Test of MSR4000 802.11a/b/g/n Access Point

To: FCC 47 CFR Part 15.247 & IC RSS-210

Test Report Serial No.: ARUB65-U1 Rev A

TEST REPORT

FROM

MiCOM Labs

Test of MSR4000 802.11a/b/g/n Access Point

to

To FCC 47 CFR Part 15.247 & IC RSS-210

Test Report Serial No.: ARUB65-U1 Rev A

Note: this report contains data with regard to the 2400 to 2483.5 MHz and 5725 to 5850 MHz operational modes of the Aruba Networks MSR4000 Wireless Access Point.

This report supersedes: NONE

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

Product Function: Wireless Access Point

Copy No: pdf Issue Date: 4th April 2011

This Test Report is Issued Under the Authority of;

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A2LA ACCREDITED
TEST CERTIFICATE #2381.01

MiCOM Labs is an ISO 17025 Accredited Testing Laboratory

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ACCREDITATION, LISTINGS & RECOGNITION

TESTING ACCREDITATION

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

ilac-MRA

A2LA World Class Accreditation

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 8 January 2009*).

Presented this 14th day of April 2010.

President & CEO
For the Accreditation Council
Certificate Number 2381.01
Valid to November 30, 2011

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

RECOGNITION

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

Country	Recognition Body	Status	Phase	Identification No.
USA	Federal Communications Commission (FCC)	TCB	-	Listing #: 102167
Canada	Industry Canada (IC)	FCB	APEC MRA 2	Listing #: 4143A
Japan	VCCI	-	-	No. 2959
Europe	European Commission	NB	EU MRA	NB 2280
Australia	Australian Communications and Media Authority (ACMA)	CAB	APEC MRA 1	US0159
Hong Kong	Office of the Telecommunication Authority (OFTA)	CAB	APEC MRA 1	
Korea	Ministry of Information and Communication Radio Research Laboratory (RRL)	CAB	APEC MRA 1	
Singapore	Infocomm Development Authority (IDA)	CAB	APEC MRA 1	
Taiwan	National Communications Commission (NCC) Bureau of Standards, Metrology and Inspection (BSMI)	CAB	APEC MRA 1	
Vietnam	Ministry of Communication (MIC)	CAB	APEC MRA 1	

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

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

**NB – Notified Body

PRODUCT CERTIFICATION

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

The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Product Certification Body

A2LA has accredited

MICOM LABS

Pleasanton, CA

for technical competence as a

Product Certification Body

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

Presented this 24th day of June 2010.

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

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

United States of America – Telecommunication Certification Body (TCB)

TCB Identifier – US0159

Industry Canada – Certification Body

CAB Identifier – US0159

Europe – Notified Body

Notified Body Identifier - 2280

DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft		
Rev A	4th April 2011	Initial release.

1. TEST RESULT CERTIFICATE

Manufacturer:	Aruba Networks, Inc 1344 Crossman Avenue Sunnyvale California 94089, USA	Tested By:	MiCOM Labs, Inc. 440 Boulder Court Suite 200 Pleasanton California, 94566, USA
EUT:	802.11a/b/g/n Wireless Access Point	Telephone:	+1 925 462 0304
Model:	MSR4000	Fax:	+1 925 462 0306
S/N's:	34B02104500017		
Test Date(s):	28th November to 24th March '11	Website:	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC 47 CFR Part 15.247 & 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
TEST CERTIFICATE #2381.01

Approved & Released for MiCOM Labs, Inc. by:

Graeme Grieve
Quality Manager MiCOM Labs,

Gordon Hurst
President & CEO MiCOM Labs, Inc.

2. REFERENCES AND MEASUREMENT UNCERTAINTY

2.1. Normative References

REF.	PUBLICATION	YEAR	TITLE
i.	FCC 47 CFR Part 15, Subpart C	2010	Title 47: Telecommunication PART 15—RADIO FREQUENCY DEVICES Subpart C—Intentional Radiators
ii.	RSS-210 Annex 8	2010	Radio Standards Specification 210, Issue 8, Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment
iii.	DA 00-705	2000	FCC DA 00-705 "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems" released March 30, 2000
iv.	RSS-GEN	2010	Radio Standards Specification-Gen, Issue 3, General Requirements and Information for the Certification of Radiocommunication Equipment
v.	FCC 47 CFR Part 15, Subpart B	2010	47 CFR Part 15, SubPart B; Unintentional Radiators
vi.	ICES-003	2004	Spectrum Management and Telecommunications Policy Interference-Causing Equipment Standard Digital Apparatus; Issue 4
vii.	ANSI C63.4	2009	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
viii.	CISPR 22/ EN 55022	2008 2006+A1:2007	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
ix.	M 3003	Edition 1 Dec. 1997	Expression of Uncertainty and Confidence in Measurements
x.	LAB34	Edition 1 Aug 2002	The expression of uncertainty in EMC Testing
xi.	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
xii.	A2LA	9th June 2010	Reference to A2LA Accreditation Status – A2LA Advertising Policy

2.2. Test and Uncertainty Procedures

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

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

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

3. PRODUCT DETAILS AND TEST CONFIGURATIONS

3.1. Technical Details

Details	Description
Purpose:	Test of the MSR4000 802.11a/b/g/n Access Point to FCC Part 15.247 and Industry Canada RSS-210 regulations.
Applicant:	Aruba Networks, Inc 1344 Crossman Avenue Sunnyvale California 94089, USA
Manufacturer:	As applicant.
Laboratory performing the tests:	MiCOM Labs, Inc. 440 Boulder Court, Suite 200 Pleasanton, California 94566 USA
Test report reference number:	ARUB65-U1 Rev A
Date EUT received:	1st October 2011
Standard(s) applied:	FCC 47 CFR Part 15.247 & IC RSS-210
Dates of test (from - to):	28th November to 24th March '11
No of Units Tested:	One
Type of Equipment:	802.11a/b/g/n Wireless Access Point, 2x2 Spatial Multiplexing MIMO configuration
Manufacturers Trade Name:	Wireless Access Point
Model(s):	MSR4000
Location for use:	Outdoor
Declared Frequency Range(s):	2400 - 2483.5 MHz; 5725 - 5850 MHz
Software Release	AzOS4.1.5
Type of Modulation:	Per 802.11 –CCK, BPSK, QPSK, DSSS, OFDM
Declared Nominal Average Output Power:	802.11b: +19 dBm 802.11g:Leg. +19dBm,HT-20 +19 dBm,HT-40 +18 dBm 802.11a:Leg. +19dBm,HT-20 +19 dBm,HT-40 +18 dBm
EUT Modes of Operation:	Legacy 802.11a/b/g, 802.11n HT-20, HT-40
Transmit/Receive Operation:	Time Division Duplex
Rated Input Voltage and Current:	POE 48 Vdc 1.25 A
Operating Temperature Range:	Declared range -30° to +55ºC
ITU Emission Designator:	2400 – 2483.5 MHz 802.11b 15M7G1D 2400 – 2483.5 MHz 802.11g 18M0D1D 2400 – 2483.5 MHz 802.11n – HT-20 18M7D1D 2400 – 2483.5 MHz 802.11n – HT-40 38M3D1D 5725 – 5850 MHz 802.11a 18M0D1D 5725 – 5850 MHz 802.11n – HT-20 19M0D1D 5725 – 5850 MHz 802.11n – HT-40 36M8D1D
Equipment Dimensions:	13” x 11.5” x 5”
Weight:	11.5 lb (5.25 kg)
Primary function of equipment:	Wireless Access Point for transmitting data and voice.

3.2. Scope of Test Program

The scope of the test program was to test the Aruba Networks MSR4000.11a/b/g/n Wireless Access Point, 2x2 Spatial Multiplexing MIMO configurations in the frequency ranges 2400 - 2483.5 MHz and 5725 – 5850 MHz for compliance against FCC 47 CFR Part 15.247 and Industry Canada RSS-210 specifications.

Aruba MSR4000 Access Point

Ruggedized and hardened to withstand extreme environmental conditions, the MSR4000 is ideal for deployment in metropolitan and industrial areas, oilfields, mines, and shipping ports.

MSR4000 802.11 a/b/g/n Wireless Access Point

MSR4000 802.11 a/b/g/n Wireless Access Point
Label Position

PowerDSine POE

PowerDSine POE

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

Type (EUT/ Support)	Equipment Description (Including Brand Name)	Mfr	Model No.	Serial No.
EUT	802.11a/b/g/n Wireless Access Point	Aruba Networks	MSR4000	
Support	Laptop PC	IBM	Thinkpad	None

3.4. Antenna Details

- AP-ANT-80D = +8.0 dBi (2,4 GHz Direct Mount Omni)
- AP-ANT-85 = 15.0 dBi (2.4 GHz High Gain Directional)
- AP-ANT-2x2-5614U = +14.0 dBi (5.8 GHz 60 Sector 2 element MIMO)

3.5. Cabling and I/O Ports

Number and type of I/O ports

1. 10/100/1000 Ethernet with 48 Vdc POE
2. USB Maintenance Terminal
3. RF Ports 50Ω, N-type connector(s)
    - RO-1 & R0-2
    - R1-1 & R1-2
    - R2-1 & R2-2
    - R3-1 & R3-2

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.

Operational Mode(s) (802.11a/b/g/n)	Variant	Data Rate with Highest Power	Frequencies (MHz)
b	Legacy	1 MBit/s	2,412 2,437 2,462
g	Legacy	6 MBit/s	
n	HT-20	6.5 MCS	
	HT-40	13.5 MCS	2,422 2,437 2,452
a	Legacy	6 MBit/s	5,745 5,785 5,825
n	HT-20	6.5 MCS	
	HT-40	13.5 MCS	5,755 5,785 5,815

Legacy – data rates for 802.11abg products

Results for the above configurations are provided in this report.

Antenna Test Configurations for Radiated Emissions

Spurious Emission and Band-Edge Test Strategy

When testing radiated spurious emissions and band-edge two 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.

2,400 – 2483.5 MHz

15.247	
802.11b	b SE 2412
	b SE 2437
	b SE 2462
	BE b 2390
	BE b 2483.5
802.11g	g SE 2412
	g SE 2437
	g SE 2462
	BE g 2390
	BE g 2483.5
802.11n HT-20	n HT-20 SE 2412
	n HT-20 SE 2437
	n HT-20 SE 2462
	BE n HT-20 2390
	BE n HT-20 2483.5
802.11n HT-40	n HT-40 SE 2422
	n HT-40 SE 2437
	n HT-40 SE 2452
	BE n HT-40 2390
	BE n HT-40 2483.5

5,725 – 5850 MHz

15.247	
802.11a	a SE 5745
	a SE 5785
	a SE 5825
	BE a 5460
802.11n HT-20	n HT-20 SE 5745
	n HT-20 SE 5785
	n HT-20 SE 5825
	BE n HT-20 5460
802.11n HT-40	n HT-40 SE 5755
	n HT-40 SE 5785
	n HT-40 SE 5815
	BE n HT-40 5460

KEY;-

SE – Spurious Emission
BE – Band-Edge

3.7. Equipment Modifications

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

1. Band-Edge Power Reduction

During radiated band-edge emission testing the output power was reduced in order to comply with the Restricted Band criteria. At 2.4 GHz restricted bands are 2,310 – 2,390 MHz and 2,400 – 2,500 MHz. 5.8 GHz restricted band was tested at 5,350 – 5,460 MHz.

It was necessary to reduce power for all band-edges. Section 5.1.3 identifies the total conducted power levels measured the port and combined power levels. The following tables modifies the maximum power levels reported for 2.4 GHz band-edge frequencies on an antenna by antenna basis.

The maximum calculated power levels is as follows;

Antenna Type	Gain (dBi)	Antenna Gain >6dBi (dB)	Max. Allowable Combined Conducted Peak Power (dBm)	Maximum EIRP (dBm)
AP-ANT-80D	+8.0	Yes	+28.0	+36.0
AP-ANT-85	+15.0	Yes	+21.0	+36.0
AP-ANT-2x2-5614U	+14.0	Yes	+22.0	+36.0

2.4 GHz Antenna AP-ANT-80D

TABLE OF RESULTS – **802.11b – Legacy**
Maximum Conducted Power per antenna type

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
2,412	+16.6	+15.4	+20.6	+28.00	-7.4
2,437	+22.53	+22.05	+25.31		-6.69
2,462	+15.0	+16.2	+19.6		-8.4

TABLE OF RESULTS – **802.11g – Legacy**
Maximum Conducted Power per antenna type

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
2,412	+14.1	+13.4	+17.2	+28.00	-10.8
2,437	+22.56	+21.90	+25.25		-6.75
2,462	+10.8	+11.8	+14.5		-13.5

TABLE OF RESULTS – **802.11n – HT-20**
Maximum Conducted Power per antenna type

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
2,412	+14.2	+13.0	+17.5	+28.00	-10.5
2,437	+22.50	+21.88	+25.21		-6.75
2,462	+12.9	+11.8	+15.0		-13.0

TABLE OF RESULTS – **802.11n – HT-40**
Maximum Conducted Power per antenna type

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
2,422	+12.0	+10.0	+13.4	+28.00	-14.6
2,437	+22.46	+21.84	+25.17		-6.83
2,452	+10.2	+10.0	+13.4		-14.6

2.4 GHz Antenna AP-ANT-80D (15 dBi Gain)

TABLE OF RESULTS – **802.11b – Legacy**
Maximum Conducted Power per antenna type

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
2,412	+16.6	+15.2	+19.7	+21.00	-1.3
2,437	+18.00	+18.00	+21.00		-0.0
2,462	+16.7	+15.8	+19.0		-2.0

TABLE OF RESULTS – **802.11g – Legacy**
Maximum Conducted Power per antenna type

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
2,412	+13.5	+12.3	+17.0	+21.00	-4.0
2,437	+18.00	+18.00	+21.00		-0.0
2,462	+11.6	+11.1	+13.8		-7.2

TABLE OF RESULTS – **802.11n – HT-20**
Maximum Conducted Power per antenna type

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
2,412	+13.4	+12.3	+16.9	+21.00	-4.1
2,437	+18.00	+18.00	+21.00		-0.0
2,462	+11.6	+10.9	+13.7		-7.3

TABLE OF RESULTS – **802.11n – HT-40**
Maximum Conducted Power per antenna type

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
2,422	+10.1	+8.7	+13.1	+21.00	-7.9
2,437	+18.00	+18.00	+21.00		-0.0
2,452	+7.2	+6.3	+9.9		-11.1

5.8 GHz Antenna AP-ANT-2x2-5614U (14 dBi Gain)

TABLE OF RESULTS – **802.11a – Legacy**
Maximum Conducted Power per antenna type

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
5,745	+14.4	+14.1	+17.3	+22.00	-2.7
5,785	+13.4	+13.1	+16.5		-5.5
5,825	+12.9	+13.5	+16.3		-5.7

TABLE OF RESULTS – **802.11n – HT-20**
Maximum Conducted Power per antenna type

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
5,745	+15.7	+16.1	+19.4	+22.00	-2.6
5,785	+14.1	+14.6	+17.8		-4.2
5,825	+13.7	+14.1	+17.3		-4.7

TABLE OF RESULTS – **802.11n – HT-40**
Maximum Conducted Power per antenna type

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
5,755	+13.9	+15.1	+18.1	+22.00	-3.9
5,785	+12.9	+14.1	+17.0		-5.0
5,815	+11.9	+13.0	+15.9		-6.1

3.8. Deviations from the Test Standard

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

1. NONE

3.9. Subcontracted Testing or Third Party Data

1. NONE

4. TEST SUMMARY

List of Measurements

The following table represents the list of measurements required under the **FCC CFR47 Part 15.247** and **Industry Canada RSS-210** and **Industry Canada RSS-Gen.**

Section(s)	Test Items	Description	Condition	Result	Test Report Section
15.247(a)(2) **A8.2(1)** **4.4**	6 dB and 99 % Bandwidths	≥500 kHz	Conducted	Complies	5.1.1
15.247(b)(3) **15.31(e)** **A8.4(4)**	Peak Output Power Voltage Variation	Shall not exceed 1W Variation of supply voltage 85 % -115 %	Conducted	Complies	5.1.2
15.247(e) **A8.2**	Peak Power Spectral Density	Shall not be greater than +8 dBm in any 3 kHz band	Conducted	Complies	5.1.3
15.247(i) **5.5**	Maximum Permissible Exposure	Exposure to radio frequency energy levels	Conducted	Complies	5.1.4
15.247(d) **15.205 /** **15.209** **A8.5** **2.2** **4.7**	Spurious Emissions (30MHz - 26 GHz b/g and 30 MHz – 40 GHz a)	The radiated emission in any 100 kHz of out-band shall be at least 20 dB below the highest in-band spectral density	Conducted	Complies	5.1.5

List of Measurements (continued)

The following table represents the list of measurements required under the **FCC CFR47 Part 15.247, Industry Canada RSS-210,** and **Industry Canada RSS-Gen.**

Section(s)	Test Items	Description	Condition	Result	Test Report Section
15.247(d) **15.205 /** **15.209** **A8.5** **2.2** **2.6** **4.7**	Radiated Emissions	Restricted Bands	Radiated	Complies	5.1.6
	Transmitter Radiated Spurious Emissions	Emissions above 1 GHz		Complies	*5.1.6.1*
	Radiated Band Edge	Band-edge results Peak Emissions		Complies	*5.1.6.2.*
Industry Canada only **RSS-Gen §4.10, §6**	Receiver Radiated Spurious Emissions	Emissions above 1 GHz		Complies	*5.1.6.3*
15.205 / **15.209** **2.2**	Radiated Spurious Emissions	Emissions <1 GHz (30M-1 GHz)	Radiated	Complies	*5.1.6.4*
15.207 **7.2.2**	AC Wireline Conducted Emissions 150 kHz–30 MHz	Conducted Emissions	Conducted	Complies	*5.1.7*

Note 1: *Test results reported in this document relate only to the items tested*
Note 2: *The required tests demonstrated compliance as per client declaration of test configuration, monitoring methodology and associated pass/fail criteria*
Note 3: *Section 3.7 Equipment Modifications highlights the equipment modifications that were required to bring the product into compliance with the above test matrix*

5. TEST RESULTS

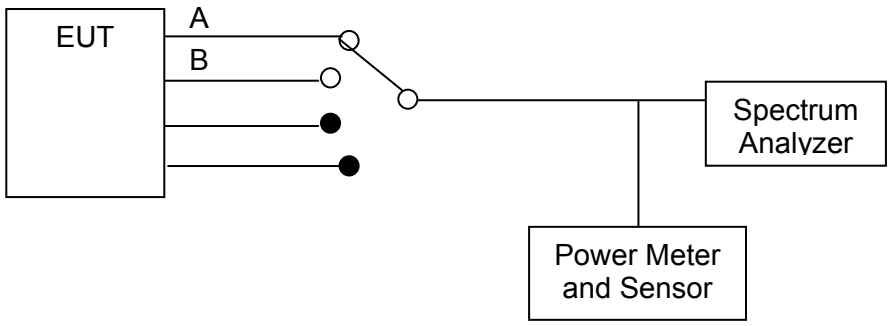
5.1. Device Characteristics

5.1.1. 6 dB and 99 % Bandwidth

FCC, Part 15 Subpart C §15.247(a)(2)
Industry Canada RSS-210 §A8.2
Industry Canada RSS-Gen §4.4

Test Procedure
The bandwidth at 6 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 6 dB and 99 % bandwidth test

Measurement Results for 6 dB & 99% Bandwidth

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: Default, Maximum Power
Test s/w: ART

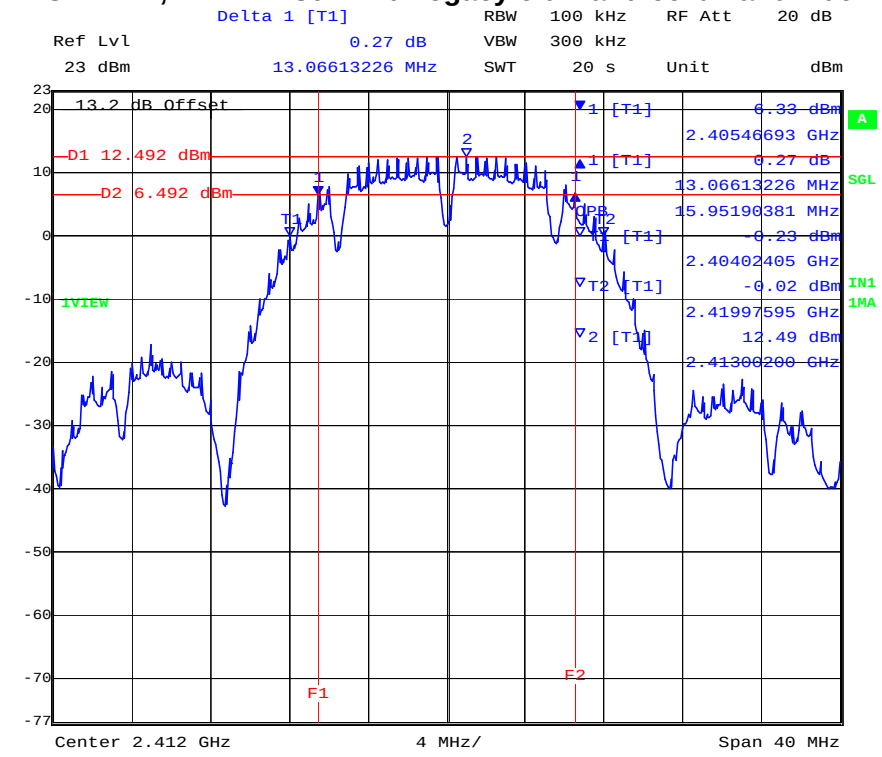
Measurement Results for 6 dB Operational Bandwidth(s) Ambient conditions.

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

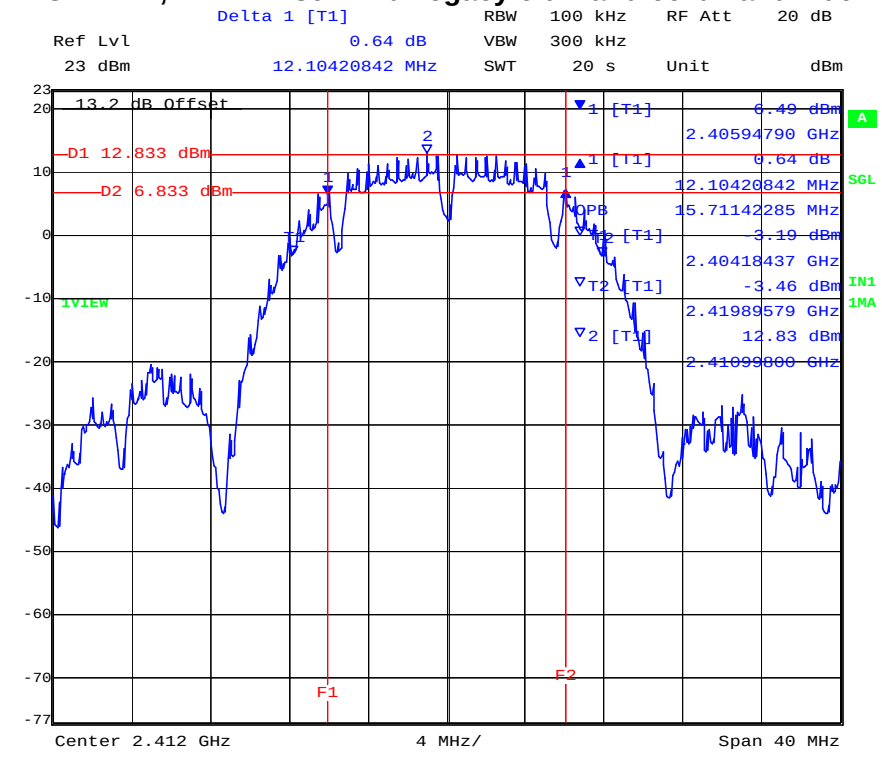
TABLE OF RESULTS – **802.11b Legacy**

Center Frequency (MHz)	6 dB Bandwidth (MHz)		99% BW (MHz)	
	PORT A	PORT B	PORT A	PORT B
2,412	13.066000	12.104000	15.952000	15.711000
2,437	12.184000	11.222000	15.631000	15.872000
2,462	12.184000	11.222000	15.792000	16.112000

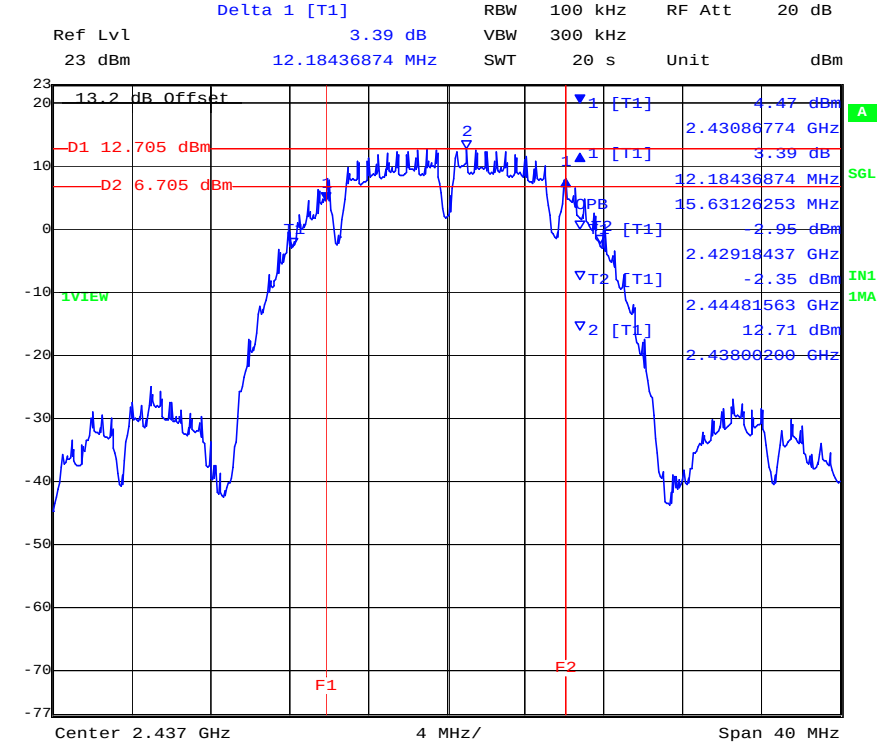
PORT A 2,412 MHz 802.11b Legacy 6 dB and 99% Bandwidth



PORT B 2,412 MHz 802.11b Legacy 6 dB and 99% Bandwidth

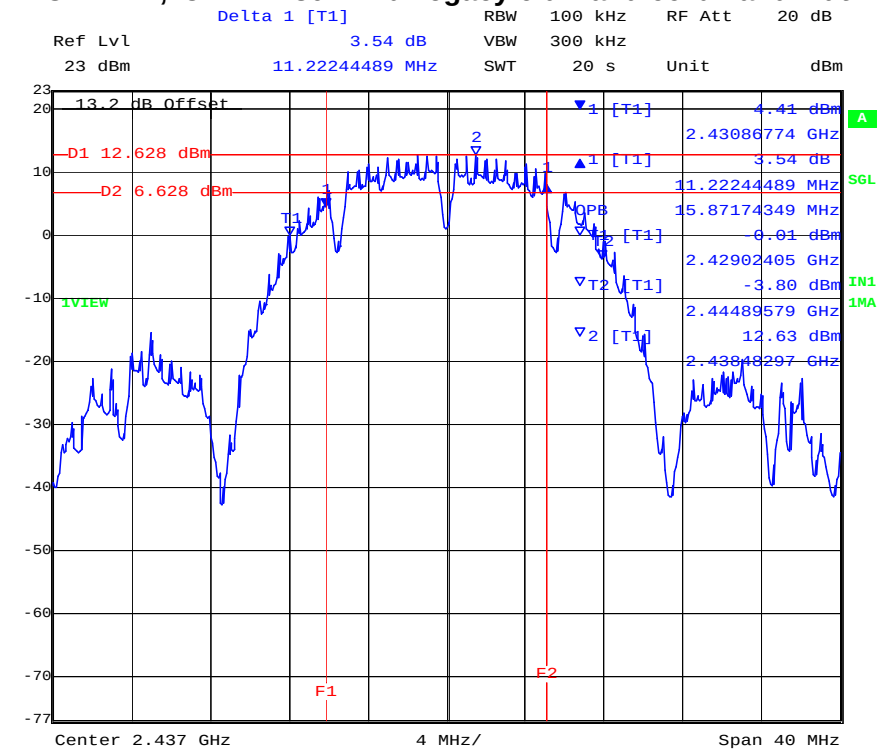


PORT A 2,437 MHz 802.11b Legacy 6 dB and 99% Bandwidth



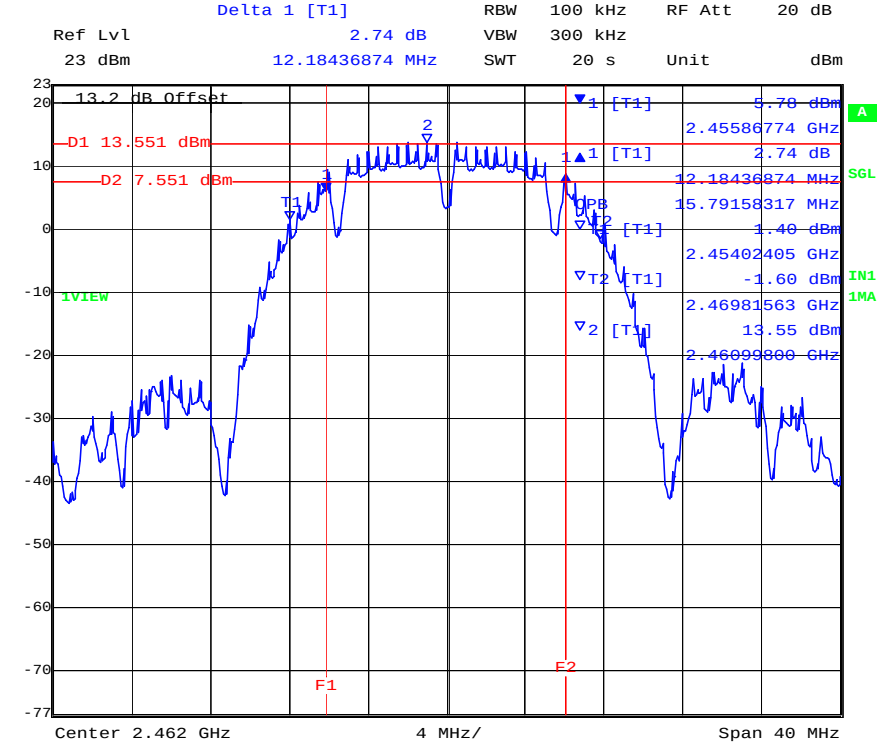
Date: 28.NOV.2010 09:26:28

PORT B 2,437 MHz 802.11b Legacy 6 dB and 99% Bandwidth



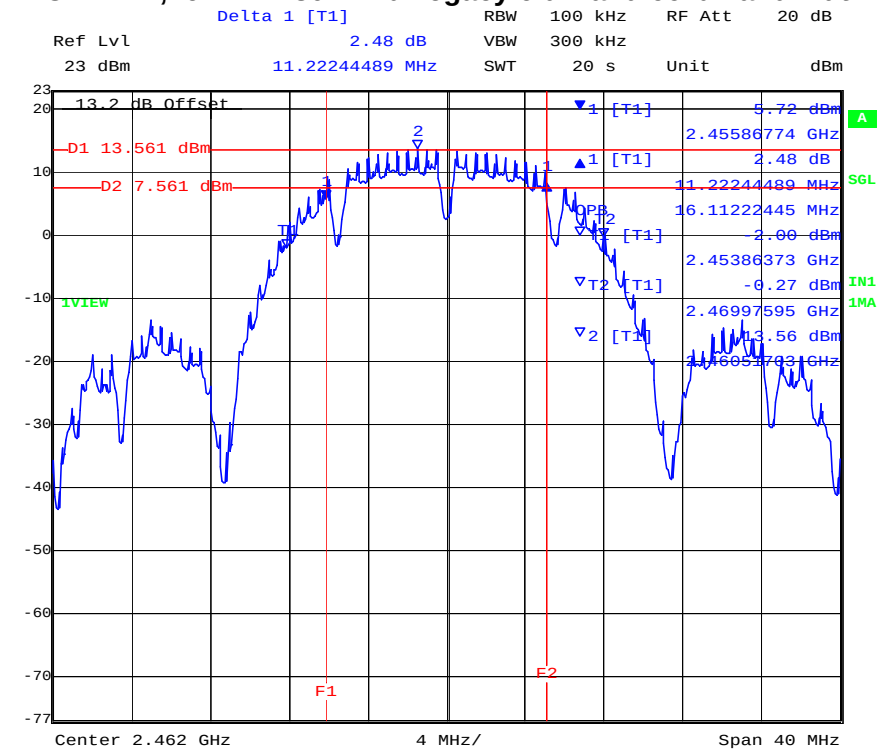
Date: 28.NOV.2010 09:29:09

PORT A 2,462 MHz 802.11b Legacy 6 dB and 99% Bandwidth



Date: 28.NOV.2010 10:02:26

PORT B 2,462 MHz 802.11b Legacy 6 dB and 99% Bandwidth

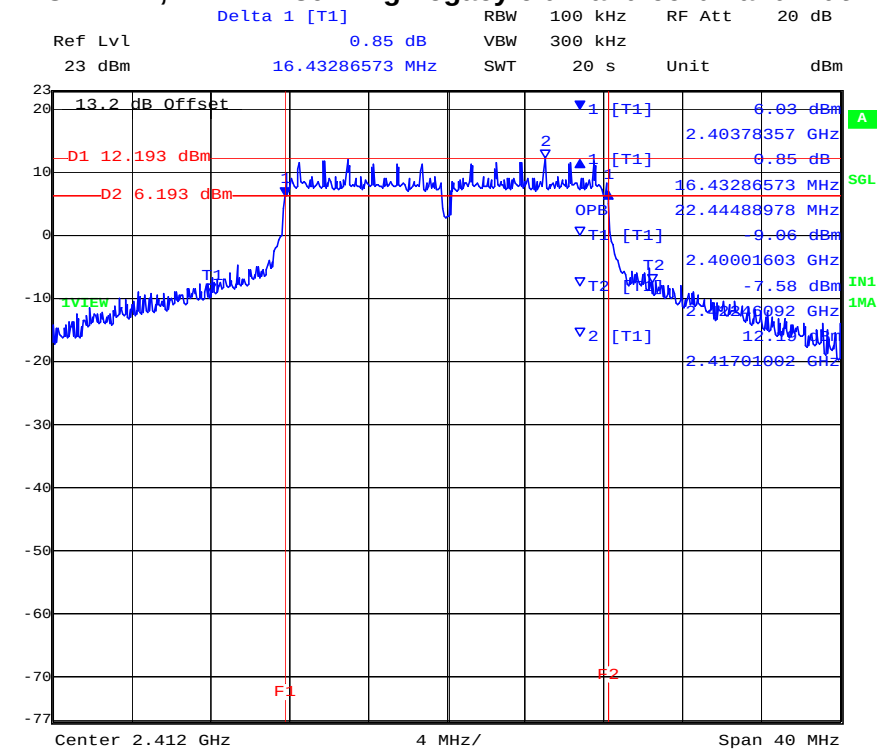


Date: 28.NOV.2010 10:05:07

TABLE OF RESULTS – **802.11g Legacy**

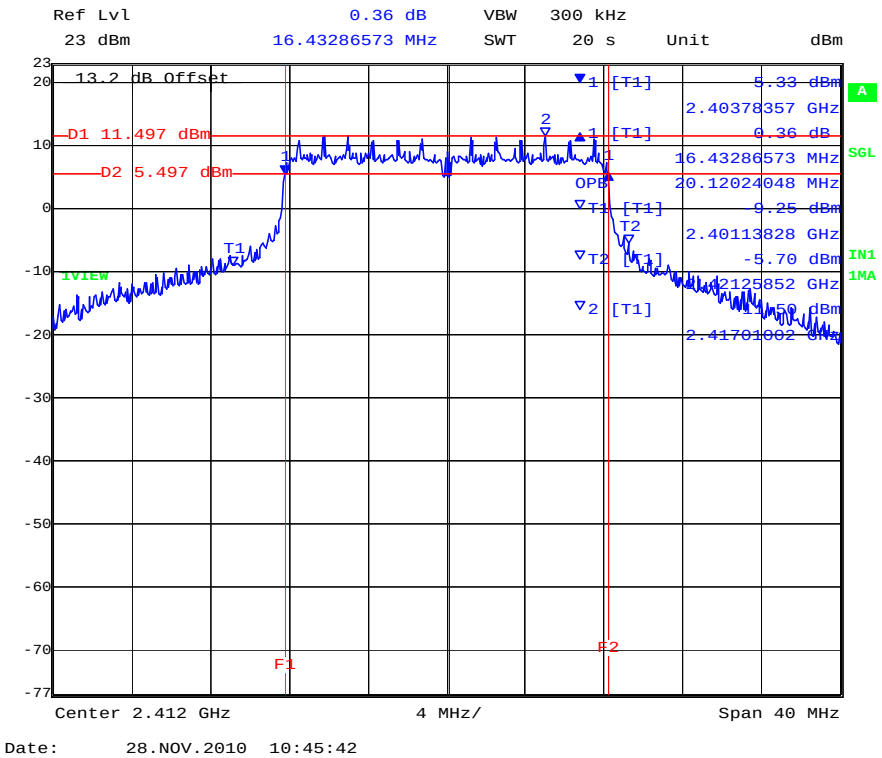
Center Frequency (MHz)	6 dB Bandwidth (MHz)		99% BW (MHz)	
	PORT A	PORT B	PORT A	PORT B
2,412	16.433000	16.433000	22.445000	20.120000
2,437	16.433000	16.433000	18.036000	24.289000
2,462	16.513000	16.433000	19.800000	24.449000

PORT A 2,412 MHz 802.11g Legacy 6 dB and 99% Bandwidth



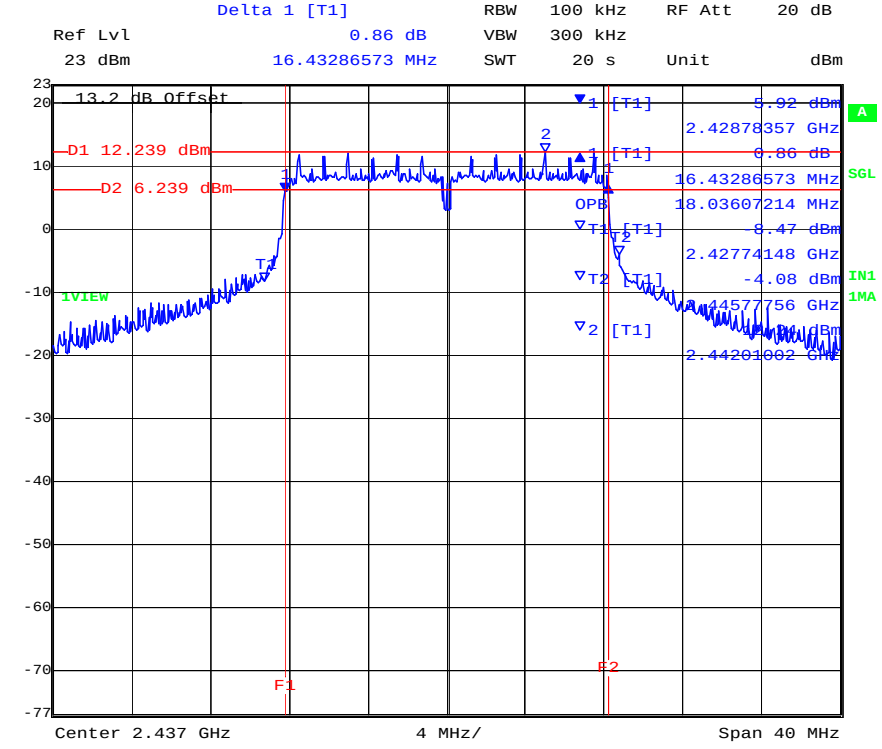
Date: 28.NOV.2010 10:43:01

PORT B 2,412 MHz 802.11g Legacy 6 dB and 99% Bandwidth



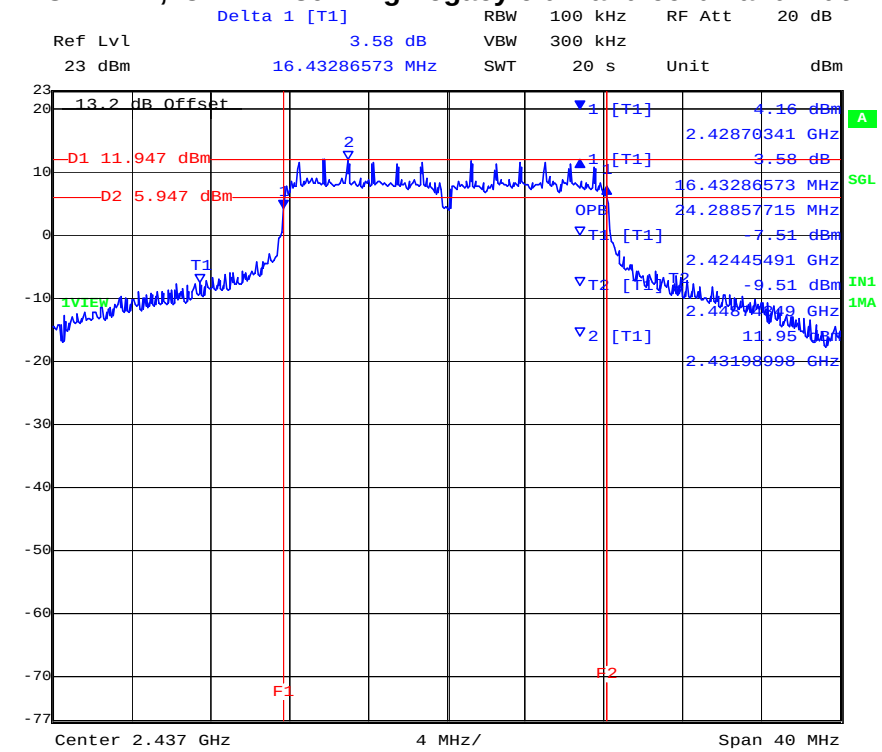
Date: 28.NOV.2010 10:45:42

PORT A 2,437 MHz 802.11g Legacy 6 dB and 99% Bandwidth



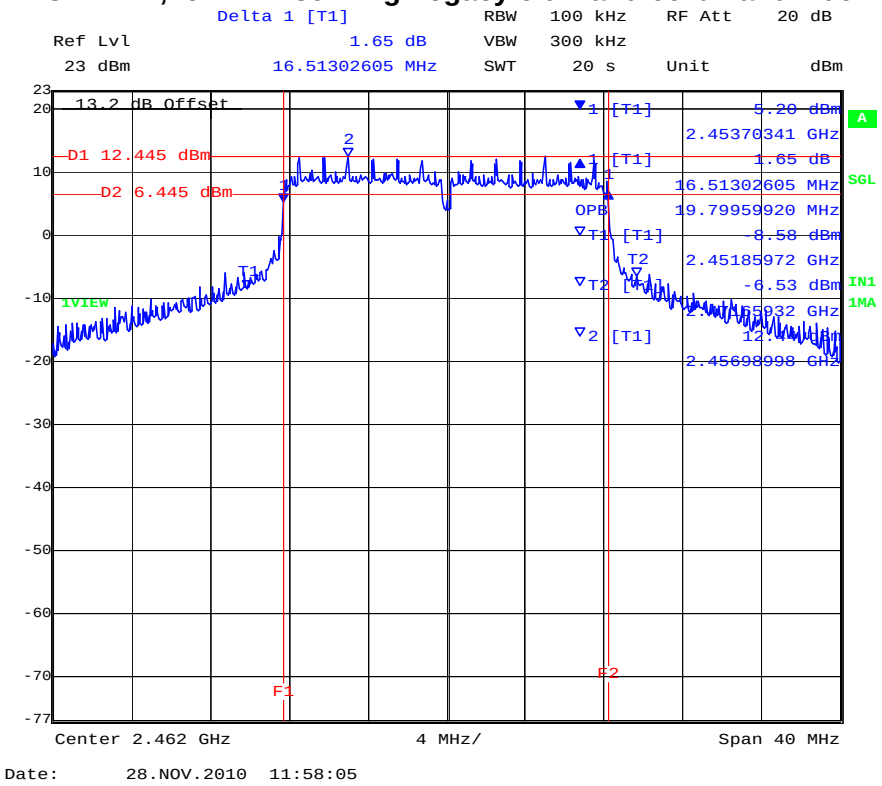
Date: 28.NOV.2010 11:22:22

PORT B 2,437 MHz 802.11g Legacy 6 dB and 99% Bandwidth



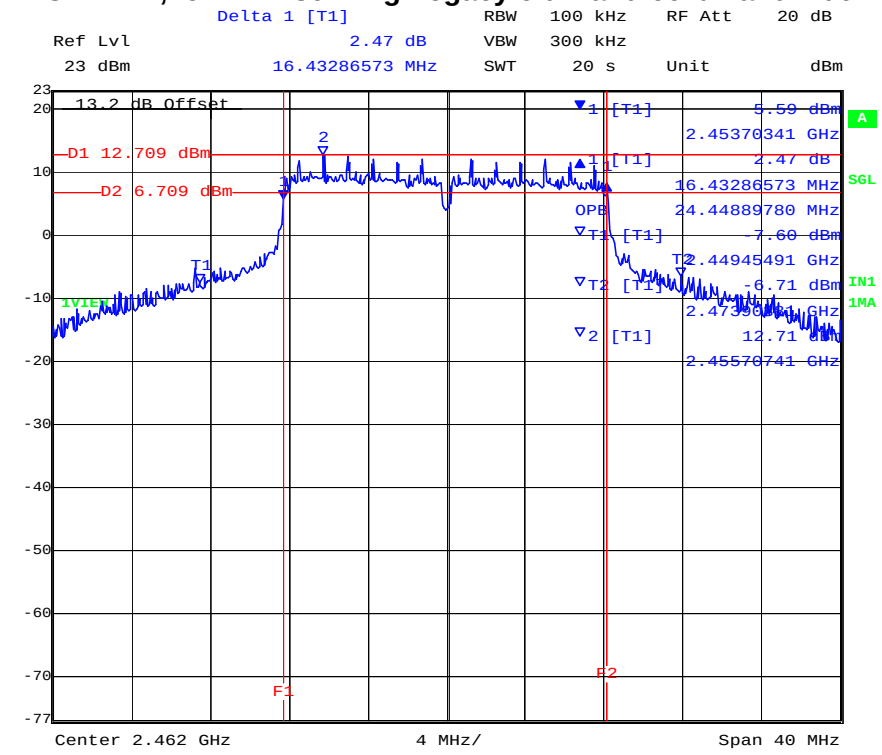
Date: 28.NOV.2010 11:25:03

PORT A 2,462 MHz 802.11g Legacy 6 dB and 99% Bandwidth



Date: 28.NOV.2010 11:58:05

PORT B 2,462 MHz 802.11g Legacy 6 dB and 99% Bandwidth

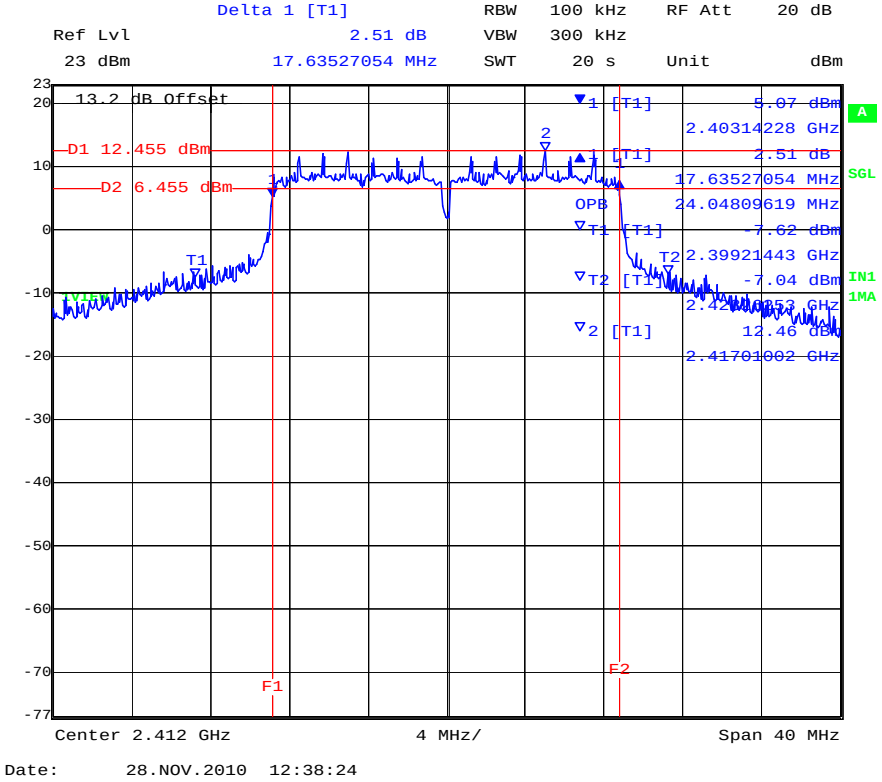


Date: 28.NOV.2010 12:00:46

TABLE OF RESULTS – **802.11n HT-20 Legacy**

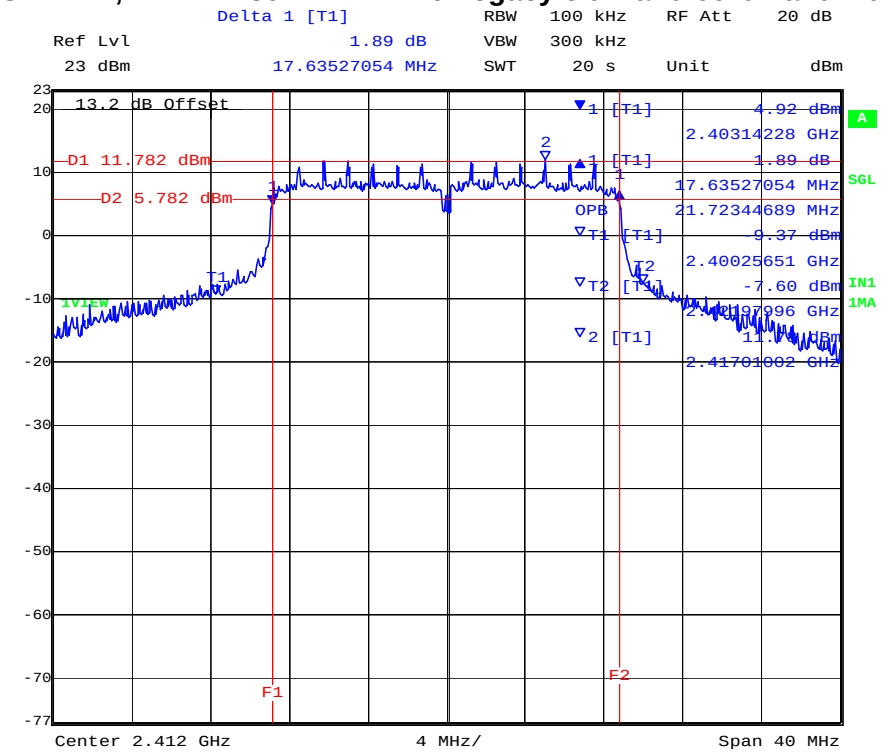
Center Frequency (MHz)	6 dB Bandwidth (MHz)		99% BW (MHz)	
	PORT A	PORT B	PORT A	PORT B
2,412	17.635000	17.635000	24.048000	21.723000
2,437	17.635000	17.635000	18.677000	24.850000
2,462	17.635000	17.635000	20.281000	25.090000

PORT A 2,412 MHz 802.11n HT-20 Legacy 6 dB and 99% Bandwidth



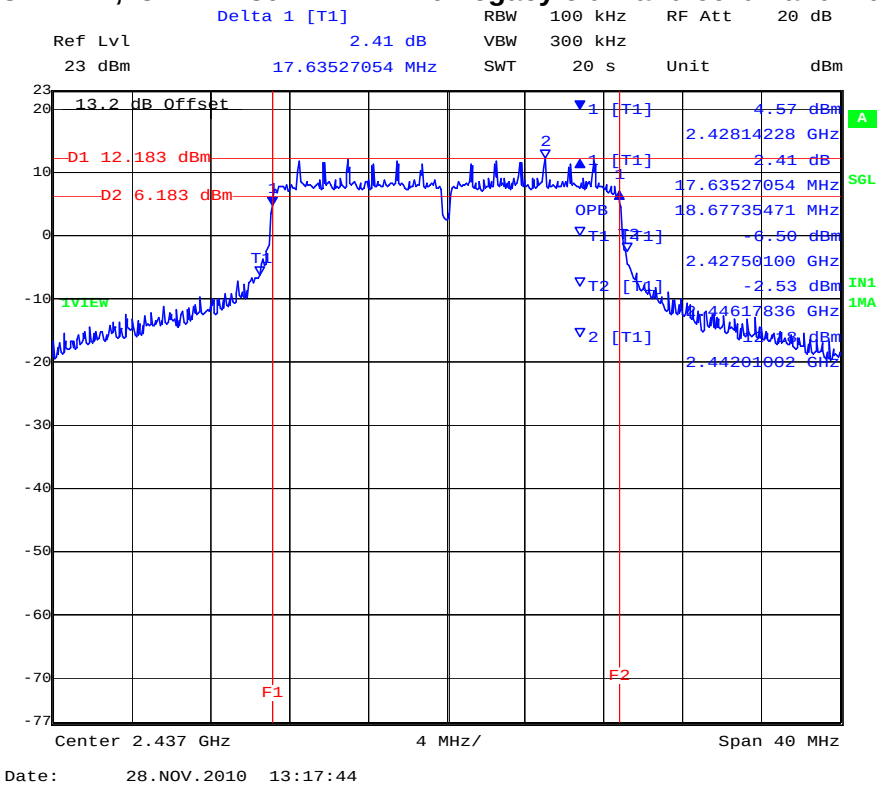
Date: 28.NOV.2010 12:38:24

PORT B 2,412 MHz 802.11n HT-20 Legacy 6 dB and 99% Bandwidth

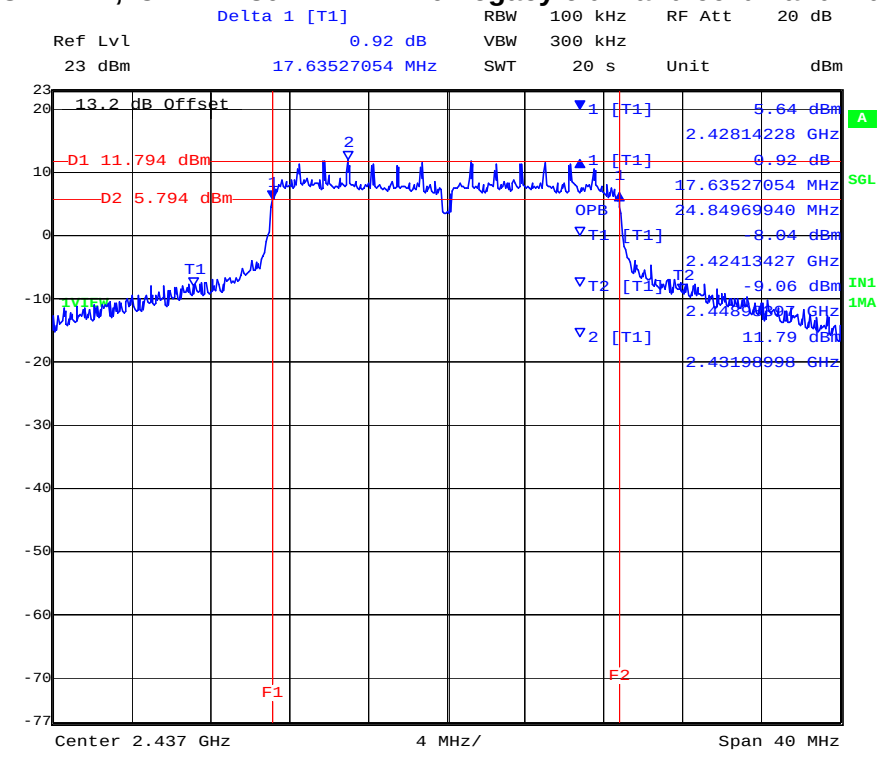


Date: 28.NOV.2010 12:41:06

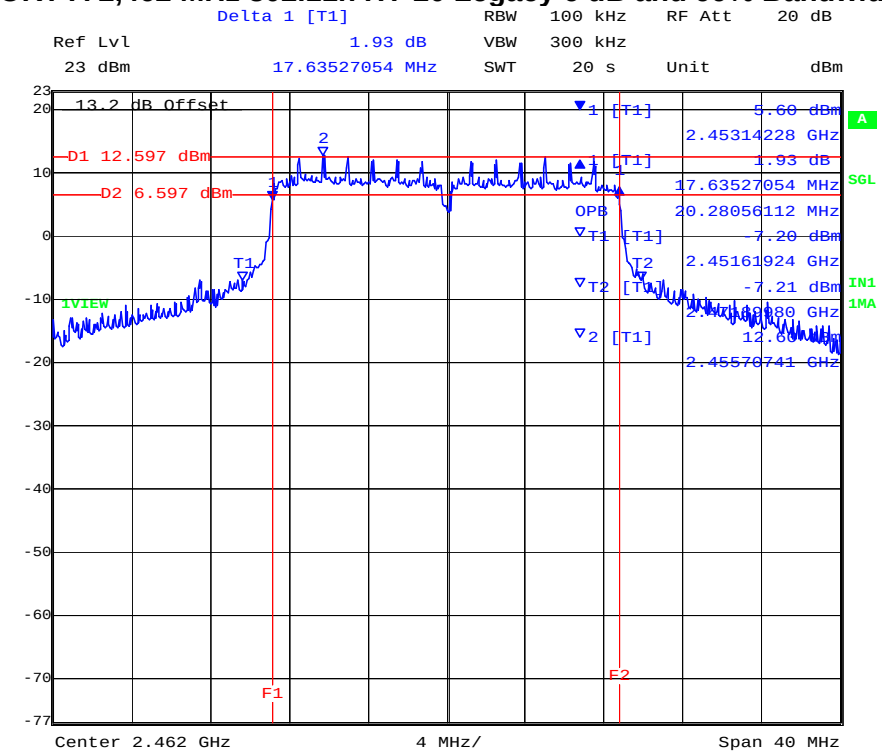
PORT A 2,437 MHz 802.11n HT-20 Legacy 6 dB and 99% Bandwidth



PORT B 2,437 MHz 802.11n HT-20 Legacy 6 dB and 99% Bandwidth



PORT A 2,462 MHz 802.11n HT-20 Legacy 6 dB and 99% Bandwidth



PORT B 2,462 MHz 802.11n HT-20 Legacy 6 dB and 99% Bandwidth

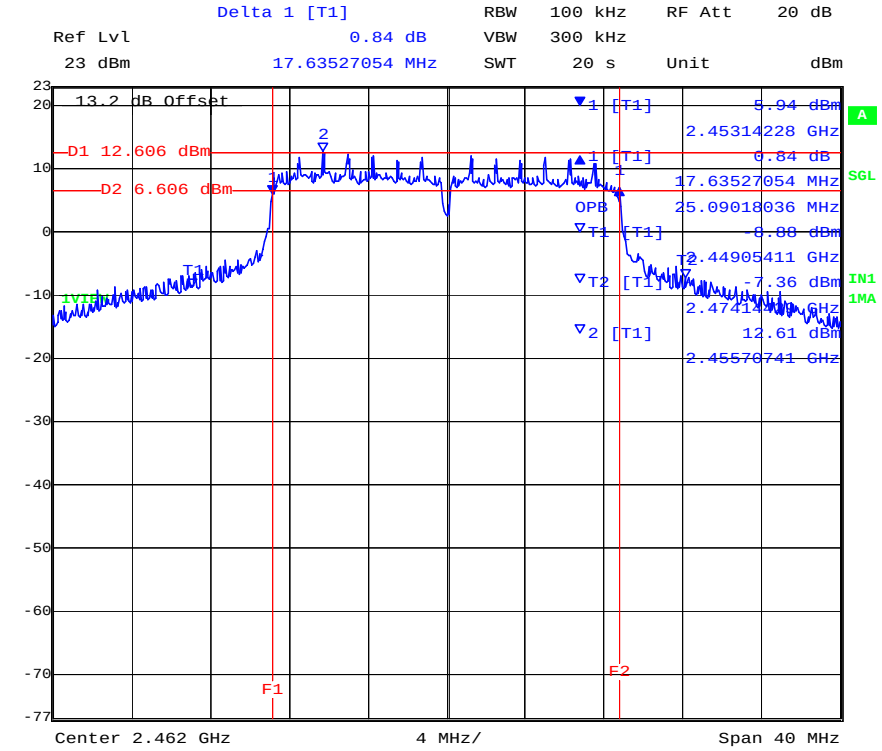
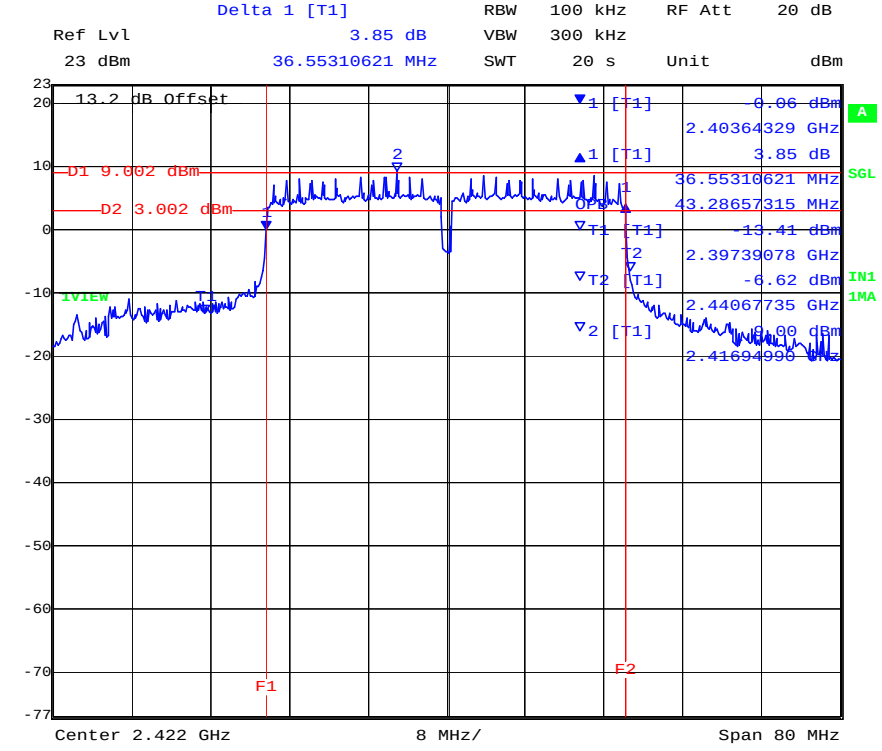


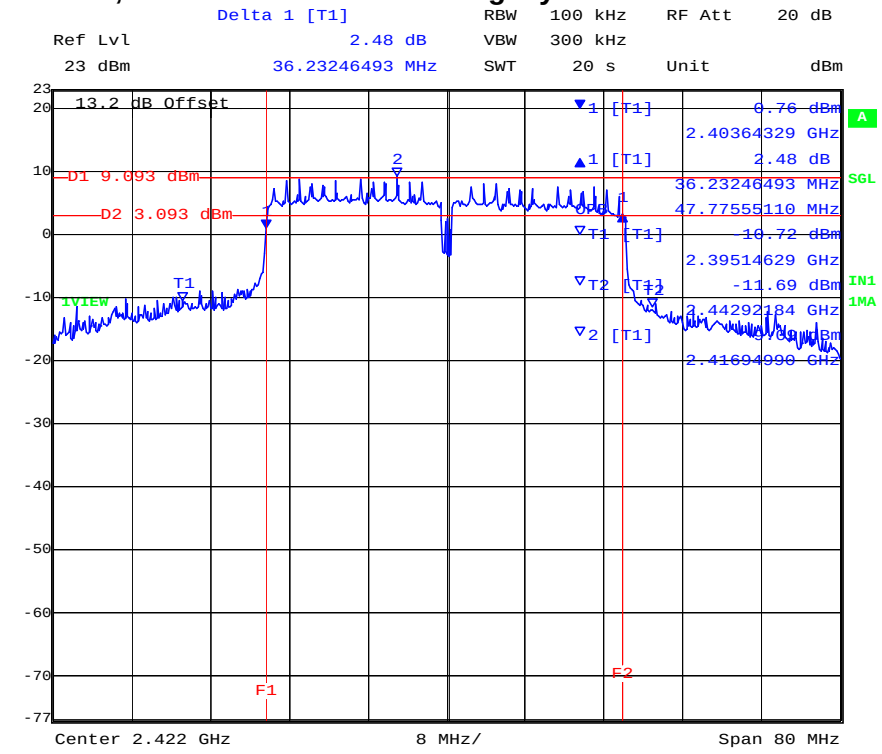
TABLE OF RESULTS – **802.11n HT-40 Legacy**

Center Frequency (MHz)	6 dB Bandwidth (MHz)		99% BW (MHz)	
	PORT A	PORT B	PORT A	PORT B
2,422	36.553000	36.232000	43.287000	47.776000
2,437	36.553000	36.393000	38.317000	48.737000
2,452	35.912000	36.232000	37.355000	52.425000

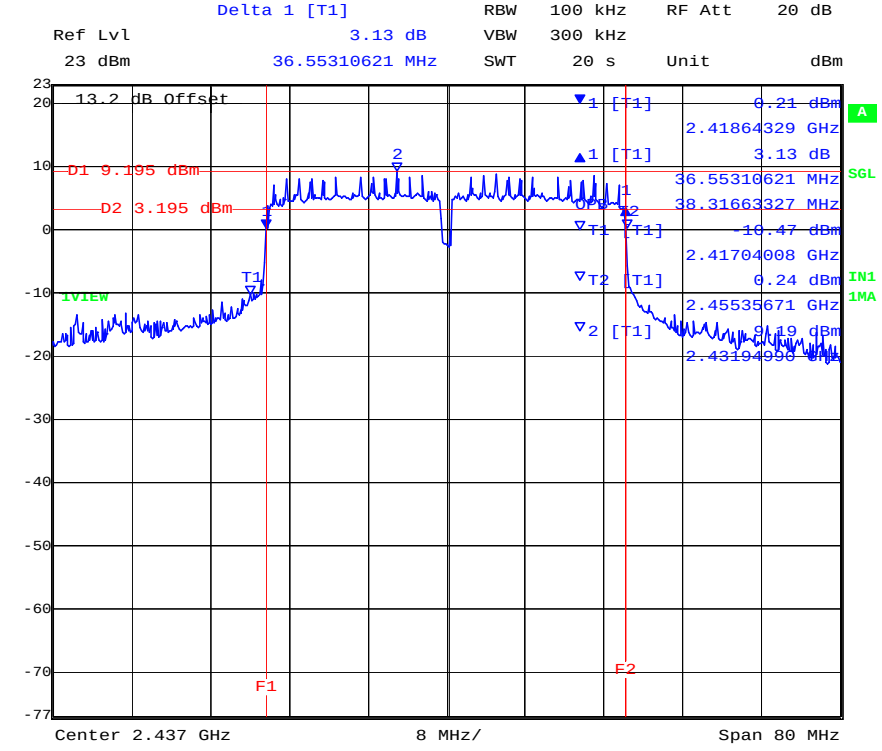
PORT A 2,422 MHz 802.11n HT-40 Legacy 6 dB and 99% Bandwidth



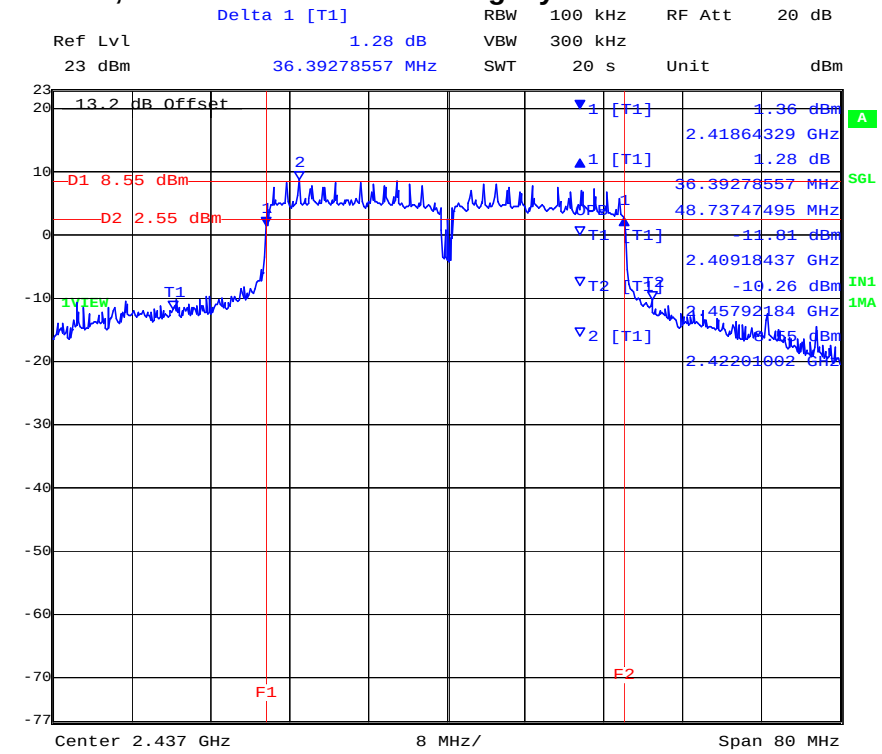
PORT B 2,422 MHz 802.11n HT-40 Legacy 6 dB and 99% Bandwidth



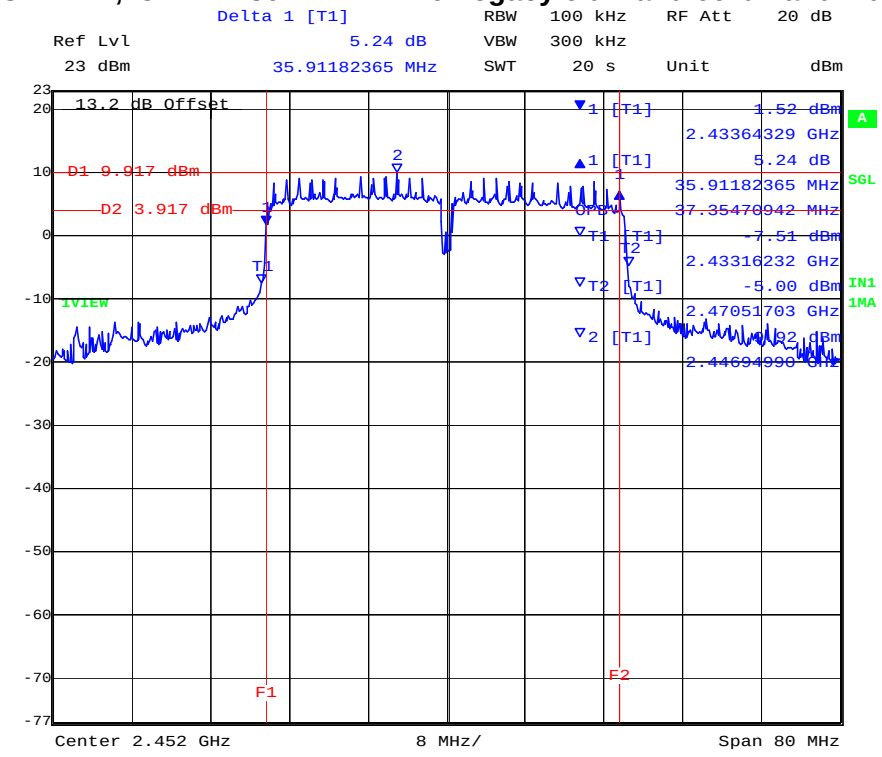
PORT A 2,437 MHz 802.11n HT-20 Legacy 6 dB and 99% Bandwidth



PORT B 2,437 MHz 802.11n HT-20 Legacy 6 dB and 99% Bandwidth

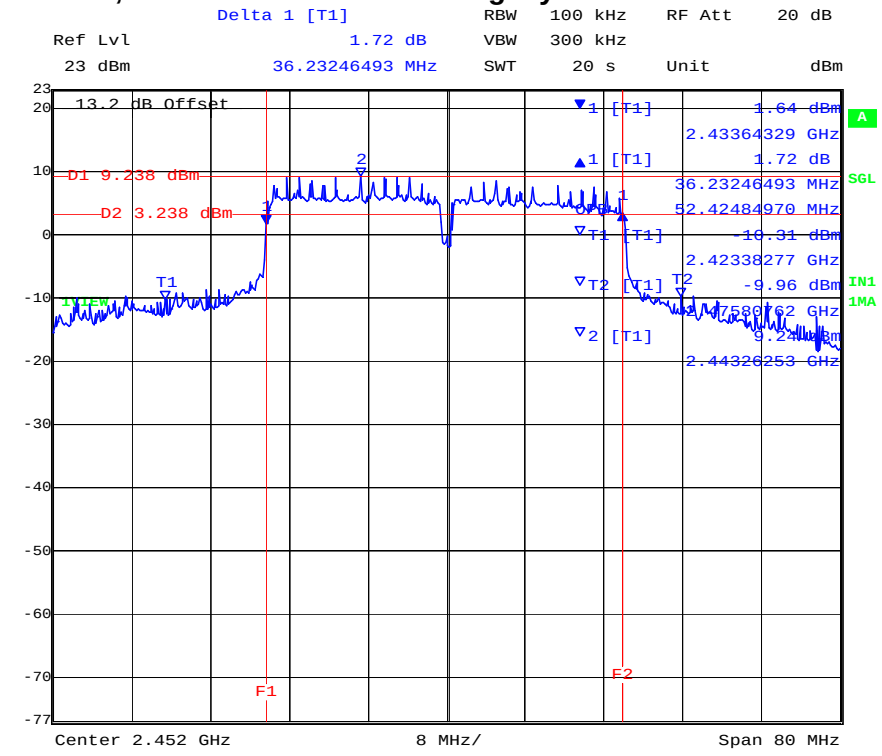


PORT A 2,452 MHz 802.11n HT-20 Legacy 6 dB and 99% Bandwidth



Date: 28.NOV.2010 15:49:06

PORT B 2,452 MHz 802.11n HT-20 Legacy 6 dB and 99% Bandwidth

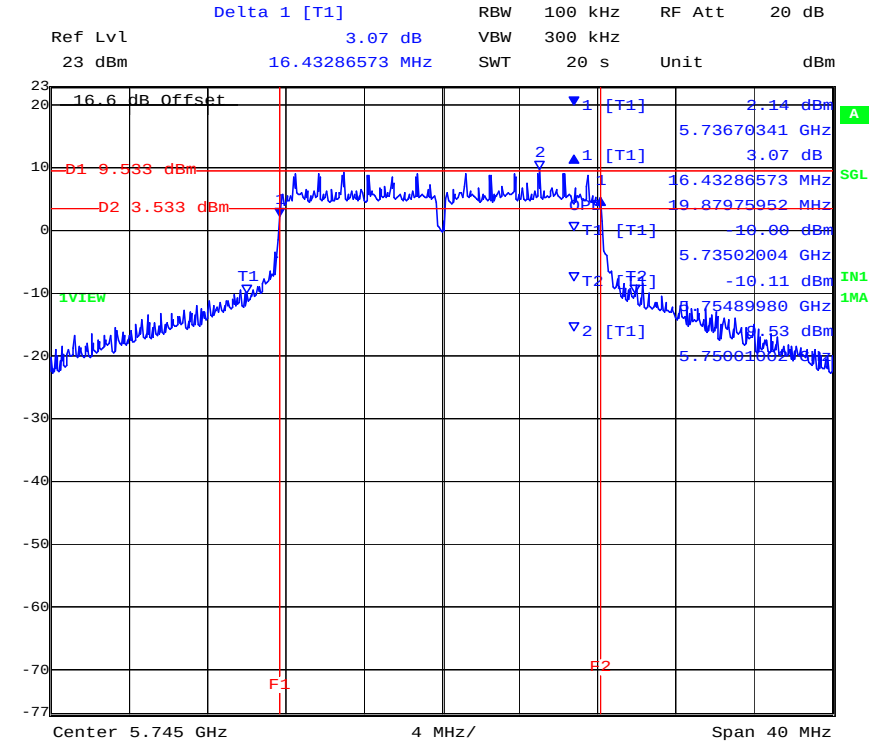


Date: 28.NOV.2010 15:51:47

TABLE OF RESULTS – **802.11a - Legacy**

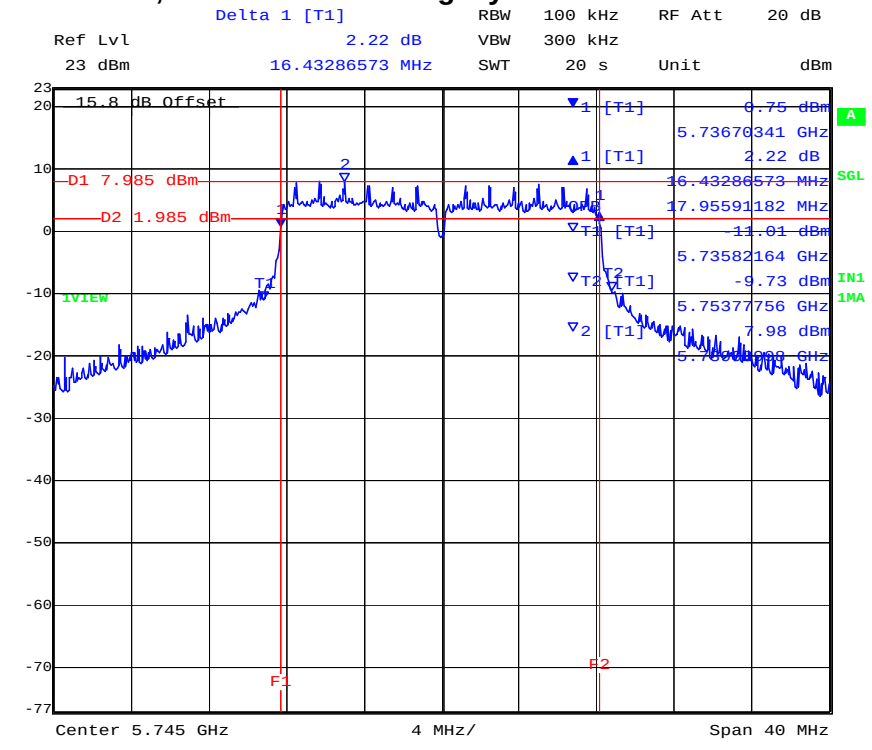
Center Frequency (MHz)	6 dB Bandwidth (MHz)		99% BW (MHz)	
	PORT A	PORT B	PORT A	PORT B
5,745	16.433000	16.433000	19.880000	17.956000
5,785	16.353000	16.433000	22.365000	19.479000
5,825	16.433000	16.433000	23.006000	20.681000

PORT A 5,745 MHz 802.11a Legacy 6 dB and 99% Bandwidth



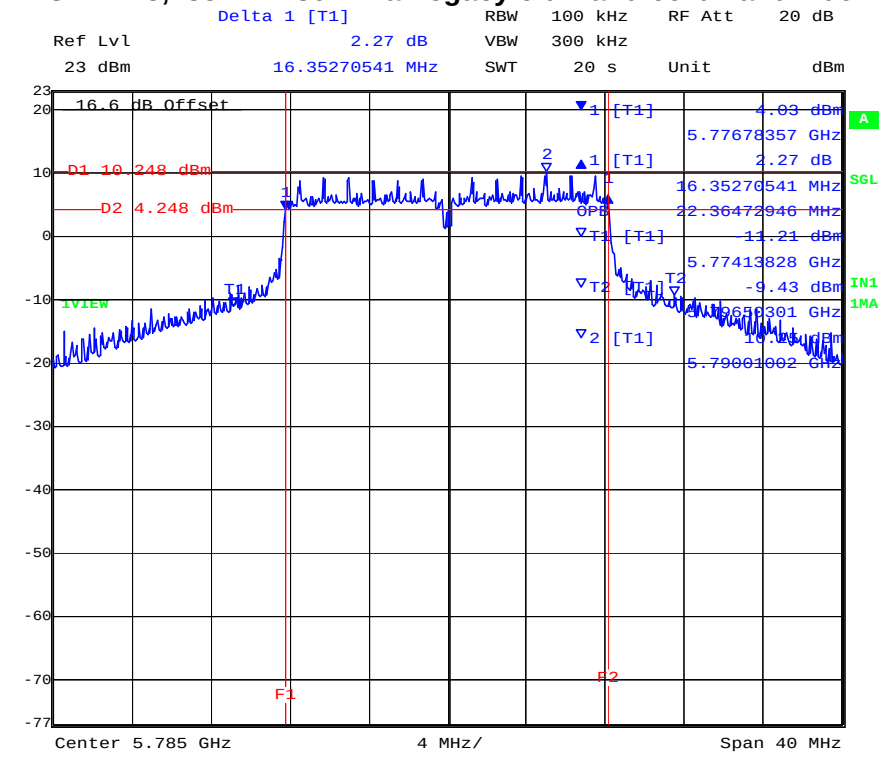
Date: 28.NOV.2010 16:33:52

PORT B 5,745 MHz 802.11a Legacy 6 dB and 99% Bandwidth



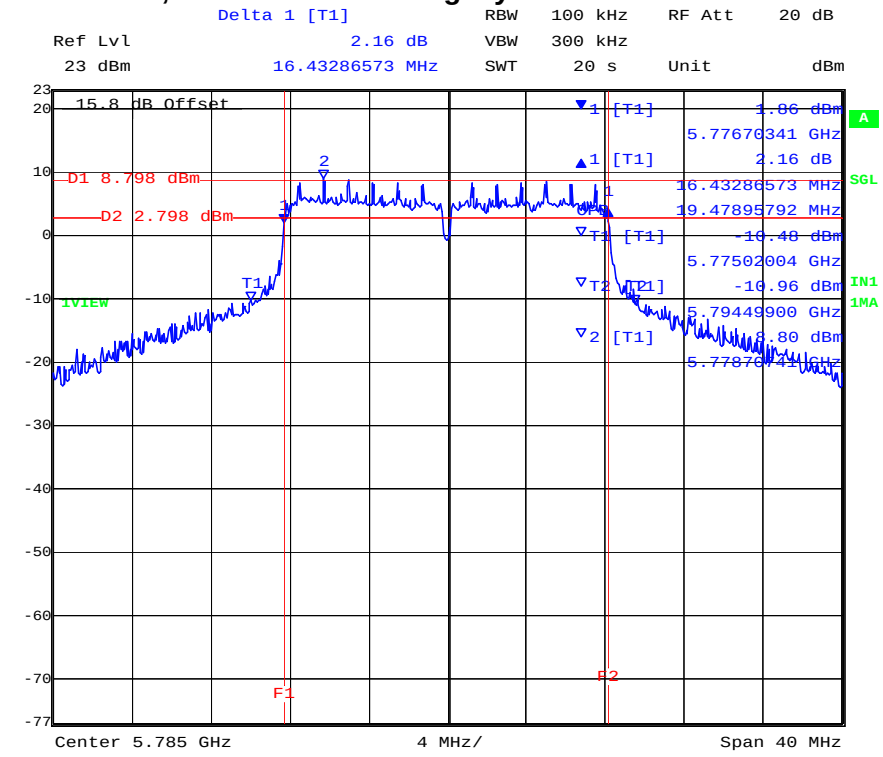
Date: 28.NOV.2010 16:37:26

PORT A 5,785 MHz 802.11a Legacy 6 dB and 99% Bandwidth



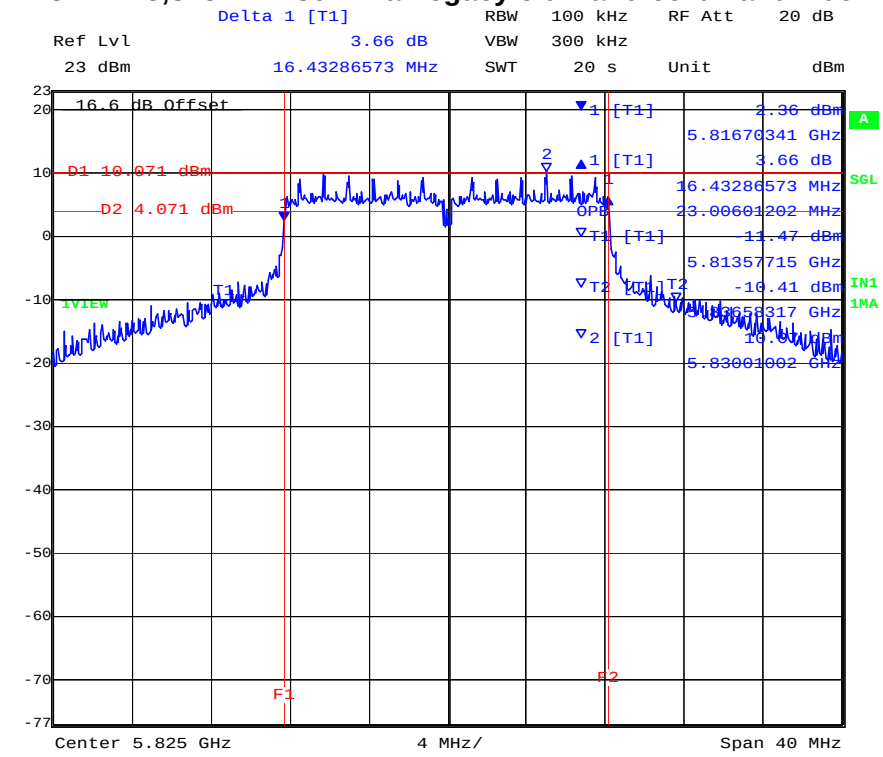
Date: 28.NOV.2010 17:16:49

PORT B 5,785 MHz 802.11a Legacy 6 dB and 99% Bandwidth



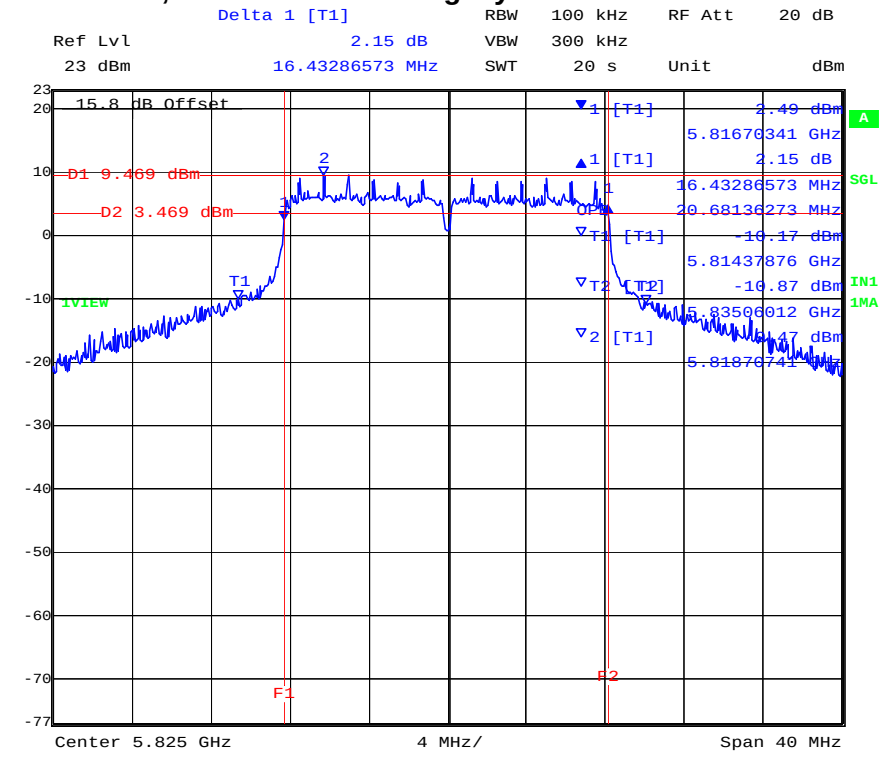
Date: 28.NOV.2010 17:20:22

PORT A 5,825 MHz 802.11a Legacy 6 dB and 99% Bandwidth



Date: 28.NOV.2010 17:56:07

PORT B 5,825 MHz 802.11a Legacy 6 dB and 99% Bandwidth

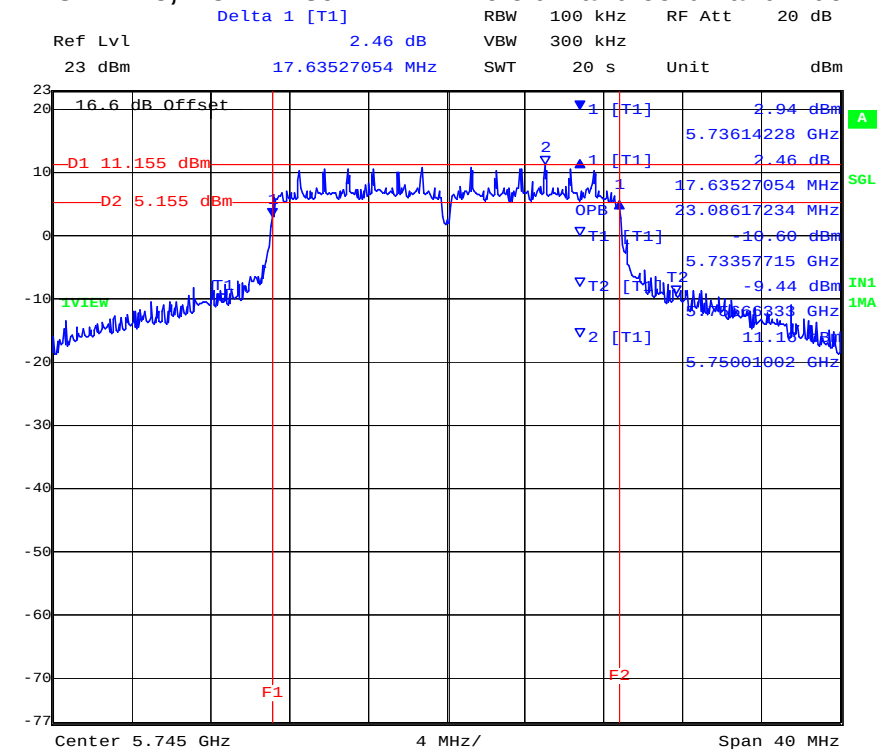


Date: 28.NOV.2010 17:59:40

TABLE OF RESULTS – **802.11n HT-20**

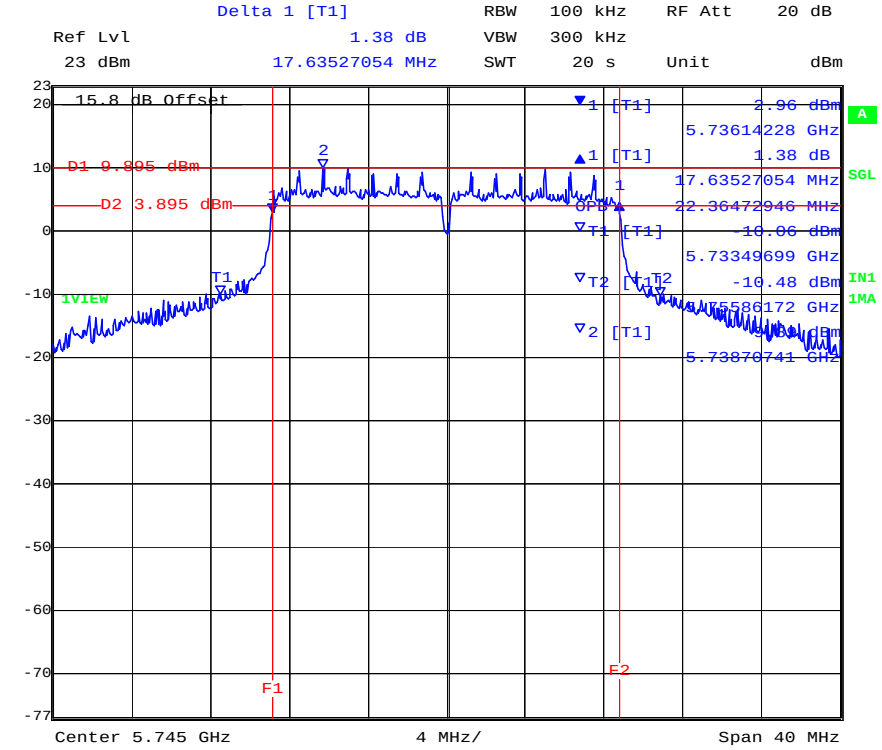
Center Frequency (MHz)	6 dB Bandwidth (MHz)		99% BW (MHz)	
	PORT A	PORT B	PORT A	PORT B
5,745	17.635000	17.635000	23.086000	22.365000
5,785	17.635000	17.635000	27.255000	20.120000
5,825	17.635000	17.635000	25.411000	21.884000

PORT A 5,745 MHz 802.11n HT-20 6 dB and 99% Bandwidth



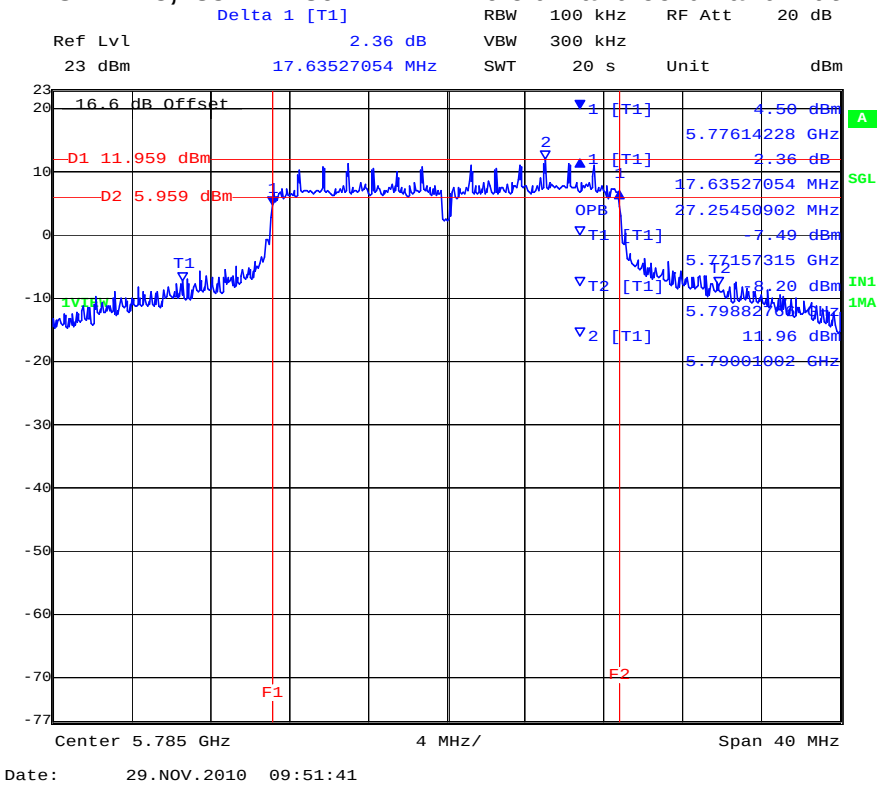
Date: 29.NOV.2010 09:08:32

PORT B 5,745 MHz 802.11n HT-20 6 dB and 99% Bandwidth



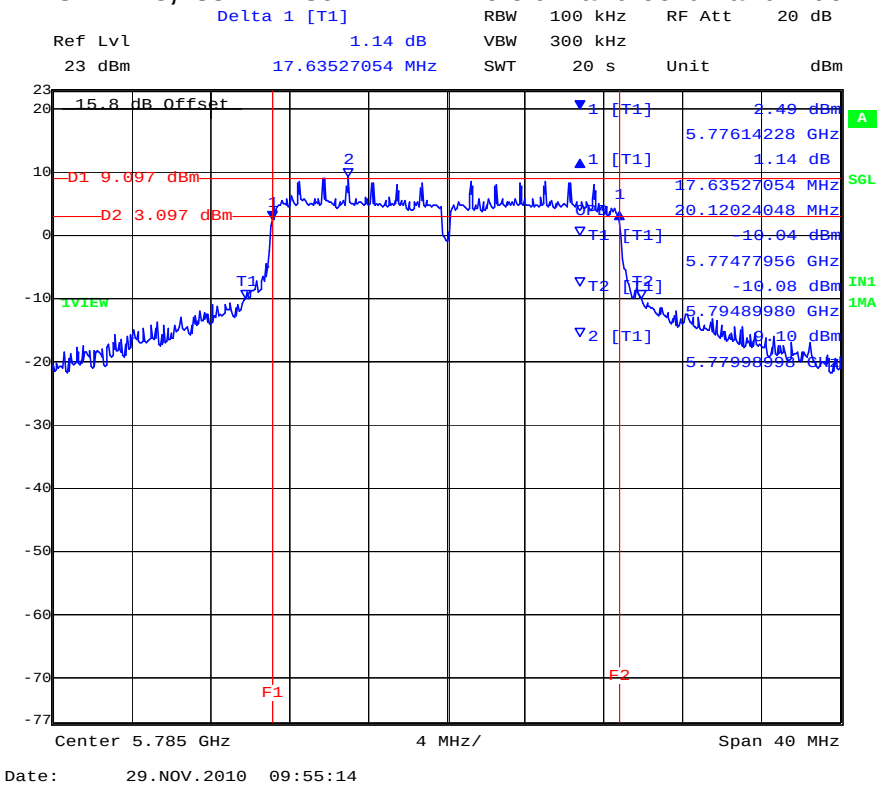
Date: 29.NOV.2010 09:12:05

PORT A 5,785 MHz 802.11n HT-20 6 dB and 99% Bandwidth



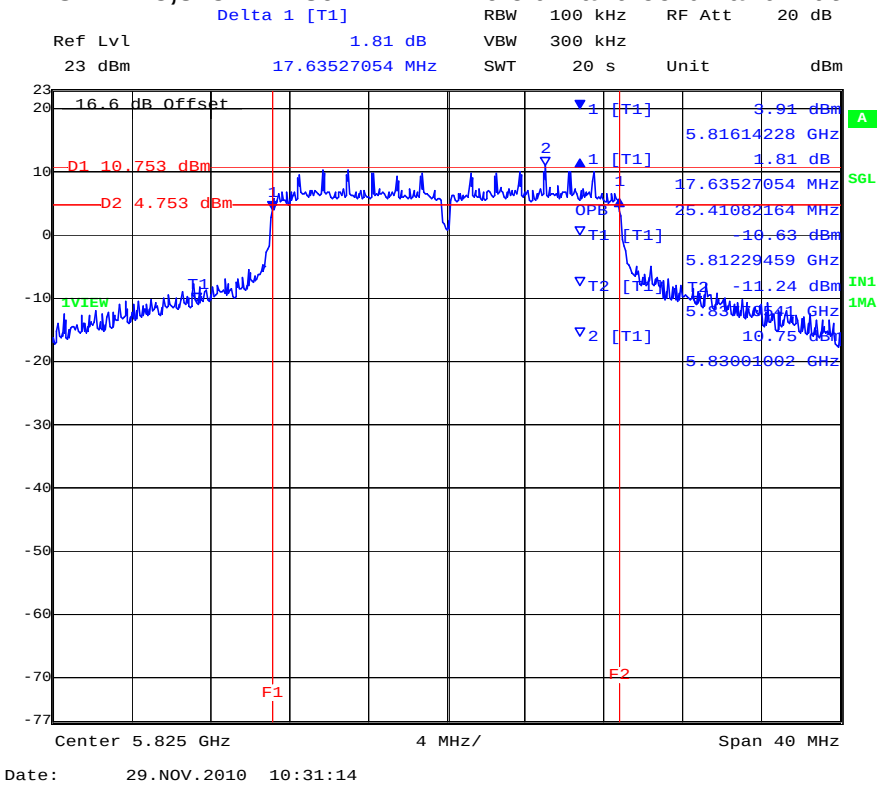
Date: 29.NOV.2010 09:51:41

PORT B 5,785 MHz 802.11n HT-20 6 dB and 99% Bandwidth



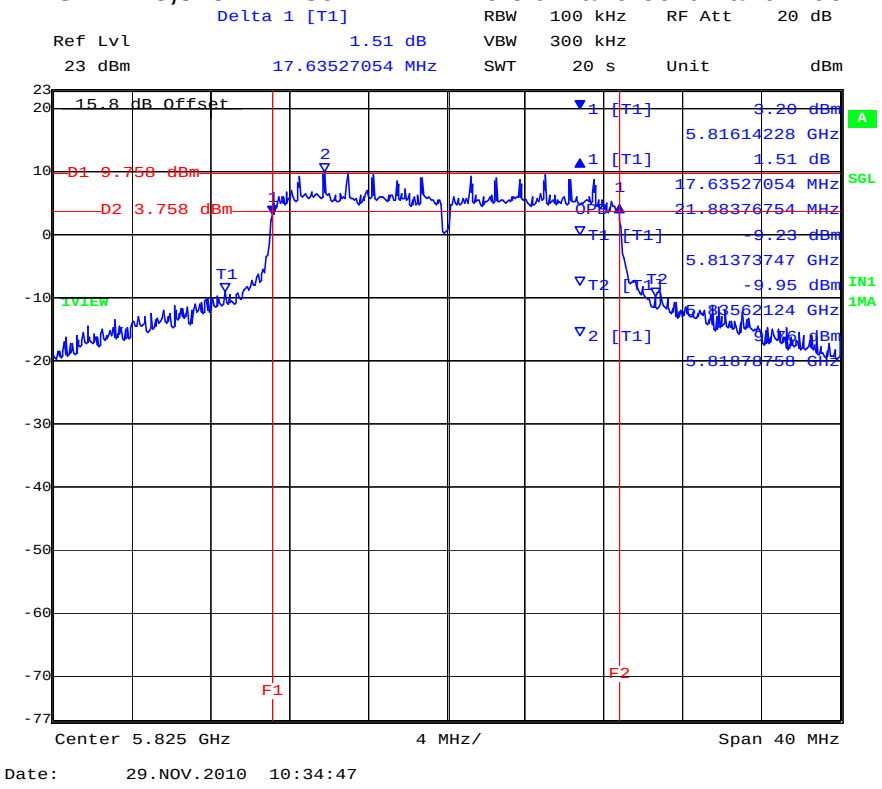
Date: 29.NOV.2010 09:55:14

PORT A 5,825 MHz 802.11n HT-20 6 dB and 99% Bandwidth



Date: 29.NOV.2010 10:31:14

PORT B 5,825 MHz 802.11n HT-20 6 dB and 99% Bandwidth

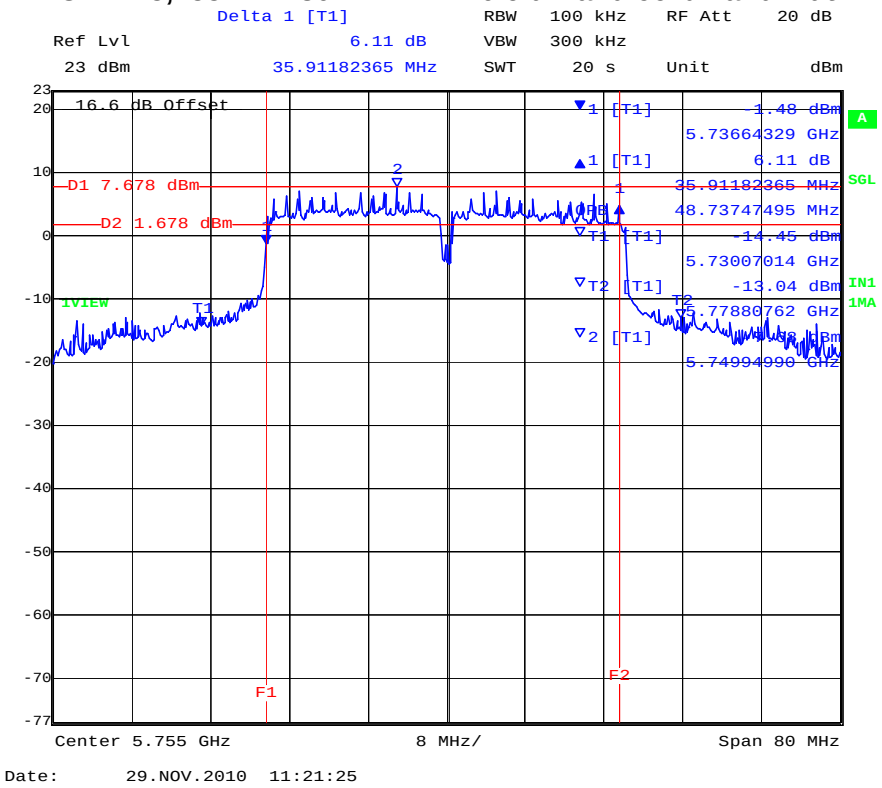


Date: 29.NOV.2010 10:34:47

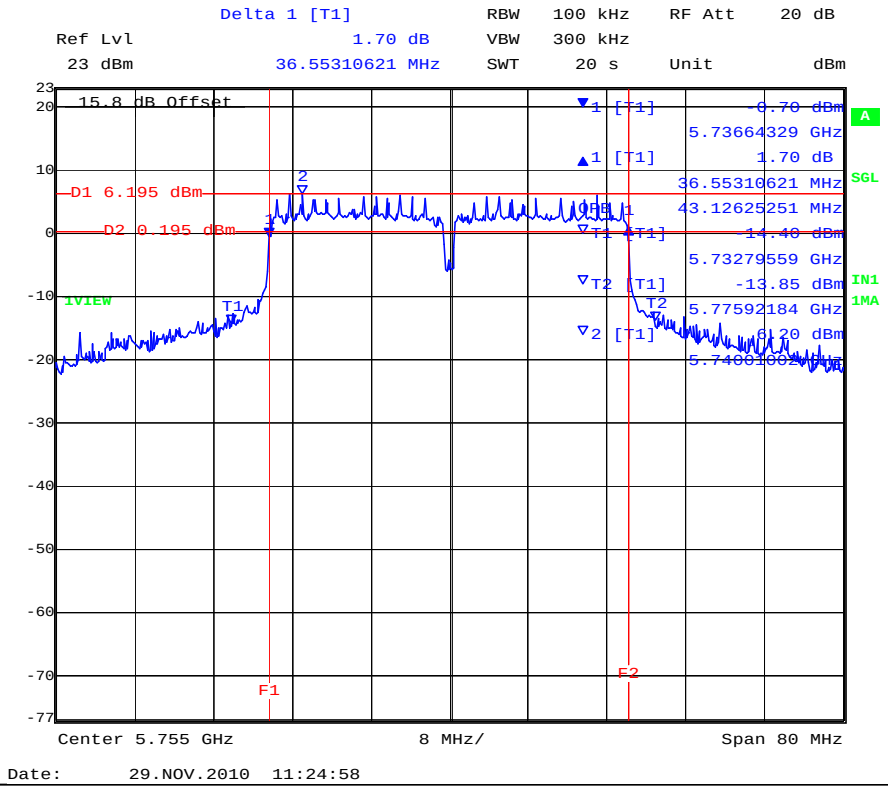
TABLE OF RESULTS – **802.11n - HT-40**

Center Frequency (MHz)	6 dB Bandwidth (MHz)		99% BW (MHz)	
	PORT A	PORT B	PORT A	PORT B
5,755	35.912000	36.553000	48.737000	43.126000
5,785	36.553000	36.553000	48.096000	45.371000
5,815	36.232000	36.553000	36.713000	36.553000

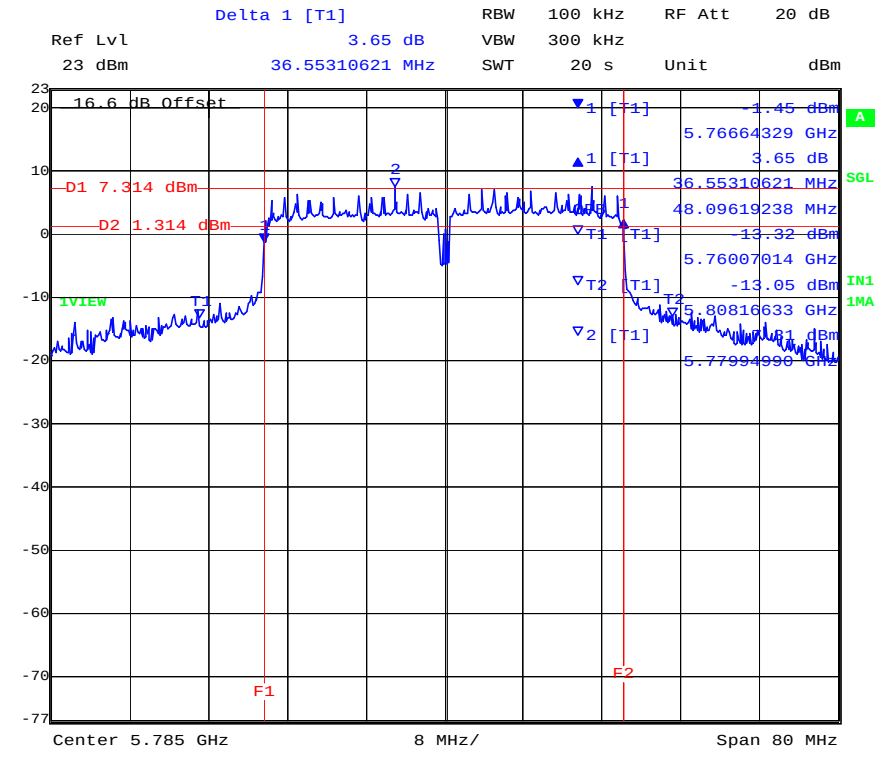
PORTA 5,755 MHz 802.11n HT-40 6 dB and 99% Bandwidth



PORTB 5,755 MHz 802.11n HT-40 6 dB and 99% Bandwidth

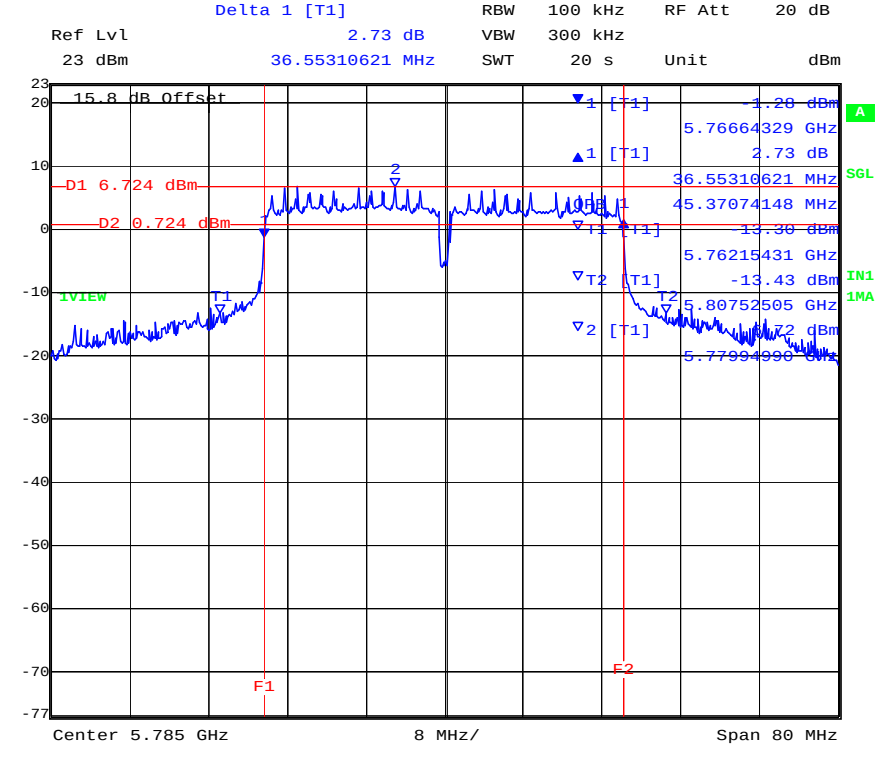


PORT A 5,785 MHz 802.11n HT-40 6 dB and 99% Bandwidth



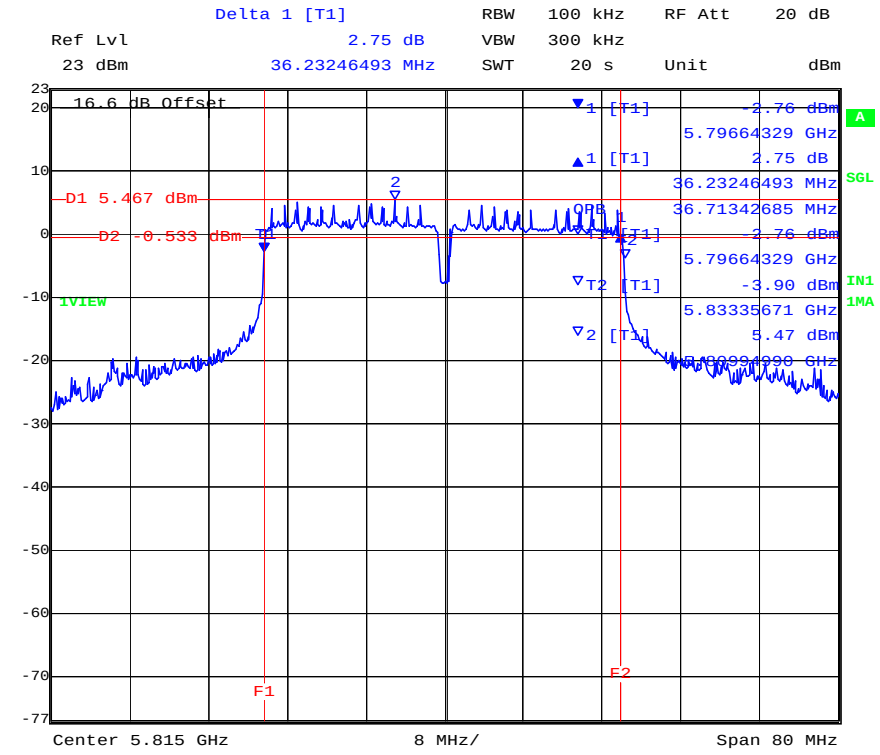
Date: 29.NOV.2010 12:07:27

PORT B 5,785 MHz 802.11n HT-40 6 dB and 99% Bandwidth



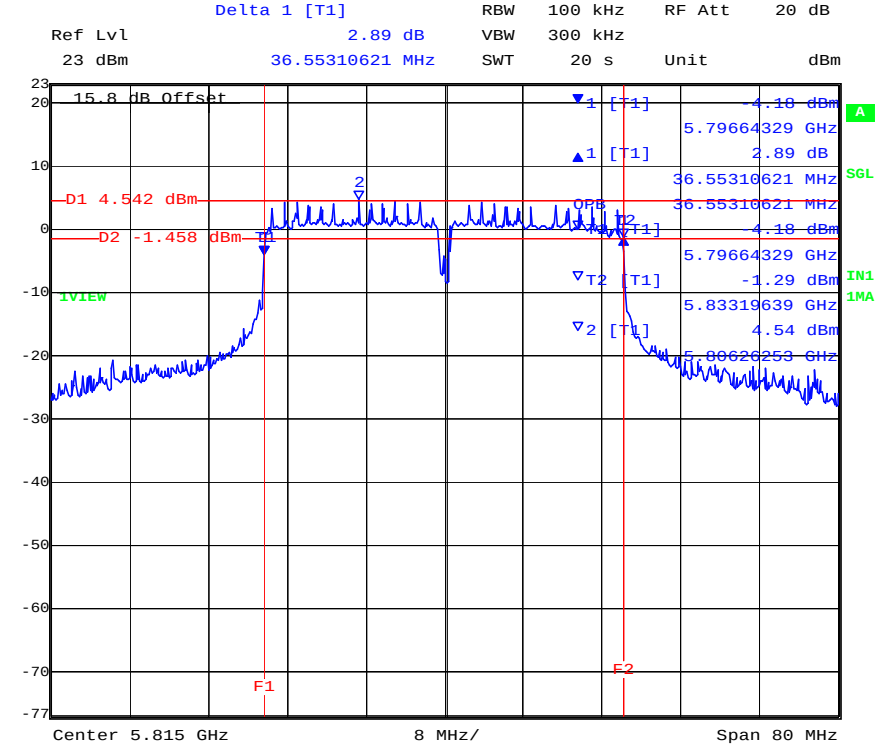
Date: 29.NOV.2010 12:11:00

PORT A 5,815 MHz 802.11n HT-40 6 dB and 99% Bandwidth



Date: 29.NOV.2010 12:55:08

PORT B 5,815 MHz 802.11n HT-40 6 dB and 99% Bandwidth



Date: 29.NOV.2010 12:58:41

Specification

Limits

§15.247 (a)(2) & RSS-210 §A8.2(1)
The minimum 6 dB bandwidth shall be at least 500 kHz.

§ IC RSS-Gen 4.4.1 Occupied Bandwidth 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.

§ IC RSS-Gen 4.4.2 6 dB Bandwidth Where indicated, the 6 dB bandwidth is measured at the points when the spectral density of the signal is 6 dB down from the in –band spectral density of the modulated signal, with the transmitter modulated by a representative signal.

Laboratory Measurement Uncertainty for Spectrum Measurement

Measurement uncertainty	±2.81 dB

Traceability

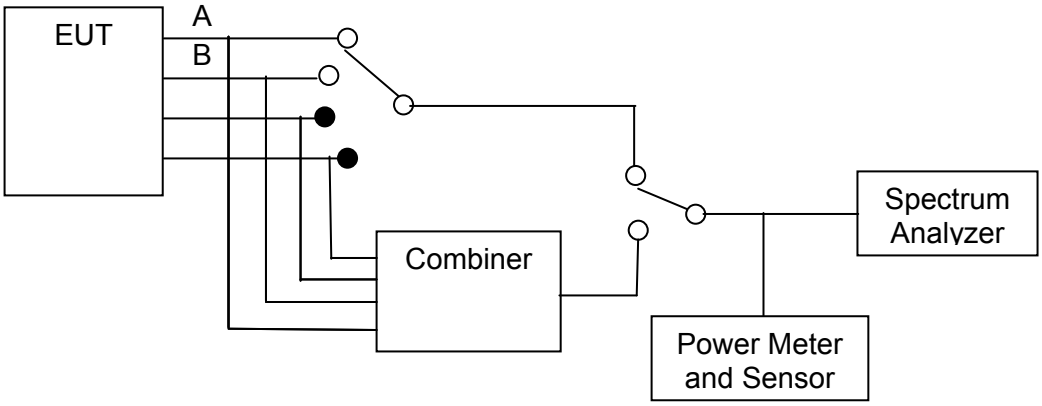
Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of RF Spectrum Mask'	0158, 0287, 0252, 0313, 0314, 0070, 0116, 0117

5.1.2. Peak Output Power

FCC, Part 15 Subpart C §15.247(b)(3), §15.31(e)
Industry Canada RSS-210 §A8.4(4)

Test Procedure
The transmitter terminal of EUT was connected to the input of the spectrum analyzer set to measure peak power. The resolution filter bandwidth was set to 6 dB, peak detector selected and the analyzer built-in power function was used to measure peak power over the 99 % bandwidth.

Test Measurement Set up



Measurement set up for Transmitter Peak Output Power

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

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

A = Total Power [10 Log_{10} ($10^{a/10}$ + $10^{b/10}$)], G = Antenna Gain,
x = Duty Cycle

AP-ANT-80D = +8.0 dBi (2,4 GHz Direct Mount Omni)
AP-ANT-85 = 15.0 dBi (2.4 GHz High Gain Directional)
AP-ANT-2x2-5614U = +14.0 dBi (5.8 GHz 60 Sector 2 element MIMO)

15.247 (c) Operation with directional antenna gains greater than 6 dBi.

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

Antenna Type	Gain (dBi)	Antenna Gain >6dBi (dB)	Max. Allowable Conducted Peak Power (dBm)	Maximum EIRP (dBm)
AP-ANT-80D	+8.0	Yes	+28.0	+36.0
AP-ANT-85	+15.0	Yes	+21.0	+36.0
AP-ANT-2x2-5614U	+14.0	Yes	+22.0	+36.0

NOTE: see Section 3.7 Equipment Modifications for amended power levels.

TABLE OF RESULTS – **802.11b – Legacy**
Maximum Conducted Power

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
2,412	+22.25	+22.22	+25.25	+30.00	-8.75
2,437	+22.53	+22.05	+25.31	+30.00	-8.69
2,462	+22.98	+22.75	+25.88	+30.00	-8.12

TABLE OF RESULTS – **802.11g – Legacy**
Maximum Conducted Power

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
2,412	+22.24	+21.97	+25.12	+30.00	-8.88
2,437	+22.56	+21.90	+25.25	+30.00	-8.75
2,462	+22.92	+22.41	+25.68	+30.00	-8.32

TABLE OF RESULTS – **802.11n – HT-20**
Maximum Conducted Power

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
2,412	+22.50	+22.14	+25.33	+30.00	-8.88
2,437	+22.50	+21.88	+25.21	+30.00	-8.75
2,462	+22.90	+22.37	+25.65	+30.00	-8.32

TABLE OF RESULTS – **802.11n – HT-40**
Maximum Conducted Power

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
2,422	+22.33	+22.14	+25.25	+30.00	-8.75
2,437	+22.46	+21.84	+25.17	+30.00	-8.83
2,452	+22.98	+22.36	+25.69	+30.00	-8.31

TABLE OF RESULTS – **802.11a – Legacy**
Maximum Conducted Power

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
5,745	+18.86	+17.62	+21.29	+30.00	-10.71
5,785	+19.50	+18.54	+22.06	+30.00	-9.94
5,825	+19.51	+19.14	+22.34	+30.00	-11.66

TABLE OF RESULTS – **802.11n – HT-20**
Maximum Conducted Power

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
5,745	+20.19	+19.39	+22.82	+30.00	-9.18
5,785	+19.42	+18.80	+22.13	+30.00	-9.87
5,825	+19.86	+19.19	+22.55	+30.00	-9.45

TABLE OF RESULTS – **802.11n – HT-40**
Maximum Conducted Power

Center Frequency (MHz)	Average Power (dBm)			Limit	Margin
	Port A	Port B	Combined	dBm	dB
5,755	+19.79	+18.98	+22.41	+30.00	-9.59
5,785	+19.81	+19.57	+22.70	+30.00	-9.30
5,815	+18.21	+17.63	+20.94	+30.00	-11.06

Specification

Limits

§15.247 (b) The maximum peak output power of the intentional radiator shall not exceed the following:

§15.247 (b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands: 1.0 watt.

15.247 (b) (4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

15.247 (c) Operation with directional antenna gains greater than 6 dBi.

(1) Fixed point-to-point operation:

(i) Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

(ii) Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.

§15.31 (e) For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

§ RSS-210 A8.4(4) For systems employing digital modulation techniques operating in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands the maximum peak conducted power shall not exceed 1 watt.

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, 0287, 0252, 0313, 0314, 0070, 0116, 0117

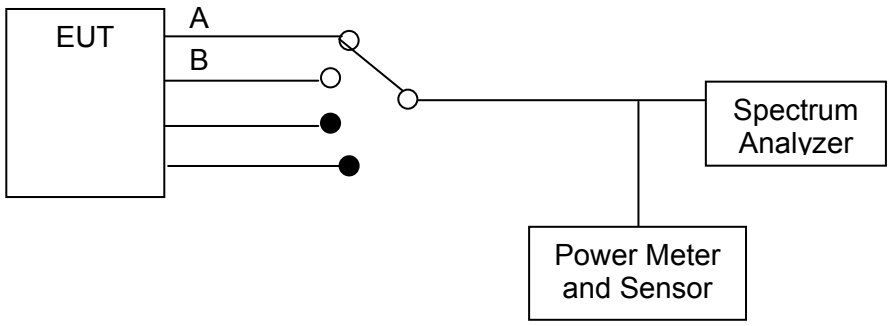
5.1.3. Peak Power Spectral Density

FCC, Part 15 Subpart C §15.247(e)
Industry Canada RSS-210 §A8.2

Test Procedure

The transmitter output was connected to a spectrum analyzer and the maximum level in a 3 kHz bandwidth was measured. A peak value was found over the full emission bandwidth and the frequency span reduced to obtain enhanced resolution. Sweep time ≥ span / 3 kHz with video averaging turned off. The Peak Power Spectral Density is the highest level found across the emission in a 3 kHz 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

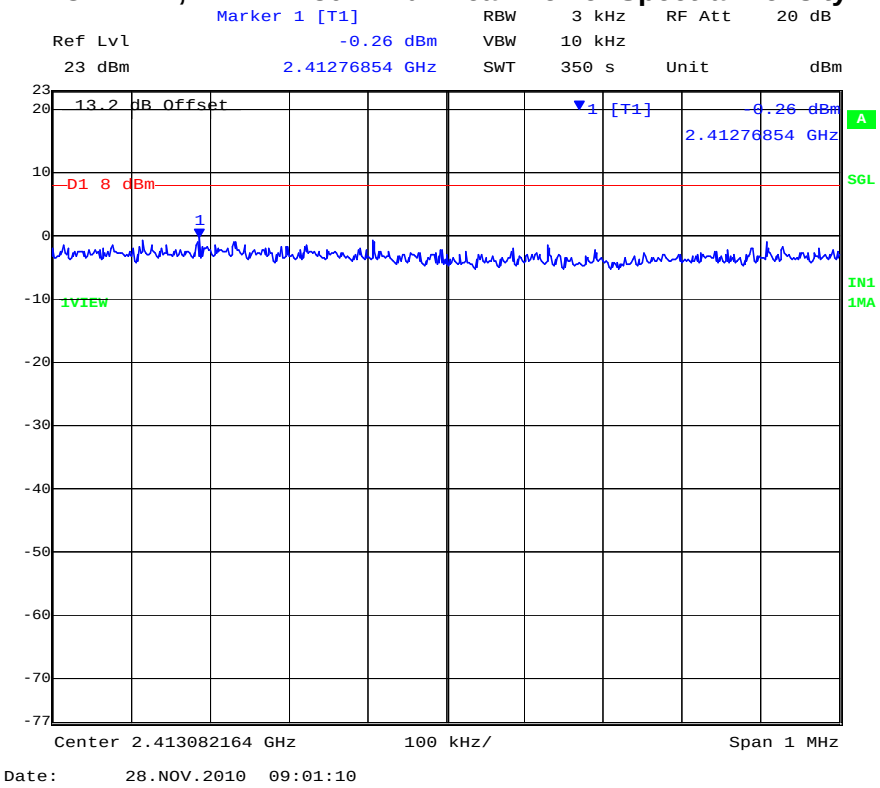
Radio Parameters
Duty Cycle: 100%
Output: Modulated Carrier
Power: Maximum Default Power

Peak Power Spectral Density

TABLE OF RESULTS – **802.11b**

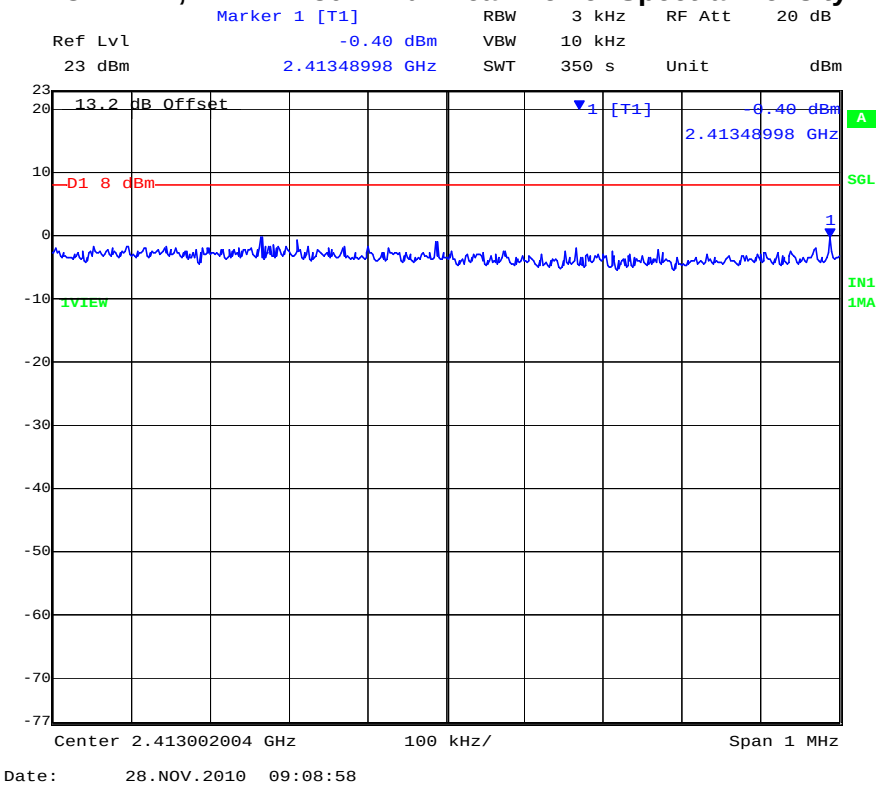
Center Frequency (MHz)	PPSD (dBm)		Limit (dBm)
	PORT A	PORT B	
2,412	-0.26	-0.40	+8
2,437	-0.44	-0.16	+8
2,462	+0.58	+0.03	+8

PORT A 2,412 MHz 802.11b - Peak Power Spectral Density



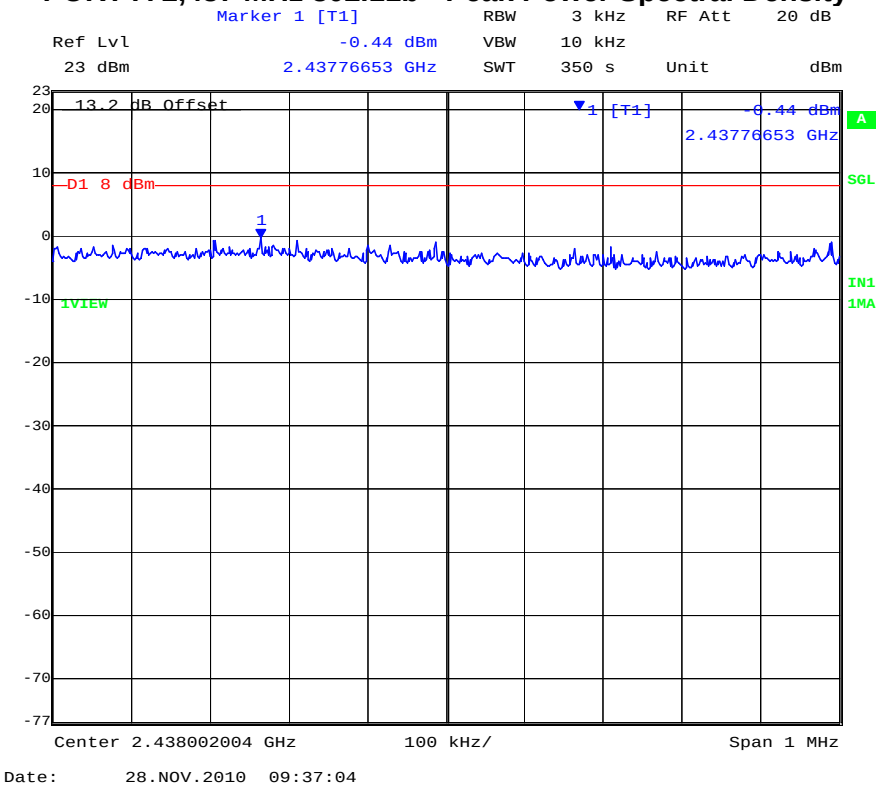
Date: 28.NOV.2010 09:01:10

PORT B 2,412 MHz 802.11b - Peak Power Spectral Density



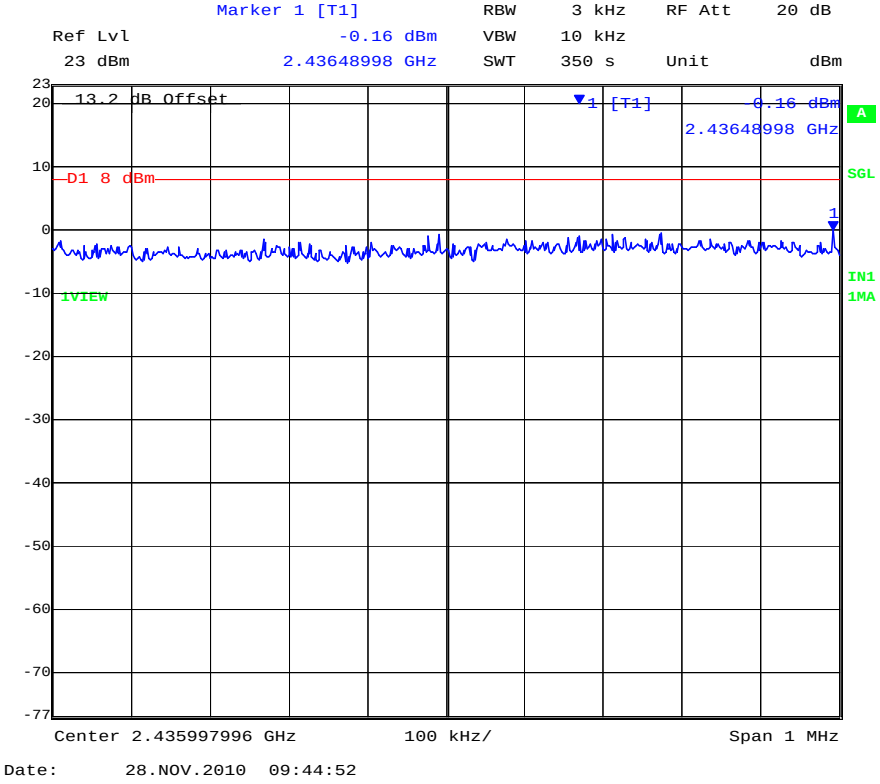
Date: 28.NOV.2010 09:08:58

PORT A 2,437 MHz 802.11b - Peak Power Spectral Density



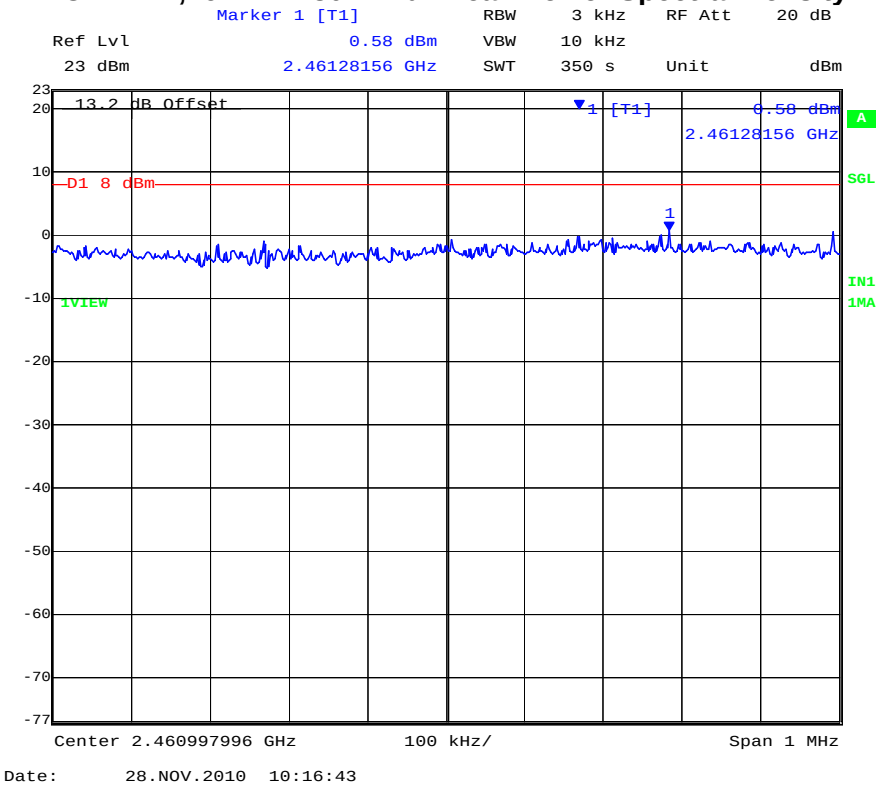
Date: 28.NOV.2010 09:37:04

PORT B 2,437 MHz 802.11b - Peak Power Spectral Density



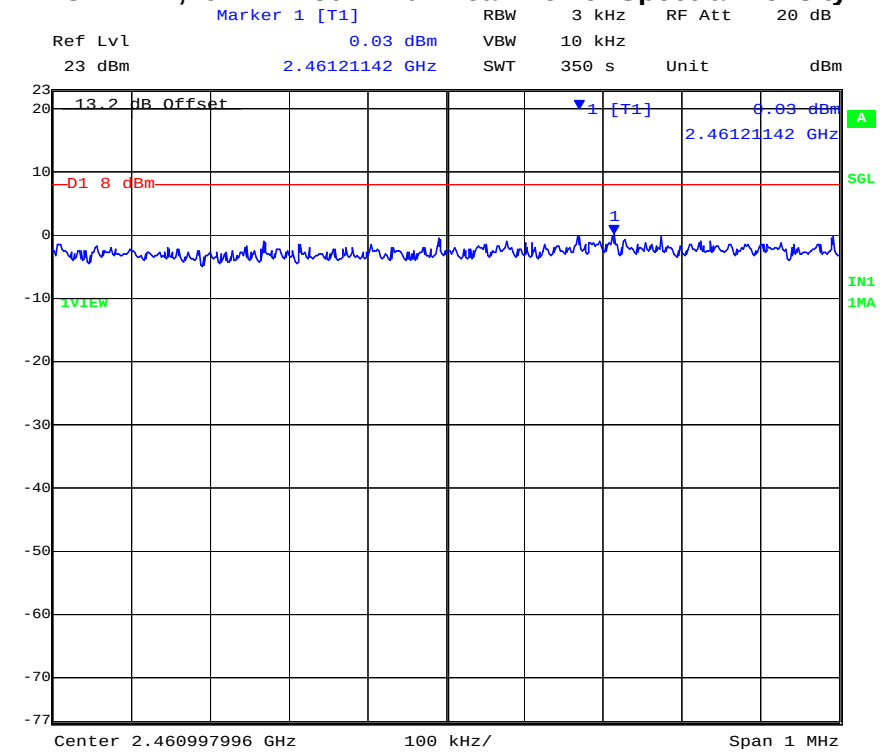
Date: 28.NOV.2010 09:44:52

PORT A 2,462 MHz 802.11b - Peak Power Spectral Density



Date: 28.NOV.2010 10:16:43

PORT B 2,462 MHz 802.11b - Peak Power Spectral Density



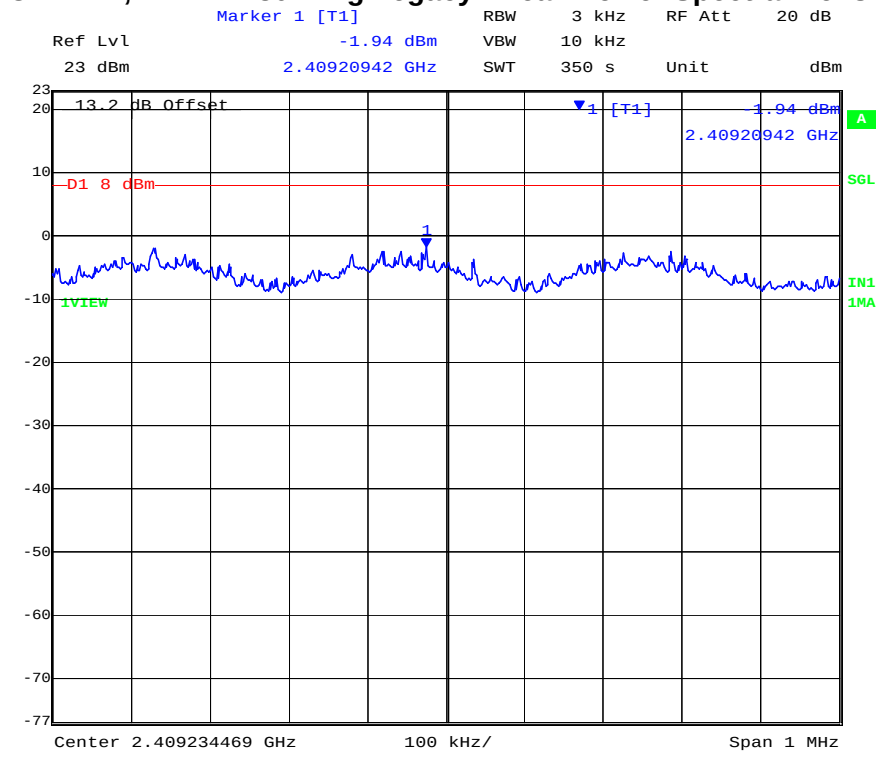
Date: 28.NOV.2010 10:24:31

Peak Power Spectral Density

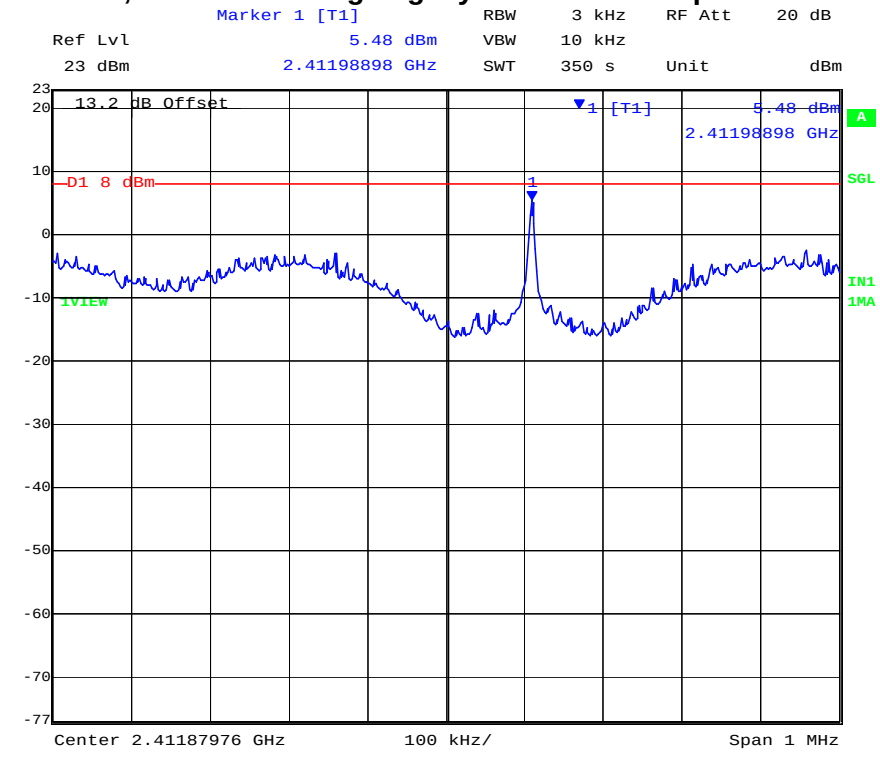
TABLE OF RESULTS – **802.11g Legacy**

Center Frequency (MHz)	PPSD (dBm)		Limit (dBm)
	PORT A	PORT B	
2,412	-1.94	5.48	+8
2,437	-1.82	-1.10	+8
2,462	-0.93	-0.73	+8

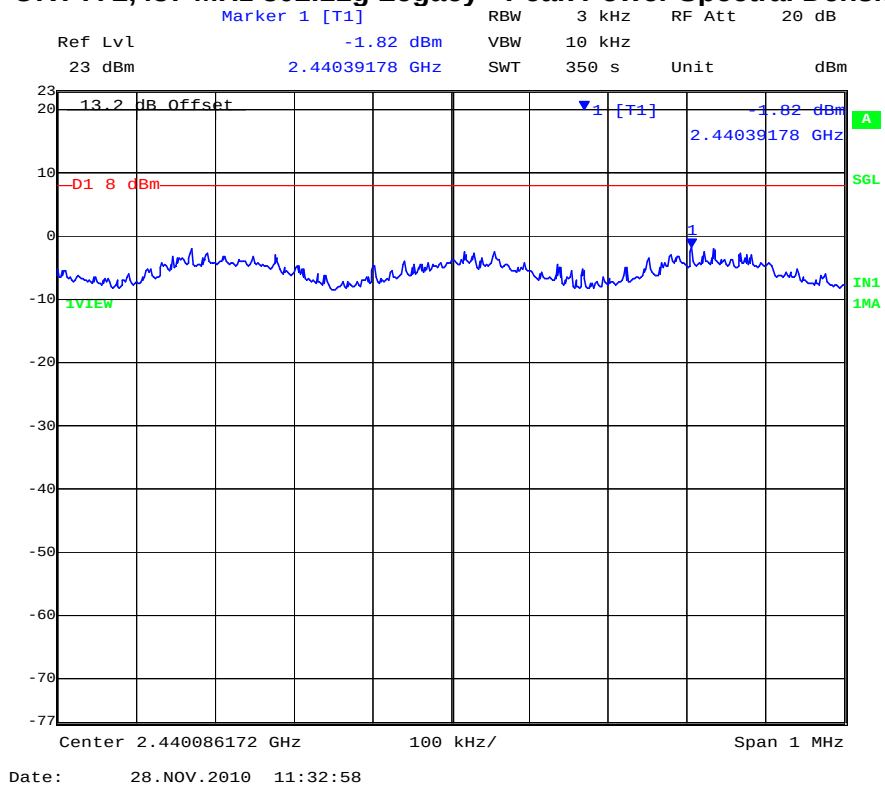
PORT A 2,412 MHz 802.11g Legacy - Peak Power Spectral Density



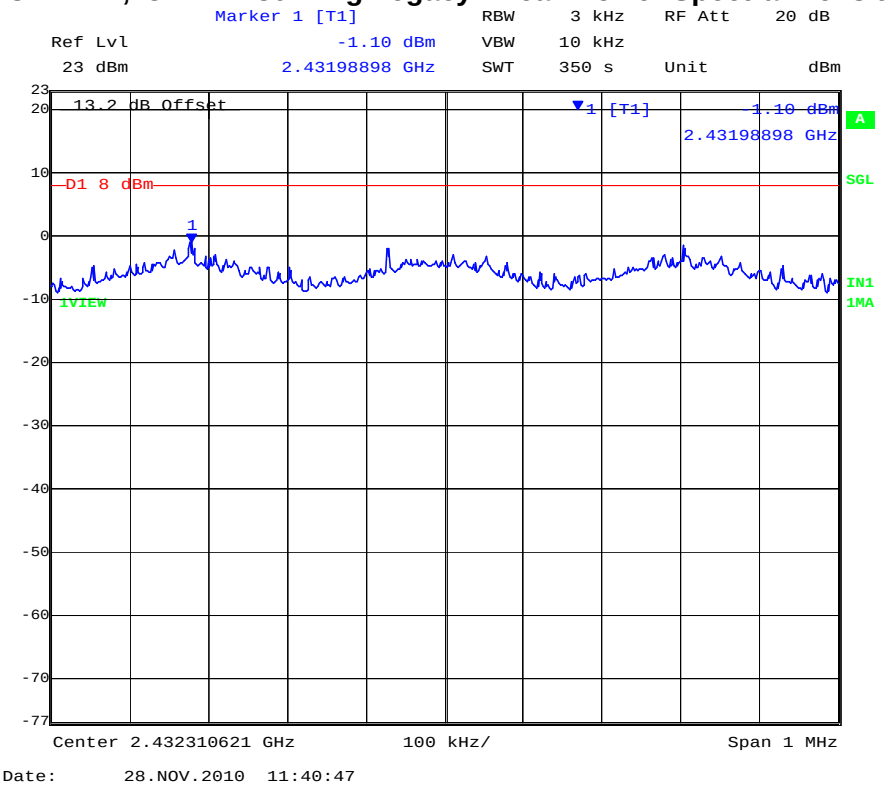
PORT B 2,412 MHz 802.11g Legacy - Peak Power Spectral Density



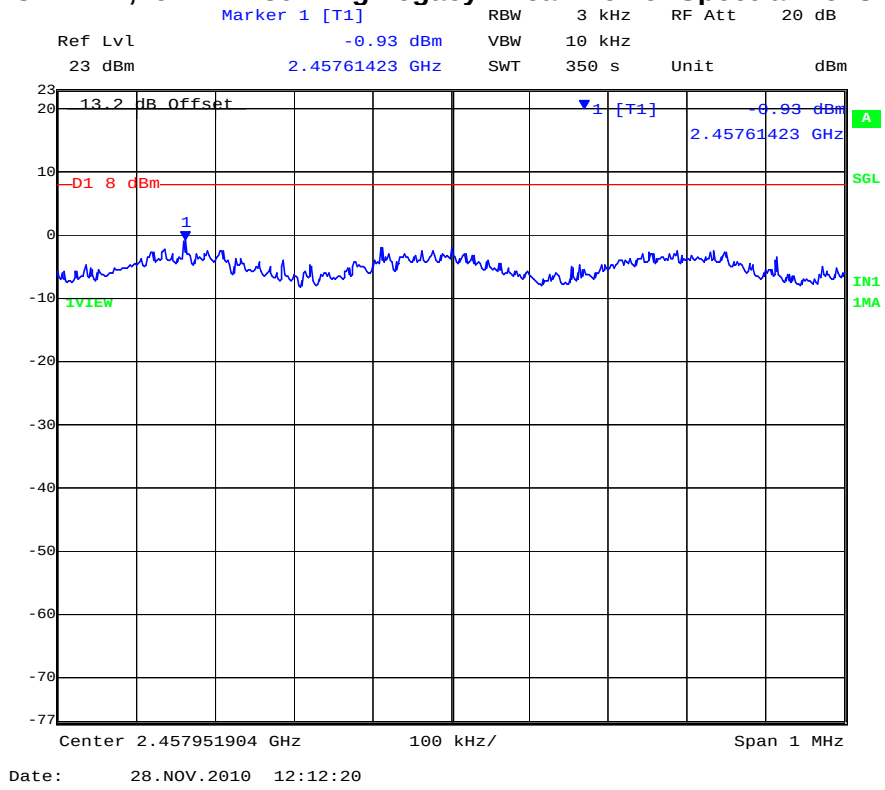
PORT A 2,437 MHz 802.11g Legacy - Peak Power Spectral Density



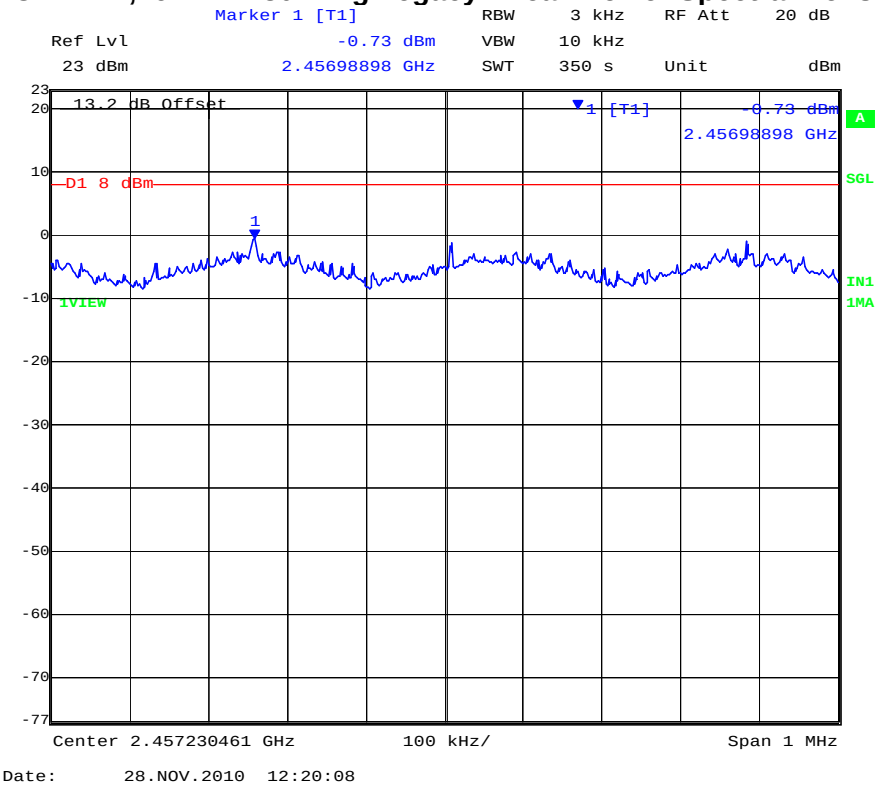
PORT B 2,437 MHz 802.11g Legacy - Peak Power Spectral Density



PORT A 2,462 MHz 802.11g Legacy - Peak Power Spectral Density



PORT B 2,462 MHz 802.11g Legacy - Peak Power Spectral Density

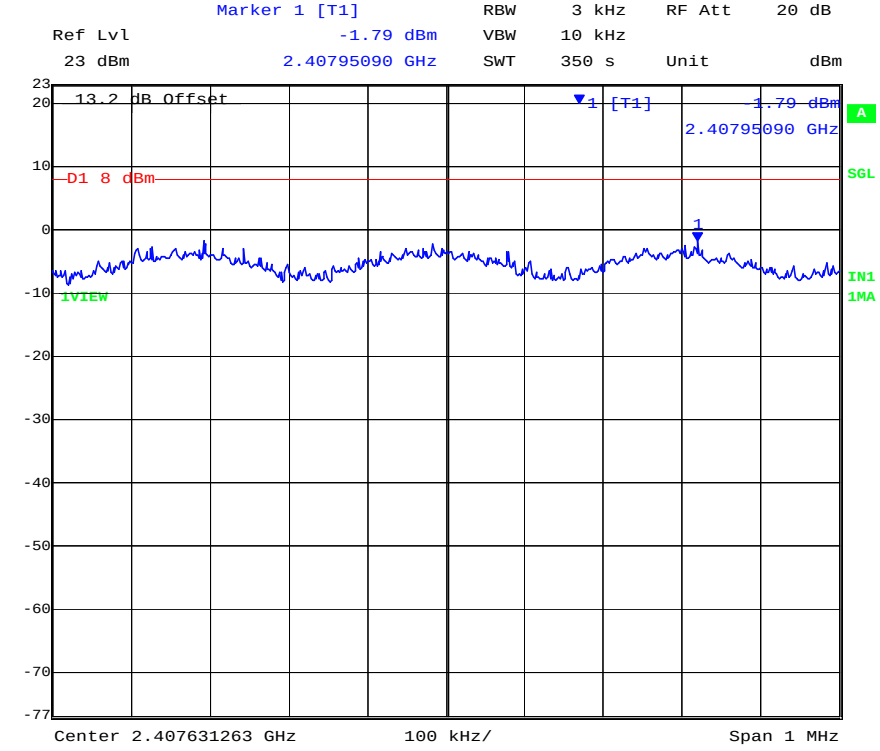


Peak Power Spectral Density

TABLE OF RESULTS – **802.11N HT-20**

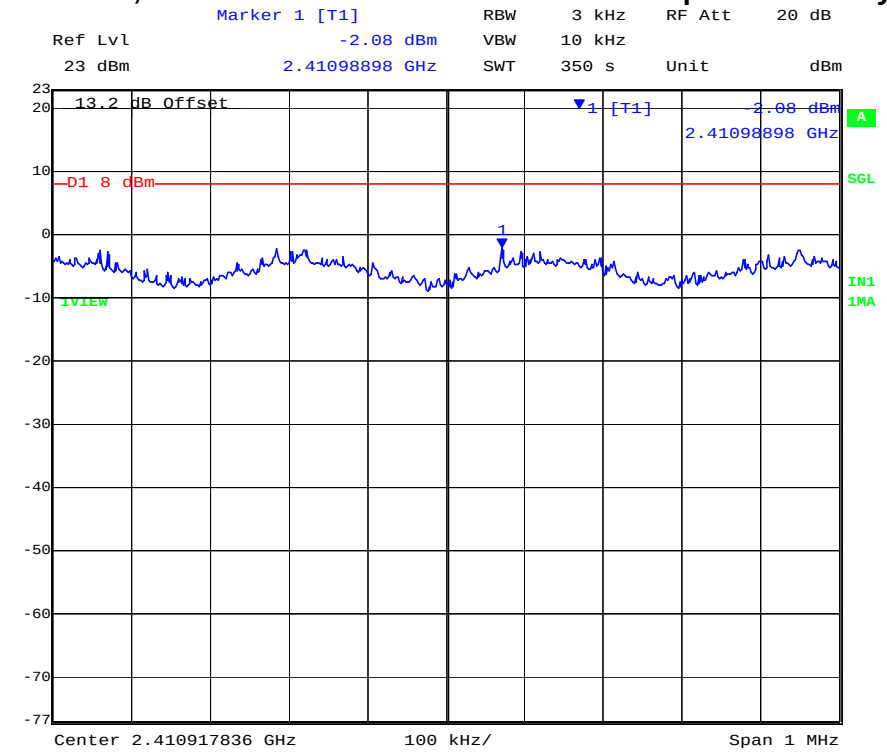
Center Frequency (MHz)	PPSD (dBm)		Limit (dBm)
	PORT A	PORT B	
2,412	-1.79	-2.08	+8
2,437	-1.66	-2.03	+8
2,462	-2.05	-2.61	+8

PORT A 2,412 MHz 802.11n HT-20 - Peak Power Spectral Density



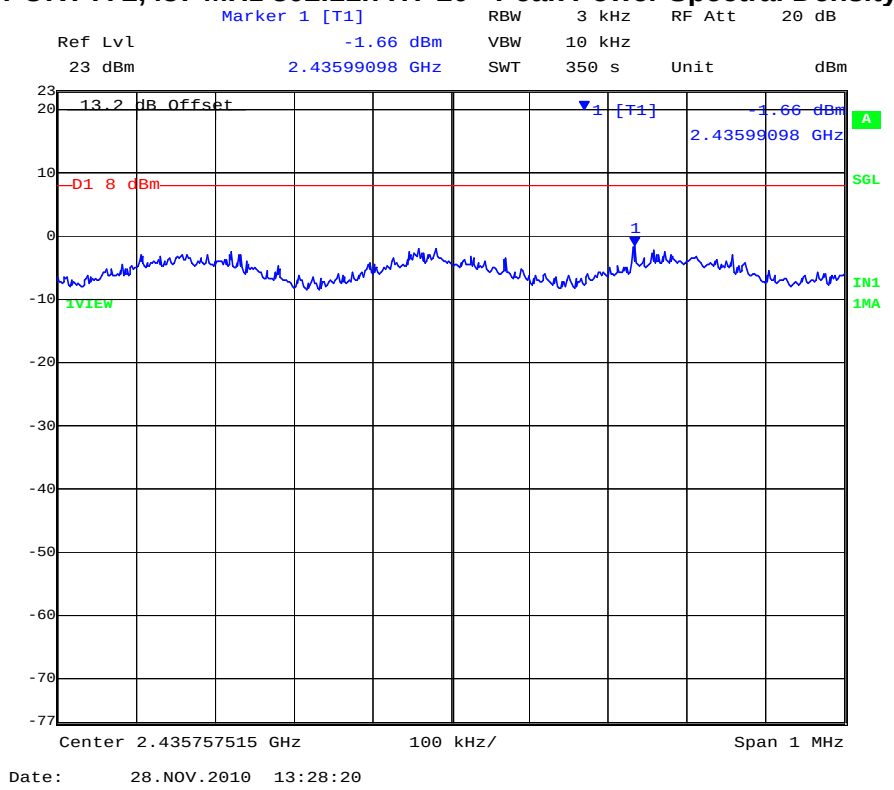
Date: 28.NOV.2010 12:52:37

PORT B 2,412 MHz 802.11n HT-20 - Peak Power Spectral Density



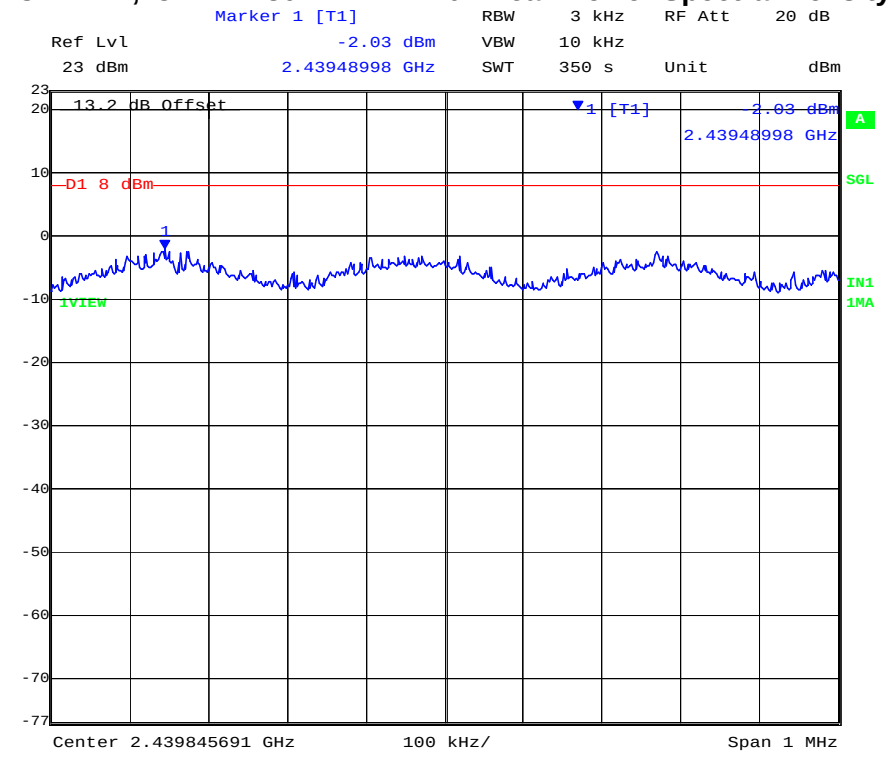
Date: 28.NOV.2010 13:00:24

PORT A 2,437 MHz 802.11n HT-20 - Peak Power Spectral Density



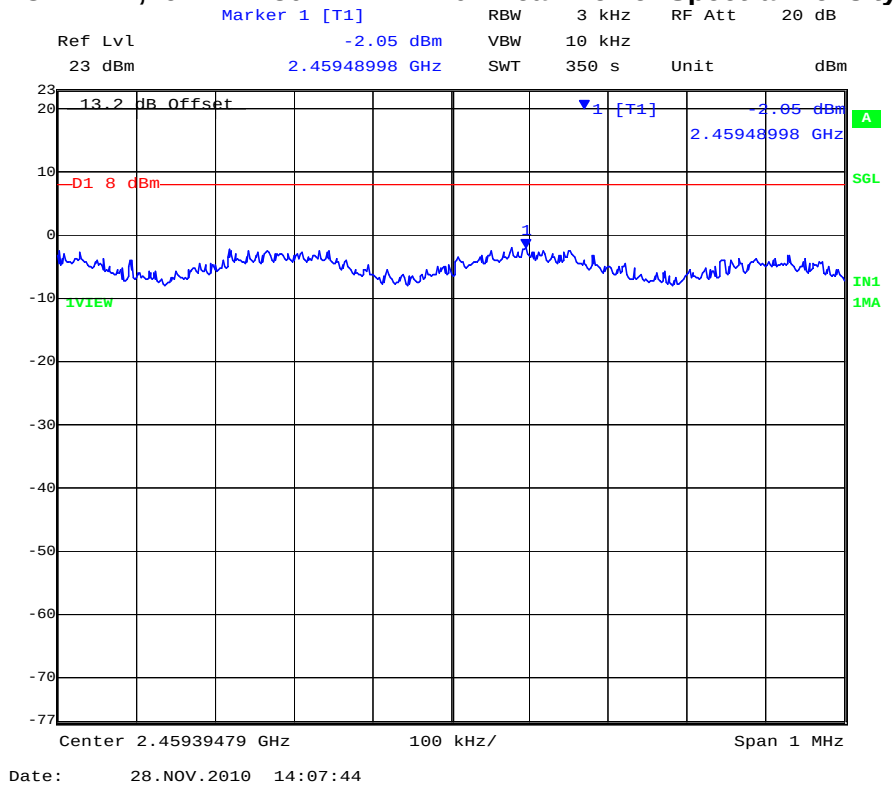
Date: 28.NOV.2010 13:28:20

PORT B 2,437 MHz 802.11n HT-20 - Peak Power Spectral Density



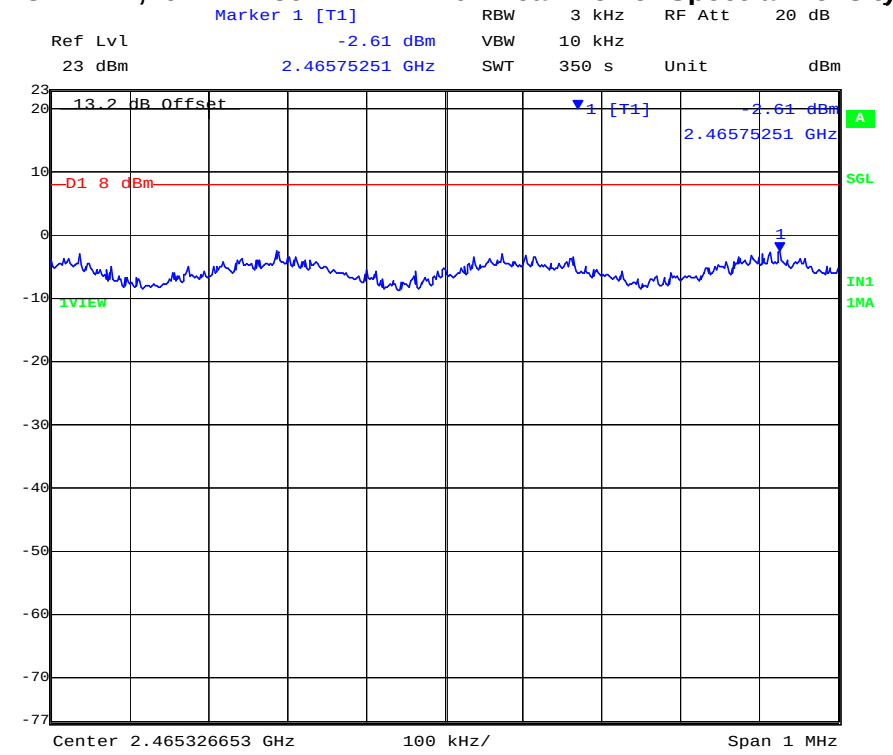
Date: 28.NOV.2010 13:36:08

PORT A 2,462 MHz 802.11n HT-20 - Peak Power Spectral Density



Date: 28.NOV.2010 14:07:44

PORT B 2,462 MHz 802.11n HT-20 - Peak Power Spectral Density



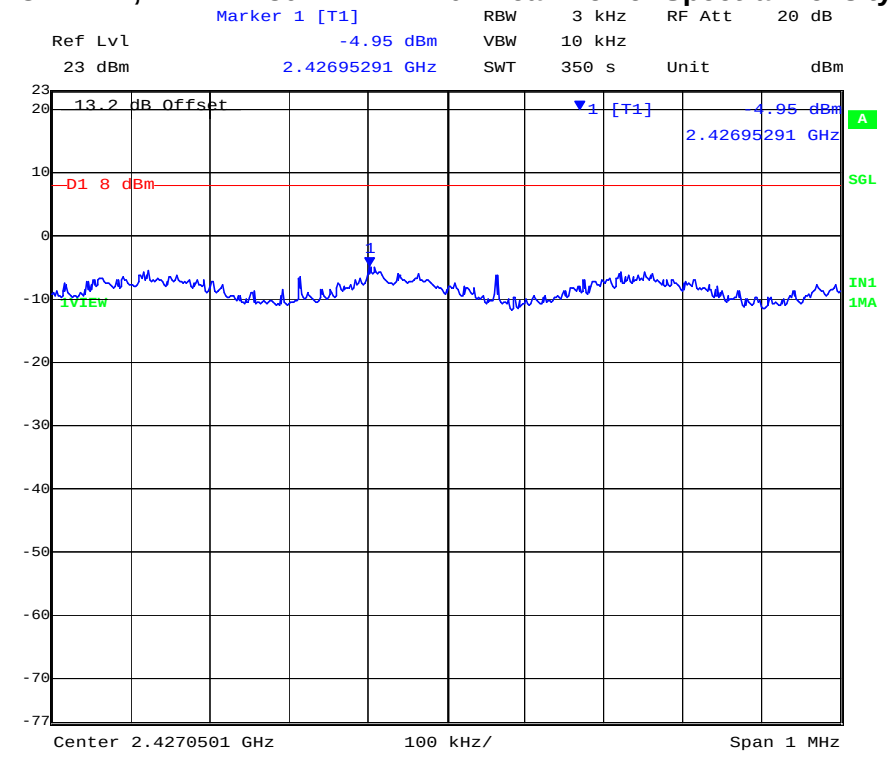
Date: 28.NOV.2010 14:15:34

Peak Power Spectral Density

TABLE OF RESULTS – **802.11N HT-40**

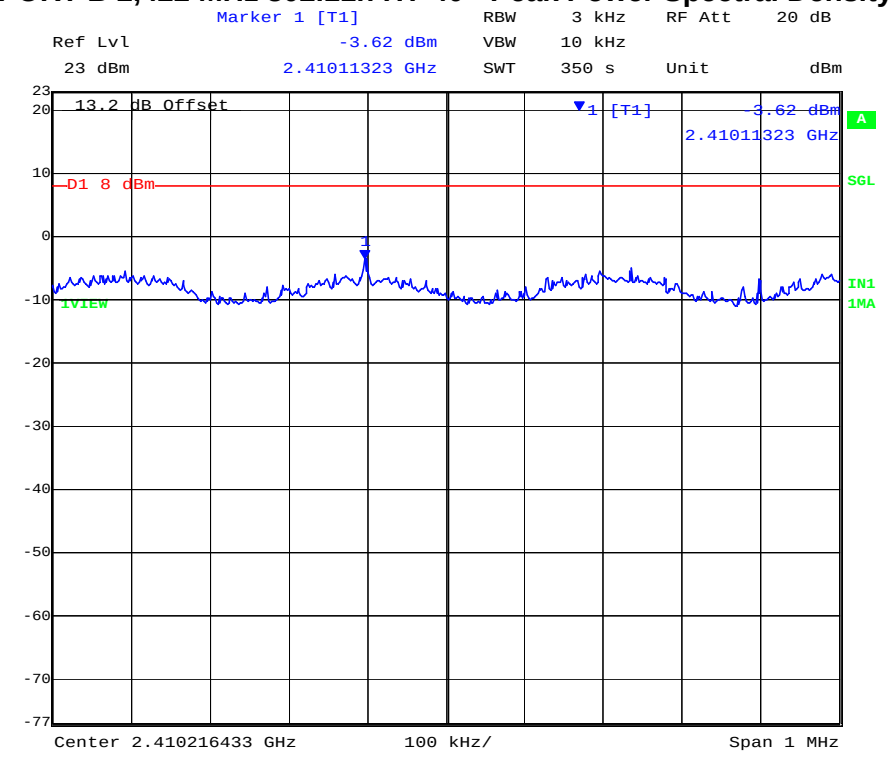
Center Frequency (MHz)	PPSD (dBm)		Limit (dBm)
	PORT A	PORT B	
2,422	-4.95	-3.62	+8
2,437	-3.12	-3.79	+8
2,452	-2.22	-2.68	+8

PORT A 2,422 MHz 802.11n HT-40 - Peak Power Spectral Density



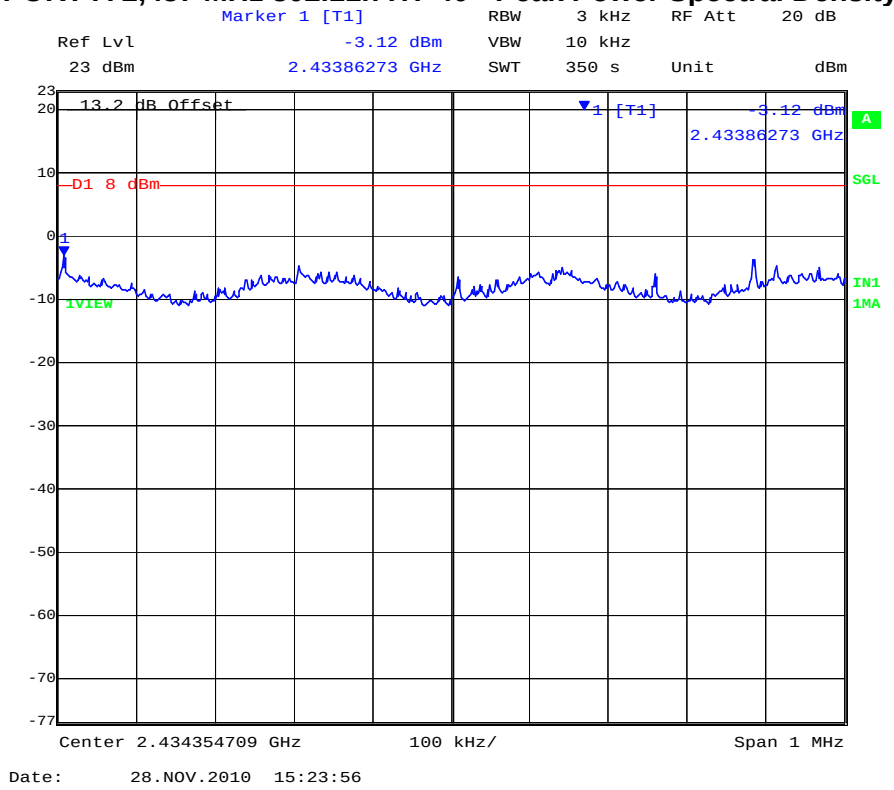
Date: 28.NOV.2010 14:48:12

PORT B 2,422 MHz 802.11n HT-40 - Peak Power Spectral Density



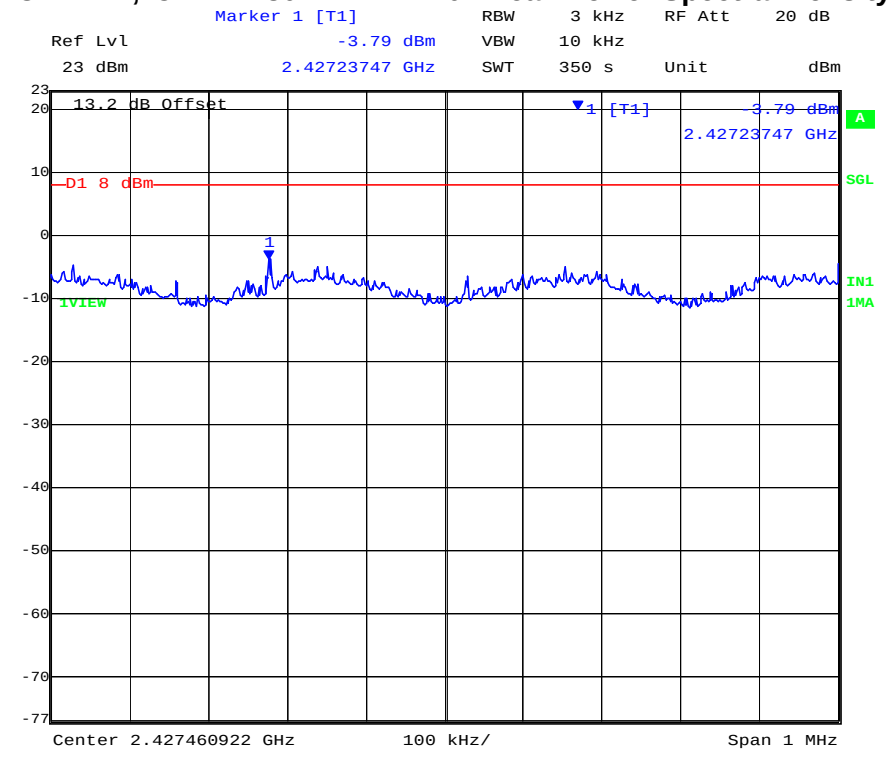
Date: 28.NOV.2010 14:55:59

PORT A 2,437 MHz 802.11n HT-40 - Peak Power Spectral Density



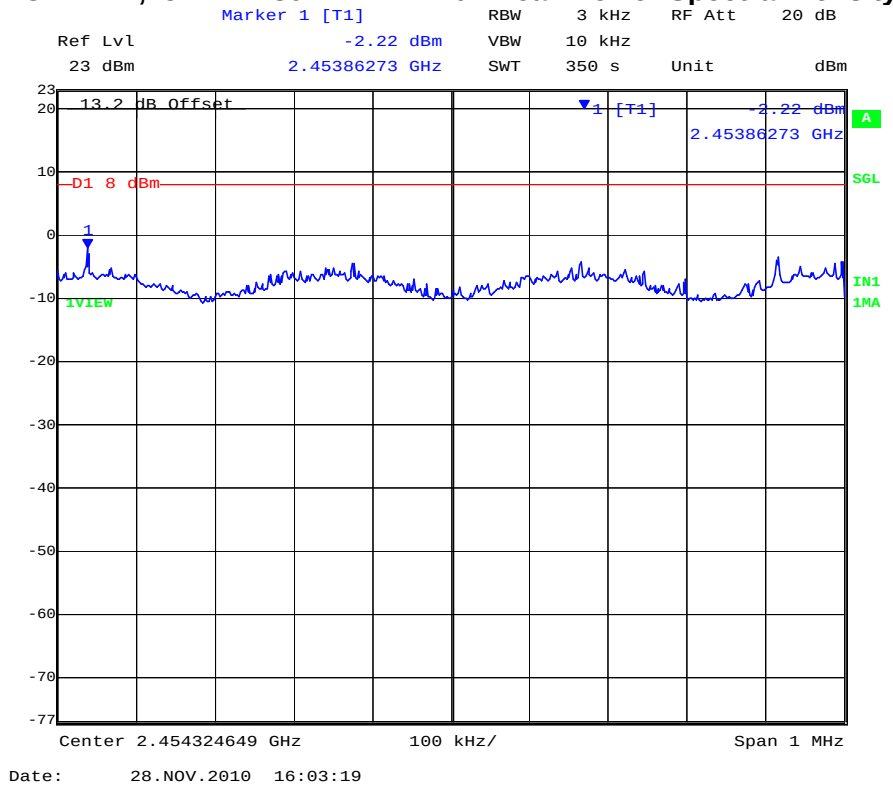
Date: 28.NOV.2010 15:23:56

PORT B 2,437 MHz 802.11n HT-40 - Peak Power Spectral Density



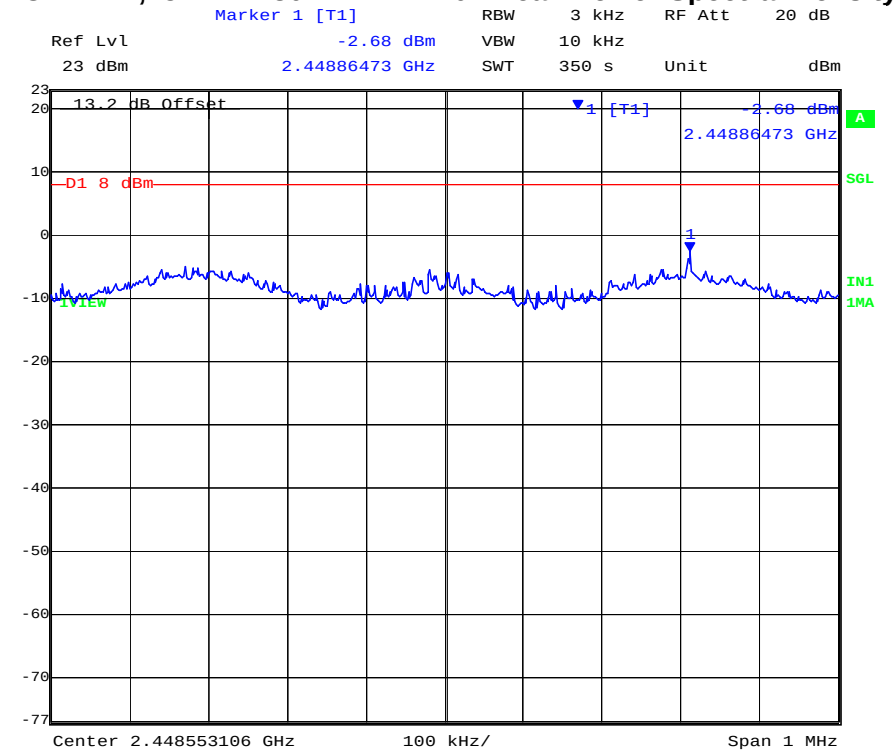
Date: 28.NOV.2010 15:31:44

PORT A 2,452 MHz 802.11n HT-40 - Peak Power Spectral Density



Date: 28.NOV.2010 16:03:19

PORT B 2,452 MHz 802.11n HT-40 - Peak Power Spectral Density

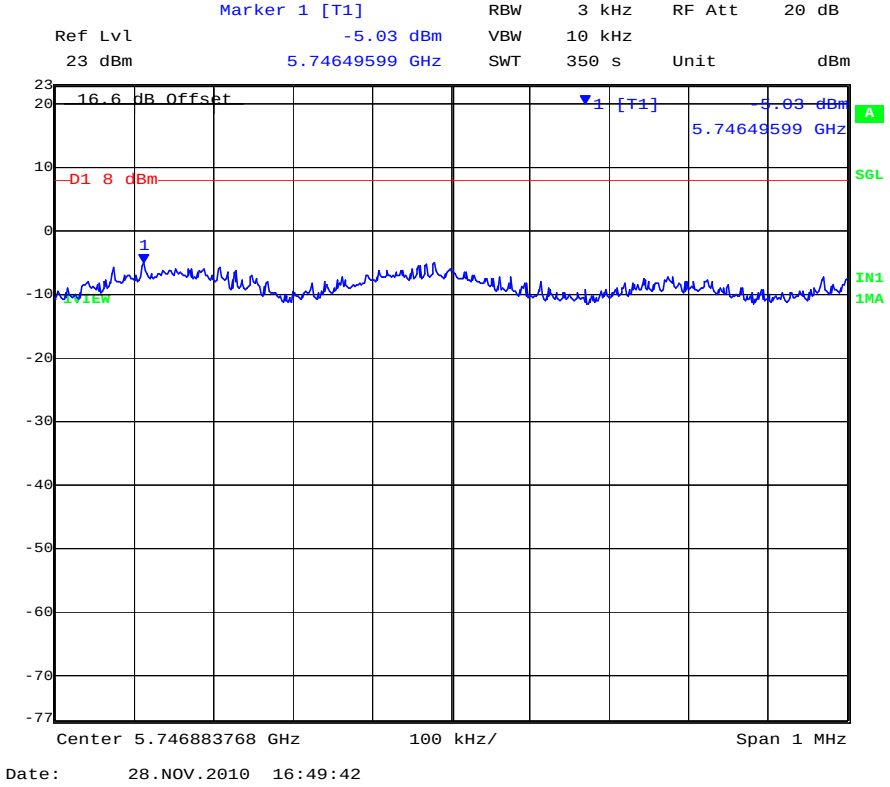


Date: 28.NOV.2010 16:11:09

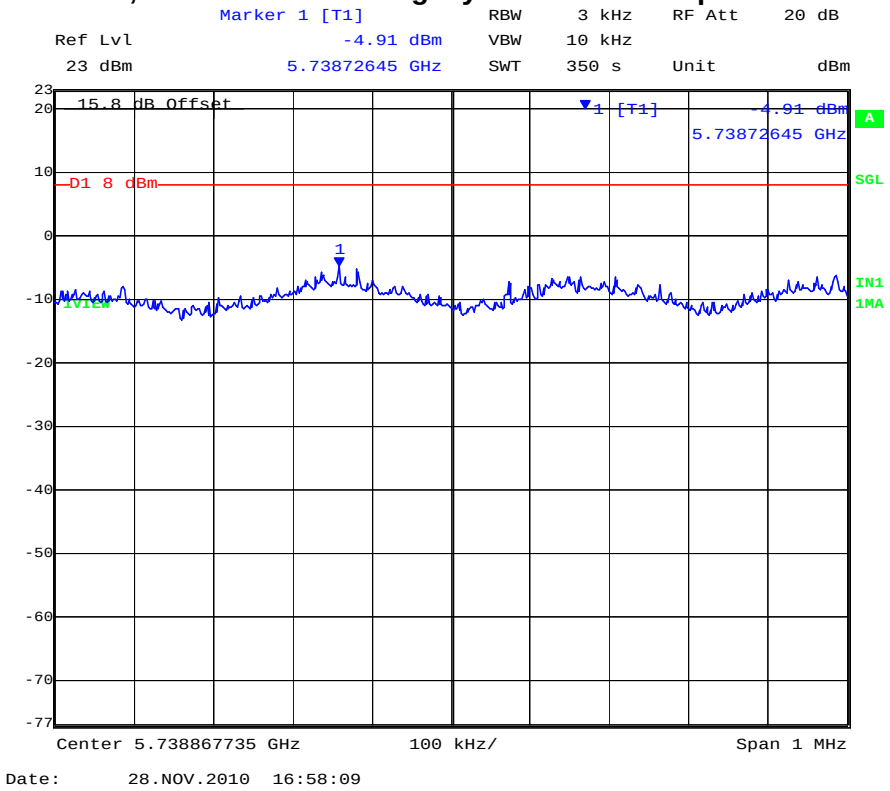
TABLE OF RESULTS – **802.11a Legacy**

Center Frequency (MHz)	PPSD (dBm)		Limit (dBm)
	PORT A	PORT B	
5,745	-5.03	-4.91	+8
5,785	-4.04	-5.05	+8
5,825	-4.32	-3.47	+8

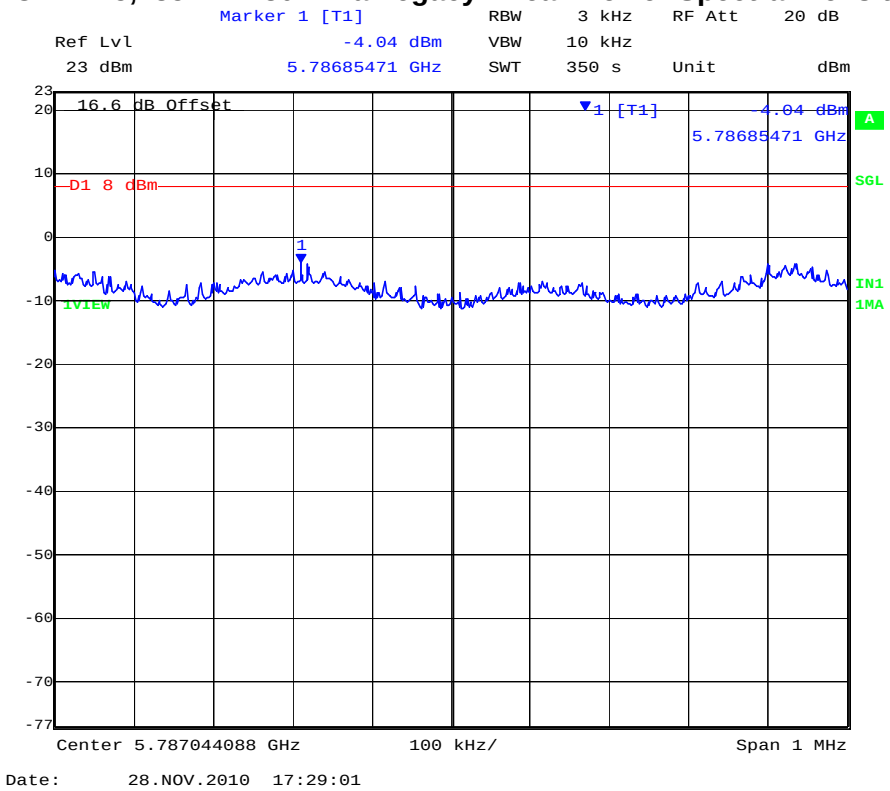
PORT A 5,745 MHz 802.11a Legacy - Peak Power Spectral Density



PORT B 5,745 MHz 802.11a Legacy - Peak Power Spectral Density

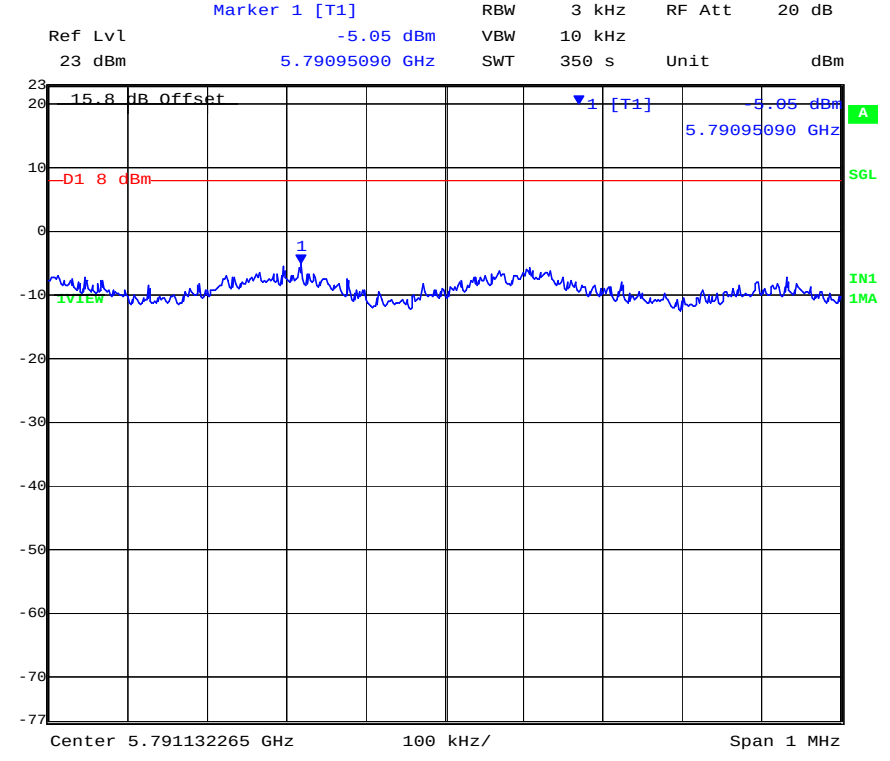


PORT A 5,785 MHz 802.11a Legacy - Peak Power Spectral Density



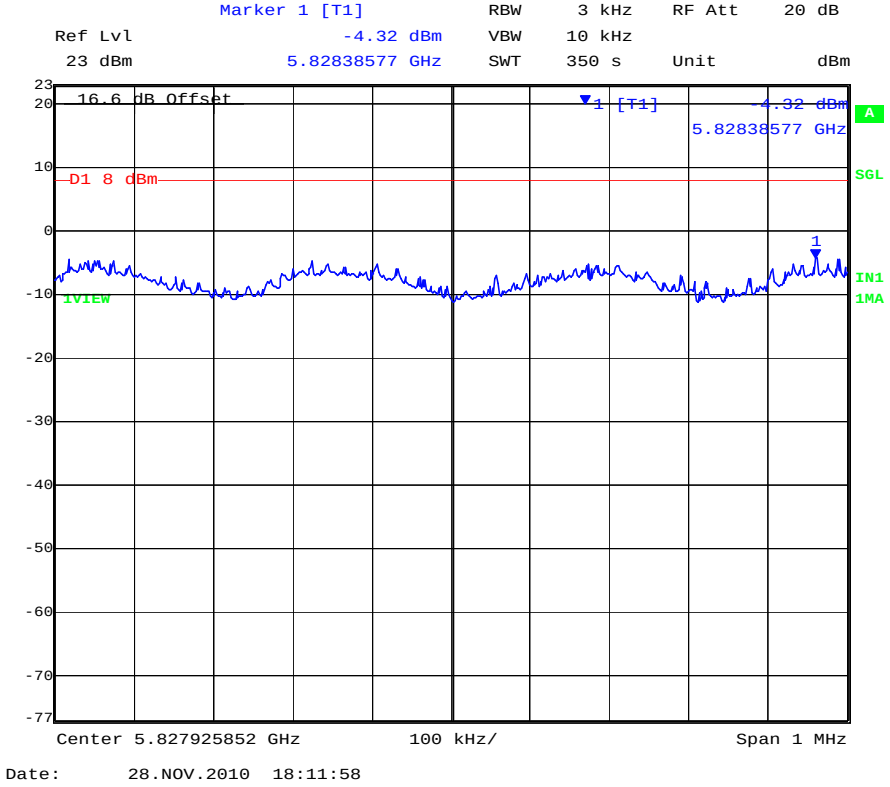
Date: 28.NOV.2010 17:29:01

PORT B 5,785 MHz 802.11a Legacy - Peak Power Spectral Density



Date: 28.NOV.2010 17:37:29

PORT A 5,825 MHz 802.11a Legacy - Peak Power Spectral Density



PORT B 5,825 MHz 802.11a Legacy - Peak Power Spectral Density

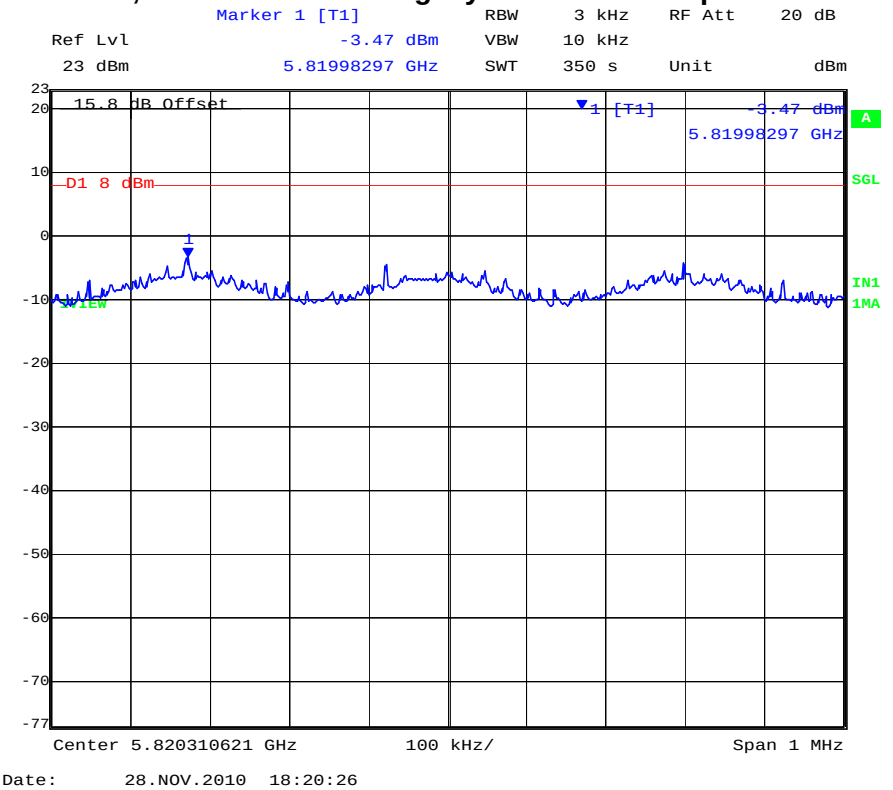
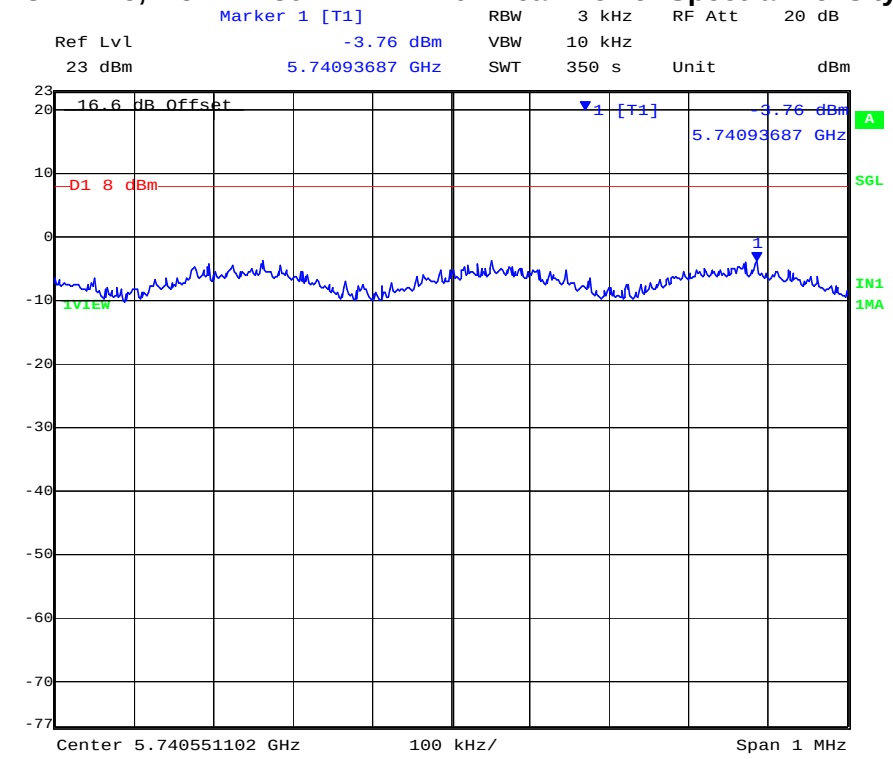


TABLE OF RESULTS – **802.11N HT-20**

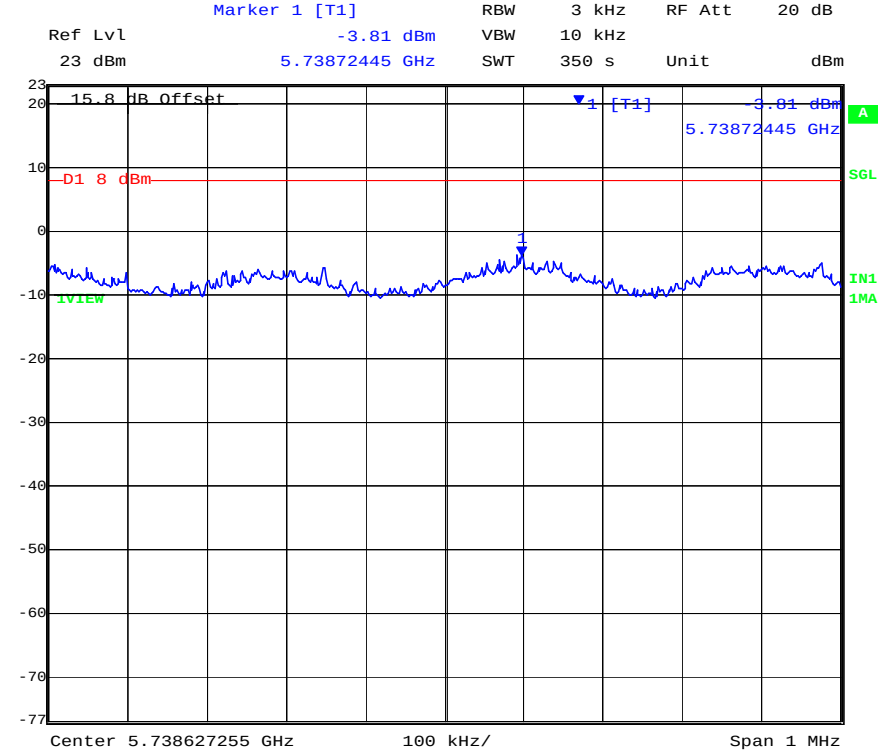
Center Frequency (MHz)	PPSD (dBm)		Limit (dBm)
	PORT A	PORT B	
5,745	-3.76	-3.81	+8
5,785	-3.48	-4.64	+8
5,825	-4.33	-4.96	+8

PORT A 5,745 MHz 802.11n HT-20 - Peak Power Spectral Density



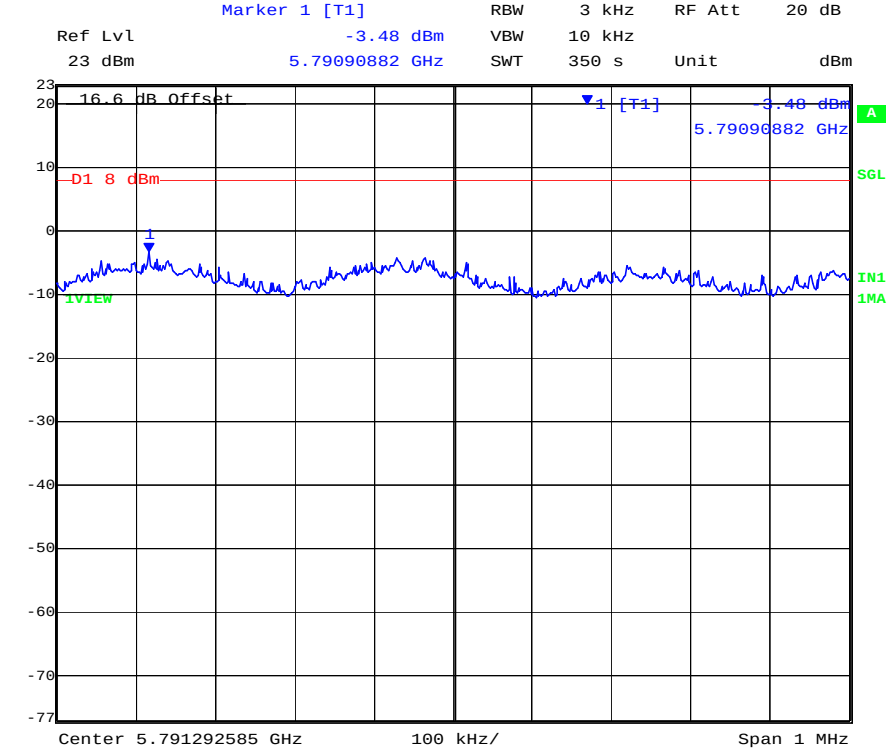
Date: 29.NOV.2010 09:24:20

PORT B 5,745 MHz 802.11n HT-20 - Peak Power Spectral Density



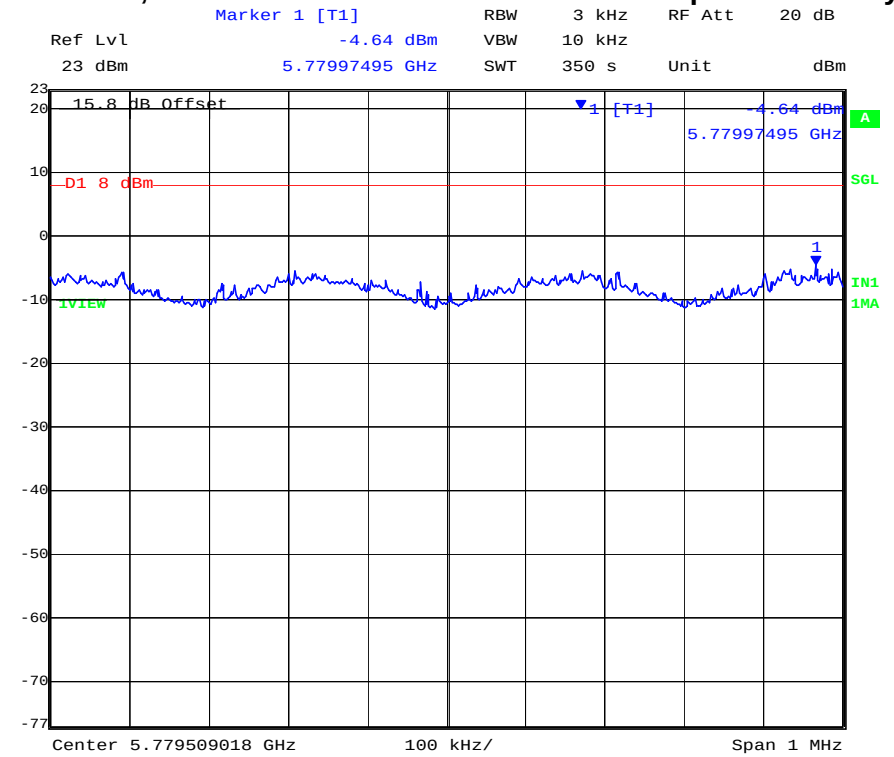
Date: 29.NOV.2010 09:32:49

PORT A 5,785 MHz 802.11n HT-20 - Peak Power Spectral Density



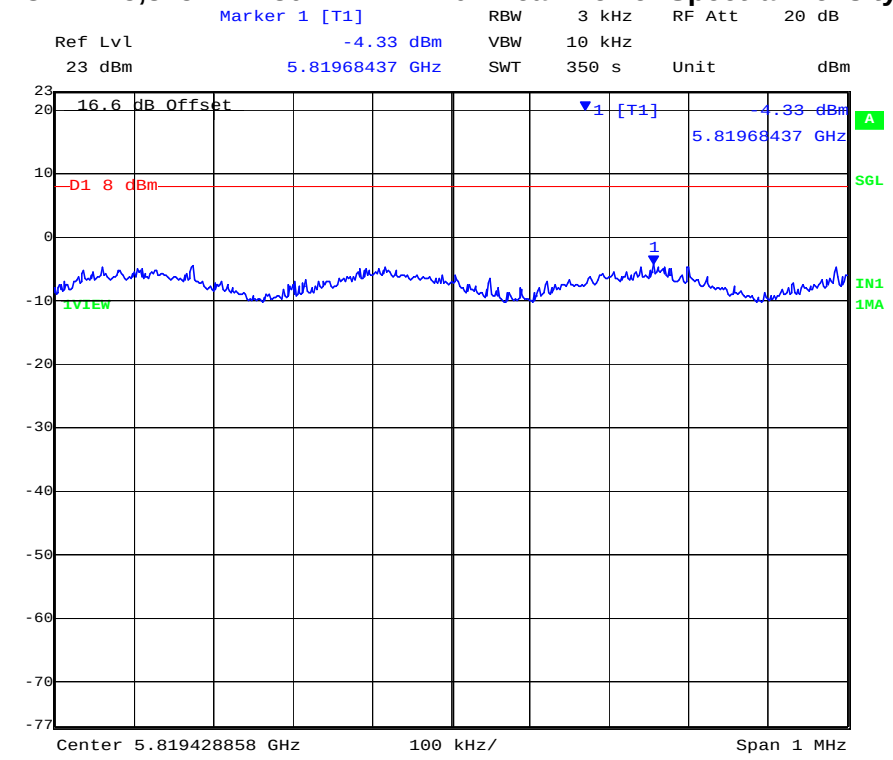
Date: 29.NOV.2010 10:03:52

PORT B 5,785 MHz 802.11n HT-20 - Peak Power Spectral Density



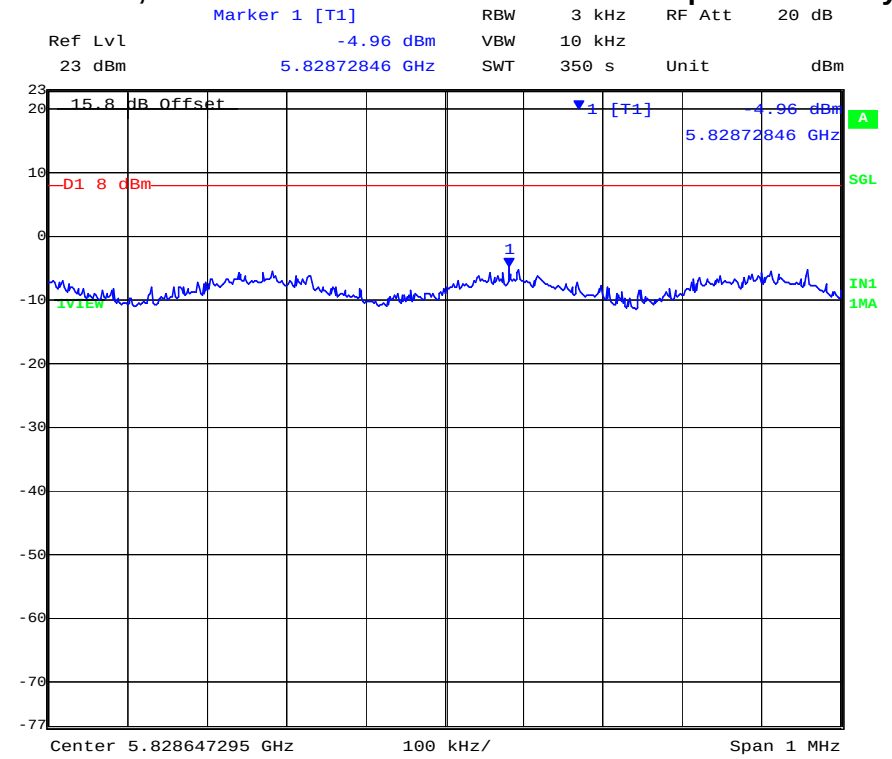
Date: 29.NOV.2010 10:12:21

PORT A 5,825 MHz 802.11n HT-20 - Peak Power Spectral Density



Date: 29.NOV.2010 10:47:04

PORT B 5,825 MHz 802.11n HT-20 - Peak Power Spectral Density

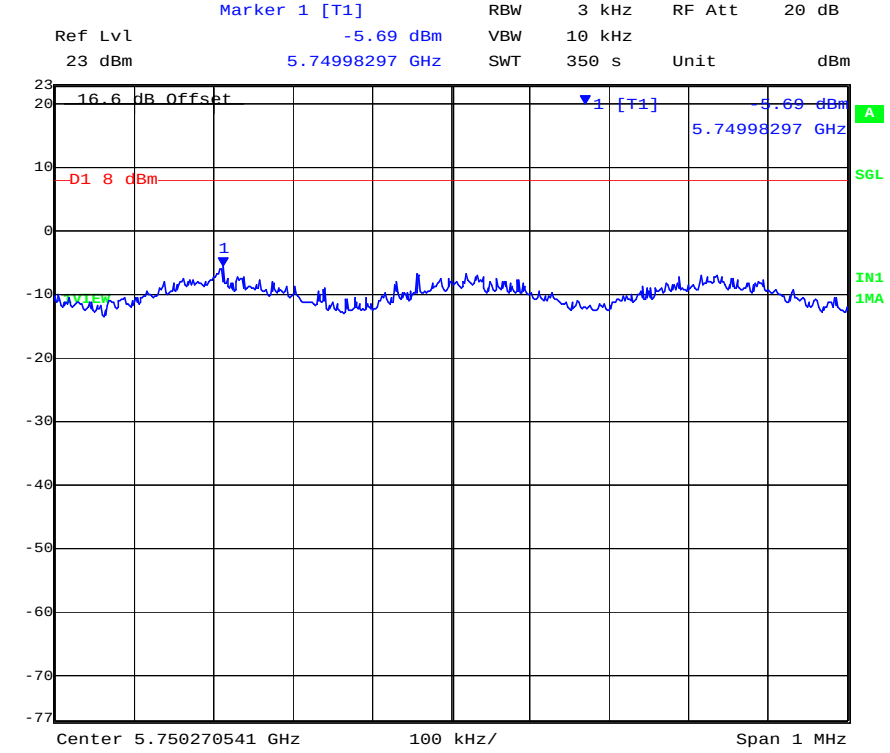


Date: 29.NOV.2010 10:55:34

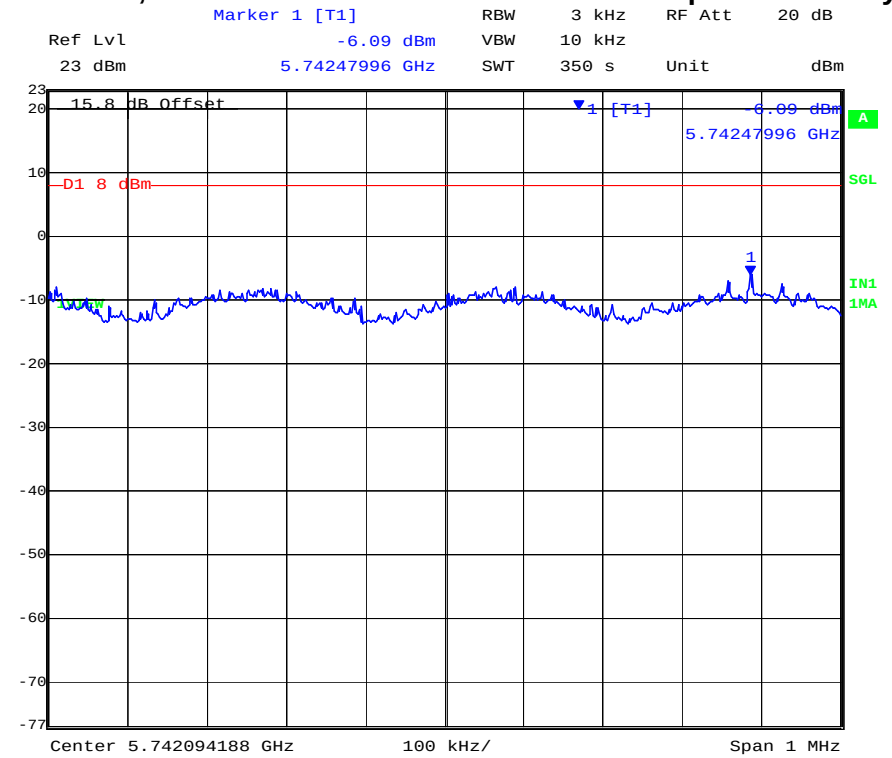
TABLE OF RESULTS – **802.11N HT-40**

Center Frequency (MHz)	PPSD (dBm)		Limit (dBm)
	PORT A	PORT B	
5,755	-5.69	-6.09	+8
5,785	-6.89	-5.91	+8
5,815	-6.71	-7.80	+8

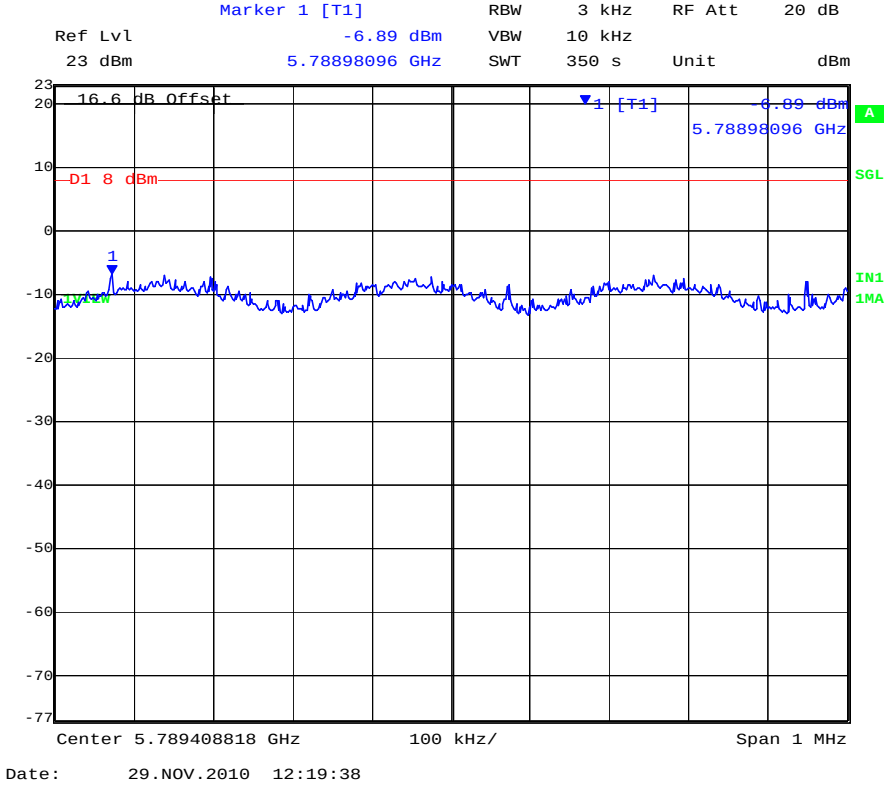
PORT A 5,755 MHz 802.11n HT-40 - Peak Power Spectral Density



PORT B 5,755 MHz 802.11n HT-40 - Peak Power Spectral Density

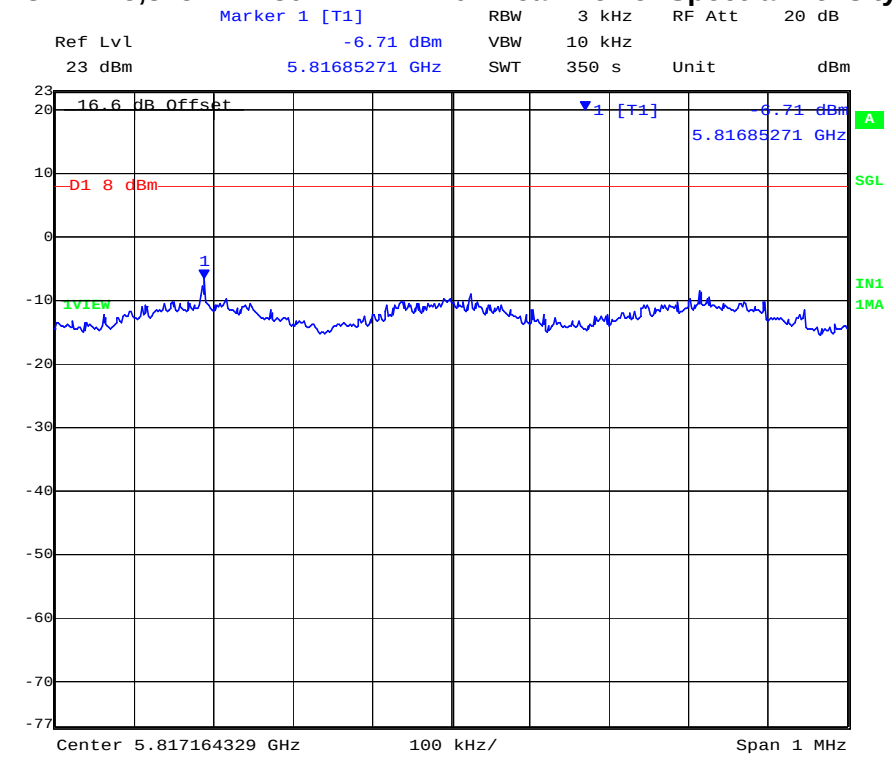


PORT A 5,785 MHz 802.11n HT-40 - Peak Power Spectral Density



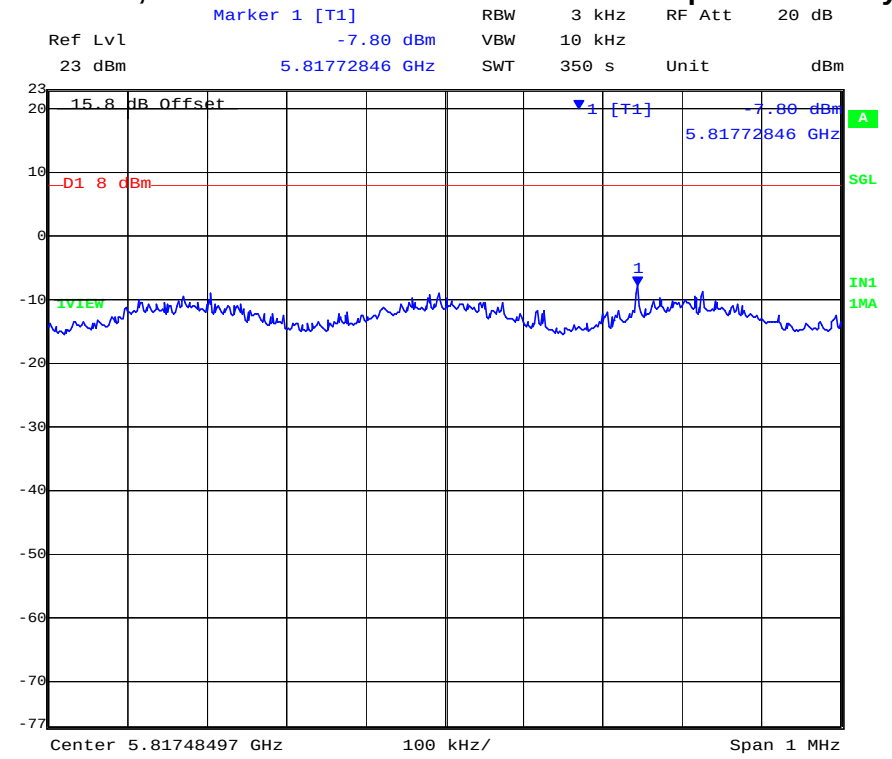
PORT B 5,785 MHz 802.11n HT-40 - Peak Power Spectral Density

PORT A 5,815 MHz 802.11n HT-40 - Peak Power Spectral Density



Date: 29.NOV.2010 13:10:55

PORT B 5,815 MHz 802.11n HT-40 - Peak Power Spectral Density



Date: 29.NOV.2010 13:19:23

Specification
Peak Power Spectral Density Limits

§15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than +8 dBm in any 3 kHz band during any time interval of continuous transmission

RSS-210 §**A8.2(2)** The transmitter power spectral density (into the antenna) shall not be greater than +8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0 second duration.

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, 0287, 0252, 0313, 0314, 0070, 0116, 0117

5.1.4. Maximum Permissible Exposure

FCC, Part 15 Subpart C §15.247(i)
Industry Canada RSS-Gen §5.5

Calculations for Maximum Permissible Exposure Levels

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

EIRP = P * G

P = Peak output power (mW)

G = Antenna numeric gain (numeric)

d = Separation distance (cm)

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

The Aruba MSR4000 has two transmitters operating in each band. The peak power in the table below is calculated by assuming a worst case scenario where the two transmitters are operating simultaneously in the same band. The combined Peak Power (mW) is used for calculation purposes.

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

Freq. Band (GHz)	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)
2.4	8.0	6.3	+25.88	387.3	13.9	20.0*
2.4	15.0	31.6	+21.00	125.9	17.8	20.0*
5.8	14.0	25.1	+16.90	49.0	3.6	20.0*

*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

§15.247(i) Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency levels in excess of the Commission's guidelines.

FCC §1.1310 Limit = 1mW / cm^2 from 1.310 Table 1

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

Laboratory Measurement Uncertainty for Power Measurements

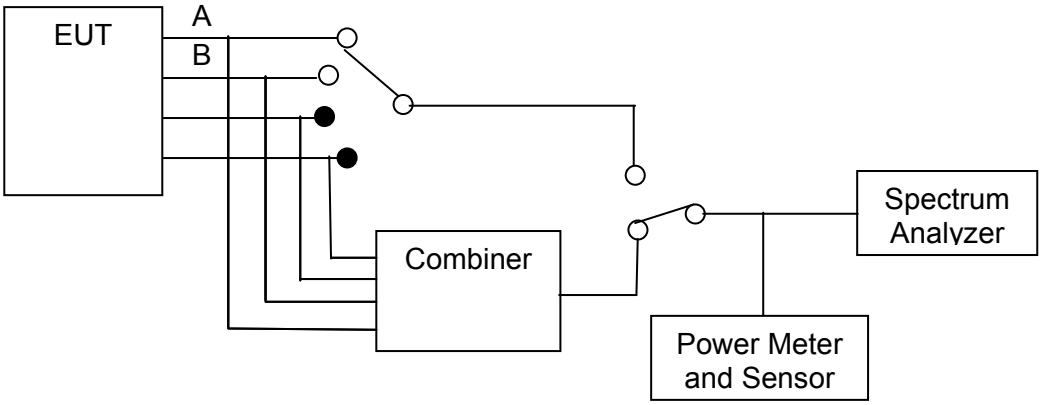
Measurement uncertainty	±1.33 dB

5.1.5. Conducted Spurious Emissions

FCC, Part 15 Subpart C §15.247(d); 15.205; 15.209
Industry Canada RSS-210 §A8.5, §2.2
Industry Canada RSS-Gen 4.7

Test Procedure
Conducted emissions were measured at a limit of 20 dB below the highest in-band spectral density measured with a spectrum analyzer connected to the antenna terminal. Emissions at the band edge were measured and recorded. Measurements were made while EUT was operating in transmit mode of operation at the appropriate center frequency.

Test Measurement Set up



Band-edge measurement test configuration

Measurement Results of Conducted Spurious Emissions

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

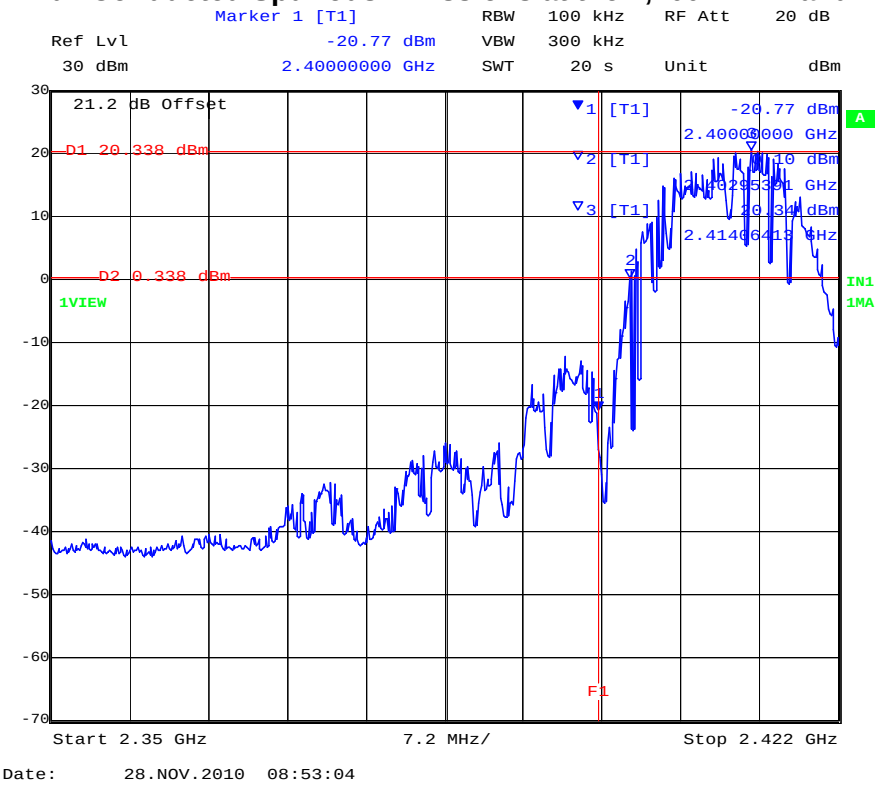
Conducted Band-Edge Results

Measurements were performed with the transmitter tuned to the channel closest to the band-edge being measured. All emissions were maximized during measurement. Limits which were derived from the band-edge measurements provided below are drawn on each plot.

TABLE OF RESULTS – **802.11b – Legacy**

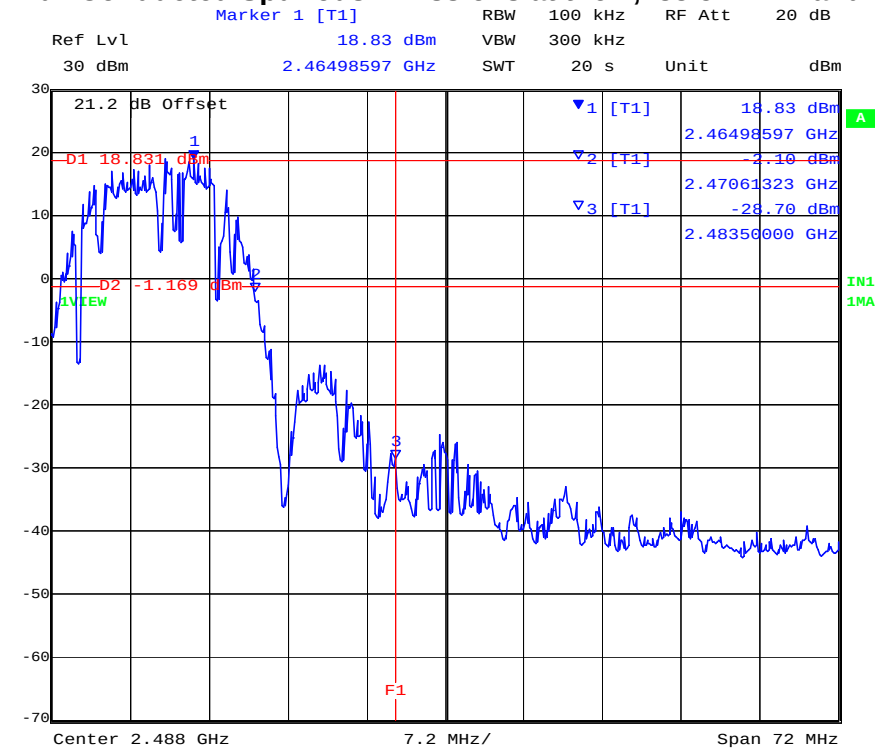
Center Frequency (MHz)	Band edge Frequency (MHz)	Limit (20 dB below peak of fundamental)	Amplitude @ Band edge (dBm)	Margin (dB)
2,412	2,400	0.34	-20.77	-21.11
2,462	2,483.5	-1.17	-28.70	-27.54

802.11b - Conducted Spurious Emissions at the 2,400 MHz Band Edge



Date: 28.NOV.2010 08:53:04

802.11b - Conducted Spurious Emissions at the 2,483.5 MHz Band Edge



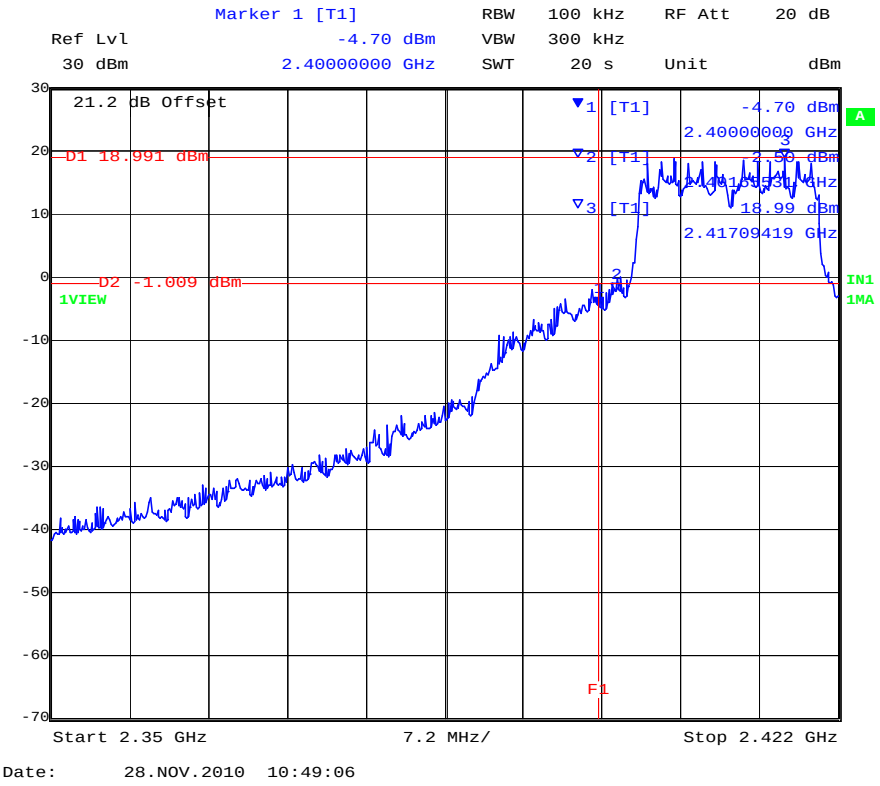
Date: 28.NOV.2010 10:08:33

Conducted Band-Edge Results

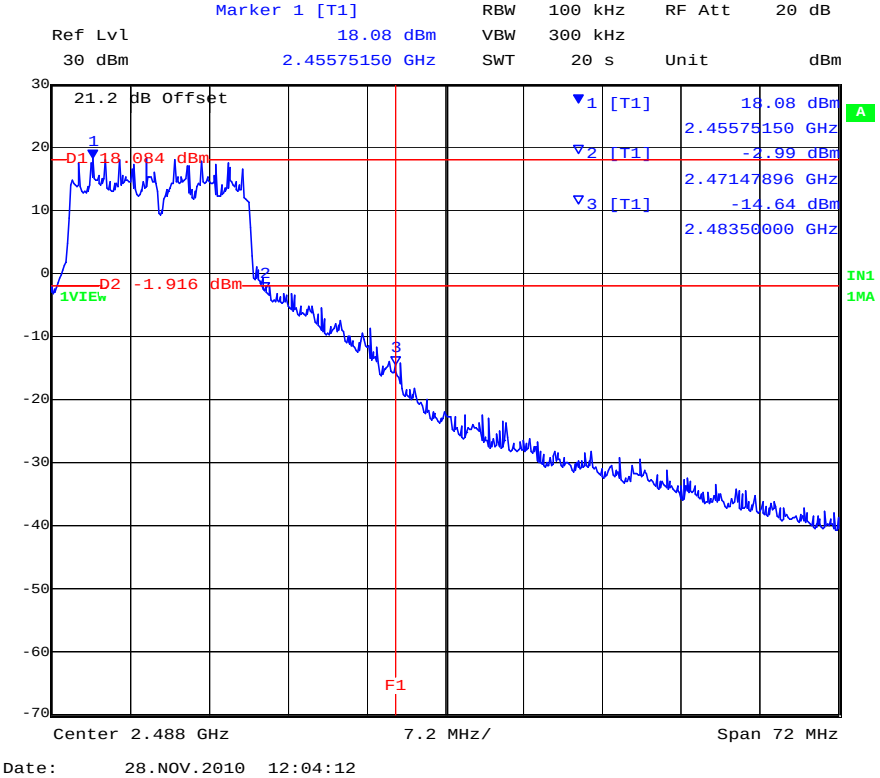
TABLE OF RESULTS – **802.11g Legacy**

Center Frequency (MHz)	Band edge Frequency (MHz)	Limit (20 dB below peak of fundamental)	Amplitude @ Band edge (dBm)	Margin (dB)
2,412	2,400	-1.01	-4.70	-3.69
2,462	2,483.5	-1.92	-14.64	-12.73

802.11g Legacy - Conducted Spurious Emissions at the 2,400 MHz Band Edge



802.11g Legacy Conducted Spurious Emissions at the 2,483.5 MHz Band Edge

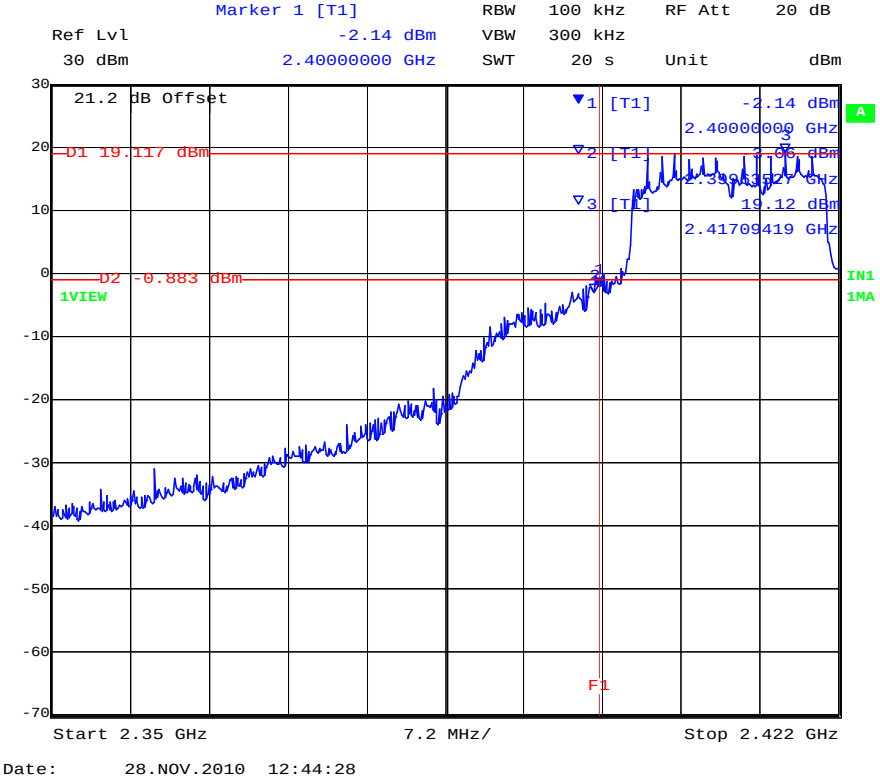


Conducted Band-Edge Results

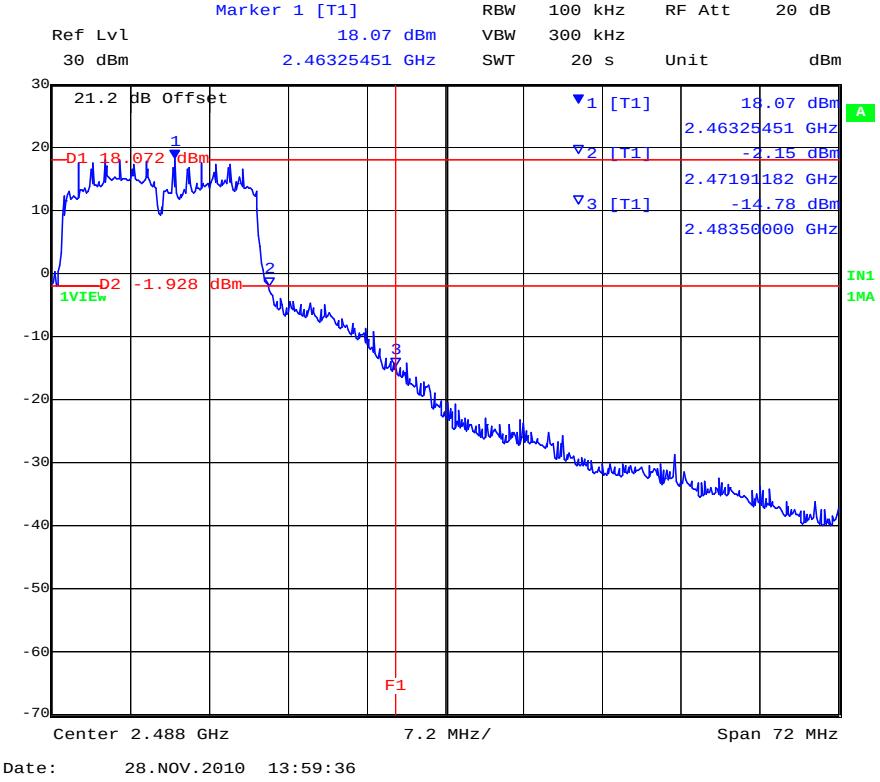
TABLE OF RESULTS – **802.11n HT-20**

Center Frequency (MHz)	Band edge Frequency (MHz)	Limit (20 dB below peak of fundamental)	Amplitude @ Band edge (dBm)	Margin (dB)
2,412	2,400	-0.88	-2.14	-1.26
2,462	2,483.5	-1.93	-14.78	-12.85

802.11n HT-20 - Conducted Spurious Emissions at the 2,400 MHz Band Edge



802.11n HT-20 - Conducted Spurious Emissions at the 2,483.5 MHz Band Edge

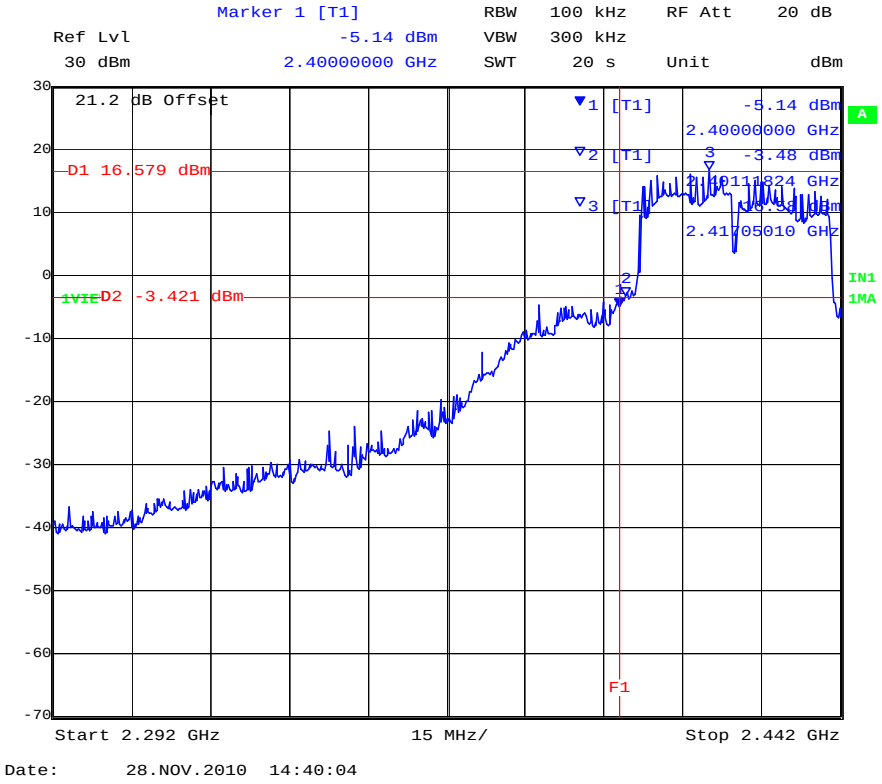


Conducted Band-Edge Results

TABLE OF RESULTS – **802.11N HT-40**

Center Frequency (MHz)	Band edge Frequency (MHz)	Limit (20 dB below peak of fundamental)	Amplitude @ Band edge (dBm)	Margin (dB)
2,422	2,400	-3.42	-5.14	-1.72
2,452	2,483.5	-5.71	-11.48	-5.78

802.11n HT-40 - Conducted Spurious Emissions at the 2,400 MHz Band Edge



802.11n HT-40 - Conducted Spurious Emissions at the 2,483.5 MHz Band Edge

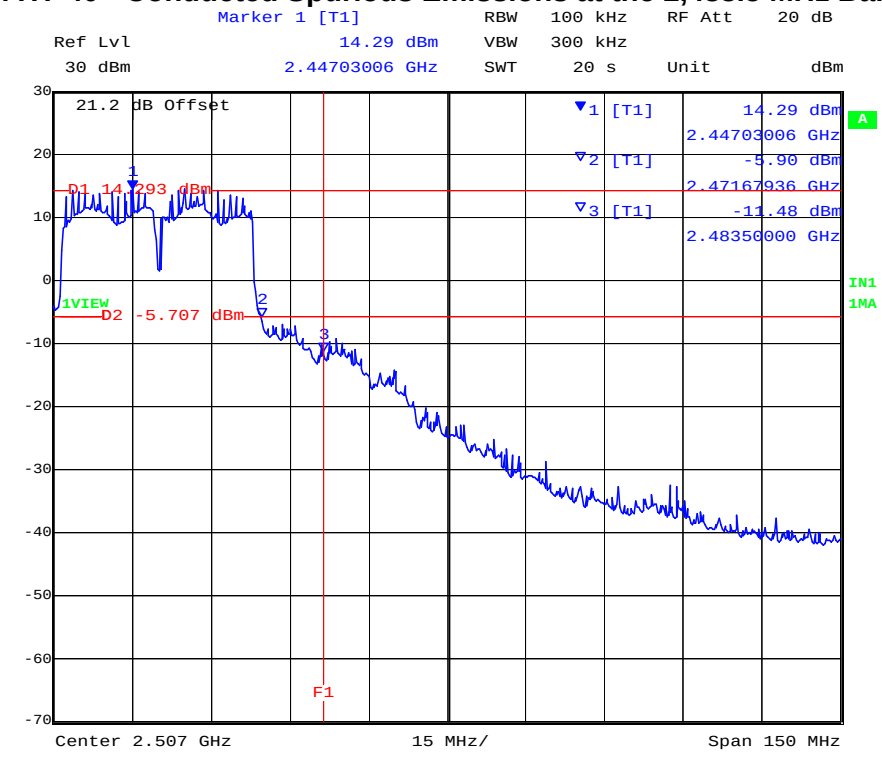
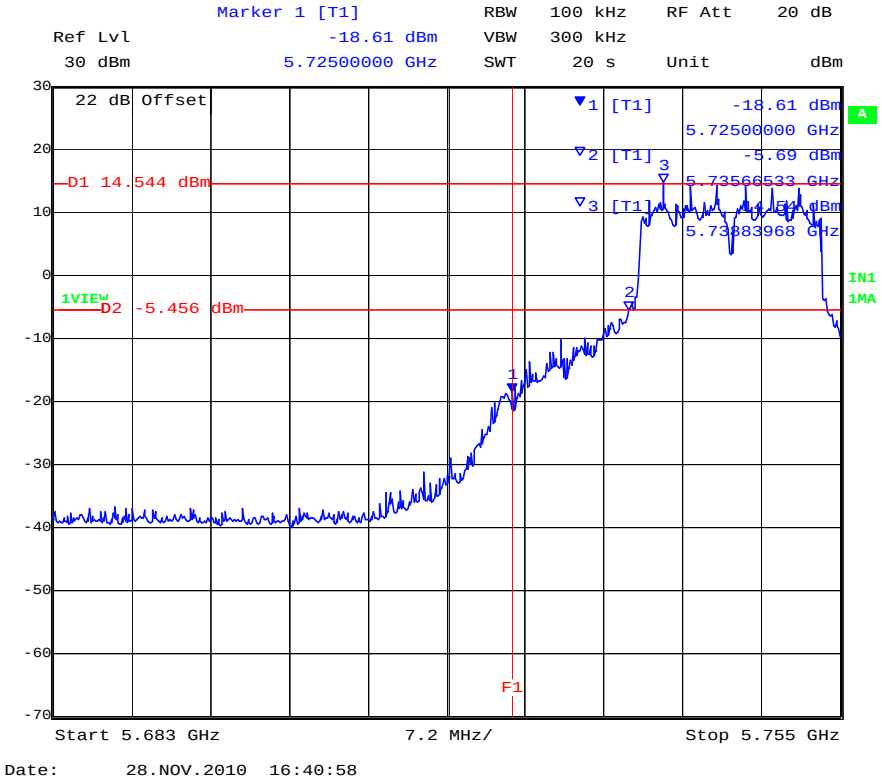


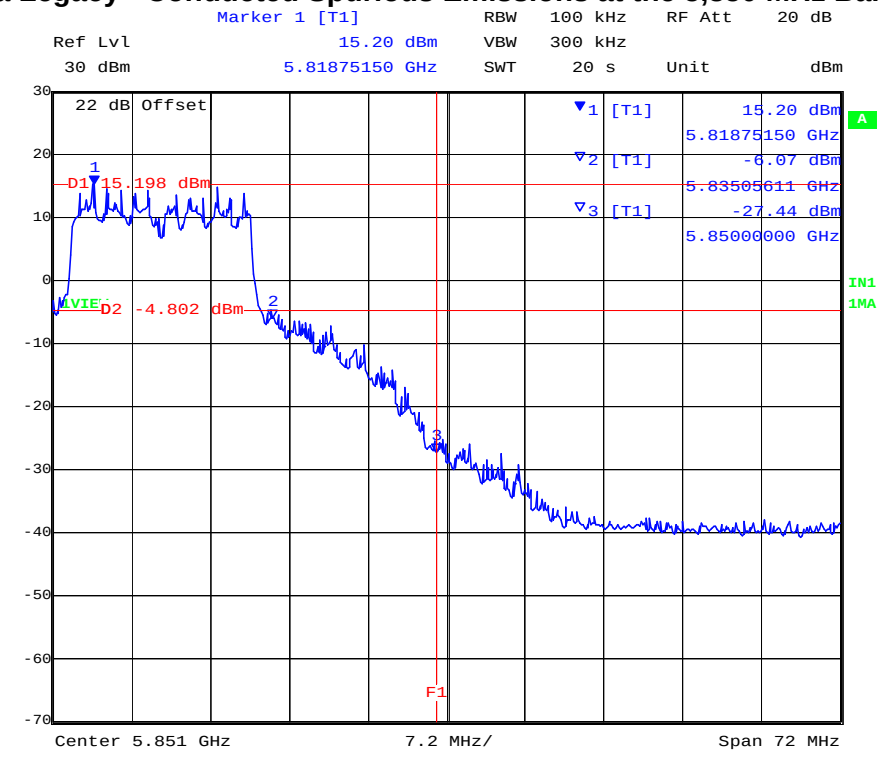
TABLE OF RESULTS – **802.11a Legacy**

Center Frequency (MHz)	Band edge Frequency (MHz)	Limit (20 dB below peak of fundamental)	Amplitude @ Band edge (dBm)	Margin (dB)
5,745	5,725	-5.46	-18.61	-13.15
5,825	5,850	-4.80	-27.44	-22.63

802.11a Legacy Conducted Spurious Emissions at the 5,725 MHz Band Edge



802.11a Legacy - Conducted Spurious Emissions at the 5,850 MHz Band Edge

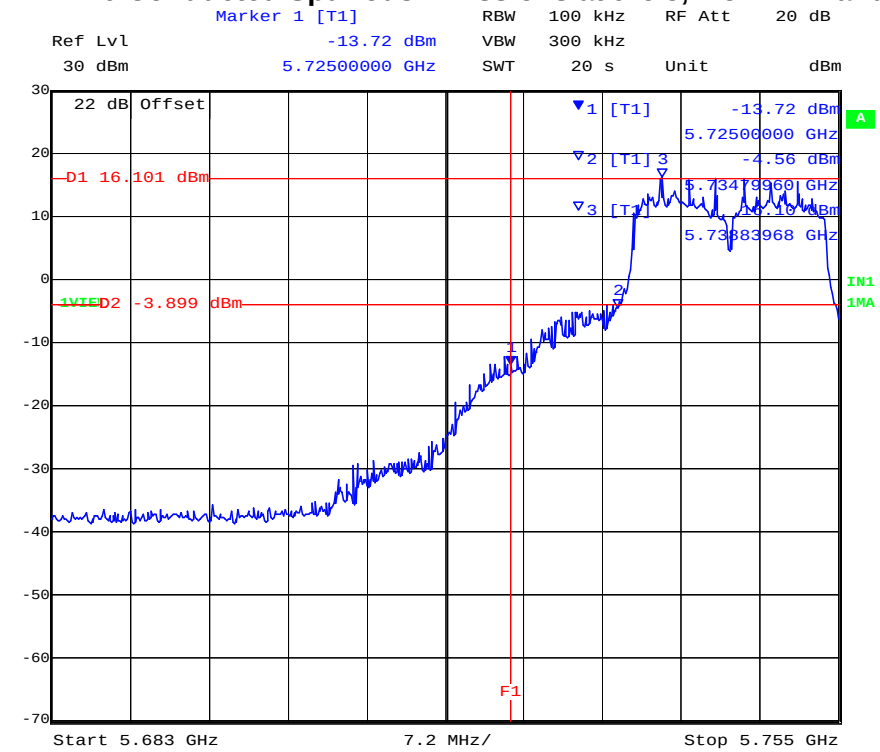


Conducted Band-Edge Results

TABLE OF RESULTS – **802.11n HT-20**

Center Frequency (MHz)	Band edge Frequency (MHz)	Limit (20 dB below peak of fundamental)	Amplitude @ Band edge (dBm)	Margin (dB)
5,745	5,725	-3.90	-13.72	-9.82
5,825	5,850	-4.60	-22.68	-18.08

802.11n HT-20 Conducted Spurious Emissions at the 5,725 MHz Band Edge



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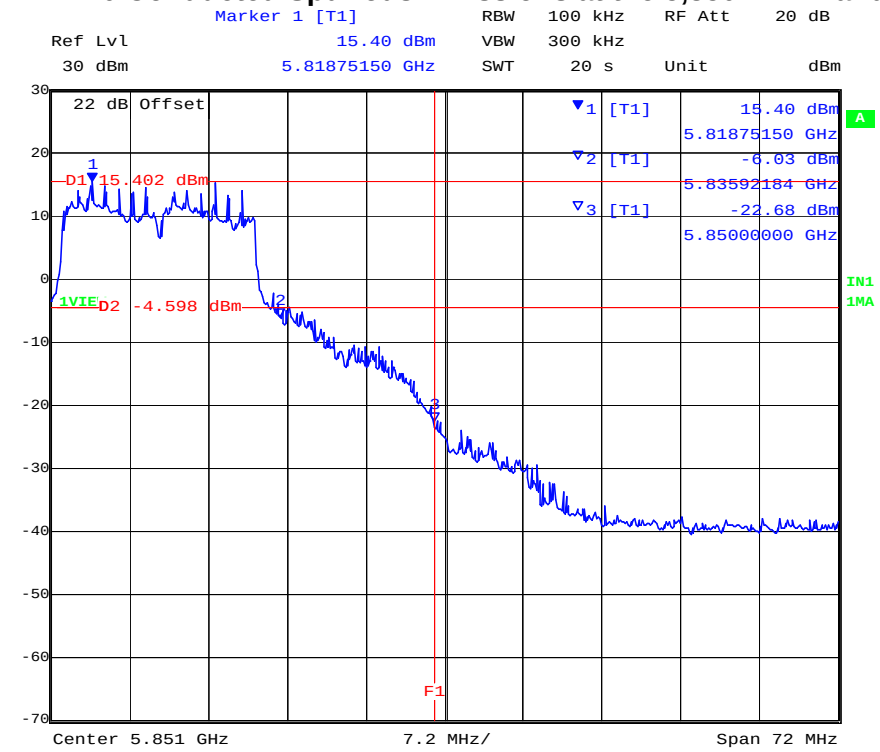
802.11n HT-20 Conducted Spurious Emissions at the 5,850 MHz Band Edge



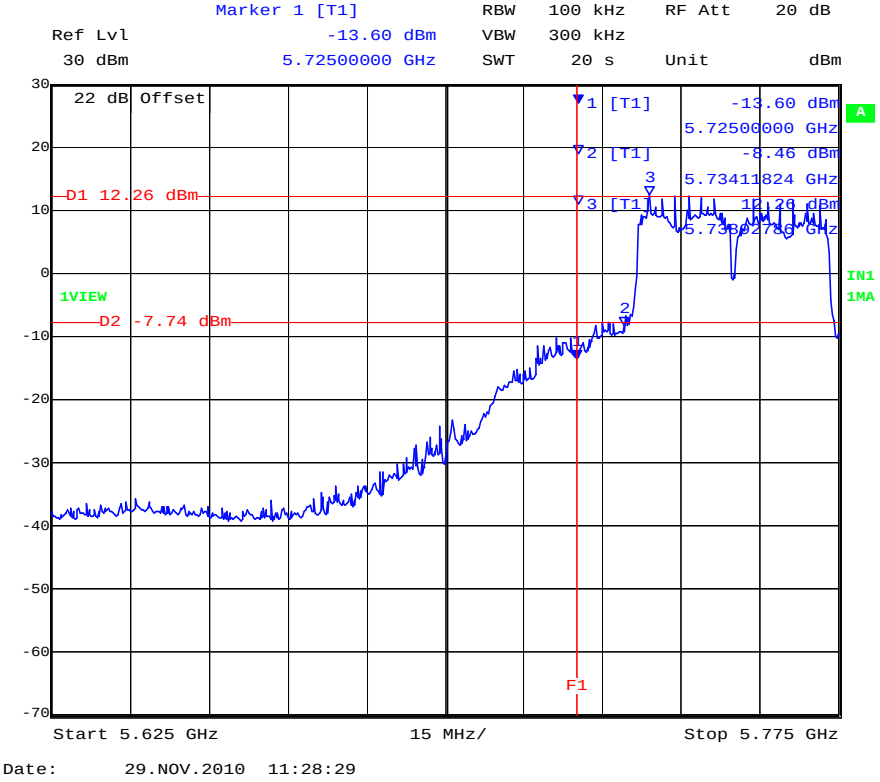
Date: 29.NOV.2010 10:38:21

Conducted Band-Edge Results

TABLE OF RESULTS – **802.11n HT-40**

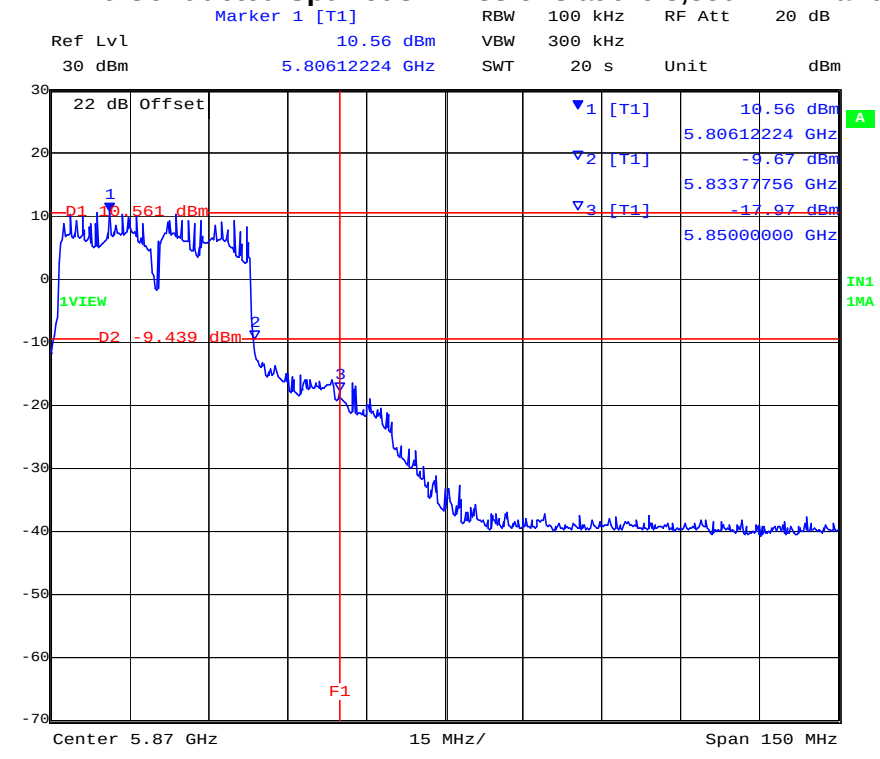
Center Frequency (MHz)	Band edge Frequency (MHz)	Limit (20 dB below peak of fundamental)	Amplitude @ Band edge (dBm)	Margin (dB)
5,745	5,725	-7.74	-13.60	-5.86
5,825	5,850	-9.44	-17.97	-8.53

802.11n HT-40 Conducted Spurious Emissions at the 5,725 MHz Band Edge



Date: 29.NOV.2010 11:28:29

802.11n HT-40 Conducted Spurious Emissions at the 5,850 MHz Band Edge



Date: 29.NOV.2010 13:02:11

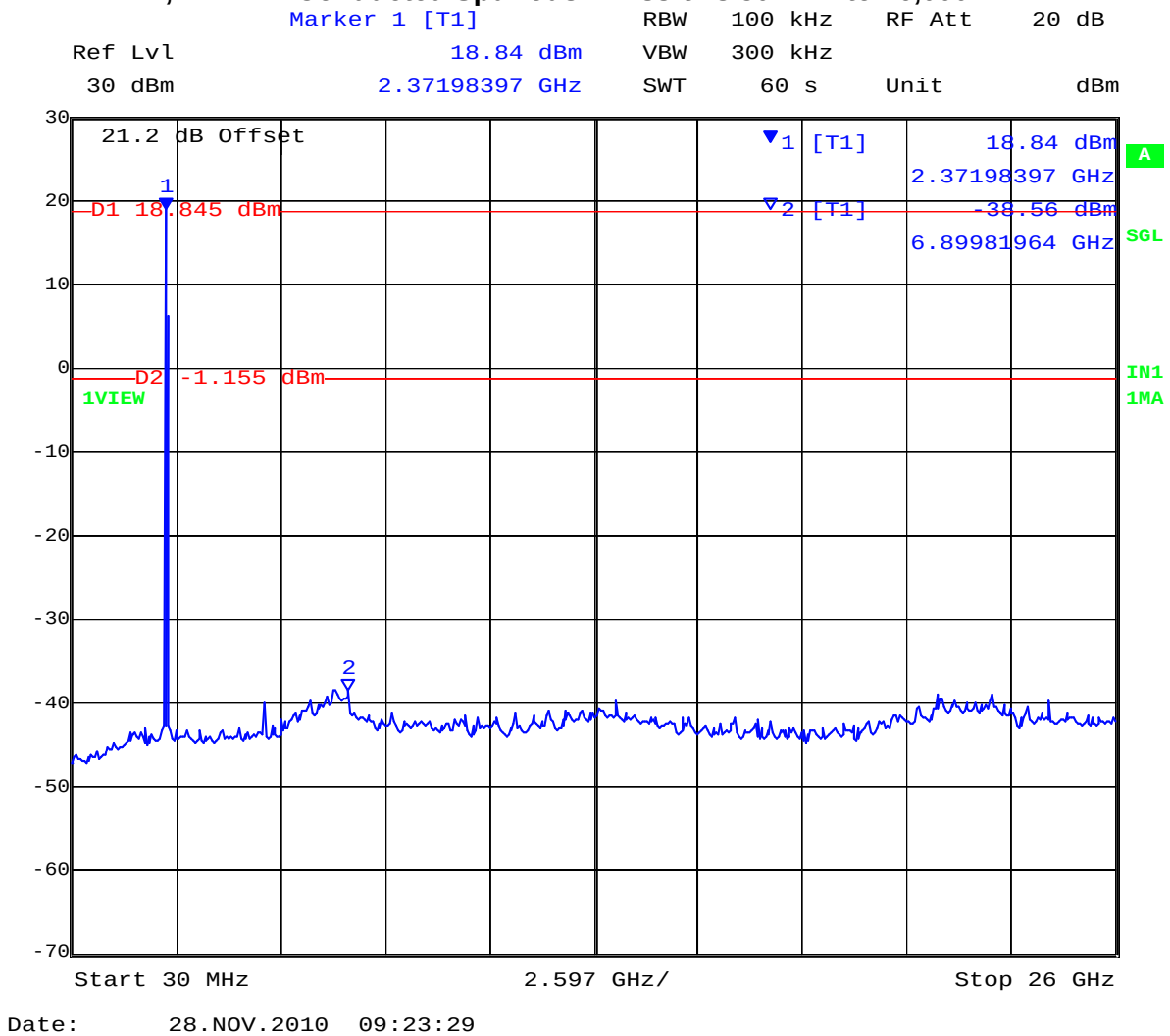
Spurious Emissions (30 - 26,000 MHz)

TABLE OF RESULTS – **802.11b – Legacy**

Channel Centre Frequency (MHz)	Start Frequency (MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
2,412	30	26,000	-38.56	-1.16	-37.4

802.11b – Legacy

2,412 MHz Conducted Spurious Emissions 30 MHz to 26,000 MHz



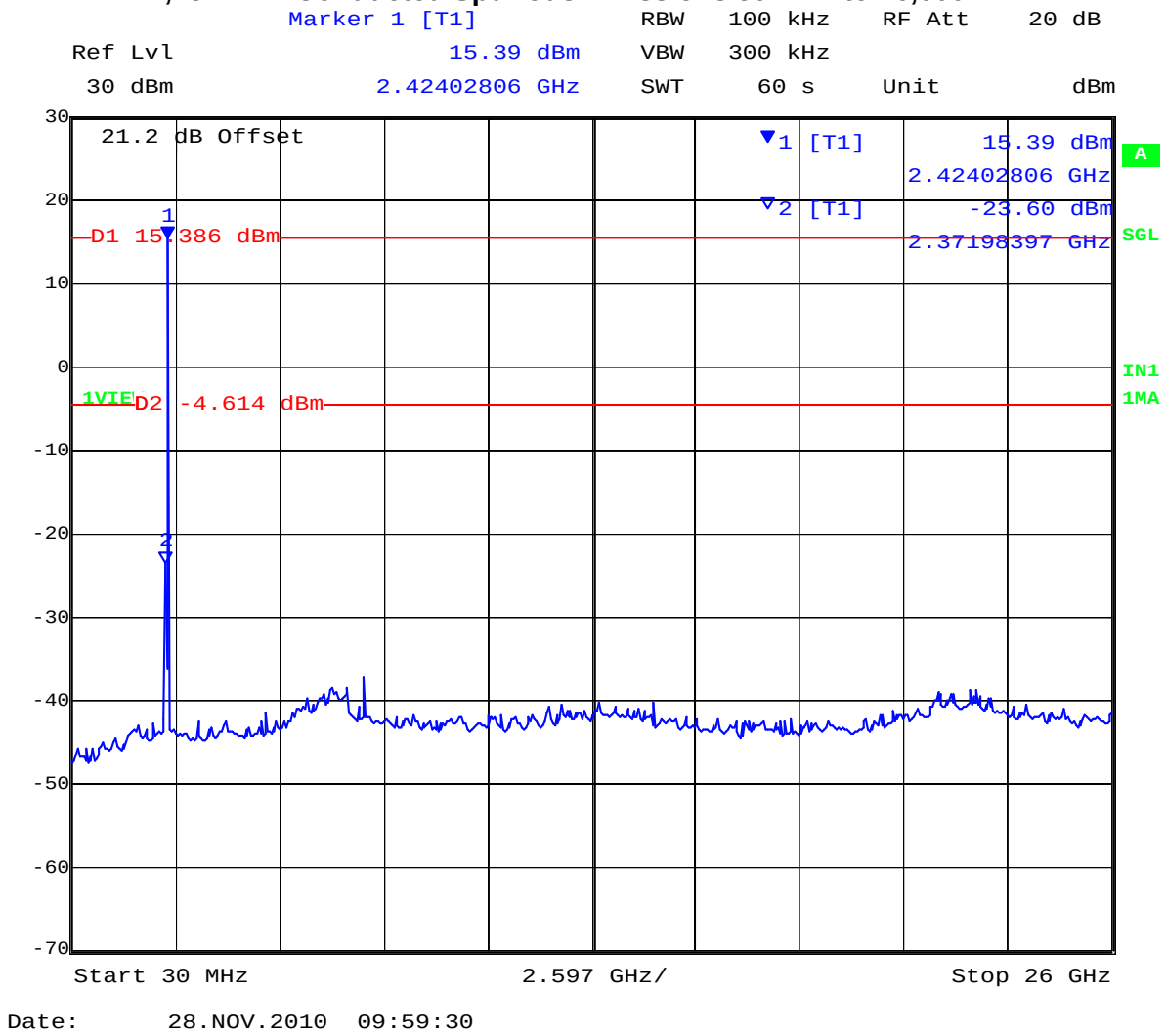
Spurious Emissions (30 - 26,000 MHz)

TABLE OF RESULTS – **802.11b – Legacy**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
2,437	30	26,000	-37.28	-4.61	-32.7

802.11b – Legacy

2,437 MHz Conducted Spurious Emissions 30 MHz to 26,000 MHz



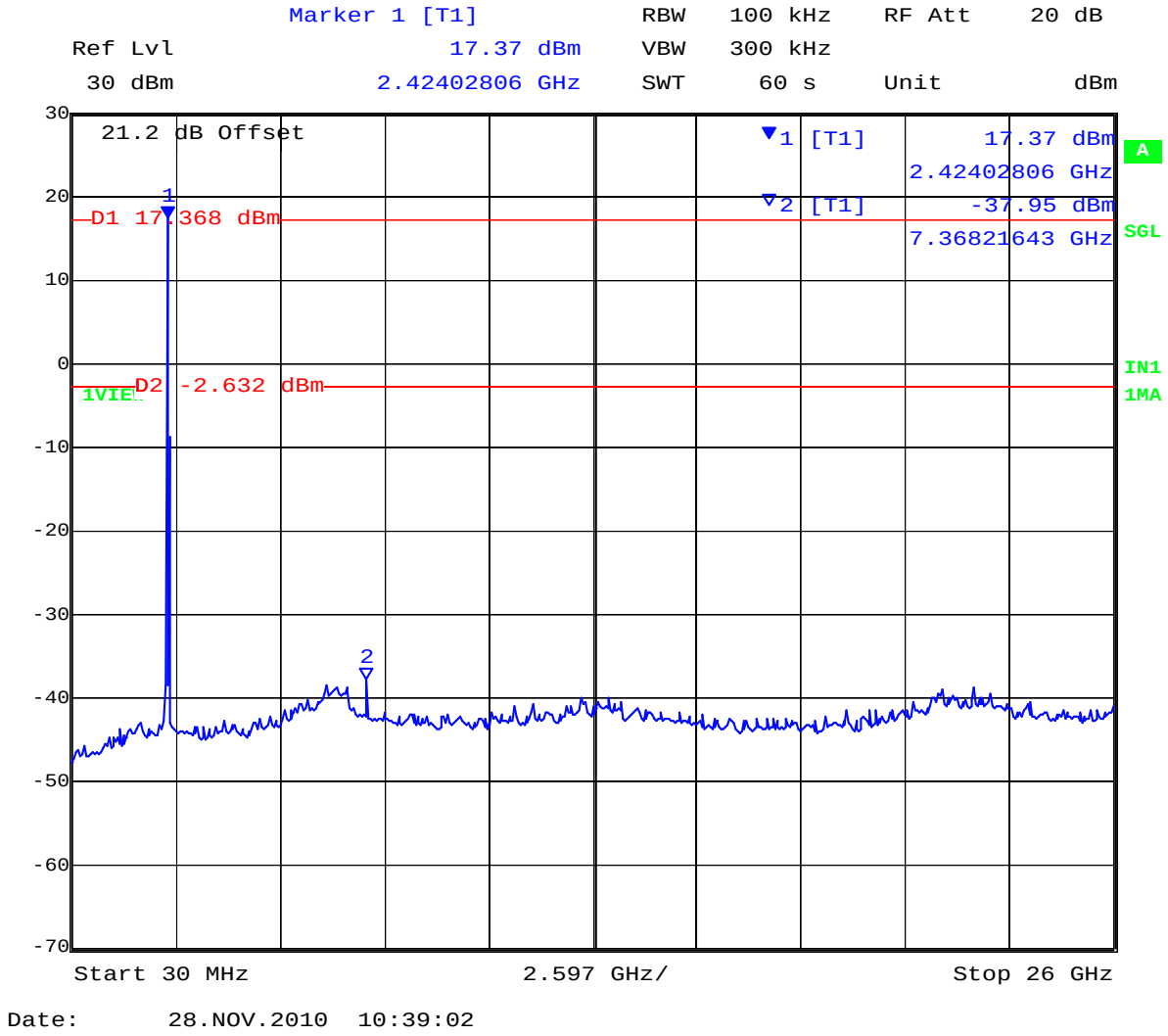
Spurious Emissions (30 - 26,000 MHz)

TABLE OF RESULTS – **802.11b – Legacy**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
2,462	30	26,000	-37.95	-2.63	-35.3

802.11b – Legacy

2,462 MHz Conducted Spurious Emissions 30 MHz to 26,000 MHz



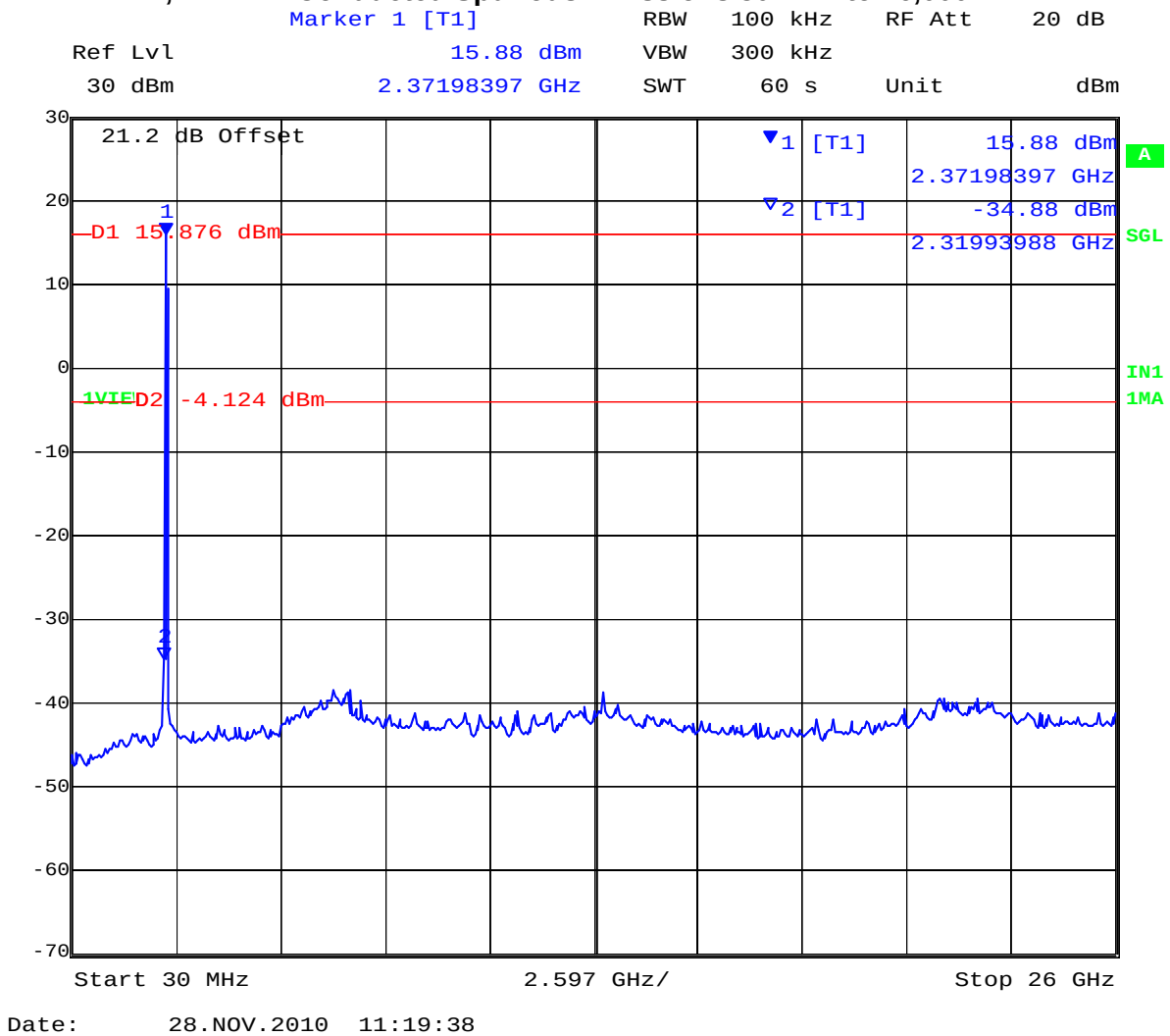
Spurious Emissions (30 - 26,000 MHz)

TABLE OF RESULTS – **802.11g – Legacy**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
2,412	30	26,000	-38.54	-4.12	-34.4

802.11g – Legacy

2,412 MHz Conducted Spurious Emissions 30 MHz to 26,000 MHz



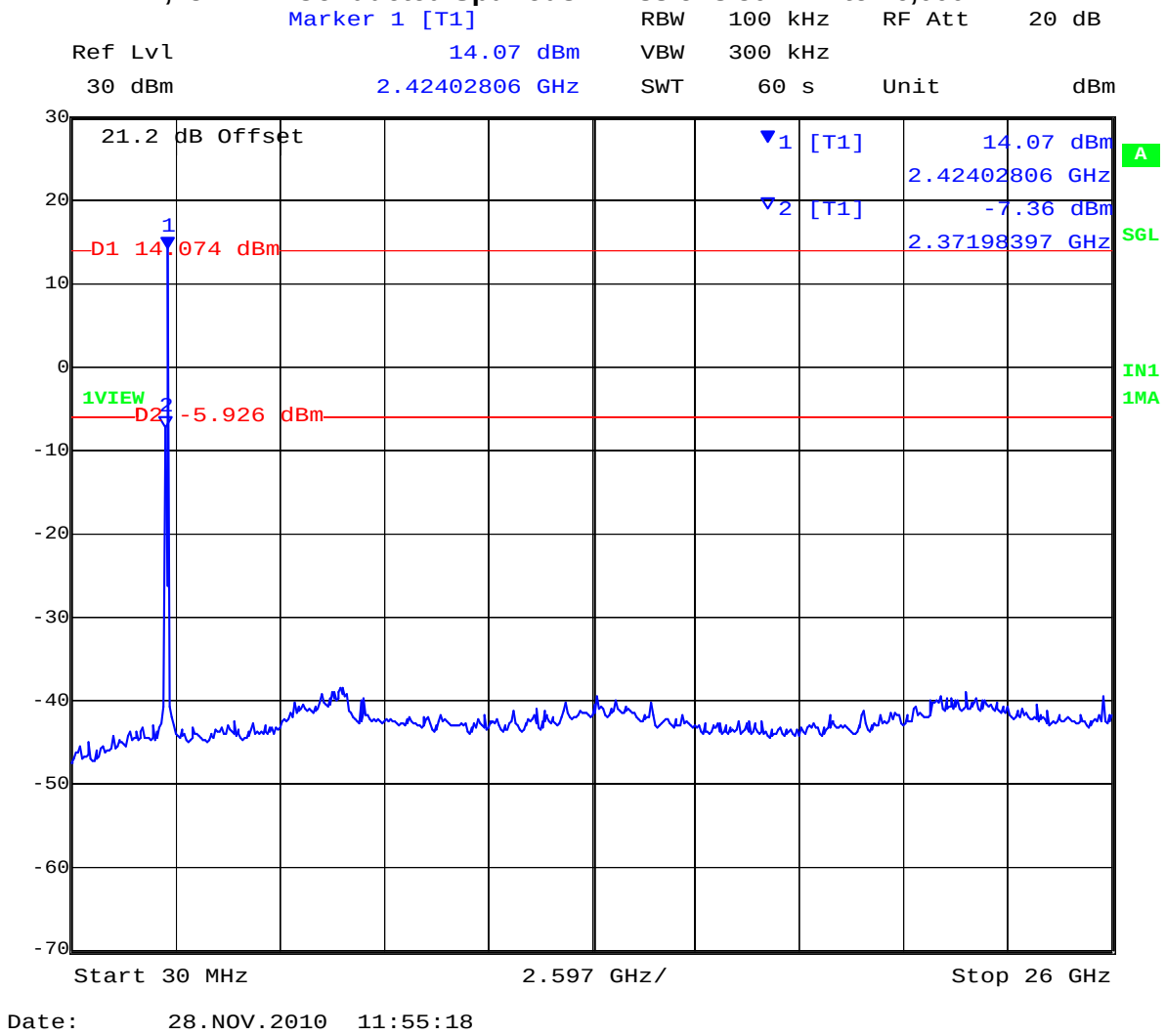
Spurious Emissions (30 - 26,000 MHz)

TABLE OF RESULTS – **802.11g – Legacy**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
2,437	30	26,000	-38.68	-5.93	-32.75

802.11g – Legacy

2,437 MHz Conducted Spurious Emissions 30 MHz to 26,000 MHz



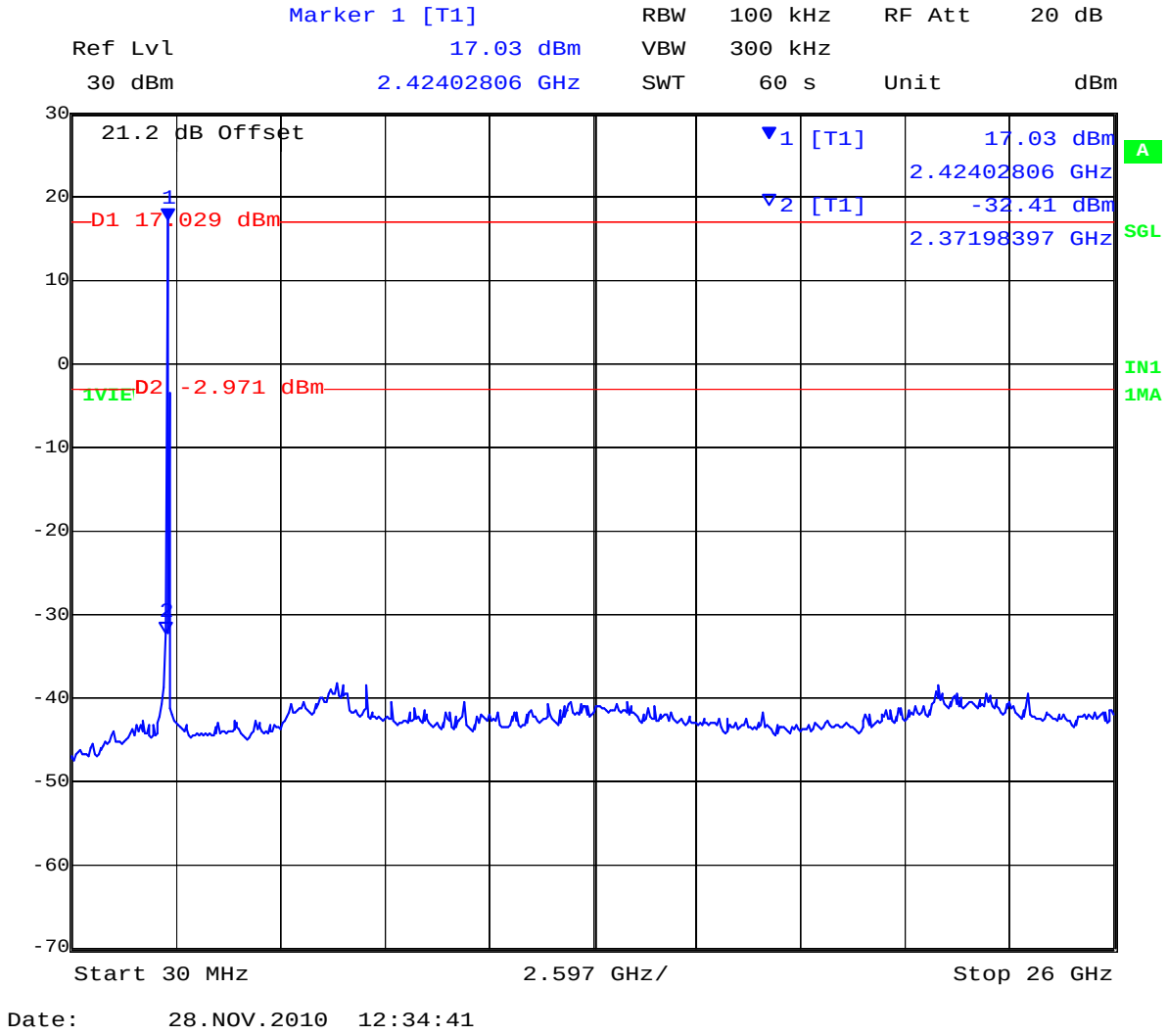
Spurious Emissions (30 - 26,000 MHz)

TABLE OF RESULTS – **802.11g – Legacy**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
2,462	30	26,000	-32.41	-2.97	-29.4

802.11g – Legacy

2,462 MHz Conducted Spurious Emissions 30 MHz to 26,000 MHz



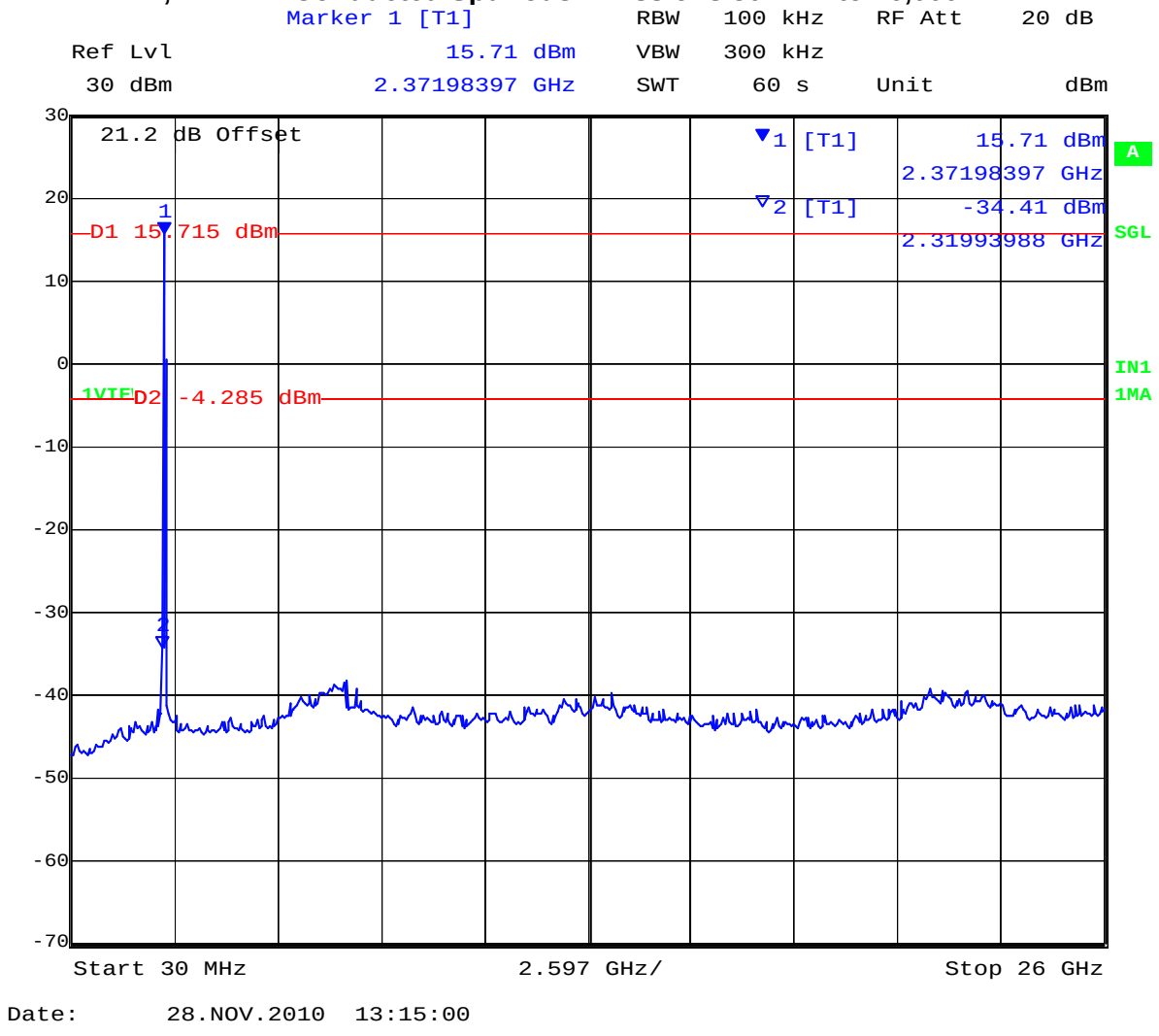
Spurious Emissions (30 - 26,000 MHz)

TABLE OF RESULTS – **802.11n HT-20**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
2,412	30	26,000	-34.41	-4.29	-30.12

802.11n HT-20

2,412 MHz Conducted Spurious Emissions 30 MHz to 26,000 MHz



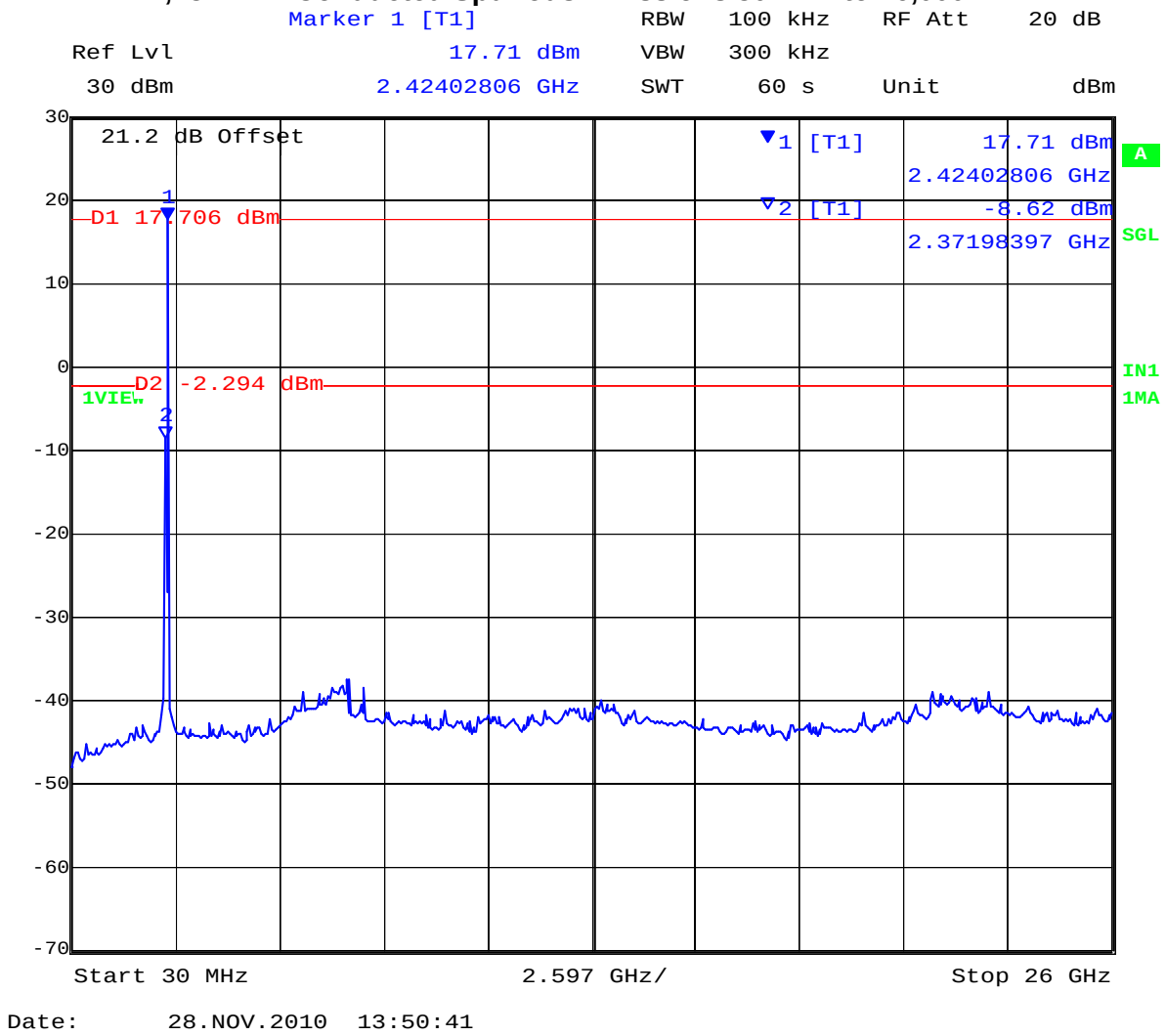
Spurious Emissions (30 - 26,000 MHz)

TABLE OF RESULTS – **802.11n HT-20**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
2,437	30	26,000	-8.62	-2.29	-6.33

802.11n HT-20

2,437 MHz Conducted Spurious Emissions 30 MHz to 26,000 MHz



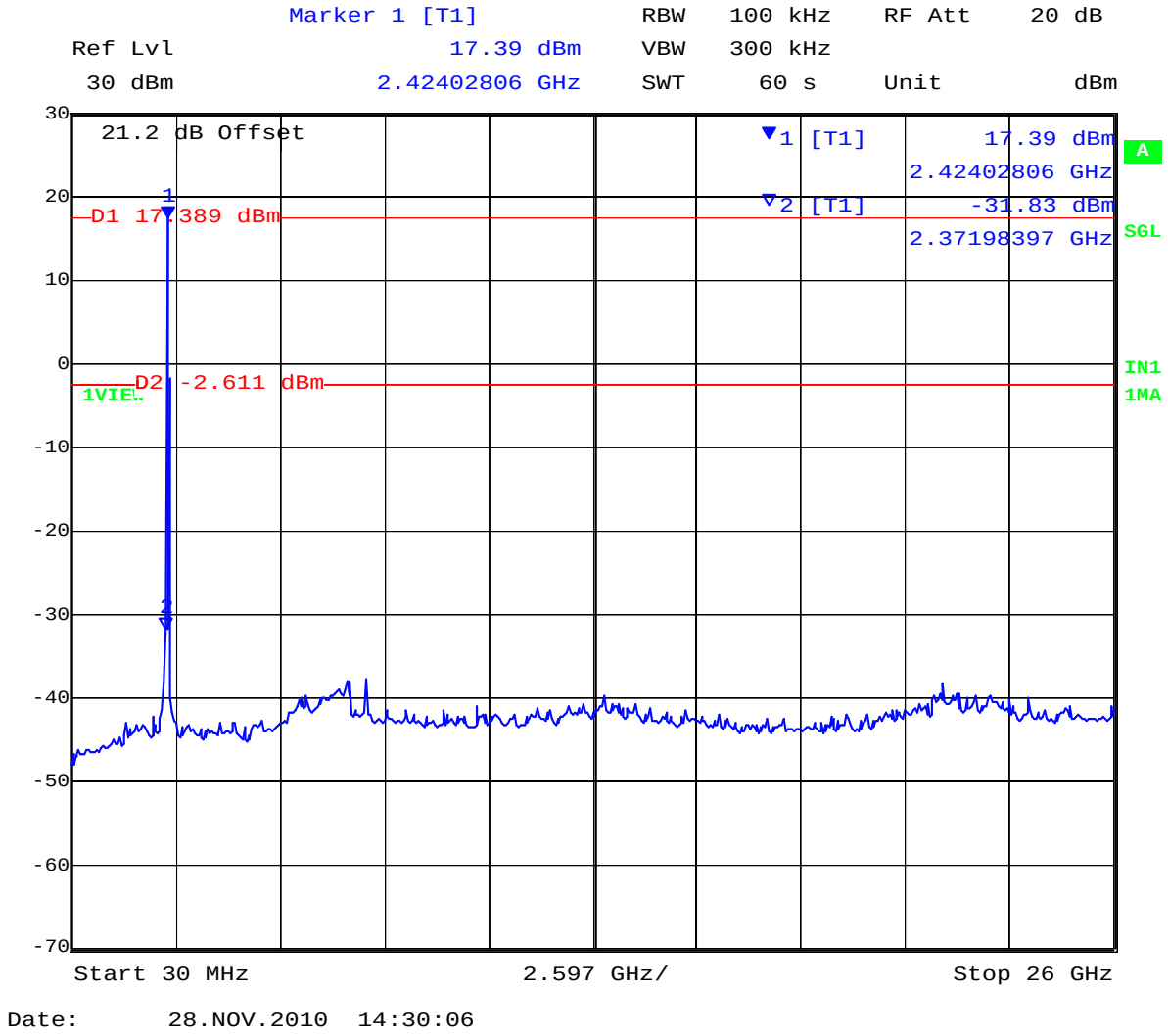
Spurious Emissions (30 - 26,000 MHz)

TABLE OF RESULTS – **802.11n HT-20**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
2,462	30	26,000	-31.83	-2.61	-29.2

802.11n HT-20

2,462 MHz Conducted Spurious Emissions 30 MHz to 26,000 MHz



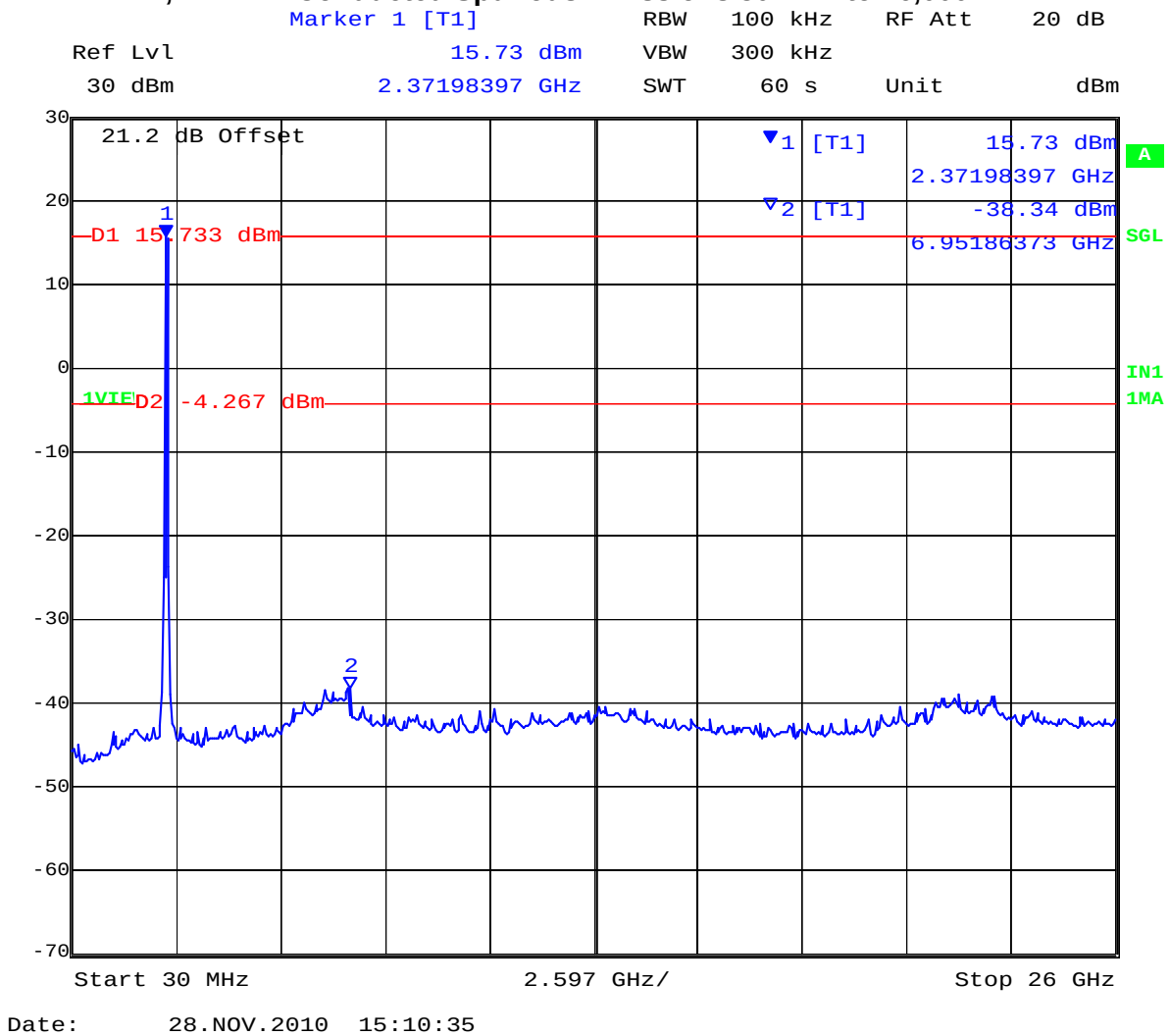
Spurious Emissions (30 - 26,000 MHz)

TABLE OF RESULTS – **802.11n HT-40**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
2,422	30	26,000	-38.34	-4.27	-34.07

802.11n – HT-40

2,422 MHz Conducted Spurious Emissions 30 MHz to 26,000 MHz



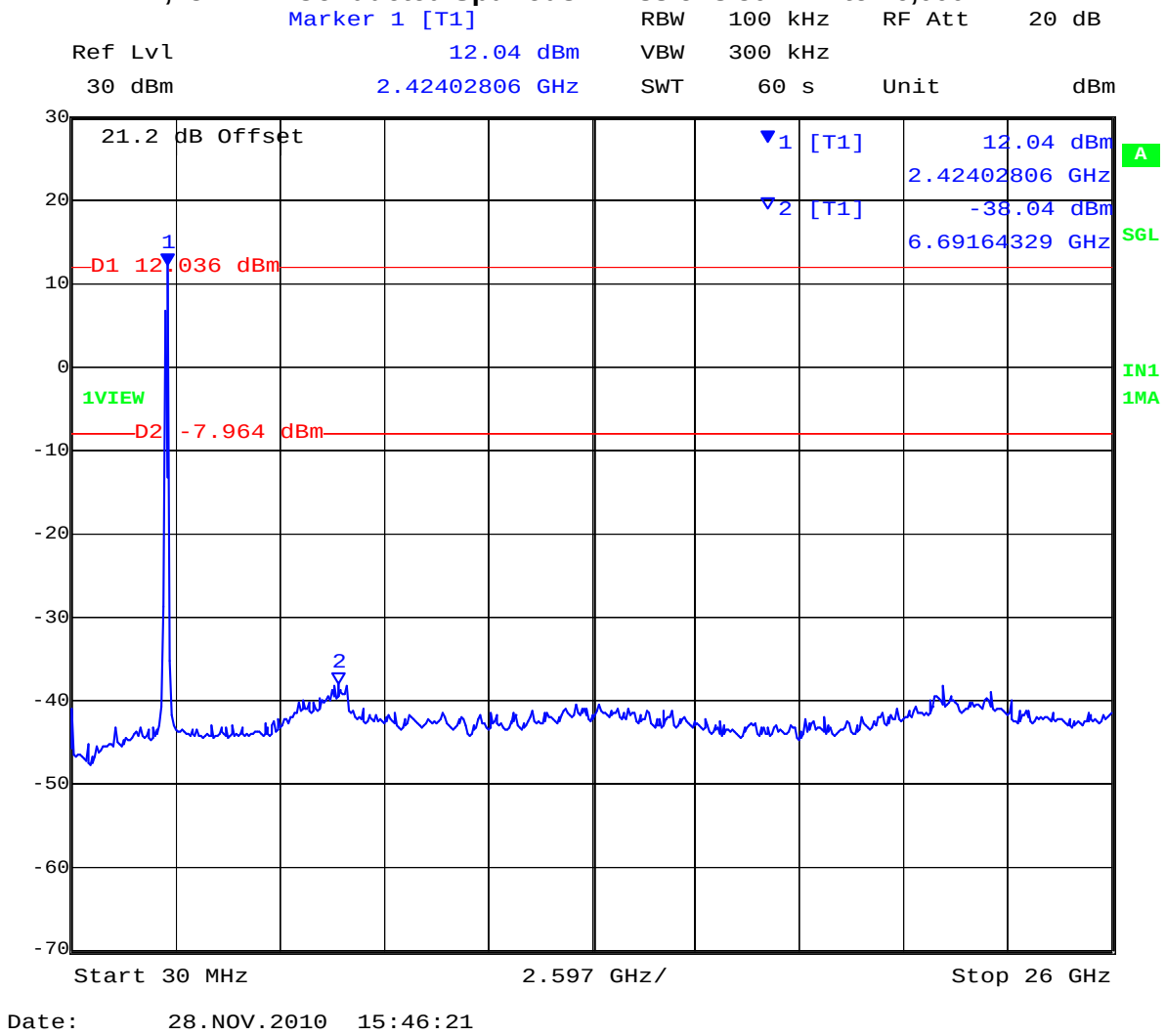
Spurious Emissions (30 - 26,000 MHz)

TABLE OF RESULTS – **802.11n HT-40**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
2,437	30	26,000	-38.04	-7.96	-38.1

802.11n HT-40

2,437 MHz Conducted Spurious Emissions 30 MHz to 26,000 MHz



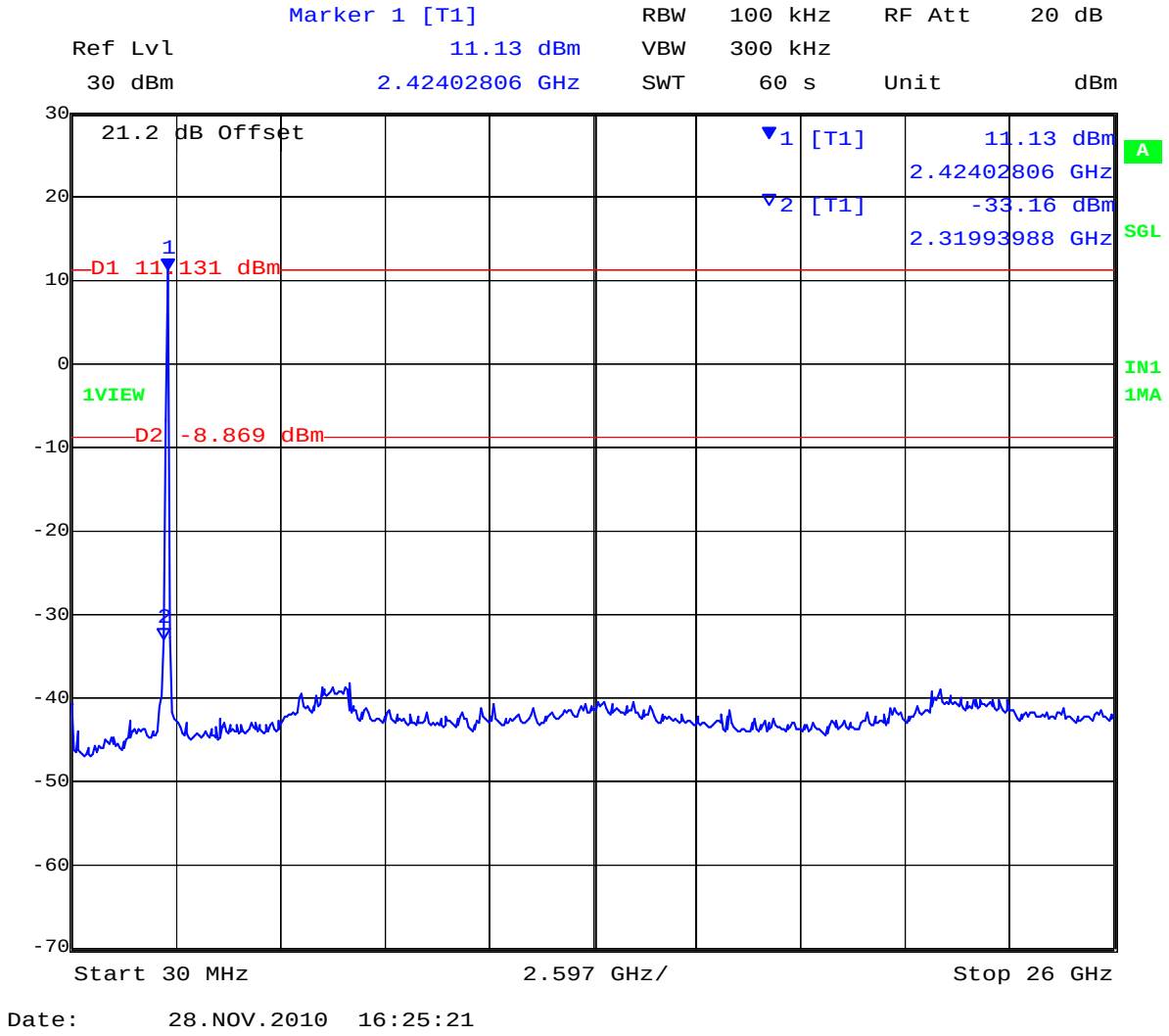
Spurious Emissions (30 - 26,000 MHz)

TABLE OF RESULTS – **802.11n HT-40**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
2,452	30	26,000	-33.16	-8.87	-24.3

802.11n HT-40

2,452 MHz Conducted Spurious Emissions 30 MHz to 26,000 MHz



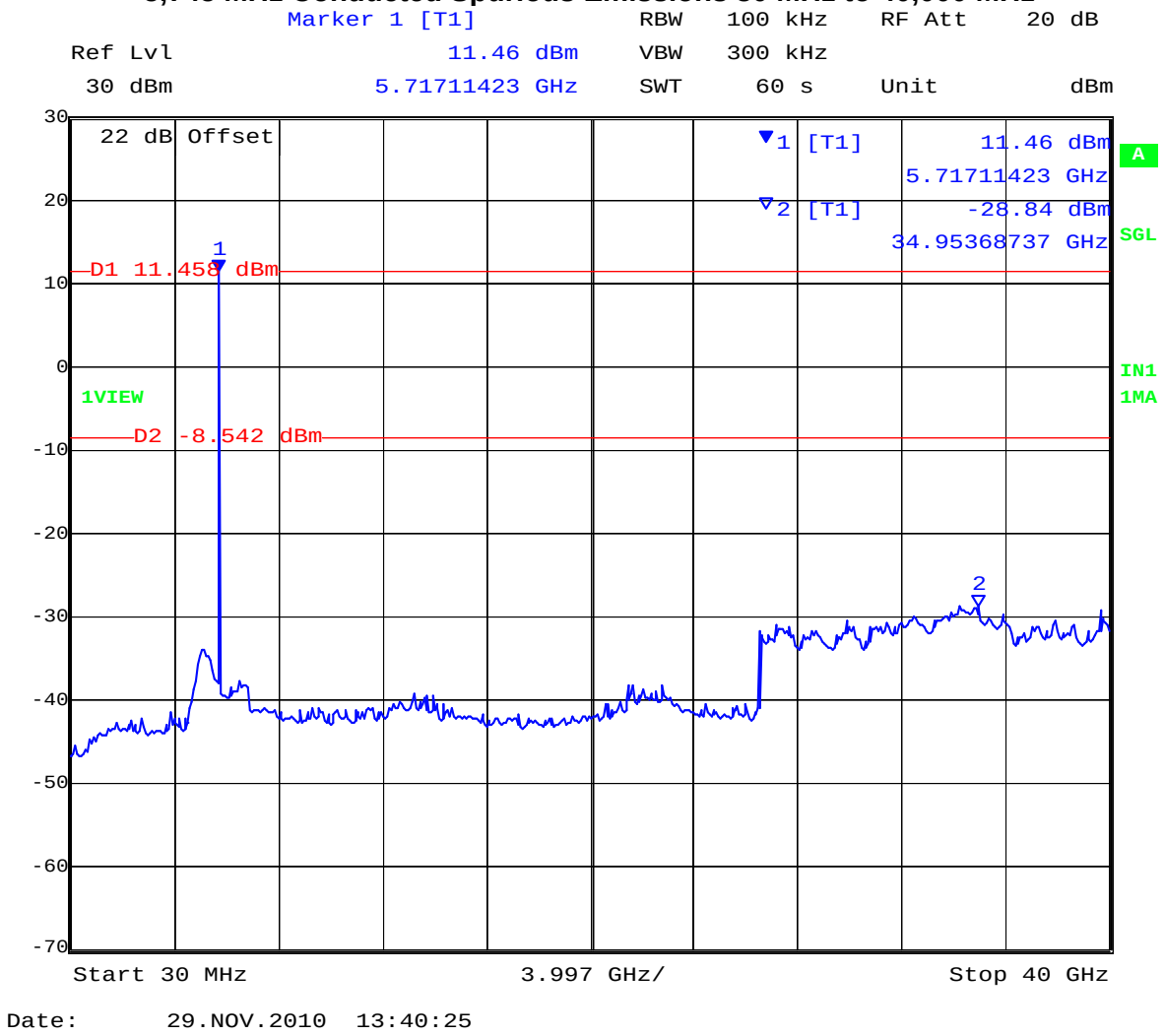
Spurious Emissions (30 - 40,000 MHz)

TABLE OF RESULTS – **802.11a – Legacy**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
5,745	30	40,000	-28.84	-8.54	-20.30

802.11a – Legacy

5,745 MHz Conducted Spurious Emissions 30 MHz to 40,000 MHz



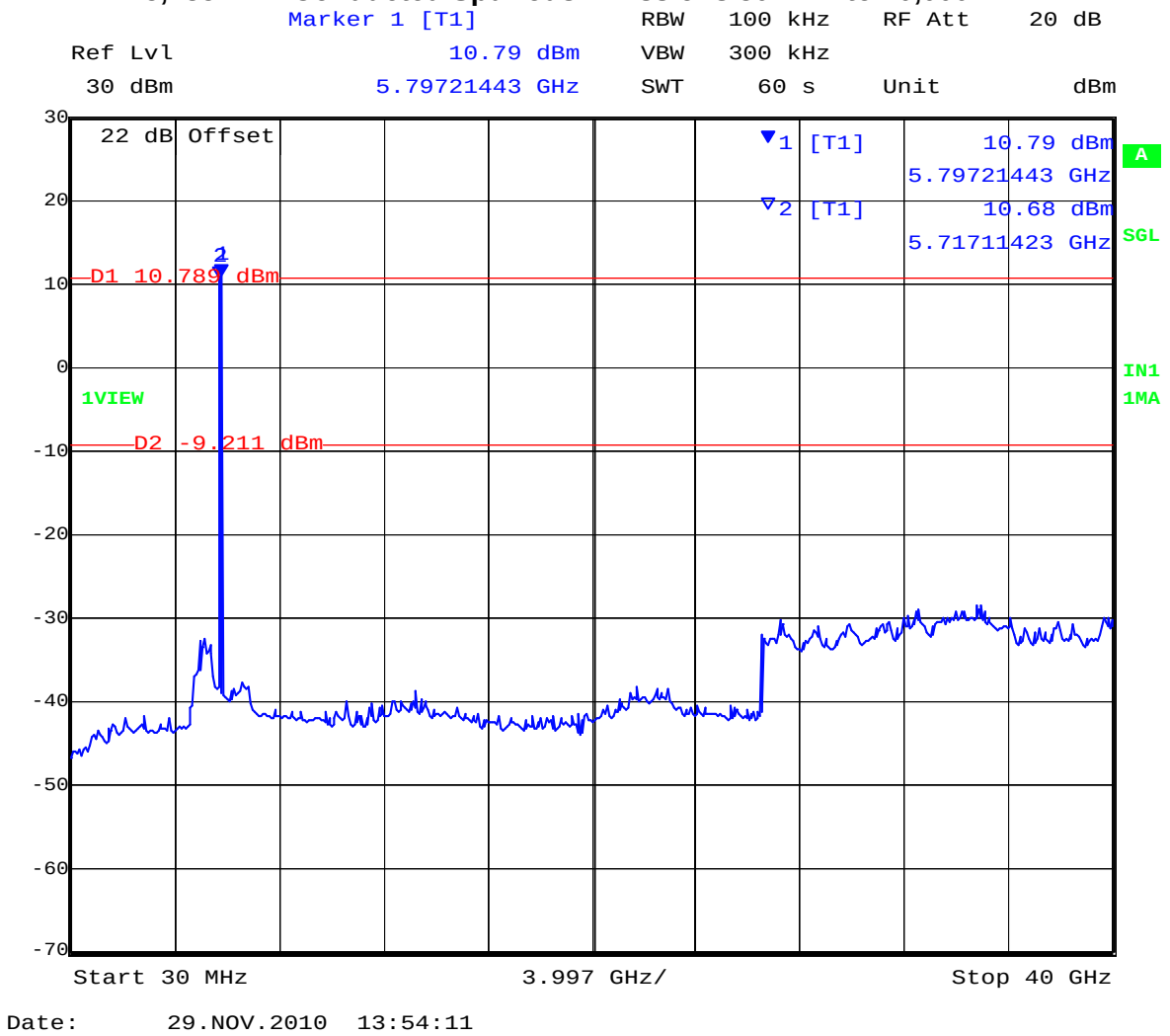
Spurious Emissions (30 - 40,000 MHz)

TABLE OF RESULTS – **802.11a – Legacy**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
5,785	30	40,000	-28.62	-9.21	-19.4

802.11a – Legacy

5,785 MHz Conducted Spurious Emissions 30 MHz to 40,000 MHz



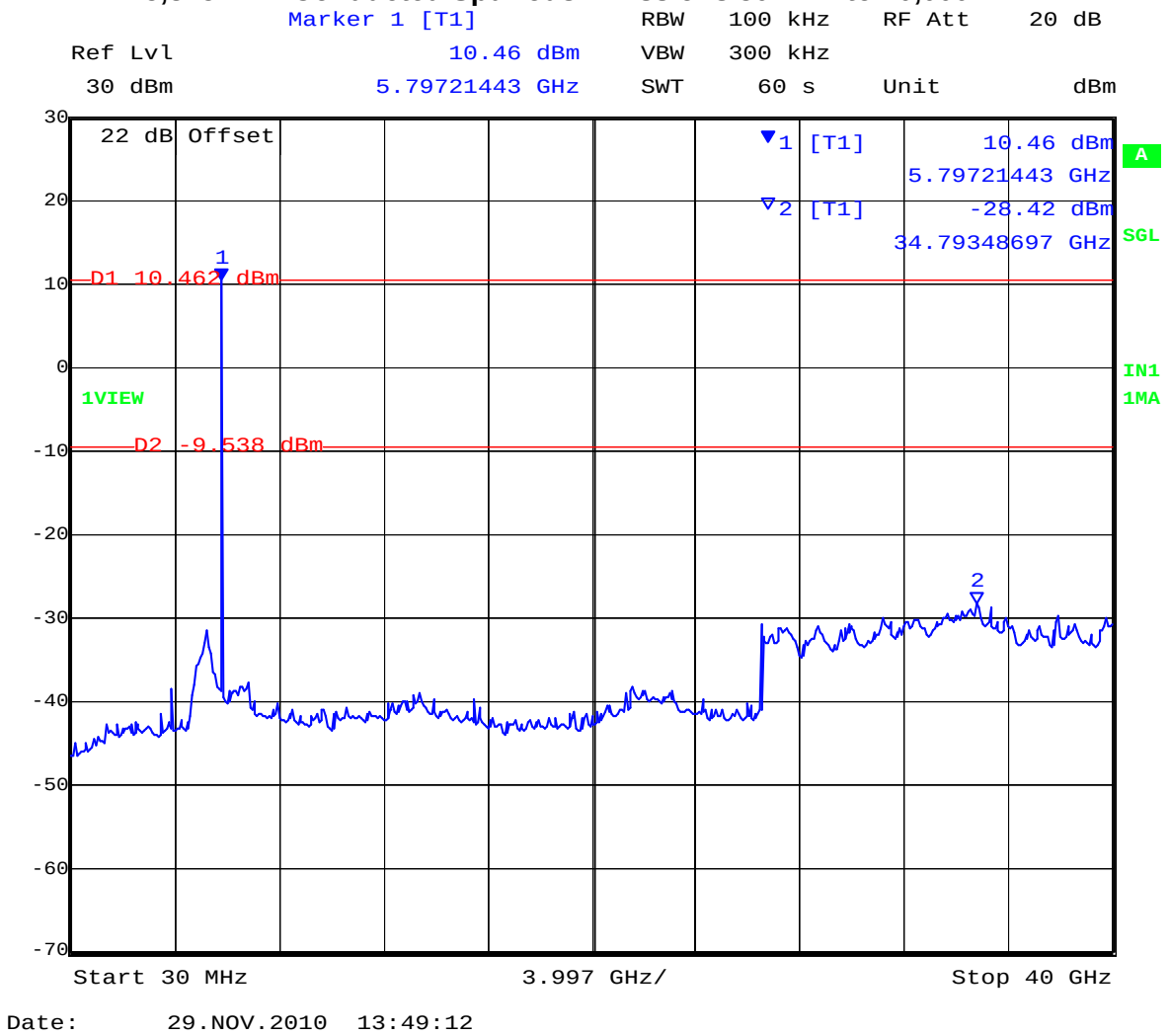
Spurious Emissions (30 - 40,000 MHz)

TABLE OF RESULTS – **802.11a – Legacy**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
5,825	30	40,000	-28.42	-9.54	-18.9

802.11a – Legacy

5,825 MHz Conducted Spurious Emissions 30 MHz to 40,000 MHz



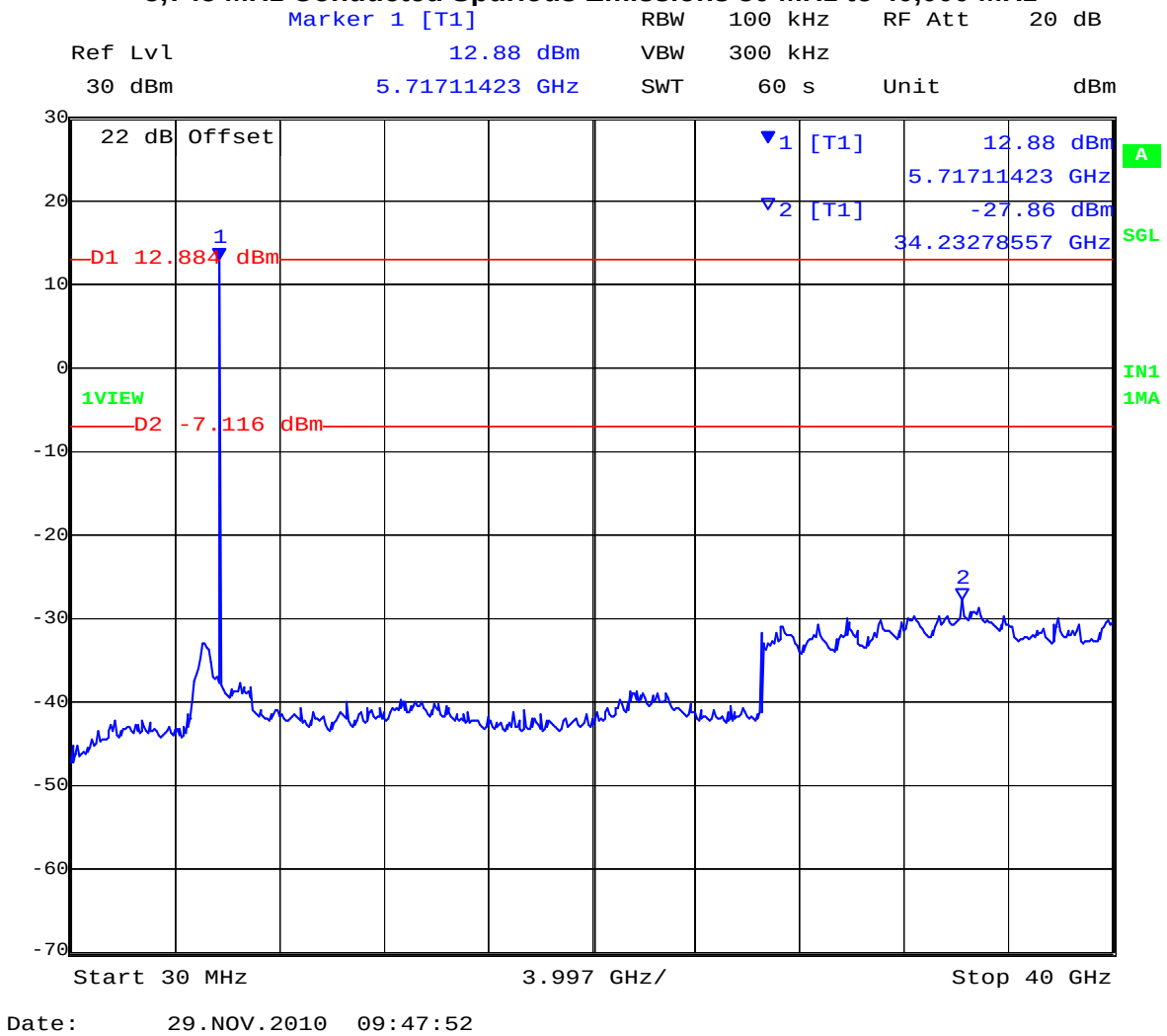
Spurious Emissions (30 - 40,000 MHz)

TABLE OF RESULTS – **802.11n – HT-20**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
5,745	30	40,000	-27.86	-7.12	-20.7

802.11n HT-20

5,745 MHz Conducted Spurious Emissions 30 MHz to 40,000 MHz



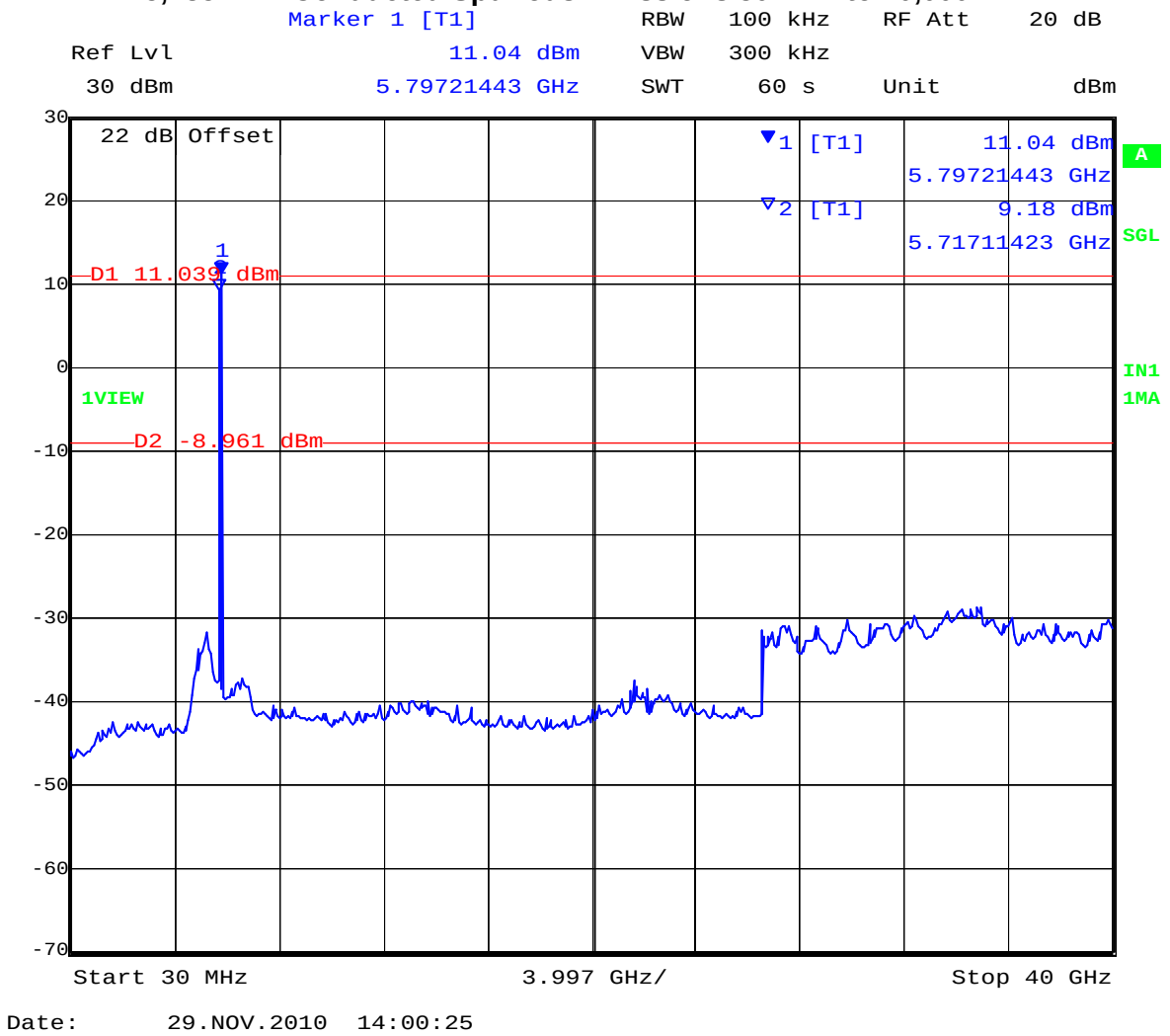
Spurious Emissions (30 - 40,000 MHz)

TABLE OF RESULTS – **802.11n HT-20**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
5,785	30	40,000	-28.94	-8.96	-19.98

802.11n HT-20

5,785 MHz Conducted Spurious Emissions 30 MHz to 40,000 MHz



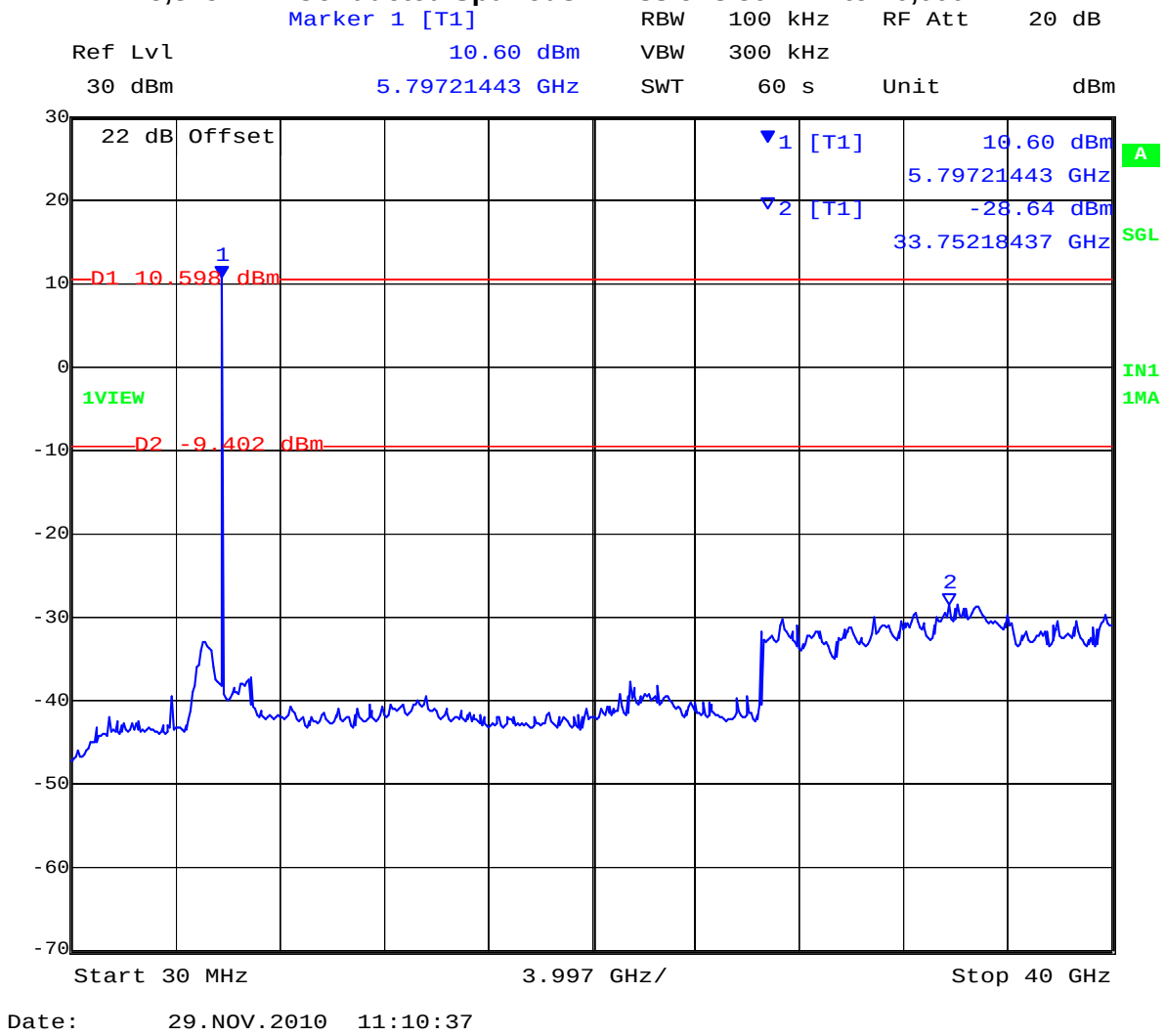
Spurious Emissions (30 - 40,000 MHz)

TABLE OF RESULTS – **802.11n HT-20**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
5,825	30	40,000	-28.64	-9.40	-19.2

802.11n HT-20

5,825 MHz Conducted Spurious Emissions 30 MHz to 40,000 MHz



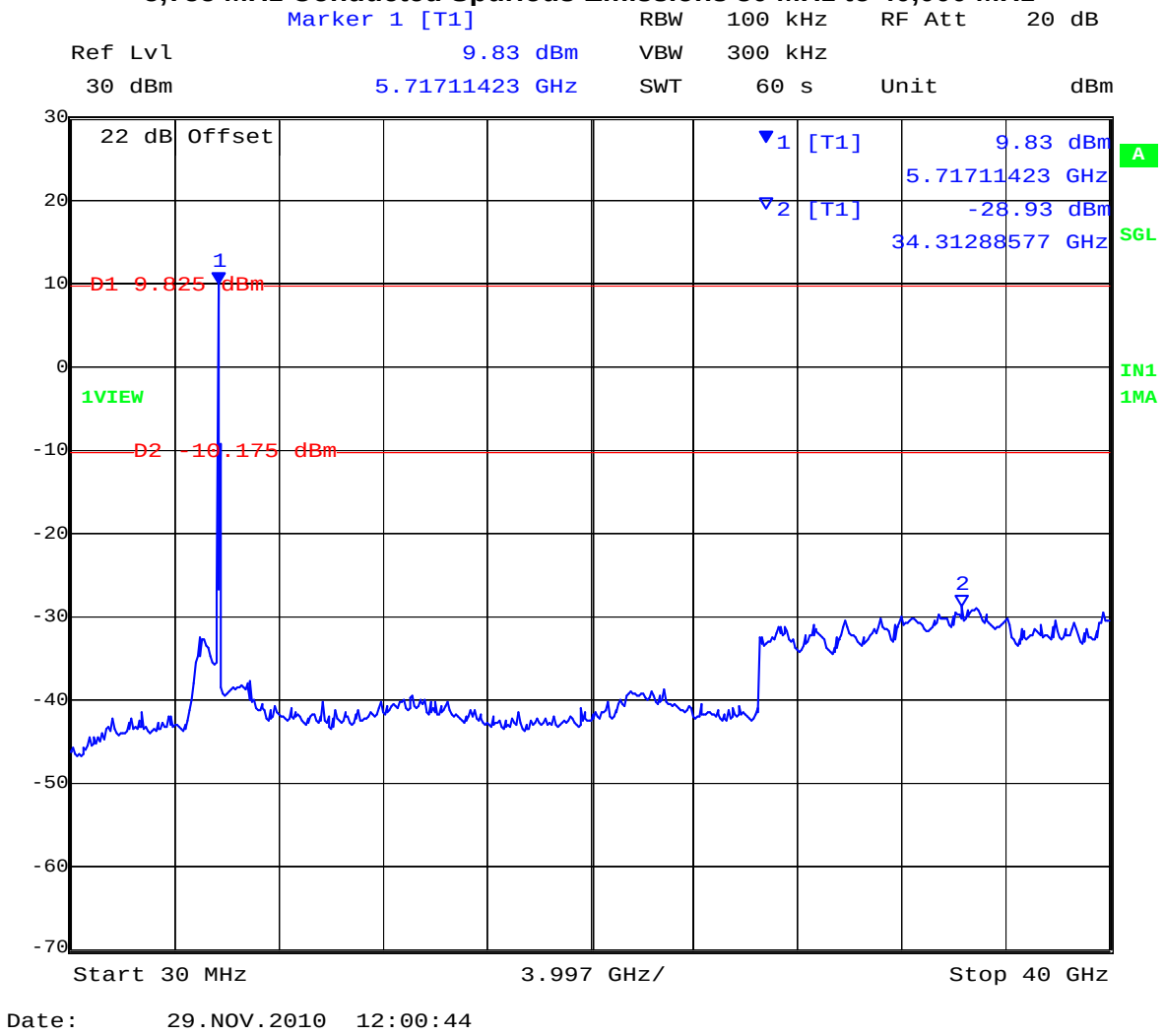
Spurious Emissions (30 - 40,000 MHz)

TABLE OF RESULTS – **802.11n HT-40**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
5,755	30	40,000	-28.93	-10.18	-18.8

802.11n HT-40

5,755 MHz Conducted Spurious Emissions 30 MHz to 40,000 MHz



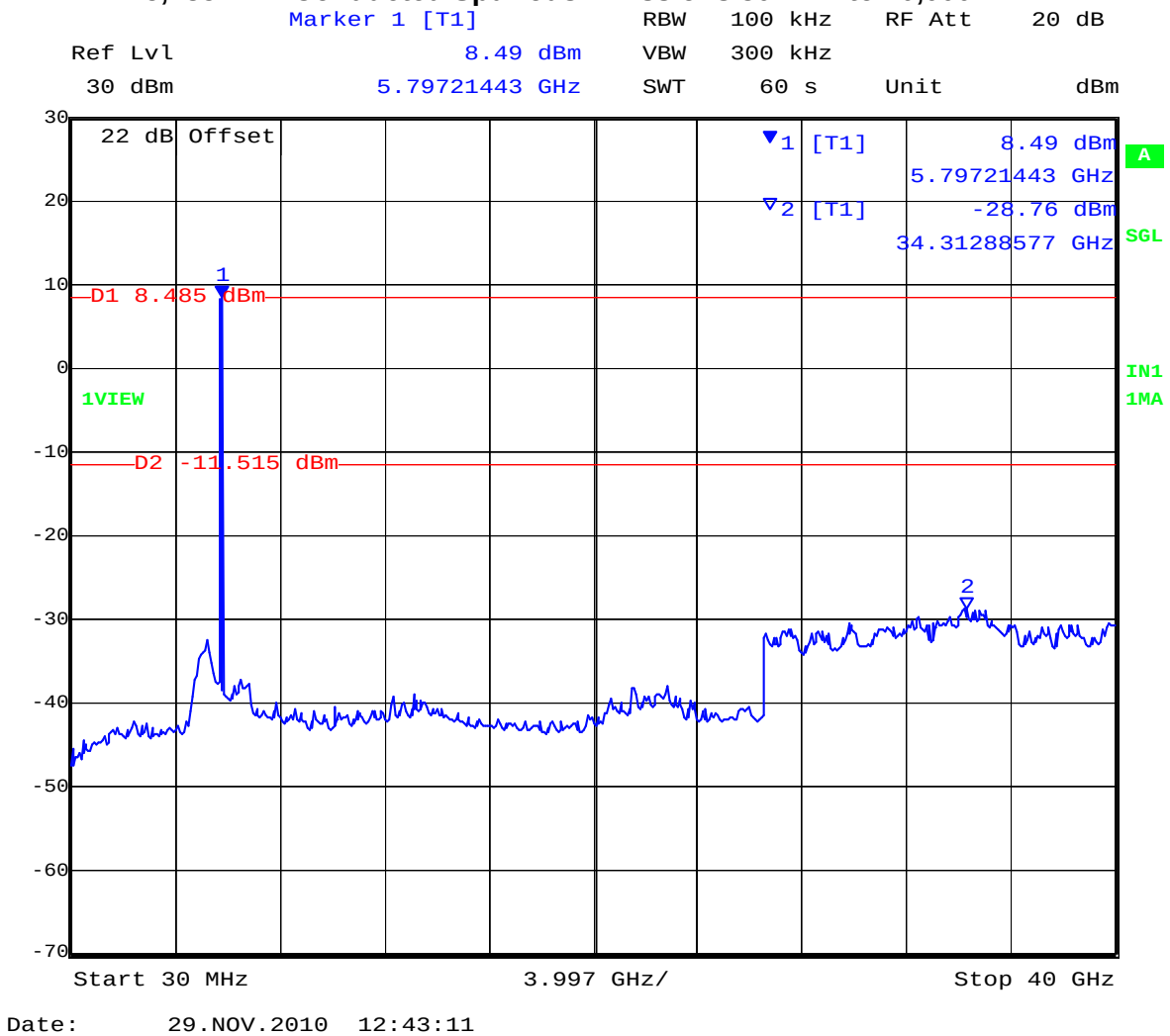
Spurious Emissions (30 - 40,000 MHz)

TABLE OF RESULTS – **802.11n HT-40**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
5,785	30	40,000	-28.76	-11.52	-17.2

802.11n HT-40

5,785 MHz Conducted Spurious Emissions 30 MHz to 40,000 MHz



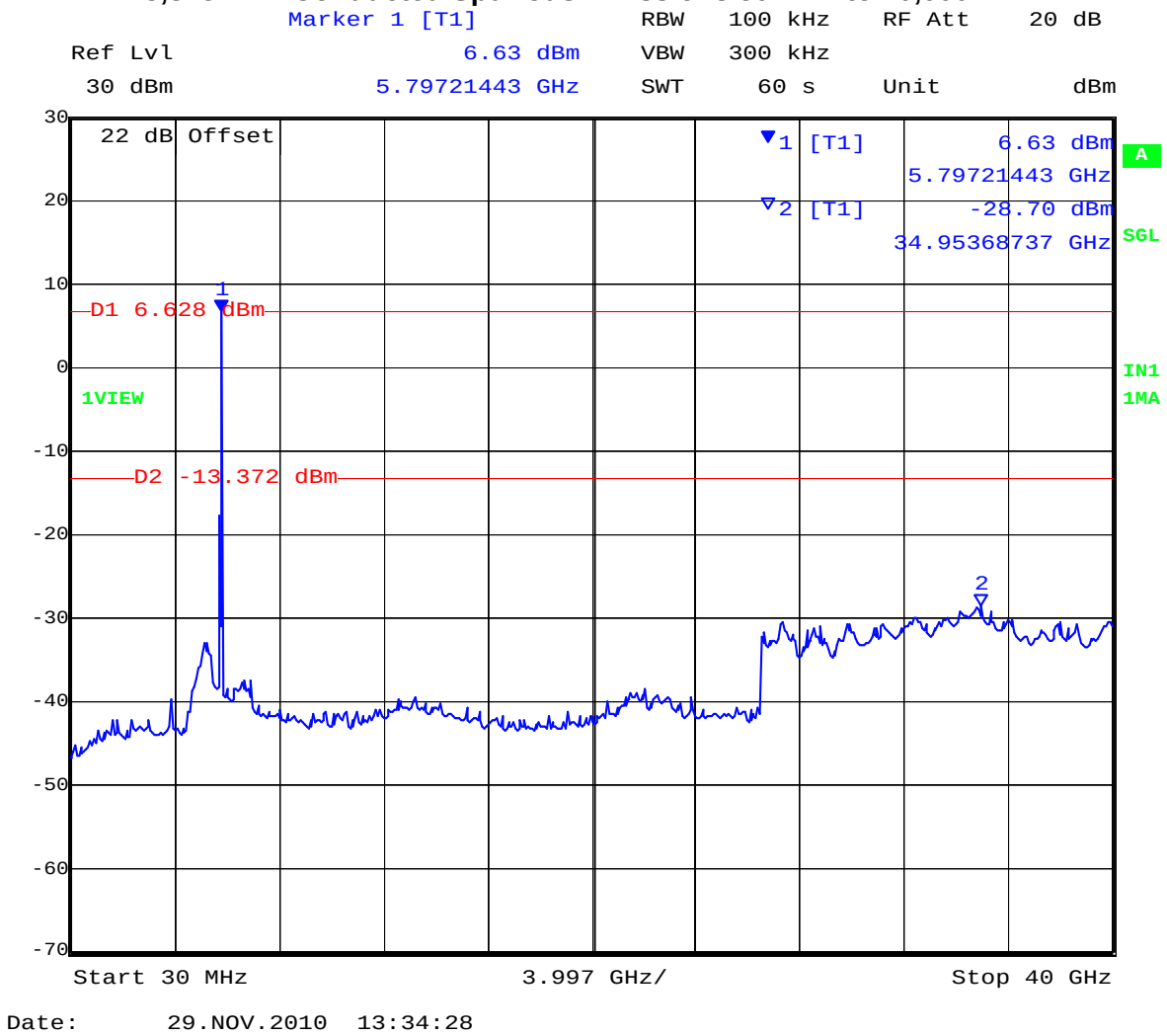
Spurious Emissions (30 - 40,000 MHz)

TABLE OF RESULTS – **802.11n HT-40**

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency (MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
5,815	30	40,000	-28.70	-13.37	-15.3

802.11n HT-40

5,815 MHz Conducted Spurious Emissions 30 MHz to 40,000 MHz



Specification

Limits Band-Edge

Lower Limit Band-edge	Upper Limit Band-edge	Limit below highest level of desired power
2,400 MHz	2,483.5 MHz	≥ 20 dB
5725 MHz	5850 MHz	

§15.247(d) and RSS-210 §A8.5 In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

§15.247(d)
If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section §15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(a)).

RSS-210 §A8.5 If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

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

Laboratory Measurement Uncertainty for Conducted Spurious Emissions

Measurement uncertainty	±2.37 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-05 'Measurement of Spurious Emissions'	0088, 0158, 0287, 0252, 0313, 0314, 0070, 0116, 0117.

5.1.6. Radiated Emissions

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

FCC, Part 15 Subpart C §15.247(d) 15.205; 15.209
Industry Canada RSS-210 §A8.5, §2.2, §2.6
Industry Canada 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.

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

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:

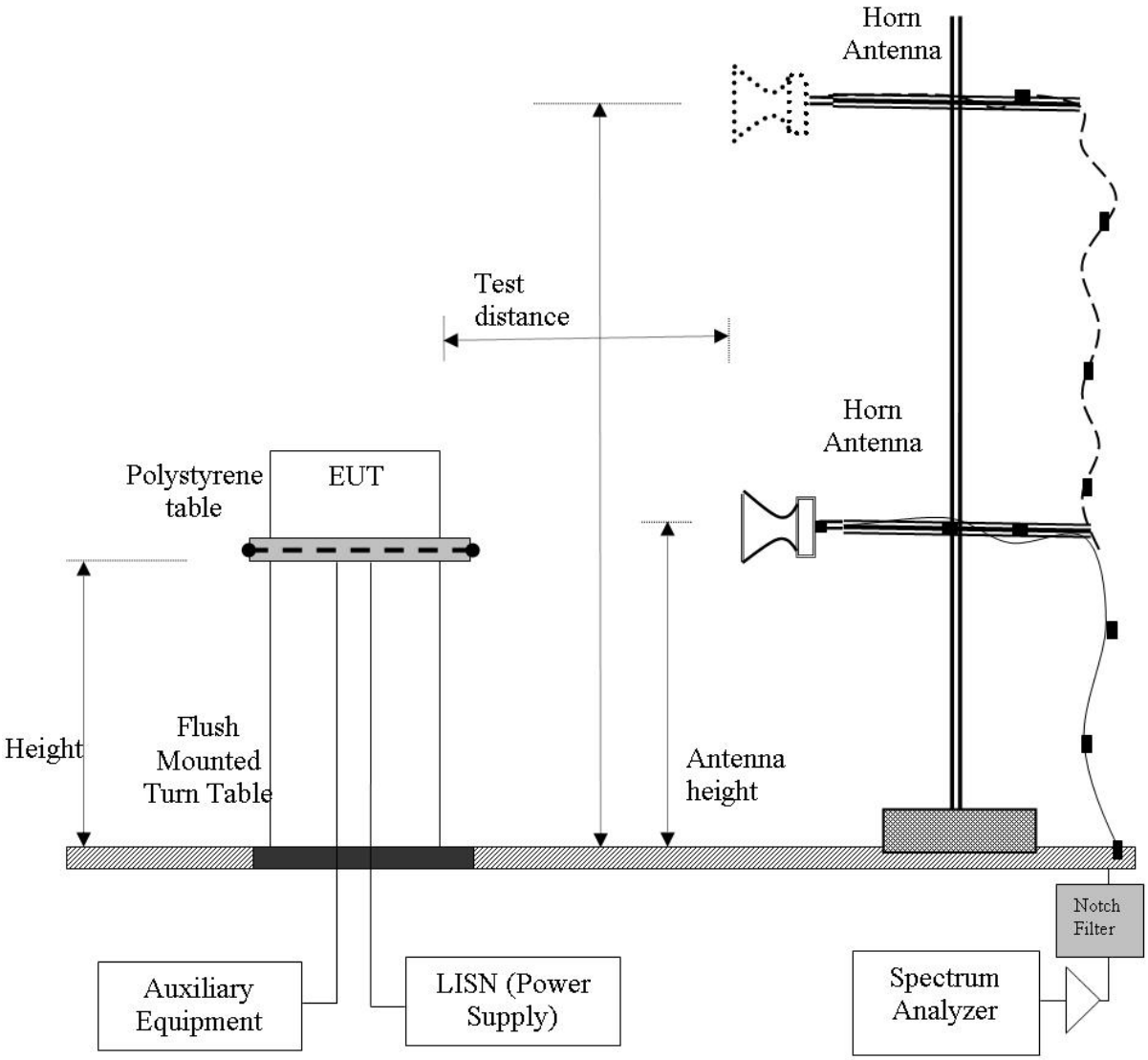
FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3 dBμV/m

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

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

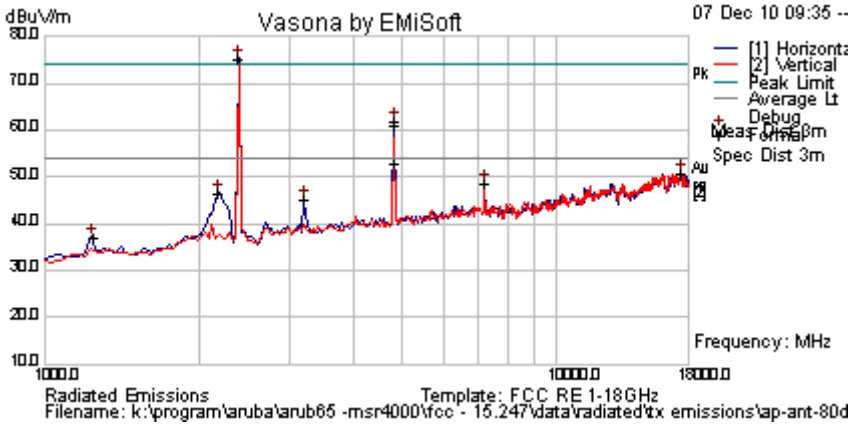
40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

Radiated Emission Measurement Setup – Above 1 GHz



2.4 GHz Operational Mode

Test Freq.	2412 MHz	**Engineer**	SB
Variant	802.11b; 1 Mbs	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	17	**Press. (mBars)**	1011
Antenna	AP-ANT-80D	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

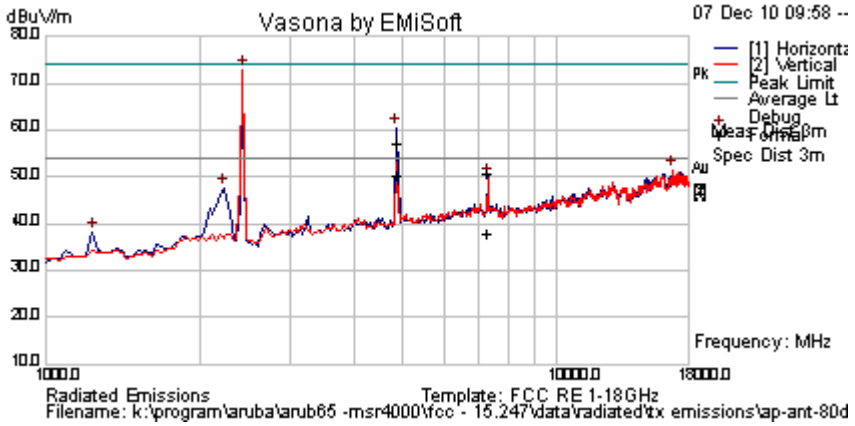


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4823.938	65.9	4.5	-9.4	60.9	Peak Max	H	98	221	74.0	-13.1	Pass	RB
4823.988	58.1	4.5	-9.4	53.1	Average Max	H	98	221	54.0	-0.9	Pass	RB
2396.794	83.5	3.0	-11.2	75.3	Peak [Scan]	H	--	--	--	--	n/a	Fund
17454.910	40.1	8.7	2.0	50.9	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB
7234.469	48.3	5.4	-5.2	48.5	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
3214.449	52.9	3.5	-11.2	45.2	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
2197.553	55.0	2.9	-11.4	46.4	Peak [Scan]	H	98	293	54	-7.6	Pass	BE
1250.353	49.0	2.2	-14.1	37.0	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2437 MHz	**Engineer**	SB
Variant	802.11b; 1 Mbs	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	20	**Press. (mBars)**	1011
Antenna	AP-ANT-80D	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

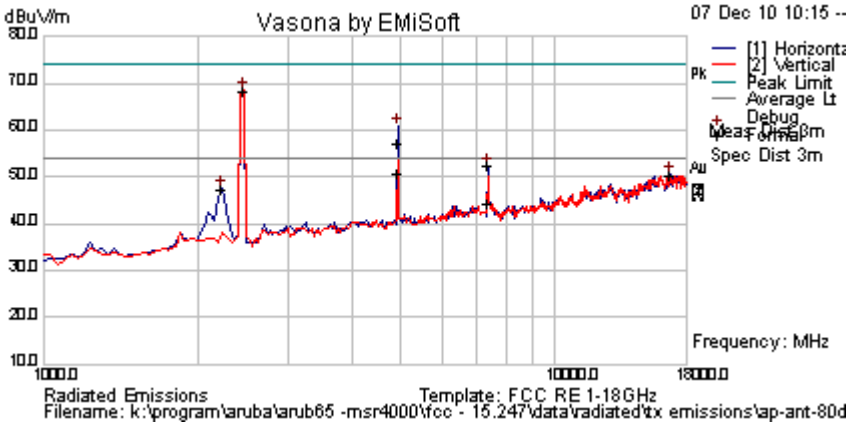


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4873.948	62.2	4.5	-9.3	57.4	Peak Max	H	168	342	74.0	-16.6	Pass	NB
7305.61917	50.4	5.4	-4.9	50.9	Peak Max	H	125	139	74.0	-23.1	Pass	NB
4873.948	55.3	4.5	-9.3	50.5	Average Max	H	168	342	54	-3.5	Pass	NB
7305.619	37.4	5.4	-4.9	37.9	Average Max	H	125	139	54	-16.1	Pass	NB
2430.862	81.1	3.0	-11.1	73.0	Peak [Scan]	V	--	--	--	--	n/a	Fund
16807.615	41.3	8.6	1.6	51.6	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB
1256.378	50.3	2.2	-14.2	38.2	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB
2226.027	56.2	2.9	-11.4	47.7	Peak [Scan]	V	98	363	54	-6.3	Pass	BE

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2462 MHz	**Engineer**	SB
Variant	802.11b; 1 Mbs	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	20	**Press. (mBars)**	1011
Antenna	AP-ANT-80D	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

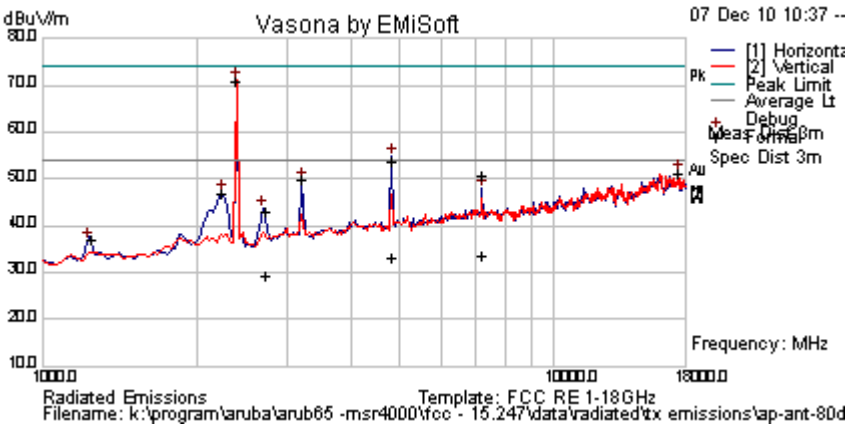


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4923.958	61.9	4.6	-9.1	57.4	Peak Max	H	147	158	74.0	-16.6	Pass	NB
7381.924	52.0	5.5	-4.8	52.7	Peak Max	H	98	137	74.0	-21.3	Pass	NB
4923.958	55.5	4.6	-9.1	51.0	Average Max	H	147	158	54	-3.0	Pass	NB
7381.924	43.7	5.5	-4.8	44.4	Average Max	H	98	137	54	-9.7	Pass	NB
2464.930	76.6	3.0	-11.1	68.5	Peak [Scan]	V	--	--	--	--	n/a	Fund
16807.615	40.3	8.6	1.6	50.5	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
2229.135	55.9	2.9	-11.4	47.3	Peak [Scan]	V	98	0	54	-6.7	Pass	BE

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2412 MHz	**Engineer**	SB
Variant	802.11g; 6 Mbs	**Temp (°C)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	14	**Press. (mBars)**	1011
Antenna	AP-ANT-80D	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

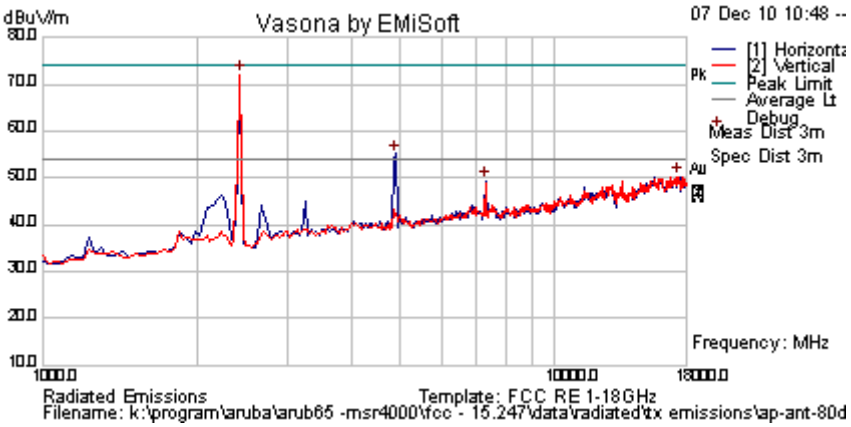


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4825.291	58.9	4.5	-9.5	53.9	Peak Max	H	98	343	74.0	-20.1	Pass	RB
7237.561	50.5	5.4	-5.1	50.8	Peak Max	H	138	133	74.0	-23.2	Pass	RB
2738.976	51.5	3.2	-11.5	43.2	Peak Max	H	105	2	74	-30.8	Pass	RB
4825.291	38.1	4.5	-9.5	33.1	Average Max	H	98	343	54	-20.9	Pass	RB
7237.561	33.5	5.4	-5.1	33.8	Average Max	H	138	133	54	-20.2	Pass	RB
2738.976	37.8	3.2	-11.5	29.5	Average Max	H	105	2	54	-24.5	Pass	RB
2396.794	79.3	3.0	-11.2	71.1	Peak [Scan]	V	--	--	--	--	n/a	Fund
17454.910	40.3	8.7	2.0	51.1	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB
3214.429	57.4	3.5	-11.2	49.7	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
1255.009	48.9	2.2	-14.2	36.9	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB
2256.104	55.3	2.9	-11.3	46.9	Peak [Scan]	V	98	0	54	-7.1	Pass	BE

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2437 MHz	**Engineer**	SB
Variant	802.11g; 6 Mbs	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	14	**Press. (mBars)**	1011
Antenna	AP-ANT-80D	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

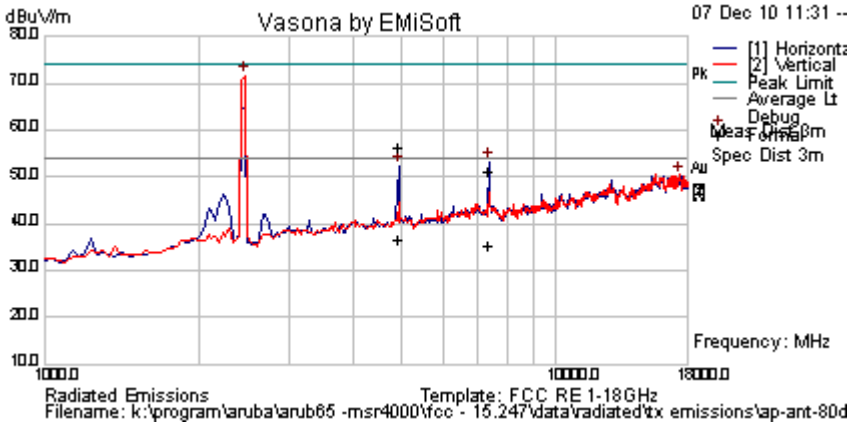


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4874.148	60.3	4.5	-9.3	55.4	Peak Max	H	126	156	74.0	-18.6	Pass	RB
7304.128	53.4	5.4	-4.9	54.0	Peak Max	H	98	132	74.0	-20.0	Pass	RB
2719.898	50.0	3.2	-11.3	41.9	Peak Max	H	103	87	74	-32.1	Pass	RB
3249.302	54.6	3.5	-11.3	46.8	Peak Max	H	102	0	74	-27.2	Pass	RB
4874.148	39.1	4.5	-9.3	34.2	Average Max	H	126	156	54	-19.8	Pass	RB
7304.128	35.2	5.4	-4.9	35.7	Average Max	H	98	132	54	-18.3	Pass	RB
2719.898	36.0	3.2	-11.3	28.0	Average Max	H	103	87	54	-26.1	Pass	RB
3249.302	49.2	3.5	-11.3	41.3	Average Max	H	102	0	54	-12.7	Pass	RB
2430.862	80.3	3.0	-11.1	72.1	Peak [Scan]	V	--	--	--	--	n/a	BE
17420.842	39.7	8.7	1.9	50.3	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB
1245.663	48.4	2.2	-14.1	36.5	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2462 MHz	**Engineer**	SB
Variant	802.11g; 6 Mbs	**Temp (°C)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	12.5	**Press. (mBars)**	1011
Antenna	AP-ANT-80D	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

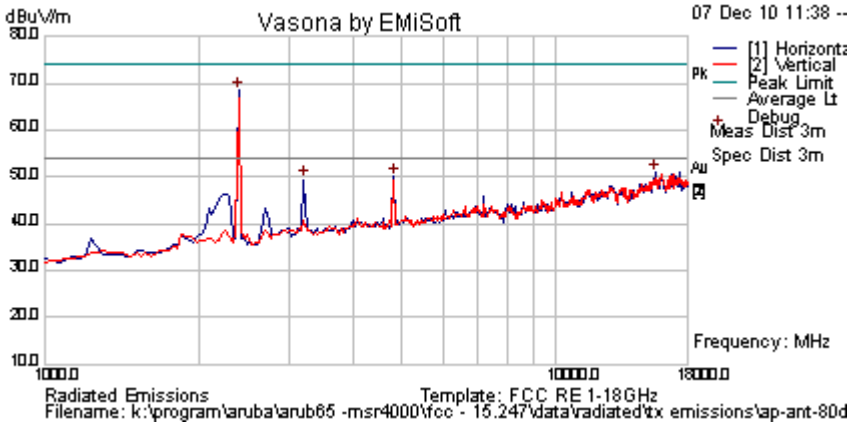


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
7381.964	50.5	5.5	-4.8	51.1	Peak Max	H	98	92	74.0	-22.9	Pass	RB
4923.126	60.7	4.6	-9.1	56.1	Peak Max	H	99	57	74.0	-17.9	Pass	RB
7381.964	34.7	5.5	-4.8	35.3	Average Max	H	98	92	54	-18.7	Pass	RB
4923.126	41.0	4.6	-9.1	36.4	Average Max	H	99	57	54	-17.6	Pass	RB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2412 MHz	**Engineer**	SB
Variant	802.11n; HT-20; 6.5 MCS	**Temp (°C)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	13.5	**Press. (mBars)**	1011
Antenna	AP-ANT-80D	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

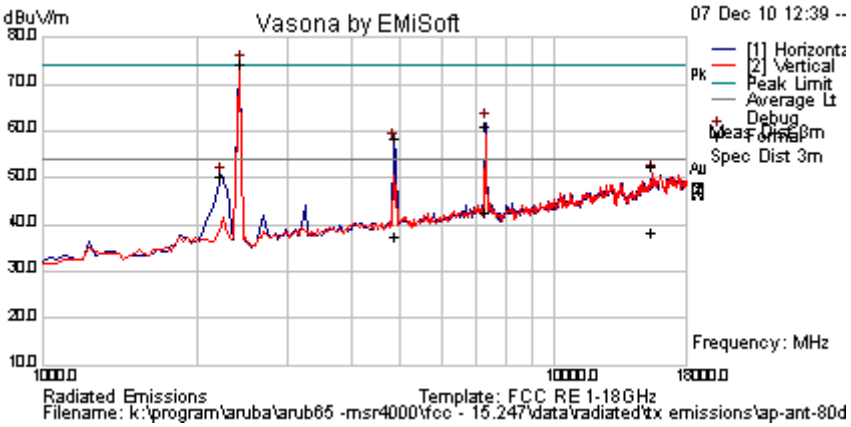


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
15638.117	44.1	8.4	0.1	52.6	Peak Max	H	130	54	74.0	-21.4	Pass	RB
4826.854	57.3	4.5	-9.5	52.3	Peak Max	H	151	253	74.0	-21.7	Pass	RB
15638.117	30.5	8.4	0.1	39.0	Average Max	H	130	54	54	-15.0	Pass	RB
4826.854	36.6	4.5	-9.5	31.6	Average Max	H	151	253	54	-22.5	Pass	RB
2396.794	76.7	3.0	-11.2	68.6	Peak [Scan]	H	--	--	--	--	n/a	Fund
3214.429	57.0	3.5	-11.2	49.3	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2437 MHz	**Engineer**	SB
Variant	802.11n; HT-20; 6.5 MCS	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	20	**Press. (mBars)**	1011
Antenna	AP-ANT-80D	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

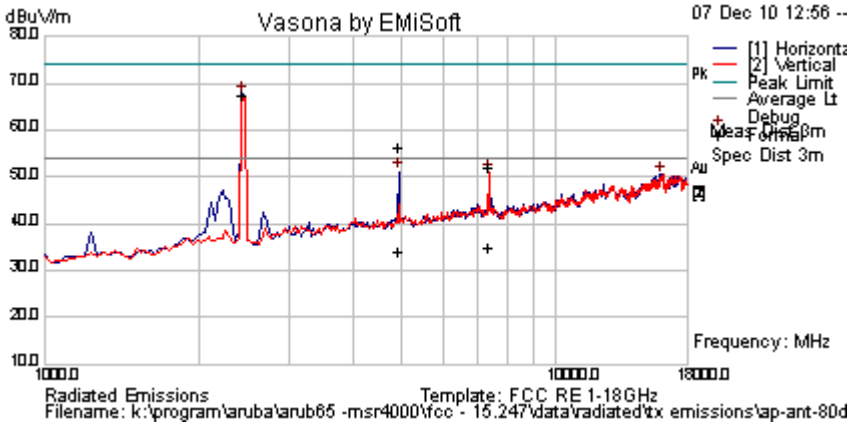


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
7304.529	60.7	5.4	-4.9	61.2	Peak Max	H	124	312	74.0	-12.8	Pass	RB
4864.449	63.3	4.5	-9.3	58.5	Peak Max	H	98	160	74.0	-15.5	Pass	RB
15513.026	44.0	8.2	0.1	52.3	Peak Max	V	188	56	74	-21.7	Pass	RB
7304.529	42.3	5.4	-4.9	42.8	Average Max	H	124	312	54	-11.2	Pass	RB
4864.449	42.2	4.5	-9.3	37.4	Average Max	H	98	160	54	-16.6	Pass	RB
15513.026	30.3	8.2	0.1	38.5	Average Max	V	188	56	54	-15.5	Pass	RB
2430.862	82.6	3.0	-11.1	74.5	Peak [Scan]	H	--	--	--	--	n/a	Fund
2226.453	59.0	2.9	-11.4	50.4	Peak [Scan]	H	100	0	54	-3.6	Pass	BE

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2462 MHz	**Engineer**	SB
Variant	802.11n; HT-20; 6.5 MCS	**Temp (°C)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	12.5	**Press. (mBars)**	1011
Antenna	AP-ANT-80D	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

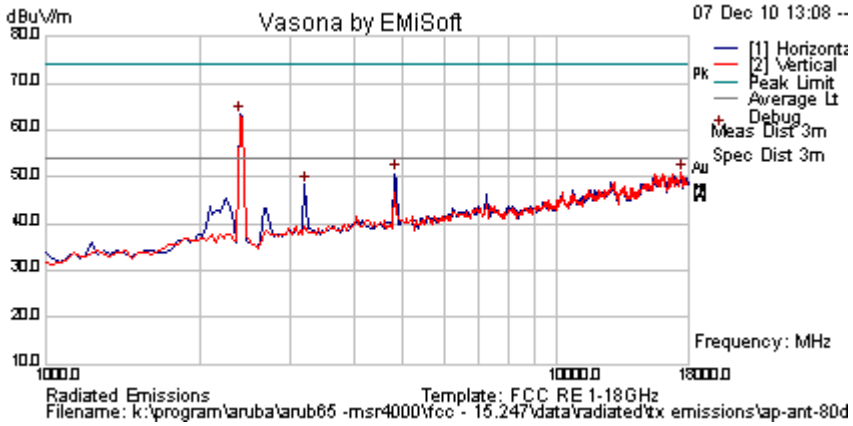


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4919.920	61.1	4.6	-9.2	56.5	Peak Max	H	105	157	74.0	-17.5	Pass	RB
7376.994	51.7	5.5	-4.9	52.2	Peak Max	V	202	113	74.0	-21.8	Pass	RB
15513.026	44.0	8.2	0.1	52.3	Peak Max	V	188	56	74	-21.7	Pass	RB
4919.920	38.8	4.6	-9.2	34.2	Average Max	H	105	157	54	-19.8	Pass	RB
7376.994	34.4	5.5	-4.9	35.0	Average Max	V	202	113	54	-19.0	Pass	RB
15513.026	30.3	8.2	0.1	38.5	Average Max	V	188	56	54	-15.5	Pass	RB
2430.862	75.7	3.0	-11.1	67.5	Peak [Scan]	H	--	--	--	--	n/a	Fund
2226.453	59.0	2.9	-11.4	50.4	Peak [Scan]	H	100	0	54	-3.6	Pass	BE

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2422 MHz	**Engineer**	SB
Variant	802.11n; HT-40; 13.5 MCS	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	11	**Press. (mBars)**	1011
Antenna	AP-ANT-80D	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

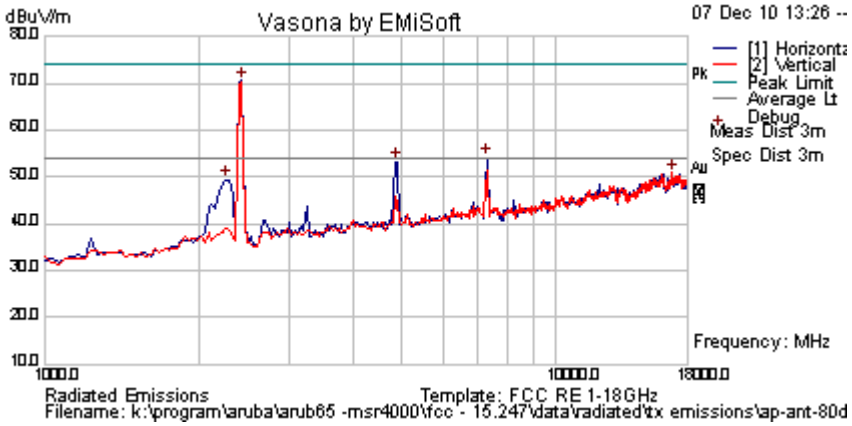


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4849.459	55.4	4.5	-9.3	50.5	Peak Max	H	120	336	74.0	-23.5	Pass	RB
4849.459	37.6	4.5	-9.3	32.8	Average Max	H	120	336	54.0	-21.2	Pass	RB
2396.794	71.6	3.0	-11.2	63.4	Peak [Scan]	H	--	--	--	--	n/a	Fund
17454.910	40.1	8.7	2.0	50.9	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB
3214.429	56.0	3.5	-11.2	48.3	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2437 MHz	**Engineer**	SB
Variant	802.11n; HT-40; 13.5 MCS	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	19.5	**Press. (mBars)**	1011
Antenna	AP-ANT-80D	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

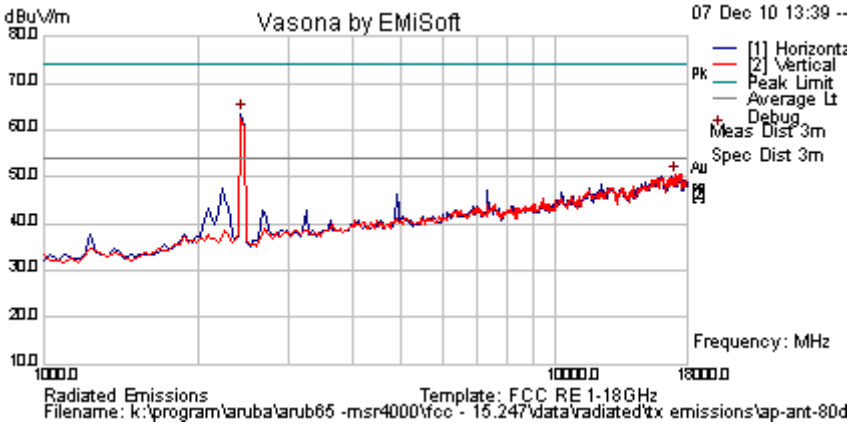


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
7302.926	59.4	5.4	-4.9	60.0	Peak Max	H	119	307	74.0	-14.0	Pass	RB
4871.423	59.1	4.5	-9.3	54.3	Peak Max	H	98	69	74.0	-19.7	Pass	RB
7302.926	43.3	5.4	-4.9	43.8	Average Max	H	119	307	54	-10.2	Pass	RB
4871.423	40.6	4.5	-9.3	35.8	Average Max	H	98	69	54	-18.2	Pass	RB
2430.862	78.7	3.0	-11.1	70.5	Peak [Scan]	H	--	--	--	--	n/a	Fund
16841.683	40.6	8.6	1.8	50.9	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB
2260.521	57.9	2.9	-11.3	49.5	Peak [Scan]	H	100	0	54	-4.5	Pass	BE

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2452 MHz	**Engineer**	SB
Variant	802.11n; HT-40; 13.5 MCS	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	10	**Press. (mBars)**	1011
Antenna	AP-ANT-80D	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

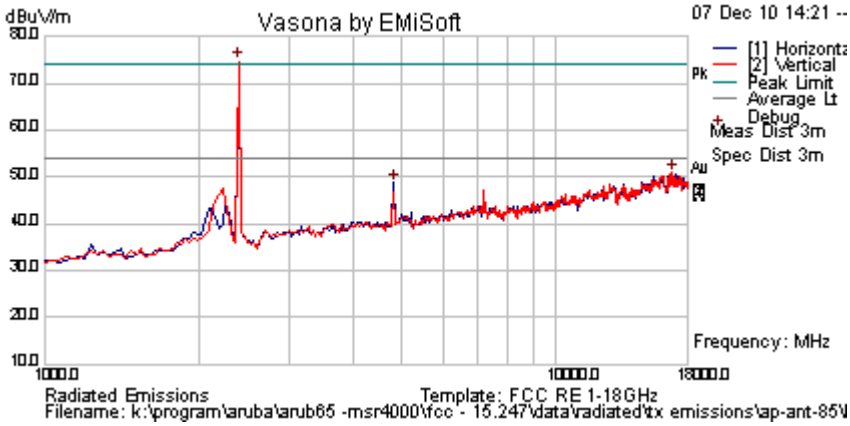


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2430.862	71.6	3.0	-11.1	63.5	Peak [Scan]	H	--	--	--	--	n/a	Fund
17114.228	41.2	8.5	0.8	50.5	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2412 MHz	**Engineer**	SB
Variant	802.11b; 1 Mbs	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	16.5	**Press. (mBars)**	1011
Antenna	AP-ANT-85	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

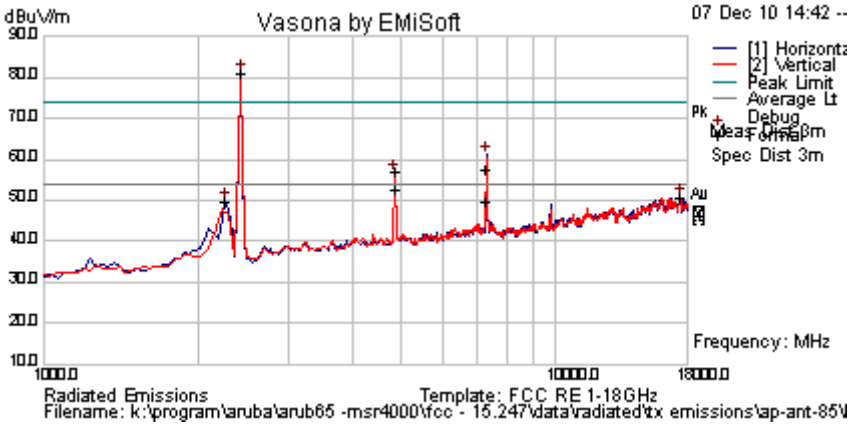


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4824.013	55.9	4.5	-9.4	50.9	Peak Max	H	153	51	74.0	-23.1	Pass	RB
4824.013	52.3	4.5	-9.4	47.3	Average Max	H	153	51	54.0	-6.7	Pass	RB
2396.794	83.0	3.0	-11.2	74.8	Peak [Scan]	V	--	--	--	--	n/a	Fund
16841.683	40.5	8.6	1.8	50.9	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2437 MHz	**Engineer**	SB
Variant	802.11b; 1 Mbs	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	21	**Press. (mBars)**	1011
Antenna	AP-ANT-85	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

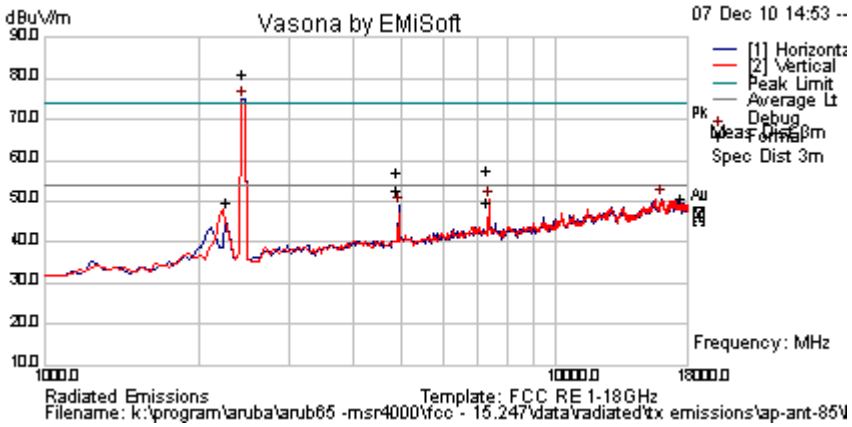


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
7308.417	56.9	5.4	-4.9	57.5	Peak Max	H	111	58	74.0	-16.5	Pass	RB
4873.985	62.1	4.5	-9.3	57.3	Peak Max	H	138	51	74.0	-16.8	Pass	RB
7308.417	49.2	5.4	-4.9	49.8	Average Max	H	111	58	54	-4.2	Pass	RB
4874.015	57.6	4.5	-9.3	52.7	Average Max	H	138	51	54	-1.3	Pass	RB
2430.862	89.3	3.0	-11.1	81.1	Peak [Scan]	H	--	--	--	--	n/a	Fund
17454.910	39.9	8.7	2.0	50.7	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
2260.521	58.2	2.9	-11.3	49.7	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2462 MHz	**Engineer**	SB
Variant	802.11b; 1 Mbs	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	16.5	**Press. (mBars)**	1011
Antenna	AP-ANT-85	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

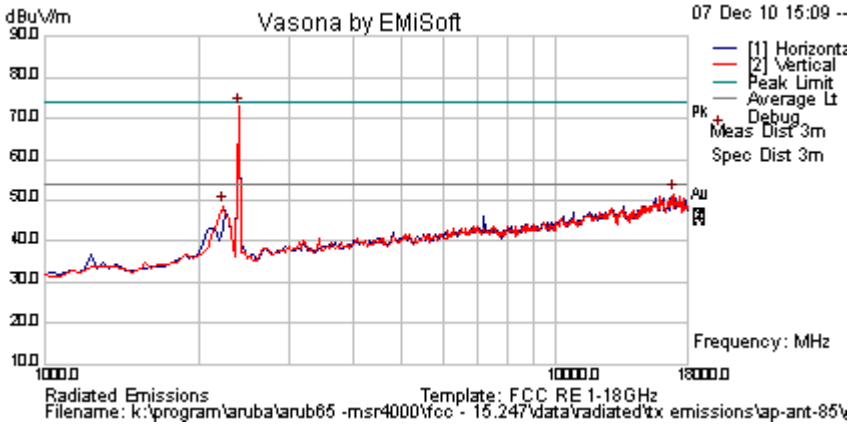


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
16055.821	43.4	9.0	0.7	53.1	Peak Max	H	197	27	74.0	-20.9	Pass	RB
7383.166	49.8	5.5	-4.8	50.4	Peak Max	V	168	53	74.0	-23.6	Pass	RB
4923.998	55.1	4.6	-9.1	50.6	Peak Max	H	104	0	74	-23.4	Pass	RB
16055.821	29.9	9.0	0.7	39.6	Average Max	H	197	27	54	-14.4	Pass	RB
7383.166	41.8	5.5	-4.8	42.4	Average Max	V	168	53	54	-11.6	Pass	RB
4923.998	50.6	4.6	-9.1	46.1	Average Max	H	104	0	54	-7.9	Pass	RB
2430.862	82.9	3.0	-11.1	74.8	Peak [Scan]	H	--	--	--	--	n/a	Fund

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2412 MHz	**Engineer**	SB
Variant	802.11g; 6 Mbs	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	13	**Press. (mBars)**	1011
Antenna	AP-ANT-85	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

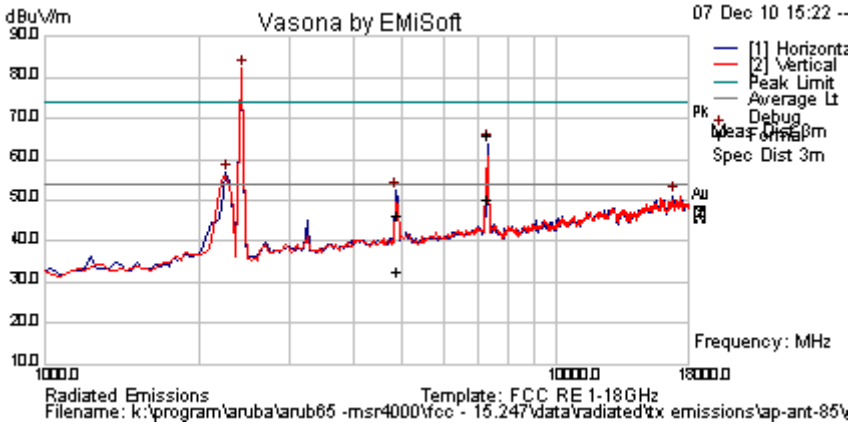


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2396.794	81.2	3.0	-11.2	73.0	Peak [Scan]	V	--	--	--	--	n/a	Fund
16875.752	41.9	8.6	1.1	51.6	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB
2226.453	57.3	2.9	-11.4	48.8	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2437 MHz	**Engineer**	SB
Variant	802.11g; 6 Mbs	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	22	**Press. (mBars)**	1011
Antenna	AP-ANT-85	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

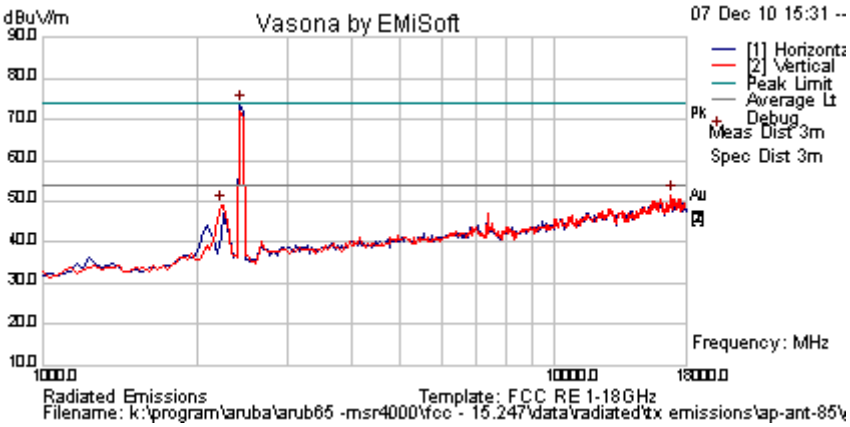


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
7304.449	65.4	5.4	-4.9	65.9	Peak Max	H	120	53	74.0	-8.1	Pass	RB
4874.87	51.1	4.5	-9.3	46.3	Peak Max	H	191	358	74.0	-27.7	Pass	RB
7304.449	49.6	5.4	-4.9	50.1	Average Max	H	120	53	54	-3.9	Pass	RB
4874.870	37.3	4.5	-9.3	32.5	Average Max	H	191	358	54	-21.5	Pass	RB
2430.862	90.5	3.0	-11.1	82.3	Peak [Scan]	V	--	--	--	--	n/a	Fund
16841.683	40.7	8.6	1.8	51.0	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2462 MHz	**Engineer**	SB
Variant	802.11g; 6 Mbs	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	11.5	**Press. (mBars)**	1011
Antenna	AP-ANT-85	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

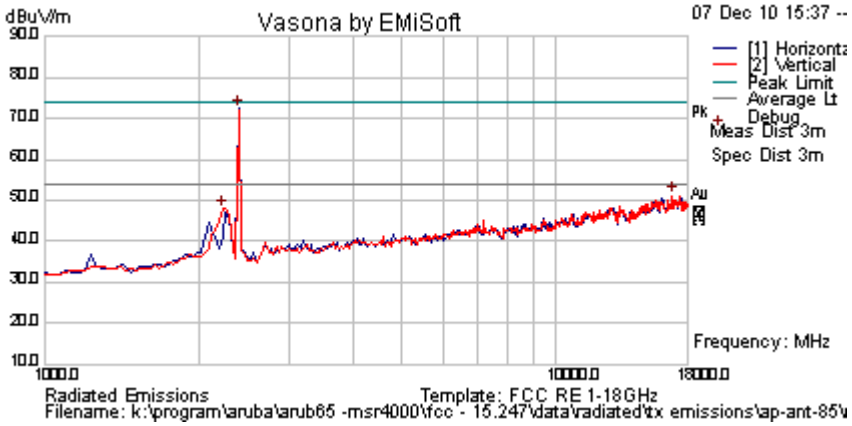


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2430.862	81.9	3.0	-11.1	73.8	Peak [Scan]	H	--	--	--	--	n/a	Fund
16841.683	41.2	8.6	1.8	51.5	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB
2226.453	57.7	2.9	-11.4	49.1	Peak [Scan]	V	100				Pass	BE

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2412 MHz	**Engineer**	SB
Variant	802.11n; HT-20; 6.5 MCS	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	13	**Press. (mBars)**	1011
Antenna	AP-ANT-85	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

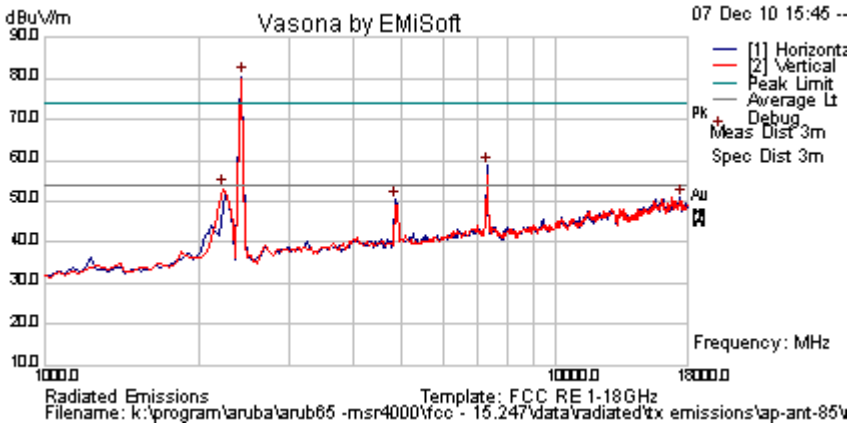


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2396.794	80.5	3.0	-11.2	72.3	Peak [Scan]	H	--	--	--	--	n/a	Fund
16841.683	40.7	8.6	1.8	51.0	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB
2226.453	56.6	2.9	-11.4	48.1	Peak [Scan]	V	150	0	54	-6.0	Pass	BE

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2437 MHz	**Engineer**	SB
Variant	802.11n; HT-20; 6.5 MCS	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	20	**Press. (mBars)**	1011
Antenna	AP-ANT-85	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

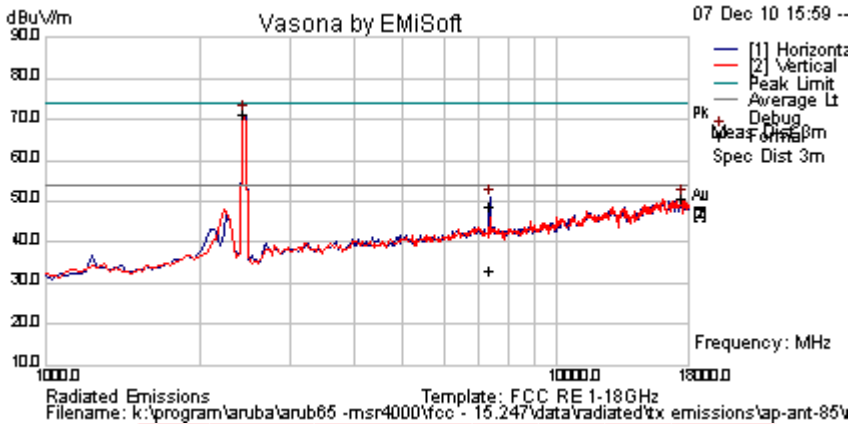


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
7301.483	57.8	5.4	-4.9	58.3	Peak Max	H	103	59	74.0	-15.7	Pass	RB
4874.87	58.5	4.5	-9.3	53.6	Peak Max	H	102	4	74.0	-20.4	Pass	RB
7301.483	40.6	5.4	-4.9	41.2	Average Max	H	103	59	54	-12.8	Pass	RB
4874.870	44.5	4.5	-9.3	39.6	Average Max	H	102	4	54	-14.4	Pass	RB
2430.862	88.6	3.0	-11.1	80.5	Peak [Scan]	H	--	--	--	--	n/a	Fund
2226.453	61.6	2.9	-11.4	53.1	Peak [Scan]	V	150	0	54	-0.9	Pass	BE
17454.910	40.0	8.7	2.0	50.8	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2462 MHz	**Engineer**	SB
Variant	802.11n; HT-20; 6.5 MCS	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	11.5	**Press. (mBars)**	1011
Antenna	AP-ANT-85	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

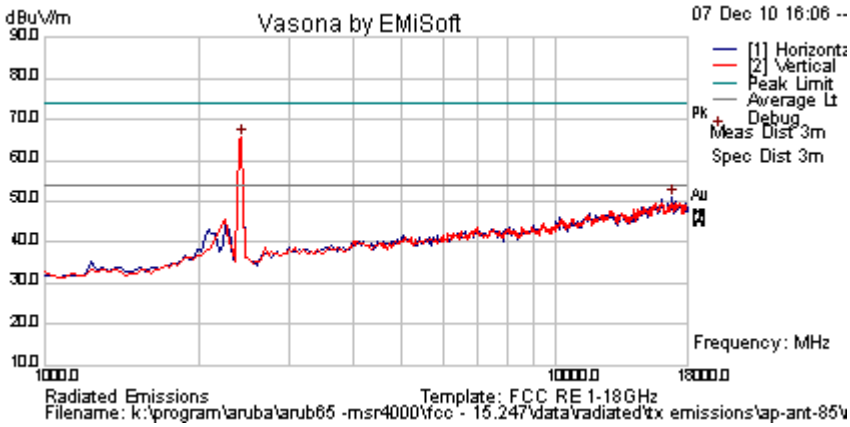


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
7381.964	48.0	5.5	-4.8	48.7	Peak Max	H	98	360	74.0	-25.3	Pass	RB
7381.964	32.6	5.5	-4.8	33.3	Average Max	H	98	360	54.0	-20.7	Pass	RB
2430.862	79.5	3.0	-11.1	71.3	Peak [Scan]	H	--	--	--	--	n/a	Fund
17454.910	39.9	8.7	2.0	50.7	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2422 MHz	**Engineer**	SB
Variant	802.11n; HT-40; 13.5 MCS	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	9	**Press. (mBars)**	1011
Antenna	AP-ANT-85	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

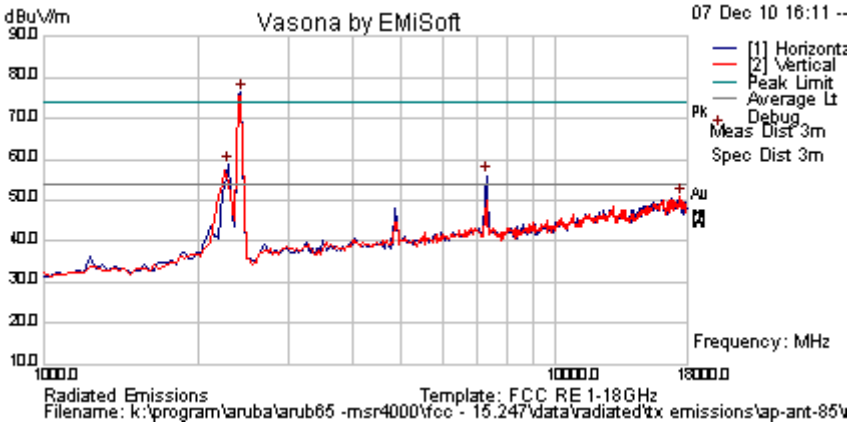


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2430.862	73.7	3.0	-11.1	65.5	Peak [Scan]	V	--	--	--	--	n/a	Fund
16841.683	40.5	8.6	1.8	50.8	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2437 MHz	**Engineer**	SB
Variant	802.11n; HT-40; 13.5 MCS	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	16	**Press. (mBars)**	1011
Antenna	AP-ANT-85	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			

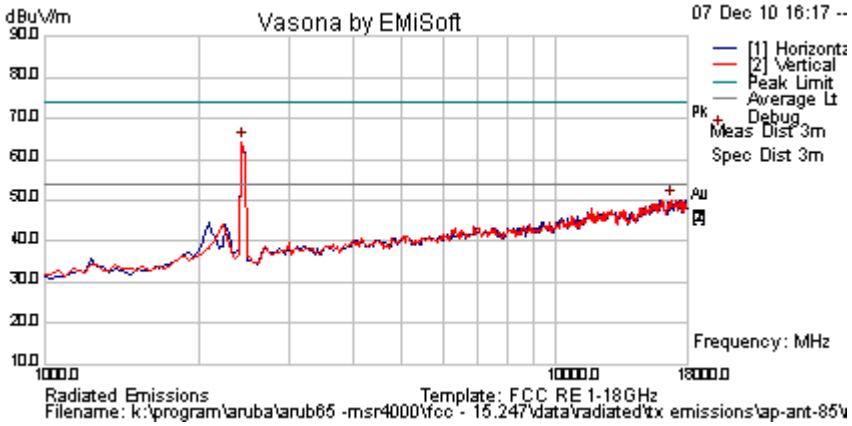


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
7302.445	55.0	5.4	-4.9	55.6	Peak	H	98	360	74.0	-18.5	Pass	RB
7302.445	38.2	5.4	-4.9	38.7	Average	H	98	360	54.0	-15.3	Pass	RB
2430.862	84.5	3.0	-11.1	76.4	Peak [Scan]	H	--	--	--	--	n/a	Fund
17454.910	40.1	8.7	2.0	50.8	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	2452 MHz	**Engineer**	SB
Variant	802.11n; HT-40; 13.5 MCS	**Temp (ºC)**	17.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	6.5	**Press. (mBars)**	1011
Antenna	AP-ANT-85	**Duty Cycle (%)**	100
Test Notes 1	Radio #3		
Test Notes 2			



Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2430.862	72.5	3.0	-11.1	64.4	Peak [Scan]	H	--	--	--	--	n/a	Fund
16807.615	40.0	8.6	1.6	50.2	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

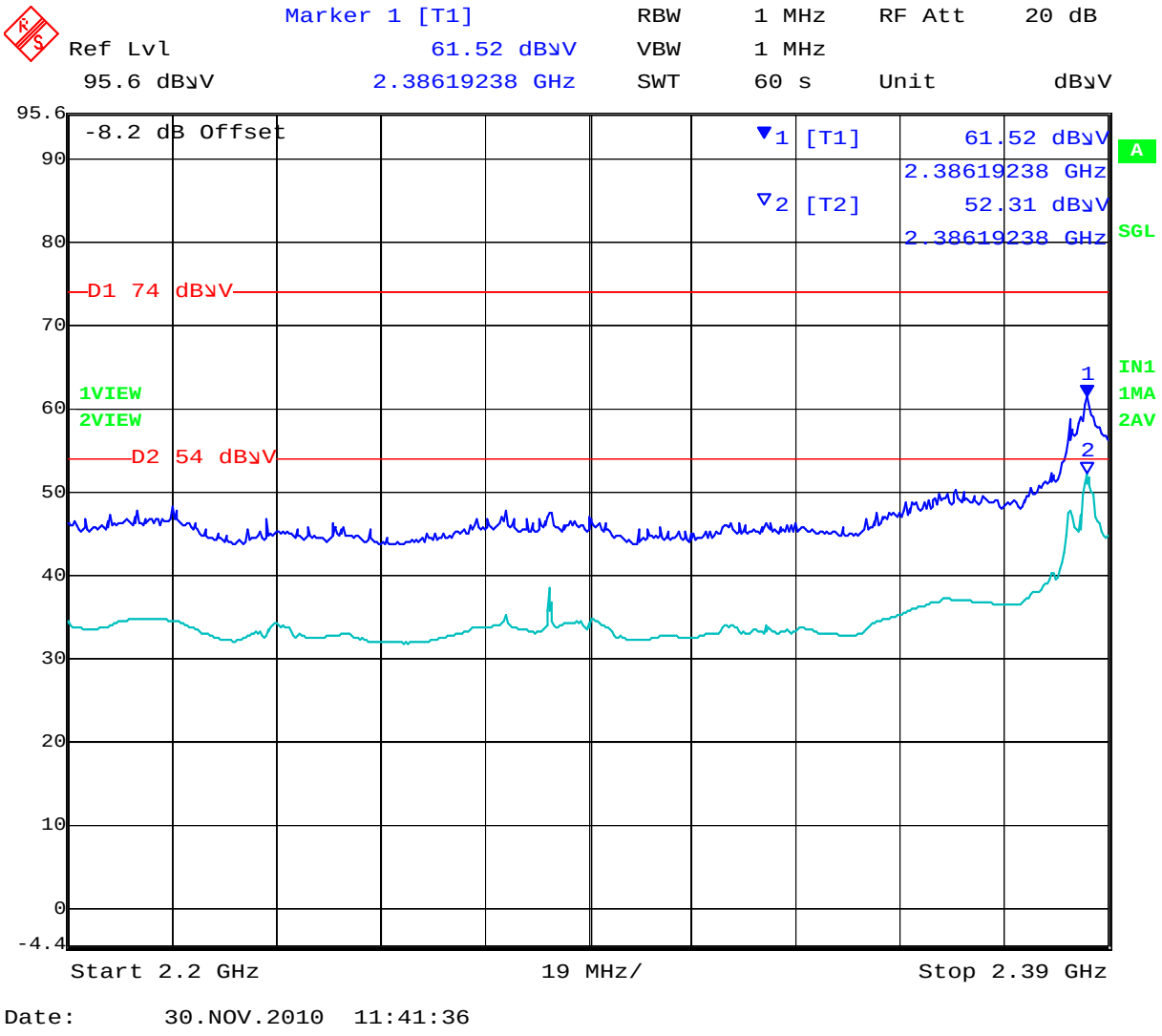
5.1.6.2. Radiated Band-Edge 2.4 GHz Antenna

Restricted Band 2390 MHz and 2483.5 MHz

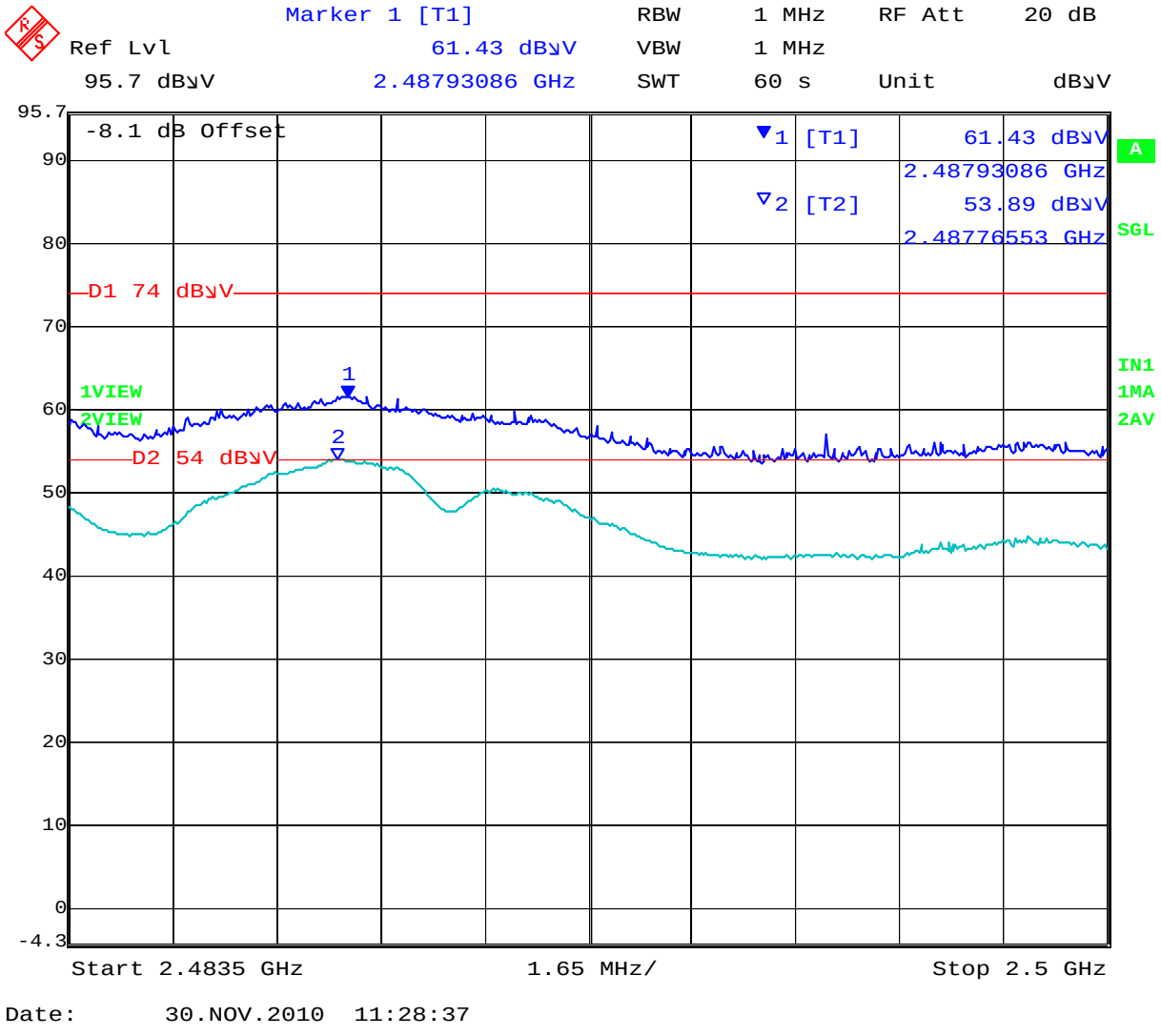
A reduction in power was necessary in order to bring the unit into compliance for all band-edge tests. The reduction in power is reported in Section 5.1.2 Peak Output Power.

ANTENNA AP-ANT-80D

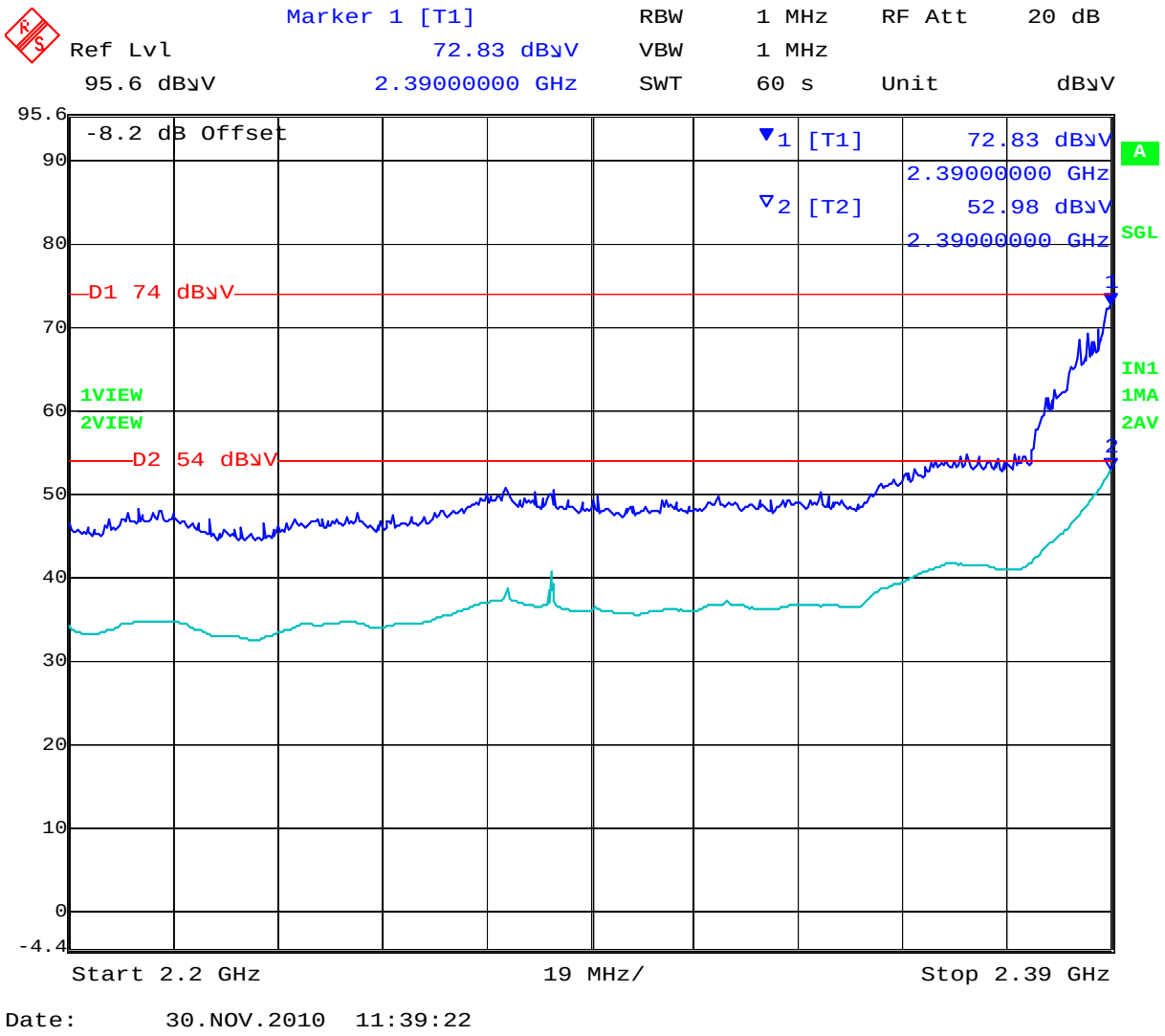
802.11b Operating Channel 2412 MHz Antenna AP-ANT-80D



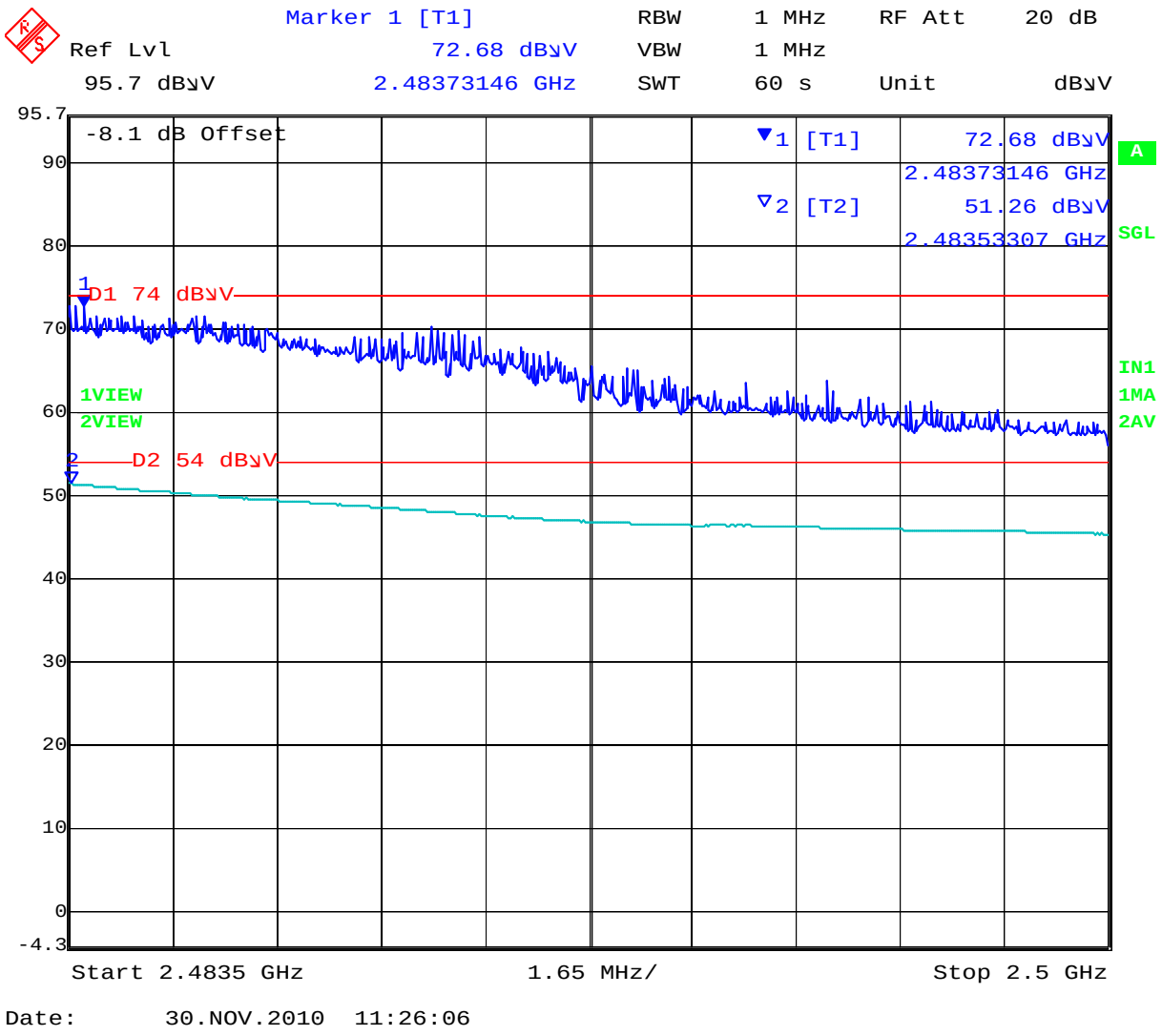
802.11b Operating Channel 2462 MHz Antenna AP-ANT-80D



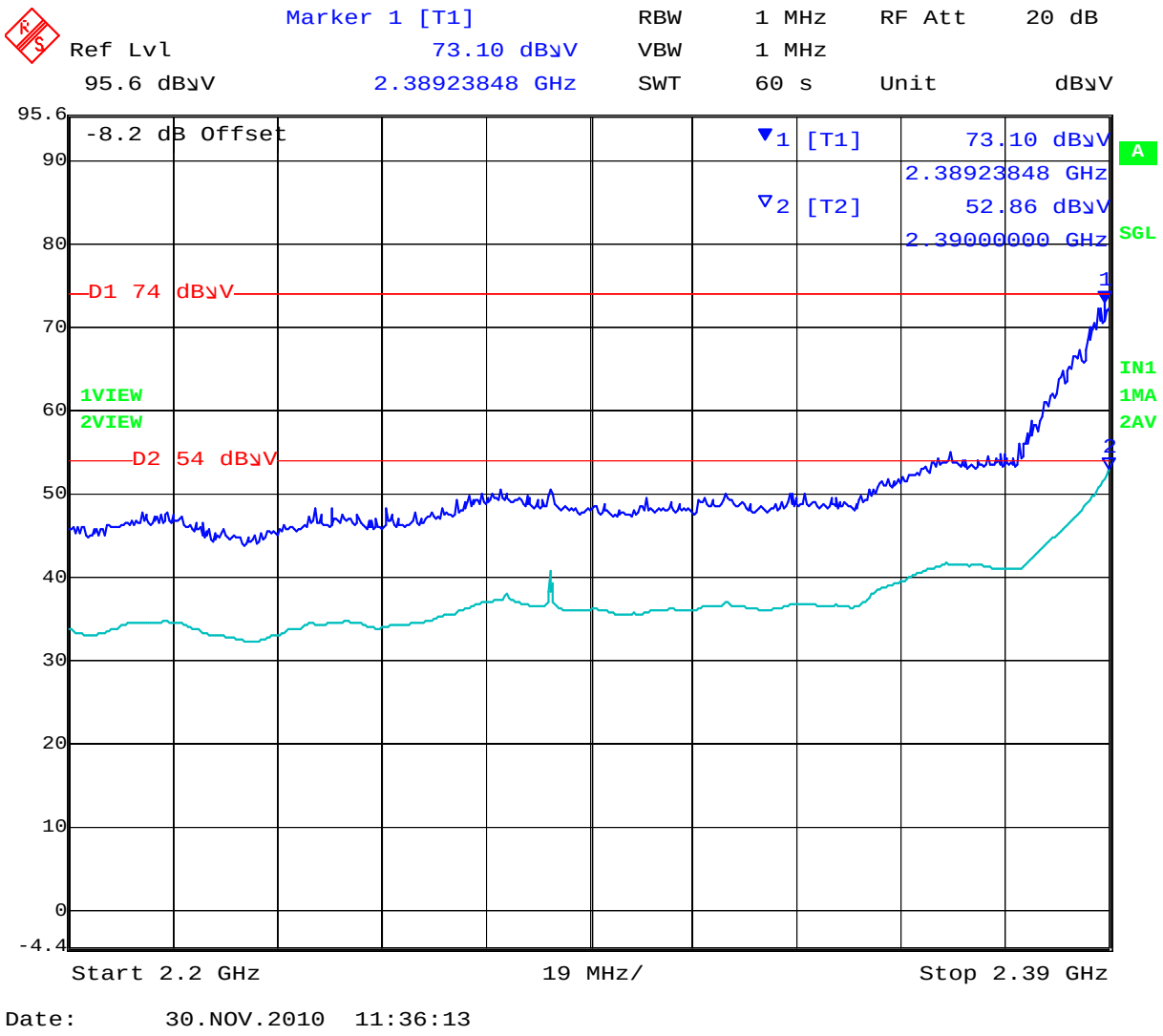
802.11g Operating Channel 2412 MHz Antenna AP-ANT-80D



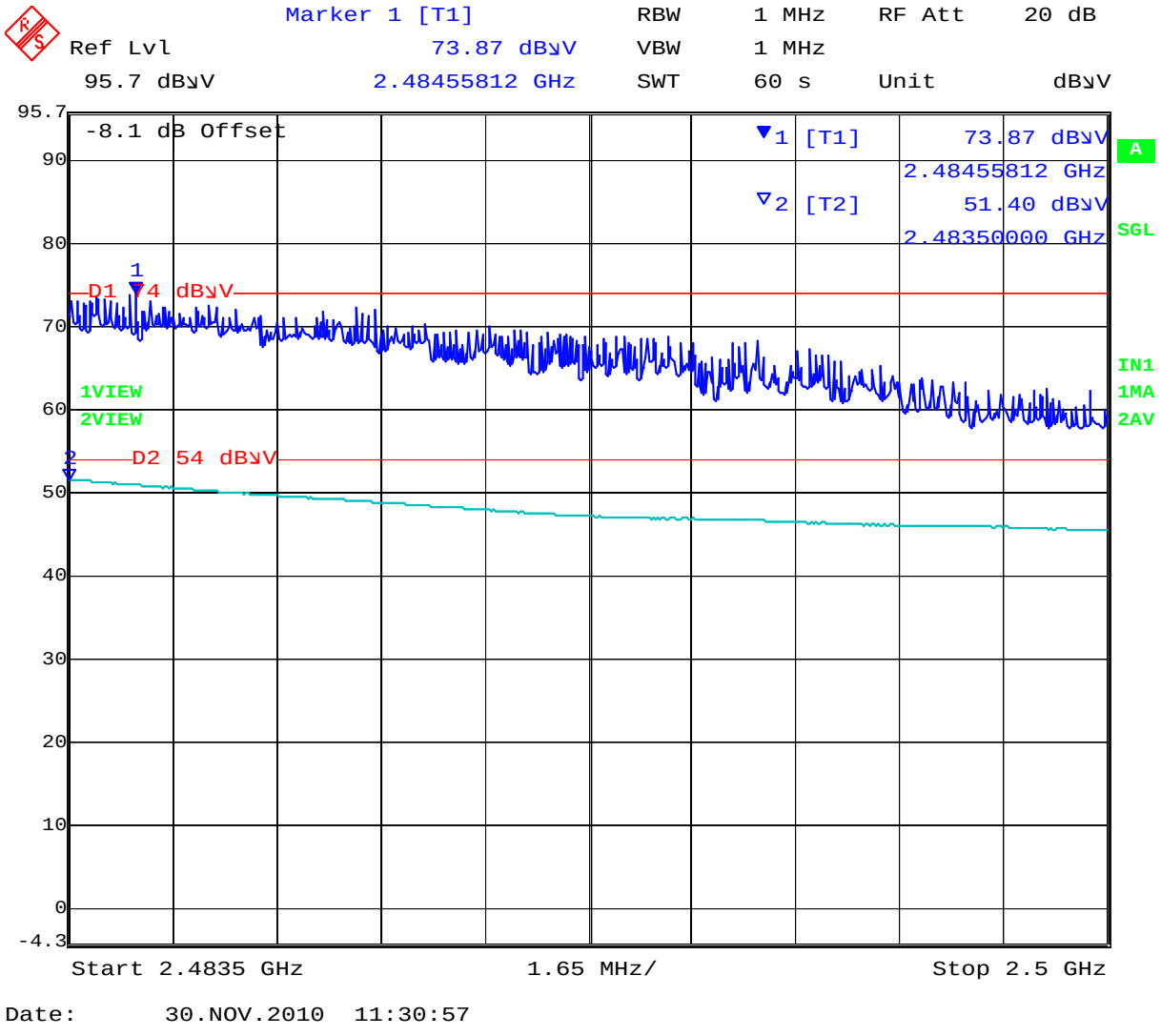
802.11g Operating Channel 2462 MHz Antenna AP-ANT-80D



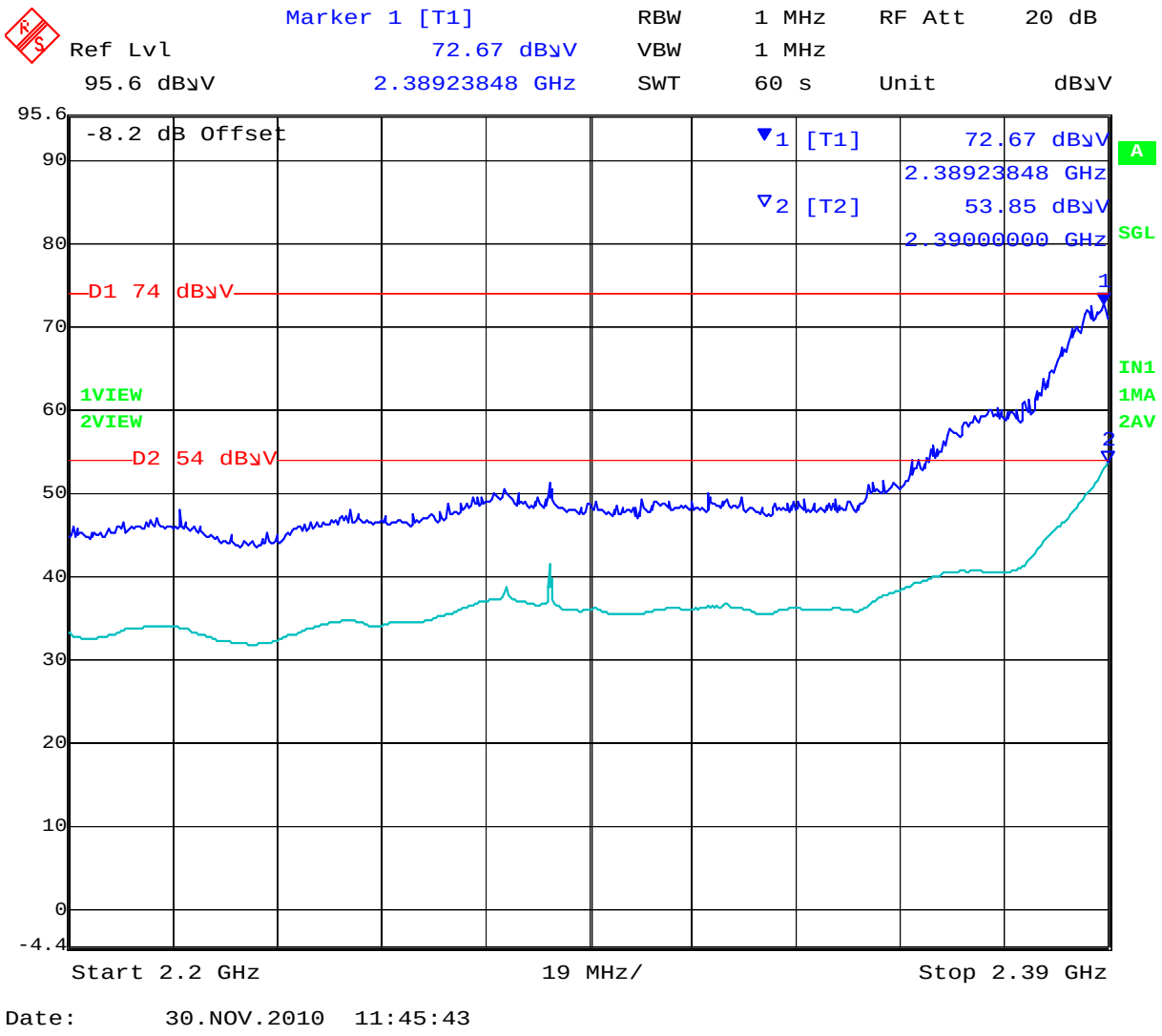
802.11n HT-20 Operating Channel 2412 MHz Antenna AP-ANT-80D



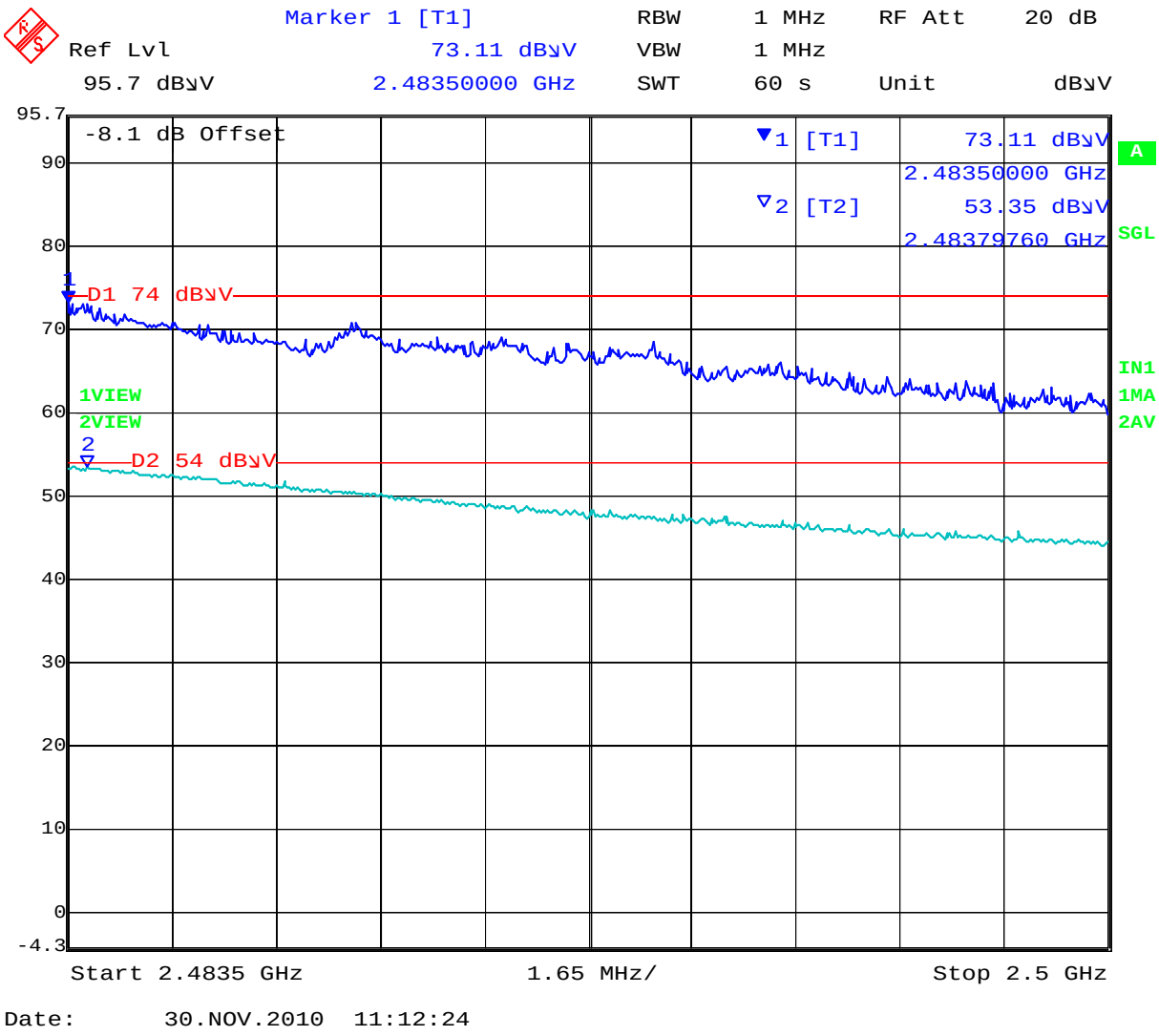
802.11n HT-20 Operating Channel 2462 MHz Antenna AP-ANT-80D



802.11n HT-40 Operating Channel 2422 MHz Antenna AP-ANT-80D

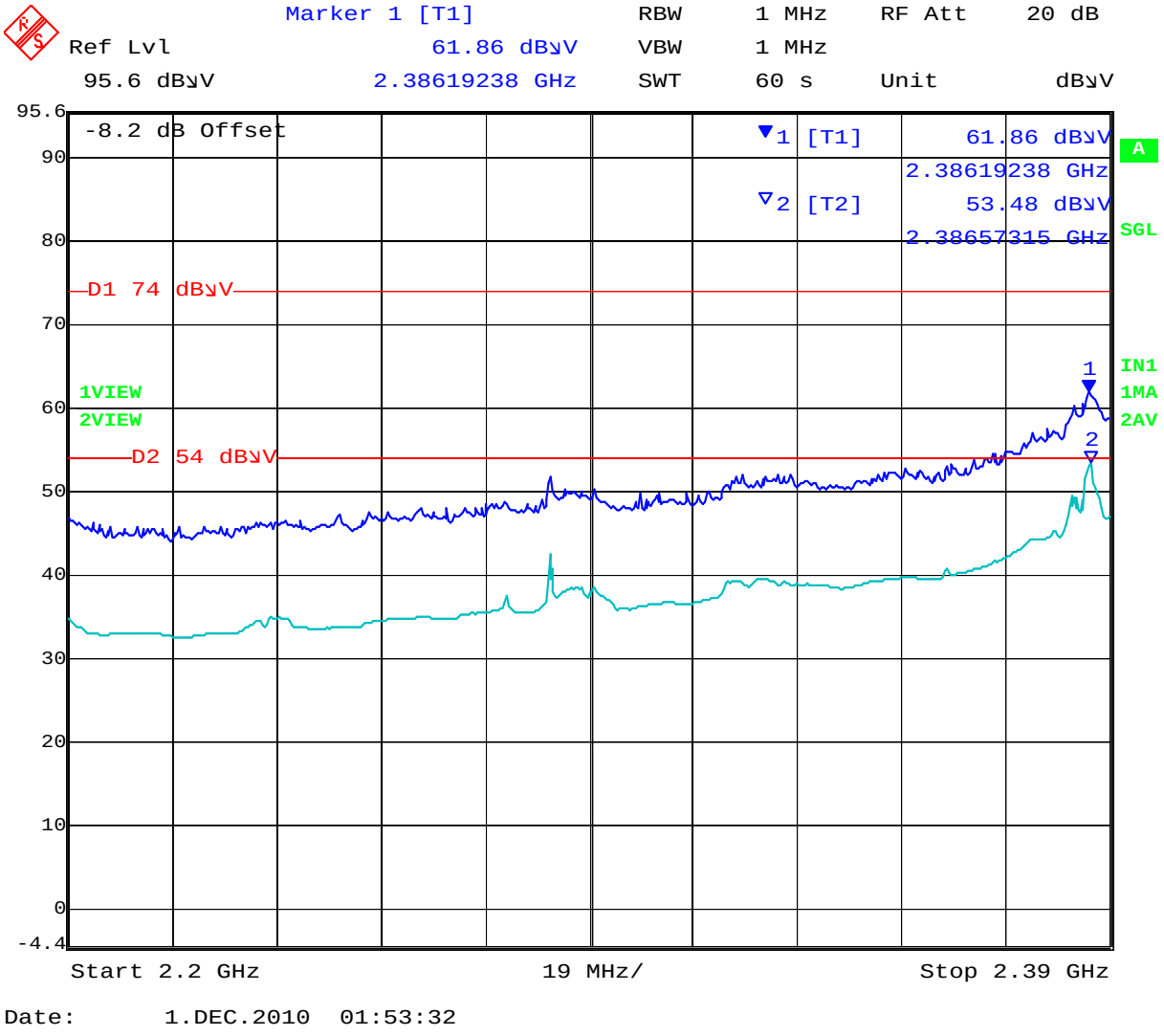


802.11n HT-40 Operating Channel 2452 MHz Antenna AP-ANT-80D

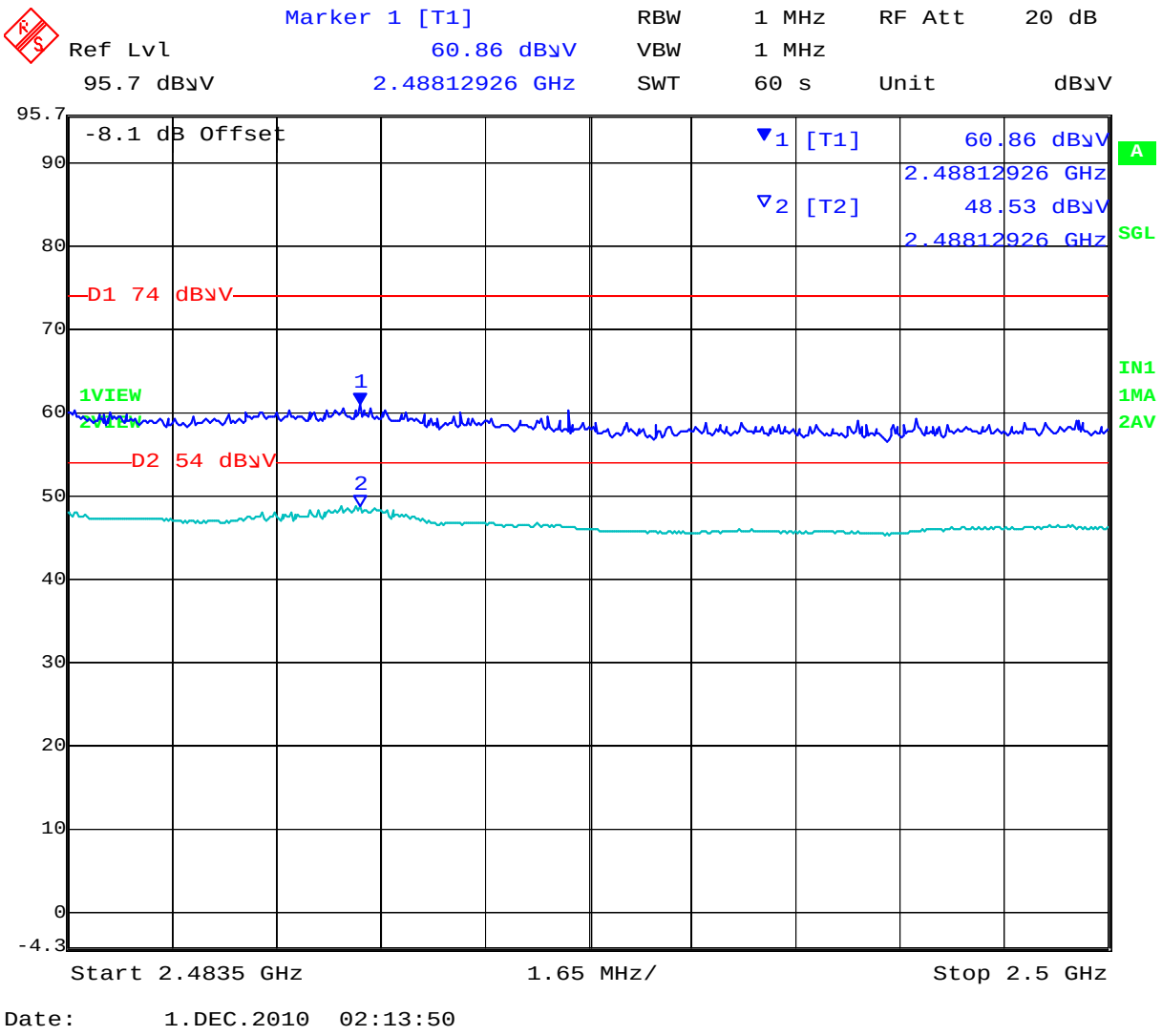


ANTENNA AP-ANT-85

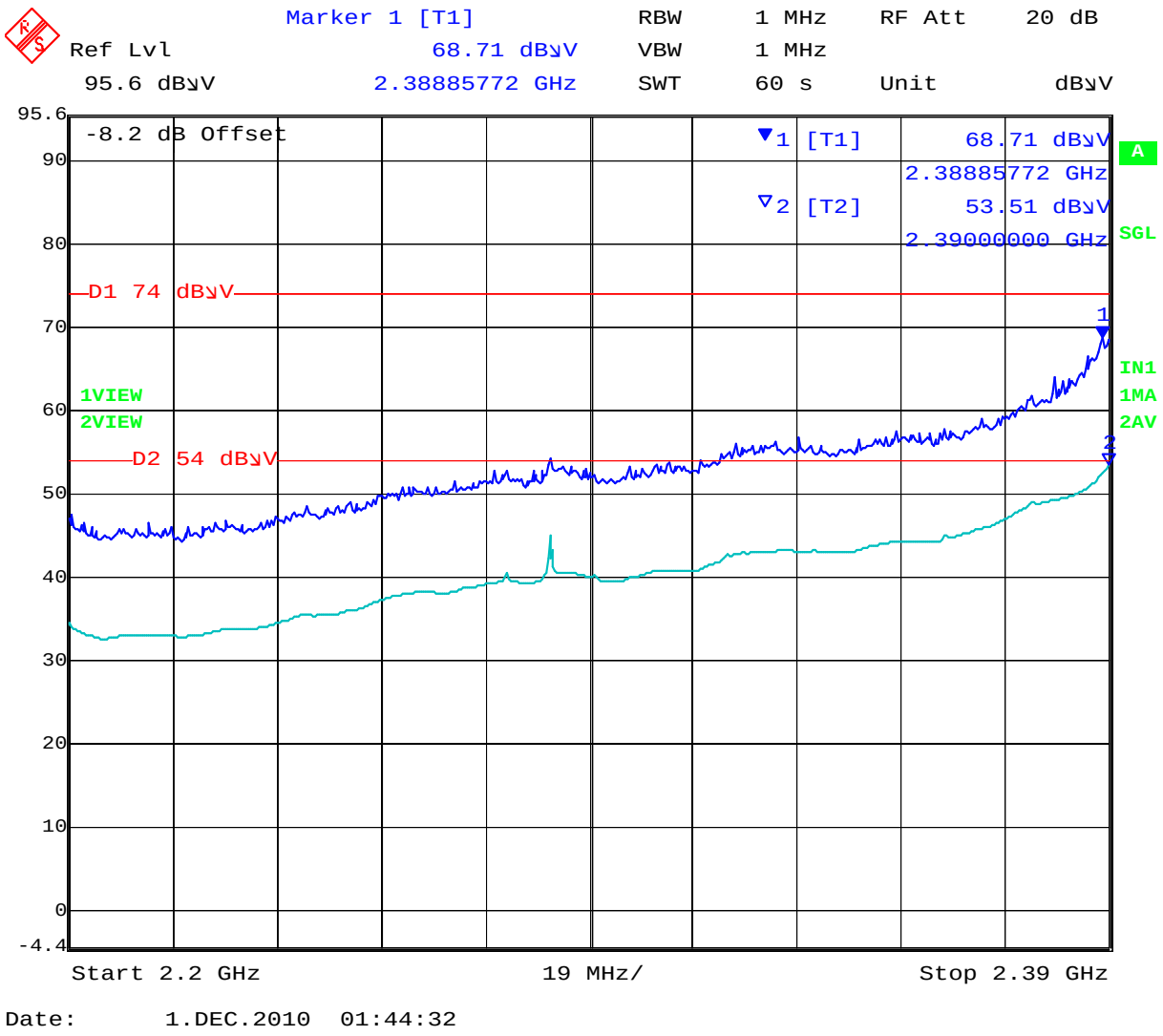
802.11b Operating Channel 2412 MHz Antenna AP-ANT-85



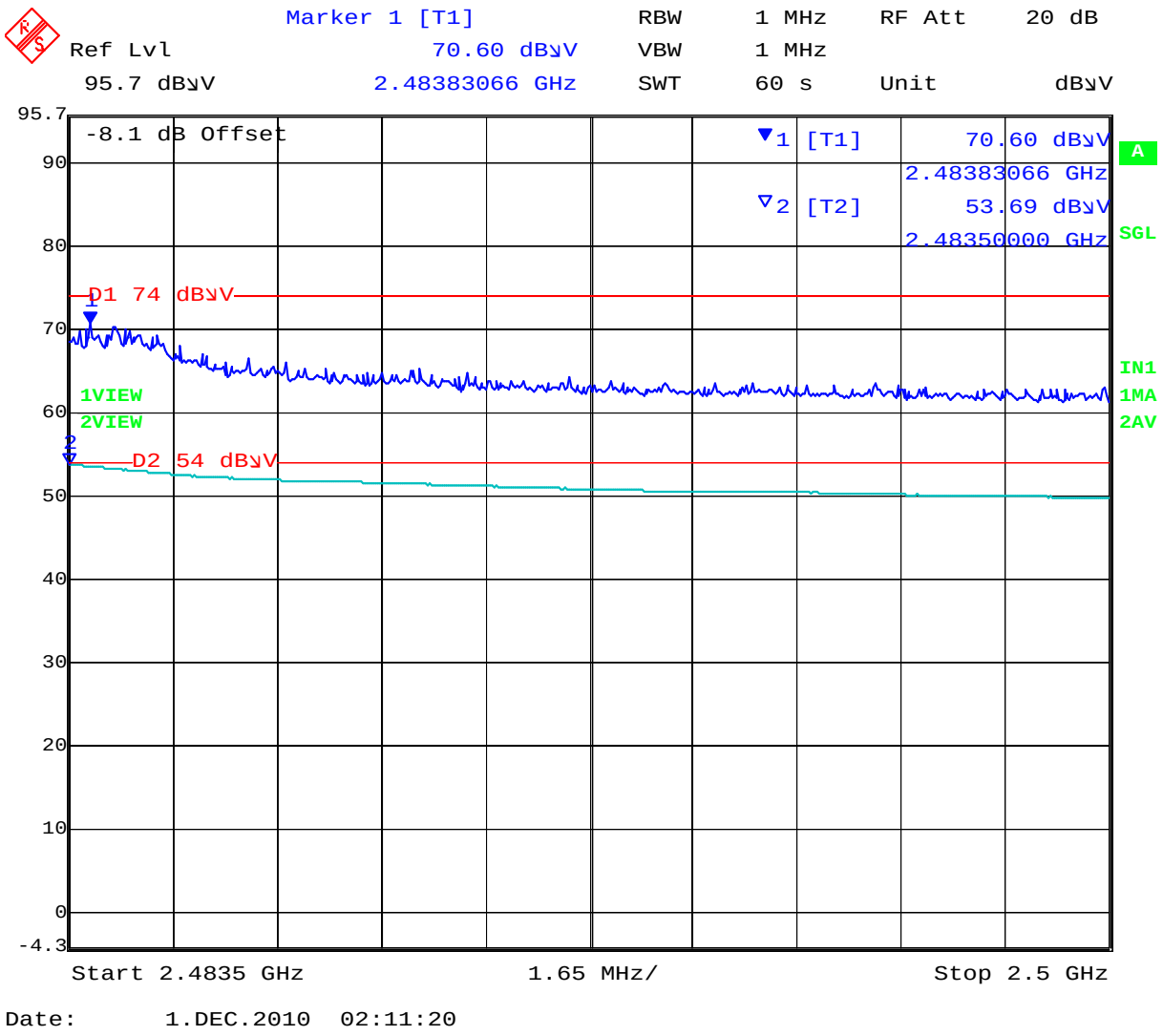
802.11b Operating Channel 2462 MHz Antenna AP-ANT-85



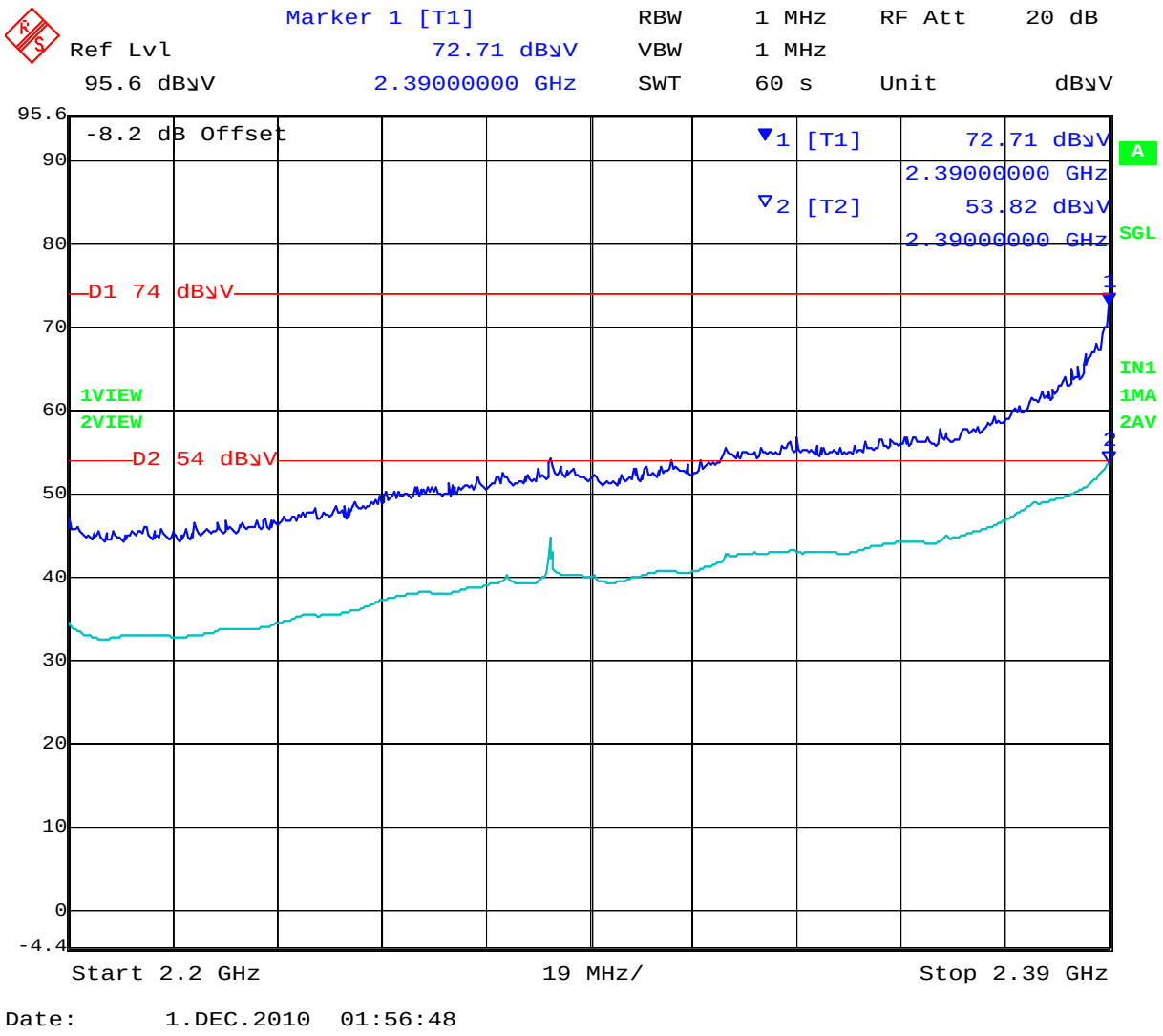
802.11g Operating Channel 2412 MHz Antenna AP-ANT-85



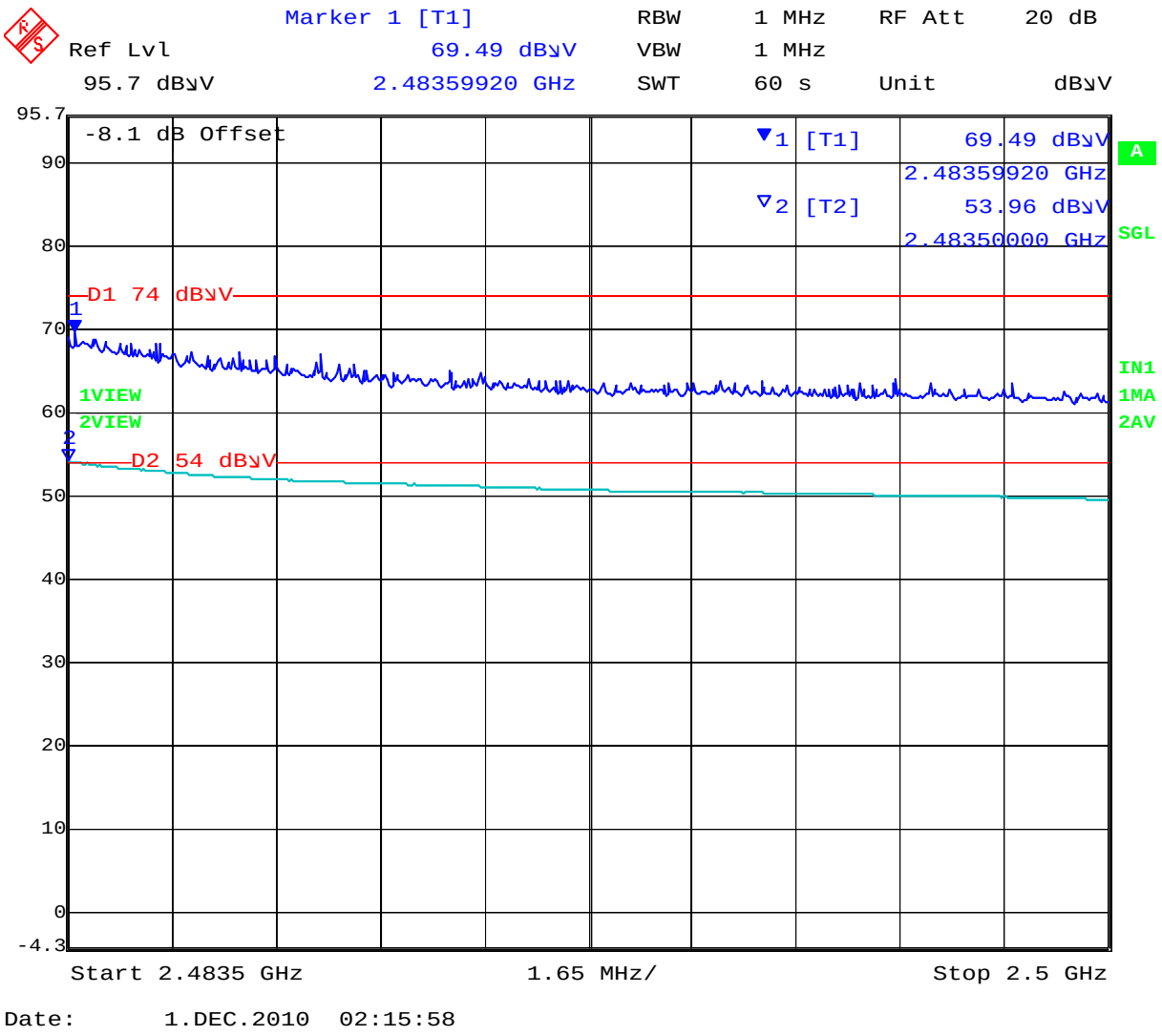
802.11g Operating Channel 2462 MHz Antenna AP-ANT-85



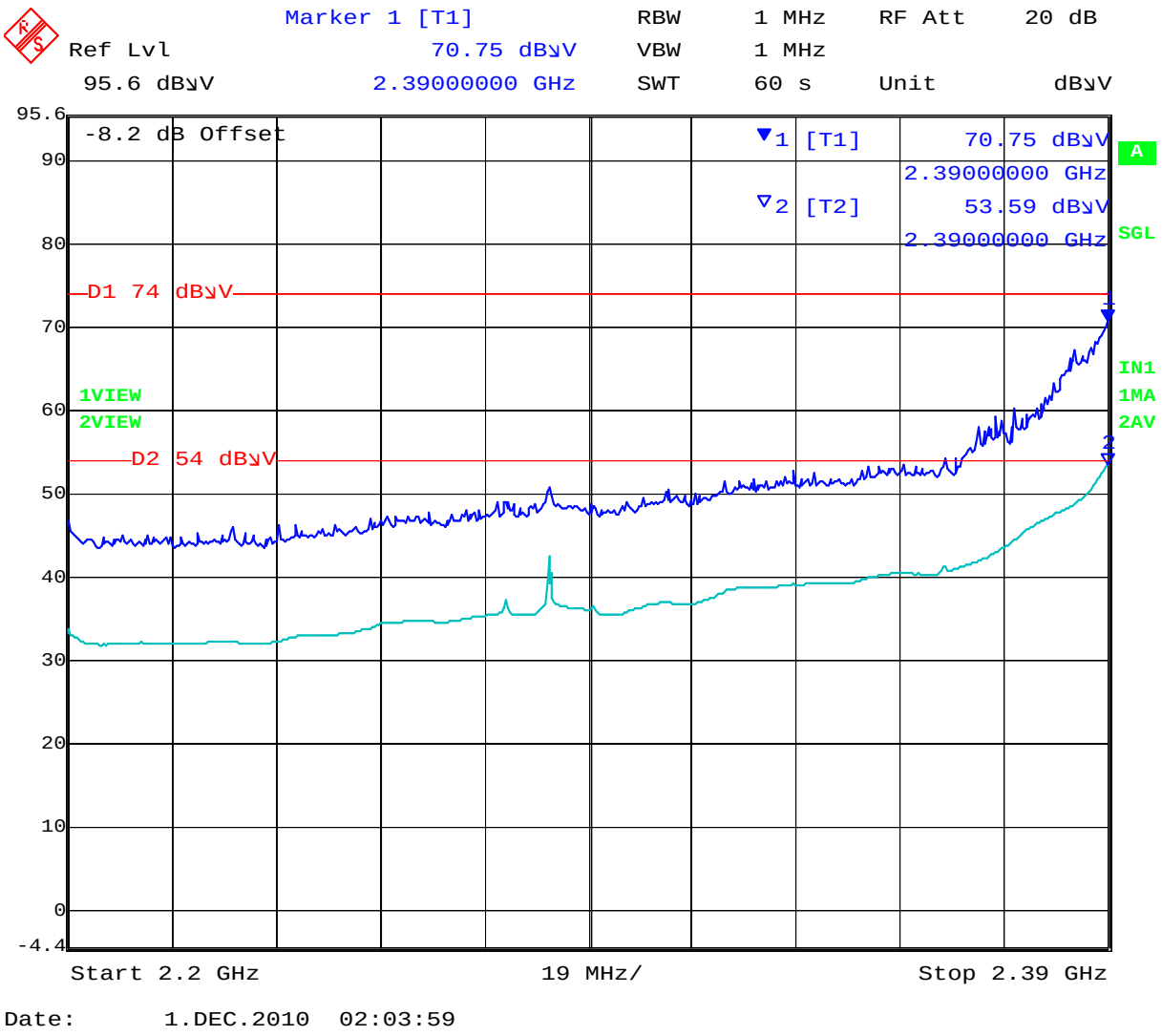
802.11n HT-20 Operating Channel 2412 MHz Antenna AP-ANT-85



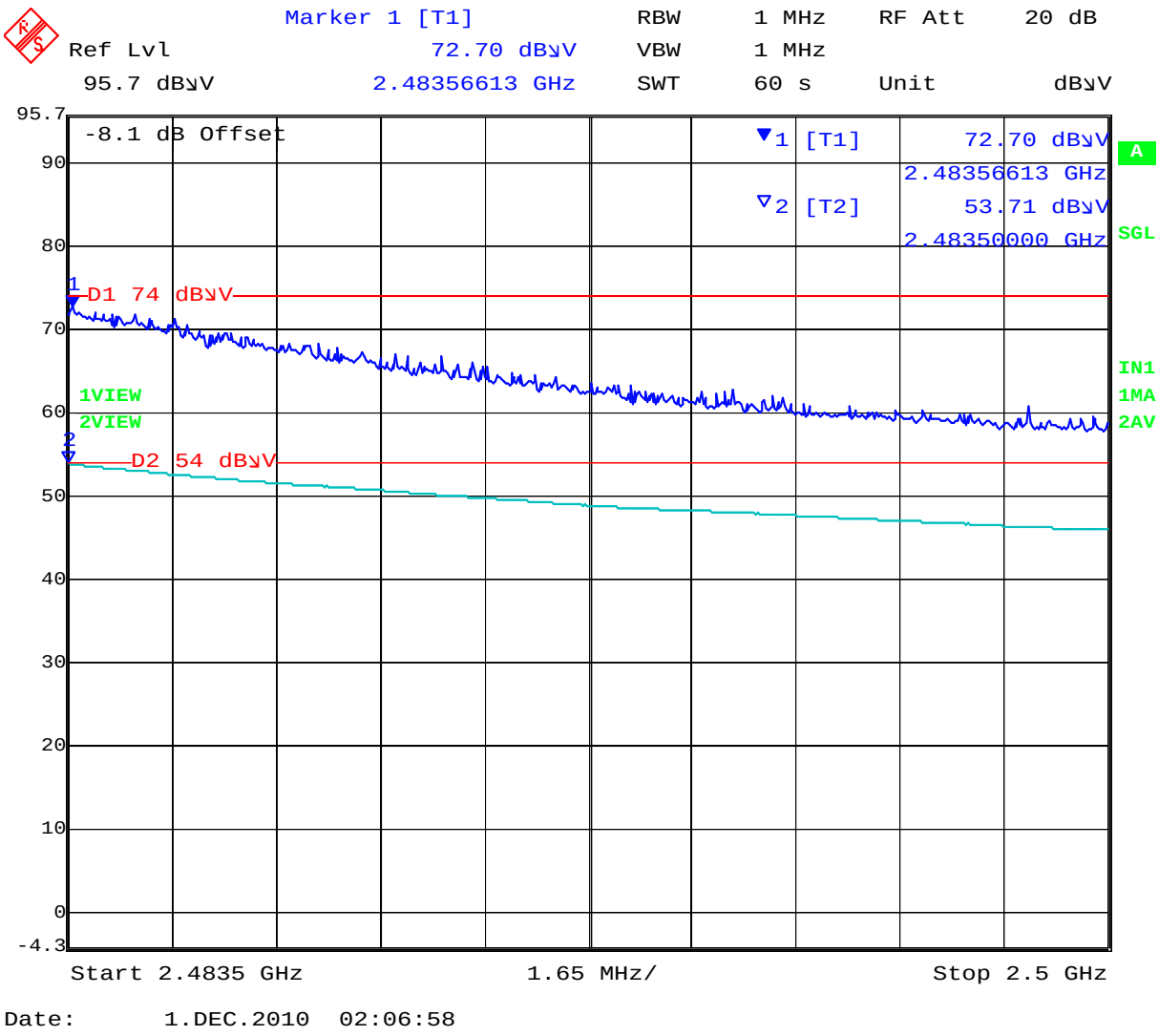
802.11n HT-20 Operating Channel 2462 MHz Antenna AP-ANT-85



802.11n HT-40 Operating Channel 2422 MHz Antenna AP-ANT-85

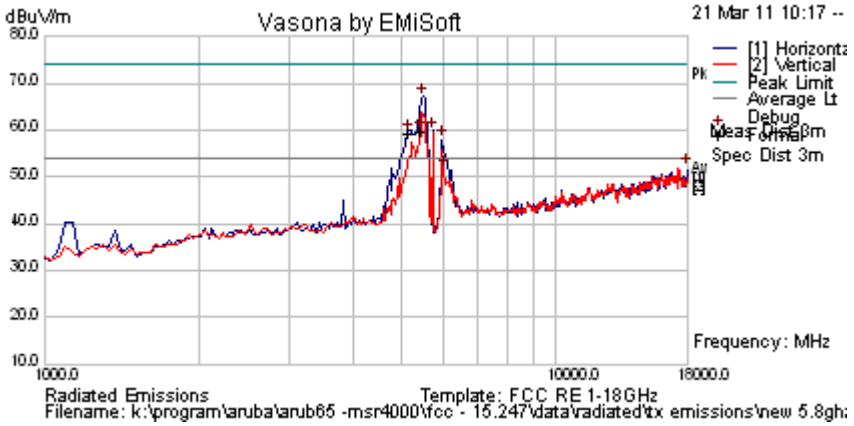


802.11n HT-40 Operating Channel 2452 MHz Antenna AP-ANT-85



5 GHz Operational Mode

Test Freq.	5745 MHz	**Engineer**	EVF
Variant	802.11a; 6 Mbs	**Temp (°C)**	18.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	18	**Press. (mBars)**	996
Antenna	new 5.8 GHz antenna (external)	**Duty Cycle (%)**	100
Test Notes 1	External Antenna positioned vertically on the turntable along with the unit		
Test Notes 2	computer located in control room		

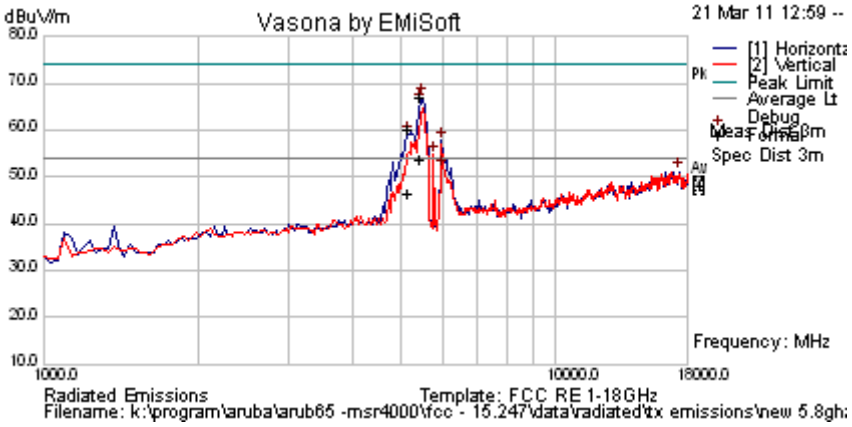


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5418.946	71.7	4.6	-9.2	67.1	Peak Max	H	116	0	74.0	-6.9	Pass	RB
5131.585	66.7	4.6	-9.2	62.2	Peak Max	H	98	74	74.0	-11.8	Pass	RB
5418.946	58.0	4.6	-9.2	53.4	Average Max	H	116	0	54	-0.6	Pass	RB
5131.585	53.5	4.6	-9.2	49.0	Average Max	H	98	74	54	-5.0	Pass	RB
5470.701	71.6	4.6	-9.1	67.2	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5739.359	63.5	4.8	-8.2	60.0	Peak [Scan]	H	--	--	--	--	n/a	FUND
5979.559	61.4	4.9	-8.3	58.0	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
18000.000	42.2	8.8	1.0	52.0	Peak [Scan]	H	150	0	54	-2.0	Pass	noise floor
6029.900	54.8	4.9	-8.2	51.5	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5439.178	71.9	4.6	-9.0	67.5	Peak Max	H	107	0	74.0	-6.5	Pass	RB
5439.178	58.2	4.6	-9.0	53.8	Average Max	H	107	0	54.0	-0.2	Pass	RB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	5785 MHz	**Engineer**	EVF
Variant	802.11a; 6 Mbs	**Temp (ºC)**	18.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	18	**Press. (mBars)**	996
Antenna	new 5.8 GHz antenna (external)	**Duty Cycle (%)**	100
Test Notes 1	External Antenna positioned vertically on the turntable along with the unit		
Test Notes 2	computer located in control room		

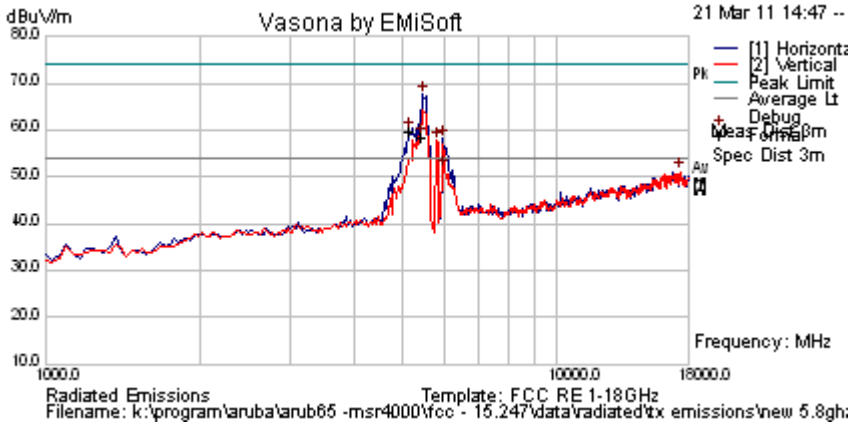


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5138.313	64.7	4.6	-9.3	60.0	Peak Max	H	99	77	74.0	-14.0	Pass	RB
5138.313	51.2	4.6	-9.3	46.5	Average Max	H	99	77	54.0	-7.5	Pass	RB
5426.560	71.7	4.6	-9.2	67.1	Peak Max	H	98	58	74.0	-6.9	Pass	RB
5426.56	58.5	4.6	-9.2	53.9	Average Max	H	98	58	54.0	-0.1	Pass	RB
5470.621	71.4	4.6	-9.1	67.0	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5982.124	61.1	4.9	-8.3	57.8	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5785.972	58.3	4.8	-8.4	54.7	Peak [Scan]	V	--	--	--	--	n/a	FUND
6028.016	55.2	4.9	-8.2	51.9	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
17352.705	40.4	8.7	2.0	51.1	Peak [Scan]	H	150	0	54	-2.9	Pass	noise floor

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	5825 MHz	**Engineer**	EVF
Variant	802.11a; 6 Mbs	**Temp (ºC)**	18.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	18	**Press. (mBars)**	996
Antenna	new 5.8 GHz antenna (external)	**Duty Cycle (%)**	100
Test Notes 1	External Antenna positioned vertically on the turntable along with the unit		
Test Notes 2	computer located in control room		

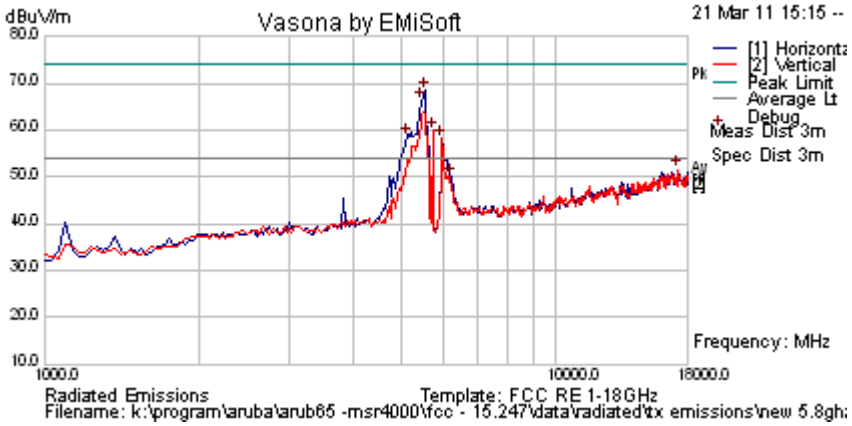


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5147.456	66.6	4.6	-9.2	62.0	Peak Max	H	99	61	74.0	-12.0	Pass	RB
5147.456	53.4	4.6	-9.2	48.8	Average Max	H	99	61	54	-5.2	Pass	RB
5509.098	71.6	4.6	-8.7	67.6	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5987.575	61.7	4.9	-8.3	58.3	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5829.980	61.4	4.8	-8.5	57.7	Peak [Scan]	V	--	--	--	--	n/a	FUND
6027.775	54.8	4.9	-8.2	51.5	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
17352.705	40.3	8.7	2.0	51.0	Peak [Scan]	V	150	0	54	-3.0	Pass	noise floor

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	5745 MHz	**Engineer**	EVF
Variant	802.11n; HT-20; 6.5 MCS	**Temp (ºC)**	18.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	18	**Press. (mBars)**	996
Antenna	new 5.8 GHz antenna (external)	**Duty Cycle (%)**	100
Test Notes 1	External Antenna positioned vertically on the turntable along with the unit		
Test Notes 2	computer located in control room		

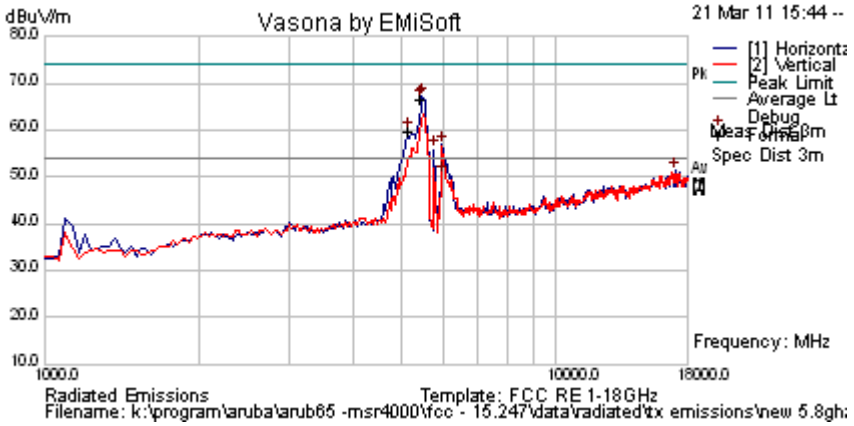


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5117.289	58.5	4.6	-9.0	54.1	Peak Max	V	201	89	74.0	-19.9	Pass	RB
5117.289	43.8	4.6	-9.0	39.5	Average Max	V	201	89	54.0	-14.5	Pass	RB
5472.064	72.9	4.6	-9.1	68.4	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5738.196	63.3	4.8	-8.2	59.8	Peak [Scan]	V	--	--	--	--	n/a	FUND
5985.170	61.5	4.9	-8.3	58.1	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB
17250.501	41.4	8.6	1.6	51.6	Peak [Scan]	V	100	0	54	-2.4	Pass	noise floor
6028.456	53.3	4.9	-8.2	50.0	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	5785 MHz	**Engineer**	EVF
Variant	802.11n; HT-20; 6.5 MCS	**Temp (ºC)**	18.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	18	**Press. (mBars)**	996
Antenna	new 5.8 GHz antenna (external)	**Duty Cycle (%)**	100
Test Notes 1	External Antenna positioned vertically on the turntable along with the unit		
Test Notes 2	computer located in control room		

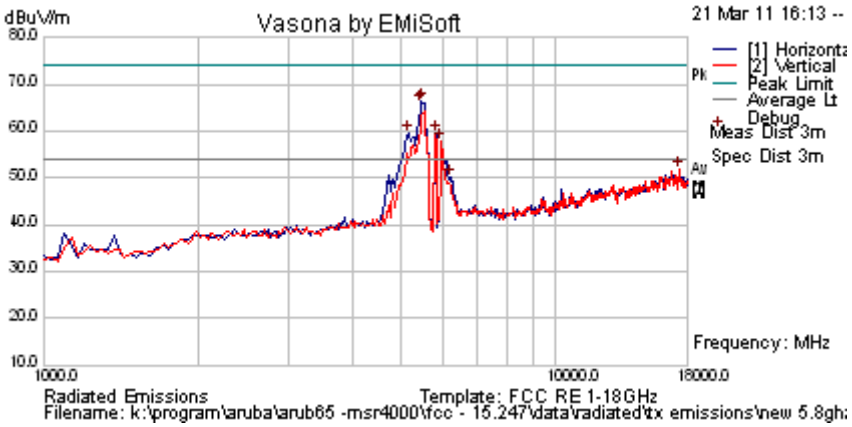


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5509.098	71.1	4.6	-8.7	67.1	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5985.491	60.3	4.9	-8.3	56.9	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5781.563	59.5	4.8	-8.4	55.8	Peak [Scan]	H	--	--	--	--	n/a	FUND
17080.160	42.9	8.5	0.0	51.4	Peak [Scan]	H	200	0	54	-2.6	Pass	noise floor
6028.456	53.6	4.9	-8.2	50.3	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5138.620	65.6	4.6	-9.3	60.9	Peak Max	H	98	74	74.0	-13.1	Pass	RB
5138.62	51.7	4.6	-9.3	47.0	Average Max	H	98	74	54.0	-7.0	Pass	RB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	5825 MHz	**Engineer**	EVF
Variant	802.11n; HT-20; 6.5 MCS	**Temp (ºC)**	18.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	18	**Press. (mBars)**	996
Antenna	new 5.8 GHz antenna (external)	**Duty Cycle (%)**	100
Test Notes 1	External Antenna positioned vertically on the turntable along with the unit		
Test Notes 2	computer located in control room		

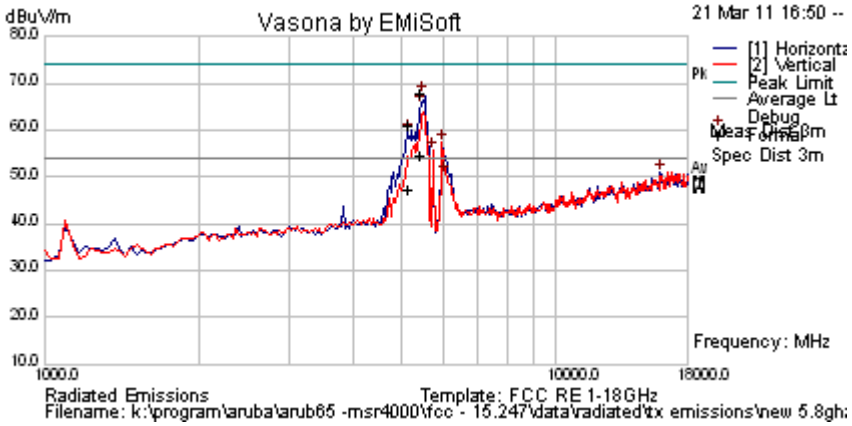


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5144.589	66.6	4.6	-9.3	61.9	Peak Max	H	98	0	74.0	-12.1	Pass	RB
5144.589	53.0	4.6	-9.3	48.3	Average Max	H	98	0	54.0	-5.7	Pass	RB
5473.828	70.9	4.6	-9.1	66.4	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5831.343	63.0	4.8	-8.5	59.3	Peak [Scan]	H	--	--	--	--	n/a	FUND
5986.453	61.2	4.9	-8.3	57.8	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB
17386.774	41.2	8.7	2.0	51.8	Peak [Scan]	V	150	0	54	-2.2	Pass	noise floor
6027.175	53.4	4.9	-8.2	50.1	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	5755 MHz	**Engineer**	EVF
Variant	802.11n; HT-40; 13.5 MCS	**Temp (ºC)**	18.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	18	**Press. (mBars)**	996
Antenna	new 5.8 GHz antenna (external)	**Duty Cycle (%)**	100
Test Notes 1	External Antenna positioned vertically on the turntable along with the unit		
Test Notes 2	computer located in control room		

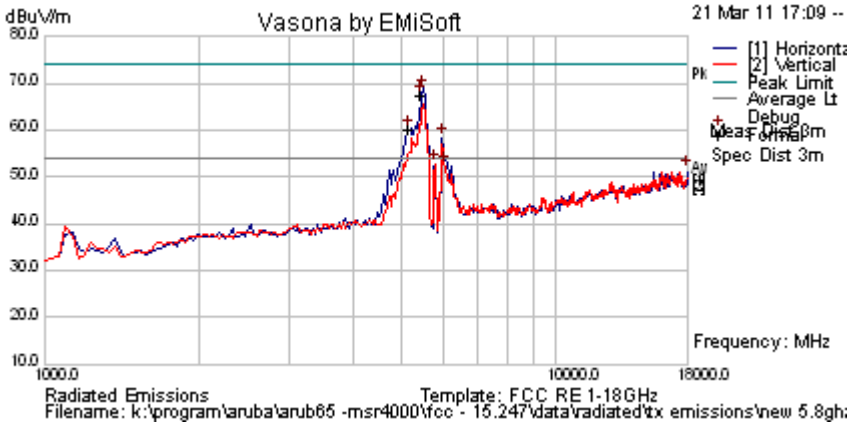


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5143.094	66.0	4.6	-9.4	61.2	Peak Max	H	98	74	74.0	-12.8	Pass	RB
5143.094	52.0	4.6	-9.4	47.3	Average Max	H	98	74	54.0	-6.8	Pass	RB
5468.858	71.9	4.6	-9.1	67.4	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5984.85	60.8	4.9	-8.3	57.4	Peak [Scan]	V	> 20dB below fundamental				Pass	NRB
5738.036	59.0	4.8	-8.2	55.5	Peak [Scan]	V	--	--	--	--	n/a	FUND
15955.912	41.6	9.0	0.4	51.0	Peak [Scan]	H	200	0	54	-3.0	Pass	noise floor
6034.148	53.8	4.9	-8.2	50.5	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	5785 MHz	**Engineer**	EVF
Variant	802.11n; HT-40; 13.5 MCS	**Temp (ºC)**	18.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	18	**Press. (mBars)**	996
Antenna	AP-ANT-86D	**Duty Cycle (%)**	100
Test Notes 1	External Antenna positioned vertically on the turntable along with the unit		
Test Notes 2	computer located in control room		

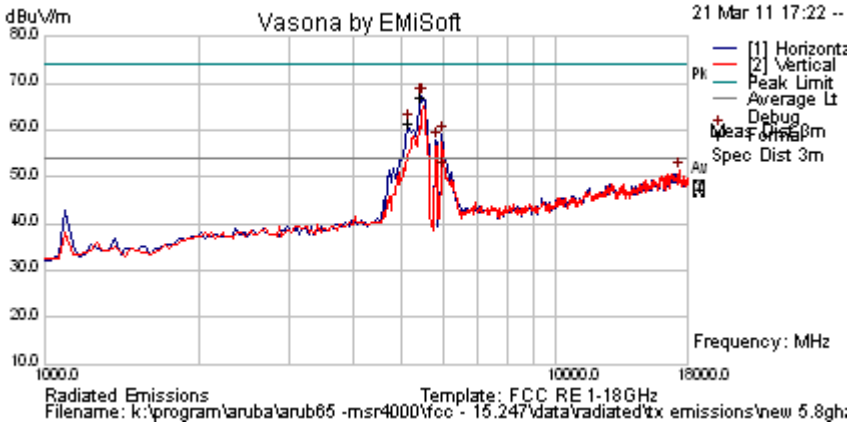


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5475.190	73.3	4.6	-9.0	68.9	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5985.01	61.8	4.9	-8.3	58.4	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5780.040	56.4	4.8	-8.4	52.8	Peak [Scan]	H	--	--	--	--	n/a	FUND
6031.022	55.7	4.9	-8.2	52.4	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
18000.000	41.7	8.8	1.0	51.5	Peak [Scan]	H	150	0	54	-2.5	Pass	noise floor
5141.219	66.7	4.6	-9.4	62.0	Peak Max	H	98	74	74.0	-12.1	Pass	RB
5141.219	53.1	4.6	-9.4	48.3	Average Max	H	98	74	54.0	-5.7	Pass	RB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Test Freq.	5815 MHz	**Engineer**	EVF
Variant	802.11n; HT-40; 13.5 MCS	**Temp (ºC)**	18.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	40
Power Setting	18	**Press. (mBars)**	996
Antenna	AP-ANT-86D	**Duty Cycle (%)**	100
Test Notes 1	External Antenna positioned vertically on the turntable along with the unit		
Test Notes 2	computer located in control room		



Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5143.252	63.4	4.6	-9.4	58.7	Peak Max	H	108	342	74.0	-15.4	Pass	RB
5143.252	50.2	4.6	-9.4	45.4	Average Max	H	108	342	54.0	-8.6	Pass	RB
5468.056	71.7	4.6	-9.1	67.3	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5985.184	62.5	4.9	-8.3	59.1	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB
5830.541	61.5	4.8	-8.5	57.9	Peak [Scan]	H	--	--	--	--	n/a	FUND
17352.705	40.7	8.7	2.0	51.4	Peak [Scan]	V	200	0	54	-2.6	Pass	noise floor
6028.456	54.3	4.9	-8.2	51.0	Peak [Scan]	H	> 20dB below fundamental				Pass	NRB

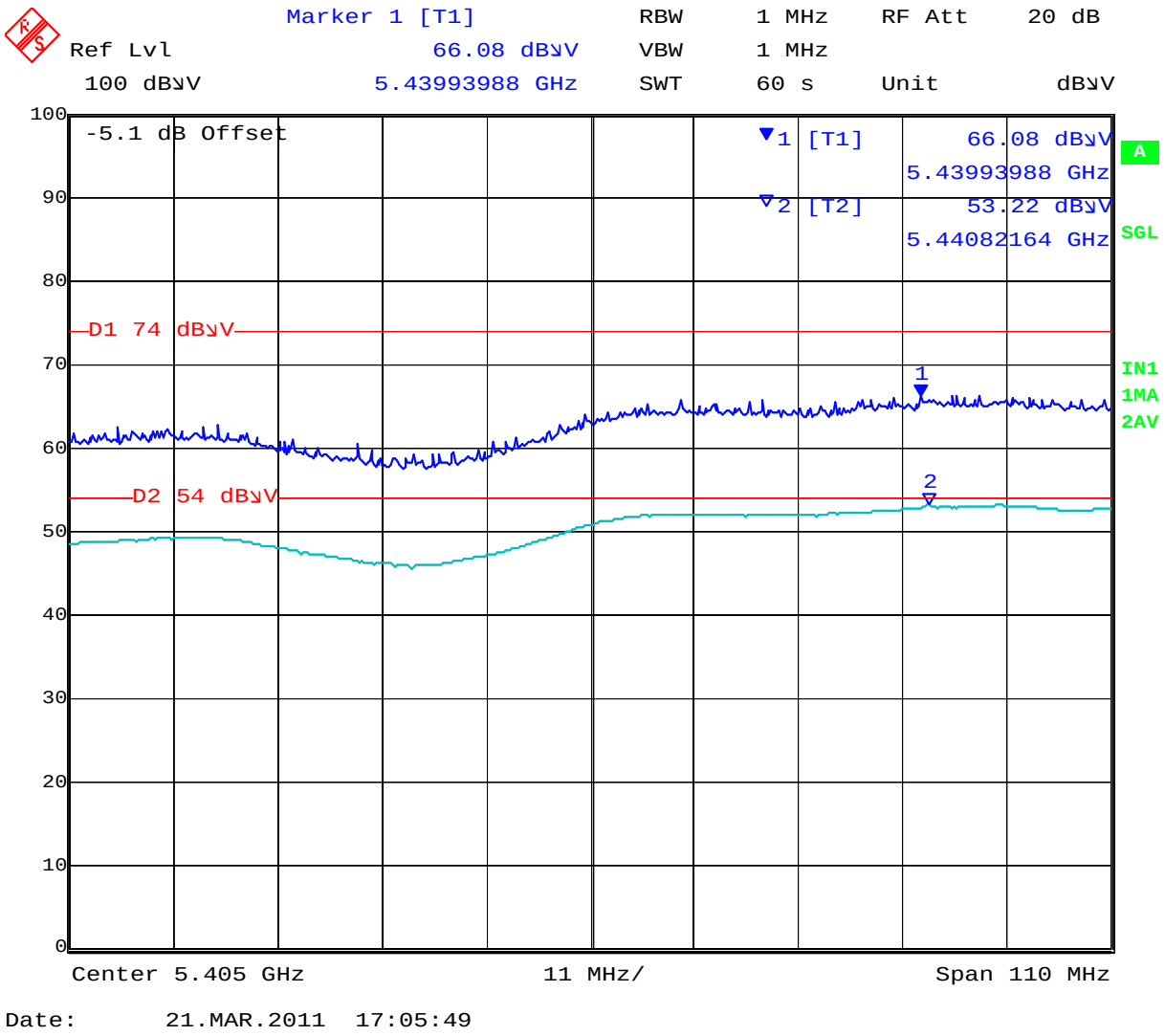
Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

Radiated Band-Edge 5.8 GHz Antenna AP-ANT-2x2-5614U

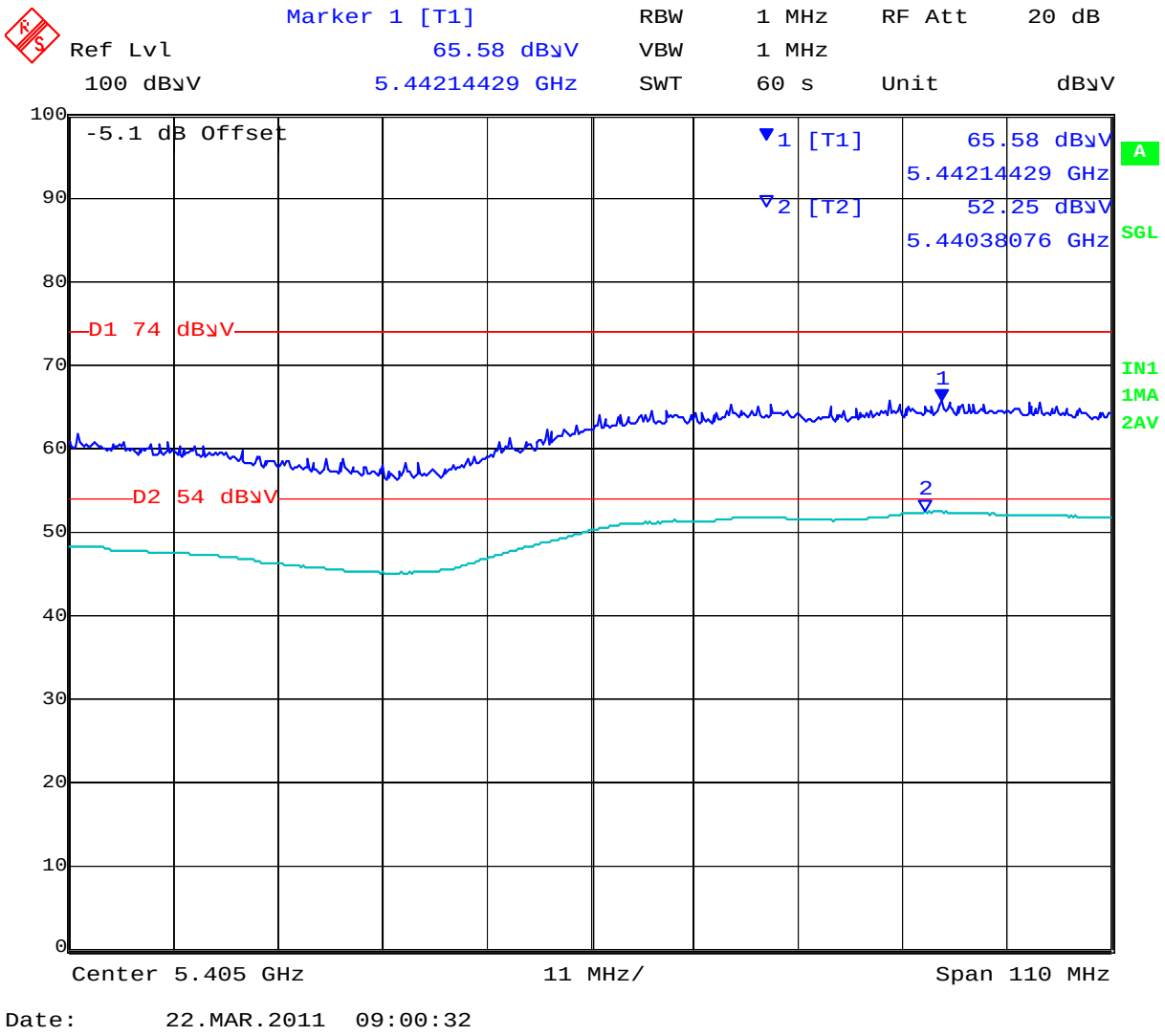
Restricted Band 5.35 – 5.46 GHz
It was found that the operating frequency providing the worst case emission was not necessarily the closest frequency to the band-edge. An investigation was completed in order to find the channel giving the worst case results.

A reduction in power was necessary in order to bring the unit into compliance. The reduction in power is reported in Section 5.1.2 Peak Output Power.

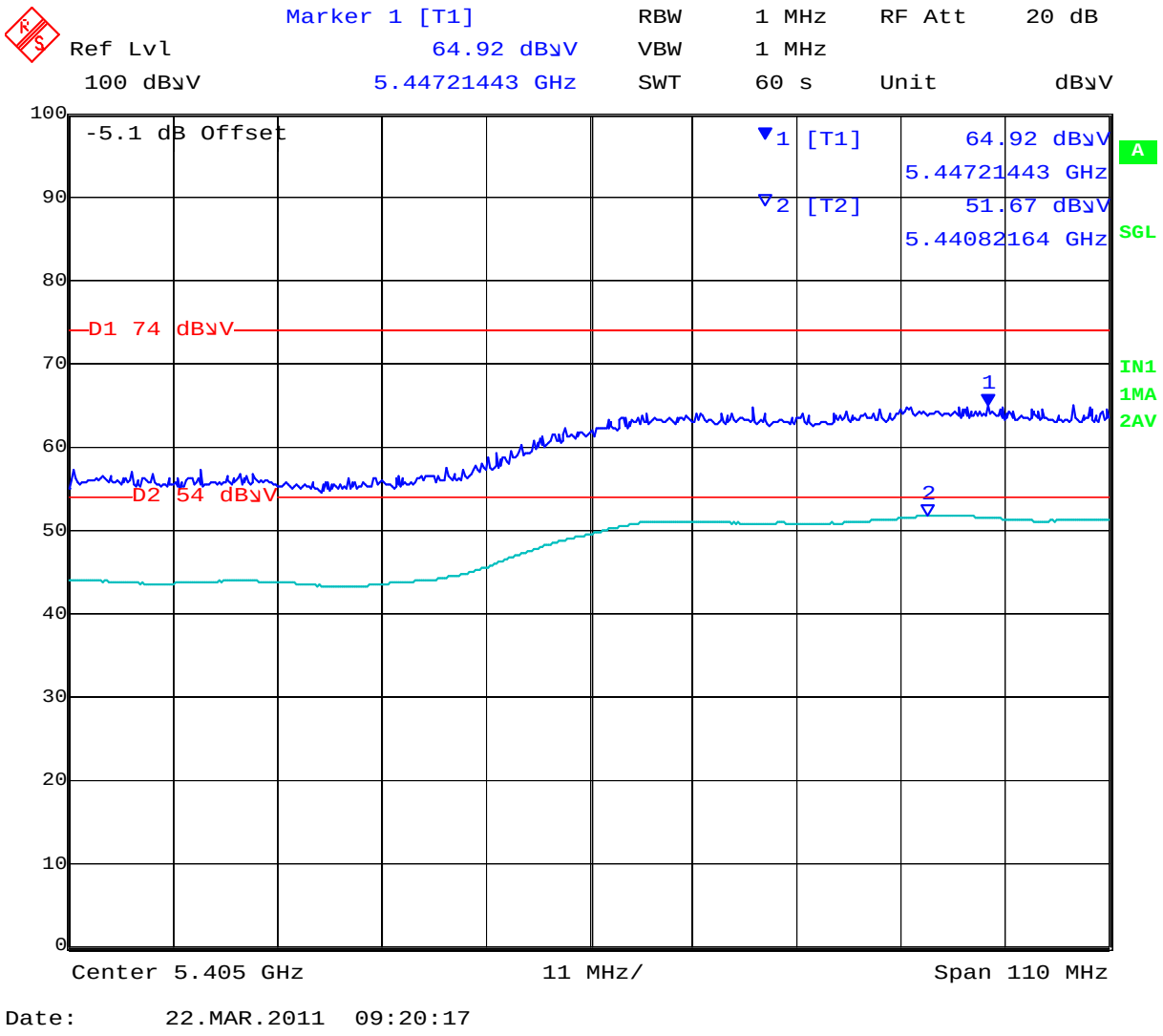
802.11a Operating Channel 5785 MHz



802.11HT-20 Operating Channel 5745 MHz



802.11HT-40 Operating Channel 5785 MHz



Specification Limits

FCC §15.247(d) and RSS-210 §A8.5 In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

FCC §15.247(d)
If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section §15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(a)).

IC RSS-210 §A8.5 If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

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

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

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

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

§15.209 (a) Limit Matrix

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

Laboratory Measurement Uncertainty for Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB

Traceability

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

5.1.6.3. Receiver Radiated Spurious Emissions (above 1 GHz)

Industry Canada RSS-Gen §4.10, §6

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.

All Sectors of the EUT were tested simultaneously

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

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:

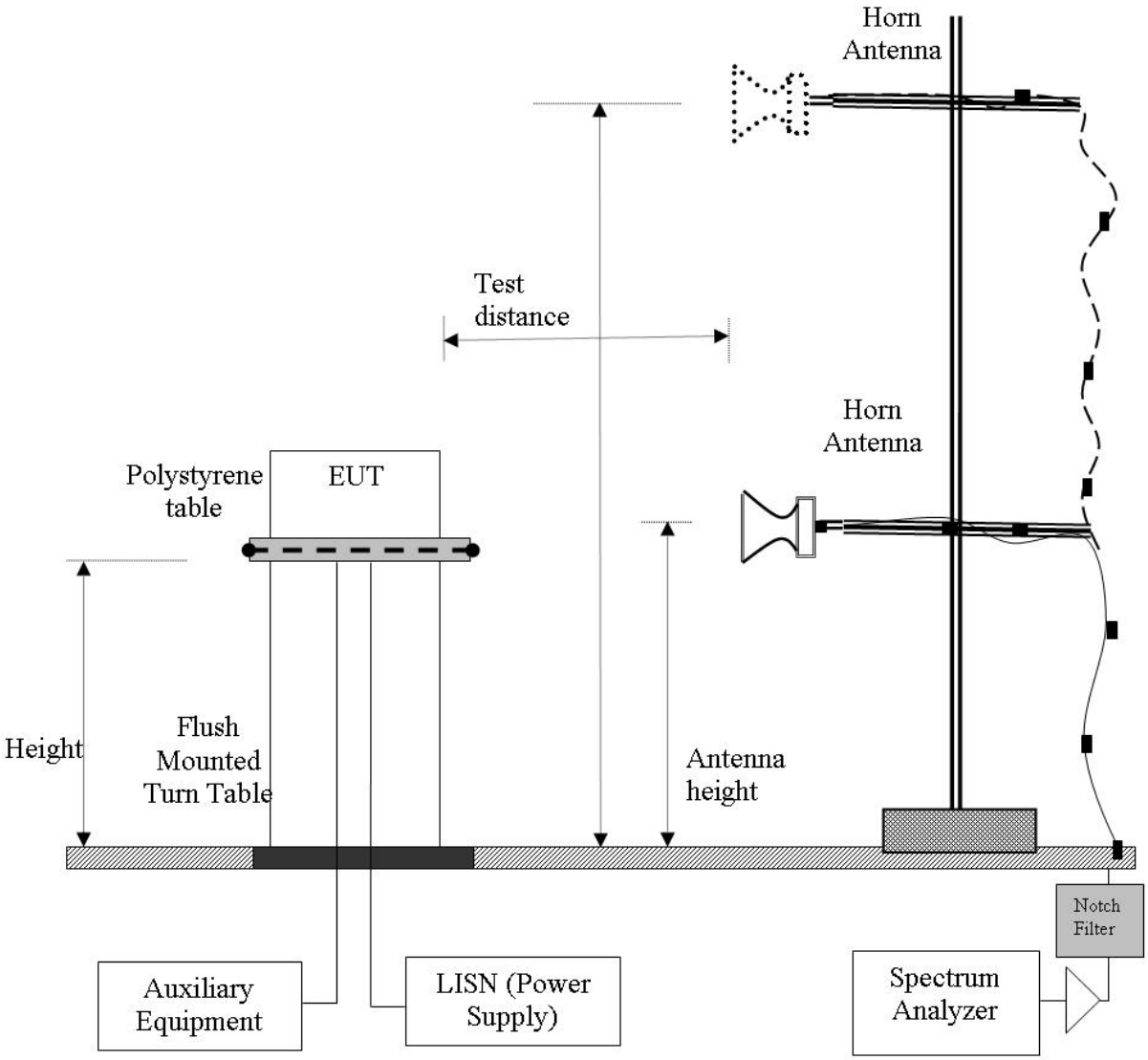
FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3 dBμV/m

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

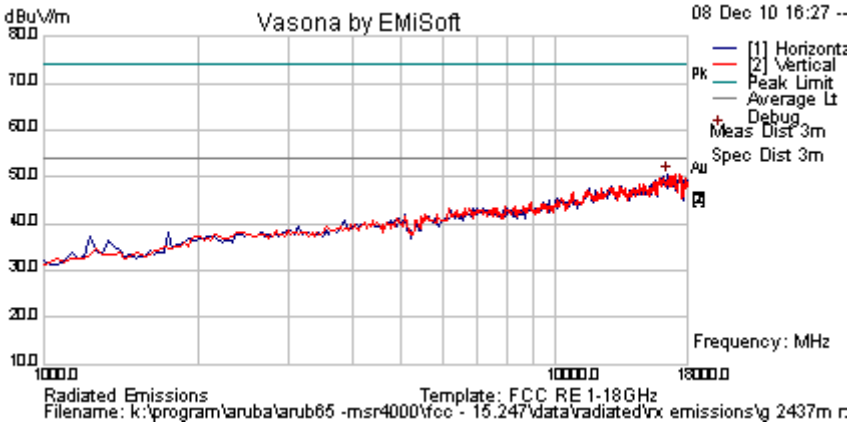
Level (dBμV/m) = 20 * Log (level (μV/m))

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

Radiated Emission Measurement Setup – Above 1 GHz



Test Freq.	2437 MHz	**Engineer**	SB
Variant	Receive in Test Utility	**Temp (°C)**	23.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	37
Power Setting	Not Applicable in Receive Mode	**Press. (mBars)**	1007
Antenna	AP-ANT-80D		
Test Notes 1			
Test Notes 2			

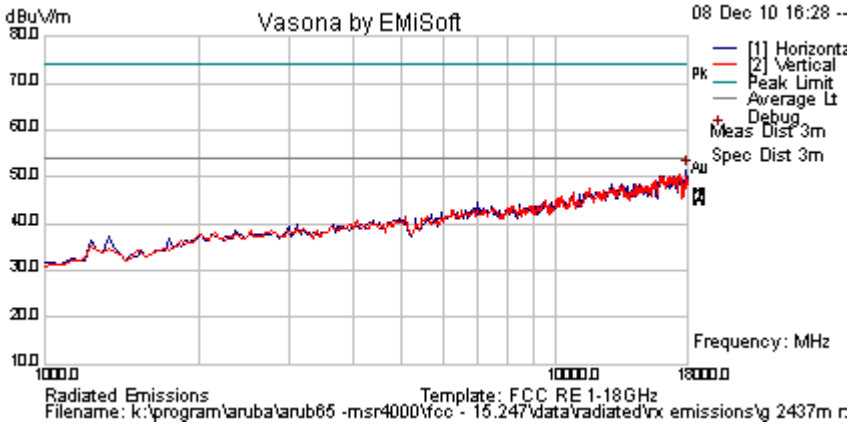


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
No Receiver Emissions Within 6dB of limit.												

Legend:	RB = Restricted Band; NRB = Non-Restricted Band; FUND = Fundamental Freq.
	BE = Emission in Restricted Band Nearest Transmission Band Edge;

Test Freq.	2437 MHz	**Engineer**	SB
Variant	Receive in Test Utility	**Temp (ºC)**	23.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	37
Power Setting	Not Applicable in Receive Mode	**Press. (mBars)**	1007
Antenna	AP-ANT-85		
Test Notes 1			
Test Notes 2			

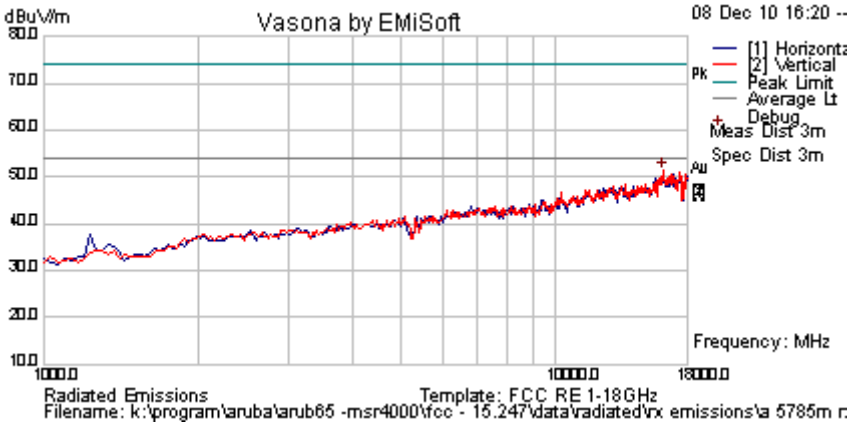


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
No Receiver Emissions Within 6dB of limit.												

Legend:	RB = Restricted Band; NRB = Non-Restricted Band; FUND = Fundamental Freq.
	BE = Emission in Restricted Band Nearest Transmission Band Edge;

Test Freq.	5785 MHz	**Engineer**	SB
Variant	Receive in Test Utility	**Temp (°C)**	23.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	37
Power Setting	Not Applicable in Receive Mode	**Press. (mBars)**	1007
Antenna	AP-ANT-86D		
Test Notes 1			
Test Notes 2			

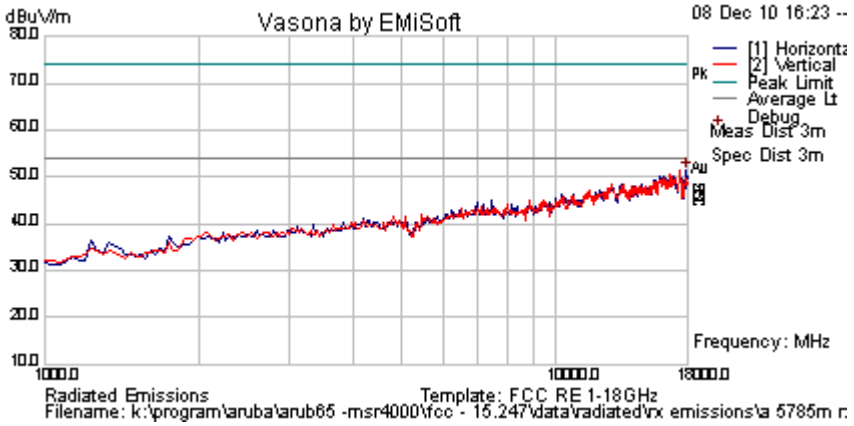


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
No Receiver Emissions Within 6dB of limit.												

Legend:	RB = Restricted Band; NRB = Non-Restricted Band; FUND = Fundamental Freq.
	BE = Emission in Restricted Band Nearest Transmission Band Edge;

Test Freq.	5785 MHz	**Engineer**	SB
Variant	Receive in Test Utility	**Temp (ºC)**	23.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	37
Power Setting	Not Applicable in Receive Mode	**Press. (mBars)**	1007
Antenna	2x2-5614U		
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
No Receiver Emissions Within 6dB of limit.												

Legend:	RB = Restricted Band; NRB = Non-Restricted Band; FUND = Fundamental Freq.
	BE = Emission in Restricted Band Nearest Transmission Band Edge;

Specification

Receiver Radiated Spurious Emissions

Industry Canada RSS-Gen §4.10,
The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tunable or local oscillator frequency, whichever is the higher, without exceeding 40 GHz.

RSS-Gen §6
The following receiver spurious emission limits shall be complied with;
(a) If a radiated measurement is made, all spurious emissions hall comply with the limits of Table 1.

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

Laboratory Measurement Uncertainty for Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB

Traceability

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

5.1.6.4. Radiated Spurious Emissions (30M-1 GHz)

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

Test Procedure

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

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

Field Strength Calculation

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

$$FS = R + AF + CORR$$

where:

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

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

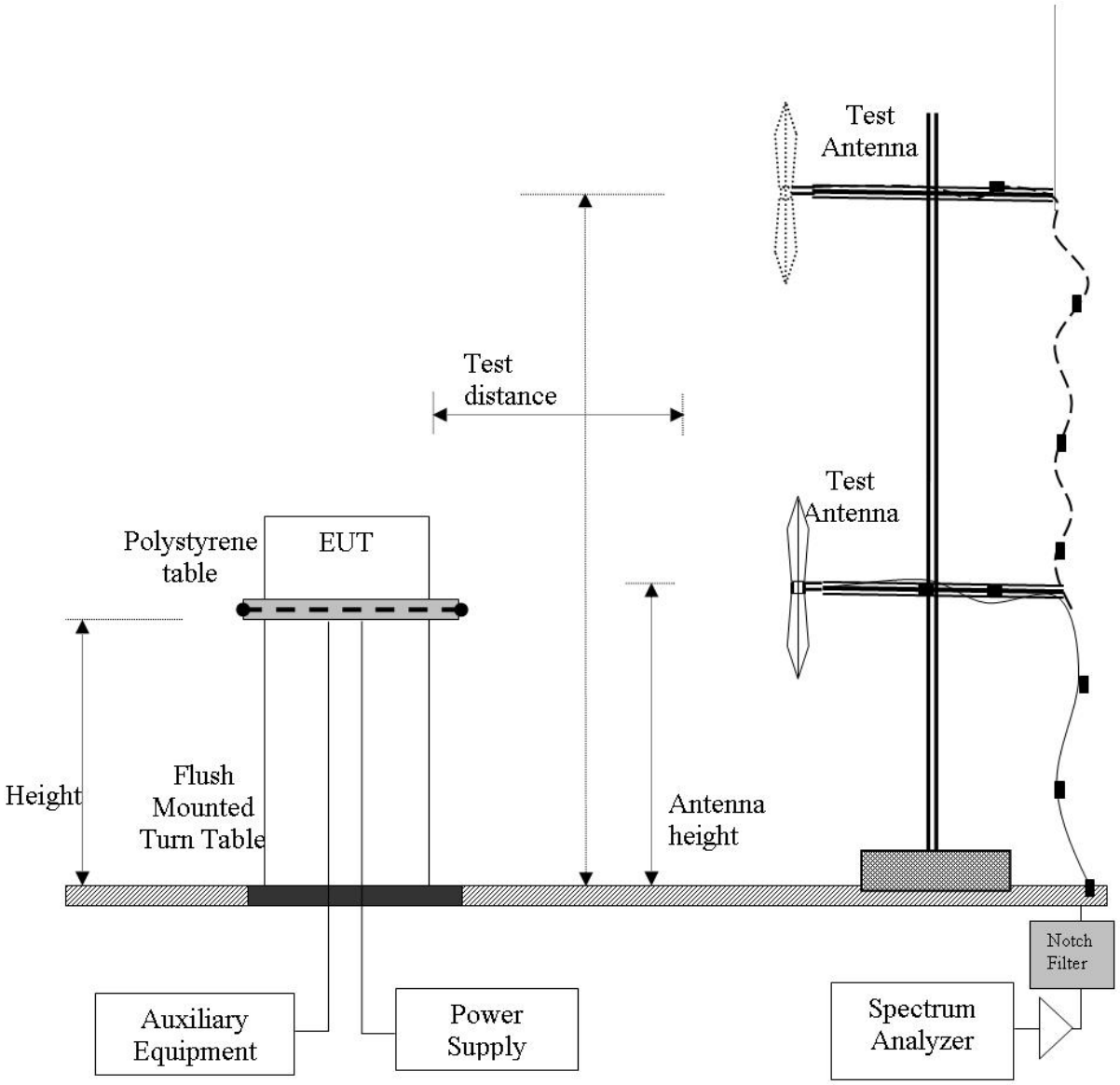
FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3dBμV/m

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

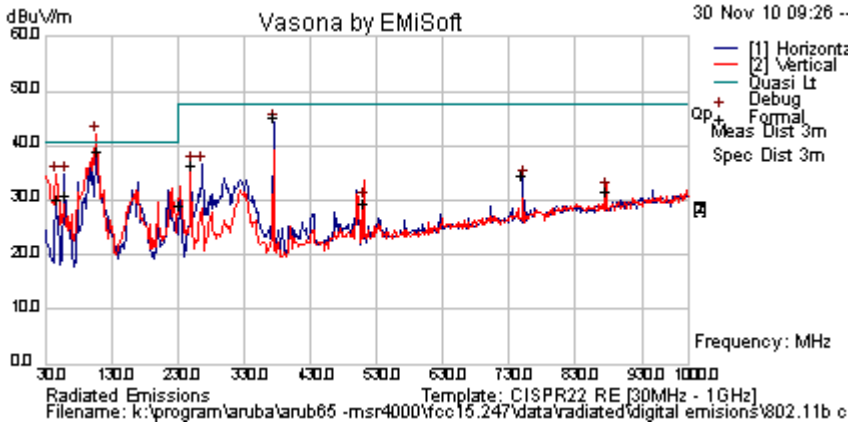
Level (dBμV/m) = 20 * Log (level (μV/m))

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

Radiated Emission Measurement Setup – Below 1 GHz



Test Freq.	2437 MHz	**Engineer**	SB
Variant	Digital Emissions	**Temp (ºC)**	18.5
Freq. Range	30 MHz - 1000 MHz	**Rel. Hum.(%)**	33
Power Setting	802.11b=21 802.11a=22	**Press. (mBars)**	1015
Antenna	50Ω Termination		
Test Notes 1	All four radios are operating at full power on 2.4GHz(802.11b) and 5 GHz(802.11a)		
Test Notes 2			

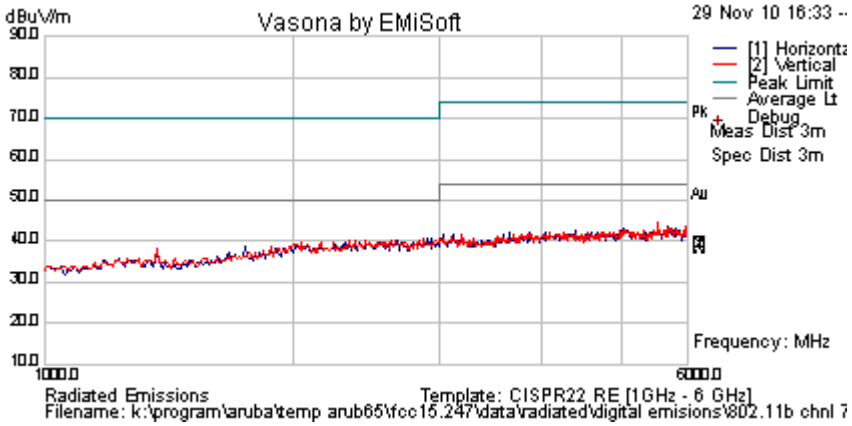


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
107.287	53.7	4.2	-18.9	39.1	Quasi Max	V	107	0	40.5	-1.5	Pass	
375.018	54.6	5.6	-15.1	45.1	Quasi Max	H	98	328	47.5	-2.4	Pass	
48.754	48.5	3.7	-22.1	30.1	Quasi Max	V	114	304	40.5	-10.4	Pass	
59.303	50.8	3.8	-23.9	30.7	Quasi Max	H	98	146	40.5	-9.8	Pass	
250.007	50.3	5.0	-18.8	36.5	Quasi Max	H	113	58	47.5	-11.0	Pass	
233.852	42.9	4.9	-18.8	29.0	Quasi Max	H	147	51	47.5	-18.5	Pass	
750.007	36.8	6.9	-9.0	34.7	Quasi Max	H	98	42	47.5	-12.8	Pass	
875.041	31.9	7.2	-7.6	31.5	Quasi Max	V	101	360	47.5	-16.0	Pass	
510.009	36.2	6.1	-12.7	29.5	Quasi Max	V	180	18	47.5	-18.0	Pass	

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

Test Freq.	2437 MHz	**Engineer**	SB
Variant	Digital Emissions	**Temp (°C)**	18.5
Freq. Range	1000 MHz - 6000 MHz	**Rel. Hum.(%)**	33
Power Setting	802.11b=21 802.11a=22	**Press. (mBars)**	1000
Antenna	50Ω Termination		
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
No emission were found within 6dB of the limit												

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

Specification

Limits

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

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

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

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

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

Laboratory Measurement Uncertainty for Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB

Traceability

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

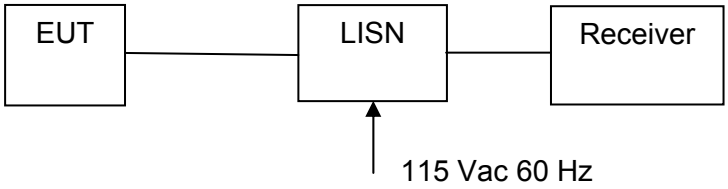
5.1.7. AC Wireline Conducted Emissions (150 kHz – 30 MHz)

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

Test Procedure

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

Test Measurement Set up

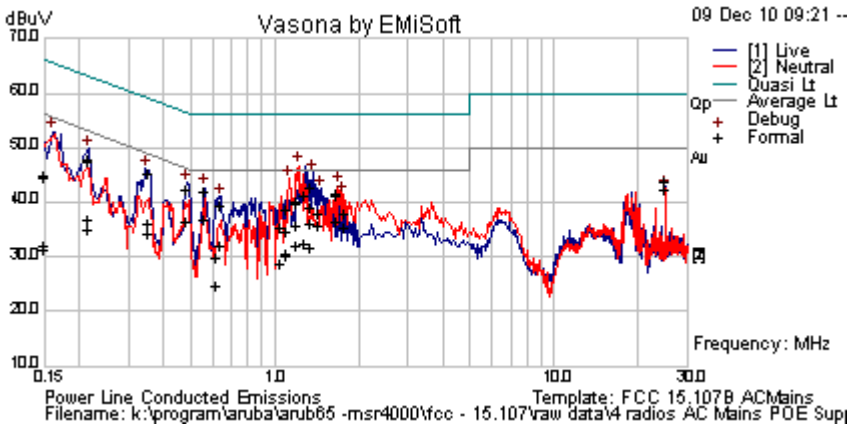


Measurement set up for AC Wireline Conducted Emissions Test

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

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

Test Freq.	N/A	**Engineer**	SB
Variant	AC Line Emissions	**Temp (ºC)**	20.5
Freq. Range	0.150 MHz - 30 MHz	**Rel. Hum.(%)**	44
Power Setting	22	**Press. (mBars)**	1009
Antenna	N/A		
Test Notes 1	4 Radios		
Test Notes 2			



Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
25.060	32.2	10.6	0.9	43.7	Quasi Peak	Live	60.0	-16.3	Pass	
0.562	32.1	9.9	0.1	42.1	Quasi Peak	Live	56.0	-13.9	Pass	
1.681	31.4	10.0	0.1	41.5	Quasi Peak	Neutral	56.0	-14.5	Pass	
1.355	32.7	10.0	0.1	42.7	Quasi Peak	Live	56.0	-13.3	Pass	
0.486	32.4	9.9	0.1	42.4	Quasi Peak	Live	56.2	-13.9	Pass	
1.449	27.7	10.0	0.1	37.8	Quasi Peak	Live	56.0	-18.2	Pass	
25.060	30.8	10.6	0.9	42.3	Average	Live	50.0	-7.7	Pass	
0.562	26.7	9.9	0.1	36.7	Average	Live	46.0	-9.3	Pass	
1.681	26.5	10.0	0.1	36.7	Average	Neutral	46.0	-9.3	Pass	
1.355	25.9	10.0	0.1	35.9	Average	Live	46.0	-10.1	Pass	
0.486	26.4	9.9	0.1	36.4	Average	Live	46.2	-9.8	Pass	
1.449	25.7	10.0	0.1	35.7	Average	Live	46.0	-10.3	Pass	

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

Specification

Limit

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

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

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

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

* Decreases with the logarithm of the frequency

Laboratory Measurement Uncertainty for Conducted Emissions

Measurement uncertainty	±2.64 dB

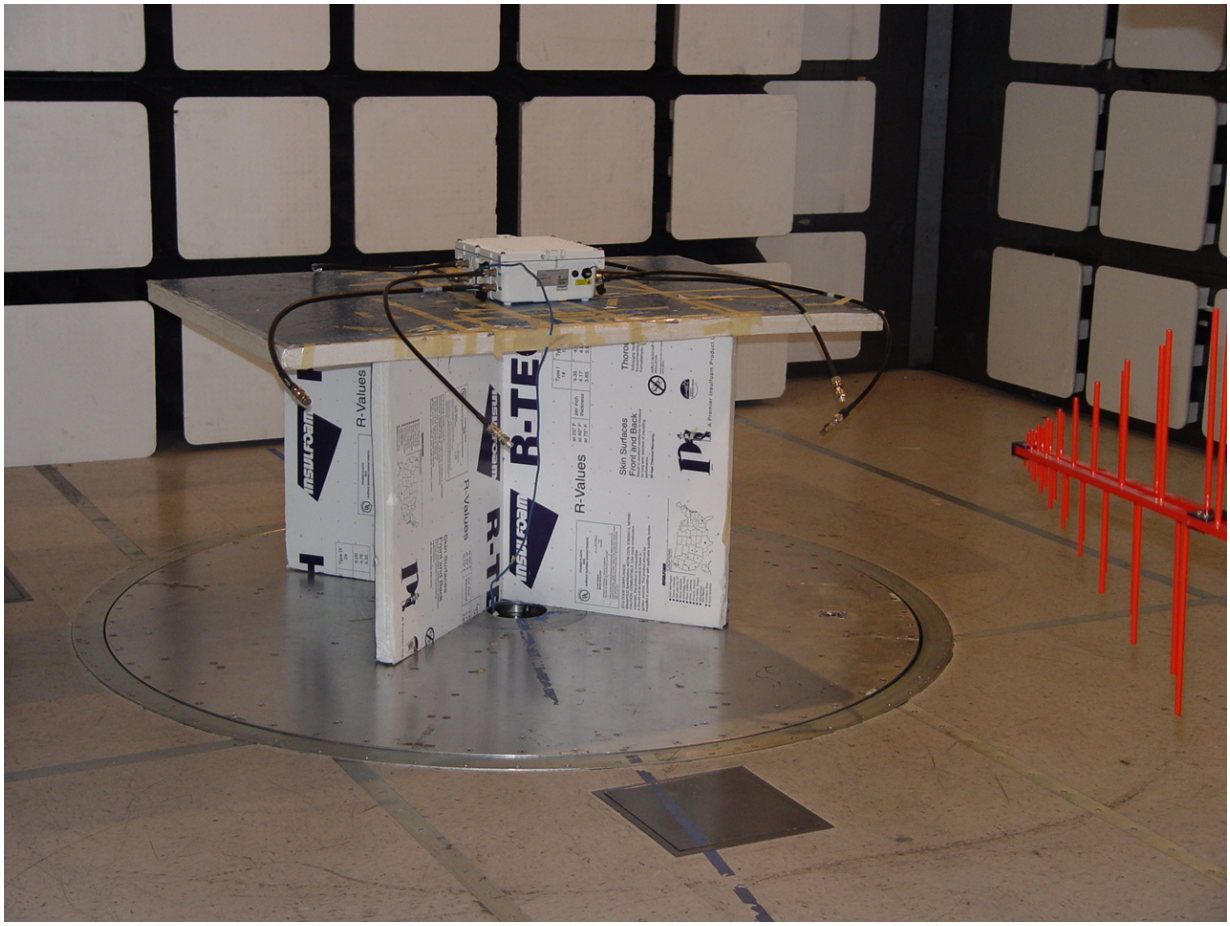
Traceability

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

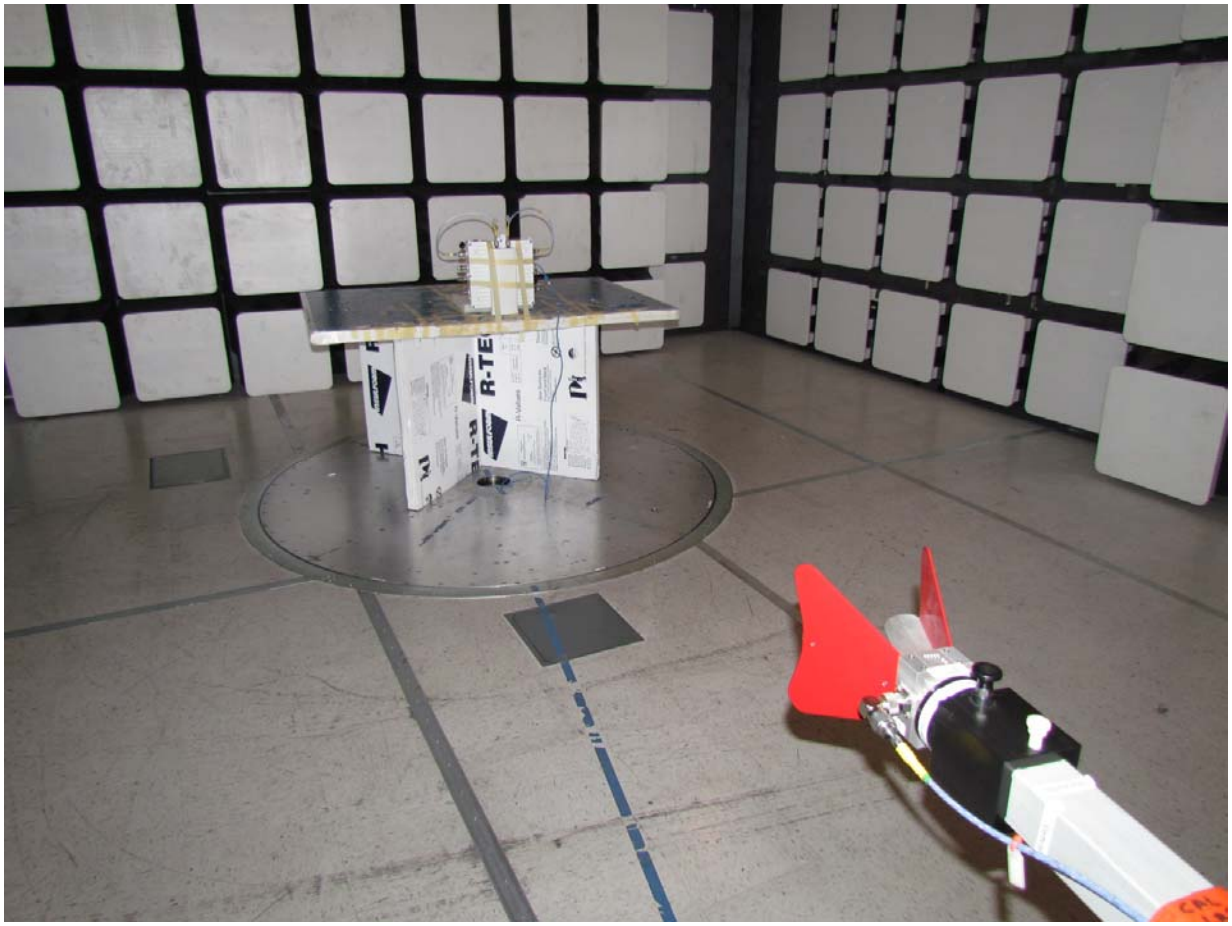
6. PHOTOGRAPHS

6.1. Conducted Test Setup

6.2. Radiated Test Setup (0.03 – 1 GHz)



6.3. Radiated Test Setup (above 1 GHz)



7. TEST EQUIPMENT DETAILS

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

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