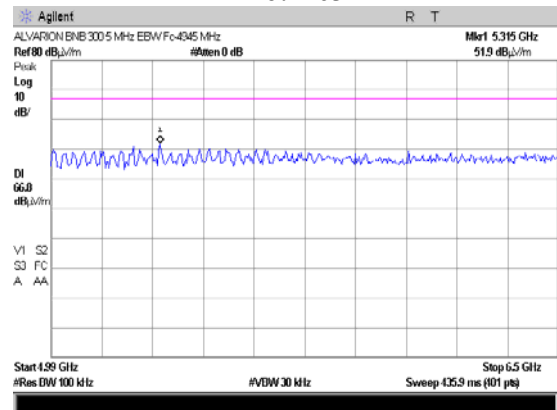
Plot # 62



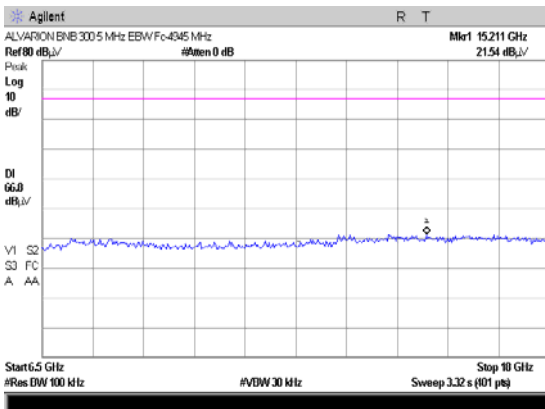
Plot # 63



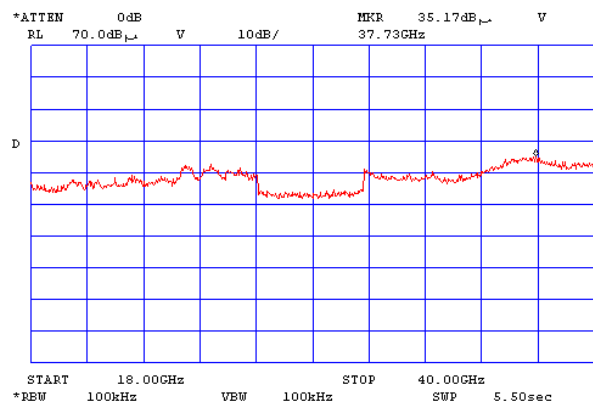
Plot # 64



Plot # 65



Plot # 66



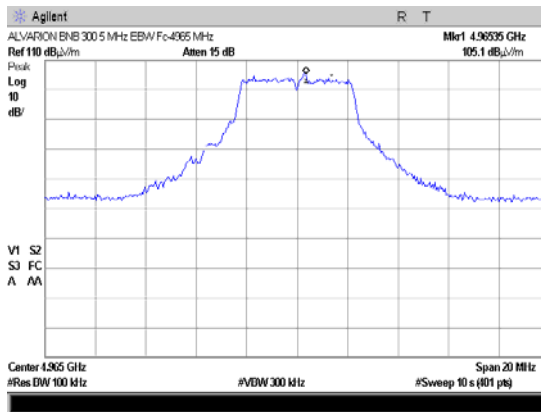
Plot # 67



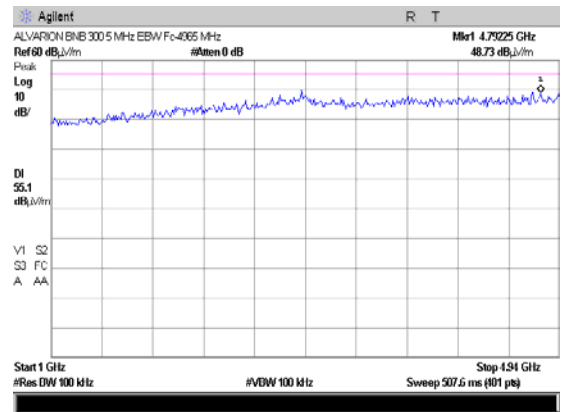
Test report N: 8912353202 Rev.3
Title: BreezeNETB 300
Model: BU/RB-B300-5X

FCC ID: LKT-BNETB-49

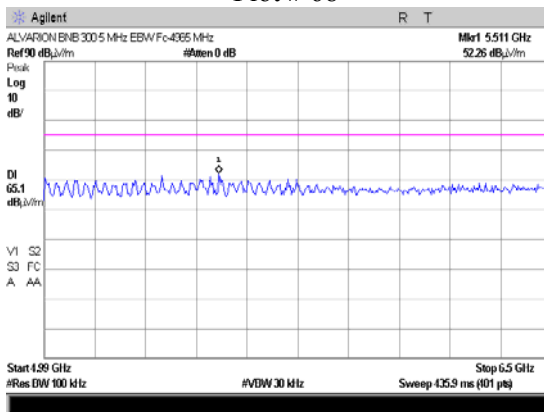
Carrier frequency – 4965 MHz



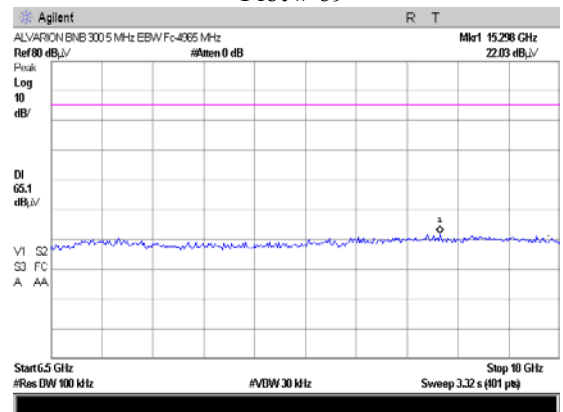
Plot # 68



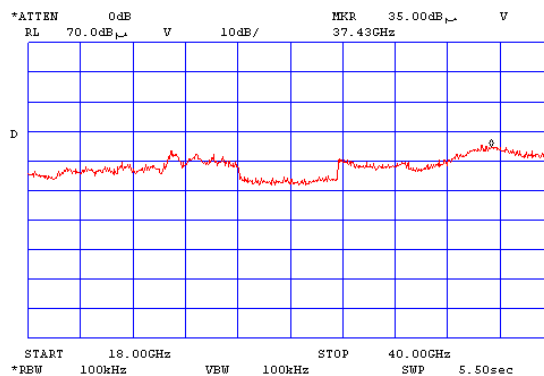
Plot # 69



Plot # 70



Plot # 71



Plot # 72

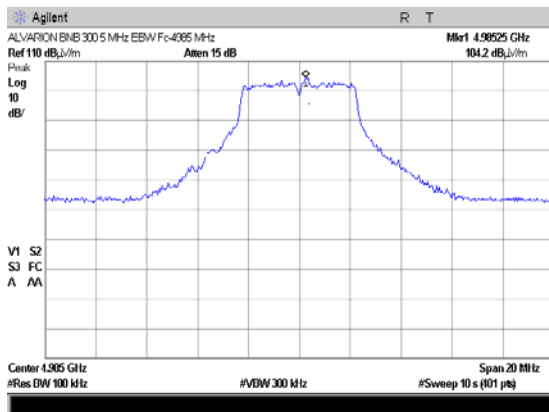


Test report N: 8912353202 Rev.3
Title: BreezeNETB 300
Model: BU/RB-B300-5X

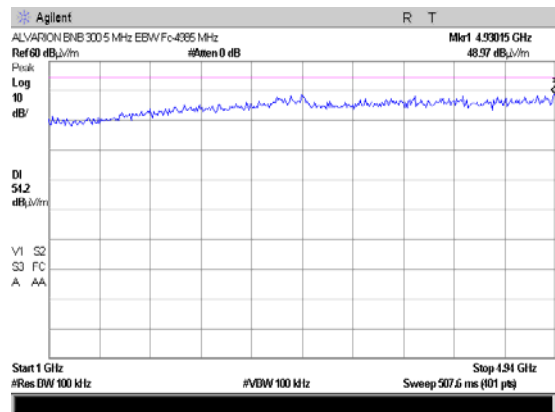
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FCC ID: LKT-BNETB-49

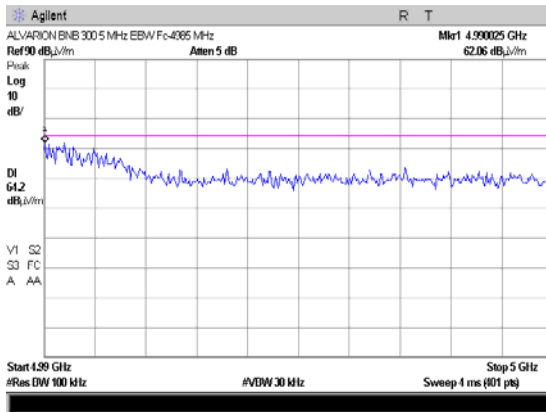
Carrier frequency – 4985 MHz



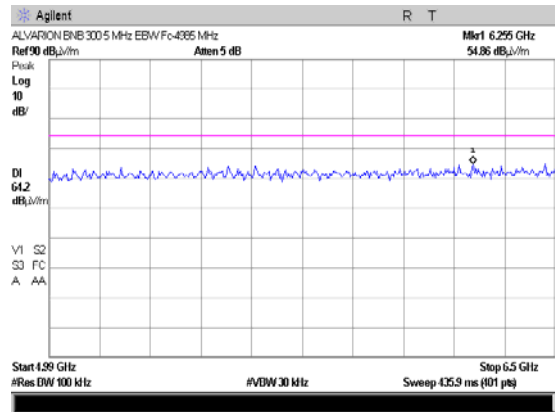
Plot # 73



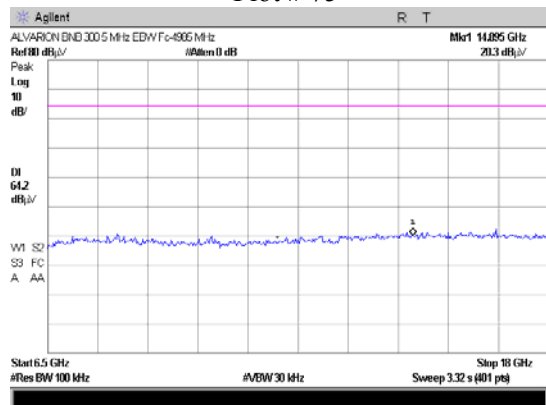
Plot # 74



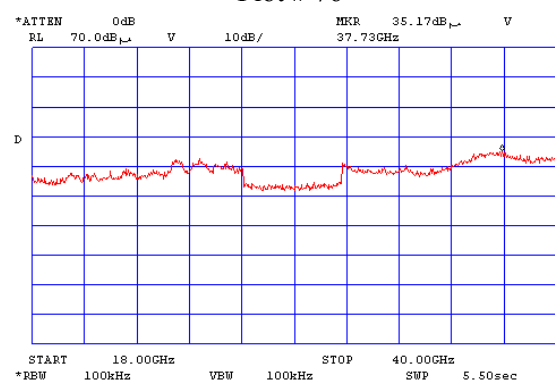
Plot # 75



Plot # 76



Plot # 77



Plot # 78

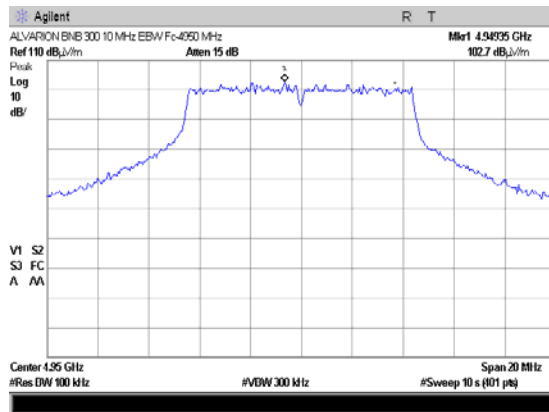


Test report N: 8912353202 Rev.3
Title: BreezeNETB 300
Model: BU/RB-B300-5X

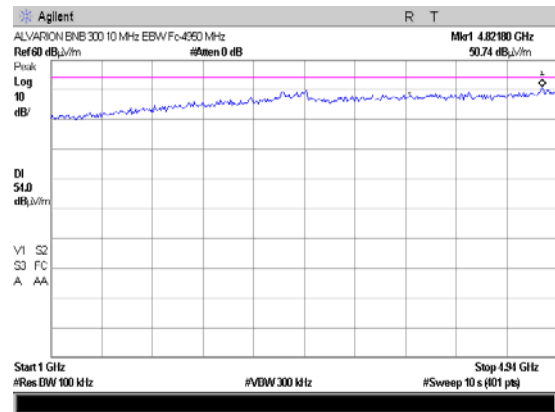
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FCC ID: LKT-BNETB-49

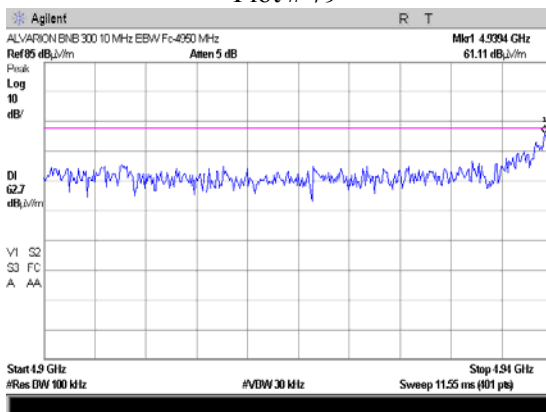
10 MHz emission bandwidth. Carrier frequency - 4950 MHz



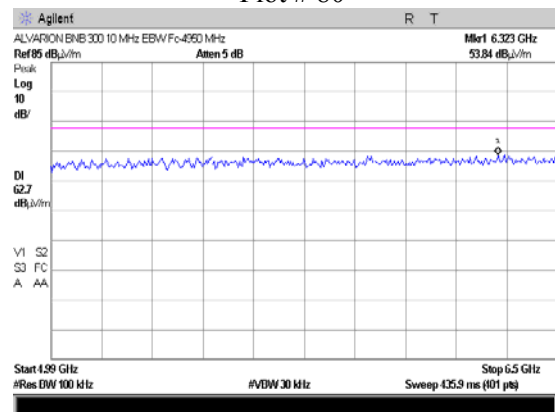
Plot # 79



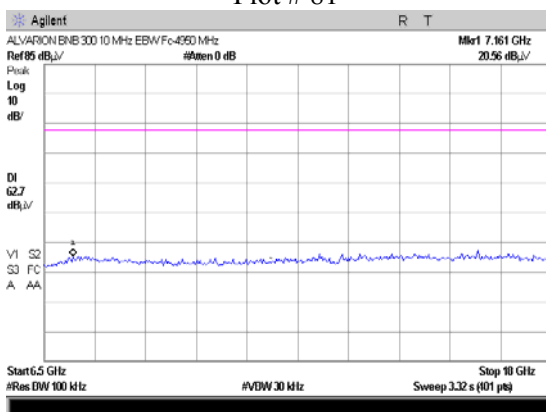
Plot # 80



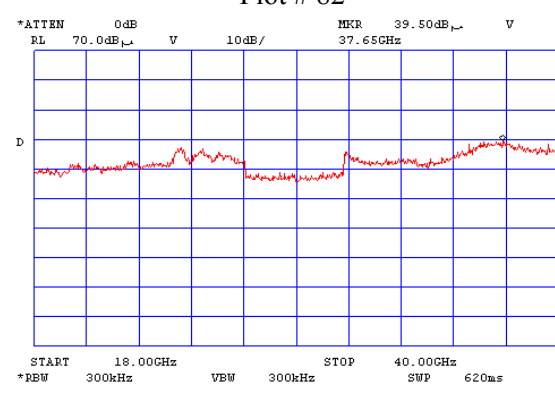
Plot # 81



Plot # 82



Plot # 83



Plot # 84

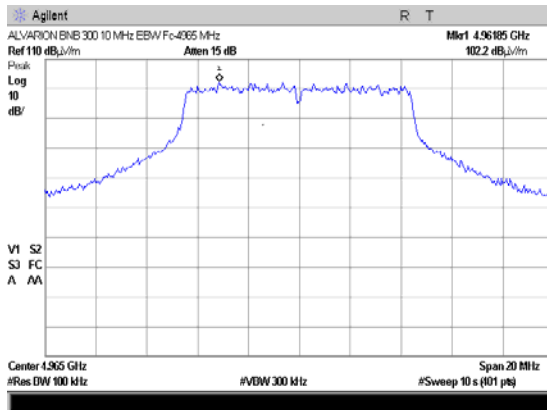


Test report N: 8912353202 Rev.3
Title: BreezeNETB 300
Model: BU/RB-B300-5X

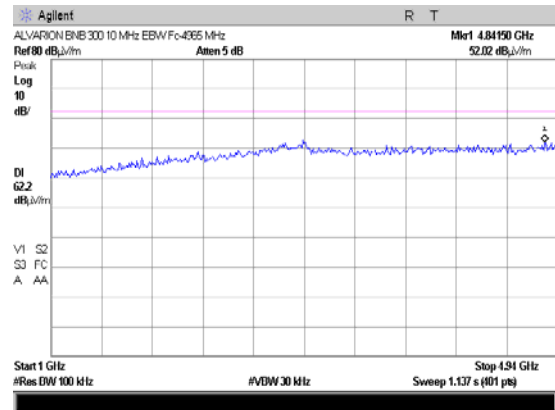
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FCC ID: LKT-BNETB-49

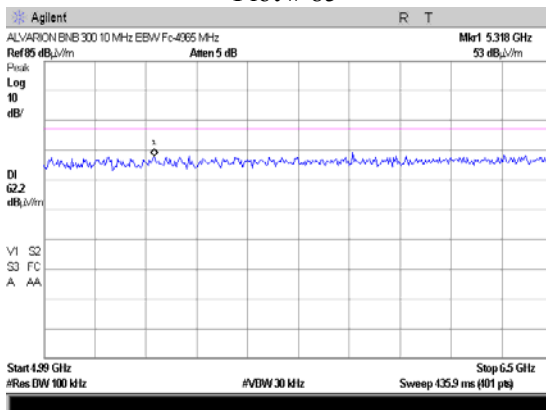
Carrier frequency – 4965 MHz



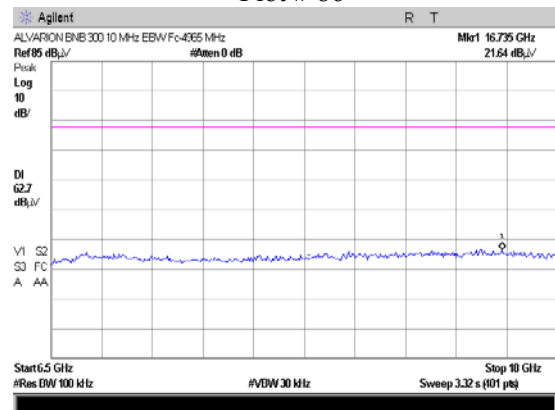
Plot # 85



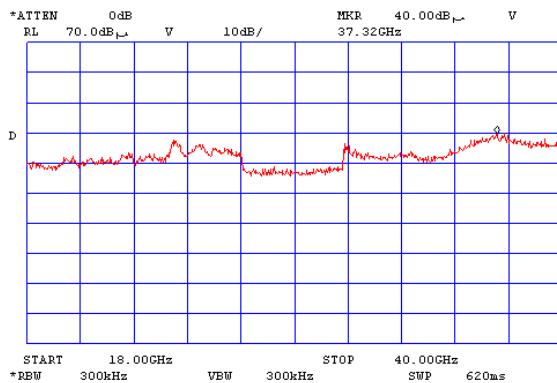
Plot # 86



Plot # 87



Plot # 88



Plot # 89

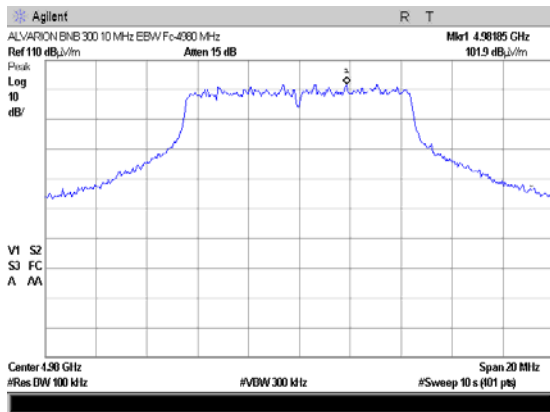


Test report N: 8912353202 Rev.3
Title: BreezeNETB 300
Model: BU/RB-B300-5X

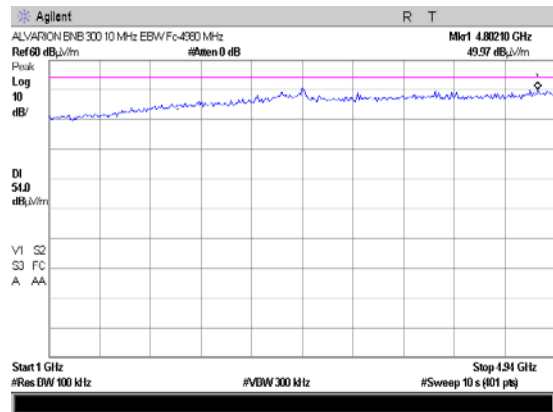
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FCC ID: LKT-BNETB-49

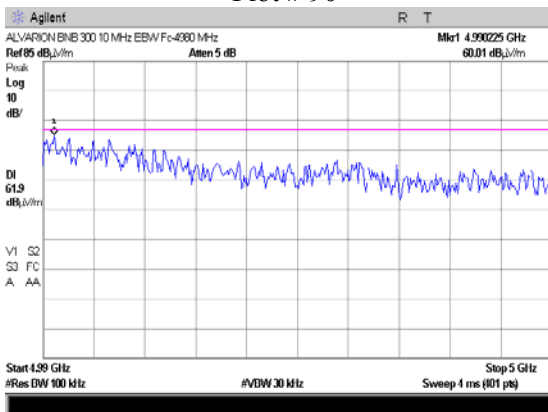
Carrier frequency 4980 MHz



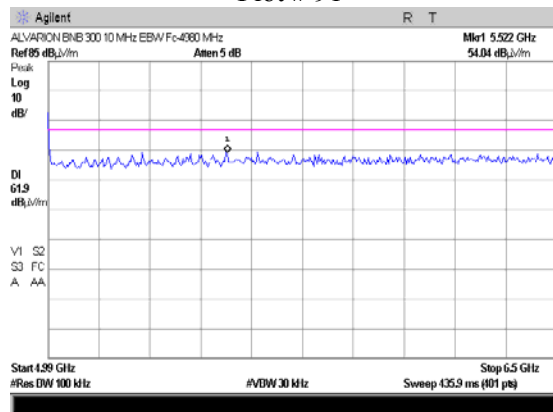
Plot # 90



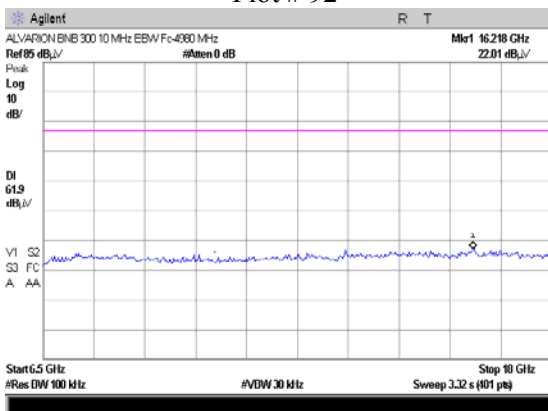
Plot # 91



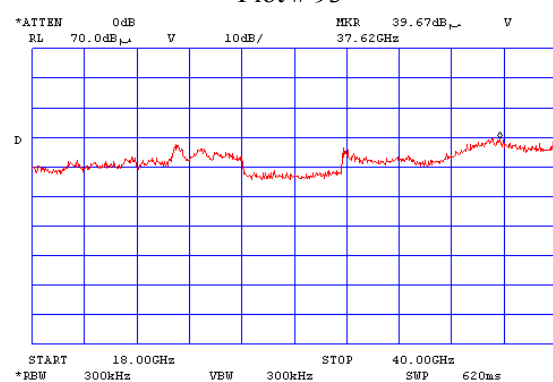
Plot # 92



Plot # 93



Plot # 94



Plot # 95

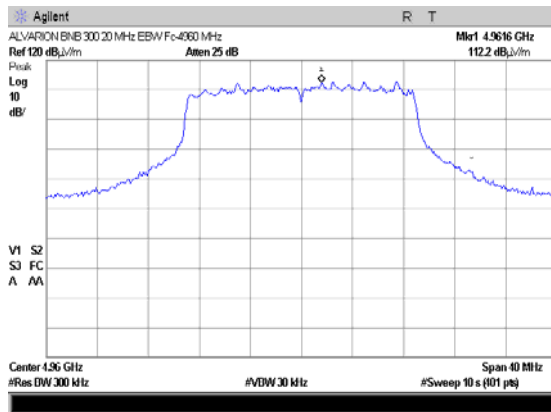


Test report N: 8912353202 Rev.3
Title: BreezeNETB 300
Model: BU/RB-B300-5X

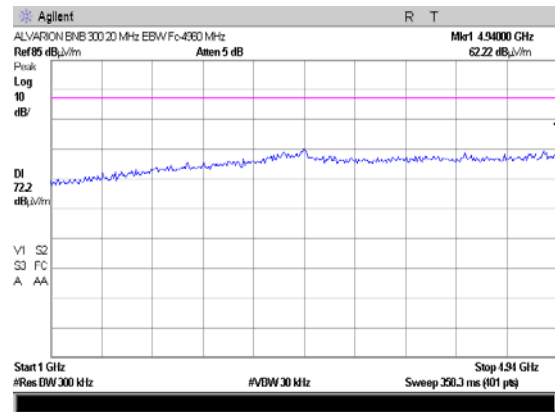
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FCC ID: LKT-BNETB-49

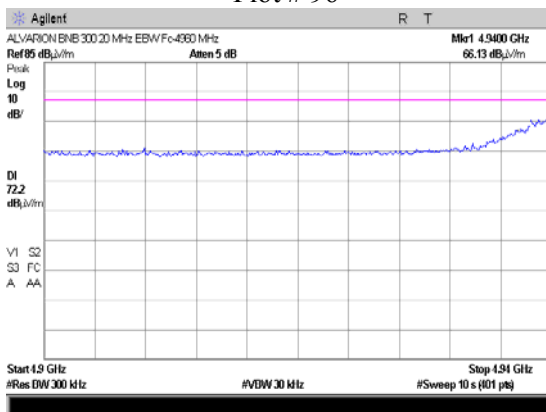
20 MHz emission bandwidth. Carrier frequency – 4960 MHz



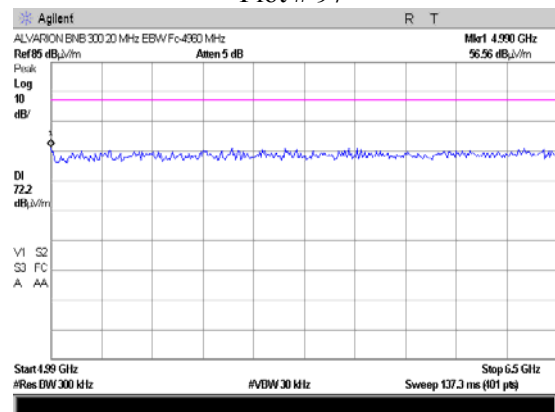
Plot # 96



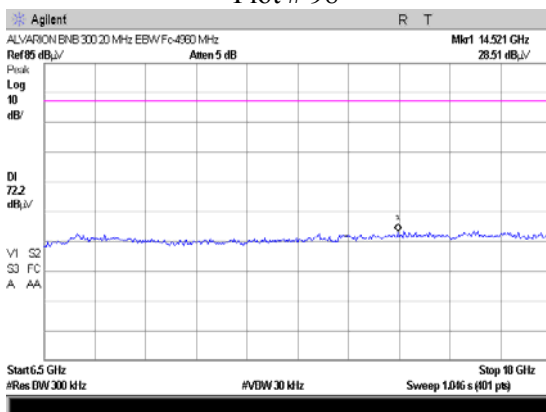
Plot # 97



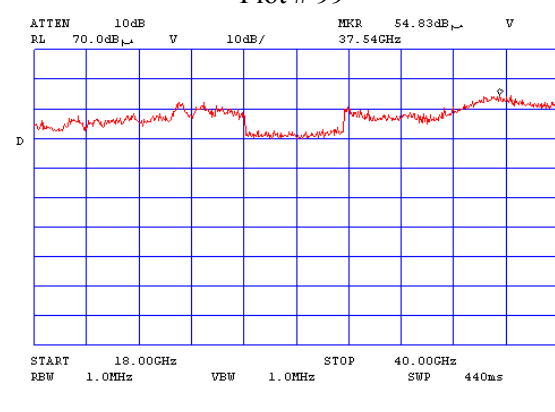
Plot # 98



Plot # 99



Plot # 100



Plot # 101



Test report N: 8912353202 Rev.3
Title: BreezeNETB 300
Model: BU/RB-B300-5X

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FCC ID: LKT-BNETB-49

7.1.6 Ratio of the peak excursion per part 90.1215(e)

Method of measurement DA 02-2138
 Operating Frequency Range 4945 - 4985 MHz
 Ambient Temperature 23⁰ C Relative Humidity 49% Air Pressure 1009 hPa

The measurements were performed for all emission bandwidth options in operating frequency range under maximum data transfer bit rate. The trace #1 was performed with RBW= 1 MHz and VBW = 3 MHz. The trace #2 was performed with RBW= 1 MHz and VBW ≥ 1/T = 1/3.475 ms = 0.3 kHz where T is transmission pulse duration from plot #109.

5 MHz emission bandwidth

Carrier frequency MHz	Measured ratio of the PEME dB	The limit of PEME ratio dB	Reference to plot
4945	12.0	13.0	#102
4965	12.1	13.0	#103
4985	11.5	13.0	#104

10 MHz emission bandwidth

Carrier frequency MHz	Measured ratio of the PEME dB	The limit of PEME ratio dB	Reference to plot
4950	11.2	13.0	#105
4965	11.5	13.0	#106
4980	11.8	13.0	#107

20 MHz emission bandwidth

Carrier frequency MHz	Measured ratio of the PEME dB	The limit of PEME ratio dB	Reference to plot
4960	12.1	13.0	#108



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REQUIREMENT

The ratio of the peak excursion of the modulation envelope (PEME) to the peak transmit power shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less as required in sec. 90.1215(e).

TEST SUMMARY

Transmitter meets standard requirement.

Test result present in plots ## 102 - 104 for 5 MHz emission bandwidth.

Test result present in plots ## 105 - 106 for 10 MHz emission bandwidth.

Test result present in plots # 108 for 20 MHz emission bandwidth.

TEST EQUIPMENT USED:

2	3	4	5			
---	---	---	---	--	--	--

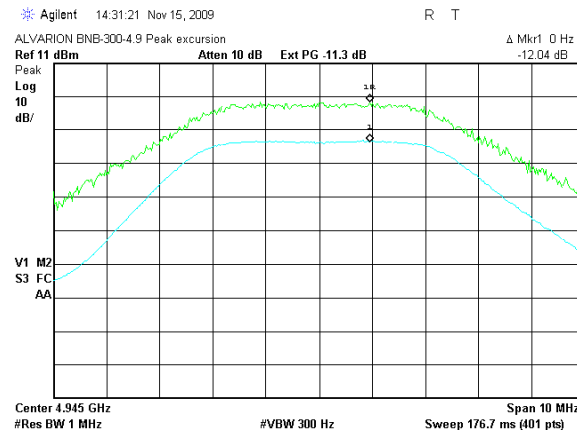


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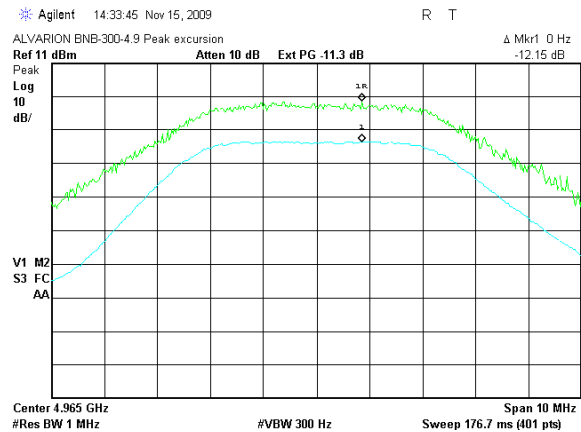
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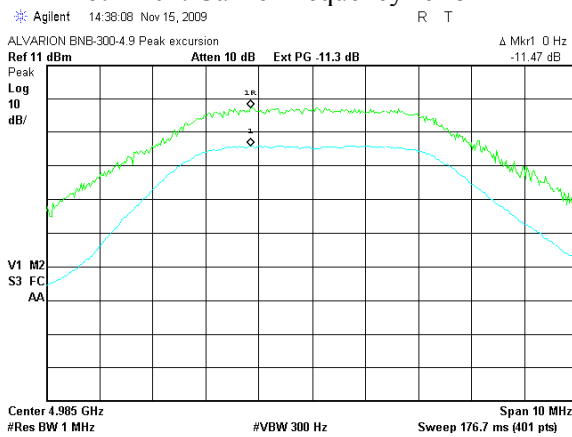
5 MHz emission bandwidth



Plot # 102. Carrier frequency 4945 MHz



Plot # 103. Carrier frequency 4965 MHz



Plot # 104. Carrier frequency 4985 MHz

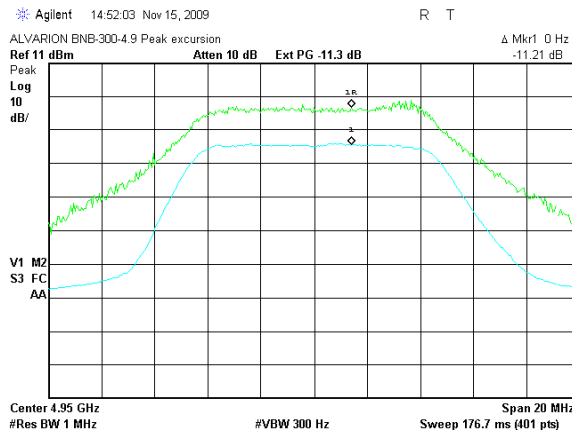


Test report N: 8912353202 Rev.3
Title: BreezeNETB 300
Model: BU/RB-B300-5X

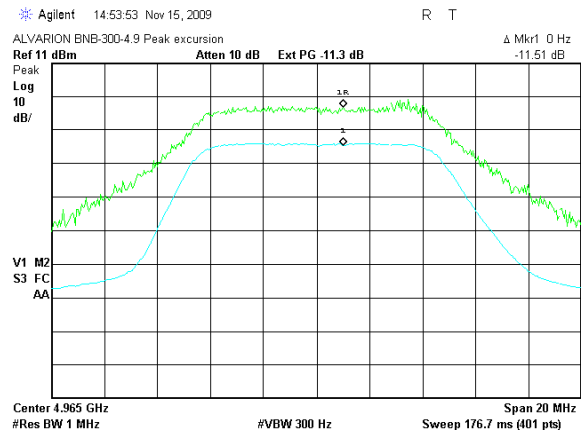
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FCC ID: LKT-BNETB-49

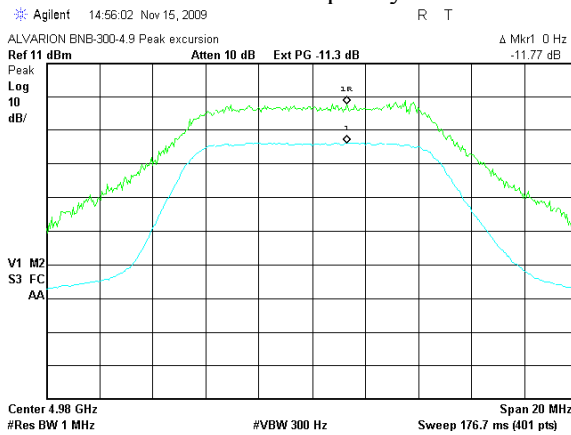
10 MHz emission bandwidth



Plot # 105. Carrier frequency 4950 MHz



Plot # 106. Carrier frequency 4965 MHz



Plot # 107. Carrier frequency 4980 MHz

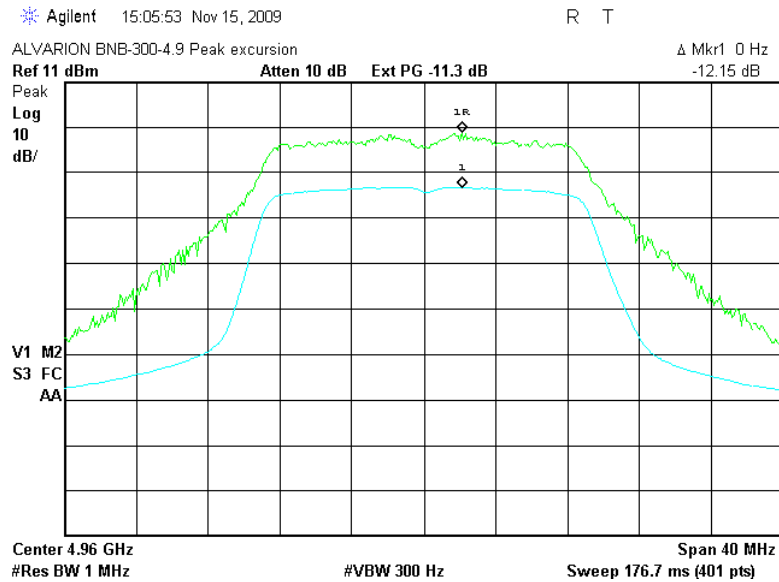


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20 MHz emission bandwidth



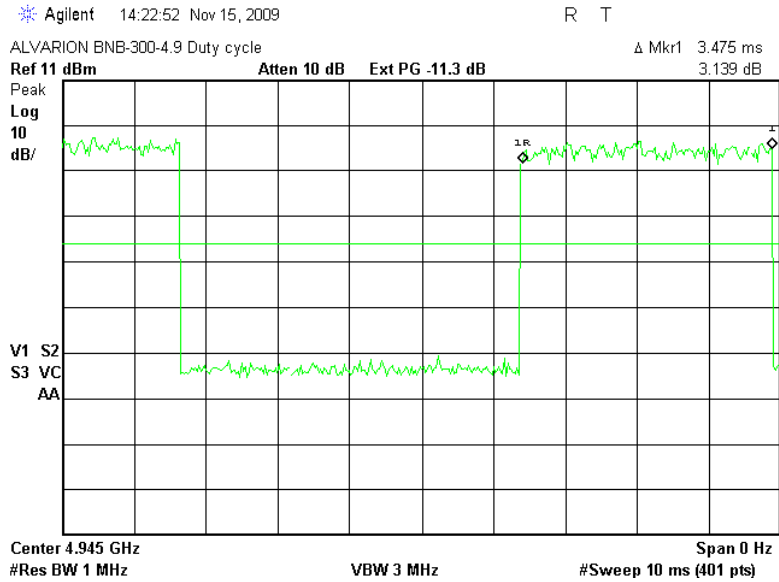
Plot # 108. Carrier frequency 4960 MHz.



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Plot # 109.

Calculation of the used in trace 2 VBW performed as follow $1/T_{on} = 1/3.475 \text{ ms} = 0.29 \text{ kHz}$



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7.1.7 Frequency stability according to § 90.213

Method of measurement FCC part 2.1055
Operating Frequency Range 4945 - 4985 MHz
Ambient Temperature 21° C Relative Humidity 54% Air Pressure 1007 hPa

TEST CONDITIONS		Lowest Tx frequency, 4945 MHz	Frequency deviation (ppm)	Highest Tx frequency, 4985 MHz	Frequency deviation (ppm)
Test temperature	Test voltage(AC)				
20°C	Vmin (102)	4944.961310	-1.56	49849.47220	-2.98
	Vmax (138)	49449.50230	-9.65	49849.41610	-10.96
-30°C	Vnom (120)	49449.90280	-3.84	49849.81760	-10.87
-20°C	Vnom (120)	49449.82360	-7.82	49849.96720	-10.58
-10°C	Vnom (120)	49449.76500	-10.06	49849.83960	-11.71
+0°C	Vnom (120)	49449.70960	-8.53	49849.67540	-7.22
+10°C	Vnom (120)	49449.57810	-5.87	49849.64010	-6.51
+30°C	Vnom (120)	49449.81010	-4.75	49849.45790	-3.22
+40°C	Vnom (120)	49449.52250	-3.57	49849.45320	-0.66
+50°C	Vnom (120)	49449.92260	-1.96	49849.85140	-3.66

TEST PROCEDURE

The EUT was placed in a climatic chamber and allowed to stabilize at 20°C temperature and nominal voltage for at list 15 min. The reference carrier frequency result was taken. The input voltage was changed from 85% of nominal to 115%. Frequency changes were noted. The temperature in climatic chamber was varied from -30°C to +50°C. Measured frequencies were noted in the table above.

LIMIT

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency bands of operation.

TEST SUMMARY

Transmitter carrier frequency stay within the authorized frequency bands 4940 – 4990 MHz.

TEST EQUIPMENT USED:

2	3	4				
---	---	---	--	--	--	--



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8. Conducted emissions test according to § 15.207

Method of measurement ANSI 63.4 §13.1.3
 Operating Frequency Range 4945 - 4985 MHz
 Ambient Temperature 21⁰ C Relative Humidity 54% Air Pressure 1008 hPa

Frequency, MHz	Class B equipment, dB (µV)	
	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

EUT was placed on a wooden table in a shielded chamber at a height of 80 cm from the floor and 40 cm from the vertical reference plane. The measurements were performed at mains terminals by means of LISN, connected to spectrum analyzer in the frequency range as referred to in the table above. The measurements were made with quasi-peak (CISPR) and average detectors. The position of the EUT cables was varied to determine maximum emission level.

TEST RESULTS:

Test results present at plots # 110 for line Phase and # 111 for line Neutral.

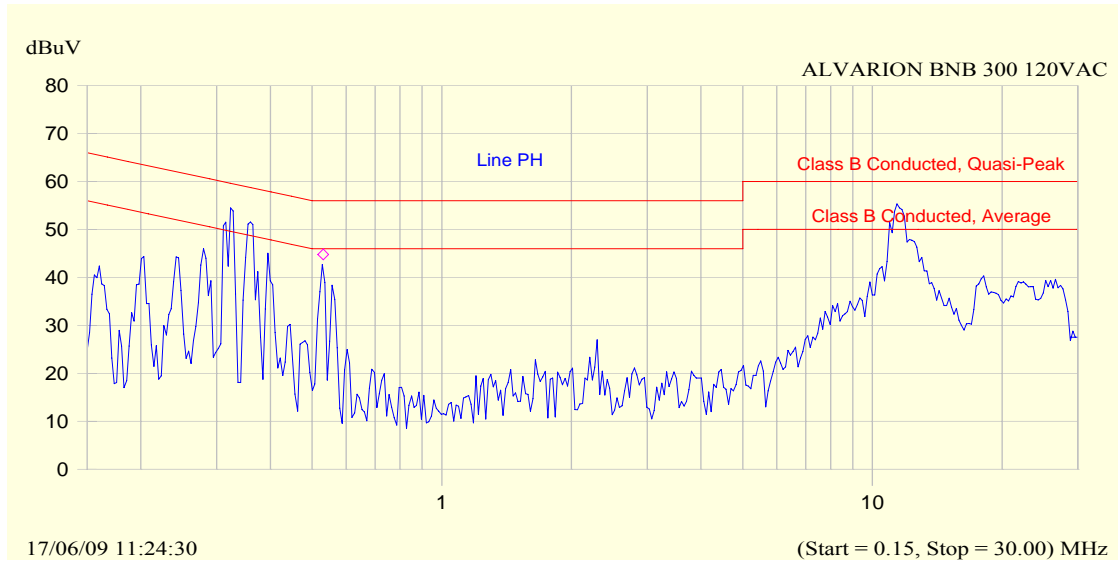
TEST EQUIPMENT USED:

10	11	12				
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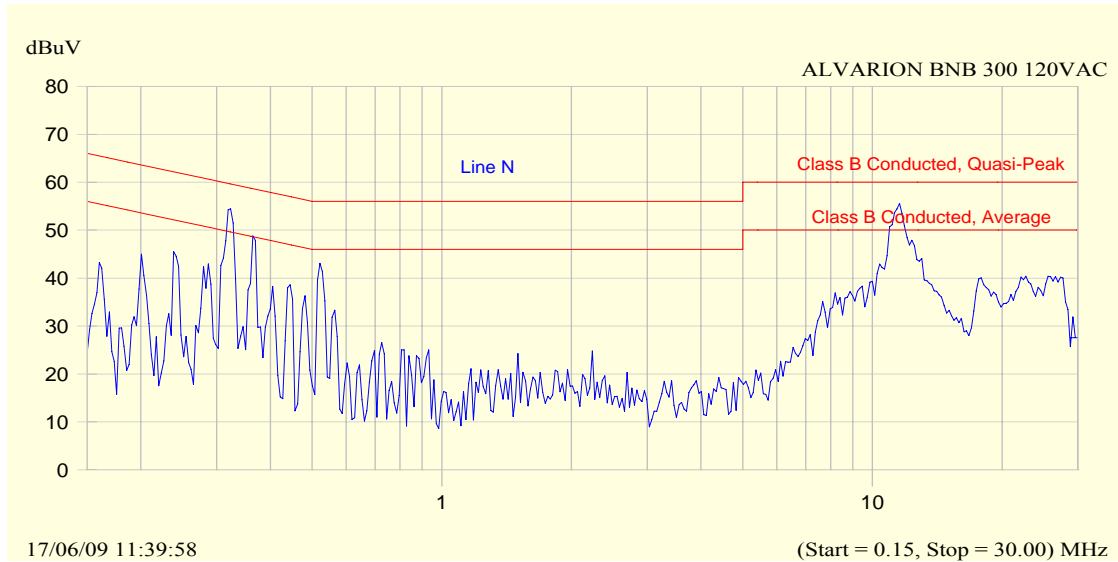
Frequency MHz	QP dB μ V	QP Limit dB	QP-QP Limit dB	Avg dB μ V	Avg Limit dB	Avg-Avg Limit dB
0.326	53.4	59.6	-6.1	48.6	49.6	-1.0
0.363	53.1	58.7	-5.6	45.9	48.7	-2.8
0.531	43.0	56.0	-13.0	38.8	46.0	-7.2
11.481	52.5	60.0	-7.5	46.4	50.0	-3.6
11.832	49.7	60.0	-10.3	43.0	50.0	-7.0
12.312	45.1	60.0	-14.9	37.7	50.0	-12.3

Plot # 110. AC line conducted emissions test. Line Phase

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Frequency MHz	QP dB μ V	QP Limit dB	QP-QP Limit dB	Avg dB μ V	Avg Limit dB	Avg-Avg Limit dB
0.326	53.5	59.6	-6.0	48.6	49.6	-1.0
0.363	52.8	58.7	-5.9	45.4	48.7	-3.2
0.531	42.0	56.0	-14.0	38.2	46.0	-7.8
11.502	52.5	60.0	-7.5	46.2	50.0	-3.8
11.833	49.8	60.0	-10.2	43.4	50.0	-6.6
12.312	44.8	60.0	-15.2	38.4	50.0	-11.6
18.073	36.9	60.0	-23.1	29.5	50.0	-20.5

Plot # 111. AC line conducted emissions test. Line Neutral

**Test report N: 8912353202 Rev.3****Title: BreezeNETB 300****Model: BU/RB-B300-5X****Page 50 of 59****FCC ID: LKT-BNETB-49****9. Radiated emissions test according to § 15.209**

Method of measurement	ANSI 63.4 §13.1.4
Operating Frequency Range	4945 - 4985 MHz
Ambient Temperature	23 ⁰ C
Relative Humidity	58%
Air Pressure	1009 hPa

TEST DESCRIPTION:

The measurements were performed at the Open Area Test Site at a 10 m test distance. EUT was arranged on a wooden table 0.8 m placed on the turn - table. The Biconilog antenna 30 MHz-2 GHz frequency range was used. The frequency range was investigated from 30 MHz to 1.0 GHz and the measurements were performed at each frequency at which the signal was 10 dB below the limit or less. The level was 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. Measurements below 1000 MHz were performed according to FCC p.15.35 (a) with CISPR quasi-peak detector.

REQUIREMENTS:

EUT radiated emission shall not exceed value required in section 15.209

TEST RESULT:

Test results are presented in the table #1.



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Table 1. Radiated emission test results.

Frequency (MHz)	Antenna Polariz V/H	Turn- table Angle (°)	Antenna Height (m)	QP emission level Note 1 (dBμV/m)	Limit @ 3m (dBμV/m)	Margin Note 2 (dB)	Results
30.2	V	171	1.0	32.9	40.0	7.1	Pass
35.1	V	37	1.0	36.5	40.0	3.5	Pass
56.3	V	260	1.0	33.5	40.0	6.5	Pass
66.4	V	63	1.0	34.4	40.0	5.6	Pass
250.0	H	74	2.7	39.3	46.0	7.7	Pass
933.3	H	325	1.1	39.7	46.0	7.3	Pass

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)

TEST EQUIPMENT USED:

8	9					
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10. APPENDIX A

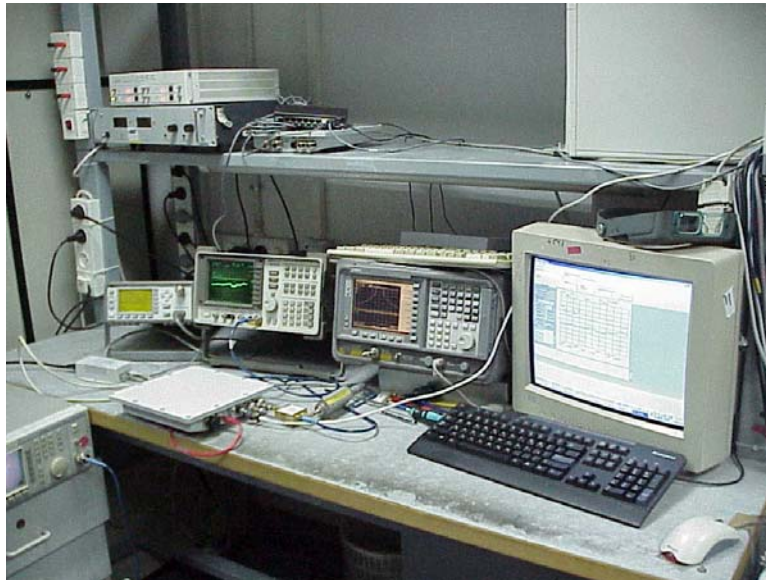


Photo #1. RF conducted emissions test setup.



Photo #2. Radiated emissions test setup on OATS.

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Photo #3. Radiated emissions test setup in anechoic chamber.



Photo #4. Radiated emissions test setup.



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11. APPENDIX B**Test equipment used**

No	Description	Manufacturer information			Due Calibration date
		Name	Model No	Serial No	
1	Spectrum Analyzer 9 kHz - 40 GHz	HP	8565E	3835A01359	June 2010
2	Spectrum Analyzer 9 kHz - 26.5 GHz	Adjilent	4407B	US40241729	June 2010
3	Attenuators set (2,3,10,20 dB) DC - 18 GHz	M/A-COM	2082	1650	Aug 2010
4	Power splitter 1.7 – 9 GHz	Mini-Circuits	ZN2PD-9G	0142	June 2010
5	Cable RF 1m	Huber-Suhner	Sucoflex 104	21324/4PE	October 2010
6	Double Ridged Guide Antenna 1 – 18 GHz	EMCO	3115	5802	Aug 2010
7	Broadband Horn antenna 15 – 40 GHz	Schwarzbeck Mess-Electronik	BBHA 9170	9170-341	Aug 2010
8	Antenna Biconilog 30 – 2000 MHz	Schaffner-Chase	CBL6112B	S/N 23181	Aug 2010
9	Spectrum analyzer 10 KHz-26.5 GHz	HP	E7405A	SII 4944	April 2010
10	EMI Receiver 9 kHz-6.5 GHz	HP	8546A+85460A	SII 4068	April 2010
11	LISN 9 kHz – 30 MHz	FCC	LISN 250-32-4-16	SII5023	October 2010
12	Transient limiter 0.009-200 MHz	HP	11947A	3107105	October 2010
13	Cable RF 4m	Huber-Suhner	Sucoflex 104PE	21328/4PE	October 2010
14	Cable RF 0.5m	Huber-Suhner	Multiflex 141	520201	October 2010



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Title: BreezeNETB 300

Model: BU/RB-B300-5X

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Cable Loss (10m cable + Mast)

Point	Frequency (MHz)	Cable Loss (dB)	Point	Frequency (MHz)	Cable Loss (dB)
1	30	0.53	21	1000	3.68
2	50	0.75	22	1100	3.82
3	100	1.08	23	1200	4.07
4	150	1.39	24	1300	4.24
5	200	1.61	25	1400	4.43
6	250	1.752	26	1500	4.6
7	300	2.00	27	1600	4.7
8	350	2.15	28	1700	4.85
9	400	2.26	29	1800	4.98
10	450	2.383	30	1900	5.19
11	500	2.52	31	2000	5.34
12	550	2.606	32	2100	5.51
13	600	2.75	33	2200	5.69
14	650	2.856	34	2300	5.89
15	700	3.06	35	2400	6.07
16	750	3.201	36	2500	6.22
17	800	3.27	37	2600	6.28
18	850	3.38	38	2700	6.41
19	900	3.46	39	2800	6.53
20	950	3.55	40	2900	6.84



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Title: BreezeNETB 300

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Model: BU/RB-B300-5X

Biconilog Antenna, Model Number: CBL-6112D, S/N: 23181.

No.	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m
1	30	17.90	170	9.40	530	17.70	1040	22.20
2	32	16.70	175	9.00	540	18.25	1060	22.50
3	34	15.55	180	8.50	550	18.60	1080	22.50
4	36	14.35	185	8.45	560	14.45	1100	22.40
5	38	13.30	190	8.60	570	18.40	1120	22.60
6	40	12.20	195	8.85	580	18.50	1140	22.45
7	42	11.05	200	8.95	590	18.60	1160	22.50
8	44	9.95	205	8.80	600	18.60	1180	22.40
9	46	8.90	210	8.50	610	18.80	1200	22.80
10	48	8.05	215	8.20	620	18.99	1220	22.95
11	50	7.30	220	8.50	630	19.05	1240	23.10
12	52	6.80	225	9.00	640	19.23	1260	23.40
13	54	6.45	230	9.65	650	19.10	1280	23.35
14	56	6.00	235	10.30	660	19.13	1300	23.62
15	58	5.70	240	11.00	670	19.04	1320	23.64
16	60	5.45	245	11.60	680	19.00	1340	23.86
17	62	5.30	250	12.00	690	19.17	1360	23.95
18	64	5.20	255	12.45	700	19.28	1380	23.90
19	66	5.30	260	12.85	710	19.25	1400	24.45
20	68	5.30	265	12.50	720	19.45	1420	24.74
21	70	5.35	270	12.45	730	19.75	1440	24.93
22	72	5.50	275	12.40	740	19.95	1460	25.03
23	74	5.80	280	12.55	750	20.07	1480	25.45
24	76	6.00	285	12.65	760	19.85	1500	25.30
25	78	6.60	290	12.75	770	19.80	1520	25.25
26	80	6.70	295	12.95	780	19.85	1540	25.36
27	82	7.15	300	13.00	790	19.95	1560	25.58
28	84	7.60	310	13.35	800	20.05	1580	25.50
29	86	8.10	320	13.75	810	20.10	1600	25.65
30	88	8.50	330	13.85	820	20.35	1620	25.60
31	90	8.90	340	14.10	830	20.40	1640	25.70
32	92	9.20	350	14.50	840	20.35	1660	25.83
33	94	9.75	360	14.70	850	20.46	1680	25.97
34	96	9.95	370	14.90	860	20.39	1700	26.10
35	98	10.20	380	15.10	870	20.29	1720	26.25
36	100	10.50	390	15.45	880	20.24	1740	26.04
37	105	11.25	400	16.00	890	20.35	1760	26.14
38	110	11.70	410	16.40	900	20.55	1780	26.20
39	115	11.70	420	16.70	910	20.45	1800	26.40
40	120	11.80	430	16.35	920	20.60	1820	26.64
41	125	11.80	440	16.30	930	20.60	1840	26.86
42	130	11.70	450	16.30	940	20.66	1860	27.12
43	135	11.35	460	16.70	950	20.88	1880	27.00
44	140	10.95	470	17.05	960	21.11	1900	27.25
45	145	10.35	480	17.20	970	20.93	1920	27.36
46	150	10.05	490	17.30	980	21.03	1940	27.68
47	155	9.70	500	17.40	990	21.05	1960	27.10
48	160	9.70	510	17.50	1000	21.10	1980	27.06
49	165	9.45	520	17.60	1020	21.40	2000	27.25



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Title: BreezeNETB 300

Model: BU/RB-B300-5X

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Antenna Factor**Double Ridged Guide Antenna mfr EMCO model 3115 1m calibration**

Point	Frequency (MHz)	Antenna Factor (dB/m)
1	1000	23.9
2	2000	28.3
3	3000	31.0
4	4000	33.1
5	4500	32.5
6	5000	32.4
7	6000	53.7
8	6500	35.6
9	7000	36.4
10	7500	36.9
11	8000	37.0
12	8500	38.0
13	9000	38.6
14	9500	38.4
15	10000	38.4
16	10500	38.4
17	11000	38.9
18	11500	39.6
19	12000	39.4
20	12500	39.2
21	13000	40.3
22	13500	41.0
23	14000	41.2
24	14500	41.3
25	15000	40.0
26	15500	38.0
27	16000	38.1
28	16500	40.3
29	17000	42.2
30	17500	44.6
31	18000	46.2

Cable Loss**Type: Sucoflex 104PE; Ser.No.21328/4PE; 4 m length**

Point	Frequency (GHz)	Cable Loss (dB)
1	0.0-1.0	1.7
2	1.0- 3.5	3.2
3	3.5- 5.5	4.0
4	5.5 - 7.5	4.7
5	7.5 - 9.5	5.3
6	9.5 - 10.5	5.6
7	10.5 - 12.5	6.2
8	12.5 - 14.5	6.8
9	14.5 - 16.5	7.5
10	16.5 - 18.0	8.1



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Title: BreezeNETB 300

Model: BU/RB-B300-5X

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Antenna Factor
Broadband Horn Antenna model BBHA 9170 1m calibration

Point	Frequency (GHz)	Antenna Factor (dB/m)
1	15.0	38.5
2	16.0	37.7
3	17.0	38.1
4	18.0	37.9
5	19.0	38.0
6	20.0	38.0
7	21.0	37.9
8	22.0	38.2
9	23.0	39.6
10	24.0	39.6
11	25.0	39.3
12	26.0	39.5
13	27.0	39.6
14	28.0	39.6
15	30.0	40.1
16	32.0	41.2
17	34.0	41.5
18	35.0	41.9
19	36.0	42.2
20	38.0	43.8
21	40.0	43.2



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12. APPENDIX C

Abbreviations and acronyms

The following abbreviations and acronyms are applicable to this test report:

AC	alternating current
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
EMC	electromagnetic compatibility
EUT	equipment under test
GHz	gigahertz
H	height
Hz	hertz
kHz	kilohertz
L	length
LNA	low noise amplifier
m	meter
Mbps	megabit per second
MHz	megahertz
NA	not applicable
OFDM	Orthogonal Frequency Division Multiple Access
PRBS	pseudo random binary sequence
QP	quasi-peak
RF	radio frequency
RE	radiated emission
SA	spectrum analyzer
rms	root mean square
W	width

Specification references

47 CFR part 90: 2009	Private land mobile radio services.
47 CFR part 15.C: 2009	Intentional radiators.
ANSI C63.2: 1996	American National Standard for Instrumentation Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz Specifications.
ANSI C63.4: 2003	American National Standard for Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz