Test of Aruba AP124,125 802.11a/b/g/n
Wireless AP

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

Test Report Serial No.: ARUB20-A4D Rev B

TEST REPORT

FROM

Test of Aruba AP124,125 802.11a/b/g/n Wireless AP
to
To: FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: ARUB20-A4D Rev B

Note: this report contains data with regard to the 5,150 to 5,350 MHz, and 5,470 to 5,725 MHz operational modes of the Aruba Wireless Access Point. 2.4 and 5.8 GHz test data are reported in MiCOM Labs test report ARUB20-A2.

This report supersedes ARUB20-A4D Rev A

Applicant: Aruba Networks
1322 Crossman Avenue
Sunnyvale
CA 94089, USA

Product Function: 802.11a/b/g/n Wireless Access Point

Copy No: pdf Issue Date: 23rd April 2008

This Test Report is Issued Under the Authority of;

MiCOM Labs, Inc.
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CERTIFICATE #2381.01

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TABLE OF CONTENTS

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ACCREDITATION, LISTINGS & RECOGNITION

MiCOM Labs, Inc. an accredited laboratory complies with the international standard BS 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

THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

MICOM LABS
Pleasanton, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 18 June 2005*).

Presented this 26th day of February 2008.

President
For the Accreditation Council
Certificate Number 2381.01
Valid to November 30, 2009

For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

LISTINGS

MiCOM Labs test facilities are listed by the following organizations;

North America

United States of America
Federal Communications Commission (FCC) Listing #: 102167

Canada

Industry Canada (IC) Listing #:4143A-2

RECOGNITION

APEC MRA (Asia-Pacific Economic Community Mutual Recognition Agreement)

Conformity Assessment Body (CAB) – MiCOM Labs

Test data generated by MiCOM Labs is accepted in the following countries under the APEC MRA.

Country	Recognition Body	Phase	CAB Identification No.
Australia	Australian Communications and Media Authority (ACMA)	I	US0159
Hong Kong	Office of the Telecommunication Authority (OFTA)	I	
Korea	Ministry of Information and Communication Radio Research Laboratory (RRL)	I	
Singapore	Infocomm Development Authority (IDA)	I	
Taiwan	Directorate General of Telecommunications (DGT) Bureau of Standards, Metrology and Inspection (BSMI)	I I	

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DOCUMENT HISTORY

Document History		
Revision	**Date**	**Comments**
Draft		
Rev A	15th February 2008	First issue of report –A4D that includes test results for 5250-5350 MHz and 5470-5725 MHz bands including Dynamic Frequency Selection (DFS) results.
Rev B	23rd April 2008	Correction of typographical errors.

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1. TEST RESULT CERTIFICATE

Applicant:	Aruba Networks 1322 Crossman Avenue Sunnyvale CA 94089, USA	Tested By:	MiCOM Labs, Inc. 440 Boulder Court Suite 200 Pleasanton California, 94566, USA
EUT:	Wireless Access Point	Telephone:	+1 925 462 0304
Model:	AP-124,125	Fax:	+1 925 462 0306
S/N:	AD0000142		
Test Date(s):	7th Nov to 6th Dec 2007	Website:	www.micomlabs.com

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

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

Notes:

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

ACCREDITED
CERTIFICATE #2381.01

Approved & Released for MiCOM Labs, Inc. by:

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	2007	Code of Federal Regulations
(ii)	FCC 06-96	June 2006	Memorandum Opinion and Order
(iii)	Industry Canada RSS-210	Issue 7 June 2007	Low Power License-Exempt Radiocommunication Devices (All Frequency Bands): Category 1 Equipment
(iv)	Industry Canada RSS-Gen	Issue 2 June 2007	General Requirements and Information for the Certification of Radiocommunication Equipment
(v)	ANSI C63.4	2003	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
(vi)	CISPR 22/ EN 55022	1997 1998	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
(vii)	M 3003	Edition 1 Dec. 1997	Expression of Uncertainty and Confidence in Measurements
(viii)	LAB34	Edition 1 Aug 2002	The expression of uncertainty in EMC Testing
(ix)	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
(x)	A2LA	14th September 2005	Reference to A2LA Accreditation Status – A2LA Advertising Policy
(xi)	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 Aruba AP124,125 802.11a/b/g/n Wireless AP in the frequency ranges 5150 to 5350 MHz, and 5470 to 5,725 MHz to FCC Part 15.407 and Industry Canada RSS-210 regulations.
Applicant:	Aruba Networks 1322 Crossman Avenue Sunnyvale CA 94089, USA
Manufacturer:	As applicant
Laboratory performing the tests:	MiCOM Labs, Inc. 440 Boulder Court, Suite 200 Pleasanton, California 94566 USA
Test report reference number:	ARUB20-A4D Rev B
Date EUT received:	10th November 2007
Standard(s) applied:	FCC 47 CFR Part 15.407 & IC RSS-210
Dates of test (from - to):	10th November 2007 to 13th February 2008
No of Units Tested:	2
Type of Equipment:	802.11a/b/g/n Wireless Access Point, 3x3 Spatial Multiplexing MIMO configuration
Applicants Trade Name:	Wireless Access Point
Model(s):	AP124 (external) and AP125 (integral) antenna
Software Release	ARUBA05 3.2.0.0
Location for use:	Indoor
Declared Frequency Range(s):	5,150 to 5,350 MHz 5,470 to 5,725 MHz
Type of Modulation:	Per 802.11 –CCK, BPSK, QPSK, DSSS, OFDM
Declared Nominal Output Power: (Average Power)	802.11a: Legacy +17 dBm 802.11n: HT-20 +19 dBm 802.11n: HT-40 +19 dBm
EUT Modes of Operation:	Legacy 802.11a/b/g, 802.11n MT-20, MT-40
Transmit/Receive Operation:	Time Division Duplex
Rated Input Voltage and Current:	5 Vdc, 2.5 A POE 48 Vdc 350 mA
Operating Temperature Range:	Declared range 0 to +40ºC
ITU Emission Designator:	5150 – 5250 MHz 38M9W7D 5250 – 5350 MHz 38M7W7D 5470 – 5725 MHz 45M3W7D
Frequency Stability:	±20 ppm max
Equipment Dimensions:	Antenna Retracted (4.9 “x 5.13” x2.0”
Weight:	15oz (420 grams)
Primary function of equipment:	Wireless Access Point for transmitting data and voice

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3.2. Scope of Test Program

RF Testing

The scope of the compliance program was to test the Aruba AP-124 and 125 wireless Access Points, 3x3 Spatial Multiplexing MIMO configurations in the frequency ranges 5150 - 5350 MHz and 5470 – 5725 MHz for compliance against FCC 47 CFR Part 15.407 and Industry Canada RSS-210 specifications including Dynamic Frequency Selection (DFS) requirements.

The Aruba Networks AP-124 has external antennas with reverse SMA connectors while the AP-125 has integral antenna(s). The device has two radios with three antennae (2x3). The antennas used with the AP-124 are detailed in section 3.4 “Antenna Details”.

Dynamic Frequency Selection

The scope of the test program was to test the Aruba AP-124/125 Systems wireless access point in the frequency ranges 5,250 – 5,350 or 5,470 to 5,725 MHz as a Master device for compliance against DFS requirements of FCC 47 CFR Part 15.407 and the FCC specification Memorandum Opinion and Order FCC 06-96.

One frequency was chosen (5,580 MHz) from the operating channels of the UUT within the 5,250 – 5,350 MHz and 5,470 – 5,725 MHz bands for DFS testing per the requirements of FCC specification “Memorandum Opinion and Order FCC 06-96”, Section 7.8 “DFS Conformance Test Procedures”.

U-NII devices operating in the 5,250 – 5,350 MHz and 5,470 - 5,725 MHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems.

The Aruba AP-124/125 product operates as a Master device with full radar detection and Dynamic Frequency Selection (DFS) capability.

The Master device provides, on aggregate, uniform loading of the spectrum across all devices by selecting an operating channel among the available channels using a random algorithm.

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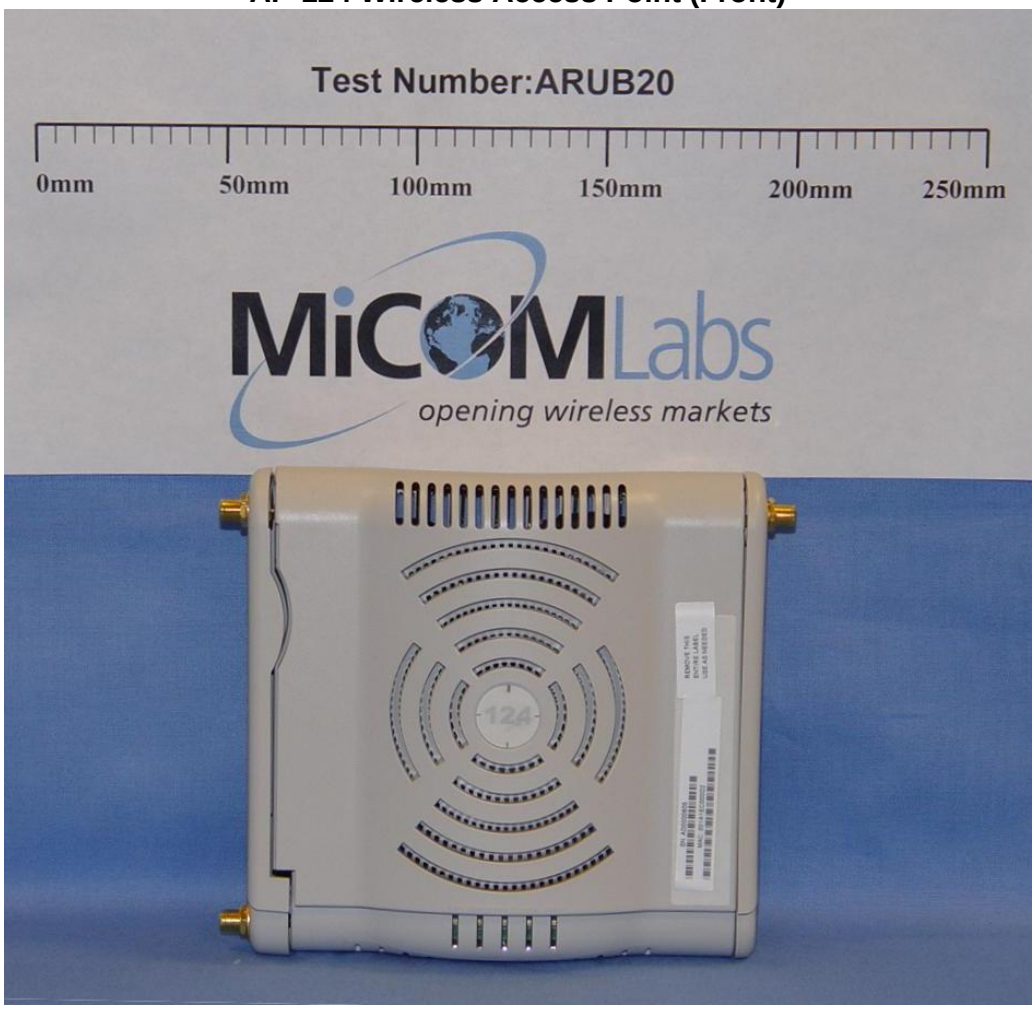
Aruba Networks
AP-124 Wireless Access Point (Front)



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Aruba Networks
Wireless Access Point (Underside)

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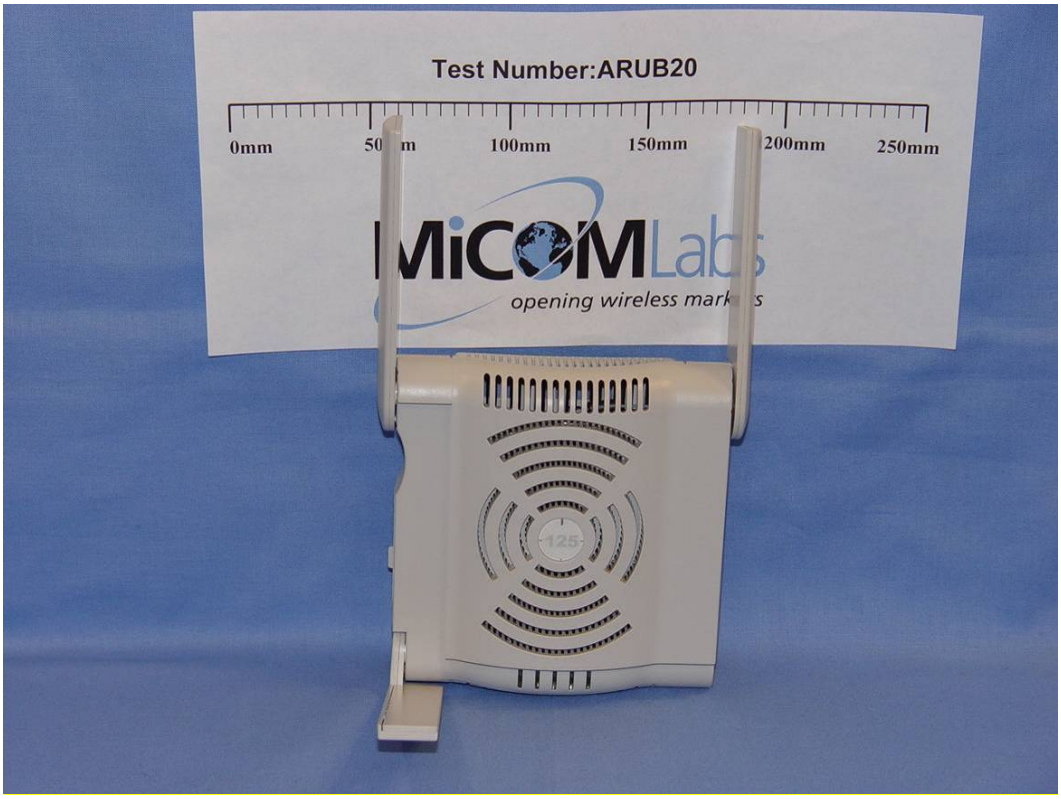
Aruba Networks
AP125 Wireless Access Point



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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	Access Point	Aruba Networks	AP-124,125	AD0000142
Support	Power Over LAN Hub	PowerDsine	PD-6001/AC	A03176040000172
Support	Power Supply	CUI Inc	A1-15S05	
Support	Laptop PC	IBM	Thinkpad	None

Note: the AP-125 access point identified in the above table was converted to an AP-124 for spurious emission testing on integral antenna.

3.4. Antenna Details

1. 5150 – 5725 MHz
    a. Integral
        - 5.15 GHz Gain: 7.21 dBi
        - 5.35 GHz Gain: 6.49 dBi
        - 5.725 GHz Gain: 5.23 dBi
    b. AP-ANT-10, 6 dBi Omni-Directional
    c. AP-ANT-12, 14 dBi Directional

3.5. Cabling and I/O Ports

Number and type of I/O ports

1. 10/100 Ethernet (non-screened) x 2
2. 5 Vdc, 4mm supply connector

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3.6. Test Configurations

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

Matrix of test configurations

Operational Mode(s) (802.11)	Variant	Data Rates with Highest Power	Frequencies (MHz)
a,n	Legacy	6 MBit/s	5,180 5,200 5,240
	HT-20	6.5 MCS	
	HT-40	13.5 MCS	5,190 5,230
a,n	Legacy	6[1] MBit/s	5,260 5,300 5,320
	HT-20	6.5 MCS	
	HT-40	13.5 MCS	5,270 5.310
a,n	Legacy	6[1] MBit/s	5,500 5,600 5,700
	HT-20	6.5 MCS	
	HT-40	13.5 MCS	5,510 5,620 5,690

[1] – Except for DFS these data rates were used to test and exercise the EUT at all times

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Conducted Testing

Conducted test parameters were performed on a single antenna connector. The performance testing was carried out on the transmitter port exhibiting the highest output power. A table of output power V's antenna port for each operational mode is provided below. The power from each transmitter is provided together with the aggregate power for all three transmitters. Complete characterization for each chain has been provided only for the power settings utilized in the generation of this report. Aggregate power measurements are provided for all power settings.

Channel 5,180 MHz

Configuration	ART Power Setting	Tx 1 Measured Pwr (dBm)	Tx 2 Measured Pwr (dBm)	Tx 3 Measured Pwr (dBm)	Aggregate Measured Pwr (dBm)
Legacy a	5				8.4
	6				9.29
	7				10.33
	8				11.36
	9				12.33
	10				13.49
	11				14.45
	12				15.51
	13	10.93	10.82	11.52	16.4
	14	11.83	11.74	12.61	17.3
	15				18.21
	16	13.70	13.65	14.56	19.27
	17				20.2
	18				21.2
	19				22.4
HT-20	5				
	6				8.32
	7				9.24
	8				10.35
	9				11.39
	10				12.48
	11				13.43
	12				14.4
	13	10.92	10.71	11.44	15.51
	14				16.41
	15				17.28
	16				18.26
	16.5	14.02	13.82	14.80	18.75
	17				19.31
	18				20
	19				21.4

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Channel 5,190 MHz

Configuration	ART Power Setting	Tx 1 Measured Pwr (dBm)	Tx 2 Measured Pwr (dBm)	Tx 3 Measured Pwr (dBm)	Aggregate Measured Pwr (dBm)
HT-40 (5.190 GHz)	5				8.17
	6				9.04
	7	4.55	4.66	5.96	10.2
	8				11.22
	9				12.26
	10	7.38	7.38	8.35	12.91
	11				14
	12				15.05
	13	10.27	10.53	10.90	16.04
	14				16.95
	15				17.92
	16				18.97
	17				19.98
	18				20.96
	19				22.09

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Channel 5,200 MHz

Configuration	ART Power Setting	Tx 1 Measured Pwr (dBm)	Tx 2 Measured Pwr (dBm)	Tx 3 Measured Pwr (dBm)	Aggregate Measured Pwr (dBm)
Legacy a	5				8.25
	6				9.17
	7				10.27
	8				11.24
	9				12.35
	10				13.07
	11				14
	12				15.07
	13				16.1
	14				17.03
	15				18.11
	16				19.16
	17				19.96
	18				21.09
	19				22.08
HT-20	5				
	6				8.2
	7				9.14
	8				10.22
	9				11.32
	10				12.35
	11				13.03
	12				13.99
	13				15.02
	14				16.08
	15				16.98
	16				17.98
	17				19
	18				20.2
	19				21.02

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Channel 5,240 MHz

Configuration	ART Power Setting	Tx 1 Measured Pwr (dBm)	Tx 2 Measured Pwr (dBm)	Tx 3 Measured Pwr (dBm)	Aggregate Measured Pwr (dBm)
Legacy a	5				8.3
	6				9.22
	7				10.26
	8				11.41
	9				12.42
	10				12.75
	11				13.75
	12				14.84
	13				15.96
	14				16.83
	15				17.87
	16				18.92
	17				19.76
	18				20.85
	19				21.66
HT-20	5				
	6				8.15
	7				8.96
	8				10.2
	9				11.3
	10				12.3
	11				12.65
	12				13.65
	13				14.57
	14				15.83
	15				16.77
	16				17.72
	17				18.87
	18				19.67
	19				20.65

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Channel 5,230 MHz

Configuration	ART Power Setting	Tx 1 Measured Pwr (dBm)	Tx 2 Measured Pwr (dBm)	Tx 3 Measured Pwr (dBm)	Aggregate Measured Pwr (dBm)
HT-40 (5.230 GHz)	5				8.25
	6				9.17
	7				8.34
	8				9.24
	9				10.36
	10				11.23
	11				12.2
	12				12.96
	13				13.86
	14				14.82
	15				15.7
	16				16.67
	17				17.62
	18				18.56
	19				19.48

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Antenna Test Configurations for Radiated Emissions

Spurious Emission and Band-Edge Test Strategy
When testing radiated spurious emissions and band-edge three identical antennae were connected to the EUT at all times. Transmission during this test process simulated a typical installation. Results for the following configurations are provided in this report.

Legacy

AP-ANT-Int	AP-ANT-12(Direct)	AP-ANT-10
a 5180	a 5180	a 5180
a 5200	a 5200	a 5200
a 5240	a 5240	a 5240
a 5260	a 5260	a 5260
a 5300	a 5300	a 5300
a 5320	a 5320	a 5320
a 5500	a 5500	a 5500
a 5600	a 5600	a 5600
a 5700	a 5700	a 5700
BE a 5150	BE a 5150	BE a 5150
Pk a 5180	Pk a 5180	Pk a 5180
Pk a 5200	Pk a 5200	Pk a 5200
Pk a 5240	Pk a 5240	Pk a 5240
Pk a 5260	Pk a 5260	Pk a 5260
Pk a 5300	Pk a 5300	Pk a 5300
Pk a 5320	Pk a 5320	Pk a 5320
BE a 5350	BE a 5350	BE a 5350
BE a 5460	BE a 5460	BE a 5460
Pk a 5500	Pk a 5500	Pk a 5500
Pk a 5600	Pk a 5600	Pk a 5600
Pk a 5700	Pk a 5700	Pk a 5700

KEY;-

BE – Band-Edge

PK - Peak Emission

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HT-20

AP-ANT-Int	AP-ANT-12(Direct)	AP-ANT-10
a 5180	a 5180	a 5180
a 5200	a 5200	a 5200
a 5240	a 5240	a 5240
a 5260	a 5260	a 5260
a 5300	a 5300	a 5300
a 5320	a 5320	a 5320
a 5500	a 5500	a 5500
a 5600	a 5600	a 5600
a 5700	a 5700	a 5700
BE a 5150	BE a 5150	BE a 5150
Pk a 5180	Pk a 5180	Pk a 5180
Pk a 5200	Pk a 5200	Pk a 5200
Pk a 5240	Pk a 5240	Pk a 5240
Pk a 5260	Pk a 5260	Pk a 5260
Pk a 5300	Pk a 5300	Pk a 5300
Pk a 5320	Pk a 5320	Pk a 5320
BE a 5350	BE a 5350	BE a 5350
BE a 5460	BE a 5460	BE a 5460
Pk a 5500	Pk a 5500	Pk a 5500
Pk a 5600	Pk a 5600	Pk a 5600
Pk a 5700	Pk a 5700	Pk a 5700

KEY;-

BE – Band-Edge

PK - Peak Emission

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HT-40

AP-ANT-Int	AP-ANT-12(Direct)	AP-ANT-10
a 5190	a 5190	a 5190
a 5230	a 5230	a 5230
a 5270	a 5270	a 5270
a 5310	a 5310	a 5310
BE a 5150	BE a 5150	BE a 5150
Pk a 5190	Pk a 5190	Pk a 5190
Pk a 5230	Pk a 5230	Pk a 5230
Pk a 5270	Pk a 5270	Pk a 5270
Pk a 5310	Pk a 5310	Pk a 5310
BE a 5350	BE a 5350	BE a 5350
a 5510	a 5510	a 5510
a 5620	a 5620	a 5620
a 5690	a 5690	a 5690
BE a 5460	BE a 5460	BE a 5460
PK a 5510	PK a 5510	PK a 5510
PK a 5620	PK a 5620	PK a 5620
PK a 5690	PK a 5690	PK a 5690

KEY;-

BE – Band-Edge

PK - Peak Emission

3.7. Equipment Modifications

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

EUT Software Power Settings - Radiated Testing

1. Reduction in output power to meet band-edge requirements was required in certain circumstances. When testing radiated spurious emissions a matrix has been included in the Radiated Emissions testing section of this report identifying the power settings for this scenario. The matrix identifies whether the reduction in power was as a result of band-edge issues or spurious emissions.

3.8. Deviations from the Test Standard

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

1. None

3.9. Subcontracted Testing or Third Party Data

1. NONE

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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*
RSS-GEN **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
7.8.1	Detection Bandwidth	UNII Detection Bandwidth	Conducted	Complies	6.2.1
7.8.2.1	Performance Requirements Check	Initial Channel Availability Check Time	Conducted	Complies	6.2.2
7.8.2.2		Radar Burst at the Beginning of the Channel Availability Check Time	Conducted	Complies	6.2.3
7.8.2.3		Radar Burst at the End of the Channel Availability Check Time	Conducted	Complies	6.2.4
7.8.3	In-Service Monitoring	In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period	Conducted	Complies	6.2.5
7.8.4	Radar Detection	Statistical Performance Check	Conducted	Complies	6.2.6

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*

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5. TEST RESULTS

5.1. Device Characteristics

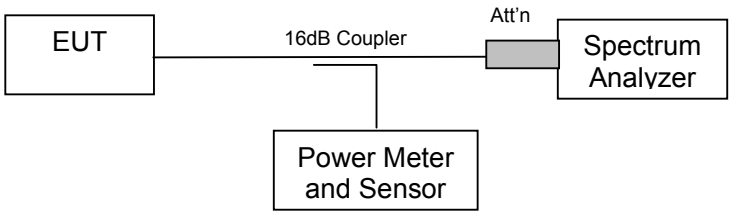
5.1.1. 26 dB and 99 % Bandwidth

FCC, Part 15 Subpart C §15.407(a)

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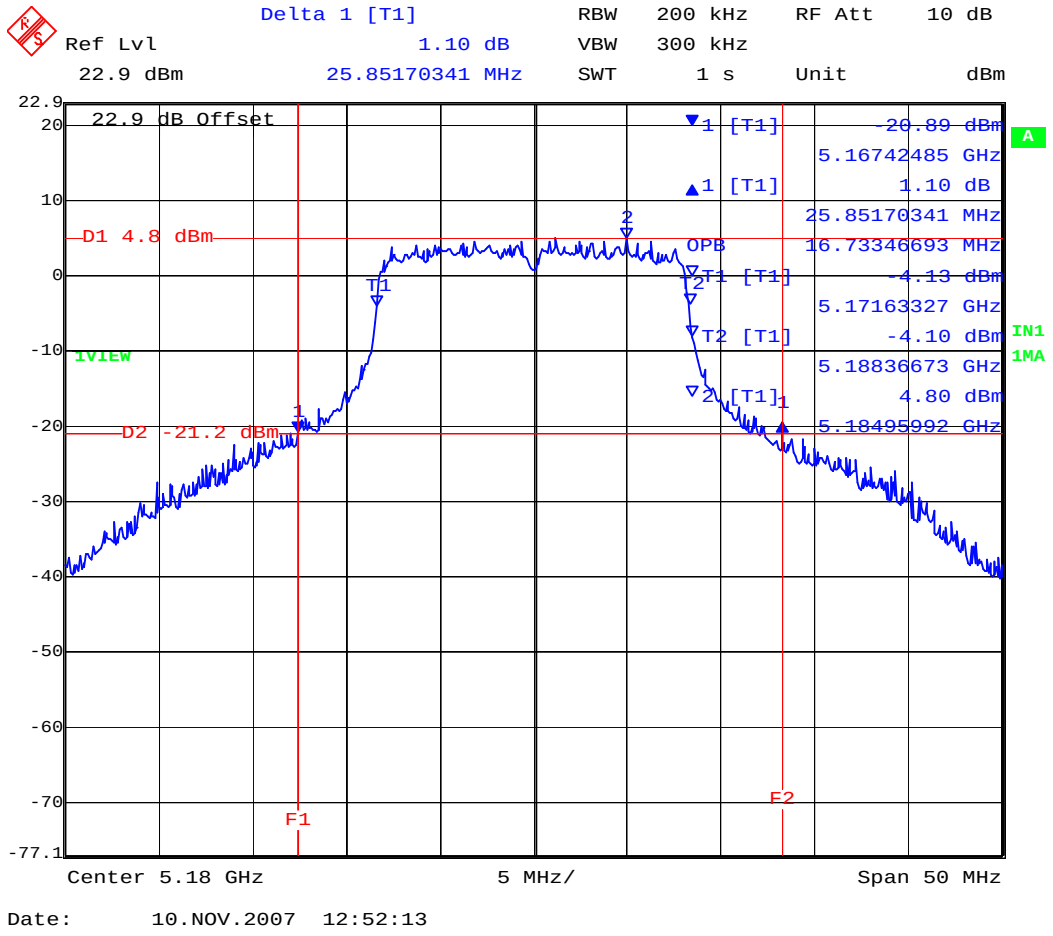
Measurement Results for 26 dB and 99 % Operational Bandwidth(s)

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

TABLE OF RESULTS – **802.11a Legacy**

Center Frequency (MHz)	26 dB Bandwidth (MHz)	99 % BW (MHz)
5,180	25.852	16.733
5,200	26.754	16.834
5,240	25.351	16.834

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



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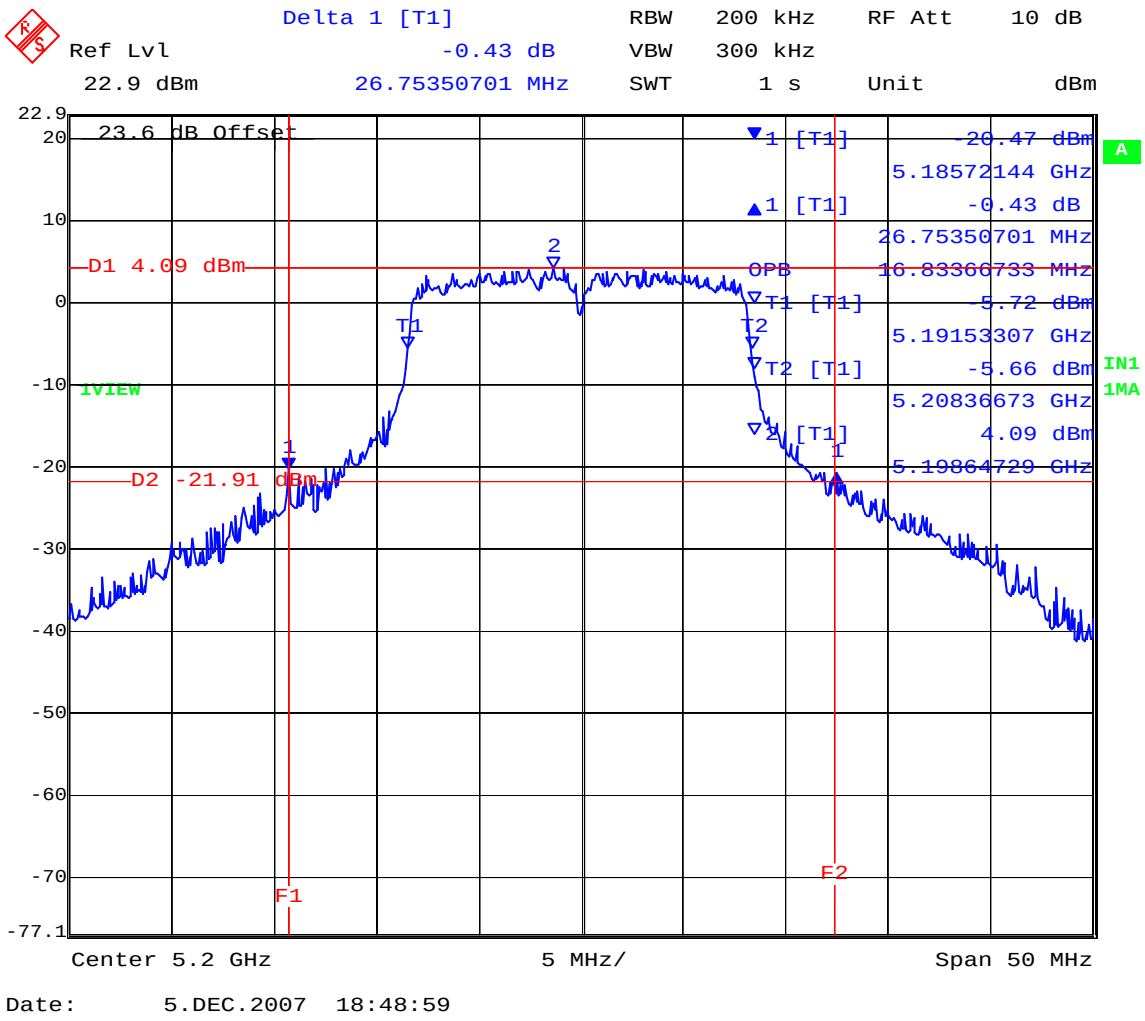
5,200 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



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

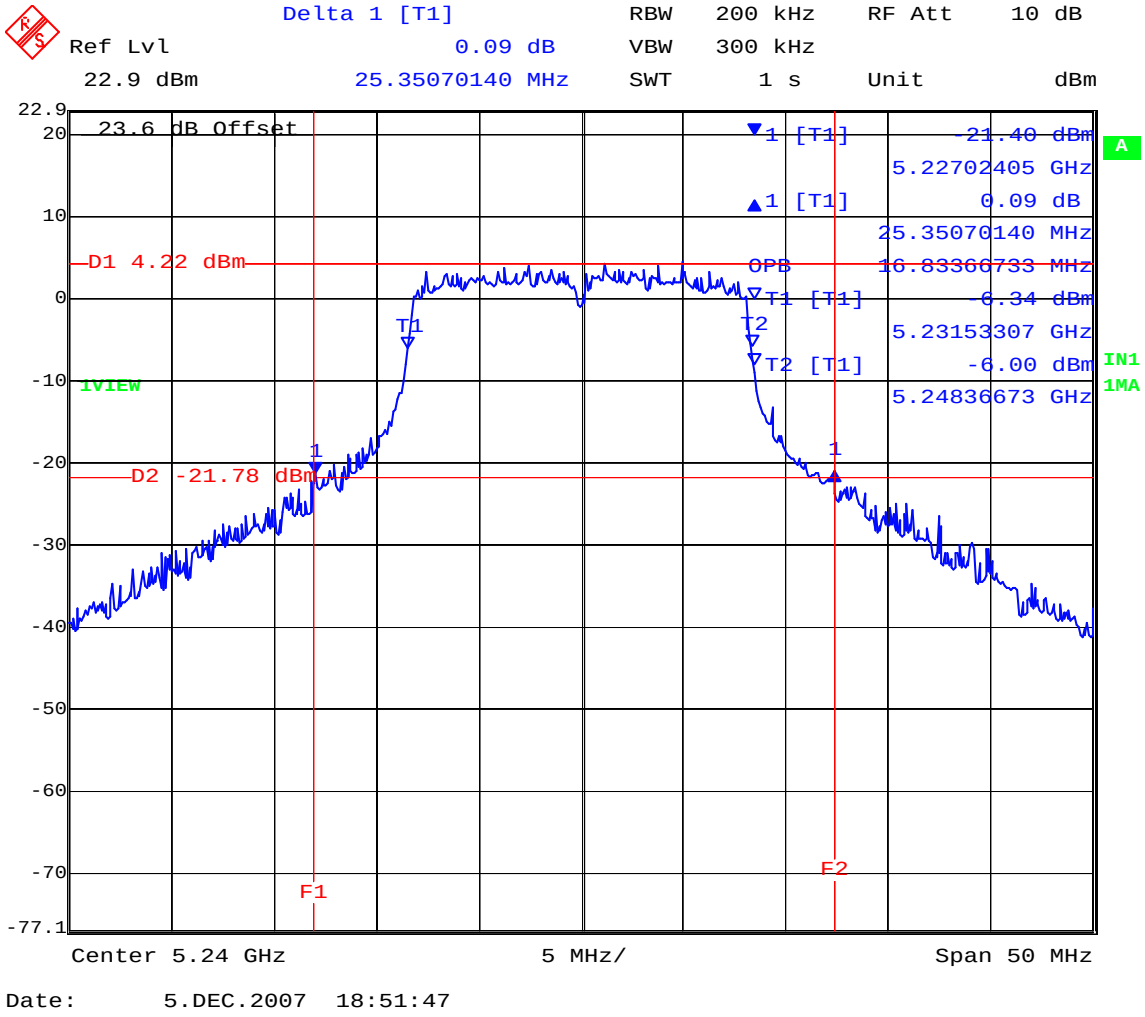

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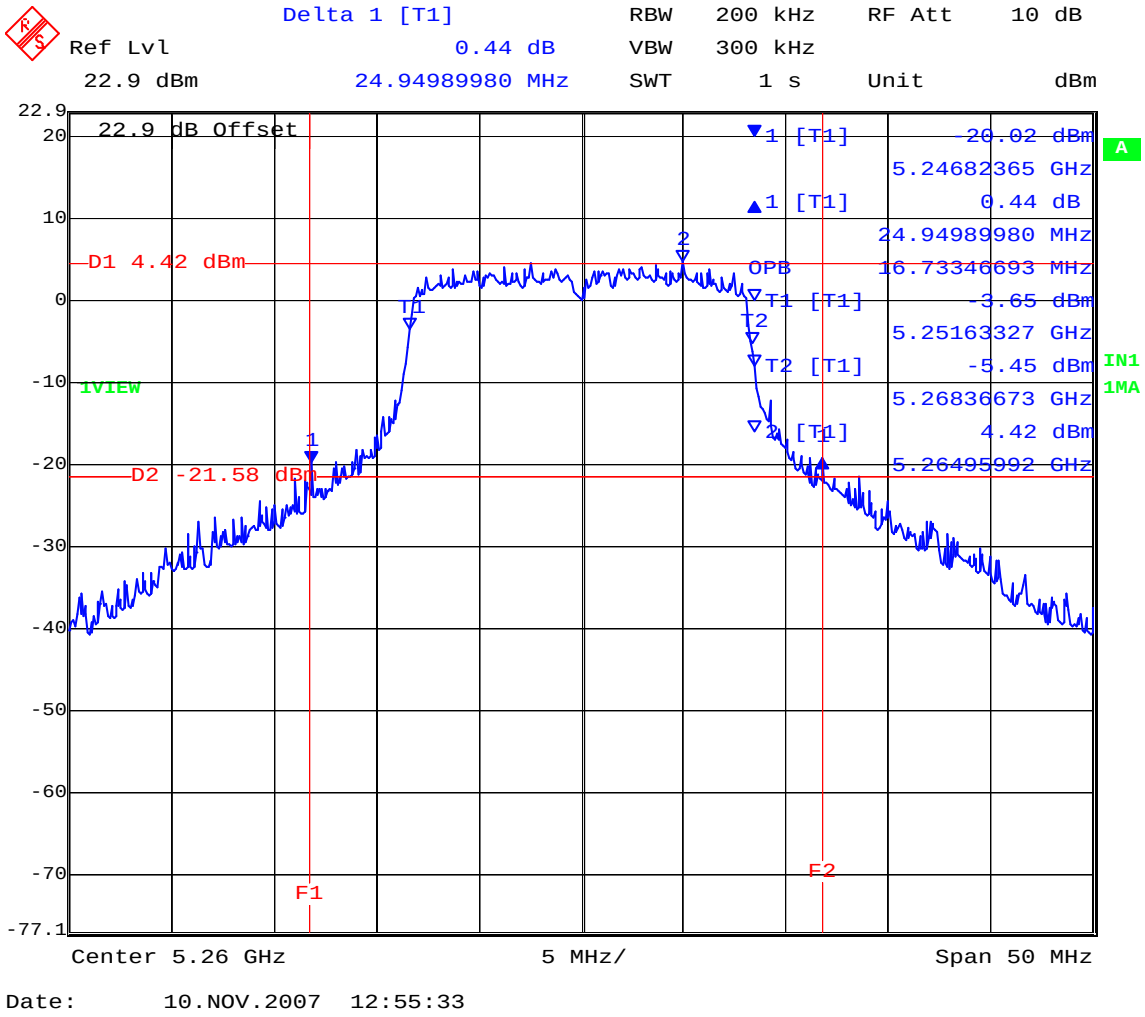
TABLE OF RESULTS – **802.11a Legacy**

Center Frequency (MHz)	26 dB Bandwidth (MHz)	99 % BW (MHz)
5,260	24.950	16.733
5,300	24.248	16.733
5,320	25.351	16.733

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



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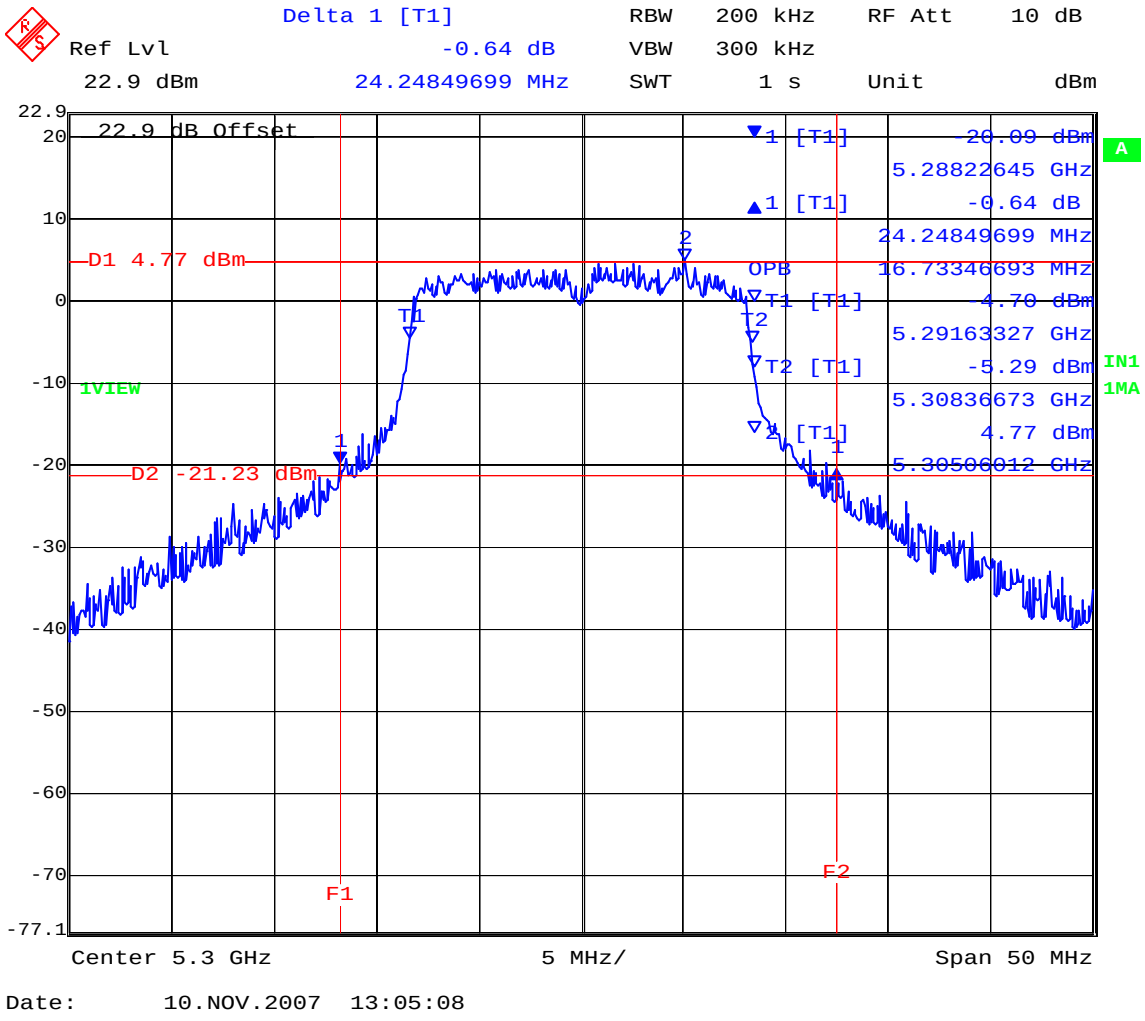
5,300 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



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

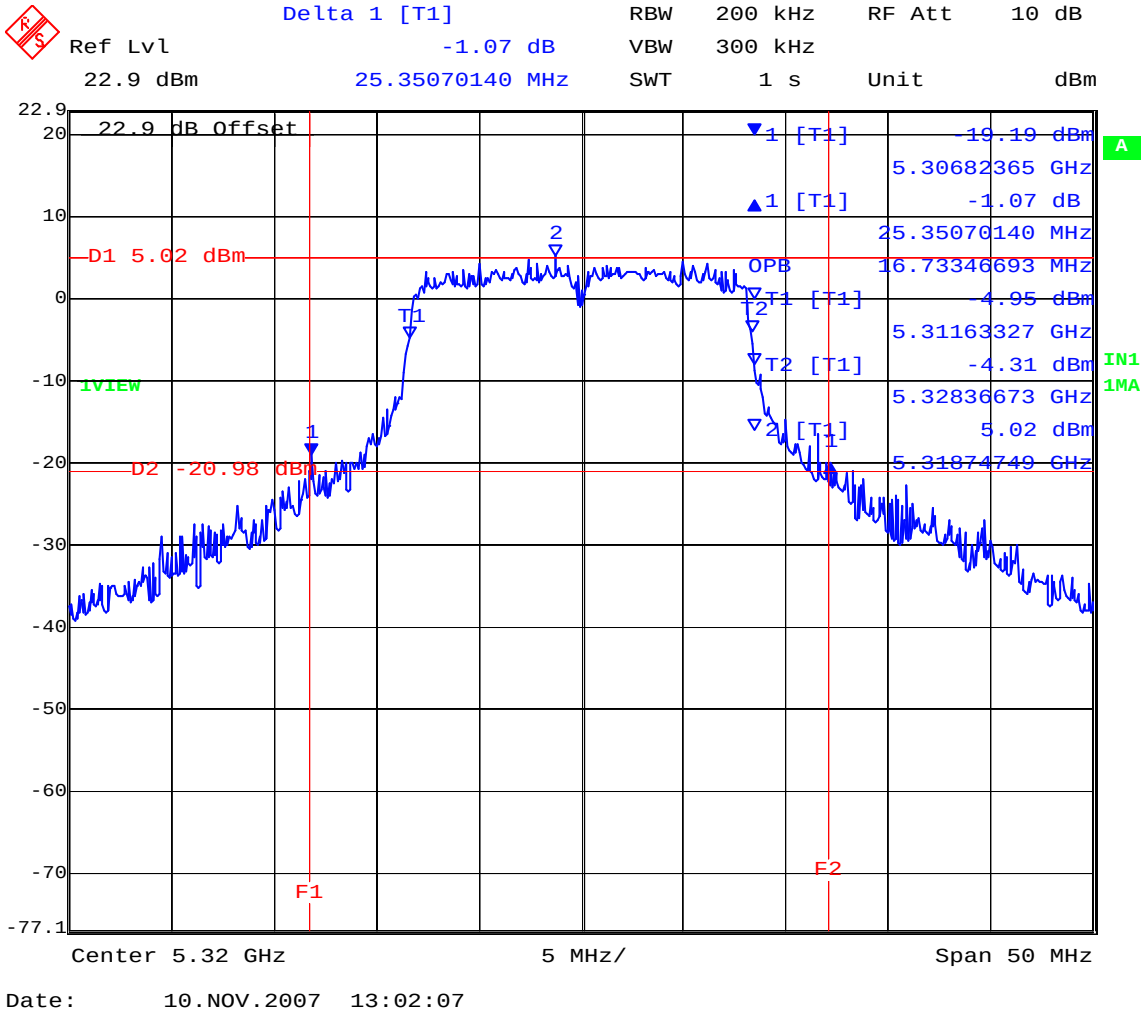

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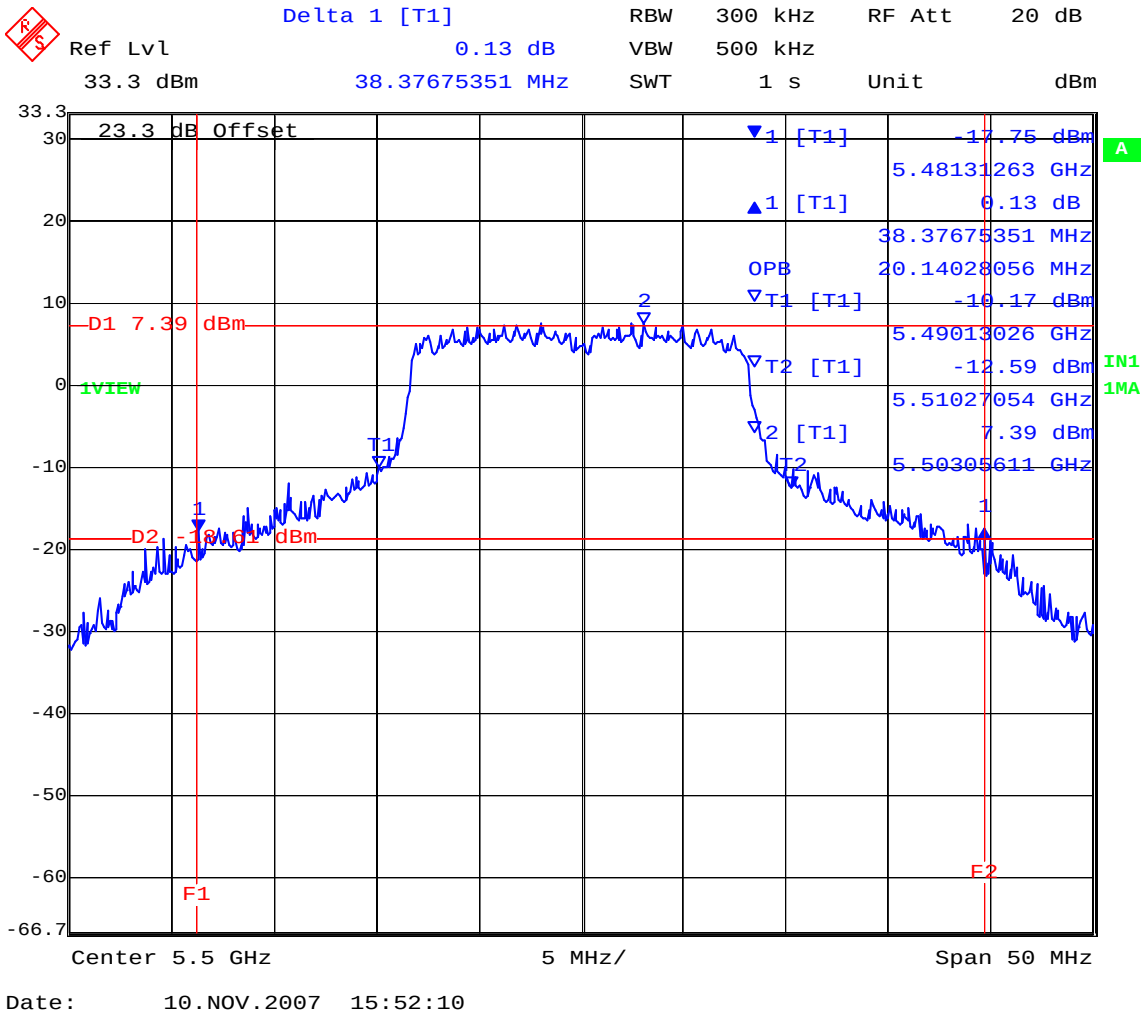
TABLE OF RESULTS – **802.11a Legacy**

Center Frequency (MHz)	26 dB Bandwidth (MHz)	99 % BW (MHz)
5,500	38.377	20.140
5,600	35.872	19.038
5,700	29.960	17.234

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



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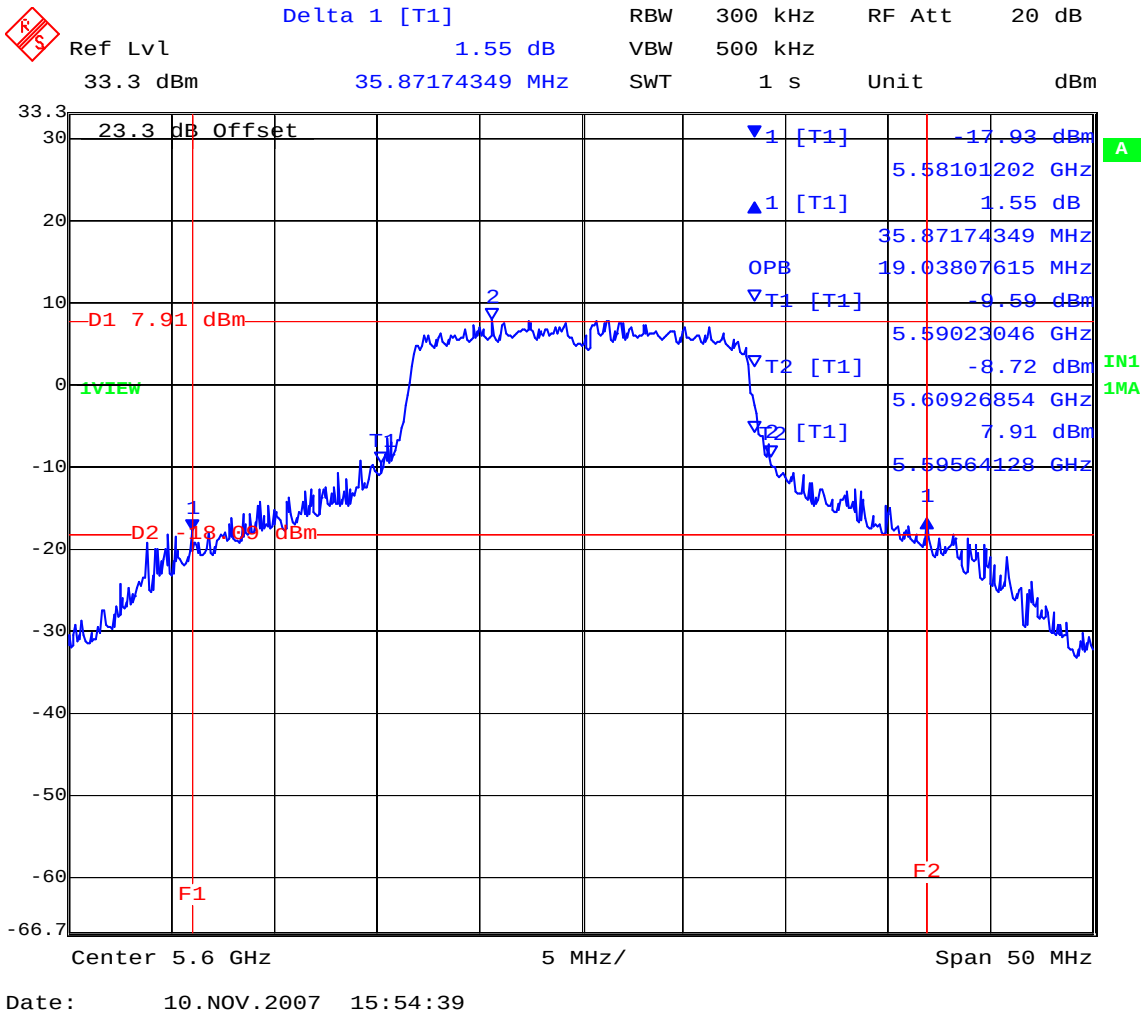
5,600 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



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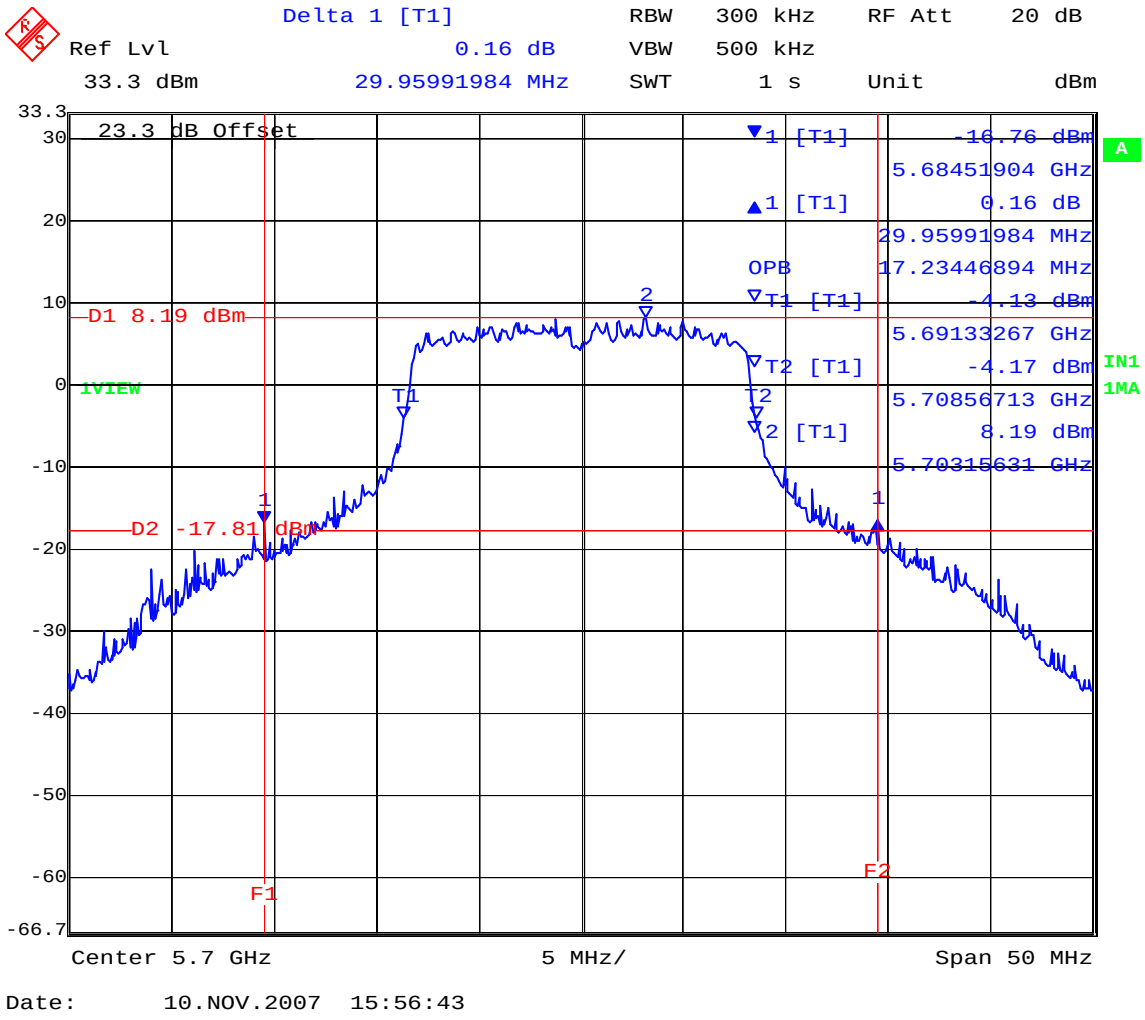
5,700 MHz 802.11a Legacy 26 dB and 99 % Bandwidth



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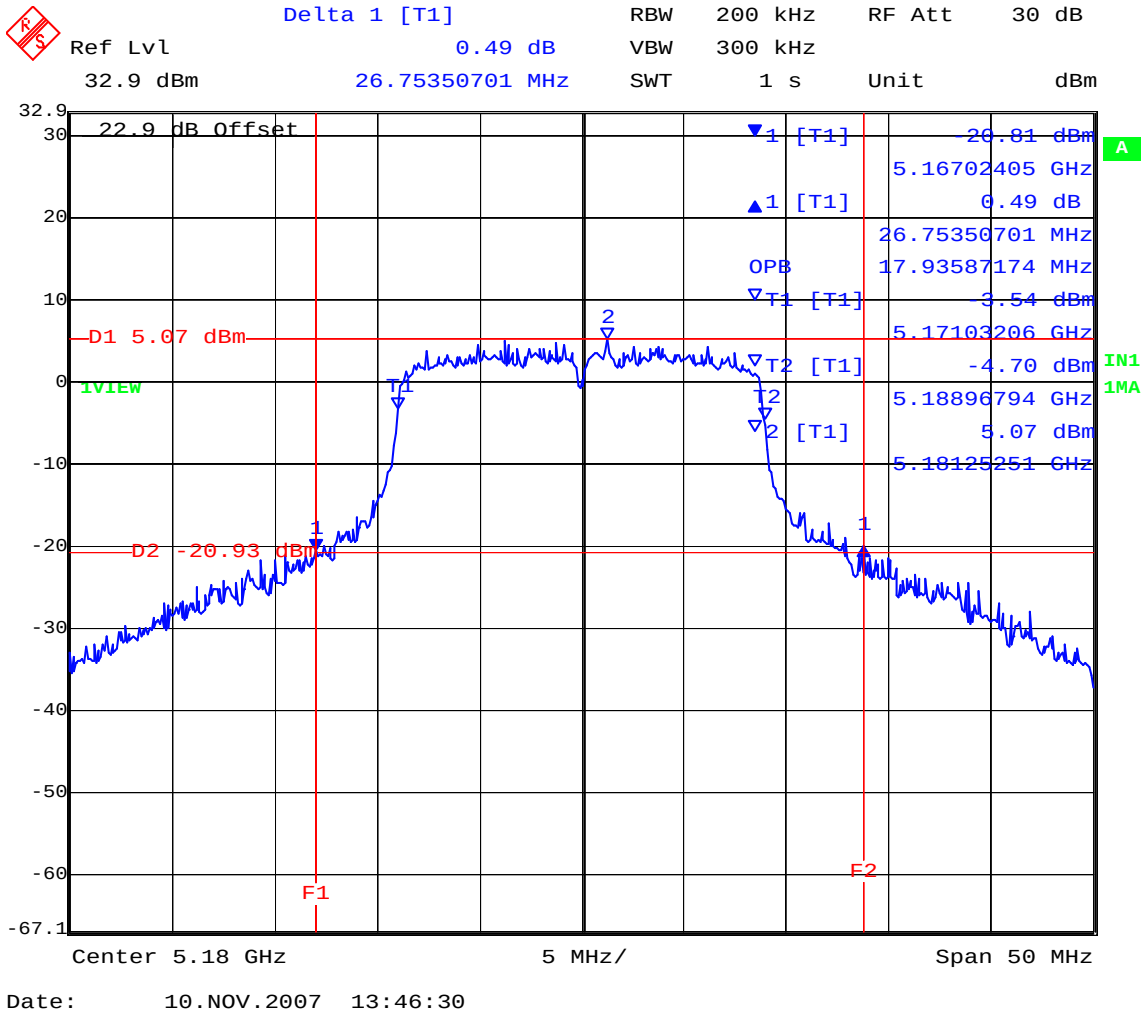
Measurement Results for 26 dB and 99 % Operational Bandwidth(s) -Continued

TABLE OF RESULTS – **802.11n HT20**

Center Frequency (MHz)	26 dB Bandwidth (MHz)	99 % BW (MHz)
5,180	26.754	17.936
5,200	25.451	17.936
5,240	24.148	17.836

5,180 MHz 802.11n HT20 26 dB and 99 % Bandwidth



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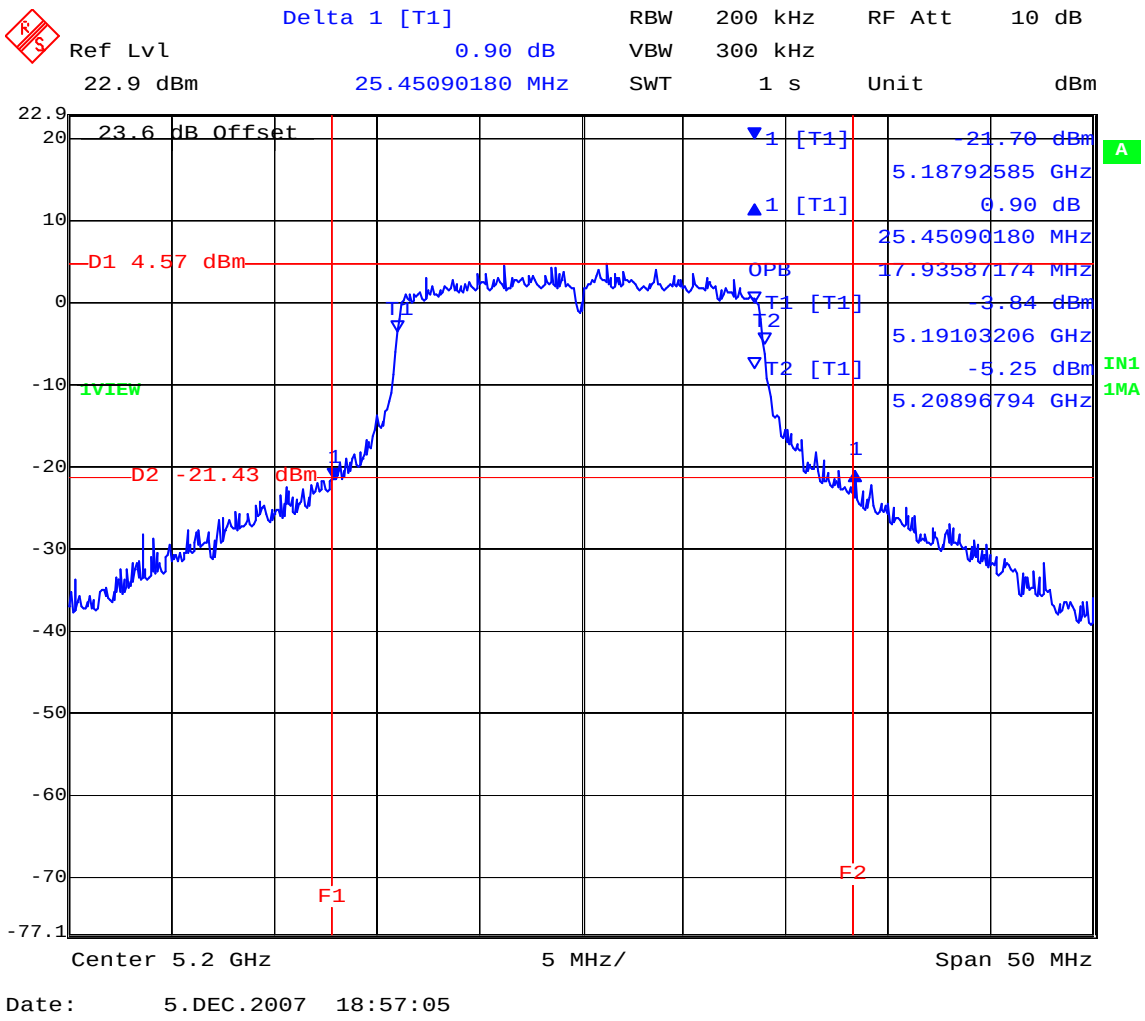
5,200 MHz 802.11n HT20 26 dB and 99 % Bandwidth



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5,240 MHz 802.11n HT20 26 dB and 99 % Bandwidth

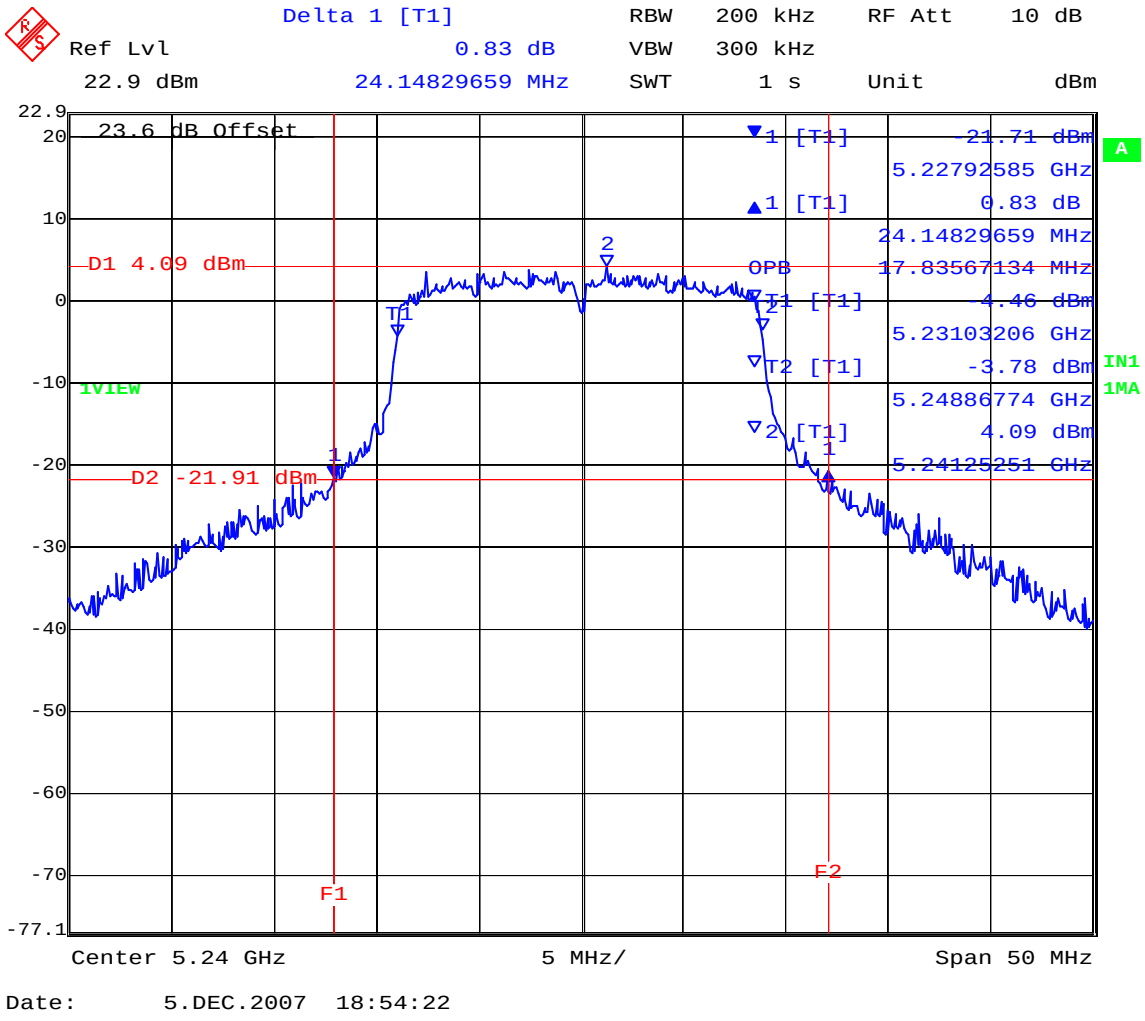

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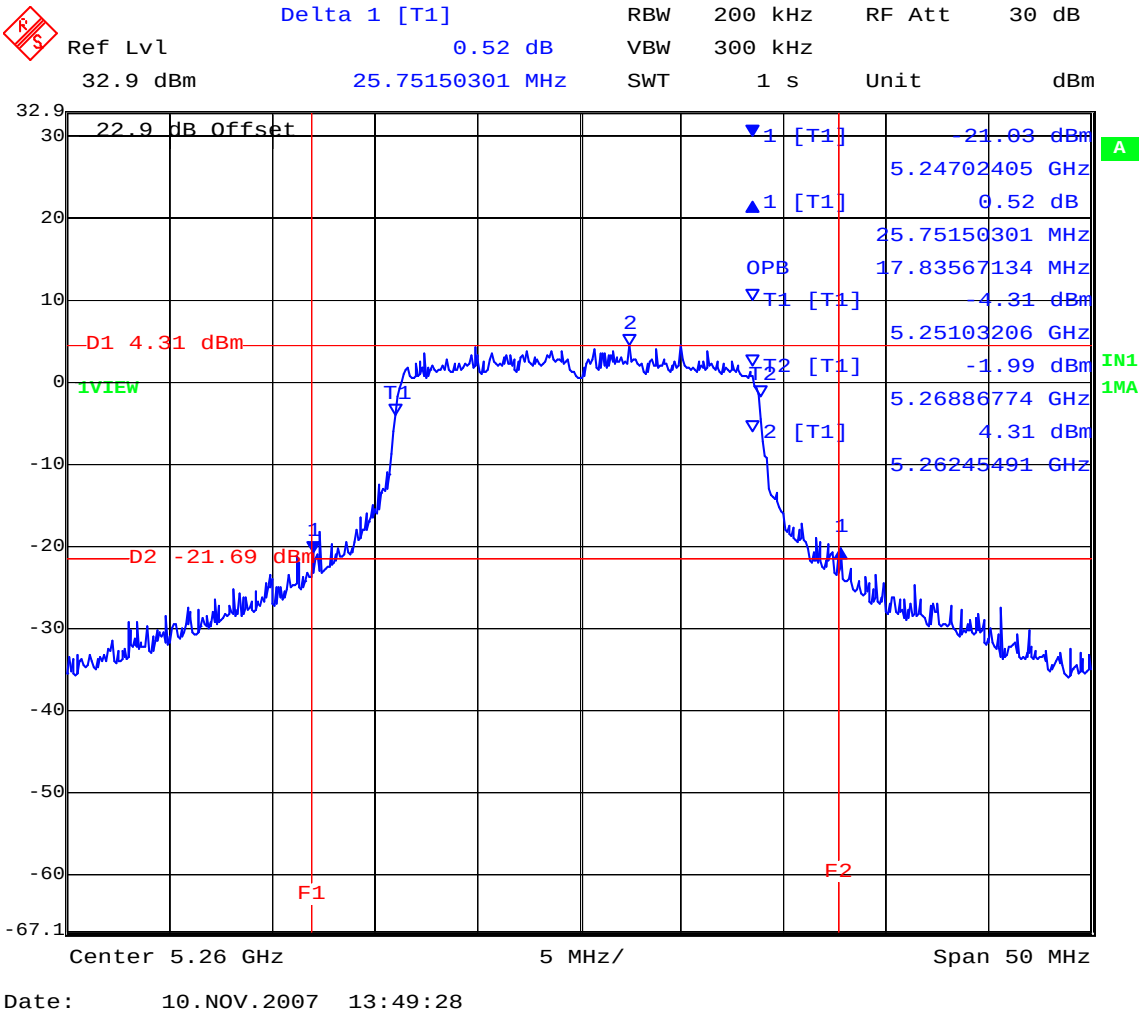
TABLE OF RESULTS – **802.11n HT20**

Center Frequency (MHz)	26 dB Bandwidth (MHz)	99 % BW (MHz)
5,260	25.752	17.836
5,300	24.850	17.936
5,320	24.850	17.936

5,260 MHz 802.11n HT20 26 dB and 99 % Bandwidth



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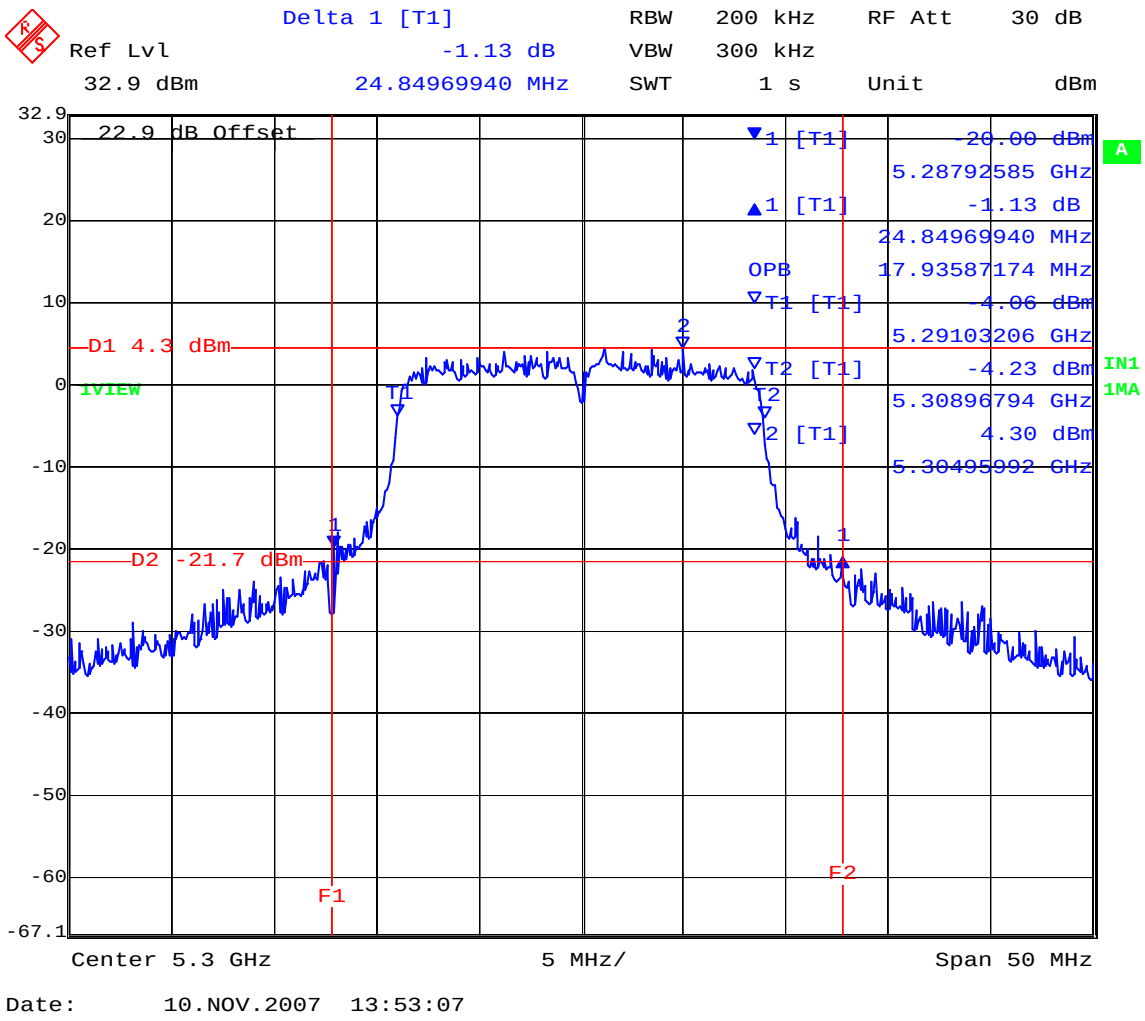
5,300 MHz 802.11n HT20 26 dB and 99 % Bandwidth



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5,320 MHz 802.11n HT20 26 dB and 99 % Bandwidth

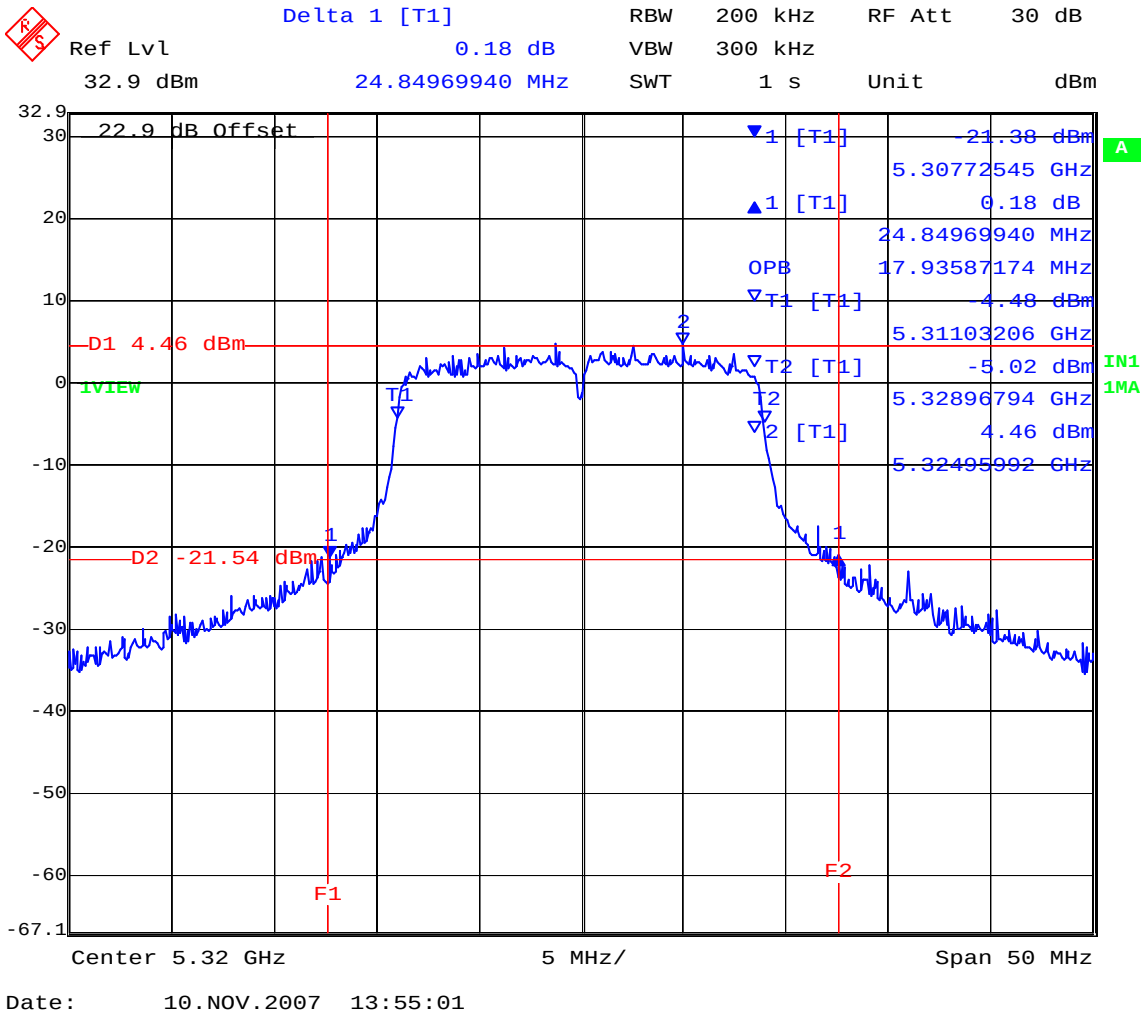

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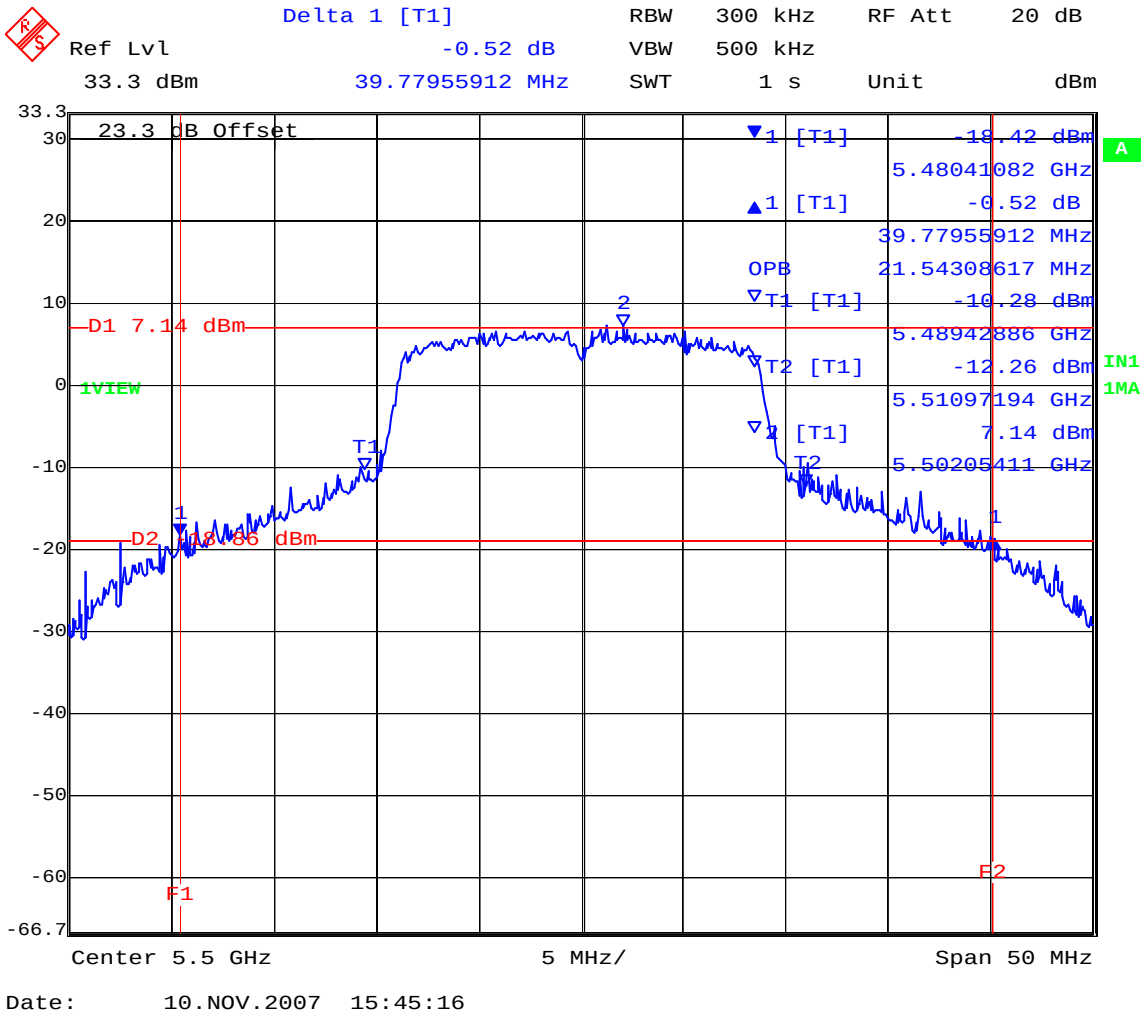
TABLE OF RESULTS – **802.11n HT20**

Center Frequency (MHz)	26 dB Bandwidth (MHz)	99 % BW (MHz)
5,500	39.780	21.543
5,600	36.874	20.040
5,700	32.565	18.537

5,500 MHz 802.11n HT20 26 dB and 99 % Bandwidth



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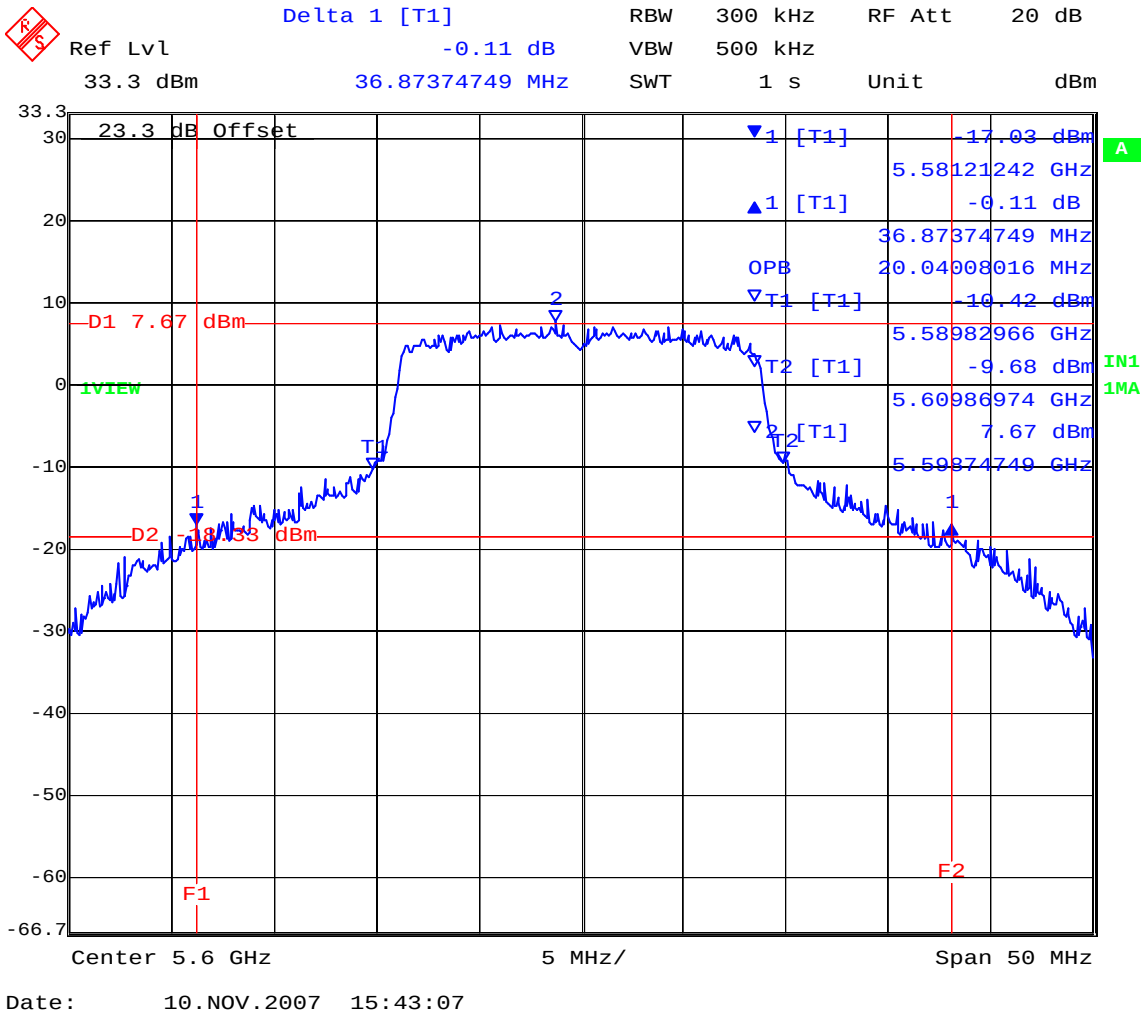
5,600 MHz 802.11n HT20 26 dB and 99 % Bandwidth



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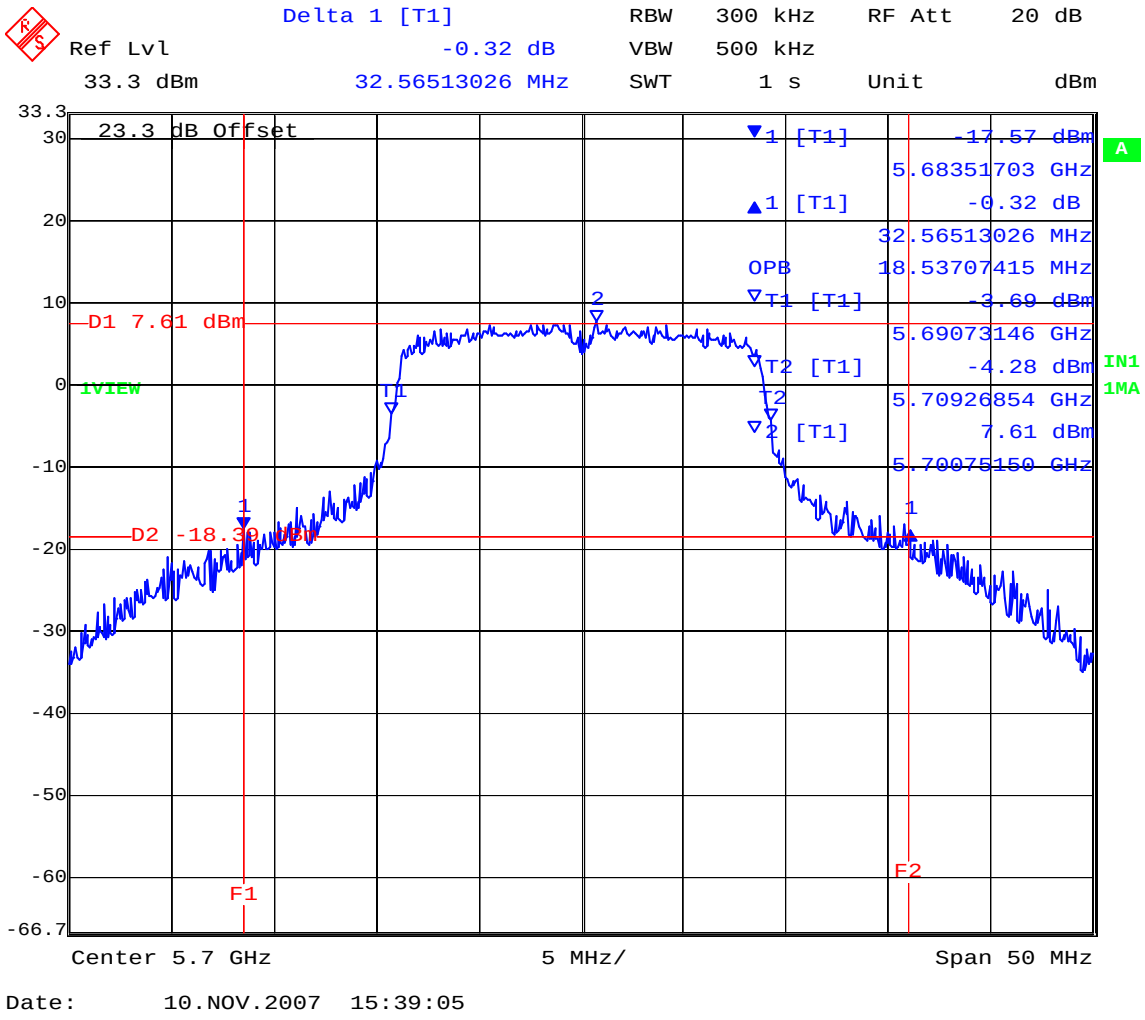
5,700 MHz 802.11n HT20 26 dB and 99 % Bandwidth



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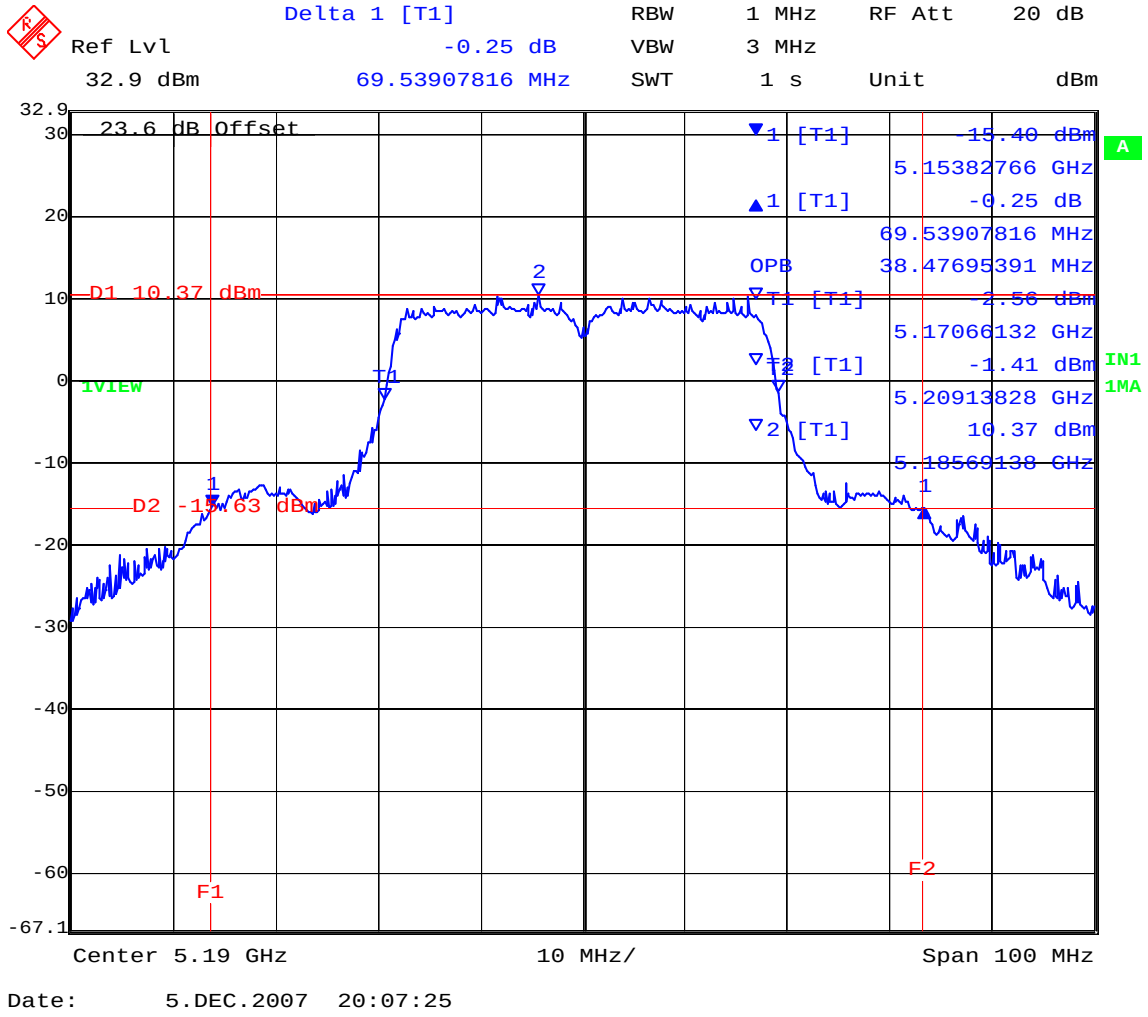
Measurement Results for 26 dB and 99 % Operational Bandwidth(s) -Continued

TABLE OF RESULTS – **802.11n HT40**

Center Frequency (MHz)	26 dB Bandwidth (MHz)	99 % BW (MHz)
5,190	69.539	38.477
5,230	67.936	38.877

5,190 MHz 802.11n HT40 26 dB and 99 % Bandwidth



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5,230 MHz 802.11n HT40 26 dB and 99 % Bandwidth

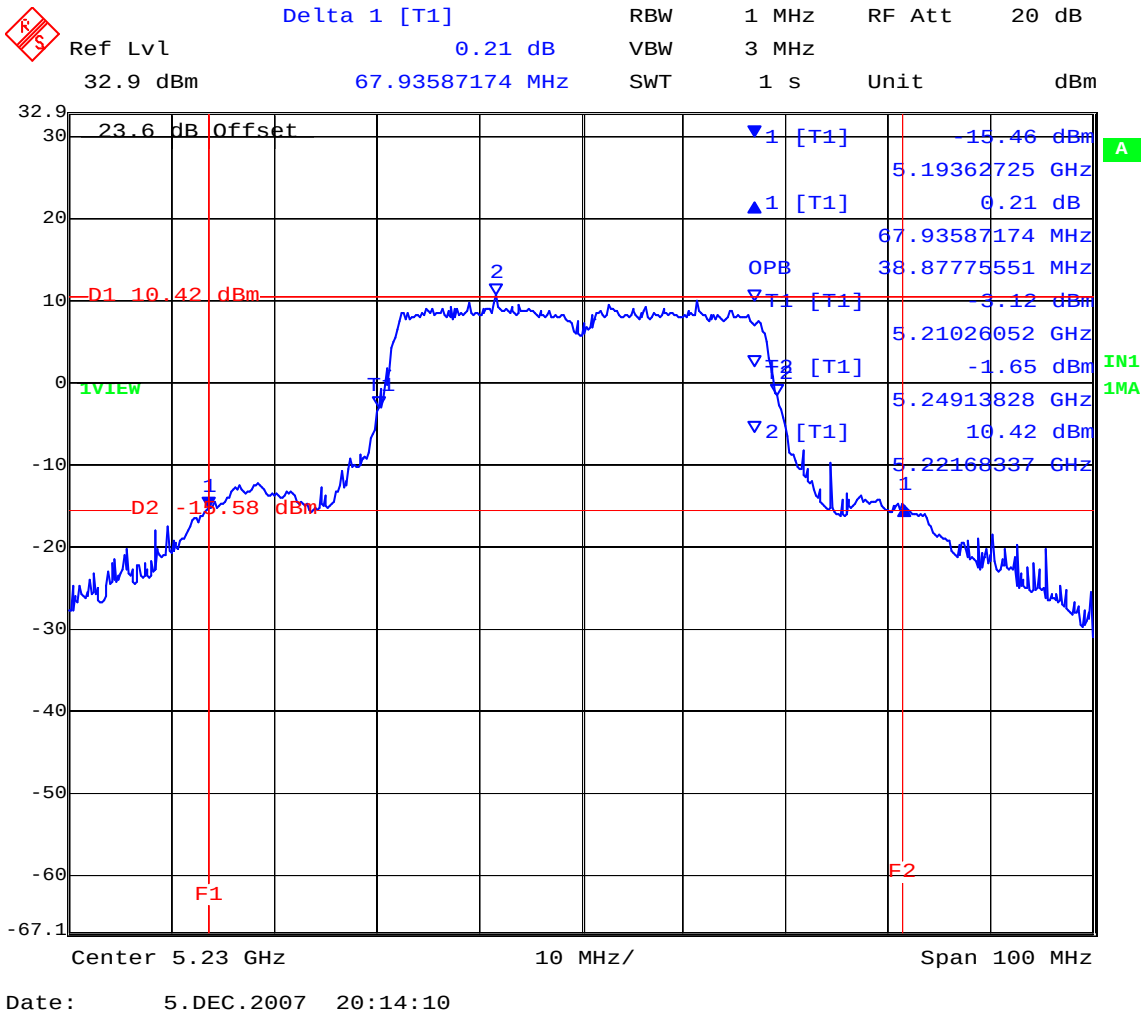

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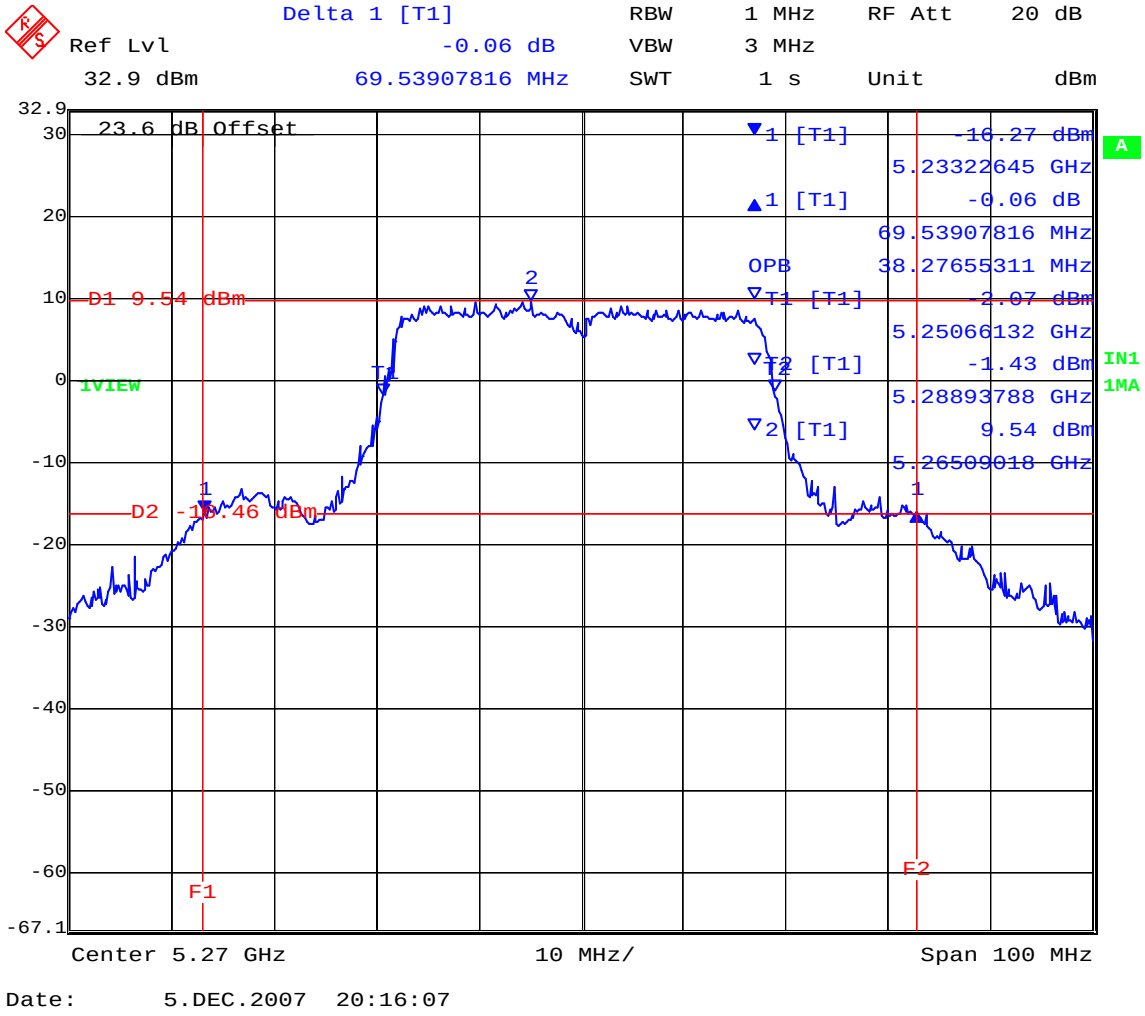
TABLE OF RESULTS – **802.11n HT40**

Center Frequency (MHz)	26 dB Bandwidth (MHz)	99 % BW (MHz)
5,270	69.539	38.277
5,310	70.140	38.677

5,270 MHz 802.11n HT40 26 dB and 99 % Bandwidth



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5,310 MHz 802.11n HT40 26 dB and 99 % Bandwidth

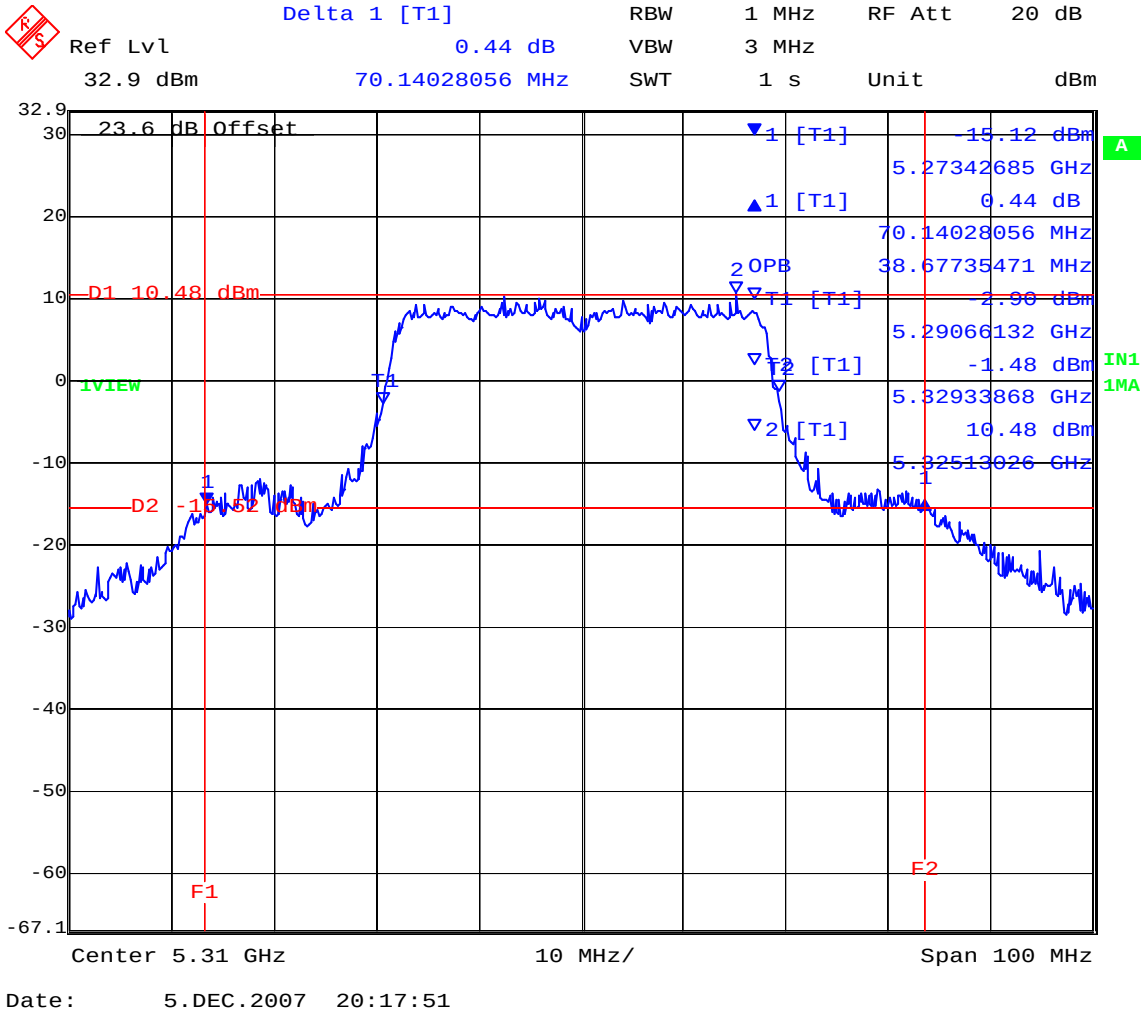

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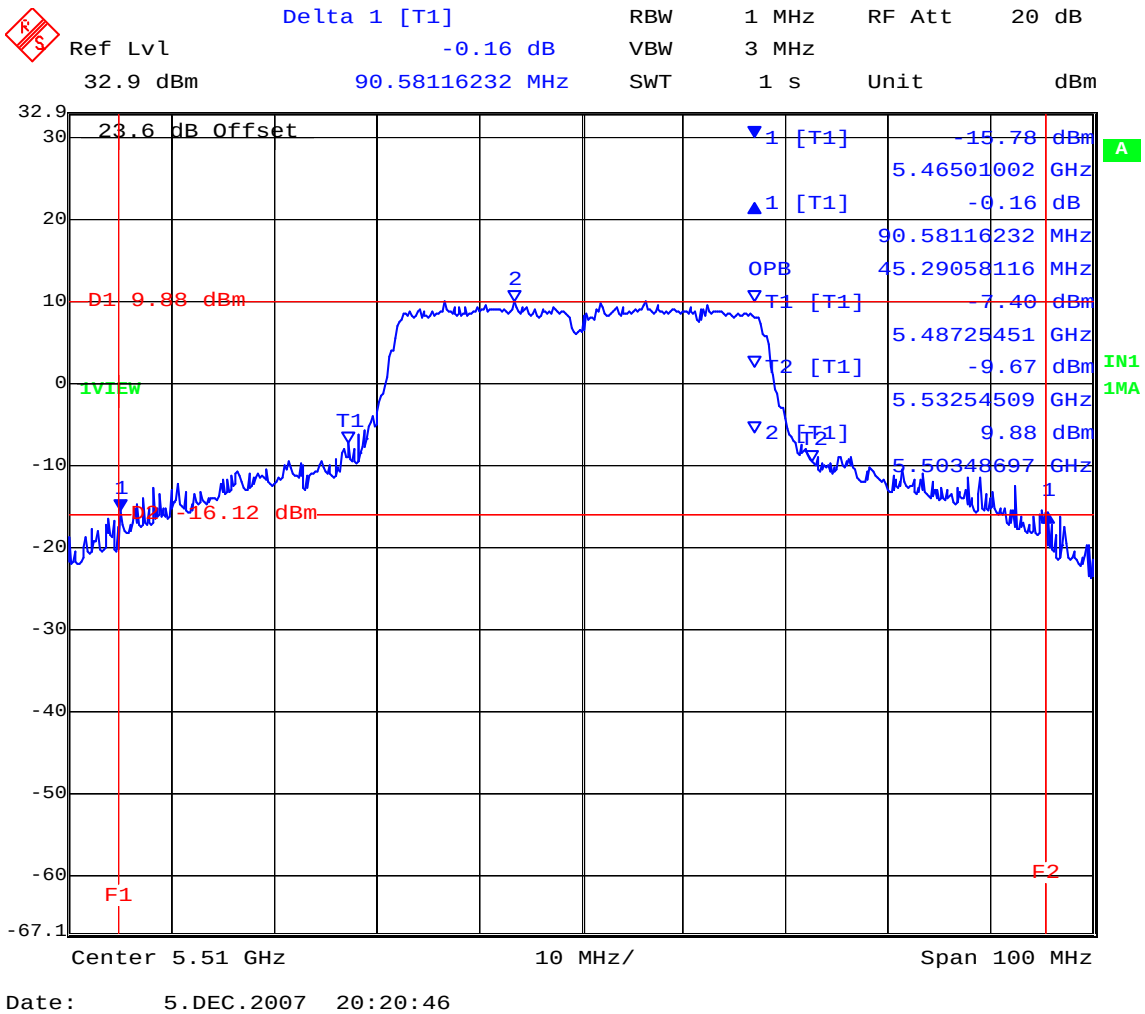
TABLE OF RESULTS – **802.11n HT40**

Center Frequency (MHz)	26 dB Bandwidth (MHz)	99 % BW (MHz)
5,510	90.581	45.291
5,620	87.575	42.084
5,690	76.152	39.078

5,510 MHz 802.11n HT40 26 dB and 99 % Bandwidth



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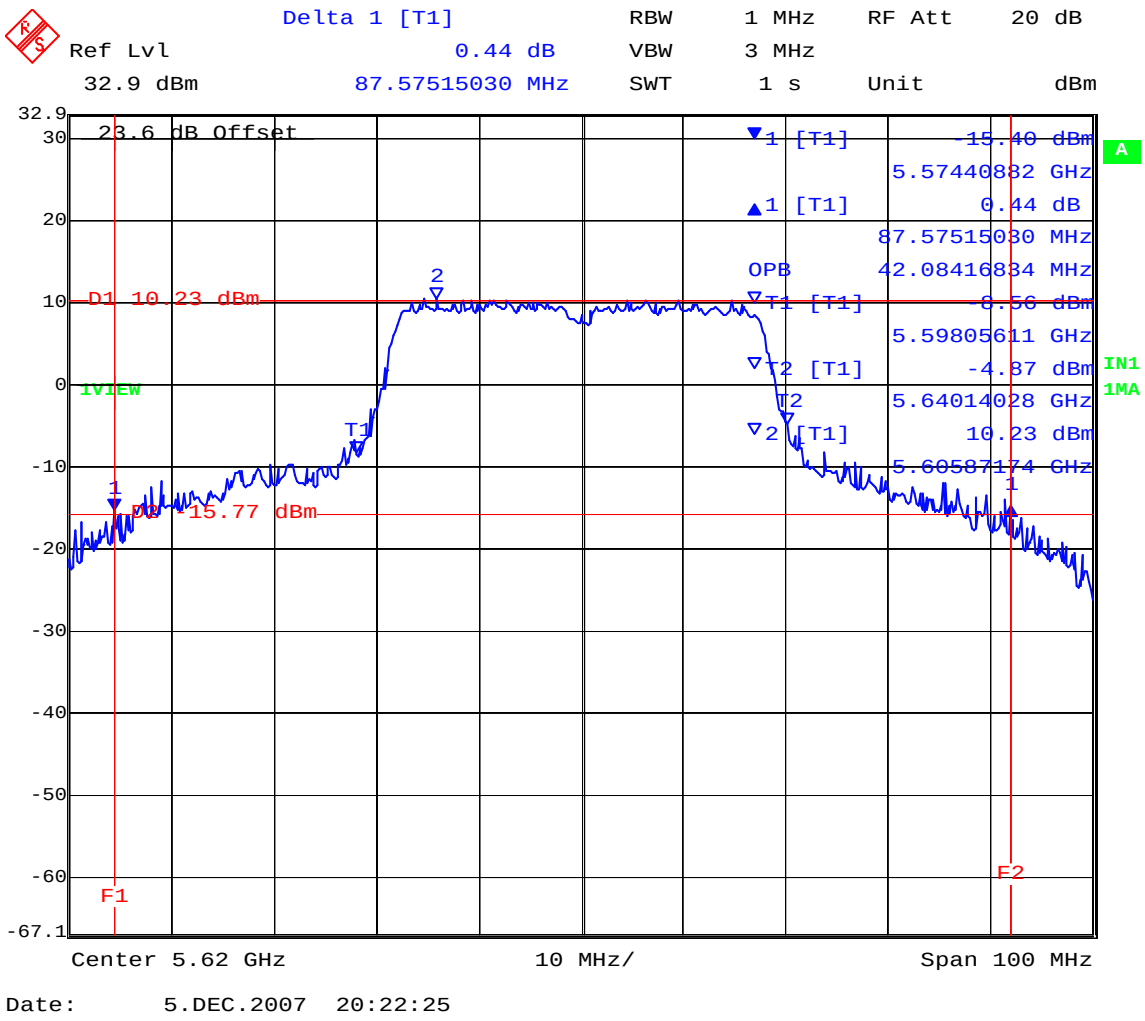
5,620 MHz 802.11n HT40 26 dB and 99 % Bandwidth



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5,690 MHz 802.11n HT40 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

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of RF Spectrum Mask'	0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117

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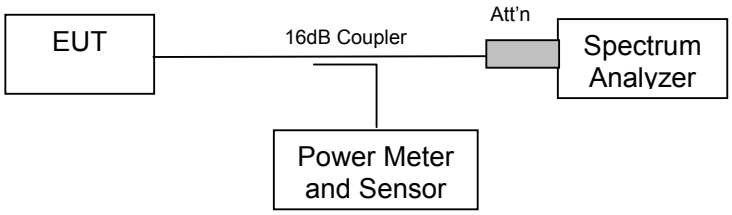
5.1.2. Transmit Output Power

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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Antenna Gain - Maximum Permissible Peak Transmit Power

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum allowable peak power in the 5150 – 5250 MHz frequency band is +17 dBm.

The maximum allowable peak power in the 5250 – 5350 MHz, and 5470 – 5725 MHz frequency band is + 24 dBm.

Antenna Type	Freq Band (MHz)	Gain (dBi)	Antenna Gain >6dBi (dB)	Max. Allowable Peak Power (dBm)	Max. EIRP (dBm)
ANT-12 Panel	5150-5250	14	8	17 – 8 = 9	23.0
ANT-12 Panel	5250-5350 5470-5725	14	8	24 – 8 = 16	30.0

Maximum Transmit Power, FCC Limits

Limit 5150 – 5250 MHz: Lesser of 50 mW (+17dBm) or 4 + 10 Log (B) dBm

Frequency Range (MHz)	Maximum 26 dB Bandwidth (MHz)	4 + 10 Log (B) (dBm)	Limit (dBm)
5150 – 5250	69.539	22.42	17.00

Limit 5250 – 5350 and 5470 – 5725; Lesser of 250 mW (+24dBm) or 11 + 10 Log (B) dBm

Frequency Range (MHz)	Maximum 26 dB Bandwidth (MHz)	11 + 10 Log (B) (dBm)	Limit (dBm)
5250 - 5350	70.140	29.46	24.00
5470 - 5725	90.581	30.57	24.00

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Maximum Transmit Power Industry Canada Limits

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

Frequency Range (MHz)	Maximum 99% Bandwidth (MHz)	10 + 10 Log (B) (dBm)	Limit (dBm)
5150 – 5250	38.877	25.90	23.00

Limit 5250 – 5350 and 5470 – 5725; Lesser of 250 mW (+24dBm) or 11 + 10 Log (B) dBm

Frequency Range (MHz)	Maximum 99% Bandwidth (MHz)	11 + 10 Log (B) (dBm)	Limit (dBm)
5250 - 5350	38.677	25.88	24.00
5470 - 5725	45.291	27.56	24.00

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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%

TABLE OF RESULTS – **802.11a Legacy**

Center Frequency (MHz)	Maximum Conducted Power (dBm)
5,180	+14.93
5,200	+14.24
5,240	+14.06

TABLE OF RESULTS – **802.11a Legacy**

Center Frequency (MHz)	Maximum Conducted Power (dBm)
5,260	+14.44
5,300	+14.20
5,320	+14.52

TABLE OF RESULTS – **802.11a Legacy**

Center Frequency (MHz)	Maximum Conducted Power (dBm)
5,500	+14.99
5,600	+15.67
5,700	+15.80

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TABLE OF RESULTS – **802.11n HT20**

Center Frequency (MHz)	Maximum Conducted Power (dBm)
5,180	+14.93
5,200	+14.29
5,240	+13.98

TABLE OF RESULTS – **802.11n HT20**

Center Frequency (MHz)	Maximum Conducted Power (dBm)
5,260	+14.37
5,300	+14.12
5,320	+14.45

TABLE OF RESULTS – **802.11n HT20**

Center Frequency (MHz)	Maximum Conducted Power (dBm)
5,500	+14.96
5,600	+15.70
5,700	+15.62

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TABLE OF RESULTS – **802.11n HT40**

Center Frequency (MHz)	Maximum Conducted Power (dBm)
5,190	+14.42
5,230	+14.15

TABLE OF RESULTS – **802.11n HT40**

Center Frequency (MHz)	Maximum Conducted Power (dBm)
5,270	+13.70
5,310	+14.10

TABLE OF RESULTS – **802.11n HT40**

Center Frequency (MHz)	Maximum Conducted Power (dBm)
5,510	+14.85
5,620	+15.95
5,690	+14.96

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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-210 §A9.2(2)

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

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

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	±1.33 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-01 'Measuring RF Output Power'	0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117

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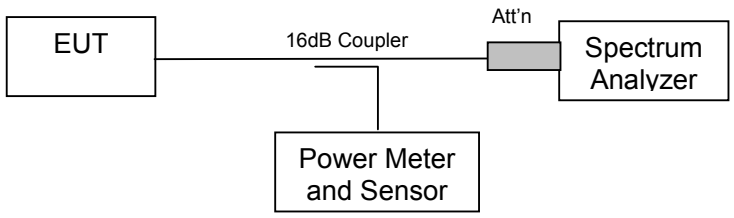
5.1.3. Peak Power Spectral Density

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



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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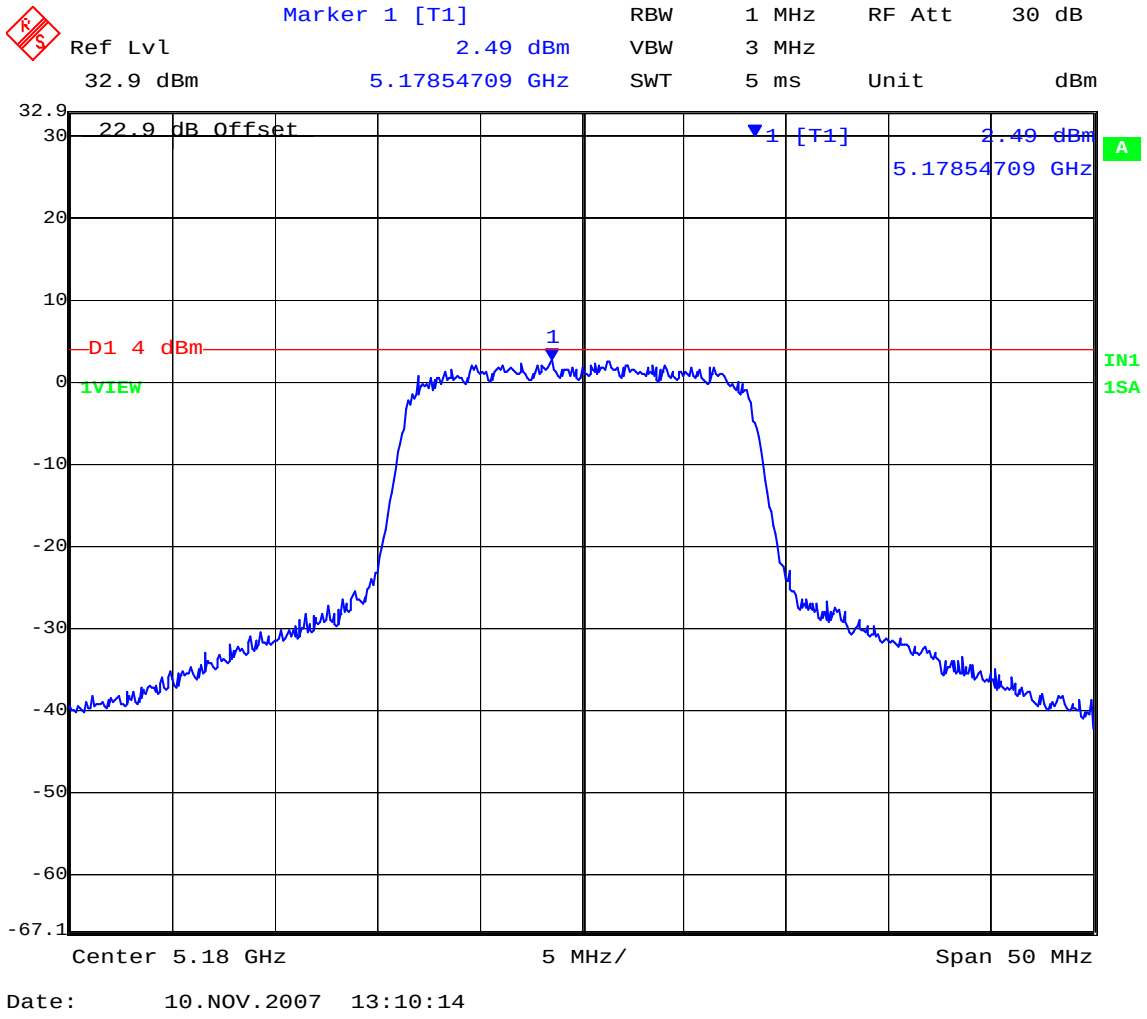
TABLE OF RESULTS – **802.11a Legacy**

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)
5,180	5178.54709	+2.49
5,200	5198.64729	+2.11
5,240	5237.34469	+2.21

5,180 MHz 802.11a Legacy Peak Power Spectral Density



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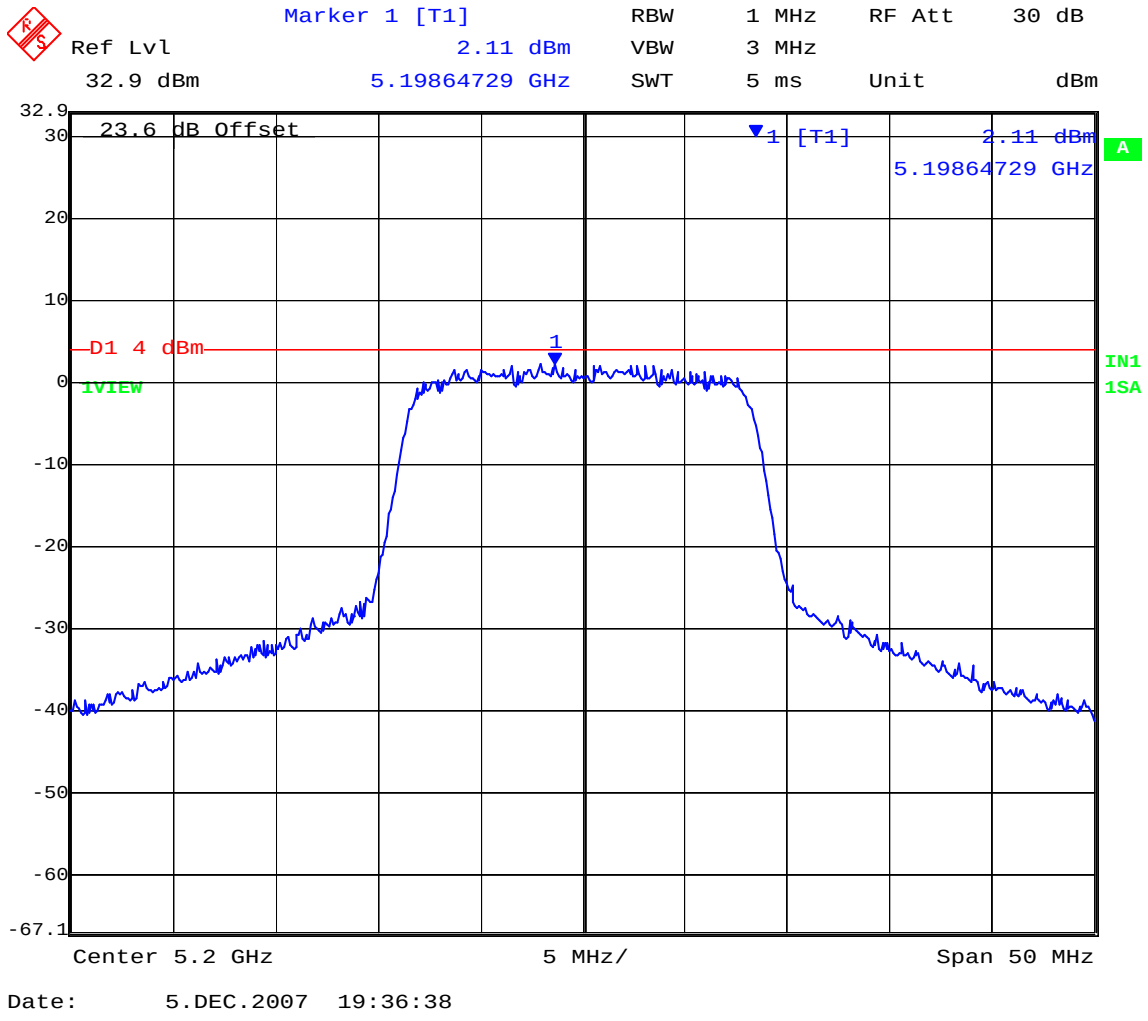
5,200 MHz 802.11a Legacy Peak Power Spectral Density



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5,240 MHz 802.11a Legacy Peak Power Spectral Density

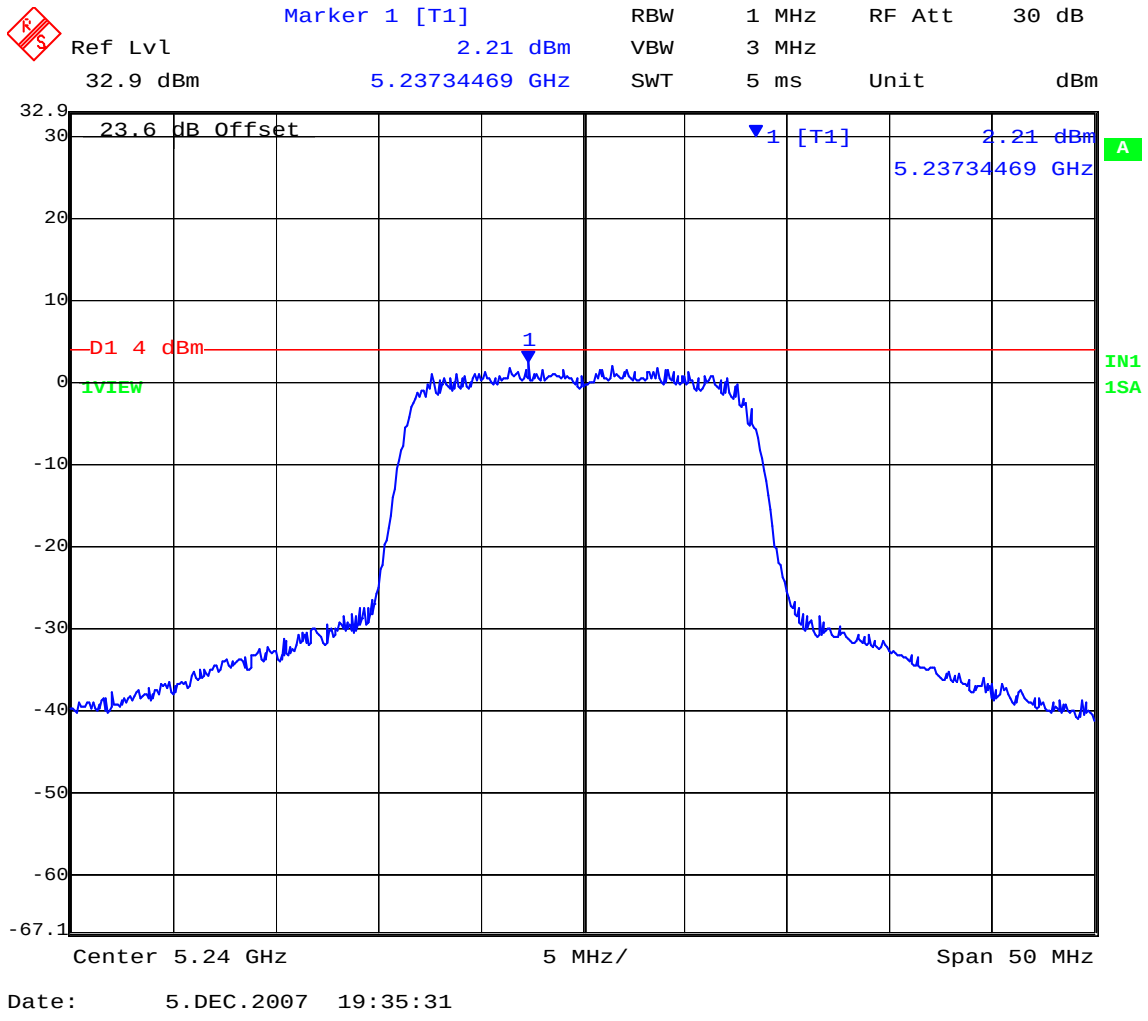

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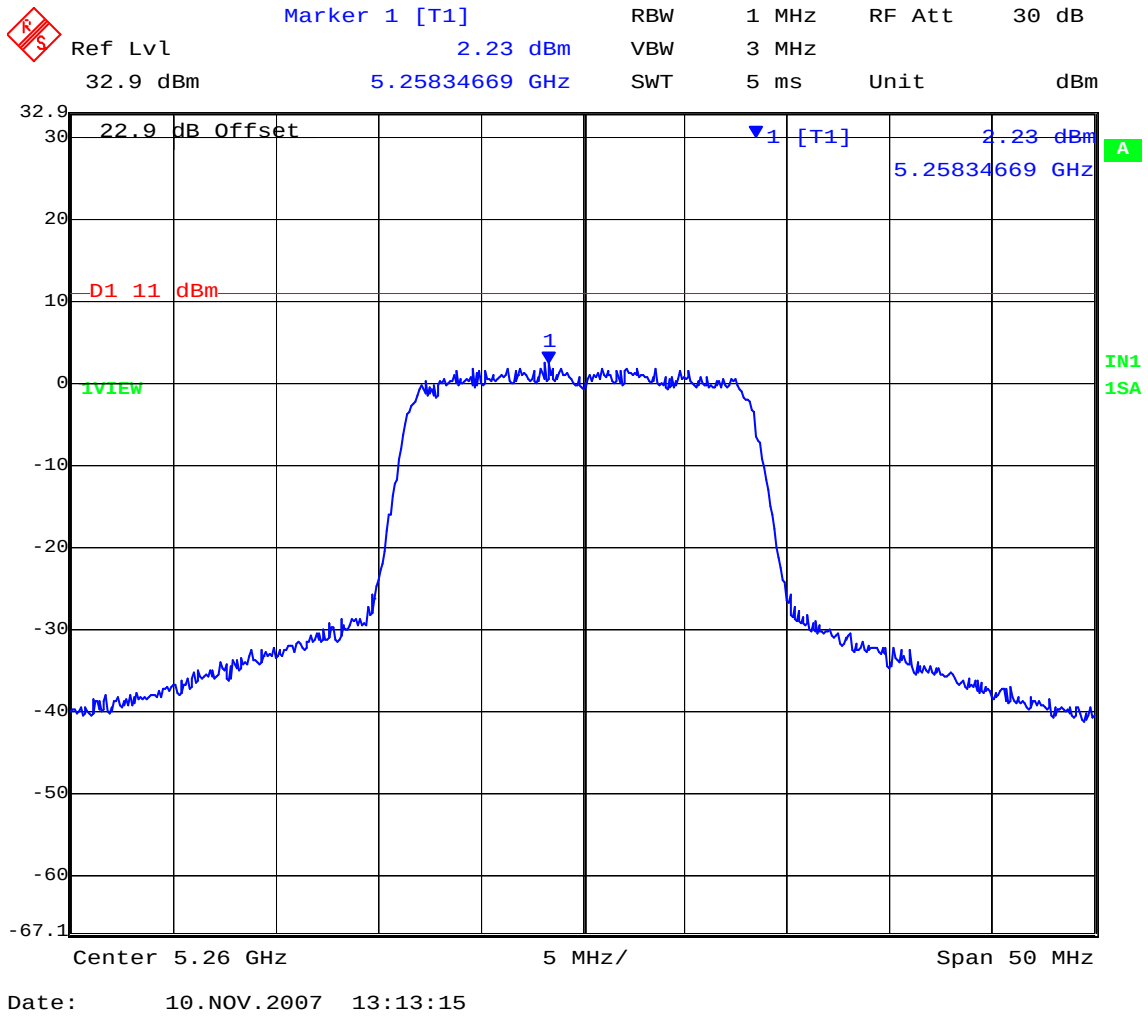
TABLE OF RESULTS – **802.11a Legacy**

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)
5,260	5258.34669	+2,23
5,300	5298.94790	+1.84
5,320	5137.24449	+2.74

5,260 MHz 802.11a Legacy Peak Power Spectral Density



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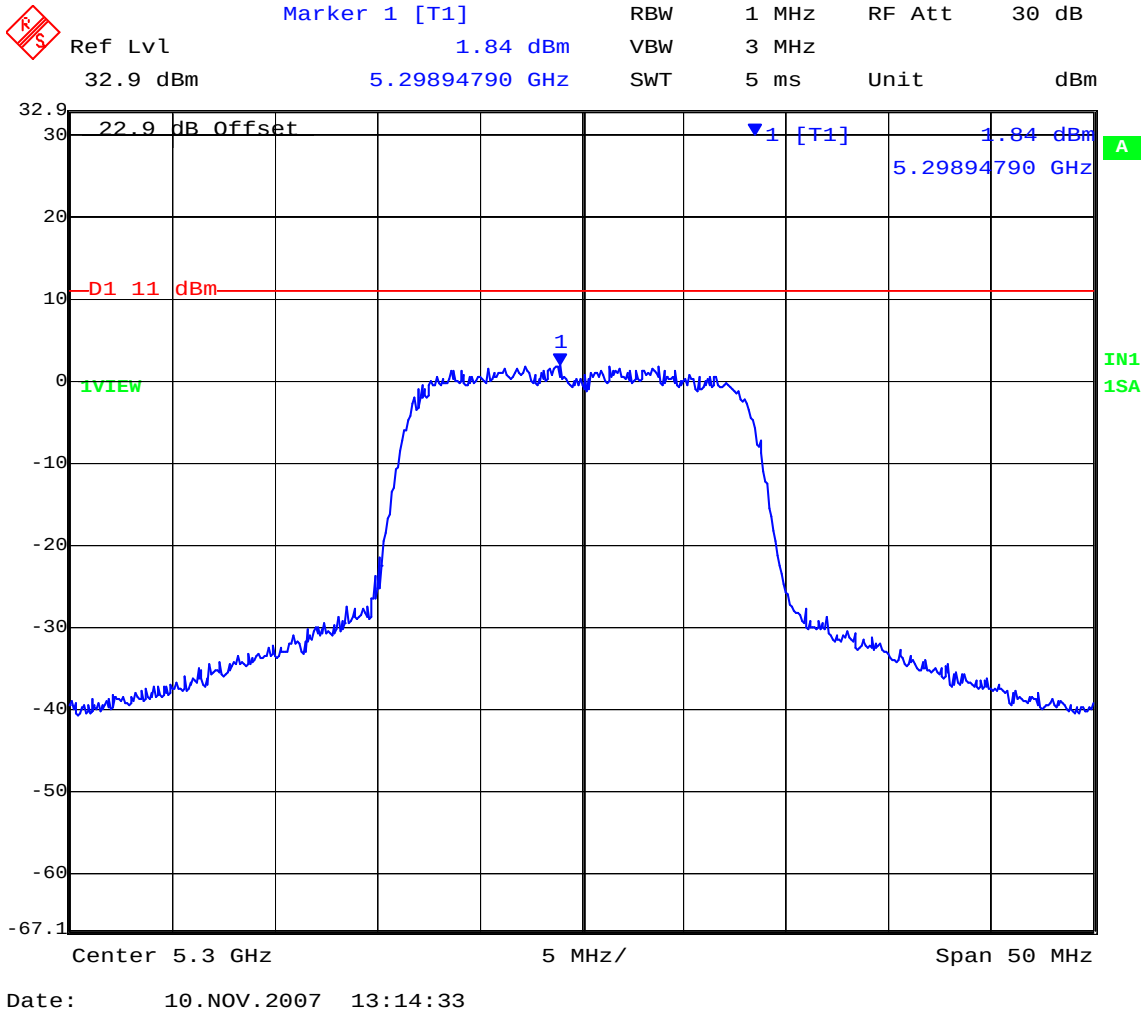
5,300 MHz 802.11a Legacy Peak Power Spectral Density



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5,320 MHz 802.11a Legacy Peak Power Spectral Density

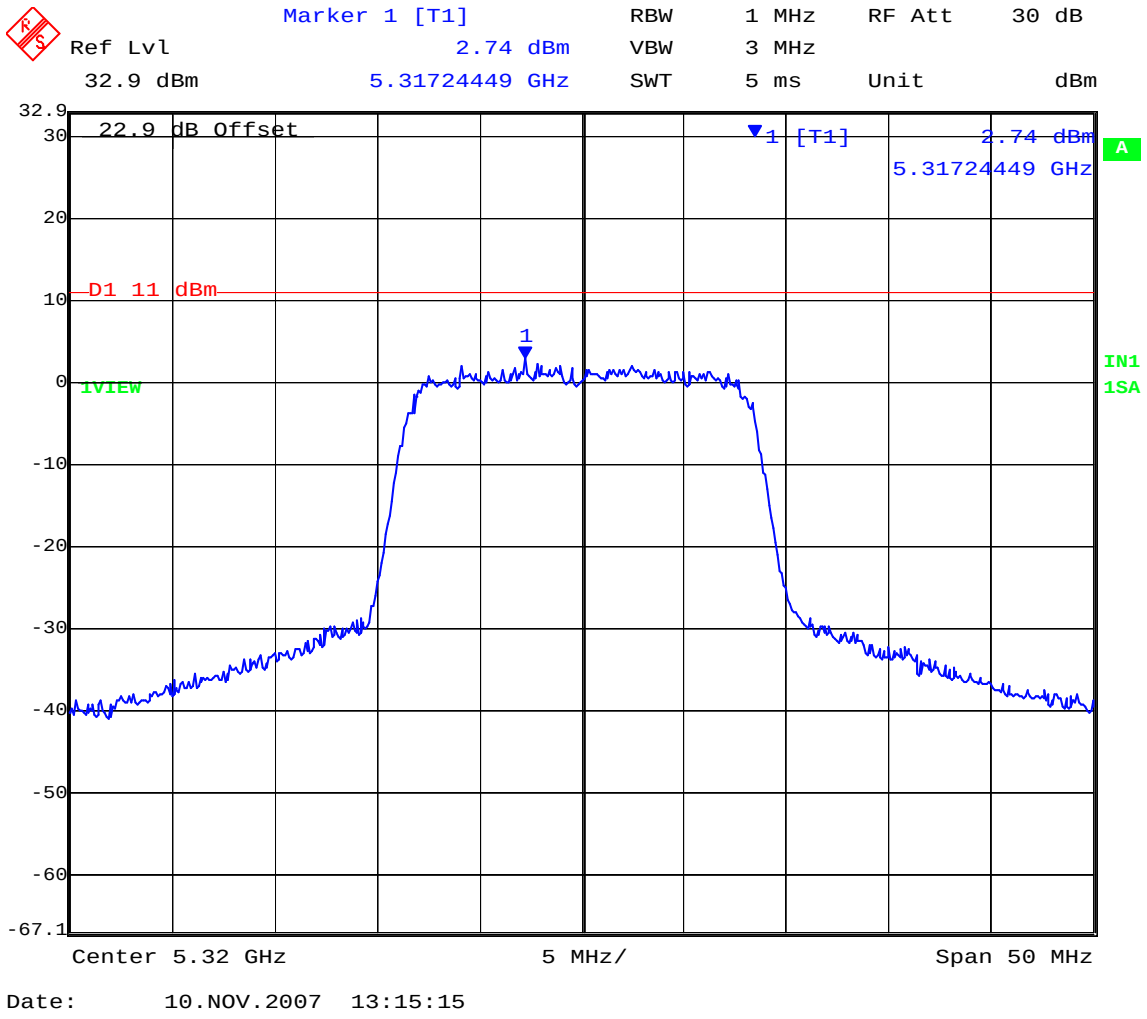

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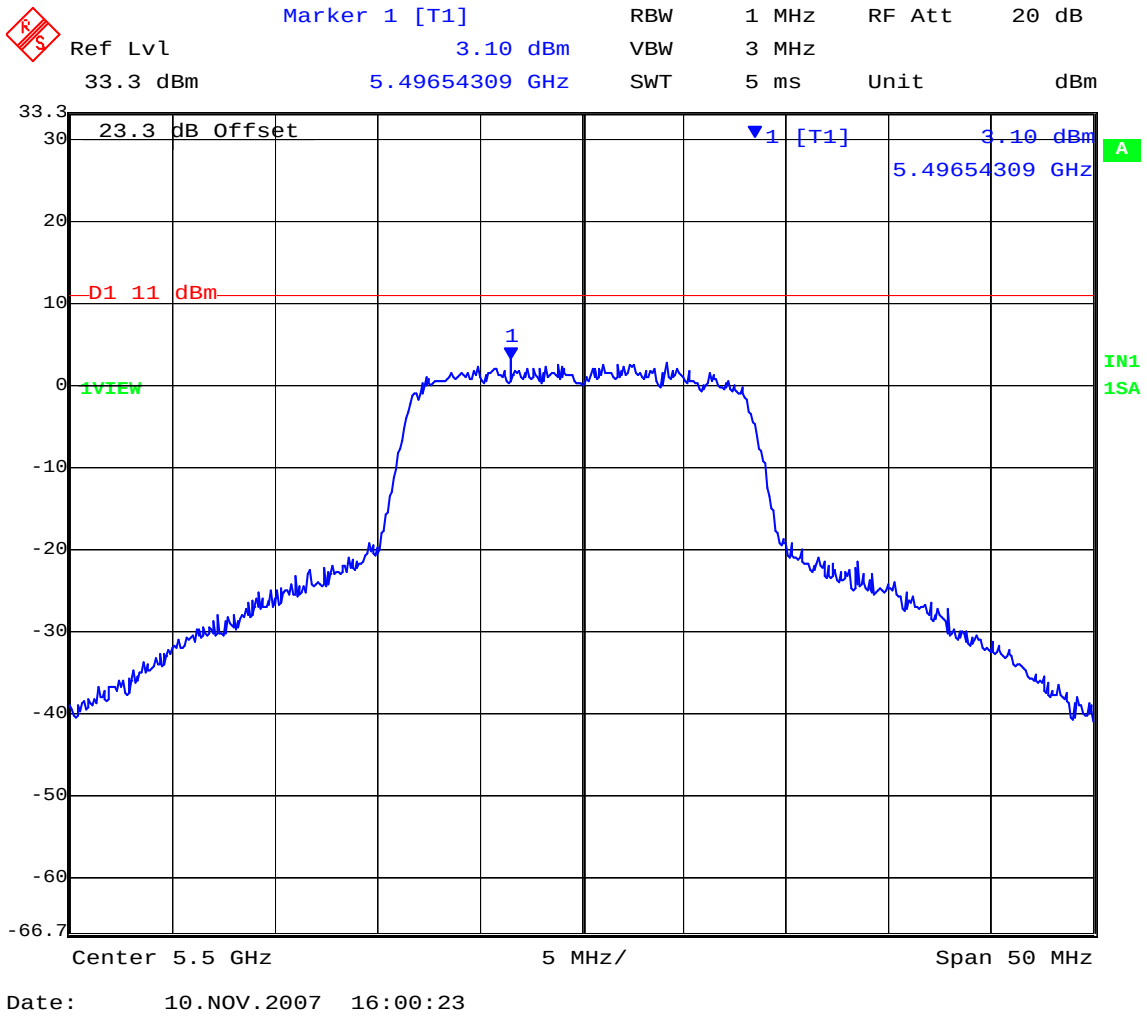
TABLE OF RESULTS – **802.11a Legacy**

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)
5,500	5496.54309	+3.10
5,600	5603.35671	+3.12
5,700	5702.65531	+3.92

5,500 MHz 802.11a Legacy Peak Power Spectral Density



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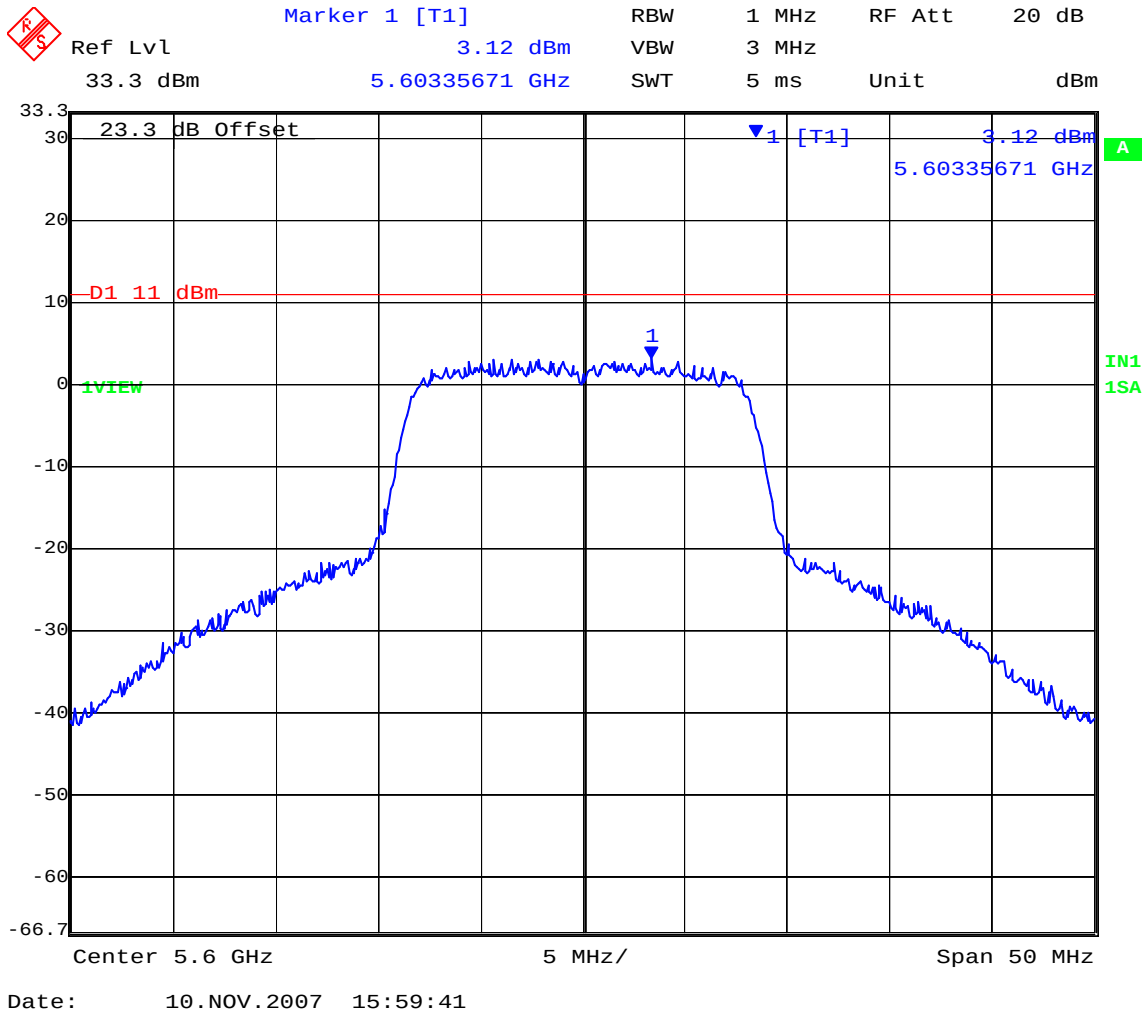
5,600 MHz 802.11a Legacy Peak Power Spectral Density



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5,700 MHz 802.11a Legacy Peak Power Spectral Density

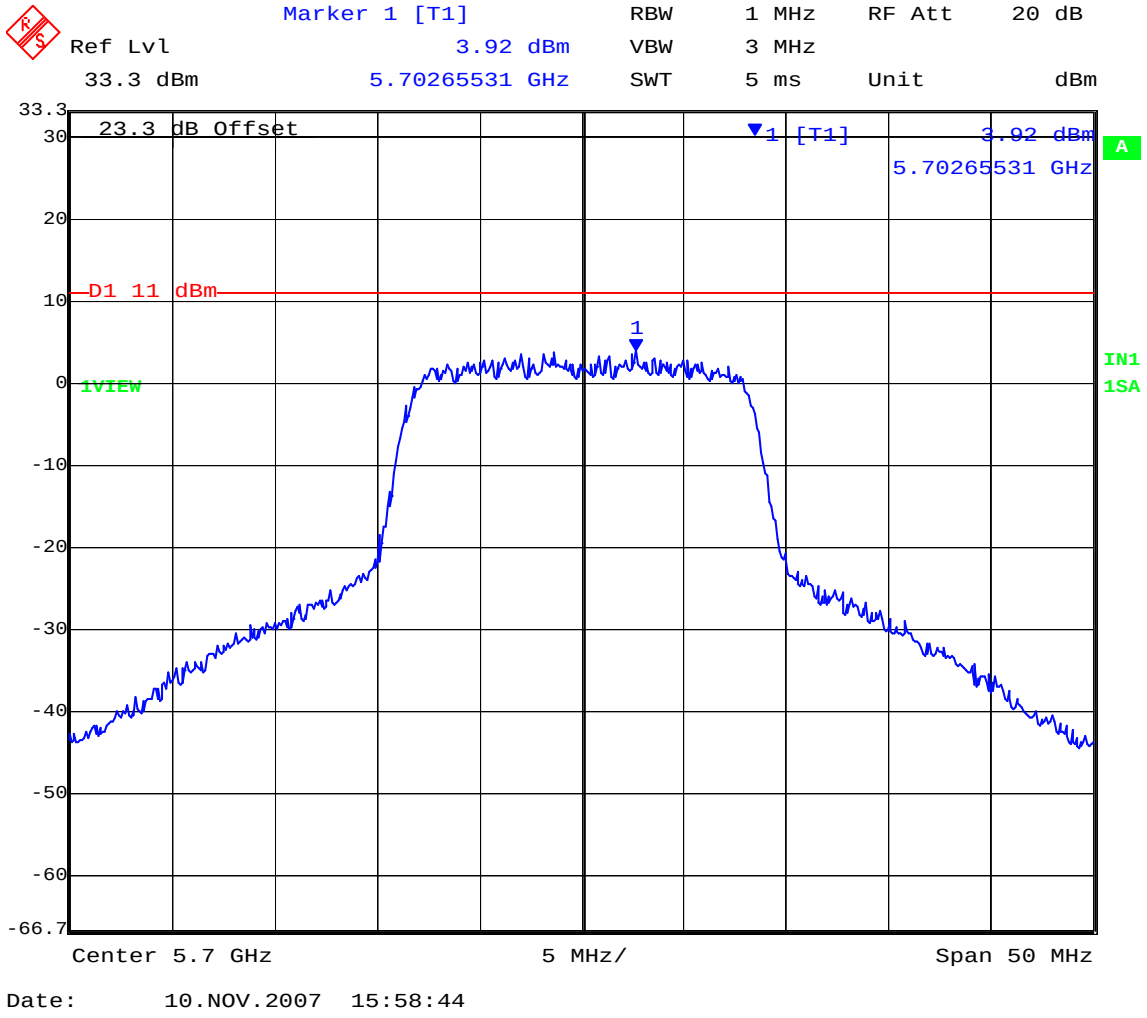

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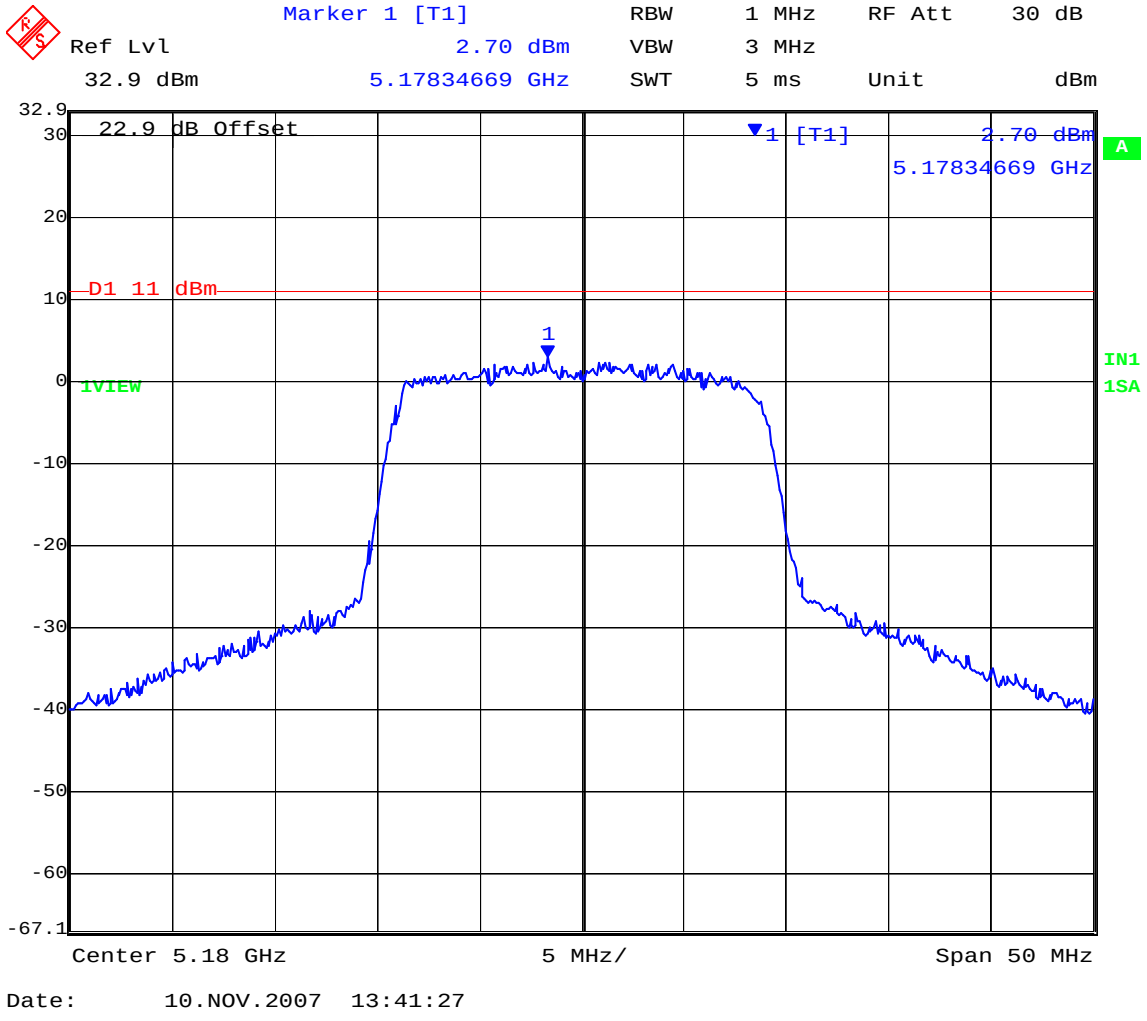
TABLE OF RESULTS – **802.11n HT20**

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)
5,180	5178.34669	+2.70
5,200	5197.34469	+2.11
5,240	5241.45291	+1.59

5,180 MHz 802.11n HT20 Peak Power Spectral Density



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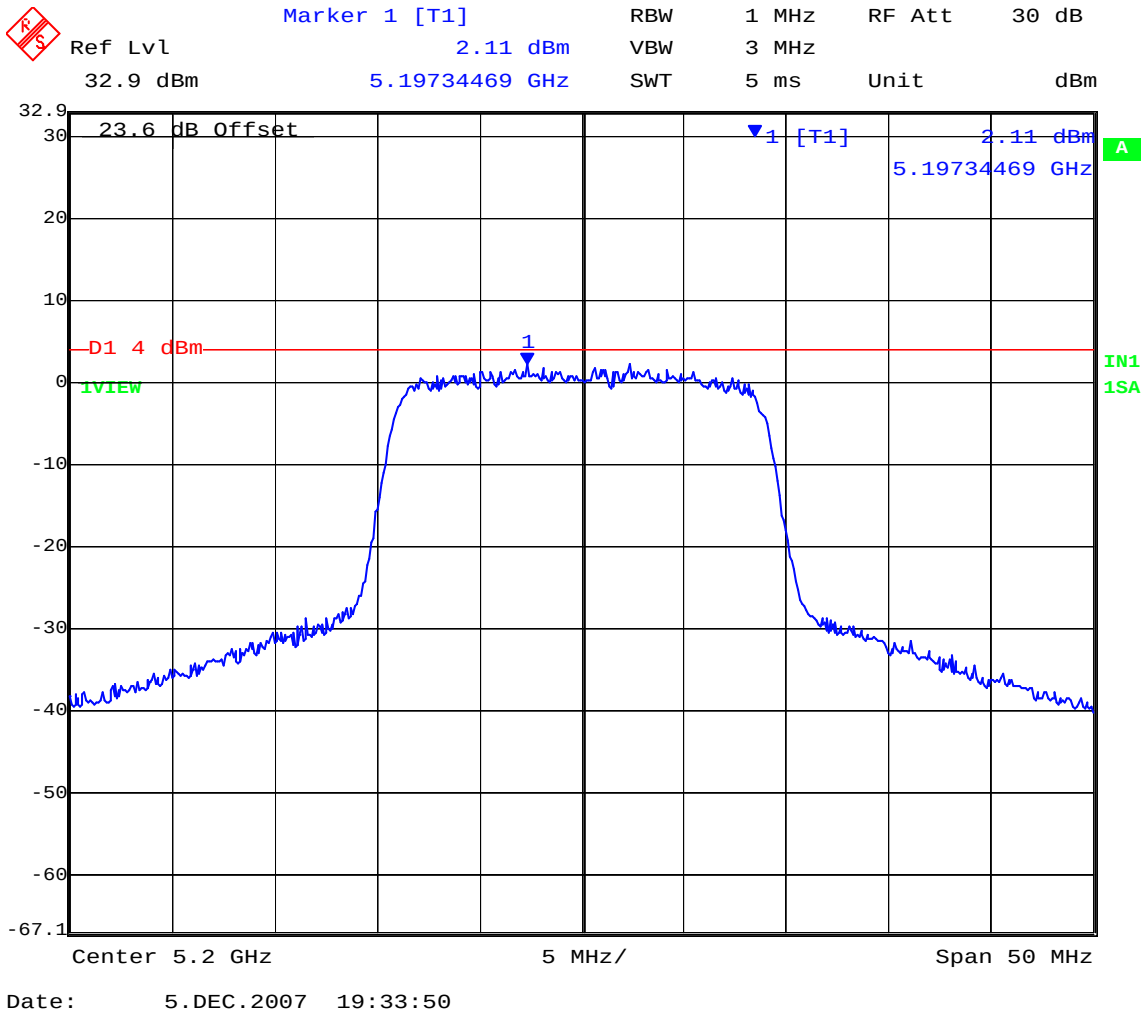
5,200 MHz 802.11n HT20 Peak Power Spectral Density



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5,240 MHz 802.11n HT20 Peak Power Spectral Density

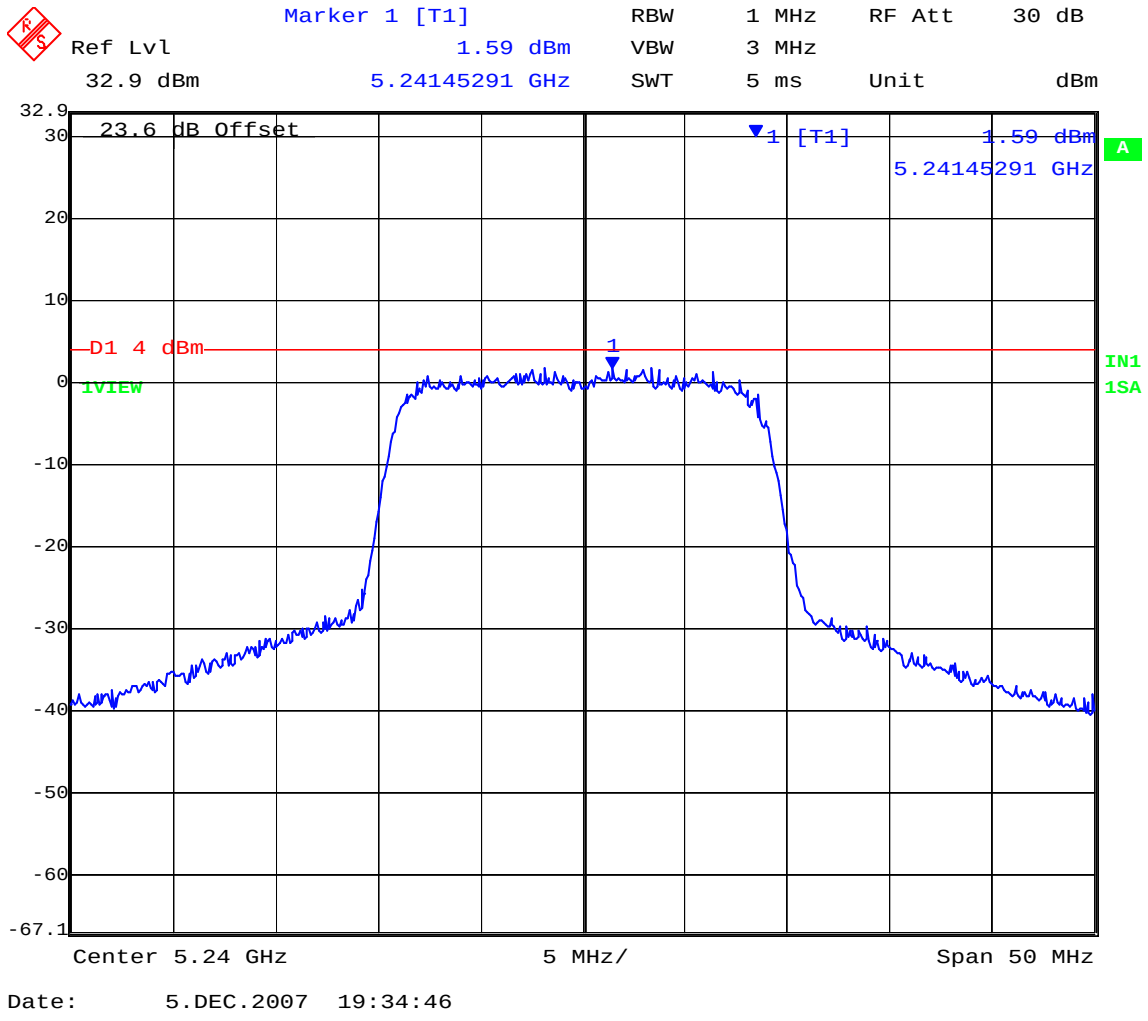

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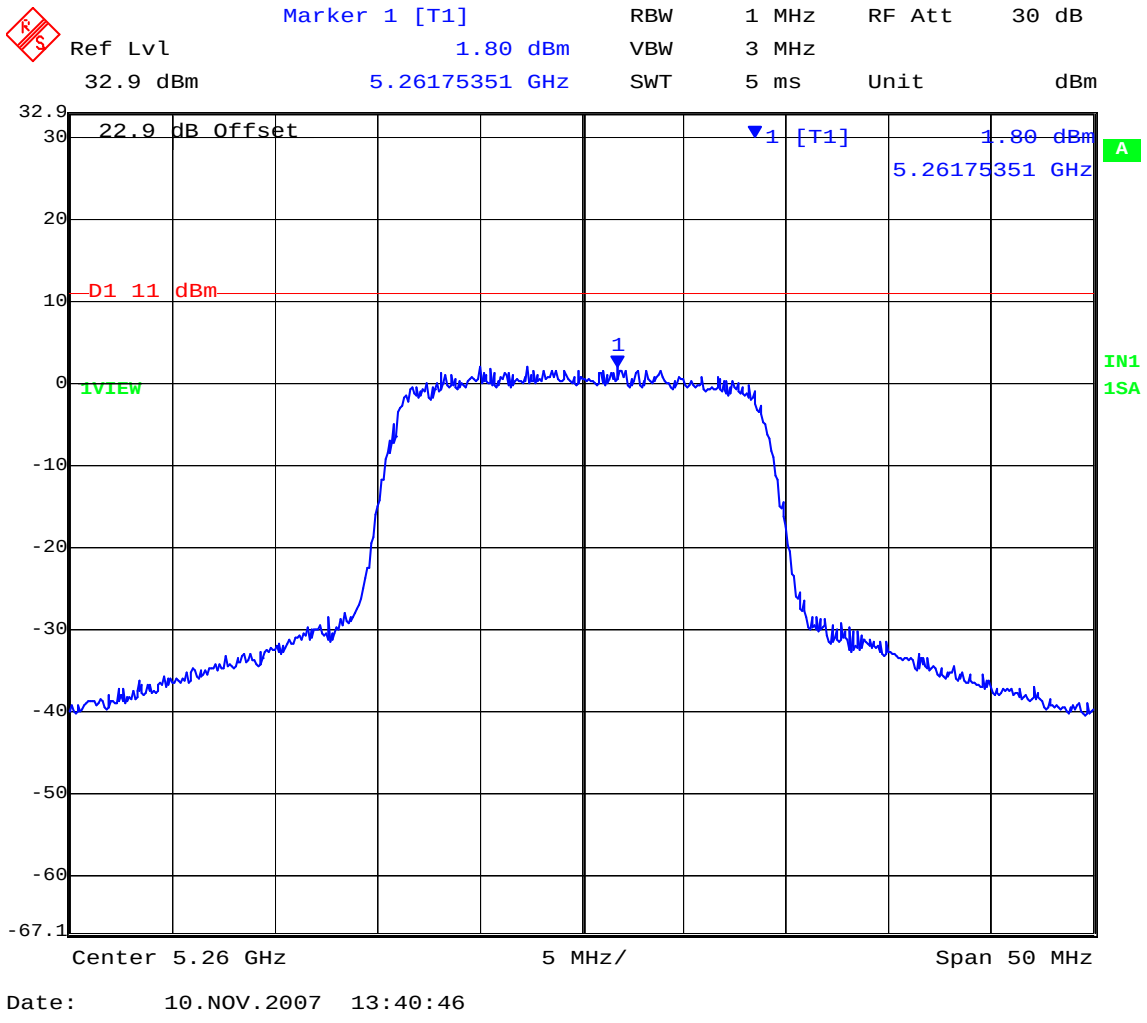
TABLE OF RESULTS – **802.11n HT20**

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)
5,260	5261.75351	+1.80
5,300	5297.84569	+1.30
5,320	5317.84569	+1.77

5,260 MHz 802.11n HT20 Peak Power Spectral Density



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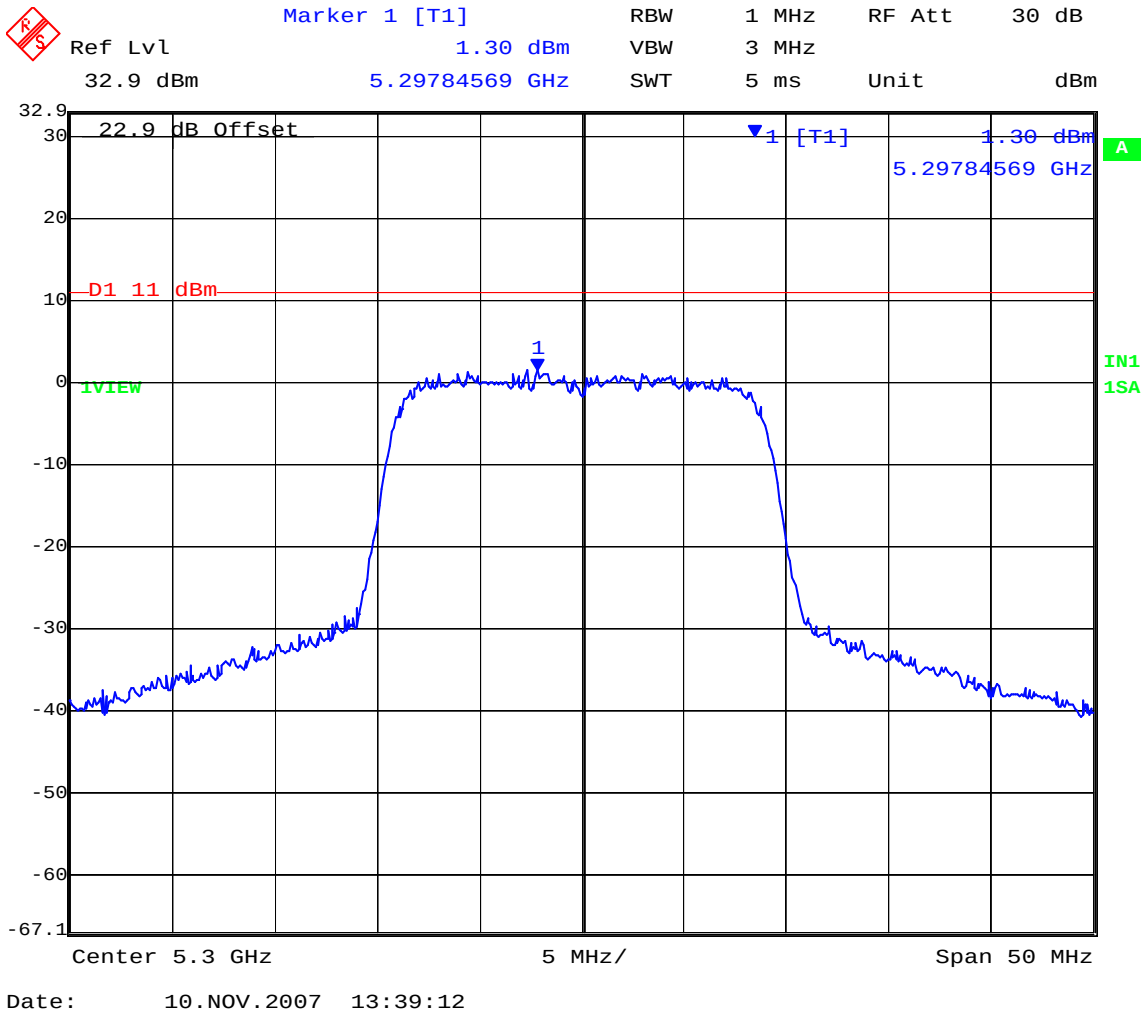
5,300 MHz 802.11n HT20 Peak Power Spectral Density



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5,320 MHz 802.11n HT20 Peak Power Spectral Density

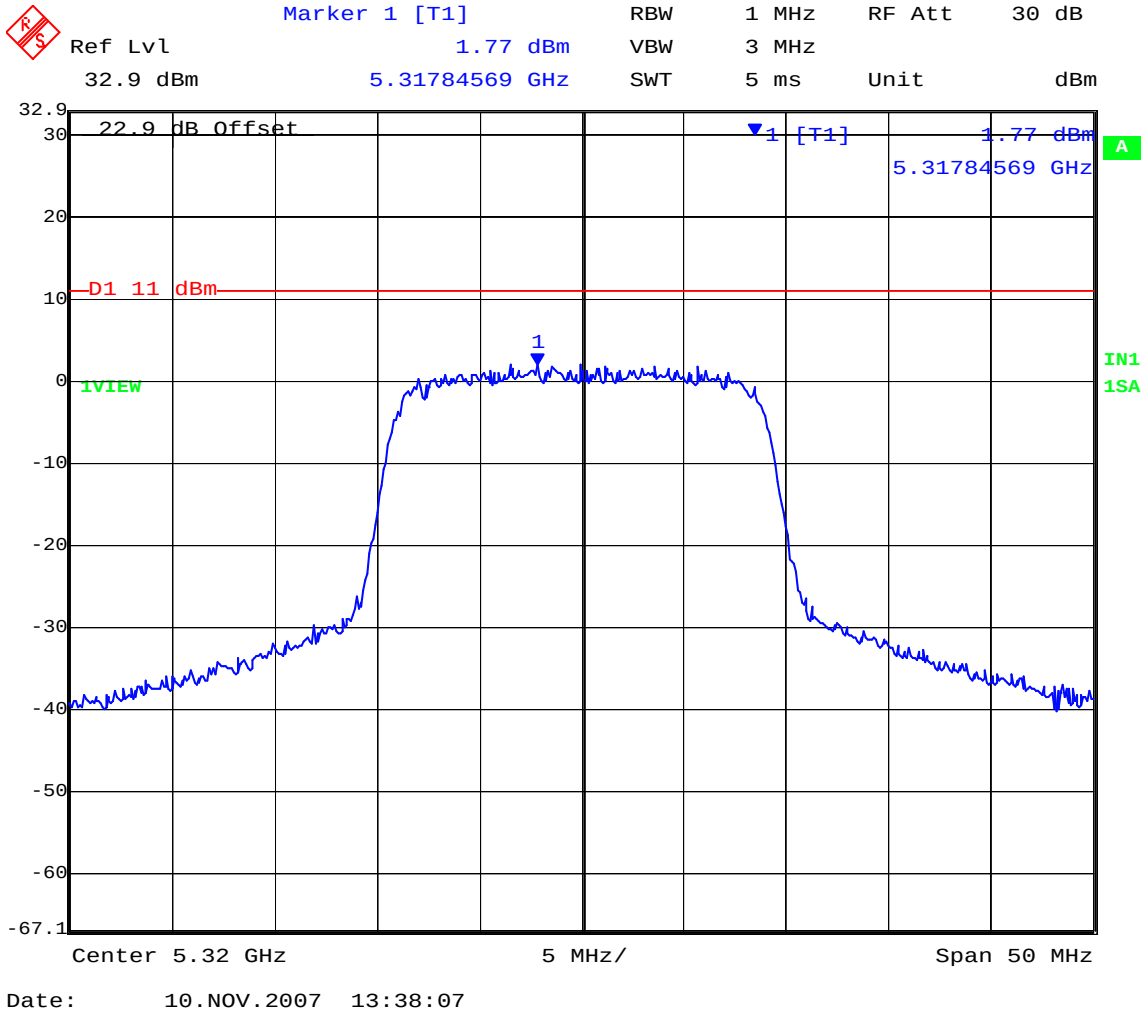

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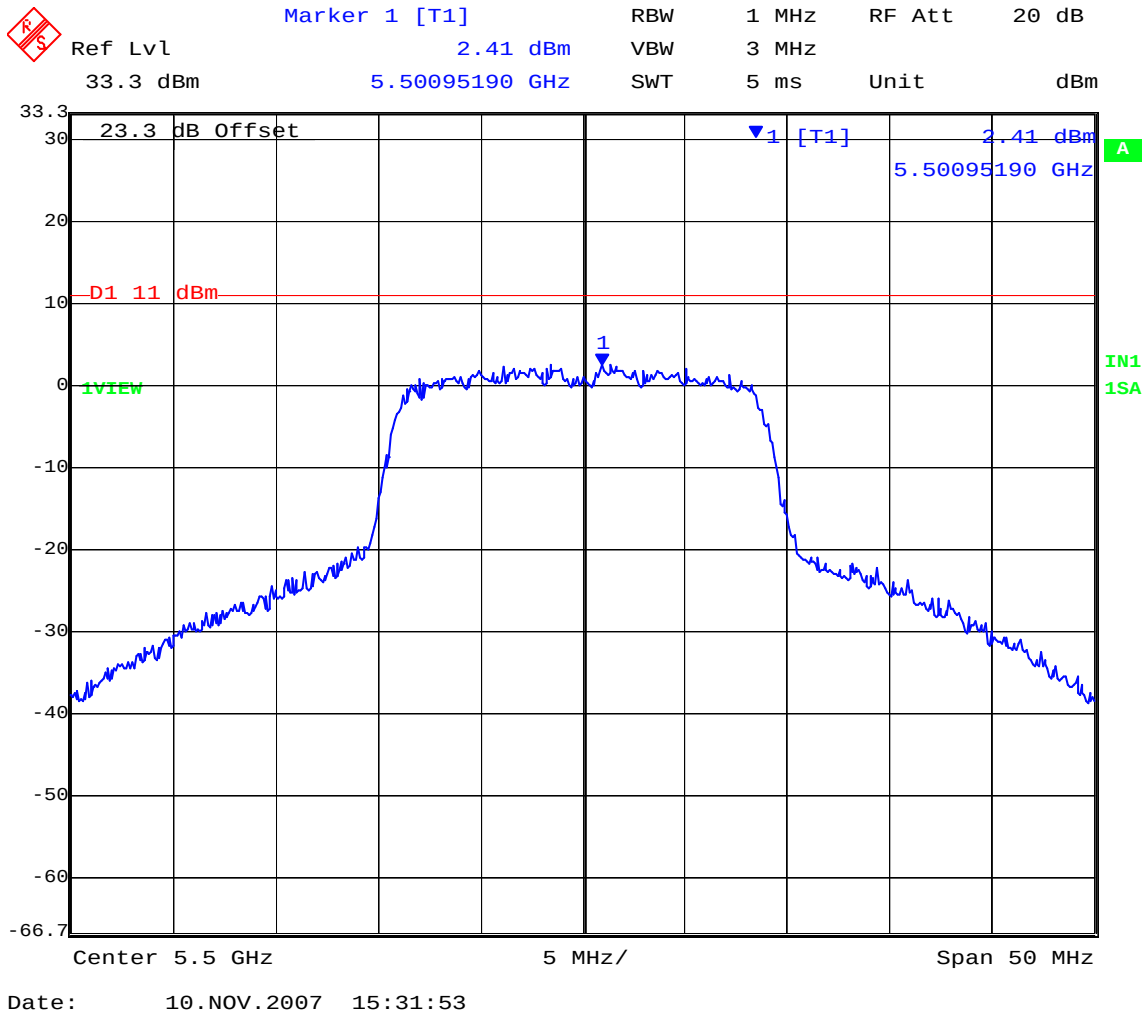
TABLE OF RESULTS – **802.11n HT20**

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)
5,500	5500.95190	+2.41
5,600	5597.64529	+2.90
5,700	5700.75150	+2.74

5,500 MHz 802.11n HT20 Peak Power Spectral Density



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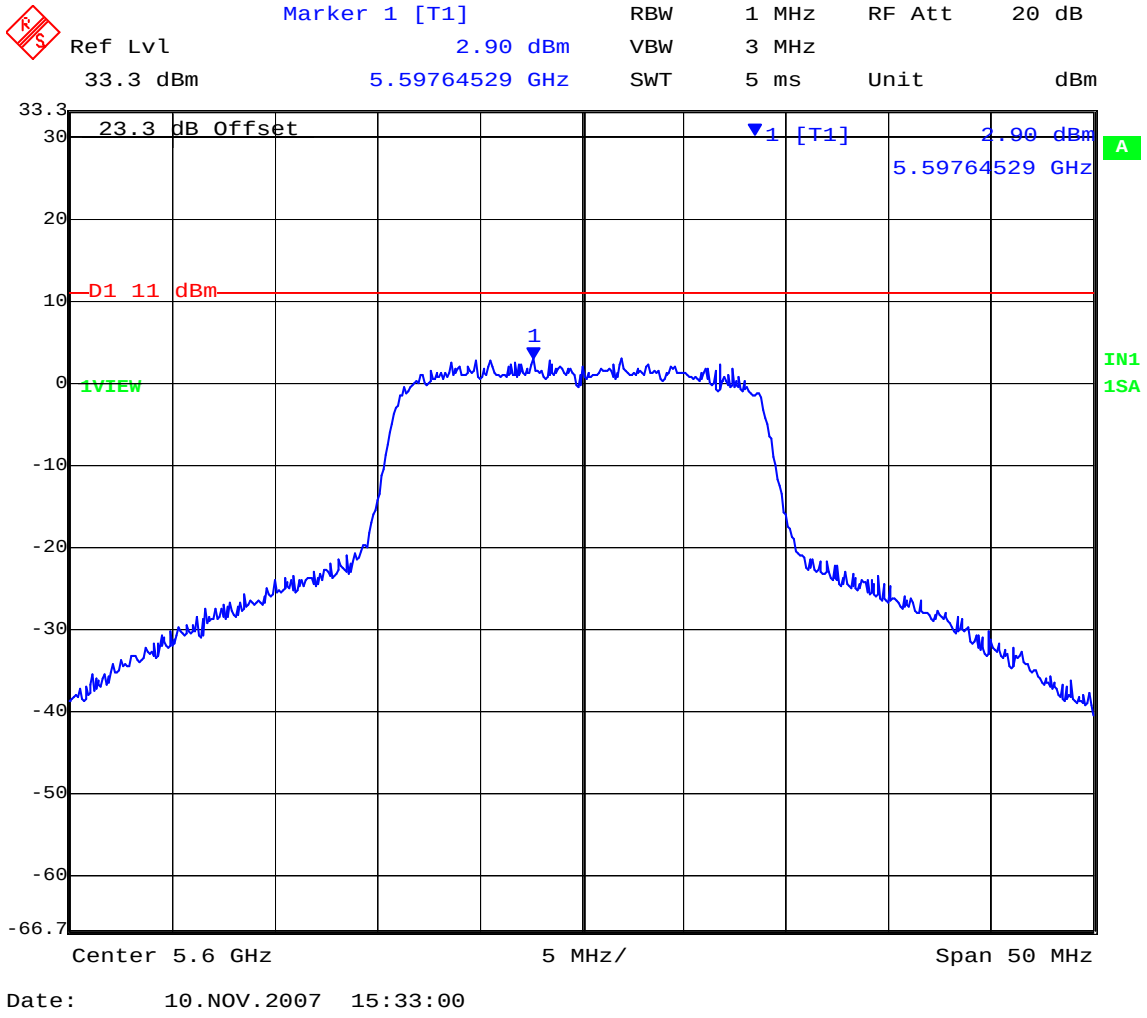
5,600 MHz 802.11n HT20 Peak Power Spectral Density



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5,700 MHz 802.11n HT20 Peak Power Spectral Density

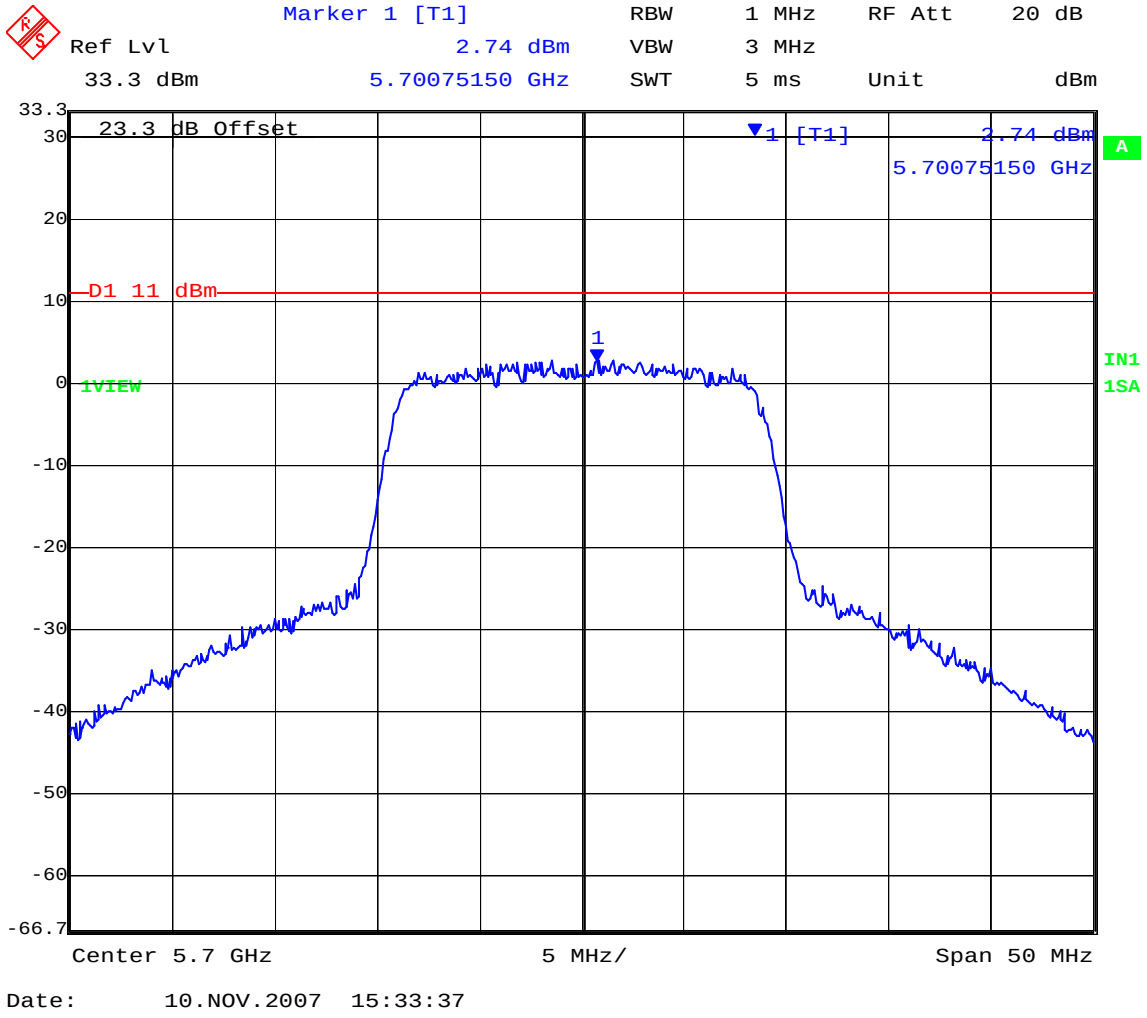

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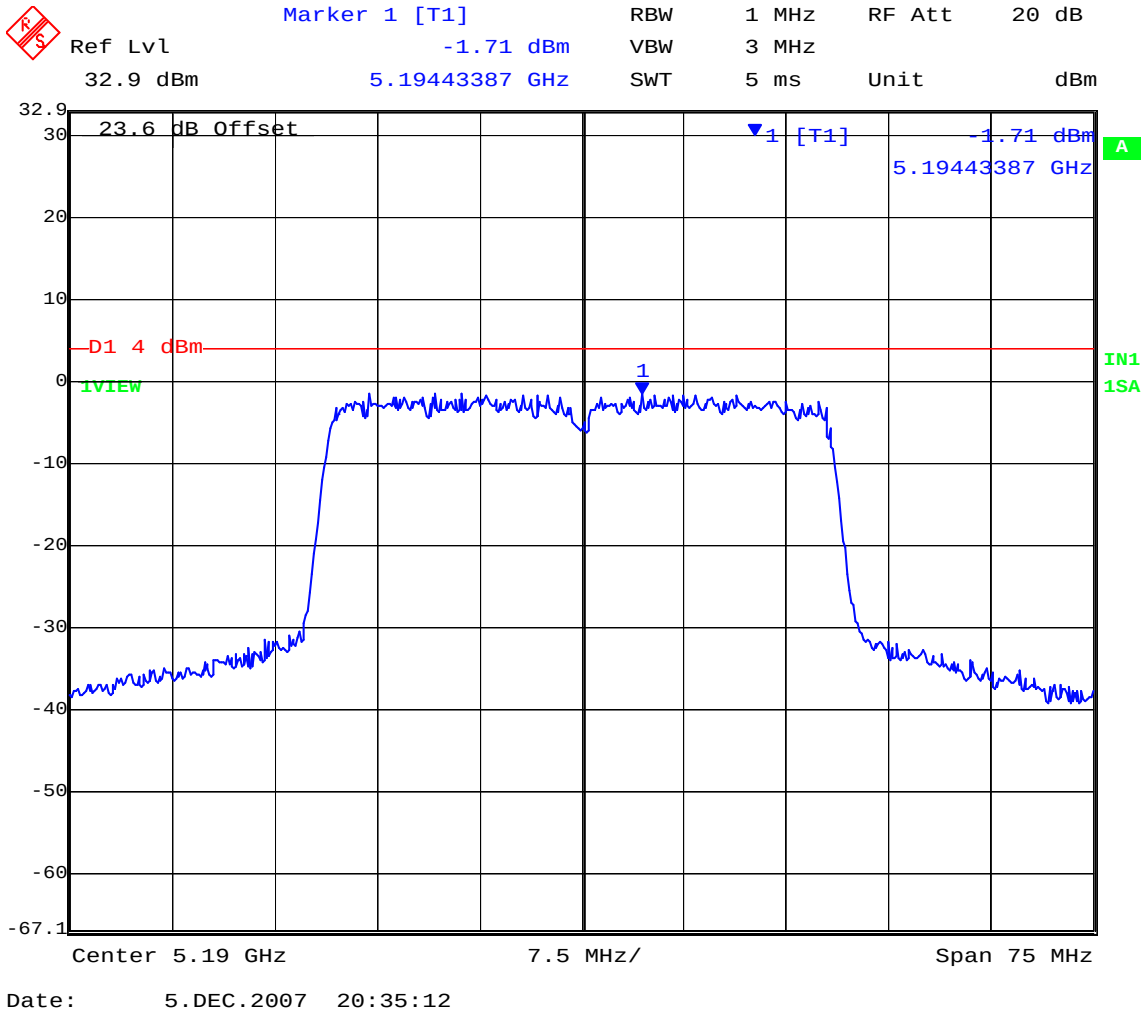
TABLE OF RESULTS – **802.11n HT40**

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)
5,190	5194.43387	-1.71
5,230	5223.61222	-1.59

5,190 MHz 802.11n HT40 Peak Power Spectral Density



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5,230 MHz 802.11n HT40 Peak Power Spectral Density

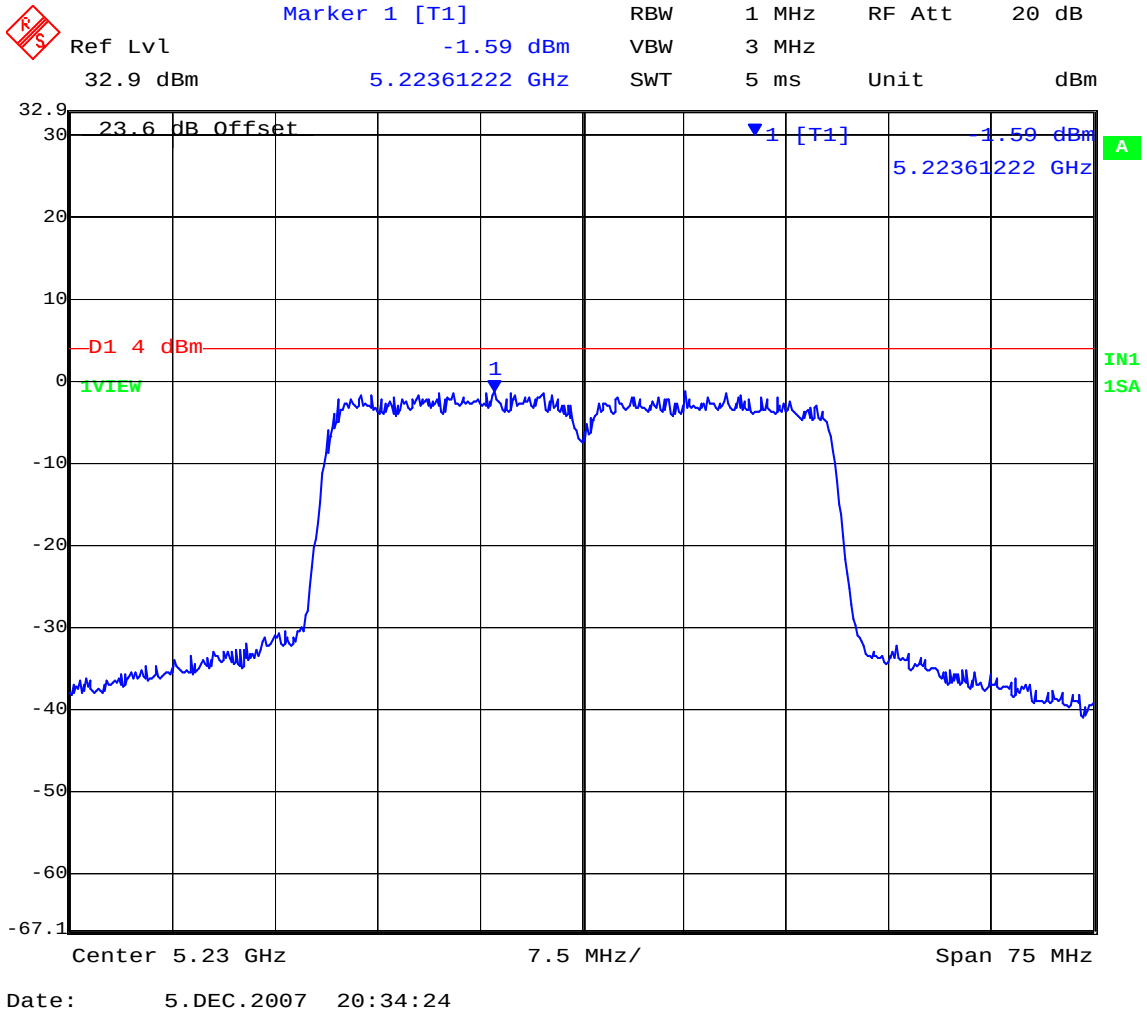

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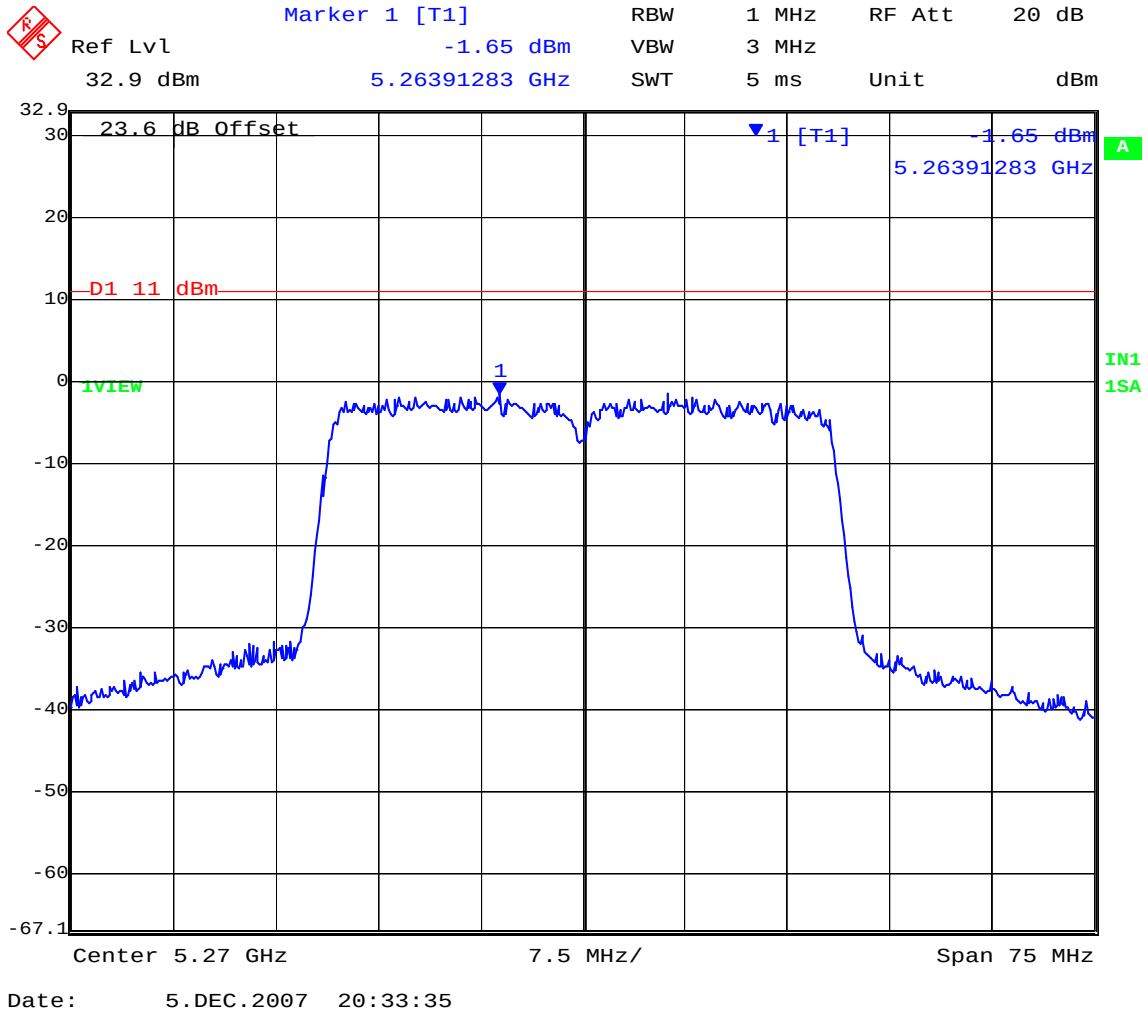
TABLE OF RESULTS – **802.11n HT40**

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)
5,270	5263.91283	-1.65
5,310	5300.60621	-1.47

5,270 MHz 802.11n HT40 Peak Power Spectral Density



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5,310 MHz 802.11n HT40 Peak Power Spectral Density

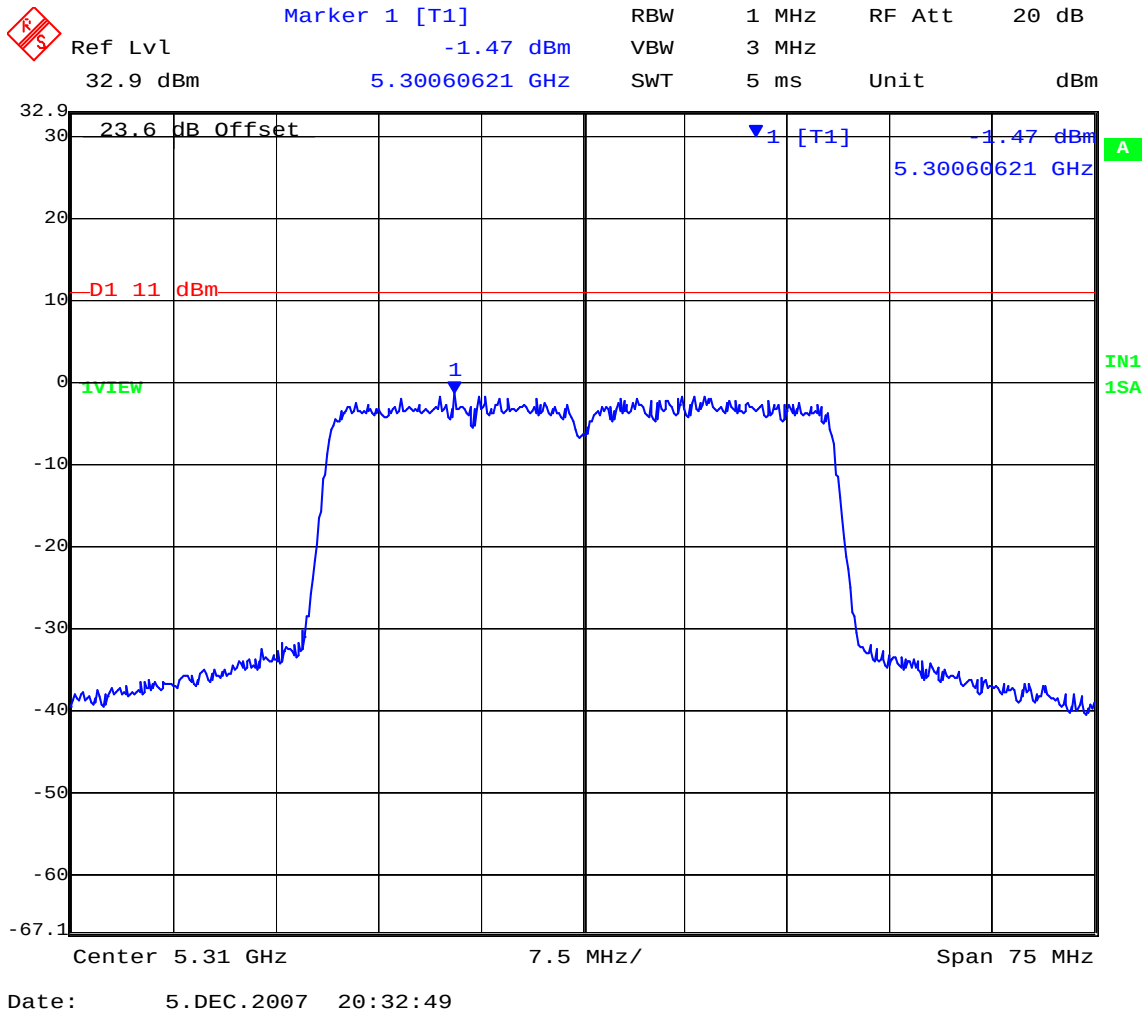

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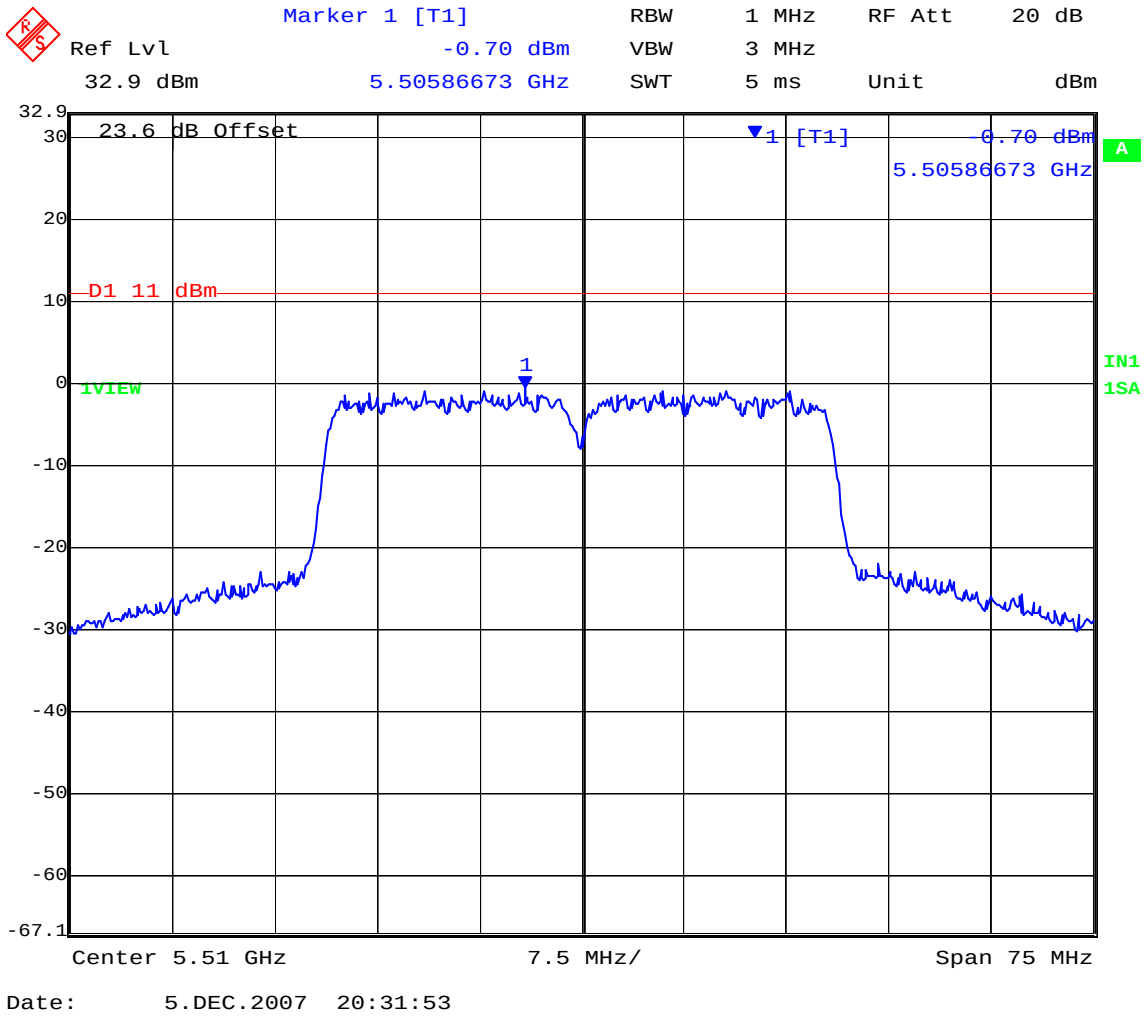
TABLE OF RESULTS – **802.11n HT40**

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)
5,510	5505.86673	-0.70
5,620	5607.90080	-0.27
5,690	5700.29559	-1.24

5,510 MHz 802.11n HT40 Peak Power Spectral Density



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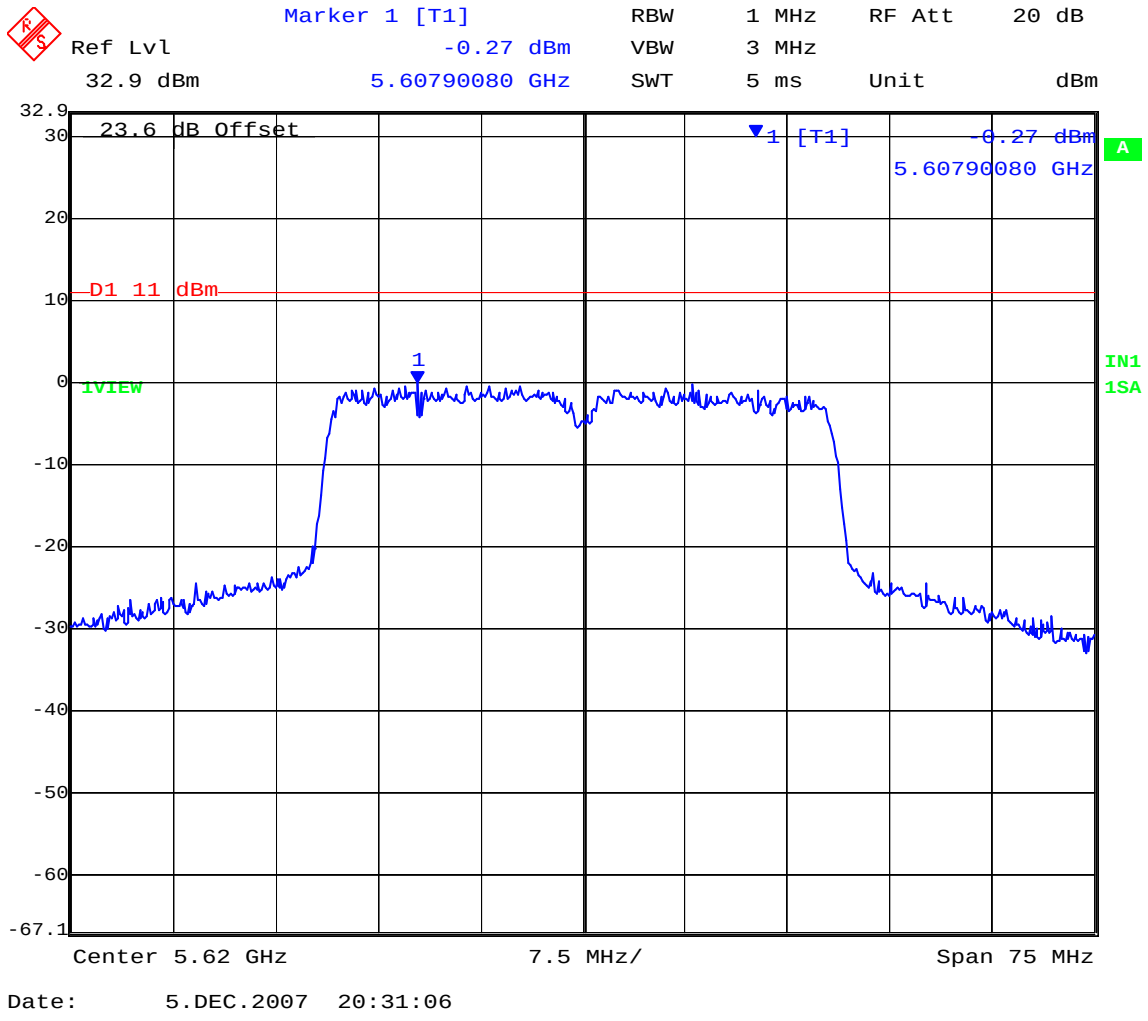
5,620 MHz 802.11n HT40 Peak Power Spectral Density



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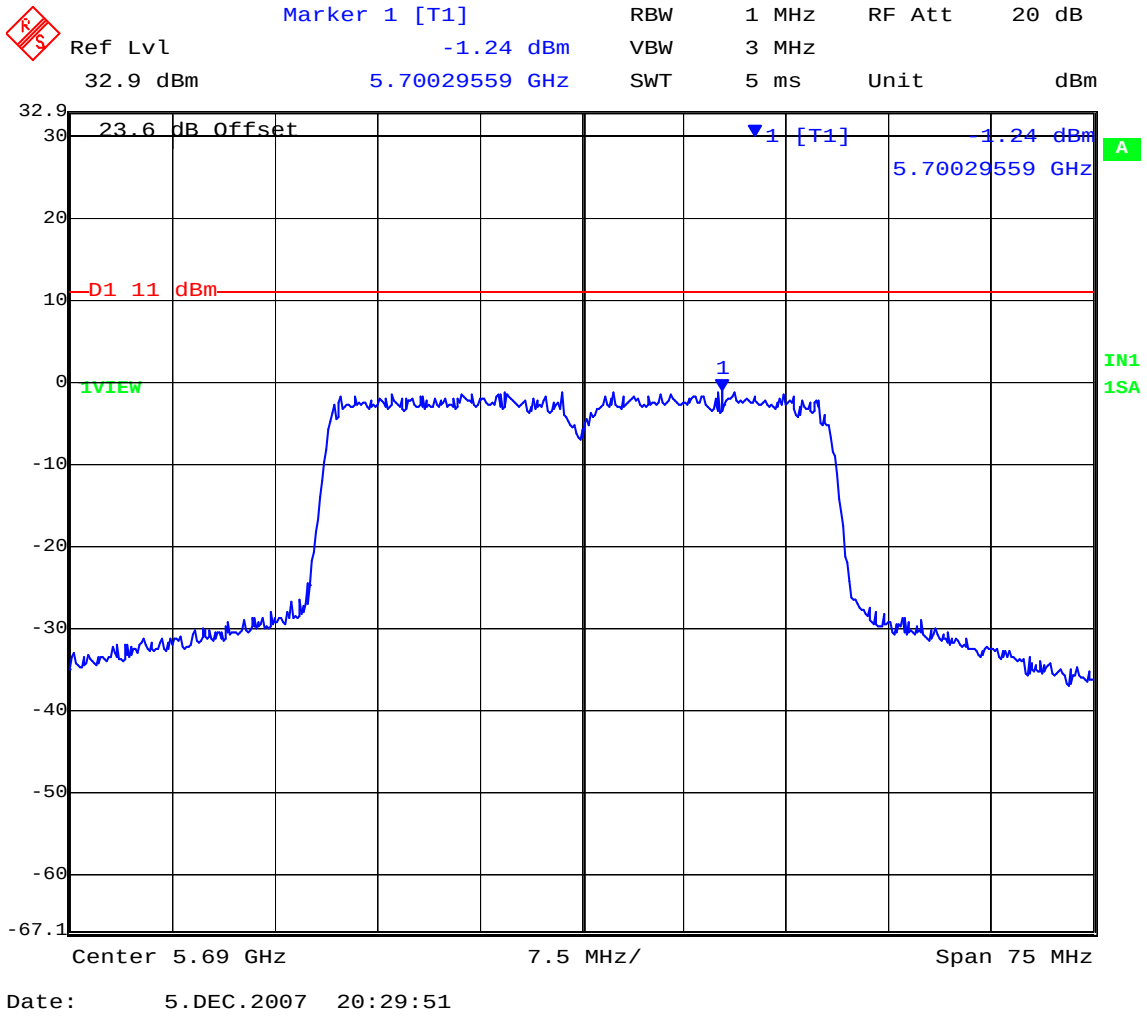
5,690 MHz 802.11n HT40 Peak Power Spectral Density



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Specification

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

(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)**
§ **A9.2(1)** The eirp spectral density shall not exceed +10 dBm in any 1 MHz band

§ **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

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-01 'Measuring RF Output Power'	0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117

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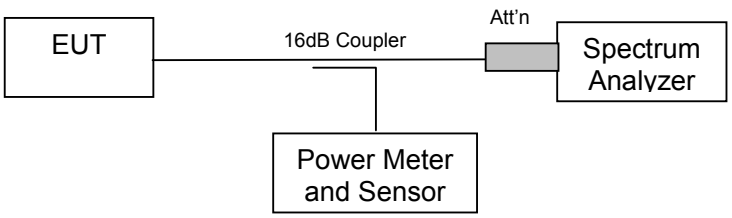
5.1.4. Peak Excursion Ratio

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

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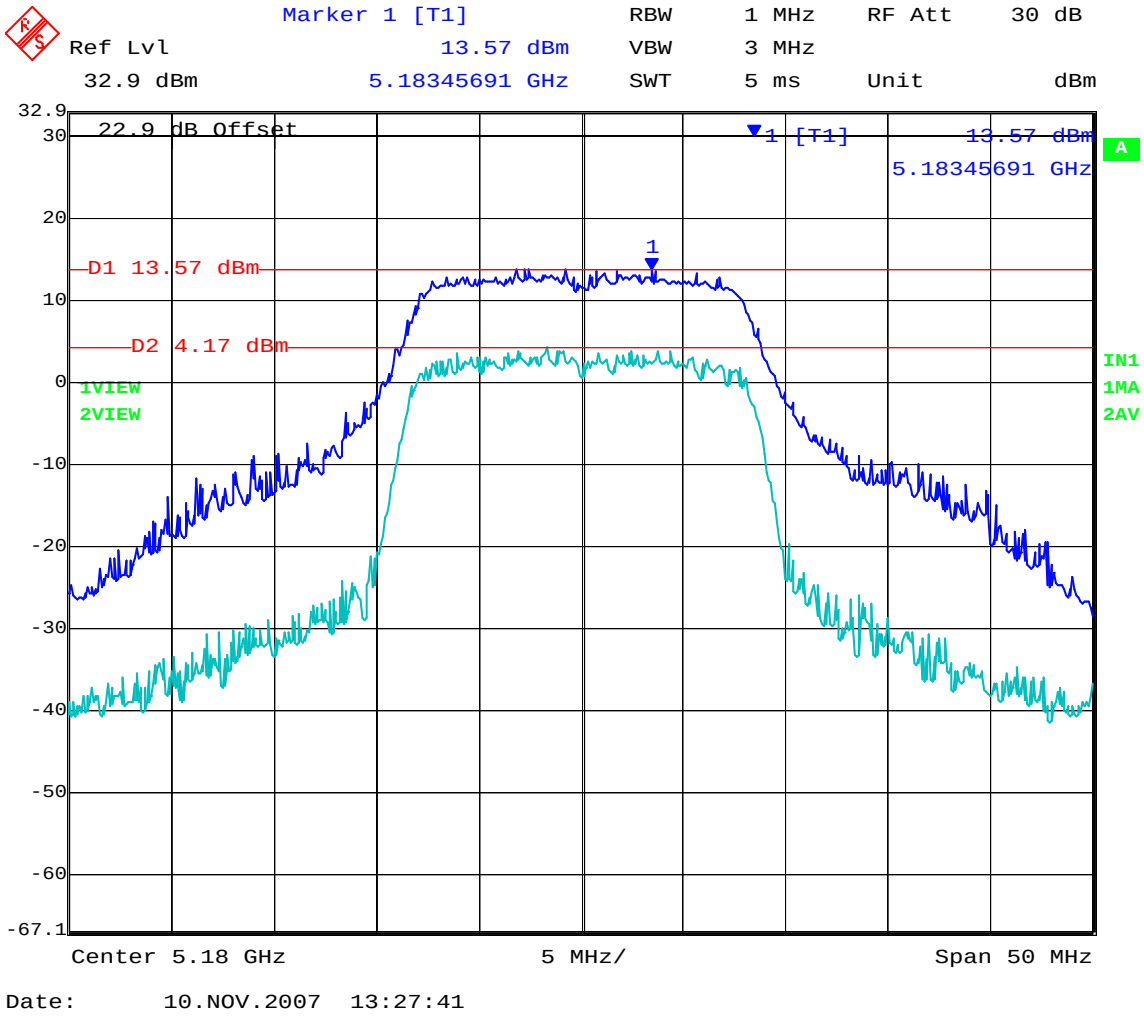
TABLE OF RESULTS – **802.11a Legacy**

Centre Frequency (MHz)	Peak Excursion Ratio (dB)
5,180	9.40
5,200	10.97
5,240	10.80

5,180 MHz 802.11a Legacy - Peak Excursion Ratio



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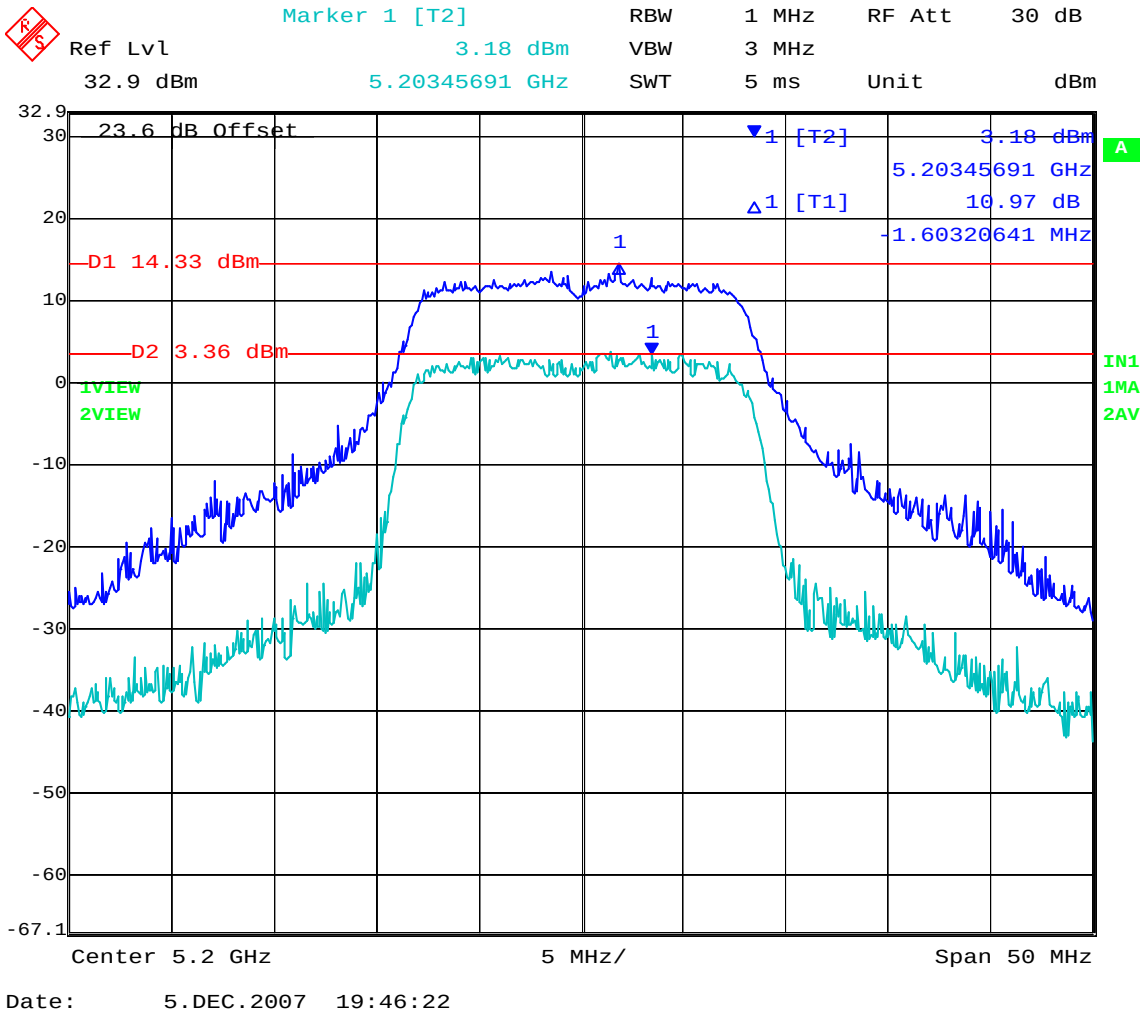
5,200 MHz 802.11a Legacy - Peak Excursion Ratio



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5,240 MHz 802.11a Legacy - Peak Excursion Ratio

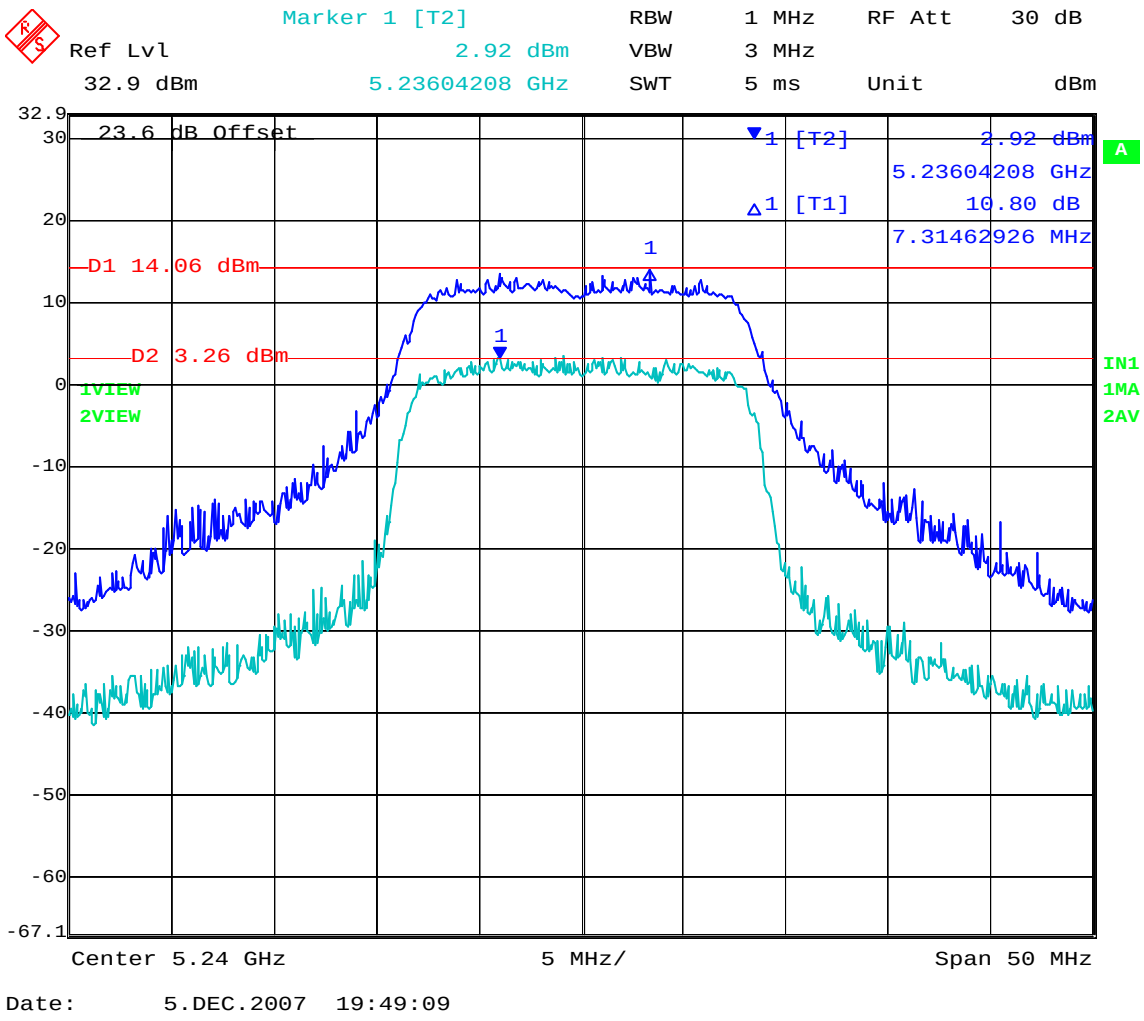

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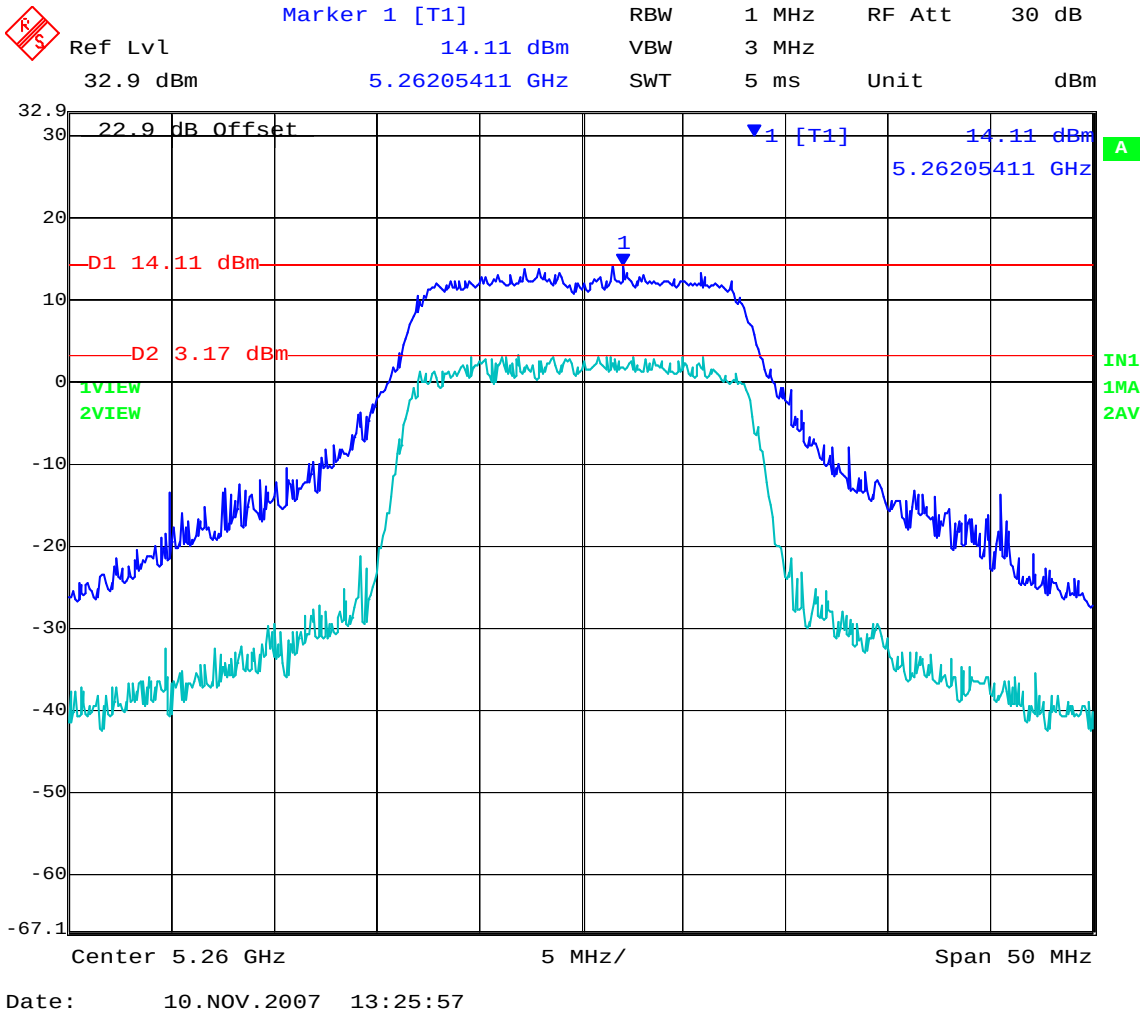
TABLE OF RESULTS – **802.11a Legacy**

Centre Frequency (MHz)	Peak Excursion Ratio (dB)
5,260	10.94
5,300	10.53
5,320	9.60

5,260 MHz 802.11a Legacy - Peak Excursion Ratio



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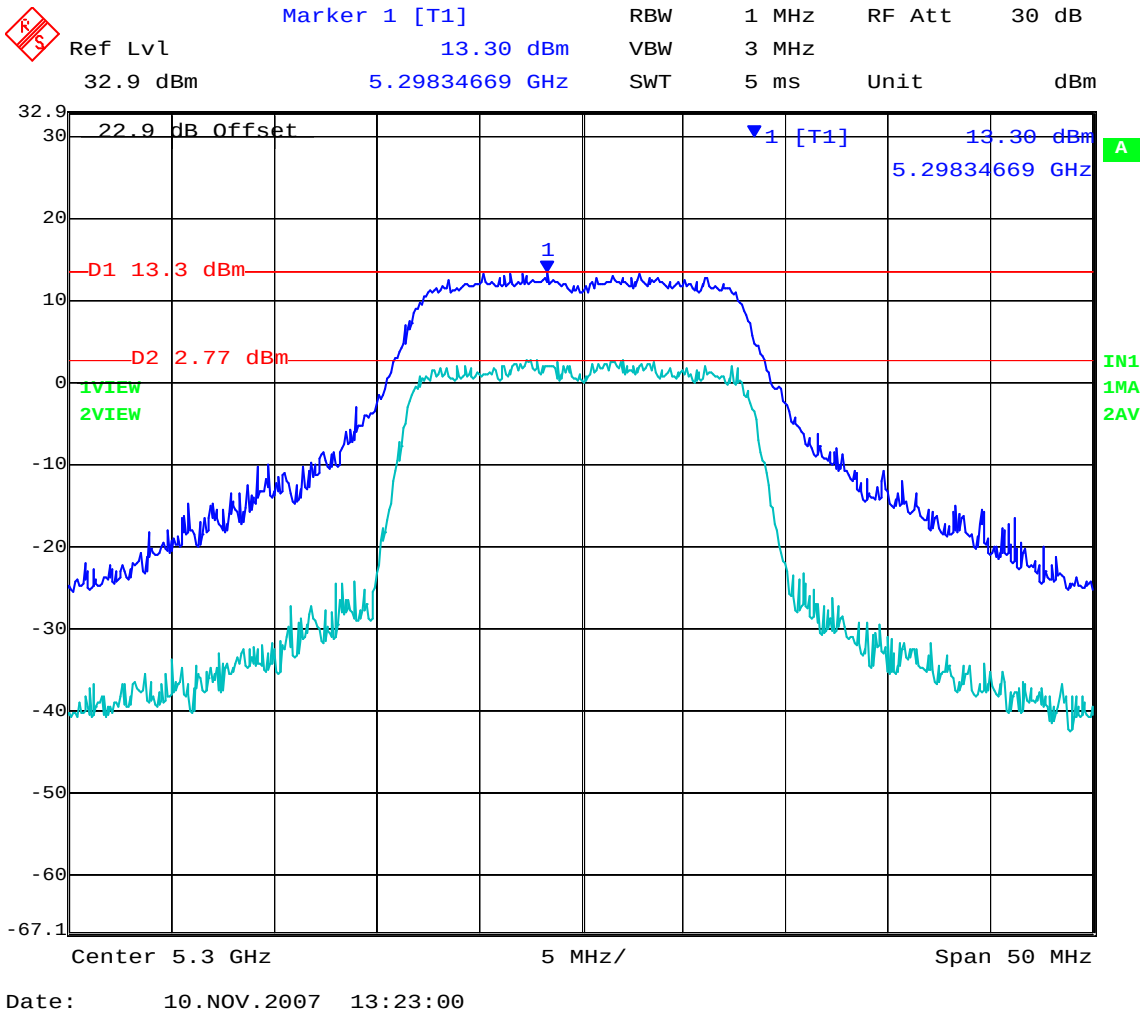
5,300 MHz 802.11a Legacy - Peak Excursion Ratio



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5,320 MHz 802.11a Legacy - Peak Excursion Ratio

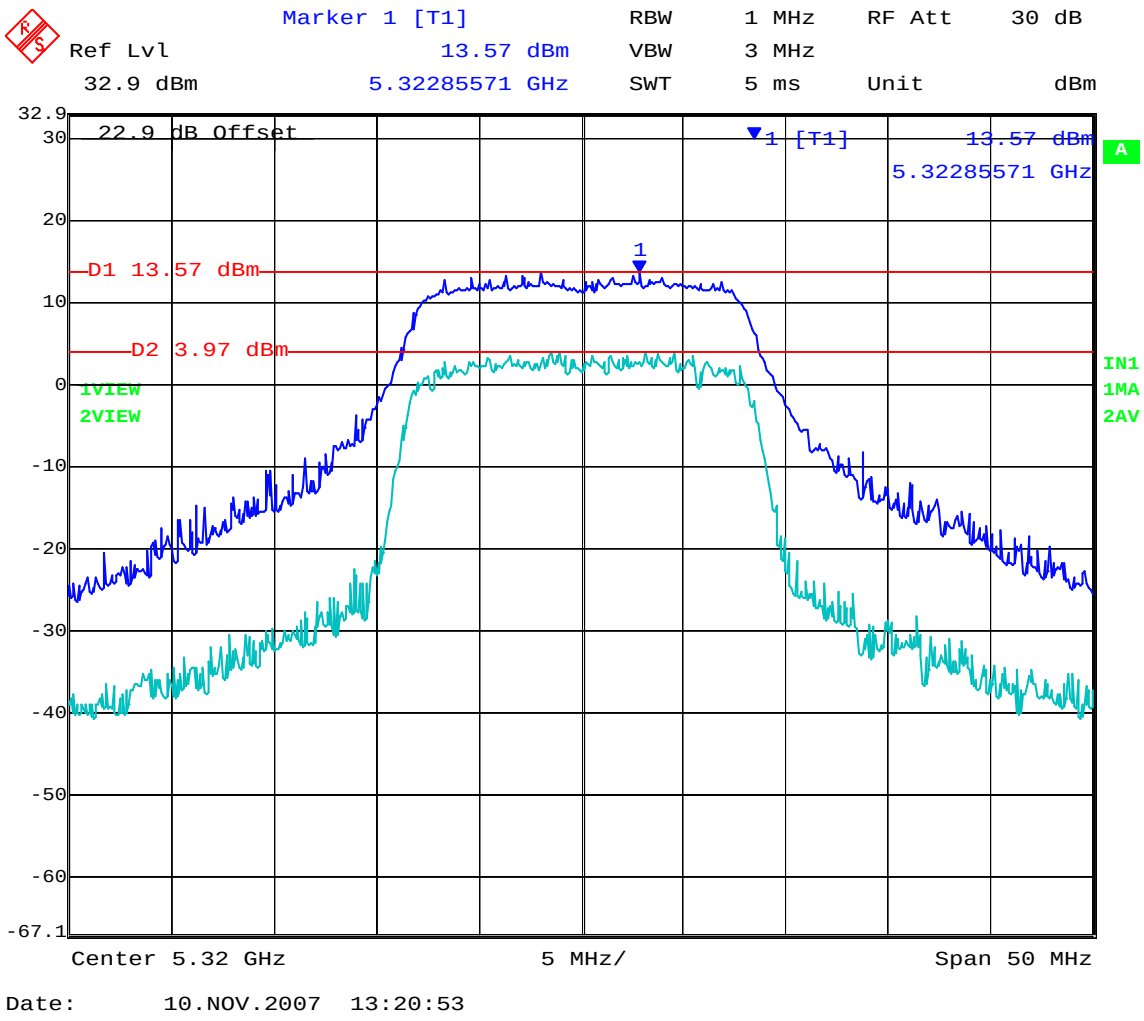

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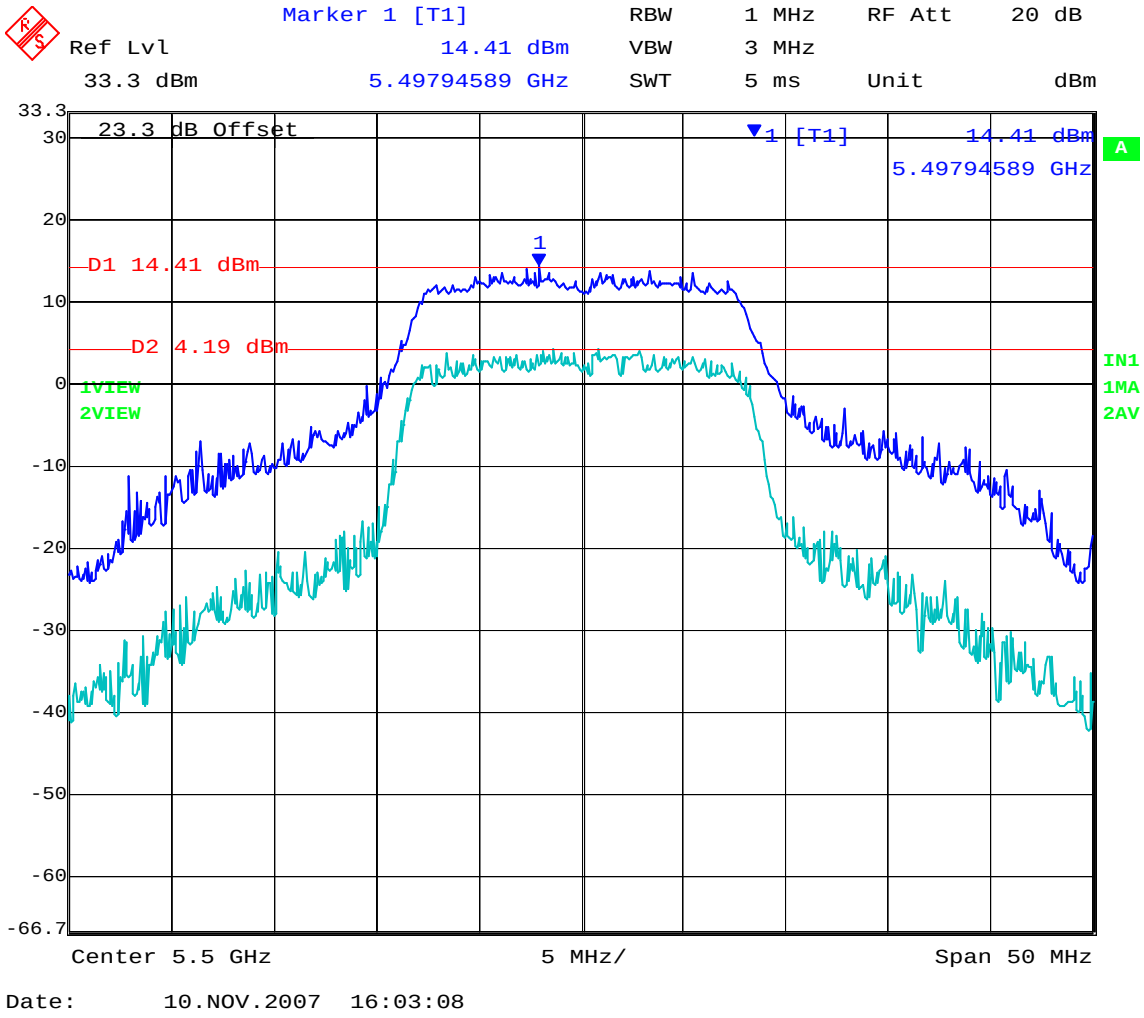
TABLE OF RESULTS – **802.11a Legacy**

Centre Frequency (MHz)	Peak Excursion Ratio (dB)
5,500	10.22
5,600	9.58
5,700	9.26

5,500 MHz 802.11a Legacy - Peak Excursion Ratio



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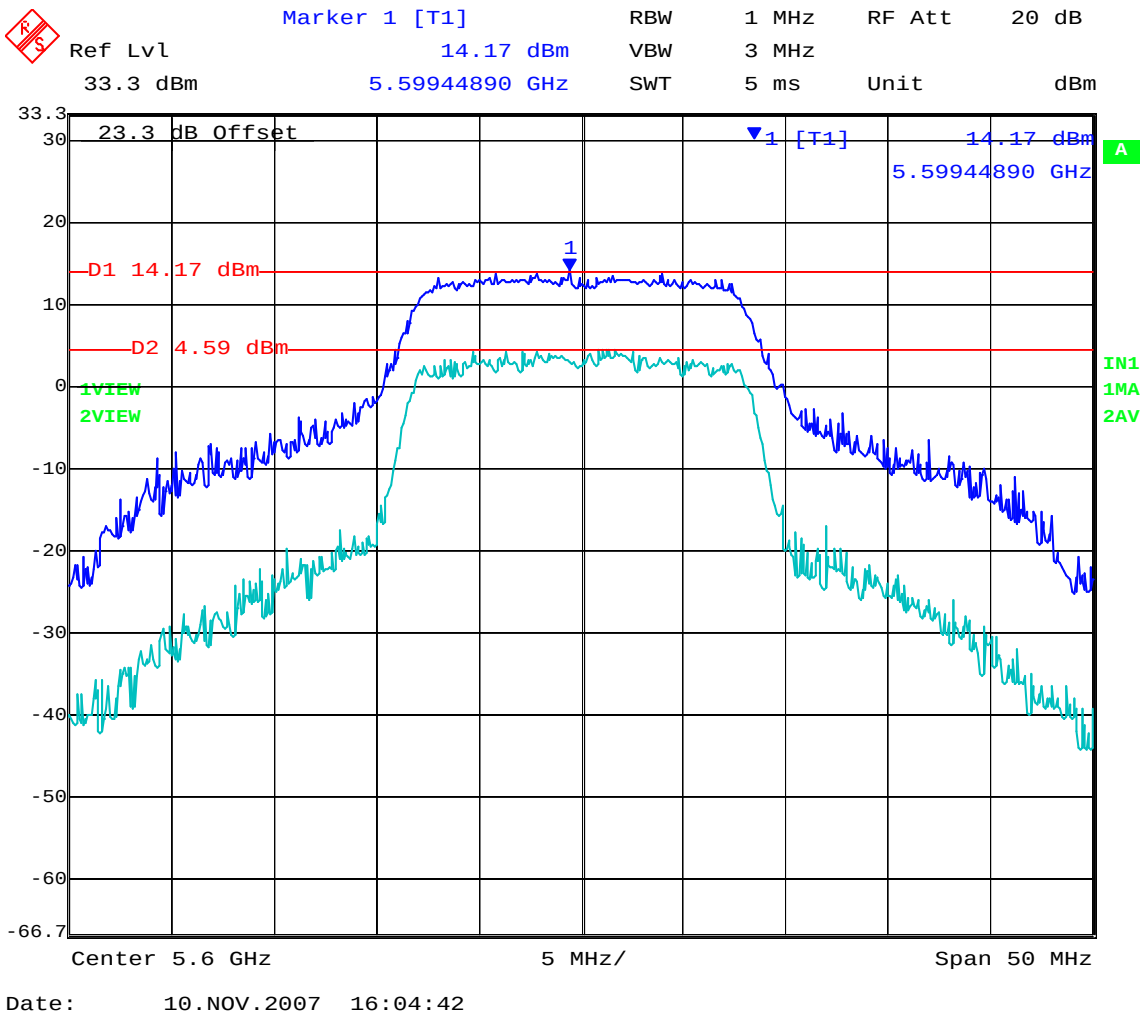
5,600 MHz 802.11a Legacy - Peak Excursion Ratio



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5,700 MHz 802.11a Legacy - Peak Excursion Ratio

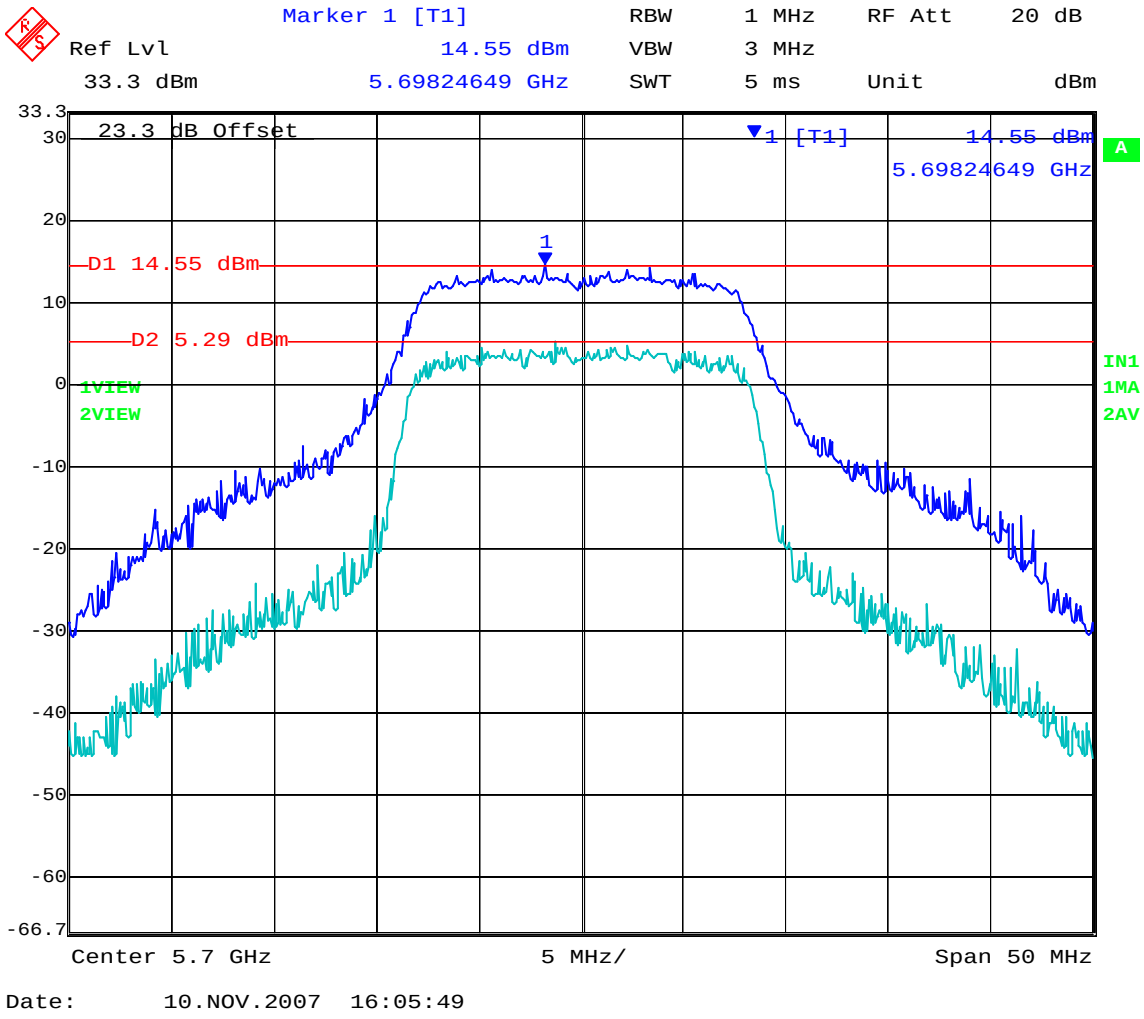

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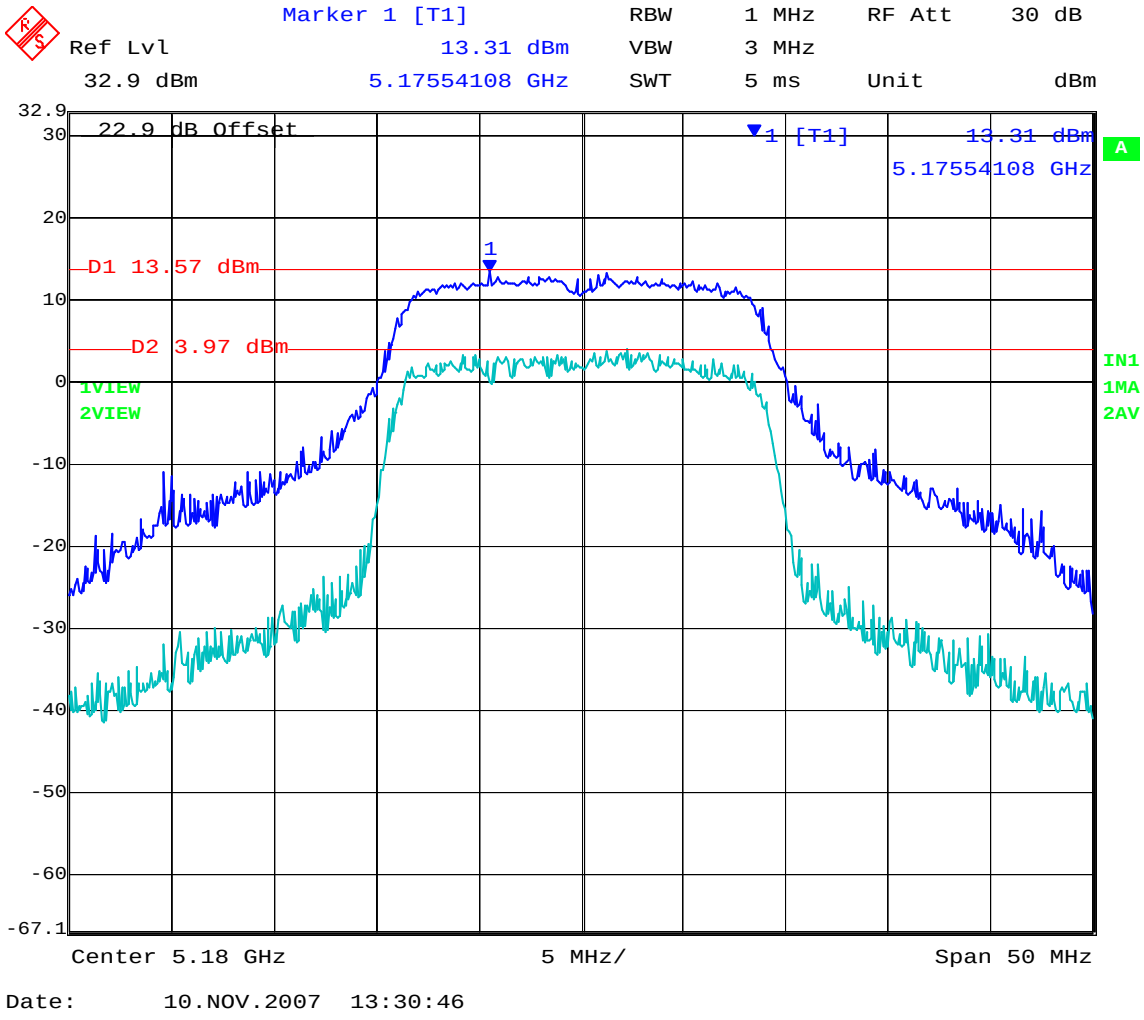
TABLE OF RESULTS – **802.11n HT20**

Centre Frequency (MHz)	Peak Excursion Ratio (dB)
5,180	9.60
5,200	9.36
5,240	8.29

5,180 MHz 802.11n HT20 - Peak Excursion Ratio



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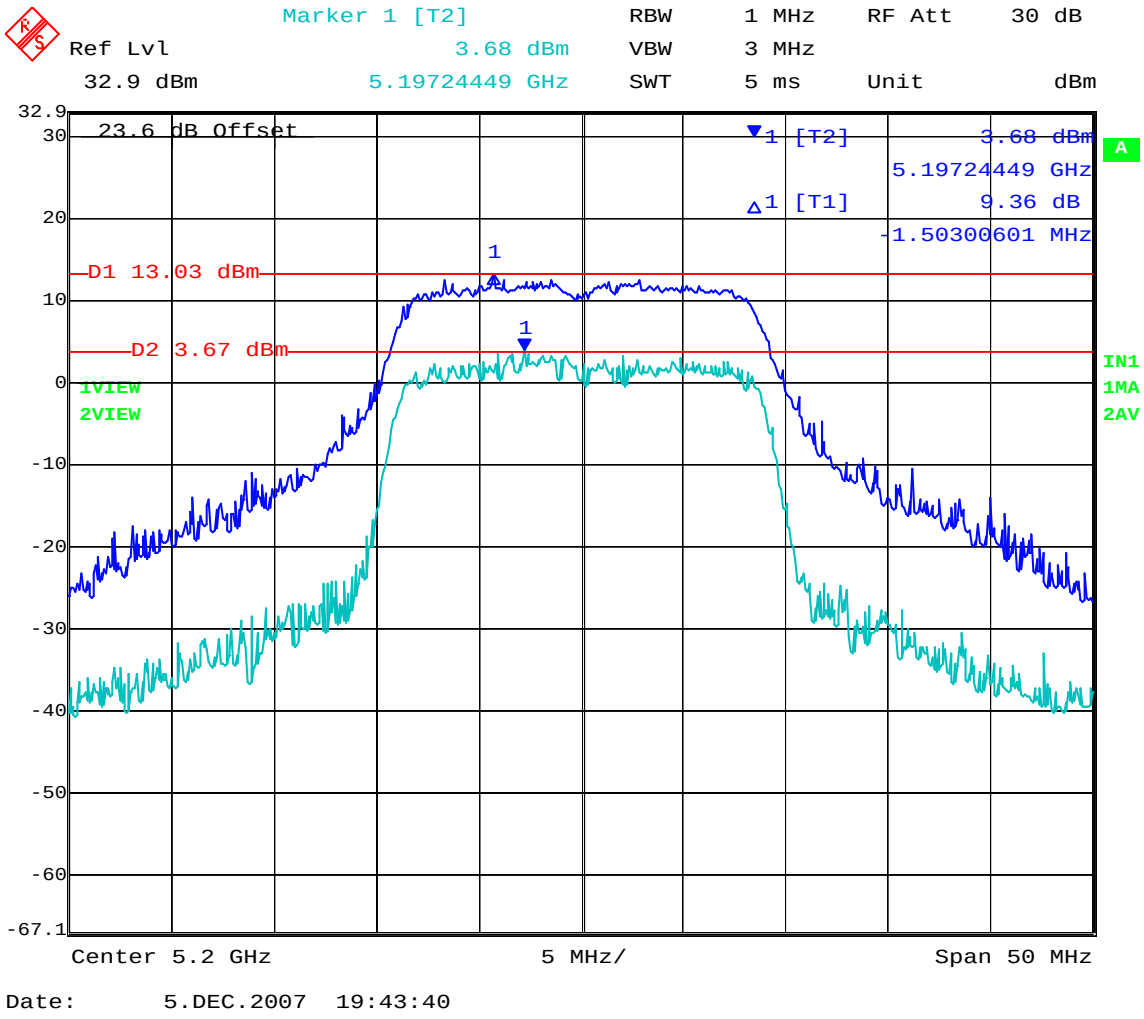
5,200 MHz 802.11n HT20 - Peak Excursion Ratio



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5,240 MHz 802.11n HT20 - Peak Excursion Ratio

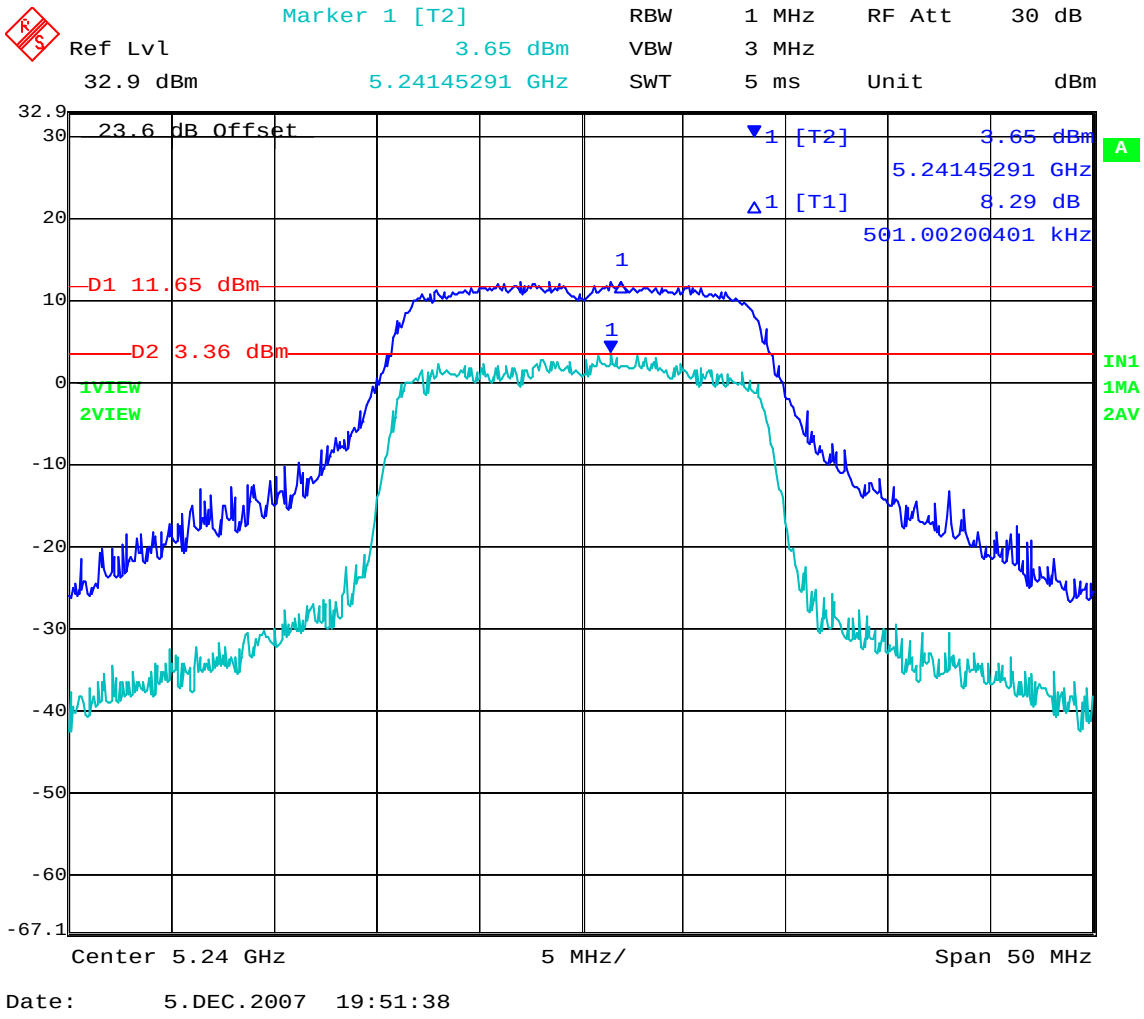

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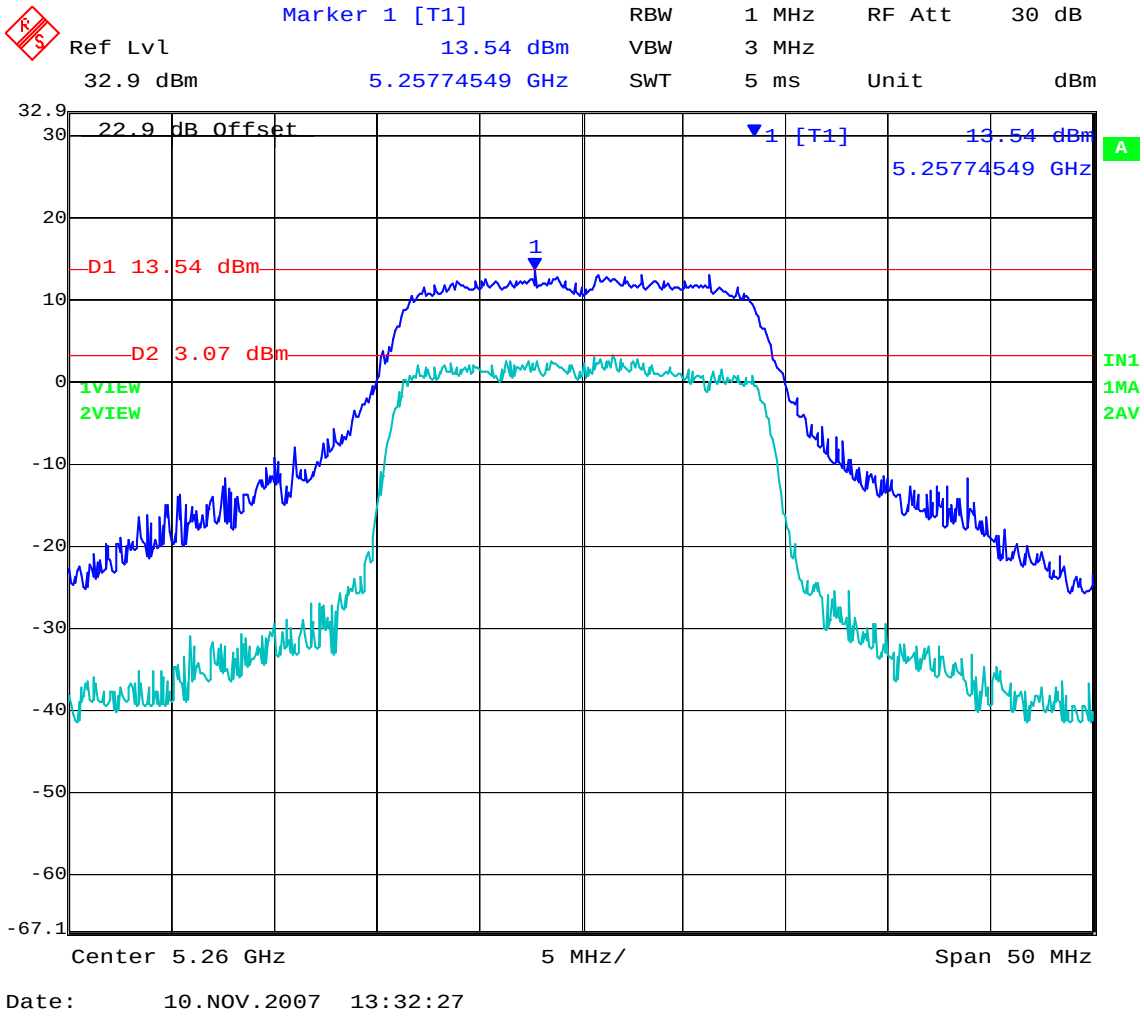
TABLE OF RESULTS – **802.11n HT20**

Centre Frequency (MHz)	Peak Excursion Ratio (dB)
5,260	10.47
5,300	10.03
5,320	8.73

5,260 MHz 802.11n HT20 - Peak Excursion Ratio



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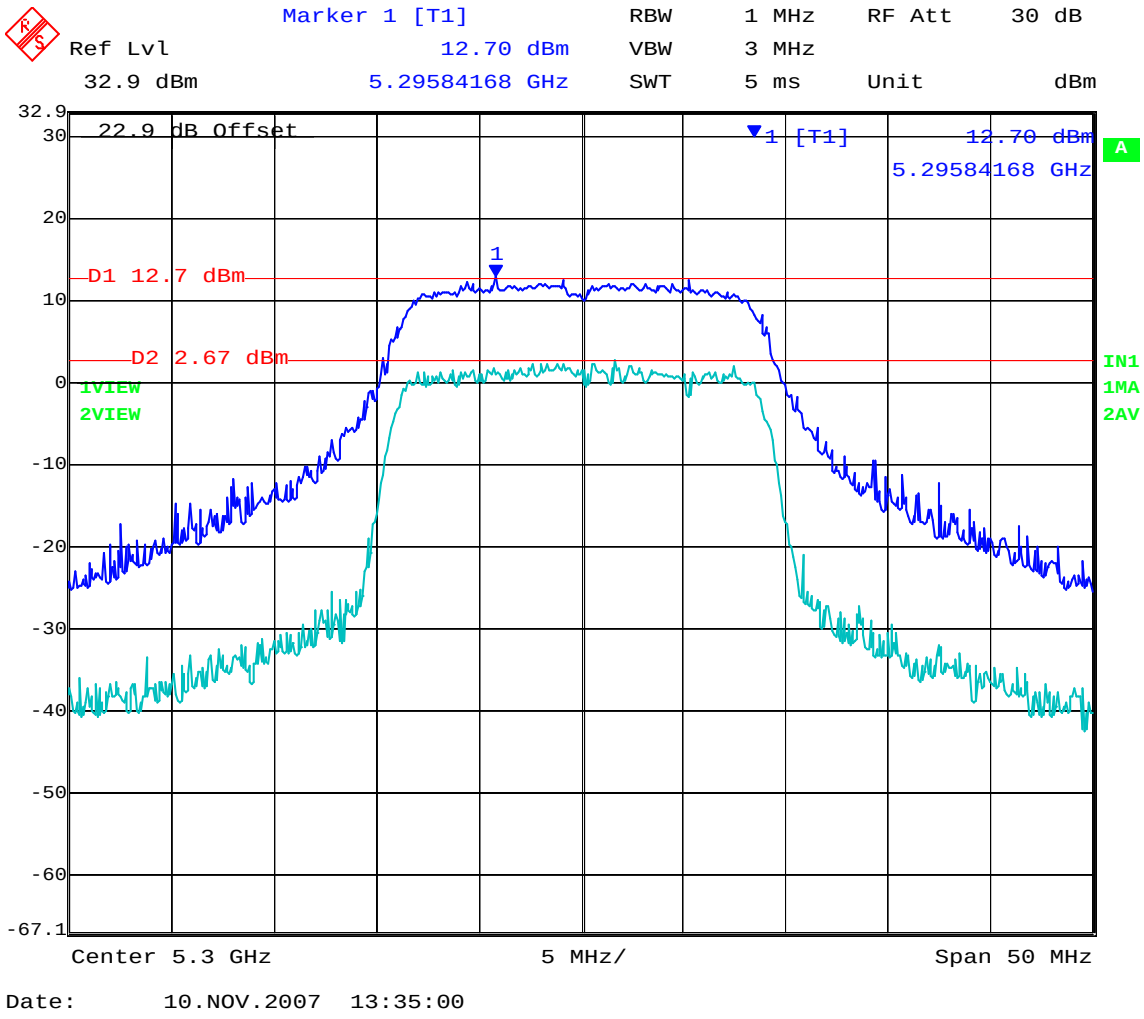
5,300 MHz 802.11n HT20 - Peak Excursion Ratio



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5,320 MHz 802.11n HT20 - Peak Excursion Ratio

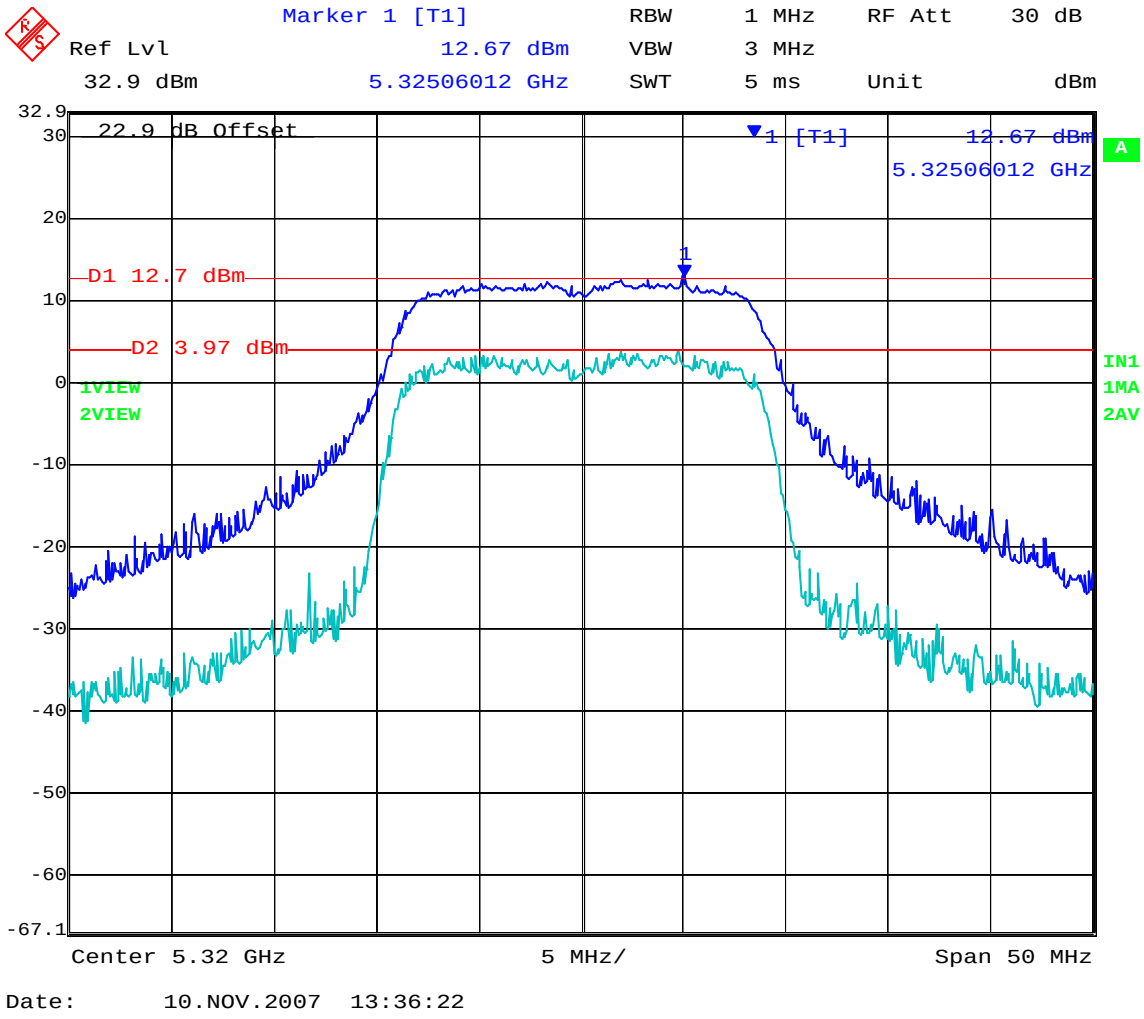

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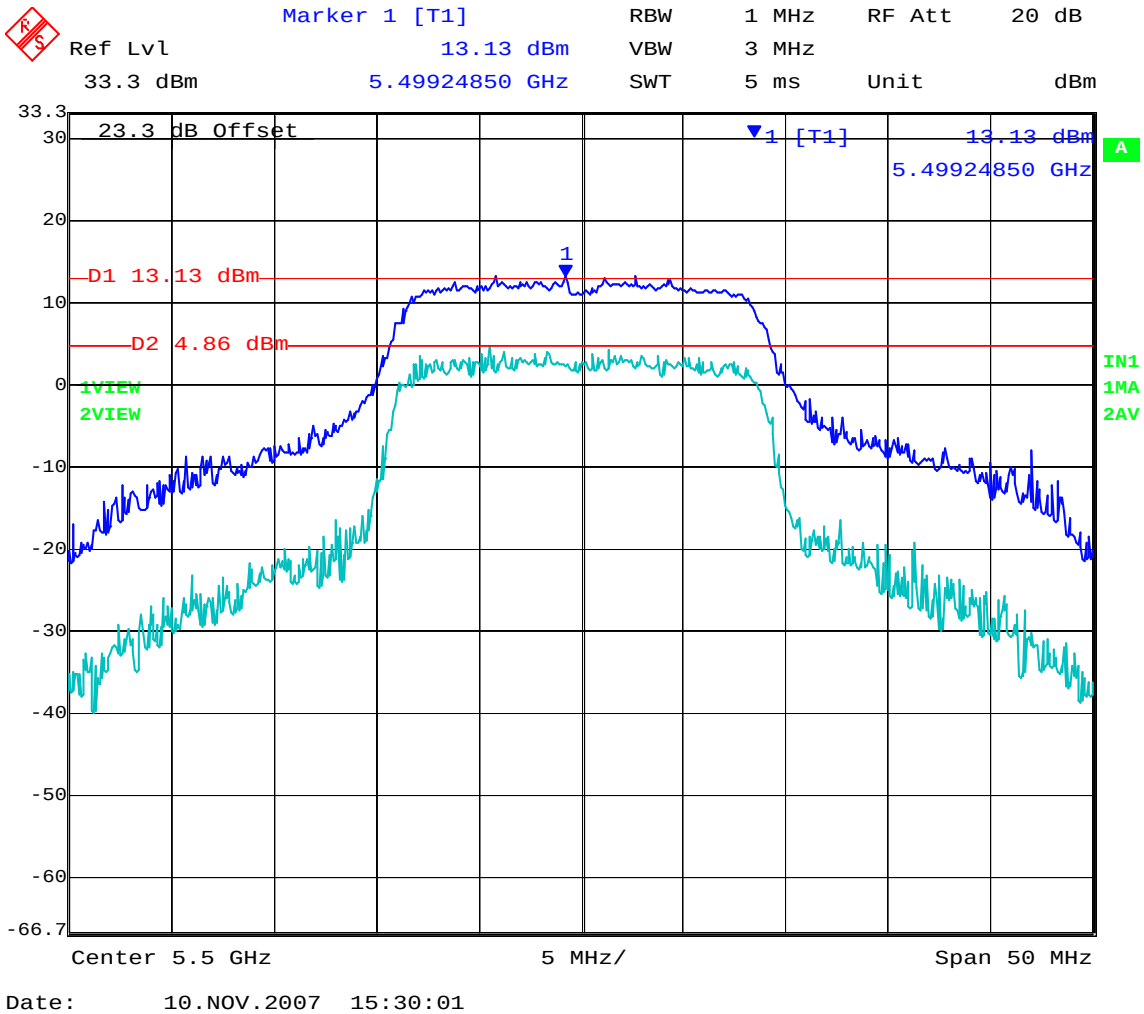
TABLE OF RESULTS – **802.11n HT20**

Centre Frequency (MHz)	Peak Excursion Ratio (dB)
5,500	8.27
5,600	9.37
5,700	9.19

5,500 MHz 802.11n HT20 - Peak Excursion Ratio



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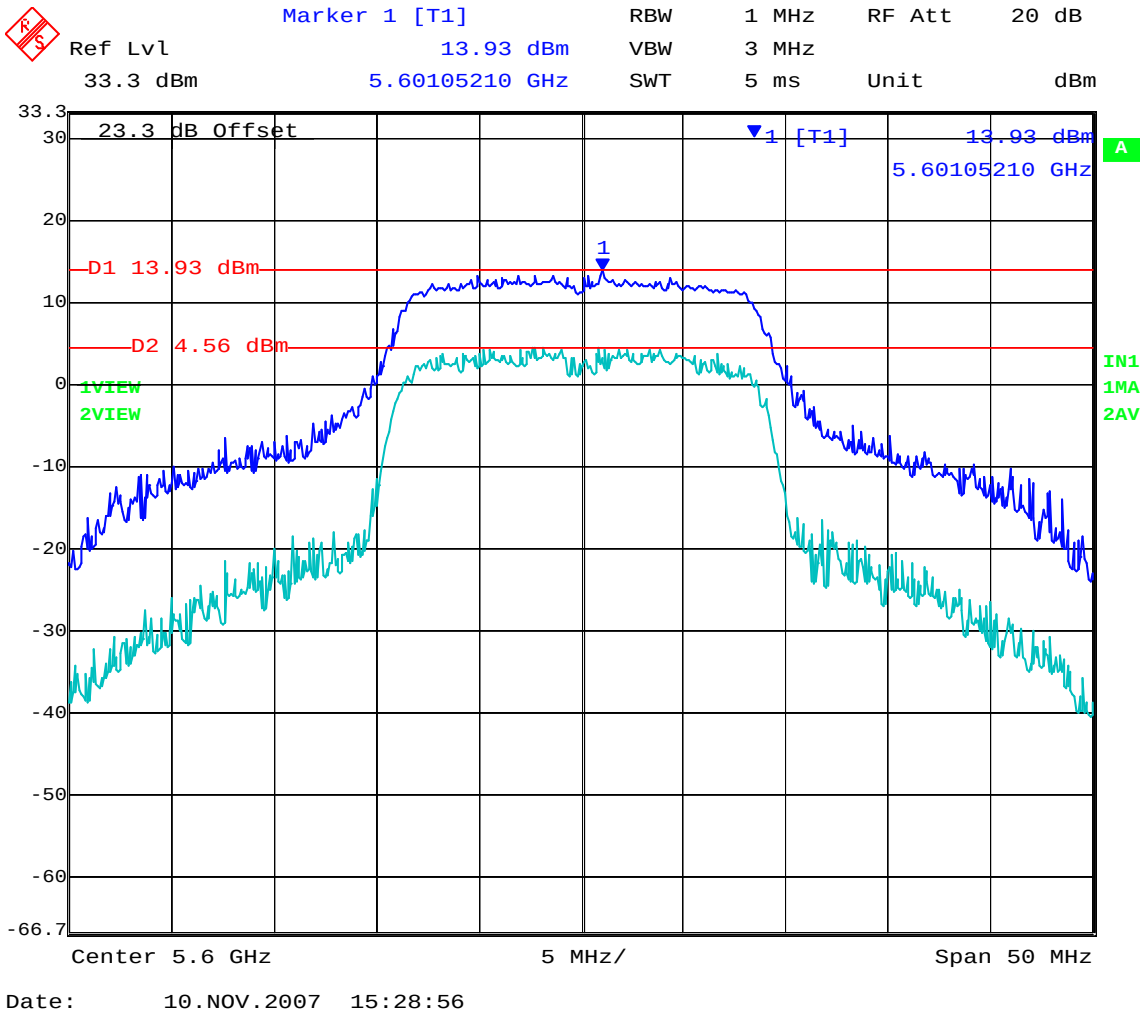
5,600 MHz 802.11n HT20 - Peak Excursion Ratio



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5,700 MHz 802.11n HT20 - Peak Excursion Ratio

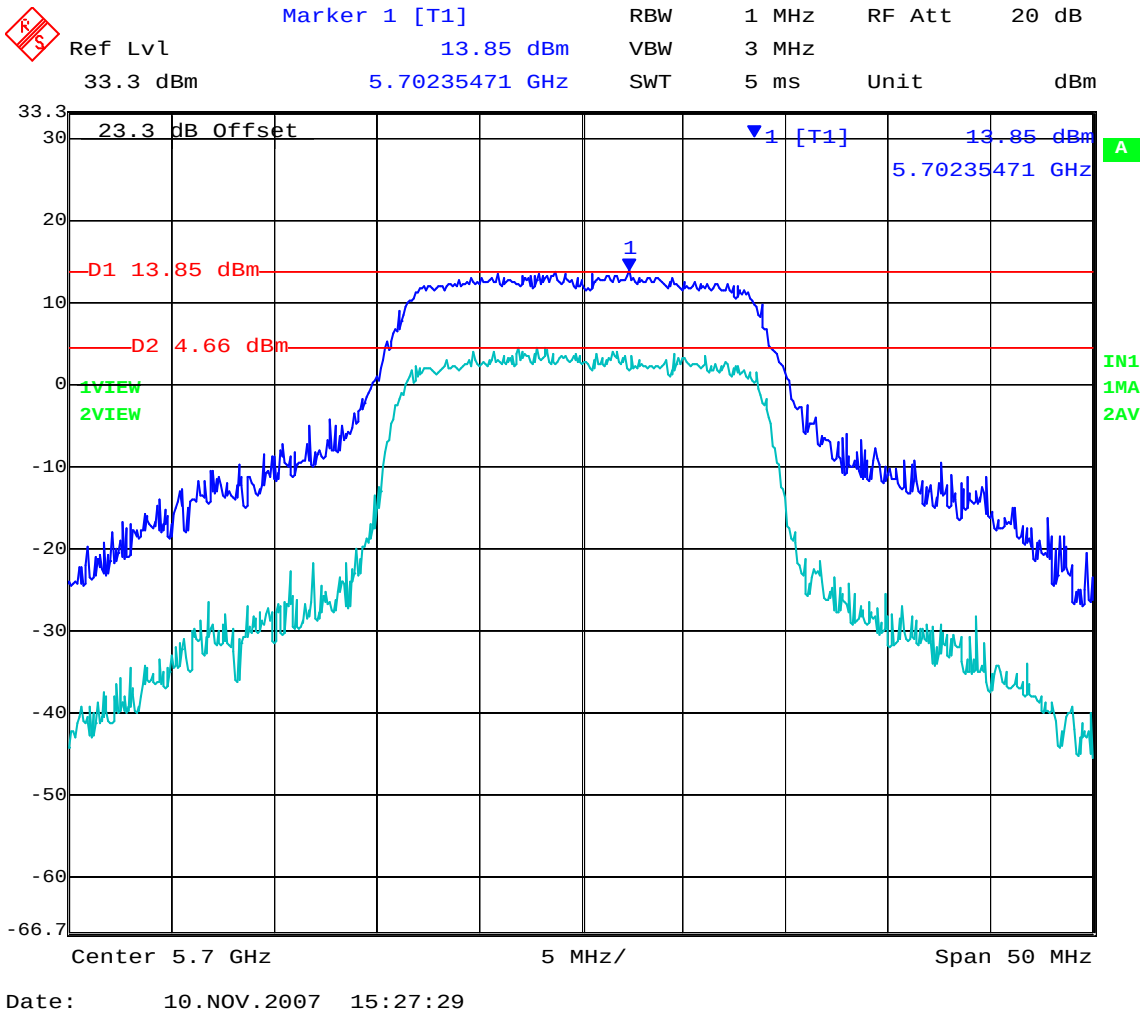

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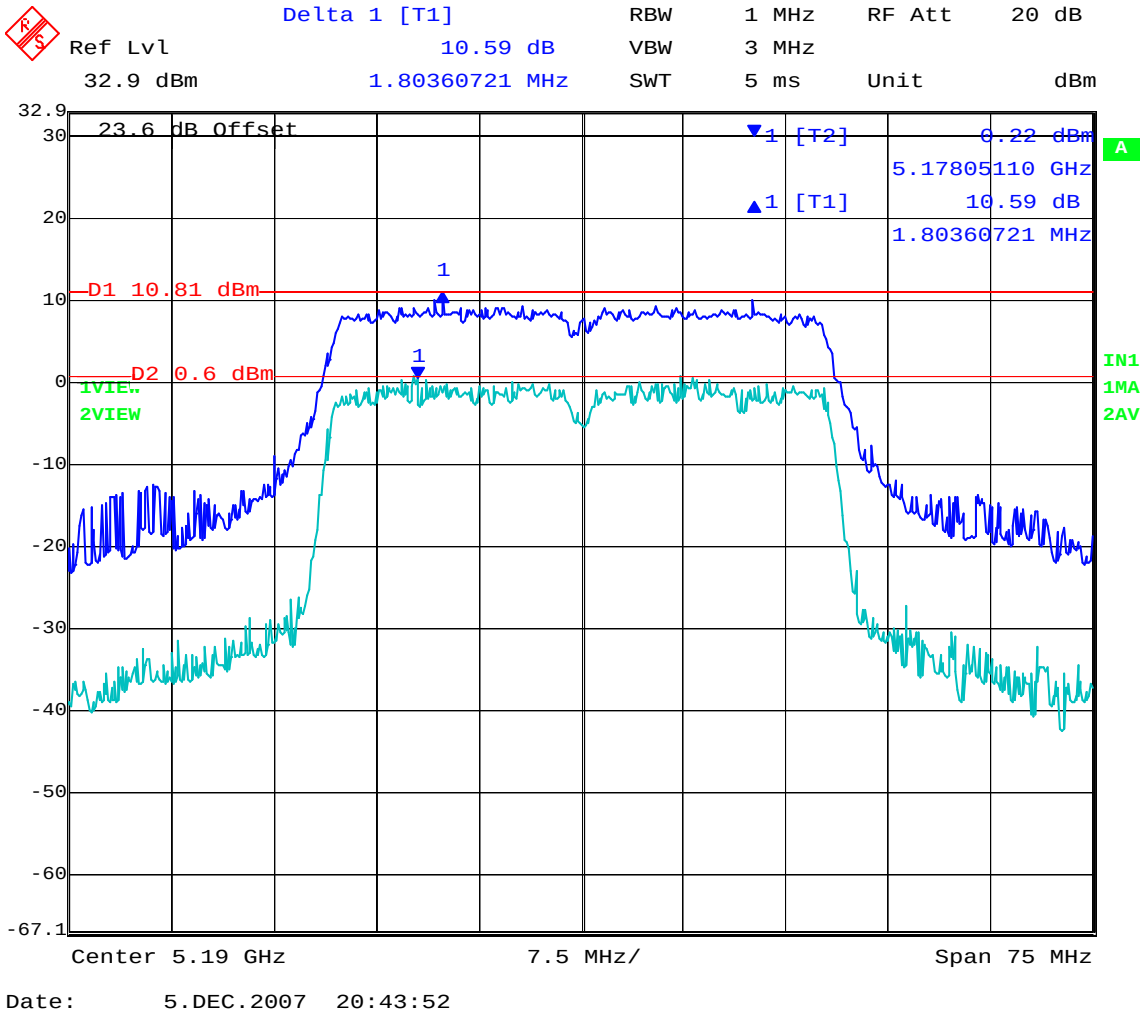
TABLE OF RESULTS – **802.11n HT40**

Centre Frequency (MHz)	Peak Excursion Ratio (dB)
5,190	10.59
5,230	9.28

5,190 MHz 802.11n HT40 - Peak Excursion Ratio



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5,230 MHz 802.11n HT40 - Peak Excursion Ratio

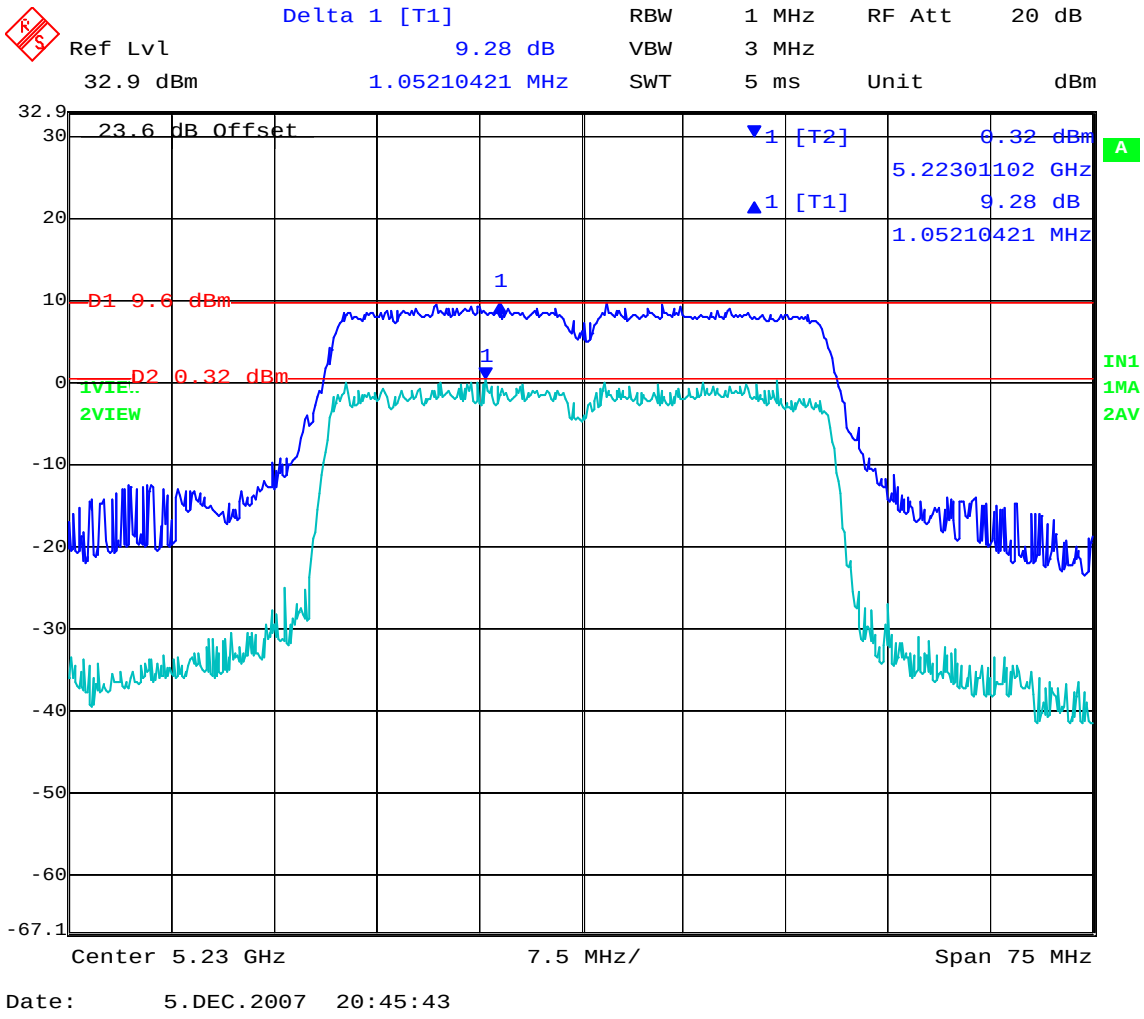

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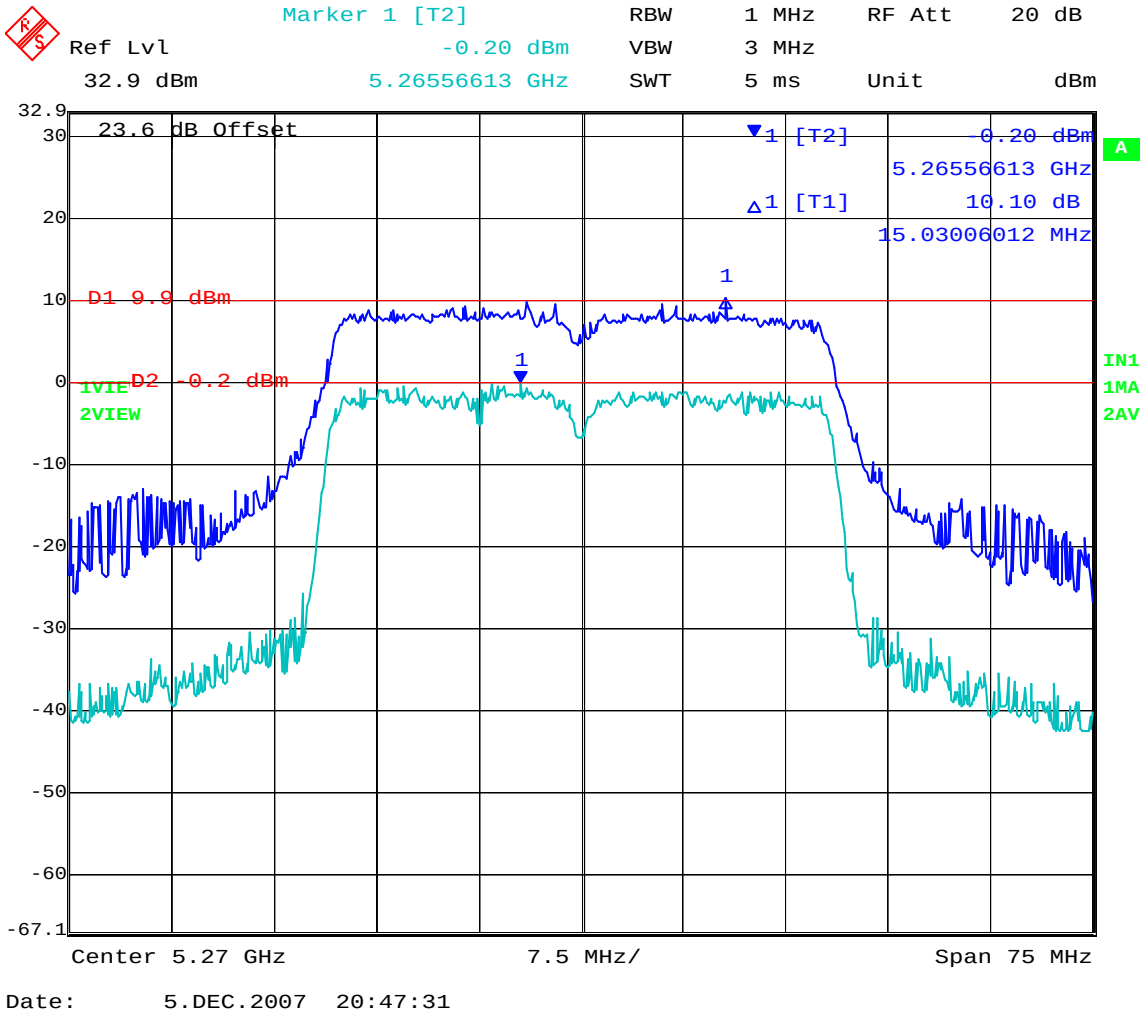
TABLE OF RESULTS – **802.11n HT40**

Centre Frequency (MHz)	Peak Excursion Ratio (dB)
5,270	10.10
5,310	10.16

5,270 MHz 802.11n HT40 - Peak Excursion Ratio



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5,310 MHz 802.11n HT40 - Peak Excursion Ratio

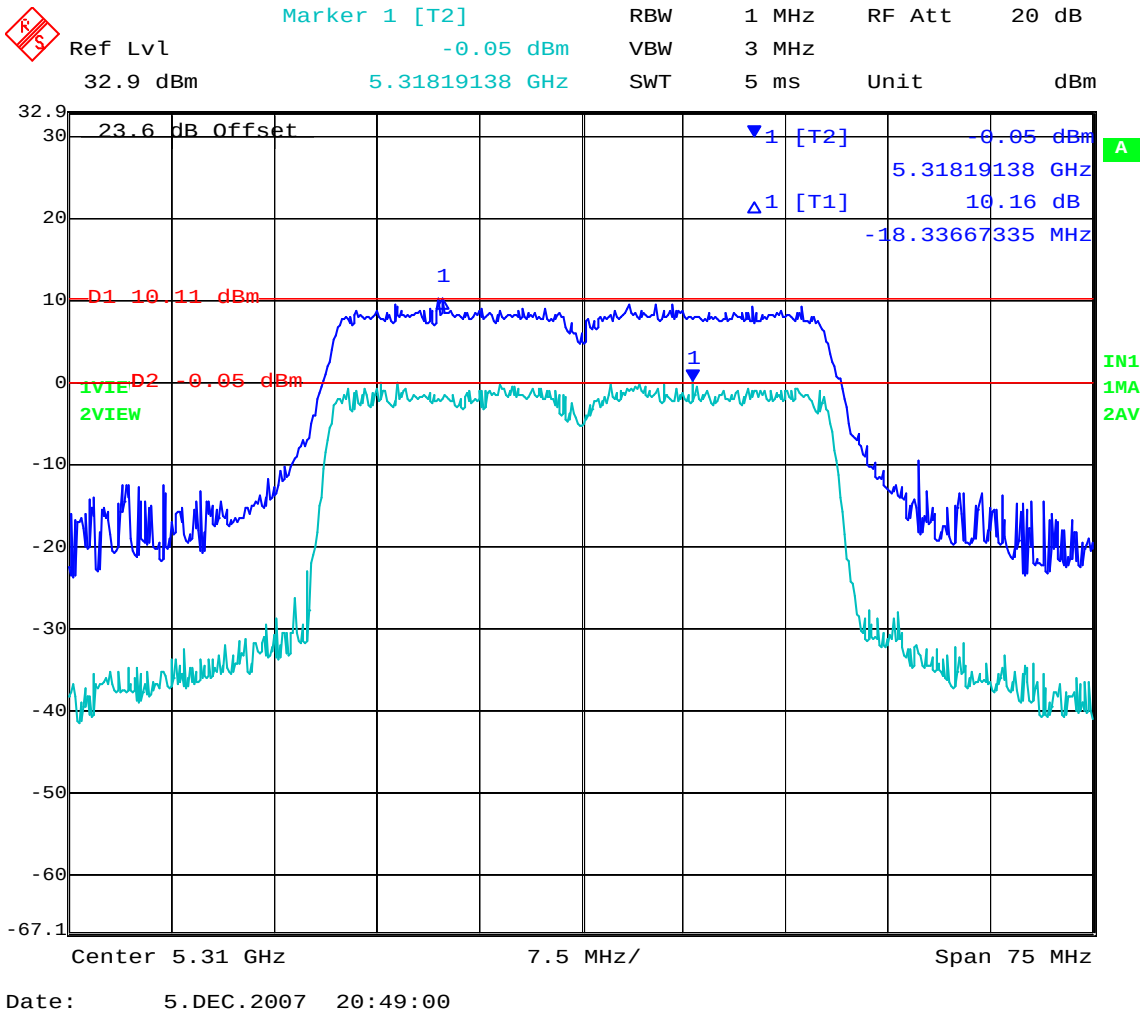

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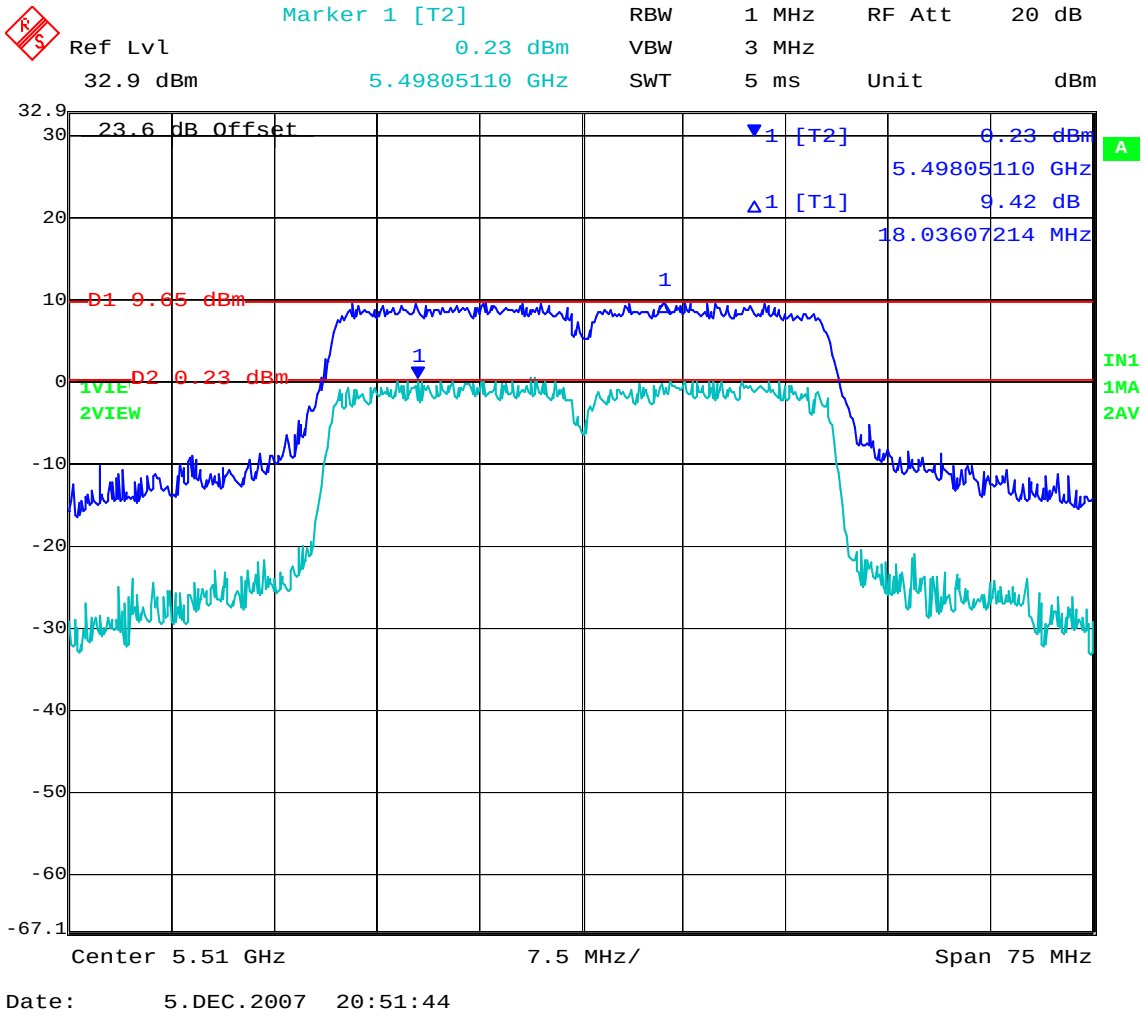
TABLE OF RESULTS – **802.11n HT40**

Centre Frequency (MHz)	Peak Excursion Ratio (dB)
5,510	9.42
5,620	10.41
5,690	9.41

5,510 MHz 802.11n HT40 - Peak Excursion Ratio



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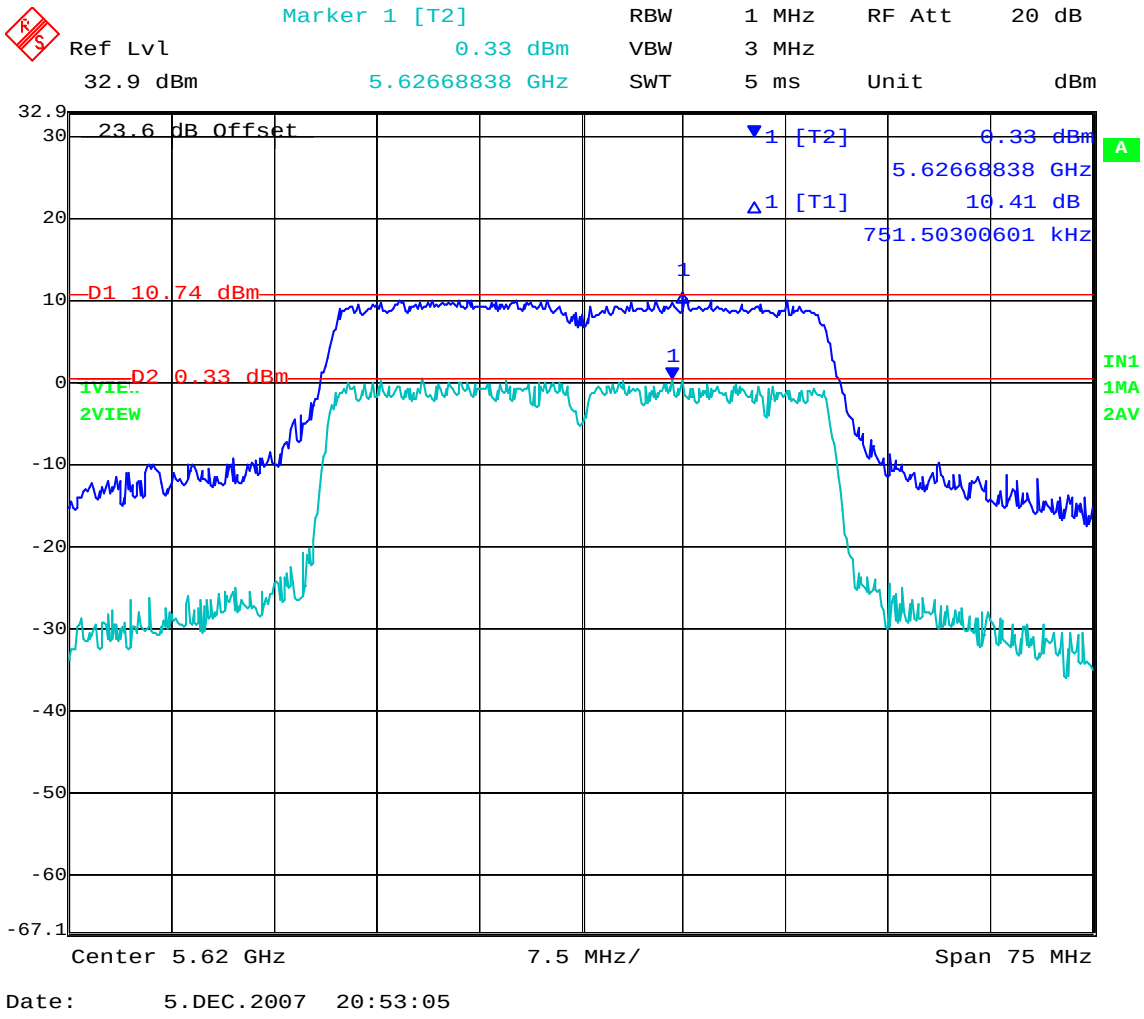
5,620 MHz 802.11n HT40 - Peak Excursion Ratio



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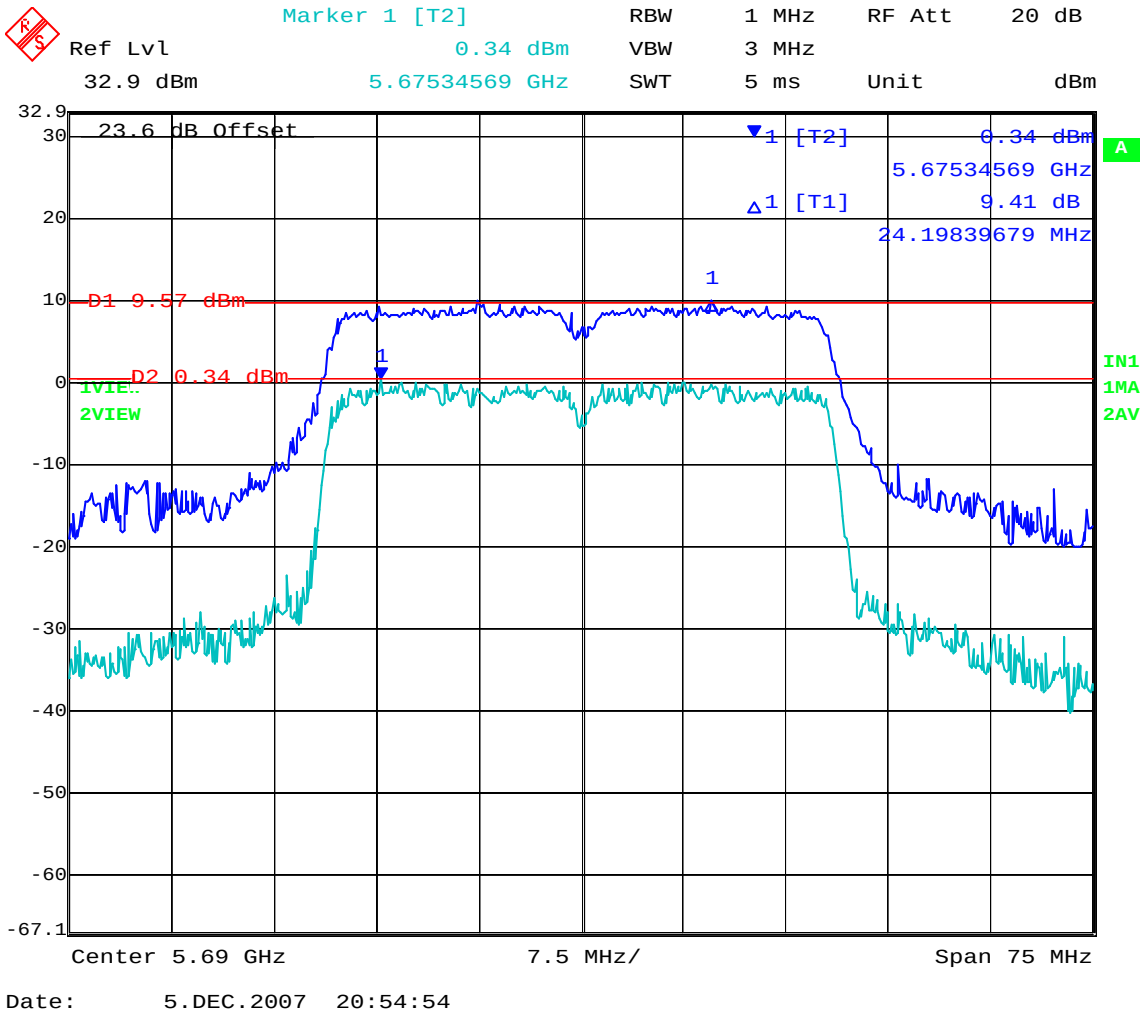
5,690 MHz 802.11n HT40 - Peak Excursion Ratio



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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

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of RF Spectrum Mask'	0158, 0193, 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 ±20ppm stability.
This stability accounts for room temp tolerance of the crystal oscillator circuit, frequency variation across temperature, and crystal ageing.

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

Specification

Limits

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

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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

Power Density = Pd (mW/cm^2) = EIRP/(4πd^2)

EIRP = P * G * 3

P = Peak output power (mW)

G = Antenna numeric gain (numeric)

d = Separation distance (cm)

Numeric Gain = 10 ^ (G (dBi)/10)

The Aruba AP-124/125 has three transmitters. The peak power in the table below is calculated by assuming a worst case scenario where the three transmitters are operating simultaneously in the same band. The Peak Power in mW is calculated by taking the maximum conducted power measured in each band and multiplying by 3.

Because the EUT belongs to the General Population/Uncontrolled Exposure the limit of power density is 1.0 mW/cm^2

Freq. Band (MHz)	Antenna Gain (dBi)	Numeric Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Calculated Safe Distance @ 1mW/cm^2 Limit(cm)	Minimum Separation Distance (cm)
5150 - 5250	14.0	25.12	+14.93	93.35	13.66	20
5250 - 5350	14.0	25.12	+14.52	84.95	13.03	20
5470 - 5725	14.0	25.12	+15.95	118.07	15.37	20

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 / cm^2 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

5.1.7.1. Transmitter Radiated Spurious Emissions (above 1 GHz); Peak Field Strength Measurements; and Radiated Band Edge Measurements – Restricted Bands

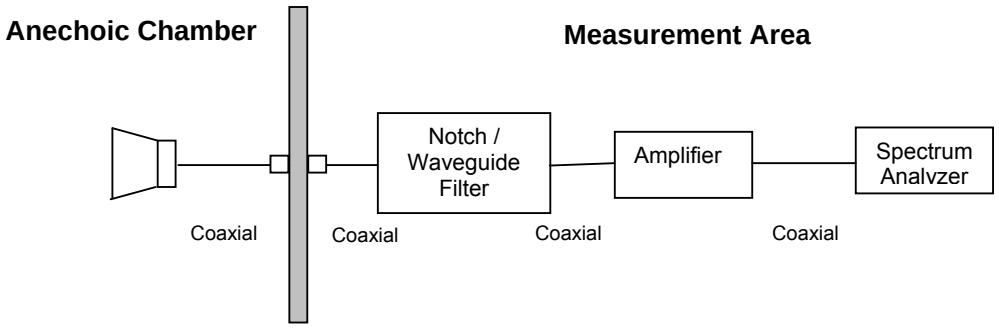
FCC, Part 15 Subpart C §15.407(b)(2), §15.205(a)/15.209(a)
Industry Canada RSS-210 §A9.3(2); §2.2; §2.6; RSS-Gen §4.7

Test Procedure

Radiated emissions above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter and waveguide filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.

All measurements on any frequency or frequencies over 1 MHz are based on the use of measurement instrumentation employing an average detector function. All measurements above 1 GHz were performed using a minimum resolution bandwidth of 1 MHz.

Test Measurement Set up



Measurement set up for Radiated Emission Test

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

where: FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss or Waveguide Loss

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

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

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

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

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

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

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

where P is the EIRP in Watts

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

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

Measurement Results Transmitter Radiated Spurious Emissions above 1 GHz

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

Emission Characterization
During testing it was verified that there were several emissions emanating from the body of the EUT which was unrelated to antenna type and gain. The emissions which were observed over the range 1 - 3.5 GHz were individually characterized. The peak amplitude of emissions were found to be above 54dBμV/m however they averaged down below the average limit in all cases.

Emissions 1-3.5 GHz and corresponding measurement values are identified on the following page.

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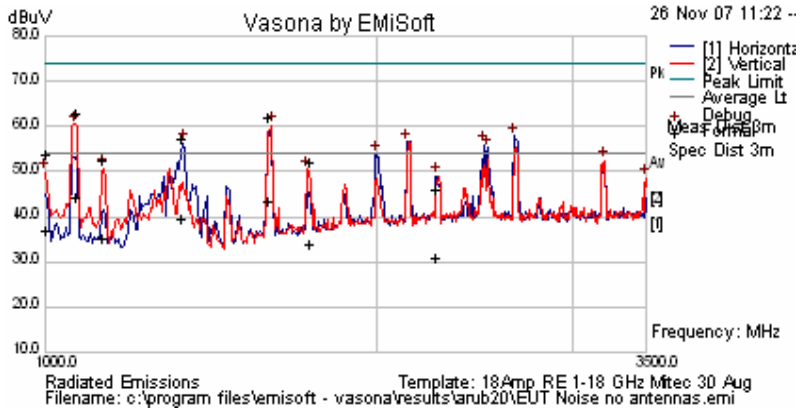
Emission Characterization

Emissions emanating from body of EUT, 50 Ohm termination on all antenna ports
NRB = None Restrictive Band

Spurious Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
1070.391	74.79	2.02	-16.09	60.72	Peak Max	V	98	45	74	-13.28	Pass	
1594.398	71.79	2.45	-14.37	59.88	Peak Max	V	104	187	74	-14.12	Pass	
2490.768	65.69	3	-11.24	57.45	Peak Max	V	128	30	74	-16.55	Pass	
1331.012	68.73	2.25	-15.58	55.4	Peak Max	V	119	66	74	-18.60	Pass	
1129.389	64.41	2.08	-15.96	50.52	Peak Max	V	98	27	74	-23.48	Pass	
1739.83	60.74	2.57	-13.26	50.04	Peak Max	V	98	218	74	-23.96	Pass	
1002.856	66.21	1.95	-16.15	52.01	Peak Max	V	99	12	74	-21.99	Pass	
2257.515	52.19	2.89	-11.02	44.05	Peak Max	V	142	185	74	-29.95	Pass	
1070.391	56.14	2.02	-16.09	42.07	Average Max	V	98	45	54	-11.93	Pass	
1594.398	53.15	2.45	-14.37	41.24	Average Max	V	104	187	54	-12.76	Pass	
2490.768	52.71	3	-11.24	44.47	Average Max	V	128	30	54	-9.53	Pass	
1331.012	51.05	2.25	-15.58	37.72	Average Max	H	106	18	54	-16.28	Pass	
1129.389	47.2	2.08	-15.96	33.31	Average Max	V	98	27	54	-20.69	Pass	
1739.83	42.47	2.57	-13.26	31.78	Average Max	V	98	218	54	-22.22	Pass	
1002.856	49.16	1.95	-16.15	34.96	Average Max	V	99	12	54	-19.04	Pass	
2257.515	37.03	2.89	-11.02	28.89	Average Max	H	125	134	54	-25.11	Pass	
2658.317	66.27	3.13	-11.37	58.02	Peak [Scan]	H	100	0				NRB
2127.255	64.97	2.82	-11.04	56.75	Peak [Scan]	H	100	0				NRB
2513.026	63.53	3.01	-11.31	55.23	Peak [Scan]	H	100	0				NRB
1996.994	62.23	2.75	-11.18	53.79	Peak [Scan]	H	100	0				NRB
3209.419	60.7	3.48	-11.65	52.53	Peak [Scan]	V	100	0				NRB
3494.99	56.73	3.6	-11.68	48.65	Peak [Scan]	V	100	0				NRB

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ARUB20 AP-125 (ANT-INTEGRAL)
ART Settings V Aggregate Measured Power

The following matrix identifies the ART power setting V's each output chain. The aggregate power was also measured for all three chains.

As a result of either spurious emissions (harmonic) or band-edge issues the power was reduced to bring the unit into compliance.

Configuration	ART Power Setting	Tx 1 Measured Pwr (dBm)	Tx 2 Measured Pwr (dBm)	Tx 3 Measured Pwr (dBm)	Aggregate Measured Pwr (dBm)
Legacy a (5150 | 5180 MHz)BE	16	13.70	13.65	14.56	19.27
Legacy a (5350 | 5320 MHz)BE	16.5	13.81	14.89	13.96	19.86
Legacy a (5460 | 5150 | 5745 MHz)BE	17	14.05	13.91	15.12	19.97
Legacy a (5460 | 5500 MHz)BE	17	15.02	14.99	15.09	20.78
HT-20 (5150 | 5180 MHz)BE	16.5	14.02	13.82	14.80	18.75
HT-20 (5350 | 5320 MHz)BE	11.5	9.19	9.69	9.20	14.76
HT-20 (5460 | 5150 | 5745 MHz)BE	17	13.95	13.75	15.00	19.98
HT-20 (5460 | 5500 MHz)BE	16.5	14.45	14.35	14.38	20.10
HT-40 (5150 | 5190 MHz)BE	13	10.27	10.53	10.90	16.04
HT-40 (5350 | 5310 MHz)BE	13.5	10.54	11.05	10.53	16.00
HT-40 (5150 | 5190 | 5755 MHz)BE	17	13.94	13.67	14.82	19.84
HT-40 (5460 | 5510 MHz)BE	14.5	12.48	12.26	12.21	17.83

Note BE = Band-edge, SE – Spurious emissions

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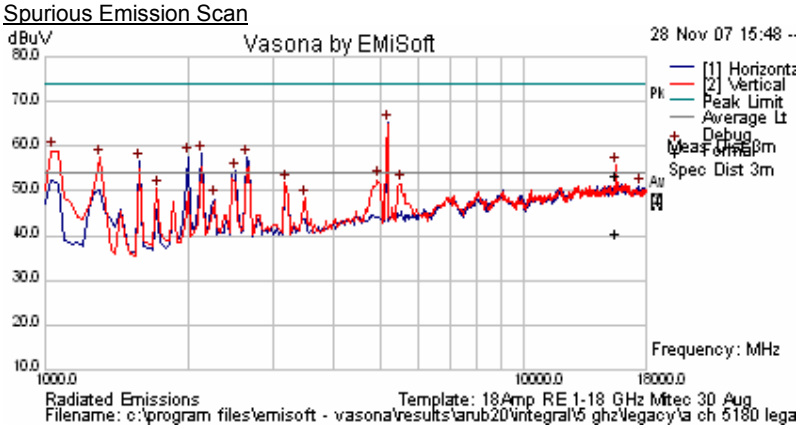
AP125: 5150-5250GHz INTEGRAL Legacy Data Rates

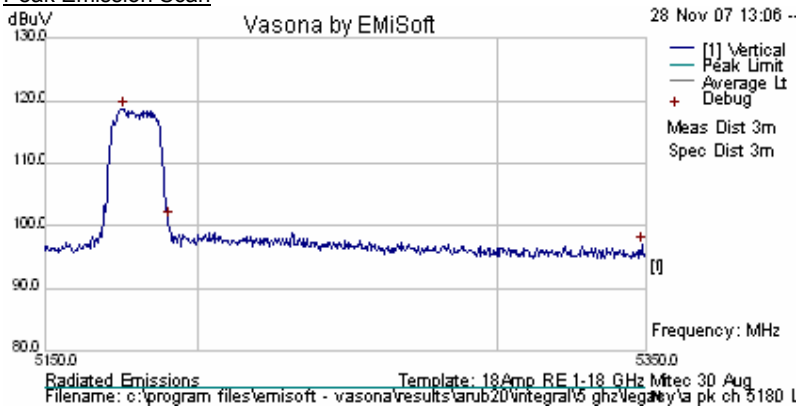
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MBit/s)**	**Compliant**
36	5180	ART 17	99%	a 6 Legacy	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5176.052	73.39	10.62	34.65	118.66	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
5150.000	ART Power Setting = 16.0				Peak Max	V			74	-1.21	Pass	Band-edge
5150.000					Average Max	V			54	-0.45	Pass	Band-edge
15541.16	44.18	8.28	-1.03	51.42	Peak Max	V	111	344	74	-22.58	Pass	
15541.16	31.06	8.28	-1.03	38.3	Average Max	H	112	154	54	-15.7	Pass	

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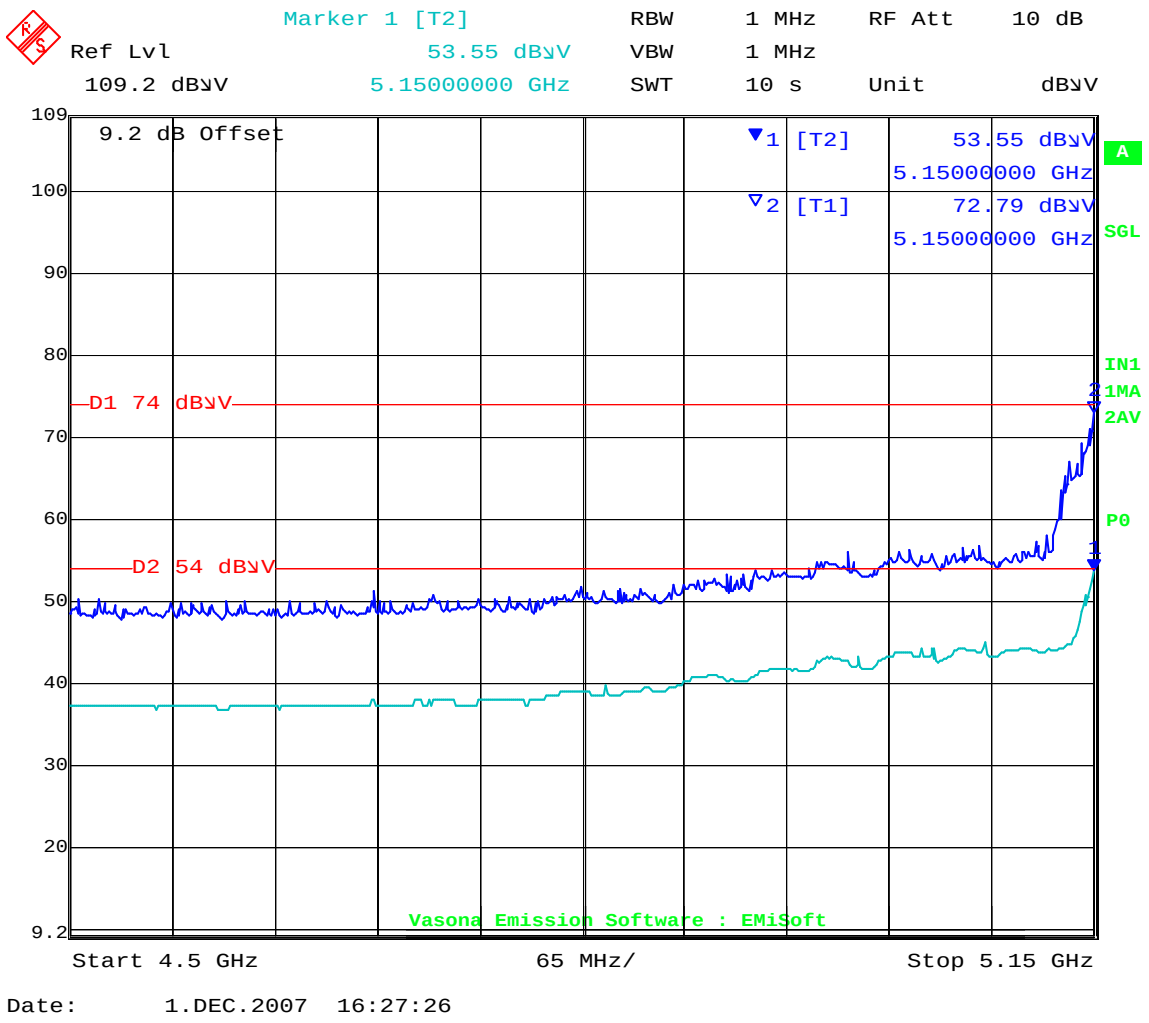

802.11a Legacy Band-edge @ 5150 MHz with Integral antenna

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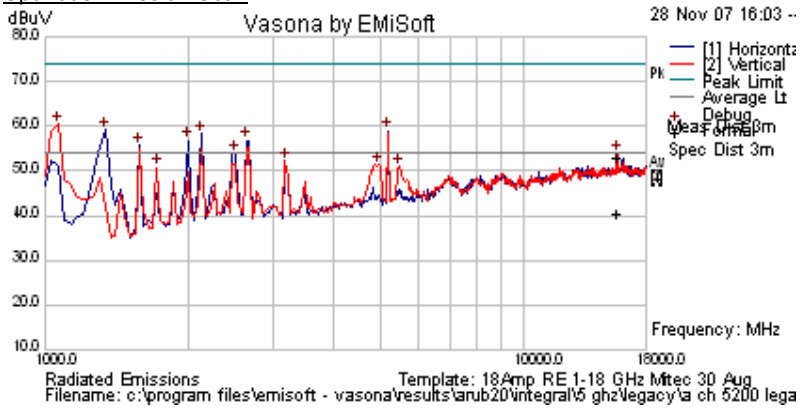
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MBit/s)**	**Compliant**
40	5200	ART 17	99%	a 6 Legacy	Yes

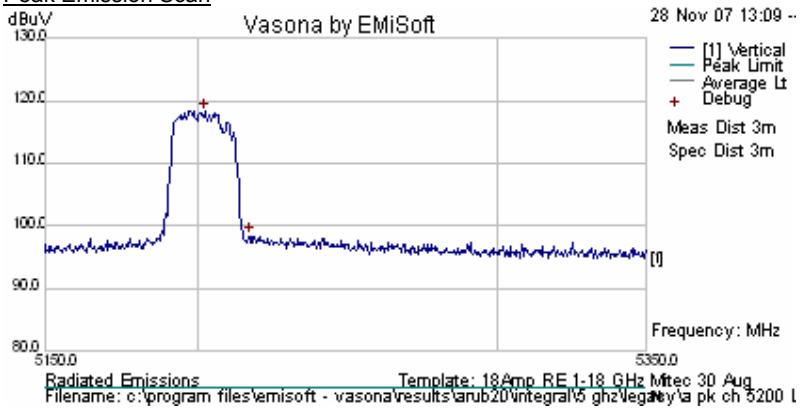
Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Spurious Emission Scan

Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5202.505	73.03	10.62	34.67	118.32	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
15602.3	43.62	8.38	-1.16	50.84	Peak Max	V	127	316	74	-23.16	15602.3	
15602.3	30.96	8.38	-1.16	38.18	Average Max	V	127	316	54	-15.82	15602.3	

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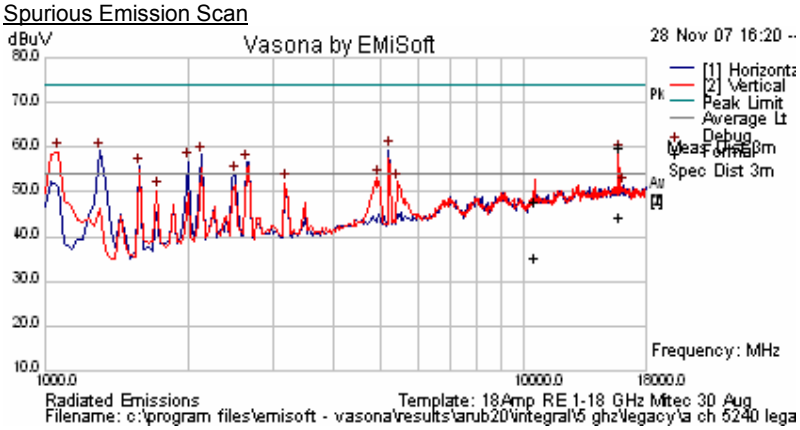
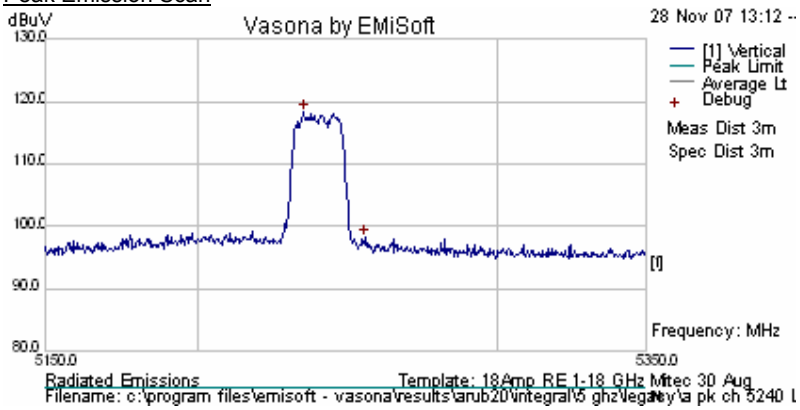
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MBit/s)**	**Compliant**
48	5240	ART 17	99%	a 6 Legacy	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5235.371	72.9	10.62	34.69	118.21	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
15751.5	50.36	8.62	-1.16	57.82	Peak Max	V	98	283	74	-16.18	Pass	
10481.65	39.9	6.77	-1.04	45.63	Peak Max	V	151	47	74	-28.37	Pass	
15751.5	34.65	8.62	-1.16	42.11	Average Max	V	98	283	54	-11.89	Pass	
10481.65	27.25	6.77	-1.04	32.98	Average Max	V	151	47	54	-21.02	Pass	

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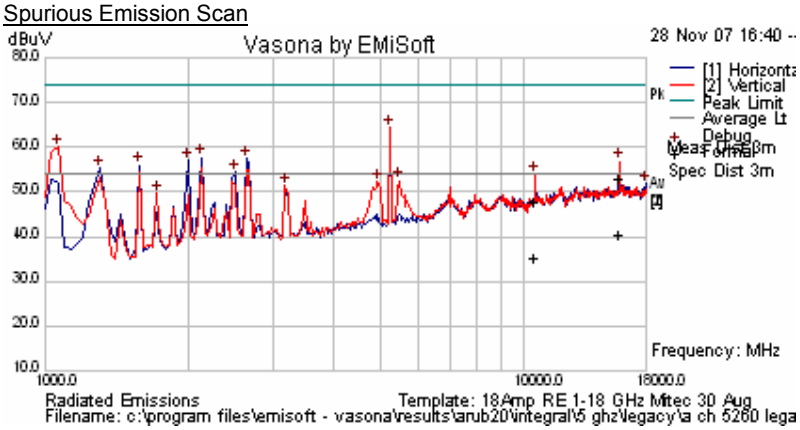
AP125: 5250-5350GHz INTEGRAL Legacy Data Rates

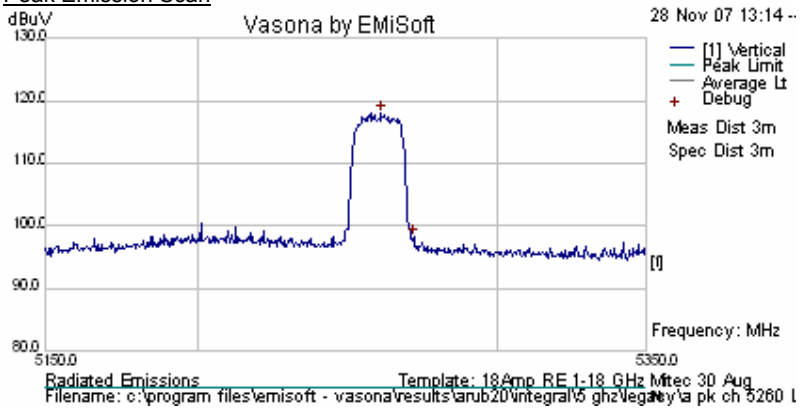
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MBit/s)**	**Compliant**
52	5260	ART 17	99%	a 6 Legacy	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5261.022	72.71	10.62	34.71	118.05	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
15782.64	43.2	8.67	-1.12	50.75	Peak Max	V	103	26	74	-23.25	Pass	
10523.08	40.02	6.79	-1.01	45.8	Peak Max	V	98	32	74	-28.2	Pass	
15782.64	30.69	8.67	-1.12	38.25	Average Max	V	103	26	54	-15.75	Pass	
10523.08	27.45	6.79	-1.01	33.23	Average Max	H	112	238	54	-20.77	Pass	

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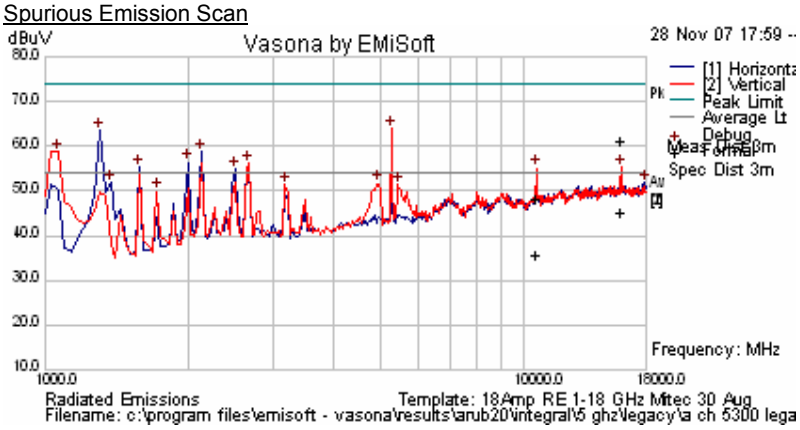
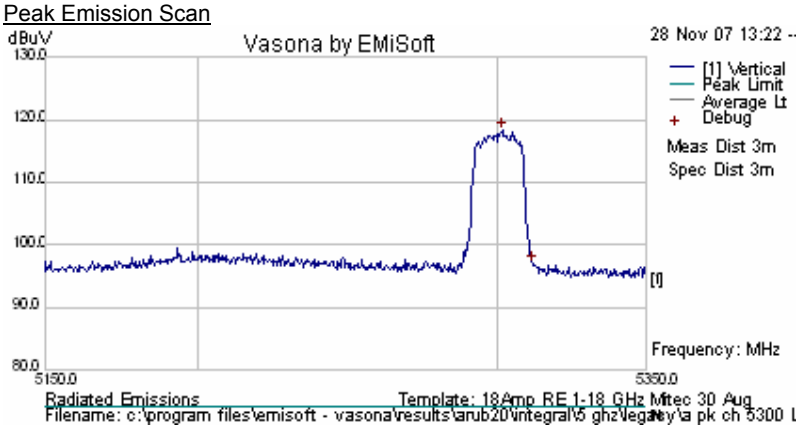
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MBit/s)**	**Compliant**
60	5300	ART 17	99%	a 6 Legacy	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5301.503	72.78	10.62	34.75	118.15	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
15901.82	51.12	8.86	-1.02	58.97	Peak Max	V	99	286	74	-15.03	Pass	
10602.59	40.55	6.82	-1.08	46.28	Peak Max	V	98	81	74	-27.72	Pass	
15901.82	35.17	8.86	-1.02	43.02	Average Max	V	99	286	54	-10.98	Pass	
10602.59	27.75	6.82	-1.08	33.49	Average Max	V	98	81	54	-20.51	Pass	

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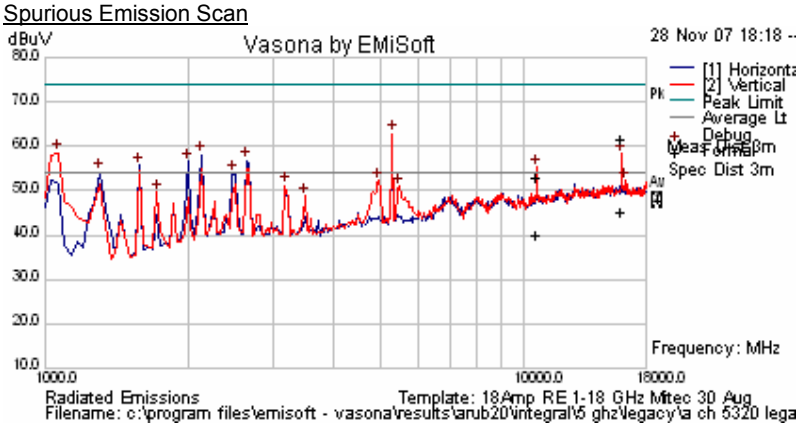
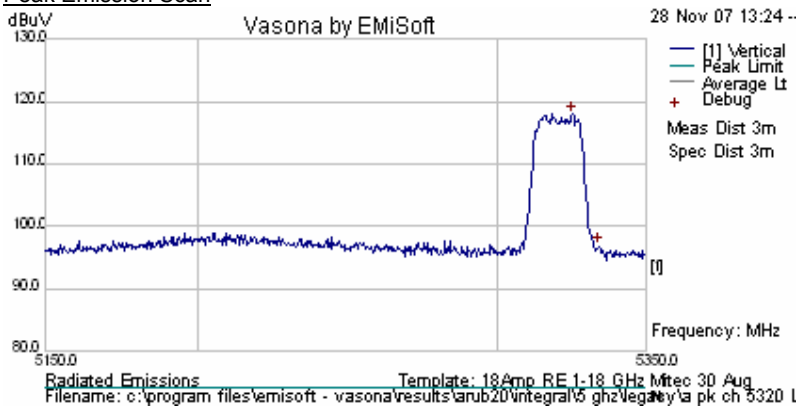
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MBit/s)**	**Compliant**
64	5320	ART 17	99%	a 6 Legacy	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5325.15	72.63	10.62	34.76	118.01	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
5350	ART power Setting = 16.5				Peak Max	V			74	-0.85	Pass	Band-edge
5350					Average Max	V			54	-3.34	Pass	Band-edge
15962.85	51.52	8.96	-1.01	59.47	Peak Max	V	140	322	74	-14.53	Pass	
10642.77	45.11	6.84	-1.18	50.77	Peak Max	V	137	5	74	-23.23	Pass	
15962.85	35.06	8.96	-1.01	43.01	Average Max	V	140	322	54	-10.99	Pass	
10642.77	32.35	6.84	-1.18	38.01	Average Max	V	137	5	54	-15.99	Pass	

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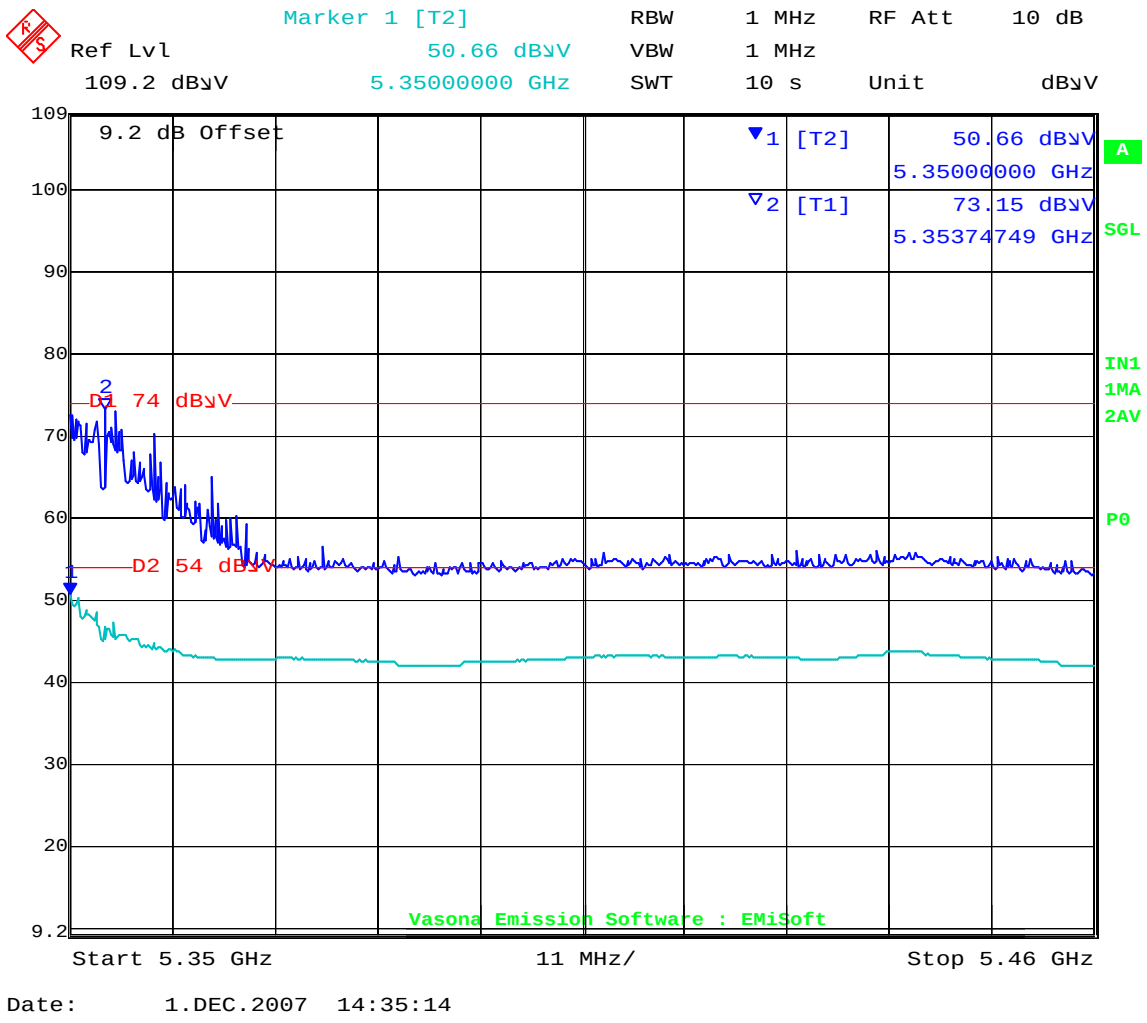

802.11a Legacy Band-edge @ 5350 MHz with Integral antenna

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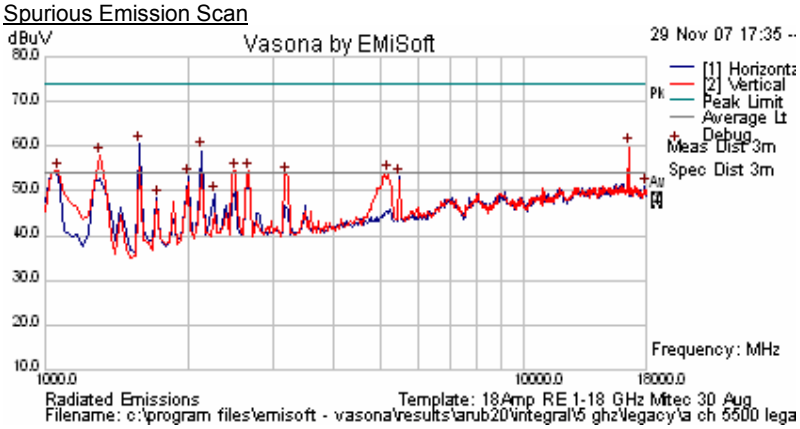
AP125 - INTEGRAL Legacy Data Rates

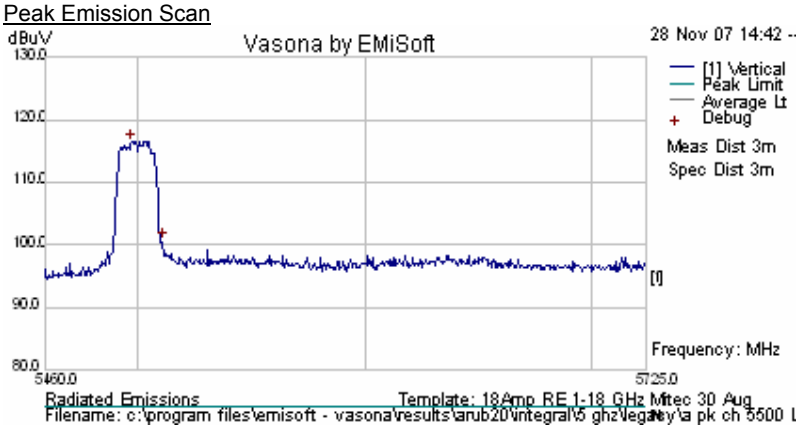
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MBit/s)**	**Compliant**
100	5500	ART 17	99%	a 6 Legacy	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5498.236	71.61	10.62	34.9	117.13	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
5460.000	ART Power Setting = 17.0				Peak Max	V			74	-2.69	Pass	Band-edge
5460.000					Average Max	V			54	-5.72	Pass	Band-edge
16501.002	52.08	8.82	-0.97	59.93	Peak [Scan]	H	100	0	68.23	-8.30	Pass	

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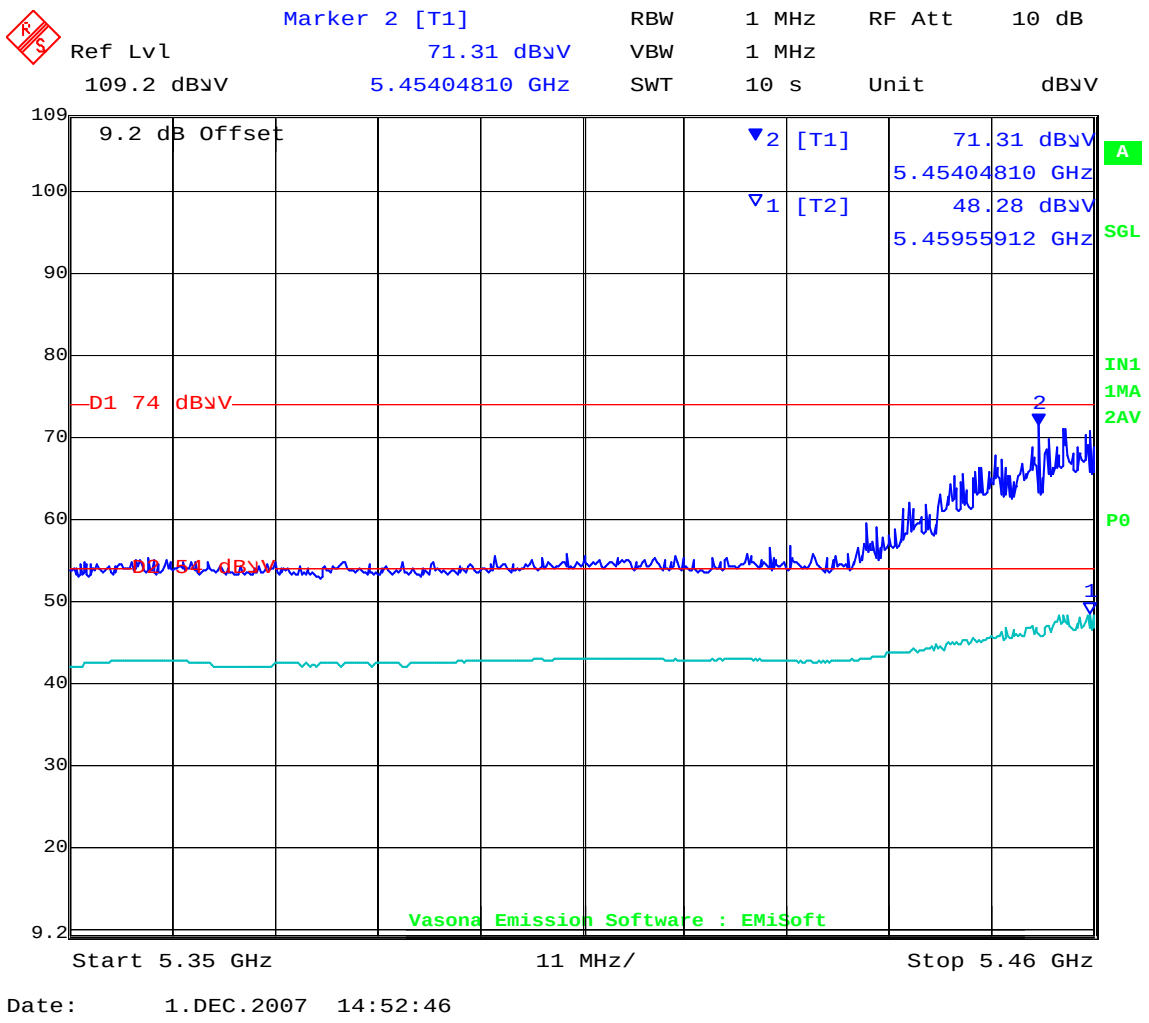

802.11a Legacy Band-edge @ 5460 MHz with Integral antenna

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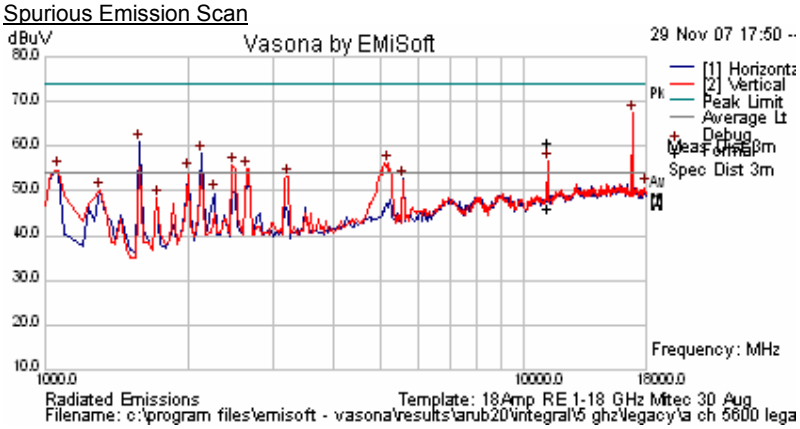
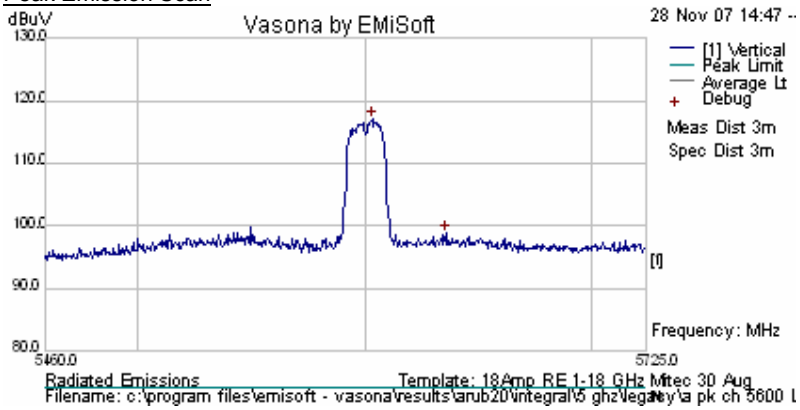
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MBit/s)**	**Compliant**
120	5600	ART 17	99%	a 6 Legacy	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5602.856	71.37	10.68	34.99	117.03	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
11204.57	53.7	6.9	-1.83	58.77	Peak Max	V	132	82	74	-15.23	Pass	
11204.57	39.06	6.9	-1.83	44.13	Average Max	V	132	82	54	-9.87	Pass	
16807.62	59.91	7.2	-0.99	66.12	Peak [Scan]	H	100	0	68.23	-2.11	Pass	

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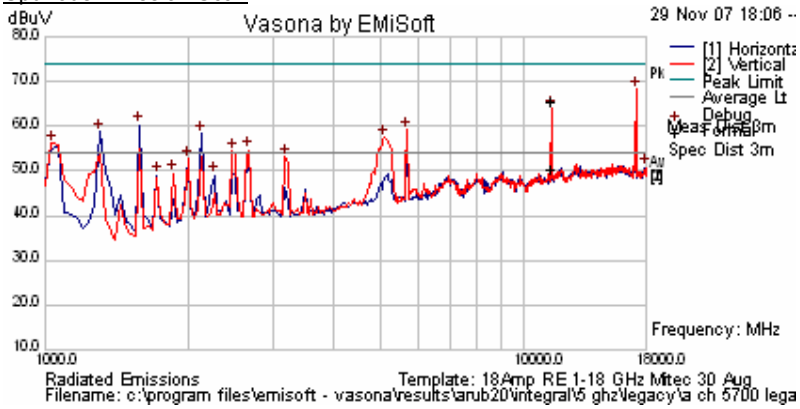
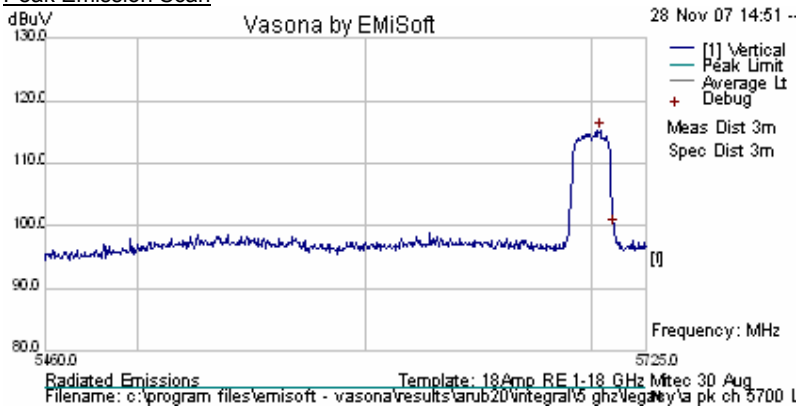
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MBit/s)**	**Compliant**
140	5700	ART 14	99%	a 6 Legacy	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5704.289	69.45	10.73	35.07	115.25	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
11405.85	58.34	6.82	-1.73	63.43	Peak Max	V	111	81	74	-10.57	Pass	
11405.85	43.27	6.82	-1.73	48.36	Average Max	V	111	81	54	-5.64	Pass	
17114.23	58.41	6.37	-0.74	64.04	Peak [Scan]	H	100	0	68.23	-4.19	Pass	

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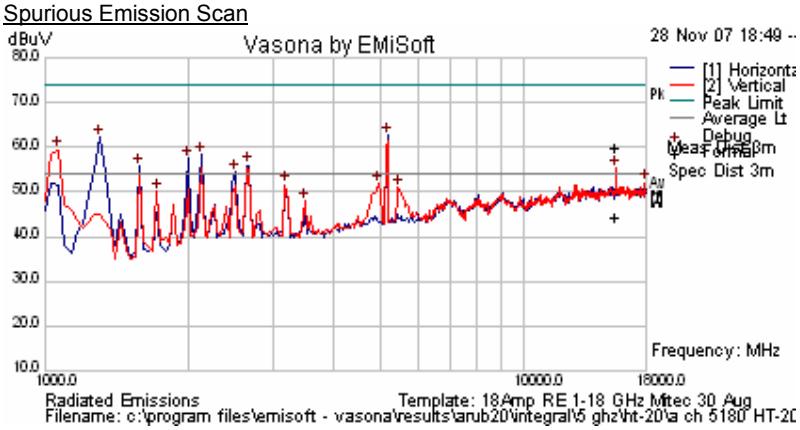
AP125: 5150-5250GHz INTEGRAL HT-20 Data Rates

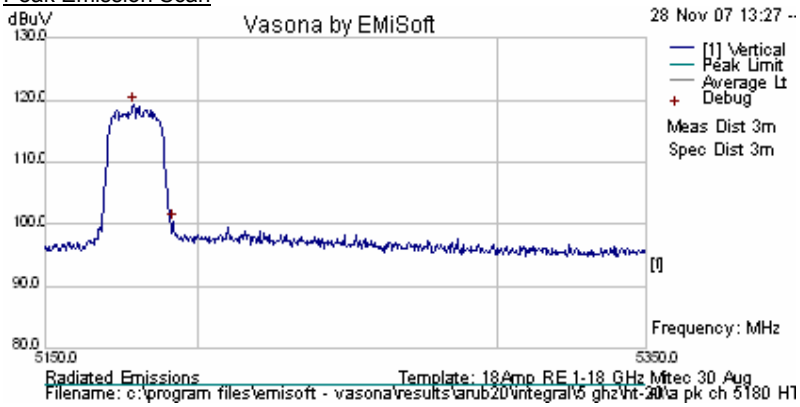
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MCS)**	**Compliant**
36	5180	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5179.259	73.87	10.62	34.65	119.14	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
5150.000	ART Power Setting = 16.5				Peak Max				74	-0.63	Pass	Band-edge
5150.000					Average Max				54	-1.18	Pass	Band-edge
15541.09	50.74	8.28	-1.03	57.98	Peak Max	V	98	283	74	-16.02	Pass	
15541.09	35.03	8.28	-1.03	42.28	Average Max	V	98	283	54	-11.72	Pass	

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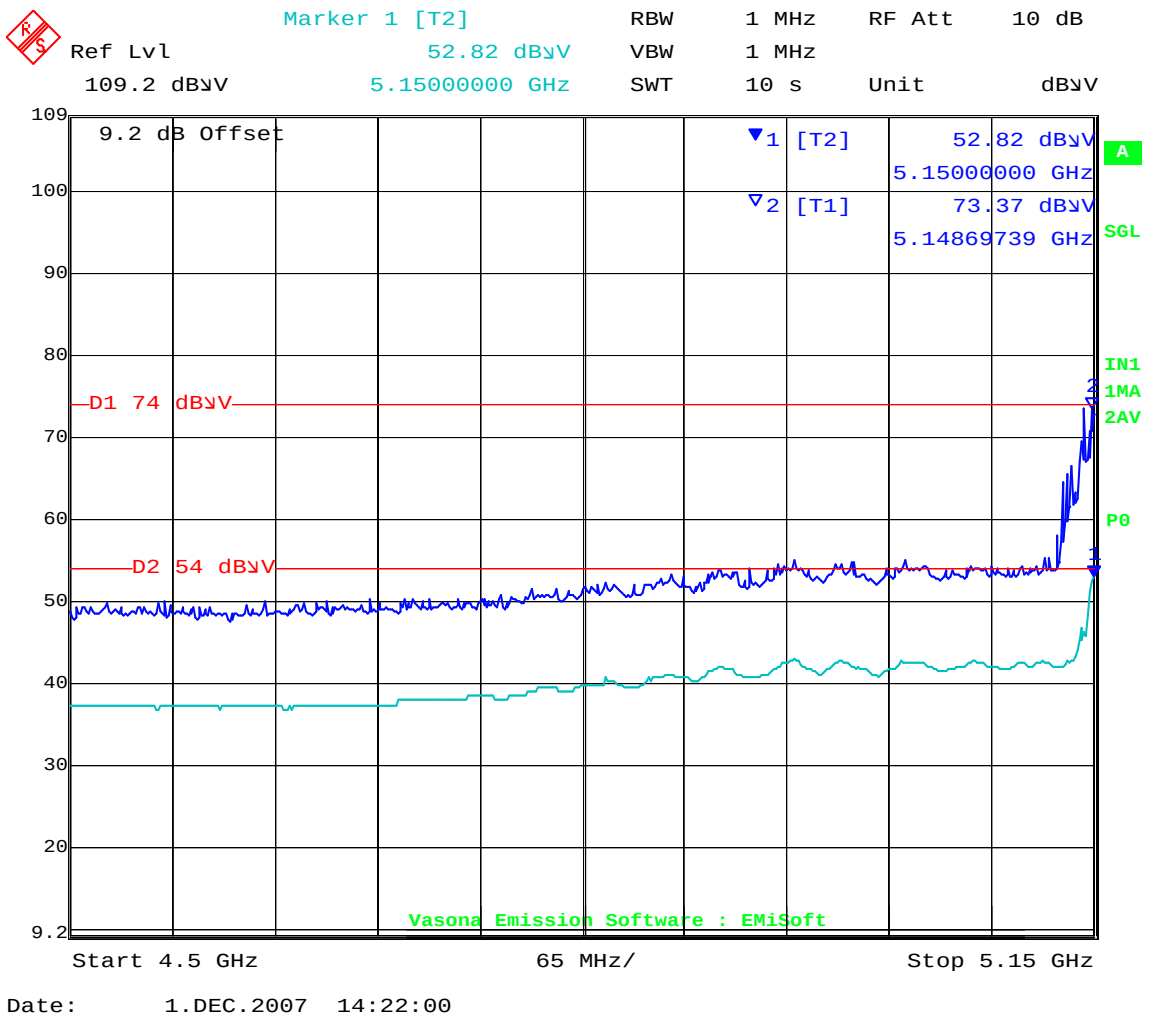

HT-20 Band-edge @ 5150 MHz - Integral antenna

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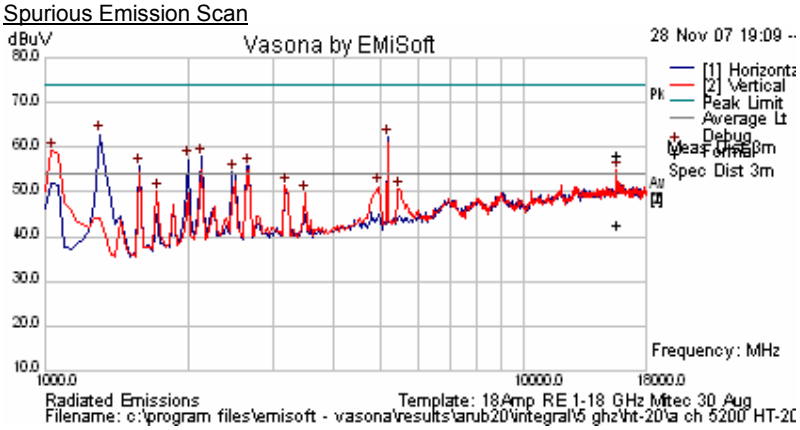
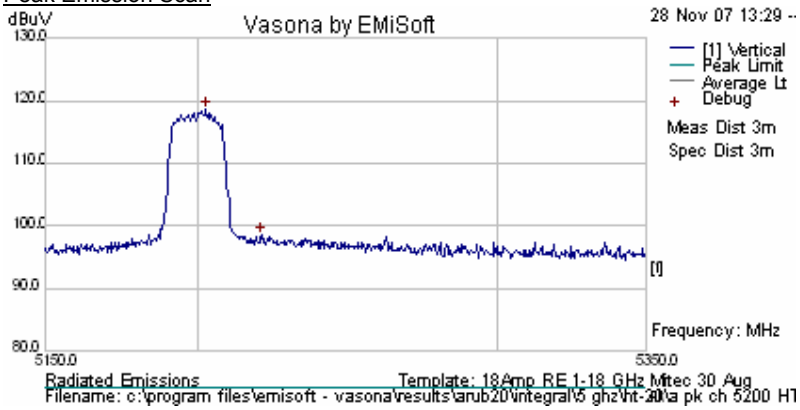
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MCS)**	**Compliant**
40	5200	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5202.906	73.18	10.62	34.67	118.46	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
15601.23	48.85	8.38	-1.17	56.06	Peak Max	V	106	288	74	-17.94	Pass	
15601.23	33.23	8.38	-1.17	40.43	Average Max	V	106	288	54	-13.57	Pass	

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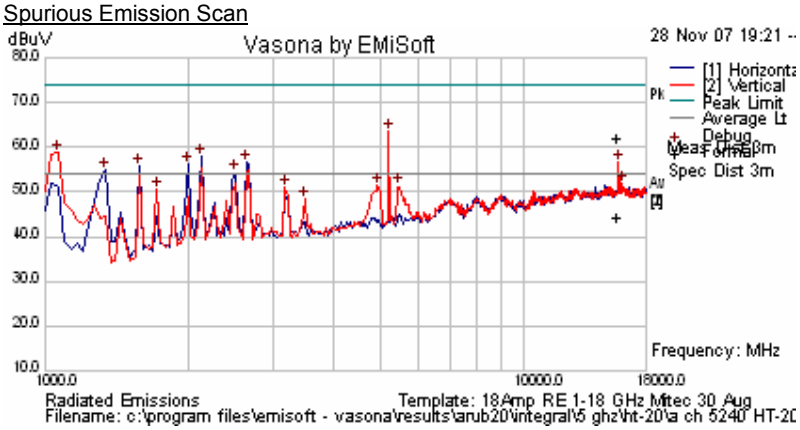
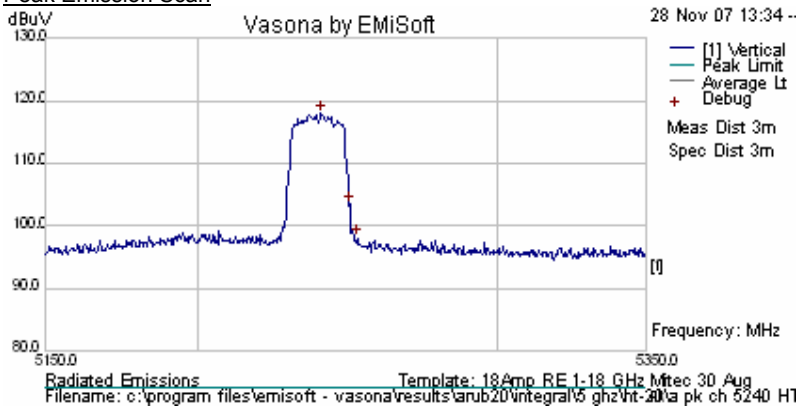
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MCS)**	**Compliant**
48	5240	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5240.982	72.65	10.62	34.7	117.97	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
15721.5	52.62	8.57	-1.09	60.09	Peak Max	V	141	285	74	-13.91	Pass	
15721.5	34.99	8.57	-1.09	42.47	Average Max	V	141	285	54	-11.53	Pass	

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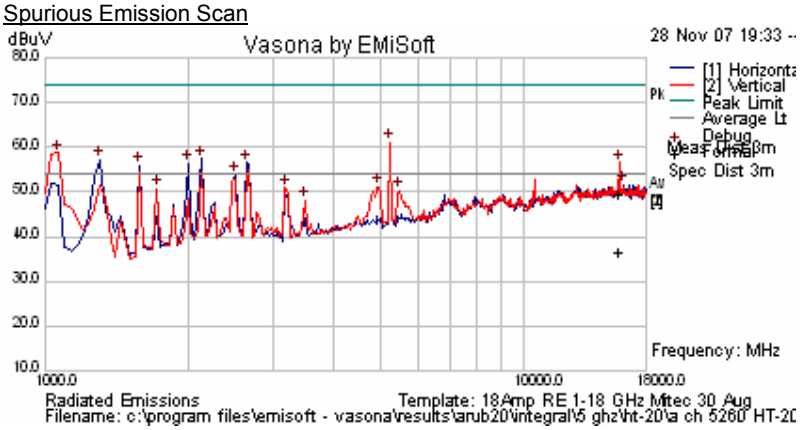
AP125: 5250-5350GHz INTEGRAL HT-20 Data Rates

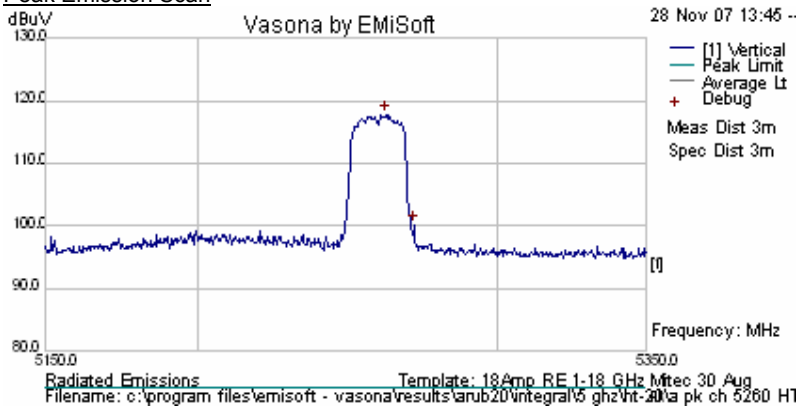
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MCS)**	**Compliant**
52	5260	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5262.625	72.42	10.62	34.71	117.76	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
15781.57	39.9	8.67	-1.12	47.45	Peak Max	V	134	-3	74	-26.55	Pass	
15781.57	26.89	8.67	-1.12	34.44	Average Max	V	134	-3	54	-19.56	Pass	

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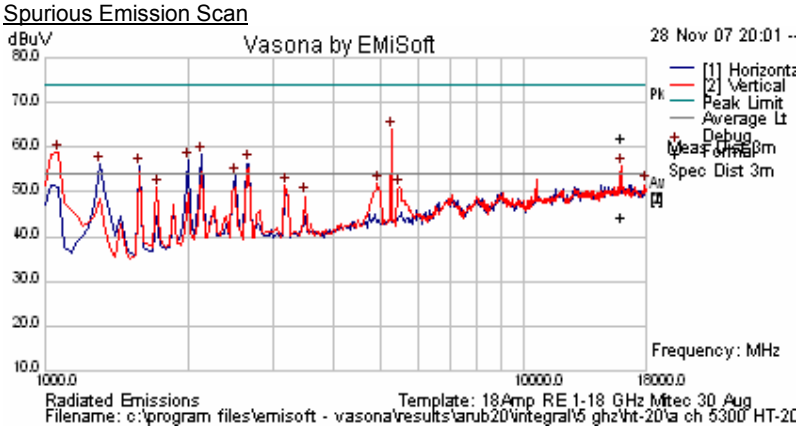
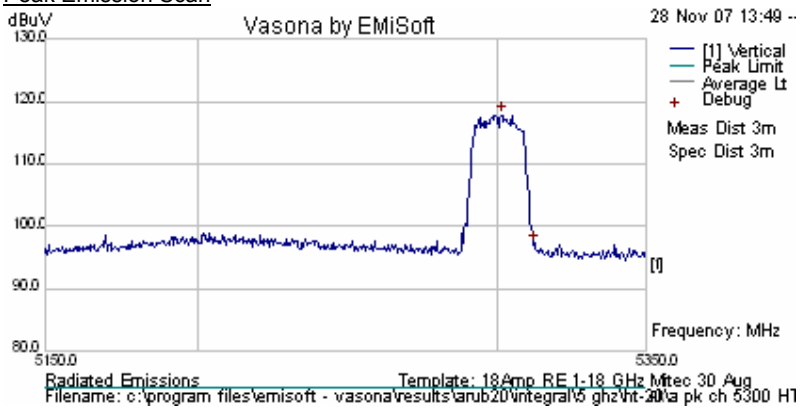
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MCS)**	**Compliant**
60	5300	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5301.503	72.47	10.62	34.75	117.83	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
15901.84	52.19	8.86	-1.02	60.04	Peak Max	V	139	284	74	-13.96	Pass	
15901.84	34.54	8.86	-1.02	42.39	Average Max	V	139	284	54	-11.61	Pass	

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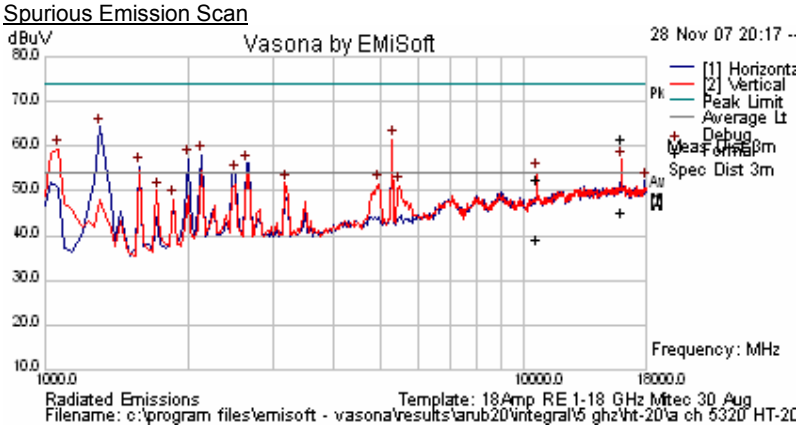
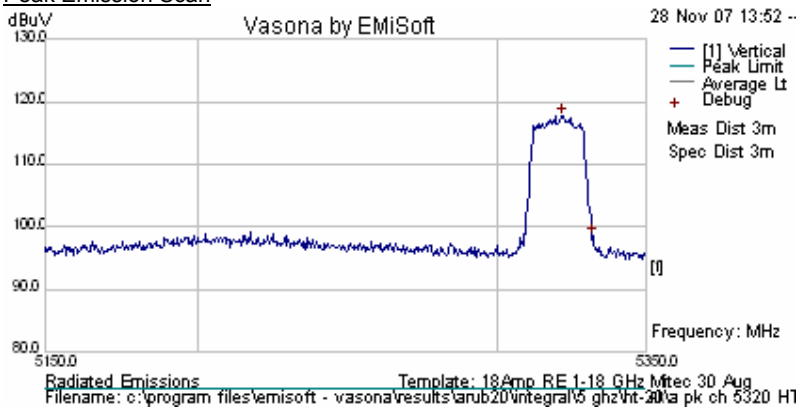
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MCS)**	**Compliant**
64	5320	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5321.543	72.32	10.62	34.76	117.7	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
5350.000	ART power Setting = 11.5				Peak Max	V			74	-0.97	Pass	Band-edge
5350.000					Average Max	v			54	-2.41	Pass	Band-edge
15962.91	51.78	8.96	-1.01	59.73	Peak Max	V	123	331	74	-14.27	Pass	
10641.28	44.84	6.83	-1.18	50.5	Peak Max	V	102	293	74	-23.5	Pass	
15962.91	35.18	8.96	-1.01	43.13	Average Max	V	123	331	54	-10.87	Pass	
10641.28	31.53	6.83	-1.18	37.18	Average Max	V	102	293	54	-16.82	Pass	

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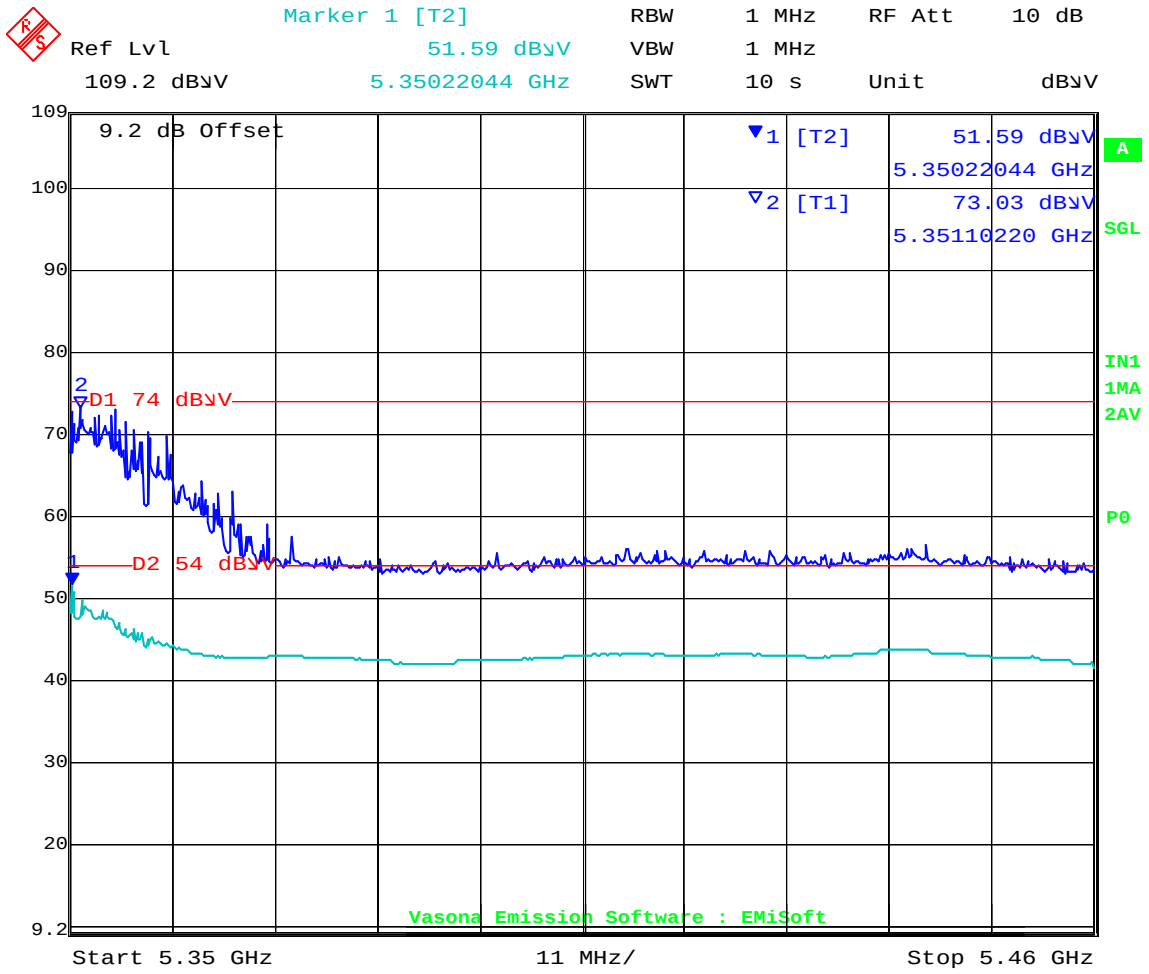

Date: 1.DEC.2007 14:37:31

HT-20 Band-edge @ 5350 MHz - Integral antenna

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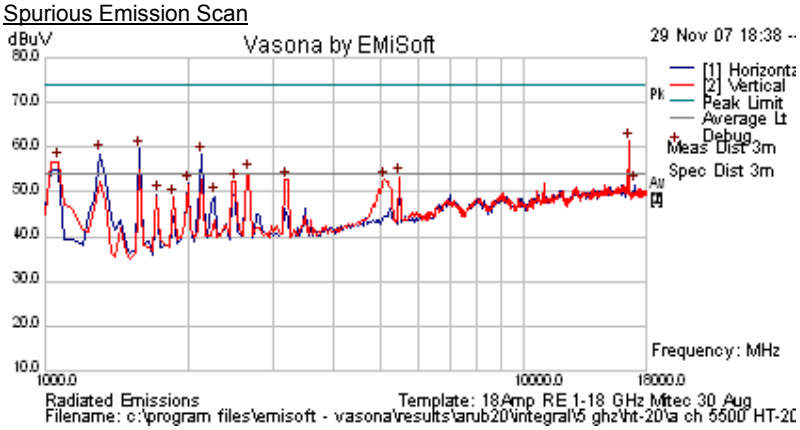
AP125: 5460-5725 MHz INTEGRAL HT-20 Data Rates

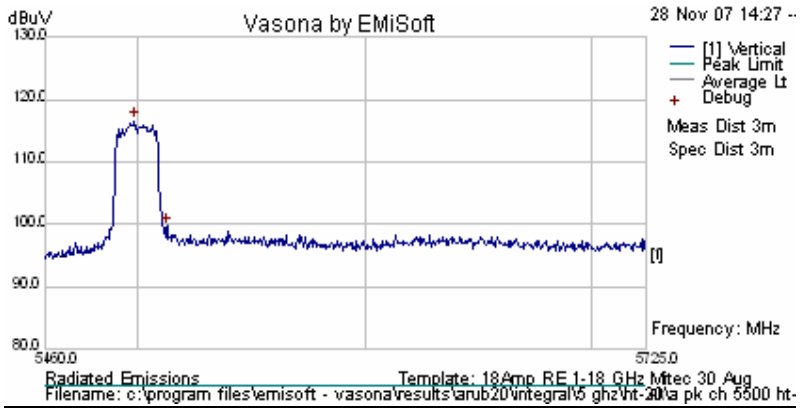
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MCS)**	**Compliant**
100	5500	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5498.768	71.02	10.62	34.9	116.54	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
16535.07	53.65	8.8	-0.95	61.49	Peak [Scan]	V	100	0	68.23	-6.74	Pass	
5460.000	ART Power Setting = 16.5				Peak Max	V			74	-3.16	Pass	Band-edge
5460.000					Average Max	V			54	-5.88	Pass	Band-edge

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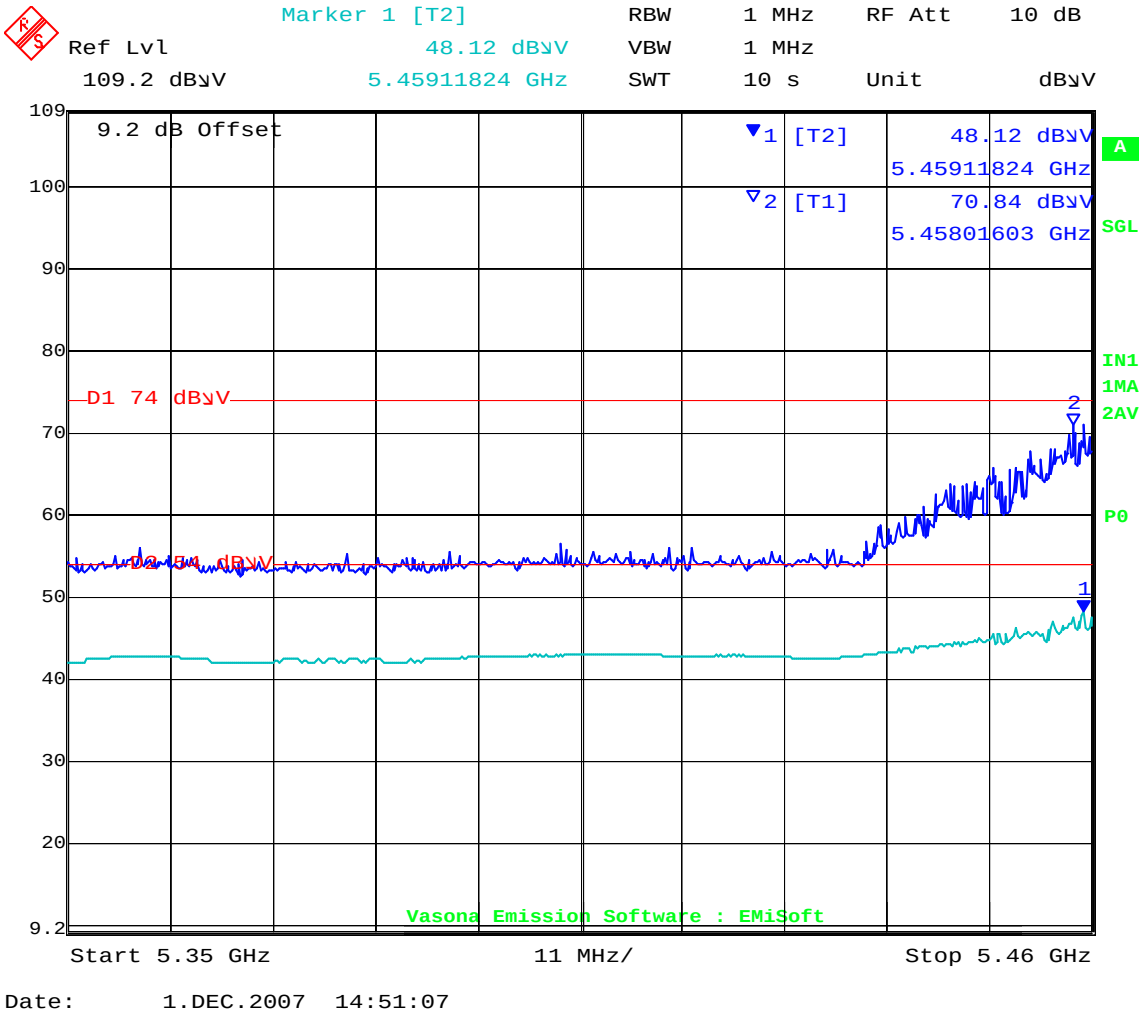

HT-20 Band-edge @ 5460 MHz - Integral antenna

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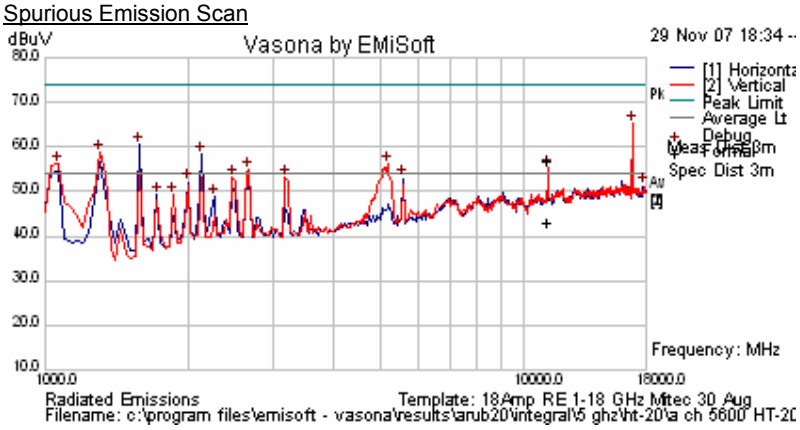
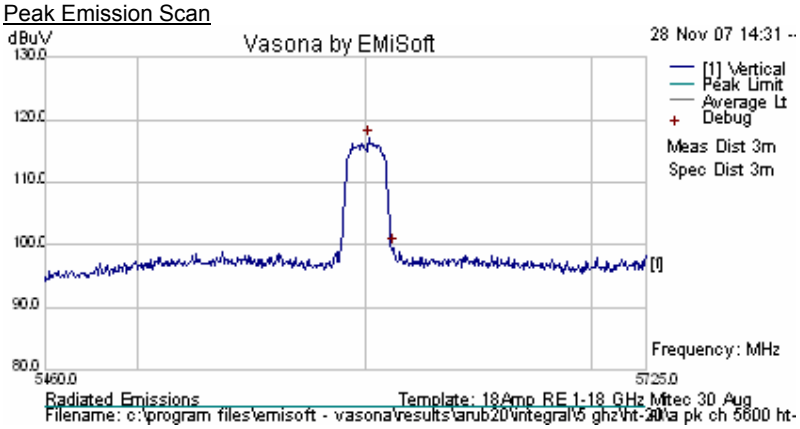
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MCS)**	**Compliant**
120	5600	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5601.263	71.32	10.68	34.98	116.98	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
11202.44	49.98	6.9	-1.84	55.04	Peak Max	V	133	85	74	-18.96	Pass	
11202.44	35.87	6.9	-1.84	40.94	Average Max	V	133	85	54	-13.06	Pass	
16807.62	57.61	8.6	-0.99	65.22	Peak [Scan]	H	100	0	68.23	-3.01	Pass	

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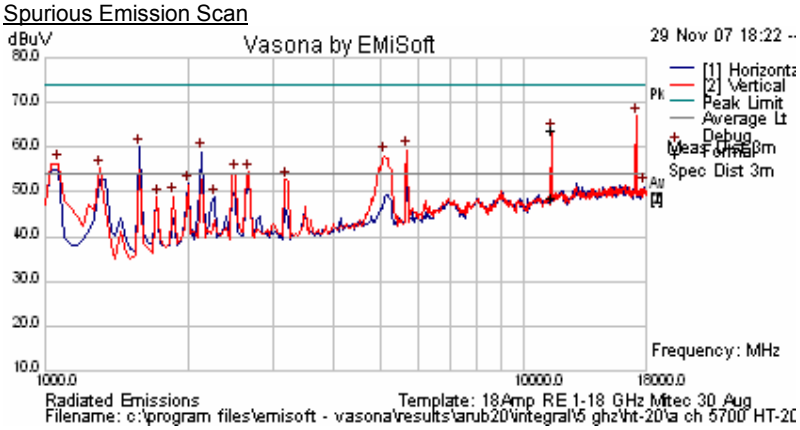
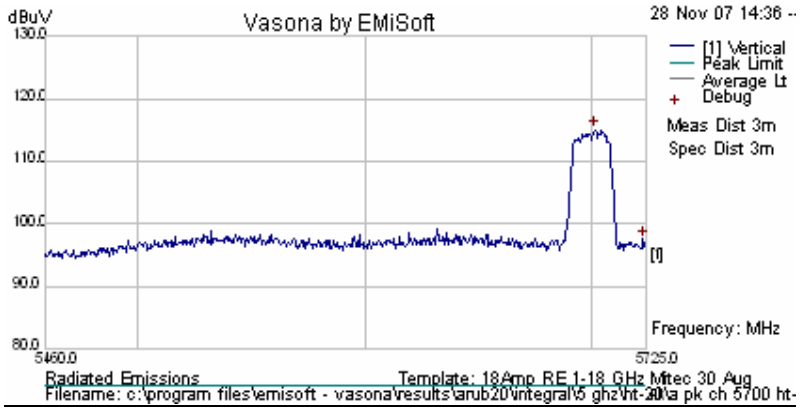
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MCS)**	**Compliant**
140	5700	ART 14	99%	6.5 HT-20	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5701.633	69.19	10.73	35.07	114.99	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
11390.78	56.77	6.83	-1.74	61.86	Peak Max	V	130	85	74	-12.14	Pass	
11390.78	41.41	6.83	-1.74	46.49	Average Max	V	130	85	54	-7.51	Pass	
17114.23	59.09	6.37	-0.74	64.72	Peak [Scan]	H	100	0	68.23	-3.51	Pass	

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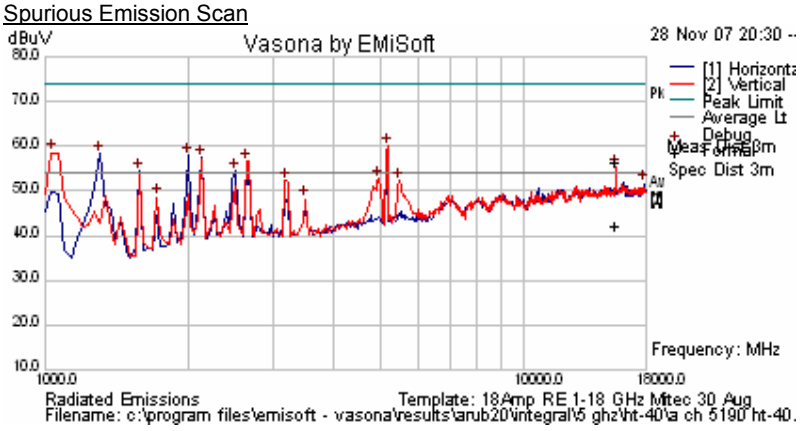
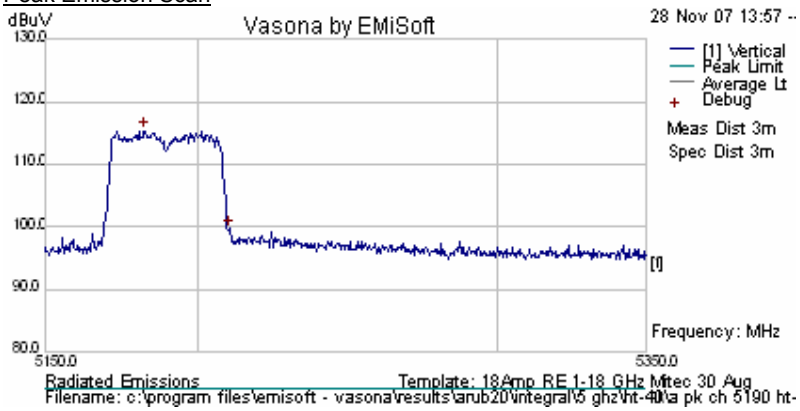
AP125: 5150-5250GHz INTEGRAL HT-40 Data Rates

ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MCS)**	**Compliant**
	5190	ART 17	99%	13.5 HT-40	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band
Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5182.866	70.02	10.62	34.65	115.29	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
5150.000	ART Power Setting = 13.0				Peak Max	V			74	-1.40	Pass	Band-edge
5150.000					Average Max	V			54	-0.90	Pass	Band-edge
15573.16	47.32	8.33	-1.2	54.46	Peak Max	V	137	288	74	-19.54	Pass	
15573.16	33.12	8.33	-1.2	40.25	Average Max	V	137	288	54	-13.75	Pass	

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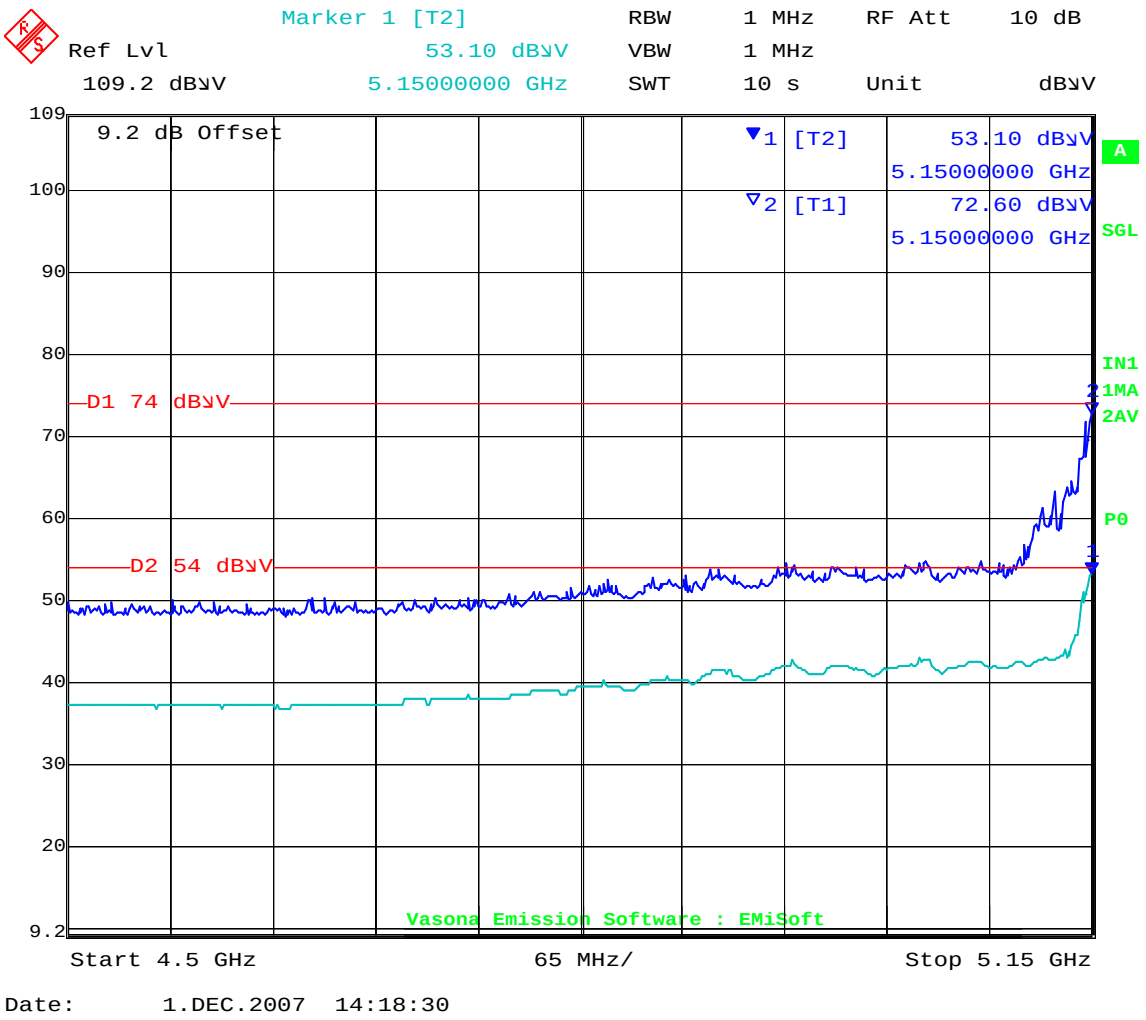

HT-40 Band-edge @ 5150 MHz - Integral antenna

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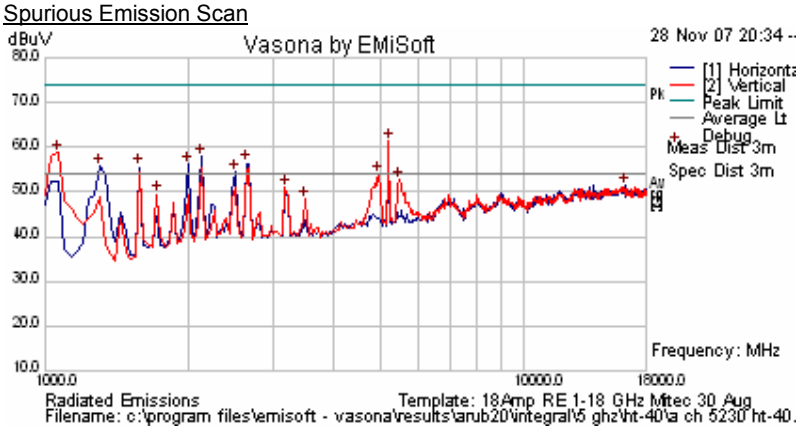
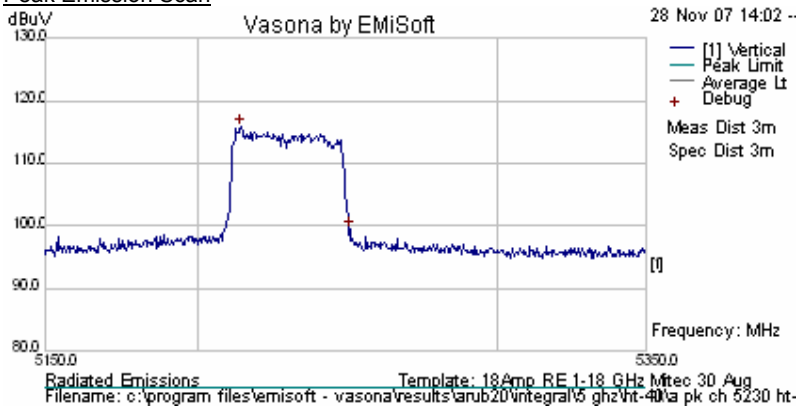
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	**Freq (MHz)**	**Software Pwr Setting**	**Duty Cycle**	**Data Rate (MCS)**	**Compliant**
	5230	ART 17	99%	13.5 HT-40	Yes

Three antennas operating simultaneously
NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5214.529	70.49	10.62	34.68	115.79	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental

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