166 South Carter, Genoa City, WI 53128

Company:	Cambium Networks
Models Tested:	C009045C001A
Report Number:	21324
Project Number:	7506

Code of Federal Regulations 47 Part 15 – Radio Frequency Devices

Subpart C – Intentional Radiators
Section 15.247
Operation within the bands 902 - 928 MHz, 2400 – 2483.5 MHz and 5725 – 5850 MHz,

THE FOLLOWING **MEETS** THE ABOVE TEST SPECIFICATION

Formal Name:	PMP450i 900MHz SM MIMO Transceiver
Kind of Equipment:	Transceiver
Frequency Range:	902 - 928 MHz
Test Configuration:	Tabletop
Model Number(s):	C009045C001A
Model Tested:	C009045C001A
Serial Number(s):	Conducted unit: 0A003E45FBF2 / Radiated unit: 0A003E45FBEE
Date of Tests:	October 1st to 2nd, 2015
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
Models Tested:	C009045C001A
Report Number:	21324
Project Number:	7506

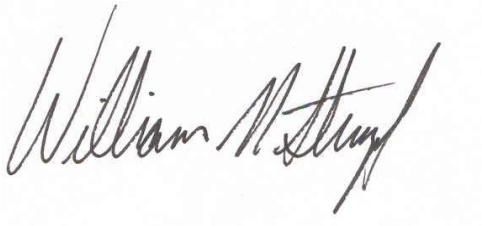
SIGNATURE PAGE

Tested By:

Paul Leo
Test Engineer

Craig Brandt
Senior Engineer

Reviewed By:



William m. 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 & 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 PMP450i 900MHz SM MIMO Transceiver, Model C009045C001A, complies with the requirements of CFR 47 Part 15 Subpart C Section 15.247.

Subpart C Section 15.247 Applicable Technical Requirements Tested:

Section	Description	Procedure	Note	Compliant?
Informative	Duty Cycle	FCC KDB 558074 Section 6.0		NA
15.247(a)(2)	DTS Bandwidth	FCC KDB 558074 Sections 8.0, 8.1 & 8.2	1	Yes
15.247(b)(3),(b)(4)	Fundamental Emission Output Power	FCC KDB 558074 Sections 9.2 & 9.2.3.1 FCC KDB 662911(E)(1)	1	Yes
15.247(e)	Maximum Power Spectral Density	FCC KDB 558074 Sections 10.0 & 10.5 FCC KDB 662911 (E)(2)(c)	1	Yes
15.247(d)	Emissions in Non-Restricted Frequency Bands – RF Conducted	FCC KDB 558074 Sections 11.0, 11.2 & 11.3	1	Yes
15.247(d), 15.209	Radiated Spurious in Restricted Bands Below 1GHz	FCC KDB 558074 ANSI C63.10-2013	2	Yes
15.247(d), 15.205(5), 15.209(a)	Radiated Spurious in Restricted Bands Above 1GHz	FCC KDB 558074 Sections 12.0 & 12.1	2	Yes
15.247(d)	Band-edge Measurements – RF Conducted	FCC KDB 558074 Sections 11.0, 11.2 & 11.3	1	Yes
15.207(a)	AC Line Conducted Emissions	ANSI C63.4-2014	3	Yes

Note 1: RF Conducted measurement.
Note 2: Radiated Emissions measurement.
Note 3: AC Mains Emissions measurement

2.0 Introduction

On October 1st to 2nd, 2015 two units of the PMP450i 900MHz SM MIMO Transceiver, Model C009045C001A, as provided from Cambium Networks were tested to the requirements of CFR 47 Part 15 Subpart C Section 15.247. 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:

Cambium Networks fixed outdoor frame based wireless transceiver with 12dBi Yagi antenna. Tested with worst case highest channel bandwidth of 20MHz and lowest channel bandwidth of 5MHz

Type of Equipment / Frequency Range:

Stand-Alone Transceiver / 902 MHz to 928 MHz

Physical Dimensions of Equipment Under Test:

Length: 11.5” x Width: 3.5” x Height: 1.5”

Power Source:

30 VDC (Power Over Ethernet to Radio)
AC - 120V/60Hz, 240V/60Hz

166 South Carter, Genoa City, WI 53128

4.0 Description of Test Sample continued…

Internal Frequencies:

55 kHz (switching power supply frequency)
40 MHz, 25 MHz, 20 MHz

Transmit / Receive Frequencies Used For Test Purpose:

5MHz BW – Low channel 904.550 MHz
Mid channel 915 MHz
High channel 925.450 MHz

20MHz BW – Low channel 912 MHz
Mid channel 916 MHz
High channel 918 MHz

Type of Modulation(s):

OFDM: QPSK tested as worst case modulation scheme as per Cambium Networks

Antenna Types:

12 dBi Yagi antenna

Description of Circuit Board(s) / Part Number:

Cambium Networks PC Board	A005164
12 dBi Yagi Antenna	DB900-12-9D-25

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 – G1, Site 2 and Screen Room

Description	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Dates	Cal Due Dates
Emissions 30-1000 MHz (S2)						
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	6-25-15	6-25-16
Antenna	EMCO	3104C	00054892	20 MHz – 200 MHz	10-1-14	10-1-16
Antenna	EMCO	3146	1205	200 MHz – 1 GHz	10-24-14	10-24-16
Test Software	Rohde & Schwarz	ESK-1	V1.7.1	N/A	N/A	N/A
Emissions 1-10 GHz (G1)						
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	6-25-15	6-25-16
Preamp	Ciao	CA118-4010	101	1GHz-18GHz	1-26-15	1-26-16
Horn Antenna	EMCO	3115	9502-4451	1-18GHz	6-1-15	6-1-17
Filter- High-Pass	Planar Filter Co.	HP2G-1780-CD-SS	PF1227/0728	1.5GHz-18GHz	6-29-15	6-29-16
Test Software	Rohde & Schwarz	ESK-1	V1.7.1	N/A	N/A	N/A
AC Line Conducted (Screen Room)						
Receiver	Narda PMM	9010F	020WW40102	10Hz-50MHz	6-25-15	6-25-16
LISN	Solar	9252-50-R-24-BNC	961019	9 kHz – 30 MHz	5-21-15	5-21-16
Filter- High-Pass	SOLAR	7930-120	090702	120 kHz – 30 MHz	1-7-15	1-7-16
Limiter	Electro-Metrics	EM-7600	705	9 kHz – 30 MHz	1-7-15	1-7-16
Test Software	Narda PMM	PMM Emission Suite	Rel.2.17	N/A	N/A	N/A

Test Equipment continued: **D.L.S. Wisconsin – Chamber G1**

Description	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Dates	Cal Due Dates
Other (G1)						
20 dB attenuator	Aeroflex/weinschel	75A-20-12	1071	DC – 40 GHz	7-1-15	7-1-16
20 dB attenuator	Anritsu	42N50-20	000451	DC – 18 GHz	5-29-15	5-29-16
Thermal Power Sensor	Rohde & Schwarz	NRP-Z51	1138.0005.03-104290-Wq	DC - 18GHz	6-25-15	6-25-16

6.0 Test Arrangements

Emissions Measurement Arrangement:

All radiated emission measurements were performed at D.L.S. Electronic Systems, Inc. and set up according to FCC KDB 558074 D01 v03r03, ANSI C63.4-2014, 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 photos of the test set up – provided as a separate exhibit.

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

Test Conditions recorded during test:

Temperature and Humidity:

63°F at 47% RH or as noted on test data

Voltage:

30 VDC (Power Over Ethernet to Radio)
AC - 120V/60Hz, 240V/60Hz

8.0 Modifications Made To EUT For Compliance

None noted at time of test.

9.0 Additional Descriptions from Test Engineer

Continuous transmit less than 98% duty cycle on low, mid and high channels.
5 and 20 MHz channel bandwidths.
QPSK type modulation.
Tested with 12 dBi Yagi antenna.

FCC ID: Z8H89FT0021

Emission Designators: 5M0X1D, 20M0X1D

10.0 Antenna Statement

SECTION 15.203 ANTENNA REQUIREMENT

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device…. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221.

Statement: This wireless device (Intentional Radiator) meets the requirements of FCC Part 15.203:

☐ The antenna is permanently attached

☐ The antenna has a unique coupling to the intentional radiator.
Description of coupling:

☒ This intentional radiator is professionally installed

☐ This intentional radiator, in accordance with Section 15.31(d), must be measured at the installation site.

11.0 Results

Measurements were performed in accordance with FCC KDB 558074 D01 DTS Meas Guidance v03r03, ANSI C63.4-2014, and ANSI C63.10-2013. Graphical and tabular data can be found in Appendix B at the end of this report.

12.0 Conclusion

The PMP450i 900MHz SM MIMO Transceiver, Model C009045C001A, as provided from Cambium Networks tested from October 1st to 2nd, 2015 **meets** the requirements of CFR 47 Part 15 Subpart C Section 15.247.

Appendix A – Test Photos - provided in a separate exhibit

Appendix B – Measurement Data

B1.0 Duty Cycle

Test Procedure:

558074 D01 DTS Meas Guidance v03r03
Section 6.0 Duty cycle
Paragraph b, zero-span mode on spectrum analyzer

Limit:

Informative

Results:

5 MHz channel bandwidth: **81.77 %**
20 MHz channel bandwidth: **82.33%**

Notes:

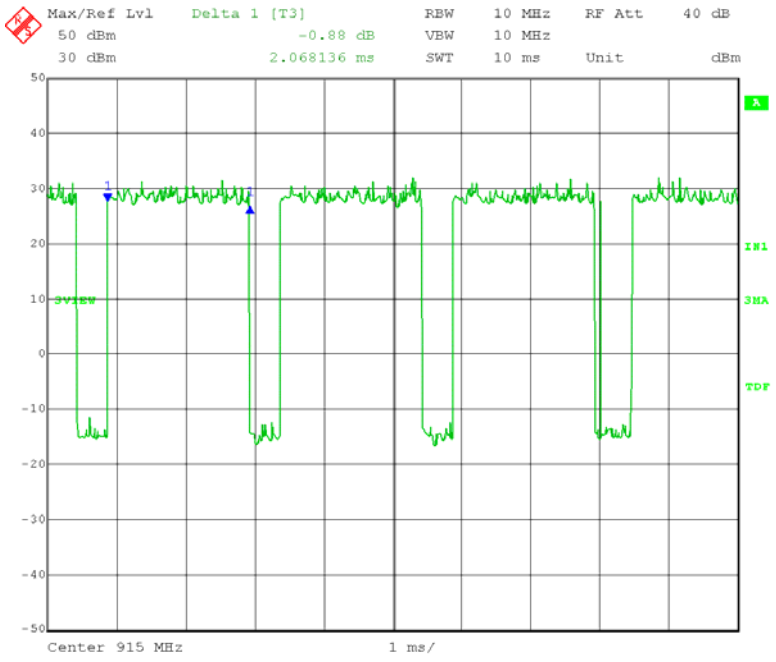
Duty cycle is less than 98%. Therefore, measured average values must be corrected by adding a duty cycle correction factor.

Measurements were performed using the worst-case modulation (QPSK) as determined by Cambium Networks.

5 MHz channel bandwidth:
Correction factor x = 10 Log (1 / 0.8177) = 0.87 dB for power measurements.
Correction factor x = 20 Log (1 / 0.8177) = 1.75 dB for voltage measurements.

20 MHz channel bandwidth:
Correction factor x = 10 Log (1 / 0.823293) = 0.85 dB for power measurements.
Correction factor x = 20 Log (1 / 0.823293) = 1.69 dB for voltage measurements.

Test Date:	10-01-2015
Company:	Cambium Networks
EUT:	450i 900 MHz SM MAC: 0A003E45FBF2
Test:	Duty Cycle during testing
Operator:	Craig B
	5 MHz channel bandwidth; QPSK
Comment:	Duty cycle = (2.068136 / 2.529058) * 100 = 81.77%
	Correction factor x = 10 Log (1 / 0.8177) = 0.87 dB



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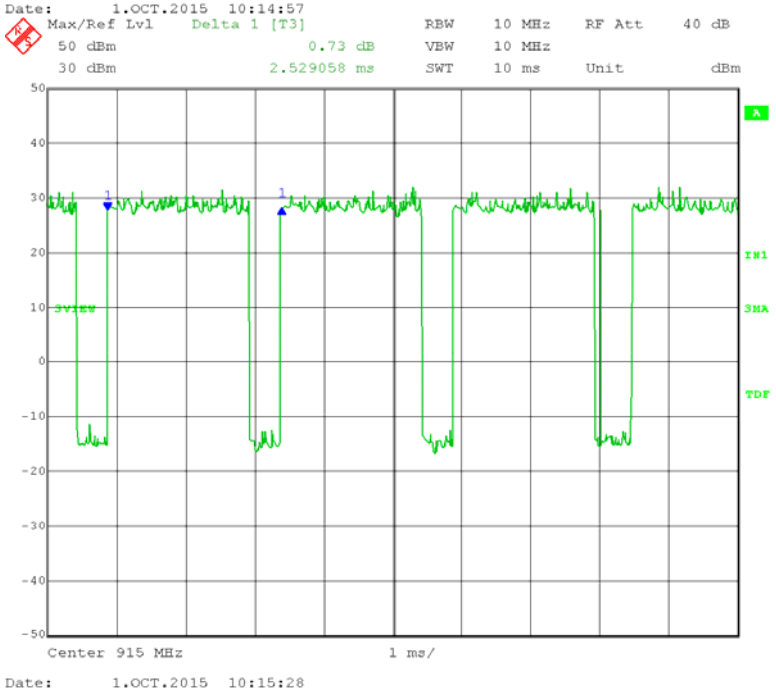
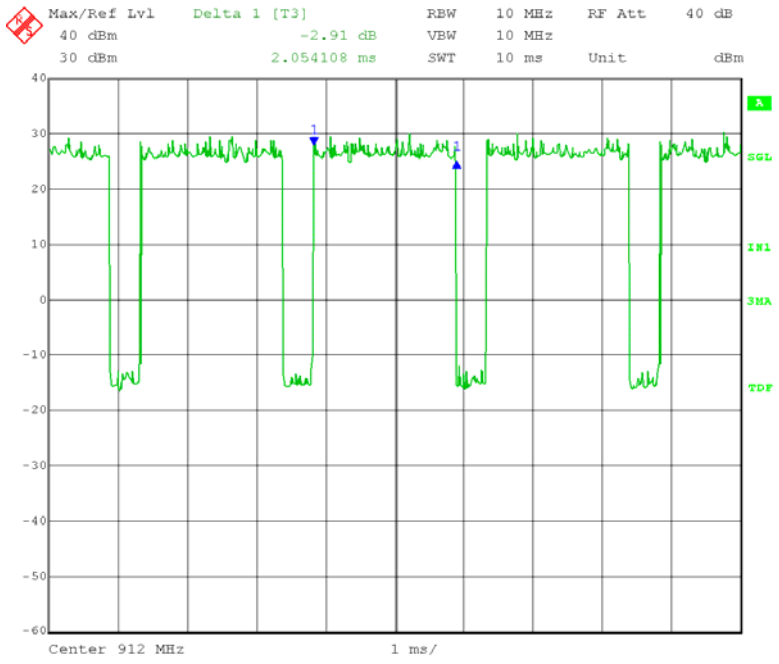
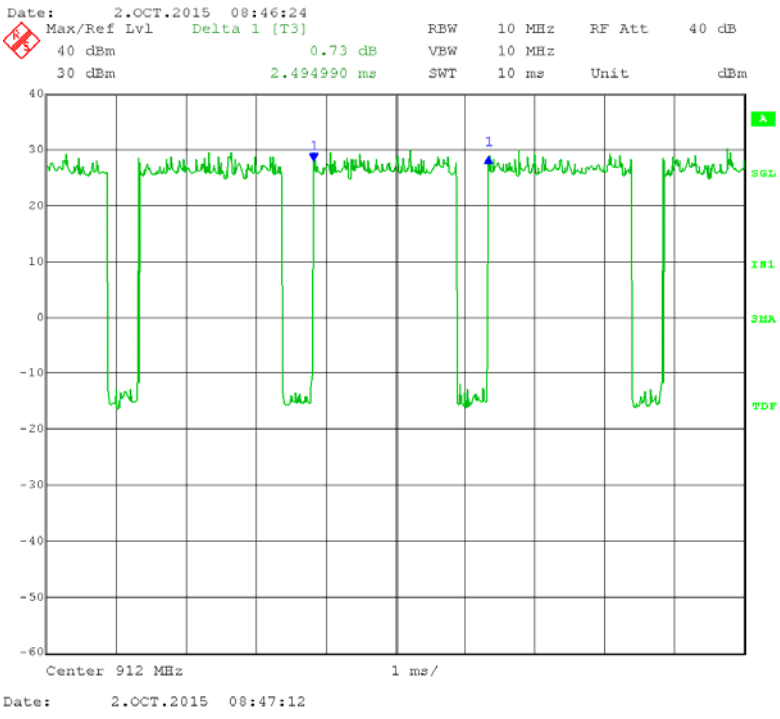


Date: 1.OCT.2015 10:15:28

Test Date:	10-02-2015
Company:	Cambium Networks
EUT:	450i 900 MHz SM MAC: 0A003E45FBF2
Test:	Duty Cycle during testing
Operator:	Craig B
	20 MHz channel bandwidth; QPSK
Comment:	Duty cycle = (2.054108 / 2.494990) * 100 = 82.3293%
	Correction factor x = 10 Log (1 / 0.823293) = 0.85 dB





Appendix B – Measurement Data

B2.0 DTS Bandwidth

Rule Part:

Section 15.247(a)(2)

Test Procedure:

558074 D01 DTS Meas Guidance v03r03
Section 8.0 DTS bandwdidth
Measurement Procedure, Sections 8.1 and 8.2

Limit:

6 dB bandwidth shall be at least 500 kHz

Results:

Compliant
Minimum 6 dB bandwidth: **4.44 MHz**

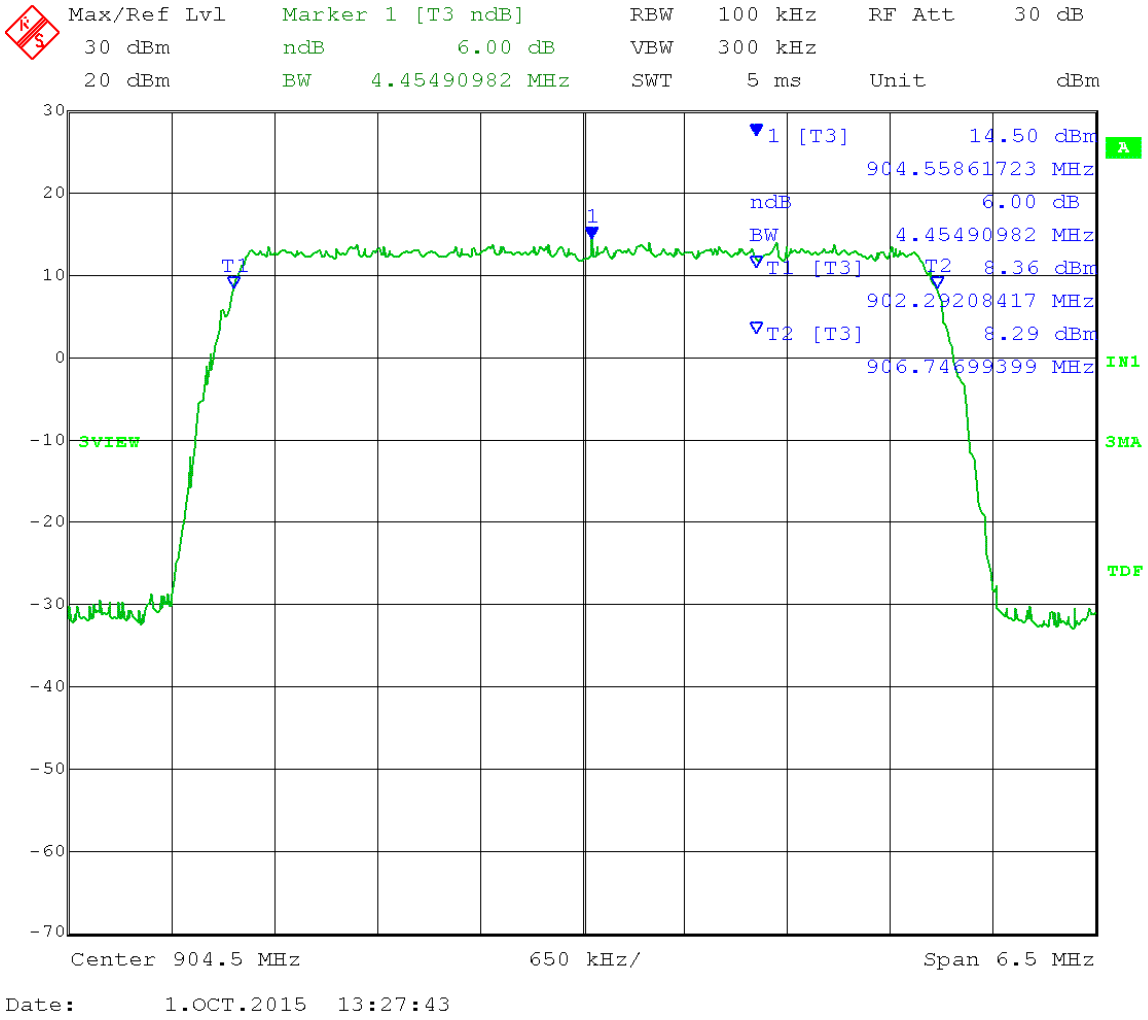
Notes:

Measurements were performed using the worst-case modulation (QPSK) as determined by Cambium Networks. The EUT was tested at the low, middle, and high channels of operation.

Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: DTS Bandwidth (6 dB) - Conducted
Operator: Craig B

Comment: Low Channel: Transmit = 904.5 MHz
Output power setting: 20 5 MHz channel BW
Output port B Modulation: QPSK

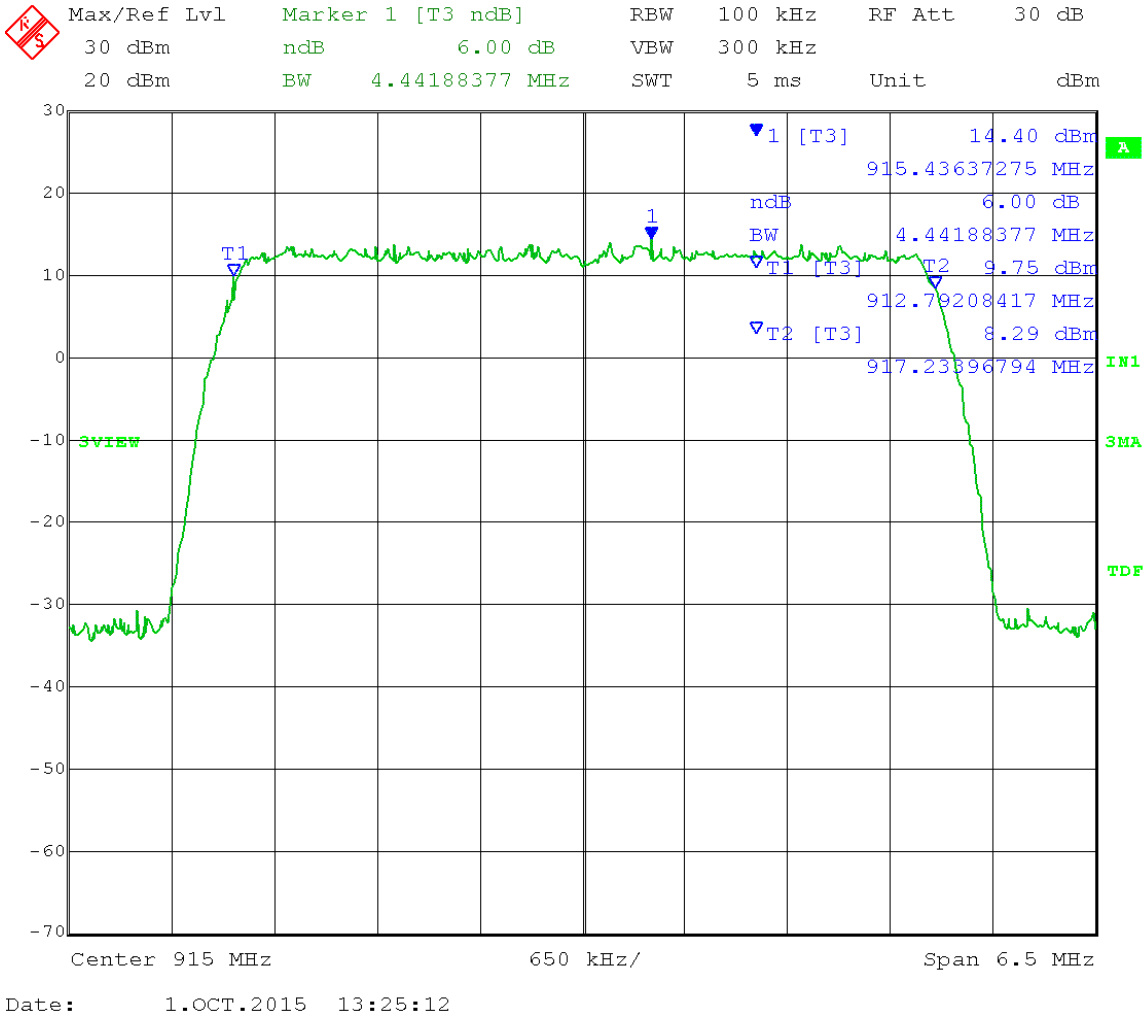
6 dB DTS Bandwidth = 4.45 MHz



Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: DTS Bandwidth (6 dB) - Conducted
Operator: Craig B

Comment: Mid Channel: Transmit = 915 MHz
Output power setting: 20 5 MHz channel BW
Output port B Modulation: QPSK

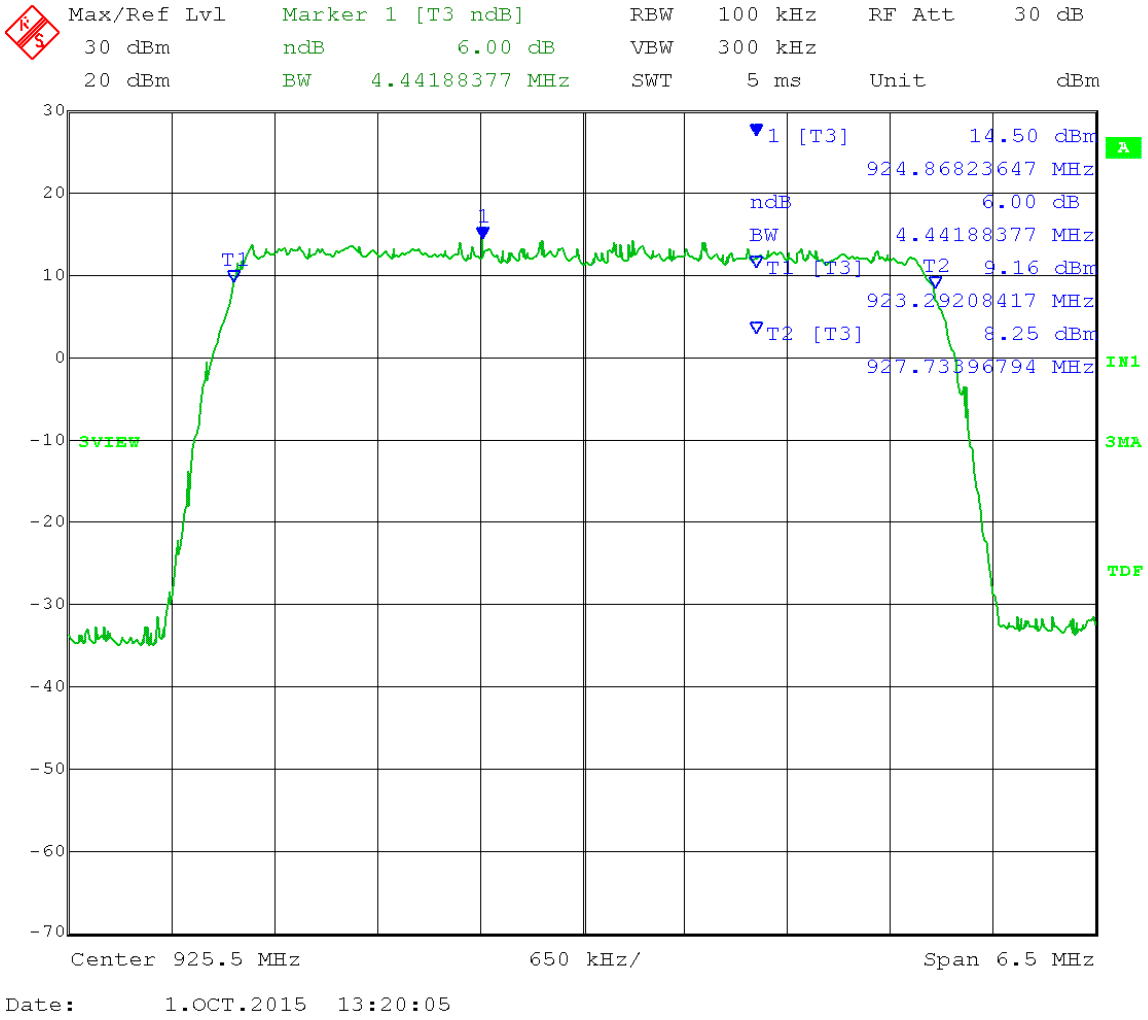
6 dB DTS Bandwidth = 4.44 MHz



Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: DTS Bandwidth (6 dB) - Conducted
Operator: Craig B

Comment: High Channel: Transmit = 925.5 MHz
Output power setting: 21 5 MHz channel BW
Output port B Modulation: QPSK

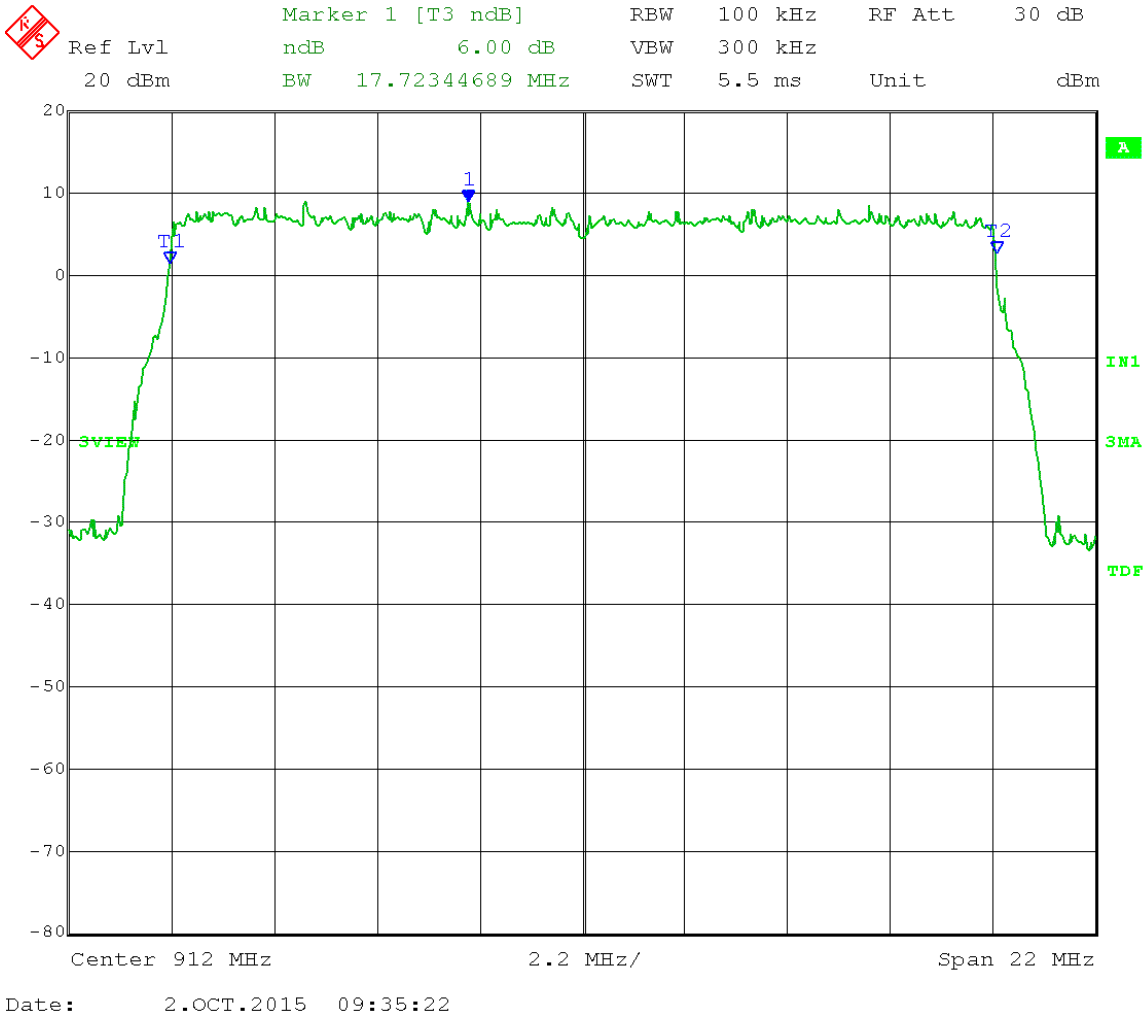
6 dB DTS Bandwidth = 4.44 MHz



Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: DTS Bandwidth (6 dB) - Conducted
Operator: Craig B

Comment: Low Channel: Transmit = 912 MHz
Output power setting: 21 20 MHz channel BW
Output port B Modulation: QPSK

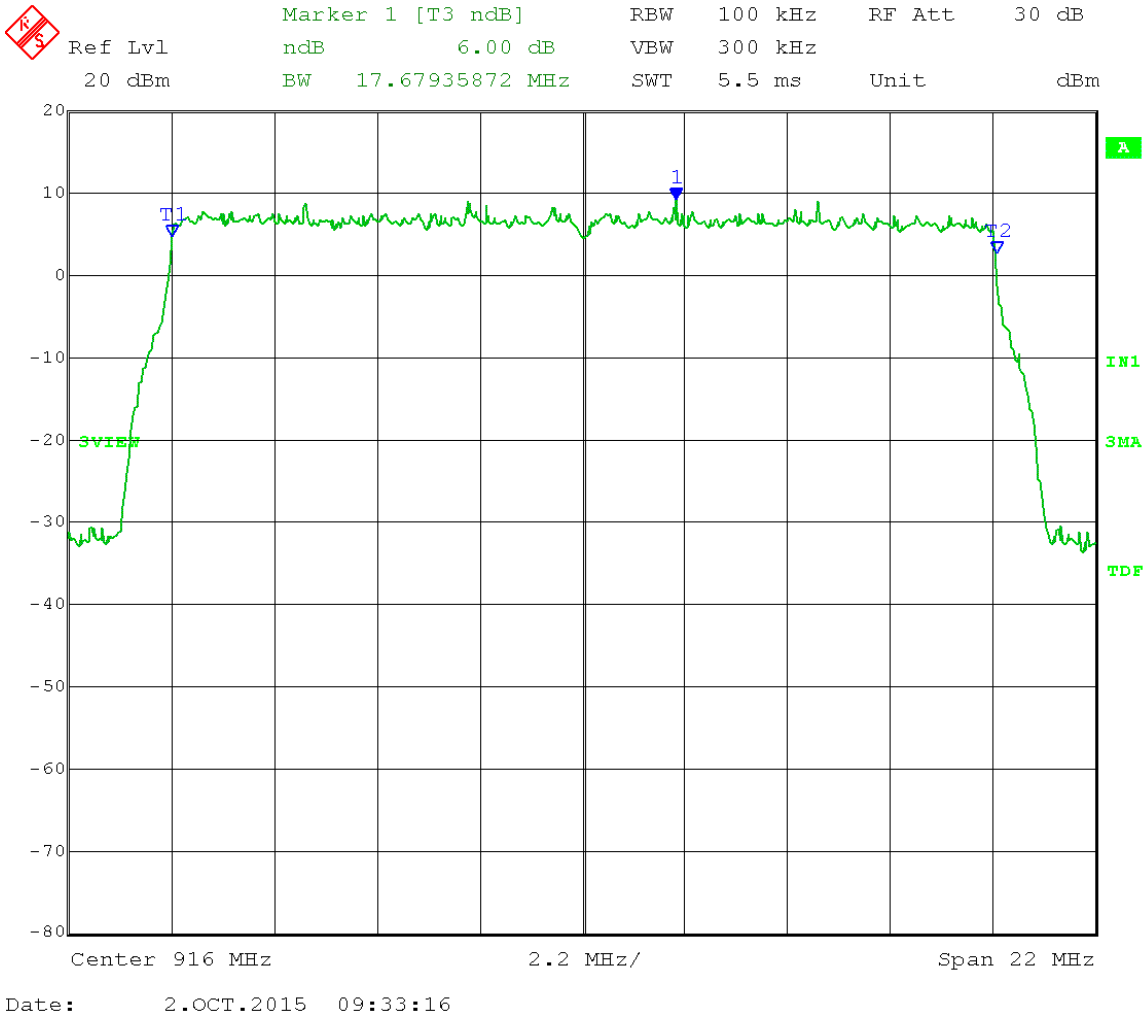
6 dB DTS Bandwidth = 17.72 MHz



Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: DTS Bandwidth (6 dB) - Conducted
Operator: Craig B

Comment: Mid Channel: Transmit = 916 MHz
Output power setting: 21 20 MHz channel BW
Output port B Modulation: QPSK

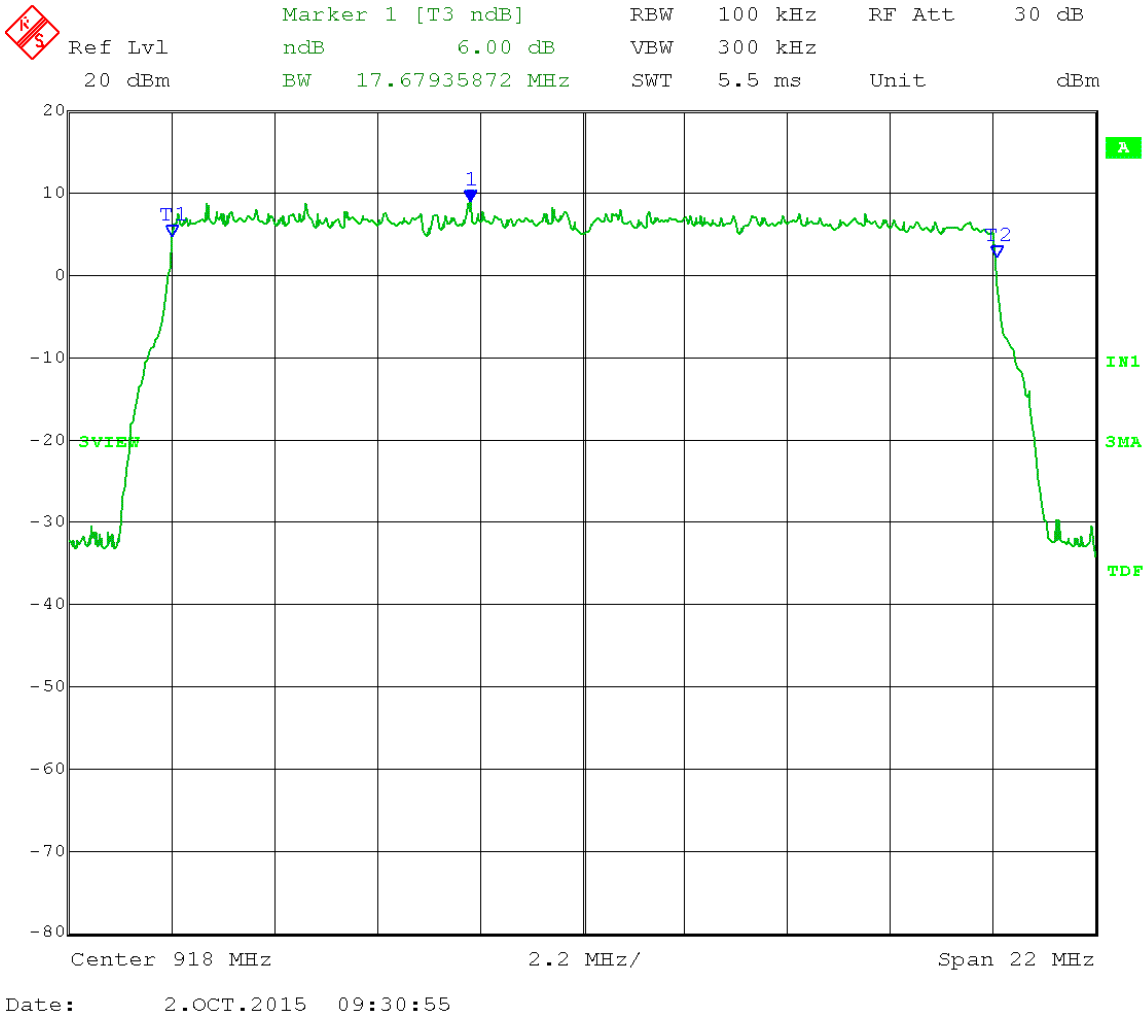
6 dB DTS Bandwidth = 17.68 MHz



Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: DTS Bandwidth (6 dB) - Conducted
Operator: Craig B

Comment: High Channel: Transmit = 918 MHz
Output power setting: 21 20 MHz channel BW
Output port B Modulation: QPSK

6 dB DTS Bandwidth = 17.68 MHz



Appendix B – Measurement Data

B3.0 Fundamental Emission Output Power

Rule Part:

15.247(b)(3) and 15.247(b)(4)

Test Procedure:

558074 D01 DTS Meas Guidance v03r03
Section 9.2 Maximum conducted (average) output power
Section 9.2.3.1 – AVGPM (Measurement using an RF average power meter with a thermocouple detector)
662911 D01 Multiple Transmitter Output v02r01(E)(1) – Measure and sum technique for In-Band Power Measurements

Limit:

The maximum peak conducted output power limit is 1 watt (30 dBm).
The conducted output power shall be reduced below 1 watt by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
Limit: [15.247(b)(3)&(4)]: 30 dBm (1 Watt) – 6 dB (antenna gain is 6 dB greater than the 6 dBi allowed) = **24 dBm** conducted.

Results:

Compliant
Maximum conducted output power: **244.71 mW (23.89 dBm)**

Notes:

Measurements were performed using the worst-case modulation (QPSK) as determined by Cambium Networks. The EUT was tested at the low, middle, and high channels of operation. The power meter measurements were corrected to account for the external attenuator and RF adapters.

Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: AVERAGE Fundamental Emission Output Power – Conducted
Procedure: FCC KDB D01 DTS Meas Guidance v03r03
Section 9.2.3.1 – AVGPM (Measurement using an RF average power meter with a thermocouple detector)
Operator: Craig B

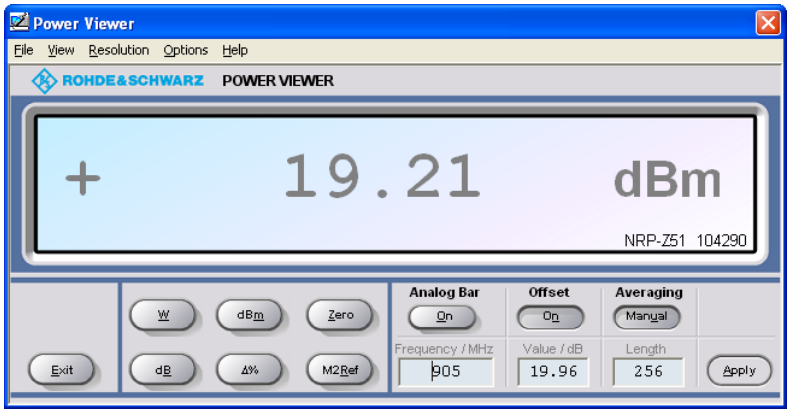
EUT nominal channel bandwidth: 5 MHz
Low Channel Frequency: 904.5 MHz
Test software power setting: 20
Modulation Type: QPSK
Antenna gain: 12 dBi; Point-to-Point operation

Limit: [15.247(b)(3)&(4)]: 30 dBm (1 Watt) – 6 dB (antenna gain is 6 dB greater than the 6 dBi allowed) = 24 dBm conducted.

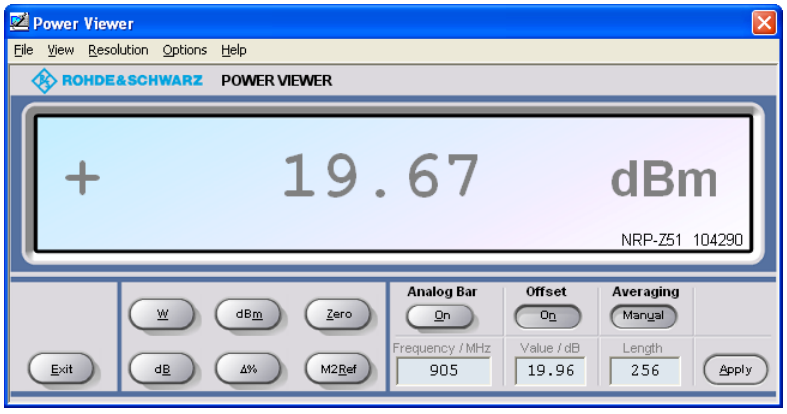
Correction for duty cycle = 0.87 dB

Fundamental Emission AVERAGE Output Power:

Port A:



Port B:



Port A: 19.21 dBm + 0.87 dB = 20.08 dBm = 101.86 mW
Port B: 19.67 dBm + 0.87 dB = 20.54 dBm = 113.24 mW
Total Power: 215.10 mW = 23.33 dBm

Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: AVERAGE Fundamental Emission Output Power – Conducted
Procedure: FCC KDB D01 DTS Meas Guidance v03r03
Section 9.2.3.1 – AVGPM (Measurement using an RF average power meter with a thermocouple detector)
Operator: Craig B

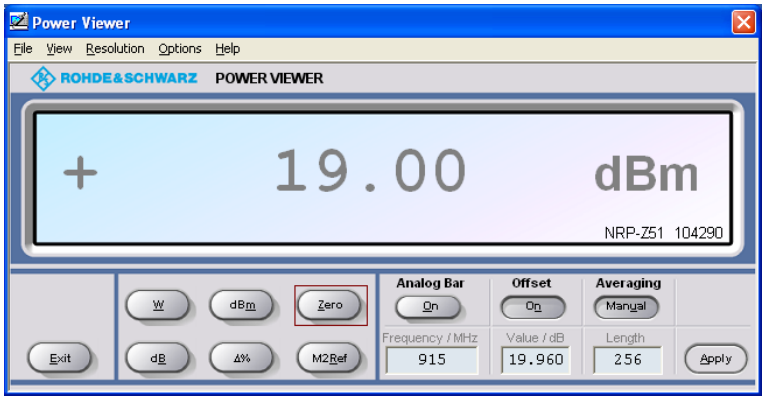
EUT nominal channel bandwidth: 5 MHz
Mid Channel Frequency: 915 MHz
Test software power setting: 20
Modulation Type: QPSK
Antenna gain: 12 dBi; Point-to-Point operation

Limit: [15.247(b)(3)&(4)]: 30 dBm (1 Watt) – 6 dB (antenna gain is 6 dB greater than the 6 dBi allowed) = 24 dBm conducted.

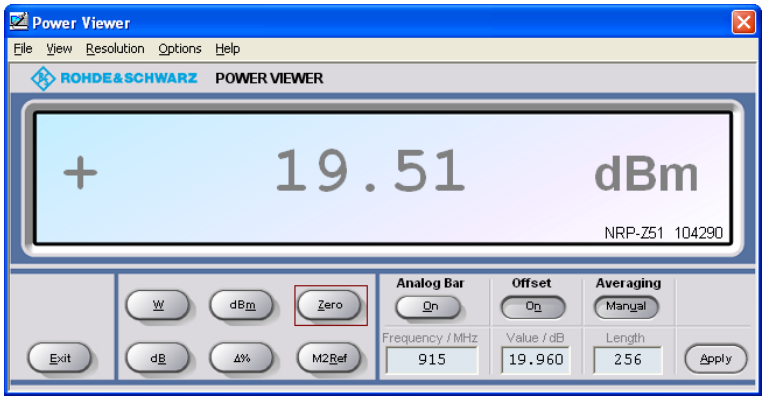
Correction for duty cycle = 0.87 dB

Fundamental Emission AVERAGE Output Power:

Port A:



Port B:



Port A: 19.00 dBm + 0.87 dB = 19.87 dBm = 97.05 mW
Port B: 19.51 dBm + 0.87 dB = 20.38 dBm = 109.15 mW
Total Power: 206.20 mW = 23.14 dBm

Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: AVERAGE Fundamental Emission Output Power – Conducted
Procedure: FCC KDB D01 DTS Meas Guidance v03r03
Section 9.2.3.1 – AVGPM (Measurement using an RF average power meter with a thermocouple detector)
Operator: Craig B

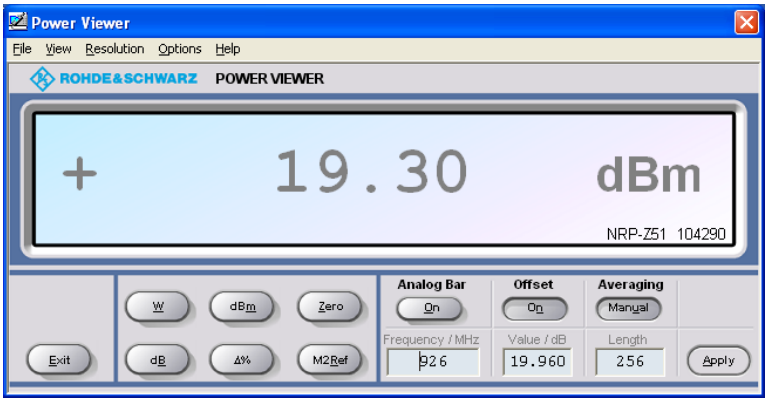
EUT nominal channel bandwidth: 5 MHz
High Channel Frequency: 925.5 MHz
Test software power setting: 21
Modulation Type: QPSK
Antenna gain: 12 dBi; Point-to-Point operation

Limit: [15.247(b)(3)&(4)]: 30 dBm (1 Watt) – 6 dB (antenna gain is 6 dB greater than the 6 dBi allowed) = 24 dBm conducted.

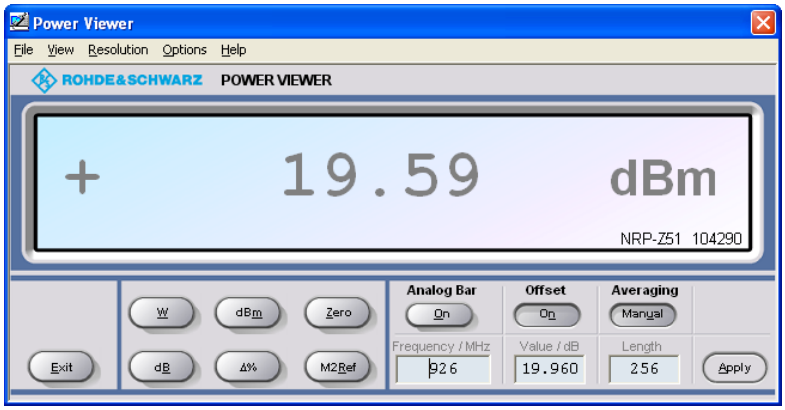
Correction for duty cycle = 0.87 dB

Fundamental Emission AVERAGE Output Power:

Port A:



Port B:



Port A: 19.30 dBm + 0.87 dB = 20.17 dBm = 103.99 mW
Port B: 19.59 dBm + 0.87 dB = 20.46 dBm = 111.17 mW
Total Power: 215.16 mW = 23.33 dBm

Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: AVERAGE Fundamental Emission Output Power – Conducted
Procedure: FCC KDB D01 DTS Meas Guidance v03r03
Section 9.2.3.1 – AVGPM (Measurement using an RF average power meter with a thermocouple detector)
Operator: Craig B

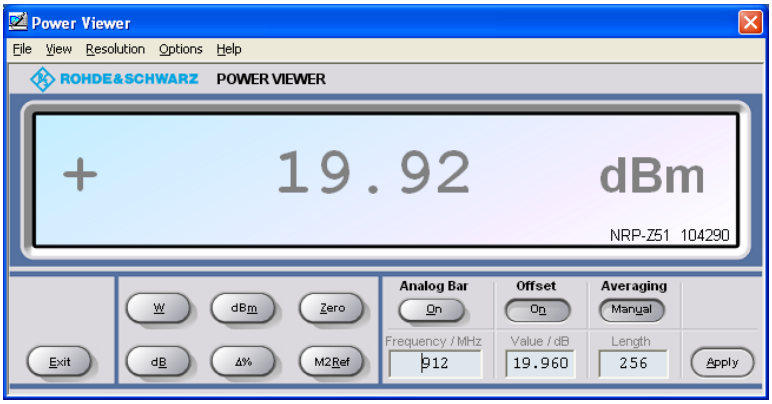
EUT nominal channel bandwidth: 20 MHz
Low Channel Frequency: 912 MHz
Test software power setting: 21
Modulation Type: QPSK
Antenna gain: 12 dBi; Point-to-Point operation

Limit: [15.247(b)(3)&(4)]: 30 dBm (1 Watt) – 6 dB (antenna gain is 6 dB greater than the 6 dBi allowed) = 24 dBm conducted.

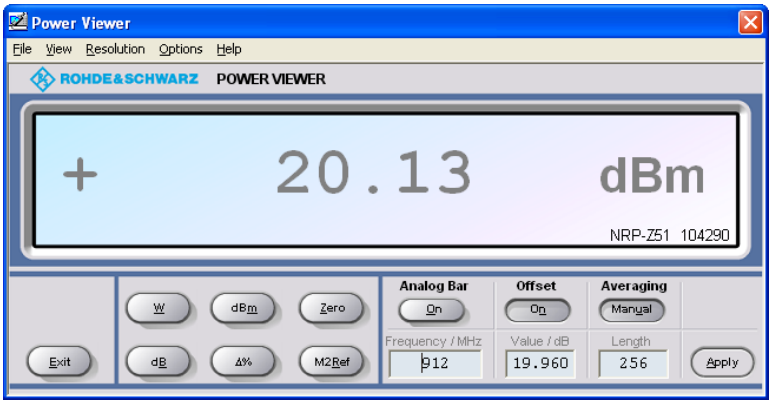
Correction for duty cycle = 0.85 dB

Fundamental Emission AVERAGE Output Power:

Port A:



Port B:



Port A: 19.92 dBm + 0.85 dB = 20.77 dBm = 119.40 mW
Port B: 20.13 dBm + 0.85 dB = 20.98 dBm = 125.31 mW
Total Power: 244.71 mW = 23.89 dBm

Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: AVERAGE Fundamental Emission Output Power – Conducted
Procedure: FCC KDB D01 DTS Meas Guidance v03r03
Section 9.2.3.1 – AVGPM (Measurement using an RF average power meter with a thermocouple detector)
Operator: Craig B

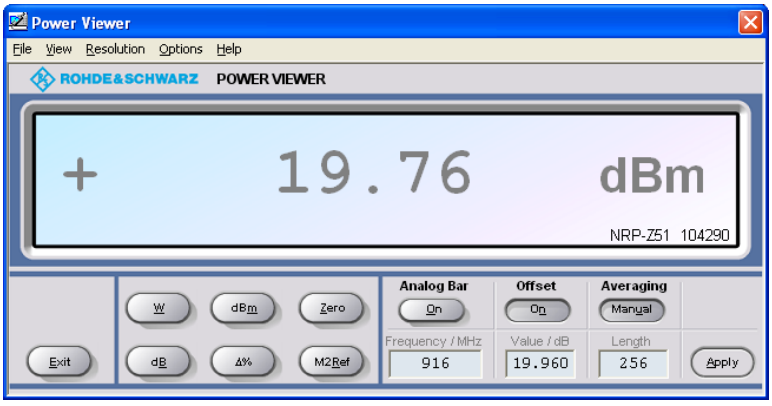
EUT nominal channel bandwidth: 20 MHz
Mid Channel Frequency: 916 MHz
Test software power setting: 21
Modulation Type: QPSK
Antenna gain: 12 dBi; Point-to-Point operation

Limit: [15.247(b)(3)&(4)]: 30 dBm (1 Watt) – 6 dB (antenna gain is 6 dB greater than the 6 dBi allowed) = 24 dBm conducted.

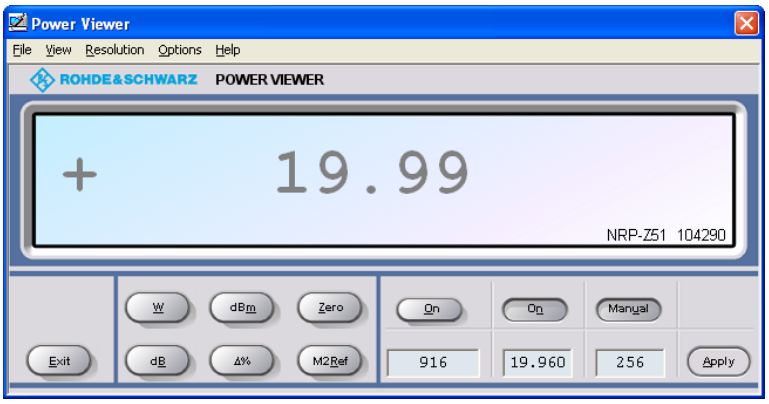
Correction for duty cycle = 0.85 dB

Fundamental Emission AVERAGE Output Power:

Port A:



Port B:



Port A: 19.76 dBm + 0.85 dB = 20.61 dBm = 115.08 mW
Port B: 19.99 dBm + 0.85 dB = 20.84 dBm = 121.34 mW
Total Power: 236.42 mW = 23.74 dBm

Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: AVERAGE Fundamental Emission Output Power – Conducted
Procedure: FCC KDB D01 DTS Meas Guidance v03r03
Section 9.2.3.1 – AVGPM (Measurement using an RF average power meter with a thermocouple detector)
Operator: Craig B

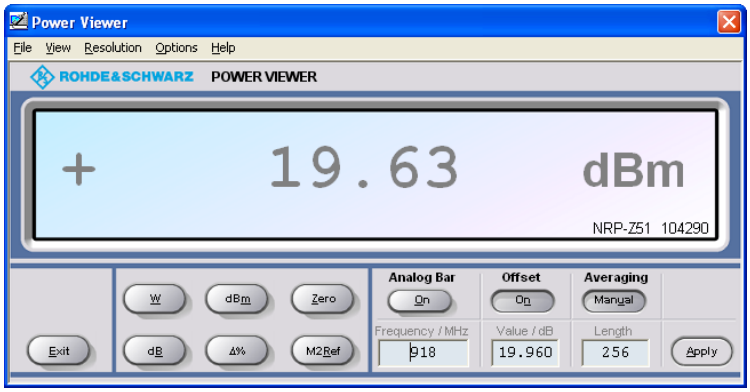
EUT nominal channel bandwidth: 20 MHz
Mid Channel Frequency: 918 MHz
Test software power setting: 21
Modulation Type: QPSK
Antenna gain: 12 dBi; Point-to-Point operation

Limit: [15.247(b)(3)&(4)]: 30 dBm (1 Watt) – 6 dB (antenna gain is 6 dB greater than the 6 dBi allowed) = 24 dBm conducted.

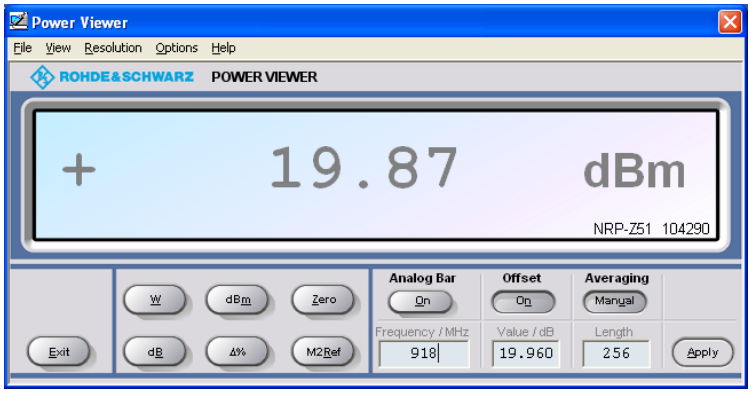
Correction for duty cycle = 0.85 dB

Fundamental Emission AVERAGE Output Power:

Port A:



Port B:



Port A: 19.63 dBm + 0.85 dB = 20.48 dBm = 111.69 mW
Port B: 19.87 dBm + 0.85 dB = 20.72 dBm = 118.03 mW
Total Power: 229.72 mW = 23.61 dBm

Appendix B – Measurement Data

B4.0 Maximum Power Spectral Density (PSD)

Rule Part:

15.247(e)

Test Procedure:

558074 D01 DTS Meas Guidance v03r03
Section 10.0 Maximum Power Spectral Density Level in the Fundamental Emission
Section 10.5, method AVGPSD-2 – trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction
662911 D01 Multiple Transmitter Output v02r01(E)(2)(c) – Measure and add 10 log(N_{ant}) dB where N is the number of outputs for In-Band Power Spectral Density (PSD) Measurements

Limit:

+8 dBm in any 3 kHz band segment within the fundamental during any time interval of continuous transmission.

Results:

Compliant
Maximum conducted power spectral density (PSD): **7.51 dBm / 100 kHz**

Notes:

Measurements were performed using the worst-case modulation (QPSK) as determined by Cambium Networks. The EUT was tested at the low, middle, and high channels of operation. The spectrum analyzer measurements were corrected to account for the cable loss and external attenuator.

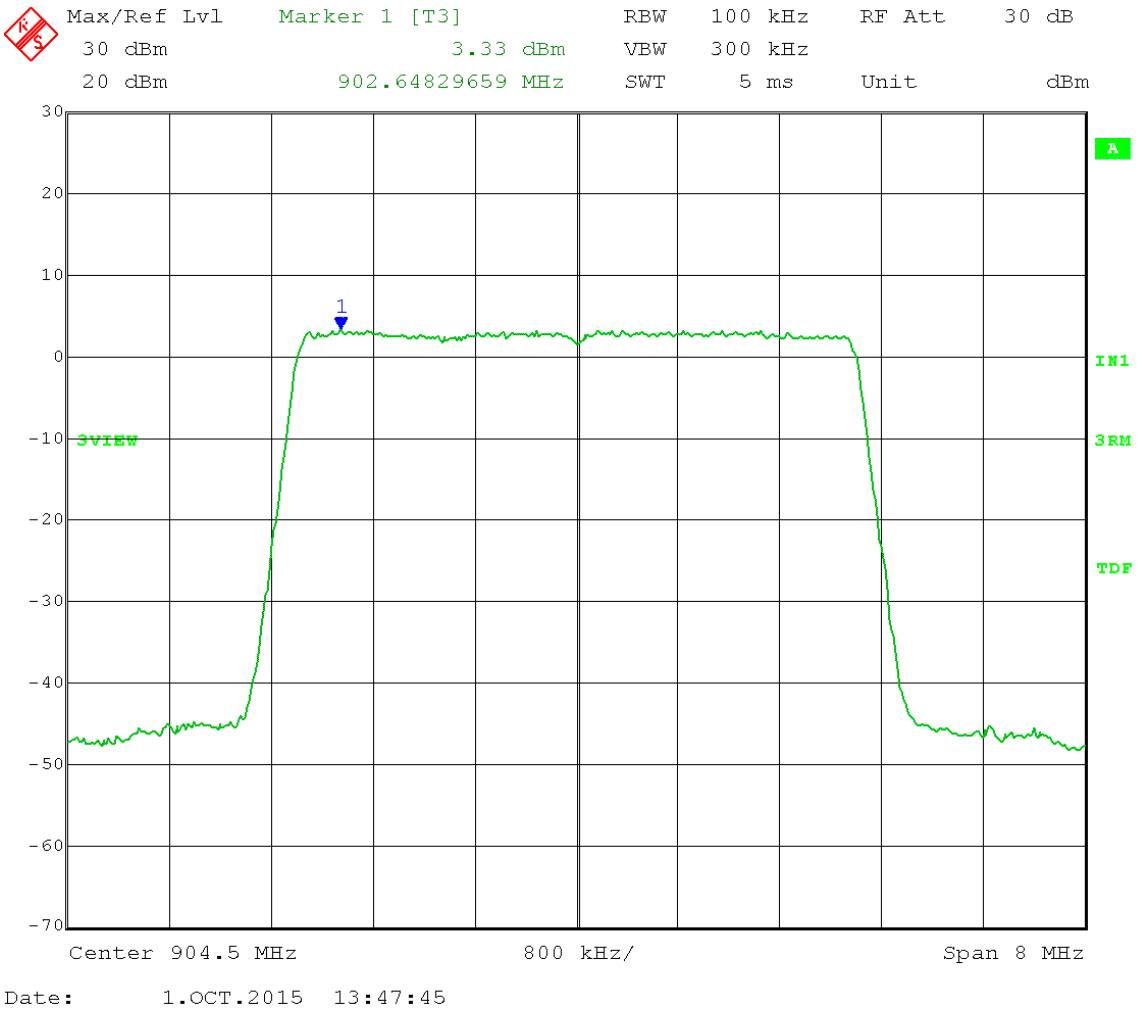
Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Power Spectral Density level in the fundamental emission
Method 10.5: AVGPSD-2 – trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction
Operator: Craig B
Comment: Low Channel: Frequency = 904.5 MHz

Output Power Setting = 20	5 MHz channel BW
RBW = 100 kHz	VBW = 300 kHz
Span ≥ 1.5 x DTS bandwidth	Detector = RMS
Sweep = auto couple	Trace mode: average 200 traces
Output port B	

Limit: +8 dBm / 3 kHz

KDB 662911 D01 v02r01, section E(2)(c): Measure and add 10 log(N_{ant}) dB for MIMO with Cross-Polarized antenna, where N is the number of outputs. = 10 log(2) = 3 dB

Max PSD = 3.33 dBm / 100 kHz + 0.87 dB (duty cycle correction) + 3 dB (MIMO) = 7.20 dBm / 100 kHz

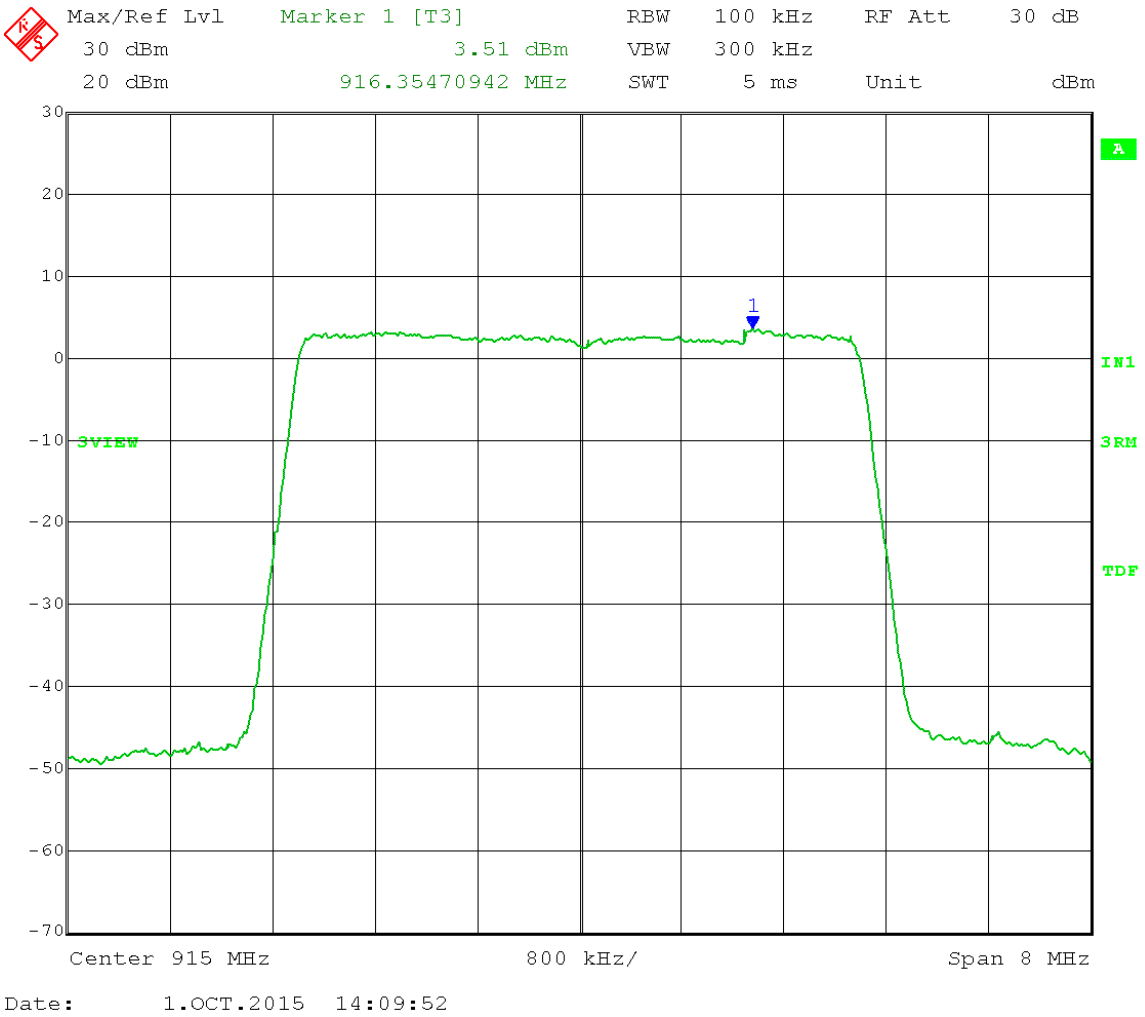


Test Date:	10-01-2015
Company:	Cambium Networks
EUT:	450i 900 MHz SM MAC: 0A003E45FBF2
Test:	Maximum Power Spectral Density level in the fundamental emission Method 10.5: AVGPSD-2 – trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction
Operator:	Craig B
Comment:	Mid Channel: Frequency = 915 MHz

Output Power Setting = 20 — 5 MHz channel BW
RBW = 100 kHz — VBW = 300 kHz
Span ≥ 1.5 x DTS bandwidth — Detector = RMS
Sweep = auto couple — Trace mode: average 200 traces
Output port B
Limit: +8 dBm / 3 kHz

KDB 662911 D01 v02r01, section E(2)(c): Measure and add 10 log(N_{ant}) dB for MIMO with Cross-Polarized antenna, where N is the number of outputs. = 10 log(2) = 3 dB

Max PSD = 3.51 dBm / 100 kHz + 0.87 dB (duty cycle correction) + 3 dB (MIMO) = 7.38 dBm / 100 kHz

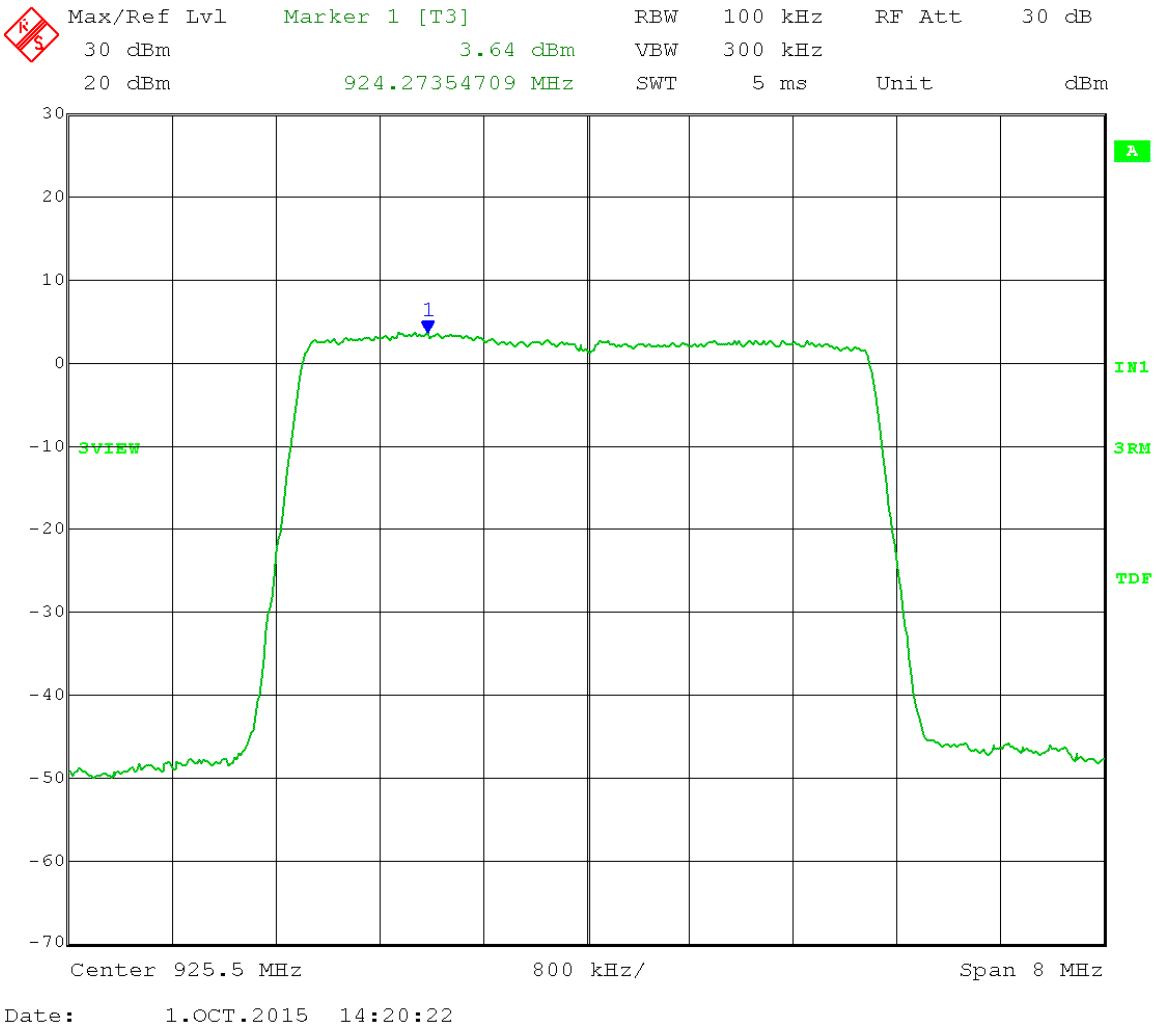


Test Date:	10-01-2015
Company:	Cambium Networks
EUT:	450i 900 MHz SM MAC: 0A003E45FBF2
Test:	Maximum Power Spectral Density level in the fundamental emission Method 10.5: AVGPSD-2 – trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction
Operator:	Craig B
Comment:	High Channel: Frequency = 925.5 MHz

Output Power Setting = 21 — 5 MHz channel BW
RBW = 100 kHz — VBW = 300 kHz
Span ≥ 1.5 x DTS bandwidth — Detector = RMS
Sweep = auto couple — Trace mode: average 200 traces
Output port B
Limit: +8 dBm / 3 kHz

KDB 662911 D01 v02r01, section E(2)(c): Measure and add 10 log(N_{ant}) dB for MIMO with Cross-Polarized antenna, where N is the number of outputs. = 10 log(2) = 3 dB

Max PSD = 3.64 dBm / 100 kHz + 0.87 dB (duty cycle correction) + 3 dB (MIMO) = 7.51 dBm / 100 kHz

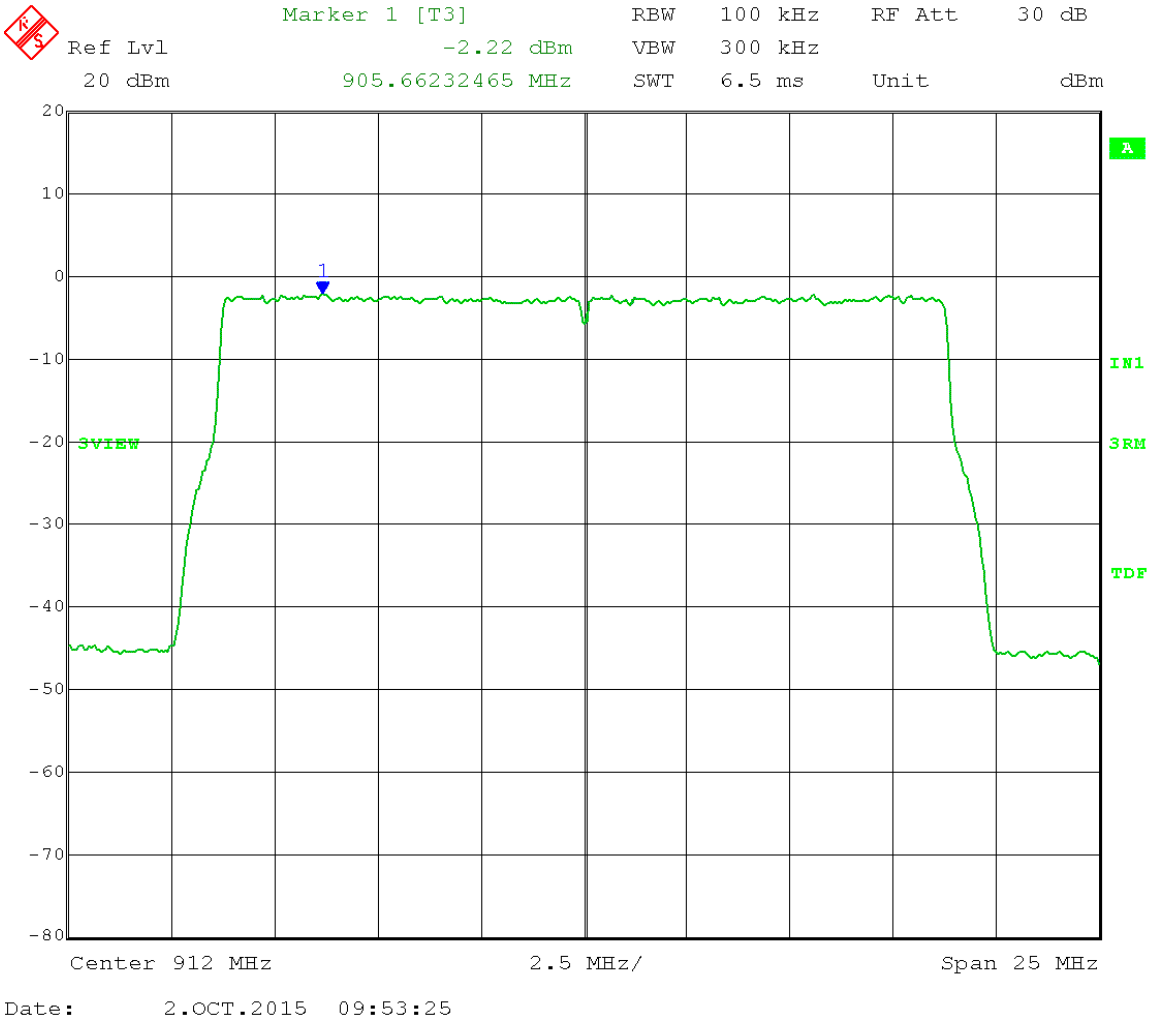


Test Date:	10-02-2015
Company:	Cambium Networks
EUT:	450i 900 MHz SM MAC: 0A003E45FBF2
Test:	Maximum Power Spectral Density level in the fundamental emission Method 10.5: AVGPSD-2 – trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction
Operator:	Craig B
Comment:	Low Channel: Frequency = 912 MHz

Output Power Setting = 21 — 20 MHz channel BW
RBW = 100 kHz — VBW = 300 kHz
Span ≥ 1.5 x DTS bandwidth — Detector = RMS
Sweep = auto couple — Trace mode: average 200 traces
Output port B
Limit: +8 dBm / 3 kHz

KDB 662911 D01 v02r01, section E(2)(c): Measure and add 10 log(N_{ant}) dB for MIMO with Cross-Polarized antenna, where N is the number of outputs. = 10 log(2) = 3 dB

Max PSD = -2.22 dBm / 100 kHz + 0.85 dB (duty cycle correction) + 3 dB (MIMO) = 1.63 dBm / 100 kHz

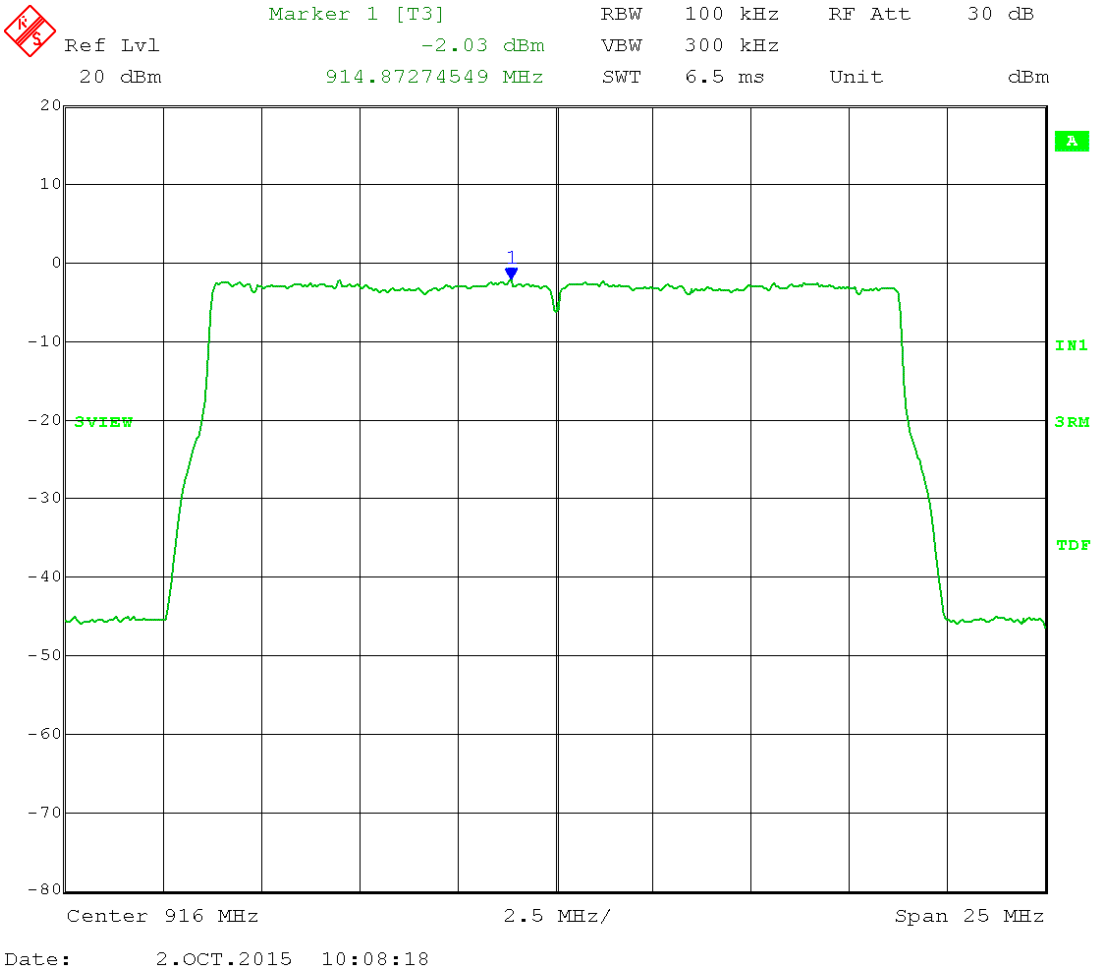


Test Date:	10-02-2015
Company:	Cambium Networks
EUT:	450i 900 MHz SM MAC: 0A003E45FBF2
Test:	Maximum Power Spectral Density level in the fundamental emission Method 10.5: AVGPSD-2 – trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction
Operator:	Craig B
Comment:	Mid Channel: Frequency = 916 MHz

Output Power Setting = 21 — 20 MHz channel BW
RBW = 100 kHz — VBW = 300 kHz
Span ≥ 1.5 x DTS bandwidth — Detector = RMS
Sweep = auto couple — Trace mode: average 200 traces
Output port B
Limit: +8 dBm / 3 kHz

KDB 662911 D01 v02r01, section E(2)(c): Measure and add 10 log(N_{ant}) dB for MIMO with Cross-Polarized antenna, where N is the number of outputs. = 10 log(2) = 3 dB

Max PSD = -2.03 dBm / 100 kHz + 0.85 dB (duty cycle correction) + 3 dB (MIMO) = 1.82 dBm / 100 kHz

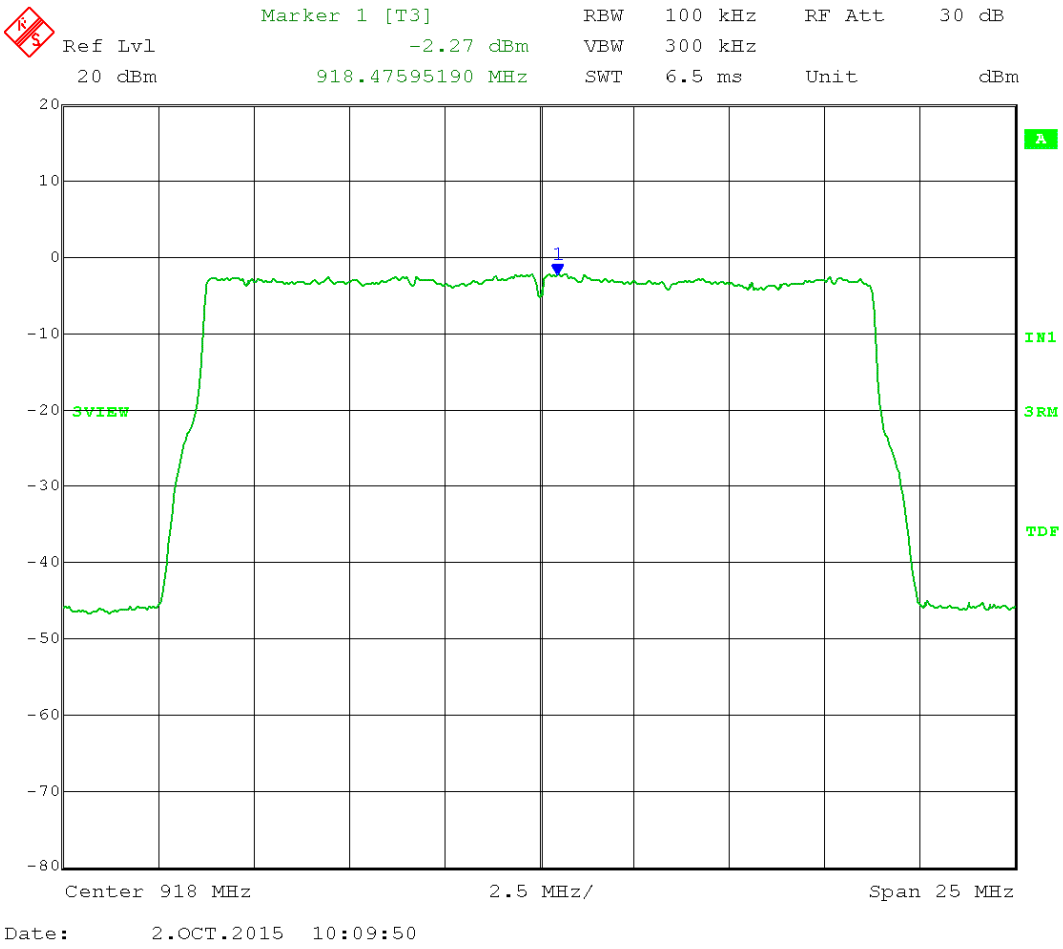


Test Date:	10-02-2015
Company:	Cambium Networks
EUT:	450i 900 MHz SM MAC: 0A003E45FBF2
Test:	Maximum Power Spectral Density level in the fundamental emission Method 10.5: AVGPSD-2 – trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction
Operator:	Craig B
Comment:	High Channel: Frequency = 918 MHz

Output Power Setting = 21 — 20 MHz channel BW
RBW = 100 kHz — VBW = 300 kHz
Span ≥ 1.5 x DTS bandwidth — Detector = RMS
Sweep = auto couple — Trace mode: average 200 traces
Output port B
Limit: +8 dBm / 3 kHz

KDB 662911 D01 v02r01, section E(2)(c): Measure and add 10 log(N_{ant}) dB for MIMO with Cross-Polarized antenna, where N is the number of outputs. = 10 log(2) = 3 dB

Max PSD = -2.27 dBm / 100 kHz + 0.85 dB (duty cycle correction) + 3 dB (MIMO) = 1.58 dBm / 100 kHz



Appendix B – Measurement Data

B5.0 Emissions in Non-Restricted Frequency Bands - RF Conducted

Rule Part:

15.247(d)

Test Procedure:

558074 D01 DTS Meas Guidance v03r03
Section 11.0 Emissions in non-restricted frequency bands
Section 11.2 Reference Level Measurement
Section 11.3 Emissions Level Measurement

Limit:

The peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band peak PSD level. (Compliance to the conducted power limits is based on RMS averaging)

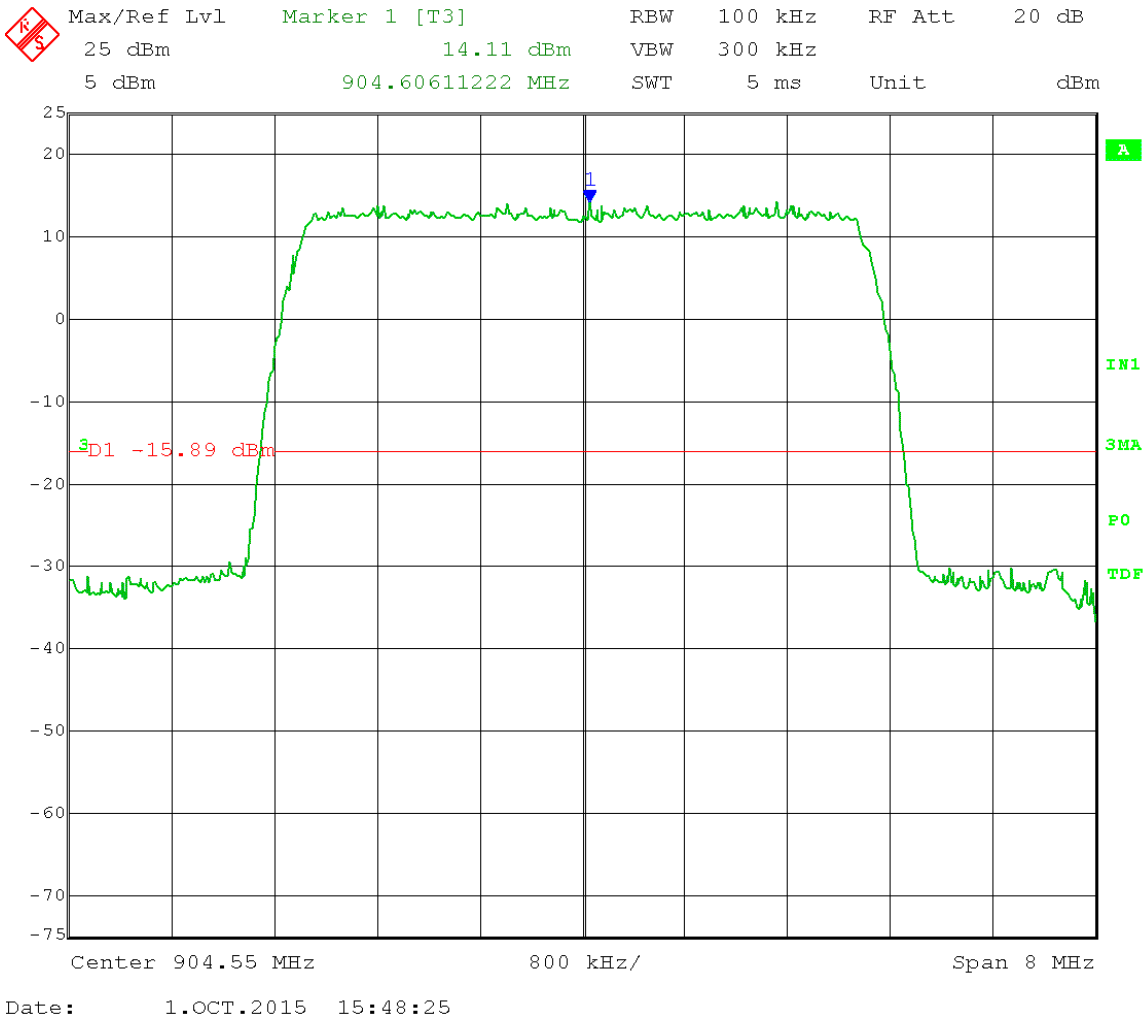
Results:

Compliant

Notes:

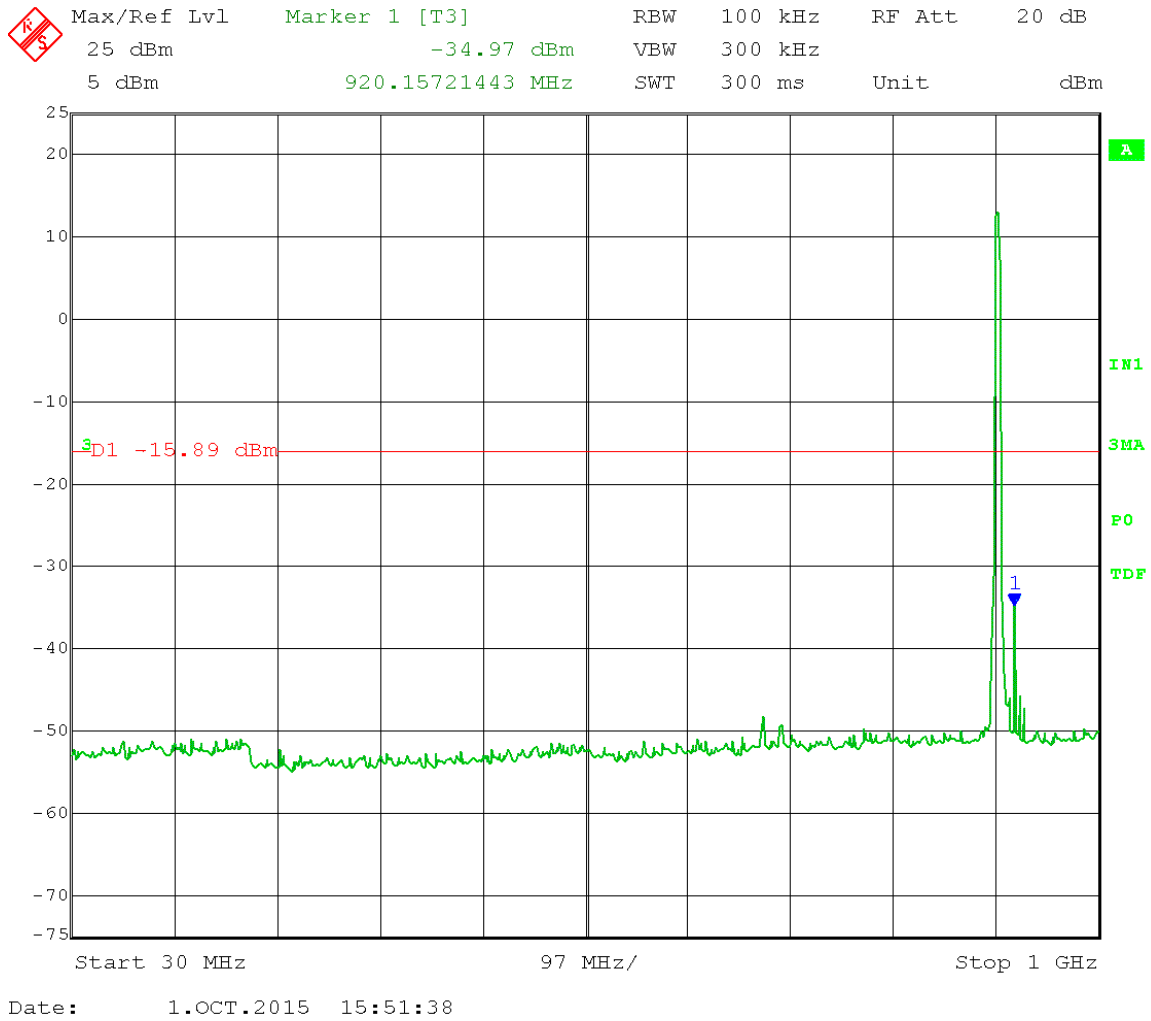
Measurements were performed using the worst-case modulation (QPSK) as determined by Cambium Networks. The EUT was tested at the low, middle, and high channels of operation.

Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Low Channel Transmit = 904.550 MHz
Output Power Setting 20 Channel bandwidth: 5 MHz
Output port: A QPSK
Reference Level Measurement
Limit = 14.11 dBm – 30 dB = -15.89 dBm



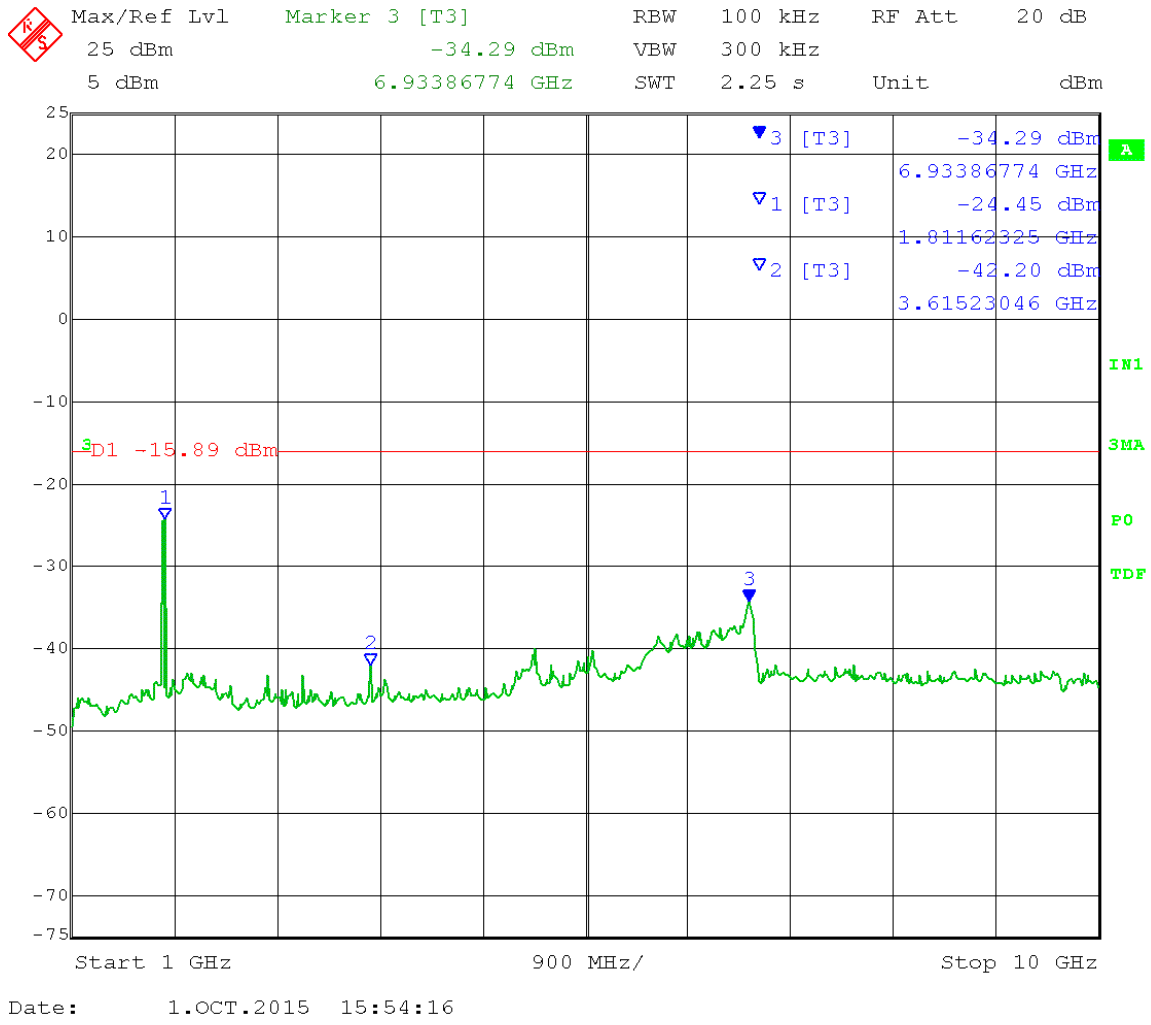
Date: 1.OCT.2015 15:48:25

Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Low Channel Transmit = 904.550 MHz
Output Power Setting 20 Channel bandwidth: 5 MHz
Output port: A QPSK
Emission Level Measurement
Limit = 14.11 dBm – 30 dB = -15.89 dBm
Frequency range: 30-1000 MHz



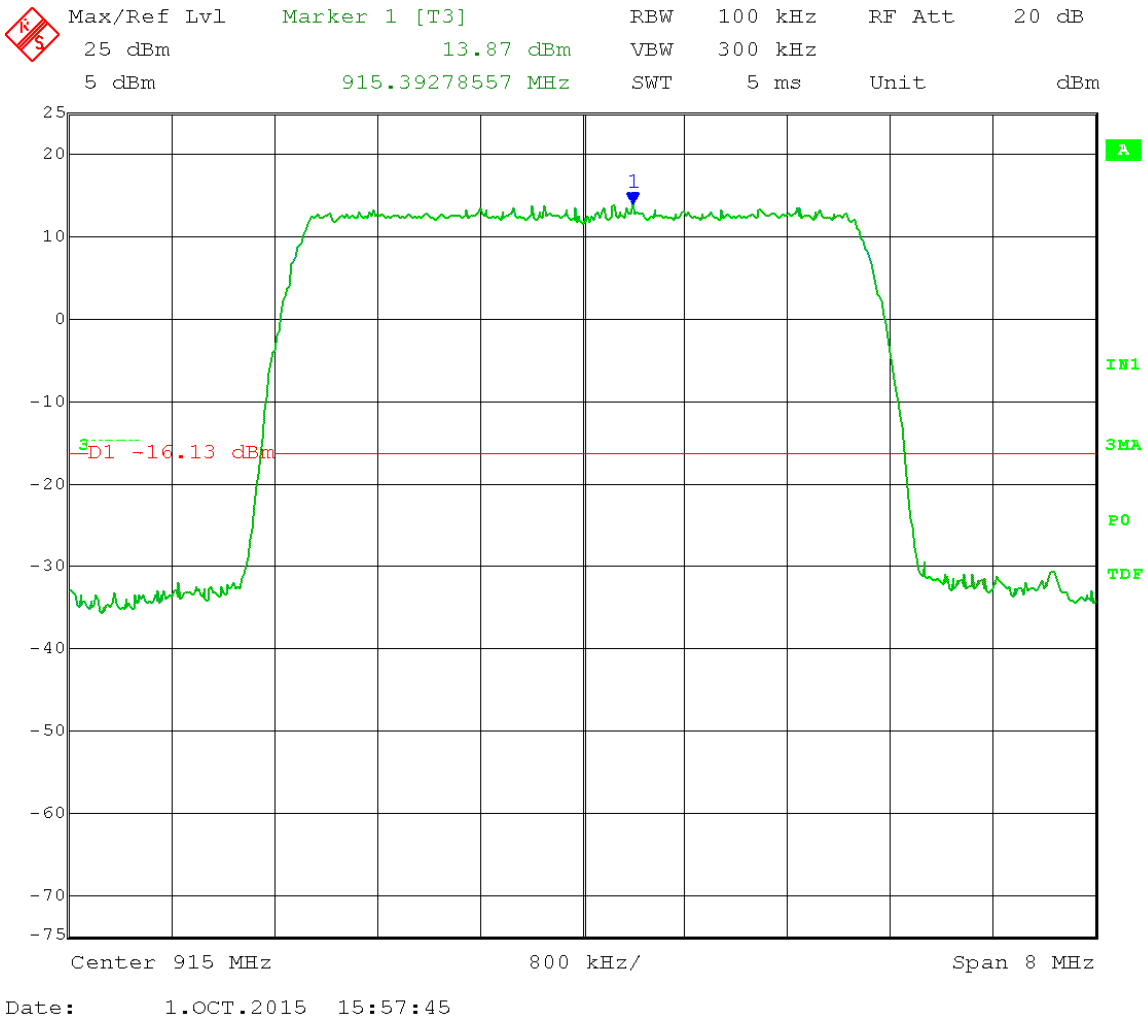
Date: 1.OCT.2015 15:51:38

Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Low Channel Transmit = 904.550 MHz
Output Power Setting 20 Channel bandwidth: 5 MHz
Output port: A QPSK
Emission Level Measurement
Limit = 14.11 dBm – 30 dB = -15.89 dBm
Frequency range: 1-10 GHz

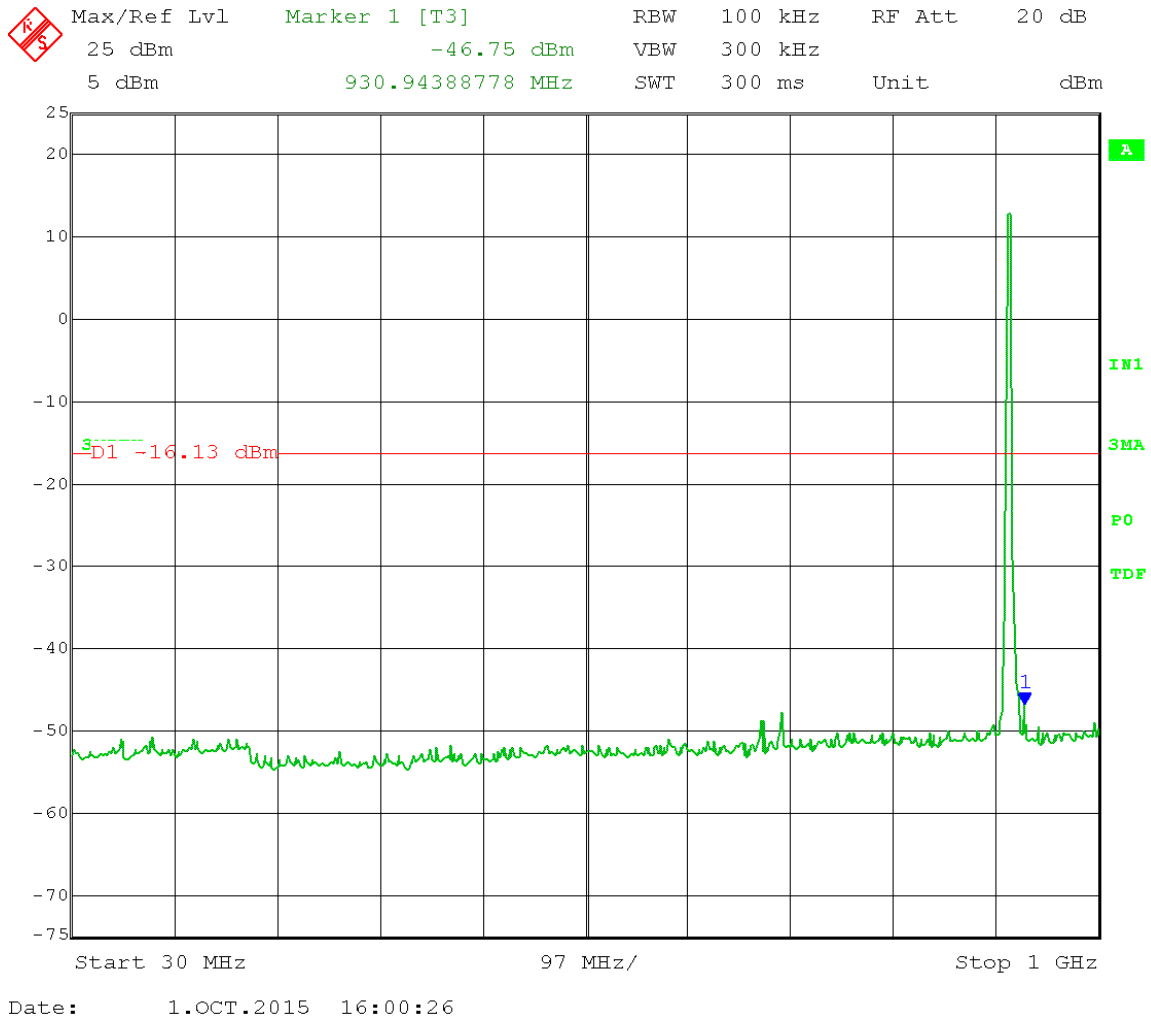


Date: 1.OCT.2015 15:54:16

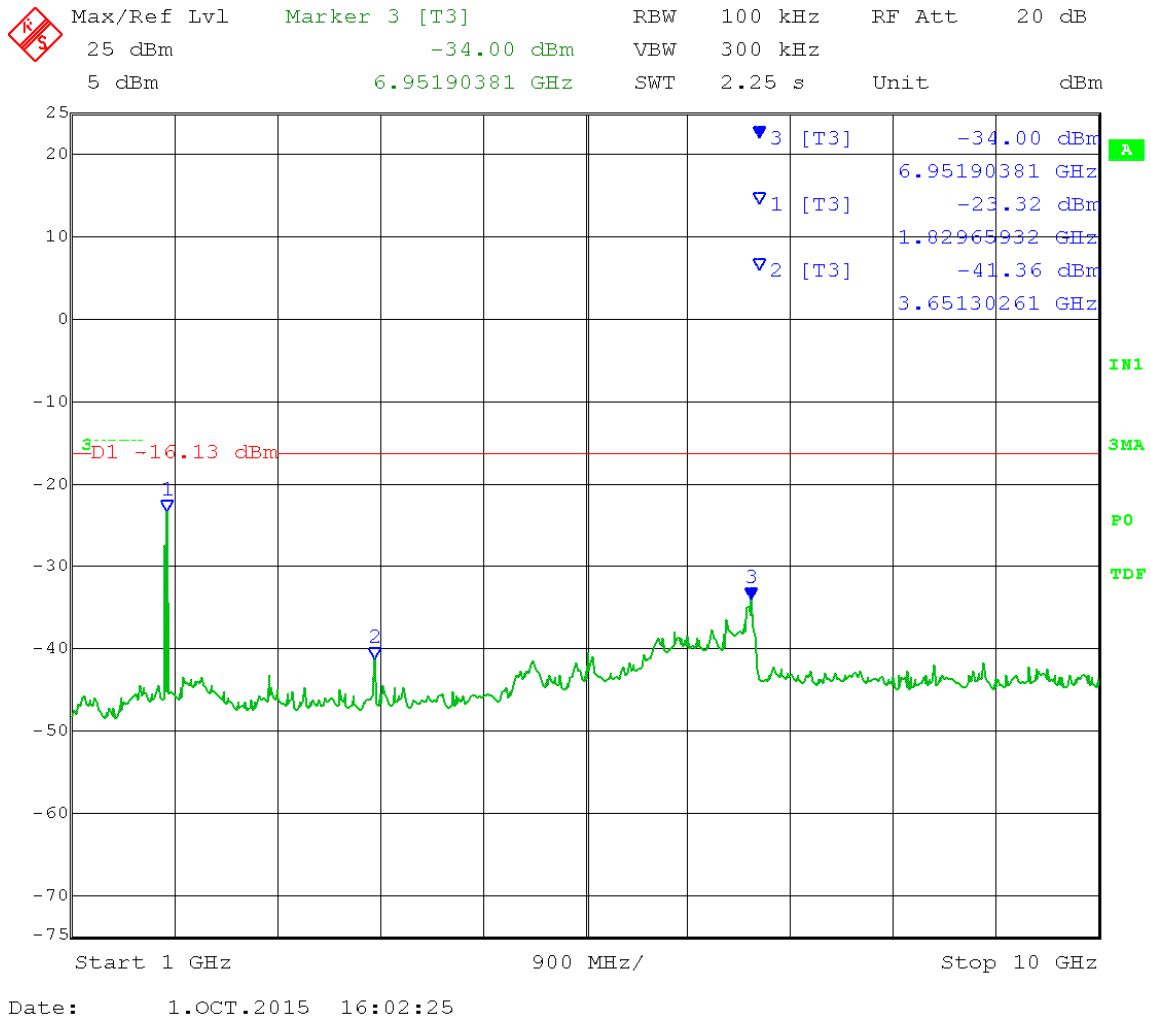
Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Mid Channel Transmit = 915 MHz
Output Power Setting 20 Channel bandwidth: 5 MHz
Output port: A QPSK
Reference Level Measurement
Limit = 13.87 dBm – 30 dB = -16.13 dBm



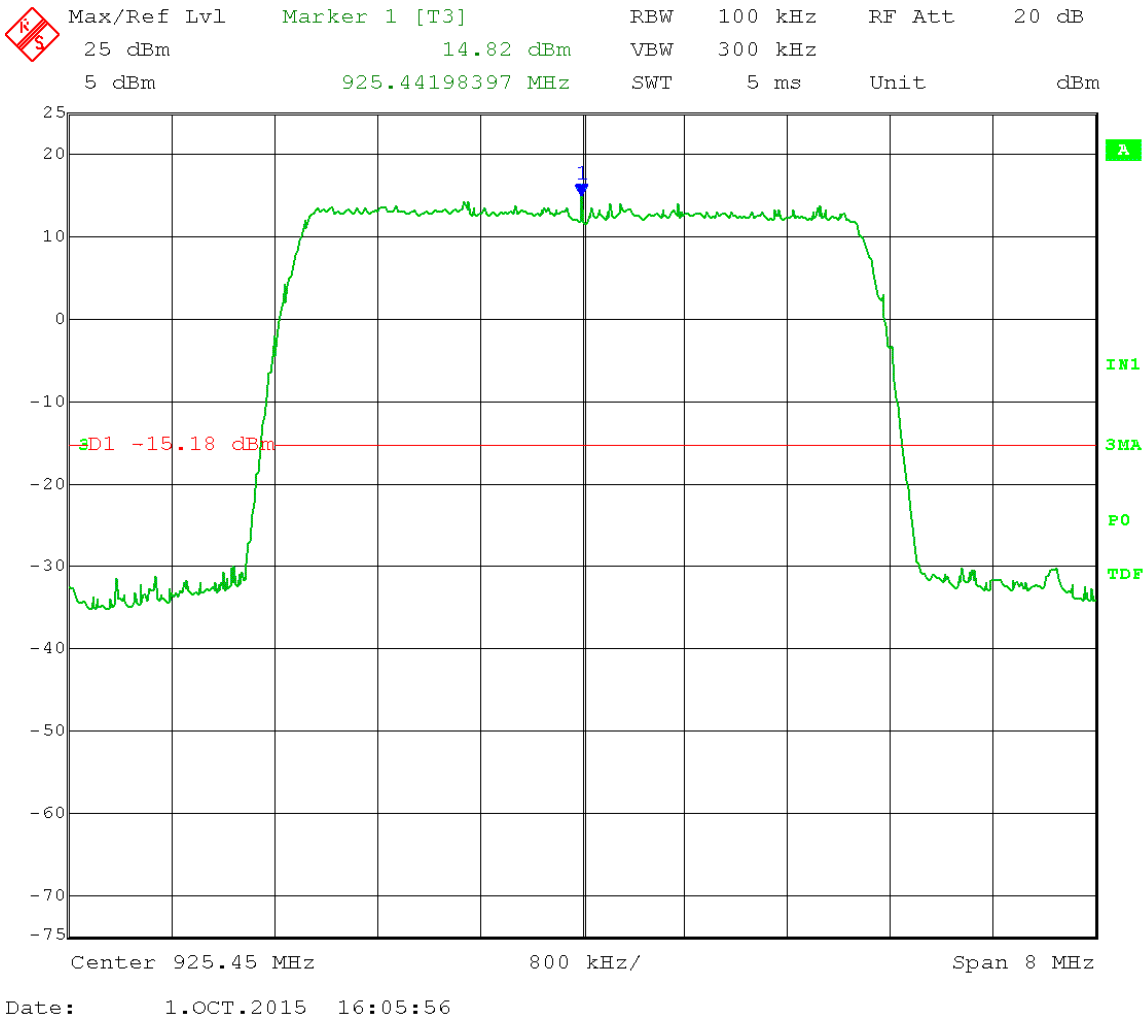
Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Mid Channel Transmit = 915 MHz
Output Power Setting 20 Channel bandwidth: 5 MHz
Output port: A QPSK
Emission Level Measurement
Limit = 13.87 dBm – 30 dB = -16.13 dBm
Frequency range: 30-1000 MHz



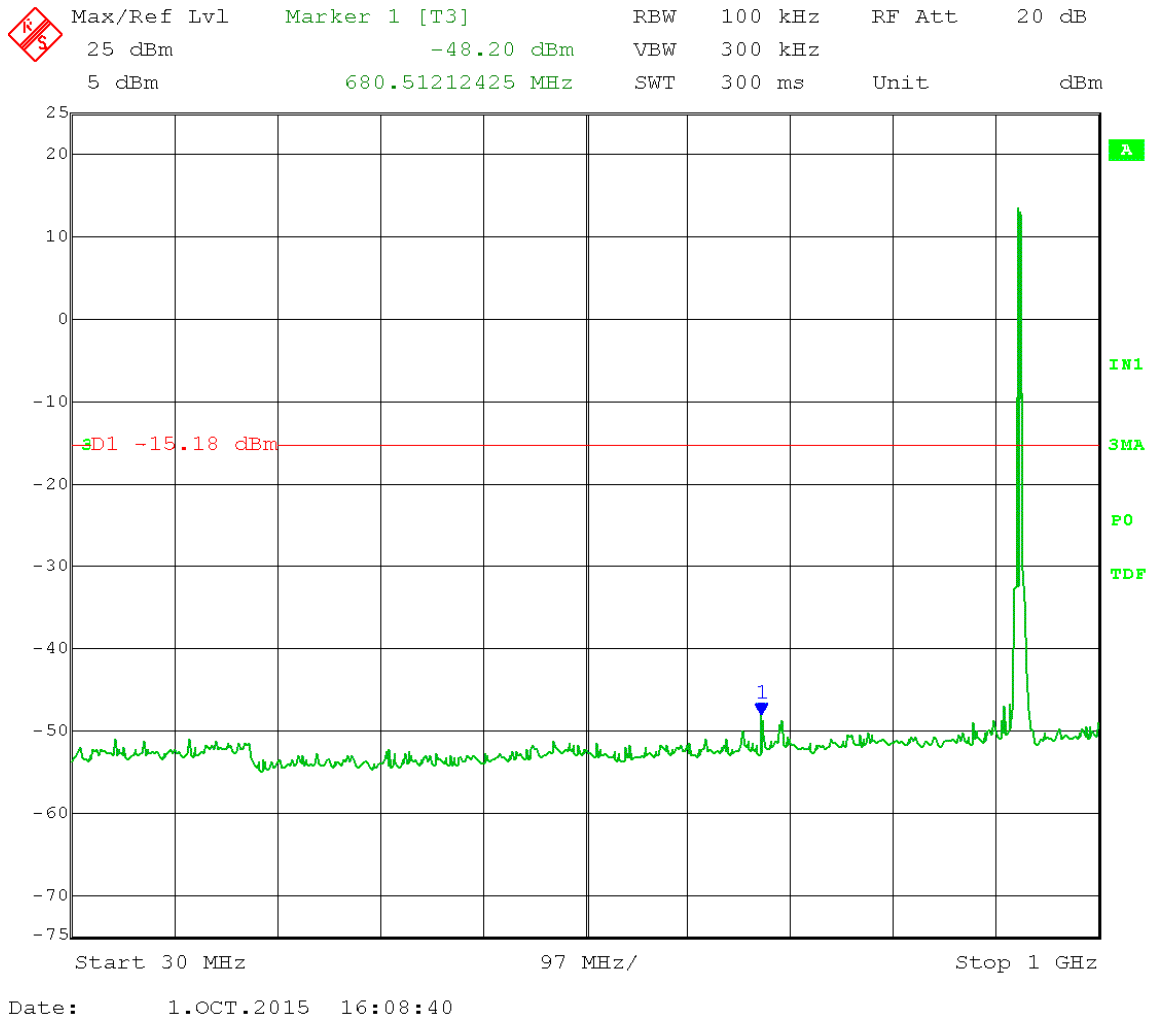
Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Mid Channel Transmit = 915 MHz
Output Power Setting 20 Channel bandwidth: 5 MHz
Output port: A QPSK
Emission Level Measurement
Limit = 13.87 dBm – 30 dB = -16.13 dBm
Frequency range: 1-10 GHz



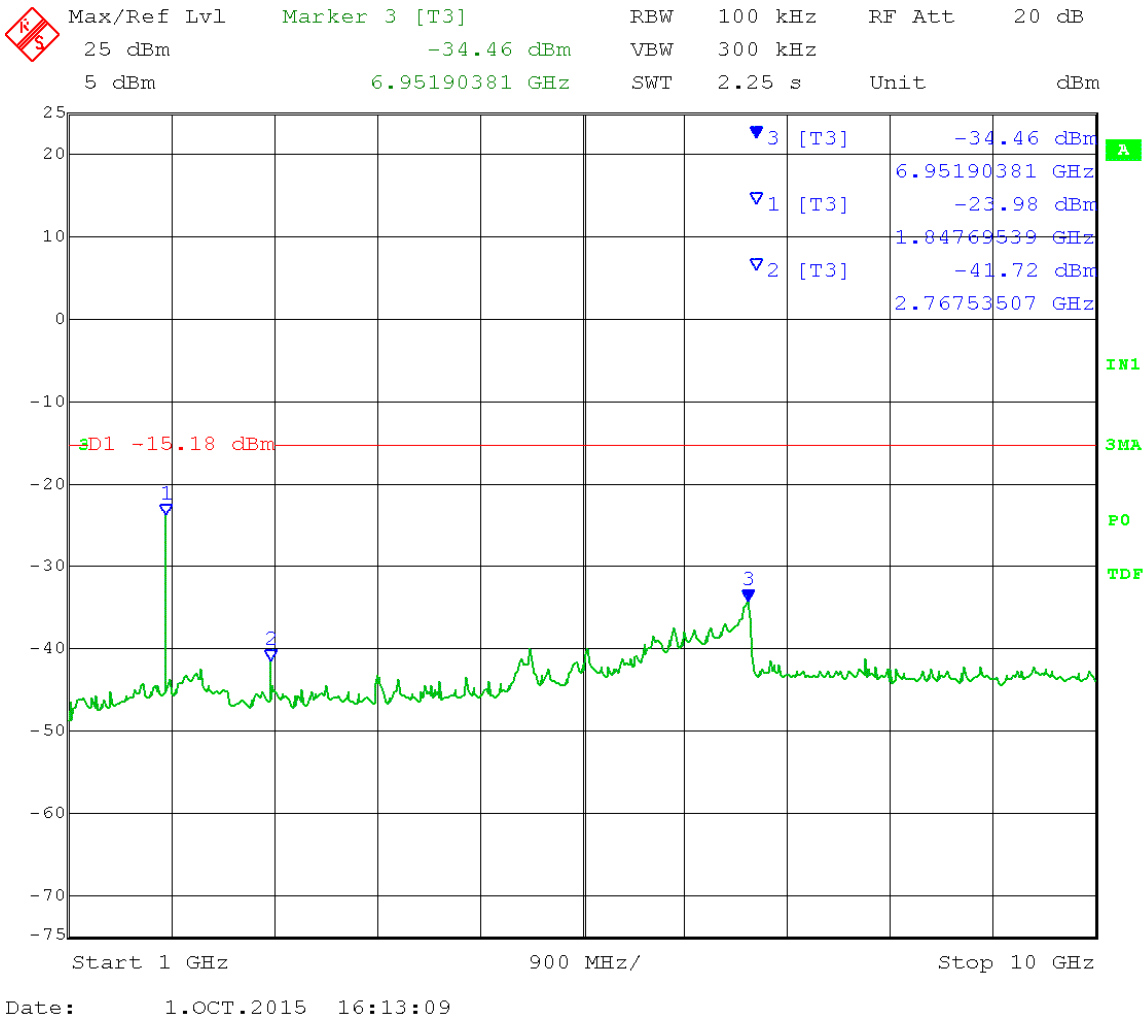
Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold High Channel Transmit = 925.450 MHz
Output Power Setting 21 Channel bandwidth: 5 MHz
Output port: A QPSK
Reference Level Measurement
Limit = 14.82 dBm – 30 dB = -15.18 dBm



Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold High Channel Transmit = 925.450 MHz
Output Power Setting 21 Channel bandwidth: 5 MHz
Output port: A QPSK
Emission Level Measurement
Limit = 14.82 dBm – 30 dB = -15.18 dBm
Frequency range: 30-1000 MHz

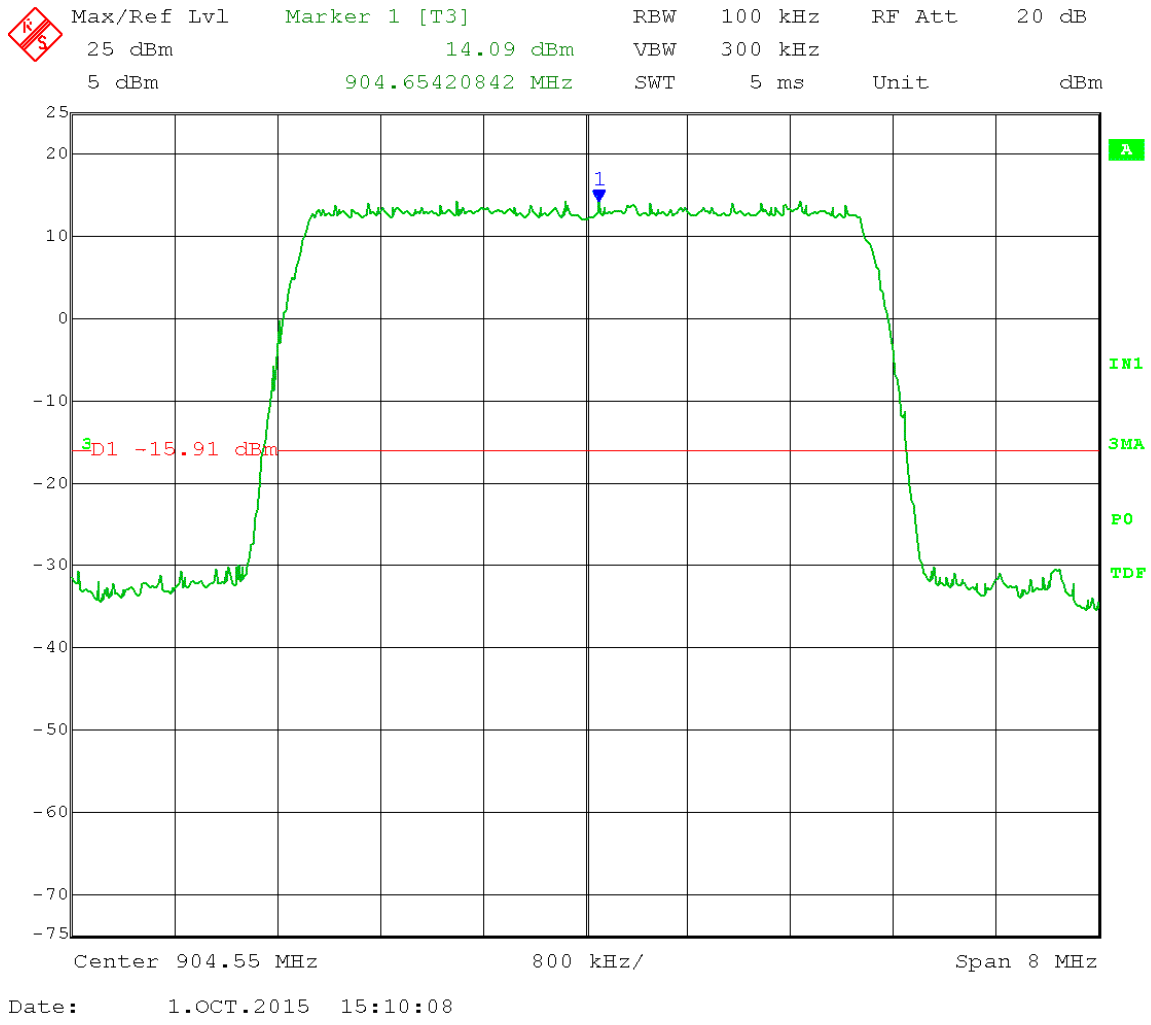


Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold High Channel Transmit = 925.450 MHz
Output Power Setting 21 Channel bandwidth: 5 MHz
Output port: A QPSK
Emission Level Measurement
Limit = 14.82 dBm – 30 dB = -15.18 dBm
Frequency range: 1-10 GHz

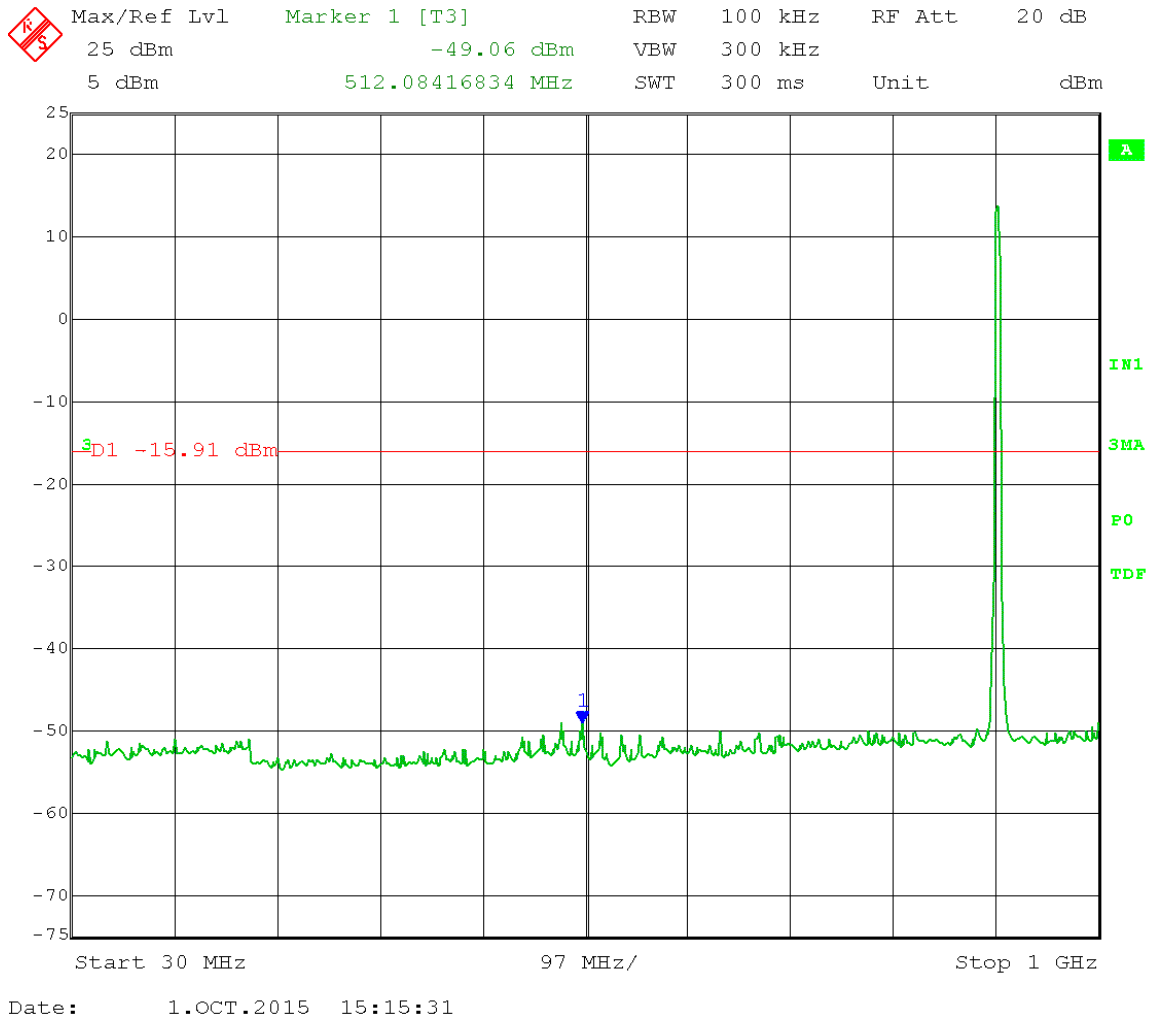


Date: 1.OCT.2015 16:13:09

Test Date:	10-01-2015	
Company:	Cambium Networks	
EUT:	450i 900 MHz SM MAC: 0A003E45FBF2	
Test:	Maximum Unwanted Emission Levels - Conducted	
Operator:	Craig B	
Comment:	RBW = 100 kHz	VBW ≥ 300 kHz
	Detector = Peak	Sweep = Auto Couple
	Trace = Max Hold	Low Channel Transmit = 904.550 MHz
	Output Power Setting 20	Channel bandwidth: 5 MHz
	Output port: B	QPSK
	Reference Level Measurement	
	Limit = 14.09 dBm – 30 dB = -15.91 dBm	

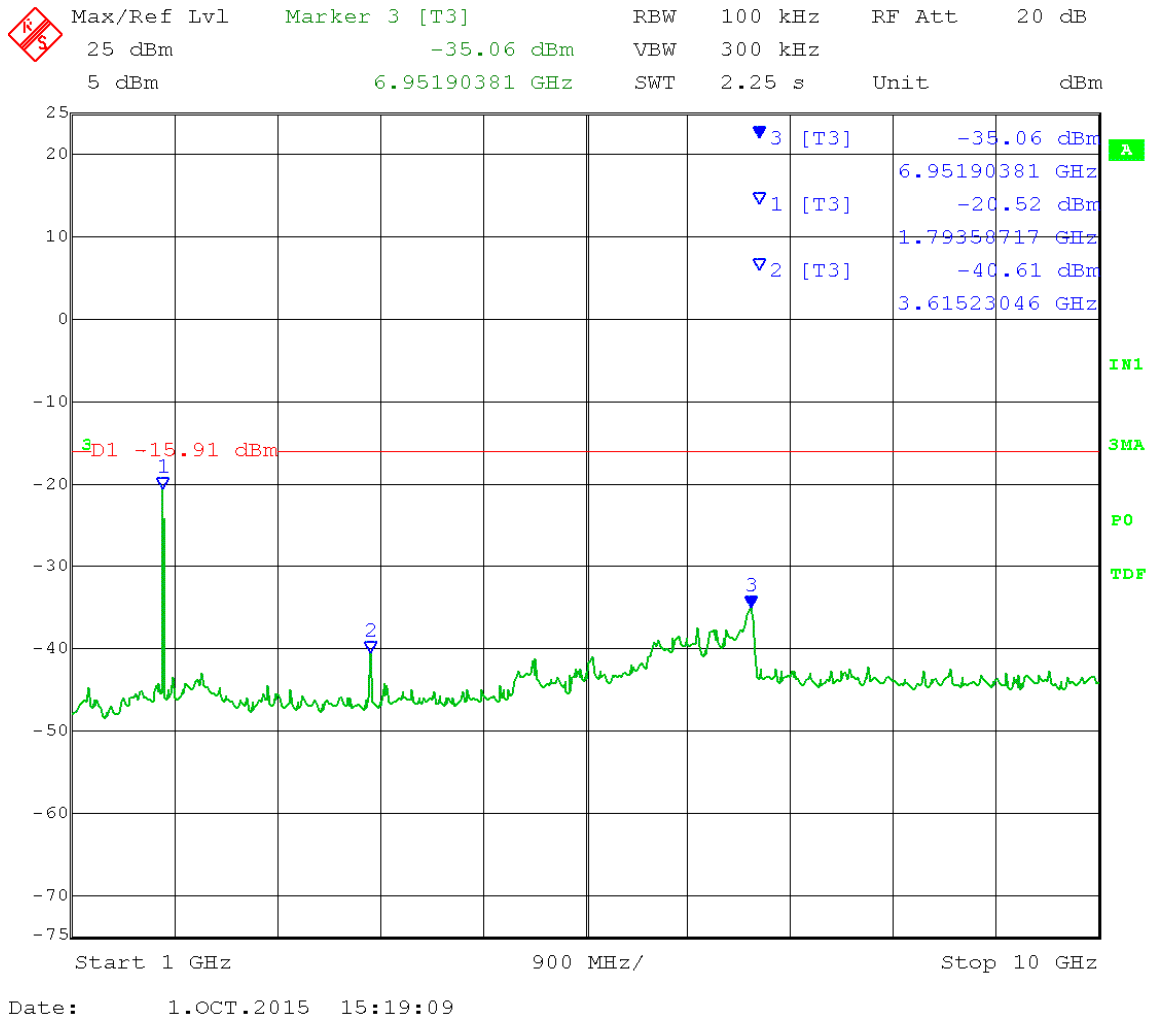


Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Low Channel Transmit = 904.550 MHz
Output Power Setting 20 Channel bandwidth: 5 MHz
Output port: B QPSK
Emission Level Measurement
Limit = 14.09 dBm – 30 dB = -15.91 dBm
Frequency range: 30-1000 MHz



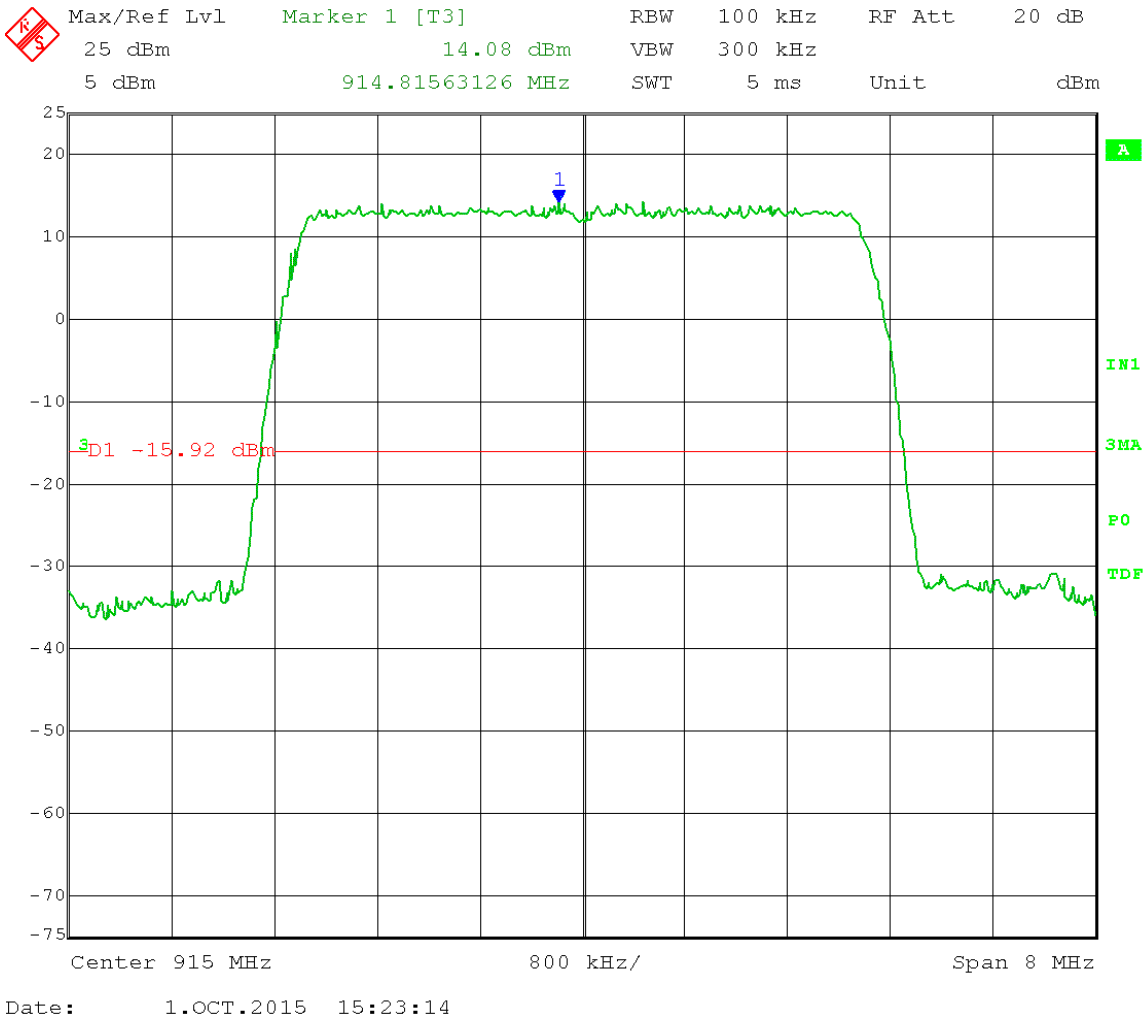
Date: 1.OCT.2015 15:15:31

Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Low Channel Transmit = 904.550 MHz
Output Power Setting 20 Channel bandwidth: 5 MHz
Output port: B QPSK
Emission Level Measurement
Limit = 14.09 dBm – 30 dB = -15.91 dBm
Frequency range: 1-10 GHz

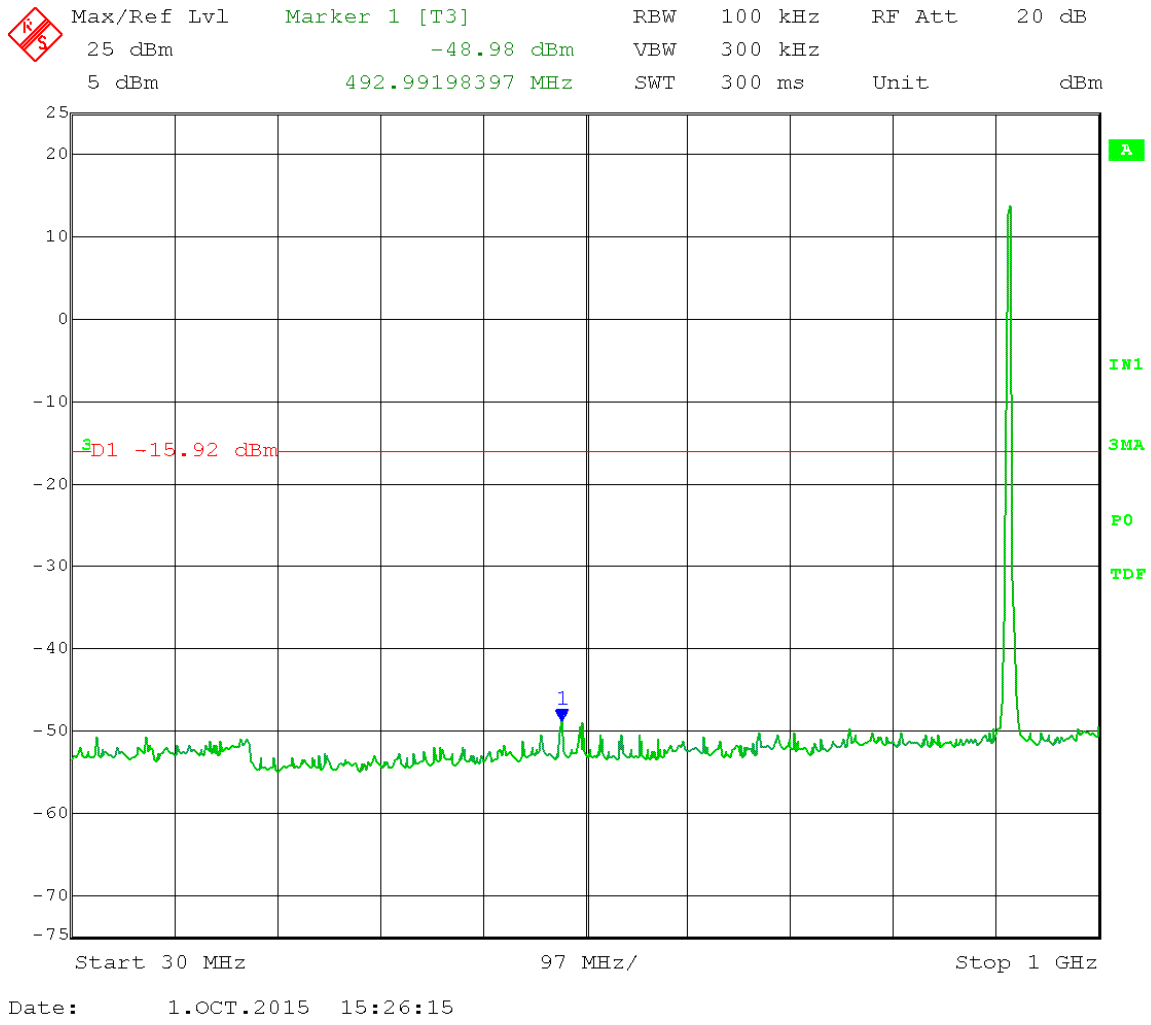


Date: 1.OCT.2015 15:19:09

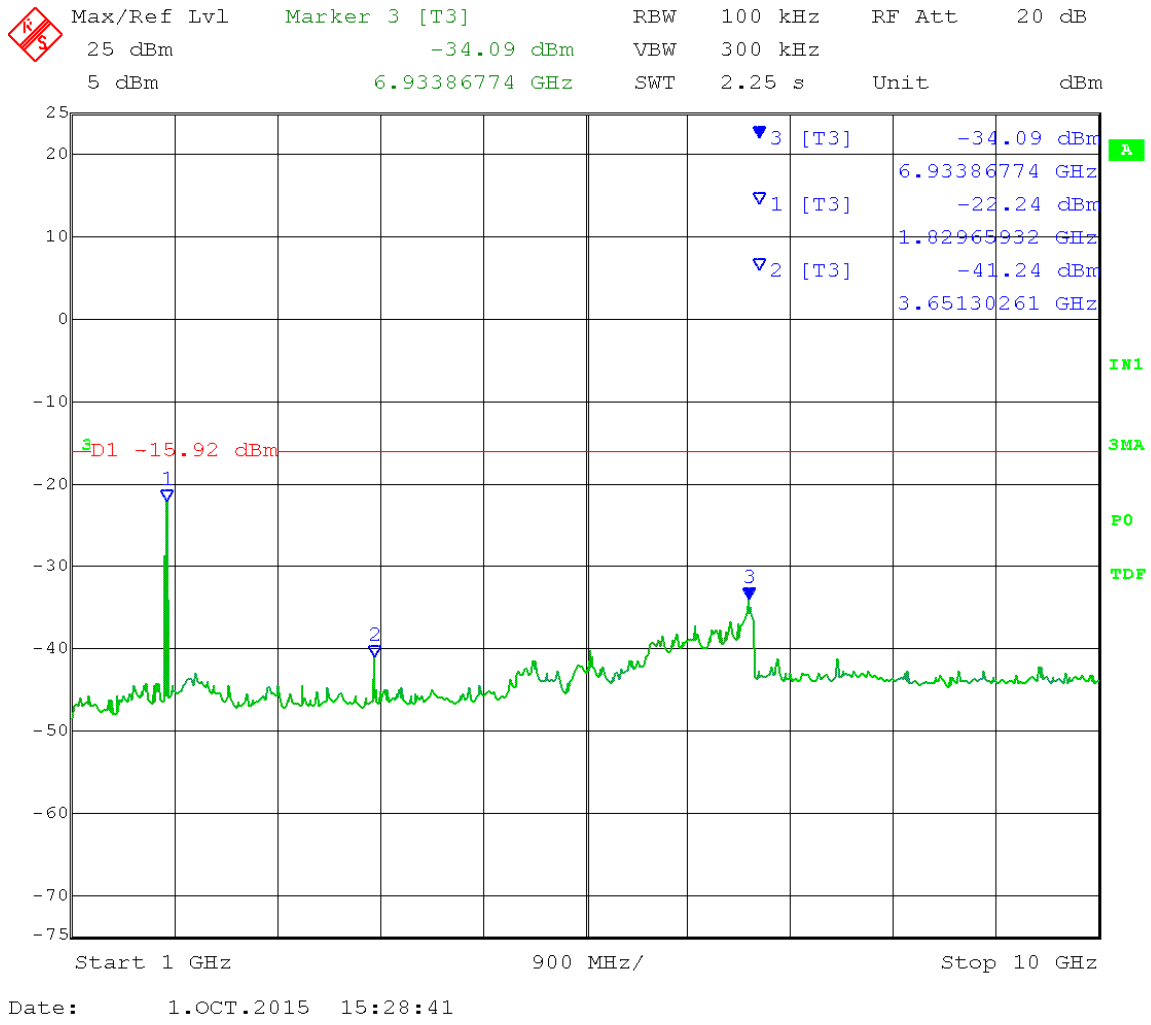
Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Mid Channel Transmit = 915 MHz
Output Power Setting 20 Channel bandwidth: 5 MHz
Output port: B QPSK
Reference Level Measurement
Limit = 14.08 dBm – 30 dB = -15.92 dBm



Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Mid Channel Transmit = 915 MHz
Output Power Setting 20 Channel bandwidth: 5 MHz
Output port: B QPSK
Emission Level Measurement
Limit = 14.08 dBm – 30 dB = -15.92 dBm
Frequency range: 30-1000 MHz

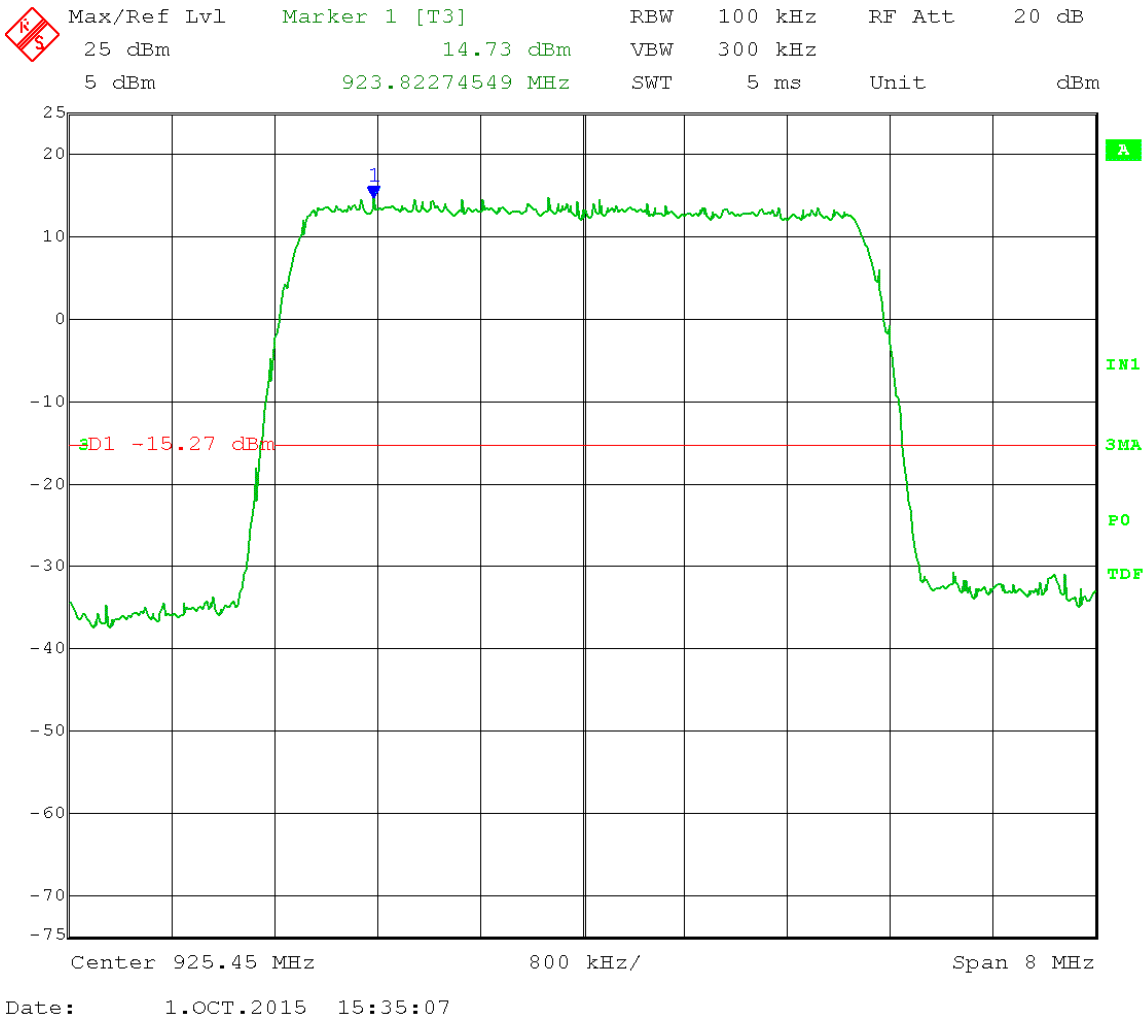


Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Mid Channel Transmit = 915 MHz
Output Power Setting 20 Channel bandwidth: 5 MHz
Output port: B QPSK
Emission Level Measurement
Limit = 14.08 dBm – 30 dB = -15.92 dBm
Frequency range: 1-10 GHz

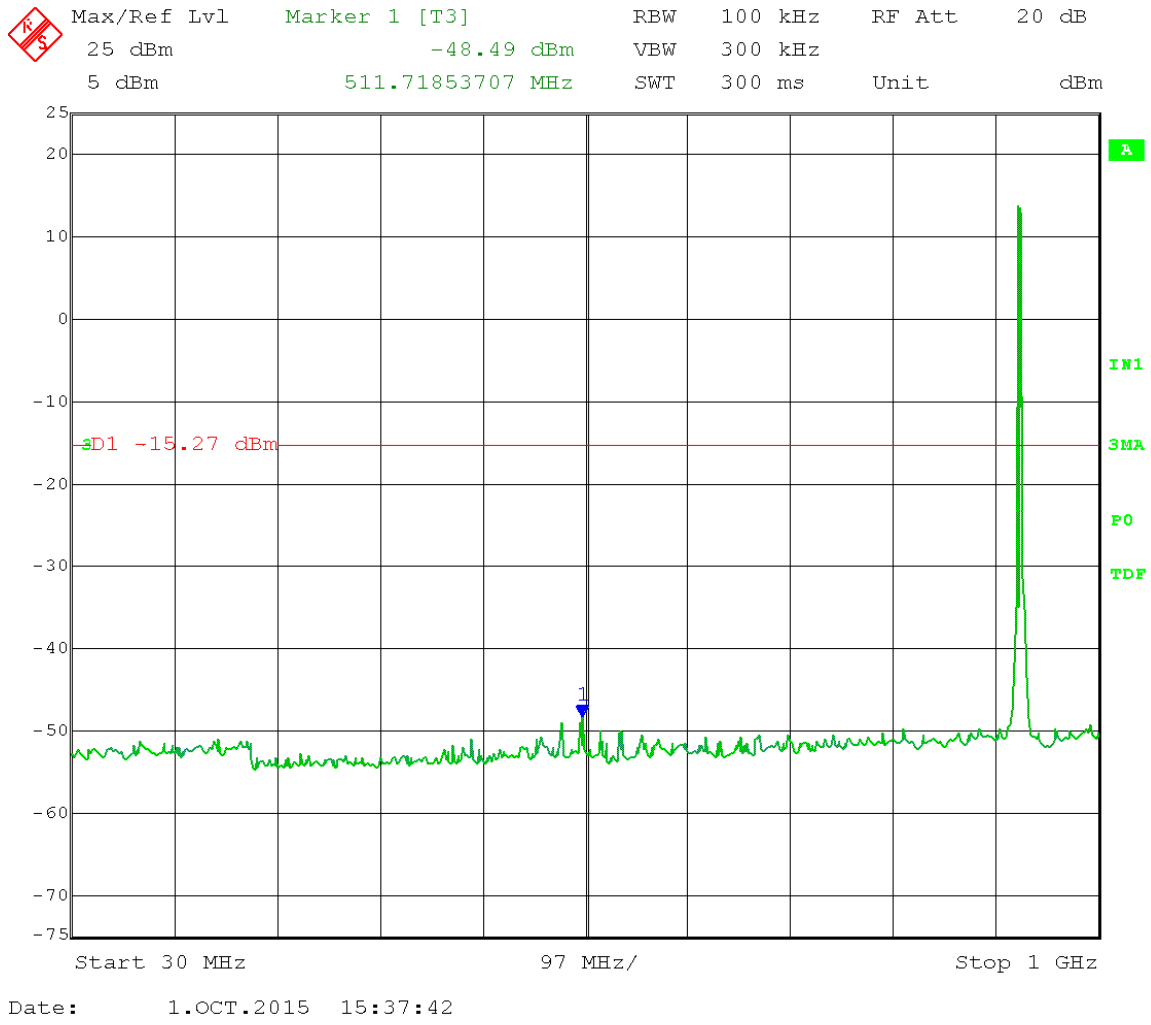


Date: 1.OCT.2015 15:28:41

Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold High Channel Transmit = 925.450 MHz
Output Power Setting 21 Channel bandwidth: 5 MHz
Output port: B QPSK
Reference Level Measurement
Limit = 14.73 dBm – 30 dB = -15.27 dBm

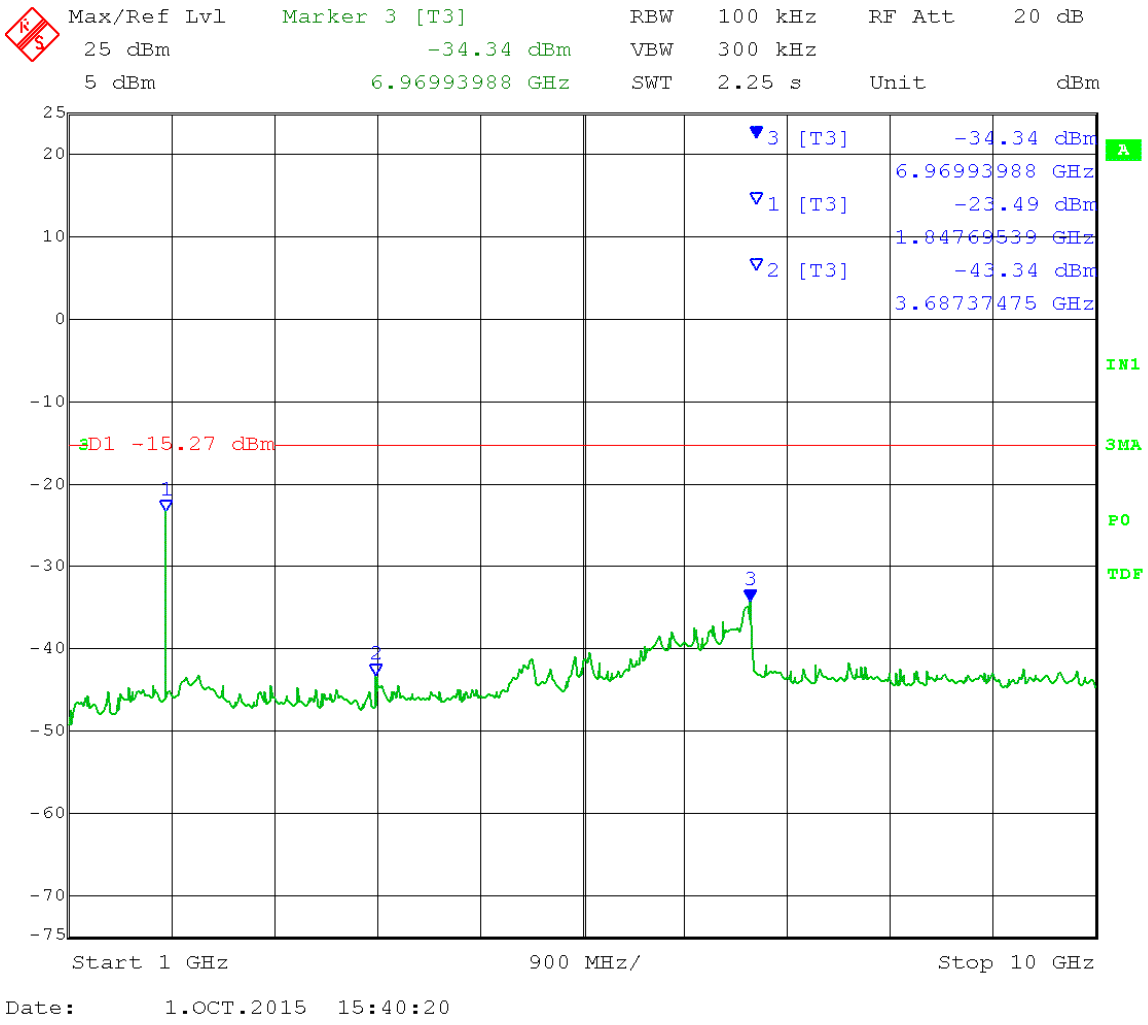


Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold High Channel Transmit = 925.450 MHz
Output Power Setting 21 Channel bandwidth: 5 MHz
Output port: B QPSK
Emission Level Measurement
Limit = 14.73 dBm – 30 dB = -15.27 dBm
Frequency range: 30-1000 MHz



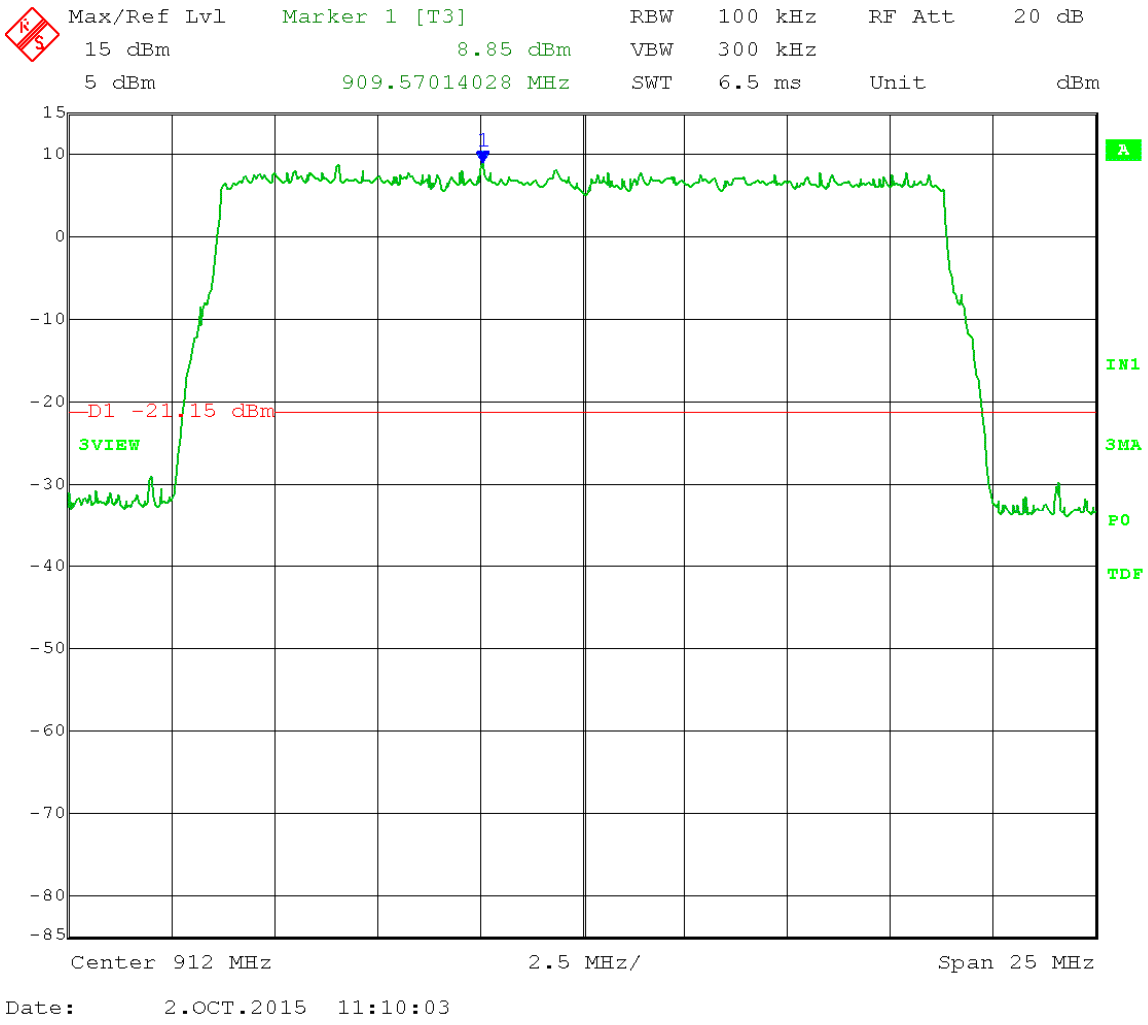
Date: 1.OCT.2015 15:37:42

Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold High Channel Transmit = 925.450 MHz
Output Power Setting 21 Channel bandwidth: 5 MHz
Output port: B QPSK
Emission Level Measurement
Limit = 14.73 dBm – 30 dB = -15.27 dBm
Frequency range: 1-10 GHz

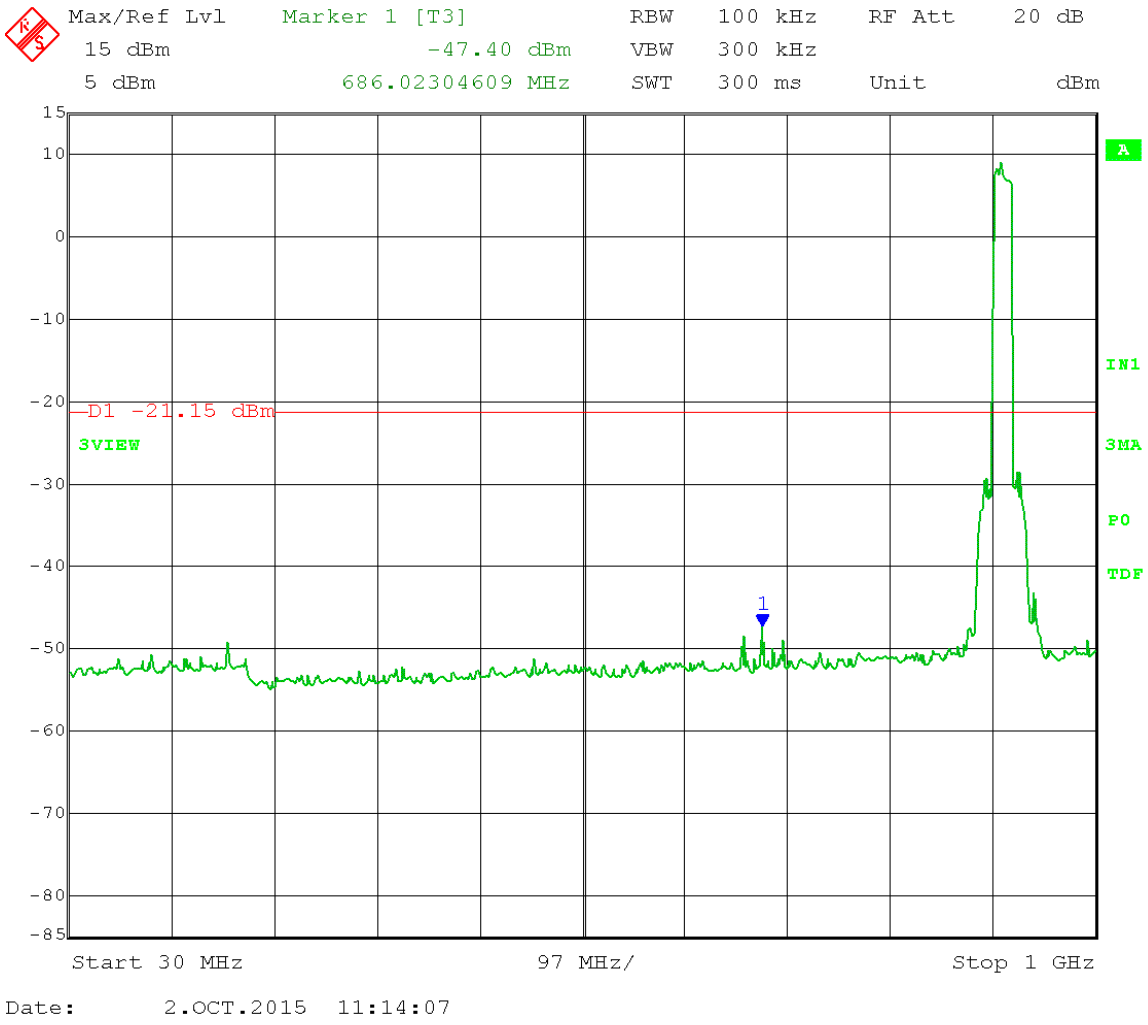


Date: 1.OCT.2015 15:40:20

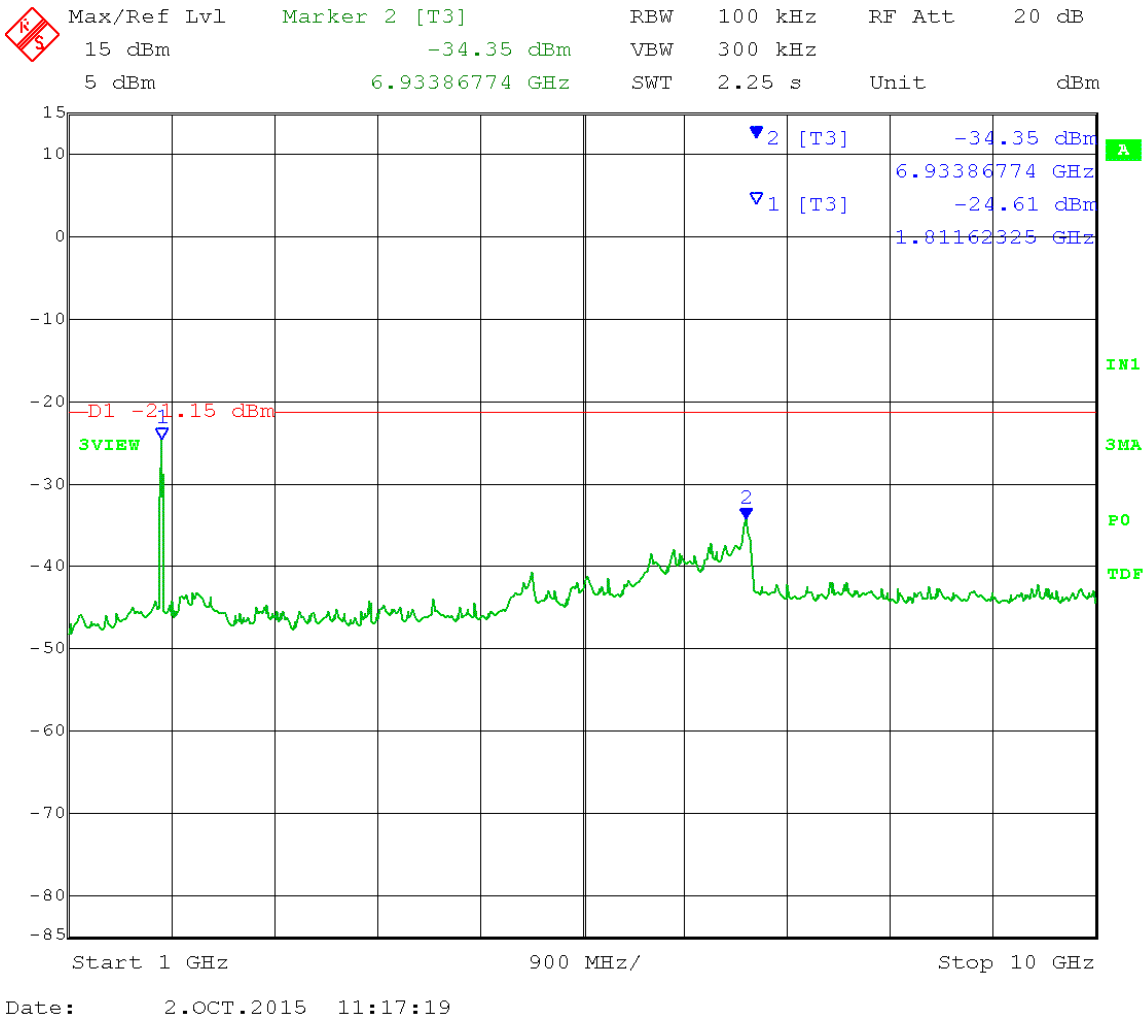
Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Low Channel Transmit = 912 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: A QPSK
Reference Level Measurement
Limit = 8.85 dBm – 30 dB = -21.15 dBm



Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Low Channel Transmit = 912 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: A QPSK
Emission Level Measurement
Limit = 8.85 dBm – 30 dB = -21.15 dBm
Frequency range: 30-1000 MHz

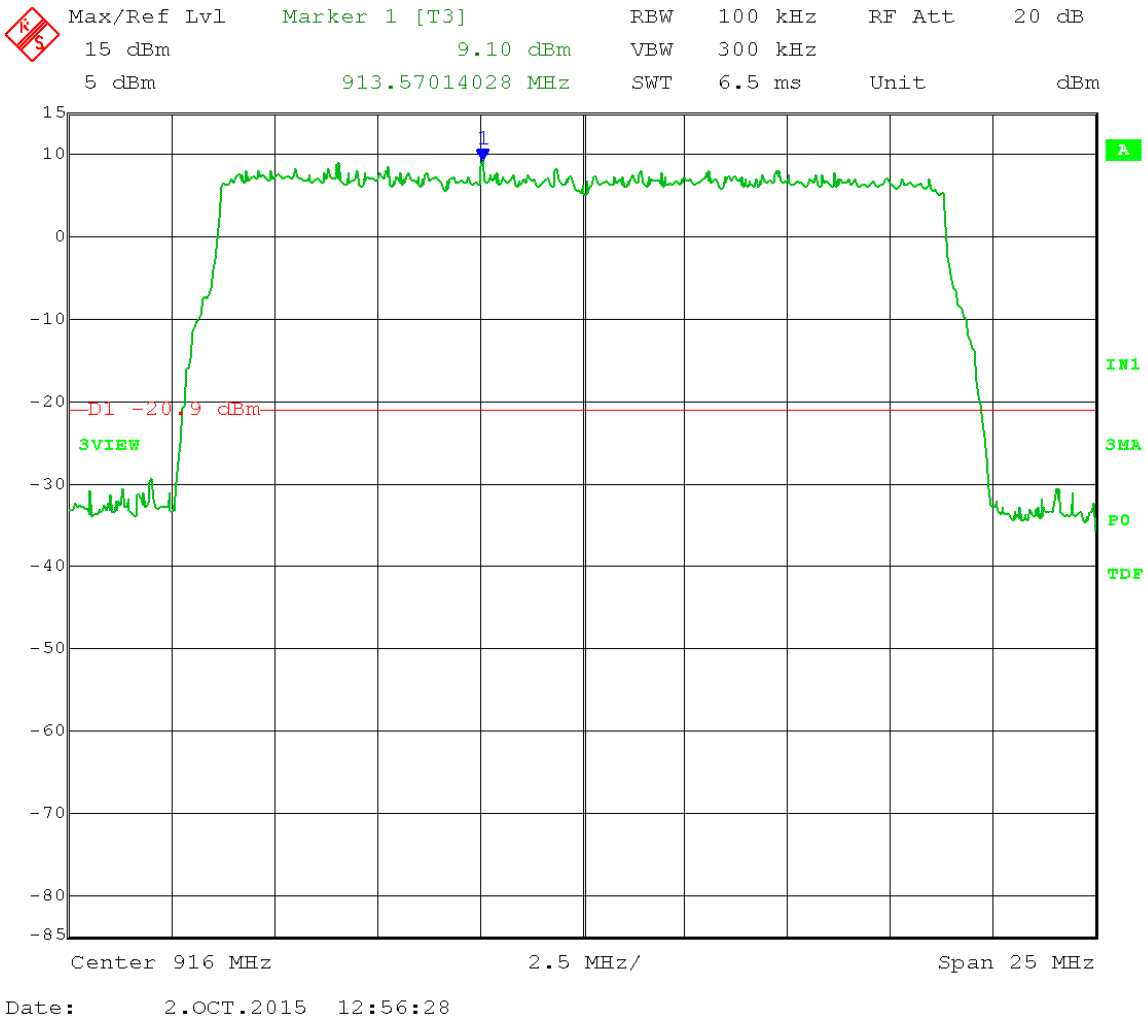


Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Low Channel Transmit = 912 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: A QPSK
Emission Level Measurement
Limit = 8.85 dBm – 30 dB = -21.15 dBm
Frequency range: 1-10 GHz

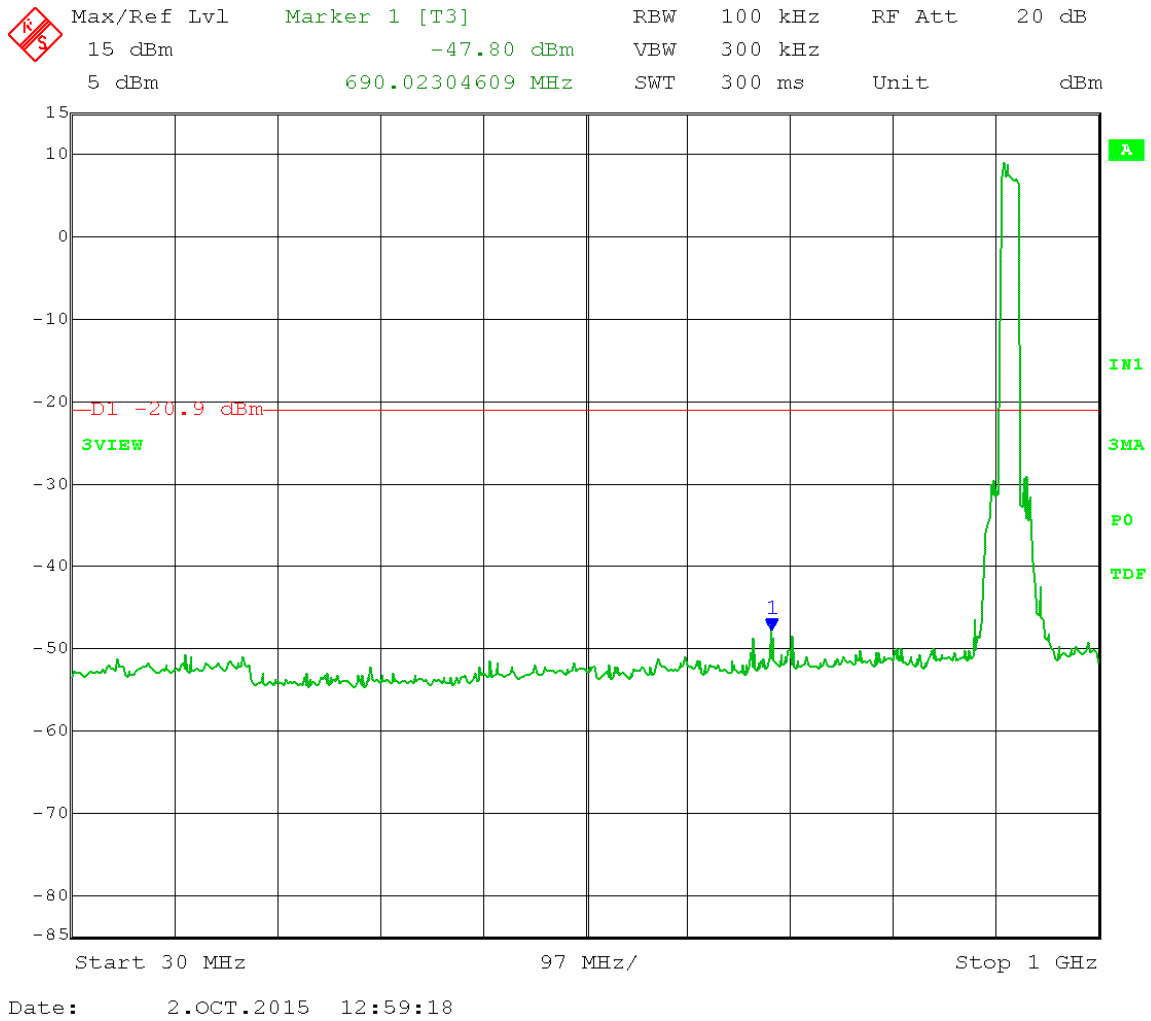


Date: 2.OCT.2015 11:17:19

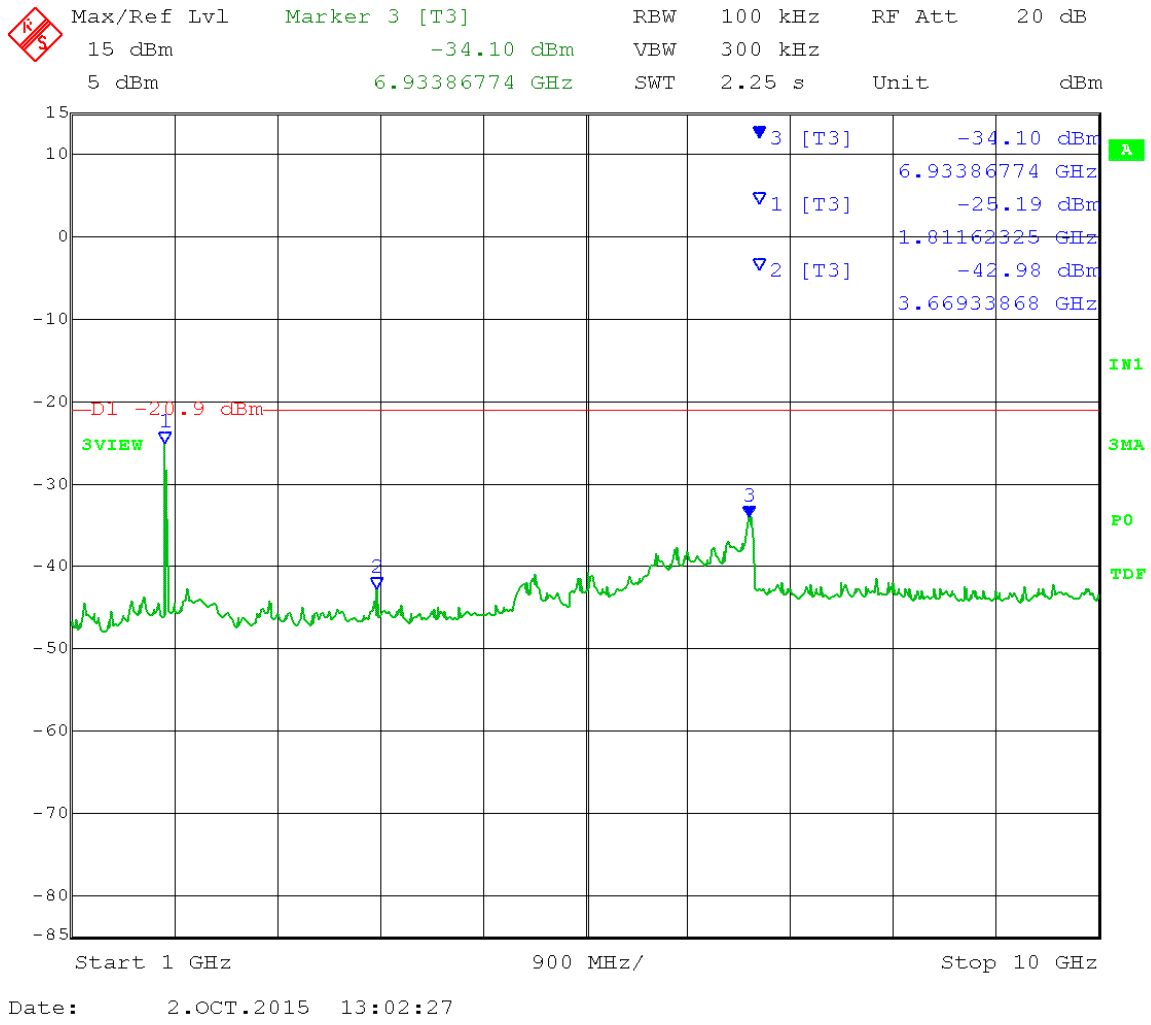
Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Mid Channel Transmit = 916 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: A QPSK
Reference Level Measurement
Limit = 9.10 dBm – 30 dB = -20.90 dBm



Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Mid Channel Transmit = 916 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: A QPSK
Emission Level Measurement
Limit = 9.10 dBm – 30 dB = -20.90 dBm
Frequency range: 30-1000 MHz

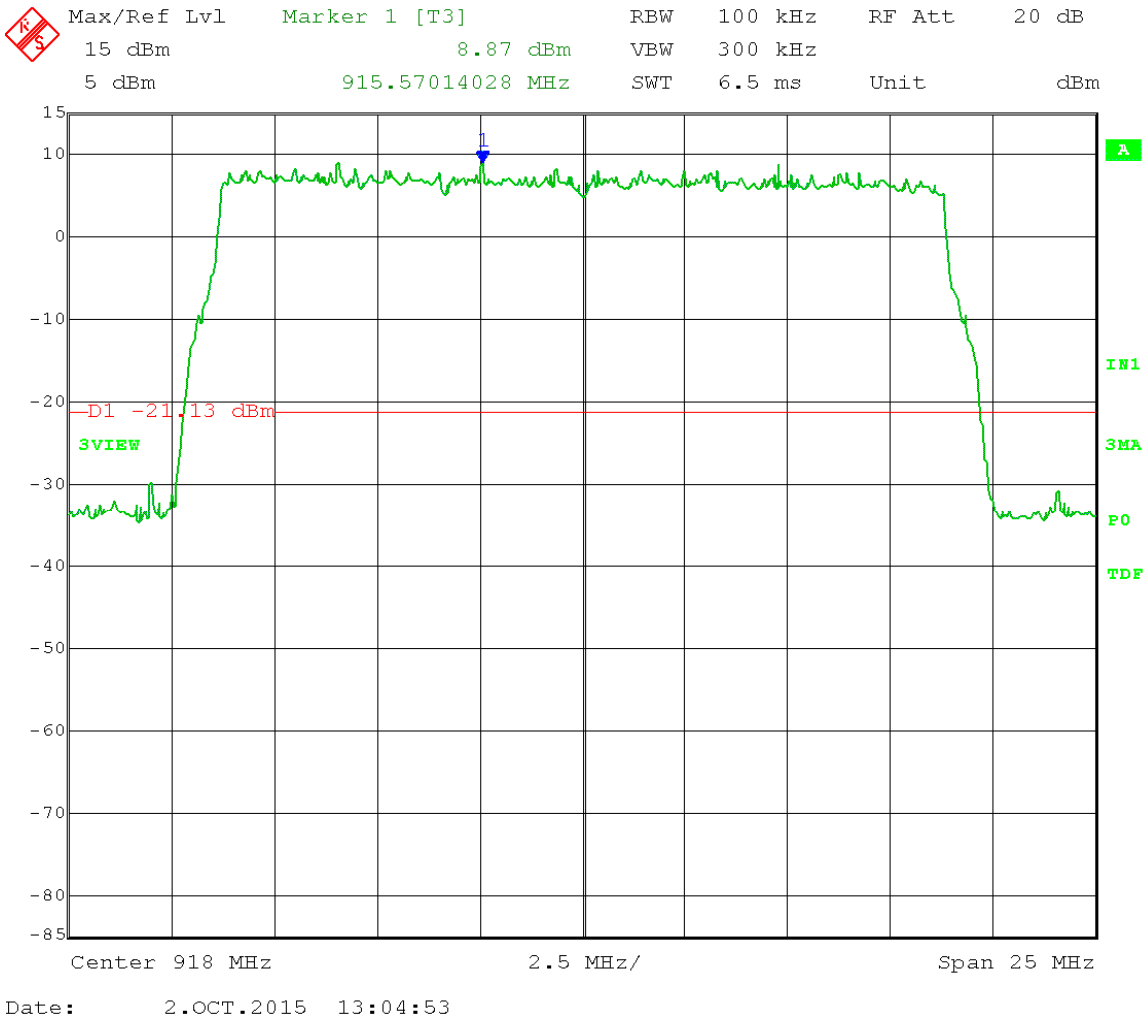


Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Mid Channel Transmit = 916 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: A QPSK
Emission Level Measurement
Limit = 9.10 dBm – 30 dB = -20.90 dBm
Frequency range: 1-10 GHz

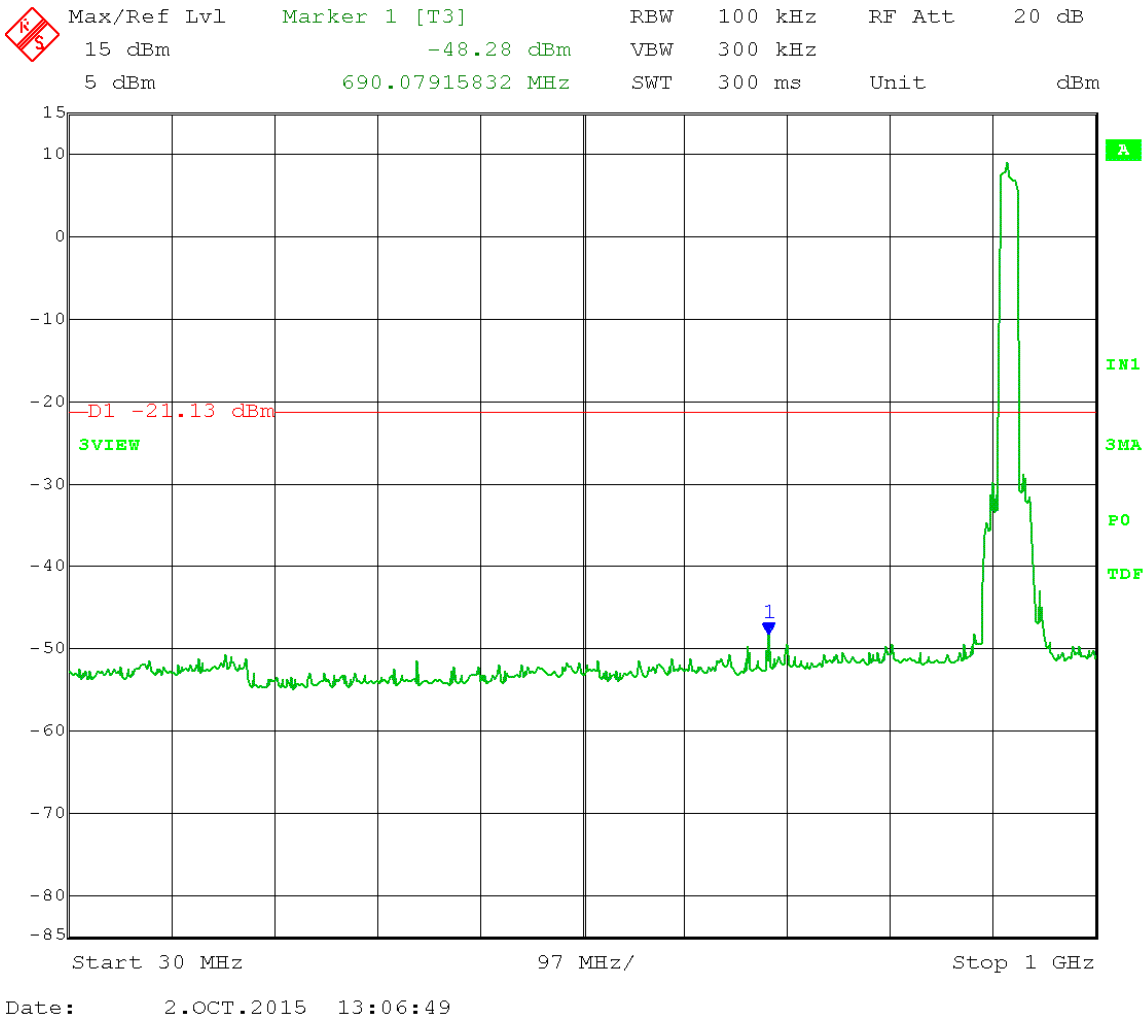


Date: 2.OCT.2015 13:02:27

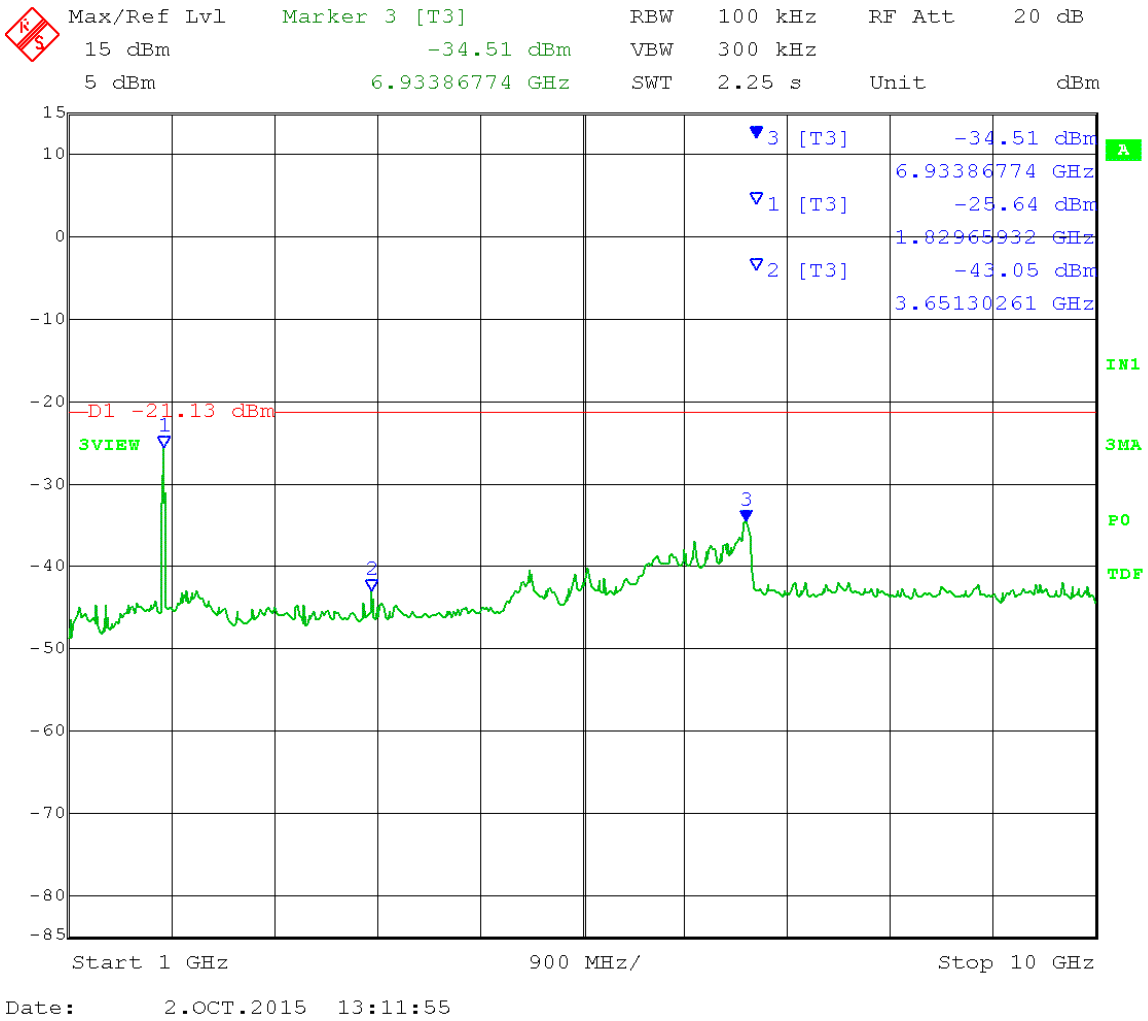
Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold High Channel Transmit = 918 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: A QPSK
Reference Level Measurement
Limit = 8.87 dBm – 30 dB = -21.13 dBm



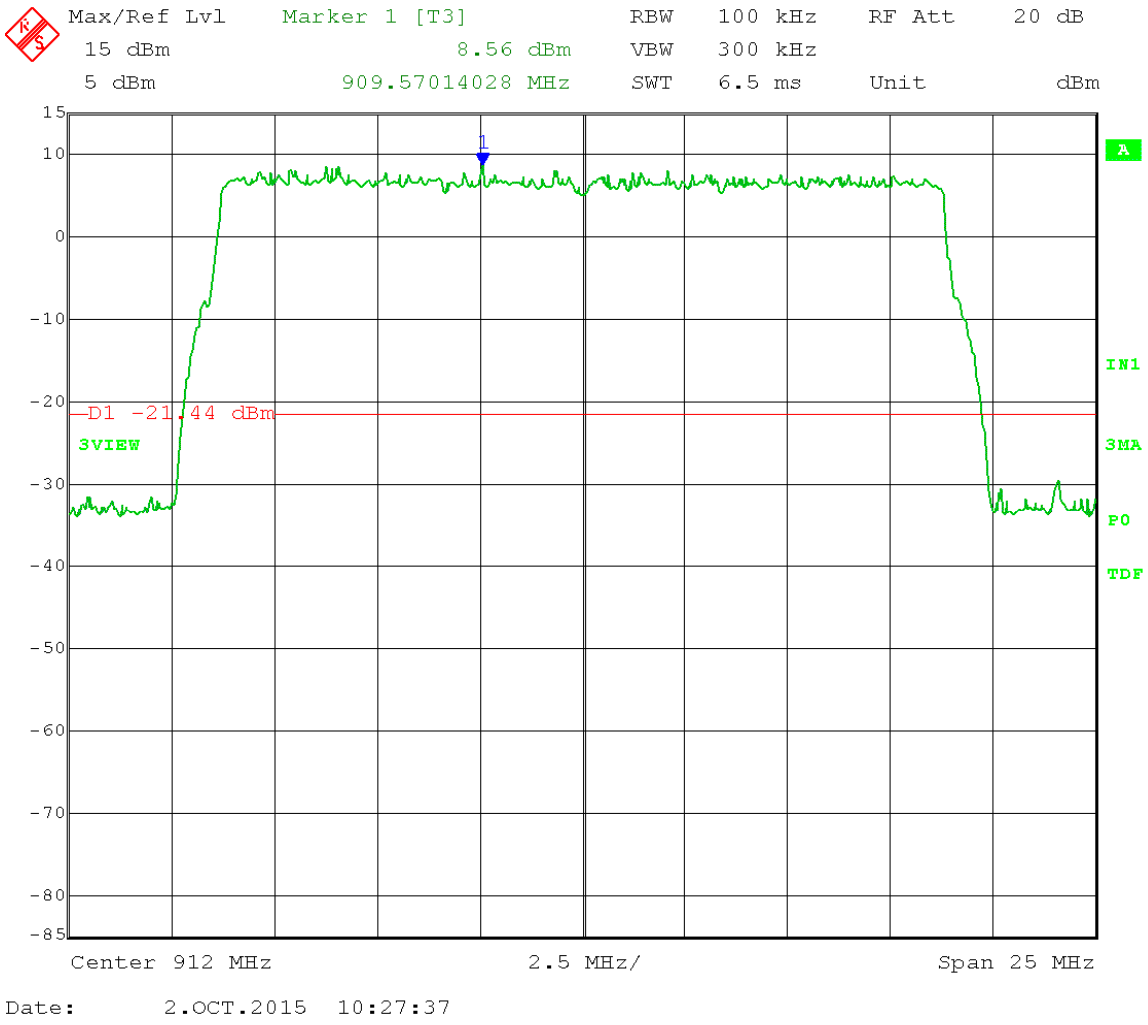
Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold High Channel Transmit = 918 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: A QPSK
Emission Level Measurement
Limit = 8.87 dBm – 30 dB = -21.13 dBm
Frequency range: 30-1000 MHz



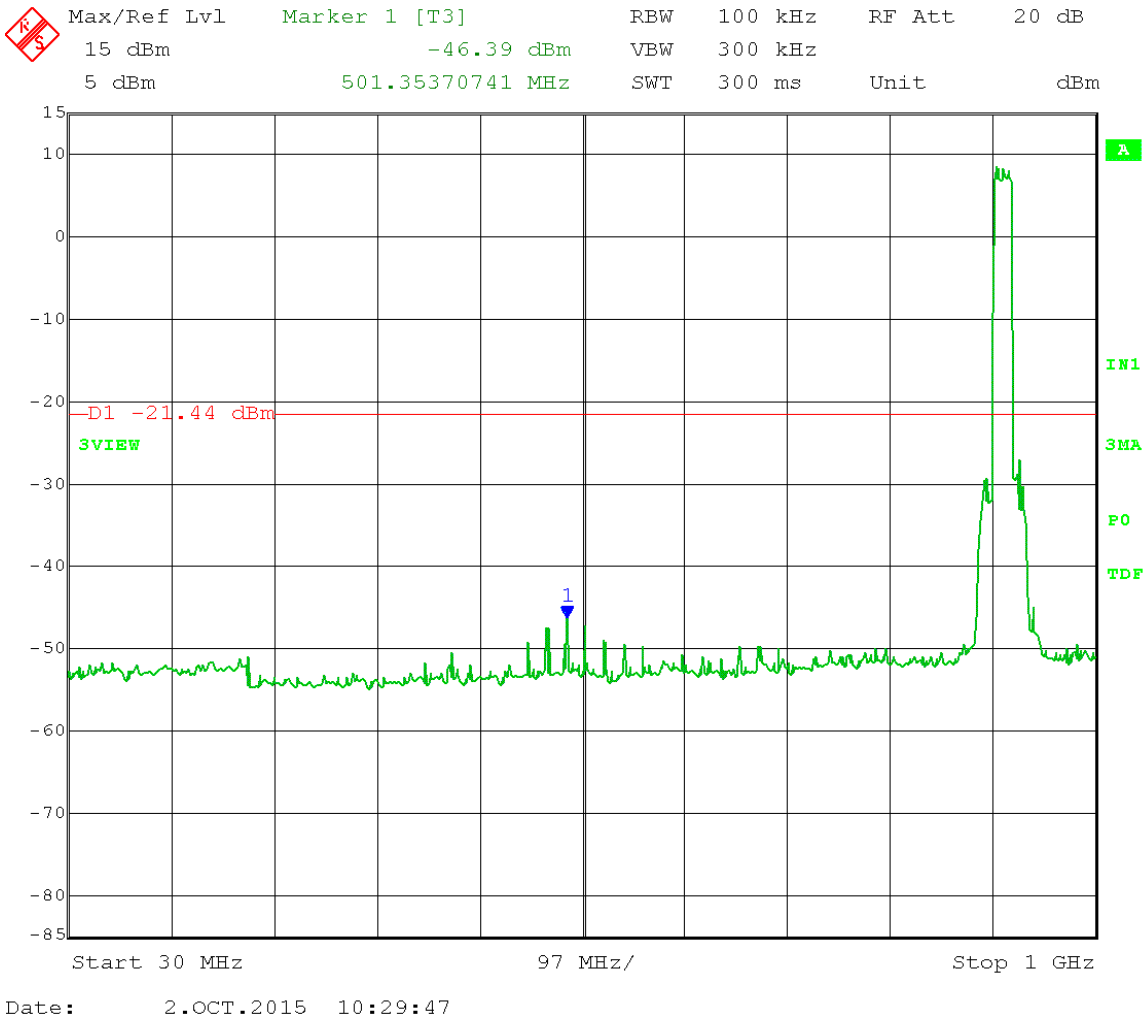
Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold High Channel Transmit = 918 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: A QPSK
Emission Level Measurement
Limit = 8.87 dBm – 30 dB = -21.13 dBm
Frequency range: 1-10 GHz



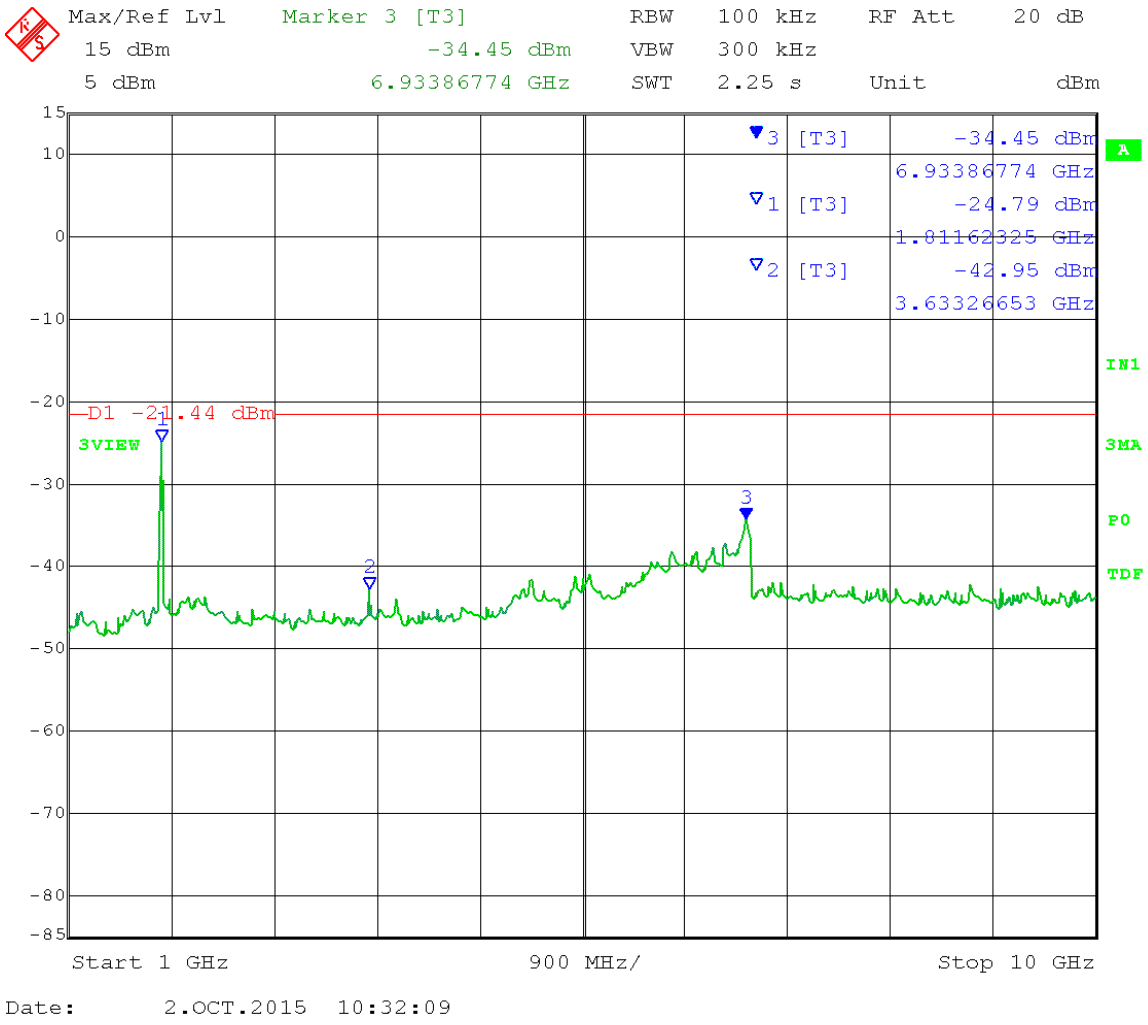
Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Low Channel Transmit = 912 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: B QPSK
Reference Level Measurement
Limit = 8.56 dBm – 30 dB = -21.44 dBm



Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Low Channel Transmit = 912 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: B QPSK
Emission Level Measurement
Limit = 8.56 dBm – 30 dB = -21.44 dBm
Frequency range: 30-1000 MHz

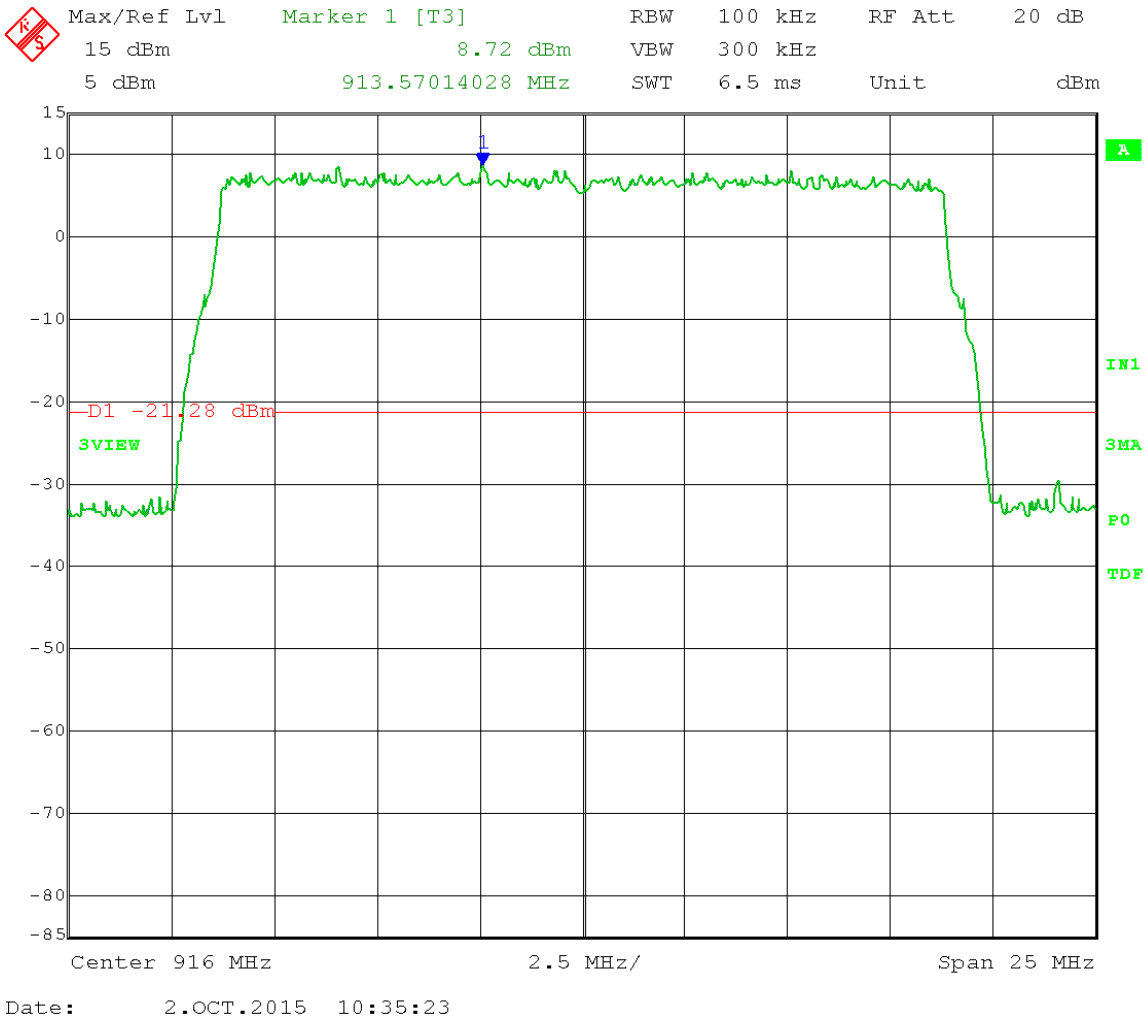


Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Low Channel Transmit = 912 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: B QPSK
Emission Level Measurement
Limit = 8.56 dBm – 30 dB = -21.44 dBm
Frequency range: 1-10 GHz

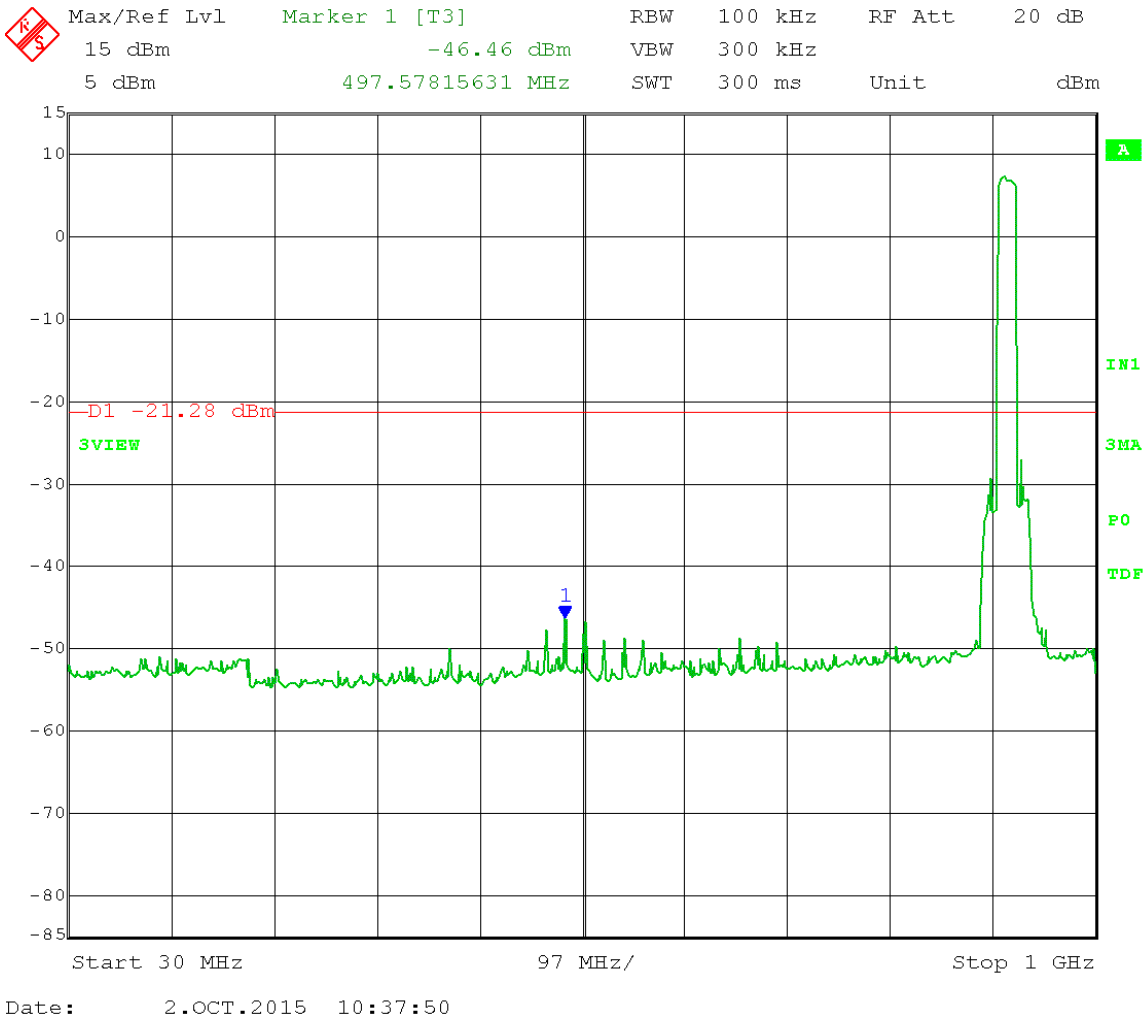


Date: 2.OCT.2015 10:32:09

Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Mid Channel Transmit = 916 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: B QPSK
Reference Level Measurement
Limit = 8.72 dBm – 30 dB = -21.28 dBm



Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold Mid Channel Transmit = 916 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: B QPSK
Emission Level Measurement
Limit = 8.72 dBm – 30 dB = -21.28 dBm
Frequency range: 30-1000 MHz

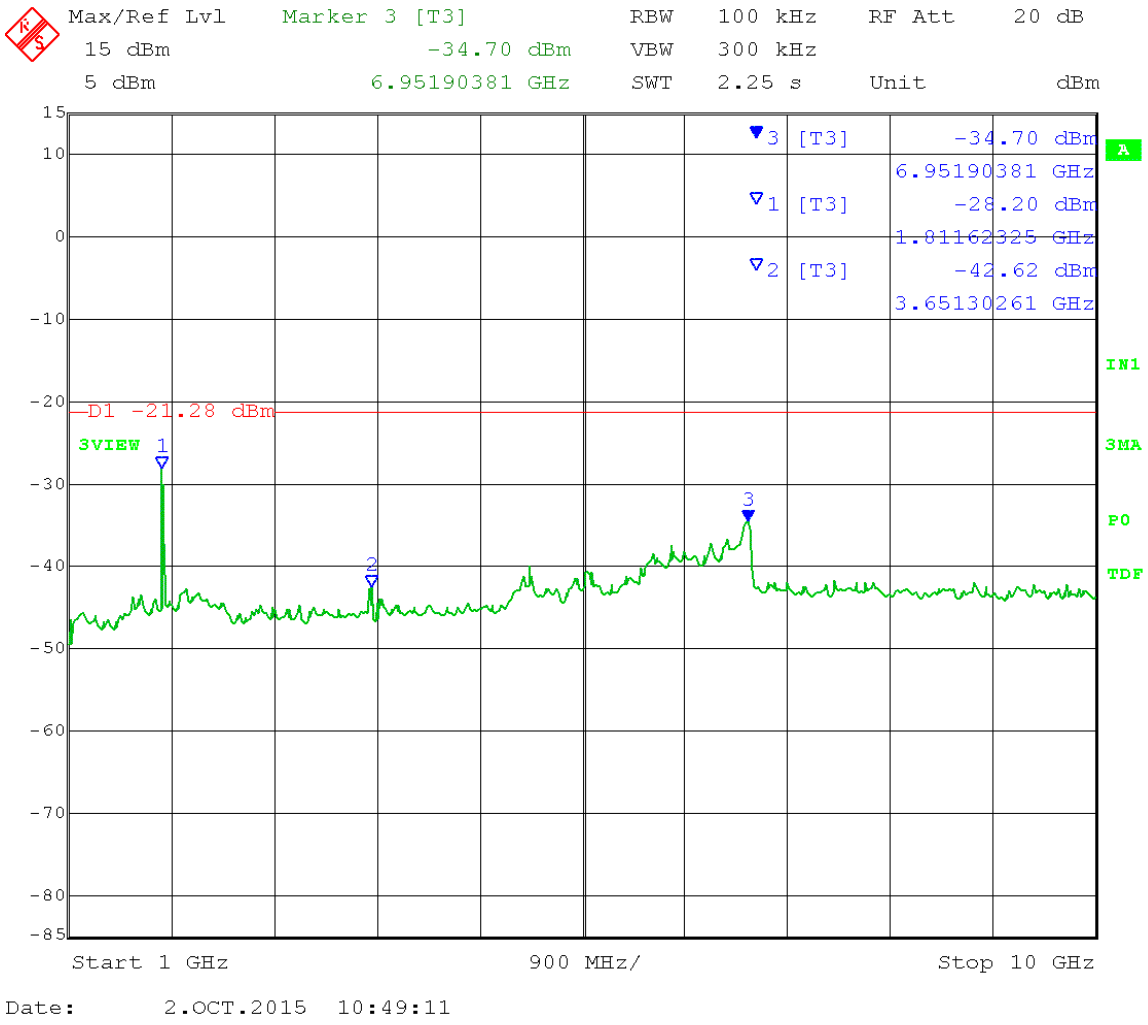


Test Date:	10-02-2015	
Company:	Cambium Networks	
EUT:	450i 900 MHz SM MAC: 0A003E45FBF2	
Test:	Maximum Unwanted Emission Levels - Conducted	
Operator:	Craig B	
Comment:	RBW = 100 kHz	VBW ≥ 300 kHz
	Detector = Peak	Sweep = Auto Couple
	Trace = Max Hold	Mid Channel Transmit = 916 MHz
	Output Power Setting 21	Channel bandwidth: 20 MHz
	Output port: B	QPSK

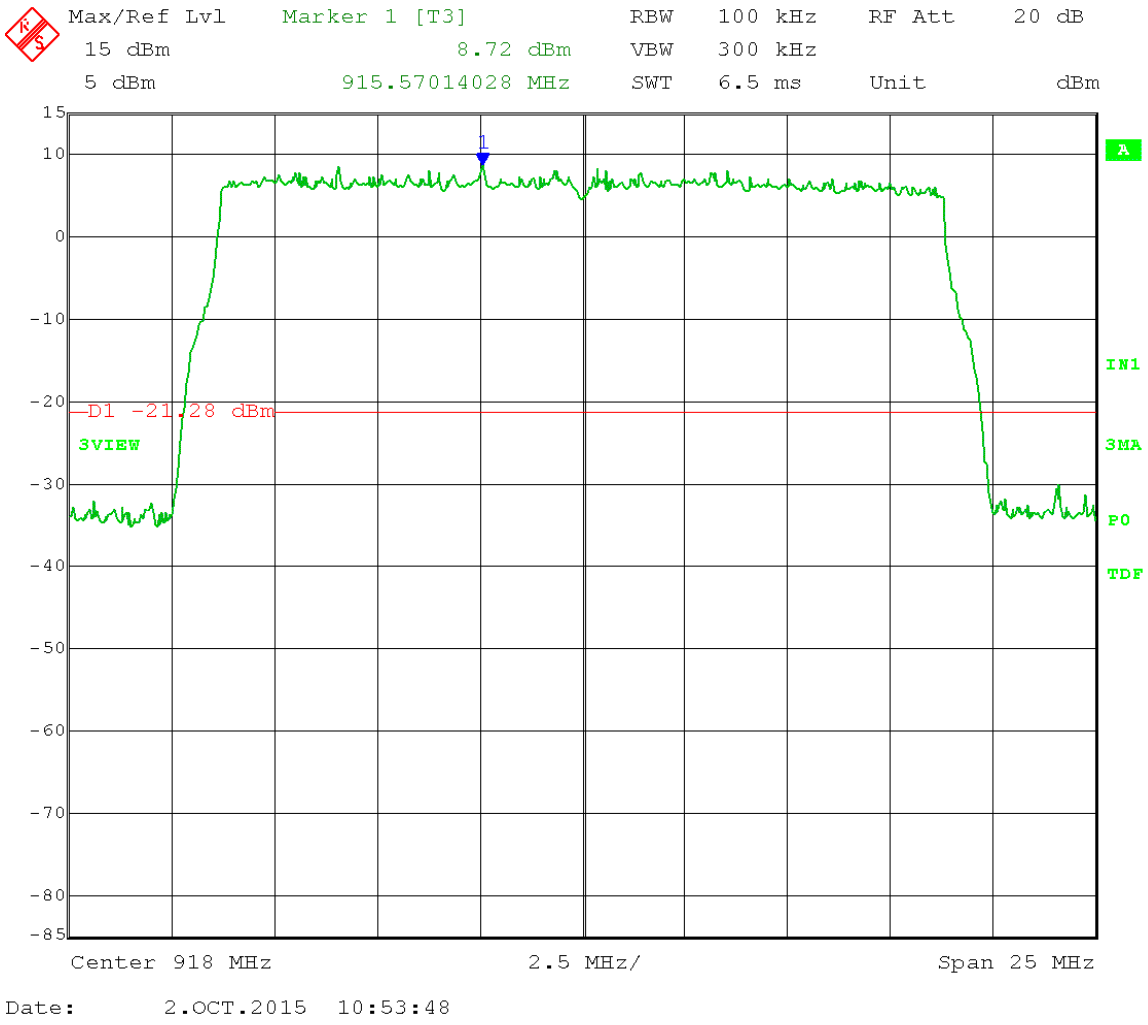
Emission Level Measurement

Limit = 8.72 dBm – 30 dB = -21.28 dBm

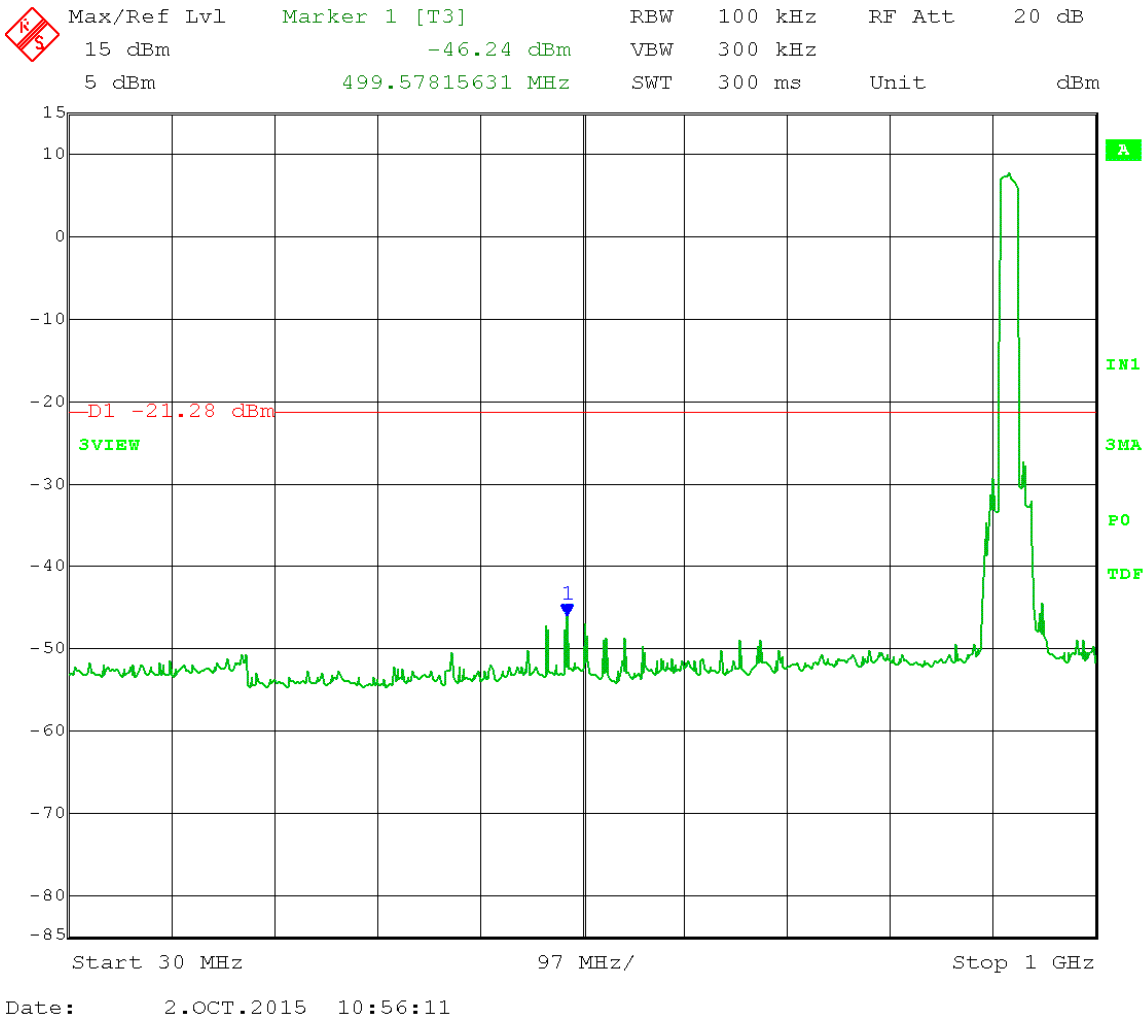
Frequency range: 1-10 GHz



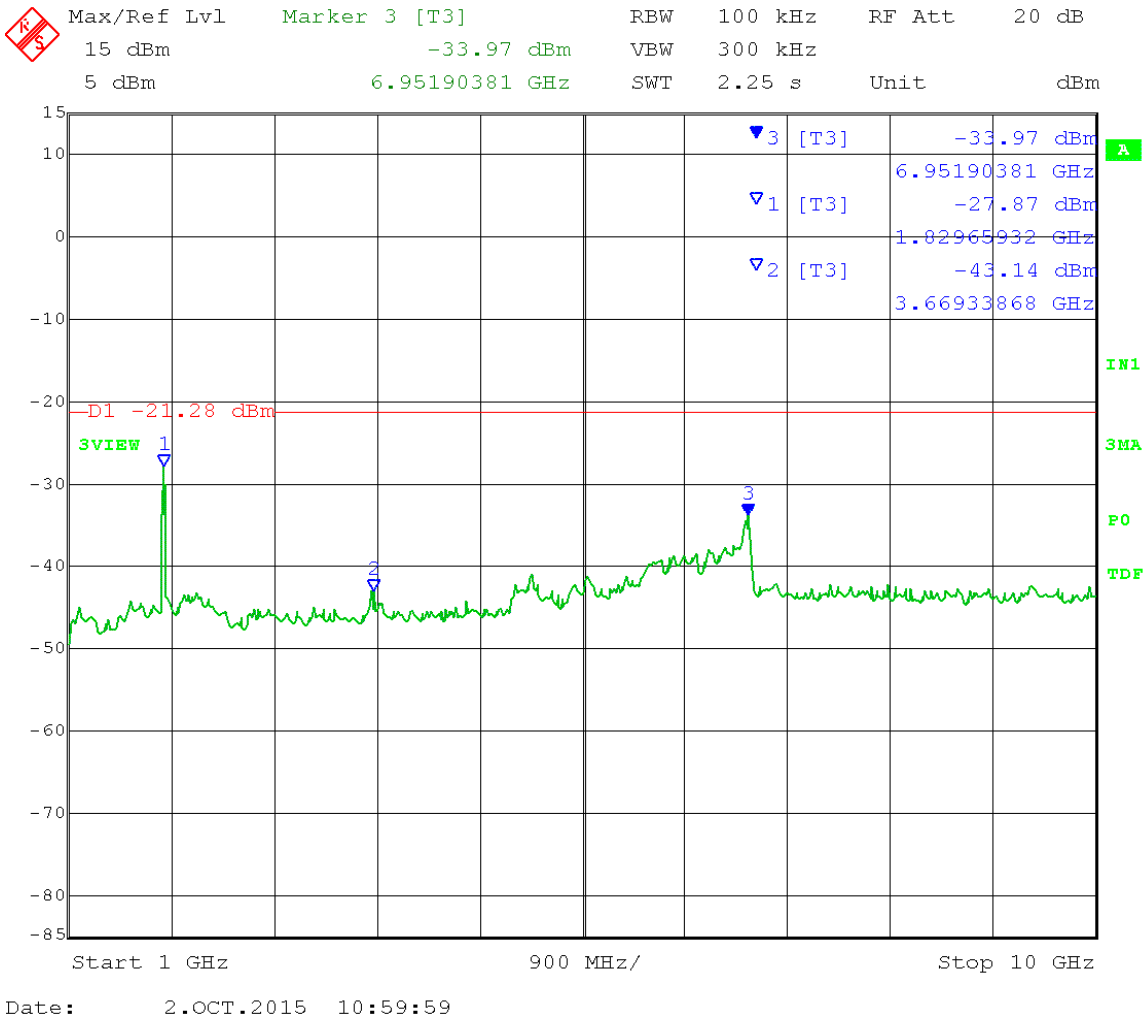
Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold High Channel Transmit = 918 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: B QPSK
Reference Level Measurement
Limit = 8.72 dBm – 30 dB = -21.28 dBm



Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold High Channel Transmit = 918 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: B QPSK
Emission Level Measurement
Limit = 8.72 dBm – 30 dB = -21.28 dBm
Frequency range: 30-1000 MHz



Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Maximum Unwanted Emission Levels - Conducted
Operator: Craig B
Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = Auto Couple
Trace = Max Hold High Channel Transmit = 918 MHz
Output Power Setting 21 Channel bandwidth: 20 MHz
Output port: B QPSK
Emission Level Measurement
Limit = 8.72 dBm – 30 dB = -21.28 dBm
Frequency range: 1-10 GHz



Appendix B – Measurement Data

B6.0 Radiated Spurious Emissions in Restricted Bands – Below 1GHz

Tested with 12 dBi Yagi Antenna

Rule Part: 15.247(d); 15.209

Test Procedure: ANSI C63.10, 2013, FCC KDB 558074 Guidance on Measurements for Digital Transmission Systems

Limit: FCC 15.209

Results: PASS

Notes: The measurement bandwidth on the receiver was set to 120 kHz from 30 to1000 MHz. The detector was set to Quasi-Peak. The test distance was 3 meters. The EUT was set to Max. Power output and Max. Duty Cycle with both antenna transmitting simultaneously. Low, Mid, and High channels were explored and the worst case was reported.

FCC Part 15.209

Electric Field Strength

EUT: 450I 900MHz SM
Manufacturer: Cambium Networks
Operating Condition: 63 deg. F; 47% R.H.
Test Site: DLS Site 2
Operator: Paul L
Test Specification: 120VAC 60Hz 30VDC to EUT
Comment: 5MHz BW
Date: 10-2-2015

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)

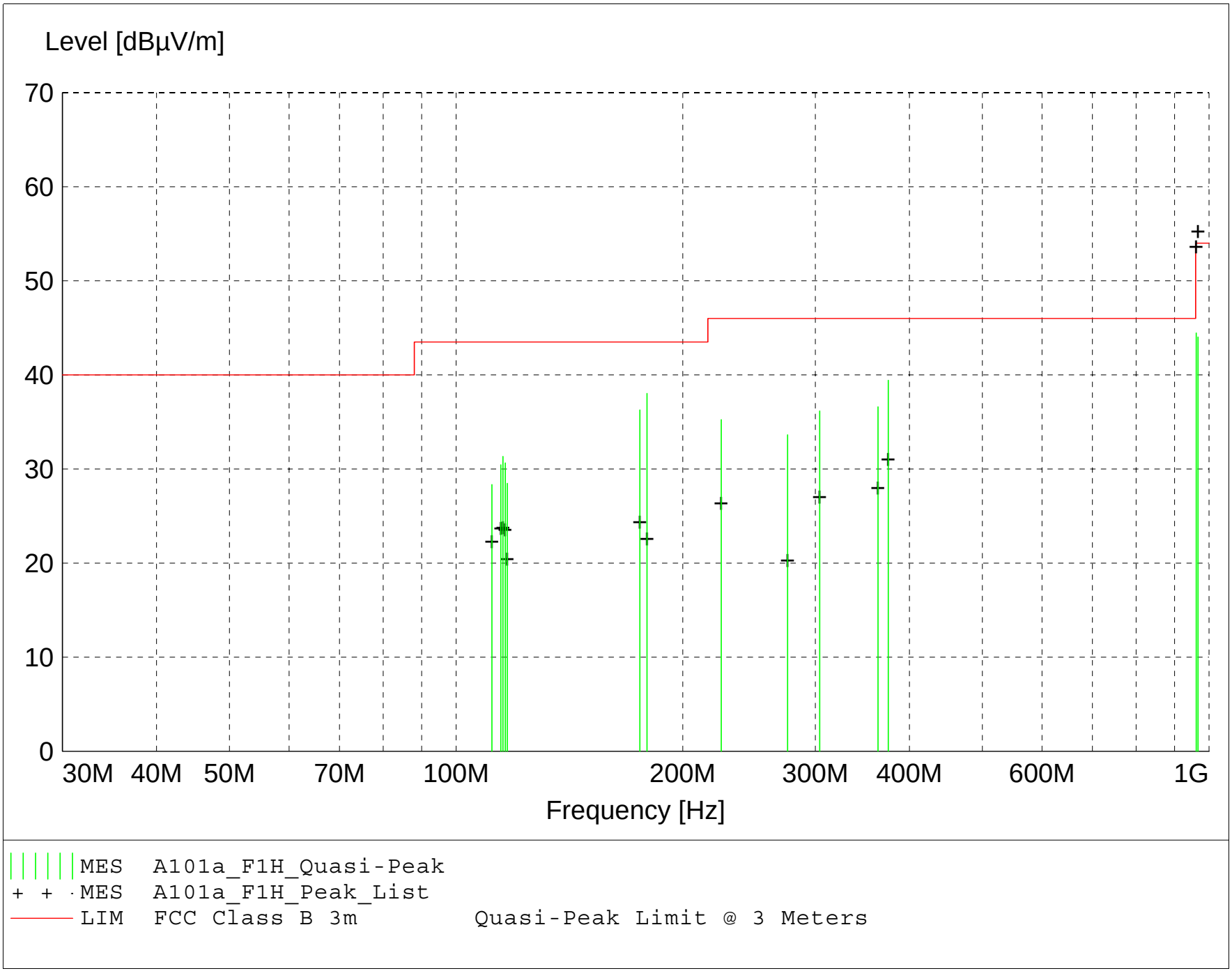
Margin(dB) = Limit(dBµV/m) - Total Level(dBµV/m)

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]
70
60
50
40
30
20
10
0
30M
40M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
MES A101a_F1H_Quasi-Peak
MES A101a_F1H_Peak_List
LIM FCC Class B 3m
Quasi-Peak Limit @ 3 Meters

MEASUREMENT RESULT: "A101a_F1H_Final"

10/5/2015 10:27AM

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		
179.300000	19.51	15.89	2.6	38.0	43.5	5.5	1.00	315	QUASI-PEAK	None
375.000000	20.60	15.00	3.8	39.4	46.0	6.6	1.00	337	QUASI-PEAK	None
175.450000	18.41	15.29	2.6	36.3	43.5	7.2	2.00	315	QUASI-PEAK	None
363.450000	17.86	14.97	3.8	36.6	46.0	9.4	1.00	337	QUASI-PEAK	None
961.450000	13.99	23.87	6.6	44.5	54.0	9.5	1.00	0	QUASI-PEAK	RB 925.5MHz
304.100000	17.54	15.15	3.5	36.2	46.0	9.8	1.00	0	QUASI-PEAK	None
966.900000	13.62	23.80	6.6	44.0	54.0	10.0	1.00	0	QUASI-PEAK	RB 925.5MHz
225.000000	21.08	11.20	3.0	35.2	46.0	10.8	1.00	0	QUASI-PEAK	None
115.400000	16.84	12.38	2.1	31.3	43.5	12.2	1.50	315	QUASI-PEAK	RB 915MHz
275.600000	16.92	13.41	3.3	33.6	46.0	12.4	1.00	22	QUASI-PEAK	RB 915MHz
116.200000	16.03	12.50	2.1	30.6	43.5	12.9	2.00	315	QUASI-PEAK	RB 915MHz
114.650000	16.08	12.27	2.1	30.4	43.5	13.1	1.50	315	QUASI-PEAK	RB 915MHz
116.950000	13.86	12.50	2.1	28.5	43.5	15.0	2.00	315	QUASI-PEAK	RB 915MHz
111.550000	14.26	12.01	2.1	28.4	43.5	15.1	2.00	315	QUASI-PEAK	RB 915MHz

FCC Part 15.209

Electric Field Strength

EUT: 450I 900MHz SM
Manufacturer: Cambium Networks
Operating Condition: 63 deg. F; 47% R.H.
Test Site: DLS Site 2
Operator: Paul L
Test Specification: 120VAC 60Hz 30VDC to EUT
Comment: 5MHz BW
Date: 10-2-2015

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)

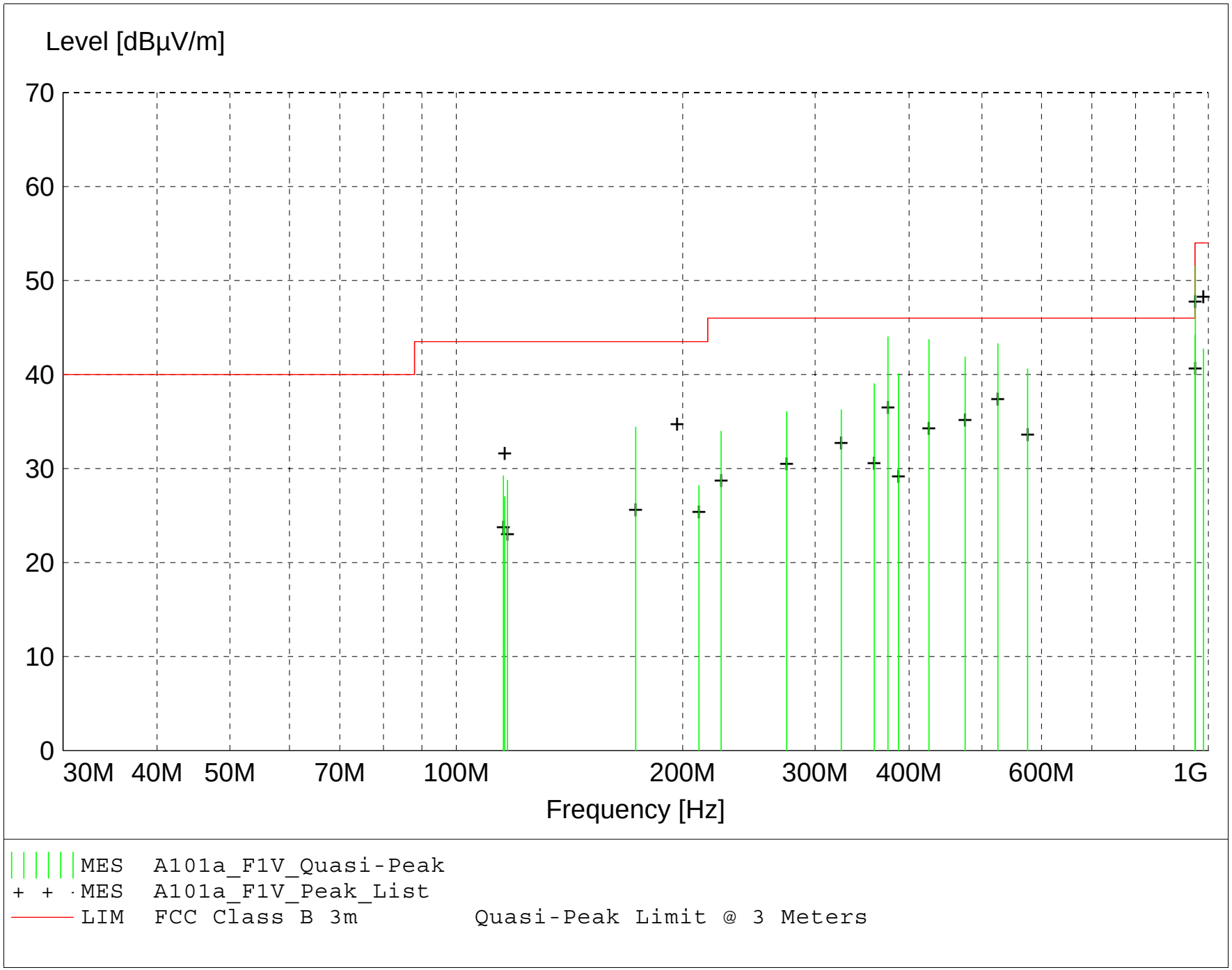
Margin(dB) = Limit(dBµV/m) - Total Level(dBµV/m)

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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60
50
40
30
20
10
0
30M
40M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
MES A101a_F1V_Quasi-Peak
MES A101a_F1V_Peak_List
LIM FCC Class B 3m
Quasi-Peak Limit @ 3 Meters

MEASUREMENT RESULT: "A101a_F1V_Final"

10/5/2015 10:30AM

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		
375.000000	25.19	15.00	3.8	44.0	46.0	2.0	1.50	0	QUASI-PEAK	None
425.000000	23.24	16.30	4.2	43.7	46.0	2.3	1.50	0	QUASI-PEAK	None
961.050000	21.11	23.88	6.6	51.6	54.0	2.4	1.00	135	QUASI-PEAK	RB 925.5MHz
525.000000	20.38	18.20	4.7	43.3	46.0	2.7	1.50	0	QUASI-PEAK	None
475.000000	20.14	17.30	4.4	41.9	46.0	4.1	1.50	0	QUASI-PEAK	None
575.000000	16.97	18.70	4.9	40.6	46.0	5.4	1.00	0	QUASI-PEAK	None
387.250000	20.61	15.54	3.9	40.1	46.0	5.9	2.00	337	QUASI-PEAK	None
359.500000	20.38	14.90	3.7	39.0	46.0	7.0	1.50	0	QUASI-PEAK	None
173.200000	16.92	14.94	2.5	34.4	43.5	9.1	1.00	0	QUASI-PEAK	RB 915MHz
325.000000	18.10	14.50	3.7	36.2	46.0	9.8	1.50	0	QUASI-PEAK	RB 915MHz
960.250000	13.71	23.90	6.6	44.2	54.0	9.8	1.00	0	QUASI-PEAK	RB 925.5MHz
275.000000	19.35	13.40	3.3	36.1	46.0	9.9	2.00	0	QUASI-PEAK	RB 915MHz
985.050000	11.78	24.30	6.6	42.7	54.0	11.3	1.00	0	QUASI-PEAK	RB 925.5MHz
225.000000	19.81	11.20	3.0	34.0	46.0	12.0	2.50	0	QUASI-PEAK	None
115.500000	14.70	12.40	2.1	29.2	43.5	14.3	1.00	0	QUASI-PEAK	RB 915MHz
117.000000	14.12	12.50	2.1	28.7	43.5	14.8	1.00	0	QUASI-PEAK	RB 915MHz
210.200000	13.74	11.60	2.9	28.2	43.5	15.3	2.00	0	QUASI-PEAK	None
116.000000	12.39	12.50	2.1	27.0	43.5	16.5	1.00	0	QUASI-PEAK	RB 915MHz

FCC Part 15.209

Electric Field Strength

EUT: 450I 900MHz SM
Manufacturer: Cambium Networks
Operating Condition: 63 deg. F; 47% R.H.
Test Site: DLS Site 2
Operator: Paul L
Test Specification: 120VAC 60Hz 30VDC to EUT
Comment: 20MHz BW
Date: 10-2-2015

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)

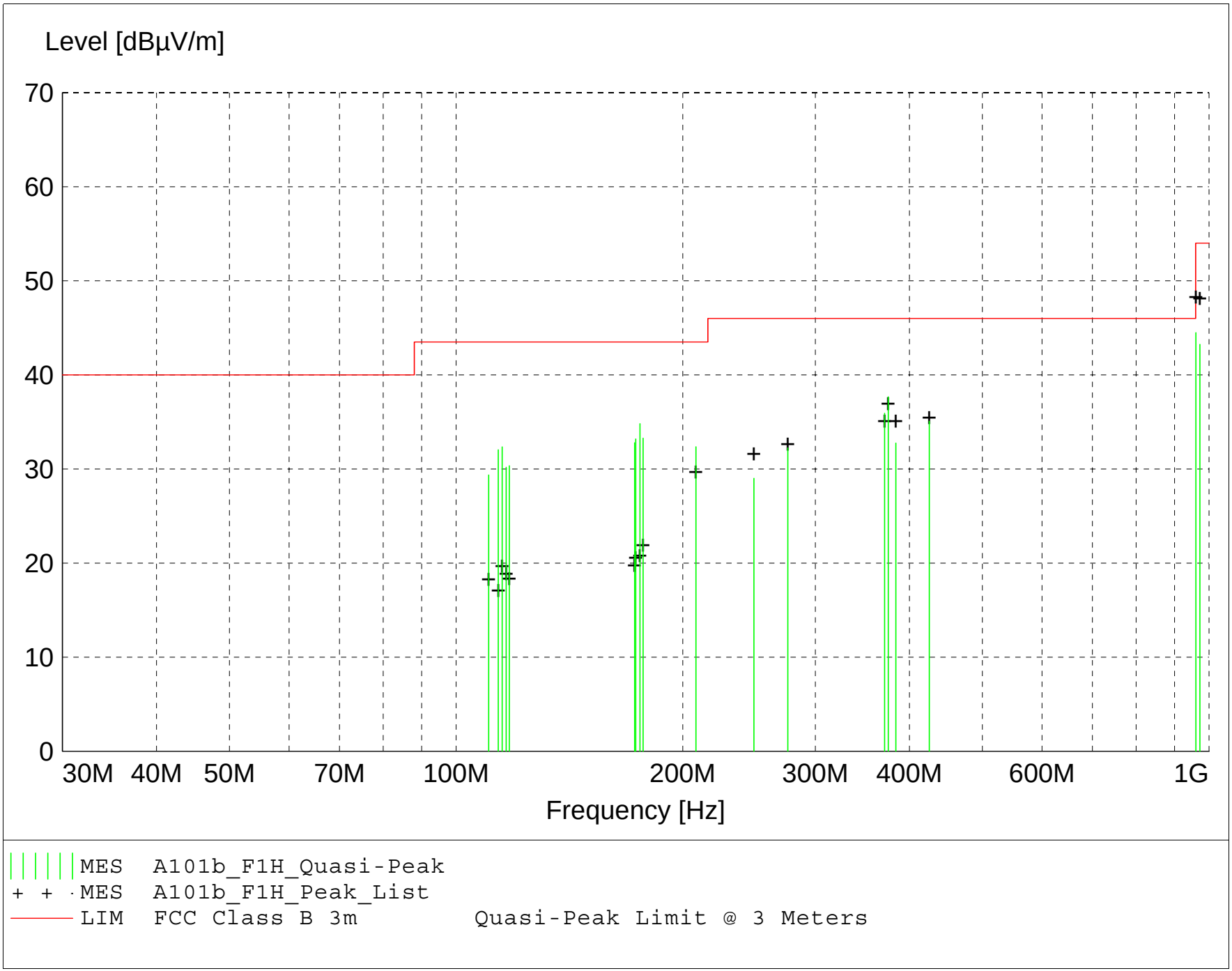
Margin(dB) = Limit(dBµV/m) - Total Level(dBµV/m)

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]
70
60
50
40
30
20
10
0
30M
40M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
MES A101b_F1H_Quasi-Peak
MES A101b_F1H_Peak_List
LIM FCC Class B 3m
Quasi-Peak Limit @ 3 Meters

MEASUREMENT RESULT: "A101b_F1H_Final"

10/5/2015 10:35AM

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		
375.000000	18.85	15.00	3.8	37.7	46.0	8.3	1.00	337	QUASI-PEAK	916MHz
175.500000	16.96	15.30	2.6	34.8	43.5	8.7	1.50	45	QUASI-PEAK	None
375.000000	17.84	15.00	3.8	36.7	46.0	9.3	1.50	0	QUASI-PEAK	918MHz
960.550000	14.01	23.89	6.6	44.5	54.0	9.5	1.00	0	QUASI-PEAK	RB 918MHz
370.800000	17.02	15.08	3.8	35.9	46.0	10.1	1.50	45	QUASI-PEAK	None
177.150000	15.14	15.55	2.6	33.3	43.5	10.2	2.00	135	QUASI-PEAK	None
173.200000	15.70	14.94	2.5	33.2	43.5	10.3	1.00	45	QUASI-PEAK	RB 916MHz
172.600000	15.39	14.86	2.5	32.8	43.5	10.7	1.00	315	QUASI-PEAK	RB 916MHz
972.450000	12.73	23.90	6.6	43.3	54.0	10.7	1.00	0	QUASI-PEAK	RB 918MHz
425.000000	14.62	16.30	4.2	35.1	46.0	10.9	1.50	22	QUASI-PEAK	None
208.200000	17.77	11.74	2.9	32.4	43.5	11.1	2.00	45	QUASI-PEAK	None
275.750000	15.51	13.42	3.3	32.2	46.0	13.8	1.00	45	QUASI-PEAK	RB 916MHz
113.750000	17.78	12.18	2.1	32.1	43.5	11.4	1.50	285	QUASI-PEAK	RB 916MHz
117.650000	15.66	12.57	2.1	30.4	43.5	13.1	1.50	45	QUASI-PEAK	RB 916MHz
383.750000	13.53	15.35	3.9	32.8	46.0	13.2	1.00	22	QUASI-PEAK	None
116.550000	15.56	12.50	2.1	30.2	43.5	13.3	1.50	45	QUASI-PEAK	RB 916MHz
275.750000	15.51	13.42	3.3	32.2	46.0	13.8	1.00	45	QUASI-PEAK	RB 916MHz
110.450000	15.39	11.90	2.1	29.4	43.5	14.1	1.50	45	QUASI-PEAK	RB 916MHz
248.600000	13.68	12.22	3.1	29.0	46.0	17.0	2.00	45	QUASI-PEAK	RB 916MHz

FCC Part 15.209

Electric Field Strength

EUT: 450I 900MHz SM
Manufacturer: Cambium Networks
Operating Condition: 63 deg. F; 47% R.H.
Test Site: DLS Site 2
Operator: Paul L
Test Specification: 120VAC 60Hz 30VDC to EUT
Comment: 20MHz BW
Date: 10-2-2015

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)

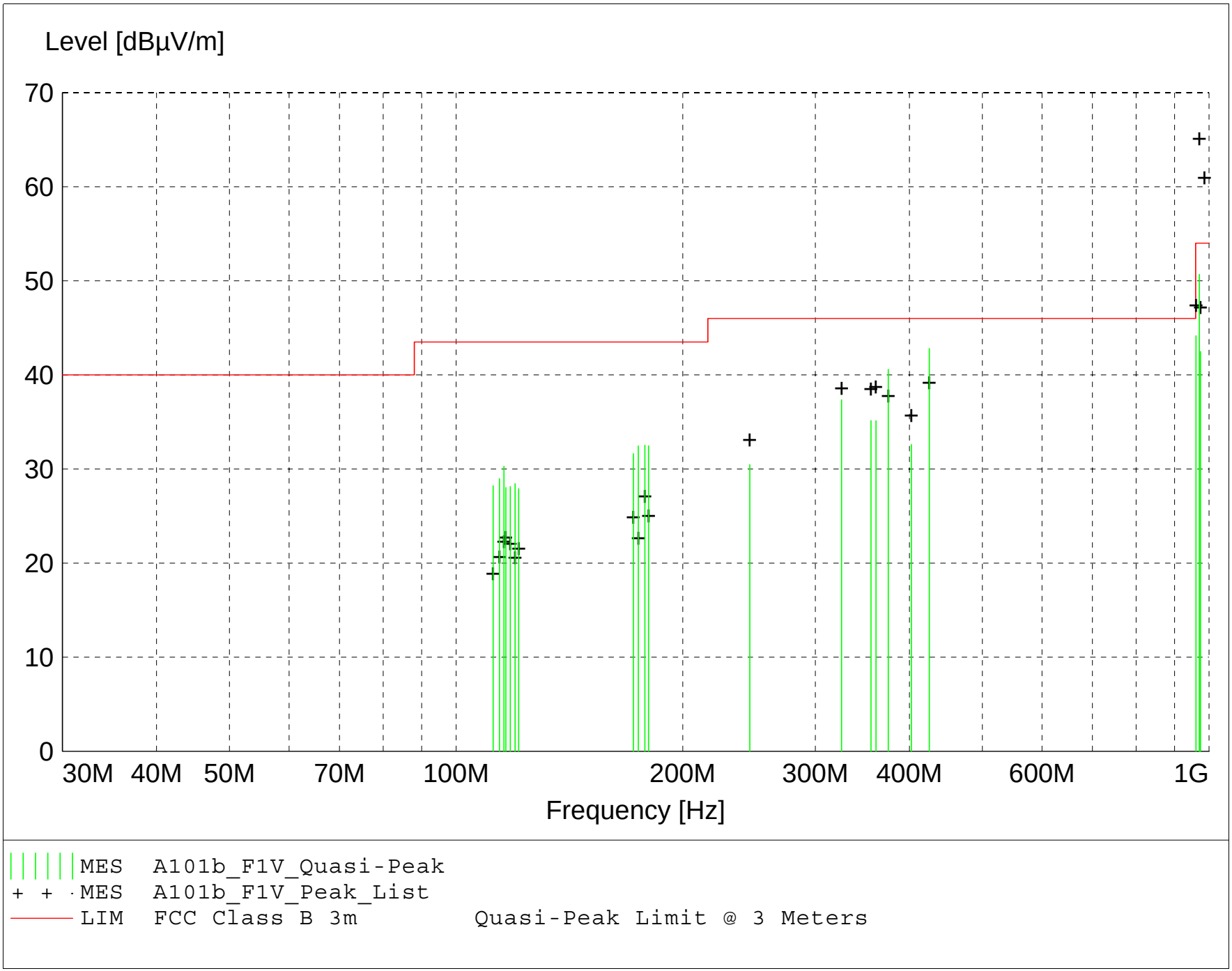
Margin(dB) = Limit(dBµV/m) - Total Level(dBµV/m)

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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70
60
50
40
30
20
10
0
30M
40M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
MES A101b_F1V_Quasi-Peak
MES A101b_F1V_Peak_List
LIM FCC Class B 3m Quasi-Peak Limit @ 3 Meters

MEASUREMENT RESULT: "A101b_F1V_Final"

10/5/2015 10:22AM

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		
425.000000	22.34	16.30	4.2	42.8	46.0	3.2	2.00	0	QUASI-PEAK	None
970.850000	20.25	23.83	6.6	50.7	54.0	3.3	1.00	135	QUASI-PEAK	RB 918MHz
375.000000	21.76	15.00	3.8	40.6	46.0	5.4	2.00	22	QUASI-PEAK	None
325.000000	19.21	14.50	3.7	37.4	46.0	8.6	2.00	337	QUASI-PEAK	RB 916MHz
961.050000	13.68	23.88	6.6	44.2	54.0	9.8	1.00	0	QUASI-PEAK	RB 918MHz
355.650000	16.52	14.90	3.7	35.1	46.0	10.9	2.00	337	QUASI-PEAK	None
361.100000	16.45	14.92	3.8	35.1	46.0	10.9	2.00	337	QUASI-PEAK	None
178.150000	14.12	15.80	2.6	32.5	43.5	11.0	1.00	180	QUASI-PEAK	None
180.150000	13.71	16.10	2.7	32.5	43.5	11.0	1.00	180	QUASI-PEAK	None
174.600000	14.73	15.16	2.6	32.4	43.5	11.1	1.00	180	QUASI-PEAK	None
974.150000	11.89	23.97	6.6	42.5	54.0	11.5	1.00	0	QUASI-PEAK	RB 918MHz
172.000000	14.29	14.80	2.5	31.6	43.5	11.9	1.00	0	QUASI-PEAK	RB 916MHz
115.750000	15.73	12.45	2.1	30.3	43.5	13.2	2.50	0	QUASI-PEAK	RB 916MHz
402.300000	12.83	15.70	4.1	32.6	46.0	13.4	1.50	337	QUASI-PEAK	RB 916MHz
114.200000	14.65	12.22	2.1	29.0	43.5	14.5	2.50	0	QUASI-PEAK	RB 916MHz
119.800000	13.59	12.70	2.1	28.4	43.5	15.1	1.00	0	QUASI-PEAK	RB 916MHz
112.000000	14.03	12.10	2.1	28.2	43.5	15.3	2.50	0	QUASI-PEAK	RB 916MHz
118.000000	13.41	12.60	2.1	28.1	43.5	15.4	2.50	0	QUASI-PEAK	RB 916MHz
116.450000	13.41	12.50	2.1	28.0	43.5	15.5	1.00	0	QUASI-PEAK	RB 916MHz
245.450000	15.34	12.03	3.1	30.5	46.0	15.5	2.00	135	QUASI-PEAK	RB 916MHz
121.100000	12.96	12.79	2.2	27.9	43.5	15.6	1.50	0	QUASI-PEAK	RB 916MHz

Appendix B – Measurement Data

B7.0 Radiated Spurious in Restricted Bands – Above 1 GHz

Tested with 12dBi Yagi Antenna

Rule Part:

15.247(d), 15.205(5), 15.209(a)

Test Procedure:

558074 D01 DTS Meas Guidance v03r03
12.0 Emissions in Restricted Frequency Bands
12.1 Radiated Emissions Measurements
Measurement Procedure – ANSI C63.10-2013

Limits: 15.209(a)

Results: Compliant

Notes:

Measurements were performed using the worst-case modulation (QPSK) as determined by Cambium Networks. The EUT was tested at the low, middle, and high channels of operation.

A duty cycle correction factor was added to the average measurement values because the transmitter duty cycle was less than 98%.

Power Setting 21 for 5MHz Channel Bandwidth
Power Setting 20 for 20MHz Channel Bandwidth

Radiated Spurious Emissions in Restricted Bands
Tested at a 3 Meter Distance from 1 GHz to 10 GHz

EUT: 450i 900 MHz SM MAC: 0A003E45FBEE
Manufacturer: Cambium networks
Operating Condition: 70 deg F; 50% R.H.
Test Site: Site G1
Operator: Craig B
Test Specification: FCC Part 15.247(d) and FCC Part 15.205
Comment: Transmit @ 81.77% duty cycle Correction factor x = 20 Log (1 / 0.8177) = 1.75 dB
Date: 10-02-2015
Notes: **(1)** Peak measurements were taken with receiver 1 MHz Peak detector.
(2) Average measurements were taken with receiver 1 MHz linear CISPR Average detector.
(3) All other restricted band emissions at least 20 dB under the limit.

Low Channel (904.550 MHz):

Frequency (GHz)	Measurement Type	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
2.71365	Average	Vert	55.76	28.70	-39.5	44.9	1.75	46.7	54	7.3	Res. Band
2.71365	Max Peak	Vert	72.59	28.70	-39.5	61.8	---	61.8	74	12.2	Res. Band
2.71365	Average	Horz	56.48	28.70	-39.5	45.6	1.75	47.4	54	6.6	Res. Band
2.71365	Max Peak	Horz	77.87	28.70	-39.5	67.0	---	67.0	74	7.0	Res. Band
3.61820	Average	Vert	54.92	31.54	-38.9	47.6	1.75	49.4	54	4.6	Res. Band
3.61820	Max Peak	Vert	80.10	31.54	-38.9	72.8	---	72.8	74	1.2	Res. Band
3.61820	Average	Horz	52.59	31.54	-38.9	45.3	1.75	47.1	54	6.9	Res. Band
3.61820	Max Peak	Horz	77.99	31.54	-38.9	70.7	---	70.7	74	3.3	Res. Band

Radiated Spurious Emissions in Restricted Bands
Tested at a 3 Meter Distance from 1 GHz to 10 GHz

EUT: 450i 900 MHz SM MAC: 0A003E45FBEE
Manufacturer: Cambium networks
Operating Condition: 70 deg F; 50% R.H.
Test Site: Site G1
Operator: Craig B
Test Specification: FCC Part 15.247(d) and FCC Part 15.205
Comment: Transmit @ 81.77% duty cycle Correction factor x = 20 Log (1 / 0.8177) = 1.75 dB
Date: 10-02-2015
Notes: **(1)** Peak measurements were taken with receiver 1 MHz Peak detector.
(2) Average measurements were taken with receiver 1 MHz linear CISPR Average detector.
(3) All other restricted band emissions at least 20 dB under the limit.

Mid Channel (915.000 MHz):

Frequency (GHz)	Measurement Type	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
2.745	Average	Vert	58.61	28.71	-39.5	47.8	1.75	49.6	54	4.4	Res. Band
2.745	Max Peak	Vert	79.80	28.71	-39.5	69.0	---	69.0	74	5.0	Res. Band
2.745	Average	Horz	59.09	28.71	-39.5	48.3	1.75	50.1	54	3.9	Res. Band
2.745	Max Peak	Horz	80.75	28.71	-39.5	70.0	---	70.0	74	4.0	Res. Band
3.660	Average	Vert	56.79	31.80	-38.8	49.8	1.75	51.6	54	2.4	Res. Band
3.660	Max Peak	Vert	80.49	31.80	-38.8	73.5	---	73.5	74	0.5	Res. Band
3.660	Average	Horz	55.22	31.80	-38.8	48.2	1.75	50.0	54	4.0	Res. Band
3.660	Max Peak	Horz	78.84	31.80	-38.8	71.8	---	71.8	74	2.2	Res. Band

Radiated Spurious Emissions in Restricted Bands
Tested at a 3 Meter Distance from 1 GHz to 10 GHz

EUT: 450i 900 MHz SM MAC: 0A003E45FBEE
Manufacturer: Cambium networks
Operating Condition: 70 deg F; 50% R.H.
Test Site: Site G1
Operator: Craig B
Test Specification: FCC Part 15.247(d) and FCC Part 15.205
Comment: Transmit @ 81.77% duty cycle Correction factor x = 20 Log (1 / 0.8177) = 1.75 dB
Date: 10-02-2015
Notes: **(1)** Peak measurements were taken with receiver 1 MHz Peak detector.
(2) Average measurements were taken with receiver 1 MHz linear CISPR Average detector.
(3) All other restricted band emissions at least 20 dB under the limit.

High Channel (925.450 MHz):

Frequency (GHz)	Measurement Type	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
2.77635	Average	Vert	60.46	28.73	-39.5	49.7	1.75	51.5	54	2.5	Res. Band
2.77635	Max Peak	Vert	82.50	28.73	-39.5	71.7	---	71.7	74	2.3	Res. Band
2.77635	Average	Horz	59.58	28.73	-39.5	48.8	1.75	50.6	54	3.4	Res. Band
2.77635	Max Peak	Horz	82.26	28.73	-39.5	71.5	---	71.5	74	2.5	Res. Band
3.70180	Average	Vert	55.75	32.06	-38.8	49.0	1.75	50.8	54	3.2	Res. Band
3.70180	Max Peak	Vert	76.18	32.06	-38.8	69.5	---	69.5	74	4.5	Res. Band
3.70180	Average	Horz	54.40	32.06	-38.8	47.7	1.75	49.5	54	4.5	Res. Band
3.70180	Max Peak	Horz	78.98	32.06	-38.8	72.3	---	72.3	74	1.7	Res. Band

Radiated Spurious Emissions in Restricted Bands
Tested at a 3 Meter Distance from 1 GHz to 10 GHz

EUT: 450i 900 MHz SM MAC: 0A003E45FBEE
Manufacturer: Cambium networks
Operating Condition: 70 deg F; 50% R.H.
Test Site: Site G1
Operator: Craig B
Test Specification: FCC Part 15.247(d) and FCC Part 15.205
Comment: Transmit @ 82.33% duty cycle Correction factor x = 20 Log (1 / 0.823293) = 1.69 dB
Date: 10-02-2015
Notes: **(1)** Peak measurements were taken with receiver 1 MHz Peak detector.
(2) Average measurements were taken with receiver 1 MHz linear CISPR Average detector.
(3) All other restricted band emissions at least 20 dB under the limit.

Low Channel (912 MHz):

Frequency (GHz)	Measurement Type	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
2.736	Average	Vert	52.10	28.71	-39.5	41.3	1.69	43.0	54	11.0	Res. Band
2.736	Max Peak	Vert	67.08	28.71	-39.5	56.3	---	56.3	74	17.7	Res. Band
2.736	Average	Horz	52.20	28.71	-39.5	41.4	1.69	43.1	54	10.9	Res. Band
2.736	Max Peak	Horz	67.32	28.71	-39.5	56.5	---	56.5	74	17.5	Res. Band
3.648	Average	Vert	51.07	31.72	-38.8	44.0	1.69	45.7	54	8.3	Res. Band
3.648	Max Peak	Vert	69.15	31.72	-38.8	62.0	---	62.0	74	12.0	Res. Band
3.648	Average	Horz	49.30	31.72	-38.8	42.2	1.69	43.9	54	10.1	Res. Band
3.648	Max Peak	Horz	65.92	31.72	-38.8	58.8	---	58.8	74	15.2	Res. Band

Radiated Spurious Emissions in Restricted Bands
Tested at a 3 Meter Distance from 1 GHz to 10 GHz

EUT: 450i 900 MHz SM MAC: 0A003E45FBEE
Manufacturer: Cambium networks
Operating Condition: 70 deg F; 50% R.H.
Test Site: Site G1
Operator: Craig B
Test Specification: FCC Part 15.247(d) and FCC Part 15.205
Comment: Transmit @ 82.33% duty cycle Correction factor x = 20 Log (1 / 0.823293) = 1.69 dB
Date: 10-02-2015
Notes: **(1)** Peak measurements were taken with receiver 1 MHz Peak detector.
(2) Average measurements were taken with receiver 1 MHz linear CISPR Average detector.
(3) All other restricted band emissions at least 20 dB under the limit.

Mid Channel (916 MHz):

Frequency (GHz)	Measurement Type	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
2.748	Average	Vert	52.95	28.71	-39.5	42.2	1.69	43.9	54	10.1	Res. Band
2.748	Max Peak	Vert	68.53	28.71	-39.5	57.8	---	57.8	74	16.2	Res. Band
2.748	Average	Horz	54.11	28.71	-39.5	43.3	1.69	45.0	54	9.0	Res. Band
2.748	Max Peak	Horz	69.65	28.71	-39.5	58.9	---	58.9	74	15.1	Res. Band
3.664	Average	Vert	51.27	31.83	-38.8	44.3	1.69	46.0	54	8.0	Res. Band
3.664	Max Peak	Vert	67.93	31.83	-38.8	60.9	---	60.9	74	13.1	Res. Band
3.664	Average	Horz	50.06	31.83	-38.8	43.1	1.69	44.8	54	9.2	Res. Band
3.664	Max Peak	Horz	67.44	31.83	-38.8	60.4	---	60.4	74	13.6	Res. Band

Radiated Spurious Emissions in Restricted Bands
Tested at a 3 Meter Distance from 1 GHz to 10 GHz

EUT: 450i 900 MHz SM MAC: 0A003E45FBEE
Manufacturer: Cambium networks
Operating Condition: 70 deg F; 50% R.H.
Test Site: Site G1
Operator: Craig B
Test Specification: FCC Part 15.247(d) and FCC Part 15.205
Comment: Transmit @ 82.33% duty cycle Correction factor x = 20 Log (1 / 0.823293) = 1.69 dB
Date: 10-02-2015
Notes: **(1)** Peak measurements were taken with receiver 1 MHz Peak detector.
(2) Average measurements were taken with receiver 1 MHz linear CISPR Average detector.
(3) All other restricted band emissions at least 20 dB under the limit.

High Channel (918 MHz):

Frequency (GHz)	Measurement Type	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
2.754	Average	Vert	53.95	28.72	-39.5	43.2	1.69	44.9	54	9.1	Res. Band
2.754	Max Peak	Vert	69.77	28.72	-39.5	59.0	---	59.0	74	15.0	Res. Band
2.754	Average	Horz	54.66	28.72	-39.5	43.9	1.69	45.6	54	8.4	Res. Band
2.754	Max Peak	Horz	70.54	28.72	-39.5	59.8	---	59.8	74	14.2	Res. Band
3.672	Average	Vert	50.67	31.91	-38.8	43.7	1.69	45.4	54	8.6	Res. Band
3.672	Max Peak	Vert	67.20	31.91	-38.8	60.3	---	60.3	74	13.7	Res. Band
3.672	Average	Horz	47.95	31.91	-38.8	41.1	1.69	42.8	54	11.2	Res. Band
3.672	Max Peak	Horz	64.93	31.91	-38.8	58.0	---	58.0	74	16.0	Res. Band

Appendix B – Measurement Data

B8.0 Band-Edge Measurements – RF Conducted

Rule Part:

15.247(d)

Test Procedure:

558074 D01 DTS Meas Guidance v03r03
11.0 Emissions in non-restricted frequency bands
11.2 Reference Level Measurement
11.3 Emissions Level Measurement

Limit:

The peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band peak PSD level. (Compliance to the conducted power limits is based on RMS averaging)

Results:

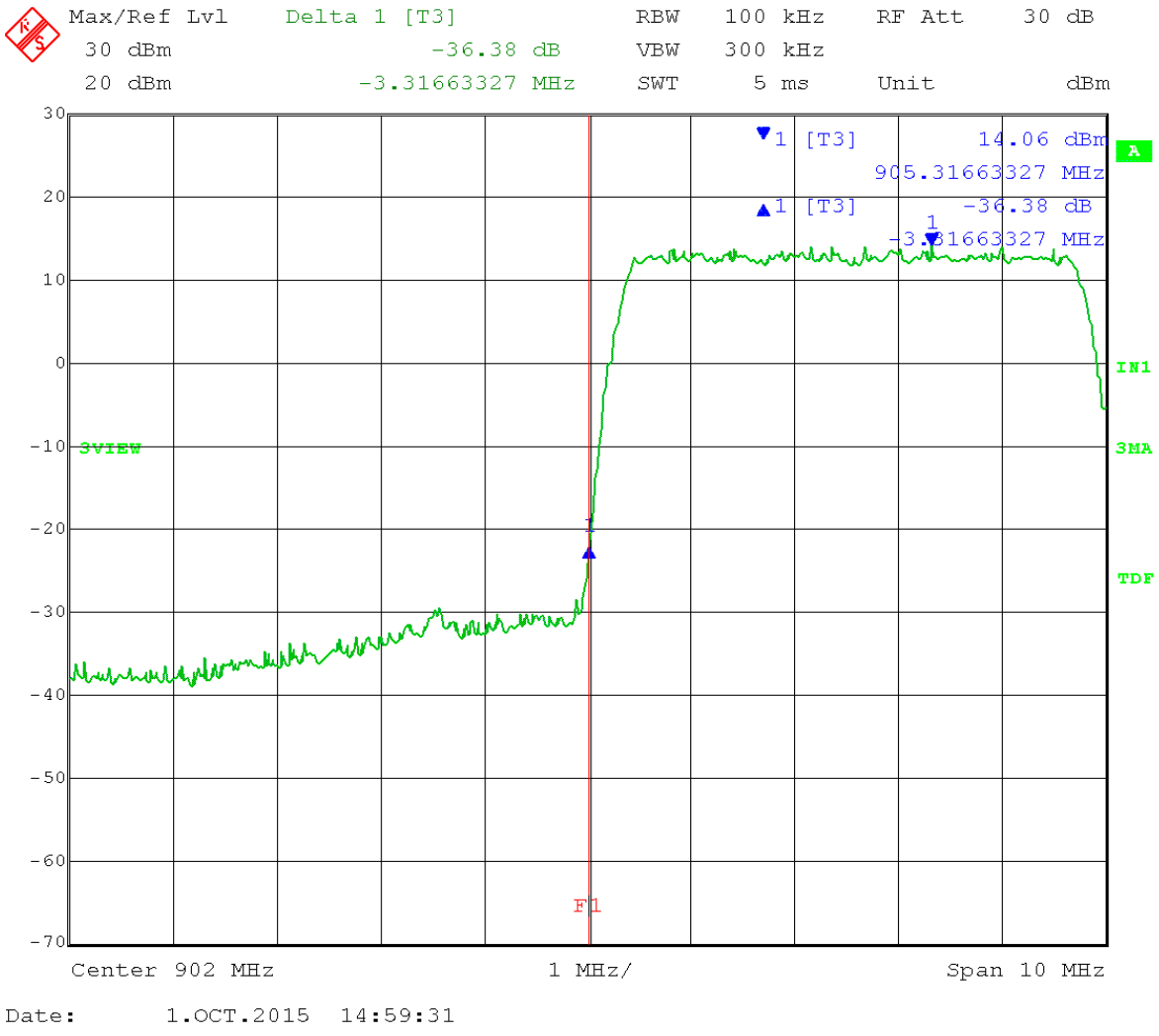
Compliant

Notes:

Measurements were performed using the worst-case modulation (QPSK) as determined by Cambium Networks. The EUT was tested at the low and high channels of operation.

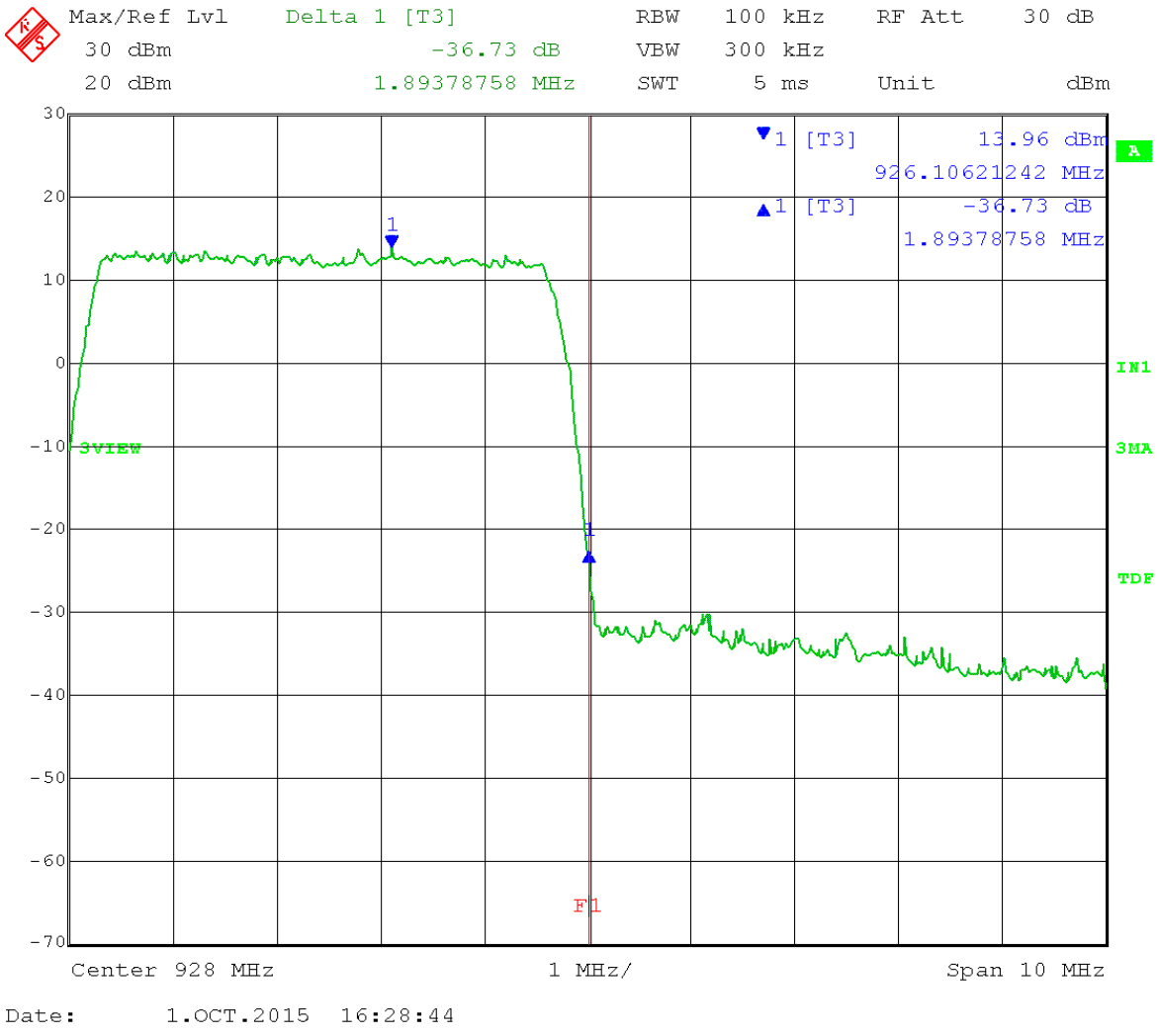
Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Lower Band-Edge Measurement - Conducted
Operator: Craig B

Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = auto couple
Trace = max hold
Low Channel: Transmit = 904.550 MHz Output power setting: 20
Channel bandwidth: 5 MHz Output port: B
Lower band edge frequency = 902 MHz
Limit: > 30 dB below Peak In-Band Emission



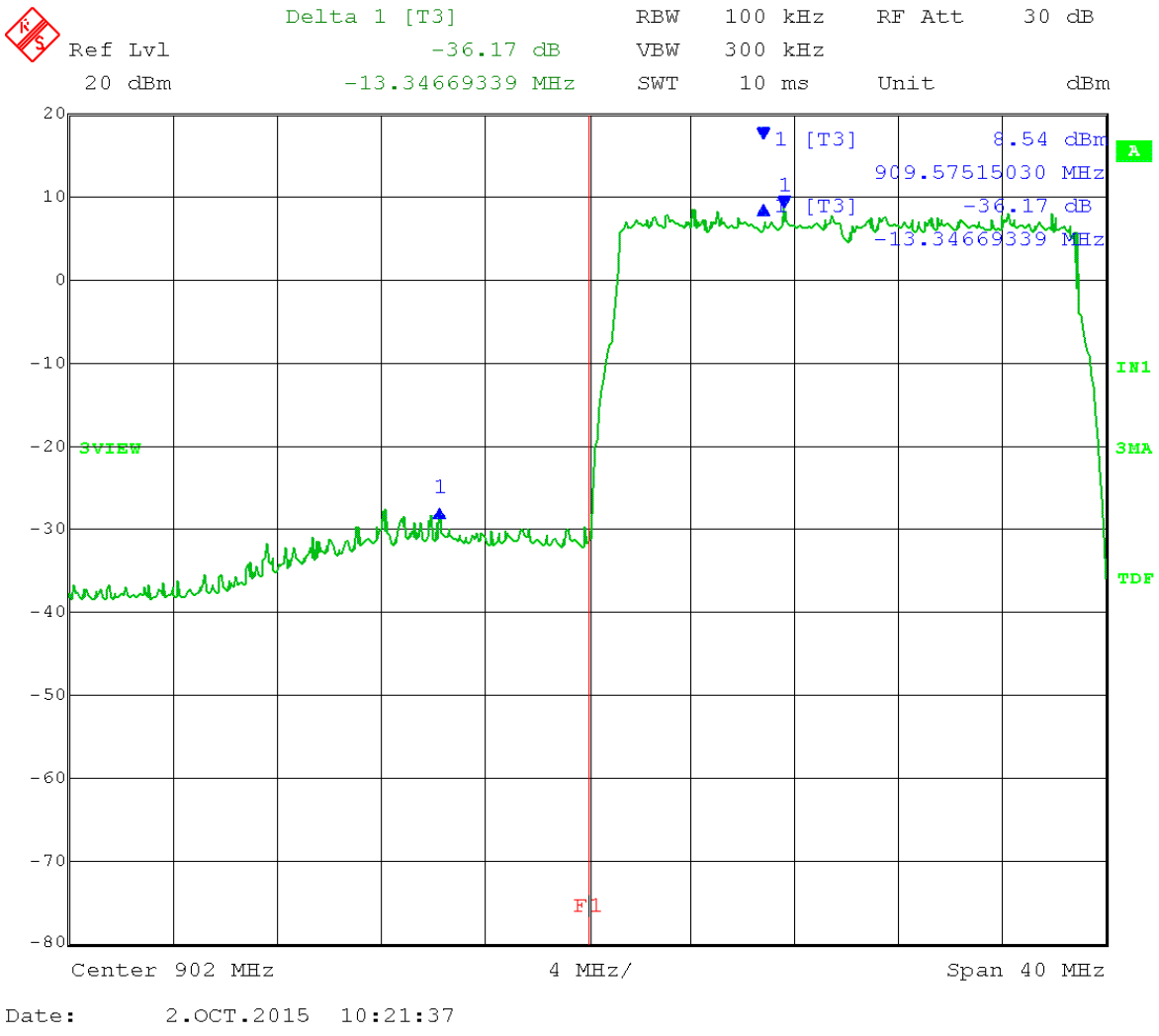
Test Date: 10-01-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Upper Band-Edge Measurements - Conducted
Operator: Craig B

Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = auto couple
Trace = max hold
High Channel: Transmit = 925.450 MHz Output power setting: 21
Channel bandwidth: 5 MHz Output port: B
Upper band edge frequency = 928 MHz
Limit: > 30 dB below Peak In-Band Emission



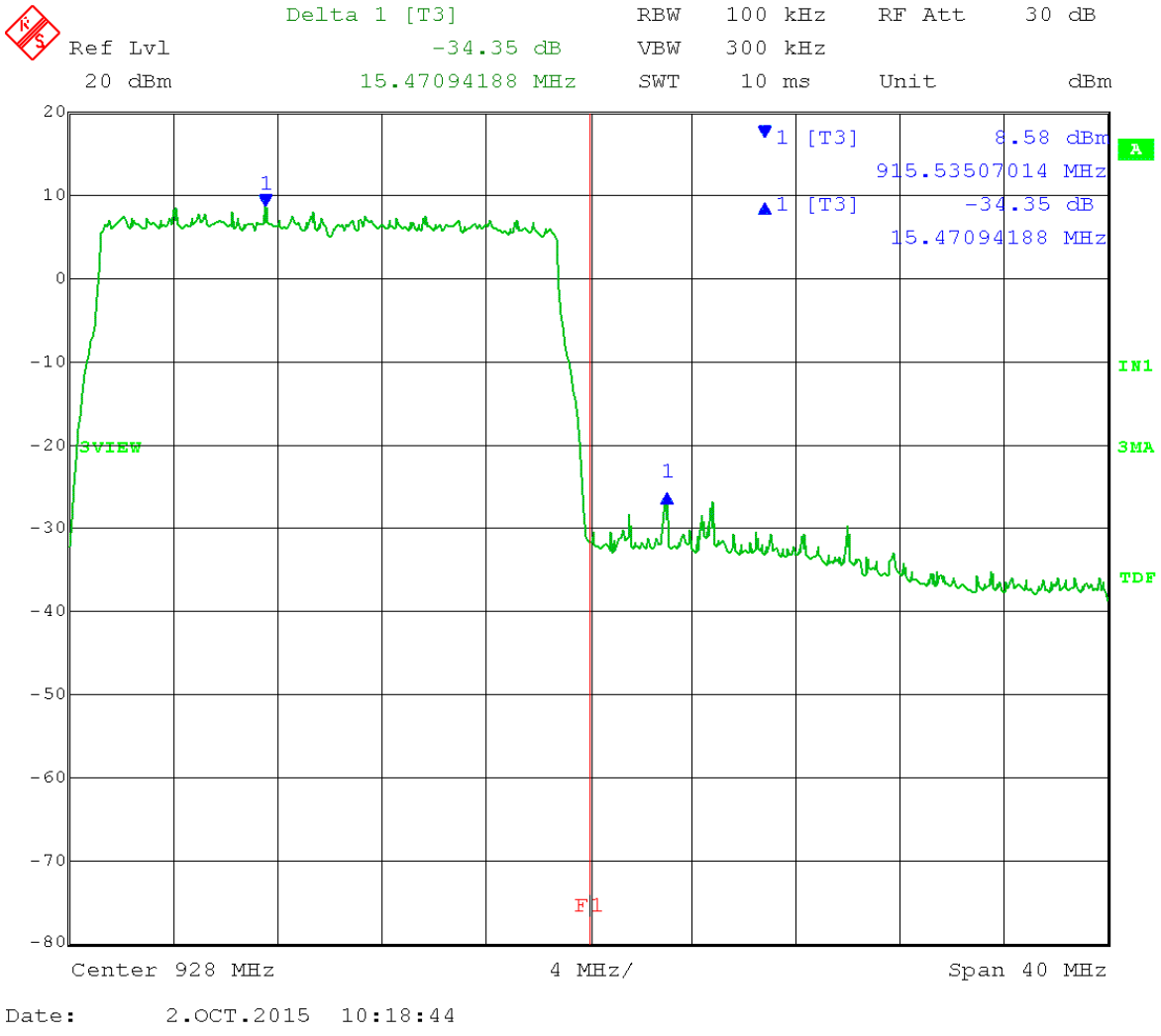
Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Upper Band-Edge Measurements - Conducted
Operator: Craig B

Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = auto couple
Trace = max hold
Low Channel: Transmit = 912 MHz Output power setting: 21
Channel bandwidth: 20 MHz Output port: B
Lower band edge frequency = 902 MHz
Limit: > 30 dB below Peak In-Band Emission



Test Date: 10-02-2015
Company: Cambium Networks
EUT: 450i 900 MHz SM MAC: 0A003E45FBF2
Test: Upper Band-Edge Measurements - Conducted
Operator: Craig B

Comment: RBW = 100 kHz VBW ≥ 300 kHz
Detector = Peak Sweep = auto couple
Trace = max hold
High Channel: Transmit = 918 MHz Output power setting: 21
Channel bandwidth: 20 MHz Output port: B
Upper band edge frequency = 928 MHz
Limit: > 30 dB below Peak In-Band Emission



166 South Carter, Genoa City, WI 53128

Appendix B – Measurement Data

B9.0 AC Line Conducted Emissions

Rule Part: FCC Pt.15.207(a)

Test Procedure: ANSI C63.4-2014

Limit: FCC Pt.15.207(a)

Results: Compliant

Notes: This was an AC Power Line Conducted emissions measurement.

The EUT was powered from an included AC Adapter with an input of 120 VAC, 60 Hz and 240VAC, 60Hz.

PMM NARDA REPORT: 7506 Cambium 450I 900MHz 120V L1_000

Report issuing date : 10-2-2015

Standard	: FCC Part 15.207
Test Type	: Voltage Mains
Test Site	: DLS O.F. Screen Room
Temperature	: 70 °F
Humidity	: 43 %
Test Specs	: Line:1 Average
Operator	: Paul L
DLS Project #	: 7506
Result	: Pass

EUT

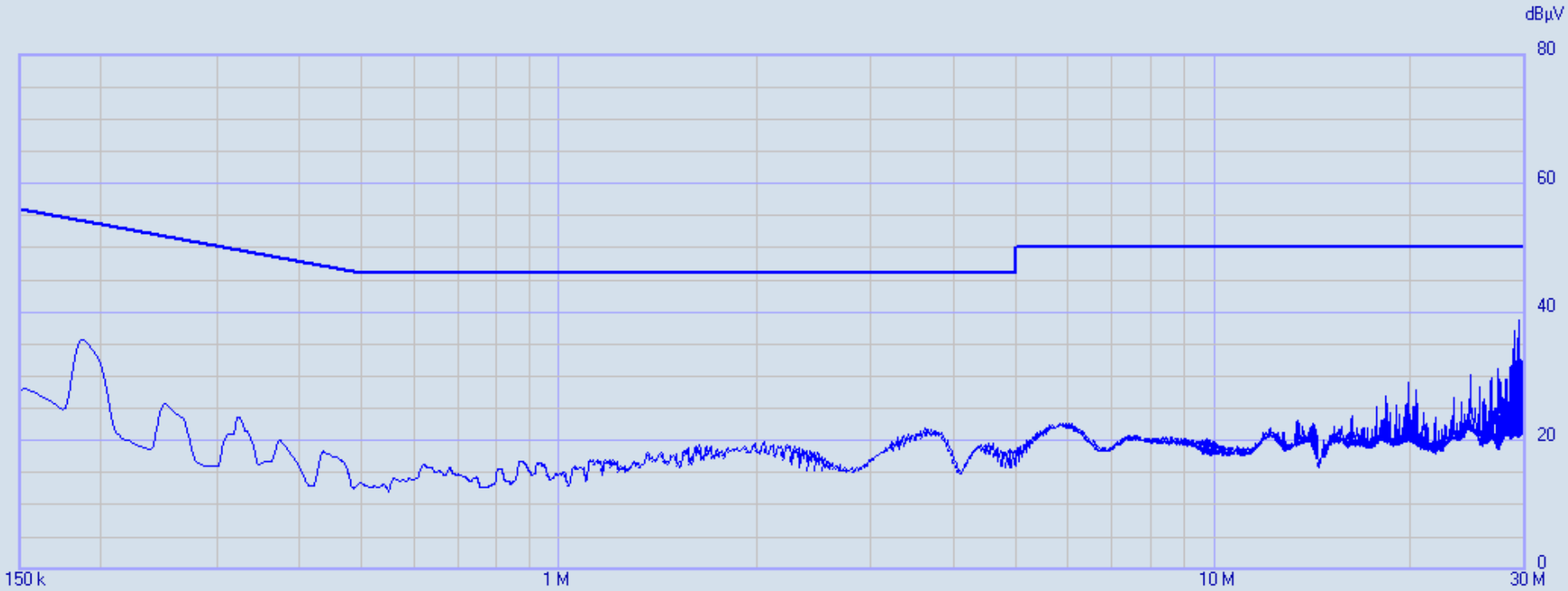
Manufacturer	: Cambium Networks
Model	: 450I 900MHz SM
Product	: Radio
Notes	: 120 V 60 Hz

Testing Company	: DLS Electronic Systems, Inc.
Telephone	: 262-279-0210
Web site	: http://www.dlsemc.com

Receiver Details

Model	: PMM 9010F
Brand	: Narda
S/N	: 020WW40102
Last Calibration	: 06/25/2015

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.



7506 Cambium 450I 900MHz 120V L1_000

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1000 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General

Limits:
FCC Class B V AV

Factors:
LISN DLS#128
DLS #507
DLS#592
Cables 43 & 45

C-Avg

7506 Cambium 450I 900MHz 120V L1_000 02/10/2015 15:18:19
Rel. SW 2.19 (July 2014)
Rel. FW 1.45 27/03/15
Margin: 19 dB

	Frequency [MHz]	C-Avg [dBµV]	Limit FCC Class.. [dBµV]	Delta [dB]	Factor LISN DLS#.. [dB]	Factor DLS #507 [dB]	Factor DLS#592 [dB]	Factor Cables 43.. [dB]
1	0.18681	35.74	54.18	-18.44	1.24	9.70	1.74	0.10
2	0.188855	35.71	54.09	-18.38	1.22	9.70	1.73	0.10
3	0.1909	35.00	54.00	-19.00	1.20	9.70	1.71	0.10
4	27.199215	31.14	50.00	-18.86	0.41	9.88	0.32	0.97
5	28.377135	31.42	50.00	-18.58	0.41	9.86	0.34	0.97
6	28.528465	31.53	50.00	-18.47	0.41	9.86	0.34	0.96
7	28.679795	34.35	50.00	-15.65	0.41	9.86	0.34	0.96
8	28.83317	37.17	50.00	-12.83	0.41	9.86	0.34	0.96
9	28.9845	32.46	50.00	-17.54	0.42	9.85	0.35	0.96
10	29.13992	35.98	50.00	-14.02	0.42	9.85	0.35	0.96
11	29.293295	38.66	50.00	-11.34	0.42	9.85	0.35	0.96
12	29.45076	32.53	50.00	-17.47	0.42	9.85	0.35	0.96
13	29.60618	32.38	50.00	-17.62	0.42	9.85	0.35	0.96
14	29.763645	31.99	50.00	-18.01	0.42	9.84	0.36	0.96
15	29.92111	33.84	50.00	-16.16	0.42	9.84	0.36	0.96

PMM NARDA REPORT: 7506 Cambium 450I 900MHz 120V L1_000

Report issuing date : 10-2-2015

Standard	: FCC Part 15.207
Test Type	: Voltage Mains
Test Site	: DLS O.F. Screen Room
Temperature	: 70 °F
Humidity	: 43 %
Test Specs	: Line:1 QP
Operator	: Paul L
DLS Project #	: 7506
Result	: Pass

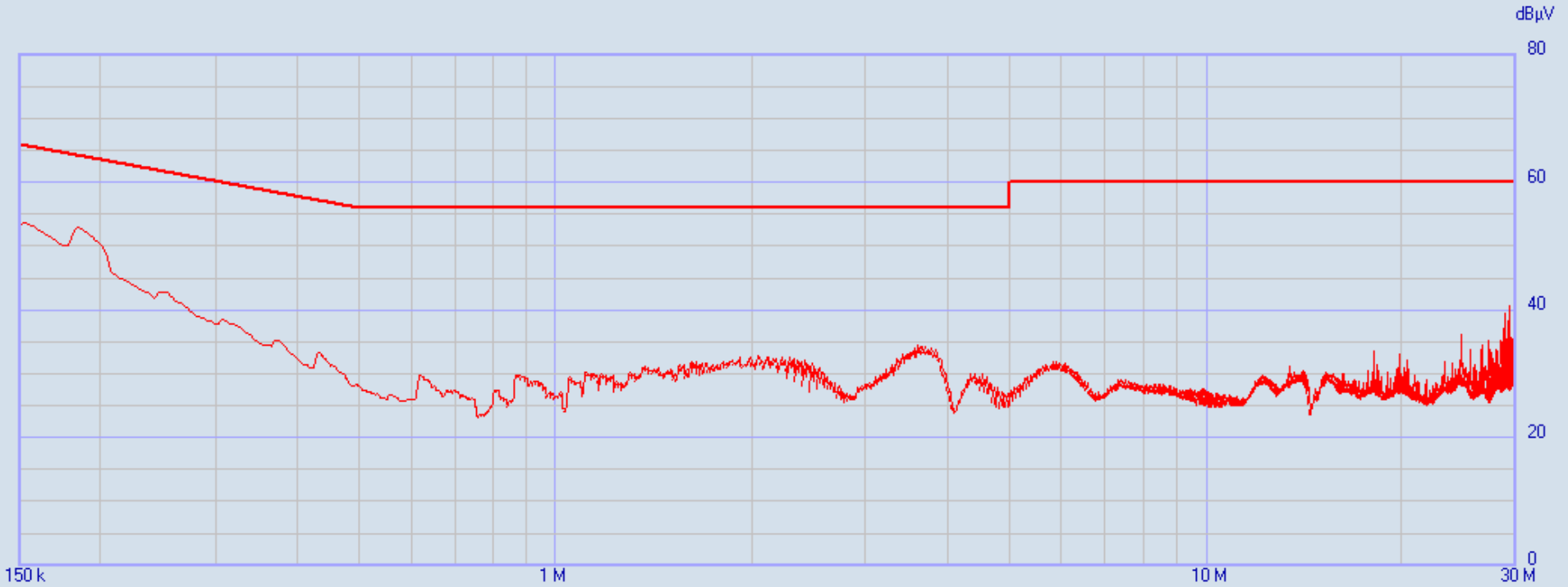
EUT

Manufacturer	: Cambium Networks
Model	: 450I 900MHz SM
Product	: Radio
Notes	: 120 V 60 Hz
Testing Company	: DLS Electronic Systems, Inc.
Telephone	: 262-279-0210
Web site	: http://www.dlsemc.com

Receiver Details

Model	: PMM 9010F
Brand	: Narda
S/N	: 020WW40102
Last Calibration	: 06/25/2015

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.



7506 Cambium 450I 900MHz 120V L1_000

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1000 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General

Limits:
FCC Class B V QP

Factors:
LISN DLS#128
DLS #507
DLS#592
Cables 43 & 45

QPeak

7506 Cambium 450I 900MHz 120V L1_000 02/10/2015 15:18:19
Rel. SW 2.19 (July 2014)
Rel. FW 1.45 27/03/15
Margin: 13 dB

	Frequency [MHz]	QPeak [dBµV]	Limit FCC Class.. [dBµV]	Delta [dB]	Factor LISN DLS#.. [dB]	Factor DLS #507 [dB]	Factor DLS#592 [dB]	Factor Cables 43.. [dB]
1	0.15	53.44	66.00	-12.56	1.67	9.64	2.12	0.03
2	0.152045	53.63	65.89	-12.26	1.64	9.65	2.09	0.04
3	0.15409	53.42	65.78	-12.36	1.61	9.66	2.07	0.04
4	0.156135	53.17	65.67	-12.50	1.59	9.67	2.04	0.04
5	0.15818	52.87	65.56	-12.69	1.56	9.67	2.02	0.05
6	0.160225	52.54	65.45	-12.91	1.54	9.68	1.99	0.05
7	0.18272	52.49	64.36	-11.87	1.28	9.70	1.78	0.09
8	0.184765	52.81	64.27	-11.46	1.26	9.70	1.76	0.10
9	0.18681	52.70	64.18	-11.48	1.24	9.70	1.74	0.10
10	0.188855	52.38	64.09	-11.71	1.22	9.70	1.73	0.10
11	0.1909	52.01	64.00	-11.99	1.20	9.70	1.71	0.10
12	0.192945	51.60	63.91	-12.31	1.18	9.70	1.69	0.10
13	0.19499	51.21	63.82	-12.61	1.17	9.70	1.67	0.10
14	0.197035	50.89	63.73	-12.84	1.15	9.71	1.66	0.10

PMM NARDA REPORT: 7506 Cambium 450I 900MHz 120V L2

Report issuing date : 10-2-2015

Standard : FCC Part 15.207
Test Type : Voltage Mains
Test Site : DLS O.F. Screen Room
Temperature : 70 °F
Humidity : 43 %
Test Specs : Line:2 Average
Operator : Paul L
DLS Project # : 7506
Result : Pass

EUT

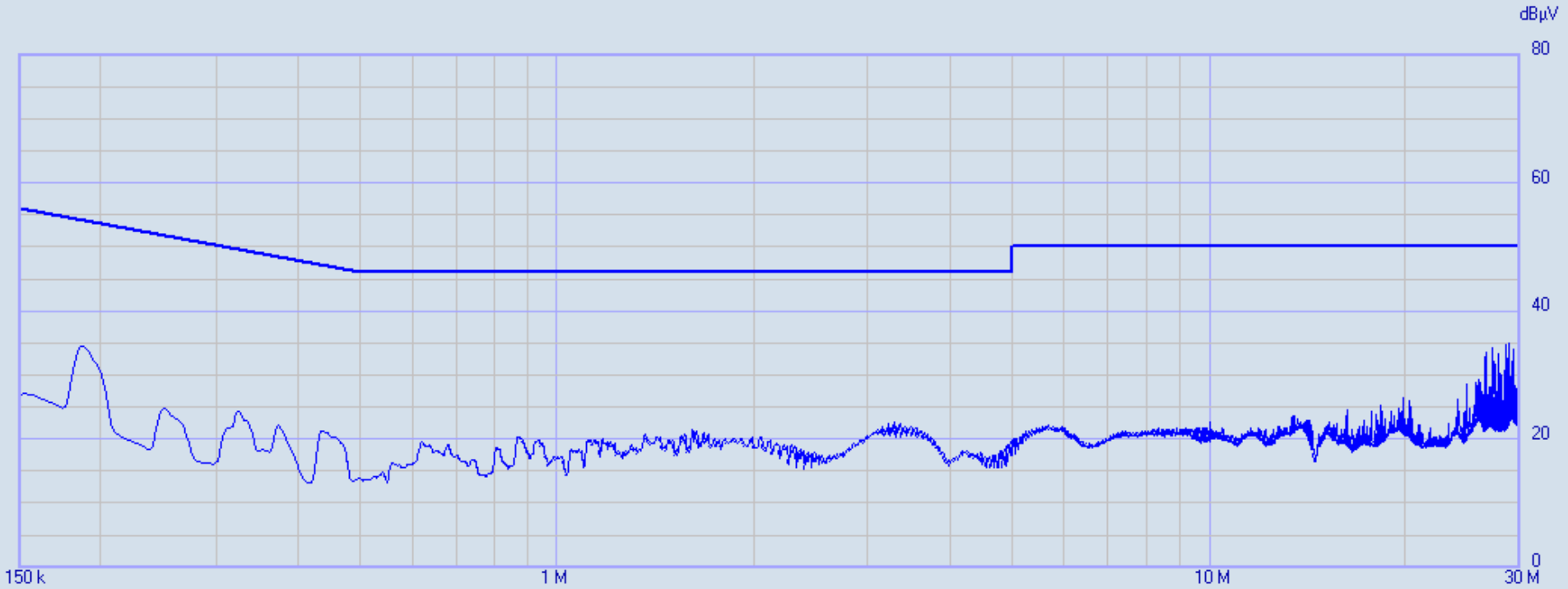
Manufacturer : Cambium Networks
Model : 450I 900MHz SM
Product : Radio
Notes : 120 V 60 Hz

Testing Company : DLS Electronic Systems, Inc.
Telephone : 262-279-0210
Web site : http://www.dlsemc.com

Receiver Details

Model : PMM 9010F
Brand : Narda
S/N : 020WW40102
Last Calibration : 06/25/2015

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.



7506 Cambium 450I 900MHz 120V L2

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1000 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General

Limits:
FCC Class B V AV

Factors:
LISN DLS#128
DLS #507
DLS#592
Cables 43 & 45

C-Avg

7506 Cambium 450I 900MHz 120V L2 02/10/2015 15:30:30
Rel. SW 2.19 (July 2014)
Rel. FW 1.45 27/03/15
Margin: 19 dB

	Frequency [MHz]	C-Avg [dBµV]	Limit FCC Class.. [dBµV]	Delta [dB]	Factor LISN DLS#.. [dB]	Factor DLS #507 [dB]	Factor DLS#592 [dB]	Factor Cables 43.. [dB]
1	26.4896	32.87	50.00	-17.13	0.40	9.88	0.31	0.95
2	26.491645	32.12	50.00	-17.88	0.40	9.88	0.31	0.95
3	26.62866	33.41	50.00	-16.59	0.40	9.88	0.32	0.96
4	27.199215	34.30	50.00	-15.70	0.41	9.88	0.32	0.97
5	27.34441	32.06	50.00	-17.94	0.41	9.87	0.33	0.97
6	27.346455	31.56	50.00	-18.44	0.41	9.87	0.33	0.97
7	27.489605	31.56	50.00	-18.44	0.41	9.87	0.33	0.97
8	27.78204	33.36	50.00	-16.64	0.41	9.87	0.33	0.97
9	28.528465	34.79	50.00	-15.21	0.41	9.86	0.34	0.96
10	28.679795	32.65	50.00	-17.35	0.41	9.86	0.34	0.96
11	28.83317	34.83	50.00	-15.17	0.41	9.86	0.34	0.96
12	29.13992	32.04	50.00	-17.96	0.42	9.85	0.35	0.96
13	29.293295	34.04	50.00	-15.96	0.42	9.85	0.35	0.96

PMM NARDA REPORT: 7506 Cambium 450I 900MHz 120V L2

Report issuing date : 10-2-2015

Standard	: FCC Part 15.207
Test Type	: Voltage Mains
Test Site	: DLS O.F. Screen Room
Temperature	: 70 °F
Humidity	: 43 %
Test Specs	: Line:2 QP
Operator	: Paul L
DLS Project #	: 7506
Result	: Pass

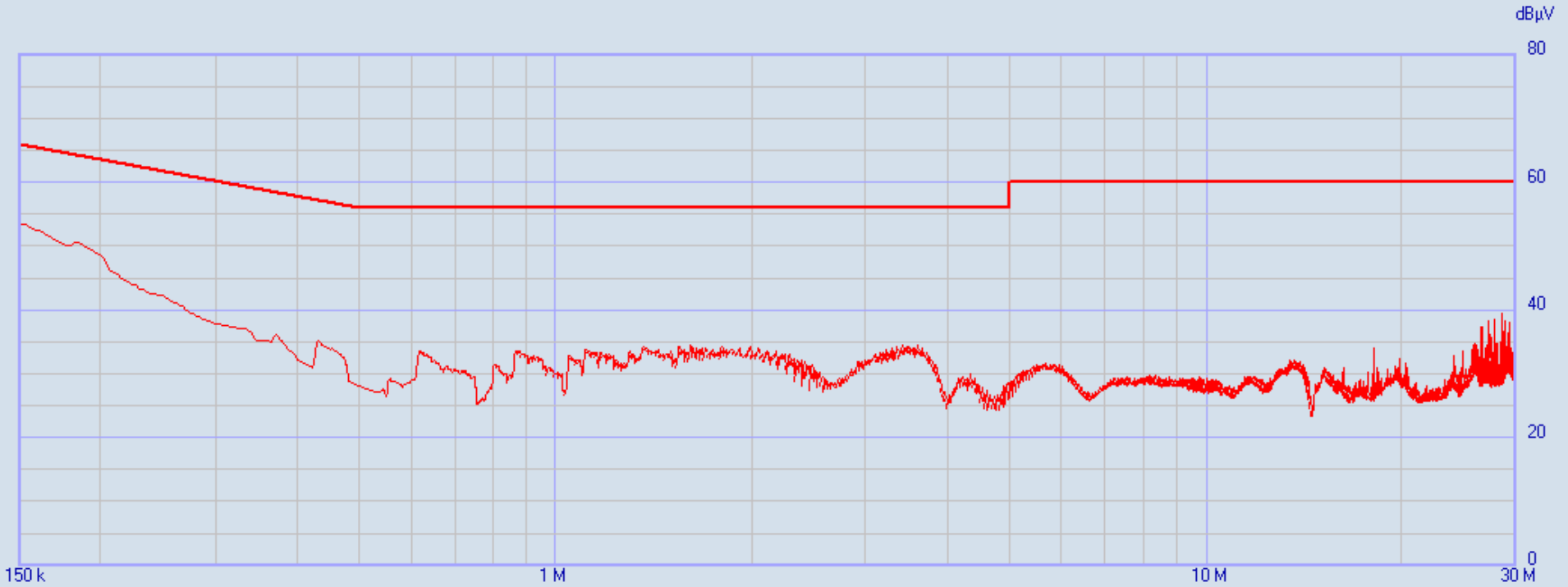
EUT

Manufacturer	: Cambium Networks
Model	: 450I 900MHz SM
Product	: Radio
Notes	: 120 V 60 Hz
Testing Company	: DLS Electronic Systems, Inc.
Telephone	: 262-279-0210
Web site	: http://www.dlsemc.com

Receiver Details

Model	: PMM 9010F
Brand	: Narda
S/N	: 020WW40102
Last Calibration	: 06/25/2015

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.



7506 Cambium 450I 900MHz 120V L2

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1000 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General

Limits:
FCC Class B V QP

Factors:
LISN DLS#128
DLS #507
DLS#592
Cables 43 & 45

QPeak

7506 Cambium 450I 900MHz 120V L2 02/10/2015 15:30:30
Rel. SW 2.19 (July 2014)
Rel. FW 1.45 27/03/15
Margin: 14 dB

	Frequency [MHz]	QPeak [dBµV]	Limit FCC Class.. [dBµV]	Delta [dB]	Factor LISN DLS#.. [dB]	Factor DLS #507 [dB]	Factor DLS#592 [dB]	Factor Cables 43.. [dB]
1	0.15	53.31	66.00	-12.69	1.67	9.64	2.12	0.03
2	0.152045	53.36	65.89	-12.53	1.64	9.65	2.09	0.04
3	0.15409	53.06	65.78	-12.72	1.61	9.66	2.07	0.04
4	0.156135	52.75	65.67	-12.92	1.59	9.67	2.04	0.04
5	0.15818	52.55	65.56	-13.01	1.56	9.67	2.02	0.05
6	0.160225	52.34	65.45	-13.11	1.54	9.68	1.99	0.05
7	0.16227	52.10	65.35	-13.25	1.51	9.69	1.97	0.06
8	0.164315	51.79	65.24	-13.45	1.48	9.70	1.94	0.06
9	0.16636	51.44	65.14	-13.70	1.46	9.71	1.92	0.07
10	0.168405	51.11	65.04	-13.93	1.43	9.71	1.90	0.07
11	0.18272	50.53	64.36	-13.83	1.28	9.70	1.78	0.09
12	0.184765	50.58	64.27	-13.69	1.26	9.70	1.76	0.10
13	0.18681	50.34	64.18	-13.84	1.24	9.70	1.74	0.10

PMM NARDA REPORT: 7506 Cambium 450I 900MHz 240V L1

Report issuing date : 10-2-2015

Standard	: FCC Part 15.207
Test Type	: Voltage Mains
Test Site	: DLS O.F. Screen Room
Temperature	: 70 °F
Humidity	: 43 %
Test Specs	: Line:1 Average
Operator	: Paul L
DLS Project #	: 7506
Result	: Pass

EUT

Manufacturer	: Cambium Networks
Model	: 450I 900MHz SM
Product	: Radio
Notes	: 240 V 60 Hz

Testing Company	: DLS Electronic Systems, Inc.
Telephone	: 262-279-0210
Web site	: http://www.dlsemc.com

Receiver Details

Model	: PMM 9010F
Brand	: Narda
S/N	: 020WW40102
Last Calibration	: 06/25/2015

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.

7506 Cambium 450I 900MHz 240V L1

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1000 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General

Limits:
FCC Class B V AV

Factors:
LISN DLS#128
DLS #507
DLS#592
Cables 43 & 45

C-Avg

7506 Cambium 450I 900MHz 240V L1 02/10/2015 15:47:50
Rel. SW 2.19 (July 2014)
Rel. FW 1.45 27/03/15
Margin: 16 dB

	Frequency [MHz]	C-Avg [dBµV]	Limit FCC Class.. [dBµV]	Delta [dB]	Factor LISN DLS#.. [dB]	Factor DLS #507 [dB]	Factor DLS#592 [dB]	Factor Cables 43.. [dB]
1	0.16636	39.19	55.14	-15.95	1.46	9.71	1.92	0.07
2	25.796345	34.26	50.00	-15.74	0.40	9.88	0.30	0.92
3	25.93336	34.68	50.00	-15.32	0.40	9.88	0.31	0.93
4	26.4896	37.22	50.00	-12.78	0.40	9.88	0.31	0.95
5	26.491645	36.51	50.00	-13.49	0.40	9.88	0.31	0.95
6	26.62866	37.62	50.00	-12.38	0.40	9.88	0.32	0.96
7	27.199215	37.37	50.00	-12.63	0.41	9.88	0.32	0.97
8	27.34441	34.85	50.00	-15.15	0.41	9.87	0.33	0.97
9	27.346455	34.35	50.00	-15.65	0.41	9.87	0.33	0.97
10	27.489605	34.35	50.00	-15.65	0.41	9.87	0.33	0.97
11	27.78204	34.79	50.00	-15.21	0.41	9.87	0.33	0.97
12	28.528465	35.25	50.00	-14.75	0.41	9.86	0.34	0.96
13	28.679795	34.87	50.00	-15.13	0.41	9.86	0.34	0.96
14	28.83317	37.21	50.00	-12.79	0.41	9.86	0.34	0.96
15	29.13992	34.28	50.00	-15.72	0.42	9.85	0.35	0.96
16	29.293295	36.56	50.00	-13.44	0.42	9.85	0.35	0.96

PMM NARDA REPORT: 7506 Cambium 450I 900MHz 240V L1

Report issuing date : 10-2-2015

Standard	: FCC Part 15.207
Test Type	: Voltage Mains
Test Site	: DLS O.F. Screen Room
Temperature	: 70 °F
Humidity	: 43 %
Test Specs	: Line:1 QP
Operator	: Paul L
DLS Project #	: 7506
Result	: Pass

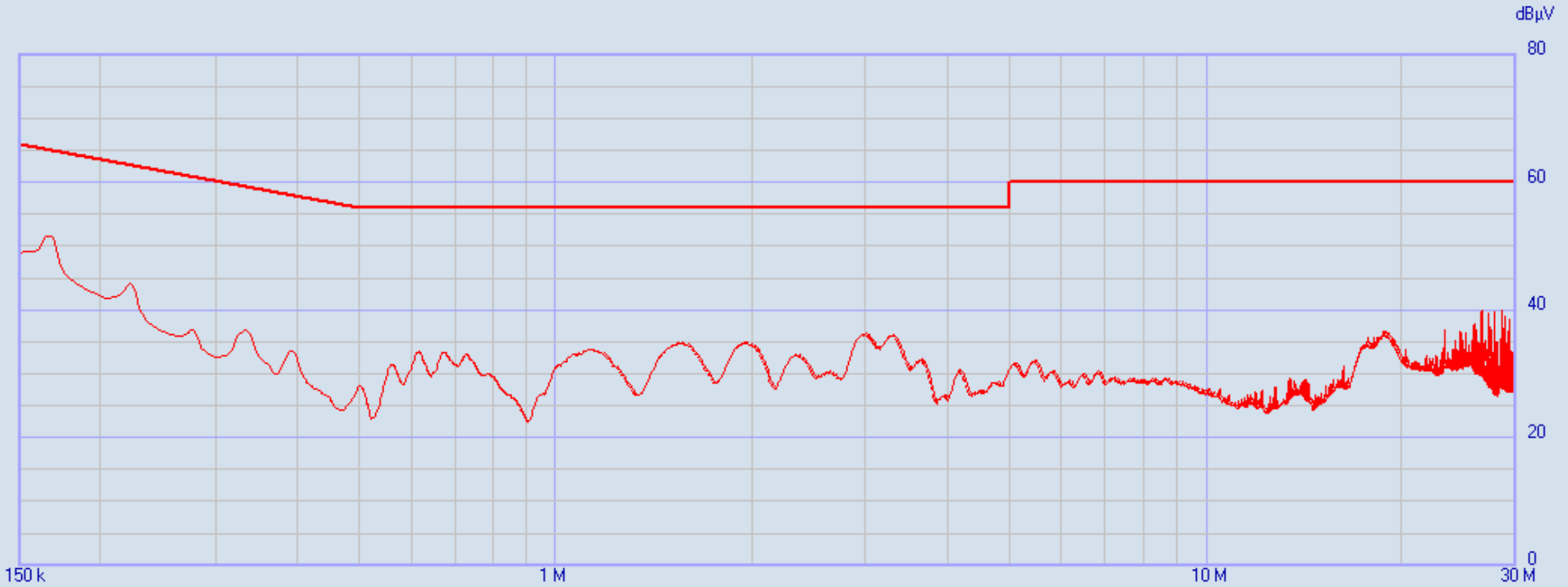
EUT

Manufacturer	: Cambium Networks
Model	: 450I 900MHz SM
Product	: Radio
Notes	: 240 V 60 Hz
Testing Company	: DLS Electronic Systems, Inc.
Telephone	: 262-279-0210
Web site	: http://www.dlsemc.com

Receiver Details

Model	: PMM 9010F
Brand	: Narda
S/N	: 020WW40102
Last Calibration	: 06/25/2015

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.



7506 Cambium 450I 900MHz 240V L1

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1000 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General

Limits:
FCC Class B V QP

Factors:
LISN DLS#128
DLS #507
DLS#592
Cables 43 & 45

QPeak

7506 Cambium 450I 900MHz 240V L1 02/10/2015 15:47:50
Rel. SW 2.19 (July 2014)
Rel. FW 1.45 27/03/15
Margin: 19 dB

	Frequency [MHz]	QPeak [dBµV]	Limit FCC Class.. [dBµV]	Delta [dB]	Factor LISN DLS#.. [dB]	Factor DLS #507 [dB]	Factor DLS#592 [dB]	Factor Cables 43.. [dB]
1	0.15	48.82	66.00	-17.18	1.67	9.64	2.12	0.03
2	0.152045	49.12	65.89	-16.77	1.64	9.65	2.09	0.04
3	0.15409	49.09	65.78	-16.69	1.61	9.66	2.07	0.04
4	0.156135	49.13	65.67	-16.54	1.59	9.67	2.04	0.04
5	0.15818	49.09	65.56	-16.47	1.56	9.67	2.02	0.05
6	0.160225	49.42	65.45	-16.03	1.54	9.68	1.99	0.05
7	0.16227	50.54	65.35	-14.81	1.51	9.69	1.97	0.06
8	0.164315	51.43	65.24	-13.81	1.48	9.70	1.94	0.06
9	0.16636	51.56	65.14	-13.58	1.46	9.71	1.92	0.07
10	0.168405	51.22	65.04	-13.82	1.43	9.71	1.90	0.07
11	0.17045	49.65	64.94	-15.29	1.40	9.71	1.88	0.08
12	0.172495	47.53	64.84	-17.31	1.38	9.71	1.86	0.08
13	0.17454	46.38	64.74	-18.36	1.36	9.71	1.85	0.08
14	0.176585	45.64	64.64	-19.00	1.34	9.70	1.83	0.09
15	0.221575	44.07	62.76	-18.69	0.99	9.72	1.53	0.10
16	0.22362	43.95	62.68	-18.73	0.98	9.72	1.52	0.10

PMM NARDA REPORT: 7506 Cambium 450I 900MHz 240V L2

Report issuing date : 10-2-2015

Standard : FCC Part 15.207
Test Type : Voltage Mains
Test Site : DLS O.F. Screen Room
Temperature : 70 °F
Humidity : 43 %
Test Specs : Line:2 Average
Operator : Paul L
DLS Project # : 7506
Result : Pass

EUT

Manufacturer : Cambium Networks
Model : 450I 900MHz SM
Product : Radio
Notes : 240 V 60 Hz

Testing Company : DLS Electronic Systems, Inc.
Telephone : 262-279-0210
Web site : http://www.dlsemc.com

Receiver Details

Model : PMM 9010F
Brand : Narda
S/N : 020WW40102
Last Calibration : 06/25/2015

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.

7506 Cambium 450I 900MHz 240V L2

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1000 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General

Limits:
FCC Class B V AV

Factors:
LISN DLS#128
DLS #507
DLS#592
Cables 43 & 45

C-Avg

7506 Cambium 450I 900MHz 240V L2 02/10/2015 15:54:56
Rel. SW 2.19 (July 2014)
Rel. FW 1.45 27/03/15
Margin: 16 dB

	Frequency [MHz]	C-Avg [dBµV]	Limit FCC Class.. [dBµV]	Delta [dB]	Factor LISN DLS#.. [dB]	Factor DLS #507 [dB]	Factor DLS#592 [dB]	Factor Cables 43.. [dB]
1	0.16636	39.56	55.14	-15.58	1.46	9.71	1.92	0.07
2	25.796345	34.29	50.00	-15.71	0.40	9.88	0.30	0.92
3	25.93336	34.73	50.00	-15.27	0.40	9.88	0.31	0.93
4	26.4896	37.16	50.00	-12.84	0.40	9.88	0.31	0.95
5	26.491645	36.45	50.00	-13.55	0.40	9.88	0.31	0.95
6	26.62866	37.60	50.00	-12.40	0.40	9.88	0.32	0.96
7	27.199215	37.34	50.00	-12.66	0.41	9.88	0.32	0.97
8	27.34441	34.87	50.00	-15.13	0.41	9.87	0.33	0.97
9	27.346455	34.37	50.00	-15.63	0.41	9.87	0.33	0.97
10	27.489605	34.37	50.00	-15.63	0.41	9.87	0.33	0.97
11	27.78204	34.16	50.00	-15.84	0.41	9.87	0.33	0.97
12	28.528465	35.30	50.00	-14.70	0.41	9.86	0.34	0.96
13	28.679795	34.90	50.00	-15.10	0.41	9.86	0.34	0.96
14	28.83317	37.30	50.00	-12.70	0.41	9.86	0.34	0.96
15	29.13992	34.47	50.00	-15.53	0.42	9.85	0.35	0.96
16	29.293295	36.87	50.00	-13.13	0.42	9.85	0.35	0.96

PMM NARDA REPORT: 7506 Cambium 450I 900MHz 240V L2

Report issuing date : 10-2-2015

Standard : FCC Part 15.207
Test Type : Voltage Mains
Test Site : DLS O.F. Screen Room
Temperature : 70 °F
Humidity : 43 %
Test Specs : Line:2 QP
Operator : Paul L
DLS Project # : 7506
Result : Pass

EUT

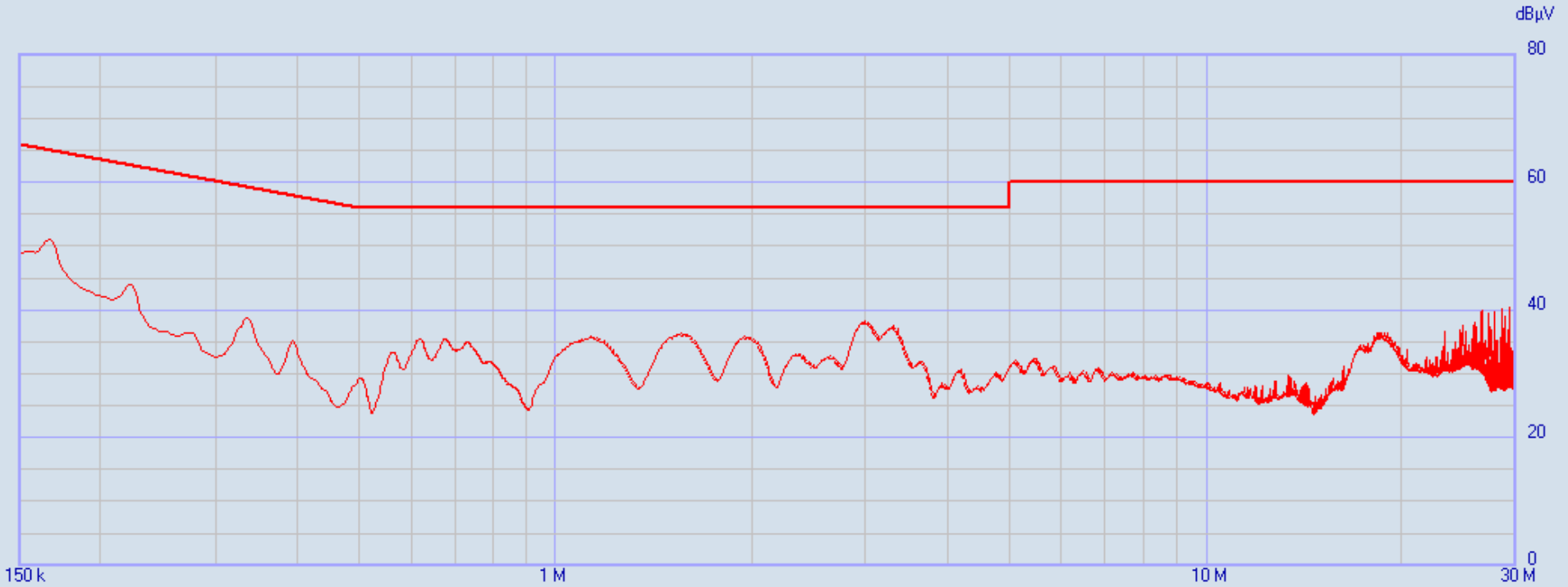
Manufacturer : Cambium Networks
Model : 450I 900MHz SM
Product : Radio
Notes : 240 V 60 Hz

Testing Company : DLS Electronic Systems, Inc.
Telephone : 262-279-0210
Web site : http://www.dlsemc.com

Receiver Details

Model : PMM 9010F
Brand : Narda
S/N : 020WW40102
Last Calibration : 06/25/2015

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.



7506 Cambium 450I 900MHz 240V L2

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1000 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General

Limits:
FCC Class B V QP

Factors:
LISN DLS#128
DLS #507
DLS#592
Cables 43 & 45

QPeak

7506 Cambium 450I 900MHz 240V L2 02/10/2015 15:54:56
Rel. SW 2.19 (July 2014)
Rel. FW 1.45 27/03/15
Margin: 18 dB

	Frequency [MHz]	QPeak [dBµV]	Limit FCC Class.. [dBµV]	Delta [dB]	Factor LISN DLS#.. [dB]	Factor DLS #507 [dB]	Factor DLS#592 [dB]	Factor Cables 43.. [dB]
1	0.15	48.68	66.00	-17.32	1.67	9.64	2.12	0.03
2	0.152045	49.25	65.89	-16.64	1.64	9.65	2.09	0.04
3	0.15409	49.24	65.78	-16.54	1.61	9.66	2.07	0.04
4	0.156135	49.05	65.67	-16.62	1.59	9.67	2.04	0.04
5	0.15818	48.94	65.56	-16.62	1.56	9.67	2.02	0.05
6	0.160225	49.19	65.45	-16.26	1.54	9.68	1.99	0.05
7	0.16227	50.19	65.35	-15.16	1.51	9.69	1.97	0.06
8	0.164315	50.89	65.24	-14.35	1.48	9.70	1.94	0.06
9	0.16636	51.00	65.14	-14.14	1.46	9.71	1.92	0.07
10	0.168405	50.67	65.04	-14.37	1.43	9.71	1.90	0.07
11	0.17045	49.38	64.94	-15.56	1.40	9.71	1.88	0.08
12	0.172495	47.42	64.84	-17.42	1.38	9.71	1.86	0.08
13	2.95574	38.00	56.00	-18.00	0.28	9.76	0.21	0.34
14	2.9721	38.18	56.00	-17.82	0.28	9.76	0.21	0.34
15	2.986415	38.30	56.00	-17.70	0.28	9.76	0.21	0.34
16	3.002775	38.08	56.00	-17.92	0.28	9.76	0.21	0.34
17	3.00482	38.11	56.00	-17.89	0.28	9.76	0.21	0.34
18	3.019135	38.11	56.00	-17.89	0.28	9.76	0.21	0.34

END OF REPORT

Revision #	Date	Comments	By
1.0	10-12-2015	Preliminary Release	JS
1.1	10-12-2015	Minor edits on pages 13, 34, 92, & line conducted data	JS
1.2	10-19-2015	Setup photos extracted	JS