



**Test Report No. 9012321870/1
complementary to SII # 8912311553/1**

For ALVARION Ltd.

Equipment Under Test:

BreezeMAX Extreme 5.4 Base station

Model: XTRM-BS-2SIS-5.4-Ext

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



ACCLASS Accreditation Services

Certificate Number: AT-1359



Test report No: 9012321870/1

Title: BreezeMAX Extreme 5.4 Base station

Model: XTRM-BS-2SIS-5.4-Ext

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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 test:	21- 28 February, 14 – 15 March 2010 27 March, 10 April 2011.

Equipment under test information.

Description of Equipment Under Test (EUT):	BreezeMAX Extreme 5.4 Base station
Model:	XTRM-BS-2SIS-5.4-Ext
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 15.407, part 1 §1.1310

Reference Documents:

CFR 47 FCC:	Rules and Regulations; Part 15. "Radio frequency devices"; Subpart C: "Intentional radiators", Subpart E: "UNII devices"
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Note: Test Report # 9012321870 has been superseded by the presented test report # 9012321870/1.

This Test Report contains 49 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 15 section 15.407

Transmitter characteristics	Subclasses
Peak output power	15.407(a)(2)
Peak power spectral density	15.407(a)(2)
Spurious emissions at antenna terminal	15.407(b)(3)
Out of band spurious emissions radiated	15.205, 15.407(b)(3)
Peak excursion test	15.407(a)(6)
Conducted emissions on AC power line	see SII test report # 8912311553/1
Unwanted radiated emissions below 1 GHz	see SII test report # 8912311553/1

Test performed by: Mr. Michael Feldman test technician

Test report prepared by: Mr. Michael Feldman test technician

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

Measurement uncertainty.

Were relevant, the following measurement uncertainty level have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test description	Expanded uncertainty
<u>Radiated emissions</u> in the open field test site at 3 m measuring distance: 30 MHz – 1.0 GHz 1.0 GHz – 18 GHz	 2 Uc (E) = ± 4.32 dB 2 Uc (E) = ± 4.47 dB

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4. Equipment under test description.

*The customer provided description.

4.1 General description

The BreezeMAX Extreme 5.4 Base station product is high-capacity WiMAX communication system. It shall be compatible with IEEE802.16e standard and support set of Alvarion's enhancements.

BreezeMAX Extreme 5.4 is digital modulated TDD system which covers 5470 MHz up to 5950 MHz range. The system contains a base station unit and a subscriber unit. The basic base station system configuration is all outdoor-box configurations.

The BTS Extreme is a low cost 16e mobile WiMAX solution. It should provide high performance and advanced feature set and complement Alvarion's macro-BTS solutions. This product family comes to provide wireless access solutions for the following deployment scenarios:

- Low cost Point to Multi Point wireless access mass deployments in emerging markets for licensed and un-licensed solutions to provide dual play services (Primary VoIP & Data).
- Vertical markets for video surveillance, security and municipalities markets solutions using products licensed and un-licensed portfolio.

Base station Extreme consists of the following main components: One or two 16e WiMax SoCs (System on Chip) with one or two Radio channels using integrated antenna or external antennas. In two Radio channels applications, one antenna is connected to each radio output port.

EUT technical characteristics

Transmitter technical characteristics.			Note
Stand-alone/fixed use			
Assigned frequency range	5.470 GHz – 5.725 GHz		-
	5.490 GHz – 5.705 GHz		-
RF channel spacing	20 MHz		-
Antenna connection	Two N-type for external antennas		Professional installation
Type of modulation	4QAM, 16QAM, 64QAM		-
Type of multiplexing	OFDM		-
Modulating test signal (baseband)	PRBS		-
Maximum transmitter duty cycle in normal use	60 %		-
Transmitter duty cycle supplied for test	100%		-
Antenna information			
Type	Manufacturer	Model	Gain
External, sector	MTI	AN1353	17 dBi
External, Omni	MTI	AN1299	9.5 dBi
Internal dual slant	MTI	AN1427-01	15.5 dBi

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4.1.1 Environmental evaluation and exposure limit according to FCC CFR 47 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 $S = (P_t / 4\pi r^2)$.

Where:

P_t - 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:

P_t - the transmitted power which is equal to the maximum output power 17.4 dBm plus external antenna gain 9.5 dBi. The maximum EIRP power = 26.9 dBm = 489.8 mW.

Maximum allowed distance “ r ”, where RF exposure limits may not be exceeded = $\text{SQRT}(489.8/4\pi)$ and is more than 6.5 cm from the antenna main lobe.

Peak power density at worse case distance 20 cm is $P_t/4\pi r^2 = 0.49 \text{ W}/4\pi * 0.2^2 = 0.97 \text{ W}/\text{m}^2$

That is less than $10 \text{ W}/\text{m}^2$ power density limit.

4.2 EUT configuration

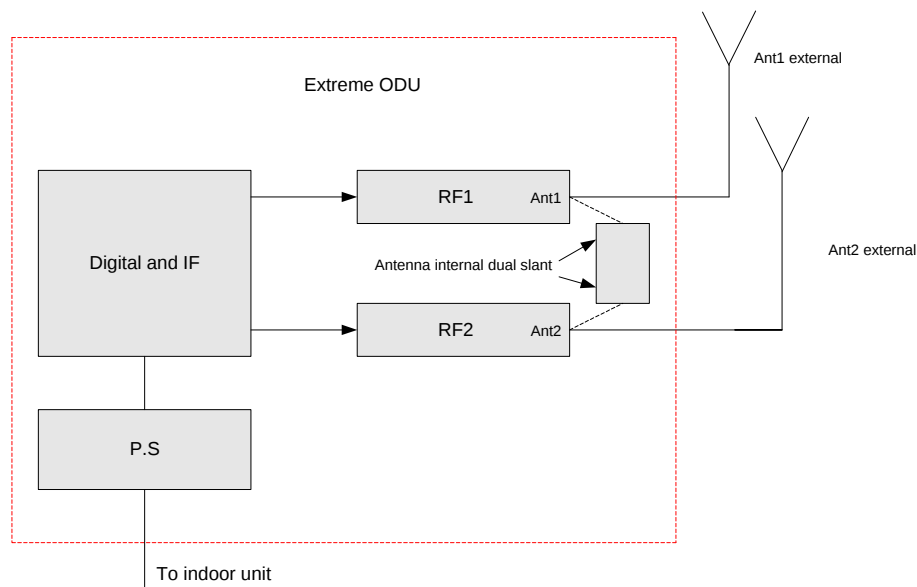


Fig. 1 XTRM-BS-2SIS-5.4-Ext block diagram.

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Title: BreezeMAX Extreme 5.4 Base station**Model:** XTRM-BS-2SIS-5.4-Ext

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5. Test results

5.1 Transmitter characteristics

5.1.1 Peak output power test

Method of measurement DA 02-2138
Operating Frequency Range 5.490 - 5.705 GHz
Ambient Temperature 21⁰ C Relative Humidity 46% Air Pressure 1006 hPa

The peak transmit power shall not exceed the lesser of 250mW (24 dBm) or 11dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. as required in sec. 15.407 (a)(2).

Chain 1

Carrier frequency MHz	Measured 26 dB bandwidth, MHz	Measured peak output power, dBm	Limit, dBm	Margin, dBm	Reference to plots ##
5490	19.65	17.3.	23.9	6.6	##1, 4
5580	20.17	17.3	24.0	6.7	##2, 5
5705	19.66	17.4	23.9	6.5	##3, 6

Chain 2

Carrier frequency MHz	Measured 26 dB bandwidth, MHz	Measured peak output power, dBm	Limit, dBm	Margin, dBm	Reference to plots
5490	20.2	17.4	24.0	6.6	##7, 10
5580	20.8	16.8	24.0	7.2	##8, 11
5705	19.9	17.1	23.9	6.8	##9, 12

Total output power calculated as sum of chain 1 + chain 2 powers:

Carrier frequency 5490 MHz = 20.36 dBm.

Carrier frequency 5580 MHz = 20.06 dBm.

Carrier frequency 5705 MHz = 20.26 dBm.



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TEST PROCEDURE

Test was performed at worse case mode - maximum allowed output power for antenna Omni with directional gain 9.5 dBi. The measurements were performed at three transmitted carrier (channel) frequencies at bottom, middle and top of the 5.490 - 5.705 GHz 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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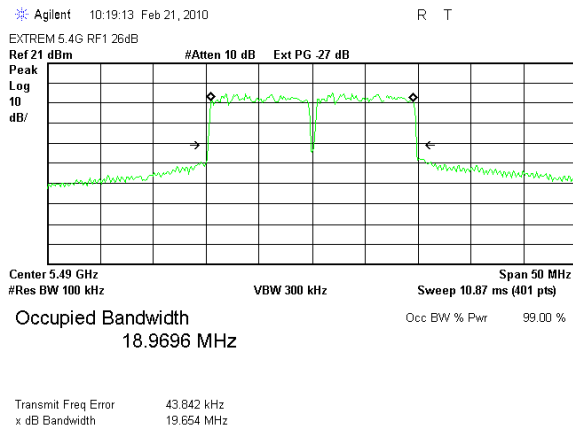
Model: XTRM-BS-2SIS-5.4-Ext

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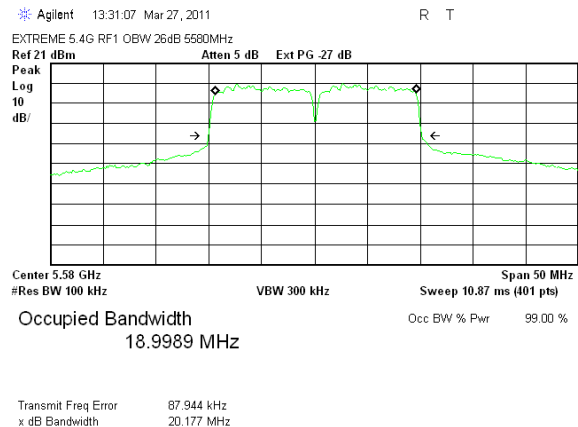
FCC ID: LKT-EXTR-50

RF chain 1

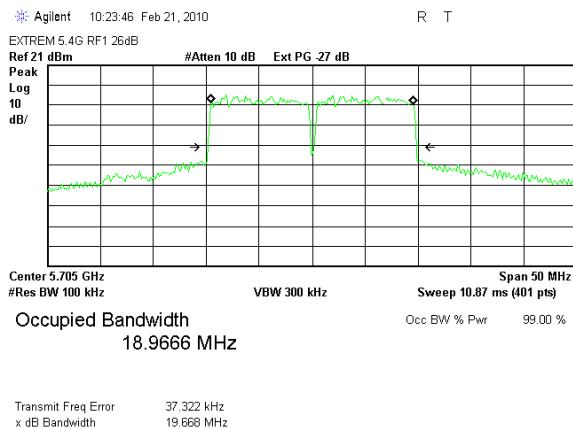
26 dB EBW results.



Plot # 1. Carrier Frequency 5490 MHz



Plot # 2. Carrier Frequency 5580 MHz



Plot # 3. Carrier Frequency 5705 MHz

Insertion loss of external attenuator, directional coupler and cable = 27 dB

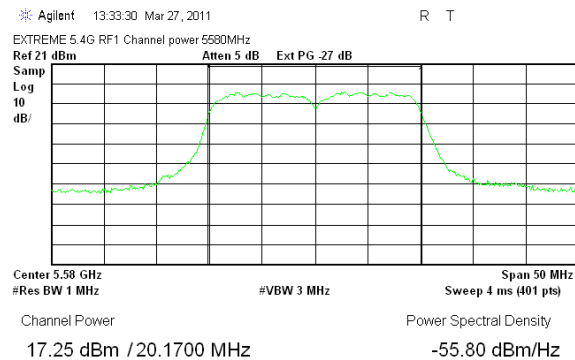
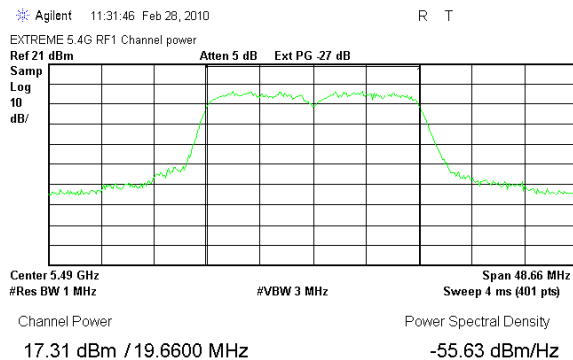


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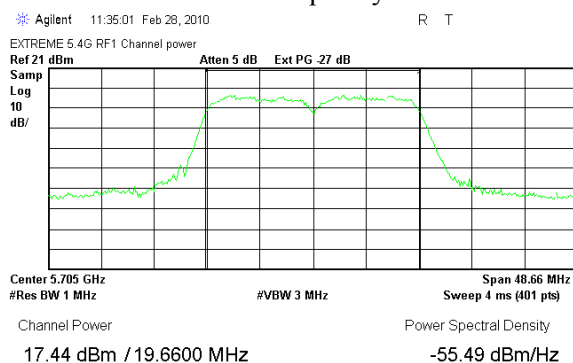
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Peak output power results



Plot # 4. Carrier Frequency 5490 MHz



Plot # 5. Carrier Frequency 5580 MHz

Plot # 6. Carrier Frequency 5705 MHz

Insertion loss of external attenuator, power splitter and cable = 27 dB.



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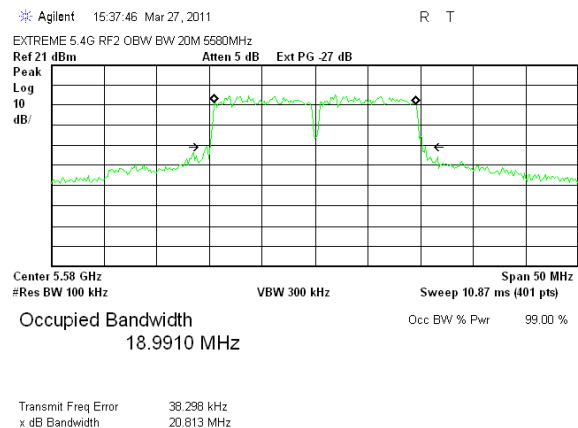
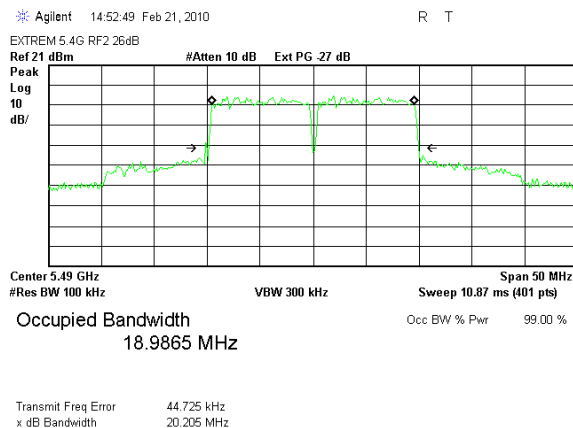
Model: XTRM-BS-2SIS-5.4-Ext

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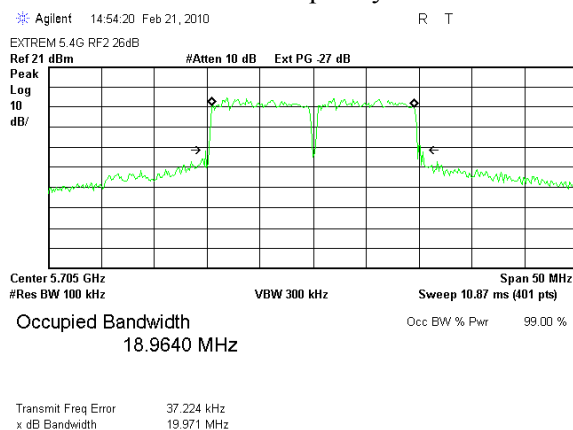
FCC ID: LKT-EXTR-50

RF chain 2

26 dB EBW results.



Plot # 7. Carrier Frequency 5490 MHz



Plot # 8. Carrier Frequency 5580 MHz

Plot # 9. Carrier Frequency 5705 MHz

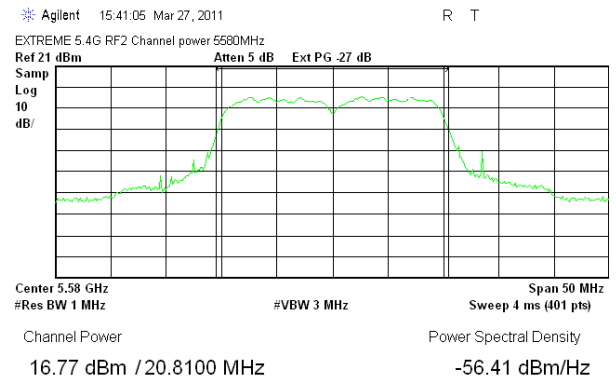
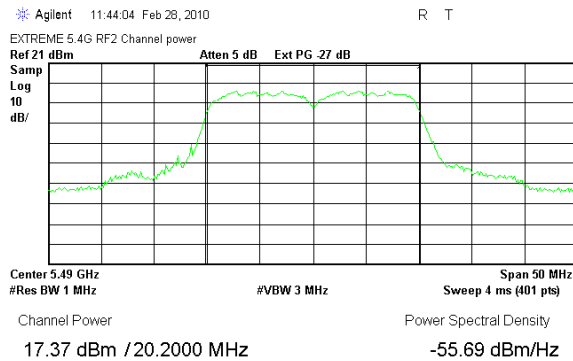


Test report No: 9012321870/1
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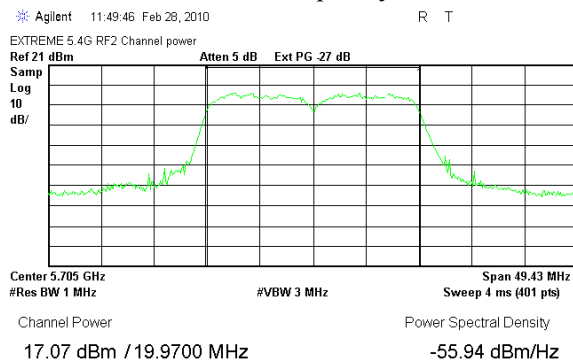
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Peak output power results.



Plot # 10. Carrier Frequency 5490 MHz



Plot # 11. Carrier Frequency 5580 MHz

Plot # 12. Carrier Frequency 5705 MHz

**Test report No:** 9012321870/1**Page 12 of 49 Pages****Title:** BreezeMAX Extreme 5.4 Base station**Model:** XTRM-BS-2SIS-5.4-Ext**FCC ID:** LKT-EXTR-50**5.1.2 Peak power density test § 15.407(a) (2)**

Method of measurement DA 02-2138
 Operating Frequency Range 5.490 - 5.705 GHz
 Ambient Temperature 21⁰ C Relative Humidity 46% Air Pressure 1006 hPa

The peak power spectral density shall not exceed 11 dBm in any 1 MHz band.

For antennas with directional gain grater than 6 dBi power spectral density limit was calculated as follow: 11 dBm - (Antenna gain – 6 dBi).

For antenna Omni PSD calculated limit is $11 - (9.5 - 6) = 7.5$ dBm

Carrier frequency MHz	PSD, chain 1 dBm	Limit, dBm	Margin dB	PSD, chain 2 dBm	Limit, dBm	Margin dB	Total, ch.1+ ch.2 dBm	Margin dB
5490	-0.32	7.5	7.82	-0.58	7.5	8.08	3.82	3.68
5580	-1.37	7.5	8.87	-1.54	7.5	9.04	2.87	4.63
5705	-0.35	7.5	7.85	-0.93	7.5	8.43	3.97	3.53

TEST PROCEDURE

The test was performed in MIMO mode at maximum allowed output power for antenna 9.5 dBi gain. The measurements were performed according to procedure DA 02-2138 August 2002 at three transmitted carrier (channel) frequencies at bottom, middle and top of the 5.490 - 5.705 GHz 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 total power density of chain 1 and chain 2 measured via power splitter connected to both RF outputs.

TEST SUMMARY

Transmitter complies with standard requirement.

Test results for chain 1 shown in plots ## 13 – 15 and for chain 2 in plots ## 16 – 18.

The total results for chain 1 + chain 2 in plots ## 19 – 21.

TEST EQUIPMENT USED:

2	3	4	5			
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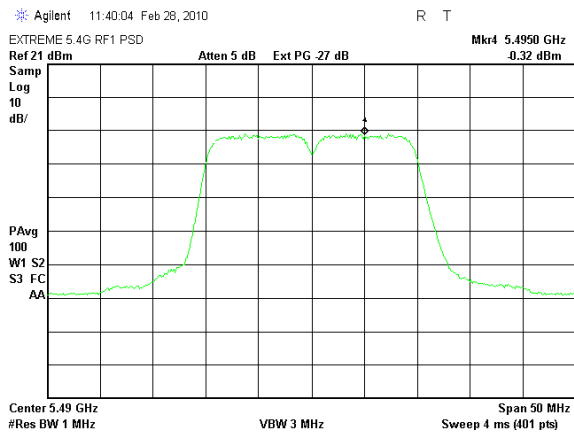
Model: XTRM-BS-2SIS-5.4-Ext

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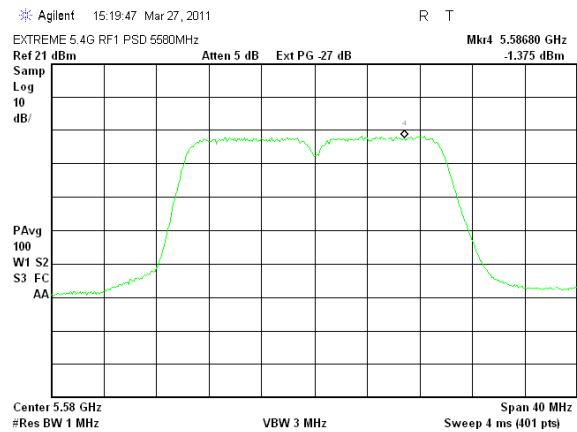
FCC ID: LKT-EXTR-50

Chain 1

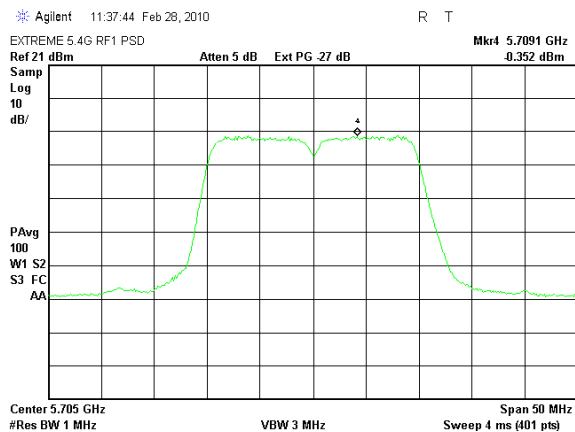
Power spectral density test results.



Plot # 13. Carrier Frequency 5490 MHz



Plot # 14. Carrier Frequency 5580 MHz



Plot # 15. Carrier Frequency 5705 MHz

Insertion loss of external attenuator, power splitter and cable = 27 dB



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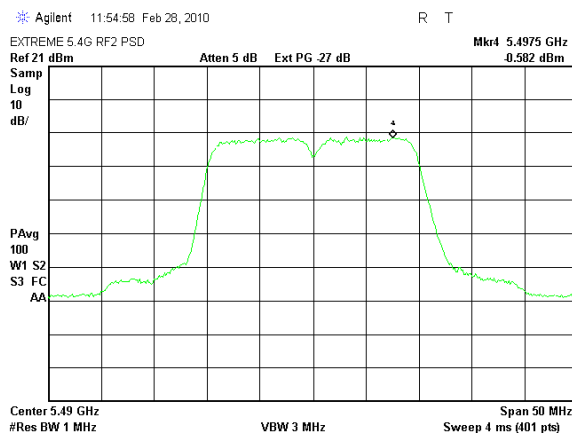
Model: XTRM-BS-2SIS-5.4-Ext

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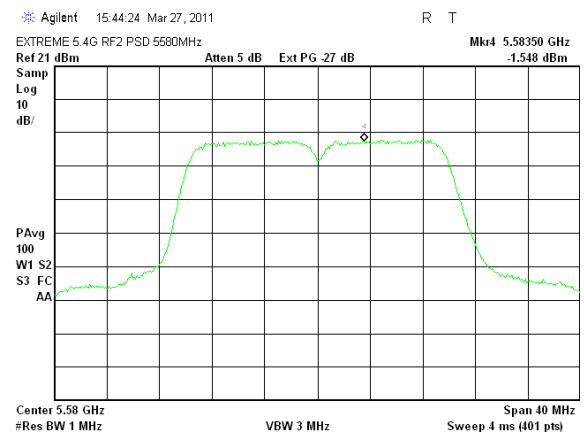
FCC ID: LKT-EXTR-50

Chain 2

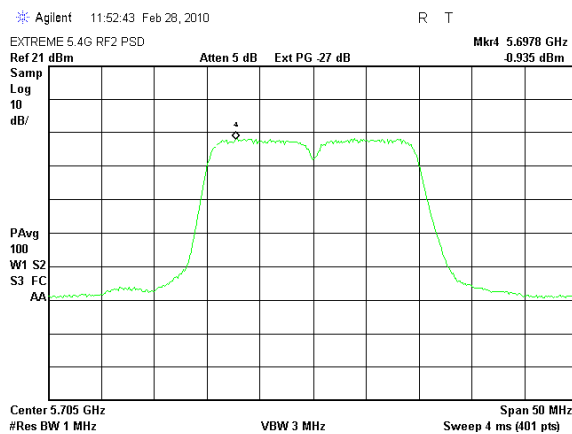
Peak power spectral density test results.



Plot # 16. Carrier Frequency 5490 MHz



Plot # 17. Carrier Frequency 5580 MHz



Plot # 18. Carrier Frequency 5705 MHz



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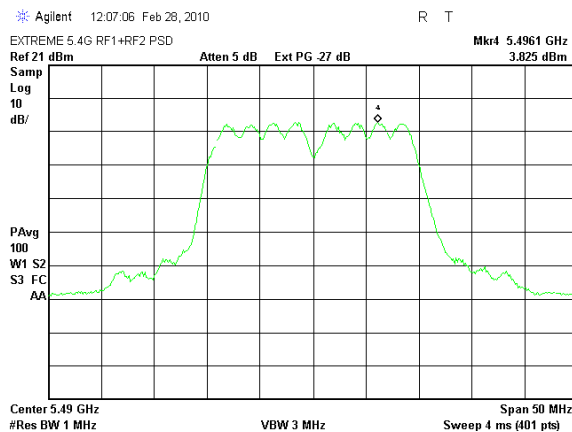
Title: BreezeMAX Extreme 5.4 Base station

Model: XTRM-BS-2SIS-5.4-Ext

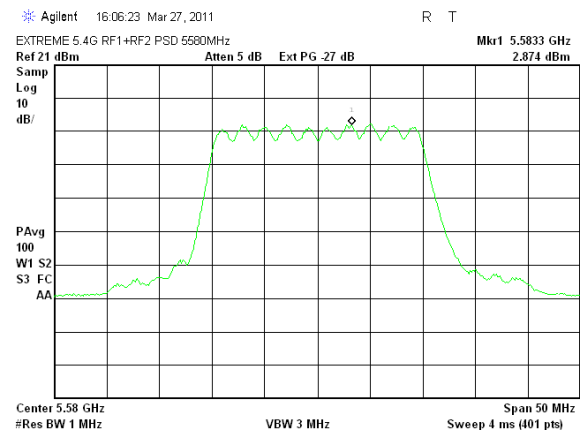
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FCC ID: LKT-EXTR-50

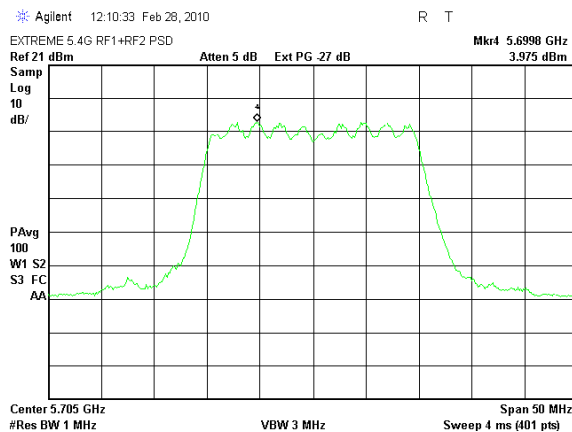
PSD result chain 1 + chain 2.



Plot # 19. Carrier Frequency 5490 MHz



Plot # 20. Carrier Frequency 5580 MHz



Plot # 21. Carrier Frequency 5705 MHz

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5.1.3 Spurious emissions at antenna terminal § 15.407(b)(3)

Operating Frequency Range 5.490 - 5.705 GHz
Ambient Temperature 21⁰ C Relative Humidity 46% Air Pressure 1006 hPa

The frequency spectrum was investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to 40 GHz. The emission levels 20 dB lower than specified limit were not recorded in the tables. No spurious emissions above SA noise floor were found except band-edge point.

Frequency, MHz	Spurious emission level, dBm	EIRP limit, dBm/MHz	Margin dB	Reference to plot #
5470	-35.4	-27	8.4	23
5725	-34.0	-27	7.0	30

LIMIT

For operation in the band 5470 - 5725 MHz all emissions outside of the band shall not exceed an EIRP of -27dBm/MHz

TEST PROCEDURE

The test was performed at worse case mode at maximum allowed for antenna Omni output power. The measurements were performed at three transmitted carrier (channel) frequencies at bottom, middle and top of the 5.490 - 5.705 GHz 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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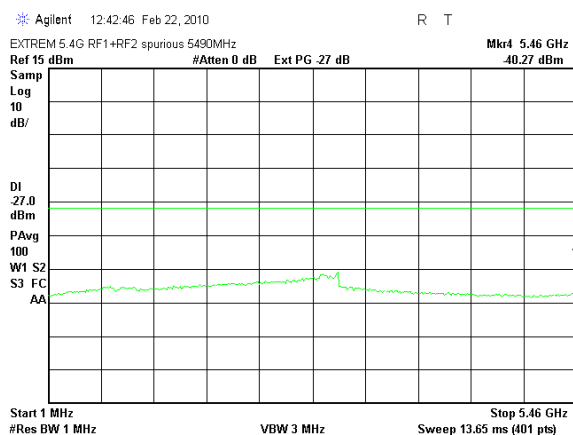


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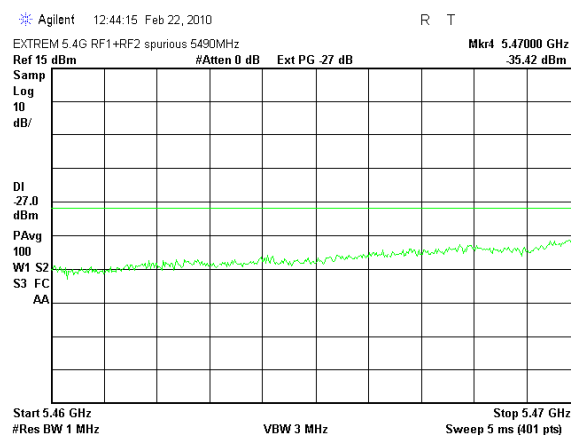
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FCC ID: LKT-EXTR-50

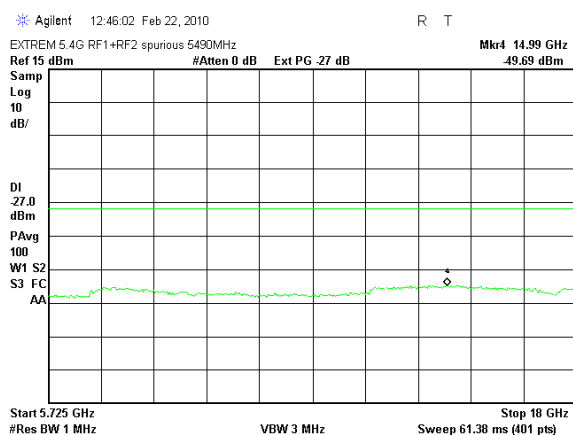
Carrier Frequency 5490 MHz



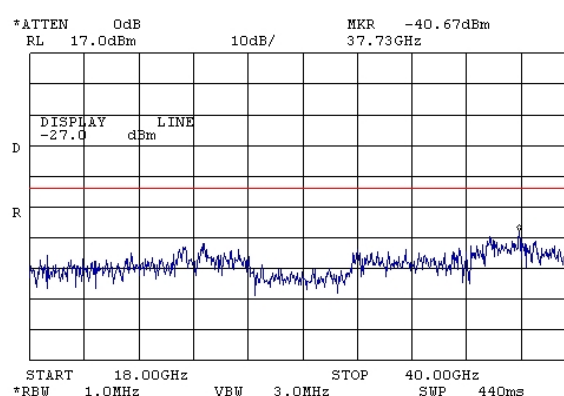
Plot # 22



Plot # 23



Plot # 24



Plot # 25

Insertion loss of external attenuator and cable = 27 dB



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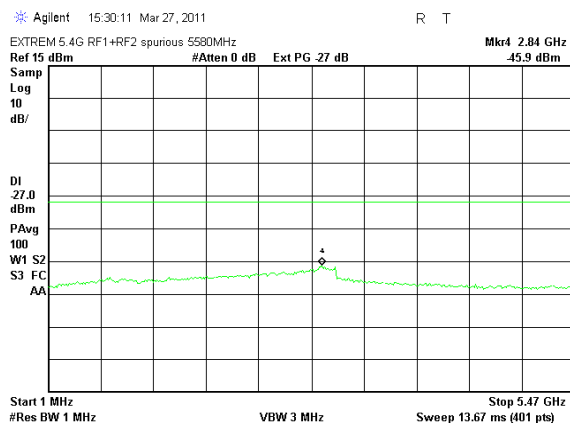
Title: BreezeMAX Extreme 5.4 Base station

Model: XTRM-BS-2SIS-5.4-Ext

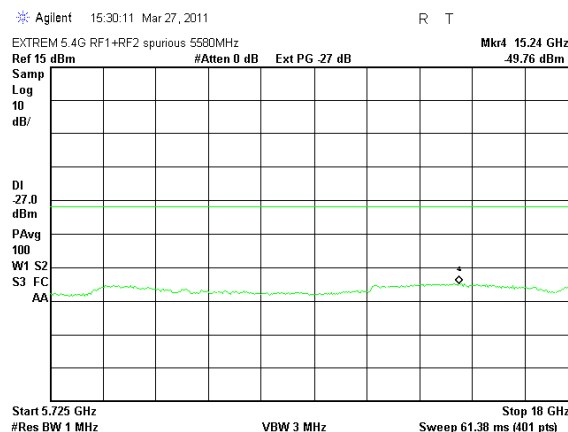
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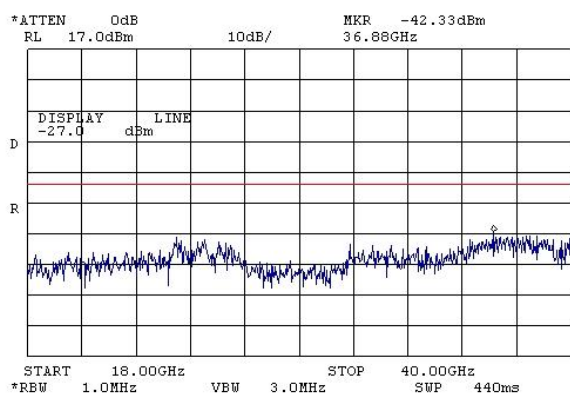
Carrier Frequency 5580 MHz.



Plot # 26



Plot # 27



Plot # 28

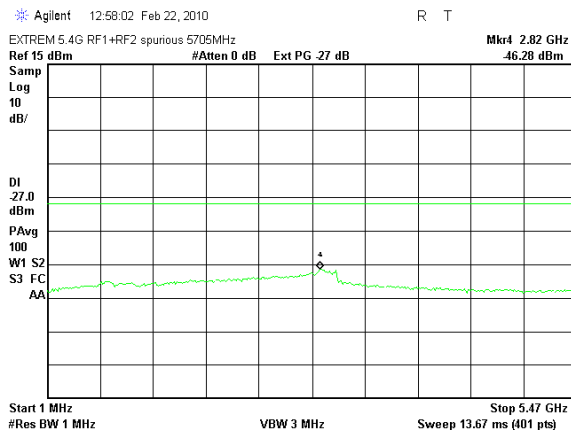


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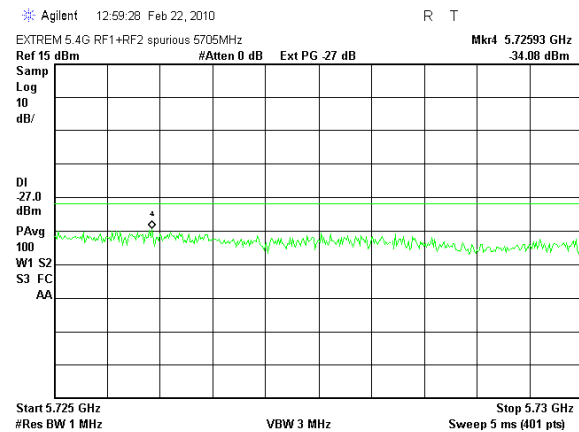
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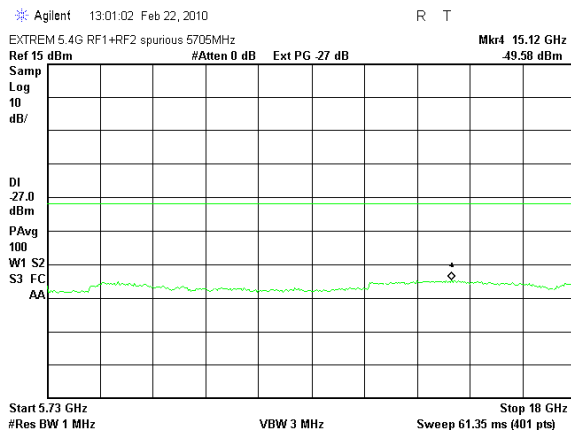
Carrier Frequency 5705 MHz.



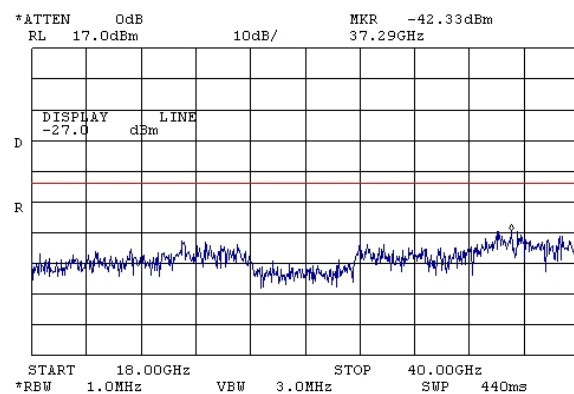
Plot # 29



Plot # 30



Plot # 31



Plot # 32



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5.1.4 Radiated spurious emissions test § 15.407(b)(3)

Operating Frequency Range 5.490 - 5.705 GHz
 Ambient Temperature 22⁰ C Relative Humidity 51% Air Pressure 1007 hPa

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

Antenna integral 15.5 dBi gain

Carrier frequency 5490 MHz.

Frequency, MHz	Radiated emissions, dBμV/m/dBm	Limit, dBμV/m/dBm	Margin, dB	Note	Reference to plot #
5369.0	65.8	*74.0	8.2	detector peak	33
5459.7	47.1	*54.0	6.9	detector average	34
5468.9	-31.0	-27.0	6.0	MIMO mode	36

Carrier frequency 5580 MHz

Frequency, MHz	Radiated emissions, dBμV/m	Limit, dBμV/m	Margin, dB	Note	Reference to plot #
5436	58.3	*74.0	15.7	detector peak	40
5458.9	46.7	*54.0	11.2	detector average	41

Carrier frequency 5705 MHz.

Frequency, MHz	Radiated emissions, dBμV/m/dBm	Limit, dBμV/m/dBm	Margin, dB	Note	Reference to plot #
5381	66.8	*74.0	14.8	detector peak	45
5396.5	45.5	*54.0	2.6	detector average	46
5725.0	-29.9	-27.0	3.1	MIMO mode	48

*Requirement of section 15.205(b).



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Title: BreezeMAX Extreme 5.4 Base station
Model: XTRM-BS-2SIS-5.4-Ext

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FCC ID: LKT-EXTR-50

Antenna Omni 9.5 dBi gain

Carrier frequency 5490 MHz.

Frequency, MHz	Radiated emissions, dB μ V/m/dBm	Limit, dB μ V/m/dBm	Margin, dB	Note	Reference to plot #
5371	64.0	*74.0	10.0		52
5459.2	46.9	*54.0	7.1	Noise floor	53
5469.6	-35.0	-27.0	8.0	MIMO mode	55
6453.5	-34.8	-27.0	7.8	Noise floor	56

Carrier frequency 5580 MHz.

Frequency, MHz	Radiated emissions, dB μ V/m/dBm	Limit, dB μ V/m/dBm	Margin, dB	Note	Reference to plot #
5381	57.2	*74.0	16.8	detector peak	59
5457	46.1	*54.0	7.9	detector average	60
6199.7	-35.4	-27.0	8.4	Noise floor	61

Carrier frequency 5705 MHz.

Frequency, MHz	Radiated emissions, dB μ V/m/dBm	Limit, dB μ V/m/dBm	Margin, dB	Note	Reference to plot #
5414	63.9	*74	10.1	detector peak	64
5444.5	46.5	*54	2.2	detector average	65
5725.2	-35.7	-27	8.7	MIMO mode	67

*Requirement of section 15.205(b).

**Test report No: 9012321870/1****Page 22 of 49 Pages****Title: BreezeMAX Extreme 5.4 Base station****Model: XTRM-BS-2SIS-5.4-Ext****FCC ID: LKT-EXTR-50****Antenna 17 dBi gain**

Carrier frequency 5490 MHz.

Frequency, MHz	Radiated emissions, dBμV/m/dBm	Limit, dBμV/m/dBm	Margin, dB	Note	Reference to Plot number
5314	65.4	*74.0	1.4	detector peak	71
5459.2	49.0	*54.0	10.2	detector average	72
5469.6	-30.9	-27.0	3.9	MIMO mode	74

Carrier frequency 5580 MHz.

Frequency, MHz	Radiated emissions, dBμV/m	Limit, dBμV/m	Margin, dB	Note	Reference to plot
5403	58.2	*74.0	15.8	detector peak	78
5460	47.7	*54.0	6.3	detector average	79

Carrier frequency 5705 MHz.

Frequency, MHz	Radiated emissions, dBμV/m/dBm	Limit, dBμV/m/dBm	Margin, dB	Note	Reference to plot #
5470	67.2	*74.0	6.8	detector peak	83
5458	46.6	*54.0	7.4	detector average	84
5725.1	-32.0	-27.0	5.0	MIMO mode	86
6195	-37.1	-27.0	10.1	Noise floor	87

*Requirement of section 15.205(b).

**Test report No:** 9012321870/1**Title:** BreezeMAX Extreme 5.4 Base station**Model:** XTRM-BS-2SIS-5.4-Ext**Page 23 of 49 Pages****FCC ID:** LKT-EXTR-50

TEST PROCEDURE

The test was conducted with three antenna configurations: internal slant, external Omni and external sector. In order to find a worse case result preliminary testing for each configuration were performed in single chain (SISO) and in spatial multiplexing (SM-MIMO) modes.

The worse case results founded for different antennas in SM-MIMO and in SISO modes were noted in the tables above. Transmitter output power was changed according to antenna configuration and standard requirements:

Antenna configuration	Output power dBm	
	SISO	MIMO
Internal slant antenna 15.5 dBi	20.5	20.5
Antenna Omni 9.5 dBi	*27.2	*24.2
Antenna sector 17 dBi	*19.7	*16.7

* Calculation includes an external antenna cable loss 0.7 dB.

Substitution method.

The measurements were performed according to ANSI/TIA-603-C-2004 section 2.2.12 test method. Investigation of transmitter spurious emissions was performed. EUT was replaced by generator and substitution antenna. Result calculated from generator output level, substitution antenna gain and loss of connected cable was compared with the limit. Transmitter was operated at bottom, middle and top of the 5.490 - 5.705 GHz frequency band.

LIMIT

For transmitters operating in the 5.47 – 5.725 GHz band: all emissions outside of the 5.47 – 5.725 GHz band shall not exceed an EIRP limit of -27 dBm/MHz.

The emissions in restricted bands shall comply with provision of Section 15.205.

TEST EQUIPMENT USED:

1	5	6	7	8	9	10	14
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Test report No: 9012321870/1

Title: BreezeMAX Extreme 5.4 Base station

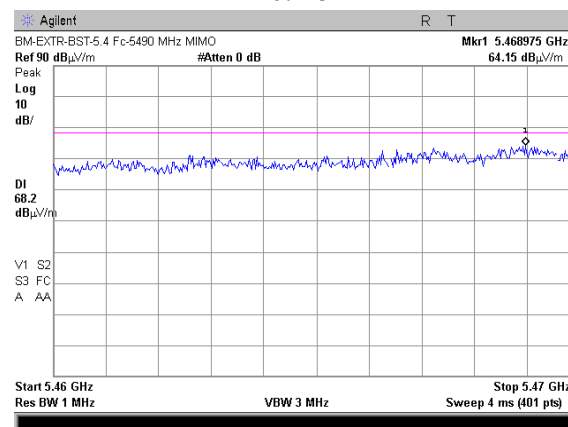
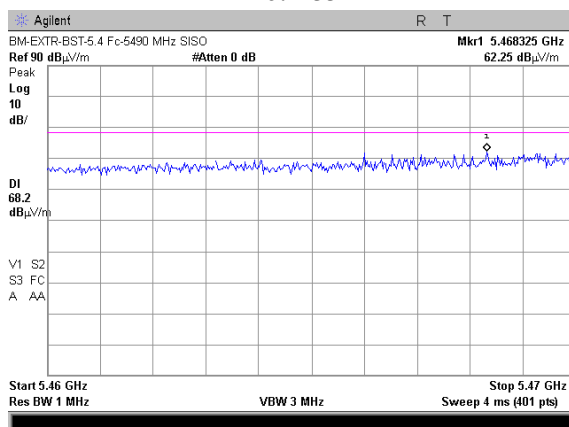
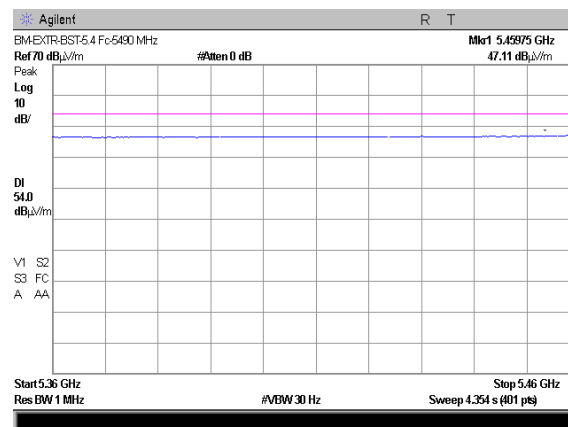
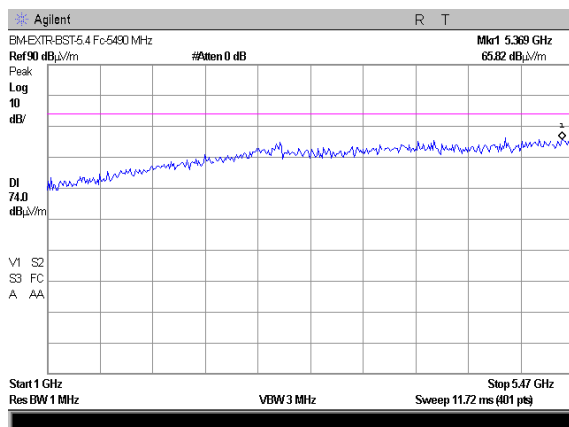
Model: XTRM-BS-2SIS-5.4-Ext

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FCC ID: LKT-EXTR-50

Antenna internal 15.5 dBi.

Carrier frequency 5490 MHz.

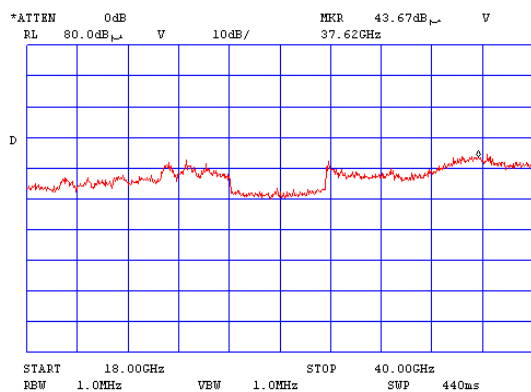
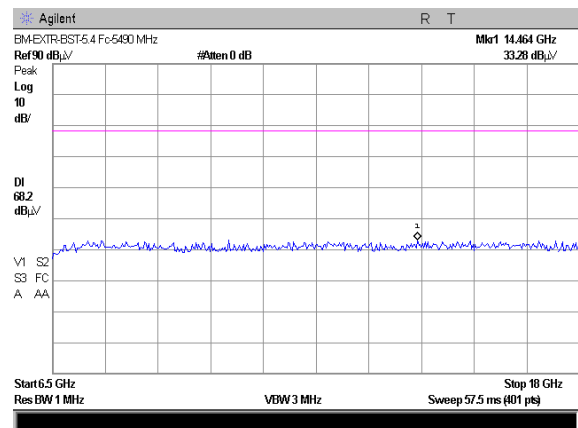
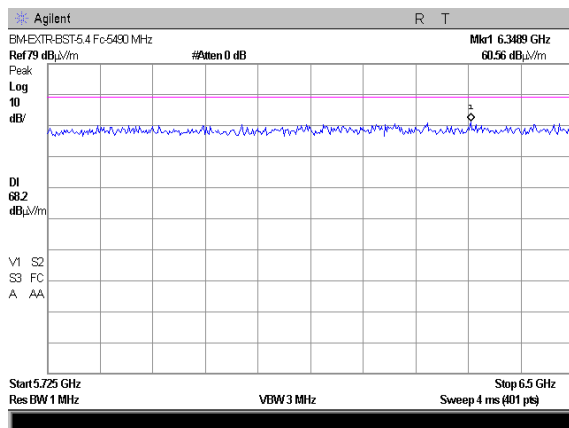




Test report No: 9012321870/1
Title: BreezeMAX Extreme 5.4 Base station
Model: XTRM-BS-2SIS-5.4-Ext

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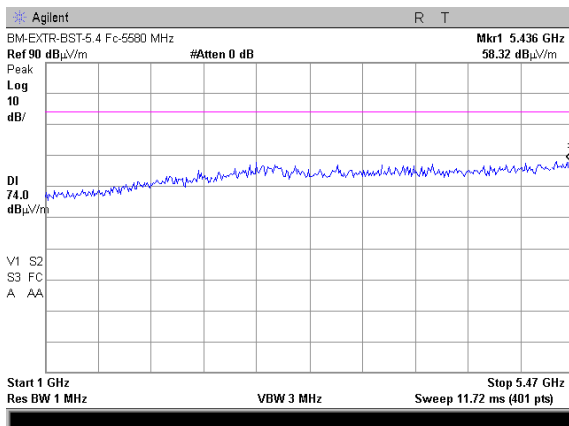


Test report No: 9012321870/1
Title: BreezeMAX Extreme 5.4 Base station
Model: XTRM-BS-2SIS-5.4-Ext

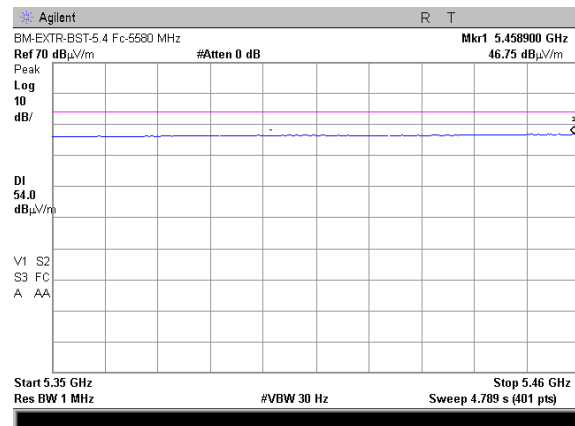
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FCC ID: LKT-EXTR-50

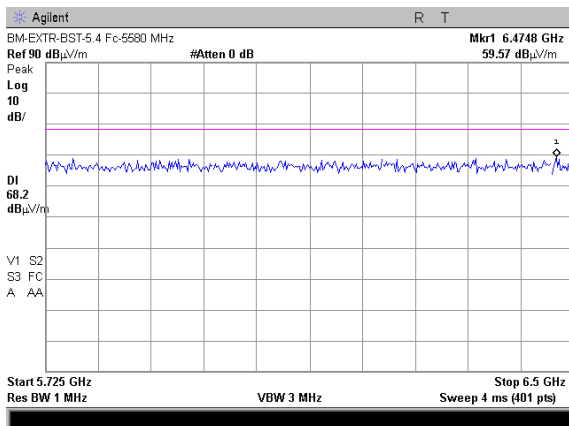
Carrier frequency 5580 MHz.



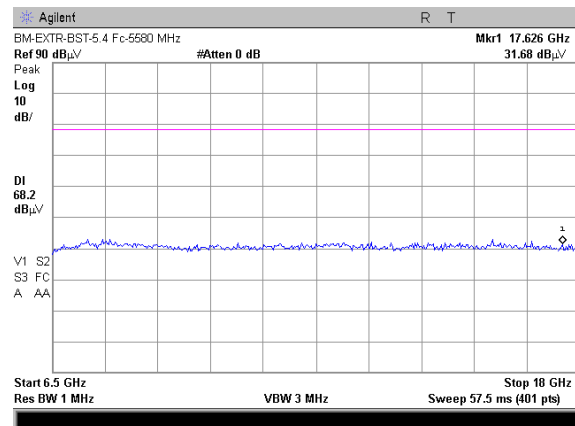
Plot # 40



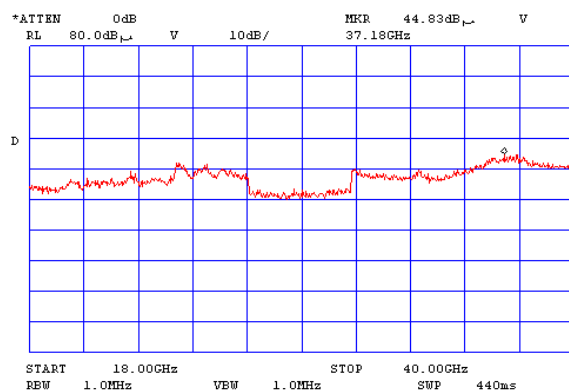
Plot # 41



Plot # 42



Plot # 43



Plot # 44

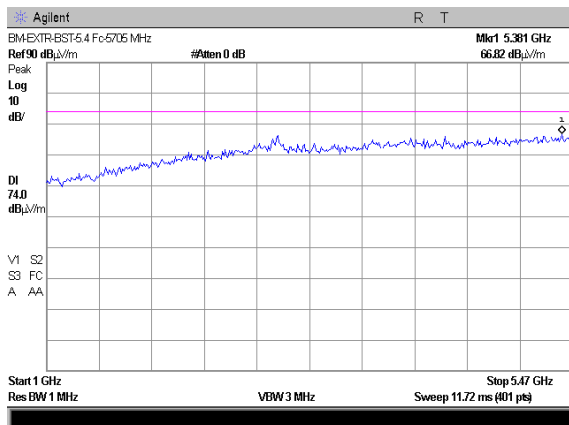


Test report No: 9012321870/1
Title: BreezeMAX Extreme 5.4 Base station
Model: XTRM-BS-2SIS-5.4-Ext

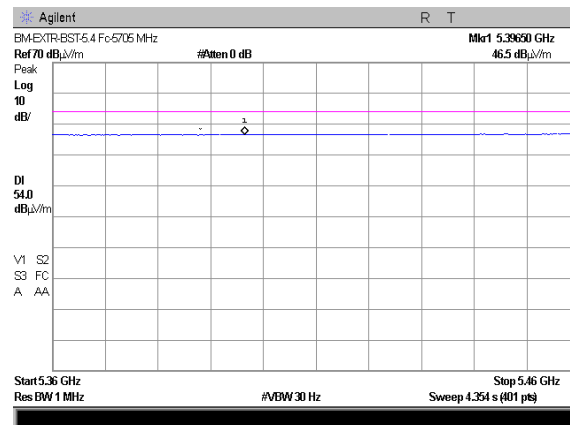
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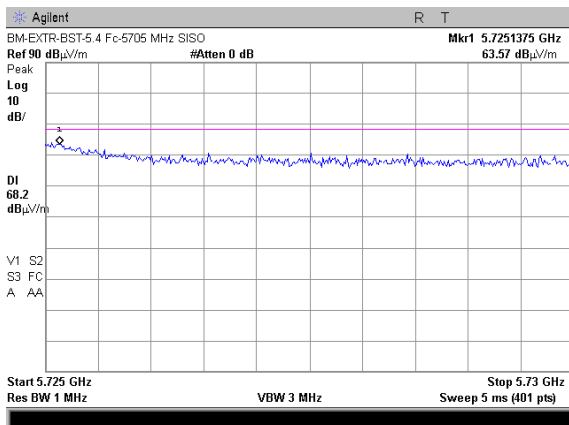
Carrier frequency 5705 MHz.



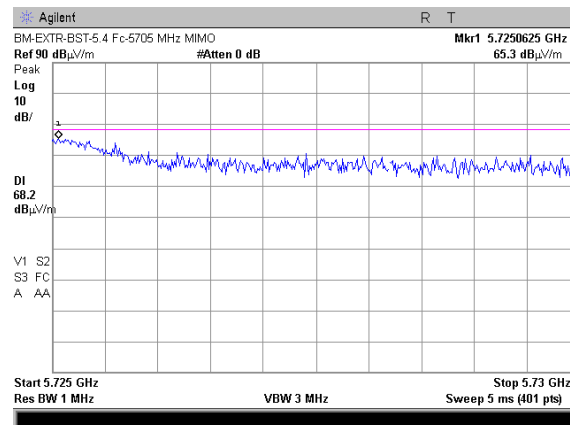
Plot # 45



Plot # 46



Plot # 47



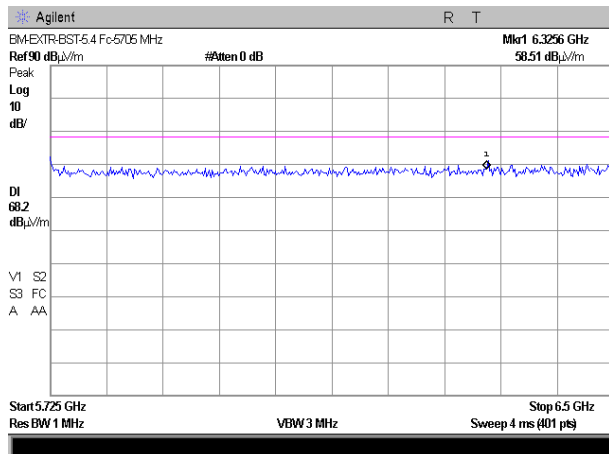
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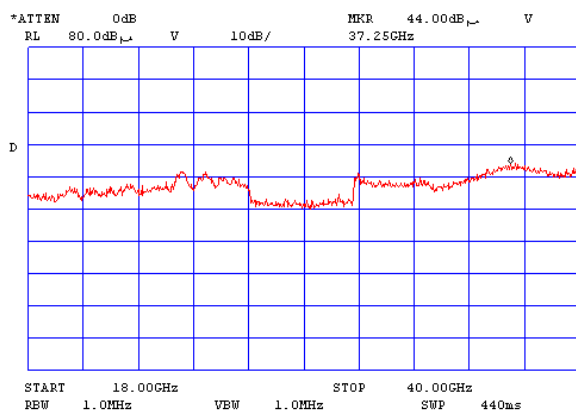
Test report No: 9012321870/1
Title: BreezeMAX Extreme 5.4 Base station
Model: XTRM-BS-2SIS-5.4-Ext

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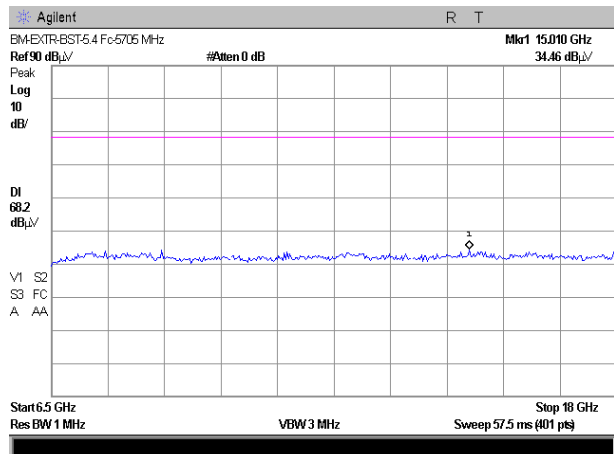
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Plot # 49



Plot # 51



Plot # 50



Test report No: 9012321870/1

Title: BreezeMAX Extreme 5.4 Base station

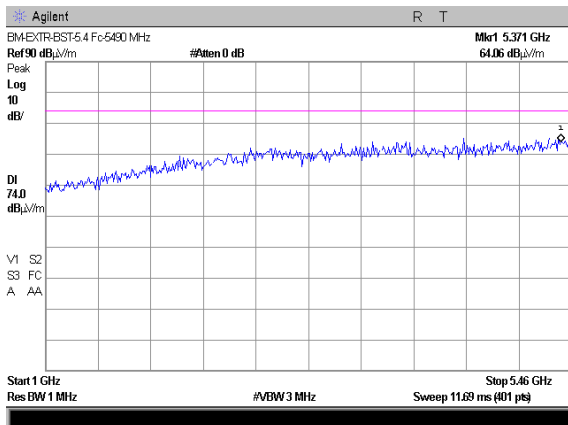
Model: XTRM-BS-2SIS-5.4-Ext

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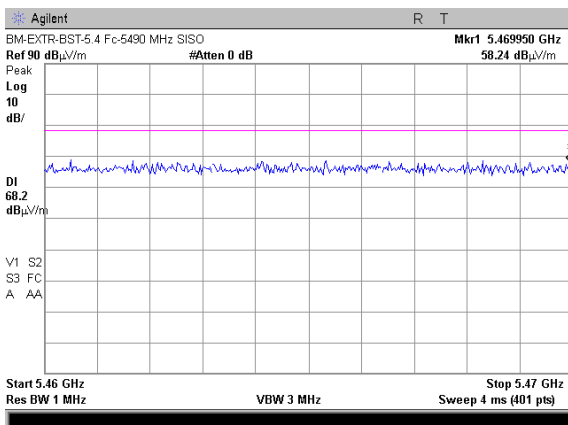
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Antenna Omni.

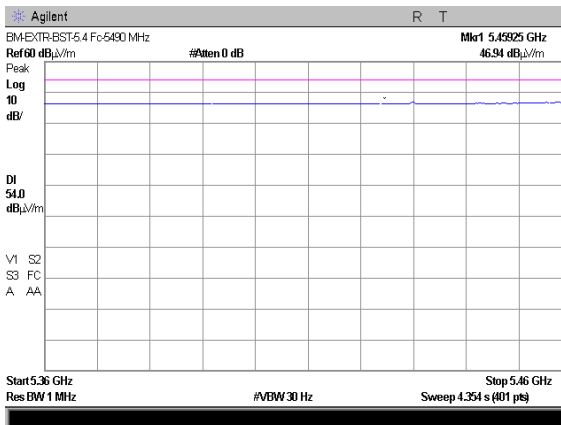
Carrier frequency 5490 MHz.



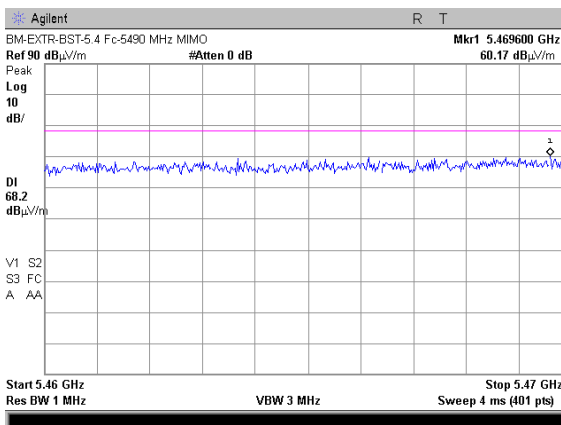
Plot # 52



Plot # 54



Plot # 53



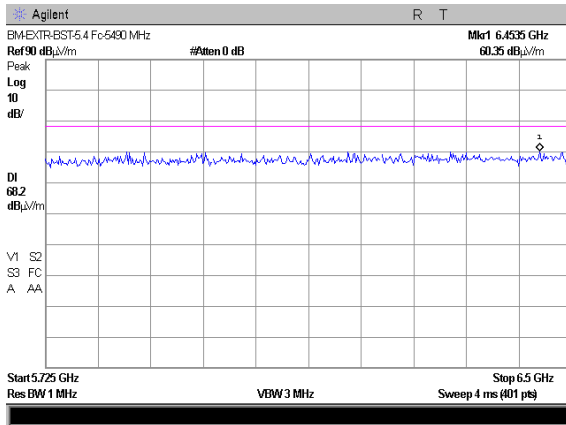
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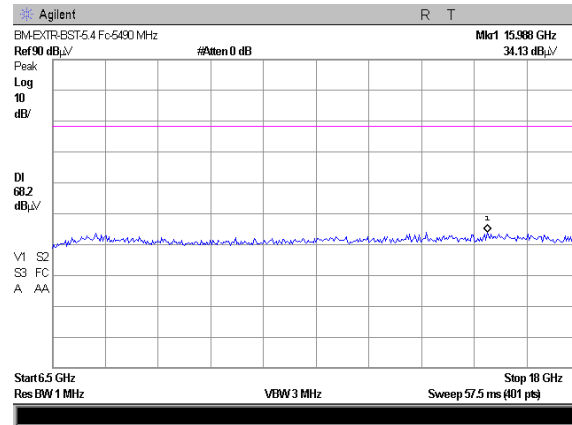
Test report No: 9012321870/1
Title: BreezeMAX Extreme 5.4 Base station
Model: XTRM-BS-2SIS-5.4-Ext

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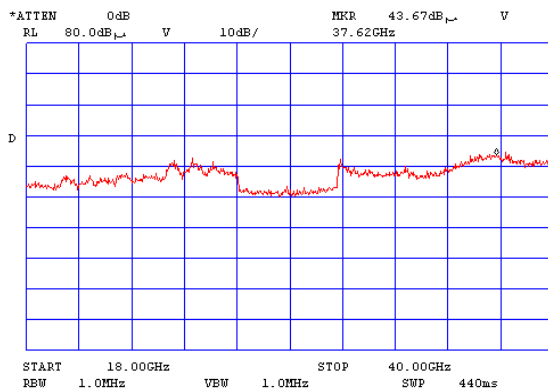
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Plot # 56



Plot # 57



Plot # 58



Test report No: 9012321870/1

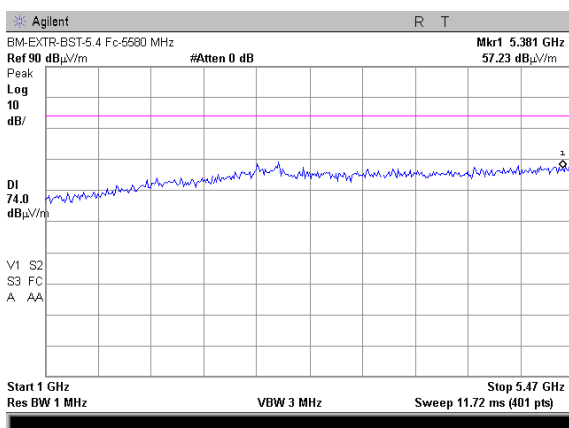
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Model: XTRM-BS-2SIS-5.4-Ext

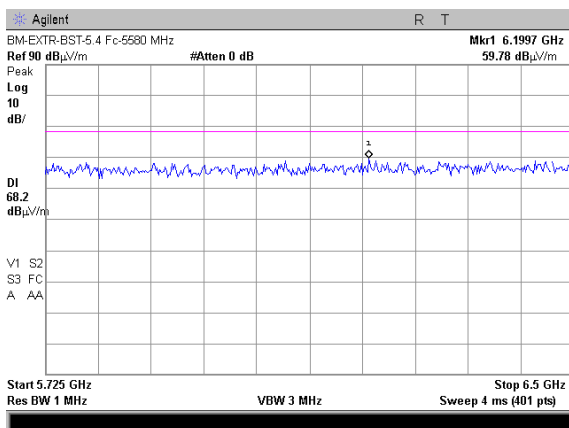
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FCC ID: LKT-EXTR-50

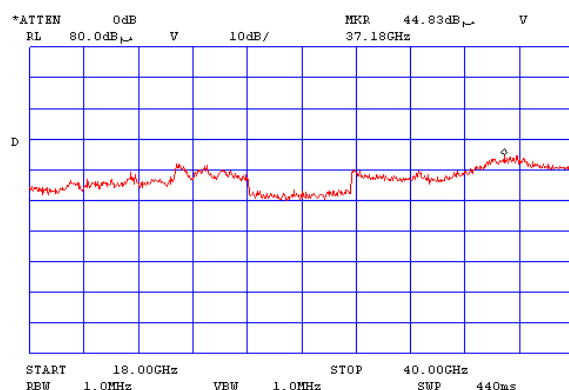
Carrier frequency 5580 MHz.



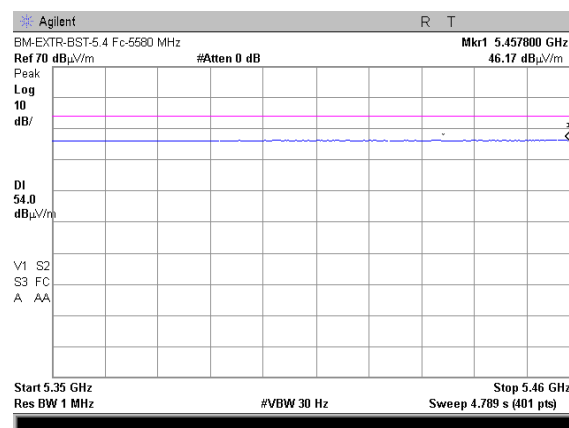
Plot # 59



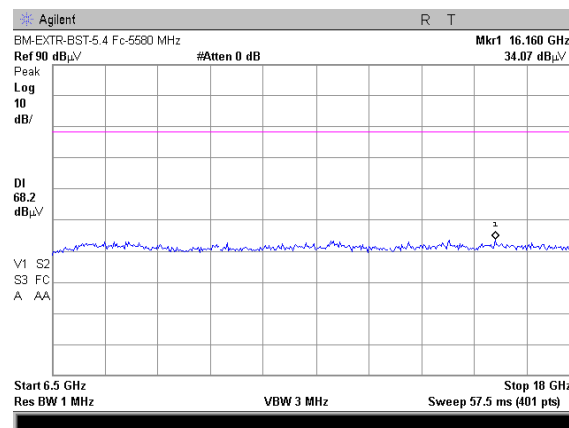
Plot # 61



Plot # 63



Plot # 60



Plot # 62



Test report No: 9012321870/1

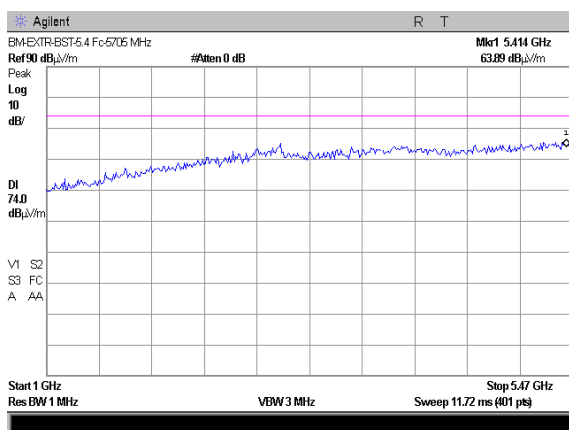
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Model: XTRM-BS-2SIS-5.4-Ext

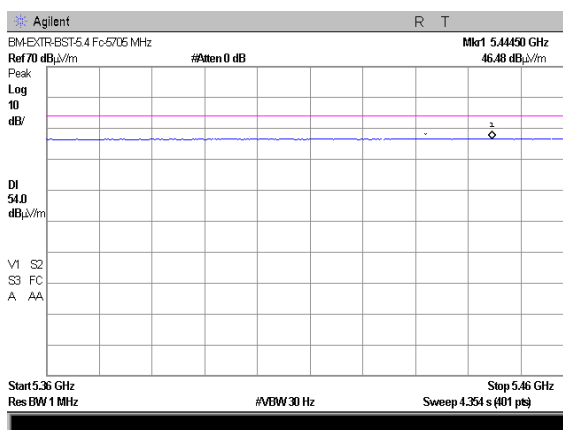
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FCC ID: LKT-EXTR-50

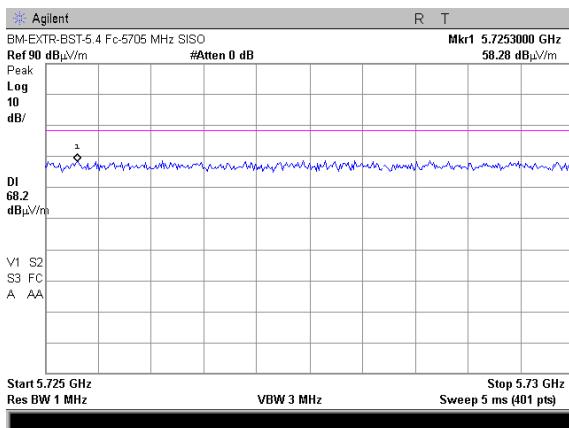
Carrier frequency 5705 MHz.



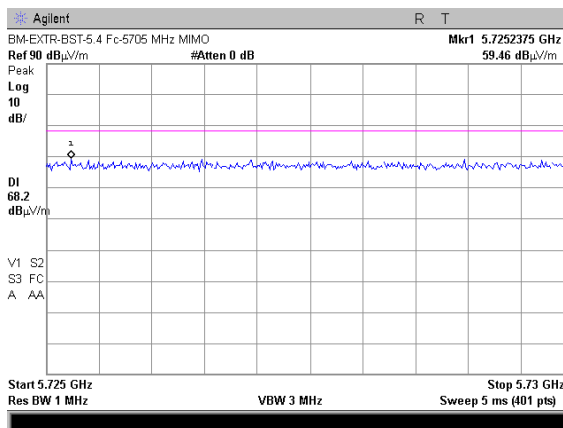
Plot # 64



Plot # 65



Plot # 66



Plot # 67



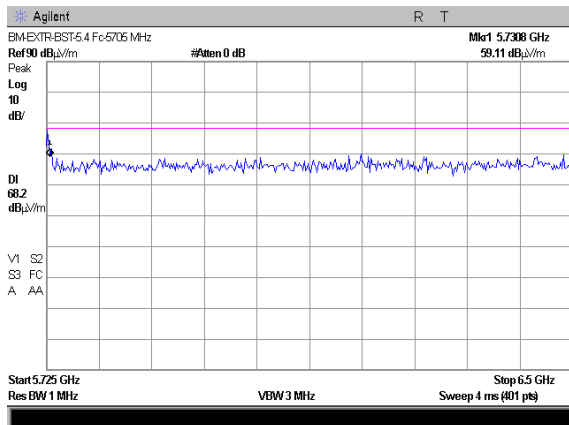
Test report No: 9012321870/1

Title: BreezeMAX Extreme 5.4 Base station

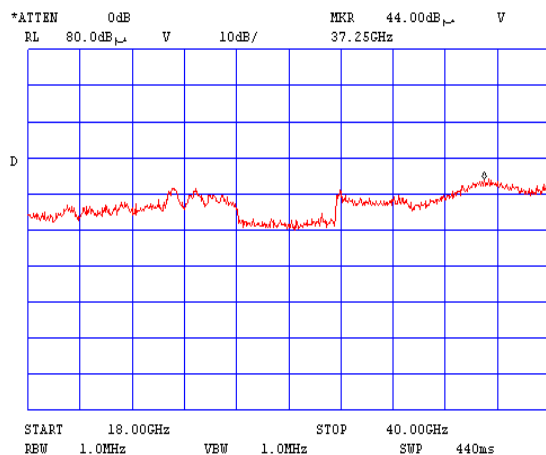
Model: XTRM-BS-2SIS-5.4-Ext

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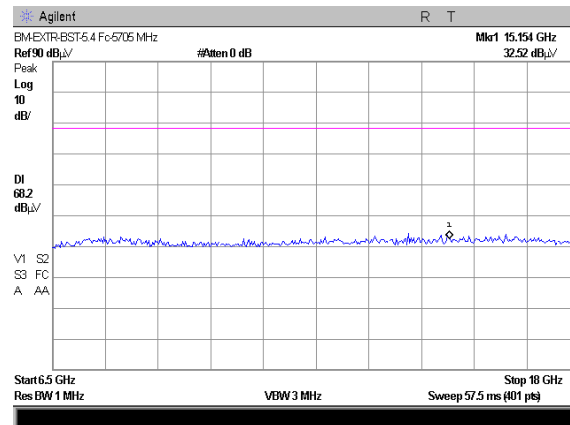
FCC ID: LKT-EXTR-50



Plot # 68



Plot # 70



Plot # 69



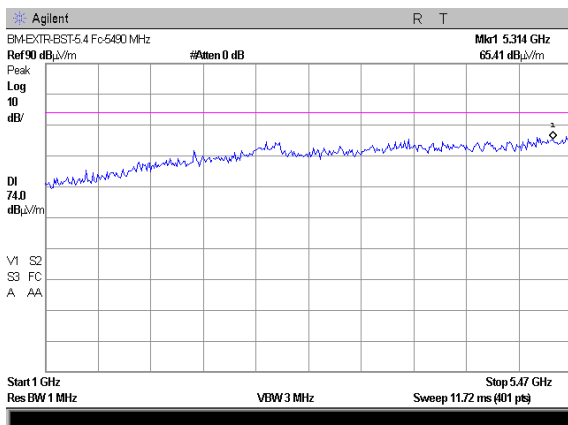
Test report No: 9012321870/1
Title: BreezeMAX Extreme 5.4 Base station
Model: XTRM-BS-2SIS-5.4-Ext

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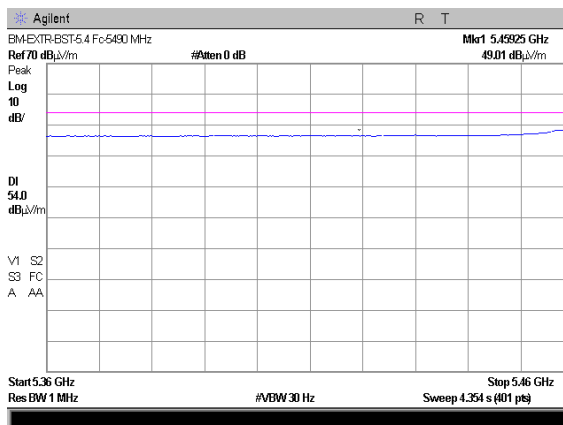
FCC ID: LKT-EXTR-50

Antenna sector 17 dBi.

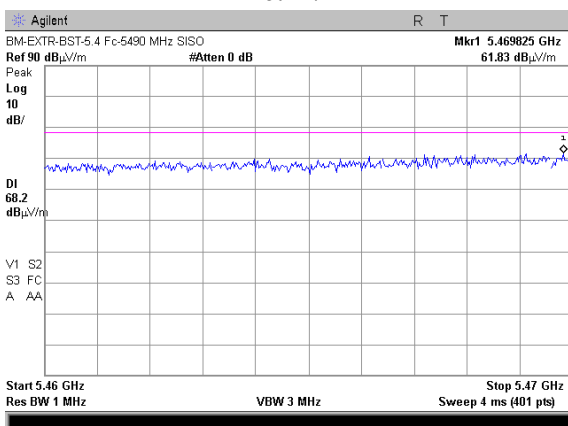
Carrier frequency 5490 MHz.



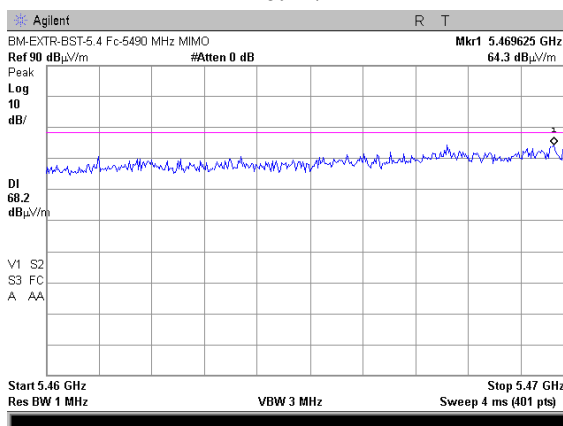
Plot # 71



Plot # 72



Plot # 73



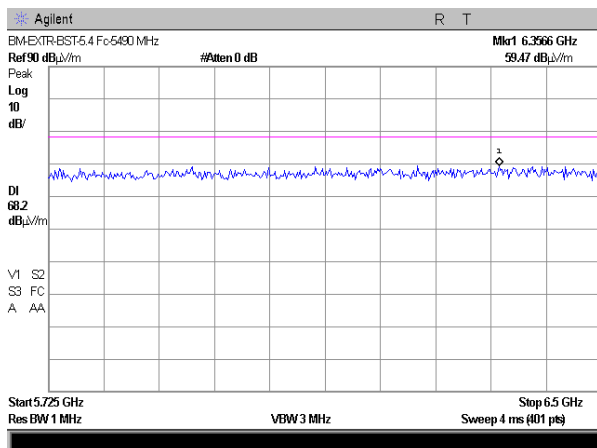
Plot # 74



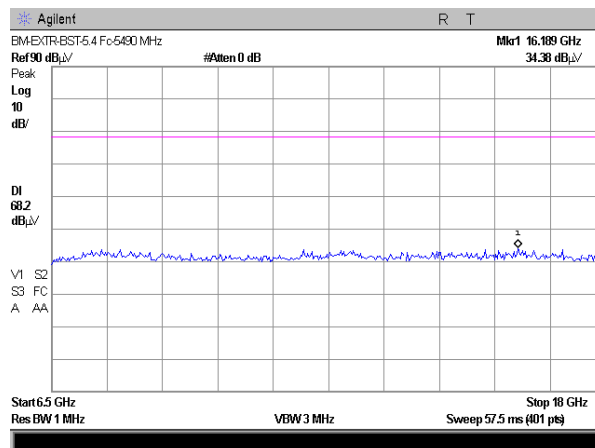
Test report No: 9012321870/1
Title: BreezeMAX Extreme 5.4 Base station
Model: XTRM-BS-2SIS-5.4-Ext

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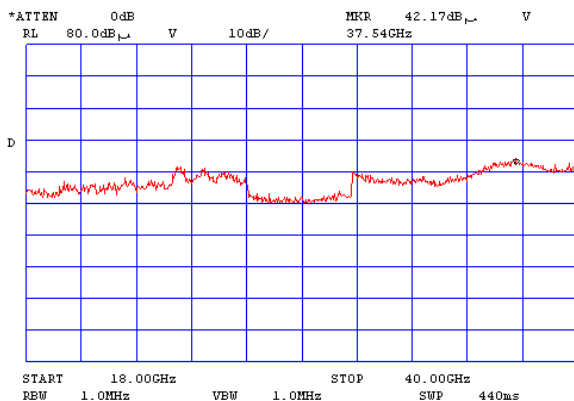
FCC ID: LKT-EXTR-50



Plot # 75



Plot # 76



Plot # 77



Test report No: 9012321870/1

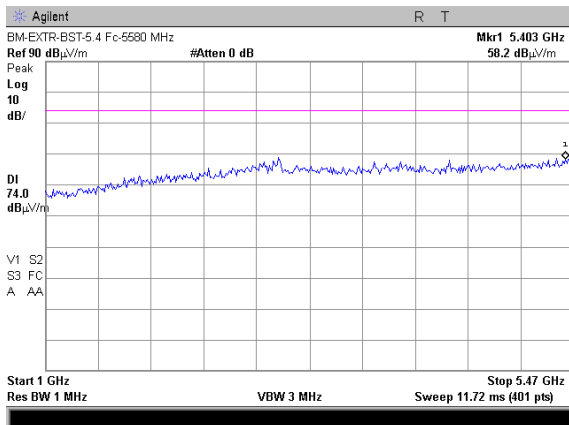
Title: BreezeMAX Extreme 5.4 Base station

Model: XTRM-BS-2SIS-5.4-Ext

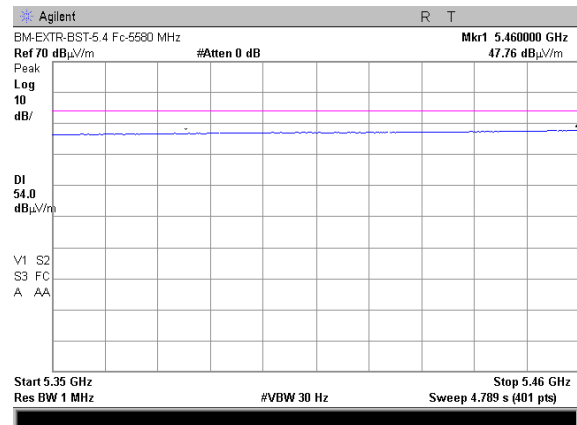
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FCC ID: LKT-EXTR-50

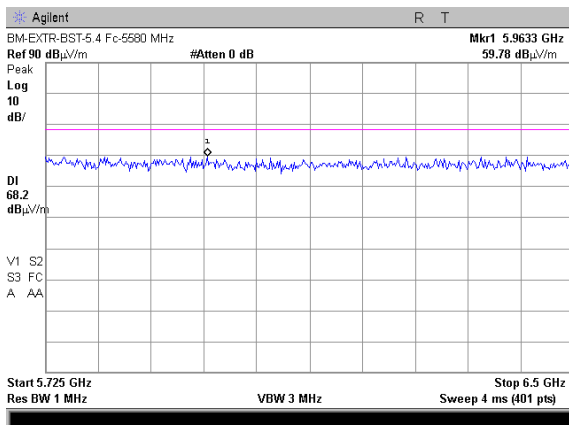
Carrier frequency 5580 MHz.



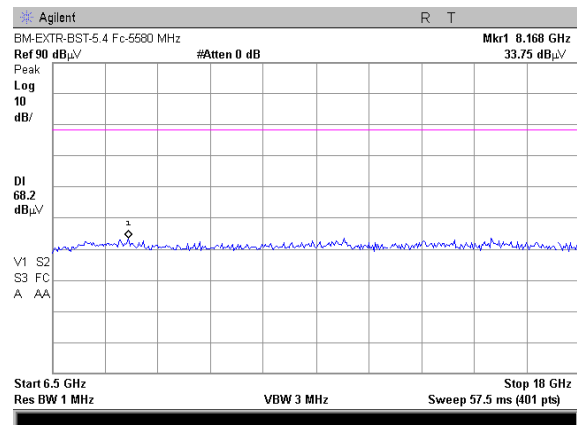
Plot # 78



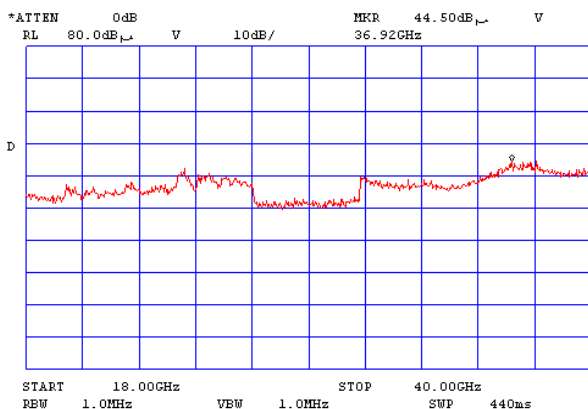
Plot # 79



Plot # 80



Plot # 81



Plot # 82



Test report No: 9012321870/1

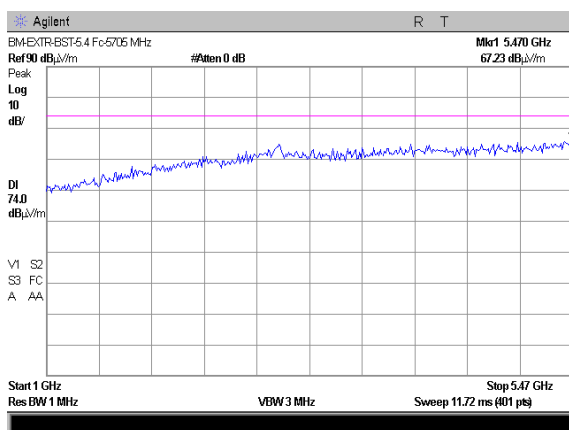
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Model: XTRM-BS-2SIS-5.4-Ext

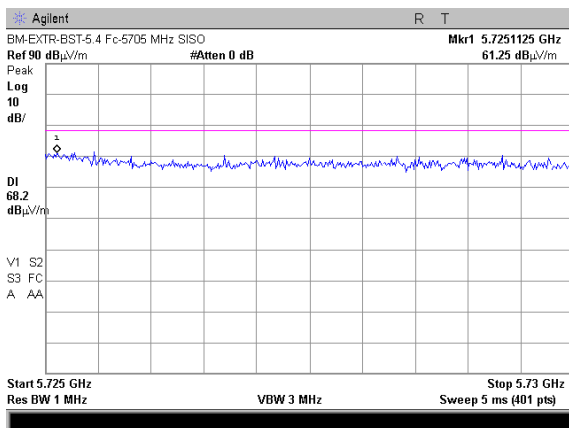
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FCC ID: LKT-EXTR-50

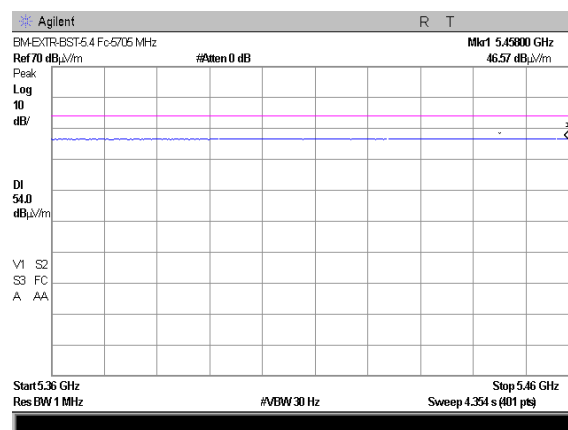
Carrier frequency 5705 MHz.



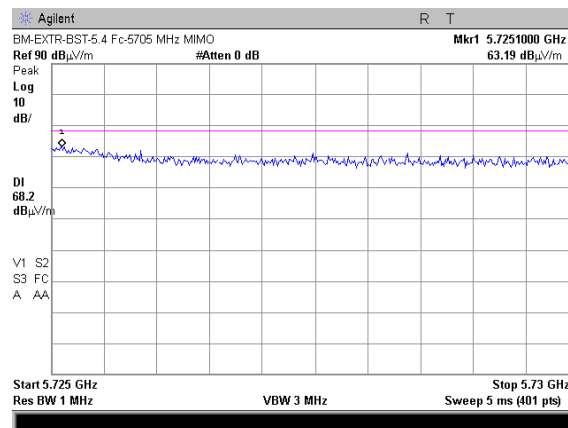
Plot # 83



Plot # 85



Plot # 84



Plot # 86



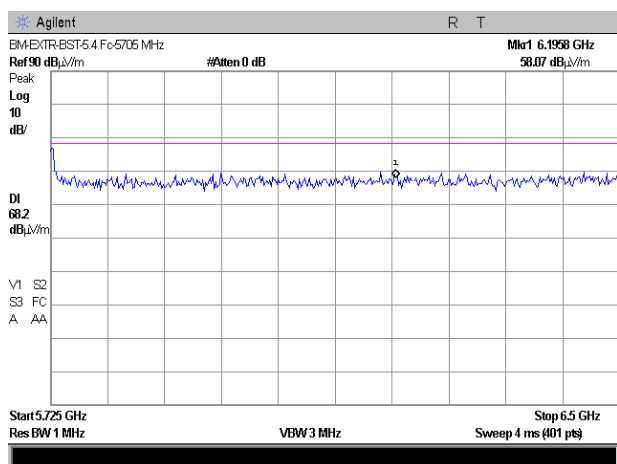
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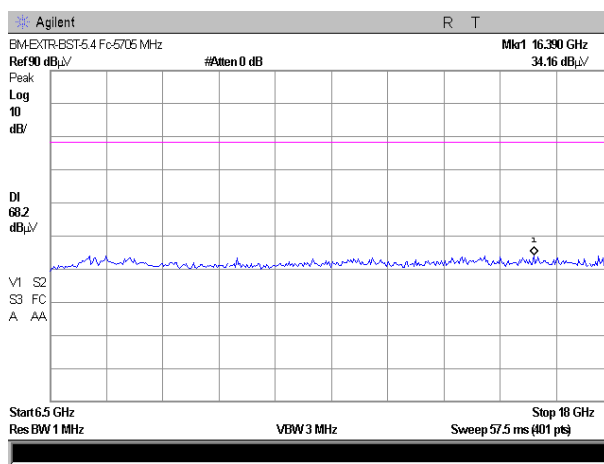
Model: XTRM-BS-2SIS-5.4-Ext

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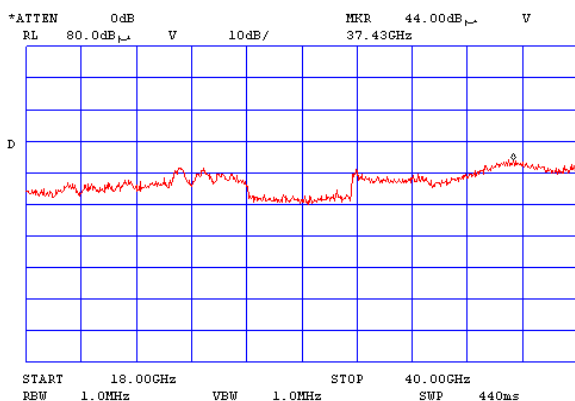
FCC ID: LKT-EXTR-50



Plot # 87



Plot # 88



Plot # 89

**Test report No:** 9012321870/1**Page 39 of 49 Pages****Title:** BreezeMAX Extreme 5.4 Base station**Model:** XTRM-BS-2SIS-5.4-Ext**FCC ID:** LKT-EXTR-50**5.1.5 Peak excursion test**

Method of measurement DA 02-2138
 Operating Frequency Range 5.490 - 5.705 GHz
 Ambient Temperature 23⁰ C Relative Humidity 49% Air Pressure 1009 hPa

The measurements were performed at three transmitted carrier (channel) frequencies at bottom, middle and top of the 5.490 - 5.705 GHz frequency band under maximum data transfer bit rate.

RF chain	Carrier frequency, MHz	Measured ratio, dB	Limit, dB	Margin, dB	Reference to plot #
1	5490	11.9	13	1.1	90
	5580	11.9	13	1.1	91
	5705	11.9	13	1.1	92
2	5490	10.8	13	1.2	93
	5580	10.7	13	1.3	94
	5705	10.8	13	1.2	95

REQUIREMENT

The ratio of the peak excursion of the modulation envelope 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. 15.407 (a) (6).

TEST PROCEDURE

The test was performed at worse case mode at maximum allowed output power.

The measurements were performed at three transmitted carrier (channel) frequencies at bottom, middle and top of the 5.490 - 5.705 GHz frequency band under maximum data transfer bit rate.

Test was conducted with the follow SA settings:

Trace #1 – RBW = 1 MHz VBW = 3 MHz Max hold mode.

Trace #2 – RBW = 1 MHz VBW = 1 kHz were VBW was calculated from transmission time duration T. (plot # 96). $VBW = 1 \text{ kHz} > 1/T = 1/2.84 \text{ ms} = 0.35 \text{ kHz}$

TEST SAMMARY

Transmitter meets standard requirement.

TEST EQUIPMENT USED:

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

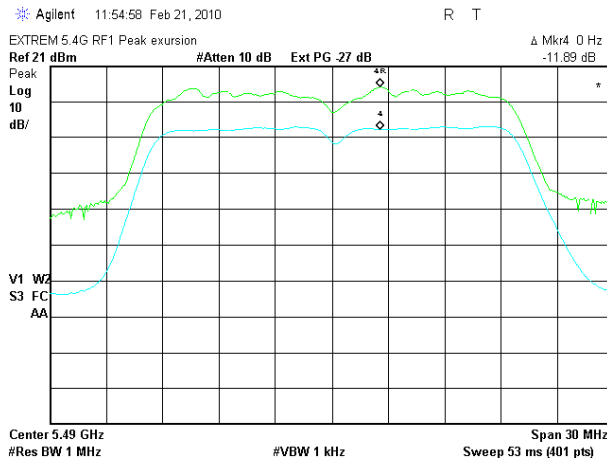


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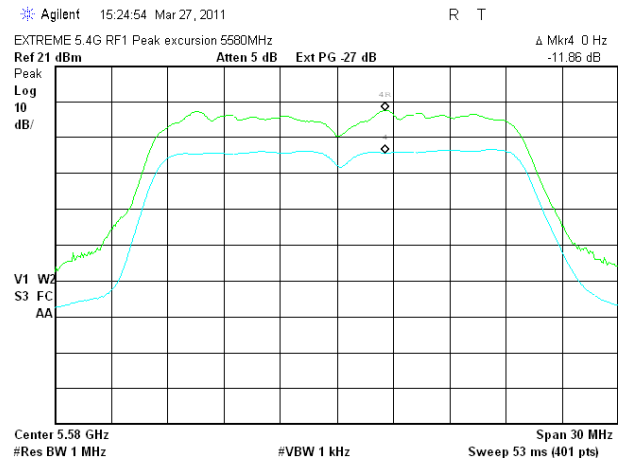
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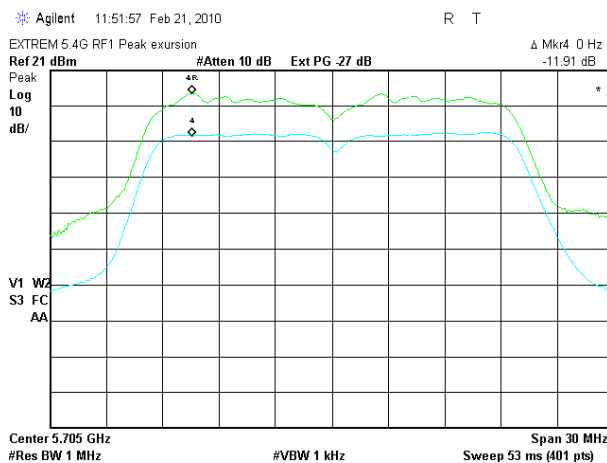
RF chain #1



Plot # 90. Carrier Frequency 5490 MHz



Plot # 91. Carrier Frequency 5580 MHz



Plot # 92. Carrier Frequency 5705 MHz

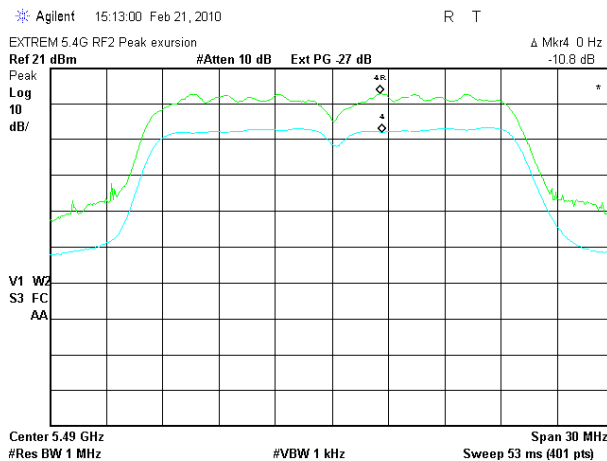


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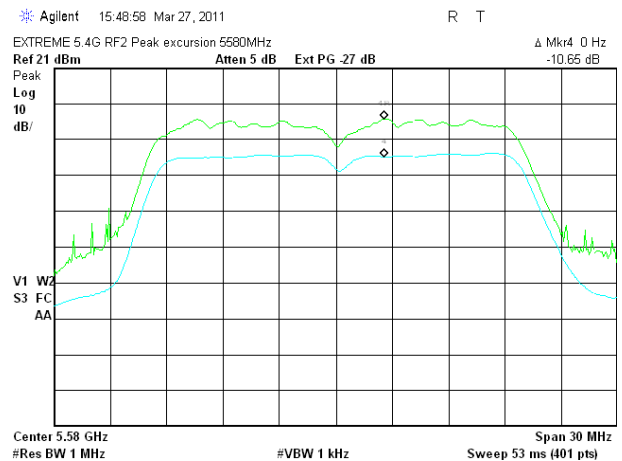
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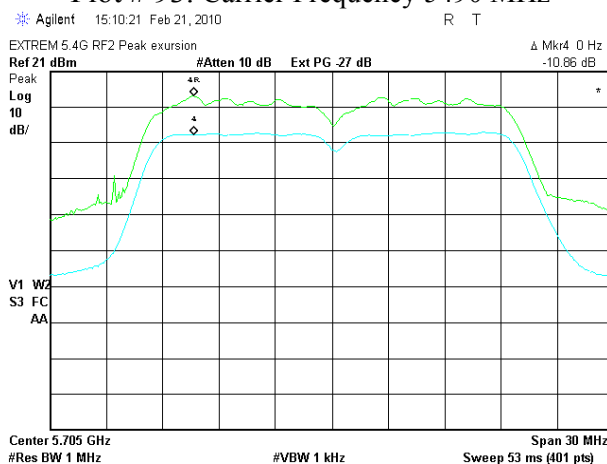
RF chain # 2



Plot # 93. Carrier Frequency 5490 MHz



Plot # 94. Carrier Frequency 5580 MHz



Plot # 95. Carrier Frequency 5705 MHz



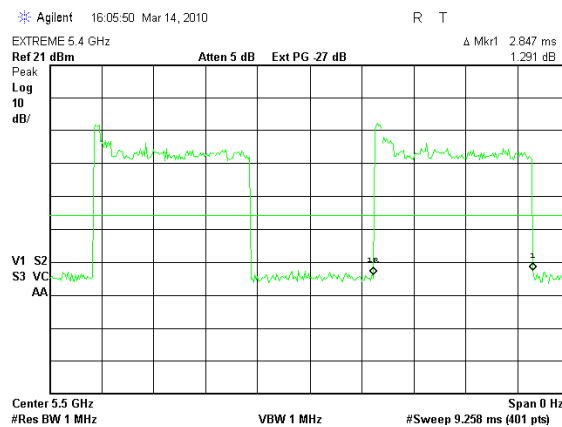
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Plot # 96. Measurement of transimtion time duration T.

Video bandwidth was calculated from transimtion time duration T.

Calculated VBW = 1 kHz > 1/T = 1/2.84 ms = 0.35 kHz.

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APPENDIX A Photographs

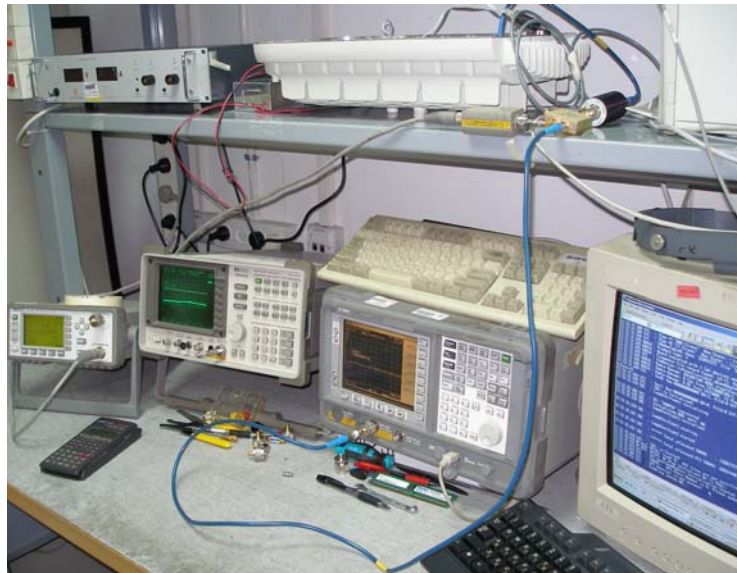


Photo 1. Conducted measurements. Test setup.



Photo 2. Test setup with internal antenna.

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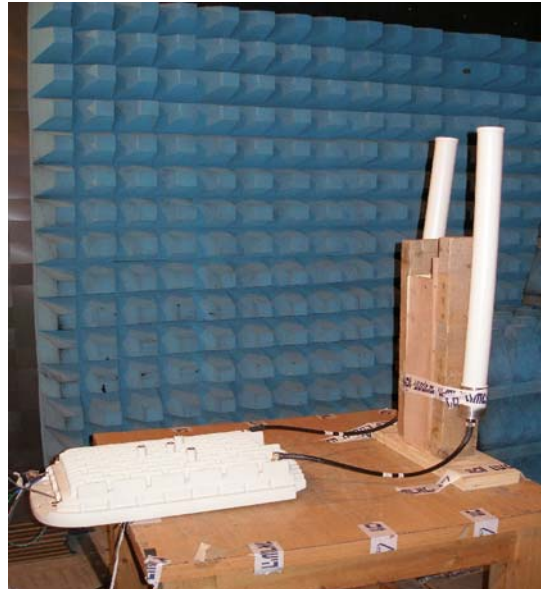


Photo 4. RE test setup with external Omni antennas.



Photo 5. RE test setup with external sector antennas.

**Test report No:** 9012321870/1**Title:** BreezeMAX Extreme 5.4 Base station**Model:** XTRM-BS-2SIS-5.4-Ext**Page 45 of 49 Pages****FCC ID:** LKT-EXTR-50**APPENDIX B Test equipment used****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 2011
2	Spectrum Analyzer 9 kHz - 26.5 GHz	Agilent	4407B	US40241729	June 2011
3	Attenuators 20 dB DC – 8.5 GHz	Aeroflex/ Weinshel	33-30-34	A3451	June 2011
4	Power splitter 1.7 – 9 GHz	Mini-Circuits	ZN2PD-9G	0142	June 2011
5	Cable RF 1m	Huber-Suhner	Sucoflex 104	21324/4PE	October 2011
6	Double Ridged Guide Antenna 1 – 18 GHz	EMCO	3115	5802	Aug 2011
7	Broadband Horn antenna 15 – 40 GHz	Schwarzbeck Mess-Electronik	BBHA 9170	9170-341	Aug 2011
8	Antenna Biconilog 30 – 2000 MHz	Schaffner-Chase	CBL6112B	S/N 23181	Aug 2011
9	Spectrum analyzer 10 KHz-26.5 GHz	HP	E7405A	SII 4944	April 2011
10	EMI Receiver 9 kHz-6.5 GHz	HP	8546A+85460A	SII 4068	April 2011
11	Spectrum analyzer 20 Hz - 13.6 GHz	Agilent	MXA 9020A	MY48010501	June 2011
12	LISN 9 kHz – 30 MHz	FCC	LISN 250-32-4-16	SII5023	October 2011
13	Transient limiter 0.009-200 MHz	HP	11947A	3107105	October 2011
14	Cable RF 4m	Huber-Suhner	Sucoflex 104PE	21329/4PE	October 2011
15	Cable RF 0.5m	Huber-Suhner	Multiflex 141	520201	October 2011
16	Active Loop antenna 10 kHz – 30 MHz	EMCO	6502	SII 4874	October 2011

**Test report No:** 9012321870/1**Page 46 of 49 Pages****Title:** BreezeMAX Extreme 5.4 Base station**Model:** XTRM-BS-2SIS-5.4-Ext**FCC ID:** LKT-EXTR-50**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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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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FCC ID: LKT-EXTR-50

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.21329/4PE; 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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Model: XTRM-BS-2SIS-5.4-Ext

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APPENDIX C General information.

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
rms	root mean square

Specification references

47 CFR part 15: 2009	Radio Frequency Devices
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
ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communication Equipment Measurement and Performance.