Test of Aruba Networks APINR108, APINR109
Wireless AP

To: FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: ARUB120-U2 Rev A

TEST REPORT

FROM

Test of Aruba Networks APINR108, APINR109 Wireless AP

to

To FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: ARUB120-U2 Rev A

Note: this report contains data with regard to the 5,150 to 5,250 MHz band for Aruba Networks, APINR108, APINR109 Wireless Access Point. 2.4 and 5.8 GHz test data are reported in MiCOM Labs test report ARUB120-U1

This report supersedes None

Applicant: Aruba Networks
1344 Crossman Avenue
Sunnyvale
California 94089, USA

Product Function: Wireless Access Point

Copy No: pdf Issue Date: 28th November 2012

This Test Report is Issued Under the Authority of;

MiCOM Labs, Inc.
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ACCREDITED
TEST CERTIFICATE #2381.01

MiCOM Labs is an ISO 17025 Accredited Testing Laboratory

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TABLE OF CONTENTS

ACCREDITATION, LISTINGS & RECOGNITION

TESTING ACCREDITATION

MiCOM Labs, Inc. is an accredited Electrical testing laboratory per the international standard EN ISO/IEC 17025. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-01.pdf

RECOGNITION

MiCOM Labs, Inc has widely recognized Electrical testing capabilities. Our international recognition includes Conformity Assessment Body designation by APEC MRA** countries. Our test reports are widely accepted for global type approvals.

Country	Recognition Body	Status	Phase	Identification No.
USA	Federal Communications Commission (FCC)	TCB	-	US0159 Listing #: 102167
Canada	Industry Canada (IC)	FCB	APEC MRA 2	US0159 Listing #: 4143A-2
Japan	MIC (Ministry of Internal Affairs and Communication)	CAB	APEC MRA 2	RCB 210
	VCCI	--	--	A-0012
Europe	European Commission	NB	EU MRA	NB 2280
Australia	Australian Communications and Media Authority (ACMA)	CAB	APEC MRA 1	US0159
Hong Kong	Office of the Telecommunication Authority (OFTA)	CAB	APEC MRA 1	
Korea	Ministry of Information and Communication Radio Research Laboratory (RRL)	CAB	APEC MRA 1	
Singapore	Infocomm Development Authority (IDA)	CAB	APEC MRA 1	
Taiwan	National Communications Commission (NCC) Bureau of Standards, Metrology and Inspection (BSMI)	CAB	APEC MRA 1	
Vietnam	Ministry of Communication (MIC)	CAB	APEC MRA 1	

**APEC MRA – Asia Pacific Economic Community Mutual Recognition Agreement.
Is a recognition agreement under which test lab is accredited to regulatory standards of the APEC member countries.
Phase I - recognition for product testing
Phase II – recognition for both product testing and certification
N/A – Not Applicable

**EU MRA – European Union Mutual Recognition Agreement.
Is a recognition agreement under which test lab is accredited to regulatory standards of the EU member countries.

**NB – Notified Body

PRODUCT CERTIFICATION

MiCOM Labs, Inc. is an accredited Product Certification Body per the international standard EN ISO/IEC Guide 65. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.02. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-02.pdf

USA Telecommunication Certification Body (TCB) - TCB Identifier – US0159

Industry Canada Certification Body - CAB Identifier – US0159

European Notified Body - Notified Body Identifier - 2280

Japan – Recognized Certification Body (RCB) - RCB Identifier - 210

DOCUMENT HISTORY

Document History		
Revision	**Date**	**Comments**
Draft		
Rev A	28th November 2012	Initial release

1. TEST RESULT CERTIFICATE

Applicant:	Aruba Networks 1344 Crossman Avenue Sunnyvale California 94089, USA	Tested By:	MiCOM Labs, Inc. 440 Boulder Court Suite 200 Pleasanton California, 94566, USA
EUT:	Wireless LAN Access point	Tel:	+1 925 462 0304
Model:	APINR108, APINR109	Fax:	+1 925 462 0306
S/N:	BV0000142		
Test Date(s):	1st to 31st October'12	Website:	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC 47 CFR Part 15.407 & IC RSS-210	EQUIPMENT COMPLIES

MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Notes:

1. This document reports conditions under which testing was conducted and the results of testing performed.
2. Details of test methods used have been recorded and kept on file by the laboratory.
3. Test results apply only to the item(s) tested.

ACCREDITED
TESTING CERTIFICATE #2381.01

Approved & Released for MiCOM Labs, Inc. by:

Graeme Grieve
Quality Manager MiCOM Labs,

Gordon Hurst
President & CEO MiCOM Labs, Inc.

2. REFERENCES AND MEASUREMENT UNCERTAINTY

2.1. Normative References

Ref.	Publication	Year	Title
(i)	FCC 47 CFR Part 15.407	2012	Code of Federal Regulations
(ii)	FCC 06-96	June 2006	Memorandum Opinion and Order
(iii)	FCC OET KDB 662911	4th April 2011	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
(iv)	Industry Canada RSS-210	2010	Low Power License-Exempt Radiocommunication Devices (All Frequency Bands): Category 1 Equipment
(v)	Industry Canada RSS-Gen	2010	General Requirements and Information for the Certification of Radiocommunication Equipment
(vi)	ANSI C63.4	2009	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
(vii)	CISPR 22/ EN 55022	2008 2006+A1:2007	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
(viii)	M 3003	Edition 1 Dec. 1997	Expression of Uncertainty and Confidence in Measurements
(ix)	LAB34	Edition 1 Aug 2002	The expression of uncertainty in EMC Testing
(x)	ETSI TR 100 028	2001	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
(xi)	A2LA	July 2012	Reference to A2LA Accreditation Status – A2LA Advertising Policy
(xii)	FCC Public Notice – DA 02-2138	2002	Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices

2.2. Test and Uncertainty Procedures

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.4, listed in the Normative References section of this report.

Measurement uncertainty figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2.

Measurement uncertainties stated are based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 % in accordance with UKAS document M 3003 listed in the Normative References section of this report.

3. PRODUCT DETAILS AND TEST CONFIGURATIONS

3.1. Technical Details

Details	Description
Purpose:	Test of the Aruba Networks APINR108, APINR109 Wireless AP in the frequency range 5,150 to 5,250 MHz to FCC Part 15.407 and Industry Canada RSS-210 regulations.
Applicant:	Aruba Networks 1344 Crossman Avenue Sunnyvale California 94089, USA
Manufacturer:	As applicant
Laboratory performing the tests:	MiCOM Labs, Inc. 440 Boulder Court, Suite 200 Pleasanton, California 94566 USA
Test report reference number:	ARUB120-U2 Rev A
Date EUT received:	1st October 2012
Standard(s) applied:	FCC 47 CFR Part 15.407 & IC RSS-210
Dates of test (from - to):	1st to 31st October'12
No of Units Tested:	One
Type of Equipment:	Wireless LAN Access Point, 2X2 Spatial Multiplexing MIMO configuration
Applicants Trade Name:	Wireless Access Point
Model(s):	APINR108, APINR109–US ; APINR108, APINR109-WW
Location for use:	Indoor only
Declared Frequency Range(s):	5,150 – 5,250 MHz
Hardware Rev	R0D
Software Rev	AOS 6.2
Type of Modulation:	Per 802.11 – OFDM
Declared Nominal Output Power: (Average Power)	802.11a: Legacy +18 dBm 802.11n: HT-20 +18 dBm 802.11n: HT-40 +18 dBm
EUT Modes of Operation:	Legacy 802.11a, 802.11n HT-20, HT-40
Transmit/Receive Operation:	Time Division Duplex
System Beam Forming:	APINR108, APINR109 has no capability for beam forming
Rated Input Voltage and Current:	POE 12 Vdc 1.25 A
Operating Temperature Range:	Declared range 0° to +40ºC
ITU Emission Designator:	802.11a 16M8D1D 802.11n HT-20 17M9D1D 802.11n HT-40 36M3D1D
Equipment Dimensions:	170mm X 170mm X 40mm
Weight:	385 g
Primary function of equipment:	Wireless Access Point for transmitting data and voice.

3.2. Scope of Test Program

Aruba Networks APINR108, APINR109 Access Point RF Testing
The scope of the test program was to test the Aruba Networks APINR108, APINR109 Wireless LAN Access Point, 2X2 Spatial Multiplexing MIMO configurations in the frequency range 5,150 to 5,250 MHz for compliance against FCC 47 CFR Part 15.407 and Industry Canada RSS-210 specifications.

FCC OET KDB Implementation
This test program implements the following FCC KDB – 662911 4/4/2011;
Emissions Testing of Transmitters with Multiple Outputs in the Same Band

The KDB document provides guidance for measurements of conducted output emissions of devices that employ a single transmitter with multiple outputs in the same band, with the outputs occupying the same or overlapping frequency ranges. It applies to EMC compliance measurements on devices that transmit on multiple antennas simultaneously in the same or overlapping frequency ranges through a coordinated process. Examples include, but are not limited to, devices employing beam forming or multiple-input and multiple-output (MIMO.) This guidance applies to both licensed and unlicensed devices wherever the FCC rules call for conducted output measurements. Guidance is provided for in-band, out-of-band and spurious emission measurements.

This guidance does not apply to the multiple transmitters included in a composite device, such as a device that combines an 802.11 modem with a cell phone in one enclosure with each driving its own antenna.

APINR108 Wireless LAN Access Point

APINR109 Wireless LAN Access Point

APINR108, APINR109 Wireless LAN Access Point (Rear)

APINR108, APINR109 Wireless LAN Access Point Label	Device has an electronic label

3.3. Equipment Model(s) and Serial Number(s)

Type (EUT/ Support)	Equipment Description (Including Brand Name)	Mfr	Model No.	Serial No.
EUT	Wireless LAN Access Point	Aruba Networks	APINR108, APINR109	BV0000142
Support	Laptop PC	IBM	Thinkpad	None

3.4. Antenna Details

Model	Type	Gain (dBi)	Freq. Band (MHz)	Note
AP-ANT-1B	Omni	3.8	2400 - 2500	(3x per unit)
		5.8	4900 - 5875	
AP-ANT-13B	Omni	4.4	2400 - 2500	(3x per unit)
		3.3	4900 - 5900	
AP-ANT-16	Omni	3.9	2400 - 2500	(1x per unit) 3x3 MIMO
		4.7	4900 - 5900	
AP-ANT-17	Directional 120degr.	6.0	2400 - 2500	(1x per unit) 3x3 MIMO
		5.0	4900 - 5875	
AP-ANT-18	Directional 60degr.	7.0	2400 - 2500	(1x per unit) 3x3 MIMO
		7.5	5150 - 5875	
AP-ANT-19	Omni	3.0	2400 - 2500	(3 x per unit)
		6.0	5150 - 5875	

3.5. Cabling and I/O Ports

Number and type of I/O ports

Port Type	Port Description	Qty	Screened (Yes/ No)	Length
Ethernet	Ethernet PoE	1	NO	> 10m
Ethernet	Ethernet	1	NO	3m-10m
Serial RS 323 (RJ45)	Serial Console	1	NO	1m-3m
USB	USB port	1	NO	1m-3m

3.6. Test Configurations

Testing was performed to determine the highest power level versus bit rate. The variant with the highest power was used to exercise the product.

Matrix of test configurations

Operational Mode(s) (802.11)	Variant	Data Rates with Highest Power	Frequencies (MHz)
a,n	Legacy	6 MBit/s	5180/5,200/5,240
	HT-20	6.5 MCS	
	HT-40	13.5 MCS	5,190, 5,230

Antenna Test Configurations for Radiated Emissions and Band-Edge
Results for the following configurations are provided in this report.

Radiated emissions testing was performed for three different antennas that represent the highest gain for each antenna type intended for use with the EUT;- Integral antenna (As used in APINR109) ; ANT-18 60 degree sector antenna; ANT-19 monopole antenna.

Radiated emissions testing was performed for all possible configurations for antenna ANT-18 which is the highest gain antenna used with the equipment. Radiated emissions testing was performed for the other two antennas in worst case mode (mode with the highest spectral density)

Spurious Emission and Band-Edge Test Strategy
Bands 5,150 – 5250; 5,250 – 5,350

11a	11n HT-20	11n HT-40
SE 5180	SE 5180	SE 5190
SE 5200	SE 5200	
SE 5240	SE 5240	SE 5230
BE 5350	BE 5350	BE 5350

KEY:-

SE – Spurious Emissions

BE – Band-Edge

3.7. Equipment Modifications

The following modifications were required to bring the equipment into compliance:

1. Peak Power Spectral Density and Conducted Power

   In order to comply with the Peak power Spectral Density and maximum conducted power limits for the 5150 – 5250 MHz band the EUT power was set as summarized in the following tables;-

NART Power Settings

	5180 MHz	5200 MHz	5240 MHz
11a	13.5	13.5	14.5
11n HT-20	13.5	14.0	15.0

NART Power Settings

	5190 MHz	5230 MHz
11n HT-40	15.5	16.0

3.8. Deviations from the Test Standard

The following deviations from the test standard were required in order to complete the test program:

1. NONE

3.9. Subcontracted Testing or Third Party Data

1. NONE

4. TESTING EQUIPMENT CONFIGURATION(S)

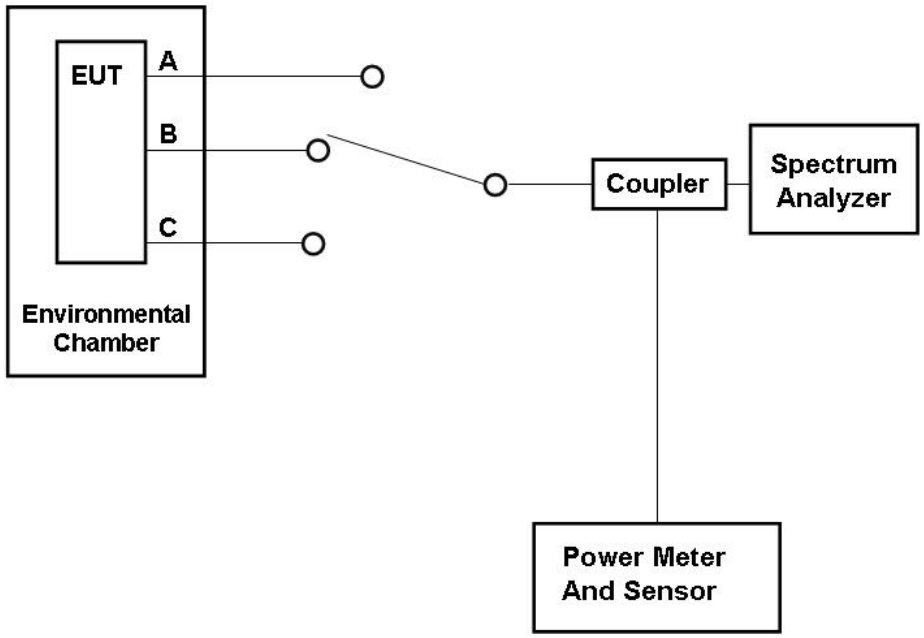
4.1. Conducted RF Emission Test Set-up

The following tests were performed using the conducted test set-up shown in the diagram below.

1. Section 6.1.1.1. 26 dB and 99% Bandwidth
2. Section 6.1.1.2. Maximum Conducted Output Power
3. Section 6.1.1.3. Peak Power Spectral Density
4. Section 6.1.1.4. Peak Excursion Ratio

Conducted Test Set-Up Pictorial Representation

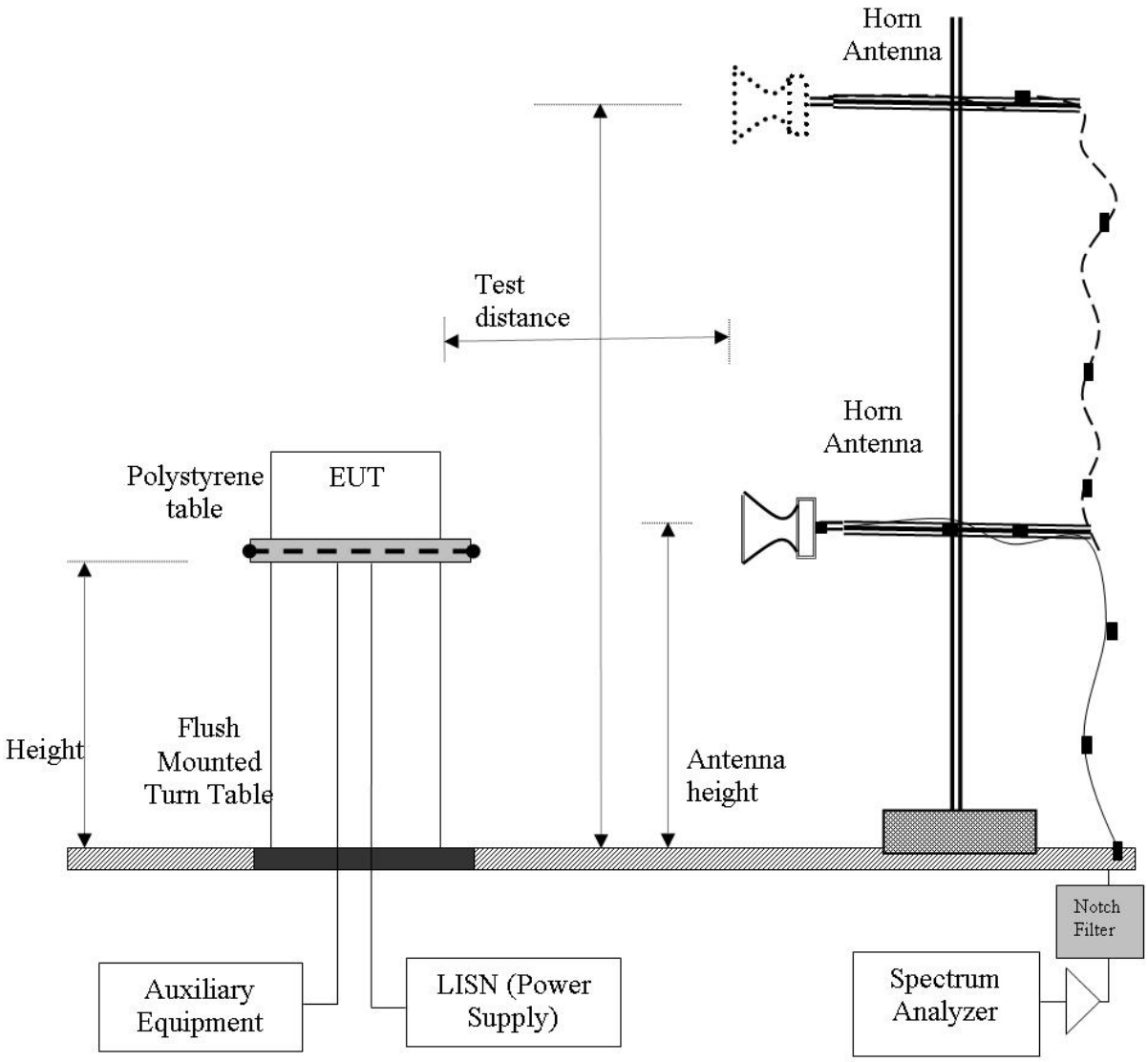
3 - Port Test Configuration



4.2. Radiated Spurious Emission Test Set-up > 1 GHz

The following tests were performed using the conducted test set-up shown in the diagram below.

Radiated Emission Measurement Setup – Above 1 GHz

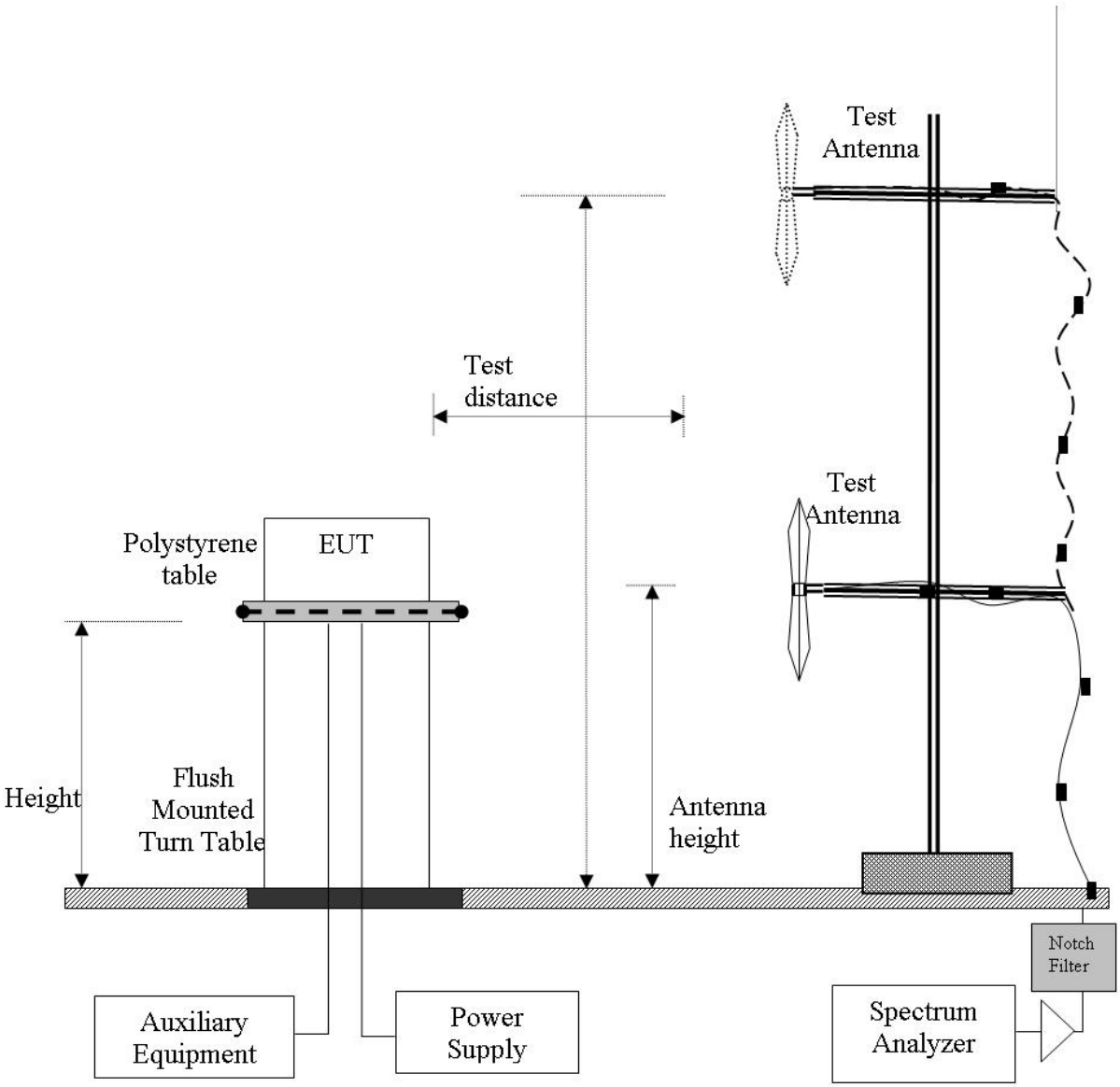


4.3. Digital Emissions Test Set-up (0.03 – 1 GHz)

The following tests were performed using the conducted test set-up shown in the diagram below.

1. Section 6.1.2.4. Digital Emissions

Digital Emission Measurement Setup – Below 1 GHz

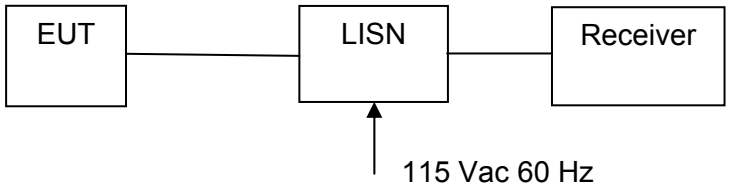


4.4. ac Wireline Emission Test Set-up

The following tests were performed using the conducted test set-up shown in the diagram below.

1. Section 6.1.3 ac Wireline Conducted Emissions

Conducted Test Set-Up Pictorial Representation



Measurement set up for ac Wireline Conducted Emissions Test

5. TEST SUMMARY

List of Measurements

The following table represents the list of measurements required under the **FCC CFR47 Part 15.407** and **Industry Canada RSS-210**.and **Industry Canada RSS-Gen**.

Section(s)	Test Items	Description	Condition	Result	Test Report Section
15.407(a) **A9.2(2)** **4.4**	26dB and 99% Emission BW	Emission bandwidth measurement	Conducted	Complies	6.1.1.1 A.1.1
15.407(a) **A9.2(2)** **4.6**	Maximum Conducted Output Power	Power Measurement	Conducted	Complies	6.1.1.2
15.407(a) **A9.2(2)**	Peak Power Spectral Density	PPSD	Conducted	Complies	6.1.1.3 A.1.2
15.407(a)(6)	Peak Excursion Ratio	<13dB in any 1MHz bandwidth	Conducted	Complies	6.1.1.4 A.1.3
15.407(g) **15.31** **2.1** **4.5**	Frequency Stability	Limits: contained within band of operation at all times.	Applicant declaration	Complies	6.1.1.5
15.407(f) **5.5**	Radio Frequency Radiation Exposure	Exposure to radio frequency energy levels, Maximum Permissible Exposure (MPE)	Conducted	See included MPE exhibit	--

List of Measurements (continued)

The following table represents the list of measurements required under the **FCC CFR47 Part 15.407** and **Industry Canada RSS-210** and **Industry Canada RSS-Gen**.

Section(s)	Test Items	Description	Condition	Result	Test Report Section
15.407(b)(2) **15.205(a)** **15.209(a)** **2.2** **2.6** **A9.3(2)** **4.7**	Radiated Emissions		Radiated		6.1.2
	Transmitter Radiated Spurious Emissions	Emissions above 1 GHz		Complies	*6.1.2.1* *6.1.2.2* *6.1.2.3*
	Radiated Band Edge	Band edge results		Complies	*6.1.2.1* *6.1.2.2* *6.1.2.3*
15.407(b)(6) **15.205(a)** **15.209(a)** **2.2**	Radiated Emissions	Emissions <1 GHz (30M-1 GHz)		Complies	*6.1.2.4*
15.407(b)(6) **15.207** **7.2.2**	AC Wireline Conducted Emissions 150 kHz–30 MHz	Conducted Emissions	Conducted	N/A EUT is POE powered - not shipped with equipment	6.1.3

Note 1: Test results reported in this document relate only to the items tested

Note 2: The required tests demonstrated compliance as per client declaration of test configuration, monitoring methodology and associated pass/fail criteria

Note 3: Section 3.7 Equipment Modifications highlights the equipment modifications that were required to bring the product into compliance with the above test matrix

6. TEST RESULTS

6.1. Device Characteristics

6.1.1. Conducted Testing

6.1.1.1. 26 dB and 99 % Bandwidth

Conducted Test Conditions for 26 dB and 99% Bandwidth			
Standard:	FCC CFR 47:15.407	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	26 dB and 99 % Bandwidth	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.407 (a)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	KDB 789033 - D01 DTS General UNII Test Procedures v01		

Test Procedure for 26 dB and 99% Bandwidth Measurement

The bandwidth at 26 dB and 99 % is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency. KDB 789033 Section 5.1 Emission Bandwidth was used in order to prove compliance. The Resolution Bandwidth was set to approximately 1% of the emission bandwidth.

Measurement Results for 26 dB and 99 % Operational Bandwidth(s)

Equipment Configuration for 26 dB and 99% Bandwidth			
Variant:	802.11a	**Duty Cycle (%):**	99
Data Rate:	6 MBit/s	**Antenna Gain (dBi):**	N/A
Modulation:	OFDM	**Beam Forming Gain (Y):**	N/A
TPC:	Maximum Power		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz) Port(s)				26 dB Bandwidth (MHz)			
MHz	a	b	c	d	Highest	Lowest		
5180.0	21.844	21.242			21.844	21.242		
5200.0	21.743	21.443			21.743	21.443		
5240.0	22.244	21.643			22.244	21.643		

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				99% Bandwidth (MHz)			
MHz	a	b	c	d	Highest	Lowest		
5180.0	16.633	16.533			16.633	16.533		
5200.0	16.633	16.533			16.633	16.533		
5240.0	16.733	16.533			16.733	16.533		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 Measuring RF Spectrum Mask
Measurement Uncertainty:	±2.81 dB

Click on the links above to see the plot

Equipment Configuration for 26 dB and 99% Bandwidth			
Variant:	802.11n HT-20	**Duty Cycle (%):**	99
Data Rate:	6.5 MBit/S	**Antenna Gain (dBi):**	N/A
Modulation:	OFDM	**Beam Forming Gain (Y):**	N/A
TPC:	Maximum Power		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz) Port(s)				26 dB Bandwidth (MHz)			
MHz	**a**	**b**	**c**	**d**	**Highest**	**Lowest**		
5180.0	23.647	22.445			23.647	22.445		
5200.0	23.246	22.244			23.246	22.244		
5240.0	23.146	22.846			23.146	22.846		

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				99% Bandwidth (MHz)			
MHz	**a**	**b**	**c**	**d**	**Highest**	**Lowest**		
5180.0	17.735	17.735			17.735	17.735		
5200.0	17.735	17.735			17.735	17.735		
5240.0	17.836	17.735			17.836	17.735		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 Measuring RF Spectrum Mask
Measurement Uncertainty:	±2.81 dB

Click on the links above to see the plot

Equipment Configuration for 26 dB and 99% Bandwidth			
Variant:	802.11n HT-40	**Duty Cycle (%):**	99
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	N/A
Modulation:	OFDM	**Beam Forming Gain (Y):**	N/A
TPC:	Maximum Power		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz) Port(s)				26 dB Bandwidth (MHz)			
MHz	**a**	**b**	**c**	**d**	**Highest**	**Lowest**		
5190.0	44.088	43.888			44.088	43.888		
5230.0	44.088	43.487			44.088	43.487		

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				99% Bandwidth (MHz)			
MHz	**a**	**b**	**c**	**d**	**Highest**	**Lowest**		
5190.0	36.273	36.273			36.273	36.273		
5230.0	36.273	36.273			36.273	36.273		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 Measuring RF Spectrum Mask
Measurement Uncertainty:	±2.81 dB

Click on the links above to see the plot

Specification

Limits

FCC, Part 15 §15.407 (a)(1), (a)(2) and Industry Canada RSS-210 § A9.2(2)

(a)(1) For the band 5.15-5.25 GHz the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or +4 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +4 dBm in any 1 megahertz band.

(a)(2) For the 5.25-5.35 GHz band the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or +11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +11 dBm in any 1 megahertz band.

Industry Canada RSS-Gen 4.4

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

Traceability

Test Equipment Used
0158, 0287, 0252, 0313, 0314, 0070, 0116, 0117

6.1.1.2. Maximum Conducted Output Power

Conducted Test Conditions for Maximum Conducted Output Power			
Standard:	FCC CFR 47:15.407	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Maximum Conducted Output Power	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.407 (a)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	KDB 789033 - D01 DTS General UNII Test Procedures v01		

Test Procedure for Maximum Conducted Output Power Measurement

Method PM (Measurement using an RF average power meter). Section C) 4) of KDB 789033 defines a methodology using an average wideband power meter. Measurements were made while the EUT was operating in a continuous transmission mode (100% duty cycle) at the appropriate center frequency. All cable losses and offsets were taken into consideration in the measured result. All operational modes and frequency bands were measured independently and the resultant calculated. For multiple outputs, the measurements were made simultaneously on each output port and summed in a linear fashion. This technique was used in order to prove compliance.

Antenna Beam and Non-Beam Forming Power Levels

15. 407 (a)(1), (a) (2) Operation with directional antenna gains greater than 6 dBi.

If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Further FCC KDB 662911 D01 Multiple Transmitter Output v01 requires that the gain of antennas transmitting the same data (legacy 802.11a mode) must be increased by 10 * Log (N) when N is the number of antenna elements.

Operating Frequency Band 5150-5250 MHz

5150 – 5250 MHz Uncorrelated Operation (MIMO)

Antenna	Gain	Max. Allowable Conducted Peak Power (dBm)		Maximum EIRP
(dB)	(dBi)	Uncorrelated	Max. Power Per Chain	(dBm)
Integral	3.0	+17.00	+14.00	+20.0
ANT-18	7.5	+15.5	+12.50	+23.0
ANT-19	6.0	+17.0	+14.00	+23.0

5150 – 5250 MHz Correlated Operation (Non-MIMO i.e. Legacy)

Antenna	Gain dBi	Antenna Gain Increase V's No. Antenna Ports		Total Gain	Max. Allowable Conducted Peak Power	Maximum EIRP
(dB)		Ports	dB	dBi	∑ (dBm)	(dBm)
Integral	3.0	2	3.01	6.01	+16.99	+23.0
ANT-18	7.5	2	3.01	10.51	+12.49	+23.0
ANT-19	6.0	2	3.01	9.01	+13.99	+23.0

The APINR108, APINR109 has no beam-forming capability

Maximum Transmit (Conducted) Power, FCC Limits and Industry Canada Limits

Bands 5150 – 5250 MHz

FCC Limits

Conducted Power Limit lesser of: 50 mW or 4 dBm + 10 log (B) dBm. B is the 26 dB emission bandwidth in MHz.

Mode	Frequency Range (MHz)	Minimum 26 dB Bandwidth (MHz)	4 + 10 Log (B) (dBm)	Limit (dBm)
a	5150 – 5250	21.242	+17.27	+17.00
HT-20		22.244	+17.47	+17.00
HT-40		43.487	+20.64	+17.00

Industry Canada Limits

EIRP Limit 5150 – 5250 MHz: Lesser of 200 mW (+23 dBm) or 10 + 10 Log (B) dBm. B is the 99% emission bandwidth in MHz.

Mode	Frequency Range (MHz)	Minimum 99 % Bandwidth (MHz)	4 + 10 Log (B) (dBm)	EIRP Limit (dBm)
a	5150 – 5250	16.533	+22.18	+22.18
HT-20		17.735	+22.49	+22.49
HT-40		36.273	+25.59	+23.00

Measurement Results for Maximum Conducted Output Power

Equipment Configuration for Maximum Conducted Output Power			
Variant:	802.11a	**Duty Cycle (%):**	99
Data Rate:	6 MBit/s	**Antenna Gain (dBi):**	N/A
Modulation:	OFDM	**Beam Forming Gain (Y):**	N/A
TPC:	See EUT Power Setting		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dBm	
5180.0	11.80	9.97	--	--	13.99	17.00	-2.01	13.5
5200.0	11.72	9.53	--	--	13.77	17.00	-3.23	13.5
5240.0	11.45	9.64	--	--	13.65	17.00	-3.35	14.5

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 Measuring RF Output Power
Measurement Uncertainty:	±1.33 dB

Equipment Configuration for Maximum Conducted Output Power			
Variant:	802.11a	**Duty Cycle (%):**	99
Data Rate:	6.5 MBit/s	**Antenna Gain (dBi):**	N/A
Modulation:	OFDM	**Beam Forming Gain (Y):**	N/A
TPC:	See EUT Power Setting		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dBm	
5180.0	11.34	9.48	--	--	13.52	17.00	-3.48	13.5
5200.0	11.98	9.94	--	--	14.09	17.00	-2.91	14.0
5240.0	11.07	9.36	--	--	13.31	17.00	-3.69	15.0

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 Measuring RF Output Power
Measurement Uncertainty:	±1.33 dB

Click on the links above to see the plot

Equipment Configuration for Maximum Conducted Output Power			
Variant:	802.11n HT-40	**Duty Cycle (%):**	99
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	N/A
Modulation:	OFDM	**Beam Forming Gain (Y):**	N/A
TPC:	See EUT Power Setting		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dBm	
5190.0	14.11	11.92	--	--	16.16	17.00	-0.84	15.5
5230.0	13.96	12.08	--	--	16.13	17.00	-0.87	16.0

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 Measuring RF Output Power
Measurement Uncertainty:	±1.33 dB

Click on the links above to see the plot

Specification Limits

FCC, Part 15 §15.407 (a)(1), (a)(2) and Industry Canada RSS-210 § A9.2(2)

(a)(1) For the band 5.15-5.25 GHz the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or +4 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +4 dBm in any 1 megahertz band.

(a)(2) For the 5.25-5.35 and 5470-5725 MHz GHz band the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or +11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +11 dBm in any 1 megahertz band.

Industry Canada RSS-210 §A9.2(2)
For the band 5150-5250 MHz, the maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

For the band 5250-5350 MHz and 5470-5725 MHz, the maximum conducted output power shall not exceed 250 mW or 11 + 10 log10 B, dBm, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

Traceability

Test Equipment Used
0158, 0287, 0252, 0313, 0314, 0070, 0116, 0117

6.1.1.3. Peak Power Spectral Density

Conducted Test Conditions for Power Spectral Density			
Standard:	FCC CFR 47:15.407	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Power Spectral Density	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.247 (a)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	KDB 789033 - D01 DTS General UNII Test Procedures v01		

Test Procedure for Power Spectral Density

The In-Band power spectral density was measured using the measure and sum approach per FCC KDB 662911 (D01 Multiple Transmitter Output v01.)

Measure and sum the spectra across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The individual spectra are then summed mathematically in linear power units. Unlike in-band power measurements, in which the sum involves a single measured value (output power) from each output, measurements for compliance with PSD limits involve summing entire spectra across corresponding frequency bins on the various outputs. Consistency is maintained for any device with N transmitter outputs to be certain the individual outputs are all aligned with the same span and same number of points. In this instance, the linear power spectrum value within the first spectral bin of output 0 is summed with that in the first spectral bin of output 1, and the first spectral bin of output 2, and so on up to the Nth output to obtain the true value for the first frequency bin of the summed spectrum. The summed spectrum value for each frequency bin is computed in this fashion. These summed spectral values were calculated on a computer, and the results read back into the spectrum analyzer as a data file to produce a representative plot of total spectral power density.

Calculated Power = A + 10 log (1/x) dBm

A = Total Power Spectral Density [10 Log10 (10a/10 + 10 b/10 + 10c/10 + 10d/10)]

x = Duty Cycle

Equipment Configuration for Power Spectral Density			
Variant:	802.11a	**Duty Cycle (%):**	100
Data Rate:	6 MBit/s	**Antenna Gain (dBi):**	N/A
Modulation:	OFDM	**Beam Forming Gain (Y):**	N/A
TPC:	Maximum Power		

Test Measurement Results

Test Frequency	Measured Power Spectral Density (dBm) Port(s)				Calculated Total Power Spectral Density (dBm)		Limit	Margin
MHz	**a**	**b**	**c**	**d**	**S Port(s)**	**Conversion to 3 kHz RBW**	**dBm**	**dB**
5180.0	0.560	-1.395			2.702	N/A	4.0	-1.30
5200.0	0.316	-1.986			2.326	N/A	4.0	-1.67
5240.0	0.002	-1.832			2.191	N/A	4.0	-1.81

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 Measuring RF Spectrum Mask
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Power Spectral Density			
Variant:	802.11n HT-20	**Duty Cycle (%):**	100
Data Rate:	6.5 MBit/S	**Antenna Gain (dBi):**	N/A
Modulation:	OFDM	**Beam Forming Gain (Y):**	N/A
TPC:	Maximum Power		

Test Measurement Results

Test Frequency	Measured Power Spectral Density (dBm) Port(s)				Calculated Total Power Spectral Density (dBm)		Limit	Margin
MHz	**a**	**b**	**c**	**d**	**S Port(s)**	**Conversion to 3 kHz RBW**	**dBm**	**dB**
5180.0	-0.109	-1.699			2.179	N/A	4.0	-1.82
5200.0	0.479	-1.347			2.672	N/A	4.0	-1.33
5240.0	-0.463	-2.057			1.823	N/A	4.0	-2.18

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 Measuring RF Spectrum Mask
Measurement Uncertainty:	±2.81 dB

Click on the links above to see the plot

Equipment Configuration for Power Spectral Density			
Variant:	802.11n HT-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	N/A
Modulation:	OFDM	**Beam Forming Gain (Y):**	N/A
TPC:	Maximum Power		

Test Measurement Results

Test Frequency	Measured Power Spectral Density (dBm) Port(s)				Calculated Total Power Spectral Density (dBm)		Limit	Margin
MHz	**a**	**b**	**c**	**d**	**S Port(s)**	**Conversion to 3 kHz RBW**	**dBm**	**dB**
5190.0	-0.425	-2.682			1.602	N/A	4.0	-2.40
5230.0	-0.667	-2.832			1.394	N/A	4.0	-2.61

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 Measuring RF Spectrum Mask
Measurement Uncertainty:	±2.81 dB

Click on the links above to see the plot

Specification

FCC, Part 15 §15.407 (a)(1), (a)(2)
5150 – 5250 MHz
(a)(1) The peak power spectral density shall not exceed +4 dBm in any 1 megahertz band.

5250 – 5350 MHz & 5470 – 5725 MHz
(a)(2) The peak power spectral density shall not exceed +11 dBm in any 1 megahertz band.

Industry Canada RSS-210 § **A9.2(1), A9.2(2)**
5150 – 5250 MHz
§ **A9.2(1)** The eirp spectral density shall not exceed +10 dBm in any 1 MHz band

5250 – 5350 MHz & 5470 – 5725 MHz
§ **A9.2(2)** The power spectral density shall not exceed +11 dBm in any 1 MHz band

Traceability

Test Equipment Used
0158, 0287, 0252, 0313, 0314, 0070, 0116, 0117

6.1.1.4. Peak Excursion Ratio

Conducted Test Conditions for Peak Excursion Ratio			
Standard:	FCC CFR 47:15.407	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Peak Excursion Ratio	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.407 (a)(6)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	KDB 789033 - D01 DTS General UNII Test Procedures v01		

Test Procedure for Peak Excursion Ratio

Compliance with the peak excursion requirement is demonstrated by confirming the ratio of the maximum of the peak-hold spectrum to the maximum of the average spectrum during continuous transmission. Section F) of KDB 789033 was used in order to prove compliance. This is a conducted measurement using a spectrum analyzer using dual traces. Peak Excursion Ratio is the difference in amplitude (dB) between both traces; The following identifies two spectrum traces on the same plot. Trace 1 is the max hold Peak detector, and Trace 2 is the recalled trace data from Peak Power Spectral Density measurements. Each frequency and operational mode is recalled in order to prove compliance.

Equipment Configuration for Peak Excursion Ratio			
Variant:	802.11a	**Duty Cycle (%):**	99
Data Rate:	6 MBit/s	**Antenna Gain (dBi):**	N/A
Modulation:	OFDM	**Beam Forming Gain (Y):**	N/A
TPC:	Maximum Power		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Peak Excursion (dB) Port(s)				Ratio (dB)		Limit	Lowest Margin
MHz	**a**	**b**	**c**	**d**	**Highest**	**Lowest**	**dB**	**MHz**
5180.0	9.31	11.02			11.02	9.31	-13.0	-1.98
5200.0	9.64	10.73			10.73	9.64	-13.0	-2.27
5240.0	9.09	10.52			10.52	9.09	-13.0	-2.48

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 Measuring Spectrum Mask
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Peak Excursion Ratio			
Variant:	802.11n HT-20	**Duty Cycle (%):**	99
Data Rate:	6.5 MBit/s	**Antenna Gain (dBi):**	N/A
Modulation:	OFDM	**Beam Forming Gain (Y):**	N/A
TPC:	Maximum Power		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Peak Excursion (dB) Port(s)				Ratio (dB)		Limit	Lowest Margin
MHz	**a**	**b**	**c**	**d**	**Highest**	**Lowest**	**dB**	**MHz**
5180.0	9.07	9.82			9.82	9.07	-13.0	-3.18
5200.0	9.36	9.94			9.94	9.36	-13.0	-3.06
5240.0	10.35	9.67			10.35	9.67	-13.0	-2.65

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 Measuring Spectrum Mask
Measurement Uncertainty:	±2.81 dB

Click on the links above to see the plot

Equipment Configuration for Peak Excursion Ratio			
Variant:	802.11n HT-40	**Duty Cycle (%):**	99
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	N/A
Modulation:	OFDM	**Beam Forming Gain (Y):**	N/A
TPC:	Maximum Power		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Peak Excursion (dB) Port(s)				Ratio (dB)		Limit	Lowest Margin
MHz	a	b	c	d	Highest	Lowest	dB	MHz
5190.0	9.54	9.88			9.88	9.54	-13.0	-3.12
5230.0	10.06	9.87			10.06	9.87	-13.0	-2.94

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 Measuring Spectrum Mask
Measurement Uncertainty:	±2.81 dB

Click on the links above to see the plot

Specification

Limits

§15.407 (a)(6) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified in this paragraph) shall not exceed 13dB across any 1MHz bandwidth or the emission bandwidth whichever is less

Traceability

Test Equipment Used
0158, 0287, 0252, 0313, 0314, 0070, 0116, 0117

6.1.1.5. Frequency Stability

FCC, Part 15 Subpart C §15.407(g)
Industry Canada RSS-210 §2.1

Test Procedure

The manufacturer of the equipment is responsible for ensuring that the frequency stability is such that emissions are always maintained within the band of operation under all conditions.

Manufacturer Declaration

The frequency stability of the reference oscillator sets the frequency stability of the RF transceiver signals. Therefore all of the RF signals should have ±20ppm stability.
This stability accounts for room temp tolerance of the crystal oscillator circuit, frequency variation across temperature, and crystal ageing.

±20ppm at 5.250 GHz translates to a maximum frequency shift of ±105 KHz. As the edge of the channels is at least one MHz from either of the band edges, ±105 KHz is more than sufficient to guarantee that the intentional emission will remain in the band over the entire operating range of the EUT.

Specification

Limits

§15.407 (g) Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

6.1.2. Radiated Emission Testing

FCC, Part 15 Subpart C §15.407(b)(2), §15.205(a)/15.209(a)
Industry Canada RSS-210 §A9.3(2); §2.2; §2.6; RSS-Gen §4.7

Test Procedure

Testing was performed in a 3-meter anechoic chamber. Preliminary radiated emissions were measured on every azimuth and with the receiving antenna in both horizontal and vertical polarizations. Preliminary emissions were recorded with in Spectrum Analyzer mode, using a maximum peak detector while in peak hold mode. Depending on the frequency band spanned a notch filter and/or waveguide filter was used to remove the fundamental frequency.

Emissions nearest the limits were chosen for maximization and formal measurement using a CISPR compliant receiver. Emissions above 1000 MHz are measured utilizing a CISPR compliant average detector with a tuned receiver, using a bandwidth of 1 MHz. Emissions from 30 MHz – 1000 MHz are measured utilizing a CISPR compliant quasi-peak detector with a tuned receiver, using a bandwidth of 120 kHz. Only the highest emissions relative to the limit are listed.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

FS = R + AF + CORR – FO

FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor

CORR = Correction Factor = CL – AG + NFL

CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss or Waveguide Loss

Field Strength Calculation Example:

Given receiver input reading of 51.5 dBμV; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength of the measured emission is:

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3 dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength (dBμV/m);

$$E = 1000000 \times \sqrt{30P} / 3 \ \mu V/m$$

where P is the EIRP in Watts

Therefore: -27 dBm/MHz = 68.23 dBuV/m

Note: The data in this Section identifies that the EUT is in compliance with the -27dBm/MHz EIRP limit (68.23 dBμV/m) for out of band emissions. All out of band emissions are less than 68.23 dB μV/m.

Specification

Radiated Spurious Emissions

15.407 (b)(2). All emissions outside of the 5,150-5,350MHz band shall not exceed an EIRP of -27dBm/MHz.

FCC §15.205 (a) Except as shown in paragraph (d) of 15.205 (a), only spurious emissions are permitted in any of the frequency bands listed.

FCC §15.205 (a) Except as shown in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

FCC §15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

RSS-210 §A9.3(2) For transmitters operating in the 5250-5350 MHz band, all emissions outside the 5150-5350 MHz band shall not exceed -27 dBm/MHz e.i.r.p. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band shall not exceed out of band emission limit of 27 dBm/MHz e.i.r.p. in the 5150-5250 MHz band in order to operate indoor/outdoor, or alternatively shall comply with the spectral power density for operation within the 5150-5250 MHz band and shall be labeled “for indoor use only”.

RSS-Gen §4.7 The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate of carrier frequency), or from 30 MHz , whichever is the lowest frequency, to the 5th harmonic of the highest frequency generated without exceeding 40 GHz.

RSS-Gen §6 Receiver Spurious Emission Standard
If a radiated measurement is made, all spurious emissions shall comply with the limits of the following Table. The resolution bandwidth of the spectrum analyzer shall be 100 kHz for spurious emission measurements below 1.0 GHz and 1.0 MHz for measurements above 1.0 GHz

Table 1: FCC 15.209 Spurious Emissions Limits

Frequency (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Measurement Distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

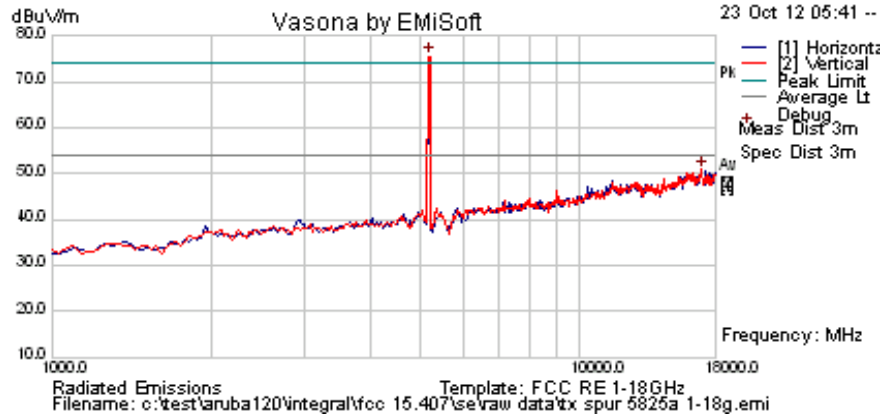
Traceability:

Test Equipment Used
0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312

6.1.2.1. Integral Antenna APINR109

Low

Test Freq.	5180 MHz	**Engineer**	JMH
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	32
Power Setting	18	**Press. (mBars)**	1001
Antenna	Integral	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			

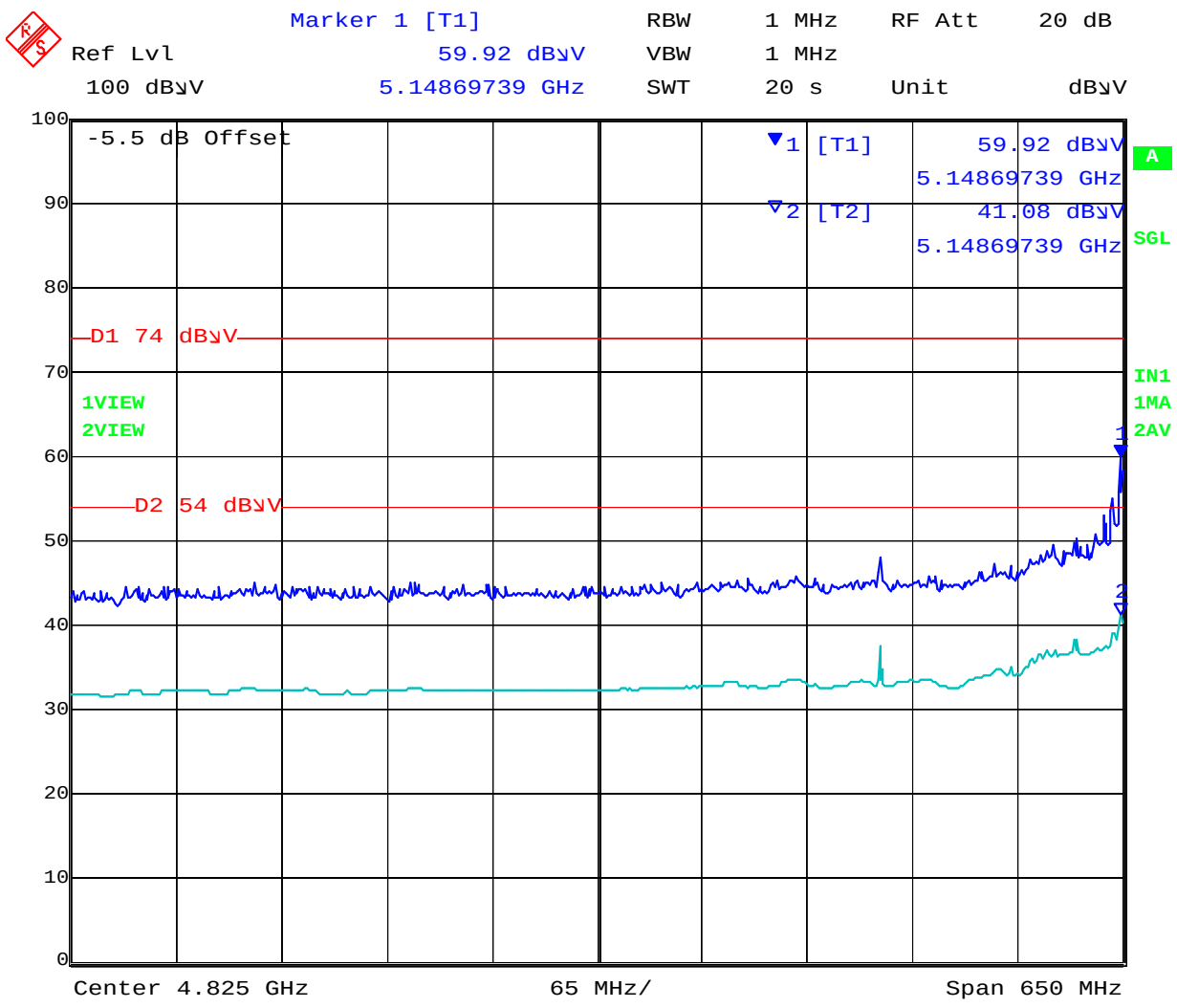


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5190.381	80.8	4.6	-9.9	75.6	Peak [Scan]	V						FUND
16977.956	42.0	8.5	0.4	50.9	Peak [Scan]	V	150	0	54.0	-3.1	Pass	Noise

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

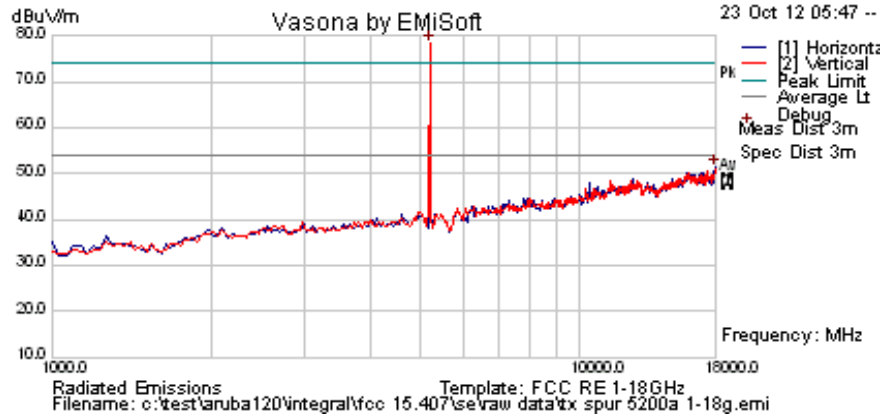
802.11a 5150 Restricted Band-edge



NART = 18

Mid

Test Freq.	5200 MHz	**Engineer**	JMH
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	32
Power Setting	18	**Press. (mBars)**	1001
Antenna	Integral	**Duty Cycle (%)**	100
Test Notes 1	0		
Test Notes 2			



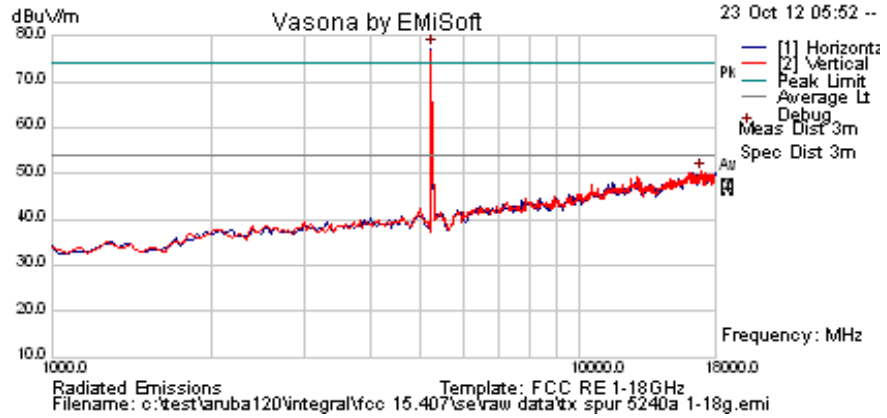
Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5190.381	83.6	4.6	-9.9	78.3	Peak [Scan]	V						FUND
17965.932	41.8	8.8	0.7	51.2	Peak [Scan]	H	150	0	54.0	-2.8	Pass	Noise

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

High

Test Freq.	5240 MHz	**Engineer**	JMH
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	32
Power Setting	18	**Press. (mBars)**	1001
Antenna	Integral	**Duty Cycle (%)**	100
Test Notes 1	0		
Test Notes 2			

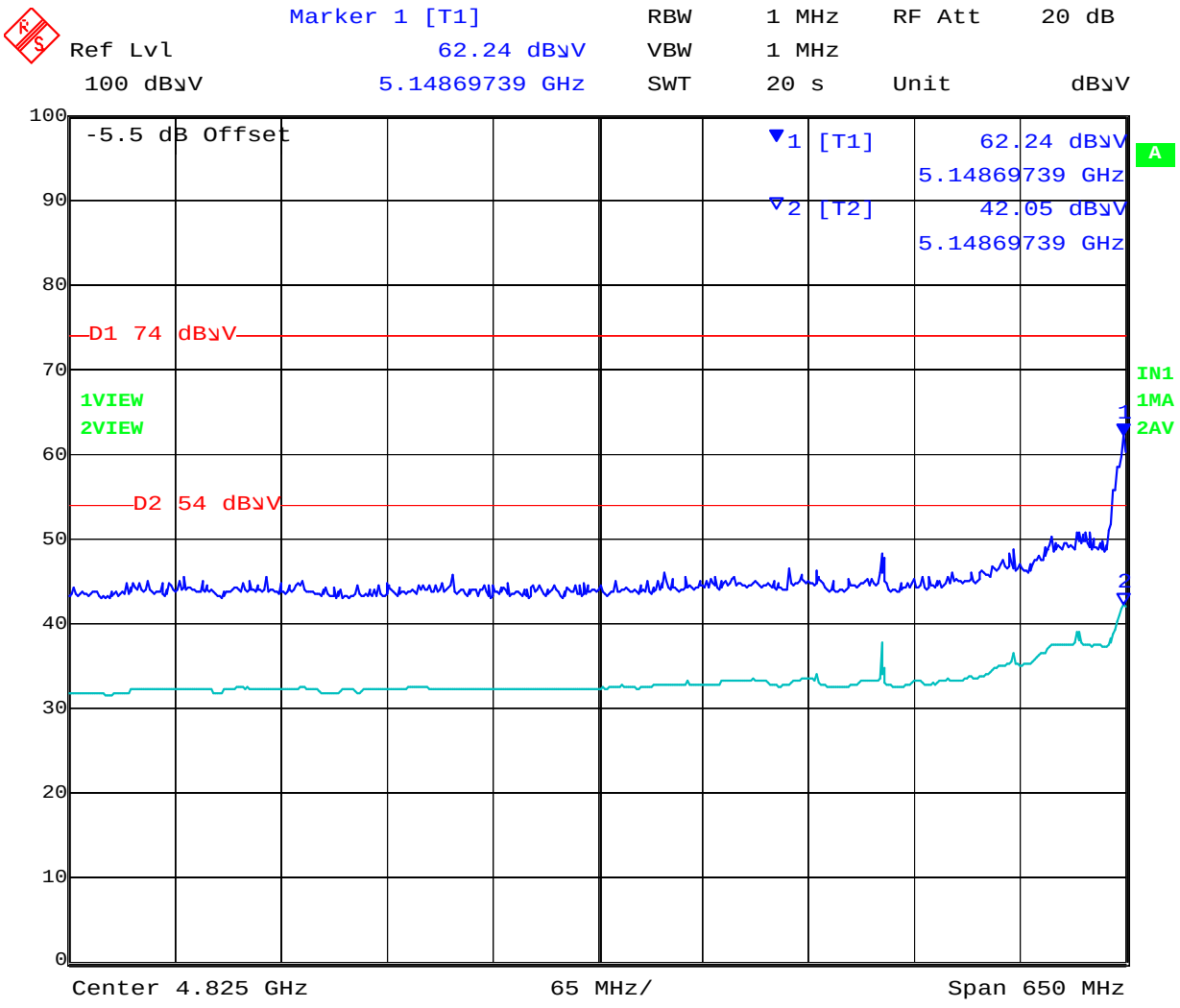


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5224.449	82.4	4.6	-9.8	77.2	Peak [Scan]	H						FUND
16943.888	41.5	8.5	0.5	50.5	Peak [Scan]	V	100	0	54.0	-3.5	Pass	Noise

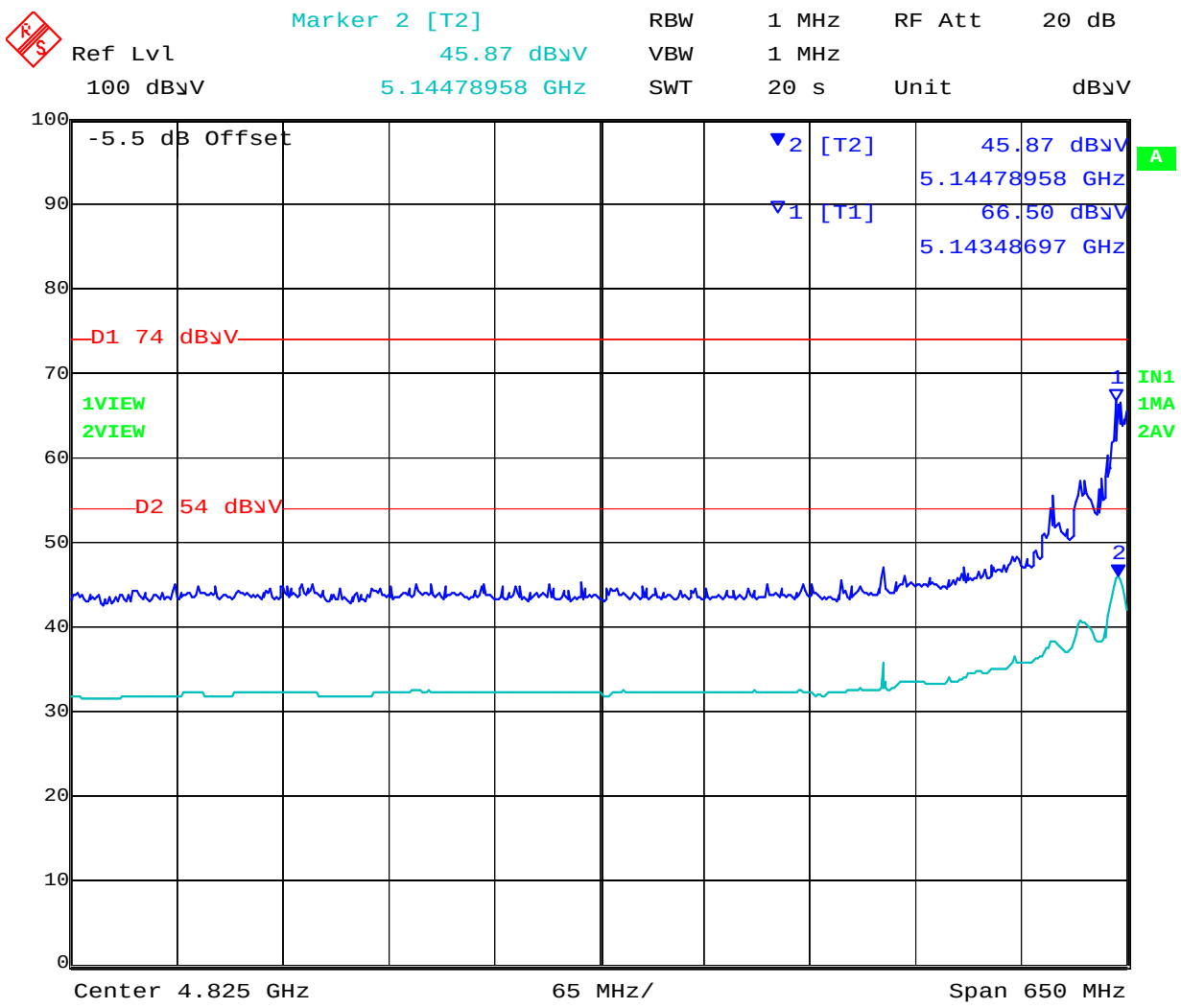
Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

802.11n HT-20 5150 Restricted Band-edge



NART = 18

802.11n HT-40 5150 Restricted Band-edge

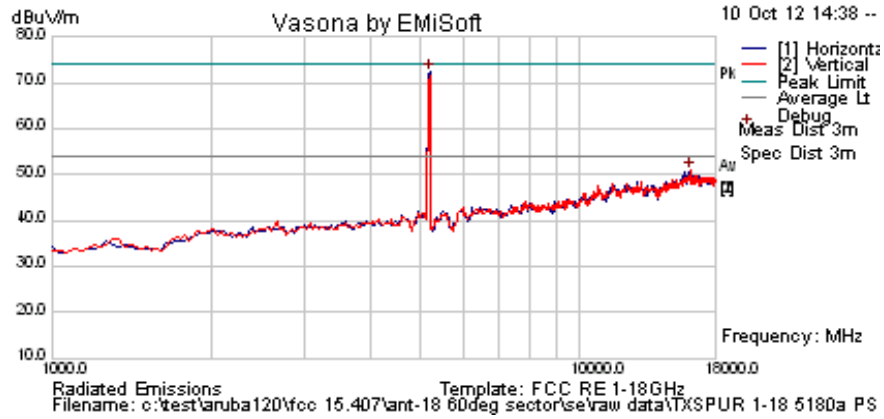


NART = 18

6.1.2.2. ANT-18 60 Degree Sector antenna

Low

Test Freq.	5180 MHz	**Engineer**	JMH
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	33
Power Setting	18	**Press. (mBars)**	996
Antenna	ANT-18 60 deg Sector Panel	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			

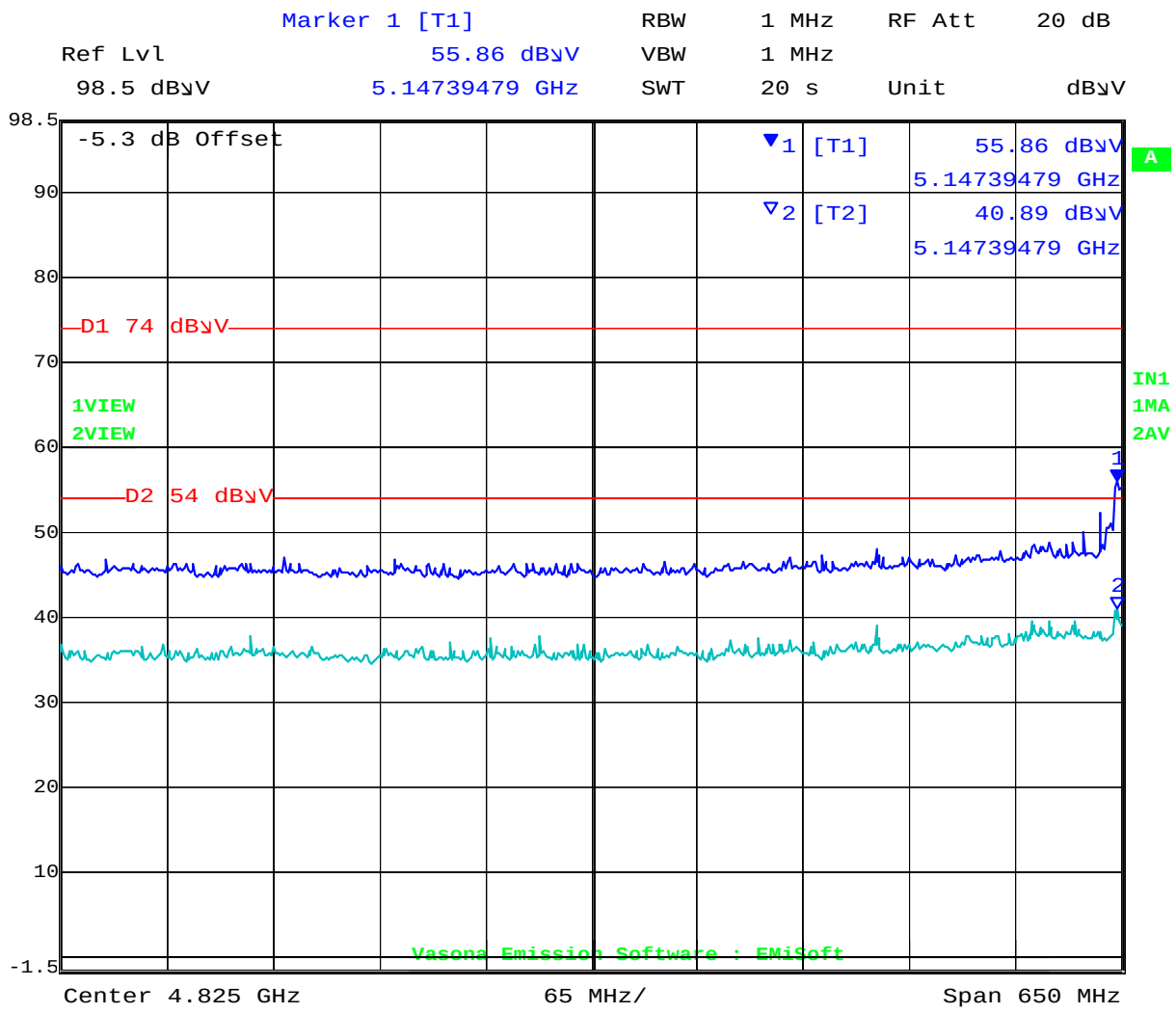


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5190.381	77.5	4.6	-9.9	72.2	Peak [Scan]	H						FUND
16160.321	41.7	9.0	0.2	50.8	Peak [Scan]	V	200	0	54.0	-3.2	Pass	Noise

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

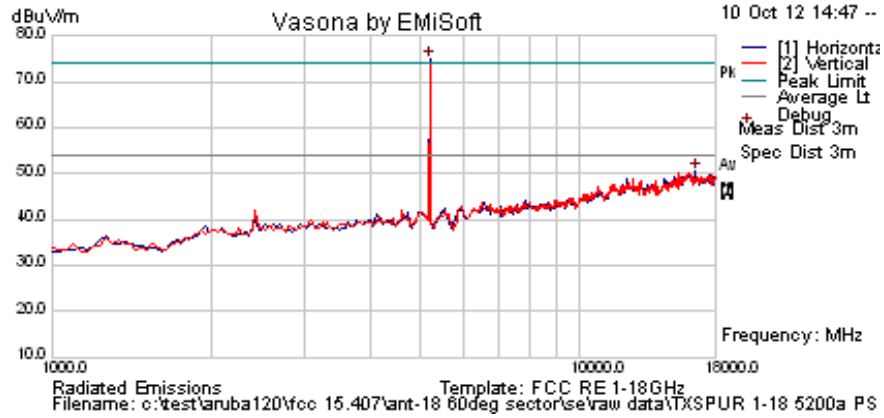
802.11a 5150 Restricted Band-edge



NART = 18

Mid

Test Freq.	5200 MHz	**Engineer**	JMH
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	33
Power Setting	18	**Press. (mBars)**	996
Antenna	ANT-18 60 deg Sector Panel	**Duty Cycle (%)**	100
Test Notes 1	0		
Test Notes 2			



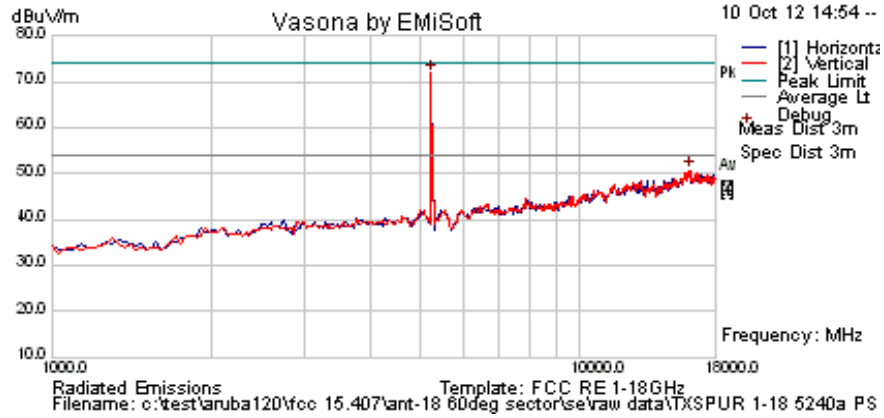
Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5190.381	80.1	4.6	-9.9	74.9	Peak [Scan]	H						FUND
16535.070	41.3	8.8	0.4	50.5	Peak [Scan]	H	150	0	54.0	-3.6	Pass	Noise

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

High

Test Freq.	5240 MHz	**Engineer**	JMH
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	33
Power Setting	18	**Press. (mBars)**	996
Antenna	ANT-18 60 deg Sector Panel	**Duty Cycle (%)**	100
Test Notes 1	0		
Test Notes 2			



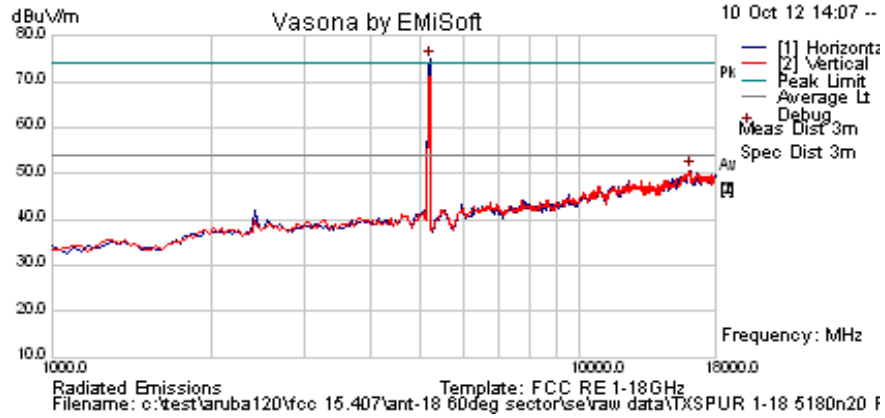
Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5224.449	77.1	4.6	-9.8	71.9	Peak [Scan]	V						FUND
16160.321	41.6	9.0	0.2	50.7	Peak [Scan]	V	200	0	54.0	-3.3	Pass	Noise

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

Low

Test Freq.	5180 MHz	**Engineer**	JMH
Variant	802.11n HT-20; 6.5 MCS	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	33
Power Setting	18	**Press. (mBars)**	996
Antenna	ANT-18 60 deg Sector Panel	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			

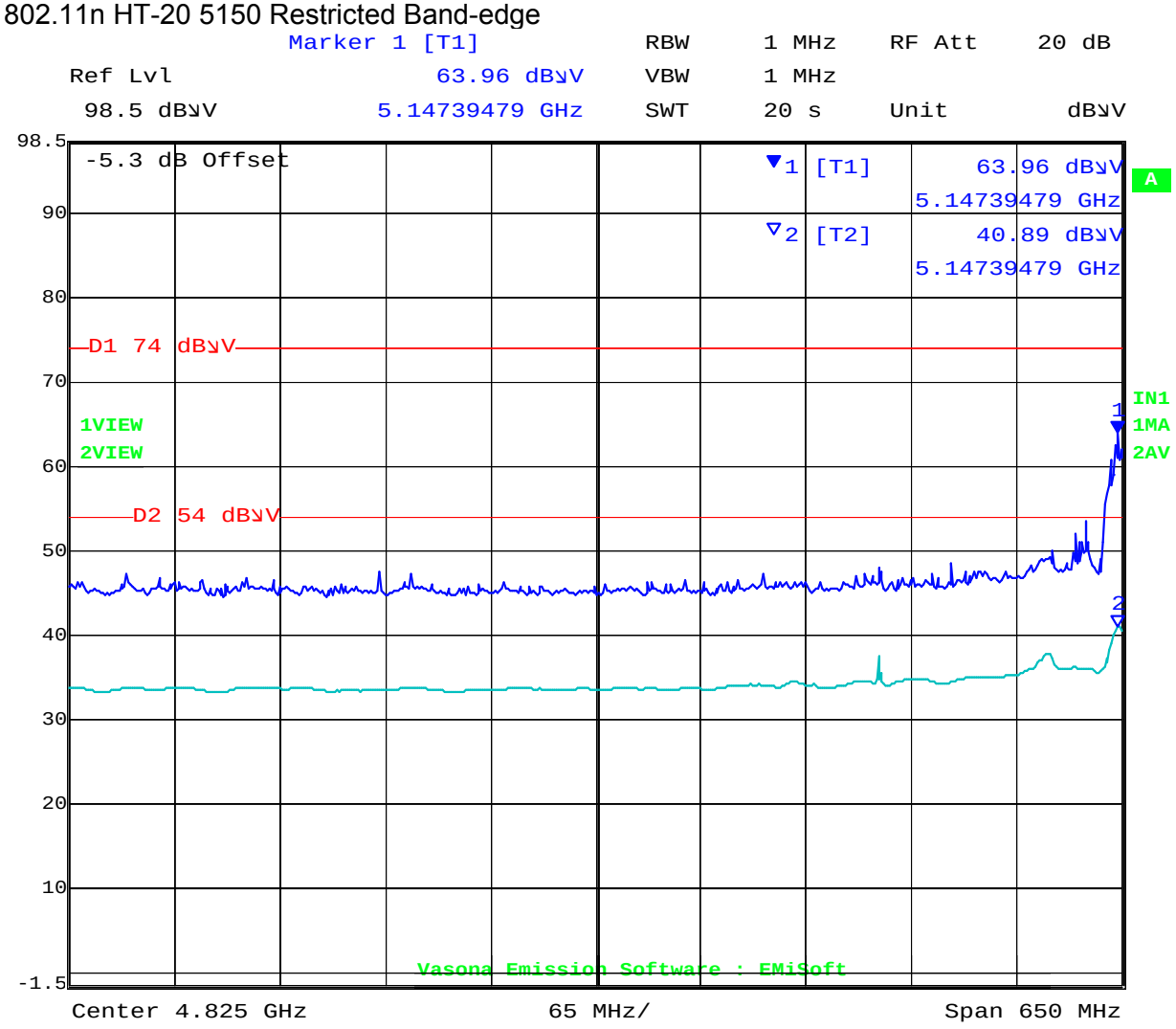


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5190.381	80.3	4.6	-9.9	75.0	Peak [Scan]	H						FUND
16092.184	41.5	9.0	0.3	50.8	Peak [Scan]	V	100	0	54.0	-3.3	Pass	Noise

Legend:	*Transients in RB; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

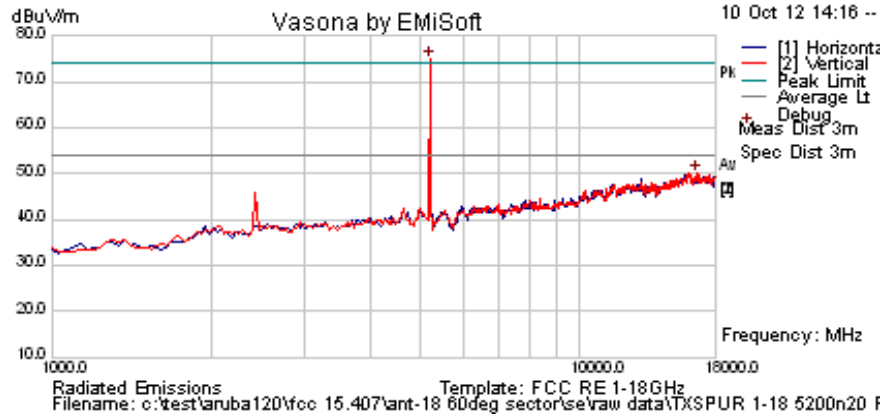
802.11n HT-20 5150 Restricted Band-edge



NART = 18

Mid

Test Freq.	5200 MHz	**Engineer**	JMH
Variant	802.11n HT-20; 6.5 MCS	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	33
Power Setting	18	**Press. (mBars)**	996
Antenna	ANT-18 60 deg Sector Panel	**Duty Cycle (%)**	100
Test Notes 1	0		
Test Notes 2			



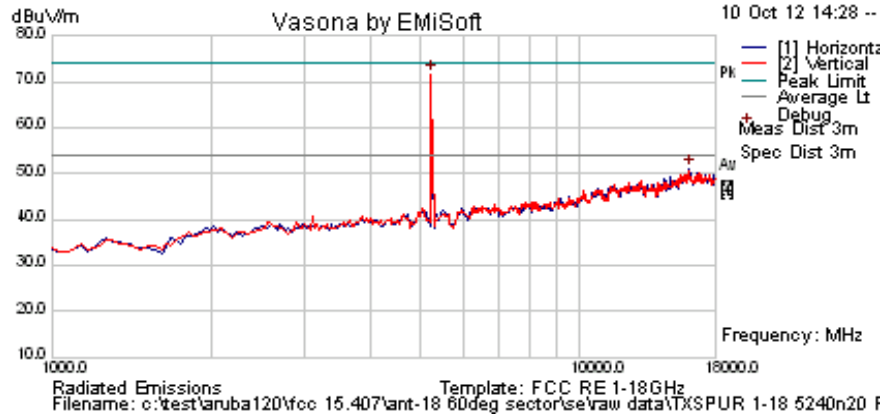
Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5202.405	80.1	4.6	-9.9	74.9	Peak [Scan]	V						FUND
16603.206	40.8	8.8	0.6	50.1	Peak [Scan]	V	100	0	54.0	-3.9	Pass	Noise

Legend: *Transients in RB; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

High

Test Freq.	5240 MHz	**Engineer**	JMH
Variant	802.11n HT-20; 6.5 MCS	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	33
Power Setting	18	**Press. (mBars)**	996
Antenna	ANT-18 60 deg Sector Panel	**Duty Cycle (%)**	100
Test Notes 1	0		
Test Notes 2			

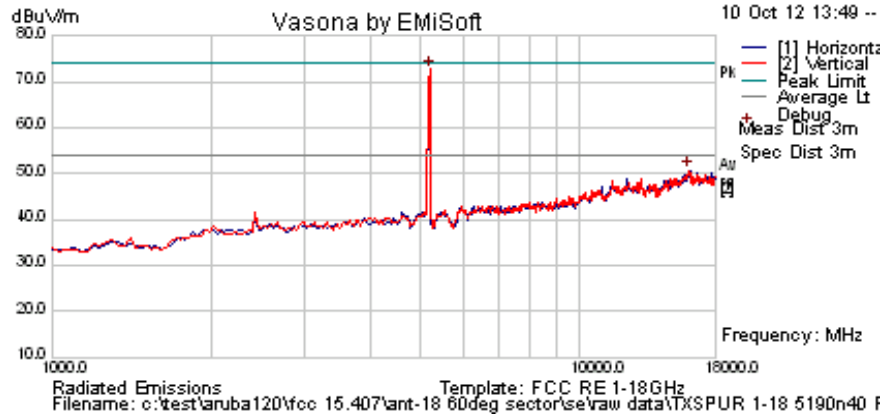


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5224.449	76.8	4.6	-9.8	71.6	Peak [Scan]	V						FUND
16092.184	41.9	9.0	0.3	51.2	Peak [Scan]	H	200	0	54.0	-2.9	Pass	Noise
Legend:	*Transients in RB; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission											
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205											

Low

Test Freq.	5190 MHz	**Engineer**	JMH
Variant	802.11n HT-40; 13.5 MCS	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	33
Power Setting	18	**Press. (mBars)**	996
Antenna	ANT-18 Sector 60	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			

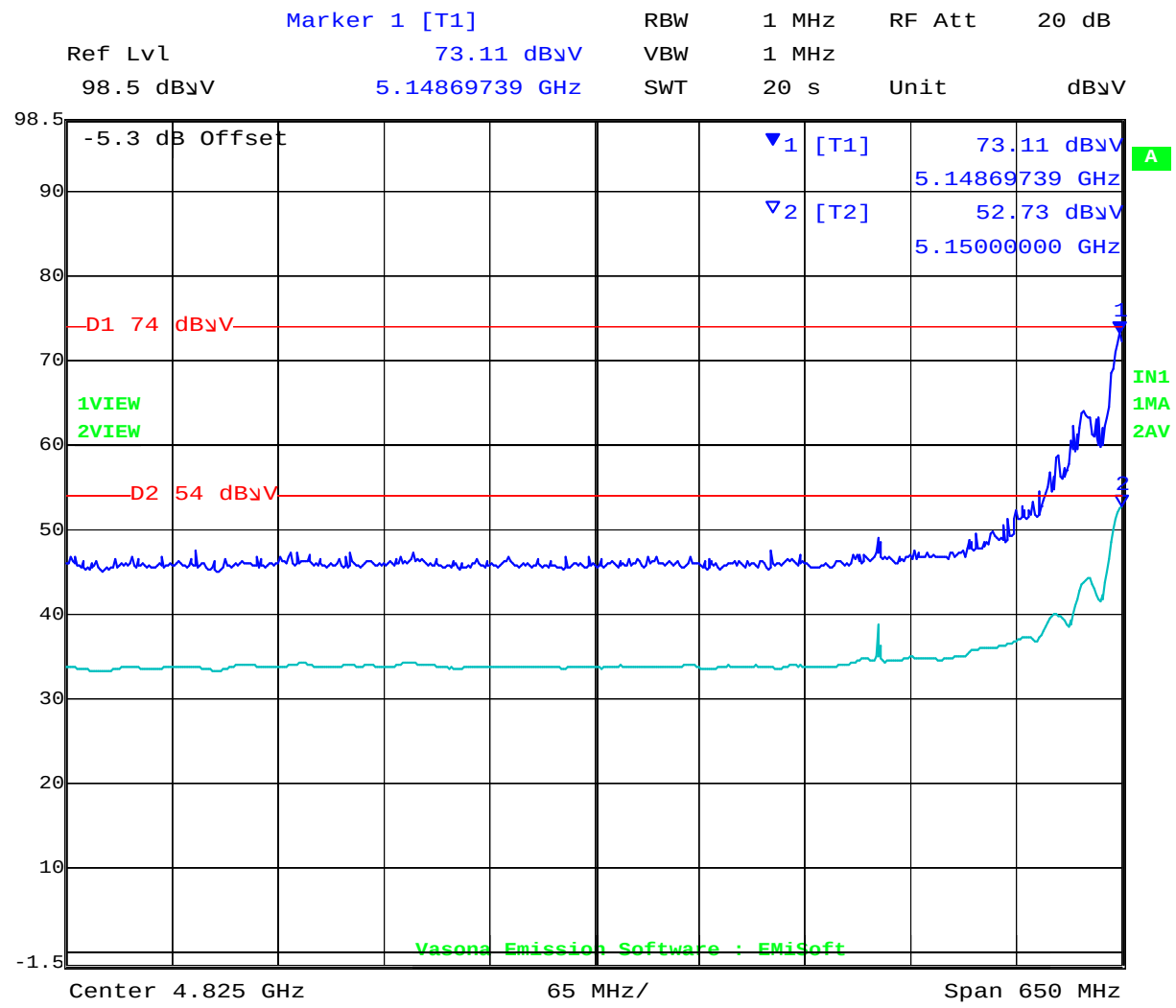


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5190.381	78.0	4.6	-9.9	72.7	Peak [Scan]	V						FUND
15989.980	41.6	9.0	0.1	50.7	Peak [Scan]	H	150	0	54.0	-3.3	Pass	Noise

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

802.11n HT-40 5150 Restricted Band-edge

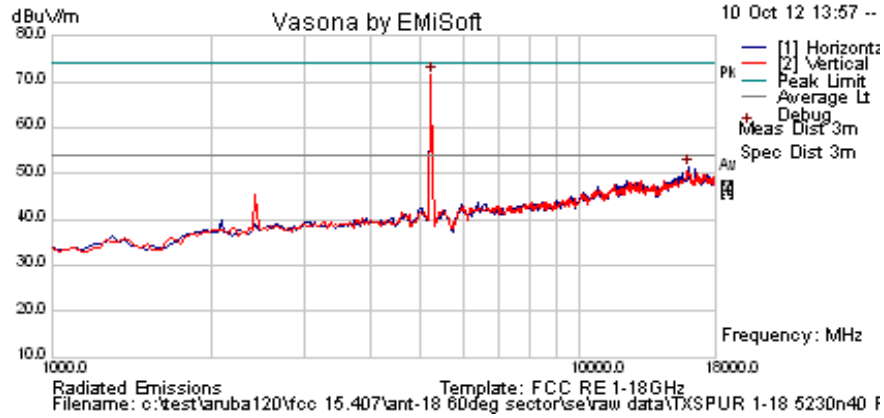


Date: 10.OCT.2012 13:34:58

NART = 18

High

Test Freq.	5230 MHz	**Engineer**	JMH
Variant	802.11n HT-40; 13.5 MCS	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	33
Power Setting	18	**Press. (mBars)**	996
Antenna	ANT-18 Sector 60	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

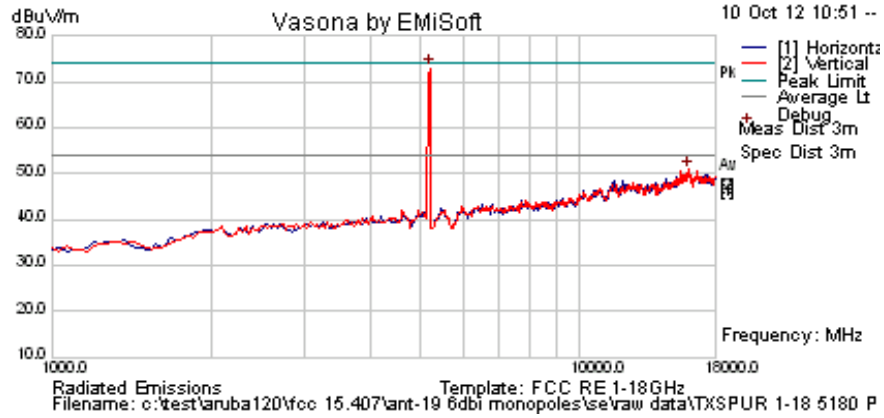
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5224.449	76.7	4.6	-9.8	71.5	Peak [Scan]	V						FUND
15989.980	42.3	9.0	0.1	51.4	Peak [Scan]	H	200	0	54.0	-2.6	Pass	Noise

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

6.1.2.3. ANT-19 Monopole antenna

Low

Test Freq.	5180 MHz	**Engineer**	JMH
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	33
Power Setting	18	**Press. (mBars)**	996
Antenna	ANT-19 6 dBi Monopole	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			

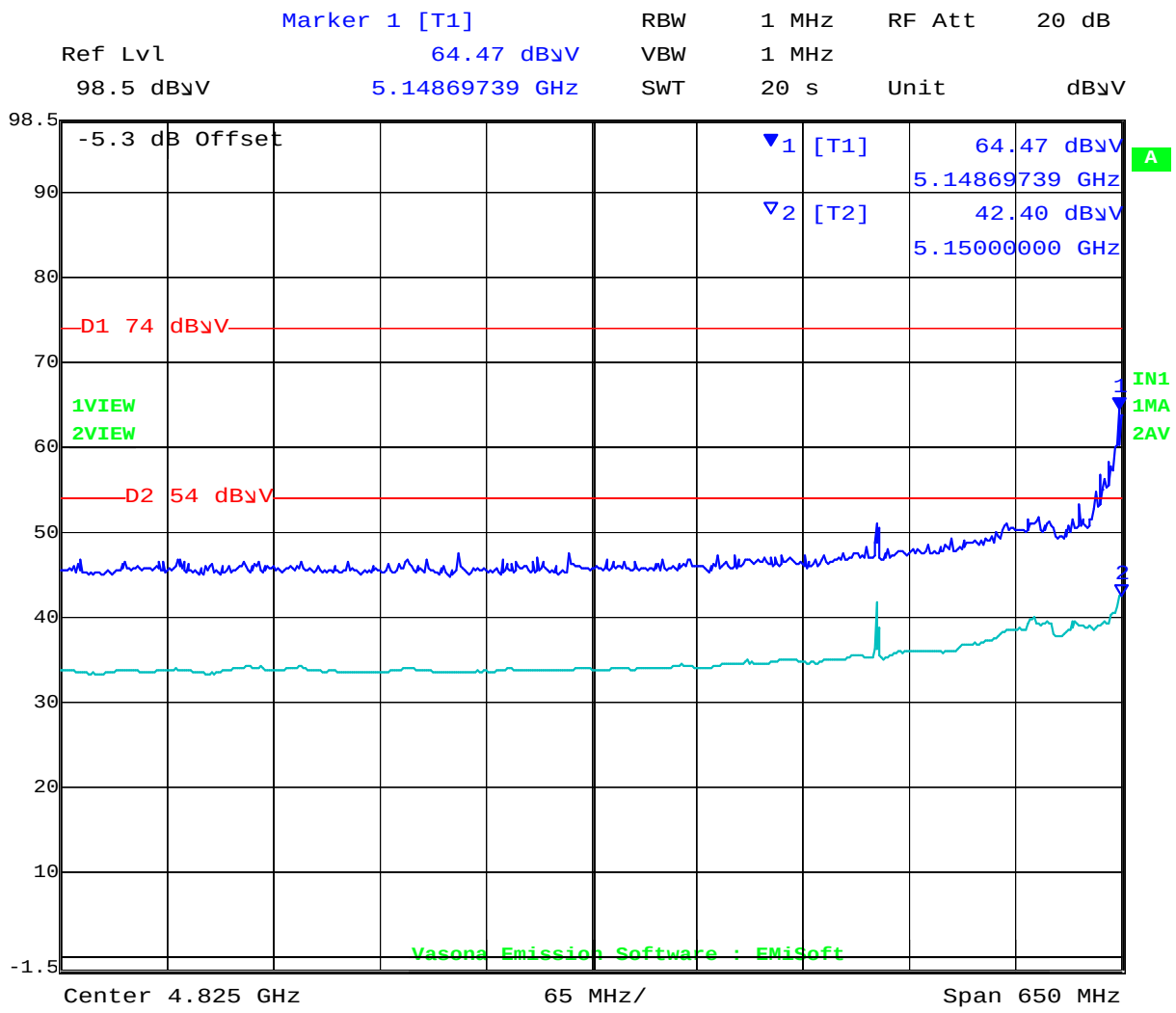


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5190.381	78.3	4.6	-9.9	73.0	Peak [Scan]	V						FUND
16058.116	41.7	9.0	0.3	51.0	Peak [Scan]	V	100	0	54.0	-3.0	Pass	Noise

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

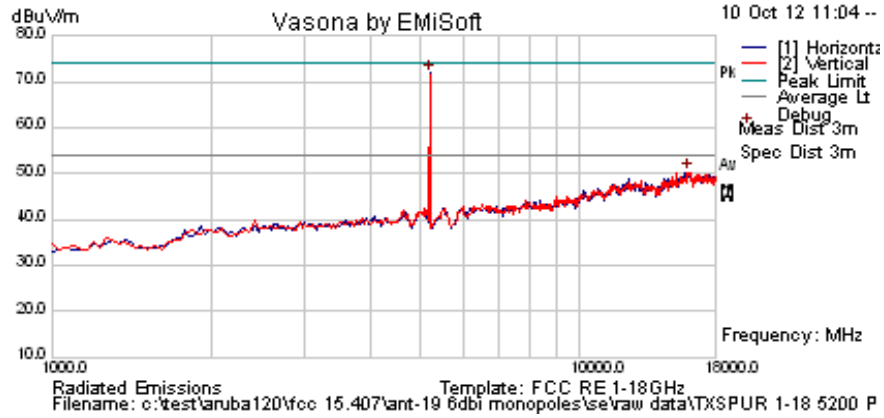
802.11a 5150 Restricted Band-edge



NART = 18

Mid

Test Freq.	5200 MHz	**Engineer**	JMH
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	33
Power Setting	18	**Press. (mBars)**	996
Antenna	ANT-19 6 dBi Monopole	**Duty Cycle (%)**	100
Test Notes 1	0		
Test Notes 2			



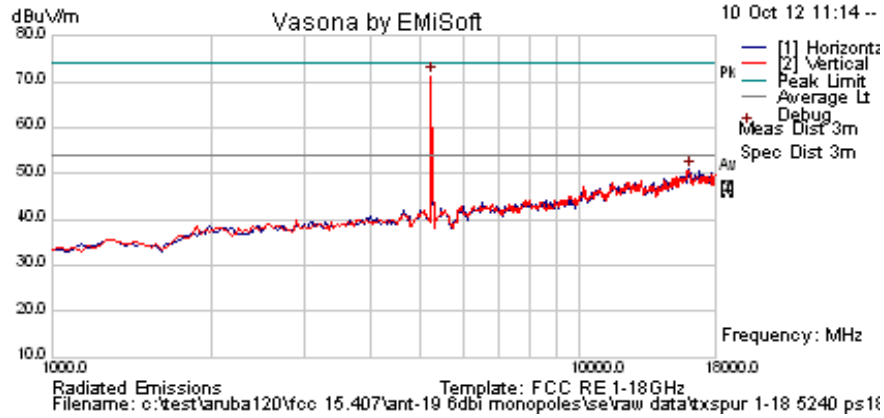
Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5190.381	77.2	4.6	-9.9	71.9	Peak [Scan]	H						FUND
15989.980	41.2	9.0	0.1	50.3	Peak [Scan]	V	150	0	54.0	-3.7	Pass	Noise

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

High

Test Freq.	5240 MHz	**Engineer**	JMH
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	33
Power Setting	18	**Press. (mBars)**	996
Antenna	ANT-19 6 dBi Monopole	**Duty Cycle (%)**	100
Test Notes 1	0		
Test Notes 2			

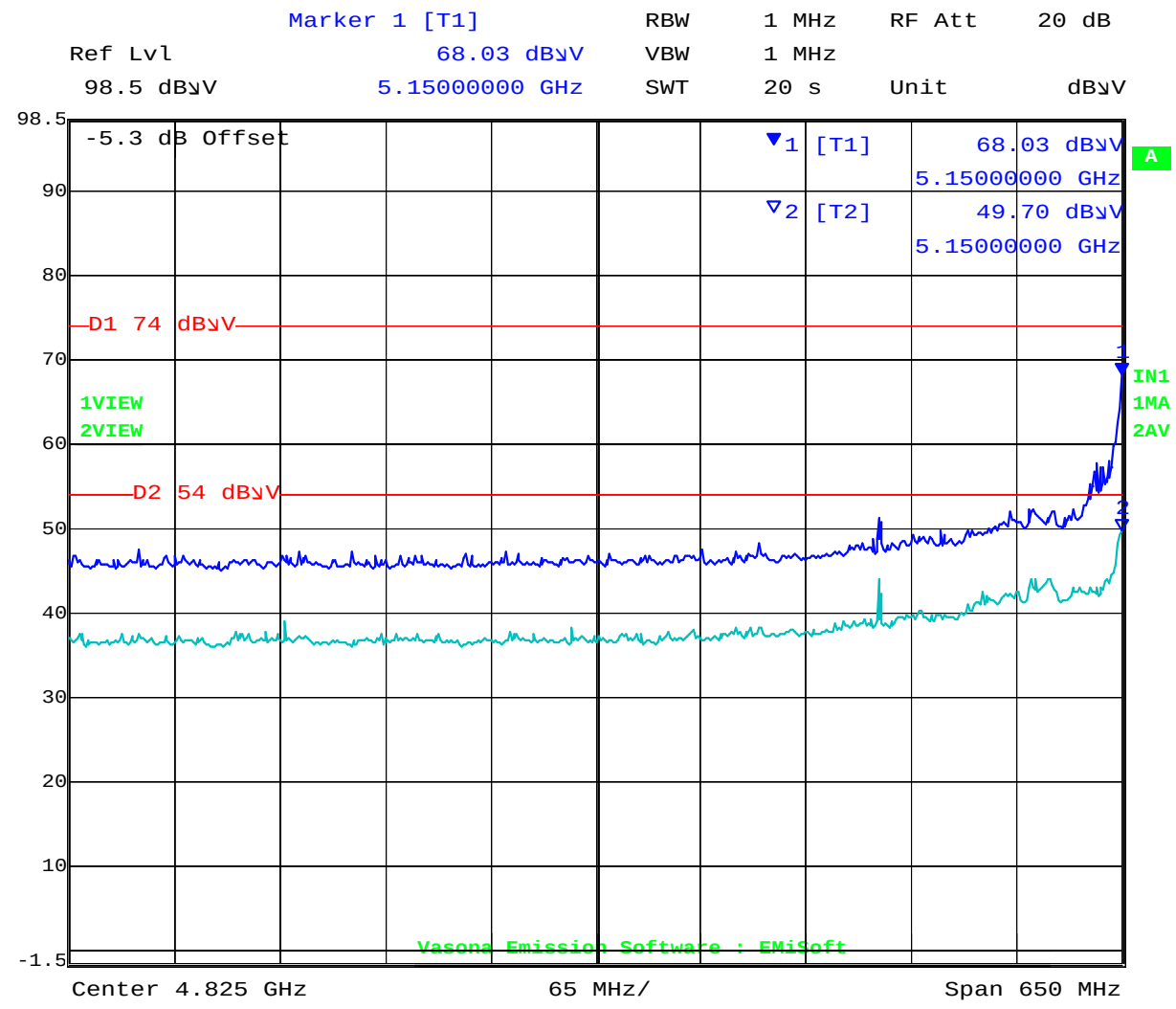


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5224.449	76.5	4.6	-9.8	71.3	Peak [Scan]	V						FUND
16092.184	41.6	9.0	0.3	50.8	Peak [Scan]	H	150	0	54.0	-3.2	Pass	Noise

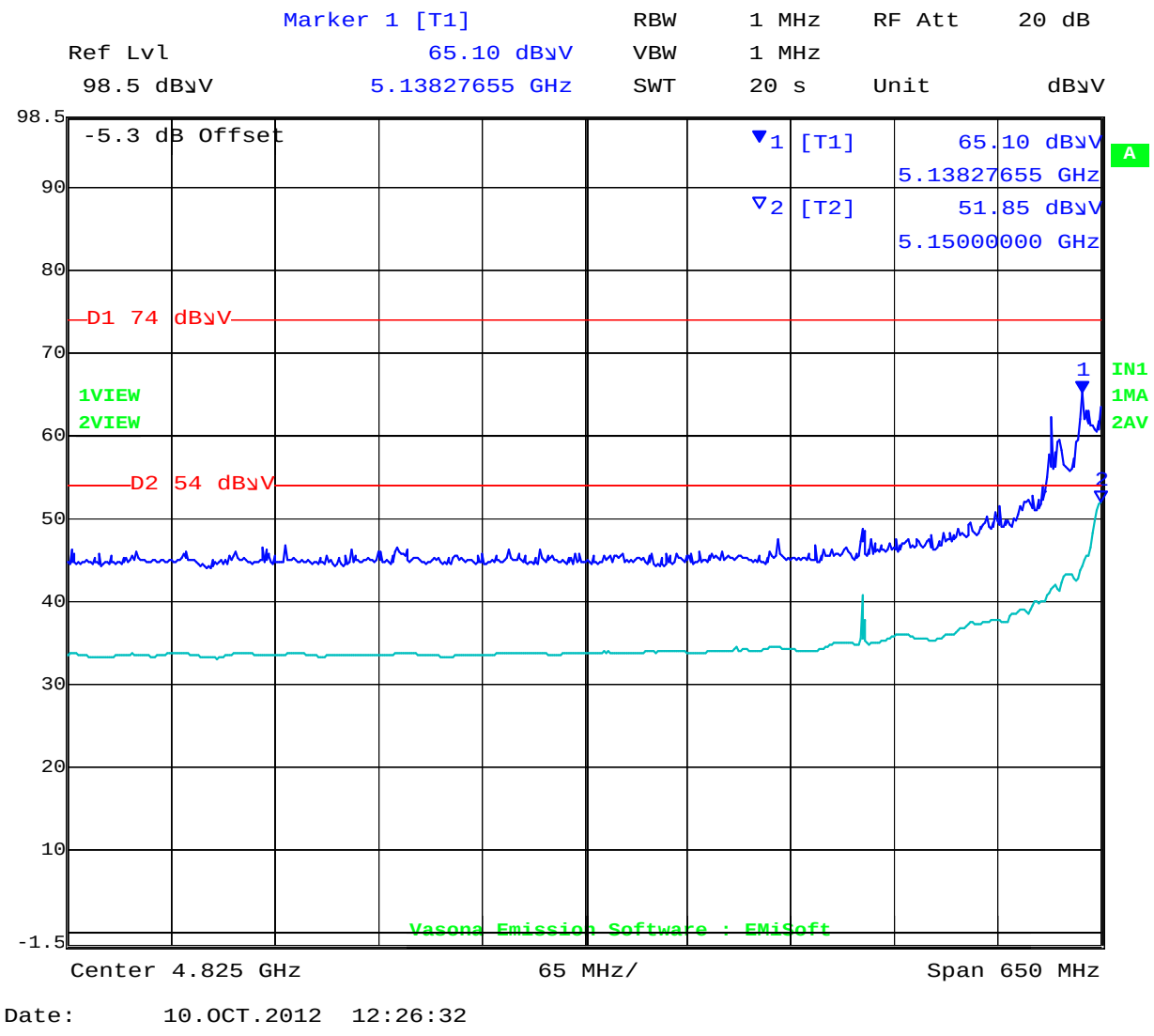
Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

802.11n HT-20 5150 Restricted Band-edge



NART = 18

802.11n HT-40 5150 Restricted Band-edge



Power reduction required in order to bring unit into compliance NART = 17.5

6.1.2.4. Digital Emissions (30M-1 GHz)

FCC, Part 15 Subpart C §15.205/ §15.209
Industry Canada RSS-210 §2.2

Test Procedure

Testing 30M-1 GHz was performed in a 3-meter anechoic chamber using a CISPR compliant receiver. Preliminary radiated emissions were measured on every azimuth and with the receiving antenna in both horizontal and vertical polarizations. To further maximize emissions the receive antenna was varied between 1 and 4 meters. The emissions are recorded with receiver in peak hold mode. Emissions closest to the limits are measured in the quasi-peak mode with the tuned receiver using a bandwidth of 120 kHz. Only the highest emissions relative to the limit are listed. The anechoic chamber test set-up is identified in Section 6 Test Set-Up Photographs.

The EUT had two methods of powering on ac/dc converter and Power over Ethernet (POE). Both modes were tested for emissions below 1GHz.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. In this test facility, the Antenna Factor, Cable Loss, and Amplifier Gains are loaded into the Rohde & Schwarz Receiver and the corrected field strength can be read directly on the receiver.

$$FS = R + AF + CORR$$

where:

FS = Field Strength
R = Measured Receiver Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain

For example:
Given a Receiver input reading of 51.5dBμV; Antenna Factor of 8.5dB; Cable Loss of 1.3dB; Falloff Factor of 0dB, an Amplifier Gain of 26dB and Notch Filter Loss of 1dB. The Field Strength of the measured emission is:

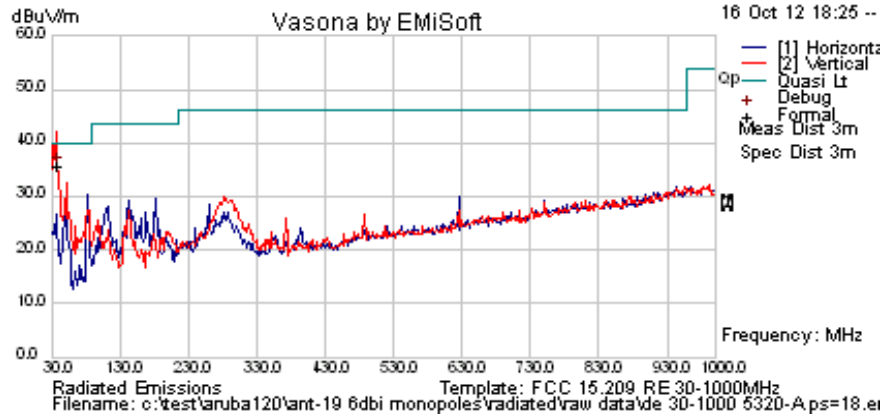
FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100μV/m
48 dBμV/m = 250μV/m

Test Freq.	5320 MHz	**Engineer**	JMH
Variant	Digital Emissions	**Temp (ºC)**	26
Freq. Range	30 MHz - 1000 MHz	**Rel. Hum.(%)**	33
Power Setting	18	**Press. (mBars)**	1000
Antenna	6 dBi Monopole		
Test Notes 1	unshielded ethernet and no console cable		
Test Notes 2			



Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
38.565	48.6	3.6	-16.4	35.8	Quasi Peak	V	114	136	40	-4.2	Pass	

Legend:	DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency
	NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band

Specification

Limits

§15.205 (a) Except as shown in paragraph (d) of 15.205 (a), only spurious emissions are permitted in any of the frequency bands listed.

§15.205 (a) Except as shown in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

§15.209 (a) and **RSS-Gen §2.2** Limit Matrix

Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Laboratory Measurement Uncertainty for Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of Radiated Emissions'	0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312

6.1.3. AC Wireline Conducted Emissions (150 kHz – 30 MHz)

FCC, Part 15 Subpart C §15.207
Industry Canada RSS-Gen §7.2.2

Test Procedure

The EUT is configured in accordance with ANSI C63.4. The conducted emissions are measured in a shielded room with a spectrum analyzer in peak hold in the first instance. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation. The highest emissions relative to the limit are listed.

Measurement Results for AC Wireline Conducted Emissions (150 kHz – 30 MHz)

Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

Not required - EUT is POE only.

Specification

Limit

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μΩ line impedance stabilization network (LISN), see §15.207 (a) matrix below. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

RSS-Gen §7.2.2
The radio frequency voltage that is conducted back into the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table below. The tighter limit applies at the frequency range boundaries.

§15.207 (a) and **RSS-Gen §7.2.2** Limit Matrix
The lower limit applies at the boundary between frequency ranges

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency

Laboratory Measurement Uncertainty for Conducted Emissions

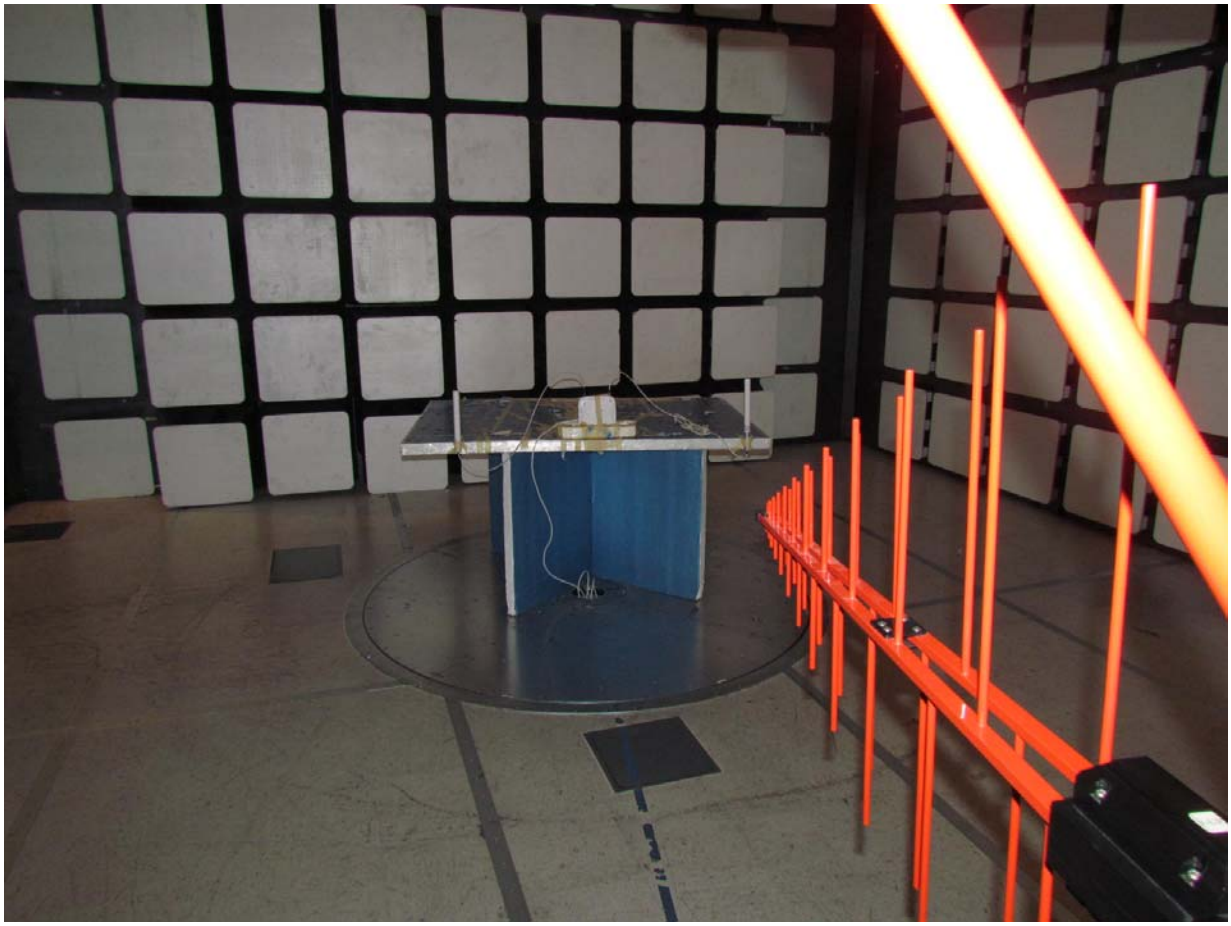
Measurement uncertainty	±2.64 dB

Traceability

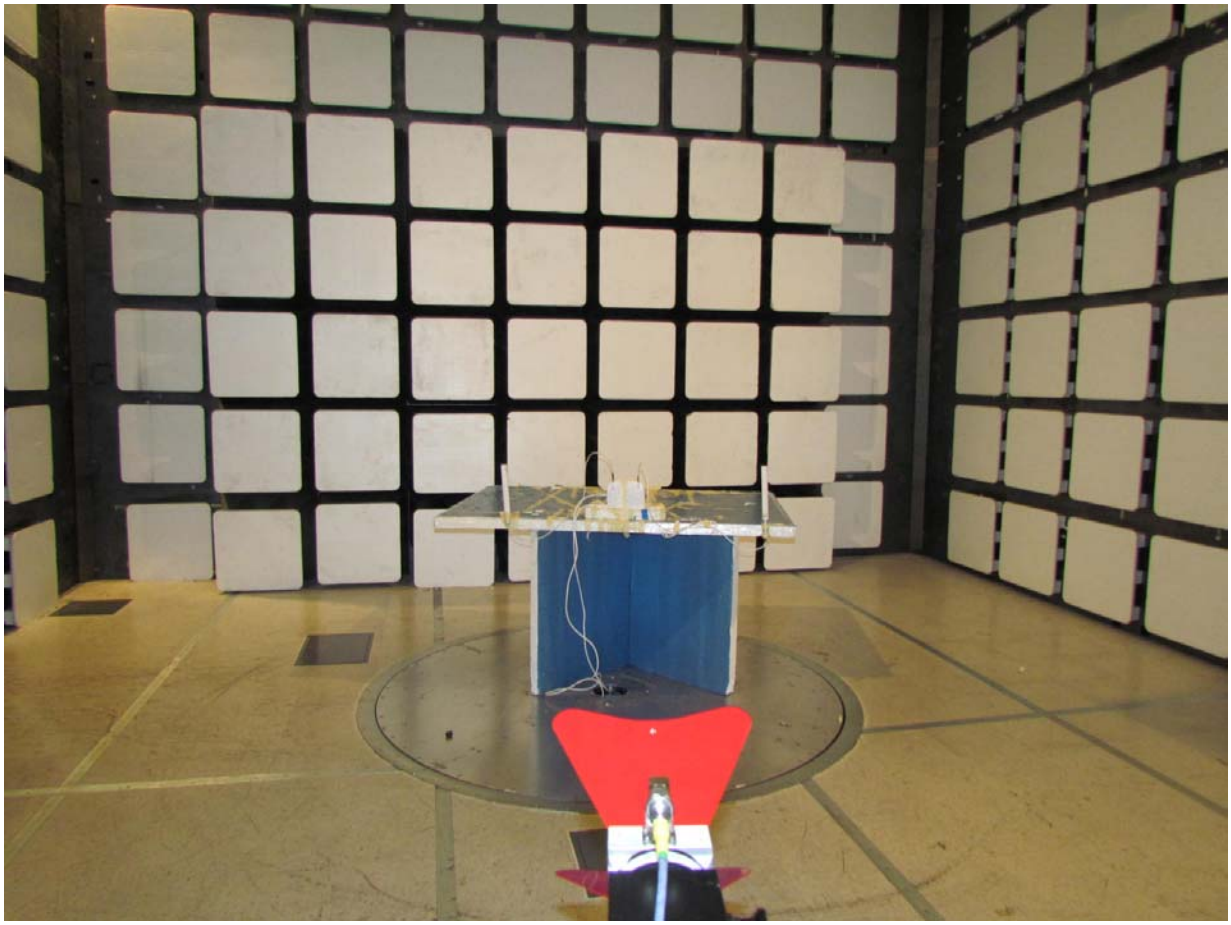
Method	Test Equipment Used
Measurements were made per work instruction WI-EMC-01 'Measurement of Conducted Emissions'	0158, 0184, 0287, 0190, 0293, 0307

7. PHOTOGRAPHS

7.1. Test Setup - Digital Emissions below 1 GHz



7.2. Radiated Emissions Test Setup >1 GHz – ANT-19



8. TEST EQUIPMENT DETAILS

Asset #	Instrument	Manufacturer	Part #	Serial #	Calibration Due Date
0070	Power Meter	Hewlett Packard	437B	3125U11552	28th Nov 12
0117	Power Sensor	Hewlett Packard	8487D	3318A00371	15th Nov 12
0223	Power Meter	Hewlett Packard	EPM-442A	US37480256	15th Nov 12
0374	Power Sensor	Hewlett Packard	8485A	3318A19694	29th Nov 12
0158	Barometer /Thermometer	Control Co.	4196	E2846	8th Dec 12
0193	EMI Receiver	Rhode & Schwartz	ESI 7	838496/007	2nd Dec 12
0287	EMI Receiver	Rhode & Schwartz	ESIB40	100201	16th Nov 12
0338	30 - 3000 MHz Antenna	Sunol	JB3	A052907	8th Nov 13
0335	1-18 GHz Horn Antenna	EMCO	3117	00066580	7th Nov 13
0252	SMA Cable	Megaphase	Sucoflex 104	None	N/A
0293	BNC Cable	Megaphase	1689 1GVT4	15F50B001	N/A
0307	BNC Cable	Megaphase	1689 1GVT4	15F50B002	N/A
0310	2m SMA Cable	Micro-Coax	UFA210A-0-0787-3G03G0	209089-001	N/A
0312	3m SMA Cable	Micro-Coax	UFA210A-1-1181-3G0300	209092-001	N/A
0314	30dB N-Type Attenuator	ARRA	N9444-30	1623	N/A
	EMC Test Software	EMISoft	Vasona	5.0051	N/A
	RF Conducted Test Software	National Instruments	Labview	Version 8.2	N/A
	RF Conducted Test Software	MiCOM Labs ATS		Version 1.5	N/A

APPENDIX

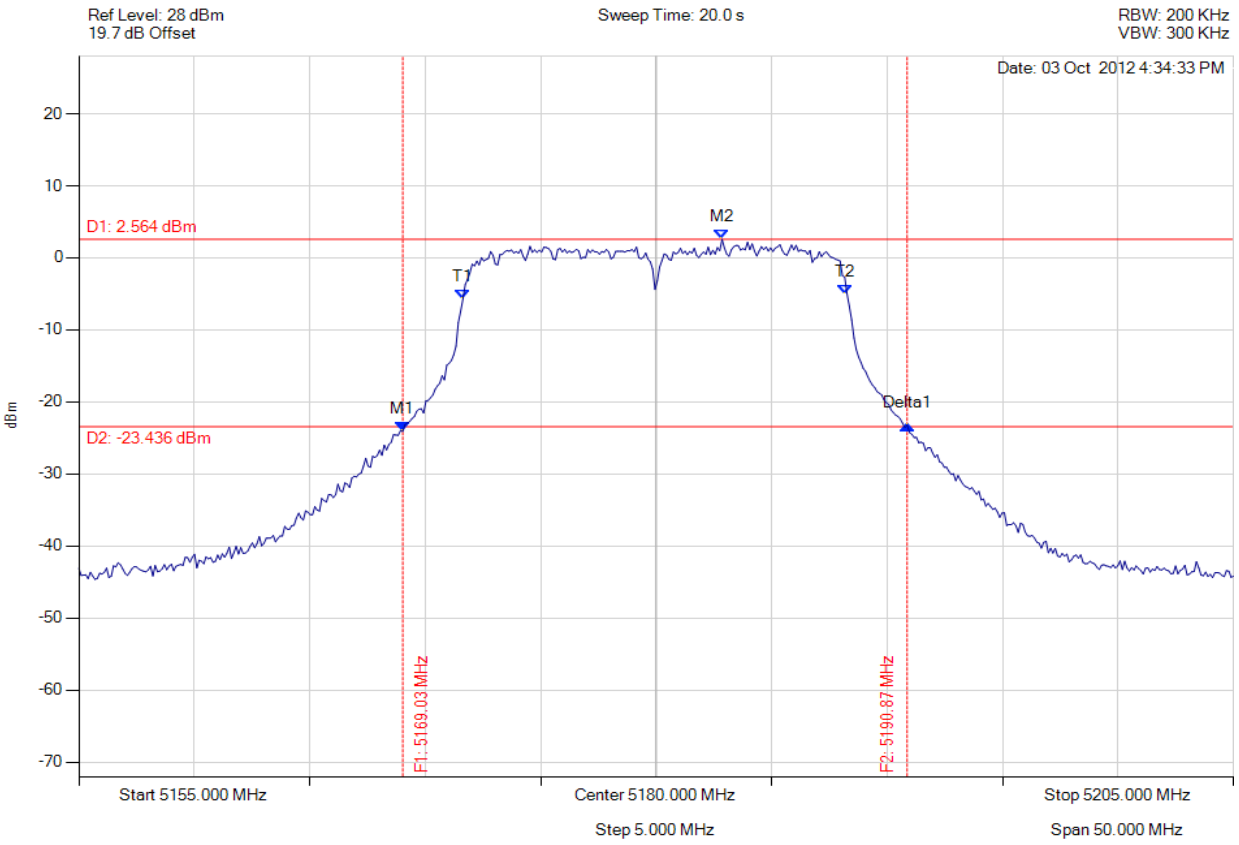
A. SUPPORTING INFORMATION

A.1. CONDUCTED TEST PLOTS

A.1.1. 26 dB & 99% Bandwidth

26 dB 99%

Variant: 802.11a, Channel: 5180.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

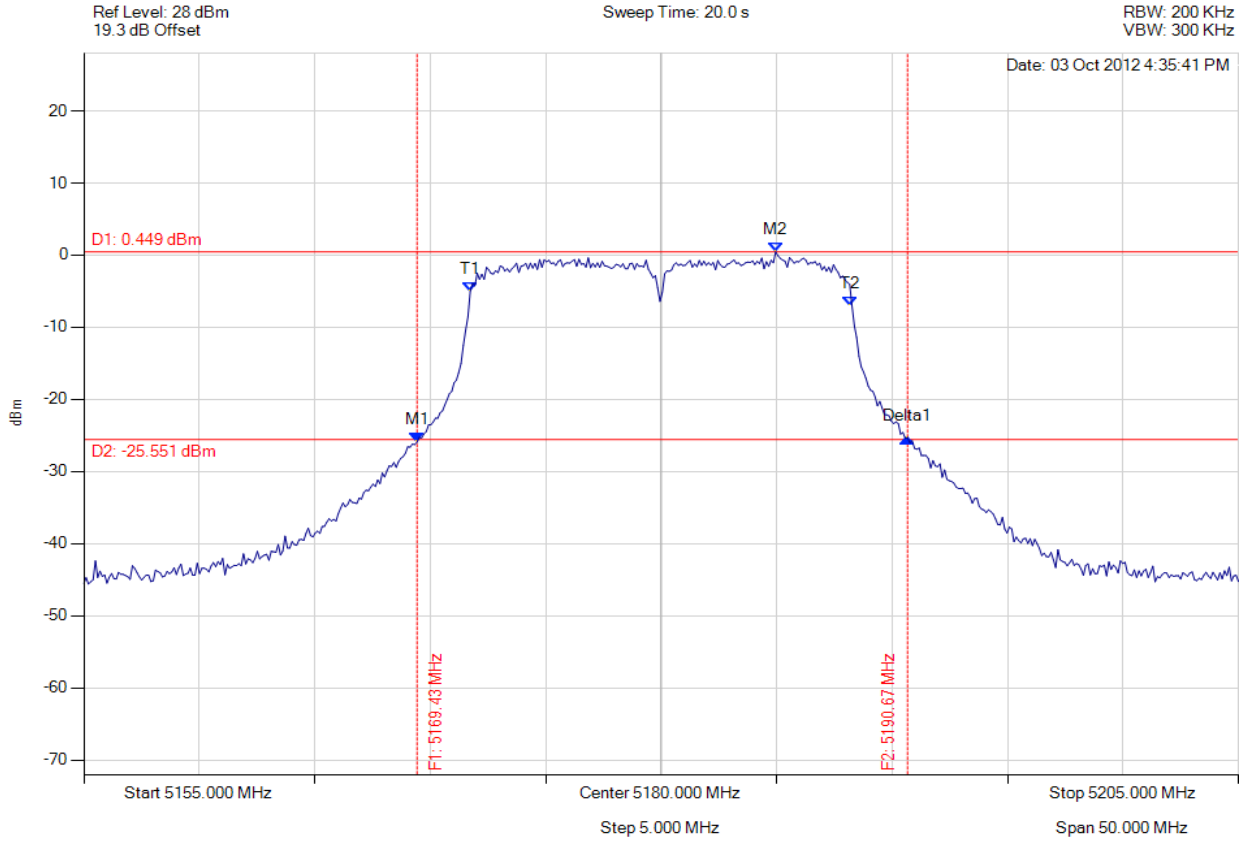


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5169.028 MHz : -24.088 dBm M2 : 5182.856 MHz : 2.564 dBm Delta1 : 21.844 MHz : 0.850 dB T1 : 5171.633 MHz : -5.715 dBm T2 : 5188.166 MHz : -4.971 dBm OBW : 16.633 MHz	Measured 26 dB Bandwidth: 21.844 MHz Measured 99% Bandwidth: 16.633 MHz

Back to the Matrix

26 dB 99%

Variant: 802.11a, Channel: 5180.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

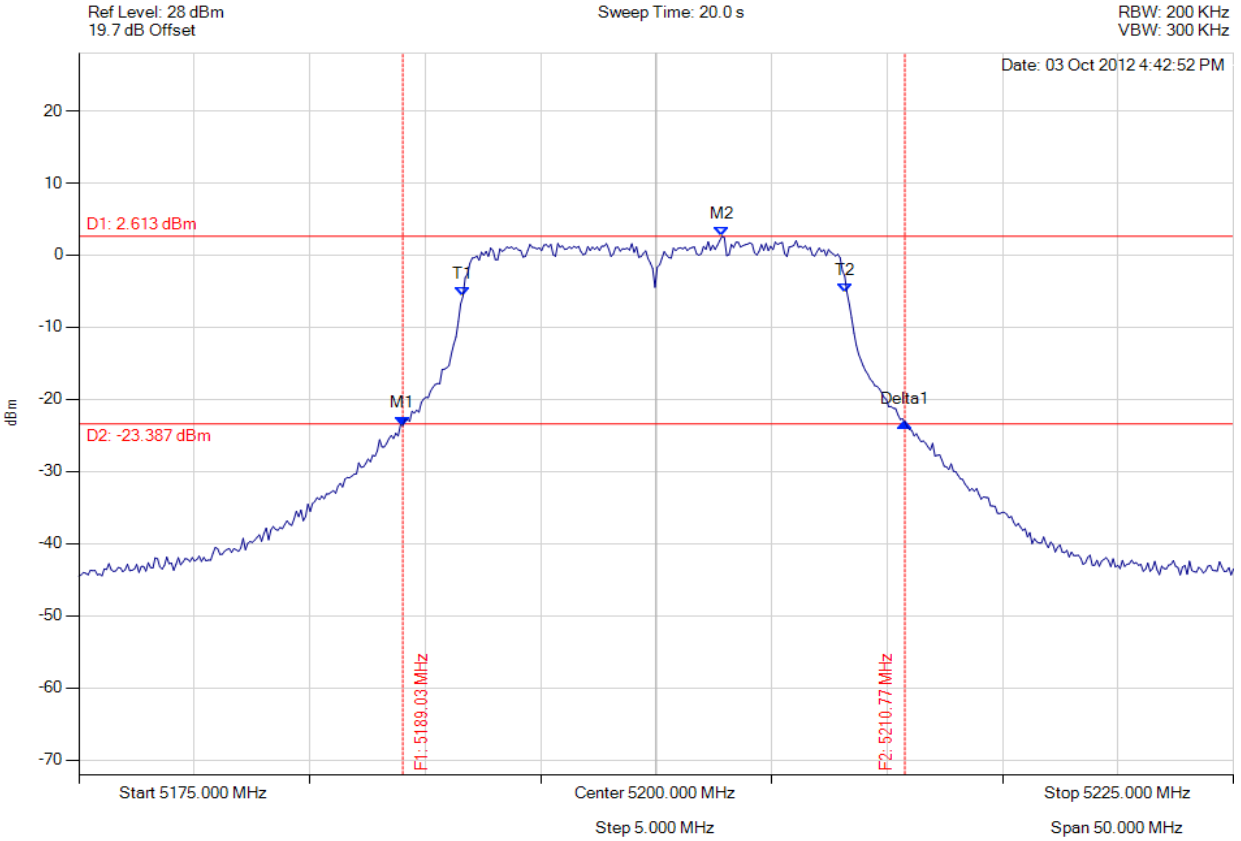


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5169.429 MHz : -25.935 dBm M2 : 5184.960 MHz : 0.449 dBm Delta1 : 21.242 MHz : 0.614 dB T1 : 5171.733 MHz : -5.057 dBm T2 : 5188.166 MHz : -7.033 dBm OBW : 16.533 MHz	Measured 26 dB Bandwidth: 21.242 MHz Measured 99% Bandwidth: 16.533 MHz

Back to the Matrix

26 dB 99%

Variant: 802.11a, Channel: 5200.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

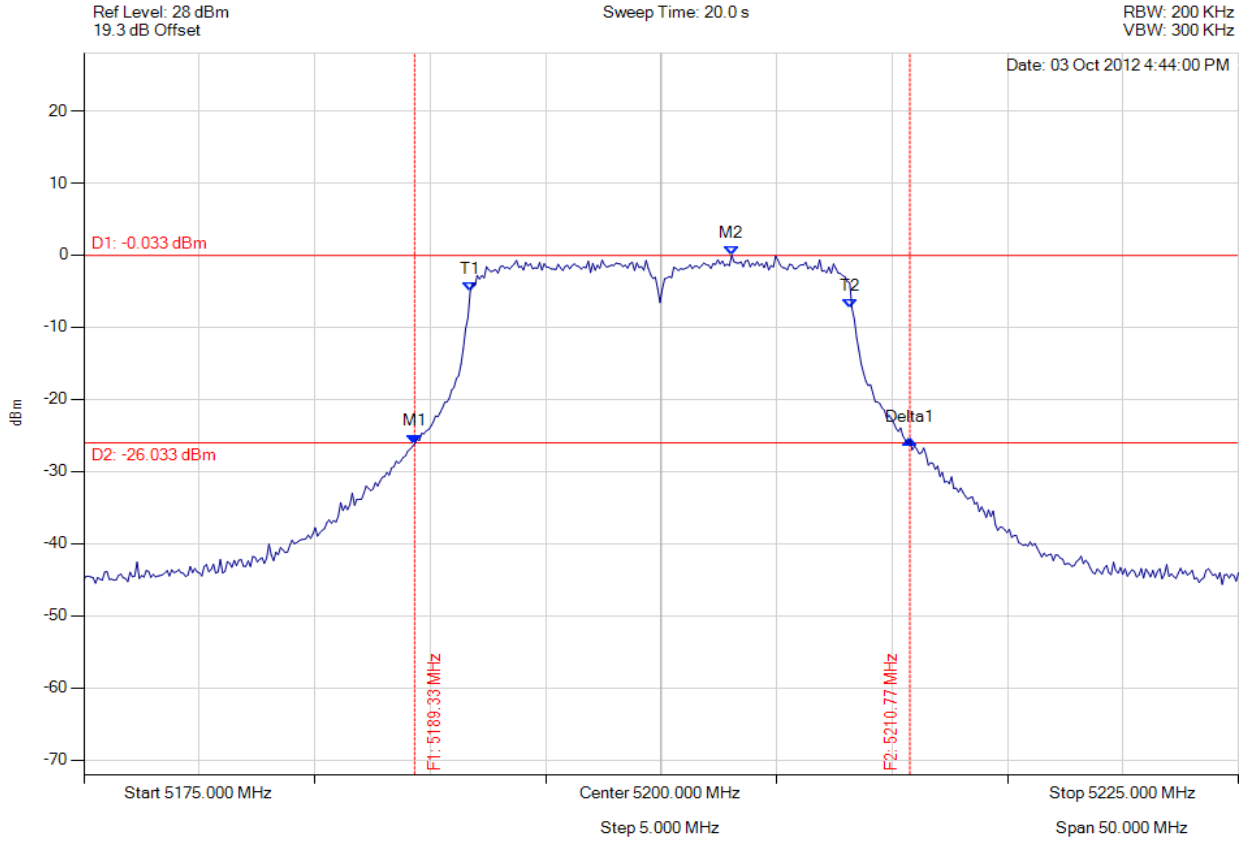


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5189.028 MHz : -23.631 dBm M2 : 5202.856 MHz : 2.613 dBm Delta1 : 21.743 MHz : 0.494 dB T1 : 5191.633 MHz : -5.713 dBm T2 : 5208.166 MHz : -5.197 dBm OBW : 16.633 MHz	Measured 26 dB Bandwidth: 21.743 MHz Measured 99% Bandwidth: 16.633 MHz

Back to the Matrix

26 dB 99%

Variant: 802.11a, Channel: 5200.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

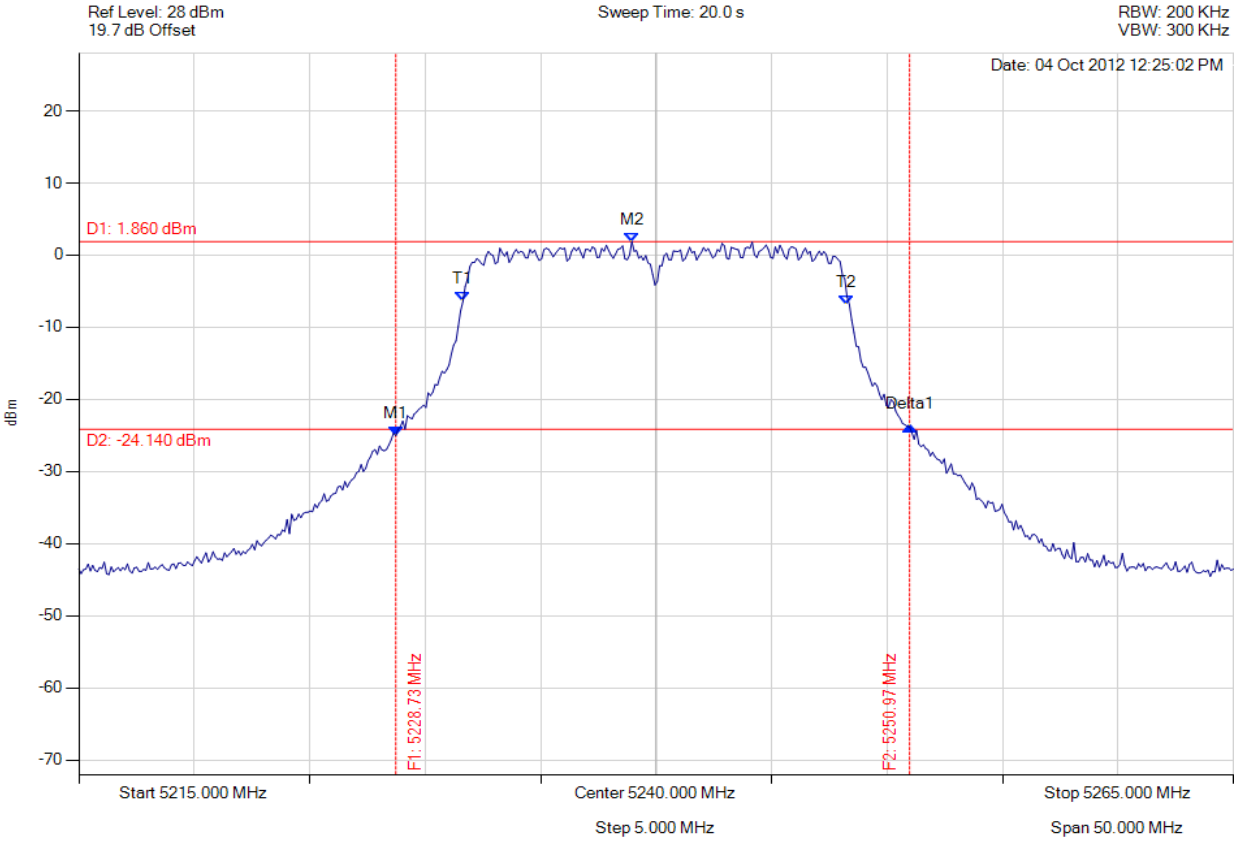


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5189.329 MHz : -26.132 dBm M2 : 5203.056 MHz : -0.033 dBm Delta1 : 21.443 MHz : 0.539 dB T1 : 5191.733 MHz : -5.008 dBm T2 : 5208.166 MHz : -7.381 dBm OBW : 16.533 MHz	Measured 26 dB Bandwidth: 21.443 MHz Measured 99% Bandwidth: 16.533 MHz

Back to the Matrix

26 dB 99%

Variant: 802.11a, Channel: 5240.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

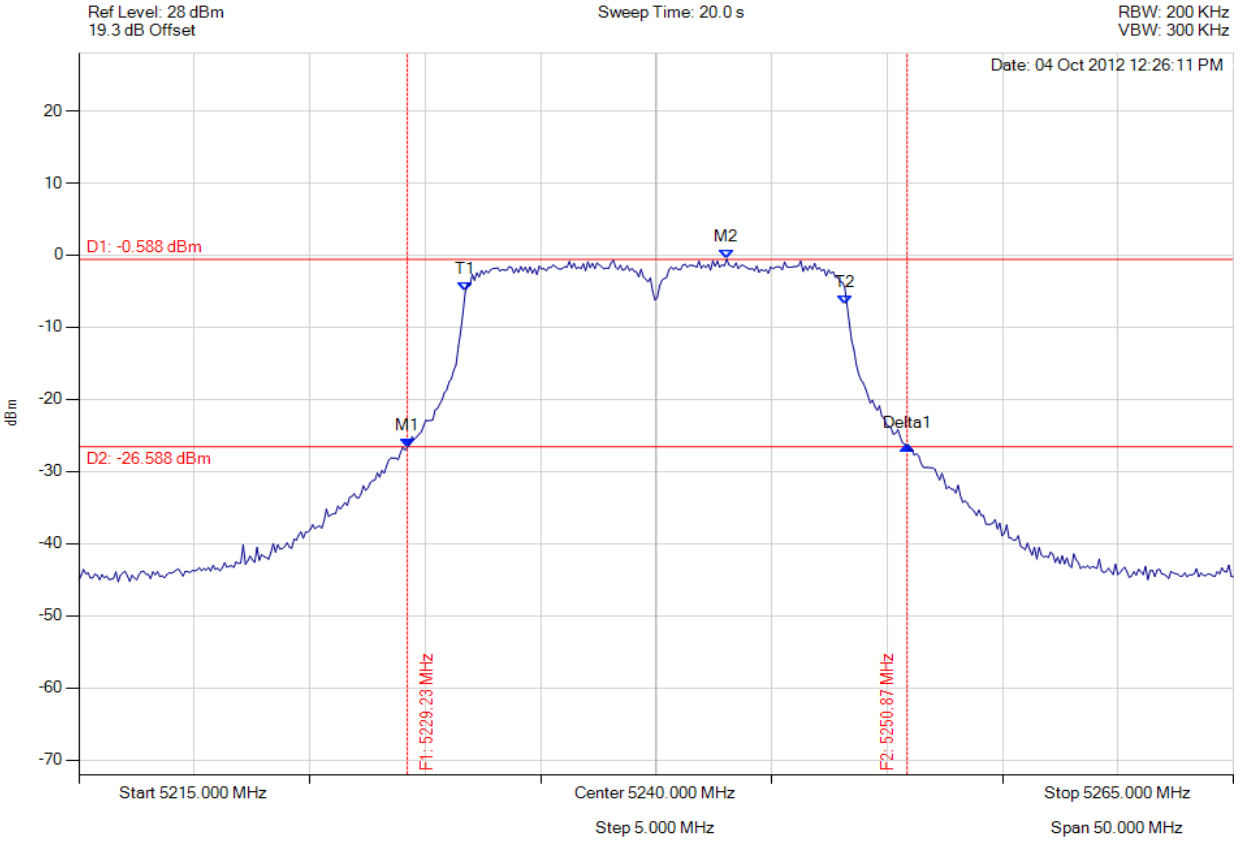


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5228.727 MHz : -25.040 dBm M2 : 5238.948 MHz : 1.860 dBm Delta1 : 22.244 MHz : 1.253 dB T1 : 5231.633 MHz : -6.403 dBm T2 : 5248.267 MHz : -6.824 dBm OBW : 16.733 MHz	Measured 26 dB Bandwidth: 22.244 MHz Measured 99% Bandwidth: 16.733 MHz

Back to the Matrix

26 dB 99%

Variant: 802.11a, Channel: 5240.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

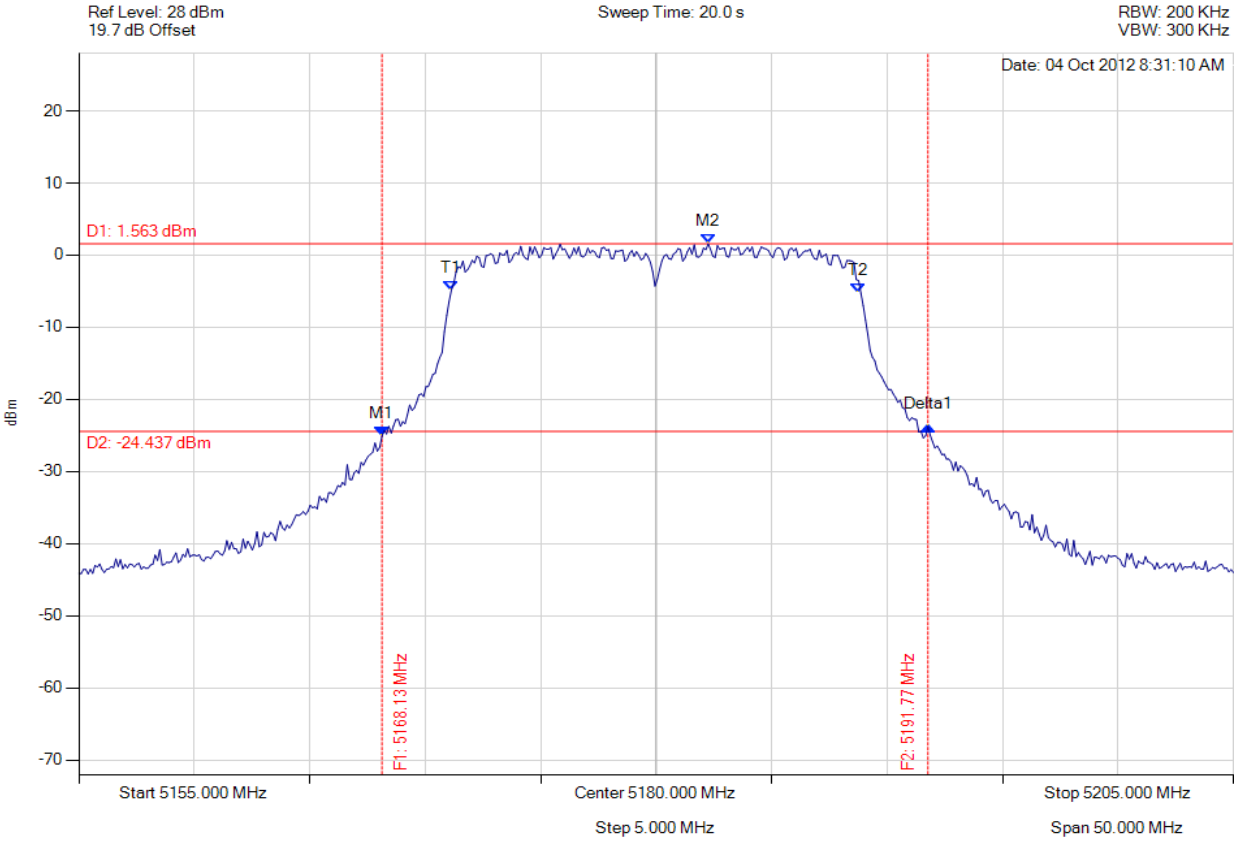


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5229.228 MHz : -26.659 dBm M2 : 5243.056 MHz : -0.588 dBm Delta1 : 21.643 MHz : 0.273 dB T1 : 5231.733 MHz : -5.107 dBm T2 : 5248.166 MHz : -6.897 dBm OBW : 16.533 MHz	Measured 26 dB Bandwidth: 21.643 MHz Measured 99% Bandwidth: 16.533 MHz

Back to the Matrix

26 dB 99%

Variant: 802.11n HT-20, Channel: 5180.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

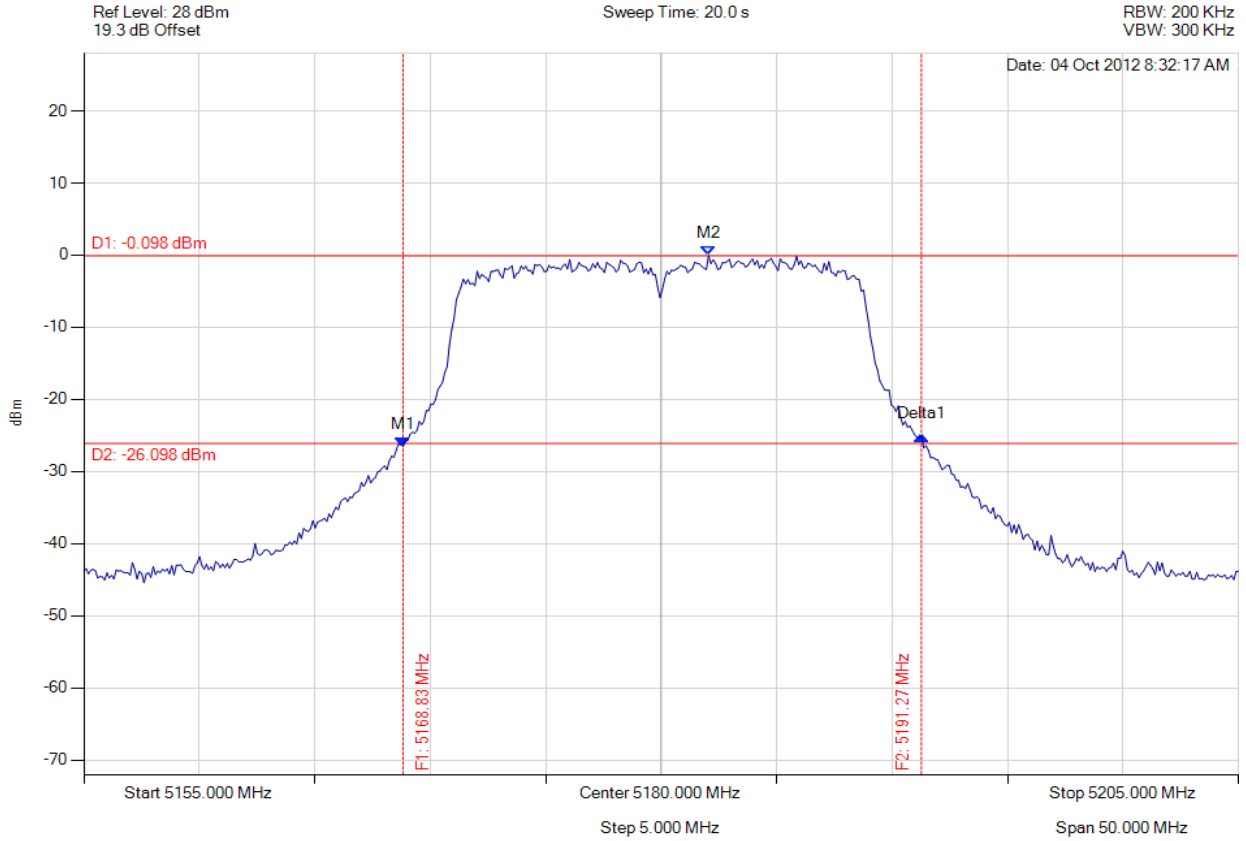


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5168.126 MHz : -25.111 dBm M2 : 5182.255 MHz : 1.563 dBm Delta1 : 23.647 MHz : 1.338 dB T1 : 5171.132 MHz : -4.851 dBm T2 : 5188.768 MHz : -5.274 dBm OBW : 17.735 MHz	Measured 26 dB Bandwidth: 23.647 MHz Measured 99% Bandwidth: 17.735 MHz

Back to the Matrix

26 dB 99%

Variant: 802.11n HT-20, Channel: 5180.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

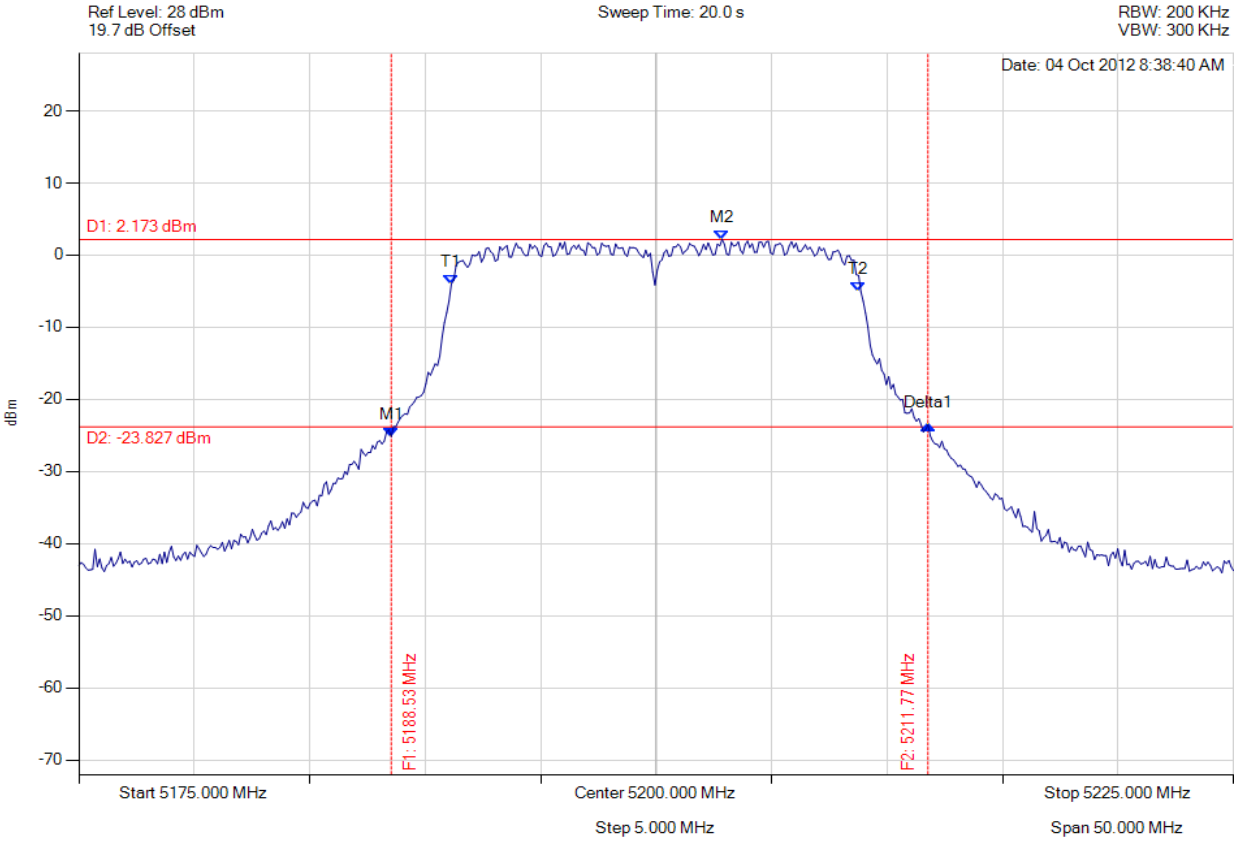


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5168.828 MHz : -26.527 dBm M2 : 5182.054 MHz : -0.098 dBm Delta1 : 22.445 MHz : 1.448 dB T1 : 0 Hz : 500.000 dBm T2 : 0 Hz : 500.000 dBm OBW : 17.735 MHz	Measured 26 dB Bandwidth: 22.445 MHz Measured 99% Bandwidth: 17.735 MHz

Back to the Matrix

26 dB 99%

Variant: 802.11n HT-20, Channel: 5200.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

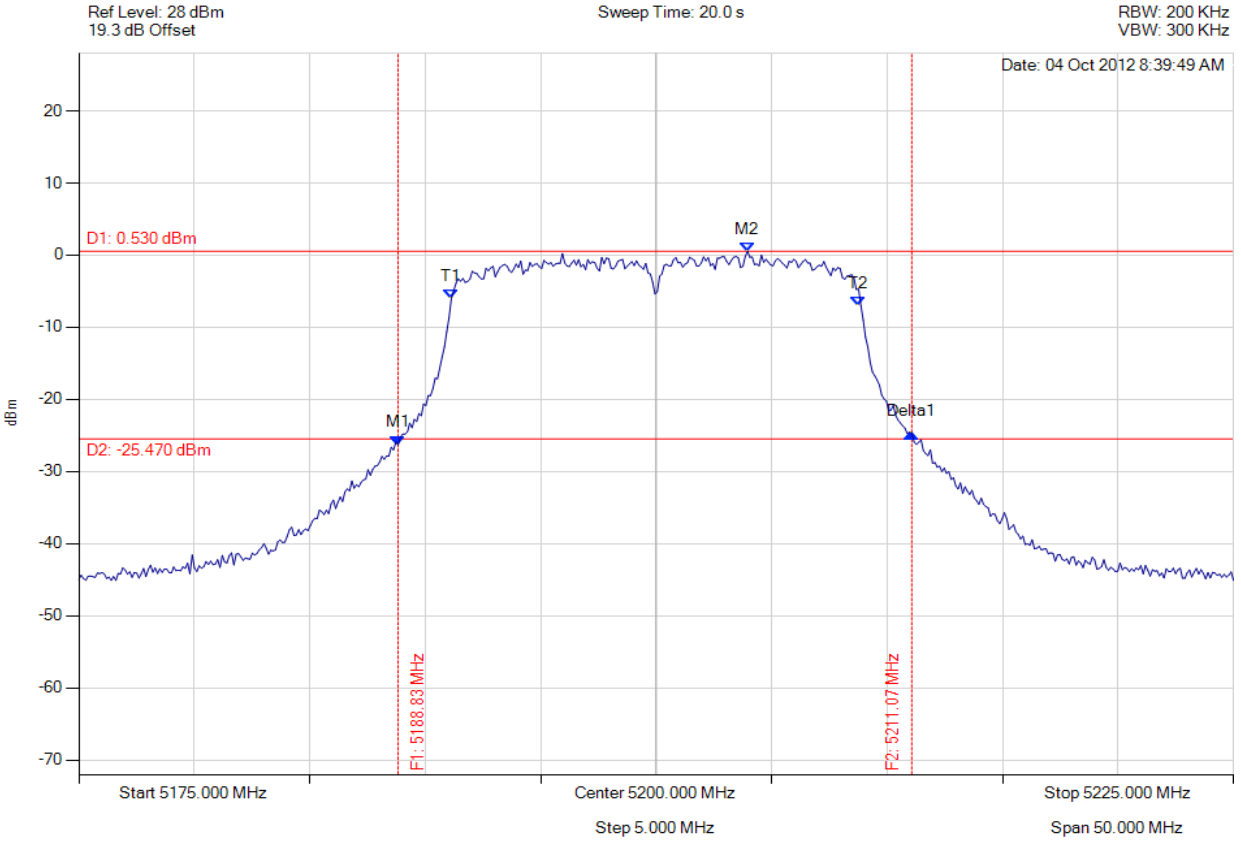


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5188.527 MHz : -25.150 dBm M2 : 5202.856 MHz : 2.173 dBm Delta1 : 23.246 MHz : 1.625 dB T1 : 5191.132 MHz : -3.981 dBm T2 : 5208.768 MHz : -5.079 dBm OBW : 17.735 MHz	Measured 26 dB Bandwidth: 23.246 MHz Measured 99% Bandwidth: 17.735 MHz

Back to the Matrix

26 dB 99%

Variant: 802.11n HT-20, Channel: 5200.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

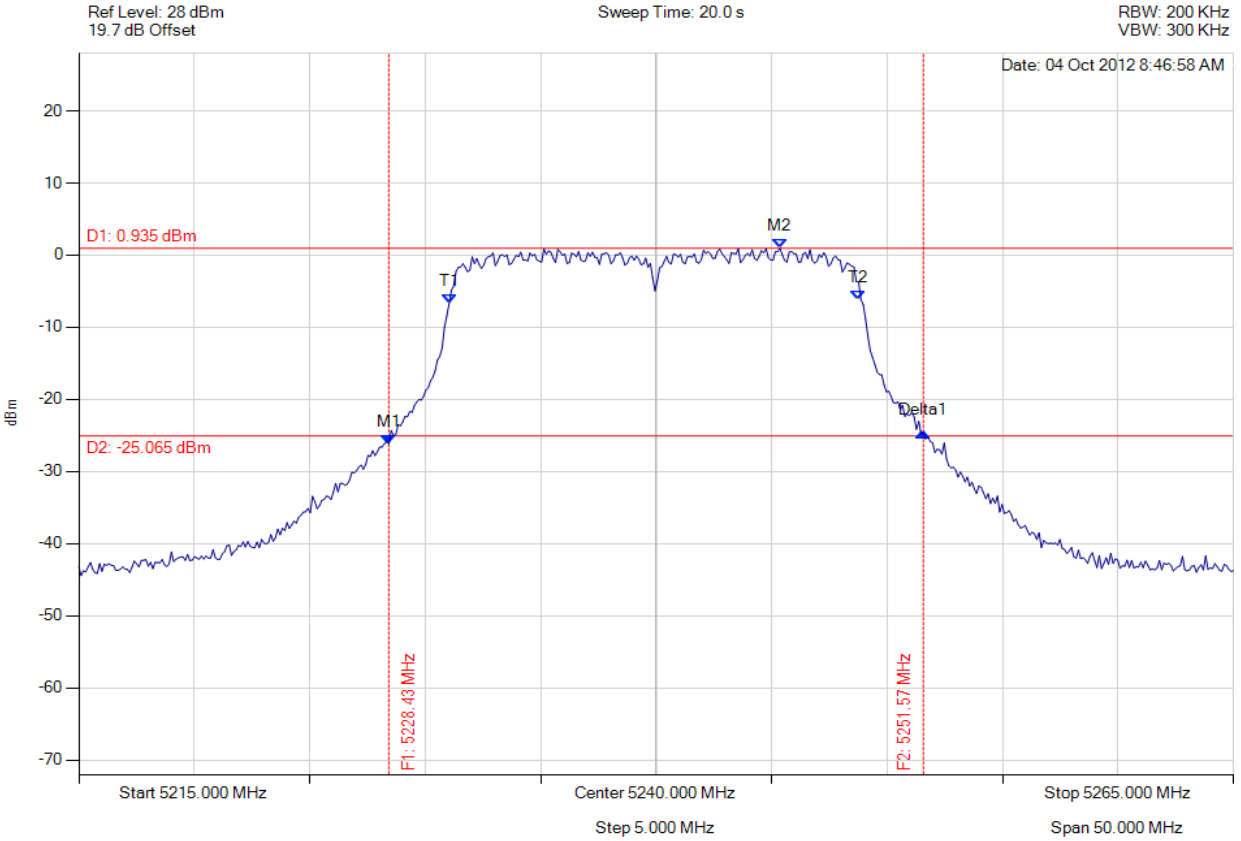


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5188.828 MHz : -26.303 dBm M2 : 5203.958 MHz : 0.530 dBm Delta1 : 22.244 MHz : 1.531 dB T1 : 5191.132 MHz : -5.978 dBm T2 : 5208.768 MHz : -6.987 dBm OBW : 17.735 MHz	Measured 26 dB Bandwidth: 22.244 MHz Measured 99% Bandwidth: 17.735 MHz

Back to the Matrix

26 dB 99%

Variant: 802.11n HT-20, Channel: 5240.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

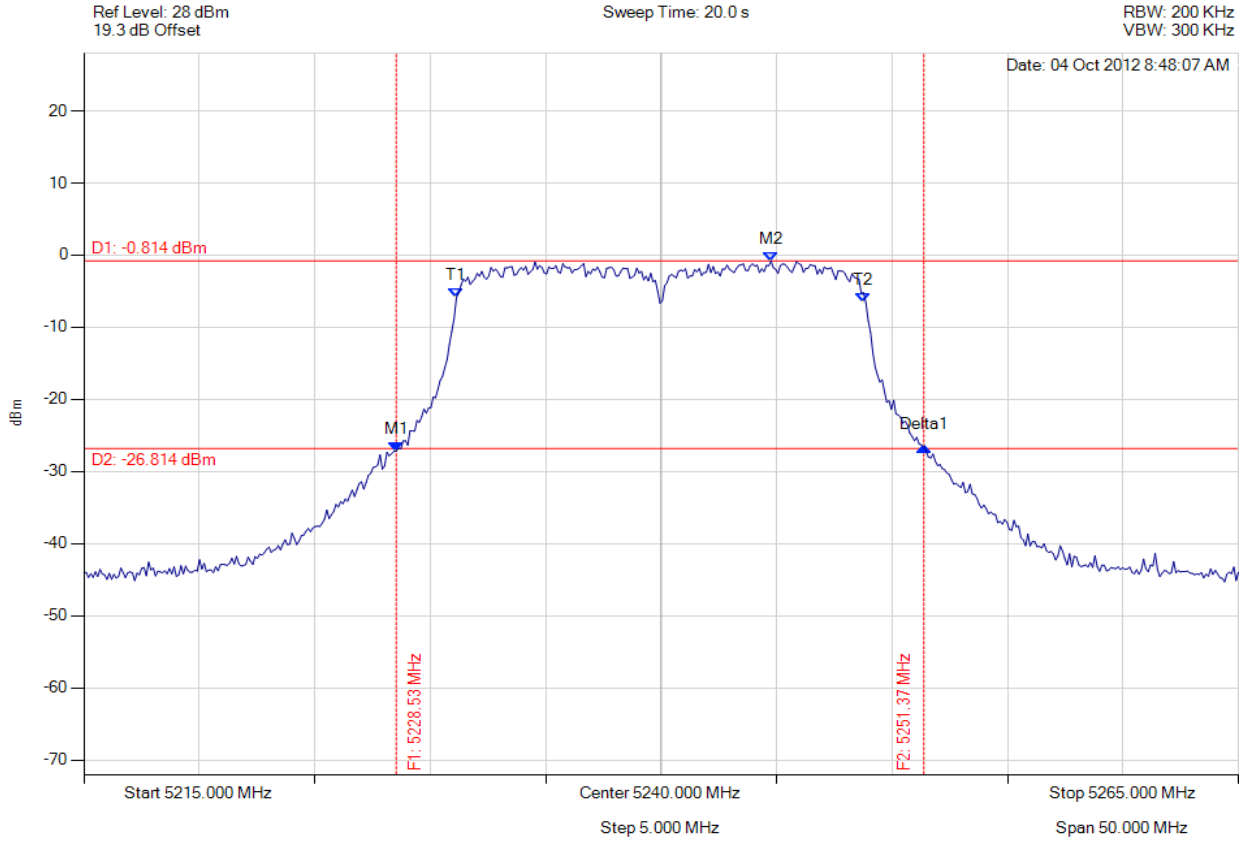


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5228.427 MHz : -26.189 dBm M2 : 5245.361 MHz : 0.935 dBm Delta1 : 23.146 MHz : 1.560 dB T1 : 5231.032 MHz : -6.759 dBm T2 : 5248.768 MHz : -6.155 dBm OBW : 17.836 MHz	Measured 26 dB Bandwidth: 23.146 MHz Measured 99% Bandwidth: 17.836 MHz

Back to the Matrix

26 dB 99%

Variant: 802.11n HT-20, Channel: 5240.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

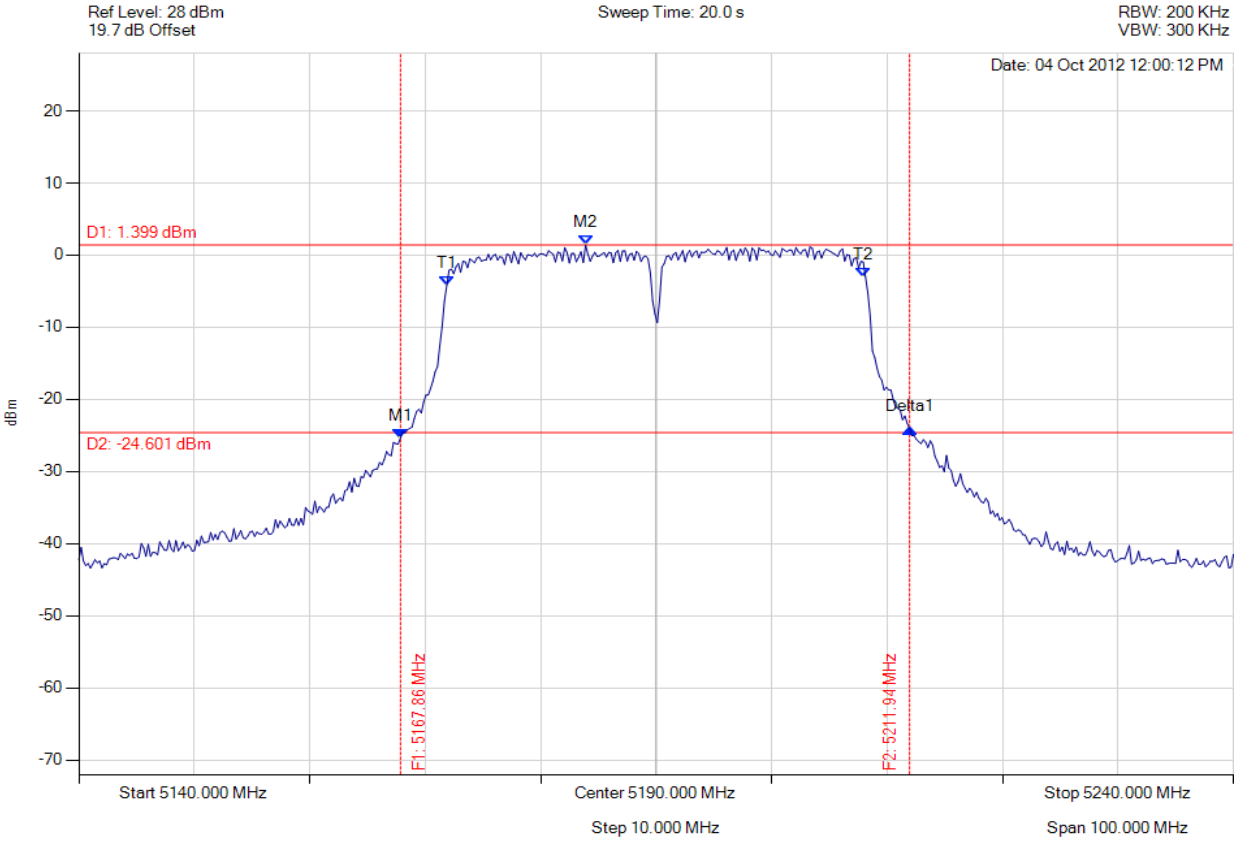


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5228.527 MHz : -27.151 dBm M2 : 5244.760 MHz : -0.814 dBm Delta1 : 22.846 MHz : 0.594 dB T1 : 5231.132 MHz : -5.927 dBm T2 : 5248.768 MHz : -6.600 dBm OBW : 17.735 MHz	Measured 26 dB Bandwidth: 22.846 MHz Measured 99% Bandwidth: 17.735 MHz

Back to the Matrix

26 dB 99%

Variant: 802.11n HT-40, Channel: 5190.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

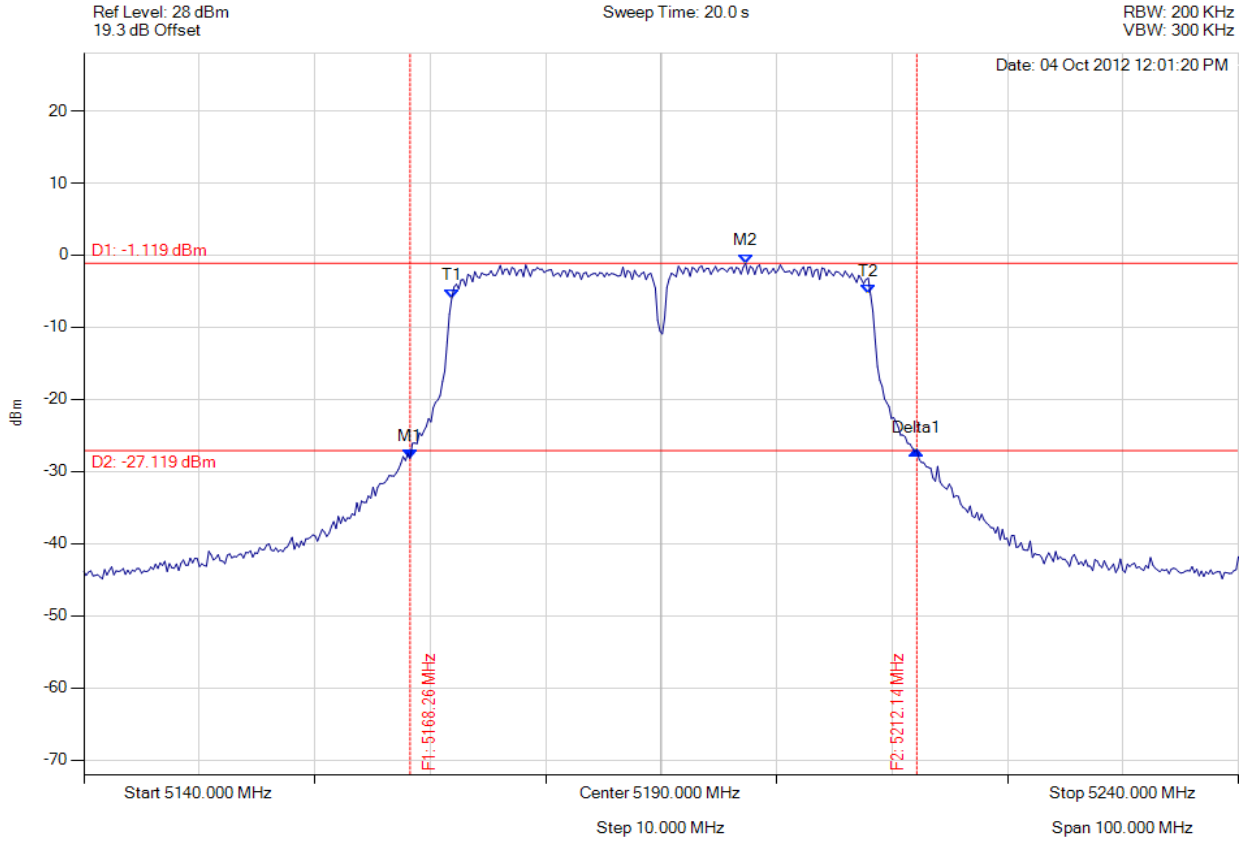


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5167.856 MHz : -25.337 dBm M2 : 5183.888 MHz : 1.399 dBm Delta1 : 44.088 MHz : 1.328 dB T1 : 5171.864 MHz : -4.206 dBm T2 : 5207.936 MHz : -3.051 dBm OBW : 36.273 MHz	Measured 26 dB Bandwidth: 44.088 MHz Measured 99% Bandwidth: 36.273 MHz

Back to the Matrix

26 dB 99%

Variant: 802.11n HT-40, Channel: 5190.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

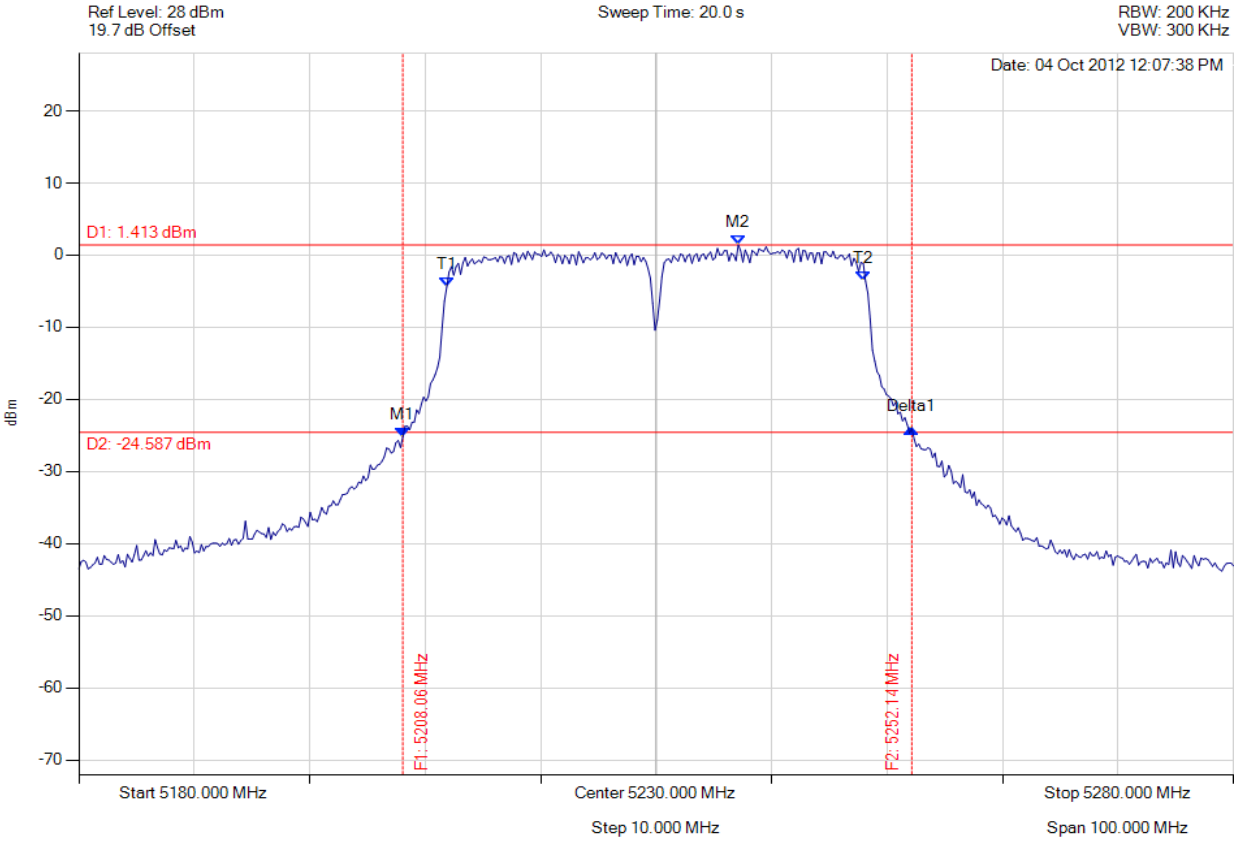


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5168.257 MHz : -28.194 dBm M2 : 5197.315 MHz : -1.119 dBm Delta1 : 43.888 MHz : 1.204 dB T1 : 5171.864 MHz : -5.953 dBm T2 : 5207.936 MHz : -5.447 dBm OBW : 36.273 MHz	Measured 26 dB Bandwidth: 43.888 MHz Measured 99% Bandwidth: 36.273 MHz

Back to the Matrix

26 dB 99%

Variant: 802.11n HT-40, Channel: 5230.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

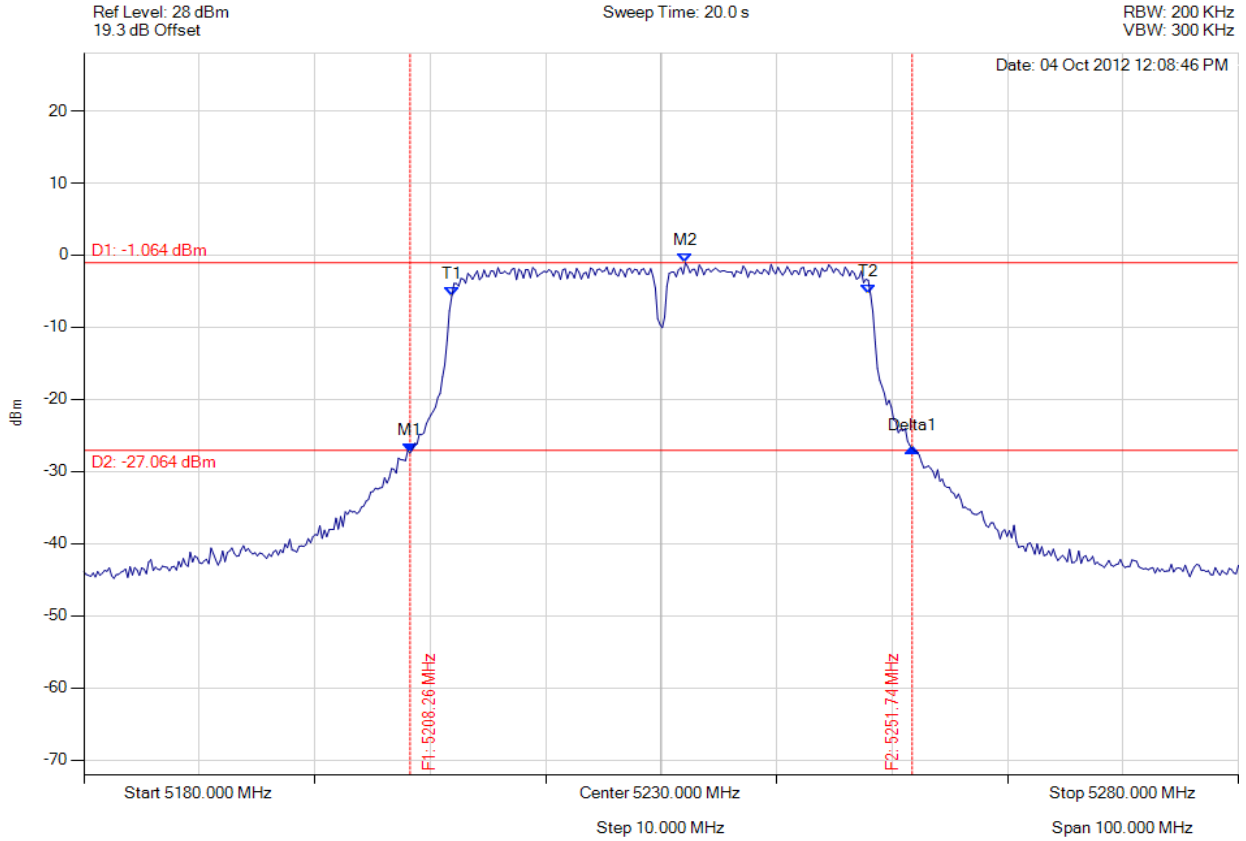


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5208.056 MHz : -25.248 dBm M2 : 5237.114 MHz : 1.413 dBm Delta1 : 44.088 MHz : 1.186 dB T1 : 5211.864 MHz : -4.410 dBm T2 : 5247.936 MHz : -3.598 dBm OBW : 36.273 MHz	Measured 26 dB Bandwidth: 44.088 MHz Measured 99% Bandwidth: 36.273 MHz

Back to the Matrix

26 dB 99%

Variant: 802.11n HT-40, Channel: 5230.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V



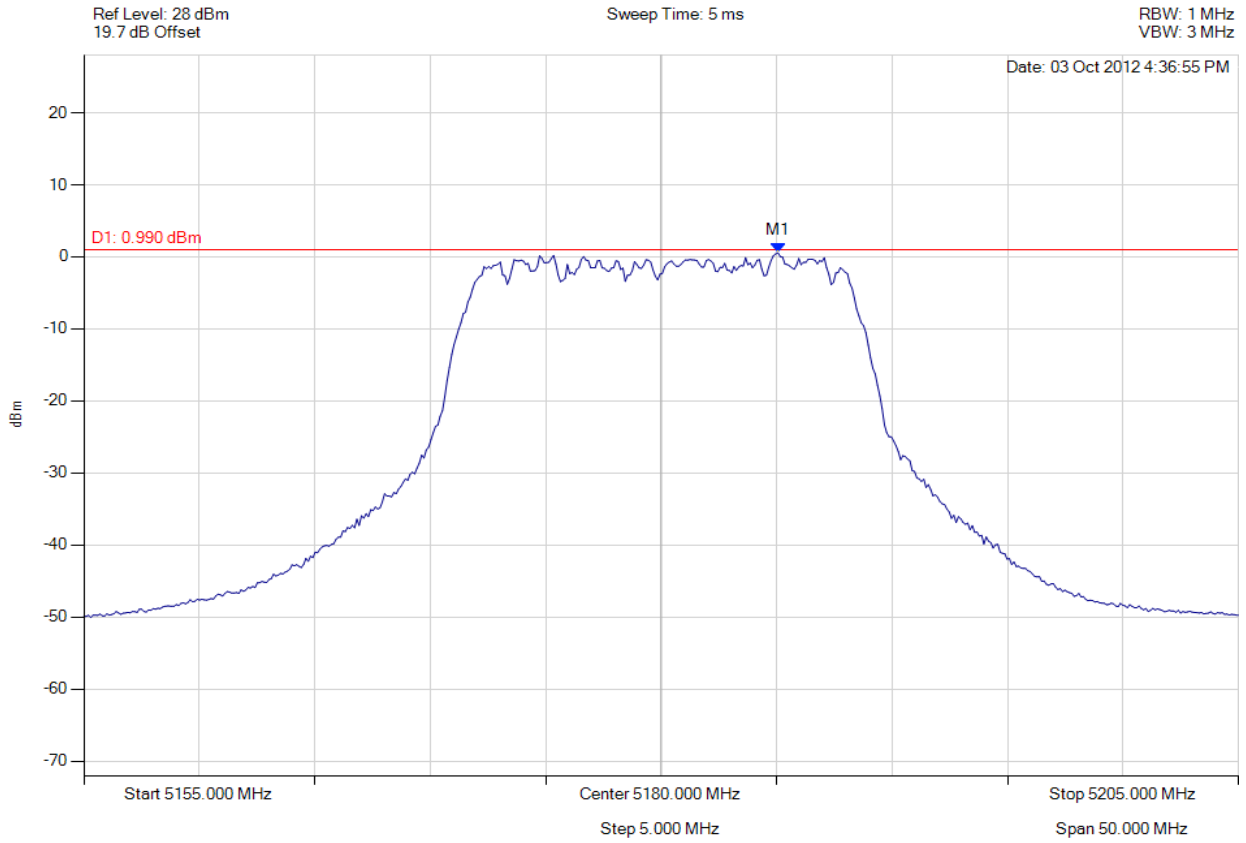
Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5208.257 MHz : -27.450 dBm M2 : 5232.104 MHz : -1.064 dBm Delta1 : 43.487 MHz : 0.675 dB T1 : 5211.864 MHz : -5.720 dBm T2 : 5247.936 MHz : -5.421 dBm OBW : 36.273 MHz	Measured 26 dB Bandwidth: 43.487 MHz Measured 99% Bandwidth: 36.273 MHz

Back to the Matrix

A.1.2. Peak Power Spectral Density

power density

Variant: 802.11a, Channel: 5180.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

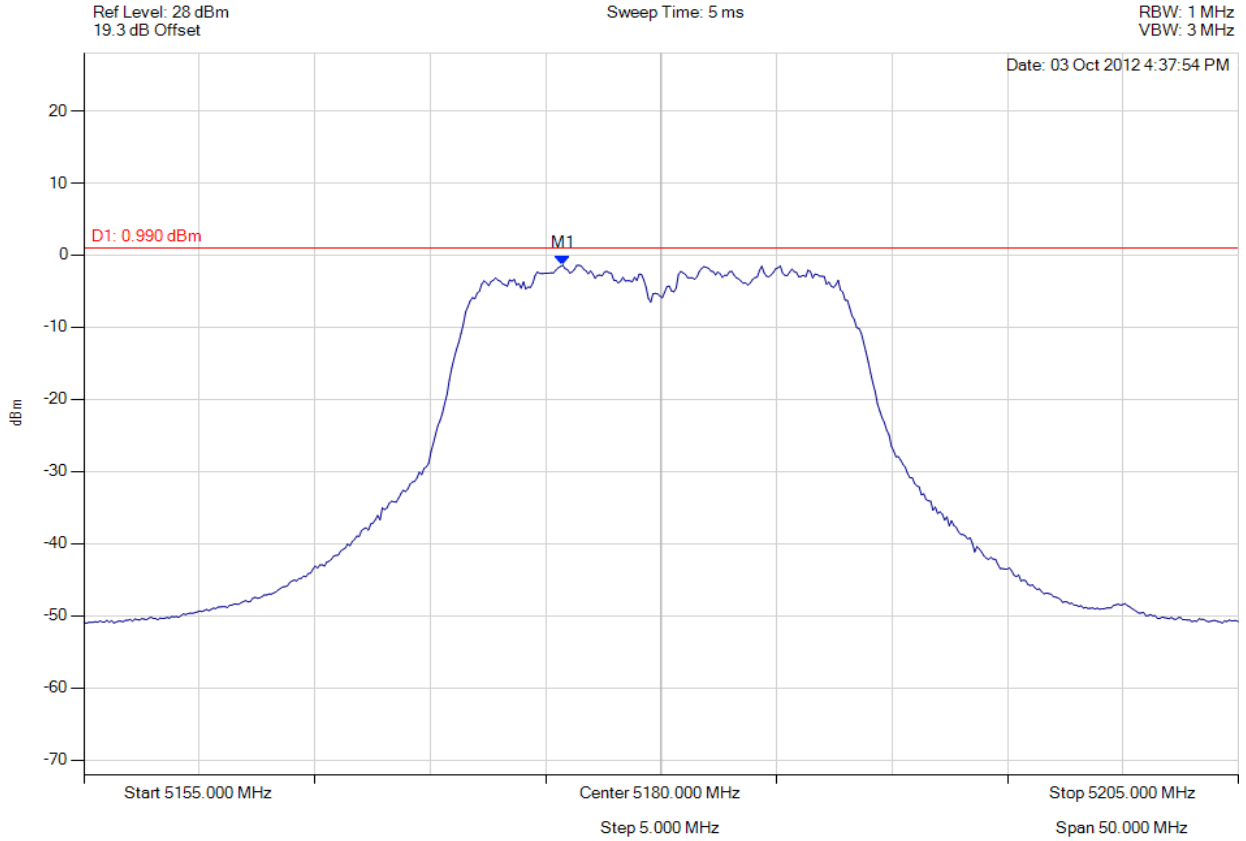


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5185.060 MHz : 0.560 dBm	Limit: 4.990 dBm Margin: -4.43 dB

Back to the Matrix

power density

Variant: 802.11a, Channel: 5180.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

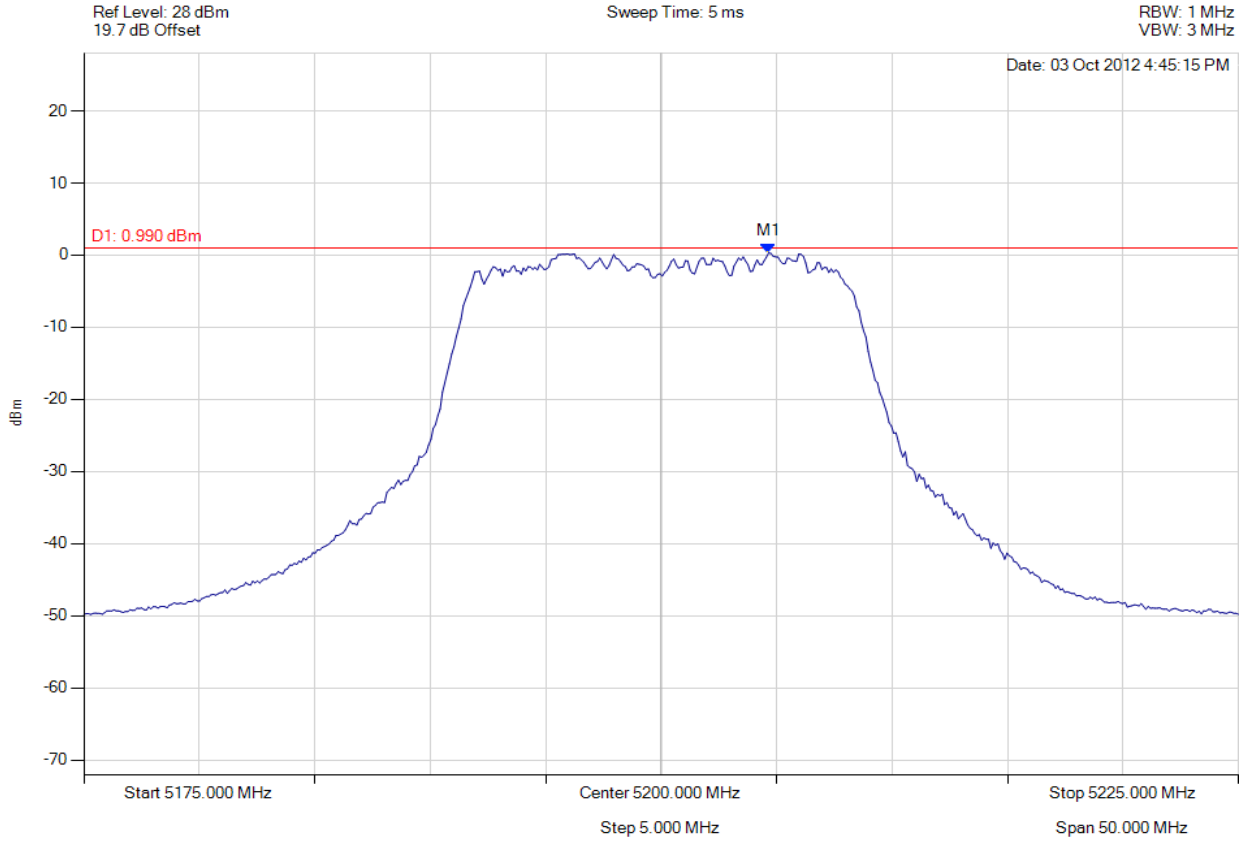


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5175.741 MHz : -1.395 dBm	Limit: 4.990 dBm Margin: -6.38 dB

Back to the Matrix

power density

Variant: 802.11a, Channel: 5200.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

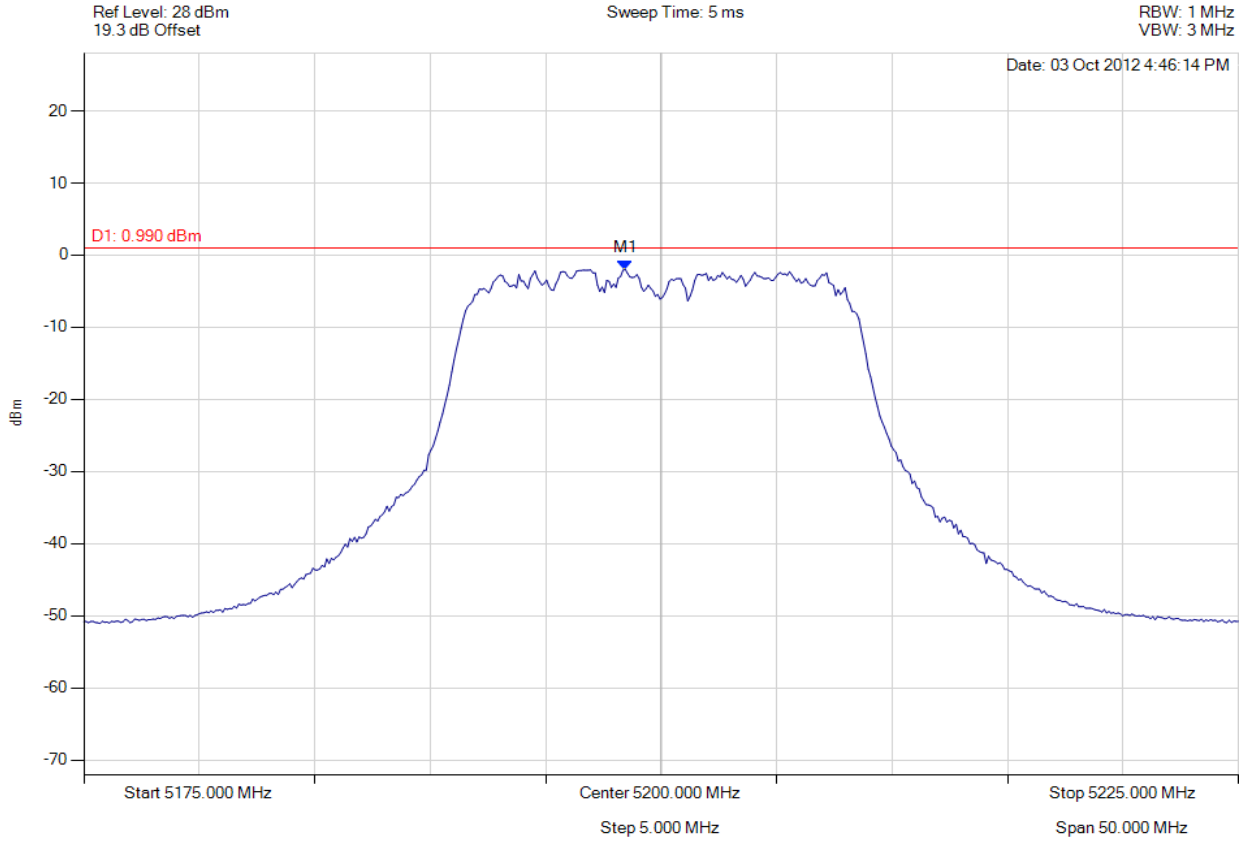


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5204.659 MHz : 0.316 dBm	Limit: 4.990 dBm Margin: -4.67 dB

Back to the Matrix

power density

Variant: 802.11a, Channel: 5200.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

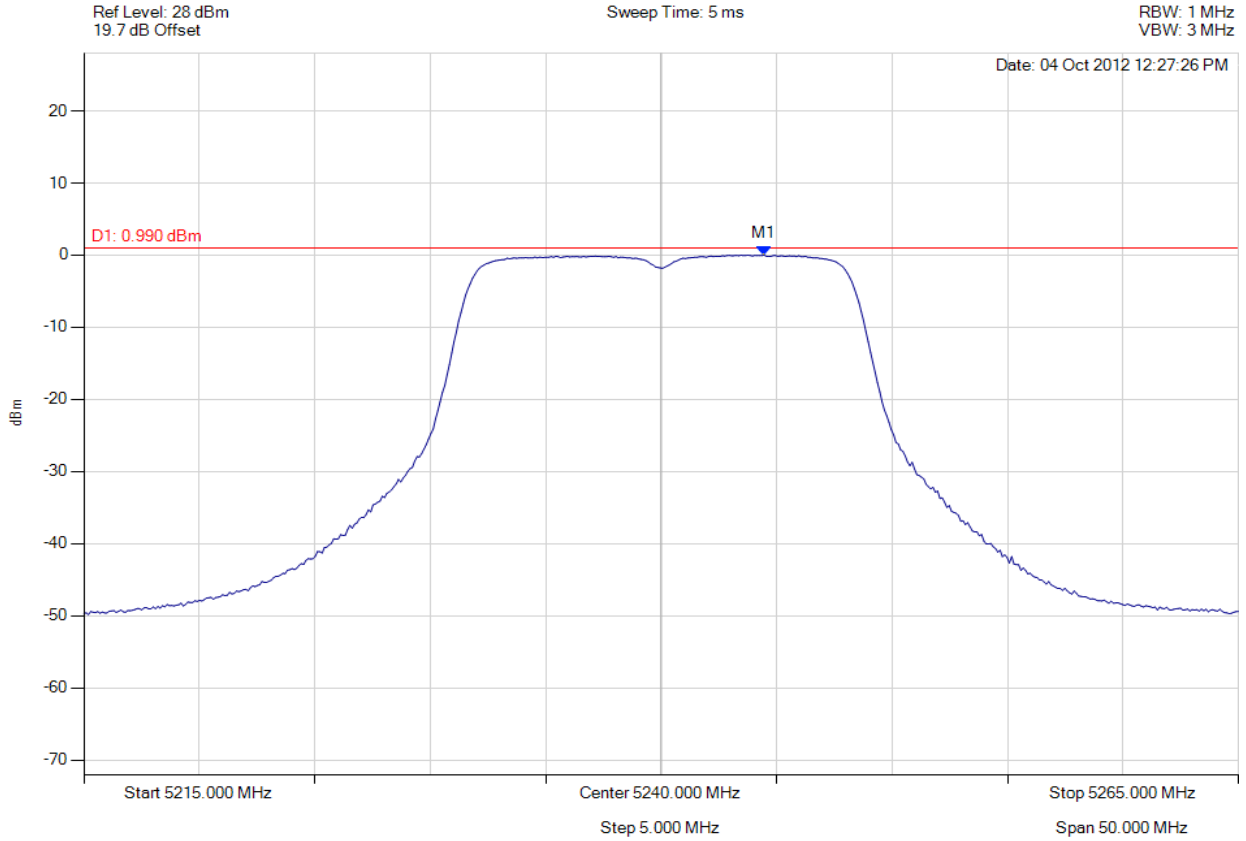


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5198.447 MHz : -1.986 dBm	Limit: 4.990 dBm Margin: -6.98 dB

Back to the Matrix

power density

Variant: 802.11a, Channel: 5240.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

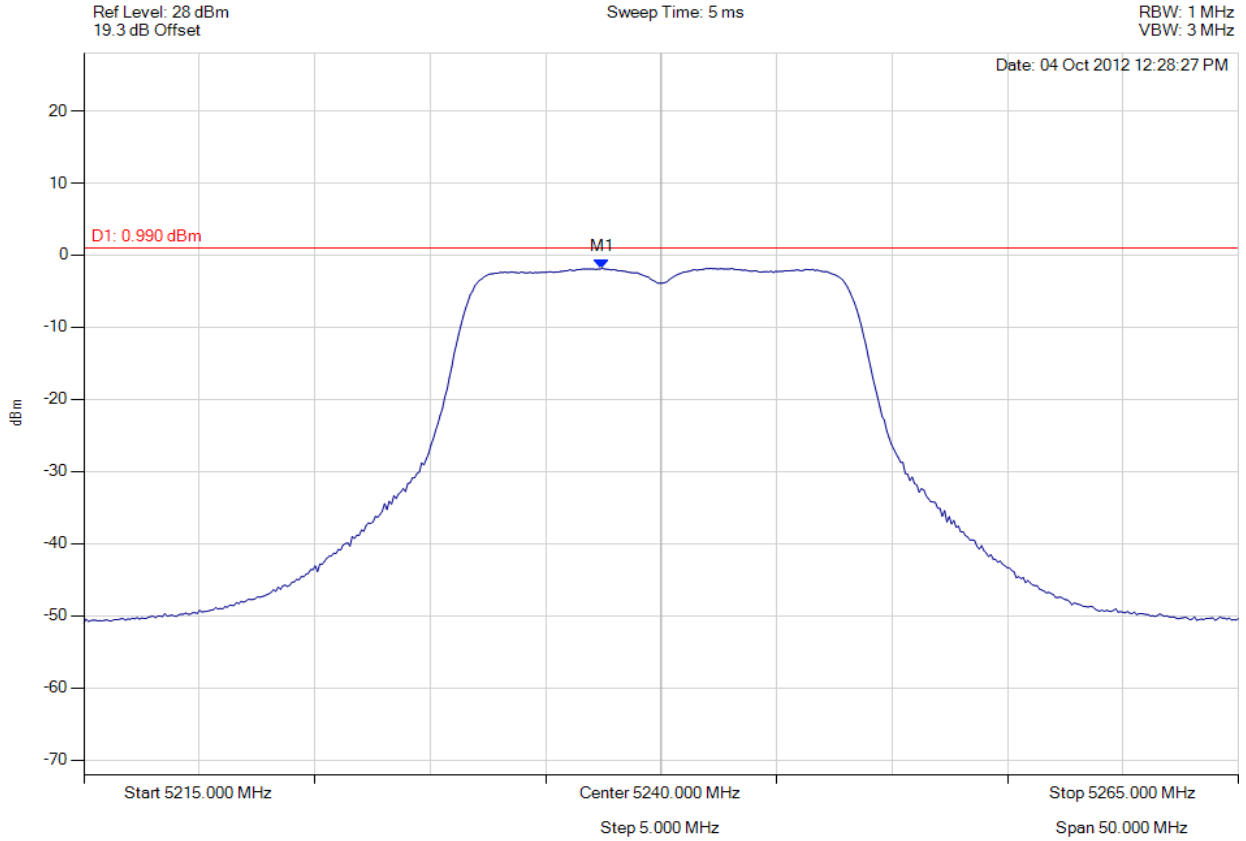


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5244.459 MHz : 0.002 dBm	Limit: 4.990 dBm Margin: -4.99 dB

Back to the Matrix

power density

Variant: 802.11a, Channel: 5240.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

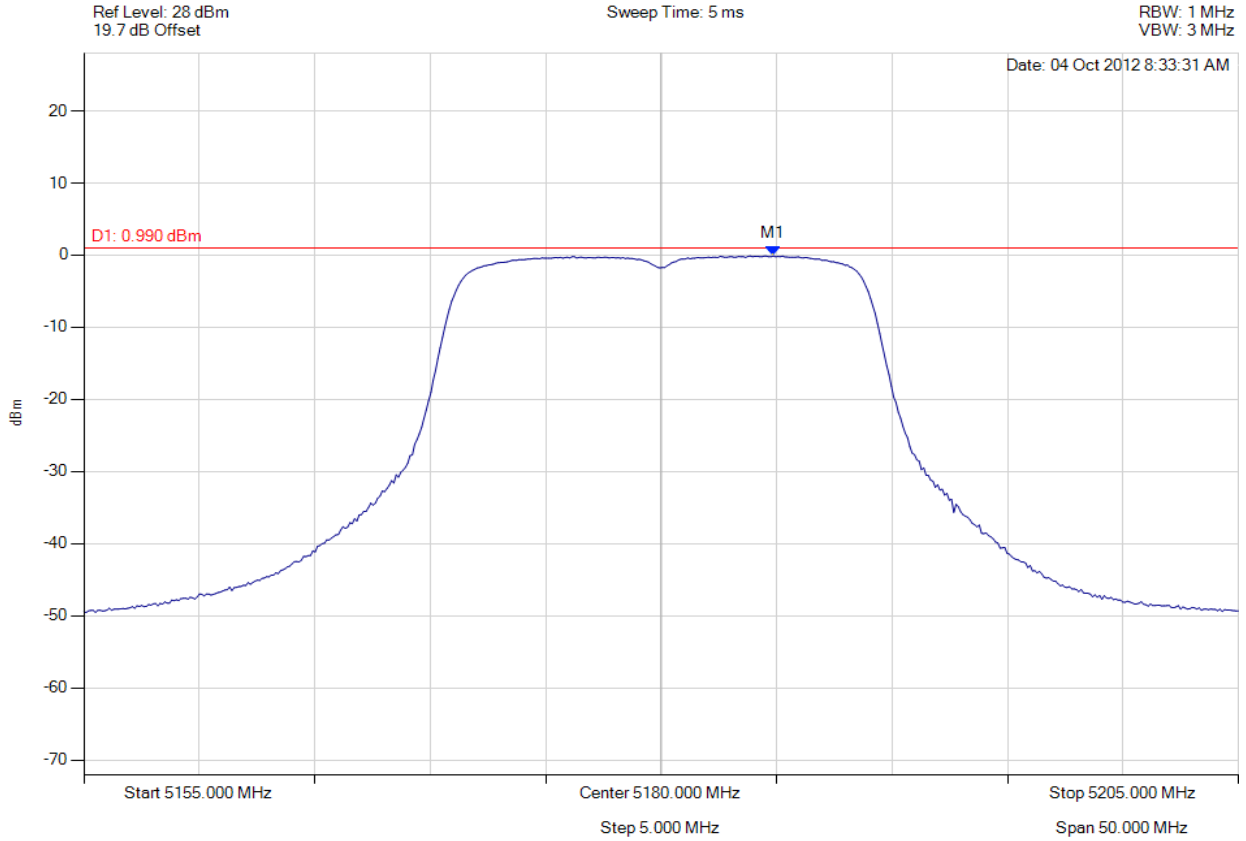


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5237.445 MHz : -1.832 dBm	Limit: 4.990 dBm Margin: -6.82 dB

Back to the Matrix

power density

Variant: 802.11n HT-20, Channel: 5180.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

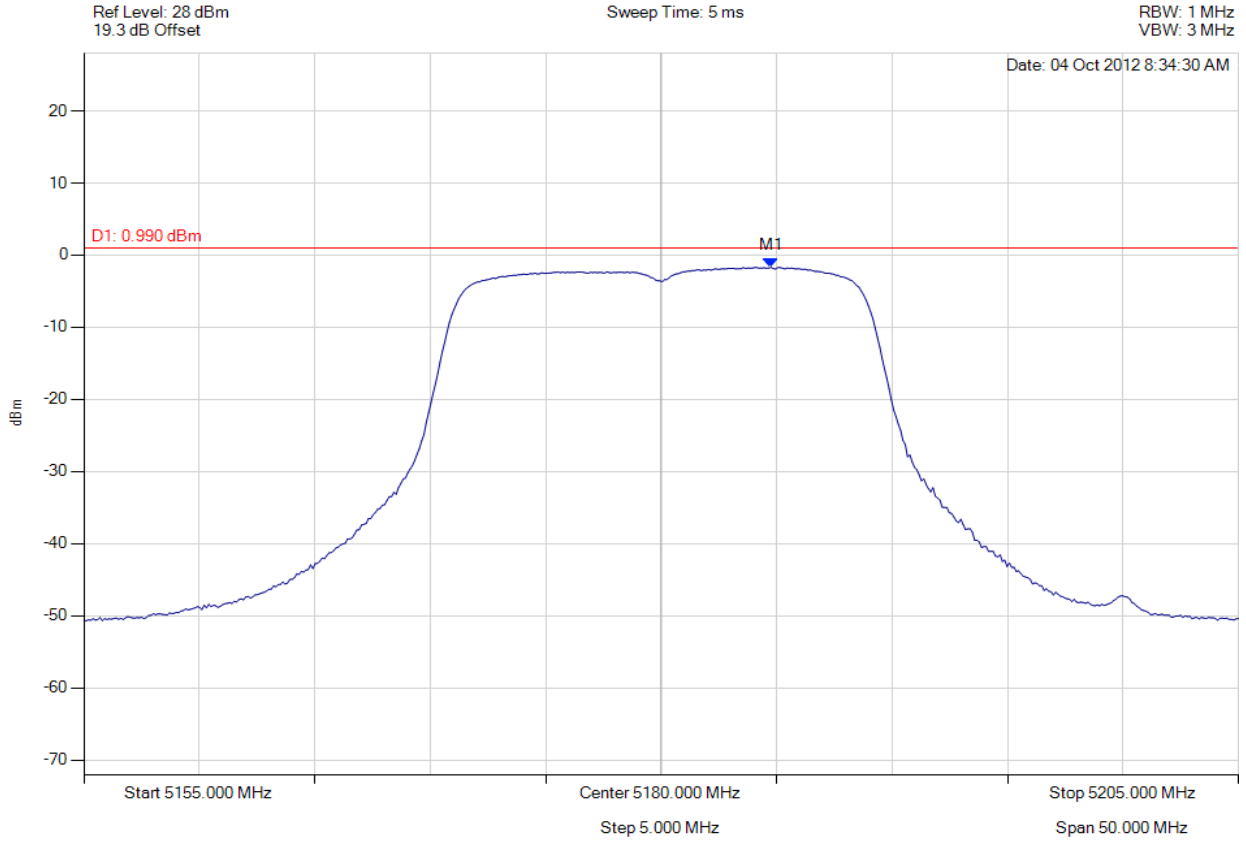


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5184.860 MHz : -0.109 dBm	Limit: 4.990 dBm Margin: -5.10 dB

Back to the Matrix

power density

Variant: 802.11n HT-20, Channel: 5180.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

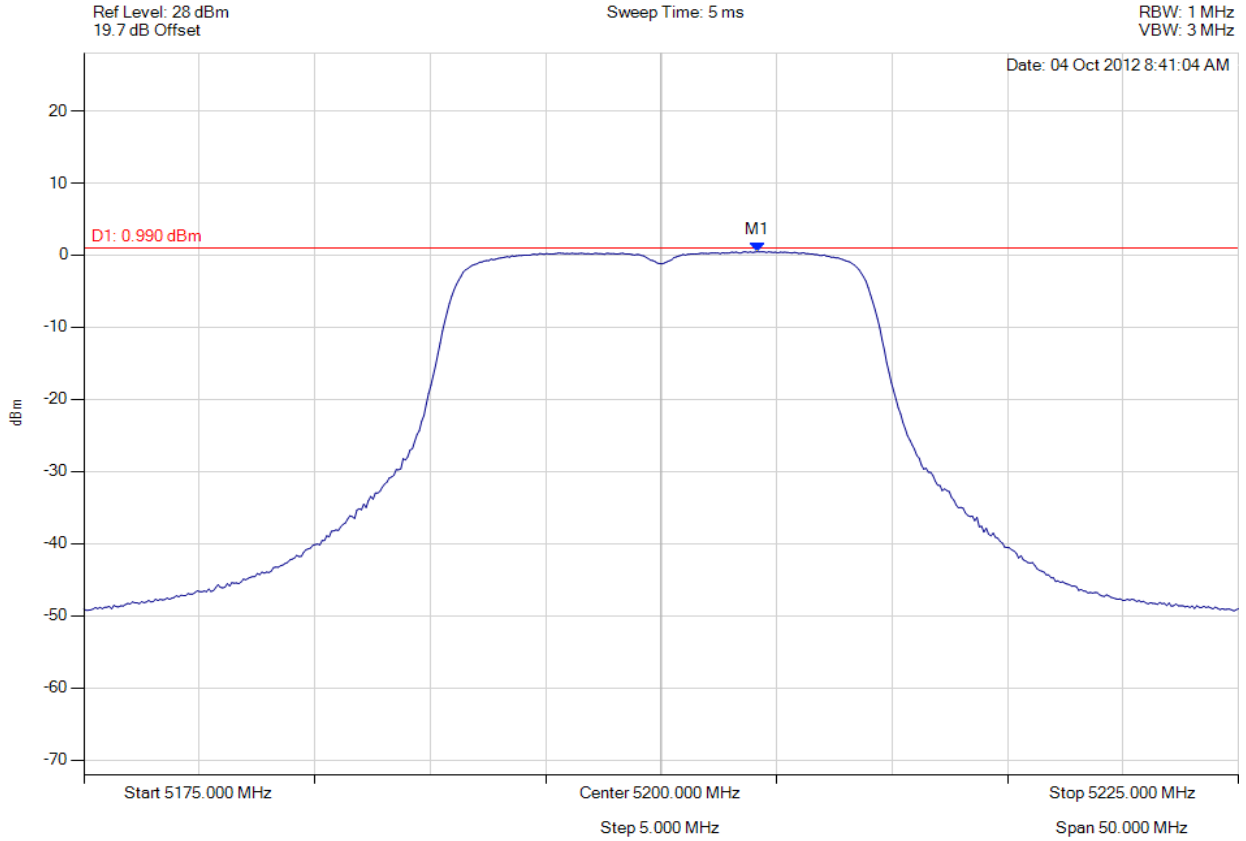


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5184.760 MHz : -1.699 dBm	Limit: 4.990 dBm Margin: -6.69 dB

Back to the Matrix

power density

Variant: 802.11n HT-20, Channel: 5200.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

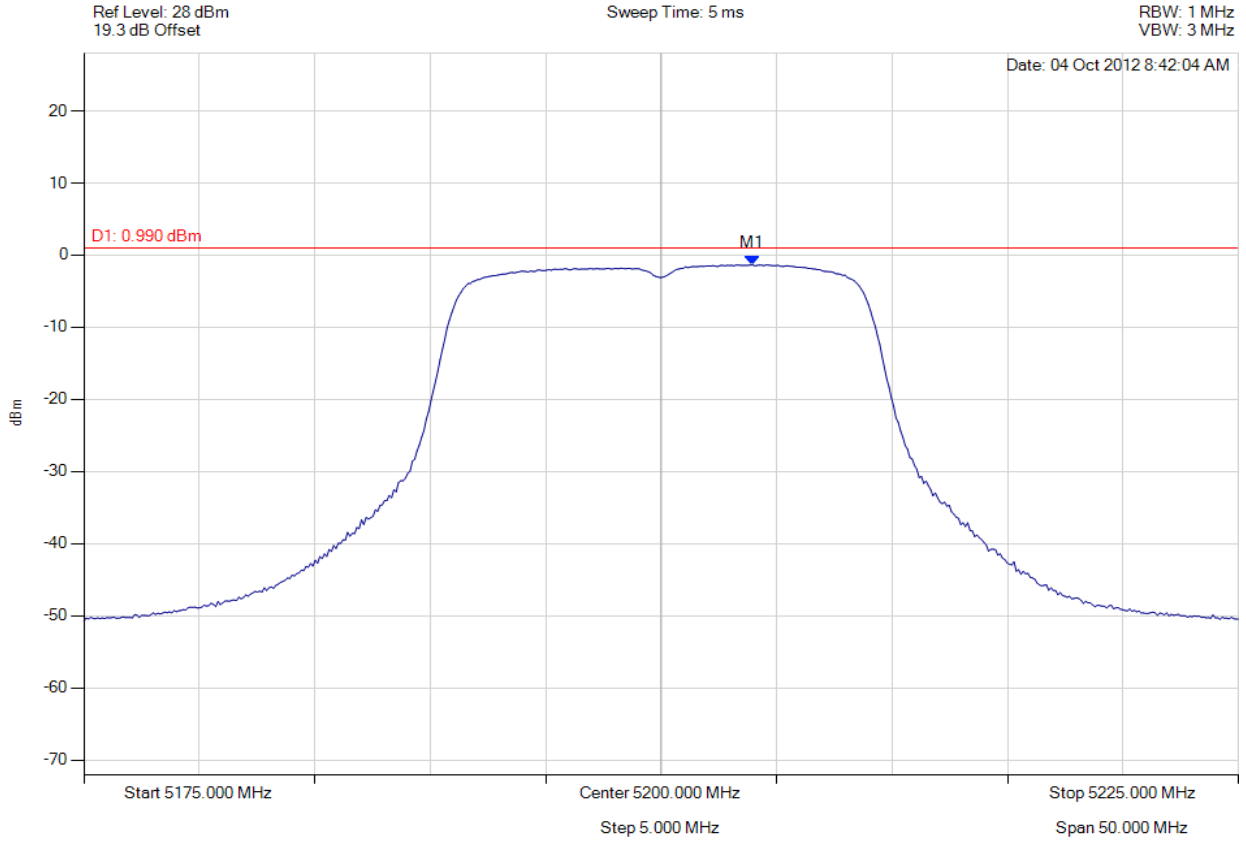


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5204.158 MHz : 0.479 dBm	Limit: 4.990 dBm Margin: -4.51 dB

Back to the Matrix

power density

Variant: 802.11n HT-20, Channel: 5200.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

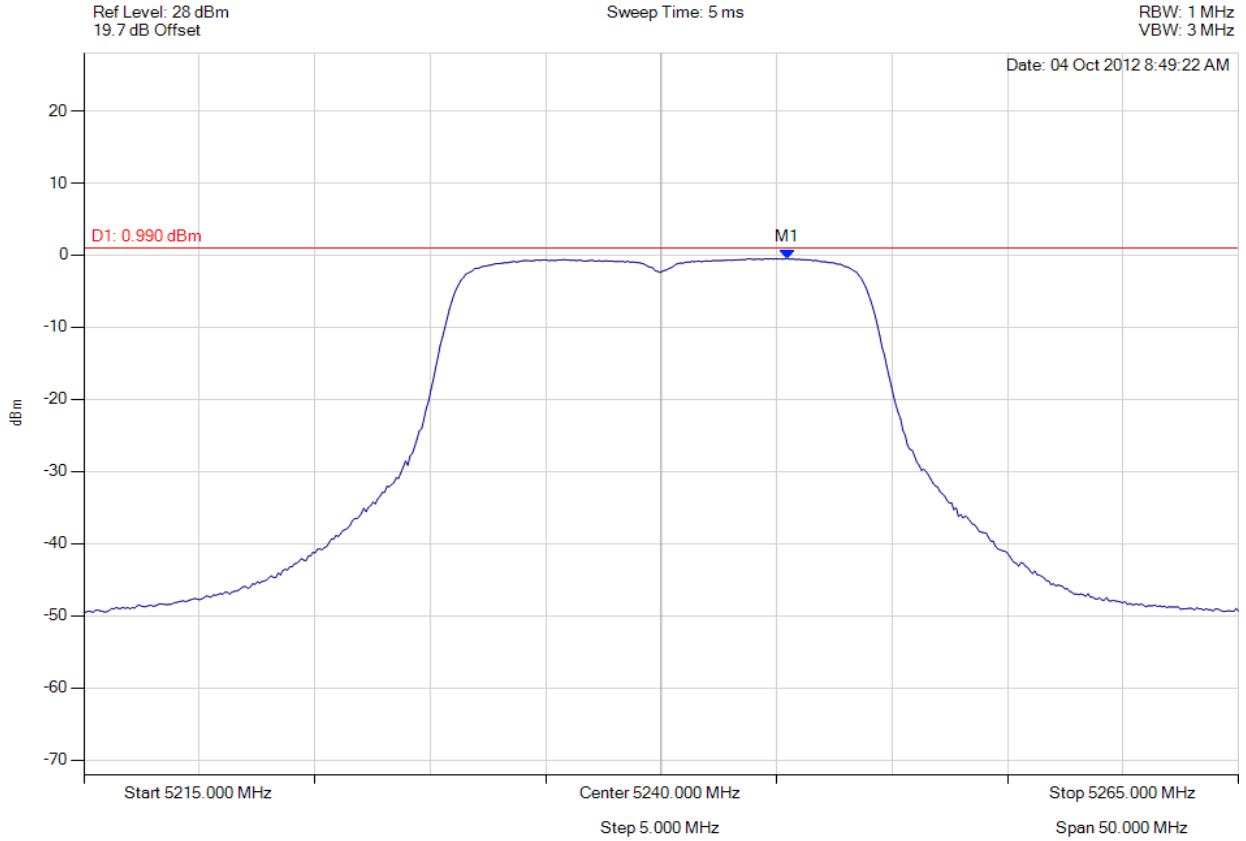


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5203.958 MHz : -1.347 dBm	Limit: 4.990 dBm Margin: -6.34 dB

Back to the Matrix

power density

Variant: 802.11n HT-20, Channel: 5240.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

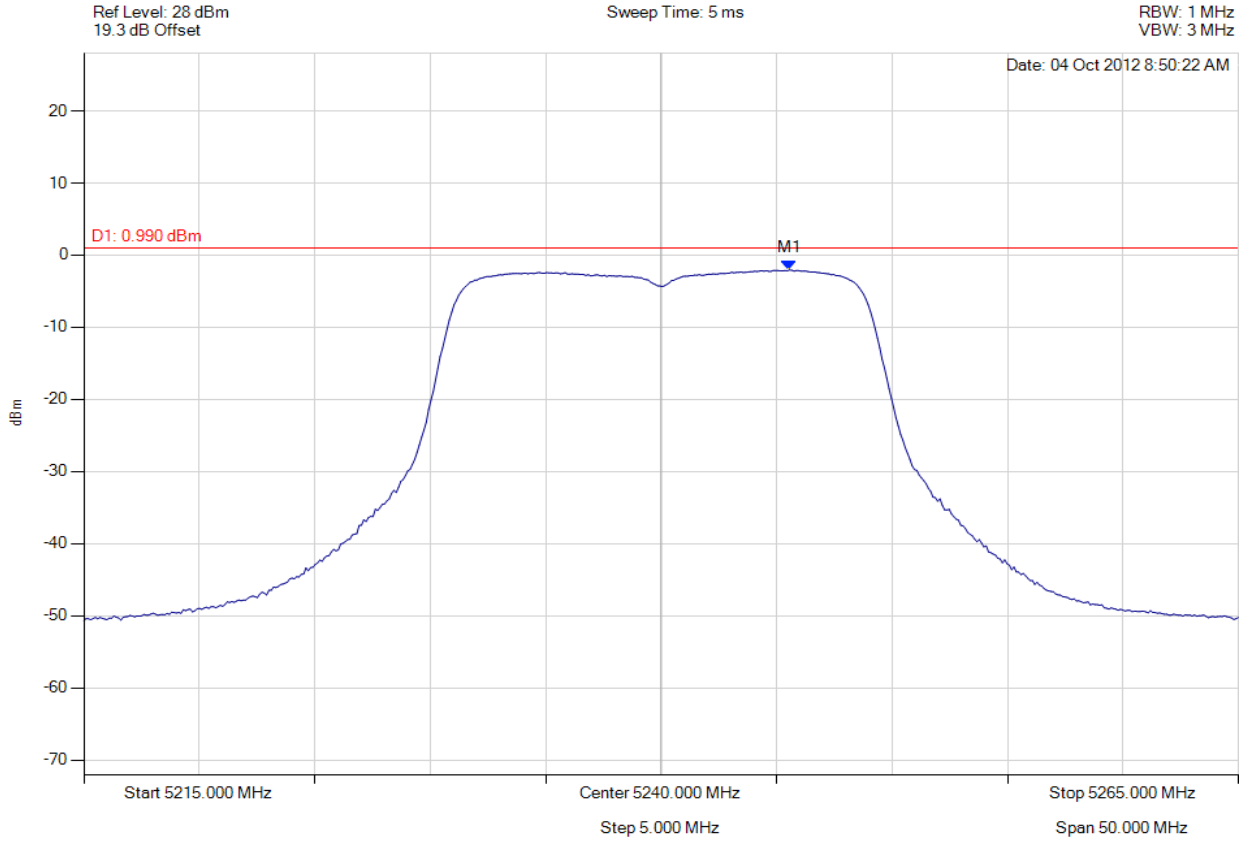


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5245.461 MHz : -0.463 dBm	Limit: 4.990 dBm Margin: -5.45 dB

Back to the Matrix

power density

Variant: 802.11n HT-20, Channel: 5240.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

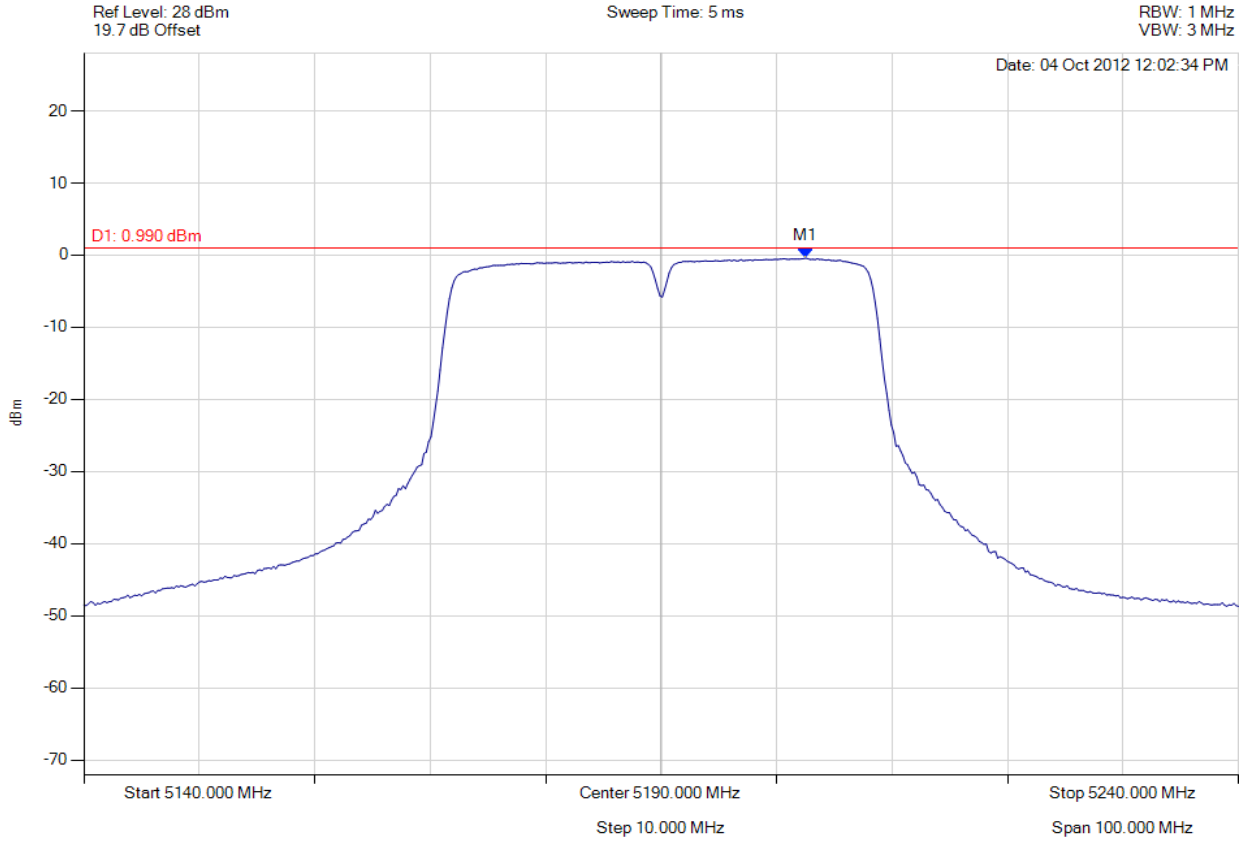


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5245.561 MHz : -2.057 dBm	Limit: 4.990 dBm Margin: -7.05 dB

Back to the Matrix

power density

Variant: 802.11n HT-40, Channel: 5190.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

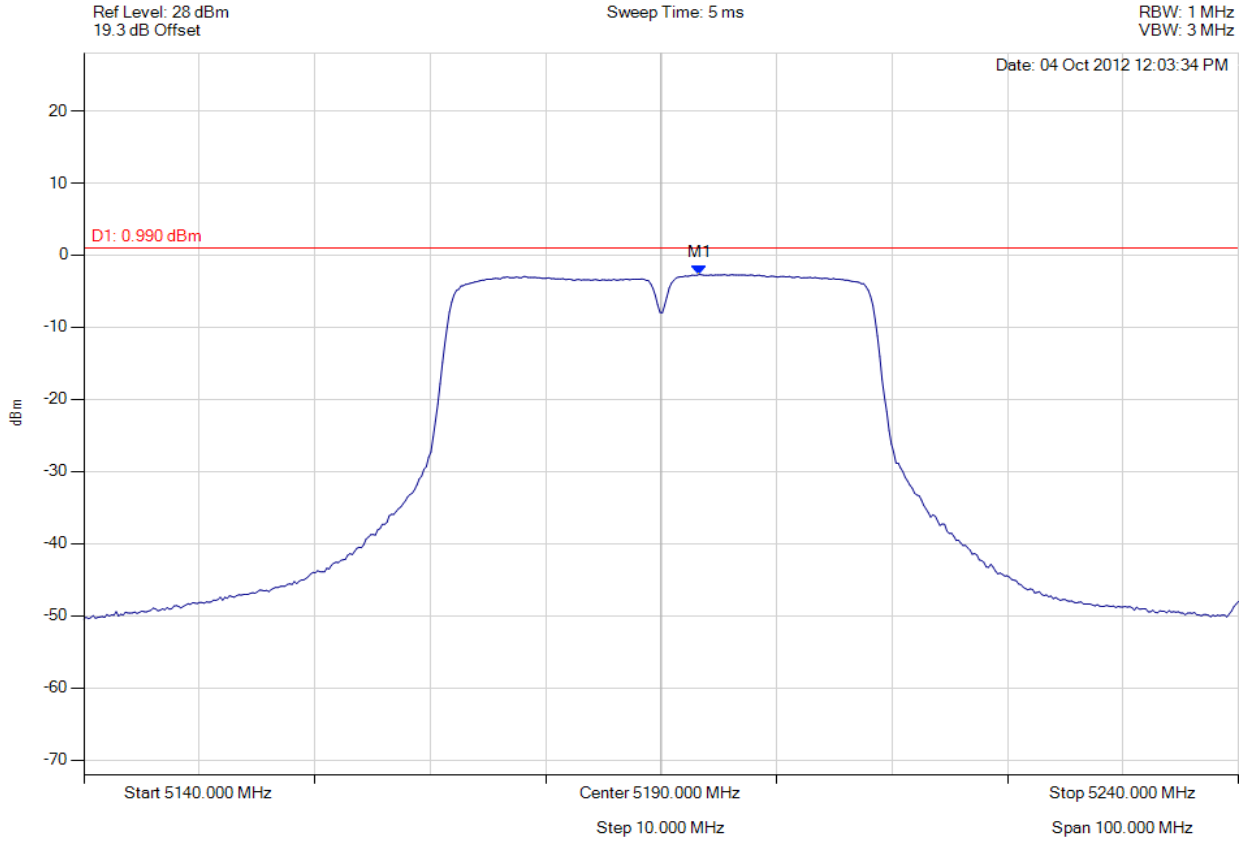


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5202.525 MHz : -0.425 dBm	Limit: 4.990 dBm Margin: -5.41 dB

Back to the Matrix

power density

Variant: 802.11n HT-40, Channel: 5190.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

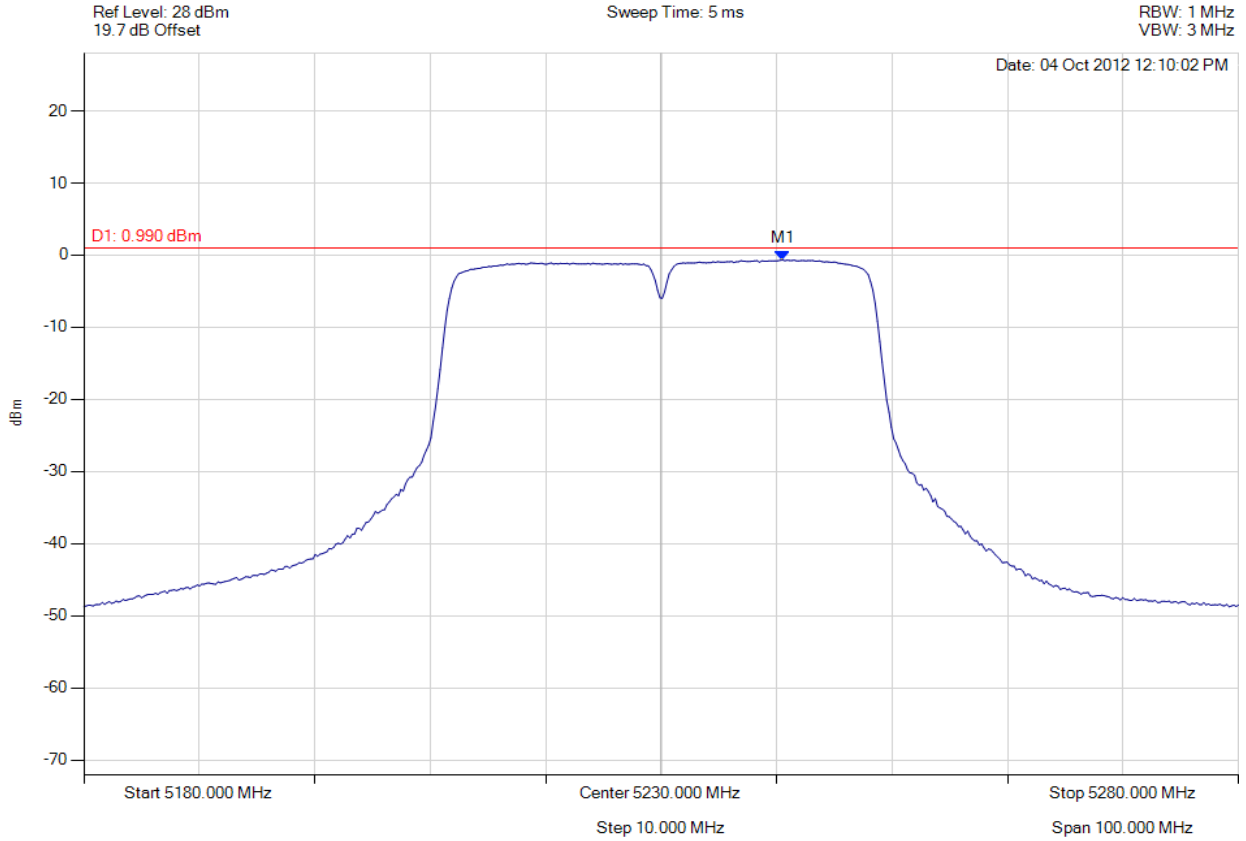


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5193.307 MHz : -2.682 dBm	Limit: 4.990 dBm Margin: -7.67 dB

Back to the Matrix

power density

Variant: 802.11n HT-40, Channel: 5230.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

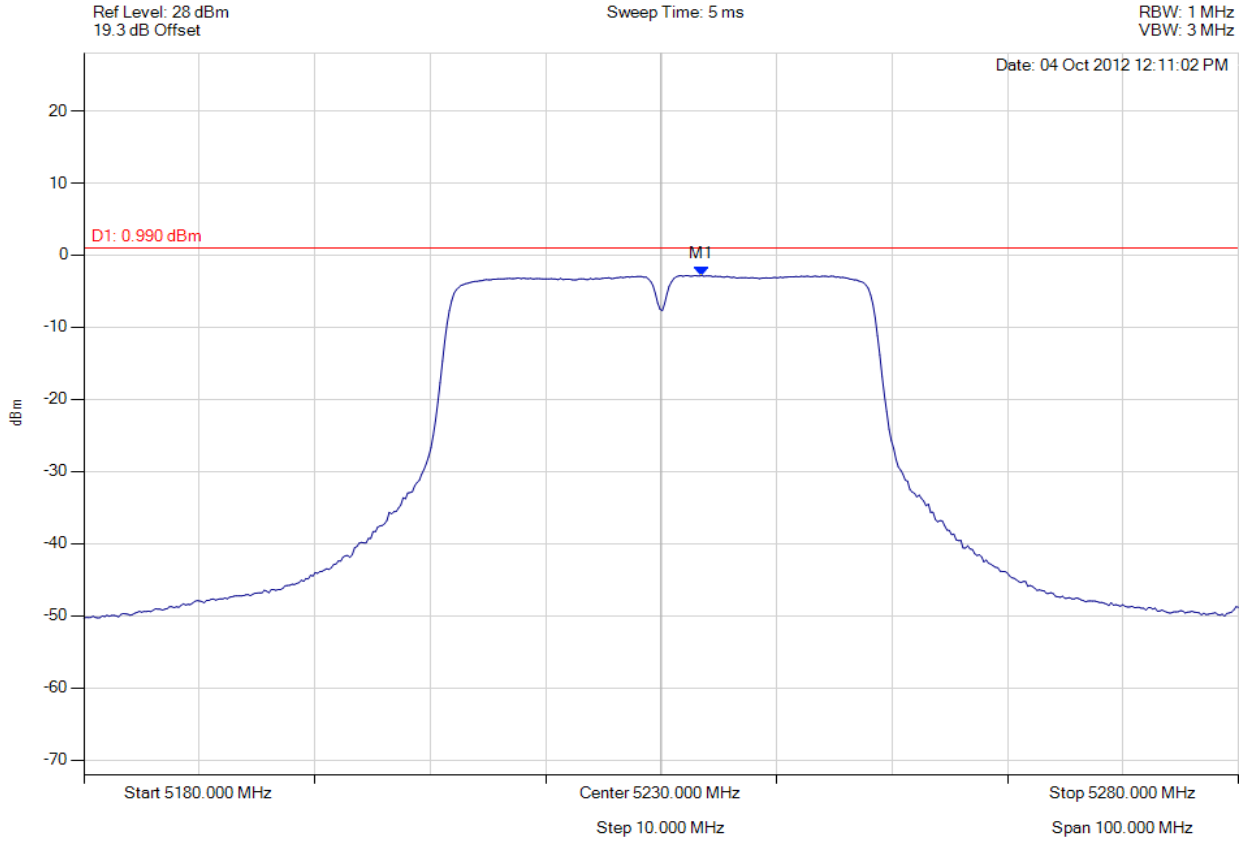


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5240.521 MHz : -0.667 dBm	Limit: 4.990 dBm Margin: -5.66 dB

Back to the Matrix

power density

Variant: 802.11n HT-40, Channel: 5230.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V



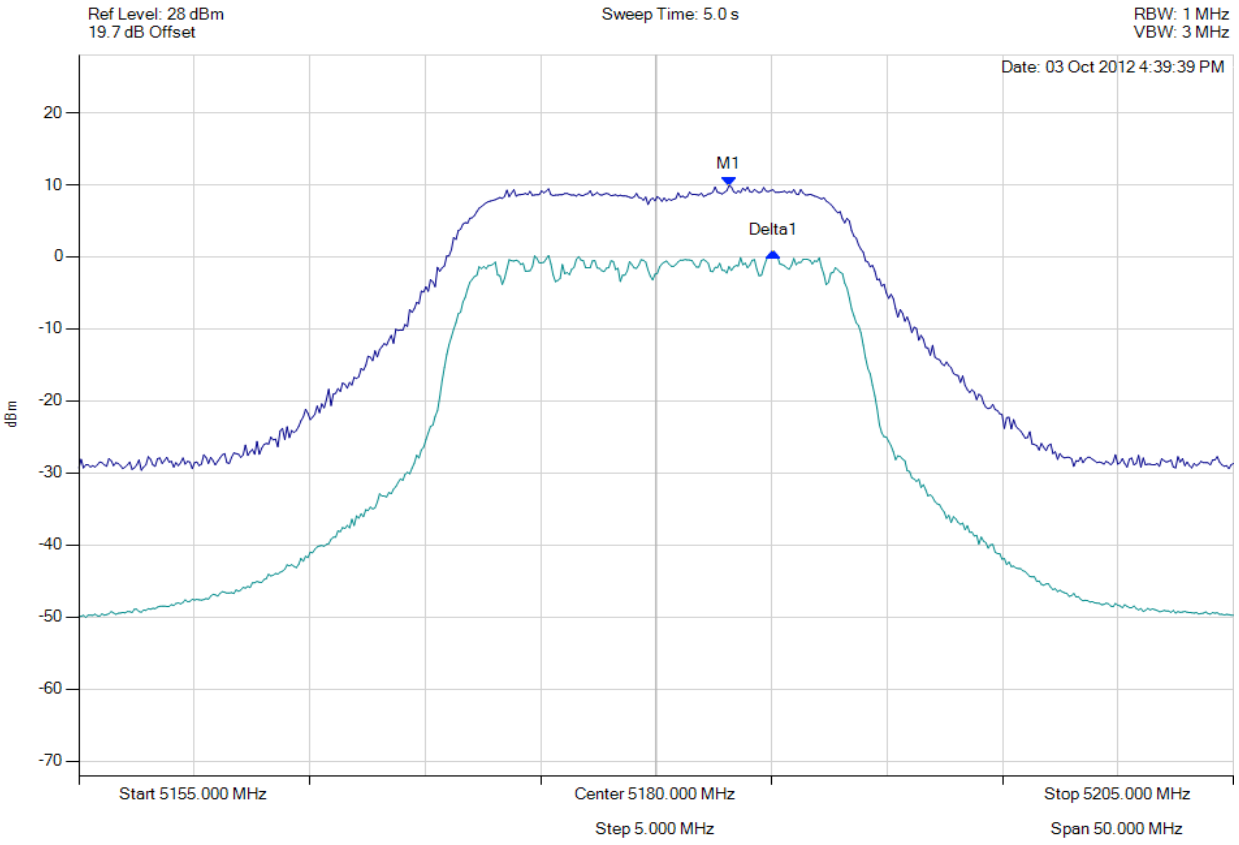
Analyser Setup	Marker : Frequency : Amplitude	Test Results
Detector = RMS Sweep Count = 100 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 5233.507 MHz : -2.832 dBm	Limit: 4.990 dBm Margin: -7.82 dB

Back to the Matrix

A.1.3. Peak Excursion Ratio

peak excursion

Variant: 802.11a, Channel: 5180.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

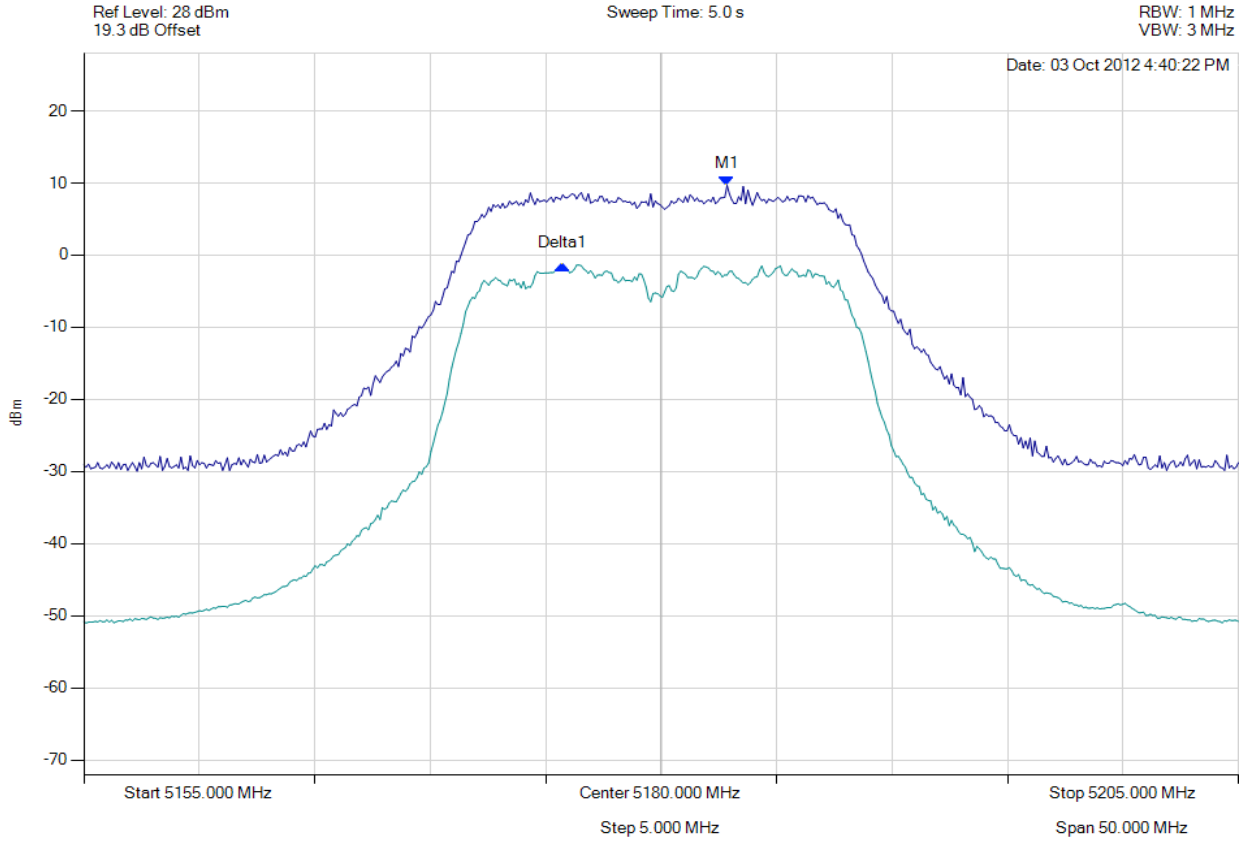


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5183.156 MHz : 9.868 dBm Delta1 : 1.904 MHz : -9.314 dB	Measured Excursion Ratio: 9.31 dB Limit: -13.0 dB Margin: -3.69 dB

Back to the Matrix

peak excursion

Variant: 802.11a, Channel: 5180.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

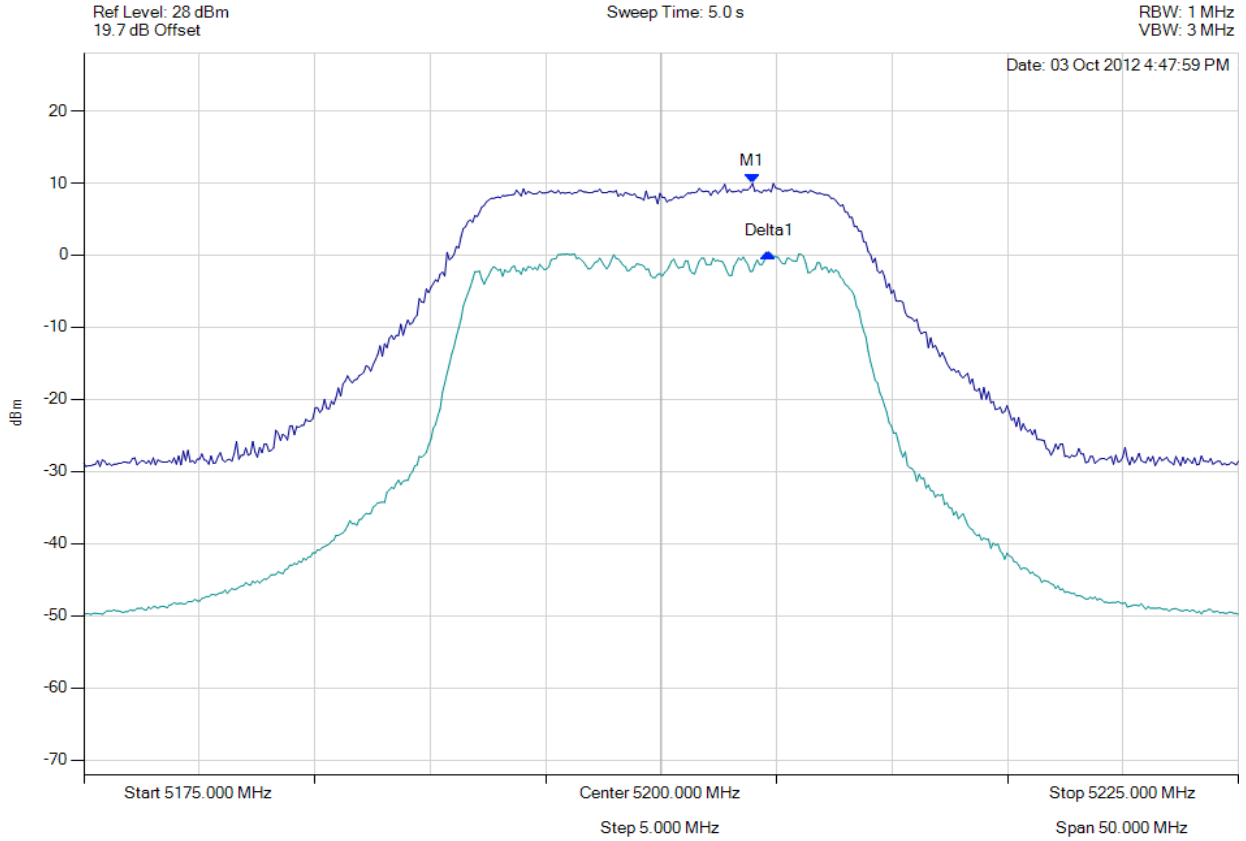


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5182.856 MHz : 9.662 dBm Delta1 : -7114228 Hz : -11.018 dB	Measured Excursion Ratio: 11.02 dB Limit: -13.0 dB Margin: -1.98 dB

Back to the Matrix

peak excursion

Variant: 802.11a, Channel: 5200.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

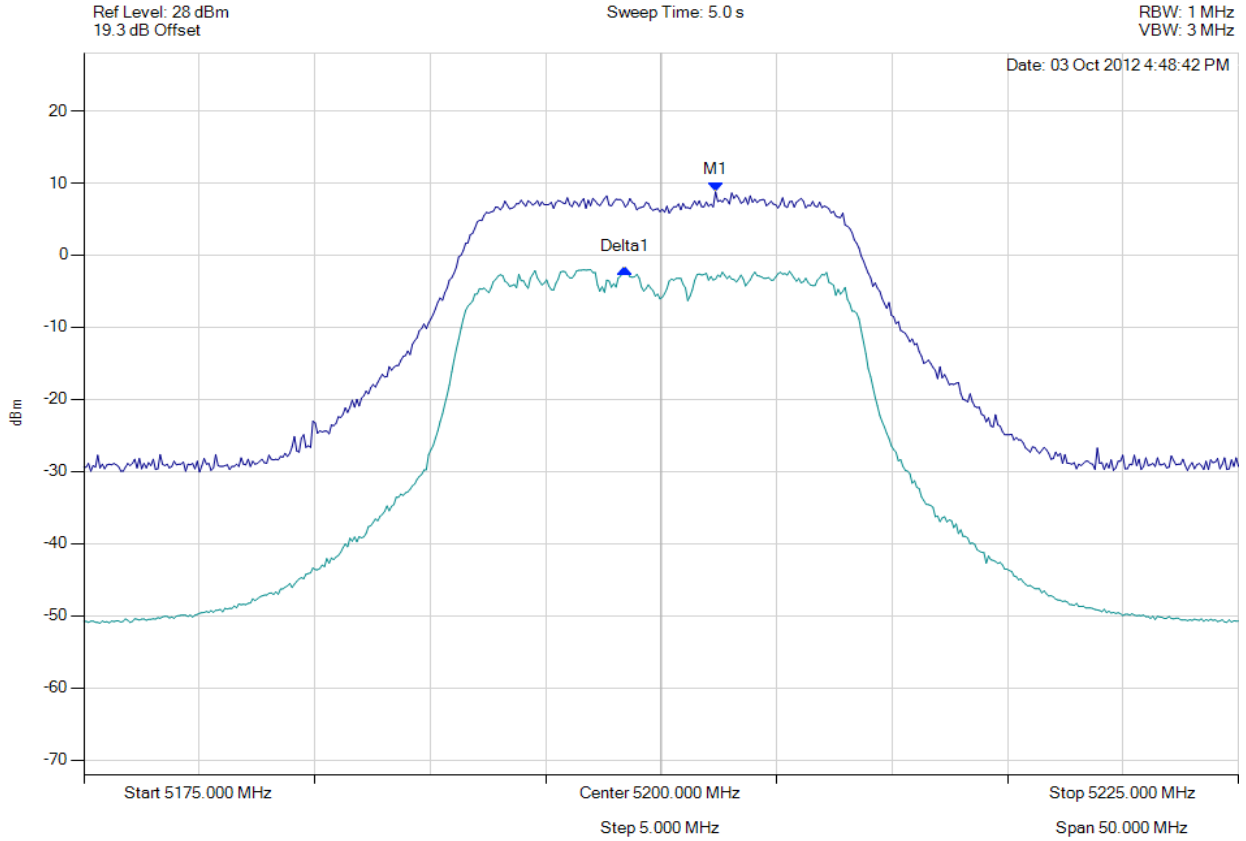


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5203.958 MHz : 9.946 dBm Delta1 : 701 KHz : -9.635 dB	Measured Excursion Ratio: 9.64 dB Limit: -13.0 dB Margin: -3.36 dB

Back to the Matrix

peak excursion

Variant: 802.11a, Channel: 5200.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

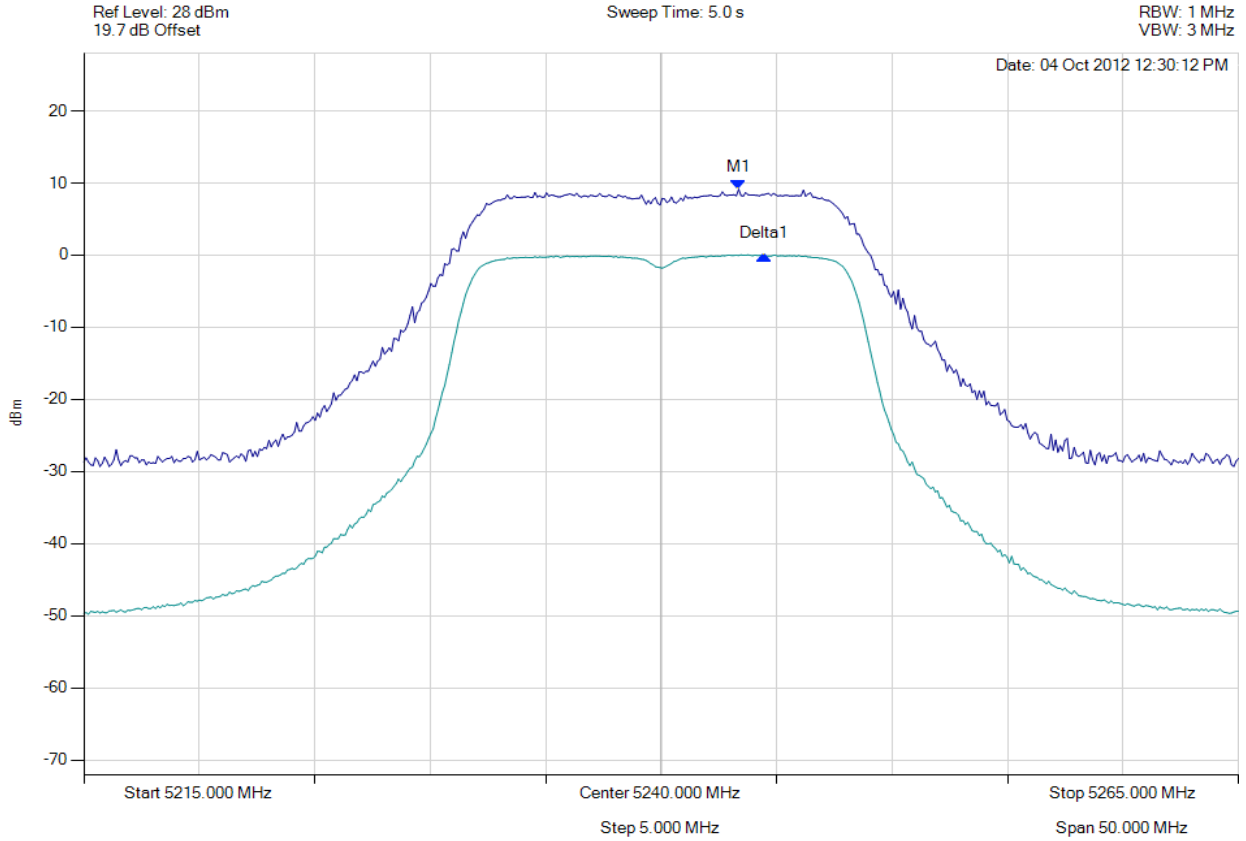


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5202.355 MHz : 8.785 dBm Delta1 : -3907816 Hz : -10.732 dB	Measured Excursion Ratio: 10.73 dB Limit: -13.0 dB Margin: -2.27 dB

Back to the Matrix

peak excursion

Variant: 802.11a, Channel: 5240.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

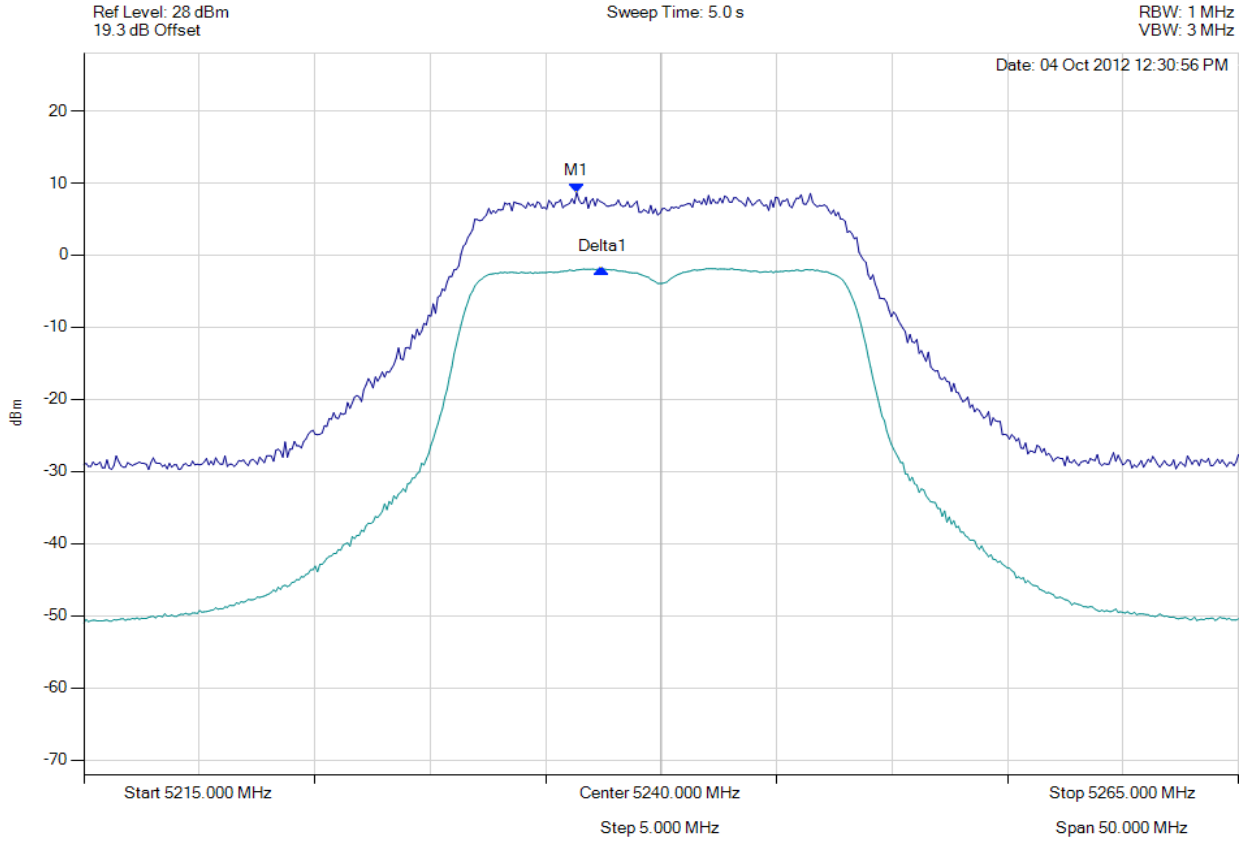


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5243.357 MHz : 9.126 dBm Delta1 : 1.102 MHz : -9.090 dB	Measured Excursion Ratio: 9.09 dB Limit: -13.0 dB Margin: -3.91 dB

Back to the Matrix

peak excursion

Variant: 802.11a, Channel: 5240.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

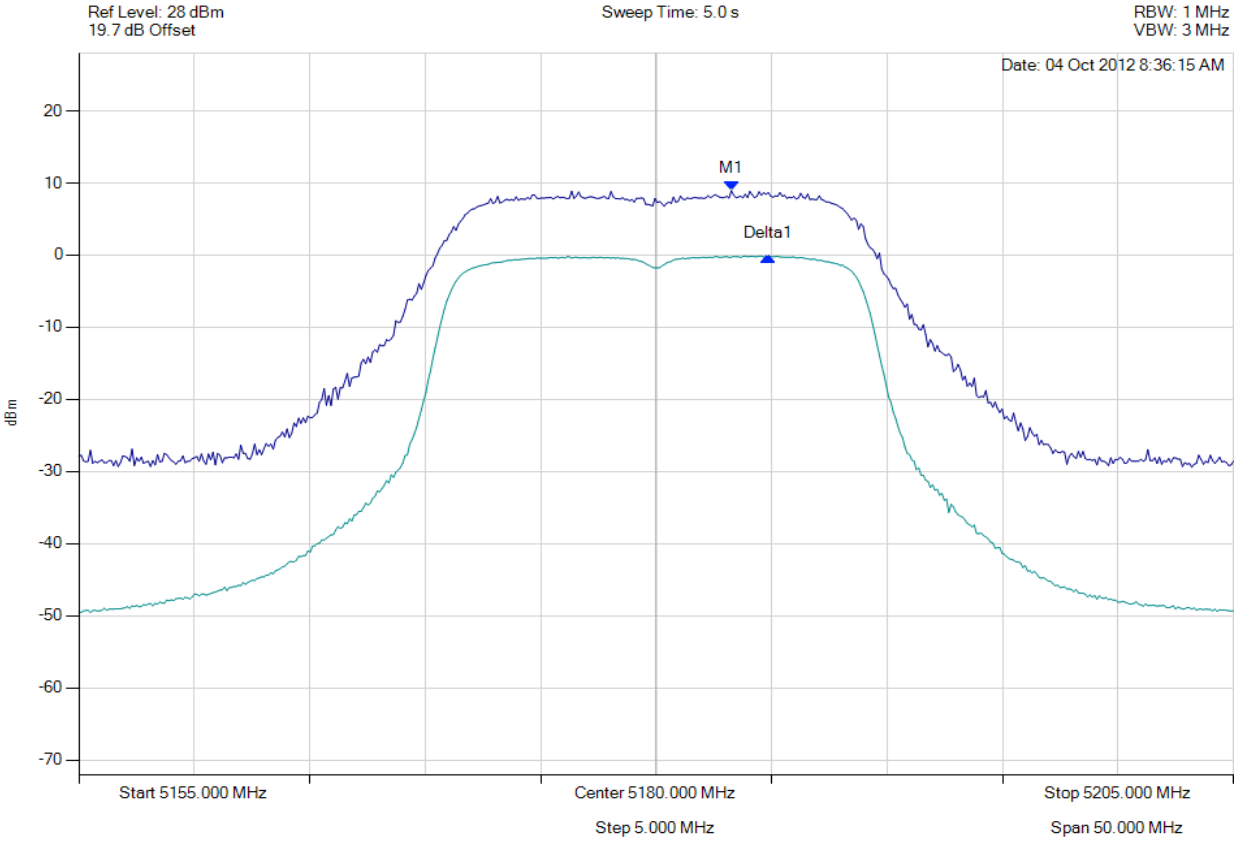


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5236.343 MHz : 8.665 dBm Delta1 : 1.102 MHz : -10.520 dB	Measured Excursion Ratio: 10.52 dB Limit: -13.0 dB Margin: -2.48 dB

Back to the Matrix

peak excursion

Variant: 802.11n HT-20, Channel: 5180.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

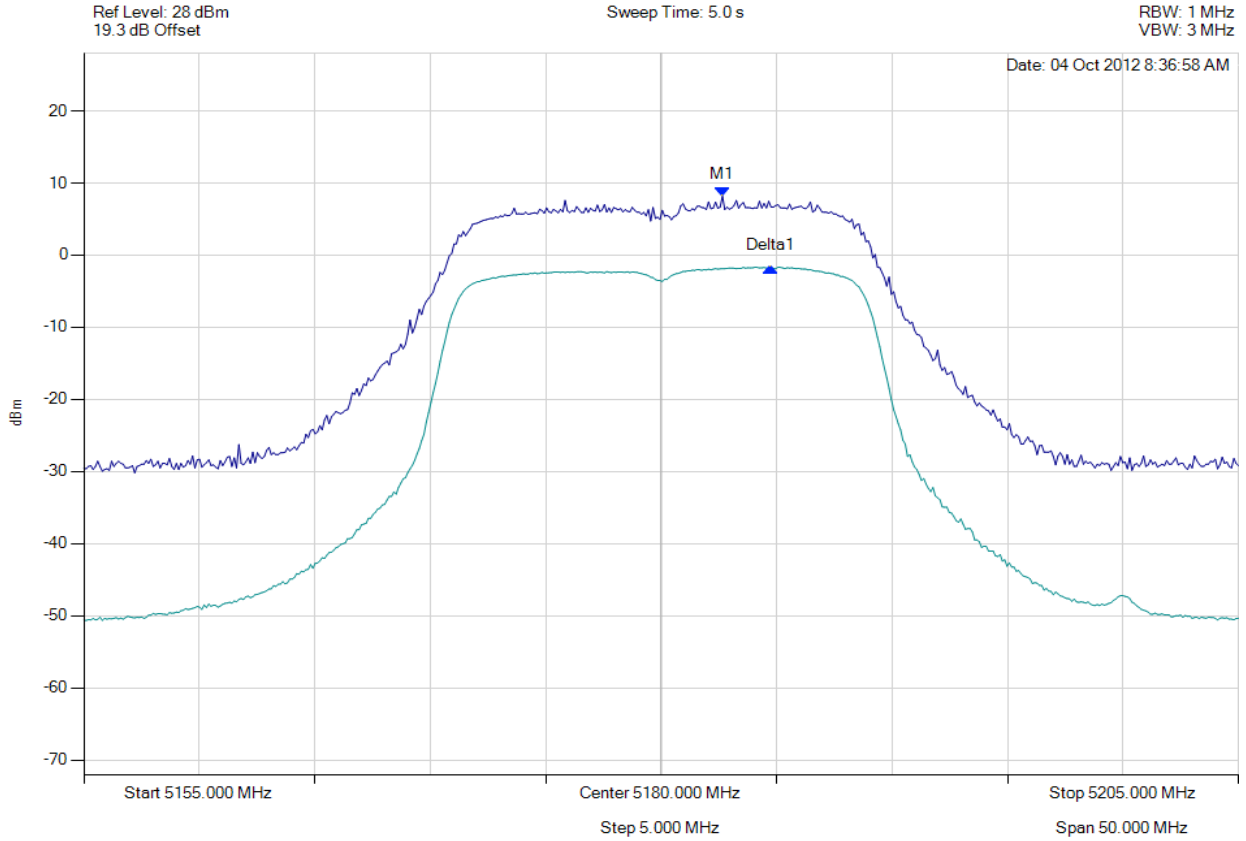


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5183.257 MHz : 8.951 dBm Delta1 : 1.603 MHz : -9.066 dB	Measured Excursion Ratio: 9.07 dB Limit: -13.0 dB Margin: -3.93 dB

Back to the Matrix

peak excursion

Variant: 802.11n HT-20, Channel: 5180.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

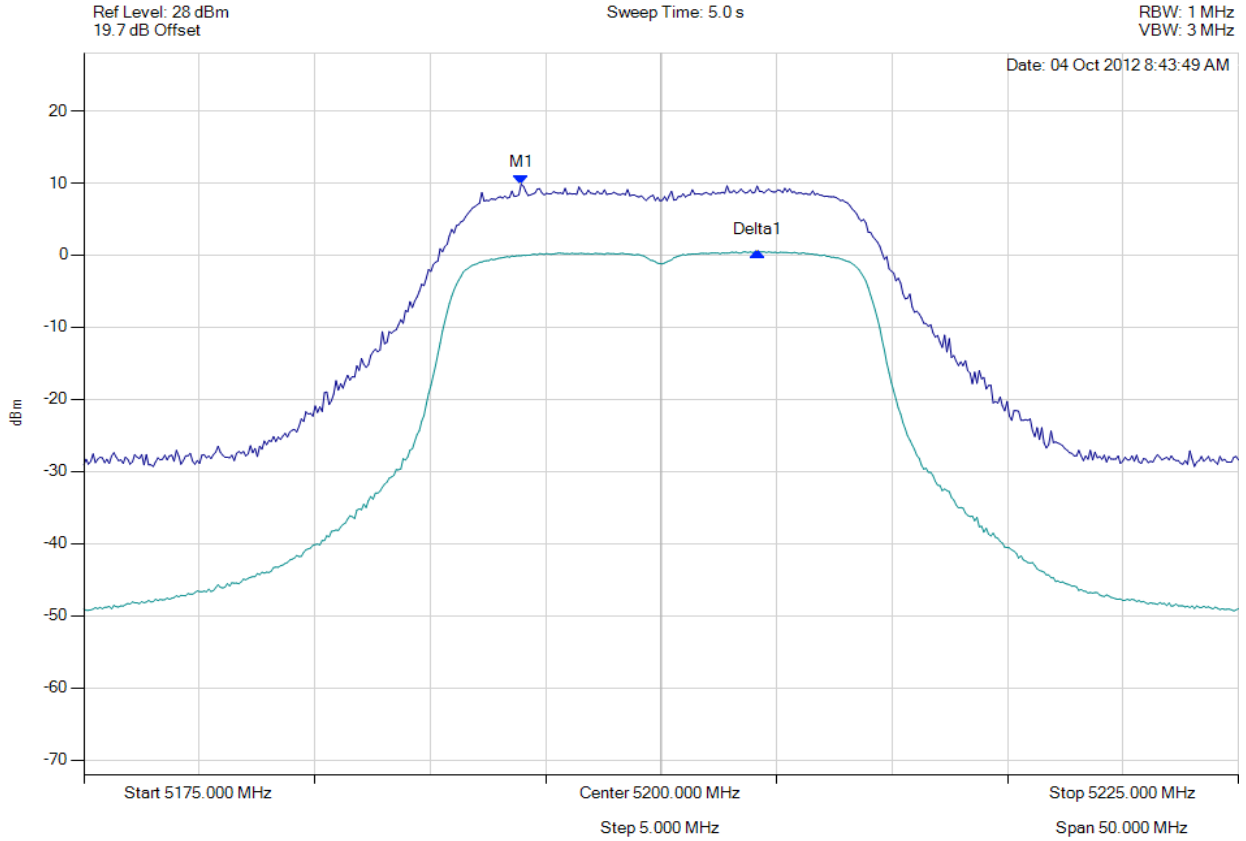


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5182.655 MHz : 8.164 dBm Delta1 : 2.104 MHz : -9.824 dB	Measured Excursion Ratio: 9.82 dB Limit: -13.0 dB Margin: -3.18 dB

Back to the Matrix

peak excursion

Variant: 802.11n HT-20, Channel: 5200.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

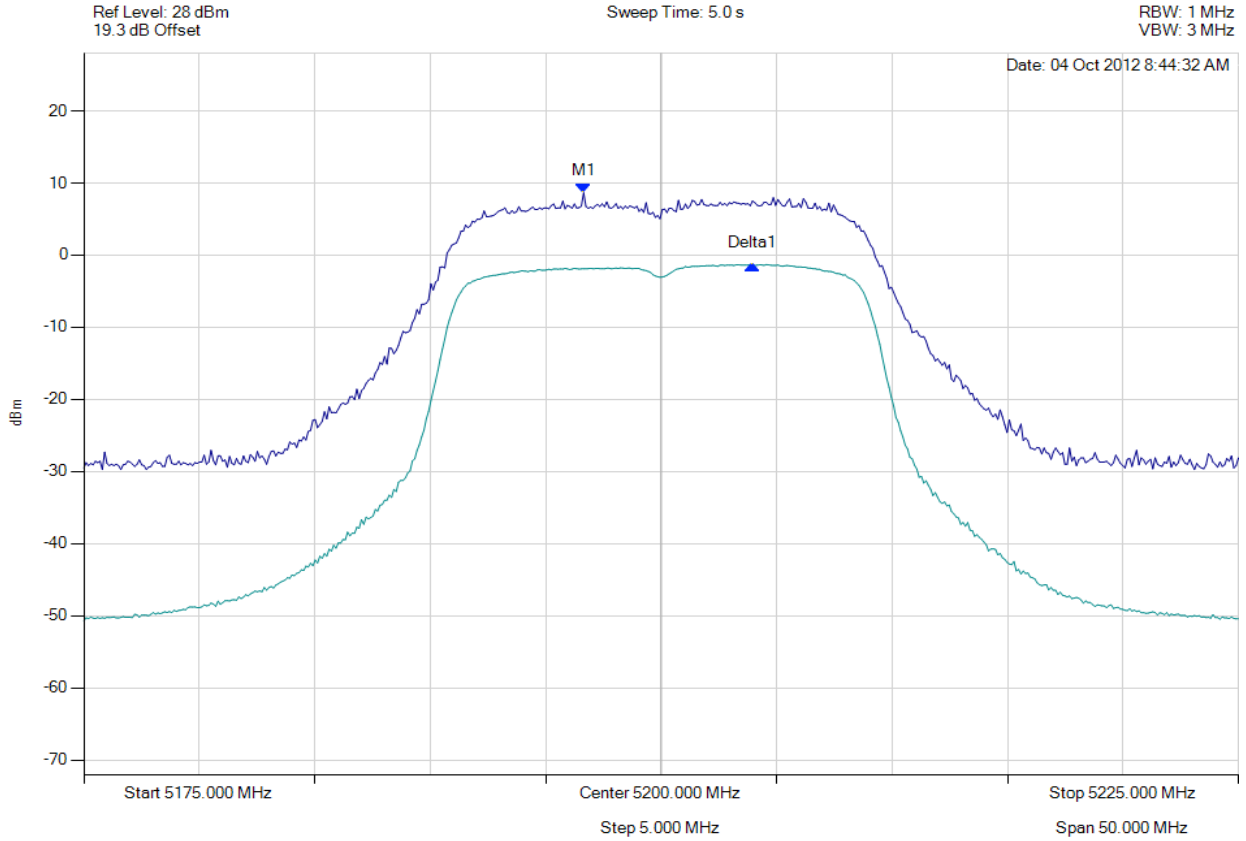


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5193.938 MHz : 9.837 dBm Delta1 : 10.220 MHz : -9.363 dB	Measured Excursion Ratio: 9.36 dB Limit: -13.0 dB Margin: -3.64 dB

Back to the Matrix

peak excursion

Variant: 802.11n HT-20, Channel: 5200.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

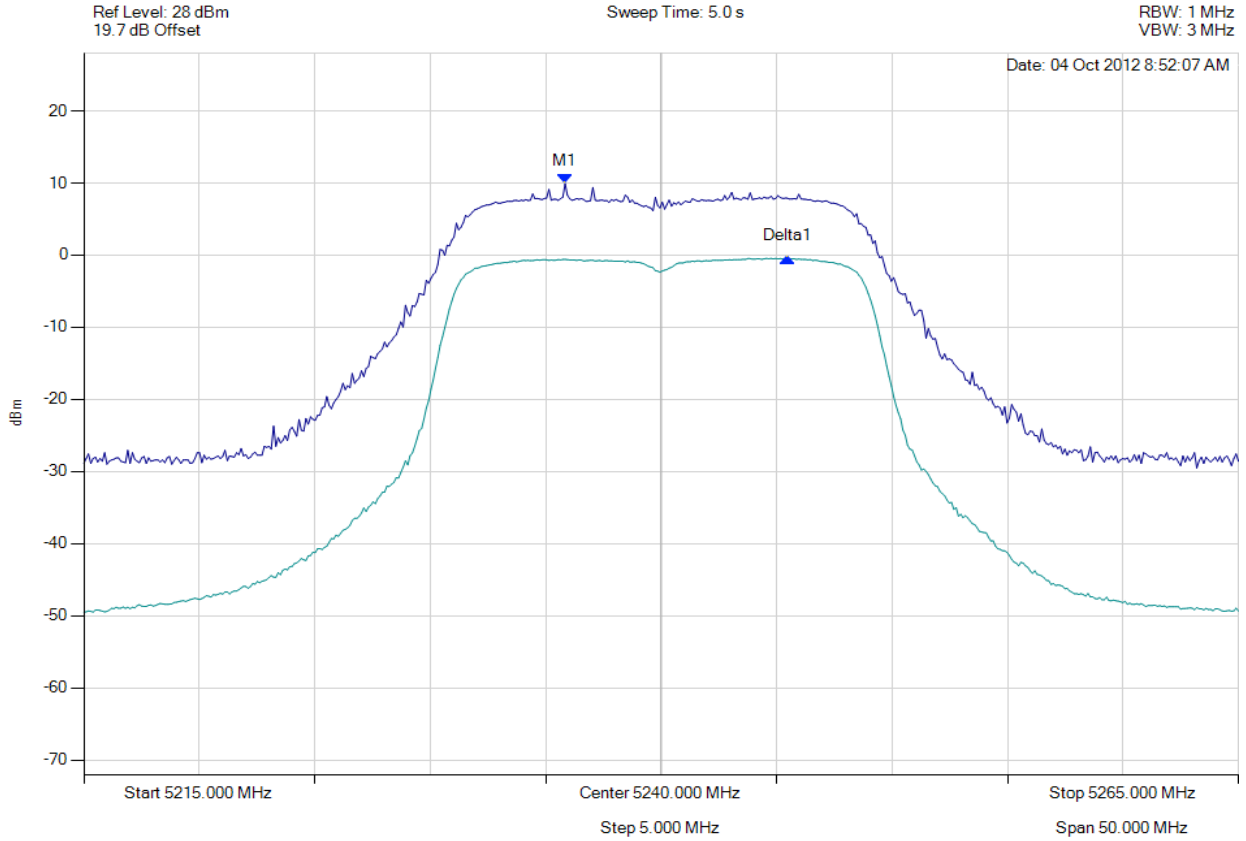


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5196.643 MHz : 8.634 dBm Delta1 : 7.315 MHz : -9.942 dB	Measured Excursion Ratio: 9.94 dB Limit: -13.0 dB Margin: -3.06 dB

Back to the Matrix

peak excursion

Variant: 802.11n HT-20, Channel: 5240.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

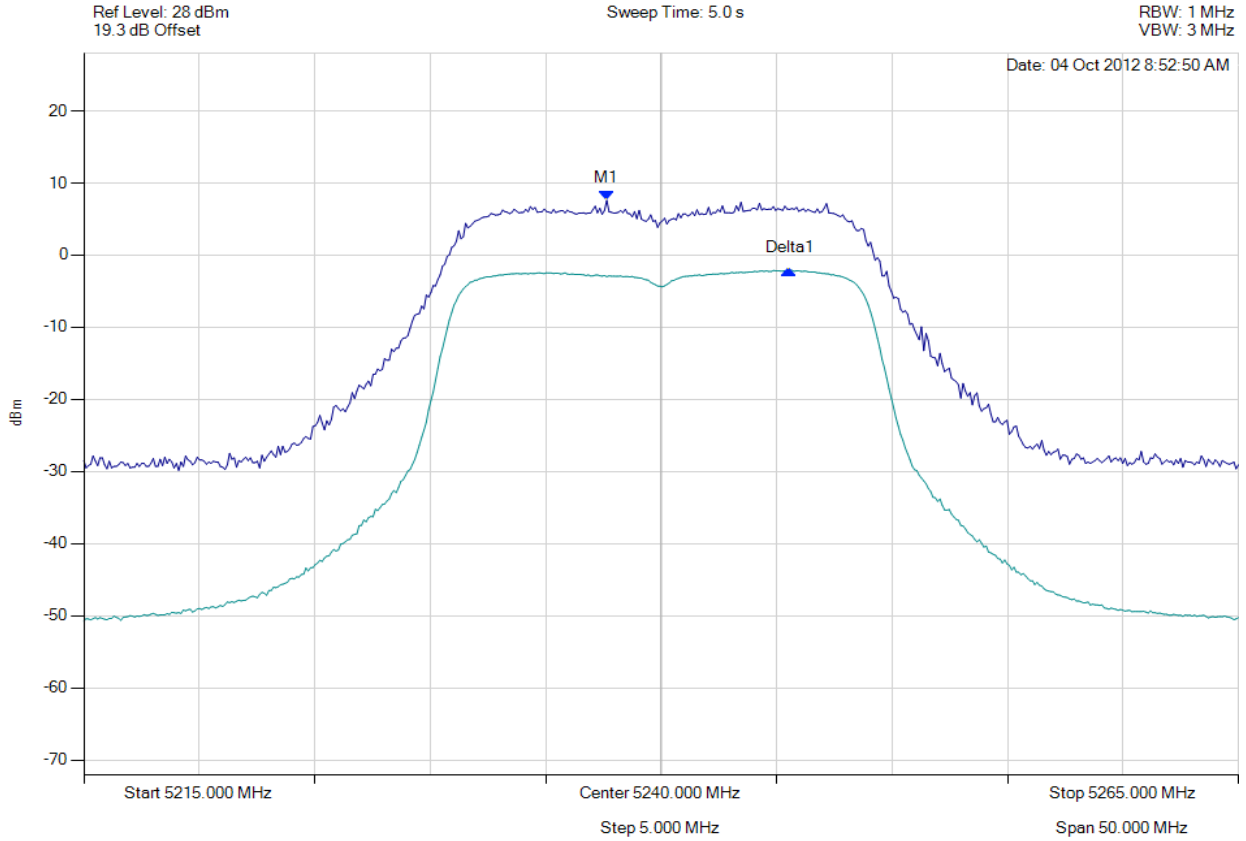


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5235.842 MHz : 9.920 dBm Delta1 : 9.619 MHz : -10.349 dB	Measured Excursion Ratio: 10.35 dB Limit: -13.0 dB Margin: -2.65 dB

Back to the Matrix

peak excursion

Variant: 802.11n HT-20, Channel: 5240.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

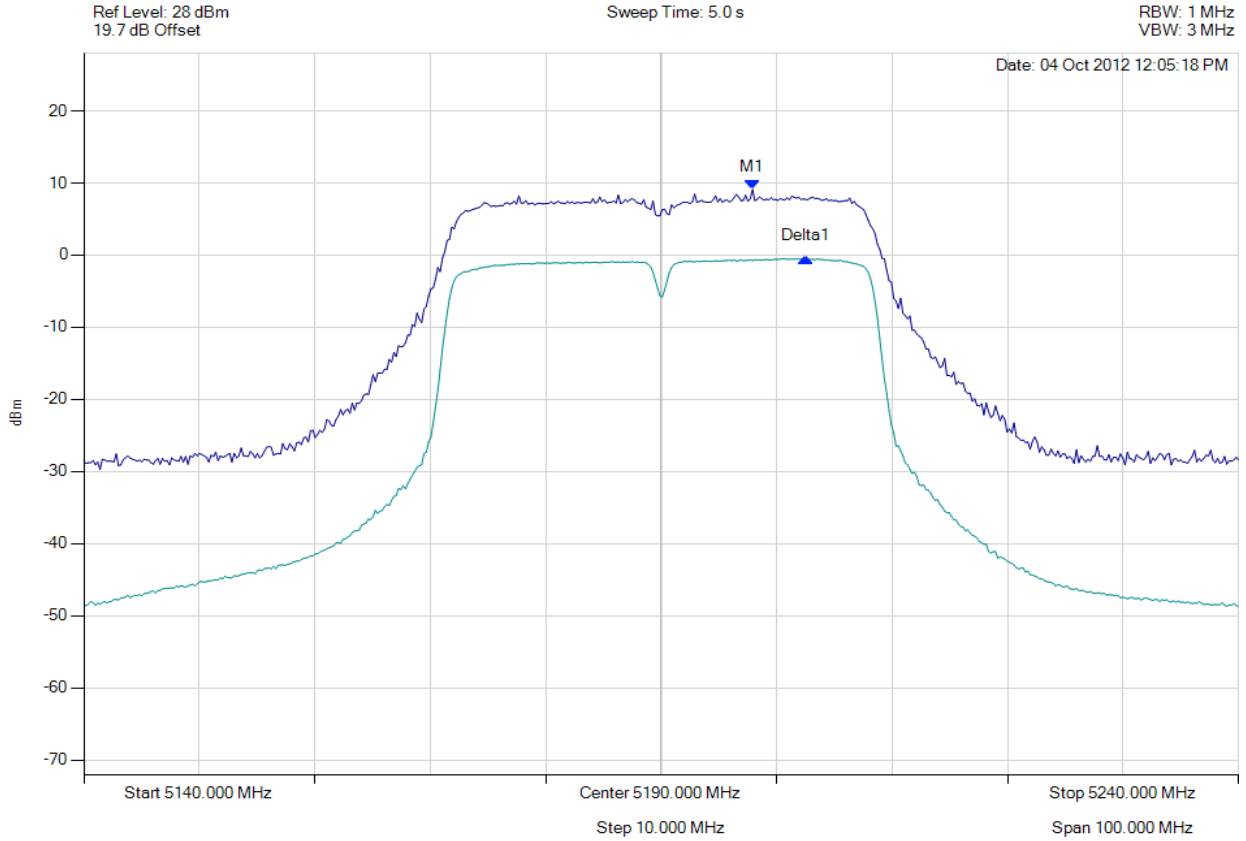


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5237.645 MHz : 7.593 dBm Delta1 : 7.916 MHz : -9.673 dB	Measured Excursion Ratio: 9.67 dB Limit: -13.0 dB Margin: -3.33 dB

Back to the Matrix

peak excursion

Variant: 802.11n HT-40, Channel: 5190.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

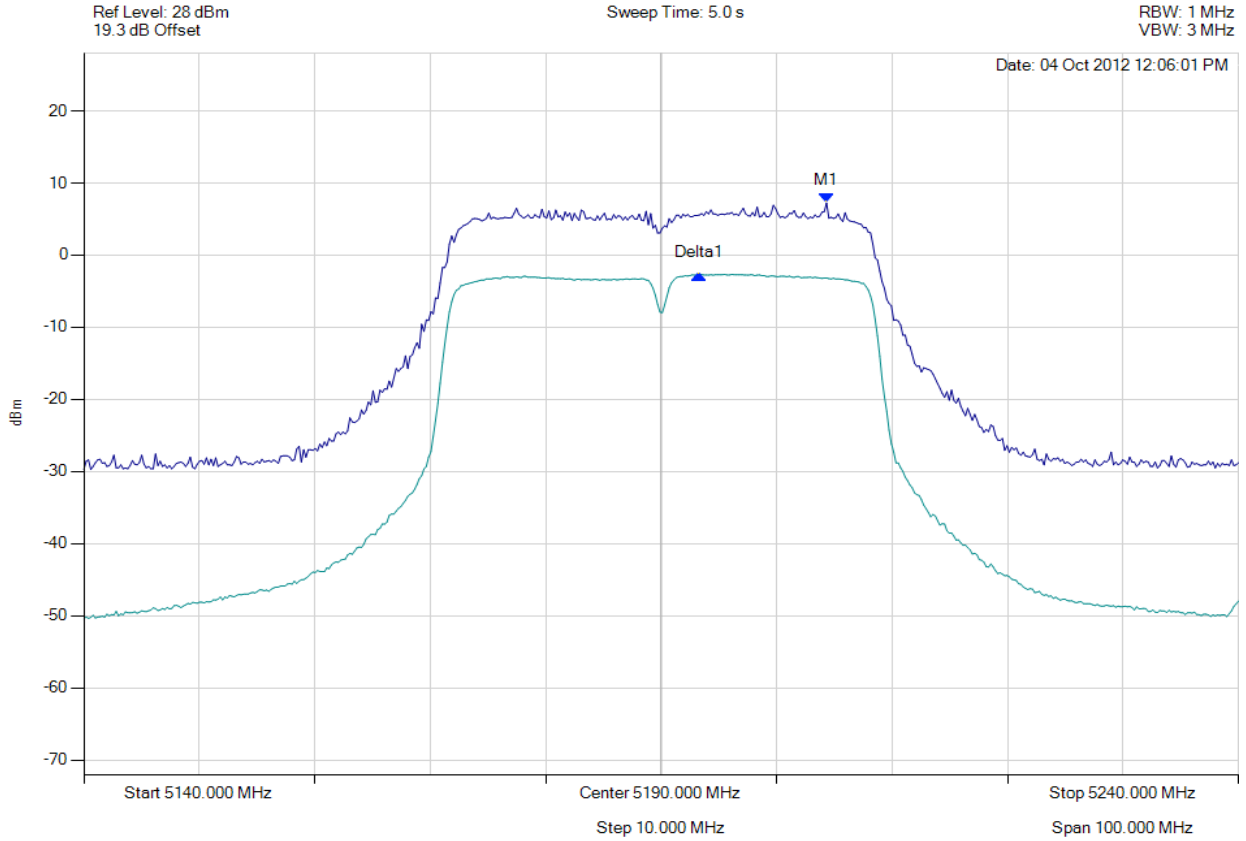


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5197.916 MHz : 9.110 dBm Delta1 : 4.609 MHz : -9.540 dB	Measured Excursion Ratio: 9.54 dB Limit: -13.0 dB Margin: -3.46 dB

Back to the Matrix

peak excursion

Variant: 802.11n HT-40, Channel: 5190.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V

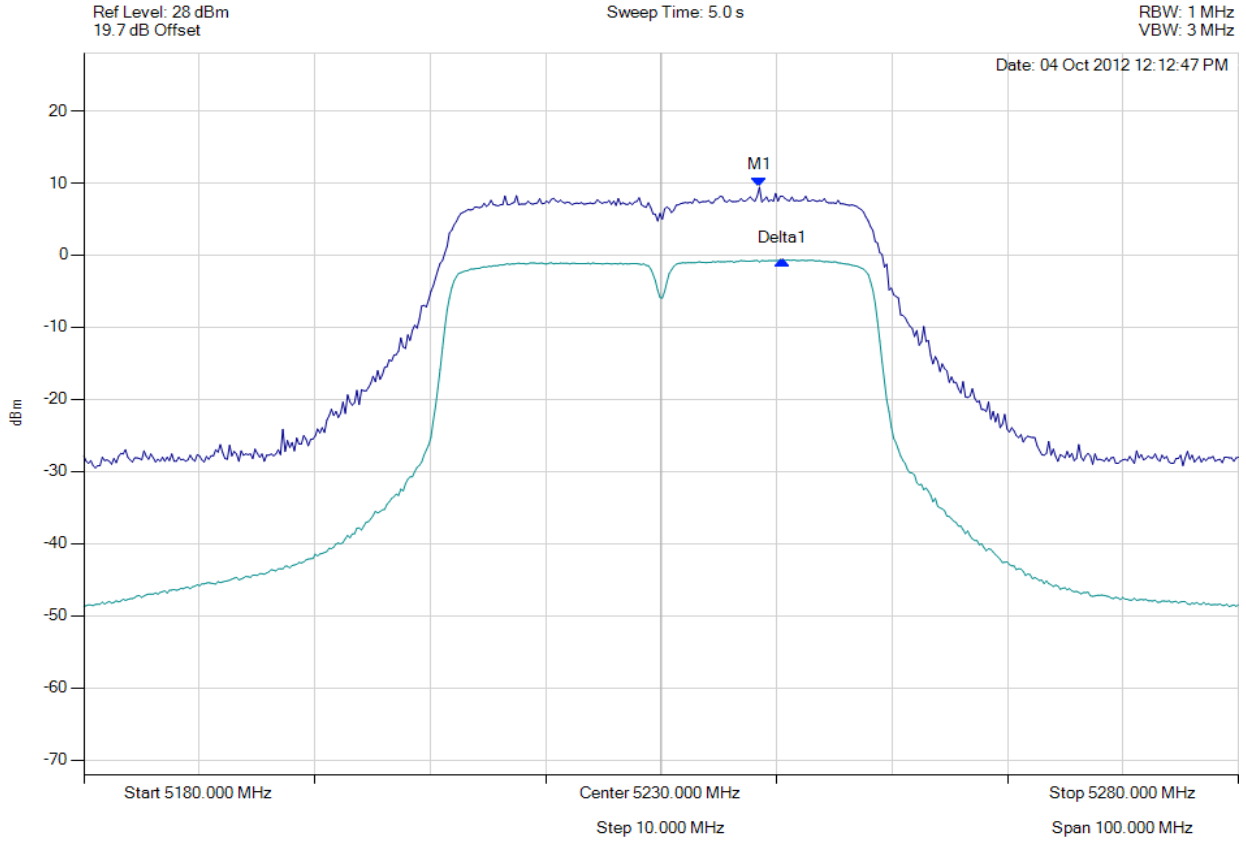


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5204.329 MHz : 7.239 dBm Delta1 : -11022044 Hz : -9.882 dB	Measured Excursion Ratio: 9.88 dB Limit: -13.0 dB Margin: -3.12 dB

Back to the Matrix

peak excursion

Variant: 802.11n HT-40, Channel: 5230.00 MHz, Chain a, Temp: Ambient, Voltage: 12.00V

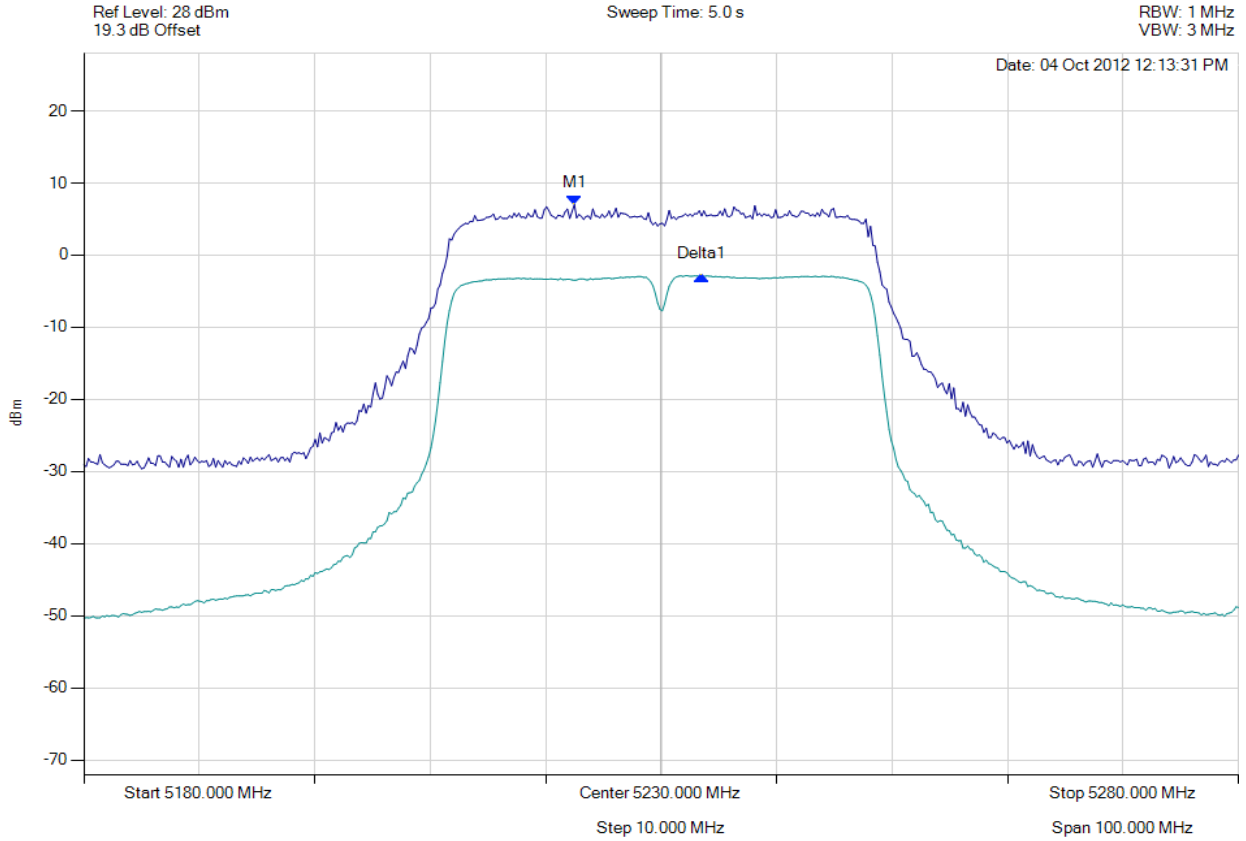


Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5238.517 MHz : 9.424 dBm Delta1 : 2.004 MHz : -10.057 dB	Measured Excursion Ratio: 10.06 dB Limit: -13.0 dB Margin: -2.94 dB

Back to the Matrix

peak excursion

Variant: 802.11n HT-40, Channel: 5230.00 MHz, Chain b, Temp: Ambient, Voltage: 12.00V



Analyser Setup	Marker : Frequency : Amplitude	Test Results
Sweep Count = 0 RF Atten (dB) = 30 TRACE 1 Detector = MAX PEAK Trace Mode = VIEW TRACE 2 Detector = RMS Trace Mode = VIEW	M1 : 5222.485 MHz : 7.011 dBm Delta1 : 11.022 MHz : -9.865 dB	Measured Excursion Ratio: 9.87 dB Limit: -13.0 dB Margin: -3.13 dB

Back to the Matrix

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