

Test of Fluke Networks Sensor4 Wireless Client

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

Test Report Serial No.: AMGT14-U2 Rev C



TEST REPORT

FROM



Test of Fluke Networks Sensor4 Wireless Client

to

To FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: AMGT14-U2 Rev C

Note: this report contains data with regard to the 5,150 to 5,350 MHz and 5,470 to 5,725 MHz bands for Fluke Networks, Sensor4 Wireless Client. 2.4 and 5.8 GHz test data are reported in MiCOM Labs test report AMGT14-U1

This report supersedes AMGT14-U2 Rev B

Applicant: Fluke Networks
2575 Augustine Dr.
Santa Clara
California 95054, USA

Product Function: Wireless LAN Client

Copy No: pdf Issue Date: 27th August 2013

This Test Report is Issued Under the Authority of:

MiCOM Labs, Inc.
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CERTIFICATE #2381.01

MiCOM Labs is an ISO 17025 Accredited Testing Laboratory



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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>



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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	-	Listing #: 102167
Canada	Industry Canada (IC)	FCB	APEC MRA 2	Listing #: 4143A-2
Japan	MIC (Ministry of Internal Affairs and Communication)	CAB	APEC MRA 2	210
	VCCI	--	--	No. 2959
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

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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>



The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Product Certification Body

A2LA has accredited

MICOM LABS

Pleasanton, CA

for technical competence as a

Product Certification Body

This product certification body is accredited in accordance with the recognized International Standard ISO/IEC Guide 65:1996 *General requirements for bodies operating product certification systems*. This accreditation demonstrates technical competence for a defined scope and the operation of a quality management system for a Telecommunications Certification Body (TCB) meeting FCC (U.S.) and IC (Canada) requirements.



Presented this 24th day of June 2010.

President & CEO
For the Accreditation Council
Certificate Number 2381.02
Valid to November 30, 2011

For the product certification schemes to which this accreditation applies, please refer to the organization's Product Certification Scope of Accreditation.

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

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DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft		
Rev A	4 th June 2012	Initial release.
Rev B	20 th June 2012	Clarification of antenna details.
Rev C	27 th August 2013	Included reference to:- a).. Single transmitting radio module FCC ID (RD7-SENSOR4X1) b).. dual transmitting radio module FCC ID: RD7-SENSOR4X

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1. TEST RESULT CERTIFICATE

Applicant:	Fluke Networks 2575 Augustine Dr. Santa Clara California 95054, USA	Tested By:	MiCOM Labs, Inc. 440 Boulder Court Suite 200 Pleasanton California, 94566, USA
EUT:	Product Description	Tel:	+1 925 462 0304
Model:	Sensor4	Fax:	+1 925 462 0306
S/N:	Engineering samples: Integral NG5-x & External NG5-y		
Test Date(s):	7th February - 17th May 2012	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.

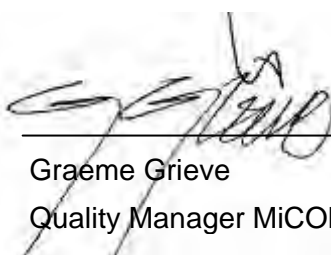
Notes:

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.

Approved & Released for MiCOM Labs, Inc. by:



Testing CERTIFICATE #2381.01



Graeme Grieve
Quality Manager MiCOM Labs,



Gordon Hurst
President & CEO MiCOM Labs, Inc.

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2. REFERENCES AND MEASUREMENT UNCERTAINTY

2.1. Normative References

Ref.	Publication	Year	Title
(i)	FCC 47 CFR Part 15.407	2010	Code of Federal Regulations
(ii)	FCC 06-96	June 2006	Memorandum Opinion and Order
(iii)	FCC OET KDB 662911	4 th 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	March 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



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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.

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3. PRODUCT DETAILS AND TEST CONFIGURATIONS

3.1. Technical Details

Details	Description
Purpose:	Test of the Fluke Networks Sensor4 Wireless Client in the frequency ranges 5,250 to 5,350 and 5,470 to 5,725 MHz to FCC Part 15.407 and Industry Canada RSS-210 regulations.
Applicant:	Fluke Networks 2575 Augustine Dr. Santa Clara California 95054, USA
Manufacturer:	As applicant
Laboratory performing the tests:	MiCOM Labs, Inc. 440 Boulder Court, Suite 200 Pleasanton, California 94566 USA
Test report reference number:	AMGT14-U2 Rev C
Date EUT received:	7th February 2012
Standard(s) applied:	FCC 47 CFR Part 15.407 & IC RSS-210
Dates of test (from - to):	7th February - 17th May 2012
No of Units Tested:	Two
Type of Equipment:	802.11a/b/g/n Wireless LAN Access Point, 3x3 Spatial Multiplexing MIMO configuration
Manufacturers Trade Name:	Wireless Client
Model(s):	Sensor4
Location for use:	Indoor
Declared Frequency Range(s):	5,150 to 5,350 and 5,470 to 5,725 MHz
Software Release	Build 26809
Hardware Release:	assembly rev 5, pcb rev 3
Type of Modulation:	Per 802.11 – OFDM
EUT Modes of Operation:	Legacy 802.11a, 802.11n HT-20, HT-40
Transmit/Receive Operation:	Time Division Duplex
System Beam Forming:	Sensor4 has no capability for beam forming
Rated Input Voltage and Current:	12 Vdc 0.65 A: POE 48 Vdc 0.2A
Operating Temperature Range:	Declared range 0° to +50°C
ITU Emission Designator:	802.11a 18M8D1D 802.11n HT-20 19M9D1D 802.11n HT-40 36M7D1D
Equipment Dimensions:	7.5" x 7.5" x 1.5"
Weight:	1 lb (0.454 Kg)
Primary function of equipment:	WiFi scanning
Secondary function of equipment:	Spectrum analyzer

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3.2. Scope of Test Program

Fluke Networks Sensor4 Wireless Client RF Testing

The scope of the test program was to test the Fluke Networks Sensor4 802.11a/b/g/n Wireless LAN Access Point, 3x3 Spatial Multiplexing MIMO configurations in the frequency ranges 5,150 to 5,250, 5,250 – 5,350 and 5,470 to 5,725 MHz for compliance against FCC 47 CFR Part 15.407 and Industry Canada RSS-210 specifications.

The Sensor4 wireless client will be can be marketed using a number of different models. The host can be configured differently therefore two DCC ID's were provided to cover all options. There are two separate FCC ID's for this family of devices;

Sensor Model	Features
¹ SENSOR4-R1S0-I	AIRMAGNET SENSOR, 4TH GEN, 1 X 11N RADIO, INTERNAL ANTENNA.
¹ SENSOR4-R1S1-I	AIRMAGNET SPECTRUM SENSOR, 4TH GEN, 1 X 11N RADIO, INTERNAL ANTENNA.
² SENSOR4-R2S0-I	AIRMAGNET SENSOR, 4TH GEN, 2 X 11N RADIO, INTERNAL ANTENNA.
² SENSOR4-R2S1-I	AIRMAGNET SPECTRUM SENSOR, 4TH GEN, 2 X 11N RADIO, INTERNAL ANTENNA.
¹ SENSOR4-R1S0-E	AIRMAGNET SENSOR, 4TH GEN, 1 X 11N RADIO 4 EXTERNAL ANTENNAS.
¹ SENSOR4-R1S1-E	AIRMAGNET SPECTRUM SENSOR, 4TH GEN, 1 X 11N RADIO 4 EXTERNAL ANTENNAS.
² SENSOR4-R2S0-E	AIRMAGNET SENSOR, 4TH GEN, 2 X 11N RADIO 8 EXTERNAL ANTENNAS.
² SENSOR4-R2S1-E	AIRMAGNET SPECTRUM SENSOR, 4TH GEN, 2 X 11N RADIO 8 EXTERNAL ANTENNAS.

a).. ¹Single transmitting radio module FCC ID: RD7-SENSOR4X1

b).. ²Dual transmitting radio module FCC ID: RD7-SENSOR4X

The test results reported in this document test worst case fully loaded dual radio configuration;

SENSOR4-R2S1-I (integral antenna)

SENSOR4-R2S1-E (external antenna)



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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.

**Sensor4 802.11 a/b/g/n Wireless Client
Integral Antenna**

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**Sensor4 802.11 a/b/g/n Wireless Client
External Antenna**



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

Type (EUT/Support)	Equipment Description (Including Brand Name)	Mfr	Model No.	Serial No.
EUT	802.11a/b/g/n Wireless Access Point	Fluke Networks	Sensor4	Engineering samples: Integral NG5-x & External NG5-y
EUT	POE	PowerDSine	PD-3501/AC	--
EUT	ac/dc Adaptor	Fairway Electronic 100-240Vac 50-60Hz 12Vdc, 1.66A	VE20-120	--
Support	Laptop PC	Dell	--	None

3.4. Antenna Details

Type	Model	Gain (dBi)	Frequency Range (MHz)
External	Omni Rubber Duck: Wanshih SQ1WFI0001A	2.0	2400 – 2483.5
		2.3	5150 - 5350
		1.0	5725 - 5850
Integral	Laird NanoGreen	0.9	2400 – 2483.5
		3.1	5150 - 5350
		4.8	5725 - 5850

Cabling and I/O Ports

Number and type of I/O ports

- 1 x 10/100/1000 Ethernet
- dc Power In (48 Vdc POE)
- RF Ports 50Ω, N-type connector(s)
 - 3 x 2.4 GHz Ports (Ports 1, 2 and 3)
 - 3 x 5 GHz Ports (Ports 4, 5 and 6)
- GND Connection (2 x bolts)

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3.5. 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, 5200, 5240 5260, 5300, 5320
	HT-20	6.5 MCS	5500, 5580, 5700
	HT-40	13.5 MCS	5190, 5310 5270, 5230 5510, 5550, 5670

Antenna Test Configurations for Radiated Emissions and Band-Edge

The following measurements were performed on all antenna configurations identified in Section 3.4 Antenna Details.

Spurious Emission and Band-Edge Test Strategy Band 5,150 – 5,350

11a	11n HT-20	11n HT-40
BE 5150	BE 5150	BE 5150
SE 5180	SE 5180	SE 5190
SE 5200	SE 5200	
SE 5240	SE 5240	SE 5230
SE 5260	SE 5260	SE 5270
SE 5300	SE 5300	
SE 5320	SE 5320	SE 5310
BE 5350	BE 5350	BE 5350

KEY:-

SE – Spurious Emissions

BE – Band-Edge

PK - Peak Emission

Band 5,470 – 5,725

11a	11n HT-20	11n HT-40
SE 5500	SE 5500	SE 5510
SE 5580	SE 5580	SE 5550
SE 5700	SE 5700	SE 5670
BE 5460	BE 5460	BE 5460

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3.6. Equipment Modifications

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

1. Output Power Settings

The output power values reported in section 5.1.2 Peak Output Power take into account any power reduction due to radiated spurious emissions and radiated band-edge measurement results.

2. Spurious Emissions V's Antenna Installation Positioning

It was found that the positioning of the external antennas was crucial in the reduction and control of spurious emissions. The device antennas were tested per the following client supplied document. Any deviation from this installation will result in non-compliant operation.

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Fluke Networks Sensor4 External Antenna Model Installation instructions

1. Screw on the supplied antennas to the RP-TNC connectors on the sensor side plates.
2. Position the antenna angles as shown in Figures 1 thru 5.
3. Hand tighten the antenna to the sensor while maintaining the angles depicted.
4. Apply a small amount of Loctite or similar adhesive in the antenna joint (elbow) to maintain antenna angle positioning during and after sensor installation.

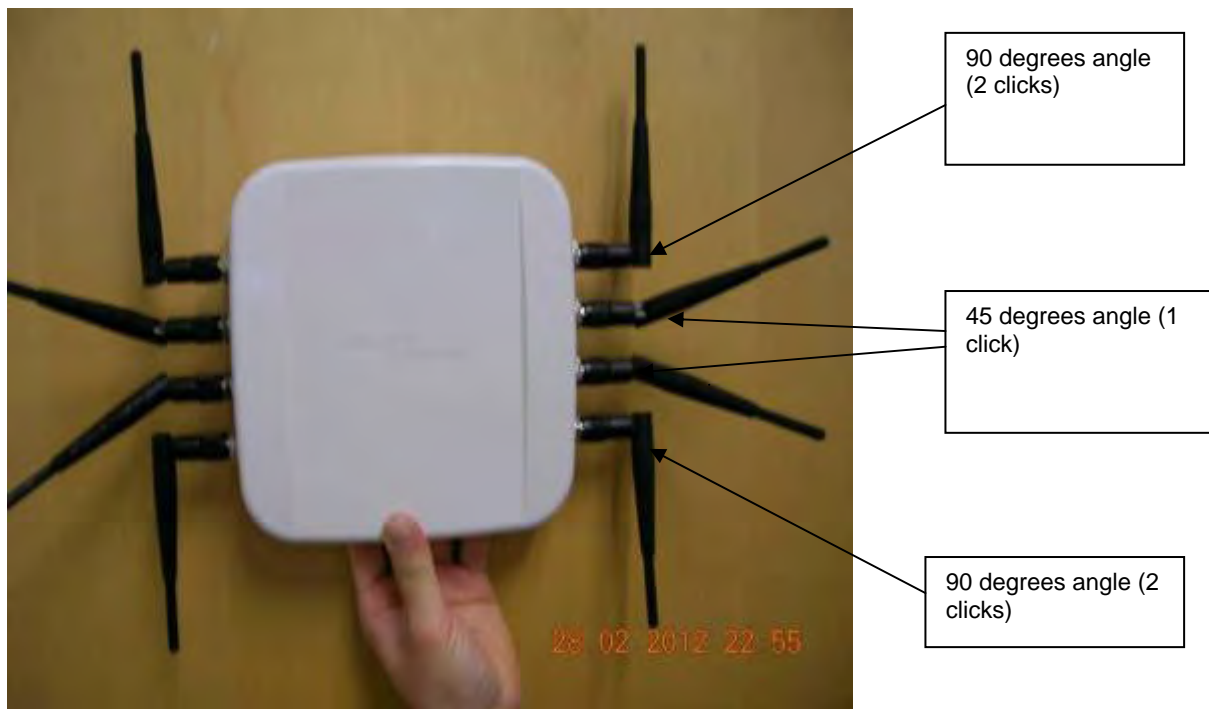


Figure 1: Top view



Figure 2: Front View

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Figure 3: Diagonal view



90 degrees angle
between the 2
antennas

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Figure 4: Side view left.



90 degrees angle
between the 2
antennas

Figure 5: Side view right

3.7. Deviations from the Test Standard

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

1. NONE

3.8. Subcontracted Testing or Third Party Data

1. NONE



4. 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	5.1.1
15.407(a) A9.2(2) 4.6	Transmit Output Power	Power Measurement	Conducted	Complies	5.1.2
15.407(a) A9.2(2)	Peak Power Spectral Density	PPSD	Conducted	Complies	5.1.3
15.407(a)(6)	Peak Excursion Ratio	<13dB in any 1MHz bandwidth	Conducted	Complies	5.1.4
15.407(g) 15.31 2.1 4.5	Frequency Stability	Limits: contained within band of operation at all times.	Applicant declaration	Complies	5.1.5
15.407(f) 5.5	Radio Frequency Radiation Exposure	Exposure to radio frequency energy levels, Maximum Permissible Exposure (MPE)	Conducted	Complies	5.1.6

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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		5.1.7
	Transmitter Radiated Spurious Emissions	Emissions above 1 GHz		Complies	5.1.7.1
	Radiated Band Edge	Band edge results		Complies	5.1.7.1
Industry Canada only RSS-Gen §4.10, §6	Receiver Radiated Spurious Emissions	Emissions above 1 GHz		Complies	5.1.7.2
15.407(b)(6) 15.205(a) 15.209(a) 2.2	Radiated Emissions	Emissions <1 GHz (30M-1 GHz)		Complies	5.1.7.3
15.407(b)(6) 15.207 7.2.2	AC Wireline Conducted Emissions 150 kHz–30 MHz	Conducted Emissions	Conducted	Complies	5.1.8

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List of Measurements (cont'd)

Dynamic Frequency Selection (DFS)

The following table represents the list of measurements required under the **FCC CFR47 Part 15.407(h)(2)** and **FCC Memorandum Opinion and Order FCC 06-96 (Compliance Measurement procedures for Unlicensed National Information Infrastructure devices operating in the 5250-5350 MHz and 5470-5725 MHz bands incorporating dynamic frequency selection)**.

Tests performed on Master Device

Section	Test Items	Description	Condition	Result	Test Report Section
	Dynamic Frequency Selection				5.1.9
7.8.1	Detection Bandwidth	UNII Detection Bandwidth	Conducted	Not Applicable	
7.8.2.1	Performance Requirements Check	Initial Channel Availability Check Time	Conducted	Not Applicable	
7.8.2.2		Radar Burst at the Beginning of the Channel Availability Check Time	Conducted	Not Applicable	
7.8.2.3		Radar Burst at the End of the Channel Availability Check Time	Conducted	Not Applicable	
7.8.3	In-Service Monitoring	In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period	Conducted	Complies	
7.8.4	Radar Detection	Statistical Performance Check	Conducted	Not Applicable	

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

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5. TEST RESULTS

5.1. Device Characteristics

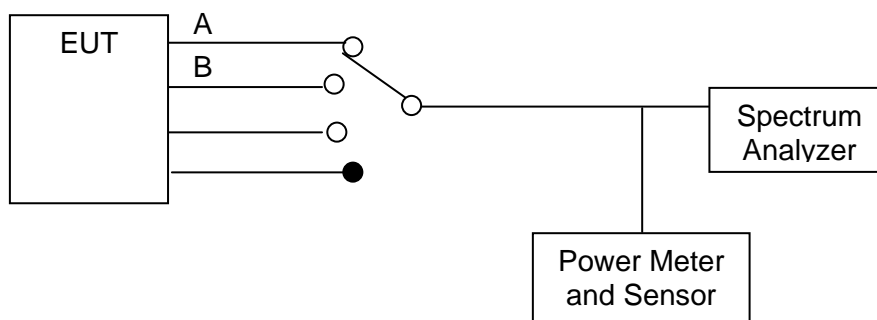
5.1.1. 26 dB and 99 % Bandwidth

FCC, Part 15 Subpart C §15.407(a)
Industry Canada RSS-210 § A9.2(2)
Industry Canada RSS-Gen 4.4

Test Procedure

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.

Test Measurement Set up



Measurement set up for 26 dB and 99 % bandwidth test

Radio Parameters

Duty Cycle: 100%

Output: Modulated Carrier

Power: Maximum Default Power



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

Ambient conditions.

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

TABLE OF RESULTS – 802.11a Legacy 5150 – 5250 MHz

Test Conditions:	15.247 (a)(2)	Rel. Humidity (%):	35 to 42
Variants:	802.11a	Ambient Temp. (°C):	19 to 22
TPC:	HIGH	Pressure (mBars):	998 to 1003
Modulation:	ON	Duty Cycle (x):	100
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi
Applied Voltage:	48.0 Vdc		
Notes 1:			
Notes 2:			

26 dB Bandwidth

Test Frequency	26 dB Bandwidth				Minimum 6dB Bandwidth Limit		Margin
	MHz				kHz	MHz	
MHz	a	b	c	d			
5180	22.445000	22.946000	23.447000		500	0.5	-21.945000
5200	22.445000	22.846000	23.146000				-21.945000
5240	22.345000	23.146000	23.347000				-21.845000

99% Bandwidth

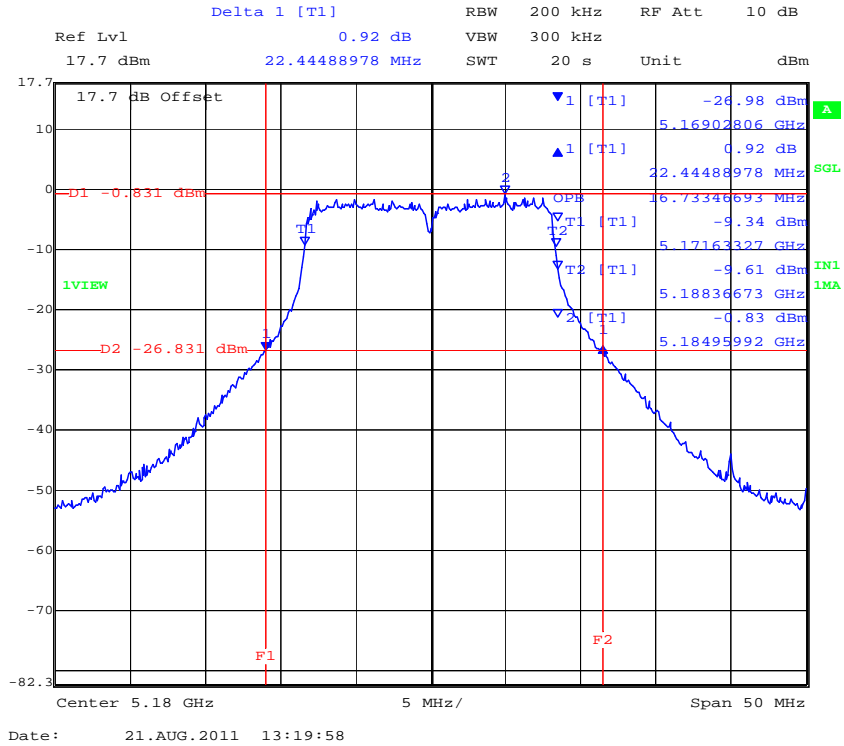
Test Frequency	99 % Bandwidth					
	MHz					
MHz	a	b	c	d		
5180	16.733000	16.834000	16.834000			
5200	16.733000	16.733000	16.934000			
5240	16.733000	16.733000	16.834000			

Measurement uncertainty:	±2.81 dB
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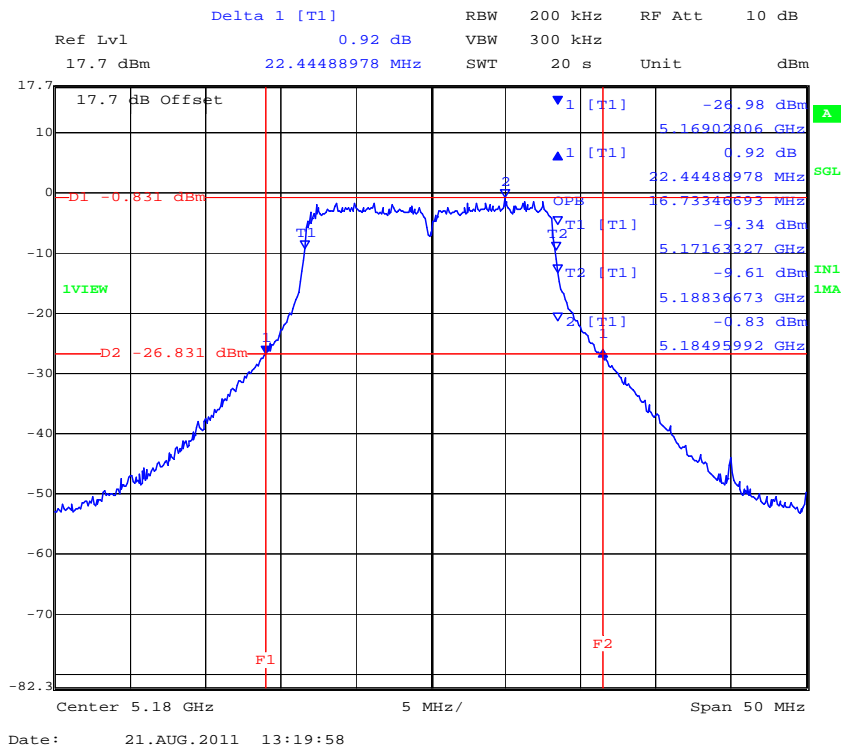
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PORT A 5,180 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



PORT B 5,180 MHz 802.11a Legacy 26 dB and 99 % Bandwidth

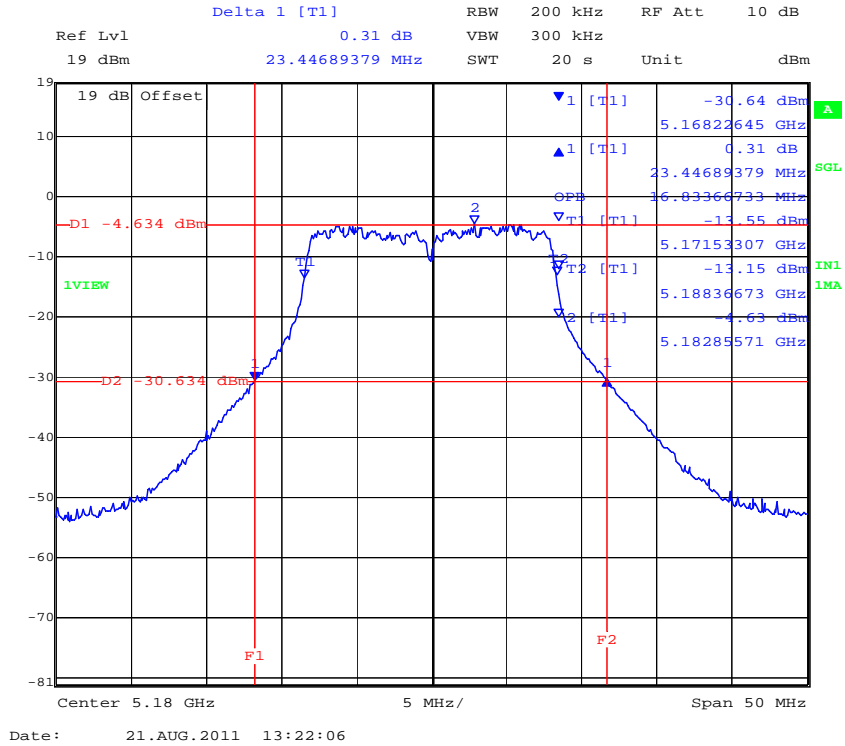


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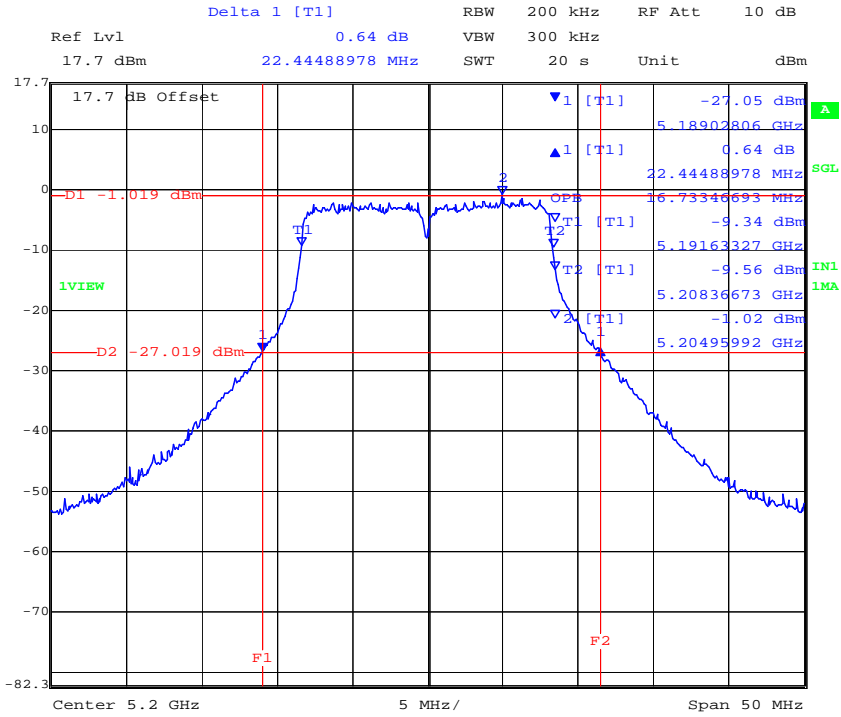
PORT C 5,180 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



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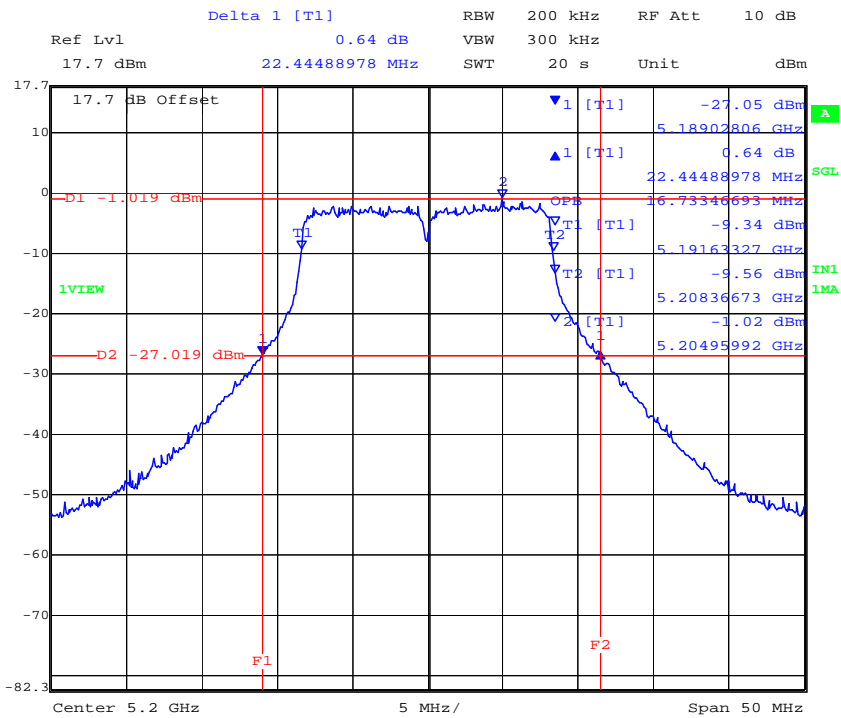


PORT A 5,200 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



Date: 21.AUG.2011 13:28:19

PORT B 5,200 MHz 802.11a Legacy 26 dB and 99 % Bandwidth

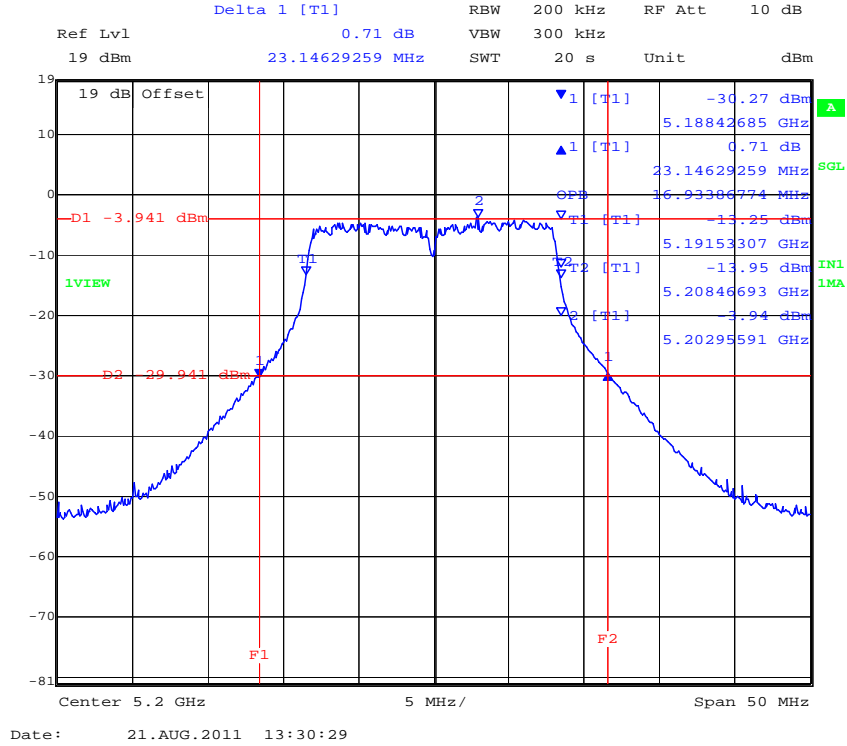


Date: 21.AUG.2011 13:28:19

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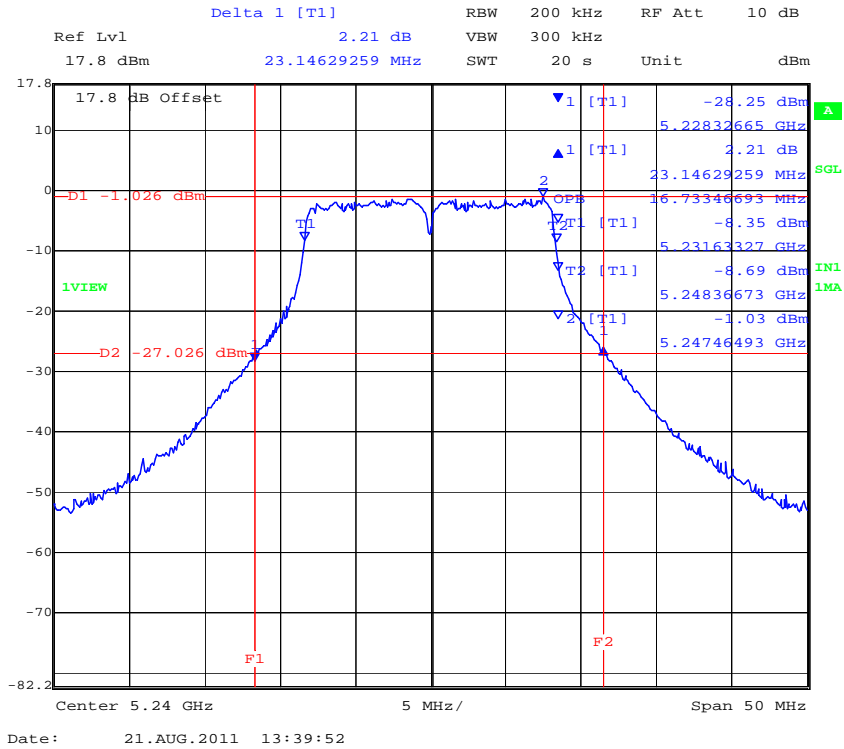
PORT C 5,200 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



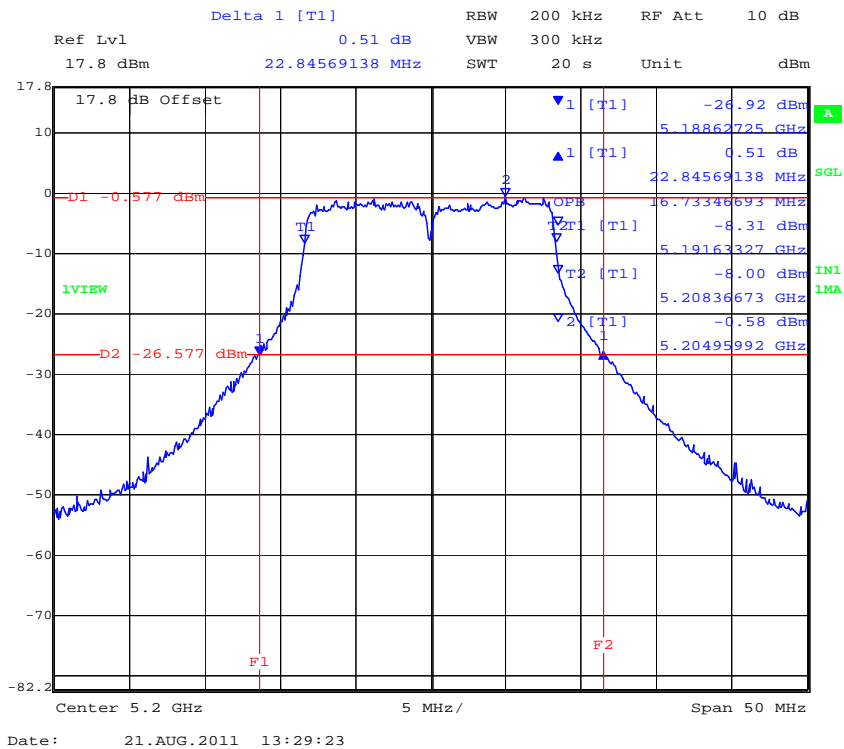
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PORT A 5,240 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



PORT B 5,240 MHz 802.11a Legacy 26 dB and 99 % Bandwidth

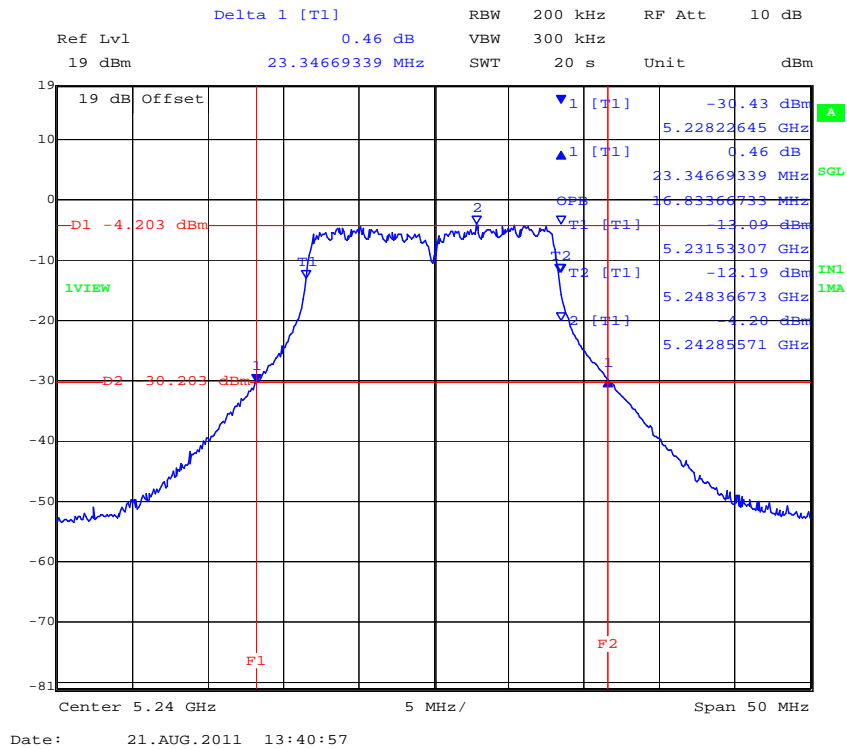


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PORT C 5,240 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



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TABLE OF RESULTS – 802.11n HT-20 5150 – 5250 MHz

Test Conditions:	15.247 (a)(2)	Rel. Humidity (%):	35 to 42
Variant:	802.11n HT-20	Ambient Temp. (°C):	19 to 22
TPC:	HIGH	Pressure (mBars):	998 to 1003
Modulation:	ON	Duty Cycle (x):	100
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi
Applied Voltage:	48.0 Vdc		
Notes 1:			
Notes 2:			

26 dB Bandwidth

Test Frequency	26 dB Bandwidth				Minimum 6dB Bandwidth Limit		Margin
	MHz				kHz	MHz	
MHz	a	b	c	d			
5180	23.547000	23.547000	24.549000		500	0.5	-23.047000
5200	23.246000	23.547000	24.549000				-22.746000
5240	23.347000	23.347000	24.649000				-22.847000

99% Bandwidth

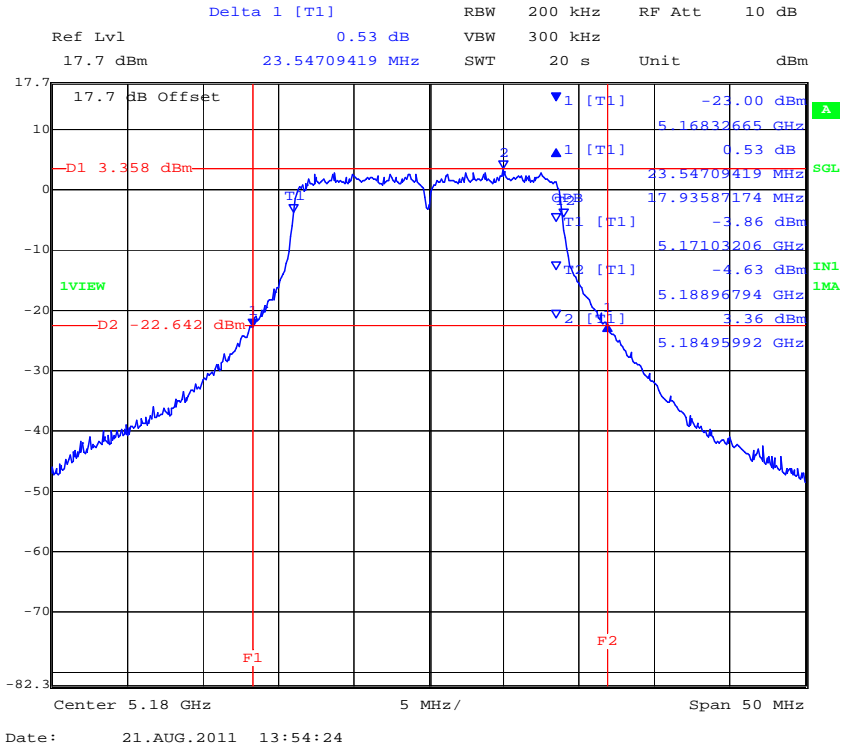
Test Frequency	99 % Bandwidth						
	MHz						
MHz	a	b	c	d			
5180	17.936000	17.936000	18.036000				
5200	17.936000	18.036000	18.036000				
5240	17.936000	17.936000	18.036000				

Measurement uncertainty:	±2.81 dB
---------------------------------	----------

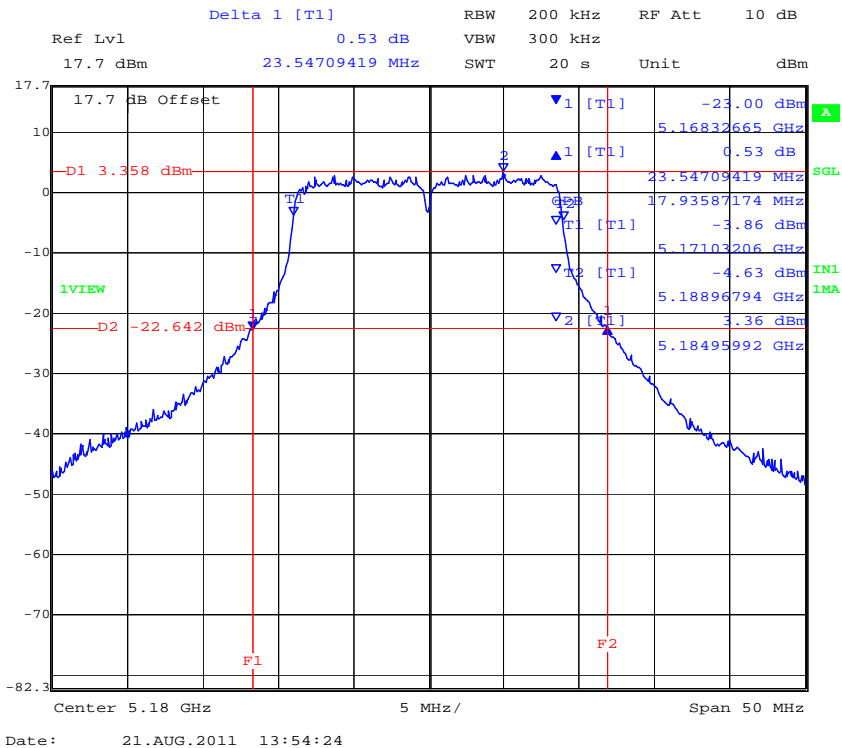
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PORT A 5,180 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



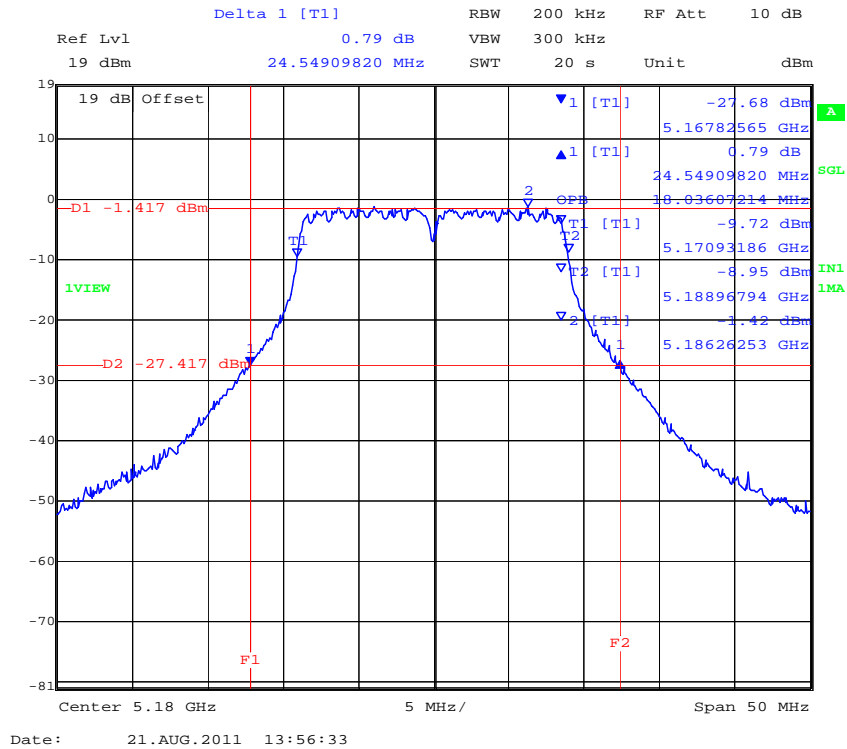
PORT B 5,180 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



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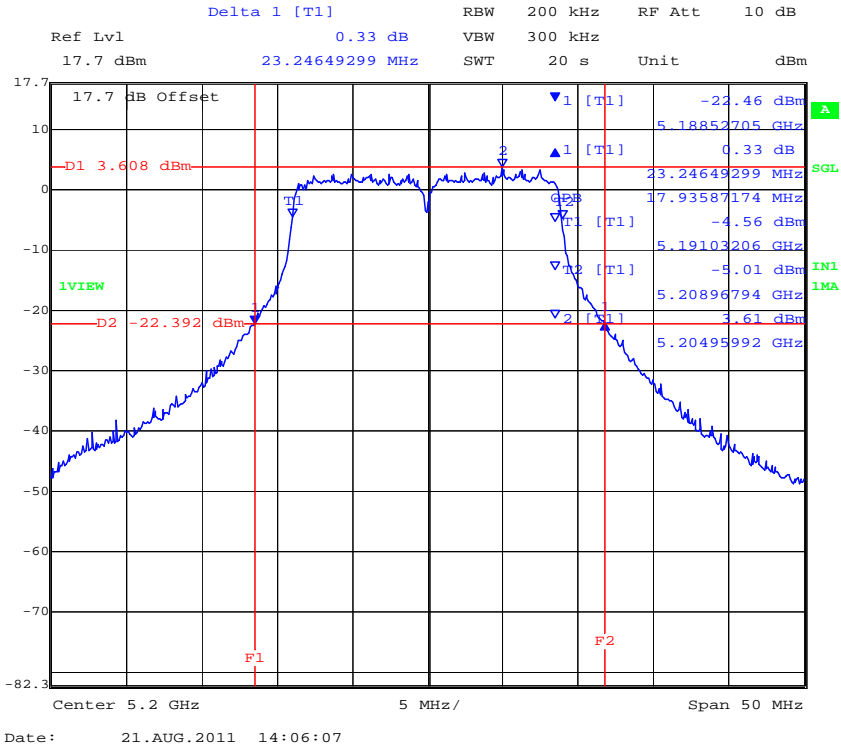
PORT C 5,180 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



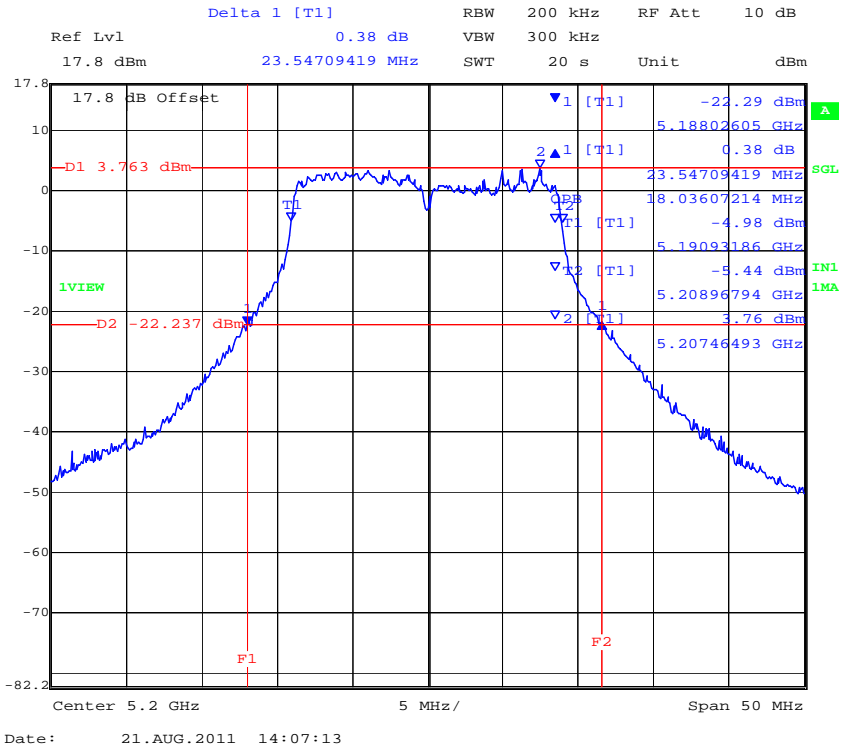
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PORT A 5,200 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



PORT B 5,200 MHz 802.11a Legacy 26 dB and 99 % Bandwidth

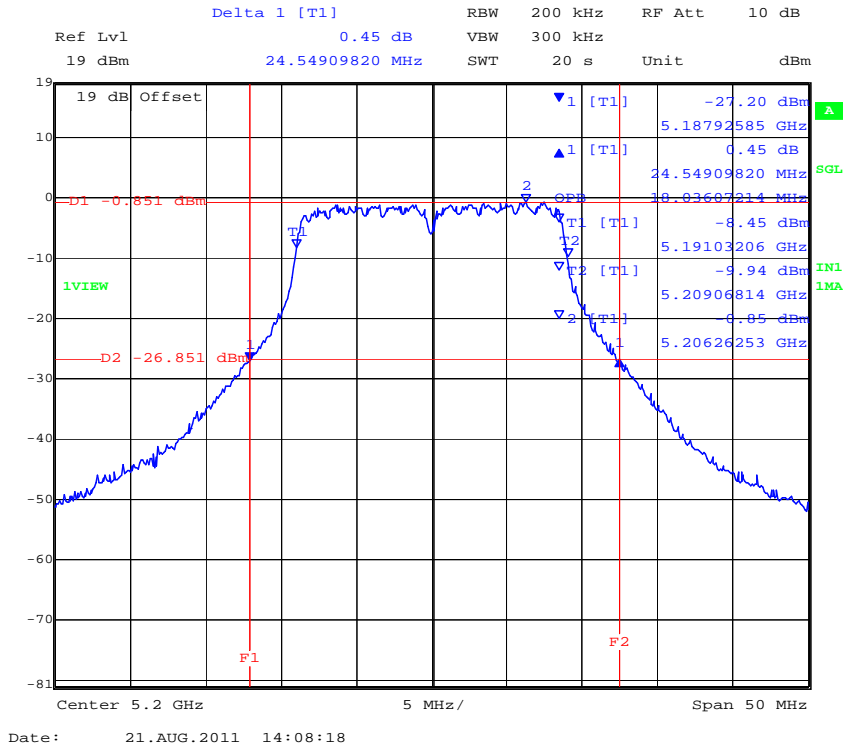


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PORT C 5,200 MHz 802.11a Legacy 26 dB and 99 % Bandwidth

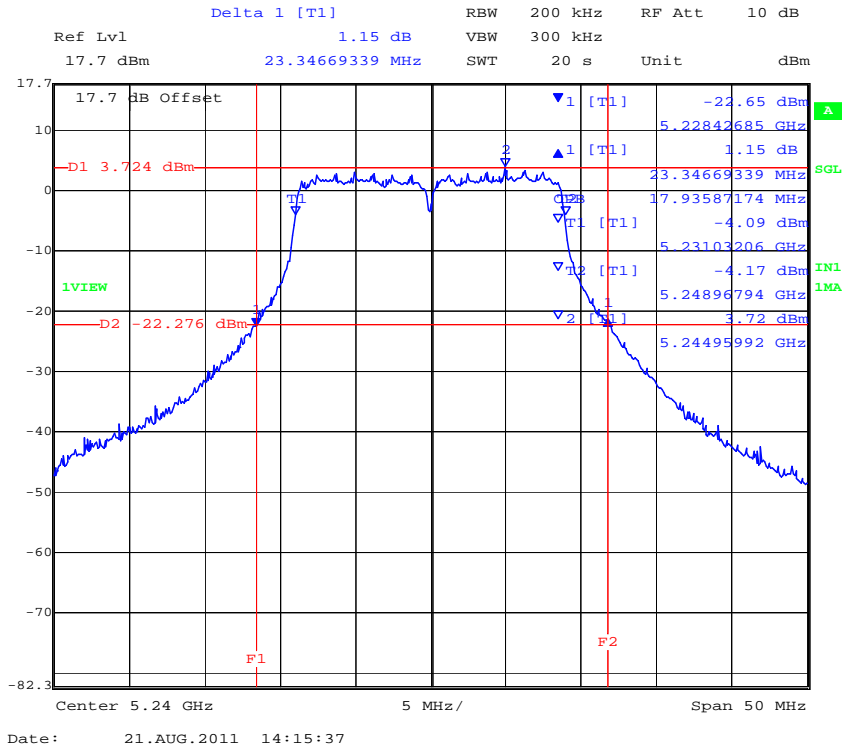


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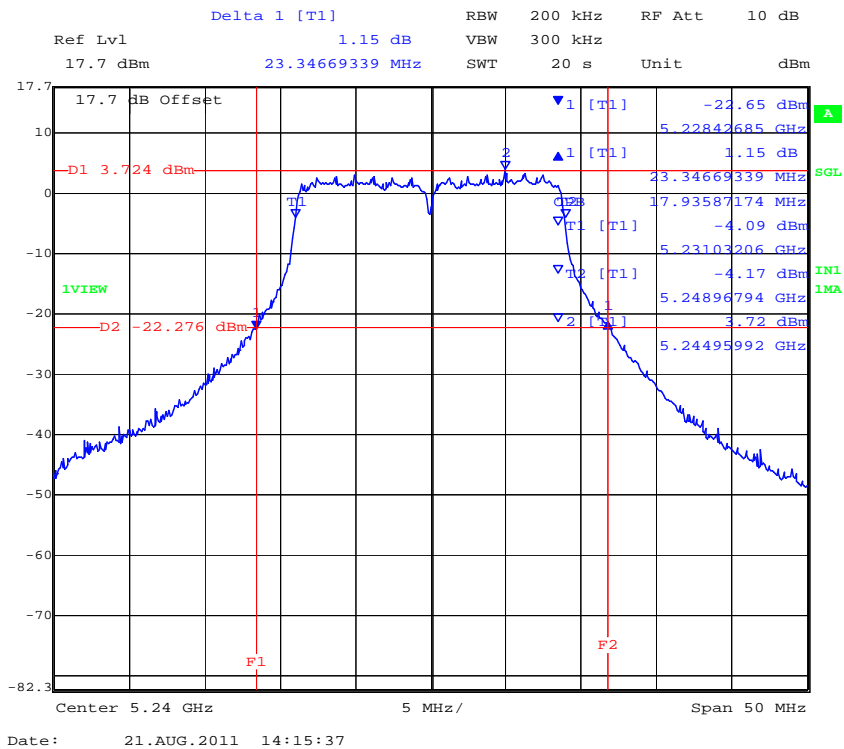


Title: Fluke Networks Sensor4 Wireless Client
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PORT A 5,240 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



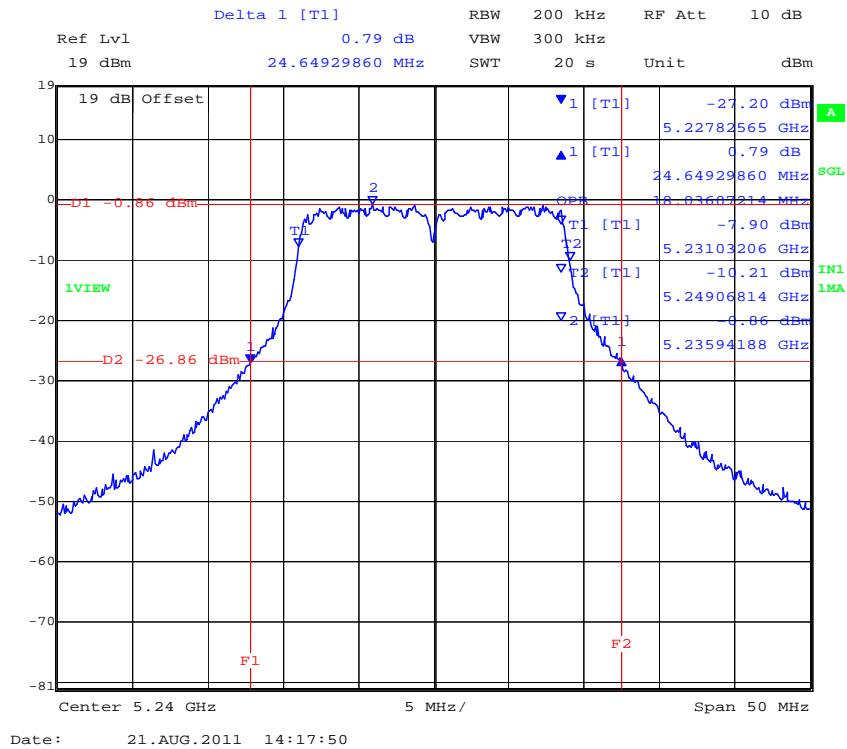
PORT B 5,240 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



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PORT C 5,240 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



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TABLE OF RESULTS – 802.11n HT-40 5150 – 5250 MHz

Test Conditions:	15.247 (a)(1)	Rel. Humidity (%):	35 to 42
Variant:	802.11n HT-40	Ambient Temp. (°C):	19 to 22
TPC:	HIGH	Pressure (mBars):	998 to 1003
Modulation:	ON	Duty Cycle (x):	100
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi
Applied Voltage:	48.0 Vdc		
Notes 1:			
Notes 2:			

26 dB Bandwidth

Test Frequency	26 dB Bandwidth				Minimum 6dB Bandwidth Limit		Margin
	MHz				kHz	MHz	
MHz	a	b	c	d			
5190	43.487000	44.689000	46.894000		500	0.5	-42.987000
5230	44.088000	44.489000	46.693000				-43.588000

99% Bandwidth

Test Frequency	99 % Bandwidth						
	MHz						
MHz	a	b	c	d			
5190	36.473000	36.473000	36.473000				
5230	36.473000	36.473000	36.473000				

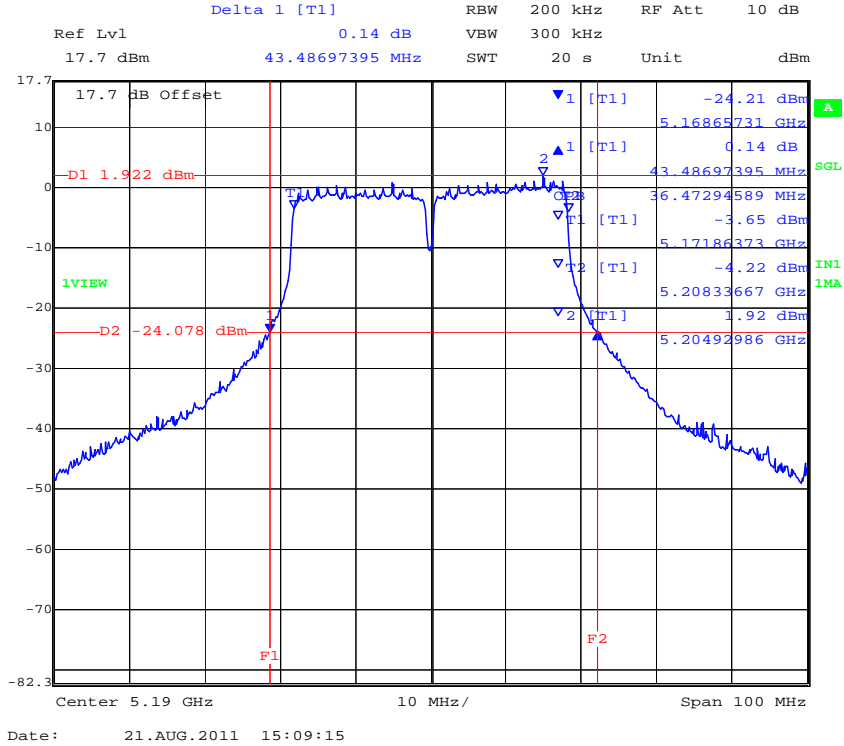
Measurement uncertainty:	±2.81 dB
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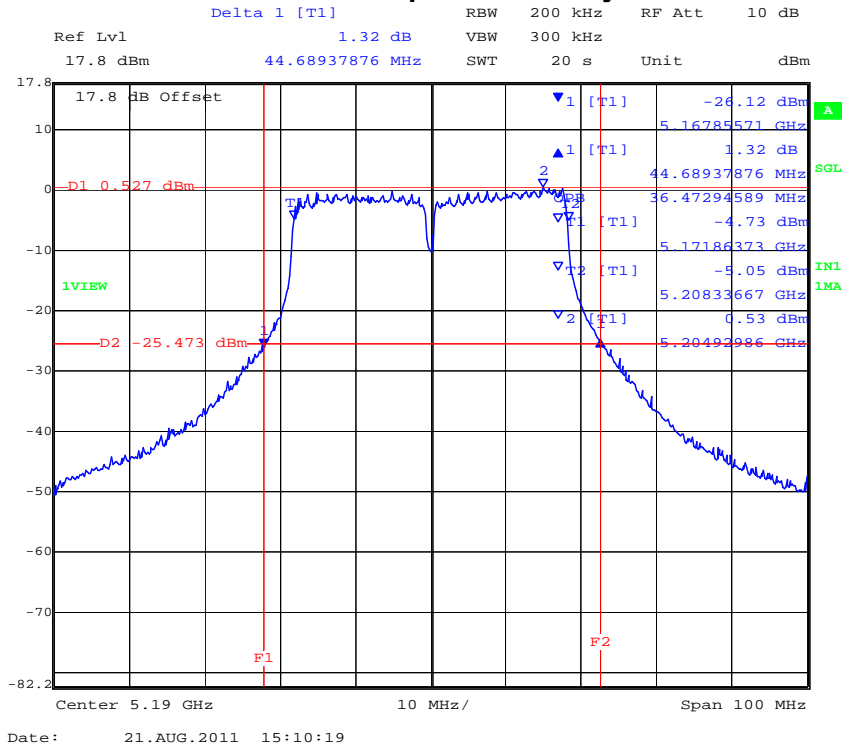


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PORT A 5,190 MHz 802.11n HT-20 Power Spectral Density



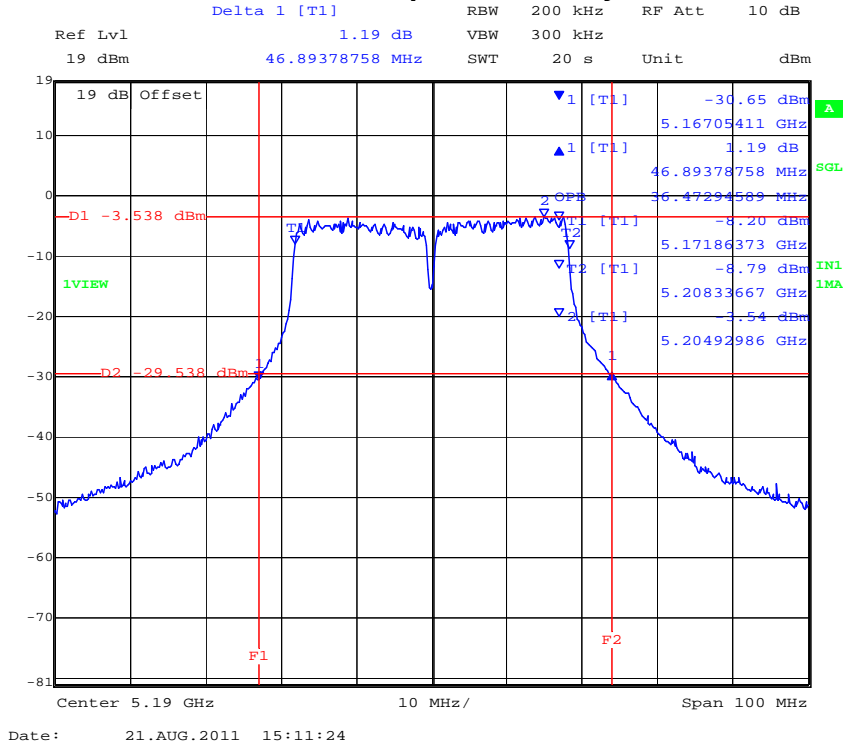
PORT B 5,190 MHz 802.11n HT-20 Power Spectral Density



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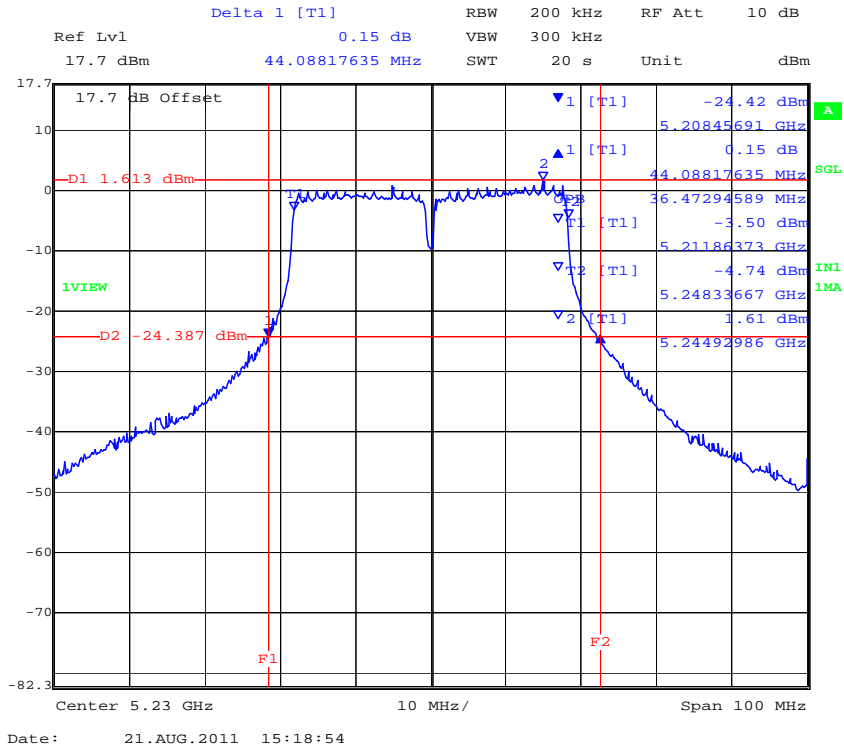
PORT C 5,190 MHz 802.11n HT-20 Power Spectral Density



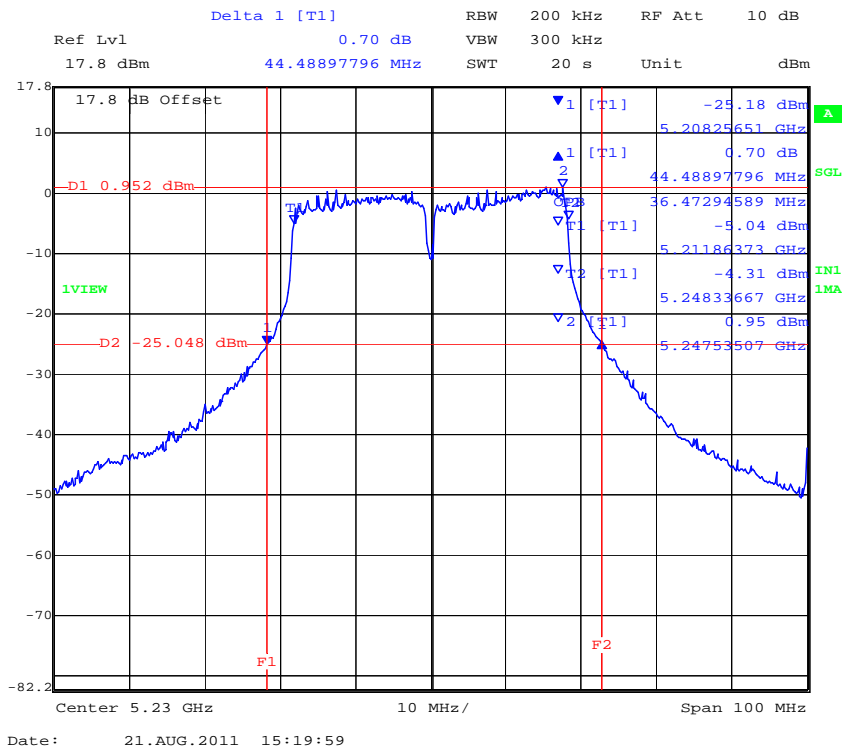
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PORT A 5,230 MHz 802.11n HT-20 Power Spectral Density



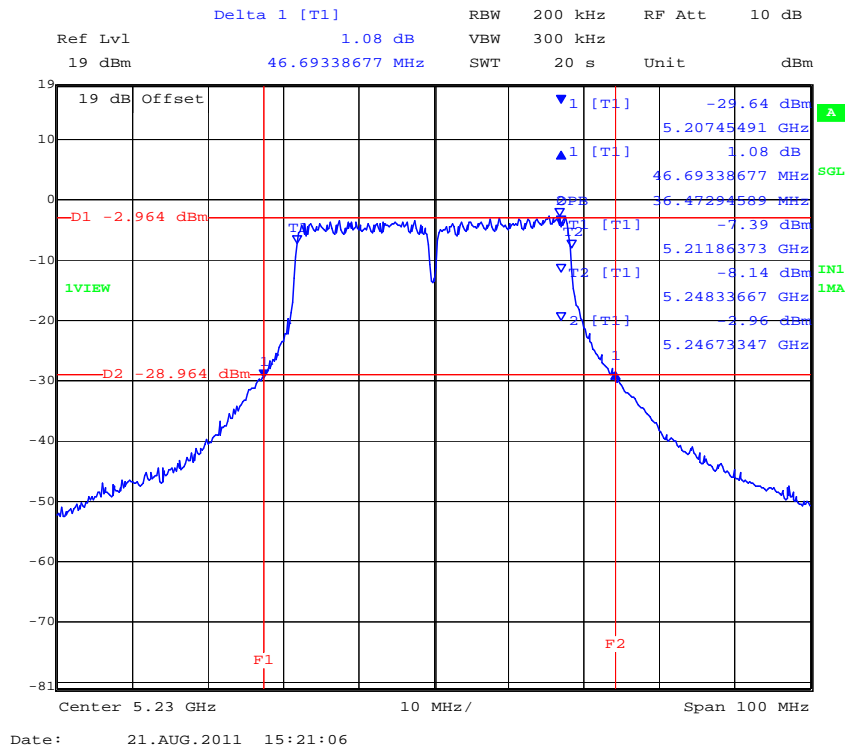
PORT B 5,230 MHz 802.11n HT-20 Power Spectral Density



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PORT C 5,230 MHz 802.11n HT-20 Power Spectral Density



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TABLE OF RESULTS – 802.11a Legacy 5250 – 5350 MHz

Test Conditions:	15.247 (a)(2)	Rel. Humidity (%):	35 to 42
Variant:	802.11a	Ambient Temp. (°C):	19 to 22
TPC:	HIGH	Pressure (mBars):	998 to 1003
Modulation:	ON	Duty Cycle (x):	100
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi
Applied Voltage:	48.0 Vdc		
Notes 1:			
Notes 2:			

26 dB Bandwidth

Test Frequency	26 dB Bandwidth				Minimum 6dB Bandwidth Limit		Margin
	MHz				kHz	MHz	MHz
MHz	a	b	c	d			
5260	29.559000	30.661000	28.257000		500	0.5	-27.757000
5300	32.866000	28.357000	28.858000				-27.857000
5320	32.565000	25.952000	28.958000				-25.452000

99% Bandwidth

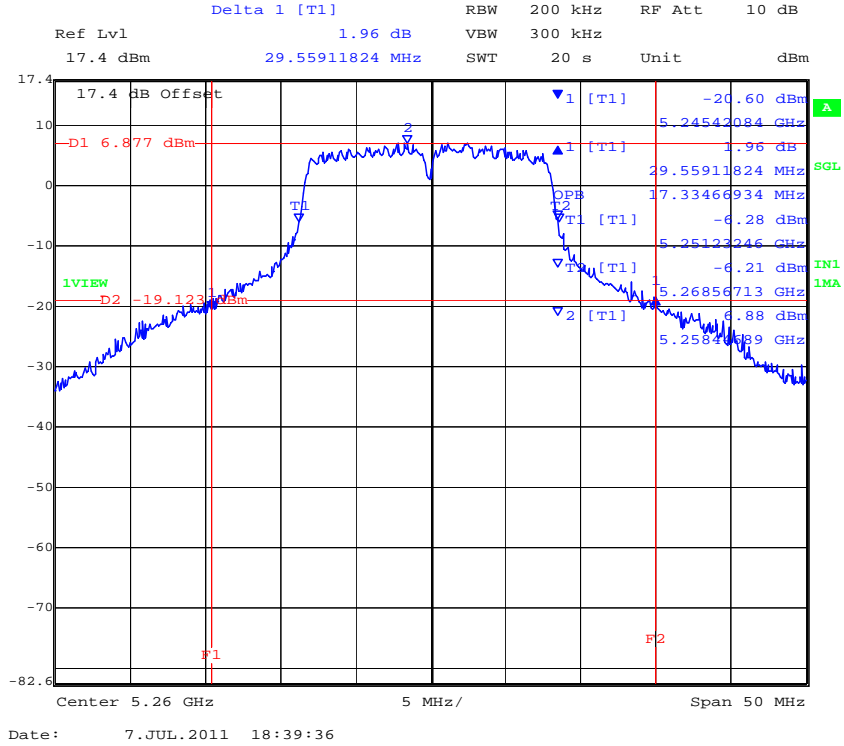
Test Frequency	99 % Bandwidth					
	MHz					
MHz	a	b	c	d		
5260	17.335000	17.134000	17.134000			
5300	18.236000	16.733000	17.134000			
5320	18.838000	16.733000	17.134000			

Measurement uncertainty:	±2.81 dB
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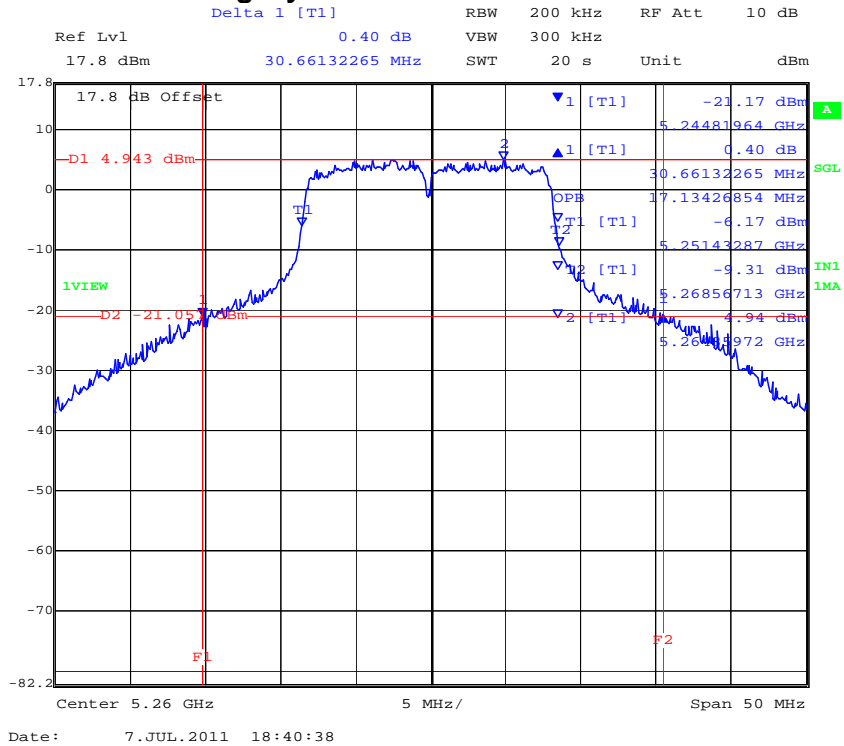
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PORT A 5,260 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



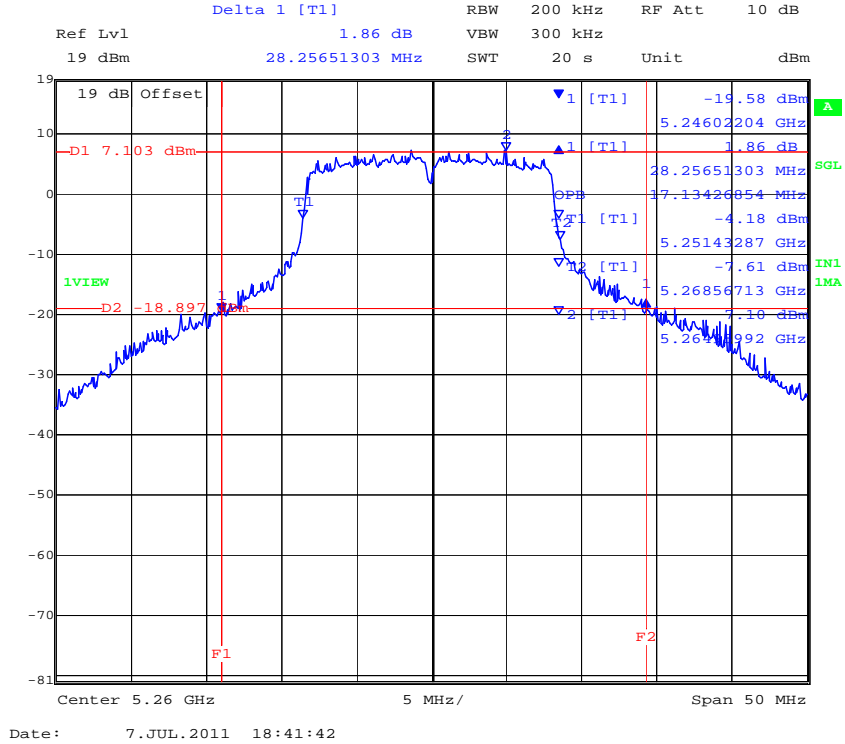
PORT B 5,260 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



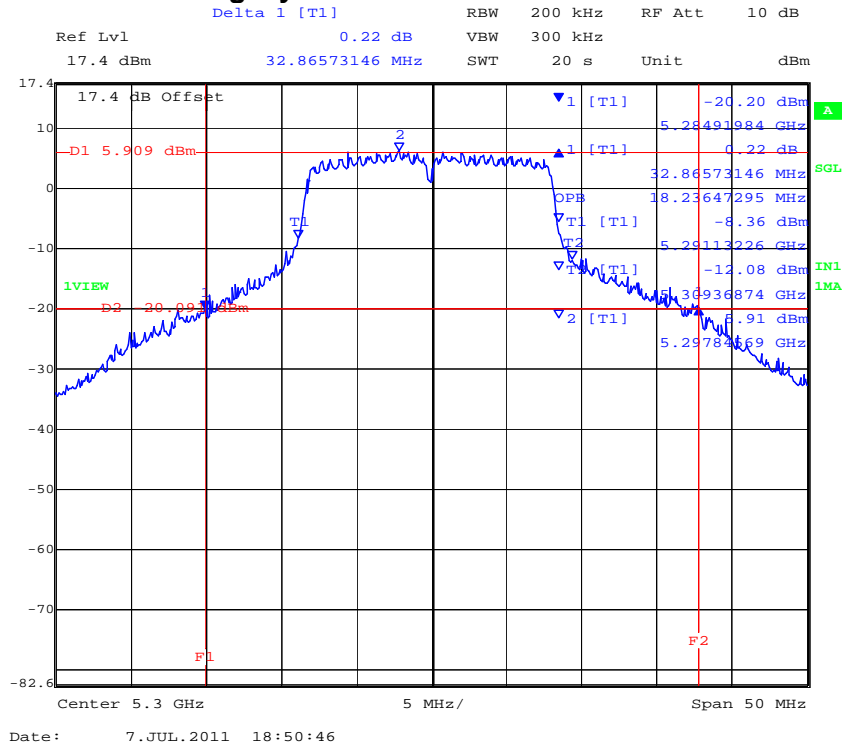
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PORT C 5,260 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



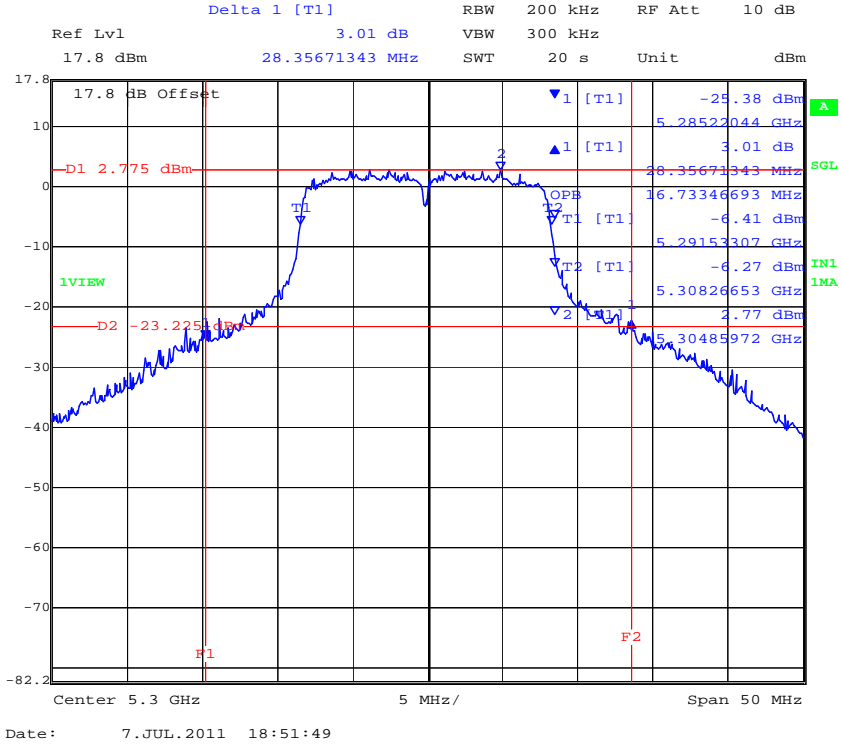
PORT A 5300 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



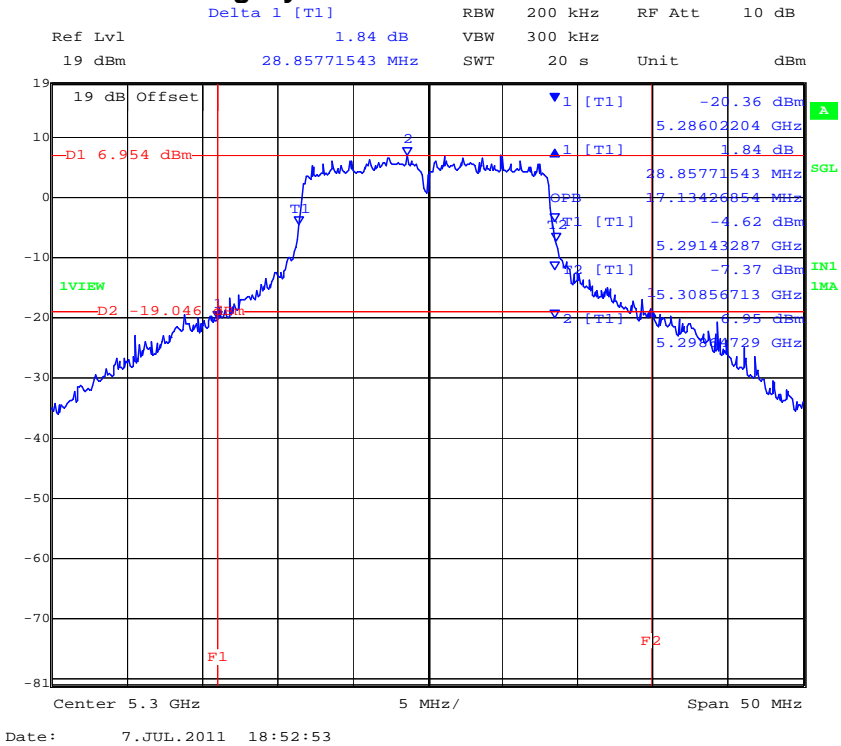
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PORT B 5,300 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



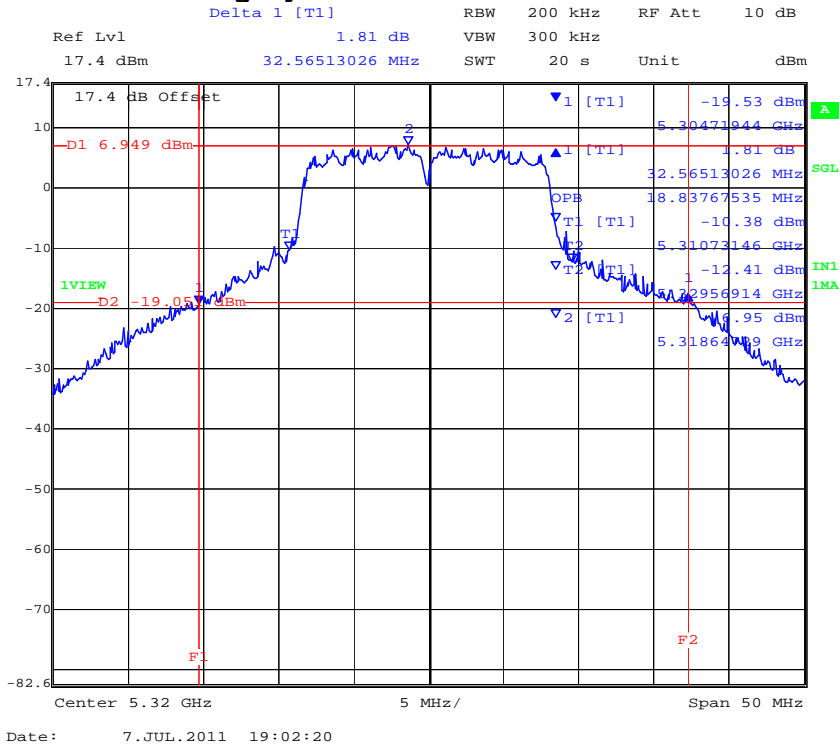
PORT C 5,300 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



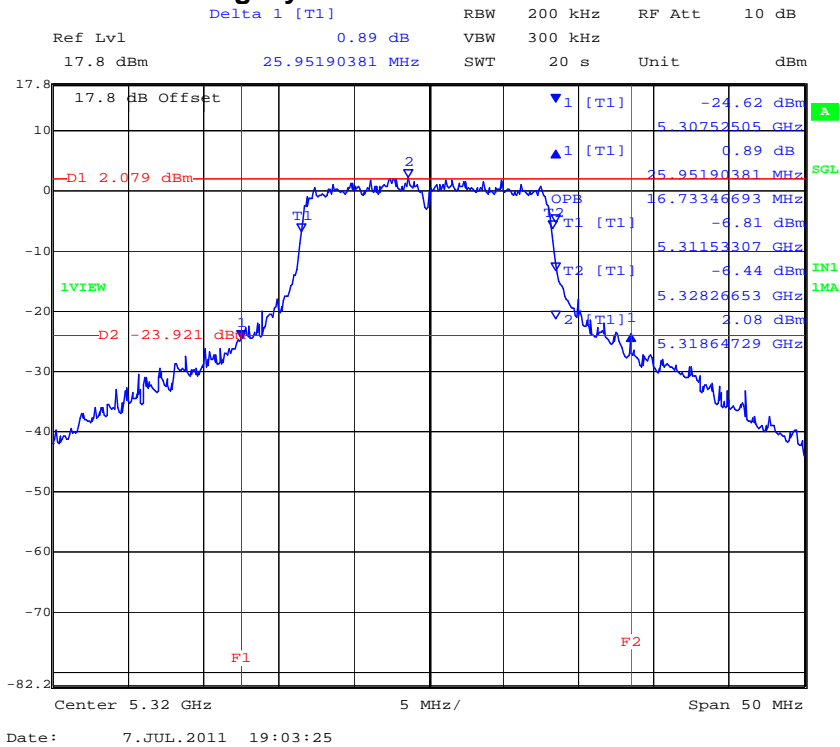
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PORT A 5,320 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



PORT B 5,320 MHz 802.11a Legacy 26 dB and 99 % Bandwidth

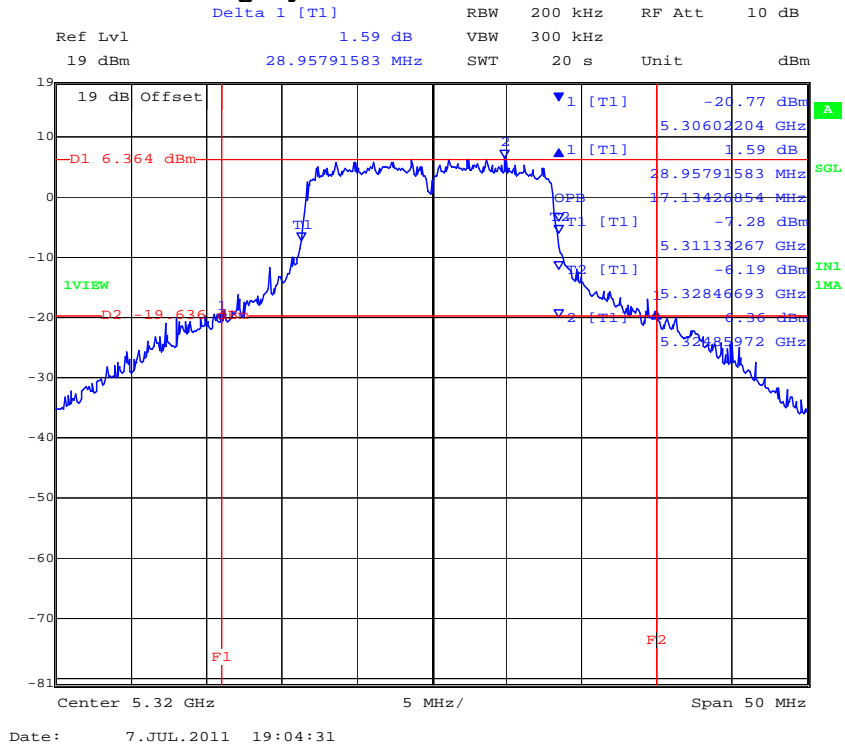


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PORT C 5,320 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



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

TABLE OF RESULTS – 802.11n HT20 5250 – 5350 MHz

Test Conditions:	15.247 (a)(2)	Rel. Humidity (%):	35 to 42
Variant:	802.11n HT-20	Ambient Temp. (°C):	19 to 22
TPC:	HIGH	Pressure (mBars):	998 to 1003
Modulation:	ON	Duty Cycle (x):	100
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi
Applied Voltage:	48.0 Vdc		
Notes 1:			
Notes 2:			

26 dB Bandwidth

Test Frequency	26 dB Bandwidth				Minimum 6dB Bandwidth Limit		Margin
	MHz						
MHz	a	b	c	d	kHz	MHz	MHz
5260	29.960000	28.858000	28.858000		500	0.5	-28.358000
5300	32.766000	26.754000	32.766000				-26.254000
5320	36.273000	25.150000	30.962000				-24.650000

99% Bandwidth

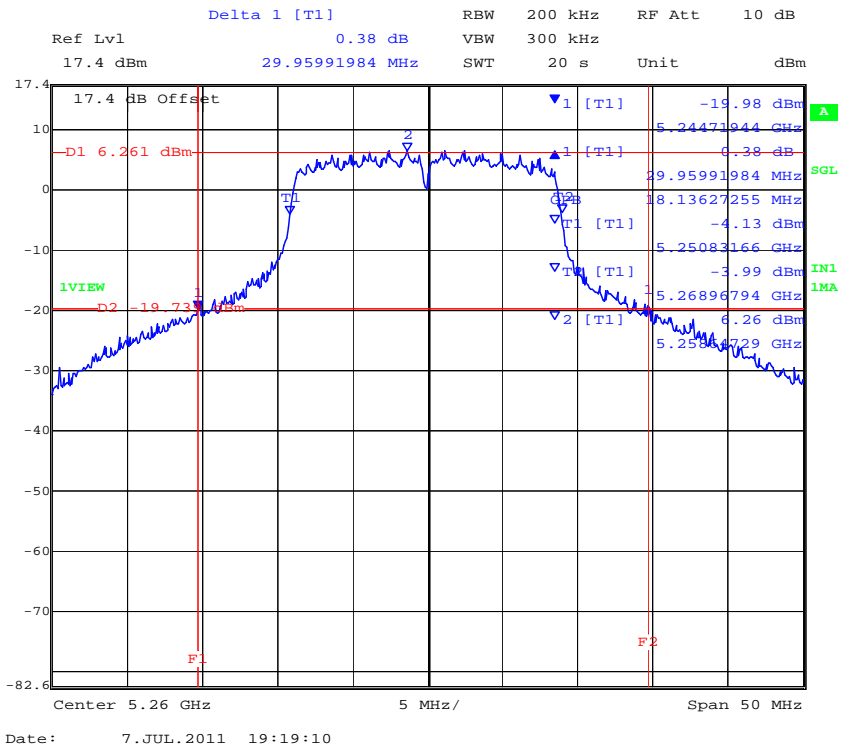
Test Frequency	99 % Bandwidth					
	MHz					
MHz	a	b	c	d		
5260	18.136000	18.036000	18.036000			
5300	18.938000	17.936000	18.236000			
5320	19.940000	17.936000	18.236000			

Measurement uncertainty:	±2.81 dB
---------------------------------	----------

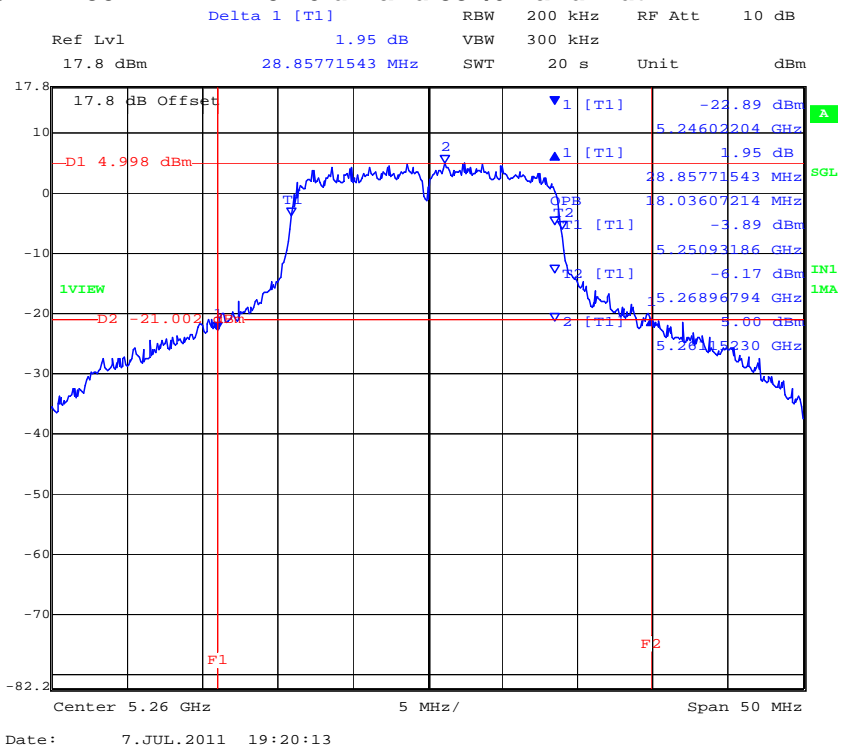
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PORT A 5,260 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



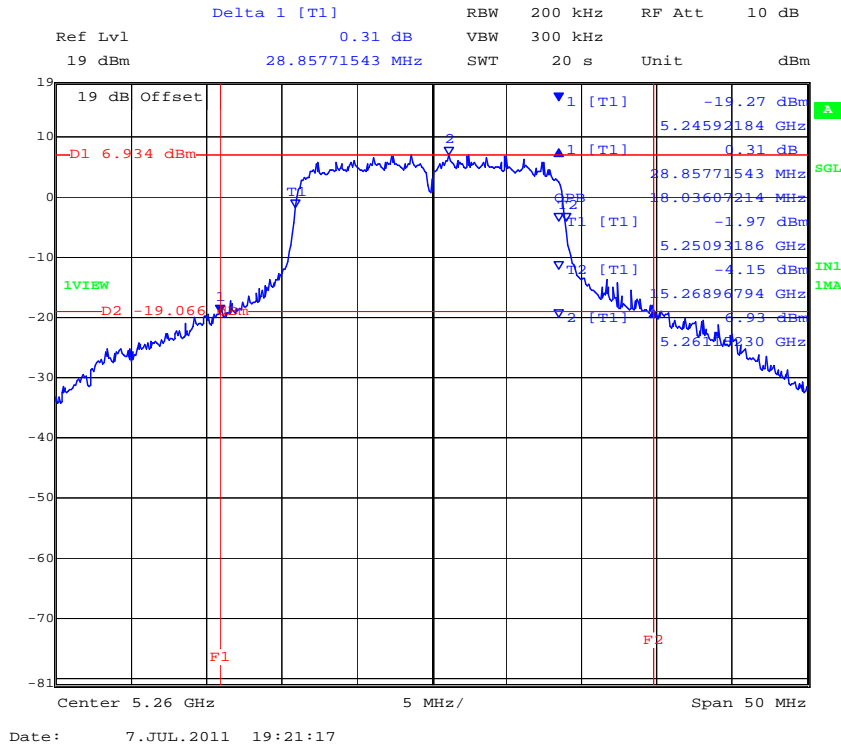
PORT B 5,260 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



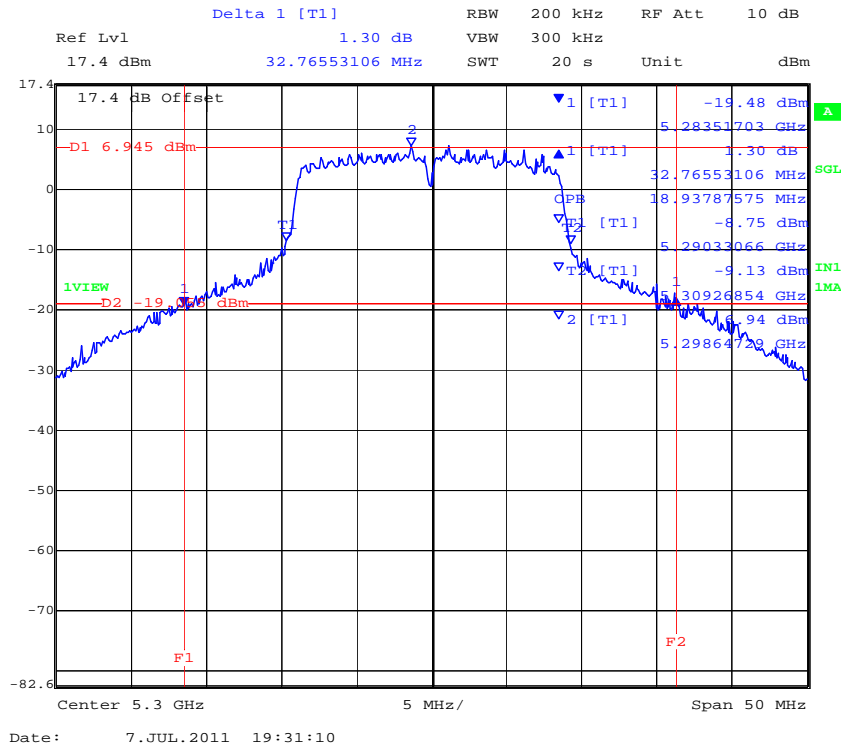
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PORT C 5,260 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



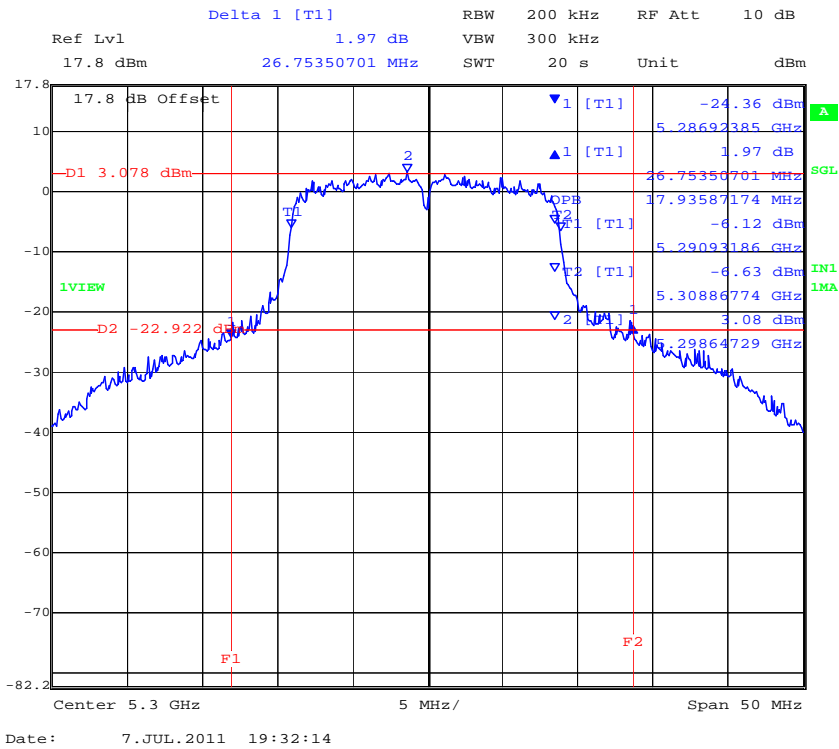
PORT A 5300 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



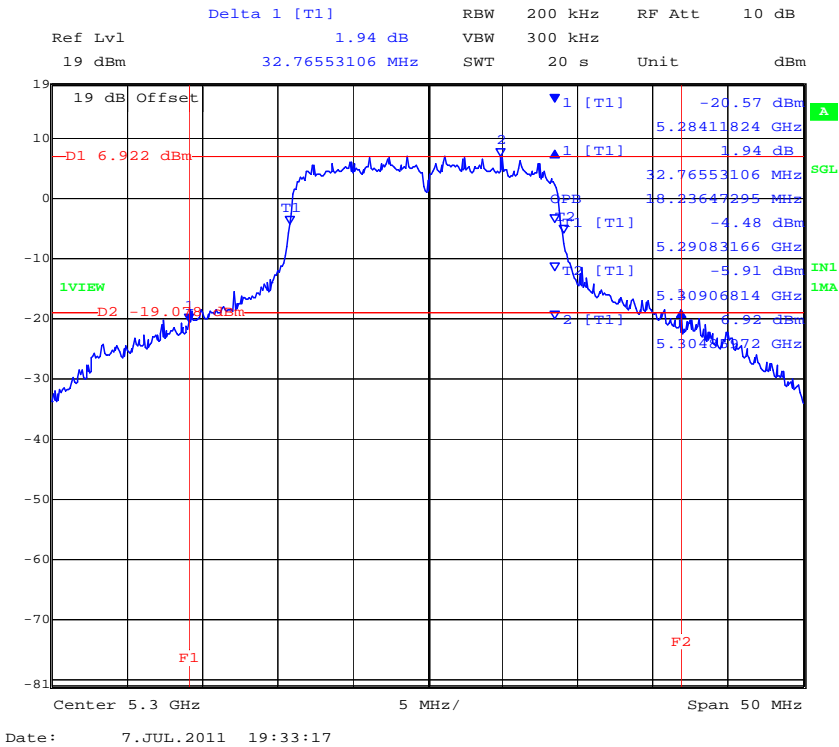
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PORT B 5,300 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



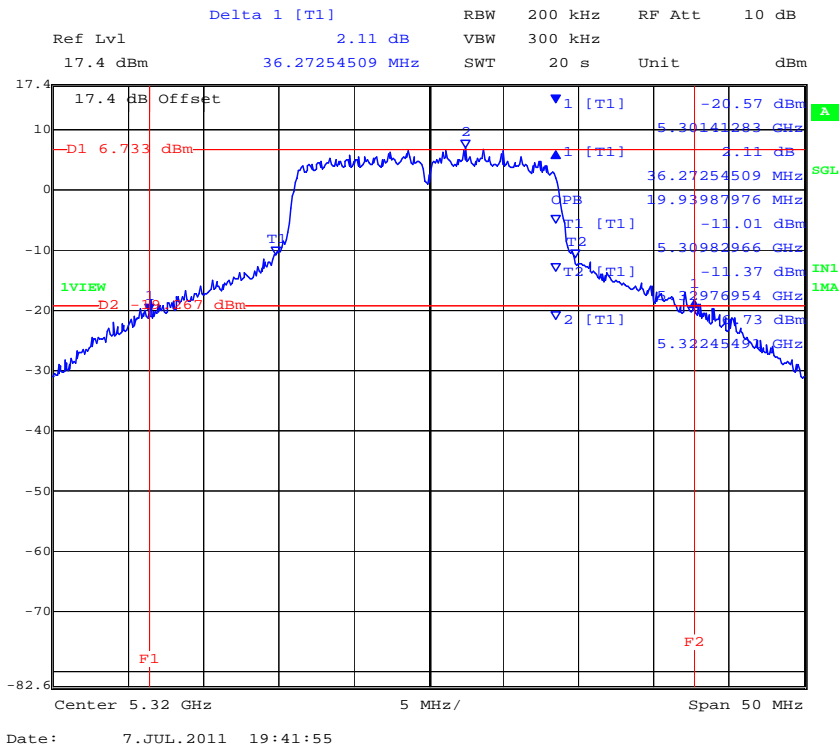
PORT C 5,300 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



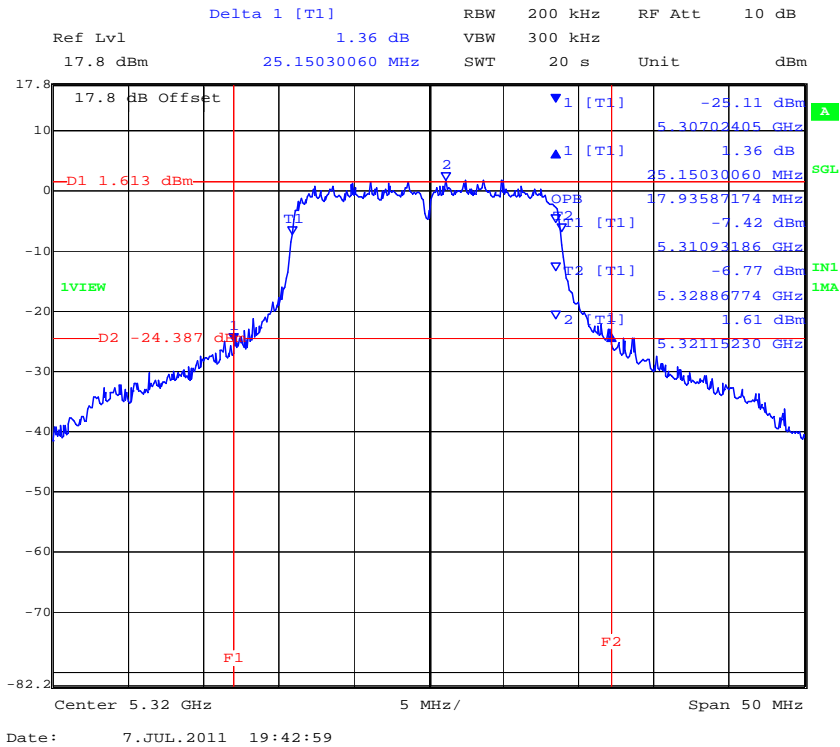
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PORT A 5,320 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



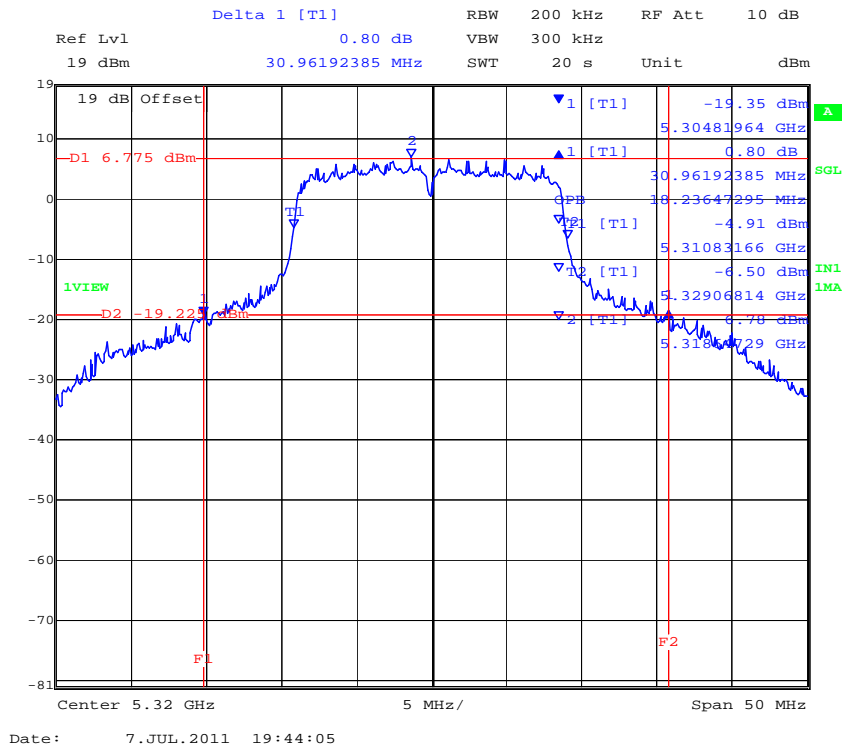
PORT B 5,320 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



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PORT C 5,320 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



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

TABLE OF RESULTS – 802.11n HT40 5250 – 5350 MHz

Test Conditions:	15.247 (a)(2)	Rel. Humidity (%):	35 to 42
Variant:	802.11n HT-40	Ambient Temp. (°C):	19 to 22
TPC:	HIGH	Pressure (mBars):	998 to 1003
Modulation:	ON	Duty Cycle (x):	100
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi
Applied Voltage:	48.0 Vdc		
Notes 1:			
Notes 2:			

26 dB Bandwidth

Test Frequency	26 dB Bandwidth				Minimum 6dB Bandwidth Limit		Margin
	MHz				kHz	MHz	
MHz	a	b	c	d			
5270	46.894000	47.896000	47.495000		500	0.5	-46.394000
5310	61.122000	45.892000	47.094000				-45.392000

99% Bandwidth

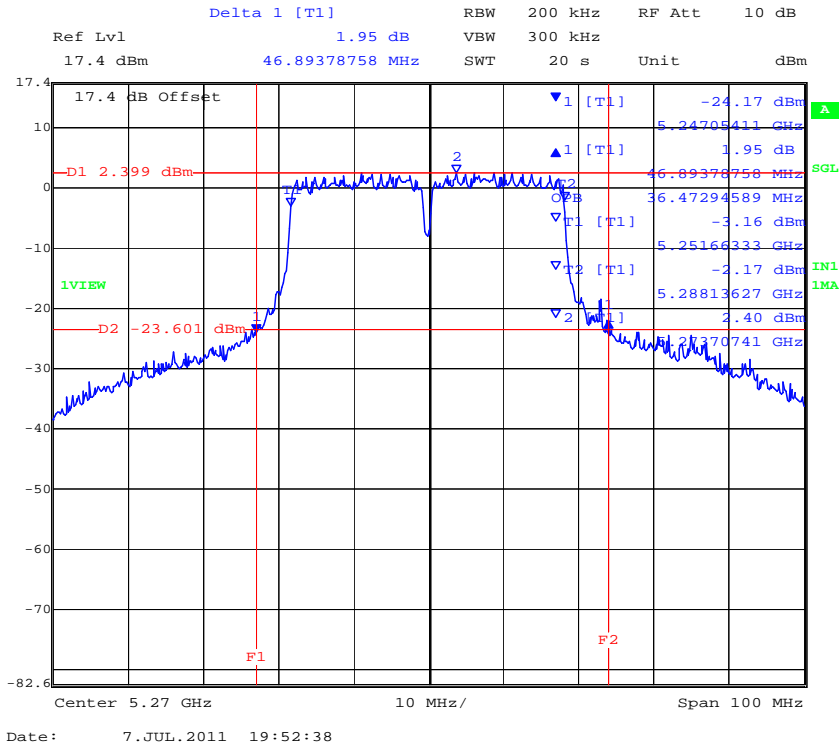
Test Frequency	99 % Bandwidth					
	MHz					
MHz	a	b	c	d		
5270	36.473000	36.473000	36.673000			
5310	36.673000	36.473000	36.473000			

Measurement uncertainty:	±2.81 dB
---------------------------------	----------

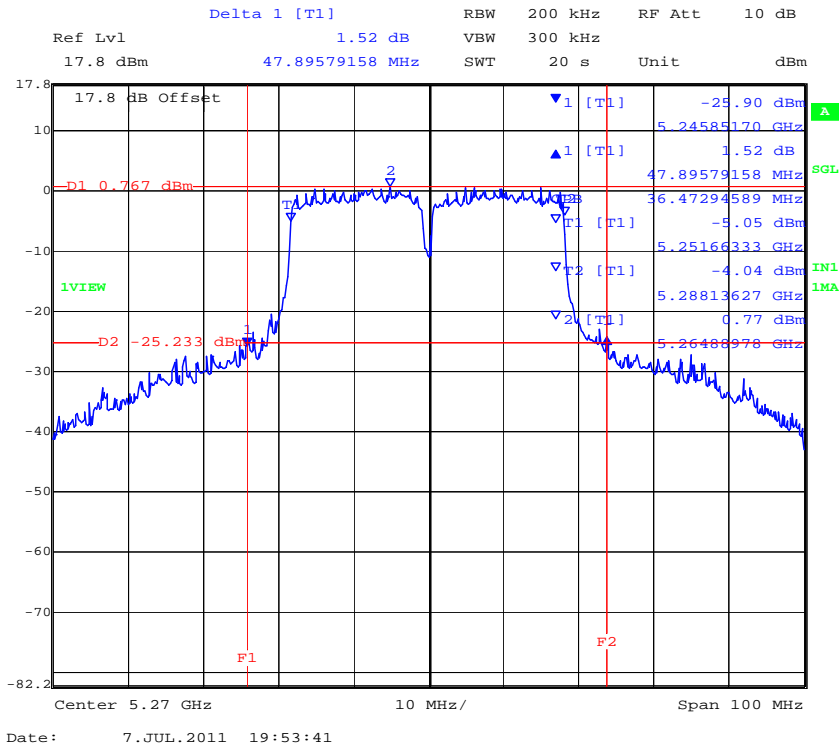
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PORT A 5,270 MHz 802.11n HT-40 26 dB and 99 % Bandwidth



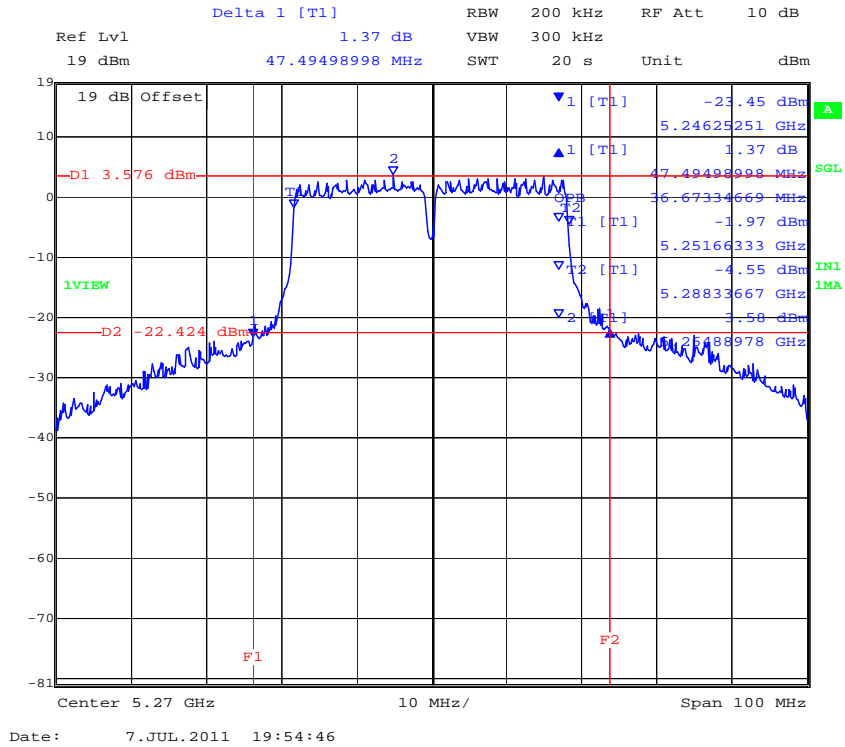
PORT B 5,270 MHz 802.11n HT-40 26 dB and 99 % Bandwidth



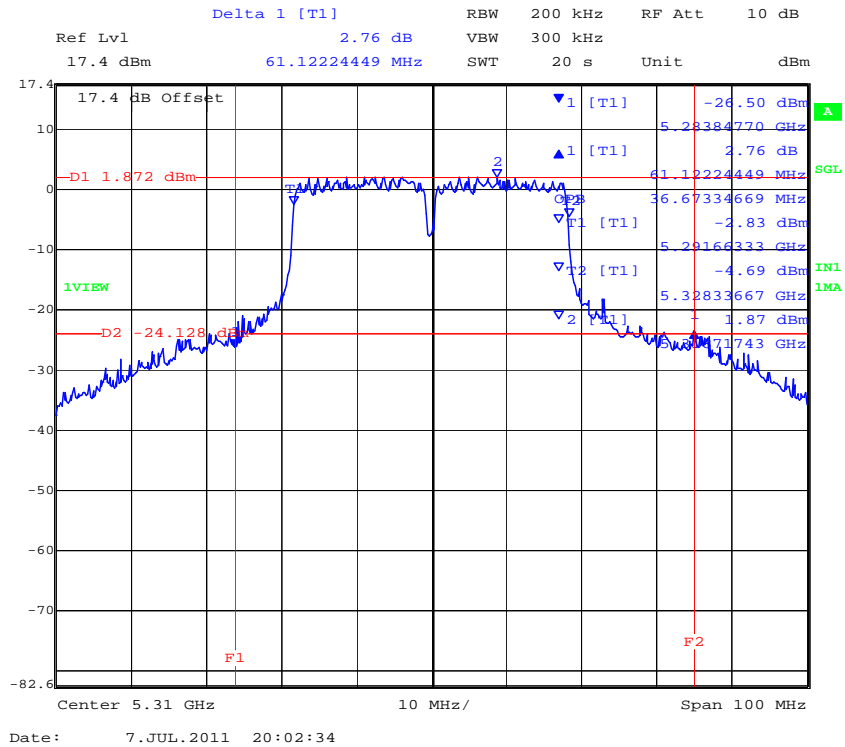
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PORT C 5,270 MHz 802.11n HT-40 26 dB and 99 % Bandwidth



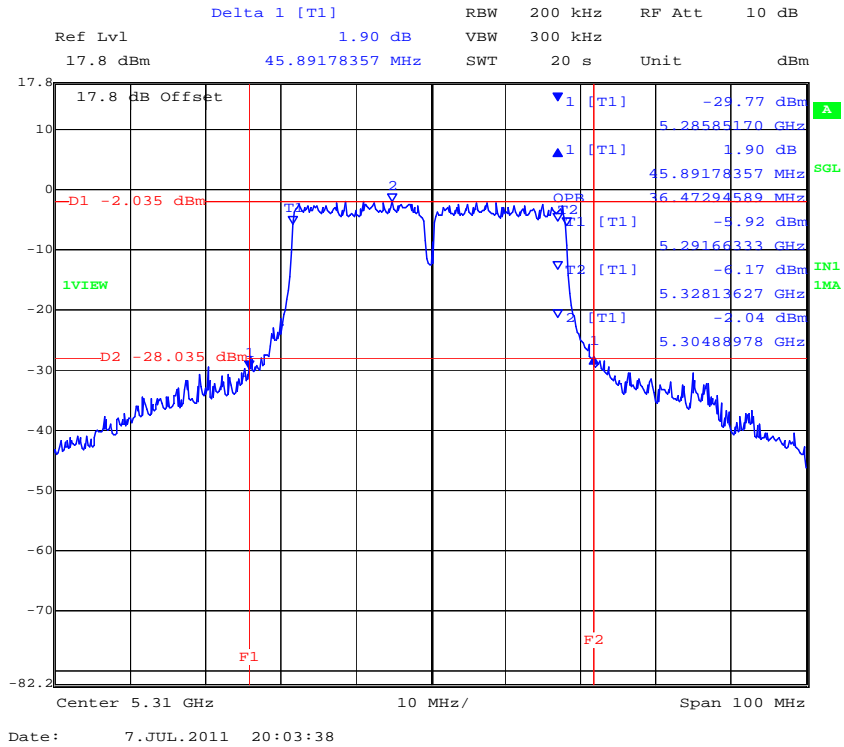
PORT A 5,310 MHz 802.11n HT-40 26 dB and 99 % Bandwidth



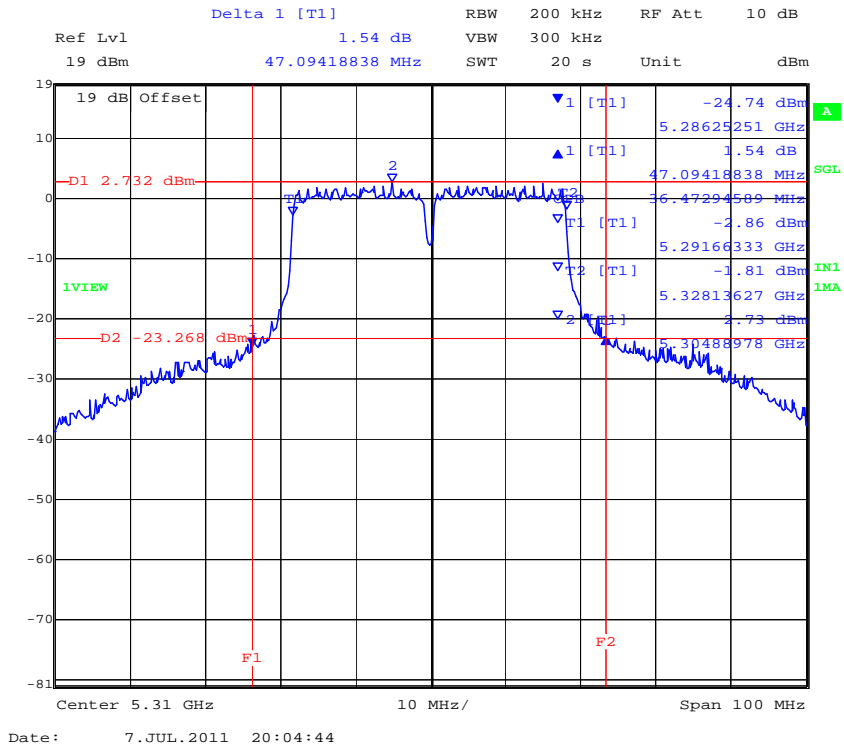
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PORT B 5,310 MHz 802.11n HT-40 26 dB and 99 % Bandwidth



PORT C 5,310 MHz 802.11n HT-40 26 dB and 99 % Bandwidth



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TABLE OF RESULTS – 802.11a Legacy 5500 – 5700 MHz

Test Conditions:	15.247 (a)(2)	Rel. Humidity (%):	35 to 42
Variant:	802.11a	Ambient Temp. (°C):	19 to 22
TPC:	HIGH	Pressure (mBars):	998 to 1003
Modulation:	ON	Duty Cycle (x):	100
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi
Applied Voltage:	48.0 Vdc		
Notes 1:			
Notes 2:			

26 dB Bandwidth

Test Frequency	26 dB Bandwidth				Minimum 6dB Bandwidth Limit		Margin
	MHz				kHz	MHz	
MHz	a	b	c	d			
5500	24.850000	25.150000	23.747000		500	0.5	-23.247000
5580	26.653000	28.357000	27.956000				-26.153000
5700	28.257000	22.044000	24.549000				-21.544000

99% Bandwidth

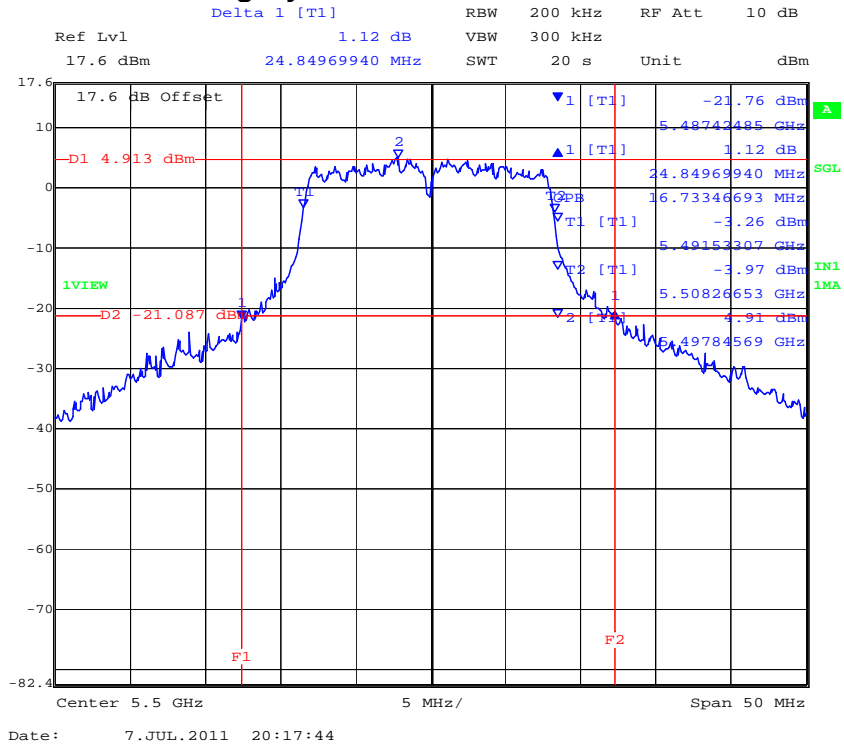
Test Frequency	99 % Bandwidth						
	MHz						
MHz	a	b	c	d			
5500	16.733000	16.733000	16.733000				
5580	16.934000	16.934000	16.934000				
5700	16.934000	16.633000	16.733000				

Measurement uncertainty:	±2.81 dB
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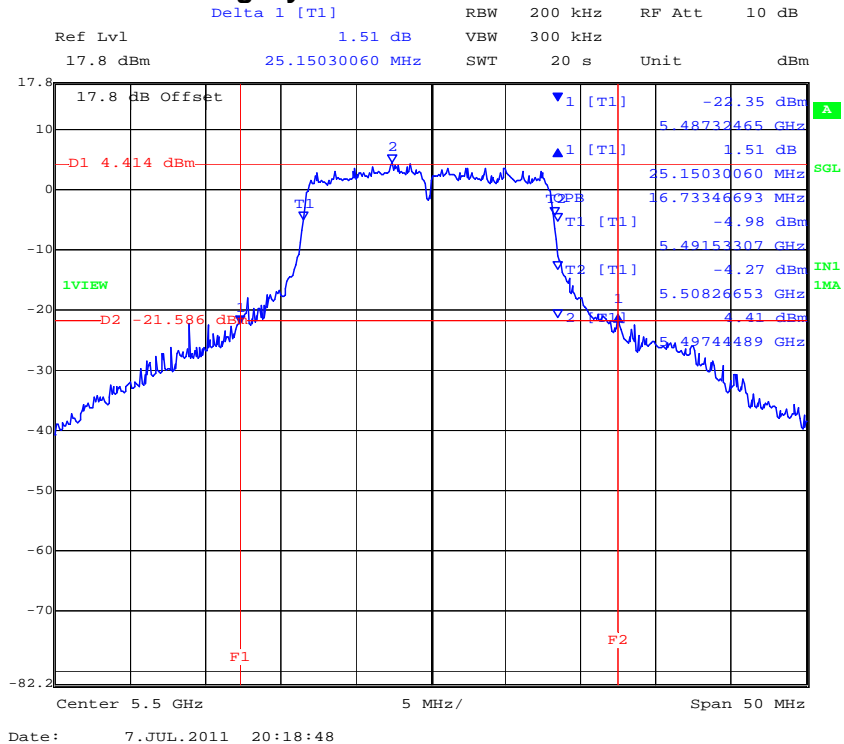
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PORT A 5,500 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



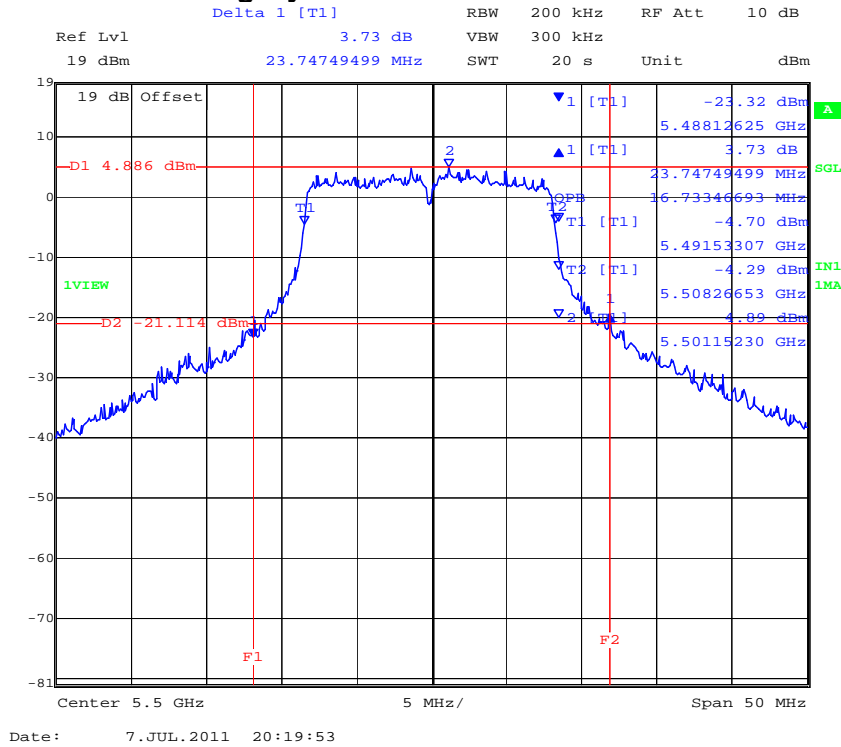
PORT B 5,500 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



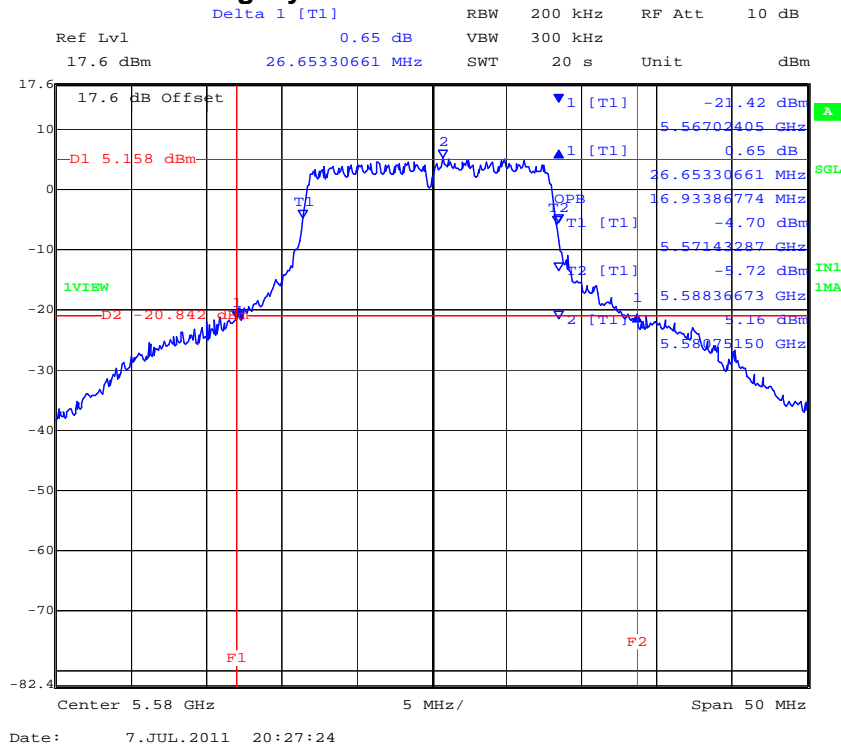
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PORT C 5,500 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



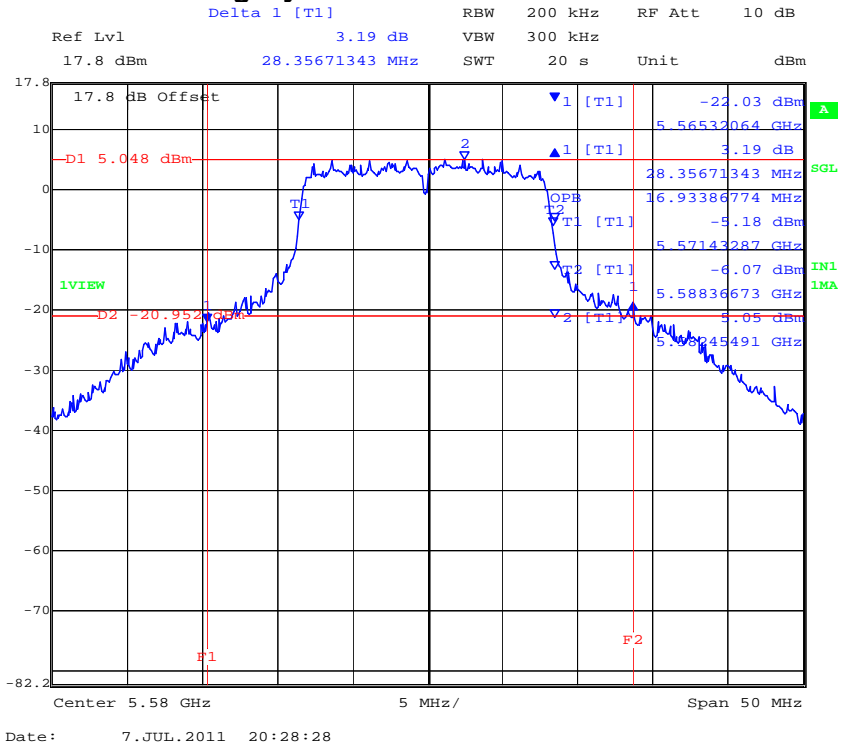
PORT A 5,580 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



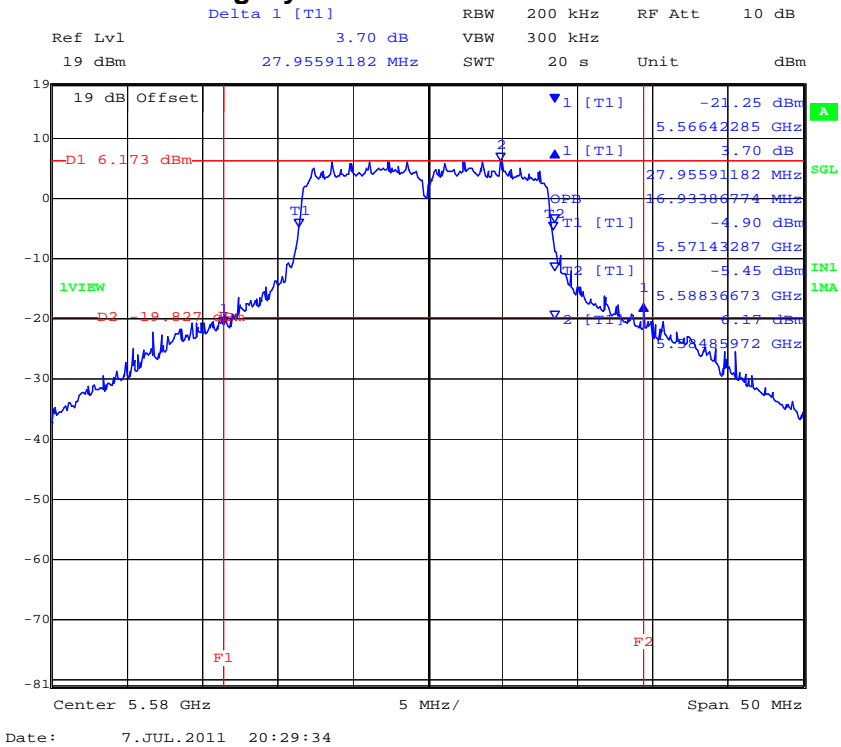
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PORT B 5,580 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



PORT C 5,580 MHz 802.11a Legacy 26 dB and 99 % Bandwidth

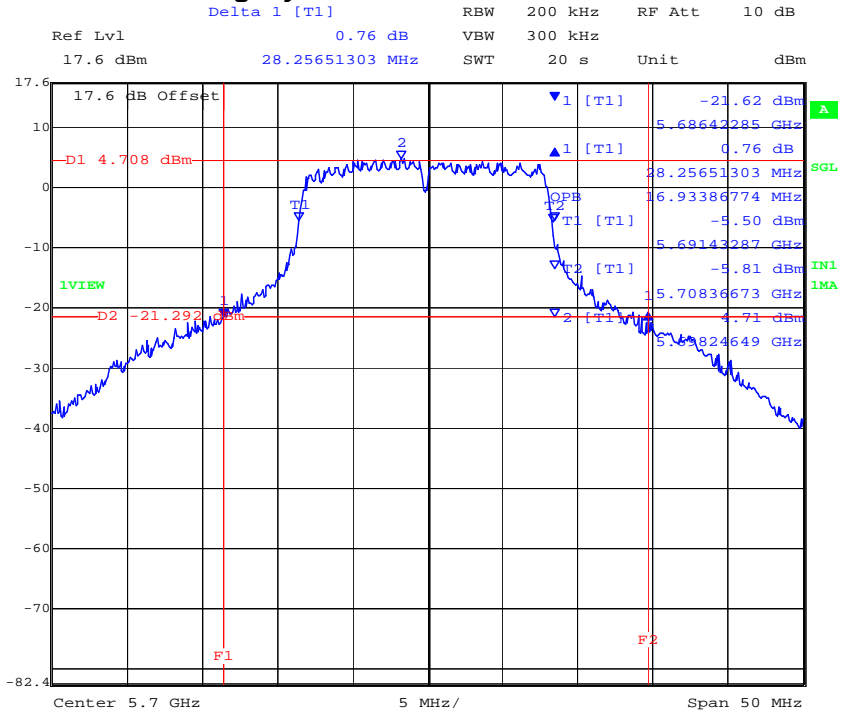


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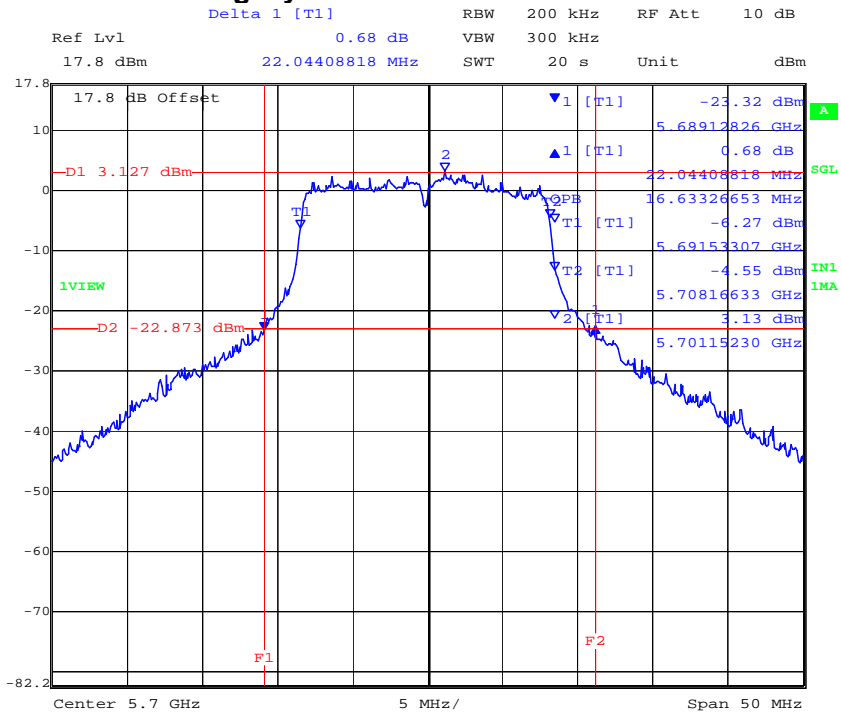
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PORT A 5,700 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



Date: 7.JUL.2011 20:38:49

PORT B 5,700 MHz 802.11a Legacy 26 dB and 99 % Bandwidth

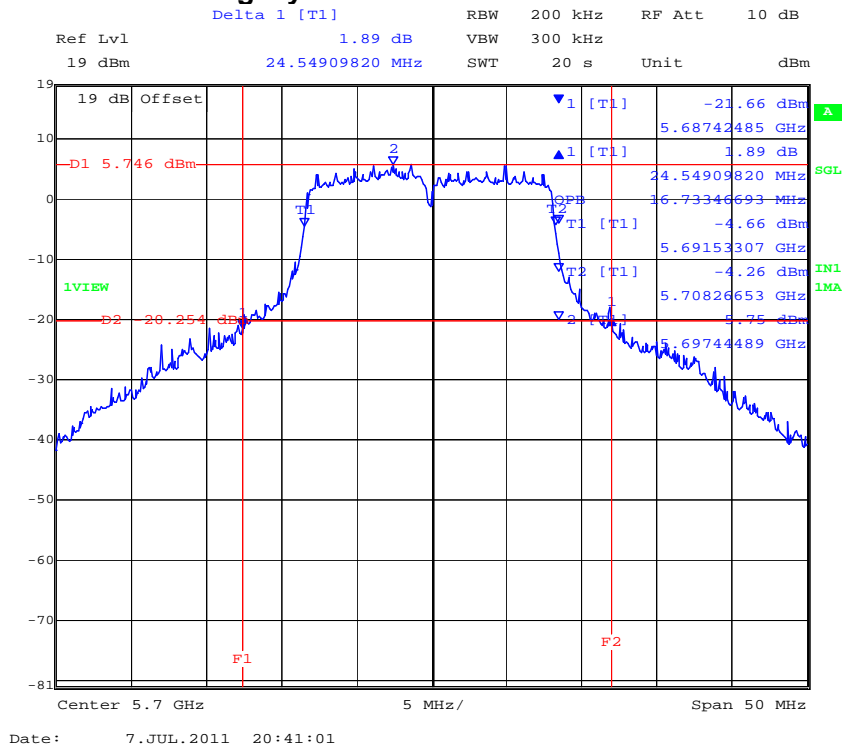


Date: 7.JUL.2011 20:39:54

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PORT C 5,700 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



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TABLE OF RESULTS – 802.11n HT-20 5500 – 5700 MHz

Test Conditions:	15.247 (a)(2)	Rel. Humidity (%):	35 to 42
Variant:	802.11n HT-20	Ambient Temp. (°C):	19 to 22
TPC:	HIGH	Pressure (mBars):	998 to 1003
Modulation:	ON	Duty Cycle (x):	100
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi
Applied Voltage:	48.0 Vdc		
Notes 1:			
Notes 2:			

26 dB Bandwidth

Test Frequency	26 dB Bandwidth				Minimum 6dB Bandwidth Limit		Margin
	MHz				kHz	MHz	
MHz	a	b	c	d			
5500	24.950000	26.353000	24.248000		500	0.5	-23.748000
5580	27.355000	29.259000	31.764000				-26.855000
5700	26.253000	23.046000	24.850000				-22.546000

99% Bandwidth

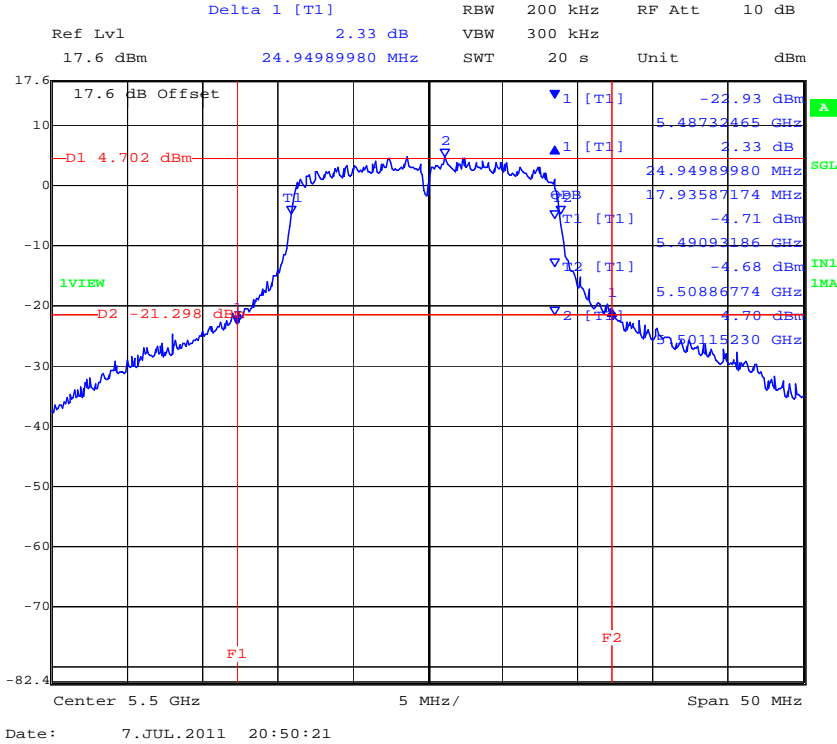
Test Frequency	99 % Bandwidth						
	MHz						
MHz	a	b	c	d			
5500	17.936000	17.836000	17.735000				
5580	18.136000	18.136000	18.136000				
5700	18.036000	17.735000	17.836000				

Measurement uncertainty:	±2.81 dB
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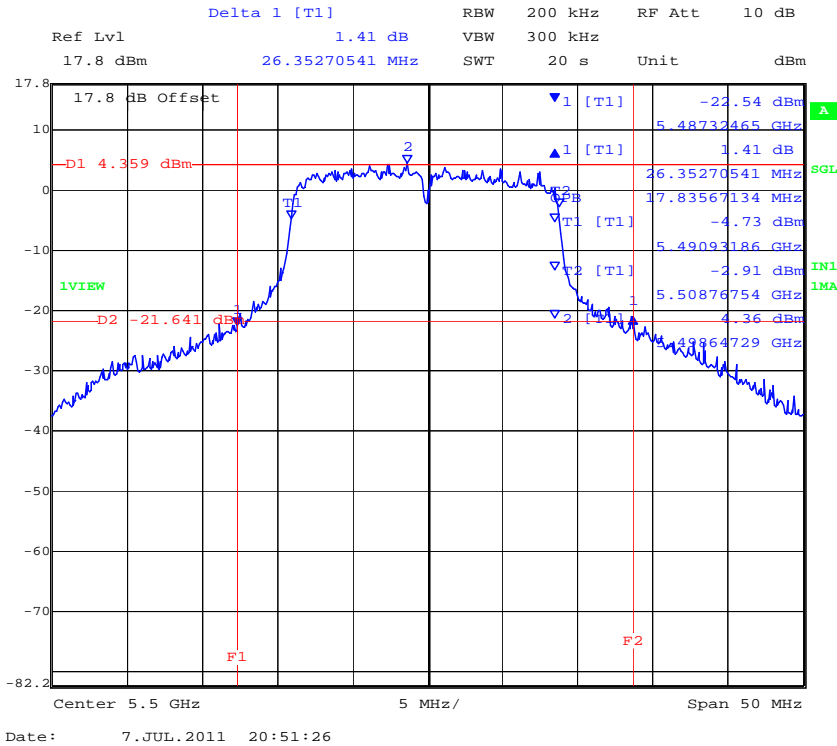
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PORT A 5,500 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



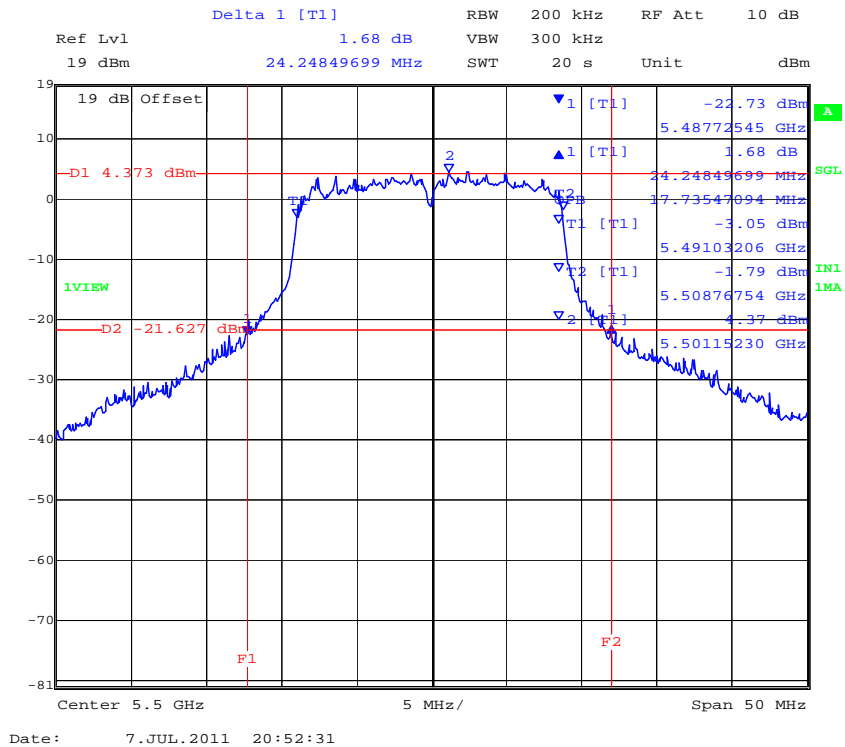
PORT B 5,500 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



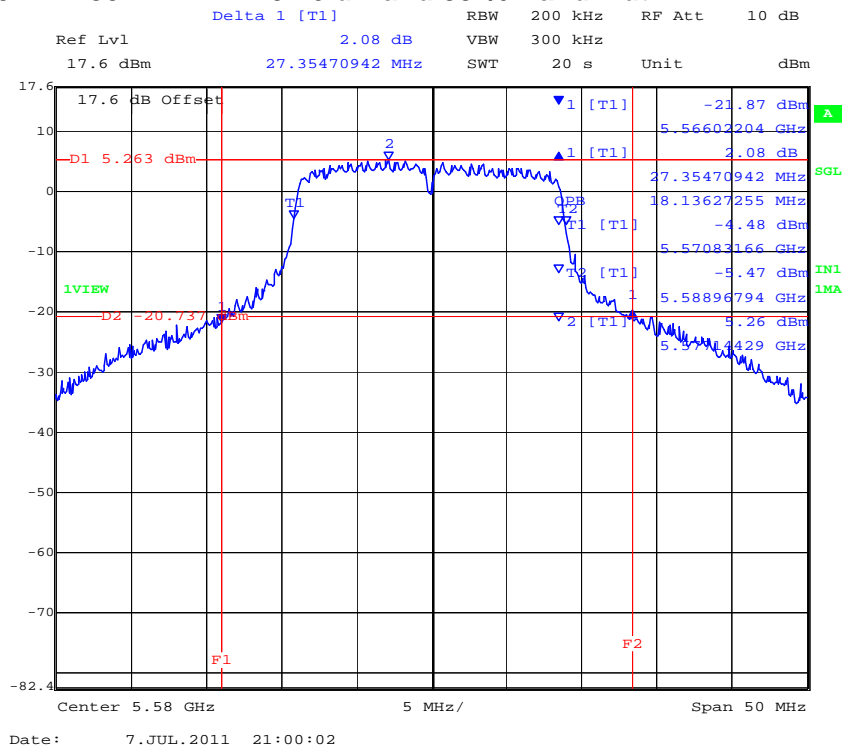
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PORT C 5,500 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



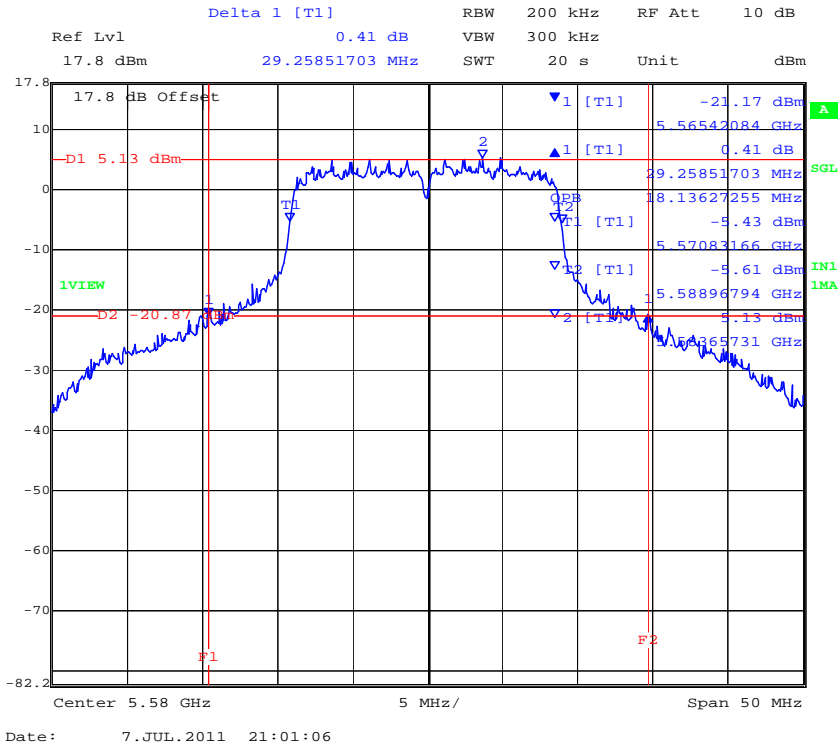
PORT A 5,580 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



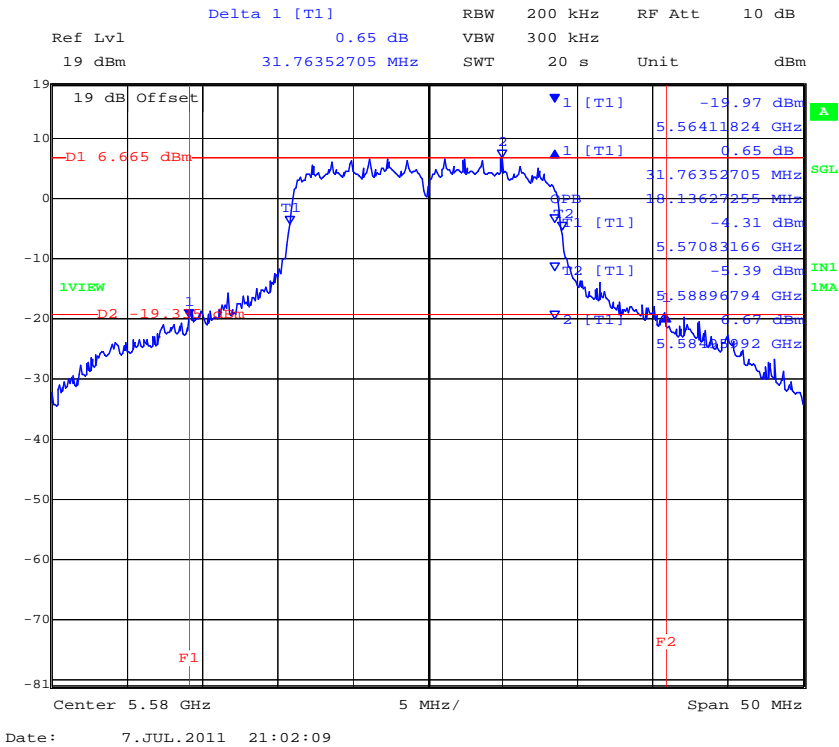
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PORT B 5,580 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



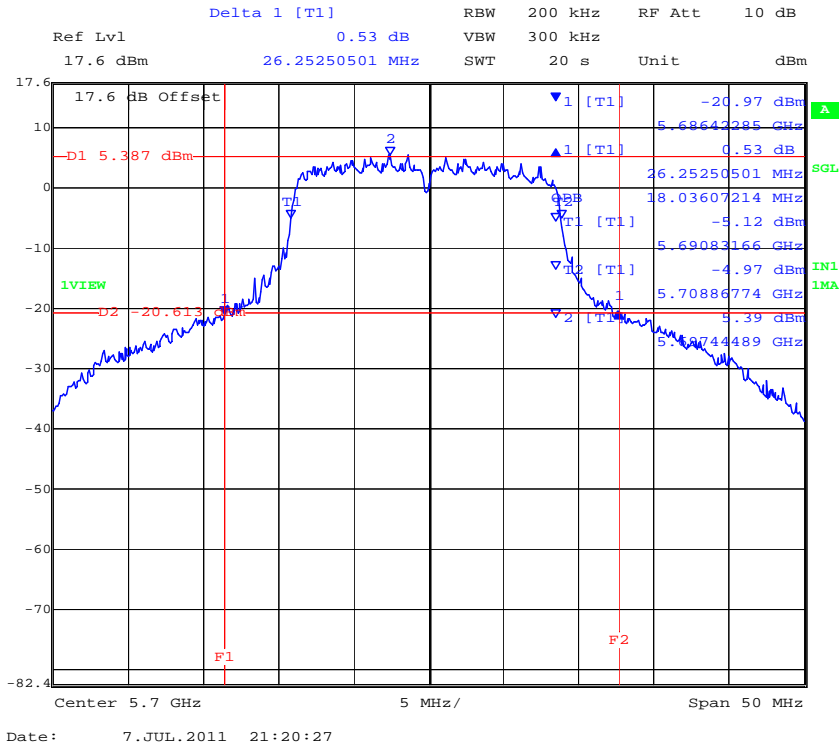
PORT C 5,580 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



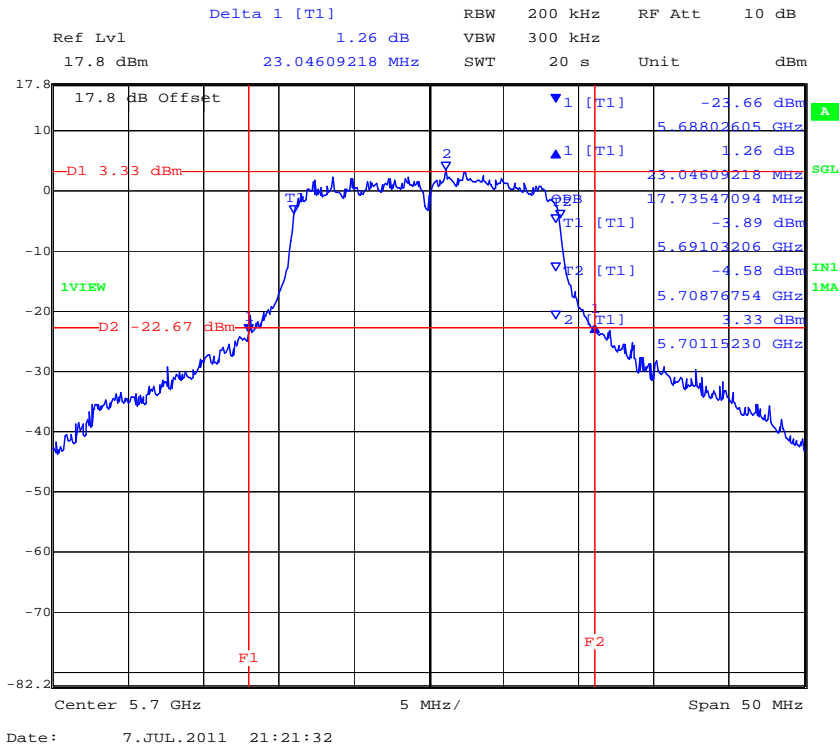
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PORT A 5,700 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



PORT B 5,700 MHz 802.11n HT-20 26 dB and 99 % Bandwidth

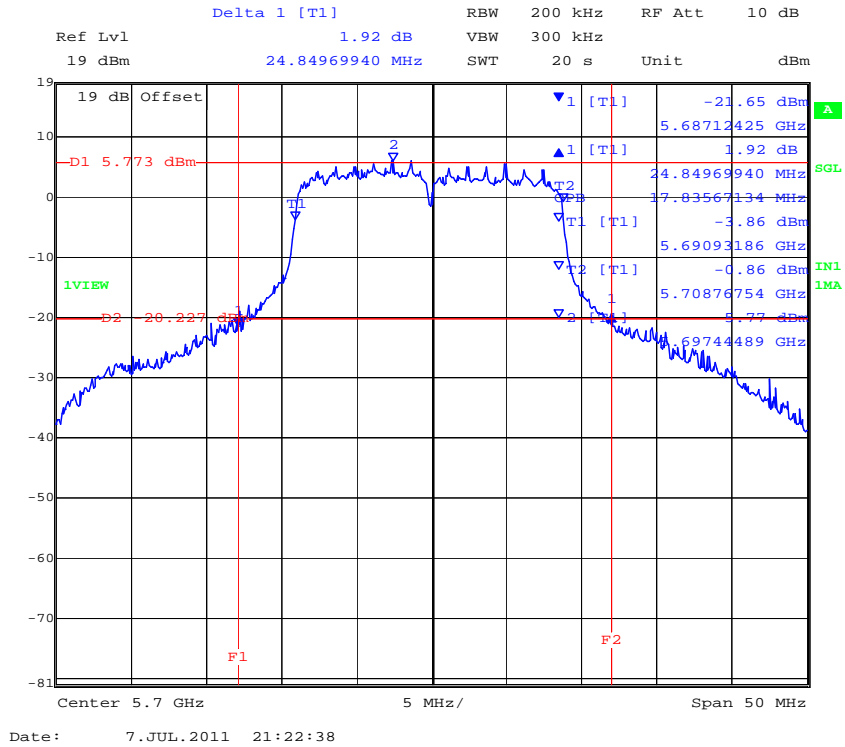


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PORT C 5,700 MHz 802.11n HT-20 26 dB and 99 % Bandwidth



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TABLE OF RESULTS – 802.11n HT-40 5500 – 5700 MHz

Test Conditions:	15.247 (a)(2)	Rel. Humidity (%):	35 to 42
Variant:	802.11n HT-40	Ambient Temp. (°C):	19 to 22
TPC:	HIGH	Pressure (mBars):	998 to 1003
Modulation:	ON	Duty Cycle (x):	100
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi
Applied Voltage:	48.0 Vdc		
Notes 1:			
Notes 2:			

26 dB Bandwidth

Test Frequency	26 dB Bandwidth				Minimum 6dB Bandwidth Limit		Margin
	MHz						
MHz	a	b	c	d	kHz	MHz	MHz
5510	45.892000	48.096000	42.285000		500	0.5	-41.785000
5550	47.896000	48.697000	45.892000				-45.392000
5670	49.900000	45.090000	47.094000				-44.590000

99% Bandwidth

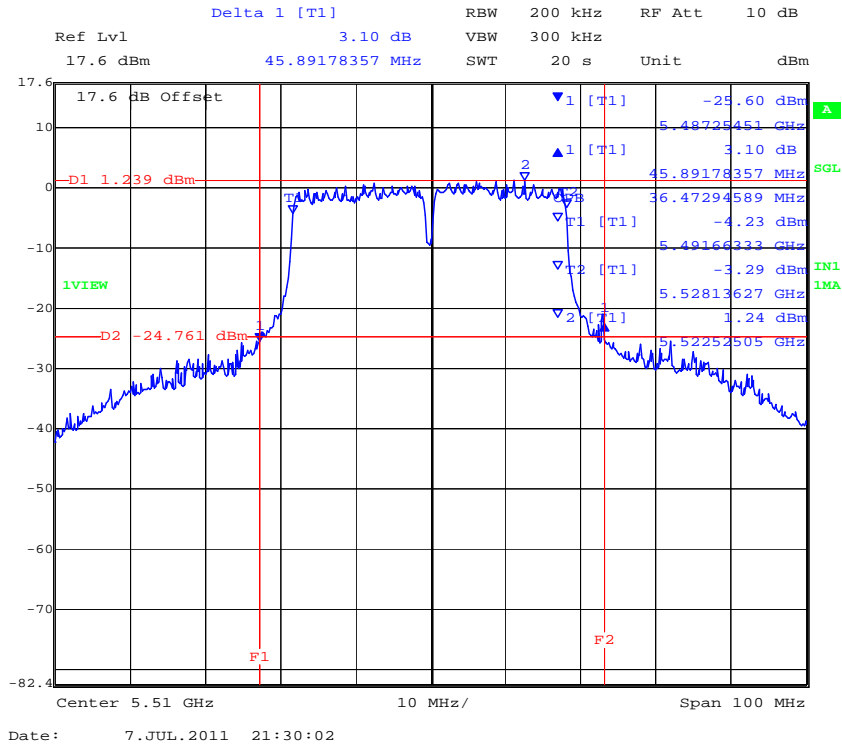
Test Frequency	99 % Bandwidth					
	MHz					
MHz	a	b	c	d		
5510	36.473000	36.473000	36.273000			
5550	36.473000	36.473000	36.473000			
5670	36.473000	36.473000	36.473000			

Measurement uncertainty:	±2.81 dB
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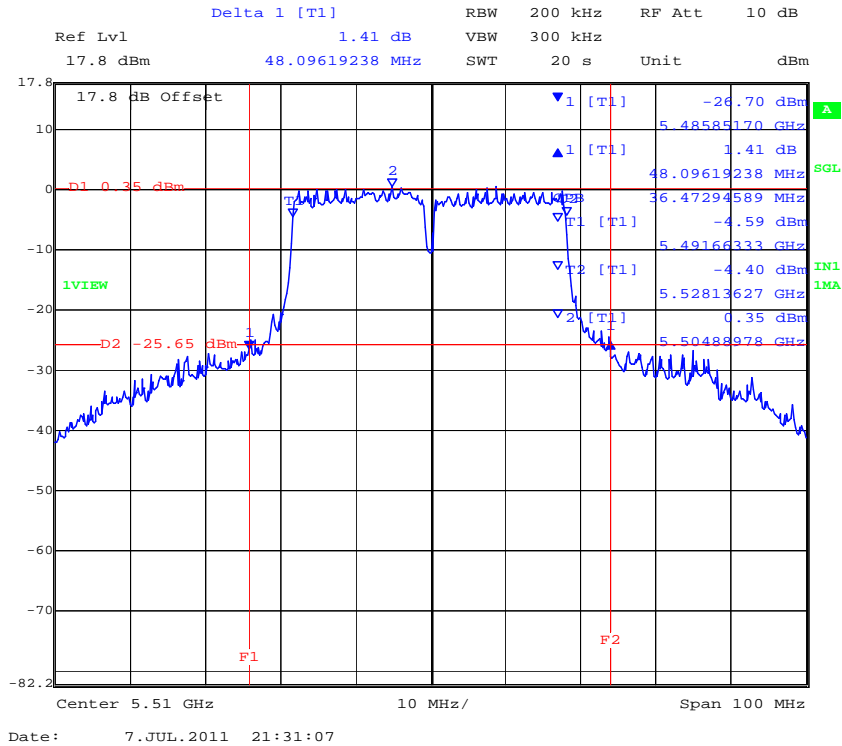
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PORT A 5,510 MHz 802.11n HT-40 26 dB and 99 % Bandwidth



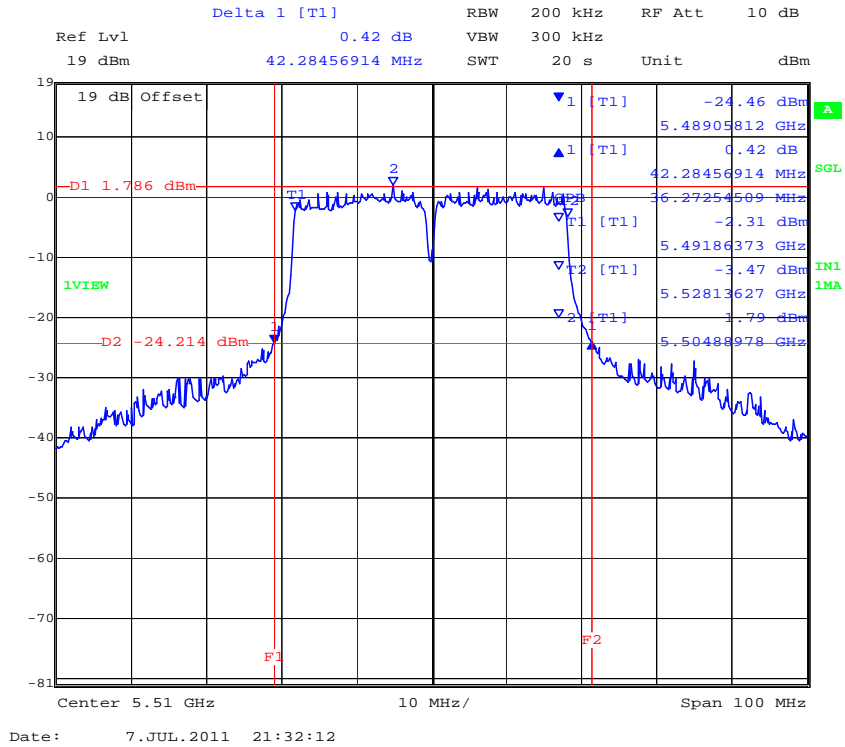
PORT B 5,510 MHz 802.11n HT-40 26 dB and 99 % Bandwidth



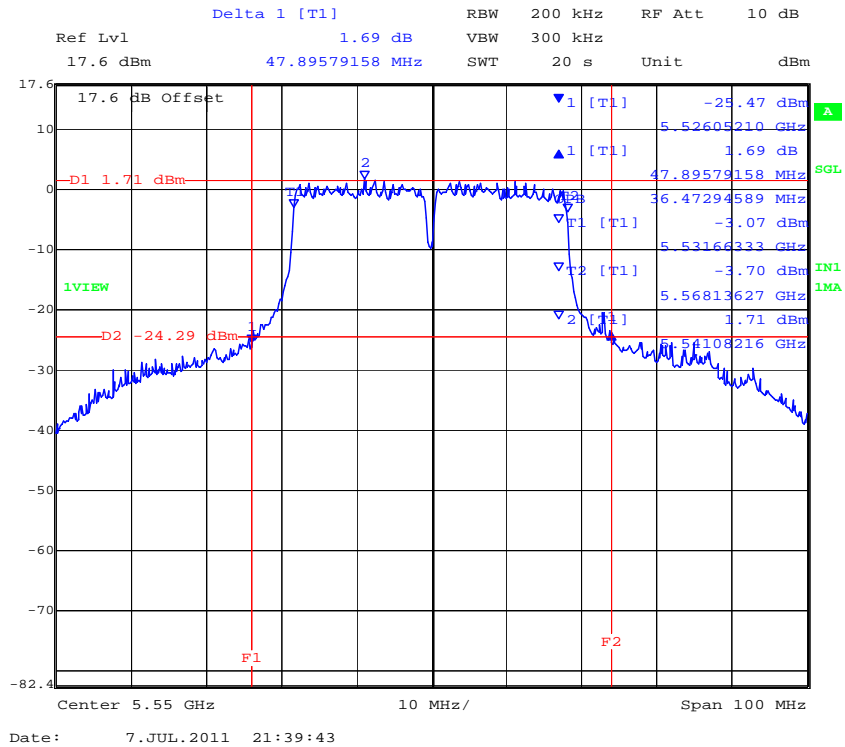
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PORT C 5,510 MHz 802.11n HT-40 26 dB and 99 % Bandwidth



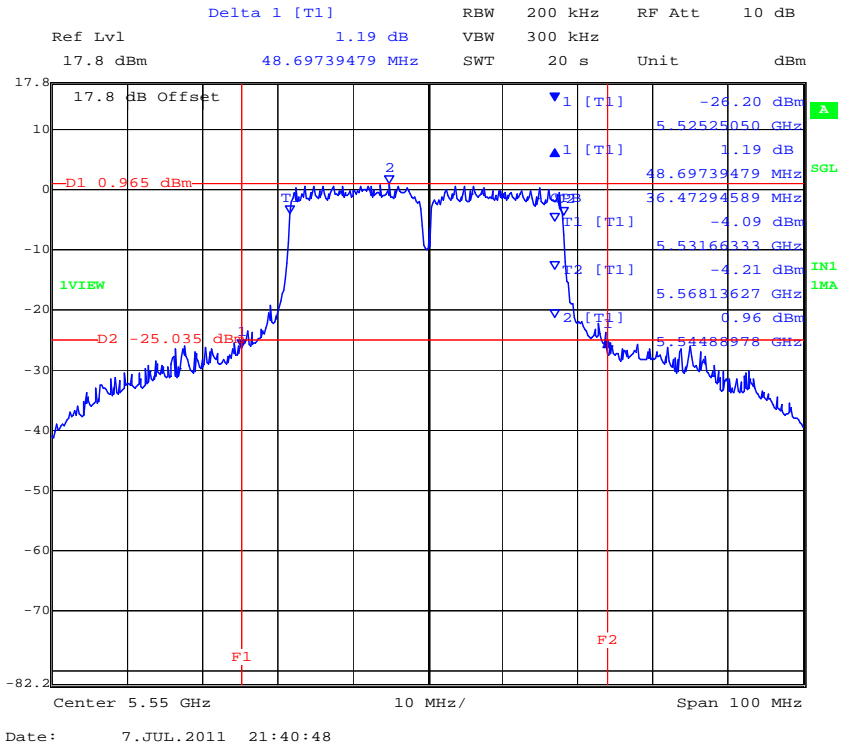
PORT A 5,550 MHz 802.11n HT-40 26 dB and 99 % Bandwidth



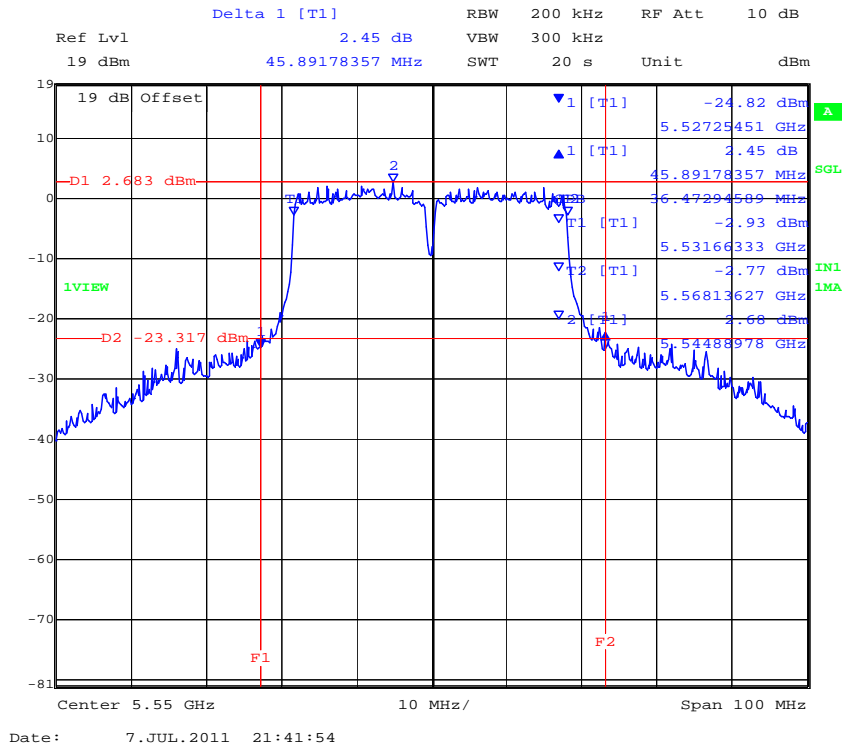
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PORT B 5,550 MHz 802.11n HT-40 26 dB and 99 % Bandwidth



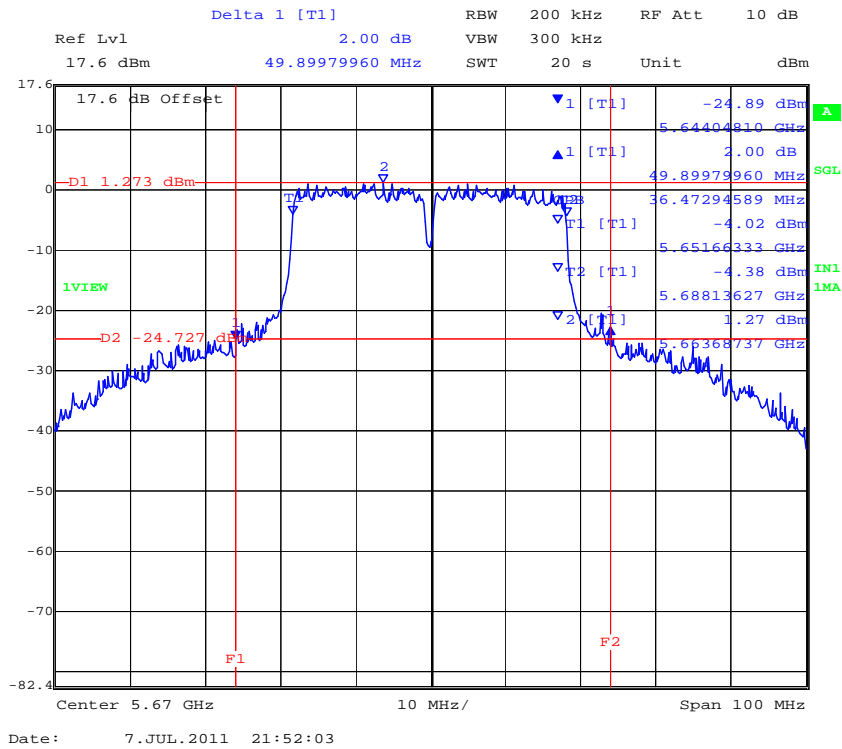
PORT C 5,550 MHz 802.11n HT-40 26 dB and 99 % Bandwidth



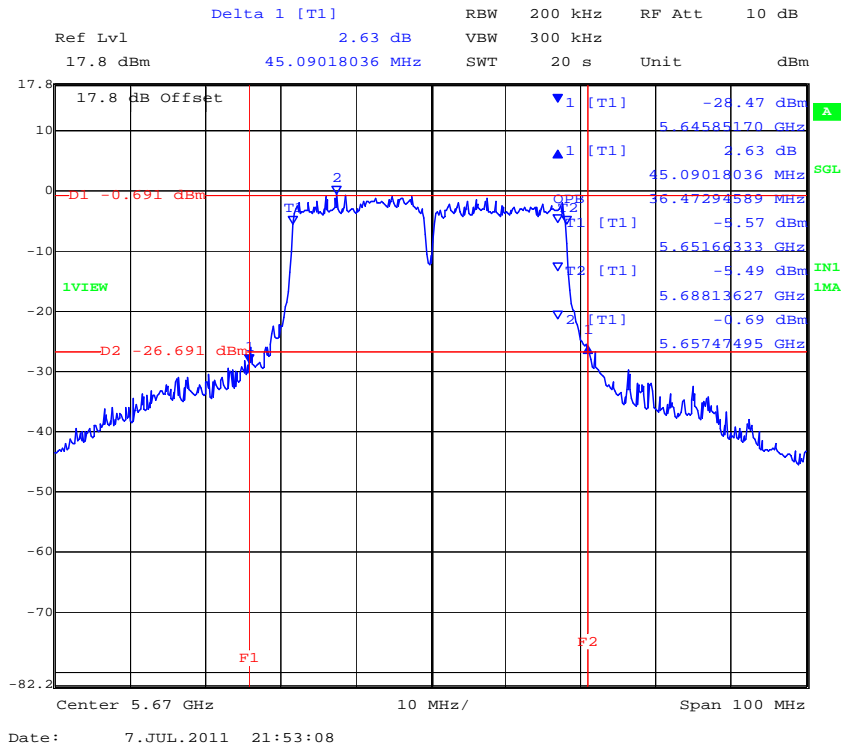
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PORT A 5,670 MHz 802.11n HT-40 26 dB and 99 % Bandwidth



PORT B 5,670 MHz 802.11n HT-40 26 dB and 99 % Bandwidth

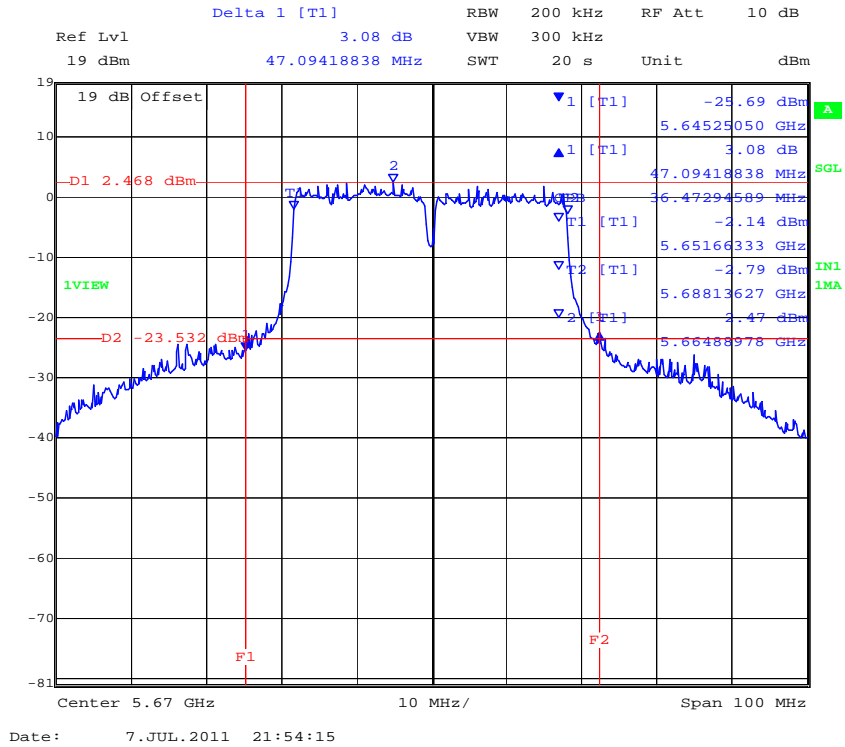


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PORT C 5,670 MHz 802.11n HT-40 26 dB and 99 % Bandwidth



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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.

Laboratory Measurement Uncertainty for Spectrum Measurement

Measurement uncertainty	±2.81 dB
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Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of RF Spectrum Mask'	0158, 0287, 0252, 0313, 0314, 0070, 0116, 0117

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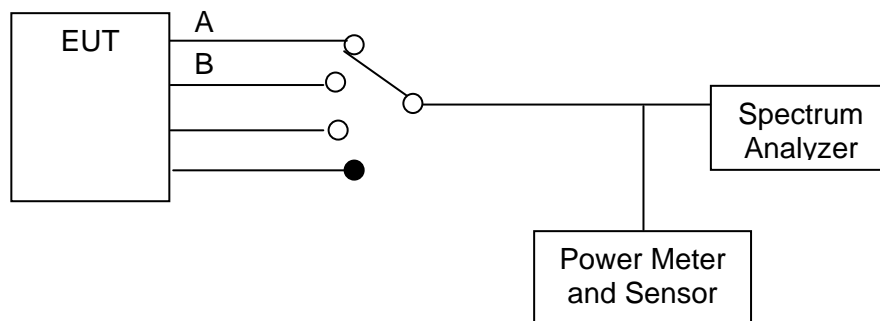
5.1.2. Transmit Output Power

FCC, Part 15 Subpart C §15.407(a)
Industry Canada RSS-210 §9.9(2)
Industry Canada RSS-Gen 4.6

Test Procedure

The transmitter terminal of EUT was connected to the input of an average power meter. Measurements were made while EUT was operating in a continuous transmission mode i.e. 100 % duty cycle at the appropriate center frequency. All cable losses and offsets were taken into consideration in the measured result.

Test Measurement Set up



Measurement set up for Transmitter Output Power



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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

Mode	Frequency Range (MHz)	Minimum 26 dB Bandwidth (MHz)	4 + 10 Log (B) (dBm)	Limit (dBm)
a	5150 – 5250	22.3	+17.48	+17.00
HT-20		23.2	+17.65	+17.00
HT-40		43.5	+20.38	+17.00

Industry Canada Limits

EIRP Limit 5150 – 5250 MHz: Lesser of 200 mW (+23 dBm) or 10 + 10 Log (B) dBm

Mode	Frequency Range (MHz)	Minimum 26 dB Bandwidth (MHz)	4 + 10 Log (B) (dBm)	EIRP Limit (dBm)
a	5150 – 5250	22.3	+23.48	+23.00
HT-20		23.2	+23.65	+23.00
HT-40		43.5	+26.38	+23.00

FCC Limits and Industry Canada Limits

Bands 5250 – 5350 and 5470 – 5725 MHz

Limit lesser of: 250 mW or 11 dBm + 10 log (B) dBm

Mode	Frequency Range (MHz)	Minimum 26 dB Bandwidth (MHz)	11 + 10 Log (B) (dBm)	Limit (dBm)
a	5250 – 5350	26.0	+25.15	+24.00
HT-20		25.2	+25.01	+24.00
HT-40	5470 – 5725	45.9	+27.62	+24.00

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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 $10 * \text{Log}(N)$ when N is the number of antenna elements.

Operating Frequency Band 5150-5250 MHz

MIMO Operation

Antenna (dB)	Gain (dBi)	Max. Allowable Conducted Peak Power (dBm)		Maximum EIRP (dBm)
		Non-Beam Forming	Beam Forming	
Integral	4.8	+17.0	N/A	+23.0
External	2.0	+17.0		+23.0

Non-MIMO Operation (Legacy)

Antenna (dB)	Gain dBi	Increased Gain V's No. Antenna Ports		Total Gain dBi	Max. Allowable Conducted Peak Power (dBm)	Maximum EIRP (dBm)
		Ports	dB			
Integral	4.8	3	4.77	9.57	+13.43	+23.0
External	2.0	3	4.77	6.77	+16.23	+23.0

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MIMO Operation 5250-5350 and 5470 – 5725 MHz

Antenna (dB)	Gain (dBi)	Max. Allowable Conducted Peak Power (dBm)		Maximum EIRP (dBm)
		Non-Beam Forming	Beam Forming	
Integral	4.8	+24.0	N/A	+30.0
External	2.0	+24.0		+30.0

Non-MIMO Operation (Legacy) 5250-5350 and 5470 – 5725 MHz

Antenna (dB)	Gain dBi	Increased Gain V's No. Antenna Ports		Total Gain dBi	Max. Allowable Conducted Peak Power (dBm)	Maximum EIRP (dBm)
		Ports	dB			
Integral	4.8	3	4.77	9.57	+20.43	+30.0
External	2.0	3	4.77	6.77	+23.23	+30.0

Measurement Results for Transmit Output Power

Ambient conditions.

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

EUT parameters.

Power Level: Maximum

Duty Cycle: 100%

Temperature: Ambient

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TABLE OF RESULTS – 802.11a Legacy 5150 - 5250

Output Power Conditions for Integral Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 a	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	4.8 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5180	8.97	7.18	9.11	--	N/A	13.28	13.43	-0.15
5200	9.39	7.63	8.76	--	N/A	13.42	13.43	-0.01
5240	9.00	6.94	8.53	--	N/A	13.01	13.43	-0.42

Measurement uncertainty:	±1.33 dB
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Output Power Conditions for External Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 a	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5180	11.52	9.61	11.64	--	N/A	15.79	16.23	-0.44
5200	11.39	9.93	10.96	--	N/A	15.57	16.23	-0.66
5240	12.00	9.94	11.53	--	N/A	16.01	16.23	-0.22

Measurement uncertainty:	±1.33 dB
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TABLE OF RESULTS – 802.11n HT-20 5150 - 5250

Output Power Conditions for Integral Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	4.8 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5180	12.41	10.70	13.01	--	N/A	16.92	17.00	-0.08
5200	12.42	11.33	12.49	--	N/A	16.88	17.00	-0.12
5240	12.49	11.04	12.17	--	N/A	16.71	17.00	-0.29

Measurement uncertainty:	±1.33 dB
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Output Power Conditions for External Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5180	12.59	11.30	12.10	--	N/A	16.80	17.00	-0.20
5200	12.23	11.39	12.71	--	N/A	16.91	17.00	-0.09
5240	12.35	11.44	12.34	--	N/A	16.83	17.00	-0.17

Measurement uncertainty:	±1.33 dB
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TABLE OF RESULTS – 802.11n HT-40 5150 - 5250

Output Power Conditions for Integral Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-40	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	4.8 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5190	11.01	8.21	11.73	--	N/A	15.33	17.00	-1.67
5230	12.55	11.67	11.78	--	N/A	16.79	17.00	-0.21

Measurement uncertainty:	±1.33 dB
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Output Power Conditions for External Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-40	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5190	11.97	9.31	12.57	--	N/A	16.27	17.00	-0.73
5230	12.69	11.57	12.15	--	N/A	16.93	17.00	-0.07

Measurement uncertainty:	±1.33 dB
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TABLE OF RESULTS – 802.11a Legacy 5250 - 5350

Output Power Conditions for Integral Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 a	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	4.8 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5260	15.87	14.65	15.50	--	N/A	20.14	20.43	-0.29
5300	16.18	14.19	14.49	--	N/A	19.82	20.43	-0.61
5320	15.52	13.97	14.62	--	N/A	19.52	20.43	-0.91

Measurement uncertainty:	±1.33 dB
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Output Power Conditions for External Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 a	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5260	18.87	17.65	18.50	--	N/A	23.14	23.23	-0.09
5300	19.18	17.19	17.49	--	N/A	22.82	23.23	-0.41
5320	17.31	15.76	16.71	--	N/A	21.41	23.23	-1.82

Measurement uncertainty:	±1.33 dB
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TABLE OF RESULTS – 802.11n HT-20 5250 - 5350

Output Power Conditions for Integral Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	4.8 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5260	18.67	17.55	18.39	--	N/A	23.00	24.00	-1.00
5300	18.92	17.26	17.77	--	N/A	22.81	24.00	-1.19
5320	15.62	13.43	14.42	--	N/A	19.35	24.00	-4.65

Measurement uncertainty:	±1.33 dB
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Output Power Conditions for External Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5260	18.67	17.55	18.39	--	N/A	23.00	24.00	-1.00
5300	18.92	17.26	17.77	--	N/A	22.81	24.00	-1.19
5320	17.53	15.11	16.87	--	N/A	21.39	24.00	-2.61

Measurement uncertainty:	±1.33 dB
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TABLE OF RESULTS – 802.11n HT-40 5250 - 5350

Output Power Conditions for Integral Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-40	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	4.8 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5270	19.06	17.35	18.16	--	N/A	23.02	24.00	-0.98
5310	13.46	10.14	11.18	--	N/A	16.59	24.00	-7.41

Measurement uncertainty:	±1.33 dB
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Output Power Conditions for External Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-40	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5270	19.06	17.35	18.16	--	N/A	23.02	24.00	-0.98
5310	14.66	10.74	12.98	--	N/A	17.85	24.00	-6.15

Measurement uncertainty:	±1.33 dB
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TABLE OF RESULTS – 802.11a Legacy 5470 - 5725

Output Power Conditions for Integral Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 a	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	4.8 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5500	16.32	13.84	14.52	--	N/A	19.79	20.43	-0.64
5580	16.55	14.35	15.01	--	N/A	20.17	20.43	-0.26
5700	16.01	14.16	14.24	--	N/A	19.66	20.43	-0.77

Measurement uncertainty:	±1.33 dB
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Output Power Conditions for External Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 a	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5500	18.32	15.84	16.52	--	N/A	21.79	23.23	-1.44
5580	18.55	16.35	17.01	--	N/A	22.17	23.23	-1.06
5700	19.01	17.16	17.24	--	N/A	22.66	23.23	-0.57

Measurement uncertainty:	±1.33 dB
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TABLE OF RESULTS – 802.11n HT-20 5470 - 5725

Output Power Conditions for Integral Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	4.8 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5500	18.13	16.01	16.42	--	N/A	21.73	24.00	-2.27
5580	18.30	16.34	17.02	--	N/A	22.07	24.00	-1.93
5700	19.25	17.18	17.06	--	N/A	22.72	24.00	-1.28

Measurement uncertainty:	±1.33 dB
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Output Power Conditions for External Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5500	18.13	16.01	16.42	--	N/A	21.73	24.00	-2.27
5580	18.30	16.34	17.02	--	N/A	22.07	24.00	-1.93
5700	19.25	17.18	17.06	--	N/A	22.72	24.00	-1.28

Measurement uncertainty:	±1.33 dB
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TABLE OF RESULTS – 802.11n HT-40 5470 - 5725

Output Power Conditions for Integral Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-40	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	4.8 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5500	17.16	13.75	13.88	--	N/A	20.01	24.00	-3.99
5580	19.09	16.28	17.06	--	N/A	22.41	24.00	-1.59
5700	19.25	16.99	16.97	--	N/A	22.65	24.00	-1.35

Measurement uncertainty:	±1.33 dB
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Output Power Conditions for External Antenna

Test Conditions:	15.407 (a)(1)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-40	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (x):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Total Power (dBm)		Limit	Margin
	RF Port (dBm)				Combined	Calculated		
MHz	a	b	c	d				
5500	19.31	15.96	16.04	--	N/A	22.17	24.00	-1.83
5580	19.09	16.28	17.06	--	N/A	22.41	24.00	-1.59
5700	19.25	16.99	16.97	--	N/A	22.65	24.00	-1.35

Measurement uncertainty:	±1.33 dB
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Power Settings V's Frequency Band

Frequency Band 5150 – 5250 MHz

	Integral Antenna			External Antenna	
	a	HT-20		a	HT-20
5180	8	13		11	16
5200	10	15		12	17
5240	10	15		13	17

	HT-40			HT-40	
5190		10			11
5230		14			17

Frequency Band 5250 – 5350 MHz

	Integral Antenna			External Antenna	
	a	HT-20		a	HT-20
5260	17	20		20	20
5300	17	20		20	20
5240	19	16		18	18

	HT-40			HT-40	
5270		20			20
5310		13			13

Frequency Band 5470 – 5725 MHz

	Integral Antenna			External Antenna	
	a	HT-20		a	HT-20
5500	18	20		20	20
5580	18	20		20	20
5700	17	20		20	20

	HT-40			HT-40	
5510		17			20
5550		20			20
5670		20			20

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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 $+4 \text{ dBm} + 10 \log B$, 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 $+11 \text{ dBm} + 10 \log B$, 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 $10 + 10 \log_{10} B$, 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 $11 + 10 \log_{10} B$, 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 $17 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

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.

Laboratory Measurement Uncertainty for Power Measurements

Measurement uncertainty	$\pm 1.33 \text{ dB}$
-------------------------	-----------------------

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-01 'Measuring RF Output Power'	0158, 0287, 0252, 0313, 0314, 0070, 0116, 0117

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5.1.3. Peak Power Spectral Density

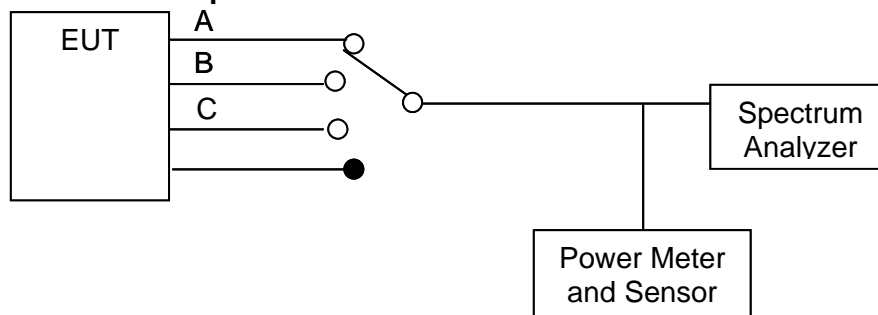
FCC, Part 15 Subpart C §15.407(a)
Industry Canada RSS-210 § A9.2(2)

Test Procedure

The transmitter output was connected to a spectrum analyzer and the peak power spectral density measured. Method 2 Sample Detection and power averaging, specified in FCC document DA 02-2138 (Normative Reference (ix) Section 2.1 “Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices”) was used to determine the peak power spectral density of the emission. The Peak Power Spectral Density is the highest level found across the emission in a 1 MHz resolution bandwidth.

Test Measurement Set up

Test Measurement Set up



Measurement set up for Peak Power Spectral Density

Measurement Results for Peak Power Spectral Density

Ambient conditions.

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

Radio Parameters

Duty Cycle: 100%

Output: Modulated Carrier

Power: Maximum Default Power

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TABLE OF RESULTS – 802.11a Legacy 5150 – 5250 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11a	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi		
Applied Voltage:	48.0 Vdc	Antenna Ports (N):	3		
Notes 1:					
Notes 2:					

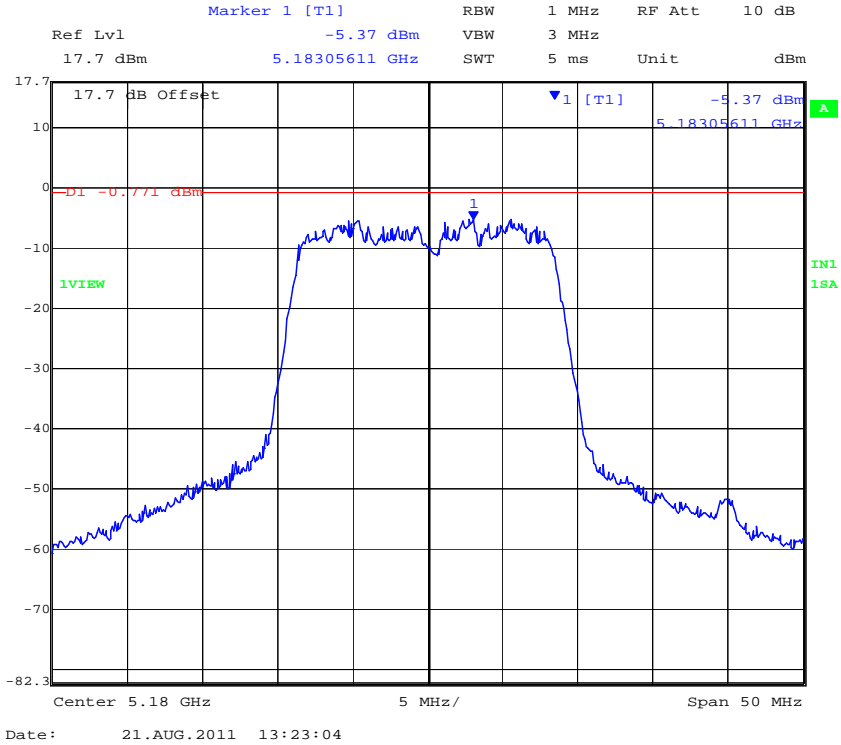
Test Frequency	Measured Peak Power				Correction factor	Peak Power Spectral Density	Limit	Margin
	RF Port (dBm)							
MHz	a	b	c	d	10Log(N)	dBm	dBm	dB
5180.00	-5.37	-4.52	-7.77	--	4.77	0.25	4.00	-3.75
5200.00	-4.83	-3.89	-8.02	--	4.77	0.89	4.00	-3.11
5240.00	-4.96	-4.91	-8.22	--	4.77	-0.14	4.00	-4.14

Measurement uncertainty:	±1.33 dB
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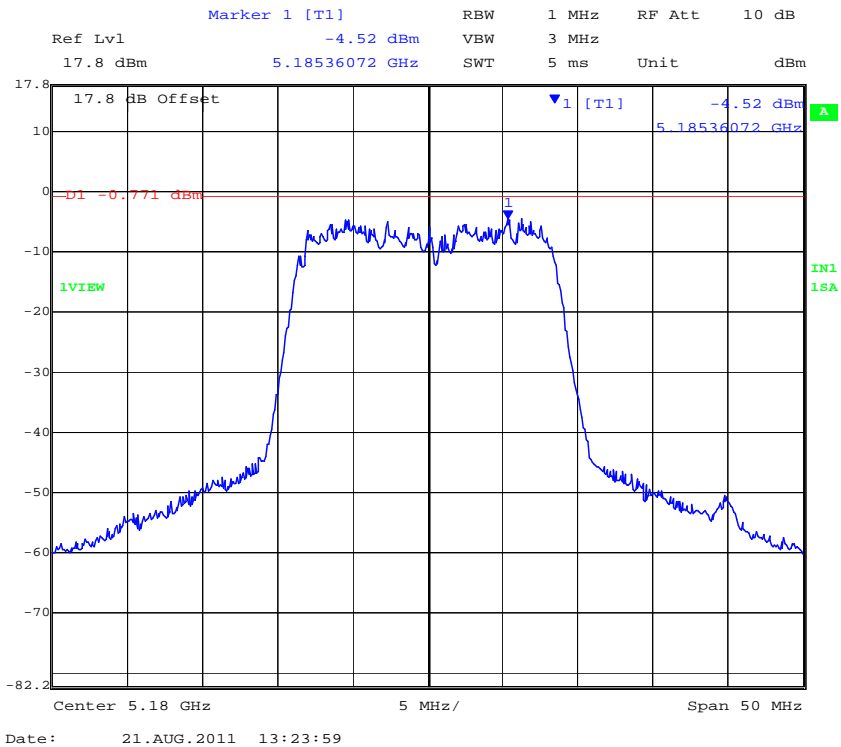
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PORT A 5,1800 MHz 802.11a Legacy Power Spectral Density



PORT B 5,1800 MHz 802.11a Legacy Power Spectral Density

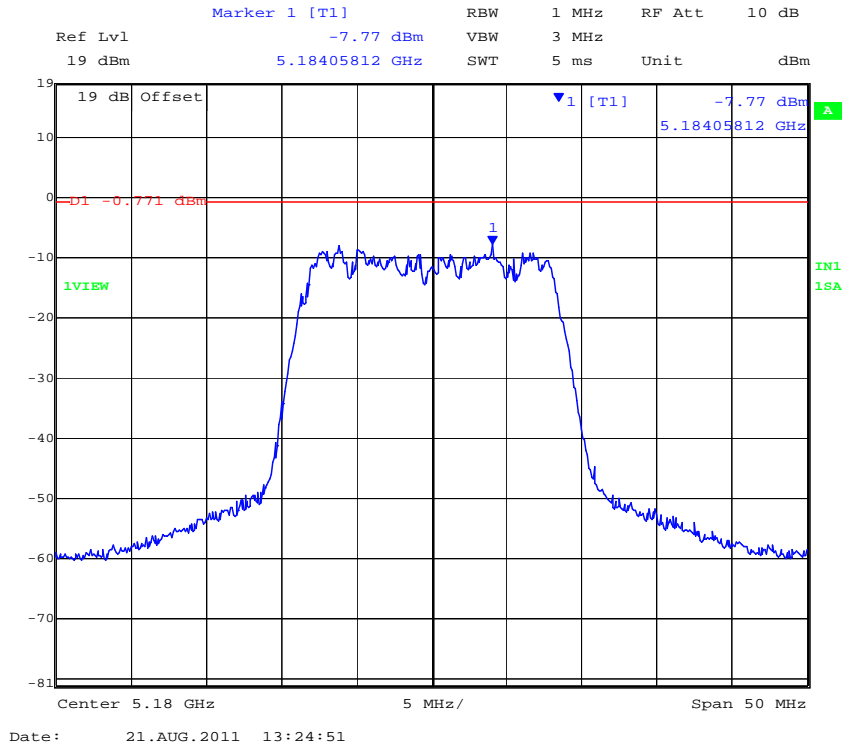


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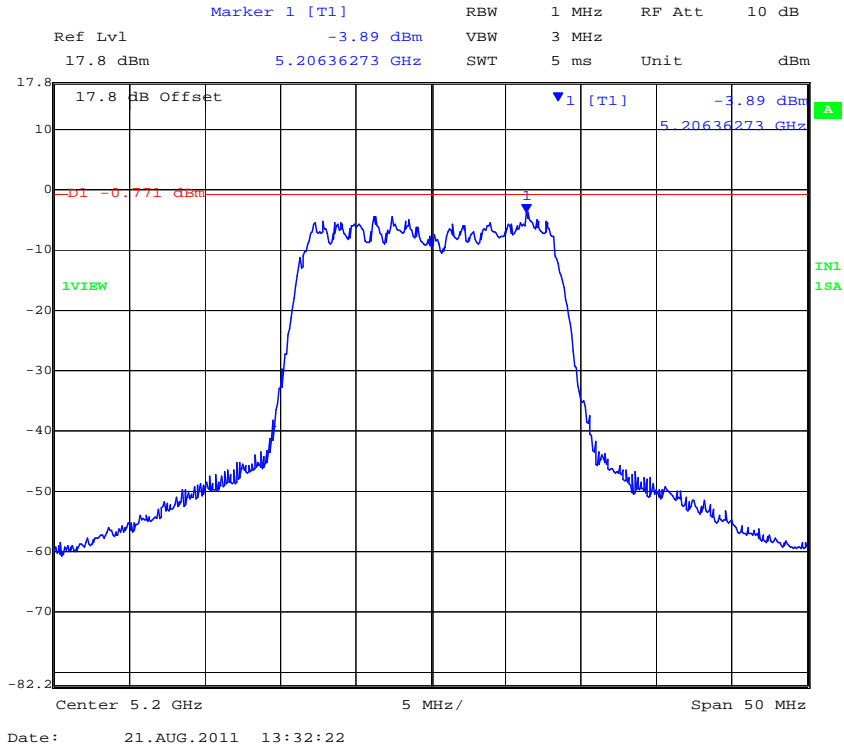
PORT C 5,1800 MHz 802.11a Legacy Power Spectral Density



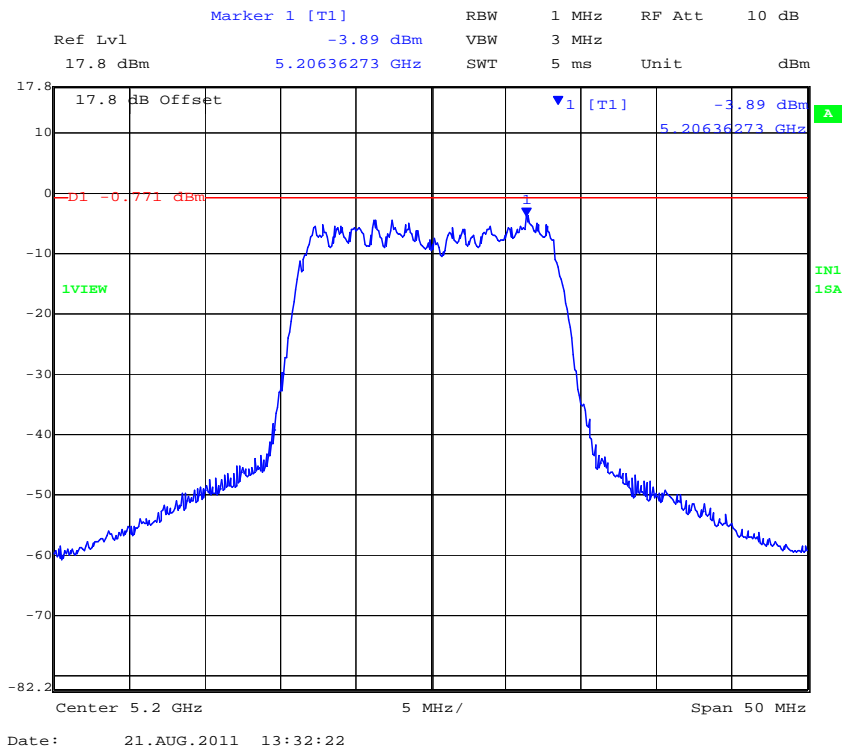
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PORT A 5,200 MHz 802.11a Legacy Power Spectral Density



PORT B 5,200 MHz 802.11a Legacy Power Spectral Density

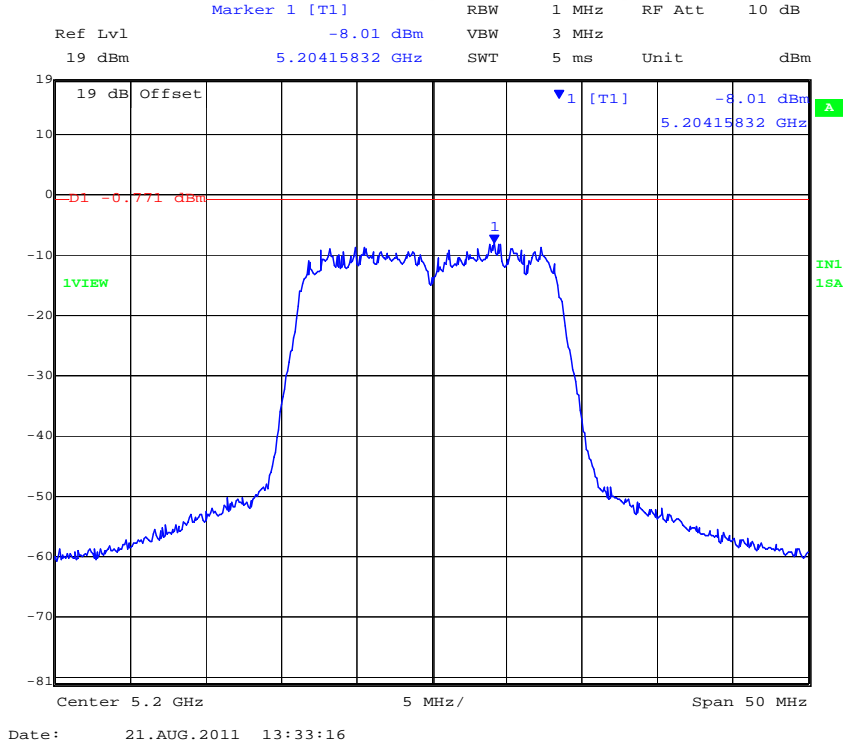


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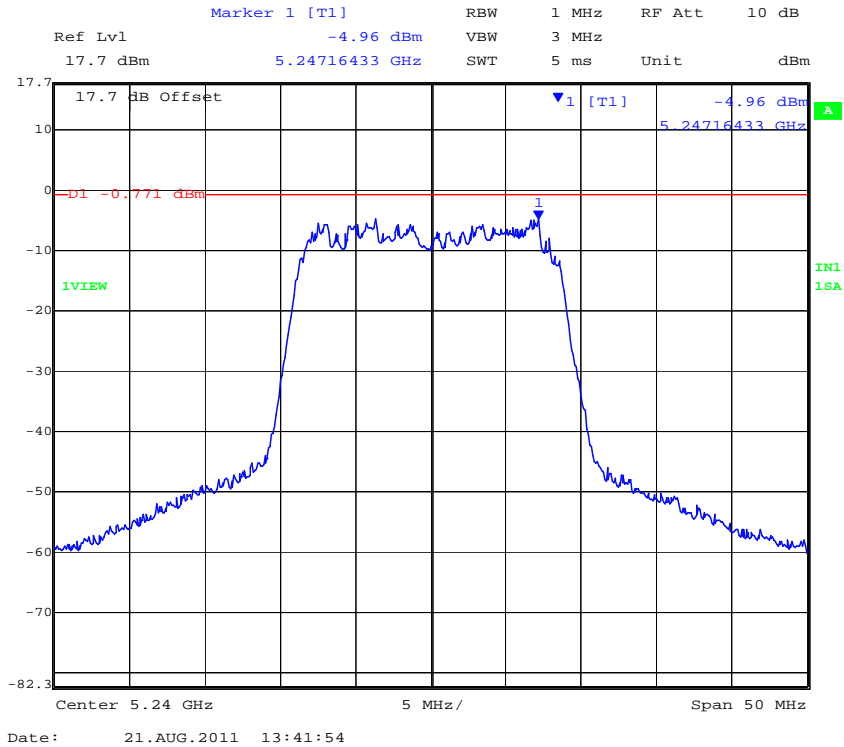
PORT C 5,200 MHz 802.11a Legacy Power Spectral Density



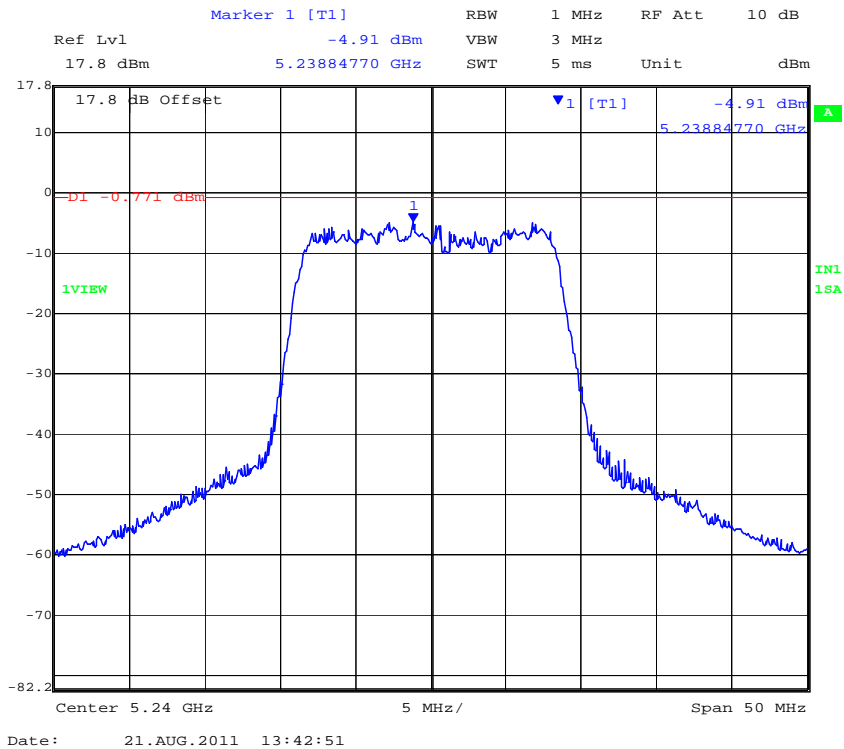
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PORT A 5,240 MHz 802.11a Legacy Power Spectral Density



PORT B 5,240 MHz 802.11a Legacy Power Spectral Density

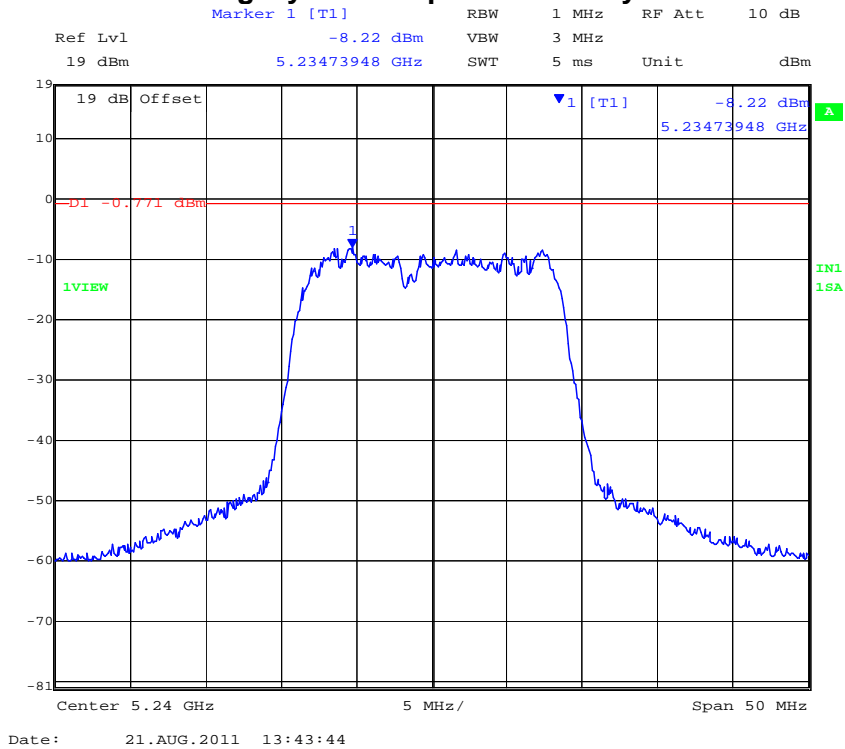


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PORT C 5,240 MHz 802.11a Legacy Power Spectral Density



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TABLE OF RESULTS – 802.11n HT-20 5150 – 5250 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi		
Applied Voltage:	48.0 Vdc	Antenna Ports (N):	3		
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Correction factor	Peak Power Spectral Density	Limit	Margin
	RF Port (dBm)							
MHz	a	b	c	d	10Log(N)	dBm	dBm	dB
5180	-1.84	-2.30	-5.90	--	4.77	2.93	4.00	-1.07
5200	-1.80	-0.84	-5.39	--	4.77	3.93	4.00	-0.07
5240	-1.69	-2.05	-5.72	--	4.77	3.08	4.00	-0.92

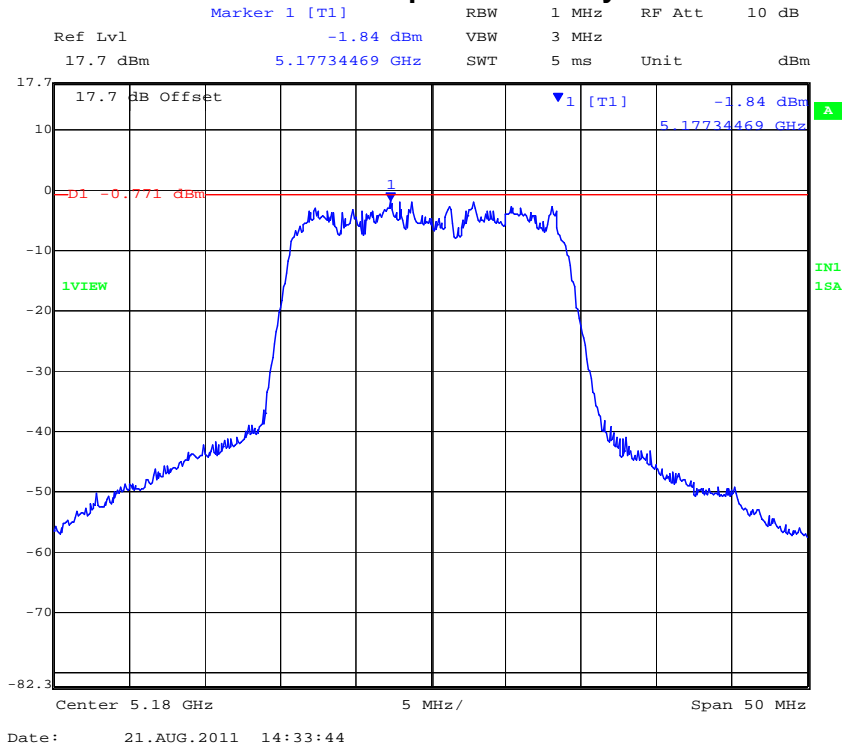
Measurement uncertainty:	±1.33 dB
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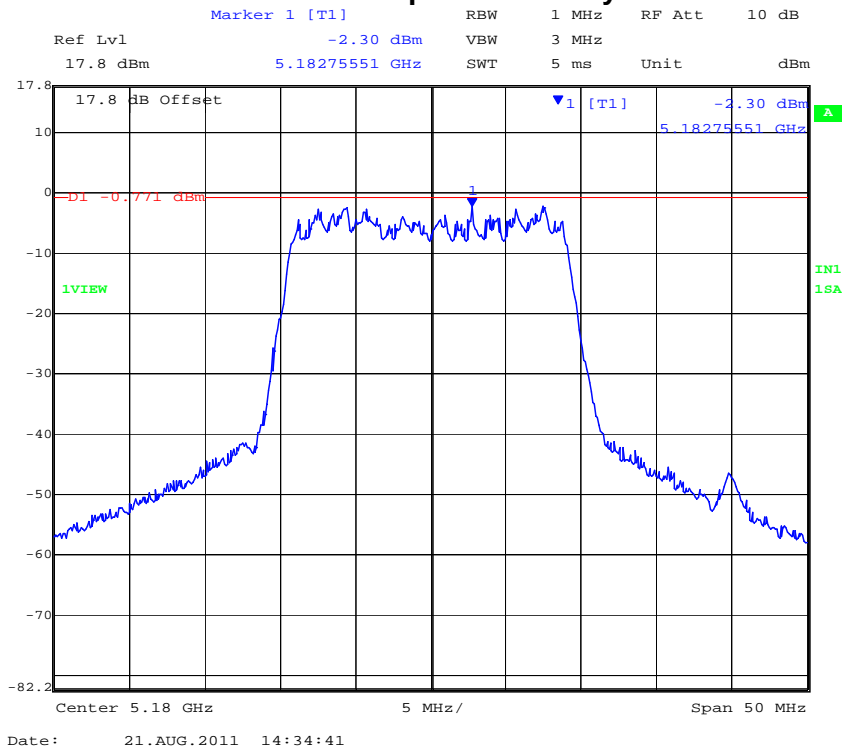


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PORT A 5,180 MHz 802.11n HT-20 Power Spectral Density



PORT B 5,180 MHz 802.11n HT-20 Power Spectral Density

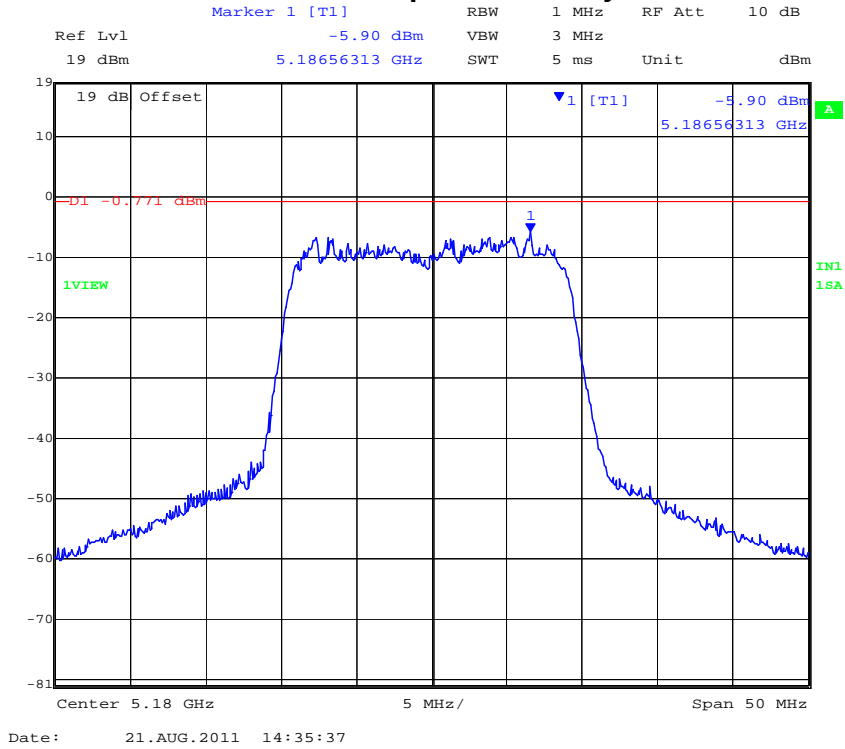


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PORT C 5,180 MHz 802.11n HT-20 Power Spectral Density

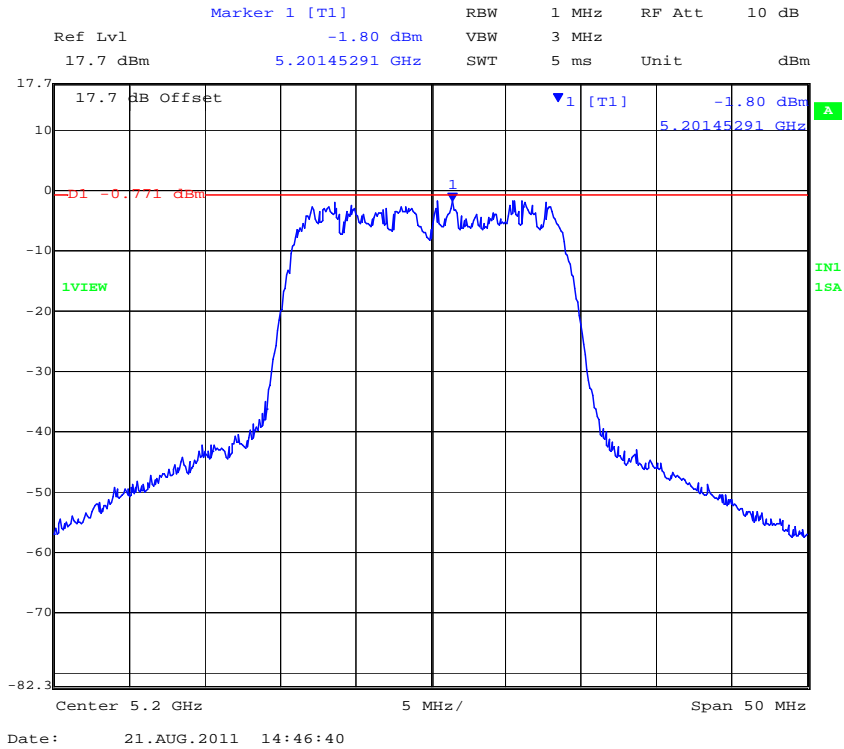


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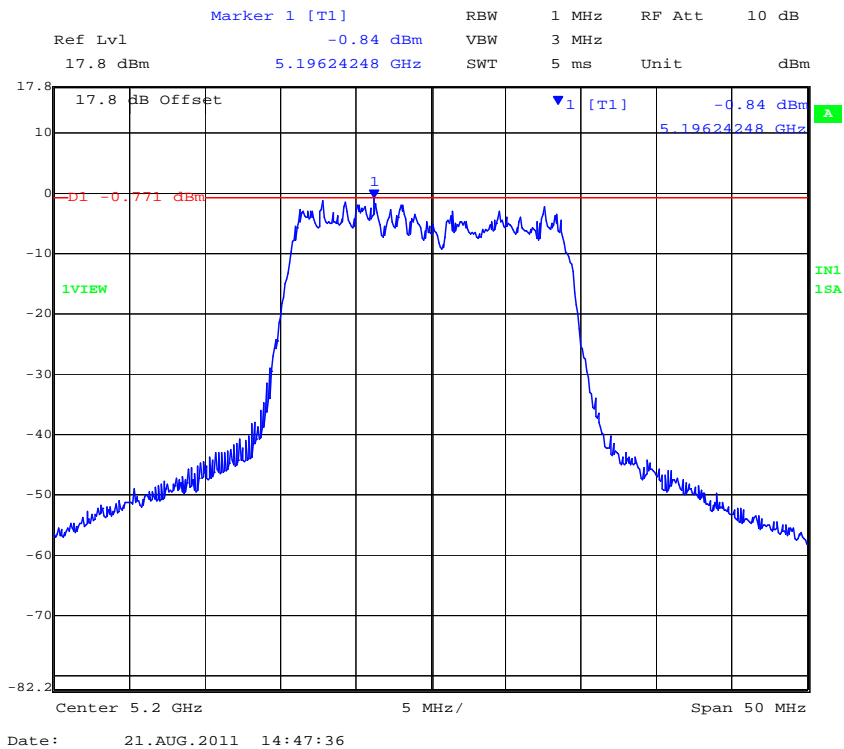


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PORT A 5,200 MHz 802.11n HT-20 Power Spectral Density



PORT B 5,200 MHz 802.11n HT-20 Power Spectral Density

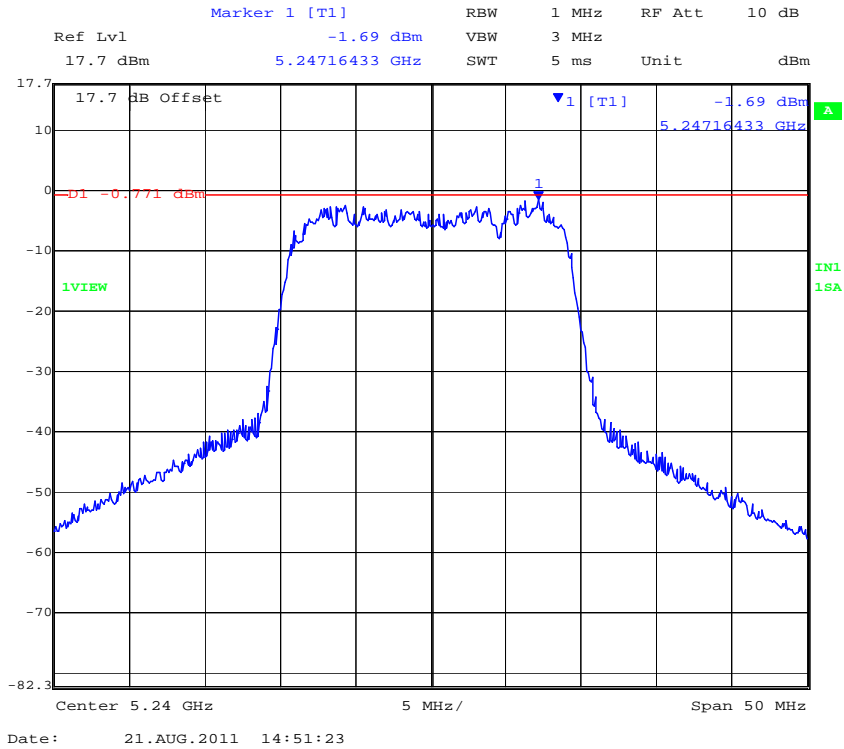


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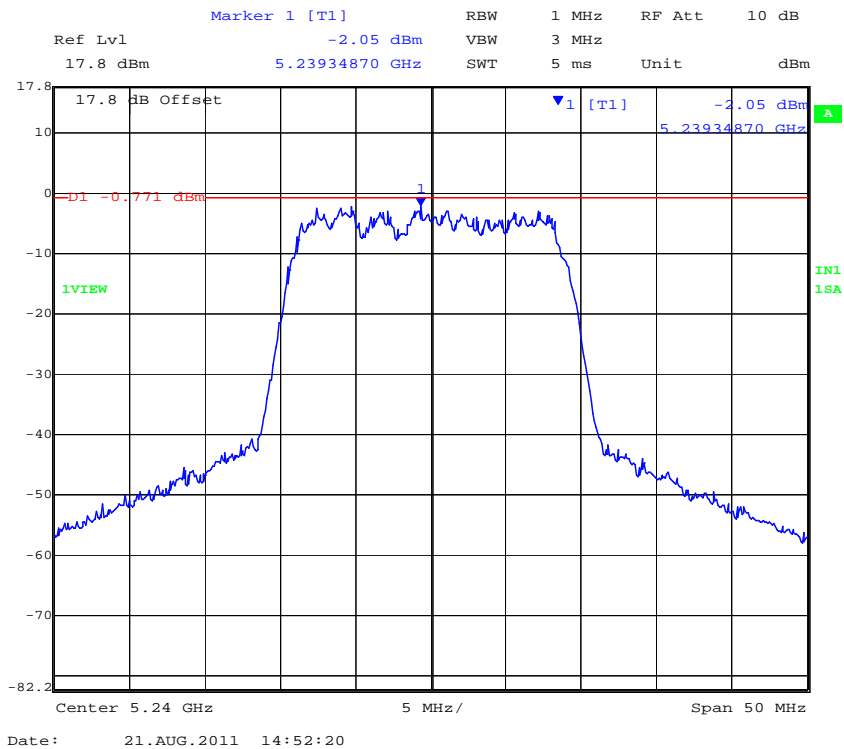


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PORT A 5,240 MHz 802.11n HT-20 Power Spectral Density



PORT B 5,240 MHz 802.11n HT-20 Power Spectral Density

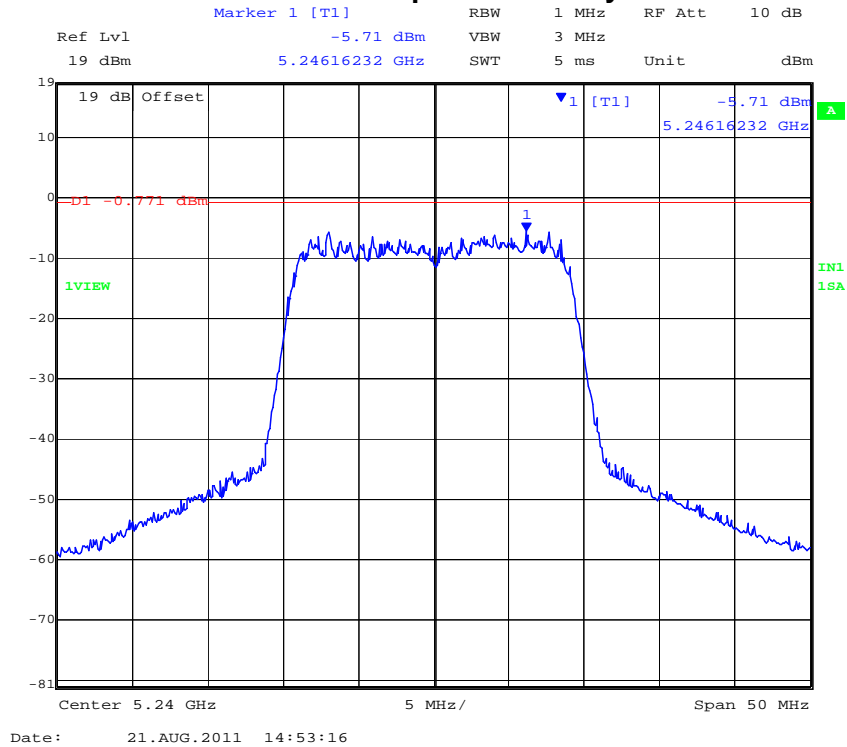


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PORT C 5,240 MHz 802.11n HT-20 Power Spectral Density



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TABLE OF RESULTS – 802.11n HT-40 5150 – 5250 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11n HT-40	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi		
Applied Voltage:	48.0 Vdc	Antenna Ports (N):	3		
Notes 1:					
Notes 2:					

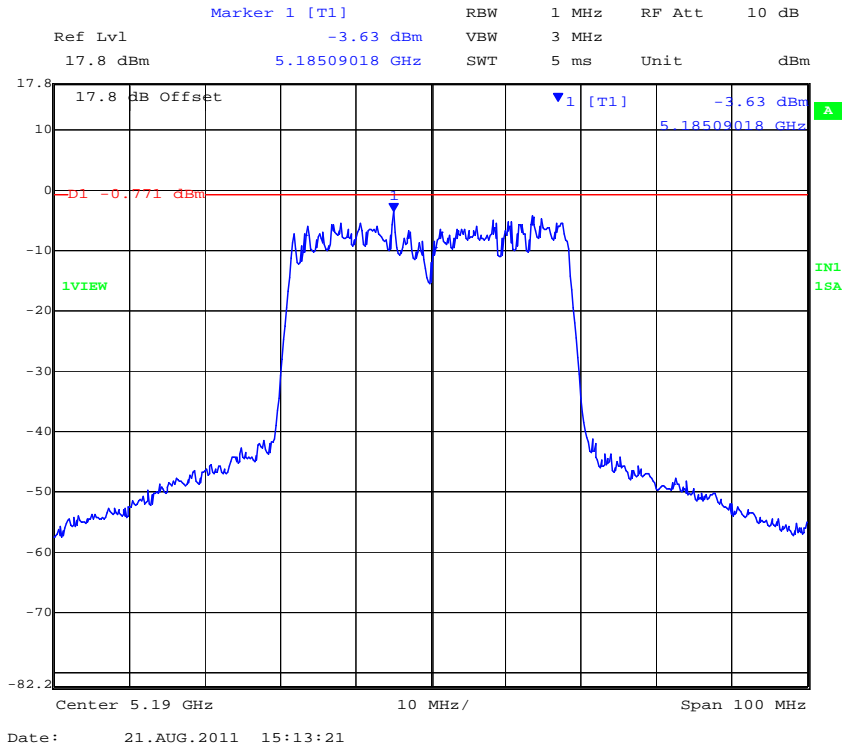
Test Frequency	Measured Peak Power				Correction factor	Peak Power Spectral Density	Limit	Margin
	RF Port (dBm)							
MHz	a	b	c	d	10Log(N)	dBm	dBm	dB
5190.00	-3.75	-3.63	-7.21	--	4.77	1.14	4.00	-2.86
5230.00	-3.77	-3.52	-7.24	--	4.77	1.25	4.00	-2.75

Measurement uncertainty:	±1.33 dB
---------------------------------	----------

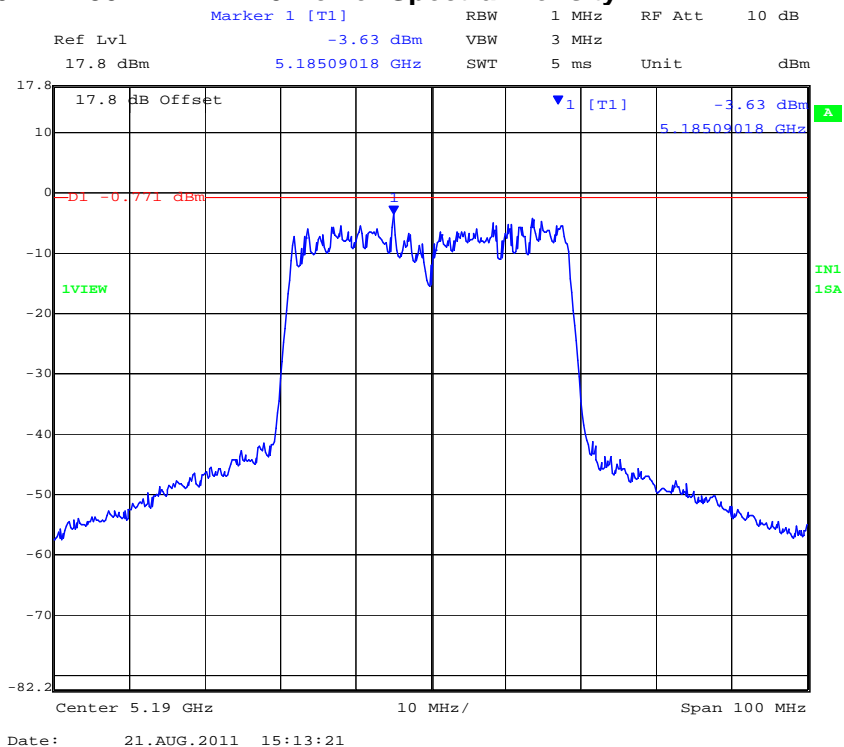
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PORT A 5,190 MHz 802.11n HT-40 Power Spectral Density



PORT B 5,190 MHz 802.11n HT-40 Power Spectral Density

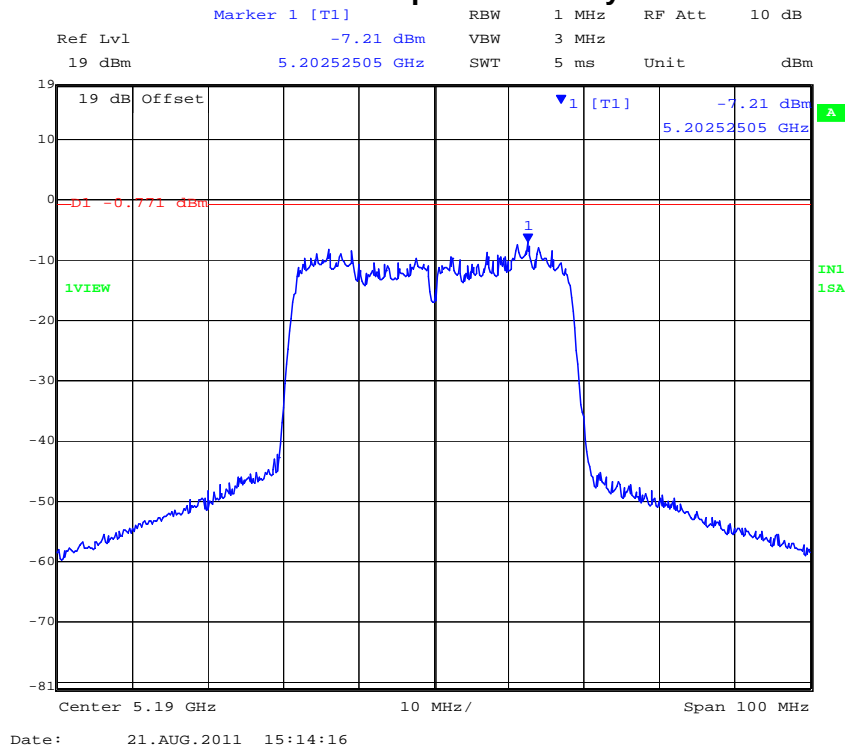


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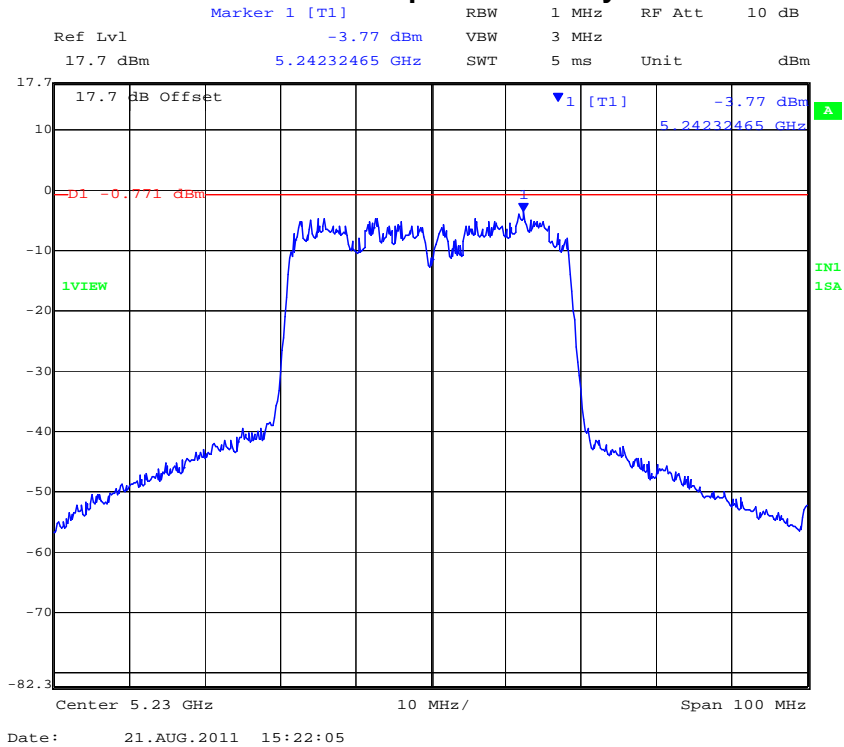
PORT C 5,190 MHz 802.11n HT-40 Power Spectral Density



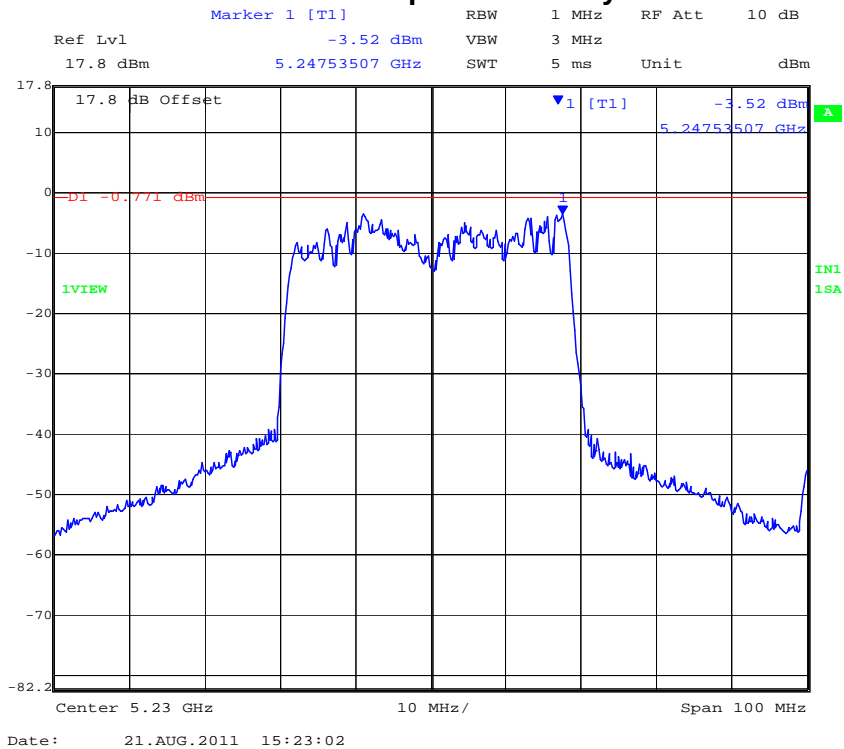
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PORT A 5,230 MHz 802.11n HT-40 Power Spectral Density



PORT B 5,230 MHz 802.11n HT-40 Power Spectral Density

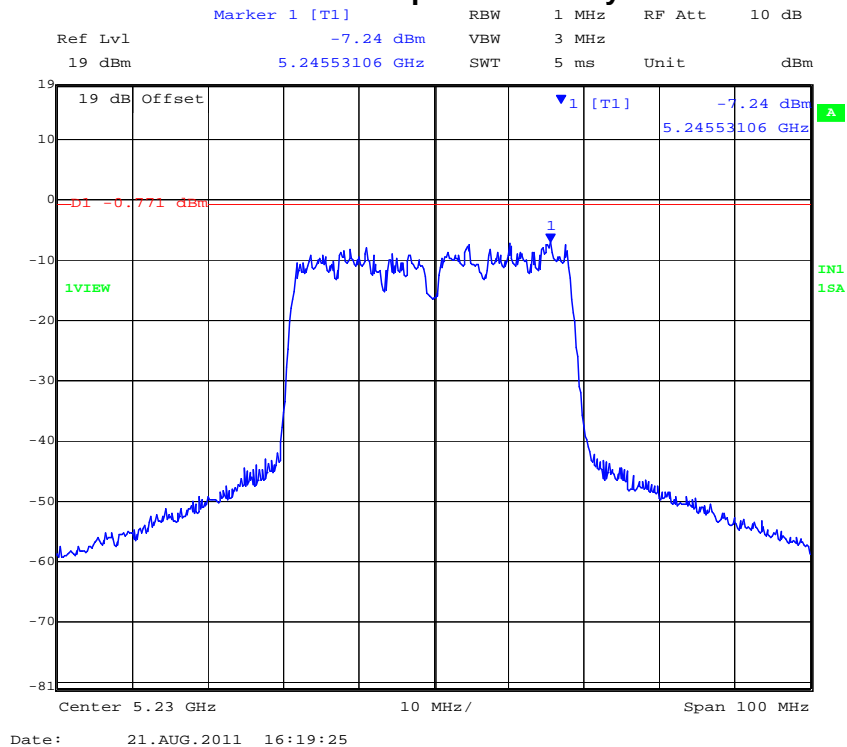


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PORT C 5,230 MHz 802.11n HT-40 Power Spectral Density



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TABLE OF RESULTS – 802.11a Legacy 5250 -5350 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11a	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi		
Applied Voltage:	48.0 Vdc	Antenna Ports (N):	3		
Notes 1:					
Notes 2:					

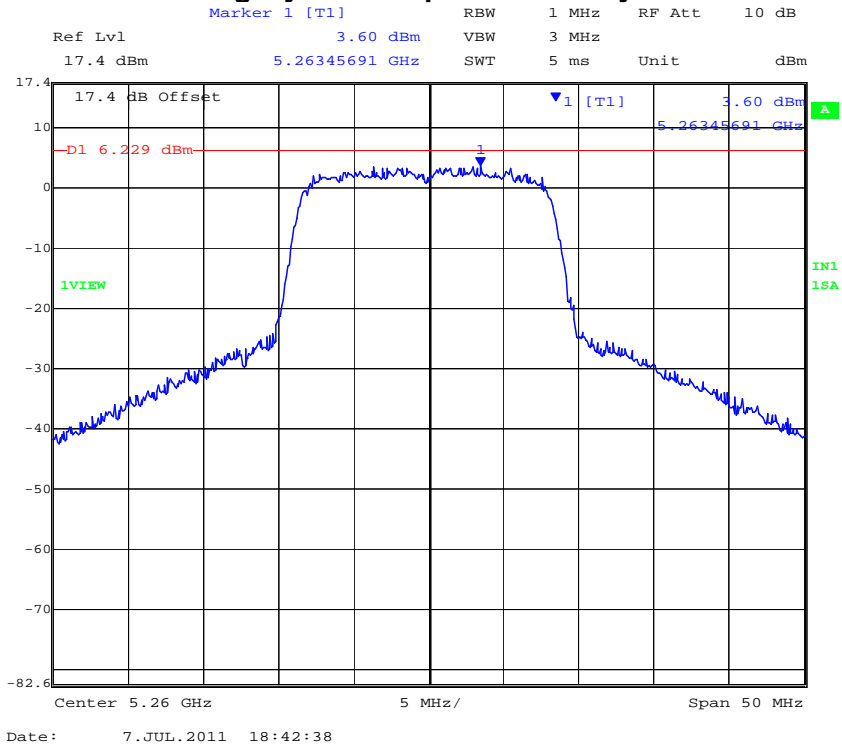
Test Frequency	Measured Peak Power				Correction factor	Peak Power Spectral Density	Limit	Margin
	RF Port (dBm)							
MHz	a	b	c	d	10Log(N)	dBm	dBm	dB
5260.00	3.60	2.06	4.07	--	4.77	8.84	11.00	-2.16
5300.00	3.08	-0.61	4.04	--	4.77	8.81	11.00	-2.19
5320.00	3.47	-0.90	3.04	--	4.77	8.24	11.00	-2.76

Measurement uncertainty:	±1.33 dB
---------------------------------	----------

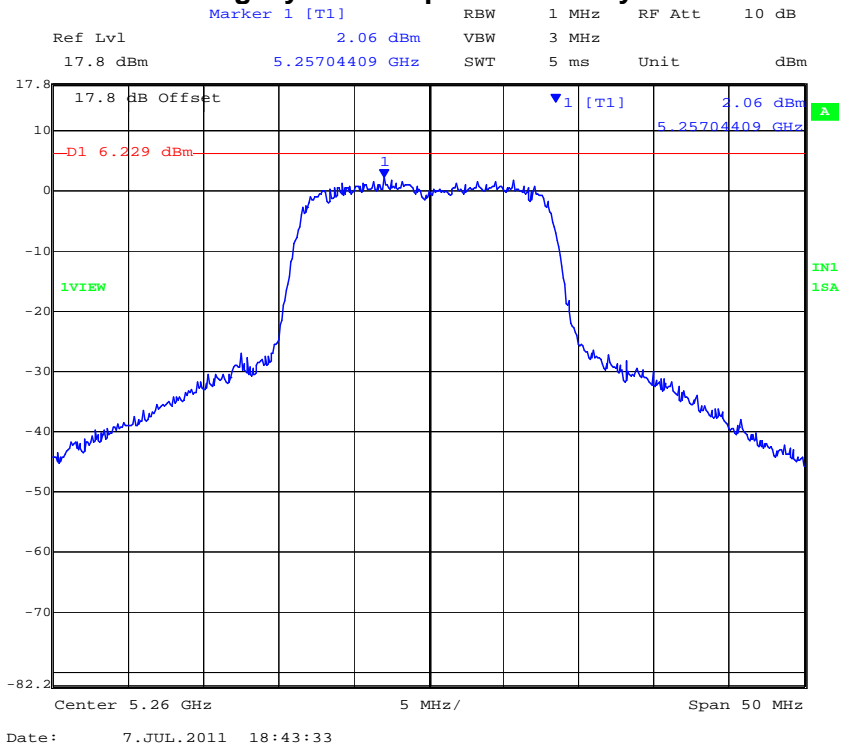
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PORT A 5,260 MHz 802.11a Legacy Power Spectral Density



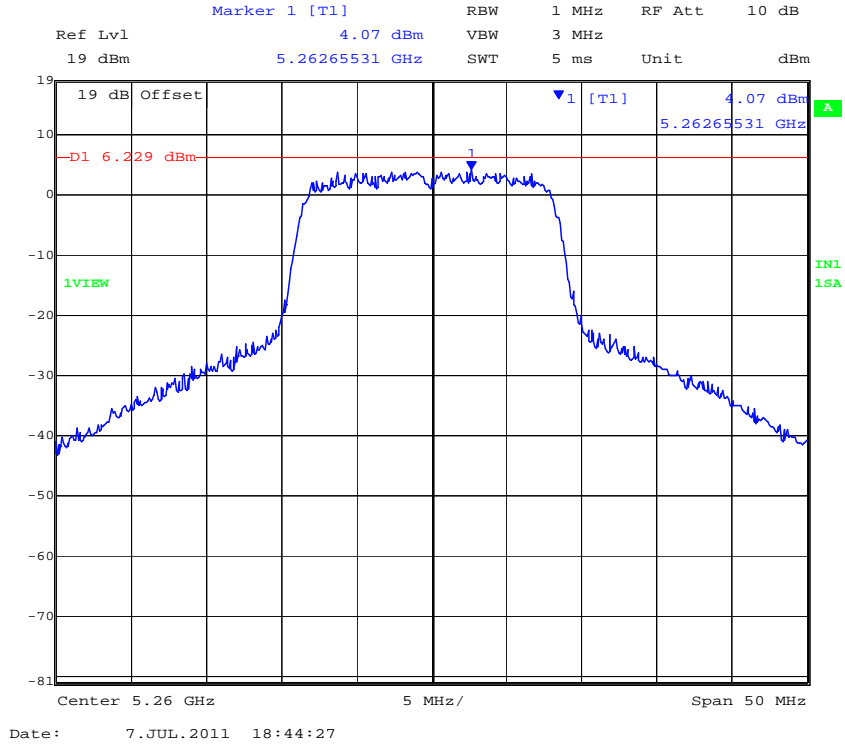
PORT B 5,260 MHz 802.11a Legacy Power Spectral Density



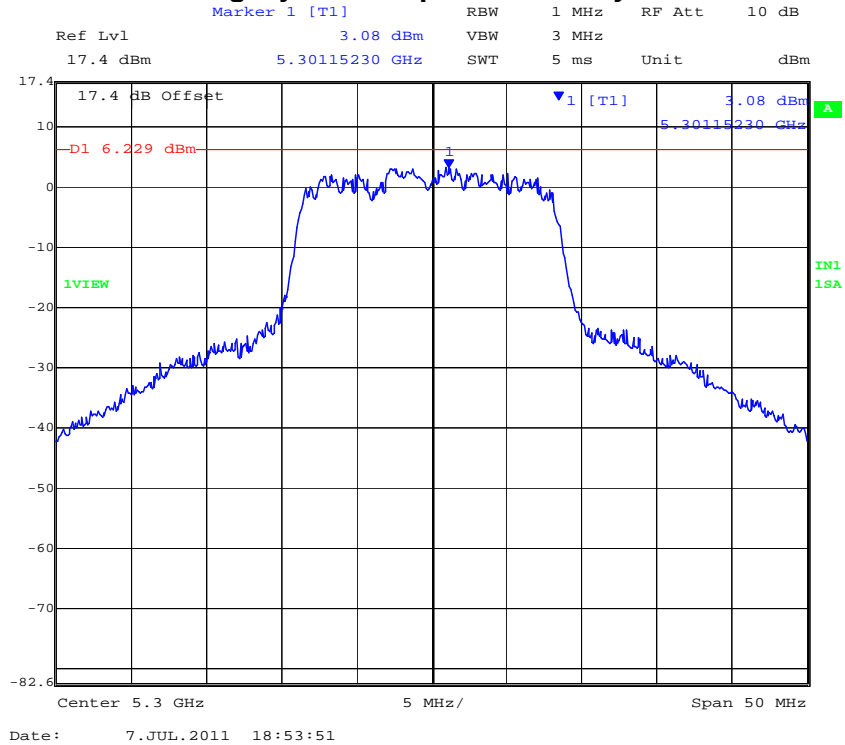
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PORT C 5,260 MHz 802.11a Legacy Power Spectral Density



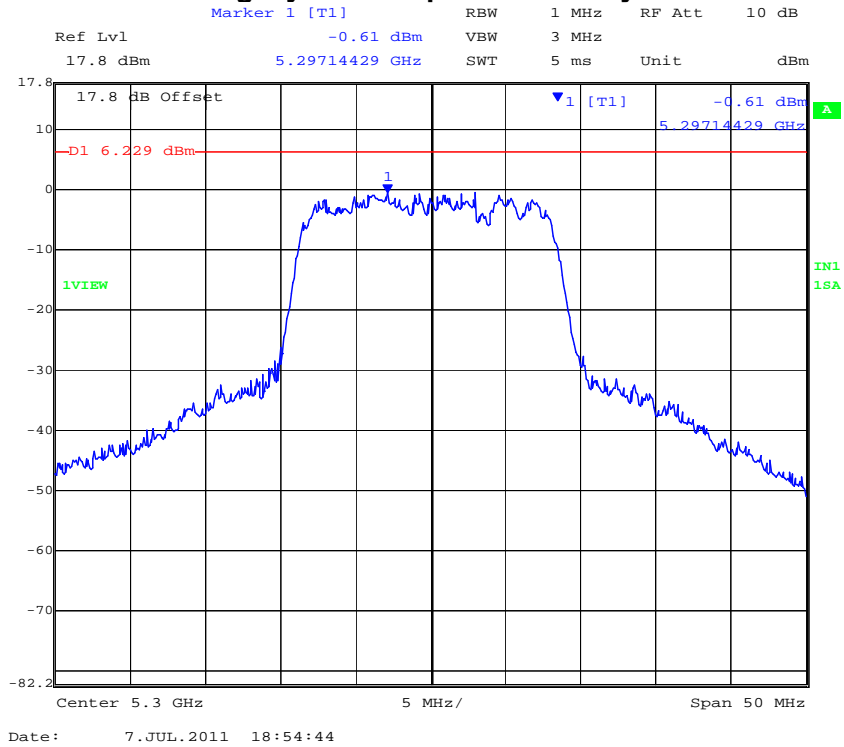
PORT A 5300 MHz 802.11a Legacy Power Spectral Density



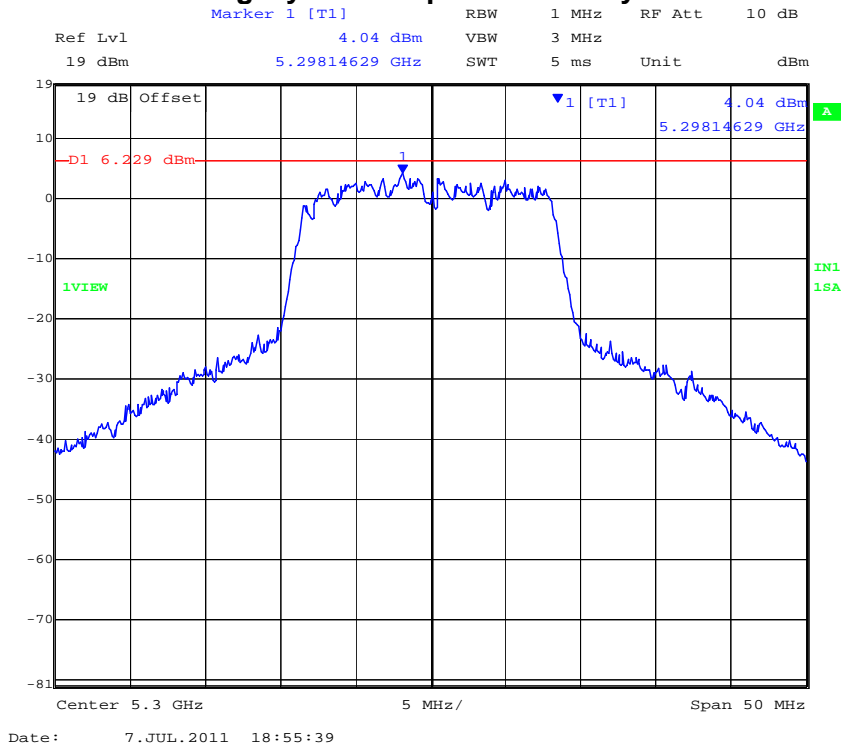
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PORT B 5,300 MHz 802.11a Legacy Power Spectral Density



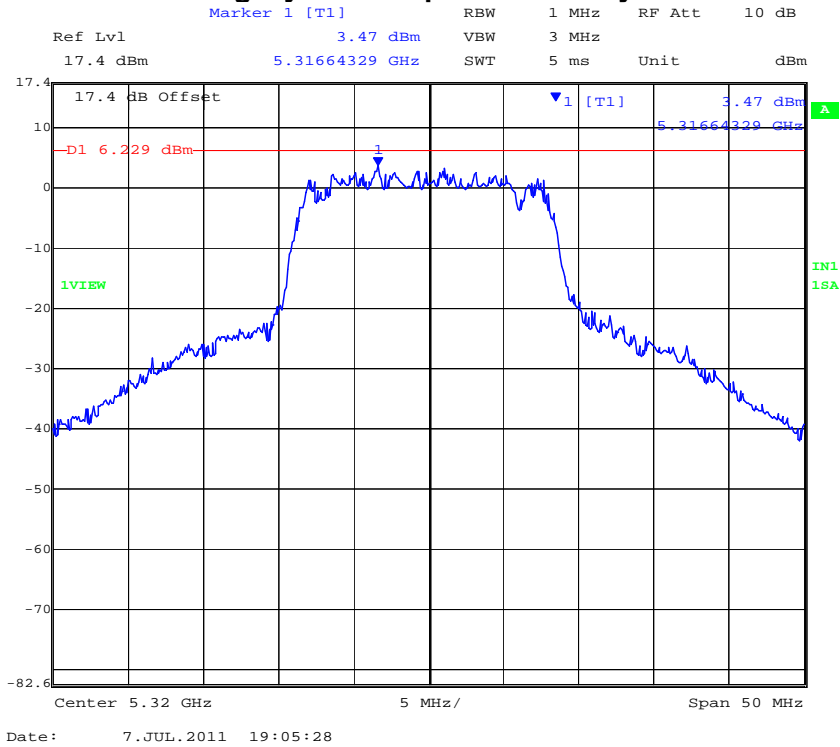
PORT C 5,300 MHz 802.11a Legacy Power Spectral Density



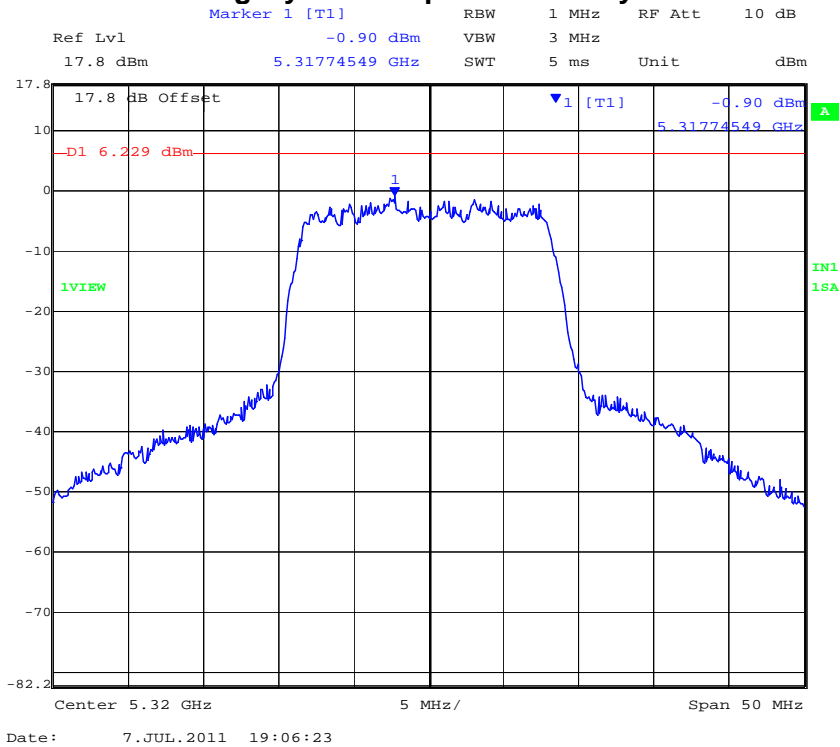
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PORT A 5,320 MHz 802.11a Legacy Power Spectral Density



PORT B 5,320 MHz 802.11a Legacy Power Spectral Density

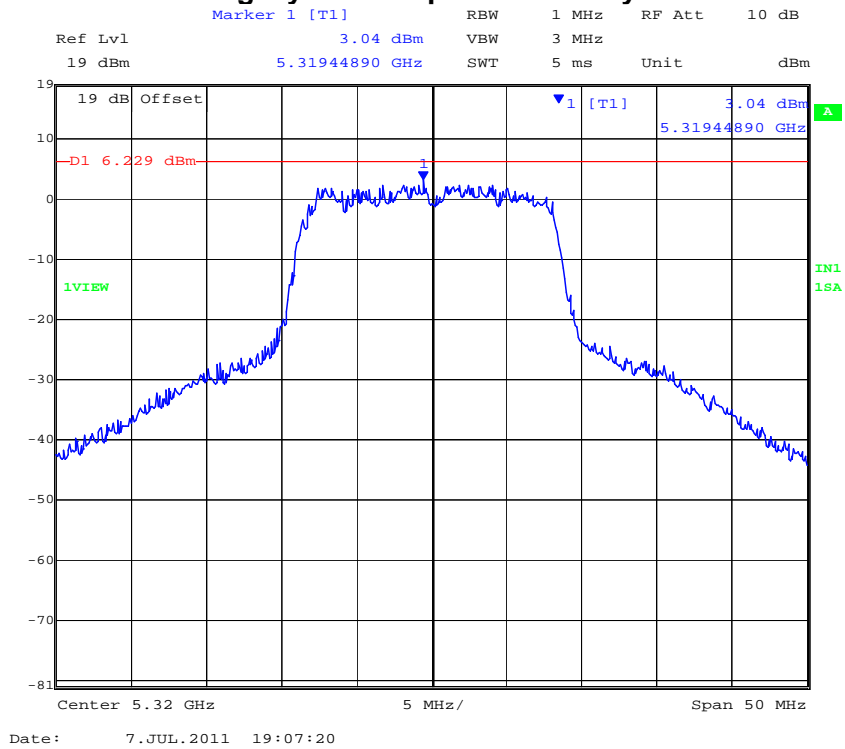


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PORT C 5,320 MHz 802.11a Legacy Power Spectral Density



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TABLE OF RESULTS – 802.11n HT-20 5250 -5350 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi		
Applied Voltage:	48.0 Vdc	Antenna Ports (N):	3		
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Correction factor	Peak Power Spectral Density	Limit	Margin
	RF Port (dBm)							
MHz	a	b	c	d	10Log(N)	dBm	dBm	dB
5260.00	2.68	1.28	3.32	--	4.77	8.09	11.00	-2.91
5300.00	2.68	0.01	3.60	--	4.77	8.37	11.00	-2.63
5320.00	2.60	-2.12	3.21	--	4.77	7.98	11.00	-3.02

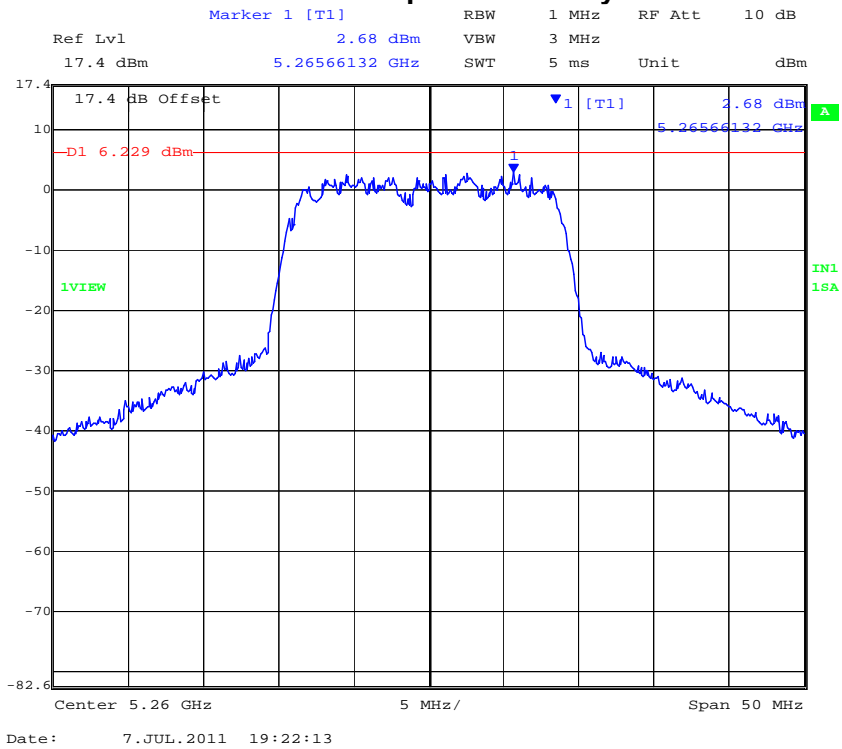
Measurement uncertainty:	±1.33 dB
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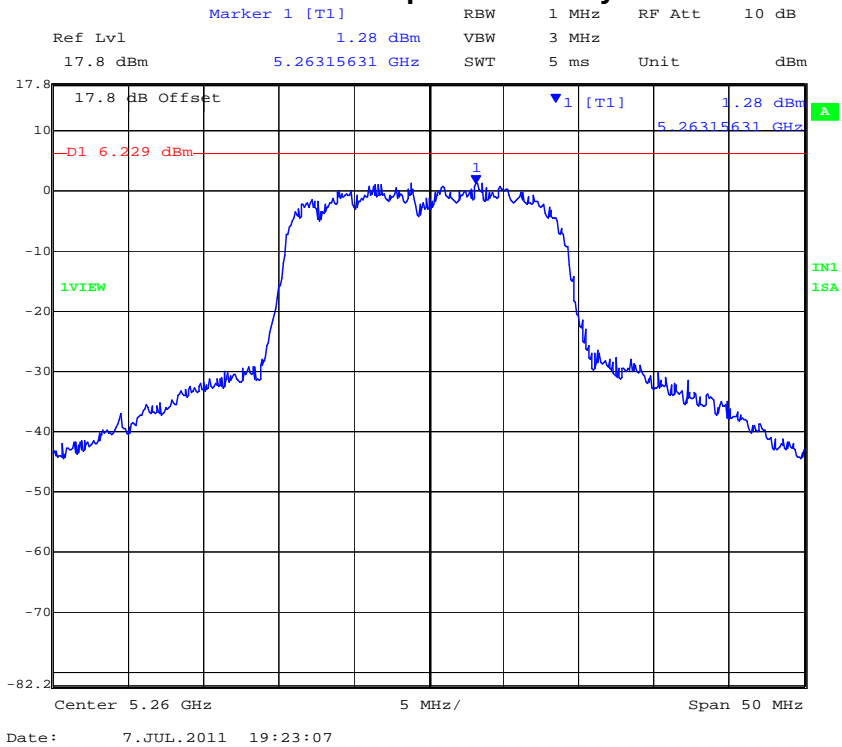


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PORT A 5,260 MHz 802.11n HT-20 Power Spectral Density



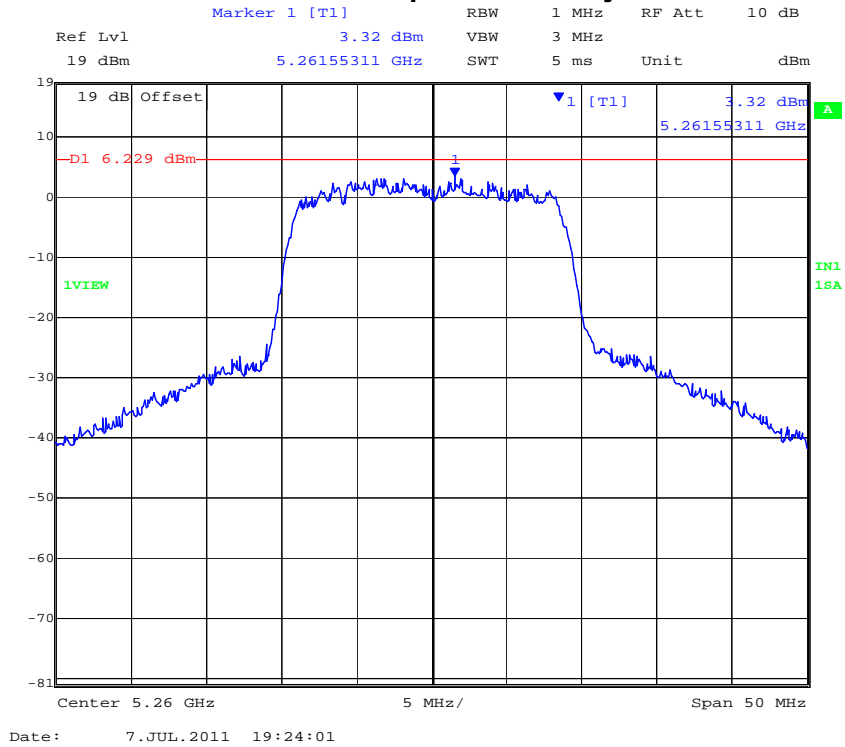
PORT B 5,260 MHz 802.11n HT-20 Power Spectral Density



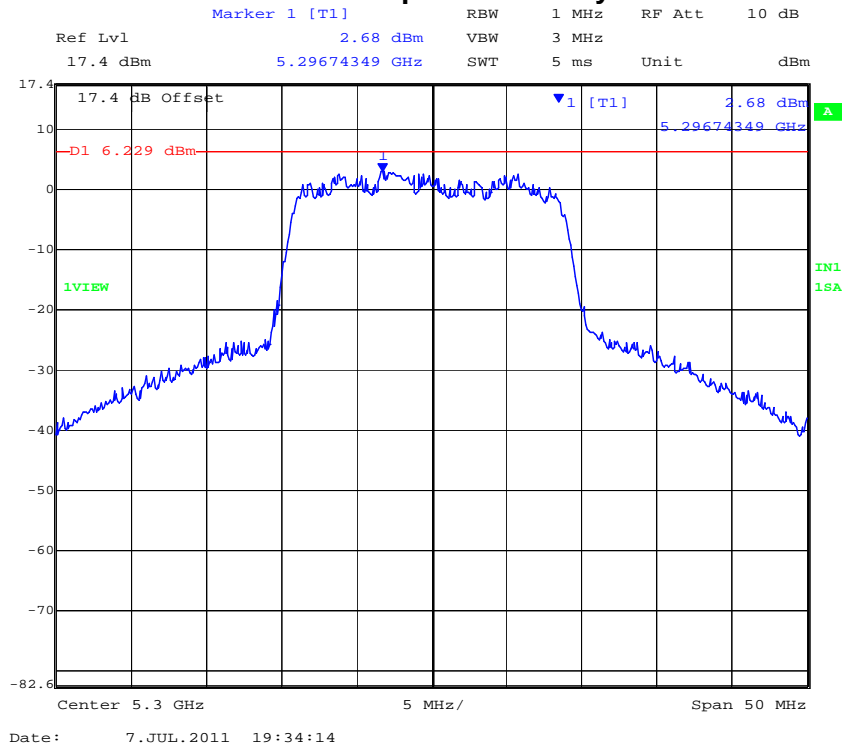
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PORT C 5,260 MHz 802.11n HT-20 Power Spectral Density



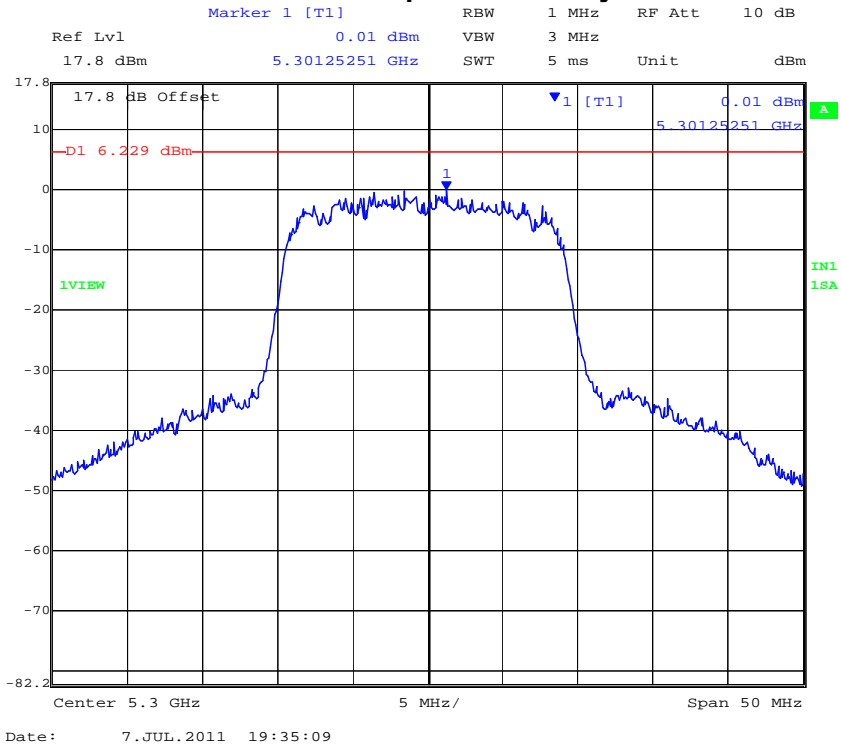
PORT A 5300 MHz 802.11n HT-20 Power Spectral Density



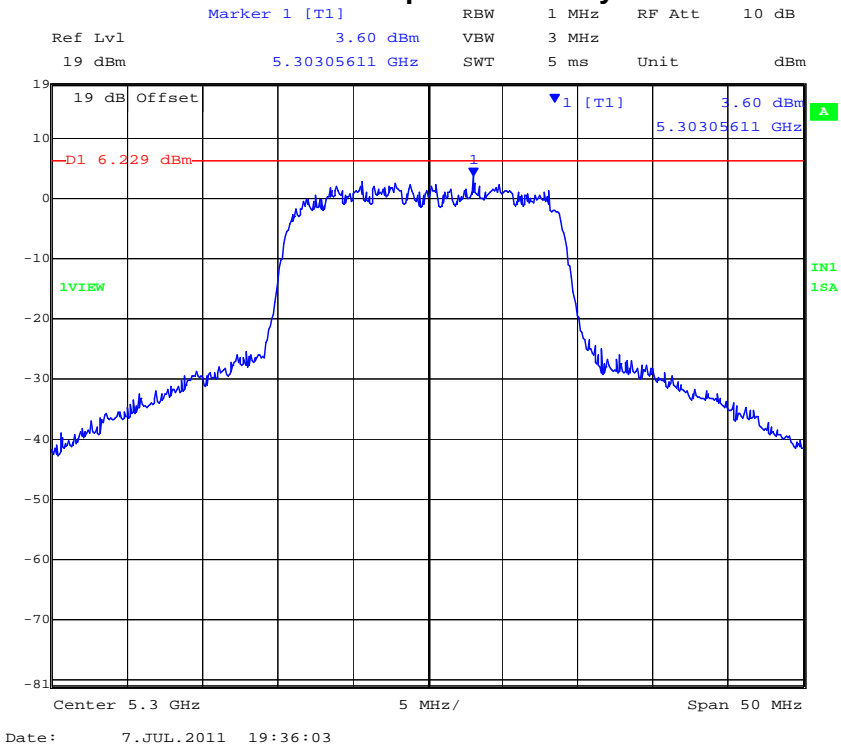
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PORT B 5,300 MHz 802.11n HT-20 Power Spectral Density



PORT C 5,300 MHz 802.11n HT-20 Power Spectral Density

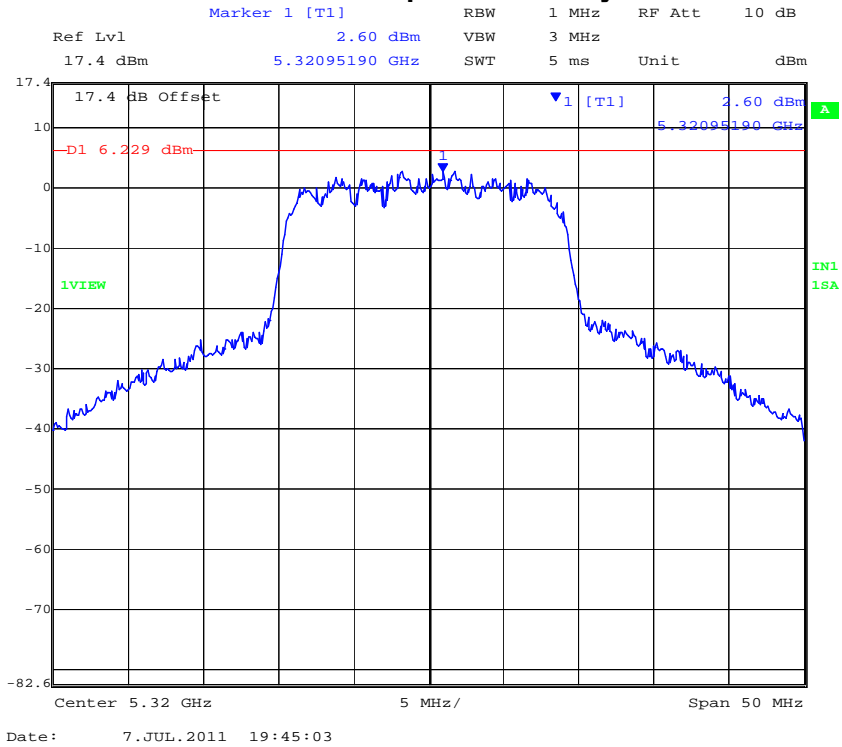


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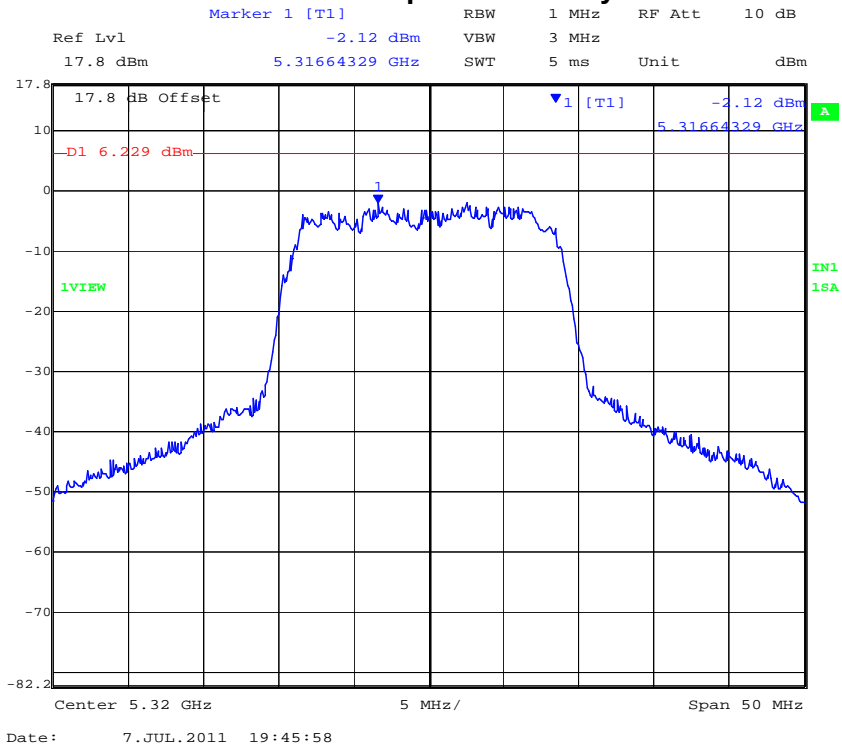


Title: Fluke Networks Sensor4 Wireless Client
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PORT A 5,320 MHz 802.11n HT-20 Power Spectral Density



PORT B 5,320 MHz 802.11n HT-20 Power Spectral Density

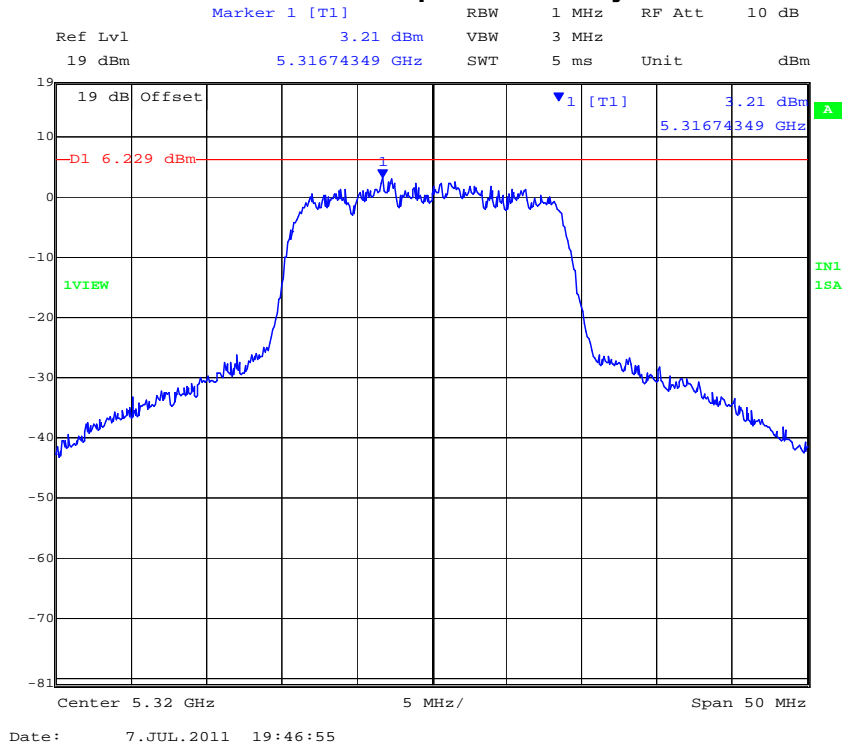


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Title: Fluke Networks Sensor4 Wireless Client
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PORT C 5,320 MHz 802.11n HT-20 Power Spectral Density



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TABLE OF RESULTS – 802.11n HT-40 5250 -5350 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11n HT-40	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi		
Applied Voltage:	48.0 Vdc	Antenna Ports (N):	3		
Notes 1:					
Notes 2:					

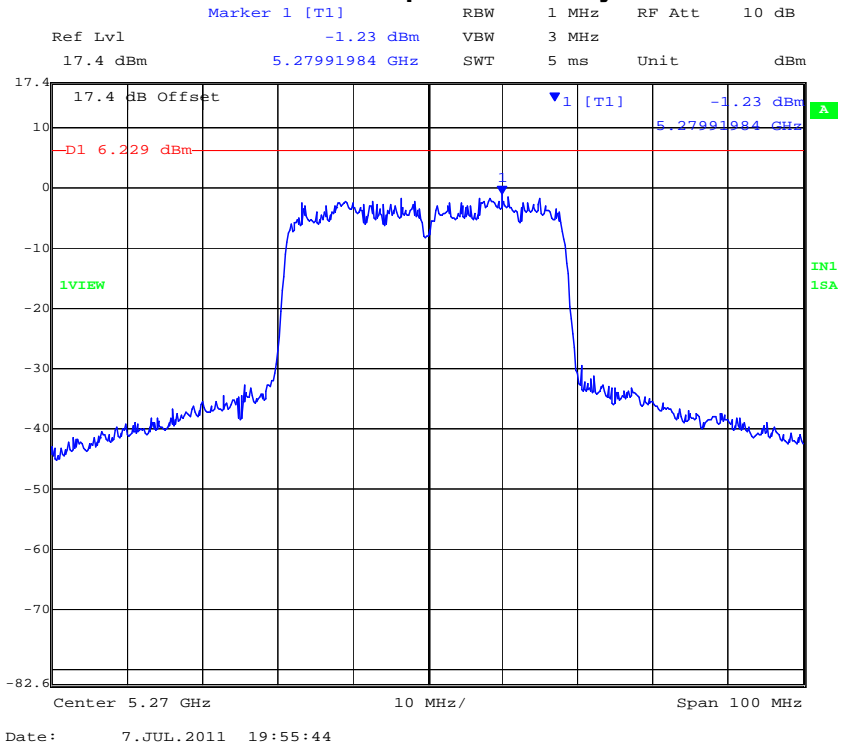
Test Frequency	Measured Peak Power				Correction factor	Peak Power Spectral Density	Limit	Margin
	RF Port (dBm)							
MHz	a	b	c	d	10Log(N)	dBm	dBm	dB
5270.00	-1.23	-3.64	-1.15	--	4.77	3.62	11.00	-7.38
5310.00	-1.65	-5.56	-0.98	--	4.77	3.79	11.00	-7.21

Measurement uncertainty:	±1.33 dB
---------------------------------	----------

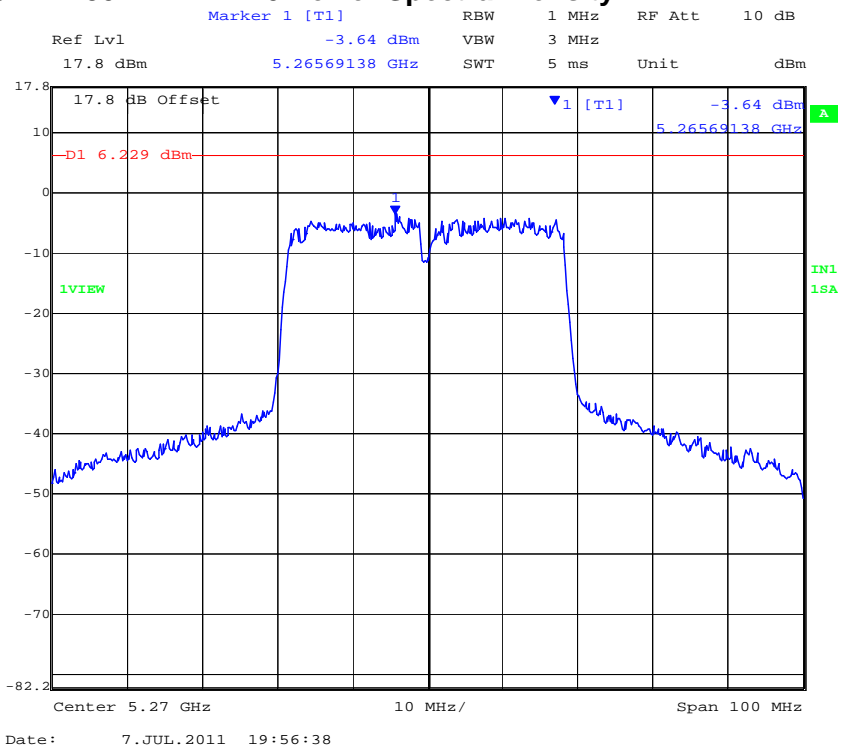
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PORT A 5,270 MHz 802.11n HT-40 Power Spectral Density



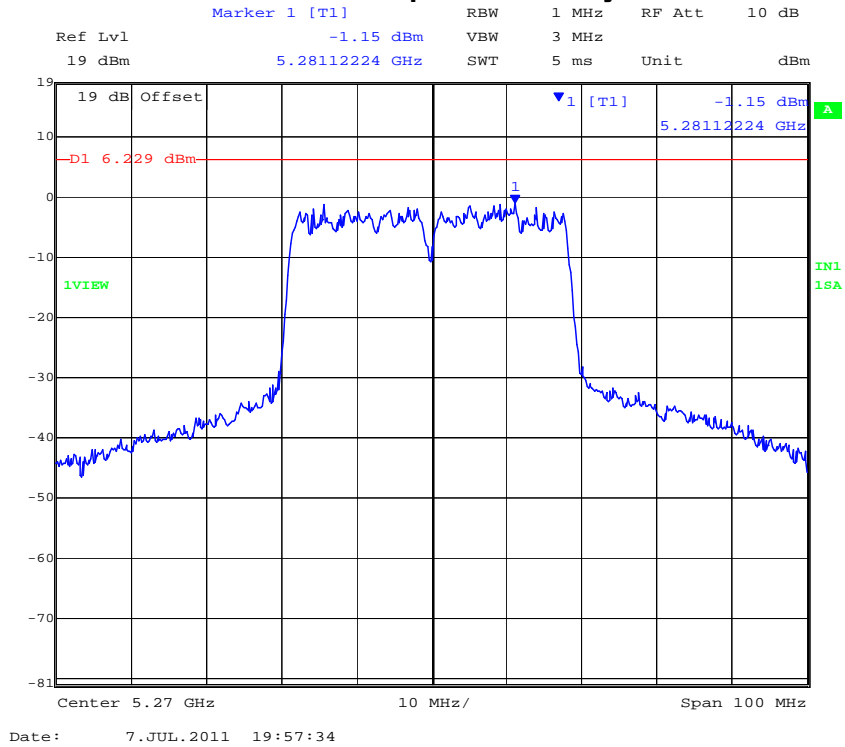
PORT B 5,270 MHz 802.11n HT-40 Power Spectral Density



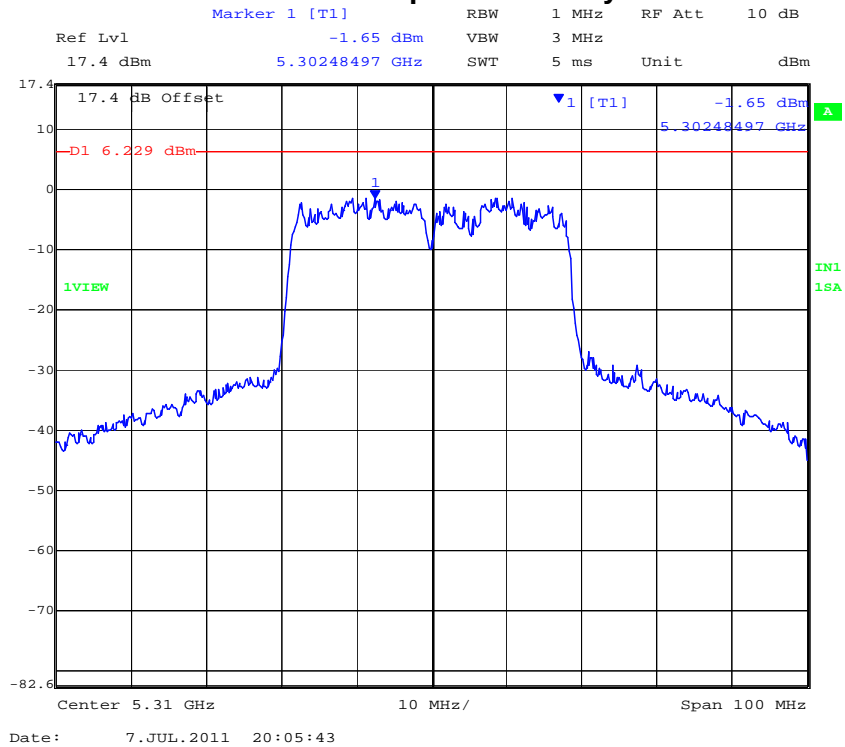
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PORT C 5,270 MHz 802.11n HT-40 Power Spectral Density



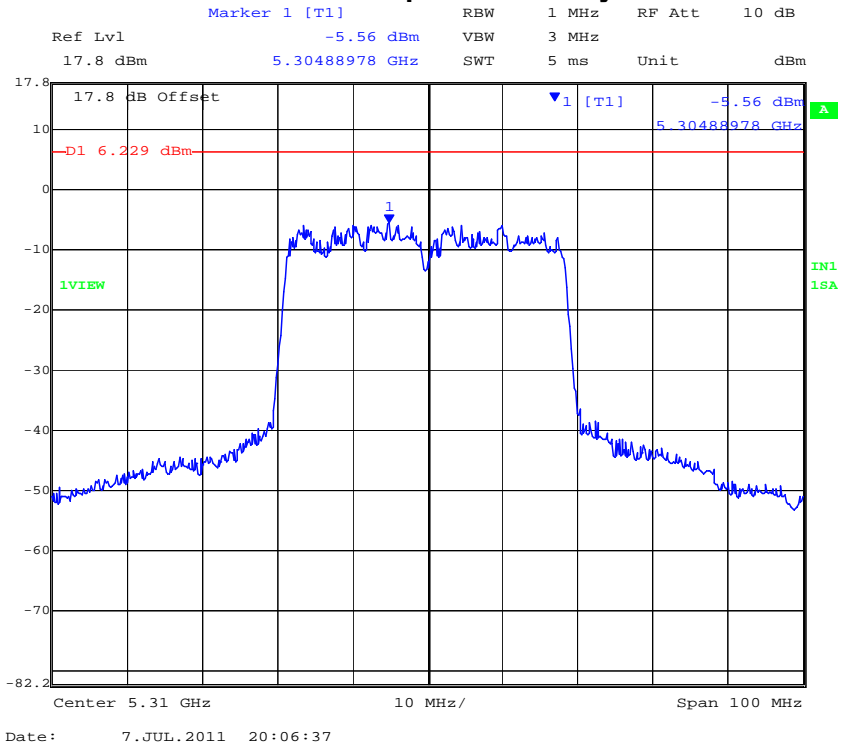
PORT A 5,310 MHz 802.11n HT-40 Power Spectral Density



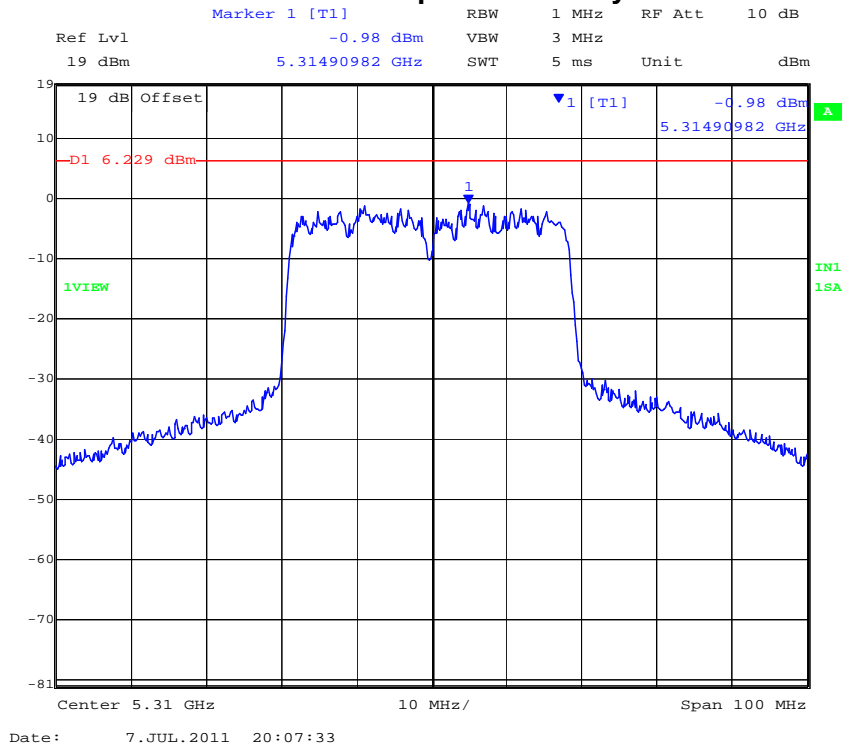
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PORT B 5,310 MHz 802.11n HT-40 Power Spectral Density



PORT C 5,310 MHz 802.11n HT-40 Power Spectral Density



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TABLE OF RESULTS – 802.11a Legacy 5500 - 5700 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11a	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi		
Applied Voltage:	48.0 Vdc	Antenna Ports (N):	3		
Notes 1:					
Notes 2:					

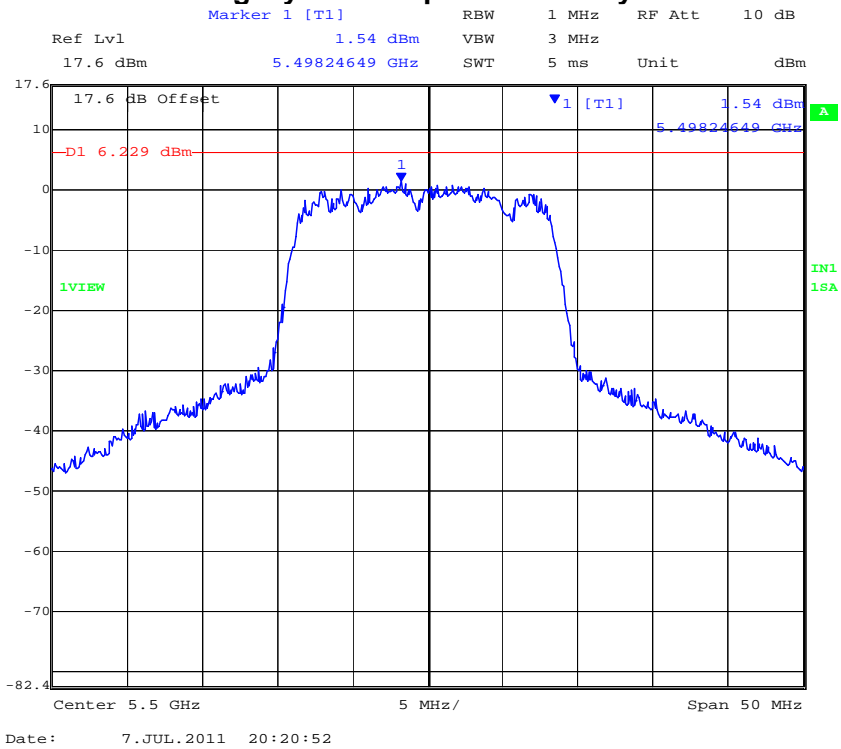
Test Frequency	Measured Peak Power				Correction factor	Peak Power Spectral Density	Limit	Margin
	RF Port (dBm)							
MHz	a	b	c	d	10Log(N)	dBm	dBm	dB
5500.00	1.54	1.39	0.99	--	4.77	6.31	11.00	-4.69
5580.00	2.21	0.90	3.42	--	4.77	8.19	11.00	-2.81
5700.00	1.69	0.24	1.82	--	4.77	6.59	11.00	-4.41

Measurement uncertainty:	±1.33 dB
---------------------------------	----------

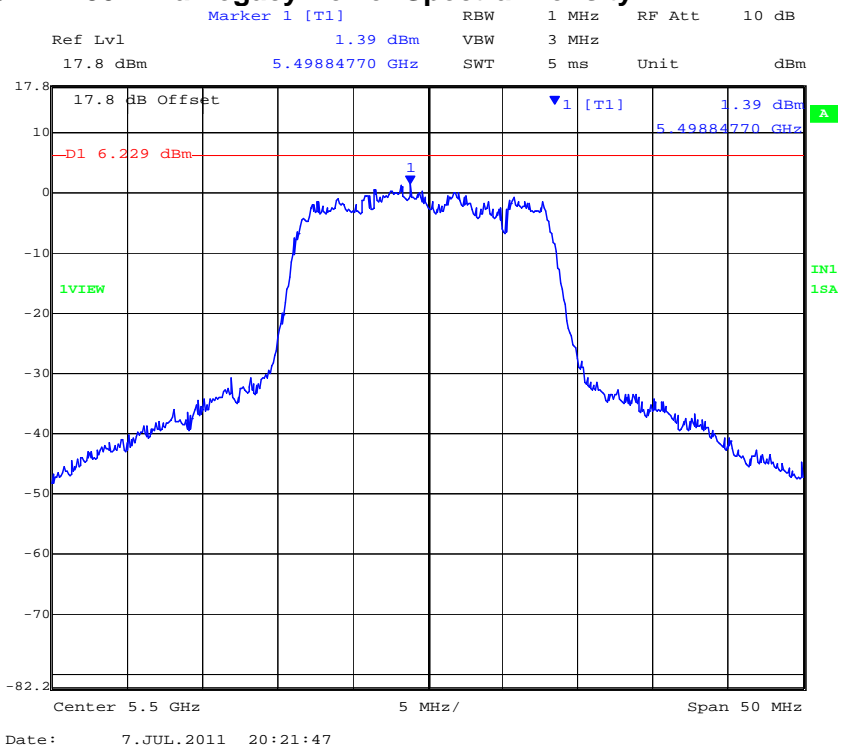
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PORT A 5,500 MHz 802.11a Legacy Power Spectral Density



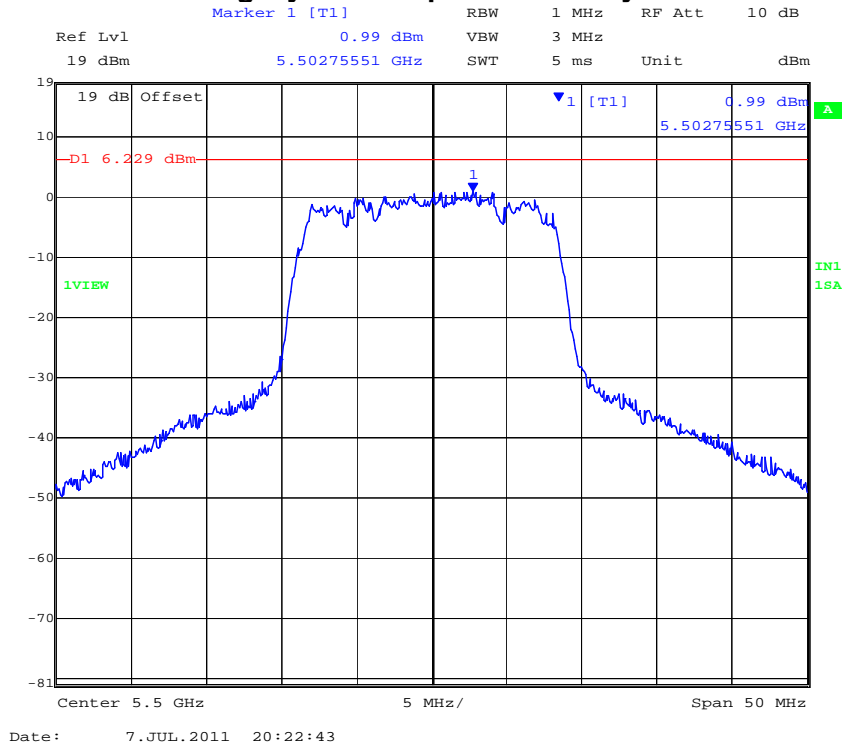
PORT B 5,500 MHz 802.11a Legacy Power Spectral Density



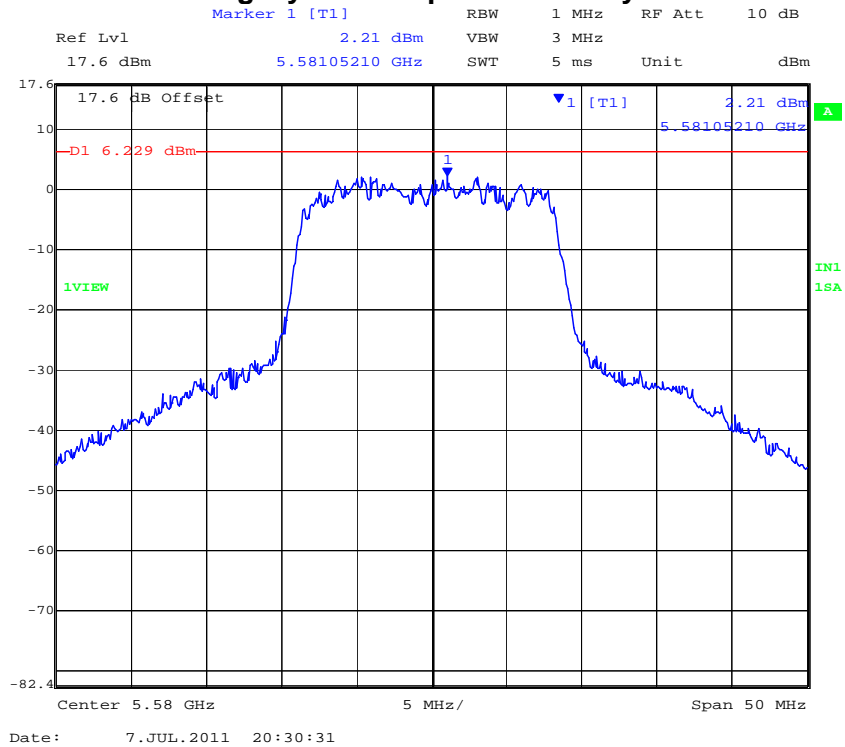
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PORT C 5,500 MHz 802.11a Legacy Power Spectral Density



PORT A 5,580 MHz 802.11a Legacy Power Spectral Density

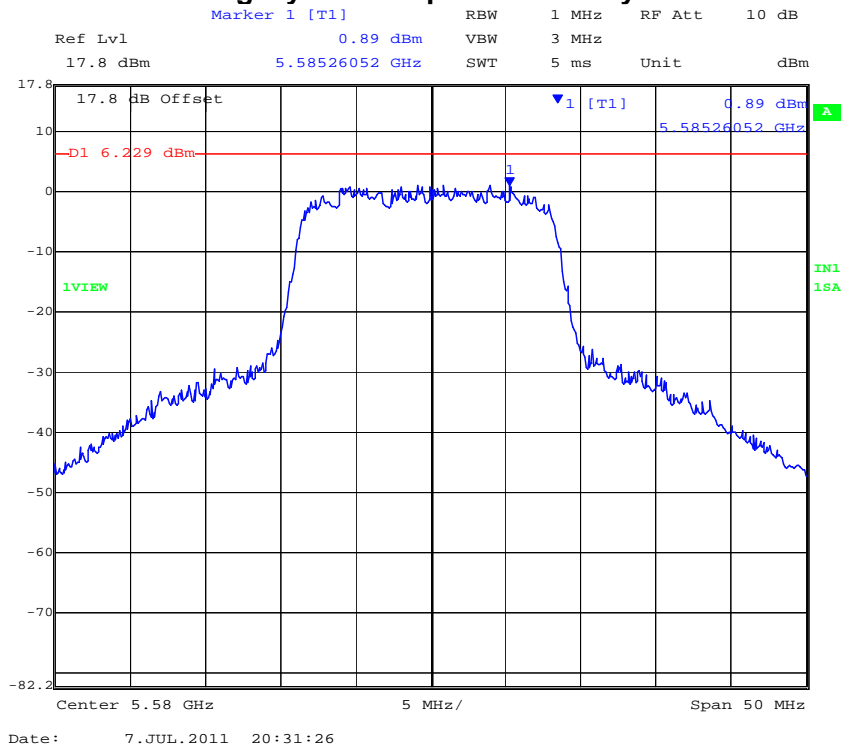


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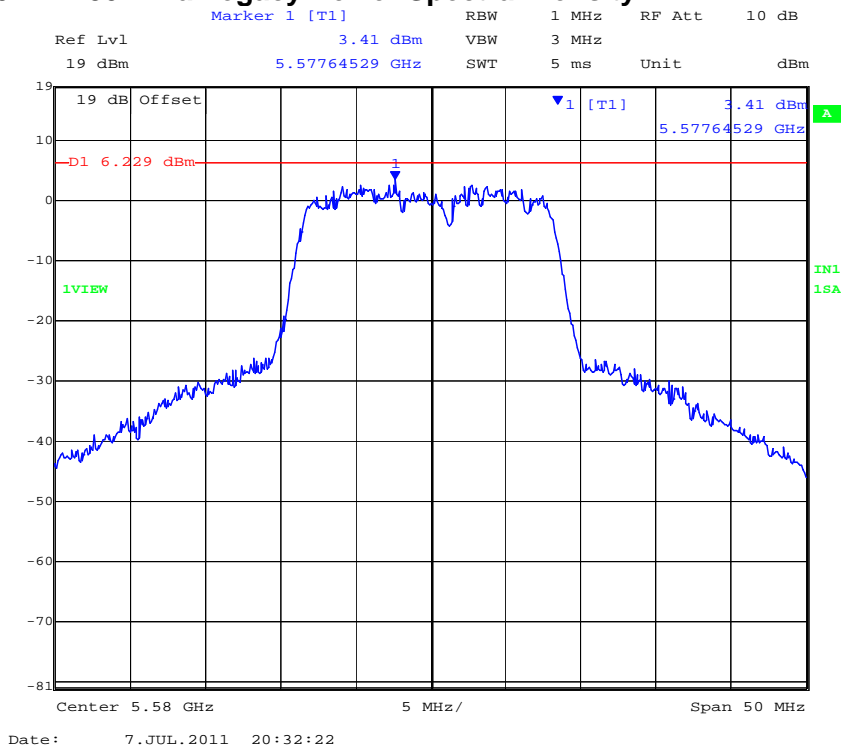


Title: Fluke Networks Sensor4 Wireless Client
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PORT B 5,580 MHz 802.11a Legacy Power Spectral Density



PORT C 5,580 MHz 802.11a Legacy Power Spectral Density

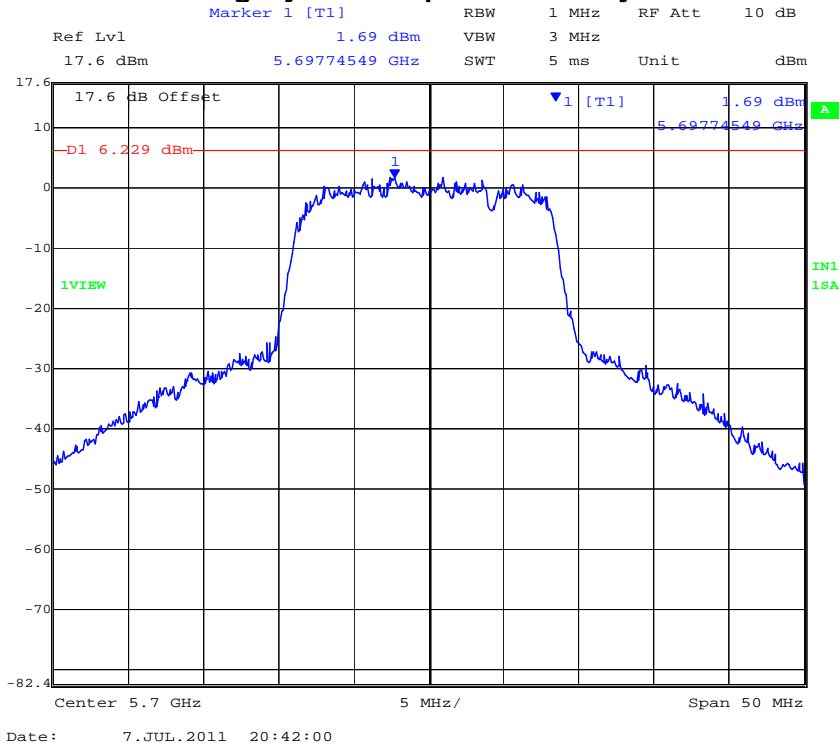


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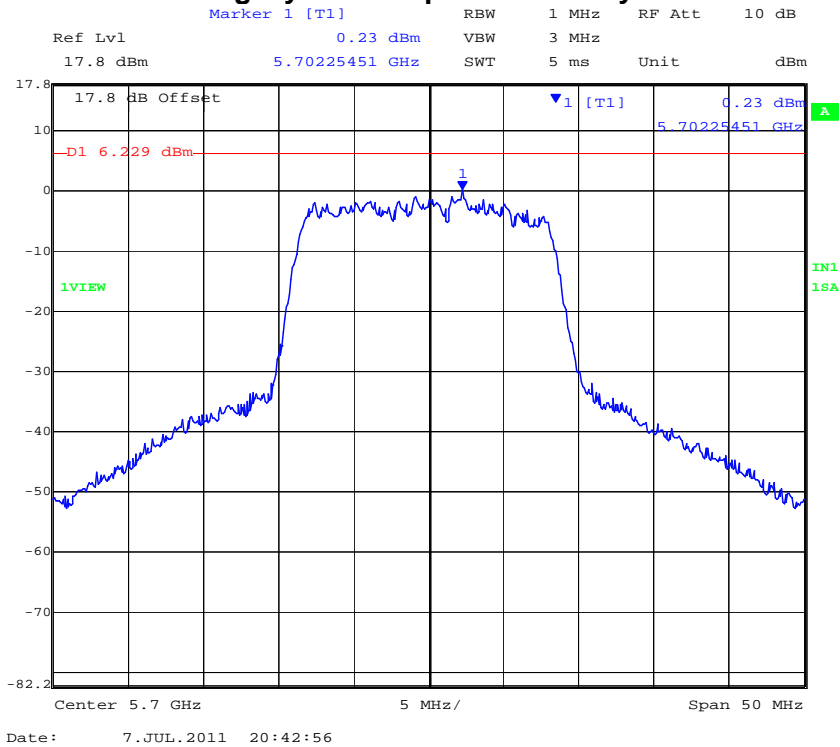


Title: Fluke Networks Sensor4 Wireless Client
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PORT A 5,700 MHz 802.11a Legacy Power Spectral Density



PORT B 5,700 MHz 802.11a Legacy Power Spectral Density

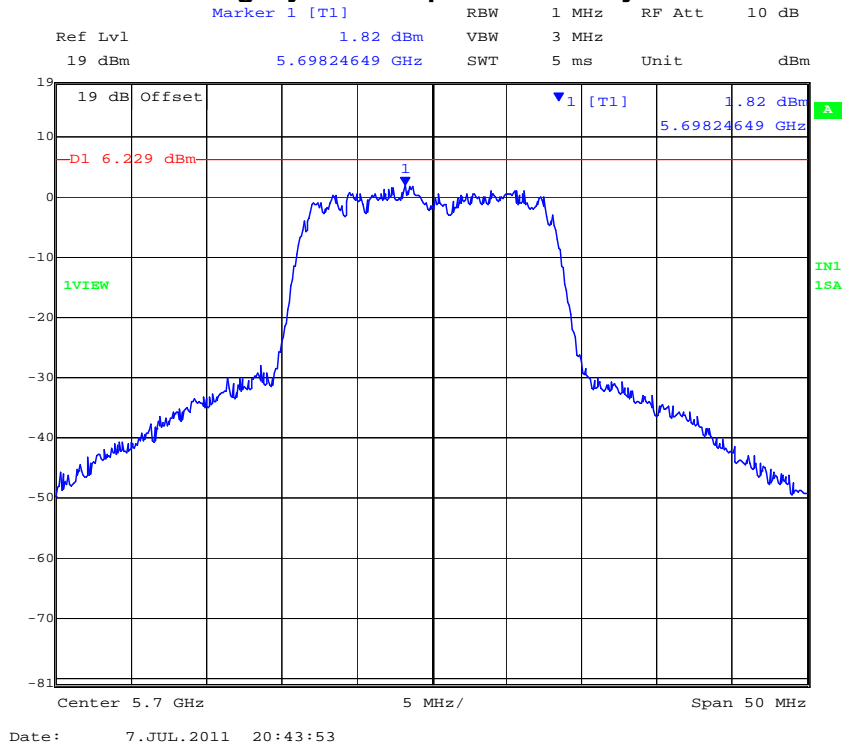


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PORT C 5,700 MHz 802.11a Legacy Power Spectral Density



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TABLE OF RESULTS – 802.11n HT-20 5500 - 5700 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi		
Applied Voltage:	48.0 Vdc	Antenna Ports (N):	3		
Notes 1:					
Notes 2:					

Test Frequency	Measured Peak Power				Correction factor	Peak Power Spectral Density	Limit	Margin
	RF Port (dBm)							
MHz	a	b	c	d	10Log(N)	dBm	dBm	dB
5500.00	2.07	0.72	1.66	--	4.77	6.84	11.00	-4.16
5580.00	2.03	1.04	3.05	--	4.77	7.82	11.00	-3.18
5700.00	0.74	-1.89	2.00	--	4.77	6.78	11.00	-4.22

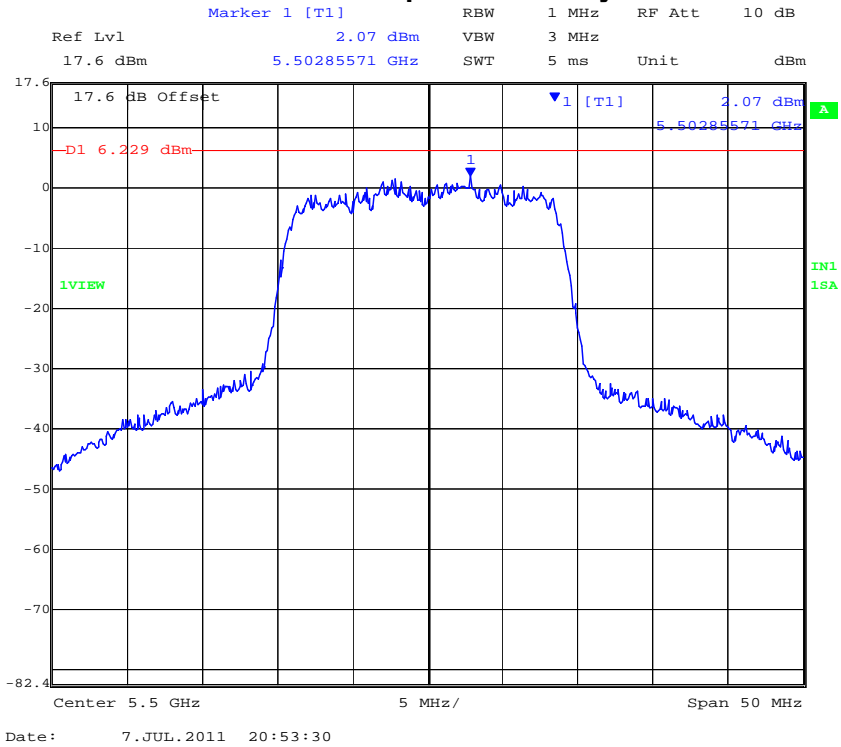
Measurement uncertainty:	±1.33 dB
---------------------------------	----------

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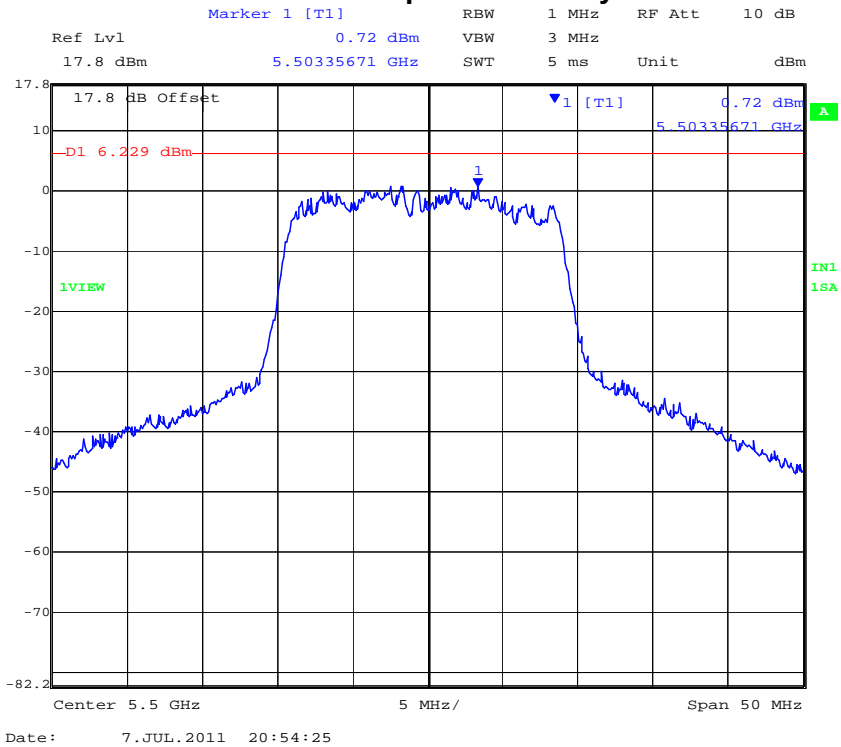


Title: Fluke Networks Sensor4 Wireless Client
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PORT A 5,500 MHz 802.11n HT-20 Power Spectral Density



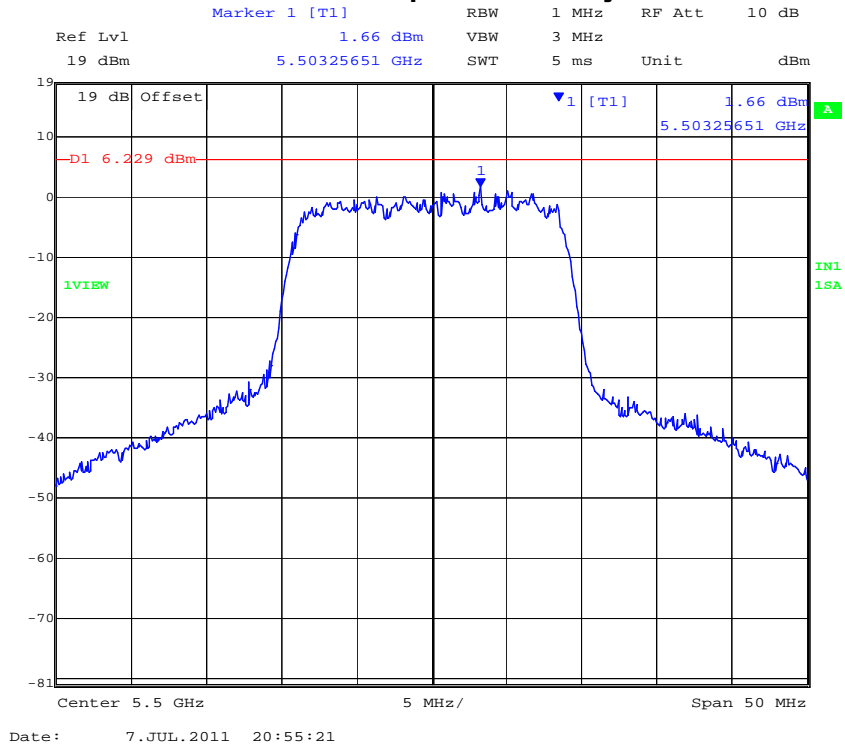
PORT B 5,500 MHz 802.11n HT-20 Power Spectral Density



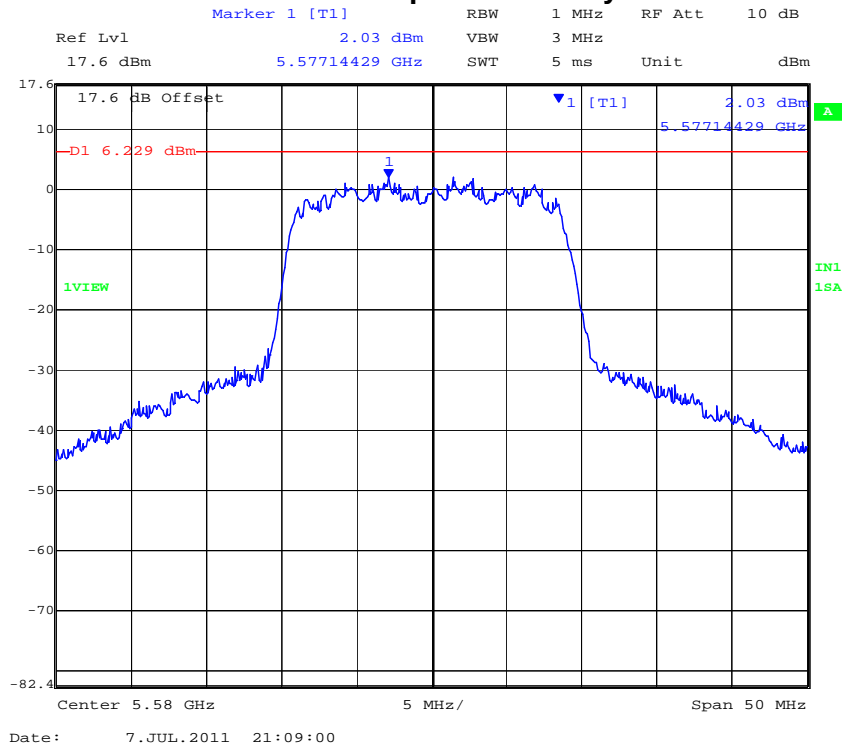
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PORT C 5,500 MHz 802.11n HT-20 Power Spectral Density



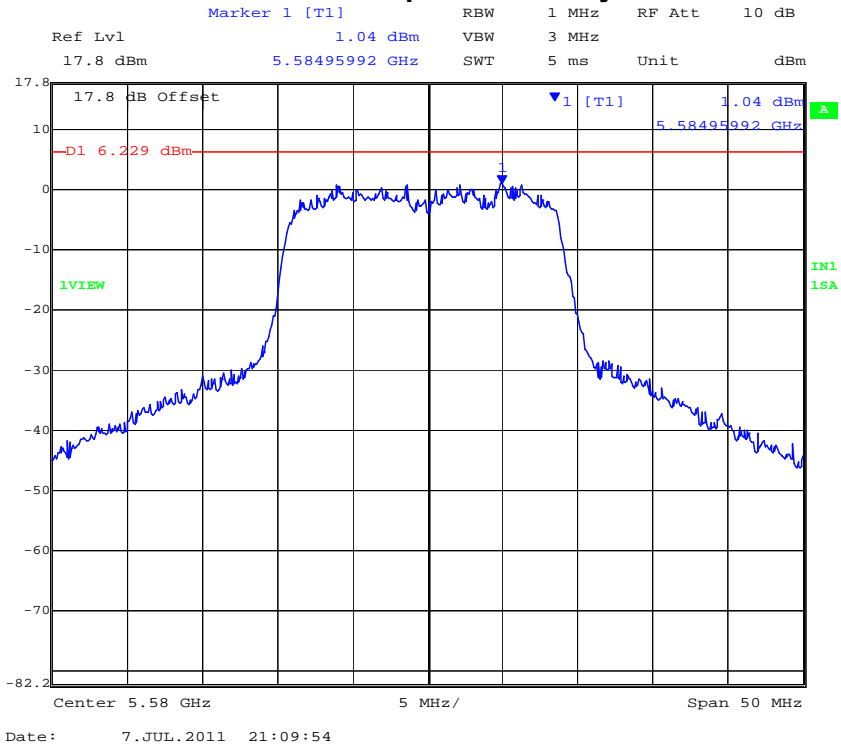
PORT A 5,580 MHz 802.11n HT-20 Power Spectral Density



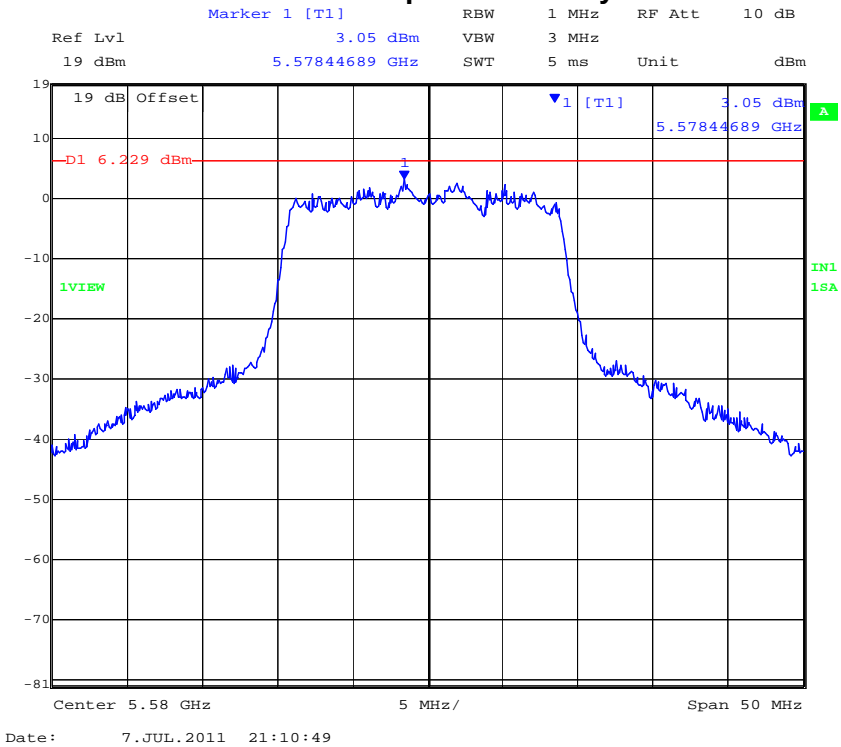
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PORT B 5,580 MHz 802.11n HT-20 Power Spectral Density



PORT C 5,580 MHz 802.11n HT-20 Power Spectral Density

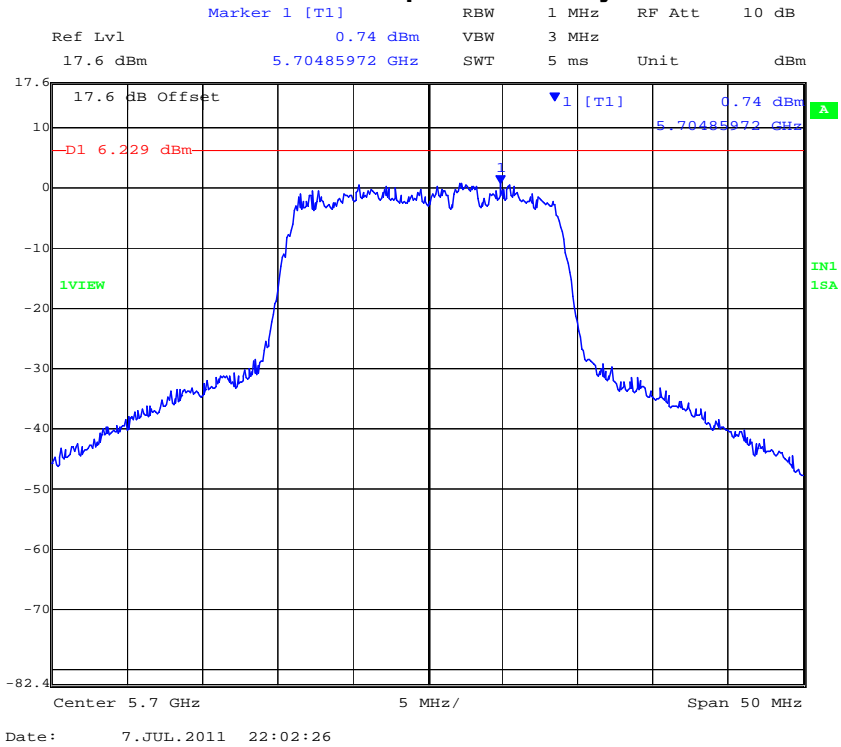


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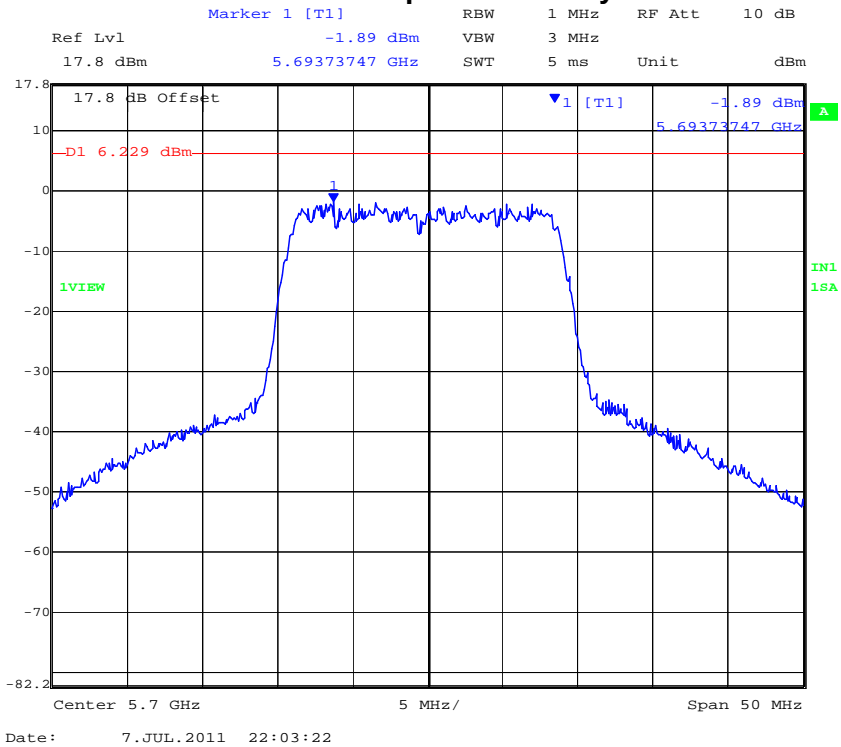


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PORT A 5,700 MHz 802.11n HT-20 Power Spectral Density



PORT B 5,700 MHz 802.11n HT-20 Power Spectral Density



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TABLE OF RESULTS – 802.11n HT-40 5500 - 5700 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11n HT-40	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	0 dBi		
Applied Voltage:	48.0 Vdc	Antenna Ports (N):	3		
Notes 1:					
Notes 2:					

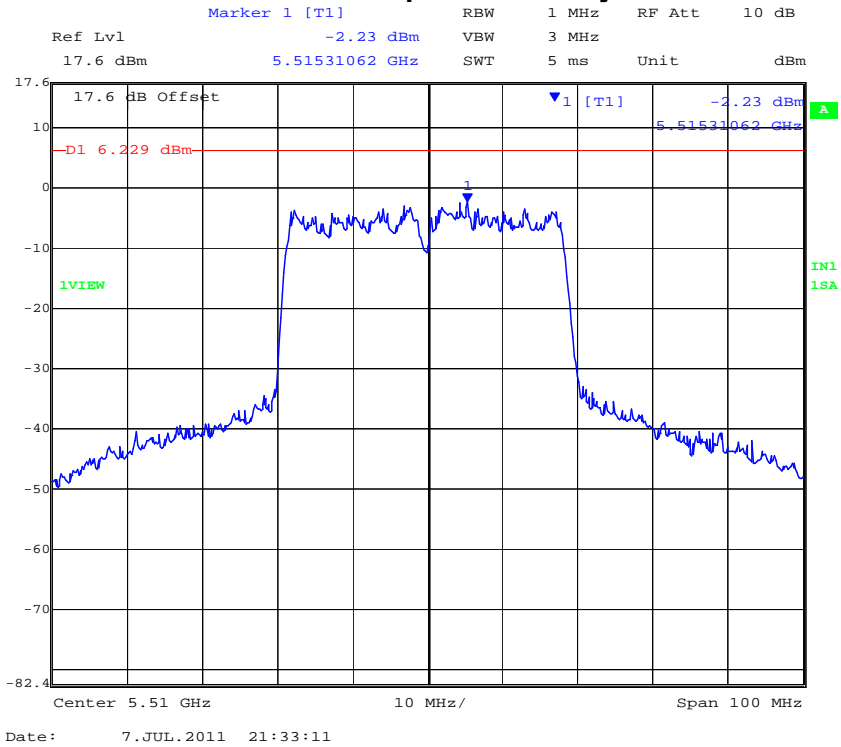
Test Frequency	Measured Peak Power				Correction factor	Peak Power Spectral Density	Limit	Margin
	RF Port (dBm)							
MHz	a	b	c	d	10Log(N)	dBm	dBm	dB
5510.00	-2.23	-3.65	-2.79	--	4.77	2.54	11.00	-8.46
5550.00	-2.01	-2.69	-1.51	--	4.77	3.27	11.00	-7.73
5670.00	-3.01	-4.75	-1.70	--	4.77	3.07	11.00	-7.93

Measurement uncertainty:	±1.33 dB
---------------------------------	----------

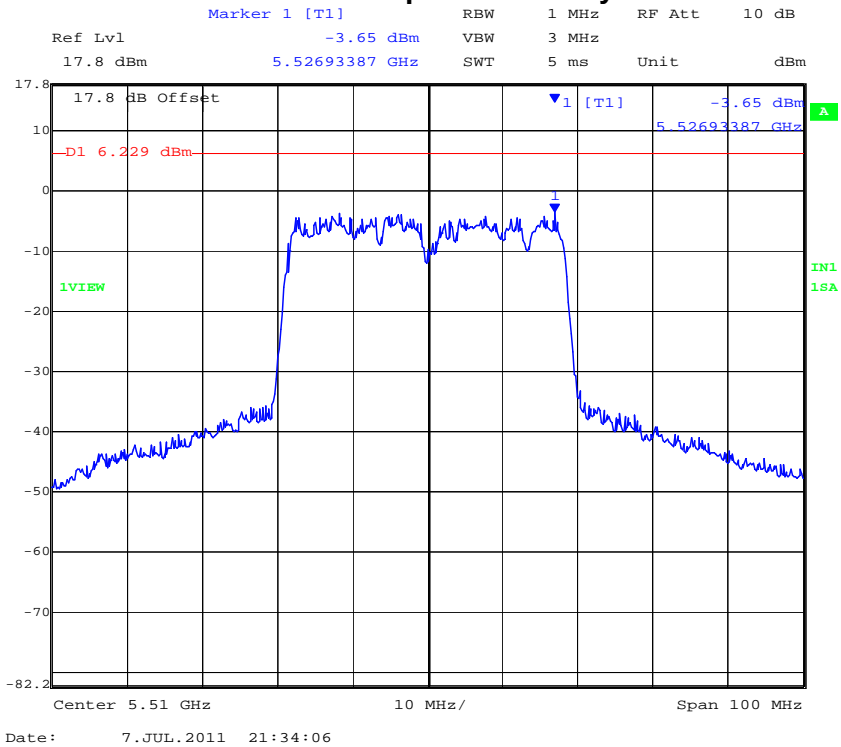
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PORT A 5,510 MHz 802.11n HT-40 Power Spectral Density



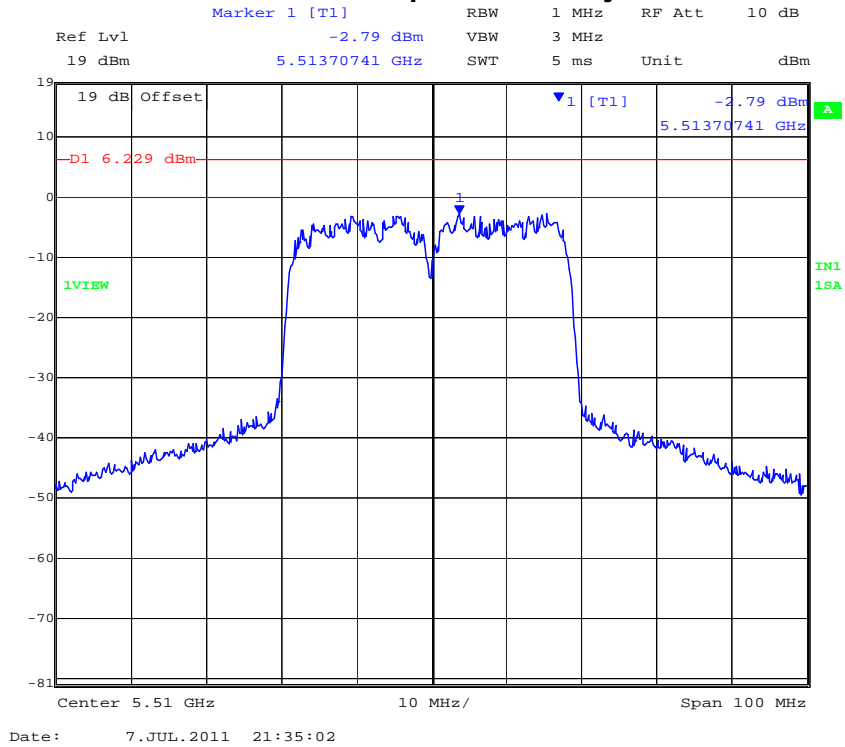
PORT B 5,510 MHz 802.11n HT-40 Power Spectral Density



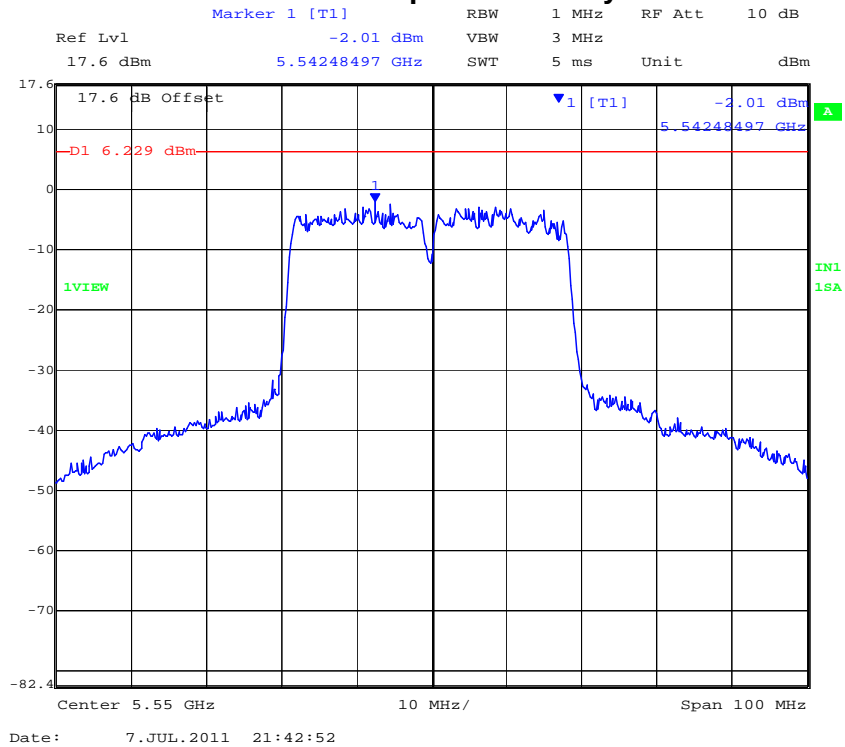
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PORT C 5,510 MHz 802.11n HT-40 Power Spectral Density



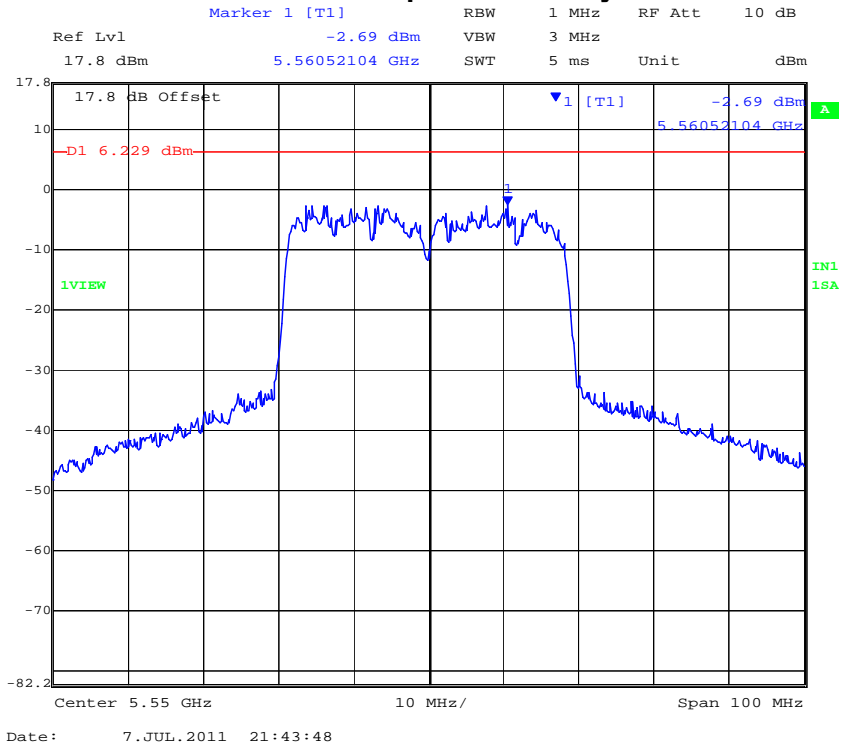
PORT A 5,500 MHz 802.11n HT-40 Power Spectral Density



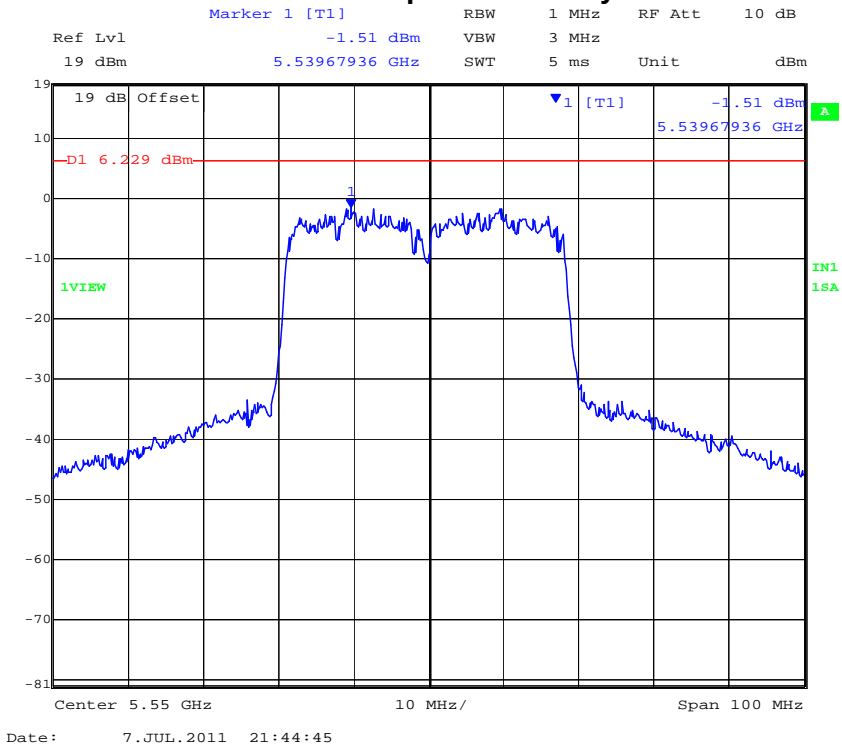
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PORT B 5,550 MHz 802.11n HT-40 Power Spectral Density



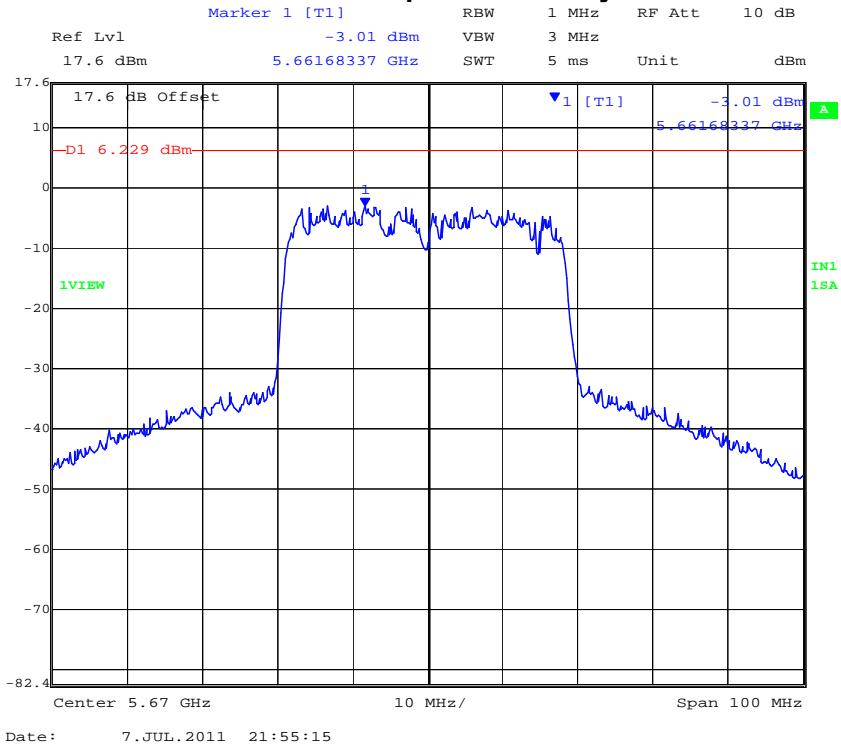
PORT C 5,550 MHz 802.11n HT-40 Power Spectral Density



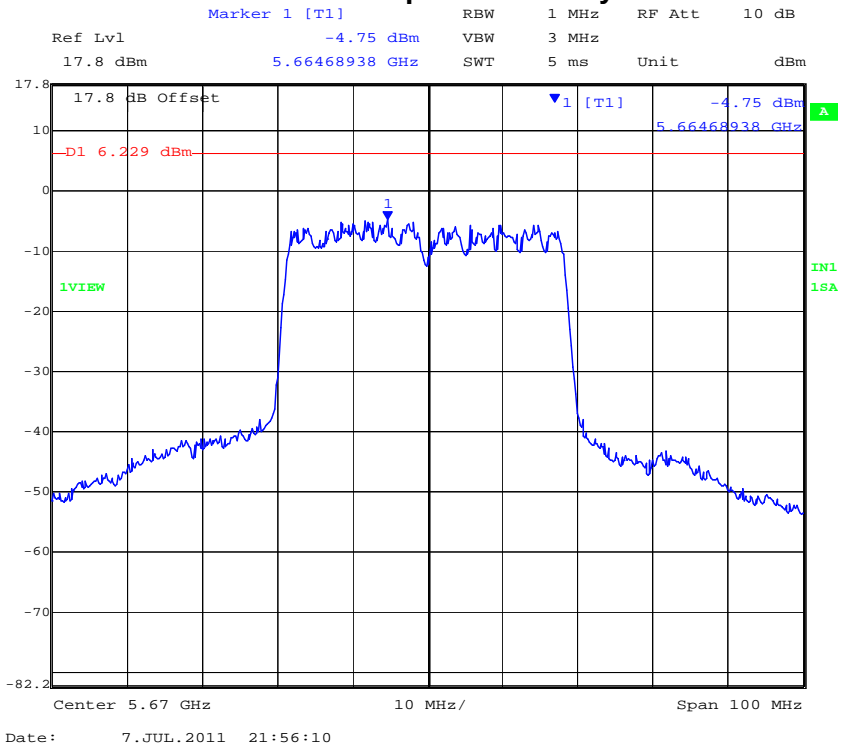
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PORT A 5,690 MHz 802.11n HT-40 Power Spectral Density



PORT B 5,690 MHz 802.11n HT-40 Power Spectral Density

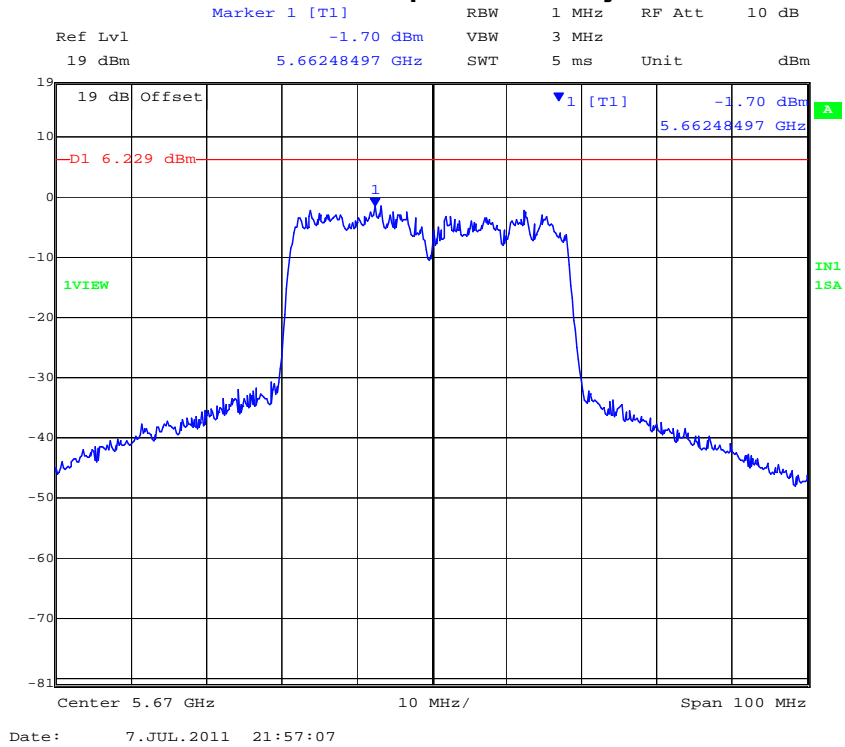


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PORT C 5,690 MHz 802.11n HT-40 Power Spectral Density



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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

Laboratory Measurement Uncertainty for Spectral Density

Measurement uncertainty	±1.33 dB
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Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-01 'Measuring RF Output Power'	0158, 0287, 0252, 0313, 0314, 0070, 0116, 0117

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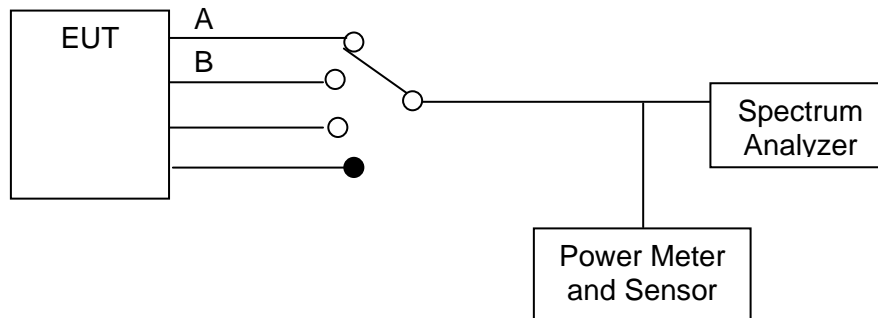
5.1.4. Peak Excursion Ratio

FCC, Part 15 Subpart C §15.407(a)(6)

Test Procedure

Normative Reference (xi) Section 2.1 Measurement Procedure DA 02-2138 "Measurement Procedure Updated for Peak Transmit Power in the UNII Bands" was implemented to determine the Peak Excursion Ratio. This is a conducted measurement using a spectrum analyzer. The Peak Excursion Ratio is the difference in amplitude (dB) between the two traces.

Test Measurement Set up



Measurement set up for Peak Excursion Ratio

Measurement Results for Peak Excursion Ratio

Ambient conditions.

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

Radio Parameters

Duty Cycle: 100%

Output: Modulated Carrier

Power: Maximum Default Power



Title: Fluke Networks Sensor4 Wireless Client
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TABLE OF RESULTS – 802.11a Legacy 5150 – 5250 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11 a	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

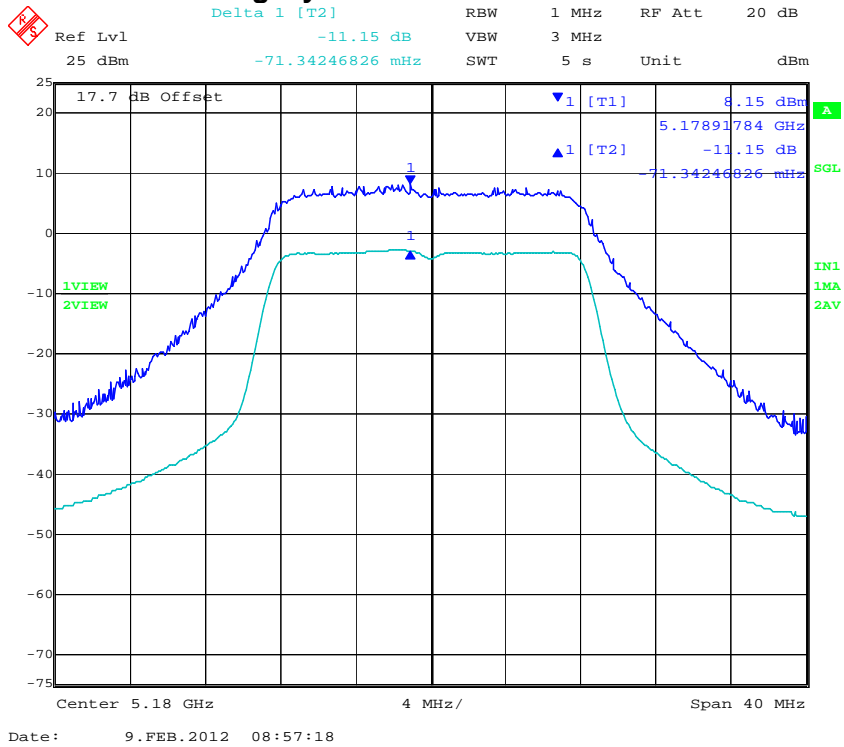
Test Frequency	Trace Δ Marker				Limit	Margin
	Port A	Port B	Port C	Port D		
MHz	dB	dB	dB	dB	dB	dB
5180	-11.15	-10.30	-11.67	--	-13.00	-1.33
5200	-11.23	-10.45	-12.26	--		-0.74
5240	-11.38	-10.74	-11.56	--		-1.44

Measurement uncertainty:	±1.33 dB
---------------------------------	----------

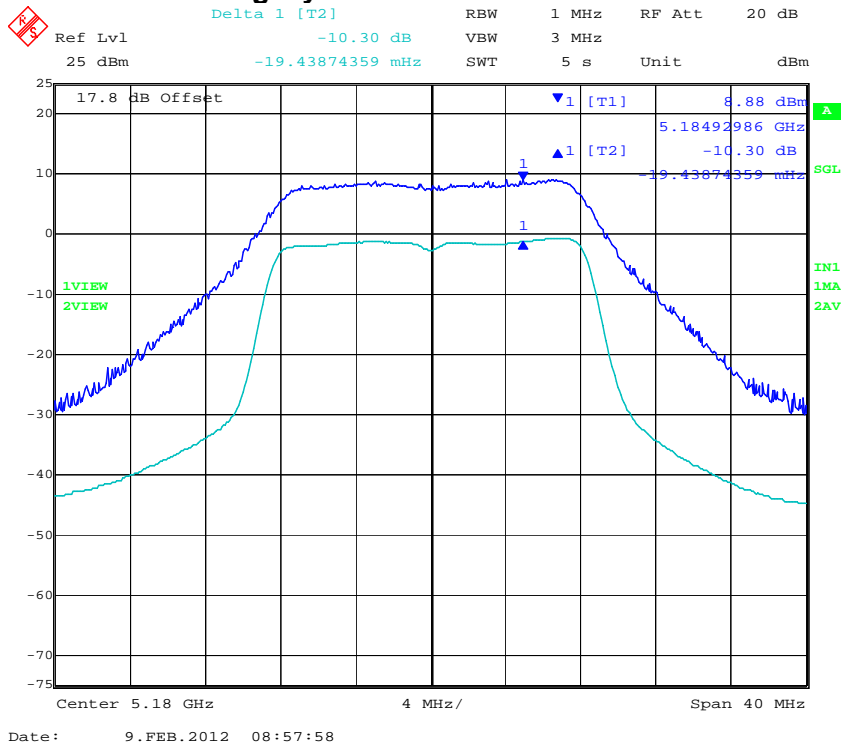
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PORT A 5,1800 MHz 802.11a Legacy Peak Excursion Ratio



PORT B 5,1800 MHz 802.11a Legacy Peak Excursion Ratio

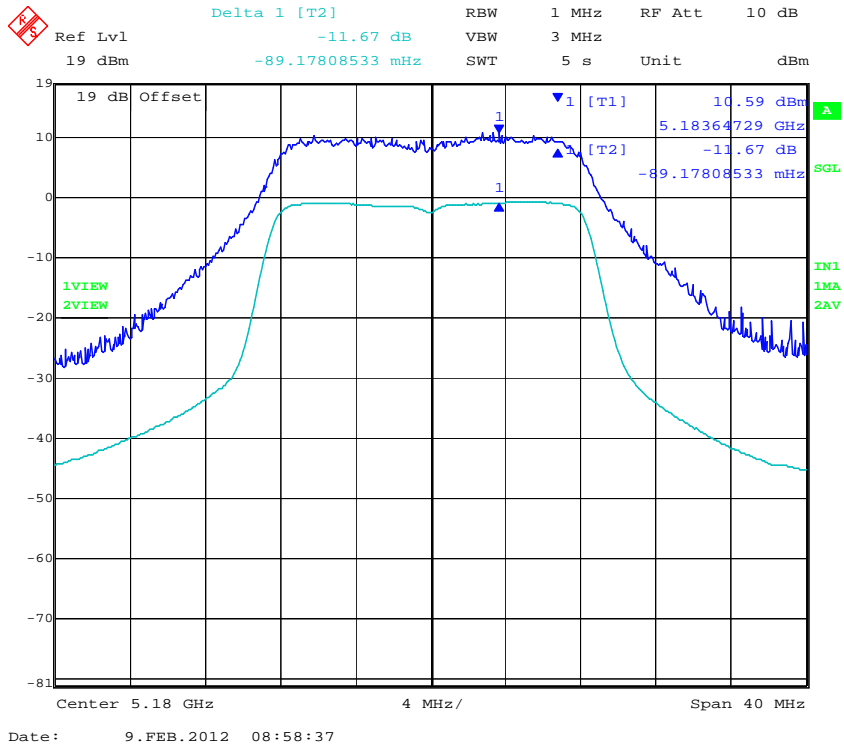


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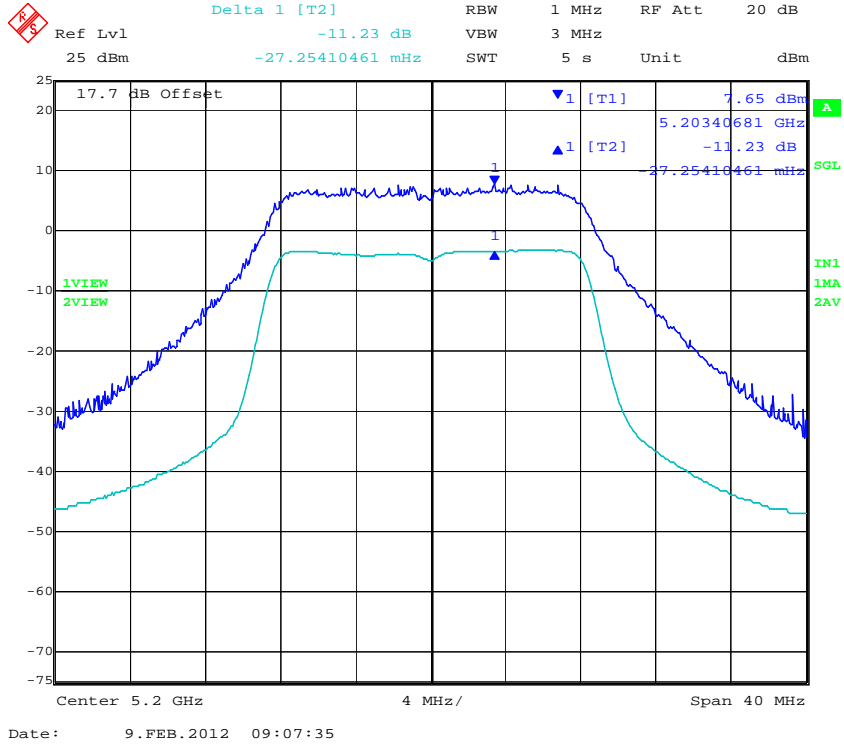
PORT C 5,1800 MHz 802.11a Legacy Excursion Ratio



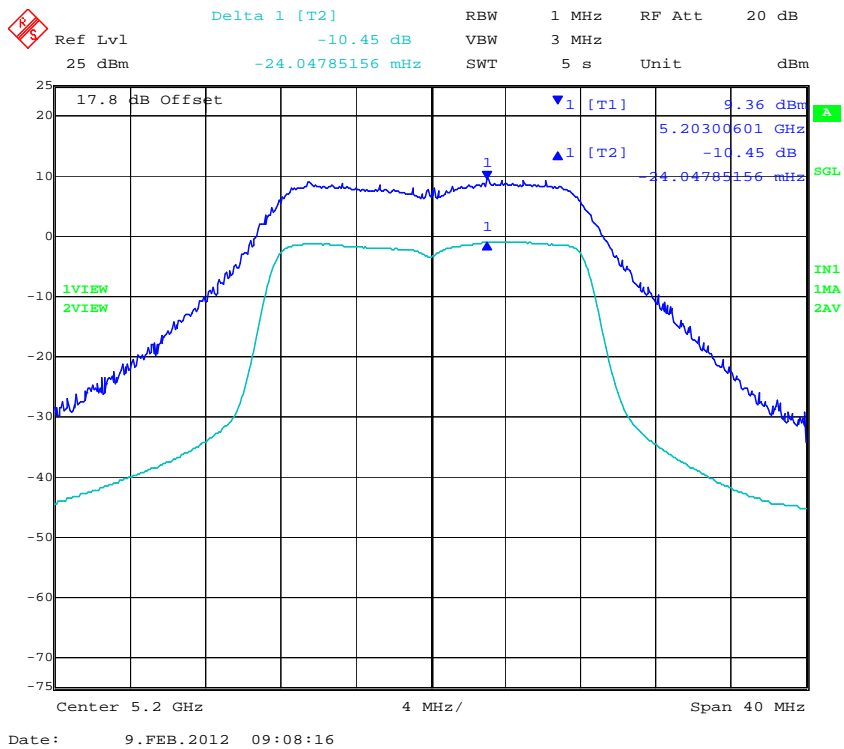
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PORT A 5,200 MHz 802.11a Legacy Peak Excursion Ratio



PORT B 5,200 MHz 802.11a Legacy Peak Excursion Ratio

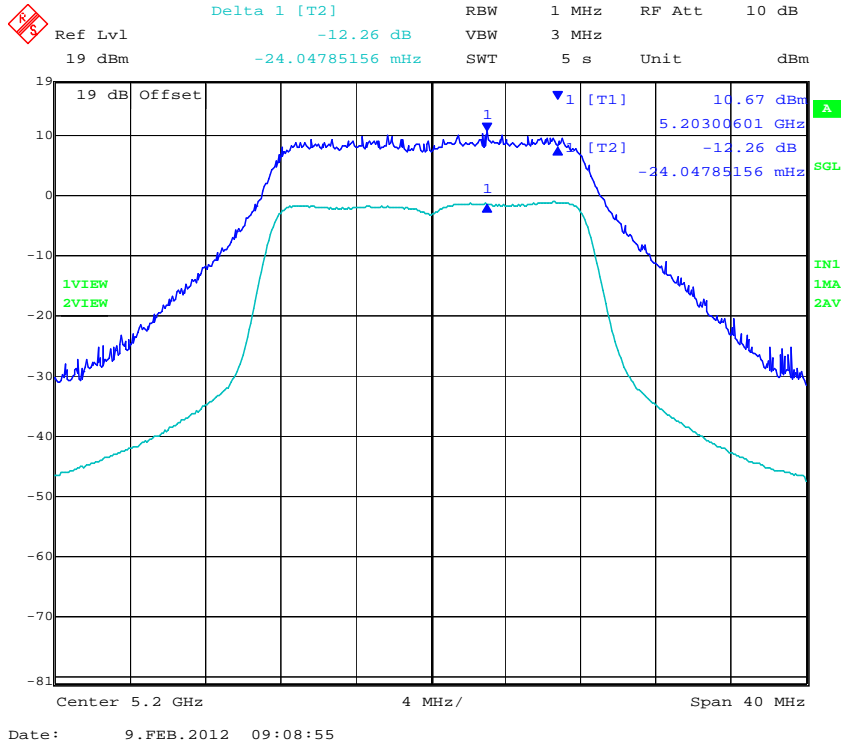


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PORT C 5,200 MHz 802.11a Legacy Peak Excursion Ratio

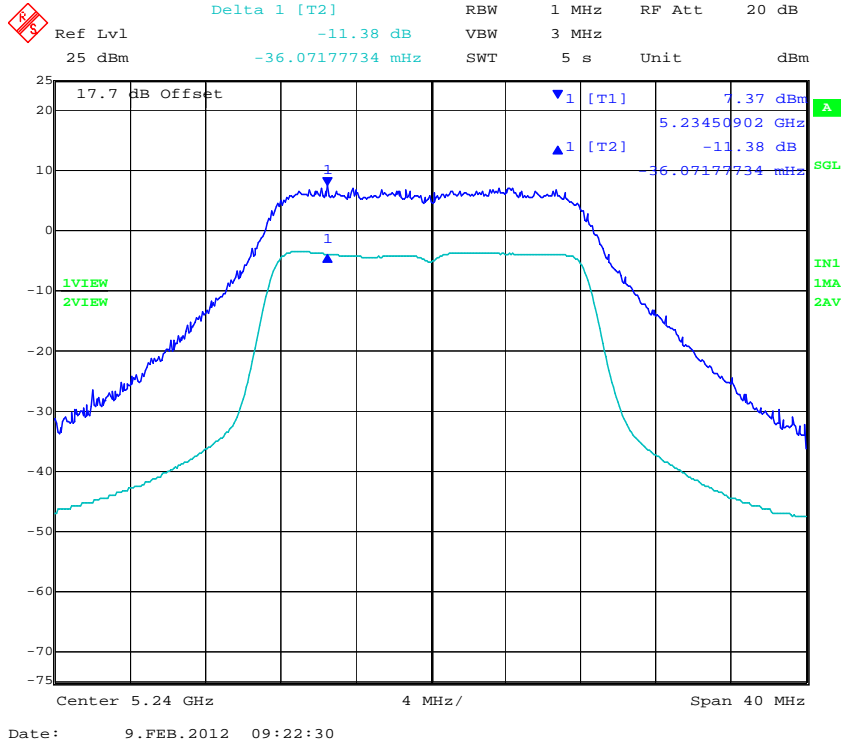


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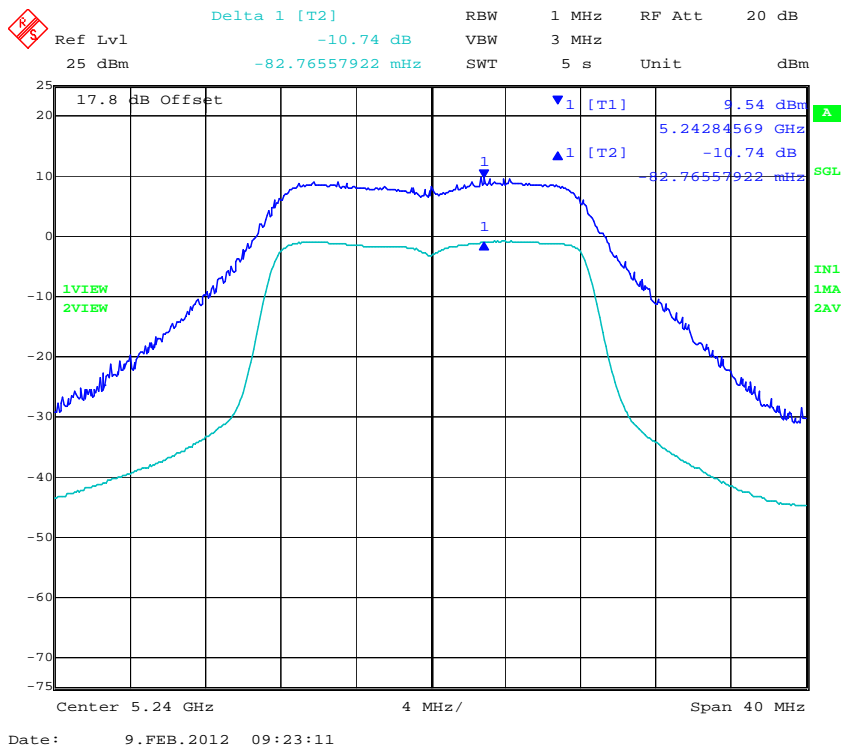


Title: Fluke Networks Sensor4 Wireless Client
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PORT A 5,240 MHz 802.11a Legacy Peak Excursion Ratio



PORT B 5,240 MHz 802.11a Legacy Peak Excursion Ratio

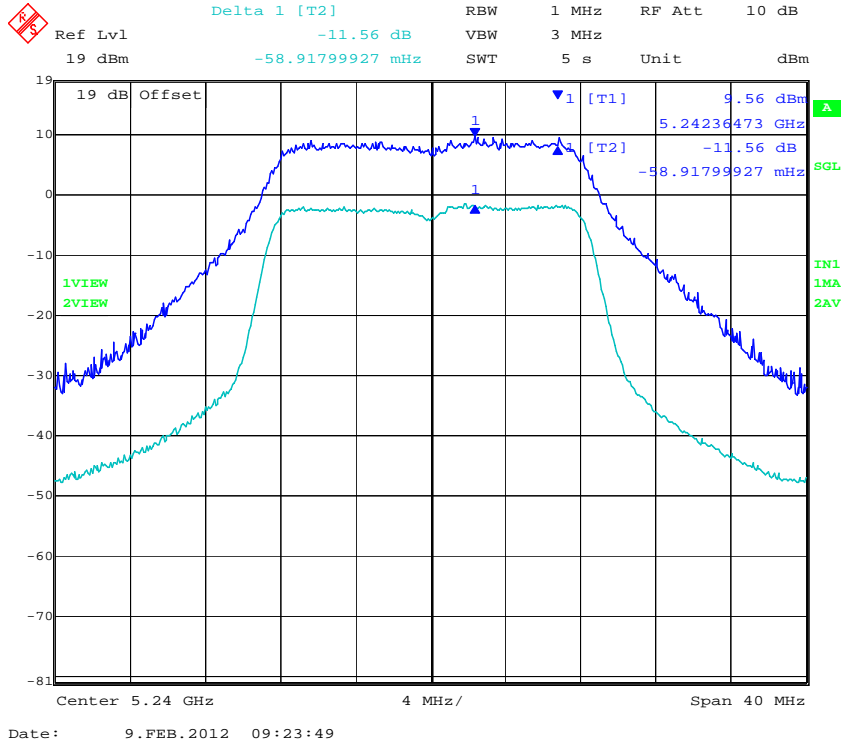


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PORT C 5,240 MHz 802.11a Legacy Peak Excursion Ratio



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TABLE OF RESULTS – 802.11n HT-20 5150 – 5250 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

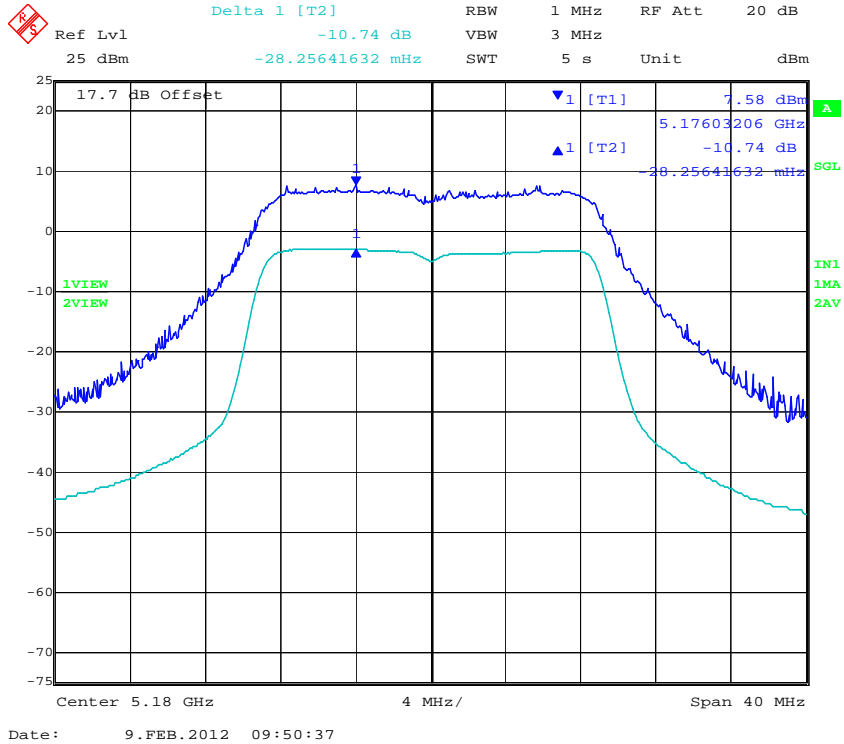
Test Frequency	Trace Δ Marker				Limit	Margin
	Port A	Port B	Port C	Port D		
MHz	dB	dB	dB	dB	dB	dB
5180	-10.74	-10.53	-11.12	--	-13.00	-1.88
5200	-10.89	-11.41	-11.12	--		-1.59
5240	-10.88	-10.69	-11.25	--		-1.75

Measurement uncertainty:	±1.33 dB
---------------------------------	----------

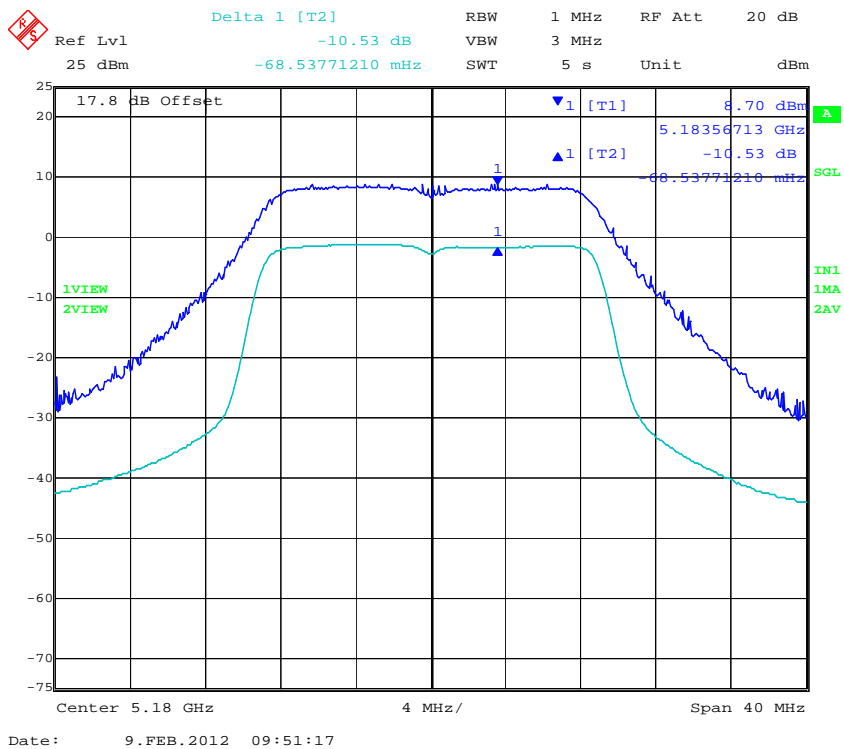
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PORT A 5,1800 MHz 802.11n HT-20 Peak Excursion Ratio



PORT B 5,1800 MHz 802.11n HT-20 Peak Excursion Ratio

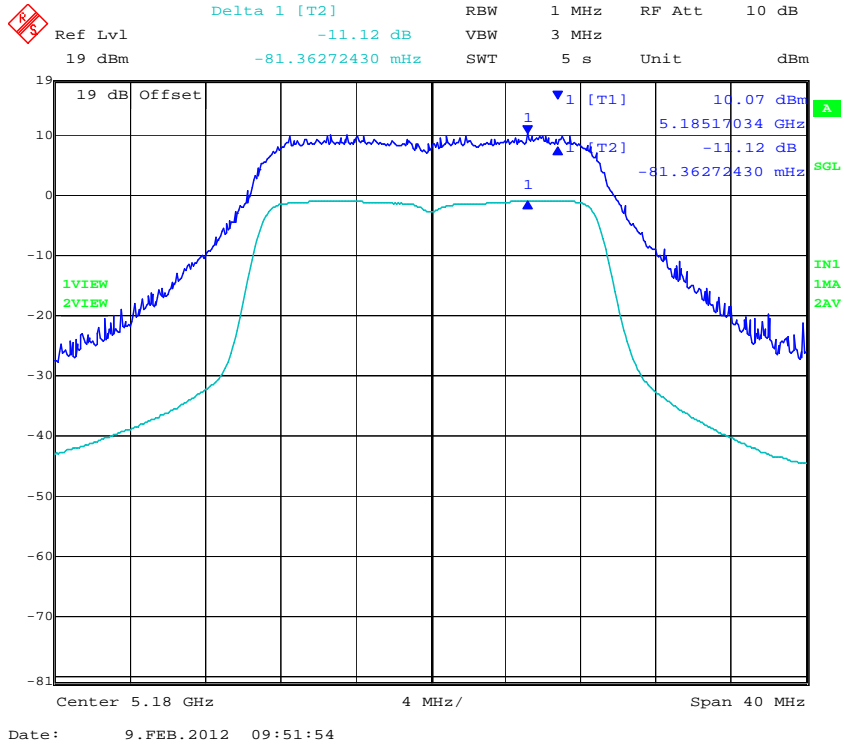


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PORT C 5,1800 MHz 802.11n HT-20 Peak Excursion Ratio

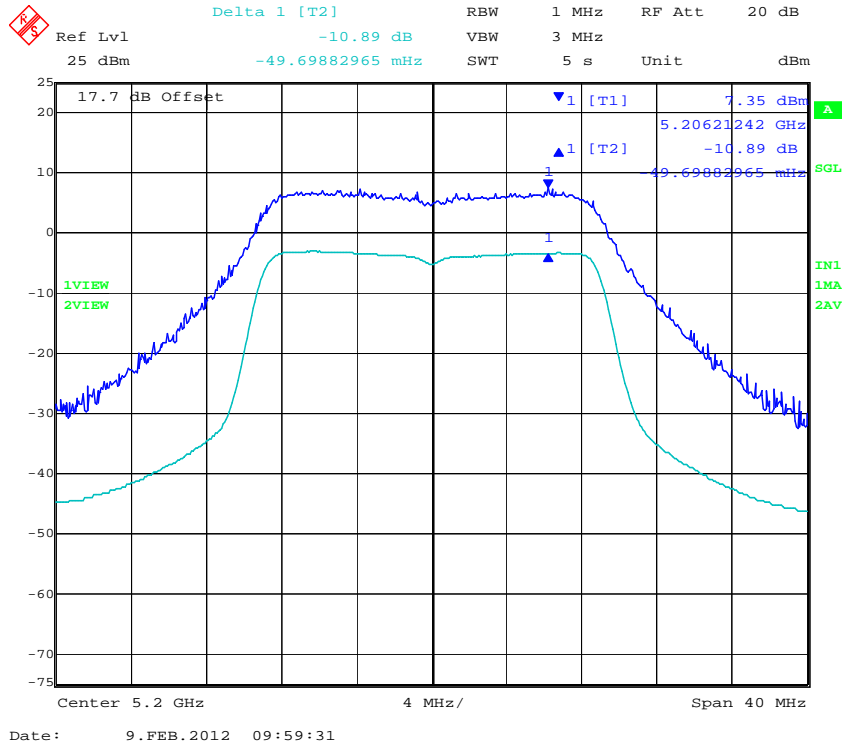


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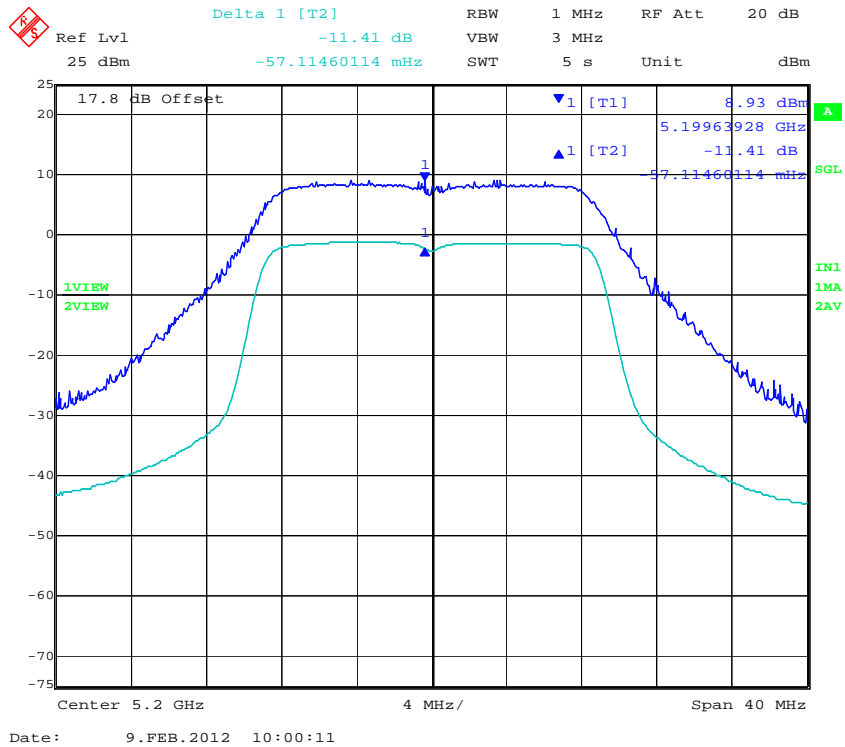


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PORT A 5,200 MHz 802.11n HT-20 Peak Excursion Ratio



PORT B 5,200 MHz 802.11n HT-20 Peak Excursion Ratio

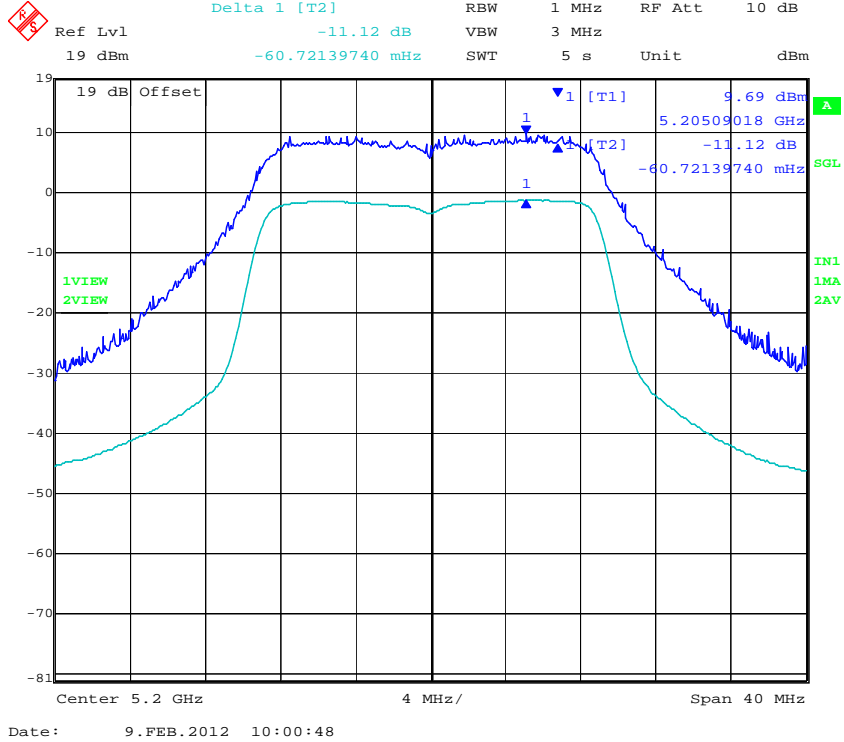


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Title: Fluke Networks Sensor4 Wireless Client
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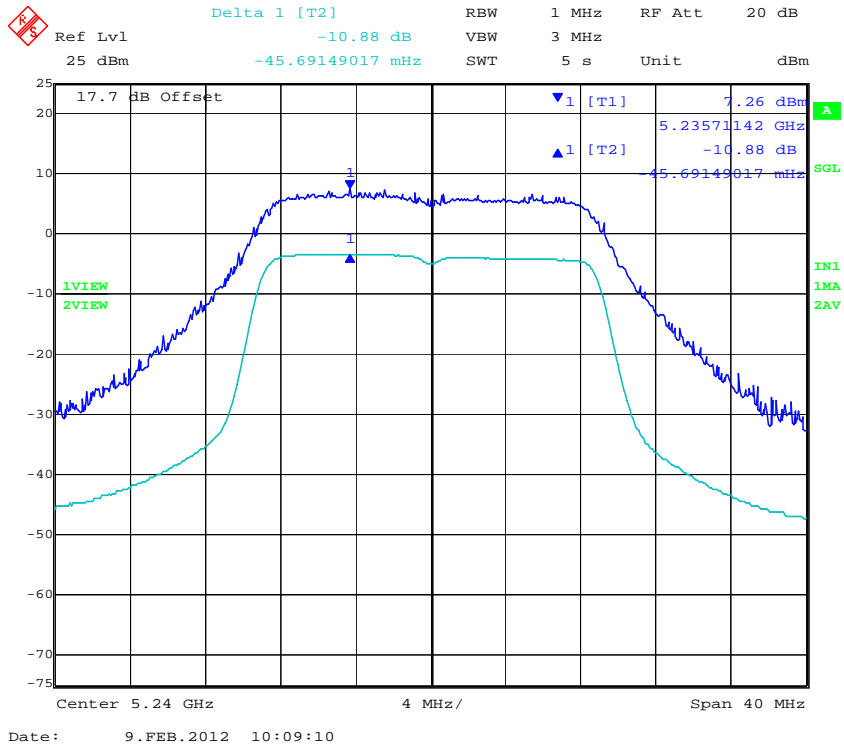
PORT C 5,200 MHz 802.11n HT-20 Peak Excursion Ratio



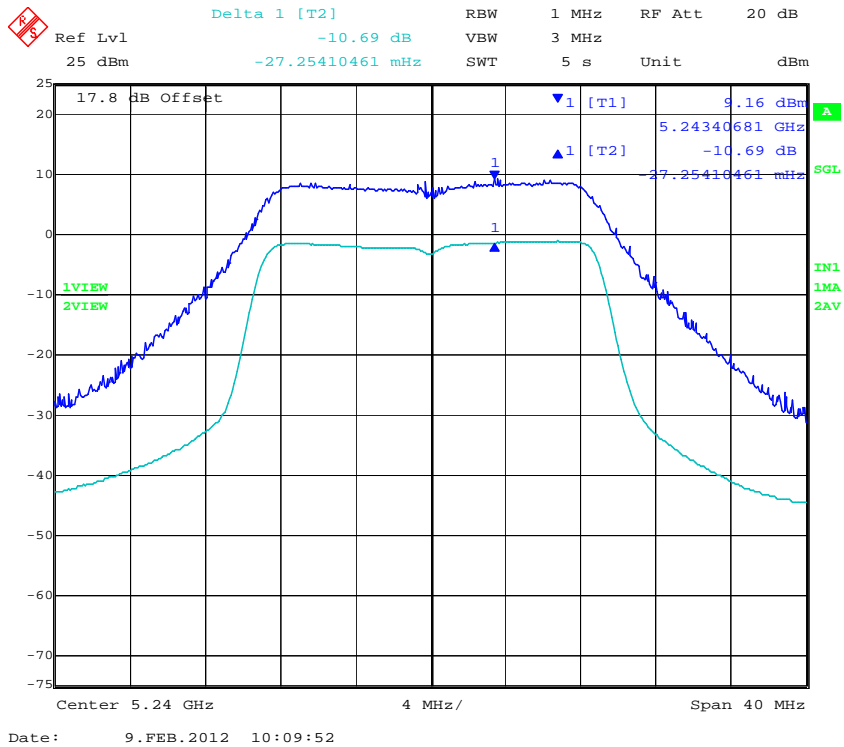
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PORT A 5,240 MHz 802.11n HT-20 Peak Excursion Ratio



PORT B 5,240 MHz 802.11n HT-20 Peak Excursion Ratio

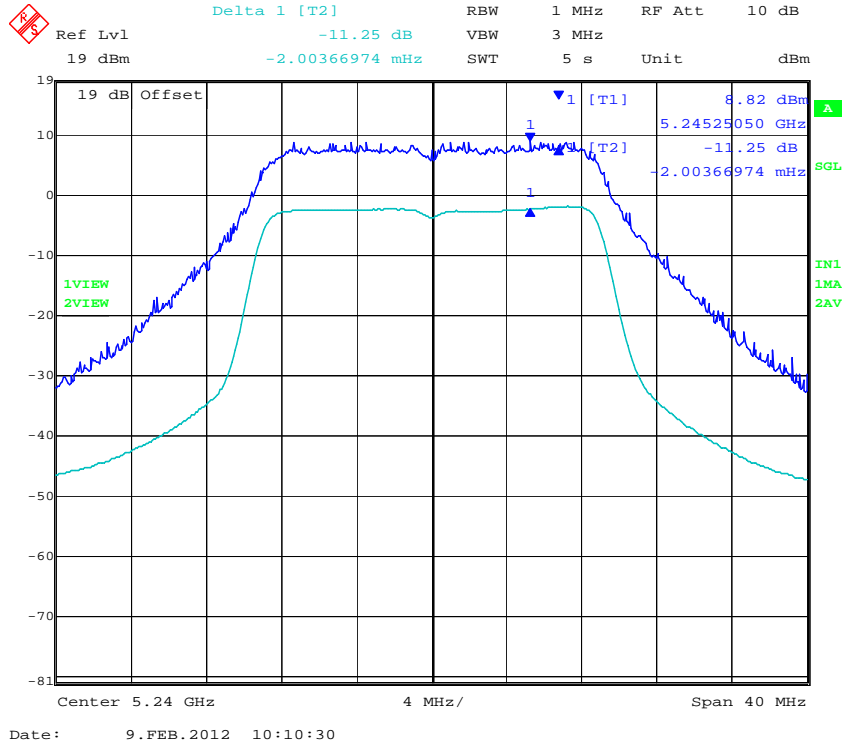


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PORT C 5,240 MHz 802.11n HT-20 Peak Excursion Ratio



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TABLE OF RESULTS – 802.11n HT-40 5150 – 5250 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-40	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

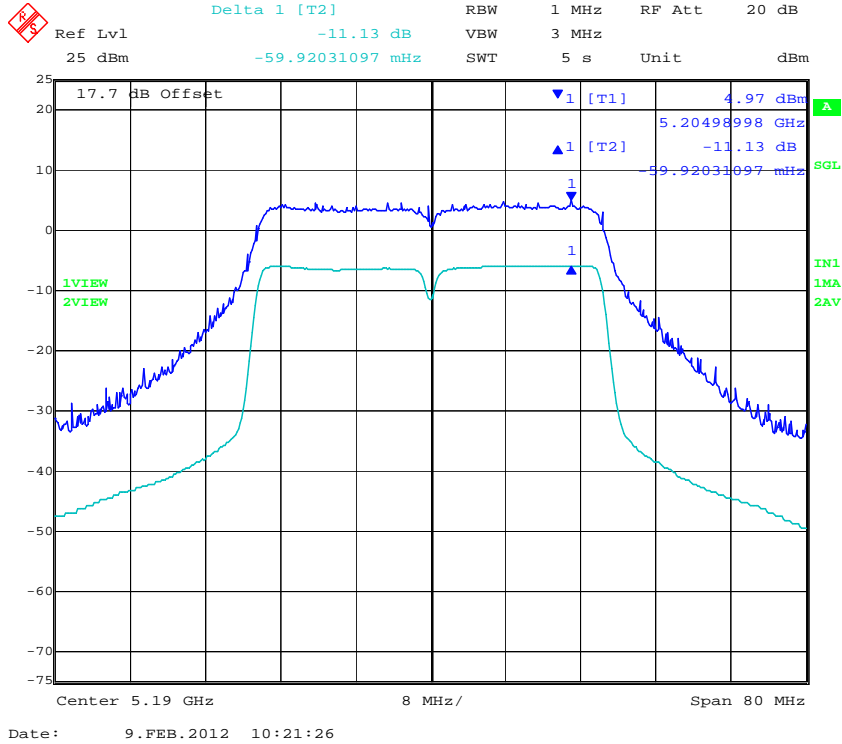
Test Frequency	Trace Δ Marker				Limit	Margin
	Port A	Port B	Port C	Port D		
MHz	dB	dB	dB	dB	dB	dB
5190	-11.13	-10.11	-11.61	--	-13.00	-1.39
5230	-11.28	-10.58	-11.69	--		-1.31

Measurement uncertainty:	±1.33 dB
---------------------------------	----------

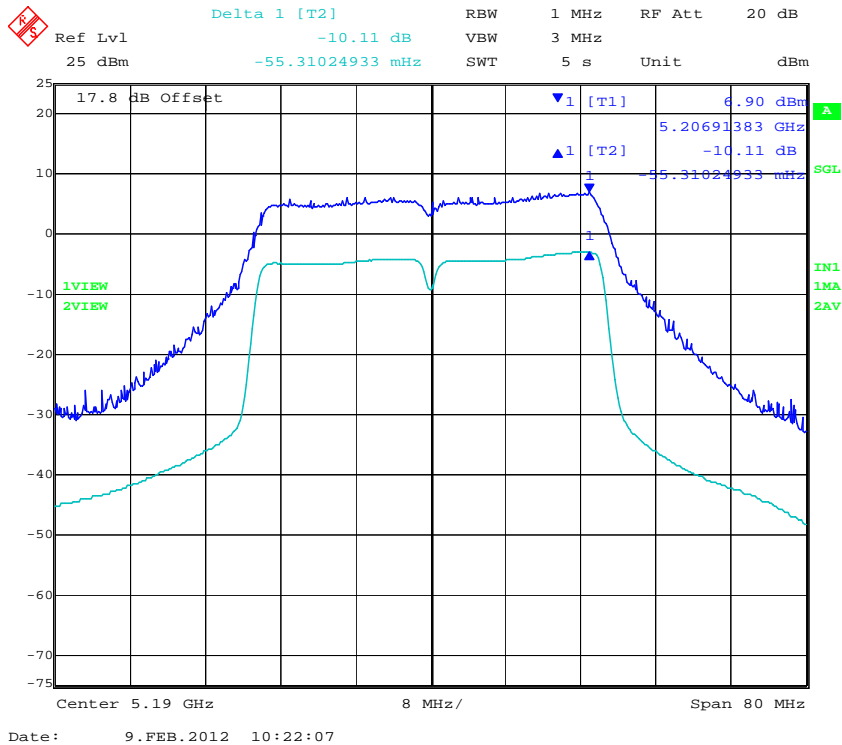
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PORT A 5,190 MHz 802.11n HT-40 Peak Excursion Ratio



PORT B 5,190 MHz 802.11n HT-40 Peak Excursion Ratio

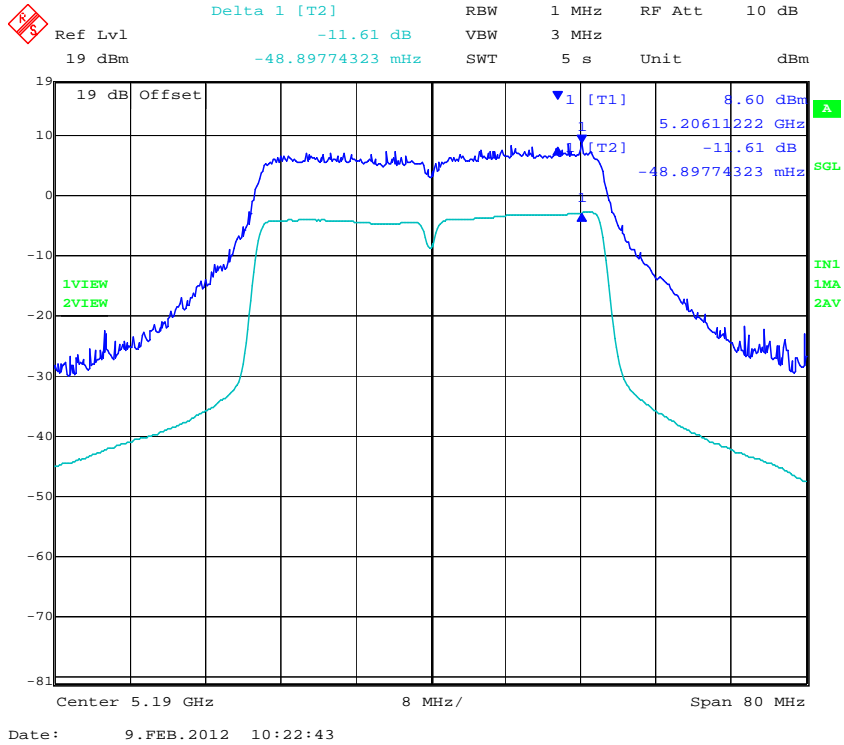


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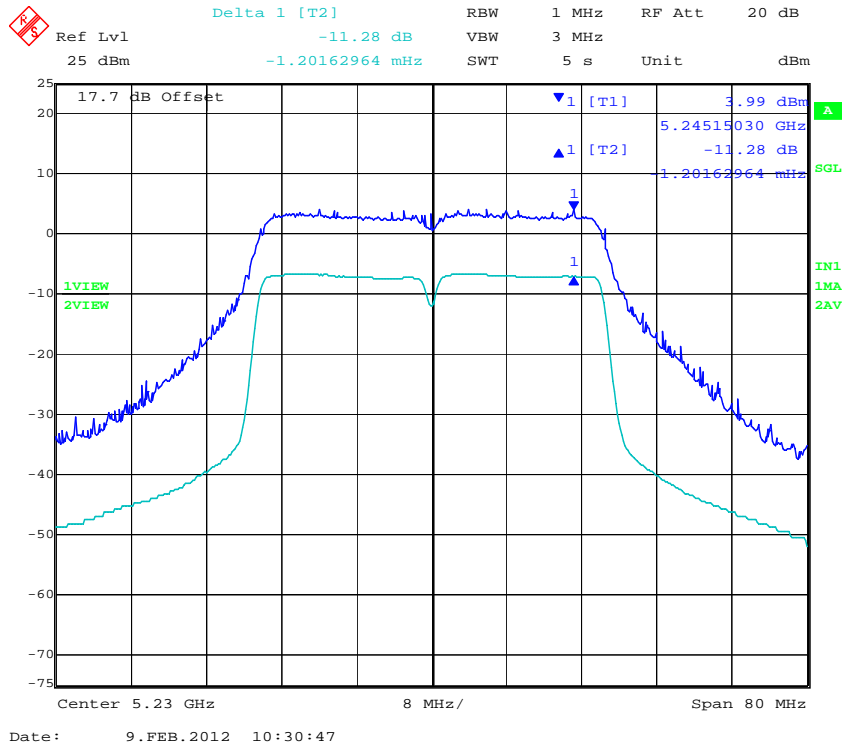
PORT C 5,190 MHz 802.11n HT-40 Peak Excursion Ratio



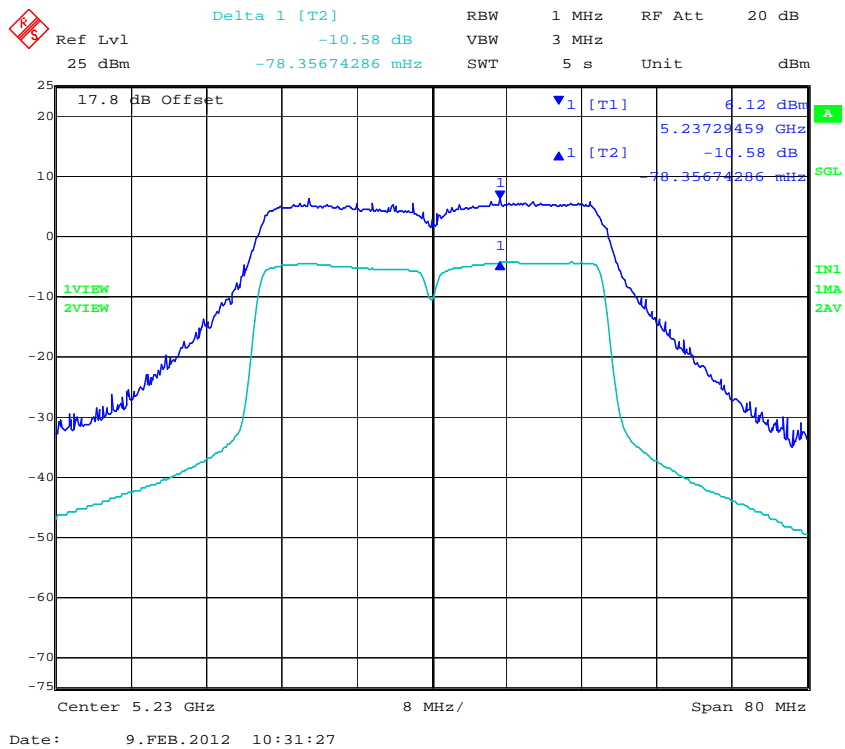
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PORT A 5,230 MHz 802.11n HT-40 Peak Excursion Ratio



PORT B 5,230 MHz 802.11n HT-40 Peak Excursion Ratio

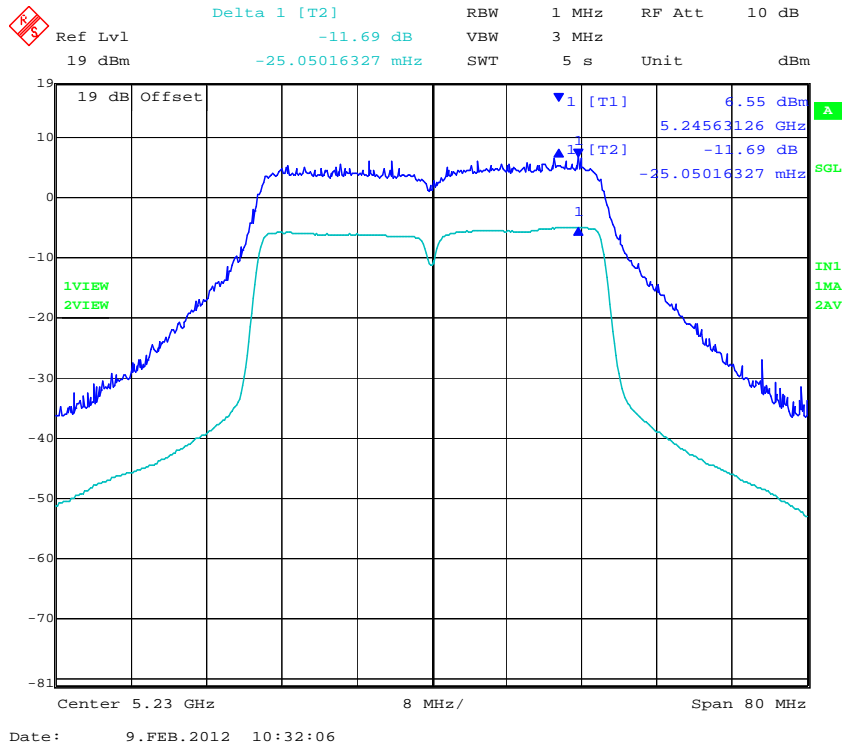


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PORT C 5,230 MHz 802.11n HT-40 Peak Excursion Ratio



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TABLE OF RESULTS – 802.11a Legacy 5250 -5350 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variants:	802.11 a	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

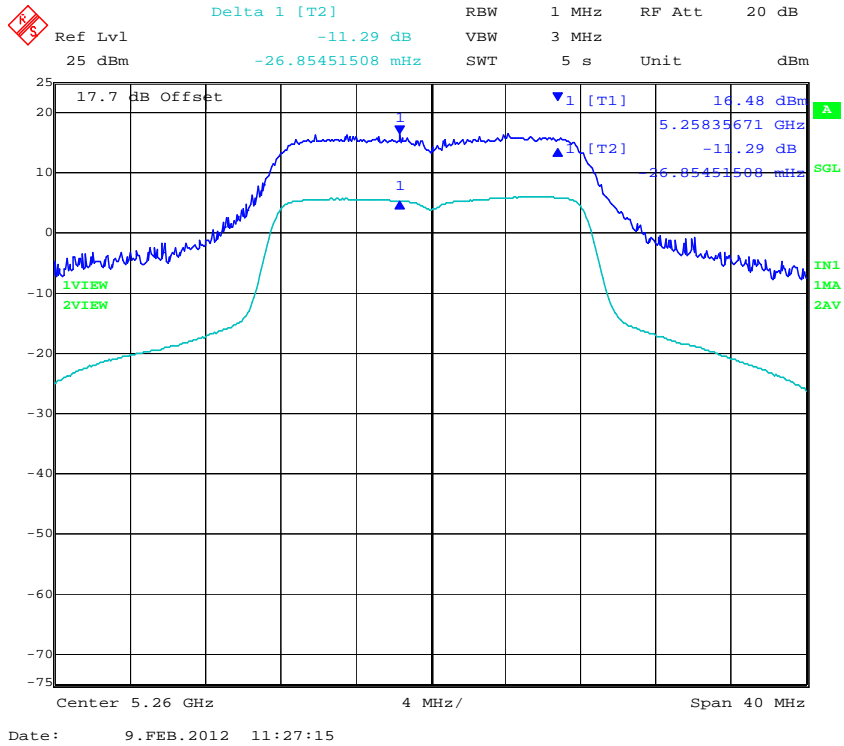
Test Frequency	Trace Δ Marker				Limit	Margin
	Port A	Port B	Port C	Port D		
MHz	dB	dB	dB	dB	dB	dB
5260	-11.29	-10.56	-11.50	--	-13.00	-1.50
5300	-11.25	-10.53	-11.02	--		-1.75
5320	-11.18	-10.74	-12.29	--		-0.71

Measurement uncertainty:	±1.33 dB
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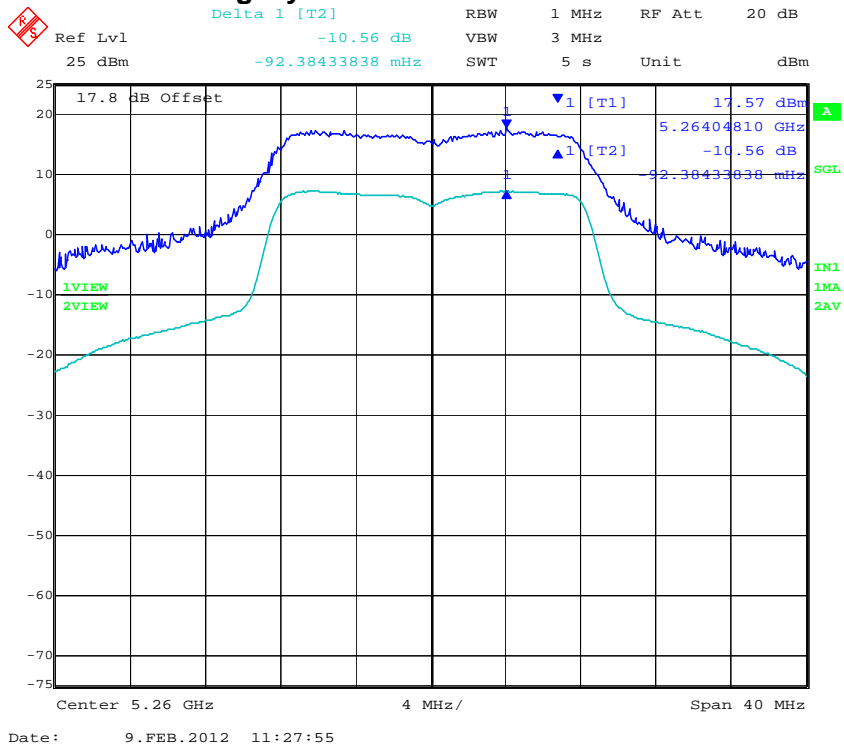
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PORT A 5,260 MHz 802.11a Legacy Peak Excursion Ratio



PORT B 5,260 MHz 802.11a Legacy Peak Excursion Ratio

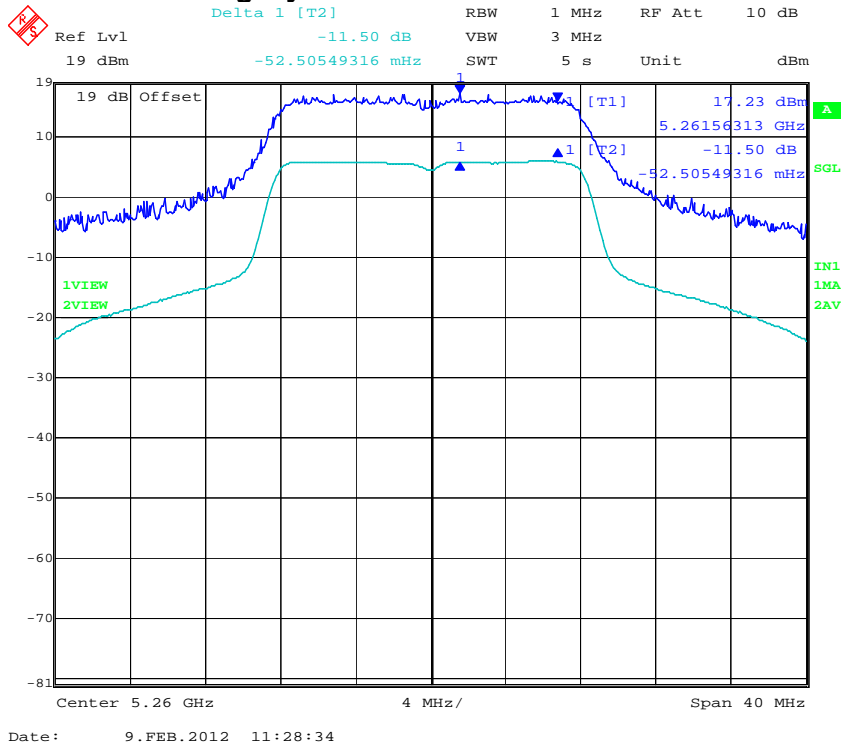


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Title: Fluke Networks Sensor4 Wireless Client
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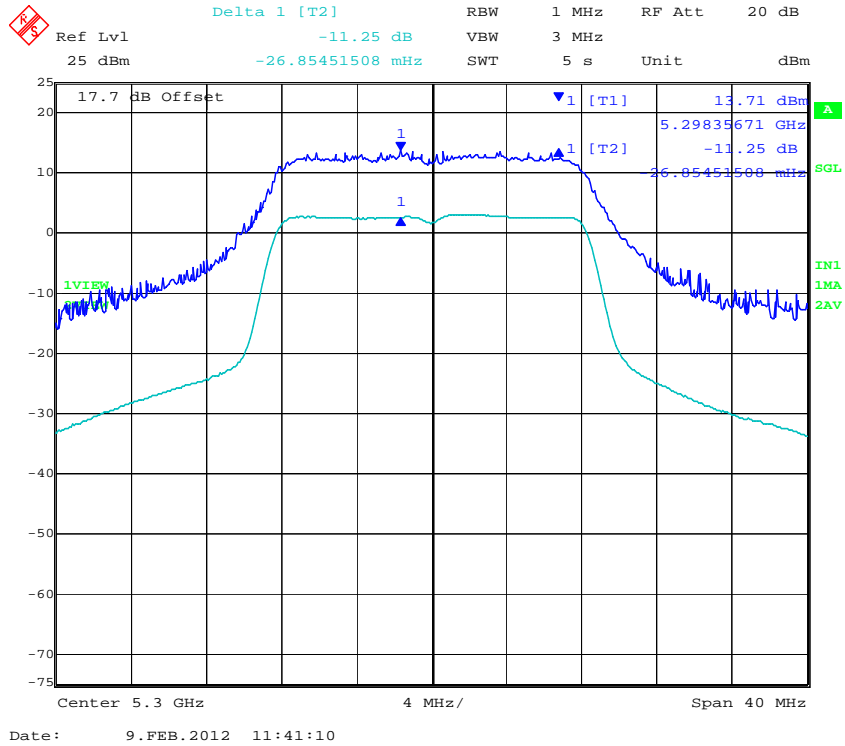
PORT C 5,260 MHz 802.11a Legacy Peak Excursion Ratio



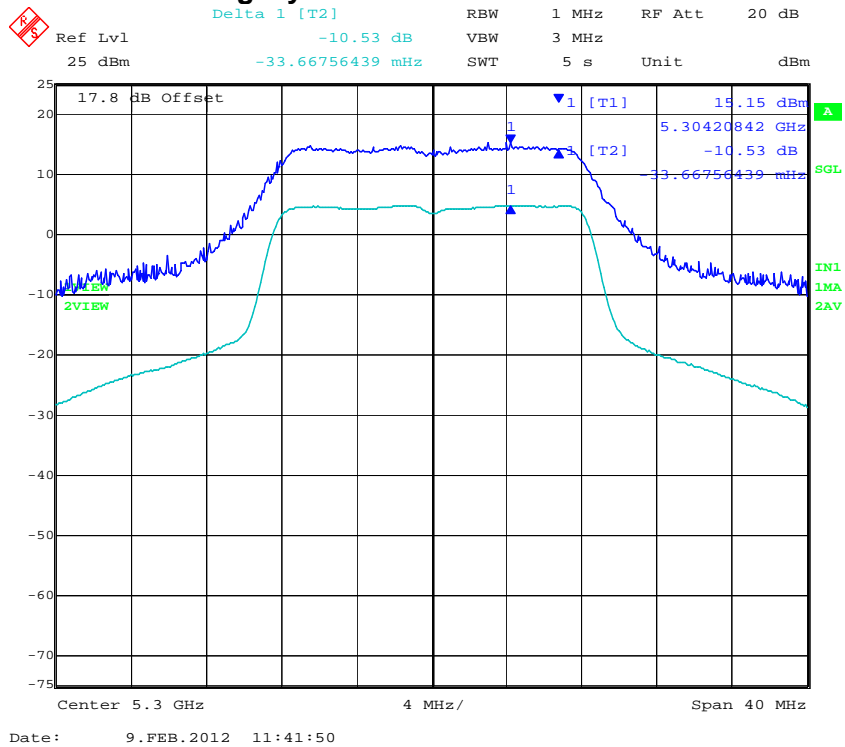
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PORT A 5300 MHz 802.11a Legacy Peak Excursion Ratio



PORT B 5,300 MHz 802.11a Legacy Peak Excursion Ratio

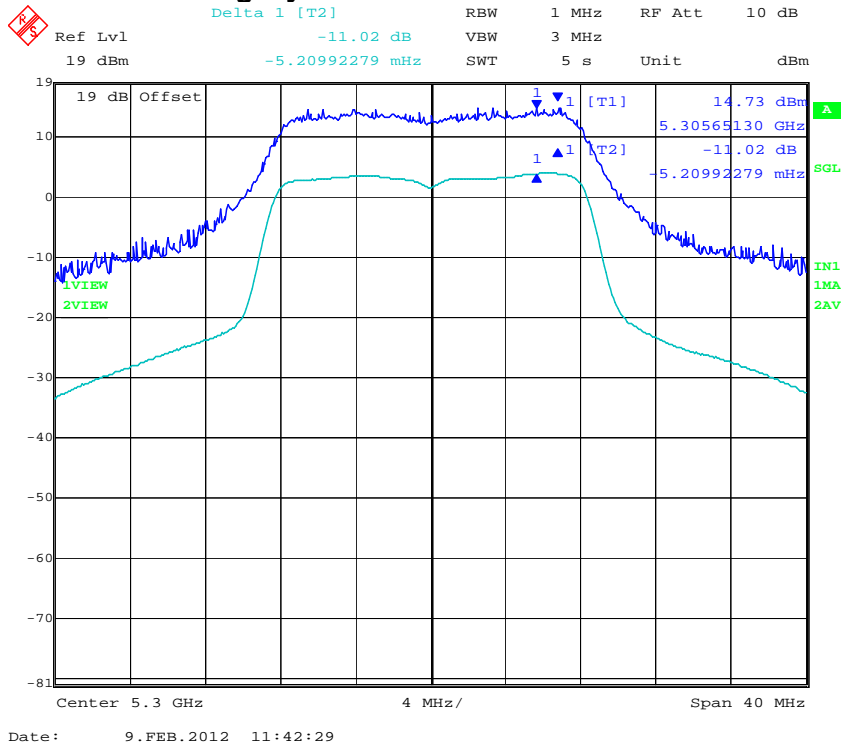


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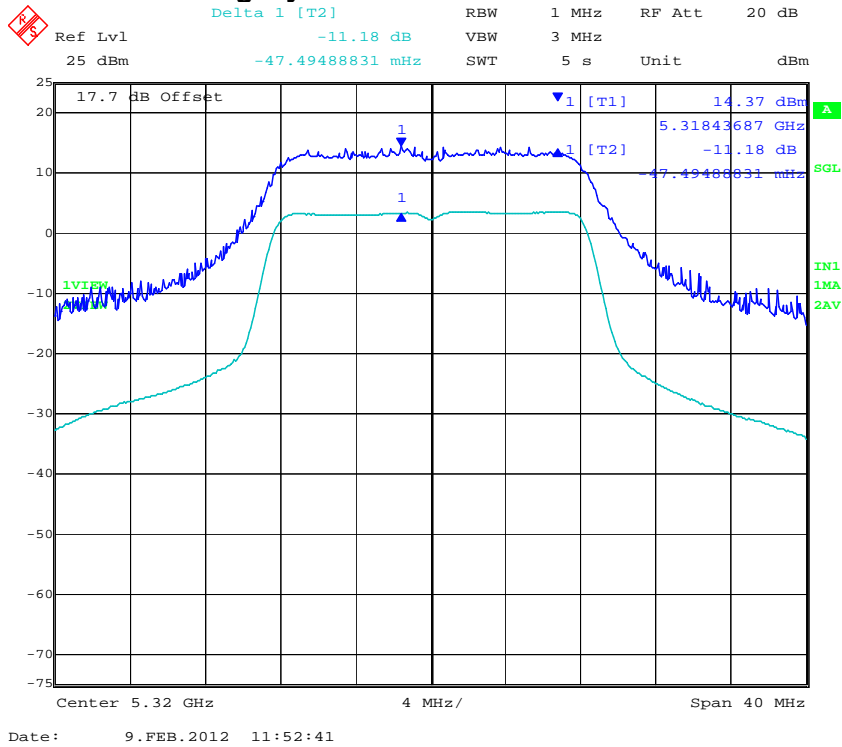
PORT C 5,300 MHz 802.11a Legacy Peak Excursion Ratio



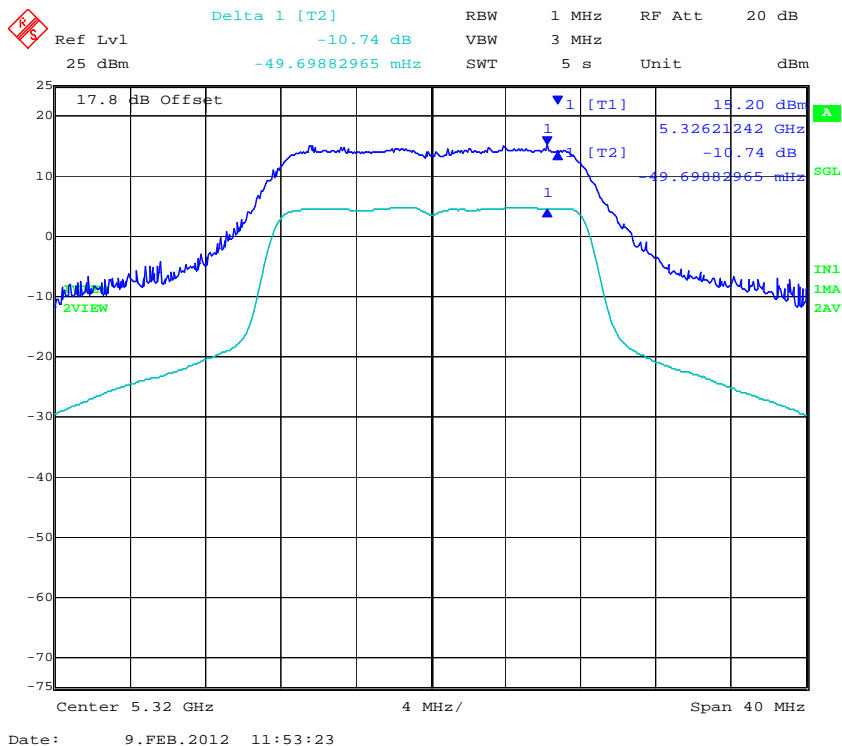
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PORT A 5,320 MHz 802.11a Legacy Peak Excursion Ratio



PORT B 5,320 MHz 802.11a Legacy Peak Excursion Ratio

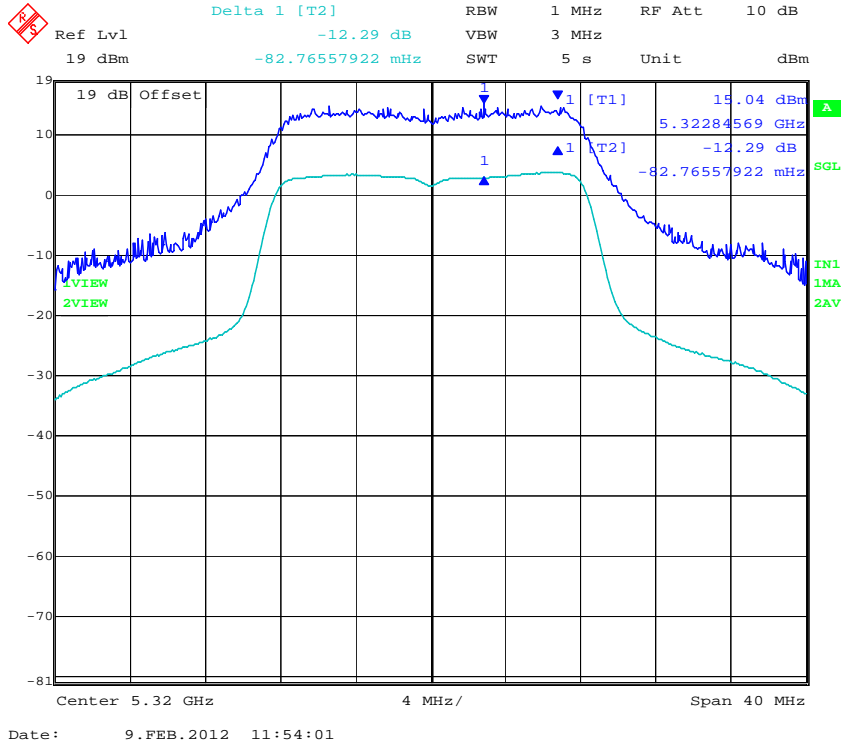


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PORT C 5,320 MHz 802.11a Legacy Peak Excursion Ratio



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TABLE OF RESULTS – 802.11n HT-20 5250-5350 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variants:	802.11 n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Trace Δ Marker				Limit	Margin
	Port A	Port B	Port C	Port D		
MHz	dB	dB	dB	dB	dB	dB
5260	-10.46	-10.60	-10.83	--	-13.00	-2.17
5300	-10.55	-9.88	-11.02	--		-1.98
5320	-10.51	-9.85	-11.14	--		-1.86

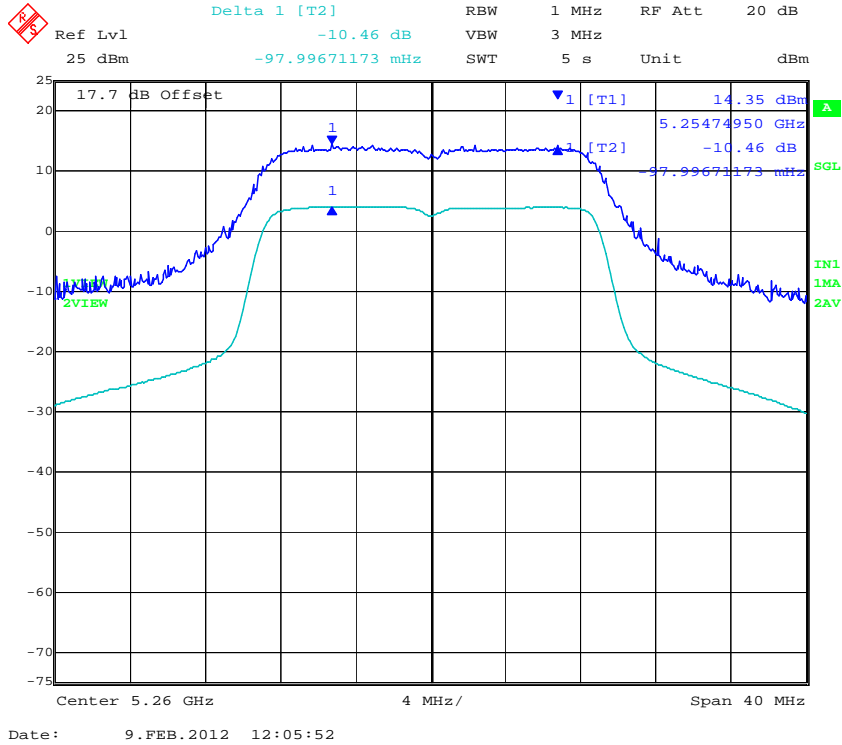
Measurement uncertainty:	±1.33 dB
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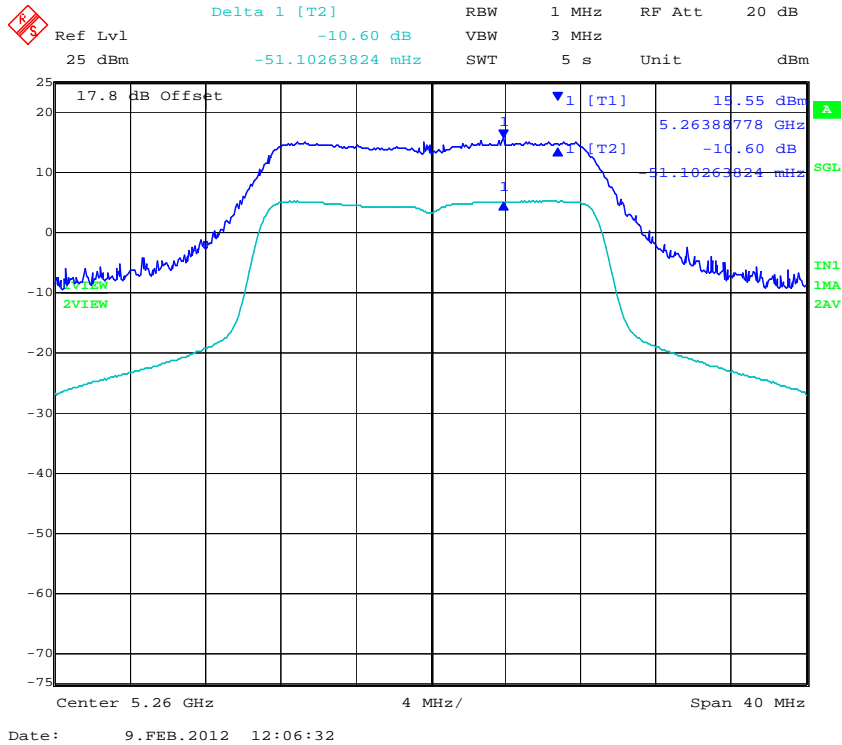


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PORT A 5,260 MHz 802.11n HT-20 Peak Excursion Ratio



PORT B 5,260 MHz 802.11n HT-20 Peak Excursion Ratio

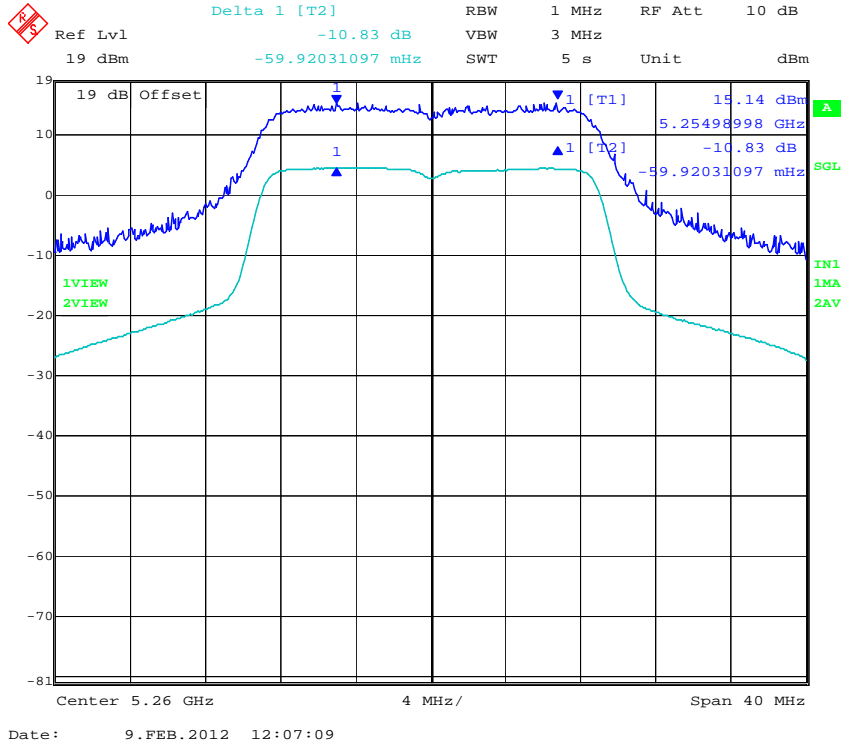


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Title: Fluke Networks Sensor4 Wireless Client
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PORT C 5,260 MHz 802.11n HT-20 Peak Excursion Ratio

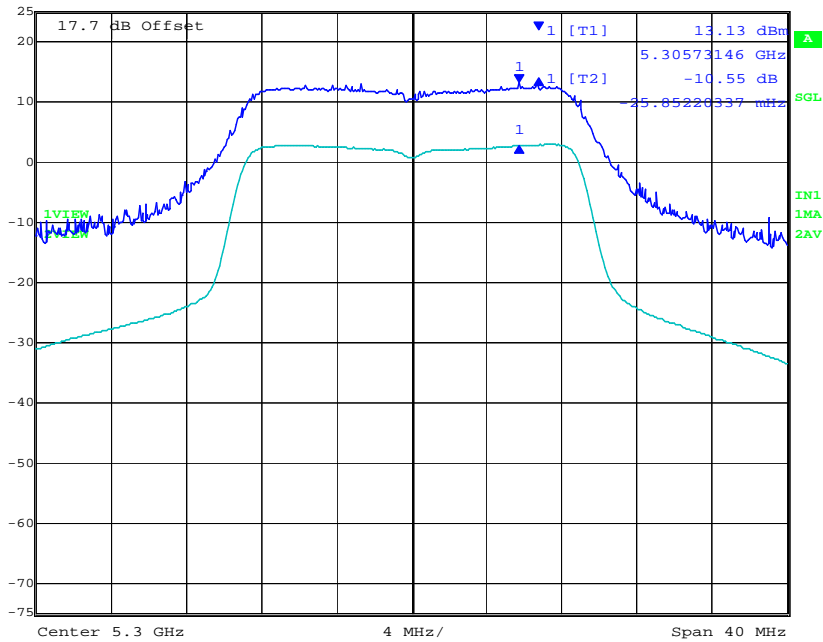


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PORT A 5300 MHz 802.11n HT-20 Peak Excursion Ratio

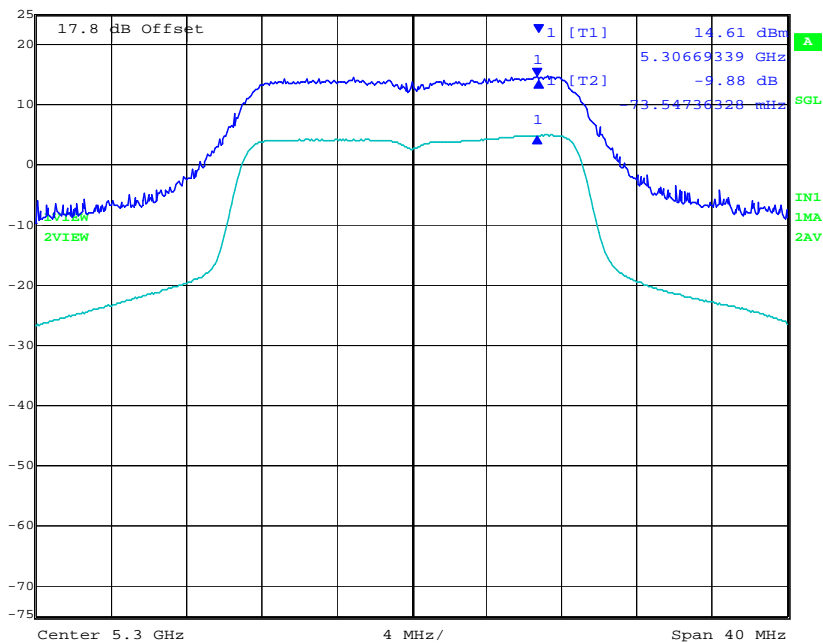
Ref Lvl 25 dBm
Delta 1 [T2] -10.55 dB
-25.85220337 mHz
RBW 1 MHz RF Att 20 dB
VBW 3 MHz
SWT 5 s Unit dBm



Date: 9.FEB.2012 12:21:05

PORT B 5,300 MHz 802.11n HT-20 Peak Excursion Ratio

Ref Lvl 25 dBm
Delta 1 [T2] -9.88 dB
-73.54736328 mHz
RBW 1 MHz RF Att 20 dB
VBW 3 MHz
SWT 5 s Unit dBm



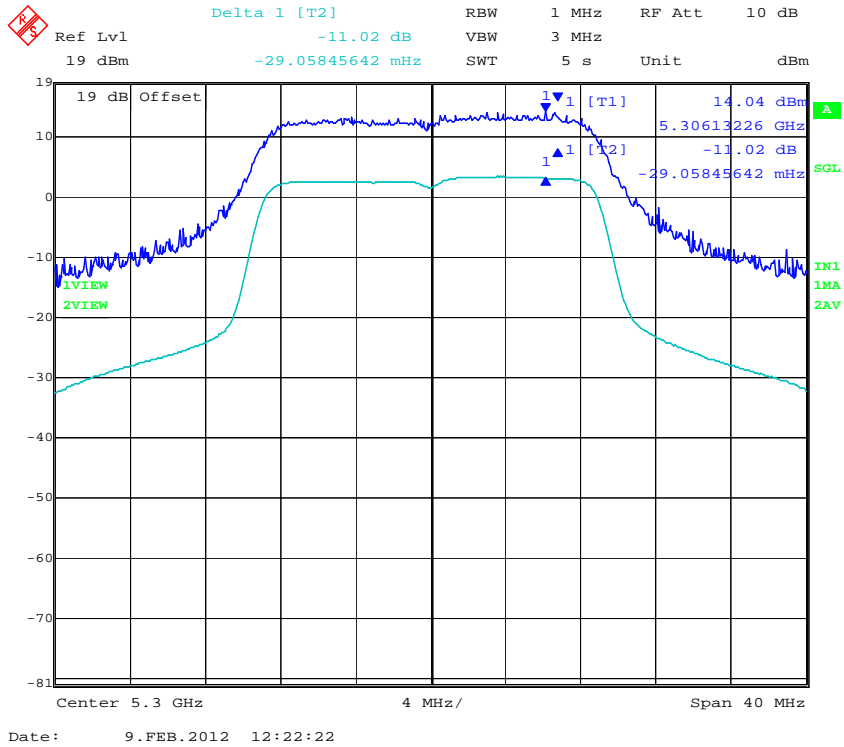
Date: 9.FEB.2012 12:21:44

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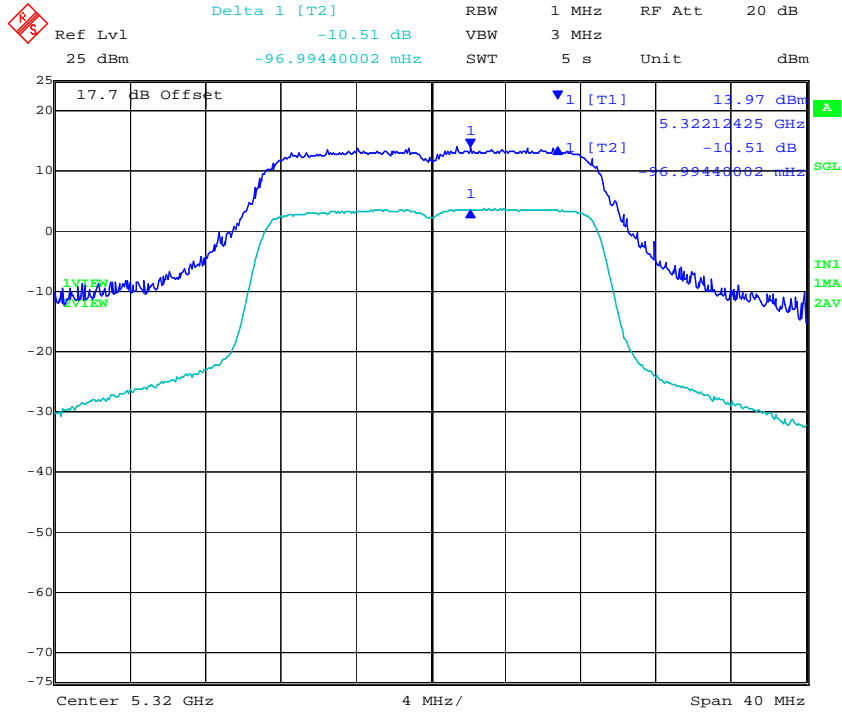
PORT C 5,300 MHz 802.11n HT-20 Peak Excursion Ratio



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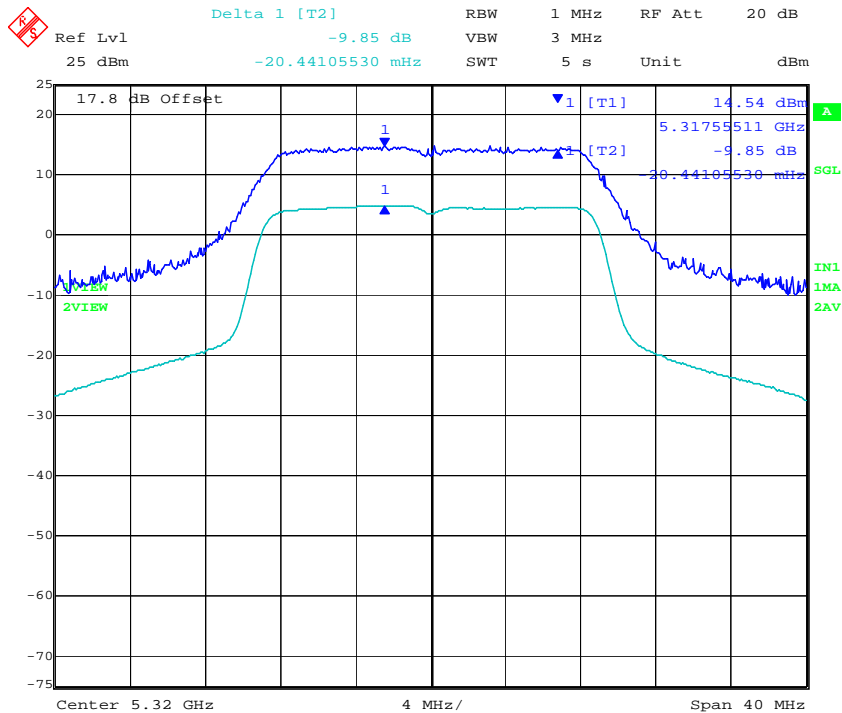


PORT A 5,320 MHz 802.11n HT-20 Peak Excursion Ratio



Date: 9.FEB.2012 12:51:06

PORT B 5,320 MHz 802.11n HT-20 Peak Excursion Ratio

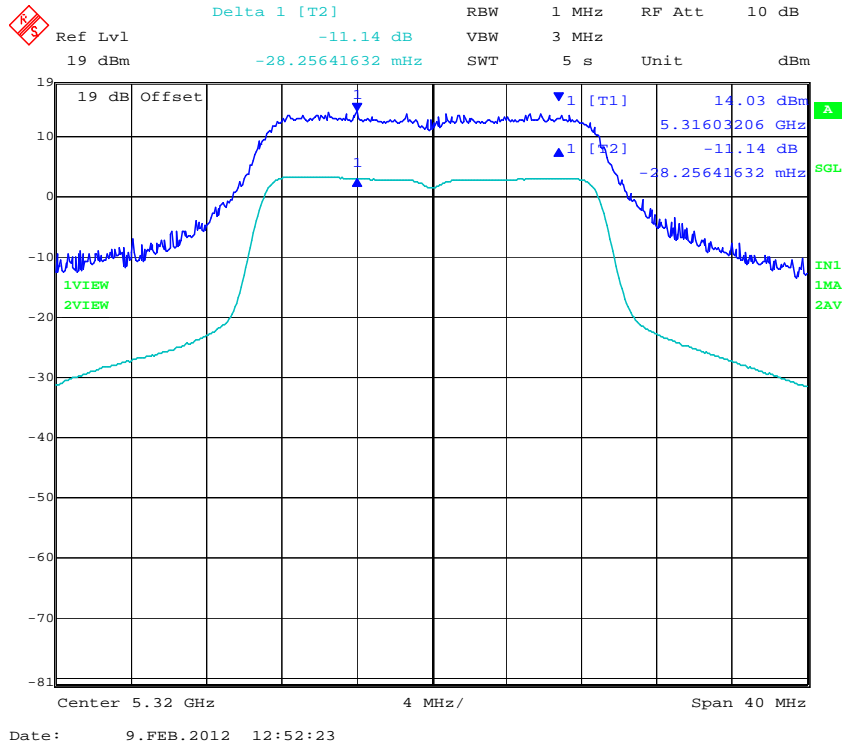


Date: 9.FEB.2012 12:51:45

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PORT C 5,320 MHz 802.11n HT-20 Peak Excursion Ratio



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TABLE OF RESULTS – 802.11n HT-40 5250-5350 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-40	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Trace Δ Marker				Limit	Margin
	Port A	Port B	Port C	Port D		
MHz	dB	dB	dB	dB	dB	dB
5270	-10.72	-10.71	-11.19	--	-13.00	-1.81
5310	-11.09	-10.53	-11.42	--		-1.58

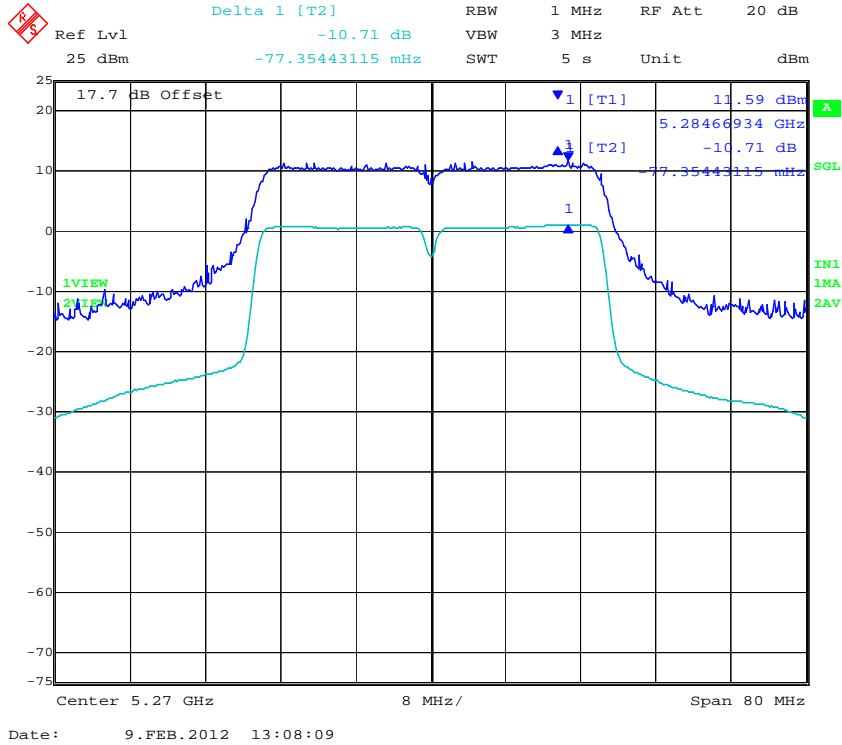
Measurement uncertainty:	±1.33 dB
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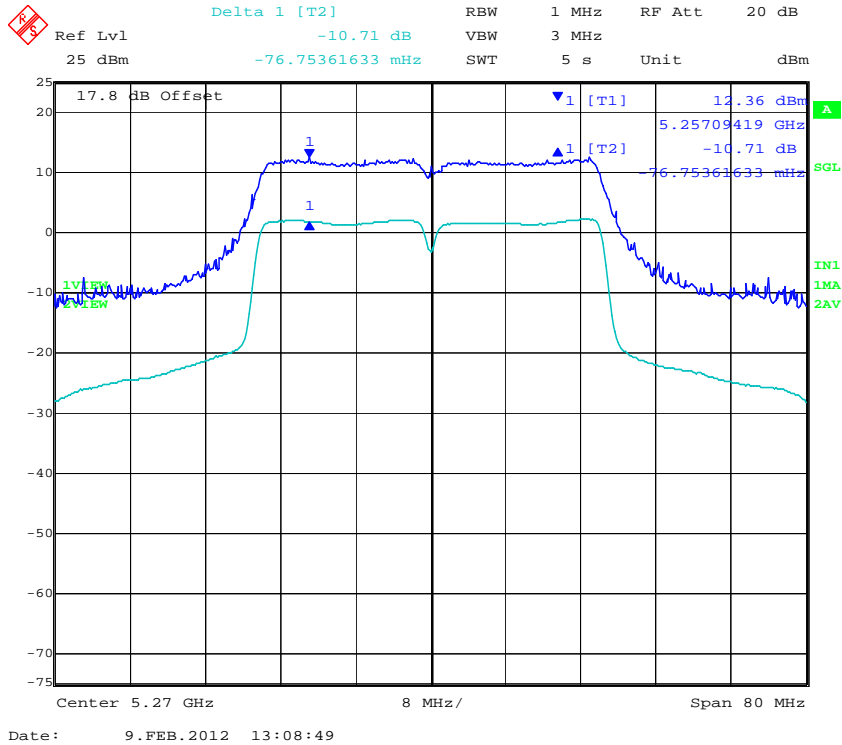


Title: Fluke Networks Sensor4 Wireless Client
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PORT A 5,270 MHz 802.11n HT-40 Peak Excursion Ratio



PORT B 5,270 MHz 802.11n HT-40 Peak Excursion Ratio

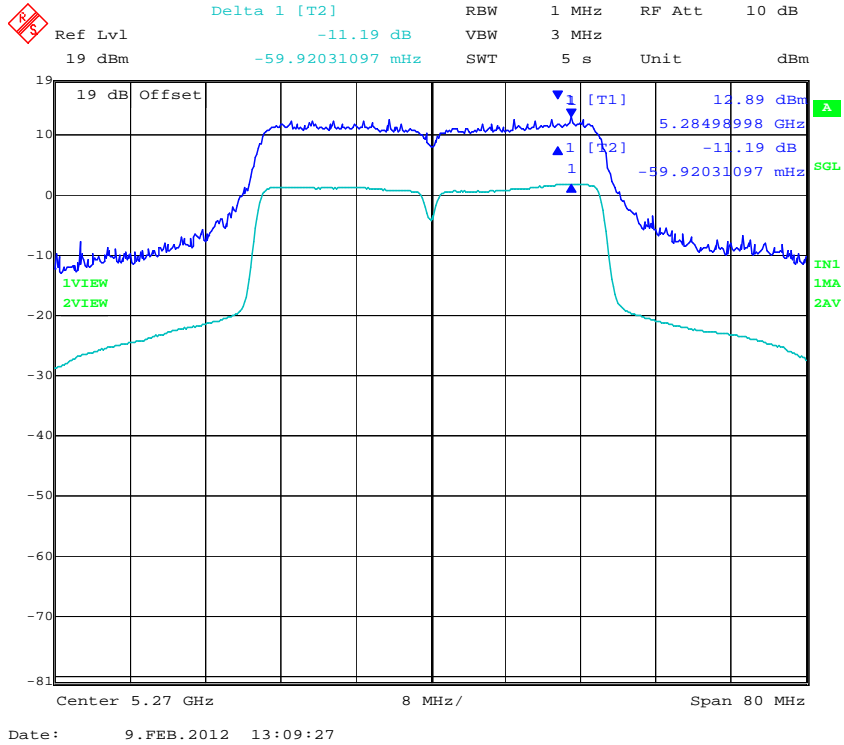


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Title: Fluke Networks Sensor4 Wireless Client
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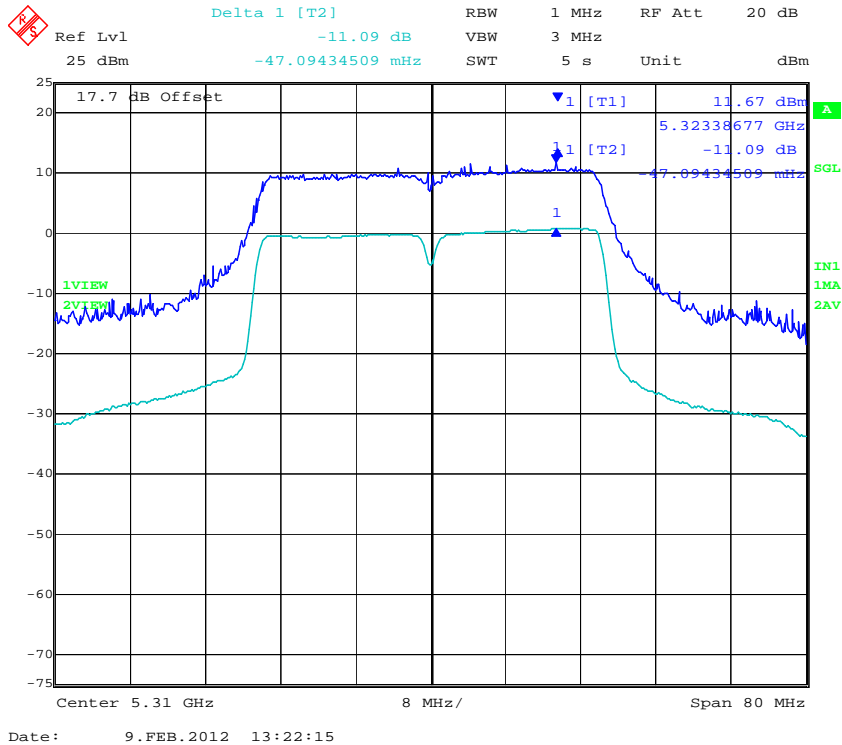
PORT C 5,270 MHz 802.11n HT-40 Peak Excursion Ratio



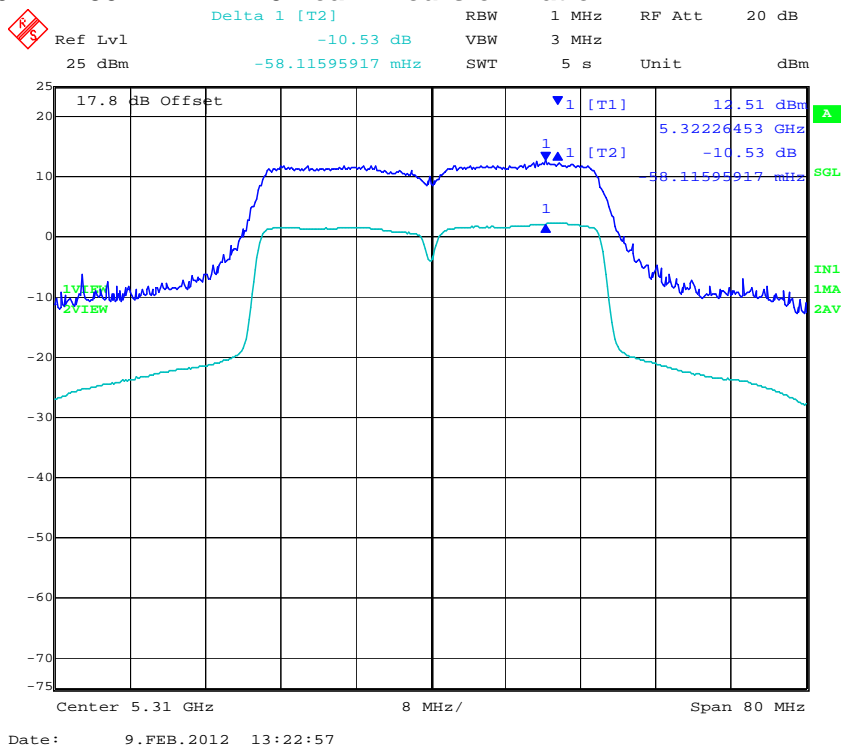
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PORT A 5,310 MHz 802.11n HT-40 Peak Excursion Ratio



PORT B 5,310 MHz 802.11n HT-40 Peak Excursion Ratio

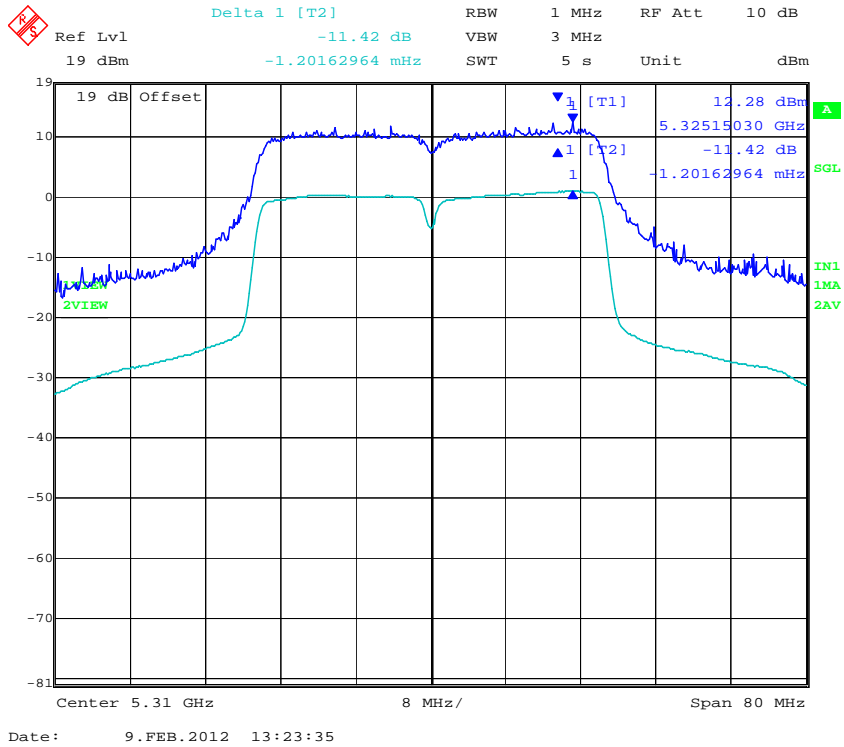


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PORT C 5,310 MHz 802.11n HT-40 Peak Excursion Ratio



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TABLE OF RESULTS – 802.11a Legacy 5500 - 5700 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11 a	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Trace Δ Marker				Limit	Margin
	Port A	Port B	Port C	Port D		
MHz	dB	dB	dB	dB	dB	dB
5500	-10.95	-10.33	-11.98	--	-13.00	-1.02
5580	-10.92	-10.23	-11.82	--		-1.18
5700	-11.44	-10.61	-11.74	--		-1.26

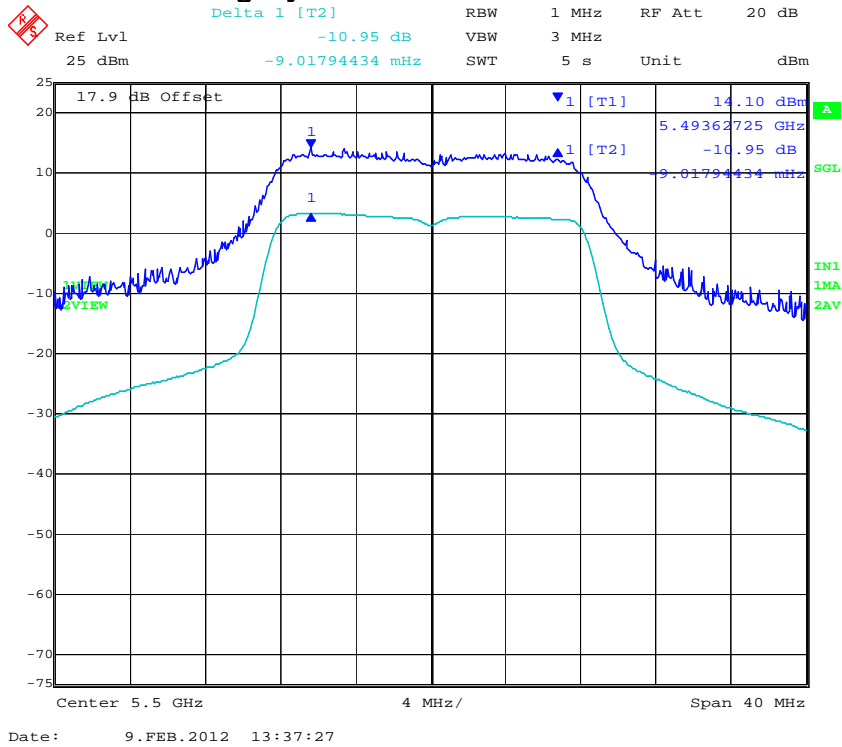
Measurement uncertainty:	±1.33 dB
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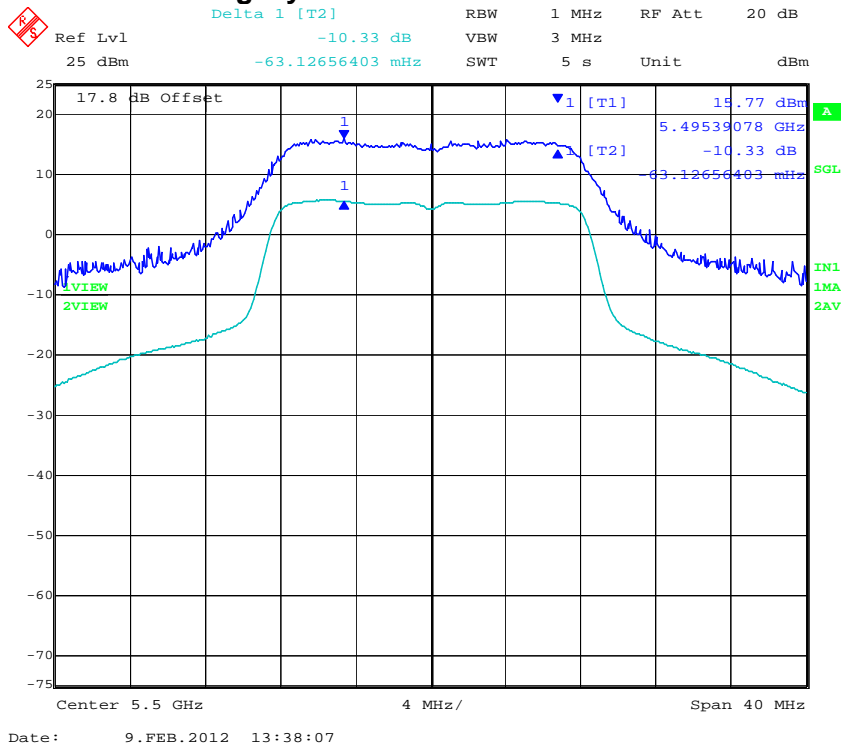


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PORT A 5,500 MHz 802.11a Legacy Peak Excursion Ratio



PORT B 5,500 MHz 802.11a Legacy Peak Excursion Ratio

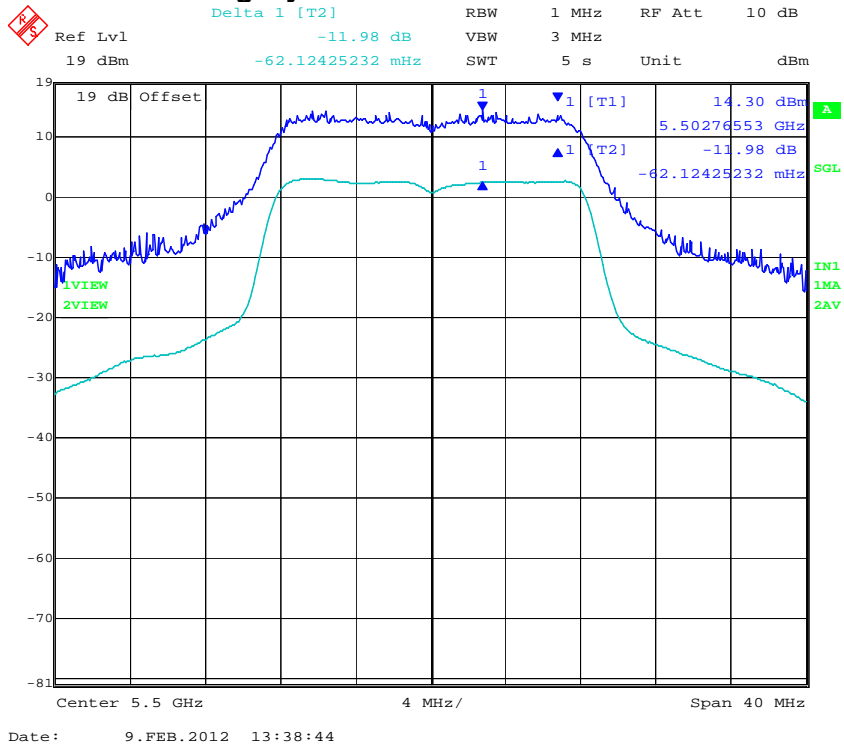


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PORT C 5,500 MHz 802.11a Legacy Peak Excursion Ratio

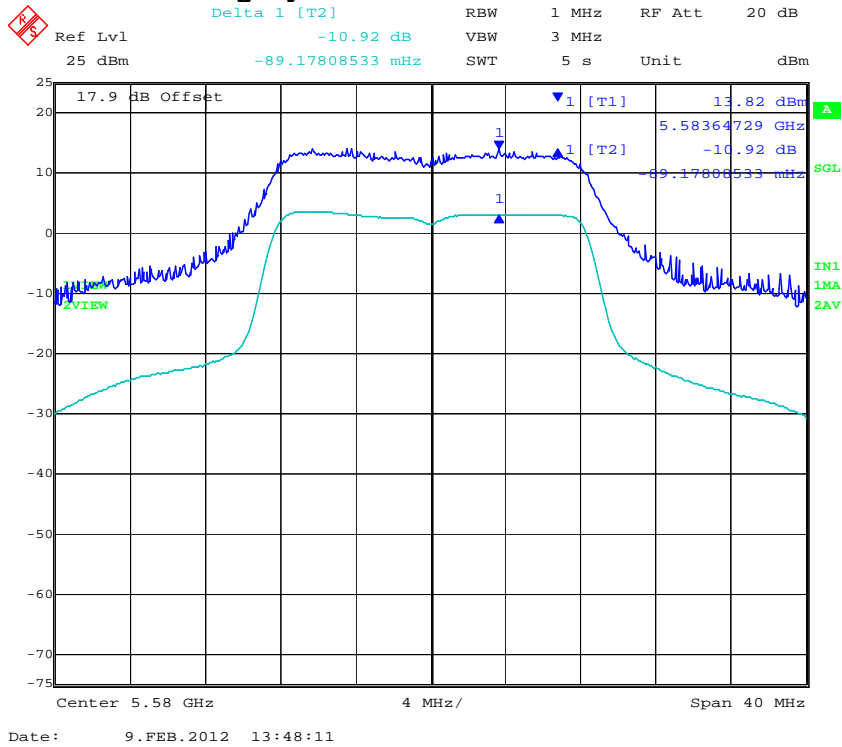


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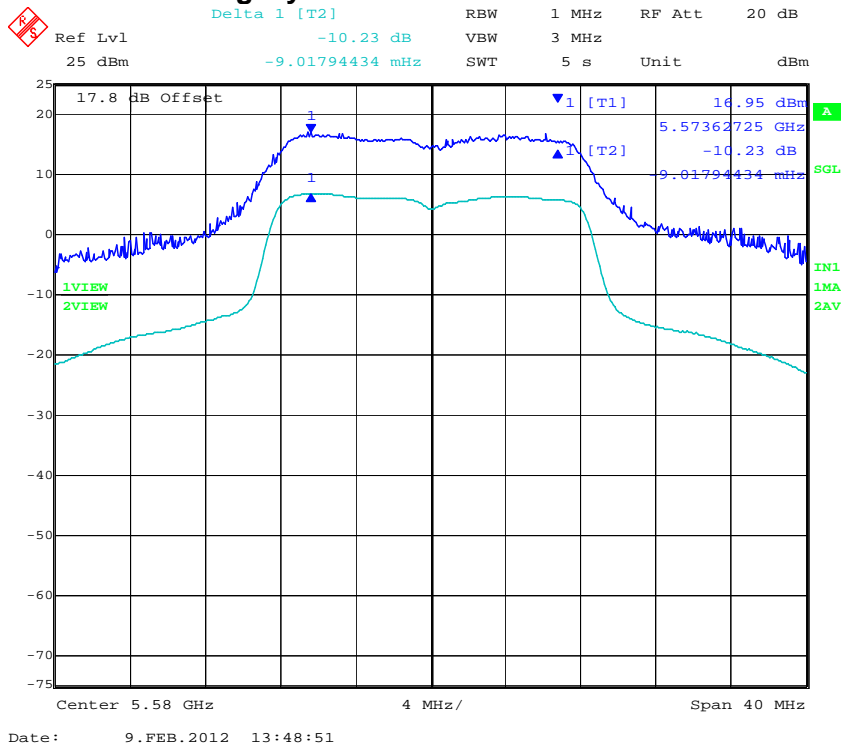


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PORT A 5,580 MHz 802.11a Legacy Peak Excursion Ratio



PORT B 5,580 MHz 802.11a Legacy Peak Excursion Ratio

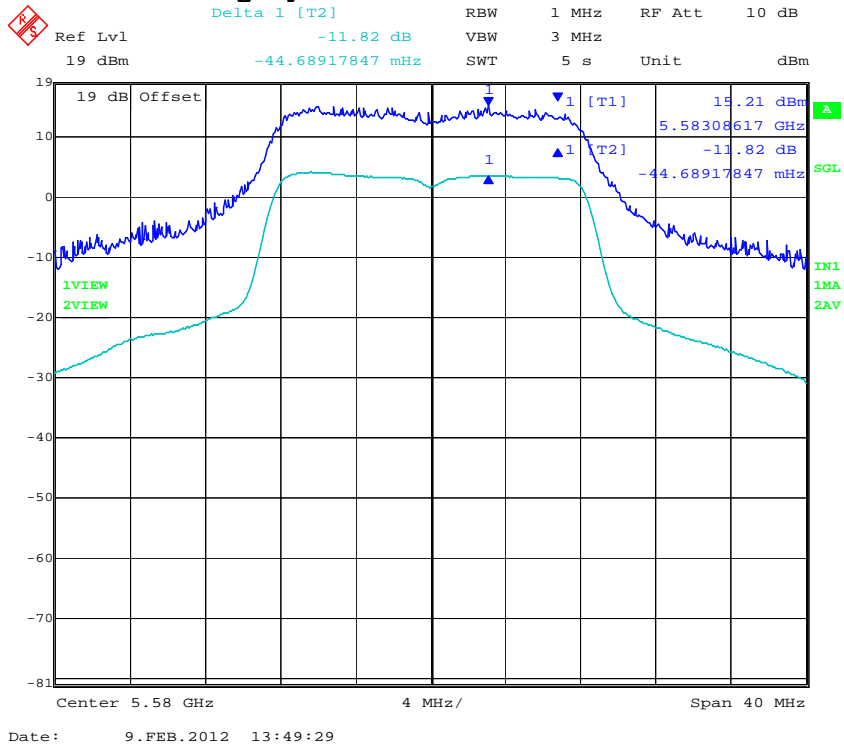


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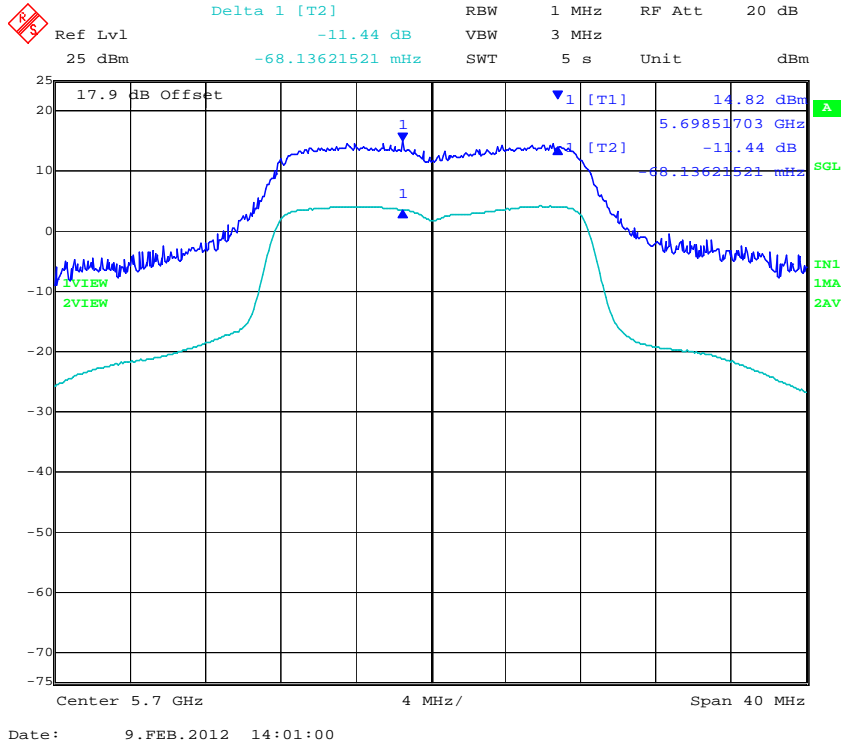
PORT C 5,580 MHz 802.11a Legacy Peak Excursion Ratio



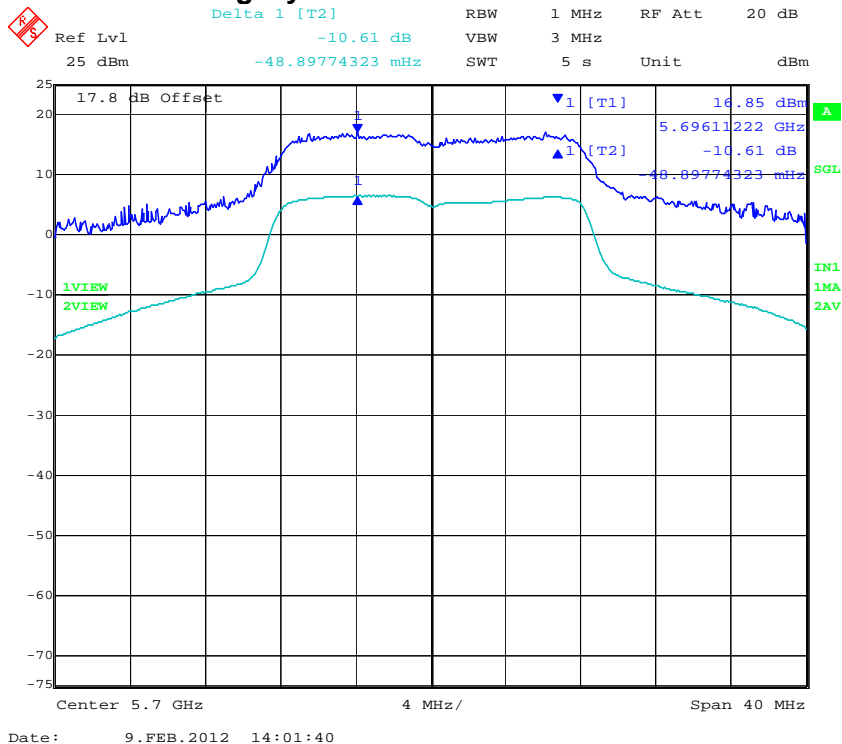
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PORT A 5,700 MHz 802.11a Legacy Peak Excursion Ratio



PORT B 5,700 MHz 802.11a Legacy Peak Excursion Ratio

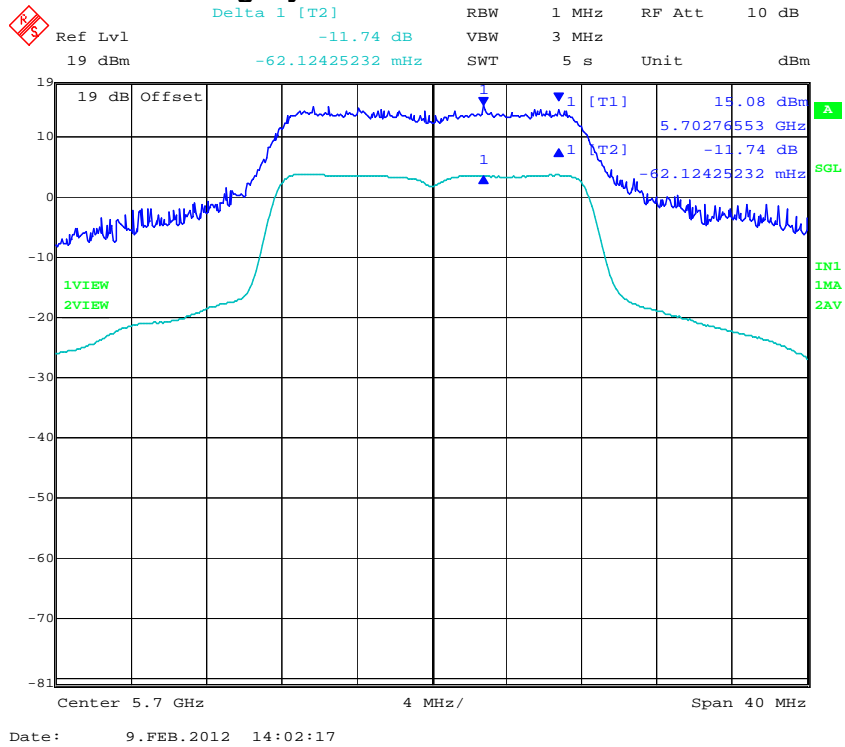


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PORT C 5,700 MHz 802.11a Legacy Peak Excursion Ratio



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TABLE OF RESULTS – 802.11n HT-20 5500 - 5700 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

Test Frequency	Trace Δ Marker				Limit	Margin
	Port A	Port B	Port C	Port D		
MHz	dB	dB	dB	dB	dB	dB
5500	-10.76	-10.47	-11.01	--	-13.00	-1.99
5580	-10.54	-9.96	-10.86	--		-2.14
5700	-10.37	-10.05	-11.15	--		-1.85

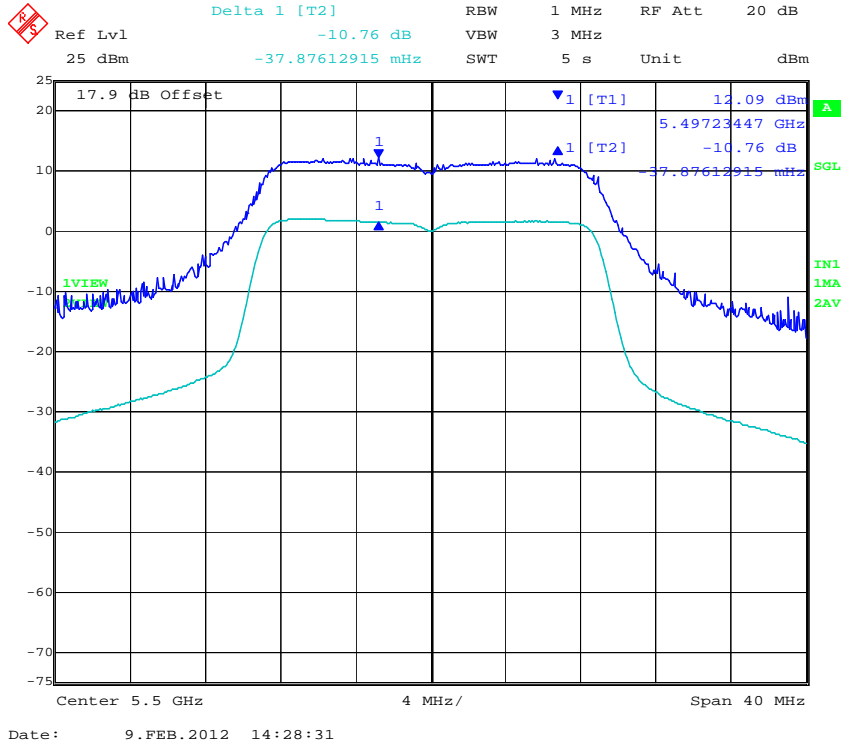
Measurement uncertainty:	±1.33 dB
---------------------------------	----------

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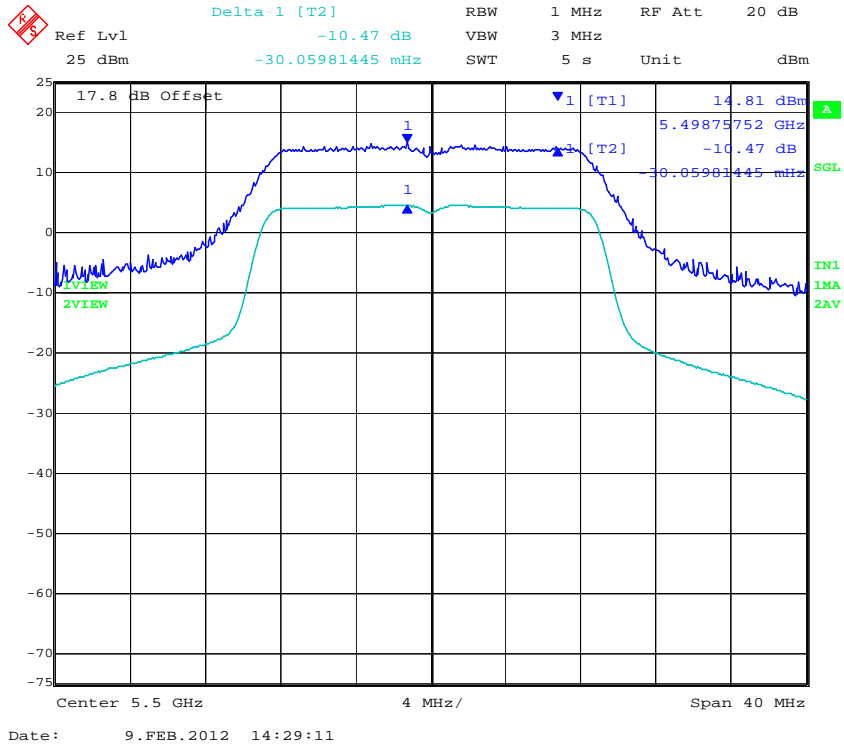


Title: Fluke Networks Sensor4 Wireless Client
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PORT A 5,500 MHz 802.11n HT-20 Peak Excursion Ratio



PORT B 5,500 MHz 802.11n HT-20 Peak Excursion Ratio

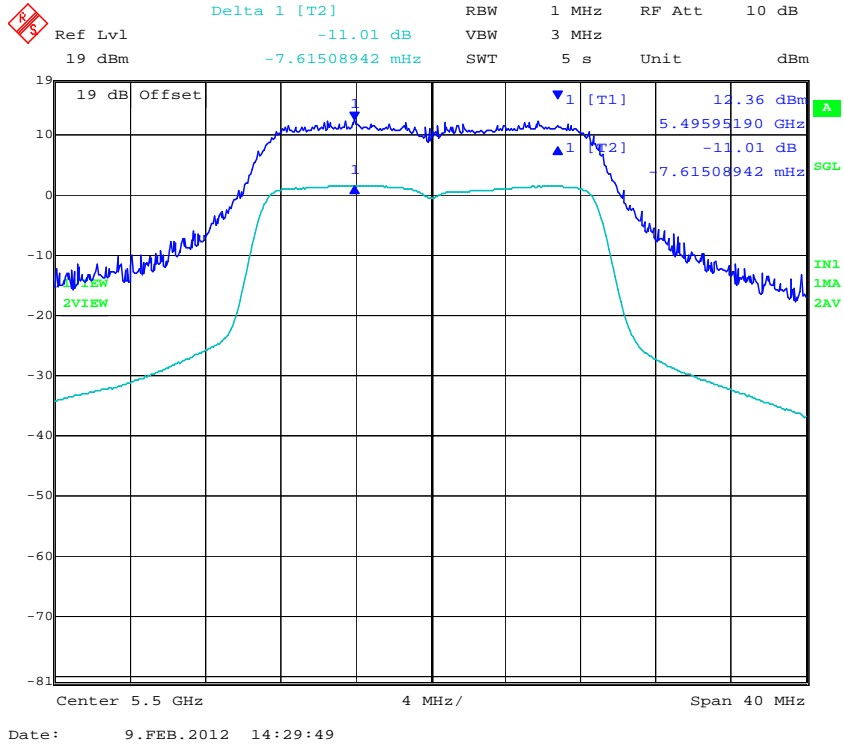


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Title: Fluke Networks Sensor4 Wireless Client
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PORT C 5,500 MHz 802.11n HT-20 Peak Excursion Ratio

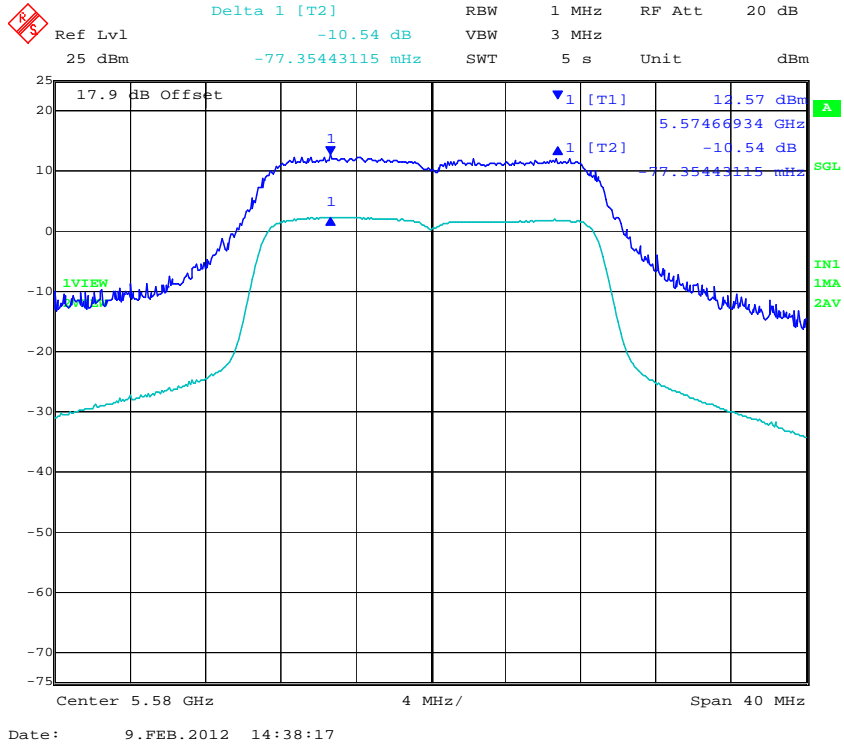


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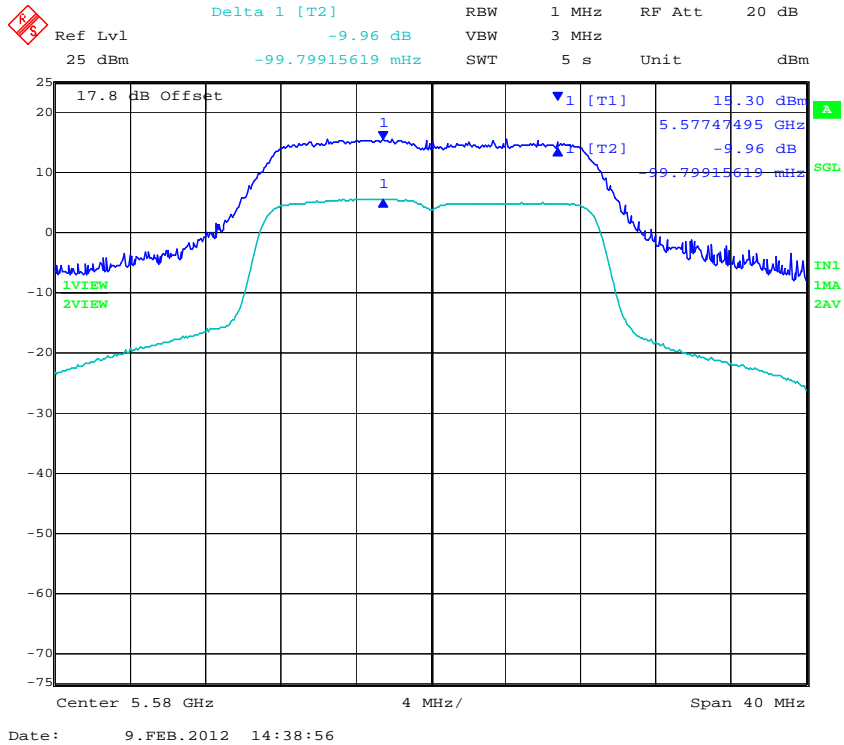


Title: Fluke Networks Sensor4 Wireless Client
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PORT A 5,580 MHz 802.11n HT-20 Peak Excursion Ratio



PORT B 5,580 MHz 802.11n HT-20 Peak Excursion Ratio

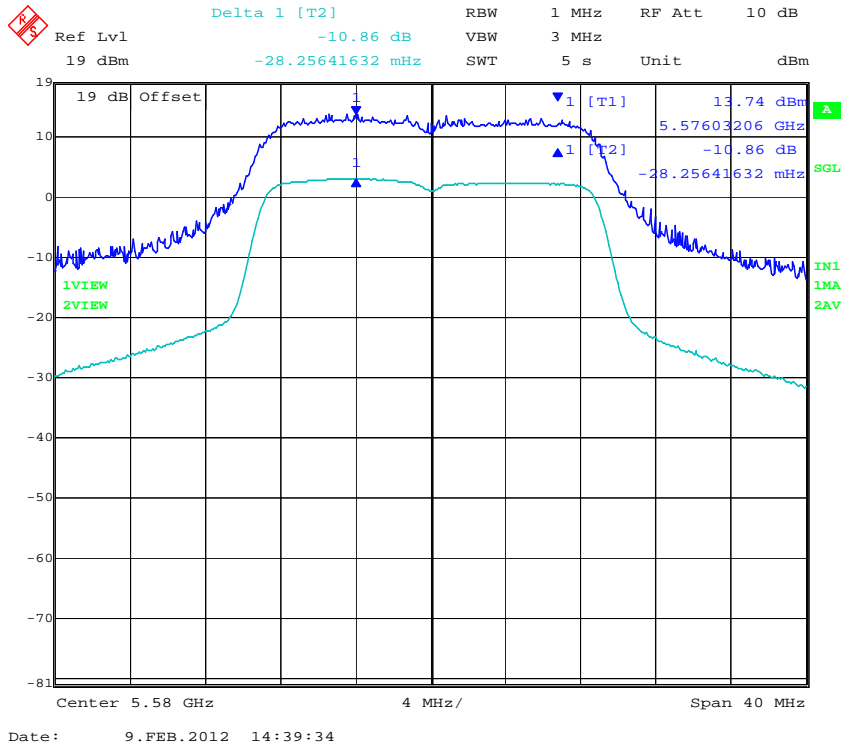


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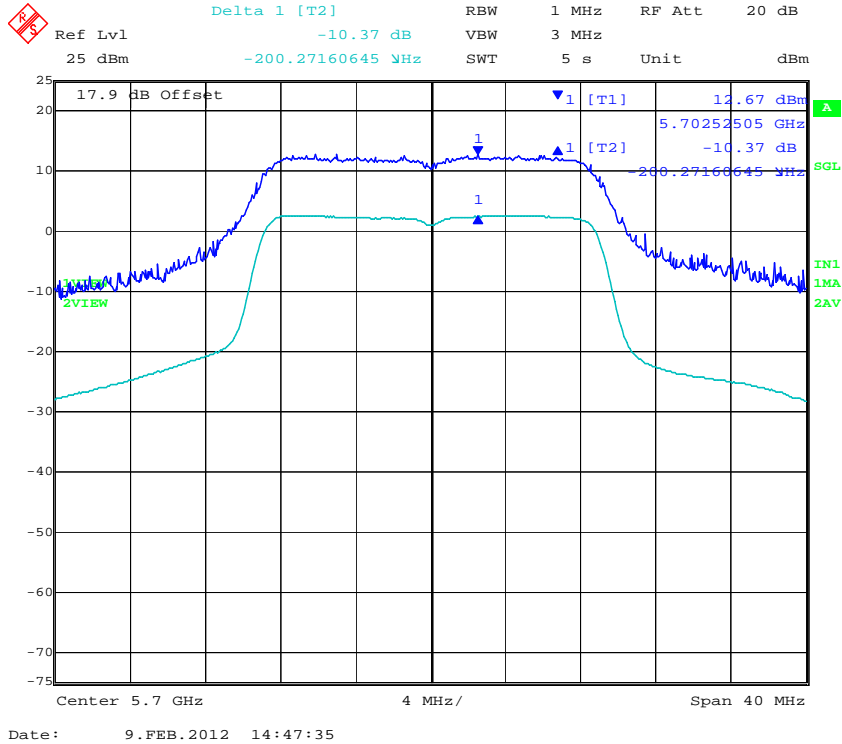
PORT C 5,580 MHz 802.11n HT-20 Peak Excursion Ratio



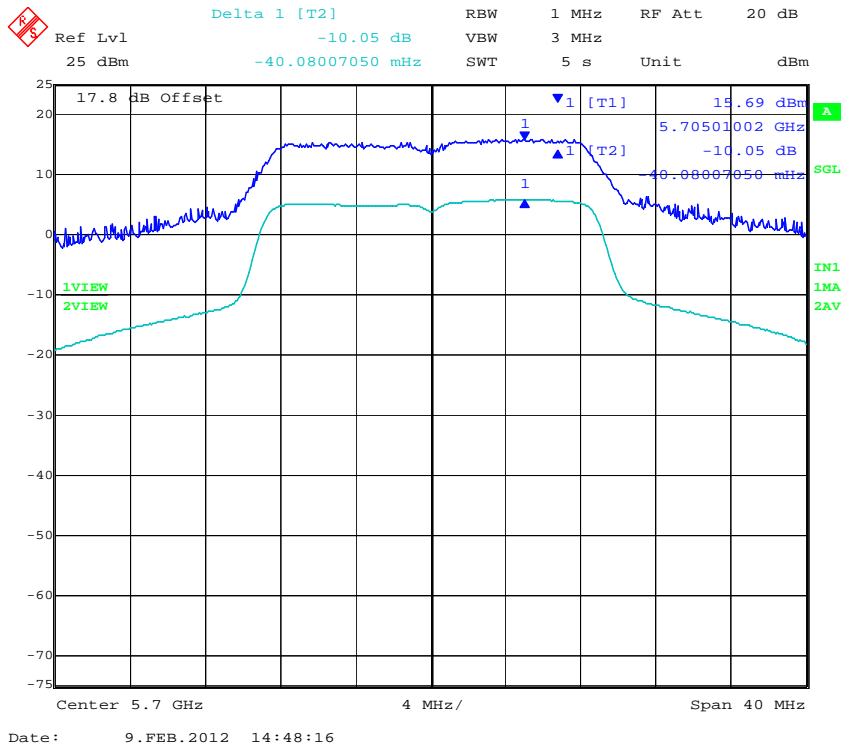
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PORT A 5,700 MHz 802.11n HT-20 Peak Excursion Ratio



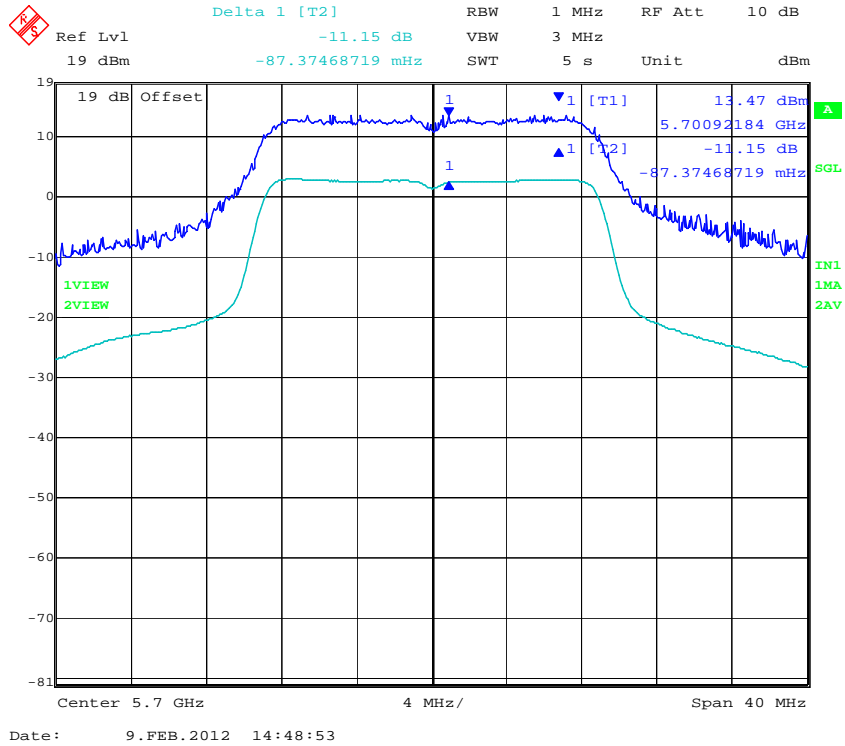
PORT B 5,700 MHz 802.11n HT-20 Peak Excursion Ratio



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PORT C 5,700 MHz 802.11n HT-20 Peak Excursion Ratio



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TABLE OF RESULTS – 802.11n HT-40 5500 - 5700 MHz

Test Conditions:	15.407 (a)	Rel. Humidity (%):	35	to	42
Variant:	802.11 n HT-40	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	2 dBi		
Applied Voltage:	48.0 Vdc				
Notes 1:					
Notes 2:					

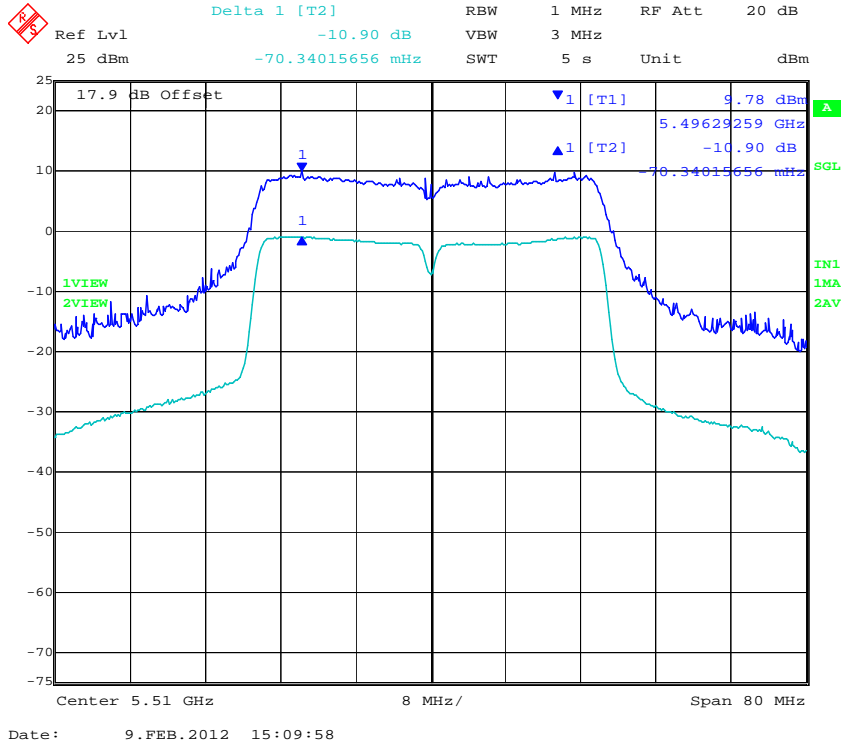
Test Frequency	Trace Δ Marker				Limit	Margin
	Port A	Port B	Port C	Port D		
MHz	dB	dB	dB	dB	dB	dB
5510	-10.90	-10.30	-11.88	--	-13.00	-1.12
5550	-11.57	-10.32	-10.89	--		-1.43
5670	-11.12	-10.98	-12.28	--		-0.72

Measurement uncertainty:	±1.33 dB
---------------------------------	----------

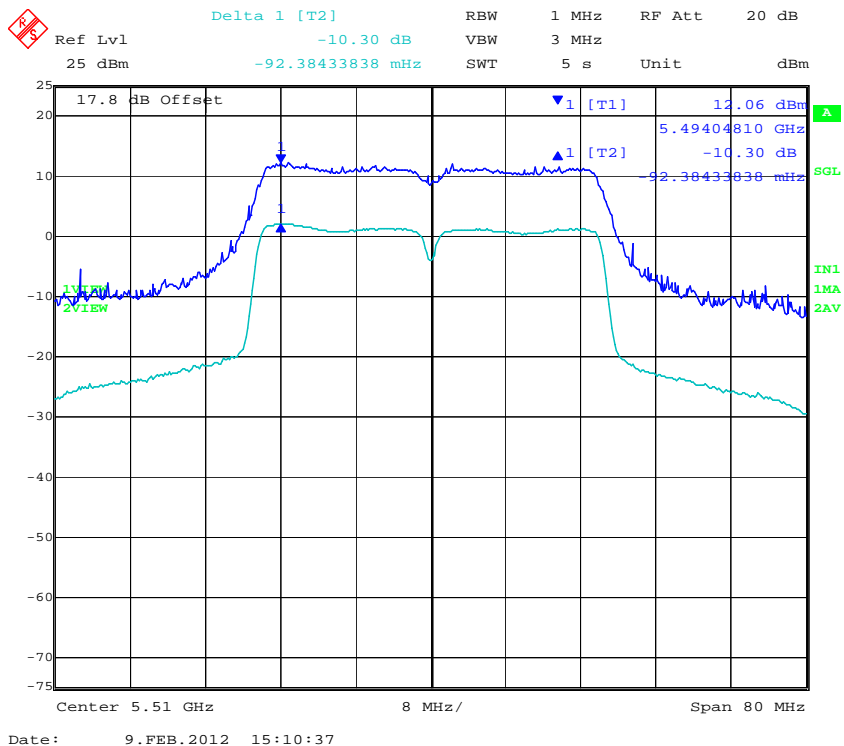
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PORT A 5,510 MHz 802.11n HT-40 Peak Excursion Ratio



PORT B 5,510 MHz 802.11n HT-40 Peak Excursion Ratio

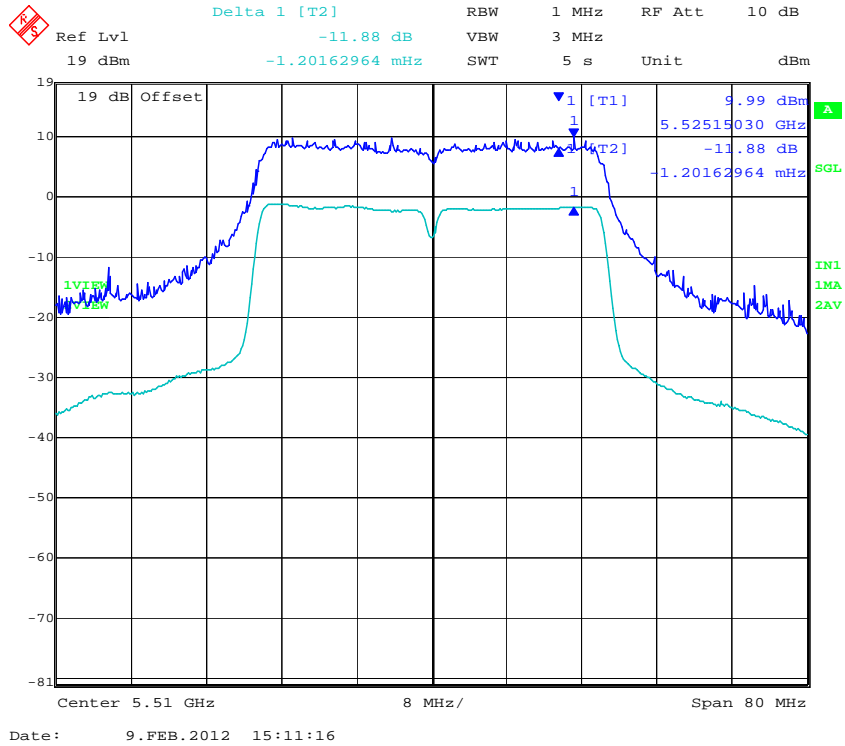


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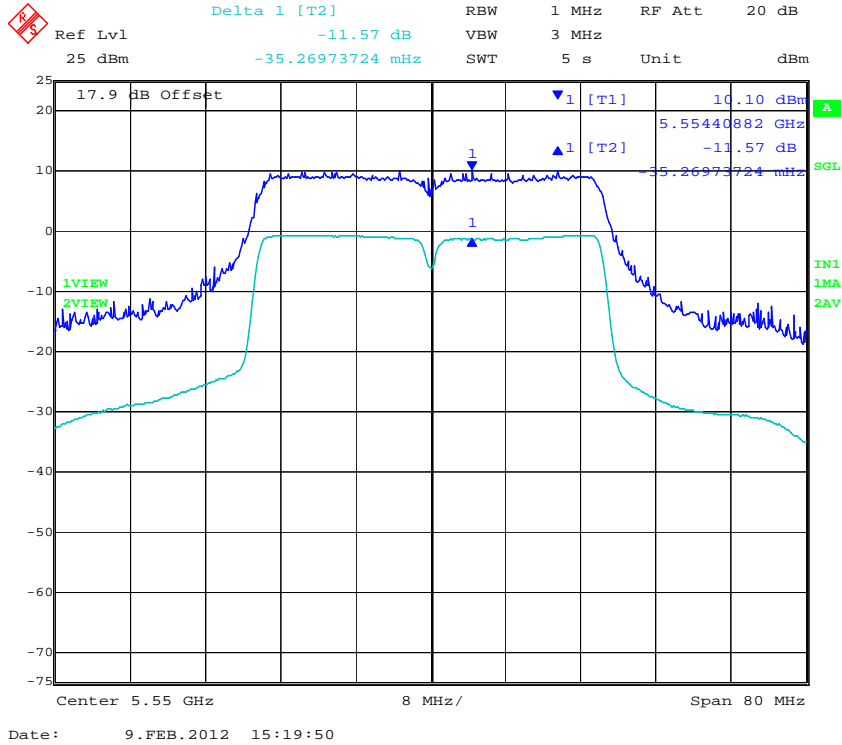
PORT C 5,510 MHz 802.11n HT-40 Peak Excursion Ratio



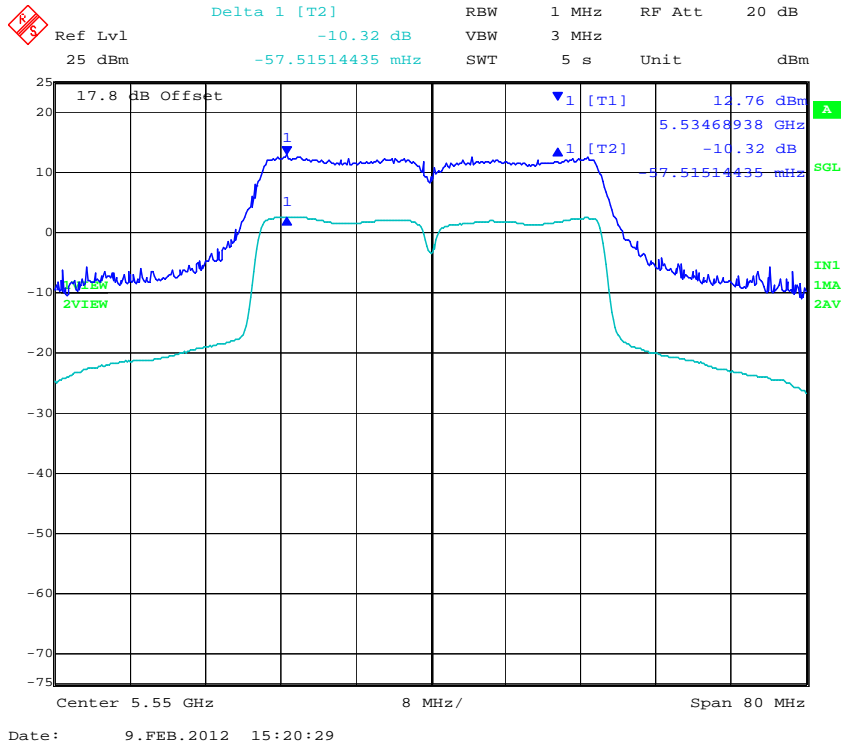
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PORT A 5,550 MHz 802.11n HT-40 Peak Excursion Ratio



PORT B 5,550 MHz 802.11n HT-40 Peak Excursion Ratio

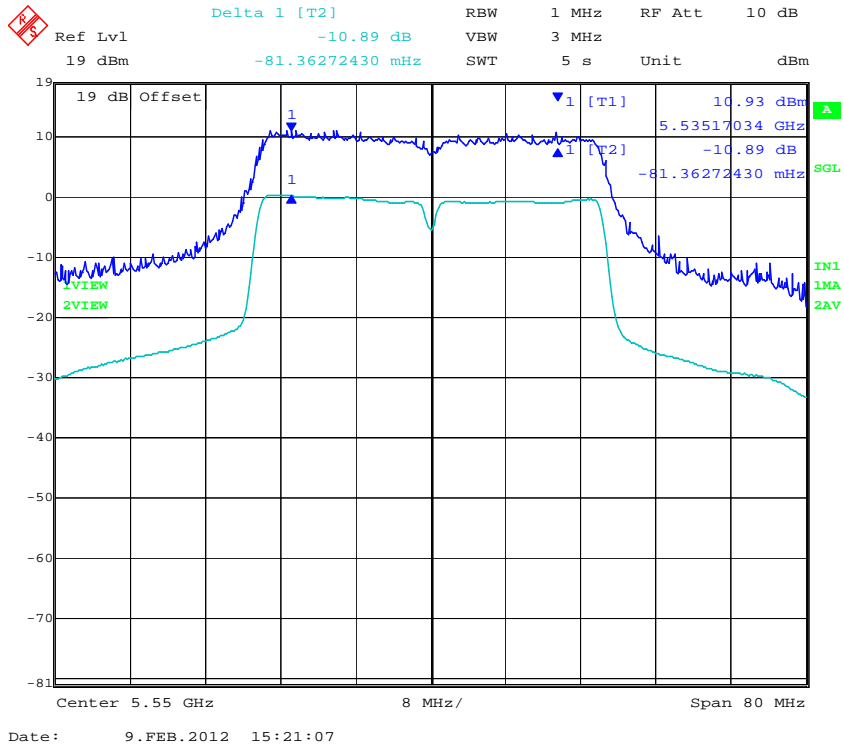


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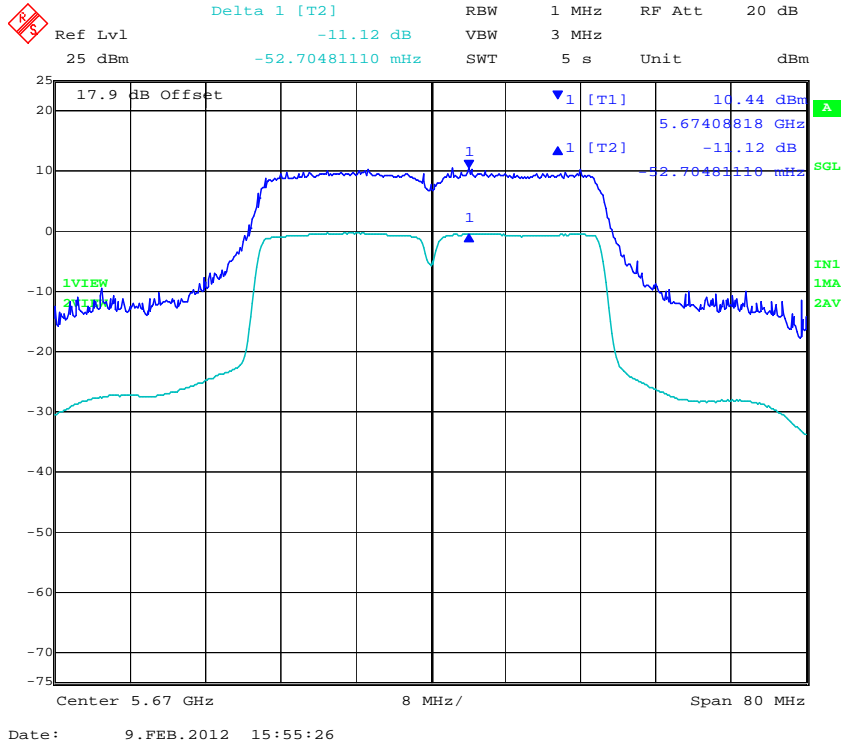
PORT C 5,550 MHz 802.11n HT-40 Peak Excursion Ratio



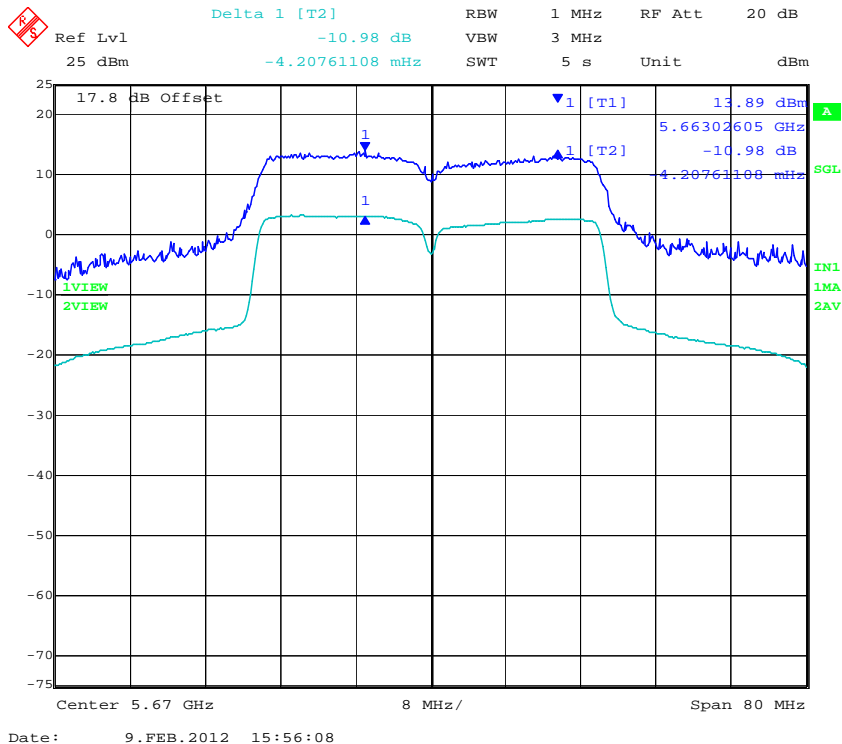
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PORT A 5,670 MHz 802.11n HT-40 Peak Excursion Ratio



PORT B 5,670 MHz 802.11n HT-40 Peak Excursion Ratio

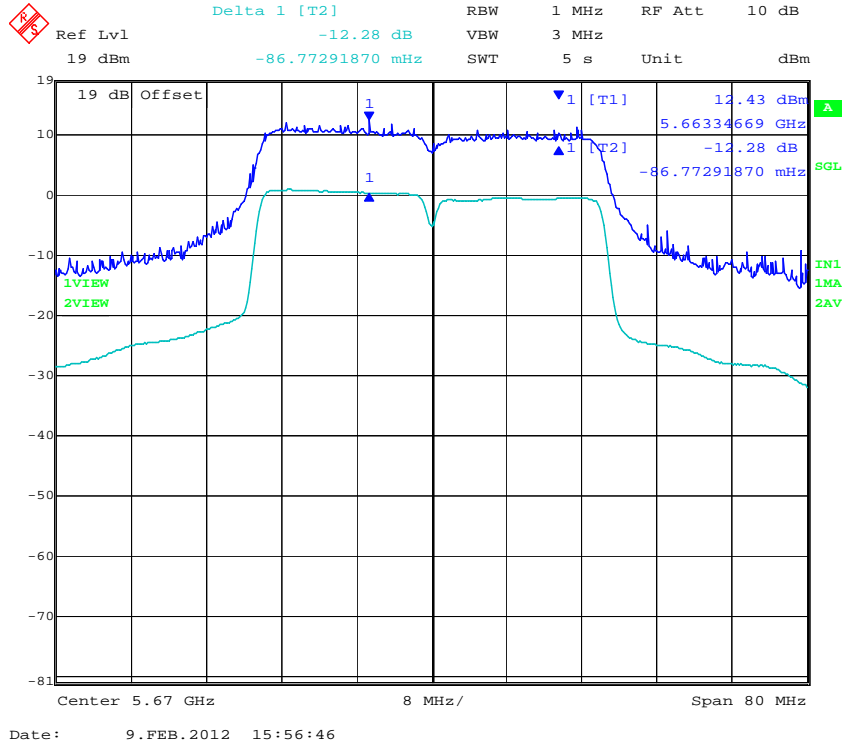


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PORT C 5,670 MHz 802.11n HT-40 Peak Excursion Ratio



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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

Laboratory Measurement Uncertainty for Spectrum Measurement

Measurement uncertainty	± 2.81dB
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Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of RF Spectrum Mask'	0158, 0287, 0252, 0313, 0314, 0070, 0116, 0117

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5.1.5. 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 ± 20 ppm stability.

This stability accounts for room temp tolerance of the crystal oscillator circuit, frequency variation across temperature, and crystal ageing.

± 20 ppm 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.

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5.1.6. Maximum Permissible Exposure

FCC, Part 15 Subpart C §15.407(f)

Industry Canada RSS-Gen §5.5

Calculations for Maximum Permissible Exposure Levels

$$\text{Power Density} = P_d \text{ (mW/cm}^2\text{)} = \text{EIRP}/(4\pi d^2)$$

$$\text{EIRP} = P * G * 2$$

P = Peak output power (mW)

G = Antenna numeric gain (numeric)

d = Separation distance (cm)

$$\text{Numeric Gain} = 10^{(G \text{ (dBi)}/10)}$$

The Fluke Networks Sensor4 has three transmitters operating in each band. It also has two similar radio's. The peak power in the table below is calculated by assuming a worst case scenario where all transmitters are operating simultaneously in the same channel and x2 the maximum power found in Section 5.1.2 Peak Output Power to take into account the two radio modules operating simultaneously in the same band.

Because the EUT belongs to the General Population/Uncontrolled Exposure the limit of power density is 1.0 mW/cm²

The following table uses the highest antenna gain for each band.

Freq. Band (MHz)	Antenna Gain (dBi)	Numeric Gain (numeric)	Peak Output Power (dBm)	Peak Output Power x 2 (mW)	Power Density (S) @ 20cm mW/cm ²
5150 – 5250	Integral 3.1	2.00	+16.92	98.4	0.04
5250 – 5350	Integral 3.1	2.00	+23.14	412.1	0.16
5470 - 5725	Integral 4.8	3.02	+22.72	374.1	0.23

Note: for mobile or fixed location transmitters the minimum separation distance is 20cm, even if calculations indicate the MPE distance to be less.

Specification

Maximum Permissible Exposure Limits

FCC §1.1310 Limit = 1mW / cm² from 1.310 Table 1

RSS-Gen §5.5 Before equipment certification is granted, the application requirements of RSS-102 shall be met.

Laboratory Measurement Uncertainty for Power Measurements

Measurement uncertainty

±1.33 dB

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5.1.7. Radiated Emissions

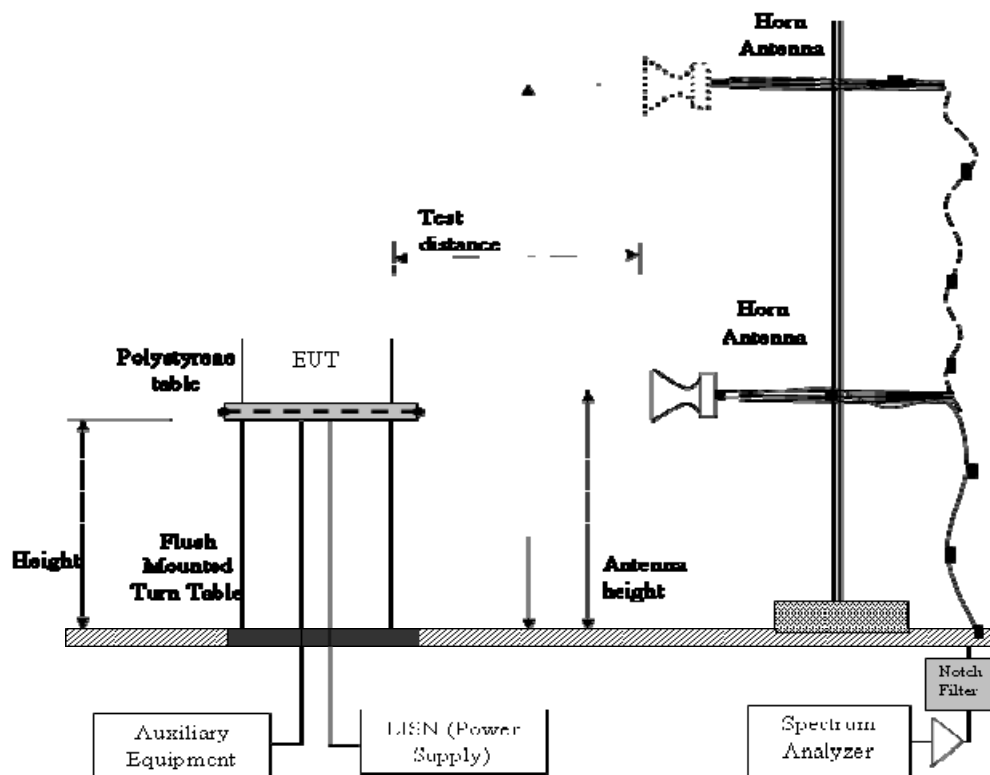
FCC, Part 15 Subpart C §15.407(b)(2), §15.205(a)/15.209(a)
Industry Canada RSS-210 §A9.3(2); §2.2; §2.6; RSS-Gen §4.7

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.

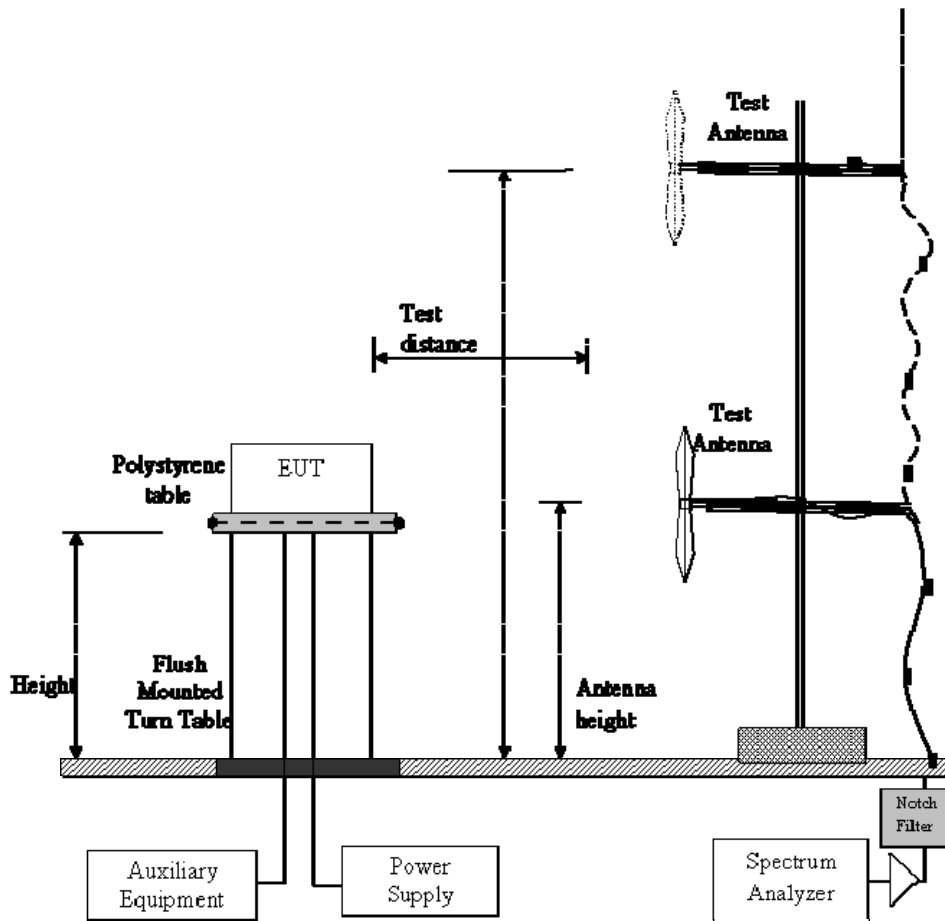
Emissions nearest the limits were chosen for maximization and formal measurement using a CISPR compliant receiver. Emissions above 1000 MHz are measured utilizing a CISPR compliant average detector with a tuned receiver, using a bandwidth of 1 MHz. Emissions from 30 MHz – 1000 MHz are measured utilizing 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.

Test Measurement Set Up



Radiated Emission Measurement Setup – Above 1 GHz

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Radiated Emission Measurement Setup – Below 1 GHz

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



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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 dB μ V; 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:

$$FS = 51.5 + 8.5 + 1.3 - 26.0 + 1 = 36.3 \text{ dB}\mu\text{V/m}$$

Conversion between dB μ V/m (or dB μ V) and μ V/m (or μ V) are done as:

$$\text{Level (dB}\mu\text{V/m)} = 20 * \text{Log (level (\mu V/m))}$$

$$40 \text{ dB}\mu\text{V/m} = 100 \mu\text{V/m}$$

$$48 \text{ dB}\mu\text{V/m} = 250 \mu\text{V/m}$$

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

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

where P is the EIRP in Watts

$$\text{Therefore: } -27 \text{ dBm/MHz} = 68.23 \text{ dB}\mu\text{V/m}$$

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

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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

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Table 1: FCC 15.209 Spurious Emissions Limits

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Field Strength ($\text{dB}\mu\text{V/m}$)	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 Spectrum Measurement

Measurement Uncertainty	+5.6/ -4.5 dB
--------------------------------	---------------

Traceability:

Method	Test Equipment Used
Work instruction WI-03	0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312

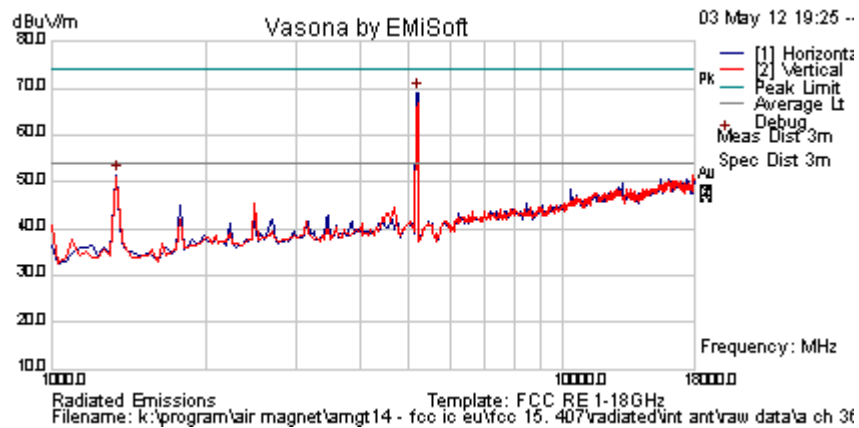
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5.1.7.1. Integral Antenna

Test Freq.	5180 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	16	Press. (mBars)	993
Antenna	Integral	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



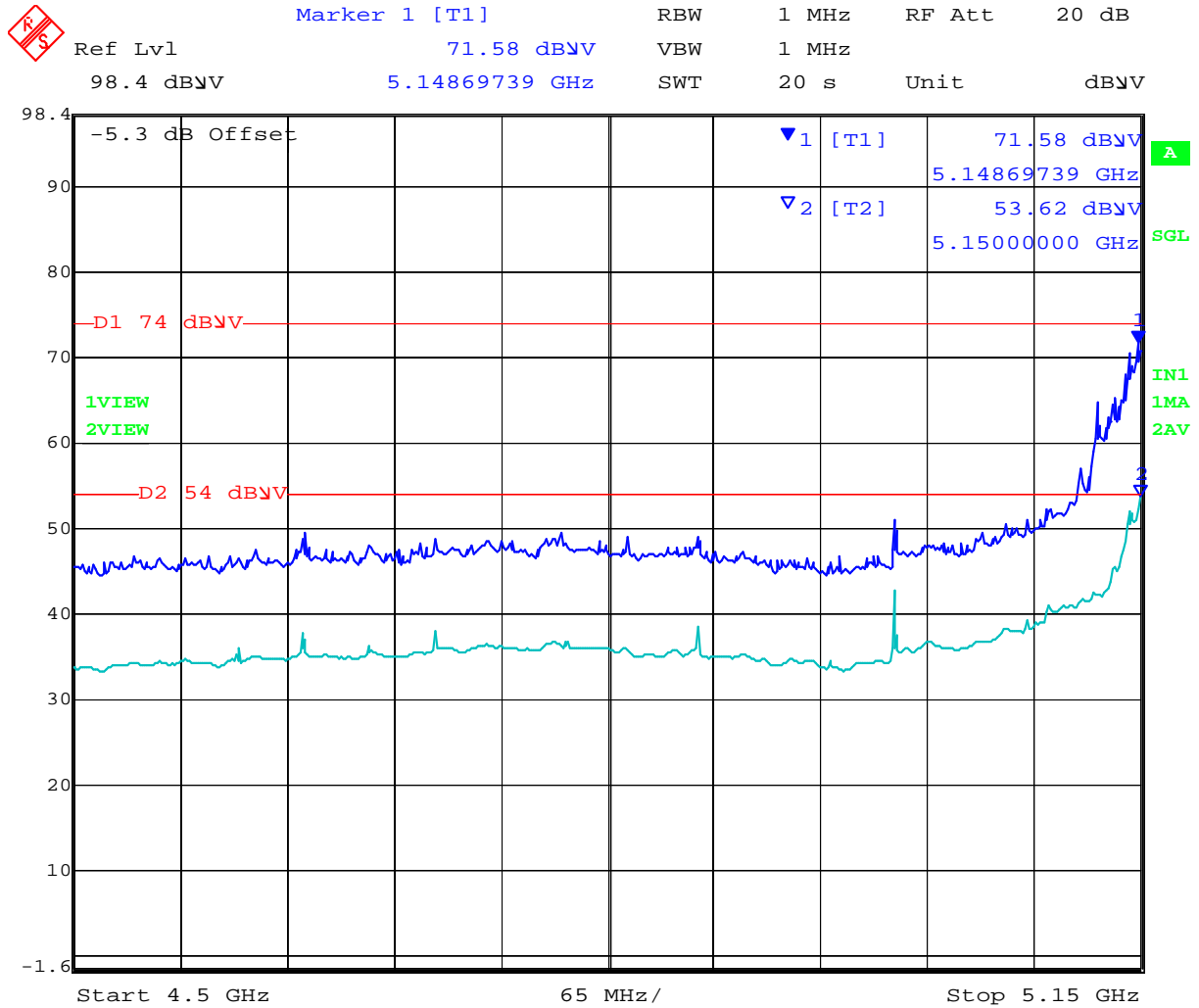
Formally measured emission peaks

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	74.4	4.6	-9.9	69.1	Peak [Scan]	H	200	0				FUND
1340.68136	63.2	2.3	-13.9	51.5	Peak [Scan]	H	100	0	54.0	-2.5	Pass	RB
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												

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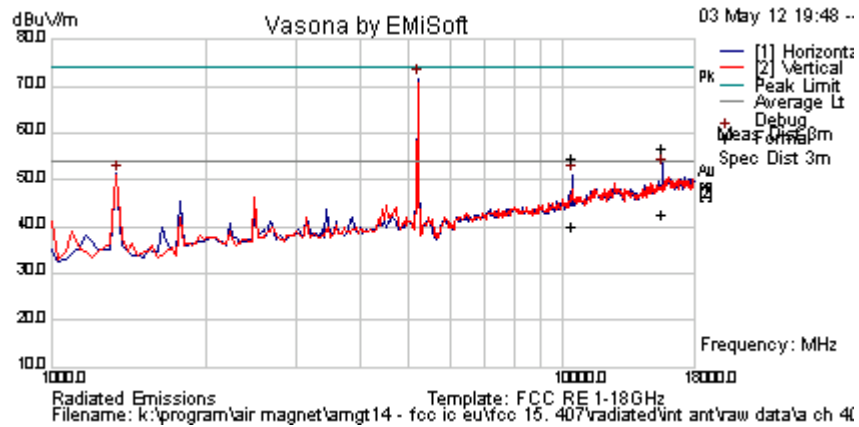
Band-Edge 802.11a Channel Frequency 5180 MHz

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Test Freq.	5200 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
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
15606.134	49.0	8.4	-0.6	56.8	Peak Max	H	100	327	74.0	-17.2	Pass	RB
10395.231	50.3	6.7	-2.5	54.5	Peak Max	H	166	345	74.0	-19.5	Pass	RB
15606.134	35.0	8.4	-0.6	42.8	Average Max	H	100	327	54.0	-11.3	Pass	RB
10395.231	35.8	6.7	-2.5	40.1	Average Max	H	166	345	54	-13.9	Pass	RB
5190.381	77.0	4.6	-9.9	71.8	Peak [Scan]	H	200	0				FUND
1340.681	62.9	2.3	-13.9	51.3	Peak [Scan]	H	100	0	54	-2.7	Pass	RB

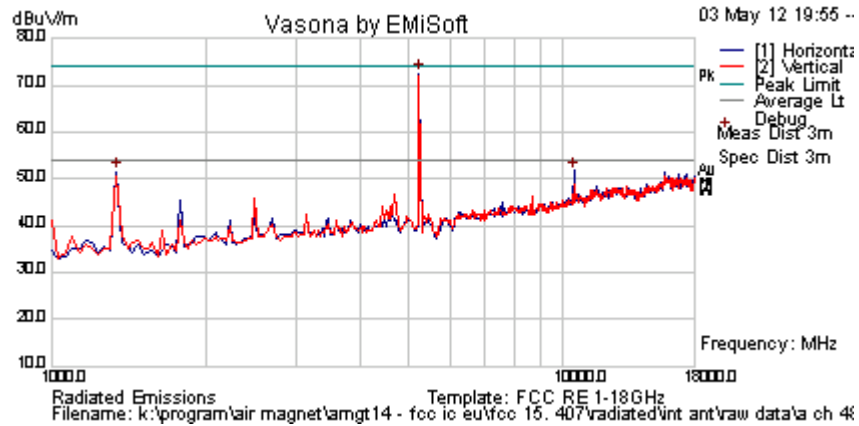
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5240 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	Integral	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

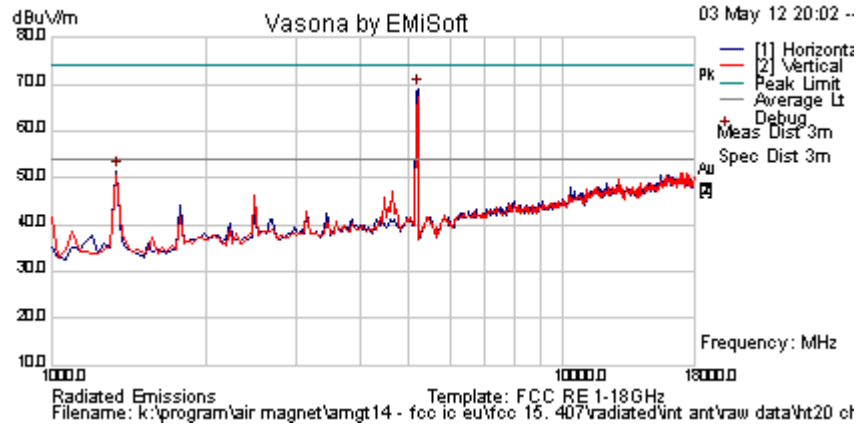
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10505.01	50.3	6.7	-2.5	54.5	Peak Max	H	166	345	74.0	-19.5	Pass	RB
10505.01	35.8	6.7	-2.5	40.1	Average Max	H	166	345	54	-13.9	Pass	RB
1340.681	63.2	2.3	-13.9	51.6	Peak [Scan]	H	100	0	54.0	-2.4	Pass	RB
5224.449	77.7	4.6	-9.8	72.5	Peak [Scan]	H	100	0				FUND
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												

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Test Freq.	5180 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	17	Press. (mBars)	993
Antenna	Integral	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

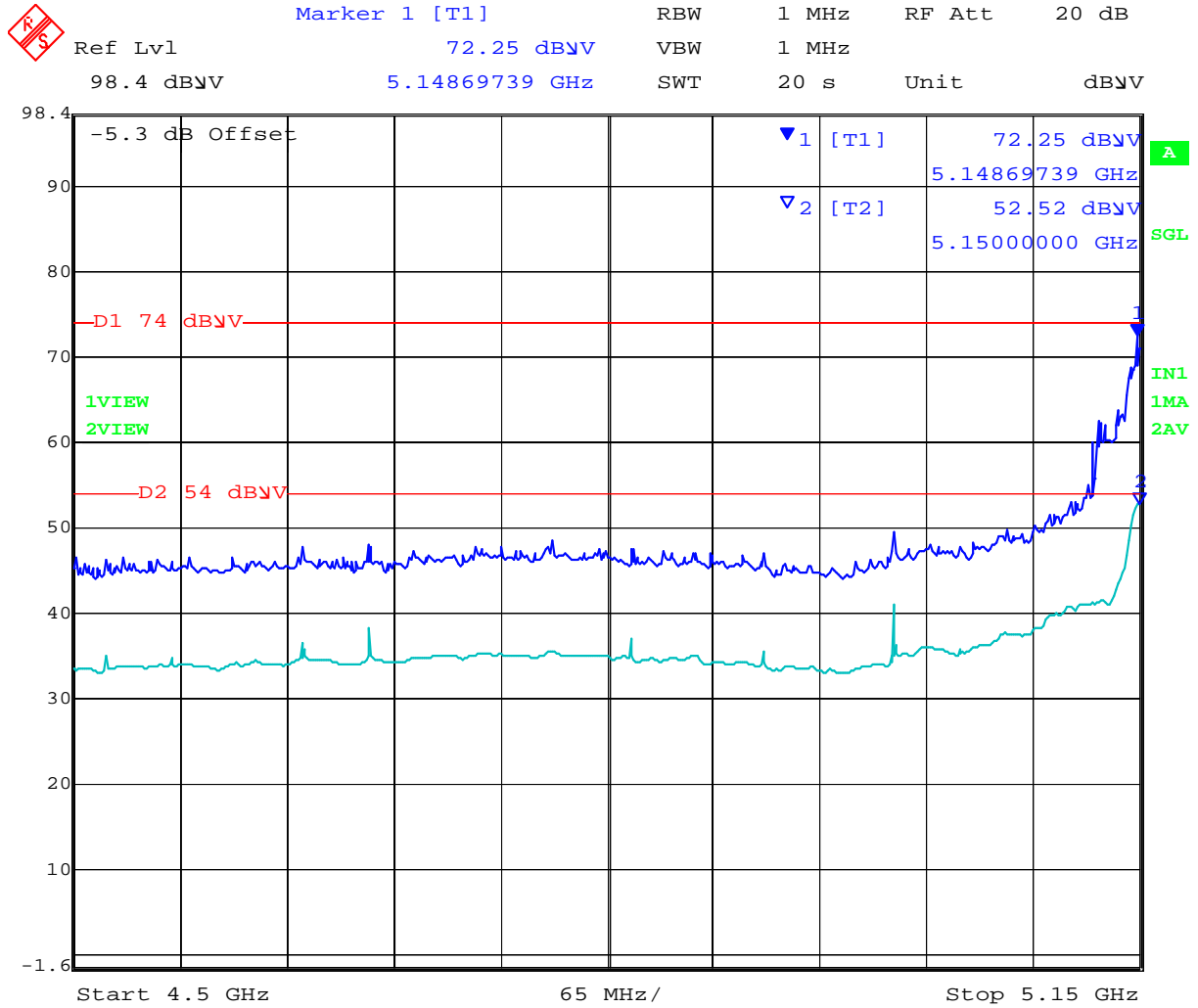
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5190.381	74.5	4.6	-9.9	69.2	Peak [Scan]	H	200	0				FUND
1340.68136	63.1	2.3	-13.9	51.5	Peak [Scan]	H	100	0	54.0	-2.5	Pass	RB

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

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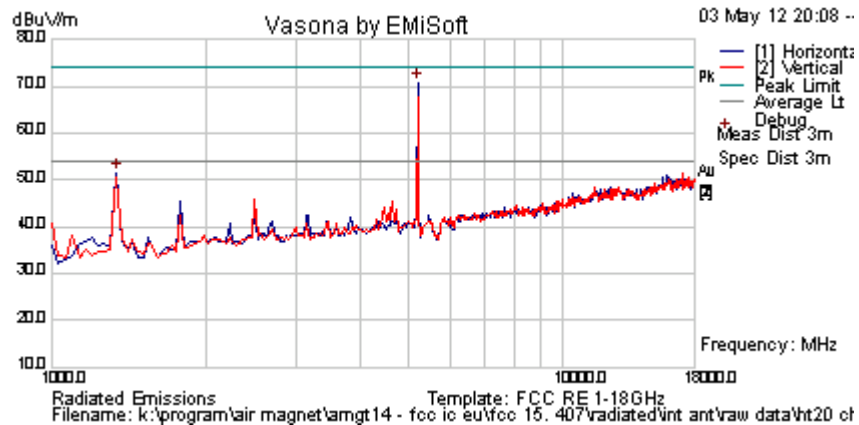
Band-Edge 802.11n HT-20 Channel Frequency 5180 MHz

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Test Freq.	5200 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
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	76.1	4.6	-9.9	70.9	Peak [Scan]	H	200	0				FUND
1340.68136	63.1	2.3	-13.9	51.5	Peak [Scan]	H	100	0	54.0	-2.6	Pass	RB

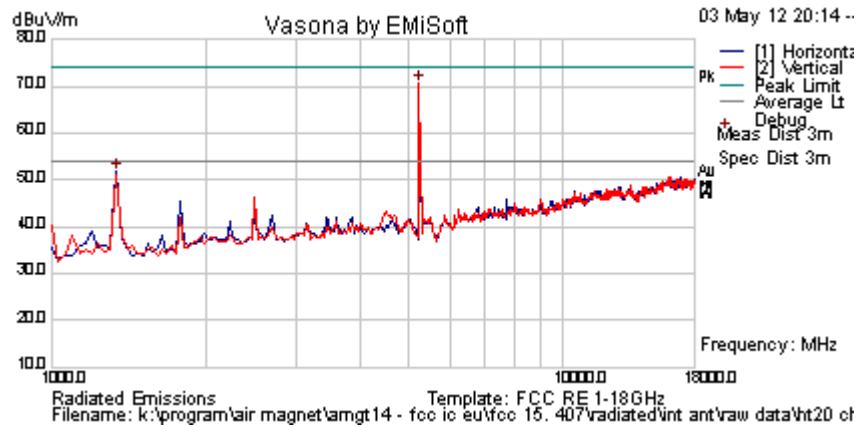
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5240 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
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
5224.449	75.9	4.6	-9.8	70.7	Peak [Scan]	V	150	0				FUND
1340.68136	63.3	2.3	-13.9	51.7	Peak [Scan]	H	100	0	54.0	-2.4	Pass	RB

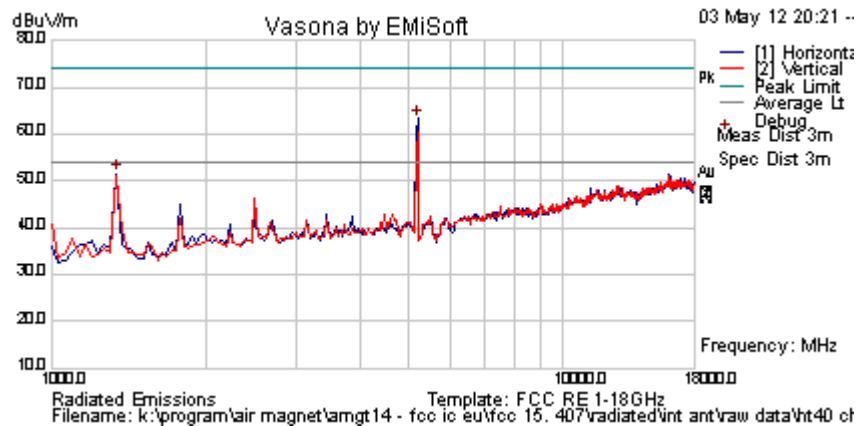
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5190 MHz	Engineer	SB
Variant	802.11n HT-40; 13.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	12	Press. (mBars)	993
Antenna	Integral	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



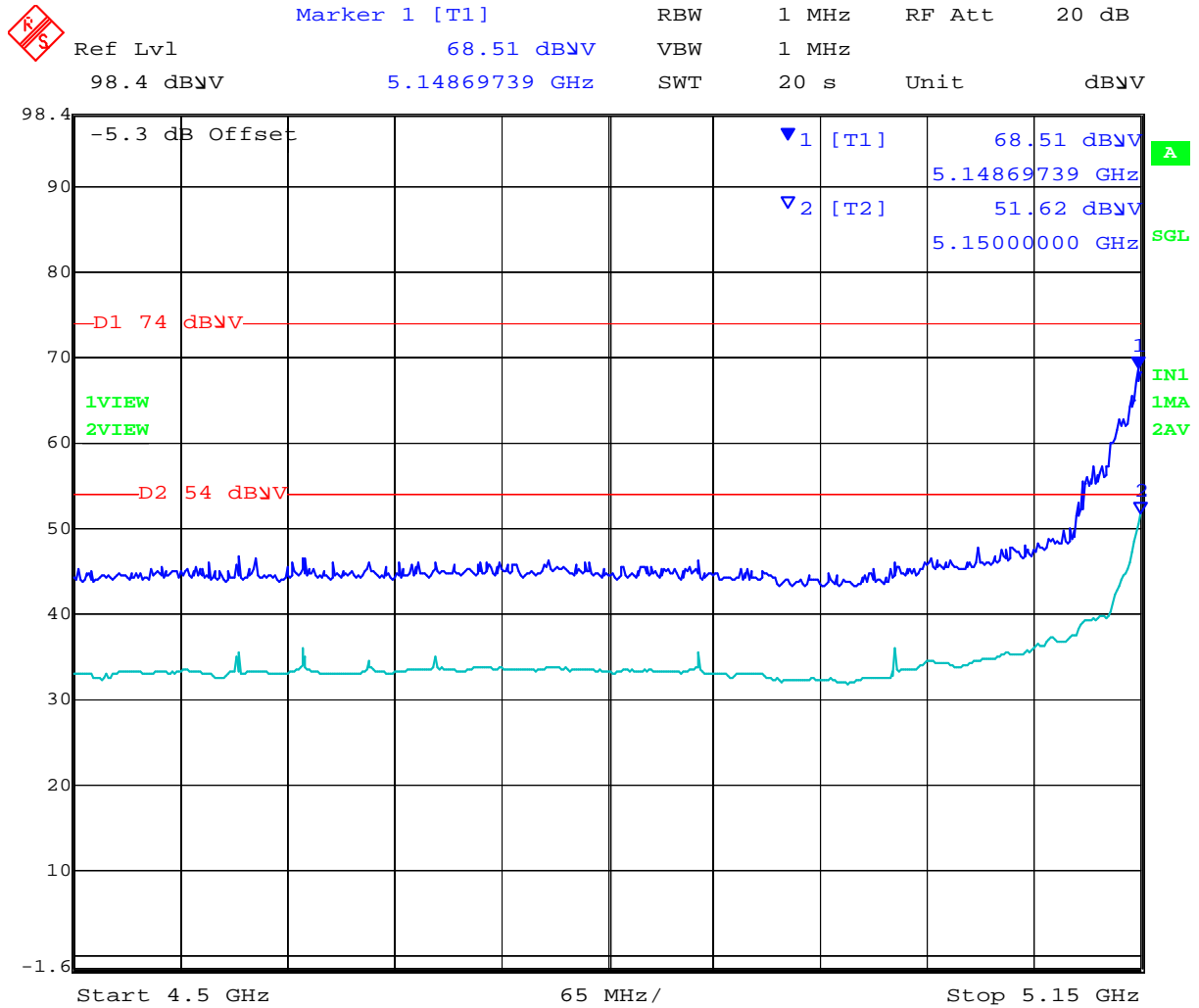
Formally measured emission peaks

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	68.5	4.6	-9.9	63.2	Peak [Scan]	H	200	0				FUND
1340.68136	63.2	2.3	-13.9	51.6	Peak [Scan]	H	100	0	54.0	-2.4	Pass	RB
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												

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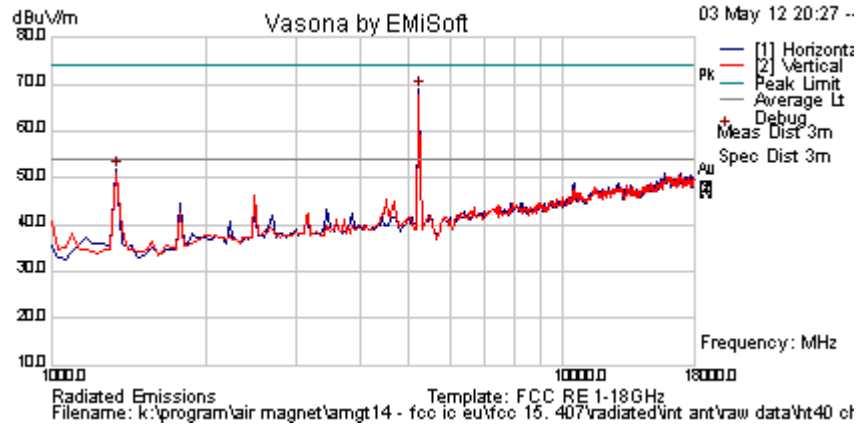
Band-Edge 802.11n HT-40 Channel Frequency 5190 MHz

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Test Freq.	5230 MHz	Engineer	SB
Variant	802.11n HT-40; 13.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
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
5224.449	74.1	4.6	-9.8	68.9	Peak [Scan]	H	100	0				FUND
1340.68136	63.3	2.3	-13.9	51.7	Peak [Scan]	H	100	0	54.0	-2.3	Pass	RB

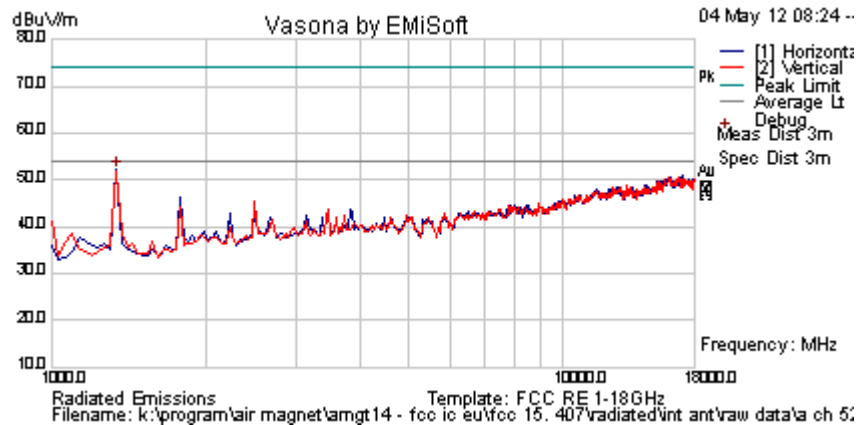
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5260 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
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
1340.681	63.8	2.3	-13.9	52.2	Peak [Scan]	H	100	0	54.0	-1.8	Pass	RB

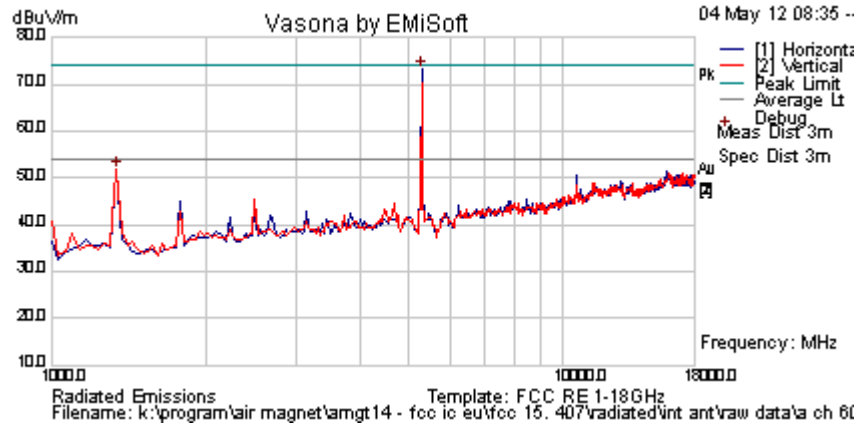
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5300 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
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
5292.585	78.1	4.6	-9.6	73.1	Peak [Scan]	H	100	0				FUND
1340.68136	63.5	2.3	-13.9	51.9	Peak [Scan]	V	100	0	54.0	-2.2	Pass	RB

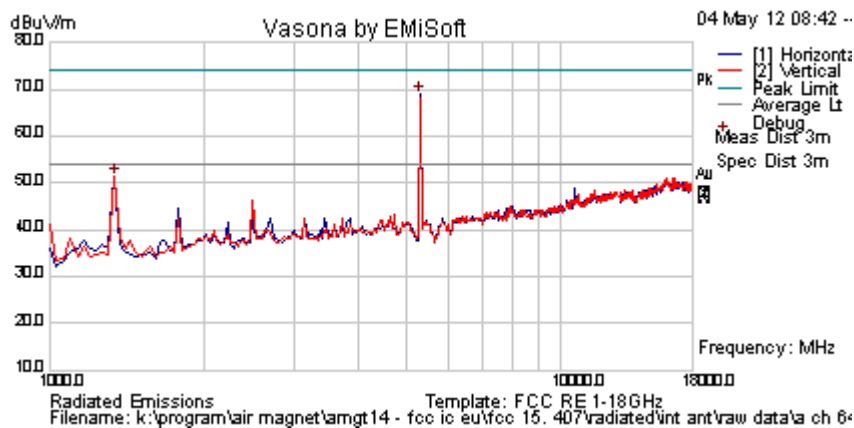
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5320 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	16	Press. (mBars)	993
Antenna	Integral	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

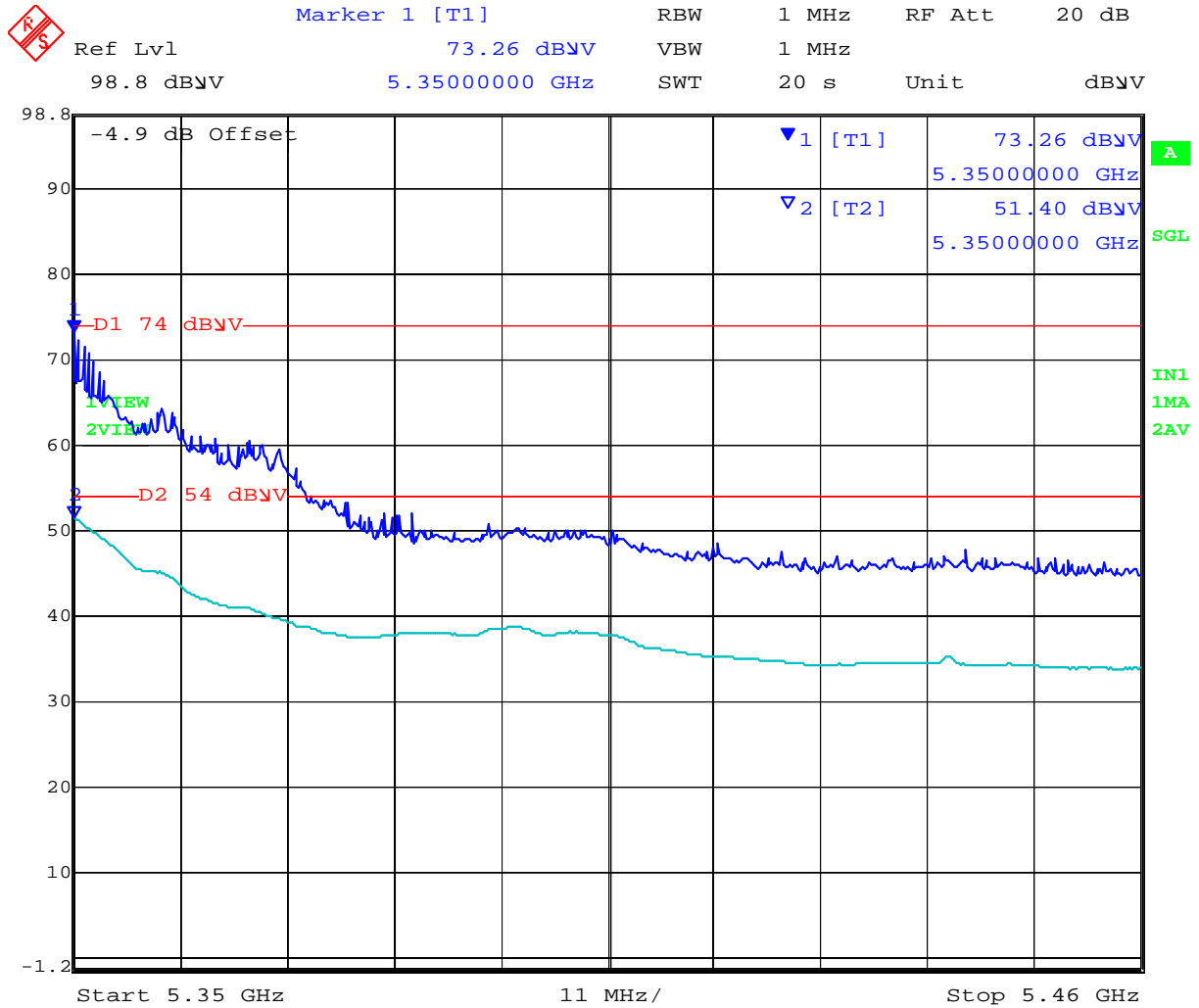
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5292.585	73.9	4.6	-9.6	68.9	Peak [Scan]	H	100	0				FUND
1340.68136	63.0	2.3	-13.9	51.4	Peak [Scan]	V	100	0	54.0	-2.6	Pass	RB

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

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Title: Fluke Networks Sensor4 Wireless Client
To: FCC 47 CFR Part 15.407 & IC RSS-210
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Date: 3.MAY.2012 12:35:45

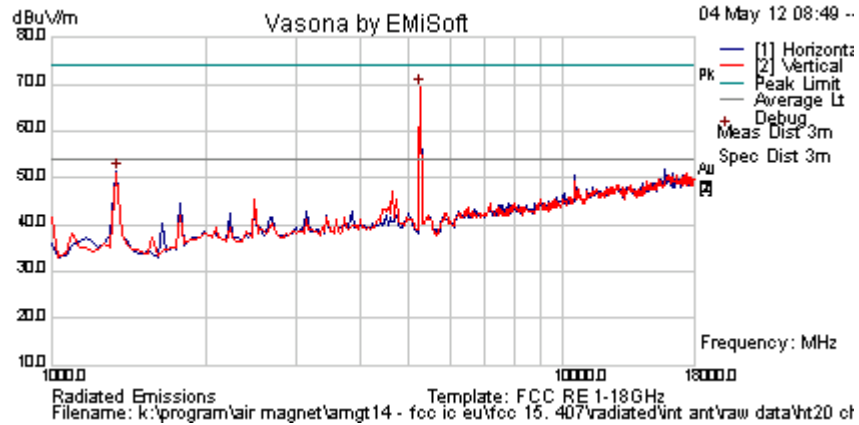
Band-Edge 802.11a Channel Frequency 5320 MHz

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Test Freq.	5260 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
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
5258.517	74.4	4.6	-9.7	69.3	Peak [Scan]	V	200	0				FUND
1340.68136	63.0	2.3	-13.9	51.4	Peak [Scan]	H	100	0	54.0	-2.6	Pass	RB

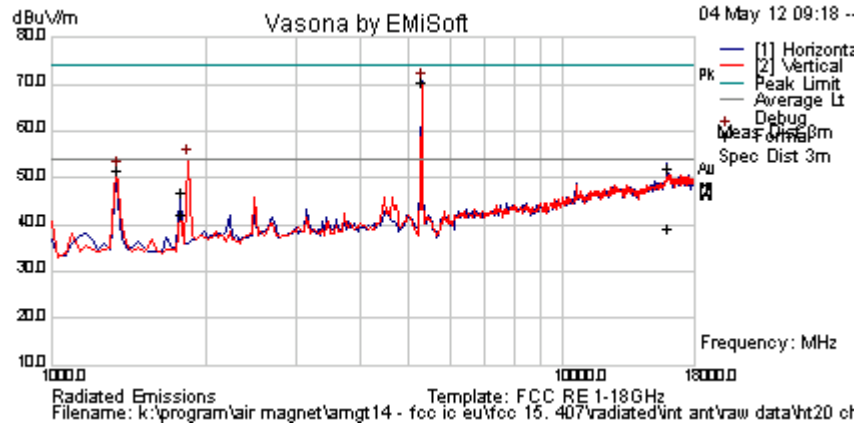
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Title: Fluke Networks Sensor4 Wireless Client
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Test Freq.	5300 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
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
15962.502	42.9	9.0	0.0	51.9	Peak Max	V	175	227	74.0	-22.1	Pass	RB
1799.96	57.0	2.6	-12.6	47.0	Peak Max	V	108	172	74.0	-27.0	Pass	RB
15962.502	30.2	9.0	0.0	39.2	Average Max	V	175	227	54.0	-14.8	Pass	RB
1799.960	52.3	2.6	-12.6	42.3	Average Max	V	108	172	54	-11.7	Pass	RB
5292.585	75.6	4.6	-9.6	70.7	Peak [Scan]	H	150	0				FUND
1340.681	63.4	2.3	-13.9	51.8	Peak [Scan]	V	100	0	54	-2.2	Pass	RB

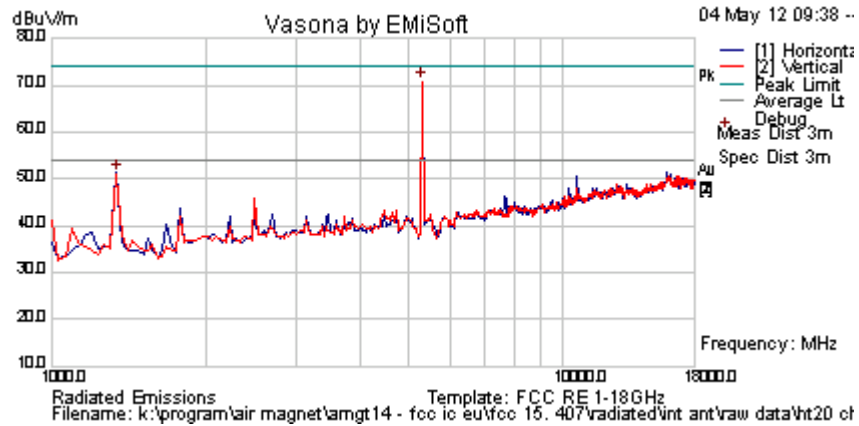
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Title: Fluke Networks Sensor4 Wireless Client
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Test Freq.	5320 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	16	Press. (mBars)	993
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
5292.585	75.7	4.6	-9.6	70.8	Peak [Scan]	V	100	0				FUND
1340.68136	62.9	2.3	-13.9	51.2	Peak [Scan]	H	100	0	54.0	-2.8	Pass	RB

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

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Date: 3.MAY.2012 12:41:28

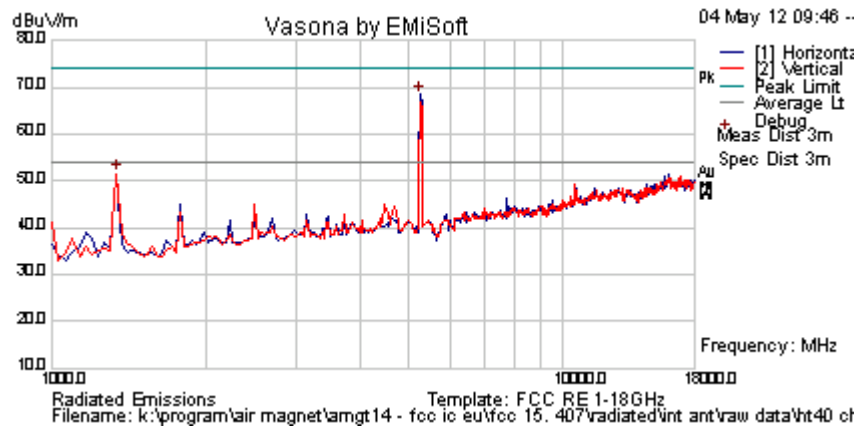
Band-Edge 802.11n HT-20 Channel Frequency 5320 MHz

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Title: Fluke Networks Sensor4 Wireless Client
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Test Freq.	5270 MHz	Engineer	SB
Variant	802.11n HT-40; 13.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
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
5258.517	73.6	4.6	-9.7	68.4	Peak [Scan]	H	100	0				FUND
1340.68136	63.2	2.3	-13.9	51.6	Peak [Scan]	V	100	0	54.0	-2.4	Pass	RB

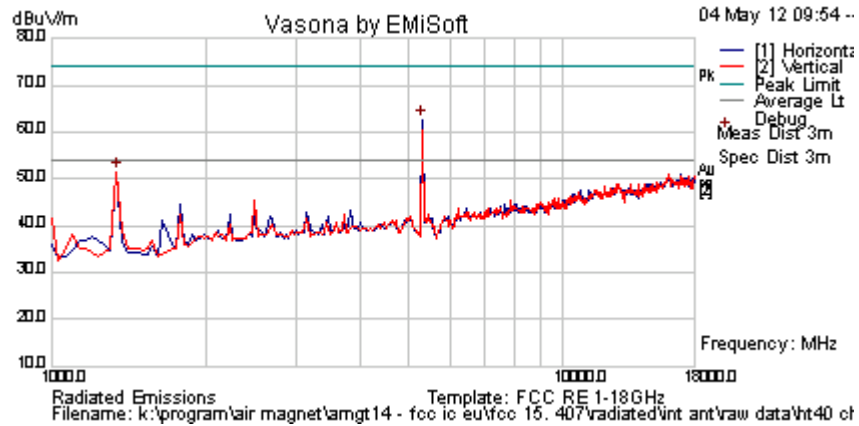
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5310 MHz	Engineer	SB
Variant	802.11n HT-40; 13.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	13	Press. (mBars)	993
Antenna	Integral	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

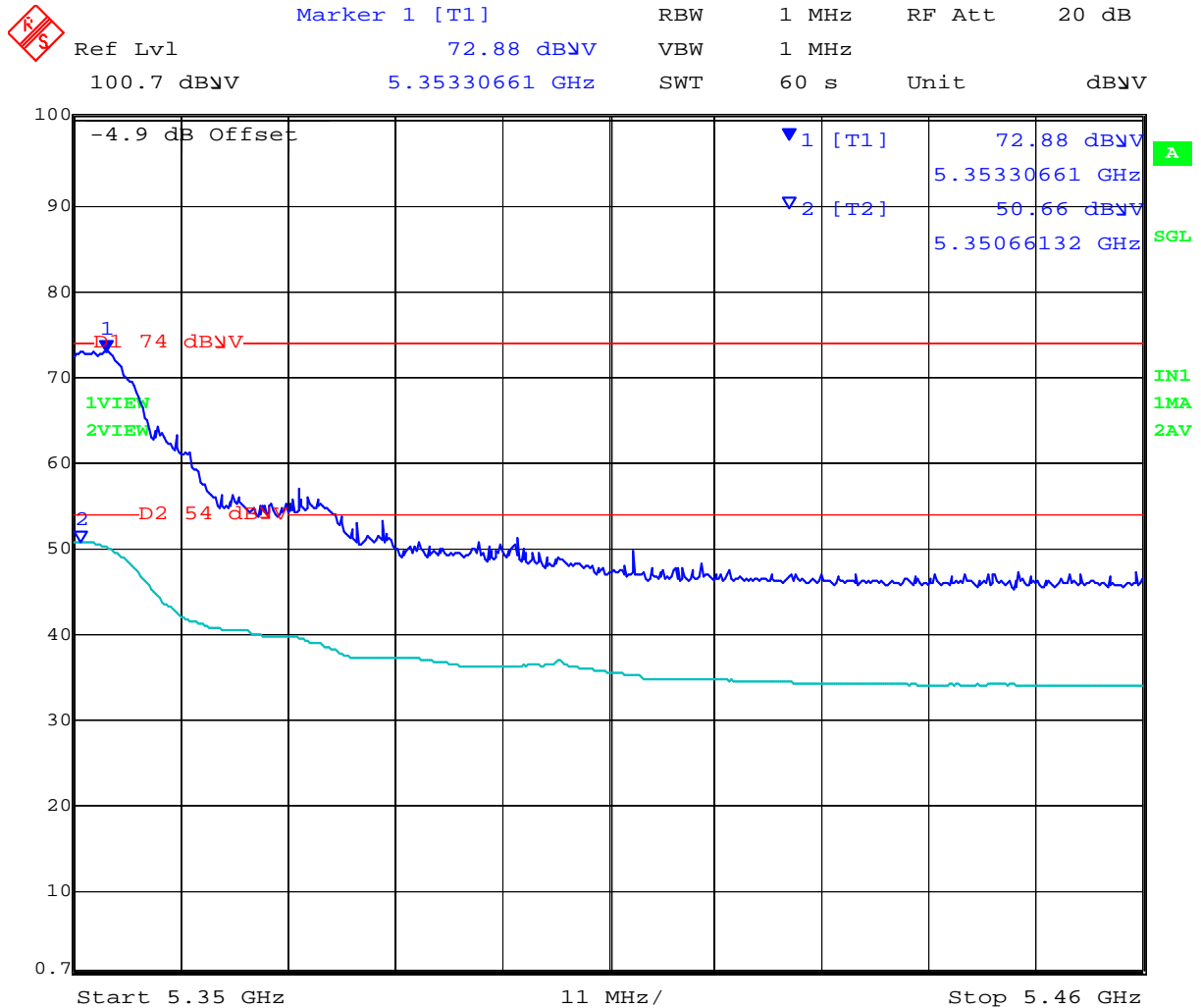
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5292.585	67.7	4.6	-9.6	62.8	Peak [Scan]	H	100	0				FUND
1340.68136	63.1	2.3	-13.9	51.5	Peak [Scan]	V	100	0	54.0	-2.5	Pass	RB

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

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Date: 3.MAY.2012 12:00:02

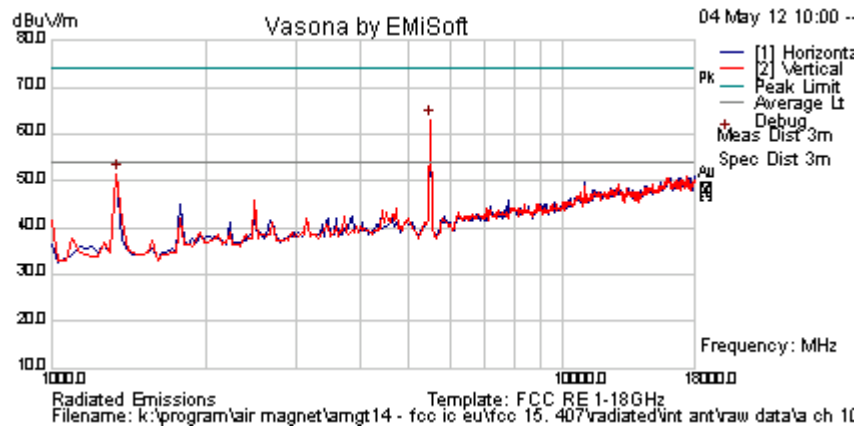
Band-Edge 802.11n HT-40 Channel Frequency 5310 MHz

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Test Freq.	5500 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	Integral	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



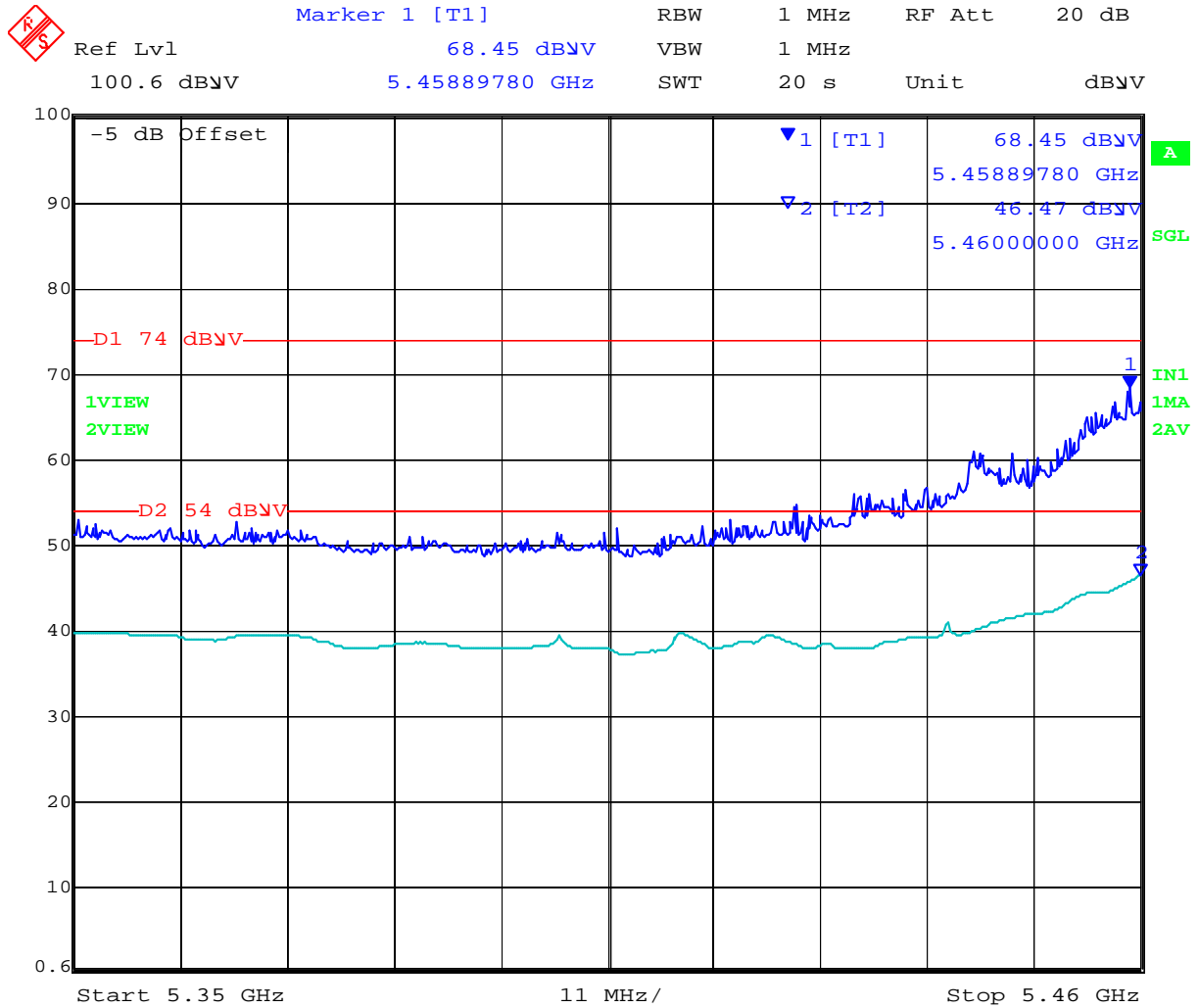
Formally measured emission peaks

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
5496.994	68.1	4.6	-9.6	63.1	Peak [Scan]	V	100	0				FUND
1340.68136	63.2	2.3	-13.9	51.6	Peak [Scan]	H	100	0	54.0	-2.4	Pass	RB
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												

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Date: 3.MAY.2012 12:04:38

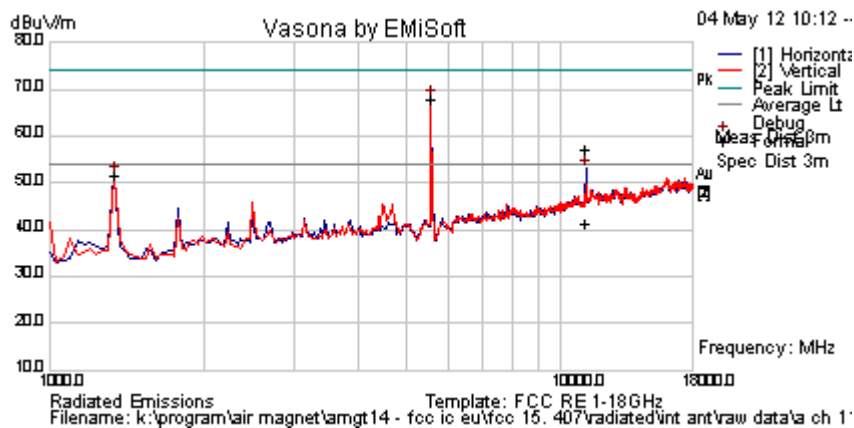
Band-Edge 802.11a Channel Frequency 5500 MHz

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Title: Fluke Networks Sensor4 Wireless Client
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Test Freq.	5580 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
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
11167.375	53.4	6.9	-3.0	57.4	Peak Max	H	144	19	74.0	-16.7	Pass	RB
11167.375	37.2	6.9	-3.0	41.2	Average Max	H	144	19	54.0	-12.8	Pass	RB
5565.130	73.1	4.7	-9.7	68.0	Peak [Scan]	V	100	0				FUND
1340.681	63.3	2.3	-13.9	51.7	Peak [Scan]	H	100	0	54	-2.3	Pass	RB

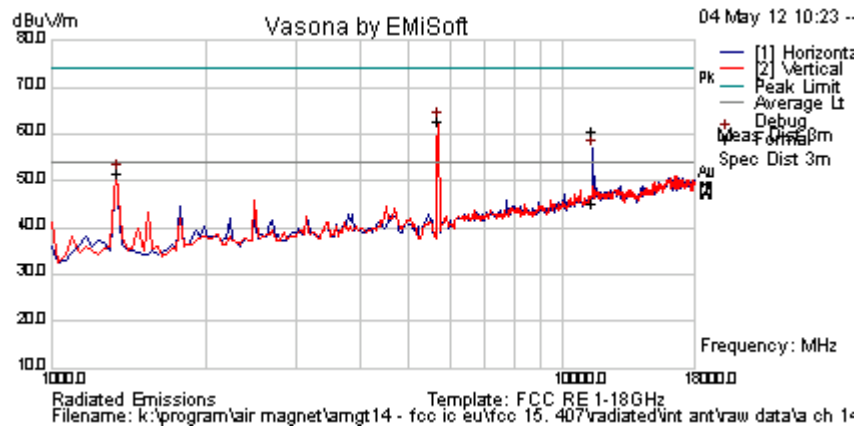
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Title: Fluke Networks Sensor4 Wireless Client
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Test Freq.	5700 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
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
11401.604	56.1	6.8	-2.2	60.7	Peak Max	H	122	1	74.0	-13.3	Pass	RB
11401.604	40.6	6.8	-2.2	45.2	Average Max	H	122	1	54.0	-8.8	Pass	RB
5701.403	67.6	4.7	-9.6	62.7	Peak [Scan]	V	100	0				FUND
1340.681	63.4	2.3	-13.9	51.7	Peak [Scan]	V	100	0	54	-2.3	Pass	RB

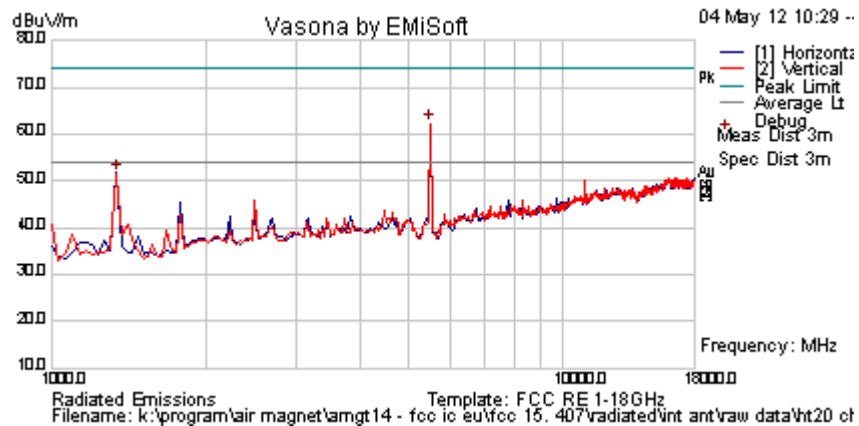
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Title: Fluke Networks Sensor4 Wireless Client
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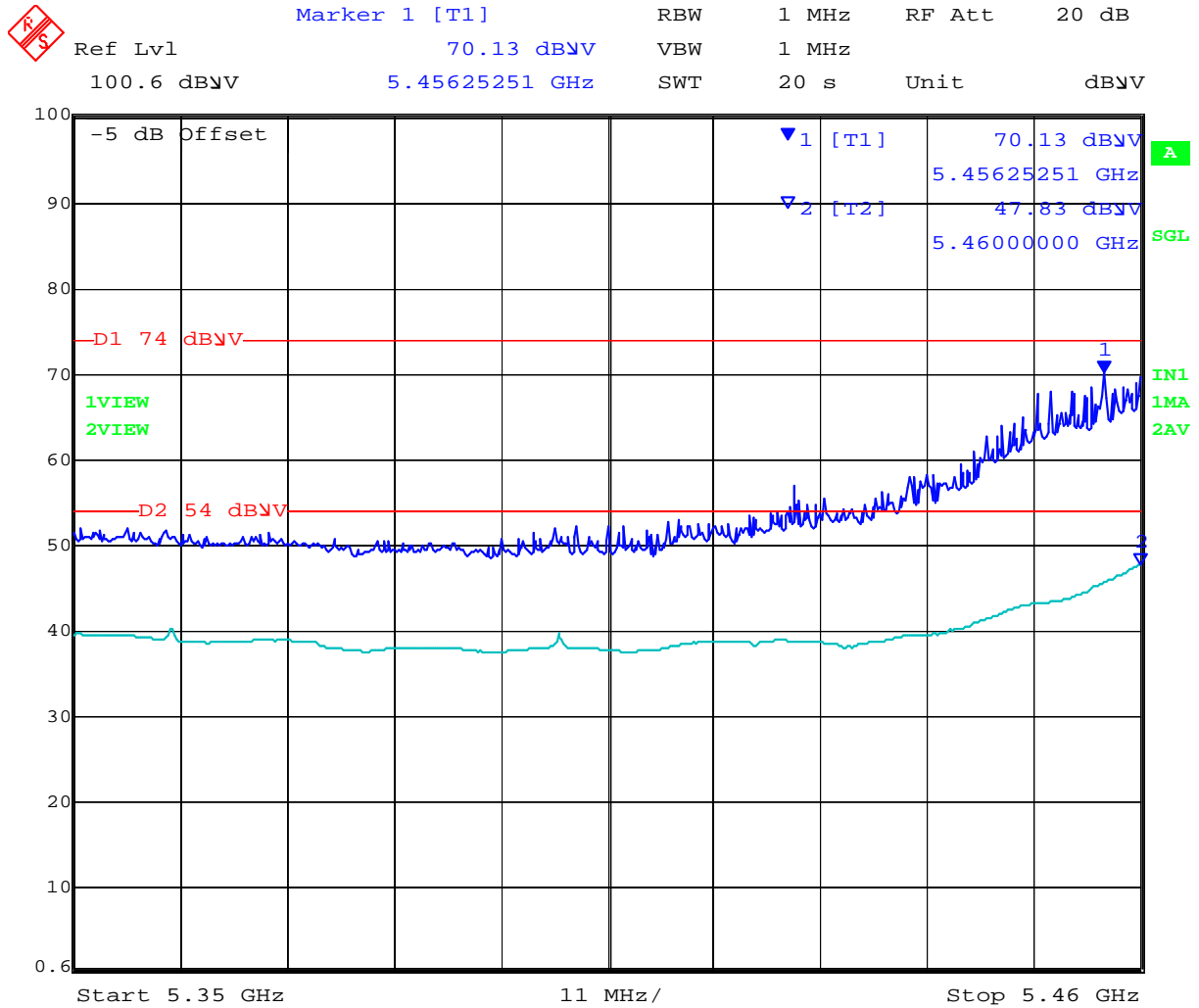
Test Freq.	5500 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	Integral	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



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
5496.994	67.2	4.6	-9.6	62.2	Peak [Scan]	V	100	0				FUND
1340.68136	63.3	2.3	-13.9	51.7	Peak [Scan]	H	100	0	54.0	-2.3	Pass	RB
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												

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Date: 3.MAY.2012 12:07:53

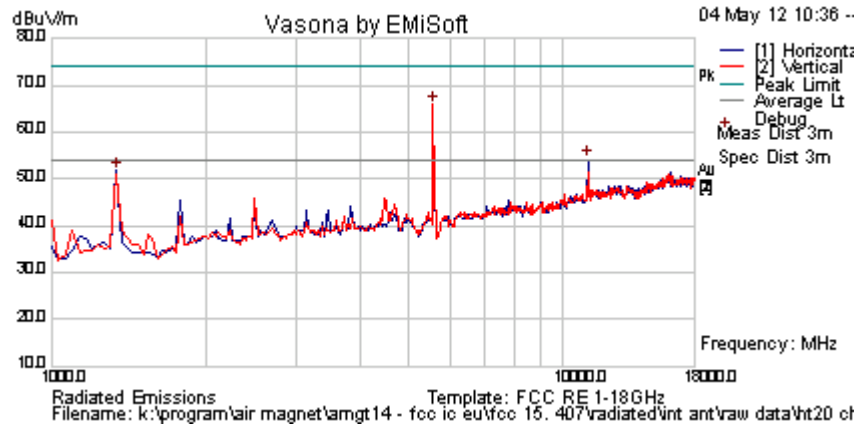
Band-Edge 802.11n HT-20 Channel Frequency 5500 MHz

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Title: Fluke Networks Sensor4 Wireless Client
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Test Freq.	5580 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	Integral	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

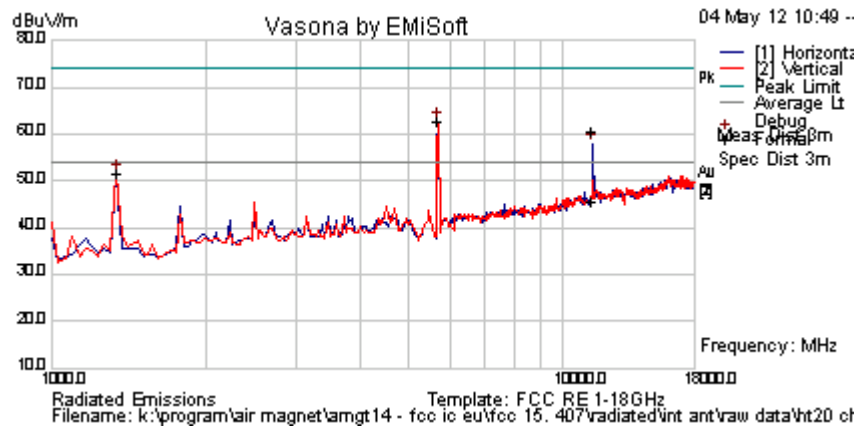
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11152.305	53.4	6.9	-3.0	57.4	Peak Max	H	144	19	74.0	-16.7	Pass	RB
11152.305	37.2	6.9	-3.0	41.2	Average Max	H	144	19	54.0	-12.8	Pass	RB
5565.130	71.0	4.7	-9.7	65.9	Peak [Scan]	V	100	0				FUND
1340.681	63.3	2.3	-13.9	51.7	Peak [Scan]	H	100	0	54.0	-2.3	Pass	RB
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												

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Test Freq.	5700 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
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
11401.123	56.1	6.8	-2.3	60.7	Peak Max	H	111	0	74.0	-13.3	Pass	
11401.123	41.0	6.8	-2.3	45.6	Average Max	H	111	0	54.0	-8.4	Pass	
5701.40281	67.5	4.7	-9.6	62.6	Peak [Scan]	V	100	0				FUND
1340.68136	63.3	2.3	-13.9	51.7	Peak [Scan]	V	100	0	54.0	-2.3	Pass	RB

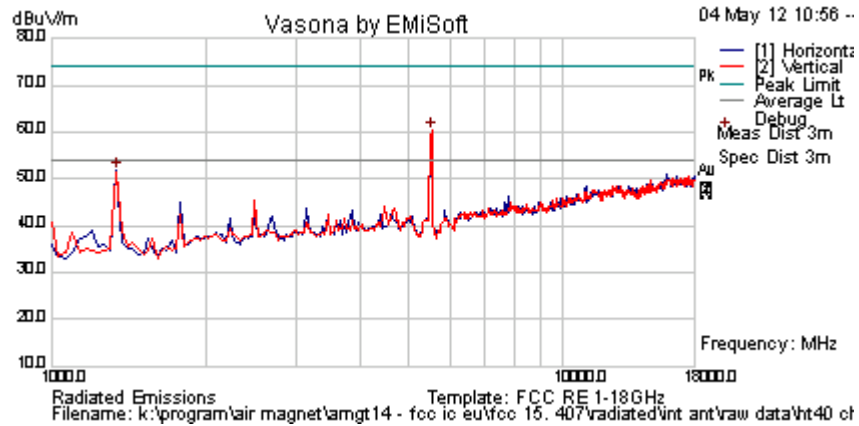
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5510 MHz	Engineer	SB
Variant	802.11n HT-40; 13.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
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
5531.062	65.3	4.6	-9.7	60.2	Peak [Scan]	V	100	0	54.0	6.2	Fail	
1340.68136	63.4	2.3	-13.9	51.8	Peak [Scan]	H	100	0				FUND

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

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Date: 3.MAY.2012 12:15:10

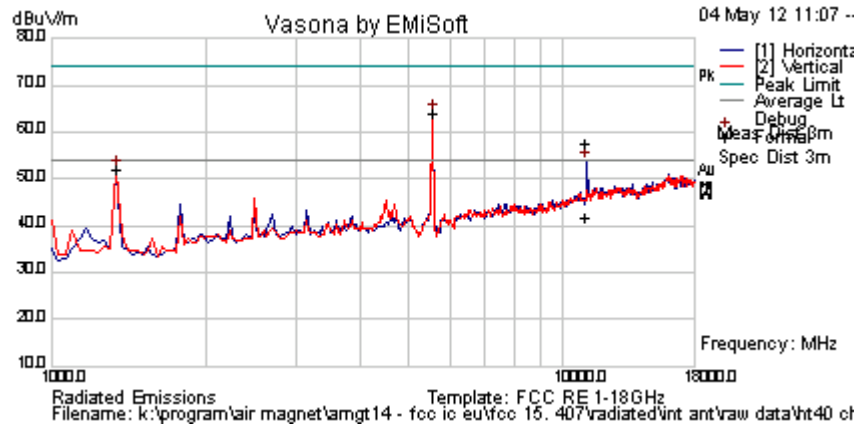
Band-Edge 802.11n HT-40 Channel Frequency 5510 MHz

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Test Freq.	5550 MHz	Engineer	SB
Variant	802.11n HT-40; 13.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
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
11101.402	53.8	6.9	-3.2	57.5	Peak Max	H	109	0	74.0	-16.5	Pass	RB
11101.402	37.9	6.9	-3.2	41.7	Average Max	H	109	0	54.0	-12.3	Pass	RB
5565.130	69.0	4.7	-9.7	64.0	Peak [Scan]	V	100	0				FUND
1340.681	63.6	2.3	-13.9	52.0	Peak [Scan]	V	100	0	54	-2.0	Pass	RB

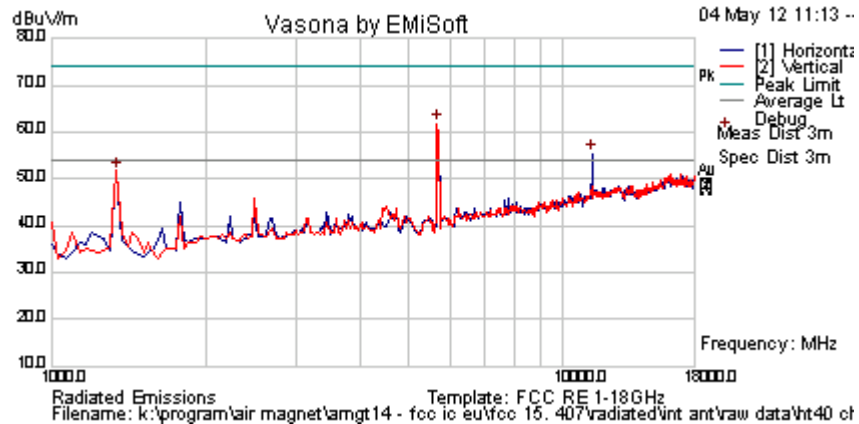
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5670 MHz	Engineer	SB
Variant	802.11n HT-40; 13.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
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
11397.636	55.6	6.8	-2.3	60.2	Peak Max	H	132	0	74.0	-13.8	Pass	RB
1350.060	64.9	2.3	-14.0	53.2	Peak Max	H	98	1	74.0	-20.8	Pass	RB
11397.636	40.9	6.8	-2.3	45.4	Average Max	H	132	0	54.0	-8.6	Pass	RB
1350.06	61.8	2.3	-14.0	50.1	Average Max	H	98	1	54.0	-3.9	Pass	RB
5667.335	65.2	4.7	-9.7	60.2	Peak [Scan]	H	150	0				FUND

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

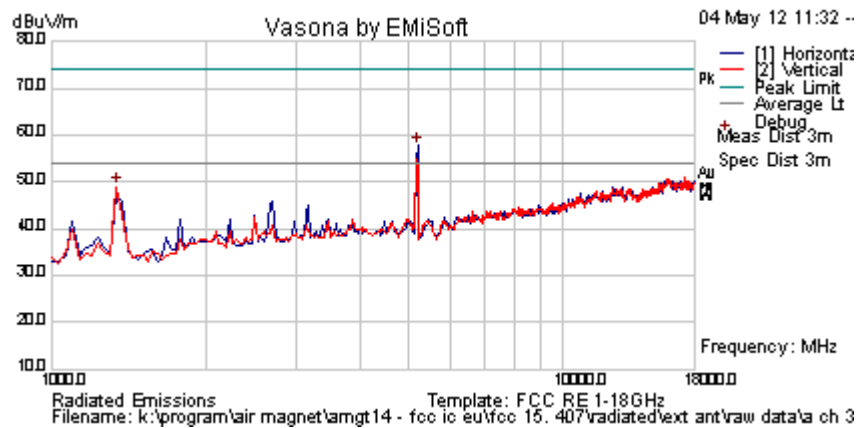
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5.1.7.2. External Antenna

Test Freq.	5180 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	17	Press. (mBars)	993
Antenna	External	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



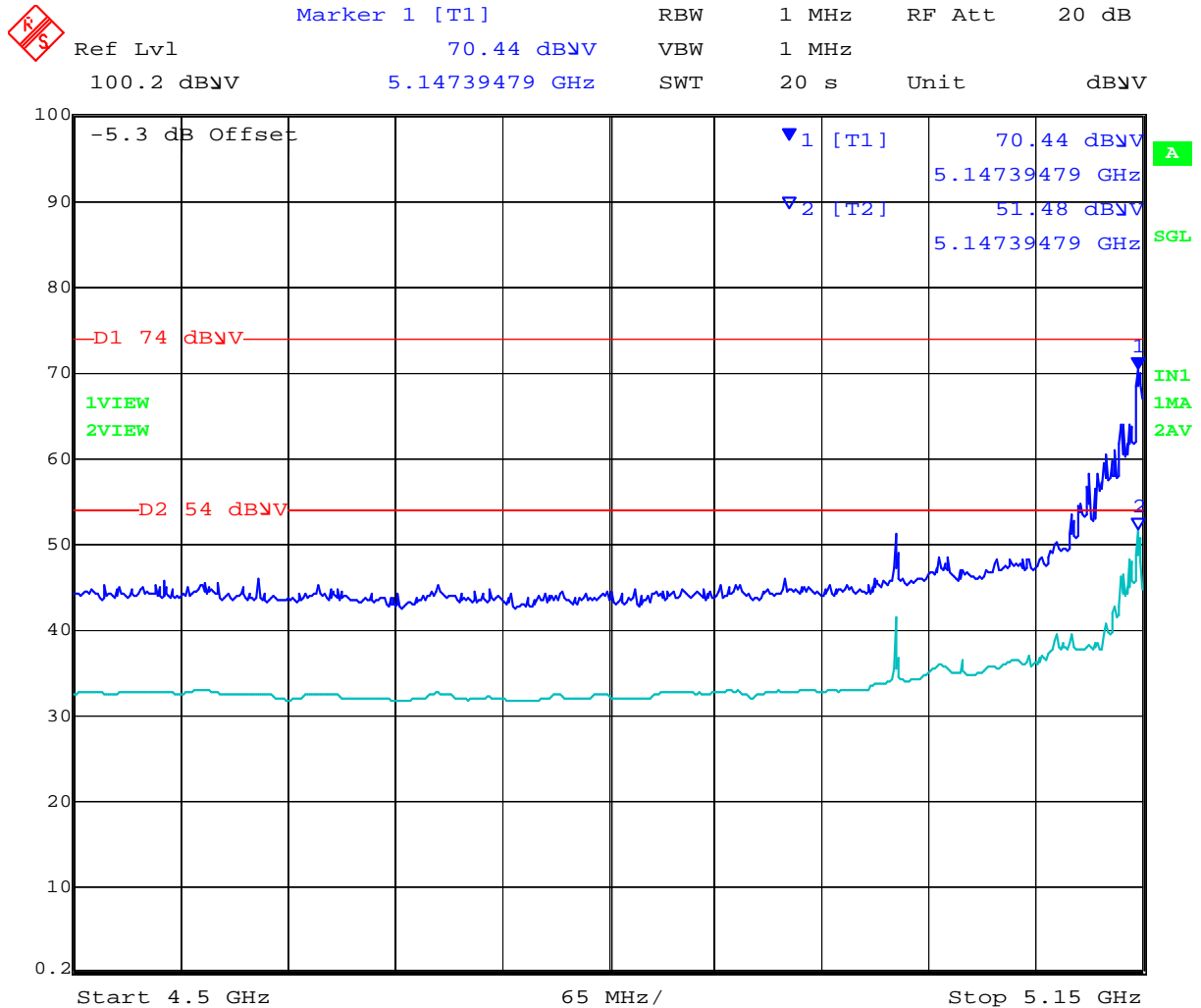
Formally measured emission peaks

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	63.1	4.6	-9.9	57.9	Peak [Scan]	H	100	0				FUND
1340.68136	60.6	2.3	-13.9	49.0	Peak [Scan]	V	100	0	54.0	-5.0	Pass	RB
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												

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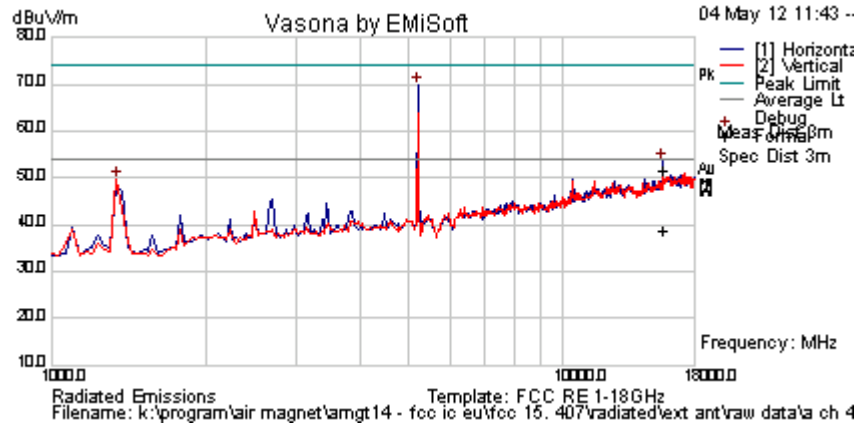
Band-Edge 802.11a Channel Frequency 5180 MHz

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Test Freq.	5200 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	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
15765.611	43.1	8.6	-0.3	51.5	Peak Max	H	113	81	74.0	-22.6	Pass	RB
15765.611	30.4	8.6	-0.3	38.8	Average Max	H	113	81	54.0	-15.2	Pass	RB
5190.381	75.1	4.6	-9.9	69.9	Peak [Scan]	H	100	0				FUND
1340.681	61.2	2.3	-13.9	49.5	Peak [Scan]	V	100	0	54	-4.5	Pass	RB

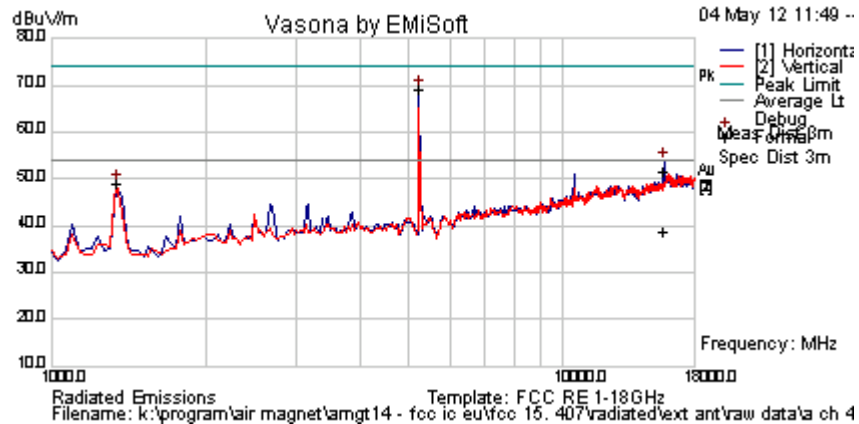
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5240 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

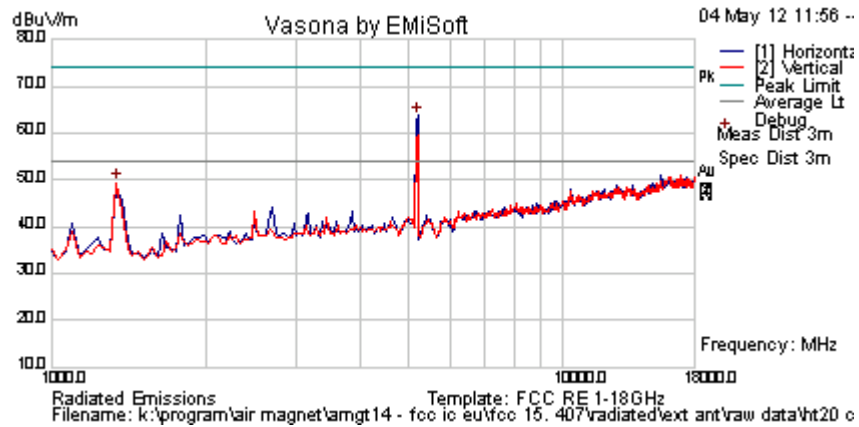
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
15717.448	43.1	8.6	-0.3	51.5	Peak Max	H	113	81	74.0	-22.6	Pass	
15717.448	30.4	8.6	-0.3	38.8	Average Max	H	113	81	54.0	-15.2	Pass	
5224.449	74.4	4.6	-9.8	69.2	Peak [Scan]	H	150	0				FUND
1340.681	60.8	2.3	-13.9	49.2	Peak [Scan]	V	100	0	54	-4.8	Pass	
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												

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Test Freq.	5180 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	17	Press. (mBars)	993
Antenna	External	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

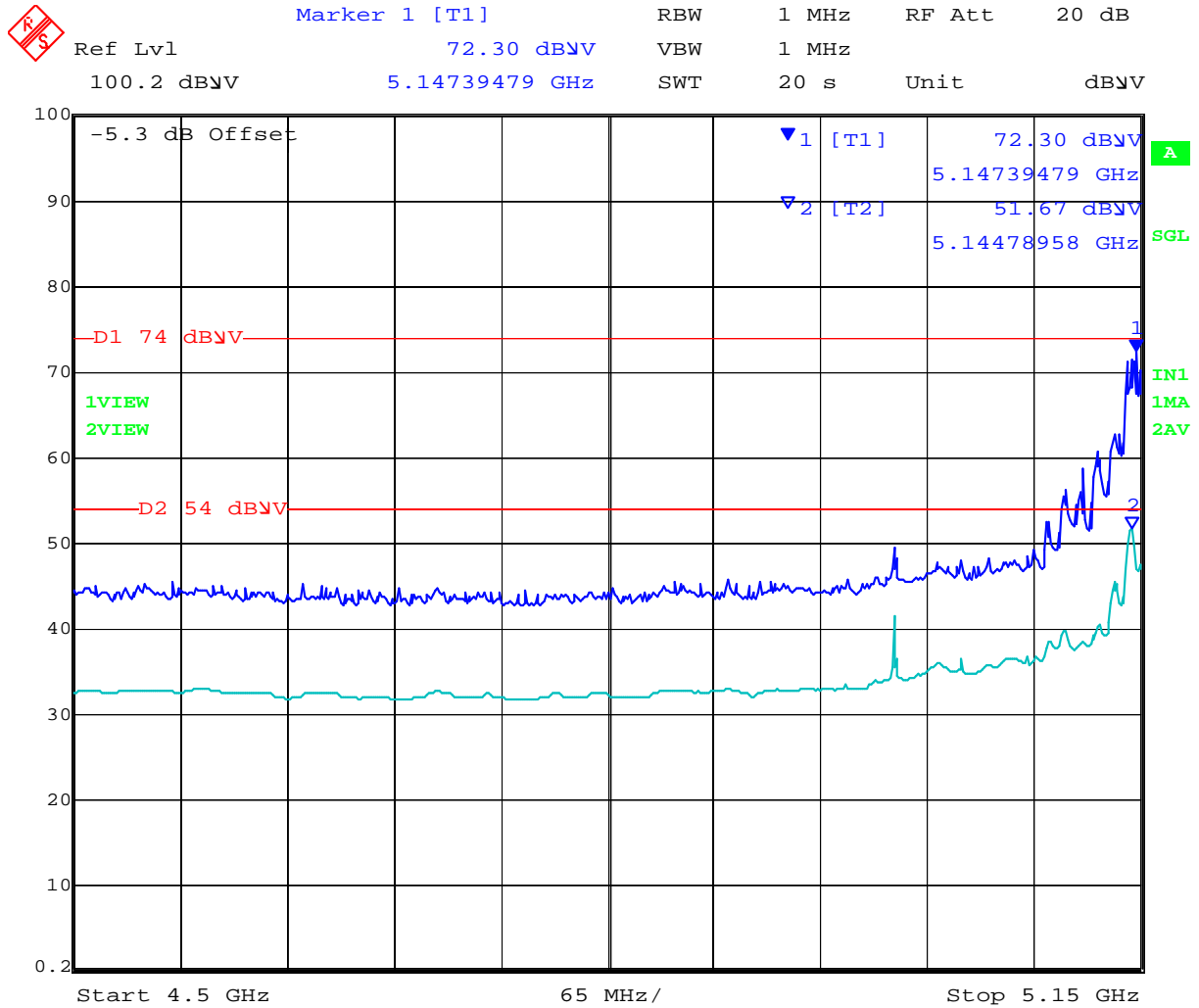
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5190.381	68.9	4.6	-9.9	63.7	Peak [Scan]	H	100	0				FUND
1340.68136	61.0	2.3	-13.9	49.4	Peak [Scan]	V	100	0	54.0	-4.6	Pass	RB

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

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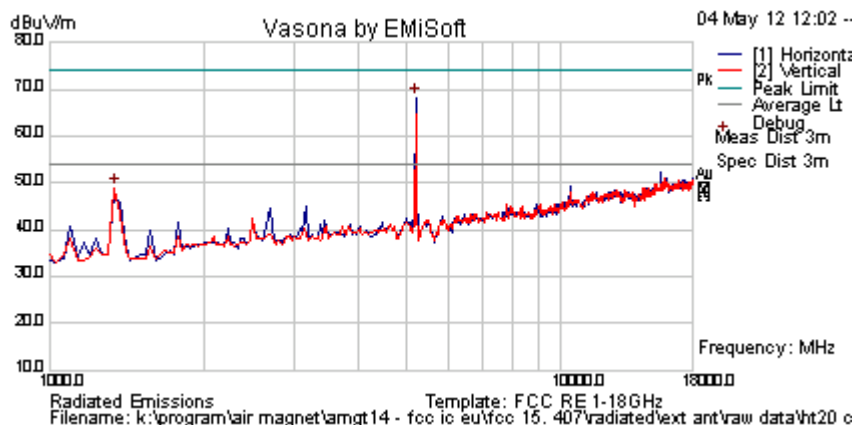
Band-Edge 802.11n HT-20 Channel Frequency 5180 MHz

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Test Freq.	5200 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	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	73.6	4.6	-9.9	68.3	Peak [Scan]	H	100	0				FUND
1340.68136	60.6	2.3	-13.9	49.0	Peak [Scan]	V	100	0	54.0	-5.0	Pass	

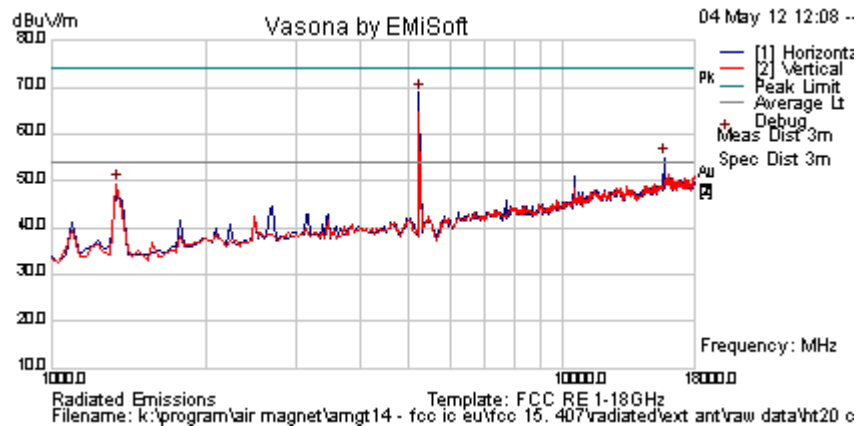
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5240 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	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
15717.435	43.1	8.6	-0.3	51.5	Peak Max	H	113	81	74.0	-22.6	Pass	
15717.435	30.4	8.6	-0.3	38.8	Average Max	H	113	81	54.0	-15.2	Pass	
5224.449	74.2	4.6	-9.8	69.0	Peak [Scan]	H	150	0	54.0	15.0	Fail	
1340.681	61.1	2.3	-13.9	49.4	Peak [Scan]	V	100	0	54	-4.6	Pass	

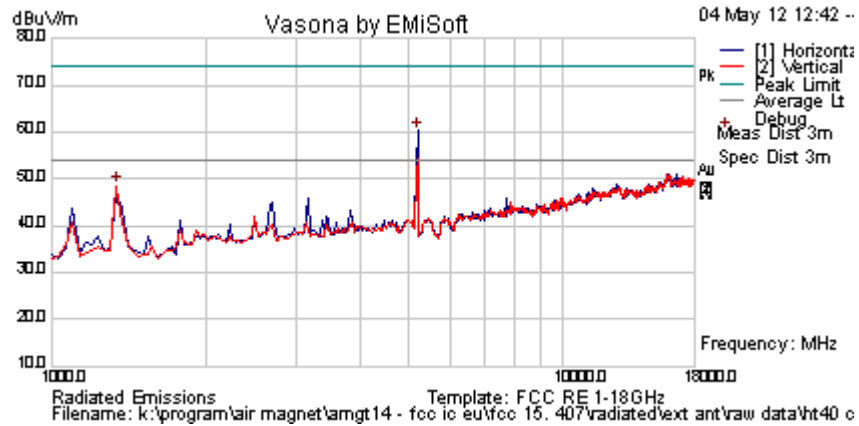
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5190 MHz	Engineer	SB
Variant	802.11n HT-40; 13.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	11	Press. (mBars)	993
Antenna	External	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

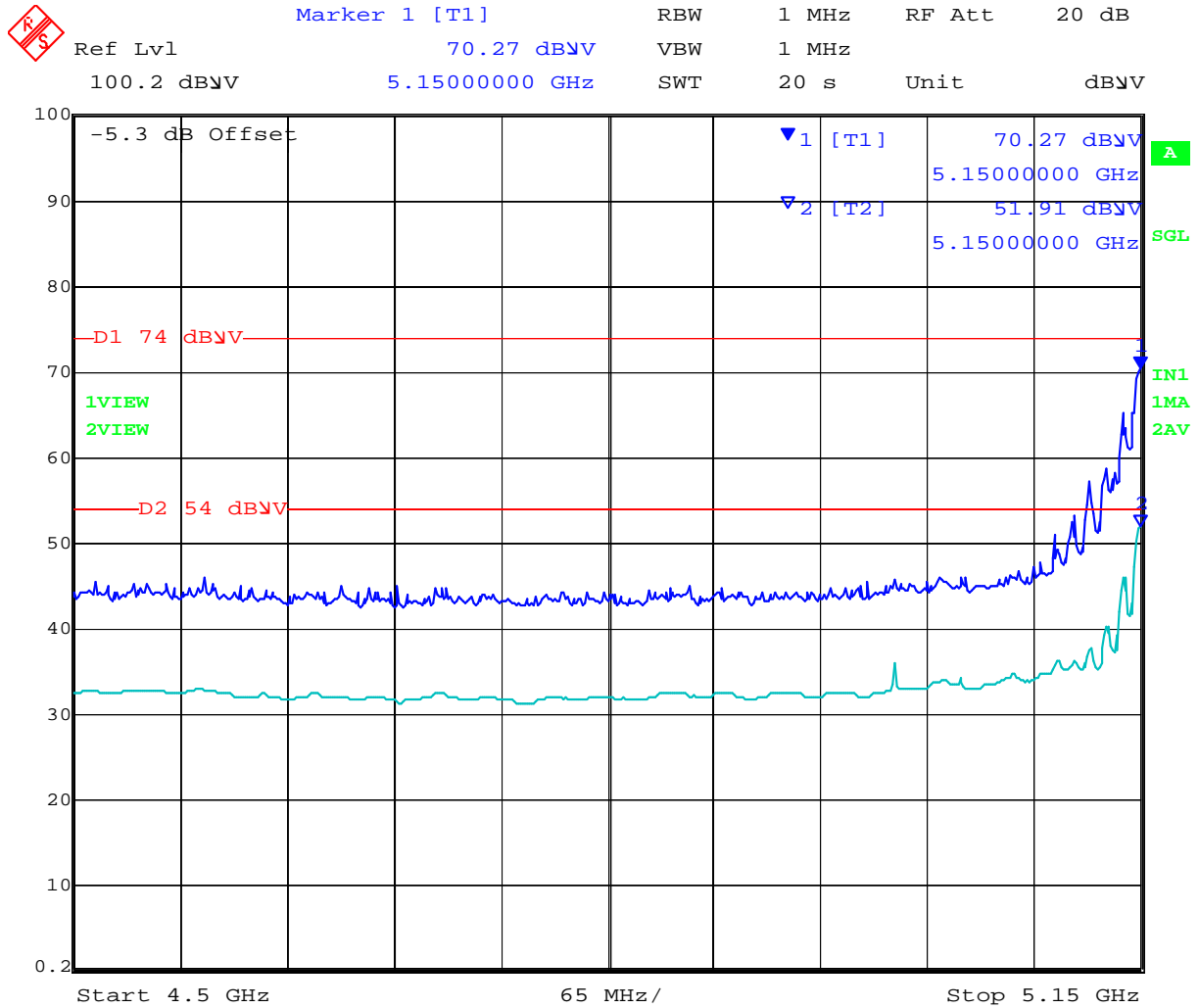
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5190.381	65.5	4.6	-9.9	60.3	Peak [Scan]	H	100	0				FUND
1340.68136	60.2	2.3	-13.9	48.5	Peak [Scan]	V	100	0	54.0	-5.5	Pass	RB

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

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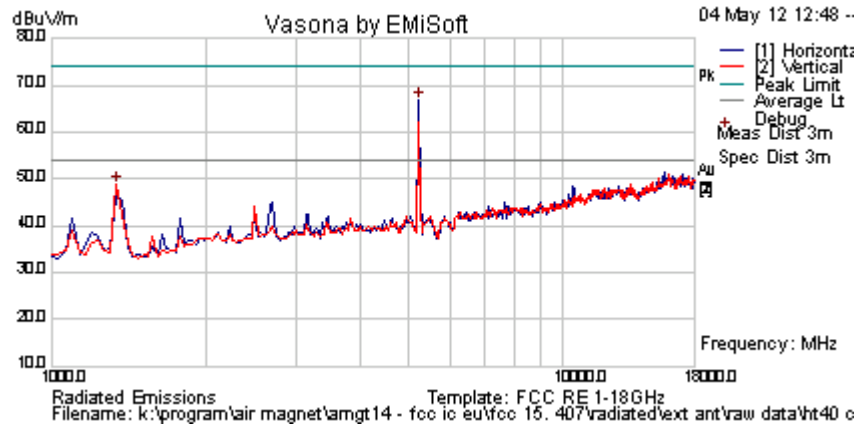
Band-Edge 802.11n HT-40 Channel Frequency 5190 MHz

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Test Freq.	5230 MHz	Engineer	SB
Variant	802.11n HT-40; 13.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	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	72.0	4.6	-9.8	66.8	Peak [Scan]	H	150	0				FUND
1340.68136	60.4	2.3	-13.9	48.8	Peak [Scan]	V	100	0	54.0	-5.2	Pass	RB

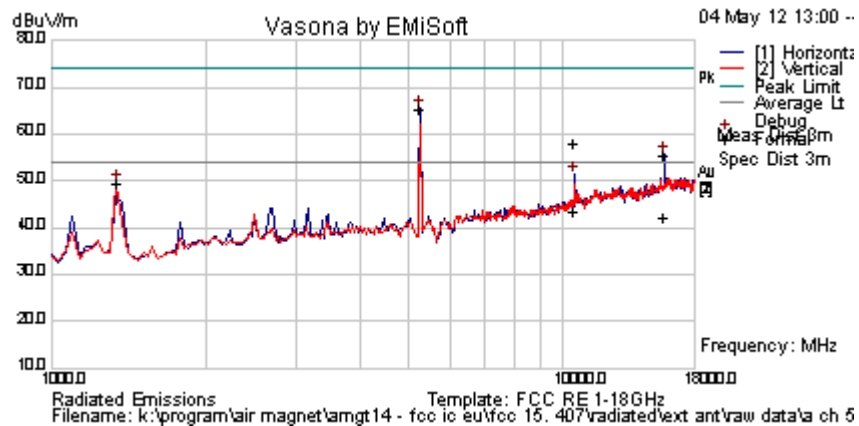
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5260 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	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
15789.258	47.1	8.7	-0.3	55.5	Peak Max	H	109	289	74.0	-18.5	Pass	RB
10524.008	53.8	6.8	-2.4	58.1	Peak Max	H	198	350	74.0	-15.9	Pass	RB
15789.258	33.6	8.7	-0.3	42.0	Average Max	H	109	289	54	-12.0	Pass	RB
10524.008	39.0	6.8	-2.4	43.3	Average Max	H	198	350	54	-10.7	Pass	RB
5258.517	70.6	4.6	-9.7	65.5	Peak [Scan]	H	150	0				FUND
1340.681	61.1	2.3	-13.9	49.5	Peak [Scan]	V	100	0	54	-4.5	Pass	RB

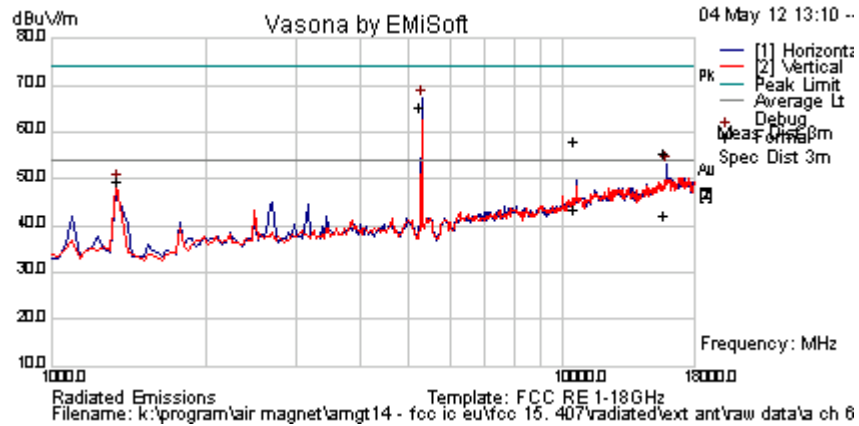
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5300 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	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
15893.989	47.1	8.7	-0.3	55.5	Peak Max	H	109	289	74.0	-18.5	Pass	RB
15893.989	33.6	8.7	-0.3	42.0	Average Max	H	109	289	54	-12.0	Pass	RB
5292.58517	72.2	4.6	-9.6	67.3	Peak [Scan]	H	100	0				FUND
1340.681	60.7	2.3	-13.9	49.1	Peak [Scan]	V	100	0	54	-5.0	Pass	RB

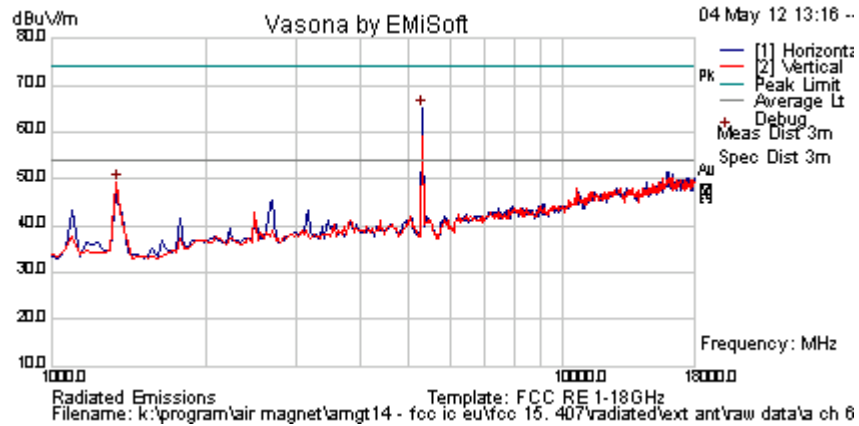
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5320 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	18	Press. (mBars)	993
Antenna	External	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

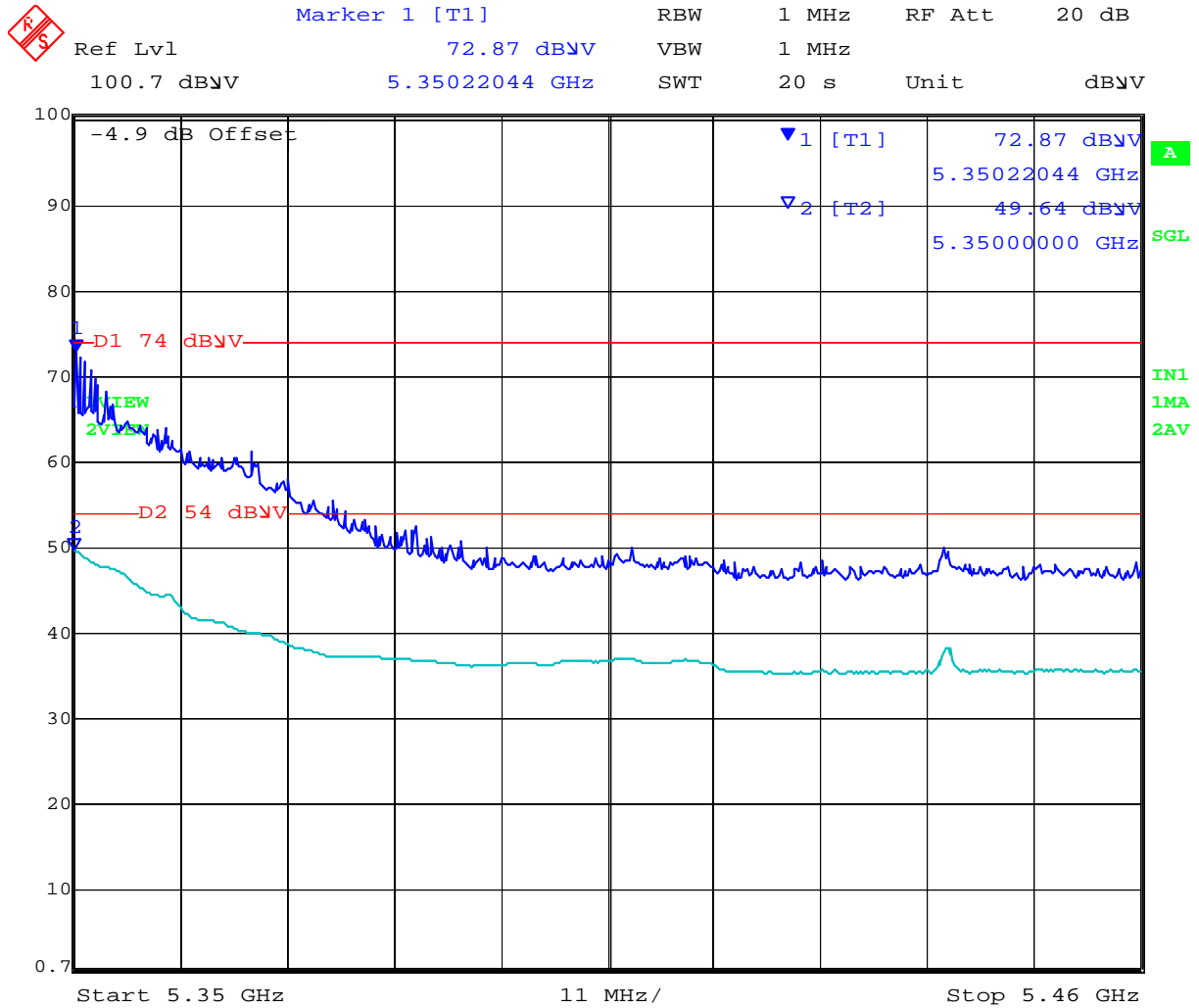
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5292.585	70.0	4.6	-9.6	65.0	Peak [Scan]	H	100	0				FUND
1340.68136	60.9	2.3	-13.9	49.3	Peak [Scan]	V	100	0	54.0	-4.7	Pass	RB

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

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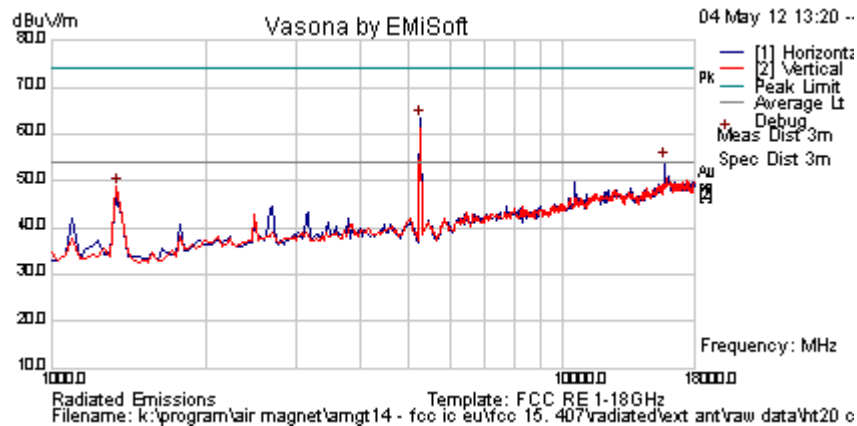
Band-Edge 802.11a Channel Frequency 5320 MHz

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Test Freq.	5260 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

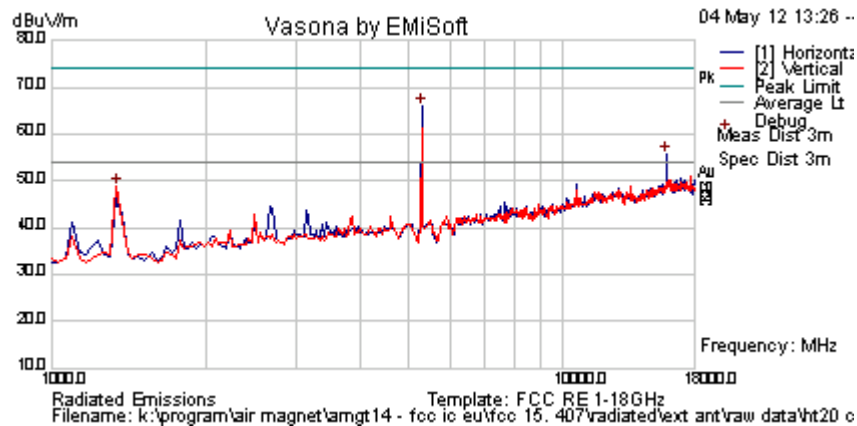
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
15785.571	47.1	8.7	-0.3	55.5	Peak Max	H	109	289	74.0	-18.5	Pass	RB
15785.571	33.6	8.7	-0.3	42.0	Average Max	H	109	289	54	-12.0	Pass	RB
5258.517	68.4	4.6	-9.7	63.3	Peak [Scan]	H	100	0				FUND
1340.681	60.4	2.3	-13.9	48.8	Peak [Scan]	V	100	0	54	-5.2	Pass	RB
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												

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Title: Fluke Networks Sensor4 Wireless Client
To: FCC 47 CFR Part 15.407 & IC RSS-210
Serial #: AMGT14-U2 Rev C
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Test Freq.	5300 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	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
15921.844	47.1	8.7	-0.3	55.5	Peak Max	H	109	289	74.0	-18.5	Pass	RB
15921.844	33.6	8.7	-0.3	42.0	Average Max	H	109	289	54	-12.0	Pass	RB
5292.585	70.9	4.6	-9.6	66.0	Peak [Scan]	H	100	0				FUND
1340.681	60.3	2.3	-13.9	48.7	Peak [Scan]	V	100	0	54	-5.3	Pass	RB

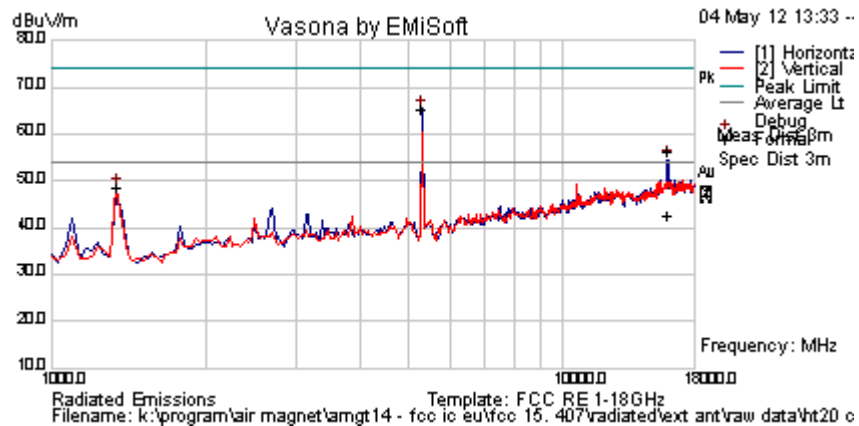
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Title: Fluke Networks Sensor4 Wireless Client
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Test Freq.	5320 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	18	Press. (mBars)	993
Antenna	External	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

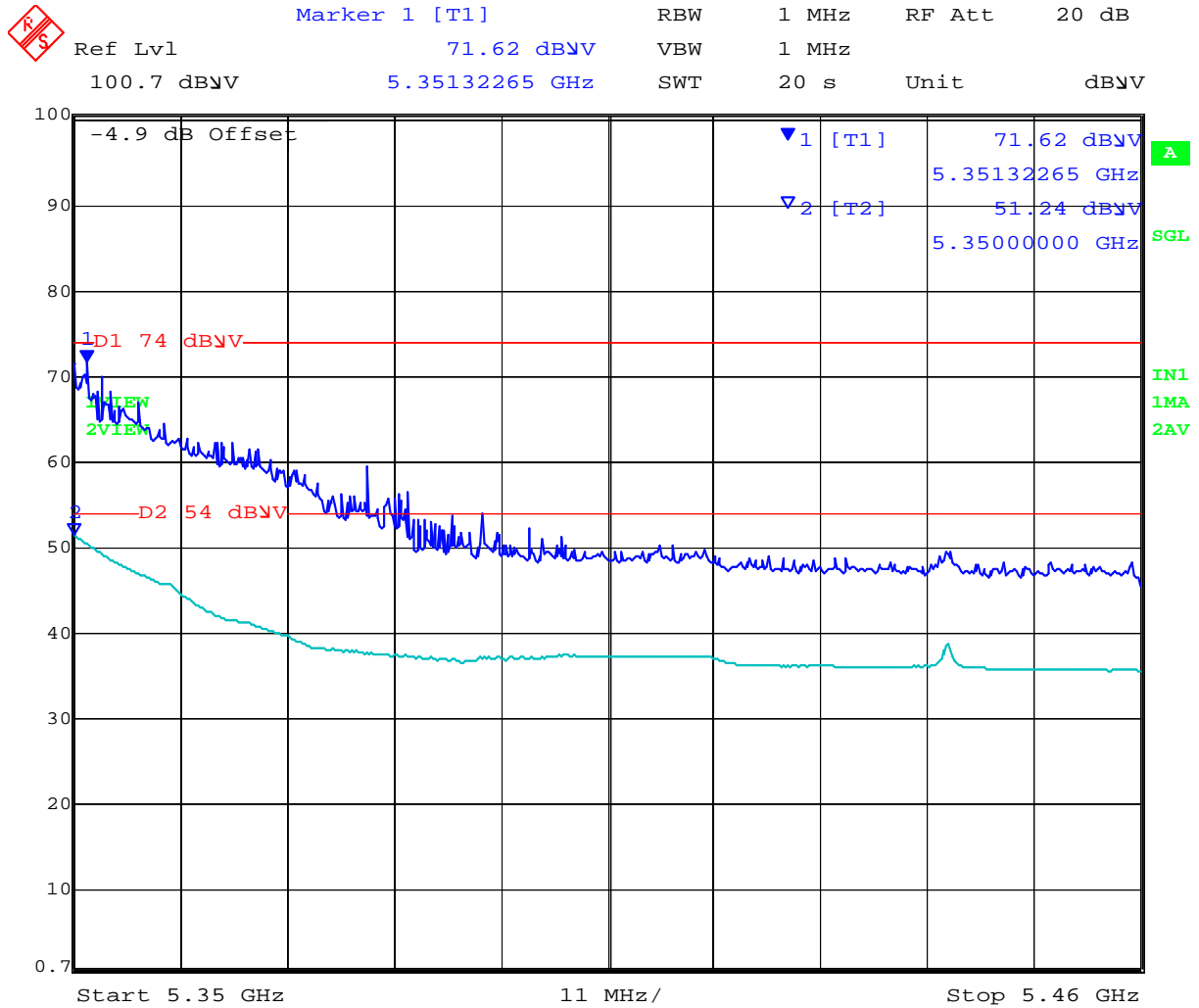
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
15961.283	47.4	9.0	0.0	56.4	Peak Max	H	111	26	74.0	-17.6	Pass	RB
15961.283	33.8	9.0	0.0	42.7	Average Max	H	111	26	54.0	-11.3	Pass	RB
5292.585	70.4	4.6	-9.6	65.5	Peak [Scan]	H	100	0				FUND
1340.681	60.3	2.3	-13.9	48.7	Peak [Scan]	V	100	0	54	-5.3	Pass	RB

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

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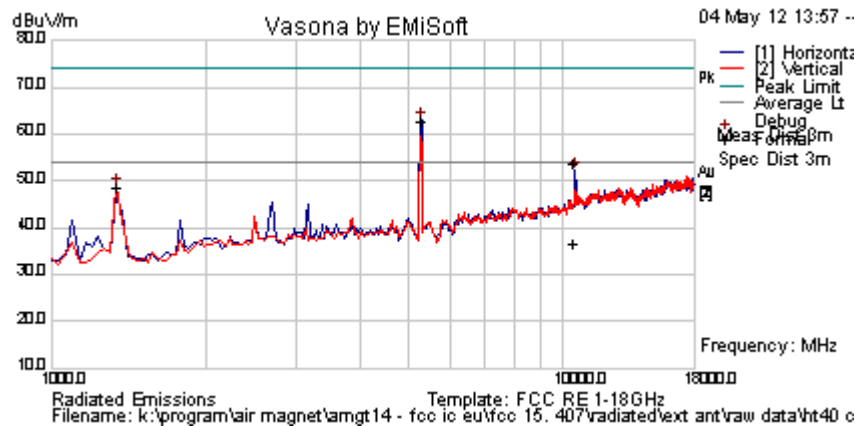
Band-Edge 802.11n HT-20 Channel Frequency 5320 MHz

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Test Freq.	5270 MHz	Engineer	SB
Variant	802.11n HT-40; 13.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	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
10534.308	49.2	6.8	-2.5	53.6	Peak Max	H	178	344	74.0	-20.4	Pass	RB
10534.308	32.3	6.8	-2.5	36.6	Average Max	H	178	344	54.0	-17.4	Pass	RB
5292.585	67.8	4.6	-9.6	62.8	Peak [Scan]	H	100	0				FUND
1340.681	60.3	2.3	-13.9	48.7	Peak [Scan]	V	100	0	54	-5.4	Pass	RB

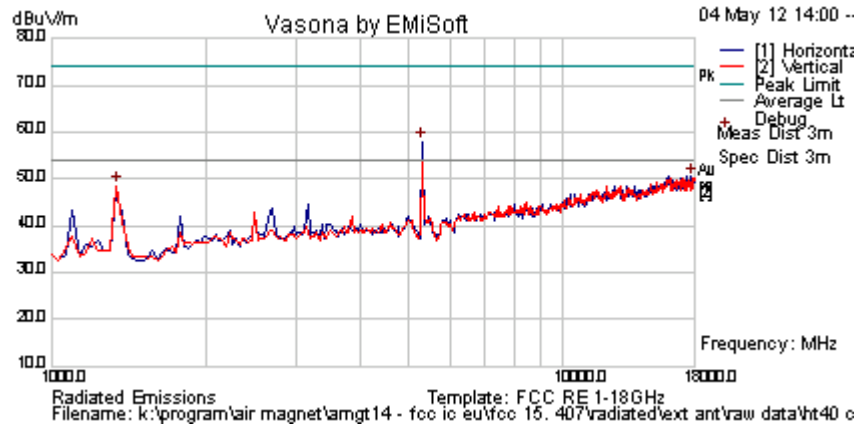
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5310 MHz	Engineer	SB
Variant	802.11n HT-40; 13.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

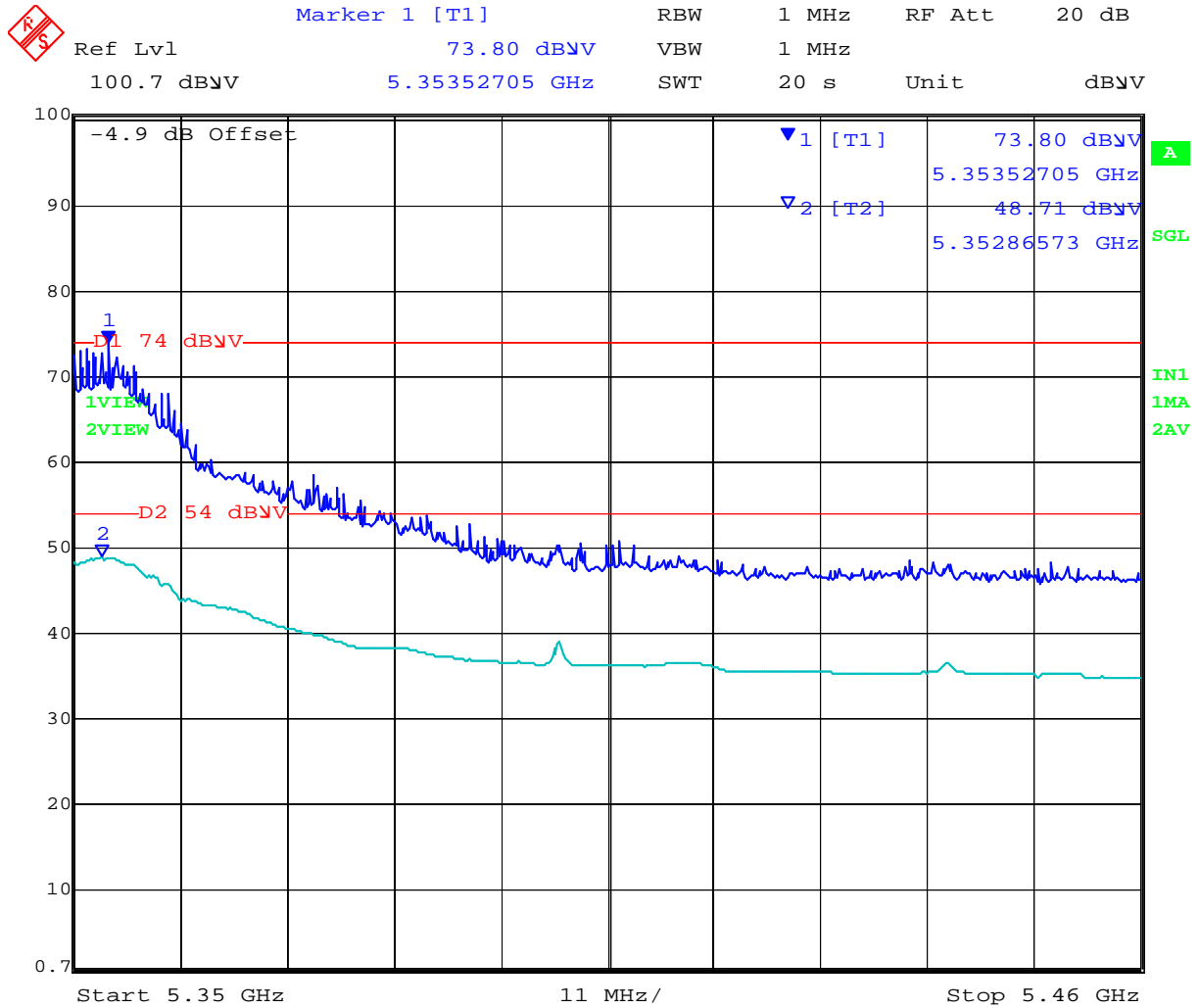
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5292.585	62.9	4.6	-9.6	58.0	Peak [Scan]	H	100	0				FUND
1340.68136	60.3	2.3	-13.9	48.6	Peak [Scan]	V	100	0	54.0	-5.4	Pass	RB

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

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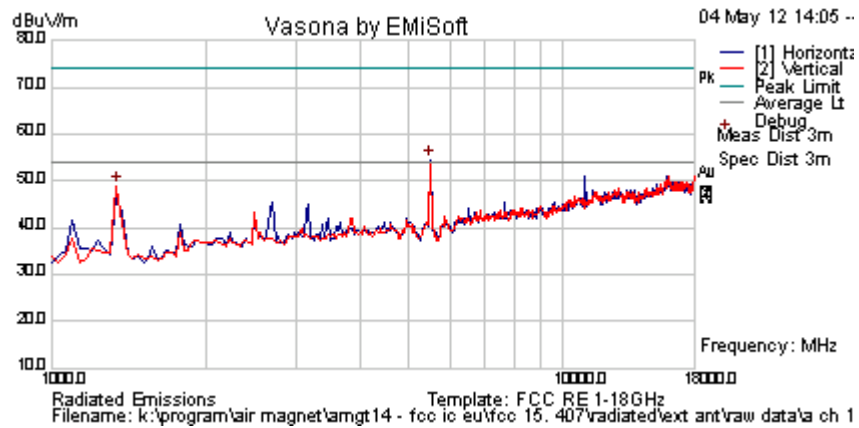
Band-Edge 802.11n HT-40 Channel Frequency 5310 MHz

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Test Freq.	5500 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



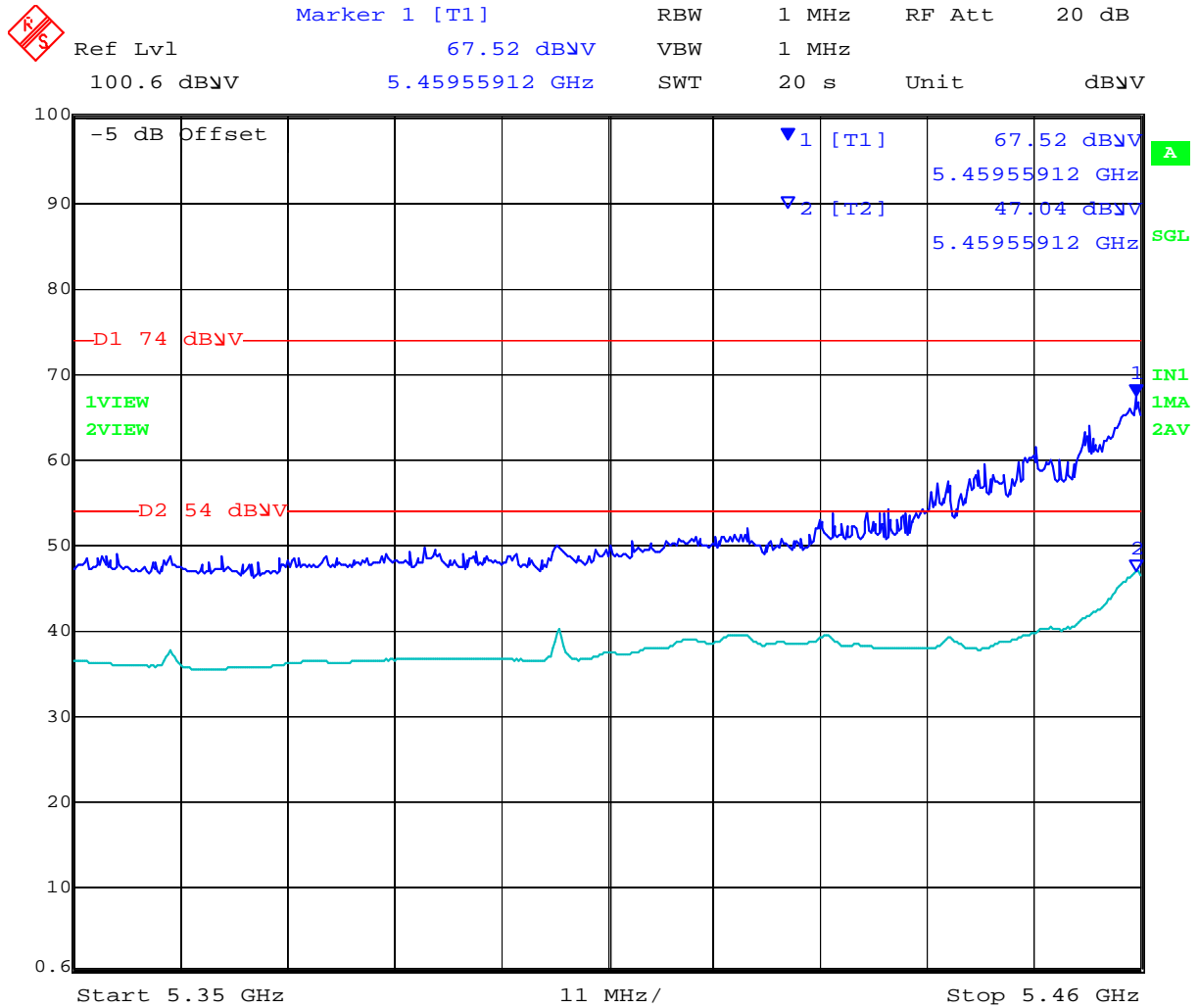
Formally measured emission peaks

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
5496.994	59.5	4.6	-9.6	54.5	Peak [Scan]	H	100	0				FUND
1340.68136	60.7	2.3	-13.9	49.1	Peak [Scan]	V	100	0	54.0	-5.0	Pass	RB
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												

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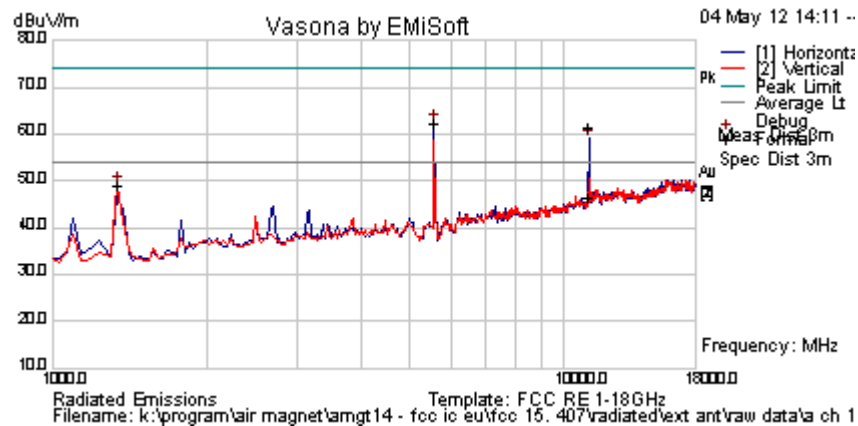
Band-Edge 802.11a Channel Frequency 5500 MHz

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Test Freq.	5580 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	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
11171.383	57.6	6.9	-2.9	61.6	Peak Max	H	112	350	74.0	-12.4	Pass	RB
11171.383	42.5	6.9	-2.9	46.5	Average Max	H	112	350	54.0	-7.5	Pass	RB
5565.130	67.5	4.7	-9.7	62.4	Peak [Scan]	H	100	0				FUND
1340.681	60.8	2.3	-13.9	49.2	Peak [Scan]	V	100	0	54	-4.8	Pass	RB

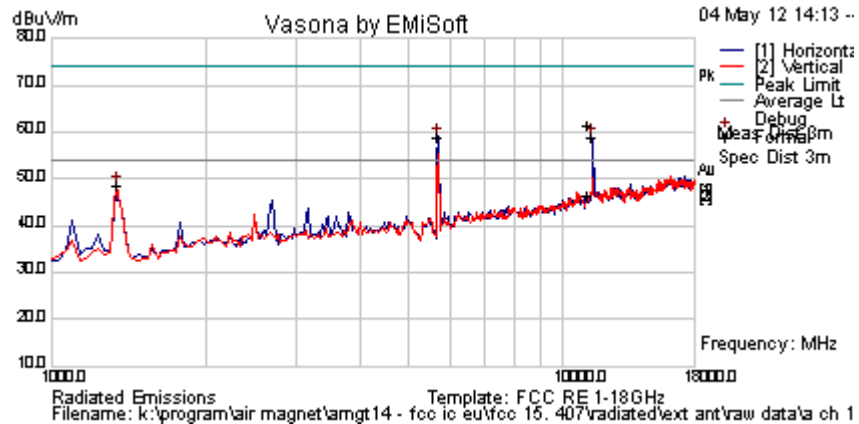
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5700 MHz	Engineer	SB
Variant	802.11a; 6 Mbs	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	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
11390.782	59.0	6.9	-2.9	63.0	Peak Max	H	112	350	74.0	-11.0	Pass	
11390.782	43.3	6.9	-2.9	47.3	Average Max	H	112	350	54.0	-6.7	Pass	
5701.403	63.8	4.7	-9.6	59.0	Peak [Scan]	H	100	0				FUND
1340.681	60.3	2.3	-13.9	48.7	Peak [Scan]	V	100	0	54	-5.3	Pass	

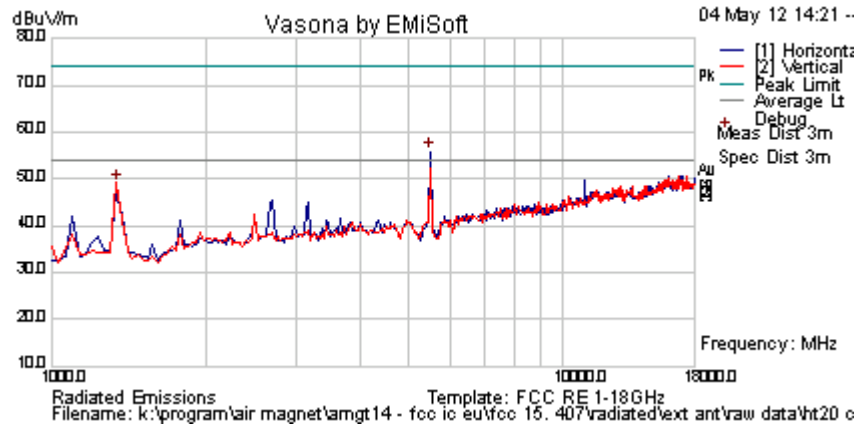
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5500 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			



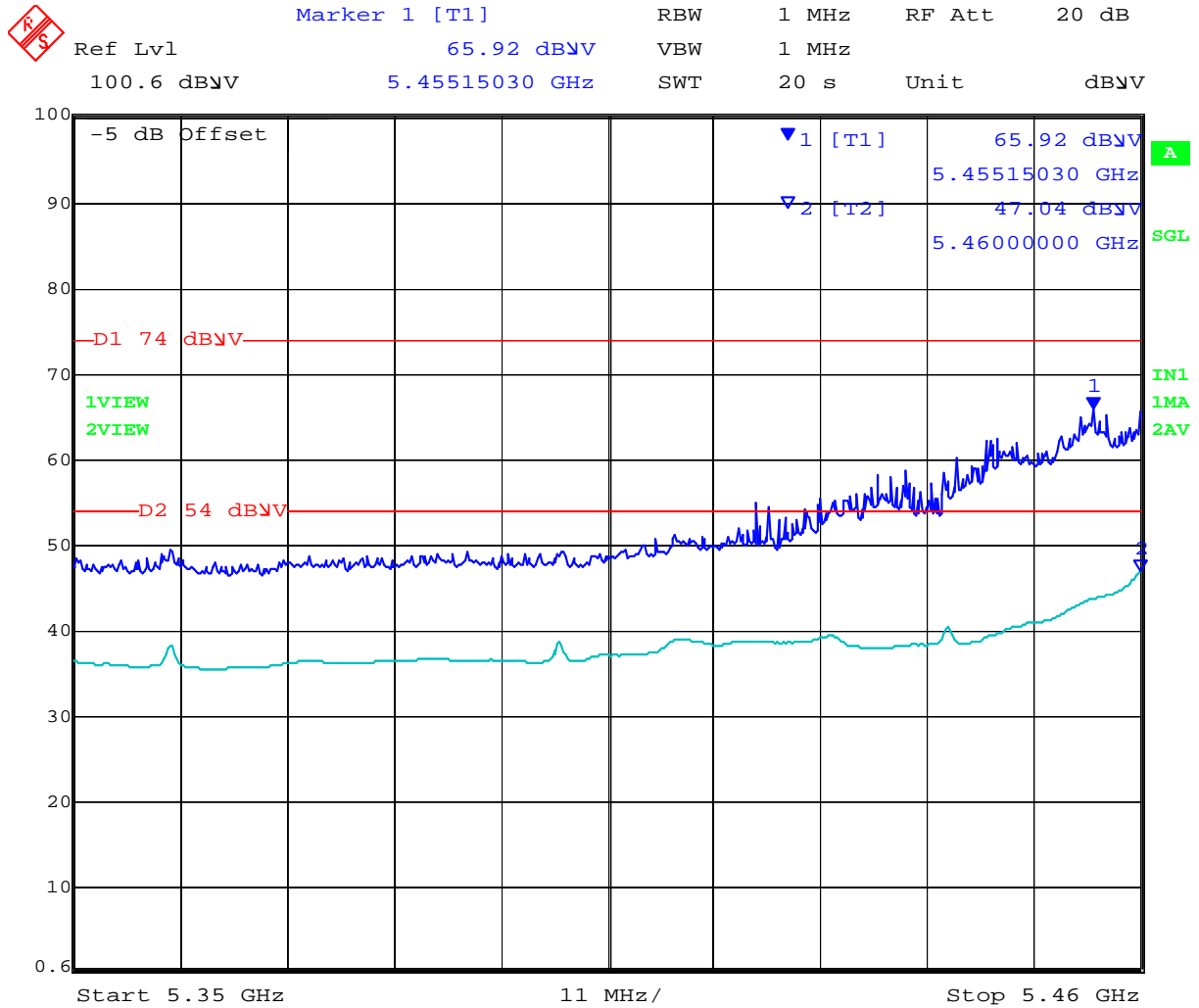
Formally measured emission peaks

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
5496.994	60.8	4.6	-9.6	55.9	Peak [Scan]	H	100	0				FUND
1340.68136	60.9	2.3	-13.9	49.3	Peak [Scan]	V	100	0	54.0	-4.7	Pass	RB
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												

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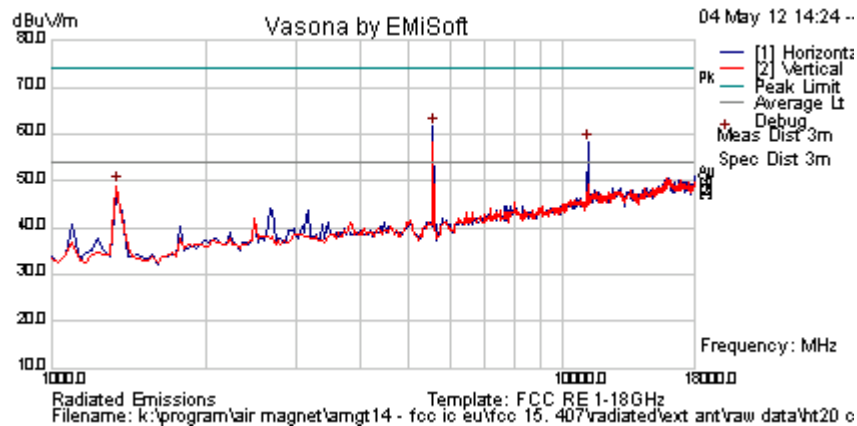
Band-Edge HT-20 Channel Frequency 5500 MHz

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Test Freq.	5580 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	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
11152.305	61.3	6.9	-2.9	65.3	Peak Max	H	112	350	74.0	-8.7	Pass	RB
11152.305	46.3	6.9	-2.9	50.3	Average Max	H	112	350	54.0	-3.7	Pass	RB
5565.130	66.7	4.7	-9.7	61.7	Peak [Scan]	H	100	0				FUND
1340.681	60.7	2.3	-13.9	49.0	Peak [Scan]	V	100	0	54	-5.0	Pass	RB

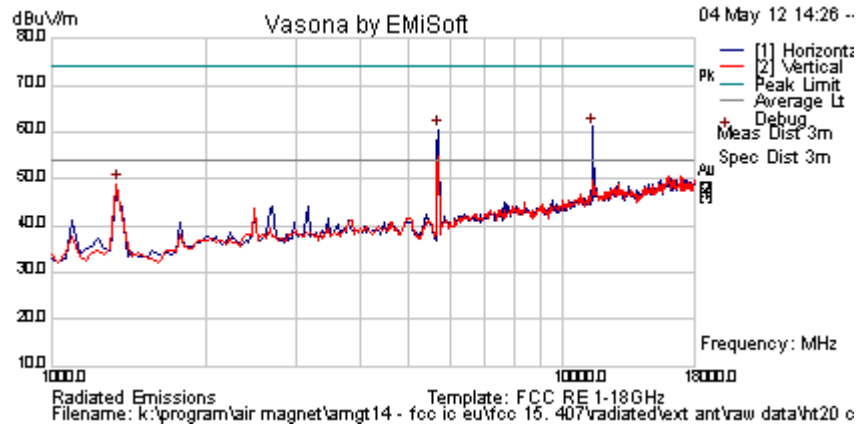
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5700 MHz	Engineer	SB
Variant	802.11n HT-20; 6.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	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
11390.782	56.9	6.9	-2.9	60.9	Peak Max	H	112	350	74.0	-13.1	Pass	RB
11390.782	44.8	6.9	-2.9	48.8	Average Max	H	112	350	54.0	-5.2	Pass	RB
5701.40281	65.4	4.7	-9.6	60.5	Peak [Scan]	H	100	0				FUND
1340.681	60.7	2.3	-13.9	49.1	Peak [Scan]	V	100	0	54	-5.0	Pass	RB

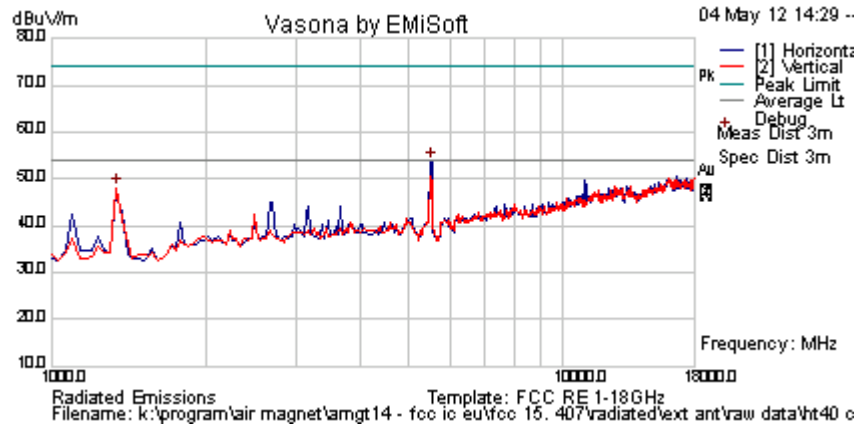
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5510 MHz	Engineer	SB
Variant	802.11n HT-40; 13.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	Duty Cycle (%)	100
Test Notes 1			
Test Notes 2			

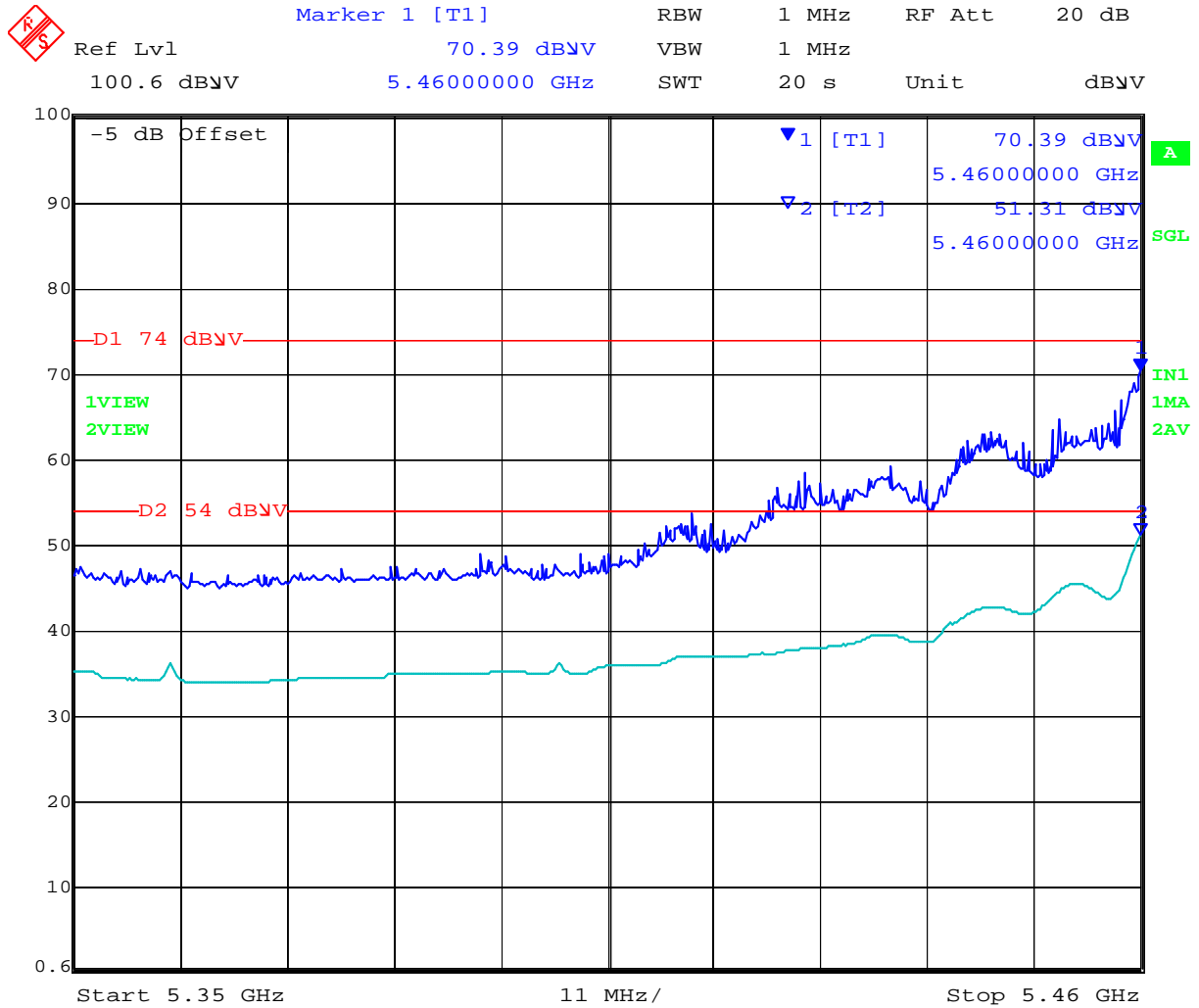


Formally measured emission peaks

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
5531.062	58.8	4.6	-9.7	53.8	Peak [Scan]	H	100	0	54.0	-0.2	Pass	FUND
1340.68136	59.8	2.3	-13.9	48.1	Peak [Scan]	V	100	0	54.0	-5.9	Pass	RB

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

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Date: 26.MAR.2012 17:01:40

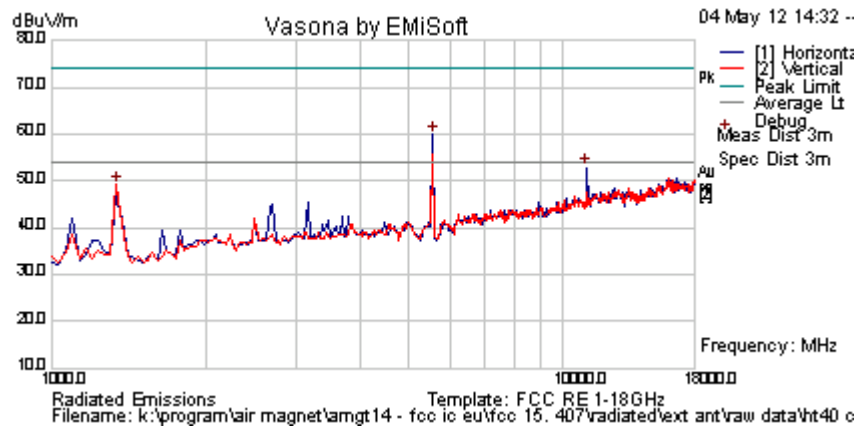
Band-Edge HT-40 Channel Frequency 5510 MHz

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Test Freq.	5550 MHz	Engineer	SB
Variant	802.11n HT-40; 13.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	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
11118.236	50.0	6.9	-2.9	54.0	Peak Max	H	112	350	74.0	-20.0	Pass	RB
11118.236	41.3	6.9	-2.9	45.3	Average Max	H	112	350	54.0	-8.7	Pass	RB
5565.13	64.9	4.7	-9.7	59.9	Peak [Scan]	H	100	0				FUND
1340.68136	59.8	2.3	-13.9	48.1	Peak [Scan]	V	100	0	54.0	-5.9	Pass	RB

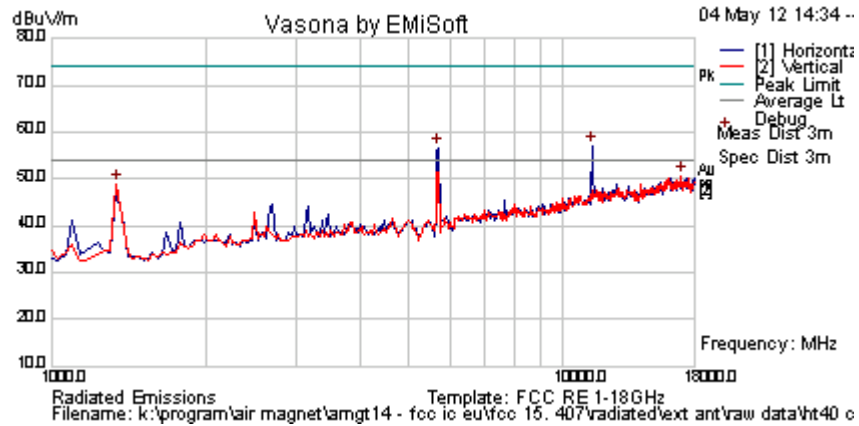
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
 NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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Test Freq.	5670 MHz	Engineer	SB
Variant	802.11n HT-40; 13.5 MCS	Temp (°C)	21
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	993
Antenna	External	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
11356.713	55.7	6.9	-2.9	59.7	Peak Max	H	112	350	74.0	-14.4	Pass	RB
11356.713	46.0	6.9	-2.9	50.0	Average Max	H	112	350	54.0	-4.0	Pass	RB
5701.40281	61.5	4.7	-9.6	56.7	Peak [Scan]	H	100	0				FUND
1340.681	60.6	2.3	-13.9	49.0	Peak [Scan]	V	100	0	54	-5.0	Pass	RB

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

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5.1.7.3. Radiated Spurious Emissions – 30MHz – 1000MHz

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 51.5dB μ V; 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:

$$FS = 51.5 + 8.5 + 1.3 - 26.0 + 1 = 36.3\text{dB}\mu\text{V/m}$$

Conversion between dB μ V/m (or dB μ V) and μ V/m (or μ V) are done as:

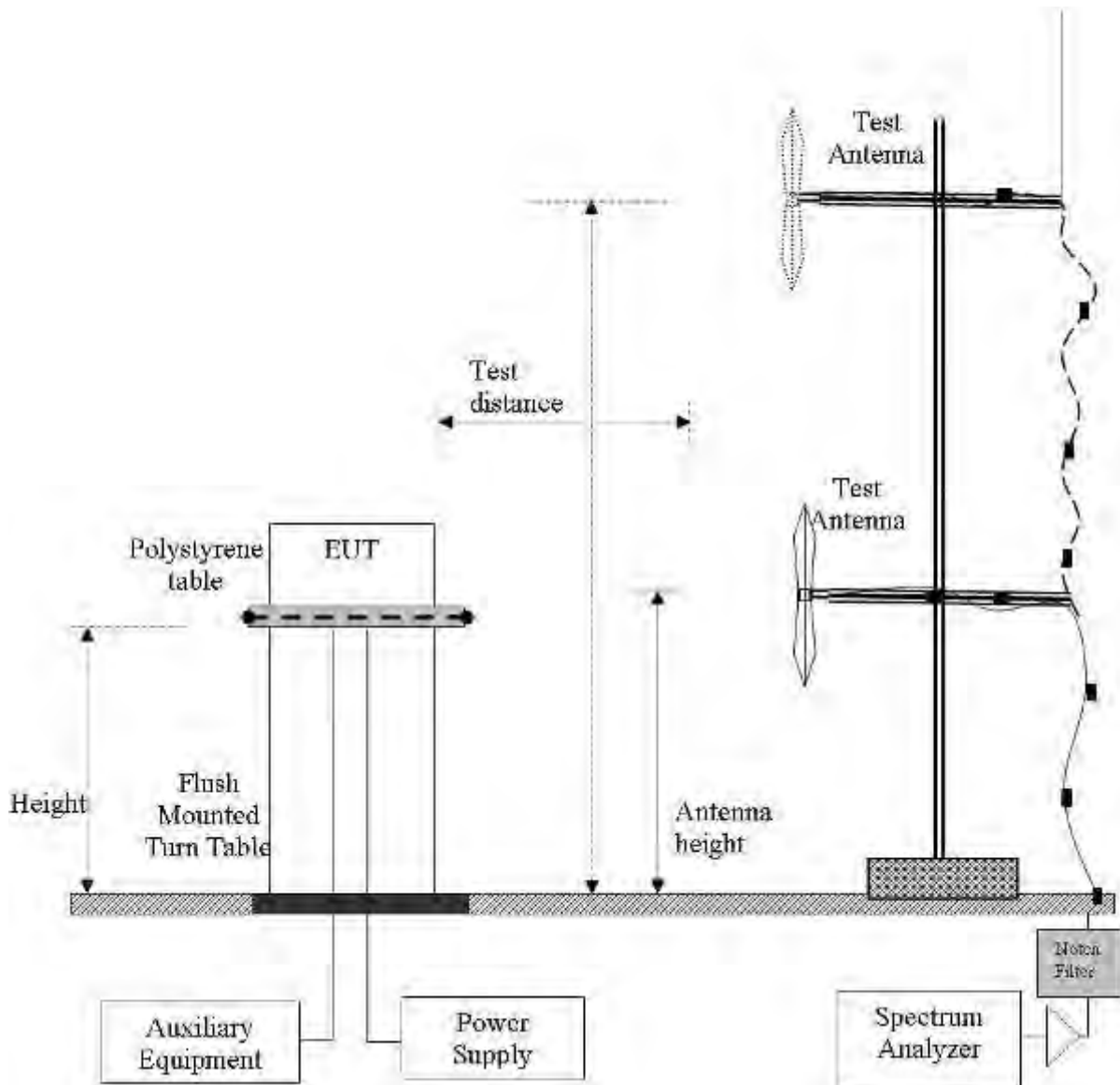
$$\text{Level (dB}\mu\text{V/m)} = 20 * \text{Log (level (\mu\text{V/m}))}$$

$$40 \text{ dB}\mu\text{V/m} = 100\mu\text{V/m}$$

$$48 \text{ dB}\mu\text{V/m} = 250\mu\text{V/m}$$

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Radiated Emission Measurement Setup – Below 1 GHz



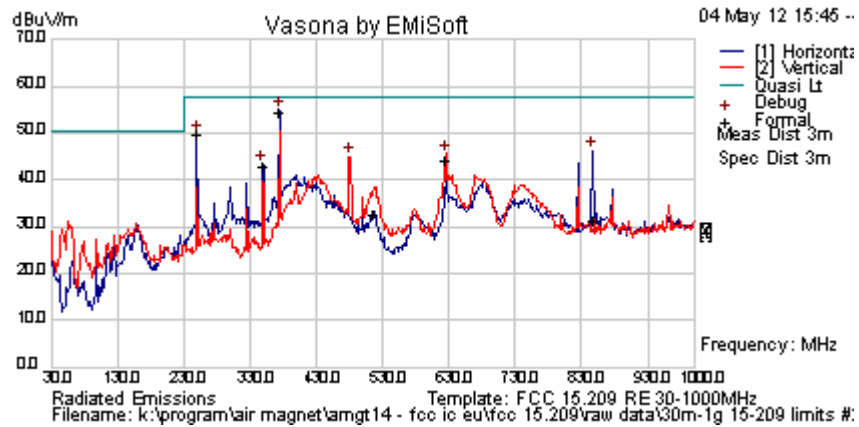
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Ferrites clamped-on antenna cables

Test Freq.	2437 MHz	Engineer	SB
Variant	Digital Emissions	Temp (°C)	19.5
Freq. Range	30 MHz - 1000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	1004
Antenna	external ant		
Test Notes 1			
Test Notes 2	ac/dc adaptor 110Vac 60 Hz		



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
375.020	64.5	5.4	-15.4	54.5	Quasi Max	H	208	184	57.5	-3.0	Pass	
249.984	64.0	4.9	-19.0	49.8	Quasi Max	H	104	167	57.5	-7.7	Pass	
850.080	32.8	7.0	-8.3	31.5	Quasi Max	H	251	273	57.5	-26.1	Pass	
624.985	49.1	6.3	-11.0	44.4	Quasi Max	V	187	342	57.5	-13.1	Pass	
516.381	39.6	5.9	-12.7	32.8	Quasi Max	V	155	159	57.5	-24.7	Pass	
350.016	53.3	5.3	-15.7	42.8	Quasi Max	H	98	187	57.5	-14.7	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

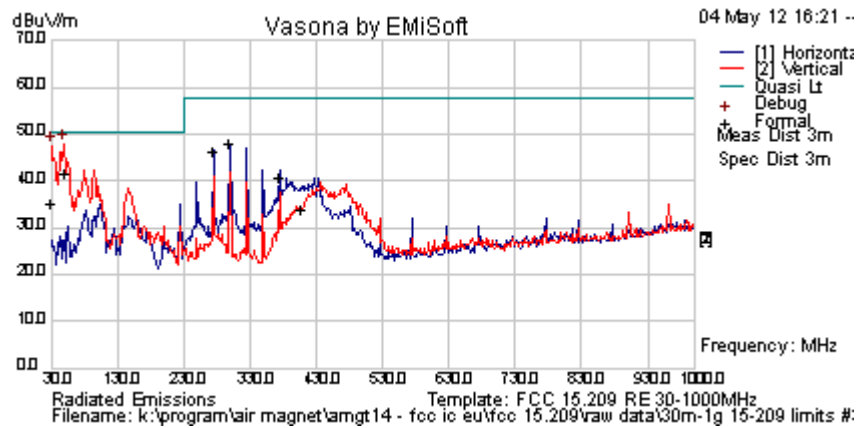
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Ferrites clamped-on antenna cables

Test Freq.	2437 MHz	Engineer	SB
Variant	Digital Emissions	Temp (°C)	19.5
Freq. Range	30 MHz - 1000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	1004
Antenna	external ant		
Test Notes 1			
Test Notes 2	POE 110Vac 60 Hz		



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
49.816	61.1	3.7	-23.1	41.7	Quasi Max	V	139	184	50.5	-8.8	Pass	
30.001	41.5	3.5	-9.7	35.3	Quasi Max	V	132	201	50.5	-15.2	Pass	
299.982	59.9	5.1	-17.2	47.8	Quasi Max	H	103	29	57.5	-9.7	Pass	
274.980	58.8	5.0	-17.4	46.4	Quasi Max	H	101	3	57.5	-11.1	Pass	
374.979	50.6	5.4	-15.4	40.6	Quasi Max	H	212	3	57.5	-16.9	Pass	
409.043	42.9	5.5	-14.5	33.9	Quasi Max	H	223	178	57.5	-23.6	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

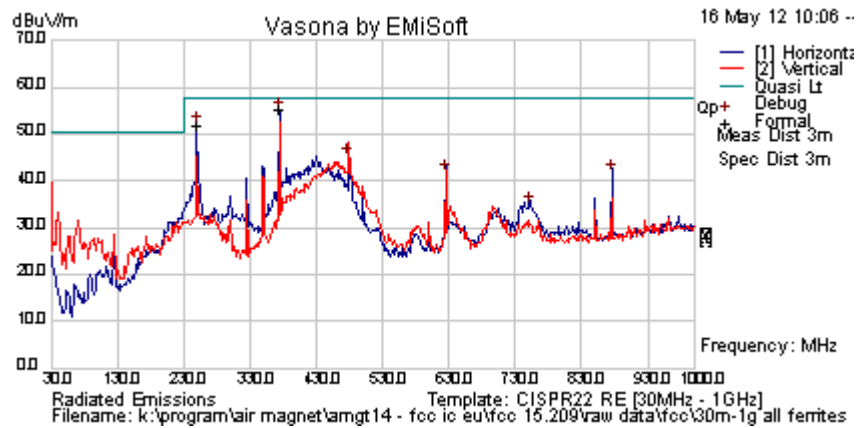
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Ferrites removed from antenna cables

Test Freq.	2437 MHz	Engineer	SB
Variant	Digital Emissions	Temp (°C)	19.5
Freq. Range	30 MHz - 1000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	1004
Antenna	external ant		
Test Notes 1	All ferrites removed except for one which is located on the cable to the dedicated RX Ant		
Test Notes 2	ac/dc adaptor 110Vac 60 Hz		



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
375.018	65.2	5.4	-15.4	55.2	Quasi Max	H	208	12	57.5	-2.3	Pass	
249.993	66.2	4.9	-19.0	52.0	Quasi Max	H	122	178	57.5	-5.5	Pass	
478.140	52.3	5.8	-12.9	45.2	Peak [Scan]	H	122	178	57.5	-12.3	Pass	
624.888	46.4	6.3	-11.0	41.8	Peak [Scan]	H	122	178	57.5	-15.8	Pass	
753.135	37.5	6.7	-9.4	34.8	Peak [Scan]	H	122	178	57.5	-22.7	Pass	
875.483	42.8	7.1	-8.1	41.8	Peak [Scan]	H	122	178	57.5	-15.7	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

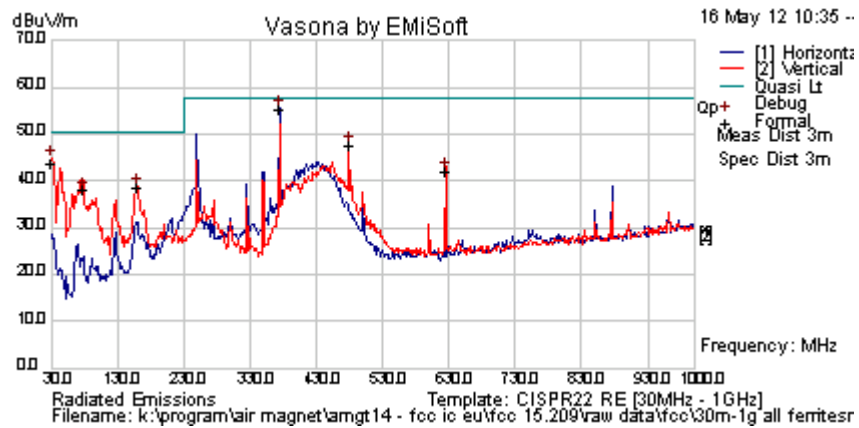
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Ferrites removed from antenna cables

Test Freq.	2437 MHz	Engineer	SB
Variant	Digital Emissions	Temp (°C)	19.5
Freq. Range	30 MHz - 1000 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	1004
Antenna	external ant		
Test Notes 1	All ferrites removed except for one which is located on the cable to the dedicated RX Ant		
Test Notes 2	POE 110Vac 60 Hz		



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
375.006	65.2	5.4	-15.4	55.3	Quasi Max	H	98	212	57.5	-2.2	Pass	
30.628	50.6	3.5	-10.3	43.8	Quasi Max	V	98	360	50.5	-6.7	Pass	
479.055	54.5	5.8	-12.9	47.5	Peak [Scan]	V	98	0	57.5	-10.1	Pass	
624.709	46.6	6.3	-11.0	41.9	Peak [Scan]	V	98	0	57.5	-15.6	Pass	
79.470	57.6	3.9	-23.5	38.0	Peak [Scan]	V	98	0	50.5	-12.5	Pass	
160.950	53.0	4.4	-18.8	38.6	Peak [Scan]	V	98	0	50.5	-11.9	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

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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
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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

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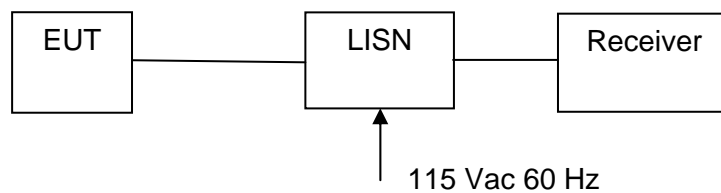
5.1.8. AC Wireline Conducted Emissions (150 kHz – 30 MHz)

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.

Test Measurement Set up



Measurement set up for AC Wireline Conducted Emissions Test

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

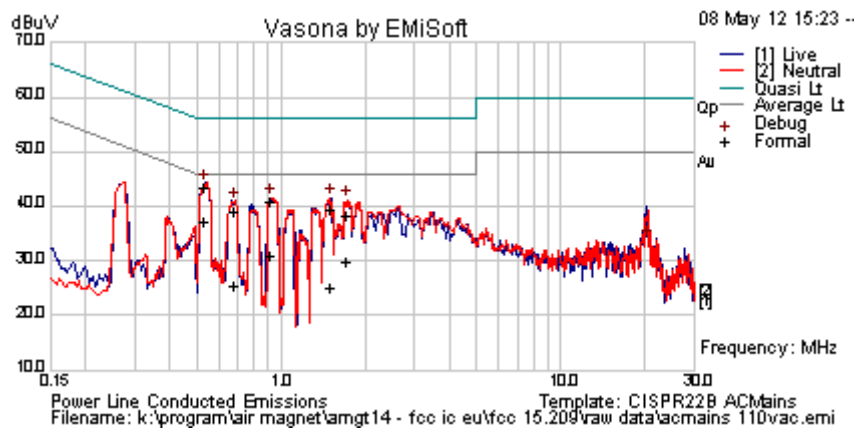
Ambient conditions.

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



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Test Freq.	N/A	Engineer	SB
Variant	AC Line Emissions	Temp (°C)	19.5
Freq. Range	0.150 MHz - 30 MHz	Rel. Hum.(%)	35
Power Setting	20	Press. (mBars)	1004
Antenna	N/A		
Test Notes 1			
Test Notes 2	Ac adaptor 110Vac 60 Hz		



Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.535	33.4	9.9	0.1	43.4	Quasi Peak	Neutral	56	-12.6	Pass	
1.502	29.4	10.0	0.1	39.5	Quasi Peak	Neutral	56	-16.5	Pass	
0.926	30.8	9.9	0.1	40.8	Quasi Peak	Neutral	56	-15.2	Pass	
1.734	28.4	10.0	0.1	38.5	Quasi Peak	Neutral	56	-17.5	Pass	
0.686	29.2	10.0	0.1	39.2	Quasi Peak	Neutral	56	-16.8	Pass	
0.535	27.2	9.9	0.1	37.2	Average	Neutral	46	-8.8	Pass	
1.502	14.9	10.0	0.1	25.0	Average	Neutral	46	-21.0	Pass	
0.926	20.9	9.9	0.1	30.9	Average	Neutral	46	-15.1	Pass	
1.734	19.9	10.0	0.1	30.1	Average	Neutral	46	-16.0	Pass	
0.686	15.6	10.0	0.1	25.6	Average	Neutral	46	-20.4	Pass	
20.594	22.7	10.5	0.8	34.0	Peak [Scan]	Neutral	50	-16.0	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

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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 $\mu\Omega$ 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 (dB μ V)	
	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
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Traceability

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



5.1.9. DFS (Dynamic Frequency Selection)

5.1.9.1. Test Procedure and Setup

FCC, Part 15 Subpart C §15.407(h)
FCC 06-96 Memorandum Opinion and Order
Industry Canada RSS-210 A9.4

5.1.9.1.1. Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see note)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna	

5.1.9.1.2. DFS Response requirement values

Parameter	Value
<i>Non-occupancy period</i>	Minimum 30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds See Note 1.
<i>Channel Closing Transmission Time</i>	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
<i>U-NII Detection Bandwidth</i>	Minimum 80% of the 99% power bandwidth See Note 3.

Note 1: The instant that the *Channel Move Time* and the *Channel Closing Transmission Time* begins is as follows:

- For the Short pulse radar Test Signals this instant is the end of the *Burst*.
- For the Frequency Hopping radar Test Signal, this instant is the end of the last radar *Burst* generated.
- For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.

Note 2: The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate *Channel* changes (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the *U-NII Detection Bandwidth* detection test, radar type 1 is used and for each frequency step the minimum percentage of detection is 90%. Measurements are performed with no data traffic.



5.1.9.1.3. Radar Test Waveforms

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Trials
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

A minimum of 30 unique waveforms are required for each of the short pulse radar types 2 through 4. For short pulse radar type 1, the same waveform is used a minimum of 30 times. If more than 30 waveforms are used for short pulse radar types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. The aggregate is the average of the percentage of successful detections of short pulse radar types 1-4.

Long Pulse Radar Test Waveform

Radar Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse radar test signal. If more than 30 waveforms are used for the Long Pulse radar test signal, then each additional waveform must also be unique and not repeated from the previous waveforms.



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Each waveform is defined as follows:

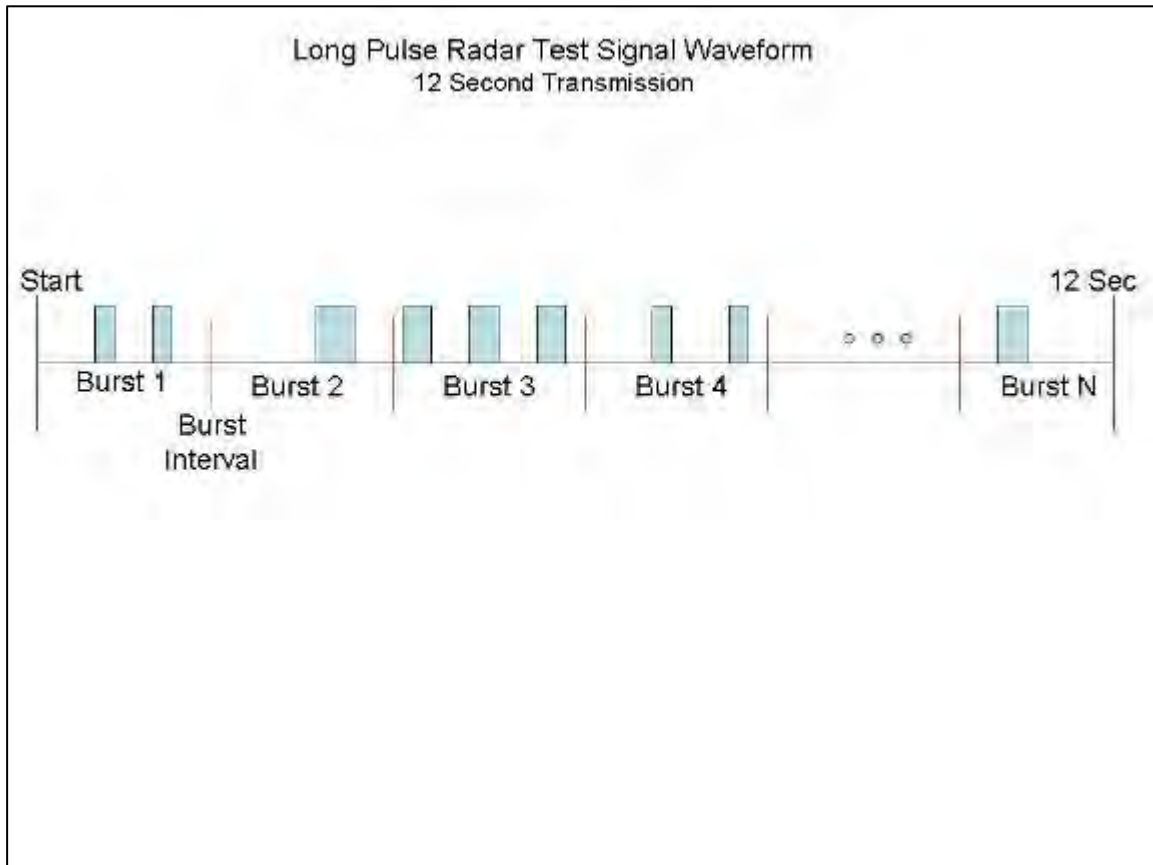
- 1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
- 2) There are a total of 8 to 20 *Bursts* in the 12 second period, with the number of *Bursts* being randomly chosen. This number is *Burst Count*.
- 3) Each *Burst* consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each *Burst* within the 12 second sequence may have a different number of pulses.
- 4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a *Burst* will have the same pulse width. Pulses in different *Bursts* may have different pulse widths.
- 5) Each pulse has a linear FM chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a *Burst* will have the same chirp width. Pulses in different *Bursts* may have different chirp widths. The chirp is centered on the pulse. For example, with a radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.
- 6) If more than one pulse is present in a *Burst*, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a *Burst*, the time between the first and second pulses is chosen independently of the time between the second and third pulses.
- 7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to *Burst_Count*. Each interval is of length $(12,000,000 / \textit{Burst_Count})$ microseconds. Each interval contains one *Burst*. The start time for the *Burst*, relative to the beginning of the interval, is between 1 and $[(12,000,000 / \textit{Burst_Count}) - (\textit{Total Burst Length}) + (\textit{One Random PRI Interval})]$ microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The start time for each *Burst* is chosen independently.

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A representative example of a Long Pulse radar test waveform:

- 1) The total test signal length is 12 seconds.
- 2) 8 *Bursts* are randomly generated for the *Burst_Count*.
- 3) *Burst 1* has 2 randomly generated pulses.
- 4) The pulse width (for both pulses) is randomly selected to be 75 microseconds.
- 5) The PRI is randomly selected to be at 1213 microseconds.
- 6) *Bursts 2* through 8 are generated using steps 3 – 5.
- 7) Each *Burst* is contained in even intervals of 1,500,000 microseconds. The starting location for Pulse 1, *Burst 1* is randomly generated (1 to 1,500,000 minus the total *Burst 1* length + 1 random PRI interval) at the 325,001 microsecond step. *Bursts 2* through 8 randomly fall in successive 1,500,000 microsecond intervals (i.e. *Burst 2* falls in the 1,500,001 – 3,000,000 microsecond range).

Graphical representation of the Long Pulse radar Test Waveform.



5.1.9.1.4. Frequency Hopping Radar Test Waveform

Frequency Hopping Radar Test Waveform

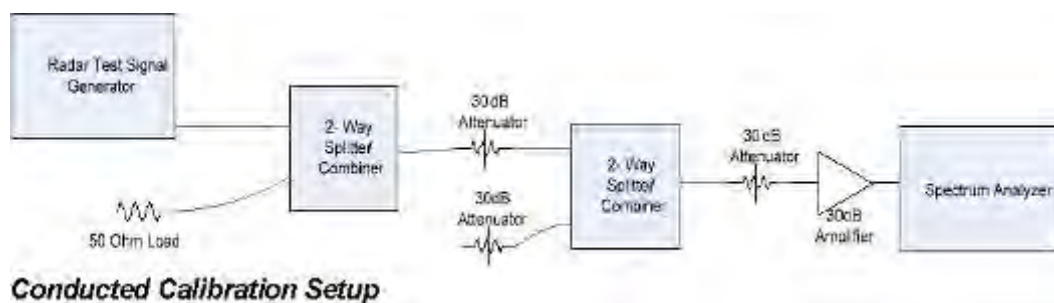
Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	9	.333	300	70%	30

For the Frequency Hopping Radar Type, the same *Burst* parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected from the hopping sequence defined by the following algorithm:

5.1.9.1.5. Radar Waveform Calibration

The following equipment setup was used to calibrate the conducted Radar Waveform. A spectrum analyzer was used to establish the test signal level for each radar type. During this process there were no transmissions by either the Master or Client Device. The spectrum analyzer was switched to the zero span (Time Domain) mode at the frequency of the Radar Waveform generator. Peak detection was utilized. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3 MHz.

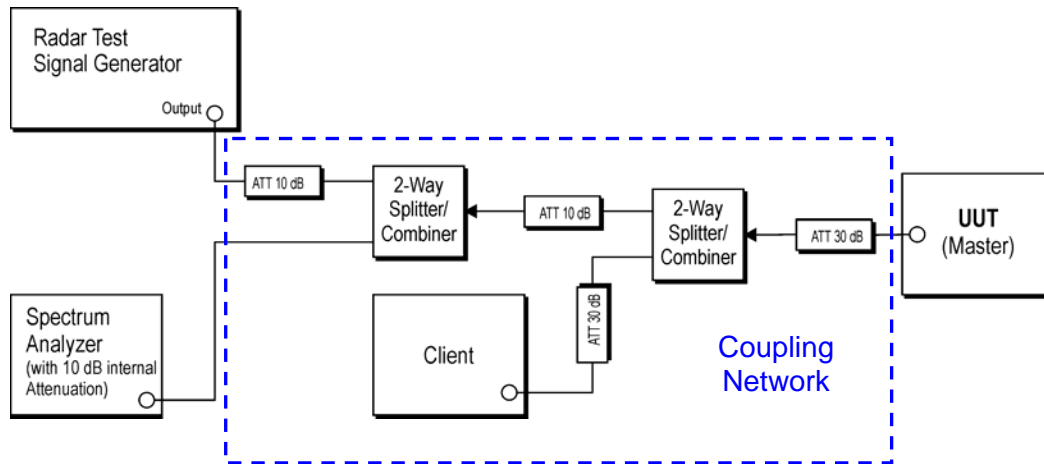
The signal generator amplitude was set so that the power level measured at the spectrum analyzer was -61dBm (Ref Section 5.1). The 30dB amplifier gain was entered as an amplitude offset on the spectrum analyzer.



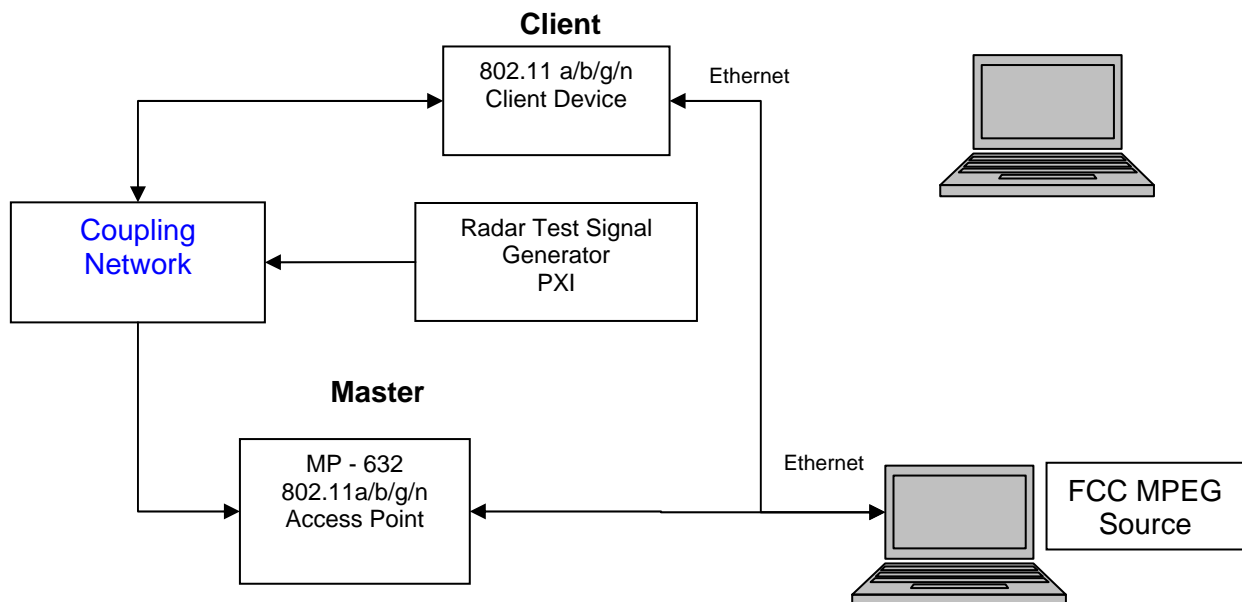
5.1.9.1.6. Block Diagram(s) of Test Setup

Block Diagram(s) of Test Setup

Setup for Conducted Measurements where the EUT is the Master with injection of Radar Test Waveforms at the Master.



Support Equipment Configuration



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The EUT is a Client Device without radar detection.

Applicability of DFS Requirements Prior to Use of a Channel
(Ref Table 1 of FCC 06-96)

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
<i>Non-Occupancy Period</i>	Yes	Yes	Yes
<i>DFS Detection Threshold</i>	Yes	Not required	Yes
<i>Channel Availability Check Time</i>	Yes	Not required	Not required
<i>Uniform Spreading</i>	Yes	Not required	Not required
<i>U-NII Detection Bandwidth</i>	Yes	Not required	Yes

Applicability of DFS requirements during normal operation
(Ref Table 2 of FCC 06-96)

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
<i>DFS Detection Threshold</i>	Yes	Not required	Yes
<i>Channel Closing Transmission Time</i>	Yes	Yes	Yes
<i>Channel Move Time</i>	Yes	Yes	Yes
<i>U-NII Detection Bandwidth</i>	Yes	Not required	Yes

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5.2. Dynamic Frequency Selection (DFS) Test Results

5.2.1. In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period

FCC §15.407(h)(2)(iii)

The steps below define the procedure to determine the above mentioned parameters when a radar Burst with a level equal to the DFS Detection Threshold is generated on the Operating Channel of the U-NII device.

A U-NII device operating as a Client Device will associate with the EUT (Master). The requisite MPEG video file ("TestFile.mpg" available on the NTIA website at the following link <http://ntiacsd.ntia.doc.gov/dfs/>) is streamed from the master device (AP) to the client.

Channel Closing Transmission Time - Measurement

A Type 1 waveform was introduced to the EUT, from which a 12 second transmission record was digitally captured, collecting nearly 250M samples of data, which included in excess of 600 ms of pre-trigger data. This Type 1 waveform had an integral marker built into its construction, marking the start of the radar waveform play, which directly triggered the PXI digitizer's data capture via the PXI backplane trigger bus.

The test system was set-up to capture all transmission data for access point events above a threshold level of -50 dBm. The test equipment time stamps all captured events with respect to T0 (zero time indicating the start of the measurements sequence) starting the 612.1 ms pre-trigger period followed by the radar type 1 burst period.

Radar (Type 1) Pre-trigger period 612.1 ms

Type 1 burst period 25.70 ms

(The period of the 18 pulse burst includes [18 pulses * 1.428mS PRI] = 25.704 ms. Then add 1 μ s pulse width for the final pulse.)

Total 637.8 ms

Channel Closing Transmission Time starts immediately after the last radar pulse is transmitted i.e. 637.8 ms after the start of the trace capture period.

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Therefore, pulses seen after this 637.8 ms boundary are identified and totaled to provide an aggregate total of transmissions in order to determine whether the EUT is compliant with the Channel Closing Transmission Time requirements as described in MO&O FCC 06-96. In this case, it was found that an aggregate total of 0.00 ms of transmission time accrued. This value is found at the right hand side at the foot of the following plot (10s Total).

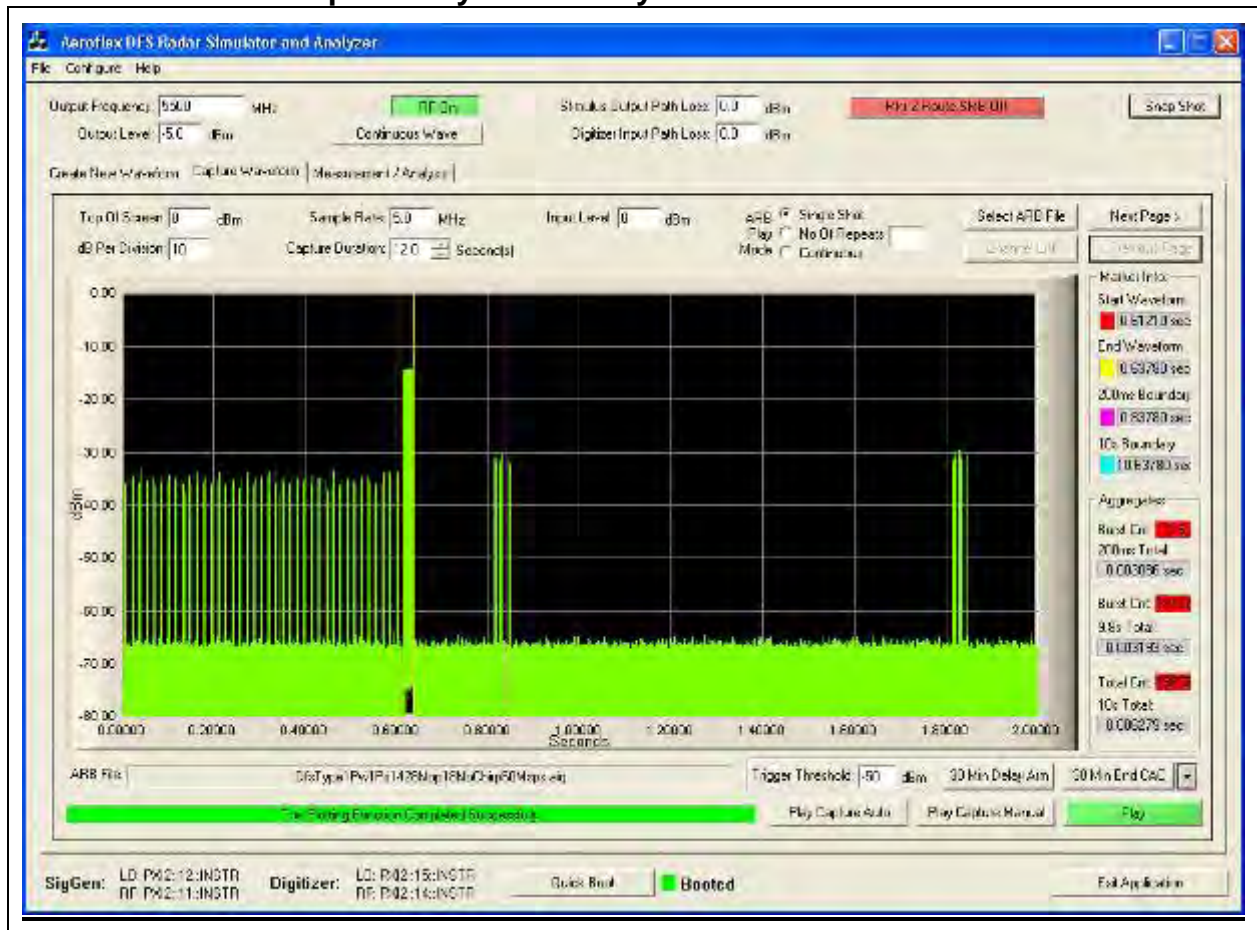
Channel Closing Transmission Time

5,500 MHz (802.11a) = 6.279 mSecs (limit 260 mSecs)

Channel Move Time

5,500MHz (802.11a) = 2.2622 Secs (limit 10 Secs)

Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - 0 to 2 seconds

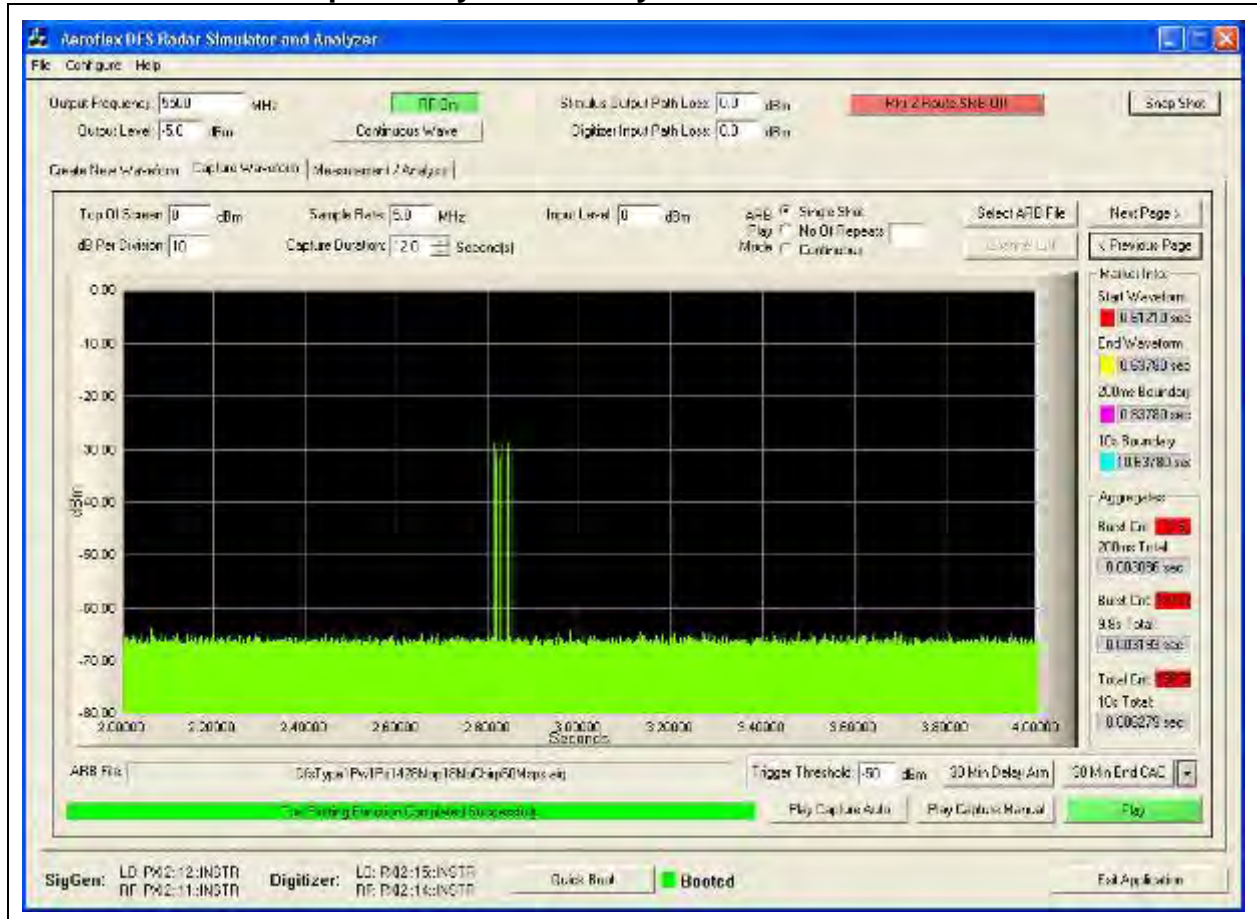


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Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - 2 to 4 seconds

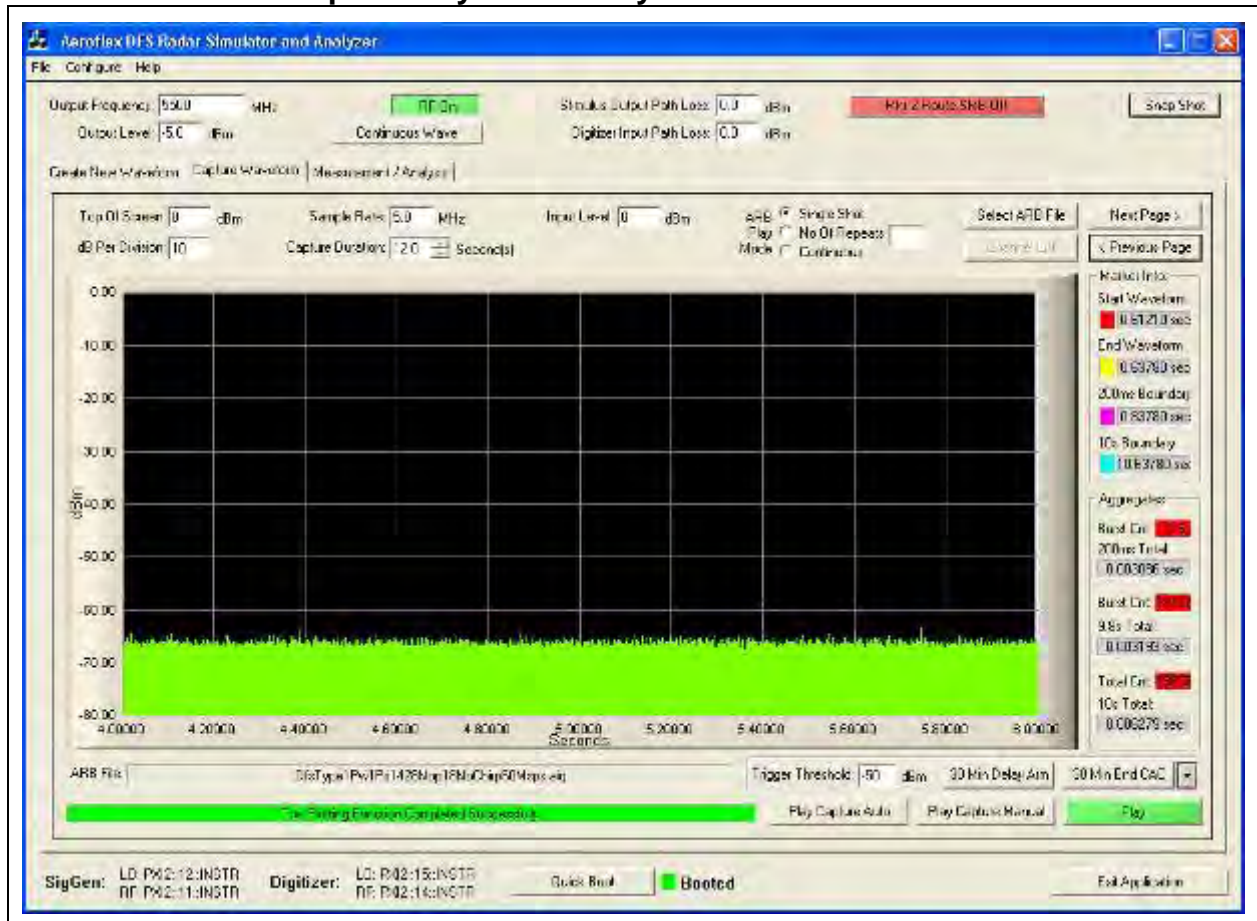


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Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - 4 to 6 seconds

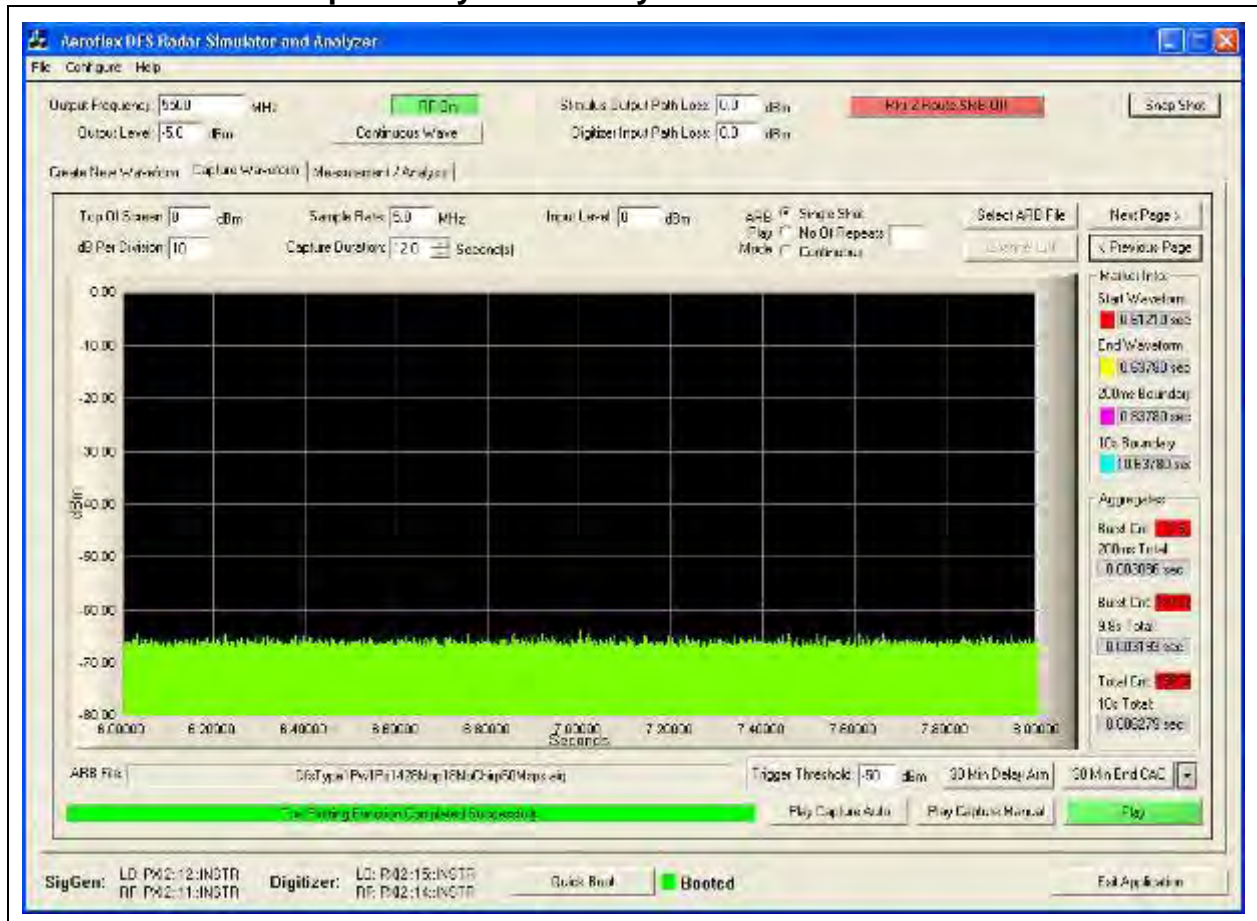


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Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - 6 to 8 seconds

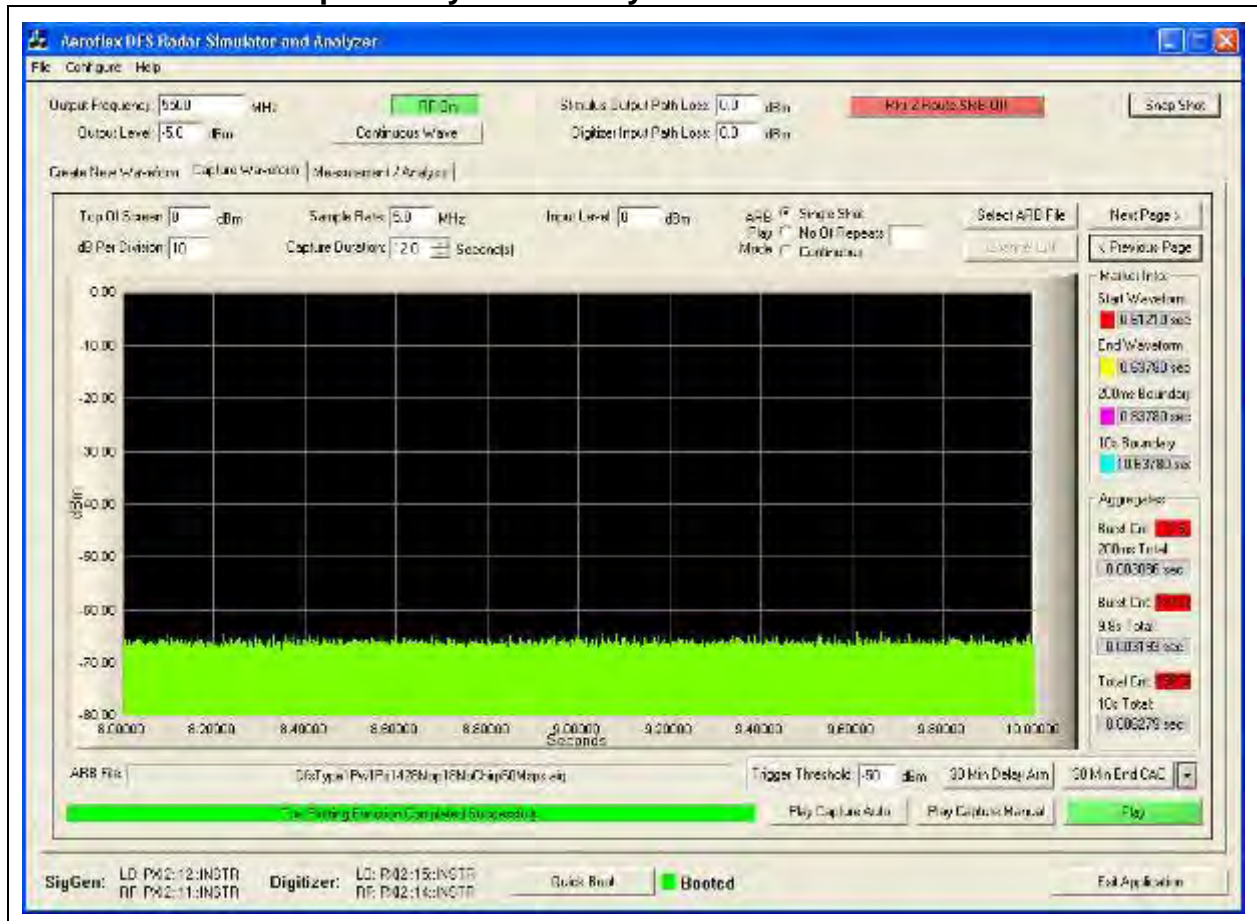


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Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - 8 to 10 seconds

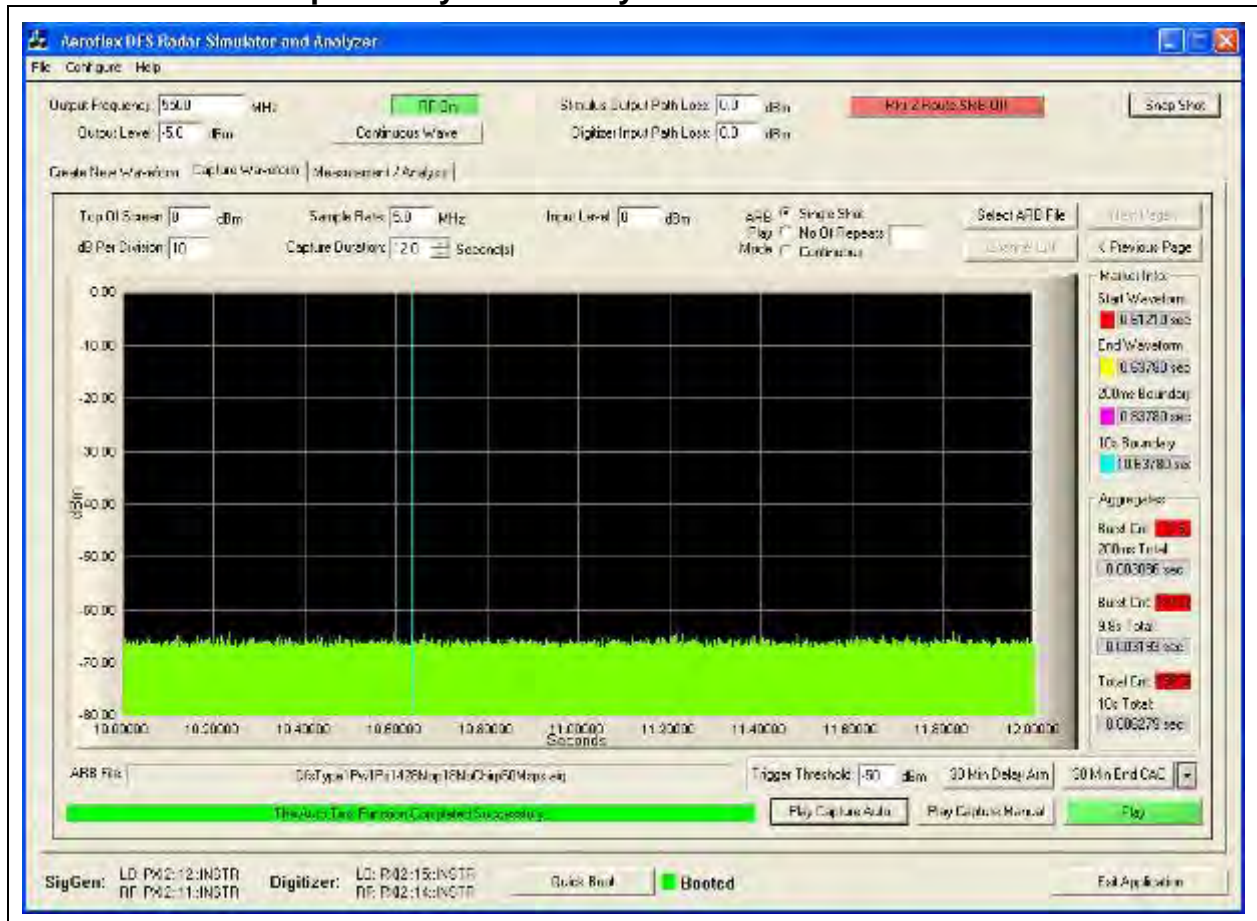


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Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - 10 to 12 seconds



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Therefore, pulses seen after this 637.8 ms boundary are identified and totaled to provide an aggregate total of transmissions in order to determine whether the EUT is compliant with the Channel Closing Transmission Time requirements as described in MO&O FCC 06-96. In this case, it was found that an aggregate total of 0.00 ms of transmission time accrued. This value is found at the right hand side at the foot of the following plot (10s Total).

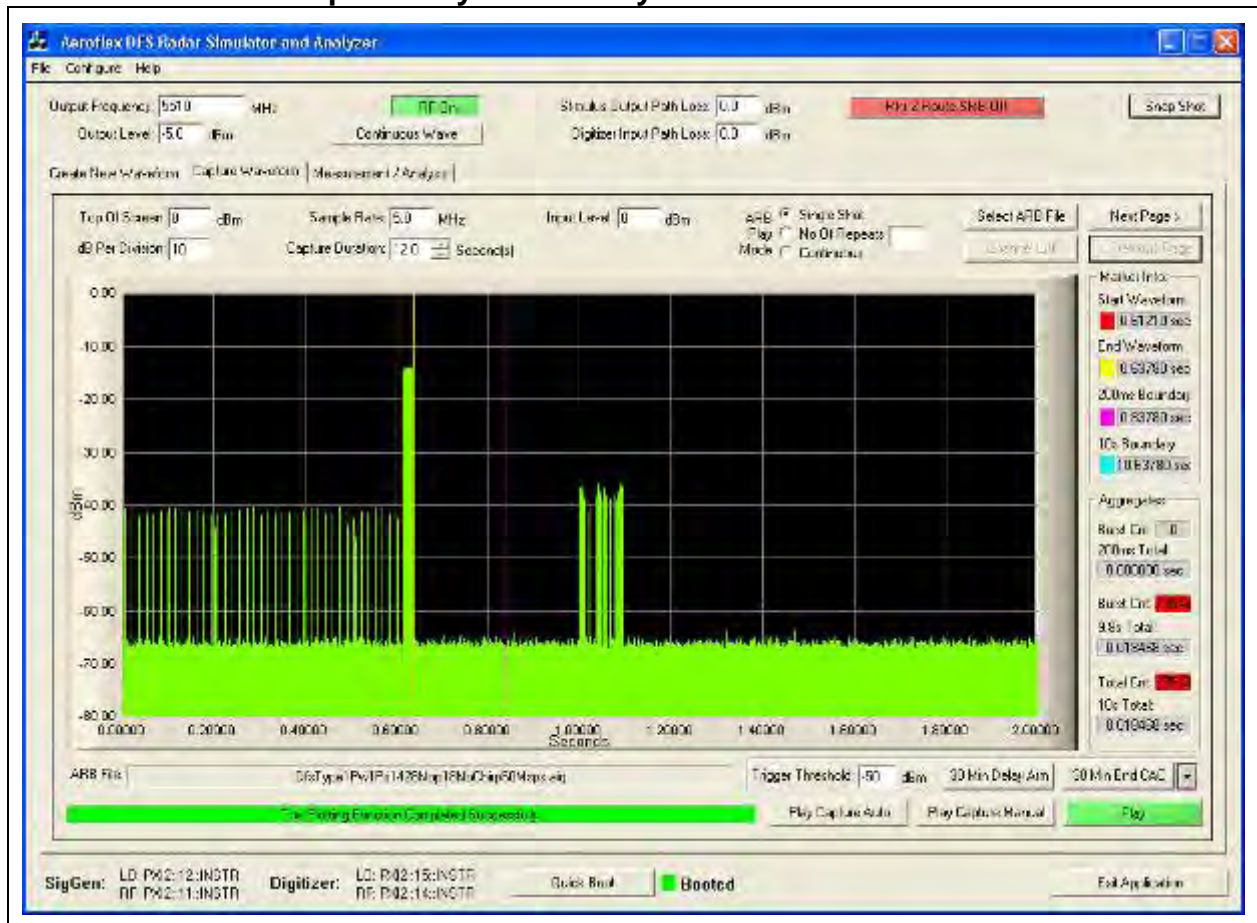
Channel Closing Transmission Time

5,510 MHz (802.11 n HT40) = 18.468 mSecs (limit 260 mSecs)

Channel Move Time

5,510MHz (802.11n HT40) = 2.4622 Secs (limit 10 Secs)

Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - 0 to 2 seconds

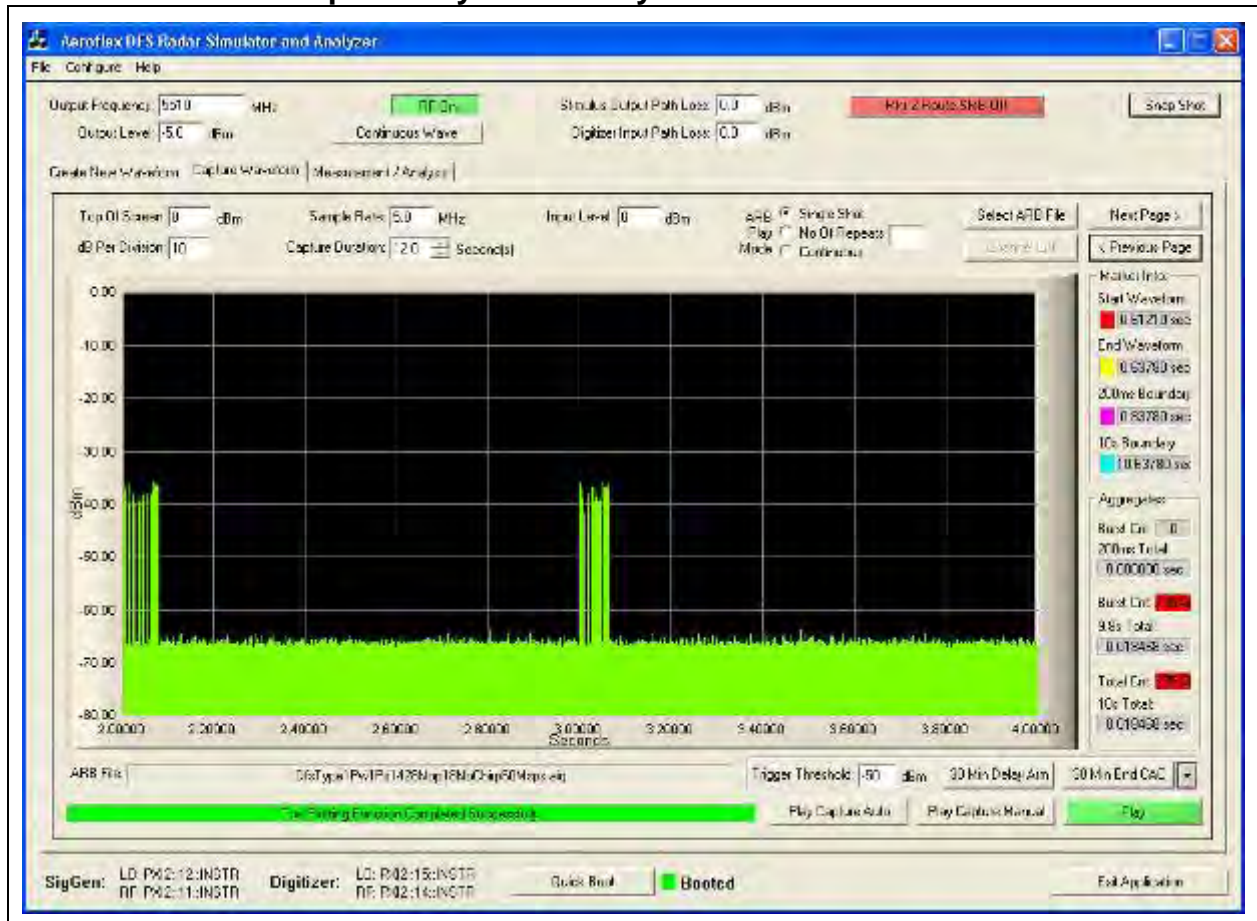


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Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - 2 to 4 seconds

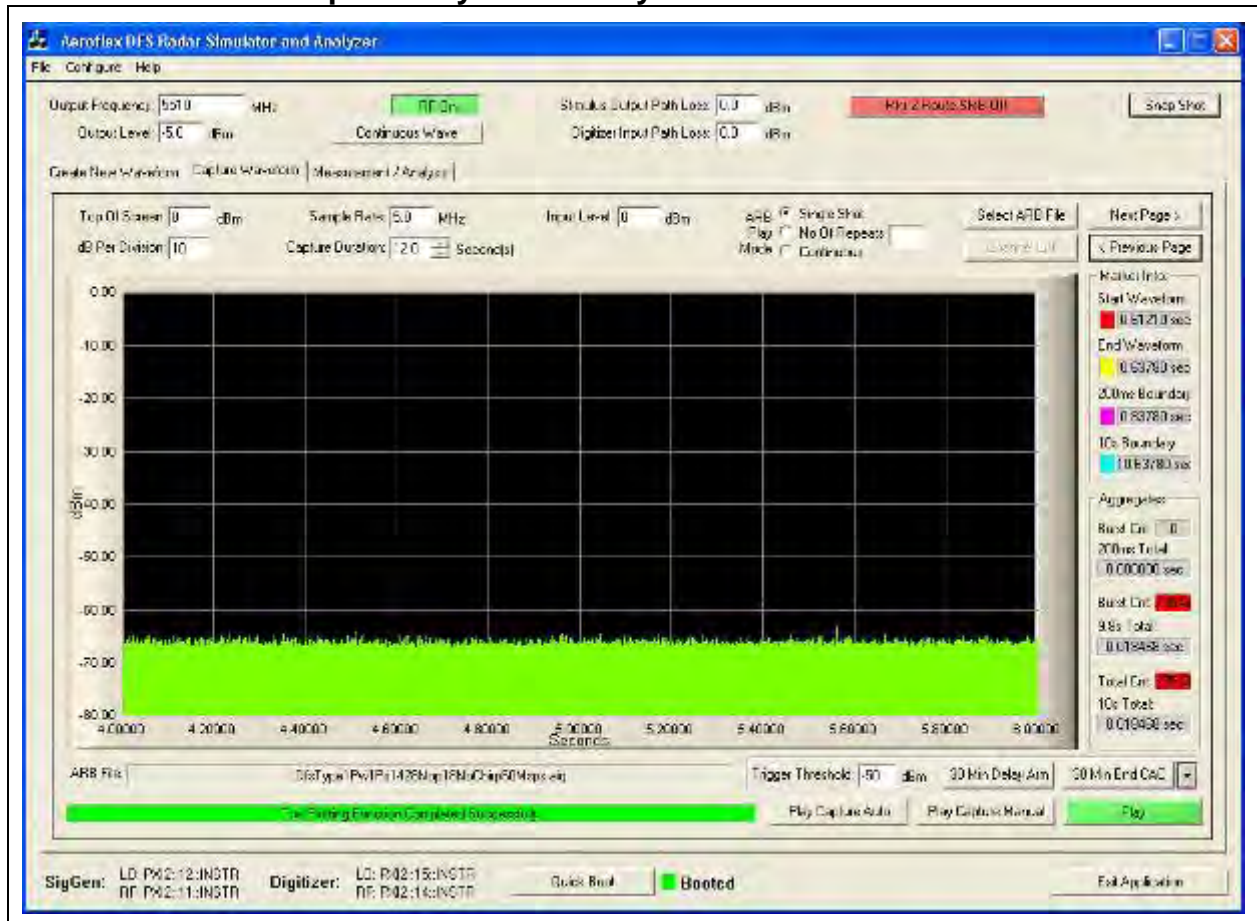


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Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - 4 to 6 seconds

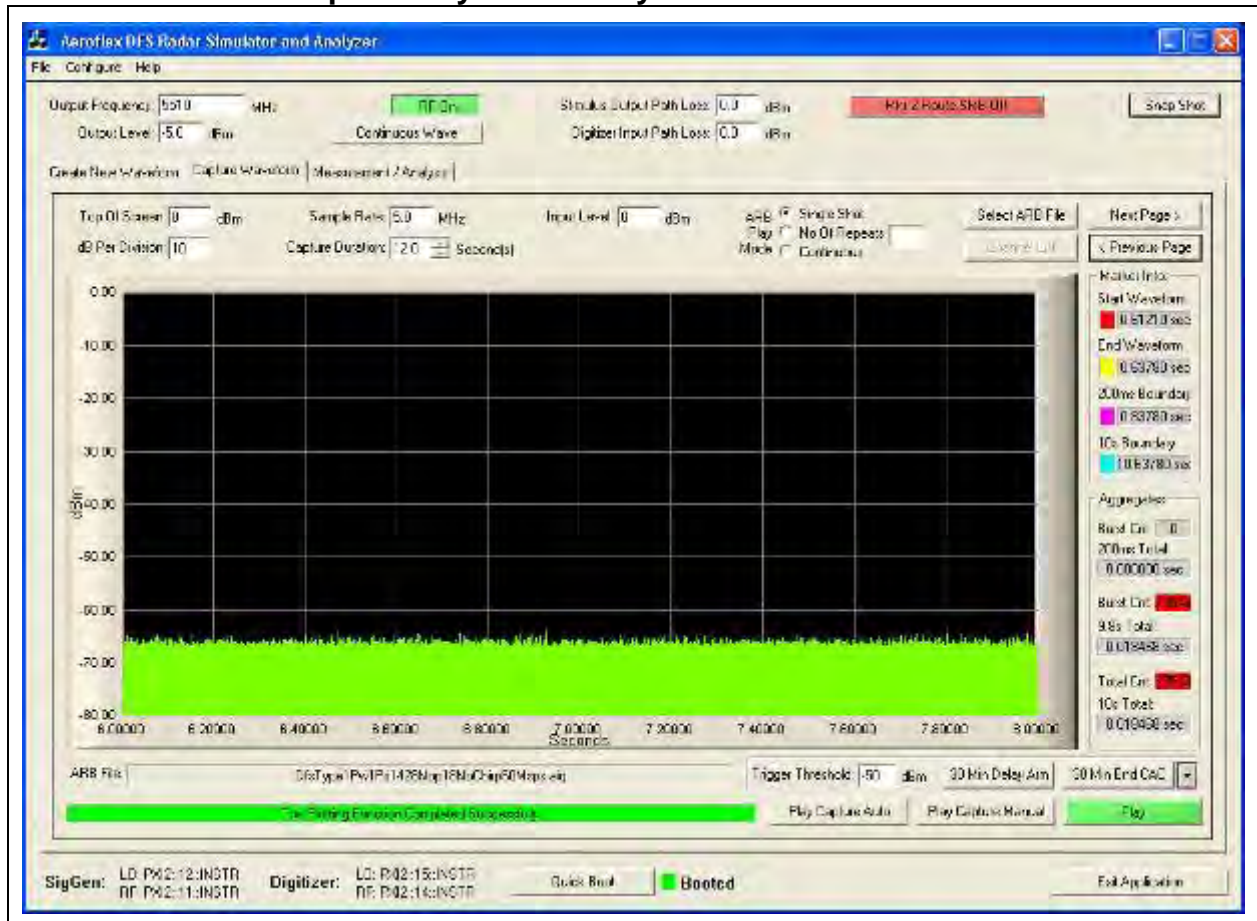


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Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - 6 to 8 seconds

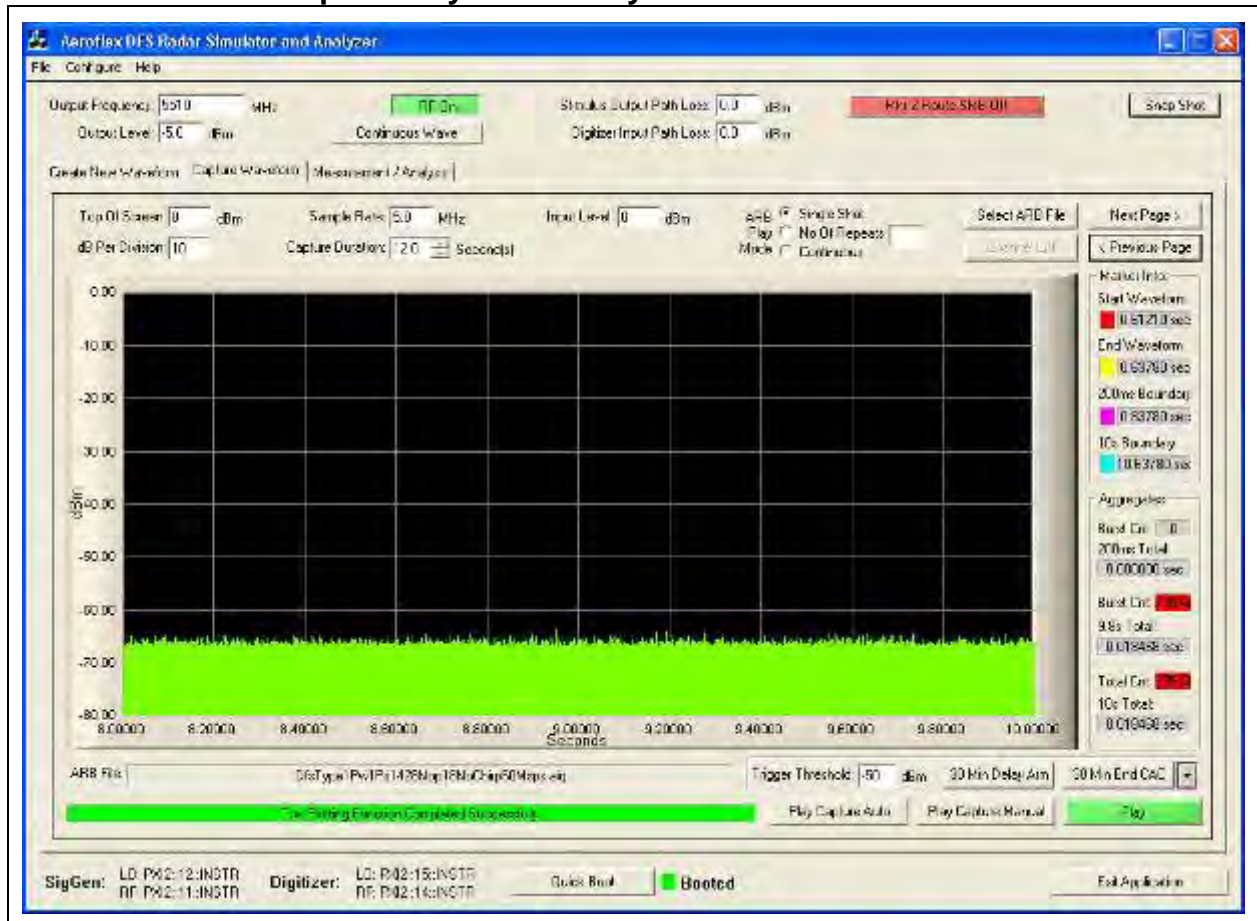


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Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - 8 to 10 seconds

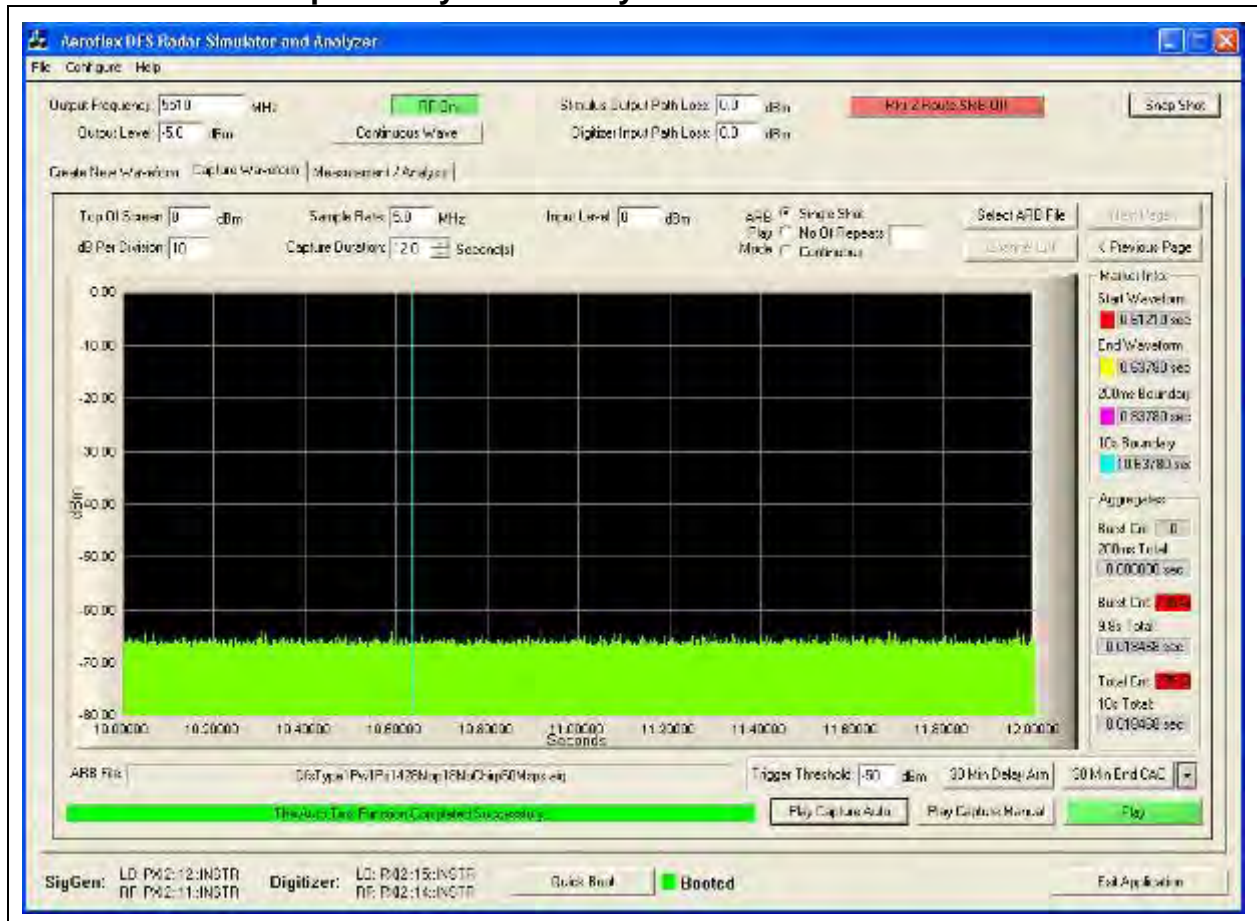


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Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - 10 to 12 seconds



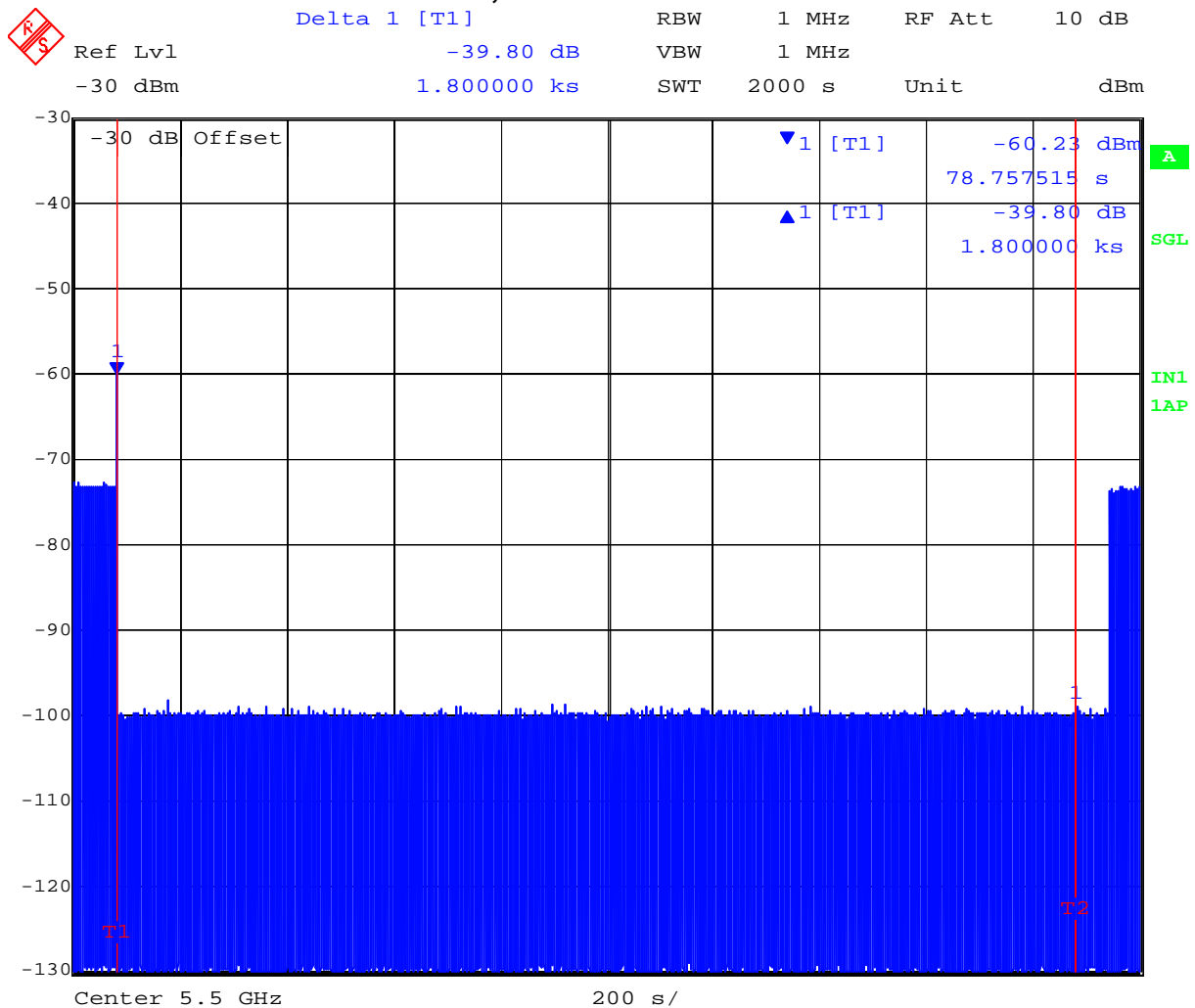
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30 Minute Non-Occupancy Period

The EUT is monitored for more than 30 minutes following the channel close/move time to verify no transmissions resume on this Channel.

30 Minute Non-Occupancy Period Type 1 Radar 5,500MHz 802.11a




Date: 18.MAR.2012 18:13:13

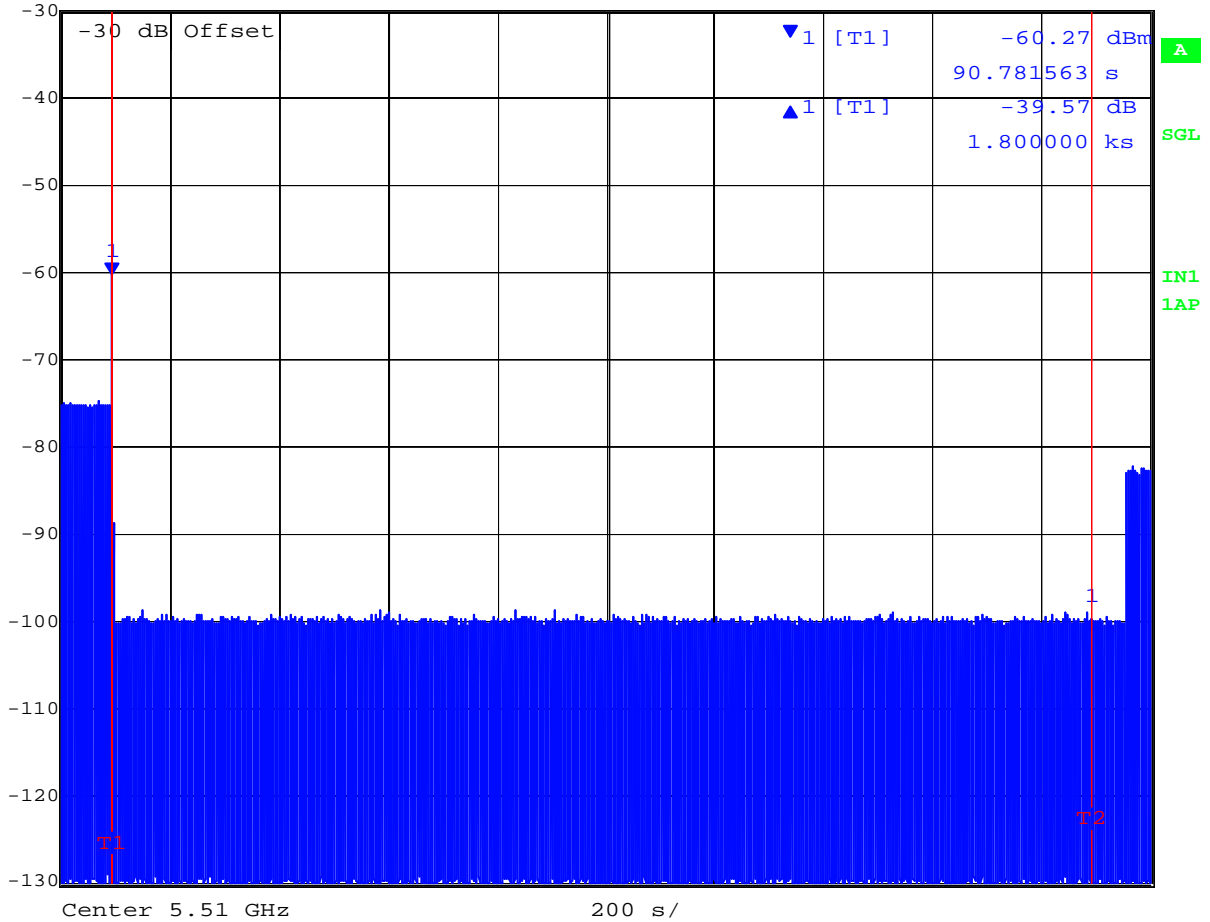
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30 Minute Non-Occupancy Period Type 1 Radar 5,510MHz 802.11n HT40

 Ref Lvl Delta 1 [T1] RBW 1 MHz RF Att 10 dB
-30 dBm -39.57 dB VBW 1 MHz
1.800000 ks SWT 2000 s Unit dBm



Date: 18.MAR.2012 17:29:34

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Measurement Uncertainty Time/Power

Measurement uncertainty		
- Time		4%
- Power		1.33dB

Traceability

Test Equipment Used
0072, 0083, 0098, 0116, 0132, 0158, 0313, 0314, 0193, 0223, 0252, 0253, 0251, 0256, 0328, 0329

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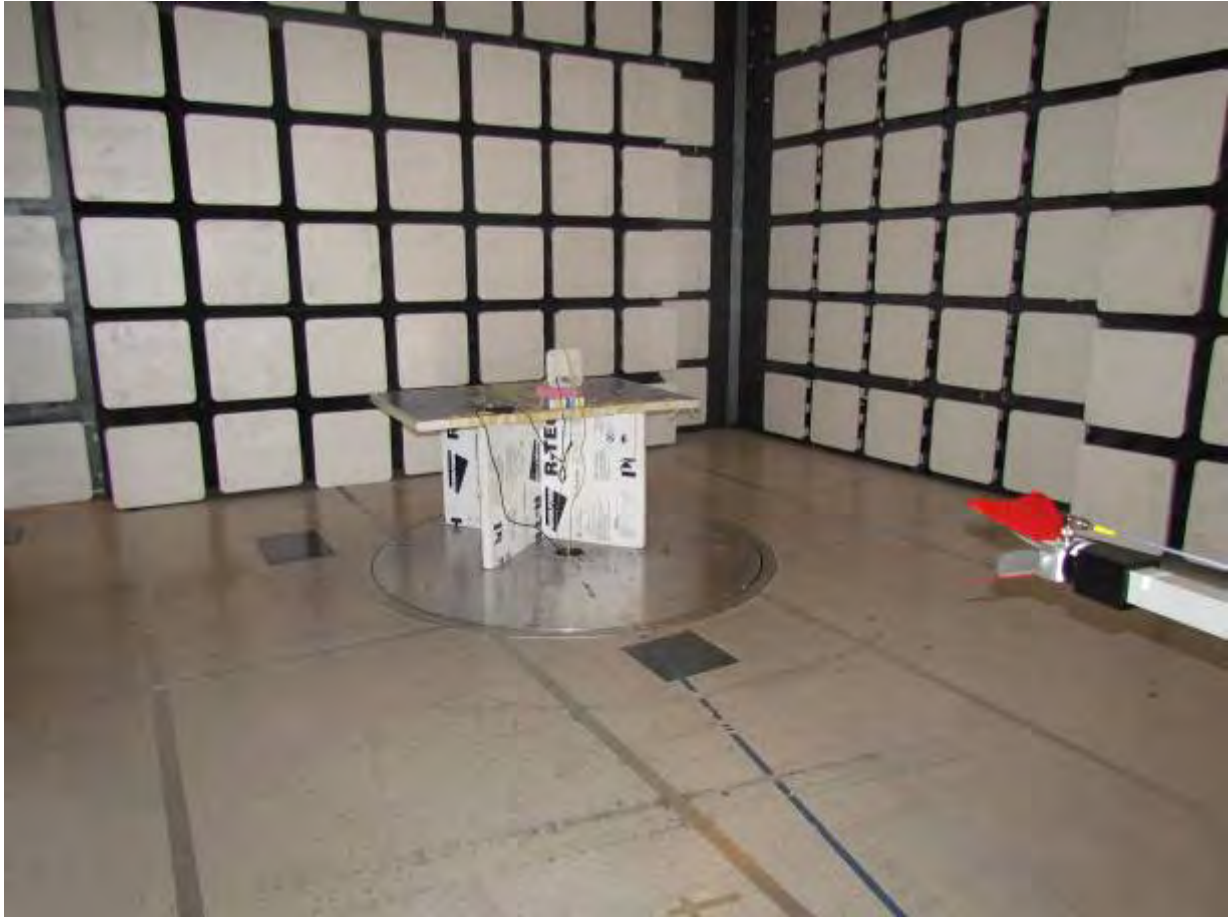
6. PHOTOGRAPHS

6.1. Conducted Test Setup



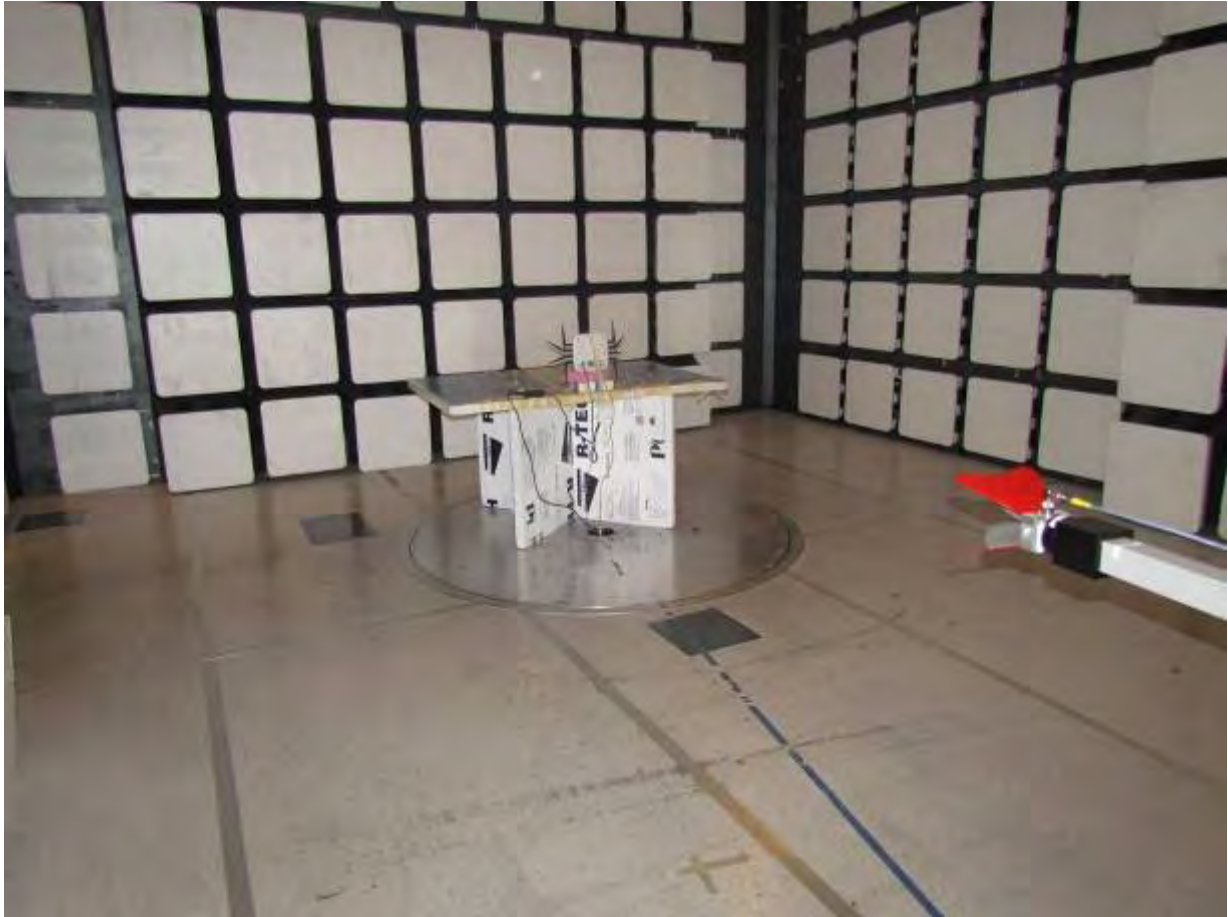
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6.2. Radiated Test Setup > 1 GHz (Integral Antenna)



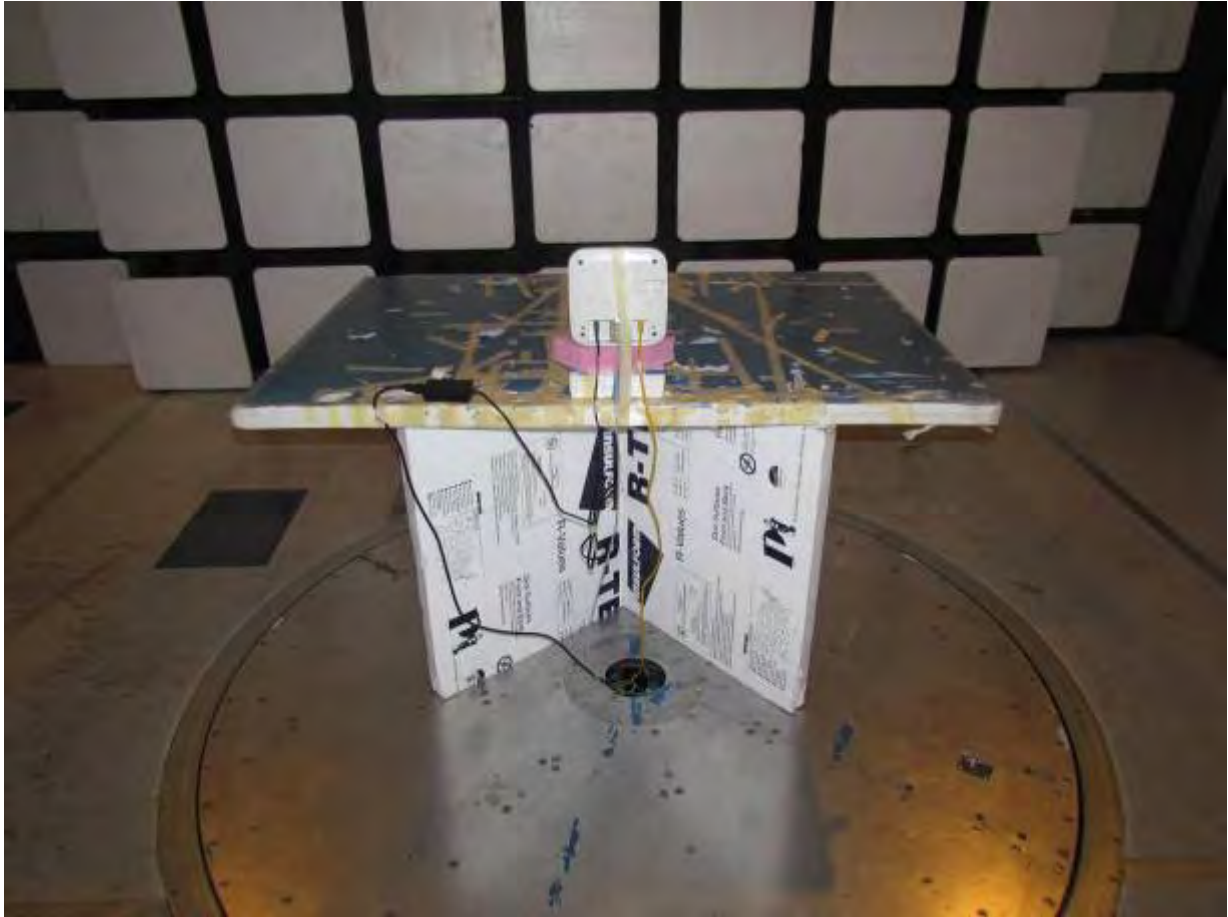
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6.3. Radiated Test Setup > 1 GHz (External Antenna)



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6.4. Radiated Test Table-top Setup (Integral Antenna)



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6.5. Radiated Test Setup < 1 GHz (External Antenna)



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6.6. Radiated Test Table-top Setup (External Antenna)



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6.7. ac Wireline Emissions



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6.8. Dynamic Frequency Selection Test Set-Up

General DFS Test Setup



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DFS Test Equipment



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7. TEST EQUIPMENT DETAILS

Asset #	Instrument	Manufacturer	Part #	Serial #
0088	Spectrum Analyzer	Hewlett Packard	8564E	3410A00141
0134	Amplifier	Com Power	PA 122	181910
0158	Barometer /Thermometer	Control Co.	4196	E2846
0287	EMI Receiver	Rhode & Schwartz	ESIB 40	100201
0252	SMA Cable	Megaphase	Sucoflex 104	None
0310	2m SMA Cable	Micro-Coax	UFA210A-0-0787- 3G03G0	209089-001
0312	3m SMA Cable	Micro-Coax	UFA210A-1-1181- 3G0300	209092-001
0313	Coupler	Hewlett Packard	86205A	3140A01285
0314	30dB N-Type Attenuator	ARRA	N9444-30	1623
0070	Power Meter	Hewlett Packard	437B	3125U11552
0116	Power Sensor	Hewlett Packard	8485A	3318A19694
0117	Power Sensor	Hewlett Packard	8487D	3318A00371
0184	Pulse Limiter	Rhode & Schwartz	ESH3Z2	357.8810.52
0190	LISN	Rhode & Schwartz	ESH3Z5	836679/006
0293	BNC Cable	Megaphase	1689 1GVT4	15F50B001
0301	5.6 GHz Notch Filter	Micro-Tronics	RBC50704	001
0302	5.25 GHz Notch Filter	Micro-Tronics	BRC50703	002
0303	5.8 GHz Notch Filter	Micro-Tronics	BRC50705	003
0304	2.4GHzHz Notch Filter	Micro-Tronics	--	001
0307	BNC Cable	Megaphase	1689 1GVT4	15F50B002
0335	1-18GHz Horn Antenna	ETS- Lindgren	3117	00066580
0337	Amplifier	MiCOM Labs	--	--
0338	Antenna	Sunol Sciences	JB-3	A052907

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