FCC Test Report

FOR:

Pearl Automation Inc.

Model Name: / Model Number:

RearVision Camera Frame / P110

Product Description:

RearVision consists of 2 main components. The “Car Adapter”, which is an accessory that connects to the vehicle’s OBD-II diagnostic port, and the “Camera Frame” which is an accessory that is mounted at the license plate of the vehicle. The “Car Adapter” will relay information from the “Camera Frame” and vehicle environmental and state information over Bluetooth/WiFi, and that information will be relayed to the phone over Bluetooth/WiFi and displayed to the driver via the phone app.

FCC ID: 2AG6M-P110

Per:

CFR 47 Part 15.407

REPORT #: EMC-PEARL-004-16001-FCC-15-407-UNII1-P110

DATE: Sept 30, 2016

ACCREDITED
TESTING LABORATORY
Certificate #2135.01

CETECOM **Inc.**
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CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

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1 Assessment

The following device was evaluated against the applicable criteria specified in FCC rules Parts 15.407 of Title 47 of the Code of Federal Regulations.

No deviations were ascertained during the course of testing performed.

Company	Description	Model #
Pearl Automation Inc.	RearVision Camera Frame	P110

Responsible for Testing Laboratory:

Date	Section	Name	Signature
Sept 30, 2016	Compliance	Franz Engert (Compliance Manager)	Digitally signed by Franz Engert DN: cn=Franz Engert, c=US, o=CETECOM, ou=Complience, email=franz.engert@cetecom.com

Responsible for the Report:

Date	Section	Name	Signature
Sept 30, 2016	Compliance	James Donnellan (Sr. EMC Engineer)	James Donnellan Digitally signed by James Donnellan DN: cn=James Donnellan, c=US, o=Cetecom Inc., ou=Compliance, email=james.donnellan@cetecom.com Date: 2016.09.30 19:37:54 -07'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Manager Compliance Services:	Franz Engert
Project Manager:	Ruther Navarro

2.2 Identification of the Client

Applicant's Name:	Pearl Automation Inc.
Street Address:	100 Enterprise Way, Suite A101
City/Zip Code	Scotts Valley, CA 95066
Country	USA
Contact Person:	Hagan O'Connor / Erturk Kocalar
Phone No.	+1 408 655-3319 (Hagan) / +1 408 410-0144 (Erturk)
e-mail:	hagan@pearlauto.com / erturk@pearlauto.com.

2.3 Identification of the Manufacturer

Manufacturer's Name:	Dongguan Primax Electronic & Telecommunications Products Co. Ltd,
Manufacturers Address:	Liu Wu District, Shek Kit Town,
City/Zip Code	DongGuan City, Guang Dong,
Country	China.

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Model No:	P110
HW Version :	DVT1B
SW Version :	001.668
FCC-ID :	2AG6M-P110
Product Description:	RearVision Camera Frame
UNII-1 Regulatory Band	5150 MHz – 5250 MHz
Channels Used	20 MHz Bandwidth: Ch. 36 – 48 (4 channels) 40 MHz Bandwidth: Ch. 38 – 46 (2 channels)
Type(s) of Modulation:	OFDM: BPSK, QPSK, 16QAM, 64QAM
Modes of Operation:	Communicates with and transmits video traffic to the RearVision Car Adapter module in peer to peer mode. Both
Antenna Type:	2.4 GHz and 5 GHz dual-band antenna
Max. declared antenna gain	6 dBi
Max. declared conducted output power + tune-up	15 dBm
Power Supply	Internal Li-ion Rechargeable Battery (Solar)
Rated Operating Voltage Range:	Vmin: 2.8 V DC - Vmax: 4.2V DC USB 4.4 VDC - 5.25 VDC
Operating Temperature Range	-20 ºC to 45 ºC
Other Radios included in the device:	Bluetooth LE 802.11 b/g/n
Sample Revision	■Prototype; ☐Production ☐ Pre-Production

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	A2A6170576	DVT1B	001.668	Radiated Sample
2	A2A61008K4	DVT1B	001.668	Conducted Sample

3.3 Ancillary Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number	Notes
1	12W USB Power Adapter	A143	Apple	-	Used to charge internal battery when needed
2	MacBook Air	A1465	Apple	C2QQ606&G4FY	Used to setup channel modes prior to test.
3	Lamp	-	-	-	To stimulate solar charging

3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#1	The radio of the EUT was stimulated directly in a test mode not accessible by the end user. The internal antenna was connected.
2	EUT#2 + AE2	The radio of the EUT was stimulated directly in a test mode not accessible by the end user. The measurement equipment was connected to the 50Ohm UFL port of the EUT.
3	EUT#1 + AE #1	The radio of the EUT was stimulated directly in a test mode not accessible by the end user. The internal antenna was connected.
4	EUT#1 + AE #3	The radio of the EUT was stimulated directly in a test mode not accessible by the end user. The internal antenna was connected.

3.5 Other Test Information:

4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to assess the performance of the EUT per the relevant requirements specified in FCC rules Part 15.407 of Title 47 of the Code of Federal Regulations.

This test report is to support a request for new equipment authorization under the FCC ID: 2AG6M-P110.

Testing procedures are based on
KDB 789033 Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E v01r02
ANSI C63.10 2013

All results are based on the EUT operating at its maximum declared peak envelope power including tune up tolerance as specified in 3.1 and customer operational description.

5 Measurement Results Summary

Test Specification	Test Case	Pass	Fail	NA	NP	Result
FCC 15.407(a)	Conducted Output Power and EIRP	■	☐	☐	☐	Complies
FCC 15.407(a)	Power Spectral Density	■	☐	☐	☐	Complies
FCC 15.407(b)	Out of Band Emissions at the Band Edge	■	☐	☐	☐	Complies
FCC 15.407(b)	Unwanted Emissions	■	☐	☐	☐	Complies
FCC 15.207	AC Power Line Conducted Emissions	☐	☐	■	☐	See Note 2

Notes:

1. NA= Not Applicable; NP= Not Performed.
2. AC power line conducted emissions is not required for vehicular devices

6 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=1.

	Uncertainty in dB radiated <30MHz	**Uncertainty in dB radiated 30MHz - 1GHz**	**Uncertainty in dB radiated > 1GHz**	**Uncertainty in dB Conducted measurement**
standard deviation k=1	2.56	1.71	2.22	0.67
95% confidence interval in dB	5.01	3.34	4.35	1.31
95% confidence interval in dB in delta to Result (rounded up to next decimal point)	+/- 2.5 dB	+/- 2.0 dB	+/- 2.3dB	+/- 0.7dB

7 Environmental Conditions During Testing

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25°C
- Relative humidity: 40-60%

8 Dates of Testing

April – June, 2016

9 Measurement Procedures

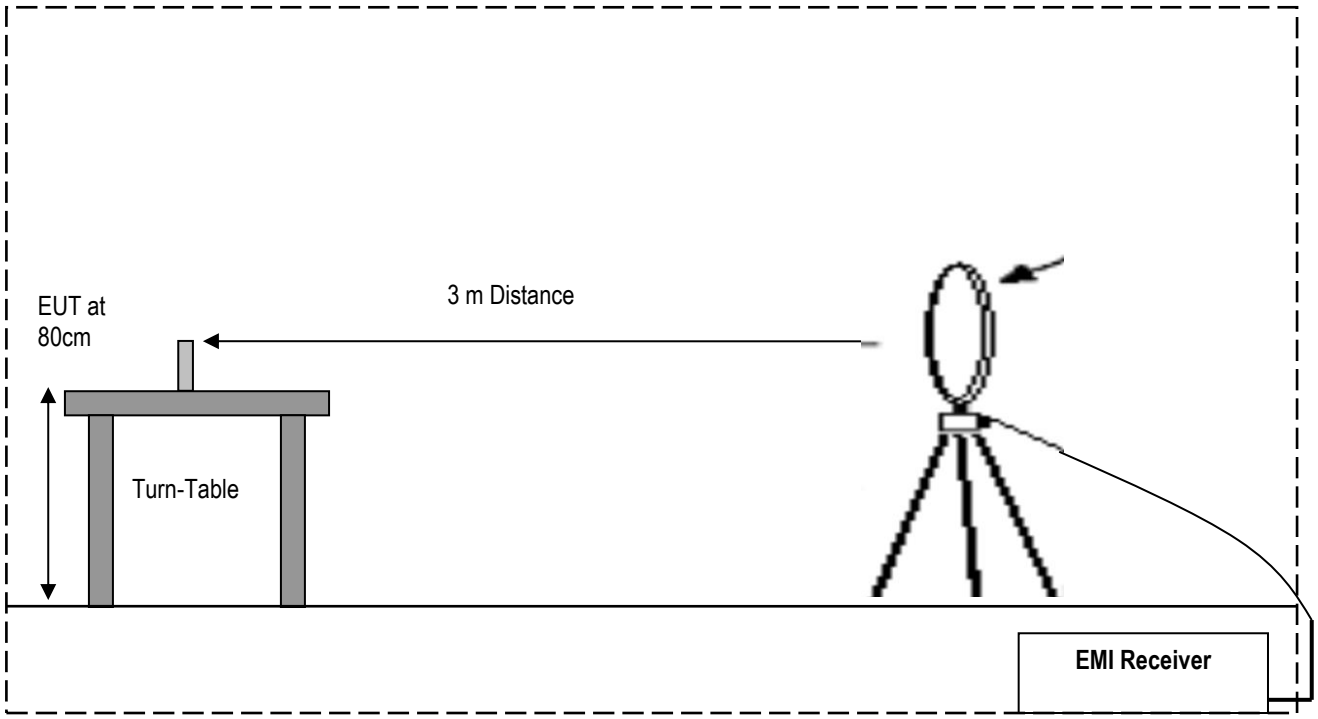
9.1 Radiated Measurement

The radiated measurement is performed according to:

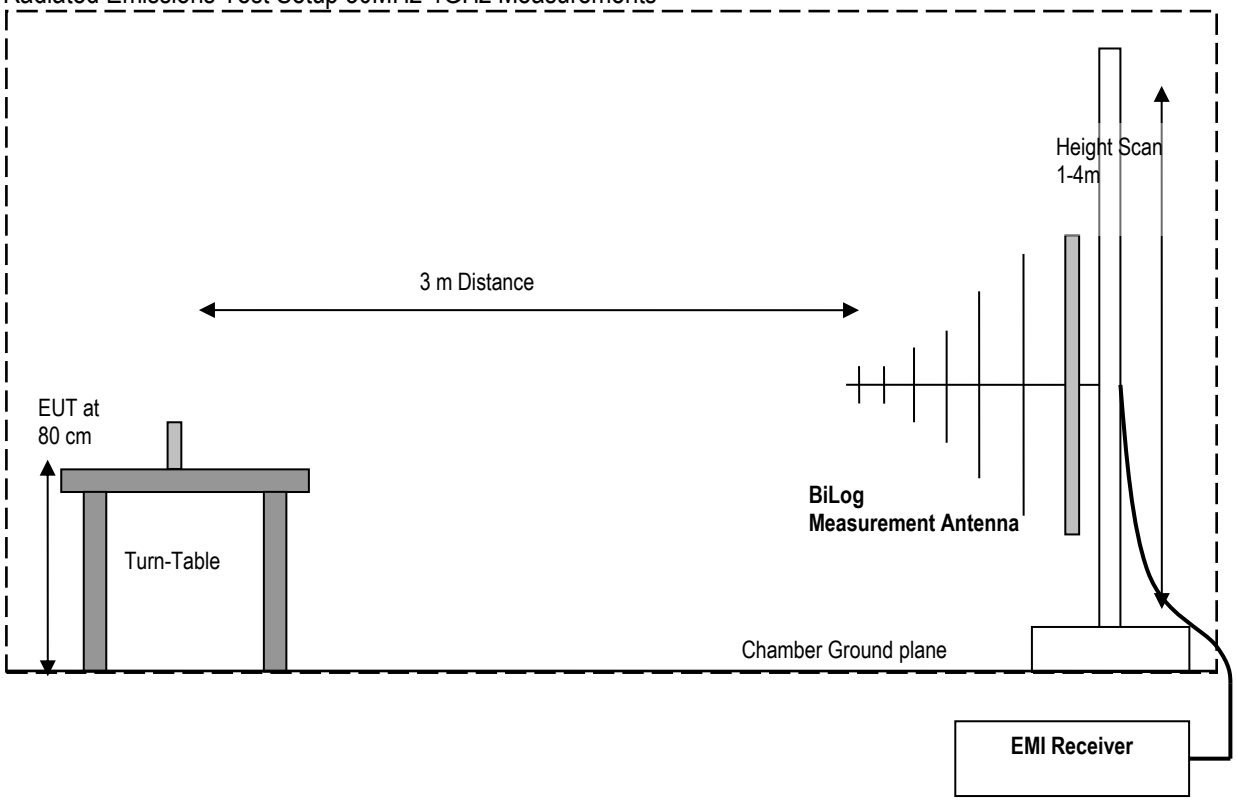
ANSI C63.10 (2013)

- The exploratory measurement is accomplished by running sweeps at 1 and 4m antenna heights over the required frequency range with R&S Test-SW EMC32 for both antenna polarizations. During each frequency scan the turntable rotates by no more than10deg.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then again maximized through a fine search in frequency domain, maximized in the 360deg range of the turntable, and maximized over antenna height between 1m and 4m and for positioning of the EUT.
- The above procedure is repeated for transmission low mid and high channel.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

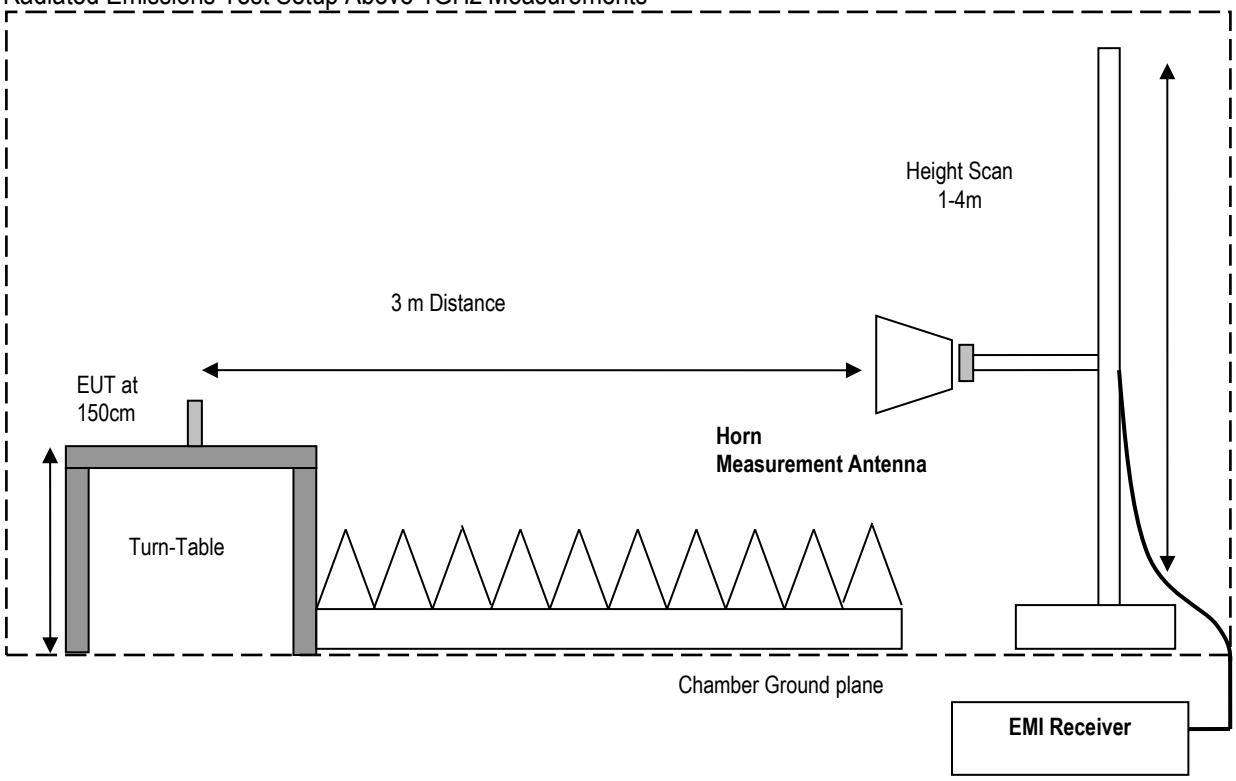
Radiated Emissions Test Setup below 30MHz Measurements



Radiated Emissions Test Setup 30MHz-1GHz Measurements



Radiated Emissions Test Setup Above 1GHz Measurements



9.2 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

1. Measured reading in dBµV
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

FS (dBµV/m) = Measured Value on SA (dBµV)- Cable Loss (dB)+ Antenna Factor (dB/m)

Example:

Frequency (MHz)	Measured SA (dBµV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBµV/m)
1000	80.5	3.5	14	98.0

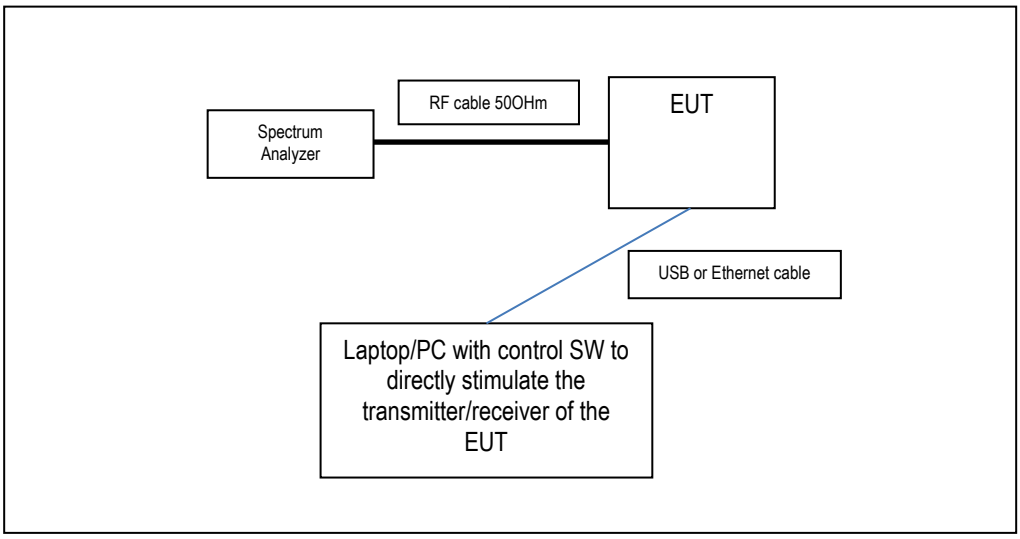
9.3 Power Line Conducted Measurement Procedure

AC Power Line conducted emissions measurements performed according to:

ANSI C63.4 (2014)

9.4 RF Conducted Measurement Procedure

9.4.1 Conducted Measurement Setup without companion device



See plots for spectrum analyzer settings.

10 Duty Cycle

10.1 Measurement Method

Measurements are according to FCC KDB 789033 D02 V01R02, Section B, measurement technique (b).

10.2 Limits

No limit

10.3 Test conditions and setup

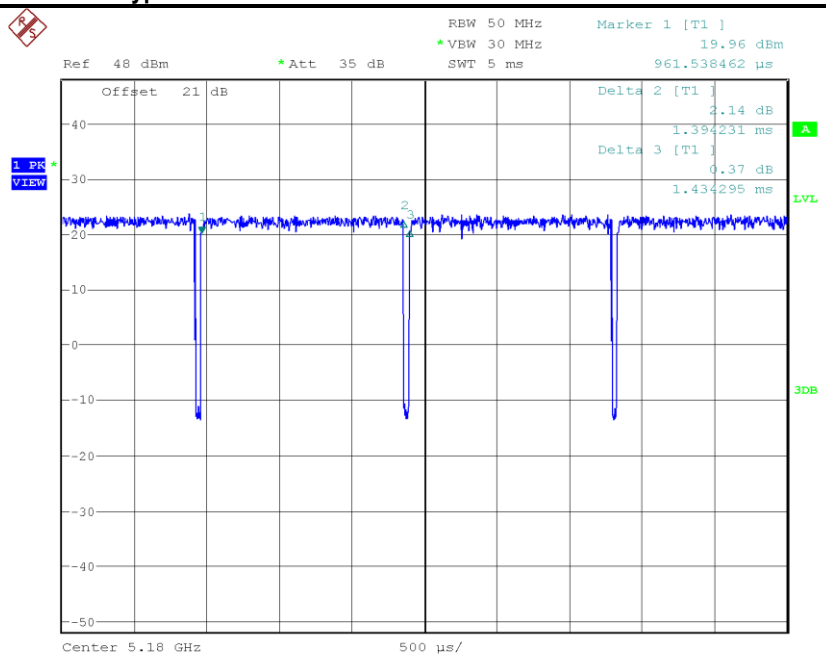
Ambient Temperature	EUT Set-Up #	Power Input
23° C	2	Battery / USB

10.4 Measurement result

Operating Mode	Tx On	Tx On + Tx Off	Duty Cycle
802.11a	1.39 ms	1.43 ms	97%
802.11n, HT20	1.30	1.35	96%
802.11n, HT40	647.4 µs	689.1 µs	94%

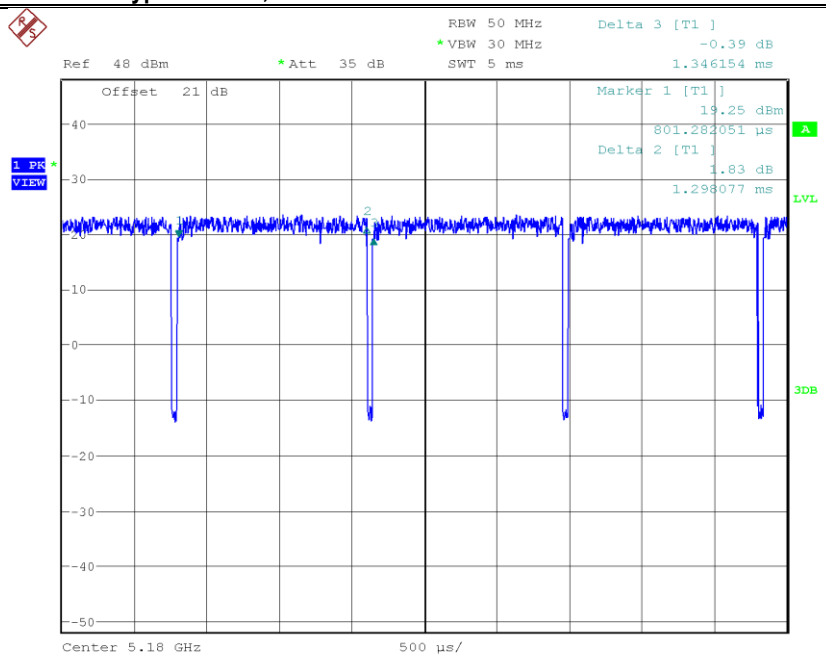
10.5 Measurement Plots:

Modulation/Packet Type: 802.11a



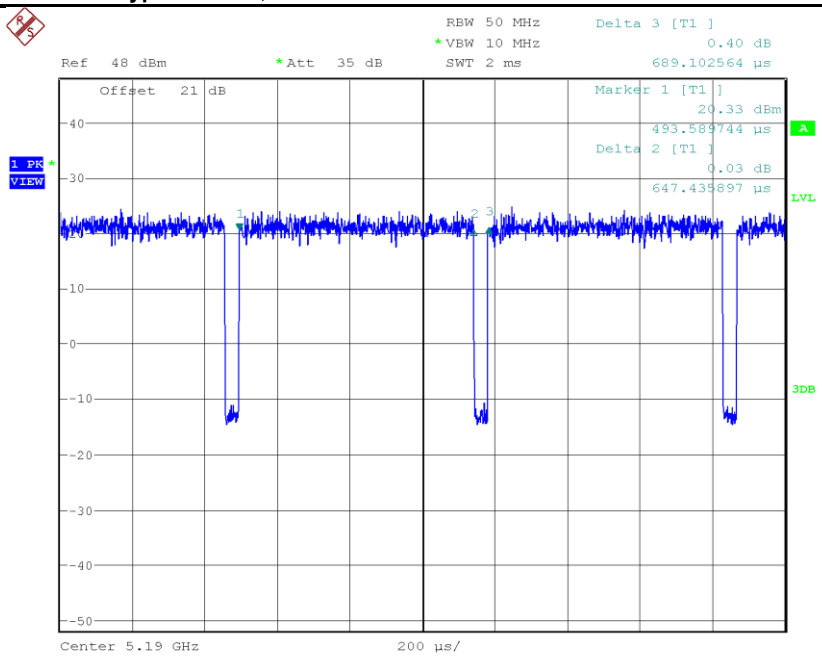
Date: 26.APR.2016 10:25:54

Modulation/Packet Type: 802.11n, HT20



Date: 26.APR.2016 10:28:18

Modulation/Packet Type: 802.11n, HT40



Date: 26.APR.2016 10:36:18

11 Bandwidth

11.1 Measurement according to FCC KDB 789033 D02 V01R02

Measurements are according to FCC KDB 789033, section C and D.

11.2 Limits:

None

11.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	Power Input
24.3° C	2	Battery / USB

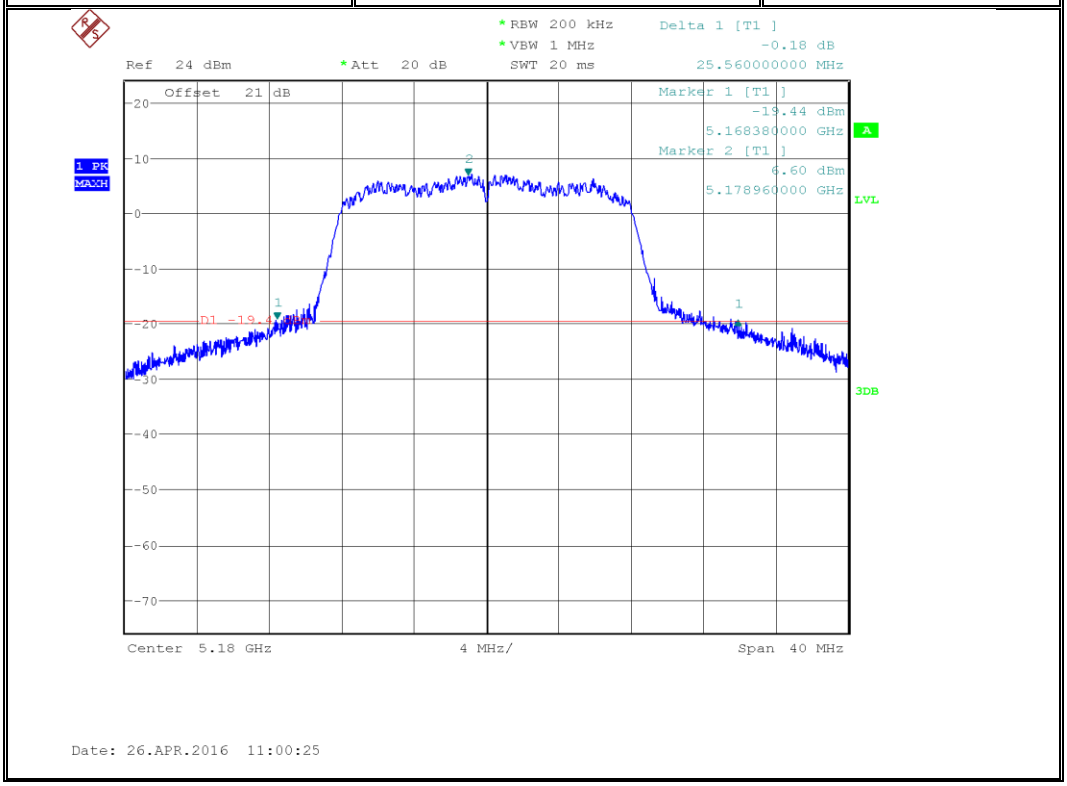
11.4 Measurement result:

Operating Mode	Frequency (MHz)	Emission Bandwidth (MHz)	Occupied Bandwidth (MHz)
802.11a	5180	25.6	16.5
	5240	23.7	16.6
802.11n, HT20	5180	22.4	17.5
	5240	22.6	17.5
802.11n, HT40	5190	50.1	36.3
	5230	50.4	36.3

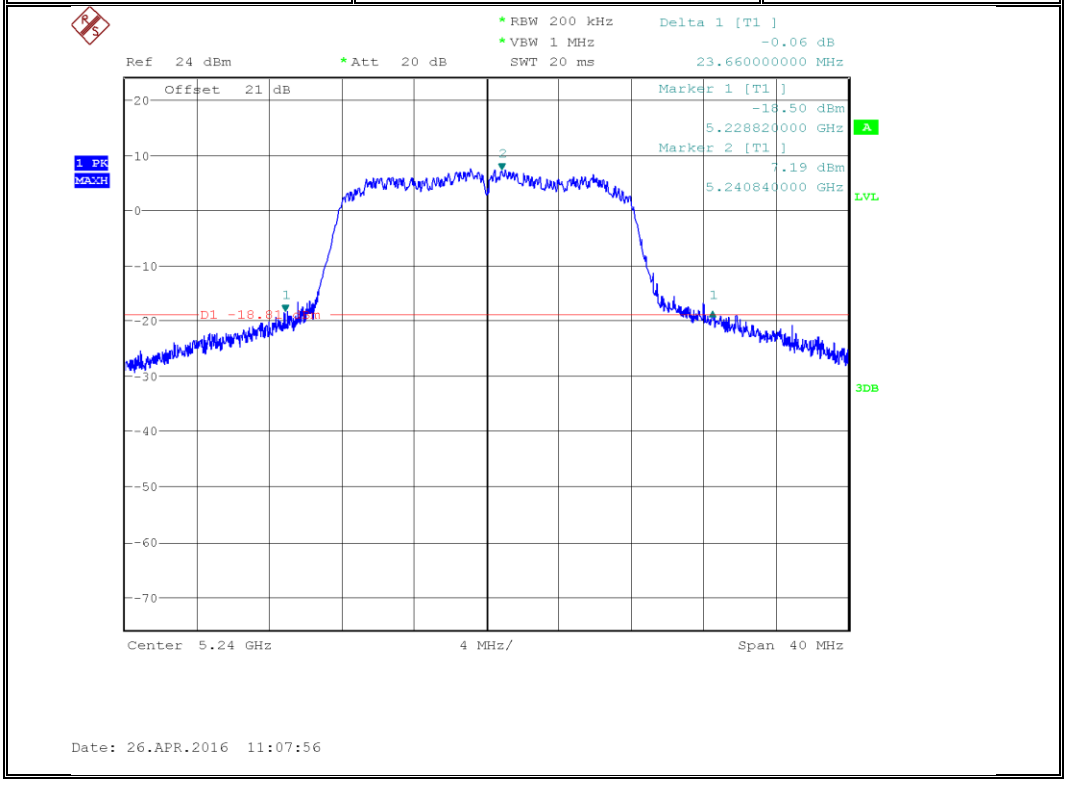
11.5 Measurement Plots:

11.5.1 Emission Bandwidth

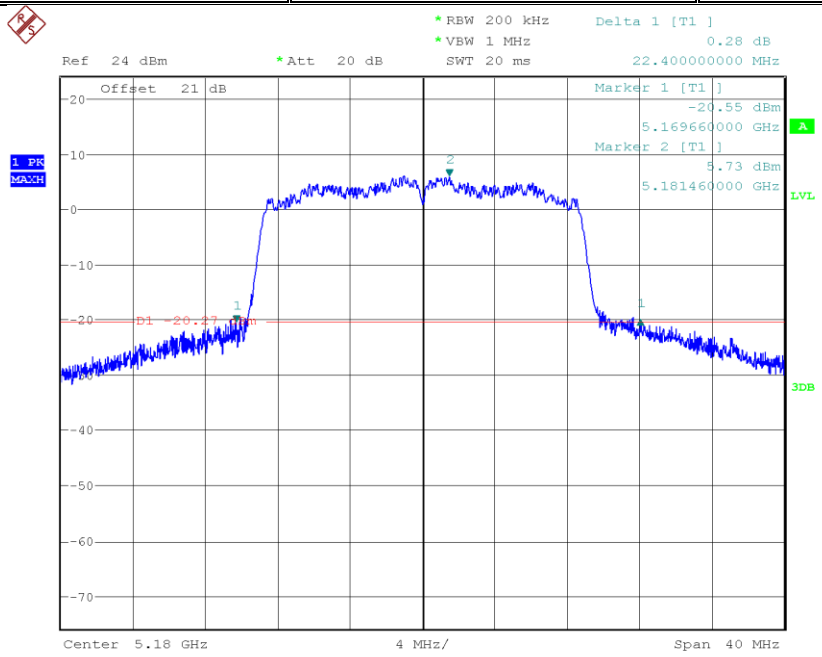
Emission Bandwidth	Ch.36 / 5180 MHz	802.11a



Emission Bandwidth	Ch.48 / 5240 MHz	802.11a



Emission Bandwidth	Ch.36 / 5180 MHz	802.11n, HT20



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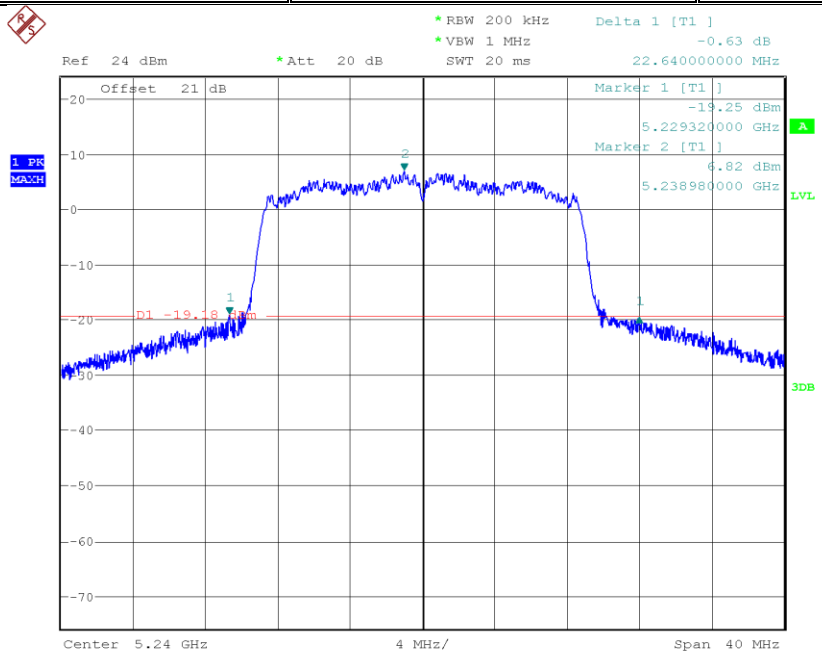
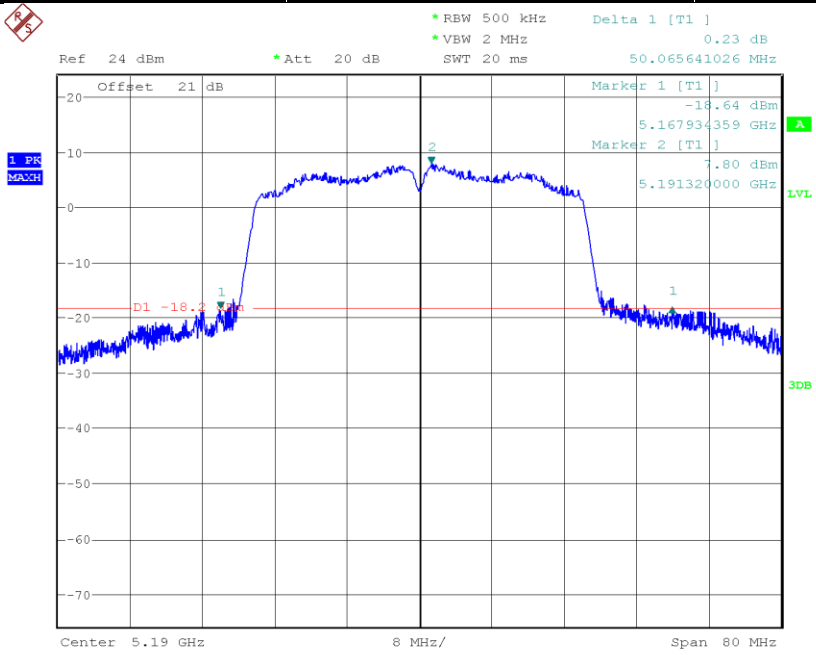
Emission Bandwidth	Ch.48 / 5240 MHz	802.11n, HT20

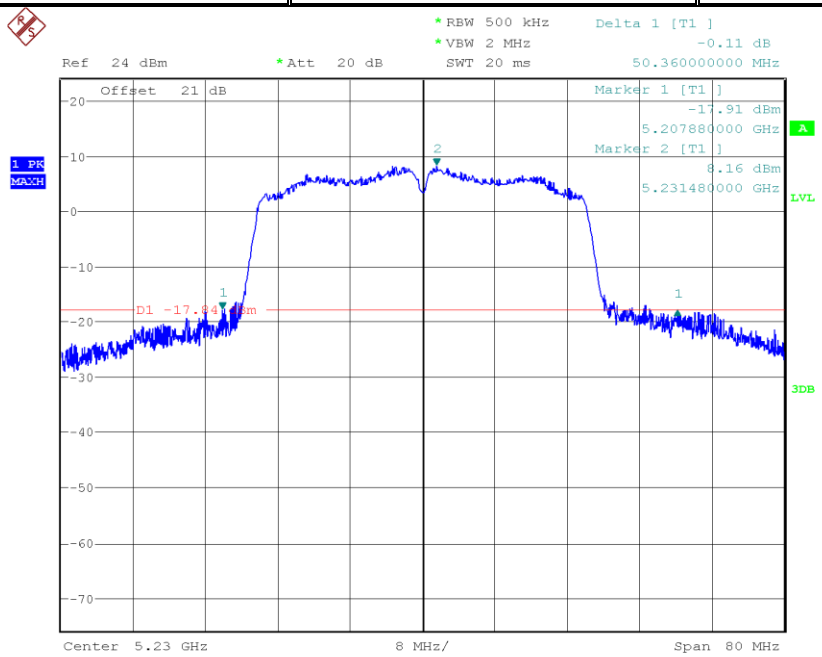


Date: 26.APR.2016 11:12:33

Emission Bandwidth	Ch.38 / 5190 MHz	802.11n, HT40

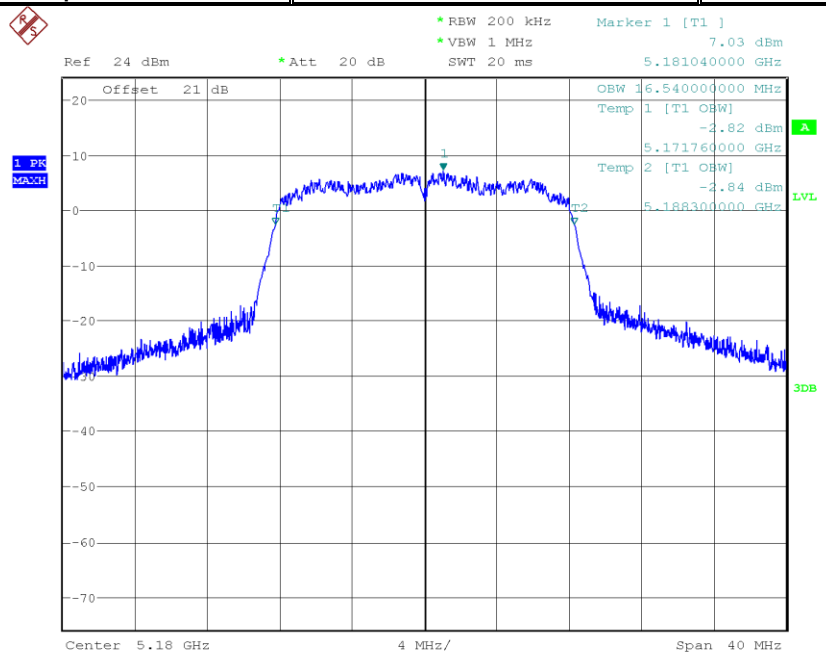


Emission Bandwidth	Ch.46 / 5230 MHz	802.11n, HT40

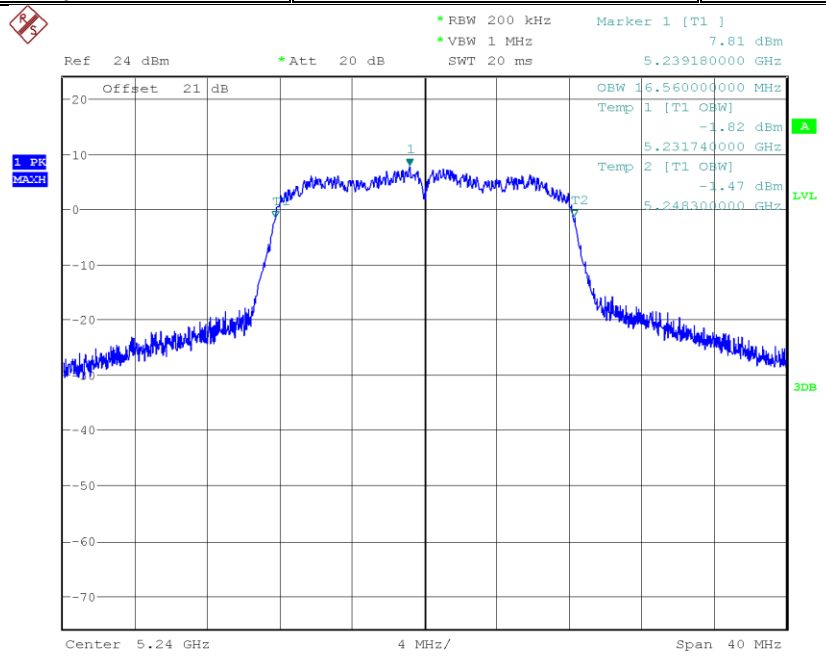


11.5.2 Occupied Bandwidth

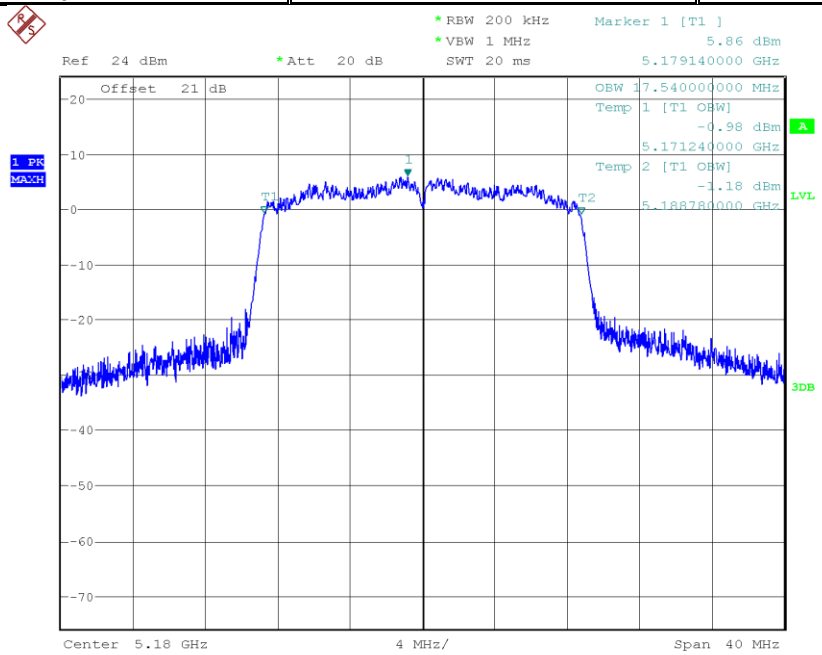
Occupied Bandwidth	Ch.36 / 5180 MHz	802.11a



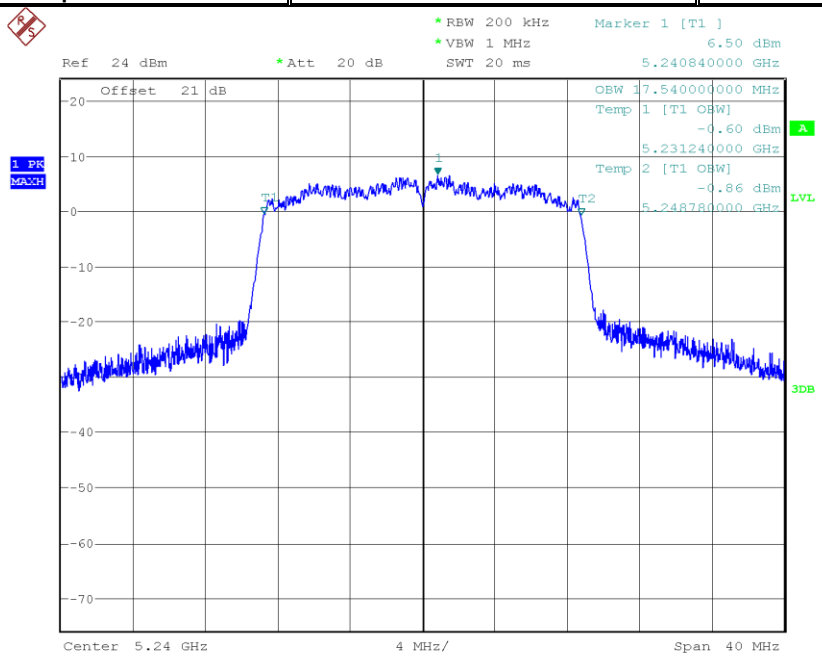
Occupied Bandwidth	Ch.48 / 5240 MHz	802.11a



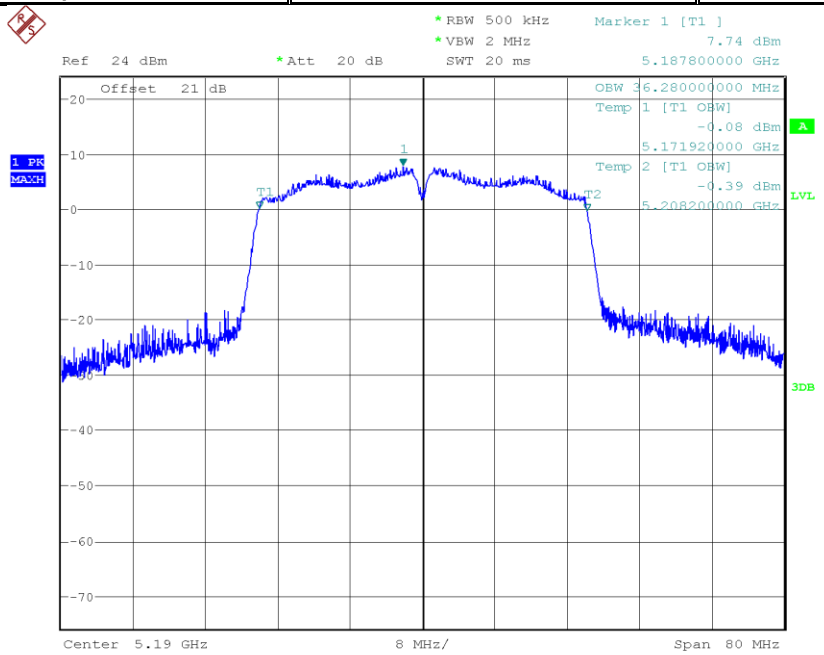
Occupied Bandwidth	Ch.36 / 5180 MHz	802.11n, HT20



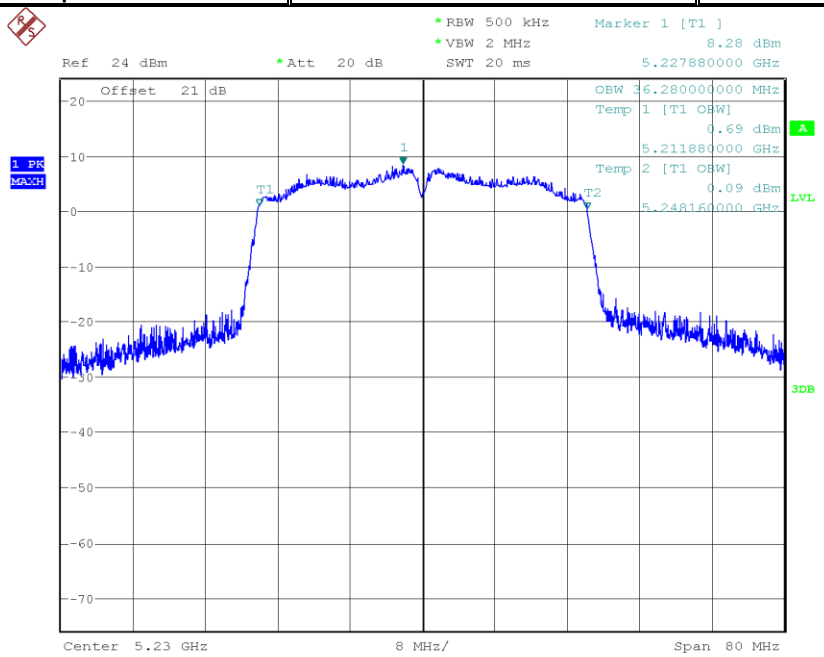
Occupied Bandwidth	Ch.48 / 5240 MHz	802.11n, HT20



Occupied Bandwidth	Ch.38 / 5190 MHz	802.11n, HT40



Occupied Bandwidth	Ch.46 / 5230 MHz	802.11n, HT40



12 Maximum Conducted Output Power and EIRP

12.1 Measurement Method.

Measurements are according to FCC KDB 789033 D02 V01R02, section II.E, Method SA-2.

12.2 Limits:

Maximum Conducted Output Power:

FCC §15.407 (a)(1)(iv):

Client Devices: 250 mW (24 dBm)

EIRP:

FCC §15.407 (a)(1)(iv):

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi

12.3 Test conditions and setup:

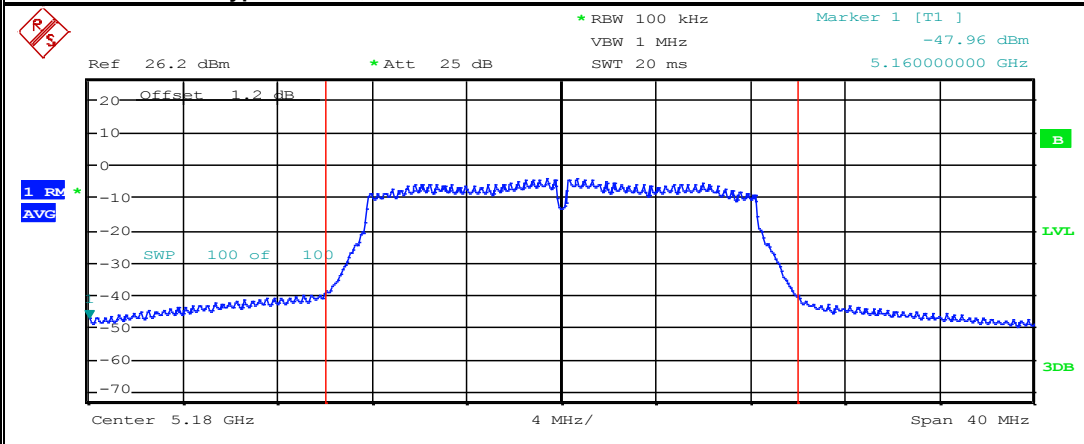
Ambient Temperature	EUT Set-Up #	Power Input	Antenna Gain (dBi)
23° C	2	Battery / USB	6

12.4 Measurement result:

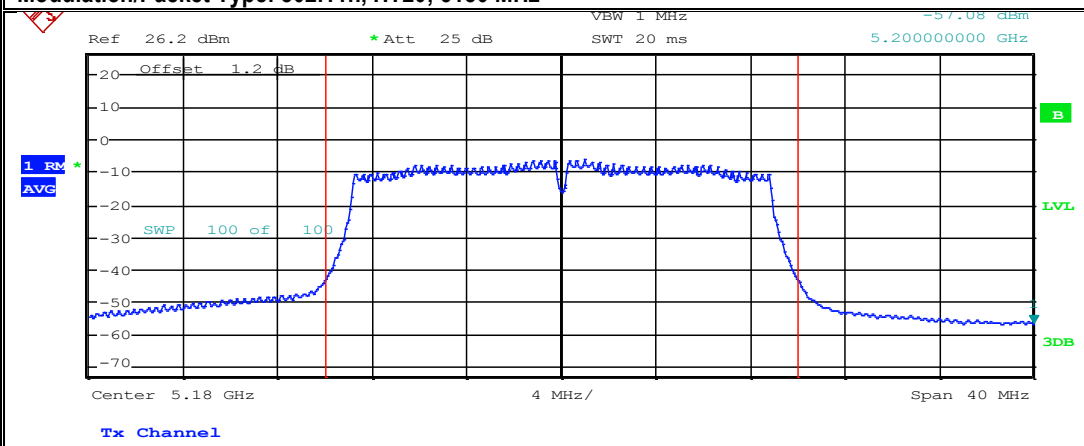
Operating Mode	Frequency (MHz)	Duty Cycle (%)	Measured Conducted Averaged Output Power (dBm)	Duty Cycle Corrected Conducted Average Output Power (dBm)	Calculated EIRP (dBm)
802.11a	5180	97	14.31	14.44	20.44
	5200	97	14.51	14.64	20.64
	5240	97	14.51	14.64	20.64
802.11n, HT20	5180	96	12.45	12.83	18.83
	5200	96	12.65	12.8	18.8
	5240	96	12.62	12.67	18.67
802.11n, HT40	5190	94	12.49	12.76	18.76
	5230	94	12.61	12.88	18.88

12.5 Measurement Plots:

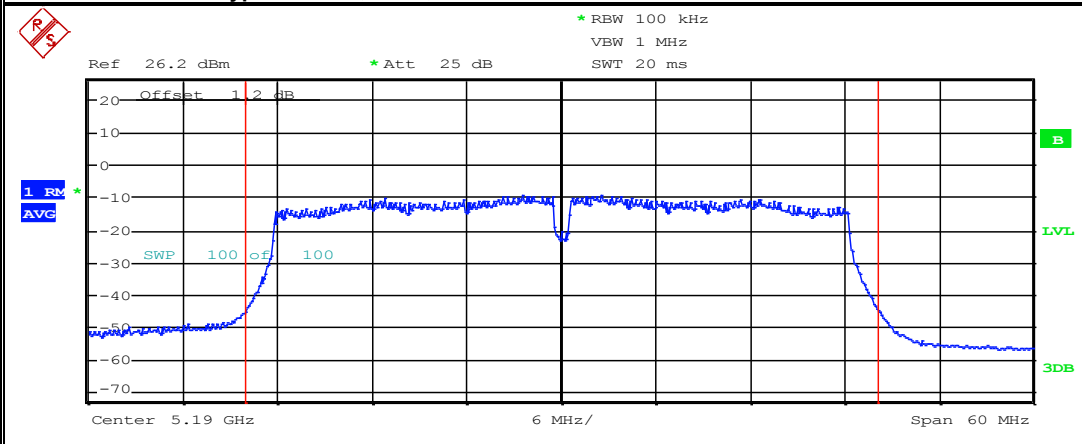
Modulation/Packet Type: 802.11a; 5180 MHz



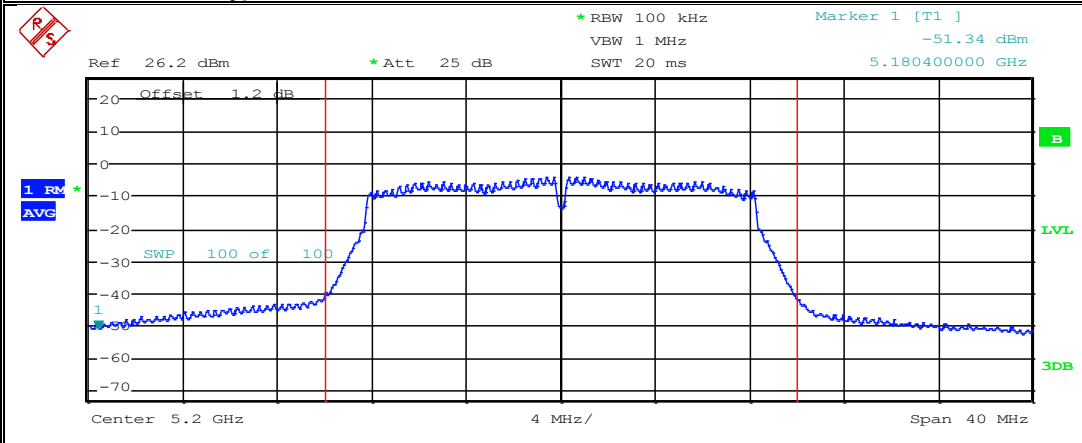
Modulation/Packet Type: 802.11n, HT20; 5180 MHz



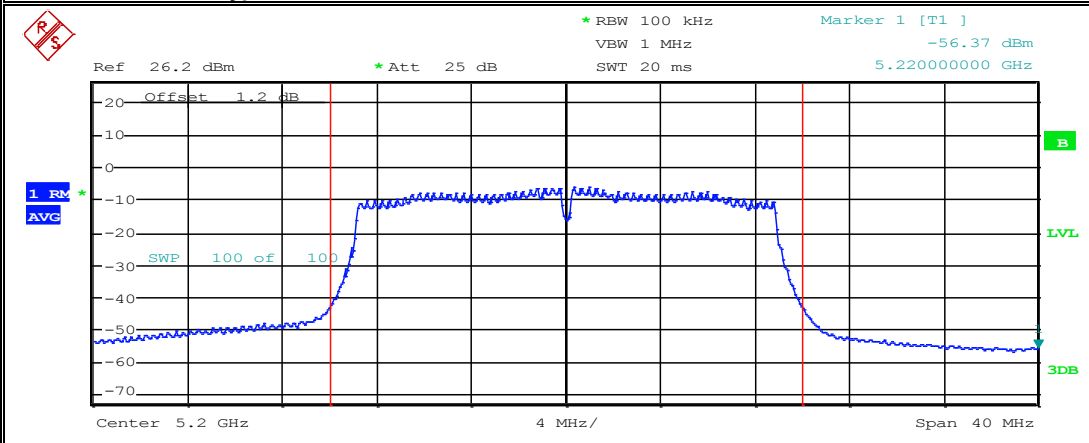
Modulation/Packet Type: 802.11n, HT40; 5190 MHz



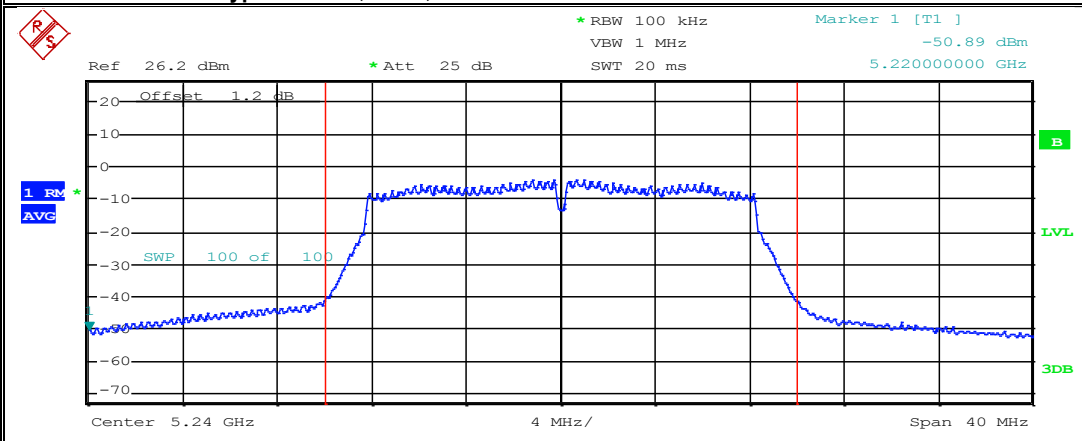
Modulation/Packet Type: 802.11a, HT20; 5200 MHz



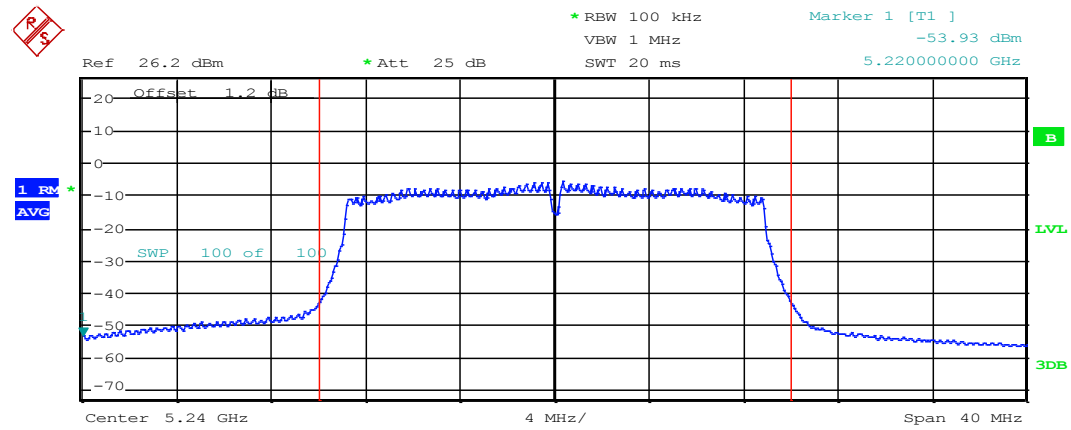
Modulation/Packet Type: 802.11n, HT20; 5200 MHz



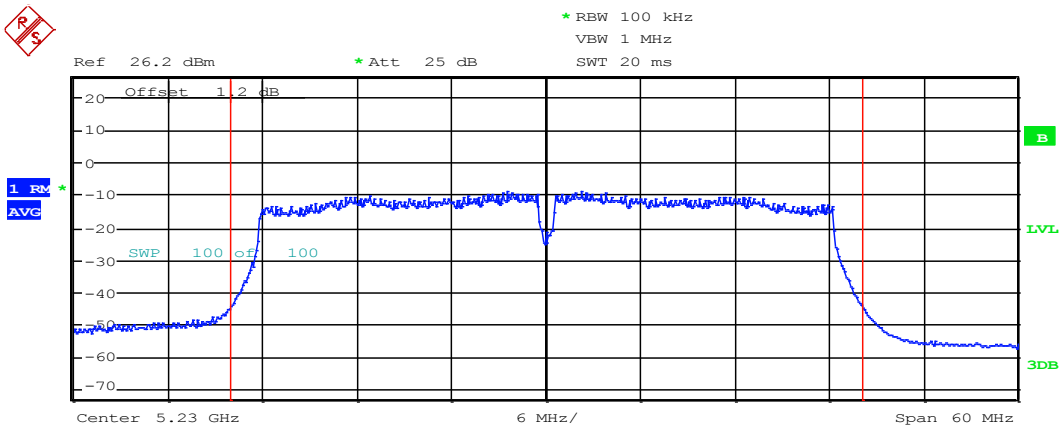
Modulation/Packet Type: 802.11a, HT20; 5240 MHz



Modulation/Packet Type: 802.11n, HT20; 5240 MHz



Modulation/Packet Type: 802.11n, HT40; 5230 MHz



13 Power Spectral Density

13.1 Measurement Method.

Measurements according to KDB 789033 D02 V01R02, section II.E, Method SA-2.

13.2 Limits:

FCC §15.407 (a)(1):

Master: 17 dBm / MHz

Client: 11 dBm / MHz

13.3 Test conditions and setup:

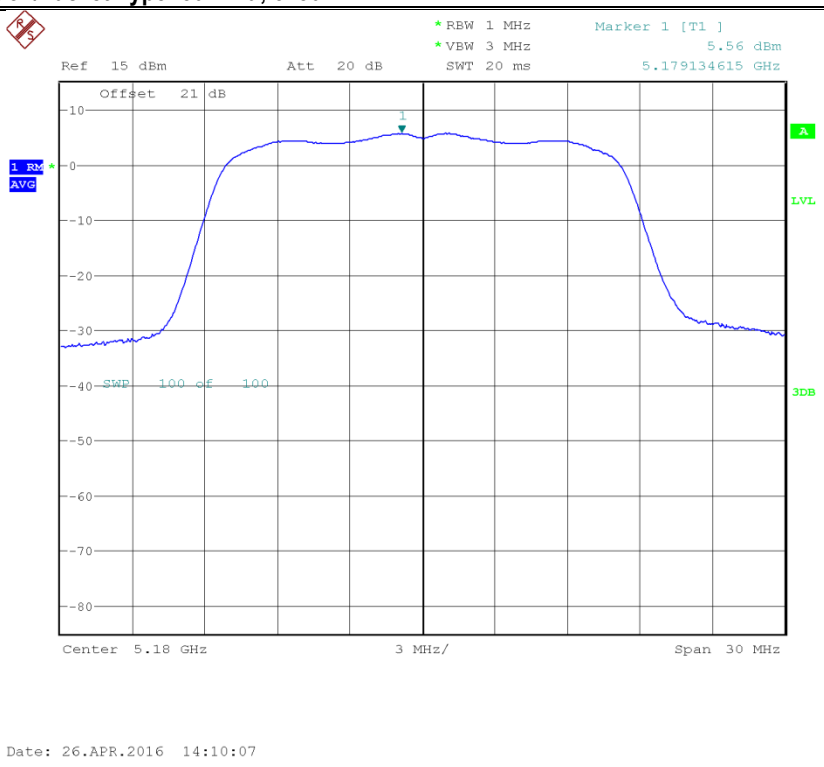
Ambient Temperature	EUT Set-Up #	Power Input
22.2° C	2	Battery / USB

13.4 Measurement result:

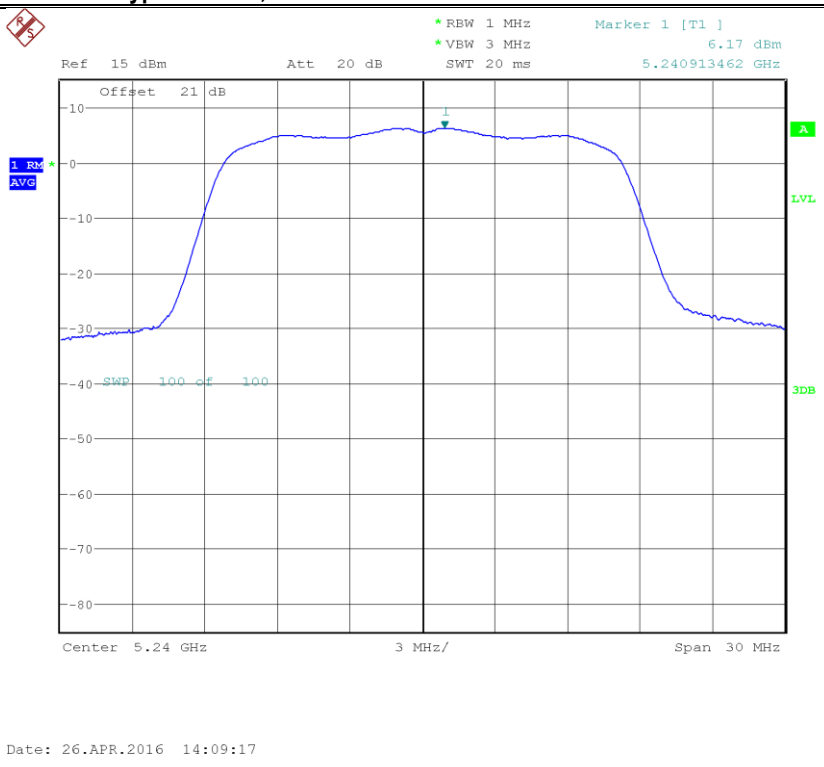
Operating Mode	Frequency (MHz)	Duty Cycle (%)	Measured Conducted Power Spectral Density (dBm)	Duty Cycle Corrected Conducted Power Spectral Density (dBm)
802.11a	5180	97	5.56	5.69
	5240	97	6.17	6.30
802.11n, HT20	5180	96	5.56	5.74
	5240	96	5.04	5.22
802.11n, HT40	5190	94	2.29	2.56
	5230	94	2.55	2.82

13.5 Measurement Plots:

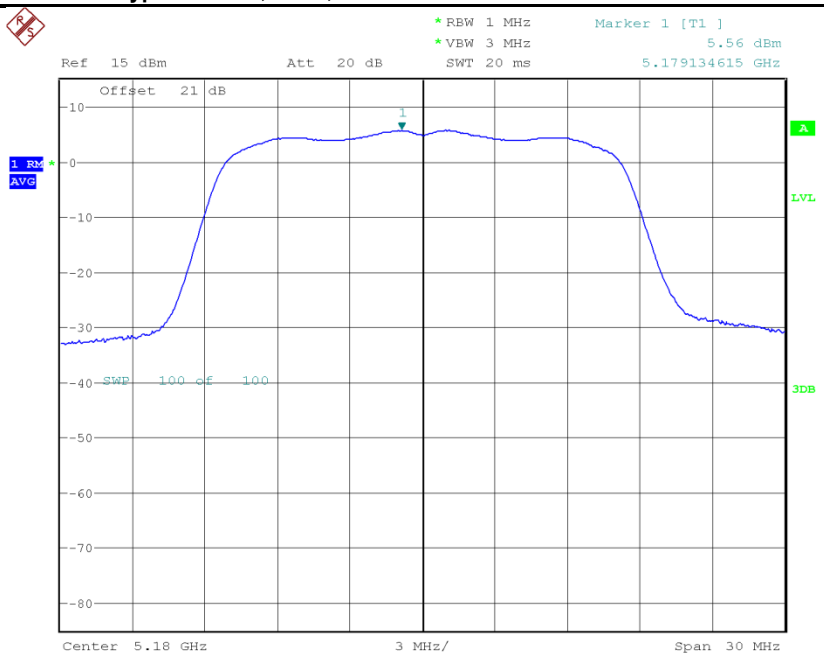
Modulation/Packet Type: 802.11a; 5180 MHz



Modulation/Packet Type: 802.11a; 5240 MHz

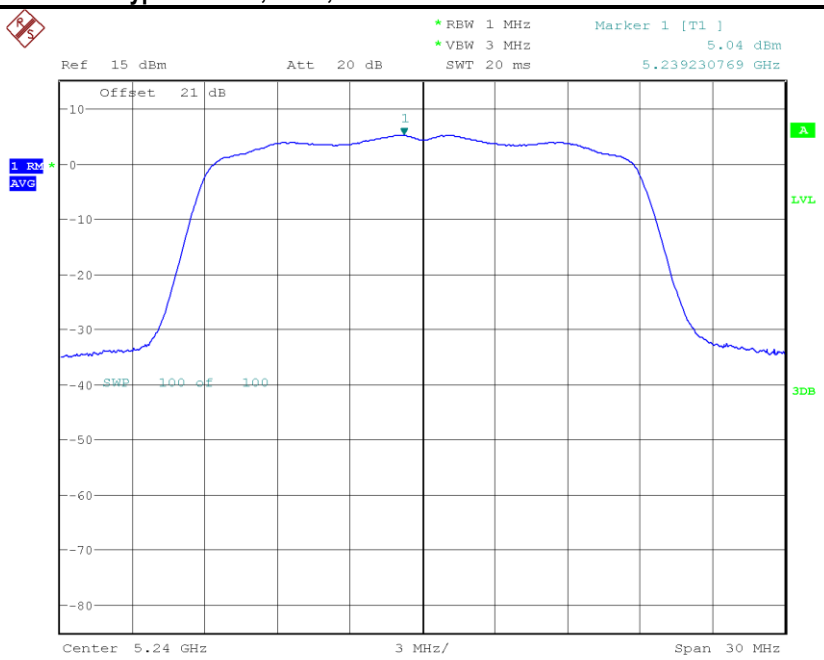


Modulation/Packet Type: 802.11n, HT20; 5180 MHz



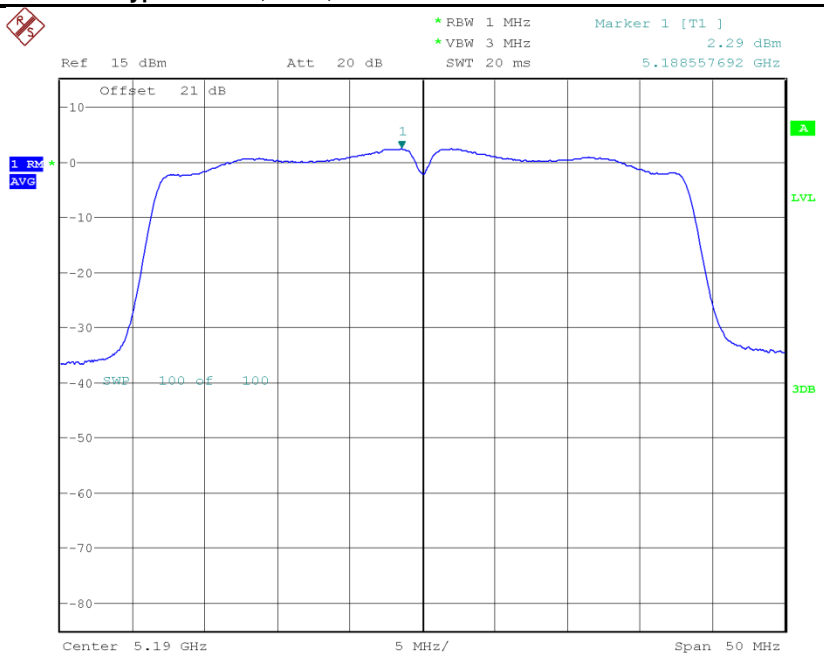
Date: 26.APR.2016 14:10:07

Modulation/Packet Type: 802.11n, HT20; 5240 MHz

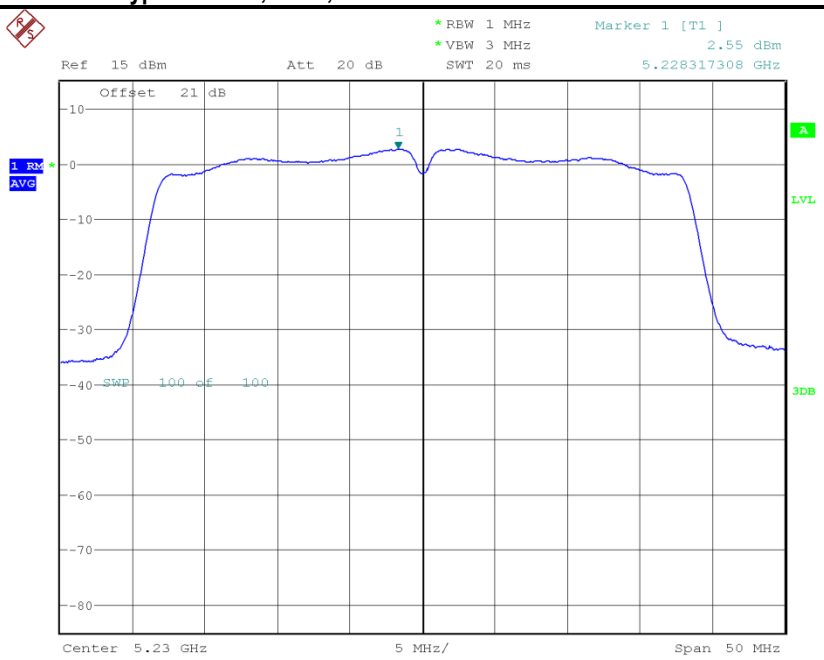


Date: 26.APR.2016 14:08:24

Modulation/Packet Type: 802.11n, HT40; 5190 MHz



Modulation/Packet Type: 802.11n, HT40; 5230 MHz



14 Out of Band Emissions at the Band Edge

14.1 Measurement Method.

Measured according to FCC KDB 789033 D02 V01R02

Receiver settings for band edge:
Set the center frequency and span to encompass frequency range to be measured
RBW = 1 MHz
Step Size < 200 kHz
Sweep Time: Auto
Detector = peak
Trace = max hold
Allow trace to fully stabilize
Use the peak marker function to determine the maximum amplitude level
Allow the trace to stabilize. Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge.

Plots reported here represent the worst case emissions for horizontal and vertical antenna polarizations and for three orientations of the EUT. Unless mentioned otherwise, the emissions outside the limit lines in the plots are from the transmit signal.

14.2 Limits

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

Additionally, the limits of FCC 15.209 apply for restricted bands as described in the previous section of this test report.

14.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	Power Input
24° C	1	Battery / USB

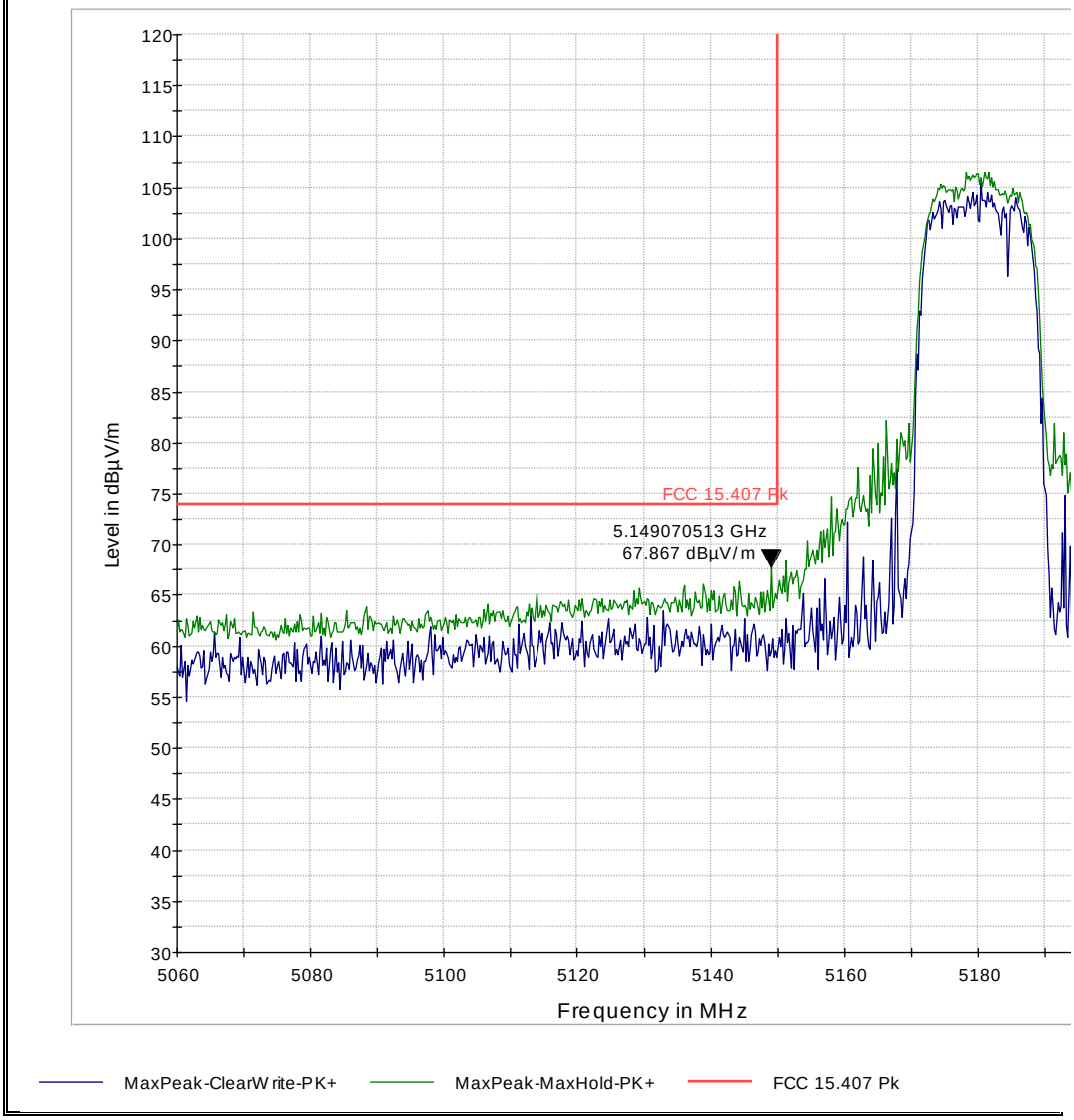
14.4 Measurement result:

EUT operating mode	Channel	Band Edge	Result
802.11a	Low	Lower, Restricted	Pass
802.11n, HT40	Low	Lower, Restricted	Pass

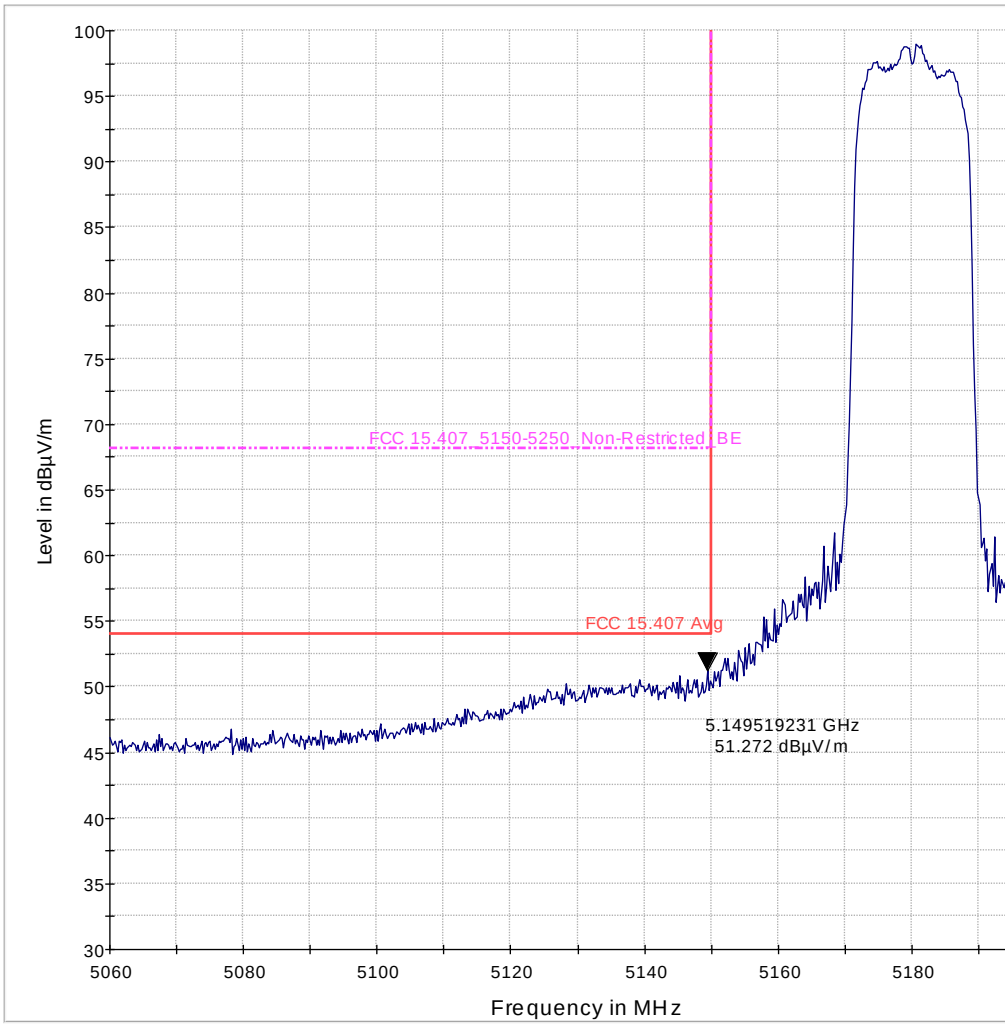
Only low channel is tested at the lower band edge. The upper frequency of the highest channel in the UNII-1 band is approximately 5250 MHz, 100 MHz below the upper edge of the UNII-2 band.

14.5 Measurement Plots

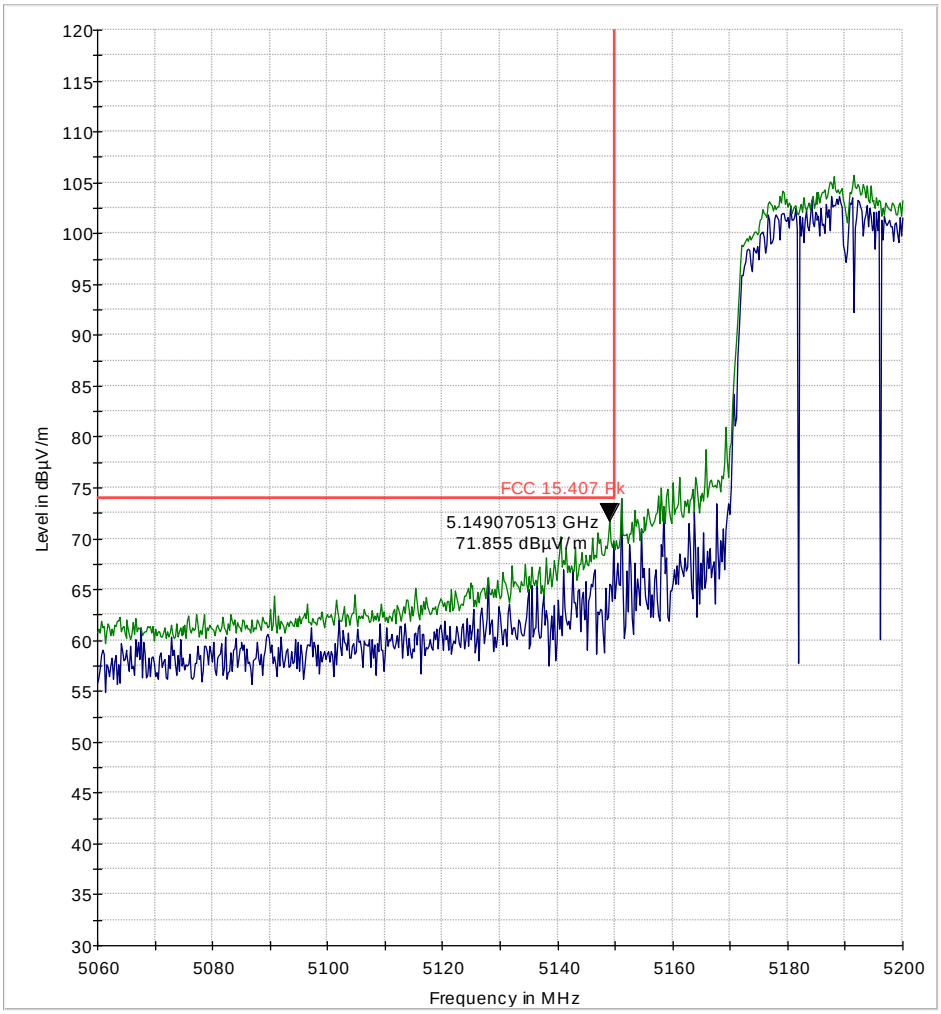
Out of Band Emissions at the Band Edge - Peak		
Modulation: 802.11a	**Channel: Low**	**Max Duty Cycle**



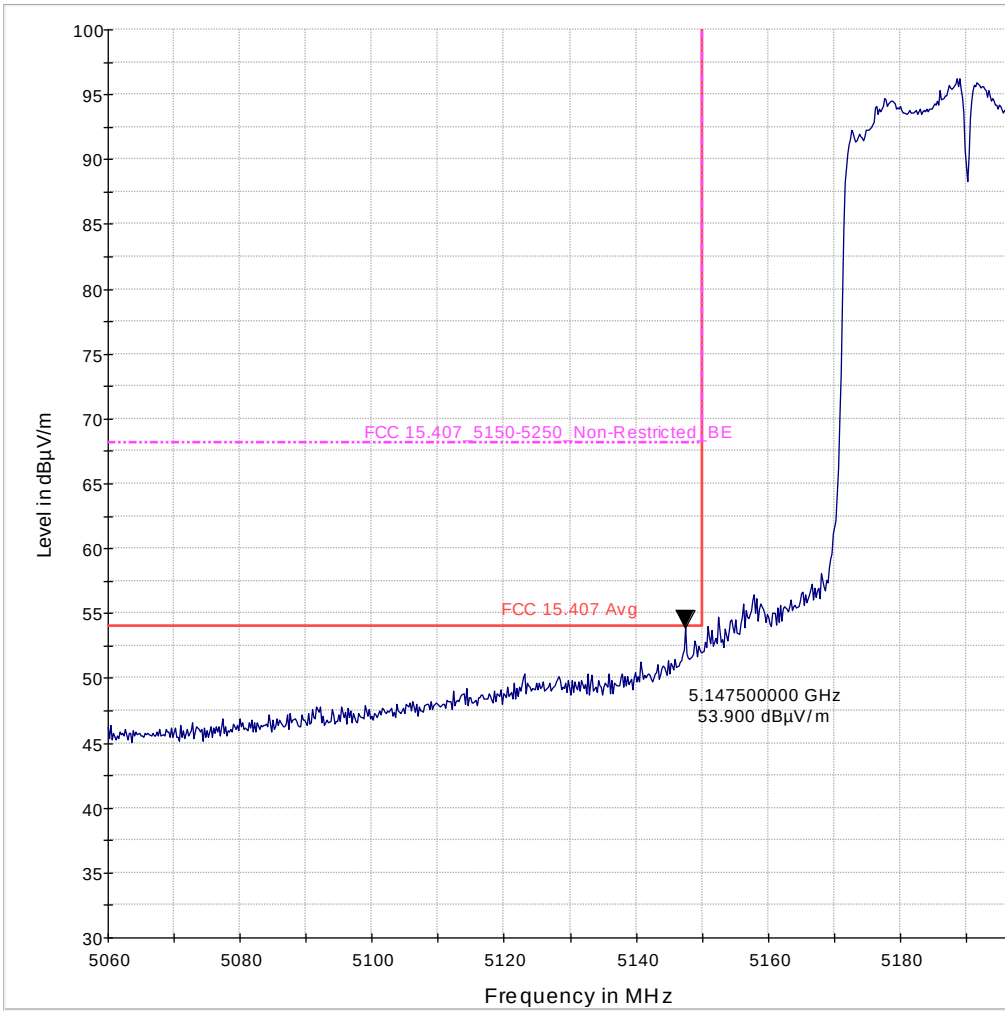
Radiated Band Edge - Average		
Modulation: 802.11a	**Channel: Low**	**Max Duty Cycle**



Out of Band Emissions at the Band Edge - Peak		
Modulation: 802.11n, HT40	**Channel: Low**	**Max Duty Cycle**



Radiated Band Edge - Average		
Modulation: 802.11n, HT40	**Channel: Low**	**Max Duty Cycle**



15 Unwanted Emissions

15.1 Measurement Method.

Measured according to FCC KDB 789033 D02 V01R02
Analyzer Settings:
Frequency = 9 KHz – 30 MHz
RBW = 9 KHz
Detector: Peak

Frequency = 30 MHz – 1 GHz
Detector = Peak / Quasi-Peak
RBW=120 KHz (<1GHz)

Frequency > 1 GHz
Detector = Peak / Average
RBW= 1MHz

Plots reported here represent the worst case emissions for horizontal and vertical antenna polarizations and for three orientations of the EUT. Unless mentioned otherwise, the emissions outside the limit lines in the plots are from the transmit signal.

15.2 Limits

§15.407/15.205/15.209
(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

*PEAK LIMIT= 74dBµV/m
*AVG. LIMIT= 54dBµV/m

Table 1:

Frequency of emission (MHz)	Field strength @ 3m (µV/m)	Field strength @ 3m (dBµV/m)
30–88	100	40dBµV/m
88–216	150	43.5 dBµV/m
216–960	200	46 dBµV/m
Above 960	500	54 dBµV/m

Table 2:

Frequency of emission (MHz)	Field strength (µV/m) / (dBuV/m)	Measurement Distance (m)
0.009–0.490	2400/F(kHz) / ---------	300
0.490–1.705	24000/F(kHz) / --------	30
1.705–30.0	30 / (29.5)	30

Radiated spurious emissions shall be measured for the transmit frequencies, transmit power, and data rate for the lowest, middle and highest channel in each frequency band of operation and for the highest gain antenna for each antenna type, and using the appropriate parameters and test requirements described in 5.4.
The highest (or worst-case) data rate shall be recorded for each measurement.

For testing at distance other than the specified in the standard, the limit conversion is calculated by using 40 dB/decade extrapolation factor as follow:

Conversion factor (CF) = 40 log (D/d) = 40 log (300m / 3m) = 80dB

15.3 Test conditions and setup:

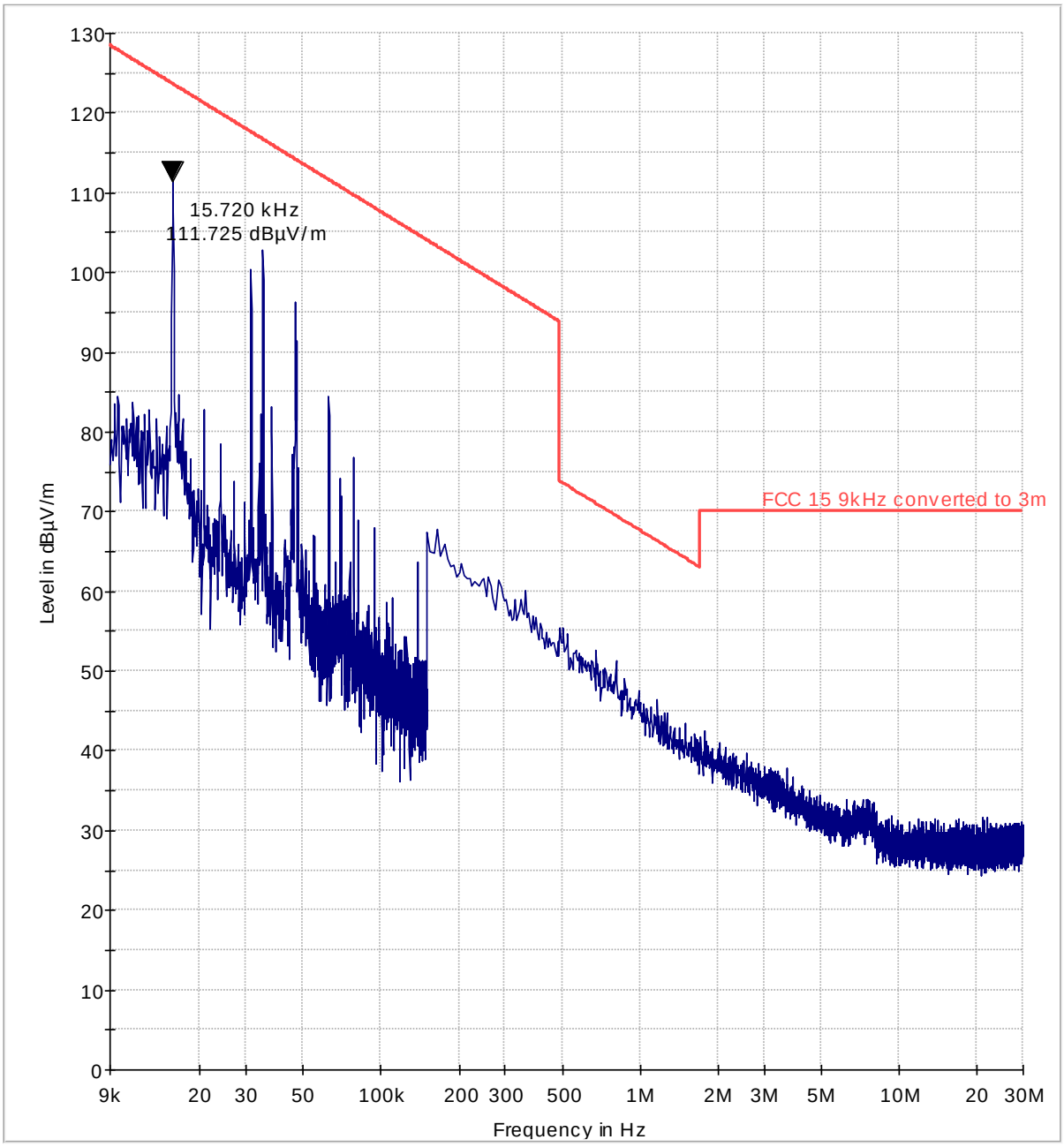
Ambient Temperature	EUT Set-Up #	Power Input
22.9° C	1	Battery, USB,

15.4 Measurement Results:

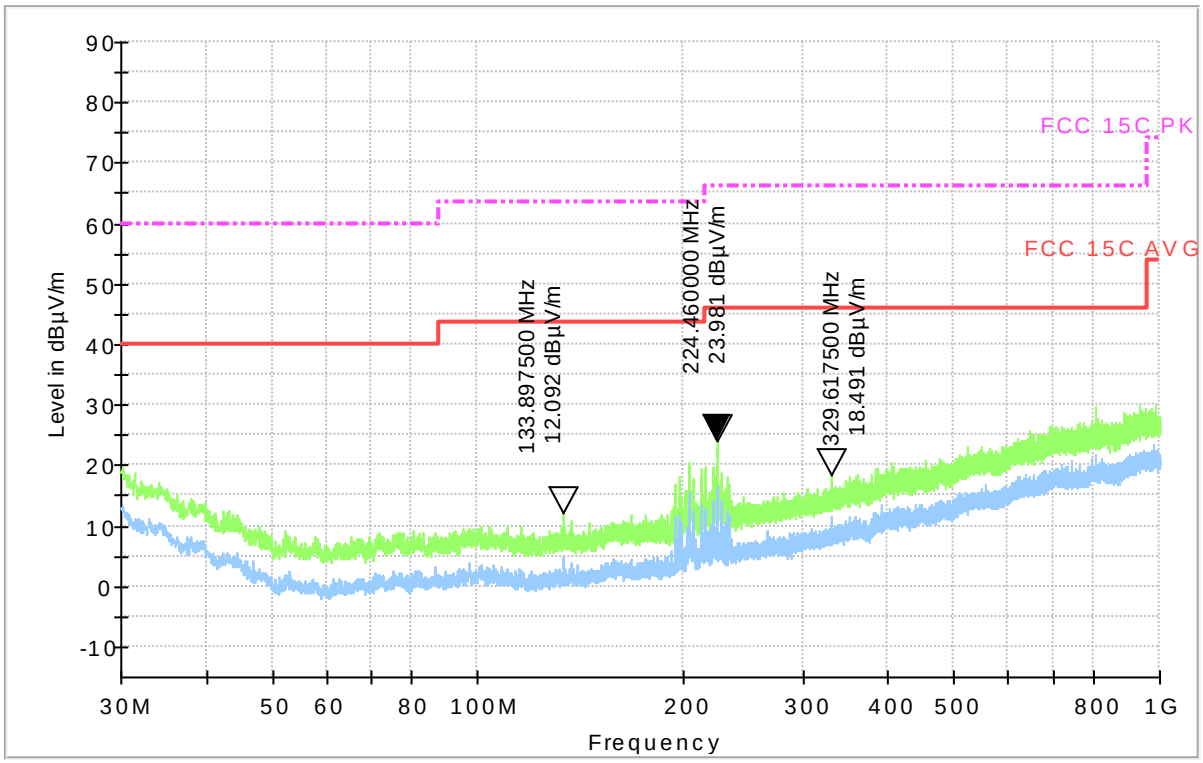
Operating Mode	Channel	Scan Frequency	Result
802.11n, HT40	38	9 kHz – 40 GHz	Pass
	46	9 kHz – 40 GHz	Pass

15.5 Measurement Plots:

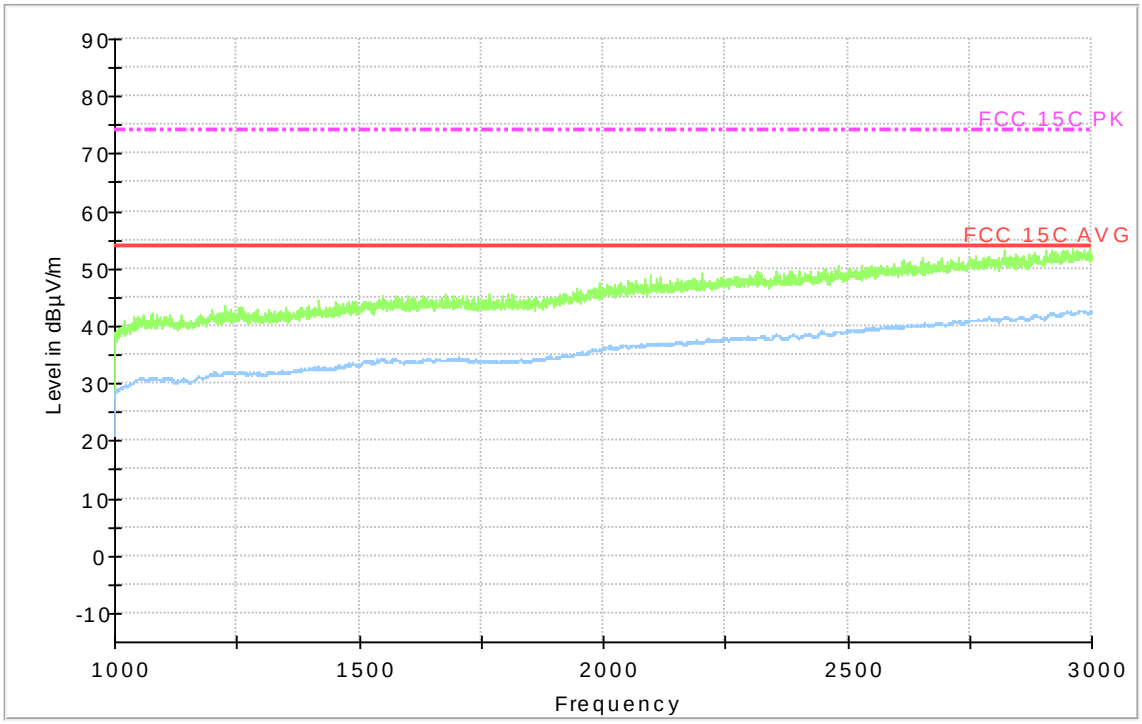
Radiated Emissions: 9 kHz – 30 MHz		
Modulation: 802.11n, HT40	**Channel: Low**	**Max Duty Cycle**



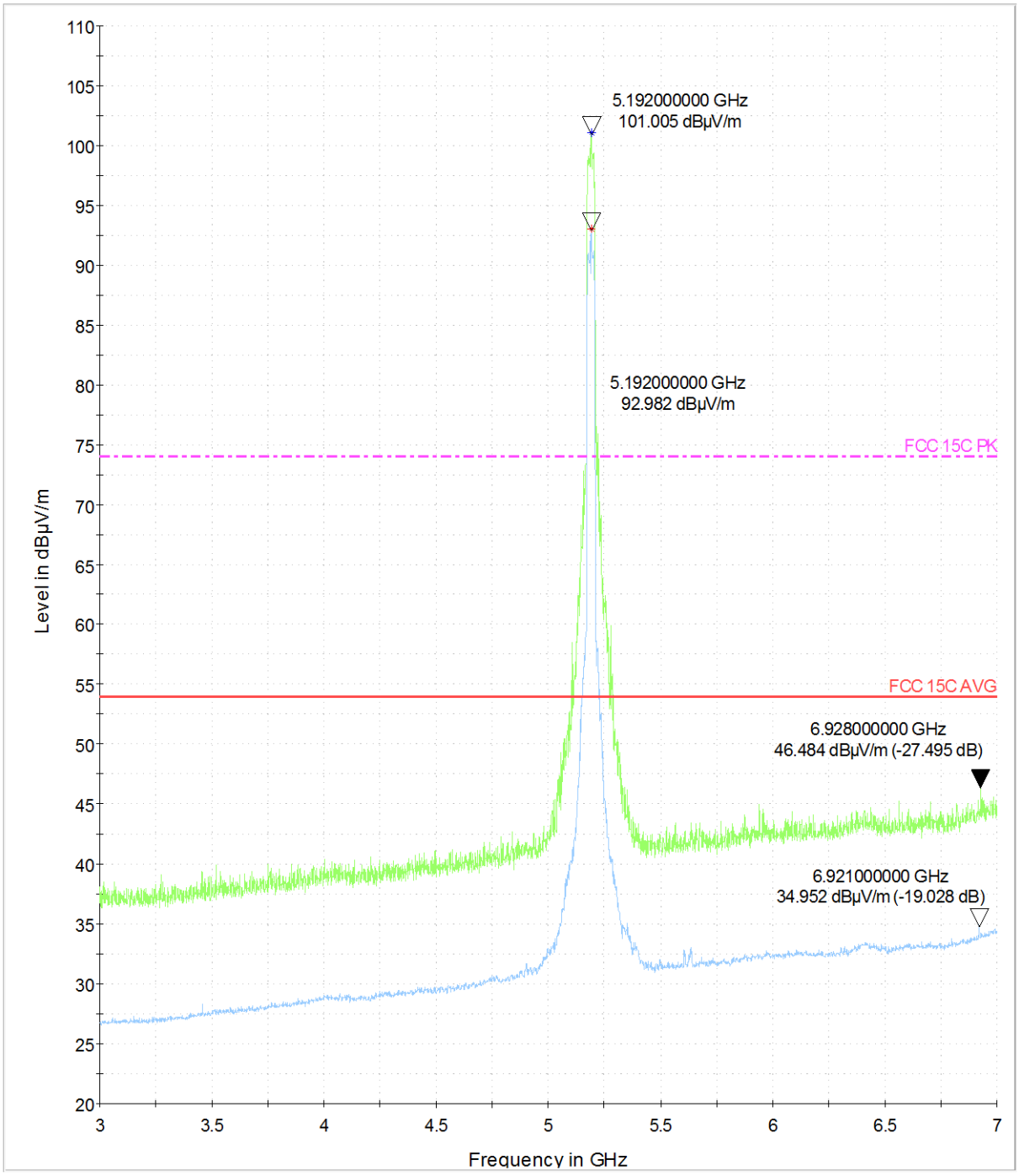
Radiated Emissions: 30 MHz – 1 GHz		
Modulation: 802.11n, HT40	**Channel: Low**	**Max Duty Cycle**



Radiated Emissions: 1GHz – 3 GHz		
Modulation: 802.11n, HT40	**Channel: Low**	**Max Duty Cycle**

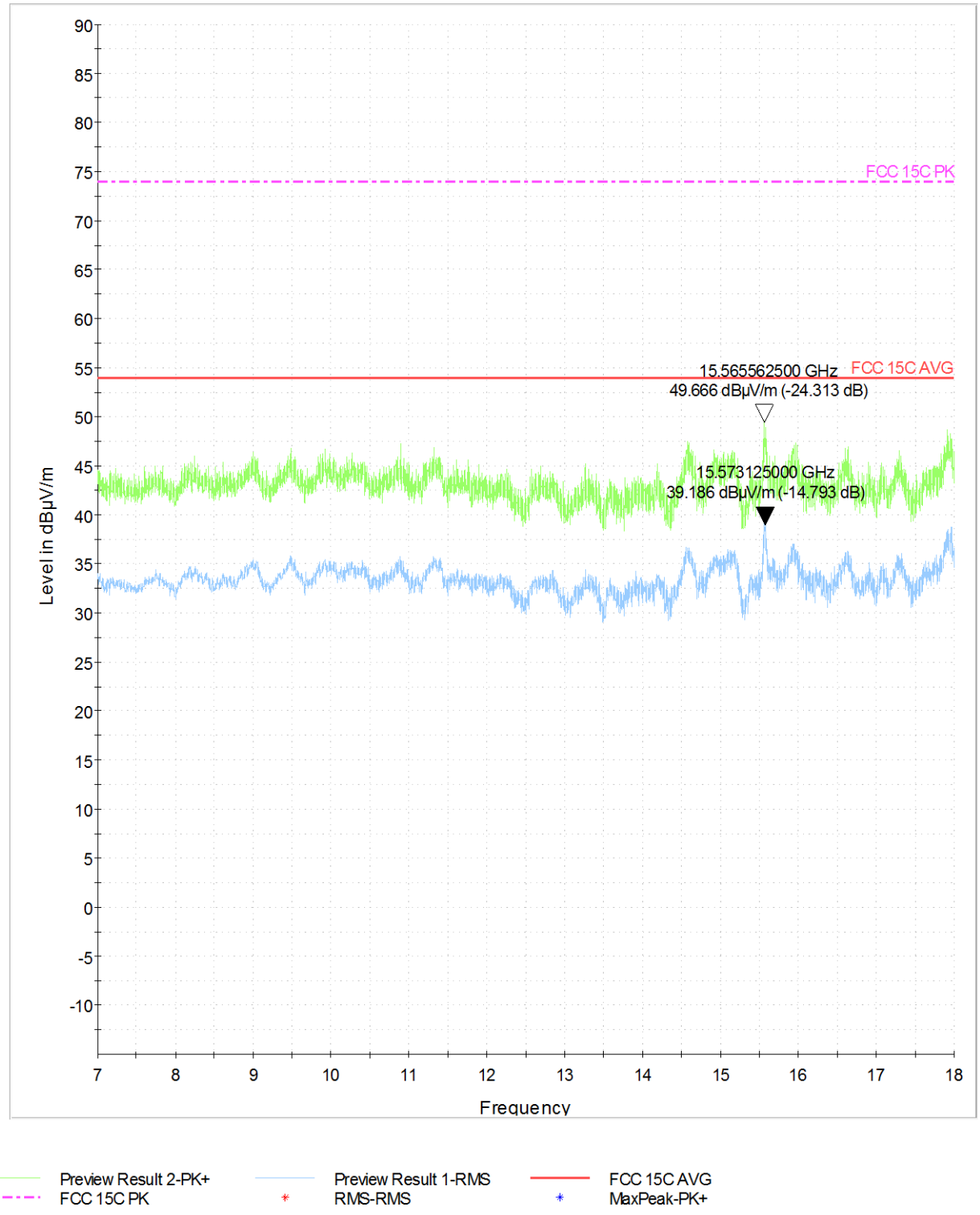


Radiated Emissions: 3 GHz – 7 GHz		
Modulation: 802.11n, HT40	**Channel: Low**	**97% Duty Cycle**

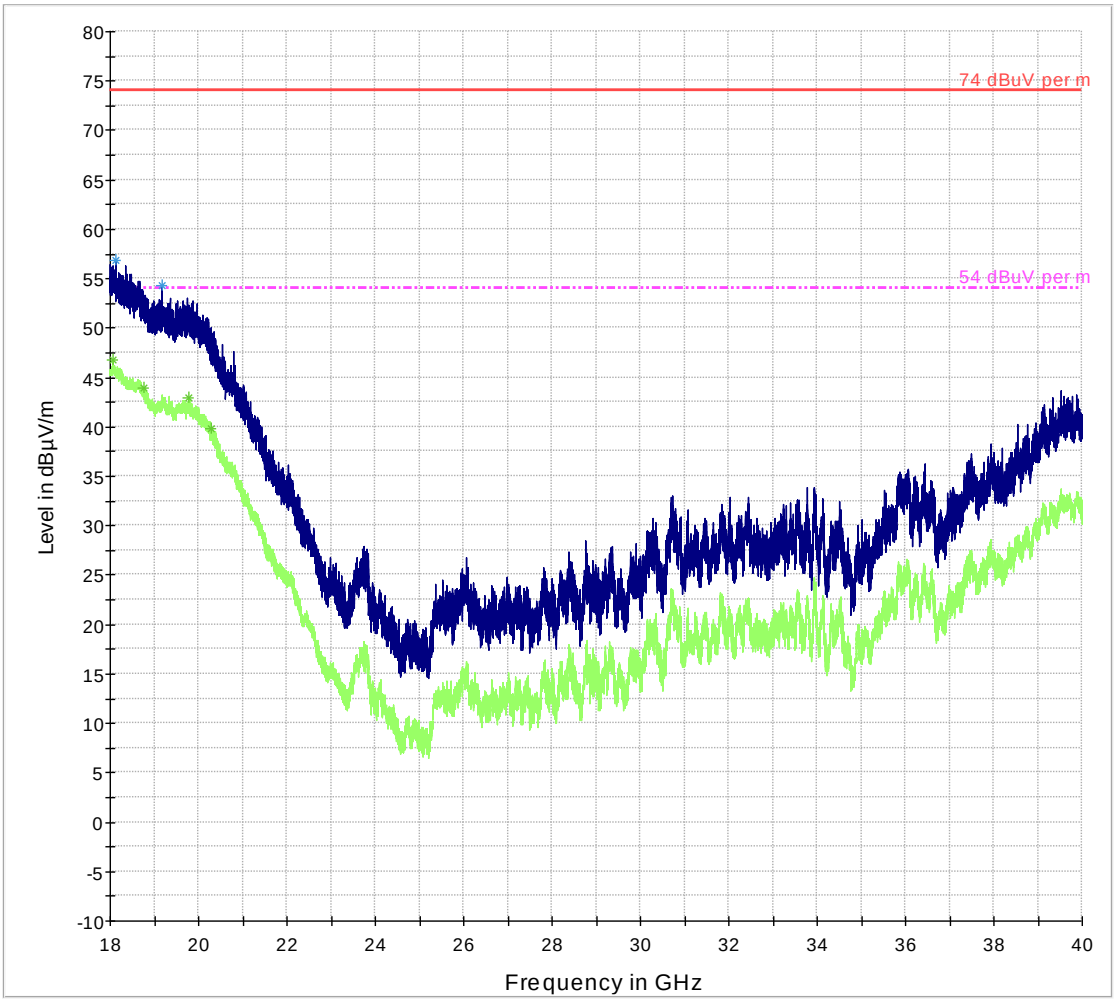


Note: signal above the limit line is the Channel Transmitter Signal

Radiated Emissions: 7 GHz – 18 GHz		
Modulation: 802.11n, HT40	**Channel: Low**	**97% Duty Cycle**



Radiated Emissions: 18 GHz – 40 GHz		
Modulation: 802.11n, HT40	**Channel: Low**	**100% Duty Cycle**



16 EUT Setup Pictures

Please refer to EMC-PEARL-004-16001-P110-TestSetupPhotos.pdf

17 Test Equipment And Ancillaries Used For Testing

Item Name	Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Turn table	Turn table	EMCO	2075	N/A	N/A	N/A
MAPS Position Controller	Controller	ETS Lindgren	2092	0004-1510	N/A	N/A
Antenna Mast	Antenna Mast	EMCO	2075	N/A	N/A	N/A
High Pass Filter	Filter	5HC2700	Trilithic Inc.	9926013	Part of system calibration	
High Pass Filter	Filter	4HC1600	Trilithic Inc.	9922307	Part of system calibration	
6GHz High Pass Filter	Filter	HPM50106	Microtronics	001	Part of system calibration	
Pre-Amplifier	Amplifier	JS4-00102600	Miteq	00616	Part of system calibration	
Relay Switch Unit	Relay Switch Unit	Rohde&Schwarz	RSU	338964/001	N/A	N/A
Spectrum Analyzer	Analyzer	Rohde&Schwarz	FSU	200302	3 Years	Jun 2013
Antenna Biconilog 3142E	Biconlog Antenna	EMCO	3142E	166067	3 years	6/14/2014
Antenna Loop 6512	Loop Antenna	ETS Lindgren	6512	49838	3 years	3/13/2014
Antenna Horn 3115 SN 35111	Horn Antenna	EMCO	3115	35111	3 years	7/24/2015
Spectrum Analyzer FSU26	Spectrum Analyzer	R&S	FSU26	200065	3 years	7/4/2015
Antenna Horn 3116	Horn Antenna	ETS Lindgren	3116	70497	3 years	7/22/2015
Digital Barometer	Compact Digital Barometer	Control Company	35519-055	91119547	2 Years	4/7/2015
ESU 40	Receiver	R&S	ESU 40	100251	2 years	6/29/2015
Thermometer Humidity TM320	Thermometer Humidity	Dickson	TM320	5283196	1 Year	10/27/2015

Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.
Calibration due dates, unless defined specifically, falls on the last day of the month.
Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

18 Revision History

Date	Report Name	Report Changes	Report prepared by
Sept 30, 2016	EMC-PEARL-004-16001-FCC-15-407-UNII1-P110	Initial Version	James Donnellan