166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Code of Federal Regulations 47 Part 15 – Radio Frequency Devices

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

And

Industry Canada Spectrum Management and Telecommunications Radio Standards Specification RSS-247 Issue 1 May 2015

Section 6: License-Exempt Local Area Network (LE-LAN) Devices

THE FOLLOWING MEETS THE ABOVE TEST SPECIFICATION FOR A CLASS III PERMISSIVE CHANGE

(DFS not tested by DLS Electronic Systems Inc.)

FCC ID: Z8H89FT0001
IC ID: 109W-0001

Formal Name:	PMP450SM 5.7GHz OFDM Radio with cross-polarized antenna
Kind of Equipment:	Point-to-Point Digital Transmission Transceiver
Frequency Range:	5730 to 5845 MHz (10 MHz bandwidth) 5735 to 5840 MHz (20 MHz bandwidth) **5745 to 5830 MHz (40 MHz bandwidth)** – in this report
Test Configuration:	Stand-alone
Original Model Number(s): Additional Model Numbers:	C054045C001A, C054045C002A, C054045C003A, C054045C004A C054045C006A, C054045C001B, C054045C003B, C054045C005B, C054045C006B, C054045C007B, C054045C008B
Model(s) Tested:	C054045C008B
Serial Number(s):	0A003EB13F98 (radiated sample), 0A003E1DD0D (conducted sample)
Date of Tests:	June 22nd to June 27th, 2016
Test Conducted For:	Cambium Networks 3800 Golf Road, Suite 360 Rolling Meadows, IL 60008, USA

NOTICE: "This test report relates only to the items tested and must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government". Please see the "Description of Test Sample" page listed inside of this report.

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
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SIGNATURE PAGE

Report By:

Craig Brandt
Test Engineer

Reviewed By:

William Stumpf
OATS Manager

Approved By:

Brian Mattson
General Manager

166 South Carter, Genoa City, WI 53128

Company: Cambium Networks
Model Tested: C054045C008B
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DLS Project: 8206

Table of Contents

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 & 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).

2015-09-25 through 2016-09-30
Effective Dates

For the National Voluntary Laboratory Accreditation Program

ELECTROMAGNETIC COMPATIBILITY & TELECOMMUNICATIONS

NVLAP LAB CODE 100276-0

Emissions

Designation	***Description***
Off-site test location	D.L.S. Electronics performs radiated emissions testing at an additional location, 166 South Carter Street, Genoa City, WI 53128.

1.0 Summary of Test Report

It was determined that the Cambium Networks PMP450SM 5.7GHz OFDM Radio, Model C054045C008B, complies with the requirements of CFR 47 Part 15 Subpart E Section 15.407 and RSS-247 Section 6. The purpose of this test was to show FCC and IC compliance of the PMP450SM 5.7GHz OFDM, pursuant to a Class III Permissive Change to FCC ID: Z8H89FT0001 and IC ID: 109W-0001. The original device was certified as a 5.7GHz OFDM Radio with cross-polarized antenna with 10MHz or 20MHz channel bandwidths, tested to CFR 47 Part 15 Subpart C, Section 15.247 and RSS-210 Annex 8. This report is being generated to show compliance of the 40MHz channel bandwidth being added to the software package of the device. Original testing of the PMP450SM 5.7GHz OFDM Radio determined that QPSK is the worst case modulation of the OFDM transceiver. This modulation was tested to show compliance to CFR 47 Part 15 Subpart E Section 15.407 and RSS-247 Section 6 for the Class III Permissive Change.

FCC Subpart E Section 15.407 and RSS-247 Section 6 Applicable Technical Requirements Tested:

Section	Description	Procedure	Note	Compliant?
Informative	Duty Cycle of test unit	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 Section II(B)(2)(b)	1	NA
Informative	26 dB Emission Bandwidth (EBW)	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 Section II(C)(1)	1	NA
FCC: 15.407(e) RSS-247: 6.2.4(1)	Minimum Emission Bandwidth for the band 5.725-5.85 GHz	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 Section II(C)(2)	1	Yes
Informative	99% Occupied Bandwidth (OBW)	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 Section II(D)	1	NA
FCC: 15.407(a)(3) RSS-247: 6.2.4(1)	Maximum Conducted Output Power	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 Section II(E)(3)	1	Yes
FCC: 15.407(a)(3) RSS-247: 6.2.4(1)	Maximum Power Spectral Density - Conducted	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 Section II(F)	1	Yes

FCC Subpart E Section 15.407 and RSS-247 Section 6 Applicable Technical Requirements Tested (continued):

Section	Description	Procedure	Note	Compliant?
FCC: 15.407(b)(4) & FCC-16-24, Appendix A, 15.407(b)(4)(i) RSS-247: 6.2.4(2) using FCC	Operating Band Edge / Emission Mask - Conducted	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 Section II(G)(2)	1	Yes
FCC: 15.407(b)(7) & 15.205 RSS-247: 6 RSS-Gen: 8.10	Restricted Band Edge - Radiated	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 Section II(G)(1)	2	Yes
FCC: 15.407(b)(4) RSS-247: 6.2.4(2)	Unwanted Emission Levels - Above 1000 MHz - Outside the Restricted Bands - Radiated	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 Section II(G)(2)	2	Yes
FCC: 15.407(b)(7) & 15.205 RSS-247: 6 RSS-Gen: 8.10	Unwanted Emission Levels - Above 1000 MHz - Inside the Restricted Bands - Radiated	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 Section II(G)(1)	2	Yes
FCC: 15.407(b)(6) & 15.209 RSS-247: 6 RSS-Gen: 8.10	Unwanted Emission Levels - Below 1000 MHz - Radiated	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 Section II(G)(4)	2	Yes

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

2.0 Introduction

In June, 2016 the PMP450SM 5.7GHz OFDM Radio with cross-polarized antenna, Model C054045C008B, as provided from Cambium Networks, was tested to the requirements of CFR 47 Part 15 Subpart E Section 15.407 and RSS-247 Section 6 to add a 40 MHz channel bandwidth to FCC ID: Z8H89FT0001 and IC ID: 109W-0001as 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

FCC Registration: 90531
IC Registration: 2060A-1 & 2060A-2

4.0 Description of Test Sample

Description:

Point-to-Point 5.7 GHz PMP450 Transceiver with integrated Patch and Reflector Dish antennas (combined gain of 23 dBi) with 10 MHz or 20 MHz channel bandwidth. The purpose of this test report is to add 40 MHz as the widest bandwidth.

Type of Equipment / Frequency Range:

Stand-Alone / 5730 to 5845 MHz (10 MHz bandwidth) (in original report)
5735 to 5840 MHz (20 MHz bandwidth) (in original report)
5745 to 5830 MHz (40 MHz bandwidth) – in this report

10 MHz and 20 MHz bandwidth data reported to the FCC and Industry Canada in reports #17831 & #17833

Physical Dimensions of Equipment Under Test:

Length: 12 in. Width: 3 in. Height: 1 in.

Power Source:

30 VDC (Power Over Ethernet to Radio)
120 Vac, 60 Hz using Phihong power supply model: PSA15M-300 (SM)

4.0 Description of Test Sample (continued)

Internal Frequencies:

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

Transmit / Receive Frequencies Used For Test Purpose:

40 MHz Channel Bandwidth: Low channel: 5745 MHz, Middle channel: 5775 MHz, High channel: 5830 MHz

Type of Modulation(s):

OFDM: QPSK, 16-QAM, 64-QAM **(QPSK is worst case)**

Description of Circuit Board(s) / Part Number:

Cambium Networks PC Board	84010124001 B
Patch Antenna	85015000001
2 x Connector (for test unit only)	0989419C01

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 26	837491/010	20 Hz – 26 GHz	6-23-16	6-23-17
Test Software	Rohde & Schwarz	ESK-1	V1.7.1	N/A	N/A	N/A
Preamp	Ciao	CA118-4010	101	1GHz-18GHz	1-20-16	1-20-17
Horn Antenna	EMCO	3115	9502-4451	1-18GHz	6-1-15	6-1-17
Filter- High-Pass	Planar	HP8G-7G8-CD-SFF	PF1225/0728	7.5GHz-18GHz	6-5-16	6-5-17
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	6-23-16	6-23-17
Preamp	Planar	PTB-60-2040-5R0-10-115VAC-292FF	PL3292	18GHz-40GHz	6-6-16	6-6-17
Horn Antenna	EMCO	3116	2549	18-40GHz	9-2-14	9-2-16
High Pass Filter	K & L	50140/11SH10-18000-T40000-K-K	8	18-40 GHz	1-27-16	1-27-17
Low Pass Filter	Mini-Circuits	VLFX-1125	R UU92600920	DC – 1 GHz	6-3-16	6-3-17
Preamplifier	Rohde & Schwarz	TS-PR10	032001/004	9 kHz – 1 GHz	12-3-15	12-3-16
Antenna	EMCO	3104C	00054892	20 MHz – 200 MHz	3-11-16	3-11-18
Antenna	EMCO	3146	1205	200 MHz – 1 GHz	3-23-16	3-23-18
10 dB Attenuator	Narda	4768-10	0702	30 MHz – 40 GHz	6-5-16	6-5-17
20 dB Attenuator	Anritsu	42N50-20	000451	DC – 18 GHz	5-11-16	5-11-17
Thermal Power Sensor	Rohde & Schwarz	NRP-Z51	1138.0005.03 -104290-WQ	DC - 18GHz	6-23-16	6-23-17
50 Ohm Load	Pasternack	PE6039	DLS #527	DC – 18 GHz	NA	NA

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 D02 General UNII test Procedures New Rules v01r02 and ANSI C63.10-2013, unless otherwise noted. Description of procedures and measurements can be found in Appendix B – Measurement Data. See Appendix A for additional photos of the test set up. See Appendix C for measurement uncertainty.

Radiated Emissions Measurement Arrangement:

All radiated emission measurements were performed at D.L.S. Electronic Systems, Inc. and set up according to FCC Publication KDB 789033 D02 General UNII test Procedures New Rules v01r02 and ANSI C63.10-2013, unless otherwise noted. Description of procedures and measurements can be found in Appendix B – Measurement Data. See Appendix A for additional photos of the test set up. See Appendix C for measurement uncertainty.

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 55% RH

Supply Voltage:

30 VDC (Power Over Ethernet to Radio)
120 Vac, 60 Hz using Phihong power supply model: PSA15M-300 (SM)

8.0 Modifications Made To EUT For Compliance

The output power setting was changed from 19 to 15 to pass the operating band edge / emission mask limit.

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.

Please note that the EUT had been nicknamed the PMP450 BH/SM 5.8 GHz radio during testing. It is only a nickname for the prototype.

10.0 Results

Measurements were performed in accordance with FCC Publication KDB 789033 D02 General UNII test Procedures New Rules v01r02 and ANSI C63.10-2013. Graphical and tabular data can be found in Appendix B at the end of this report.

11.0 Conclusion

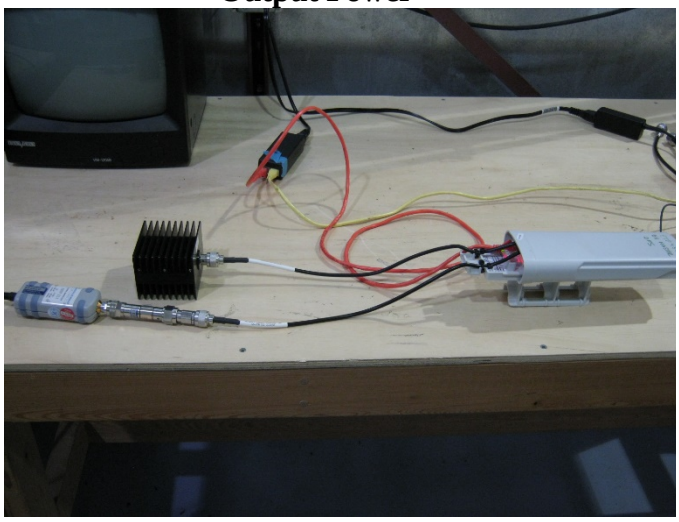
Dynamic Frequency Selection (DFS) testing was not performed by DLS Electronic Systems,Inc. Otherwise, the PMP450SM 5.7GHz OFDM Radio with cross-polarized antenna, Model C054045C008B, as provided from Cambium Networks tested in June, 2016 **meets** the requirements of CFR 47 Part 15 Subpart E Section 15.407 and RSS-247 Section 6, to add a 40 MHz channel bandwidth to FCC ID: Z8H89FT0001 and IC ID: 109W-0001 as a Class III Permissive Change.

Appendix A – Test Photos

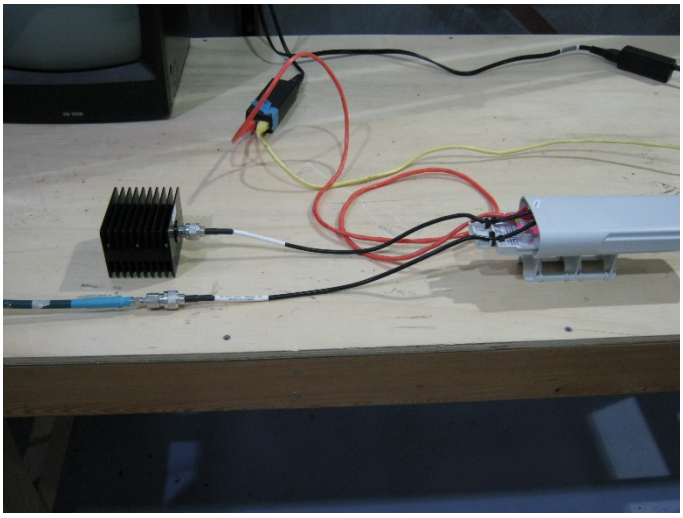
Photo Information and Test Setup

Item 0: PMP450SM 5.7GHz OFDM Radio
Item 1: 18 dBi Reflector Dish
Item 2: Shielded Power-Over-Ethernet cable (with metal connectors) to remote power supply and computer

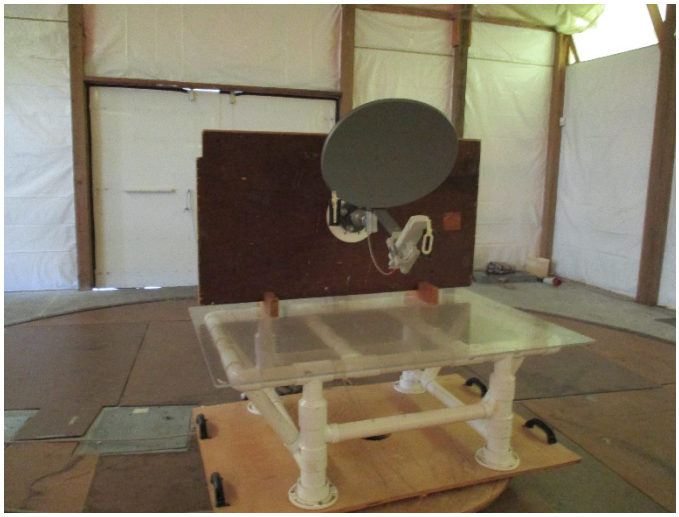
Output Power



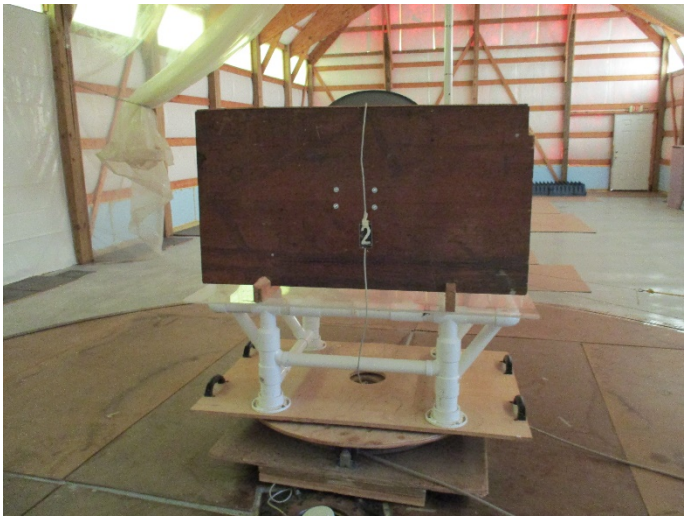
RF Conducted



Radiated – Below 1 GHz - front

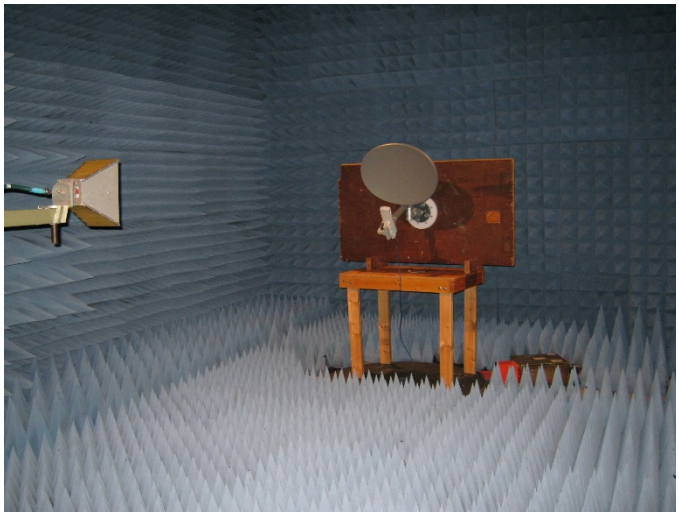


Radiated – Below 1 GHz - back



Appendix A – Test Photos (continued)

Radiated – Above 1 GHz - front



Radiated – Above 1 GHz - side

Appendix B – Measurement Data

B1.0 Duty Cycle

Rule Section: Informative

Test Procedure: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section II(B)(2)(b) Zero-span mode on a spectrum analyzer

Description: Measure the maximum duty cycle achievable for testing purposes

Limit: All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level. If 100% duty cycle cannot be achieved, measurements of duty cycle x, and maximum-power transmission duration, *T*, are required for each tested mode of operation.

Results: The maximum duty cycle achievable with the test software available at the time of test was **33.6%**. Therefore measurements of duty cycle x, and maximum-power transmission duration, *T*, are provided.

T = duration of one pulse = 1.683 ms
x = Tx ON / (Tx ON + Tx OFF) = 1.683ms / (5.010 ms) = 0.336
Duty cycle correction for power measurements
= 10 log (1/x) = 10 log (1/0.336) = 4.74 dB

Notes: Measurements were taken on the middle channel of operation for QPSK modulation with a 40 MHz nominal channel bandwidth.

166 South Carter, Genoa City, WI 53128

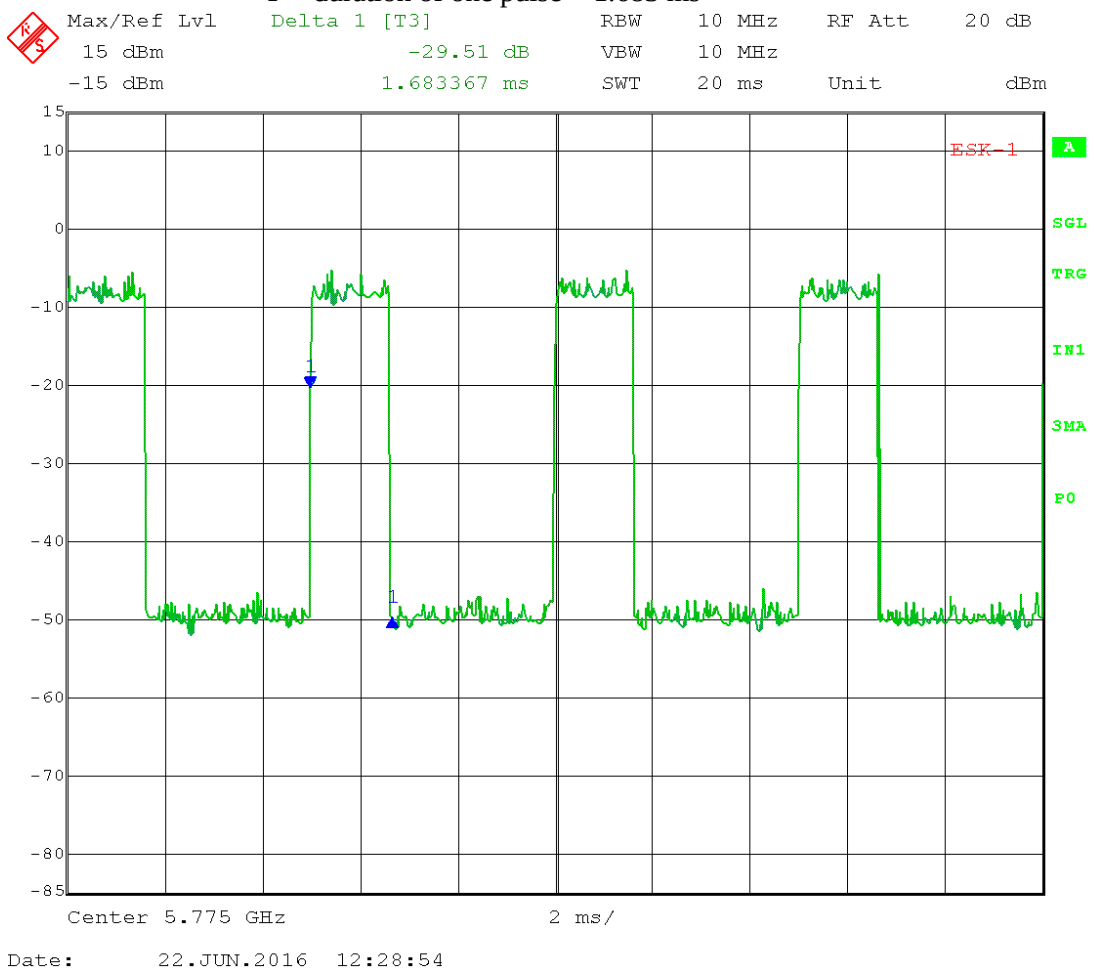
Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-22-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Duty Cycle during testing
Operator:	Craig B
Comment:	II.B(2)(b) zero-span on spectrum analyzer

RBW = 10 MHz VBW = 10 MHz
Span = 0 Hz Detector = Peak
Mid Channel: 5775 MHz 40 MHz BW

T = duration of one pulse = 1.683 ms
x = duty cycle factor = Tx ON / (Tx ON + Tx OFF) = 1.683ms / (5.010 ms) = 0.336
Duty cycle = 0.336 x 100 = 33.6%
Duty cycle correction for power measurements
= 10 log (1/x) = 10 log (1/0.336) = **4.74 dB**

T = duration of one pulse = 1.683 ms



166 South Carter, Genoa City, WI 53128

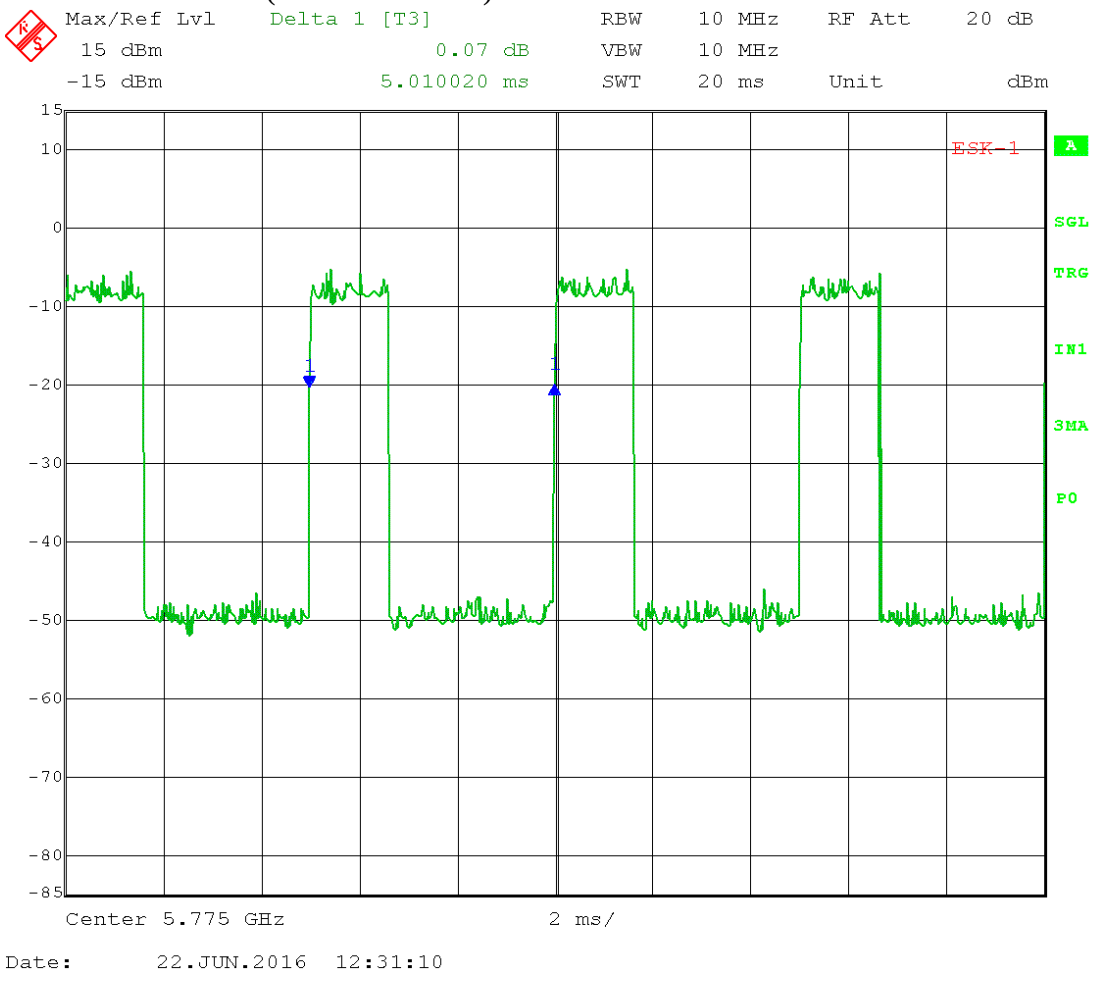
Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-22-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Duty Cycle during testing
Operator:	Craig B
Comment:	II.B(2)(b) zero-span on spectrum analyzer

RBW = 10 MHz
Span = 0 Hz
Mid Channel: 5775 MHz
VBW = 10 MHz
Detector = Peak
40 MHz BW

T = duration of one pulse = 1.683 ms
x = duty cycle factor = Tx ON / (Tx ON + Tx OFF) = 1.683ms / (5.010 ms) = 0.336
Duty cycle = 0.336 x 100 = 33.6%
Duty cycle correction for power measurements
= 10 log (1/x) = 10 log (1/0.336) = **4.74 dB**

(Tx ON + Tx OFF) = 5.010 ms



Appendix B – Measurement Data

B2.0 26 dB Emission Bandwidth (EBW)

Rule Section: Informative

Test Procedure: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section II(C)(1) Emission Bandwidth

Description: Measure the maximum width of the emission that is 26 dB down from the maximum of the emission

Limit: Informative

Results: The maximum 26 dB Emission Bandwidth measured **43.19 MHz**

Notes: Measurements were taken on the lowest, middle, and highest channels of operation for QPSK modulation with a 40 MHz nominal channel bandwidth.

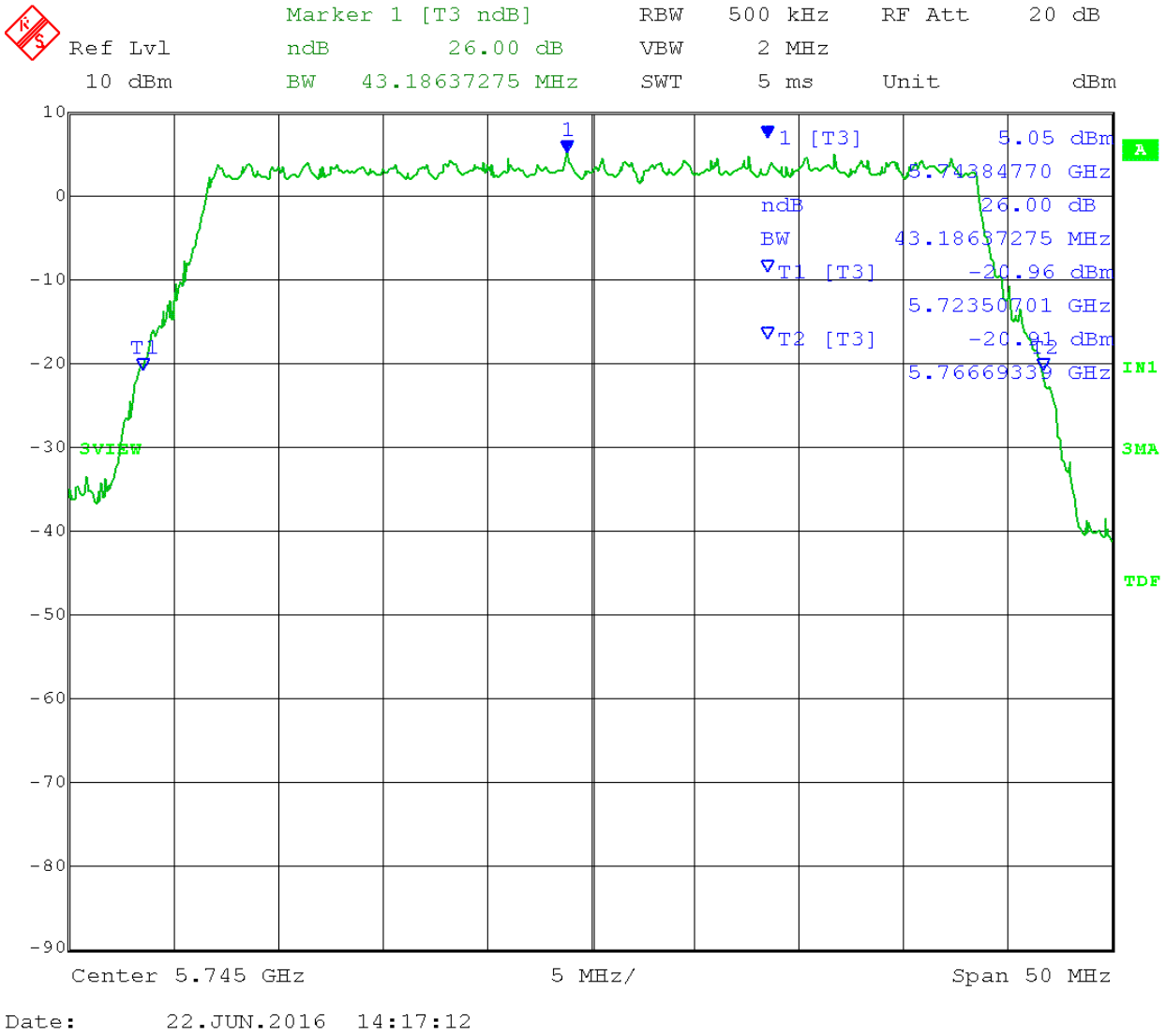
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-22-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Emission Bandwidth (26 dB) - Conducted
Operator:	Craig B
Comment:	II.C.1 Emission bandwidth

RBW ≈ 1% of EBW — VBW > RBW
Low Channel: 5745 MHz — 40 MHz BW
Detector: Peak — Trace: Max Hold

26 dB Emission Bandwidth = 43.19 MHz



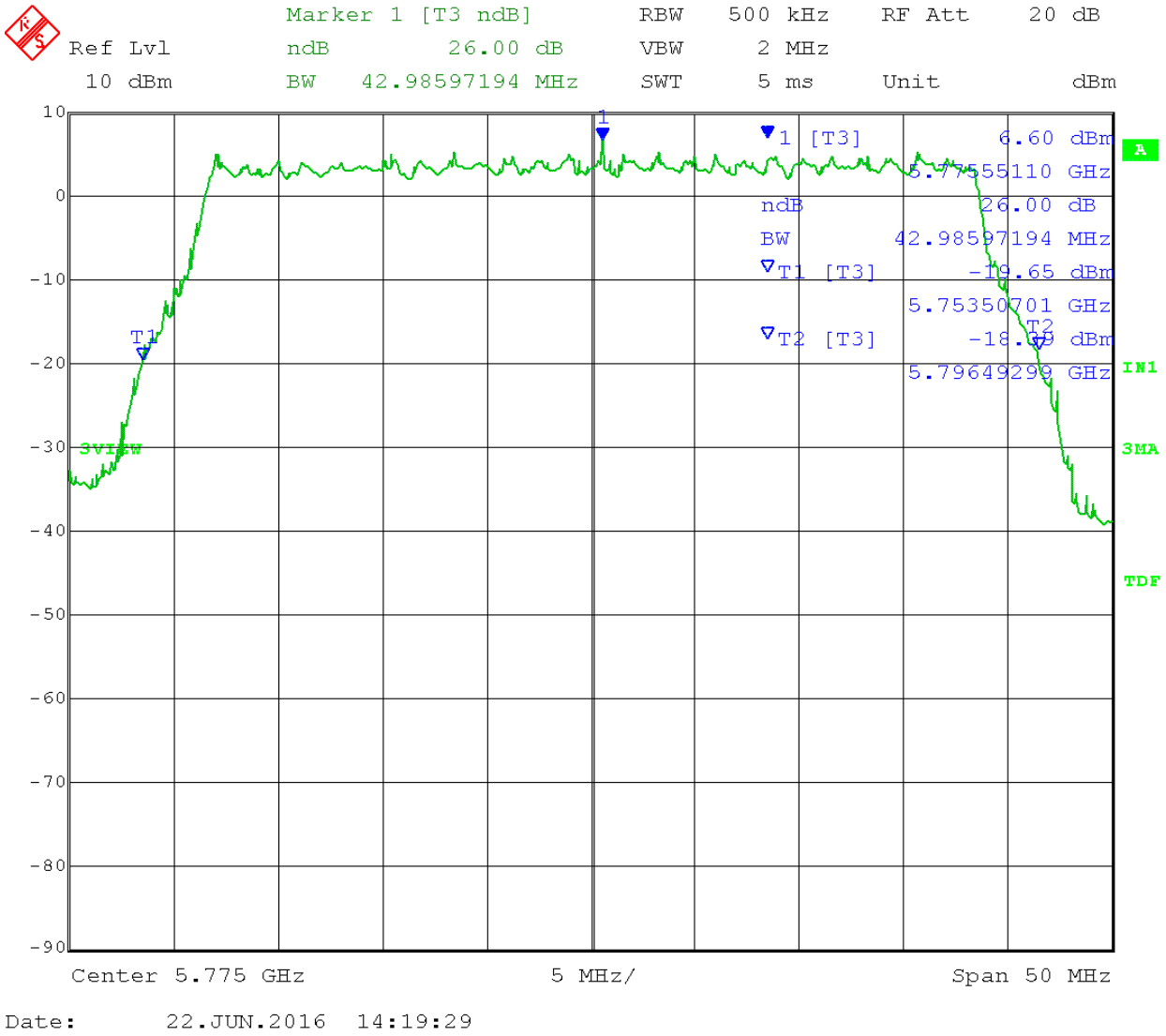
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-22-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Emission Bandwidth (26 dB) - Conducted
Operator:	Craig B
Comment:	II.C.1 Emission bandwidth

RBW ≈ 1% of EBW — VBW > RBW
Mid Channel: 5775 MHz — 40 MHz BW
Detector: Peak — Trace: Max Hold

26 dB Emission Bandwidth = 42.99 MHz



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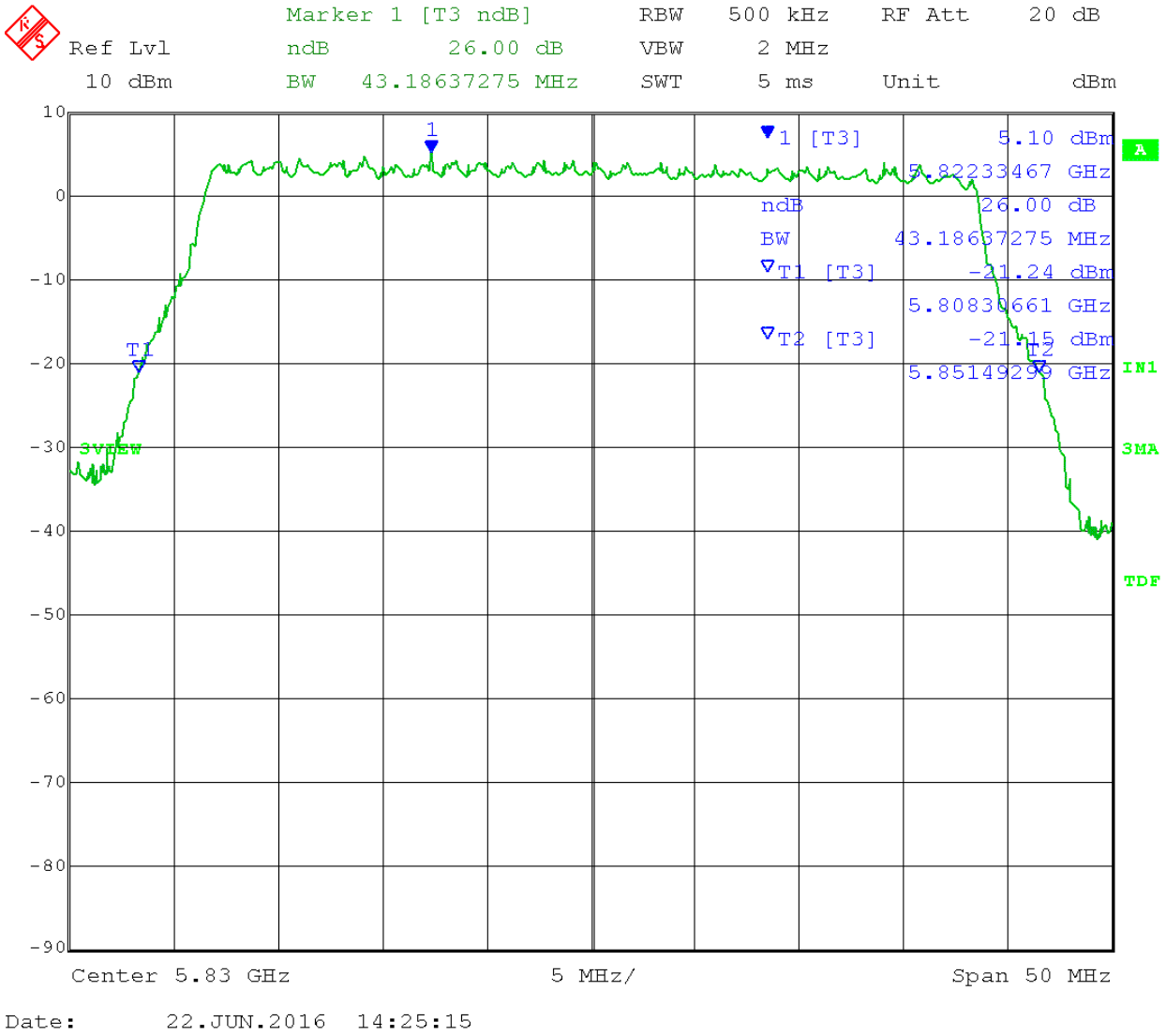
Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-22-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Emission Bandwidth (26 dB) - Conducted
Operator:	Craig B
Comment:	II.C.1 Emission bandwidth

RBW ≈ 1% of EBW — VBW > RBW
High Channel: 5830 MHz — 40 MHz BW
Detector: Peak — Trace: Max Hold

26 dB Emission Bandwidth = 43.19 MHz



Appendix B – Measurement Data

B3.0 Minimum Emission Bandwidth for the band 5.725-5.85 GHz

Rule Section: FCC Part 15.407(e)
RSS-247 section 6.2.4(1)

Test Procedure: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section II(C)(2) Minimum Emission Bandwidth

Description: Measure the minimum width of the emission that is 6 dB down from the maximum of the emission

Limit: The minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz

Results: Passed
The minimum 6 dB bandwidth measured **37.17 MHz**

Notes: Measurements were taken on the lowest, middle, and highest channels of operation for QPSK modulation with a 40 MHz nominal channel bandwidth.

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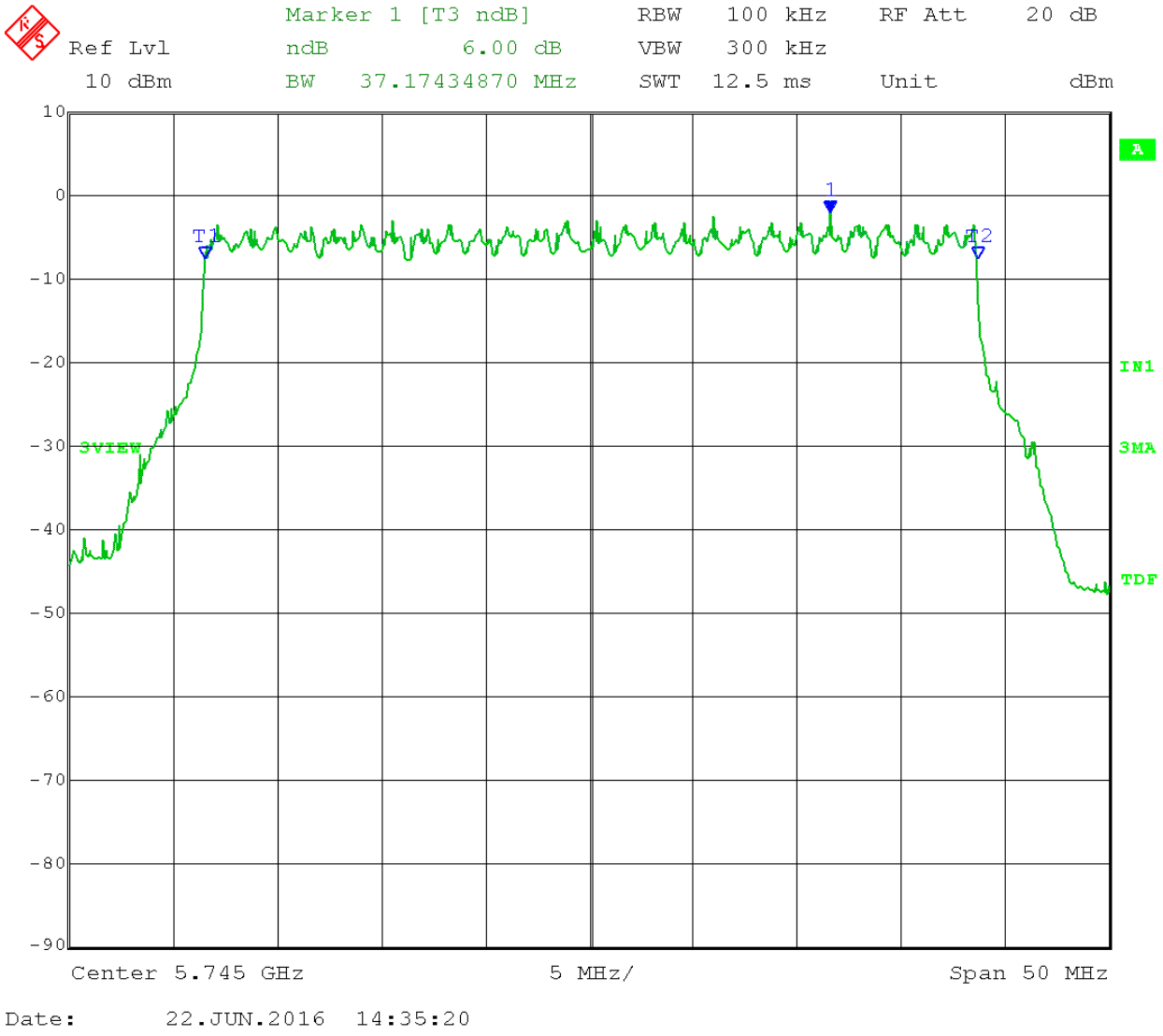
Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-22-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Emission Bandwidth (6 dB) - Conducted
Operator:	Craig B
Comment:	II.C.2 Minimum Emission Bandwidth (6 dB bandwidth > 500 kHz)

RBW = 100 kHz VBW ≥ 3 x RBW
Low Channel: 5745 MHz 40 MHz BW
Detector: Peak Trace: Max Hold

6 dB Emission Bandwidth = 37.17 MHz



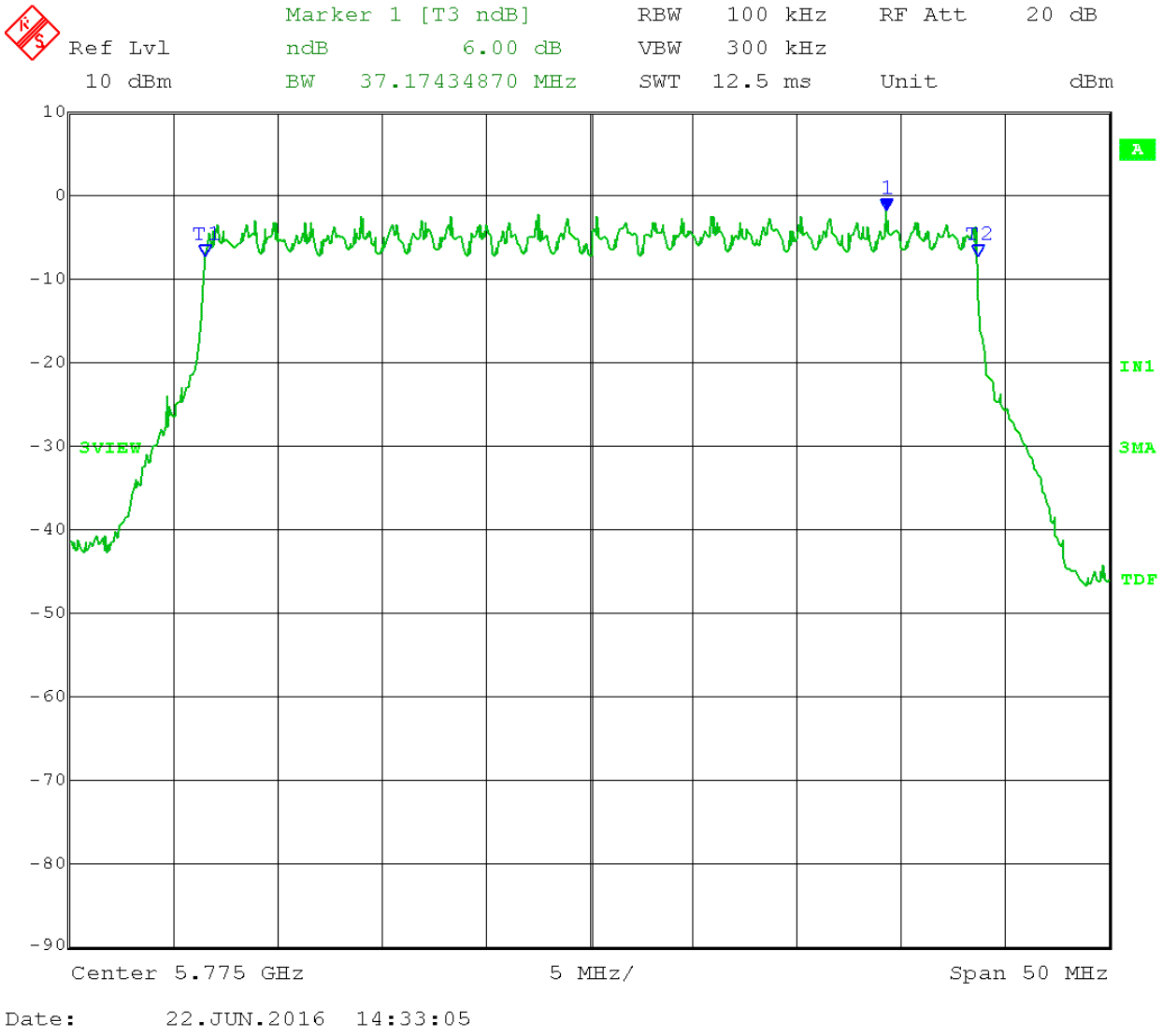
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-22-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Emission Bandwidth (6 dB) - Conducted
Operator:	Craig B
Comment:	II.C.2 Minimum Emission Bandwidth (6 dB bandwidth > 500 kHz)

RBW = 100 kHz VBW ≥ 3 x RBW
Mid Channel: 5775 MHz 40 MHz BW
Detector: Peak Trace: Max Hold

6 dB Emission Bandwidth = 37.17 MHz



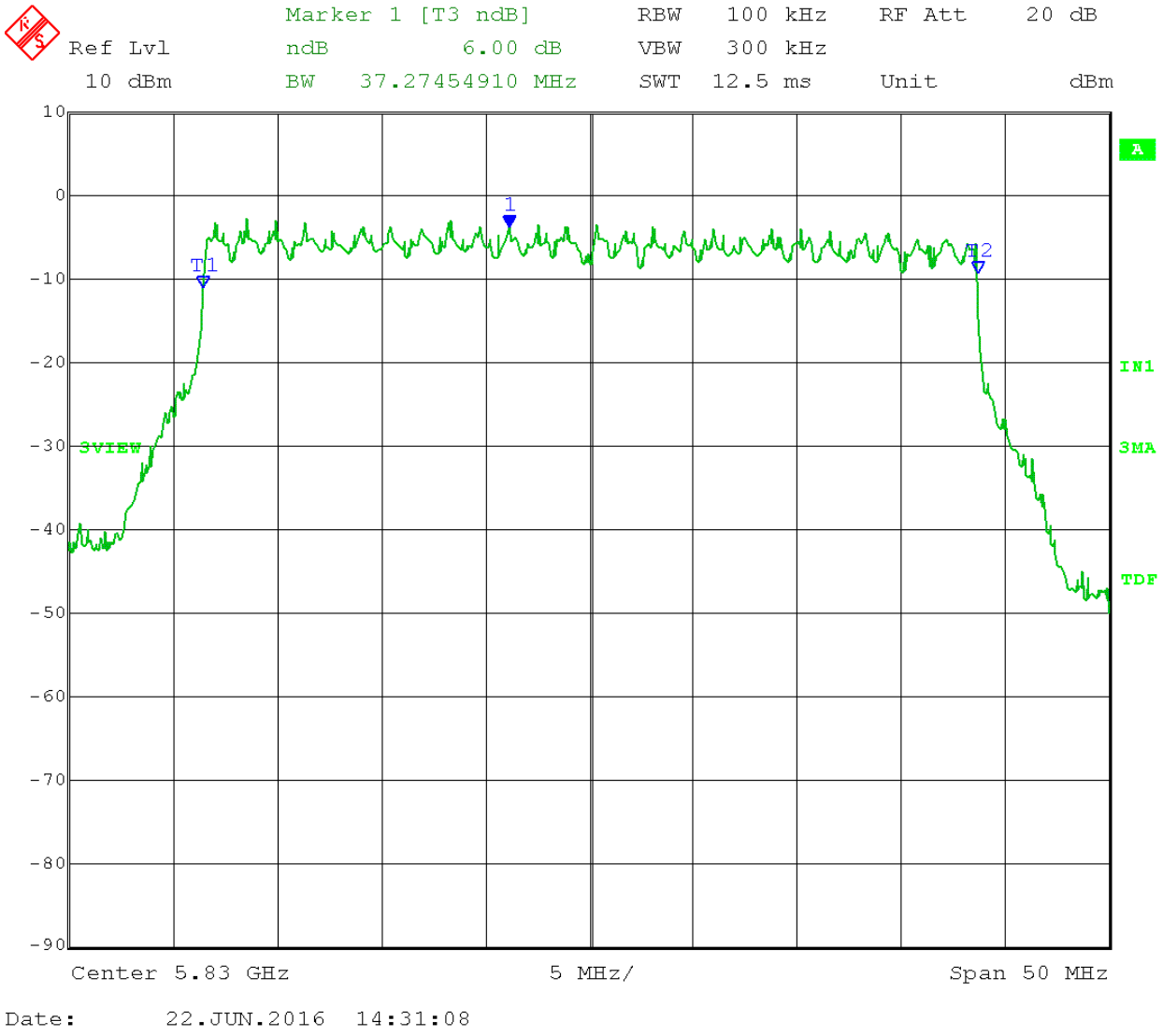
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-22-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Emission Bandwidth (6 dB) - Conducted
Operator:	Craig B
Comment:	II.C.2 Minimum Emission Bandwidth (6 dB bandwidth > 500 kHz)

RBW = 100 kHz VBW ≥ 3 x RBW
High Channel: 5830 MHz 40 MHz BW
Detector: Peak Trace: Max Hold

6 dB Emission Bandwidth = 37.27 MHz



Appendix B – Measurement Data

B4.0 99% Occupied Bandwidth

Rule Section: Informative

Test Procedure: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section II(D) 99% Occupied Bandwidth

Description: The 99% occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

Limit: Informative

Results: The 99% Occupied Bandwidth measured **37.15 MHz**

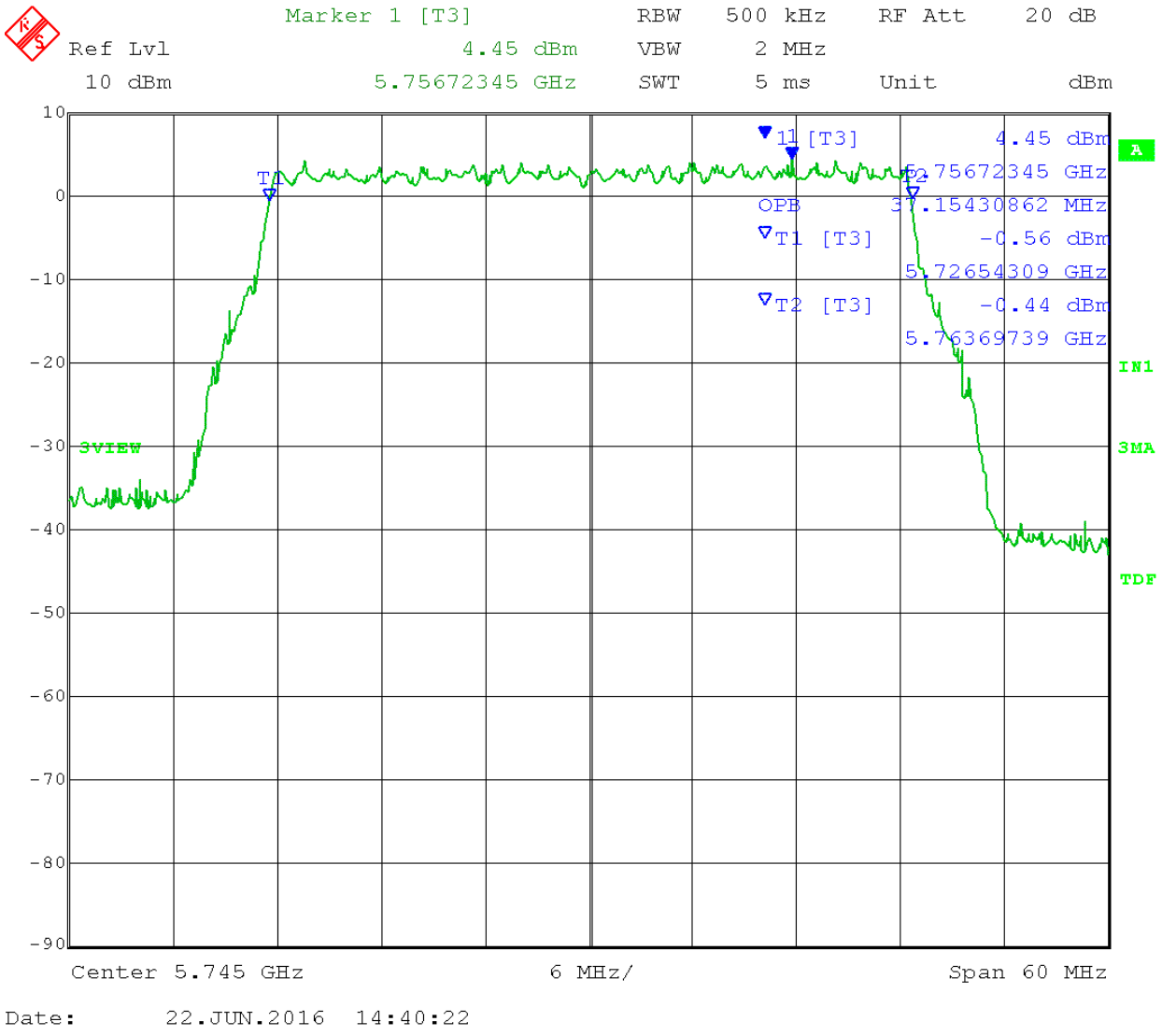
Notes: Measurements were taken on the lowest, middle, and highest channels of operation for QPSK modulation with a 40 MHz nominal channel bandwidth.

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-22-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	99% Occupied Bandwidth - Conducted
Operator:	Craig B
Comment:	II.D 99% Occupied Bandwidth
	SPAN = 1.5 to 5 times OBW
	RBW = 1% to 5% of OW — VBW ≥ 3 x RBW
	Detector = Peak — Trace = Max Hold
	Low Channel: 5745 MHz — 40 MHz BW

99% OBW = 37.15 MHz

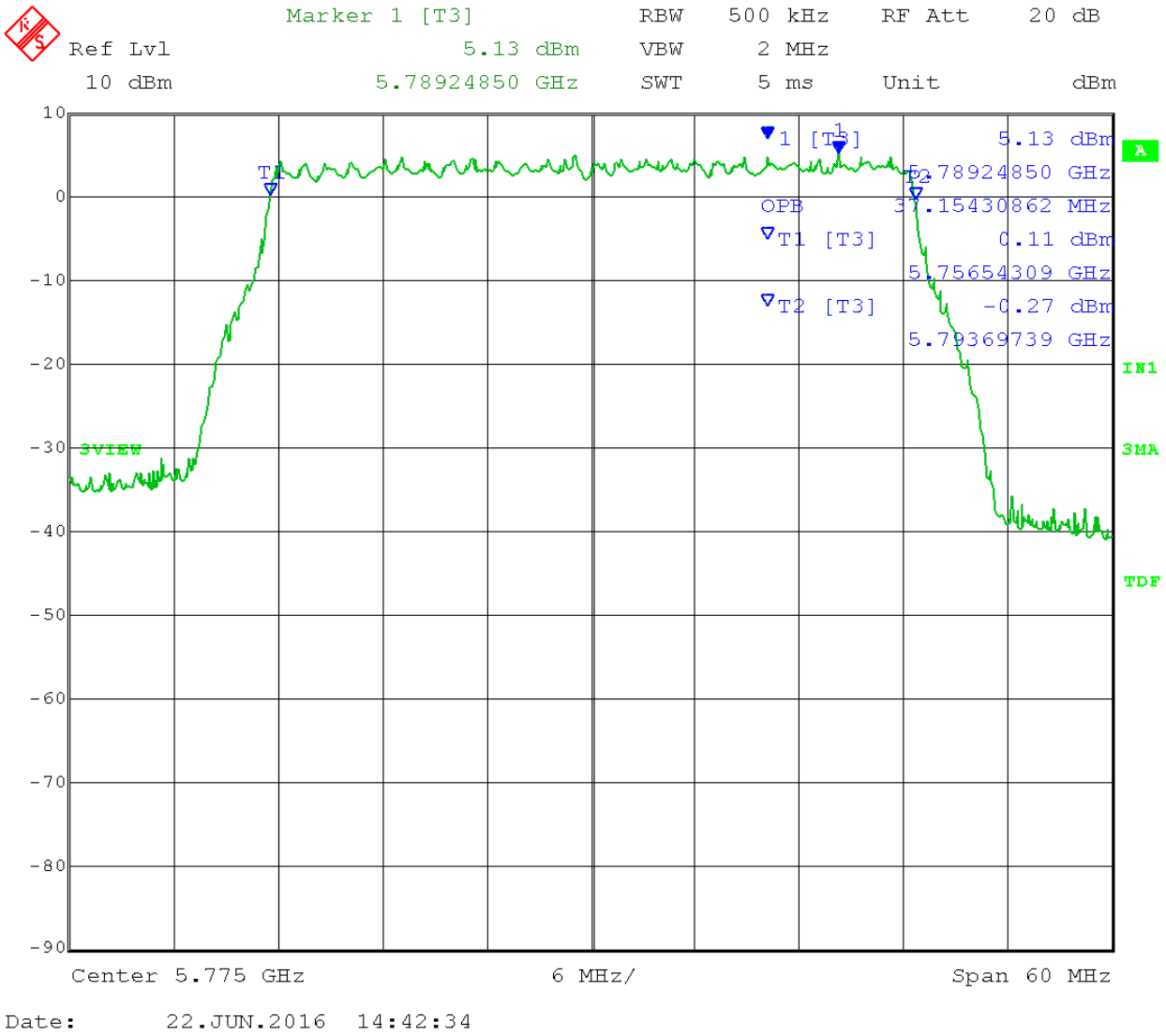


166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-22-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	99% Occupied Bandwidth - Conducted
Operator:	Craig B
Comment:	II.D 99% Occupied Bandwidth
	SPAN = 1.5 to 5 times OBW
	RBW = 1% to 5% of OW — VBW ≥ 3 x RBW
	Detector = Peak — Trace = Max Hold
	Mid Channel: 5775 MHz — 40 MHz BW

99% OBW = 37.15 MHz

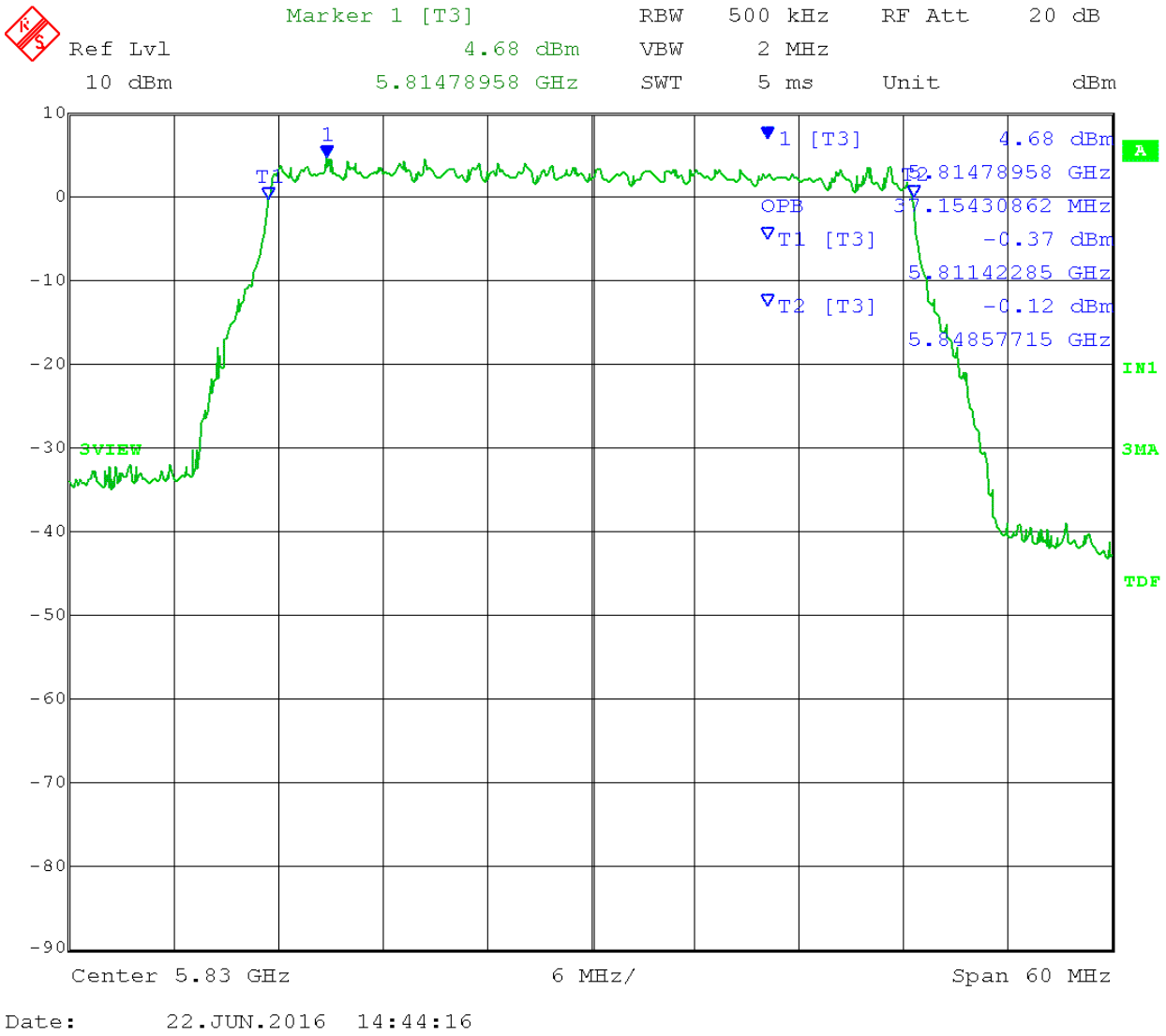


166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-22-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	99% Occupied Bandwidth - Conducted
Operator:	Craig B
Comment:	II.D 99% Occupied Bandwidth
	SPAN = 1.5 to 5 times OBW
	RBW = 1% to 5% of OW — VBW ≥ 3 x RBW
	Detector = Peak — Trace = Max Hold
	High Channel: 5830 MHz — 40 MHz BW

99% OBW = 37.15 MHz



Appendix B – Measurement Data

B5.0 Maximum Conducted Output Power

Rule Section: Section 15.407(a)(3)
RSS-247 section 6.2.4(1)

Test Procedure: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section II(E)(3) Method PM (Measurement using an RF average power meter): Measurements performed using a wideband RF power meter with a thermocouple detector

Description: Measure the average power of the transmitter
Output power from each transmit port is summed
Add 10 log (1/x), where x is the duty cycle, to the measured power

Limit: 1 Watt conducted.
No reduction in transmitter conducted power is required for fixed point-to-point operation employing transmitting antennas with directional gain greater than 6 dBi.

Results: Passed

Notes: EUT is fixed point-to-point operation only.
Measurements were taken for QPSK modulation at the lowest, middle, and highest channels of operation. EUT was set to transmit continuously with 33.6% duty cycle.

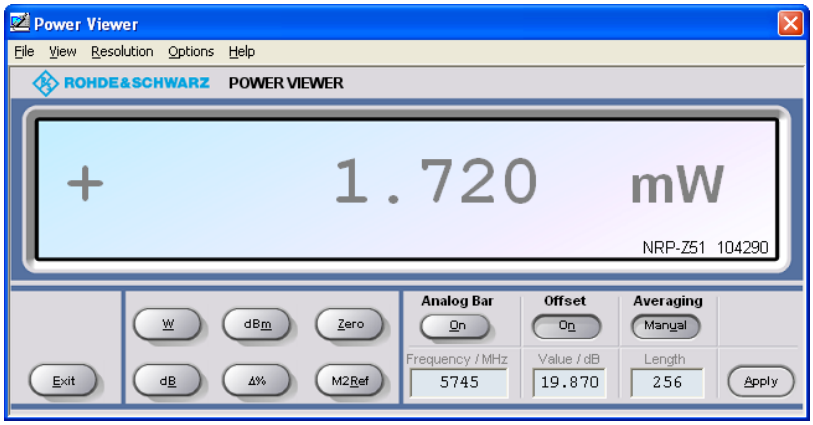
Duty cycle correction for power measurements
= 10 log (1/x) = 10 log (1/0.336) = 4.74 dB

166 South Carter, Genoa City, WI 53128

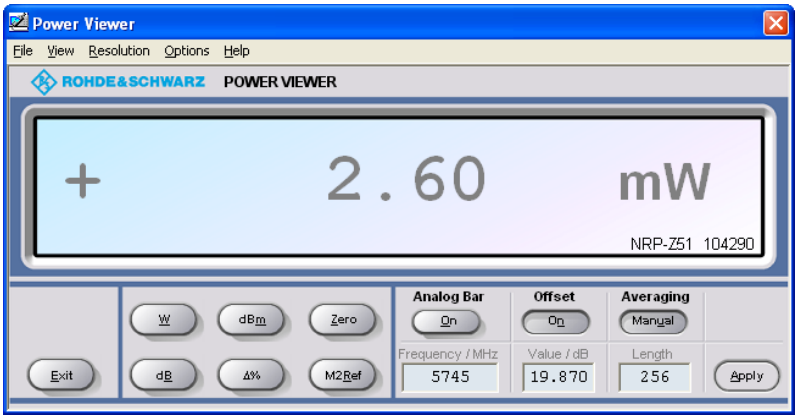
Company: Cambium Networks
Model Tested: C054045C008B
Report Number: 21973
DLS Project: 8206

Test Date: 06-23-2016
Company: Cambium Networks
EUT: PMP450 BH/SM 5.8 GHz
Test: Maximum conducted output power – Conducted
Operator: Craig B
Comment: II.E.3 Measurement using a Power Meter (PM)
Limit: [15.407(a)(3)]: 1 Watt conducted.
Operating Mode: Point-to-Point Antenna Gain (with dish) = 23 dBi
EUT Limit: 1 Watt (no reduction for point-to-point operation)
Low Channel: Transmit = 5745 MHz 40 MHz BW
Output power setting: 15

Transmit port A:
Maximum conducted output power = 1.720 mW



Transmit port B:
Maximum conducted output power = 2.620 mW



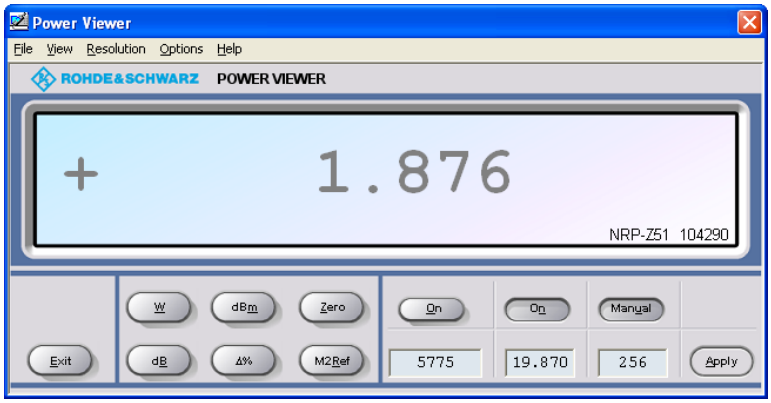
Total power = 1.720 mW + 2.600 mW = 4.320 mW
Correction for duty cycle: 4.320 mW = 6.355 dBm + 4.74 dBm (duty cycle correction) = 11.095 dBm = **12.87 mW**

166 South Carter, Genoa City, WI 53128

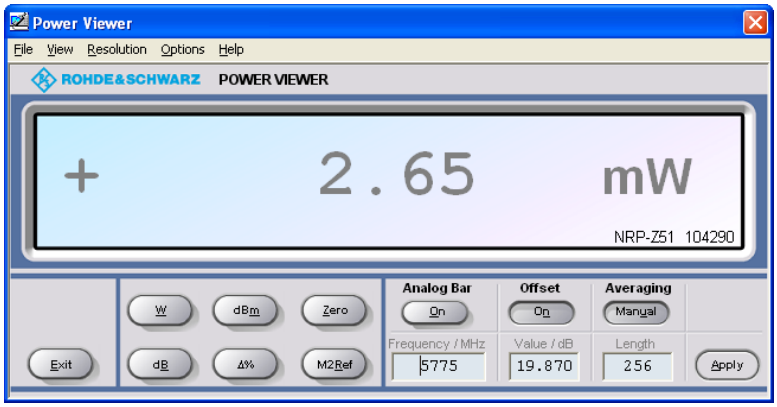
Company: Cambium Networks
Model Tested: C054045C008B
Report Number: 21973
DLS Project: 8206

Test Date: 06-23-2016
Company: Cambium Networks
EUT: PMP450 BH/SM 5.8 GHz
Test: Maximum conducted output power – Conducted
Operator: Craig B
Comment: II.E.3 Measurement using a Power Meter (PM)
Limit: [15.407(a)(3)]: 1 Watt conducted.
Operating Mode: Point-to-Point Antenna Gain (with dish) = 23 dBi
EUT Limit: 1 Watt (no reduction for point-to-point operation)
Mid Channel: Transmit = 5775 MHz 40 MHz BW
Output power setting: 15

Transmit port A:
Maximum conducted output power = 1.876 mW



Transmit port B:
Maximum conducted output power = 2.650 mW



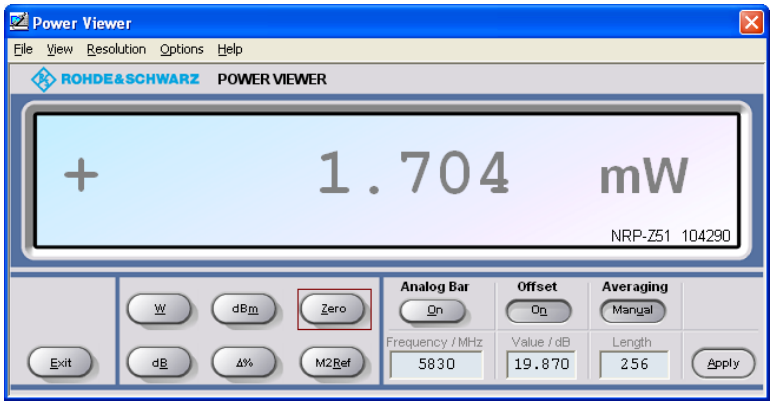
Total power = 1.876 mW + 2.650 mW = 4.526 mW
Correction for duty cycle: 4.526 mW = 6.557 dBm + 4.74 dBm (duty cycle correction) = 11.297 dBm = **13.48 mW**

166 South Carter, Genoa City, WI 53128

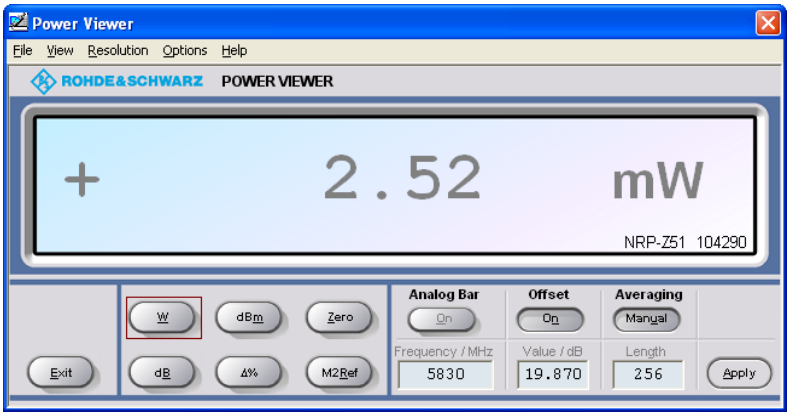
Company: Cambium Networks
Model Tested: C054045C008B
Report Number: 21973
DLS Project: 8206

Test Date: 06-23-2016
Company: Cambium Networks
EUT: PMP450 BH/SM 5.8 GHz
Test: Maximum conducted output power – Conducted
Operator: Craig B
Comment: II.E.3 Measurement using a Power Meter (PM)
Limit: [15.407(a)(3)]: 1 Watt conducted.
Operating Mode: Point-to-Point Antenna Gain (with dish) = 23 dBi
EUT Limit: 1 Watt (no reduction for point-to-point operation)
High Channel: Transmit = 5830 MHz 40 MHz BW
Output power setting: 15

Transmit port A:
Maximum conducted output power = 1.704 mW



Transmit port B:
Maximum conducted output power = 2.520 mW



Total power = 1.704 mW + 2.520 mW = 4.224 mW
Correction for duty cycle: 4.224 mW = 6.257 dBm + 4.74 dBm (duty cycle correction) = 10.997 dBm = **12.58 mW**

Appendix B – Measurement Data

B6.0 Maximum Power Spectral Density – Conducted

Rule Section: Section 15.407(a)(3)
RSS-247 section 6.2.4(1)

Test Procedure: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section II(F) – Maximum Power Spectral Density (PSD)
Using method II(E)(2)(e) SA-2 Alternative: Power averaging detection with slow sweep 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: ≥ 10 x (number of points in sweep) x (total ON/OFF period)
Detector = RMS
Sweep: single sweep
Use peak search to find the peak of the spectrum
Sum the power spectral densities of both transmit ports
Add 10 log (1/x), where x is the duty cycle, to the measured power density

Limit: 30 dBm in any 500 kHz band
No reduction in transmitter conducted power is required for fixed point-to-point operation employing transmitting antennas with directional gain greater than 6 dBi.

Results: Passed

Notes: EUT is fixed point-to-point operation only.
Measurements were taken for QPSK modulation at the lowest, middle, and highest channels of operation. EUT was set to transmit continuously with 33.6% duty cycle.

Duty cycle correction for power measurements
= 10 log (1/x) = 10 log (1/0.336) = 4.74 dB

166 South Carter, Genoa City, WI 53128

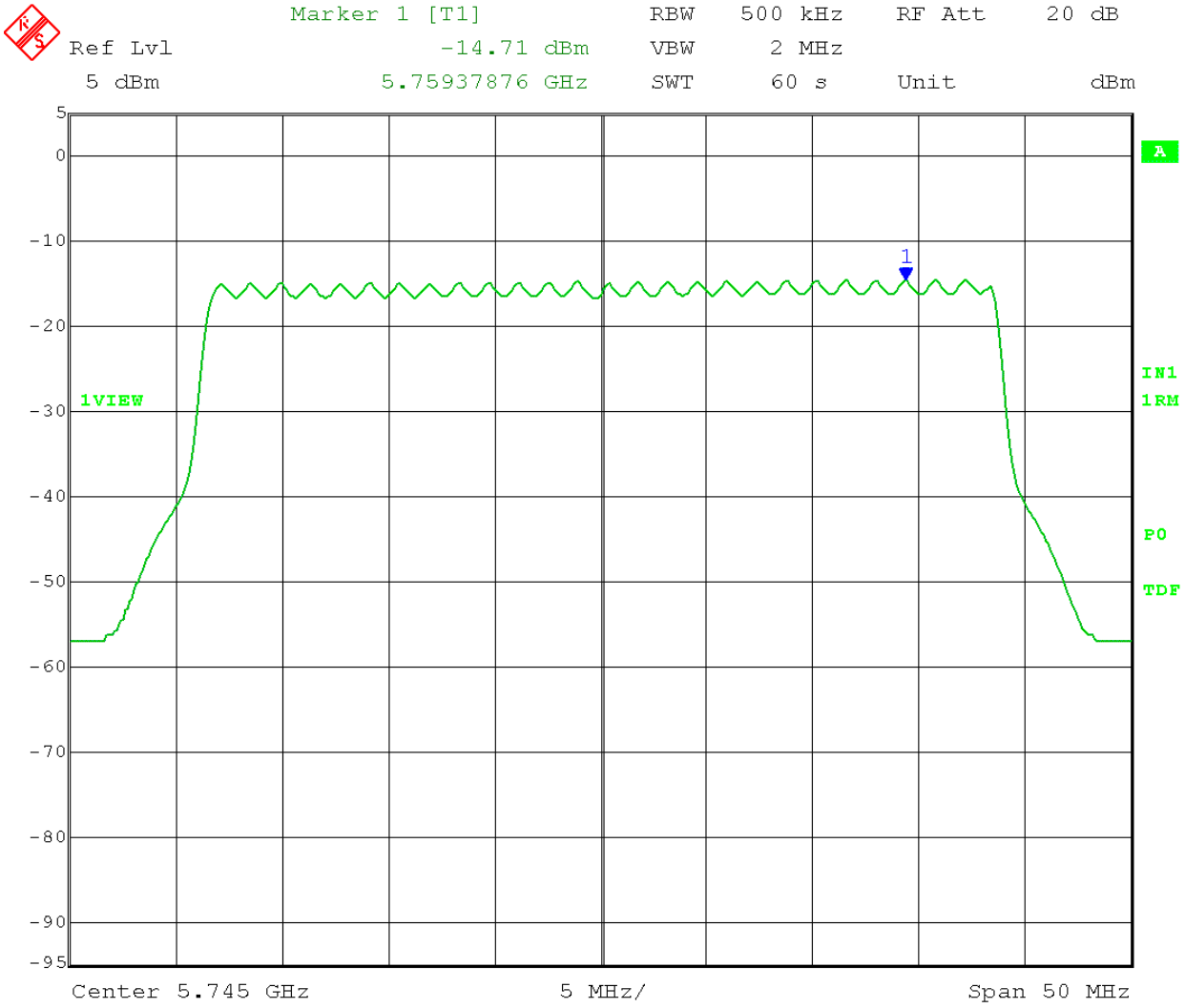
Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-23-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Power Spectral Density - Conducted
Operator:	Craig B
Comment:	II.F. using II.E.2.e. Method SA-2 Alternative: power averaging with slow sweep followed by duty cycle correction

Limit:[15.407(a)(3)]: 30 dBm/500 kHz (no reduction for point-to-point operation)

RBW = 500 kHz	VBW = 2 MHz
Detector = RMS	Trace = Average 200 traces
Sweep Time = 60 seconds	Sweep points: 500
Low Channel: 5745 MHz	40 MHz BW
Output power setting: 15	Transmit port: A

PSD of port A = -14.71 dBm/500kHz = 0.03381 mW/500kHz



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166 South Carter, Genoa City, WI 53128

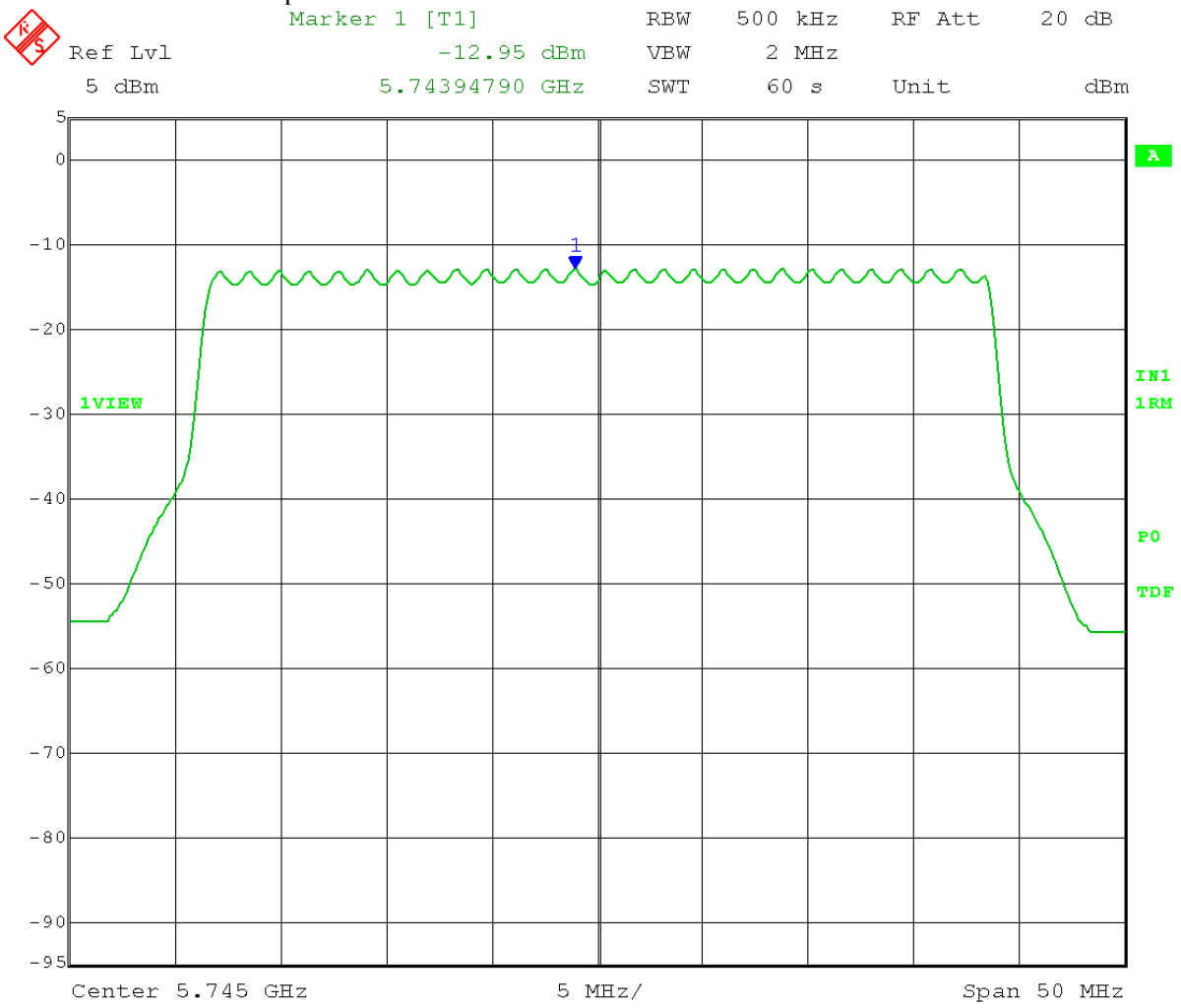
Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-23-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Power Spectral Density - Conducted
Operator:	Craig B
Comment:	II.F. using II.E.2.e. Method SA-2 Alternative: power averaging with slow sweep followed by duty cycle correction

Limit:[15.407(a)(3)]: 30 dBm/500 kHz (no reduction for point-to-point operation)

RBW = 500 kHz	VBW = 2 MHz
Detector = RMS	Trace = Average 200 traces
Sweep Time = 60 seconds	Sweep points: 500
Low Channel: 5745 MHz	40 MHz BW
Output power setting: 15	Transmit port: B

PSD of port B = -12.95 dBm/500kHz = 0.05070 mW/500kHz



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Total Maximum PSD = 0.03381 mW/500kHz + 0.05070 mW/500kHz = 0.08451 mW/500kHz = -10.731 dBm/500kHz. Correction for duty cycle: -10.731 dBm/500kHz + 4.74 dB = **-5.99 dBm/500kHz**

166 South Carter, Genoa City, WI 53128

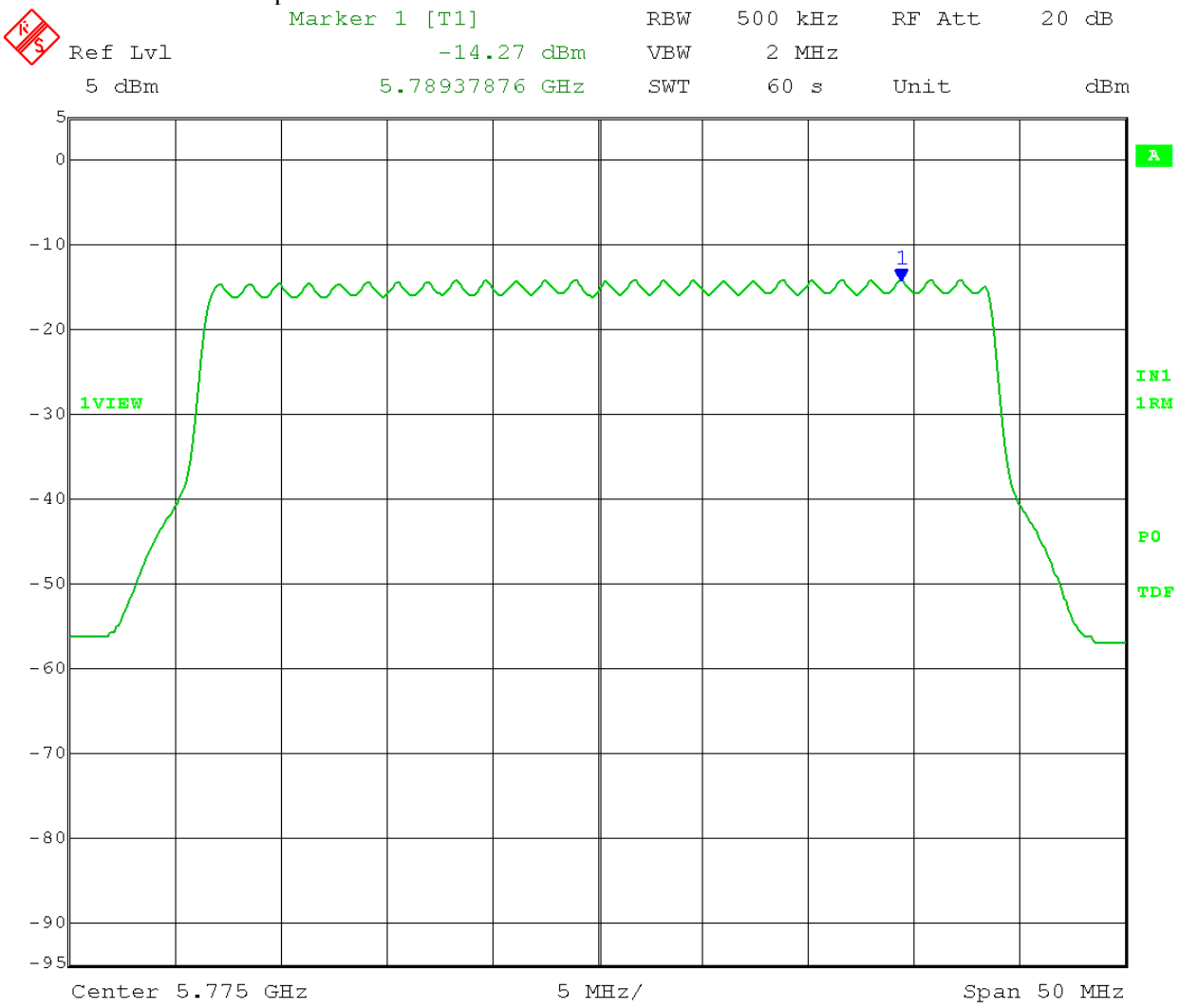
Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-23-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Power Spectral Density - Conducted
Operator:	Craig B
Comment:	II.F. using II.E.2.e. Method SA-2 Alternative: power averaging with slow sweep followed by duty cycle correction

Limit:[15.407(a)(3)]: 30 dBm/500 kHz (no reduction for point-to-point operation)

RBW = 500 kHz
VBW = 2 MHz
Detector = RMS
Trace = Average 200 traces
Sweep Time = 60 seconds
Sweep points: 500
Mid Channel: 5775 MHz
40 MHz BW
Output power setting: 15
Transmit port: A

PSD of port A = -14.27 dBm/500kHz = 0.03741 mW/500kHz



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

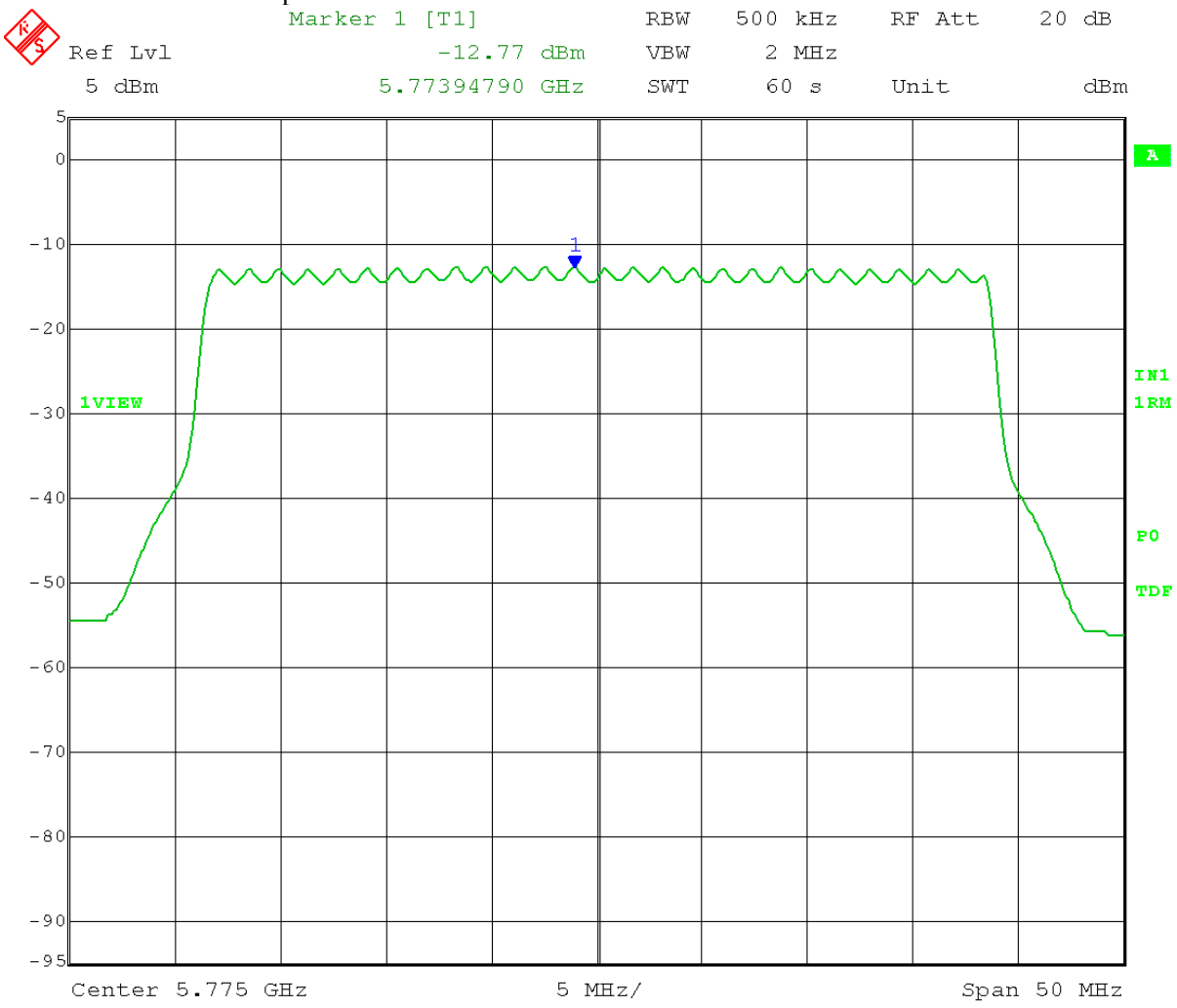
Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-23-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Power Spectral Density - Conducted
Operator:	Craig B
Comment:	II.F. using II.E.2.e. Method SA-2 Alternative: power averaging with slow sweep followed by duty cycle correction

Limit:[15.407(a)(3)]: 30 dBm/500 kHz (no reduction for point-to-point operation)

RBW = 500 kHz	VBW = 2 MHz
Detector = RMS	Trace = Average 200 traces
Sweep Time = 60 seconds	Sweep points: 500
Mid Channel: 5775 MHz	40 MHz BW
Output power setting: 15	Transmit port: B

PSD of port B = -12.77 dBm/500kHz = 0.05284 mW/500kHz



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Total Maximum PSD = 0.03741 mW/500kHz + 0.05284 mW/500kHz = 0.09025 mW/500kHz = -10.445 dBm/500kHz. Correction for duty cycle: -10.445 dBm/500kHz + 4.74 dB = **-5.70 dBm/500kHz**

166 South Carter, Genoa City, WI 53128

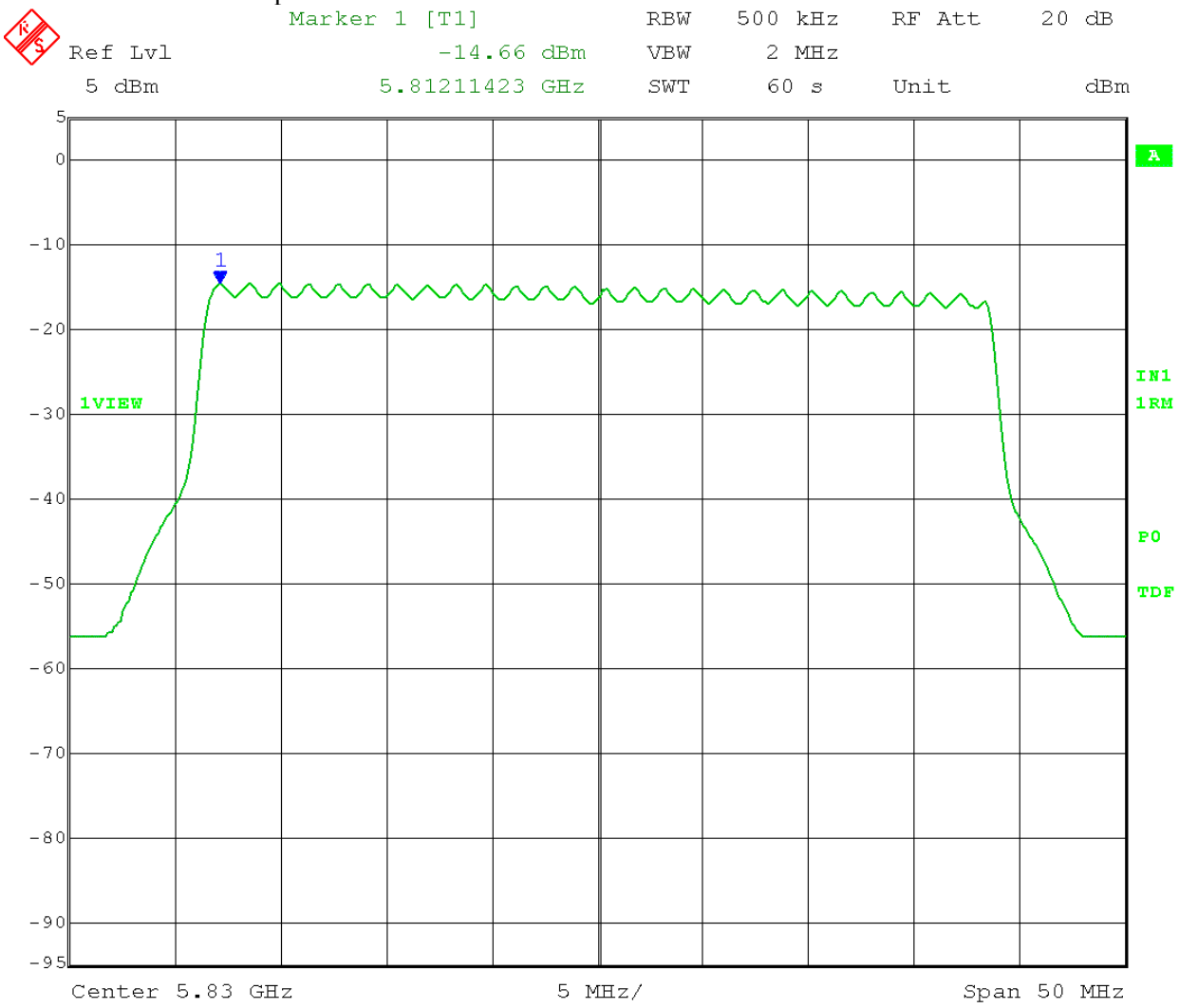
Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-22-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Power Spectral Density - Conducted
Operator:	Craig B
Comment:	II.F. using II.E.2.e. Method SA-2 Alternative: power averaging with slow sweep followed by duty cycle correction

Limit:[15.407(a)(3)]: 30 dBm/500 kHz (no reduction for point-to-point operation)

RBW = 500 kHz
VBW = 2 MHz
Detector = RMS
Trace = Average 200 traces
Sweep Time = 60 seconds
Sweep points: 500
High Channel: 5830 MHz
40 MHz BW
Output power setting: 15
Transmit port: A

PSD of port A = -14.66 dBm/500kHz = 0.03420 mW/500kHz

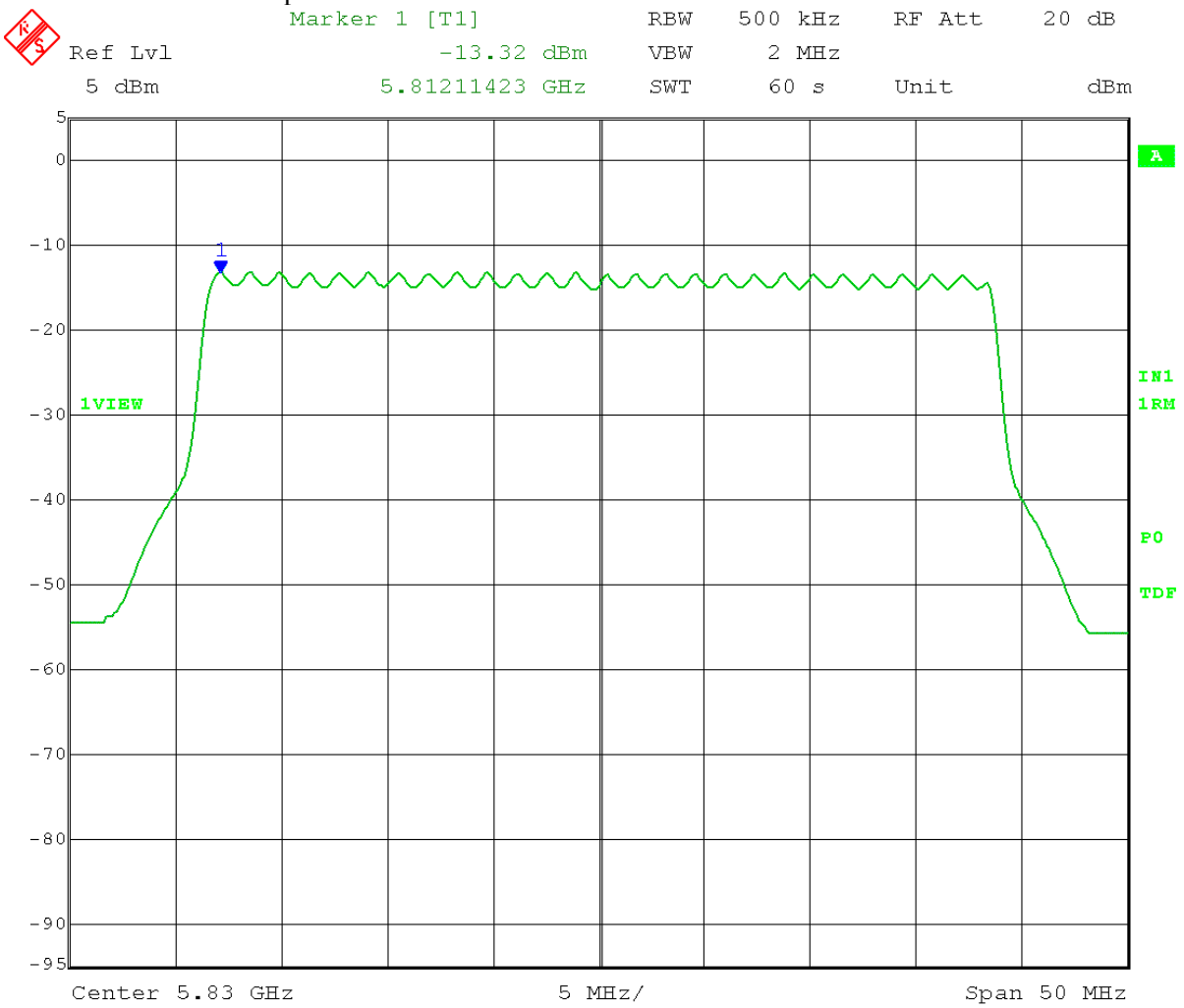


166 South Carter, Genoa City, WI 53128

Company: Cambium Networks
Model Tested: C054045C008B
Report Number: 21973
DLS Project: 8206

Test Date: 06-22-2016
Company: Cambium Networks
EUT: PMP450 BH/SM 5.8 GHz
Test: Maximum Power Spectral Density - Conducted
Operator: Craig B
Comment: II.F. using II.E.2.e. Method SA-2 Alternative: power averaging with slow sweep followed by duty cycle correction
Limit:[15.407(a)(3)]: 30 dBm/500 kHz (no reduction for point-to-point operation)
RBW = 500 kHz VBW = 2 MHz
Detector = RMS Trace = Average 200 traces
Sweep Time = 60 seconds Sweep points: 500
High Channel: 5830 MHz 40 MHz BW
Output power setting: 15 Transmit port: B

PSD of port B = -13.32 dBm/500kHz = 0.04656 mW/500kHz



Date: 23.JUN.2016 10:21:26

Total Maximum PSD = 0.03420 mW/500kHz + 0.04656 mW/500kHz = 0.08076 mW/500kHz = -10.928 dBm/500kHz. Correction for duty cycle: -10.928 dBm/500kHz + 4.74 dB = **-6.19 dBm/500kHz**

Appendix B – Measurement Data

B7.0 Operating Band Edge – Emission Mask

RF Conducted

Rule Section: Sections 15.407(b)(4) and FCC-16-24 Appendix A, 15.407(b)(4)(i)
RSS-247 section 6.2.4(2) using FCC-16-24 Appendix A, 15.407(b)(4)(i)

Test Procedure: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section II(G) – Unwanted Emission Measurement
Section II(G)(2) – Unwanted emissions that fall Outside of the Restricted Bands
Section II(G)(3) – General Requirements for Unwanted Emissions Measurements

Description: Measure the band-edge emission level using the following settings

PEAK measurements:
RBW = 1 MHz
VBW ≥ 3 MHz
Detector = peak
Sweep time = auto
Trace mode = max hold

Limit: EIRP Emission Mask limit as stated in FCC-16-24 Appendix A, 15.407(b)(4)(i)

Results: Passed

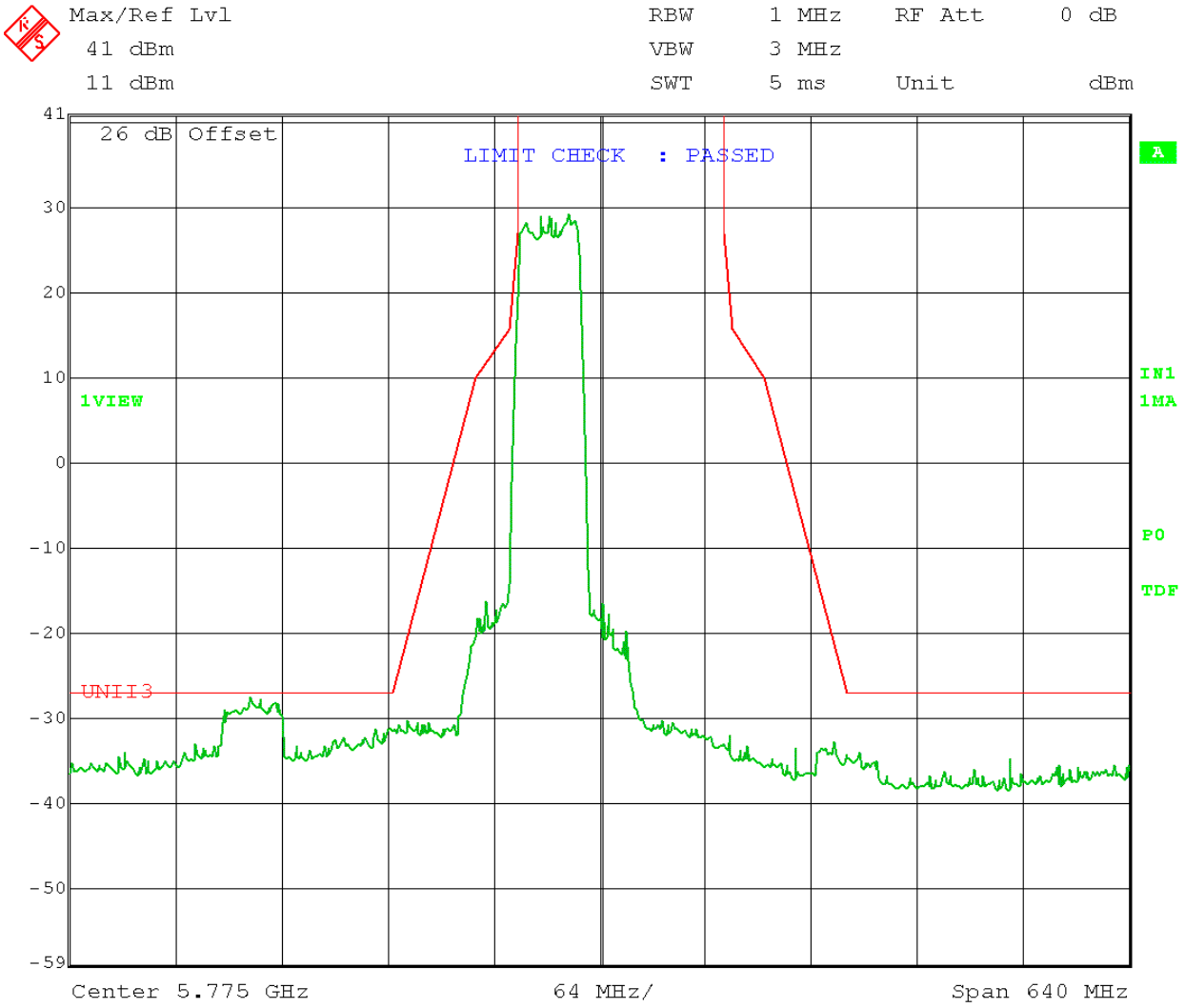
Notes: Measurements were taken for QPSK modulation at the lowest and highest channels of operation. The spectrum analyzer was set up with an offset to account for antenna gain and 2-port MIMO operation. Measurements were taken on both transmit ports.

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-23-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Lower Operating Band Edge – FCC 16-24 Emission Mask RF Conducted
Operator:	Craig B
Comment:	RBW = 1 MHz Detector = Peak Low Channel: 5745 MHz Output Power Setting: 15
	VBW ≥ 3 MHz Trace: Max Hold 40 MHz BW Transmit port A
Limit:	FCC 16-24 / FCC 15.407(b)(4)(i) Emission Mask

NOTE: Antenna Gain 23 dBi, 2-port MIMO correction = 10 log (2 ports) = 3 dB
Spectrum analyzer offset 26 dB to account for antenna gain and MIMO



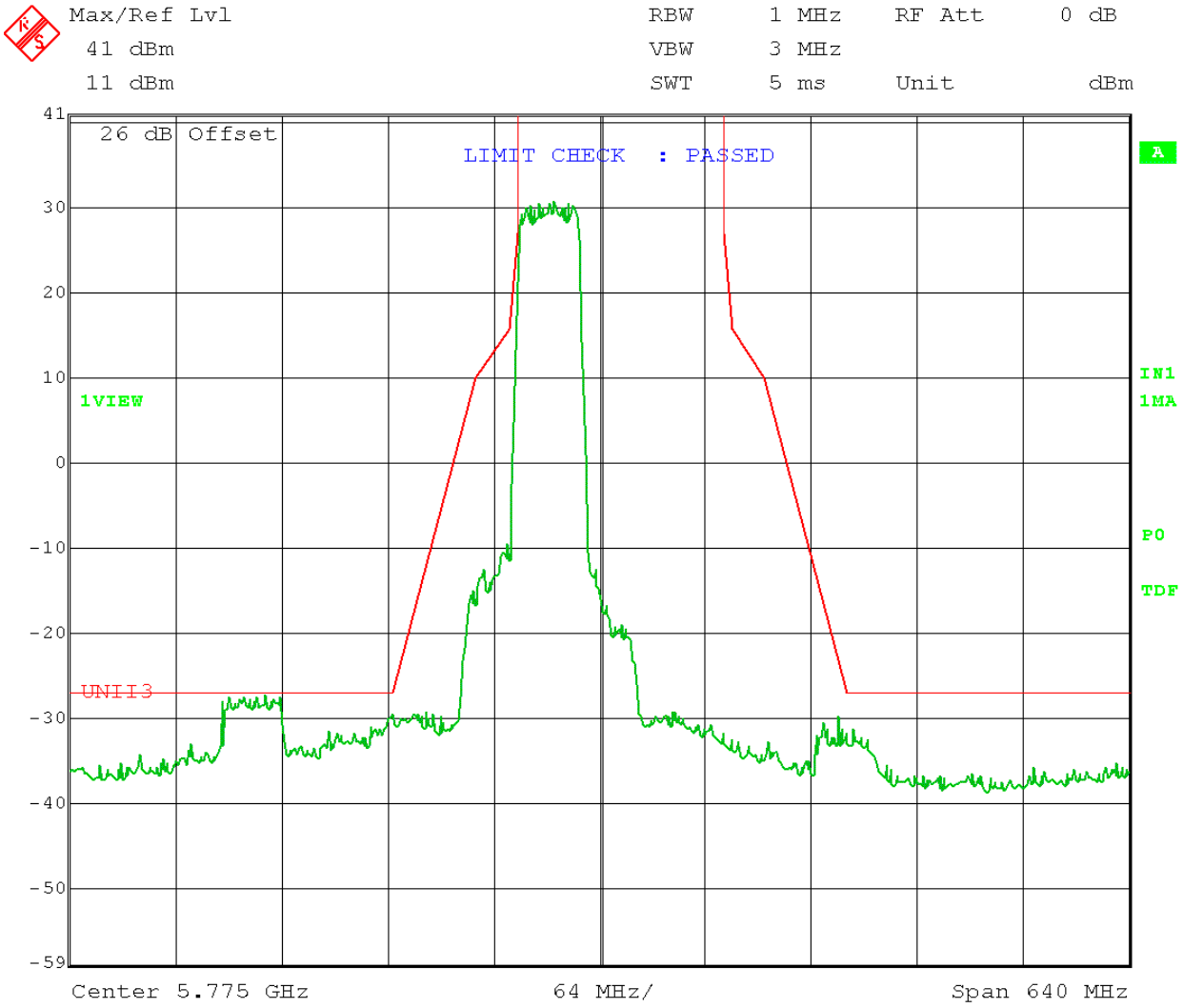
Date: 23.JUN.2016 09:22:38

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-23-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Lower Operating Band Edge – FCC 16-24 Emission Mask RF Conducted
Operator:	Craig B
Comment:	RBW = 1 MHz Detector = Peak Low Channel: 5745 MHz Output Power Setting: 15
	VBW ≥ 3 MHz Trace: Max Hold 40 MHz BW Transmit port B
Limit:	FCC 16-24 / FCC 15.407(b)(4)(i) Emission Mask

NOTE: Antenna Gain 23 dBi, 2-port MIMO correction = 10 log (2 ports) = 3 dB
Spectrum analyzer offset 26 dB to account for antenna gain and MIMO



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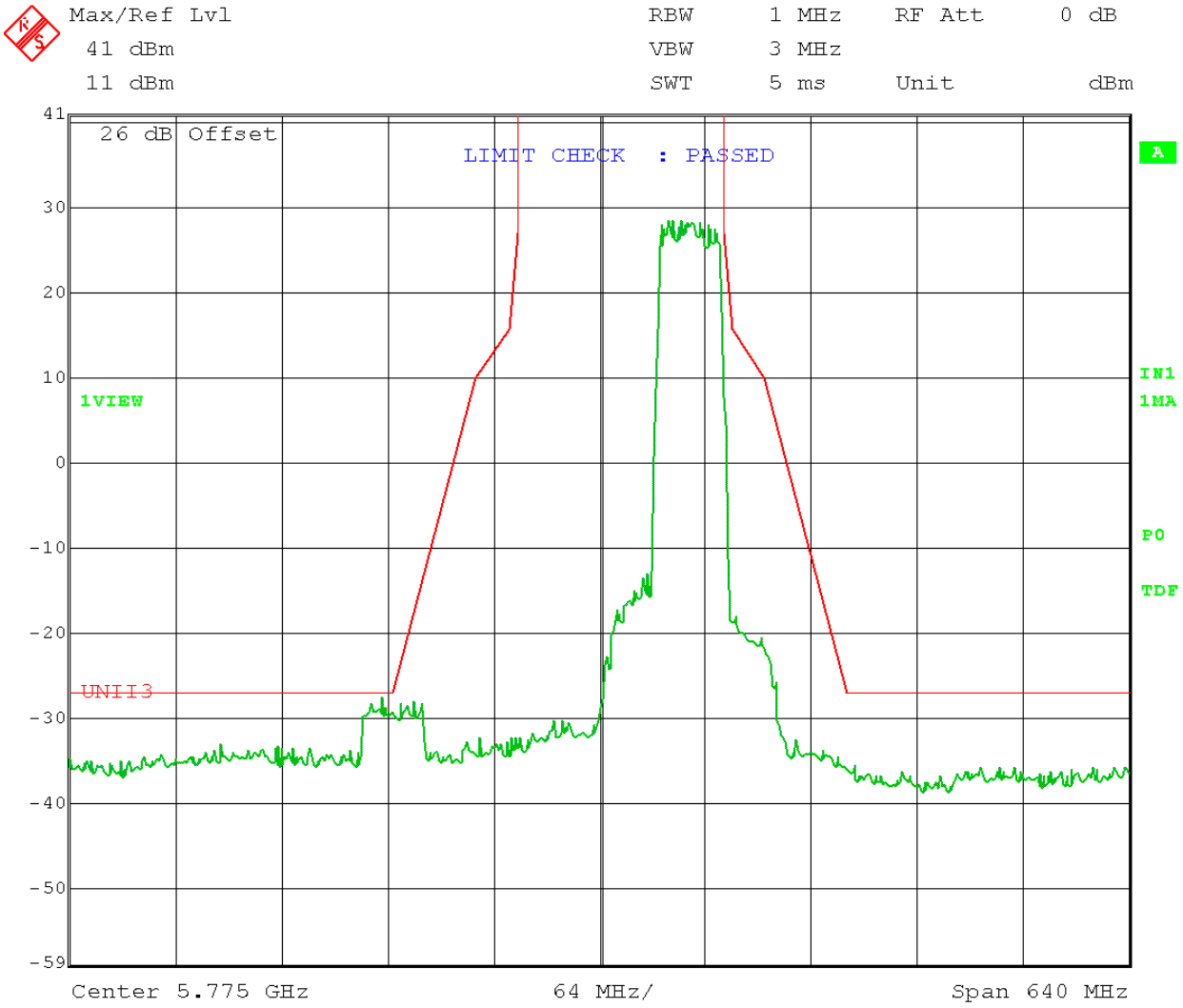
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-23-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Upper Operating Band Edge – FCC 16-24 Emission Mask RF Conducted
Operator:	Craig B
Comment:	RBW = 1 MHz Detector = Peak High Channel: 5830 MHz Output Power Setting: 15
	VBW ≥ 3 MHz Trace: Max Hold 40 MHz BW Transmit port A
Limit:	FCC 16-24 / FCC 15.407(b)(4)(i) Emission Mask

NOTE: Antenna Gain 23 dBi, 2-port MIMO correction = 10 log (2 ports) = 3 dB
Spectrum analyzer offset 26 dB to account for antenna gain and MIMO



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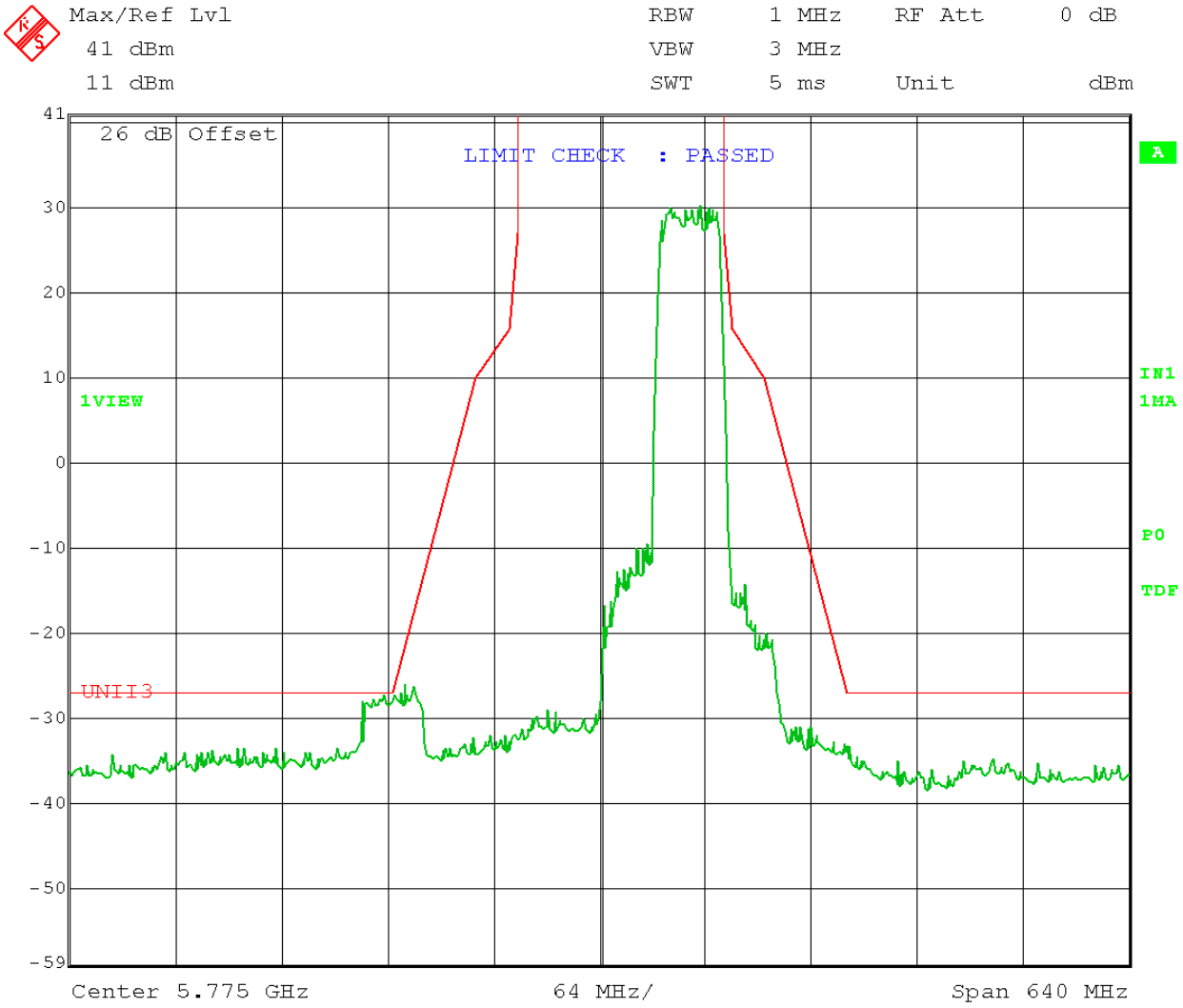
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-23-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Upper Operating Band Edge – FCC 16-24 Emission Mask RF Conducted
Operator:	Craig B
Comment:	RBW = 1 MHz Detector = Peak High Channel: 5830 MHz Output Power Setting: 15
	VBW ≥ 3 MHz Trace: Max Hold 40 MHz BW Transmit port B
Limit:	FCC 16-24 / FCC 15.407(b)(4)(i) Emission Mask

NOTE: Antenna Gain 23 dBi, 2-port MIMO correction = 10 log (2 ports) = 3 dB
Spectrum analyzer offset 26 dB to account for antenna gain and MIMO



Date: 23.JUN.2016 09:26:51

Appendix B – Measurement Data

B8.0 Restricted Band Edge
Radiated with antenna

Rule Section: Sections 15.407(b)(7), 15.205 and 15.209
RSS-247 section 6; RSS-Gen section 8.10

Test Procedure: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section II(G) – Unwanted Emission Measurement
Section II(G)(1) – Unwanted emissions in the Restricted Bands
Section II(G)(3) – General Requirements for Unwanted Emissions Measurements
Section II(G)(5) – Maximum (Peak detector) emissions above 1000 MHz
Section II(G)(6)(c) – Average emissions above 1000 MHz – Method AD (Average Detection)

Description: Measure the nearest restricted band-edge emission level using the following settings

PEAK measurements:
RBW = 1 MHz
VBW ≥ 3 MHz
Detector = peak
Sweep time = auto x (1/x) where x is the duty cycle
Trace mode = max hold

AVERAGE measurements:
RBW = 1 MHz
VBW ≥ 3 MHz
Detector = power averaging (rms)
Sweep time = auto x (1/x) where x is the duty cycle
Trace mode = Average 100 traces x (1/x) where x is the duty cycle
Add 10 log (1/x), where x is the duty cycle, to the measured value

Limit: Emissions in the restricted bands must comply with the general field strength limits set forth in FCC Part 15.209 and RSS-Gen section 8.9 Table 4.

Results: Passed

Notes: Measurements were taken for QPSK modulation at the lowest and highest channels of operation. The EUT was transmitting from the antenna with both transmit chains active and a power setting of 19 on both chains.

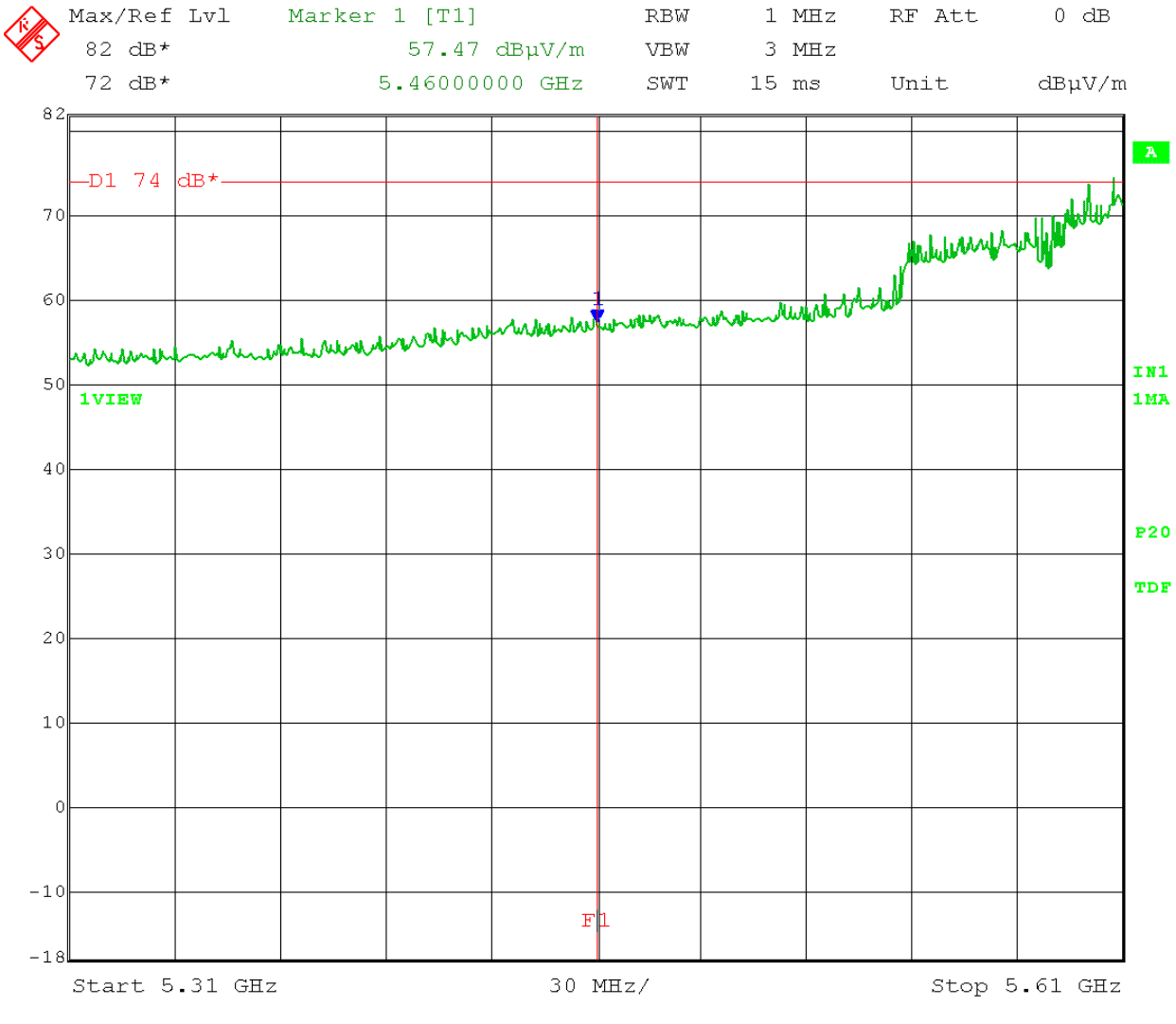
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-23-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Lower Restricted Band Edge Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains

RBW = 1 MHz	VBW ≥ 3 MHz
Detector = Peak	Trace: Max Hold
Low Channel: 5745 MHz	40 MHz BW
Output Power Setting: 19	Test distance: 3 meters
Lower Restricted Band Edge: 5.46 GHz	
Limit: Peak limit = 74 dBµV/m	Average limit = 54 dBµV/m

VERTICAL, PEAK **57.47 dBµV/m**



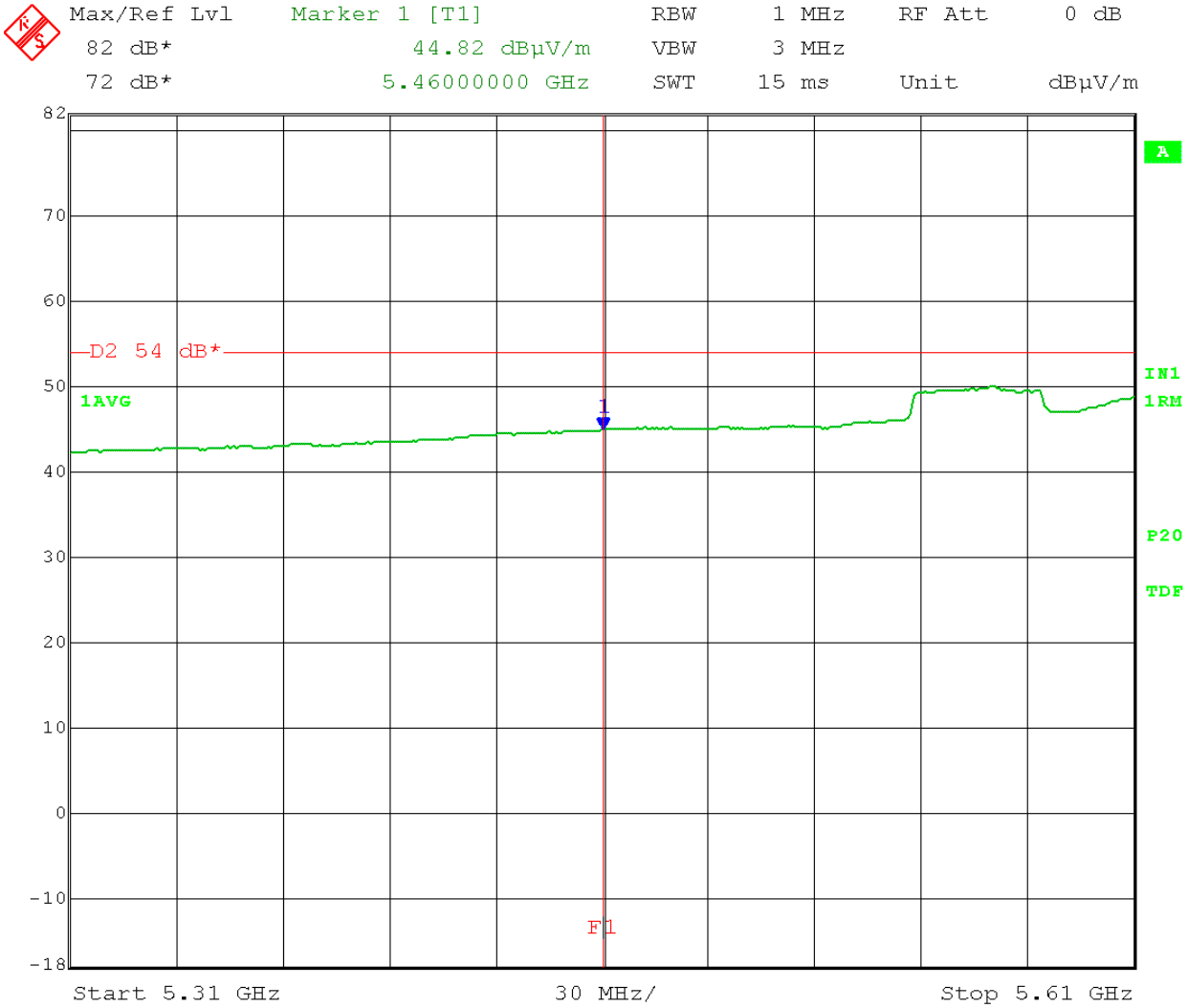
Date: 23.JUN.2016 14:43:22

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-23-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Lower Restricted Band Edge Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains RBW = 1 MHz VBW ≥ 3 MHz Detector = RMS Trace: Average (100 traces x 1/.336) = 300 traces Low Channel: 5745 MHz Sweep time: auto x 1/.336 = 5 ms x 1/.336 = 15 ms Output Power Setting: 19 40 MHz BW Lower Restricted Band Edge: 5.46 GHz Test distance: 3 meters
Limit:	Peak limit = 74 dBµV/m Average limit = 54 dBµV/m

VERTICAL, AVERAGE 44.82 dBµV/m + 4.74 dB duty cycle correction = **49.56 dBµV/m**



Date: 23.JUN.2016 14:46:00

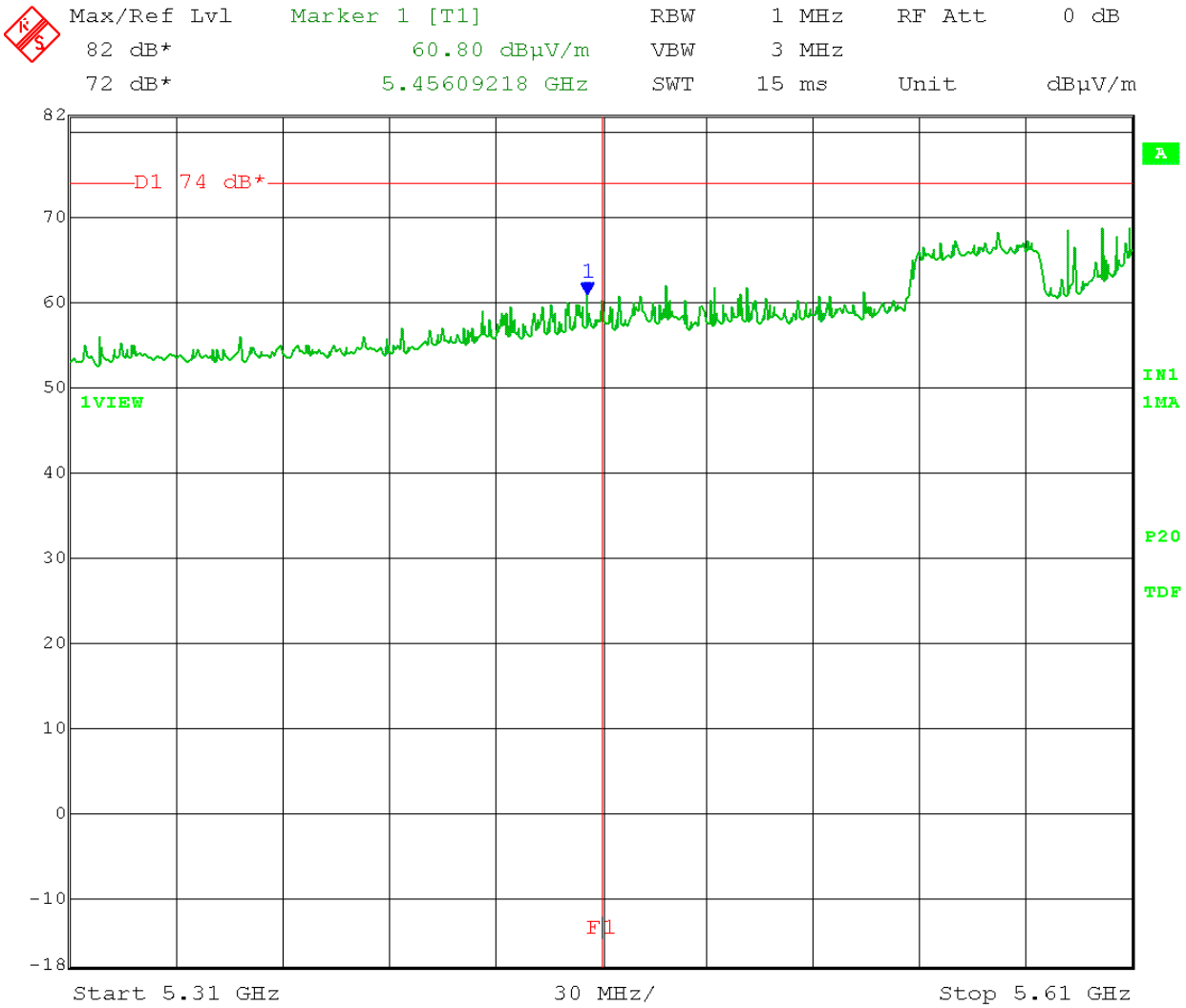
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Lower Restricted Band Edge Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains

RBW = 1 MHz	VBW ≥ 3 MHz
Detector = Peak	Trace: Max Hold
Low Channel: 5745 MHz	40 MHz BW
Output Power Setting: 19	Test distance: 3 meters
Lower Restricted Band Edge: 5.46 GHz	
Limit: Peak limit = 74 dBµV/m	Average limit = 54 dBµV/m

HORIZONTAL, PEAK **60.80 dBµV/m**



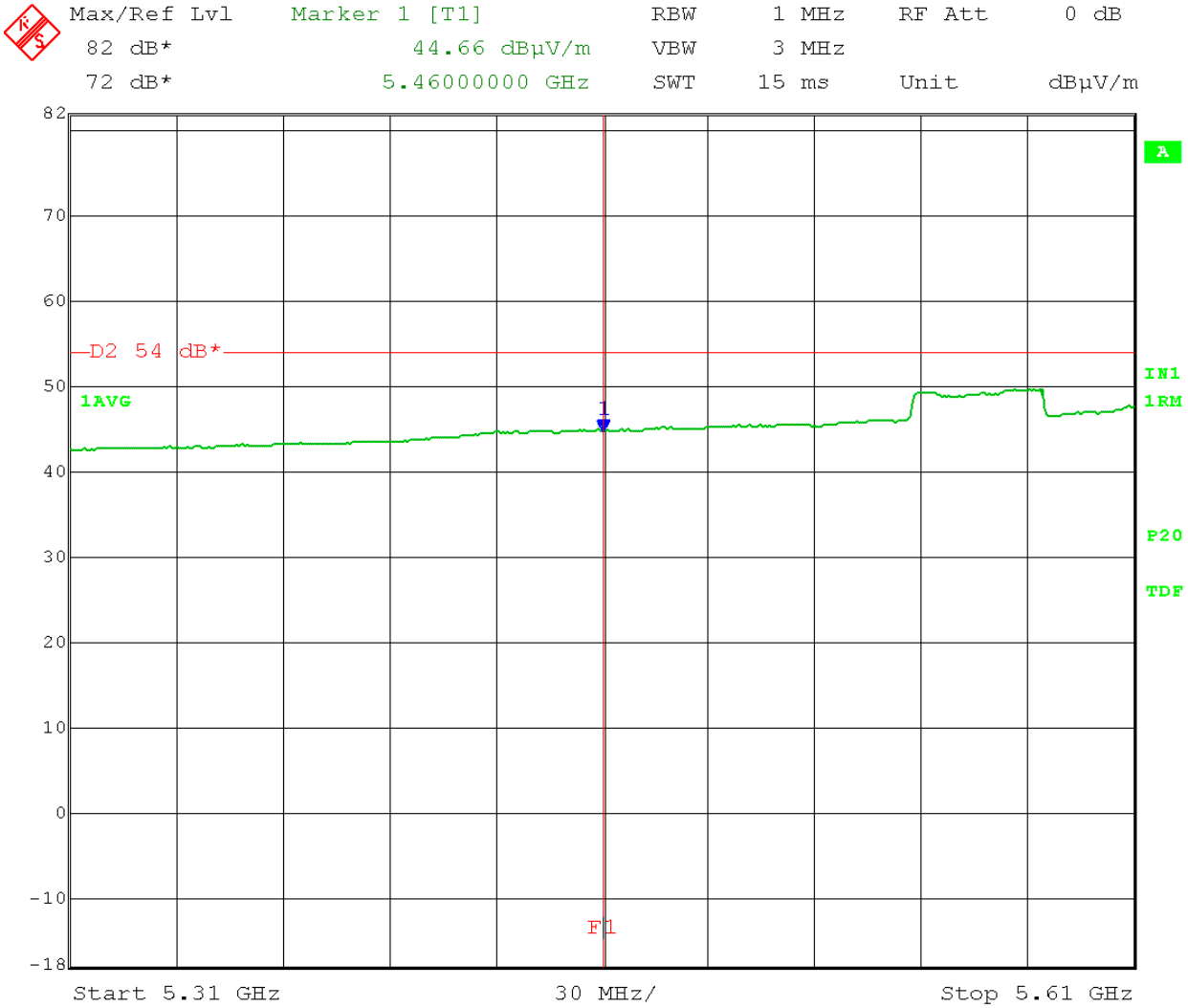
Date: 24.JUN.2016 08:05:40

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Lower Restricted Band Edge Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains RBW = 1 MHz VBW ≥ 3 MHz Detector = RMS Trace: Average (100 traces x 1/.336) = 300 traces Low Channel: 5745 MHz Sweep time: auto x 1/.336 = 5 ms x 1/.336 = 15 ms Output Power Setting: 19 40 MHz BW Lower Restricted Band Edge: 5.46 GHz Test distance: 3 meters
Limit:	Peak limit = 74 dBµV/m Average limit = 54 dBµV/m

HORIZONTAL, AVERAGE 44.66 dBµV/m + 4.74 dB duty cycle correction = **49.40 dBµV/m**



Date: 24.JUN.2016 08:07:47

166 South Carter, Genoa City, WI 53128

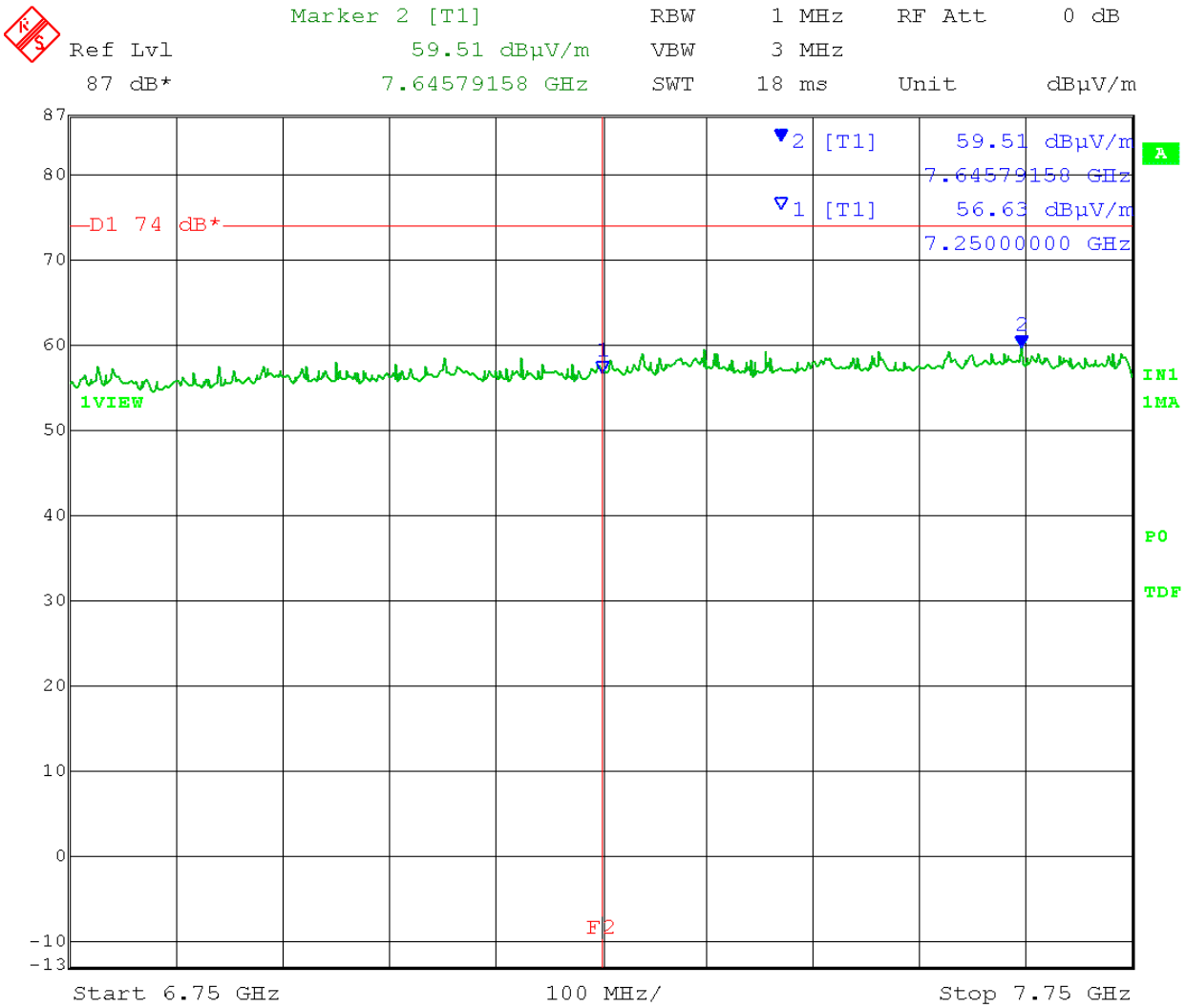
Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Upper Restricted Band Edge Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains

RBW = 1 MHz — VBW ≥ 3 MHz
Detector = Peak — Trace: Max Hold
High Channel: 5830 MHz — 40 MHz BW
Output Power Setting: 19 — Test distance: 3 meters
Upper Restricted Band Edge: 7.25 GHz

Limit: Peak limit = 74 dBµV/m — Average limit = 54 dBµV/m

VERTICAL, PEAK **59.51 dBµV/m**



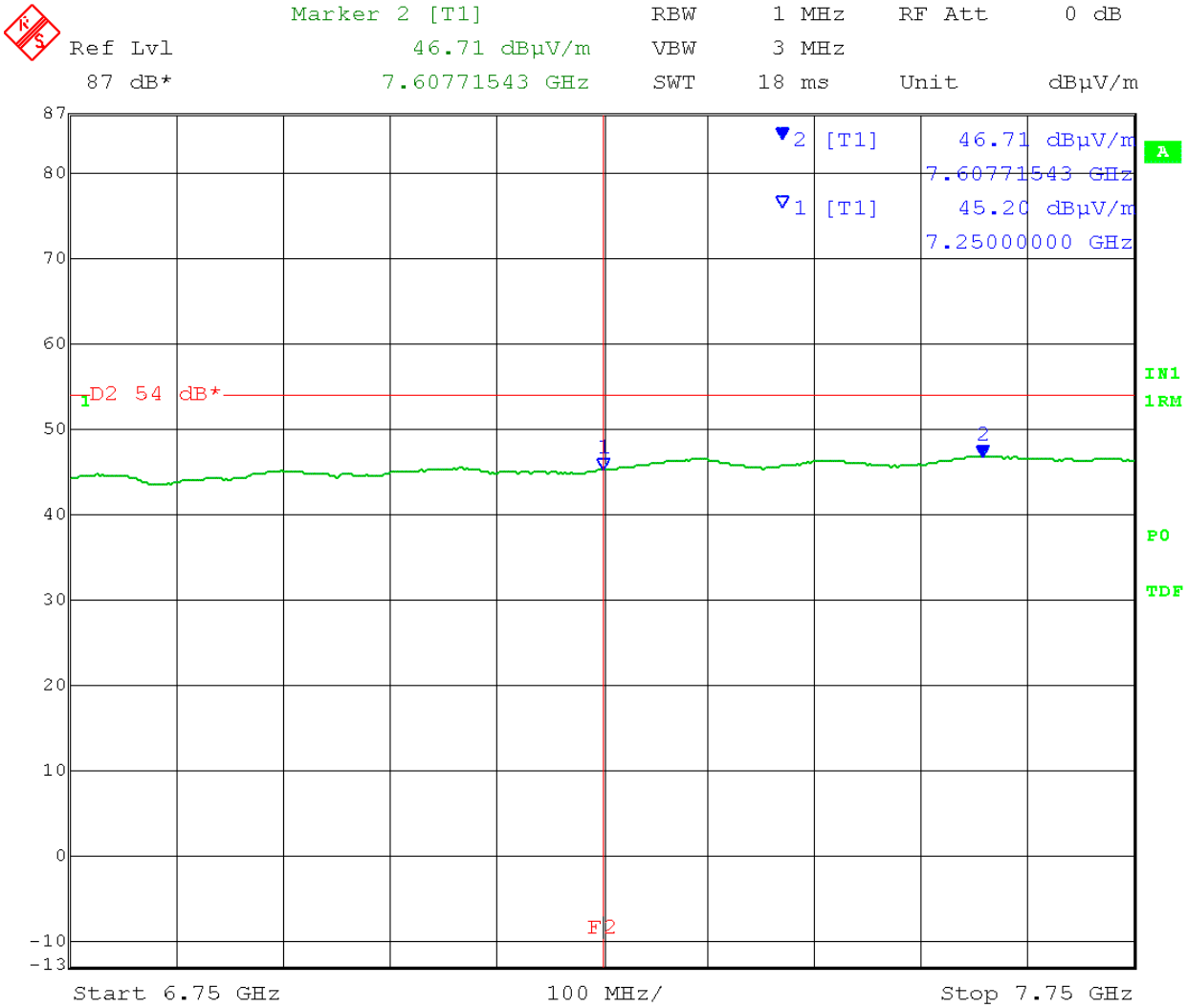
Date: 24.JUN.2016 08:59:18

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Upper Restricted Band Edge Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains RBW = 1 MHz — VBW ≥ 3 MHz Detector = RMS — Trace: Average (100 traces x 1/.336) = 300 traces High Channel: 5830 MHz — Sweep time: auto x 1/.336 = 6 ms x 1/.336 = 18 ms Output Power Setting: 19 — 40 MHz BW Upper Restricted Band Edge: 7.25 GHz — Test distance: 3 meters
Limit:	Peak limit = 74 dBµV/m — Average limit = 54 dBµV/m

VERTICAL, AVERAGE 46.71 dBµV/m + 4.74 dB duty cycle correction = **51.45 dBµV/m**



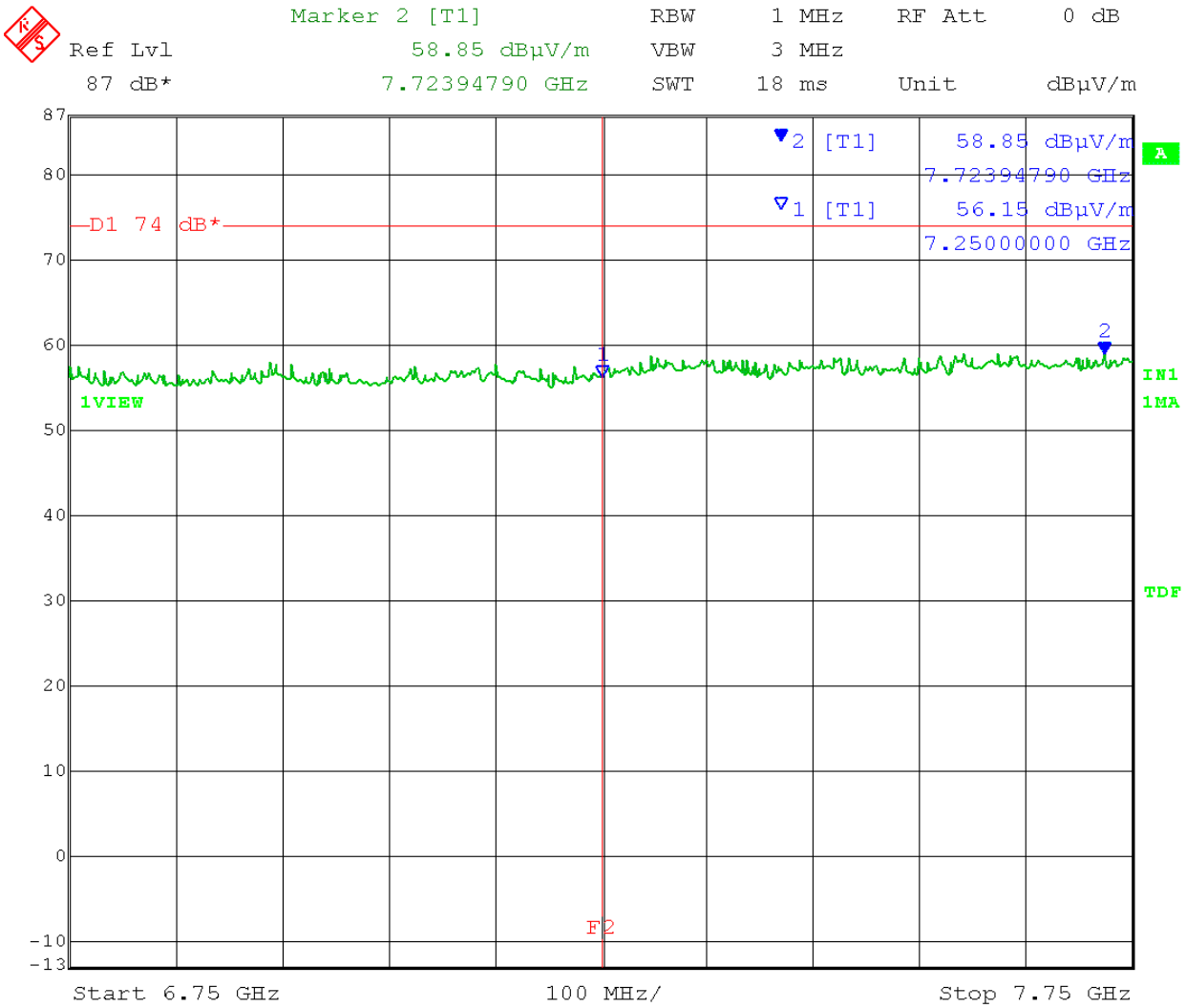
DLS ELECTRONIC SYSTEMS, INC.

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016	
Company:	Cambium Networks	
EUT:	PMP450 BH/SM 5.8 GHz	
Test:	Upper Restricted Band Edge	
	Radiated with antenna	
Operator:	Craig B	
Comment:	Duty Cycle = 33.6% on both transmit chains	
	RBW = 1 MHz	VBW ≥ 3 MHz
	Detector = Peak	Trace: Max Hold
	High Channel: 5830 MHz	40 MHz BW
	Output Power Setting: 19	Test distance: 3 meters
	Upper Restricted Band Edge: 7.25 GHz	
Limit:	Peak limit = 74 dBµV/m	Average limit = 54 dBµV/m

HORIZONTAL, PEAK **58.85 dBµV/m**



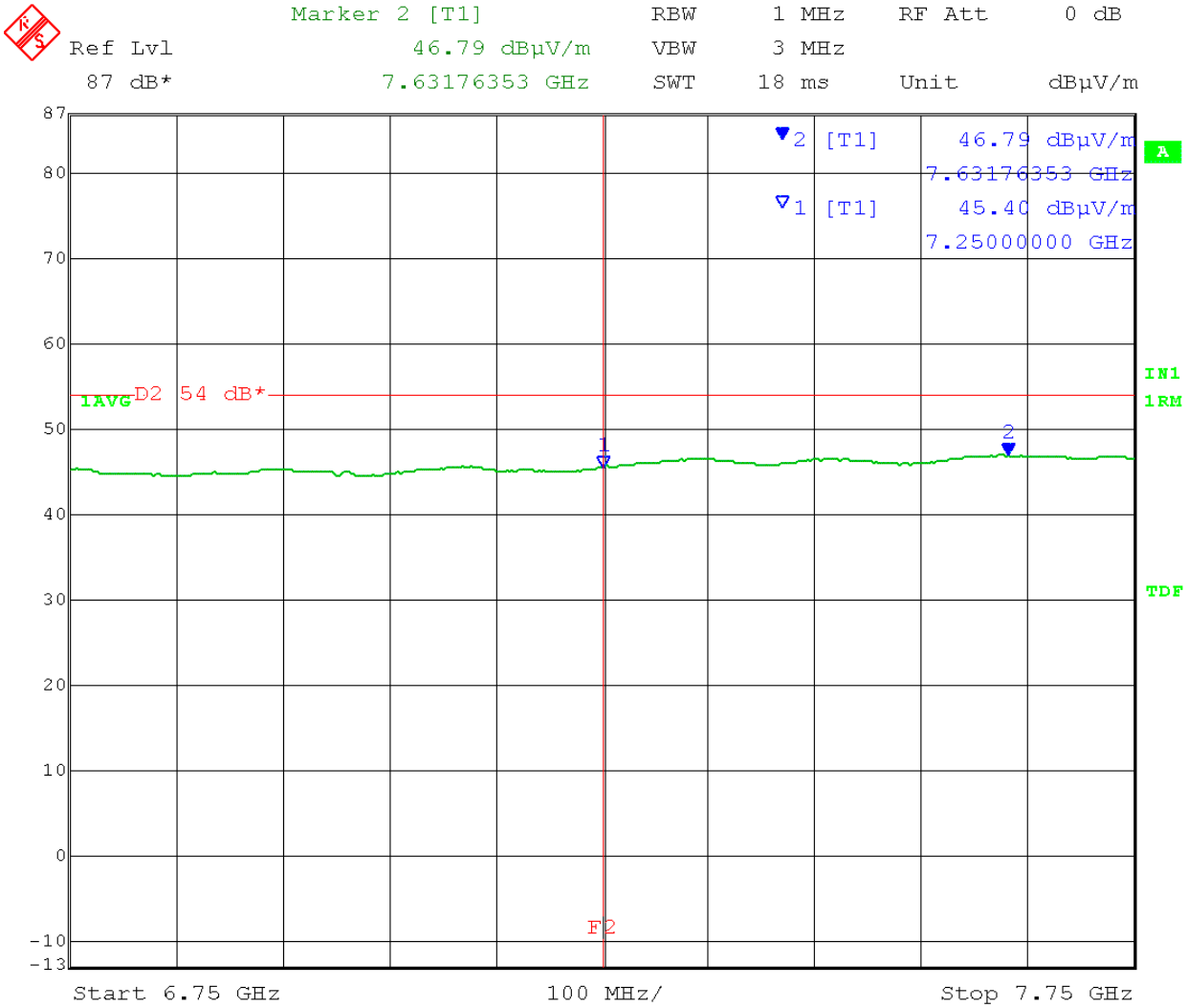
Date: 24.JUN.2016 08:52:00

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Upper Restricted Band Edge Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains
	RBW = 1 MHz — VBW ≥ 3 MHz
	Detector = RMS — Trace: Average (100 traces x 1/.336) = 300 traces
	High Channel: 5830 MHz — Sweep time: auto x 1/.336 = 6 ms x 1/.336 = 18 ms
	Output Power Setting: 19 — 40 MHz BW
	Upper Restricted Band Edge: 7.25 GHz — Test distance: 3 meters
Limit:	Peak limit = 74 dBµV/m — Average limit = 54 dBµV/m

HORIZONTAL, AVERAGE 46.79 dBµV/m + 4.74 dB duty cycle correction = **51.53 dBµV/m**



Date: 24.JUN.2016 08:48:41

Appendix B – Measurement Data

B9.0 Unwanted Emission Levels – Above 1000 MHz – Outside the Restricted Bands
Radiated with antenna

Rule Section: Section 15.407(b)(4)
RSS-247 section 6.2.4(2)

Test Procedure: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section II(G) – Unwanted Emission Measurement
Section II(G)(2) – Unwanted emissions that fall Outside of the Restricted Bands
Section II(G)(3) – General Requirements for Unwanted Emissions Measurements
Section II(G)(5) – Maximum (Peak detector) emissions above 1000 MHz

Description: Measure the emission level using the following settings

PEAK measurements:
RBW = 1 MHz
VBW ≥ 3 MHz
Detector = peak
Sweep time = auto x (1/x) where x is the duty cycle
Trace mode = max hold

Limit: Emissions shall not exceed an EIRP of -27 dBm/MHz

Results: Passed

Notes: Both transmit chains active during test. Measurements were taken for QPSK modulation at the lowest, middle, and highest channels of operation. The EUT was transmitting from the antenna with both transmit chains active and a power setting of 19 on both chains.

166 South Carter, Genoa City, WI 53128

Company: Cambium Networks
Model Tested: C054045C008B
Report Number: 21973
DLS Project: 8206

No Measurable Radiated Emissions were detected Outside the Restricted Bands from the

PMP450SM 5.7GHz OFDM Radio, Model C054045C008B

from 1 to 18 GHz

in the test mode Radiated with antenna, both transmit chains active, power setting 19, at Low, Mid, and High channels of operation

06-24-2016

166 South Carter, Genoa City, WI 53128

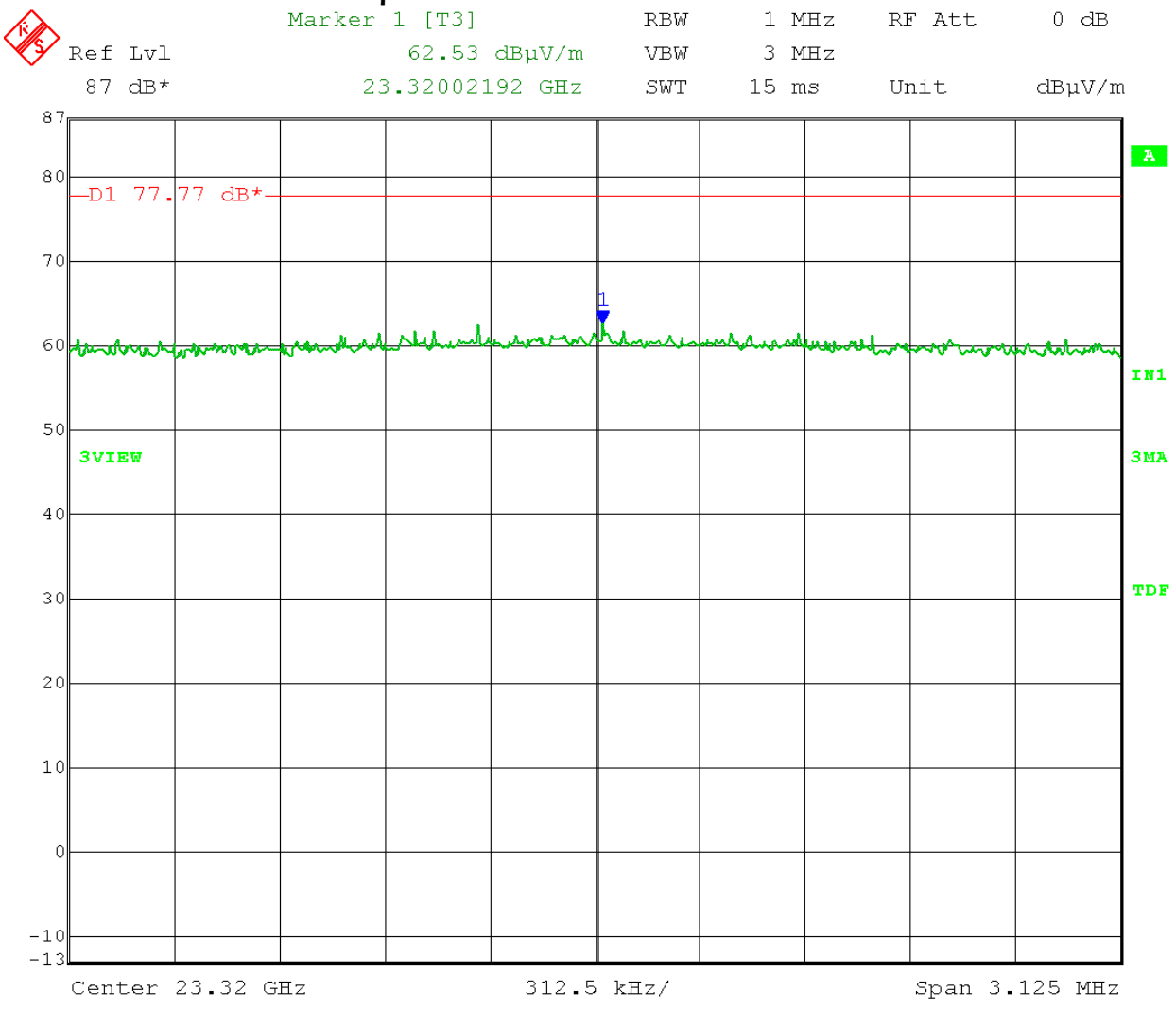
Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Outside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty cycle = 33.6% on both transmit chains

RBW = 1 MHz — VBW ≥ 3 MHz
Detector = Peak — Trace: Max Hold
High Channel: 5830 MHz — 40 MHz BW
Output Power Setting: 19 — Test distance: 1 meter
Frequency Range: 18 – 40 GHz

Limit: -27 dBm/MHz e.i.r.p
Limit (dBµV/m) at 1 meter = -27 dBm - 20 log (1 meter) + 104.77 = 77.77 dBµV/m

VERTICAL: **62.53 dBµV/m**



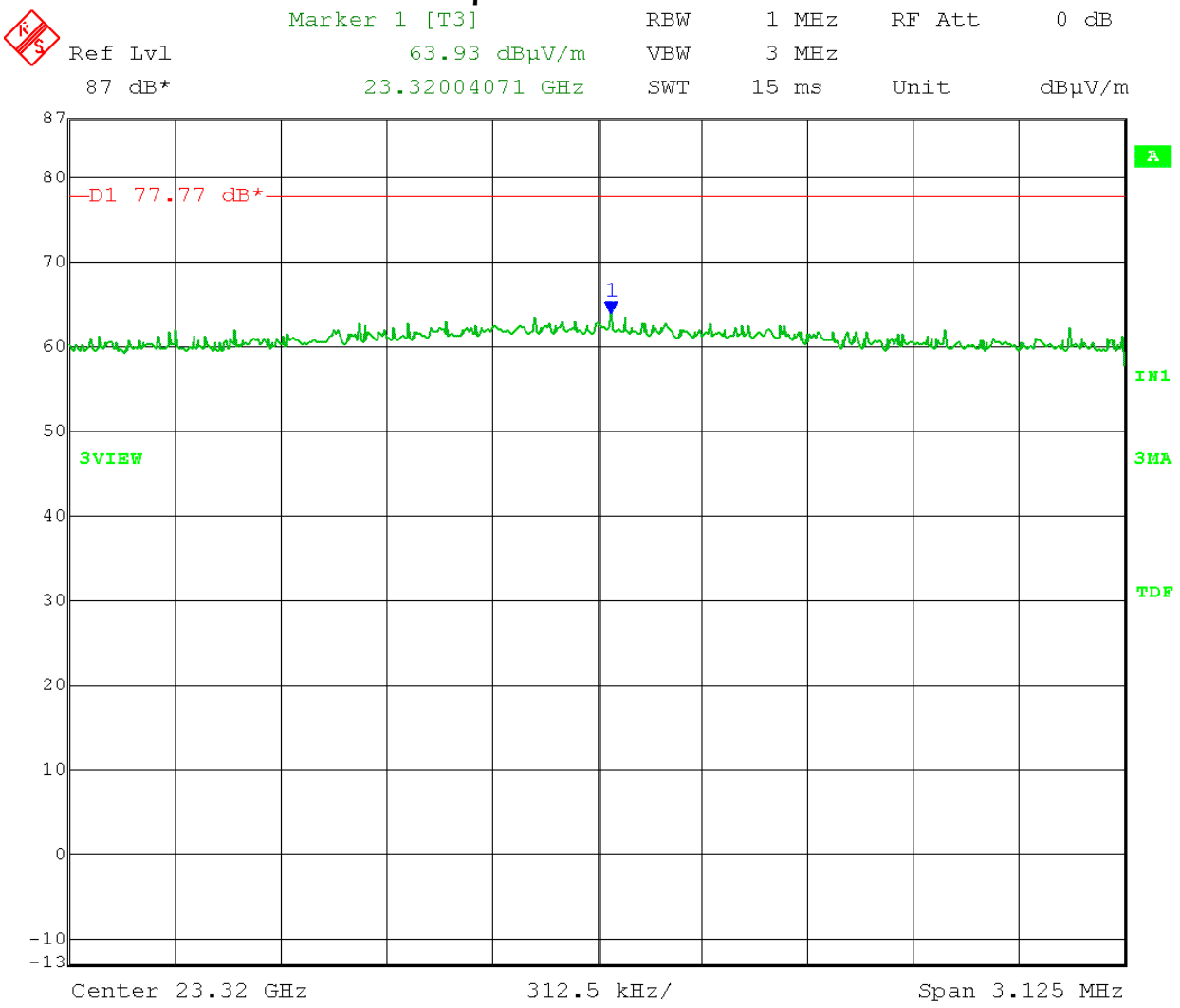
Date: 24.JUN.2016 13:53:02

166 South Carter, Genoa City, WI 53128

Company: Cambium Networks
Model Tested: C054045C008B
Report Number: 21973
DLS Project: 8206

Test Date: 06-24-2016
Company: Cambium Networks
EUT: PMP450 BH/SM 5.8 GHz
Test: Maximum Unwanted Emission Levels – Outside Restricted Bands
Radiated with antenna
Operator: Craig B
Comment: Duty cycle = 33.6% on both transmit chains
RBW = 1 MHz — VBW ≥ 3 MHz
Detector = Peak — Trace: Max Hold
High Channel: 5830 MHz — 40 MHz BW
Output Power Setting: 19 — Test distance: 1 meter
Frequency Range: 18 – 40 GHz
Limit: -27 dBm/MHz e.i.r.p
Limit (dBµV/m) at 1 meter = -27 dBm - 20 log (1 meter) + 104.77 = 77.77 dBµV/m

HORIZONTAL: **63.93 dBµV/m**



Date: 24.JUN.2016 14:30:24

Appendix B – Measurement Data

B10.0 Unwanted Emission Levels – Above 1000 MHz – Inside the Restricted Bands
Radiated with antenna

Rule Section: Sections 15.407(b)(7), 15.205 and 15.209
RSS-247 section 6; RSS-Gen section 8.10

Test Procedure: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section II(G) – Unwanted Emission Measurement
Section II(G)(1) – Unwanted emissions in the Restricted Bands
Section II(G)(3) – General Requirements for Unwanted Emissions Measurements
Section II(G)(5) – Maximum (Peak detector) emissions above 1000 MHz
Section II(G)(6)(c) – Average emissions above 1000 MHz – Method AD (Average Detection)

Description: Measure the emission level using the following settings

PEAK measurements:
RBW = 1 MHz
VBW ≥ 3 MHz
Detector = peak
Sweep time = auto x (1/x) where x is the duty cycle
Trace mode = max hold

AVERAGE measurements:
RBW = 1 MHz
VBW ≥ 3 MHz
Detector = power averaging (rms)
Sweep time = auto x (1/x) where x is the duty cycle
Trace mode = Average 100 traces x (1/x) where x is the duty cycle
Add 10 log (1/x), where x is the duty cycle, to the measured value

Limit: Emissions in the restricted bands must comply with the general field strength limits set forth in FCC Part 15.209 and RSS-Gen section 8.9 Table 4.

Results: Passed

Notes: Both transmit chains active during test. Measurements were taken for QPSK modulation at the lowest, middle, and highest channels of operation. The EUT was transmitting from the antenna with both transmit chains active and a power setting of 19 on both chains.

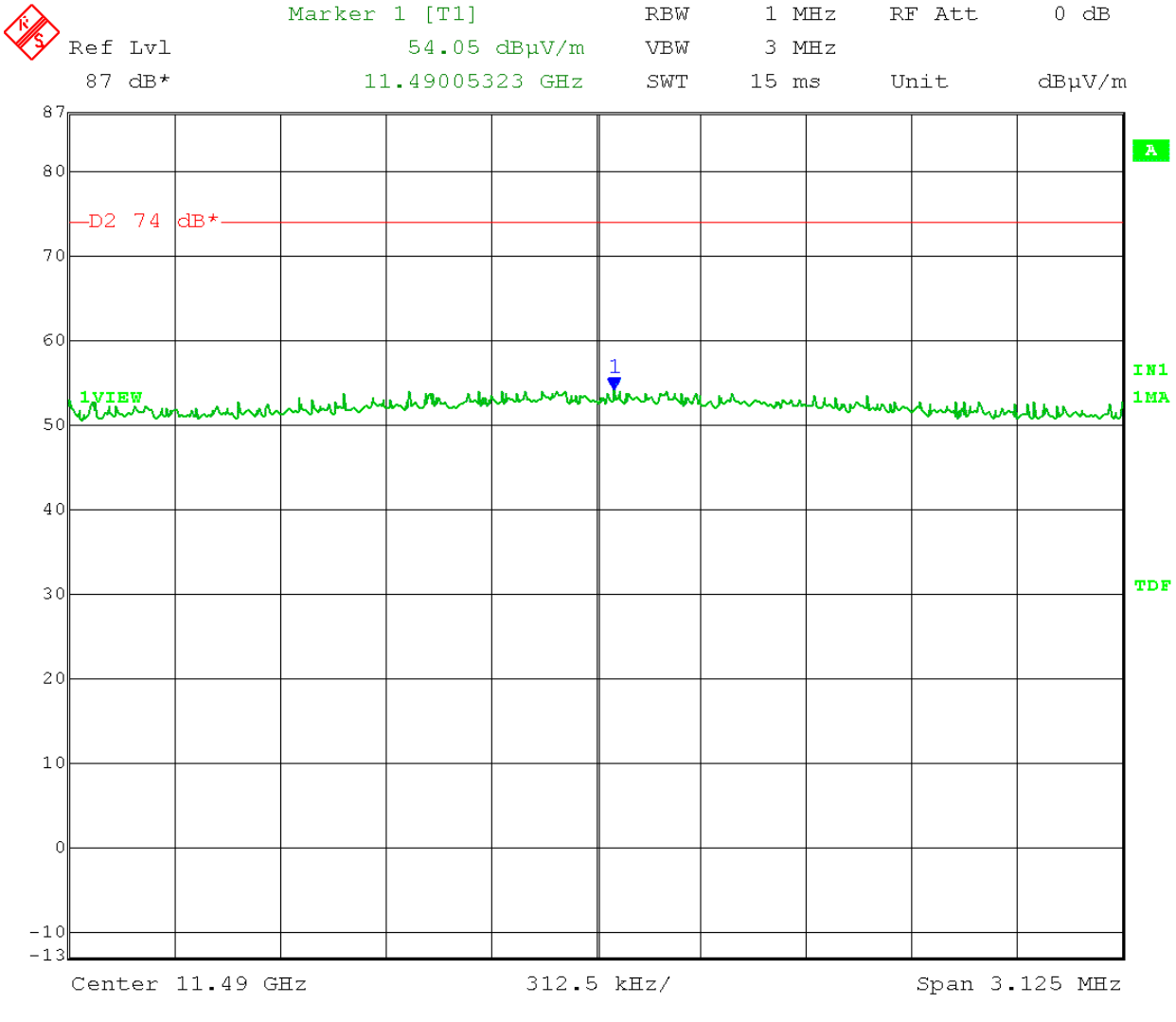
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains

RBW = 1 MHz	VBW ≥ 3 MHz
Detector = Peak	Trace: Max Hold
Low Channel: 5745 MHz	40 MHz BW
Output Power Setting: 19	Test distance: 3 meters
Frequency Range: 1 – 18 GHz	
Limit: Peak limit = 74 dBµV/m	Average limit = 54 dBµV/m

VERTICAL, PEAK **53.17 dBµV/m**



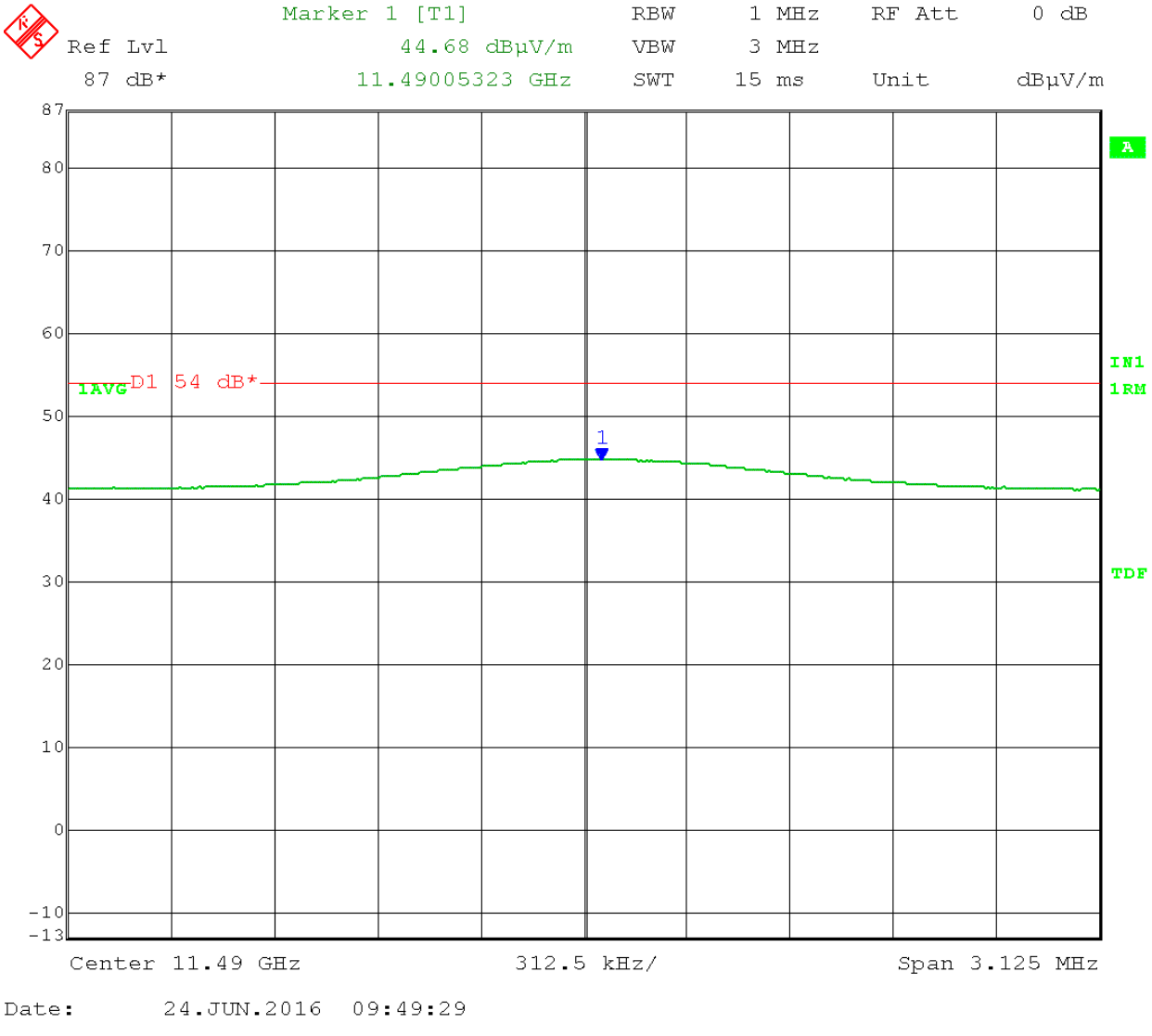
Date: 24.JUN.2016 09:50:55

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains
	RBW = 1 MHz — VBW ≥ 3 MHz
	Detector = RMS — Trace: Average (100 traces x 1/.336) = 300 traces
	Low Channel: 5745 MHz — Sweep time: auto x 1/.336 = 5 ms x 1/.336 = 15 ms
	Output Power Setting: 19 — 40 MHz BW
	Frequency Range: 1 – 18 GHz — Test distance: 3 meters
Limit:	Peak limit = 74 dBµV/m — Average limit = 54 dBµV/m

VERTICAL, AVERAGE 44.68 dBµV/m + 4.74 dB duty cycle correction = **49.42 dBµV/m**



Date: 24.JUN.2016 09:49:29

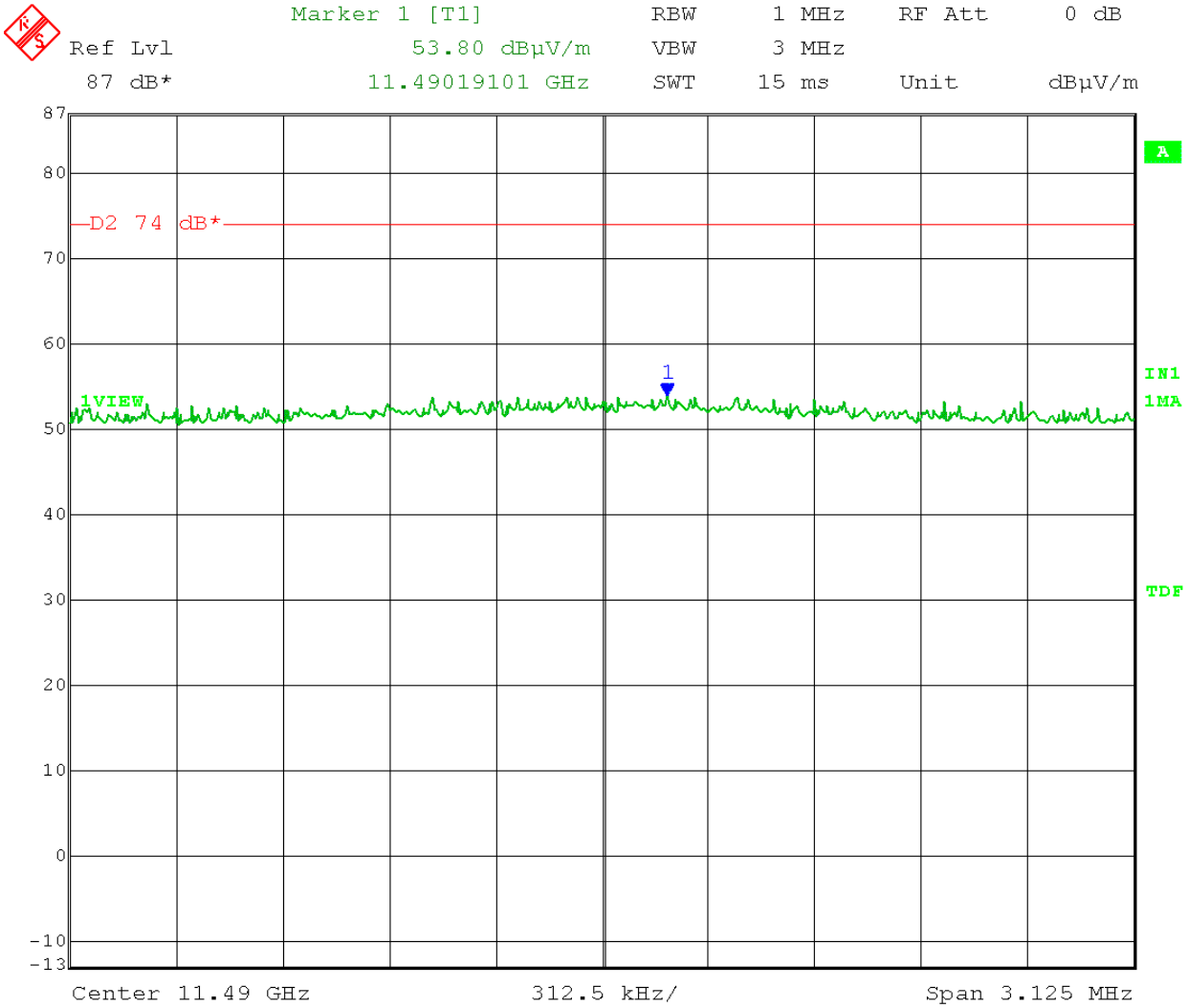
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains

RBW = 1 MHz	VBW ≥ 3 MHz
Detector = Peak	Trace: Max Hold
Low Channel: 5745 MHz	40 MHz BW
Output Power Setting: 19	Test distance: 3 meters
Frequency Range: 1 – 18 GHz	
Limit: Peak limit = 74 dBµV/m	Average limit = 54 dBµV/m

HORIZONTAL, PEAK **53.80 dBµV/m**



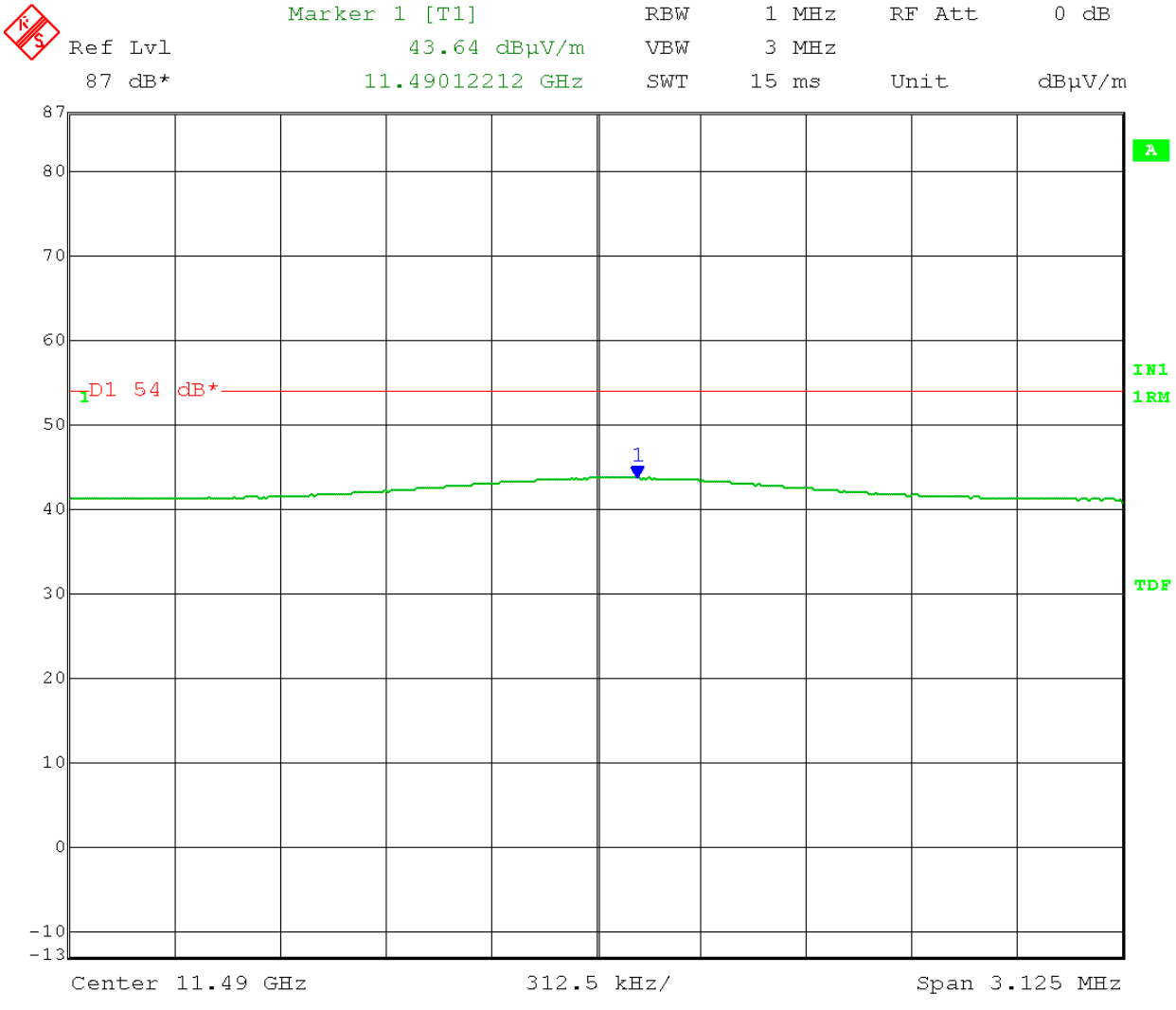
Date: 24.JUN.2016 10:13:41

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains
	RBW = 1 MHz — VBW ≥ 3 MHz
	Detector = RMS — Trace: Average (100 traces x 1/.336) = 300 traces
	Low Channel: 5745 MHz — Sweep time: auto x 1/.336 = 5 ms x 1/.336 = 15 ms
	Output Power Setting: 19 — 40 MHz BW
	Frequency Range: 1 – 18 GHz — Test distance: 3 meters
Limit:	Peak limit = 74 dBµV/m — Average limit = 54 dBµV/m

HORIZONTAL, AVERAGE 43.64 dBµV/m + 4.74 dB duty cycle correction = **48.38 dBµV/m**



Date: 24.JUN.2016 10:12:21

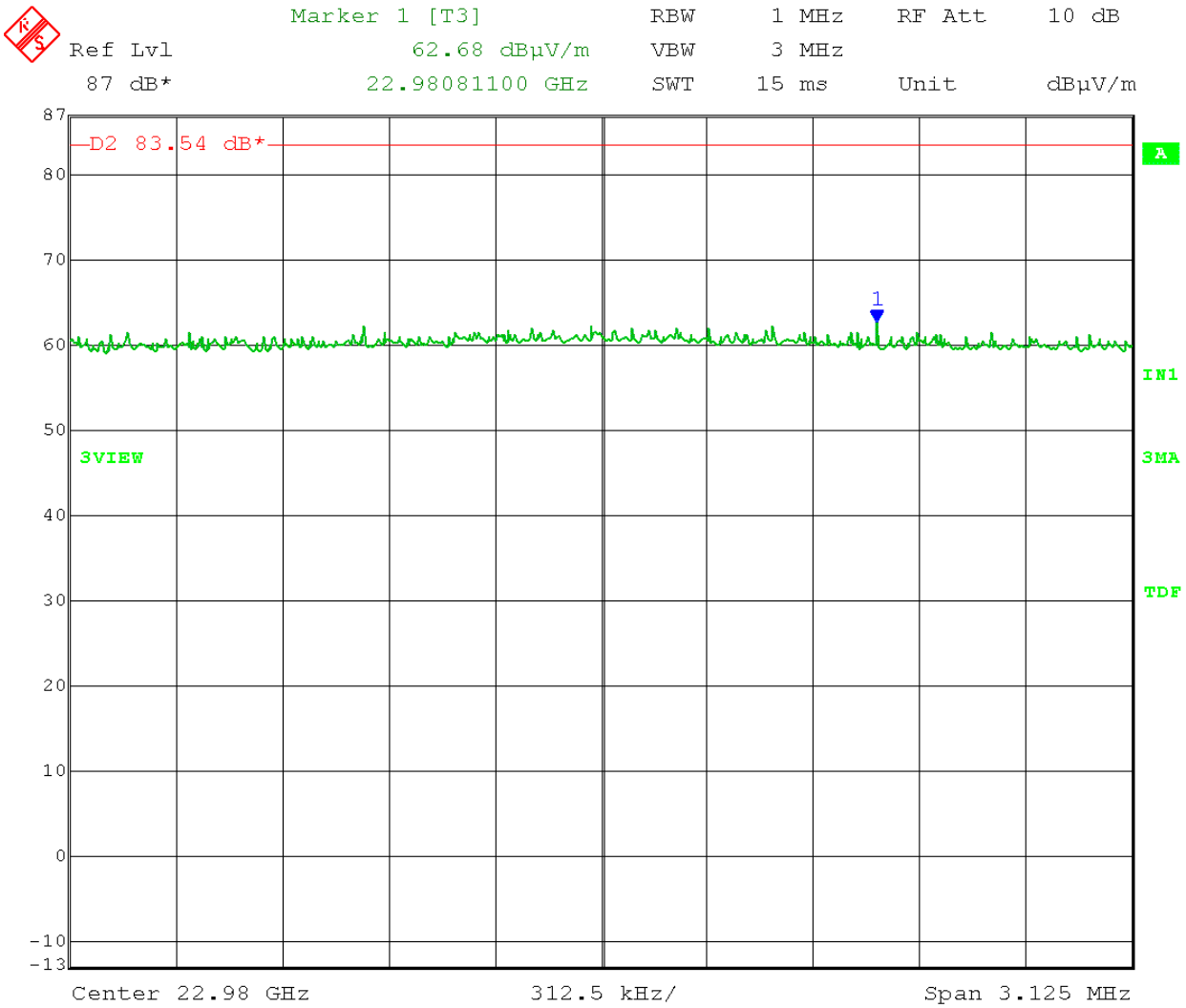
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains

RBW = 1 MHz	VBW ≥ 3 MHz
Detector = Peak	Trace: Max Hold
Low Channel: 5745 MHz	40 MHz BW
Output Power Setting: 19	Test distance: 1 meter
Frequency Range: 18 – 40 GHz	
Limit: Peak limit = 83.54 dBµV/m	Average limit = 63.54 dBµV/m

VERTICAL, PEAK **62.68 dBµV/m**



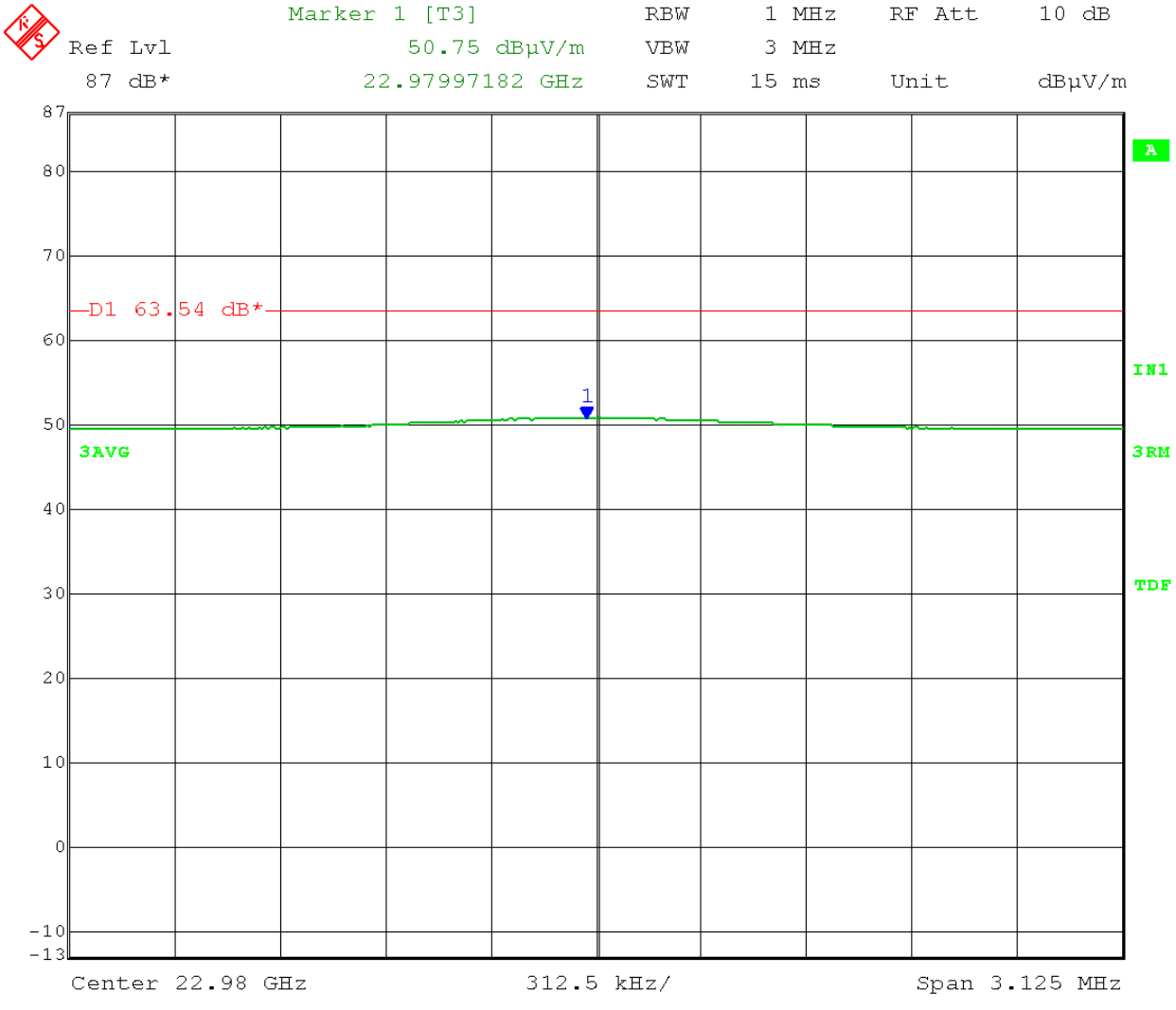
Date: 24.JUN.2016 13:39:03

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

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains
	RBW = 1 MHz — VBW ≥ 3 MHz
	Detector = RMS — Trace: Average (100 traces x 1/.336) = 300 traces
	Low Channel: 5745 MHz — Sweep time: auto x 1/.336 = 5 ms x 1/.336 = 15 ms
	Output Power Setting: 19 — 40 MHz BW
	Frequency Range: 18 – 40 GHz — Test distance: 1 meter
Limit:	Peak limit = 83.54 dBµV/m — Average limit = 63.54 dBµV/m

VERTICAL, AVERAGE 50.75 dBµV/m + 4.74 dB duty cycle correction = **55.49 dBµV/m**



Date: 24.JUN.2016 13:37:46

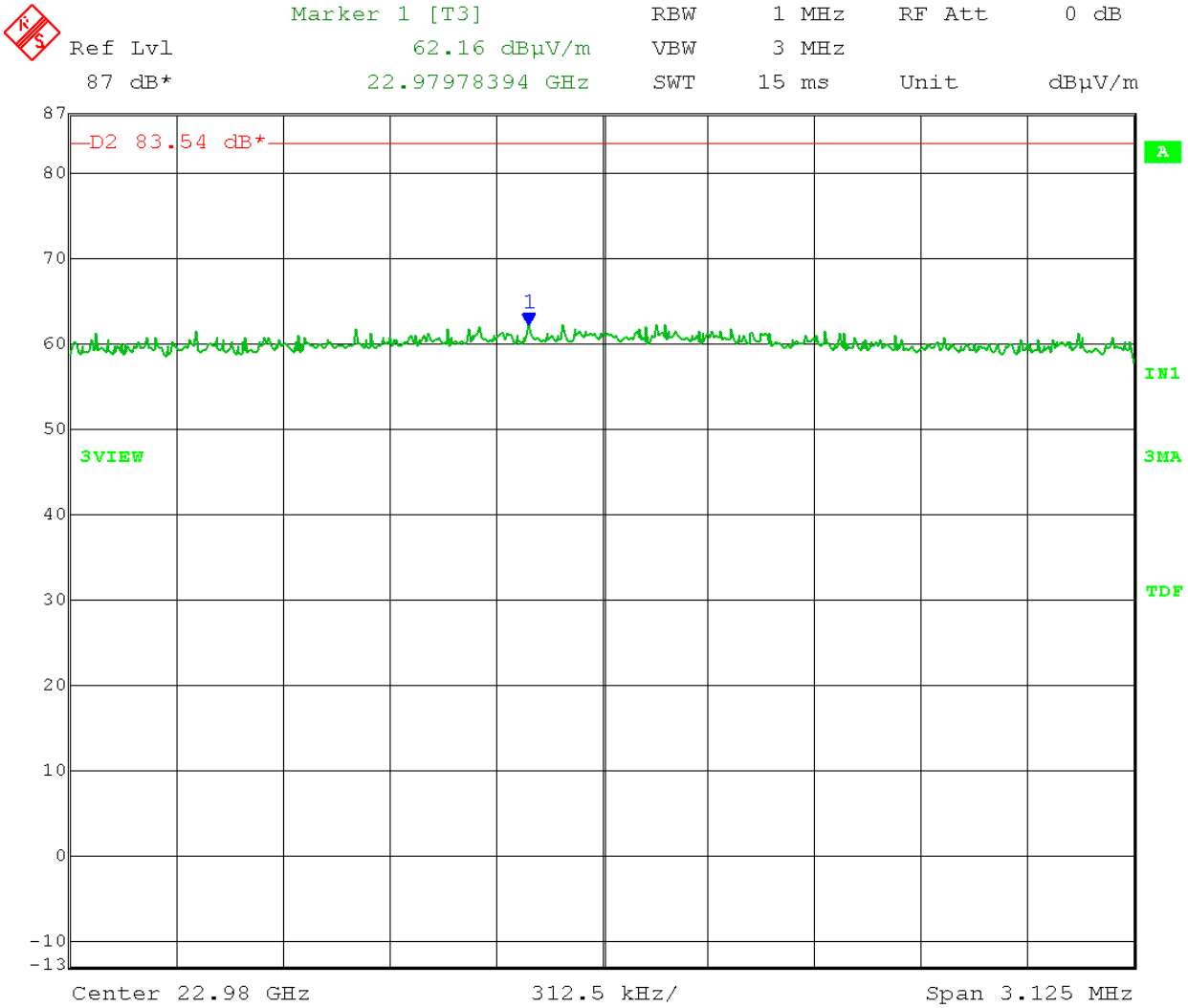
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains

RBW = 1 MHz	VBW ≥ 3 MHz
Detector = Peak	Trace: Max Hold
Low Channel: 5745 MHz	40 MHz BW
Output Power Setting: 19	Test distance: 1 meter
Frequency Range: 18 – 40 GHz	
Limit: Peak limit = 83.54 dBµV/m	Average limit = 63.54 dBµV/m

HORIZONTAL, PEAK **62.16 dBµV/m**



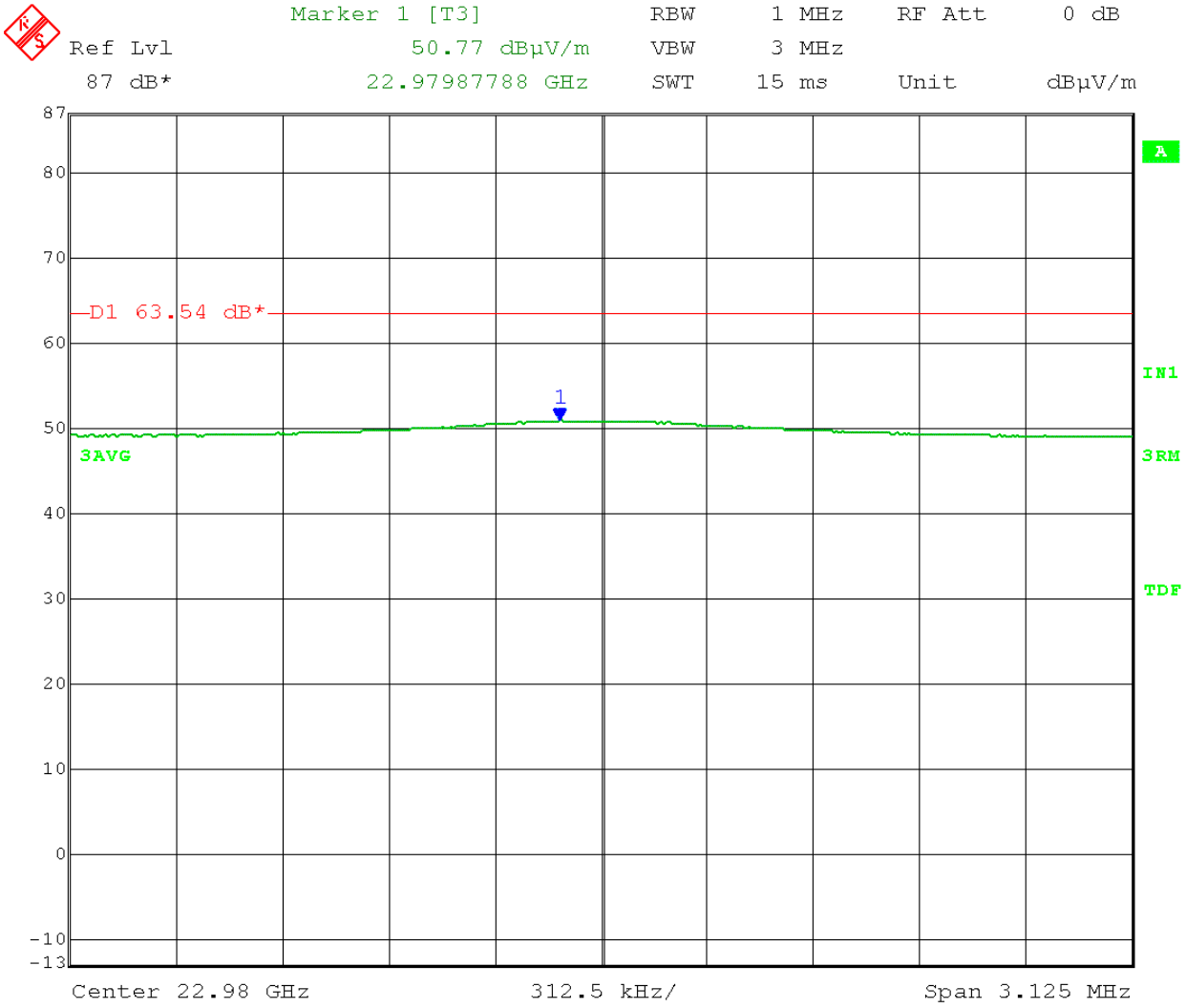
Date: 24.JUN.2016 14:16:37

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

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains
	RBW = 1 MHz — VBW ≥ 3 MHz
	Detector = RMS — Trace: Average (100 traces x 1/.336) = 300 traces
	Low Channel: 5745 MHz — Sweep time: auto x 1/.336 = 5 ms x 1/.336 = 15 ms
	Output Power Setting: 19 — 40 MHz BW
	Frequency Range: 18 – 40 GHz — Test distance: 1 meter
Limit:	Peak limit = 83.54 dBµV/m — Average limit = 63.54 dBµV/m

HORIZONTAL, AVERAGE 50.77 dBµV/m + 4.74 dB duty cycle correction = **55.51 dBµV/m**



Date: 24.JUN.2016 14:14:59

166 South Carter, Genoa City, WI 53128

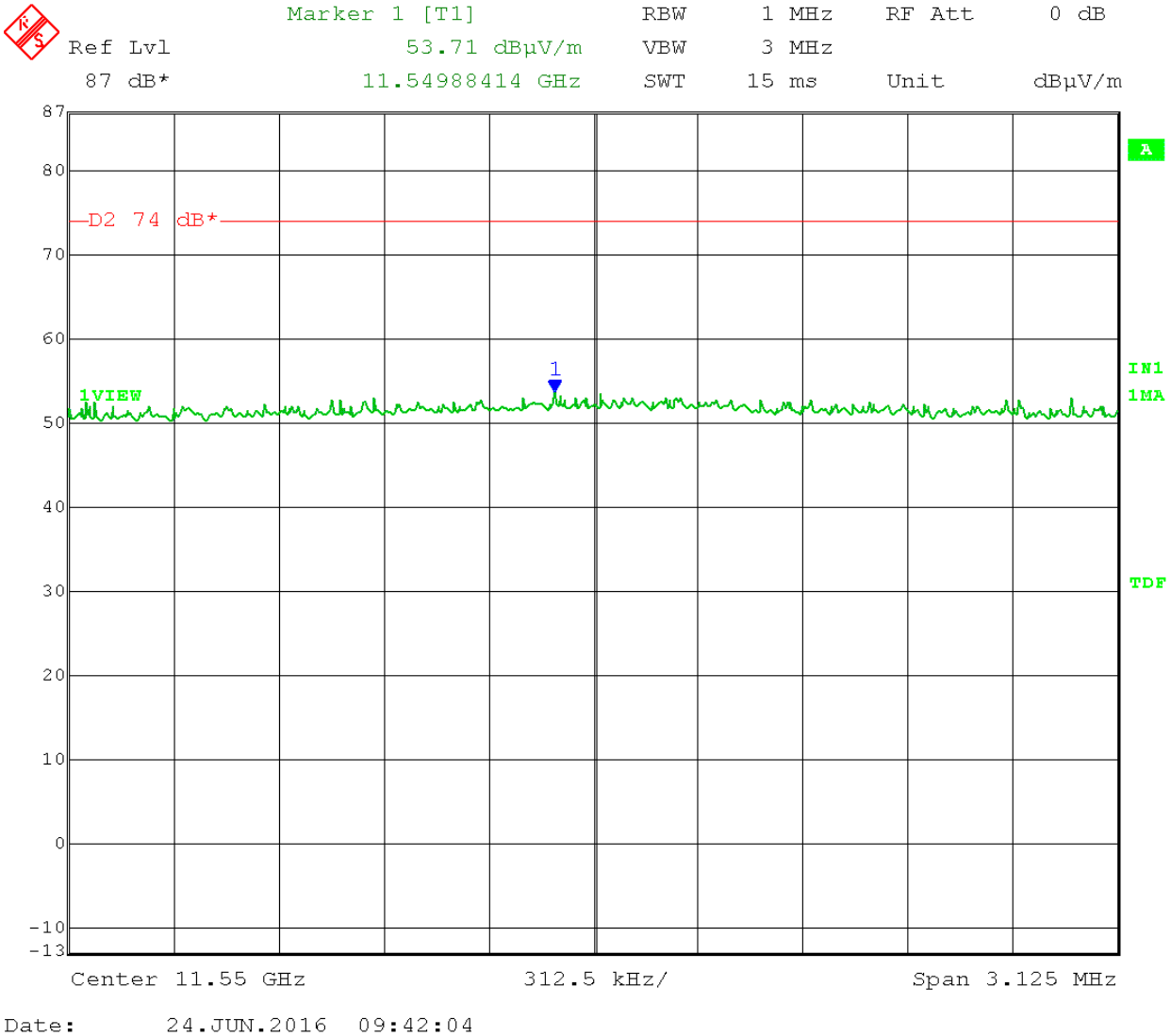
Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains

RBW = 1 MHz — VBW ≥ 3 MHz
Detector = Peak — Trace: Max Hold
Mid Channel: 5775 MHz — 40 MHz BW
Output Power Setting: 19 — Test distance: 3 meters
Frequency Range: 1 – 18 GHz

Limit: Peak limit = 74 dBµV/m — Average limit = 54 dBµV/m

VERTICAL, PEAK **53.17 dBµV/m**



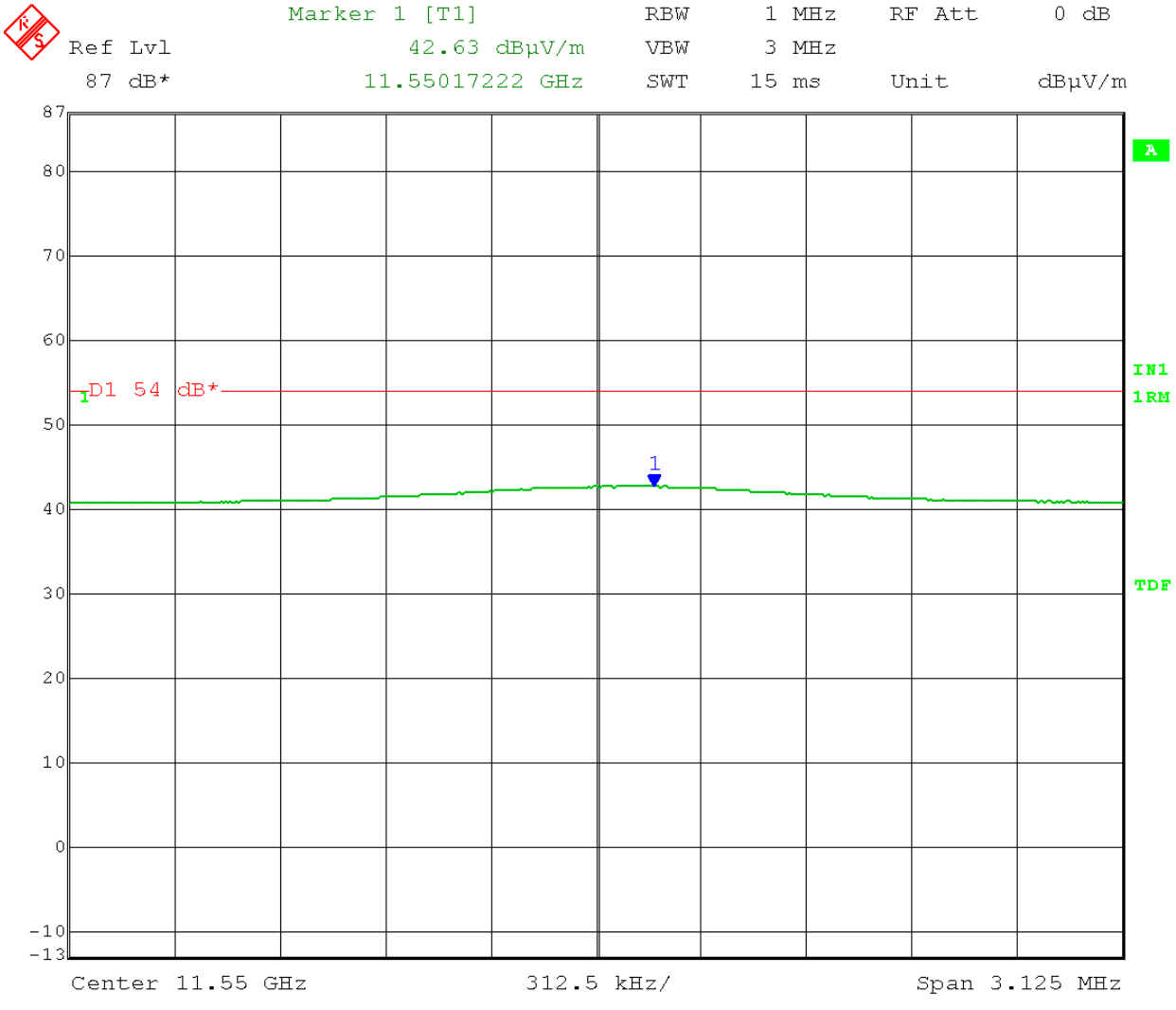
Date: 24.JUN.2016 09:42:04

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains
	RBW = 1 MHz — VBW ≥ 3 MHz
	Detector = RMS — Trace: Average (100 traces x 1/.336) = 300 traces
	Mid Channel: 5775 MHz — Sweep time: auto x 1/.336 = 5 ms x 1/.336 = 15 ms
	Output Power Setting: 19 — 40 MHz BW
	Frequency Range: 1 – 18 GHz — Test distance: 3 meters
Limit:	Peak limit = 74 dBµV/m — Average limit = 54 dBµV/m

VERTICAL, AVERAGE 42.63 dBµV/m + 4.74 dB duty cycle correction = **47.37 dBµV/m**



Date: 24.JUN.2016 09:39:02

166 South Carter, Genoa City, WI 53128

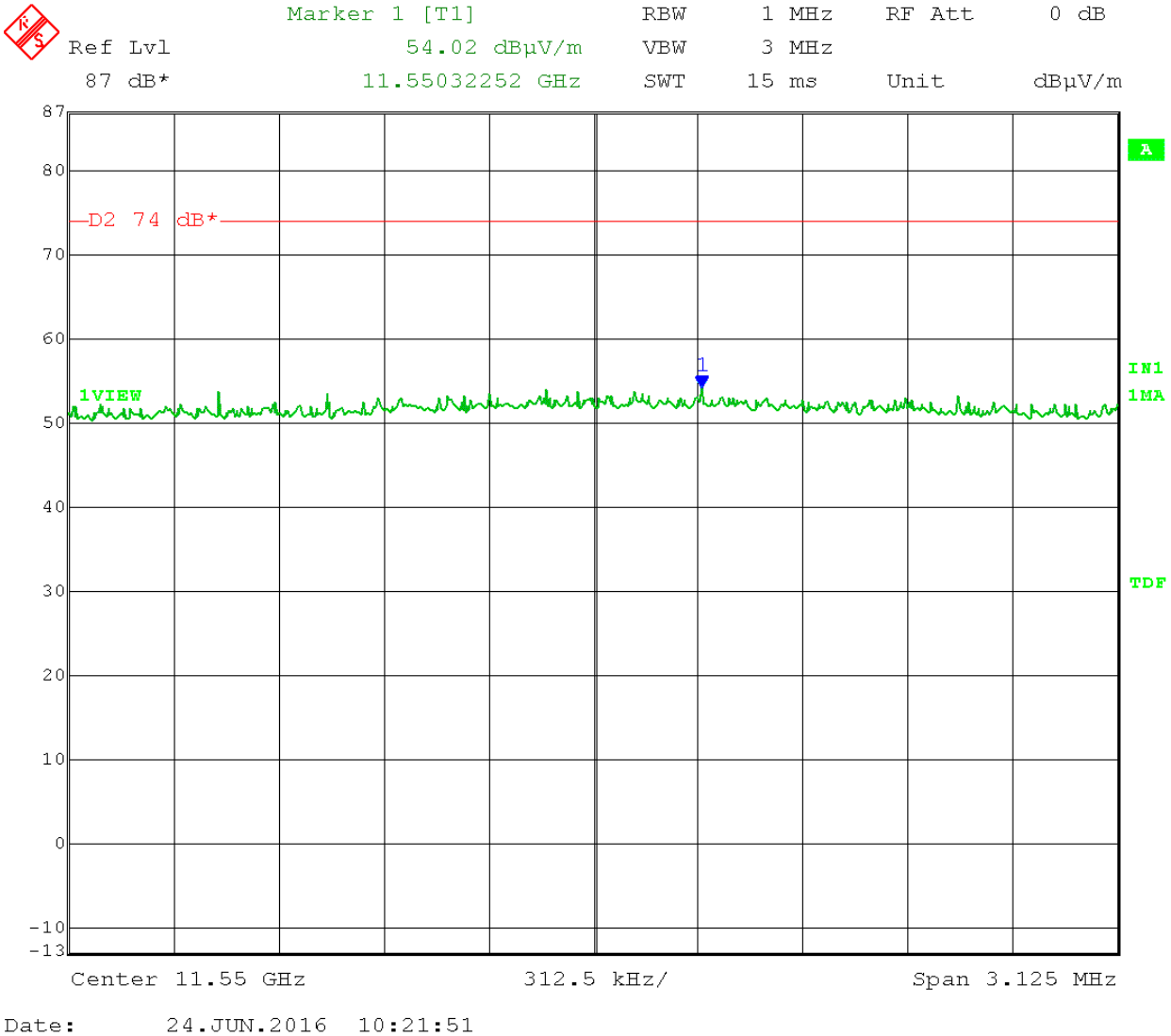
Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains

RBW = 1 MHz	VBW ≥ 3 MHz
Detector = Peak	Trace: Max Hold
Mid Channel: 5775 MHz	40 MHz BW
Output Power Setting: 19	Test distance: 3 meters
Frequency Range: 1 – 18 GHz	

Limit: Peak limit = 74 dBµV/m Average limit = 54 dBµV/m

HORIZONTAL, PEAK **54.02 dBµV/m**



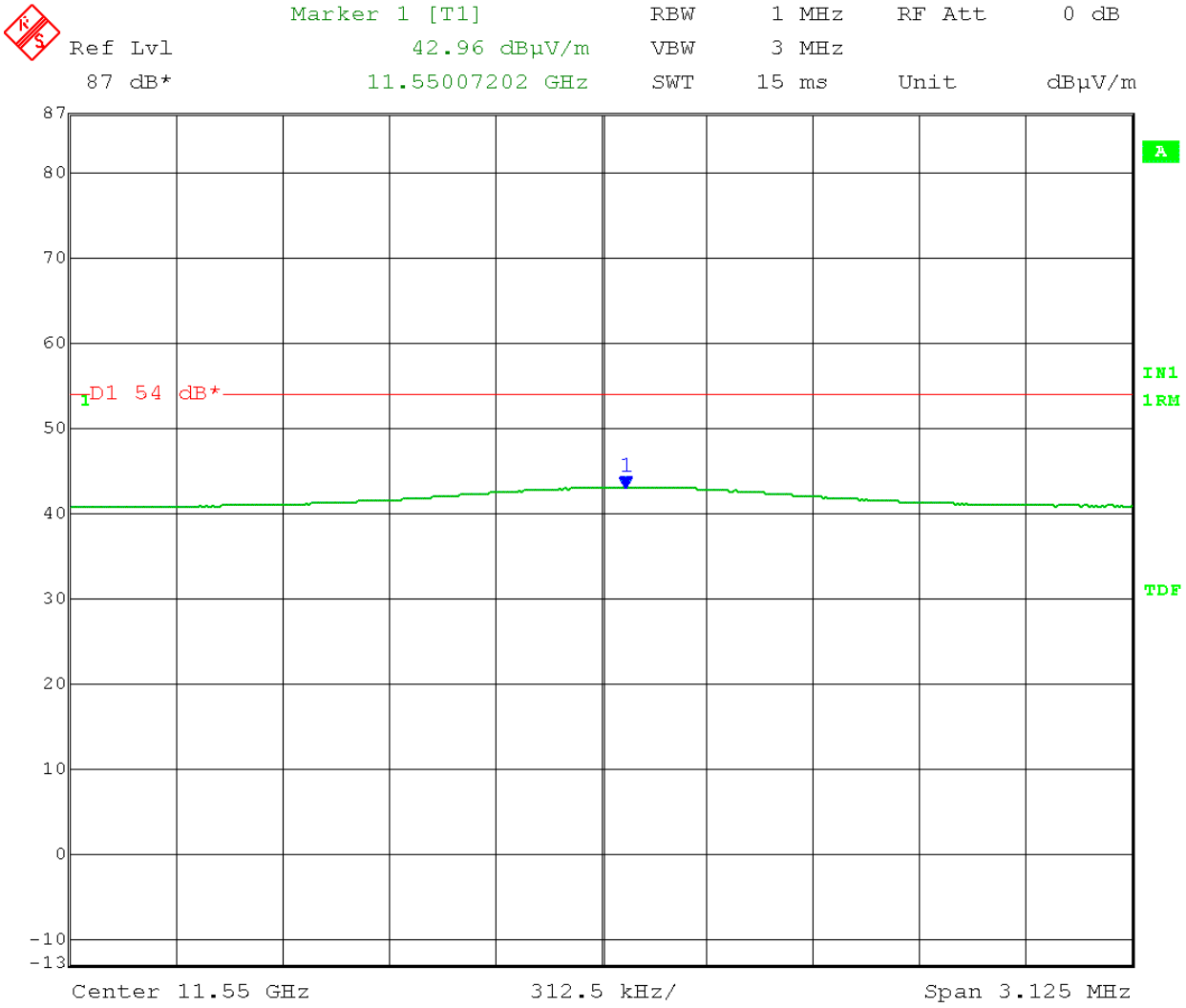
Date: 24.JUN.2016 10:21:51

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains
	RBW = 1 MHz — VBW ≥ 3 MHz
	Detector = RMS — Trace: Average (100 traces x 1/.336) = 300 traces
	Mid Channel: 5775 MHz — Sweep time: auto x 1/.336 = 5 ms x 1/.336 = 15 ms
	Output Power Setting: 19 — 40 MHz BW
	Frequency Range: 1 – 18 GHz — Test distance: 3 meters
Limit:	Peak limit = 74 dBµV/m — Average limit = 54 dBµV/m

HORIZONTAL, AVERAGE 42.96 dBµV/m + 4.74 dB duty cycle correction = **47.70 dBµV/m**



Date: 24.JUN.2016 10:20:29

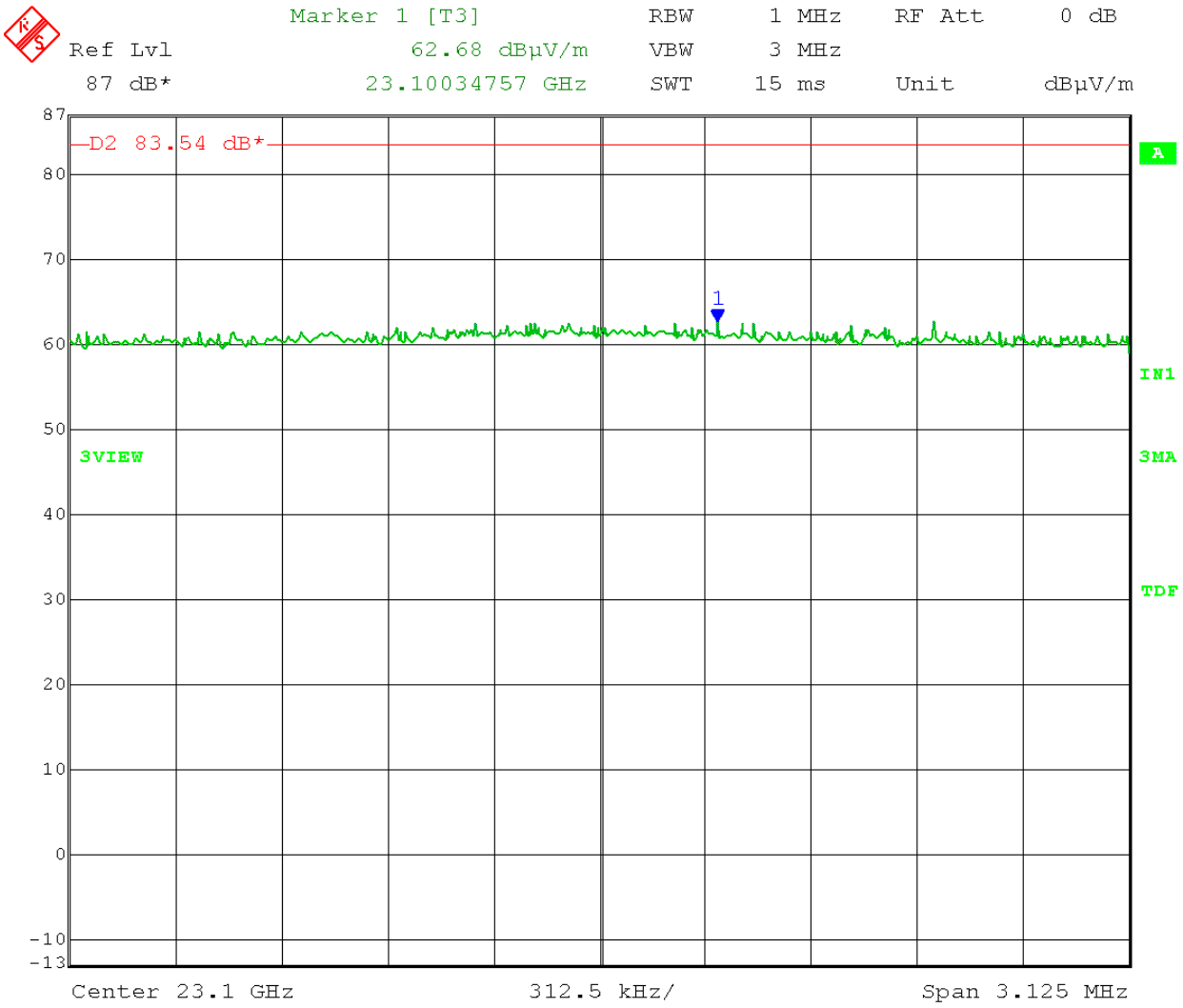
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains

RBW = 1 MHz	VBW ≥ 3 MHz
Detector = Peak	Trace: Max Hold
Mid Channel: 5775 MHz	40 MHz BW
Output Power Setting: 19	Test distance: 1 meter
Frequency Range: 18 – 40 GHz	
Limit: Peak limit = 83.54 dBµV/m	Average limit = 63.54 dBµV/m

VERTICAL, PEAK **62.68 dBµV/m**



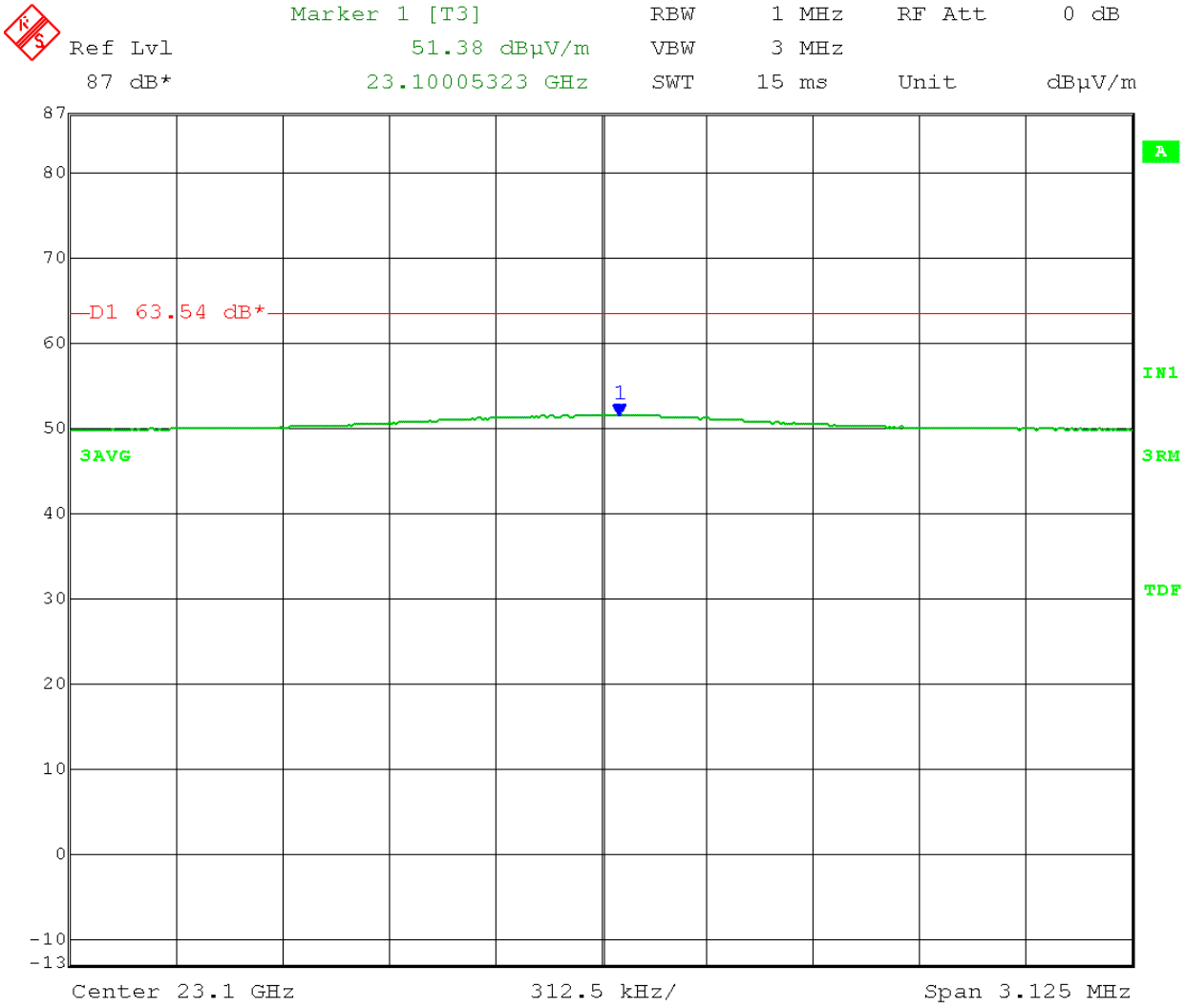
Date: 24.JUN.2016 13:32:51

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains
	RBW = 1 MHz — VBW ≥ 3 MHz
	Detector = RMS — Trace: Average (100 traces x 1/.336) = 300 traces
	Mid Channel: 5775 MHz — Sweep time: auto x 1/.336 = 5 ms x 1/.336 = 15 ms
	Output Power Setting: 19 — 40 MHz BW
	Frequency Range: 18 – 40 GHz — Test distance: 1 meter
Limit:	Peak limit = 83.54 dBµV/m — Average limit = 63.54 dBµV/m

VERTICAL, AVERAGE 51.38 dBµV/m + 4.74 dB duty cycle correction = **56.12 dBµV/m**



Date: 24.JUN.2016 13:34:37

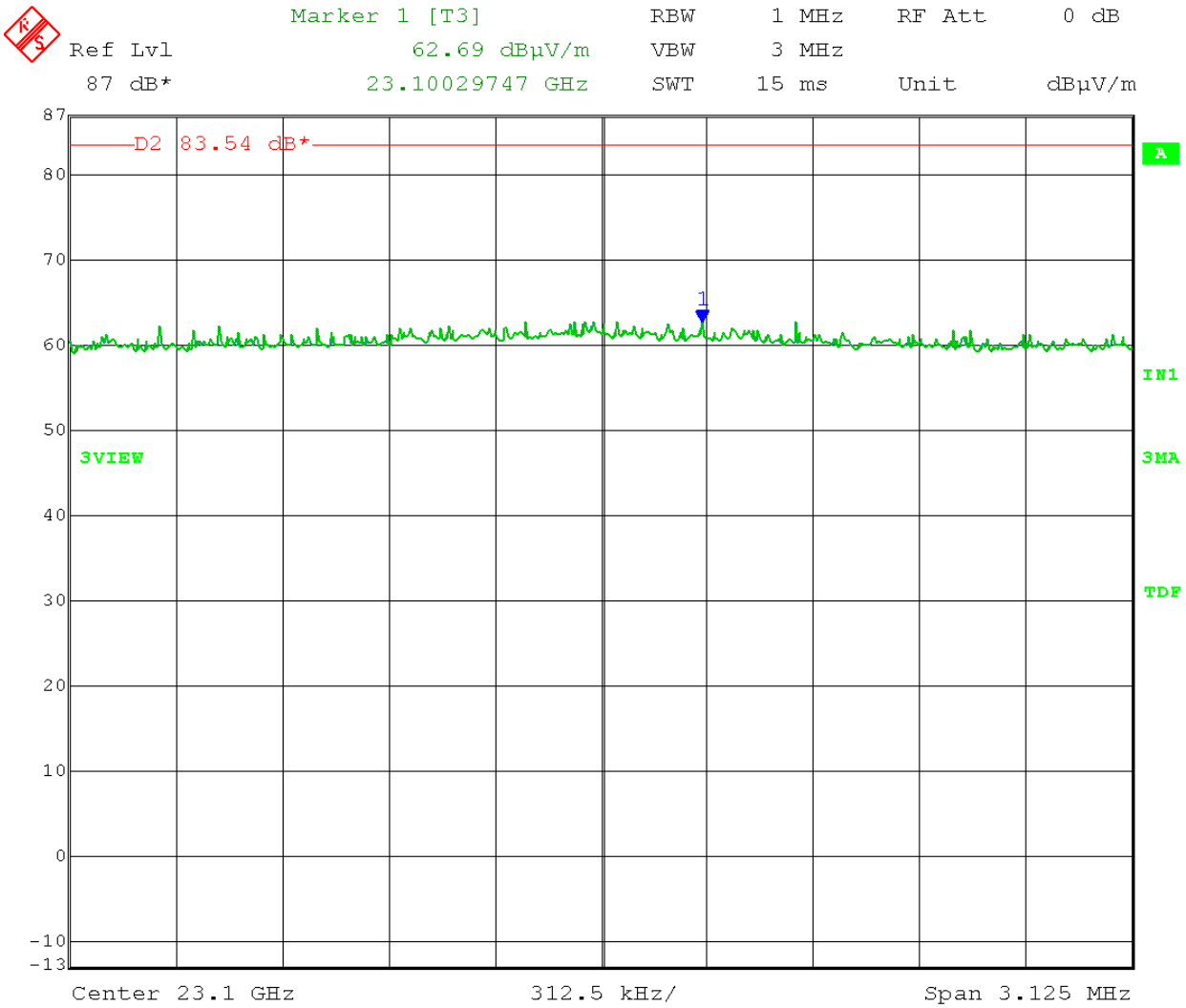
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains

RBW = 1 MHz	VBW ≥ 3 MHz
Detector = Peak	Trace: Max Hold
Mid Channel: 5775 MHz	40 MHz BW
Output Power Setting: 19	Test distance: 1 meter
Frequency Range: 18 – 40 GHz	
Limit: Peak limit = 83.54 dBµV/m	Average limit = 63.54 dBµV/m

HORIZONTAL, PEAK **62.69 dBµV/m**



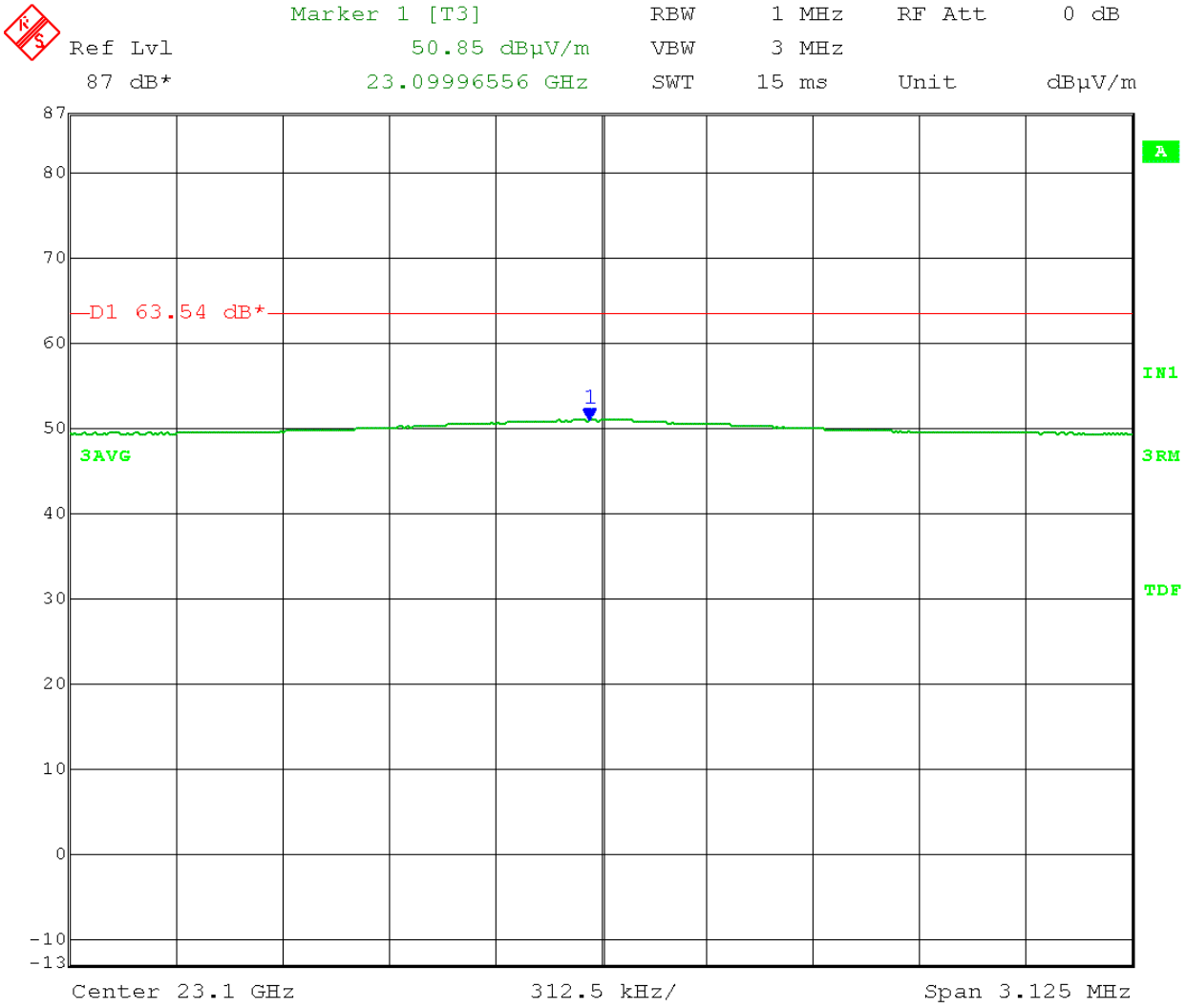
Date: 24.JUN.2016 14:26:03

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains
	RBW = 1 MHz — VBW ≥ 3 MHz
	Detector = RMS — Trace: Average (100 traces x 1/.336) = 300 traces
	Mid Channel: 5775 MHz — Sweep time: auto x 1/.336 = 5 ms x 1/.336 = 15 ms
	Output Power Setting: 19 — 40 MHz BW
	Frequency Range: 18 – 40 GHz — Test distance: 1 meter
Limit:	Peak limit = 83.54 dBµV/m — Average limit = 63.54 dBµV/m

HORIZONTAL, AVERAGE 50.85 dBµV/m + 4.74 dB duty cycle correction = **55.59 dBµV/m**



Date: 24.JUN.2016 14:24:23

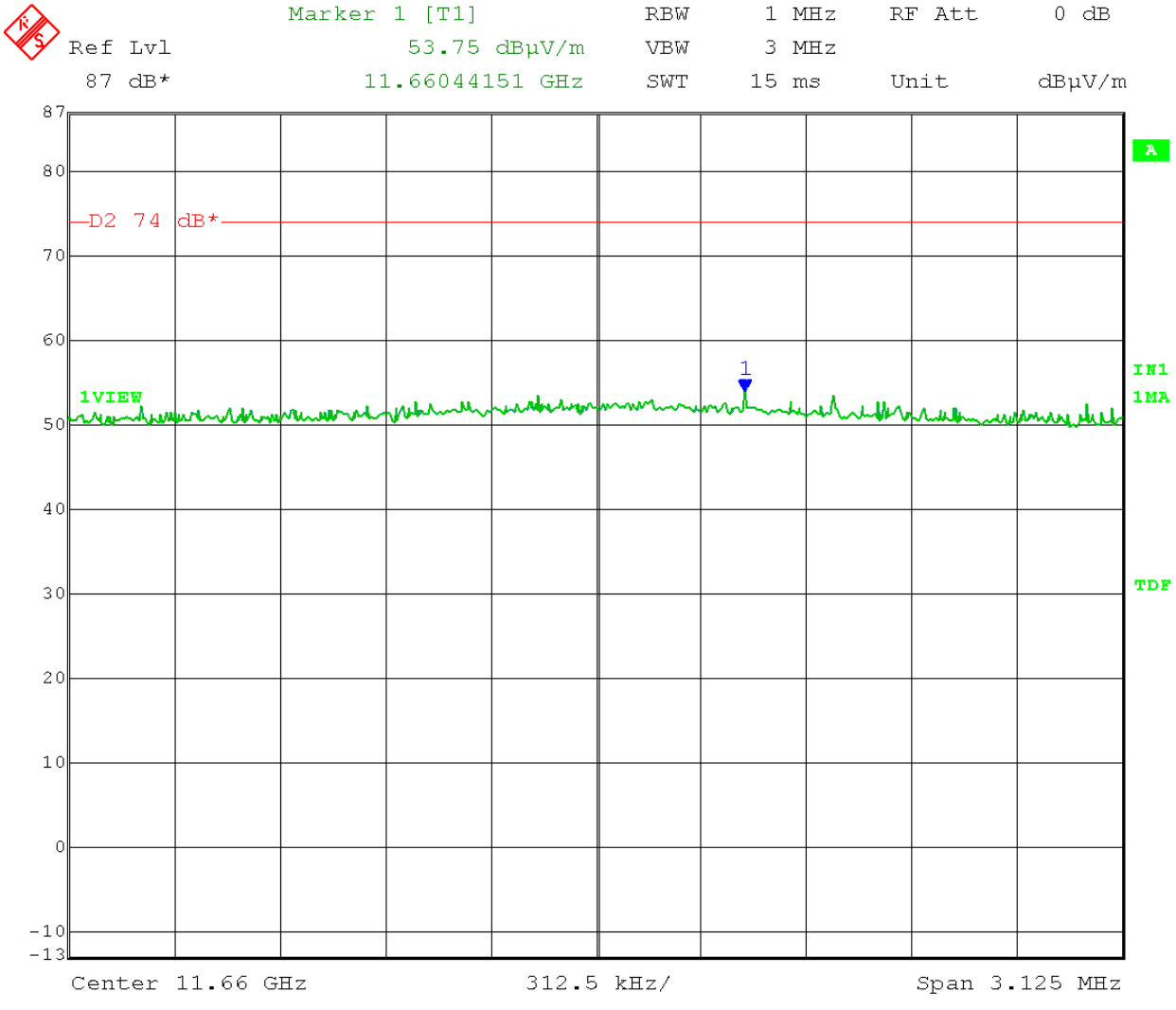
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains

RBW = 1 MHz	VBW ≥ 3 MHz
Detector = Peak	Trace: Max Hold
High Channel: 5830 MHz	40 MHz BW
Output Power Setting: 19	Test distance: 3 meters
Frequency Range: 1 – 18 GHz	
Limit: Peak limit = 74 dBµV/m	Average limit = 54 dBµV/m

VERTICAL, PEAK **53.17 dBµV/m**



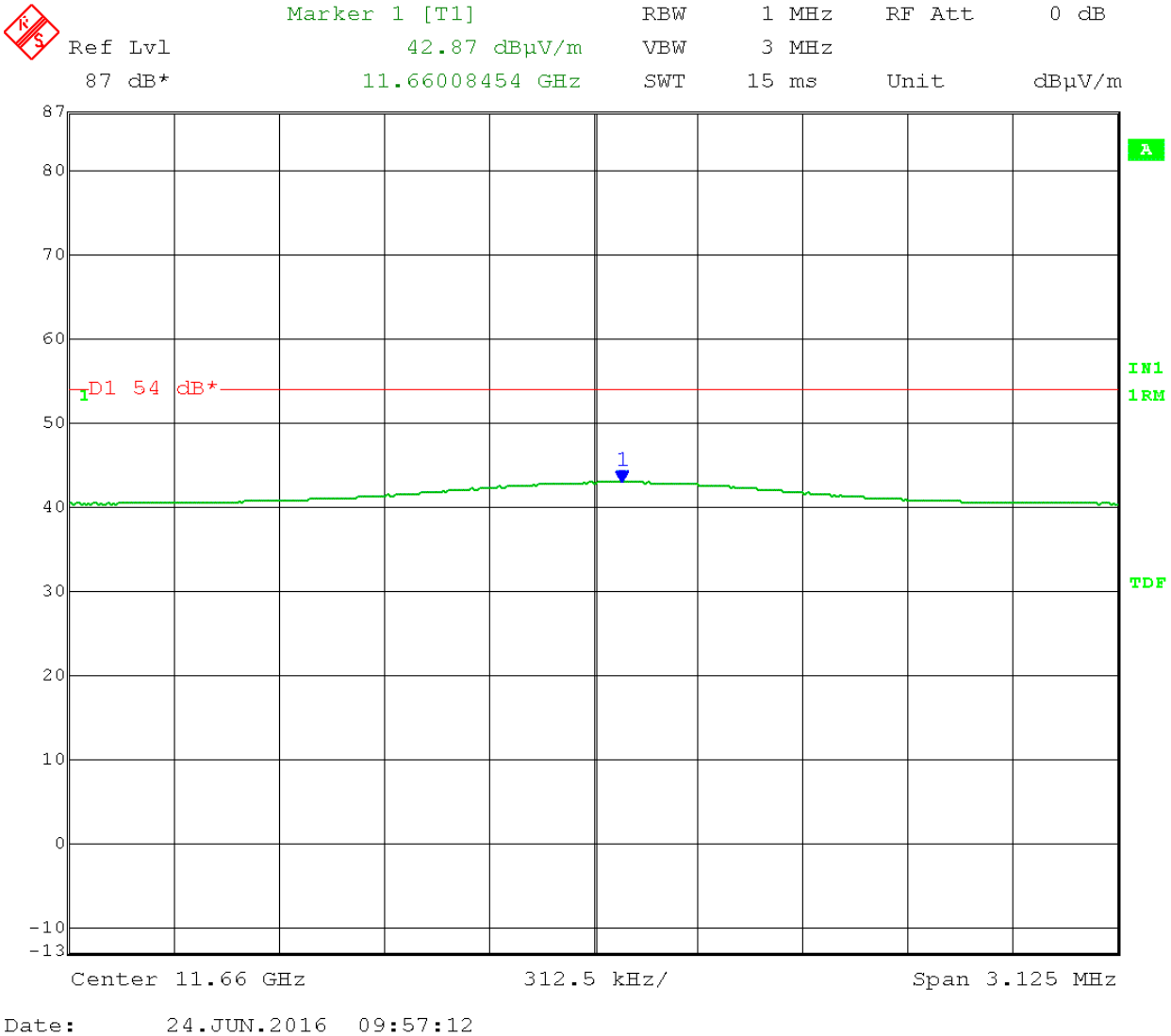
Date: 24.JUN.2016 09:58:24

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains
	RBW = 1 MHz — VBW ≥ 3 MHz
	Detector = RMS — Trace: Average (100 traces x 1/.336) = 300 traces
	High Channel: 5830 MHz — Sweep time: auto x 1/.336 = 5 ms x 1/.336 = 15 ms
	Output Power Setting: 19 — 40 MHz BW
	Frequency Range: 1 – 18 GHz — Test distance: 3 meters
Limit:	Peak limit = 74 dBµV/m — Average limit = 54 dBµV/m

VERTICAL, AVERAGE 42.87 dBµV/m + 4.74 dB duty cycle correction = **47.61 dBµV/m**



Date: 24.JUN.2016 09:57:12

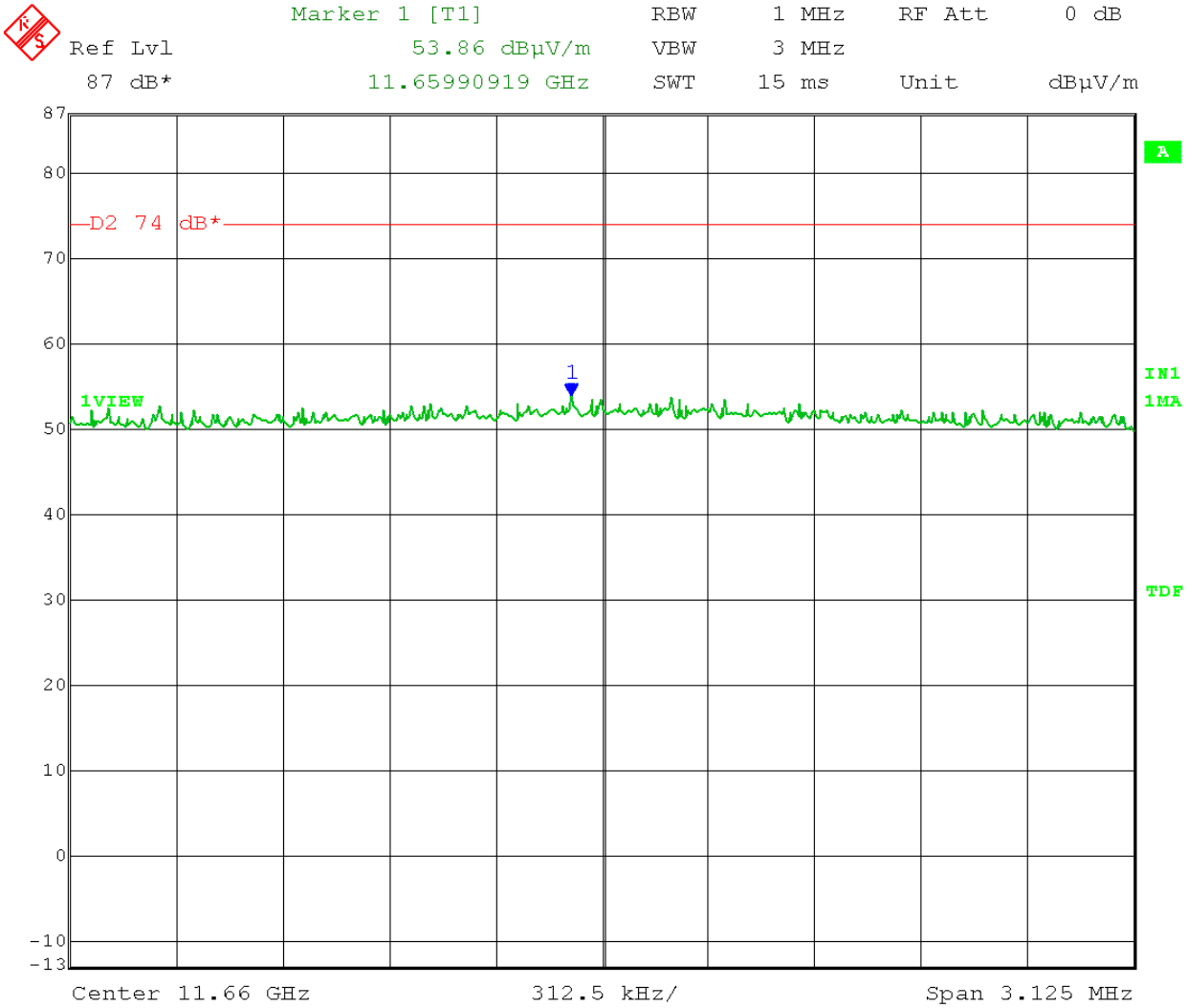
166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains

RBW = 1 MHz	VBW ≥ 3 MHz
Detector = Peak	Trace: Max Hold
High Channel: 5830 MHz	40 MHz BW
Output Power Setting: 19	Test distance: 3 meters
Frequency Range: 1 – 18 GHz	
Limit: Peak limit = 74 dBµV/m	Average limit = 54 dBµV/m

HORIZONTAL, PEAK **53.17 dBµV/m**



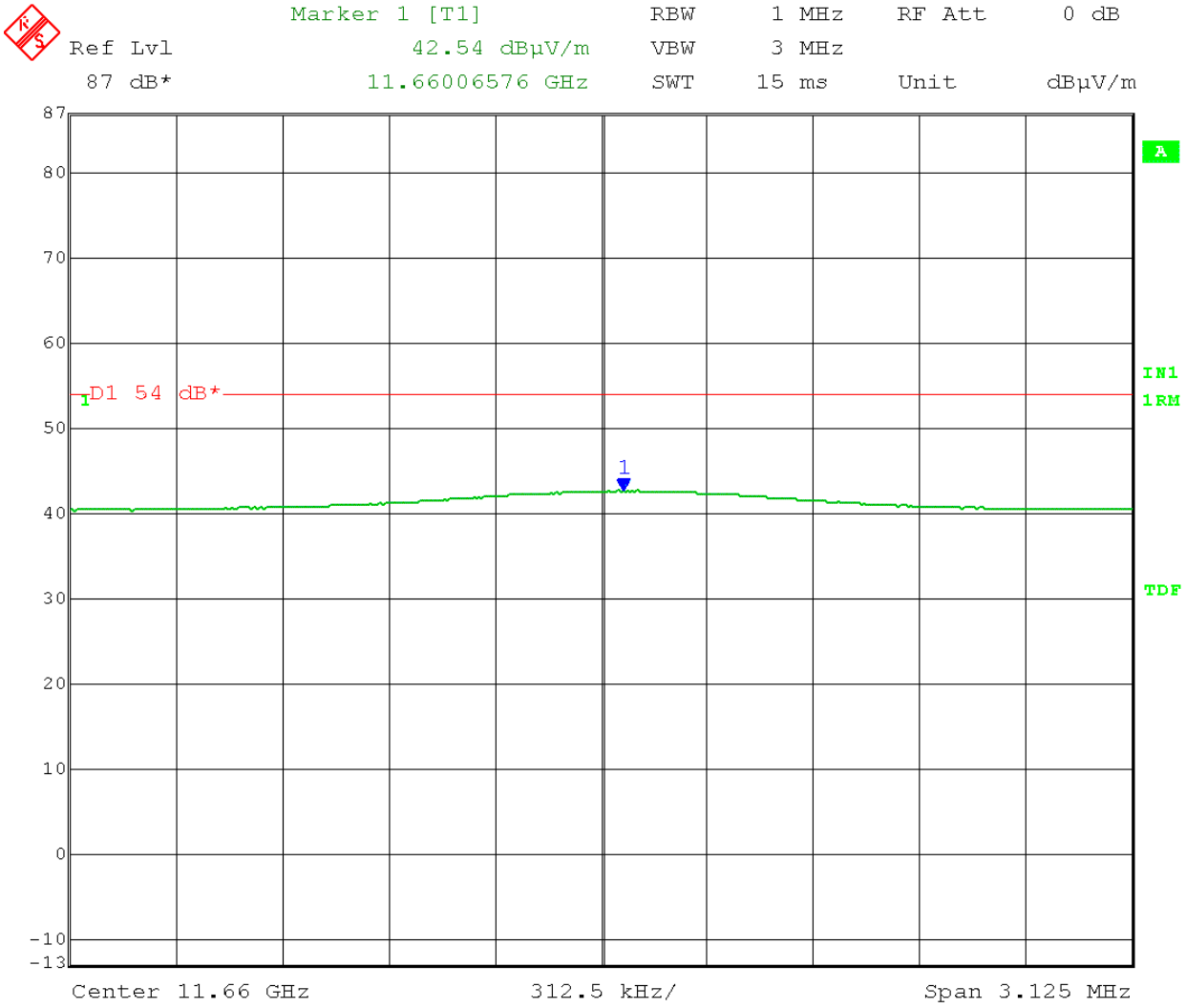
Date: 24.JUN.2016 10:27:26

166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Model Tested:	C054045C008B
Report Number:	21973
DLS Project:	8206

Test Date:	06-24-2016
Company:	Cambium Networks
EUT:	PMP450 BH/SM 5.8 GHz
Test:	Maximum Unwanted Emission Levels – Inside Restricted Bands Radiated with antenna
Operator:	Craig B
Comment:	Duty Cycle = 33.6% on both transmit chains
	RBW = 1 MHz — VBW ≥ 3 MHz
	Detector = RMS — Trace: Average (100 traces x 1/.336) = 300 traces
	High Channel: 5830 MHz — Sweep time: auto x 1/.336 = 5 ms x 1/.336 = 15 ms
	Output Power Setting: 19 — 40 MHz BW
	Frequency Range: 1 – 18 GHz — Test distance: 3 meters
Limit:	Peak limit = 74 dBµV/m — Average limit = 54 dBµV/m

HORIZONTAL, AVERAGE 42.63 dBµV/m + 4.74 dB duty cycle correction = **47.37 dBµV/m**



Date: 24.JUN.2016 10:26:37

Appendix B – Measurement Data

B11.0 Unwanted Emission Levels – Below 1000 MHz
Radiated with antenna

Rule Section: Sections 15.407(b)(6) and 15.209
RSS-247 section 6; RSS-Gen section 8.10

Test Procedure: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section II(G) – Unwanted Emission Measurement
Section II(G)(3) – General Requirements for Unwanted Emissions Measurements
Section II(G)(4) – Unwanted emissions below 1000 MHz

Description: Measure the emission level using CISPR Quasi-Peak detection

Note regarding duty cycle (Section II(G)(3)(a)(ii)) – 98% duty cycle cannot be achieved: There is a hardware chip limitation on the duty cycle. It was not designed for 98% duty cycle. The highest achievable duty cycle for testing purposes is 33.6%.

Limit: Emissions in the restricted bands must comply with the general field strength limits set forth in FCC Part 15.209 and RSS-Gen section 8.9 Table 4.

Results: Passed

Notes: Both transmit chains active during test. Measurements were taken for QPSK modulation at the lowest, middle, and highest channels of operation. The EUT was transmitting from the antenna with both transmit chains active and a power setting of 19 on both chains.

Electric Field Strength

EUT: PMP450 BH/SM 5.8 GHz
Manufacturer: Cambium Networks
Operating Condition: 73 deg. F; 55% R.H.
Test Site: DLS Site 2
Operator: Craig B #8206
Test Specification: Radiated Emissions with 23 dBi antenna/dish
Comment: Low, Mid, and High channels; Power set to 19 on both chains
Date: 06-27-2016

TEXT: "Vert 3 meters"

Short Description: Test Set-up

Test Set-up: EUT Measured at 3 Meters with VERTICAL Antenna Polarization

Equations: Total Level(dBµV/m) = Level(dBµV) + System Loss(dB) + Antenna Factor(dBµV/m)

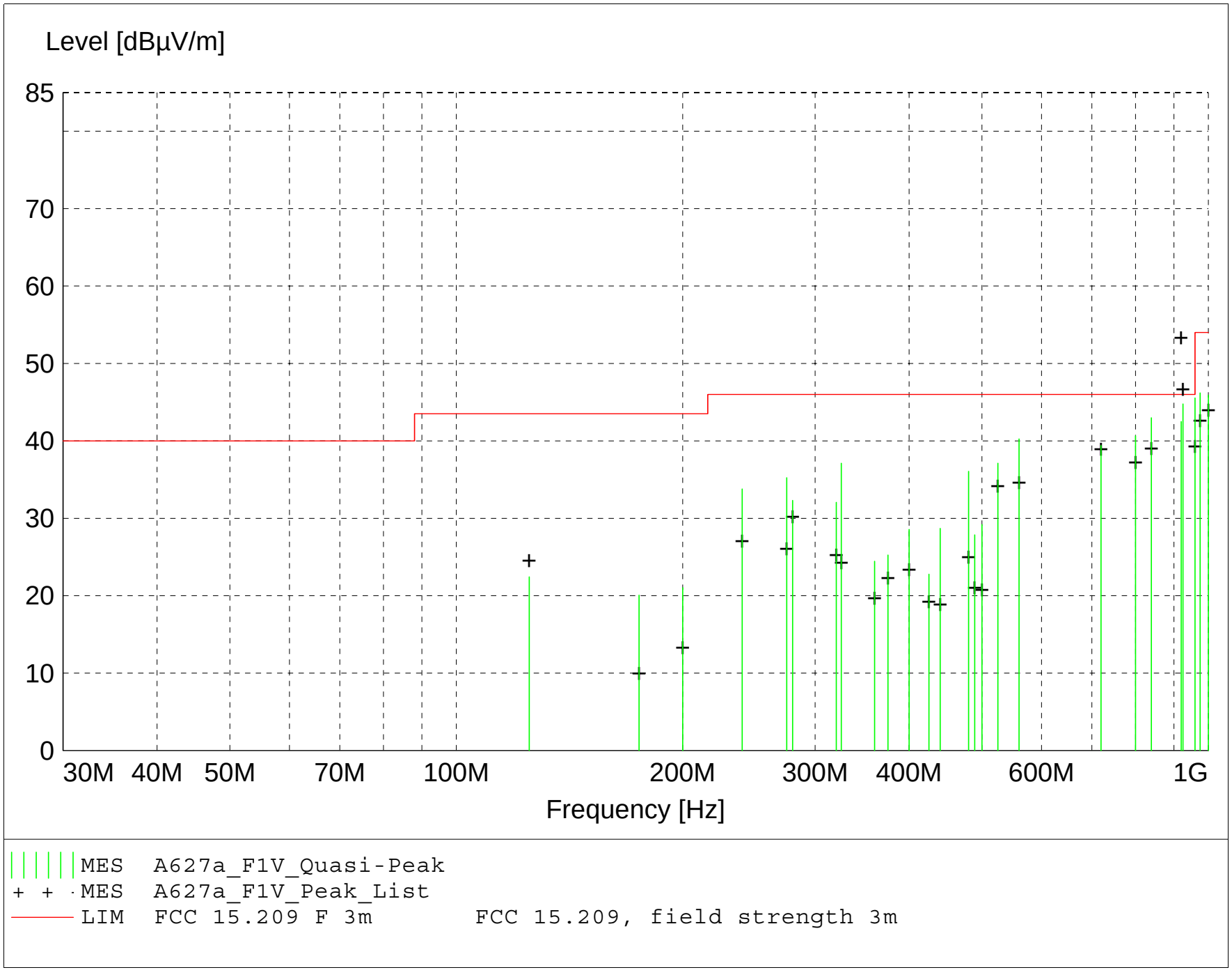
Margin(dB) = Limit(dBµV/m) - Total Level(dBµV/m)

Graph Markers: + Frequency marker (Level of marker not related to final level)

| Final maximized level using Quasi-Peak detector

X Final maximized level using Average dector

Final maximized level using Peak detector


Level [dBµV/m]
85
70
60
50
40
30
20
10
0
30M
40M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
MES A627a_F1V_Quasi-Peak
MES A627a_F1V_Peak_List
LIM FCC 15.209 F 3m
FCC 15.209, field strength 3m

MEASUREMENT RESULT: "A627a_F1V_Final"

6/27/2016 3:14PM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
125.000000	32.72	13.00	-23.3	22.4	43.5	21.1	1.00	45	QUASI-PEAK	None
175.000000	27.75	15.20	-22.9	20.1	43.5	23.4	1.00	345	QUASI-PEAK	None
200.000000	26.20	17.60	-22.8	21.0	43.5	22.5	1.00	45	QUASI-PEAK	None
239.990000	44.45	11.80	-22.5	33.8	46.0	12.2	1.50	0	QUASI-PEAK	None
275.000000	44.27	13.40	-22.4	35.3	46.0	10.7	1.50	315	QUASI-PEAK	None
280.030000	41.18	13.50	-22.4	32.3	46.0	13.7	1.50	315	QUASI-PEAK	None
320.030000	39.64	14.50	-22.1	32.1	46.0	13.9	1.50	80	QUASI-PEAK	None
325.000000	44.62	14.50	-22.0	37.1	46.0	8.9	1.80	90	QUASI-PEAK	None
360.000000	31.46	14.90	-21.9	24.5	46.0	21.5	1.00	0	QUASI-PEAK	None
375.000000	32.09	15.00	-21.8	25.3	46.0	20.7	1.00	330	QUASI-PEAK	None
399.990000	34.45	15.70	-21.6	28.6	46.0	17.4	1.00	5	QUASI-PEAK	None
425.000000	28.07	16.30	-21.6	22.8	46.0	23.2	1.00	355	QUASI-PEAK	None
439.980000	33.65	16.50	-21.5	28.7	46.0	17.3	1.00	280	QUASI-PEAK	None
480.000000	39.82	17.40	-21.2	36.1	46.0	9.9	1.00	0	QUASI-PEAK	None
489.010000	31.44	17.66	-21.2	27.9	46.0	18.1	1.00	45	QUASI-PEAK	None
500.000000	32.31	18.00	-21.1	29.2	46.0	16.8	1.00	75	QUASI-PEAK	None
525.000000	39.75	18.20	-20.8	37.1	46.0	8.9	1.70	80	QUASI-PEAK	None
560.020000	42.59	18.60	-20.9	40.3	46.0	5.7	1.00	90	QUASI-PEAK	None
720.000000	38.09	21.20	-19.9	39.4	46.0	6.6	1.00	0	QUASI-PEAK	None
800.000000	38.07	21.80	-19.2	40.7	46.0	5.3	1.00	350	QUASI-PEAK	None
840.000000	39.80	22.30	-19.1	43.0	46.0	3.0	1.00	0	QUASI-PEAK	None
920.000000	37.61	23.40	-18.5	42.5	46.0	3.5	1.58	0	QUASI-PEAK	None
925.000000	39.62	23.60	-18.4	44.8	46.0	1.2	1.60	0	QUASI-PEAK	None
960.000000	39.89	23.90	-18.2	45.6	46.0	0.4	1.30	0	QUASI-PEAK	None
975.000000	40.16	24.00	-18.0	46.2	54.0	7.8	1.90	350	QUASI-PEAK	None
1000.000000	39.29	24.50	-17.9	45.9	54.0	8.1	1.80	0	QUASI-PEAK	None

FCC 15.407 / 15.205

Electric Field Strength

EUT: PMP450 BH/SM 5.8 GHz
Manufacturer: Cambium Networks
Operating Condition: 73 deg. F; 55% R.H.
Test Site: DLS Site 2
Operator: Craig B #8206
Test Specification: Radiated Emissions with 23 dBi antenna/dish
Comment: Low, Mid, and High channels; Power set to 19 on both chains
Date: 06-27-2016

TEXT: "Horz 3 meters"

Short Description: Test Set-up

Test Set-up: EUT Measured at 3 Meters with HORIZONTAL Antenna Polarization

Equations: Total Level(dBµV/m) = Level(dBµV) + System Loss(dB) + Antenna Factor(dBµV/m)

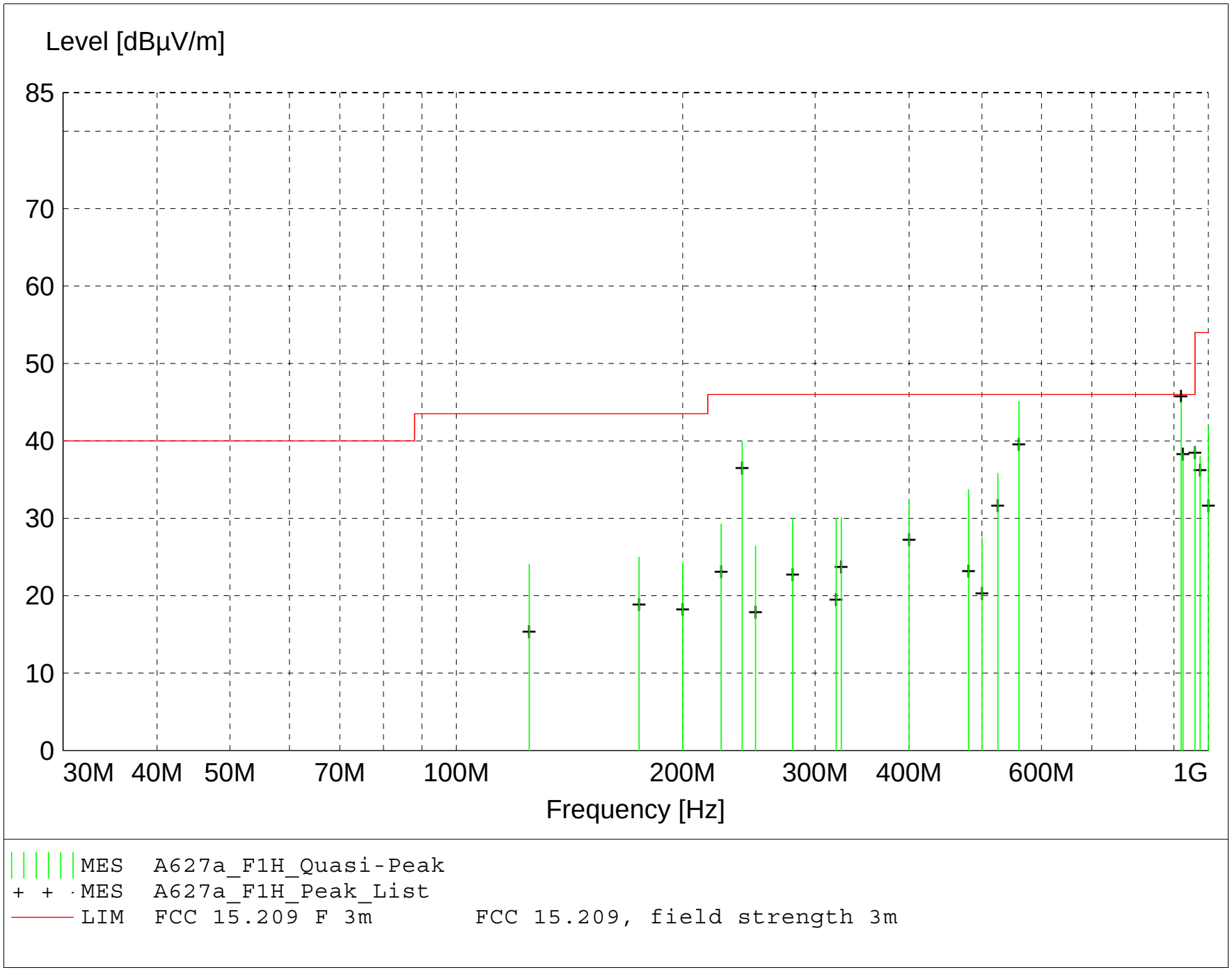
Margin(dB) = Limit(dBµV/m) - Total Level(dBµV/m)

Graph Markers: + Frequency marker (Level of marker not related to final level)

| Final maximized level using Quasi-Peak detector

X Final maximized level using Average dector

Final maximized level using Peak detector


Level [dBµV/m]
85
70
60
50
40
30
20
10
0
30M
40M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
MES A627a_F1H_Quasi-Peak
MES A627a_F1H_Peak_List
LIM FCC 15.209 F 3m
FCC 15.209, field strength 3m

MEASUREMENT RESULT: "A627a_F1H_Final"

6/27/2016 3:16PM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
125.000000	34.33	13.00	-23.3	24.1	43.5	19.4	3.00	225	QUASI-PEAK	None
175.000000	32.64	15.20	-22.9	25.0	43.5	18.5	1.50	225	QUASI-PEAK	None
200.000000	29.43	17.60	-22.8	24.3	43.5	19.2	2.50	225	QUASI-PEAK	None
200.000000	27.89	17.60	-22.8	22.7	43.5	20.8	2.50	225	QUASI-PEAK	None
225.000000	40.80	11.20	-22.7	29.3	46.0	16.7	1.00	0	QUASI-PEAK	None
240.000000	50.55	11.80	-22.5	39.9	46.0	6.1	1.00	60	QUASI-PEAK	None
250.000000	36.56	12.30	-22.4	26.4	46.0	19.6	1.20	315	QUASI-PEAK	None
280.040000	38.82	13.50	-22.4	30.0	46.0	16.0	1.00	225	QUASI-PEAK	None
320.000000	37.59	14.50	-22.1	30.0	46.0	16.0	1.00	225	QUASI-PEAK	None
325.000000	37.60	14.50	-22.0	30.1	46.0	15.9	1.00	35	QUASI-PEAK	None
400.000000	38.29	15.70	-21.6	32.4	46.0	13.6	1.70	250	QUASI-PEAK	None
480.000000	37.46	17.40	-21.2	33.7	46.0	12.3	1.40	135	QUASI-PEAK	None
500.000000	30.62	18.00	-21.1	27.5	46.0	18.5	2.00	0	QUASI-PEAK	None
525.000000	38.42	18.20	-20.8	35.8	46.0	10.2	1.10	100	QUASI-PEAK	None
560.000000	47.42	18.60	-20.9	45.1	46.0	0.9	1.00	120	QUASI-PEAK	None
920.020000	40.15	23.40	-18.5	45.1	46.0	0.9	1.00	315	QUASI-PEAK	None
925.000000	33.21	23.60	-18.4	38.4	46.0	7.6	1.00	315	QUASI-PEAK	None
960.000000	33.69	23.90	-18.2	39.4	46.0	6.6	1.00	45	QUASI-PEAK	None
975.000000	32.01	24.00	-18.0	38.0	54.0	16.0	1.00	45	QUASI-PEAK	None
1000.000000	35.34	24.50	-17.9	42.0	54.0	12.0	1.60	30	QUASI-PEAK	None

Appendix C – Measurement Uncertainty

Compliance with the limits in this standard are based on the results of the compliance measurement. Our calculated measurement uncertainty including the measurement instrumentation, associated connections between the various instruments in the measurement chain, and other contributions, are provided in this section of the test report.

Parameter		Expanded Uncertainty (K=2)
Emission Bandwidth, Conducted		+/-1.14%
RF Output Power, Conducted		+/-1.36dB
Power Spectral Density, Conducted		+/-1.26dB
All Emissions, Radiated		+/-5.69dB
Duty Cycle		+/-0.05%

166 South Carter, Genoa City, WI 53128

Company: Cambium Networks
Model Tested: C054045C008B
Report Number: 21973
DLS Project: 8206

END OF REPORT

Revision #	Date	Comments	By
1.0	07-05-2016	Preliminary Release	CB
1.1	07-07-2016	Added notes to page 11 (after DLS review)	JS