DLS ELECTRONIC SYSTEMS, INC.
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045A002A
Report Number:	18191
DLS Project:	5271

Code of Federal Regulations 47 Part 15 – Radio Frequency Devices

Subpart E – Unlicensed National Information Infrastructure Devices
Section 15.407
General Technical Requirements.

THE FOLLOWING **MEETS** THE ABOVE TEST SPECIFICATION
FOR A **CLASS III** PERMISSIVE CHANGE
(DFS not tested by DLS Electronic Systems Inc.)

Formal Name:	PMP450AP 5.4 & 5.7 GHz MIMO/Combo Radio
Kind of Equipment:	Point-to-Multipoint Digital Transmission Transceiver
Frequency Range:	**5475 to 5720 MHz (5.4 GHz xcvr in this report)** 5730 to 5845 MHz (5.7 GHz xcvr reported to the FCC in CFR 47 Part 15 Subpart C Section 15.247 reports # 17897, 17898 & 17898a)
Test Configuration:	Stand-alone
Model Number(s):	C054045A002A
Model(s) Tested:	C054045A002A
Serial Number(s):	0A003EA00157 (test unit 1), 0A003EA00154 (test unit 2), 0A003EA00145 (test unit 3)
Date of Tests:	July 2012, and October 2012
Test Conducted For:	Cambium Networks 3800 Golf Road, Suite 360 Rolling Meadows, IL 60008, USA

ELECTRONIC SYSTEMS, INC.
166 South Carter, Genoa City, WI 53128

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SIGNATURE PAGE

Report By:

Craig Brandt
Test Engineer

Reviewed By:

William Stumpf
OATS Manager

Approved By:

Brian Mattson
General Manager

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United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 100276-0

D.L.S. Electronic Systems, Inc.
Wheeling, IL

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2012-10-01 through 2013-09-30
Effective dates

For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)

1.0 Summary of Test Report

It was determined that the Cambium Networks PMP450AP 5.4 & 5.7 GHz MIMO/Combo Radio, Model C054045A002A, complies with the requirements of CFR 47 Part 15 Subpart E Section 15.407. The purpose of this test was to show FCC compliance of the PMP450AP 5.4 & 5.7 GHz MIMO/Combo Radio, pursuant to a Class III Permissive Change to FCC ID: Z8H89FT0002. The original device was certified as a 5.7 GHz MIMO/Combo Radio, tested to CFR 47 Part 15 Subpart C, Section 15.247. This report is being generated to show compliance of the 5.4 GHz MIMO/Combo Radio being added to the software package of the device. The same test samples were supplied for the current testing and the original certification for FCC ID: Z8H89FT0002. Original testing of the PMP450AP 5.7 GHz MIMO/Combo Radio determined that QPSK is the worst case modulation of the OFDM transceiver and 2-level is the worst case modulation for the FSK transceiver. These modulations were tested to show compliance to CFR 47 Part 15 Subpart E Section 15.407 for the Class III Permissive Change.

Subpart E Section 15.407 Applicable Technical Requirements Tested:

Section	Description	Procedure	Note	Compliant?
Informative	Emission Bandwidth – 26 dB bandwidth	FCC KDB 789033 D01 General UNII Test Procedures v01r01 Section D	1	NA
15.407(a)(2)	Maximum Conducted Output Power	FCC KDB 789033 D01 General UNII Test Procedures v01r01 Section C(3)(e)	1	Yes
15.407(a)(2)	Peak Power Spectral Density - Conducted	FCC KDB 789033 D01 General UNII Test Procedures v01r01 Section E. For **FSK** modulation a non-standard procedure was used.	1	Yes
15.407(a)(6)	Peak Excursion - Conducted	FCC KDB 789033 D01 General UNII Test Procedures v01r01 Section F	1	Yes
15.407(b)(3) & 15.407(b)(5)	Unwanted Emission Levels – Conducted Band-Edge	FCC KDB 789033 D01 General UNII Test Procedures v01r01 Section G(2) & FCC 15.407 (b)(5)	1	Yes
15.407(b)(3) & 15.407(b)(5)	Unwanted Emission Levels – Radiated Band-Edge	FCC KDB 789033 D01 General UNII Test Procedures v01r01 Sections G(3)(d) and G(5)	2	Yes

15.407(b)(3) & 15.407(b)(6)	Unwanted Emission Levels – RF Conducted	FCC KDB 789033 D01 General UNII Test Procedures v01r01 Sections G(1), G(2),G(3), G(4), G(5)	1	Yes
15.407(b)(3) & 15.407(b)(6)	Unwanted Emission Levels – Radiated from cabinet	FCC KDB 789033 D01 General UNII Test Procedures v01r01 Sections G(1), G(2),G(3), G(4), G(5)	2	Yes
15.407(h)(2)	Dynamic Frequency Selection (DFS)	Not tested by DLS		NA

Note 1: RF Conducted emission measurement.
Note 2: Radiated emission measurement.

2.0 Introduction

In July & October, 2012 the PMP450AP 5.4 & 5.7 GHz MIMO/Combo Radio, Model C054045A002A, as provided from Cambium Networks, was tested to the requirements of CFR 47 Part 15 Subpart E Section 15.407 to be added to FCC ID: Z8H89FT0002 as a Class III Permissive Change. To meet these requirements, the procedures contained within this report were performed by personnel of D.L.S Electronic Systems, Inc.

3.0 Test Facilities

D.L.S. Electronic Systems, Inc. is a full service EMC/Safety Testing Laboratory accredited to ISO 17025. NVLAP Certificate and Scope can be viewed at http://www.dlsemc.com/certificate. Our facilities are registered with the FCC, Industry Canada, and VCCI.

Wisconsin Test Facility:
D.L.S. Electronic Systems, Inc.
166 S. Carter Street
Genoa City, Wisconsin 53128

Wheeling Test Facility:
D.L.S. Electronic Systems, Inc.
1250 Peterson Drive
Wheeling, IL 60090

4.0 Description of Test Sample

Description:

Point-to-Multipoint 5.4 GHz & 5.7 GHz DTS/UNII Transceiver with either OMNI (13 dBi) or Sector (17 dBi) external antenna with 10 MHz or 20 MHz channel bandwidth. The Sector Antenna housing includes the 17 dBi Dipole Sector Antenna and 10.5 dBi Dual Patch Antenna. The 17 dBi antenna operates with OFDM modulation, and the 10.5 dBi Dual Patch Antenna operates with FSK modulation. An external 10 dBi OMNI antenna can operate with the FSK modulation as well.

Type of Equipment / Frequency Range:

Stand-Alone / **5475 to 5720 MHz (10 MHz bandwidth) (in this report)**
5480 to 5715 MHz (20 MHz bandwidth) (in this report)
5495 to 5705 MHz (FSK) (in this report)

5730 to 5845 MHz (5.7 GHz xcvr reported to the FCC in reports # 17897, 17898 & 17898a)

Physical Dimensions of Equipment Under Test:

Length: 9 in. Width: 9 in. Height: 3 in.

Power Source:

29 VDC (Power Over Ethernet to Radio)
120 Vac, 60 Hz using Phihong power supply model: PSA15A-295 (MOT)

Internal Frequencies:

150 kHz, 75 kHz (Switching Power Supply Frequencies)
40 MHz, 25 MHz, 20 MHz

Transmit / Receive Frequencies Used For Test Purpose:

10 MHz Channel Bandwidth:	Low channel: 5475 MHz, Middle channel: 5575 MHz, High channel: 5720 MHz
20 MHz Channel Bandwidth:	Low channel: 5480 MHz, Middle channel: 5575 MHz, High channel: 5715 MHz
FSK:	Low channel: 5495 MHz, Middle channel: 5575 MHz, High channel: 5705 MHz

Type of Modulation(s):

OFDM:	QPSK, 16-QAM, 64-QAM	**(QPSK is worst case)**
FSK:	2-level & 4-level	**(2-level is worst case)**

Description of Circuit Board(s) / Part Number:

Cambium Networks PC Board	84010120001 Issue A
17 dBi Dipole Sector antenna with 10.5 dBi Dual Patch antenna in antenna housing	SKM540045-17
Connector	09010084001
Cables x 3	30009406002
OMNI 13 dBi antenna	AMO-5G13
OMNI 10 dBi antenna	M26310100015

5.0 Test Equipment

A list of the equipment used can be found in the table below. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.

D.L.S. Wisconsin

Description	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Dates	Cal Due Dates
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	7/12	7/13
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	4/12	4/13
Preamplifier	Rohde & Schwarz	TS-PR10	032001/004	9 kHz – 1 GHz	1/12	1/13
Antenna	EMCO	3104C	00054892	20 MHz – 200 MHz	9/10	9/12
Antenna	EMCO	3146	1205	200 MHz – 1 GHz	9/10	9/12
Preamp	Ciao	CA118-4010	101	1GHz-18GHz	2/12	2/13
Preamp	Planar	PTB-60-120-5RC-10-115VAC-SFF	P13291	1GHz-20GHz	8/11	8/12
Horn Antenna	EMCO	3115	9903-5731	1-18GHz	6/11	6/13
Horn Antenna	EMCO	3115	6204	1-18GHz	6/11	6/13
Low Pass Filter	Mini-Circuits	VLFX-1125	RUU926000920	DC-1125MHz	8/11	8/12
Preamp	Miteq	AMF-8B-180265-40-10P-H/S	438727	18GHz-26GHz	8/11	8/12
Horn Antenna	EMCO	3116	2549	18 – 40GHz	8/10	8/12
High Pass Filter	Planar Filter Co.	HP8G-7G8-CD-SFF	PF1225/0728	7.5 GHz – 18 GHz	8/11	8/12
High Pass Filter	Planar Filter Co.	CL22600-9000-CD-SS	PF1230/0728	16.2 GHz – 40 GHz	8/11	8/12
LISN	Solar	9252-50-R-24-BNC	971612	9 kHz – 30 MHz	3/12	3/13
Filter- High-Pass	Solar	7930-120	090701	120 kHz– 30 MHz	1/12	1/13
Limiter	Electro-Metrics	EM-7600	705	9 kHz – 30 MHz	1/12	1/13
10 dB attenuator	narda	4768-10	0702	DC – 40 GHz	8/11 8/13/12	8/12* 8/13/13
Preamp	Rohde & Schwarz	TS-PR40	052002/025	26 GHz – 40 GHz	5/12	5/13
50 Ohm Load	Pasternack	PE6039	DLS #527	DC – 18 GHz	NA	NA
50 Ohm Load	Pasternack	PE6095	NA	DC – 18 GHz	NA	NA

*calibrated 8/13/12.The device was properly calibrated for testing in July and in October.

6.0 Test Arrangements

RF Conducted Emissions Measurement Arrangement:

All RF conducted emission measurements were performed at D.L.S. Electronic Systems, Inc. and set up according to FCC Publication KDB 789033 D01 General UNII test Procedures v01r01 and ANSI C63.10-2009, unless otherwise noted. Description of procedures and measurements can be found in Appendix A – Measurement Data. **See the separate exhibit for additional photos of the test set up.**

Radiated Emissions Measurement Arrangement:

All radiated emission measurements were performed at D.L.S. Electronic Systems, Inc. and set up according to ANSI C63.10-2009, unless otherwise noted. Description of procedures and measurements can be found in Appendix A – Measurement Data. **See the separate exhibit for photos of the test set up.**

Unless otherwise noted, the bandwidth of the measuring receiver / analyzer used during testing is shown below.

Frequency Range	Bandwidth (-6 dB)
10 to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz
Above 1 GHz	1 MHz

7.0 Test Conditions

Normal Test Conditions:

Temperature and Humidity:

73°F at 51% RH

Supply Voltage:

29 VDC (Power Over Ethernet to Radio)
120 Vac, 60 Hz using Phihong power supply model: PSA15A-295 (MOT)

8.0 Modifications Made To EUT For Compliance

No modifications were made to the EUT at the time of test.

9.0 Additional Descriptions

Test software was used to set the frequency, modulation, and output power of the EUT. Transmitter parameters are software controlled and set to Cambium Networks' specifications. Any new software will not enable any features/operations which would violate regulatory requirements.

10.0 Results

Measurements were performed in accordance with FCC Publication KDB 789033 D01 General UNII test Procedures v01r01 and ANSI C63.10-2009. Graphical and tabular data can be found in Appendix A at the end of this report.

11.0 Conclusion

Dynamic Frequency Selection (DFS) testing was not performed by DLS Electronic Systems,Inc. Otherwise, the PMP450AP 5.4 & 5.7 GHz MIMO/Combo Radio, Model C054045A002A, as provided from Cambium Networks tested in July & October, 2012 **meets** the requirements of CFR 47 Part 15 Subpart E Section 15.407, to be added to FCC ID: Z8H89FT0002 as a Class III Permissive Change.

Appendix A – Measurement Data

A1.0 Emission Bandwidth – 26 dB bandwidth – conducted

Rule Section: Informative

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section D – Emission bandwidth

Description: RBW = approximately 1% of EBW
VBW > RBW
Detector = Peak
Trace mode = max hold

Measure the maximum width of the emission between the lower and upper frequencies that measure 26 dB below the maximum level of the in-band emission.

Limit: Informative

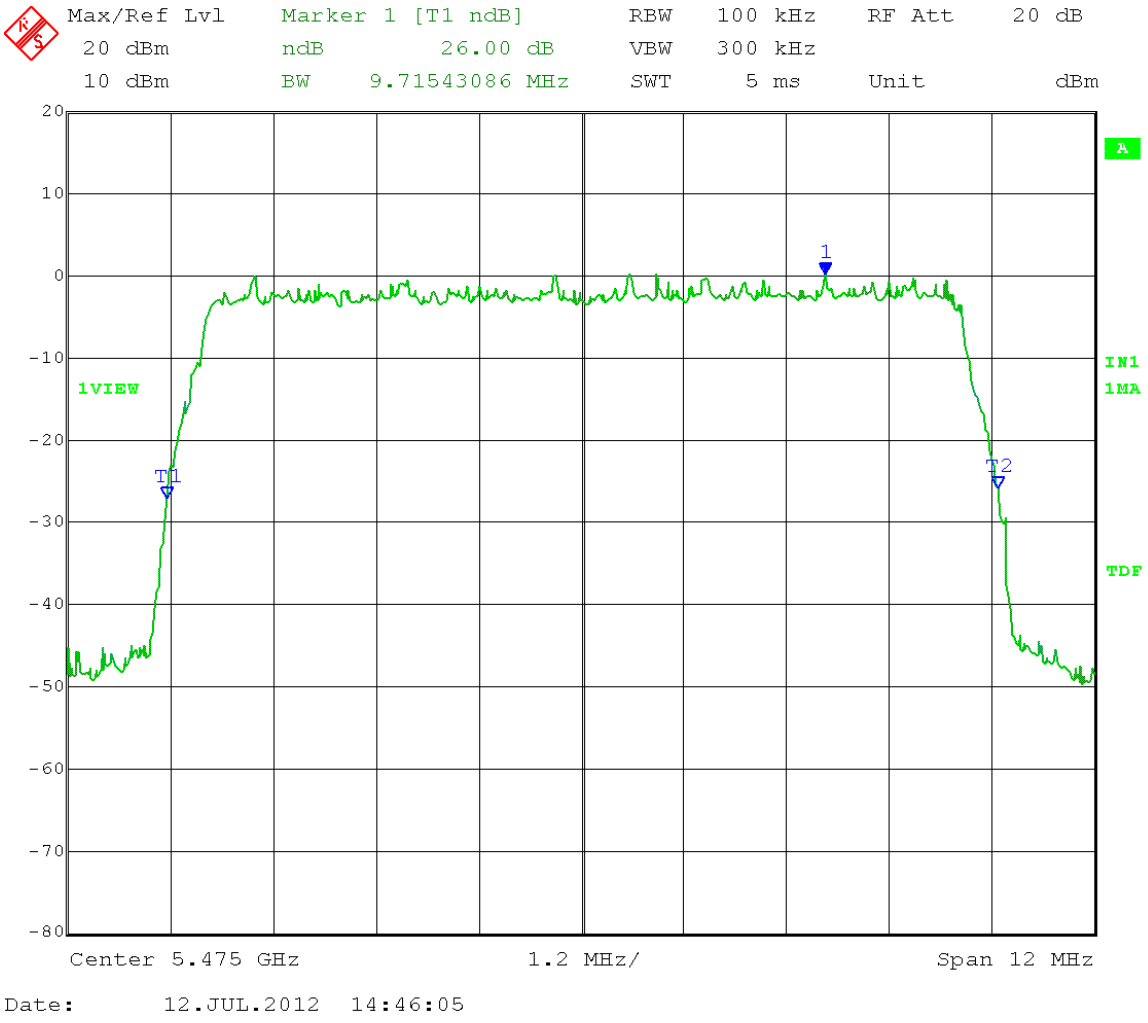
Notes: Measurements were taken for QPSK (OFDM) or 2-level (FSK) at the lowest, middle, and highest channels of operation. EUT was set to transmit continuously with 98% duty cycle.

Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Emission Bandwidth – 26 dB bandwidth – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section D – Emission bandwidth
Operator: Craig B

RBW = 1% of EBW; VBW > RBW
Detector = Peak; Trace mode = max hold

EUT nominal channel bandwidth: 10 MHz adi reg 3C
Output port: Channel A; Channel Frequency: 5.475 GHz
Output power setting: 19; Modulation Type: QPSK

26 dB Emission Bandwidth = 9.72 MHz



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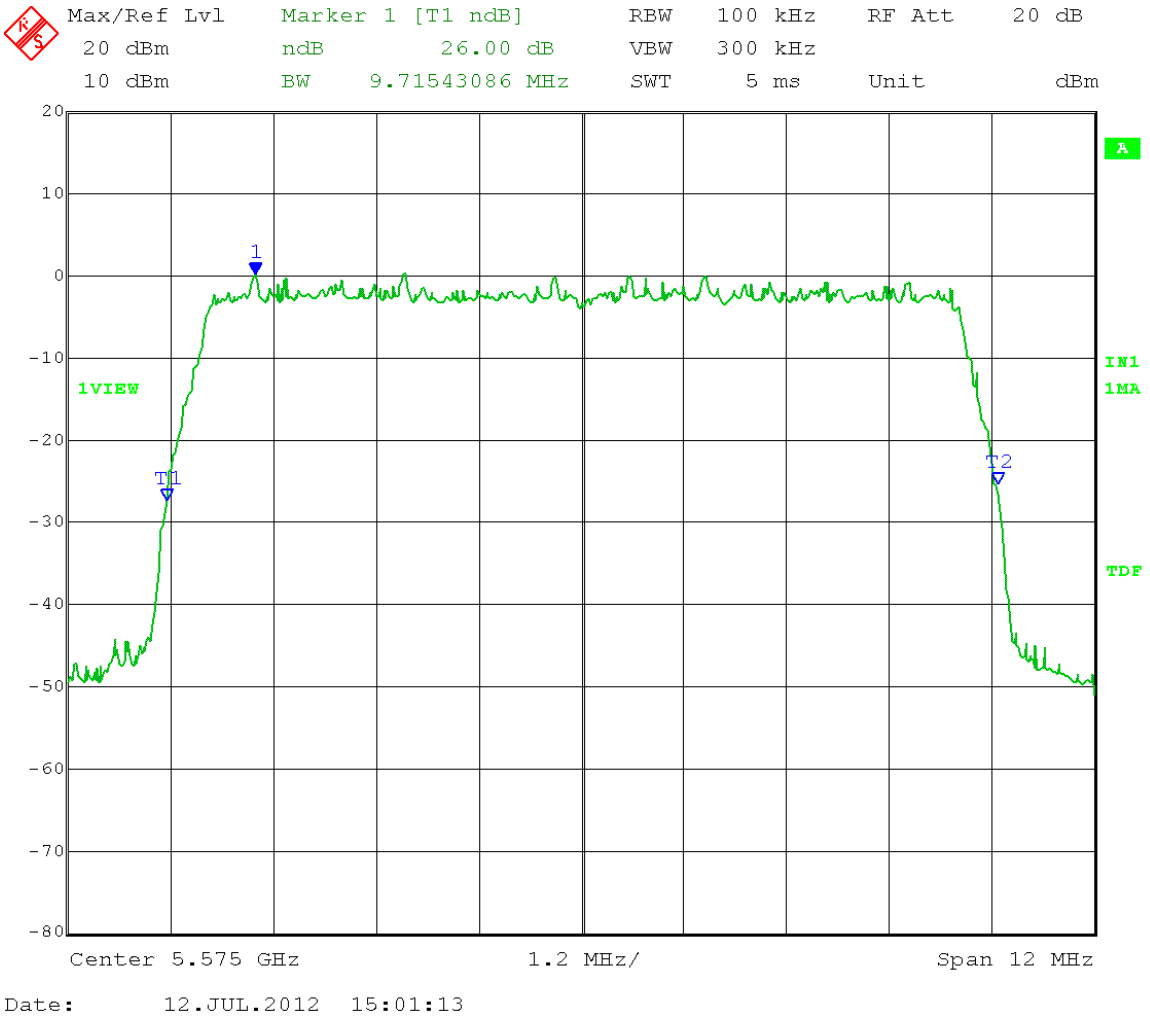
Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Emission Bandwidth – 26 dB bandwidth – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section D – Emission bandwidth
Operator: Craig B

RBW = 1% of EBW; VBW > RBW
Detector = Peak; Trace mode = max hold

EUT nominal channel bandwidth: 10 MHz adi reg 43
Output port: Channel A; Channel Frequency: 5.575 GHz
Output power setting: 19; Modulation Type: QPSK

26 dB Emission Bandwidth = 9.72 MHz



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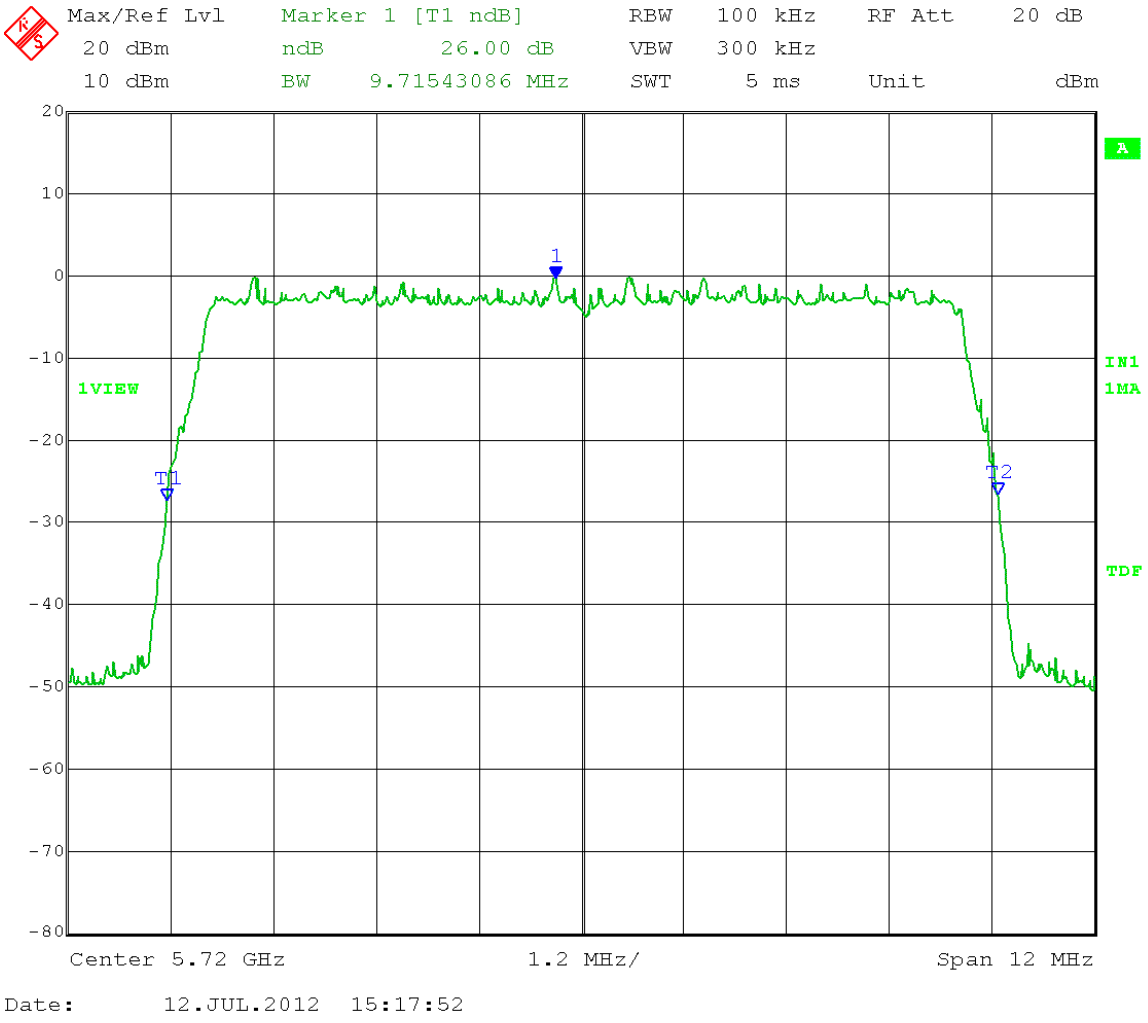
Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Emission Bandwidth – 26 dB bandwidth – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section D – Emission bandwidth
Operator: Craig B

RBW = 1% of EBW; VBW > RBW
Detector = Peak; Trace mode = max hold

EUT nominal channel bandwidth: 10 MHz adi reg 41
Output port: Channel A; Channel Frequency: 5.720 GHz
Output power setting: 19; Modulation Type: QPSK

26 dB Emission Bandwidth = 9.72 MHz

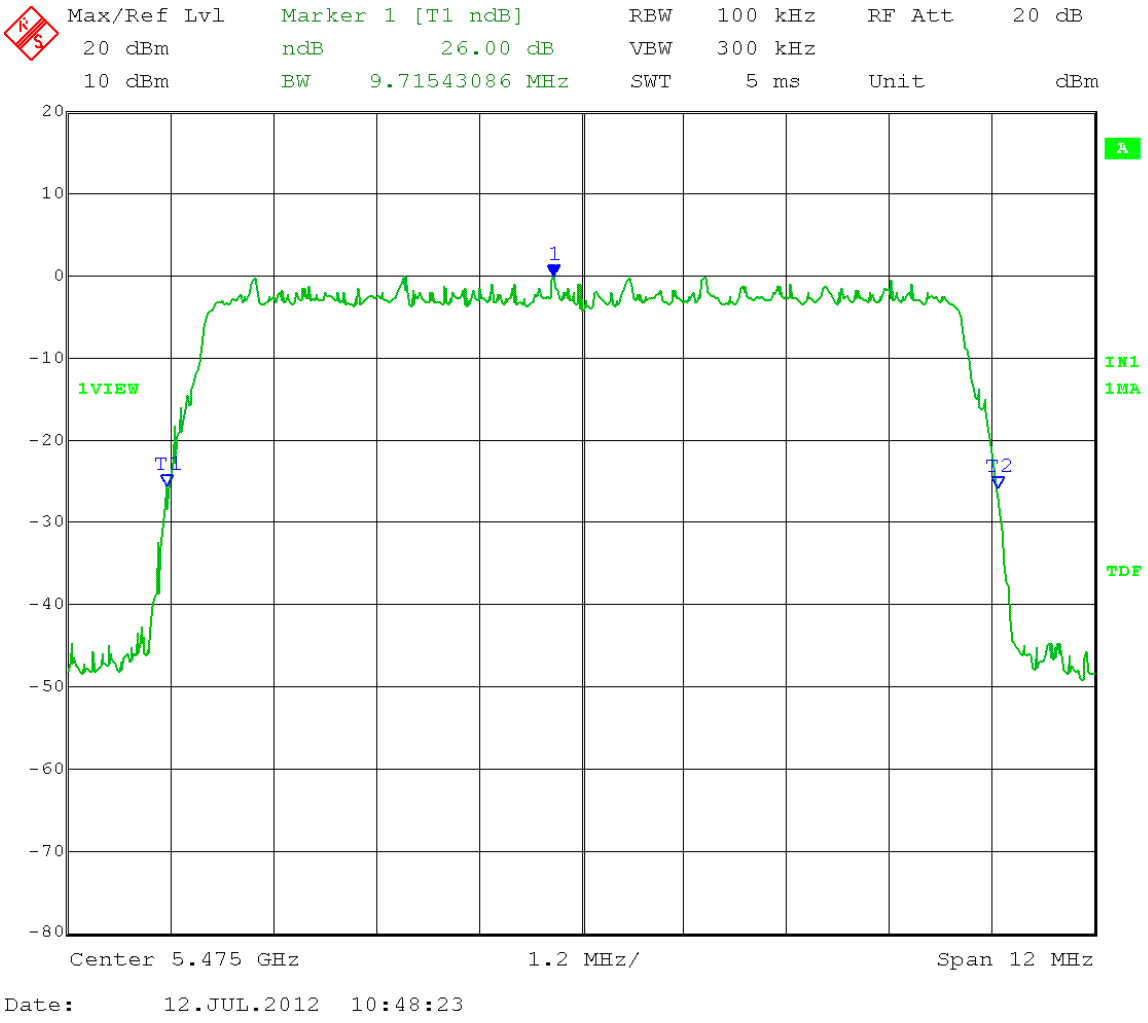


Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Emission Bandwidth – 26 dB bandwidth – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section D – Emission bandwidth
Operator: Craig B

RBW = 1% of EBW; VBW > RBW
Detector = Peak; Trace mode = max hold

EUT nominal channel bandwidth: 10 MHz adi reg 40
Output port: Channel B; Channel Frequency: 5.475 GHz
Output power setting: 19; Modulation Type: QPSK

26 dB Emission Bandwidth = 9.72 MHz

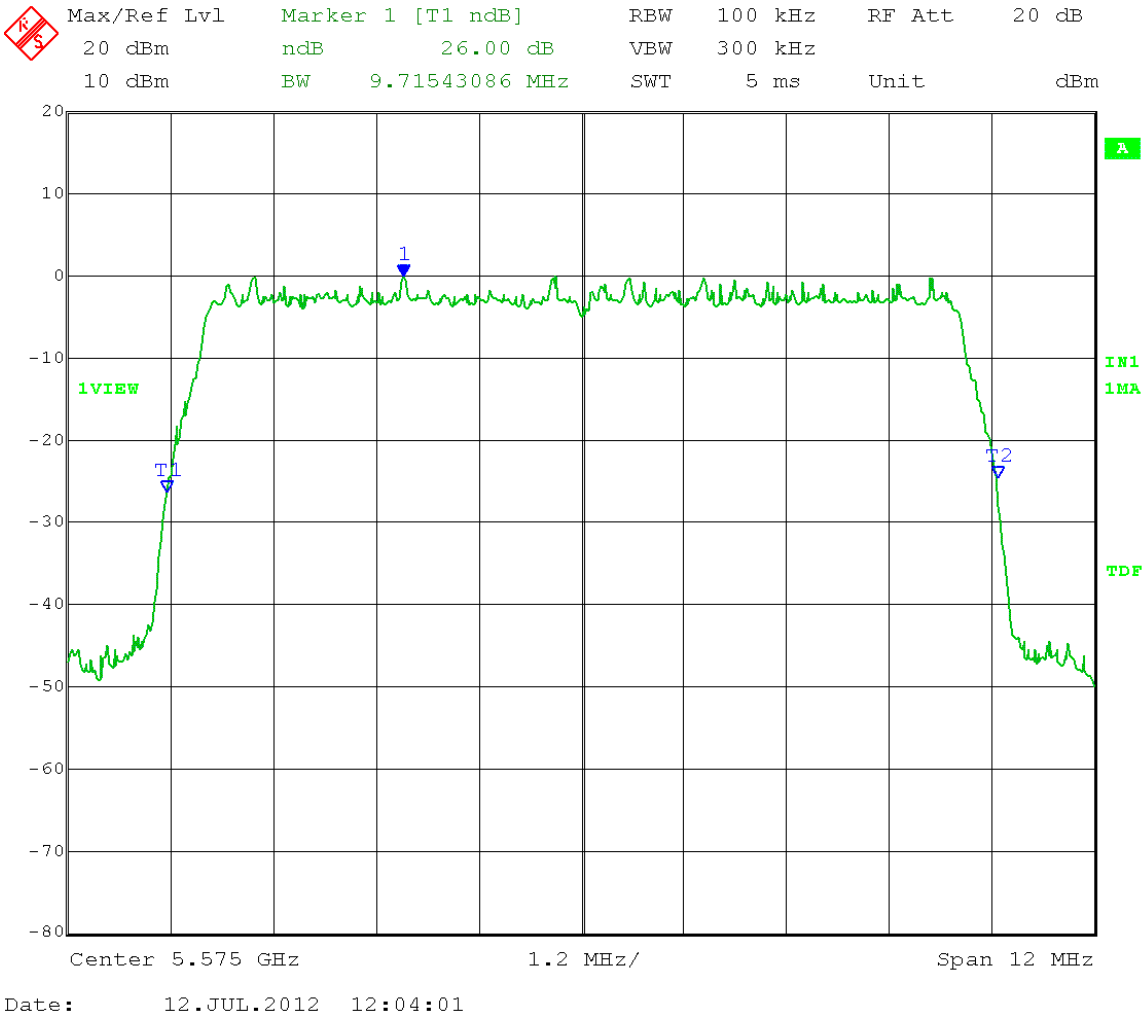


Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Emission Bandwidth – 26 dB bandwidth – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section D – Emission bandwidth
Operator: Craig B

RBW = 1% of EBW; VBW > RBW
Detector = Peak; Trace mode = max hold

EUT nominal channel bandwidth: 10 MHz adi reg 47
Output port: Channel B; Channel Frequency: 5.575 GHz
Output power setting: 19; Modulation Type: QPSK

26 dB Emission Bandwidth = 9.72 MHz



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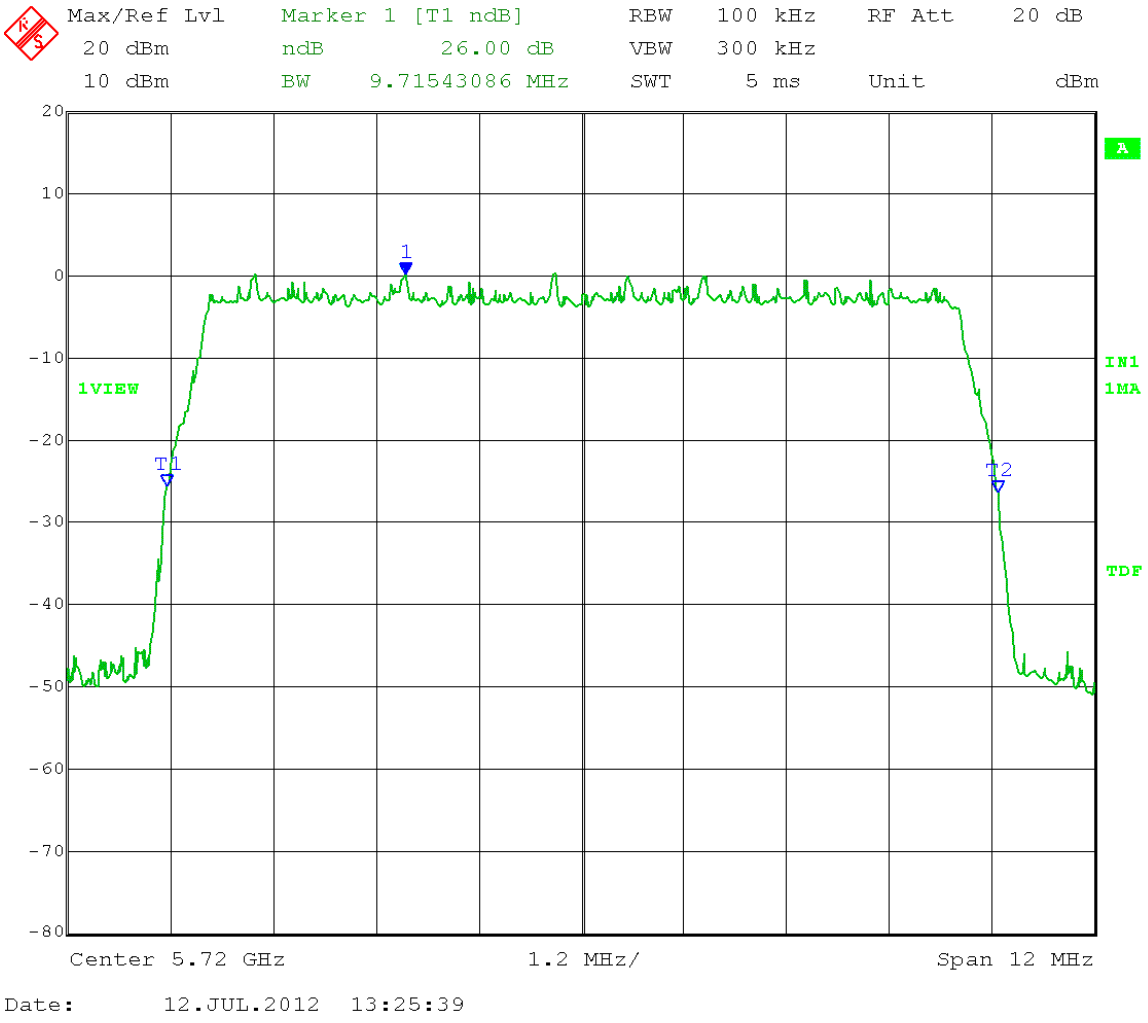
Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Emission Bandwidth – 26 dB bandwidth – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section D – Emission bandwidth
Operator: Craig B

RBW = 1% of EBW; VBW > RBW
Detector = Peak; Trace mode = max hold

EUT nominal channel bandwidth: 10 MHz adi reg 45
Output port: Channel B; Channel Frequency: 5.720 GHz
Output power setting: 19; Modulation Type: QPSK

26 dB Emission Bandwidth = 9.72 MHz

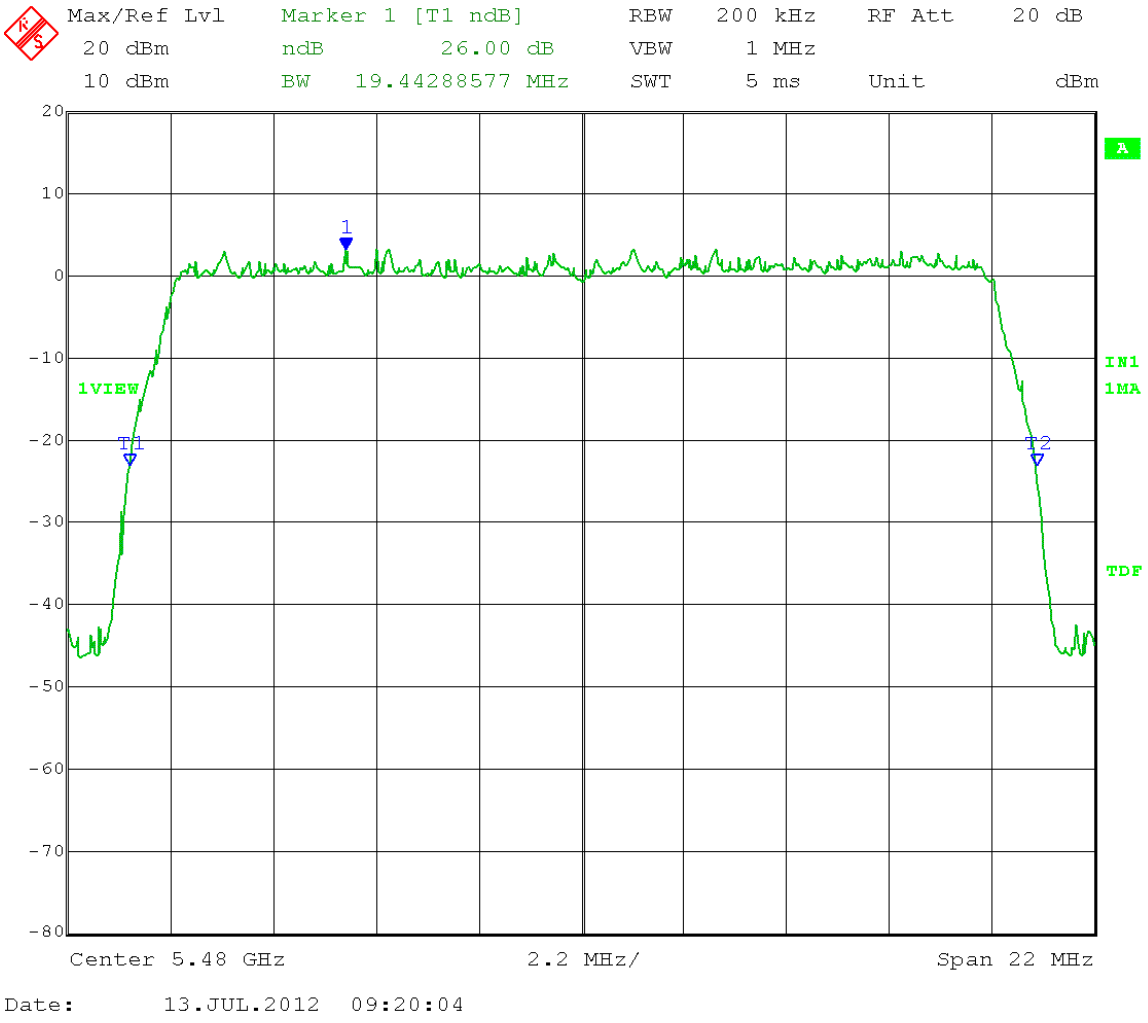


Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Emission Bandwidth – 26 dB bandwidth – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section D – Emission bandwidth
Operator: Craig B

RBW = 1% of EBW; VBW > RBW
Detector = Peak; Trace mode = max hold

EUT nominal channel bandwidth: 20 MHz adi reg 31
Output port: Channel A; Channel Frequency: 5.480 GHz
Output power setting: 19; Modulation Type: QPSK

26 dB Emission Bandwidth = 19.44 MHz

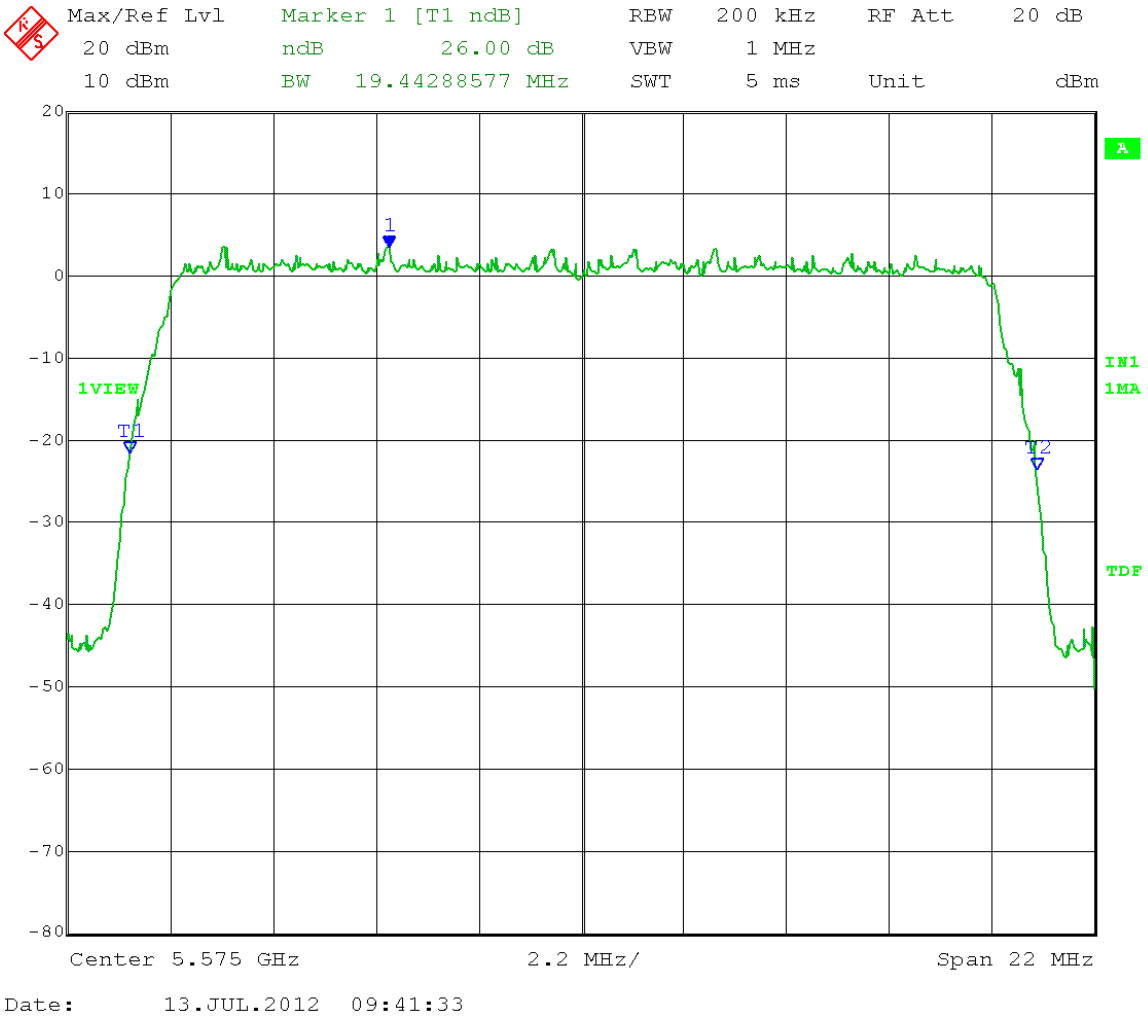


Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Emission Bandwidth – 26 dB bandwidth – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section D – Emission bandwidth
Operator: Craig B

RBW = 1% of EBW; VBW > RBW
Detector = Peak; Trace mode = max hold

EUT nominal channel bandwidth: 20 MHz adi reg 37
Output port: Channel A; Channel Frequency: 5.575 GHz
Output power setting: 19; Modulation Type: QPSK

26 dB Emission Bandwidth = 19.44 MHz



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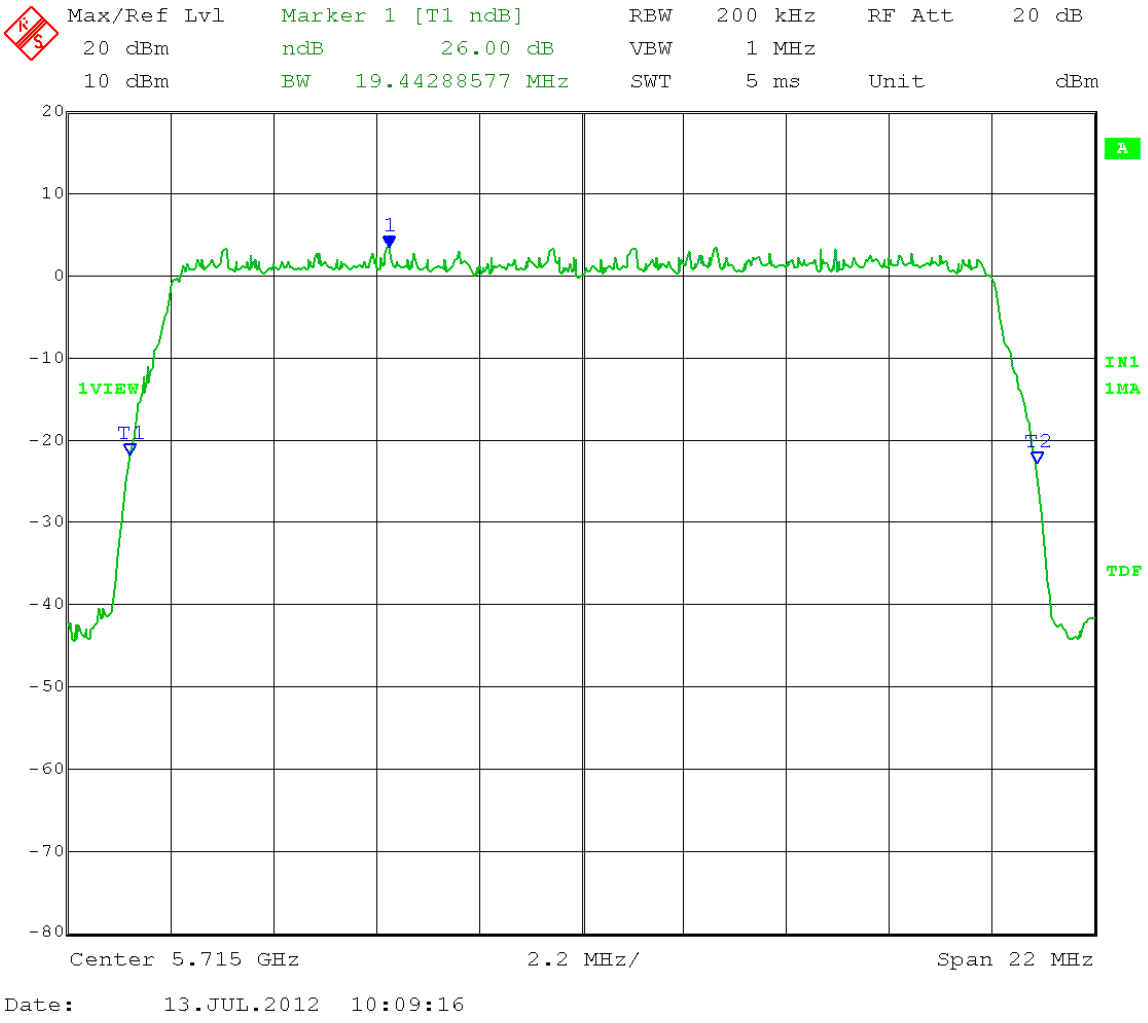
Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Emission Bandwidth – 26 dB bandwidth – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section D – Emission bandwidth
Operator: Craig B

RBW = 1% of EBW; VBW > RBW
Detector = Peak; Trace mode = max hold

EUT nominal channel bandwidth: 20 MHz adi reg 35
Output port: Channel A; Channel Frequency: 5.715 GHz
Output power setting: 19; Modulation Type: QPSK

26 dB Emission Bandwidth = 19.44 MHz



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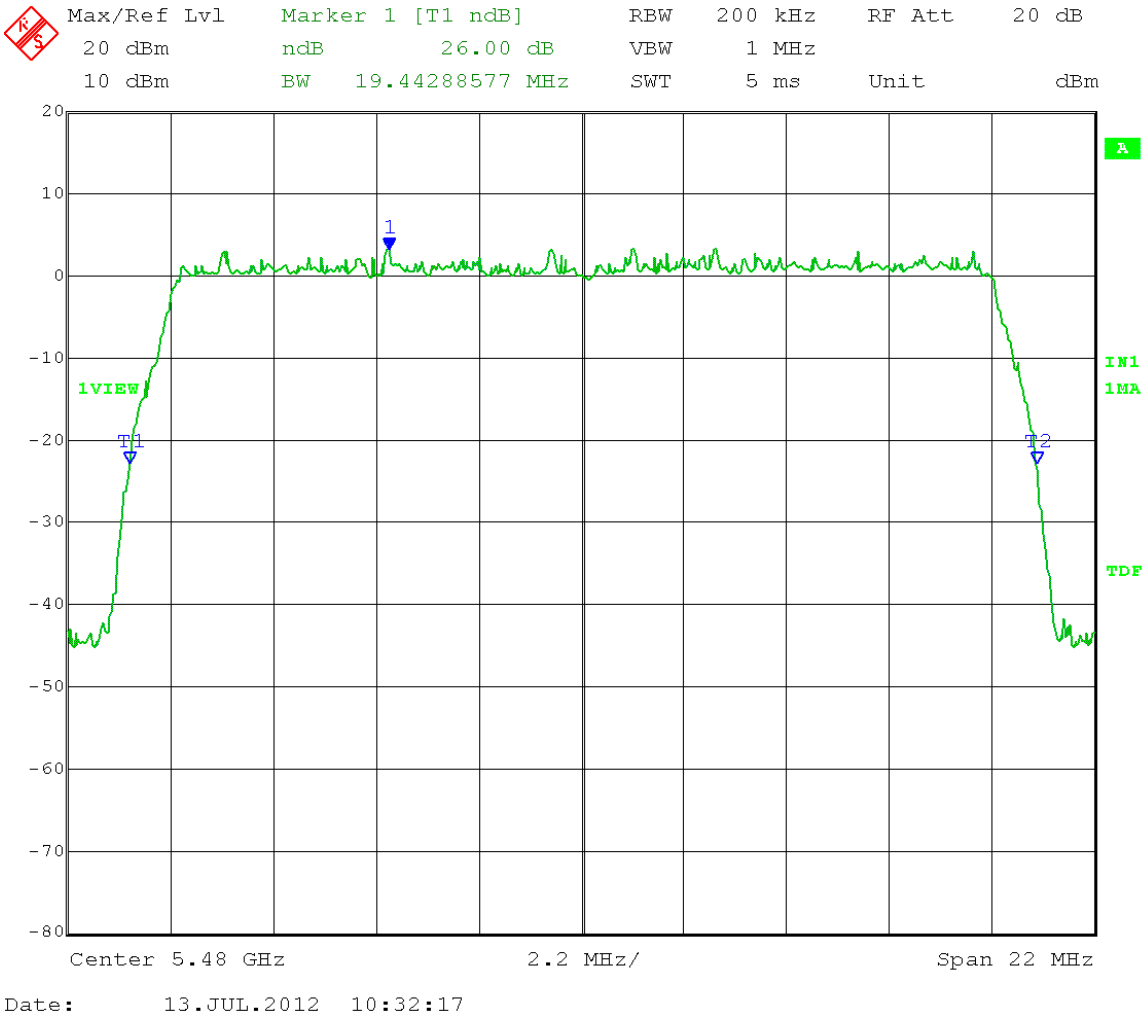
Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Emission Bandwidth – 26 dB bandwidth – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section D – Emission bandwidth
Operator: Craig B

RBW = 1% of EBW; VBW > RBW
Detector = Peak; Trace mode = max hold

EUT nominal channel bandwidth: 20 MHz adi reg 34
Output port: Channel B; Channel Frequency: 5.480 GHz
Output power setting: 19; Modulation Type: QPSK

26 dB Emission Bandwidth = 19.44 MHz

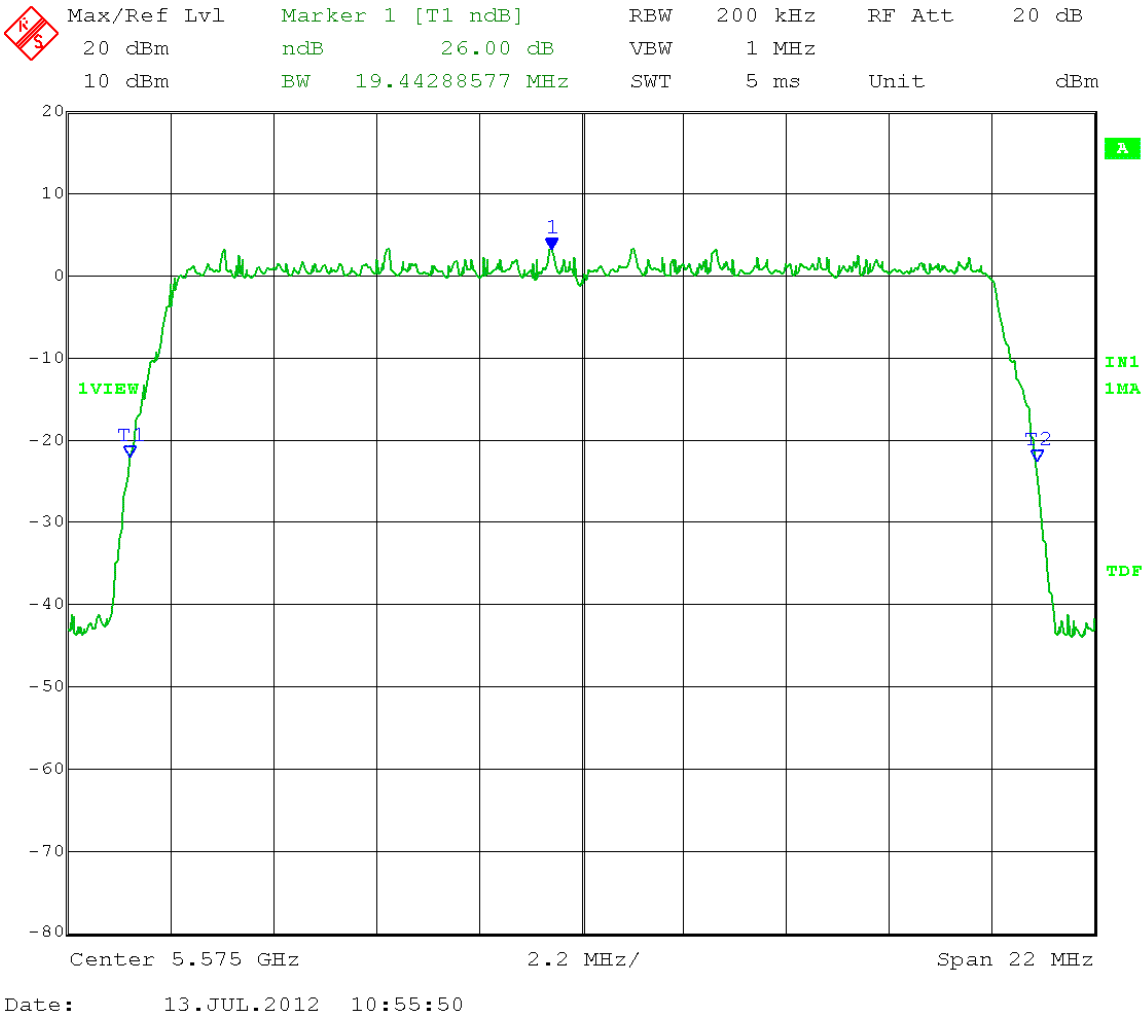


Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Emission Bandwidth – 26 dB bandwidth – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section D – Emission bandwidth
Operator: Craig B

RBW = 1% of EBW; VBW > RBW
Detector = Peak; Trace mode = max hold

EUT nominal channel bandwidth: 20 MHz adi reg 3B
Output port: Channel B; Channel Frequency: 5.575 GHz
Output power setting: 19; Modulation Type: QPSK

26 dB Emission Bandwidth = 19.44 MHz

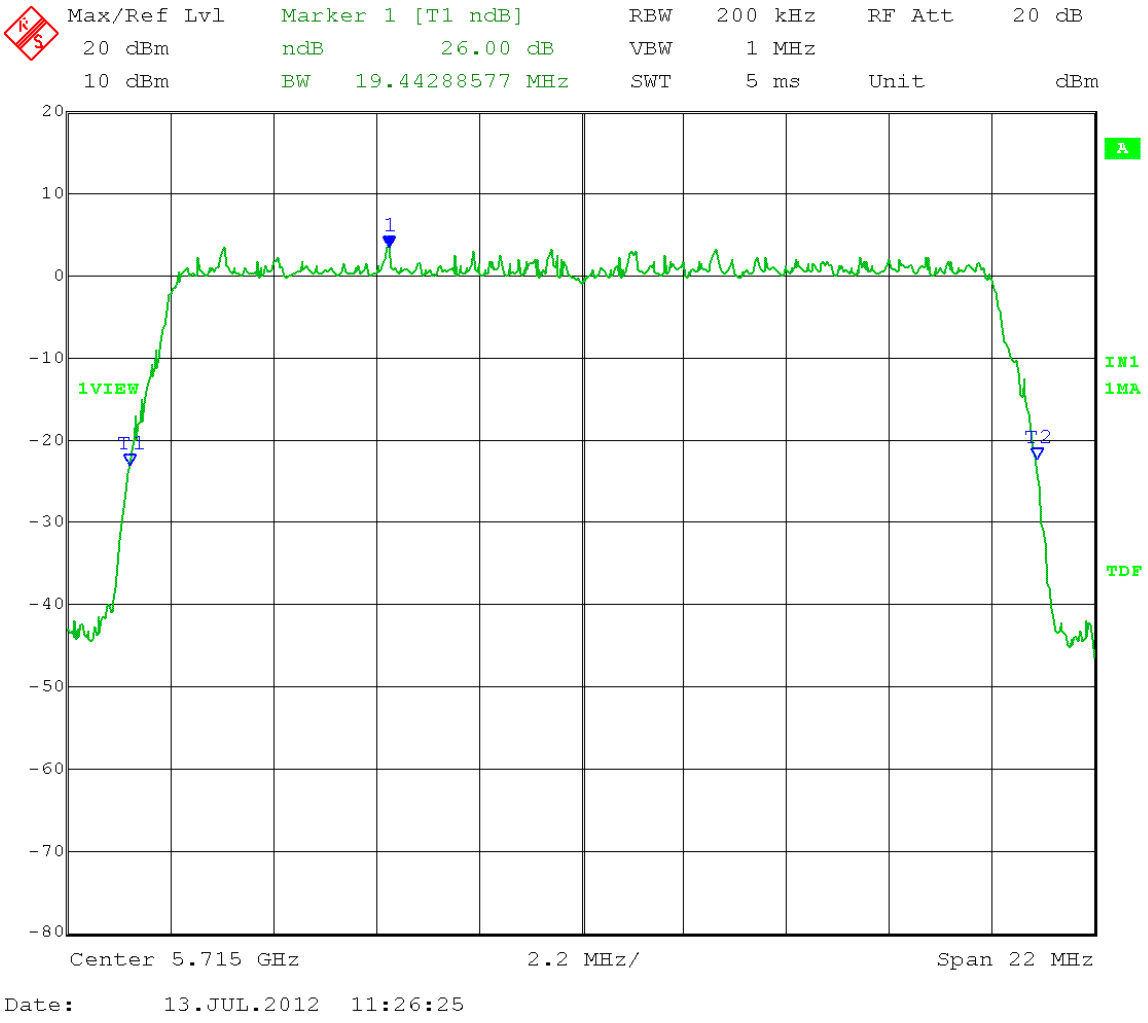


Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Emission Bandwidth – 26 dB bandwidth – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section D – Emission bandwidth
Operator: Craig B

RBW = 1% of EBW; VBW > RBW
Detector = Peak; Trace mode = max hold

EUT nominal channel bandwidth: 20 MHz adi reg 3A
Output port: Channel B; Channel Frequency: 5.715 GHz
Output power setting: 19; Modulation Type: QPSK

26 dB Emission Bandwidth = 19.44 MHz

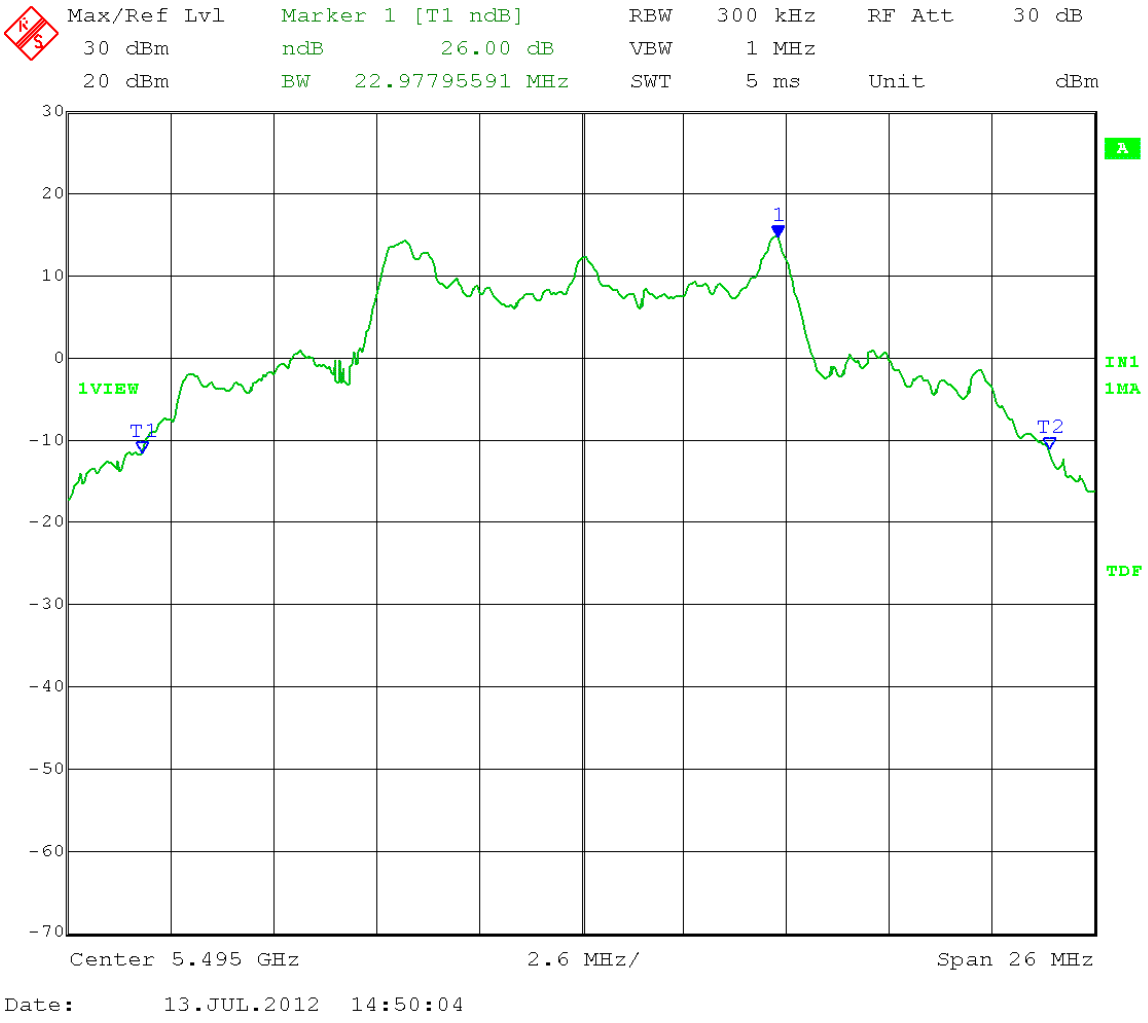


Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Emission Bandwidth – 26 dB bandwidth – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section D – Emission bandwidth
Operator: Craig B

RBW = 1% of EBW; VBW > RBW
Detector = Peak; Trace mode = max hold

EUT nominal channel bandwidth: 20 MHz
Output port: FSK; Channel Frequency: 5.495 GHz
Output power setting: 9C; Modulation Type: 2-level FSK

26 dB Emission Bandwidth = 22.98 MHz

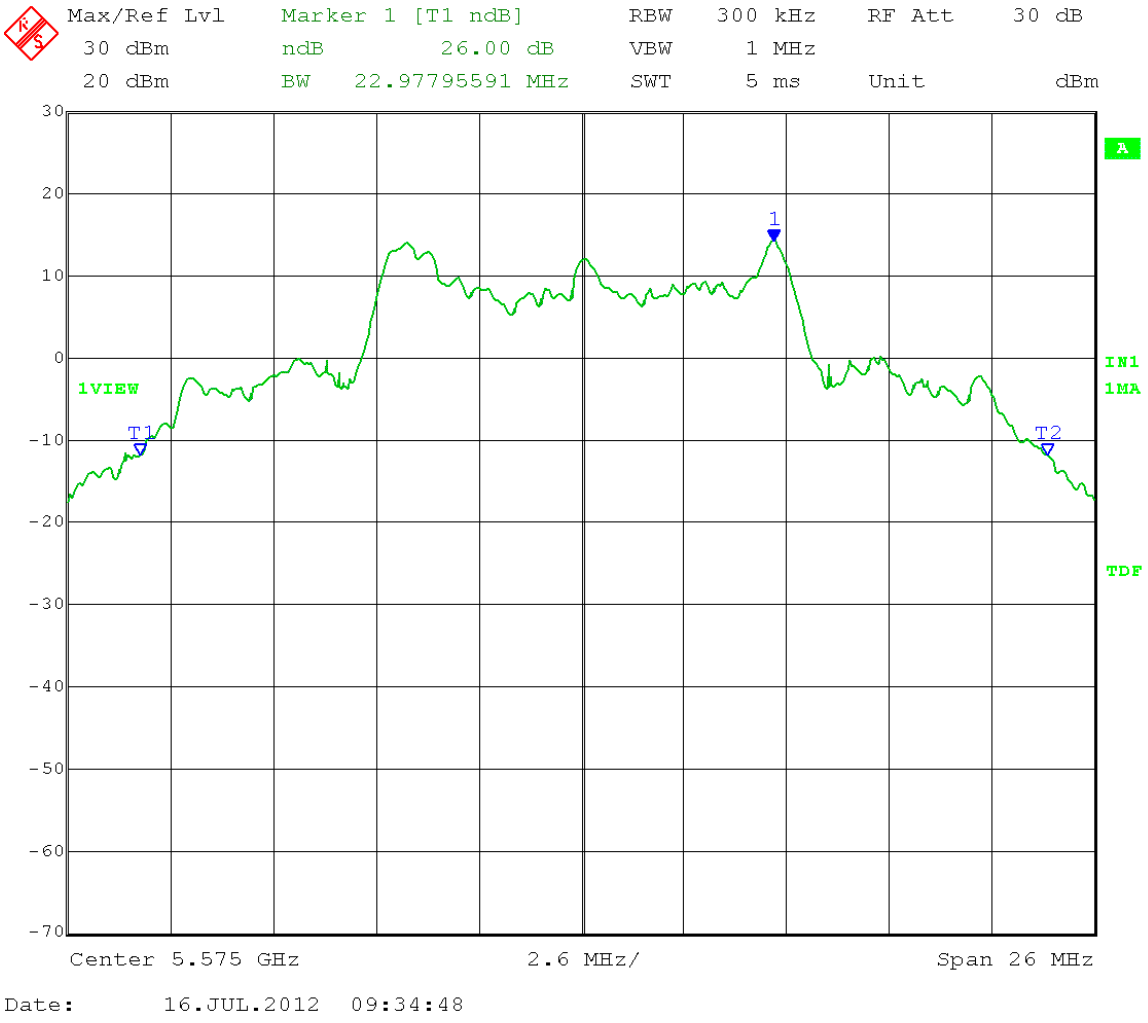


Test Date: 07-16-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Emission Bandwidth – 26 dB bandwidth – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section D – Emission bandwidth
Operator: Craig B

RBW = 1% of EBW; VBW > RBW
Detector = Peak; Trace mode = max hold

EUT nominal channel bandwidth: 20 MHz
Output port: FSK; Channel Frequency: 5.575 GHz
Output power setting: 9C; Modulation Type: 2-level FSK

26 dB Emission Bandwidth = 22.98 MHz

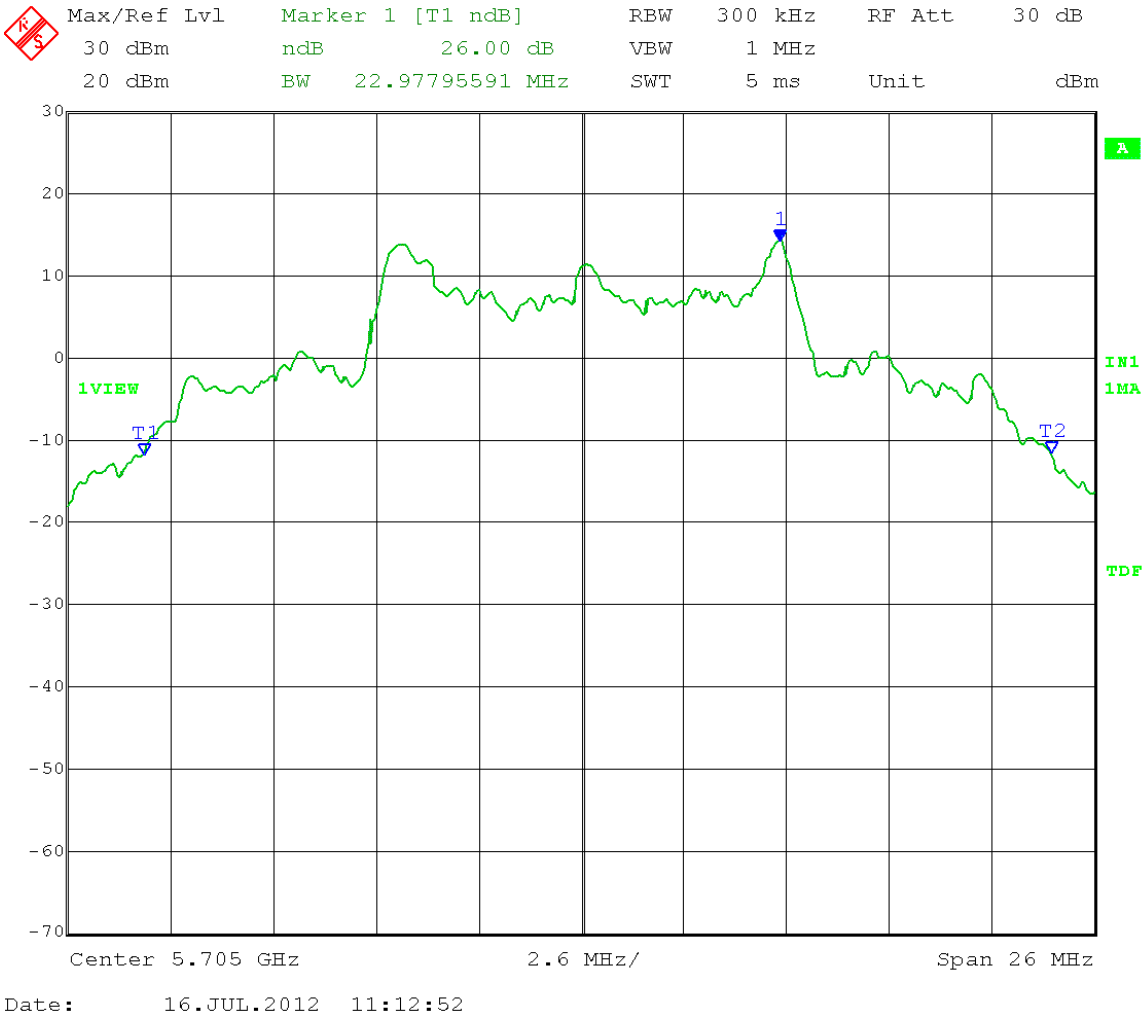


Test Date: 07-16-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Emission Bandwidth – 26 dB bandwidth – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section D – Emission bandwidth
Operator: Craig B

RBW = 1% of EBW; VBW > RBW
Detector = Peak; Trace mode = max hold

EUT nominal channel bandwidth: 20 MHz
Output port: FSK; Channel Frequency: 5.705 GHz
Output power setting: AC; Modulation Type: 2-level FSK

26 dB Emission Bandwidth = 22.98 MHz



Appendix A – Measurement Data

A2.0 Maximum Conducted Output Power

Rule Section: Section 15.407(a)(2)

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section C(3)(e) Method SA-2 Alternative: RMS detection with slow sweep with each spectrum bin averaging across on and off times of the EUT transmissions, followed by duty cycle correction.

Description:
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

Limit:
Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.
Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

Results: Passed

Notes: Measurements were taken for QPSK (OFDM) or 2-level (FSK) at the lowest, middle, and highest channels of operation. EUT was set to transmit continuously with 98% duty cycle.

Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

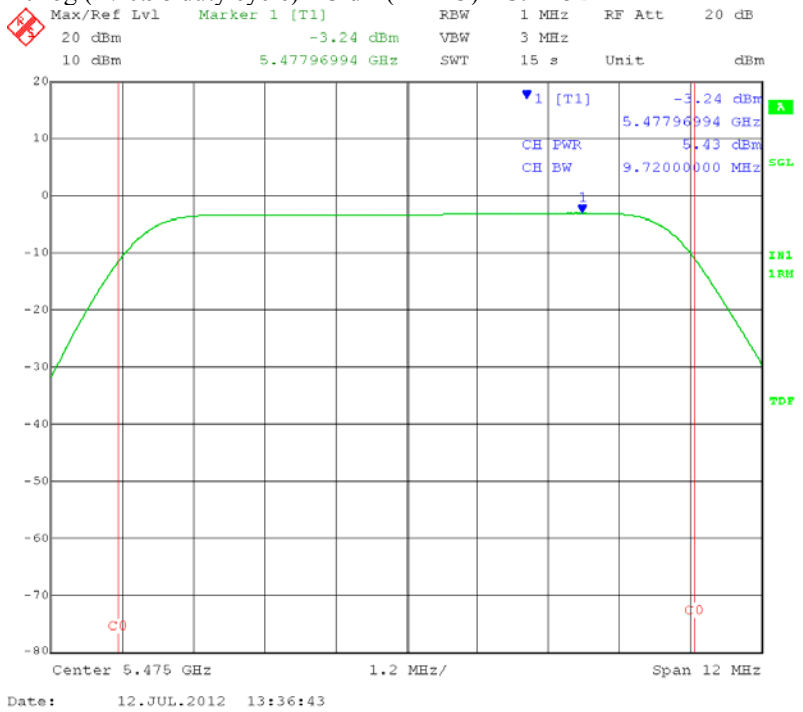
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal) = 10 x 500 x 28 µs = 0.14 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	10 MHz	adi reg 47	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 20.877 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 20.877 dBm – 11 dBi = **9.877 dBm**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

Maximum Conducted Output Power = 5.43 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = **9.72 dBm**



Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

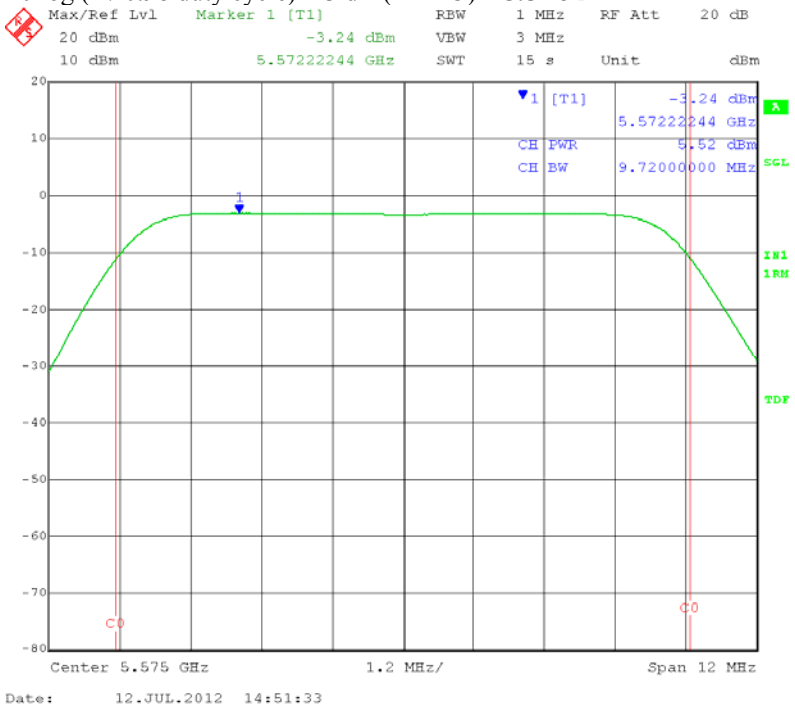
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal) = 10 x 500 x 28 µs = 0.14 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	10 MHz	adi reg 4F	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 20.877 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 20.877 dBm – 11 dBi = **9.877 dBm**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

Maximum Conducted Output Power = 5.52 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = **9.81 dBm**



Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

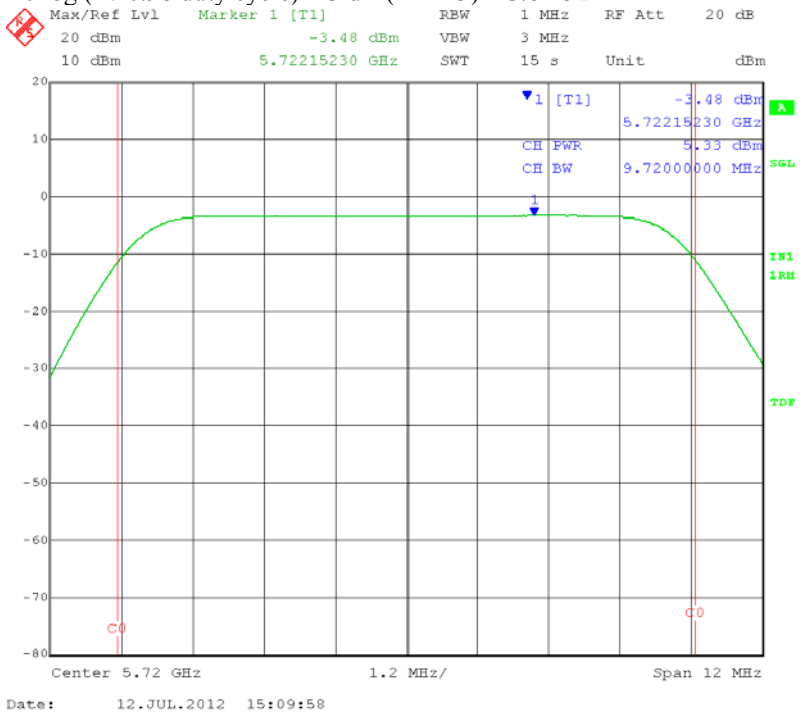
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal) = 10 x 500 x 28 µs = 0.14 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	10 MHz	adi reg 4D	26 dB EBW: 9.72 MHz
Output port:	Channel A;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 20.877 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 20.877 dBm – 11 dBi = **9.877 dBm**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

Maximum Conducted Output Power = 5.33 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = **9.62 dBm**



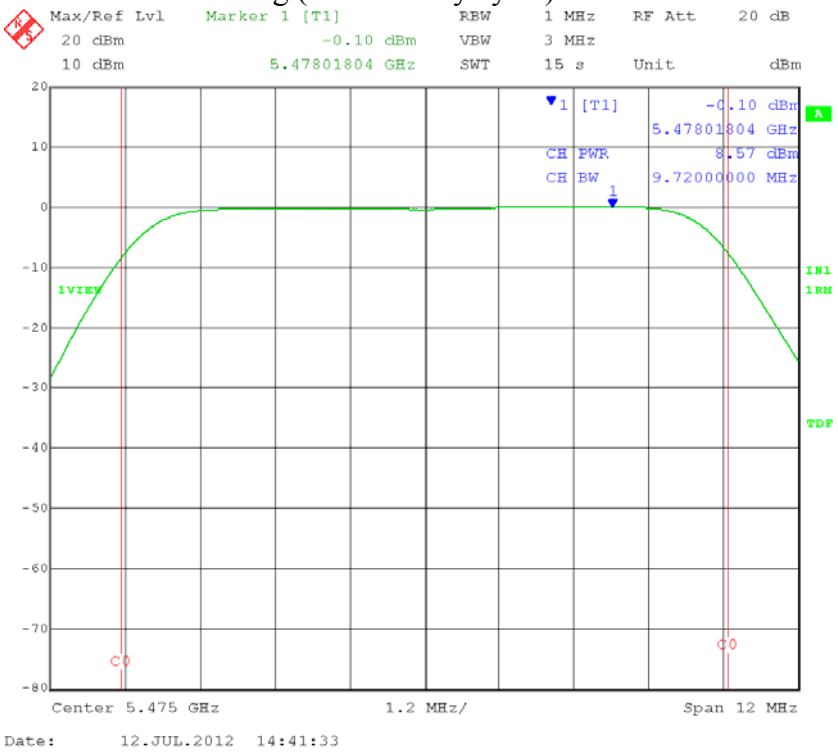
Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal) = 10 x 500 x 28 µs = 0.14 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	10 MHz	adi reg	3C
Output port:	Channel A;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK
26 dB EBW:	9.72 MHz		

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 20.877 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 20.877 dBm – 11 dBi = **9.877 dBm**

MIMO MATRIX B (completely uncorrelated signals):
Maximum Conducted Output Power = 8.57 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) = **9.86 dBm**



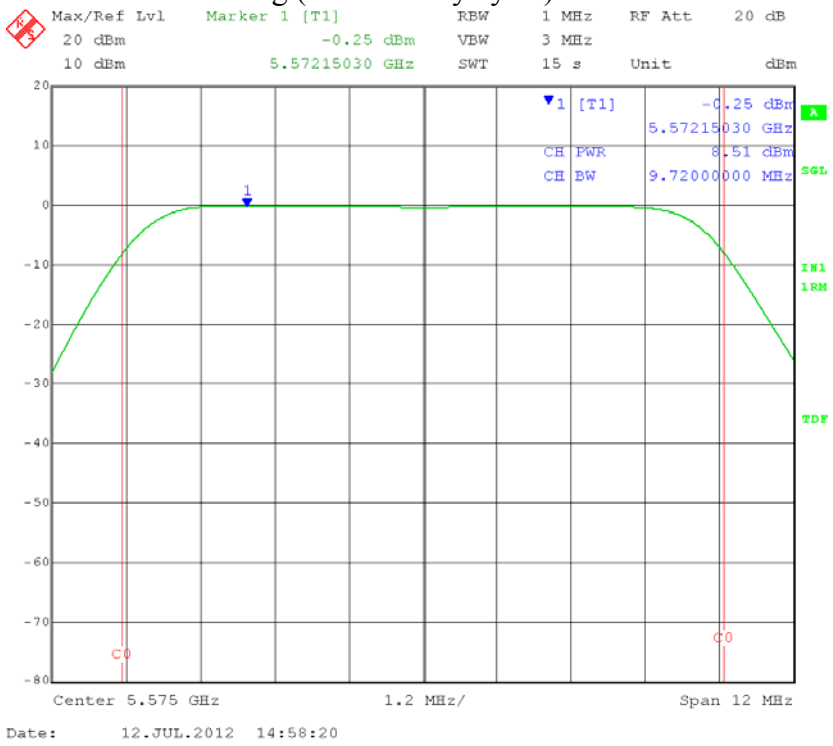
Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal) = 10 x 500 x 28 µs = 0.14 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	10 MHz	adi reg	43
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK
26 dB EBW:	9.72 MHz		

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 20.877 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 20.877 dBm – 11 dBi = **9.877 dBm**

MIMO MATRIX B (completely uncorrelated signals):
Maximum Conducted Output Power = 8.51 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) = **9.80 dBm**



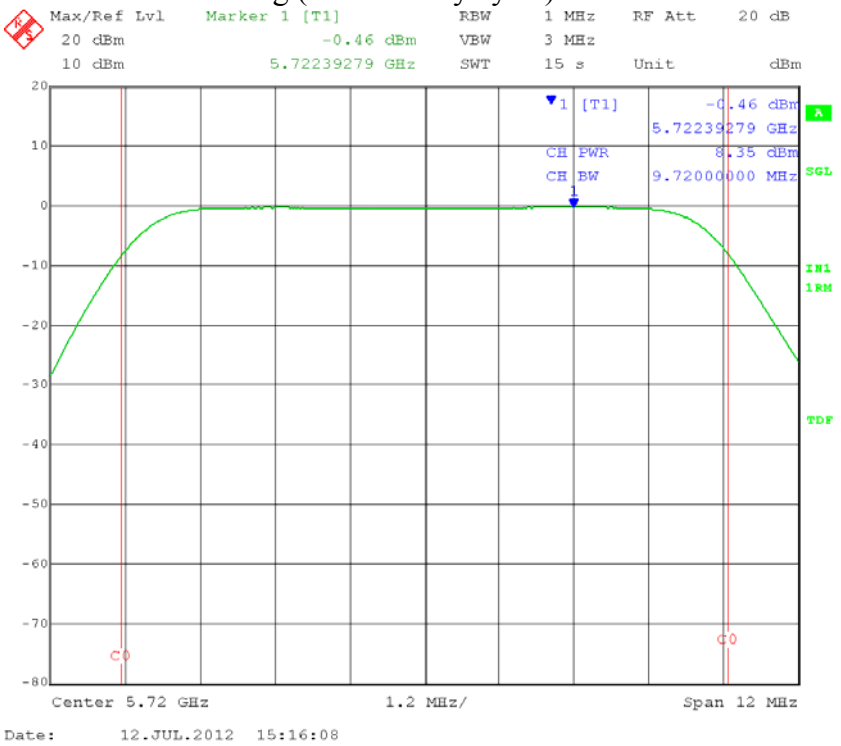
Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal) = 10 x 500 x 28 µs = 0.14 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	10 MHz	adi reg	41
Output port:	Channel A;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK
26 dB EBW:	9.72 MHz		

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 20.877 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 20.877 dBm – 11 dBi = **9.877 dBm**

MIMO MATRIX B (completely uncorrelated signals):
Maximum Conducted Output Power = 8.35 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) = **9.64 dBm**



Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

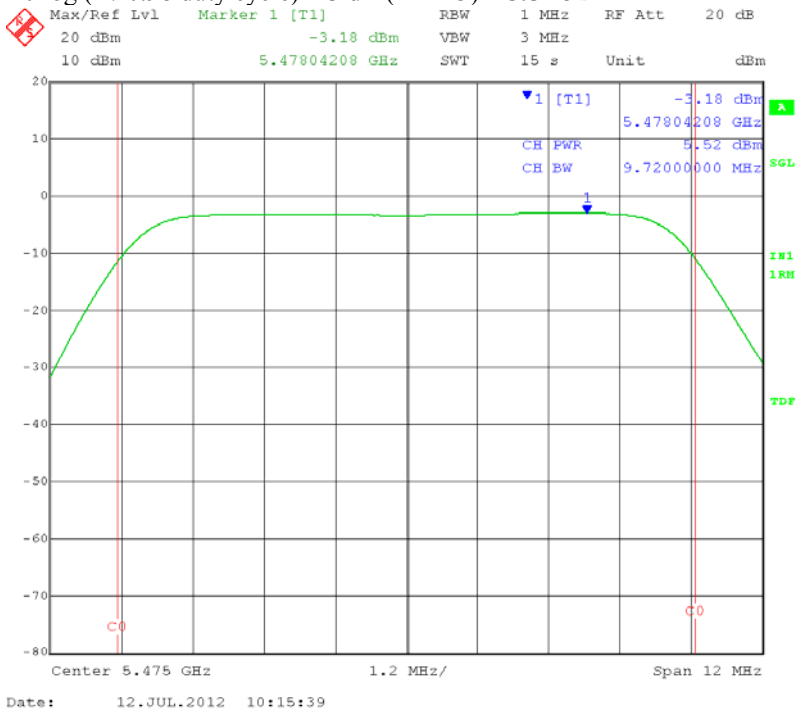
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal) = 10 x 500 x 28 µs = 0.14 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	10 MHz	adi reg 4B	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 20.877 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 20.877 dBm – 11 dBi = **9.877 dBm**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

Maximum Conducted Output Power = 5.52 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = **9.81 dBm**



Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

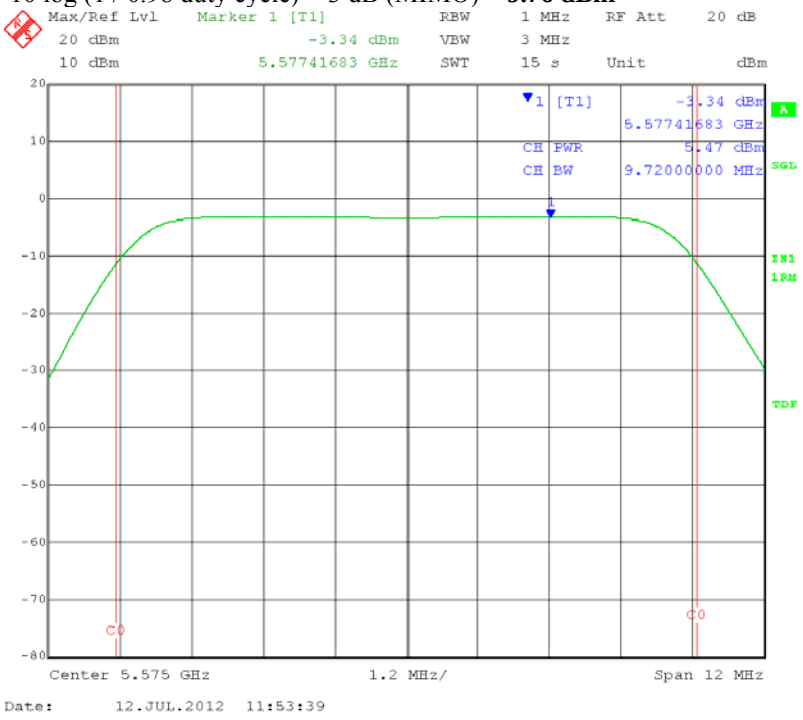
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal) = 10 x 500 x 28 µs = 0.14 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	10 MHz	adi reg 52	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 20.877 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 20.877 dBm – 11 dBi = **9.877 dBm**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

Maximum Conducted Output Power = 5.47 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = **9.76 dBm**



Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

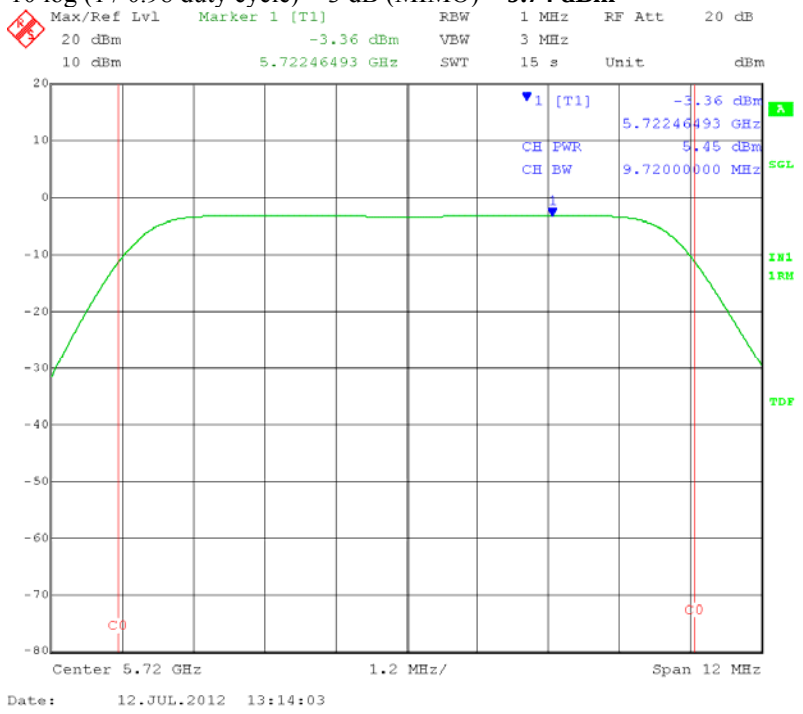
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal) = 10 x 500 x 28 µs = 0.14 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	10 MHz	adi reg 51	26 dB EBW: 9.72 MHz
Output port:	Channel B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 20.877 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 20.877 dBm – 11 dBi = **9.877 dBm**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

Maximum Conducted Output Power = 5.45 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = **9.74 dBm**



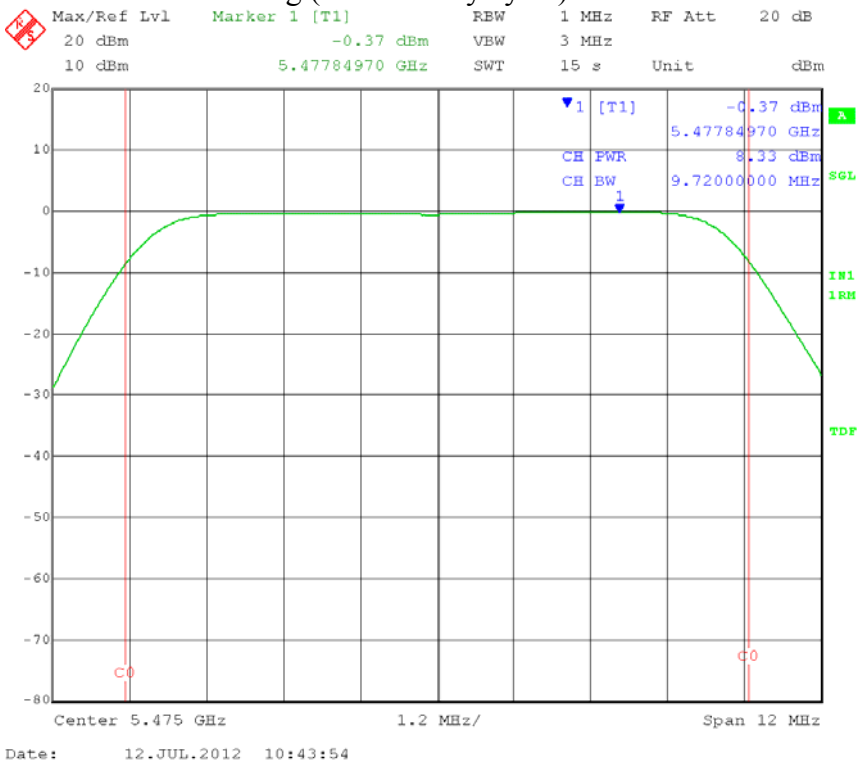
Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal) = 10 x 500 x 28 µs = 0.14 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	10 MHz	adi reg	40
Output port:	Channel B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK
26 dB EBW:	9.72 MHz		

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 20.877 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 20.877 dBm – 11 dBi = **9.877 dBm**

MIMO MATRIX B (completely uncorrelated signals):
Maximum Conducted Output Power = 8.33 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) = **9.62 dBm**



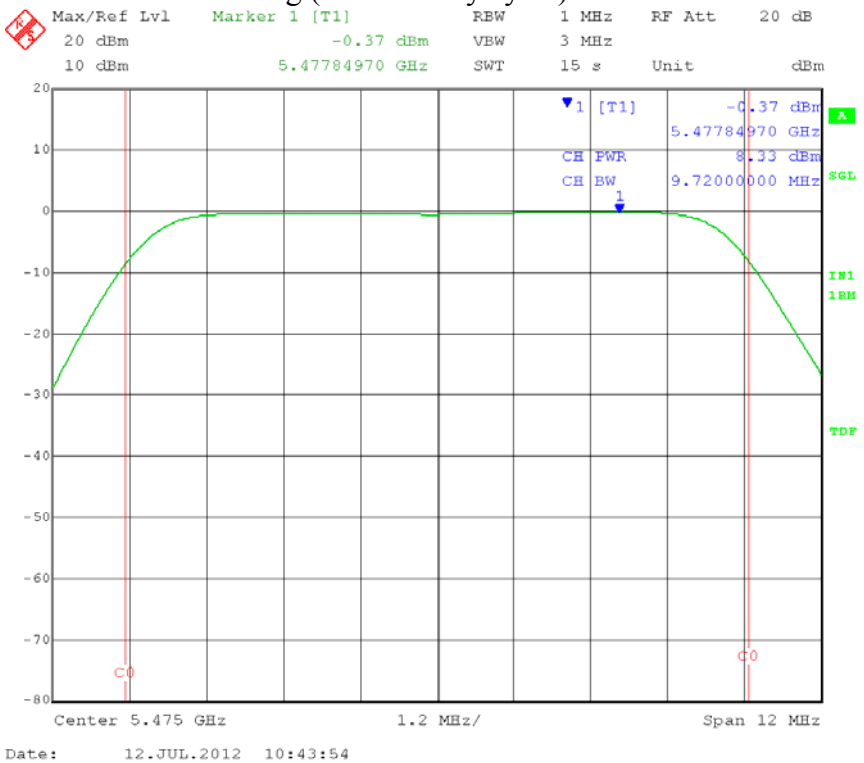
Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal) = 10 x 500 x 28 µs = 0.14 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	10 MHz	adi reg	47
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK
26 dB EBW:	9.72 MHz		

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 20.877 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 20.877 dBm – 11 dBi = **9.877 dBm**

MIMO MATRIX B (completely uncorrelated signals):
Maximum Conducted Output Power = 8.36 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) = **9.65 dBm**



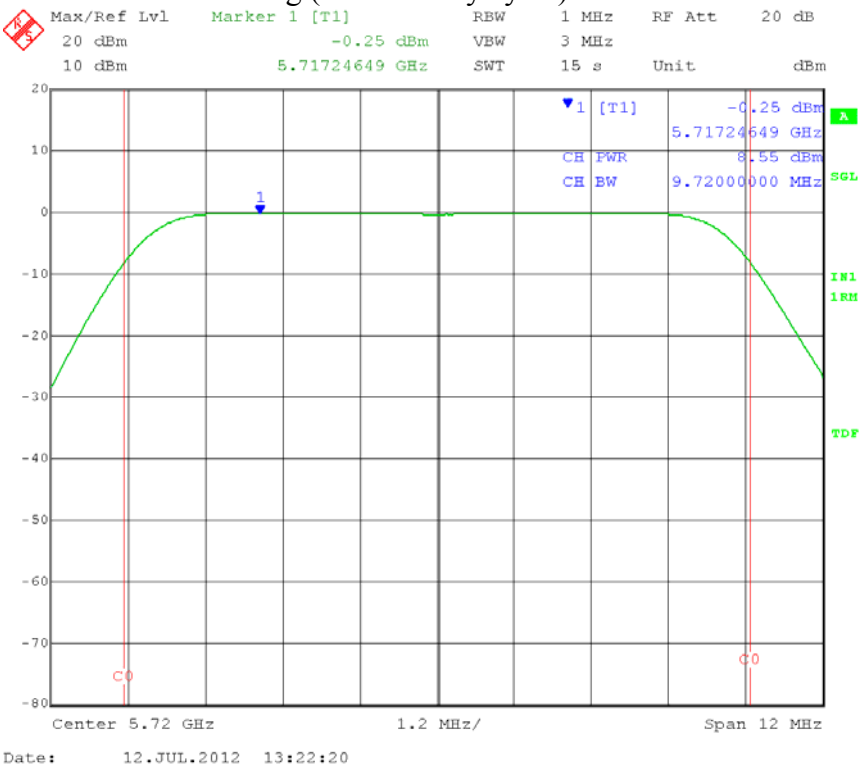
Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal) = 10 x 500 x 28 µs = 0.14 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	10 MHz	adi reg	45
Output port:	Channel B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK
26 dB EBW:	9.72 MHz		

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 20.877 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 20.877 dBm – 11 dBi = **9.877 dBm**

MIMO MATRIX B (completely uncorrelated signals):
Maximum Conducted Output Power = 8.55 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) = **9.84 dBm**



Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

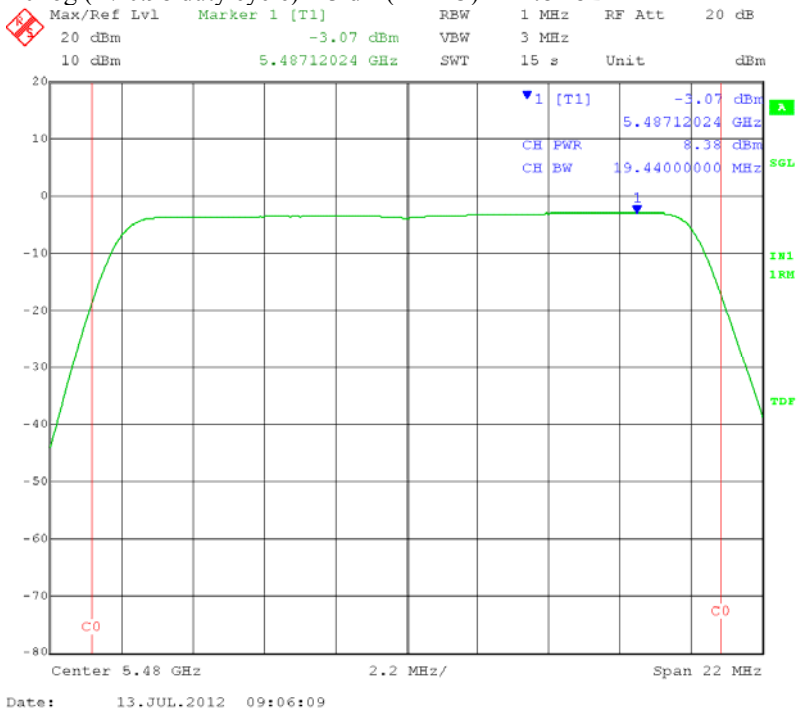
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	20 MHz	adi reg 3D	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 23.887 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 23.887 dBm – 11 dBi = **12.887 dBm**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

Maximum Conducted Output Power = 8.38 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = **12.67 dBm**



Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

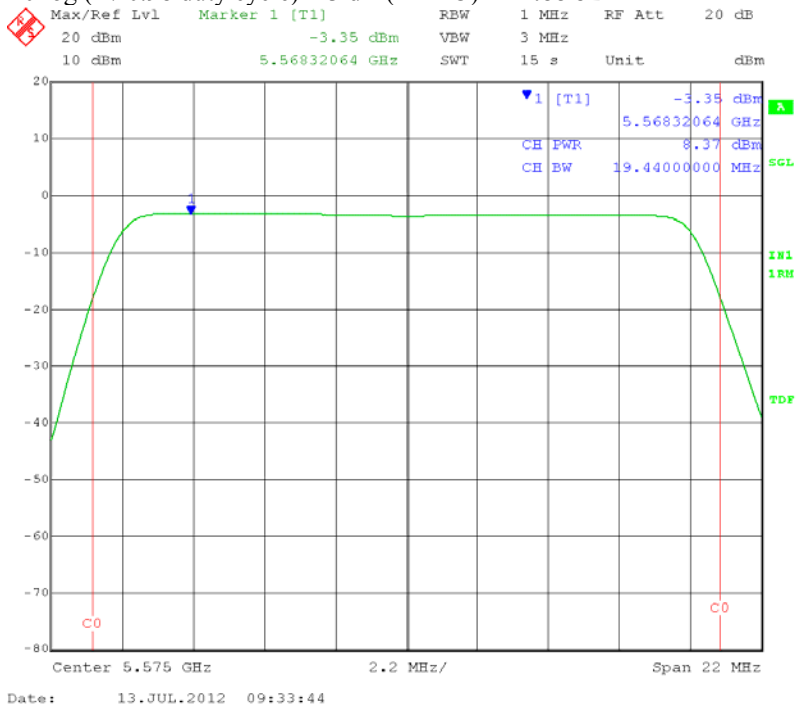
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	20 MHz	adi reg 44	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 23.887 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 23.887 dBm – 11 dBi = **12.887 dBm**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

Maximum Conducted Output Power = 8.37 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = **12.66 dBm**



Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

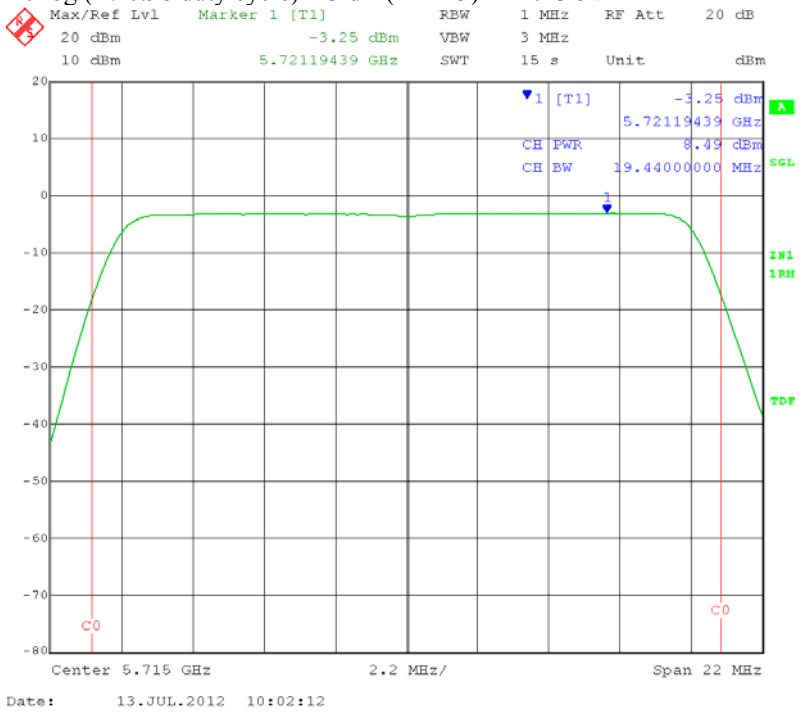
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	20 MHz	adi reg 41	26 dB EBW: 19.44 MHz
Output port:	Channel A;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 23.887 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 23.887 dBm – 11 dBi = **12.887 dBm**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

Maximum Conducted Output Power = 8.49 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = **12.78 dBm**



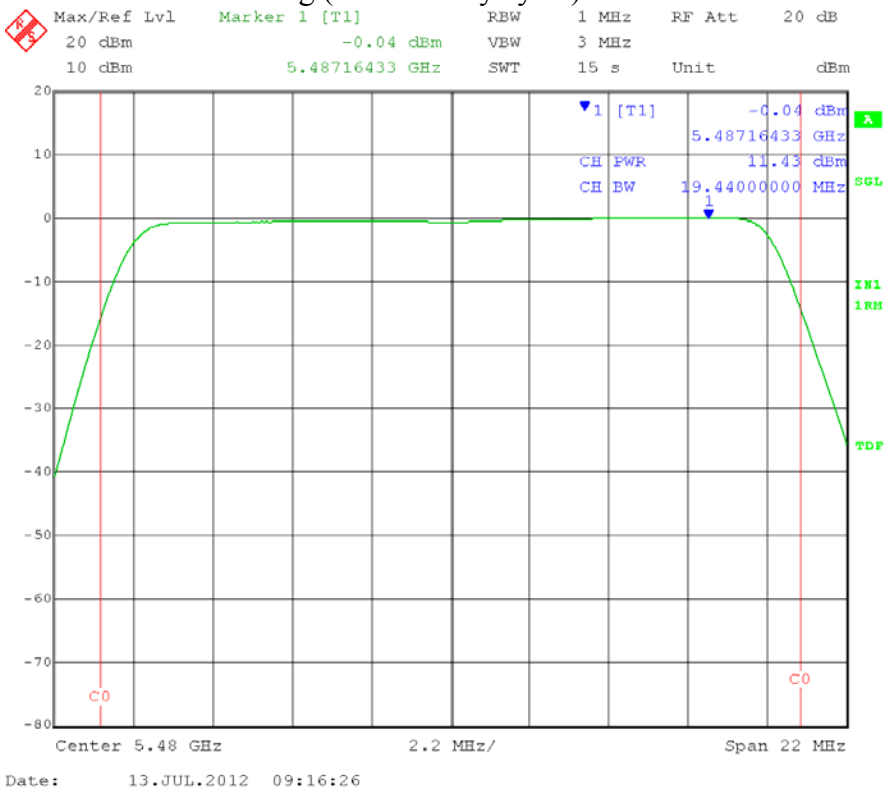
Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	20 MHz	adi reg 31	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 23.887 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 23.887 dBm – 11 dBi = **12.877 dBm**

MIMO MATRIX B (completely uncorrelated signals):
Maximum Conducted Output Power = 11.43 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) = **12.72 dBm**



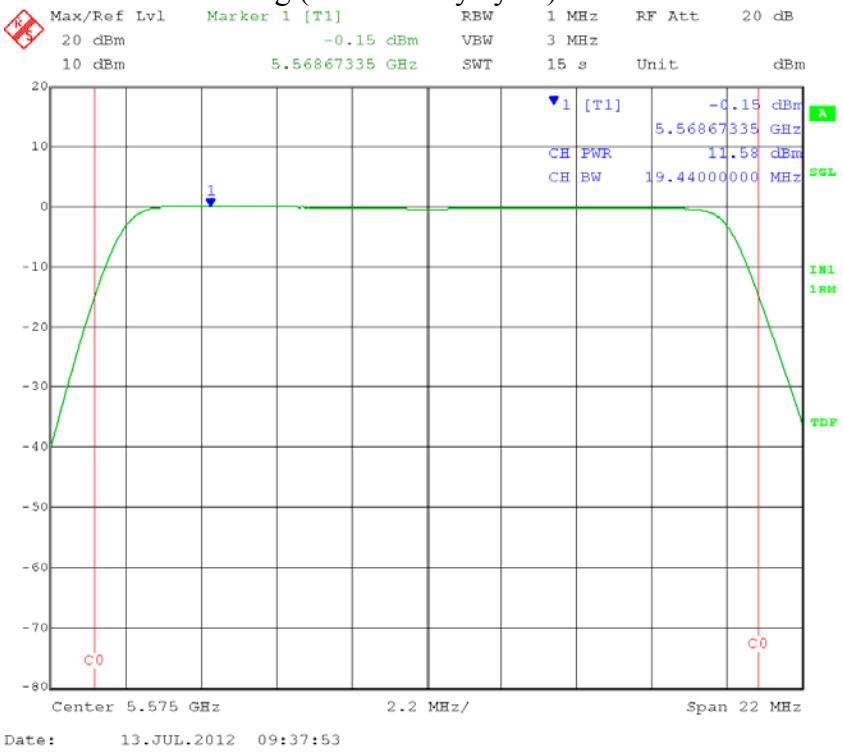
Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	20 MHz	adi reg 37	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 23.887 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 23.887 dBm – 11 dBi = **12.877 dBm**

MIMO MATRIX B (completely uncorrelated signals):
Maximum Conducted Output Power = 11.58 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) = **12.87 dBm**



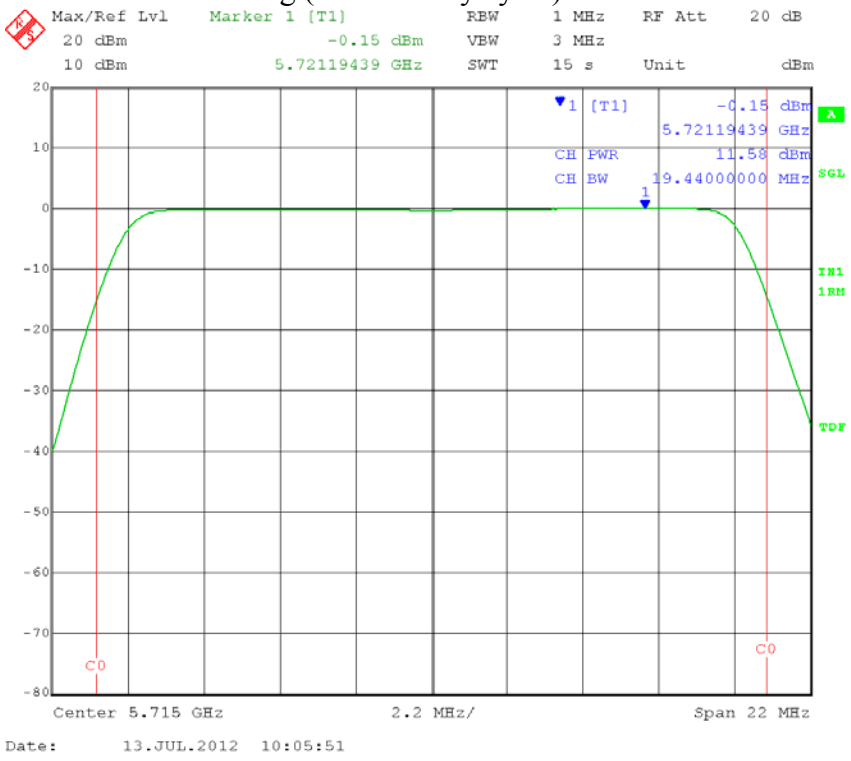
Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	20 MHz	adi reg 35	26 dB EBW: 19.44 MHz
Output port:	Channel A;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 23.887 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 23.887 dBm – 11 dBi = **12.877 dBm**

MIMO MATRIX B (completely uncorrelated signals):
Maximum Conducted Output Power = 11.58 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) = **12.87 dBm**



Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

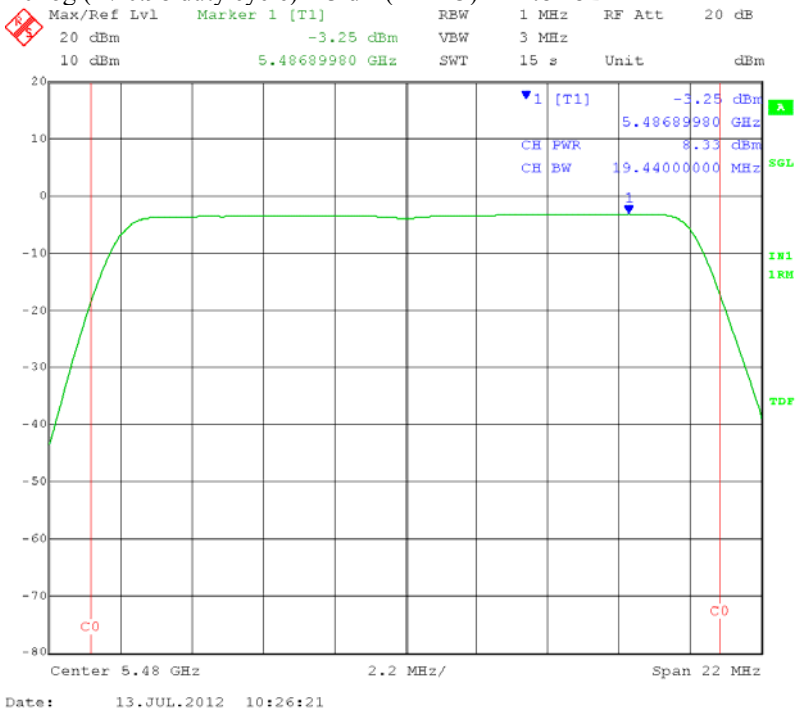
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	20 MHz	adi reg 41	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 23.887 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 23.887 dBm – 11 dBi = **12.887 dBm**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

Maximum Conducted Output Power = 8.33 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = **12.62 dBm**



Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

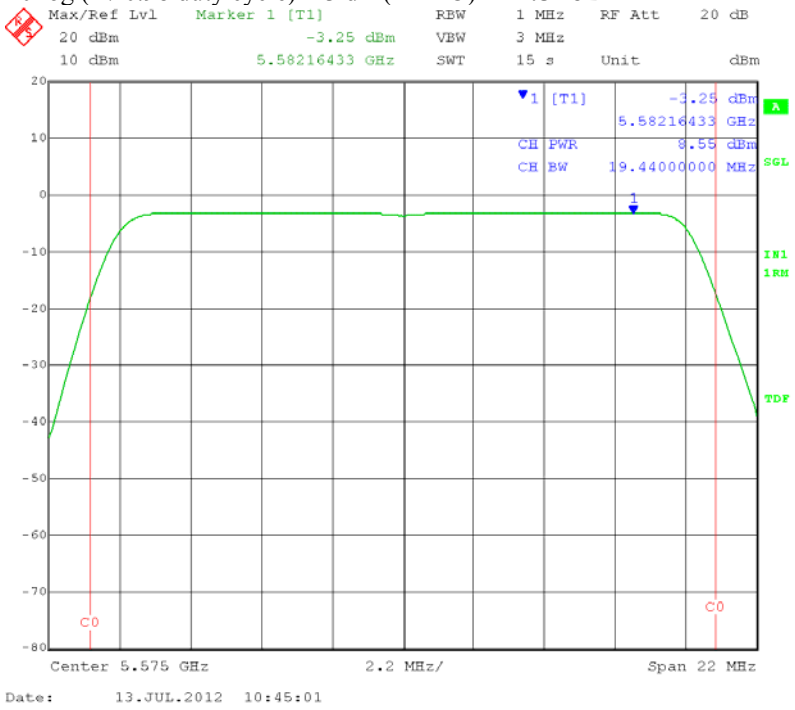
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	20 MHz	adi reg 47	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 23.887 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 23.887 dBm – 11 dBi = **12.887 dBm**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

Maximum Conducted Output Power = 8.55 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = **12.84 dBm**



Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

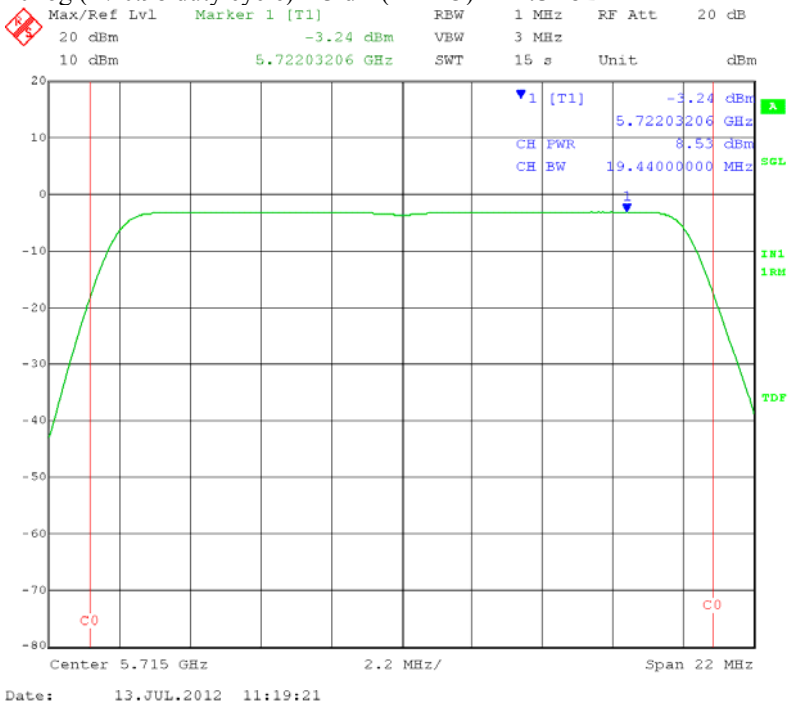
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	20 MHz	adi reg 46	26 dB EBW: 19.44 MHz
Output port:	Channel B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 23.887 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 23.887 dBm – 11 dBi = **12.887 dBm**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

Maximum Conducted Output Power = 8.53 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = **12.82 dBm**



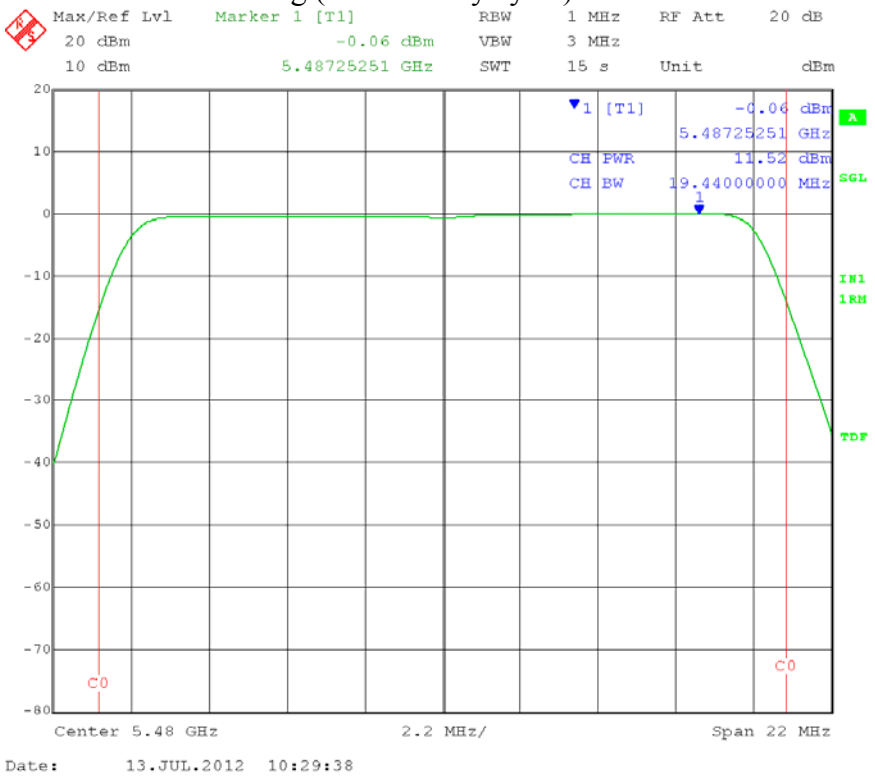
Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	20 MHz	adi reg 34	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 23.887 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 23.887 dBm – 11 dBi = **12.887 dBm**

MIMO MATRIX B (completely uncorrelated signals):
Maximum Conducted Output Power = 11.52 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) = **12.81 dBm**



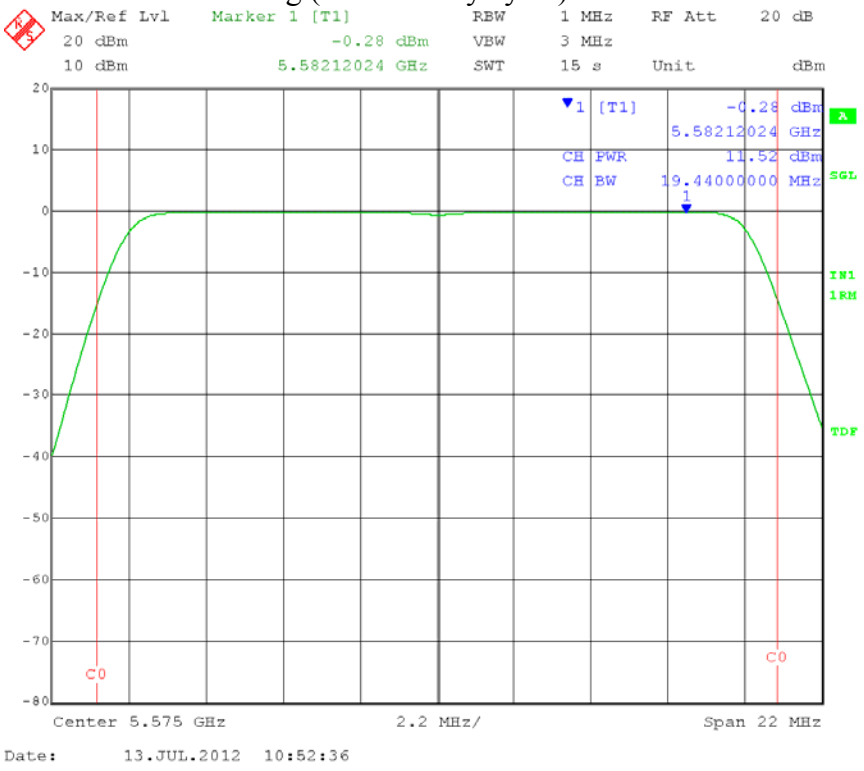
Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	20 MHz	adi reg 3B	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 23.887 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 23.887 dBm – 11 dBi = **12.887 dBm**

MIMO MATRIX B (completely uncorrelated signals):
Maximum Conducted Output Power = 11.52 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) = **12.81 dBm**



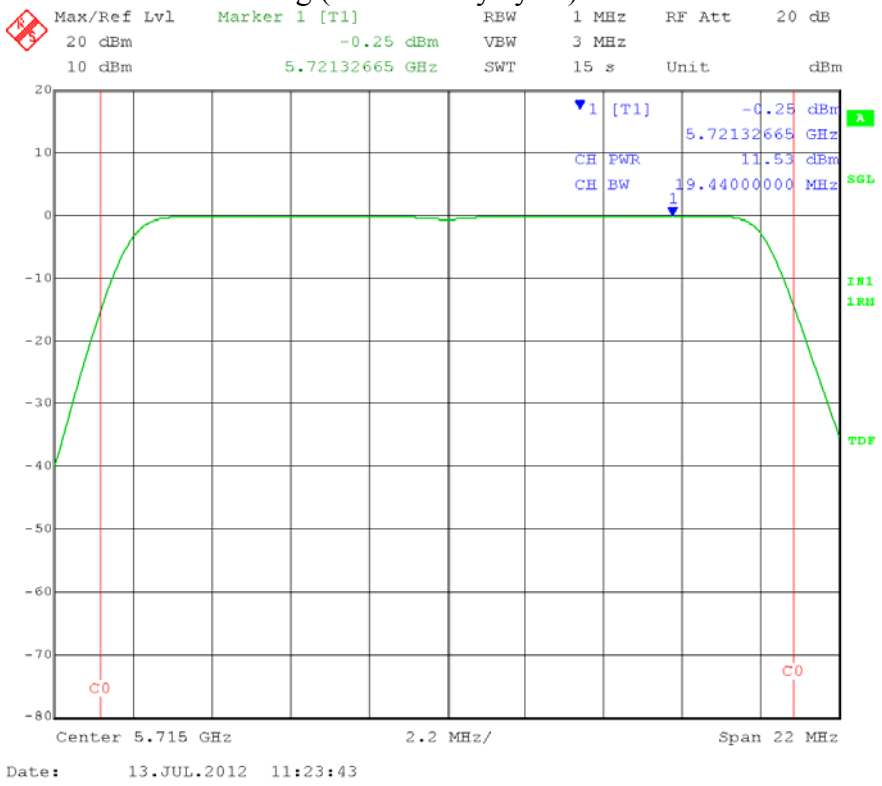
Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth:	20 MHz	adi reg 3A	26 dB EBW: 19.44 MHz
Output port:	Channel B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 23.887 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 23.887 dBm – 11 dBi = **12.887 dBm**

MIMO MATRIX B (completely uncorrelated signals):
Maximum Conducted Output Power = 11.53 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) = **12.82 dBm**



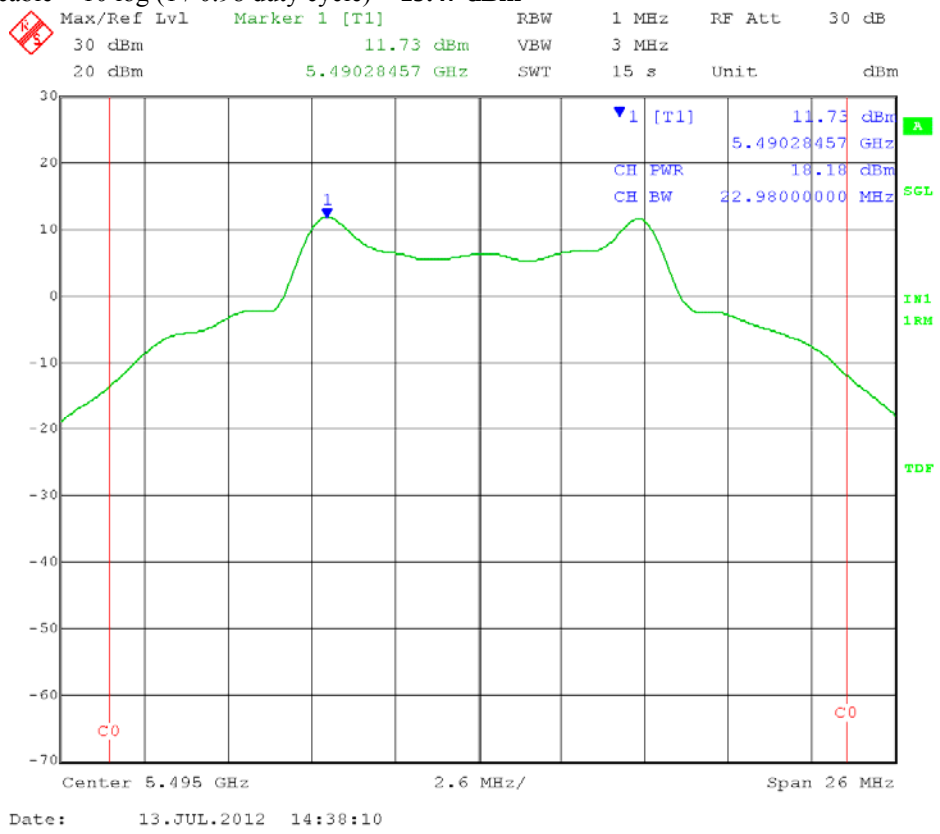
Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 100 ns = 500 µsec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth: 20 MHz
Output port: FSK
Output power setting: 9C;
26 dB EBW: 22.98 MHz
Low Channel Frequency: 5.495 GHz
Modulation Type: 2-level FSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 24.61 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 10.5 dBi.
Limit = 24 dBm – 4.5 dBi = **19.5 dBm**

Maximum Conducted Output Power = 18.18 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) = **19.47 dBm**



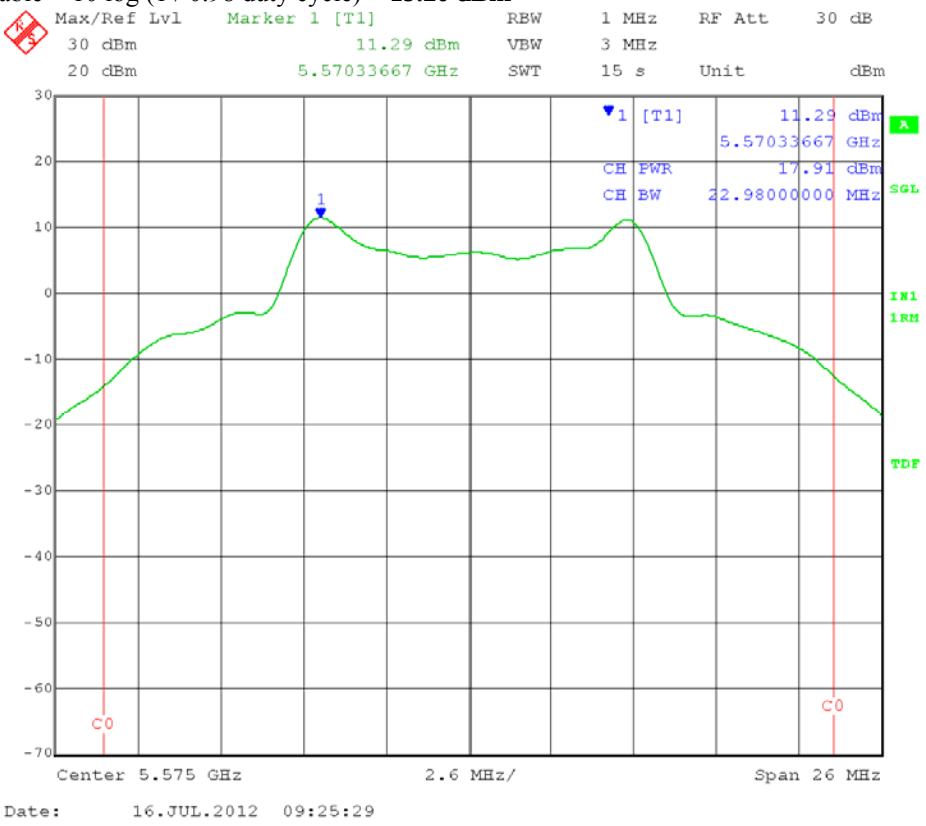
Test Date: 07-16-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 100 ns = 500 µsec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth: 20 MHz
Output port: FSK
Output power setting: 9C;
26 dB EBW: 22.98 MHz
Mid Channel Frequency: 5.575 GHz
Modulation Type: 2-level FSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 24.61 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 10.5 dBi.
Limit = 24 dBm – 4.5 dBi = **19.5 dBm**

Maximum Conducted Output Power = 17.91 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) = **19.20 dBm**



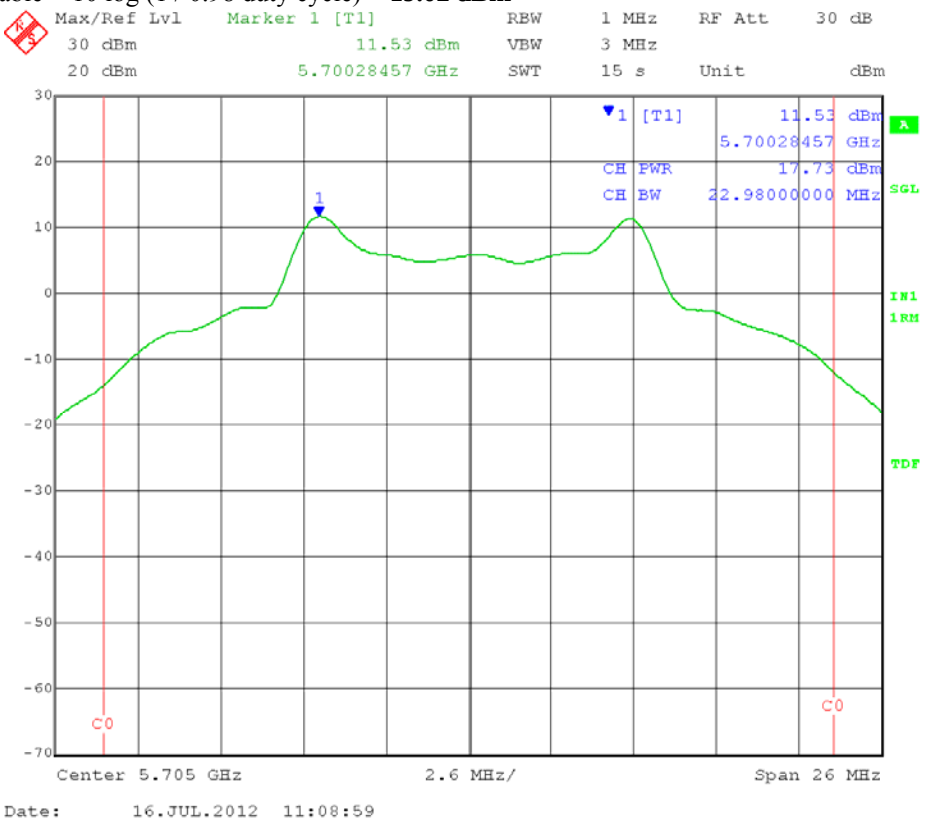
Test Date: 07-16-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Maximum Conducted Output Power
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section C – Method SA-2 Alternative (RMS detection with slow sweep with each spectrum bin averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction)
Operator: Craig B

SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x (Span/RBW)
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 100 ns = 500 µsec
Detector = RMS
Sweep: single sweep
Use analyzer's band power function with the band limits set equal to the 26 dB EBW
Add 10 log (1/x), where x is the duty cycle, to the measured power

EUT nominal channel bandwidth: 20 MHz
Output port: FSK
Output power setting: AC;
26 dB EBW: 22.98 MHz
High Channel Frequency: 5.705 GHz
Modulation Type: 2-level FSK

Limit: [15.407(a)(2)]: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 11 dBm + 10 log B = 24.61 dBm. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 10.5 dBi.
Limit = 24 dBm – 4.5 dBi = **19.5 dBm**

Maximum Conducted Output Power = 17.73 dBm + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) = **19.02 dBm**



Appendix A – Measurement Data

A3.0 Peak Power Spectral Density – Conducted - OFDM

Rule Section: Section 15.407(a)(2)

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section E – Peak power spectral density (PPSD)

Description:
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
Detector = RMS
Sweep: single sweep
Use peak search to find the peak of the spectrum
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum

Limit:
11 dBm in any 1 MHz band
Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

Results: Passed

Notes: Measurements were taken for QPSK at the lowest, middle, and highest channels of operation. EUT was set to transmit continuously with 98% duty cycle.

Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Power Spectral Density (PPSD) – Conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section E – Peak power spectral density (using Output Power method SA-2 Alternative)
Operator: Craig B

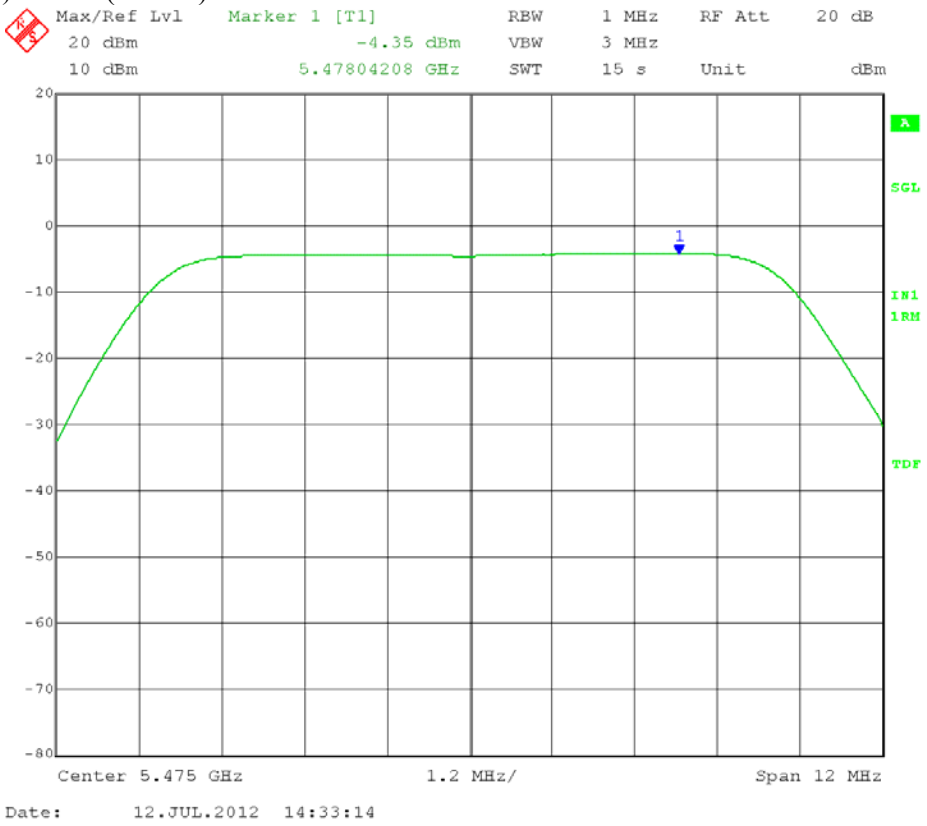
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz; VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
Detector = RMS; Sweep: single sweep
Use peak search to find the peak of the spectrum
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum

EUT nominal channel bandwidth:	10 MHz	adi reg 4C	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: 11 dBm in any 1 MHz band. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 11 dBm/MHz – 11 dBi = **0 dBm/MHz**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

PPSD = -4.35 dBm/MHz + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = -0.06 dBm/MHz



Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Power Spectral Density (PPSD) – Conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section E – Peak power spectral density (using Output Power method SA-2 Alternative)
Operator: Craig B

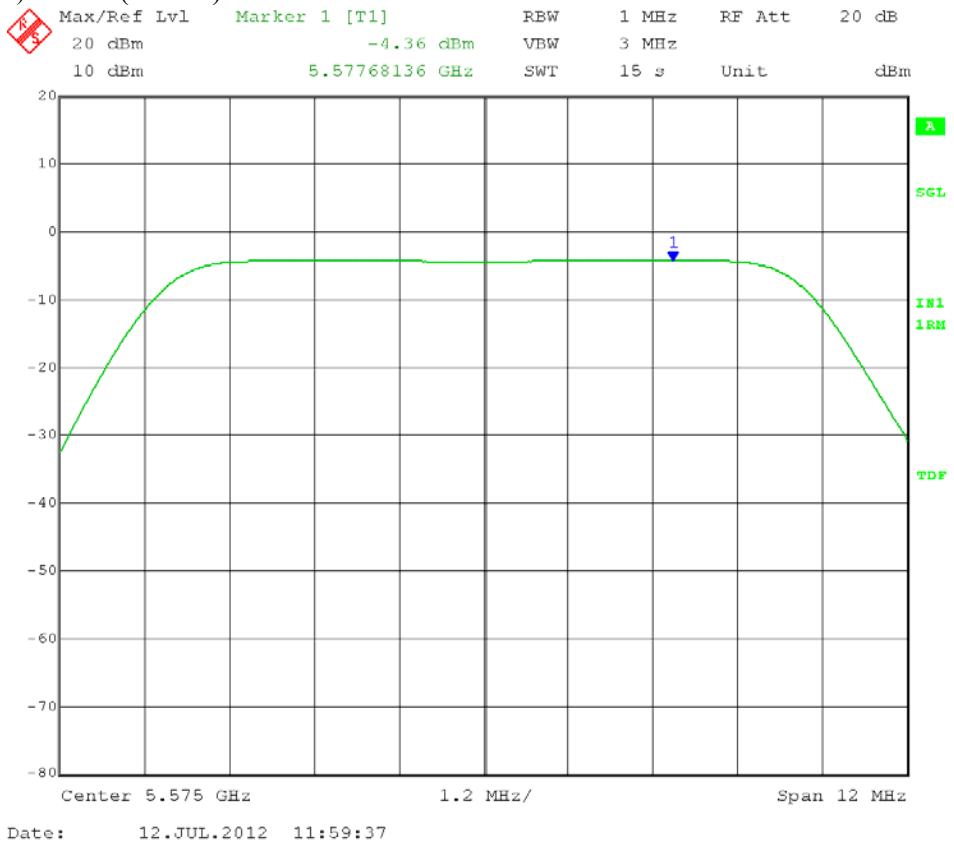
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz; VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
Detector = RMS; Sweep: single sweep
Use peak search to find the peak of the spectrum
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum

EUT nominal channel bandwidth:	10 MHz	adi reg 54	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: 11 dBm in any 1 MHz band. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 11 dBm/MHz – 11 dBi = **0 dBm/MHz**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

PPSD = -4.53 dBm/MHz + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = -0.24 dBm/MHz



Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Power Spectral Density (PPSD) – Conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section E – Peak power spectral density (using Output Power method SA-2 Alternative)
Operator: Craig B

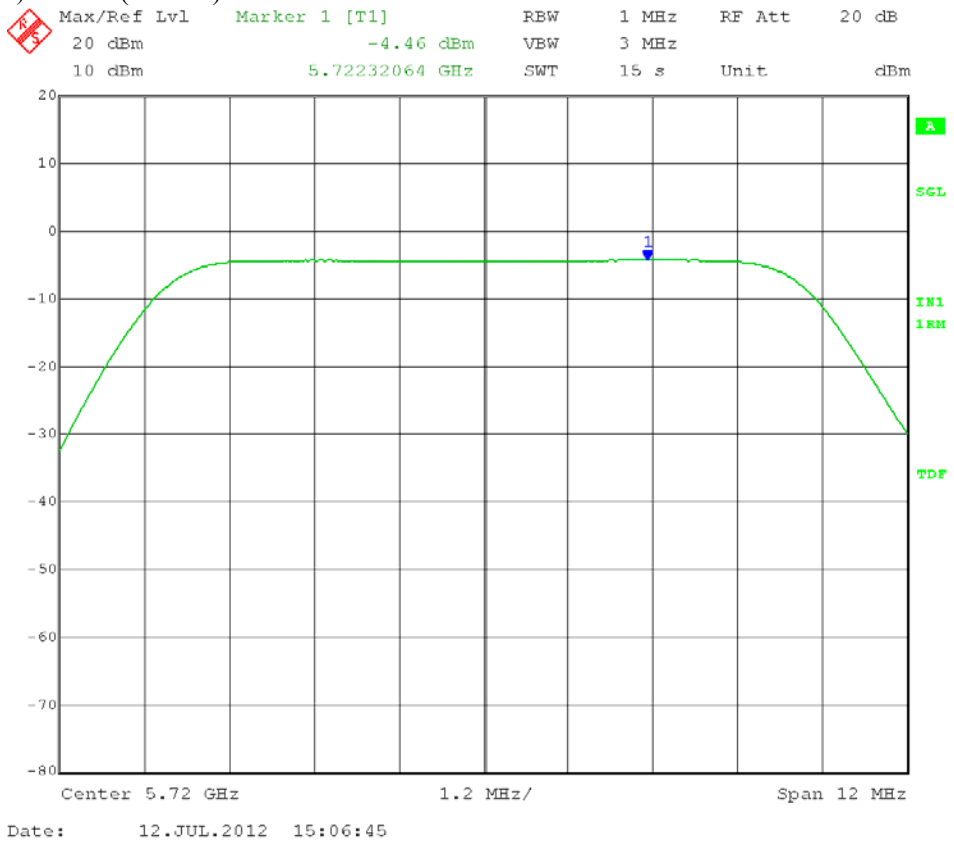
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz; VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
Detector = RMS; Sweep: single sweep
Use peak search to find the peak of the spectrum
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum

EUT nominal channel bandwidth:	10 MHz	adi reg 51	26 dB EBW: 9.72 MHz
Output port:	Channel A;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: 11 dBm in any 1 MHz band. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 11 dBm/MHz – 11 dBi = **0 dBm/MHz**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

PPSD = -4.46 dBm/MHz + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = -0.17 dBm/MHz



Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Power Spectral Density (PPSD) – Conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section E – Peak power spectral density (using Output Power method SA-2 Alternative)
Operator: Craig B

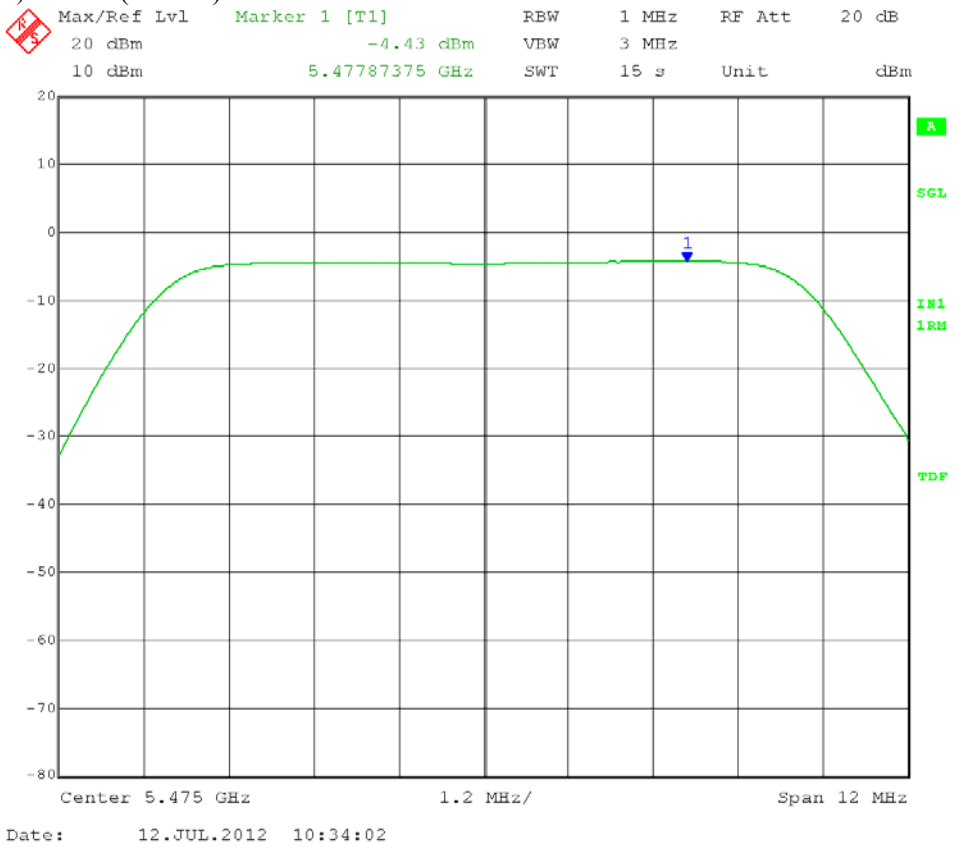
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz; VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
Detector = RMS; Sweep: single sweep
Use peak search to find the peak of the spectrum
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum

EUT nominal channel bandwidth:	10 MHz	adi reg 50	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: 11 dBm in any 1 MHz band. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 11 dBm/MHz – 11 dBi = **0 dBm/MHz**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

PPSD = -4.43 dBm/MHz + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = -0.14 dBm/MHz



Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Power Spectral Density (PPSD) – Conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section E – Peak power spectral density (using Output Power method SA-2 Alternative)
Operator: Craig B

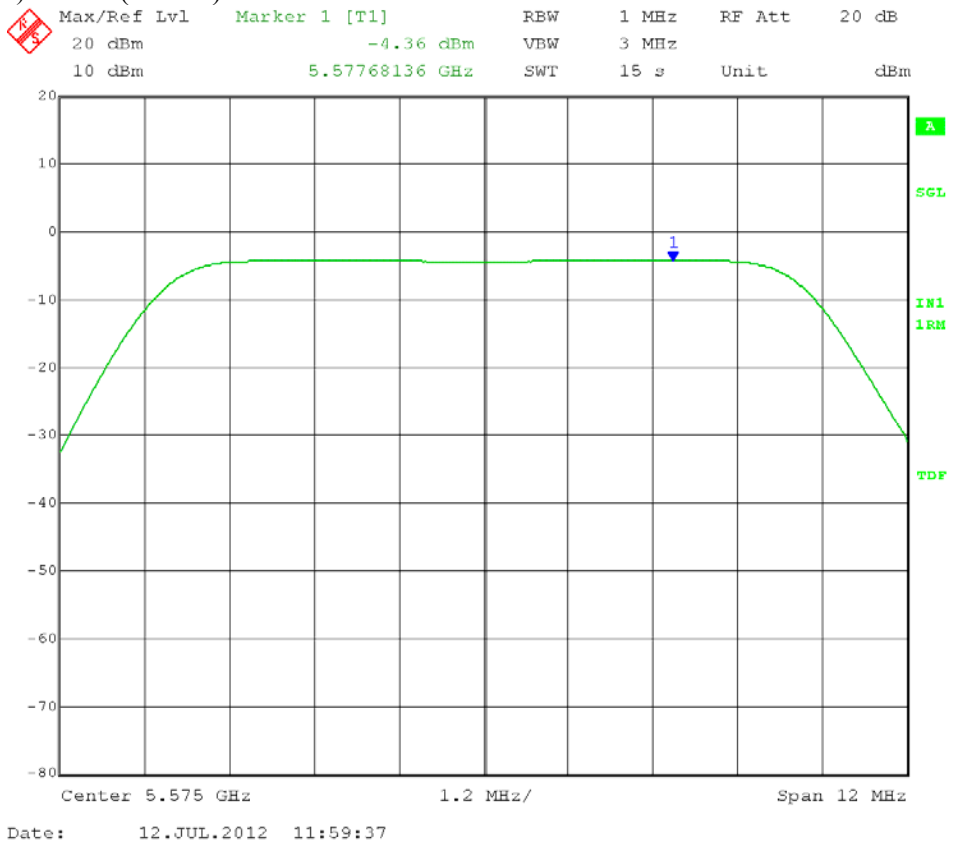
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz; VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
Detector = RMS; Sweep: single sweep
Use peak search to find the peak of the spectrum
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum

EUT nominal channel bandwidth:	10 MHz	adi reg 56	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: 11 dBm in any 1 MHz band. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 11 dBm/MHz – 11 dBi = **0 dBm/MHz**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

PPSD = -4.36 dBm/MHz + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = -0.07 dBm/MHz



Test Date: 07-12-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Power Spectral Density (PPSD) – Conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section E – Peak power spectral density (using Output Power method SA-2 Alternative)
Operator: Craig B

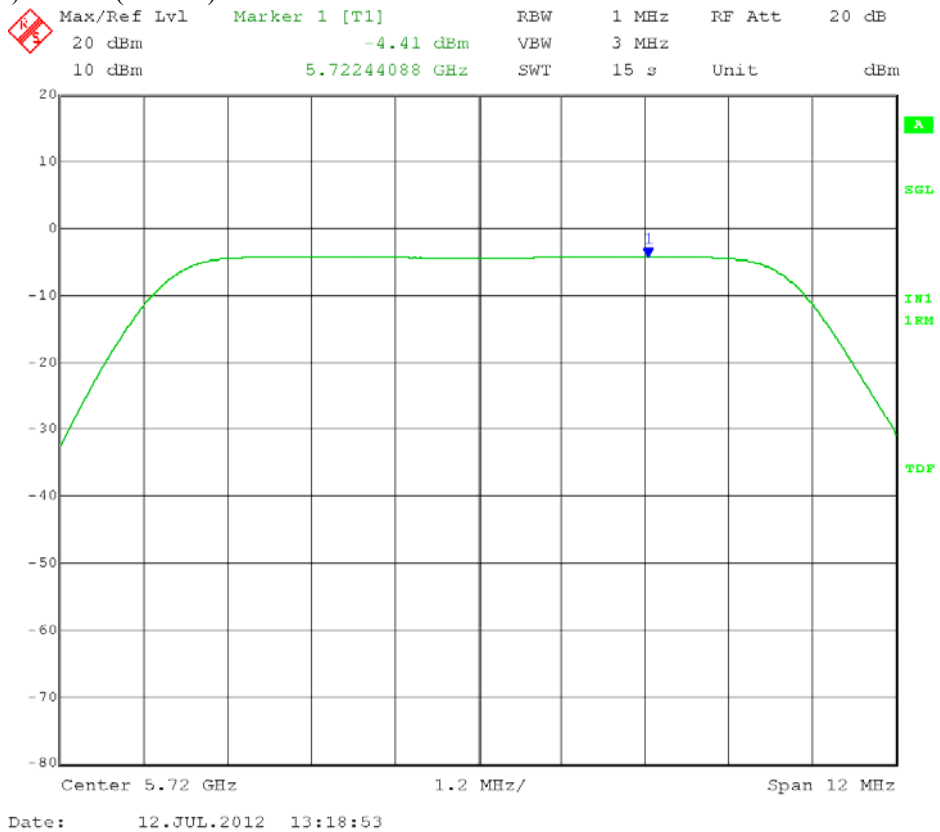
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz; VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
Detector = RMS; Sweep: single sweep
Use peak search to find the peak of the spectrum
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum

EUT nominal channel bandwidth:	10 MHz	adi reg 55	26 dB EBW: 9.72 MHz
Output port:	Channel B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: 11 dBm in any 1 MHz band. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 11 dBm/MHz – 11 dBi = **0 dBm/MHz**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

PPSD = -4.41 dBm/MHz + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = -0.12 dBm/MHz



Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Power Spectral Density (PPSD) – Conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section E – Peak power spectral density (using Output Power method SA-2 Alternative)
Operator: Craig B

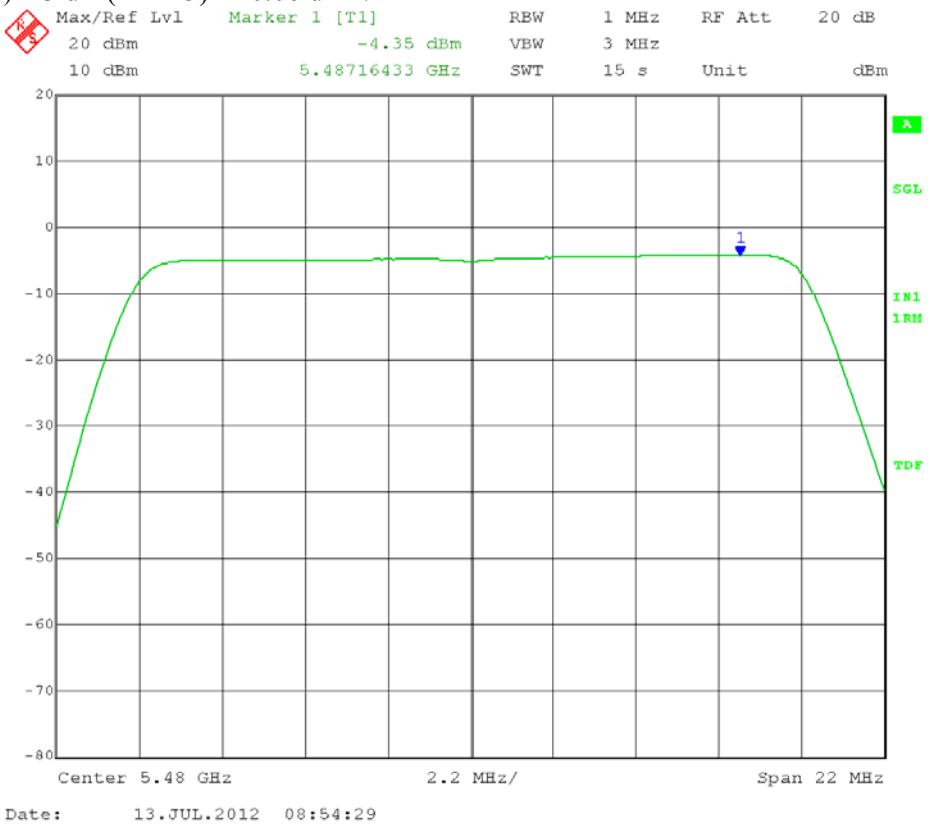
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz; VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS; Sweep: single sweep
Use peak search to find the peak of the spectrum
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum

EUT nominal channel bandwidth:	20 MHz	adi reg 42	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: 11 dBm in any 1 MHz band. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 11 dBm/MHz – 11 dBi = **0 dBm/MHz**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

PPSD = -4.35 dBm/MHz + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = -0.06 dBm/MHz



Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Power Spectral Density (PPSD) – Conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section E – Peak power spectral density (using Output Power method SA-2 Alternative)
Operator: Craig B

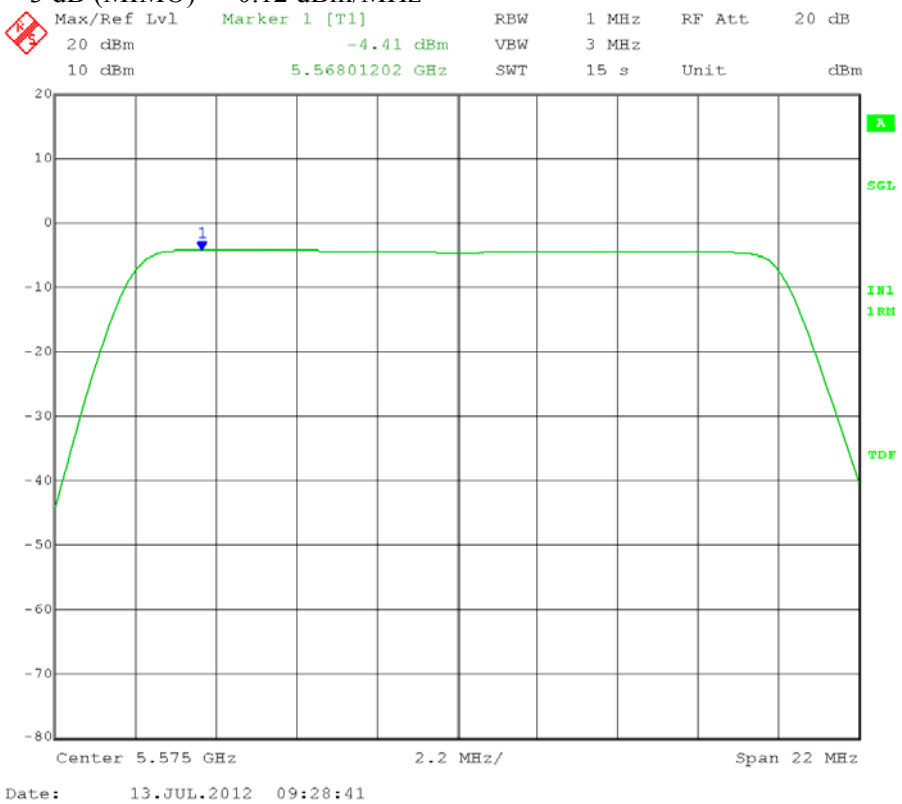
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz; VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS; Sweep: single sweep
Use peak search to find the peak of the spectrum
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum

EUT nominal channel bandwidth:	20 MHz	adi reg 48	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: 11 dBm in any 1 MHz band. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 11 dBm/MHz – 11 dBi = **0 dBm/MHz**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

PPSD = -4.41 dBm/MHz + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = -0.12 dBm/MHz



Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Power Spectral Density (PPSD) – Conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section E – Peak power spectral density (using Output Power method SA-2 Alternative)
Operator: Craig B

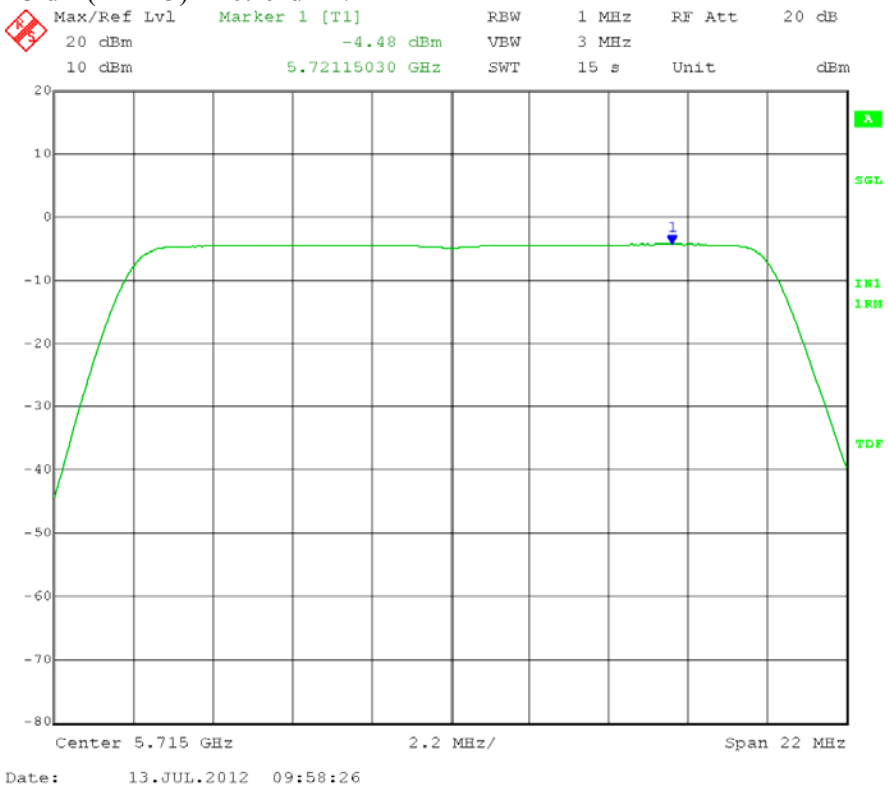
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz; VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS; Sweep: single sweep
Use peak search to find the peak of the spectrum
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum

EUT nominal channel bandwidth:	20 MHz	adi reg 46	26 dB EBW: 19.44 MHz
Output port:	Channel A;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: 11 dBm in any 1 MHz band. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 11 dBm/MHz – 11 dBi = **0 dBm/MHz**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

PPSD = -4.48 dBm/MHz + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = -0.19 dBm/MHz



Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Power Spectral Density (PPSD) – Conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section E – Peak power spectral density (using Output Power method SA-2 Alternative)
Operator: Craig B

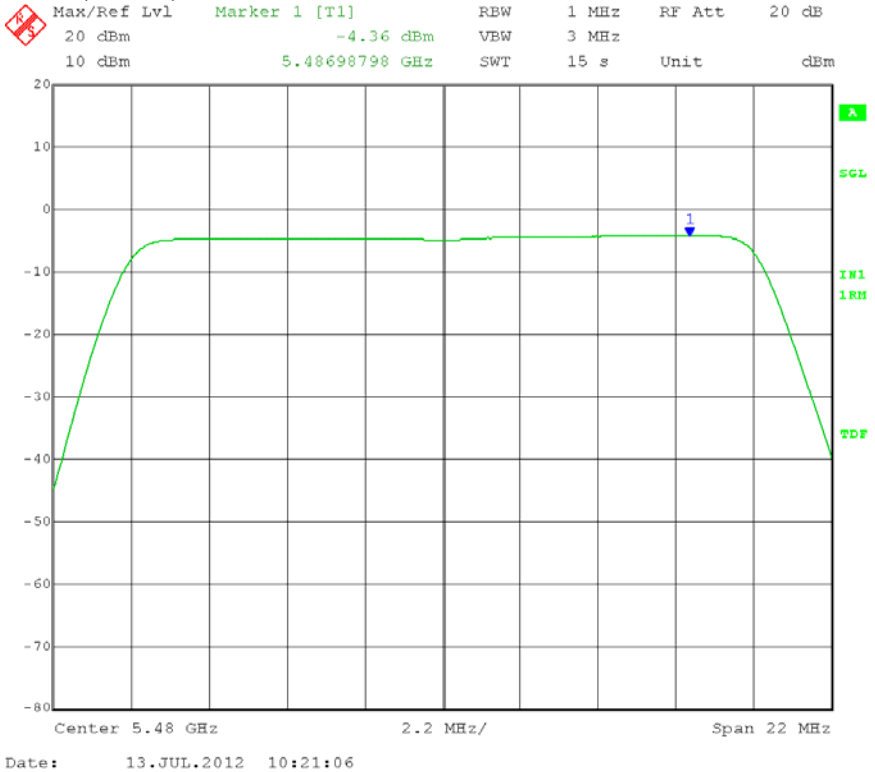
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz; VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS; Sweep: single sweep
Use peak search to find the peak of the spectrum
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum

EUT nominal channel bandwidth:	20 MHz	adi reg 45	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: 11 dBm in any 1 MHz band. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 11 dBm/MHz – 11 dBi = **0 dBm/MHz**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

PPSD = -4.36 dBm/MHz + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = -0.07 dBm/MHz



Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Power Spectral Density (PPSD) – Conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section E – Peak power spectral density (using Output Power method SA-2 Alternative)
Operator: Craig B

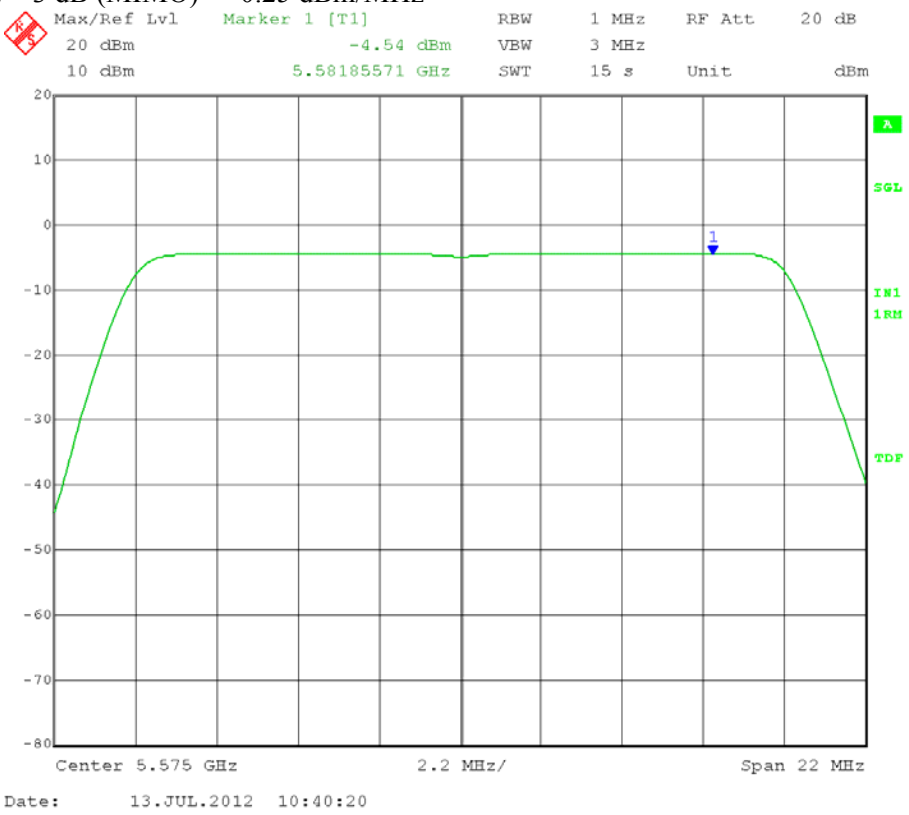
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz; VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS; Sweep: single sweep
Use peak search to find the peak of the spectrum
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum

EUT nominal channel bandwidth:	20 MHz	adi reg 4C	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: 11 dBm in any 1 MHz band. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 11 dBm/MHz – 11 dBi = **0 dBm/MHz**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

PPSD = -4.54 dBm/MHz + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = -0.25 dBm/MHz



Test Date: 07-13-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Power Spectral Density (PPSD) – Conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section E – Peak power spectral density (using Output Power method SA-2 Alternative)
Operator: Craig B

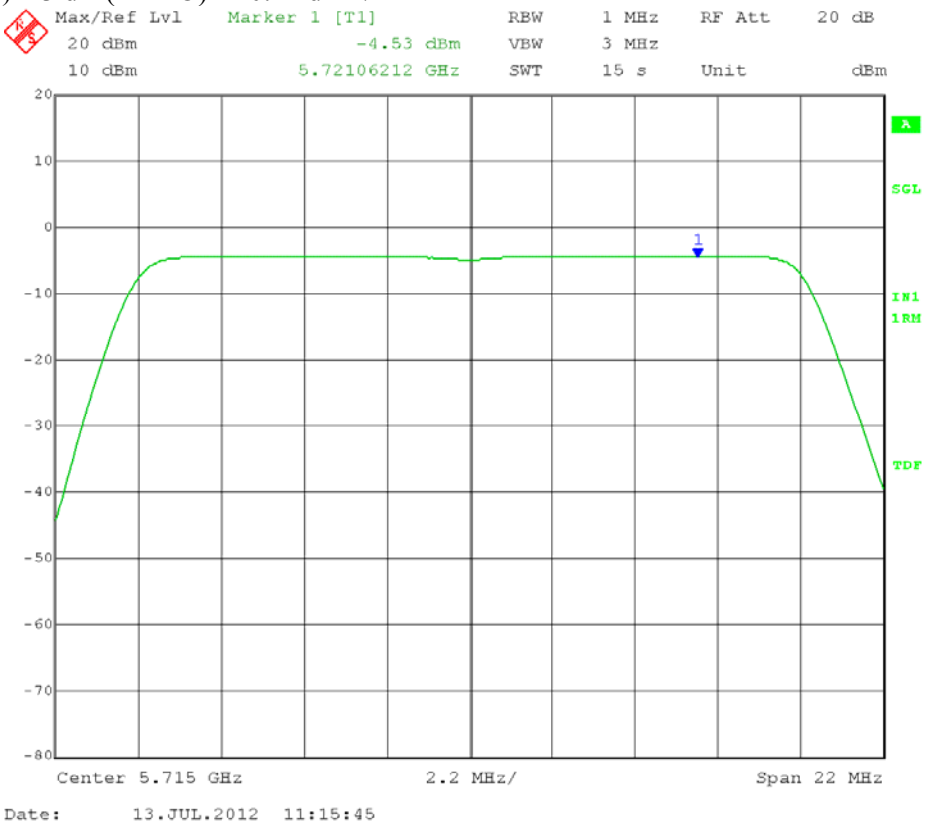
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz; VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
= 10 x 500 x 56 µs = 0.28 sec
Detector = RMS; Sweep: single sweep
Use peak search to find the peak of the spectrum
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum

EUT nominal channel bandwidth:	20 MHz	adi reg 4B	26 dB EBW: 19.44 MHz
Output port:	Channel B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Limit: [15.407(a)(2)]: 11 dBm in any 1 MHz band. Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Antenna gain = 17 dBi. Limit = 11 dBm/MHz – 11 dBi = **0 dBm/MHz**

MIMO MATRIX A: MIMO with Cross-Polarized antenna (FCC KDB 662911 D02 v01):
Measure and add 10 log(N) dB, where N is the number of outputs.
= 10 log(2) = 3 dB

PPSD = -4.53 dBm/MHz + 1.2 dB for Cambium Networks connectorized cable + 10 log (1 / 0.98 duty cycle) + 3 dB (MIMO) = -0.24 dBm/MHz



Appendix A – Measurement Data

A4.0 Peak Power Spectral Density – Conducted - FSK

Rule Section: Section 15.407(a)(2)

Test Procedure: Power Density Averaged over 20 MHz Channel.
A non-standard power density procedure was used as the device under test does not produce a square spectrum.
(FYI – this procedure has been accepted by the FCC.)

Description: Mean equivalent isotropically radiated power (e.i.r.p.) density during a transmission burst

RBW = 1 MHz
VBW = 3 MHz
Frequency Span: 500 kHz
Detector = RMS
Sweep time = 15 seconds
Trace mode = max hold
Measure the level in each 500 kHz span across the 20 MHz channel bandwidth
Calculate the average power across the 20 MHz channel bandwidth

Limit: 11 dBm in any 1 MHz band
Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

Results: Passed

Notes: Measurements were taken with 2-Level FSK modulation at the lowest and highest channels of operation. EUT was set to transmit continuously with 98% duty cycle.

DLS Electronic Systems, Inc.

Company: Cambium Networks
Operator: Craig B
Date of test: 07-16-12
Temperature: 75 deg. F.
Humidity: 45% R.H.
Test: Mean EIRP spectral density (dBm/MHz)

RBW: 1 MHz
VBW: 3 MHz
Detector: RMS
SPAN: 500 kHz
Sweep time: 15 sec.

Model: PMP450AP 5.4 GHz MIMO/COMBO
Low channel (5495 MHz); 2-Level FSK modulation; power setting 90
Power Density averaged over 20 MHz channel
Corrected for external attenuation, cable and connector to antenna interface on radio.

Center frequency of 500 kHz span (MHz)	Highest level measured within span (dBm)	dBm converted to mW (mW)
5483.5	-12.74	0.053
5484.0	-10.28	0.094
5484.5	-8.06	0.156
5485.0	-6.46	0.226
5485.5	-5.73	0.267
5486.0	-5.43	0.286
5486.5	-4.51	0.354
5487.0	-3.07	0.493
5487.5	-2.02	0.628
5488.0	-1.86	0.652
5488.5	-1.02	0.791
5489.0	4.00	2.512
5489.5	9.66	9.247
5490.0	11.75	14.962
5490.5	11.74	14.928
5491.0	9.95	9.886
5491.5	7.30	5.370
5492.0	5.77	3.776
5492.5	5.37	3.443
5493.0	5.07	3.214
5493.5	4.55	2.851
5494.0	4.90	3.090
5494.5	5.42	3.483
5495.0	5.61	3.639
5495.5	5.61	3.639
5496.0	5.30	3.388
5496.5	4.56	2.858
5497.0	4.97	3.141
5497.5	5.51	3.556
5498.0	5.58	3.614
5498.5	5.81	3.811
5499.0	7.88	6.138
5499.5	10.83	12.106
5500.0	11.41	13.836
5500.5	10.94	12.417
5501.0	6.76	4.742

5501.5	0.96	1.247
5502.0	-1.75	0.668
5502.5	-2.12	0.614
5503.0	-2.58	0.552
5503.5	-3.71	0.426
5504.0	-4.74	0.336
5504.5	-5.49	0.282
5505.0	-6.26	0.237
5505.5	-7.34	0.185
5506.0	-8.81	0.132
5506.5	-11.02	0.079

Total Power in 20 MHz channel (mW) =	161.706
Average total power (mW) =	3.944046035
Average power (dBm) =	5.96
Add 10 log (1 / 0.98 duty cycle) =	6.05
Limit = 11 dBm/MHz - 4.5 (antenna gain over 6 dBi) =	6.50 dBm/MHz
Margin (dB) =	0.45

DLS Electronic Systems, Inc.

Company: Cambium Networks
Operator: Craig B
Date of test: 07-16-12
Temperature: 75 deg. F.
Humidity: 45% R.H.
Test: Mean EIRP spectral density (dBm/MHz)

RBW: 1 MHz
VBW: 3 MHz
Detector: RMS
SPAN: 500 kHz
Sweep time: 15 sec.

Model: PMP450AP 5.4 GHz MIMO/COMBO
Mid channel (5575 MHz); 2-Level FSK modulation; power setting 94
Power Density averaged over 20 MHz channel
Corrected for external attenuation, cable and connector to antenna interface on radio.

Center frequency of 500 kHz span (MHz)	Highest level measured within span (dBm)	dBm converted to mW (mW)
5563.5	-12.51	0.056
5564.0	-10.13	0.097
5564.5	-7.96	0.160
5565.0	-6.36	0.231
5565.5	-5.61	0.275
5566.0	-5.32	0.294
5566.5	-4.41	0.362
5567.0	-3.02	0.499
5567.5	-2.01	0.630
5568.0	-1.86	0.652
5568.5	-1.14	0.769
5569.0	3.95	2.483
5569.5	9.74	9.419
5570.0	12.05	16.032
5570.5	12.04	15.996
5571.0	10.60	11.482
5571.5	8.14	6.516
5572.0	6.59	4.560
5572.5	6.13	4.102
5573.0	5.78	3.784
5573.5	5.24	3.342
5574.0	5.52	3.565
5574.5	5.98	3.963
5575.0	6.15	4.121
5575.5	6.15	4.121
5576.0	5.86	3.855
5576.5	5.14	3.266
5577.0	5.60	3.631
5577.5	6.18	4.150
5578.0	6.28	4.246
5578.5	6.47	4.436
5579.0	8.40	6.918
5579.5	11.12	12.942
5580.0	11.64	14.588
5580.5	11.13	12.972
5581.0	6.99	5.000

5581.5	1.03	1.268
5582.0	-1.94	0.640
5582.5	-2.24	0.597
5583.0	-2.63	0.546
5583.5	-3.71	0.426
5584.0	-4.68	0.340
5584.5	-5.45	0.285
5585.0	-6.24	0.238
5585.5	-7.36	0.184
5586.0	-8.79	0.132
5586.5	-10.98	0.080

Total Power in 20 MHz channel (mW) =	177.540
Average total power (mW) =	4.330240276
Average power (dBm) =	6.365
Add 10 log (1 / 0.98 duty cycle) =	6.45
Limit = 11 dBm/MHz - 4.5 (antenna gain over 6 dBi) =	6.50 dBm/MHz
Margin (dB) =	0.05

DLS Electronic Systems, Inc.

Company: Cambium Networks
Operator: Craig B
Date of test: 07-16-12
Temperature: 75 deg. F.
Humidity: 45% R.H.
Test: Mean EIRP spectral density (dBm/MHz)

RBW: 1 MHz
VBW: 3 MHz
Detector: RMS
SPAN: 500 kHz
Sweep time: 15 sec.

Model: PMP450AP 5.4 GHz MIMO/COMBO
High channel (5705 MHz); 2-Level FSK modulation; power setting A4
Power Density averaged over 20 MHz channel
Corrected for external attenuation, cable and connector to antenna interface on radio.

Center frequency of 500 kHz span (MHz)	Highest level measured within span (dBm)	dBm converted to mW (mW)
5693.5	-12.74	0.053
5694.0	-10.37	0.092
5694.5	-8.18	0.152
5695.0	-6.53	0.222
5695.5	-5.69	0.270
5696.0	-5.44	0.286
5696.5	-4.61	0.346
5697.0	-3.28	0.470
5697.5	-2.20	0.603
5698.0	-2.02	0.628
5698.5	-1.58	0.695
5699.0	3.27	2.123
5699.5	9.23	8.375
5700.0	11.85	15.311
5700.5	11.89	15.453
5701.0	10.72	11.803
5701.5	8.22	6.637
5702.0	6.60	4.571
5702.5	6.04	4.018
5703.0	5.70	3.715
5703.5	5.12	3.251
5704.0	5.30	3.388
5704.5	5.75	3.758
5705.0	5.94	3.926
5705.5	5.94	3.926
5706.0	5.72	3.733
5706.5	5.00	3.162
5707.0	5.38	3.451
5707.5	6.01	3.990
5708.0	6.14	4.111
5708.5	6.30	4.266
5709.0	8.01	6.324
5709.5	10.82	12.078
5710.0	11.49	14.093
5710.5	11.16	13.062
5711.0	7.34	5.420

5711.5	1.35	1.365
5712.0	-2.03	0.627
5712.5	-2.41	0.574
5713.0	-2.69	0.538
5713.5	-3.72	0.425
5714.0	-4.68	0.340
5714.5	-5.44	0.286
5715.0	-6.21	0.239
5715.5	-7.25	0.188
5716.0	-8.63	0.137
5716.5	-10.77	0.084

Total Power in 20 MHz channel (mW) =	171.861
Average total power (mW) =	4.191731341
Average power (dBm) =	6.224
Add 10 log (1 / 0.98 duty cycle) =	6.31
Limit = 11 dBm/MHz - 4.5 (antenna gain over 6 dBi) =	6.50 dBm/MHz
Margin (dB) =	0.19

Appendix A – Measurement Data

A5.0 Peak Excursion – Conducted – OFDM & FSK

Rule Section: Section 15.407(a)(6)

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section F – Peak excursion measurement

Description:
SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: set ≥ 10 x (number of points in sweep) x (total on/off period of transmitted signal)
Detector = RMS
Sweep: single sweep
Use peak search to find the peak of the spectrum
Save trace

Turn on 2nd trace
Detector = peak
Trace mode = max-hold
Use peak search to find the peak of the spectrum
Compare the ratio of the maximum of the peak-max-hold trace to the maximum value of the RMS trace

Limit: 13 dB peak-to-average ratio across any 1 MHz bandwidth

Results: Passed

Notes: Measurements were taken for QPSK (OFDM) or 2-level (FSK) modulation types, at the lowest, middle, and highest channels of operation. EUT was set to transmit continuously with 98% duty cycle.

Test Date: 10-04-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Excursion – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section F – Peak excursion measurement
Operator: Craig B

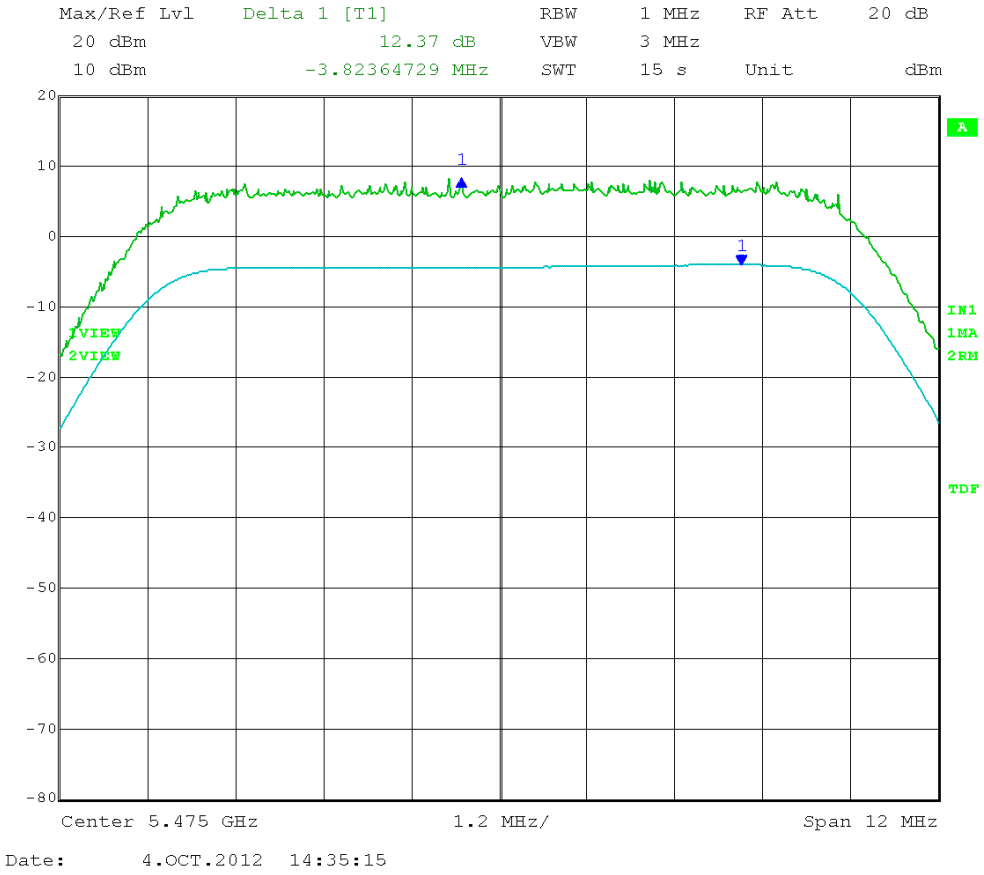
RBW = 1MHz; VBW ≥ RBW
Detector = Peak/Average; Trace mode = max hold

EUT nominal channel bandwidth: 10 MHz adi reg 5C
Output port: Channel A; Low Channel Frequency: 5.475 GHz
Output power setting: 19; Modulation Type: QPSK
FPGA reg: 10F8 0

Limit: [15.407(a)(6)]: Ratio of the peak excursion of the modulation envelope to the maximum conducted output power shall not exceed **13 dB** across any 1 MHz bandwidth.

Green trace = Peak
Blue trace = Average

Peak excursion = 12.37 dB



Test Date: 10-04-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Excursion – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section F – Peak excursion measurement
Operator: Craig B

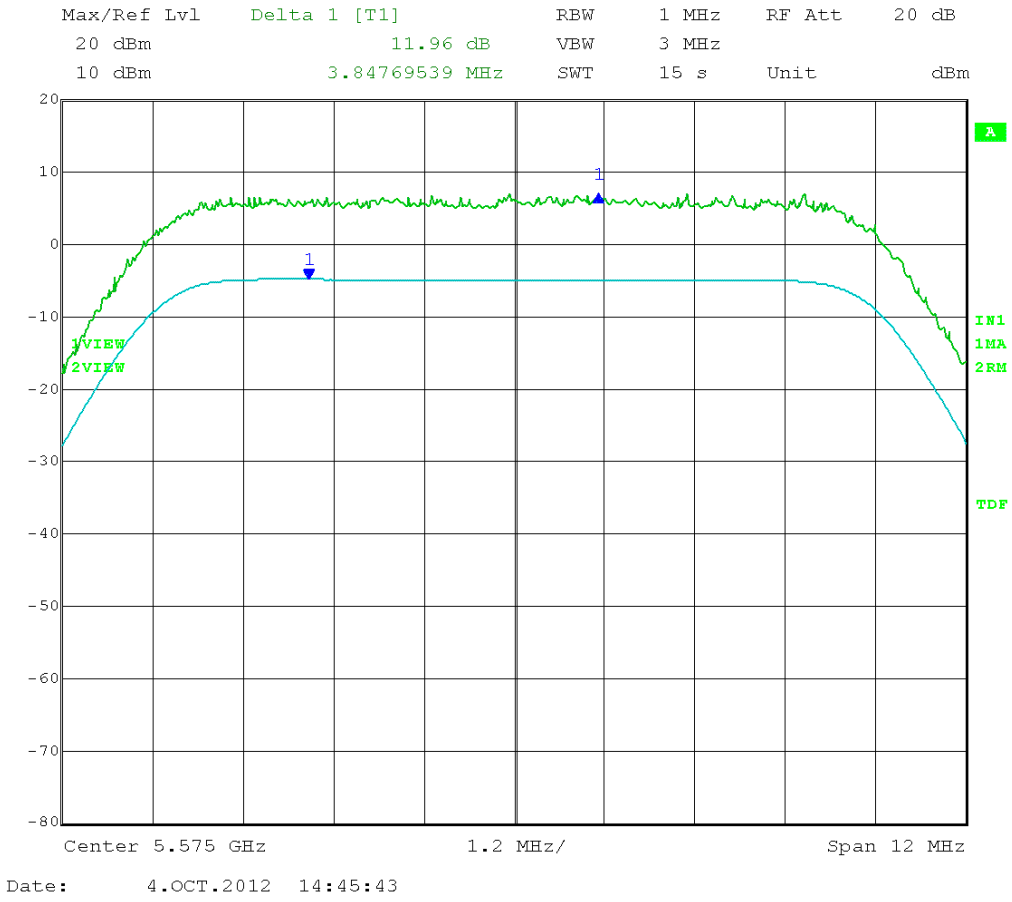
RBW = 1MHz; VBW ≥ RBW
Detector = Peak/Average; Trace mode = max hold

EUT nominal channel bandwidth: 10 MHz adi reg 64
Output port: Channel A; Mid Channel Frequency: 5.575 GHz
Output power setting: 19; Modulation Type: QPSK
FPGA reg: 10F8 0

Limit: [15.407(a)(6)]: Ratio of the peak excursion of the modulation envelope to the maximum conducted output power shall not exceed **13 dB** across any 1 MHz bandwidth.

Green trace = Peak
Blue trace = Average

Peak excursion = 11.96 dB



Test Date: 10-04-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Excursion – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section F – Peak excursion measurement
Operator: Craig B

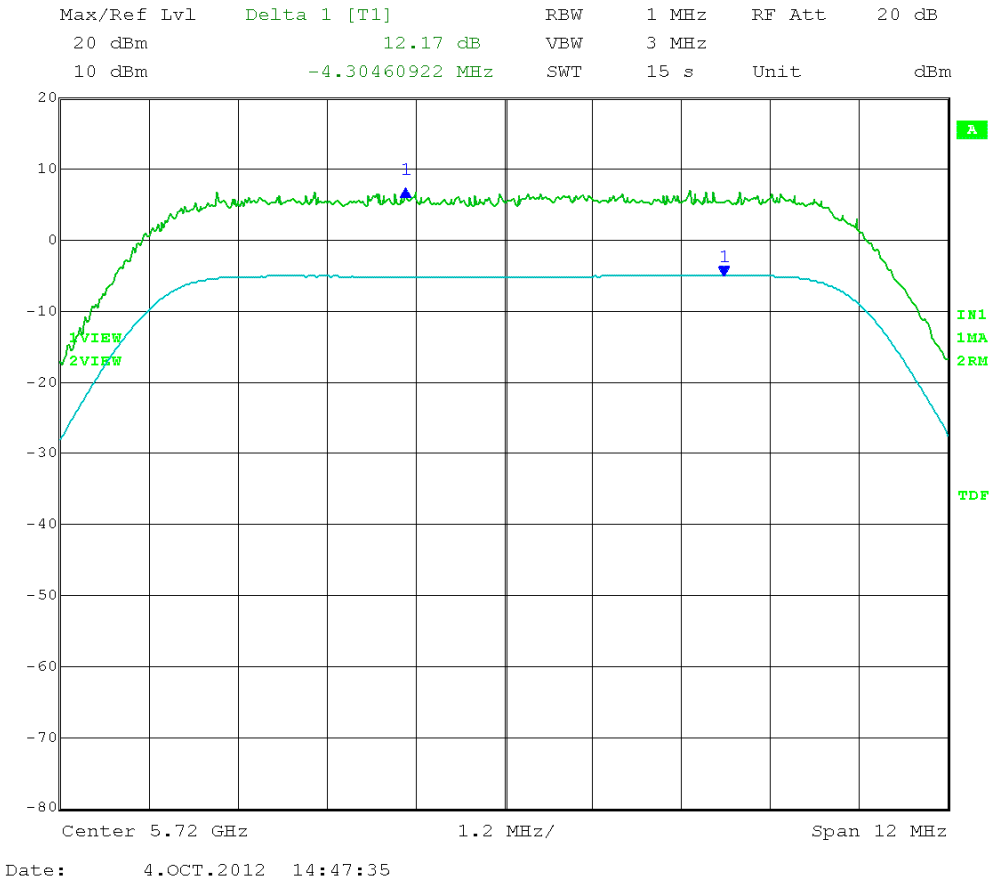
RBW = 1MHz; VBW ≥ RBW
Detector = Peak/Average; Trace mode = max hold

EUT nominal channel bandwidth: 10 MHz adi reg 64
Output port: Channel A; High Channel Frequency: 5.720 GHz
Output power setting: 19; Modulation Type: QPSK
FPGA reg: 10F8 0

Limit: [15.407(a)(6)]: Ratio of the peak excursion of the modulation envelope to the maximum conducted output power shall not exceed **13 dB** across any 1 MHz bandwidth.

Green trace = Peak
Blue trace = Average

Peak excursion = 12.17 dB



Test Date: 10-04-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Excursion – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section F – Peak excursion measurement
Operator: Craig B

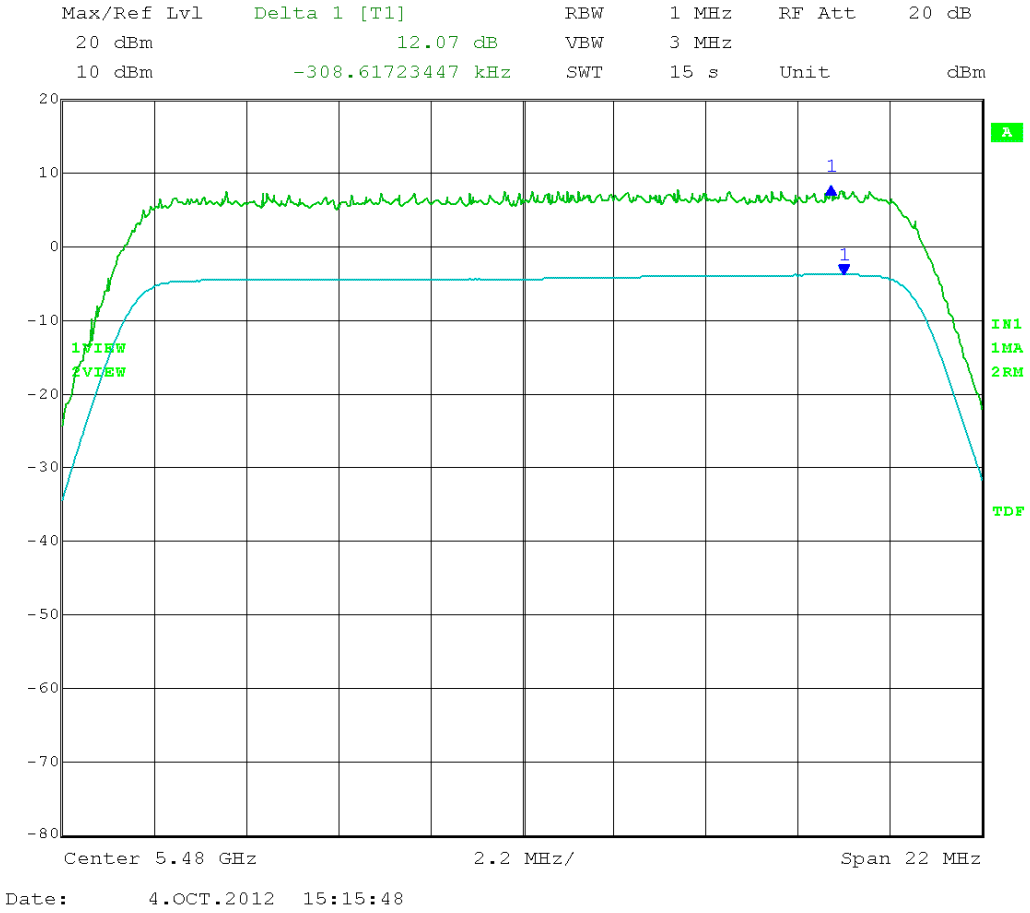
RBW = 1MHz; VBW ≥ RBW
Detector = Peak/Average; Trace mode = max hold

EUT nominal channel bandwidth: 20 MHz adi reg 50
Output port: Channel A; Low Channel Frequency: 5.480 GHz
Output power setting: 19; Modulation Type: QPSK
FPGA reg: 10F8 0

Limit: [15.407(a)(6)]: Ratio of the peak excursion of the modulation envelope to the maximum conducted output power shall not exceed **13 dB** across any 1 MHz bandwidth.

Green trace = Peak
Blue trace = Average

Peak excursion = 12.07 dB



Test Date: 10-04-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Excursion – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section F – Peak excursion measurement
Operator: Craig B

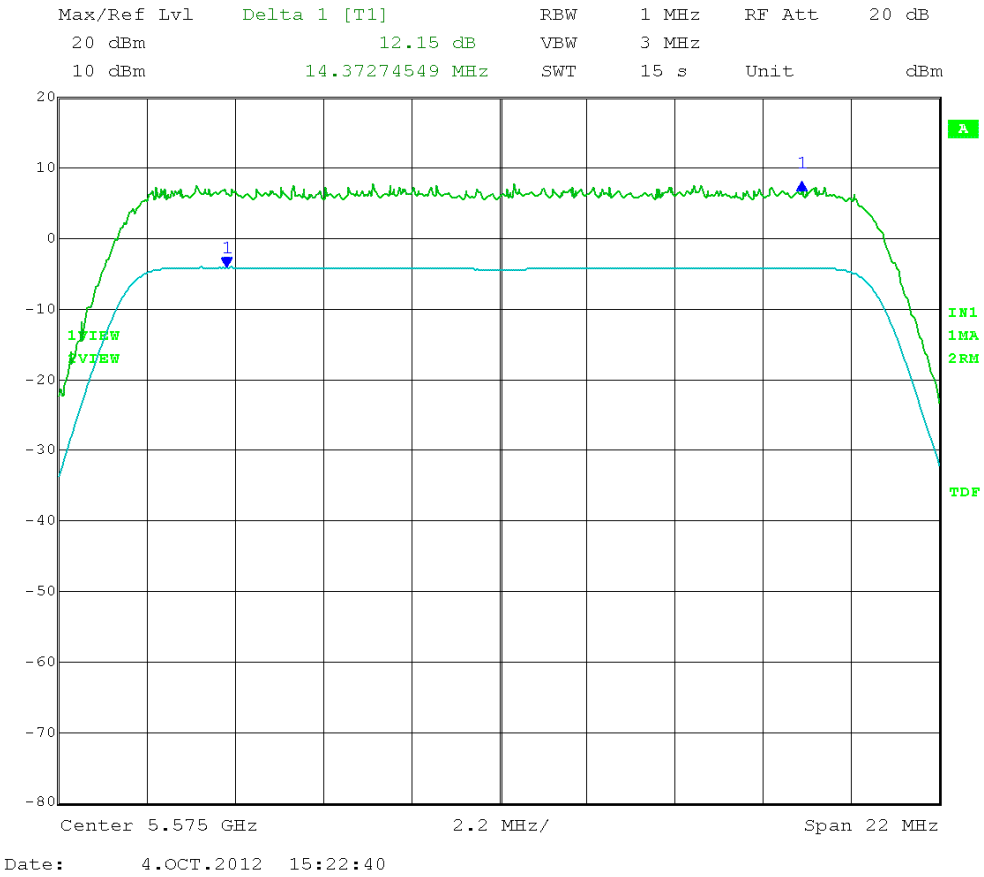
RBW = 1MHz; VBW ≥ RBW
Detector = Peak/Average; Trace mode = max hold

EUT nominal channel bandwidth: 20 MHz adi reg 54
Output port: Channel A; Mid Channel Frequency: 5.575 GHz
Output power setting: 19; Modulation Type: QPSK
FPGA reg: 10F8 0

Limit: [15.407(a)(6)]: Ratio of the peak excursion of the modulation envelope to the maximum conducted output power shall not exceed **13 dB** across any 1 MHz bandwidth.

Green trace = Peak
Blue trace = Average

Peak excursion = 12.15 dB



Test Date: 10-04-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Excursion – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section F – Peak excursion measurement
Operator: Craig B

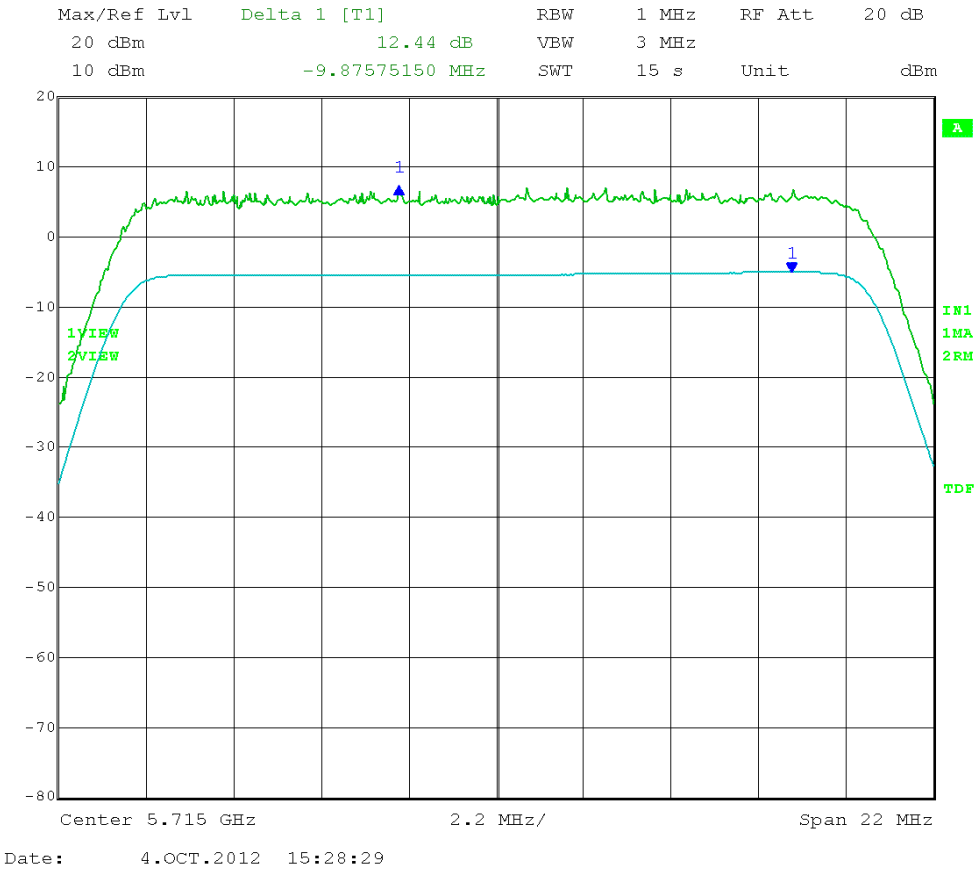
RBW = 1MHz; VBW ≥ RBW
Detector = Peak/Average; Trace mode = max hold

EUT nominal channel bandwidth: 20 MHz adi reg 58
Output port: Channel A; High Channel Frequency: 5.715 GHz
Output power setting: 19; Modulation Type: QPSK
FPGA reg: 10F8 0

Limit: [15.407(a)(6)]: Ratio of the peak excursion of the modulation envelope to the maximum conducted output power shall not exceed **13 dB** across any 1 MHz bandwidth.

Green trace = Peak
Blue trace = Average

Peak excursion = 12.44 dB



Test Date: 10-04-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Excursion – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section F – Peak excursion measurement
Operator: Craig B

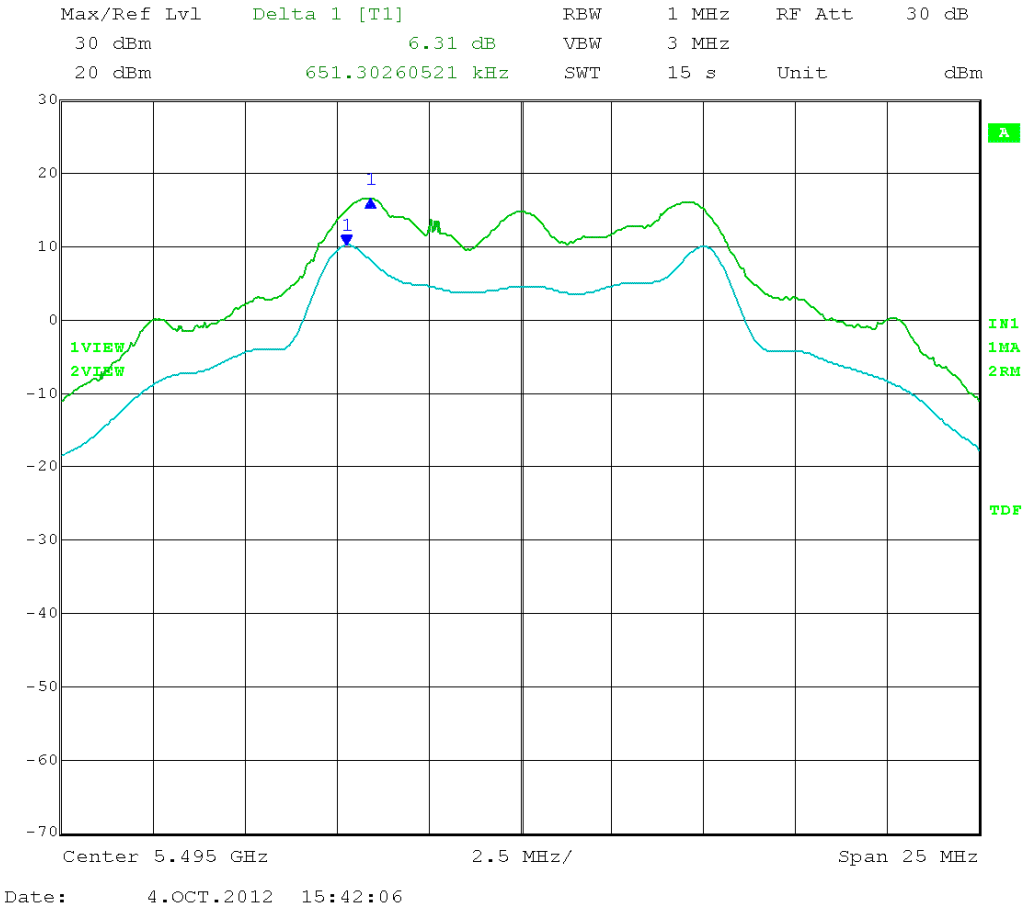
RBW = 1MHz; VBW ≥ RBW
Detector = Peak/Average; Trace mode = max hold

EUT nominal channel bandwidth: 20 MHz 26 dB EBW: 22.98 MHz
Output port: FSK Low Channel Frequency: 5.495 GHz
Output power setting: 90; Modulation Type: 2-level FSK

Limit: [15.407(a)(6)]: Ratio of the peak excursion of the modulation envelope to the maximum conducted output power shall not exceed **13 dB** across any 1 MHz bandwidth.

Green trace = Peak
Blue trace = Average

Peak excursion = 6.31 dB



Test Date: 10-04-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Excursion – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section F – Peak excursion measurement
Operator: Craig B

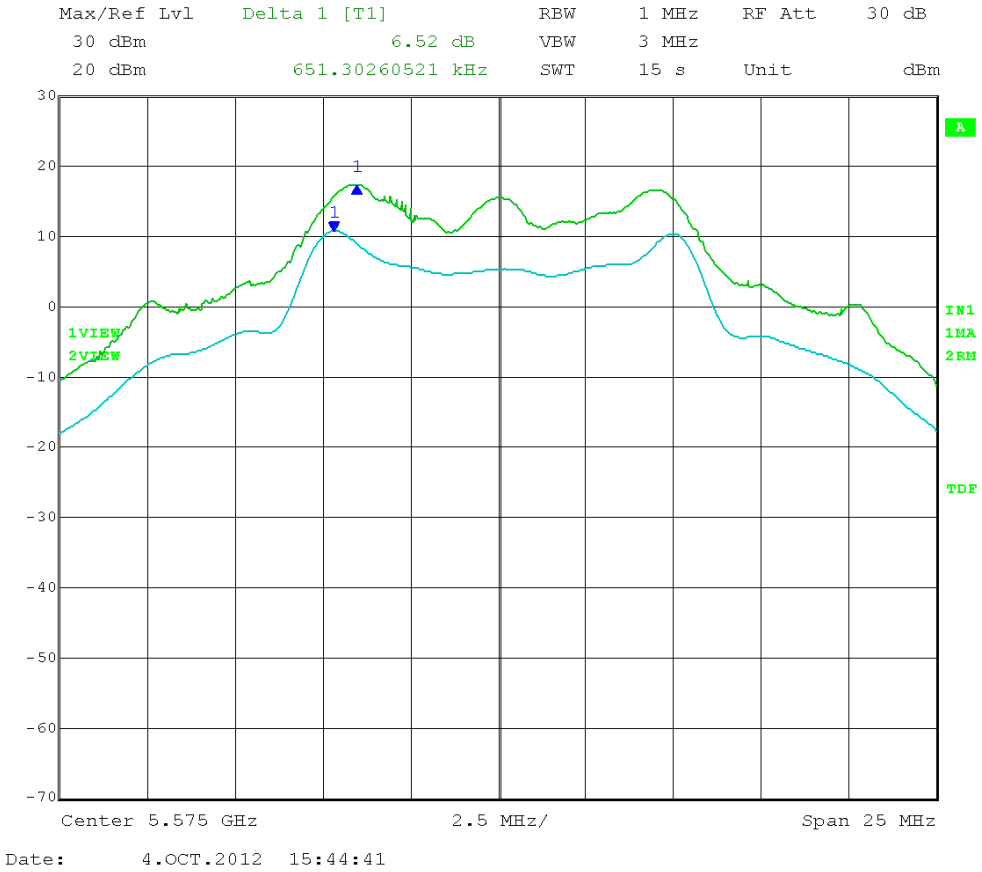
RBW = 1MHz; VBW ≥ RBW
Detector = Peak/Average; Trace mode = max hold

EUT nominal channel bandwidth:	20 MHz	26 dB EBW:	22.98 MHz
Output port:	FSK	Mid Channel Frequency:	5.575 GHz
Output power setting:	94;	Modulation Type:	2-level FSK

Limit: [15.407(a)(6)]: Ratio of the peak excursion of the modulation envelope to the maximum conducted output power shall not exceed **13 dB** across any 1 MHz bandwidth.

Green trace = Peak
Blue trace = Average

Peak excursion = 6.52 dB



Test Date: 10-04-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO SN: 0A003EA00145
Test: Peak Excursion – conducted
Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01
Section F – Peak excursion measurement
Operator: Craig B

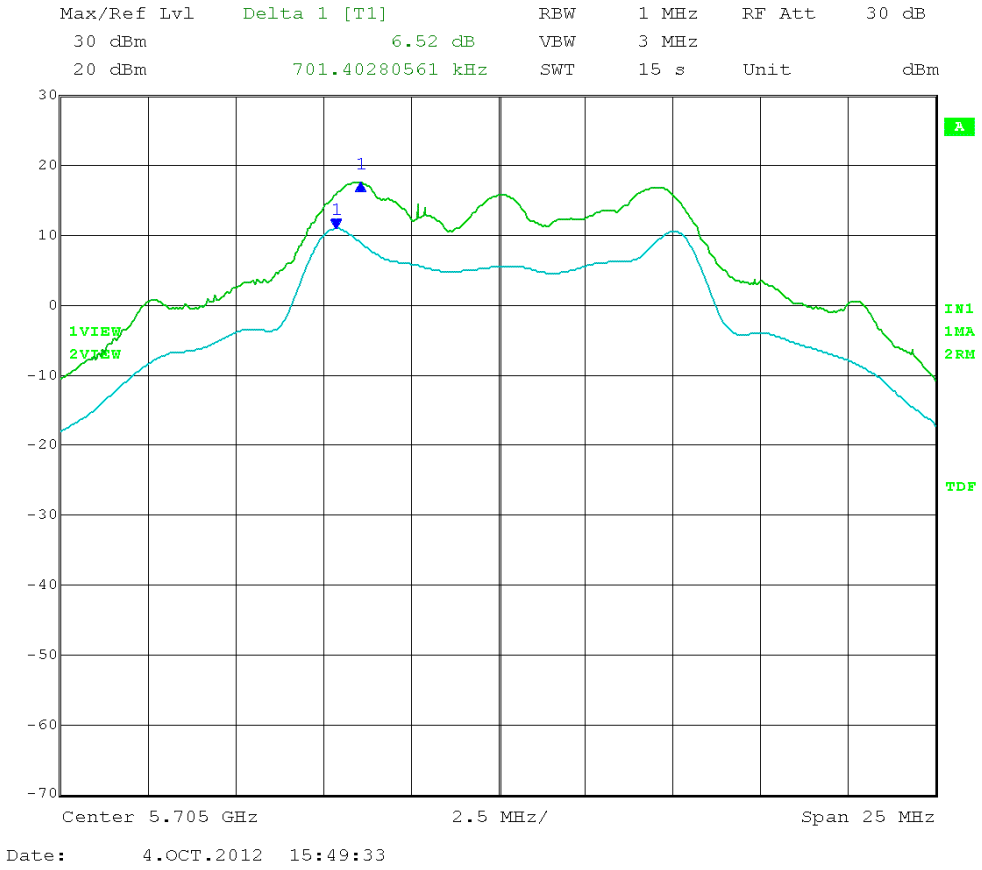
RBW = 1MHz; VBW ≥ RBW
Detector = Peak/Average; Trace mode = max hold

EUT nominal channel bandwidth: 20 MHz 26 dB EBW: 22.98 MHz
Output port: FSK High Channel Frequency: 5.705 GHz
Output power setting: A4; Modulation Type: 2-level FSK

Limit: [15.407(a)(6)]: Ratio of the peak excursion of the modulation envelope to the maximum conducted output power shall not exceed **13 dB** across any 1 MHz bandwidth.

Green trace = Peak
Blue trace = Average

Peak excursion = 6.52 dB



Appendix A – Measurement Data

A6.0 Unwanted Emission Levels – Conducted Band-Edge - OFDM

Rule Section: Sections 15.407(b)(3) and 15.407(b)(5)

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

FCC 15.407(b)(5)

Description: Lower resolution bandwidth and integrate total power over 1 MHz

Measure the band-edge emission level using the following settings
VBW ≥ RBW
Detector = peak
Trace mode = max hold
Sweep time = auto; increased by a factor of (1 / duty cycle)
Use the band power measurement function of the spectrum analyzer to integrate the total power over a 1 MHz band beginning at the band edge

EIRP calculation:
- Add upper bound on out-of-band antenna gain to measured antenna port conducted emission power. (This is the maximum in-band gain or 2 dBi, whichever is greater)
- Add 10 log(N), where N is the number of outputs, for MIMO operation
- Add an additional 10 log(N), if the signals are correlated according to FCC KDB 662911, or if the unwanted emission is narrowband

Limit: Lower band edge: EIRP of -27 dBm/MHz; FCC 15.407(b)(3)
Upper band edge: EIRP of -17 dBm/MHz; FCC 15.407(b)(4)*

*Per FCC KDB 644545 D01 Guidance for IEEE 802.11ac v01, Composite transmissions involving both rule parts must satisfy the higher of the out-of-band and spurious limits among the two rule sections.

Results: Passed

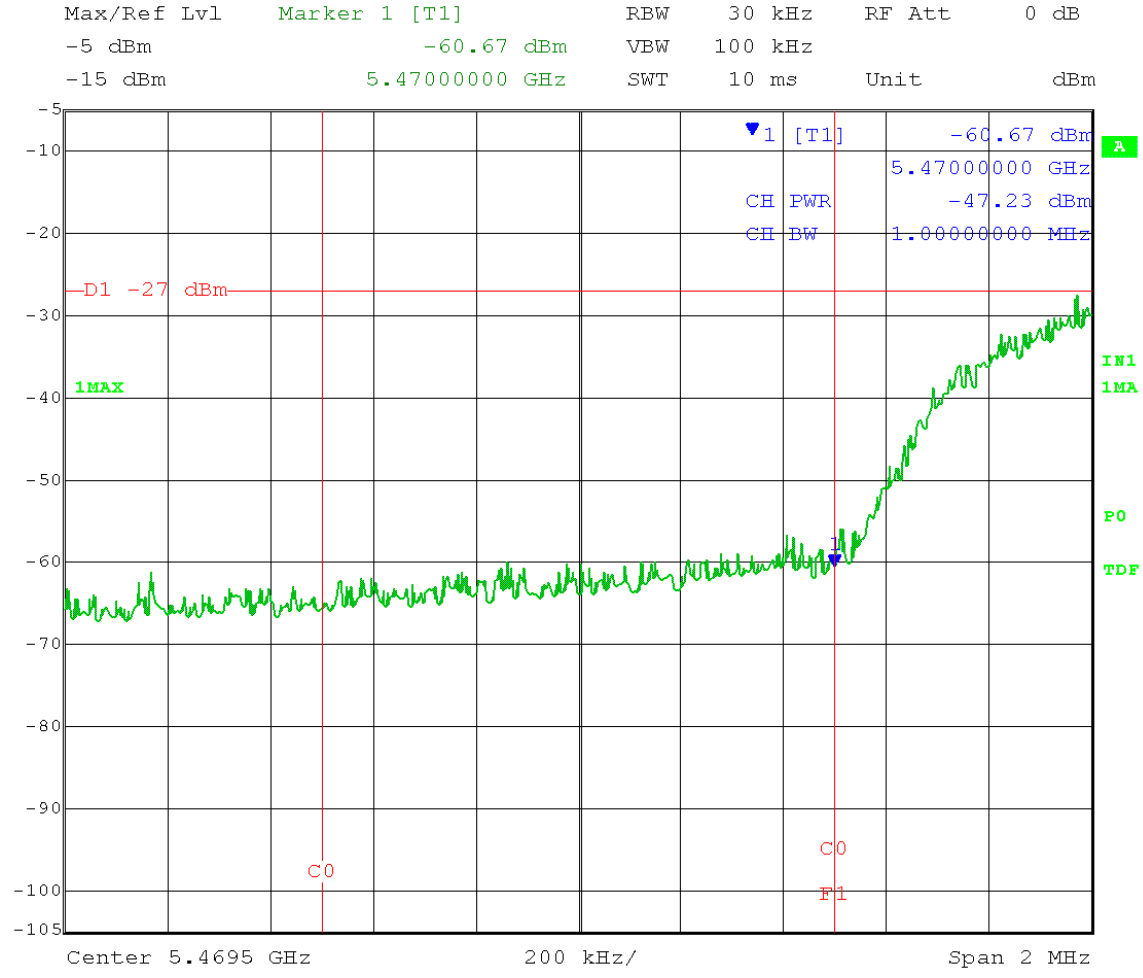
Notes: Measurements were taken for QPSK at the lowest and highest channels of operation. EUT was set to transmit continuously with 98% duty cycle.

Test Date: 07-24-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 55	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Lower Band-edge frequency: 5470 MHz
Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Total power integrated over 1 MHz at band edge:



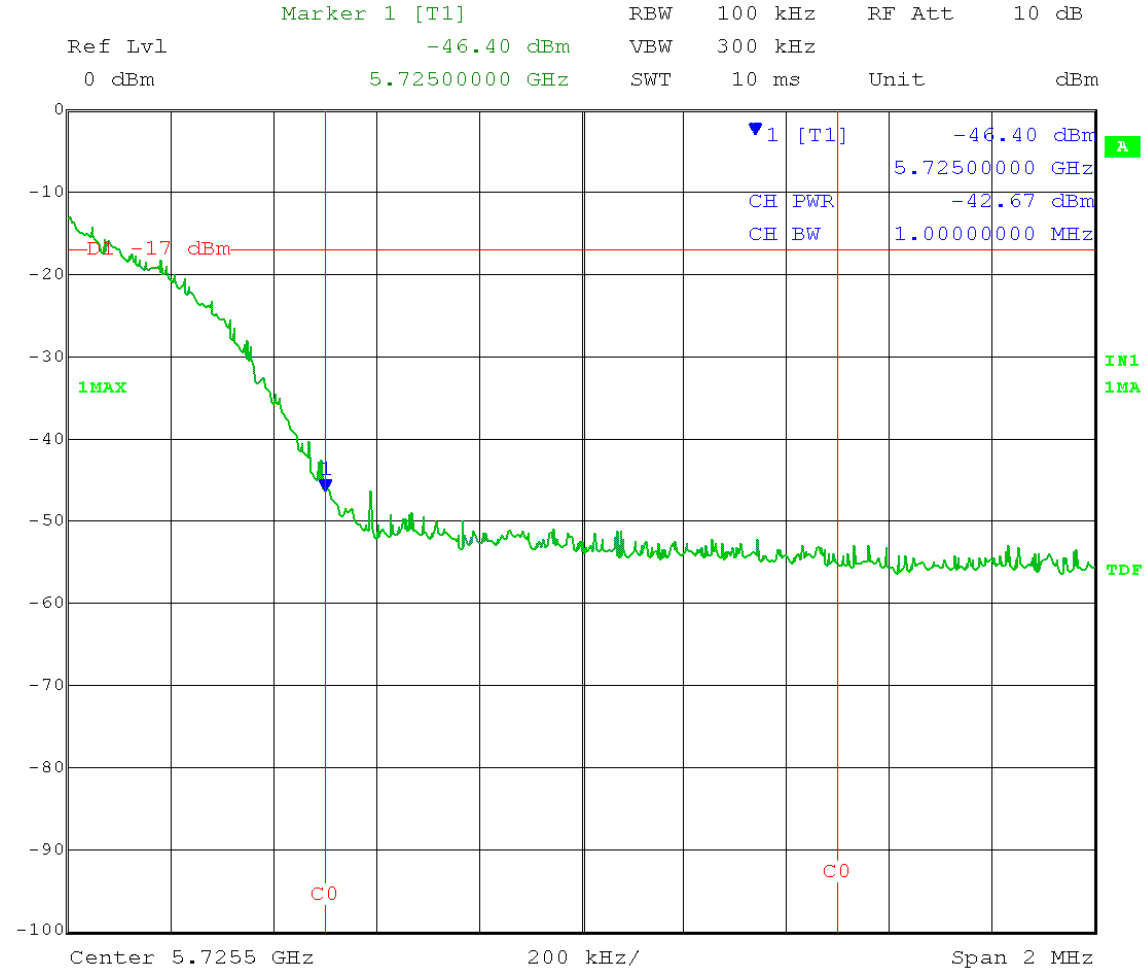
Calculated EIRP at band edge = -47.23 dBm + 17 dBi antenna gain + 3 dB (MIMO) = **-27.23** dBm/MHz

Test Date: 07-24-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 51	26 dB EBW: 9.72 MHz
Output port:	Channel A;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Upper Band-edge frequency: 5725 MHz
Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4) within 10 MHz of band edge)

Total power integrated over 1 MHz at band edge:



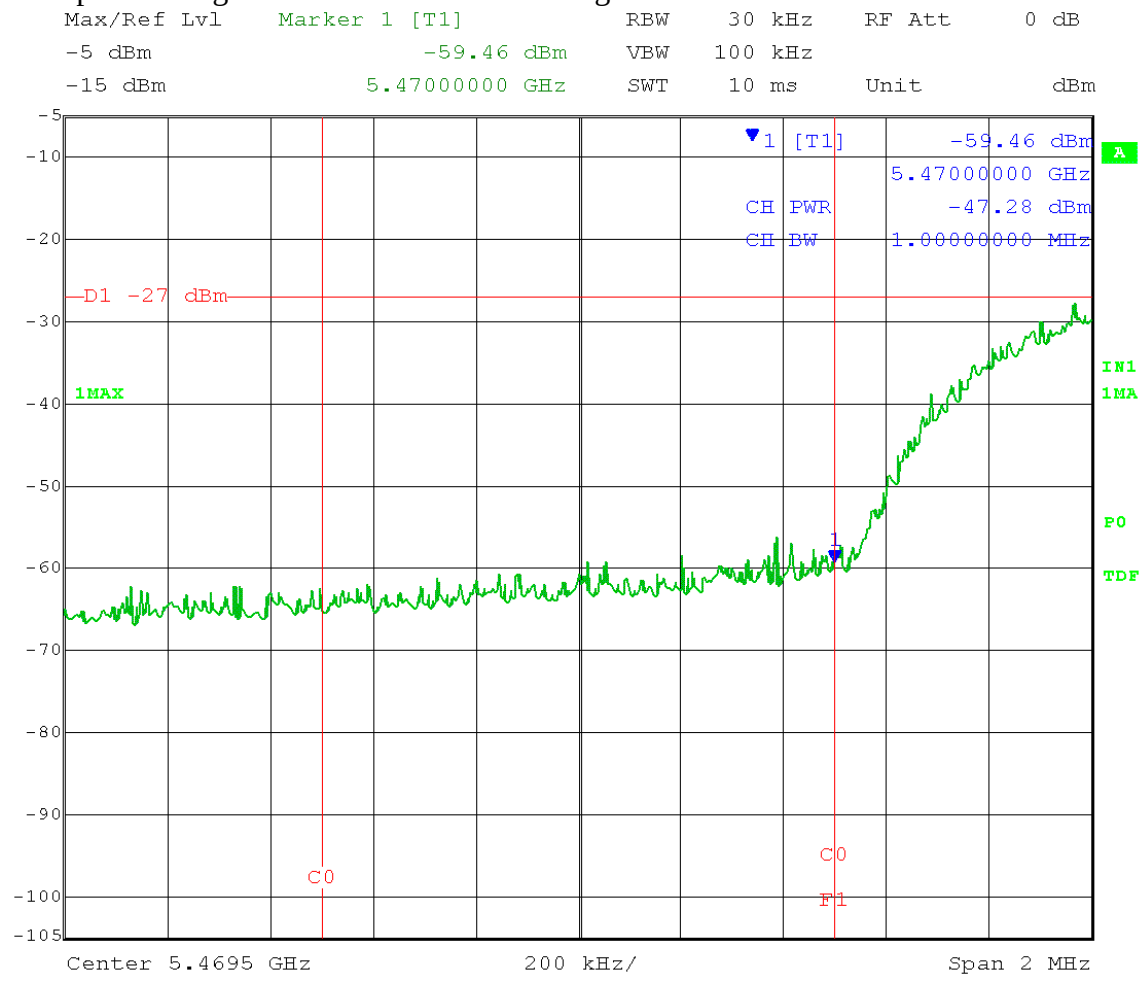
Calculated EIRP at band edge = -42.67 dBm + 17 dBi antenna gain + 3 dB (MIMO) = **-22.67** dBm/MHz

Test Date: 07-24-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 58	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Lower Band-edge frequency: 5470 MHz
Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Total power integrated over 1 MHz at band edge:



Date: 24.JUL.2012 13:19:14

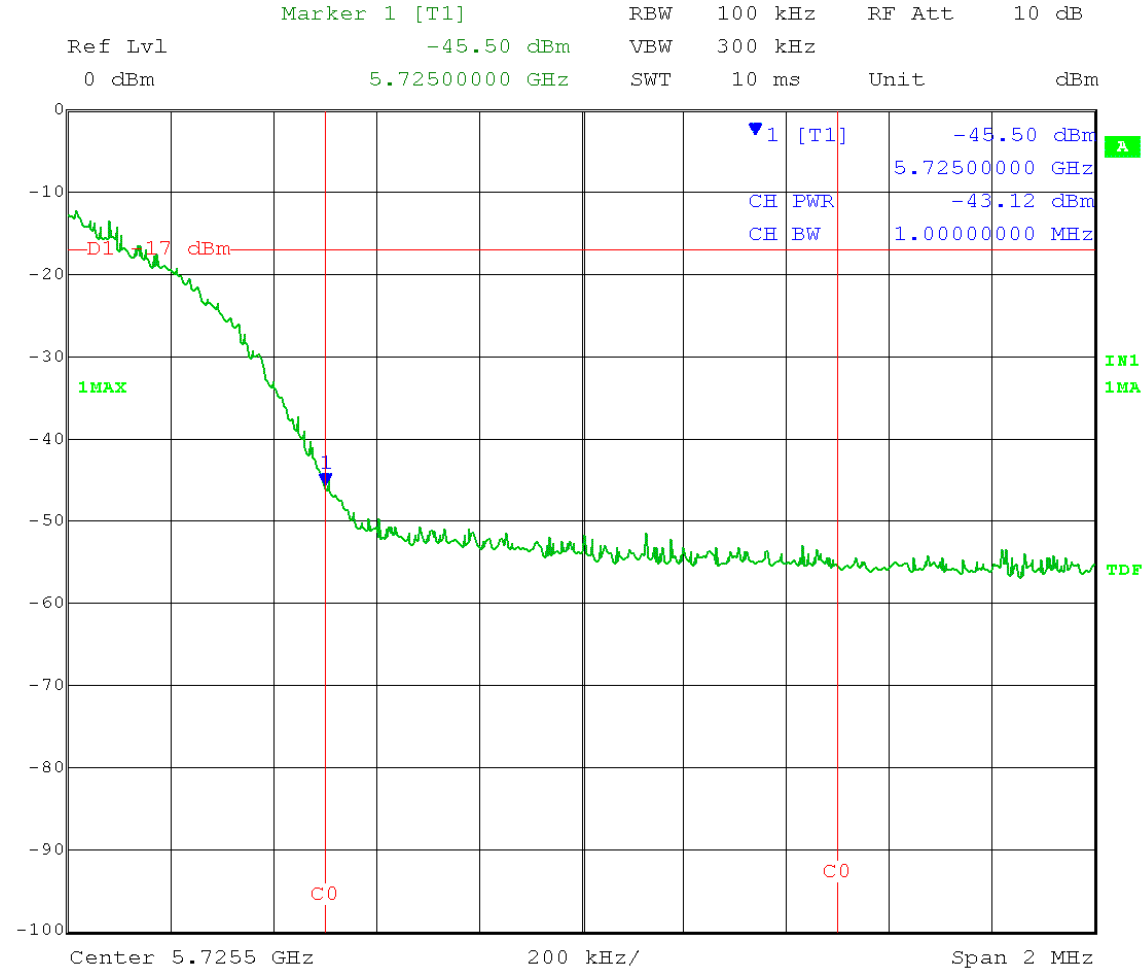
Calculated EIRP at band edge = -47.28 dBm + 17 dBi antenna gain + 3 dB (MIMO) = **-27.28** dBm/MHz

Test Date: 07-24-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 55	26 dB EBW: 9.72 MHz
Output port:	Channel B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Upper Band-edge frequency: 5725 MHz
Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4) within 10 MHz of band edge)

Total power integrated over 1 MHz at band edge:



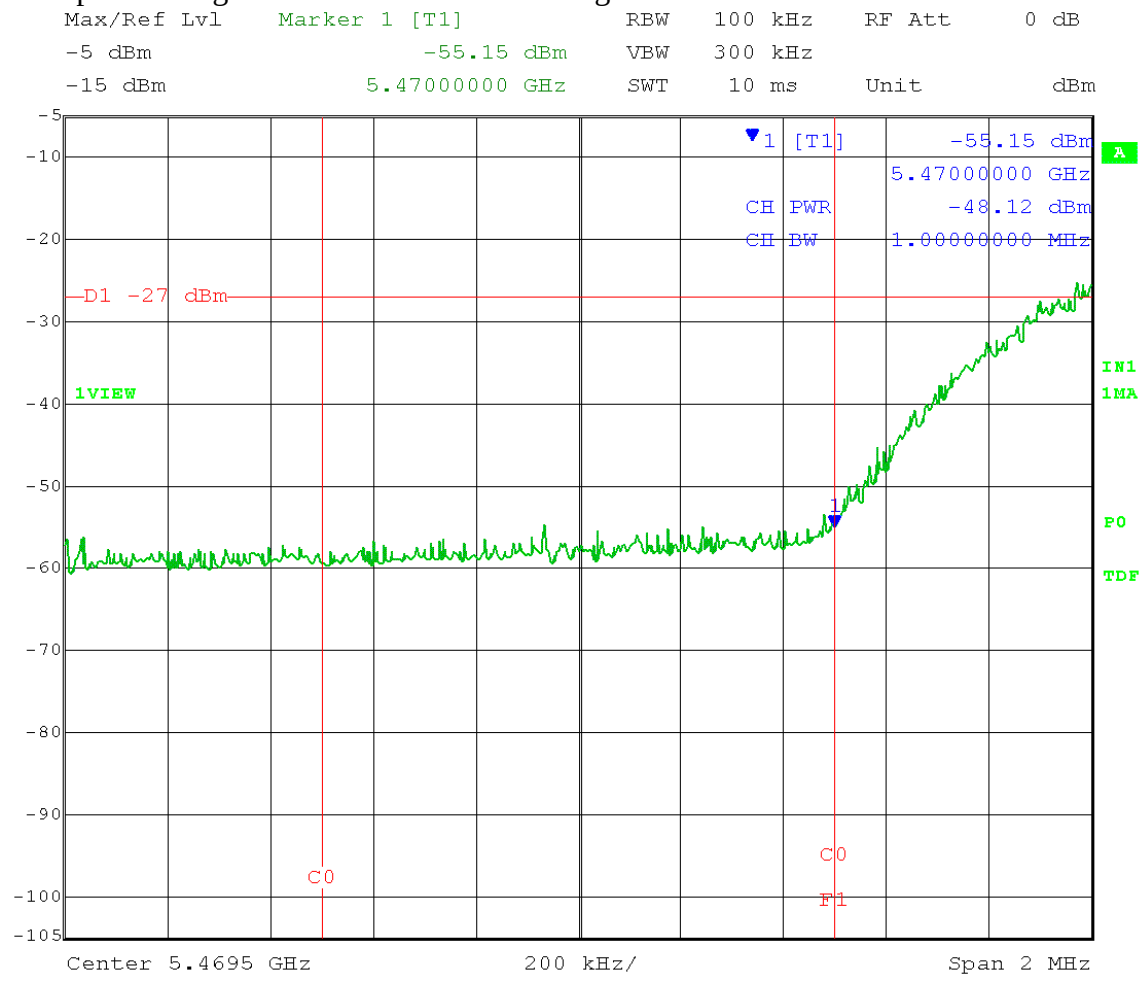
Calculated EIRP at band edge = -43.12 dBm + 17 dBi antenna gain + 3 dB (MIMO) = **-23.12** dBm/MHz

Test Date: 07-24-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 42	26 dB EBW: 19.44 MHz
Output port:	Channel A;	High Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Lower Band-edge frequency: 5470 MHz
Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Total power integrated over 1 MHz at band edge:



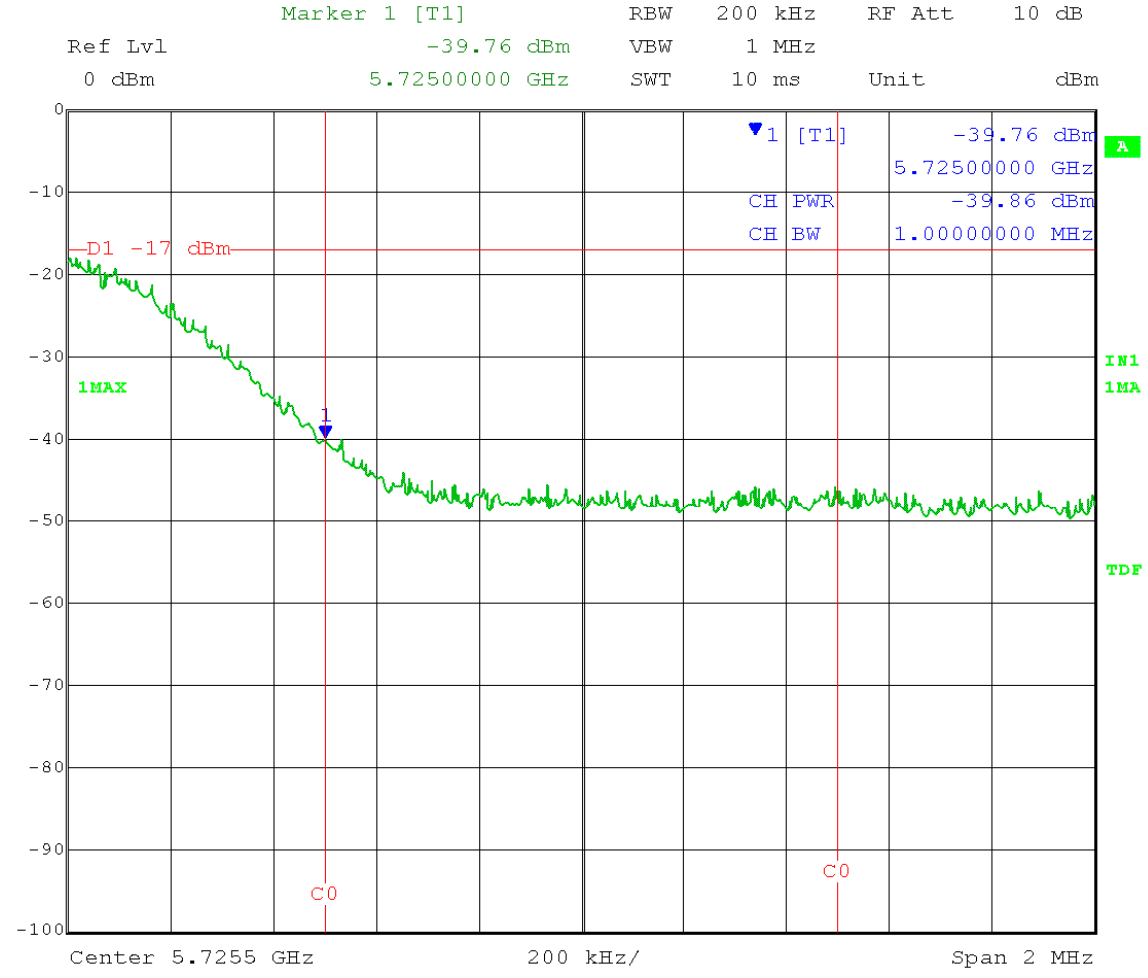
Calculated EIRP at band edge = -48.12 dBm + 17 dBi antenna gain + 3 dB (MIMO) = **-28.12** dBm/MHz

Test Date: 07-24-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 41	26 dB EBW: 19.44 MHz
Output port:	Channel A;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Upper Band-edge frequency: 5725 MHz
Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4) within 10 MHz of band edge)

Total power integrated over 1 MHz at band edge:



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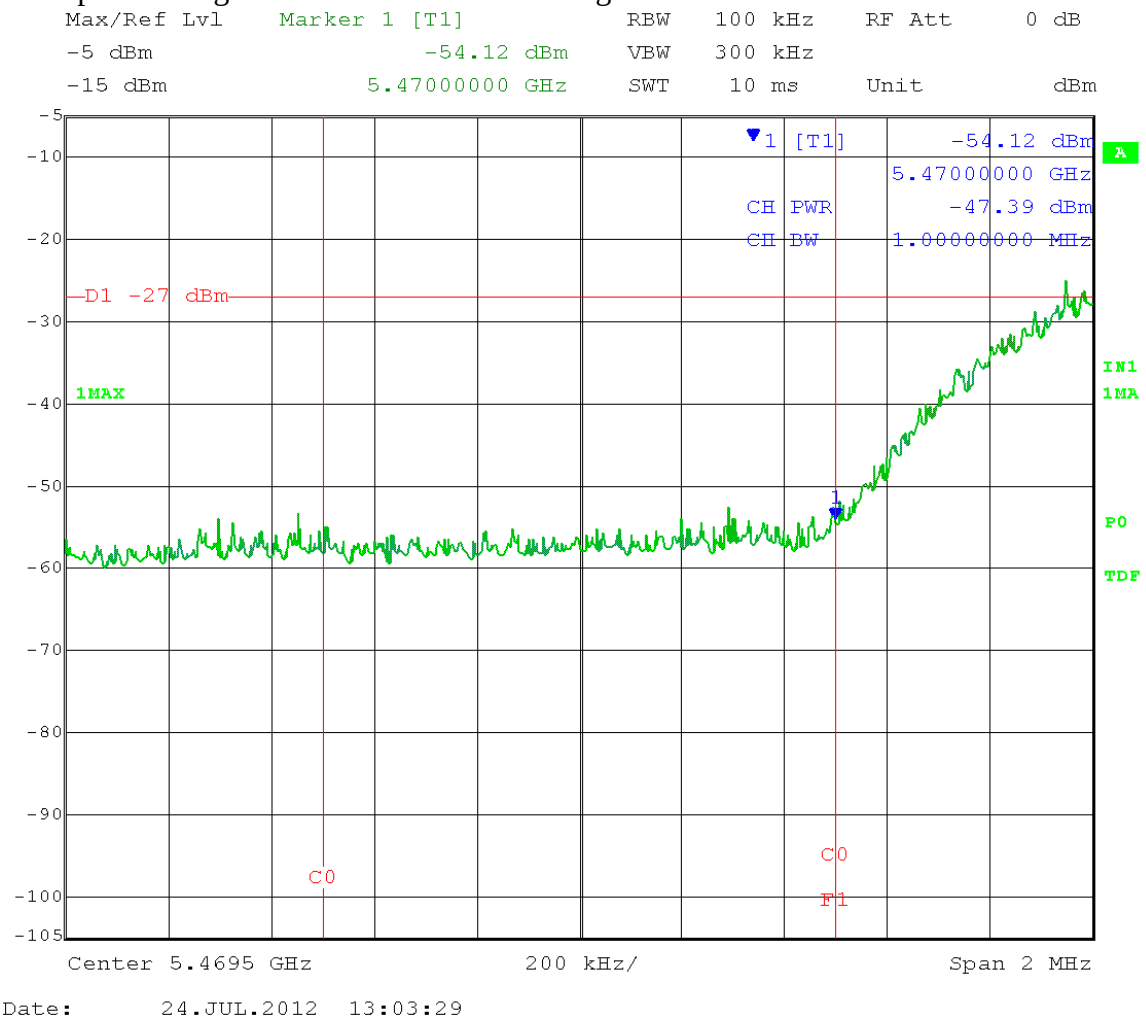
Calculated EIRP at band edge = -39.86 dBm + 17 dBi antenna gain + 3 dB (MIMO) = **-19.86** dBm/MHz

Test Date: 07-24-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 47	26 dB EBW: 19.44 MHz
Output port:	Channel B;	High Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Lower Band-edge frequency: 5470 MHz
Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Total power integrated over 1 MHz at band edge:



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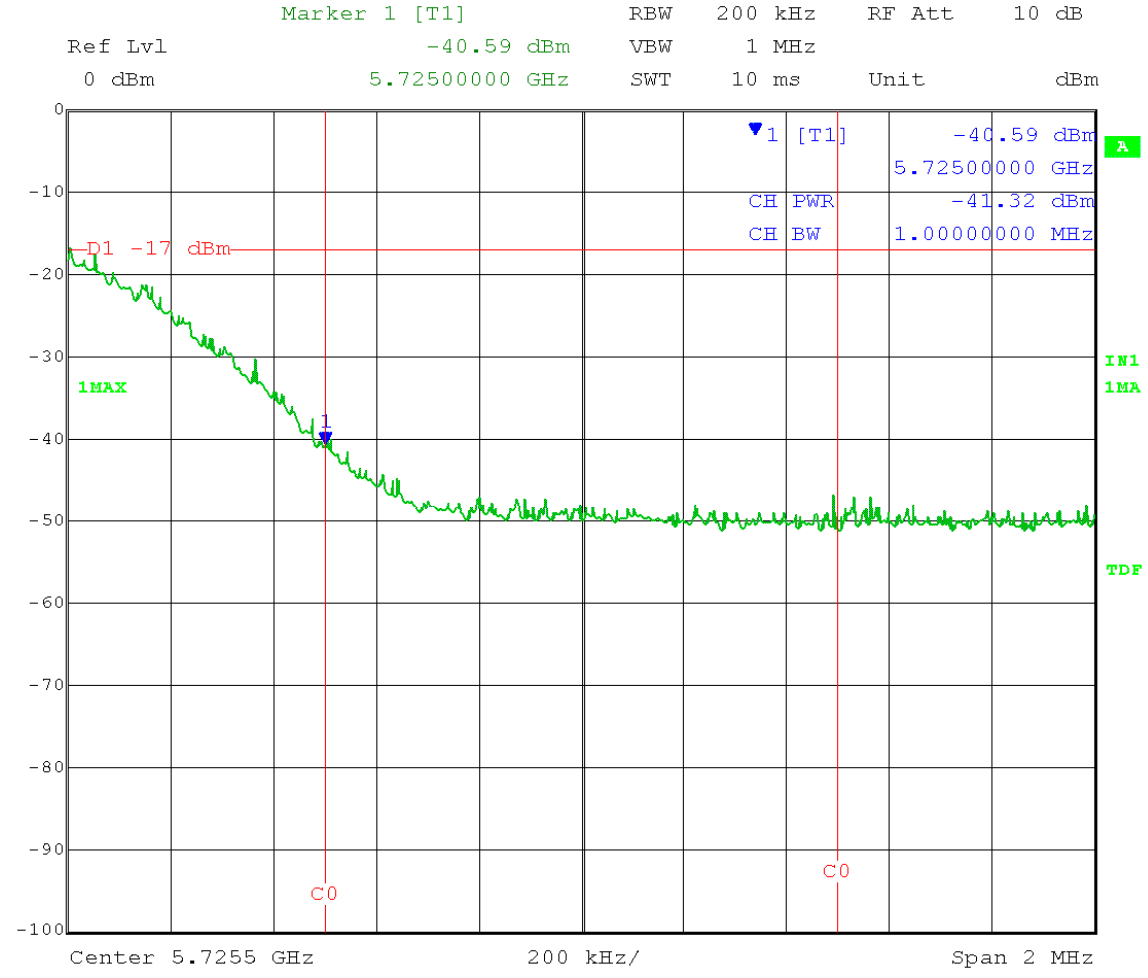
Calculated EIRP at band edge = -47.39 dBm + 17 dBi antenna gain + 3 dB (MIMO) = **-27.39** dBm/MHz

Test Date: 07-24-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4B	26 dB EBW: 19.44 MHz
Output port:	Channel B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Upper Band-edge frequency: 5725 MHz
Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4) within 10 MHz of band edge)

Total power integrated over 1 MHz at band edge:



Calculated EIRP at band edge = -41.32 dBm + 17 dBi antenna gain + 3 dB (MIMO) = **-21.32** dBm/MHz

Appendix A – Measurement Data

A7.0 Unwanted Emission Levels – Conducted Band-Edge - FSK

Rule Section: Sections 15.407(b)(3) and 15.407(b)(5)

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section G(2): Unwanted emissions outside the restricted bands

Description: Measure the band-edge emission level using the following settings
RBW = 1 MHz
VBW ≥ 3 MHz
Detector = peak
Sweep time = auto; increased by a factor of (1 / duty cycle)
Trace mode = max hold

EIRP calculation:
Add upper bound on out-of-band antenna gain to measured antenna port conducted emission power. (This is the maximum in-band gain or 2 dBi, whichever is greater)
Add 10 log(N), where N is the number of output, for MIMO operation
Add an additional 10 log(N), if the signals are correlated according to FCC KDB 662911, or if the unwanted emission is narrowband

Limit: Lower band edge: EIRP of -27 dBm/MHz; FCC 15.407(b)(3)
Upper band edge: EIRP of -17 dBm/MHz; FCC 15.407(b)(4)*

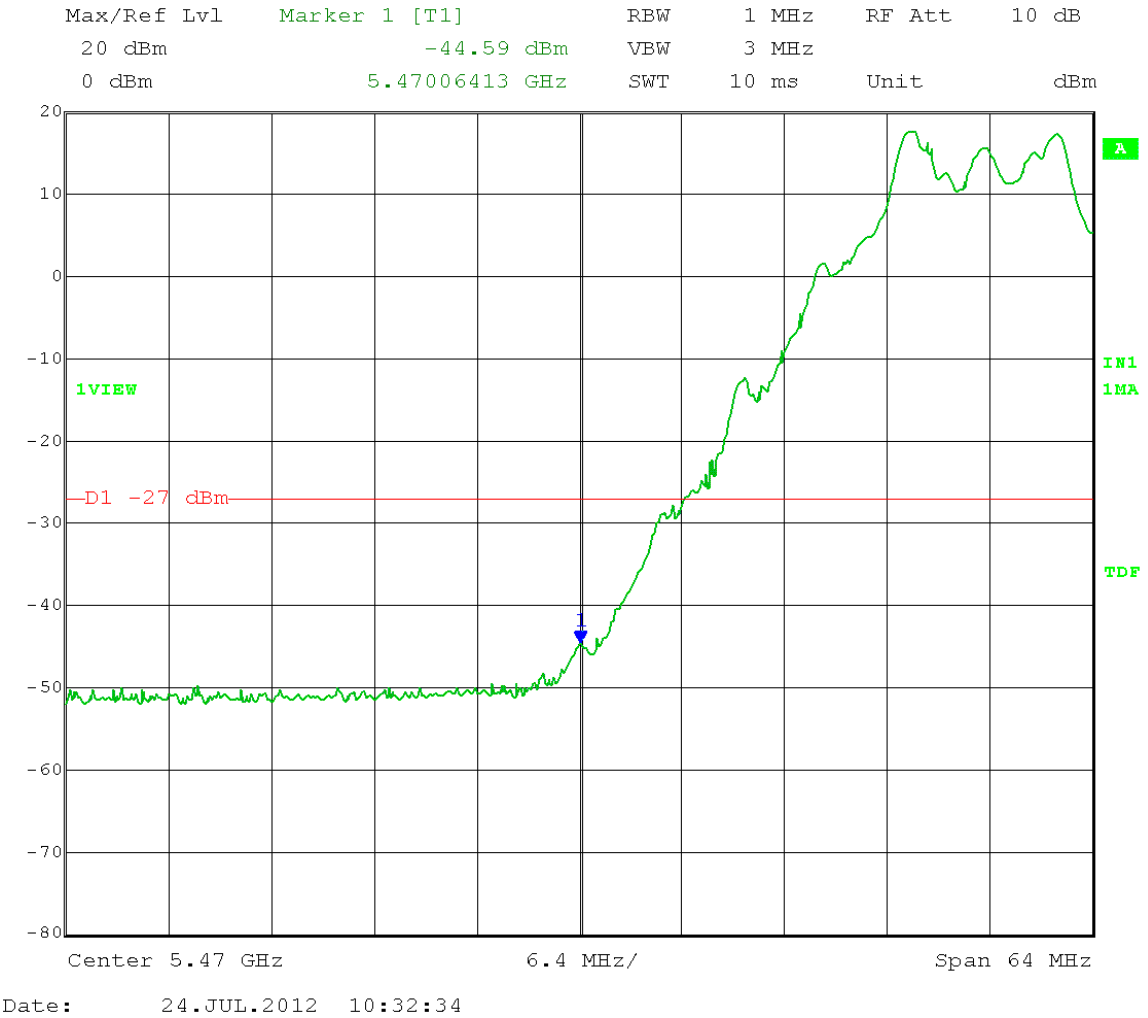
*Per FCC KDB 644545 D01 Guidance for IEEE 802.11ac v01, Composite transmissions involving both rule parts must satisfy the higher of the out-of-band and spurious limits among the two rule sections.

Results: Passed

Notes: Measurements were taken for 2-level at the lowest and highest channels of operation. EUT was set to transmit continuously with 98% duty cycle.

Test Date: 07-24-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – RF conducted
Operator: Craig B

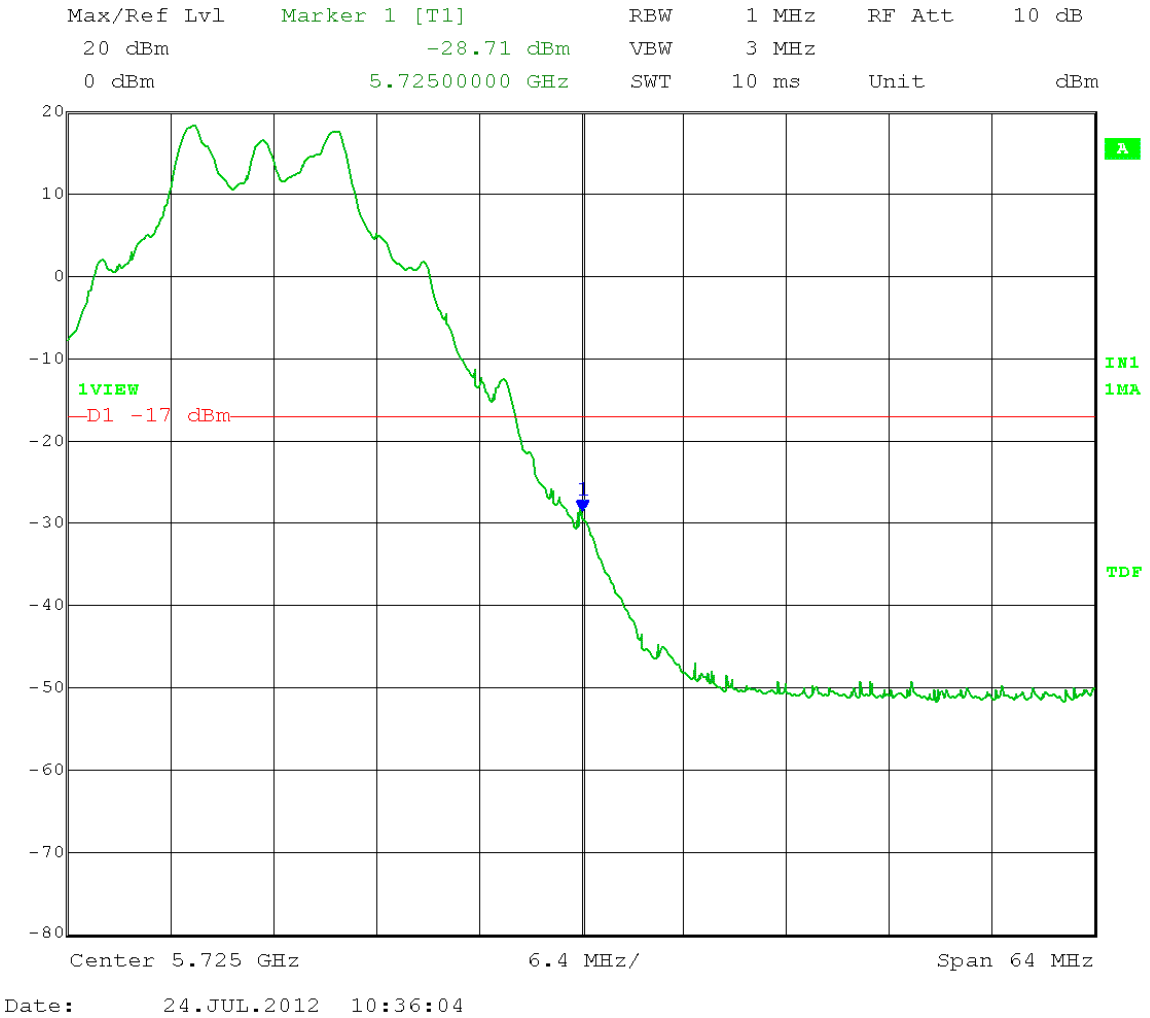
Channel Bandwidth: 20 MHz
Channel: Low – 5495 MHz
Modulation: 2-level FSK
Register setting: 90
Upper bound on out-of-band antenna gain: 10.5 dBi
Lower Band-edge frequency: 5470 MHz
Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))



Calculated EIRP at band edge = -44.59 dBm + 10.5 dBi antenna gain
= **-34.09** dBm/MHz

Test Date: 07-24-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: High – 5705 MHz
Modulation: 2-level FSK
Register setting: A4
Upper bound on out-of-band antenna gain: 10.5 dBi
Upper Band-edge frequency: 5725 MHz
Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4) within 10 MHz of band edge)



Calculated EIRP at band edge = -28.71 dBm + 10.5 dBi antenna gain
= **-18.21** dBm/MHz

Appendix A – Measurement Data

A8.0 Unwanted Emission Levels – Radiated Band-Edge
Radiated from Cabinet (50 Ohm terminations on antenna ports)

Rule Section: Sections 15.407(b)(3) and 15.407(b)(5)

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section G(3)(d): Marker-delta method
Section G(5): Peak Unwanted Emissions Measurements Above 1000 MHz

Description: For emissions that fall within 2 MHz from the band edge

Measure the maximum in-band emission level as specified in G(5)
Measure the band-edge emission level using the following settings
Span set to encompass both peak in-band and band edge emission
RBW = 1% to 5% of span
VBW ≥ RBW
Detector = peak
Trace mode = max hold
Sweep mode = auto
Measure the amplitude difference between the peak of the fundamental and the band-edge level
Subtract this difference from the maximum in-band field strength level

Limit: Lower band edge: EIRP of -27 dBm/MHz; FCC 15.407(b)(3)
Upper band edge: EIRP of -17 dBm/MHz; FCC 15.407(b)(4)*

*Per FCC KDB 644545 D01 Guidance for IEEE 802.11ac v01, Composite transmissions involving both rule parts must satisfy the higher of the out-of-band and spurious limits among the two rule sections.

Results: Passed

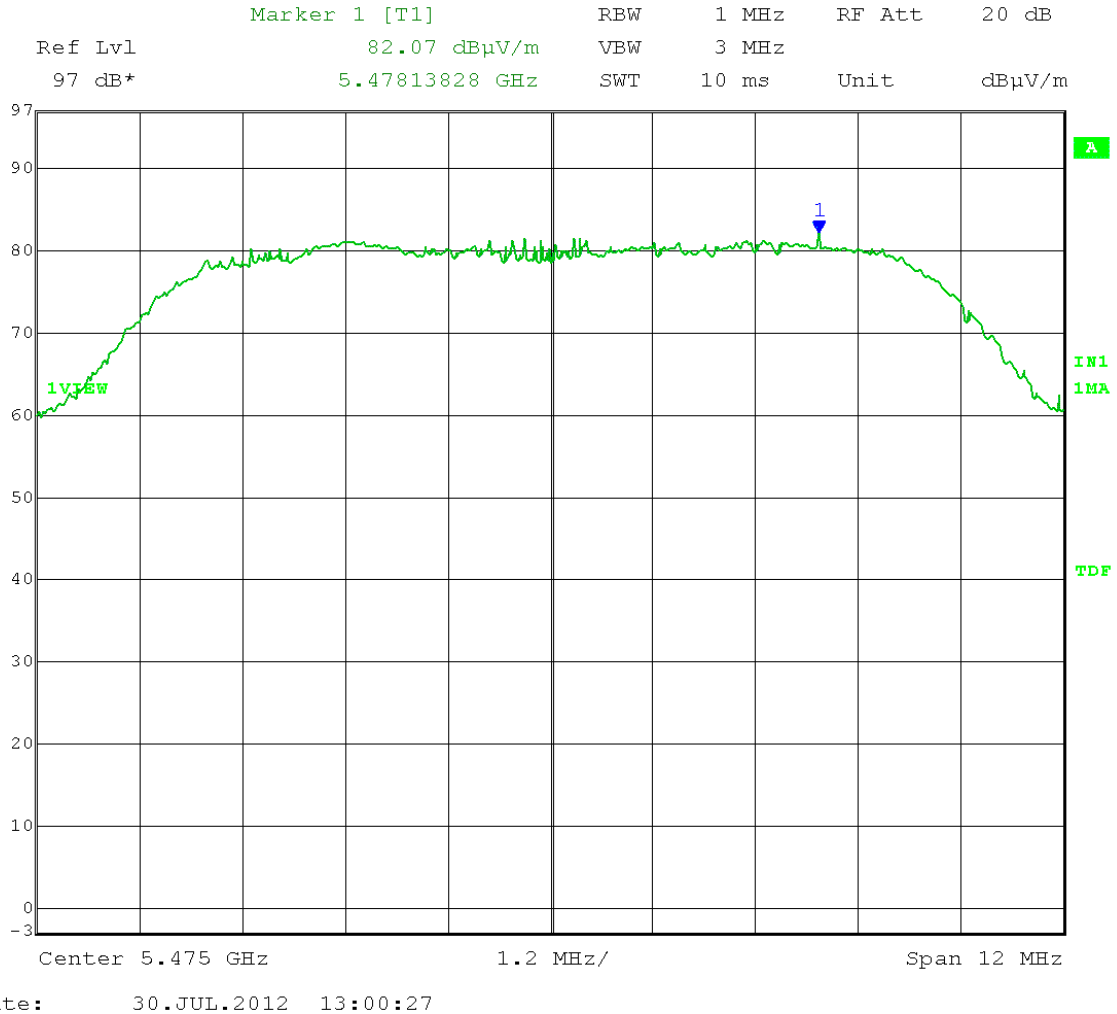
Notes: Measurements were taken for QPSK (OFDM) or 2-level (FSK) at the lowest and highest channels of operation. EUT was set to transmit continuously with 98% duty cycle.

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg Ch A 4C	adi reg Ch B 50
Output port:	Channel A and B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Lower Band-edge frequency: 5470 MHz
Both transmit chains active.
Polarization: Horizontal
Test distance: 3 meters; receive antenna height: 2.14 meters; table rotation: 112 degrees
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Measurement of Fundamental:



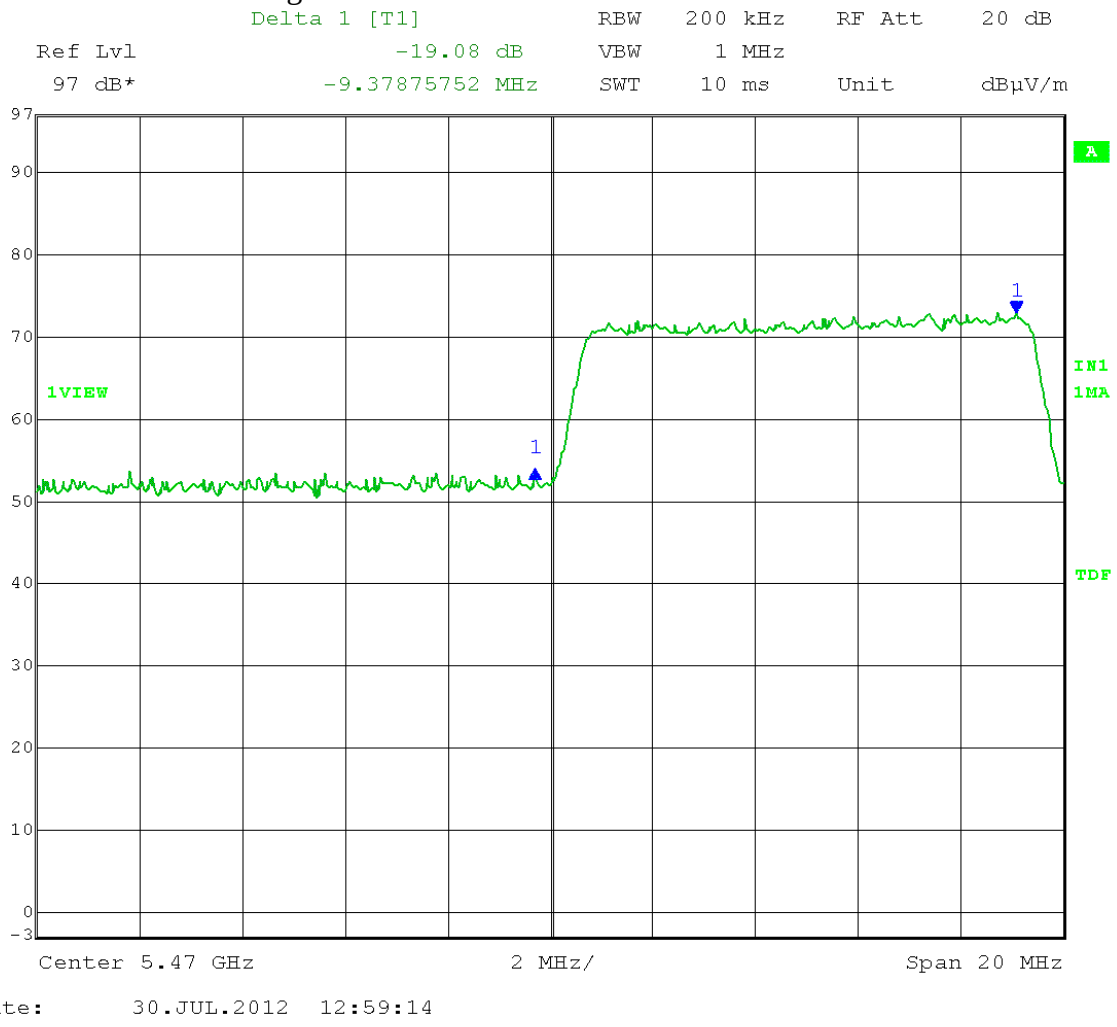
Calculated EIRP of fundamental = 82.07 dBµV/m + 20 log (3 meters) -104.77 = -13.16 dBm

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg Ch A 4C	adi reg Ch B 50
Output port:	Channel A and B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Lower Band-edge frequency: 5470 MHz
Both transmit chains active.
Polarization: Horizontal
Test distance: 3 meters; receive antenna height: 2.14 meters; table rotation: 112 degrees
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Delta-Marker at band edge:



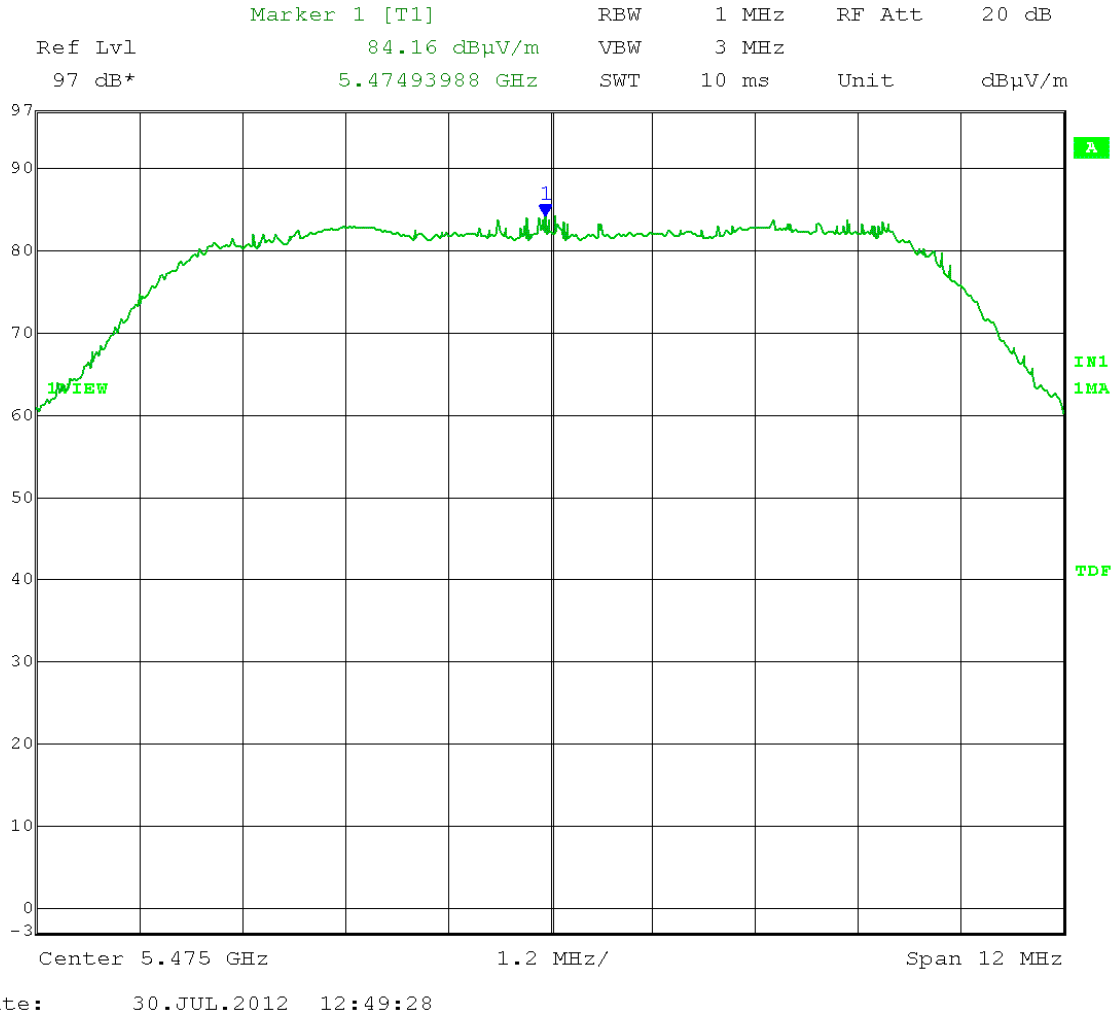
Calculated EIRP at the band edge = -13.16 dBm – 19.08 = **-32.24 dBm**

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg Ch A 4C	adi reg Ch B 50
Output port:	Channel A and B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Lower Band-edge frequency: 5470 MHz
Both transmit chains active.
Polarization: Vertical
Test distance: 3 meters; receive antenna height: 1.23 meters; table rotation: 66 degrees
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Measurement of Fundamental:



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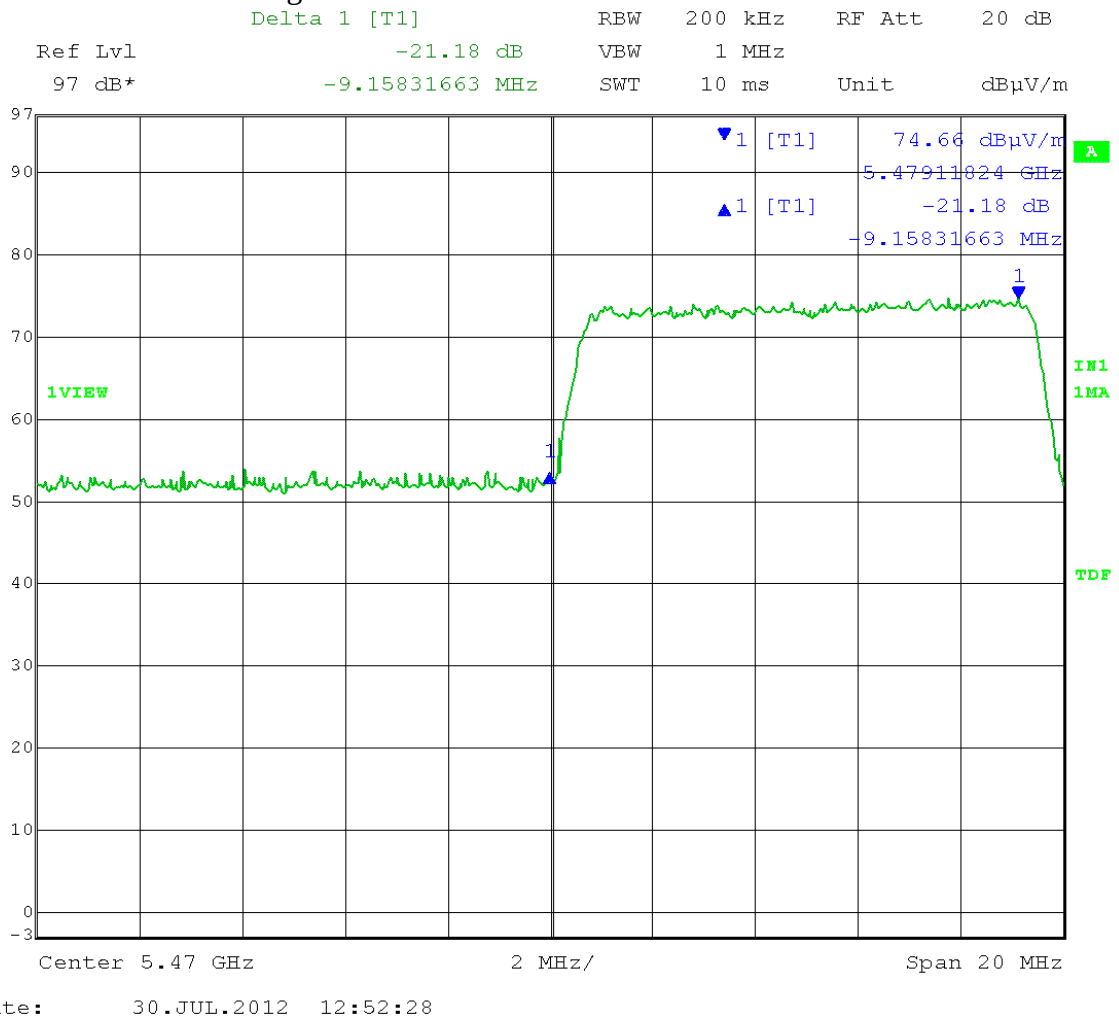
Calculated EIRP of fundamental = 84.16 dBµV/m + 20 log (3 meters) -104.77 = -11.07 dBm

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg Ch A 4C	adi reg Ch B 50
Output port:	Channel A and B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Lower Band-edge frequency: 5470 MHz
Both transmit chains active.
Polarization: Vertical
Test distance: 3 meters; receive antenna height: 1.23 meters; table rotation: 66 degrees
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Delta-Marker at band edge:



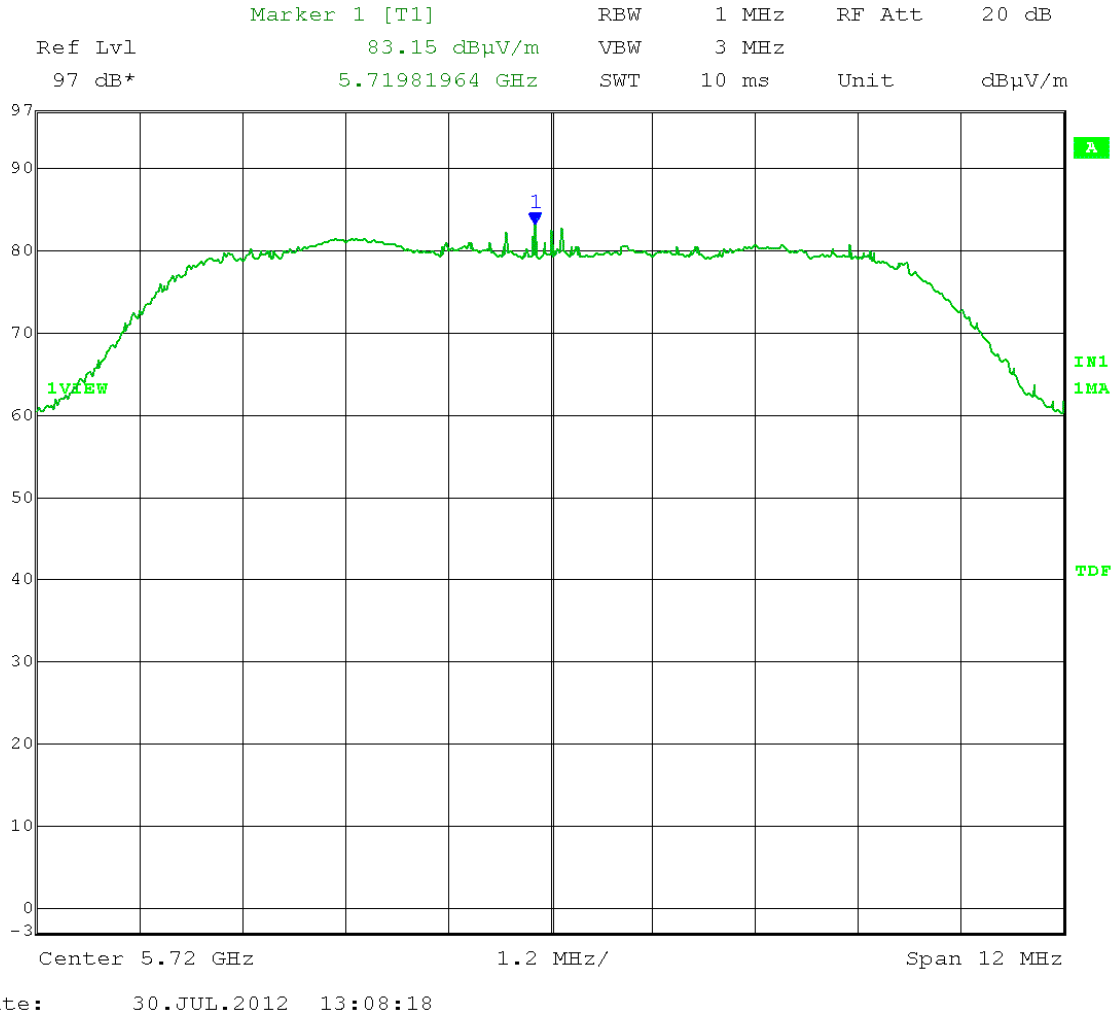
Calculated EIRP at the band edge = -11.07 dBm – 21.18 = **-32.25 dBm**

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg Ch A 51	adi reg Ch B 55
Output port:	Channel A and B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper Band-edge frequency: 5725 MHz
Both transmit chains active.
Polarization: Horizontal
Test distance: 3 meters; receive antenna height: 1.08 meters; table rotation: 101 degrees
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4))

Measurement of Fundamental:



Date: 30.JUL.2012 13:08:18

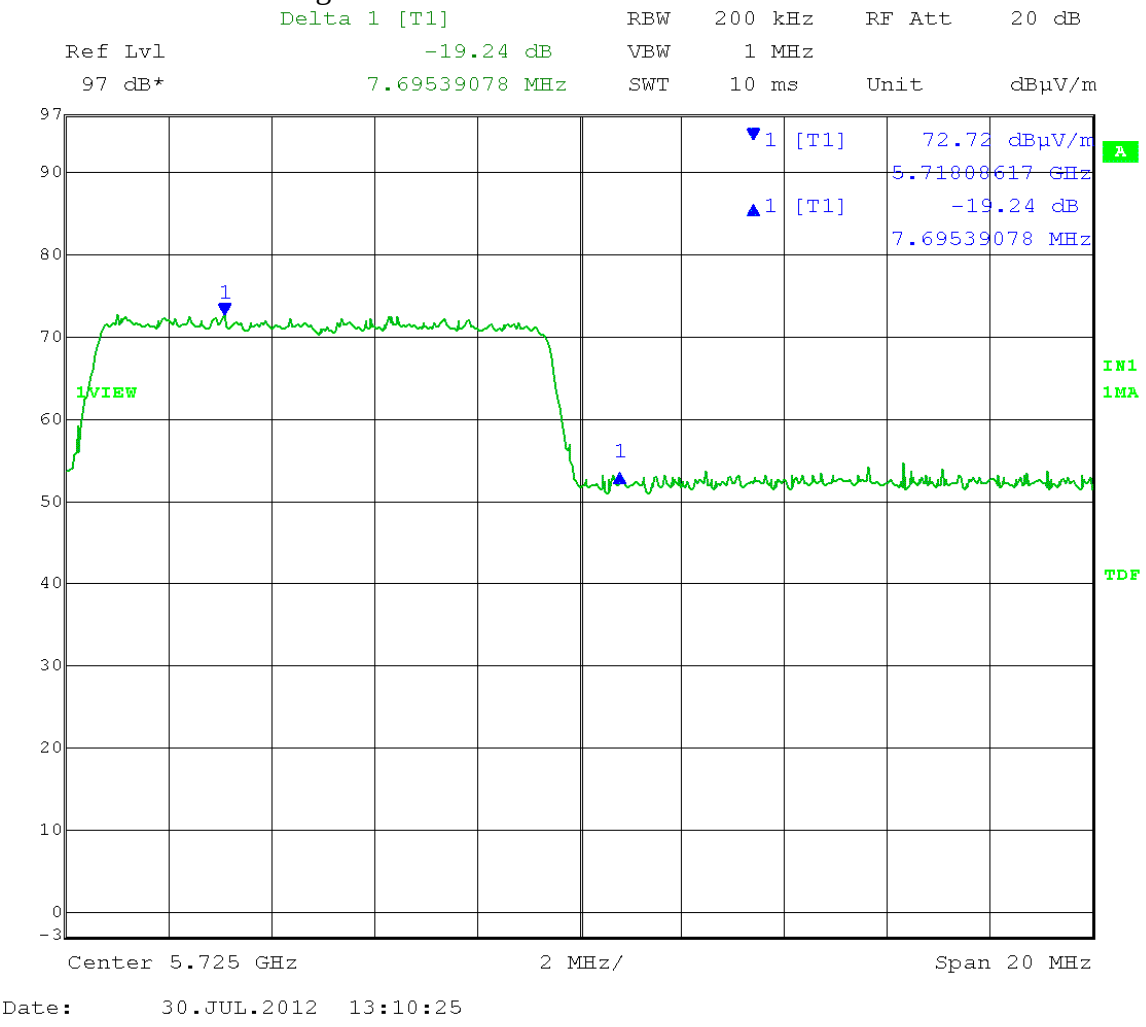
Calculated EIRP of fundamental = 83.15 dBµV/m + 20 log (3 meters) -104.77 = -12.08 dBm

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg Ch A 51	adi reg Ch B 55
Output port:	Channel A and B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper Band-edge frequency: 5725 MHz
Both transmit chains active.
Polarization: Horizontal
Test distance: 3 meters; receive antenna height: 1.08 meters; table rotation: 101 degrees
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4))

Delta-Marker at band edge:



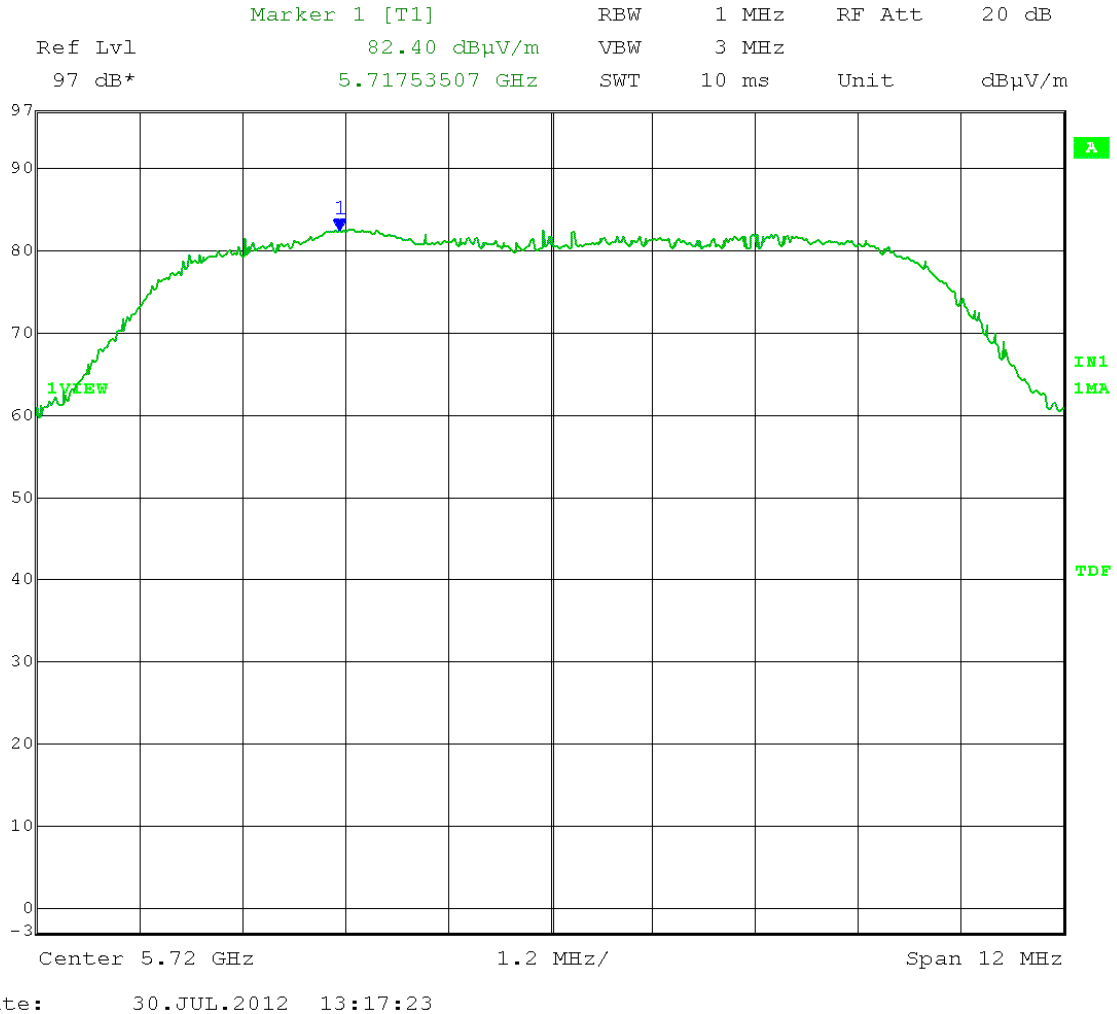
Calculated EIRP at the band edge = -12.08 dBm – 19.24 = **-31.32 dBm**

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg Ch A 51	adi reg Ch B 55
Output port:	Channel A and B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper Band-edge frequency: 5725 MHz
Both transmit chains active.
Polarization: Vertical
Test distance: 3 meters; receive antenna height: 1.00 meters; table rotation: 137 degrees
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4))

Measurement of Fundamental:



Date: 30.JUL.2012 13:17:23

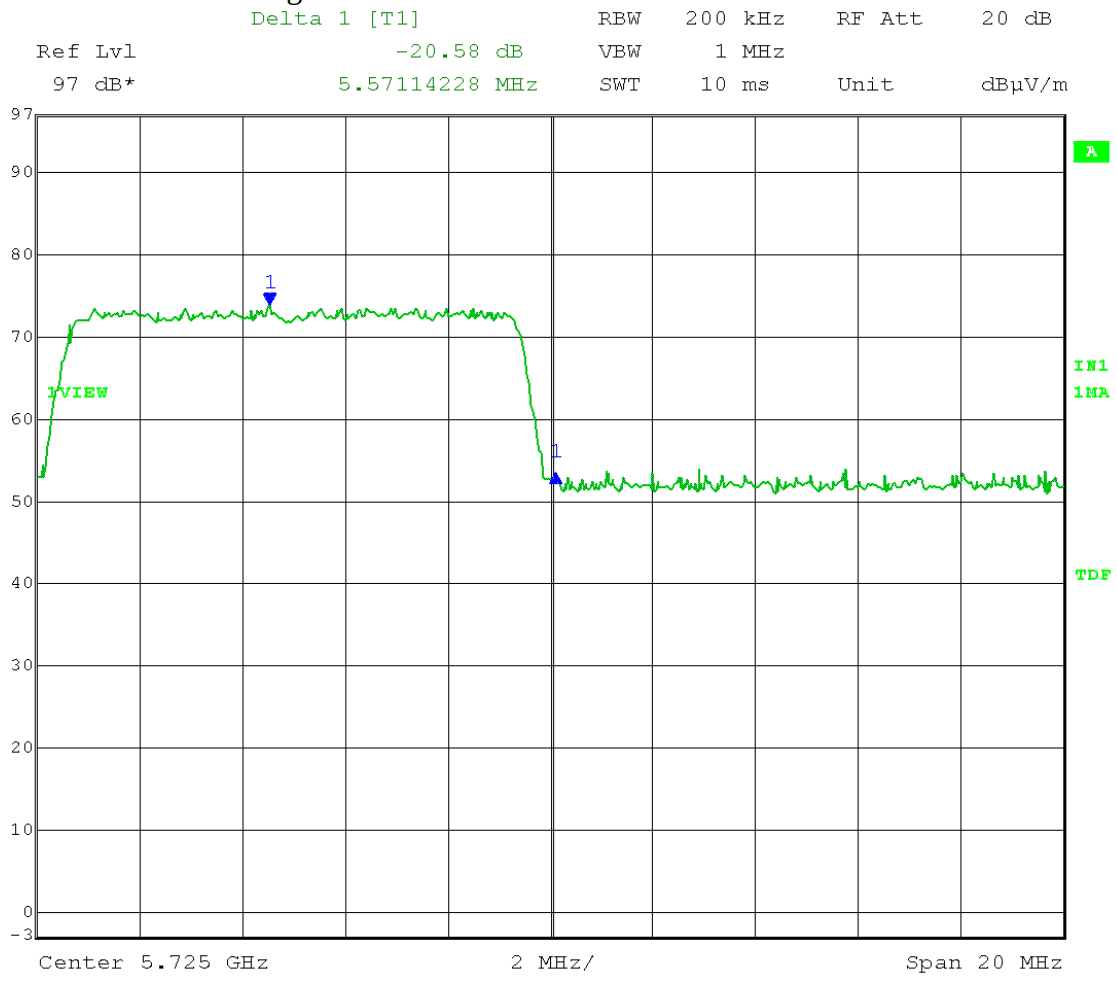
Calculated EIRP of fundamental = 82.40 dBµV/m + 20 log (3 meters) -104.77 = -12.83 dBm

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg Ch A 51	adi reg Ch B 55
Output port:	Channel A and B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper Band-edge frequency: 5725 MHz
Both transmit chains active.
Polarization: Vertical
Test distance: 3 meters; receive antenna height: 1.00 meters; table rotation: 137 degrees
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4))

Delta-Marker at band edge:



Date: 30.JUL.2012 13:16:15

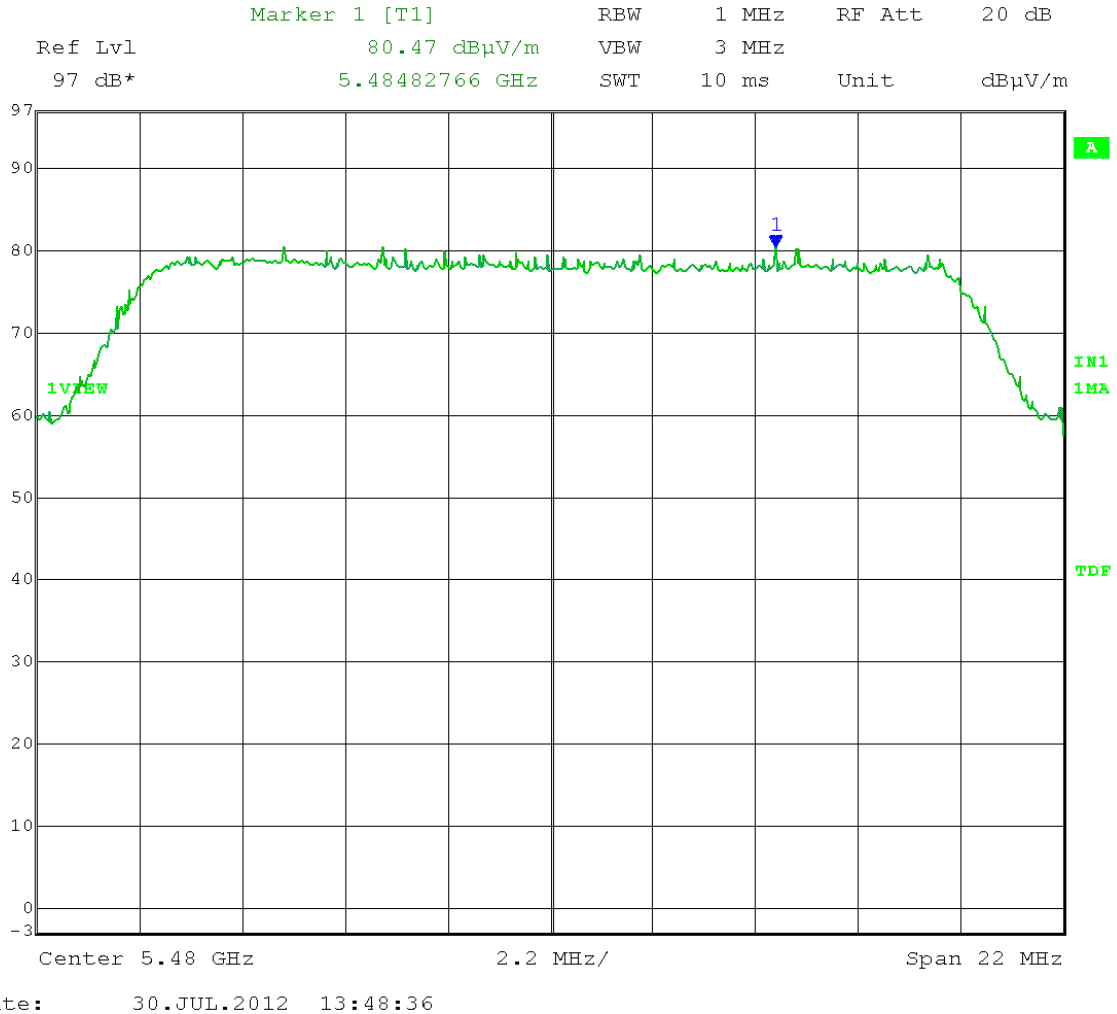
Calculated EIRP at the band edge = -12.83 dBm – 20.58 = **-33.41 dBm**

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg Ch A 42	adi reg Ch B 45
Output port:	Channel A and B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Lower Band-edge frequency: 5470 MHz
Both transmit chains active.
Polarization: Horizontal
Test distance: 3 meters; receive antenna height: 1.07 meters; table rotation: 82 degrees
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Measurement of Fundamental:



Date: 30.JUL.2012 13:48:36

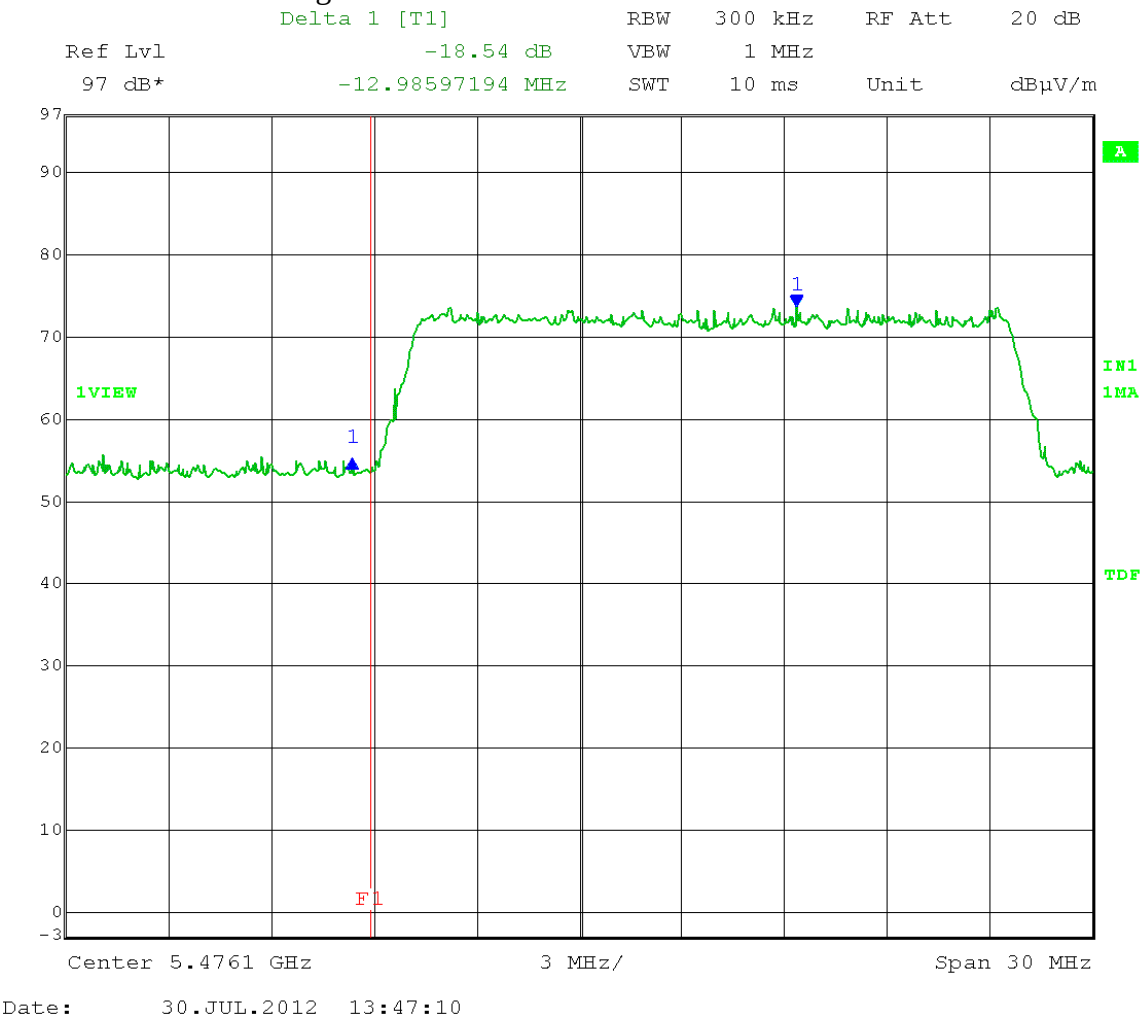
Calculated EIRP of fundamental = 80.47 dBµV/m + 20 log (3 meters) -104.77 = -14.76 dBm

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg Ch A 42	adi reg Ch B 45
Output port:	Channel A and B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Lower Band-edge frequency: 5470 MHz
Both transmit chains active.
Polarization: Horizontal
Test distance: 3 meters; receive antenna height: 1.07 meters; table rotation: 82 degrees
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Delta-Marker at band edge:



Date: 30.JUL.2012 13:47:10

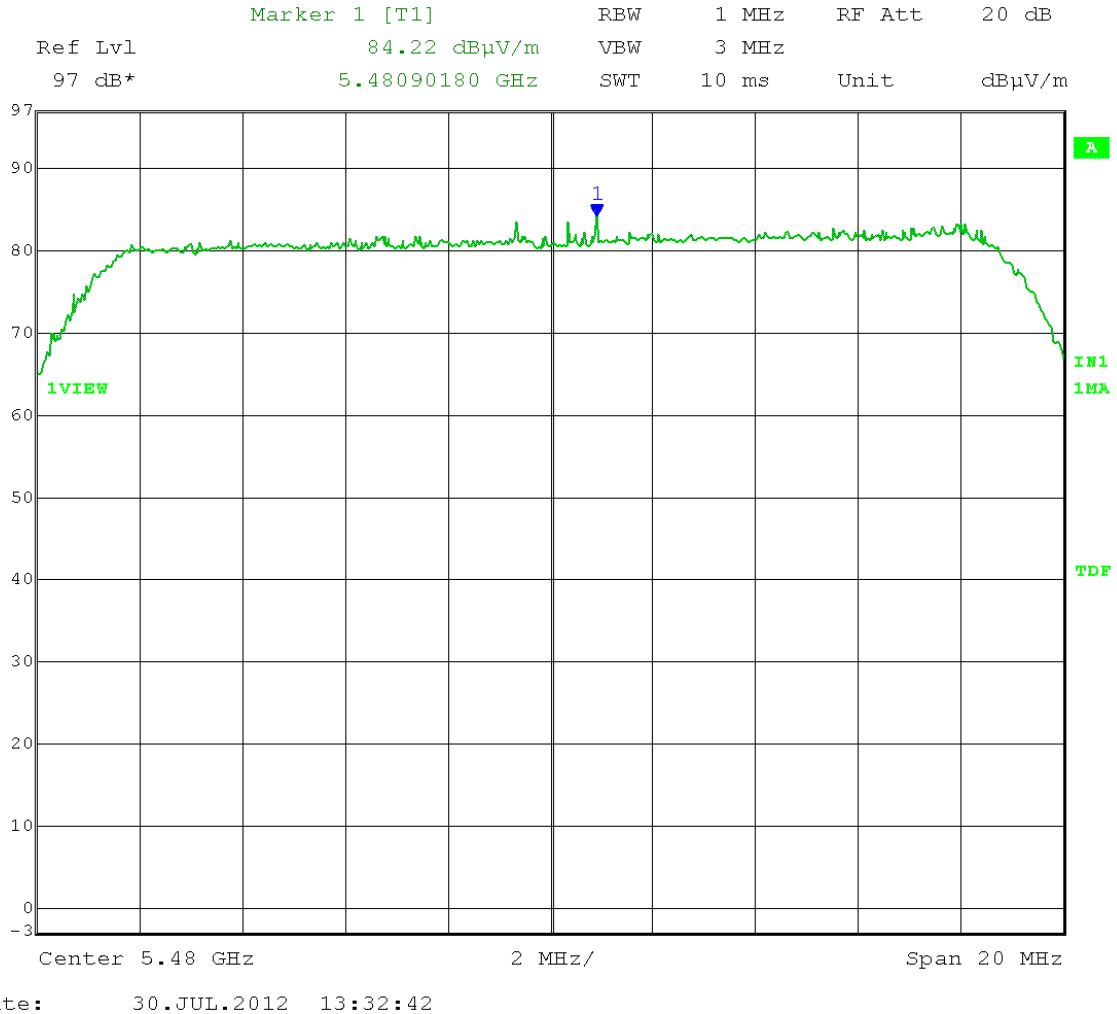
Calculated EIRP at the band edge = -14.76 dBm – 18.54 = **-33.30 dBm**

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg Ch A 42	adi reg Ch B 45
Output port:	Channel A and B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Lower Band-edge frequency: 5470 MHz
Both transmit chains active.
Polarization: Vertical
Test distance: 3 meters; receive antenna height: 1.06 meters; table rotation: 61 degrees
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Measurement of Fundamental:



Date: 30.JUL.2012 13:32:42

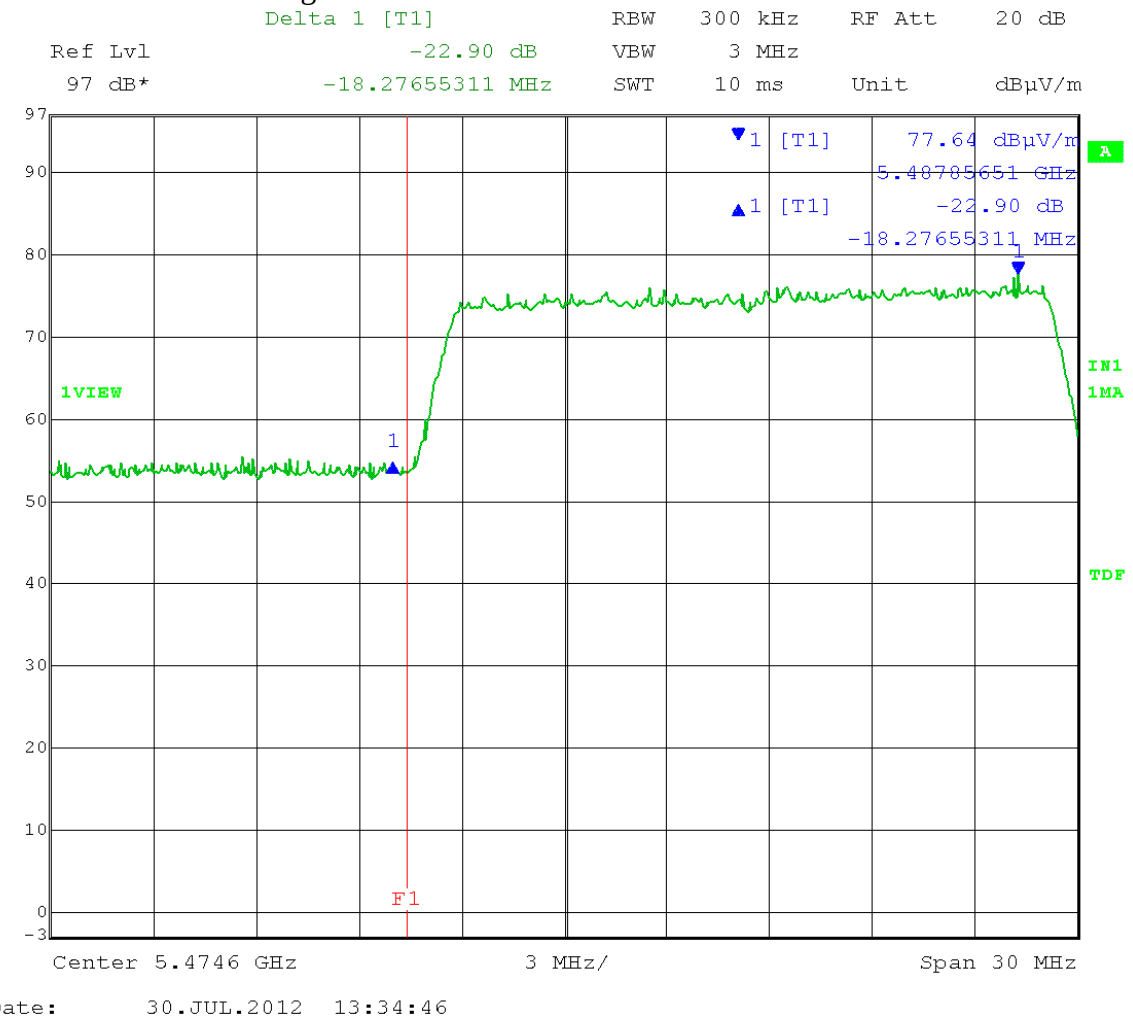
Calculated EIRP of fundamental = 84.22 dBµV/m + 20 log (3 meters) -104.77 = -11.01 dBm

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg Ch A 42	adi reg Ch B 45
Output port:	Channel A and B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Lower Band-edge frequency: 5470 MHz
Both transmit chains active.
Polarization: Vertical
Test distance: 3 meters; receive antenna height: 1.06 meters; table rotation: 61 degrees
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Delta-Marker at band edge:



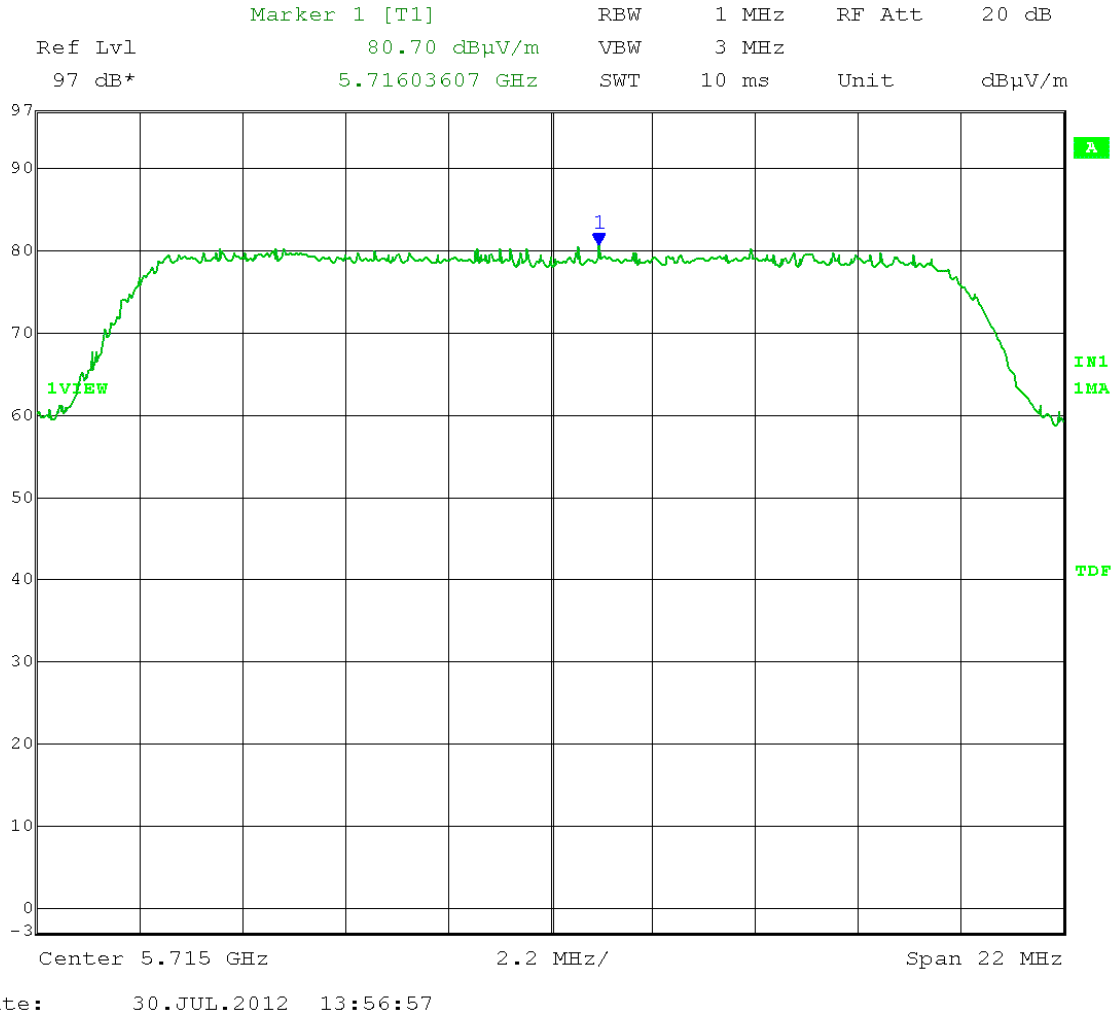
Calculated EIRP at the band edge = -11.01 dBm – 22.90 = **-33.91 dBm**

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg Ch A 46	adi reg Ch B 4B
Output port:	Channel A and B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper Band-edge frequency: 5725 MHz
Both transmit chains active.
Polarization: Horizontal
Test distance: 3 meters; receive antenna height: 1.06 meters; table rotation: 104 degrees
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4))

Measurement of Fundamental:



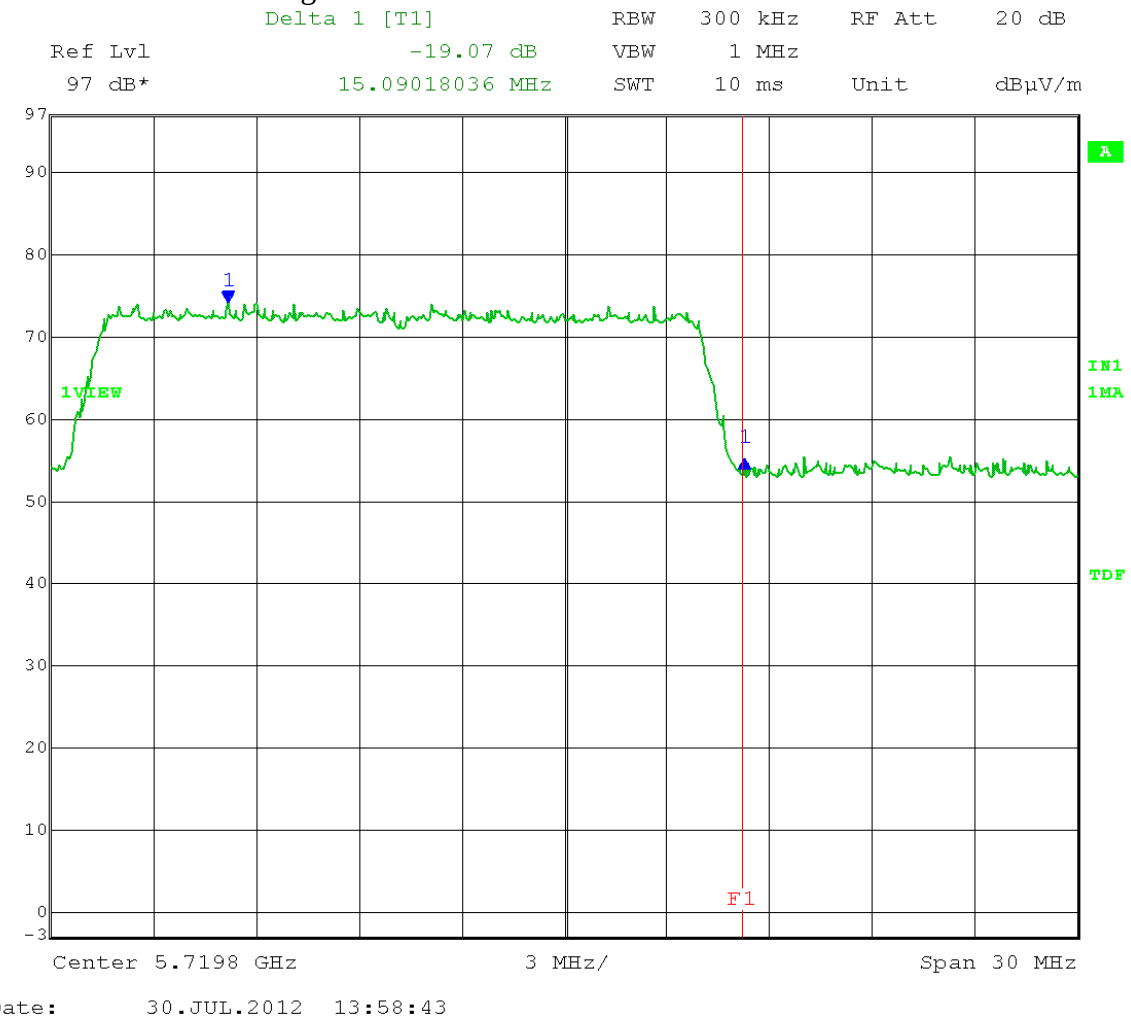
Calculated EIRP of fundamental = 80.70 dBµV/m + 20 log (3 meters) -104.77 = -14.53 dBm

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg Ch A 46	adi reg Ch B 4B
Output port:	Channel A and B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper Band-edge frequency: 5725 MHz
Both transmit chains active.
Polarization: Horizontal
Test distance: 3 meters; receive antenna height: 1.06 meters; table rotation: 104 degrees
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4))

Delta-Marker at band edge:



Date: 30.JUL.2012 13:58:43

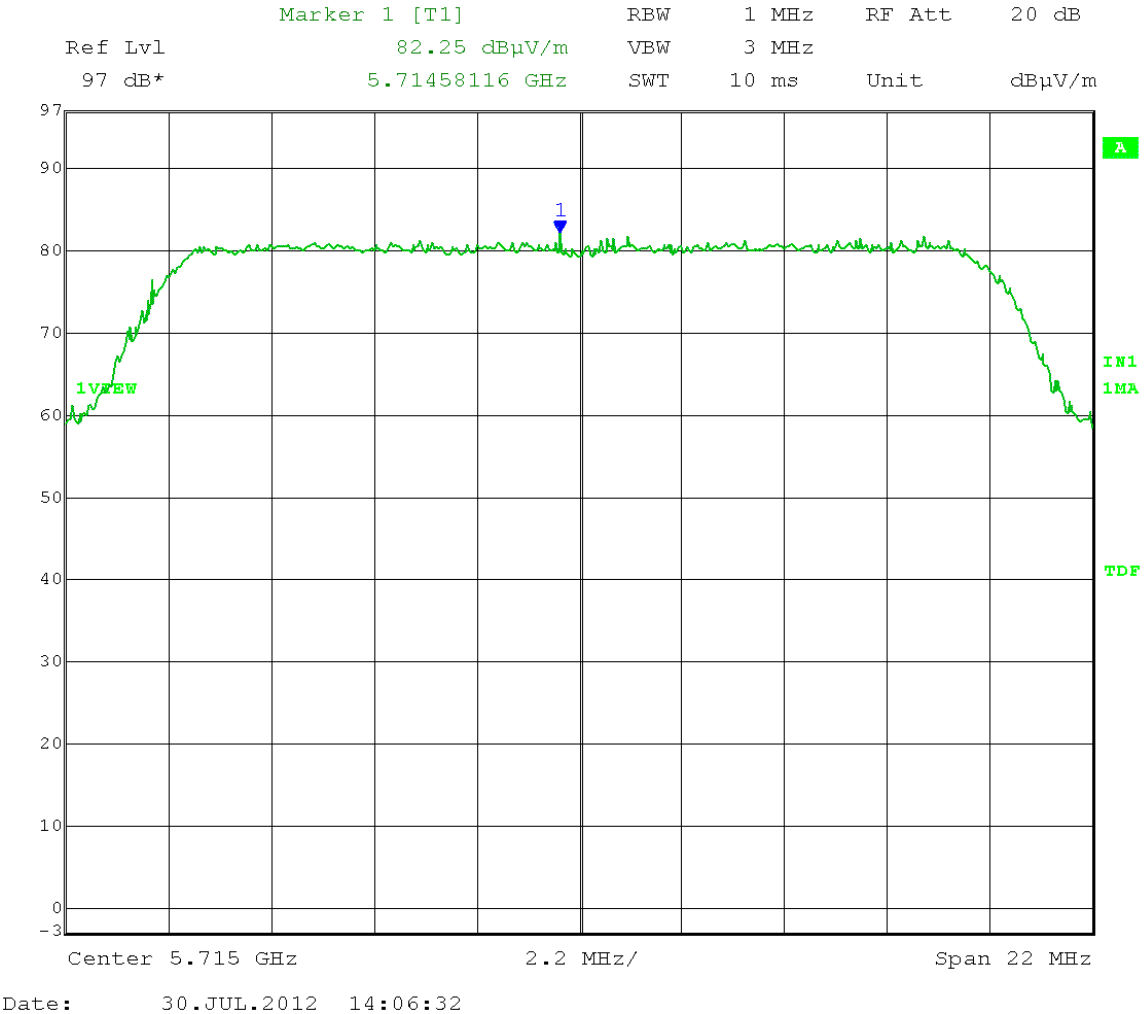
Calculated EIRP at the band edge = -14.53 dBm – 19.07 = **-33.60 dBm**

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg Ch A 46	adi reg Ch B 4B
Output port:	Channel A and B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper Band-edge frequency: 5725 MHz
Both transmit chains active.
Polarization: Vertical
Test distance: 3 meters; receive antenna height: 1.00 meters; table rotation: 137 degrees
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4))

Measurement of Fundamental:



Date: 30.JUL.2012 14:06:32

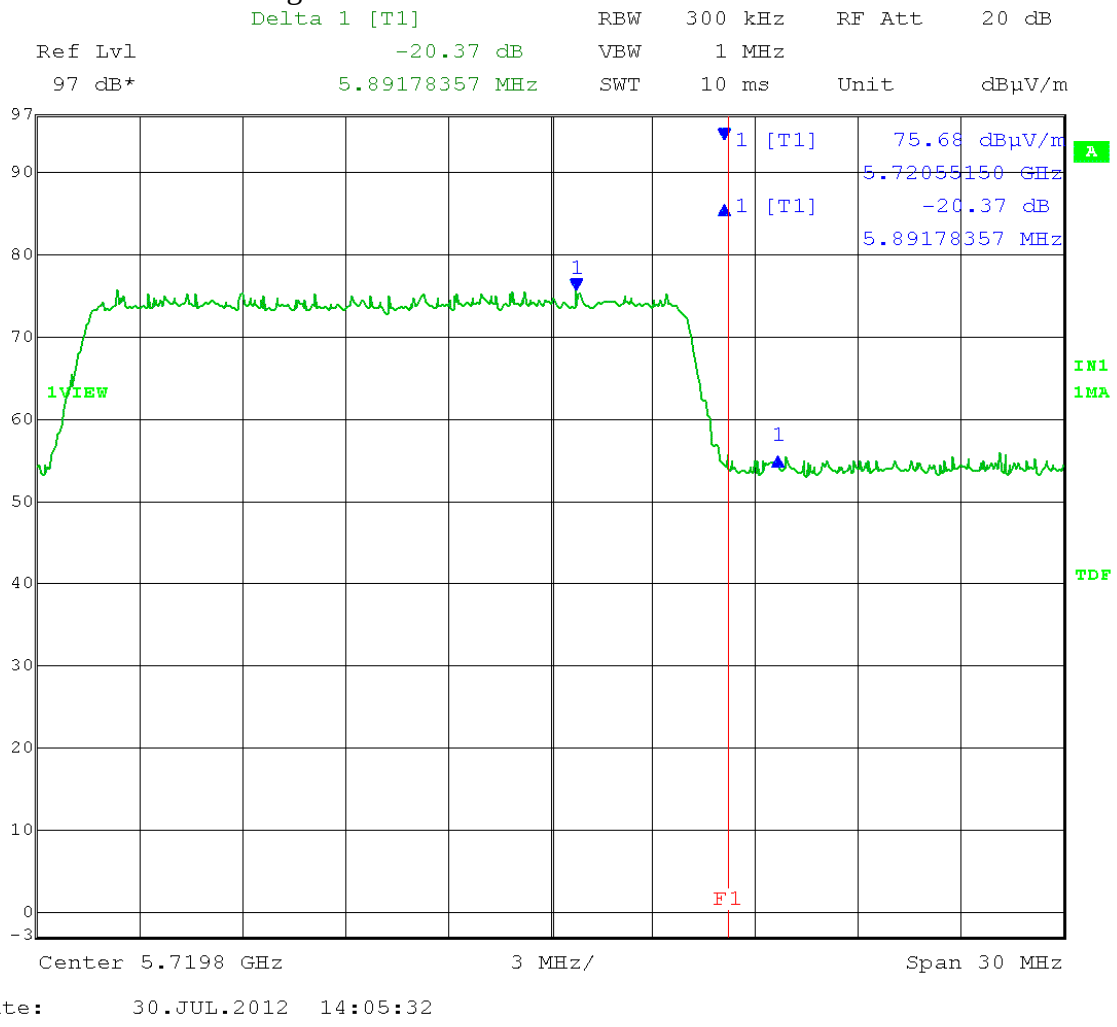
Calculated EIRP of fundamental = 82.25 dBµV/m + 20 log (3 meters) -104.77 = -12.98 dBm

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg Ch A 46	adi reg Ch B 4B
Output port:	Channel A and B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper Band-edge frequency: 5725 MHz
Both transmit chains active.
Polarization: Vertical
Test distance: 3 meters; receive antenna height: 1.00 meters; table rotation: 137 degrees
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4))

Delta-Marker at band edge:



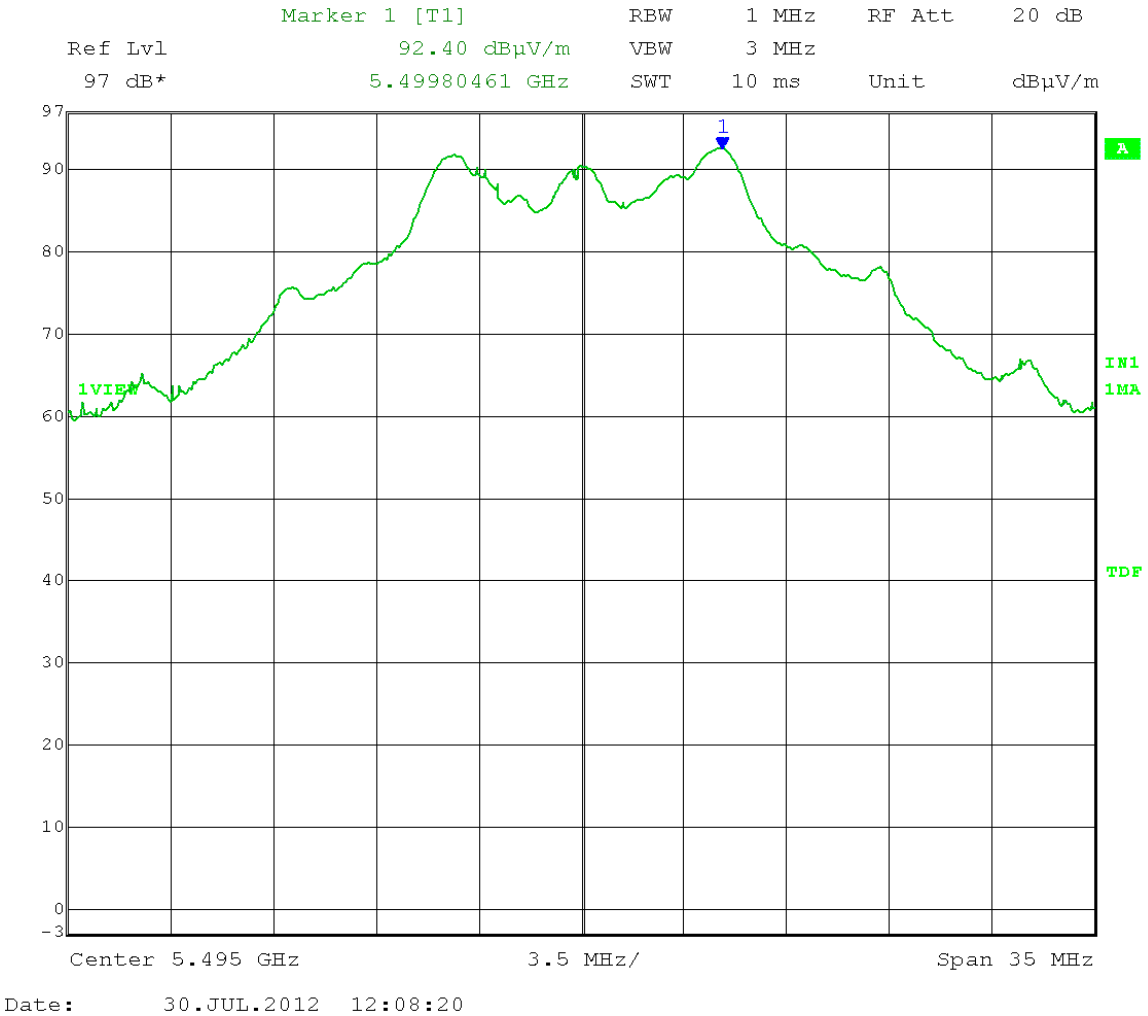
Calculated EIRP at the band edge = -12.98 dBm – 20.37 = **-33.35 dBm**

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	26 dB EBW:	22.98 MHz
Output port:	FSK	Low Channel Frequency:	5.495 GHz
Output power setting:	90;	Modulation Type:	2-level FSK

Lower Band-edge frequency: 5470 MHz
Polarization: Horizontal
Test distance: 3 meters; receive antenna height: 1.04 meters; table rotation: 81 degrees
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Measurement of Fundamental:



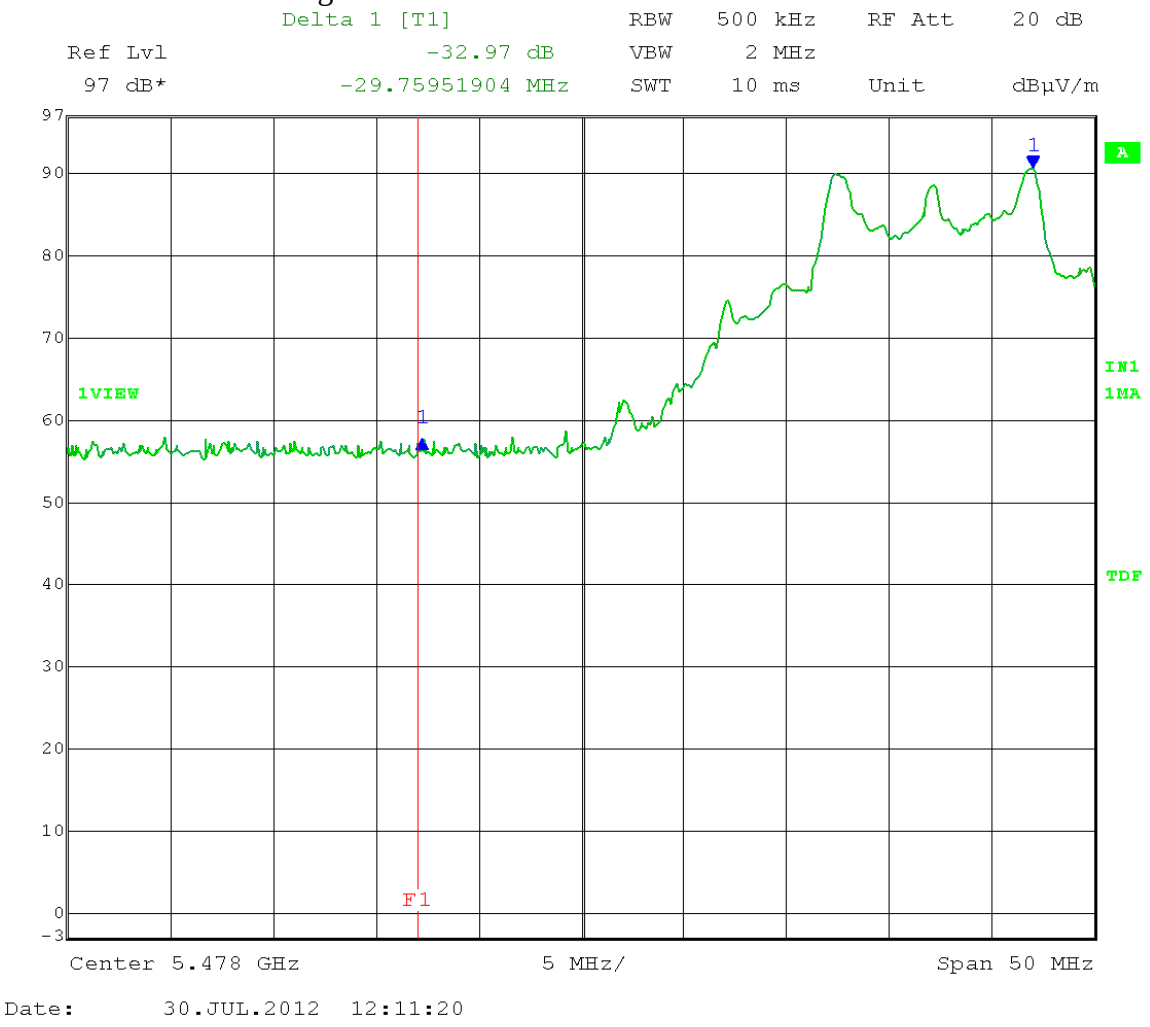
Calculated EIRP of fundamental = 92.40 dBµV/m + 20 log (3 meters) -104.77 = -2.83 dBm

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	26 dB EBW:	22.98 MHz
Output port:	FSK	Low Channel Frequency:	5.495 GHz
Output power setting:	90;	Modulation Type:	2-level FSK

Lower Band-edge frequency: 5470 MHz
Polarization: Horizontal
Test distance: 3 meters; receive antenna height: 1.04 meters; table rotation: 81 degrees
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Delta-Marker at band edge:



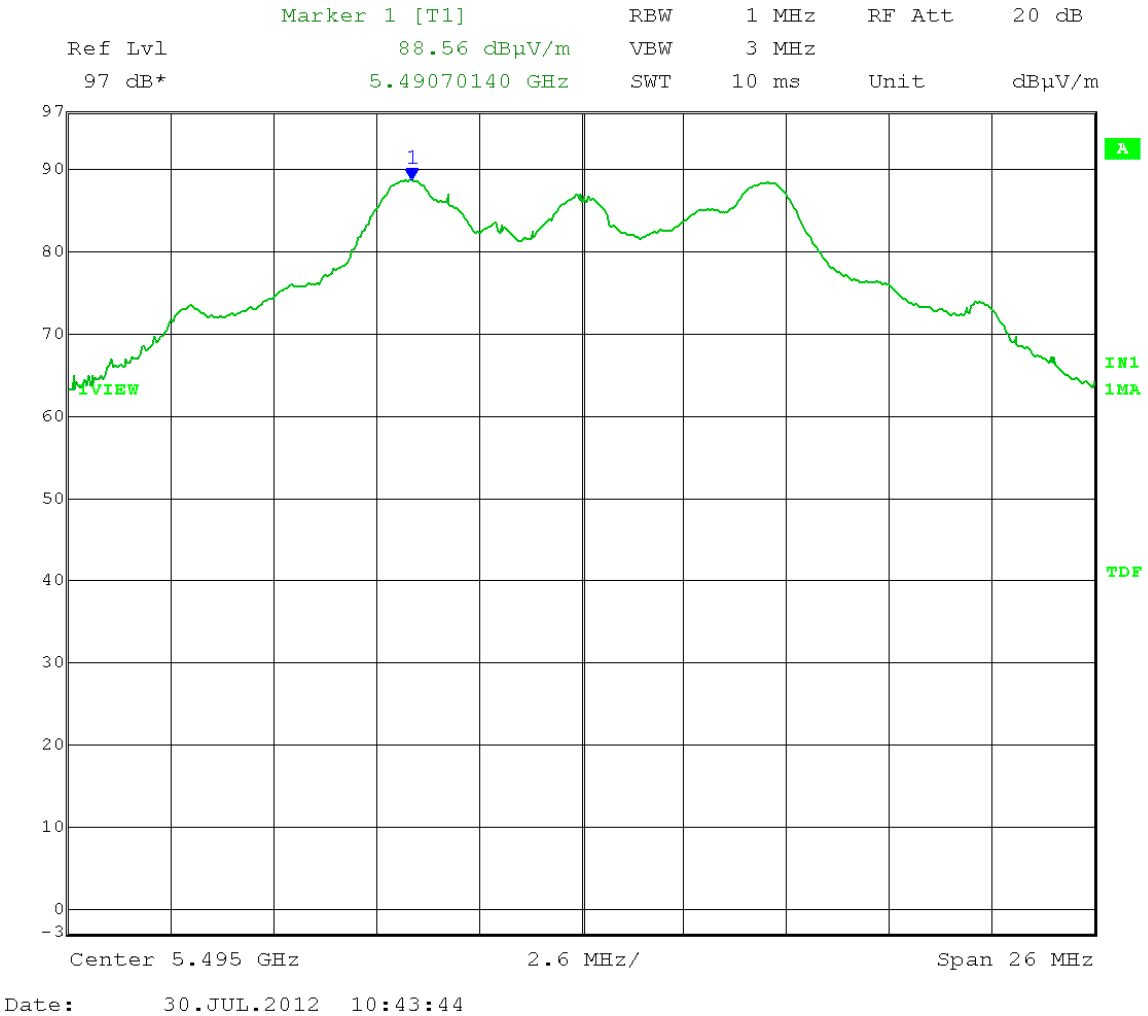
Calculated EIRP at the band edge = -2.83 dBm – 32.97 = **-35.80 dBm**

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	26 dB EBW:	22.98 MHz
Output port:	FSK	Low Channel Frequency:	5.495 GHz
Output power setting:	90;	Modulation Type:	2-level FSK

Lower Band-edge frequency: 5470 MHz
Polarization: Vertical
Test distance: 3 meters; receive antenna height: 1.00 meters; table rotation: 77 degrees
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Measurement of Fundamental:



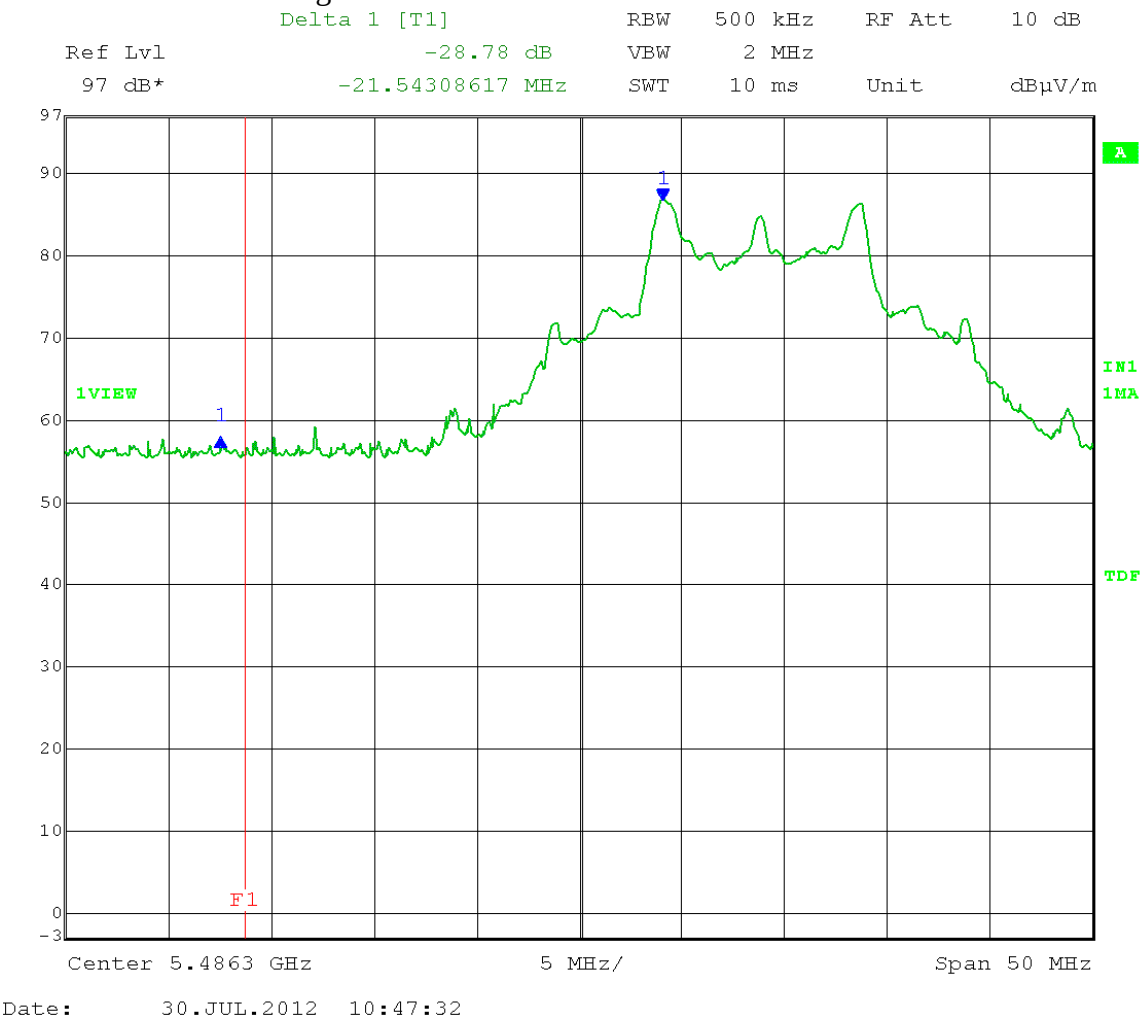
Calculated EIRP of fundamental = 88.56 dBµV/m + 20 log (3 meters) -104.77 = -6.67 dBm

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	26 dB EBW:	22.98 MHz
Output port:	FSK	Low Channel Frequency:	5.495 GHz
Output power setting:	90;	Modulation Type:	2-level FSK

Lower Band-edge frequency: 5470 MHz
Polarization: Vertical
Test distance: 3 meters; receive antenna height: 1.00 meters; table rotation: 77 degrees
EIRP Limit: **-27** dBm/MHz (FCC 15.407(b)(3))

Delta-Marker at band edge:



Date: 30.JUL.2012 10:47:32

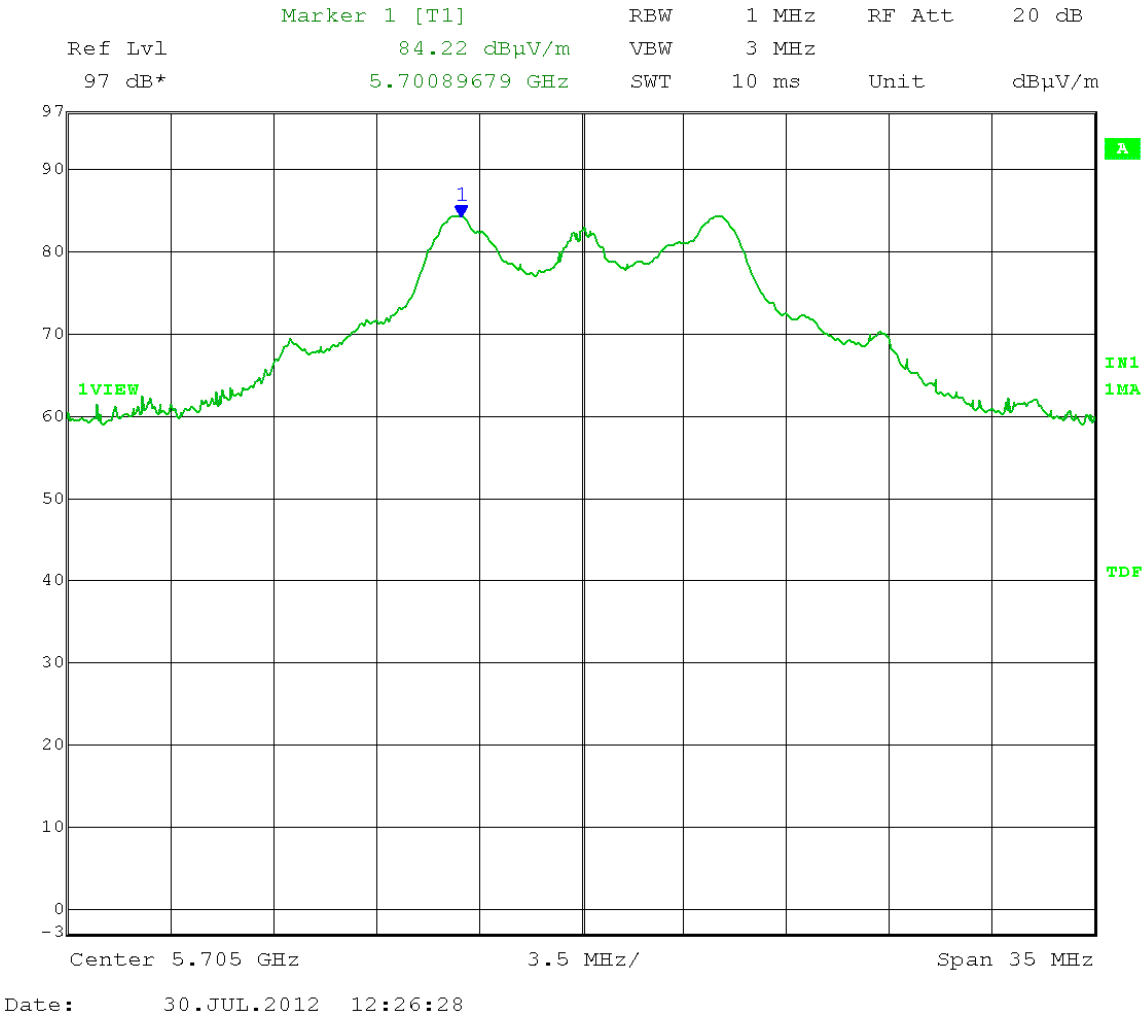
Calculated EIRP at the band edge = -6.67 dBm – 28.78 = **-35.45 dBm**

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	26 dB EBW:	22.98 MHz
Output port:	FSK	High Channel Frequency:	5.705 GHz
Output power setting:	A4;	Modulation Type:	2-level FSK

Upper Band-edge frequency: 5725 MHz
Polarization: Horizontal
Test distance: 3 meters; receive antenna height: 1.04 meters; table rotation: 120 degrees
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4))

Measurement of Fundamental:



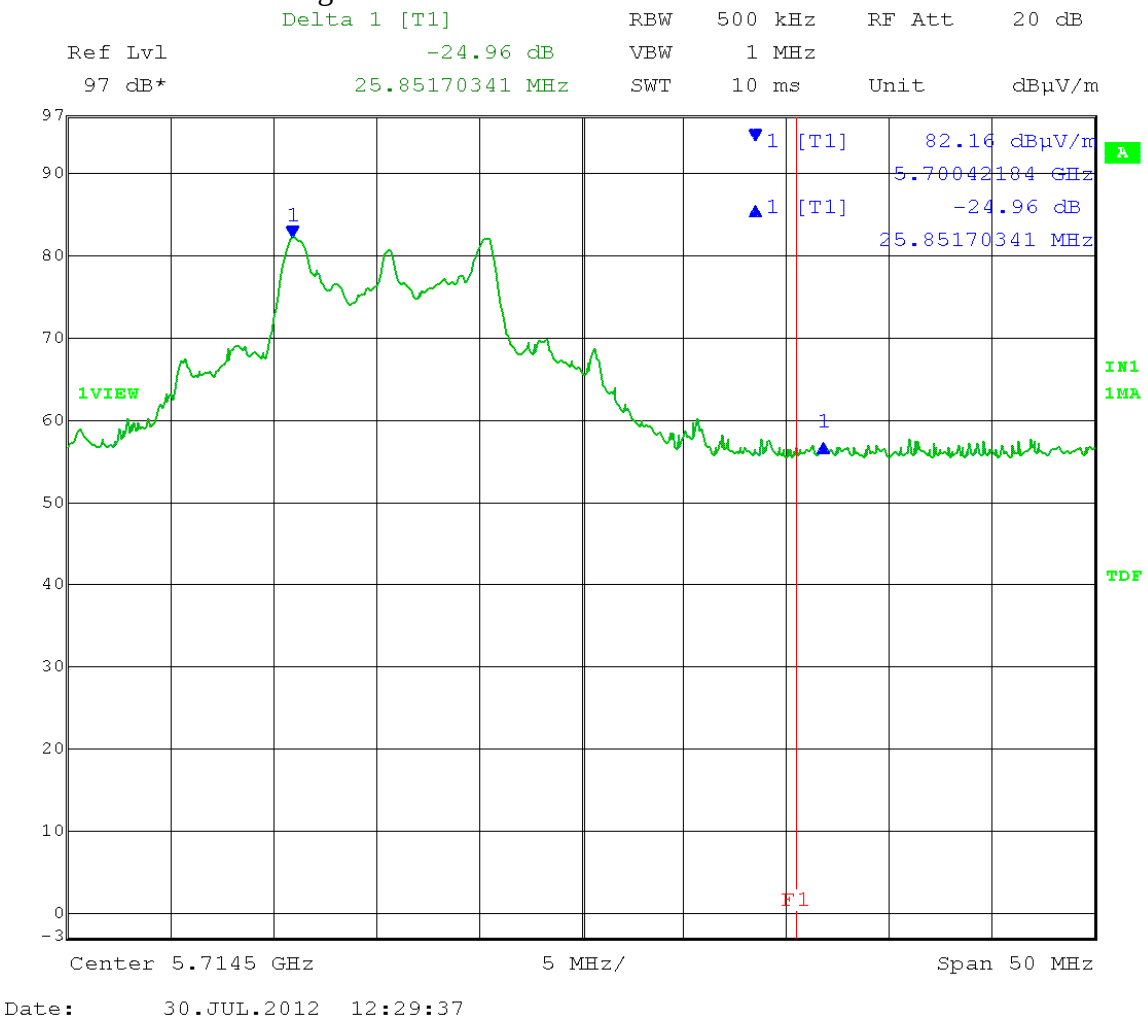
Calculated EIRP of fundamental = 84.22 dBµV/m + 20 log (3 meters) -104.77 = -11.01 dBm

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth: 20 MHz
Output port: FSK
Output power setting: A4;
26 dB EBW: 22.98 MHz
High Channel Frequency: 5.705 GHz
Modulation Type: 2-level FSK

Upper Band-edge frequency: 5725 MHz
Polarization: Horizontal
Test distance: 3 meters; receive antenna height: 1.04 meters; table rotation: 120 degrees
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4))

Delta-Marker at band edge:



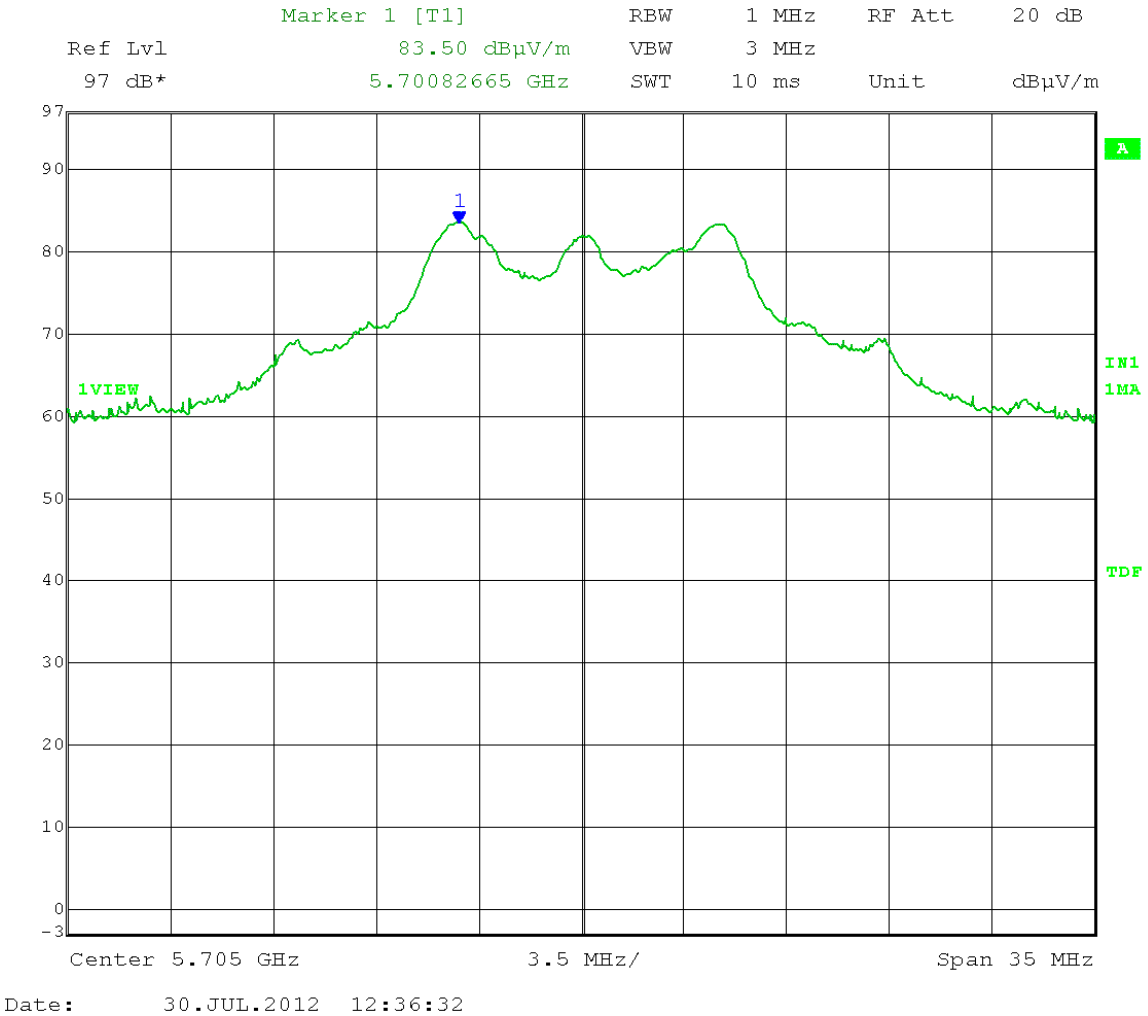
Calculated EIRP at the band edge = -11.01 dBm – 24.96 = **-35.97 dBm**

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	26 dB EBW:	22.98 MHz
Output port:	FSK	High Channel Frequency:	5.705 GHz
Output power setting:	A4;	Modulation Type:	2-level FSK

Upper Band-edge frequency: 5725 MHz
Polarization: Vertical
Test distance: 3 meters; receive antenna height: 1.00 meters; table rotation: 137 degrees
EIRP Limit: **-17** dBm/MHz (FCC 15.407(b)(4))

Measurement of Fundamental:



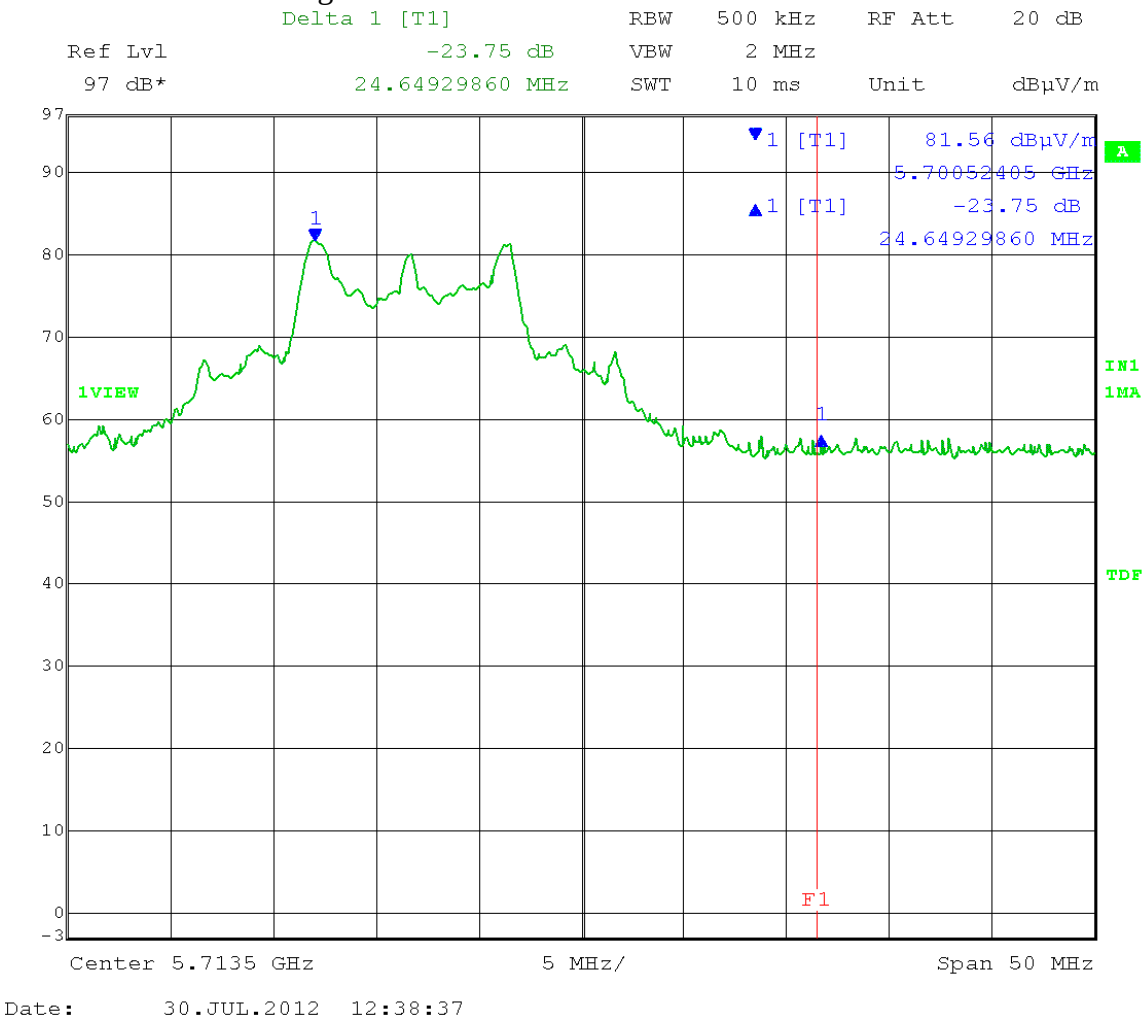
Calculated EIRP of fundamental = 83.50 dBµV/m + 20 log (3 meters) -104.77 = -11.73 dBm

Test Date: 07-30-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter Band-Edge Emission – Radiated from cabinet
Operator: Craig B

EUT nominal channel bandwidth: 20 MHz
Output port: FSK
Output power setting: A4;
26 dB EBW: 22.98 MHz
High Channel Frequency: 5.705 GHz
Modulation Type: 2-level FSK

Upper Band-edge frequency: 5725 MHz
Polarization: Vertical
Test distance: 3 meters; receive antenna height: 1.00 meters; table rotation: 137 degrees

Delta-Marker at band edge:



Calculated EIRP at the band edge = -11.73 dBm – 23.75 = **-35.48 dBm**

Appendix A – Measurement Data

A9.0 Unwanted Emission Levels – RF Conducted

Rule Section: Sections 15.407(b)(3) and 15.407(b)(6)

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section G(1): Unwanted emissions in the restricted bands
Section G(2): Unwanted emissions outside the restricted bands
Sections G(3), G(4) and G(5): Unwanted emission levels

Below 1000 MHz
Detector = quasi-peak
Alternately, peak detector is permitted

Peak measurements above 1000 MHz
RBW = 1 MHz
VBW ≥ 3 MHz
Detector = peak
Sweep time = auto; increased by a factor of (1 / duty cycle)
Trace mode = max hold

Average measurements above 1000 MHz (required for peak emissions that are above the average limits) –
Method AD (Average Detection)
RBW = 1 MHz
VBW ≥ 3 MHz
Detector = RMS (span/(# of points in sweep) ≤ RBW/2)
Averaging type = power
Sweep time = auto; increased by a factor of (1 / duty cycle)
Trace mode = trace average 100 sweeps; increased by a factor of (1 / duty cycle)
For a duty cycle less than 98%, add 10 log (1/duty cycle)

EIRP calculation:
Add upper bound on out-of-band antenna gain to measured antenna port conducted emission power. (This is the maximum in-band gain or 2 dBi, whichever is greater)
Add 10 log(N), where N is the number of output, for MIMO operation
Add an additional 10 log(N), if the signals are correlated according to FCC KDB 662911, or if the unwanted emission is narrowband

Field strength calculation:
Above 1 GHz:
E (dBµV/m) = EIRP (dBm) – 20 log (d{meters}) + 104.77
Below 1 GHz:
E (dBµV/m) = EIRP (dBm) – 20 log (d{meters}) + 104.77 + 4.7 dB

Limits: Outside restricted bands: Peak EIRP shall not exceed -27 dBm/MHz
Inside restricted bands: Peak and Average limits of FCC Part 15.209

Notes: Measurements were taken for QPSK (OFDM) or 2-level (FSK) at the lowest, middle, and highest channels of operation. EUT was set to transmit continuously with 98% duty cycle.

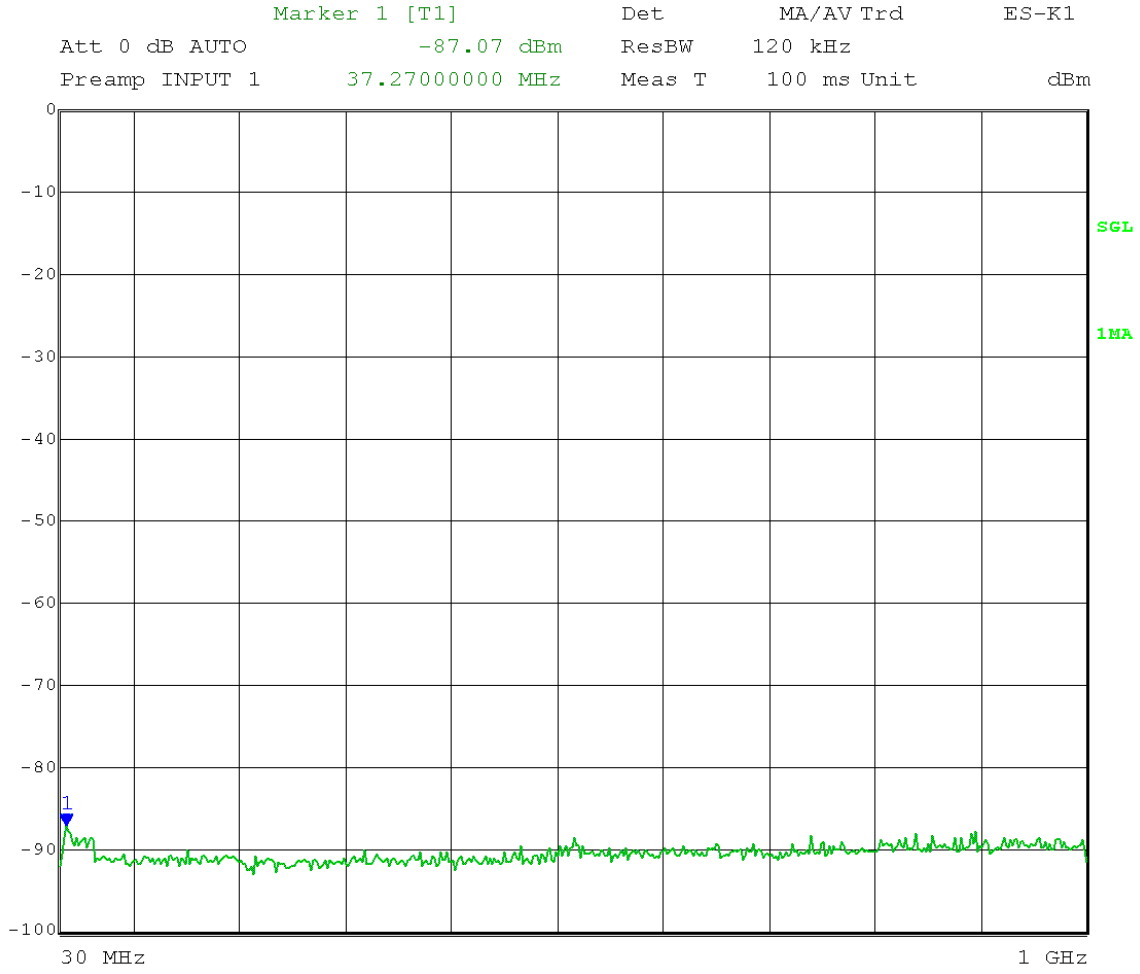
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 4C	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 30 MHz to 1 GHz; Peak detector



Date: 25.JUL.2012 08:59:28

No emissions found from 30 MHz to 1 GHz

Calculated Field Strength at noise floor = -87.07 dBm + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 + 4.7 dB = 32.86 dBµV/m Peak

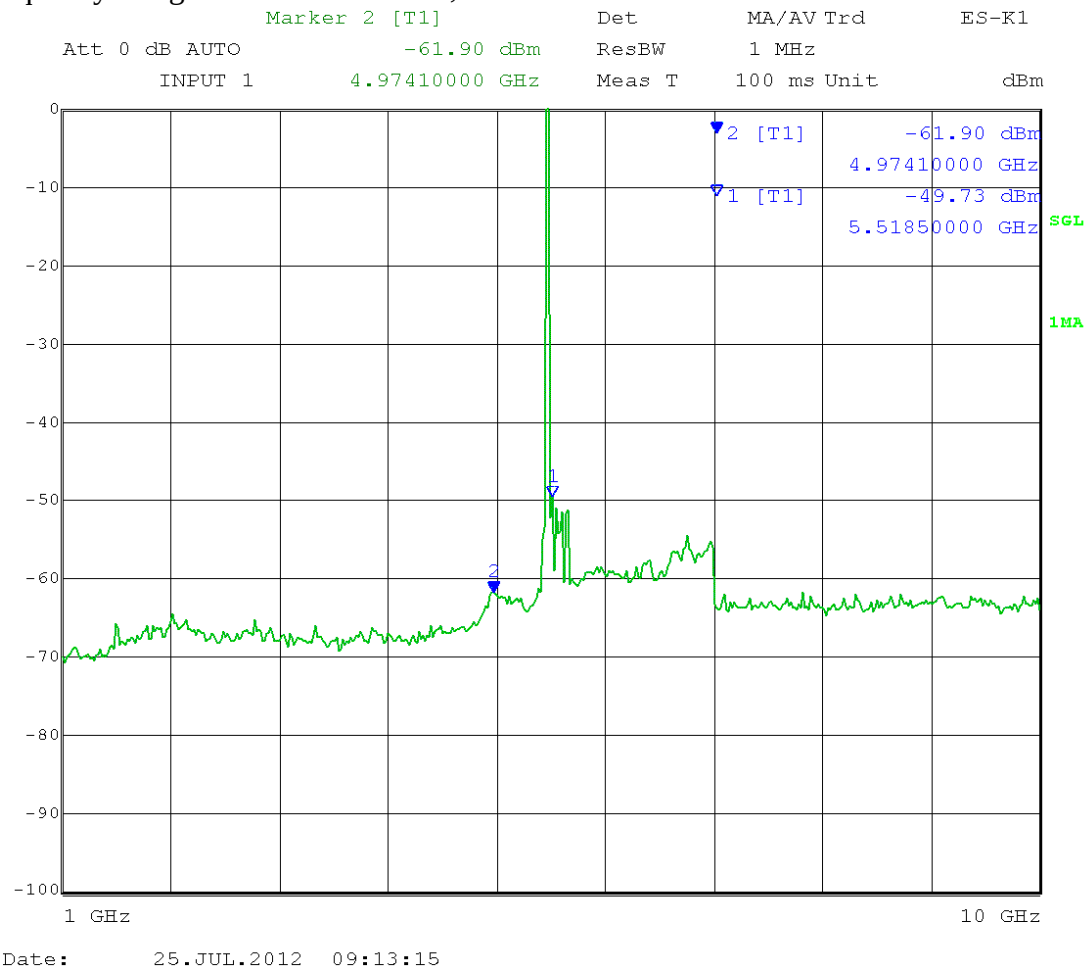
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 4C	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Peak detector



Marker 1: Calculated EIRP = -49.73 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -29.73 dBm
Marker 2: Calculated Field Strength (Restricted Band) = -61.90 + 17 dBi antenna gain
+ 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 53.33 dBµV/m Peak

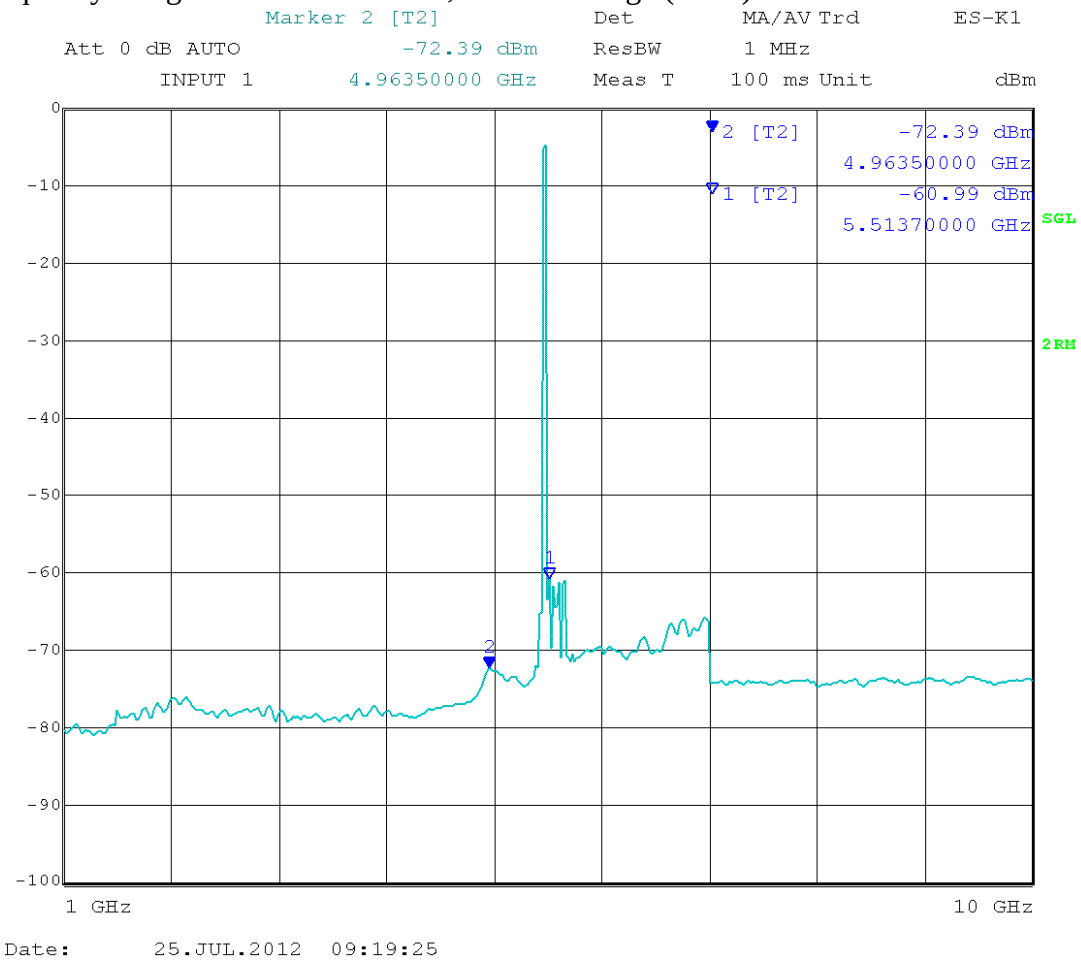
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 4C	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Average (RMS) detector



Marker 2: Calculated Field Strength (Restricted Band) = -72.39 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 42.84 dBµV/m Average

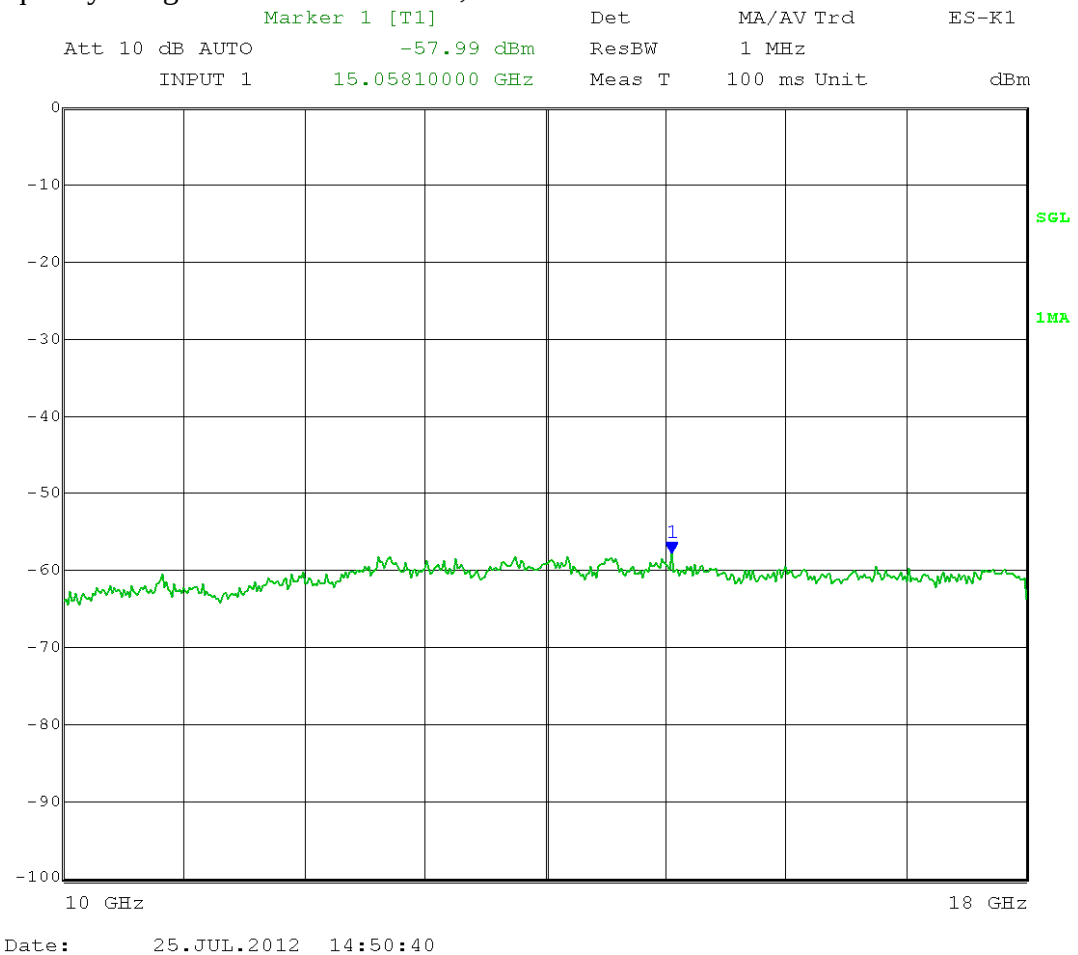
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 4C	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Peak detector



Calculated EIRP at noise floor = -57.99 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -37.99 dBm
Calculated Field Strength at noise floor = -57.99 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 57.24 dBµV/m Peak

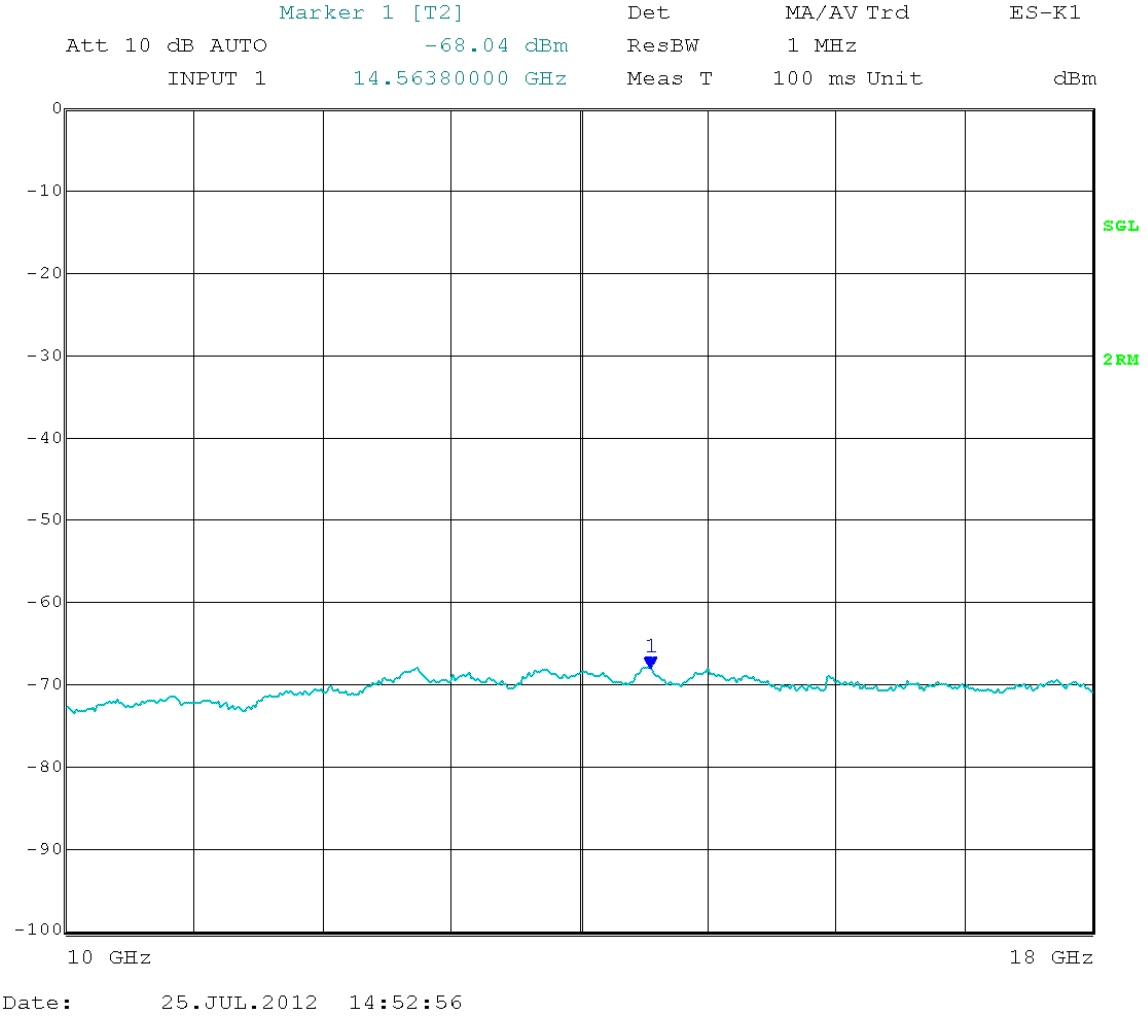
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 4C	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -68.04 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 47.19 dBµV/m Average

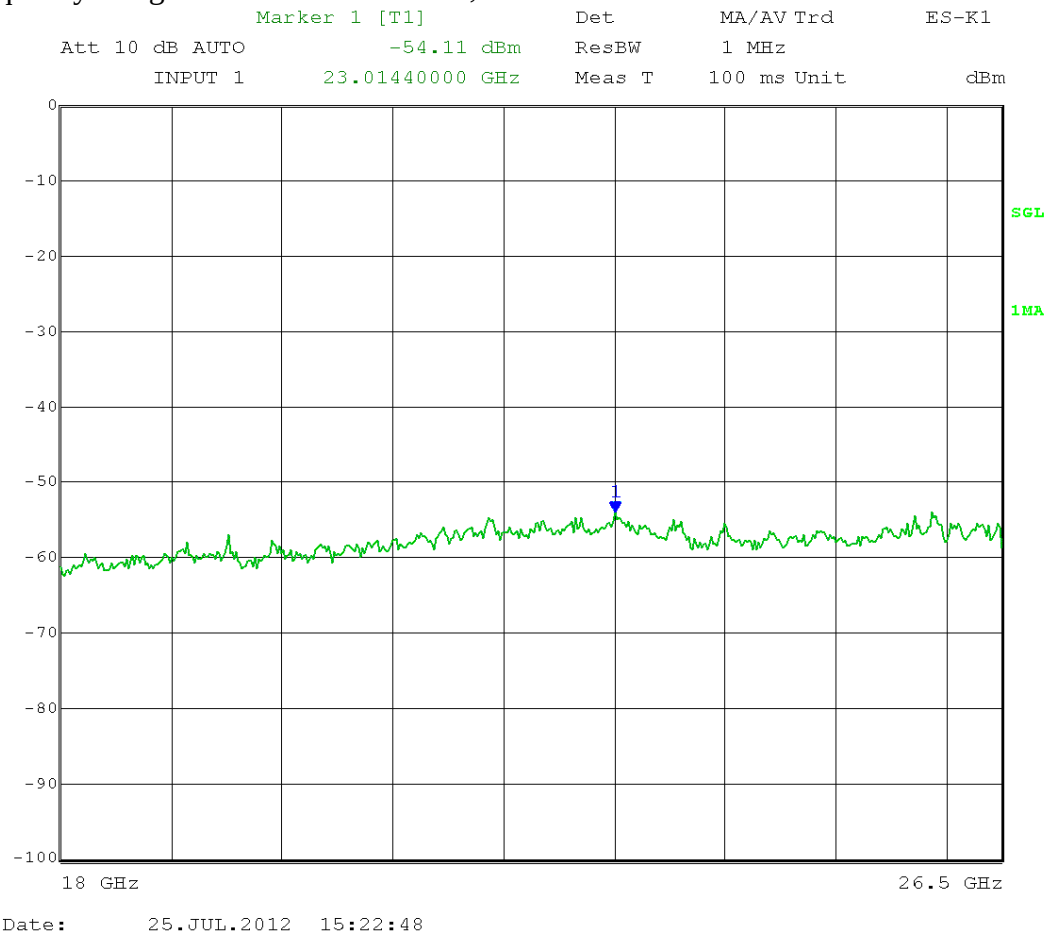
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 4C	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Peak detector



Calculated EIRP at noise floor = -54.11 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -34.11 dBm
Calculated Field Strength at noise floor = -54.11 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 61.12 dBµV/m Peak

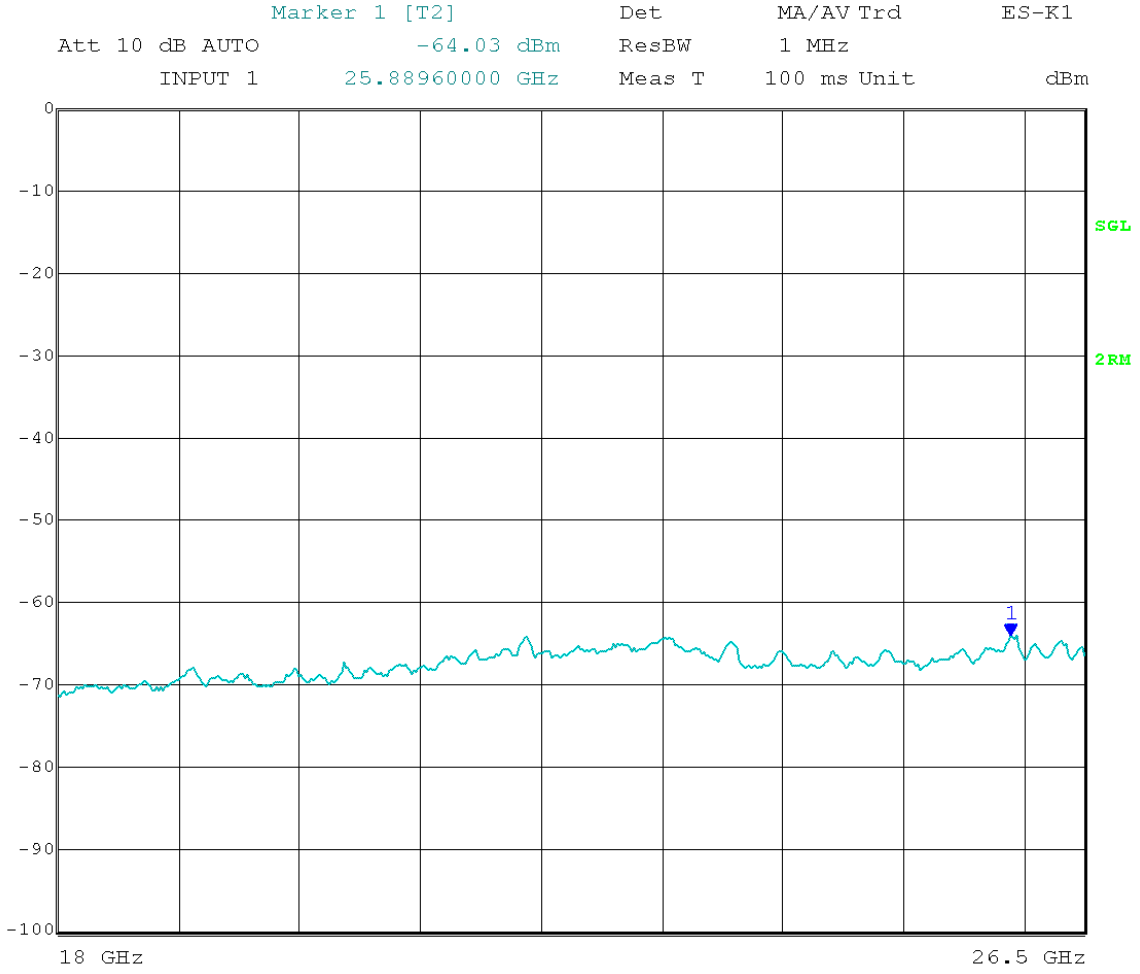
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 4C	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -64.03 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 51.20 dBµV/m Average

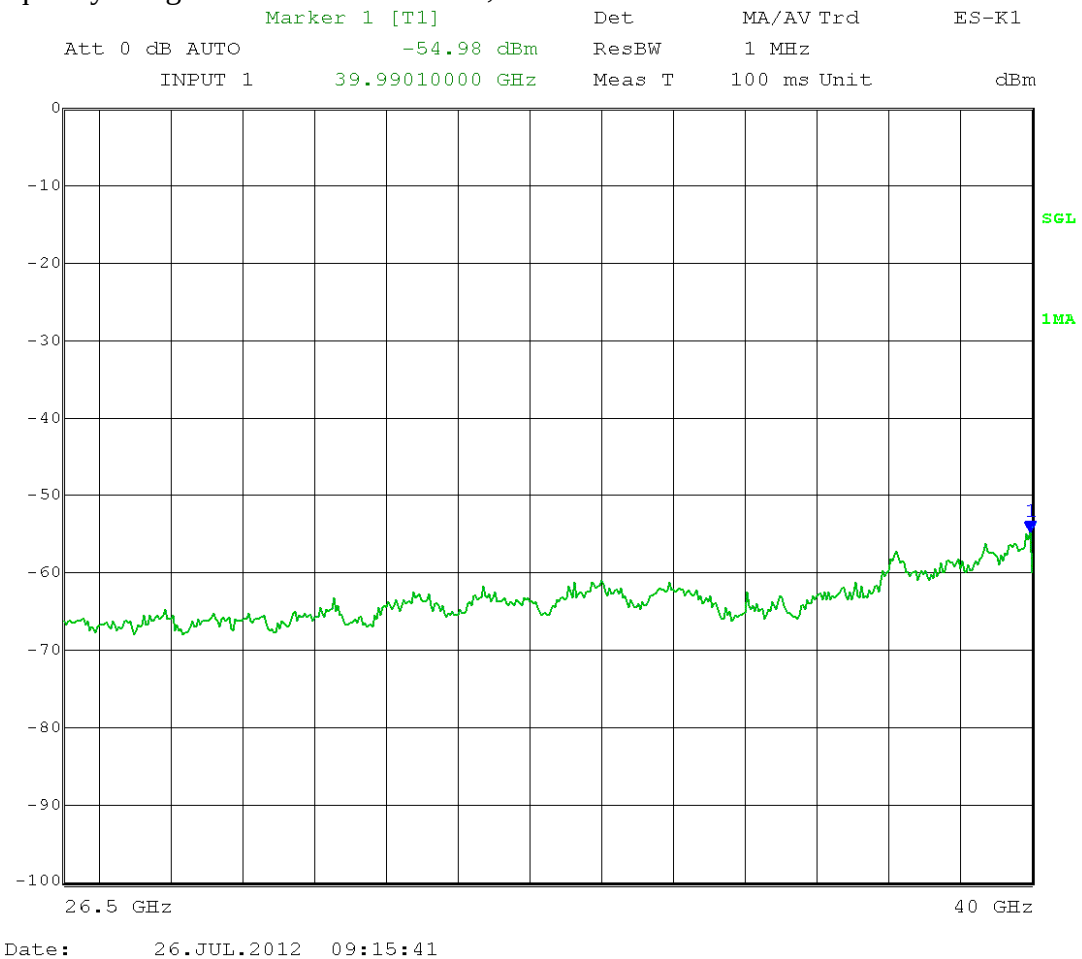
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 4C	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Peak detector



Calculated EIRP at noise floor = -54.98 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -34.98 dBm
Calculated Field Strength at noise floor = -54.98 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 60.25 dBµV/m Peak

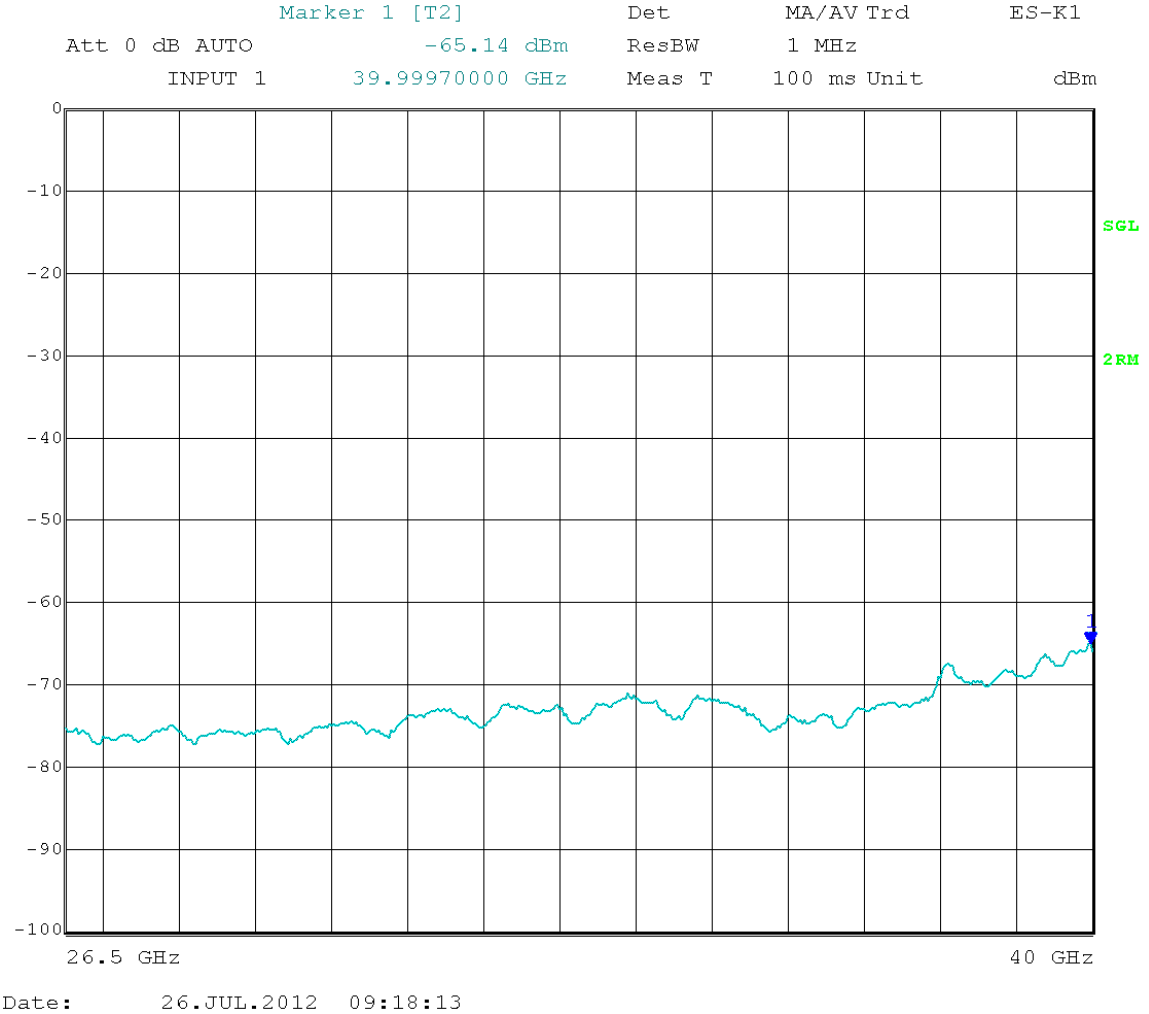
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 4C	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -65.14 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 50.09 dBµV/m Average

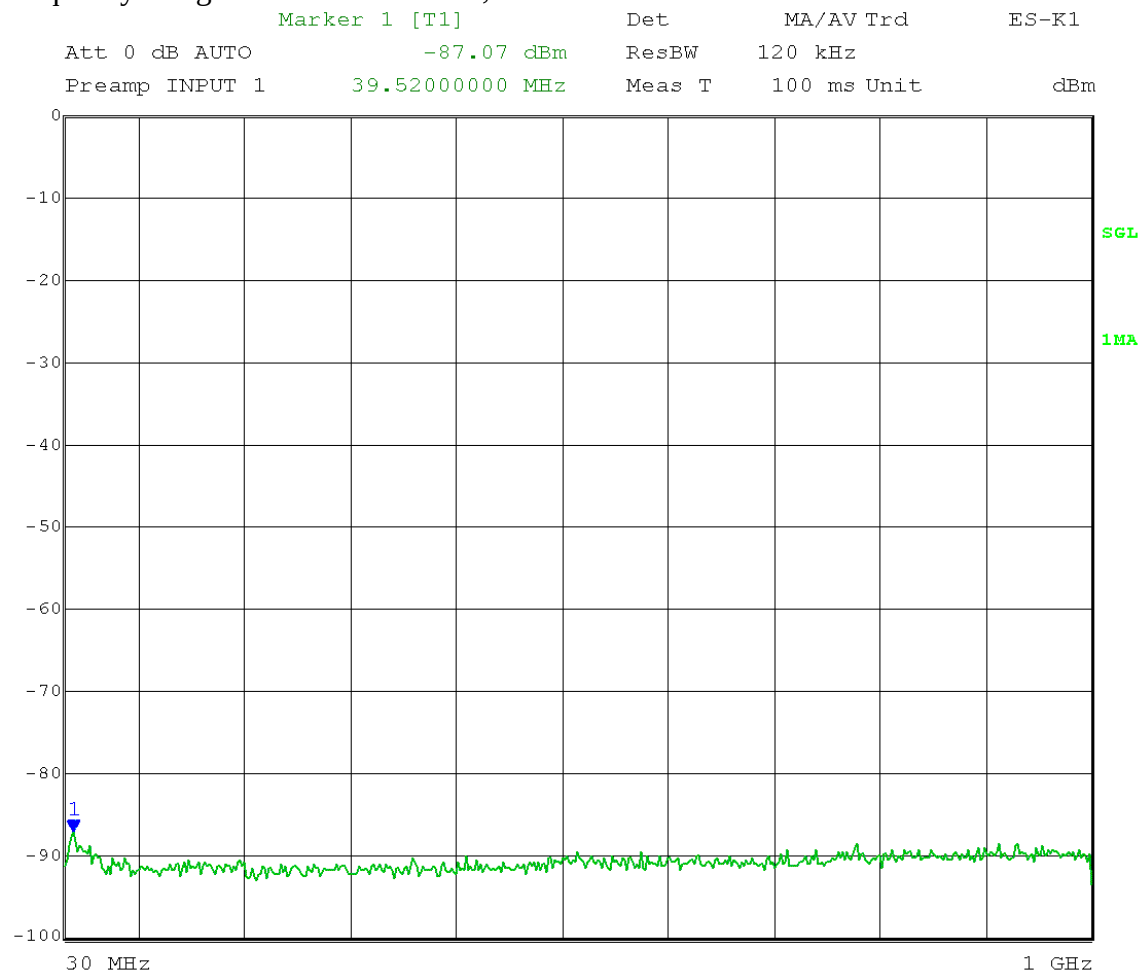
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 54	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 30 MHz to 1 GHz; Peak detector



Date: 25.JUL.2012 09:32:28

No emissions found from 30 MHz to 1 GHz

Calculated Field Strength at noise floor = -87.07 dBm + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 + 4.7 dB = 32.86 dBµV/m Peak

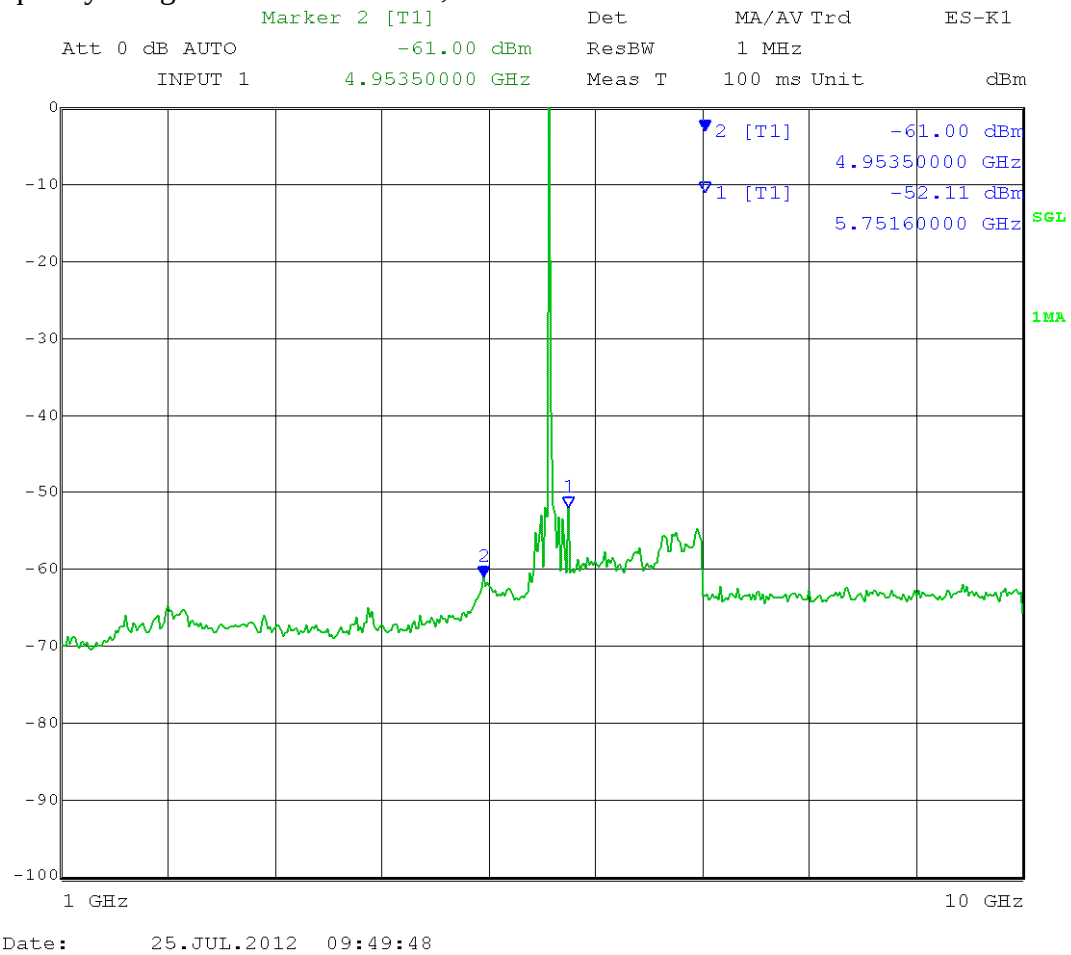
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 54	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Peak detector



Marker 1: Calculated EIRP = -52.11 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -32.11 dBm
Marker 2: Calculated Field Strength (Restricted Band) = -61.00 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 54.23 dBµV/m Peak

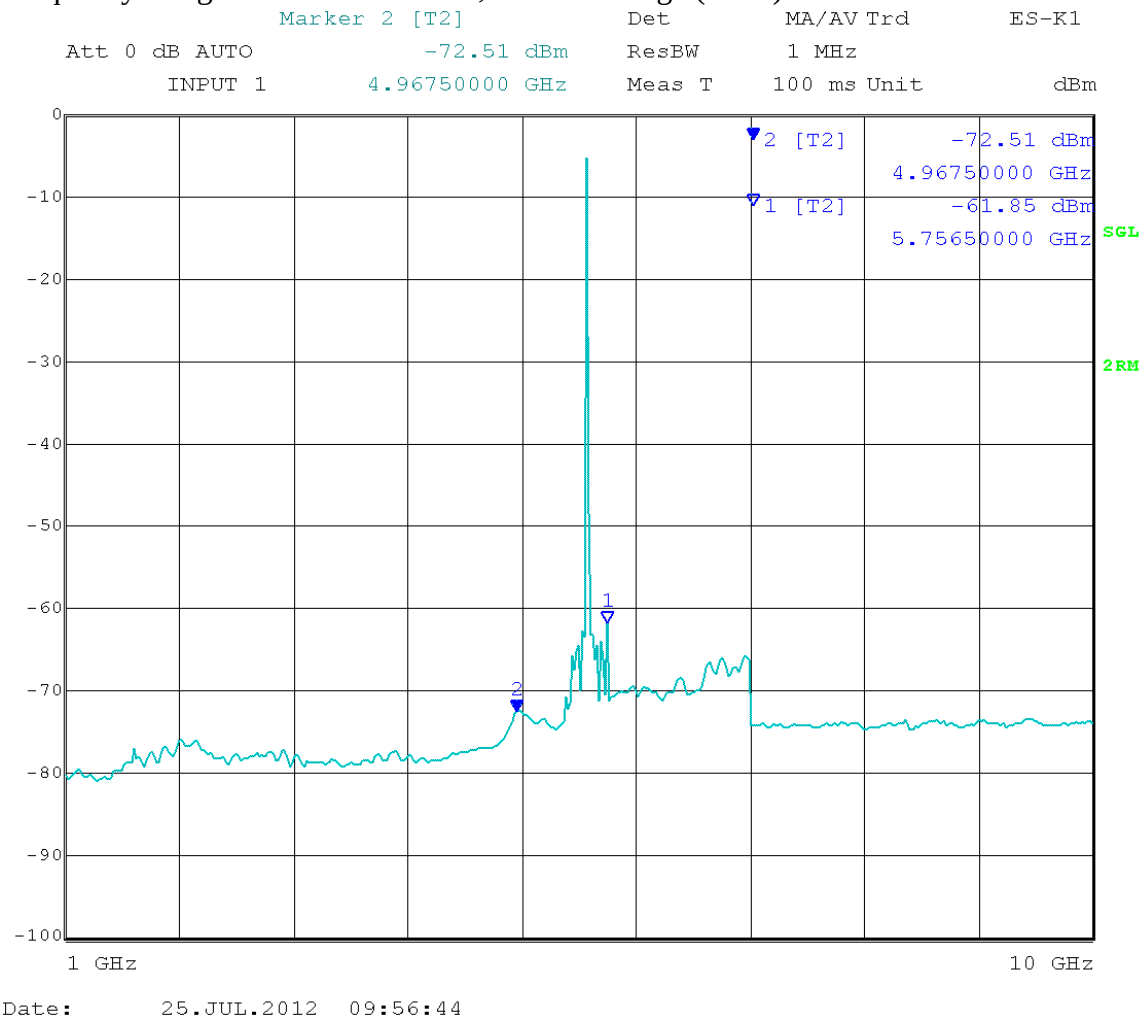
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 54	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Average (RMS) detector



Marker 2: Calculated Field Strength (Restricted Band) = -72.51 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 42.72 dBµV/m Average

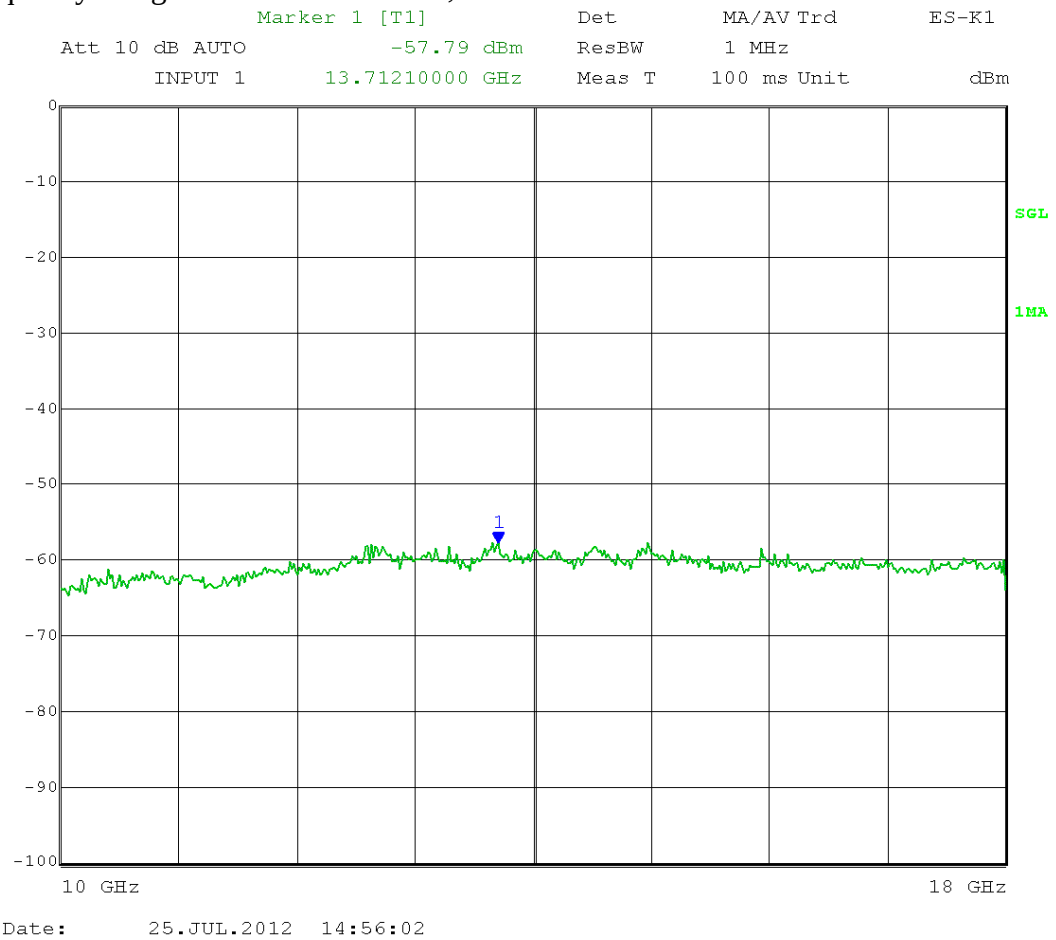
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 54	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Peak detector



Calculated EIRP at noise floor = -57.99 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -37.99 dBm
Calculated Field Strength at noise floor = -57.99 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 57.24 dBµV/m Peak

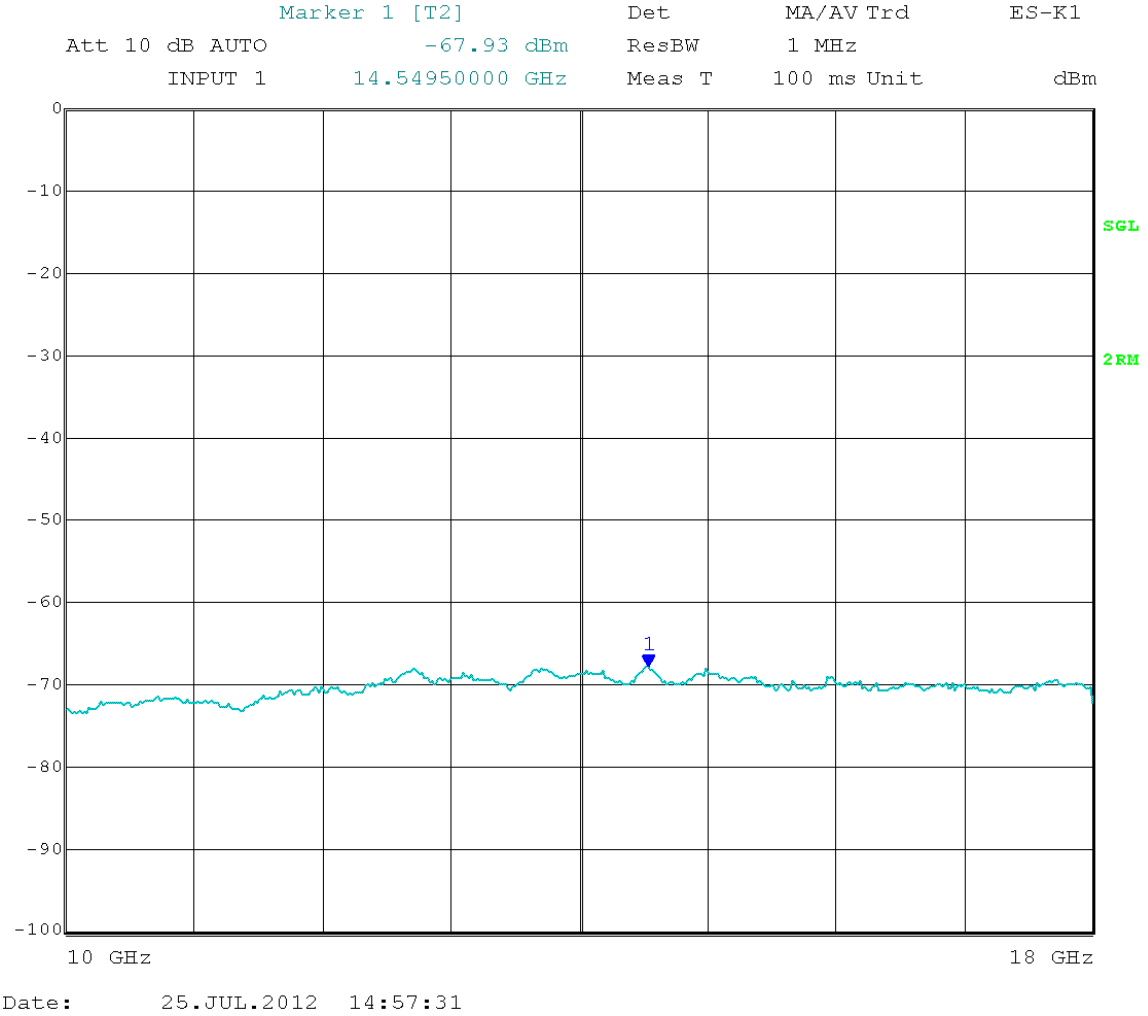
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 54	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -67.93 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 47.30 dBµV/m Average

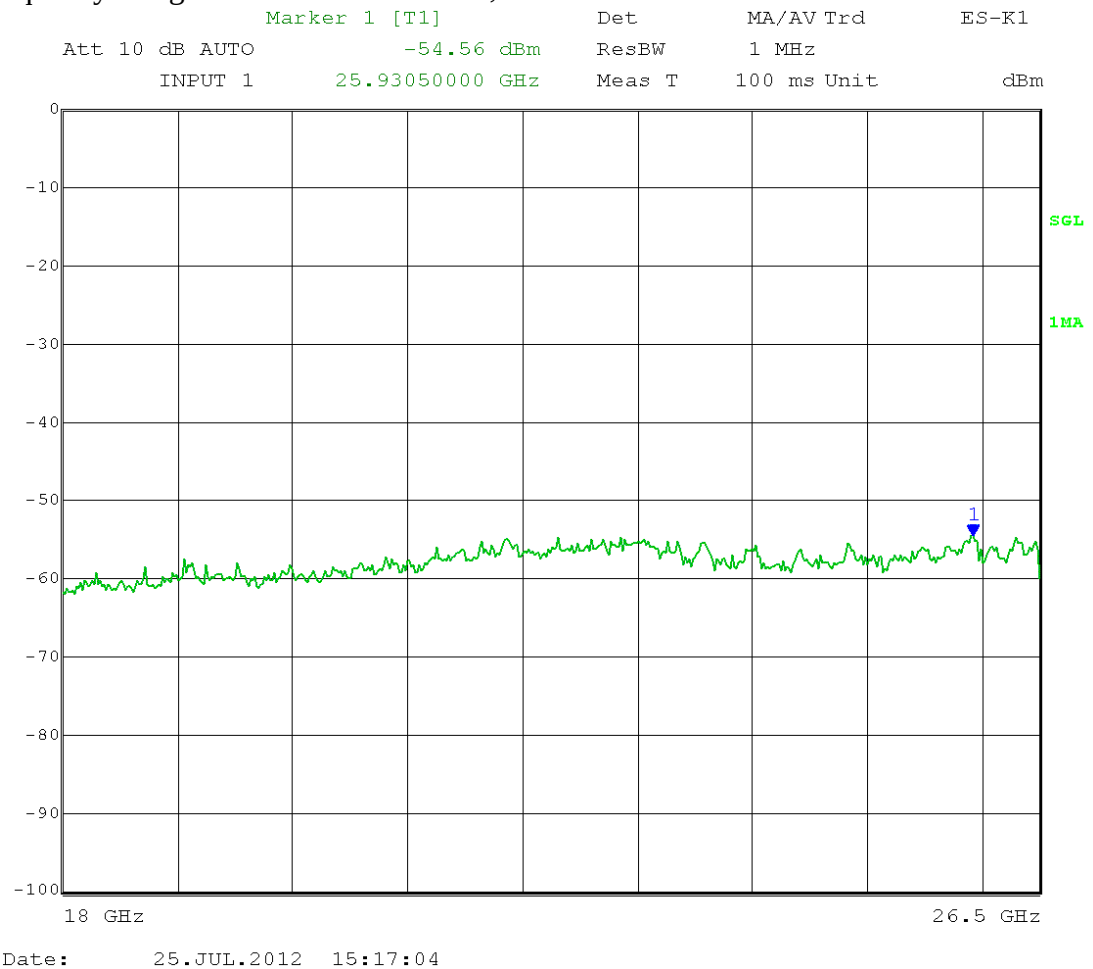
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 54	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Peak detector



Calculated EIRP at noise floor = -54.56 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -34.56 dBm
Calculated Field Strength at noise floor = -54.56 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 60.67 dBµV/m Peak

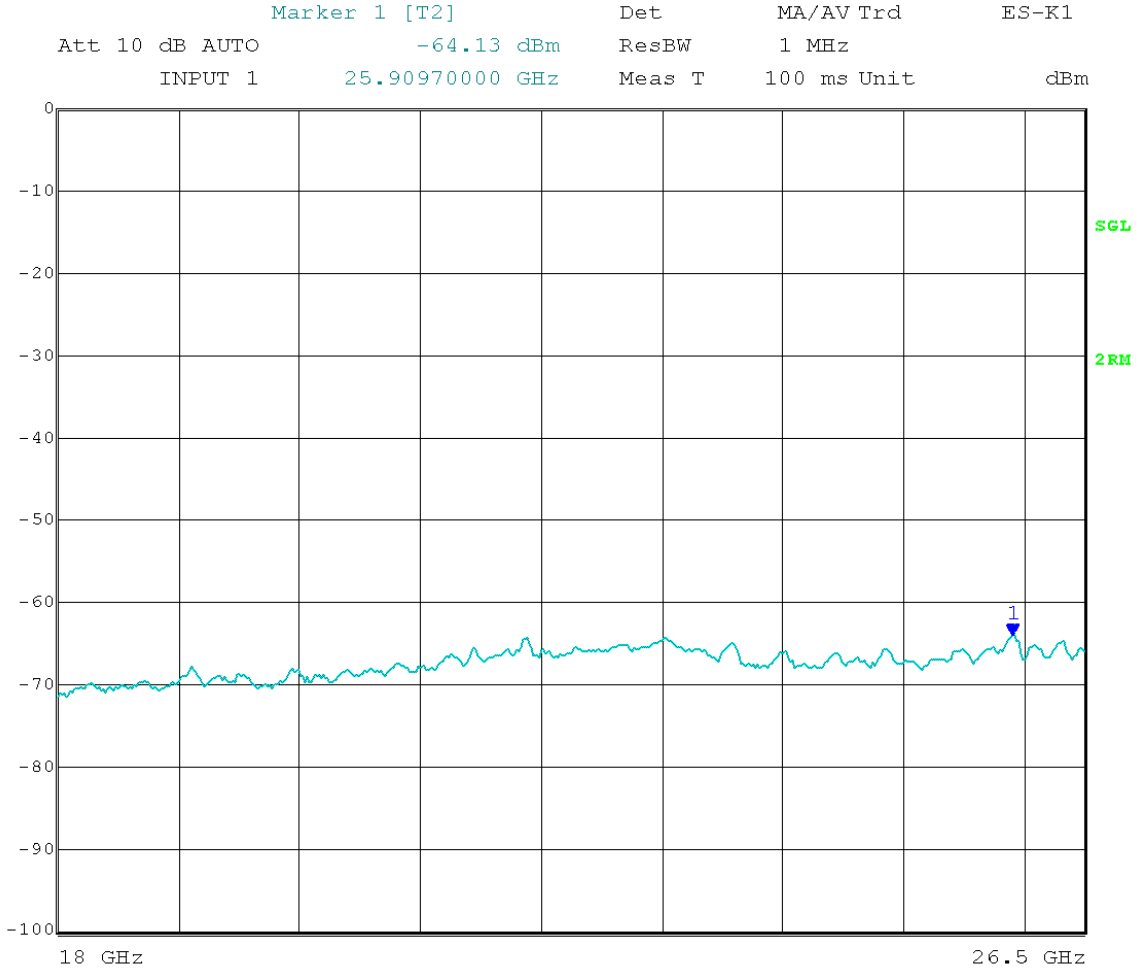
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 54	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -64.13 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 51.10 dBµV/m Average

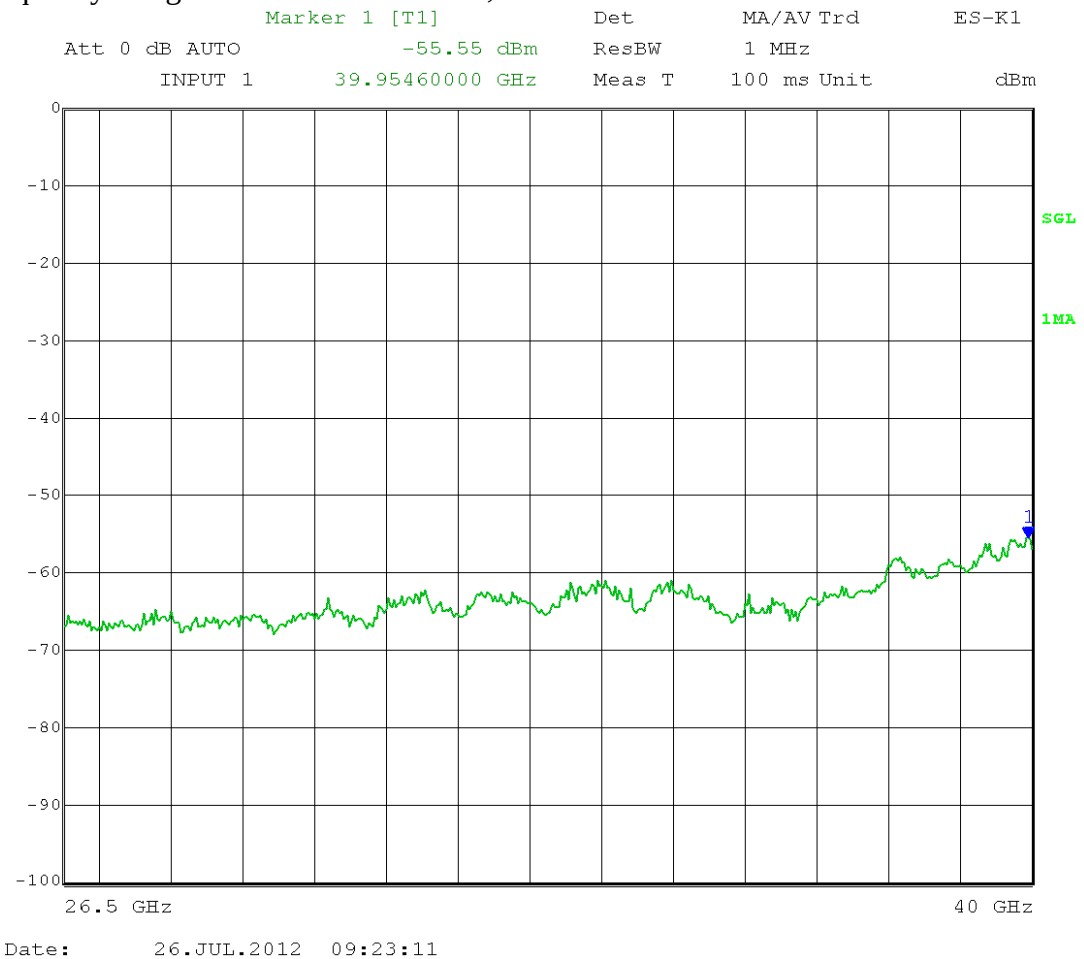
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 54	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Peak detector



Calculated EIRP at noise floor = -55.55 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -35.55 dBm
Calculated Field Strength at noise floor = -55.55 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 59.68 dBµV/m Peak

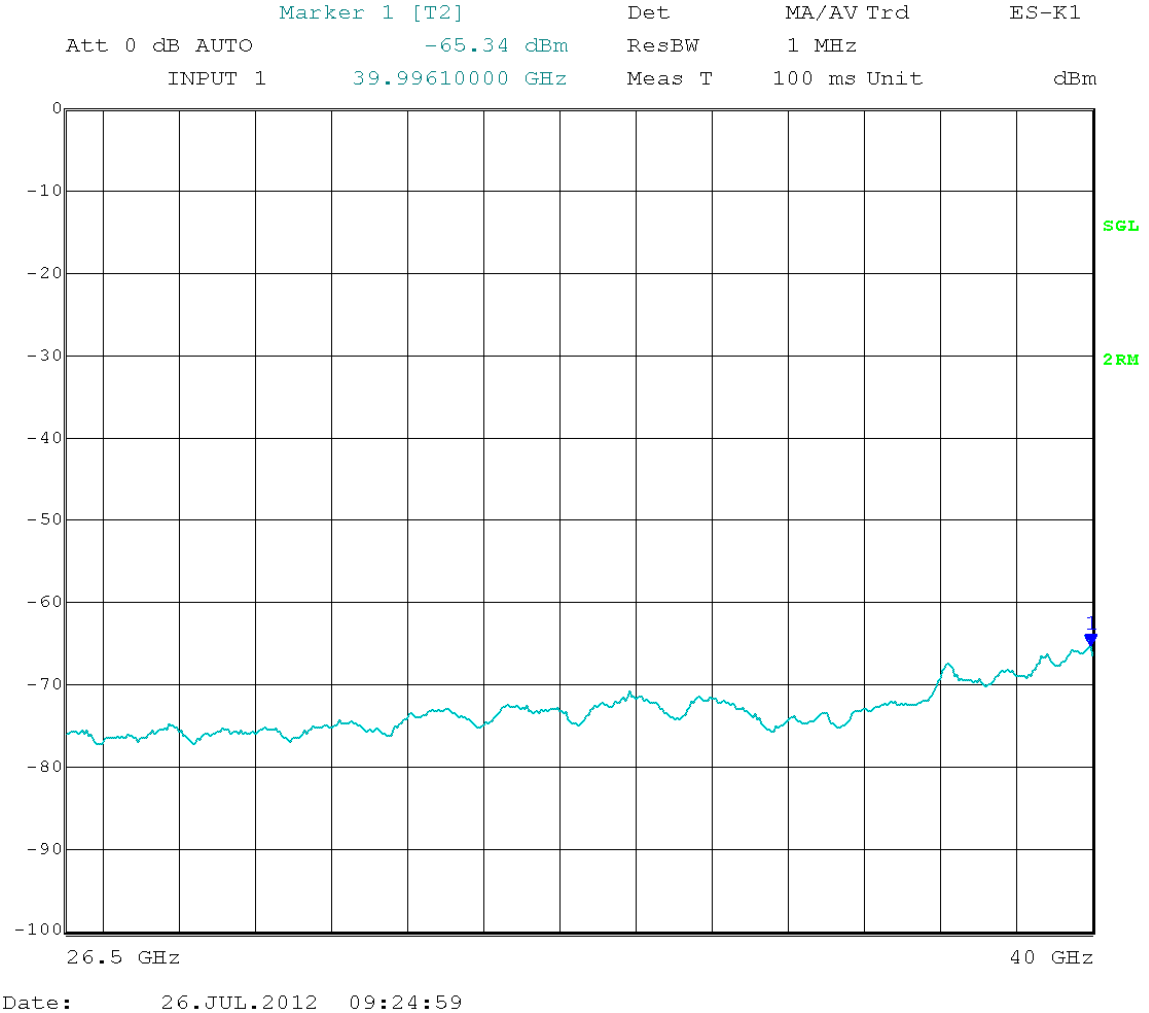
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 54	26 dB EBW: 9.72 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -65.34 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 49.89 dBµV/m Average

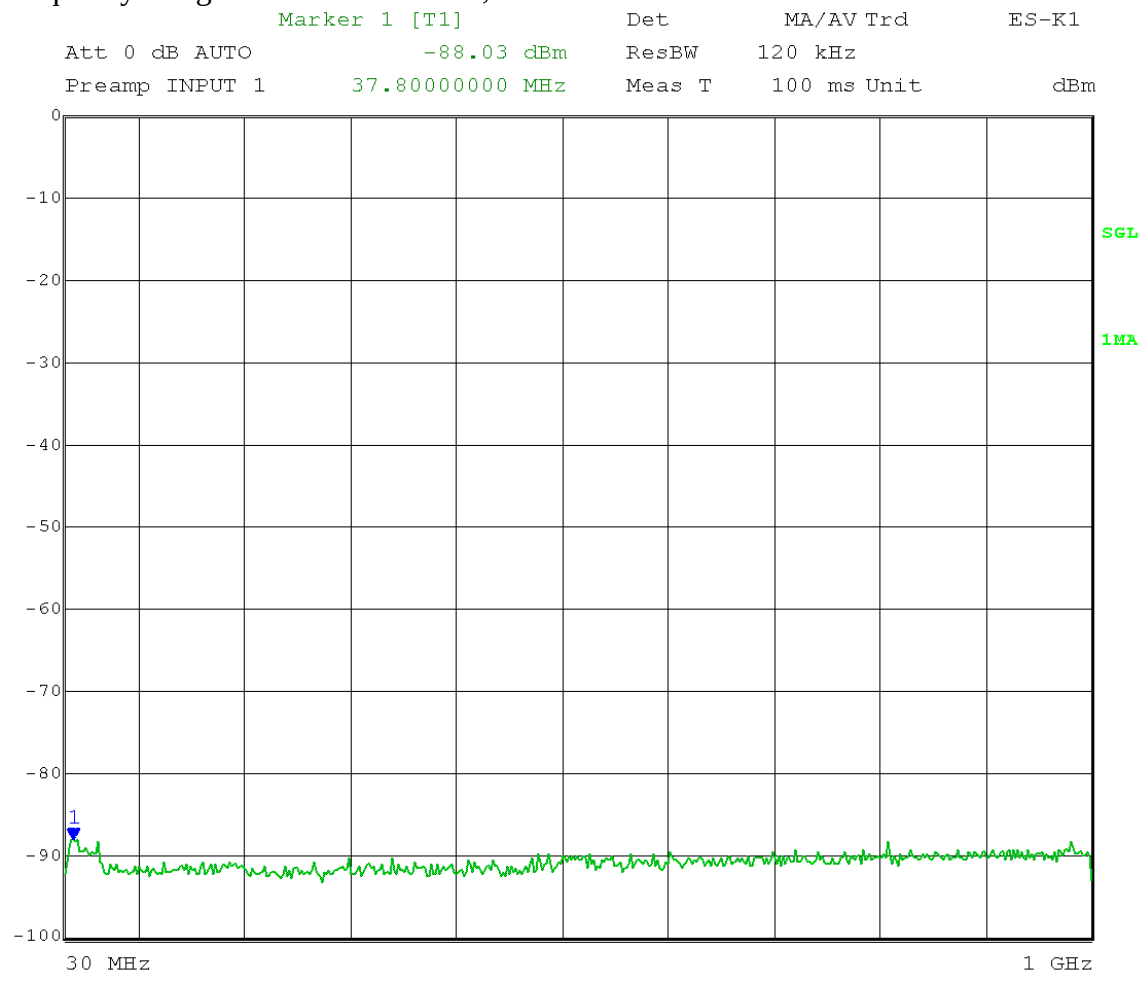
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 51	26 dB EBW: 9.72 MHz
Output port:	Channel A;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 30 MHz to 1 GHz; Peak detector



No emissions found from 30 MHz to 1 GHz

Calculated Field Strength at noise floor = -88.03 dBm + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 + 4.7 dB = 31.90 dBµV/m Peak

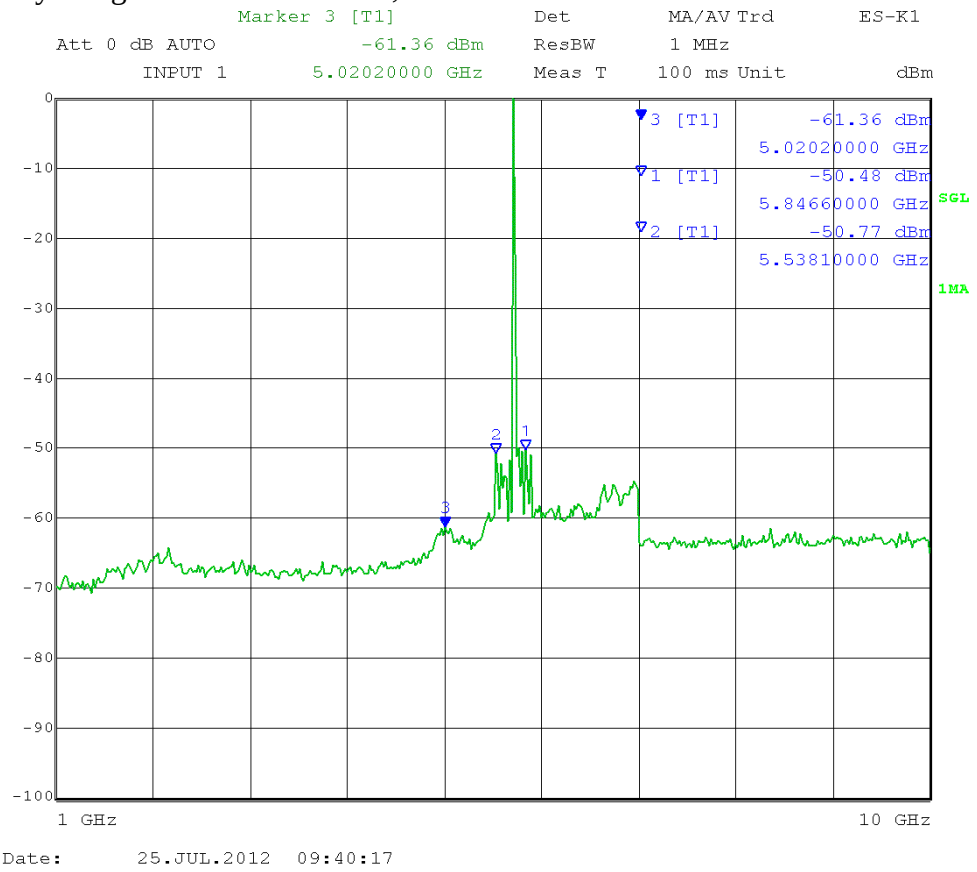
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 51	26 dB EBW: 9.72 MHz
Output port:	Channel A;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Peak detector



Marker 1: Calculated EIRP = -50.48 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -30.48 dBm
Marker 2: Calculated EIRP = -50.77 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -30.77 dBm
Marker 3: Calculated Field Strength (Restricted Band) = -61.36 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 53.87 dBµV/m Peak

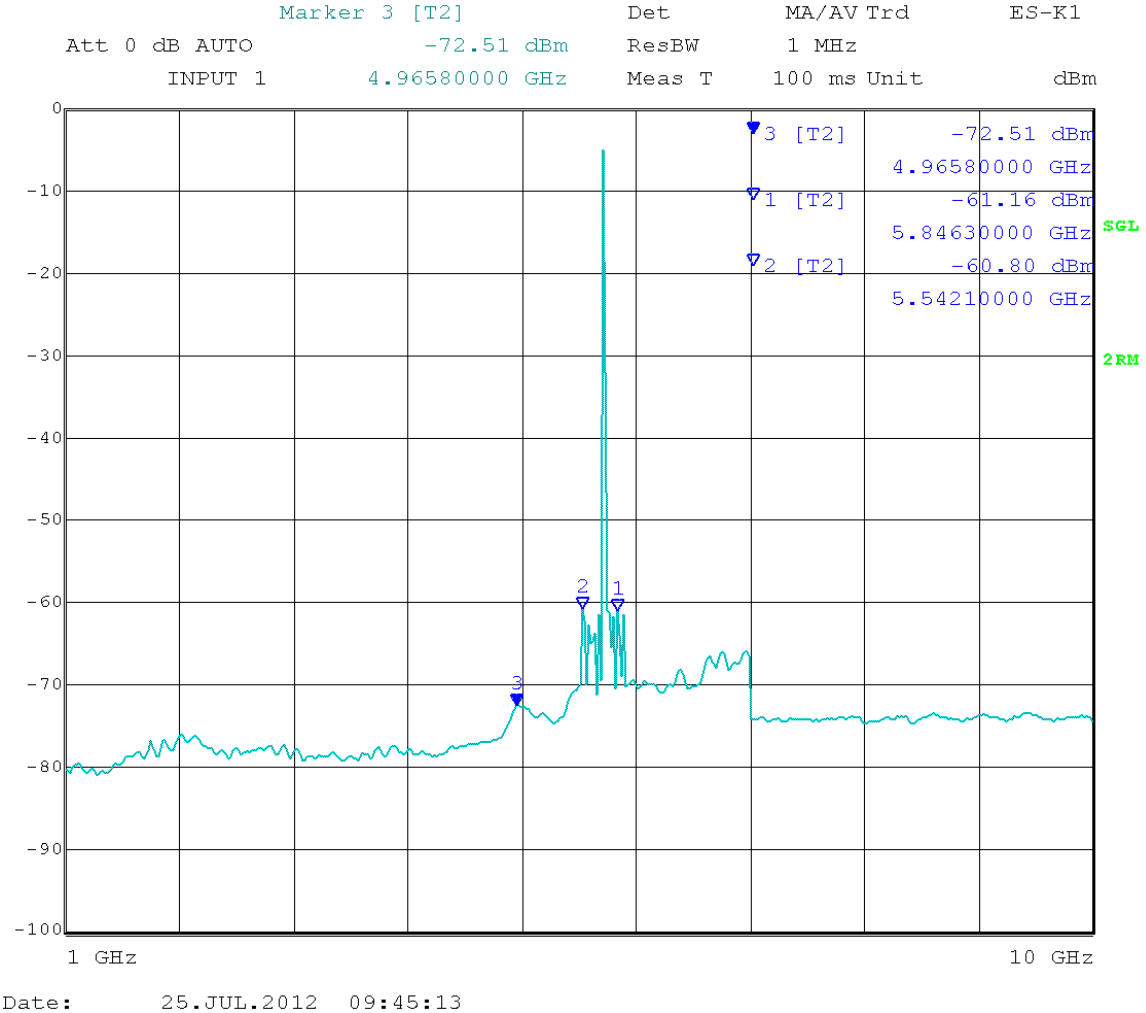
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 51	26 dB EBW: 9.72 MHz
Output port:	Channel A;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Average (RMS) detector



Marker 3: Calculated Field Strength (Restricted Band) = -72.51 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 42.72 dBµV/m Average

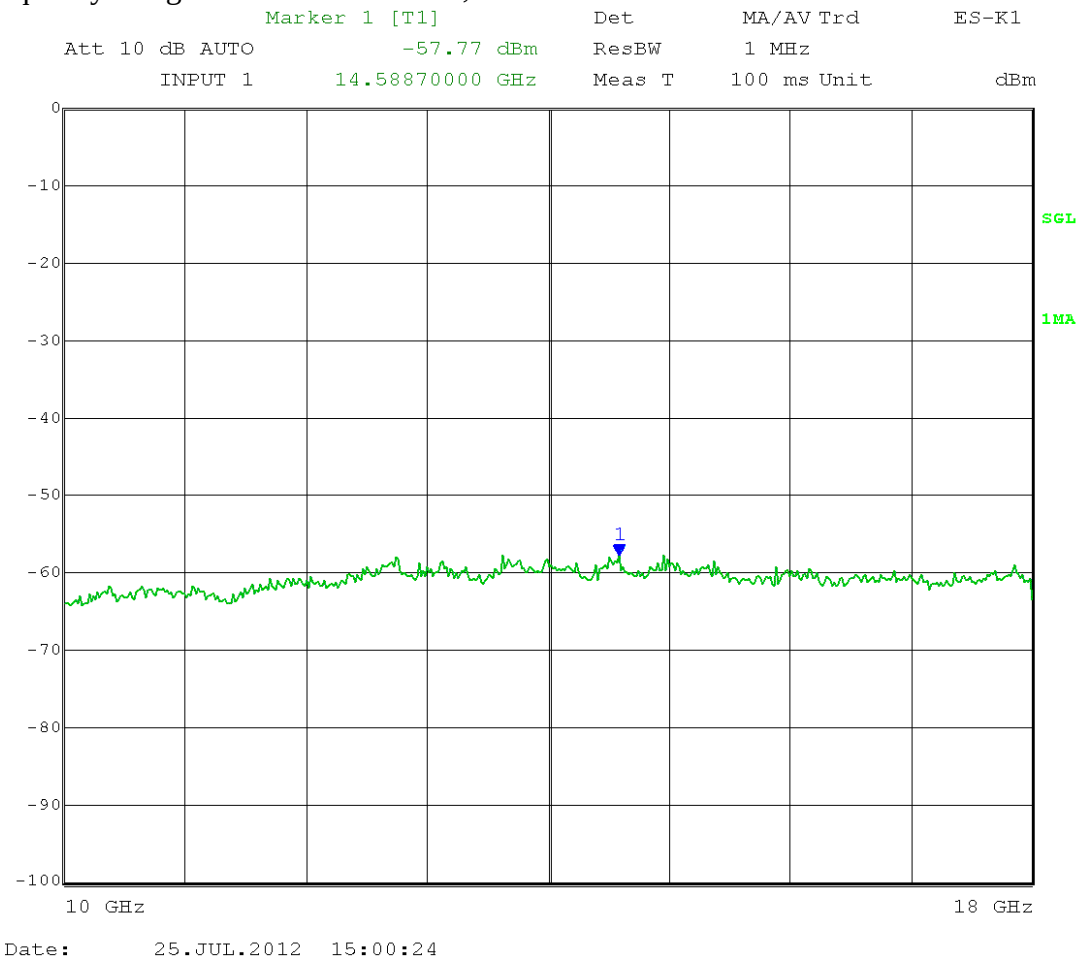
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 51	26 dB EBW: 9.72 MHz
Output port:	Channel A;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Peak detector



Calculated EIRP at noise floor = -57.77 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -37.77 dBm
Calculated Field Strength at noise floor = -57.77 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 57.46 dBµV/m Peak

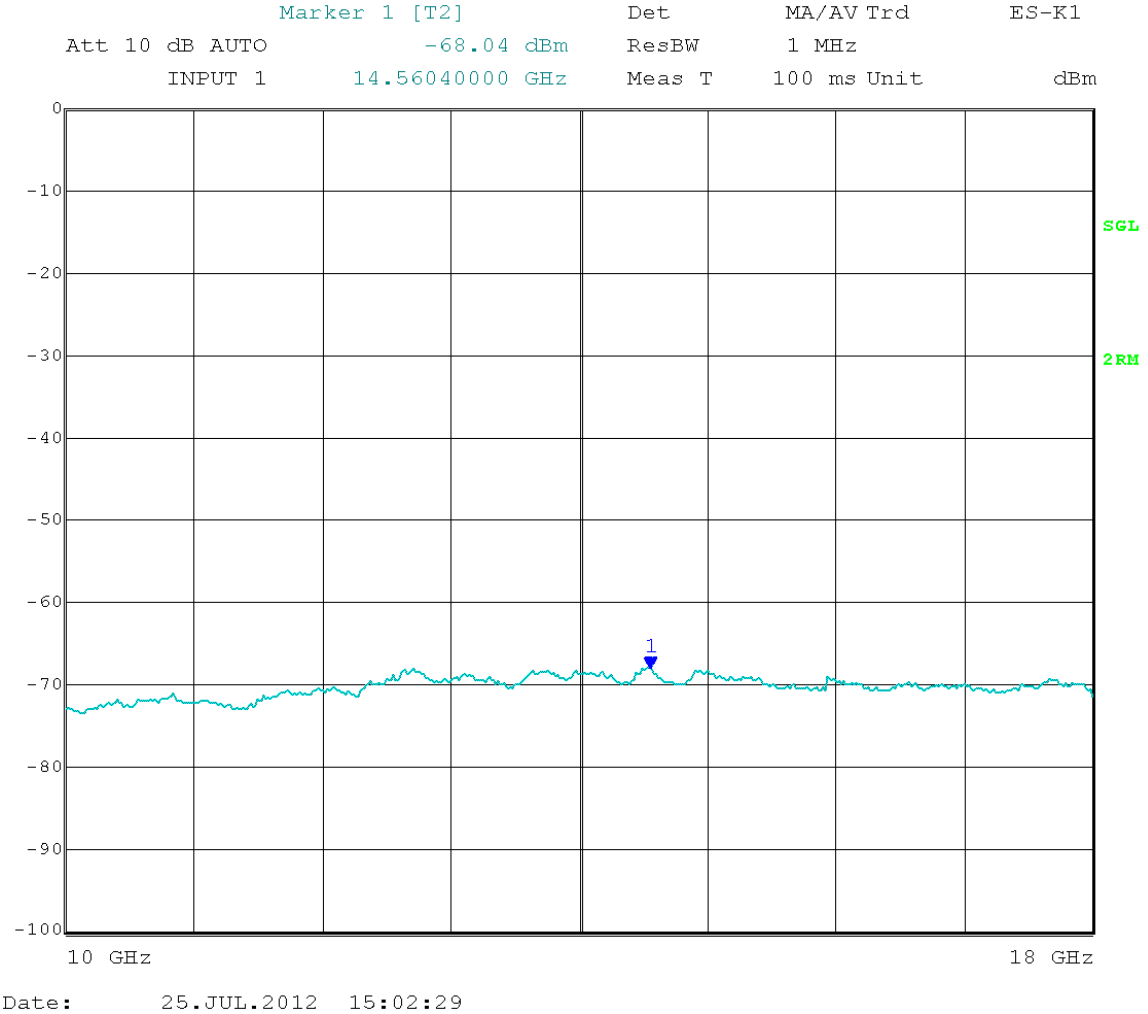
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 51	26 dB EBW: 9.72 MHz
Output port:	Channel A;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -68.04 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 47.19 dBµV/m Average

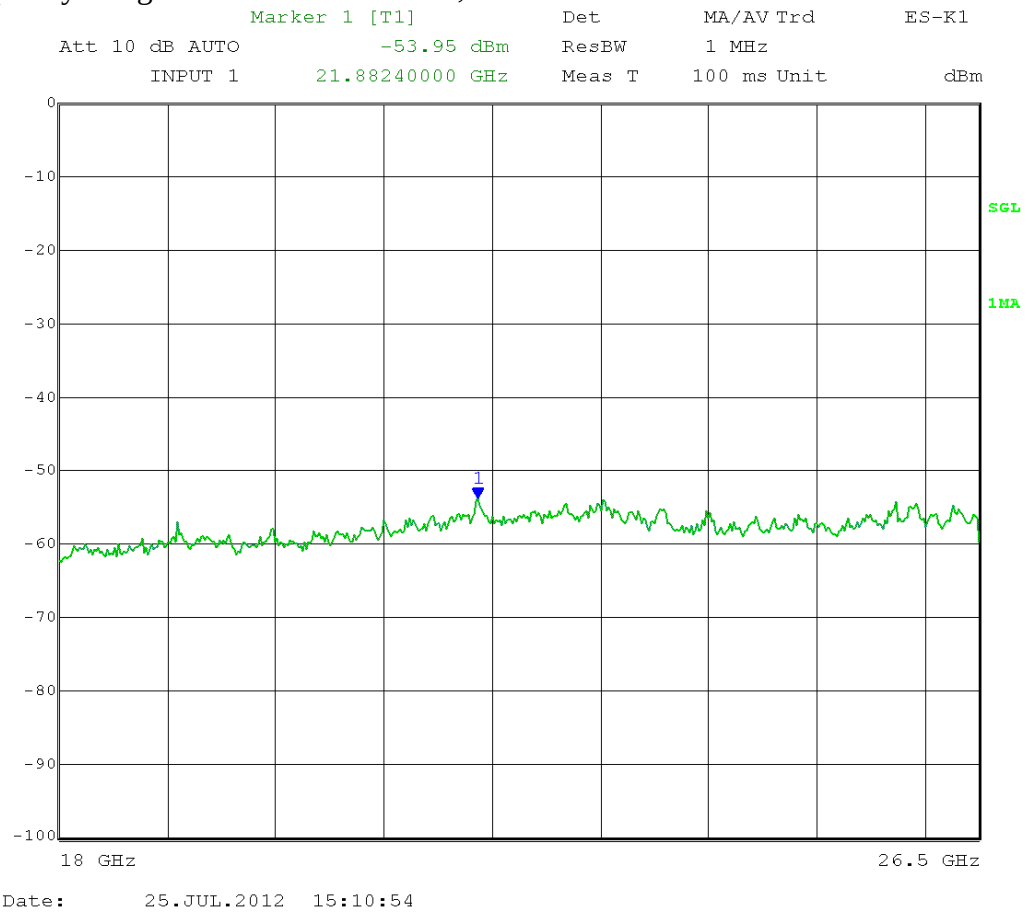
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 51	26 dB EBW: 9.72 MHz
Output port:	Channel A;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Peak detector



Calculated EIRP at noise floor = -53.95 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -33.95 dBm
Calculated Field Strength at noise floor = -53.95 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 61.28 dBµV/m Peak

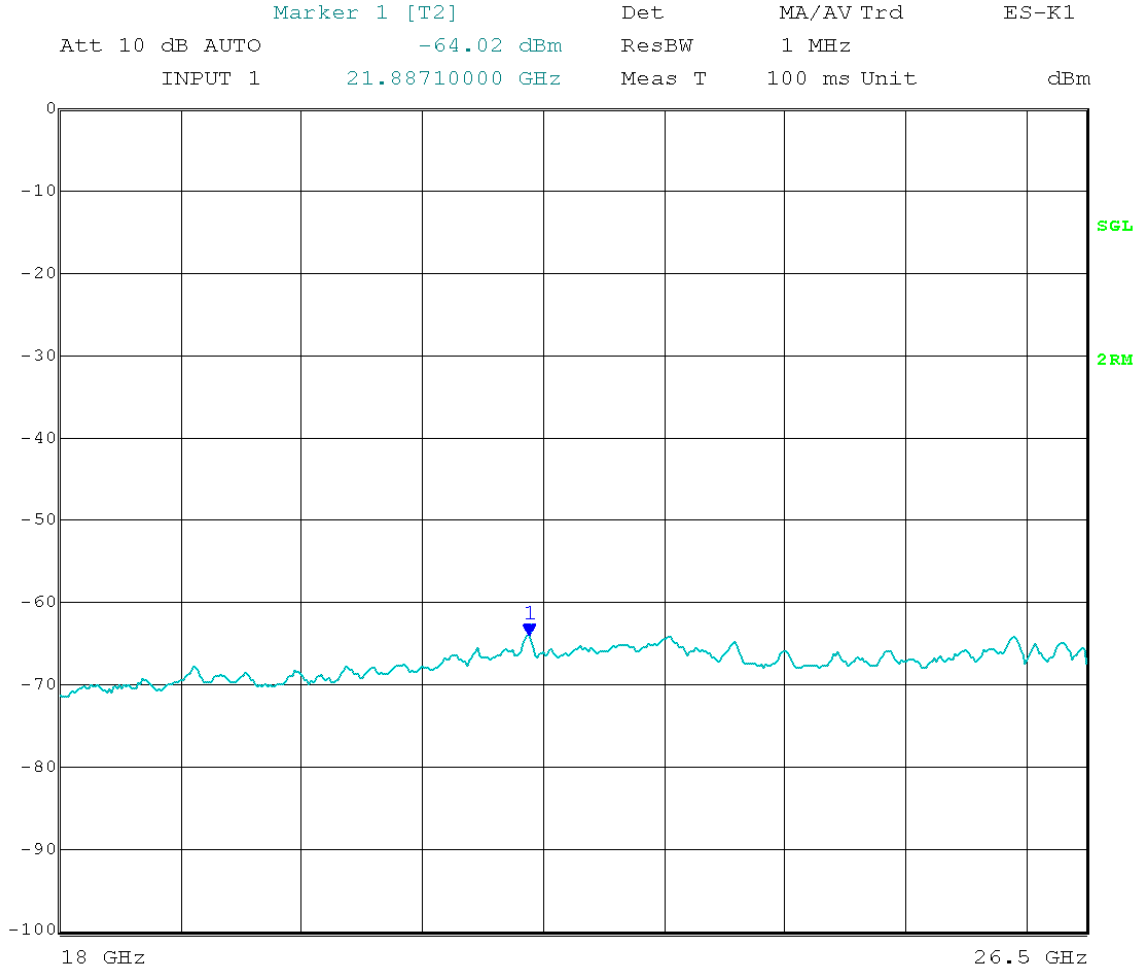
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 51	26 dB EBW: 9.72 MHz
Output port:	Channel A;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -64.02 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 51.21 dBµV/m Average

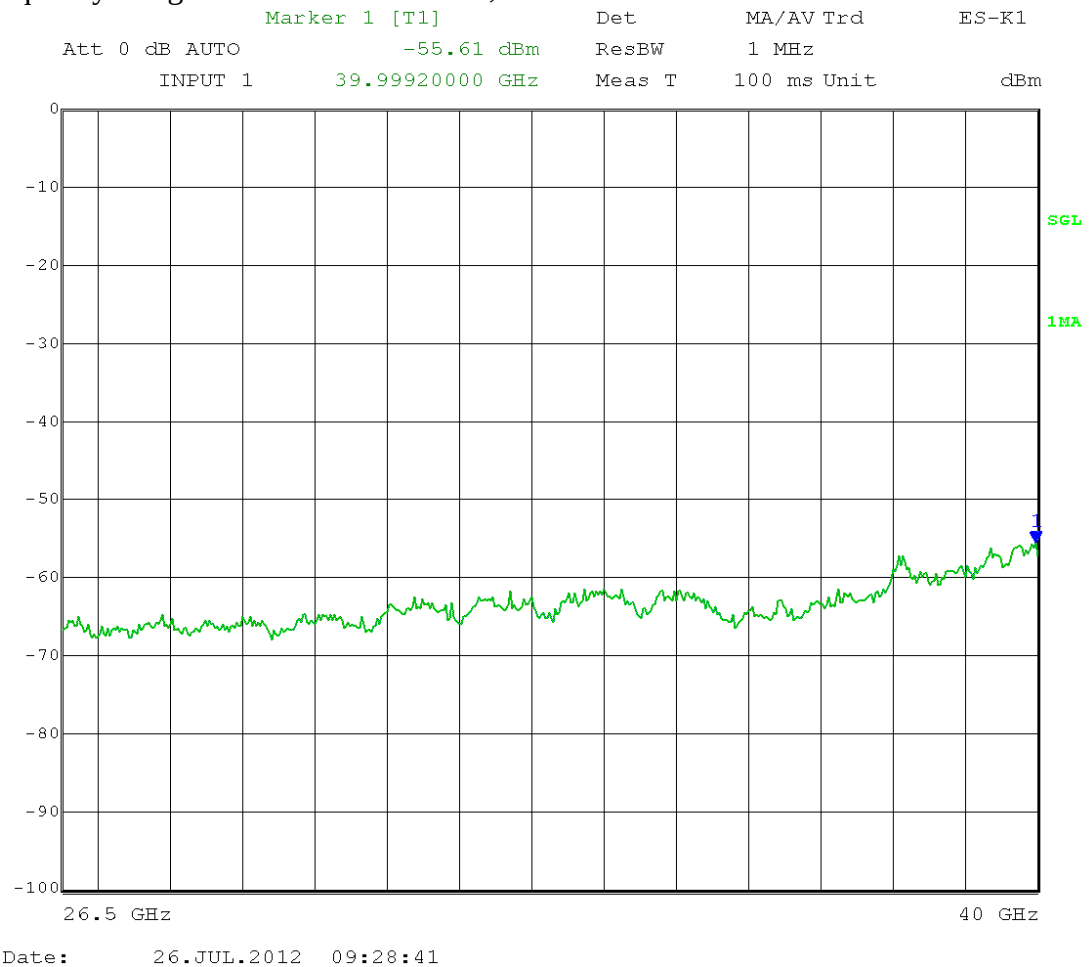
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 51	26 dB EBW: 9.72 MHz
Output port:	Channel A;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Peak detector



Calculated EIRP at noise floor = -55.61 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -35.61 dBm
Calculated Field Strength at noise floor = -55.61 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 59.62 dBµV/m Peak

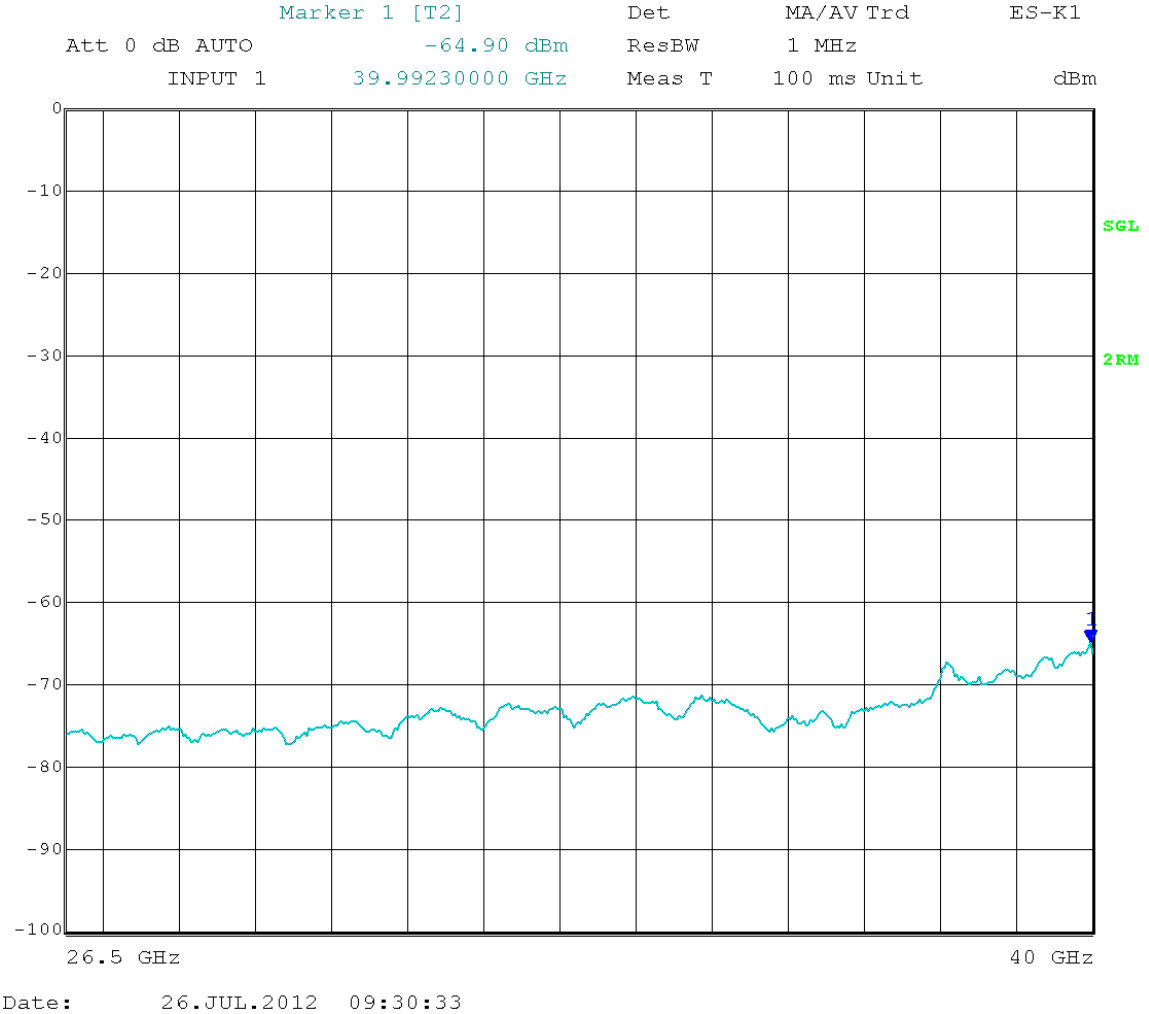
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 51	26 dB EBW: 9.72 MHz
Output port:	Channel A;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -64.90 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 50.33 dBµV/m Average

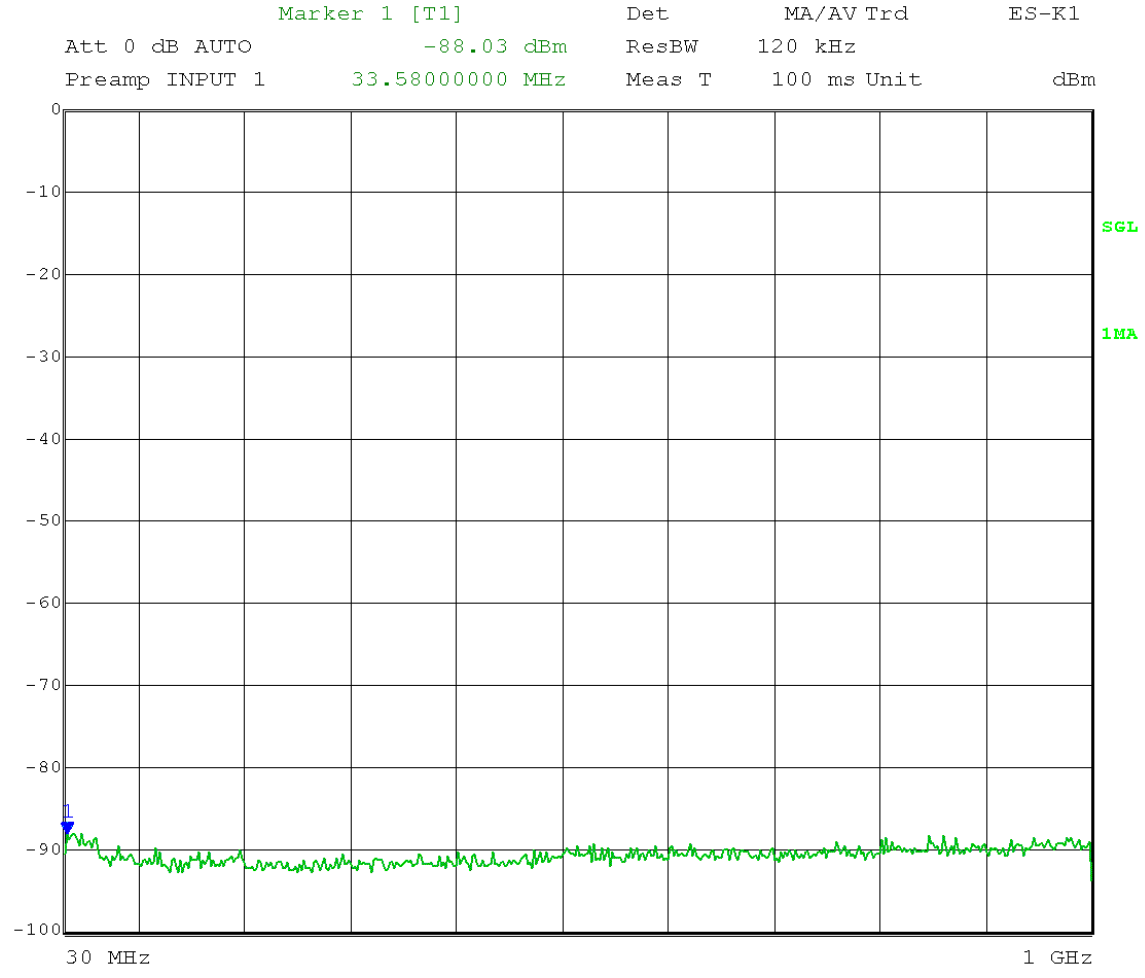
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 50	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 30 MHz to 1 GHz; Peak detector



Date: 25.JUL.2012 10:56:51

No emissions found from 30 MHz to 1 GHz

Calculated Field Strength at noise floor = -88.03 dBm + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 + 4.7 dB = 31.90 dBµV/m Peak

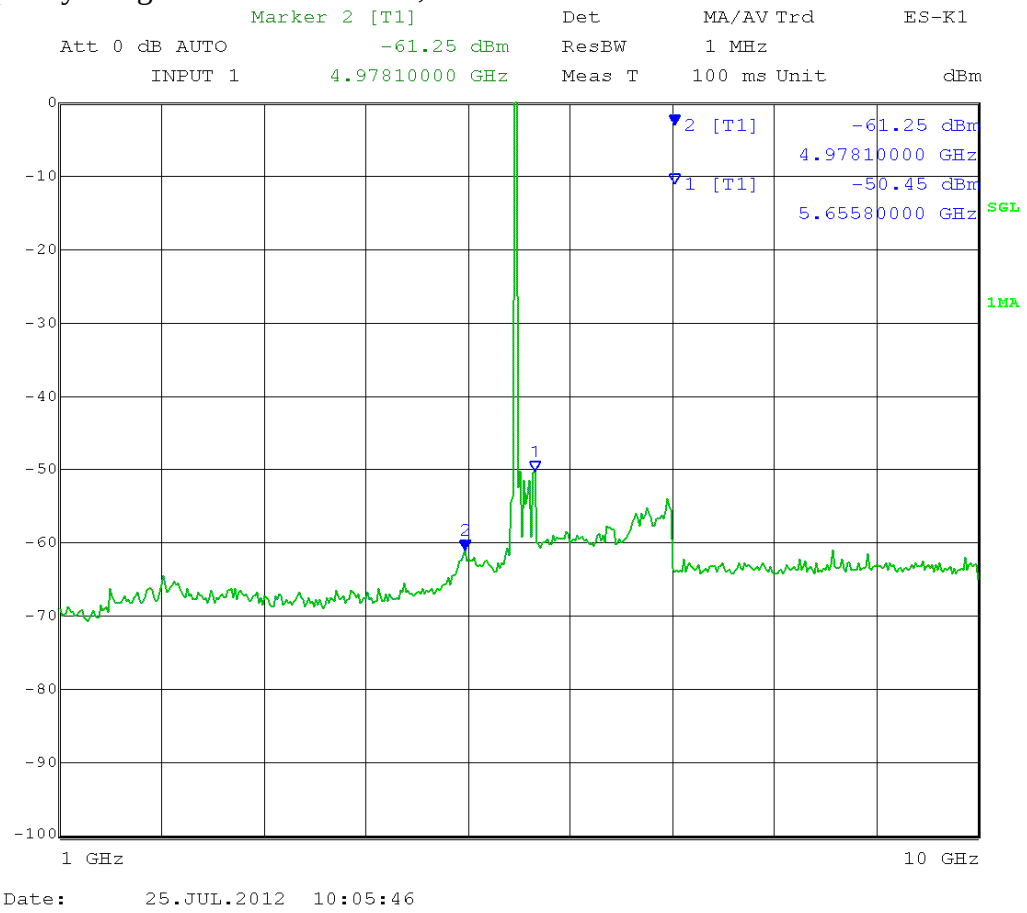
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 50	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Peak detector



Marker 1: Calculated EIRP = -50.45 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -30.45 dBm
Marker 2: Calculated Field Strength (Restricted Band) = -61.25 + 17 dBi antenna gain
+ 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 53.98 dBµV/m Peak

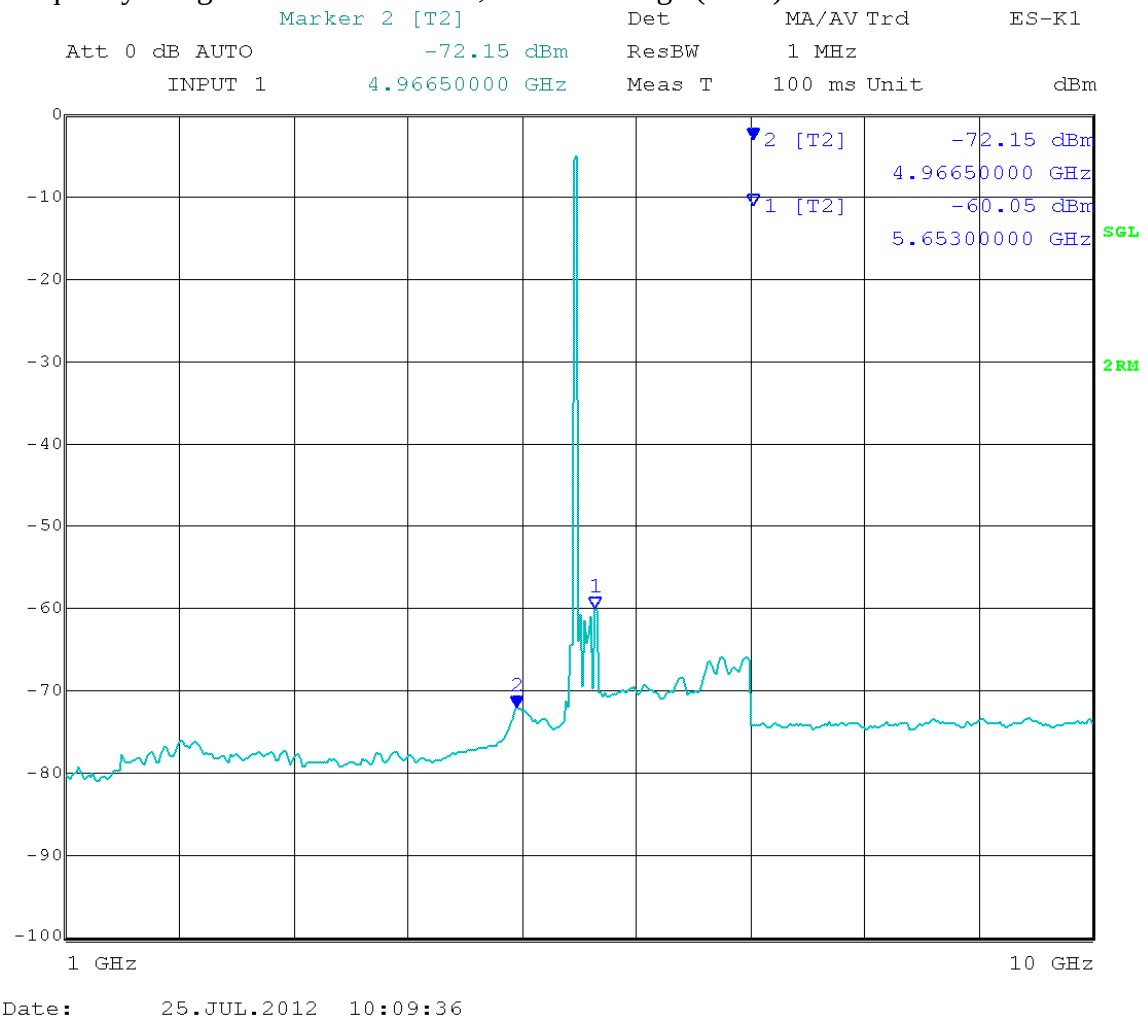
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 50	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Average (RMS) detector



Marker 2: Calculated Field Strength (Restricted Band) = -72.15 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 43.08 dBµV/m Average

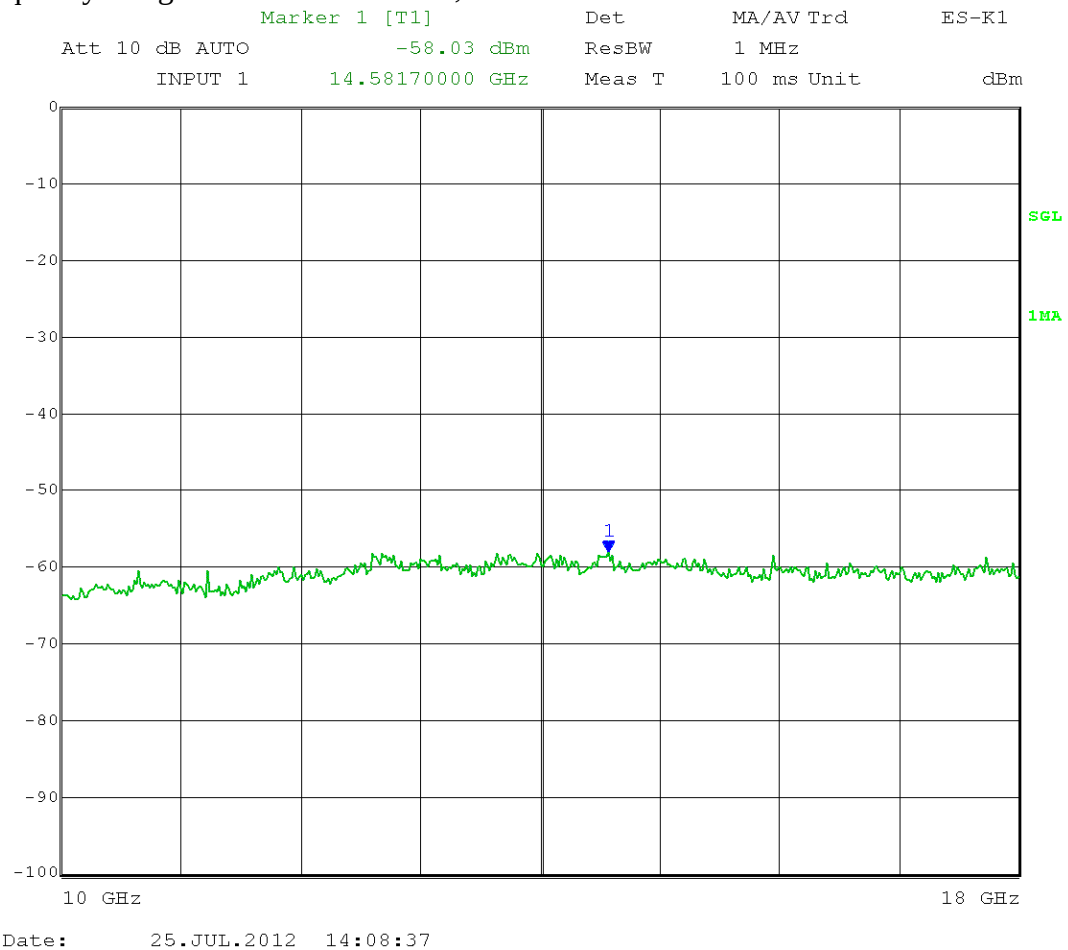
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 50	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Peak detector



Calculated EIRP at noise floor = -58.03 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -38.03 dBm
Calculated Field Strength at noise floor = -58.03 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 57.20 dBµV/m Peak

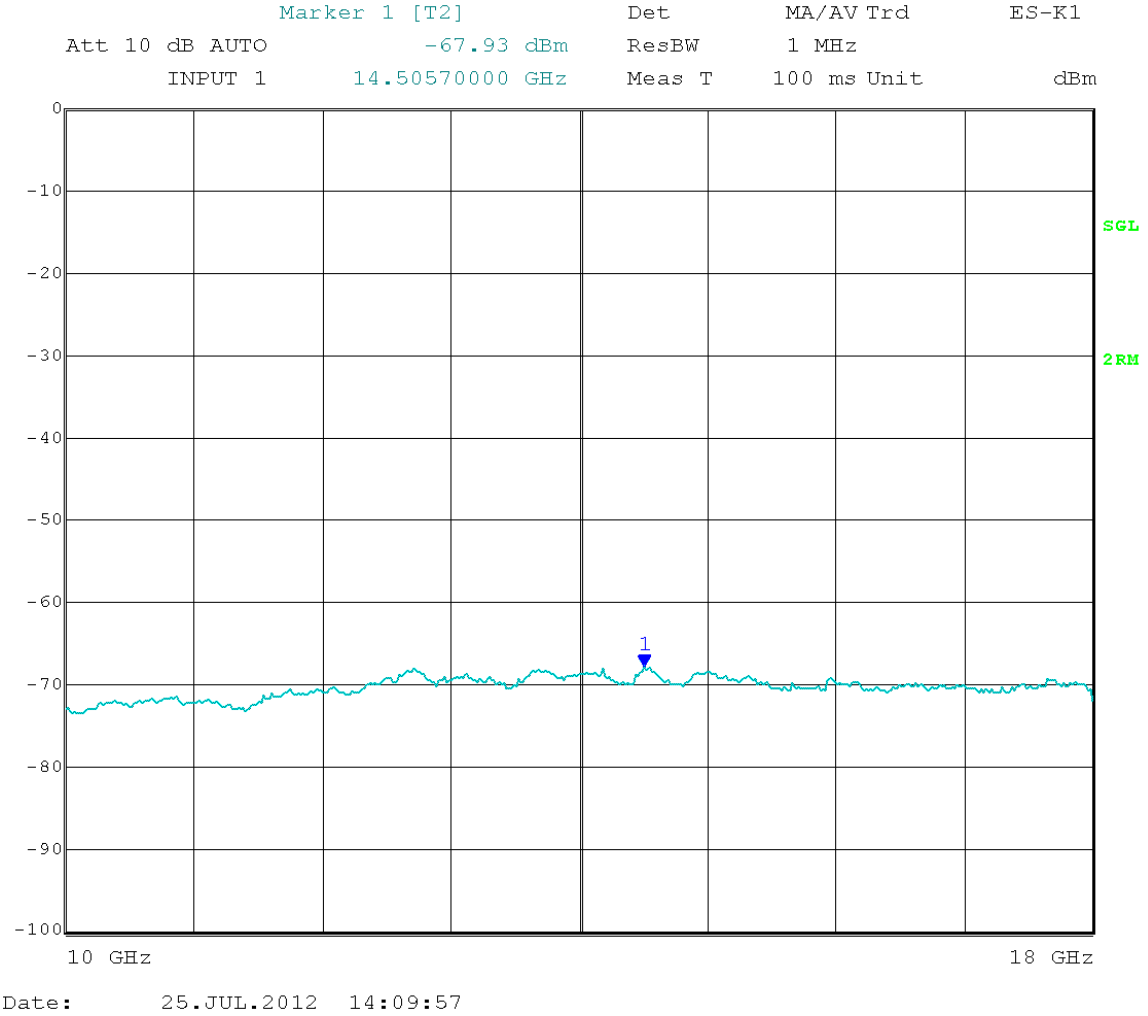
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 50	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -67.93 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 47.30 dBµV/m Average

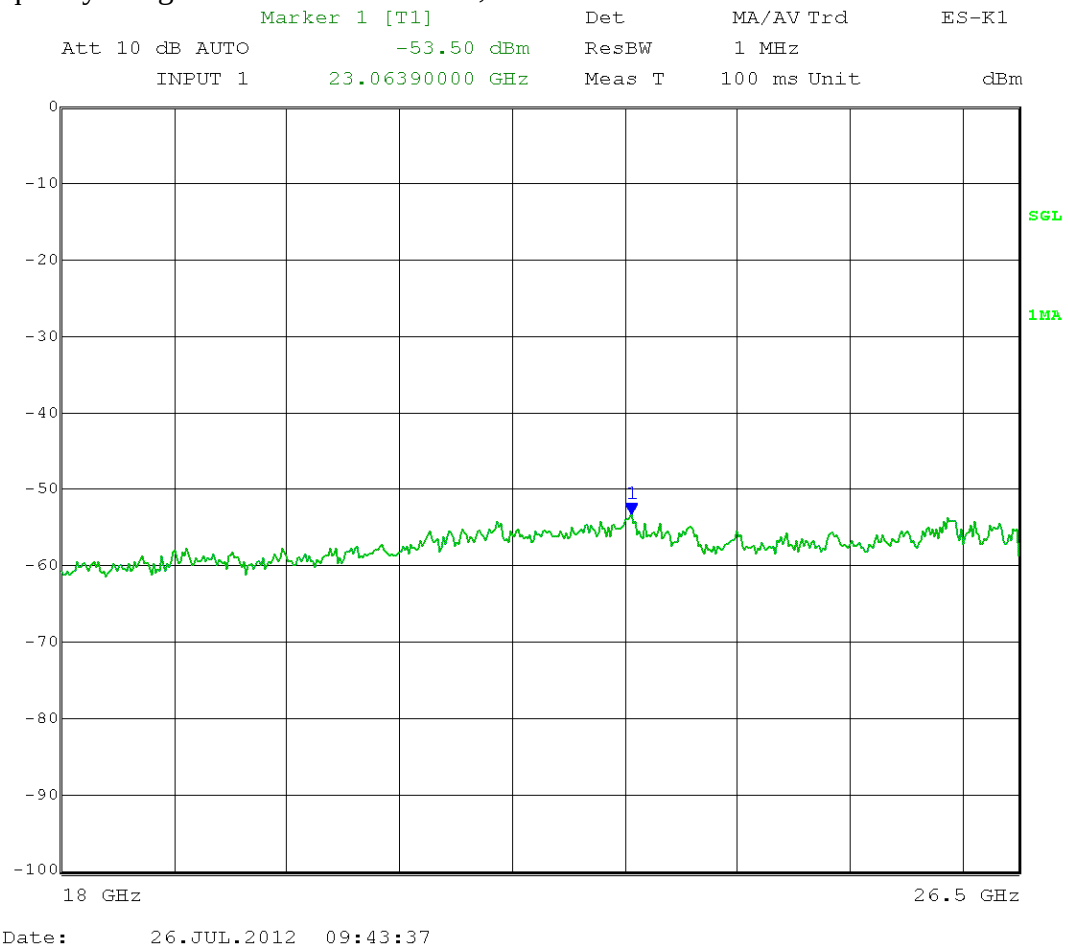
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 50	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Peak detector



Calculated EIRP at noise floor = -53.50 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -33.50 dBm
Calculated Field Strength at noise floor = -53.50 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 61.73 dBµV/m Peak

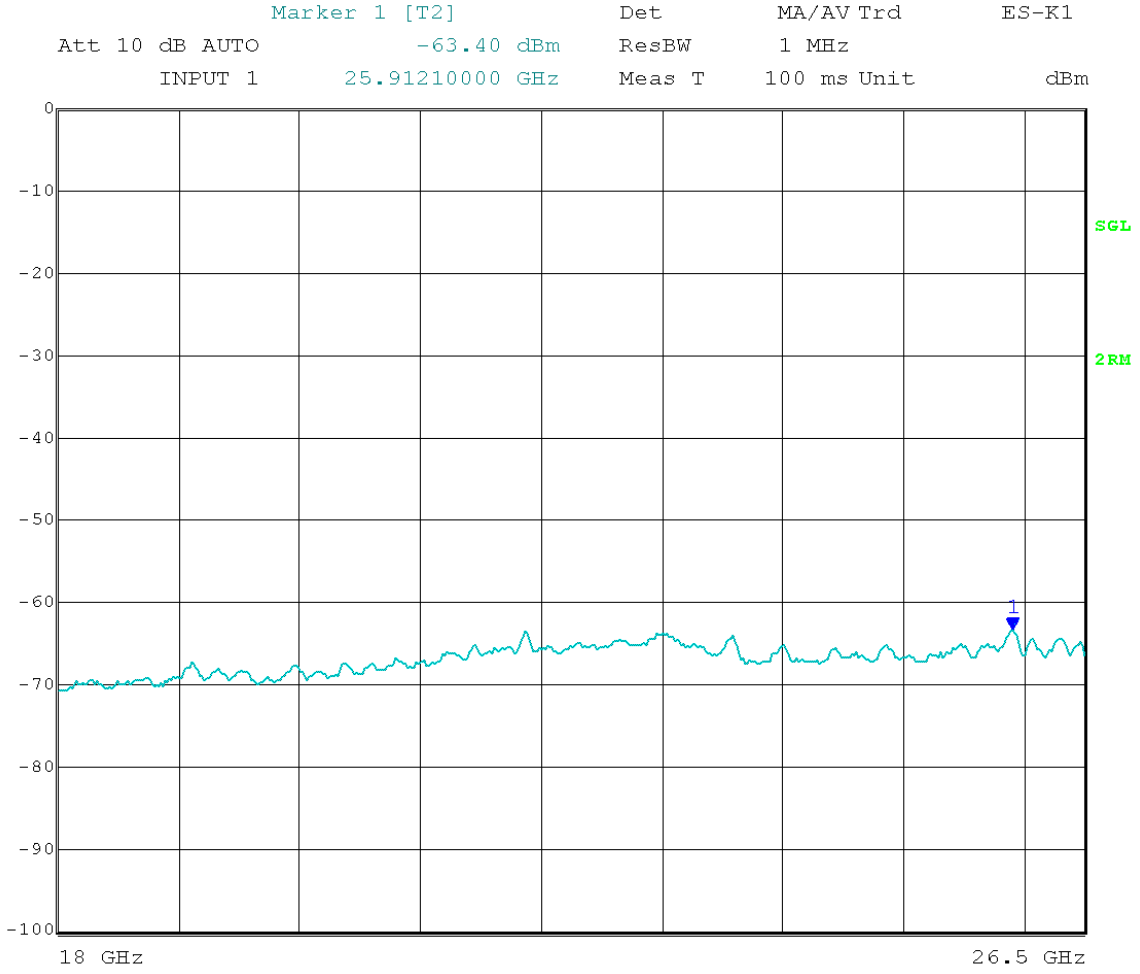
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 50	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -63.40 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 51.83 dBµV/m Average

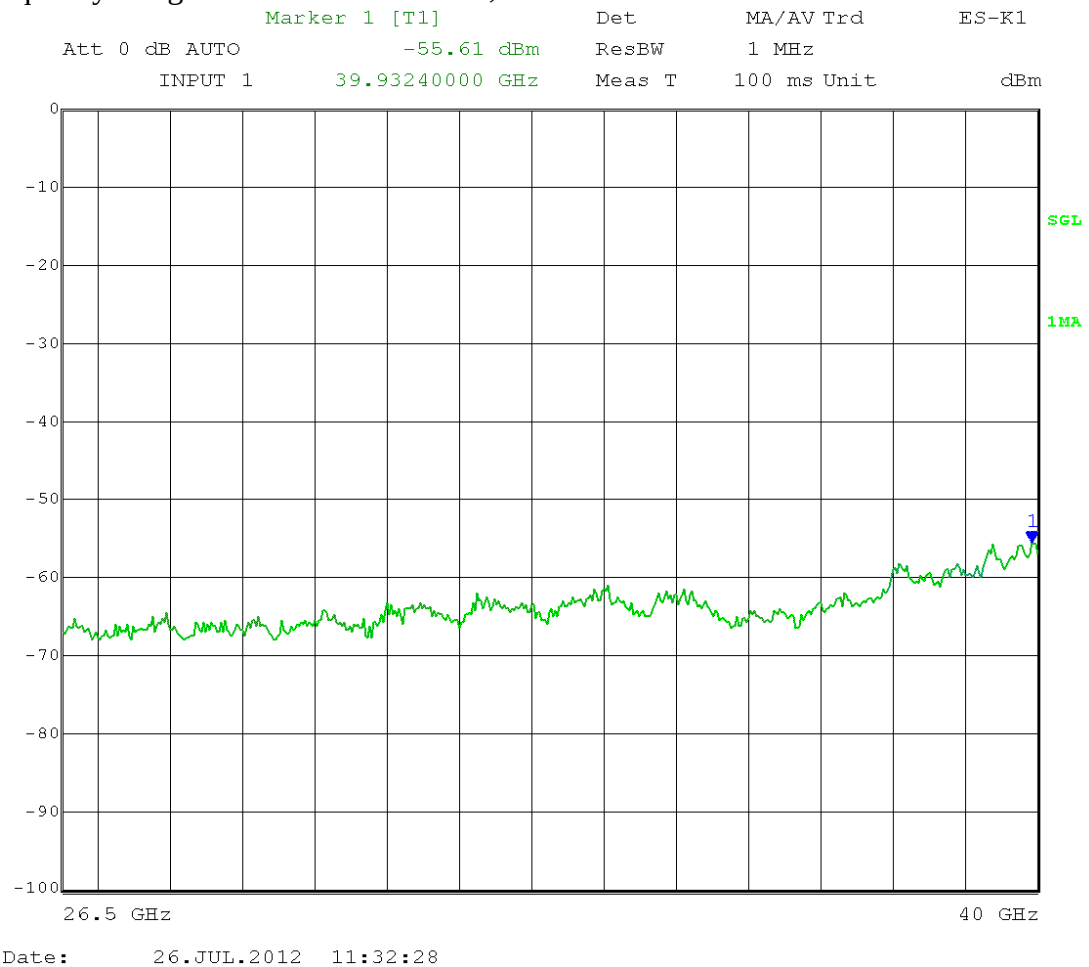
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 50	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Peak detector



Calculated EIRP at noise floor = -55.61 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -35.61 dBm
Calculated Field Strength at noise floor = -55.61 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 59.62 dBµV/m Peak

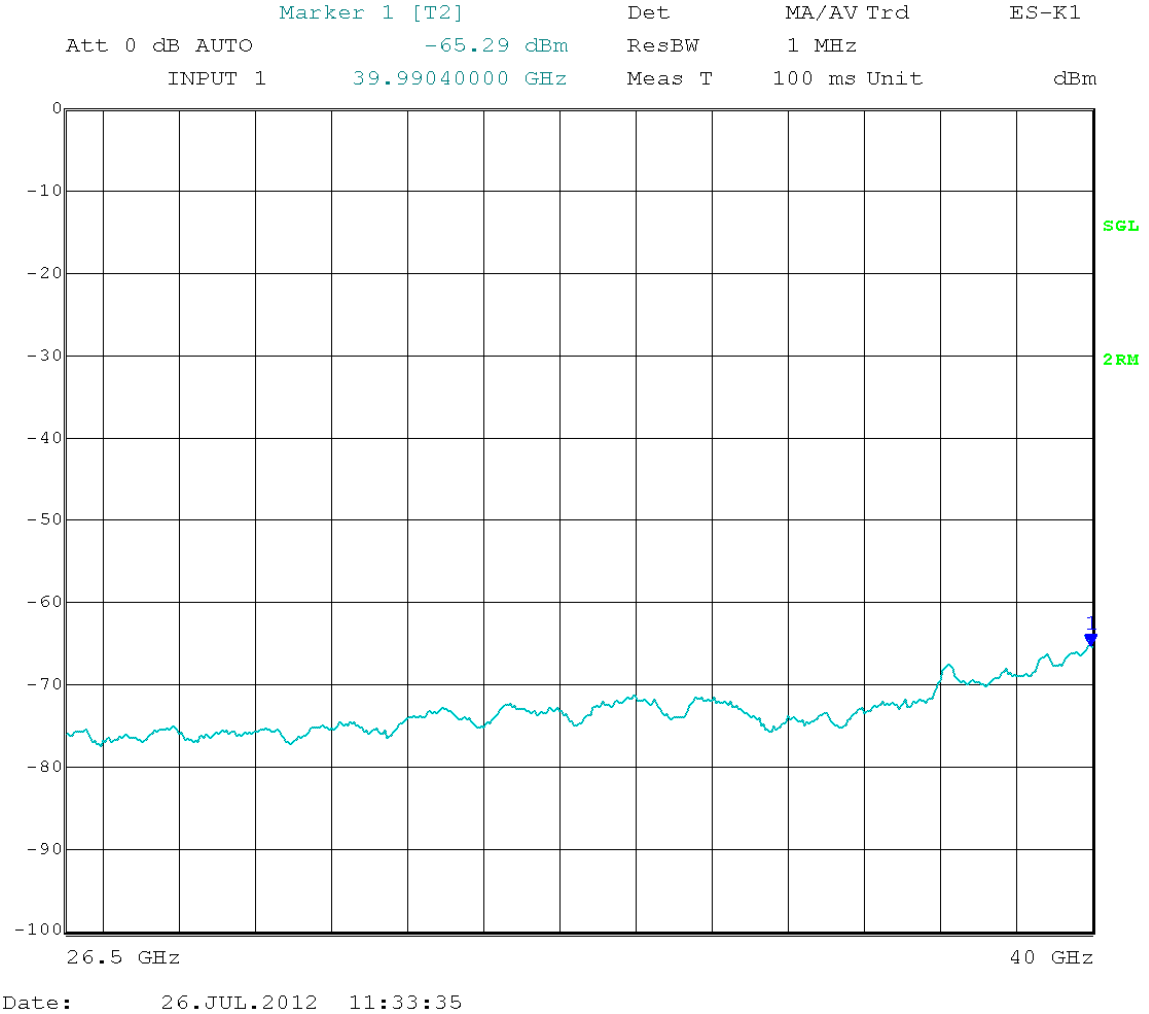
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 50	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Low Channel Frequency:	5.475 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -65.29 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 49.94 dBµV/m Average

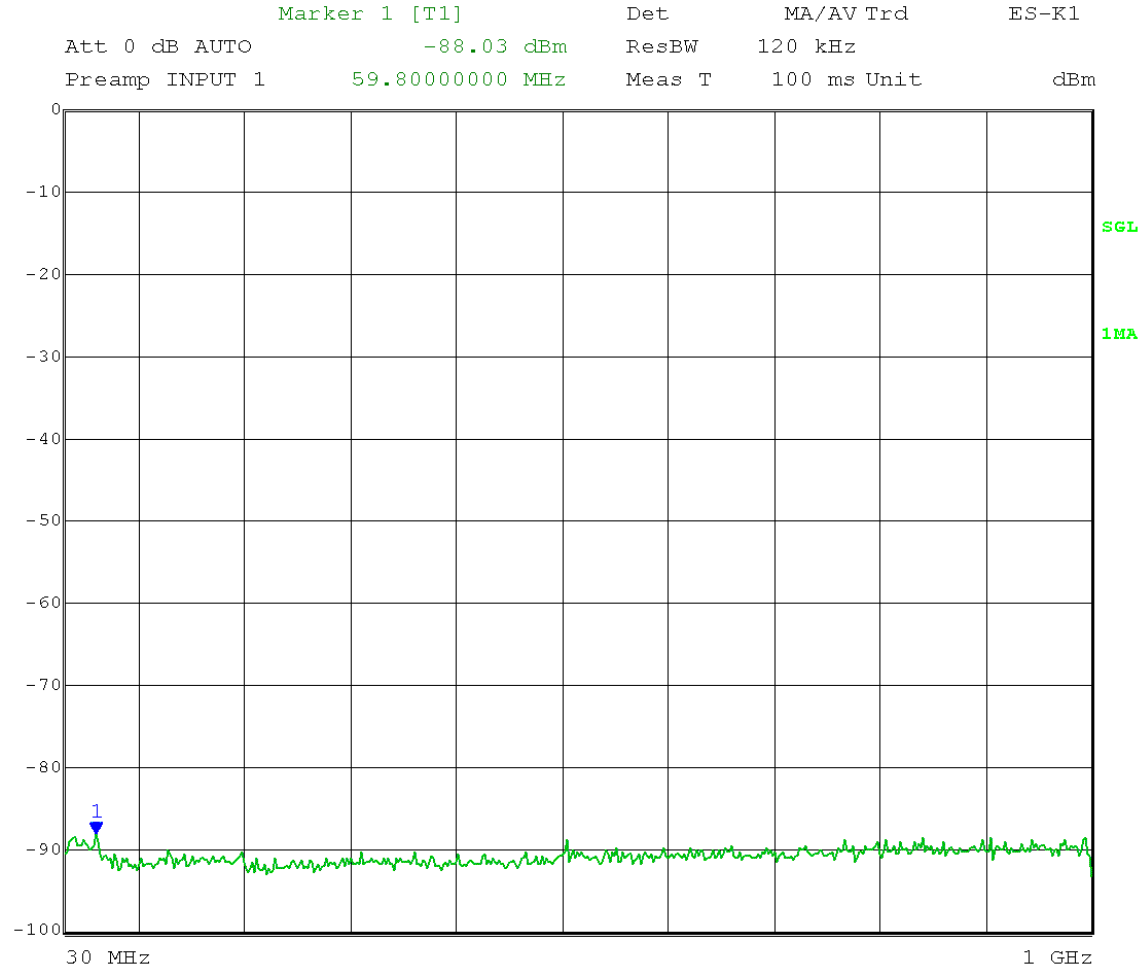
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 56	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 30 MHz to 1 GHz; Peak detector



Date: 25.JUL.2012 10:53:49

No emissions found from 30 MHz to 1 GHz

Calculated Field Strength at noise floor = -88.03 dBm + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 + 4.7 dB = 31.90 dBµV/m Peak

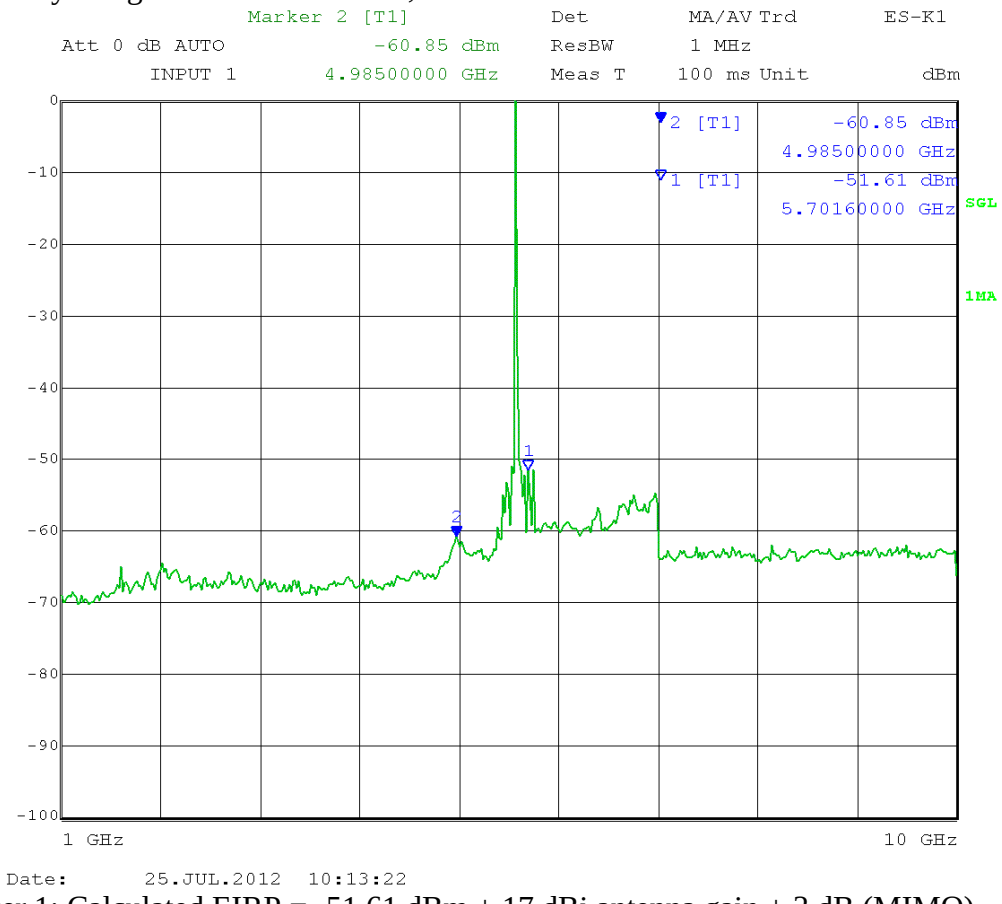
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 56	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Peak detector



Marker 1: Calculated EIRP = -51.61 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -31.61 dBm
Marker 2: Calculated Field Strength (Restricted Band) = -60.85 + 17 dBi antenna gain
+ 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 54.38 dBµV/m Peak

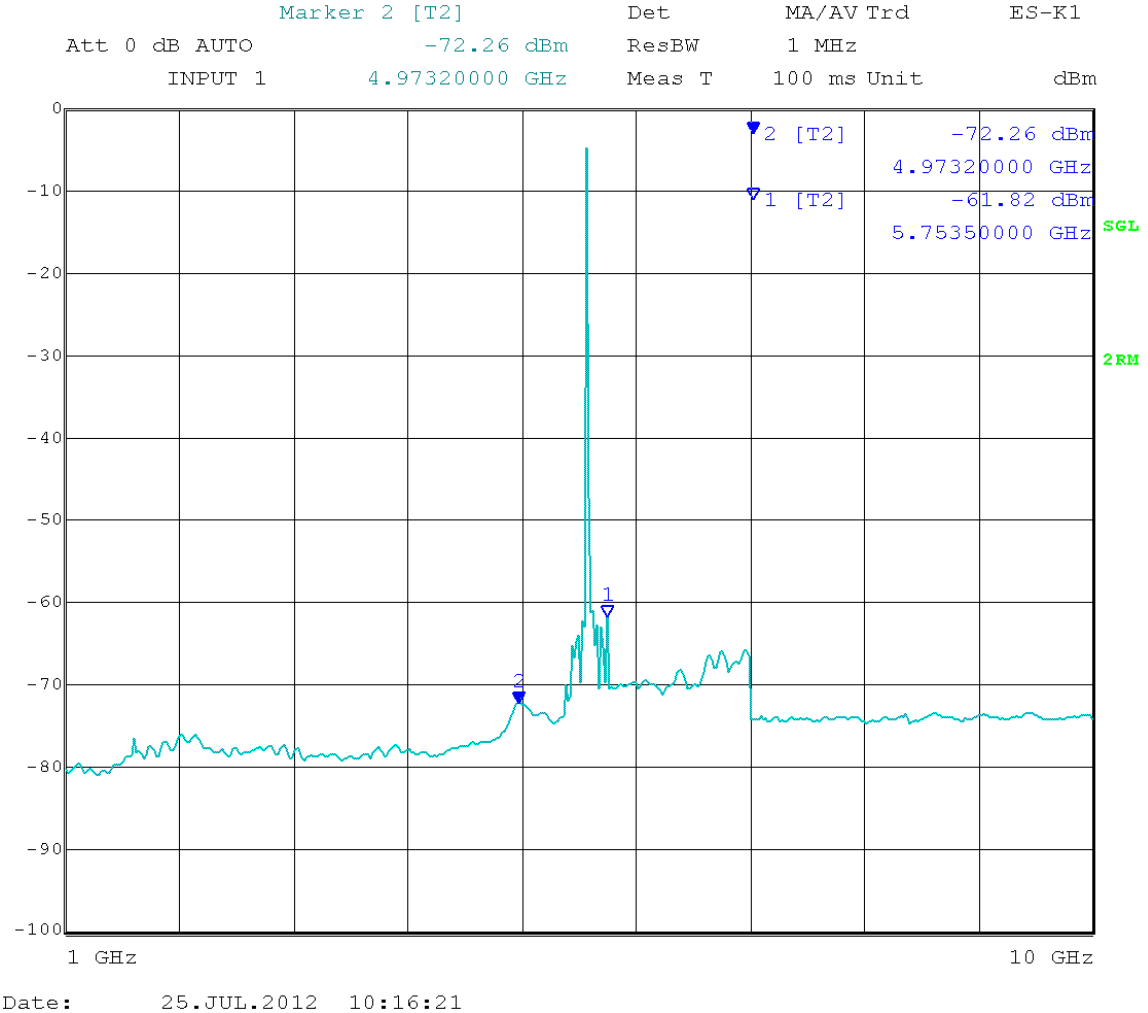
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 56	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Average (RMS) detector



Marker 2: Calculated Field Strength (Restricted Band) = -72.26 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 42.97 dBµV/m Average

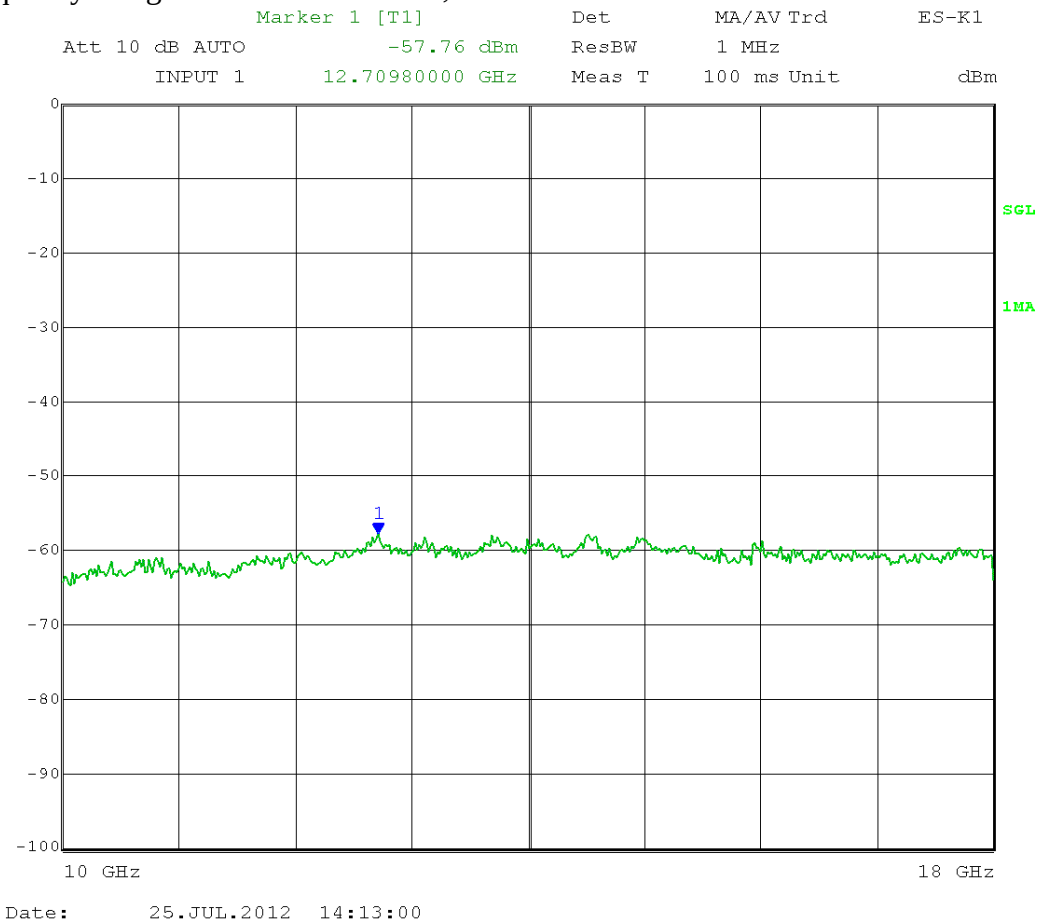
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 56	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Peak detector



Calculated EIRP at noise floor = -57.76 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -37.76 dBm
Calculated Field Strength at noise floor = -57.76 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 57.47 dBµV/m Peak

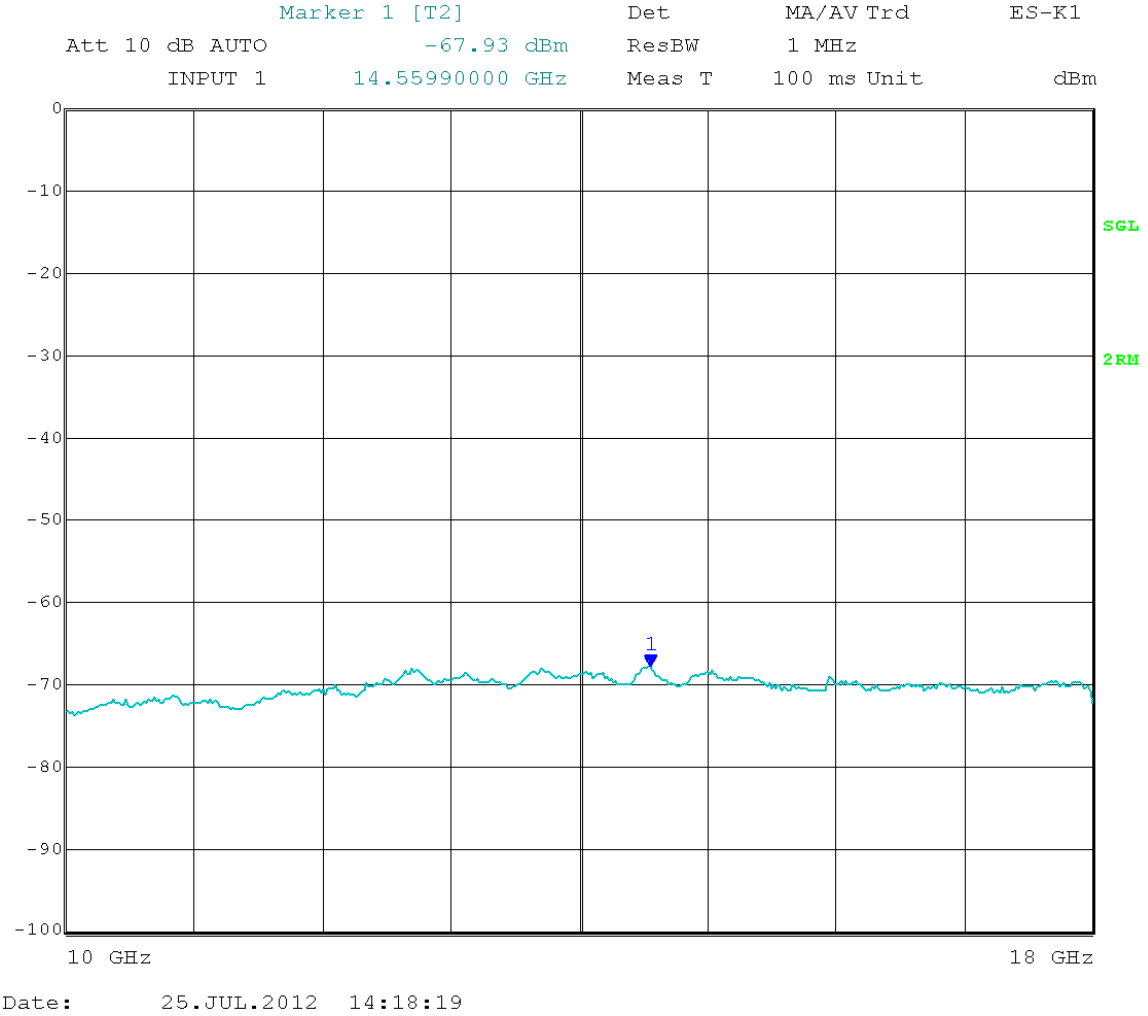
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 56	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -67.93 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 47.30 dBµV/m Average

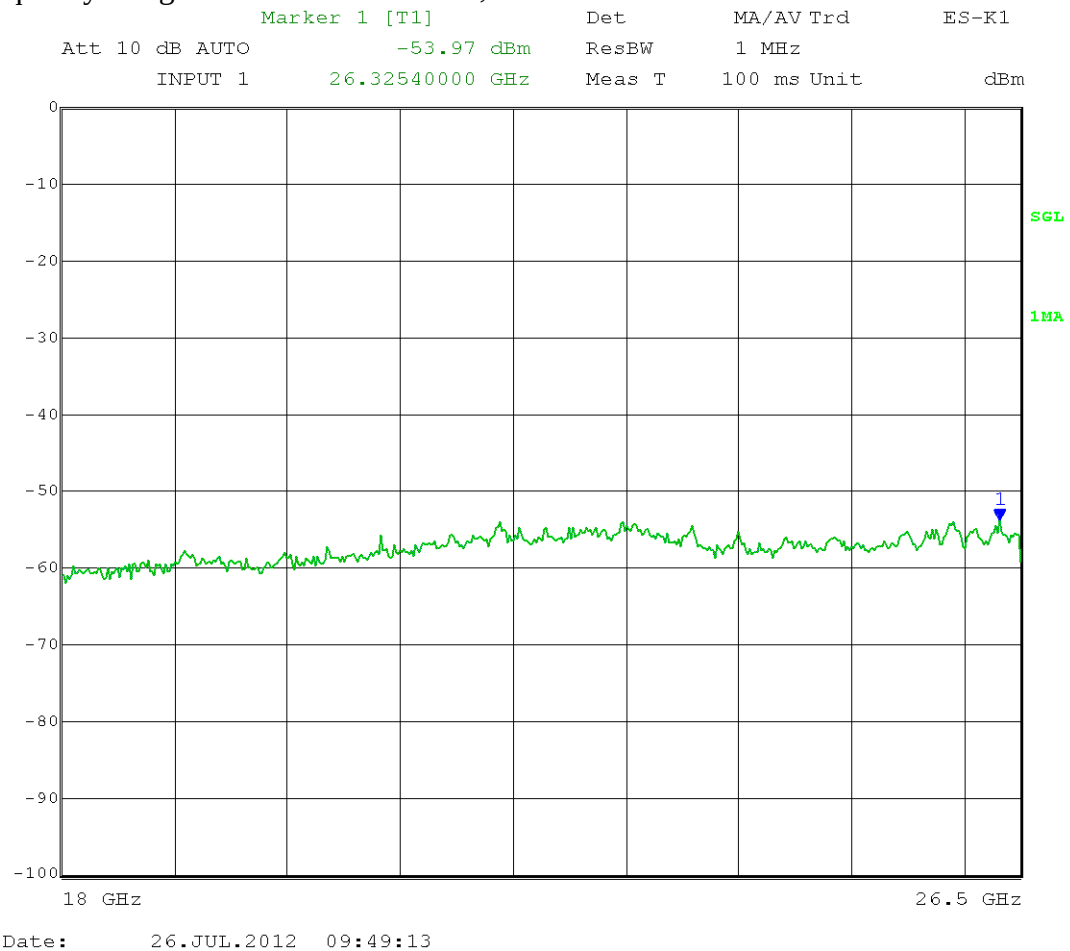
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 56	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Peak detector



Calculated EIRP at noise floor = -53.97 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -33.97 dBm
Calculated Field Strength at noise floor = -53.97 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 61.26 dBµV/m Peak

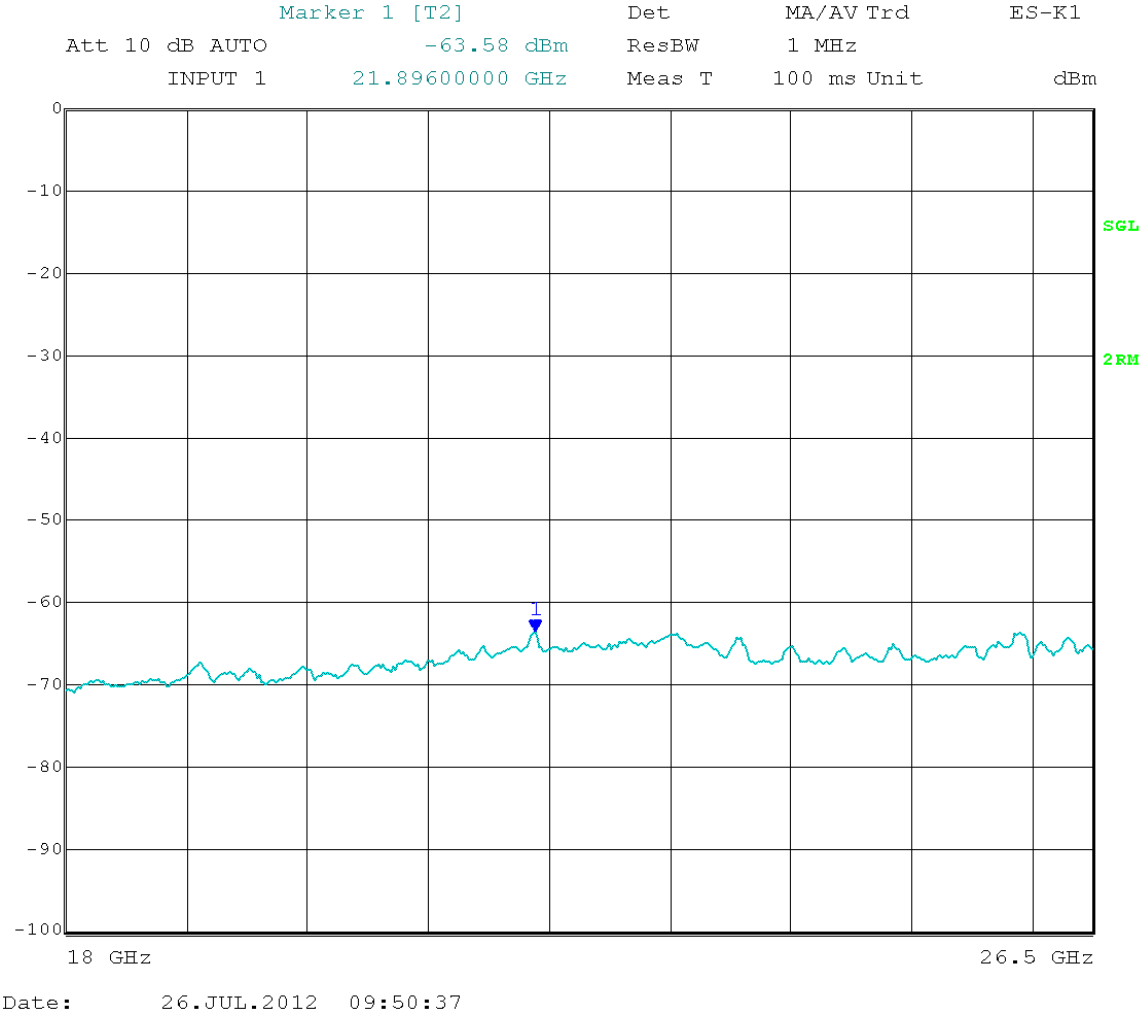
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 56	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -63.58 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 51.65 dBµV/m Average

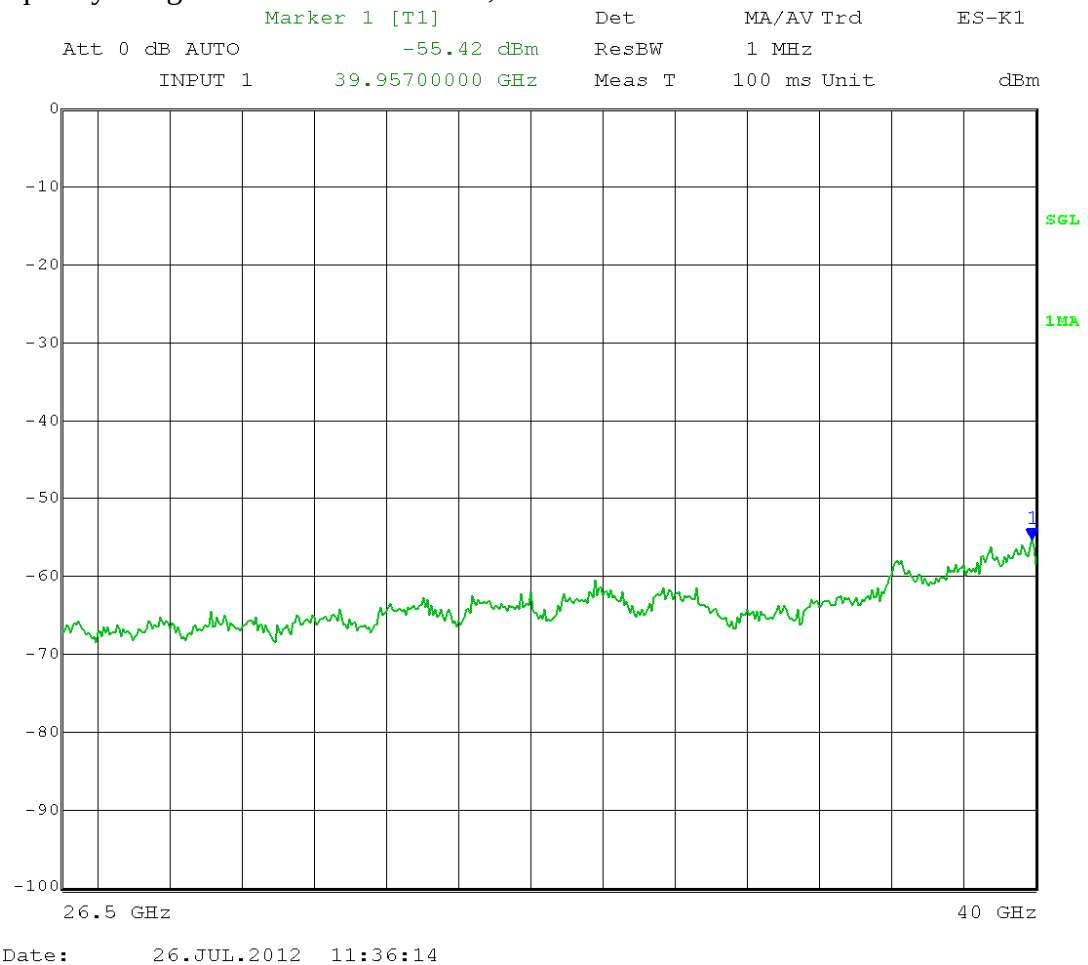
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 56	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Peak detector



Calculated EIRP at noise floor = -55.42 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -35.42 dBm
Calculated Field Strength at noise floor = -55.42 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 59.81 dBµV/m Peak

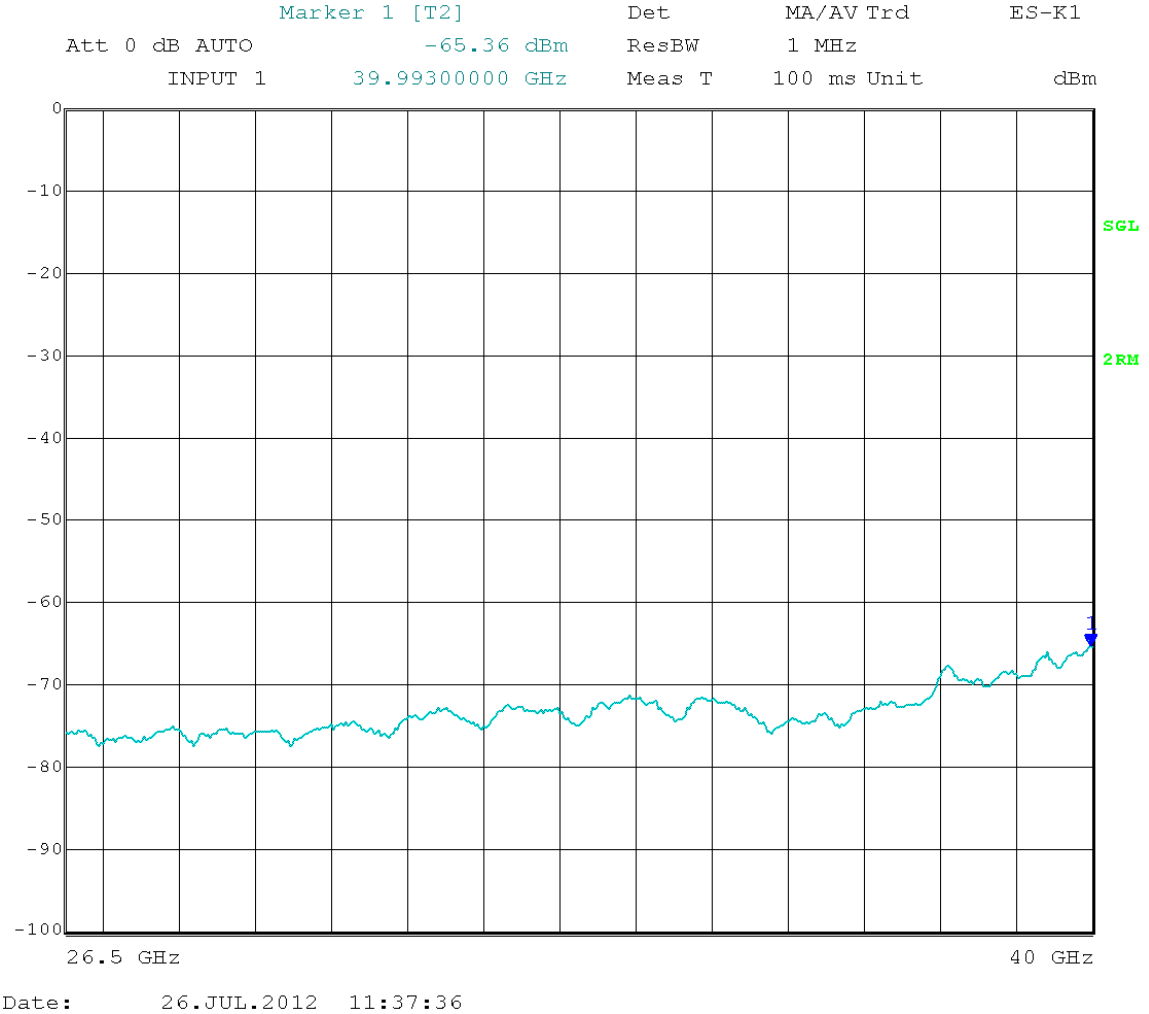
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 56	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -65.36 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 49.87 dBµV/m Average

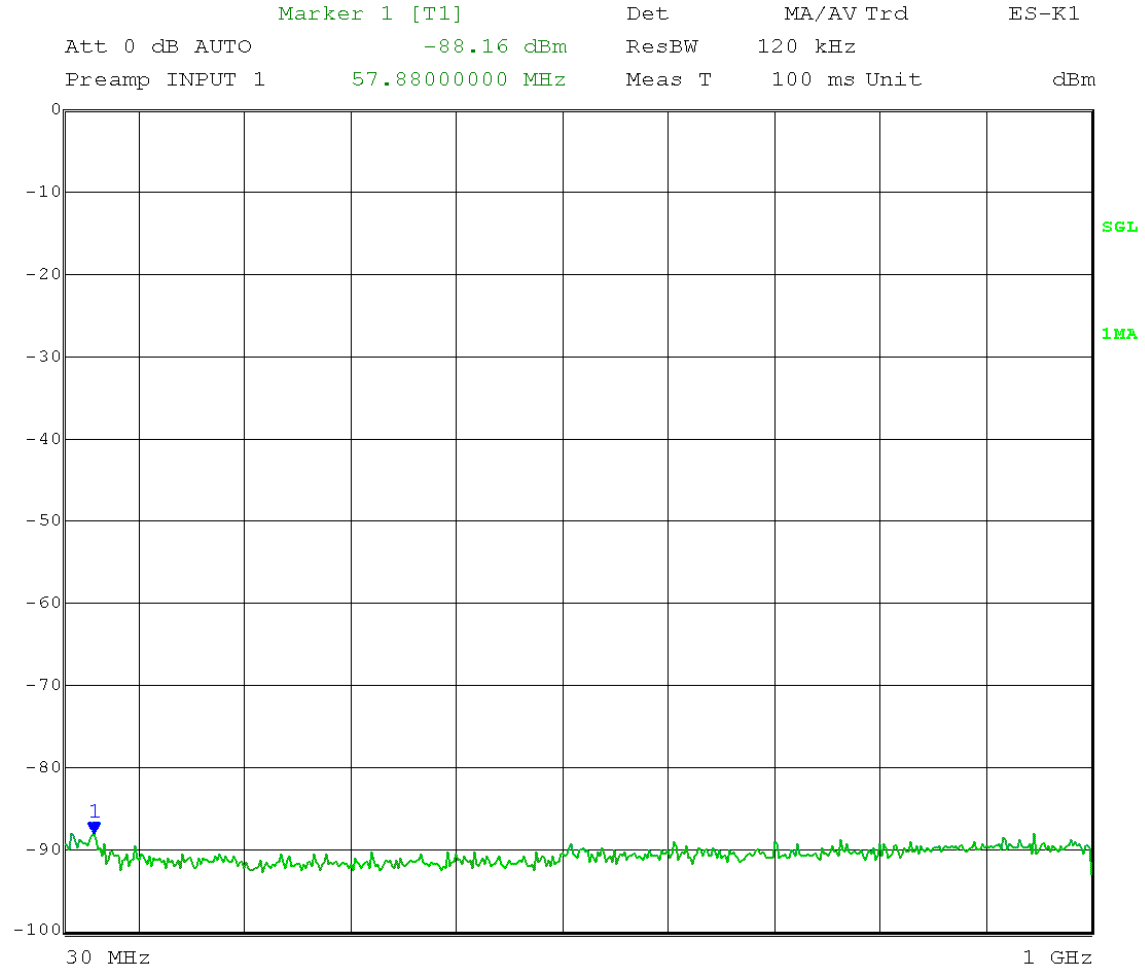
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 55	26 dB EBW: 9.72 MHz
Output port:	Channel B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 30 MHz to 1 GHz; Peak detector



Date: 25.JUL.2012 10:50:47

No emissions found from 30 MHz to 1 GHz

Calculated Field Strength at noise floor = -88.16 dBm + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 + 4.7 dB = 31.77 dBµV/m Peak

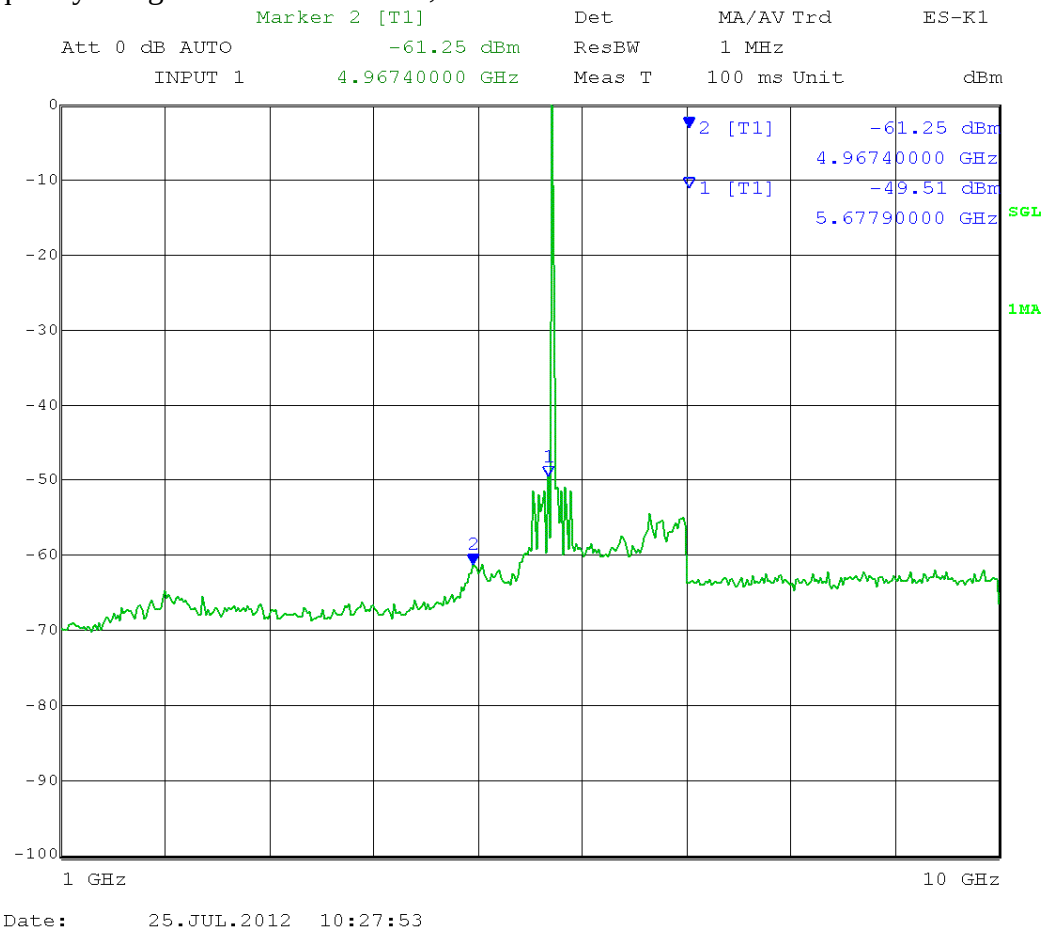
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 55	26 dB EBW: 9.72 MHz
Output port:	Channel B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Peak detector



Marker 1: Calculated EIRP = -49.51 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -29.51 dBm

Marker 2: Calculated Field Strength (Restricted Band) = -61.25 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 53.98 dBµV/m Peak

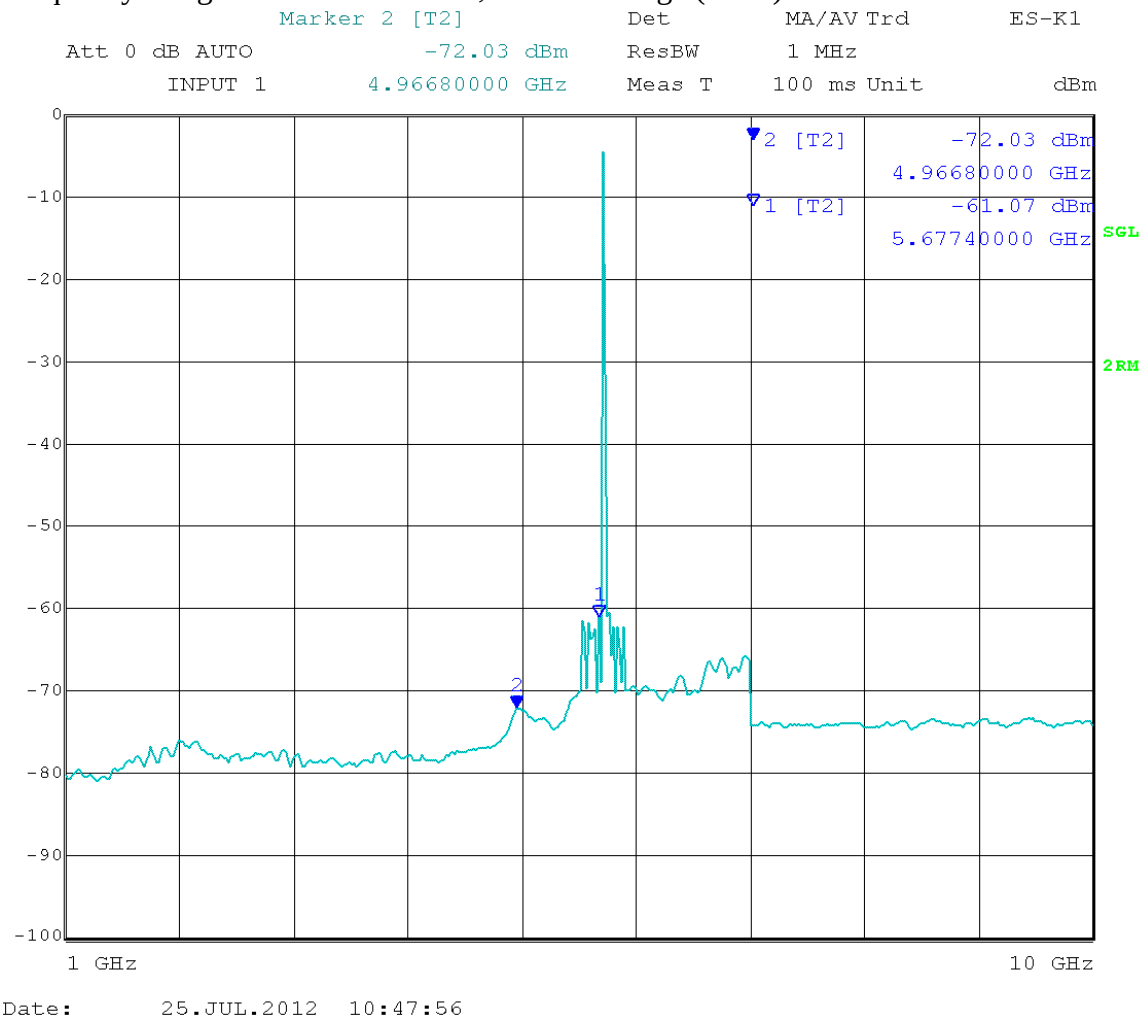
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 55	26 dB EBW: 9.72 MHz
Output port:	Channel B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Average (RMS) detector



Marker 2: Calculated Field Strength (Restricted Band) = -72.03 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 43.20 dBµV/m Average

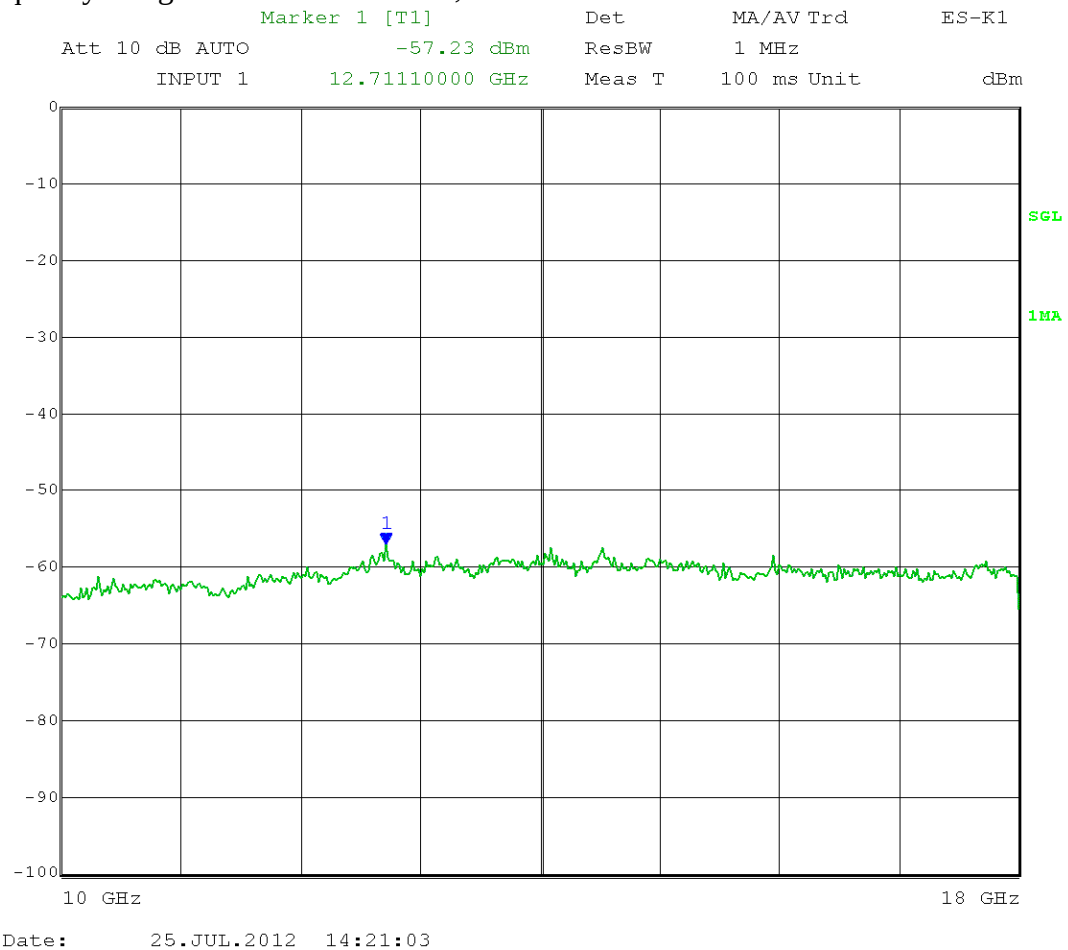
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 55	26 dB EBW: 9.72 MHz
Output port:	Channel B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Peak detector



Calculated EIRP at noise floor = -57.23 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -37.23 dBm
Calculated Field Strength at noise floor = -57.23 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 58.00 dBµV/m Peak

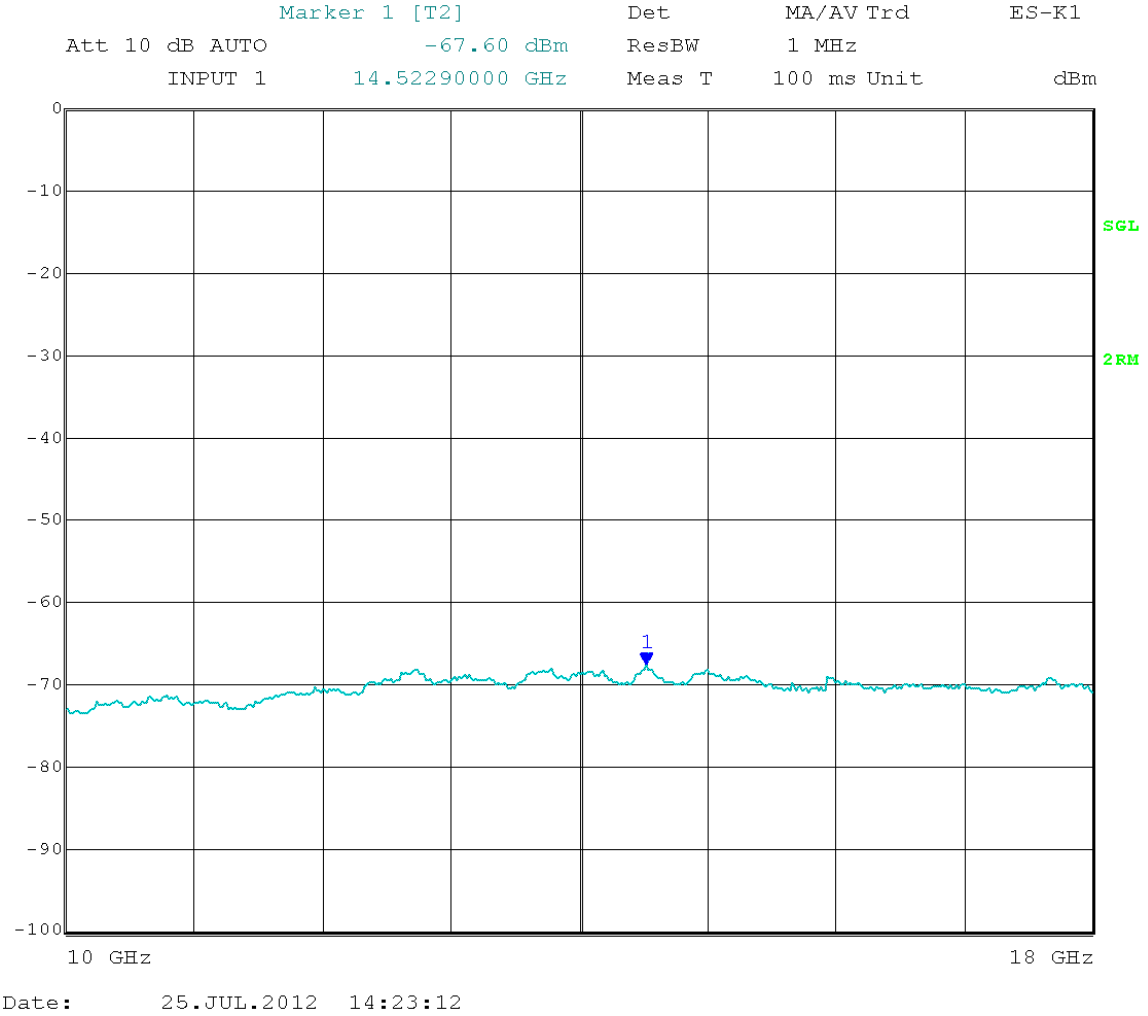
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 55	26 dB EBW: 9.72 MHz
Output port:	Channel B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -67.60 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 47.63 dBµV/m Average

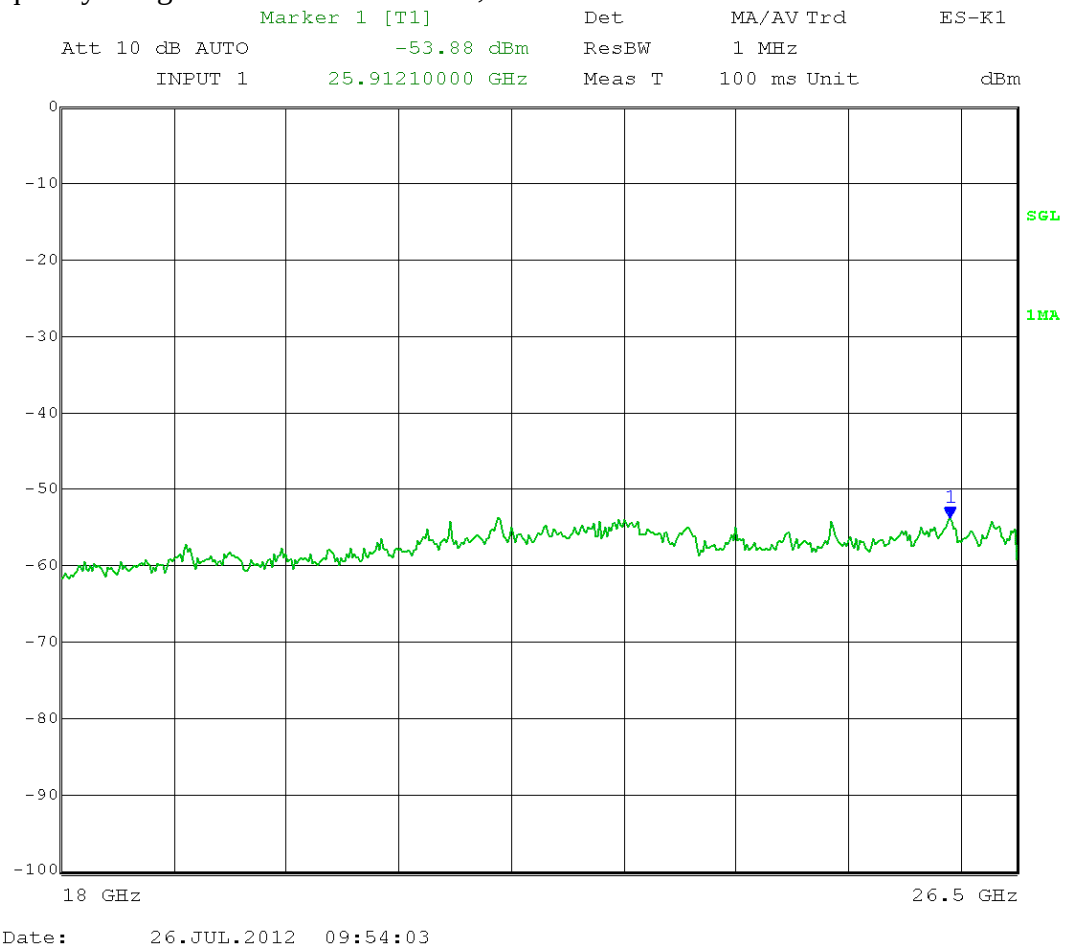
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 55	26 dB EBW: 9.72 MHz
Output port:	Channel B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Peak detector



Calculated EIRP at noise floor = -53.88 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -33.88 dBm
Calculated Field Strength at noise floor = -53.88 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 61.35 dBµV/m Peak

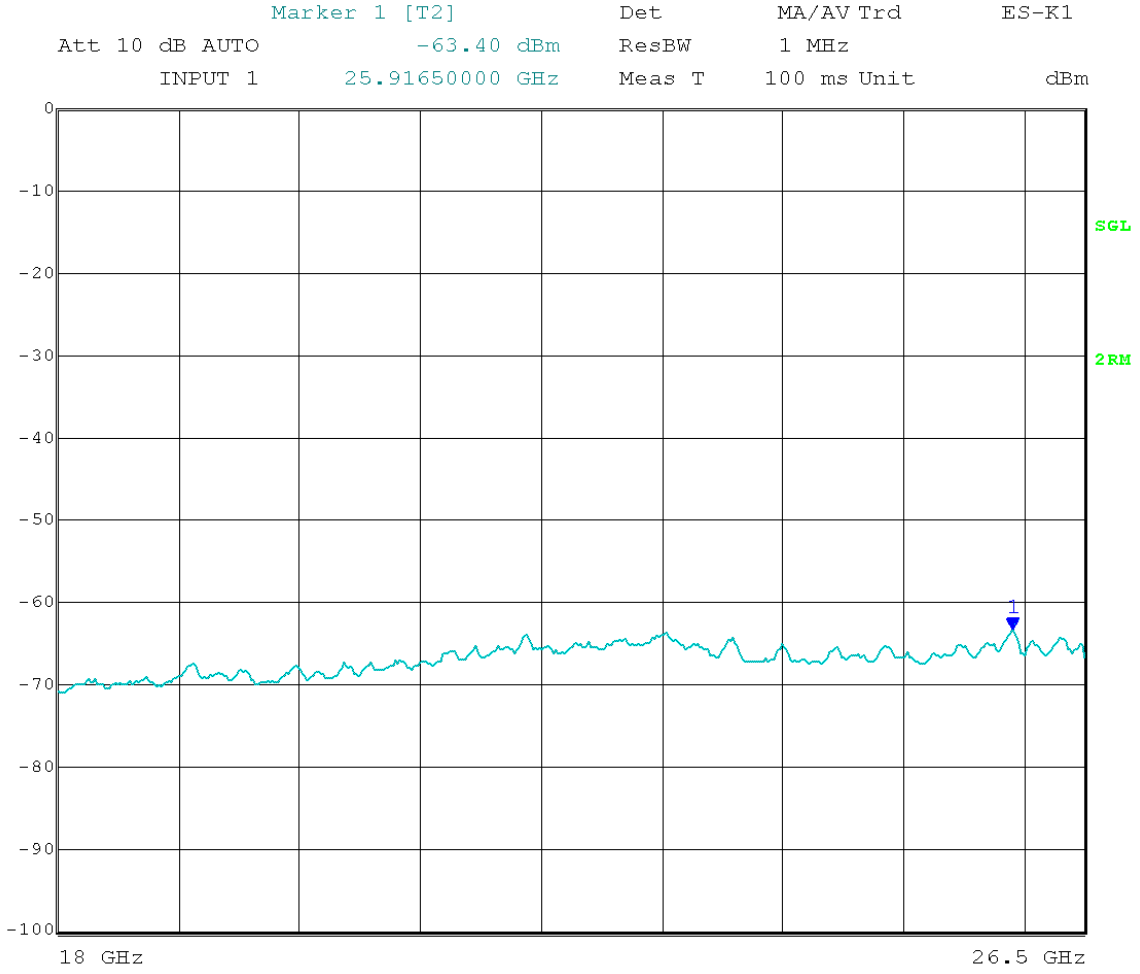
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 55	26 dB EBW: 9.72 MHz
Output port:	Channel B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -63.40 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 51.83 dBµV/m Average

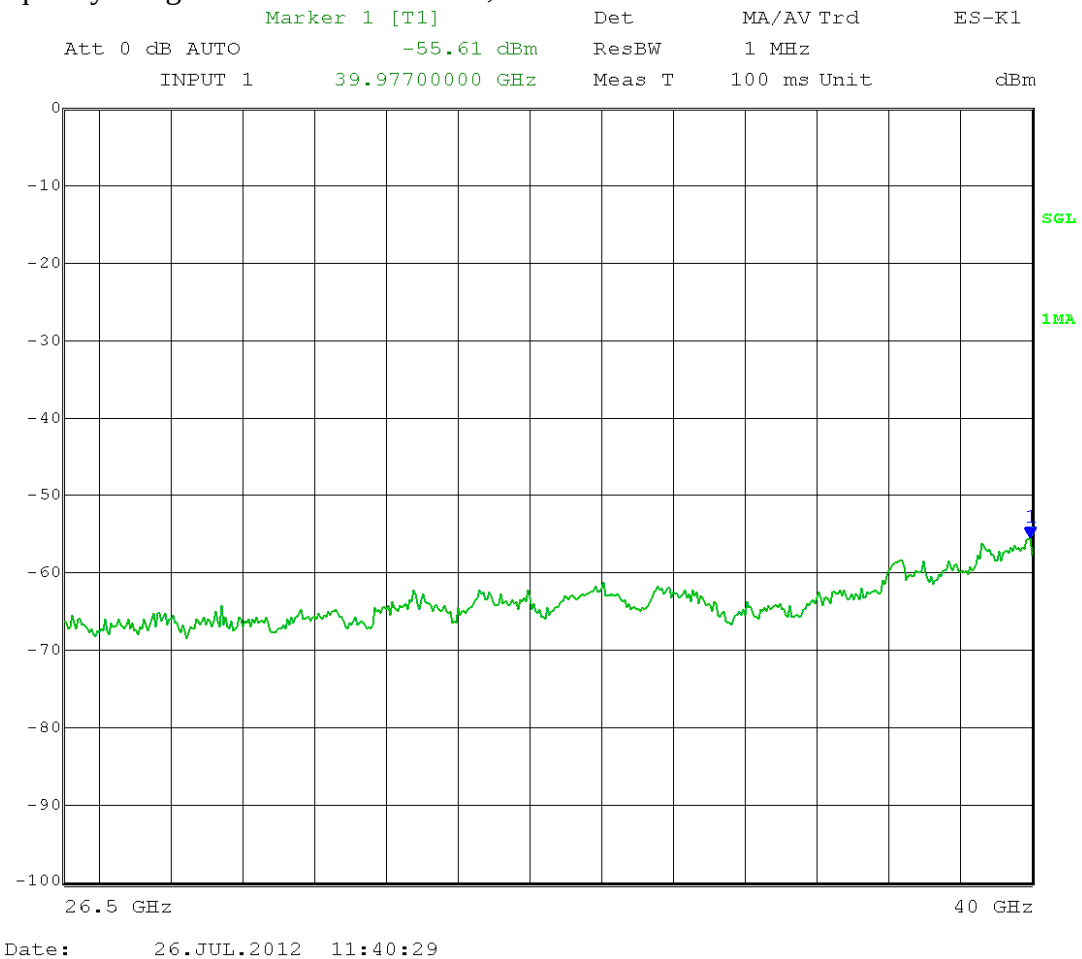
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 55	26 dB EBW: 9.72 MHz
Output port:	Channel B;	High Channel Frequency:	5.720 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Peak detector



Calculated EIRP at noise floor = -55.61 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -35.61 dBm
Calculated Field Strength at noise floor = -55.61 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 59.62 dBµV/m Peak

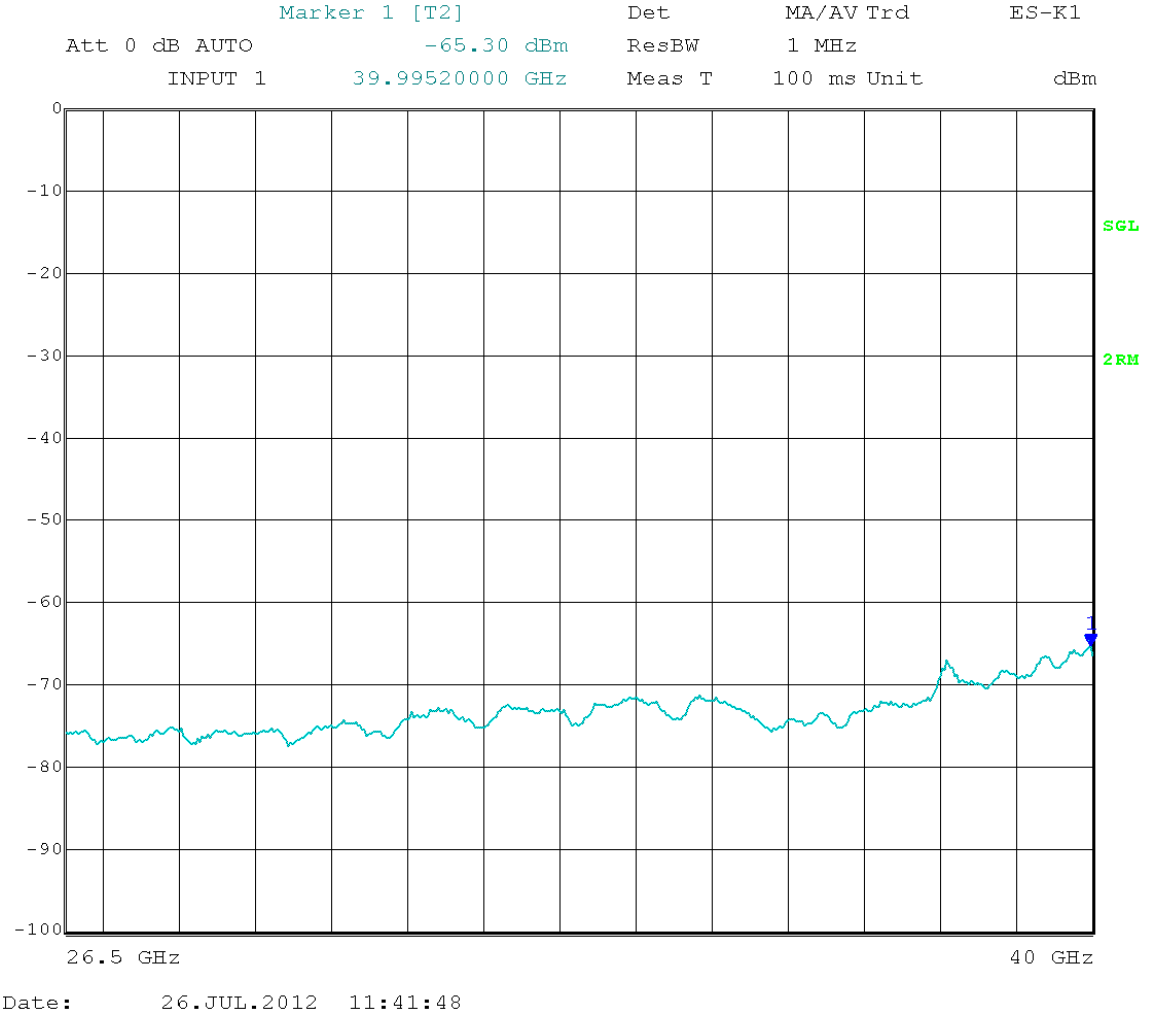
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	10 MHz	adi reg 56	26 dB EBW: 9.72 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -65.30 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 49.93 dBµV/m Average

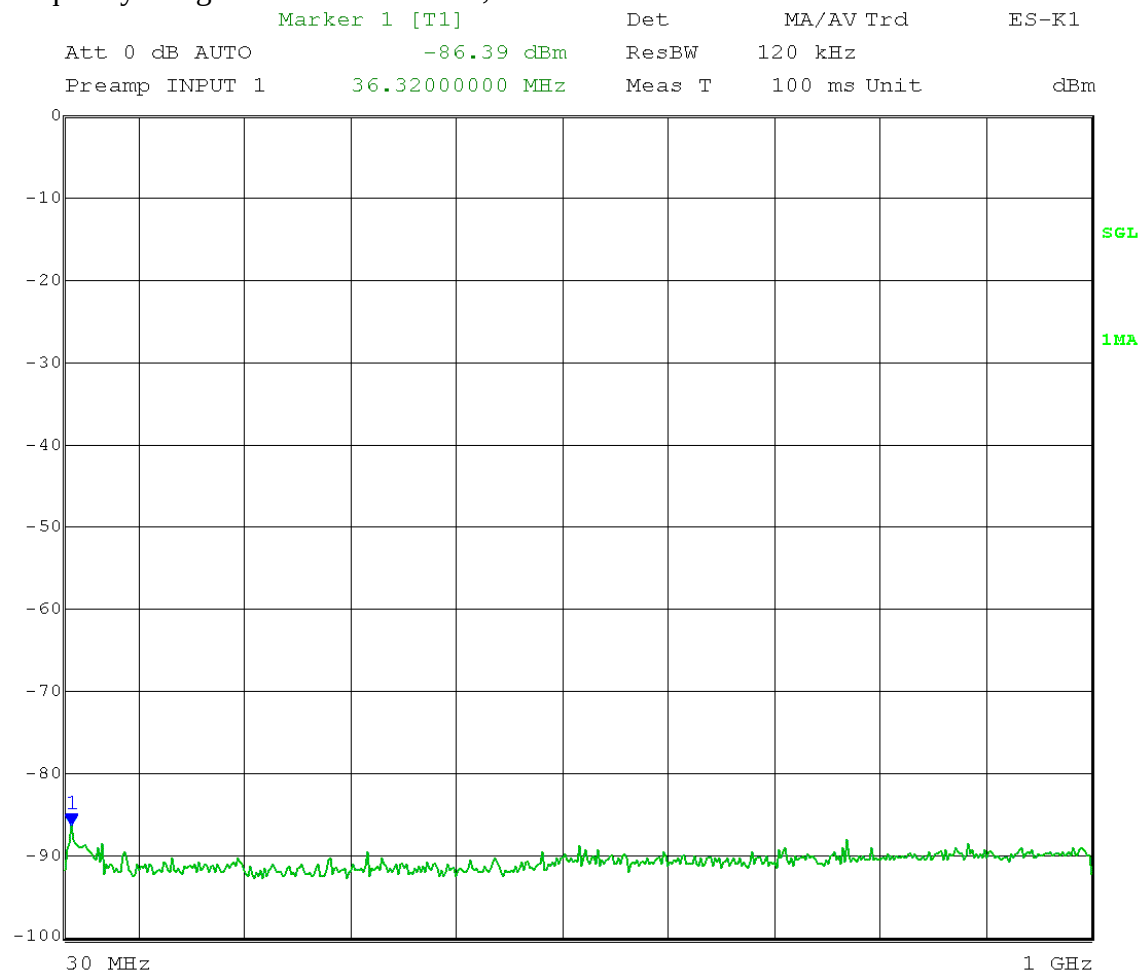
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 42	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 30 MHz to 1 GHz; Peak detector



Date: 25.JUL.2012 13:01:37

No emissions found from 30 MHz to 1 GHz

Calculated Field Strength at noise floor = -86.39 dBm + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 + 4.7 dB = 33.54 dBµV/m Peak

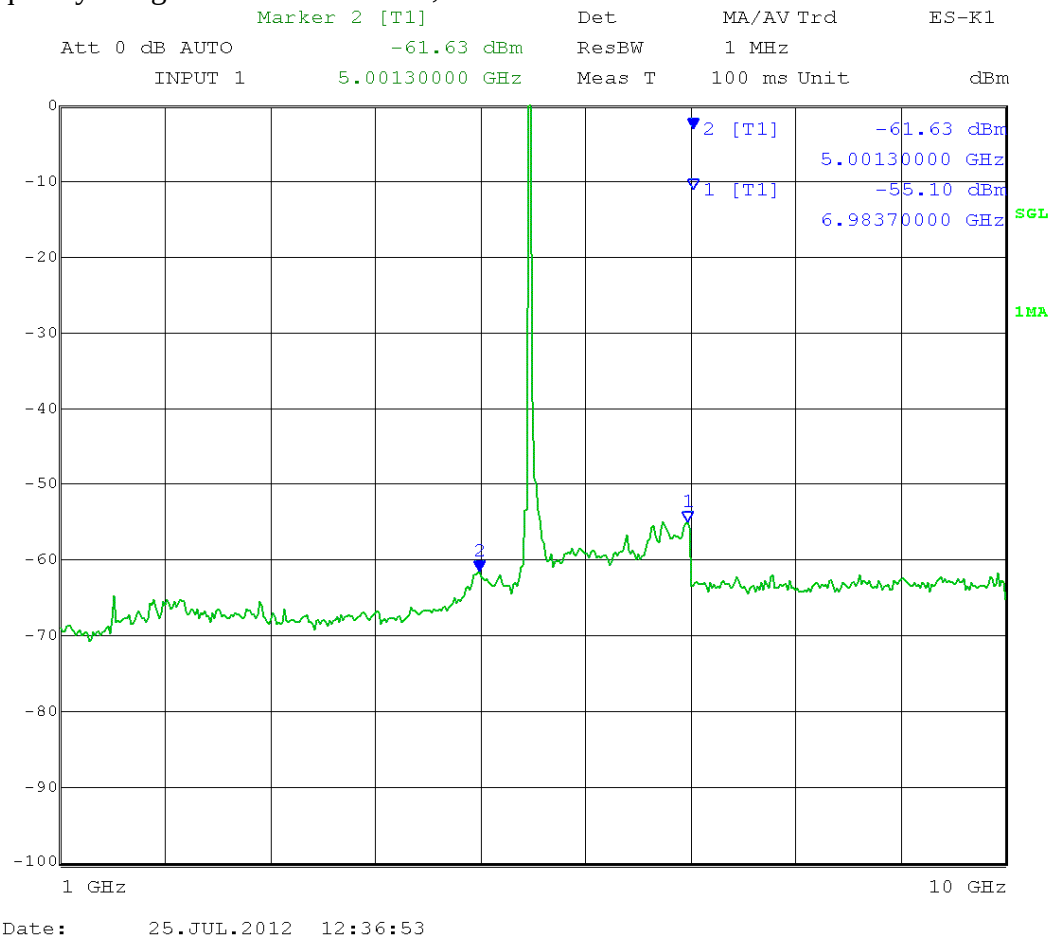
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 42	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Peak detector



Marker 1: Calculated EIRP = -55.10 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -35.10 dBm
Marker 2: Calculated Field Strength (Restricted Band) = -61.63 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 53.60 dBµV/m Peak

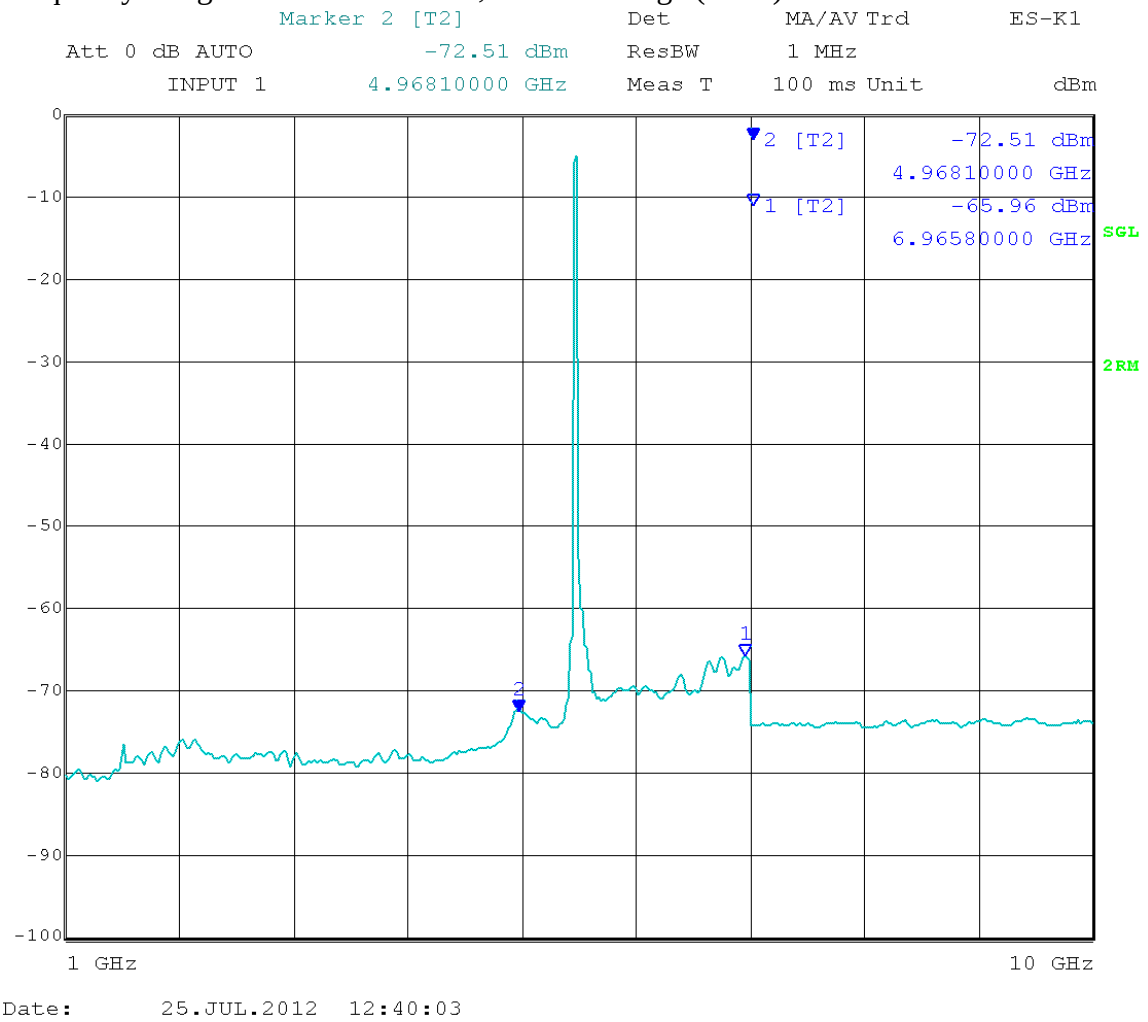
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 42	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Average (RMS) detector



Marker 2: Calculated Field Strength (Restricted Band) = -72.51 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 42.72 dBµV/m Average

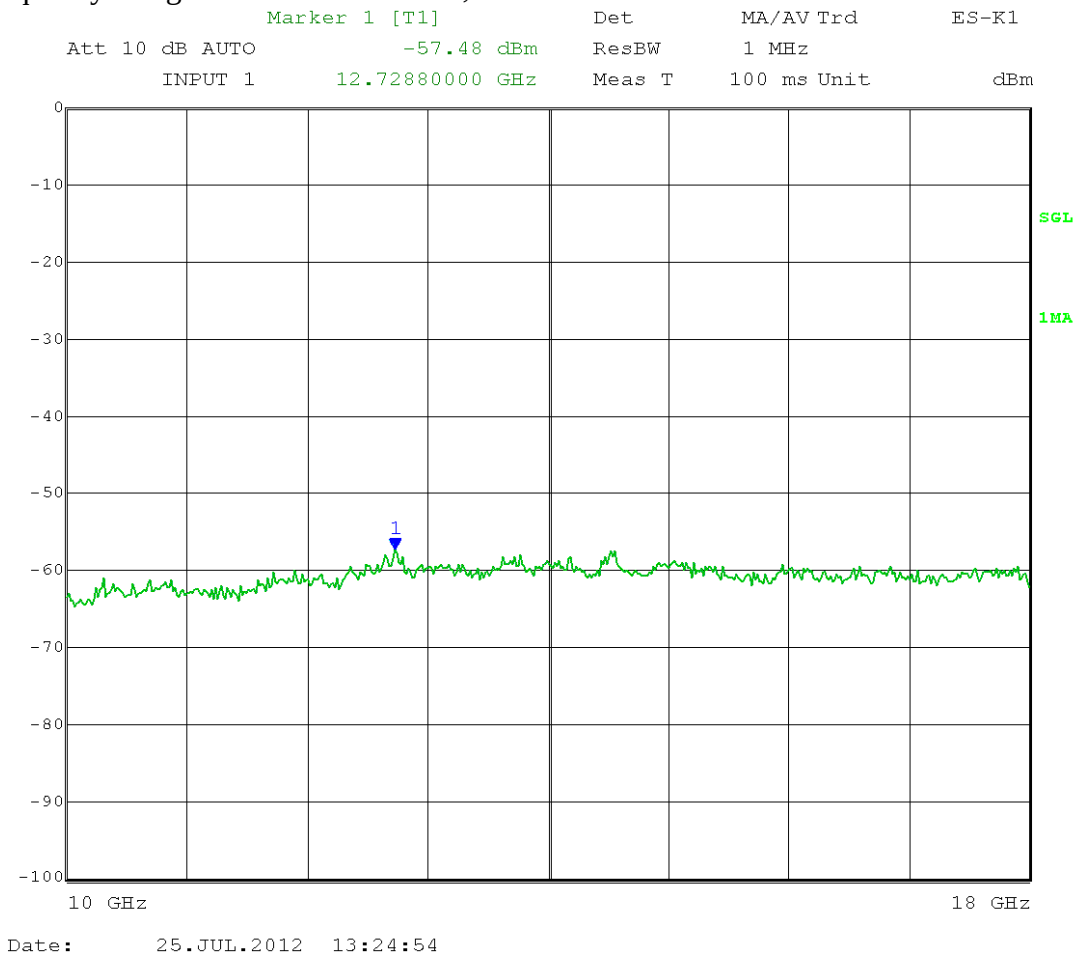
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 42	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Peak detector



Calculated EIRP at noise floor = -57.48 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -37.48 dBm
Calculated Field Strength at noise floor = -57.48 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 57.75 dBµV/m Peak

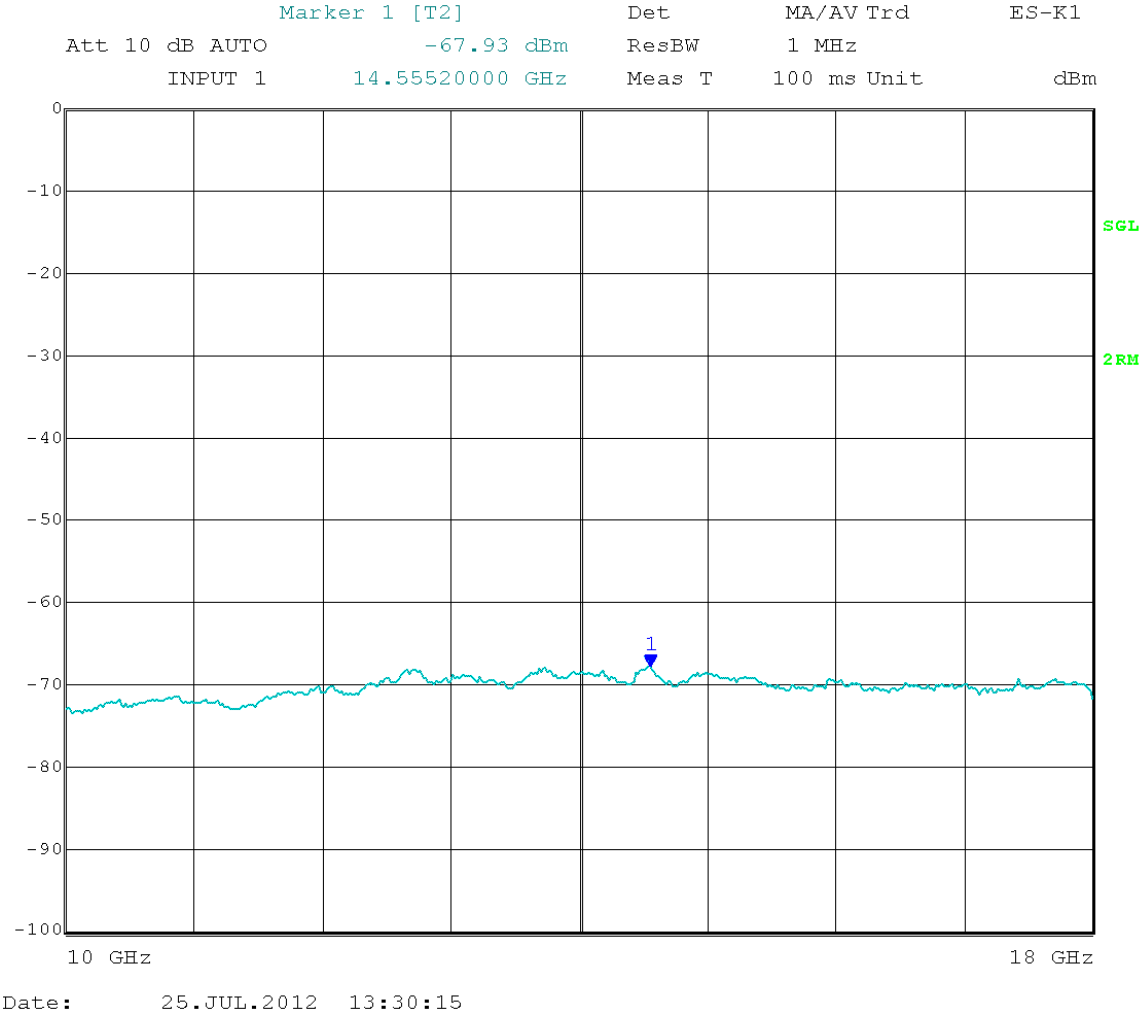
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 42	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -67.93 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 47.30 dBµV/m Average

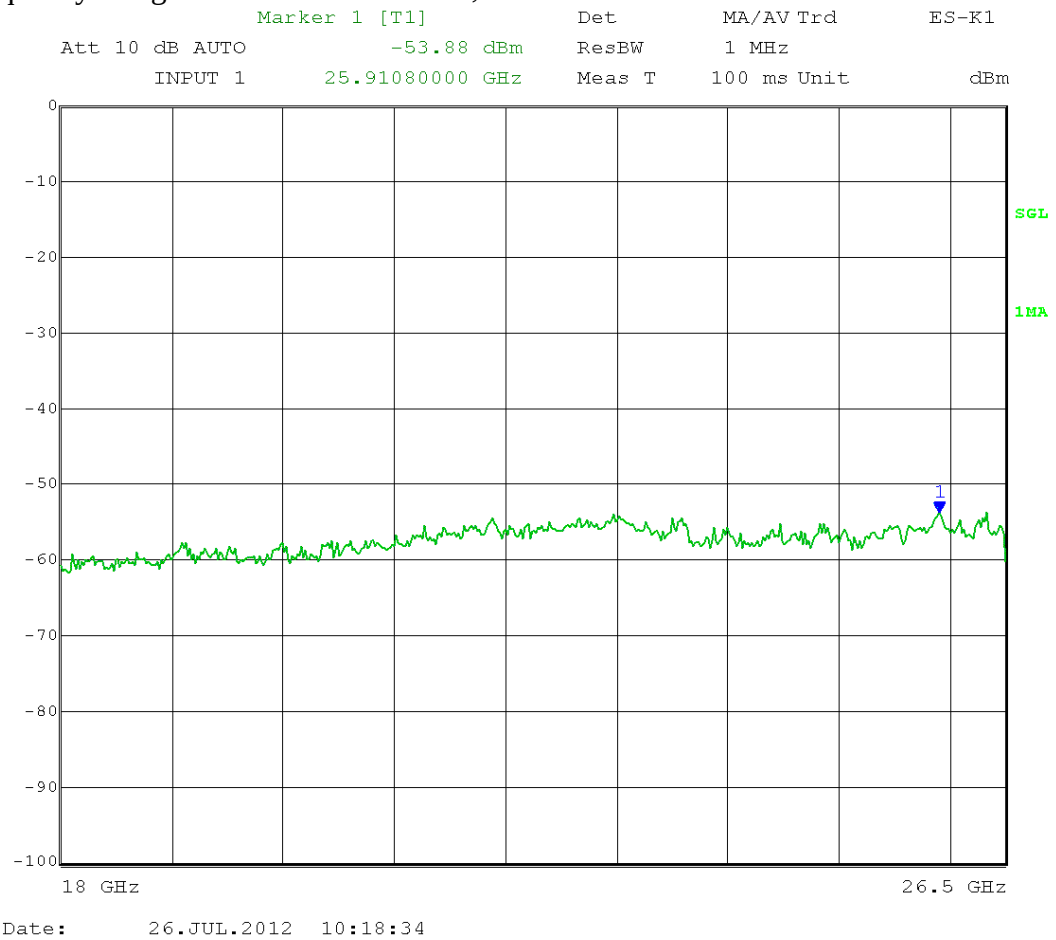
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 42	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Peak detector



Calculated EIRP at noise floor = -53.88 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -33.88 dBm
Calculated Field Strength at noise floor = -53.88 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 61.35 dBµV/m Peak

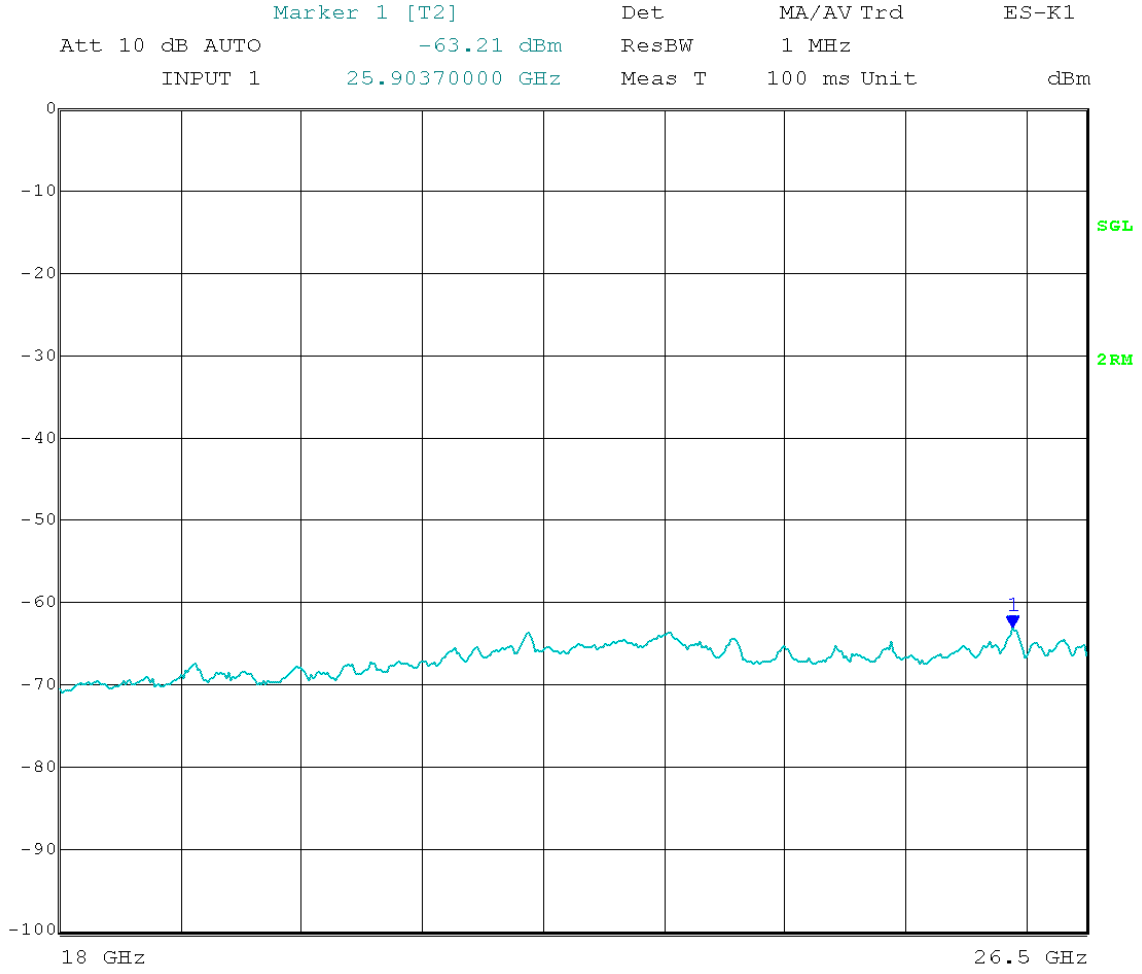
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 42	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -63.21 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 52.02 dBµV/m Average

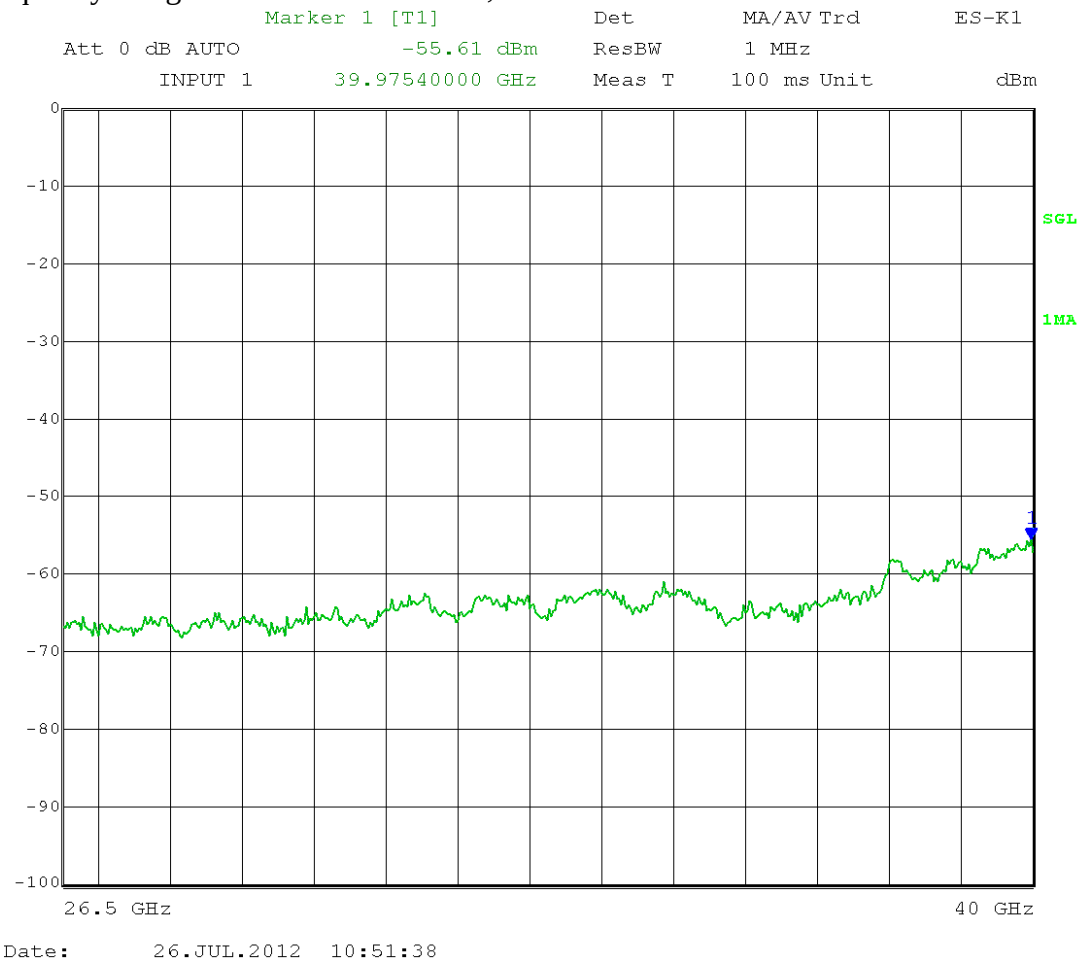
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 42	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Peak detector



Calculated EIRP at noise floor = -55.61 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -35.61 dBm
Calculated Field Strength at noise floor = -55.61 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 59.62 dBµV/m Peak

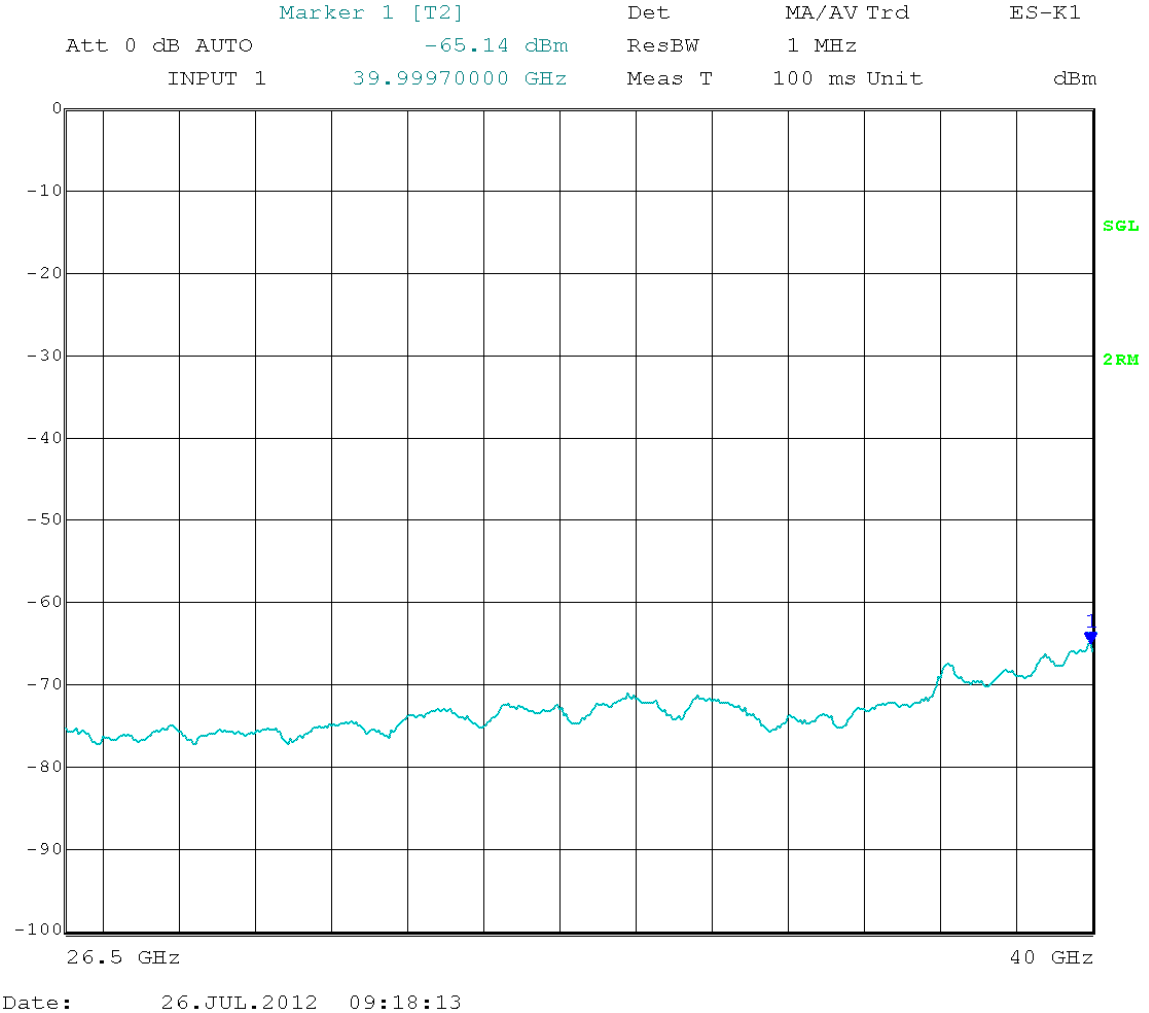
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 42	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -64.95 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 50.28 dBµV/m Average

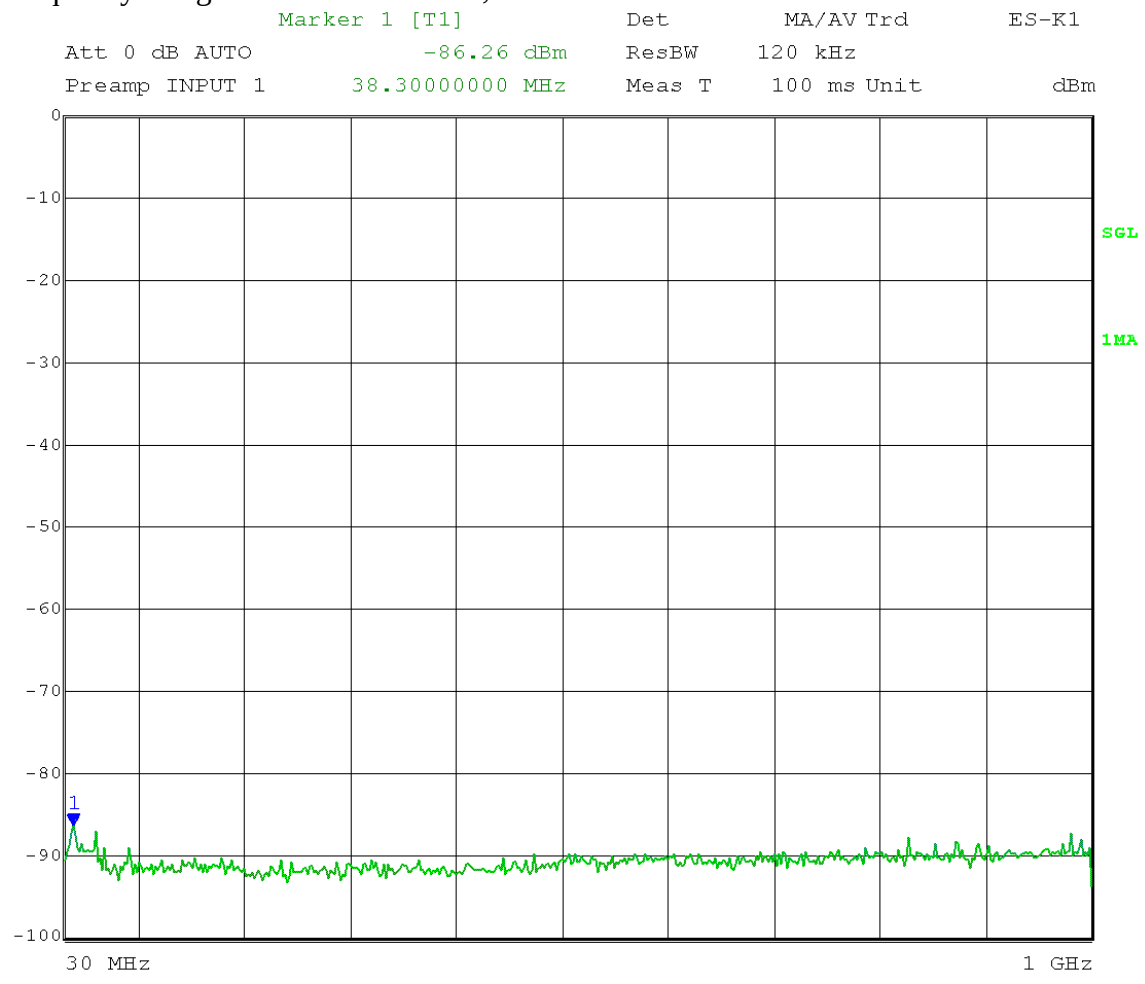
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 48	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 30 MHz to 1 GHz; Peak detector



Date: 25.JUL.2012 12:59:07

No emissions found from 30 MHz to 1 GHz

Calculated Field Strength at noise floor = -86.26 dBm + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 + 4.7 dB = 33.67 dBµV/m Peak

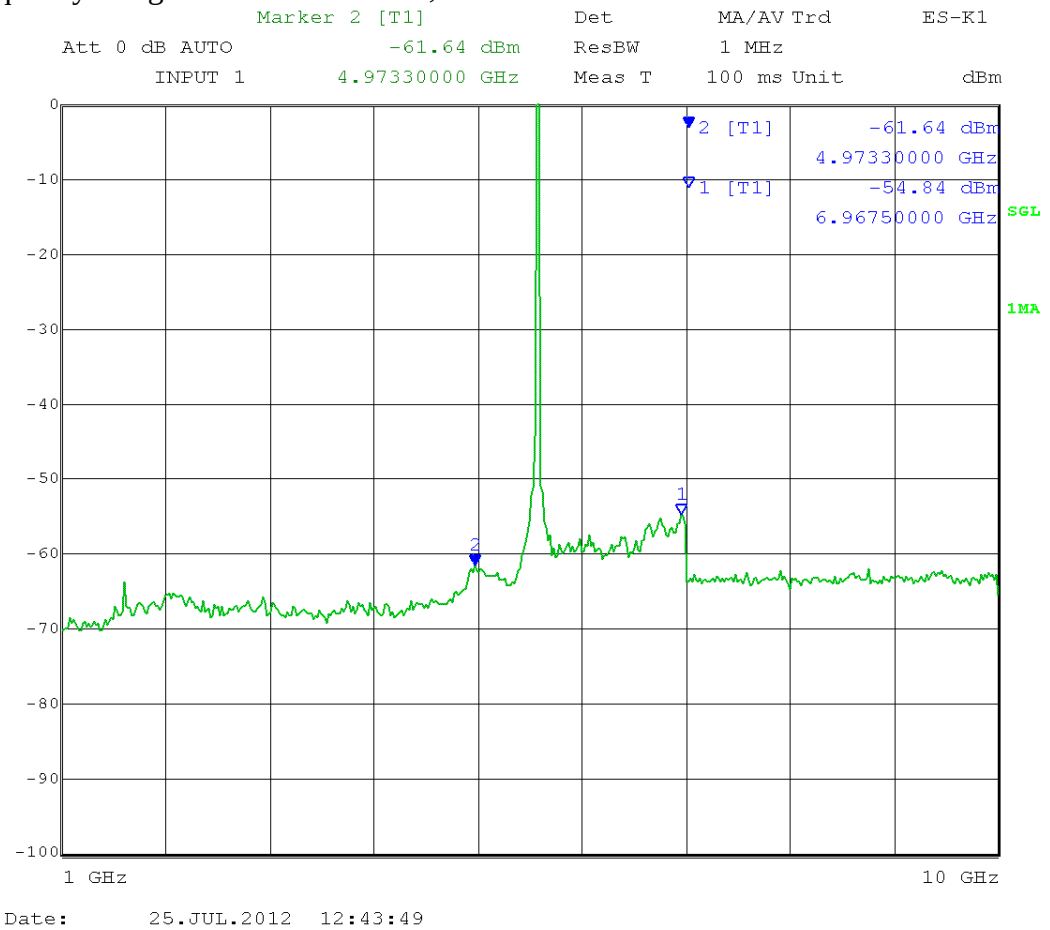
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 48	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Peak detector



Marker 1: Calculated EIRP = -54.84 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -34.84 dBm
Marker 2: Calculated Field Strength (Restricted Band) = -61.64 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 53.59 dBµV/m Peak

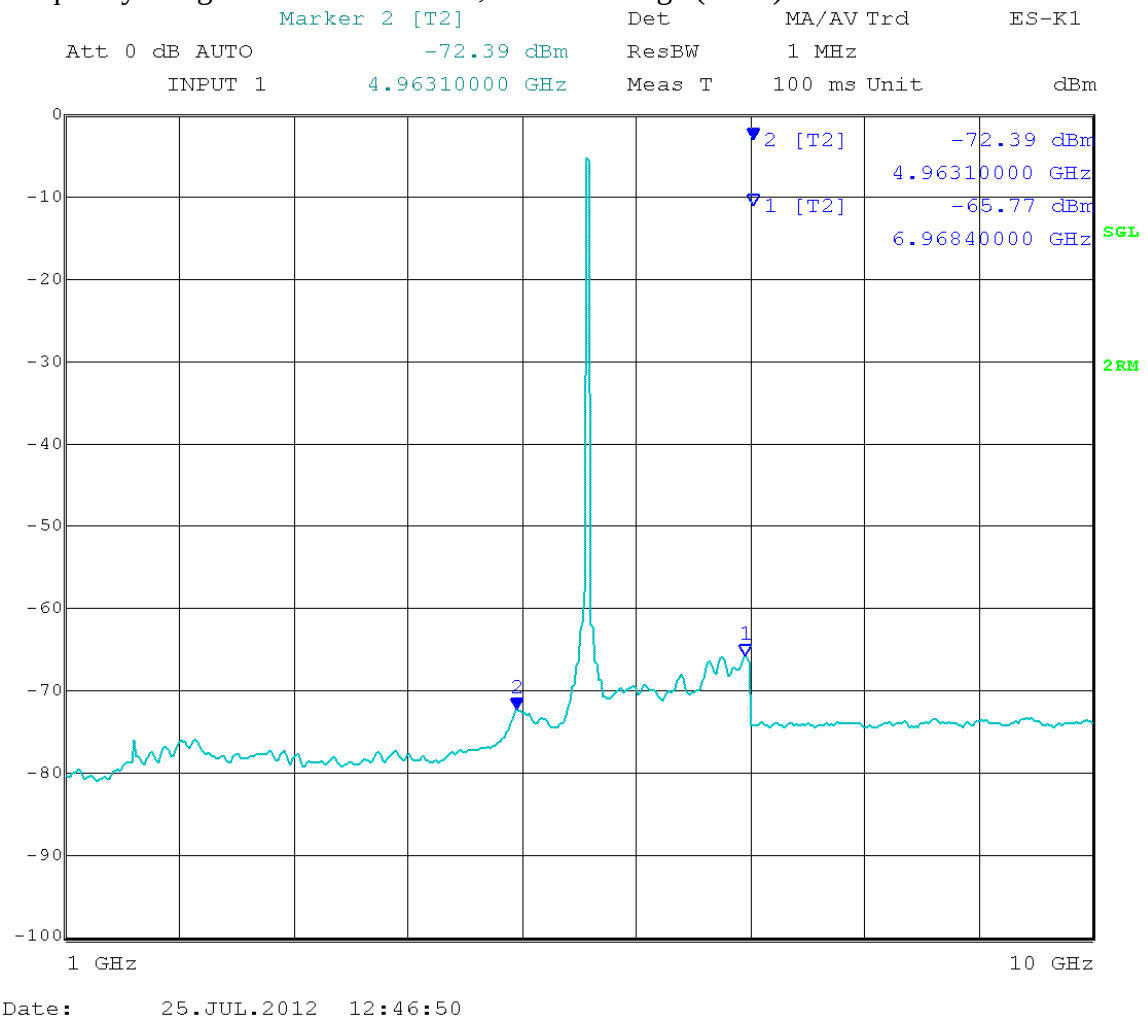
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 48	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Average (RMS) detector



Marker 2: Calculated Field Strength (Restricted Band) = -72.39 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 42.84 dBµV/m Average

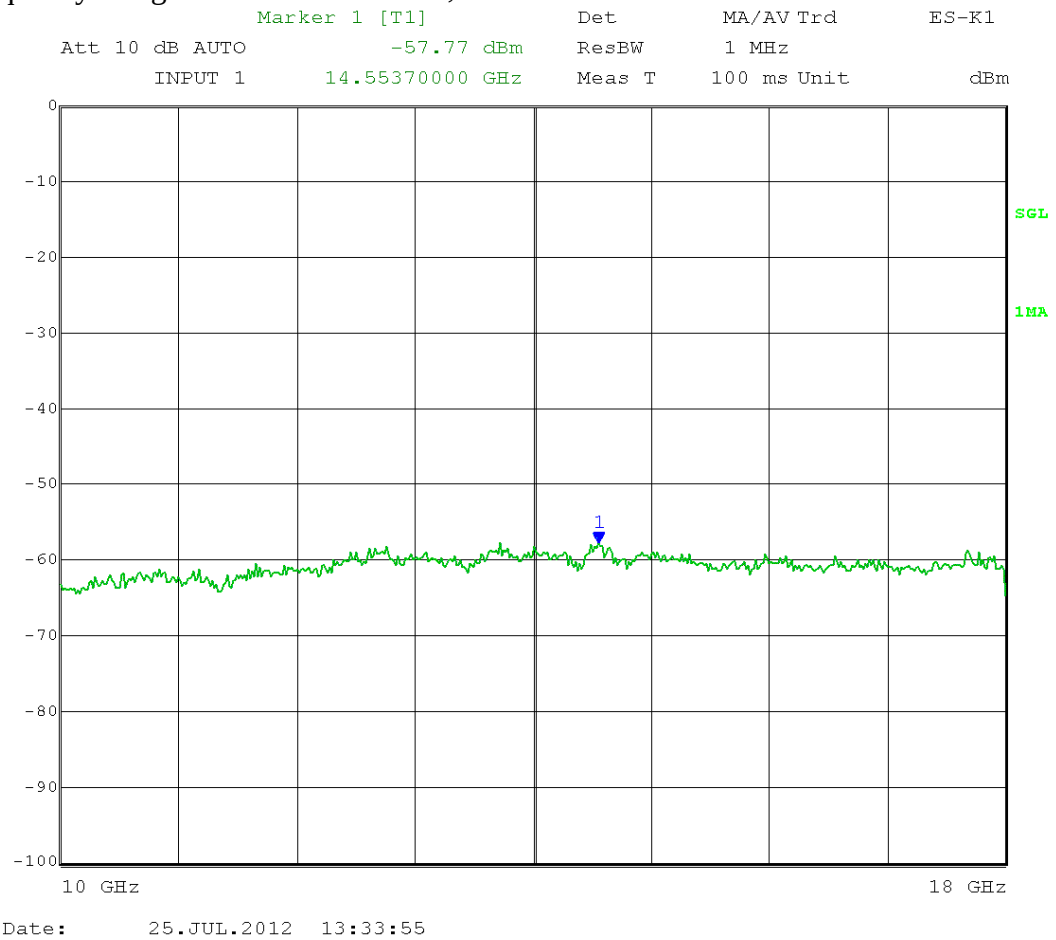
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 48	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Peak detector



Calculated EIRP at noise floor = -57.77 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -37.77 dBm
Calculated Field Strength at noise floor = -57.77 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 57.46 dBµV/m Peak

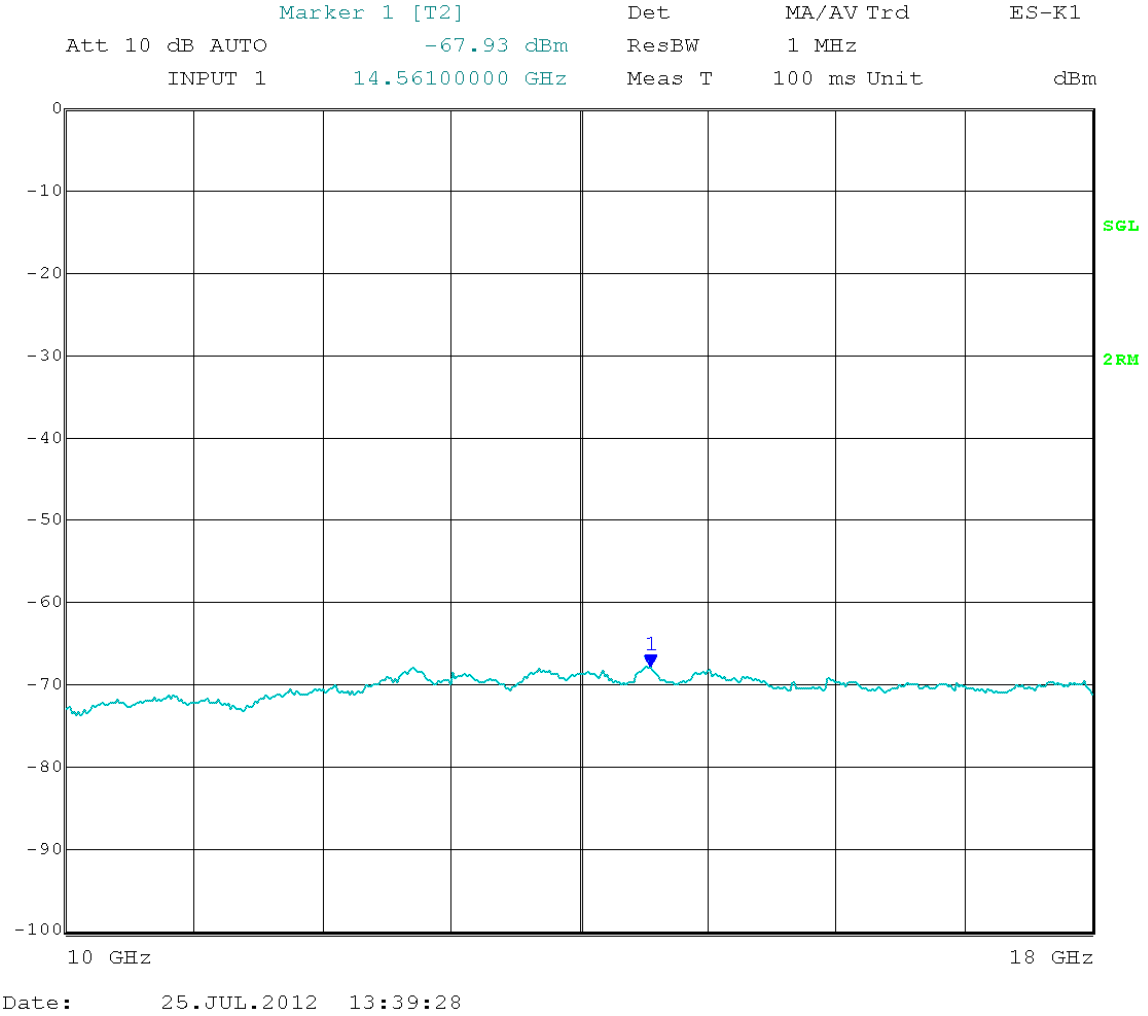
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 48	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -67.93 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 47.30 dBµV/m Average

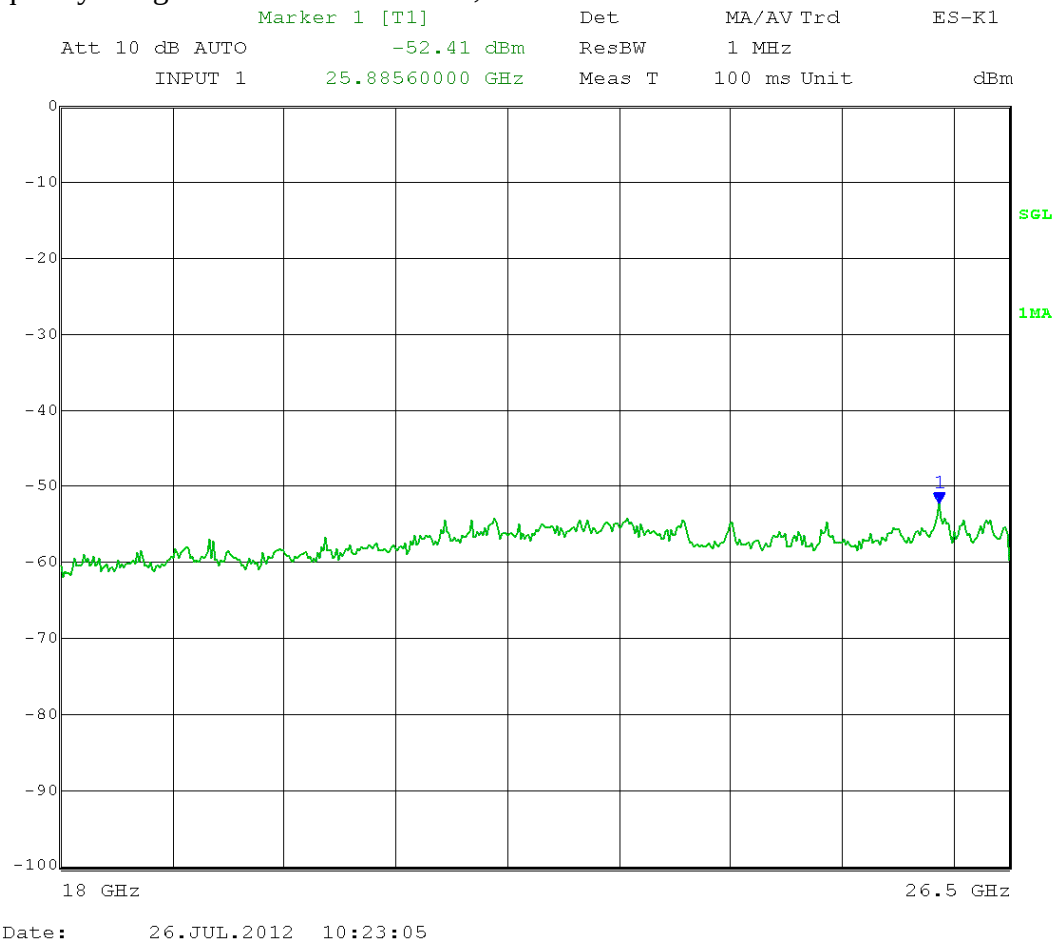
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 48	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Peak detector



Calculated EIRP at noise floor = -52.41 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -32.41 dBm
Calculated Field Strength at noise floor = -52.41 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 62.82 dBµV/m Peak

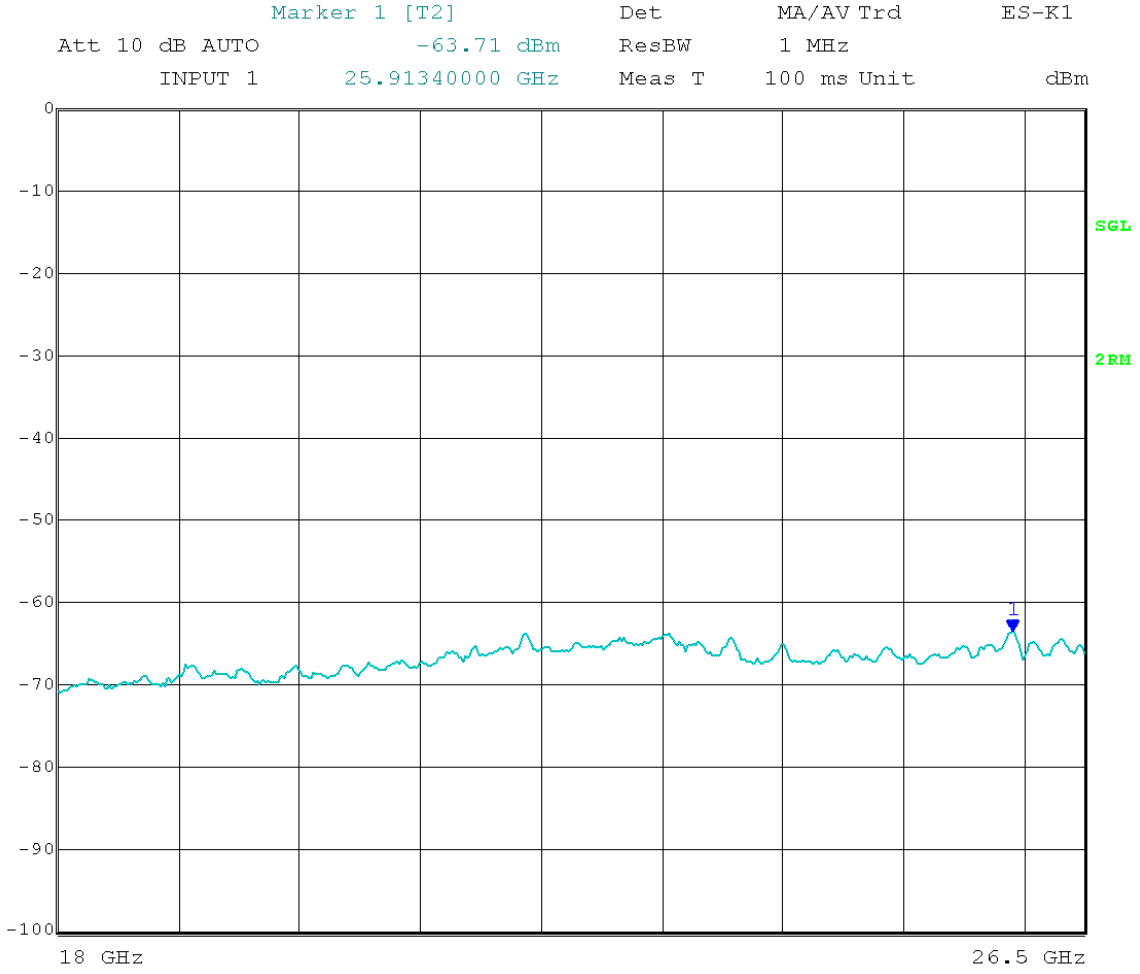
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 48	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -63.71 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 51.52 dBµV/m Average

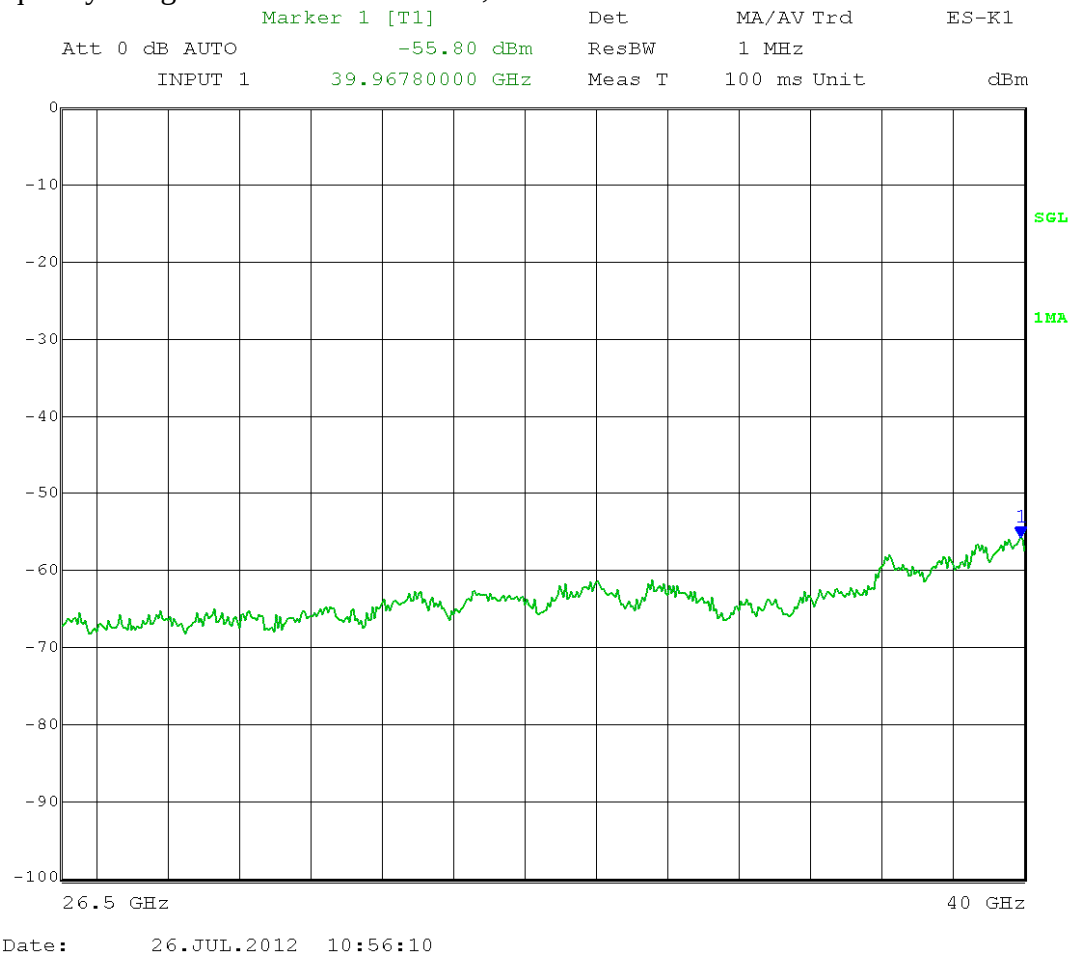
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 48	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Peak detector



Calculated EIRP at noise floor = -55.80 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -35.80 dBm
Calculated Field Strength at noise floor = -55.80 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 59.43 dBµV/m Peak

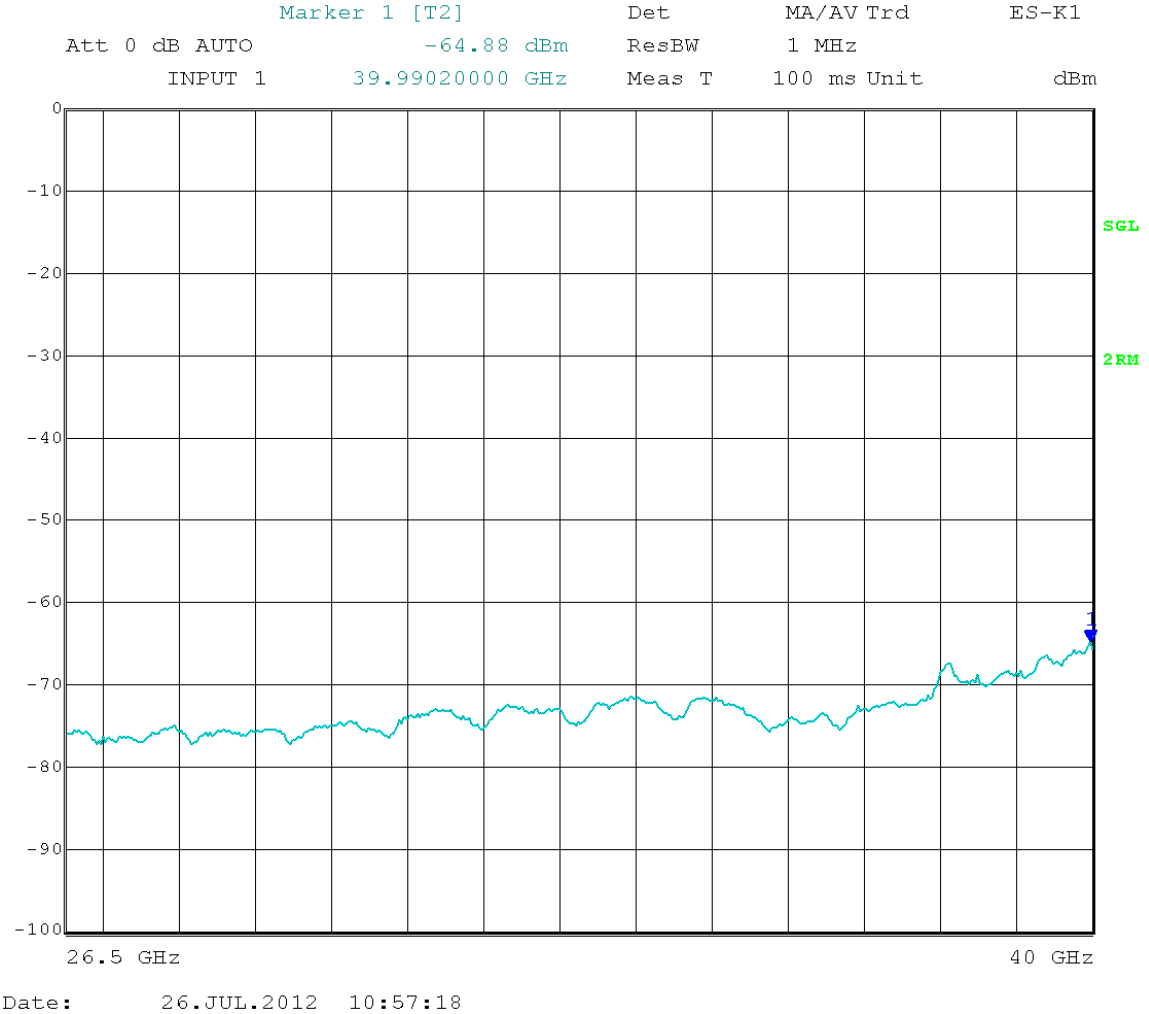
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 48	26 dB EBW: 19.44 MHz
Output port:	Channel A;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -64.88 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 50.35 dBµV/m Average

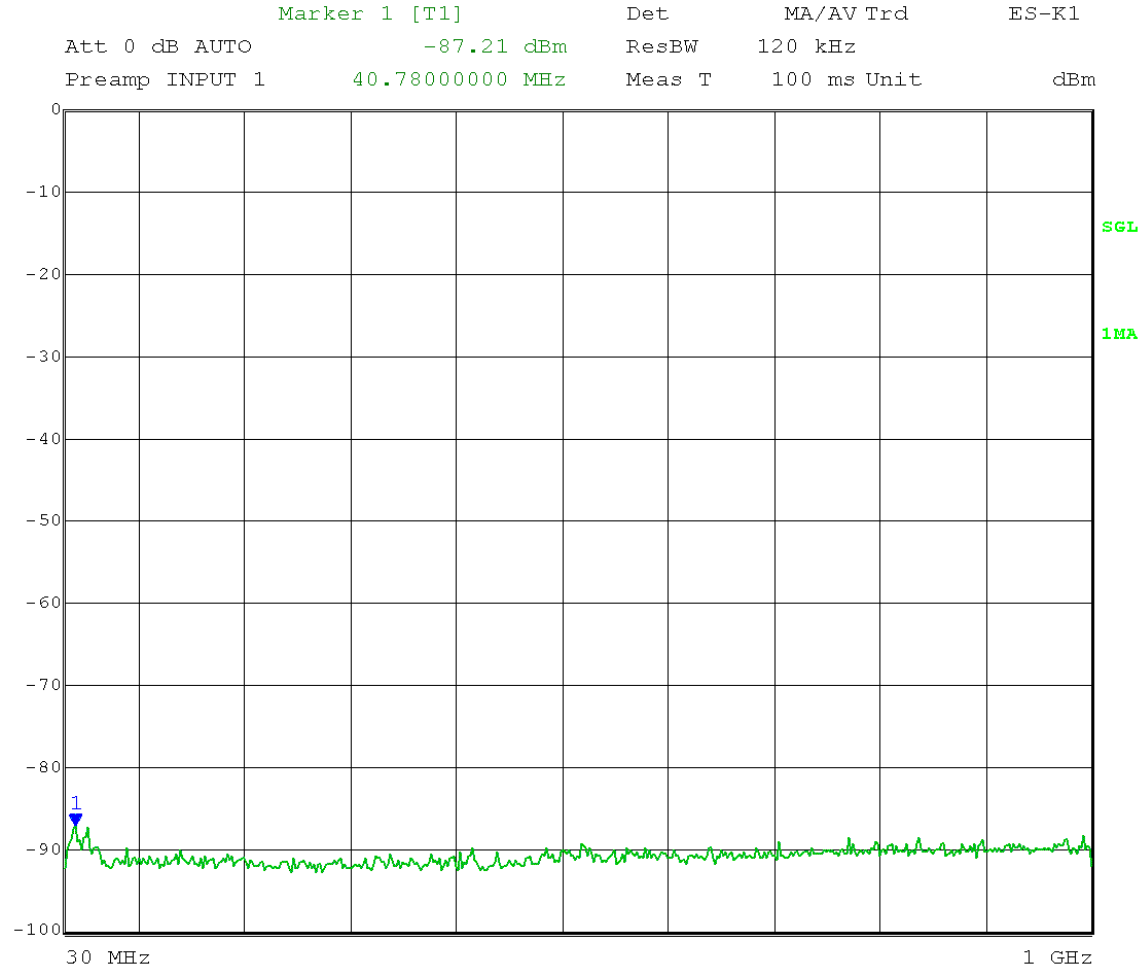
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 46	26 dB EBW: 19.44 MHz
Output port:	Channel A;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 30 MHz to 1 GHz; Peak detector



Date: 25.JUL.2012 12:56:14

No emissions found from 30 MHz to 1 GHz

Calculated Field Strength at noise floor = -87.21 dBm + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 + 4.7 dB = 32.72 dBµV/m Peak

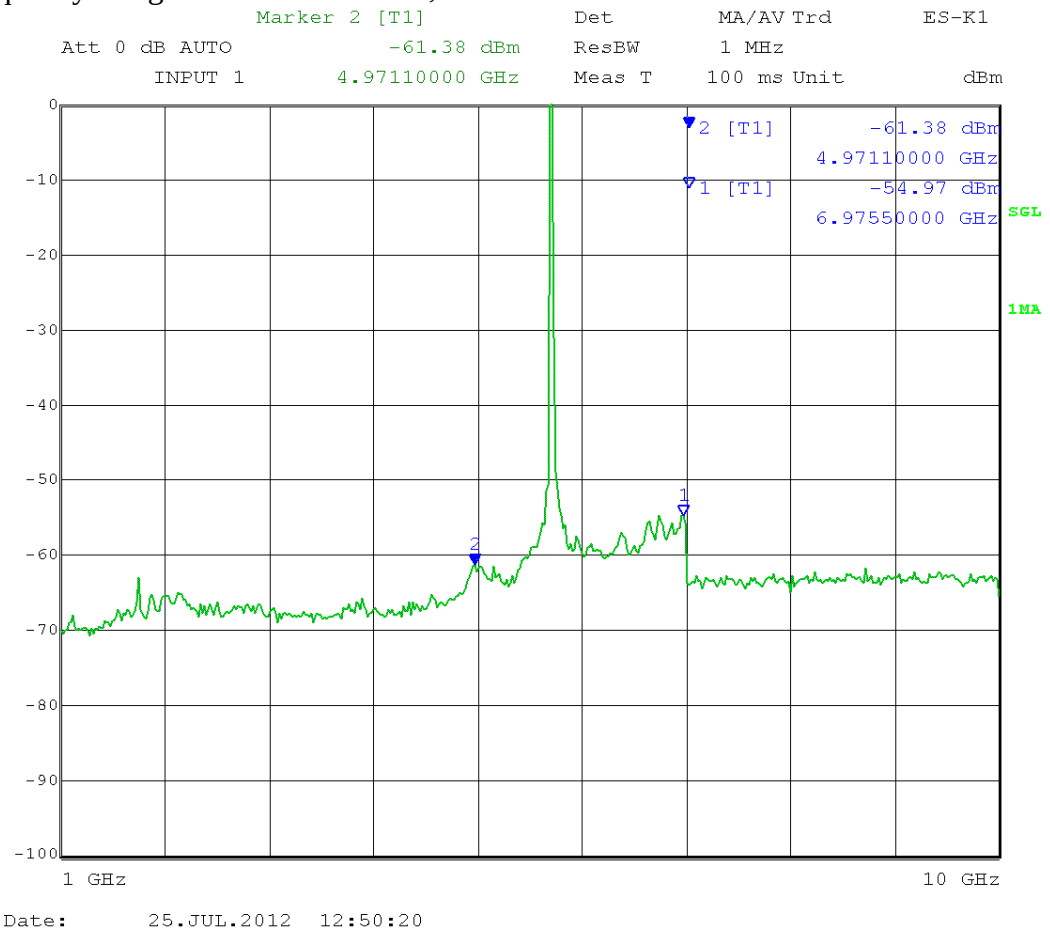
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 46	26 dB EBW: 19.44 MHz
Output port:	Channel A;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Peak detector



Marker 1: Calculated EIRP = -54.97 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -34.97 dBm

Marker 2: Calculated Field Strength (Restricted Band) = -61.38 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 53.85 dBµV/m Peak

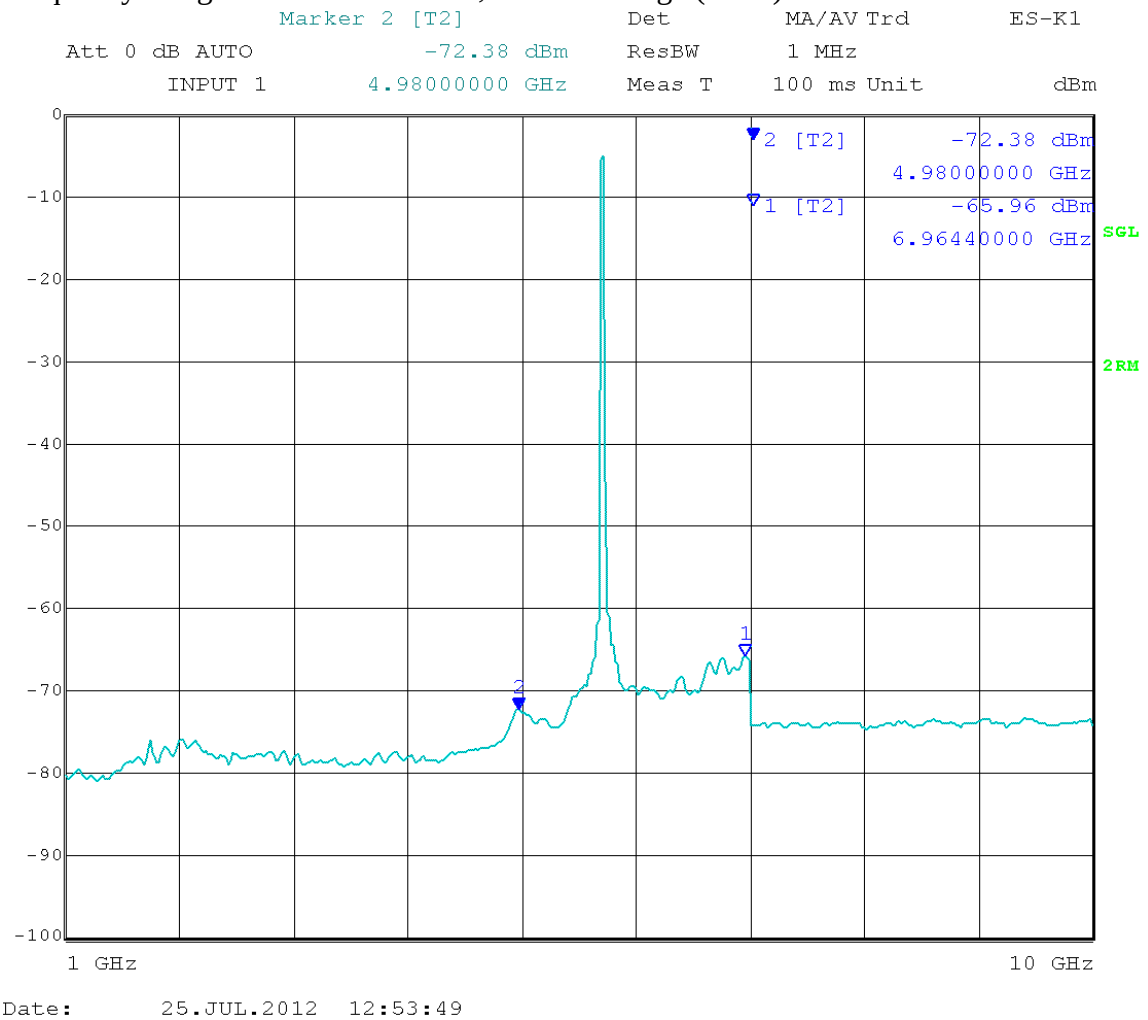
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 46	26 dB EBW: 19.44 MHz
Output port:	Channel A;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Average (RMS) detector



Marker 2: Calculated Field Strength (Restricted Band) = -72.38 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 42.85 dBµV/m Average

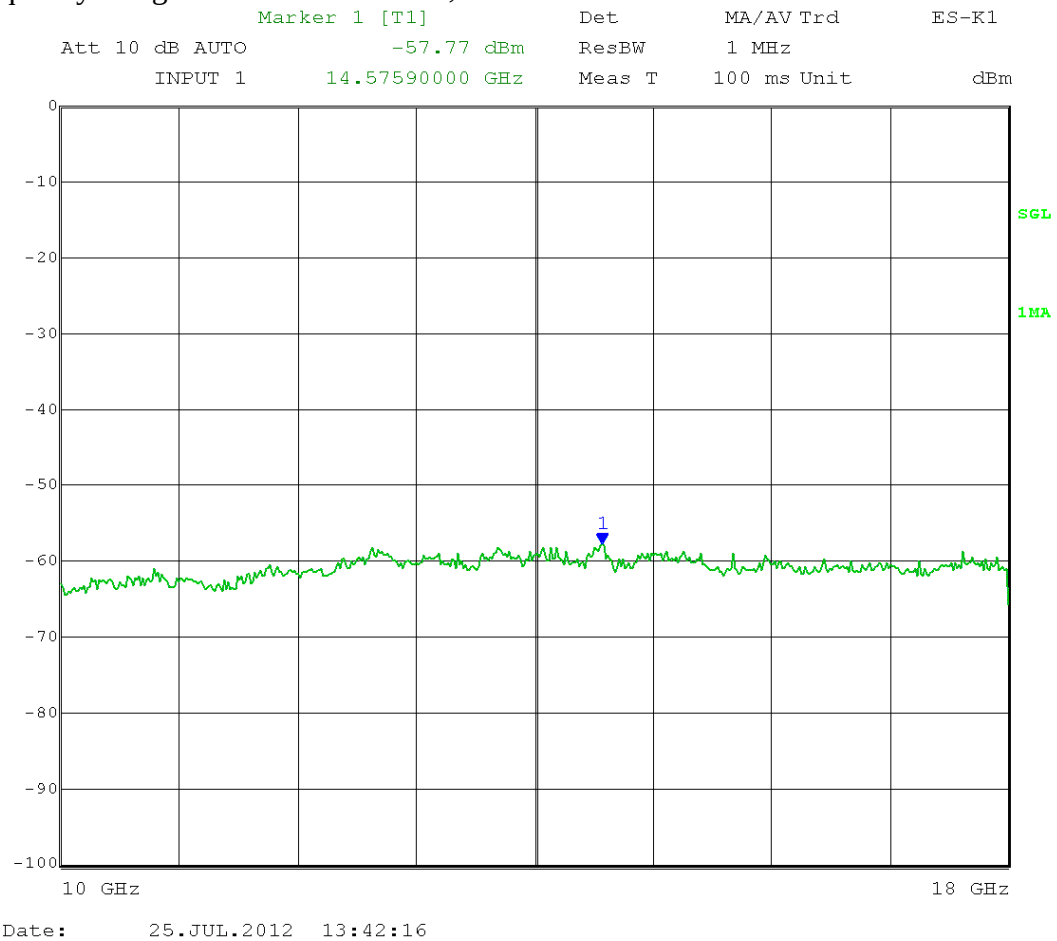
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 46	26 dB EBW: 19.44 MHz
Output port:	Channel A;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Peak detector



Calculated EIRP at noise floor = -57.77 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -37.77 dBm
Calculated Field Strength at noise floor = -57.77 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 57.46 dBµV/m Peak

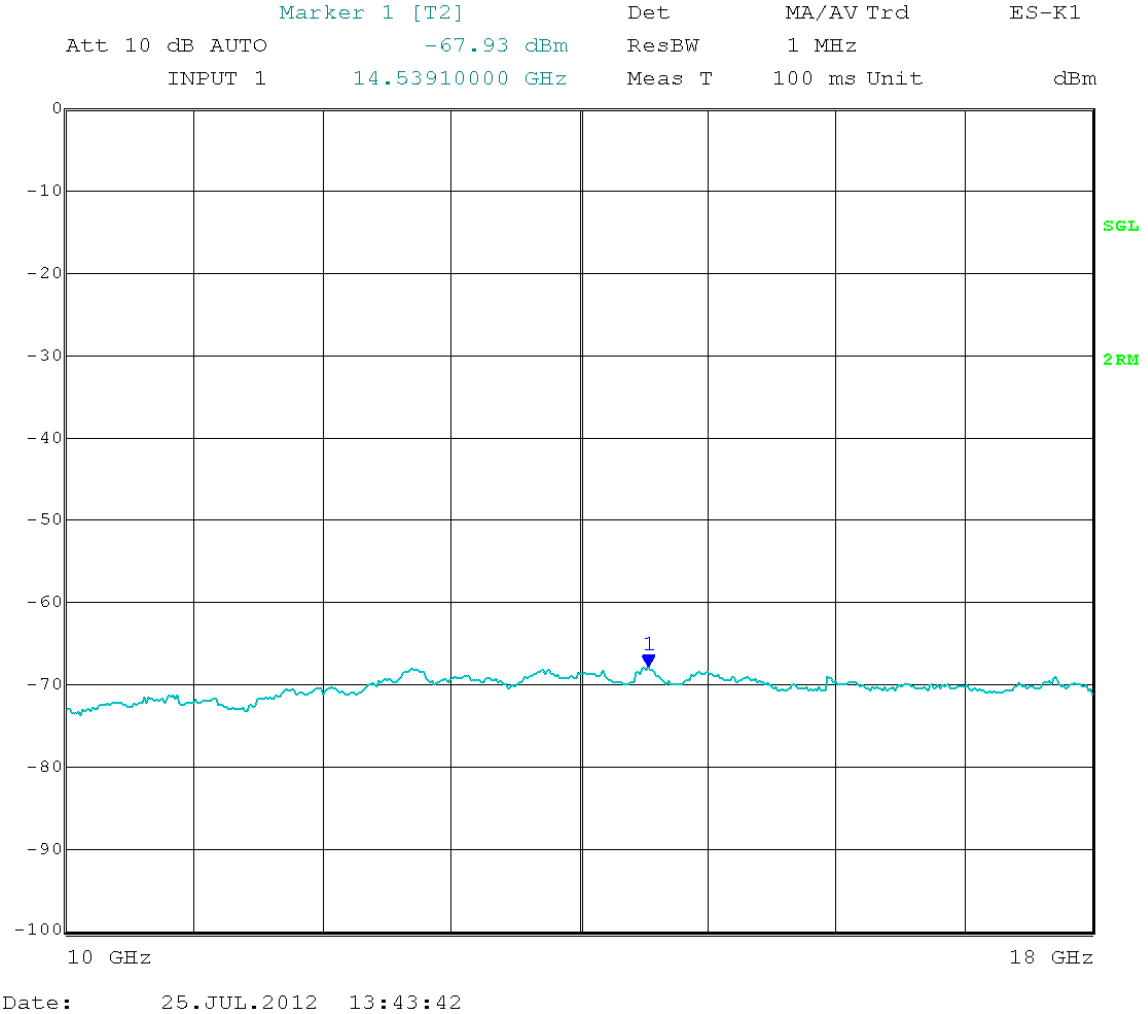
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 46	26 dB EBW: 19.44 MHz
Output port:	Channel A;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -67.93 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 47.30 dBµV/m Average

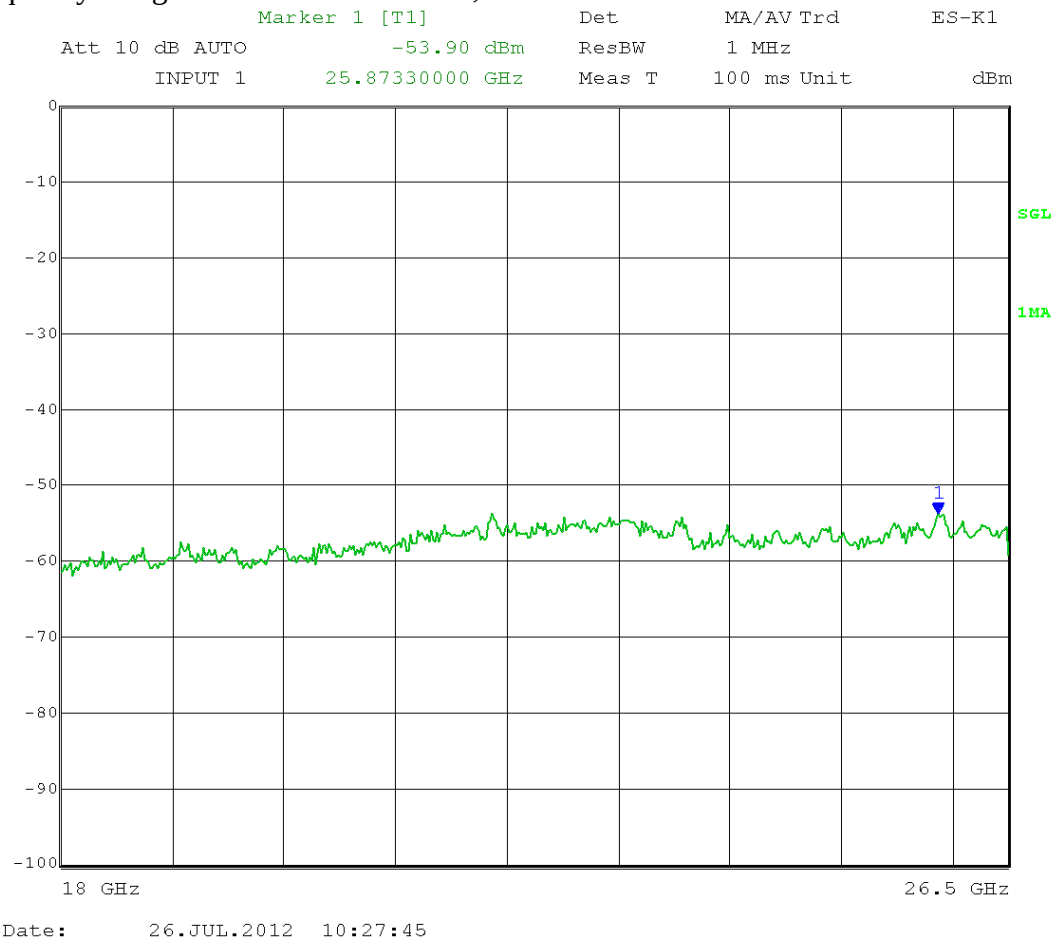
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 46	26 dB EBW: 19.44 MHz
Output port:	Channel A;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Peak detector



Calculated EIRP at noise floor = -53.90 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -33.90 dBm
Calculated Field Strength at noise floor = -53.90 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 61.33 dBµV/m Peak

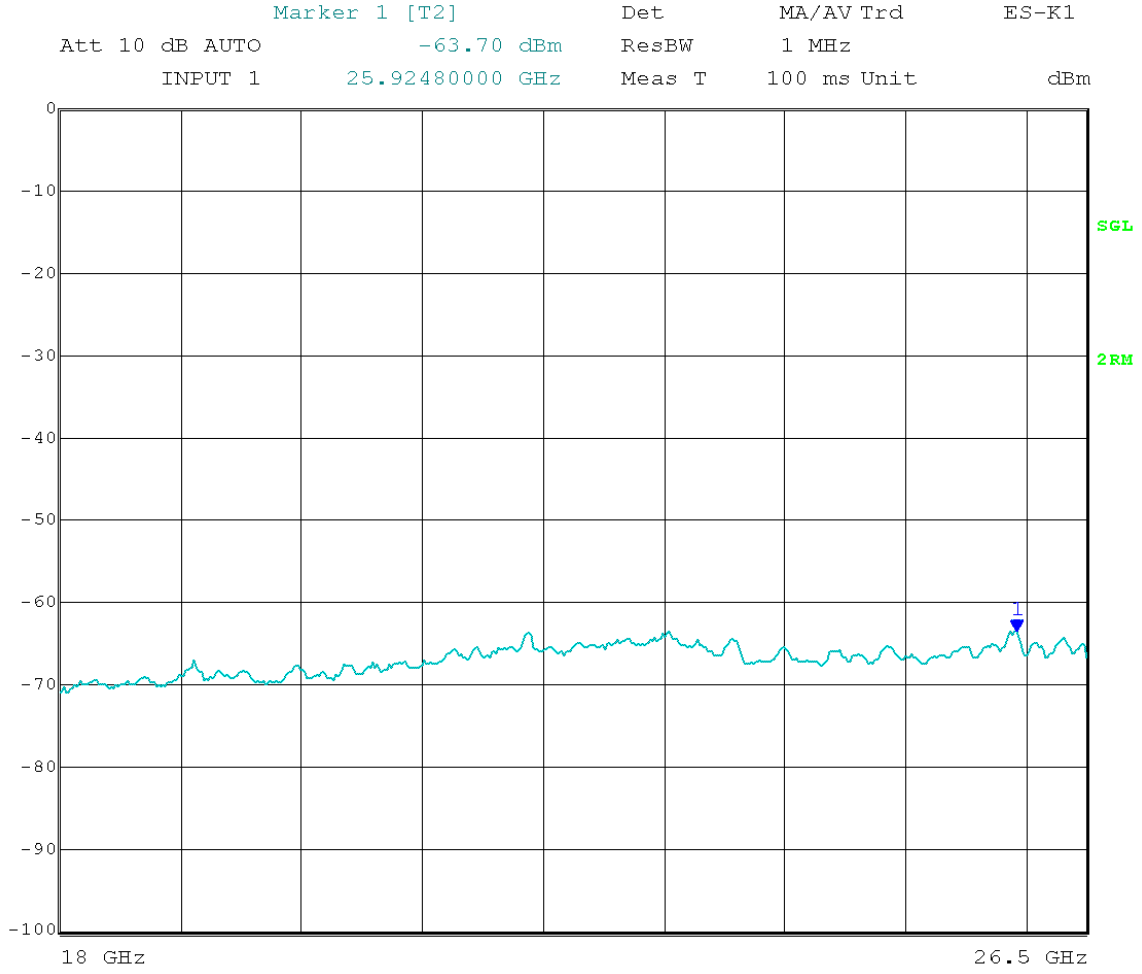
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 46	26 dB EBW: 19.44 MHz
Output port:	Channel A;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -63.70 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 51.53 dBµV/m Average

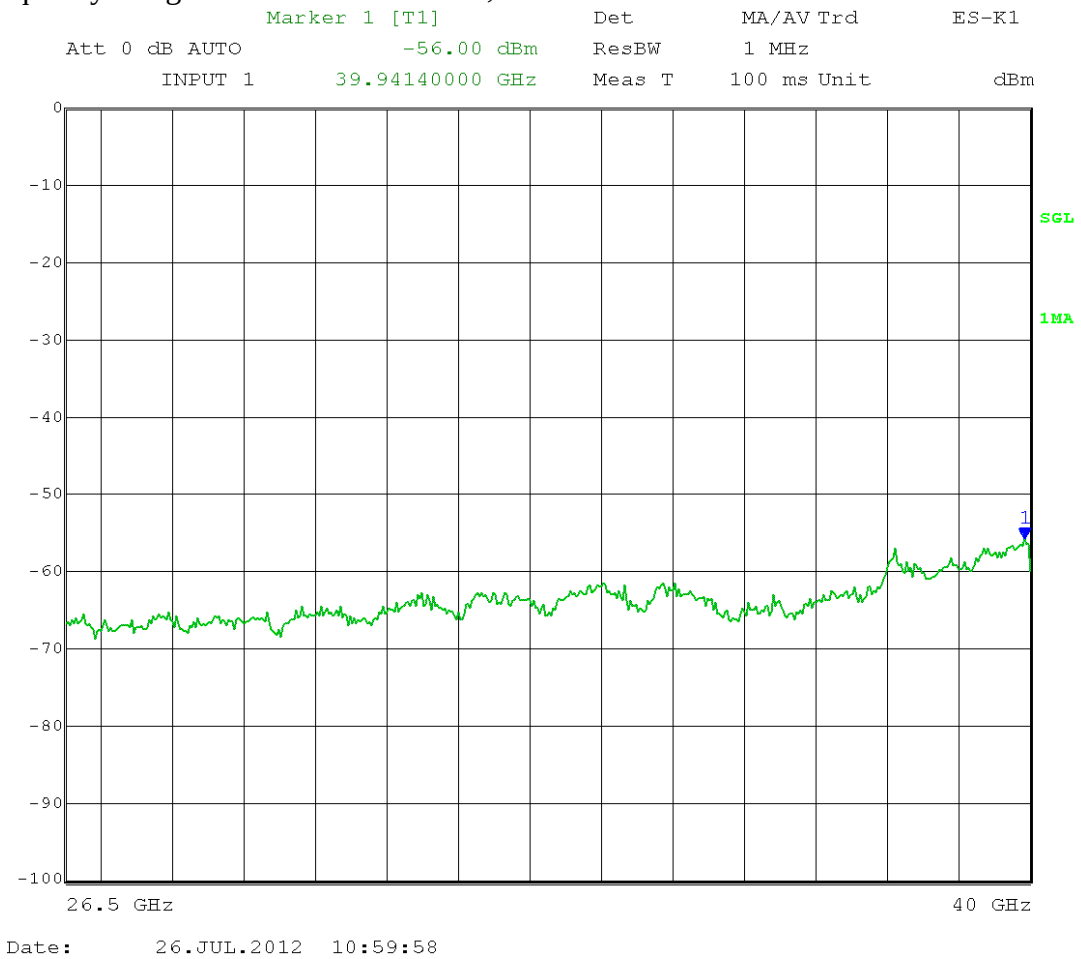
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 46	26 dB EBW: 19.44 MHz
Output port:	Channel A;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Peak detector



Calculated EIRP at noise floor = -56.00 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -36.00 dBm
Calculated Field Strength at noise floor = -56.00 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 59.23 dBµV/m Peak

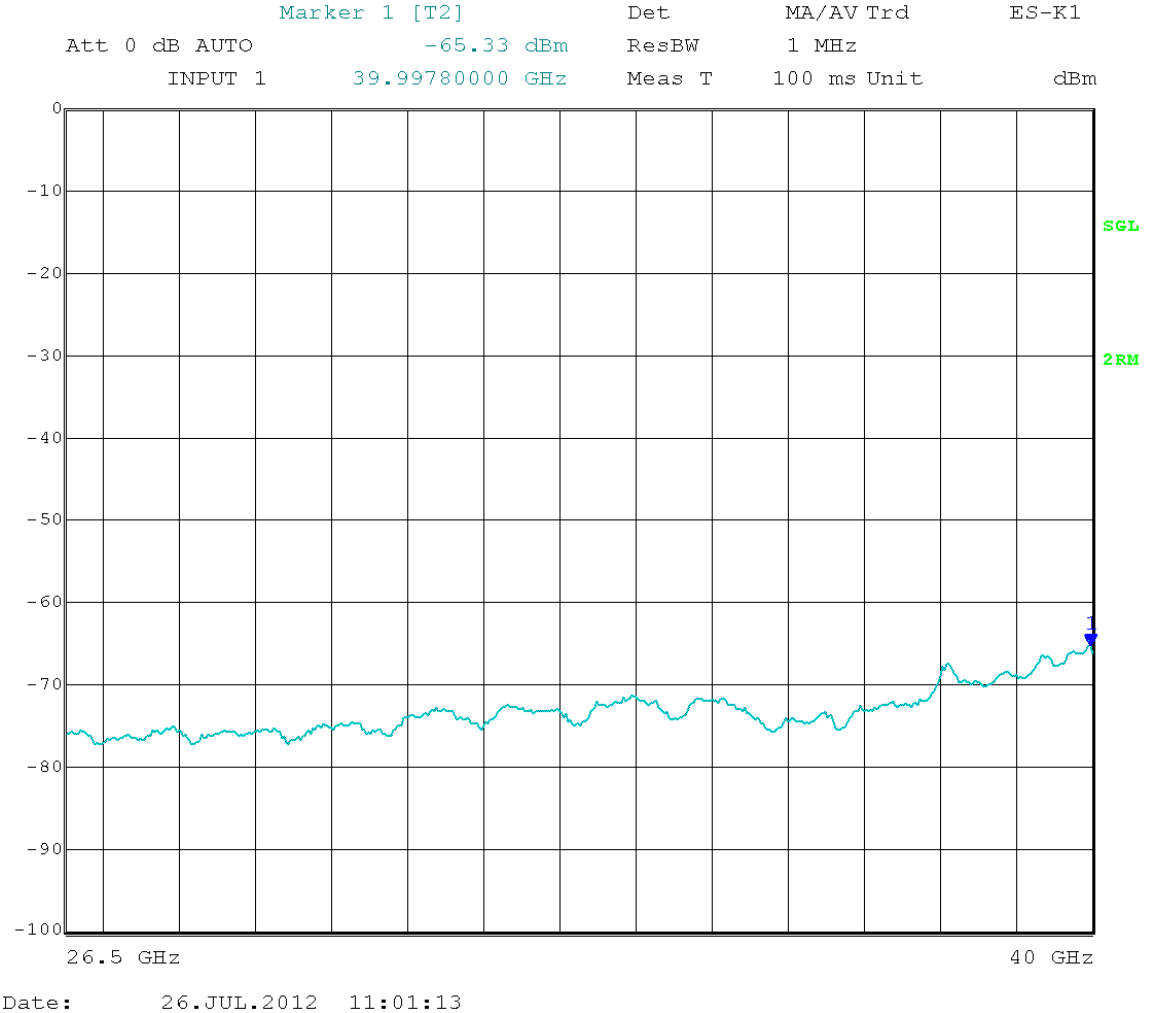
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 46	26 dB EBW: 19.44 MHz
Output port:	Channel A;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -65.33 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 49.90 dBµV/m Average

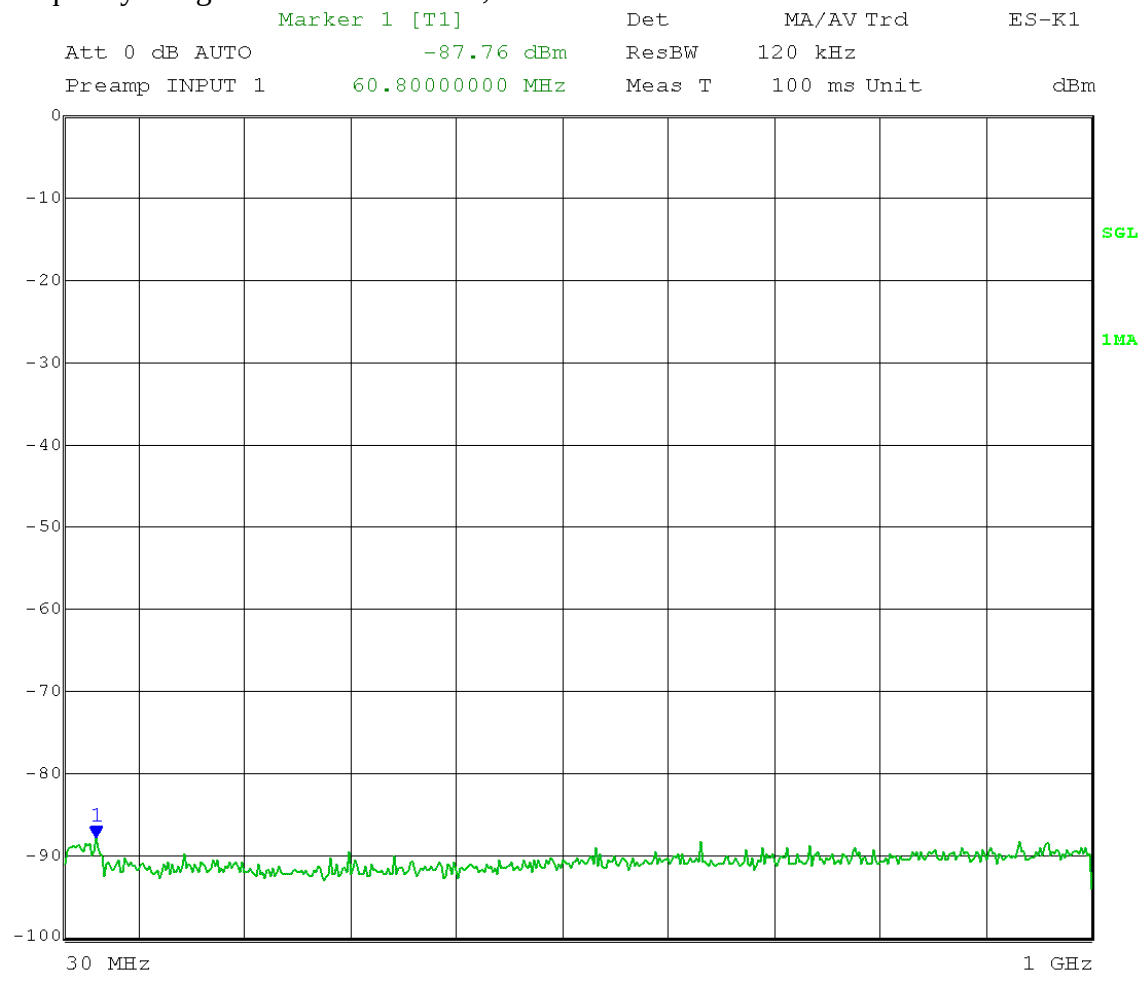
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 45	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 30 MHz to 1 GHz; Peak detector



Date: 25.JUL.2012 11:06:08

No emissions found from 30 MHz to 1 GHz

Calculated Field Strength at noise floor = -87.76 dBm + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 + 4.7 dB = 32.17 dBµV/m Peak

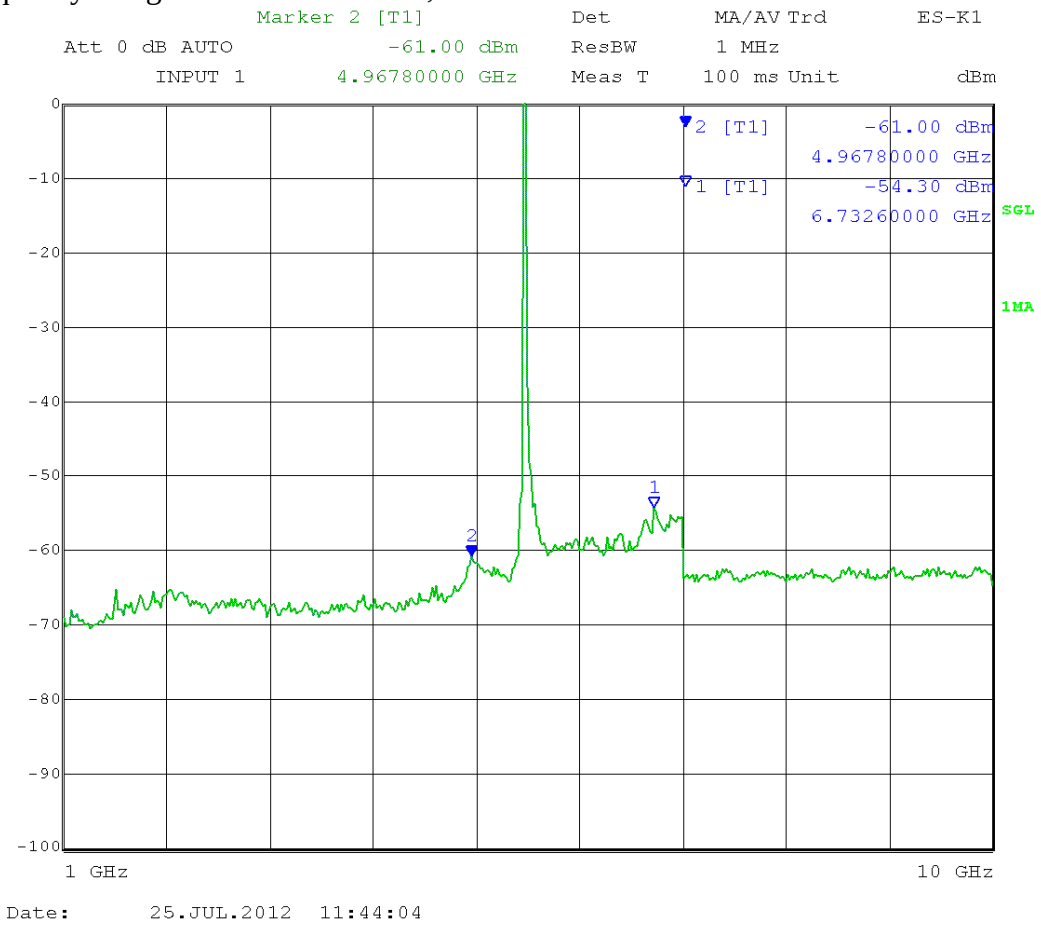
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 45	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Peak detector



Marker 1: Calculated EIRP = -54.30 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -34.30 dBm
Marker 2: Calculated Field Strength (Restricted Band) = -61.00 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 54.23 dBµV/m Peak

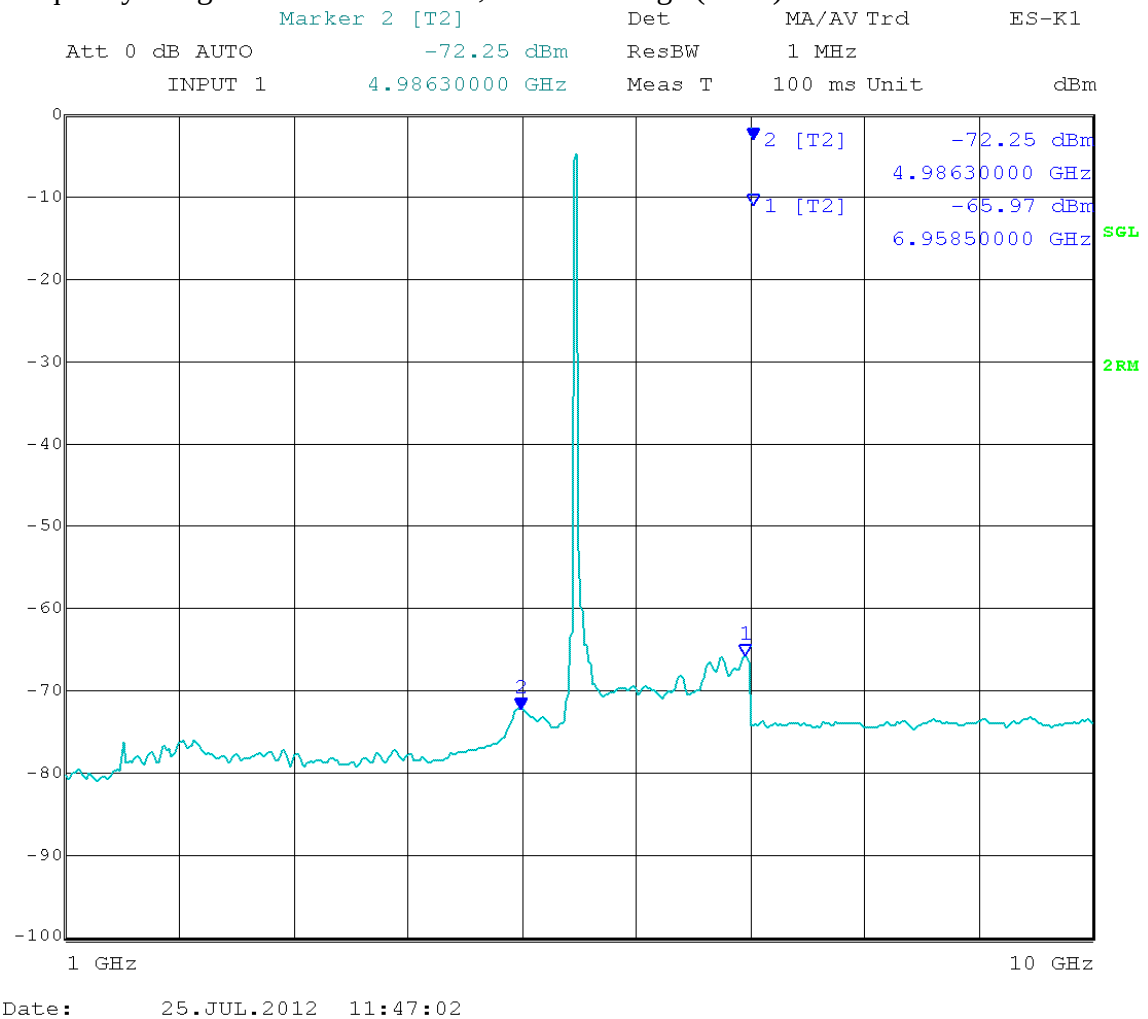
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 45	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Average (RMS) detector



Marker 2: Calculated Field Strength (Restricted Band) = -72.25 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 42.98 dBµV/m Average

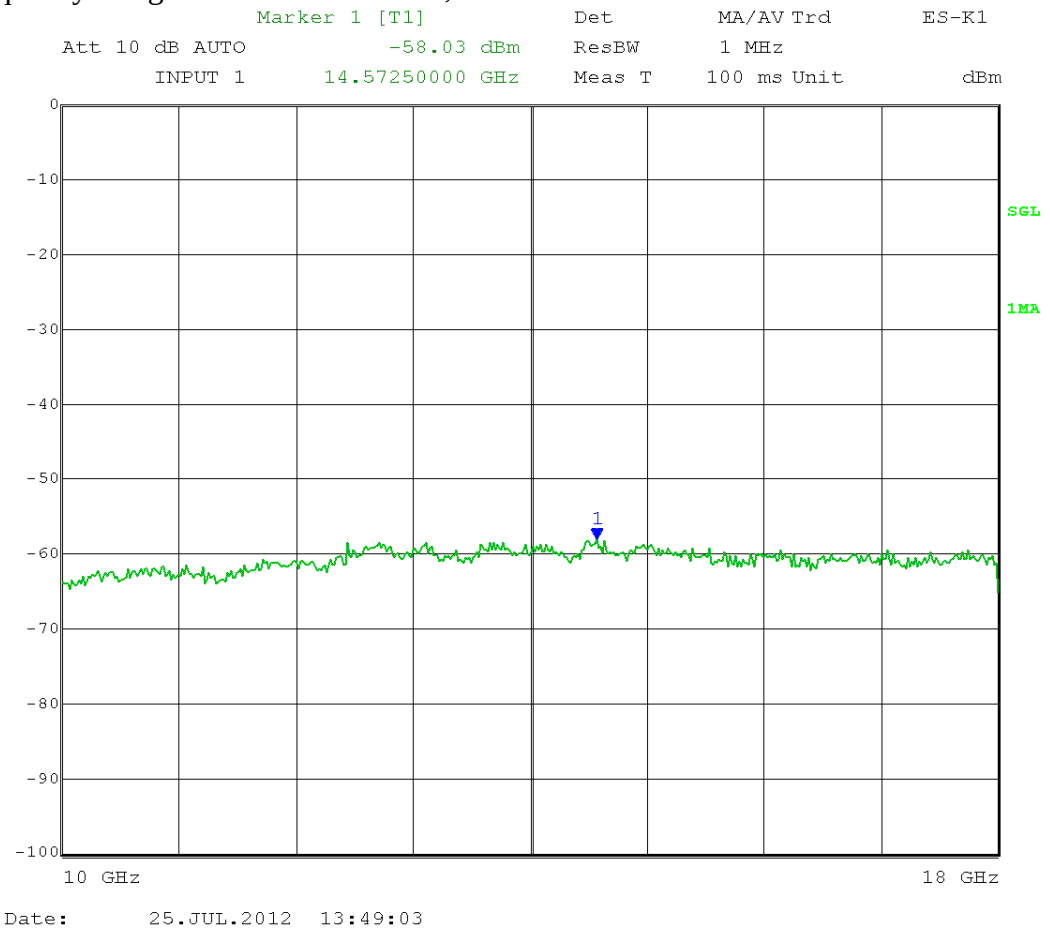
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 45	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Peak detector



Calculated EIRP at noise floor = -58.03 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -38.03 dBm
Calculated Field Strength at noise floor = -58.03 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 57.20 dBµV/m Peak

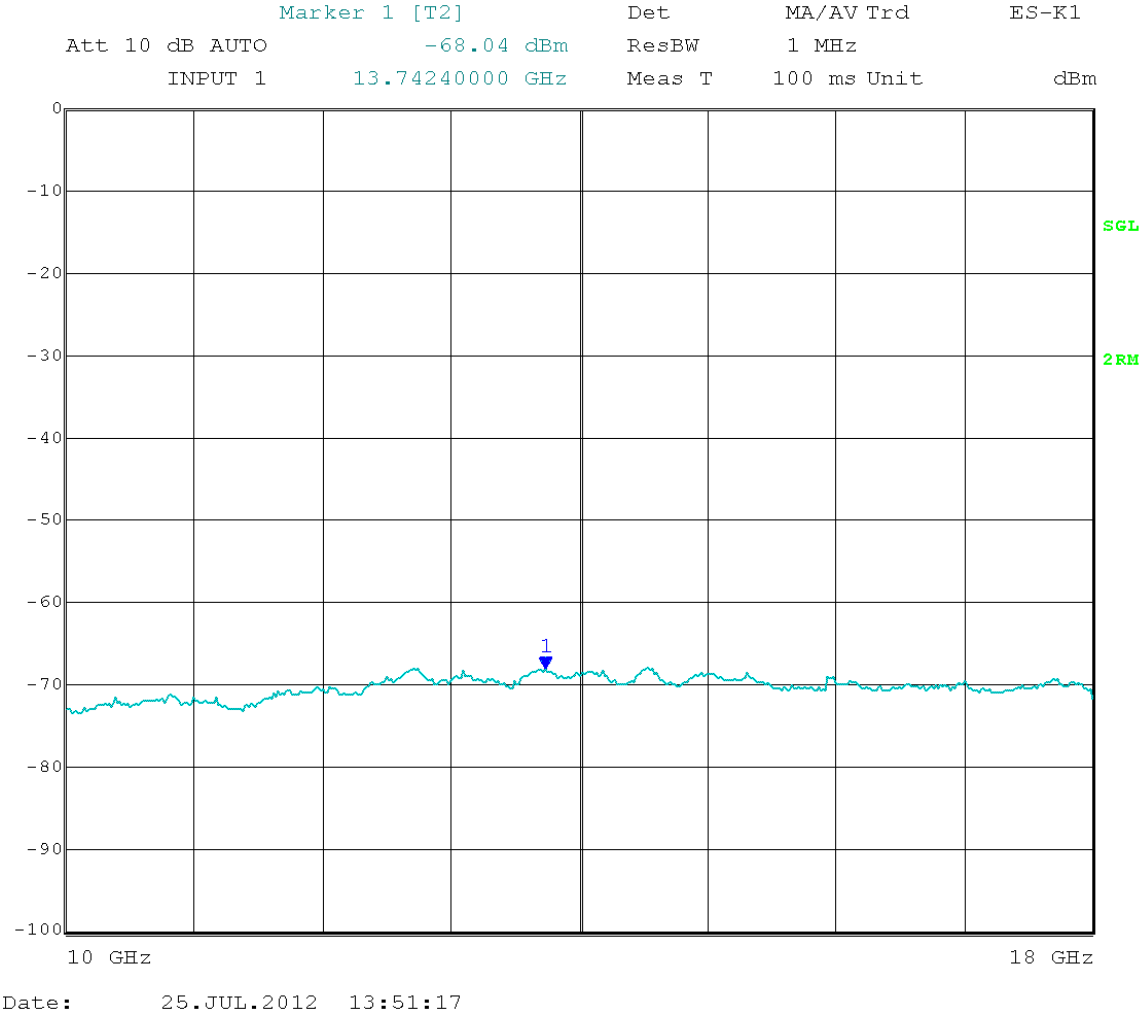
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 45	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -68.04 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 47.19 dBµV/m Average

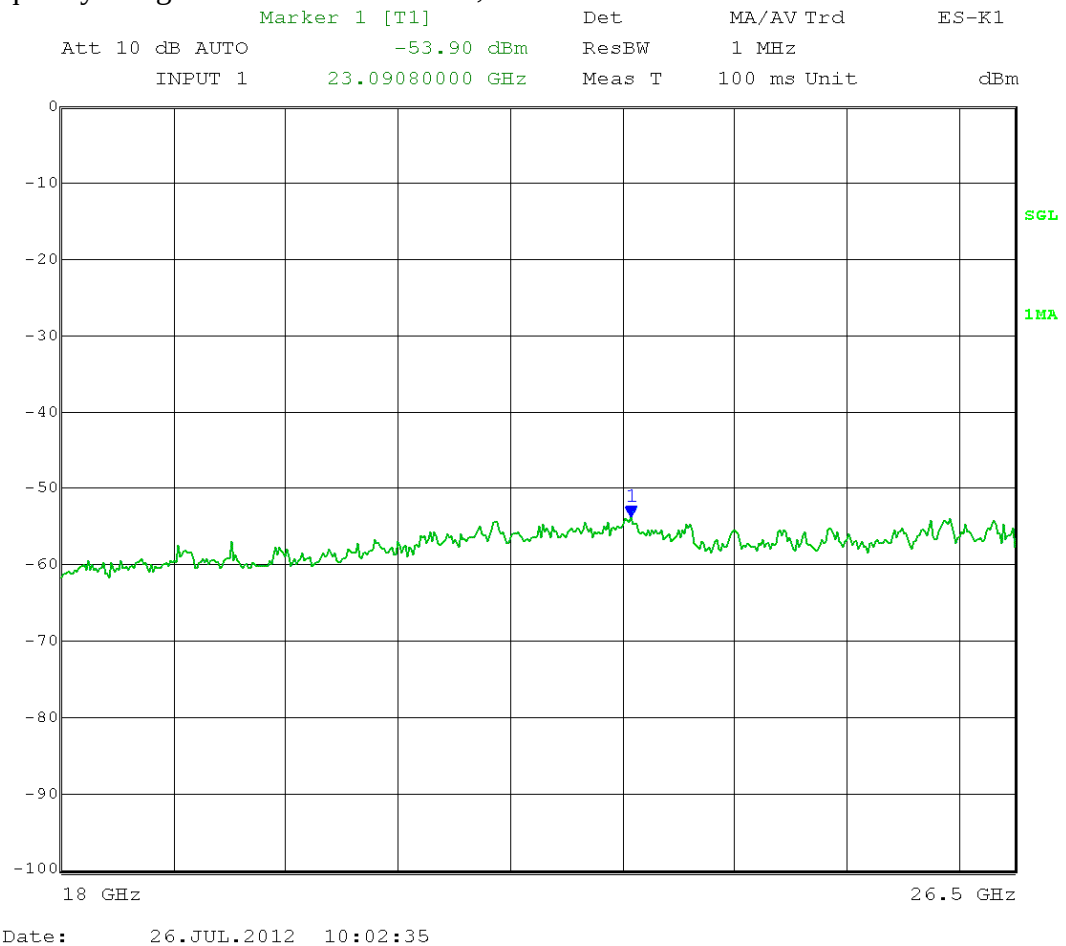
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 45	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Peak detector



Calculated EIRP at noise floor = -53.90 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -33.90 dBm
Calculated Field Strength at noise floor = -53.90 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 61.33 dBµV/m Peak

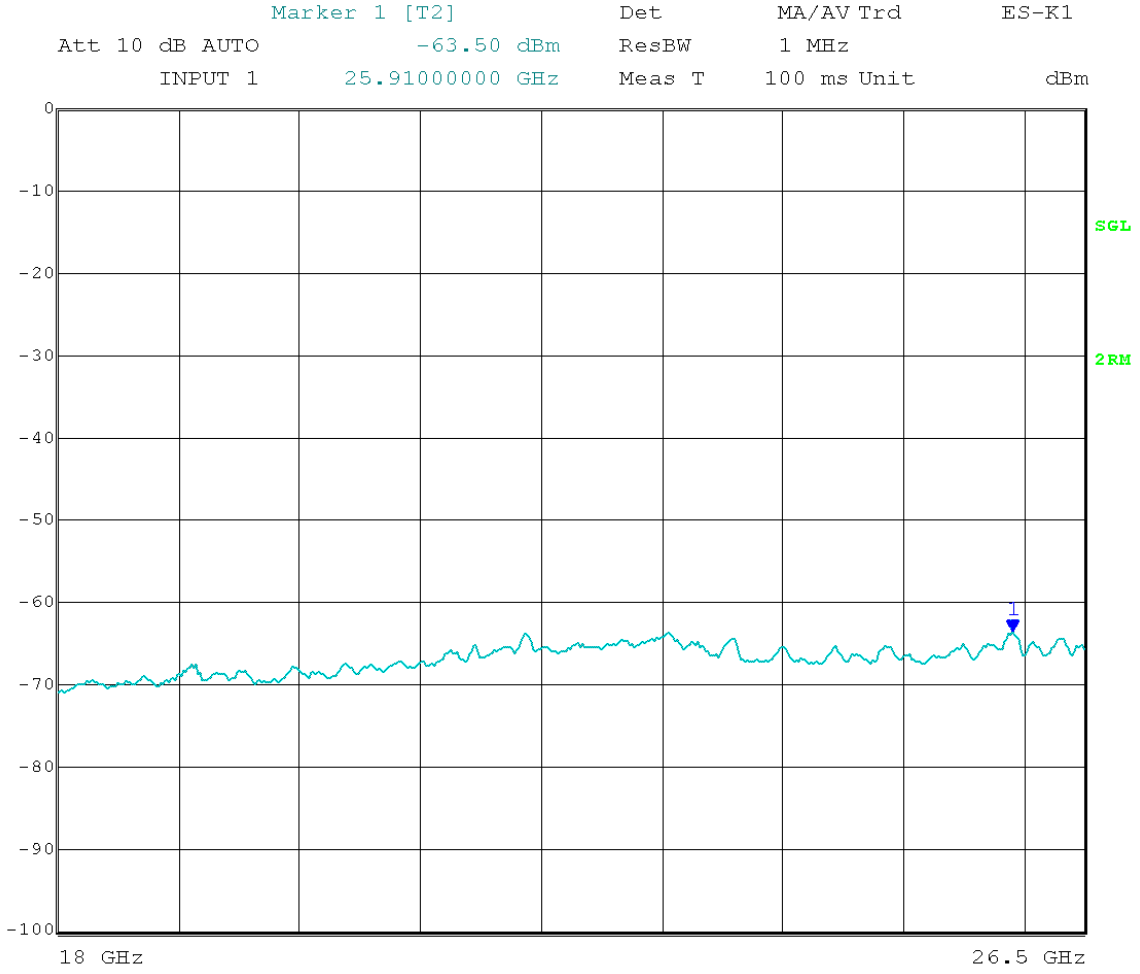
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 45	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -63.50 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 51.73 dBµV/m Average

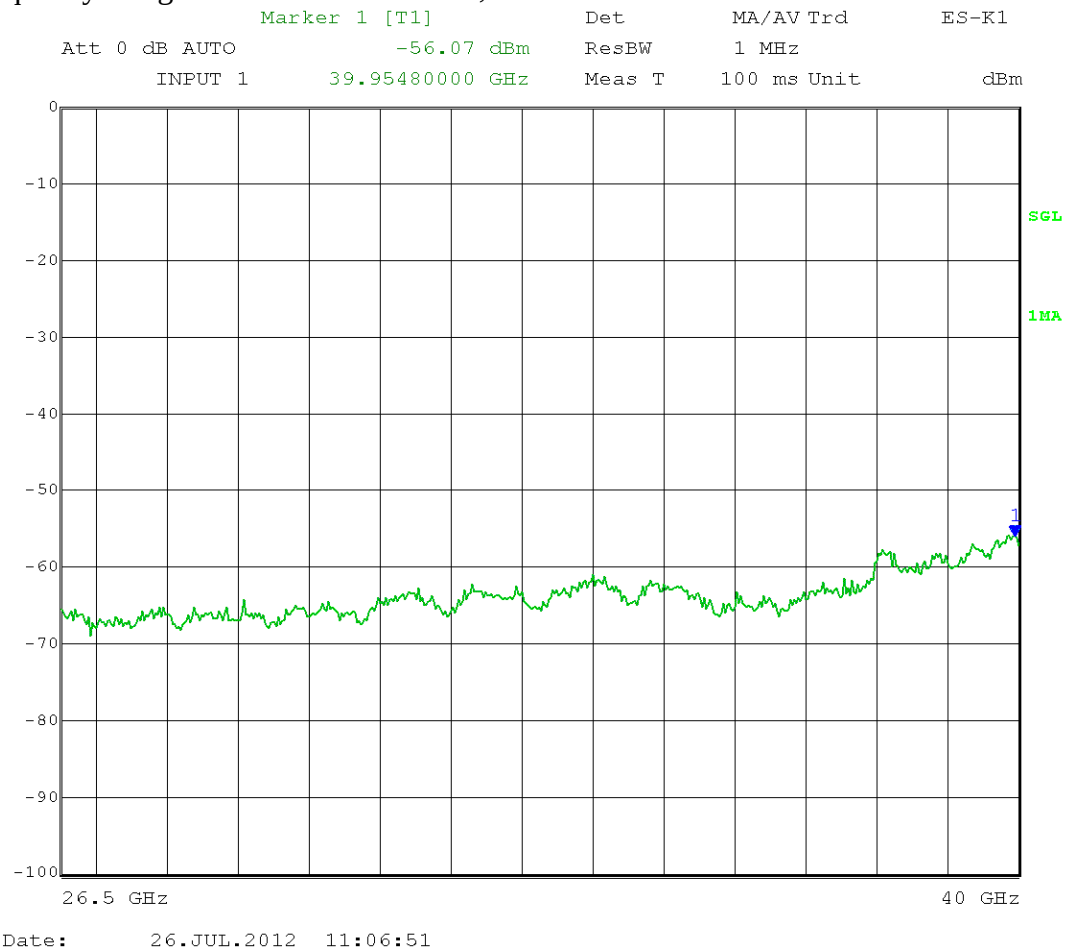
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 45	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Peak detector



Calculated EIRP at noise floor = -56.07 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -36.07 dBm
Calculated Field Strength at noise floor = -56.07 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 59.16 dBµV/m Peak

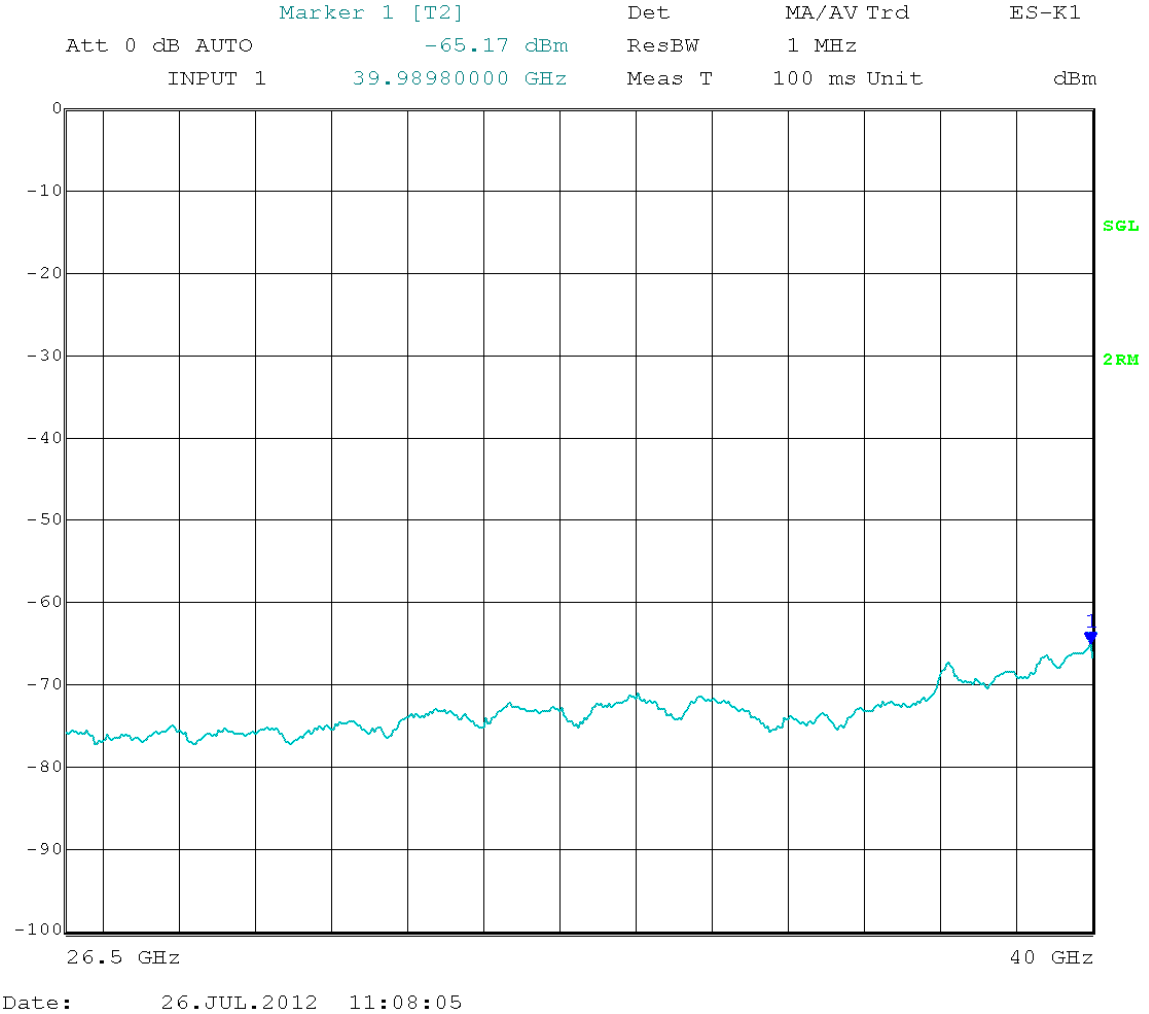
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 45	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Low Channel Frequency:	5.480 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -65.17 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 50.06 dBµV/m Average

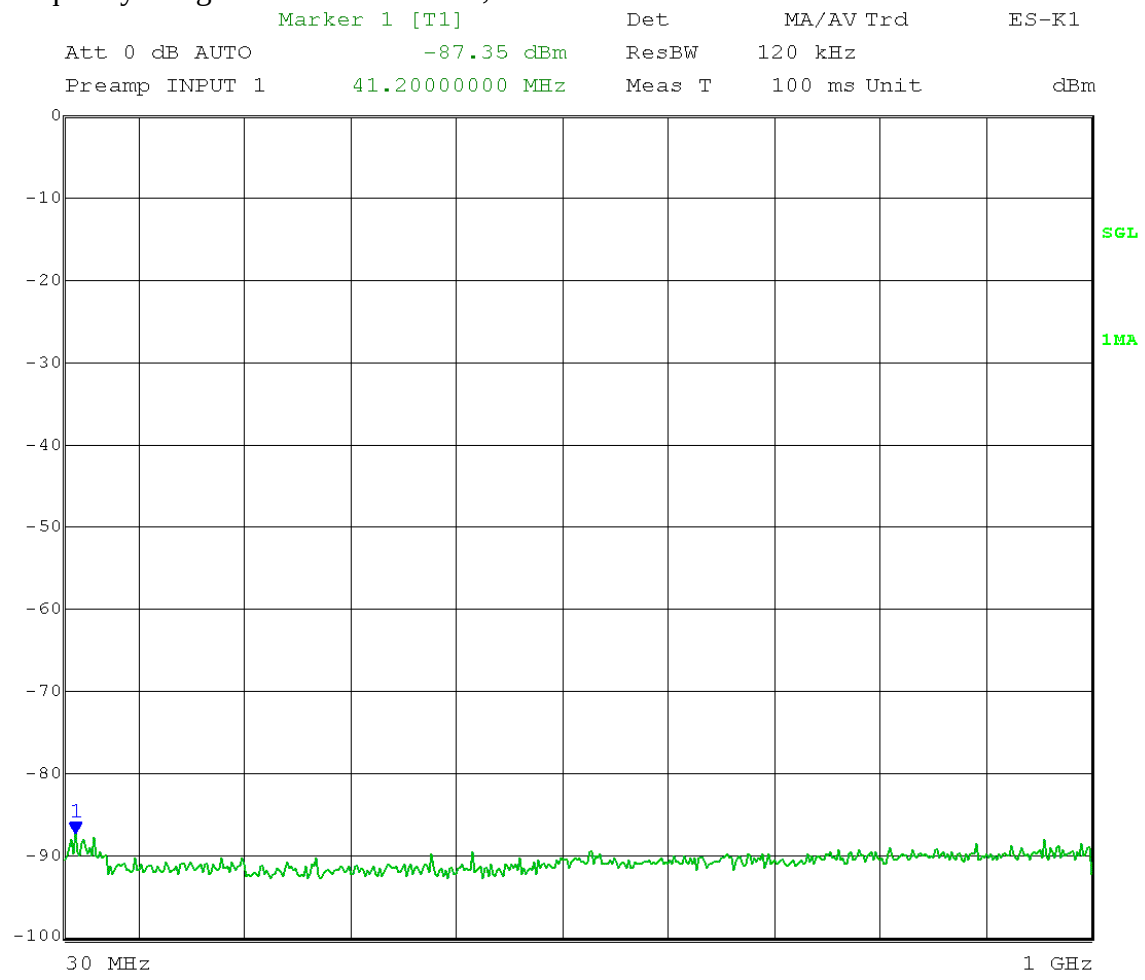
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4C	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 30 MHz to 1 GHz; Peak detector



Date: 25.JUL.2012 11:09:11

No emissions found from 30 MHz to 1 GHz

Calculated Field Strength at noise floor = -87.35 dBm + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 + 4.7 dB = 32.58 dBµV/m Peak

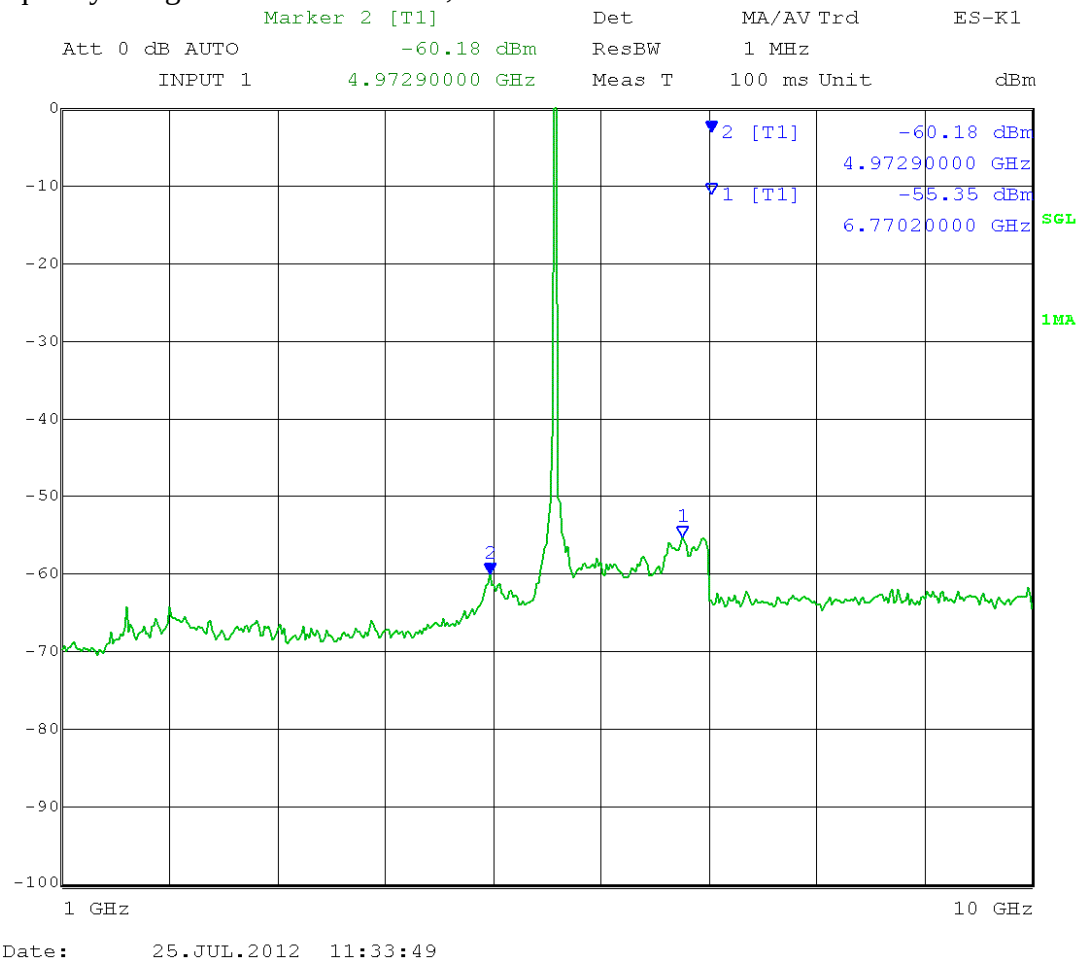
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4c	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Peak detector



Marker 1: Calculated EIRP = -55.35 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -35.35 dBm
Marker 2: Calculated Field Strength (Restricted Band) = -60.18 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 55.05 dBµV/m Peak

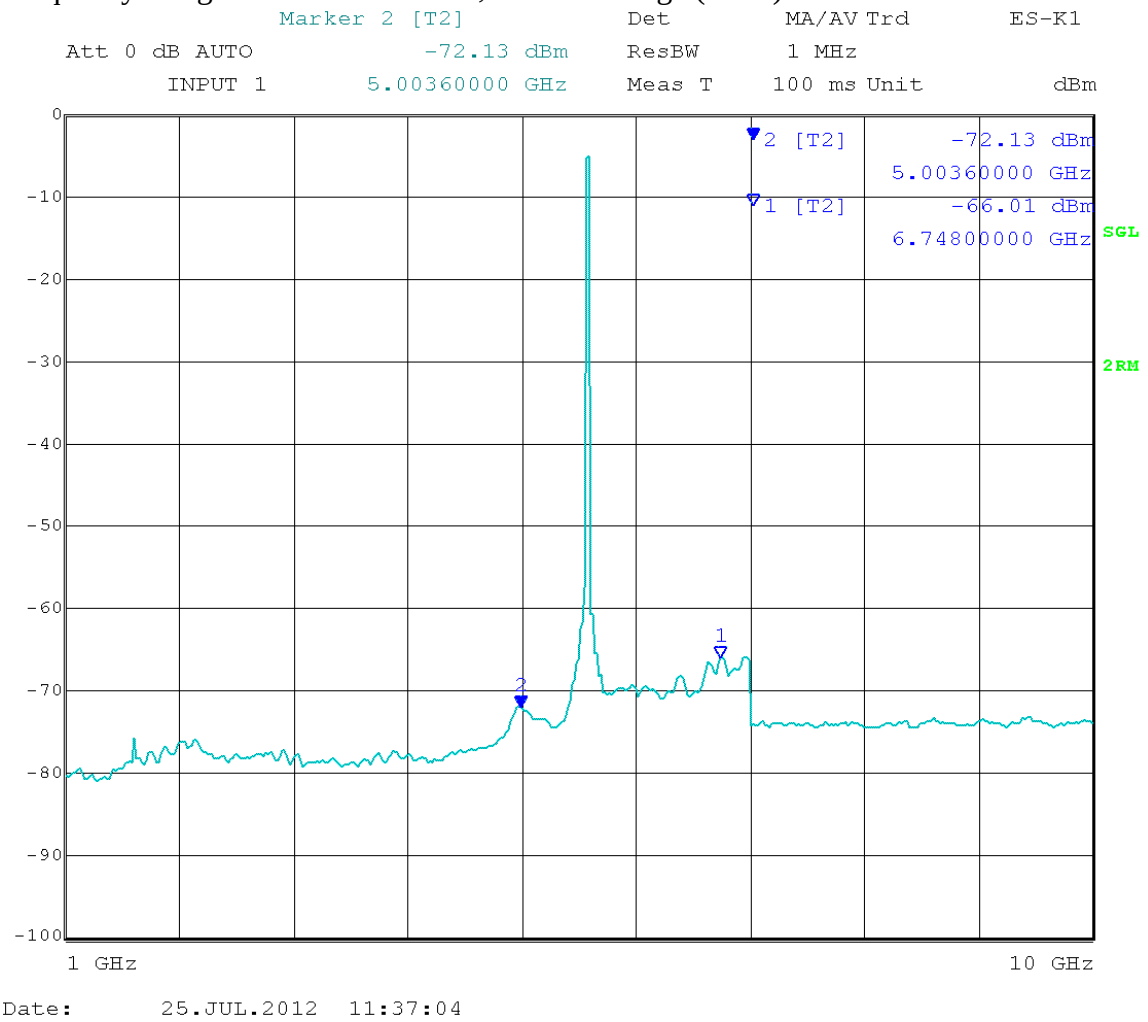
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4c	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Average (RMS) detector



Marker 2: Calculated Field Strength (Restricted Band) = -72.13 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 43.10 dBµV/m Average

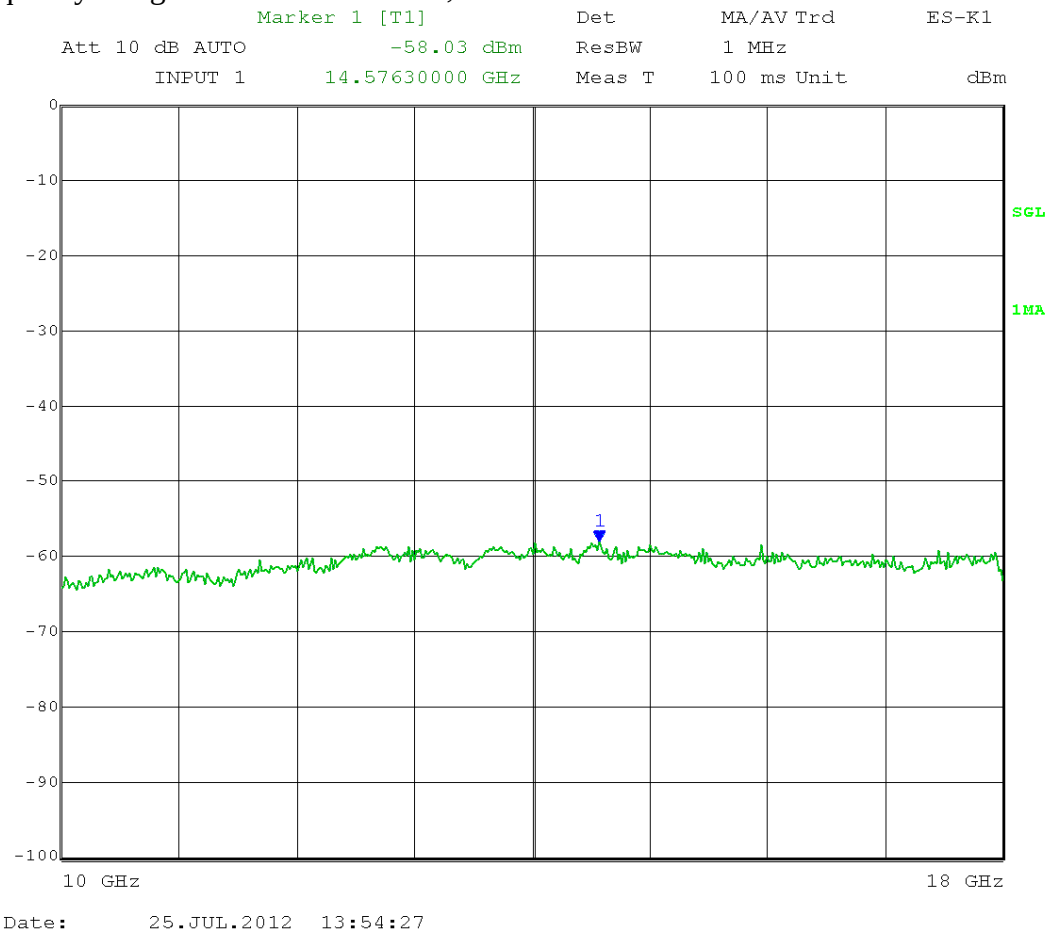
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4c	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Peak detector



Calculated EIRP at noise floor = -58.03 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -38.03 dBm
Calculated Field Strength at noise floor = -58.03 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 57.20 dBµV/m Peak

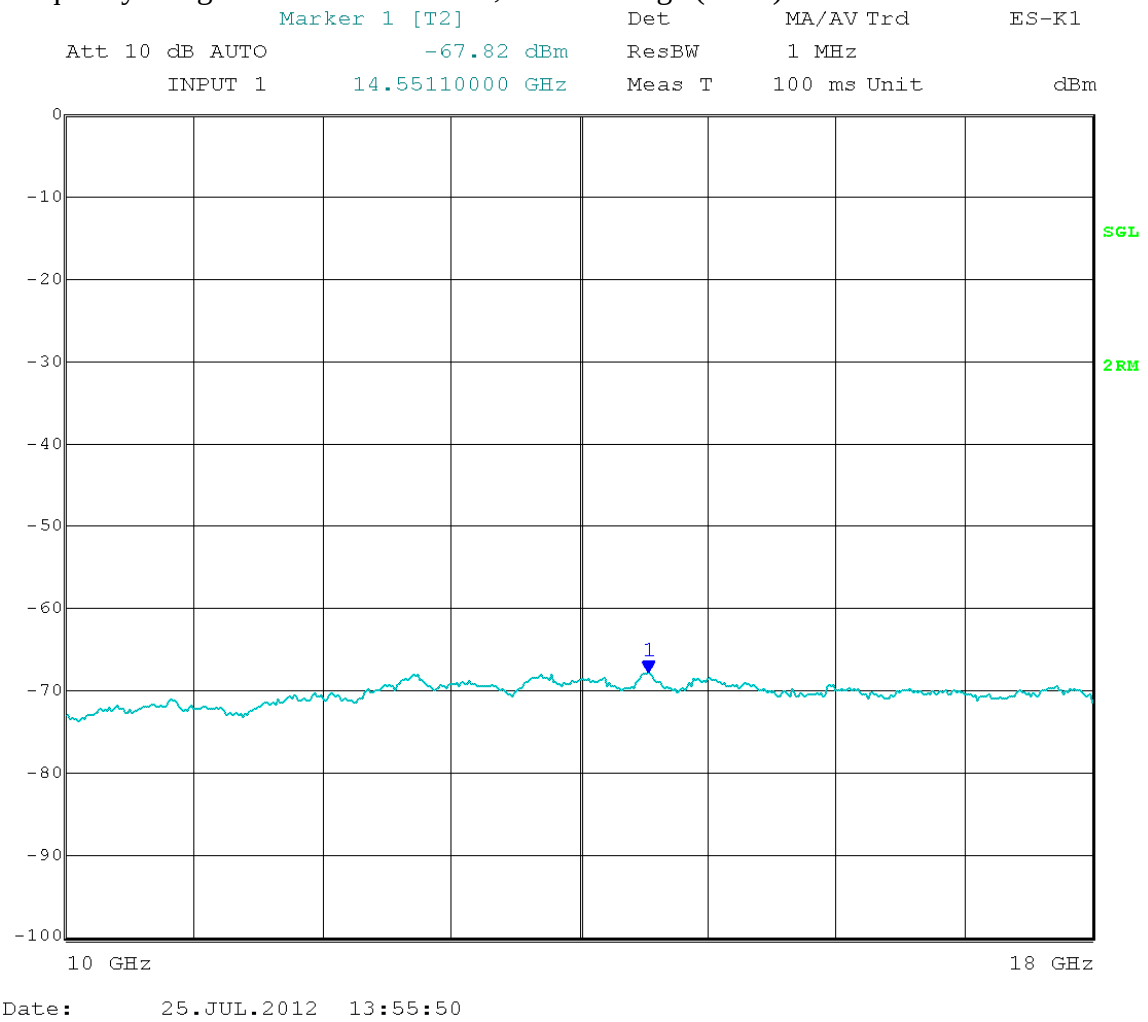
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4c	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -67.82 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 47.41 dBµV/m Average

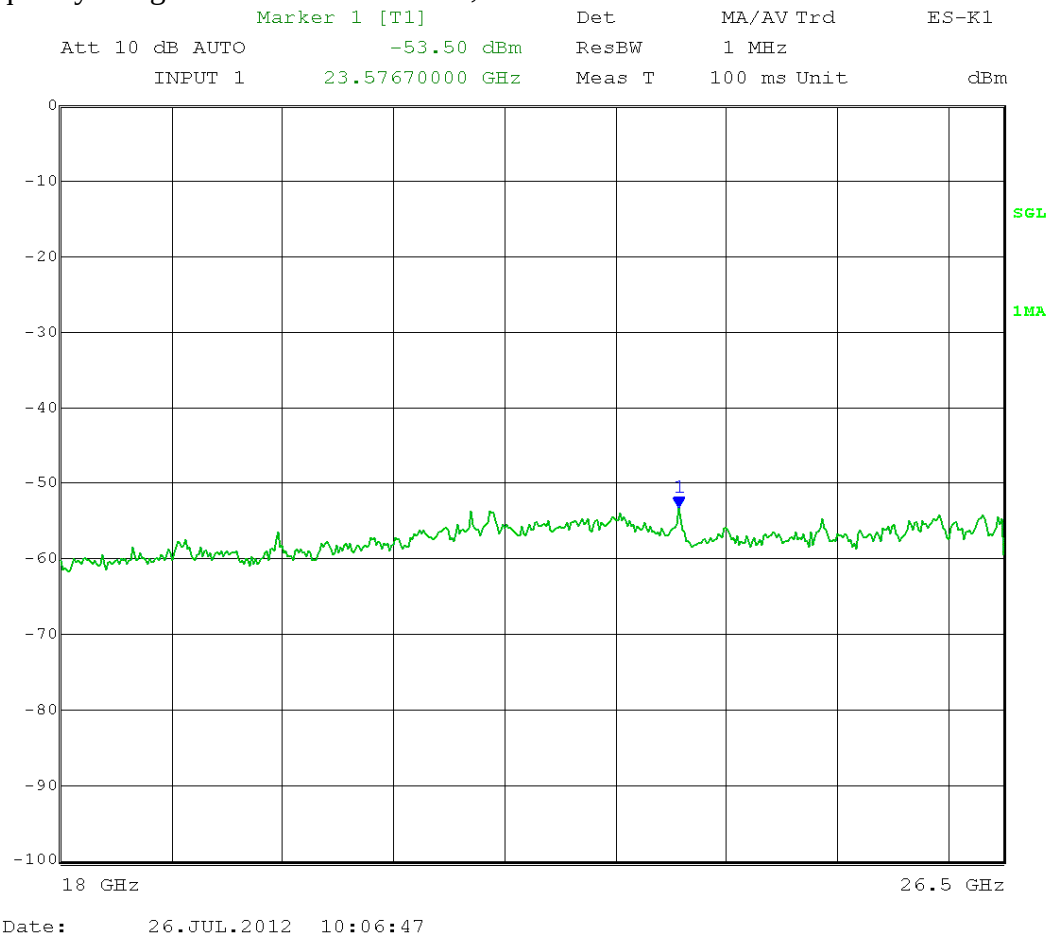
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4c	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Peak detector



Calculated EIRP at noise floor = -53.50 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -33.50 dBm
Calculated Field Strength at noise floor = -53.50 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 61.73 dBµV/m Peak

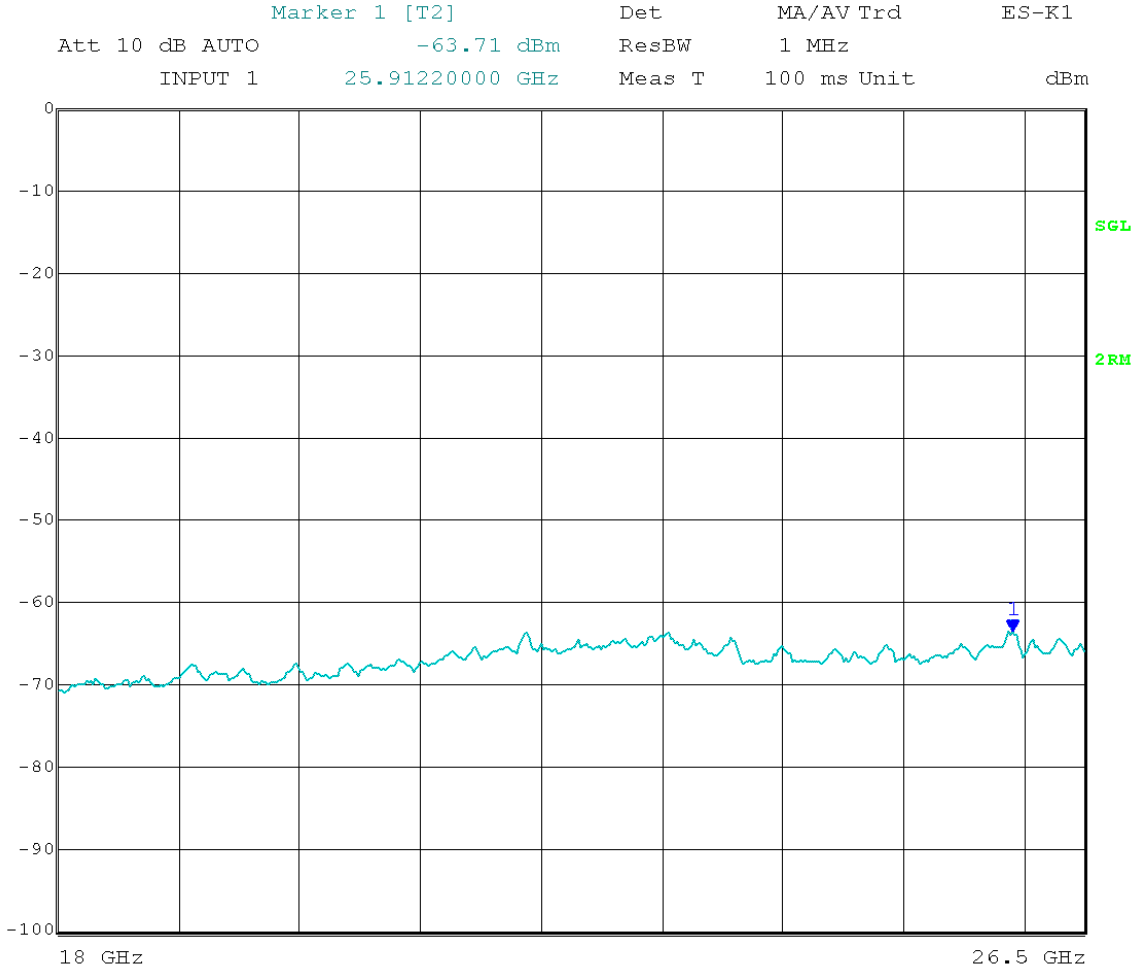
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4c	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -63.71 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 51.52 dBµV/m Average

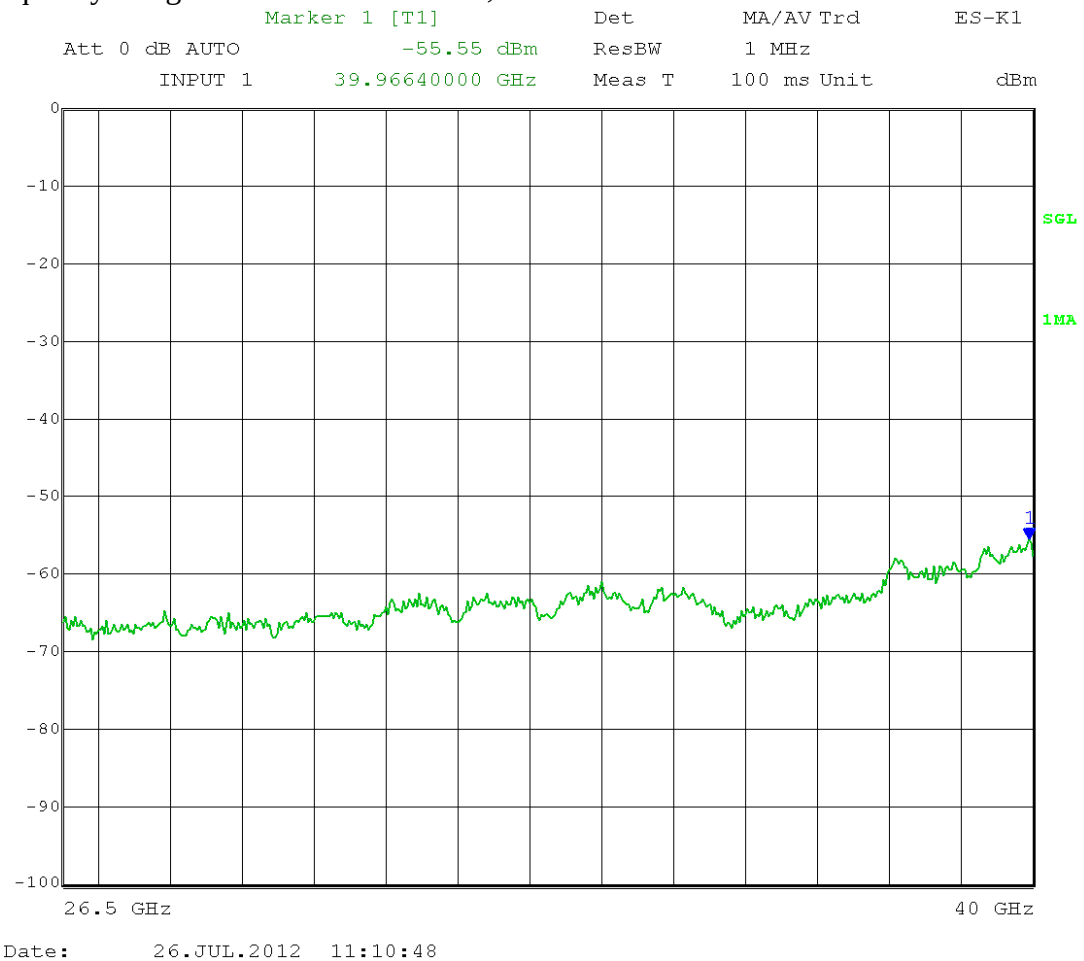
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4c	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Peak detector



Calculated EIRP at noise floor = -55.55 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -35.55 dBm
Calculated Field Strength at noise floor = -55.55 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 59.68 dBµV/m Peak

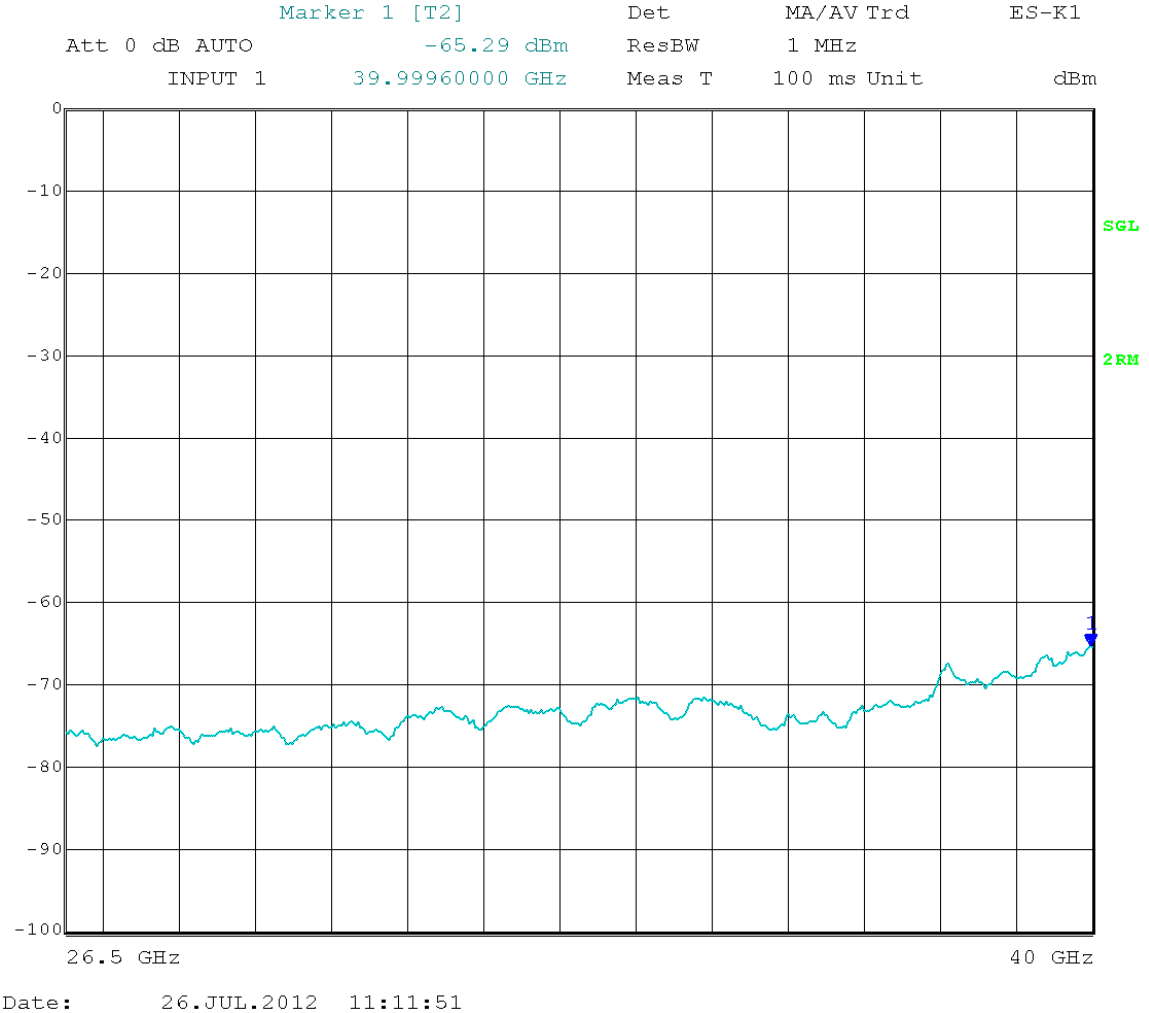
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4c	26 dB EBW: 19.44 MHz
Output port:	Channel B;	Mid Channel Frequency:	5.575 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -65.29 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 49.94 dBµV/m Average

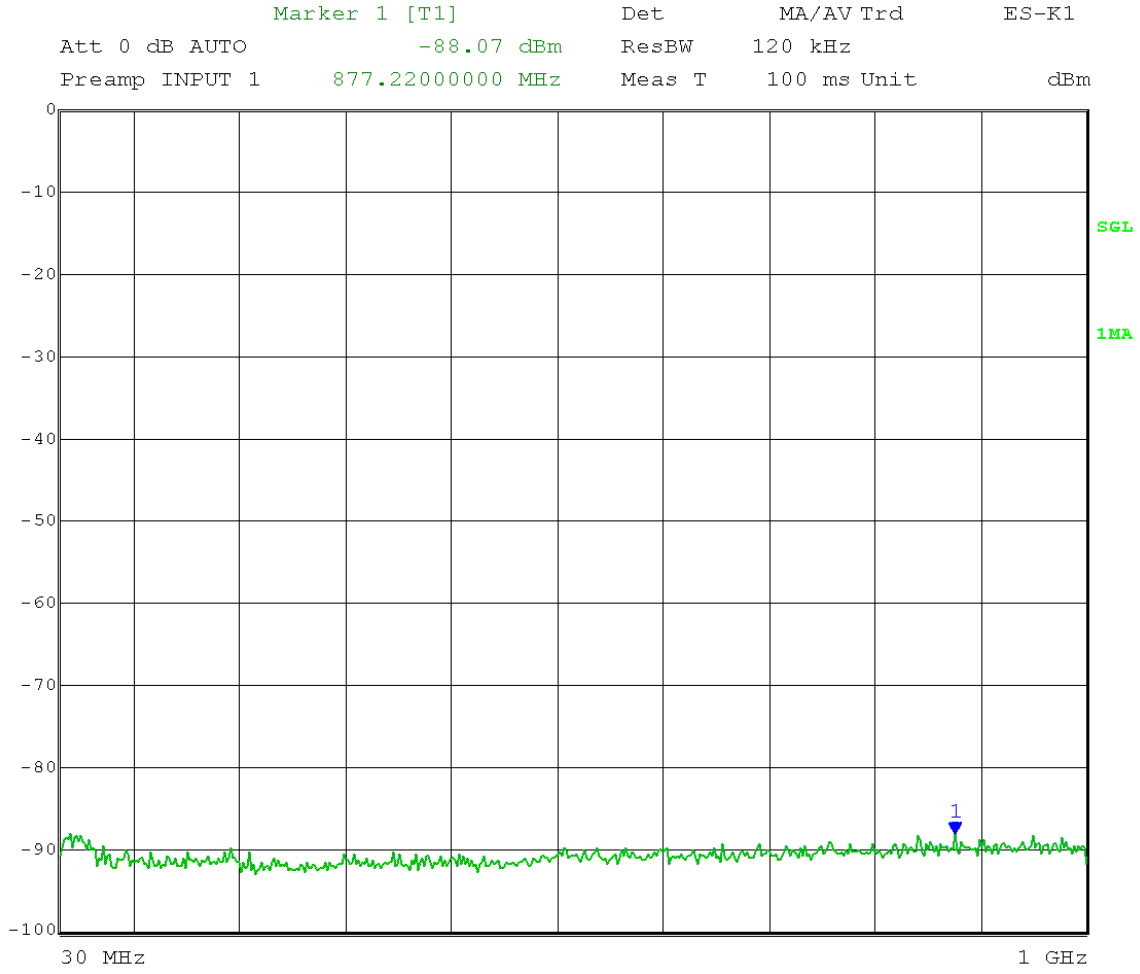
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4B	26 dB EBW: 19.44 MHz
Output port:	Channel B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 30 MHz to 1 GHz; Peak detector



Date: 25.JUL.2012 11:11:48

No emissions found from 30 MHz to 1 GHz

Calculated Field Strength at noise floor = -88.07 dBm + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 + 4.7 dB = 31.86 dBµV/m Peak

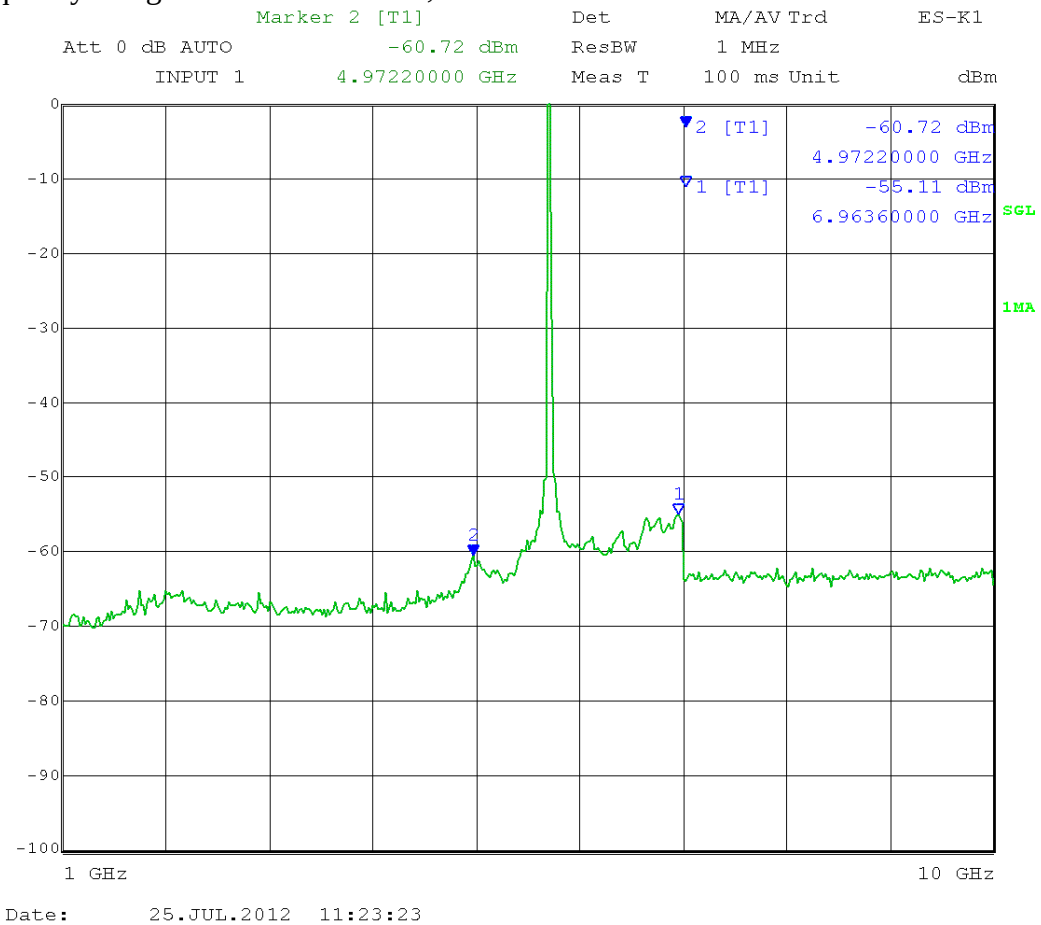
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4B	26 dB EBW: 19.44 MHz
Output port:	Channel B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Peak detector



Marker 1: Calculated EIRP = -55.11 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -35.11 dBm

Marker 2: Calculated Field Strength (Restricted Band) = -60.72 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 54.51 dBµV/m Peak

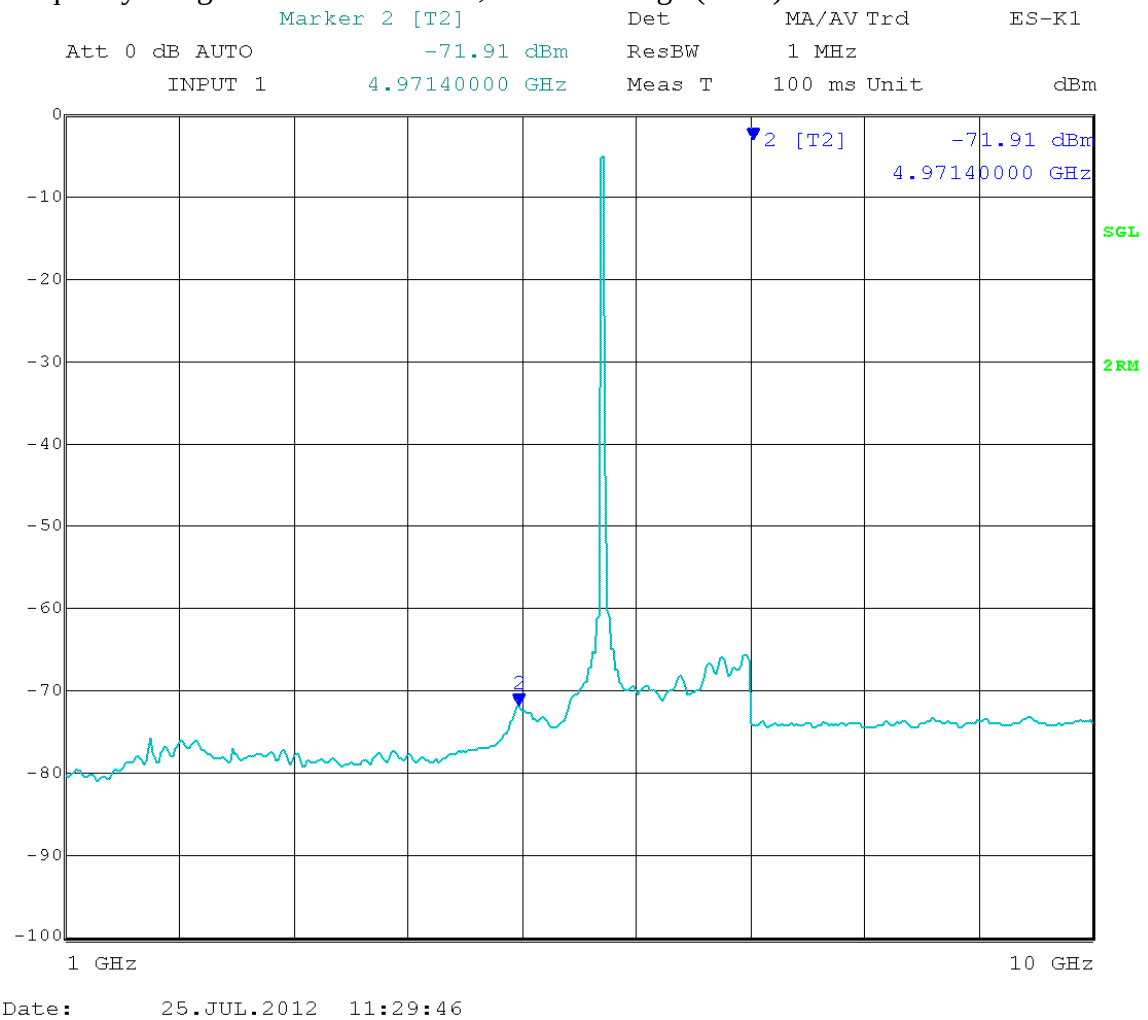
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4B	26 dB EBW: 19.44 MHz
Output port:	Channel B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 1 GHz to 10 GHz; Average (RMS) detector



Marker 2: Calculated Field Strength (Restricted Band) = -71.91 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 43.32 dBµV/m Average

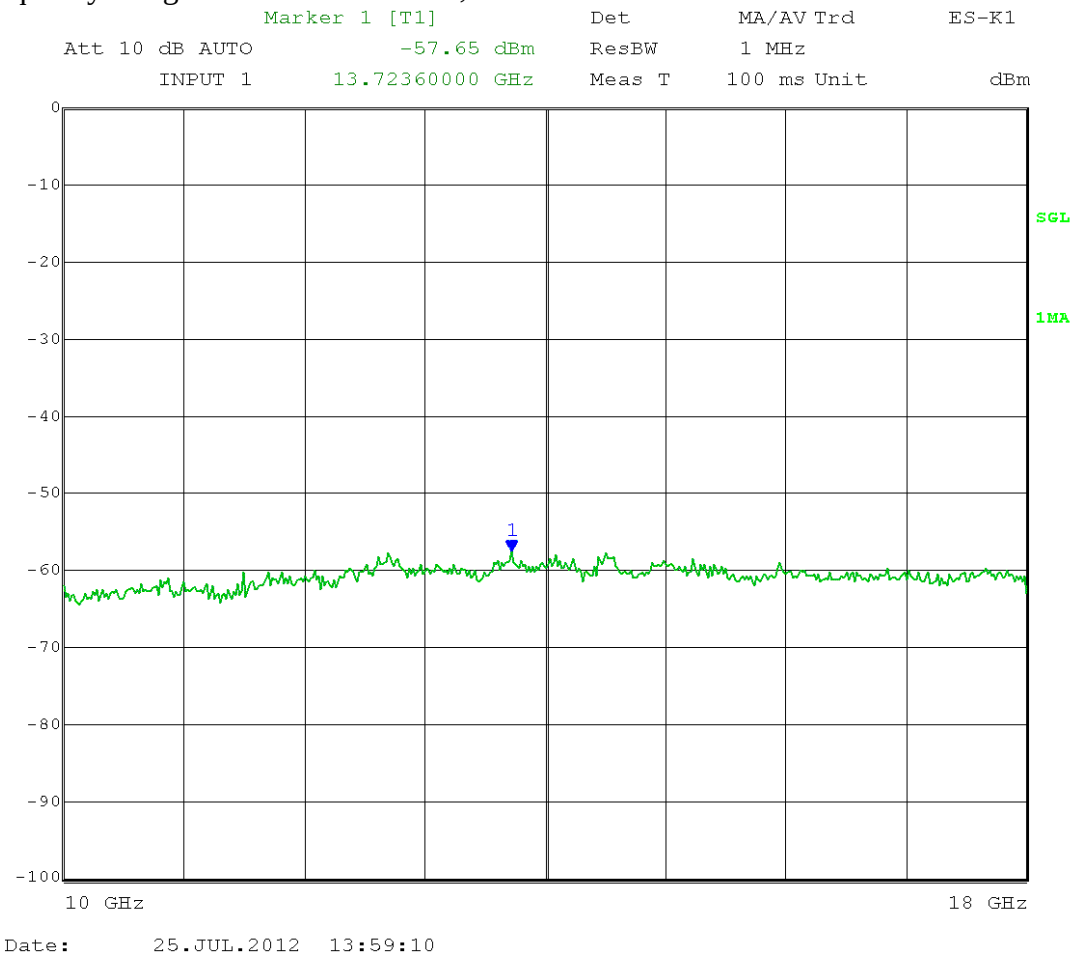
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4B	26 dB EBW: 19.44 MHz
Output port:	Channel B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Peak detector



Calculated EIRP at noise floor = -57.65 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -37.65 dBm
Calculated Field Strength at noise floor = -57.65 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 57.58 dBµV/m Peak

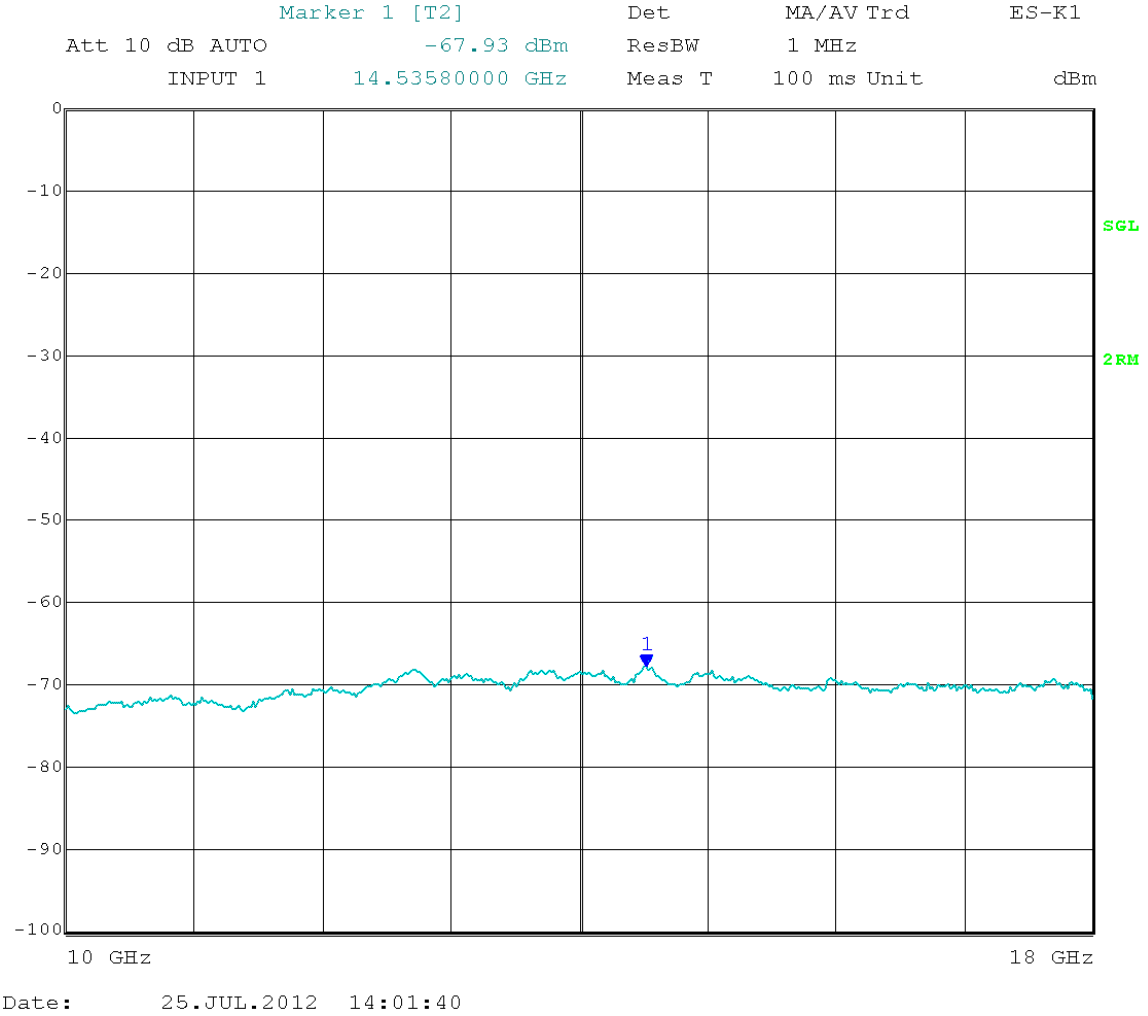
Test Date: 07-25-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4B	26 dB EBW: 19.44 MHz
Output port:	Channel B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 10 GHz to 18 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -67.93 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 47.30 dBµV/m Average

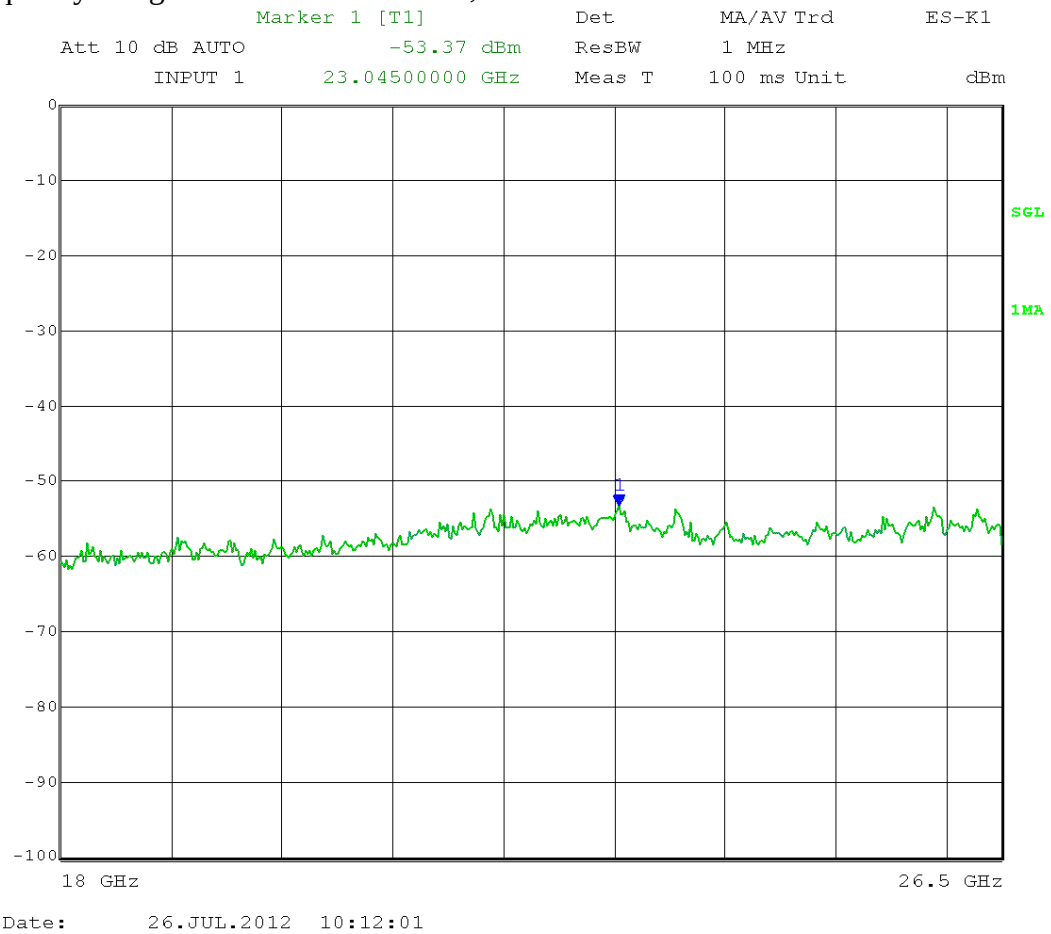
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4B	26 dB EBW: 19.44 MHz
Output port:	Channel B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Peak detector



Calculated EIRP at noise floor = -53.37 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -33.37 dBm
Calculated Field Strength at noise floor = -53.37 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 61.86 dBµV/m Peak

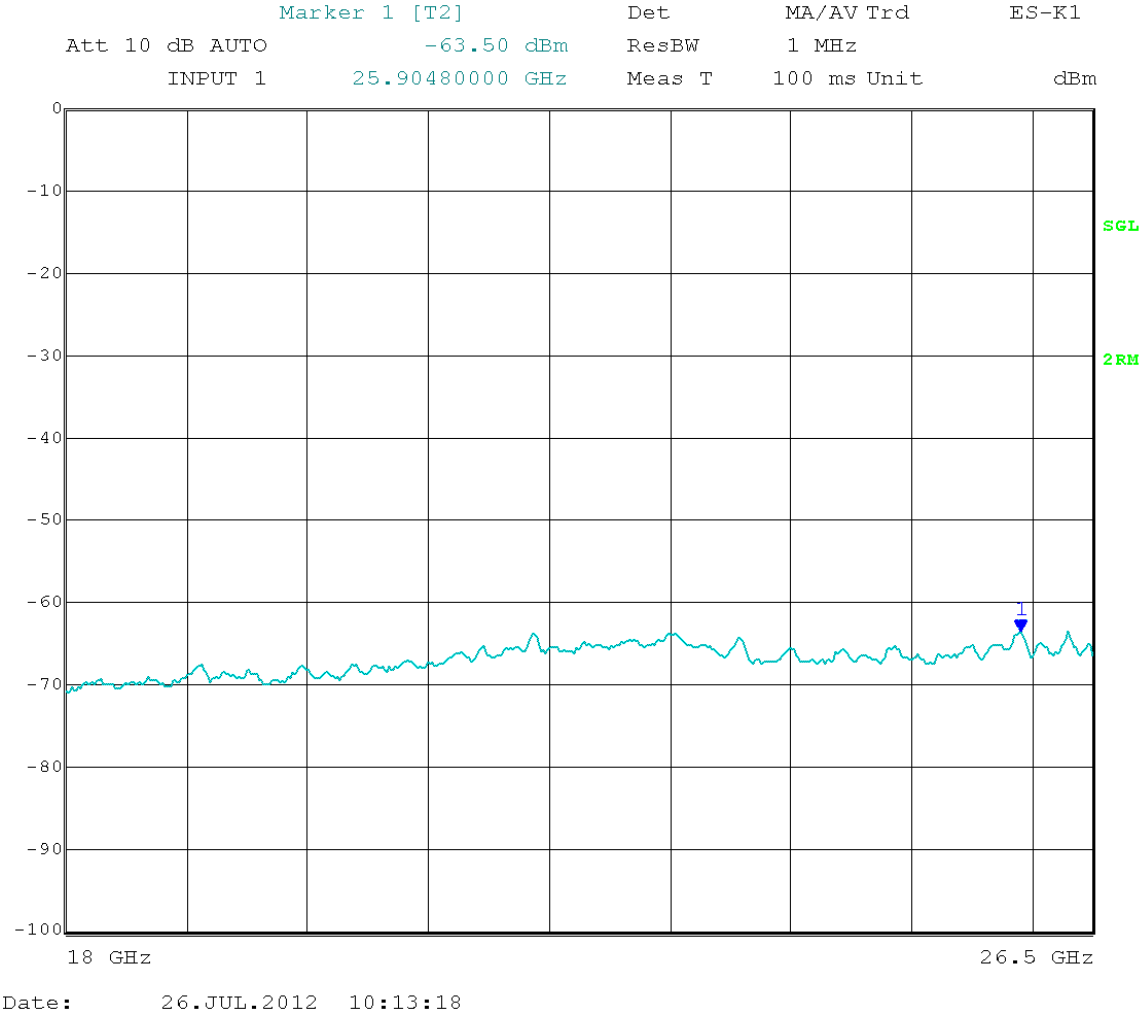
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4B	26 dB EBW: 19.44 MHz
Output port:	Channel B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 18 GHz to 26.5 GHz; Average (RMS) detector



Calculated Field Strength at noise floor = -63.50 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 51.73 dBµV/m Average

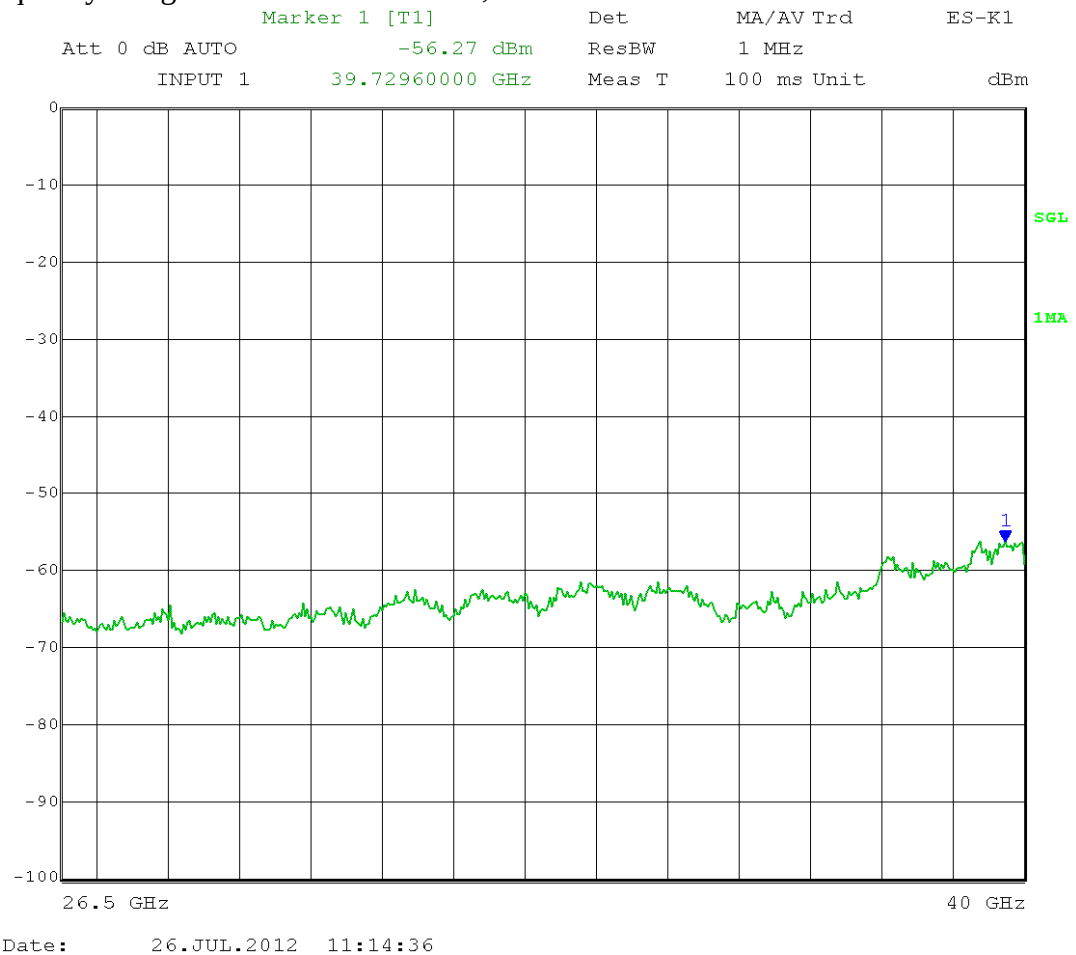
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4B	26 dB EBW: 19.44 MHz
Output port:	Channel B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Peak detector



Calculated EIRP at noise floor = -56.27 dBm + 17 dBi antenna gain + 3 dB (MIMO)
= -36.27 dBm
Calculated Field Strength at noise floor = -56.27 + 17 dBi antenna gain + 3 dB (MIMO)
– 20 log (3 meters) + 104.77 = 58.96 dBµV/m Peak

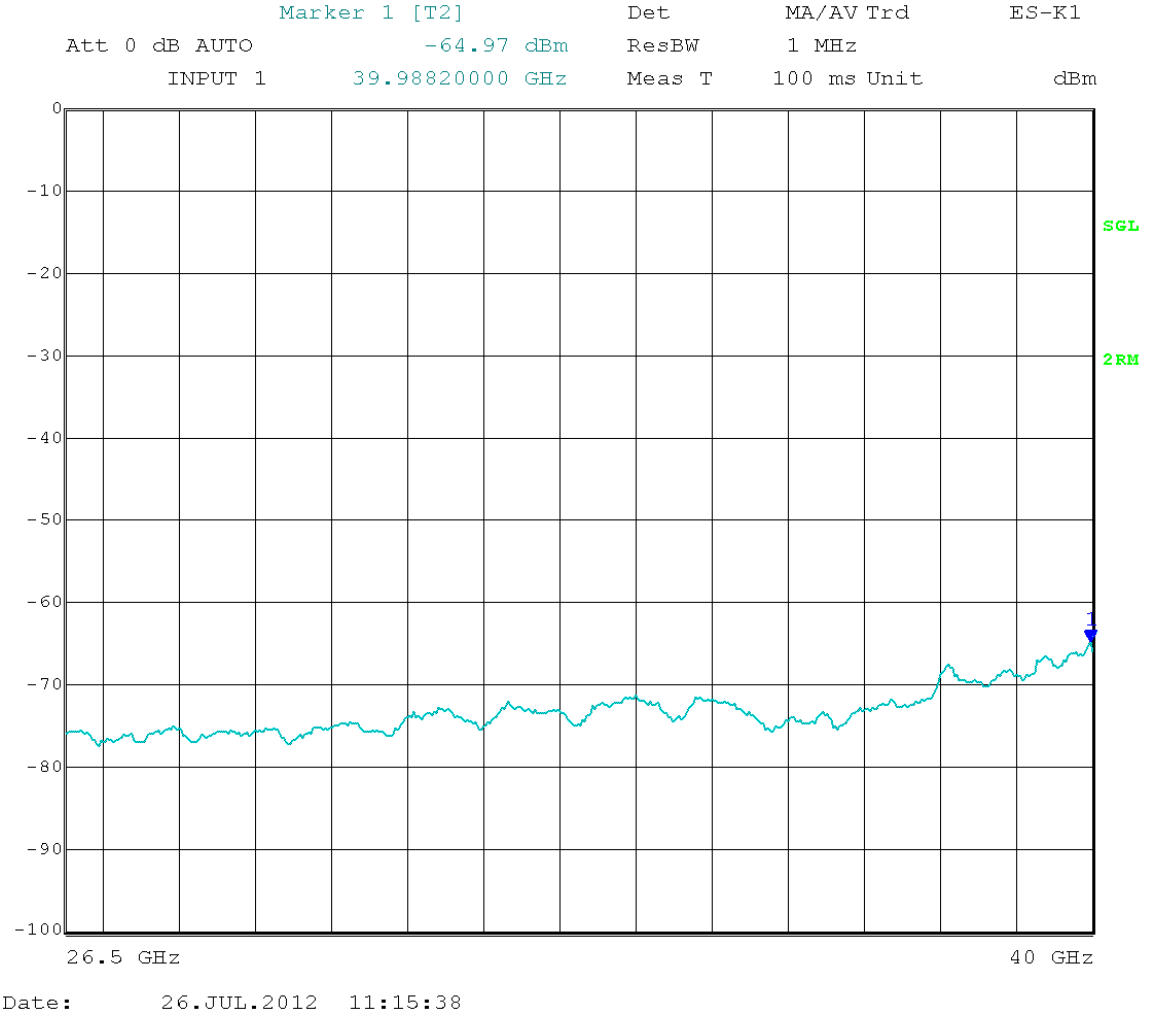
Test Date: 07-26-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

EUT nominal channel bandwidth:	20 MHz	adi reg 4B	26 dB EBW: 19.44 MHz
Output port:	Channel B;	High Channel Frequency:	5.715 GHz
Output power setting:	19;	Modulation Type:	QPSK

Upper bound on out-of-band antenna gain: 17 dBi
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Corrected for external attenuation, cable and connector to antenna interface on radio.

Frequency Range: 26.5 GHz to 40 GHz; Average (RMS) detector



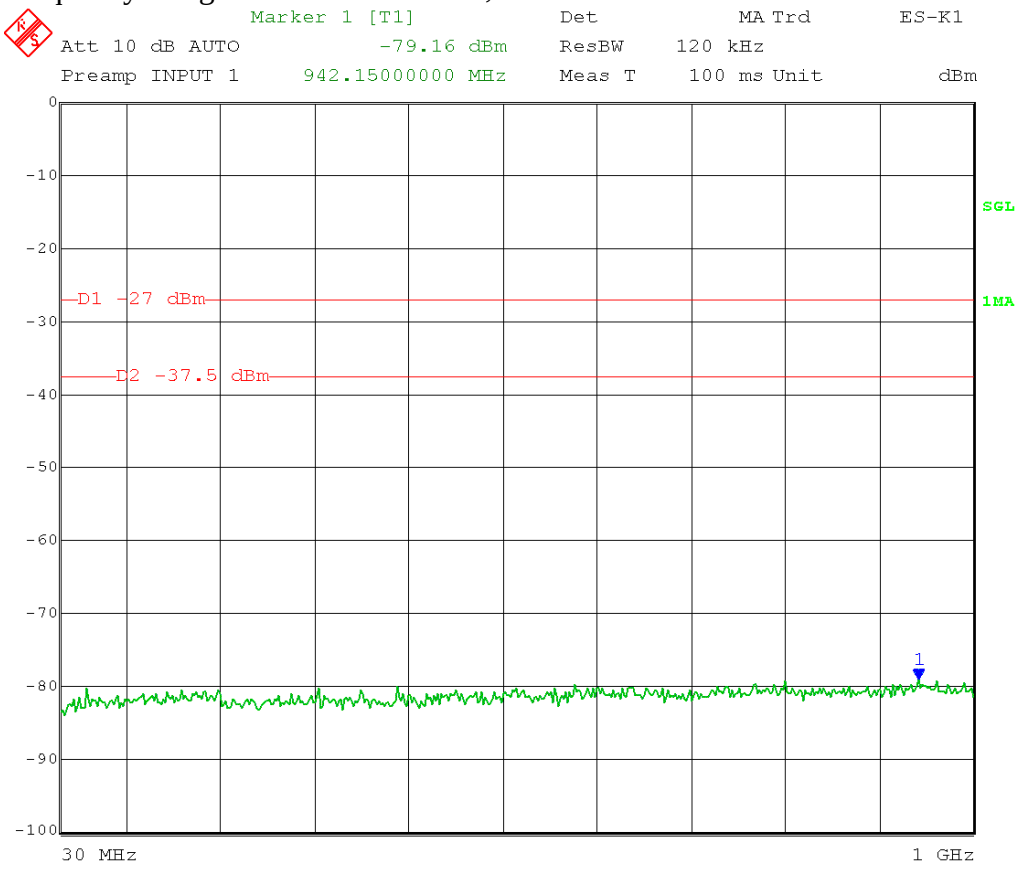
Calculated Field Strength at noise floor = -64.97 + 17 dBi antenna gain + 3 dB (MIMO) – 20 log (3 meters) + 104.77 = 50.26 dBµV/m Average

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Low – 5495 MHz
Modulation: 2-level FSK
Register setting: 9C
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Frequency Range: 30 MHz to 1 GHz; Peak detector



No emissions found from 30 MHz to 1 GHz

Calculated EIRP at noise floor = -79.16 dBm + 10.5 dBi antenna gain
= -68.66 dBm

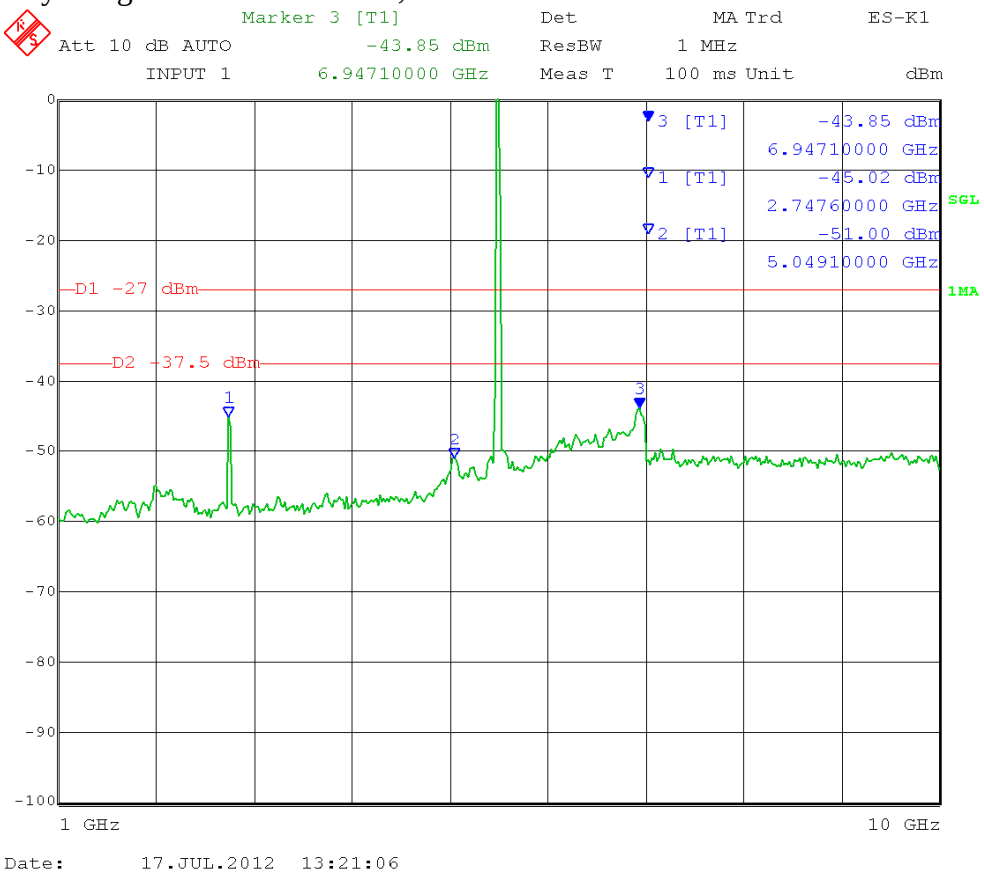
Calculated Field Strength at noise floor = -68.66 dBm – 20 log (3 meters)
+ 104.77 + 4.7 dB = 31.27 dBµV/m

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Low – 5495 MHz
Modulation: 2-level FSK
Register setting: 90
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 1 GHz to 10 GHz; Peak detector



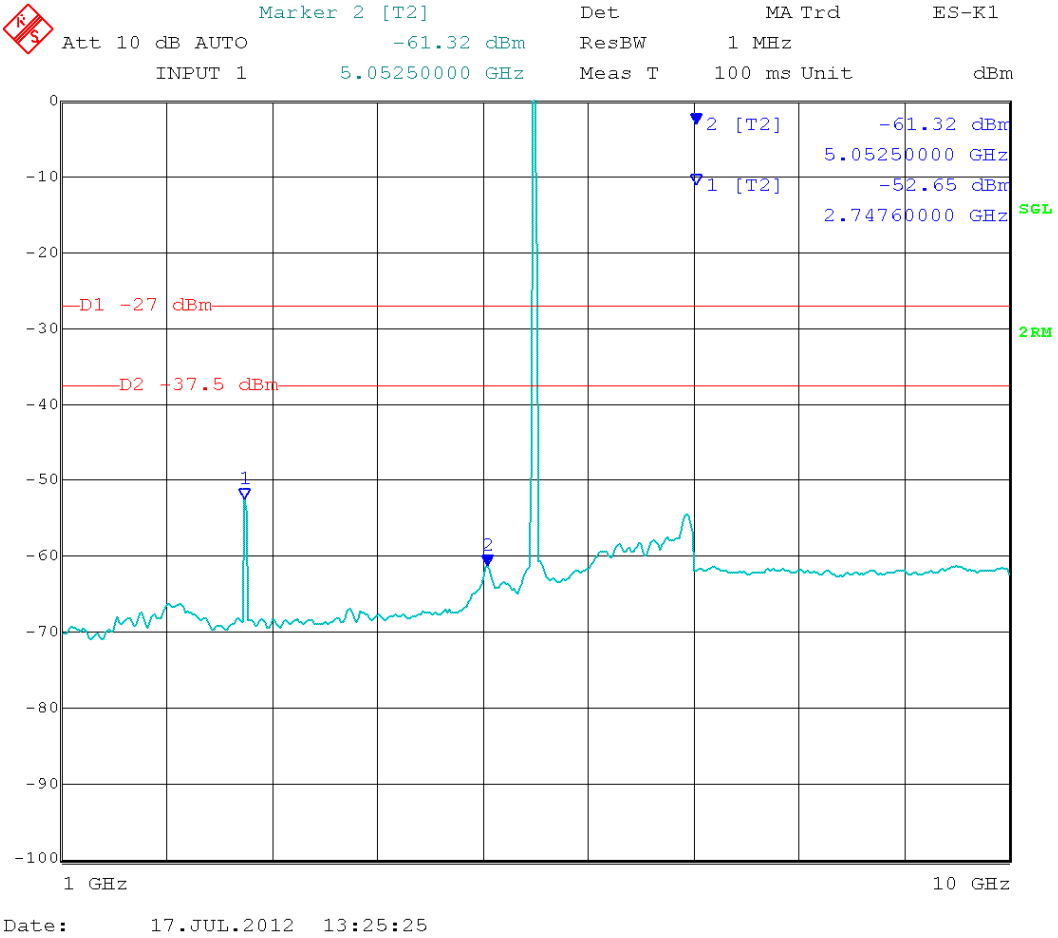
Marker 1: Calculated Field Strength (Restricted Band) = -45.02 + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 60.71 dBµV/m Peak
Marker 2: Calculated Field Strength (Restricted Band) = -51.00 + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 54.73 dBµV/m Peak
Marker 3: Calculated EIRP = -43.85 dBm + 10.5 dBi antenna gain = -33.35 dBm

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Low – 5495 MHz
Modulation: 2-level FSK
Register setting: 90
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Frequency Range: 1 GHz to 10 GHz; Average (RMS) detector



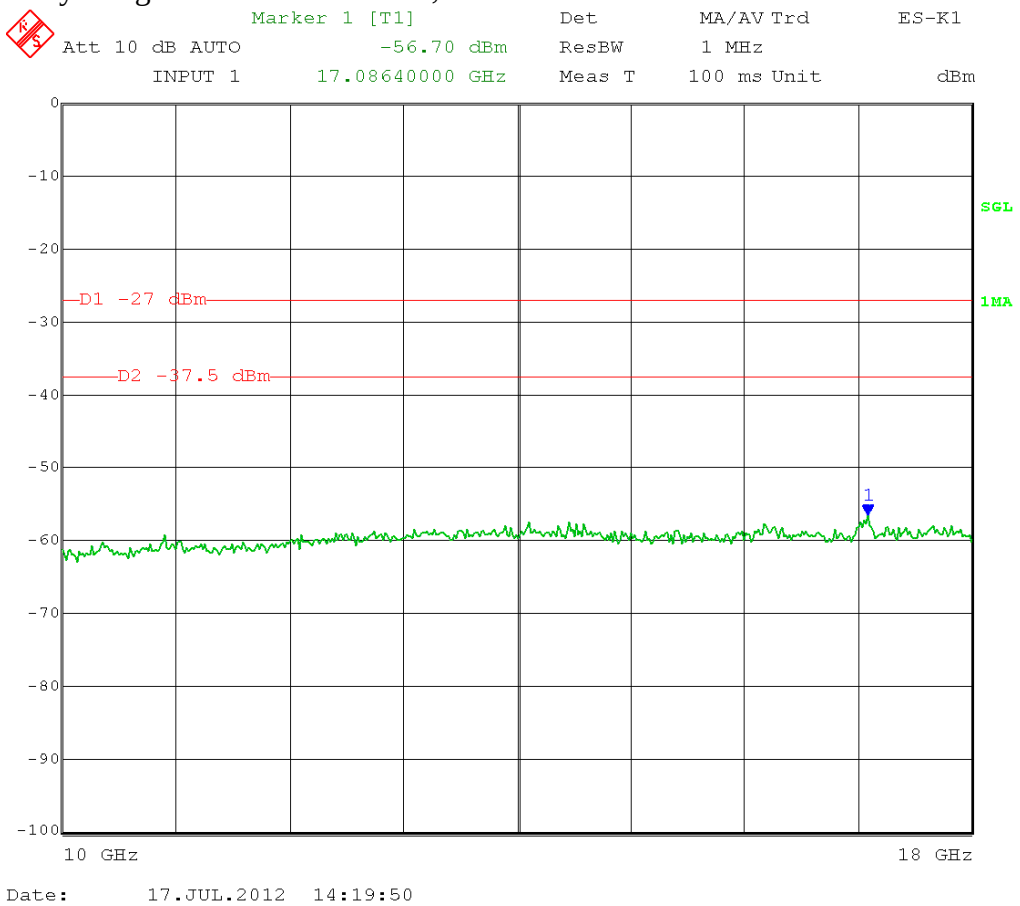
Marker 1: Calculated Field Strength (Restricted Band) = -52.65 + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 53.08 dBµV/m Average
Marker 2: Calculated Field Strength (Restricted Band) = -61.32 + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 44.41 dBµV/m Average

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Low – 5495 MHz
Modulation: 2-level FSK
Register setting: 90
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 10 GHz to 18 GHz; Peak detector



No emissions found from 10 GHz to 18 GHz

Calculated EIRP at noise floor = -56.70 dBm + 10.5 dBi antenna gain
= -46.20 dBm

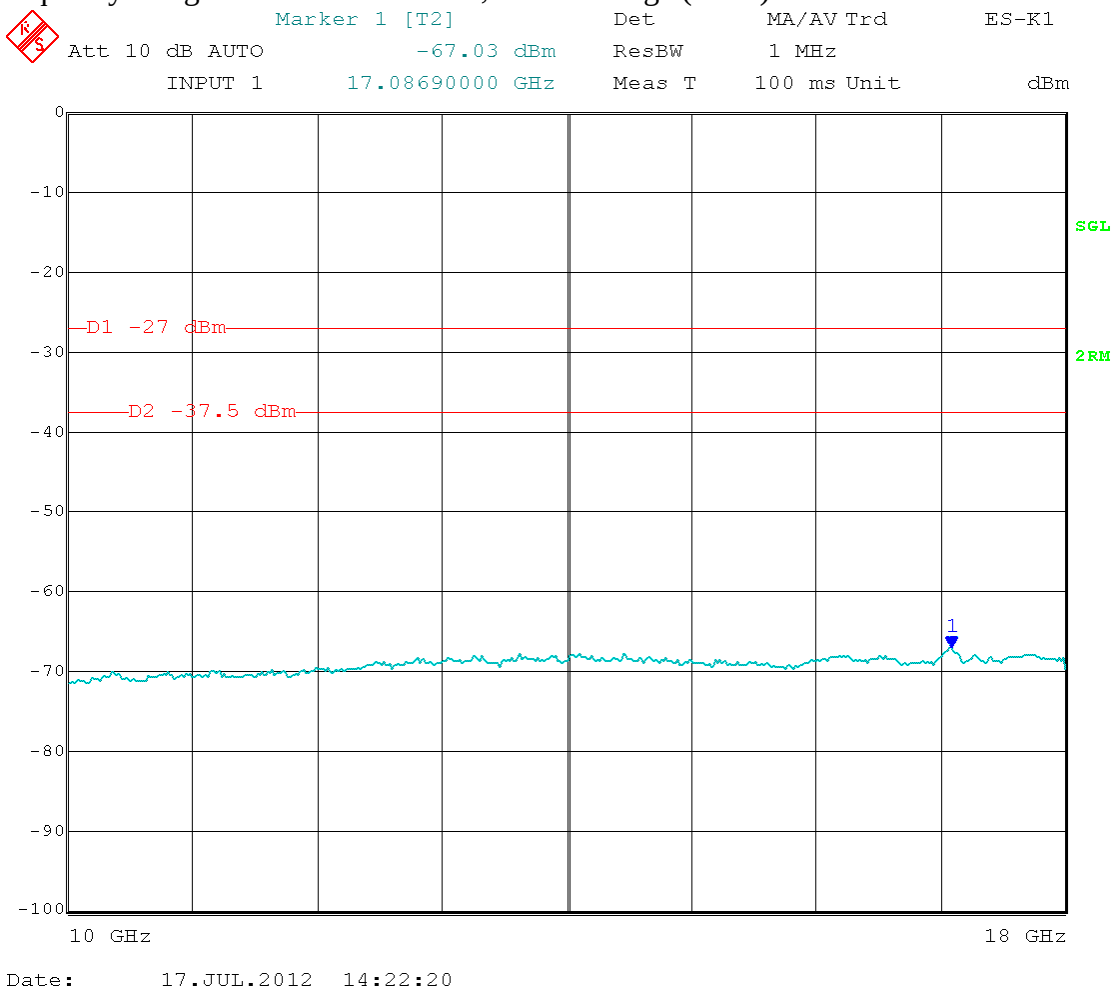
Calculated Field Strength at noise floor = -46.20 dBm – 20 log (3 meters) + 104.77 = 49.03 dBµV/m Peak

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Low – 5495 MHz
Modulation: 2-level FSK
Register setting: 90
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 10 GHz to 18 GHz; Average (RMS) detector



No emissions found from 10 GHz to 18 GHz

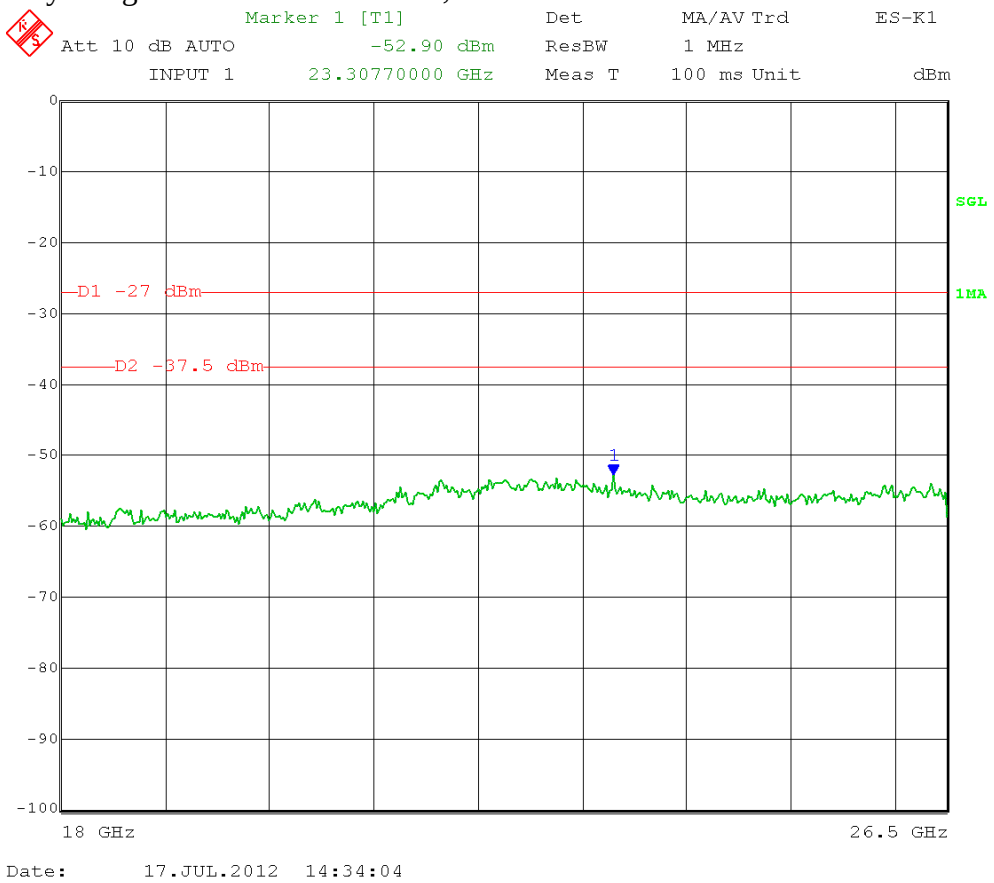
Calculated Field Strength at noise floor = -67.03 dBm + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 38.70 dBµV/m Average

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Low – 5495 MHz
Modulation: 2-level FSK
Register setting: 90
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 18 GHz to 26.5 GHz; Peak detector



No emissions found from 18 GHz to 26.5 GHz

Calculated EIRP at noise floor = -52.90 dBm + 10.5 dBi antenna gain
= -42.40 dBm

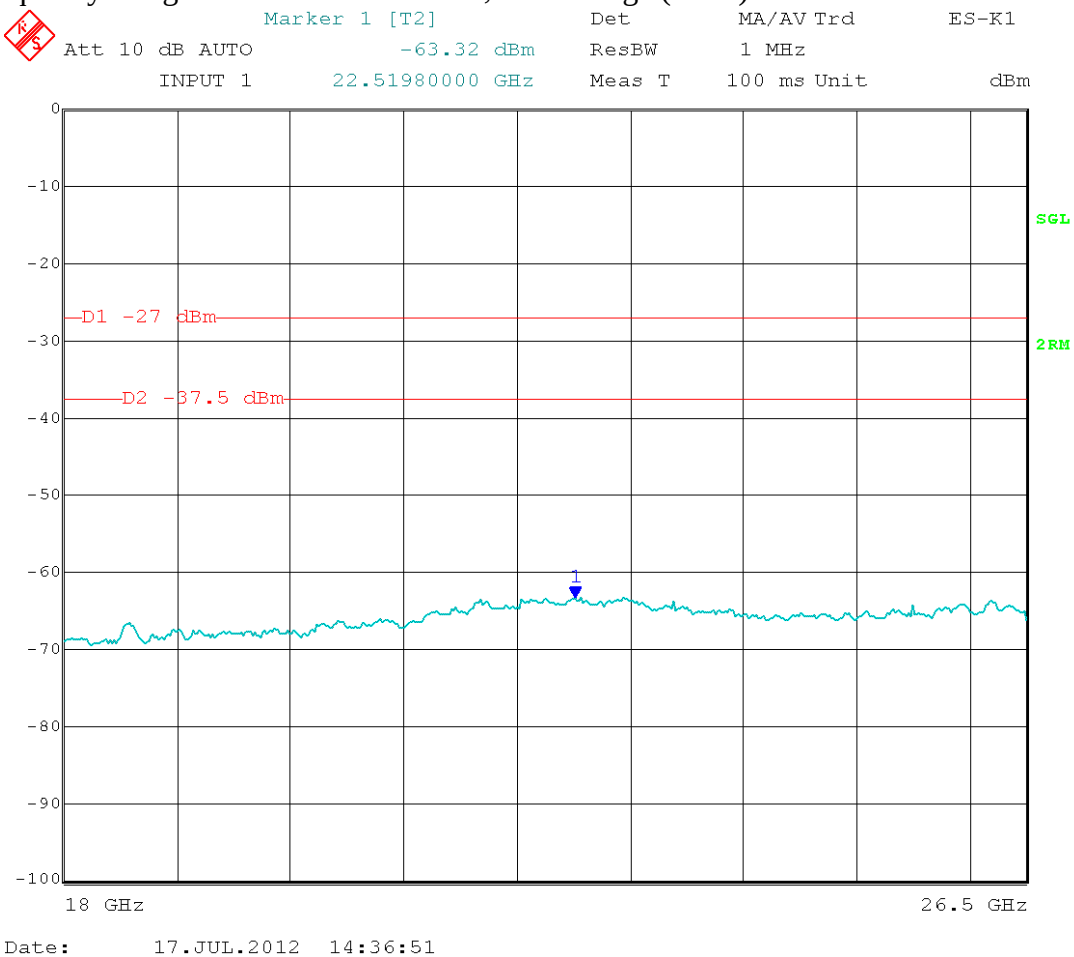
Calculated Field Strength at noise floor = -42.40 dBm – 20 log (3 meters) + 104.77 = 52.83 dBµV/m Peak

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Low – 5495 MHz
Modulation: 2-level FSK
Register setting: 90
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 18 GHz to 26.5 GHz; Average (RMS) detector



No emissions found from 18 GHz to 26.5 GHz

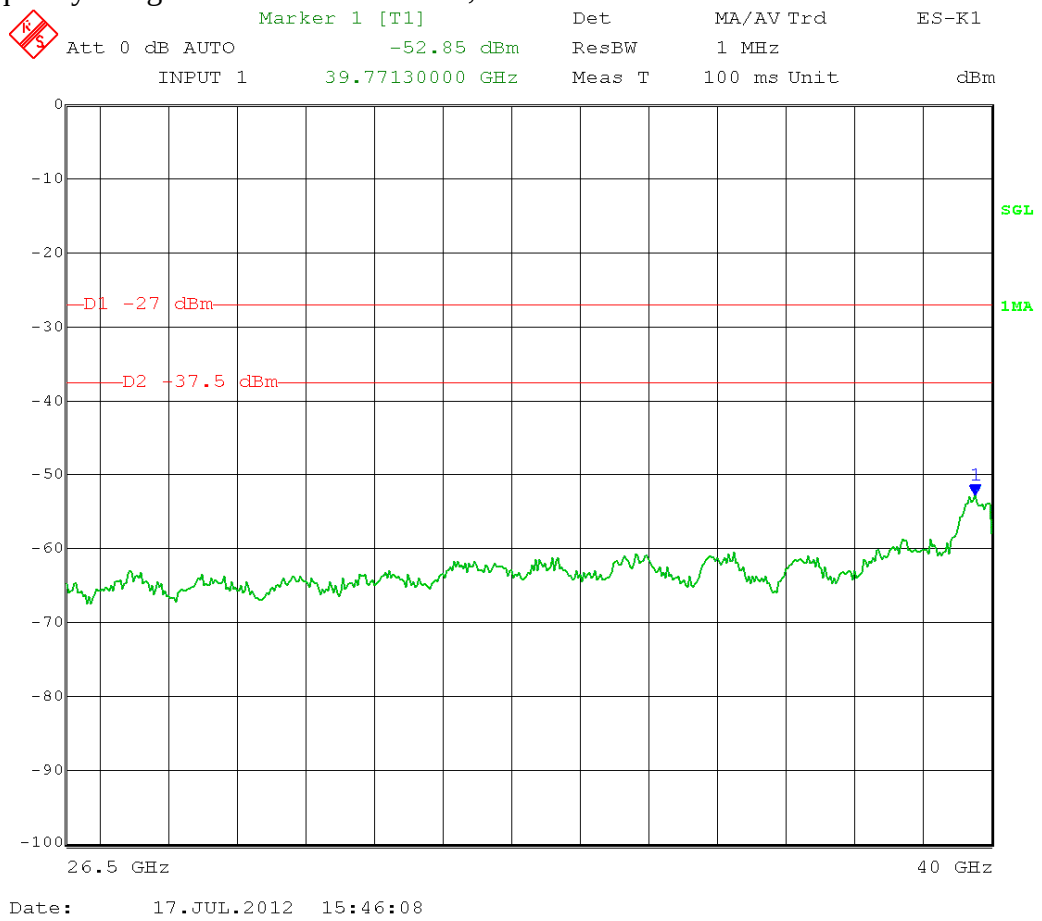
Calculated Field Strength at noise floor = -63.32 dBm + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 42.41 dBµV/m Average

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Low – 5495 MHz
Modulation: 2-level FSK
Register setting: 90
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 26.5 GHz to 40 GHz; Peak detector



No emissions found from 26.5 GHz to 40 GHz

Calculated EIRP at noise floor = -52.85 dBm + 10.5 dBi antenna gain
= -42.35 dBm

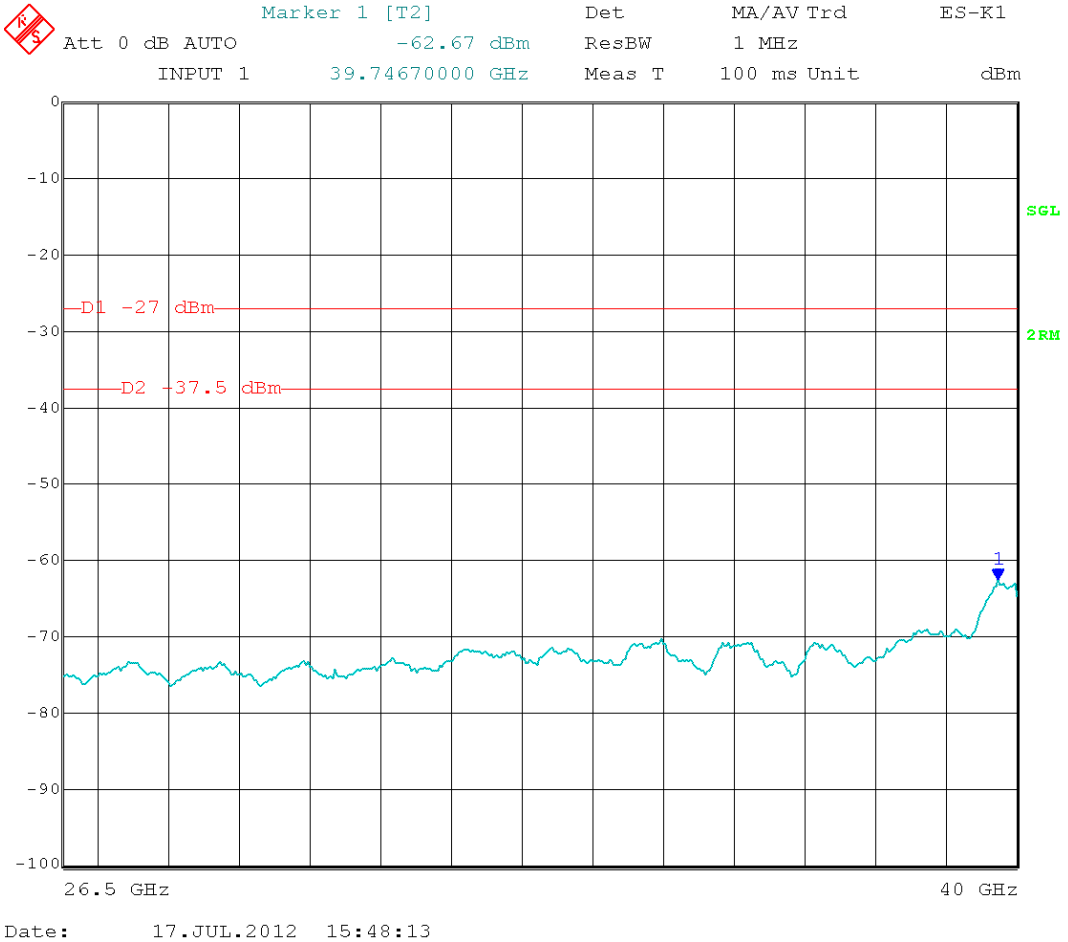
Calculated Field Strength at noise floor = -42.35 dBm – 20 log (3 meters) + 104.77 = 52.88 dBµV/m Peak

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Low – 5495 MHz
Modulation: 2-level FSK
Register setting: 90
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 26.5 GHz to 40 GHz; Average (RMS) detector



No emissions found from 26.5 GHz to 40 GHz

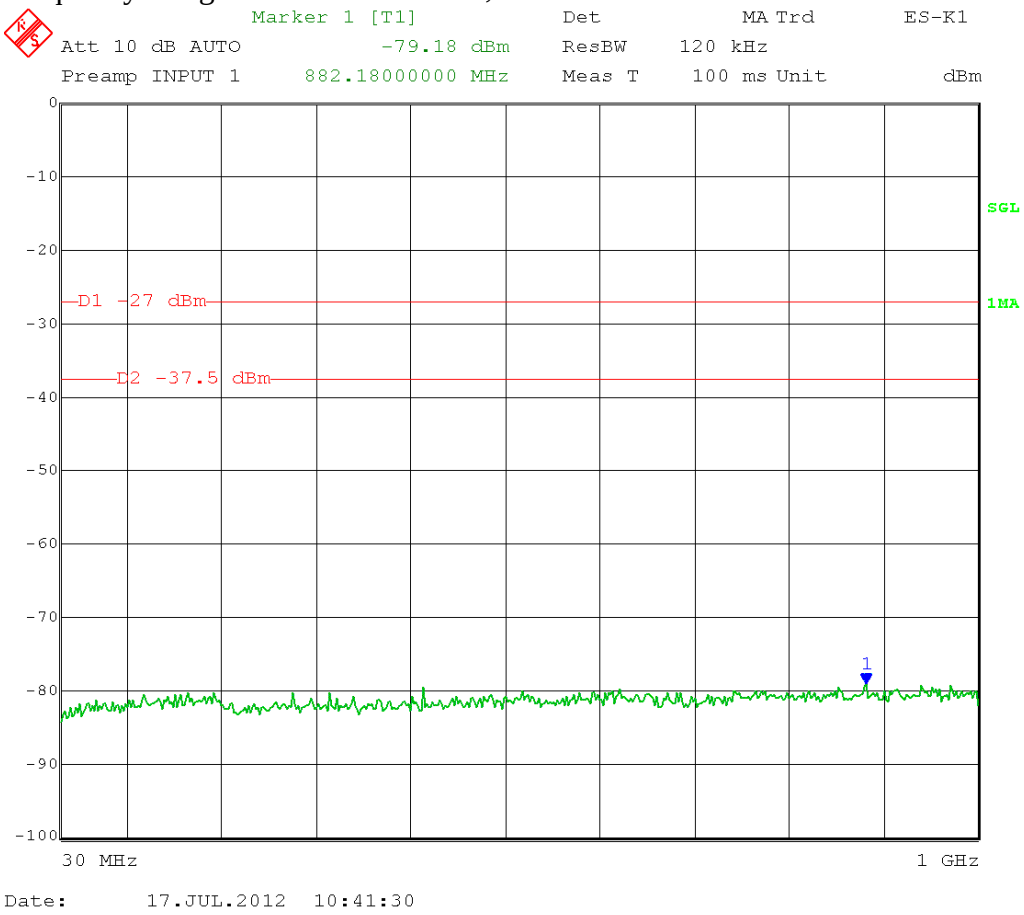
Calculated Field Strength at noise floor = -62.67 dBm + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 43.06 dBµV/m Average

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Mid – 5575 MHz
Modulation: 2-level FSK
Register setting: 9C
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Frequency Range: 30 MHz to 1 GHz; Peak detector



No emissions found from 30 MHz to 1 GHz

Calculated EIRP at noise floor = -79.18 dBm + 10.5 dBi antenna gain
= -68.68 dBm

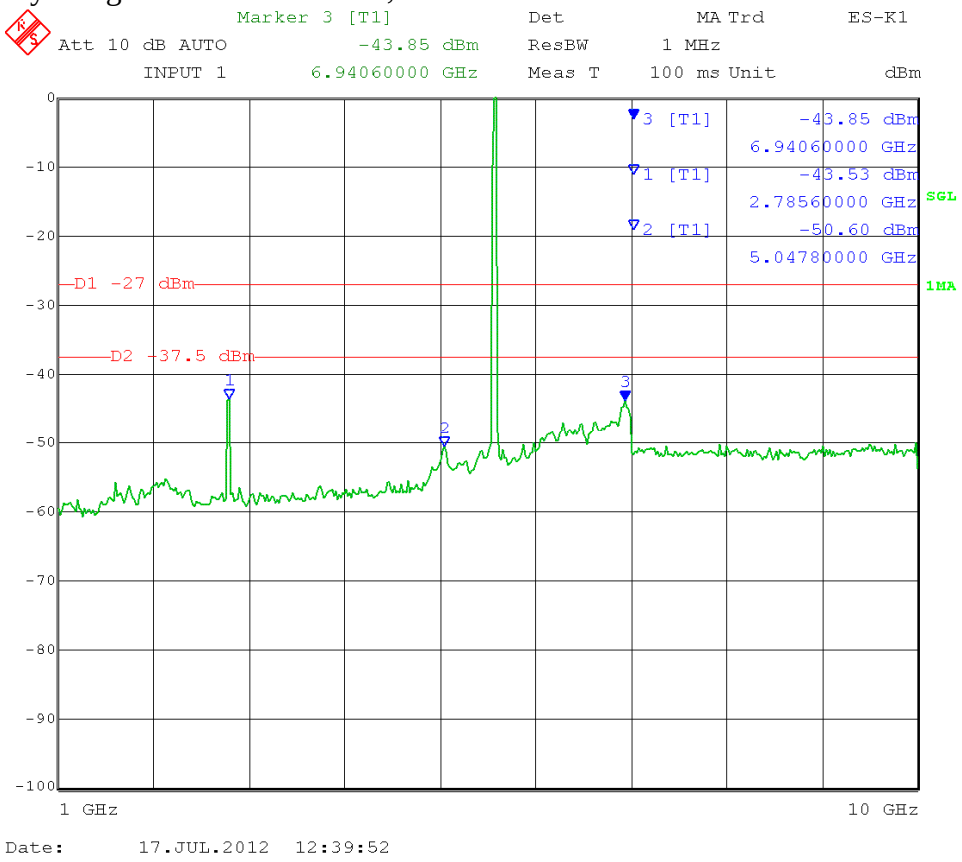
Calculated Field Strength at noise floor = -68.68 dBm – 20 log (3 meters)
+ 104.77 + 4.7 dB = 31.25 dBµV/m

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Mid – 5575 MHz
Modulation: 2-level FSK
Register setting: 94
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 1 GHz to 10 GHz; Peak detector



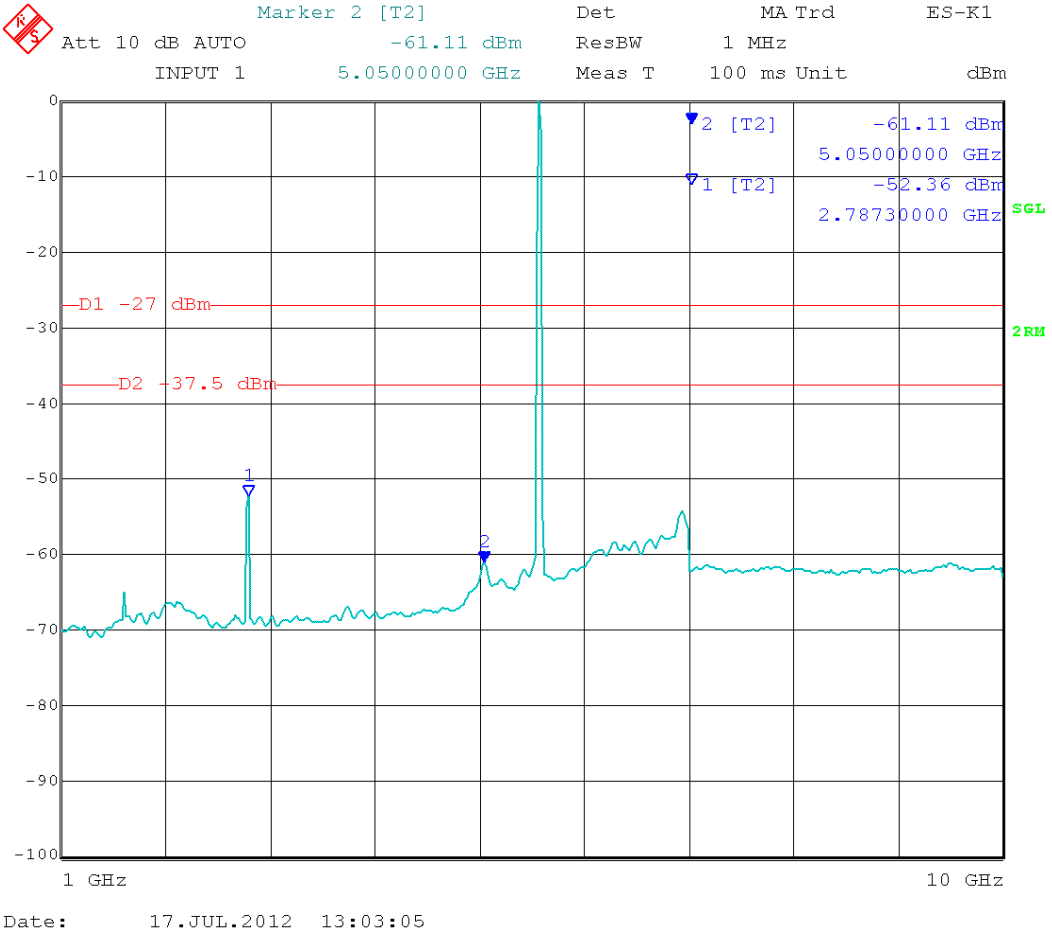
Marker 1: Calculated Field Strength (Restricted Band) = -43.53 + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 62.20 dBµV/m Peak
Marker 2: Calculated Field Strength (Restricted Band) = -50.60 + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 55.13 dBµV/m Peak
Marker 3: Calculated EIRP = -43.85 dBm + 10.5 dBi antenna gain = -33.35 dBm

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Mid – 5575 MHz
Modulation: 2-level FSK
Register setting: 94
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Frequency Range: 1 GHz to 10 GHz; Average (RMS) detector



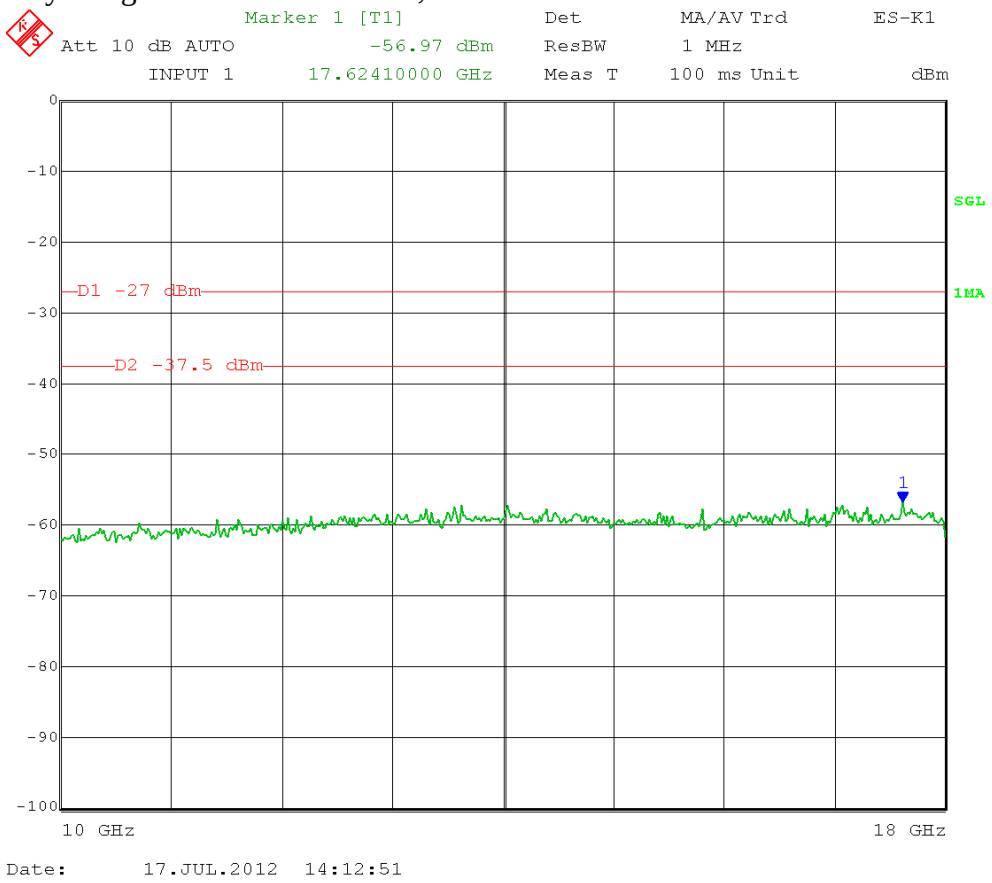
Marker 1: Calculated Field Strength (Restricted Band) = -52.36 + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 53.37 dBµV/m Average
Marker 2: Calculated Field Strength (Restricted Band) = -61.11 + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 44.62 dBµV/m Average

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Mid – 5575 MHz
Modulation: 2-level FSK
Register setting: 94
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 10 GHz to 18 GHz; Peak detector



No emissions found from 10 GHz to 18 GHz

Calculated EIRP at noise floor = -56.97 dBm + 10.5 dBi antenna gain
= -46.47 dBm

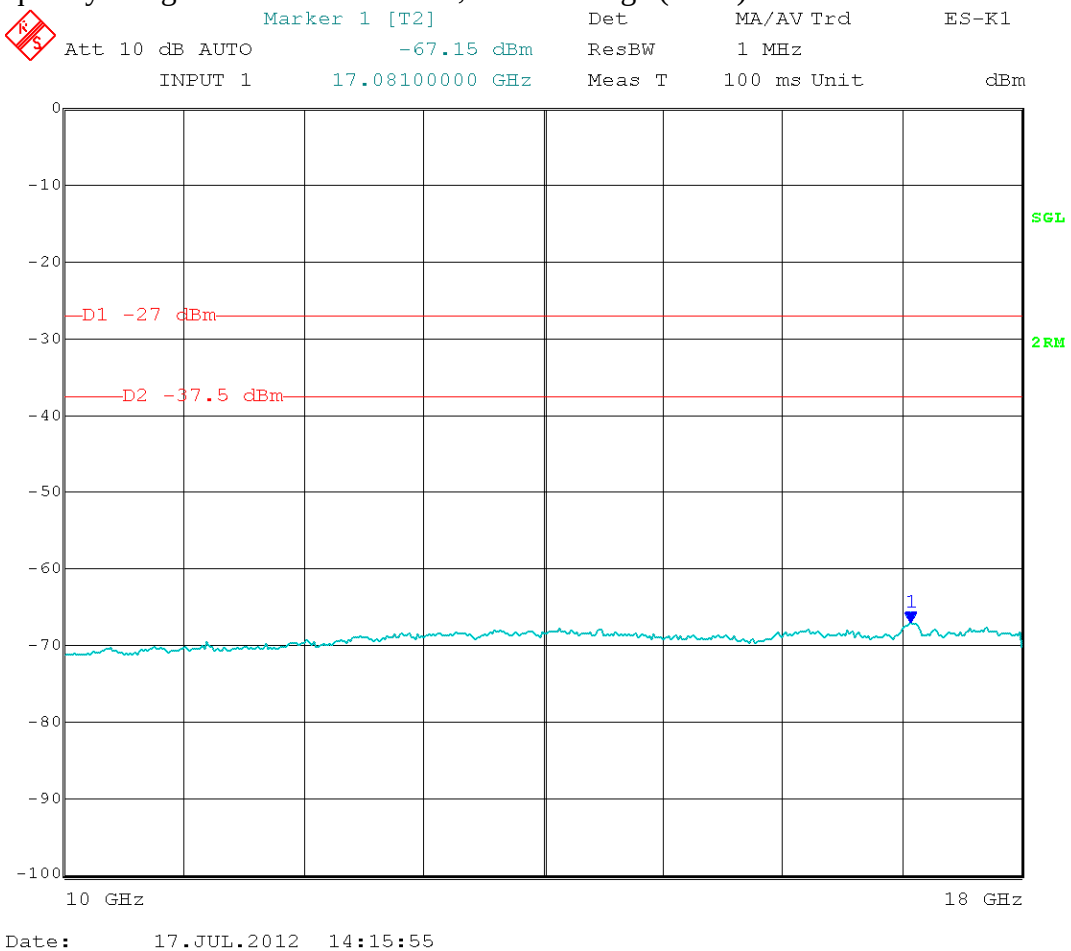
Calculated Field Strength at noise floor = -46.47 dBm – 20 log (3 meters) + 104.77 = 48.76 dBµV/m Peak

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Mid – 5575 MHz
Modulation: 2-level FSK
Register setting: 94
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 10 GHz to 18 GHz; Average (RMS) detector



No emissions found from 10 GHz to 18 GHz

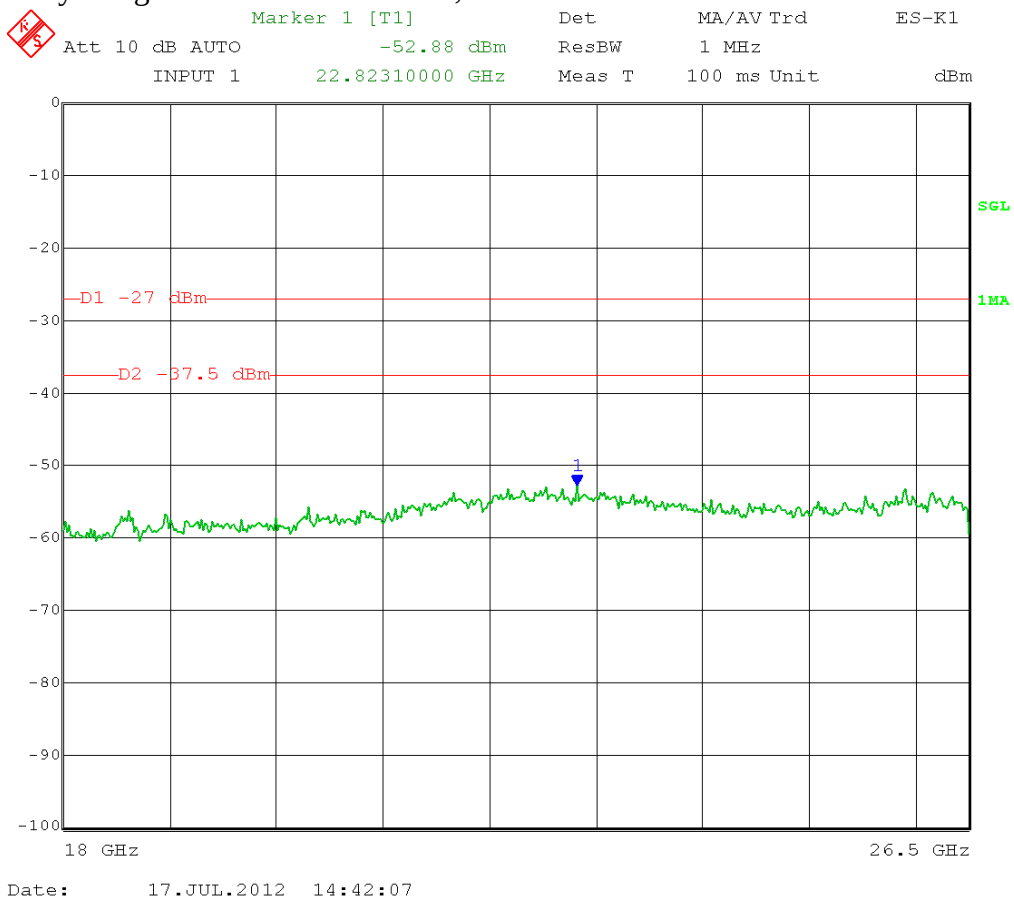
Calculated Field Strength at noise floor = -67.15 dBm + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 38.58 dBµV/m Average

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Mid – 5575 MHz
Modulation: 2-level FSK
Register setting: 94
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 18 GHz to 26.5 GHz; Peak detector



No emissions found from 18 GHz to 26.5 GHz

Calculated EIRP at noise floor = -52.88 dBm + 10.5 dBi antenna gain
= -42.38 dBm

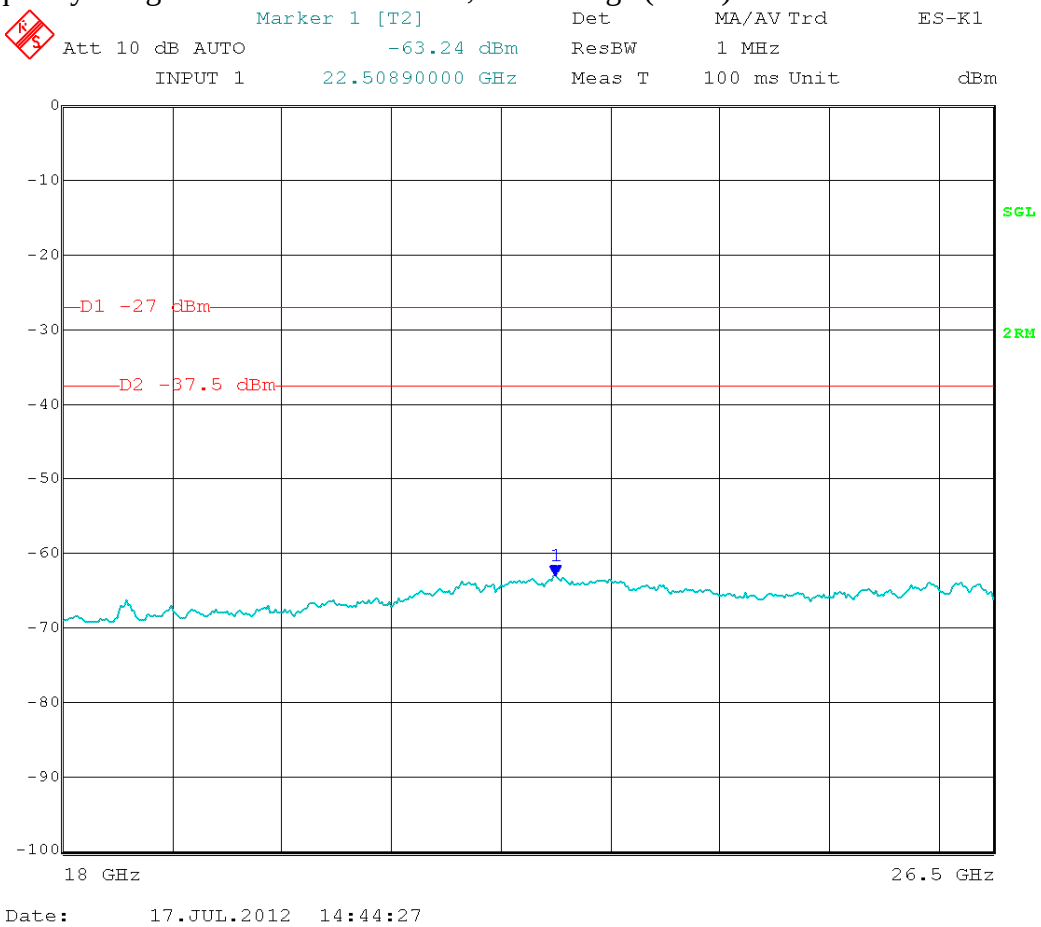
Calculated Field Strength at noise floor = -42.38 dBm – 20 log (3 meters) + 104.77 = 52.85 dBµV/m Peak

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Mid – 5575 MHz
Modulation: 2-level FSK
Register setting: 94
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 18 GHz to 26.5 GHz; Average (RMS) detector



No emissions found from 18 GHz to 26.5 GHz

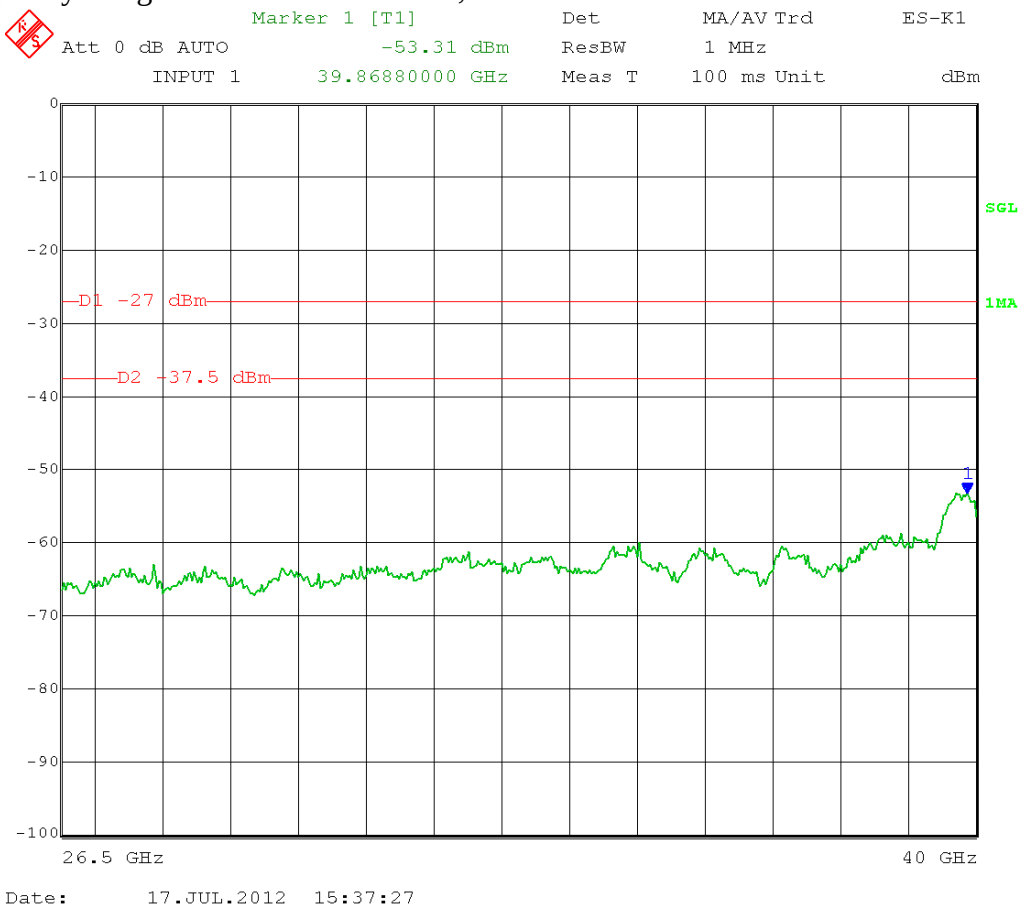
Calculated Field Strength at noise floor = -63.24 dBm + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 42.49 dBµV/m Average

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Mid – 5575 MHz
Modulation: 2-level FSK
Register setting: 94
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 26.5 GHz to 40 GHz; Peak detector



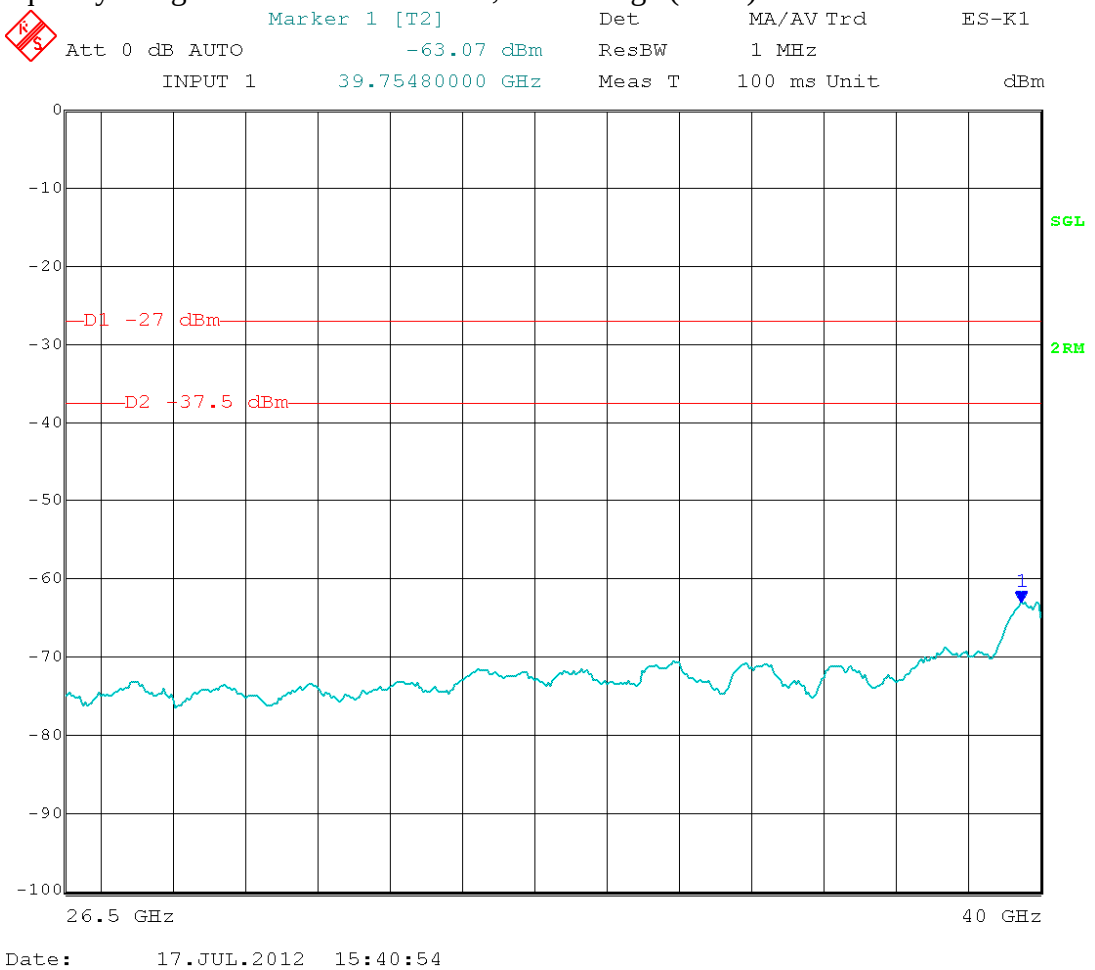
No emissions found from 26.5 GHz to 40 GHz
Calculated EIRP at noise floor = -53.31 dBm + 10.5 dBi antenna gain
= -42.81 dBm
Calculated Field Strength at noise floor = -42.81 dBm – 20 log (3 meters)
+ 104.77 = 52.42 dBµV/m Peak

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: Mid – 5575 MHz
Modulation: 2-level FSK
Register setting: 94
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 26.5 GHz to 40 GHz; Average (RMS) detector



No emissions found from 26.5 GHz to 40 GHz

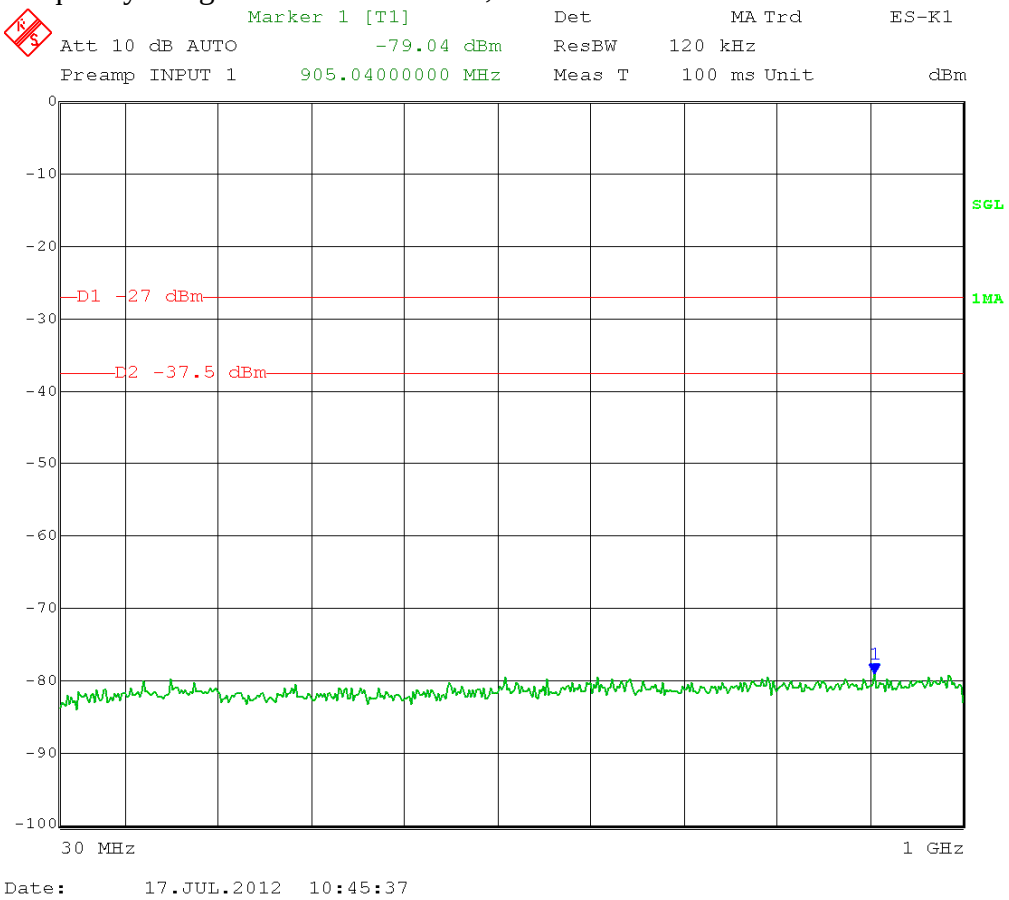
Calculated Field Strength at noise floor = -63.07 dBm + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 42.66 dBµV/m Average

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: High – 5705 MHz
Modulation: 2-level FSK
Register setting: AC
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Frequency Range: 30 MHz to 1 GHz; Peak detector



No emissions found from 30 MHz to 1 GHz

Calculated EIRP at noise floor = -79.04 dBm + 10.5 dBi antenna gain
= -68.54 dBm

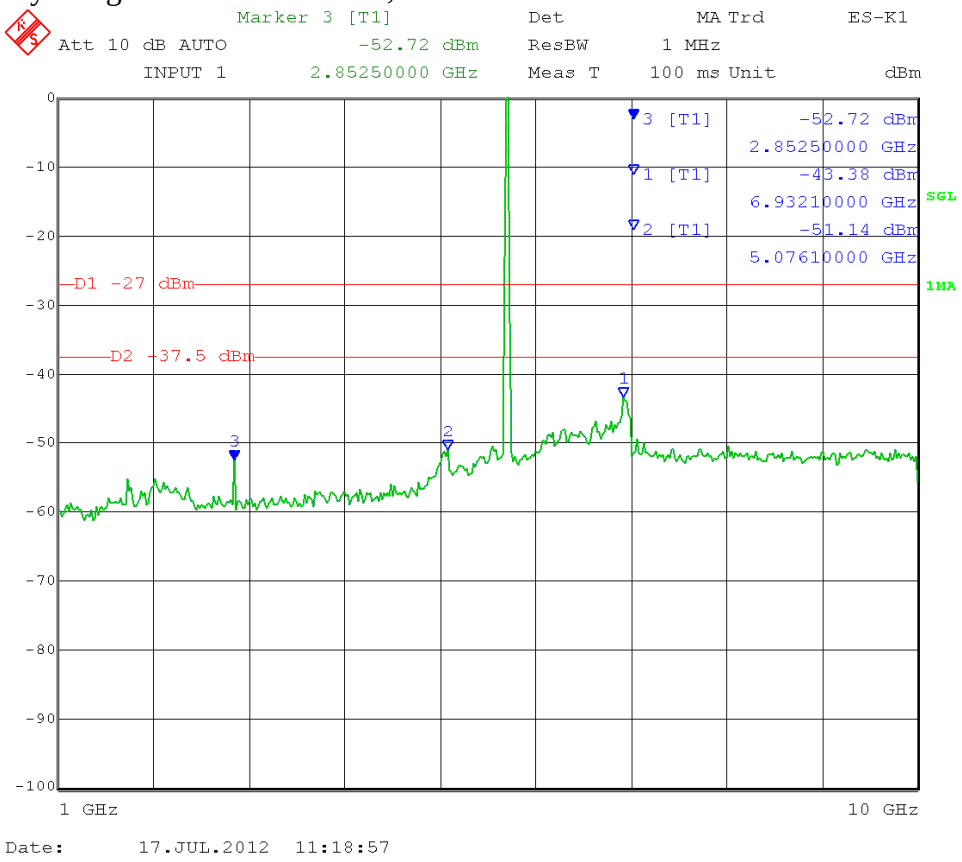
Calculated Field Strength at noise floor = -68.54 dBm – 20 log (3 meters)
+ 104.77 + 4.7 dB = 31.39 dBµV/m

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: High – 5705 MHz
Modulation: 2-level FSK
Register setting: AC
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 1 GHz to 10 GHz; Peak detector



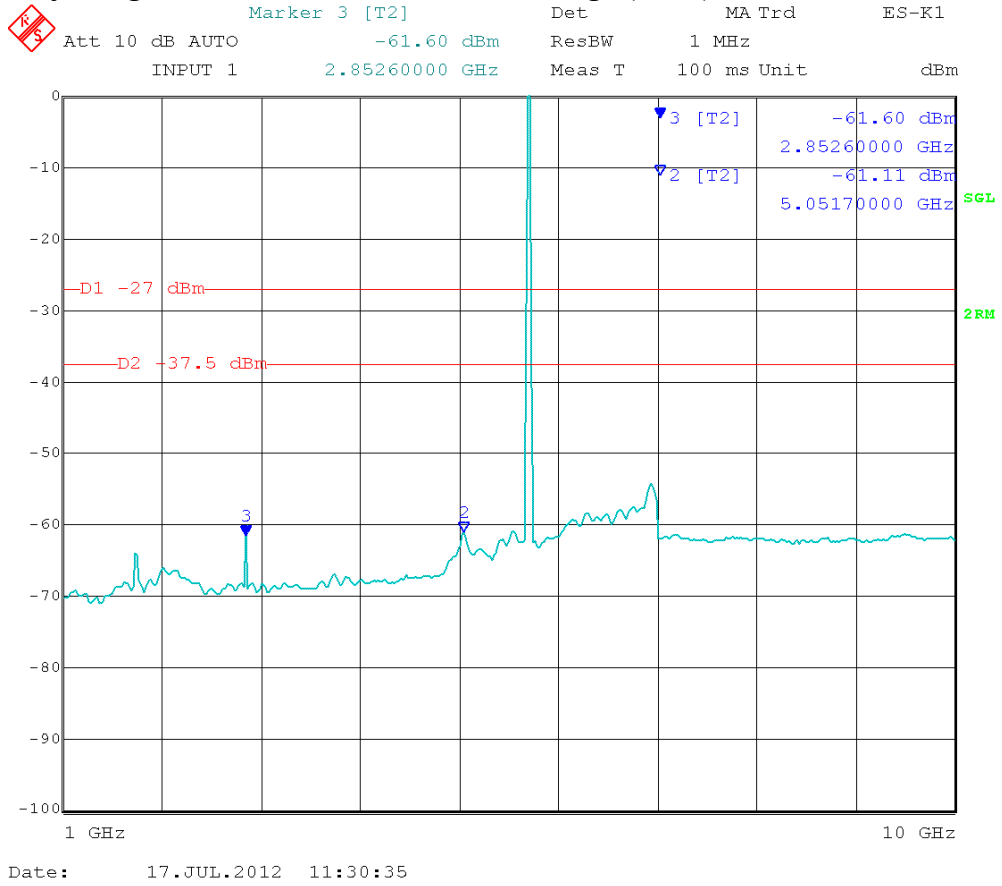
Marker 1: Calculated EIRP = -43.38 dBm + 10.5 dBi antenna gain = -32.88 dBm
Marker 2: Calculated Field Strength (Restricted Band) = -51.14 + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 54.59 dBµV/m Peak
Marker 3: Calculated Field Strength (Restricted Band) = -52.72 + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 53.01 dBµV/m Peak

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: High – 5705 MHz
Modulation: 2-level FSK
Register setting: AC
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit: FCC Sections 15.209 and 15.205 (emissions in restricted bands)

Frequency Range: 1 GHz to 10 GHz; Average (RMS) detector



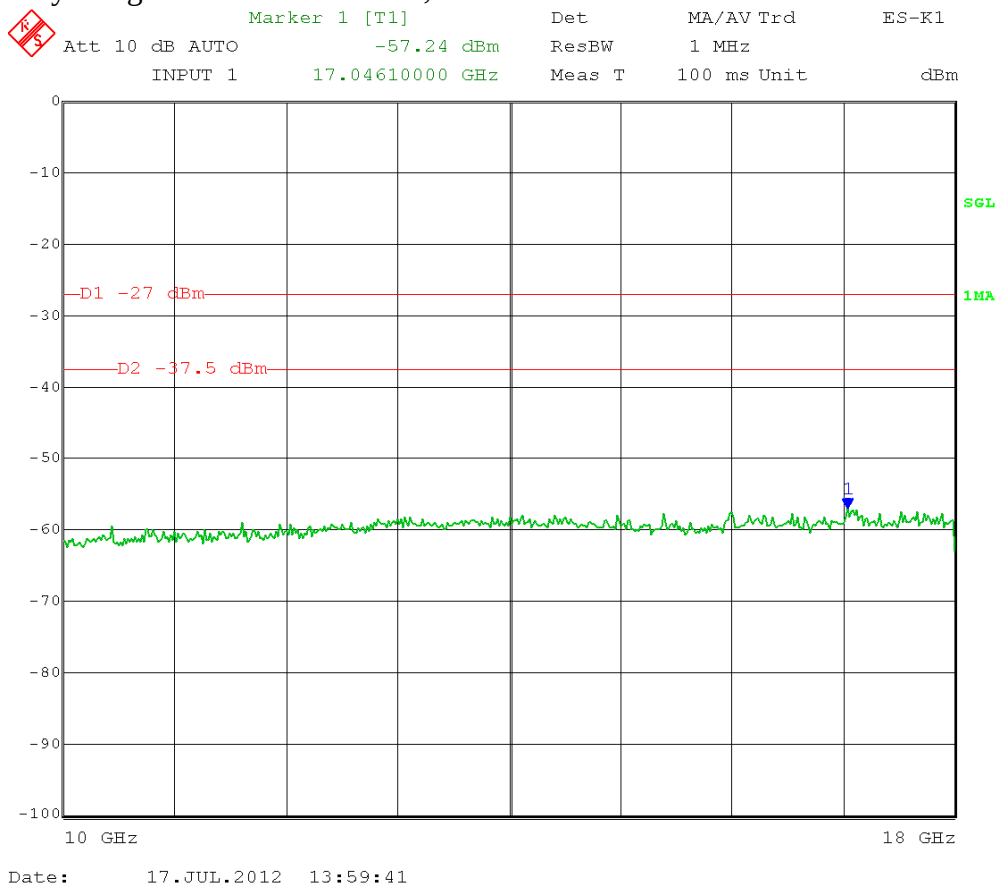
Marker 2: Calculated Field Strength (Restricted Band) = -61.11 + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 44.62 dBµV/m Average
Marker 3: Calculated Field Strength (Restricted Band) = -61.60 + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 44.13 dBµV/m Average

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: High – 5705 MHz
Modulation: 2-level FSK
Register setting: AC
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 10 GHz to 18 GHz; Peak detector



No emissions found from 10 GHz to 18 GHz

Calculated EIRP at noise floor = -57.24 dBm + 10.5 dBi antenna gain
= -46.74 dBm

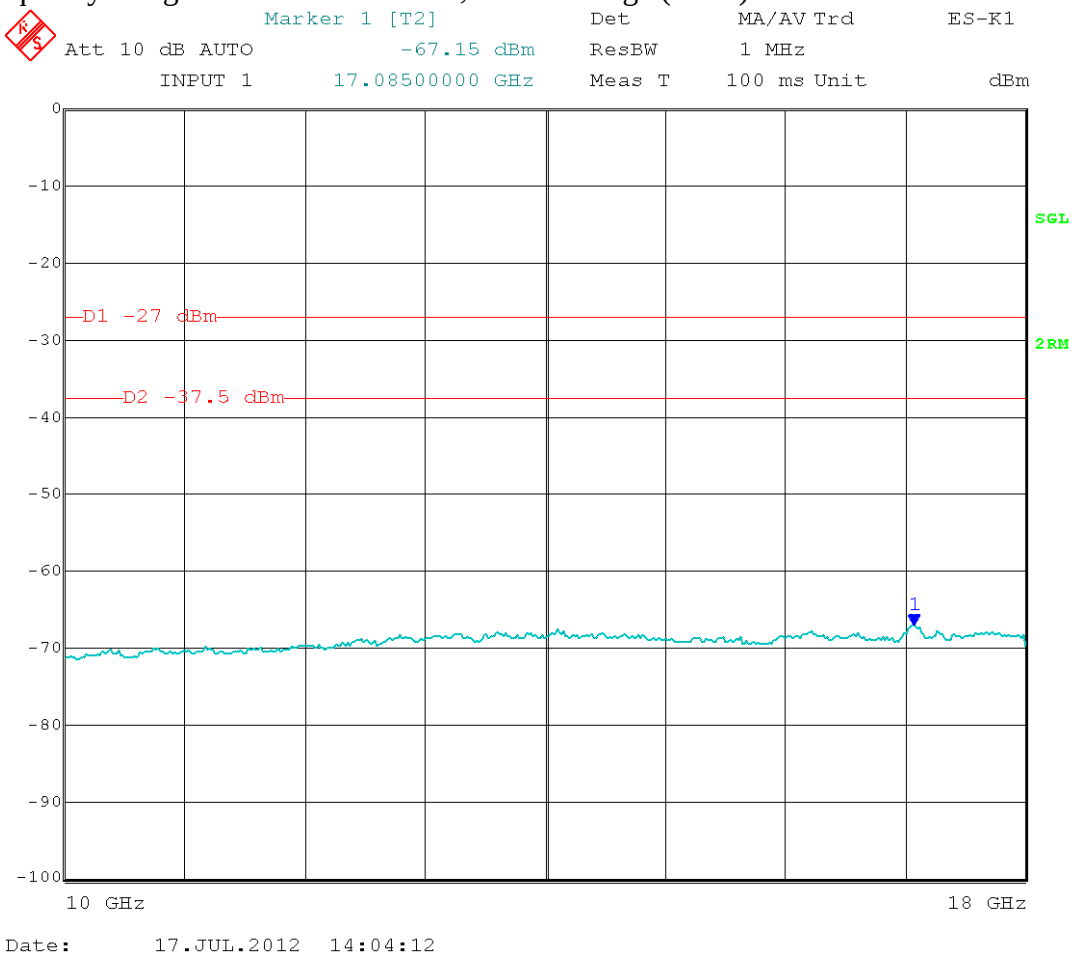
Calculated Field Strength at noise floor = -46.74 dBm – 20 log (3 meters) + 104.77 = 48.5 dBµV/m Peak

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: High – 5705 MHz
Modulation: 2-level FSK
Register setting: AC
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 10 GHz to 18 GHz; Average (RMS) detector



No emissions found from 10 GHz to 18 GHz

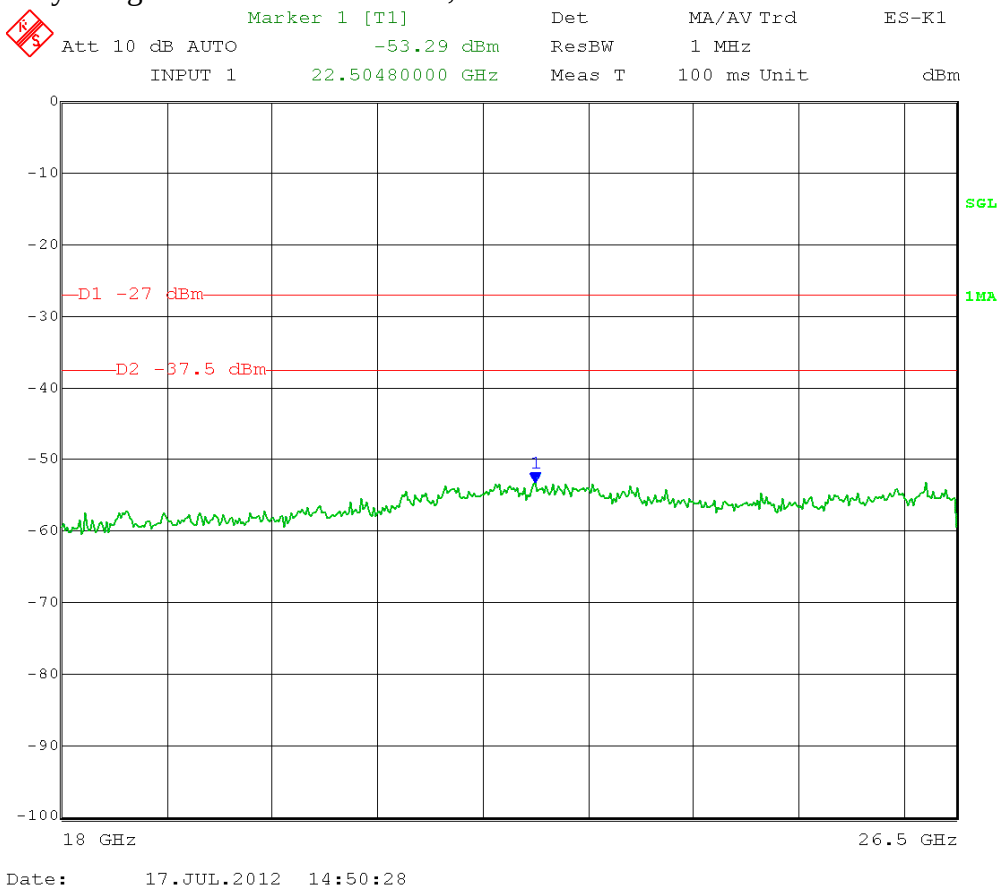
Calculated Field Strength at noise floor = -67.15 dBm + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 38.58 dBµV/m Average

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: High – 5705 MHz
Modulation: 2-level FSK
Register setting: AC
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 18 GHz to 26.5 GHz; Peak detector



No emissions found from 18 GHz to 26.5 GHz

Calculated EIRP at noise floor = -53.29 dBm + 10.5 dBi antenna gain
= -42.79 dBm

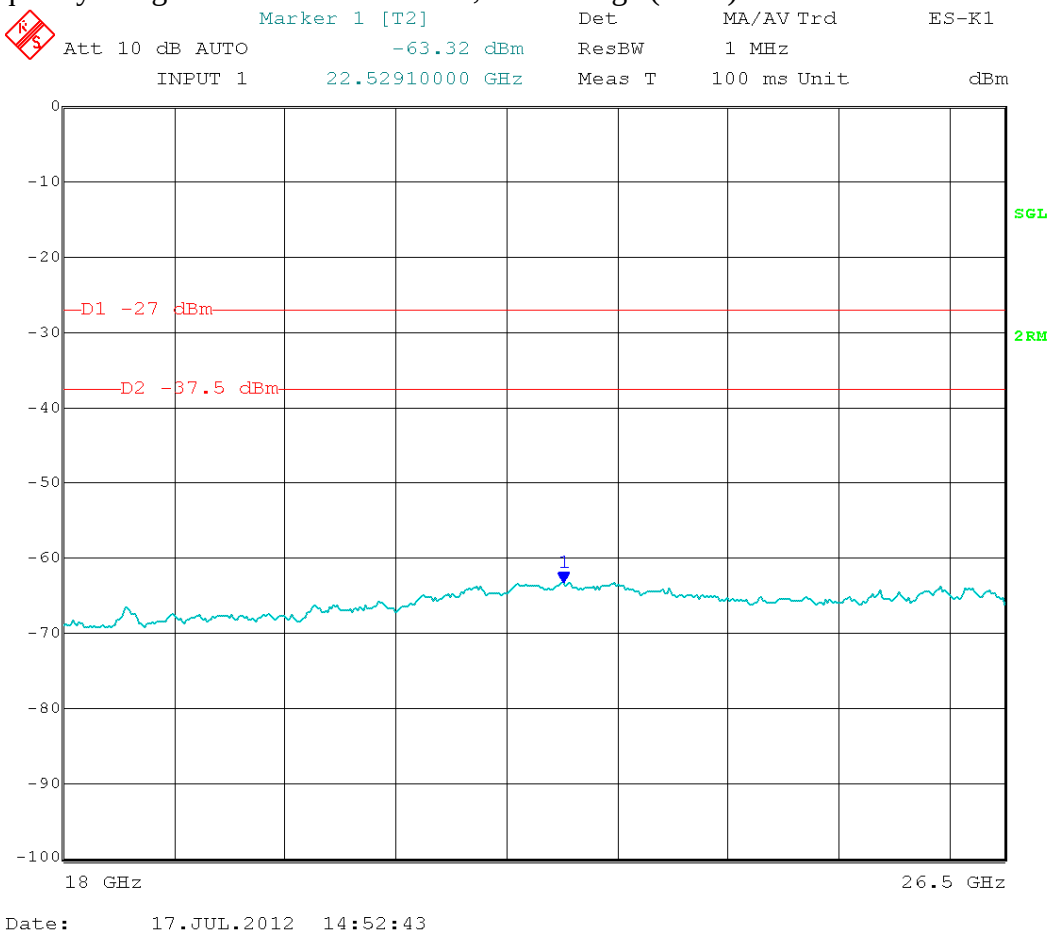
Calculated Field Strength at noise floor = -42.79 dBm – 20 log (3 meters) + 104.77 = 52.44 dBµV/m Peak

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: High – 5705 MHz
Modulation: 2-level FSK
Register setting: AC
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 18 GHz to 26.5 GHz; Average (RMS) detector



No emissions found from 18 GHz to 26.5 GHz

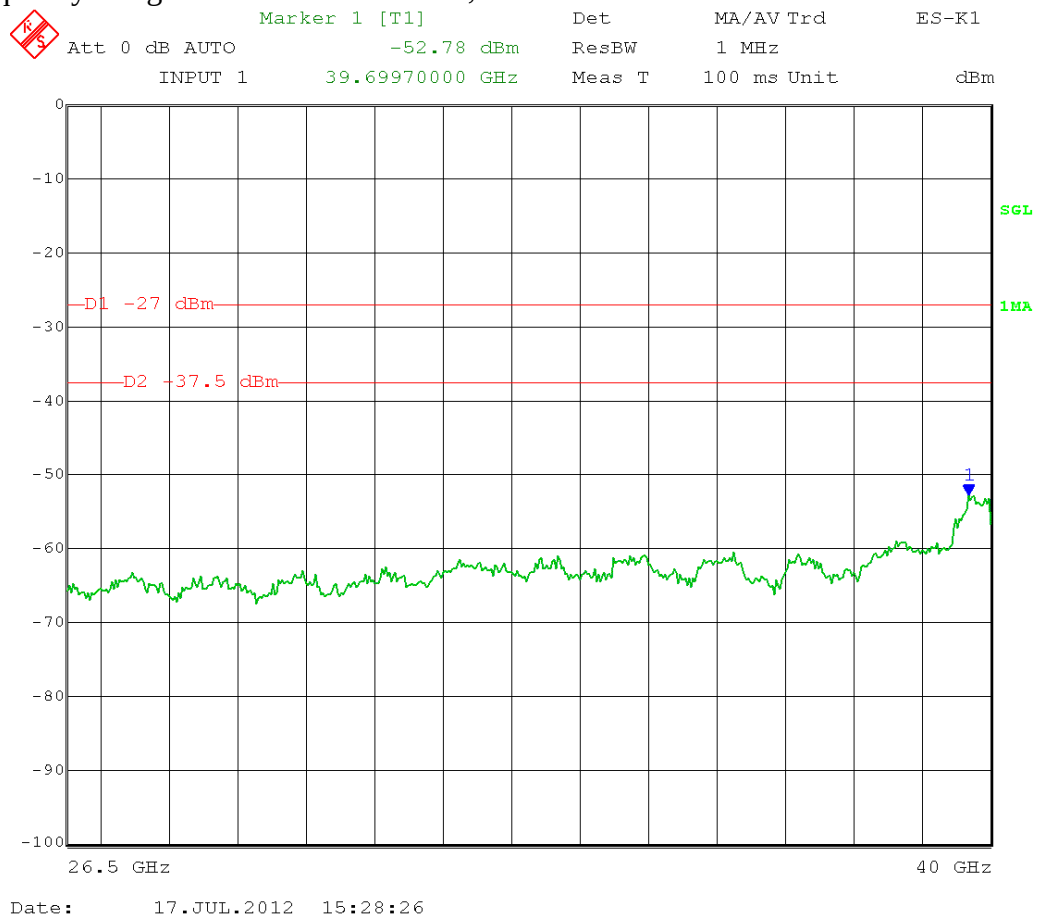
Calculated Field Strength at noise floor = -63.32 dBm + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 42.41 dBµV/m Average

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: High – 5705 MHz
Modulation: 2-level FSK
Register setting: AC
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 26.5 GHz to 40 GHz; Peak detector



No emissions found from 26.5 GHz to 40 GHz

Calculated EIRP at noise floor = -52.78 dBm + 10.5 dBi antenna gain
= -42.28 dBm

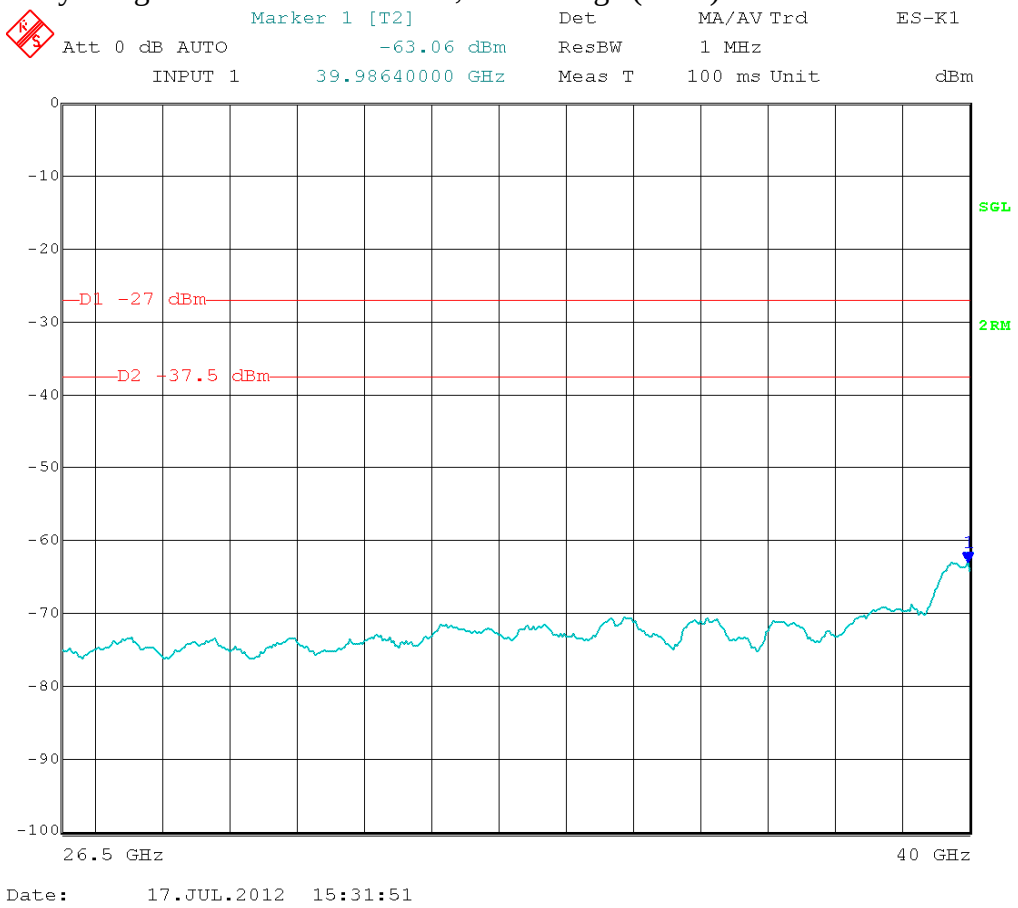
Calculated Field Strength at noise floor = -42.28 dBm – 20 log (3 meters) + 104.77 = 52.95 dBµV/m Peak

Test Date: 07-17-2012
Company: Cambium Networks
EUT: PMP450AP 5.4 GHz MIMO/COMBO
Test: Transmitter unwanted emissions – RF conducted
Operator: Craig B

Channel Bandwidth: 20 MHz
Channel: High – 5705 MHz
Modulation: 2-level FSK
Register setting: AC
Upper bound on out-of-band antenna gain: 10.5 dBi

Corrected for external attenuation, cable and connector to antenna interface on radio.
EIRP Limit: -27 dBm/MHz
Field strength limit (3 meters; Restricted Bands): 74 dBµV/m Peak, 54 dBµV/m Average

Frequency Range: 26.5 GHz to 40 GHz; Average (RMS) detector



No emissions found from 26.5 GHz to 40 GHz

Calculated Field Strength at noise floor = -63.06 dBm + 10.5 dBi antenna gain – 20 log (3 meters) + 104.77 = 42.67 dBµV/m Average

Appendix A – Measurement Data

A10.0 Unwanted Emission Levels – Radiated from cabinet

Rule Section: Sections 15.407(b)(3) and 15.407(b)(6)

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r01 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section G(1): Unwanted emissions in the restricted bands
Section G(2): Unwanted emissions outside the restricted bands
Sections G(3), G(4) and G(5): Unwanted emission levels

Below 1000 MHz
Detector = quasi-peak
Alternately, peak detector is permitted

Peak measurements above 1000 MHz
RBW = 1 MHz
VBW ≥ 3 MHz
Detector = peak
Sweep time = auto; increased by a factor of (1 / duty cycle)
Trace mode = max hold

Average measurements above 1000 MHz (required for peak emissions that are above the average limits) – Method AD (Average Detection)
RBW = 1 MHz
VBW ≥ 3 MHz
Detector = RMS (span/(# of points in sweep) ≤ RBW/2)
Averaging type = power
Sweep time = auto; increased by a factor of (1 / duty cycle)
Trace mode = trace average 100 sweeps; increased by a factor of (1 / duty cycle)
For a duty cycle less than 98%, add 10 log (1/duty cycle)

EIRP calculation:
EIRP (dBm) = E + 20 log (d) – 104.77
E = field strength in dBµV/m
d = the measurement distance in meters

Limits: Outside restricted bands: Peak EIRP shall not exceed -27 dBm/MHz
Inside restricted bands: Peak and Average limits of FCC Part 15.209

Results: Passed

Notes: Both transmit chains active and at maximum power during test.

Antenna ports were terminated with 50 Ohm terminations.

Measurements were taken for QPSK (OFDM) or 2-level (FSK) at the lowest, middle, and highest channels of operation. EUT was set to transmit continuously with 98% duty cycle.

166 South Carter, Genoa City, WI 53128

Company: Cambium Networks
Model Tested: C054045A002A
Report Number: 18191
DLS Project: 5271

DLS Electronic Systems, Inc.

Company: Cambium Networks
Operator: Jim O
Date of test: 07-2-12
Temperature: 75 deg. F
Humidity: 43% R.H.

Spurious Emissions - ERP (freq's<1GHz) - Substitution Method

Model: AP 5.4 **30M-1GHz Transmit mode**

Channel: Low, Mid & High

Frequency (MHz)	Polarization	Max. Field Strength of EUT (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [ERP] (dBm)	Limit (dBm)	Margin (dB)	Notes
109.74	V	19.70	-75.90	2.10	2.15	-78.00	-54	24.00	Low, Mid, High
112.86	V	18.30	-73.60	2.13	2.15	-75.73	-54	21.73	Low, Mid, High
120.12	V	19.60	-67.40	2.14	2.15	-69.54	-54	15.54	Low, Mid, High
122.94	V	25.00	-62.90	2.15	2.15	-65.05	-54	11.05	Low, Mid, High
124.98	V	17.70	-70.80	2.61	2.15	-73.41	-36	37.41	Low, Mid, High
375.02	V	18.30	-72.60	2.24	2.15	-74.84	-36	38.84	Low, Mid, High
258.68	H	22.10	-70.10	4.49	2.15	-74.59	-36	38.59	Low, Mid, High
355.7	H	29.20	-56.00	4.83	2.15	-60.83	-36	24.83	Low, Mid, High
531.5	H	22.90	-68.70	5.06	2.15	-73.76	-54	19.76	Low, Mid, High

$ERP_{(ref.\ to\ ½\lambda\ dipole)}$ = Signal generator output - cable loss + antenna gain - 2.15

DLS Electronic Systems, Inc.

Company: Cambium Networks
Operator: Jim O
Date of test: 07-9-12
Temperature: 77 deg. F
Humidity: 44% R.H.

Spurious Emissions - EIRP (freq's>1GHz) - Substitution Method

Model: Model: AP 5.4 **TX mode 1-6Ghz**

Channel: low, mid & high

Frequency (GHz)	Polarization	Max. Field Strength of EUT (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Limit (dBm)	Margin (dB)	Notes
1.3910	V	45.10	-54.30	2.00	7.96	-48.34	-27	21.34	LO, MID, HI
1.4399	V	43.60	-55.80	2.10	8.30	-49.60	-27	22.60	LO, MID, HI
2.0000	V	41.00	-60.60	2.60	8.92	-54.28	-27	27.28	LO, MID, HI
1.9200	V	40.50	-60.20	2.50	8.40	-54.30	-27	27.30	LO, MID, HI
1.8400	V	39.90	-60.80	2.50	8.38	-54.92	-27	27.92	LO, MID, HI
2.1601	V	39.20	-62.40	2.72	9.40	-55.72	-27	28.72	LO, MID, HI
1.1601	V	38.30	-61.10	1.90	6.60	-56.40	-27	29.40	LO, MID, HI
1.3199	V	38.00	-61.40	2.05	7.50	-55.95	-27	28.95	LO, MID, HI
3.2800	V	41.70	-60.80	3.45	9.47	-54.78	-27	27.78	LO, MID, HI
3.3600	V	41.40	-61.10	3.52	9.50	-55.12	-27	28.12	LO, MID, HI
1.1200	V	36.90	-62.50	1.85	6.60	-57.75	-27	30.75	LO, MID, HI
1.3717	H	45.60	-53.51	2.01	7.40	-48.12	-27	21.12	LO, MID, HI
1.3202	H	45.60	-53.51	1.99	7.40	-48.10	-27	21.10	LO, MID, HI
1.8401	H	44.30	-56.50	2.50	8.30	-50.70	-27	23.70	LO, MID, HI
1.2799	H	44.10	-55.01	1.95	7.00	-49.96	-27	22.96	LO, MID, HI
1.4000	H	42.10	-57.01	2.10	7.96	-51.15	-27	24.15	LO, MID, HI
1.1500	H	41.10	-58.01	1.88	6.66	-53.23	-27	26.23	LO, MID, HI
2.0001	H	41.10	-61.02	2.50	8.94	-54.58	-27	27.58	LO, MID, HI
2.2401	H	41.10	-61.02	2.70	9.40	-54.32	-27	27.32	LO, MID, HI
1.2545	H	40.90	-58.21	1.88	7.00	-53.09	-27	26.09	LO, MID, HI
2.3200	H	40.00	-62.12	2.89	9.55	-55.46	-27	28.46	LO, MID, HI
1.1199	H	39.40	-59.71	1.85	6.50	-55.06	-27	28.06	LO, MID, HI
1.0000	H	36.80	-62.31	1.82	6.49	-57.64	-27	30.64	LO, MID, HI
1.1600	H	36.70	-62.41	1.85	6.52	-57.74	-27	30.74	LO, MID, HI

EIRP = Sig. Gen(output) - Cable loss + Ant gain (dBi)

DLS Electronic Systems, Inc.

Company: Cambium Networks
Operator: Jim O
Date of test: 07-5-12
Temperature: 79 deg. F
Humidity: 44% R.H.

Spurious Emissions - EIRP (freq's>1GHz) - Substitution Method

Model: AP 5.4 OFDM **10 MHz CH 6-18GHz Transmit mode**

Channel: Low, Mid & High

Frequency(GHz)	Polarization	Max. Field Strength of EUT (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Limit (dBm)	Margin (dB)	Notes
10.95	H	54.10	-46.80	6.90	12.51	-41.19	-27	14.19	LO CH
10.95	V	51.70	-49.70	6.90	12.51	-44.09	-27	17.09	LO CH
11.15	V	53.00	-48.40	7.10	12.47	-43.03	-27	16.03	MID CH
11.15	H	52.50	-48.40	7.10	12.47	-43.03	-27	16.03	MID CH
11.44	H	52.80	-48.40	6.90	12.42	-42.88	-27	15.88	HI CH
11.44	V	55.20	-46.20	6.90	12.42	-40.68	-27	13.68	HI CH
16.425	H	51.20	-49.00	9.00	15.70	-42.30	-27	15.30	LO CH
16.425	V	52.10	-49.10	9.00	15.70	-42.40	-27	15.40	LO CH
17.16	H	55.20	-45.60	9.20	12.20	-42.60	-27	15.60	HI CH
17.16	V	55.50	-45.50	9.20	12.20	-42.50	-27	15.50	HI CH

EIRP = Sig. Gen(output) - Cable loss + Ant gain (dBi)

DLS Electronic Systems, Inc.

Company: Cambium Networks
Operator: Jim O
Date of test: 07-5-12
Temperature: 77 deg. F
Humidity: 42% R.H.

Spurious Emissions - EIRP (freq's>1GHz) - Substitution Method

Model: AP 5.4 **20Mhz OFDM 6-18GHz Transmit mode**

Channel: Low, Mid & High

Frequency (GHz)	Polarization	Max. Field Strength of EUT (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of Emission [EIRP] (dBm)	Limit (dBm)	Margin (dB)	Notes
10.96	H	54.30	-46.60	6.90	12.51	-40.99	-27	13.99	LO CH
10.96	V	51.70	-49.50	6.90	12.51	-43.89	-27	16.89	LO CH
11.15	V	52.60	-48.60	7.10	12.47	-43.23	-27	16.23	MID CH
11.44	H	54.00	-47.20	7.10	12.43	-41.87	-27	14.87	HI CH

EIRP = Sig. Gen(output) - Cable loss + Ant gain (dBi)

166 South Carter, Genoa City, WI 53128

Company: Cambium Networks
Model Tested: C054045A002A
Report Number: 18191
DLS Project: 5271

DLS Electronic Systems, Inc.

Company: Cambium Networks
Operator: Jim O
Date of test: 07-5-12
Temperature: 75 deg. F
Humidity: 45% R.H.

Spurious Emissions - EIRP (freq's>1GHz) - Substitution Method

Model: AP 5.4 FSK **6-18GHz Transmit mode**									
Channel: Low, Mid & High									
Frequency (GHz)	Polarization	Max. Field Strength of EUT (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of Emission [EIRP] (dBm)	Limit (dBm)	Margin (dB)	Notes
10.98	H	56.10	-44.80	6.90	12.50	-39.20	-27	12.20	LO CH
10.98	V	56.10	-45.30	6.90	12.50	-39.70	-27	12.70	LO CH
11.14	H	55.30	-45.60	7.10	12.47	-40.23	-27	13.23	MID CH
11.14	V	55.30	-46.10	7.10	12.47	-40.73	-27	13.73	MID CH
11.44	H	55.90	-45.30	7.20	12.44	-40.06	-27	13.06	HI CH
11.44	V	55.20	-46.20	7.20	12.44	-40.96	-27	13.96	HI CH

EIRP = Sig. Gen(output) - Cable loss + Ant gain (dBi)

DLS Electronic Systems, Inc.

Company: Cambium Networks
Operator: Jim O
Date of test: 07-5-12
Temperature: 78 deg. F
Humidity: 45% R.H.

Spurious Emissions - EIRP (freq's>1GHz) - Substitution Method

Model: AP 5.4 OFDM 10MHz **18-40GHz Transmit mode**

Channel: Low, Mid & High

Frequency (GHz)	Polarization	Max. Field Strength of EUT (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Limit (dBm)	Margin (dB)	Notes
21.9	V	57.10	-38.20	10.75	9.70	-39.25	-27	12.25	LO CH
22.2	V	57.50	-38.10	10.80	9.95	-38.95	-27	11.95	MID CH
22.88	V	57.70	-37.85	10.90	10.30	-38.45	-27	11.45	HI CH

EIRP = Sig. Gen(output) - Cable loss + Ant gain (dBi)

DLS Electronic Systems, Inc.

Company: Cambium Networks
Operator: Jim O
Date of test: 07-5-12
Temperature: 75 deg. F
Humidity: 44% R.H.

Spurious Emissions - EIRP (freq's>1GHz) - Substitution Method

Model: AP 5.4 OFDM 20MHz **18-40GHz Transmit mode**									
Channel: Low, Mid & High									
Frequency (GHz)	Polarization	Max. Field Strength of EUT (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [EIRP] (dBm)	Limit (dBm)	Margin (dB)	Notes
21.92	H	58.10	-37.80	10.75	10.20	-38.35	-27	11.35	LO CH

EIRP = Sig. Gen(output) - Cable loss + Ant gain (dBi)

166 South Carter, Genoa City, WI 53128

Company: Cambium Networks
Model Tested: C054045A002A
Report Number: 18191
DLS Project: 5271

DLS Electronic Systems, Inc.

Company: Cambium Networks
Operator: Jim O
Date of test: 07-5-12
Temperature: 70 deg. F
Humidity: 35% R.H.

Spurious Emissions - EIRP (freq's>1GHz) - Substitution Method

Model: AP 5.4 **FSK 18-40GHz Transmit mode**									
Channel: Low, Mid & High									
Frequency (GHz)	Polarization	Max. Field Strength of EUT (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of Emission [EIRP] (dBm)	Limit (dBm)	Margin (dB)	Notes
					Noise Floor Only				

EIRP = Sig. Gen(output) - Cable loss + Ant gain (dBi)

END OF REPORT

Revision #	Date	Comments	By
1.0	08-16-2012	Preliminary Release	JS
1.1	08-23-2012	Added Section 10 Tables to report	JS
1.2	09-05-2012	Editing	JS
1.3	10-10-2012	Peak Excursion data added	JS