Report On

FCC and Industry Canada Testing of the
Frontier Silicon Ltd Venice 6.5
In accordance with FCC CFR 47 Part 15E, Industry Canada RSS-210 and Industry Canada RSS-GEN

COMMERCIAL-IN-CONFIDENCE

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IC ID: UNKNOWN

Document 75917143 Report 06 Issue 1 **June 2012**

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PREPARED FOR

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APPROVED BY

Mark Jenkins
Authorised Signatory

DATED 22 June 2012

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 15E, Industry Canada RSS-210 and Industry Canada RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Lawler B Airs

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Product Service

SECTION 1

REPORT SUMMARY

FCC and Industry Canada Testing of the
Frontier Silicon Ltd Venice 6.5
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1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC and Industry Canada Testing of the Frontier Silicon Ltd Venice 6.5 to the requirements of FCC CFR 47 Part 15E, Industry Canada RSS-210 and Industry Canada RSS-GEN.

Objective	To perform FCC and Industry Canada Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Frontier Silicon Ltd
Model Number(s)	Venice 6.5
Serial Number(s)	1) Conducted PIFA Sample, S/N: RAD103037 on Test Jig S/N: RAD103234 2) External Antenna Radiated Sample, S/N: RAD103021 on Test Jig S/N: RAD1030235 3) Radiated PIFA Sample, S/N: RAD103045 on Test Jig, S/N: RAD1030235
Number of Samples Tested	3
Test Specification/Issue/Date	FCC CFR 47 Part 15E (2011) Industry Canada RSS-210 (2010) Industry Canada RSS-GEN (2010)
Incoming Release Date	Application Form 07 June 2012
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	FS021247 17 February 2012
Start of Test	7 March 2012
Finish of Test	30 April 2012
Name of Engineer(s)	G Lawler B Airs
Related Document(s)	FCC 06-96: 2006; FCC Public Notice DA 02-2138: 2002; UKAS M3003: Edition 2: 2007; ETSI TR 100 028: 2001

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 15E, Industry Canada RSS-210 a
below.

Section	Spec Clause			Test Description
	FCC	RSS-210	RSS-GEN	
802.11(a) – Onboard PIFA Antenna				
2.1	15.207	-	7.2.4	AC Line Conducted Emissions
2.2	15.407 (a)(1)(2)(3)	A9.2 (1)(2)(3)(4)	-	Power Limits
2.3	15.407 (b)(1)(2)(3)(4)(6)(7)	A9.2 (1)(2)(3)(4)	-	Undesirable Emission Limits
2.4	2.1055 and 15.407 (g)	-	-	Frequency Stability
2.5	15.407 (a)	-	-	26 dB Bandwidth
2.6	-	A9.2	-	99 % Emission Bandwidth
2.7	15.407 (a)(5)	A9.2	-	Peak Power Spectral Density
2.8	15.407 (a)(6)	-	-	Ratio of the Peak Excursion of the Modulation E

Section	Spec Clause			Test Description
	FCC	RSS-210	RSS-GEN	
802.11(n) - 5 GHz 40 MHz BW – Onboard PIFA Antenna				
2.2	15.407 (a)(1)(2)(3)	A9.2 (1)(2)(3)(4)	-	Power Limits
2.3	15.407 (b)(1)(2)(3)(4)(6)(7) and	A9.2 (1)(2)(3)(4)	-	Undesirable Emission Limits
2.4	2.1055 and 15.407 (g)	-	-	Frequency Stability
2.5	15.407 (a)	-	-	26 dB Bandwidth
2.6	-	A9.2	-	99 % Emission Bandwidth
2.7	15.407 (a)(5)	A9.2	-	Peak Power Spectral Density
2.8	15.407 (a)(6)	-	-	Ratio of the Peak Excursion of the Modulation E
802.11(n) - 5 GHz, 20 MHz BW – Onboard PIFA Antenna				
2.2	15.407 (a)(1)(2)(3)	A9.2 (1)(2)(3)(4)	-	Power Limits
2.3	15.407 (b)(1)(2)(3)(4)(6)(7)	A9.2 (1)(2)(3)(4)	-	Undesirable Emission Limits
2.4	2.1055 and 15.407 (g)	-	-	Frequency Stability
2.5	15.407 (a)	-	-	26 dB Bandwidth
2.6	-	A9.2	-	99 % Emission Bandwidth
2.7	15.407 (a)(5)	A9.2	-	Peak Power Spectral Density
2.8	15.407 (a)(6)	-	-	Ratio of the Peak Excursion of the Modulation E

Section	Spec Clause			Test Description
	FCC	RSS-210	RSS-GEN	
802.11(n) - 5 GHz – Onboard PIFA Antenna				
2.3	15.407 (a)(1)(2)(3)	A9.2 (1)(2)(3)(4)	-	Undesirable Emission Limits
802.11(a) – External Antenna				
2.2	15.407 (a)(1)(2)(3)	A9.2 (1)(2)(3)(4)	-	Power Limits
802.11(n) - 5 GHz – External Antenna				
2.2	15.407 (a)(1)(2)(3)	A9.2 (1)(2)(3)(4)	-	Power Limits
802.11(n) - 5 GHz – External Antenna				
2.2	15.407 (a)(1)(2)(3)	A9.2 (1)(2)(3)(4)	-	Power Limits

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1.3 APPLICATION FORM

EQUIPMENT DESCRIPTION	
Model Name/Number	Venice 6.5
Part Number	HA-FS2026-F5xxxx ('FCC variant , 'x' depends on customer variant e.g.HA-FS2026-F50008) and HA-FS2026-05xxxx ('ETSI variant , 'x' depends on customer variant e.g.HA-FS2026-050008)
FCC ID (if applicable)	YYX-HA-FS2026-F5
Industry Canada ID (if applicable)	
Technical Description (Please provide a brief description of the intended use of the equipment)	The Venice 6.5 is a radio module supporting Internet Radio (WiFi or Ethernet), Networked Audio Streaming (WiFi or Ethernet), iPod/iPhone/iPad control and DAB/DAB+/FM-RDS reception when installed in a consumer audio product.

INFORMATION REQUIRED		
Modes:		
☒	802.11(a)	
☒	802.11(n)	
a) The occupied channel bandwidth(s):		
☒	Channel Bandwidth 1: 20MHz	☒ Channel Bandwidth 2: 40MHz
NOTE: Add more lines if the equipment has more channel Bandwidths.		
b) The DFS related operating mode(s) of the equipment:		
☐	Master	
☐	Slave with radar detection	
☒	Slave without radar detection	
NOTE: If the equipment has more than 1 operating mode, tick all that apply.		
c) The equipment can operate in ad-hoc mode:		
☒	no ad-hoc operation	
☐	ad-hoc operation in the frequency range 5150MHz to 5250MHz without DFS	
☐	ad-hoc operation with DFS	
NOTE: If more than 1 is applicable, tick all that apply		
d) Operating Frequency Range(s):		
☒	Range 1: 5150MHz to 5250MHz	
☒	Range 2: 5250MHz to 5350MHz	
☒	Range 3: 5470MHz to 5725MHz	
☒	Range 4: 5725MHz to 5825MHz	
NOTE: If the equipment has more than 1 Operating Frequency Range, tick all that apply.		
e) TPC feature available:		☒ Yes ☐ No

Product Service

INFORMATION REQUIRED			
f) If the equipment has a TPC range, the lowest and highest power level (or lowest and highest EIRP level in case of integrated antenna equipment), intended antenna assemblies and corresponding operating frequency range for the TPC range (or for each of the TPC ranges if more than one is implemented).			
TPC range: Applicable Frequency Range:			
☐	5250MHz to 5350MHz		
☐	5470 MHz to 5725 MHz		
☒	A TPC mechanism is not required for systems with an e.i.r.p of less than 500 mW		
DFS Threshold level:	-62 dBm		
☒	at the antenna connector	☐	in front of the antenna
NOTE: For equipment with a maximum EIRP below 200 mW, the DFS threshold level shall be -62 dBm or less, for equipment with an EIRP of 200 mW or above, the DFS threshold level shall be -64 dBm or less. These levels assume a 0 dBi antenna gain. To define the applicable threshold level at the (temporary) antenna connector, the gain of the antenna (in dBi) shall be added to the threshold level. If more than one antenna is intended for this TPC range or power setting, the antenna gain of the antenna with the lowest gain shall be used.			
Power Setting 1: Applicable Frequency Range: 5150 MHz to 5250 MHz			
Conducted Average Power	11dBm	Average EIRP	16.5dBm
Power Setting 2: Applicable Frequency Range: 5250 MHz to 5350 MHz			
Conducted Average Power	11dBm	Average EIRP	16.5dBm
Power Setting 3: Applicable Frequency Range: 5470 MHz to 5725MHz			
Conducted Average Power	11dBm	Average EIRP	16.5dBm
Power Setting 4: Applicable Frequency Range: 5725 MHz to 5825MHz			
Conducted Average Power	11dBm	Average EIRP	16.5dBm

Table 3: Intended Antenna Assemblies

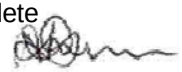
Antenna Assembly name	Antenna Gain (dBi)
PIFA	5.5

Product Service

INFORMATION REQUIRED	
h) The extreme operating temperature range that apply to the equipment:	
Please state conditions of normal operation as specified in the users manual: 0 to 70 deg C	
Supply Voltage:	
☐	AC mains. State AC voltage
☒	DC. State DC voltage 4V, 3.3V, 1.2V +/-5%
☐	State DC current
In case of DC, indicate the type of power source:	
☐	Internal Power Supply
☐	External Power Supply or AC/DC adapter
☐	Battery Nickel Cadmium
☐	Alkaline
☐	Nickel-Metal Hydride
☐	Lithium-Ion
☐	Lead acid (Vehicle regulated)
☐	Other (please specify):

ADDITIONAL INFORMATION PROVIDED BY THE SUBMITTER				
a) Modulation:				
Continuous duty	☐	Yes	☒	No
Can the transmitter operate un-modulated?	☐	Yes	☒	No
b) Duty Cycle				
Is transmitter intended for :				
Continuous duty	☐	Yes	☒	No
Intermittent duty only	☒	Yes	☐	No
If intermittent duty state DUTY CYCLE				
Transmitter ON Seconds	Transmitter OFF Seconds			
☒ Continuous operation possible for testing purposes				
Details: Test mode software supports continuous transmision on specific frequency and data rates				

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete

Signature:  Name: Abdul Wahed dewan

Position held: Principal RF Engineer Date: 07/06/2012

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Frontier Silicon Ltd Venice 6.5. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 4V, 3.3V and 1.2V DC supply.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
IC2932B-1 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard or test plan were made during testing.

1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.

Product Service

SECTION 2

TEST DETAILS

FCC and Industry Canada Testing of the
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In accordance with FCC CFR 47 Part 15E, Industry Canada RSS-210 and Industry Canada RSS-GEN

2.1 AC LINE CONDUCTED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47 Part 15E, Clause 15.207
Industry Canada RSS-GEN, Clause 7.2.4

2.1.2 Equipment Under Test and Modification State

Venice 6.5 S/N: RAD103045 on Test Jig S/N: RAD1030235 - Modification State 0

2.1.3 Date of Test

9 April 2012

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

The EUT is set up on a test table 800mm above a horizontal ground plane. A vertical ground plane is also required and is placed 400mm from the EUT. Where a EUT is floor standing it will be stood on but insulated from the ground plane by up to 12mm.

The EUT is powered through a Line Impedance Stabilisation Network (LISN) which is bonded to the ground plane. The EUT is located so that the distance between the EUT and the LISN is no less than 800mm. Where possible the cable between the mains input of the EUT and the LISN is 1m. Where this is not possible the cable is non inductively bundled with the bundle not exceeding 400mm in length.

A preliminary profile of the Conducted Emissions is obtained over the frequency range 150kHz to 30MHz. Any points of interest are noted for formal measurements.

During formal measurements, the measuring receiver is tuned to the emission of interest where Quasi – Peak and Average measurements are performed in a 9kHz Video and Resolution Bandwidth.

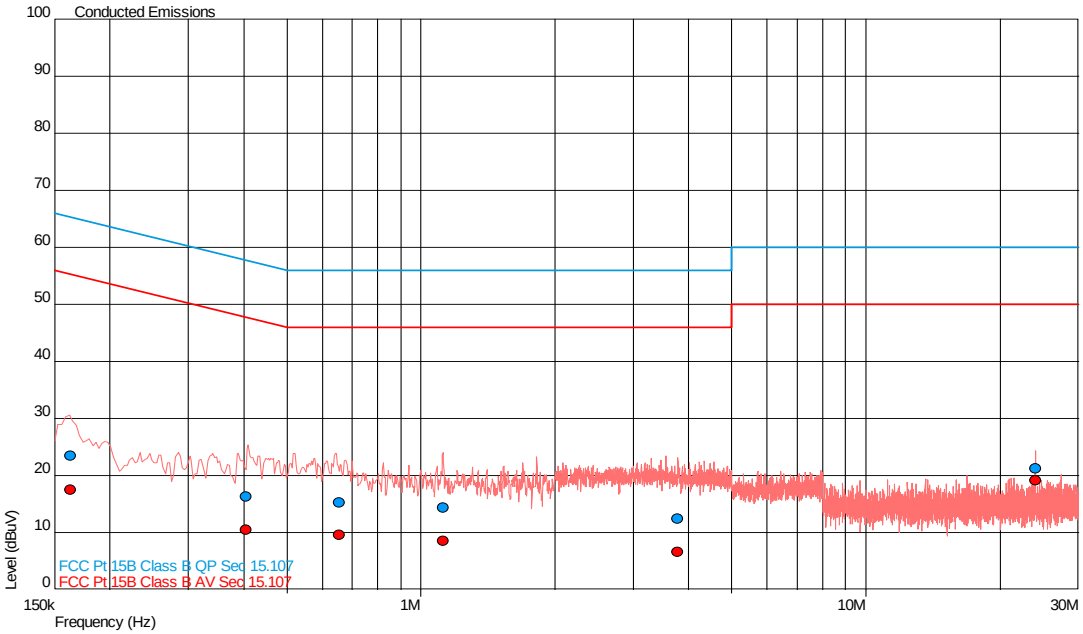
2.1.6 Environmental Conditions

Ambient Temperature	23.3°C
Relative Humidity	31.0%

2.1.7 Test Results

802.11(a) – Onboard PIFA Antenna

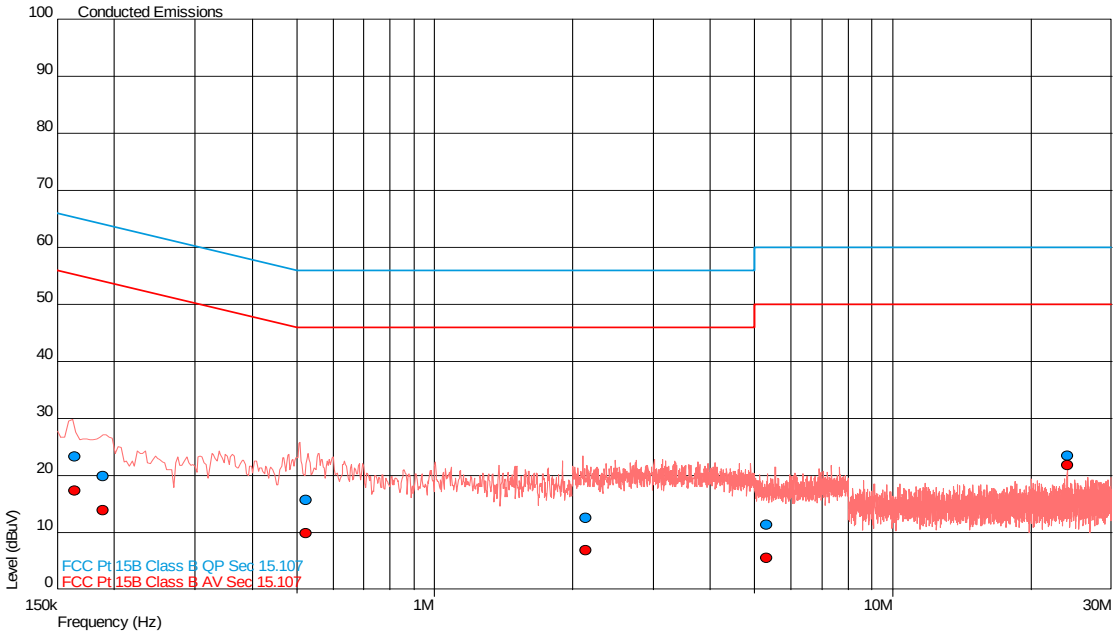
Live Line



Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dBµV)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dBµV)
0.163	23.5	65.3	-41.8	17.5	55.3	-37.8
0.405	16.4	57.8	-41.4	10.5	47.8	-37.3
0.654	15.3	56.0	-40.7	9.6	46.0	-36.4
1.122	14.4	56.0	-41.6	8.5	46.0	-37.5
3.766	12.4	56.0	-43.6	6.6	46.0	-39.4
24.002	21.3	60.0	-38.7	19.2	50.0	-30.8

Product Service

Neutral Line



Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dBµV)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dBµV)
0.164	23.4	65.3	-41.8	17.4	55.3	-37.8
0.189	19.9	64.1	-44.2	13.9	54.1	-40.1
0.524	15.8	56.0	-40.2	10.0	46.0	-36.0
2.139	12.6	56.0	-43.4	6.9	46.0	-39.1
5.298	11.4	60.0	-48.6	5.6	50.0	-44.4
24.003	23.5	60.0	-36.5	21.9	50.0	-28.1

2.2 POWER LIMITS

2.2.1 Specification Reference

FCC CFR 47 Part 15E, Clause 15.407 (a)(1)(2)(3)
Industry Canada RSS-210, Clause A9.2 (1)(2)(3)(4)

2.2.2 Equipment Under Test and Modification State

Venice 6.5 S/N: RAD103045 on Test Jig S/N: RAD1030235 - Modification State 0
Venice 6.5 S/N: RAD103037 on Test Jig S/N: RAD103234 - Modification State 0
Venice 6.5 S/N: RAD103021 on Test Jig S/N: RAD1030235 - Modification State 0

2.2.3 Date of Test

18 March 2012, 31 March 2012, 9 April 2012, 10 April 2012, 20 April 2012 & 23 April 2012

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

For conducted power, the EUT was transmitted at maximum power via a cable and attenuator to the Spectrum Analyser. The Analyser settings were adjusted to display the resultant trace on screen and a resolution bandwidth and video bandwidth of 1 MHz were used to perform the measurement.

For radiated power, the EUT was transmitted at maximum power level. The signal was observed on the Spectrum Analyser using a Double Ridge Guide antenna at 3 metres from the EUT. The signal was maximised by rotating the EUT 360° and a height search of the measuring antenna. A substitution was then performed using a substitution antenna and signal generator.

This level was maximised by adjusting the height of the measuring antenna once more. The level from the signal generator was then adjusted to achieve the same raw result as with the EUT. This level was then corrected to account for cable loss and antenna factor. A calculation was then performed to obtain the final figure.

In both cases a Peak Power Analyser was then used to obtain a correction factor for the wideband signal and in terms of an rms-equivalent voltage.

2.2.6 Environmental Conditions

Ambient Temperature	17.9 - 24.3°C
Relative Humidity	28.0 - 34.0%

2.2.7 Test Results

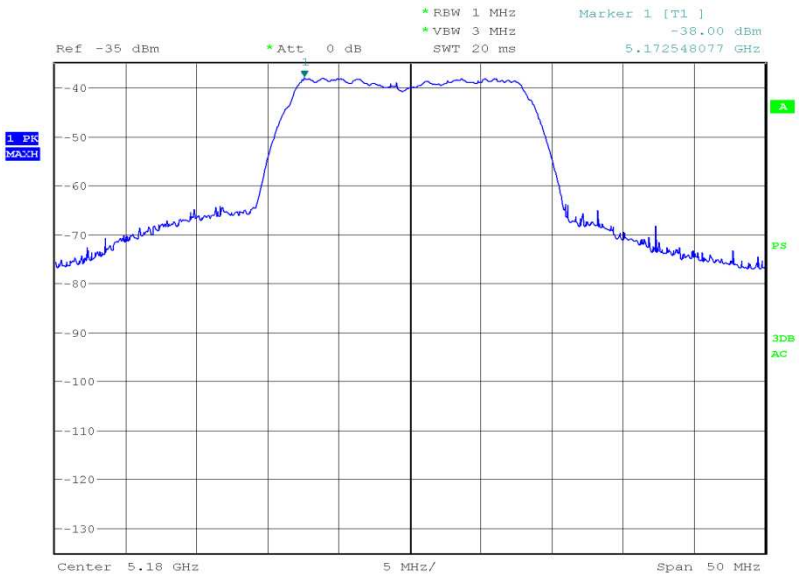
802.11(a) – Onboard PIFA Antenna

Radiated

Frequency Band 1

5180 MHz

EIRP (dBm)	EIRP (mW)
16.83	48.19



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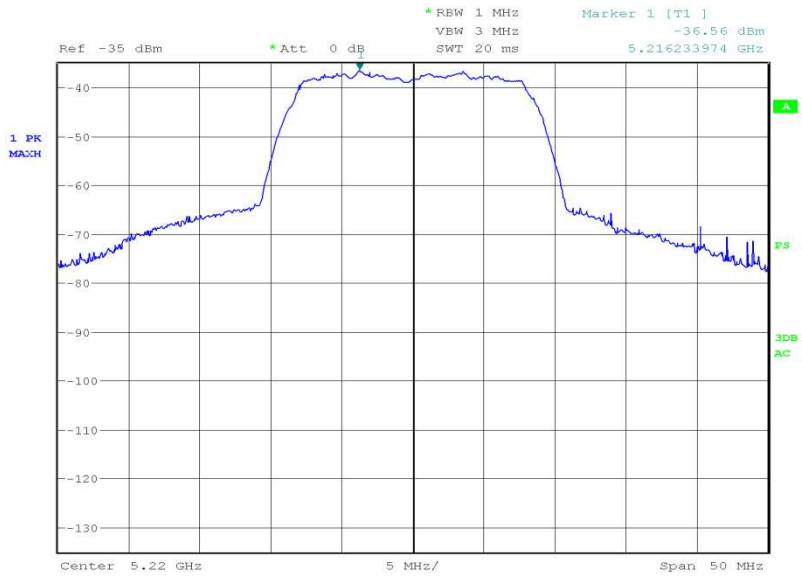
5220 MHz

EIRP (dBm)	EIRP (mW)
17.72	59.16



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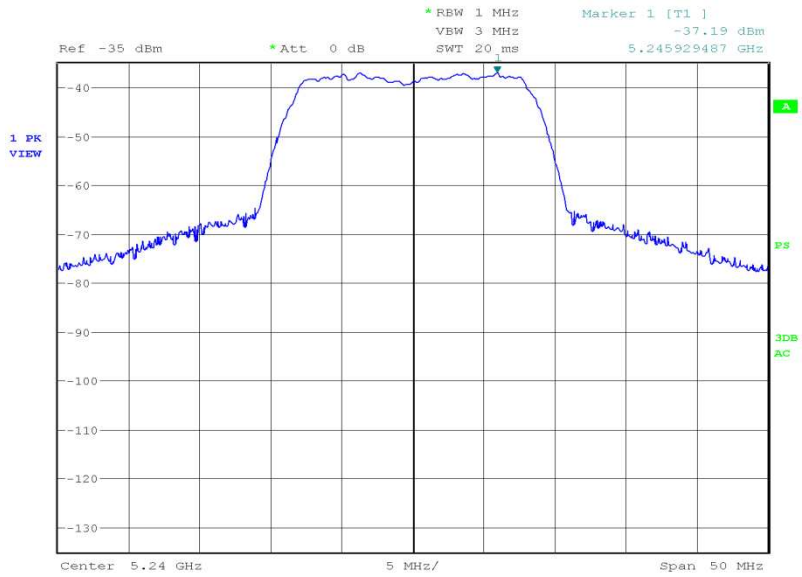
5240 MHz

EIRP (dBm)	EIRP (mW)
16.93	49.32



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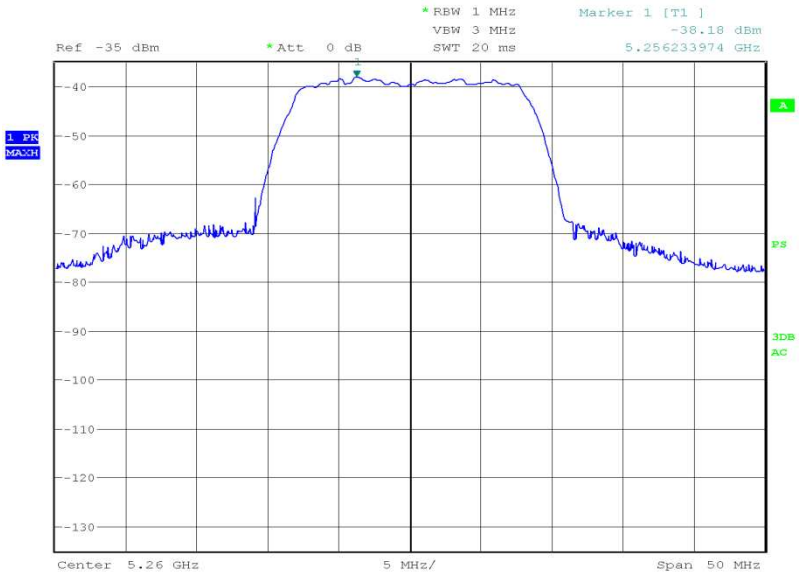
Radiated

Frequency Band 2

5260 MHz

EIRP (dBm)	EIRP (mW)
15.78	37.84



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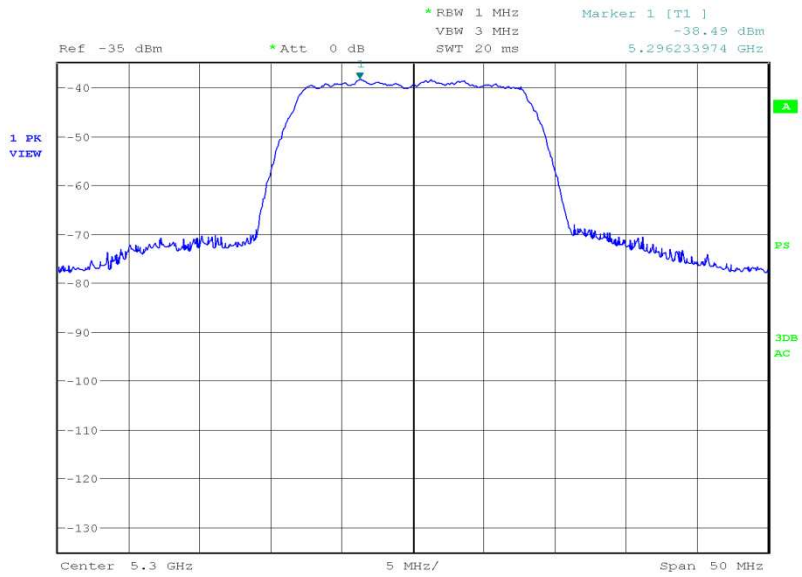
5300 MHz

EIRP (dBm)	EIRP (mW)
15.56	35.97



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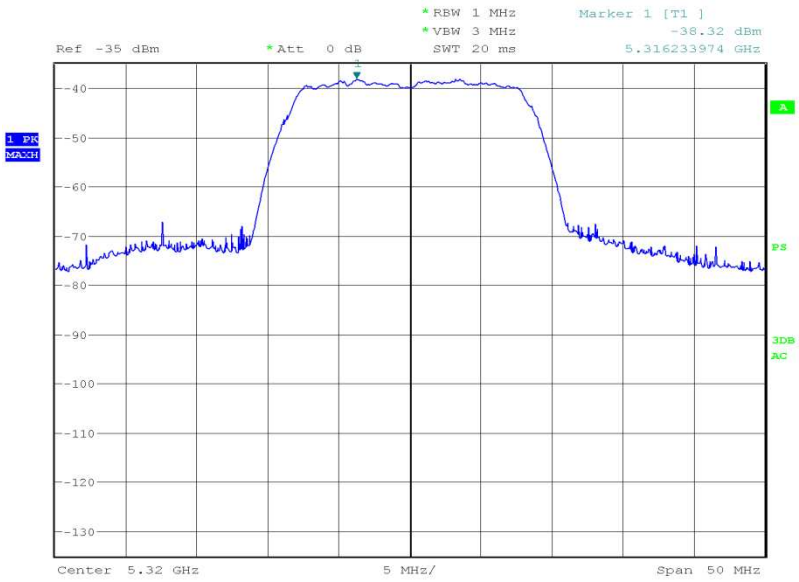
5320 MHz

EIRP (dBm)	EIRP (mW)
+15.74	37.50



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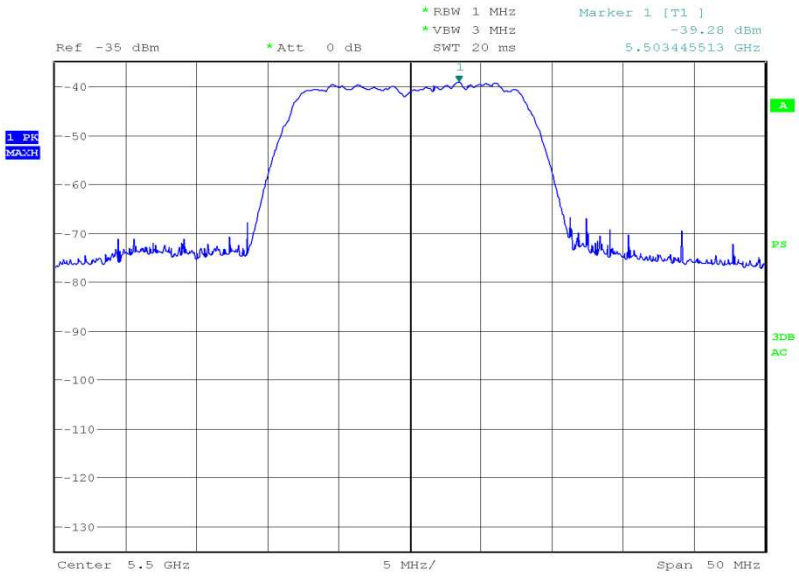
Radiated

Frequency Band 3

5500 MHz

EIRP (dBm)	EIRP (mW)
15.11	32.43



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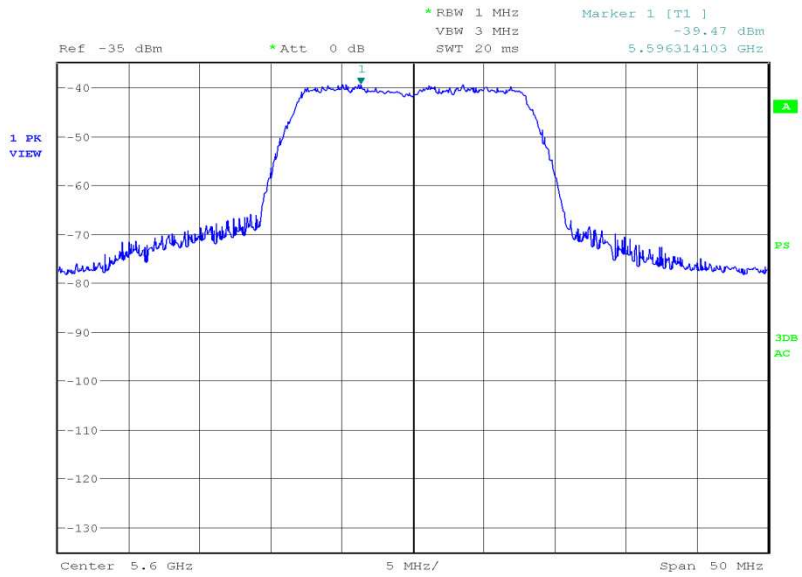
5600 MHz

EIRP (dBm)	EIRP (mW)
14.74	29.79



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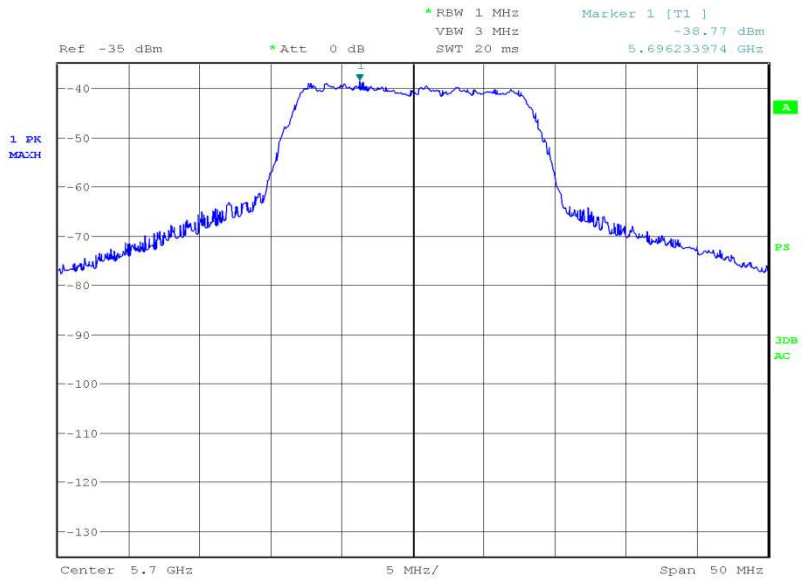
5700 MHz

EIRP (dBm)	EIRP (mW)
15.52	35.65



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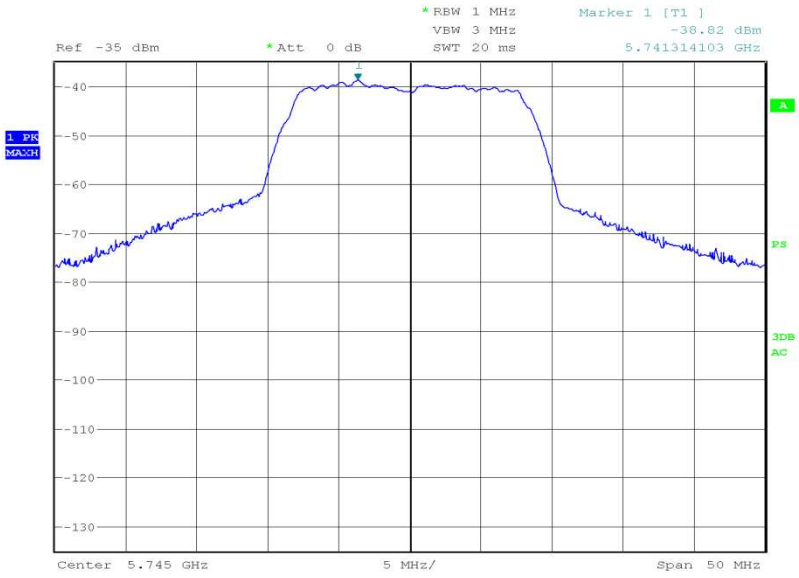
Radiated

Frequency Band 4

5745 MHz

EIRP (dBm)	EIRP (mW)
14.87	30.69



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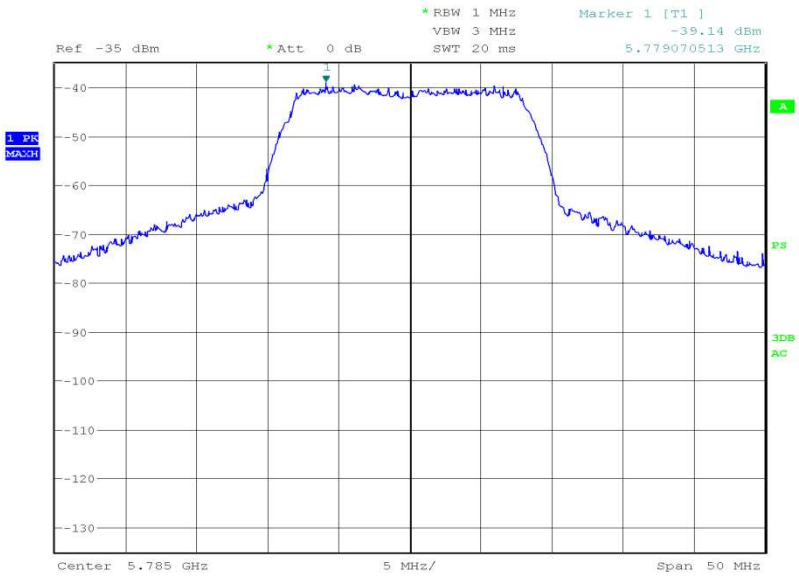
5785 MHz

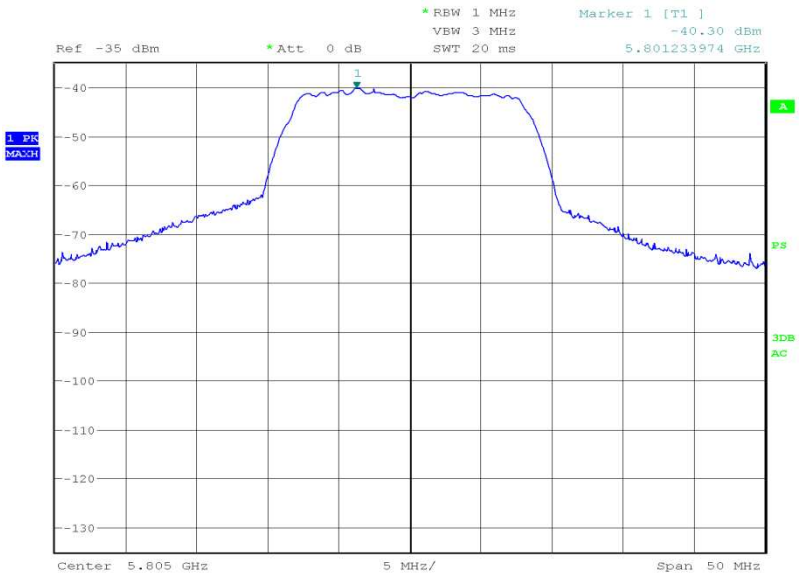
EIRP (dBm)	EIRP (mW)
13.89	24.49



Date: 10.MAR.2012 10:20:15

5805 MHz

EIRP (dBm)	EIRP (mW)
13.10	20.42



Limit for Radiated

Frequency Band (MHz)	FCC Limit	IC Limit
5150 to 5250	Lesser of 200 mW or 10 dBm + 10 log B	Lesser of 200 mW or 10 dBm + 10 log B
5250 to 5350	Lesser of 1 W or 17 dBm + 10 log B	Lesser of 1 W or 17 dBm + 10 log B
5470 to 5725	Lesser of 1 W or 17 dBm + 10 log B	Lesser of 1 W or 17 dBm + 10 log B
5725 to 5825	Lesser of 4 W or 23 dBm + 10 log B	Lesser of 4 W or 23 dBm + 10 log B

Note: For FCC limit, “B” = 26 dB Bandwidth. For IC limit “B” = 99% Occupied Bandwidth.
For FCC only – It is acceptable to have an antenna with up to 6 dBi gain, without reducing the conducted output power.

Conducted

Frequency Band 1

5180 MHz

EIRP (dBm)	EIRP (mW)
10.48	11.169

5220 MHz

EIRP (dBm)	EIRP (mW)
10.87	10.218

5240 MHz

EIRP (dBm)	EIRP (mW)
11.03	12.677

The test was performed on the worst case data rate for 802.11(a) modulation. The worst case was deemed as the data rate which produced the highest level of conducted average power. This data rate was 54Mbps.

Conducted

Frequency Band 2

5260 MHz

EIRP (dBm)	EIRP (mW)
10.15	10.351

5300 MHz

EIRP (dBm)	EIRP (mW)
9.34	8.590

5320 MHz

EIRP (dBm)	EIRP (mW)
9.78	9.506

The test was performed on the worst case data rate for 802.11(a) modulation. The worst case was deemed as the data rate which produced the highest level of conducted average power. This data rate was 54Mbps.

Conducted

Frequency Band 3

5500 MHz

EIRP (dBm)	EIRP (mW)
9.23	8.375

5600 MHz

EIRP (dBm)	EIRP (mW)
9.15	8.222

5700 MHz

EIRP (dBm)	EIRP (mW)
9.95	9.886

The test was performed on the worst case data rate for 802.11(a) modulation. The worst case was deemed as the data rate which produced the highest level of conducted average power. This data rate was 54Mbps.

Conducted

Frequency Band 4

5745 MHz

EIRP (dBm)	EIRP (mW)
10.11	10.257

5785 MHz

EIRP (dBm)	EIRP (mW)
9.82	9.594

5805 MHz

EIRP (dBm)	EIRP (mW)
10.14	10.328

The test was performed on the worst case data rate for 802.11(a) modulation. The worst case was deemed as the data rate which produced the highest level of conducted average power. This data rate was 54Mbps.

Limit for Conducted

Frequency Band (MHz)	FCC Limit	IC Limit
5150 to 5250	Lesser of 50 mW or 4 dBm + 10 log B	-
5250 to 5350	Lesser of 250 mW or 11 dBm + 10 log B	Lesser of 250 mW or 11 dBm + 10 log B
5470 to 5725	Lesser of 250 mW or 11 dBm + 10 log B	Lesser of 250 mW or 11 dBm + 10 log B
5725 to 5825	Lesser of 1 W or 17 dBm + 10 log B	Lesser of 1 W or 17 dBm + 10 log B

Note: For FCC limit, “B” = 26 dB Bandwidth. For IC limit “B” = 99% Occupied Bandwidth.

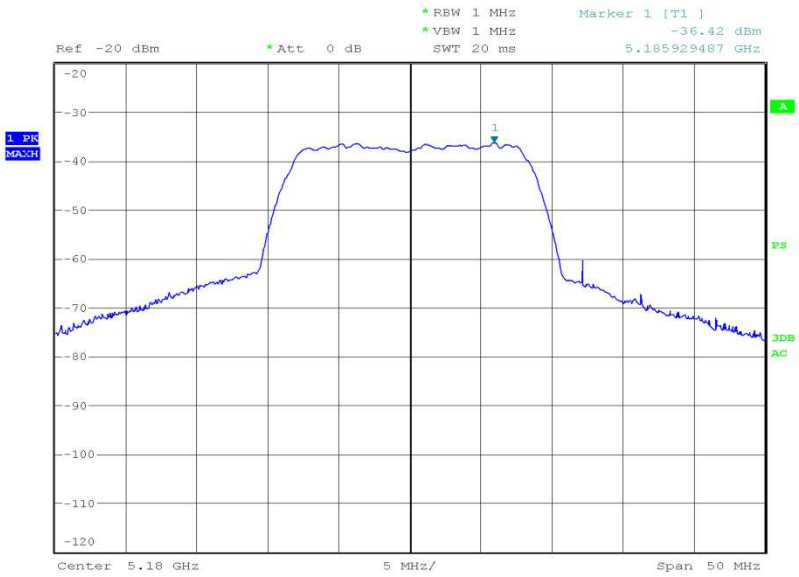
802.11(a) – External Antenna

Radiated

Frequency Band 1

5180 MHz

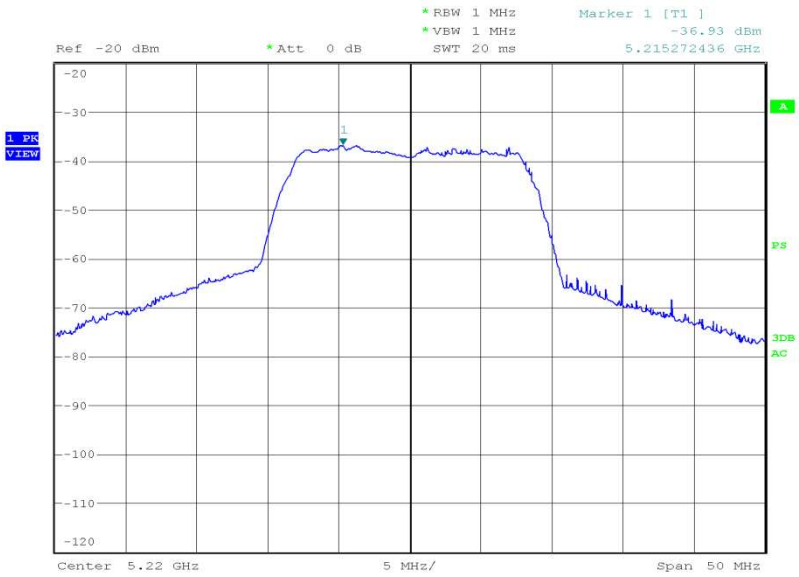
EIRP (dBm)	EIRP (mW)
16.62	45.92



Date: 9.APR.2012 13:50:22

5220 MHz

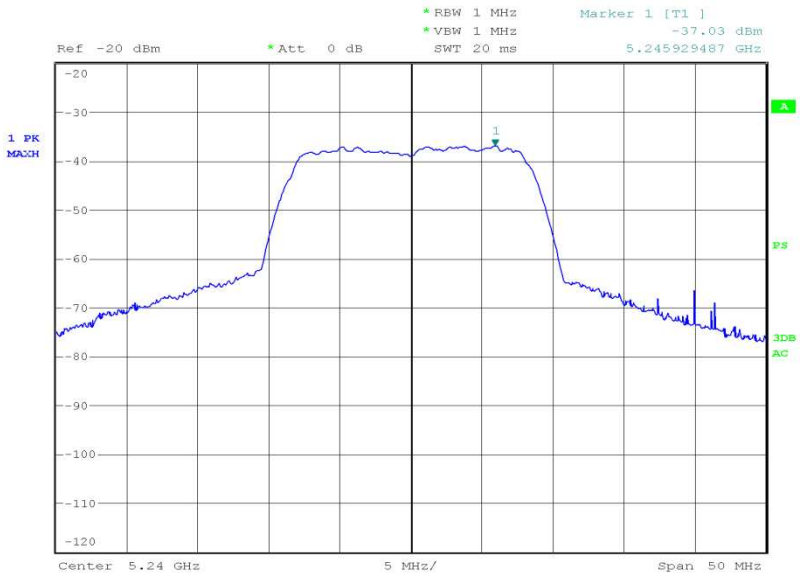
EIRP (dBm)	EIRP (mW)
15.98	39.63



Date: 9.APR.2012 13:59:19

5240 MHz

EIRP (dBm)	EIRP (mW)
16.26	42.27



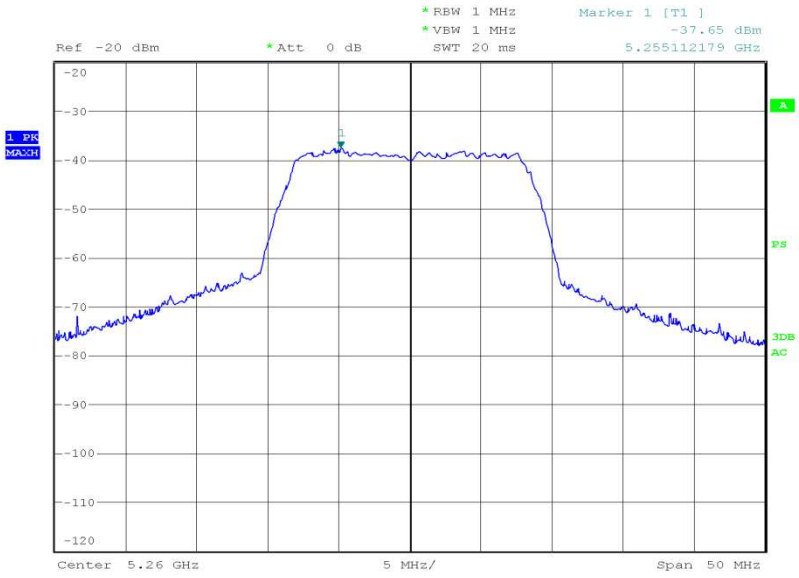
Date: 9.APR.2012 14:04:22

Radiated

Frequency Band 2

5260 MHz

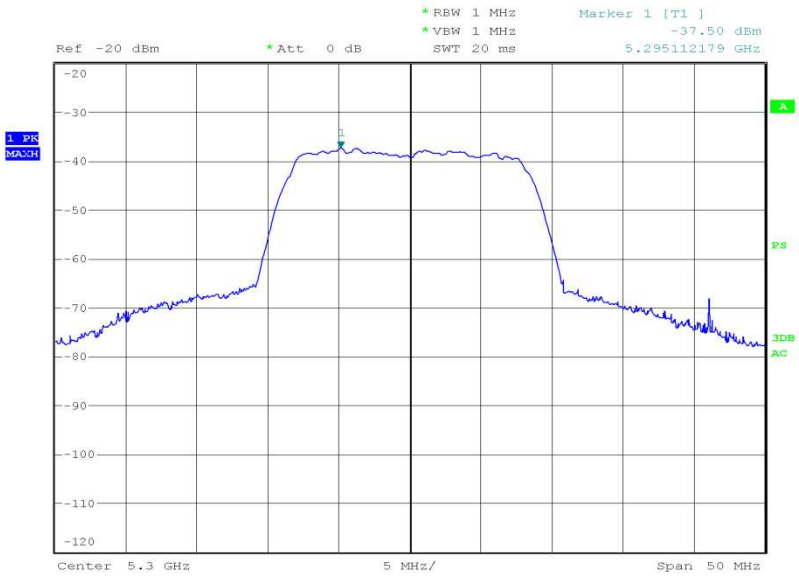
EIRP (dBm)	EIRP (mW)
15.14	32.66



Date: 9.APR.2012 14:17:46

5300 MHz

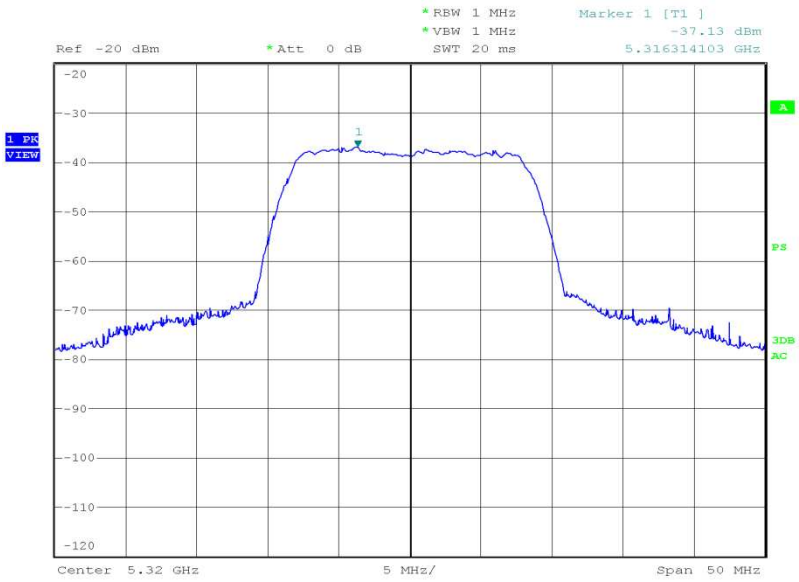
EIRP (dBm)	EIRP (mW)
15.53	35.73



Date: 9.APR.2012 14:27:25

5320 MHz

EIRP (dBm)	EIRP (mW)
16.31	42.76



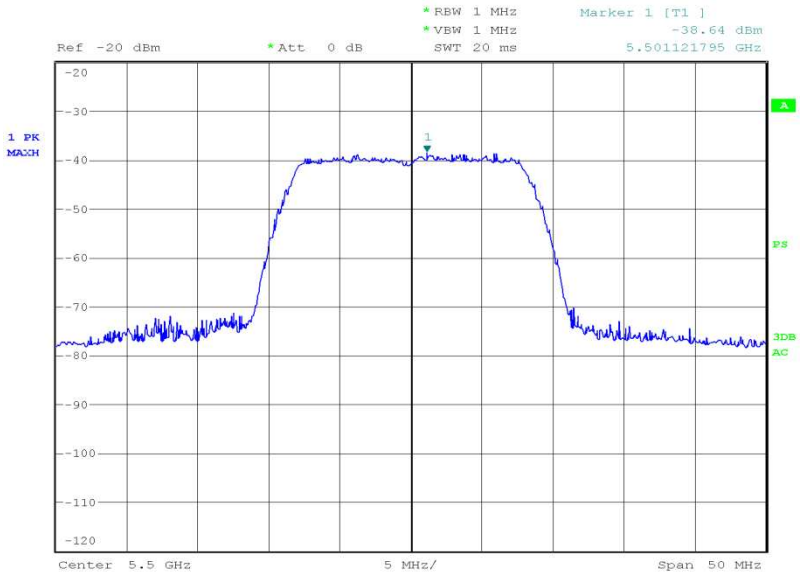
Date: 9.APR.2012 14:33:03

Radiated

Frequency Band 3

5500 MHz

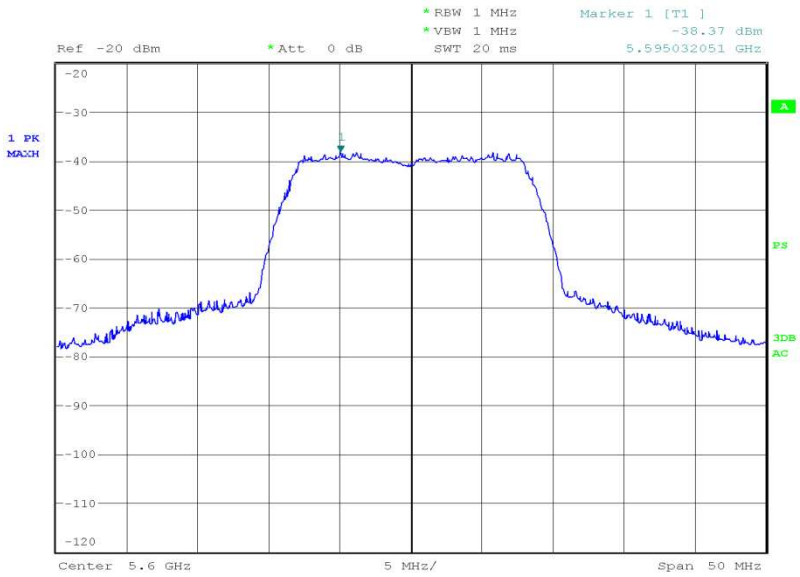
EIRP (dBm)	EIRP (mW)
15.08	32.21



Date: 9.APR.2012 14:38:58

5600 MHz

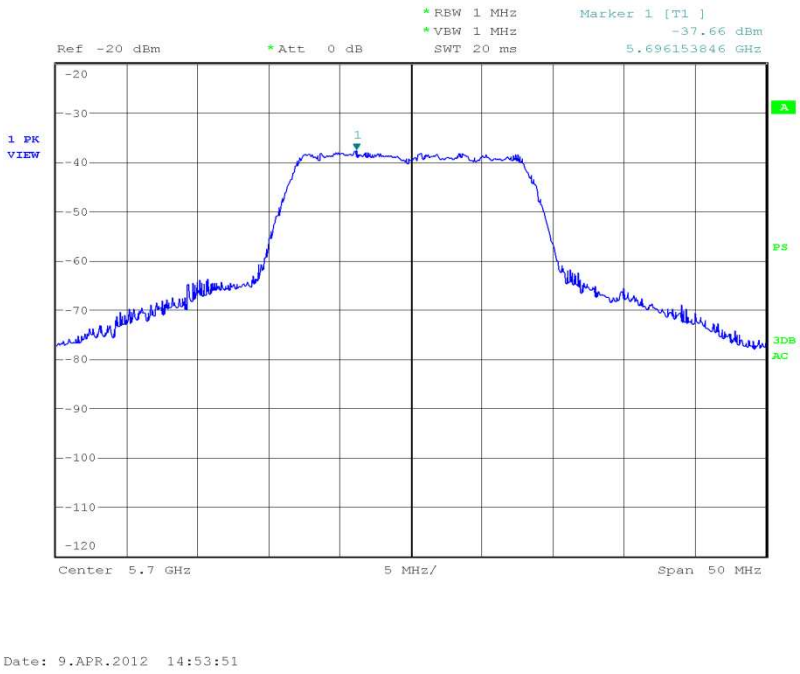
EIRP (dBm)	EIRP (mW)
15.69	37.07



Date: 9.APR.2012 14:50:23

5700 MHz

EIRP (dBm)	EIRP (mW)
16.72	46.99

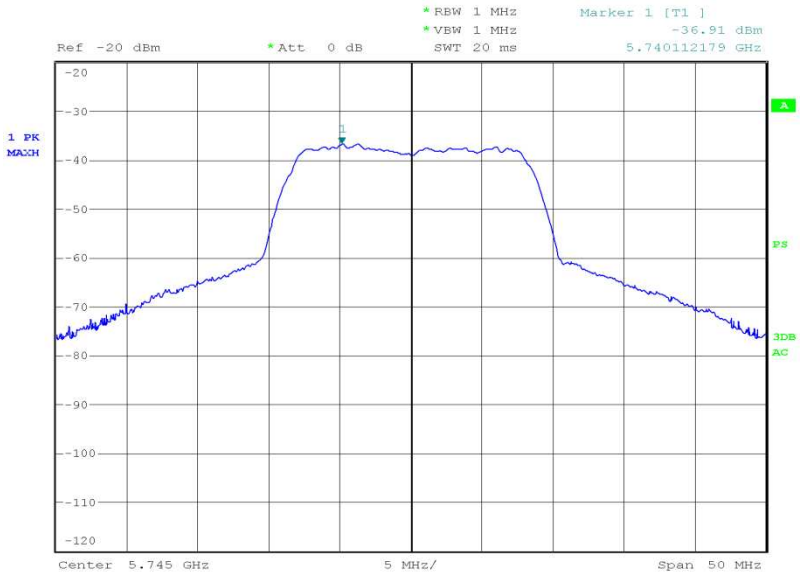


Radiated

Frequency Band 4

5745 MHz

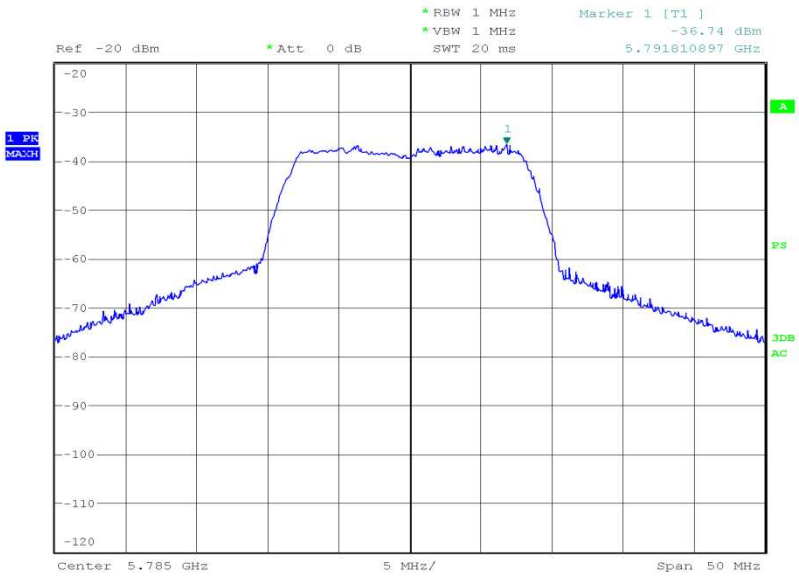
EIRP (dBm)	EIRP (mW)
17.29	53.58



Date: 9.APR.2012 14:57:32

5785 MHz

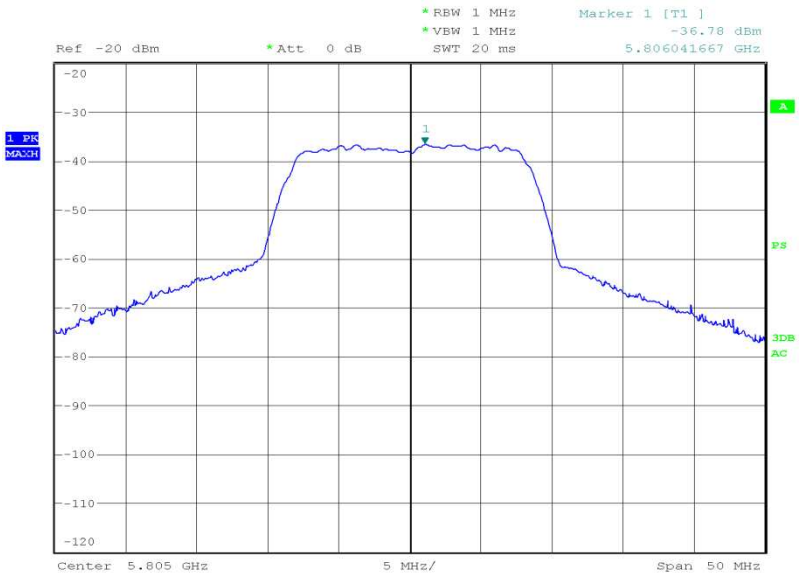
EIRP (dBm)	EIRP (mW)
17.26	53.21



Date: 9.APR.2012 15:00:51

5805 MHz

EIRP (dBm)	EIRP (mW)
17.19	52.36



Limit for Radiated

Frequency Band (MHz)	FCC Limit	IC Limit
5150 to 5250	Lesser of 200 mW or 10 dBm + 10 log B	Lesser of 200 mW or 10 dBm + 10 log B
5250 to 5350	Lesser of 1 W or 17 dBm + 10 log B	Lesser of 1 W or 17 dBm + 10 log B
5470 to 5725	Lesser of 1 W or 17 dBm + 10 log B	Lesser of 1 W or 17 dBm + 10 log B
5725 to 5825	Lesser of 4 W or 23 dBm + 10 log B	Lesser of 4 W or 23 dBm + 10 log B

Note: For FCC limit, “B” = 26 dB Bandwidth. For IC limit “B” = 99% Occupied Bandwidth.
For FCC only – It is acceptable to have an antenna with up to 6 dBi gain, without reducing the conducted output power.

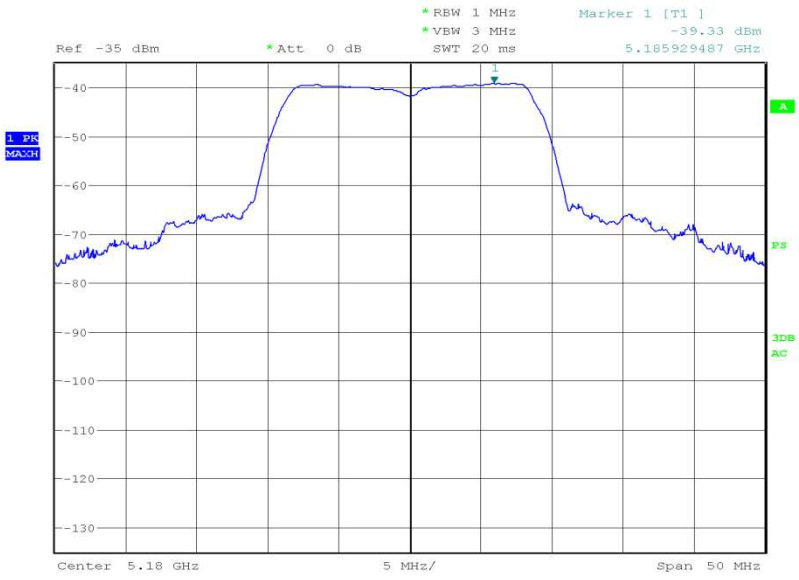
802.11(n) - 5 GHz, 20 MHz BW – Onboard PIFA Antenna

Radiated

Frequency Band 1

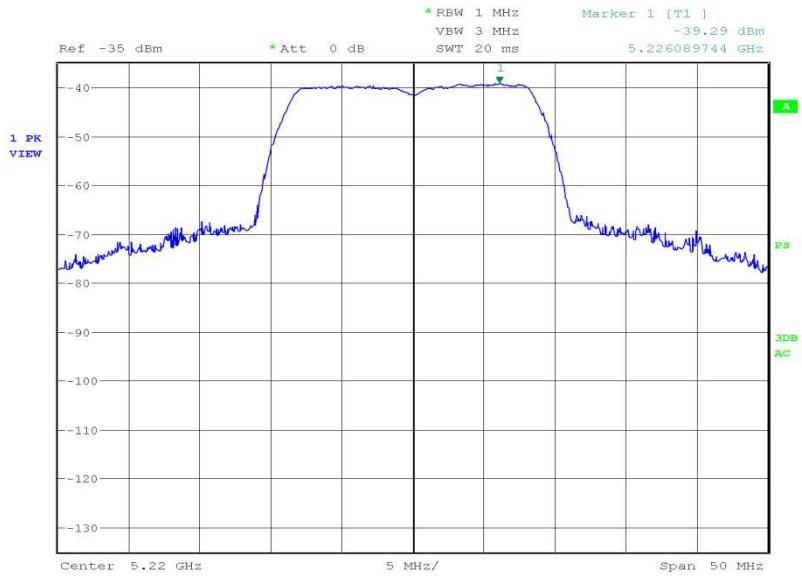
5180 MHz

EIRP (dBm)	EIRP (mW)
17.10	51.29



5220 MHz

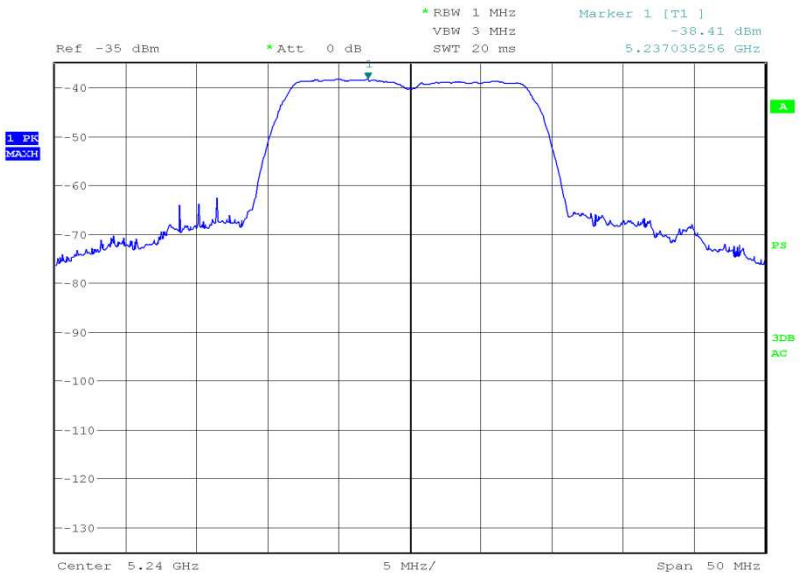
EIRP (dBm)	EIRP (mW)
16.58	45.50



Date: 10.MAR.2012 11:10:24

5240 MHz

EIRP (dBm)	EIRP (mW)
17.31	53.83



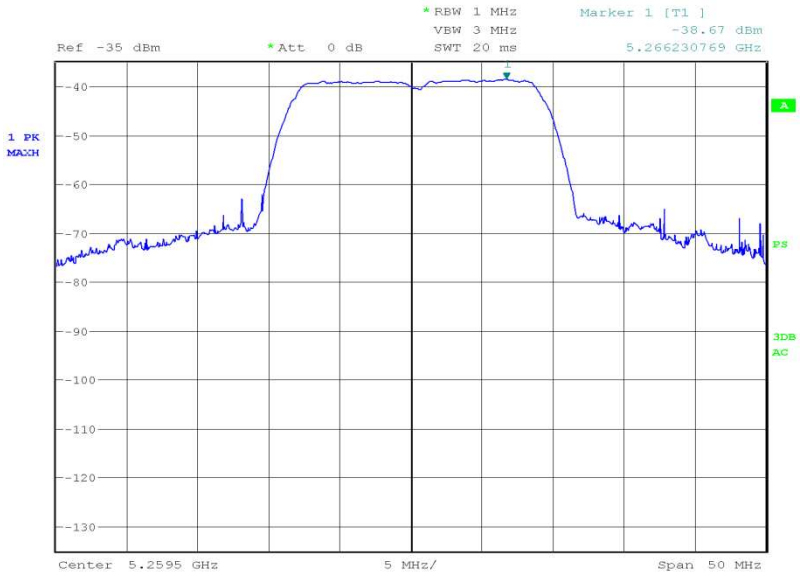
Date: 10.MAR.2012 11:20:20

Radiated

Frequency Band 2

5260 MHz

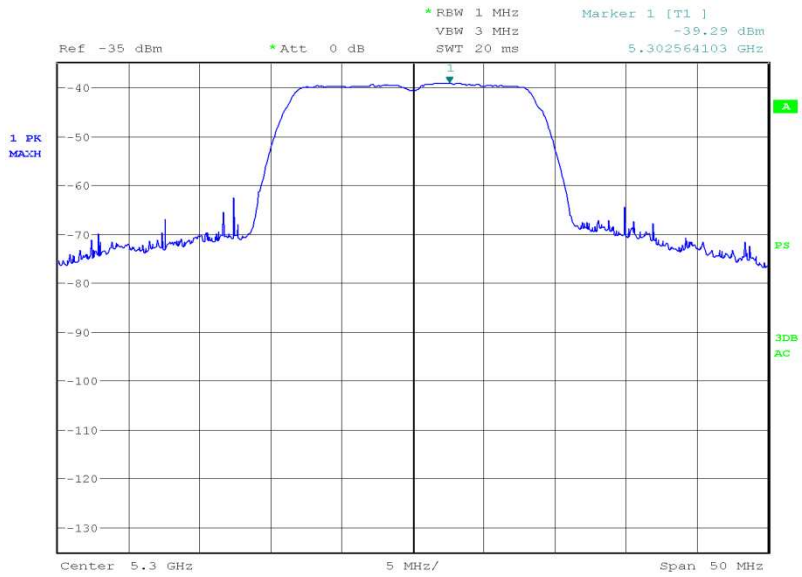
EIRP (dBm)	EIRP (mW)
16.89	48.87



Date: 10.MAR.2012 11:40:03

5300 MHz

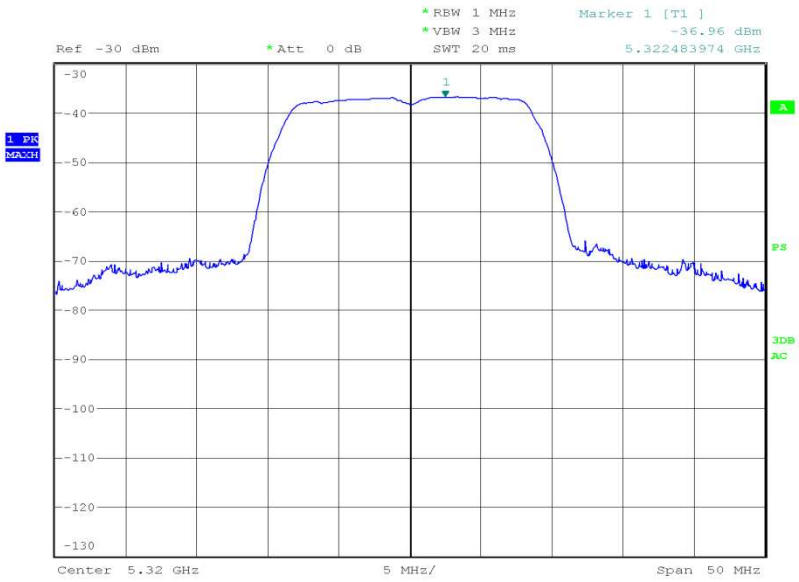
EIRP (dBm)	EIRP (mW)
16.36	43.25



Date: 10.MAR.2012 11:51:17

5320 MHz

EIRP (dBm)	EIRP (mW)
18.70	74.13

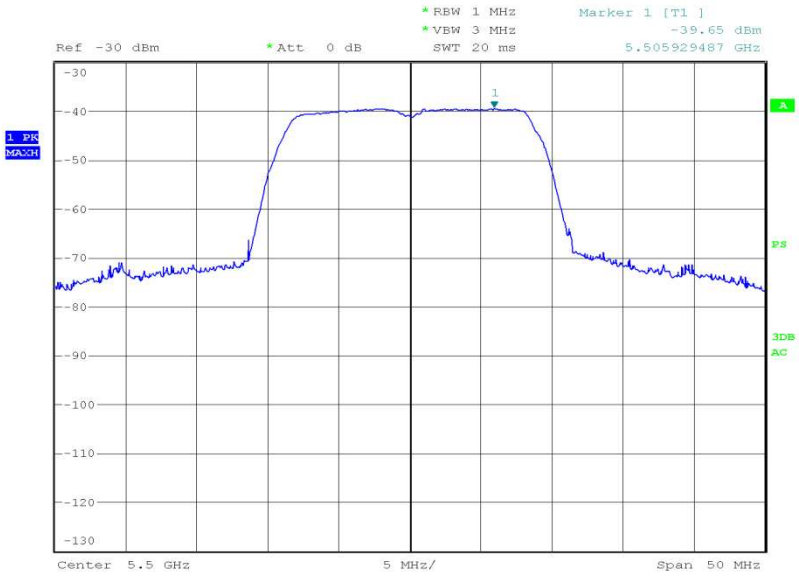


Radiated

Frequency Band 3

5500 MHz

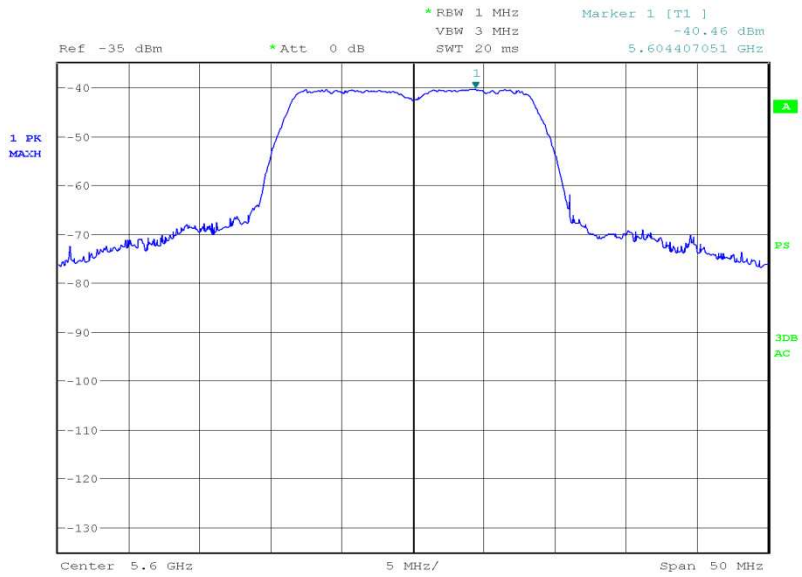
EIRP (dBm)	EIRP (mW)
16.34	46.13



Date: 7.MAR.2012 19:38:21

5600 MHz

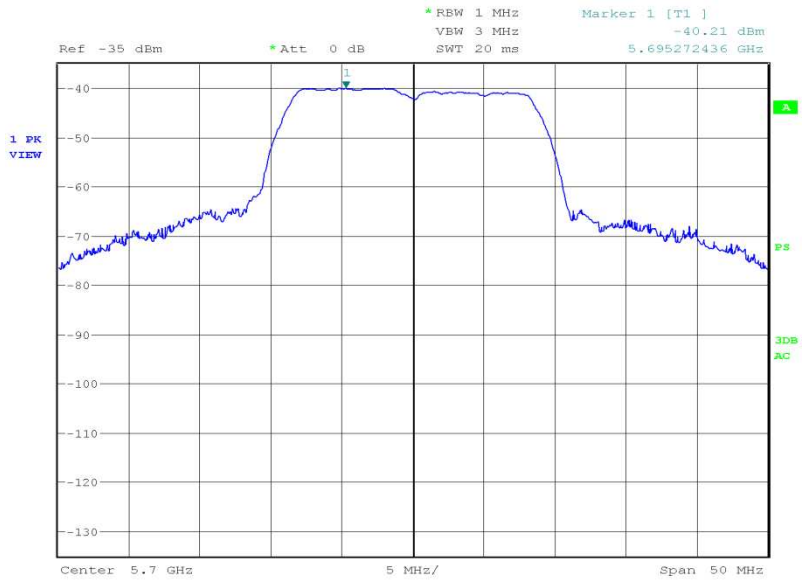
EIRP (dBm)	EIRP (mW)
15.35	34.28



Date: 10.MAR.2012 12:22:19

5700 MHz

EIRP (dBm)	EIRP (mW)
15.68	36.98



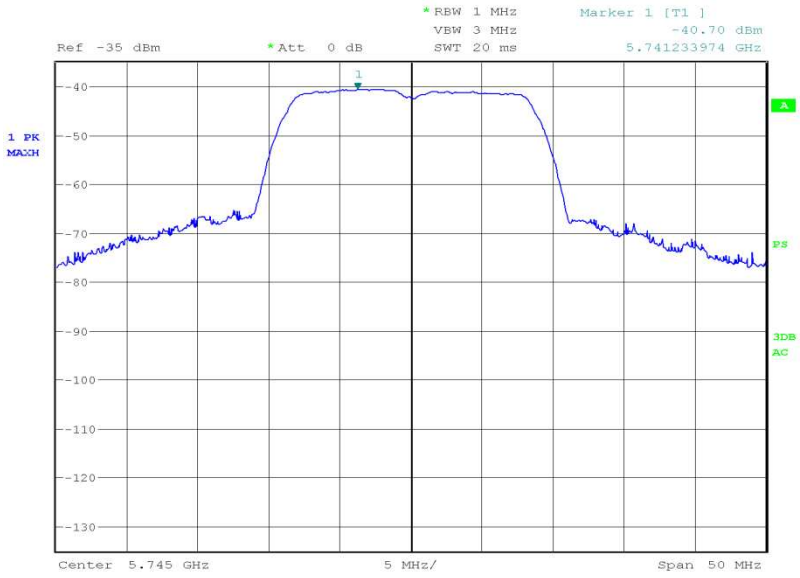
Date: 10.MAR.2012 12:19:12

Radiated

Frequency Band 4

5745 MHz

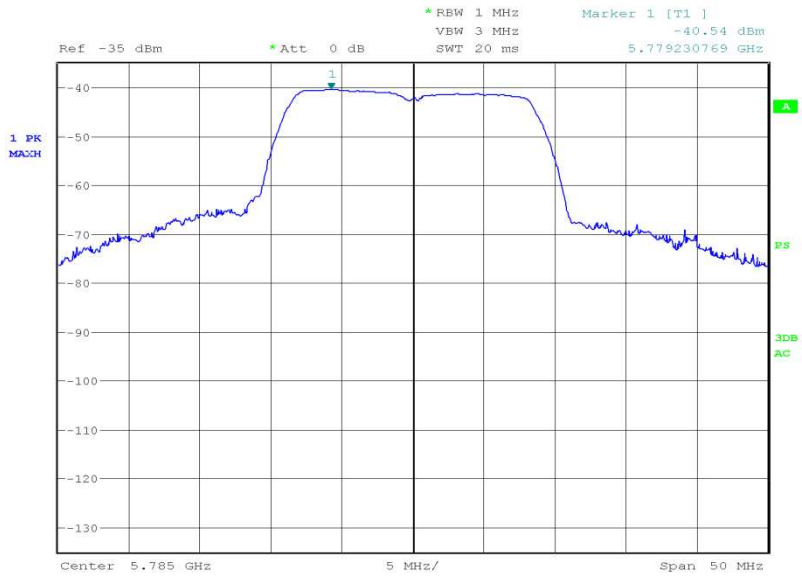
EIRP (dBm)	EIRP (mW)
14.80	30.20



Date: 10.MAR.2012 12:53:22

5785 MHz

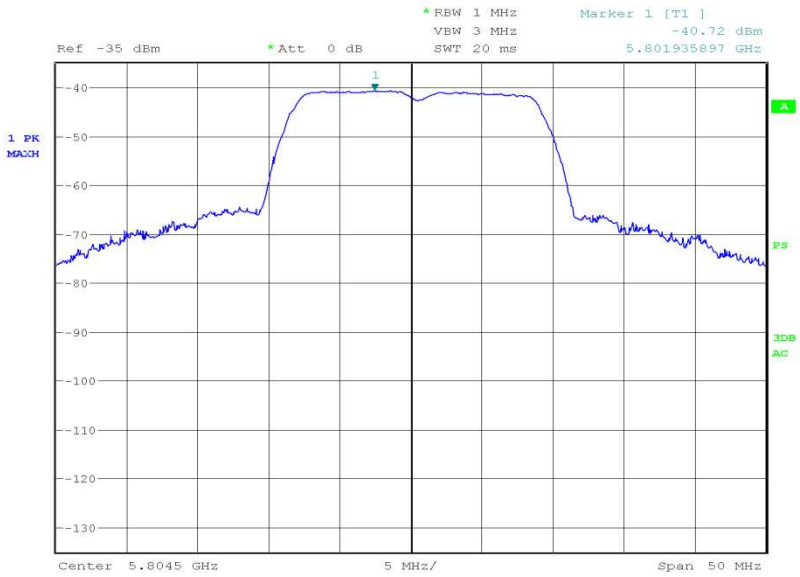
EIRP (dBm)	EIRP (mW)
13.55	22.65



Date: 10.MAR.2012 13:07:04

5805 MHz

EIRP (dBm)	EIRP (mW)
14.19	26.24



Limit for Radiated

Frequency Band (MHz)	FCC Limit	IC Limit
5150 to 5250	Lesser of 50 mW or 4 dBm + 10 log B	-
5250 to 5350	Lesser of 250 mW or 11 dBm + 10 log B	Lesser of 250 mW or 11 dBm + 10 log B
5470 to 5725	Lesser of 250 mW or 11 dBm + 10 log B	Lesser of 250 mW or 11 dBm + 10 log B
5725 to 5825	Lesser of 1 W or 17 dBm + 10 log B	Lesser of 1 W or 17 dBm + 10 log B

Note: For FCC limit, “B” = 26 dB Bandwidth. For IC limit “B” = 99% Occupied Bandwidth.
For FCC only – It is acceptable to have an antenna with up to 6 dBi gain, without reducing the conducted output power.

Conducted

Frequency Band 1

5180 MHz

EIRP (dBm)	EIRP (mW)
9.93	9.840

5220 MHz

EIRP (dBm)	EIRP (mW)
10.61	11.508

5240 MHz

EIRP (dBm)	EIRP (mW)
10.72	11.803

The test was performed on the worst case data rate for 802.11(n) - 20 MHz BW modulation. The worst case was deemed as the data rate which produced the highest level of conducted average power. This data rate was 21.70 Mbps.

Conducted

Frequency Band 2

5260 MHz

EIRP (dBm)	EIRP (mW)
10.03	10.069

5300 MHz

EIRP (dBm)	EIRP (mW)
9.17	8.260

5320 MHz

EIRP (dBm)	EIRP (mW)
9.98	9.954

The test was performed on the worst case data rate for 802.11(n) - 20 MHz BW modulation. The worst case was deemed as the data rate which produced the highest level of conducted average power. This data rate was 21.70 Mbps.

Conducted

Frequency Band 3

5500 MHz

EIRP (dBm)	EIRP (mW)
9.18	8.28

5600 MHz

EIRP (dBm)	EIRP (mW)
9.09	8.110

5700 MHz

EIRP (dBm)	EIRP (mW)
9.89	9.750

The test was performed on the worst case data rate for 802.11(n) - 20 MHz BW modulation. The worst case was deemed as the data rate which produced the highest level of conducted average power. This data rate was 21.70 Mbps.

Conducted

Frequency Band 4

5745 MHz

EIRP (dBm)	EIRP (mW)
10.06	10.139

5785 MHz

EIRP (dBm)	EIRP (mW)
9.80	9.550

5805 MHz

EIRP (dBm)	EIRP (mW)
10.05	10.116

The test was performed on the worst case data rate for 802.11(n) - 20 MHz BW modulation. The worst case was deemed as the data rate which produced the highest level of conducted average power. This data rate was 21.70 Mbps.

Limit for Conducted

Frequency Band (MHz)	FCC Limit	IC Limit
5150 to 5250	Lesser of 50 mW or 4 dBm + 10 log B	-
5250 to 5350	Lesser of 250 mW or 11 dBm + 10 log B	Lesser of 250 mW or 11 dBm + 10 log B
5470 to 5725	Lesser of 250 mW or 11 dBm + 10 log B	Lesser of 250 mW or 11 dBm + 10 log B
5725 to 5825	Lesser of 1 W or 17 dBm + 10 log B	Lesser of 1 W or 17 dBm + 10 log B

Note: For FCC limit, “B” = 26 dB Bandwidth. For IC limit “B” = 99% Occupied Bandwidth.

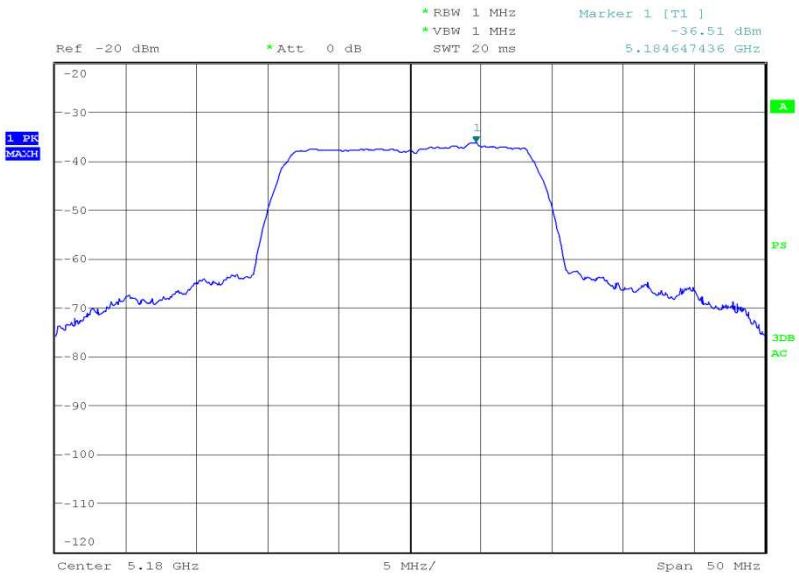
802.11(n) - 5 GHz 20MHz Bandwidth – External Antenna

Radiated

Frequency Band 1

5180 MHz

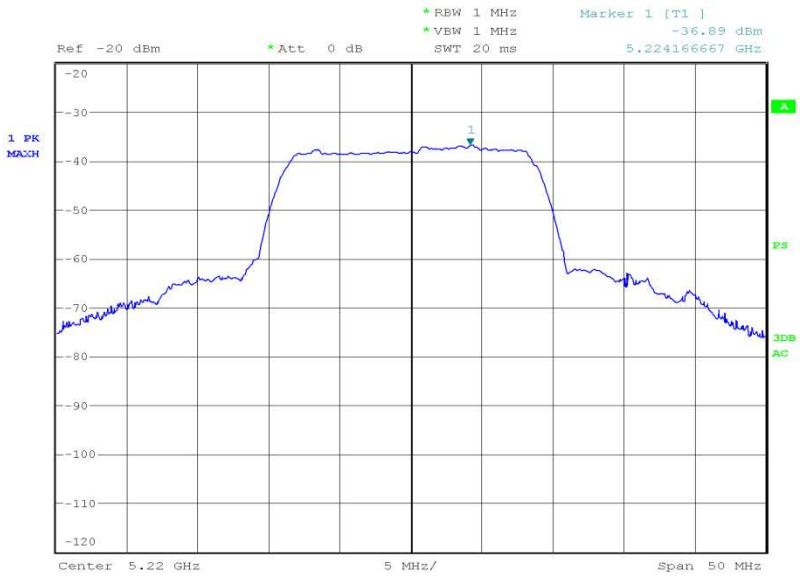
EIRP (dBm)	EIRP (mW)
18.12	64.86



Date: 10.APR.2012 16:34:44

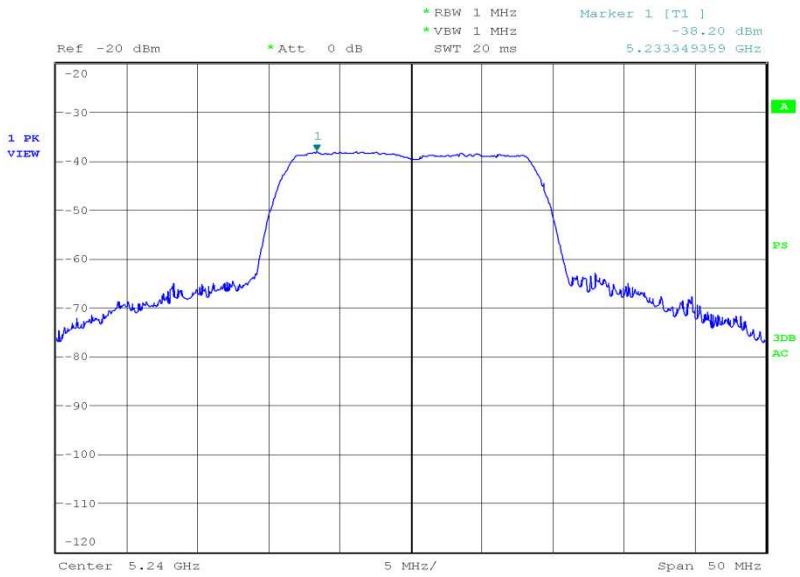
5220 MHz

EIRP (dBm)	EIRP (mW)
17.62	57.81



5240 MHz

EIRP (dBm)	EIRP (mW)
16.70	46.77



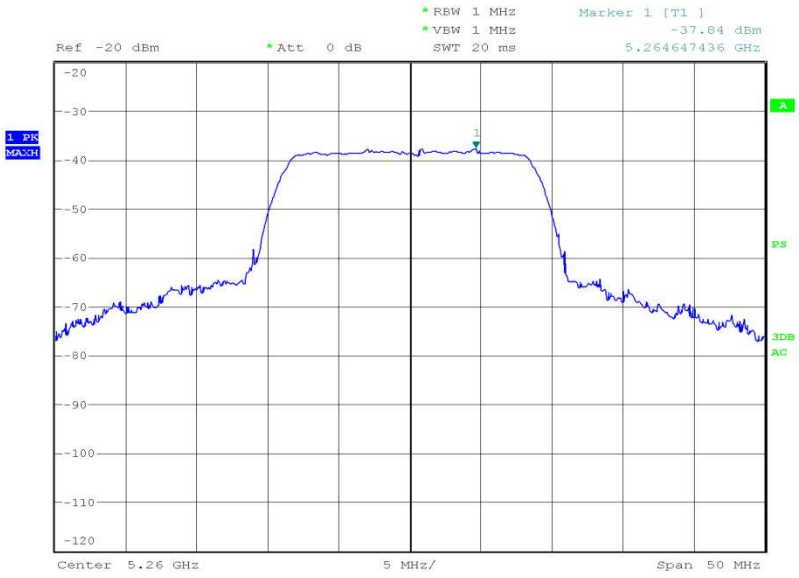
Date: 10.APR.2012 16:51:38

Radiated

Frequency Band 2

5260 MHz

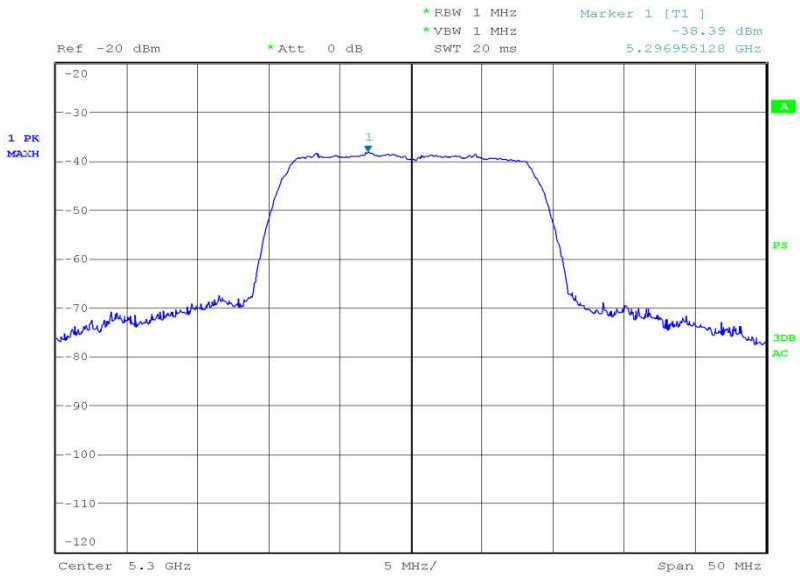
EIRP (dBm)	EIRP (mW)
16.55	45.19



Date: 10.APR.2012 16:58:05

5300 MHz

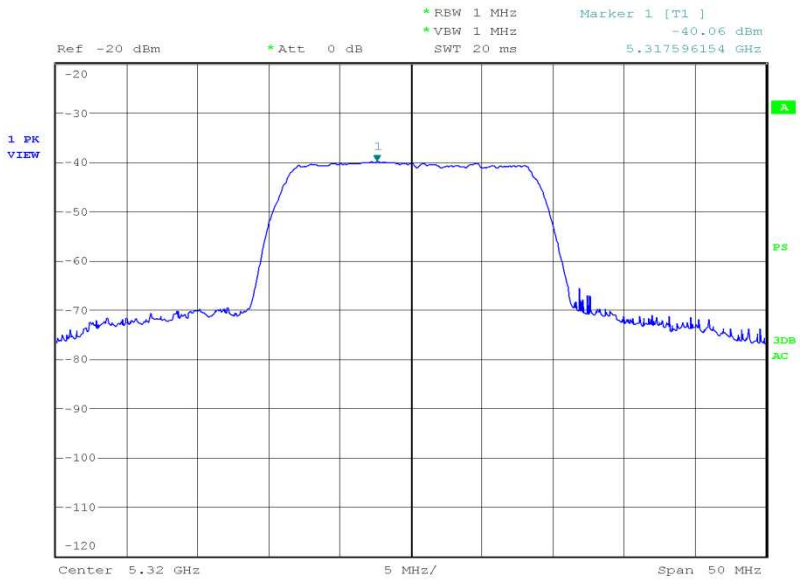
EIRP (dBm)	EIRP (mW)
16.23	41.98



Date: 10.APR.2012 17:12:06

5320 MHz

EIRP (dBm)	EIRP (mW)
14.98	31.48



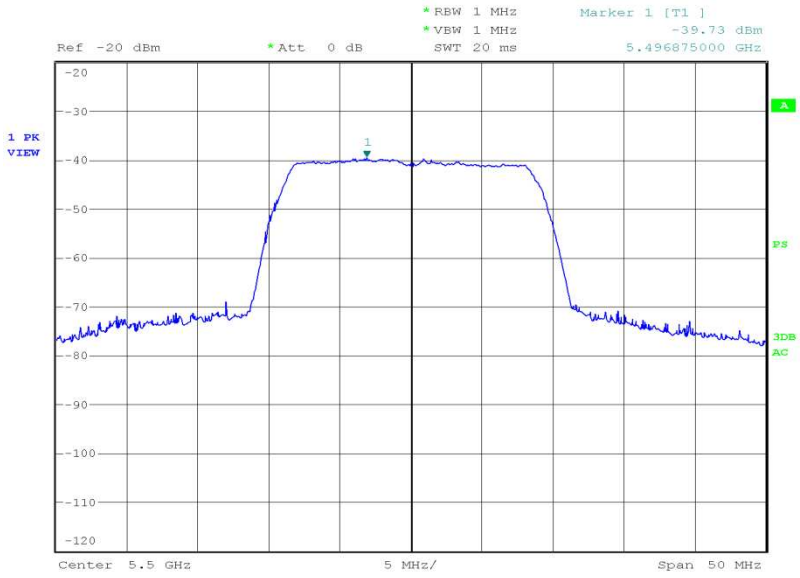
Date: 10.APR.2012 17:30:14

Radiated

Frequency Band 3

5500 MHz

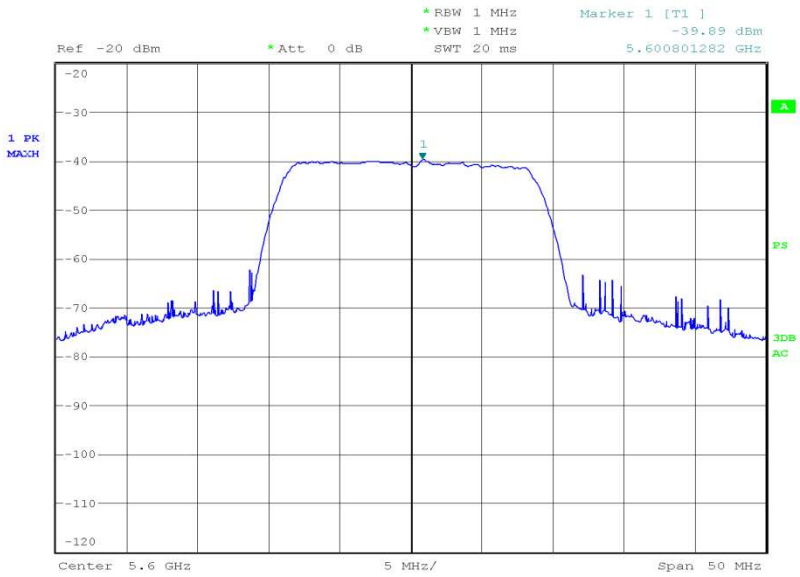
EIRP (dBm)	EIRP (mW)
15.59	36.22



Date: 10.APR.2012 17:43:37

5600 MHz

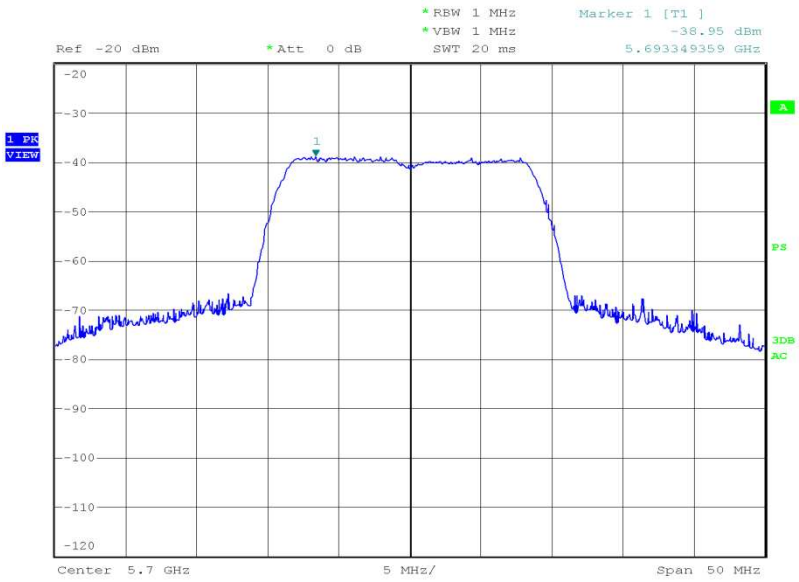
EIRP (dBm)	EIRP (mW)
15.57	36.06



Date: 10.APR.2012 17:58:44

5700 MHz

EIRP (dBm)	EIRP (mW)
17.03	50.47



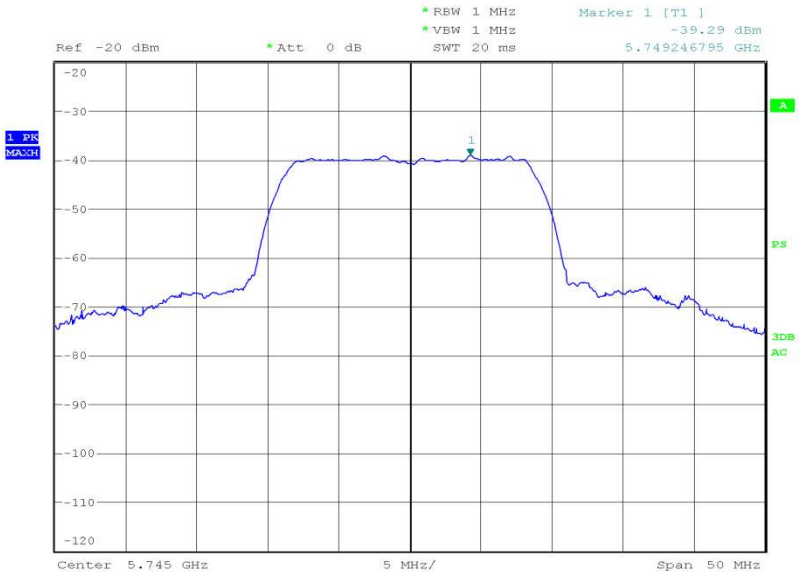
Date: 10.APR.2012 18:09:00

Radiated

Frequency Band 4

5745 MHz

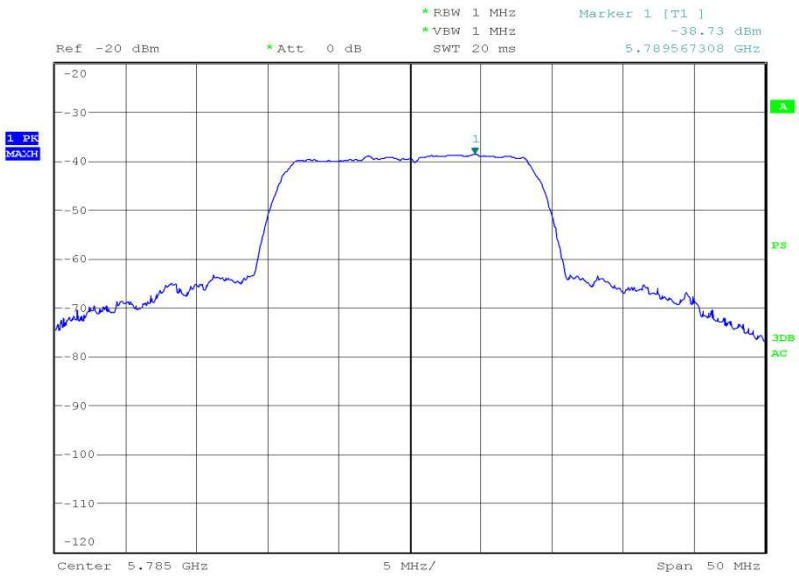
EIRP (dBm)	EIRP (mW)
16.51	44.77



Date: 10.APR.2012 18:22:14

5785 MHz

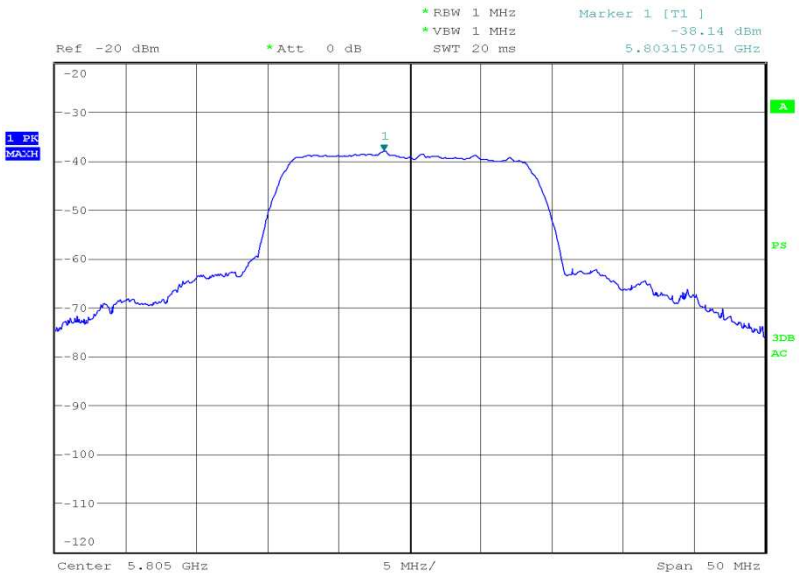
EIRP (dBm)	EIRP (mW)
16.87	48.64



Date: 10.APR.2012 18:27:19

5805 MHz

EIRP (dBm)	EIRP (mW)
17.41	55.08



Date: 10.APR.2012 18:48:34

Limit for Radiated

Frequency Band (MHz)	FCC Limit	IC Limit
5150 to 5250	Lesser of 200 mW or 10 dBm + 10 log B	Lesser of 200 mW or 10 dBm + 10 log B
5250 to 5350	Lesser of 1 W or 17 dBm + 10 log B	Lesser of 1 W or 17 dBm + 10 log B
5470 to 5725	Lesser of 1 W or 17 dBm + 10 log B	Lesser of 1 W or 17 dBm + 10 log B
5725 to 5825	Lesser of 4 W or 23 dBm + 10 log B	Lesser of 4 W or 23 dBm + 10 log B

Note: For FCC limit, “B” = 26 dB Bandwidth. For IC limit “B” = 99% Occupied Bandwidth.
For FCC only – It is acceptable to have an antenna with up to 6 dBi gain, without reducing the conducted output power.

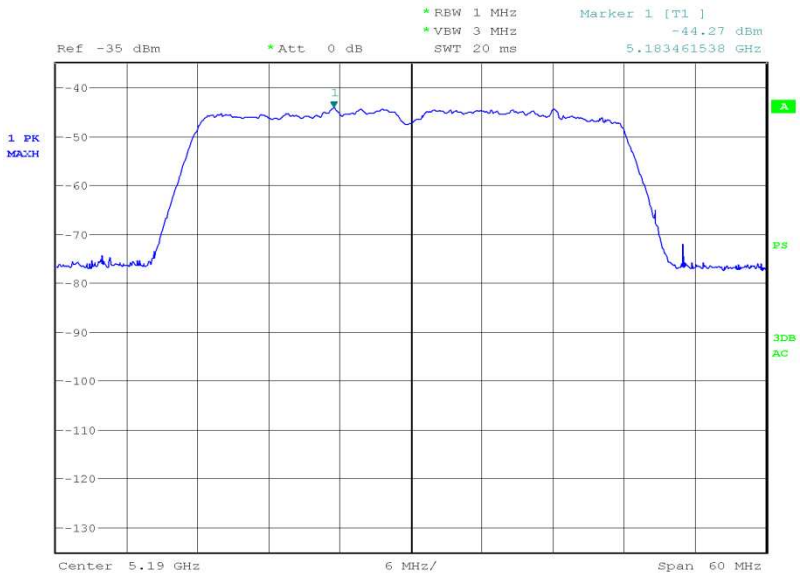
802.11(n) - 5 GHz 40 MHz BW – Onboard PIFA Antenna

Radiated

Frequency Band 1

5190 MHz

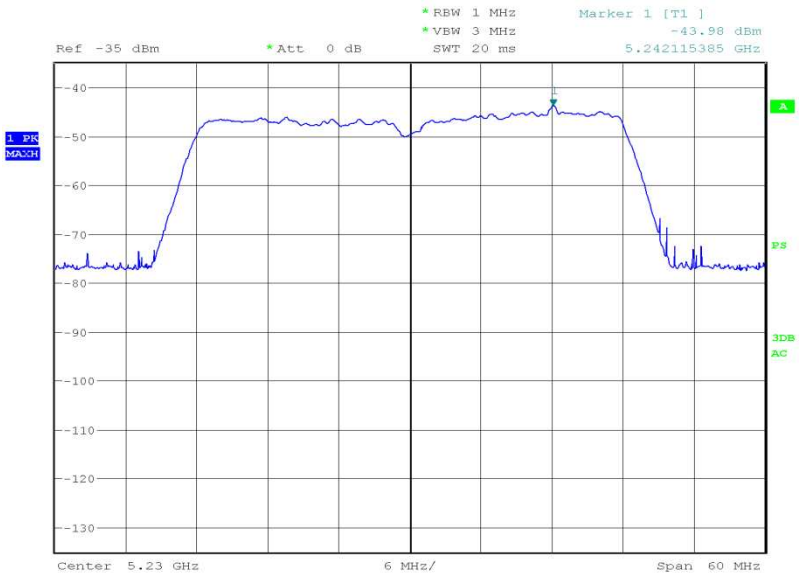
EIRP (dBm)	EIRP (mW)
+11.65	14.62



Date: 18.MAR.2012 08:50:52

5230 MHz

EIRP (dBm)	EIRP (mW)
11.99	15.81



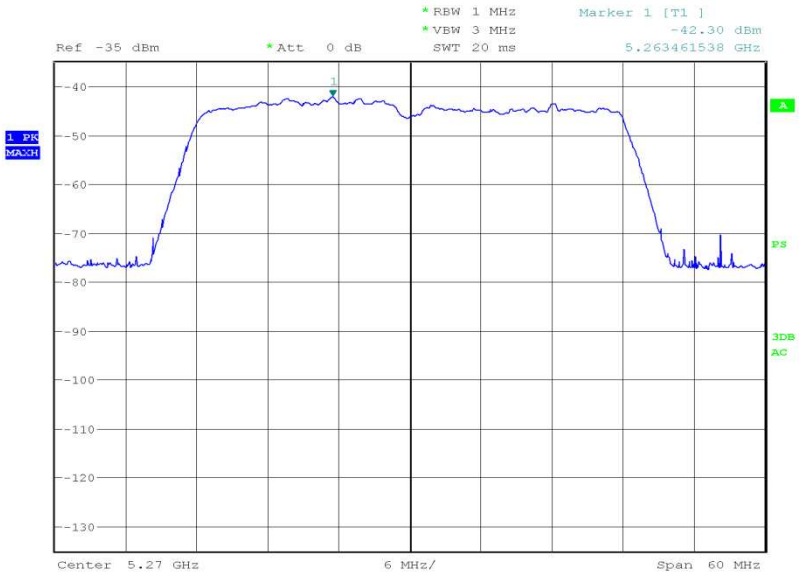
Date: 18.MAR.2012 09:04:20

Radiated

Frequency Band 2

5270 MHz

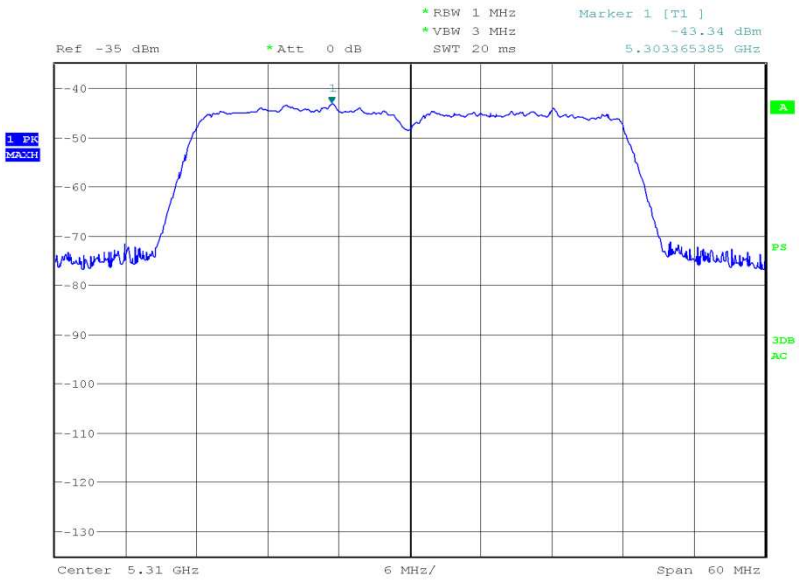
EIRP (dBm)	EIRP (mW)
13.37	21.73



Date: 18.MAR.2012 09:20:00

5310 MHz

EIRP (dBm)	EIRP (mW)
12.28	16.90



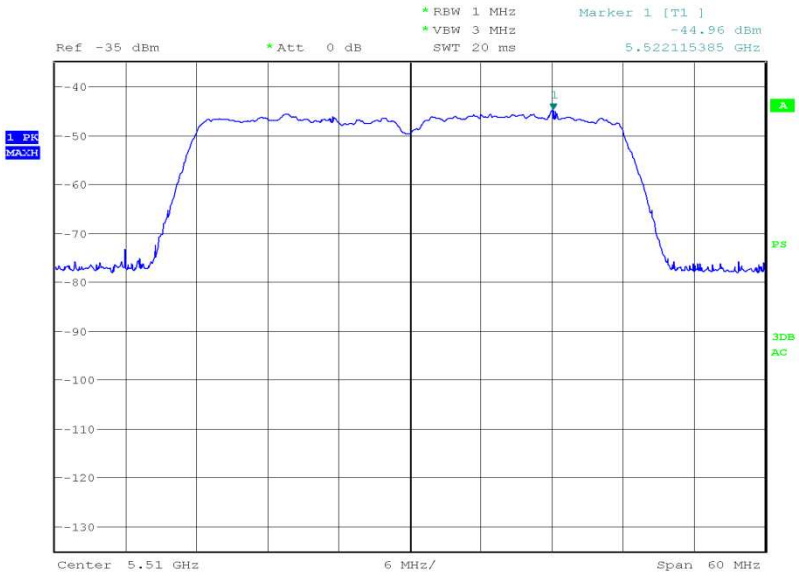
Date: 18.MAR.2012 09:30:43

Radiated

Frequency Band 3

5510 MHz

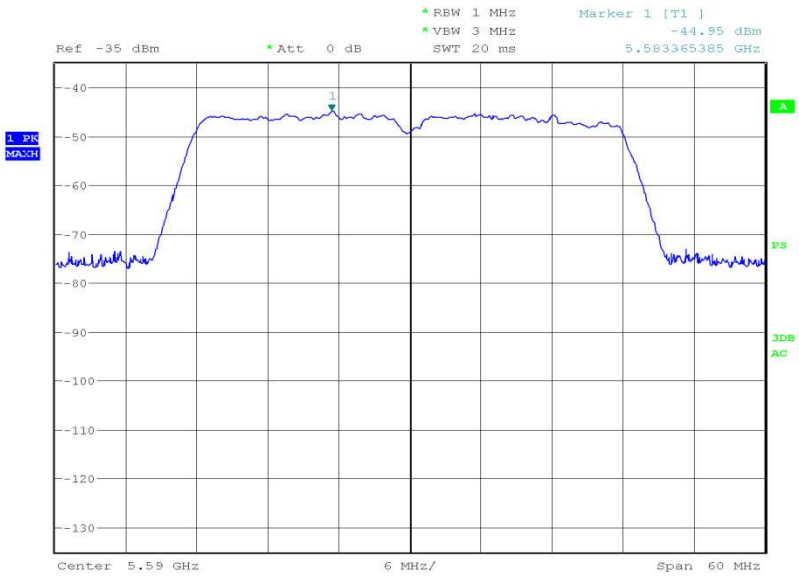
EIRP (dBm)	EIRP (mW)
10.42	11.02



Date: 18.MAR.2012 10:28:02

5590 MHz

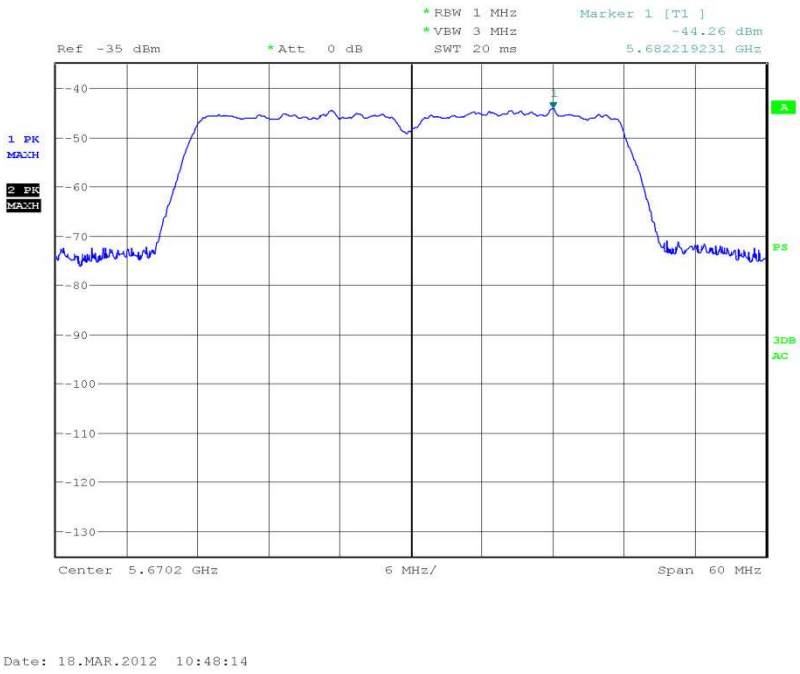
EIRP (dBm)	EIRP (mW)
11.13	12.97



Date: 18.MAR.2012 10:37:15

5670 MHz

EIRP (dBm)	EIRP (mW)
11.08	12.82



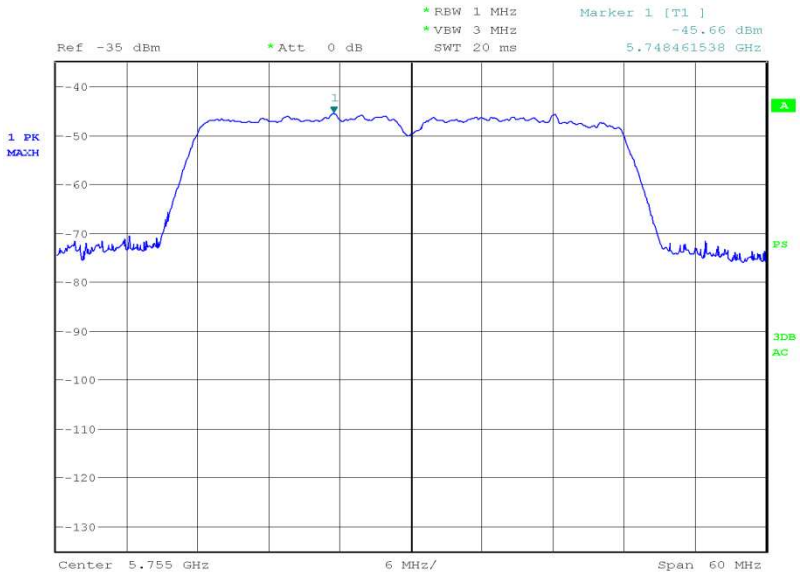
Date: 18.MAR.2012 10:48:14

Radiated

Frequency Band 4

5755 MHz

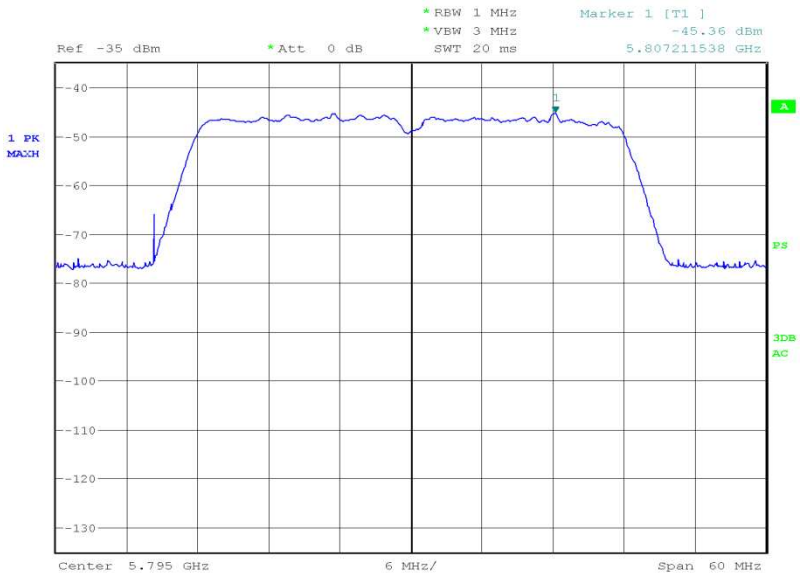
EIRP (dBm)	EIRP (mW)
8.83	7.64



Date: 18.MAR.2012 10:55:33

5795 MHz

EIRP (dBm)	EIRP (mW)
8.94	7.83



Date: 18.MAR.2012 11:07:52

Limit for Radiated

Frequency Band (MHz)	FCC Limit	IC Limit
5150 to 5250	Lesser of 200 mW or 10 dBm + 10 log B	Lesser of 200 mW or 10 dBm + 10 log B
5250 to 5350	Lesser of 1 W or 17 dBm + 10 log B	Lesser of 1 W or 17 dBm + 10 log B
5470 to 5725	Lesser of 1 W or 17 dBm + 10 log B	Lesser of 1 W or 17 dBm + 10 log B
5725 to 5825	Lesser of 4 W or 23 dBm + 10 log B	Lesser of 4 W or 23 dBm + 10 log B

Note: For FCC limit, “B” = 26 dB Bandwidth. For IC limit “B” = 99% Occupied Bandwidth.
For FCC only – It is acceptable to have an antenna with up to 6 dBi gain, without reducing the conducted output power.

For 802.11(n) – 40 MHz Bandwidth, the middle channel was not tested in Frequency Bands 1, 2 and 4. A signal width of 40 MHz means a measurement on the bottom and top channels will satisfy the requirements in these frequency bands.

802.11(n) - 5 GHz 40 MHz BW – Onboard PIFA Antenna

Conducted

Frequency Band 1

5190 MHz

EIRP (dBm)	EIRP (mW)
10.49	11.194

5230 MHz

EIRP (dBm)	EIRP (mW)
10.78	11.967

The test was performed on the worst case data rate for 802.11(n) - 40 MHz BW modulation. The worst case was deemed as the data rate which produced the highest level of conducted average power. This data rate was 135Mbps.

Conducted

Frequency Band 2

5270 MHz

EIRP (dBm)	EIRP (mW)
9.79	9.528

5310 MHz

EIRP (dBm)	EIRP (mW)
9.61	9.141

The test was performed on the worst case data rate for 802.11(n) - 40 MHz BW modulation. The worst case was deemed as the data rate which produced the highest level of conducted average power. This data rate was 135Mbps.

Conducted

Frequency Band 3

5510 MHz

EIRP (dBm)	EIRP (mW)
9.26	8.433

5590 MHz

EIRP (dBm)	EIRP (mW)
9.40	8.710

5670 MHz

EIRP (dBm)	EIRP (mW)
9.84	9.638

The test was performed on the worst case data rate for 802.11(n) - 40 MHz BW modulation. The worst case was deemed as the data rate which produced the highest level of conducted average power. This data rate was 135Mbps.

Conducted

Frequency Band 4

5755 MHz

EIRP (dBm)	EIRP (mW)
9.76	9.462

5795 MHz

EIRP (dBm)	EIRP (mW)
9.83	9.616

The test was performed on the worst case data rate for 802.11(n) - 40 MHz BW modulation. The worst case was deemed as the data rate which produced the highest level of conducted average power. This data rate was 135Mbps.

Limit for Conducted

Frequency Band (MHz)	FCC Limit	IC Limit
5150 to 5250	Lesser of 50 mW or 4 dBm + 10 log B	-
5250 to 5350	Lesser of 250 mW or 11 dBm + 10 log B	Lesser of 250 mW or 11 dBm + 10 log B
5470 to 5725	Lesser of 250 mW or 11 dBm + 10 log B	Lesser of 250 mW or 11 dBm + 10 log B
5725 to 5825	Lesser of 1 W or 17 dBm + 10 log B	Lesser of 1 W or 17 dBm + 10 log B

Note: For FCC limit, “B” = 26 dB Bandwidth. For IC limit “B” = 99% Occupied Bandwidth.

For 802.11(n) – 40 MHz Bandwidth, the middle channel was not tested in Frequency Bands 1, 2 and 4. A signal width of 40 MHz means a measurement on the bottom and top channels will satisfy the requirements in these frequency bands.

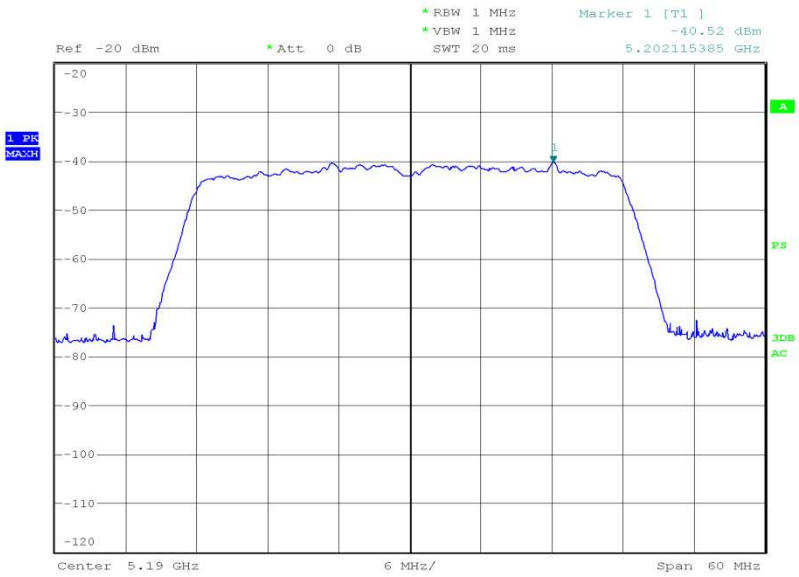
802.11(n) - 5 GHz 40MHz BW – External Antenna

Radiated

Frequency Band 1

5190 MHz

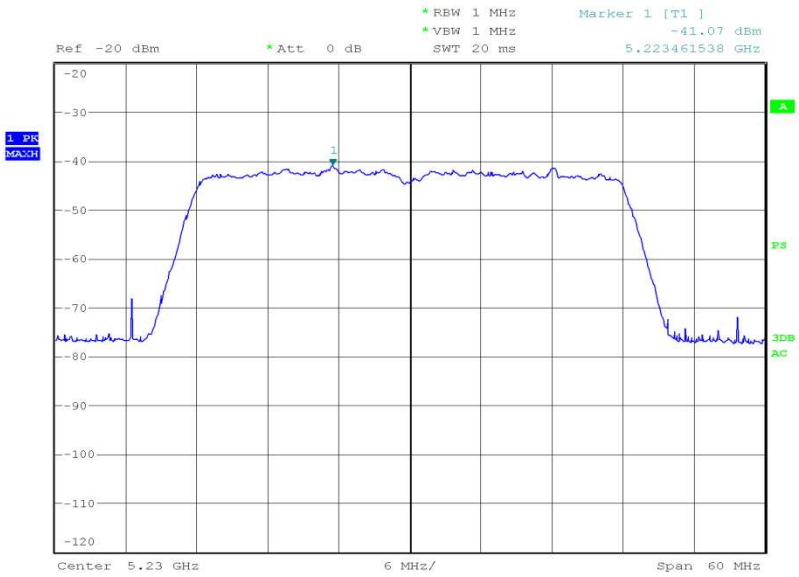
EIRP (dBm)	EIRP (mW)
13.22	20.99



Date: 10.APR.2012 19:31:07

5230 MHz

EIRP (dBm)	EIRP (mW)
12.73	18.75



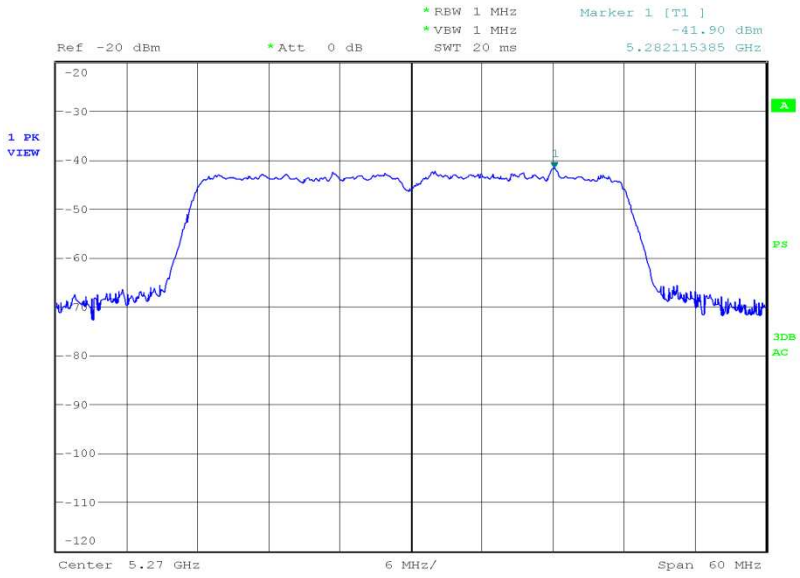
Date: 10.APR.2012 19:45:37

Radiated

Frequency Band 2

5270 MHz

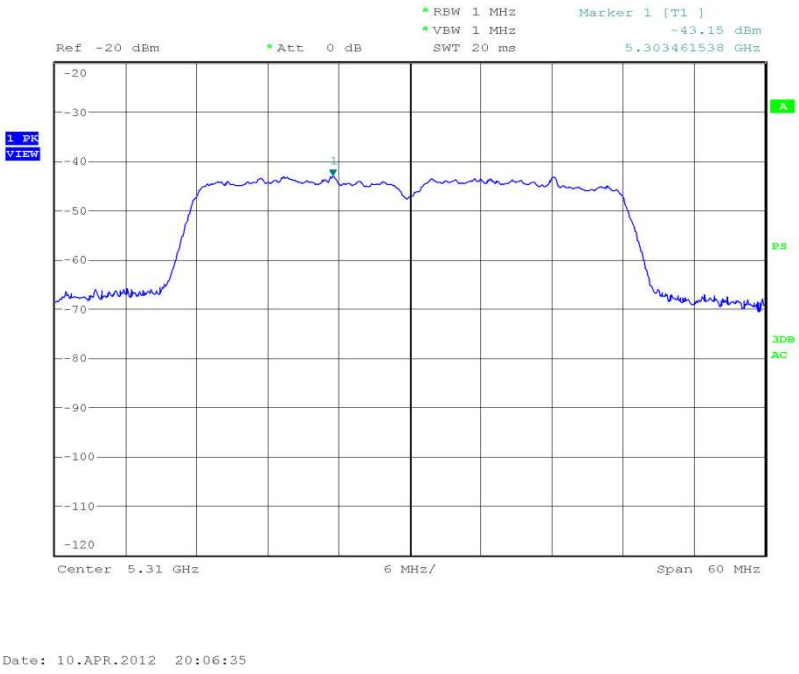
EIRP (dBm)	EIRP (mW)
11.44	13.93



Date: 10.APR.2012 19:57:09

5310 MHz

EIRP (dBm)	EIRP (mW)
10.61	11.51



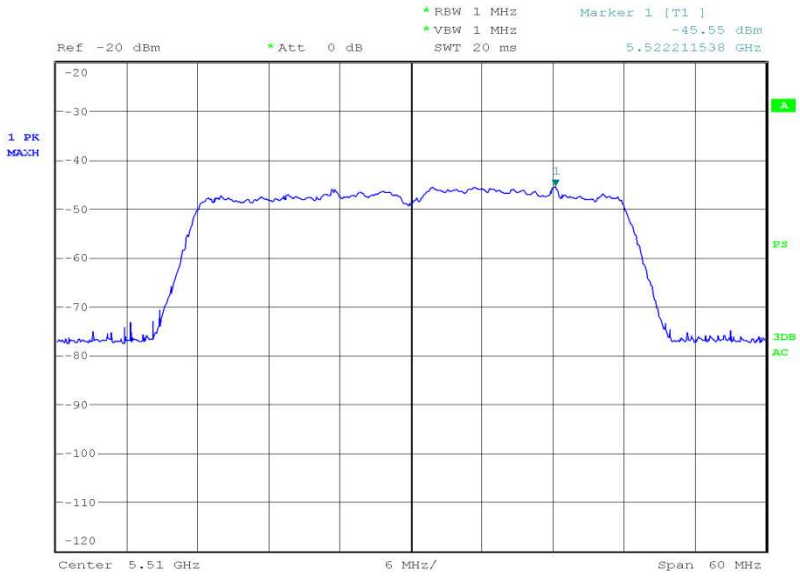
Date: 10.APR.2012 20:06:35

Radiated

Frequency Band 3

5510 MHz

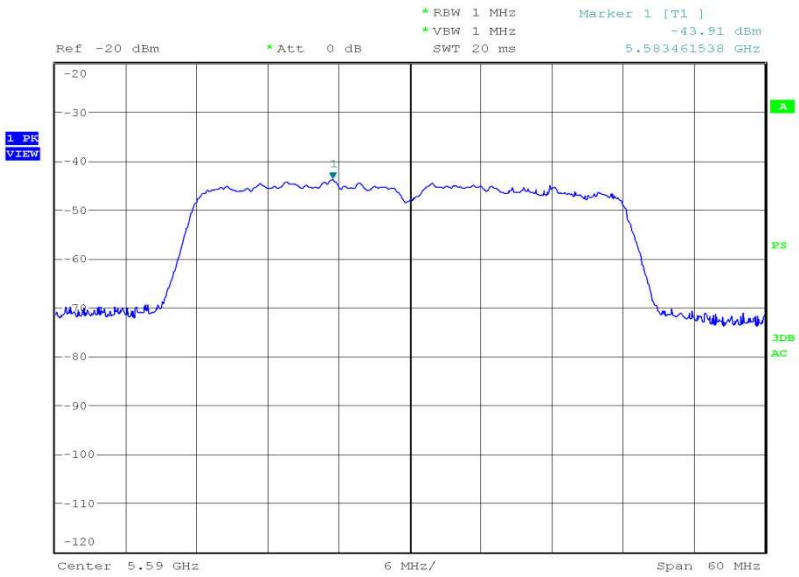
EIRP (dBm)	EIRP (mW)
8.76	7.52



Date: 10.APR.2012 20:25:41

5590 MHz

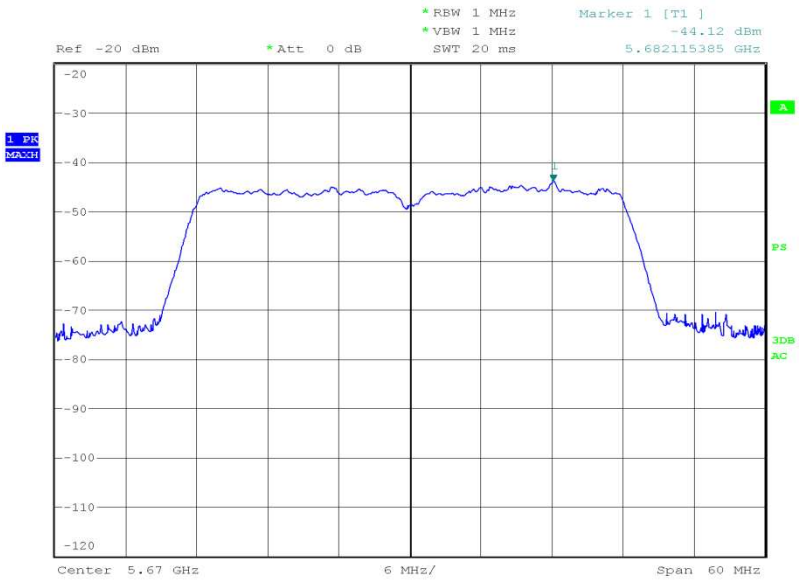
EIRP (dBm)	EIRP (mW)
11.01	12.62



Date: 10.APR.2012 20:36:47

5670 MHz

EIRP (dBm)	EIRP (mW)
10.65	11.61



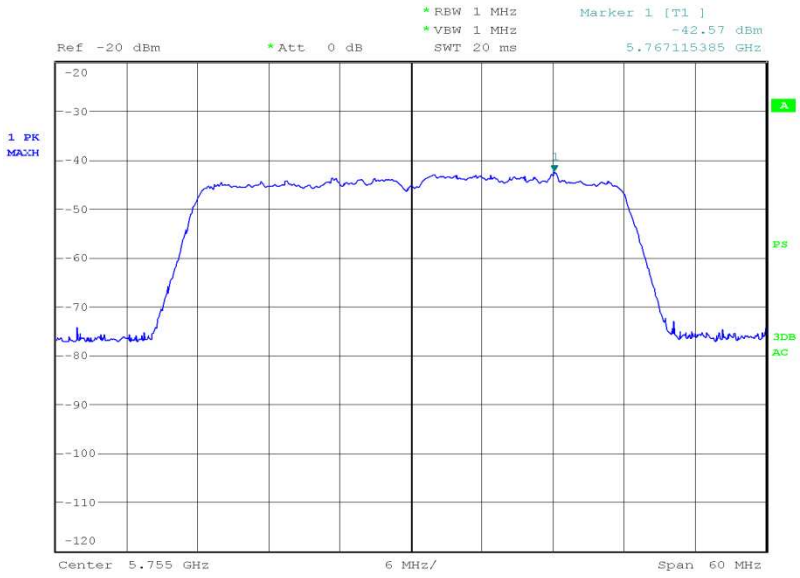
Date: 10.APR.2012 20:41:57

Radiated

Frequency Band 4

5755 MHz

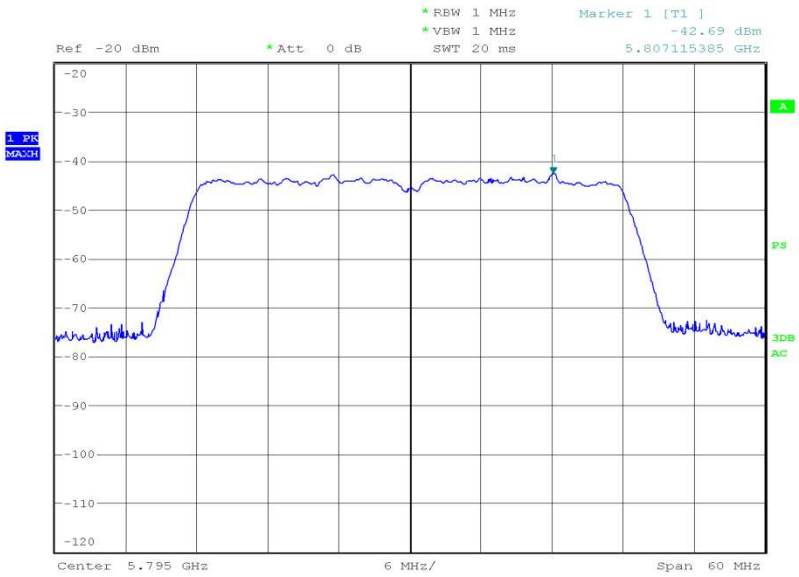
EIRP (dBm)	EIRP (mW)
12.03	15.96



Date: 10.APR.2012 20:46:43

5795 MHz

EIRP (dBm)	EIRP (mW)
10.39	10.94



Date: 10.APR.2012 21:02:43

Limit for Radiated

Frequency Band (MHz)	FCC Limit	IC Limit
5150 to 5250	Lesser of 200 mW or 10 dBm + 10 log B	Lesser of 200 mW or 10 dBm + 10 log B
5250 to 5350	Lesser of 1 W or 17 dBm + 10 log B	Lesser of 1 W or 17 dBm + 10 log B
5470 to 5725	Lesser of 1 W or 17 dBm + 10 log B	Lesser of 1 W or 17 dBm + 10 log B
5725 to 5825	Lesser of 4 W or 23 dBm + 10 log B	Lesser of 4 W or 23 dBm + 10 log B

Note: For FCC limit, “B” = 26 dB Bandwidth. For IC limit “B” = 99% Occupied Bandwidth.
For FCC only – It is acceptable to have an antenna with up to 6 dBi gain, without reducing the conducted output power.

For 802.11(n) – 40 MHz Bandwidth, the middle channel was not tested in Frequency Bands 1, 2 and 4. A signal width of 40 MHz means a measurement on the bottom and top channels will satisfy the requirements in these frequency bands.

Product Service

2.3 UNDESIRABLE EMISSION LIMITS

2.3.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.407 (b)(1)(2)(3)(4)(6)(7)
Industry Canada RSS-210, Clause A9.2 (1)(2)(3)(4)

2.3.2 Equipment Under Test and Modification State

Venice 6.5 S/N: RAD103037 on Test Jig S/N: RAD103234 - Modification State 0
Venice 6.5 S/N: RAD 103021 on Test Jig, S/N RAD103235 - Modification State 0

2.3.3 Date of Test

7 March 2012, 12 March 2012, 13 March 2012, 14 March 2012, 18 March 2012, 26 March 2012, 27 March 2012, 2 April 2012, 3 April 2012, 4 April 2012 & 30 April 2012

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Procedure

For conducted emissions, the EUT was set to operate at maximum power on the worst case data rate. The test was performed on the bottom, middle and top channels. The test was performed from 9 kHz to 40 GHz.

The measurement path loss in each relevant frequency band was measured and entered a s a reference level offset.

For radiated emissions, the test method described above was also used. However, the measurement was performed from 30 MHz to 40 GHz and the path loss is incorporated as a transducer factor and entered into the spectrum analyser. In each frequency span the level was maximised by rotating the EUT 360° and a height search of the measuring antenna.

The band edge measurements were performed in accordance with ANSI C63.10, Clause 6.9.3. The results were analysed to ensure compliance with restricted bands. The EUT was set to the lowest and highest operating frequencies.

2.3.6 Environmental Conditions

Ambient Temperature	16.7 - 24.2°C
Relative Humidity	29.0 - 43.0%

2.3.7 Test Results

802.11(a) – Onboard PIFA Antenna

4V, 3.3V, 1.2V DC Supply

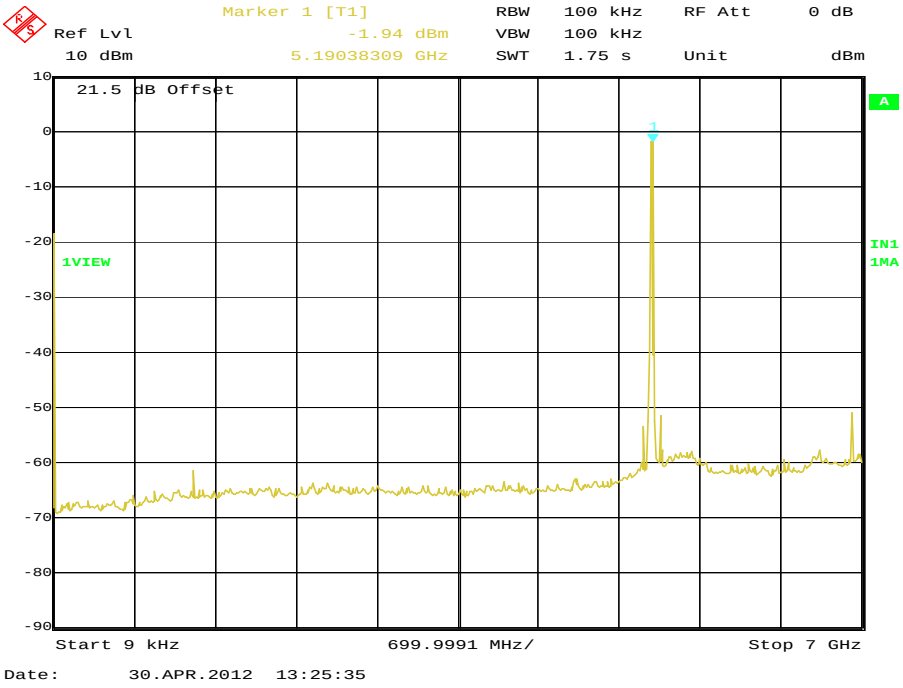
Spurious Conducted Emissions

54Mbps

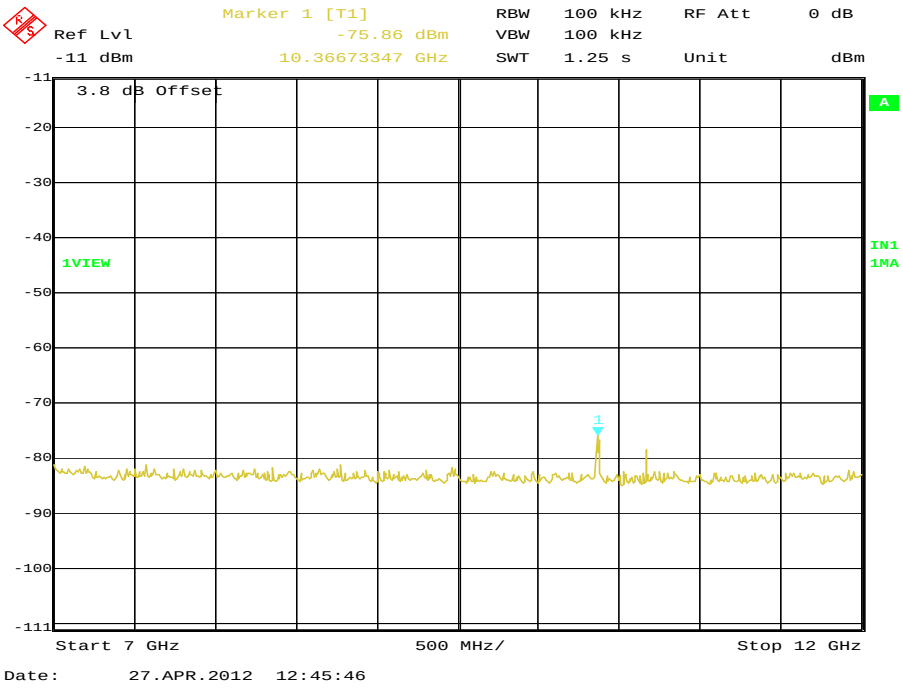
Frequency Band 1

5180 MHz

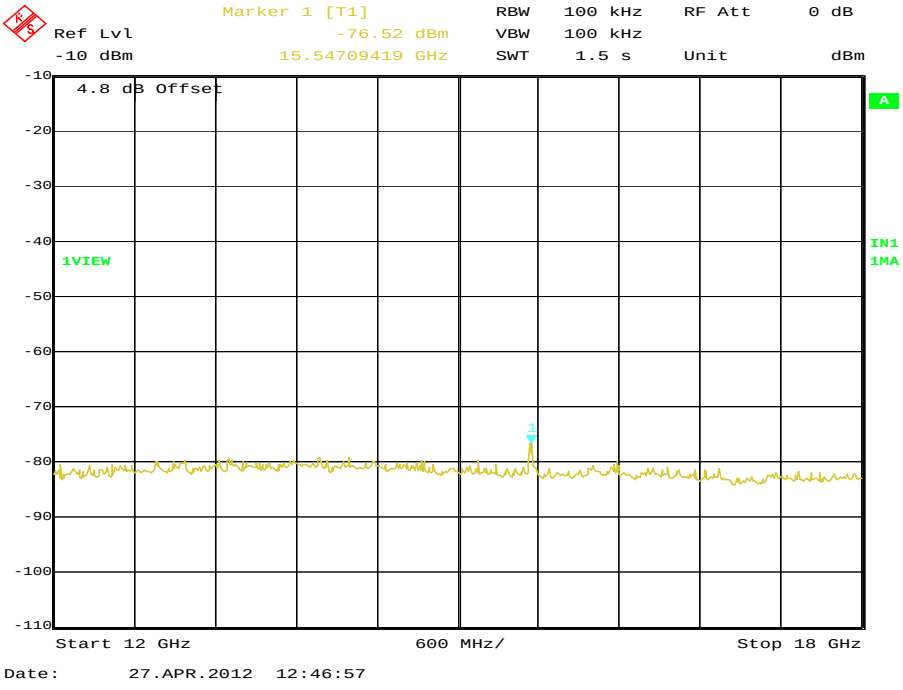
9 kHz to 7 GHz



7 GHz to 12 GHz

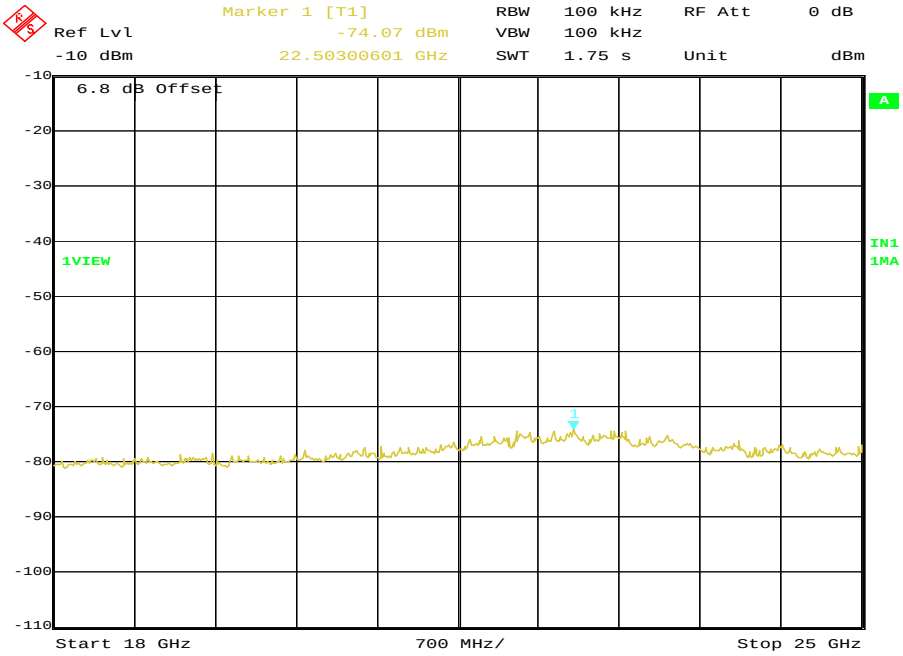


12 GHz to 18 GHz

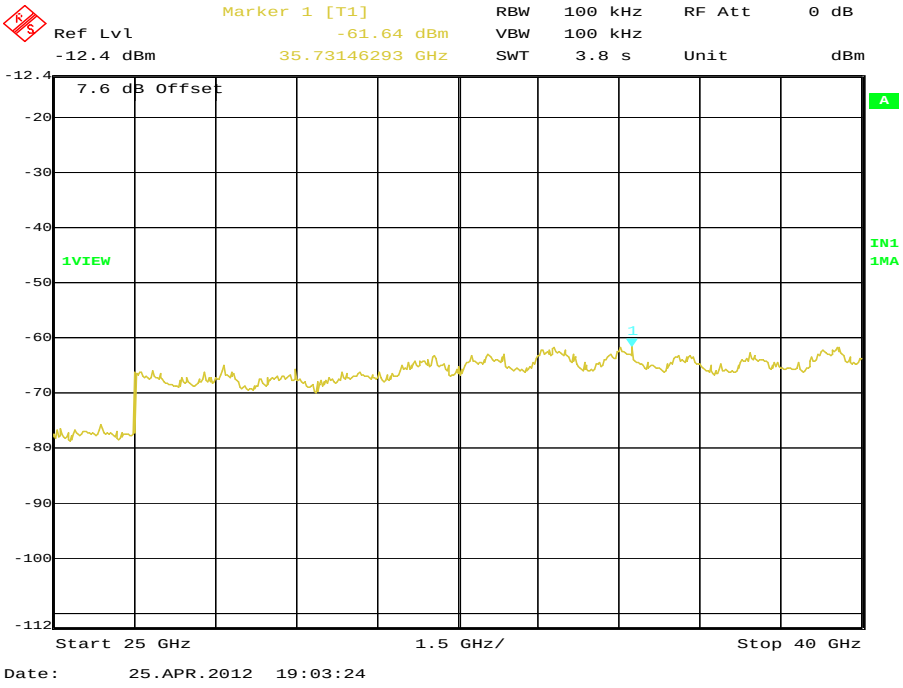


Product Service

18 GHz to 25 GHz

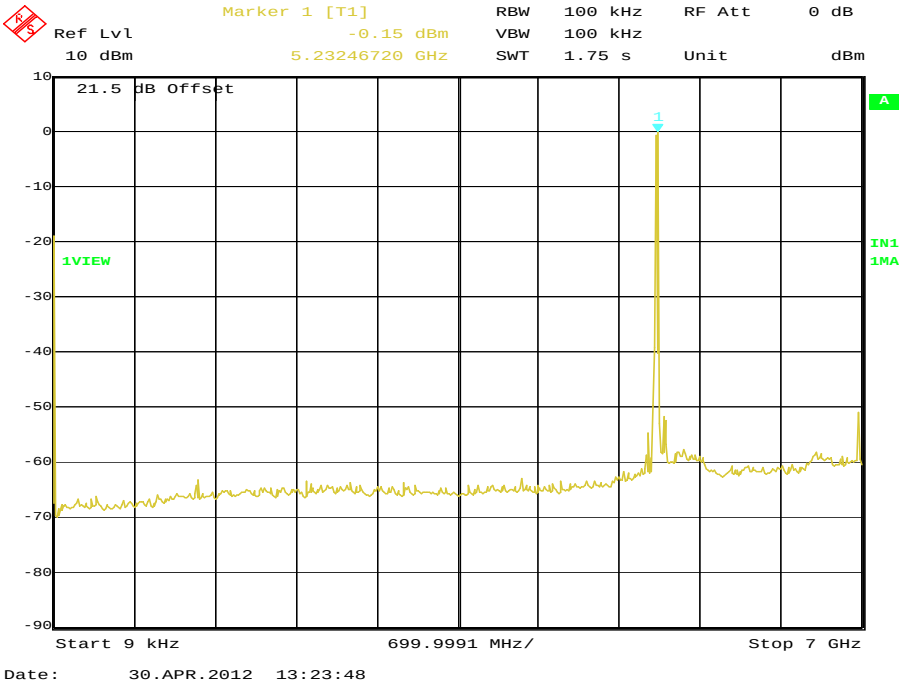


25 GHz to 40 GHz

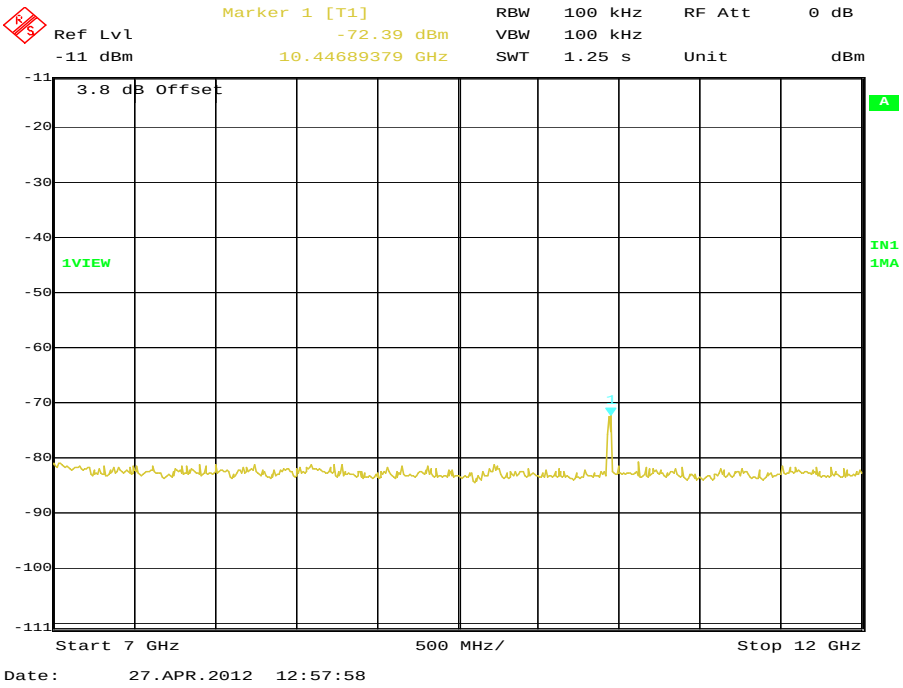


5220 MHz

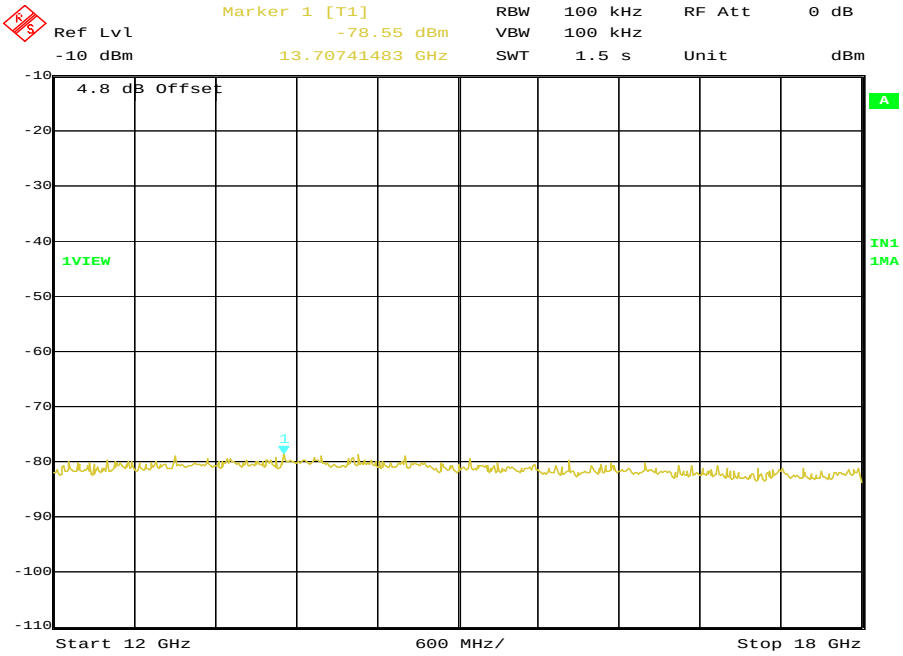
9 kHz to 7 GHz



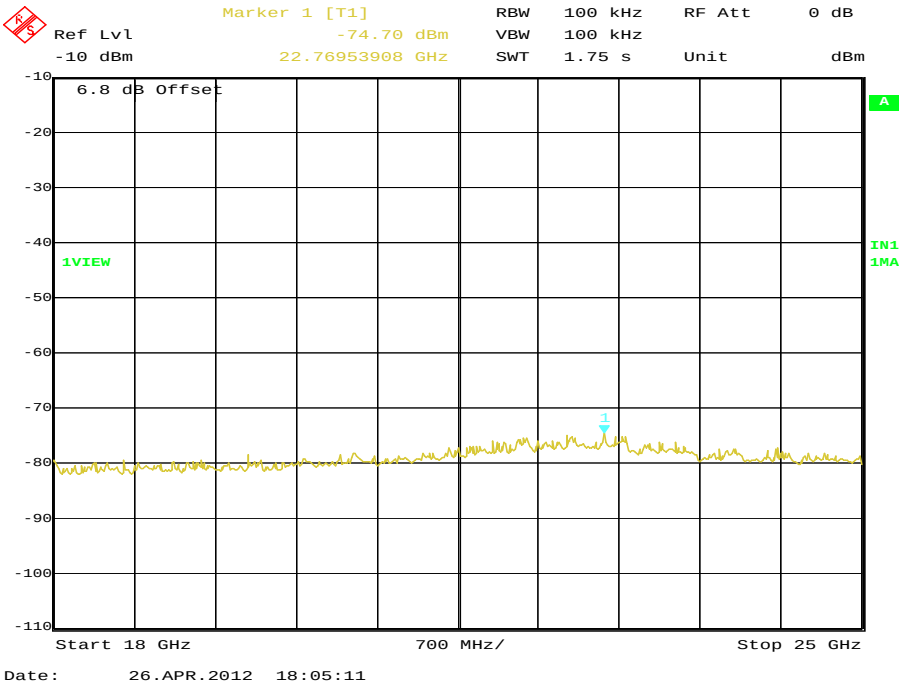
7 GHz to 12 GHz



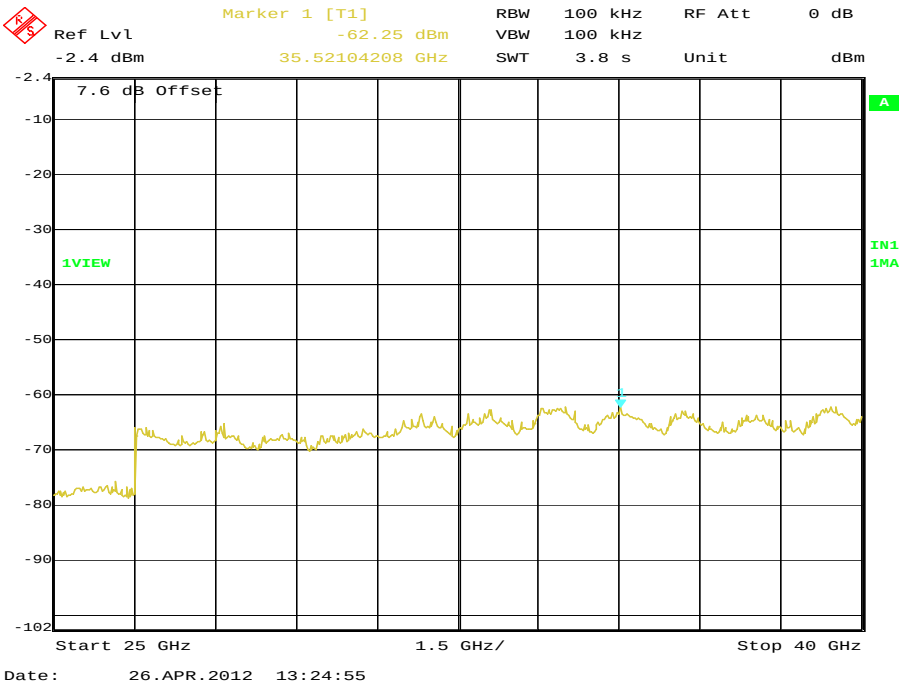
12 GHz to 18 GHz



18 GHz to 25 GHz

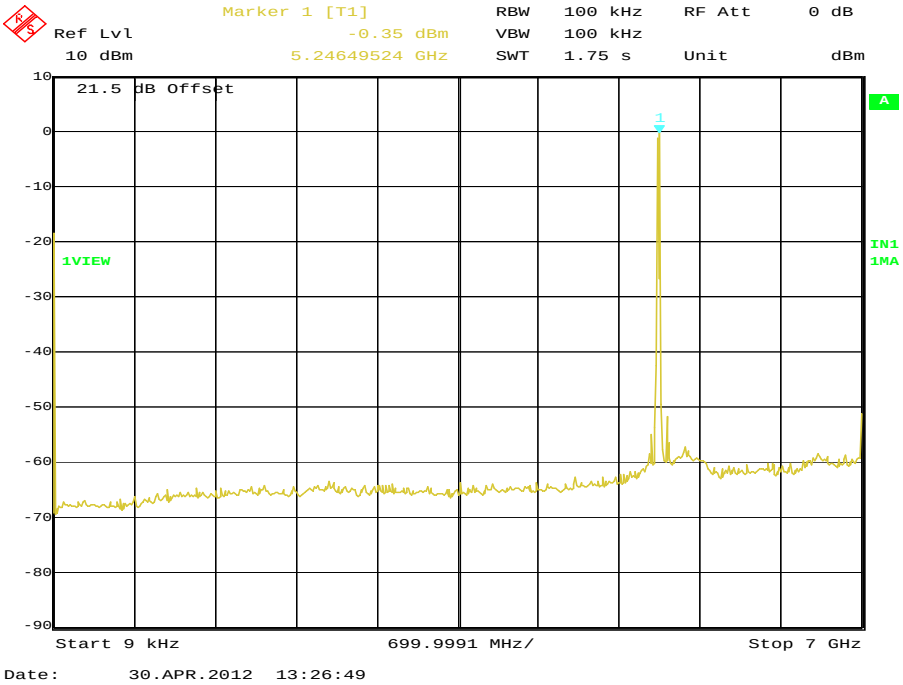


25 GHz to 40 GHz



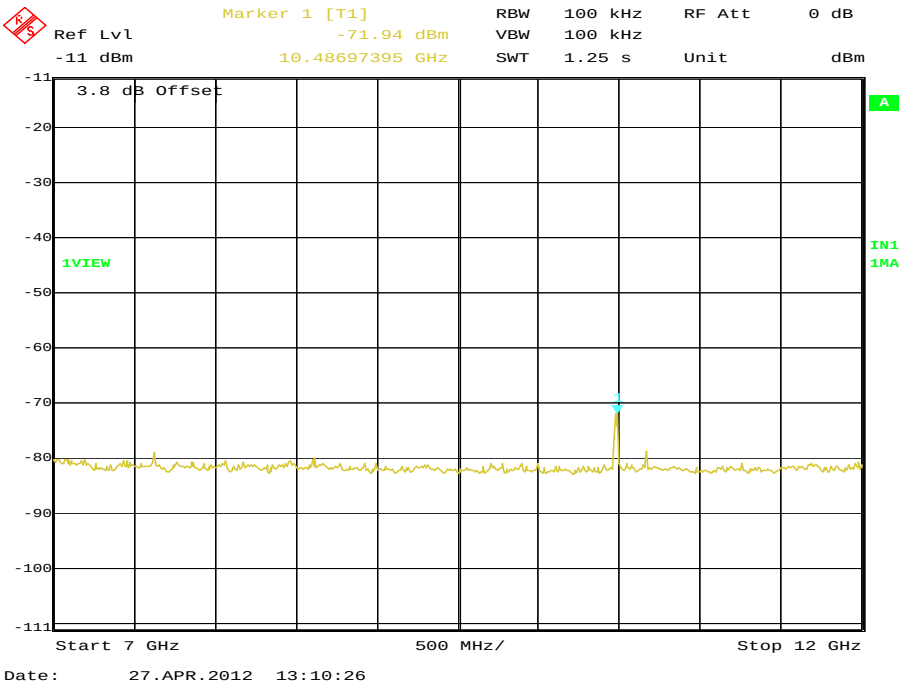
5240 MHz

9 kHz to 7 GHz



Product Service

7 GHz to 12 GHz



12 GHz to 18 GHz