TEST REPORT

Report Number: 16070285HKG-001

Application
for
Original Grant of 47 CFR Part 15 Certification
RSS-247 Issue 1 Equipment Certification

PowerUp FPV Paper Airplane VR Drone

FCC ID: WL2500020TTL

IC: 20333-500020TTL

This report contains the data of WLAN (WiFi) portion only.

Prepared and Checked by:

Signed On File
Lee Shui Tim, Tim
Lead Engineer

Approved by:

Digitally signed by Koo Wai Ip
Location: Intertek Testing Services Hong Kong Ltd.

Koo Wai Ip
Assistant Supervisor
September 12, 2016

- Intertek's standard Terms and Conditions can be obtained at our website: http://www.intertek.com/terms/.
- The test report only allows to be revised within the retention period unless further standard or the requirement was noticed.
- This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

GENERAL INFORMATION

Applicant Name:	JDH Sourcing Management Limited
Applicant Address:	Unit 508, New East Ocean Centre, 9 Science Museum Road, Tsim Sha Tsui East, Kowloon, Hong Kong.
Contact Person:	Stephanie Tang
Tel:	31816800
Fax:	31816832
e-mail:	Stephanie.tang@jdhsourcing.com
Manufacturer:	JDH Sourcing Management Limited
Manufacturer Address:	Unit 508, New East Ocean Centre, 9 Science Museum Road, Tsim Sha Tsui East, Kowloon, Hong Kong.
FCC Specification Standard:	FCC Part 15, 2014 Edition
IC Specification Standard:	RSS-247 Issue 1, May 2015 RSS-Gen Issue 4, November 2014
FCC ID:	WL2500020TTL
IC:	20333-500020TTL
Brand Name:	PowerUp FPV Plane
FCC Model(s):	500-020
For IC HVIN:	500-020
For IC PMN:	500-020
Type of EUT:	Digital Transmission System Transmitter
Description of EUT:	PowerUp FPV Paper Airplane VR Drone
Serial Number:	N/A
Sample Receipt Date:	July 06, 2016
Date of Test:	July 06, 2016 to July 15, 2016
Report Date:	September 12, 2016
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

Table of Contents

1.0 Test Results Summary & Statement of Compliance 4
1.1 Summary of Test Results 4
1.2 Statement of Compliance 4

2.0 General Description 6
2.1 Product Description 6
2.2 Test Methodology 7
2.3 Test Facility 7
2.4 Related Submittal(s) Grants 7

3.0 System Test Configuration 9
3.1 Justification 9
3.2 EUT Exercising Software 11
3.3 Details of EUT and Description of Accessories 11
3.4 Measurement Uncertainty 11

4.0 Test Results 13
4.1 Maximum Conducted Output Power at Antenna Terminals 13
4.2 Minimum 6dB RF Bandwidth 15
4.3 Maximum Power Spectral Density 26
4.4 Out of Band Conducted Emissions 37
4.5 Field Strength Calculation 62
4.6 Transmitter Radiated Emissions in Restricted Bands and Spurious Emissions 63
4.6.1 Radiated Emission Configuration Photograph 63
4.6.2 Radiated Emission Data 63
4.6.3 Transmitter Duty Cycle Calculation 84
4.7 AC Power Line Conducted Emission 84
4.7.1 AC Power Line Conducted Emission Configuration Photograph 84
4.7.2 AC Power Line Conducted Emission Data 84

5.0 Equipment List 89

EXHIBIT 1
TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.0 Test Results Summary & Statement of Compliance

1.1 Summary of Test Results

Test Items	FCC Part 15 Section	RSS-247/ RSS-Gen# Section	Results	Details see section
Antenna Requirement	15.203	7.1.2#	Pass	2.1
Max. Conducted Output Power (peak)	15.247(b)(3)&(4)	5.4(4)	Pass	4.1
Min. 6dB RF Bandwidth	15.247(a)(2)	5.2(1)	Pass	4.2
Max. Power Density (average)	15.247(e)	5.2(2)	Pass	4.3
Out of Band Antenna Conducted Emission	15.247(d)	5.5	Pass	4.4
Radiated Emission in Restricted Bands and Spurious Emissions	15.247(d), 15.209 & 15.109	5.5	Pass	4.6
AC Power Line Conducted Emission	15.207 & 15.107	7.2.4#	Pass	4.7

Note: Pursuant to FCC Part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

1.2 Statement of Compliance

The equipment under test is found to be complying with the following standard:

FCC Part 15, 2014 Edition
RSS-247 Issue 1, May 2015
RSS-Gen Issue 4, November 2014

EXHIBIT 2
GENERAL DESCRIPTION

2.0 General Description

2.1 Product Description

The Equipment Under Test (EUT) is a PowerUp FPV Paper Airplane VR Drone, equipped with WiFi and SD Interface. The EUT is powered by 3.7VDC LI-PO Rechargeable battery. The applicant declared that only WiFi 2.4GHz band functions are used in this product.

For the WLAN (WiFi) module:
For 802.11b mode, it operates at frequency range of 2412.000MHz to 2462.00MHz with 11 channels. It transmits via direct-sequence spread spectrum (DSSS) modulation through Antenna 0 only. Maximum bit rate can be up to 11Mbps. For 802.11g mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation though Antenna 0 or 1 only. Maximum bit rate can be up to 54Mbps. For 802.11n (HT20 with 20MHz bandwidth) mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation (mcs0 to mcs7) though Antenna 0 and/or 1 (MIMO). Maximum bit rate can support up to 65Mbps.

The antenna(s) used in the EUT is internal, integral.

The circuit description is saved with filename: descri.pdf.

2.2 Test Methodology

Both AC power line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2014). Preliminary radiated scans and all radiated measurements were performed in radiated emission test sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. Antenna port conducted measurements were performed according to ANSI C63.10 (2013), KDB Publication No.558074 D01 v03r05 (08-April-2016) and 662911 D01 Multiple Transmitter Output v02r01 (31-October-2013). All other measurements were made in accordance with the procedures in 47 CFR Part 2.

2.3 Test Facility

The radiated emission test site and antenna port conducted measurement facility used to collect the radiated data and conductive data are at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC and the Industry Canada.

2.4 Related Submittal(s) Grants

This is a single application for certification of a transceiver (WiFi portion only).

EXHIBIT 3
SYSTEM TEST CONFIGURATION

3.0 System Test Configuration

3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup to transmit / receive continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The EUT was powered by 3.7VDC.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable which is four feet in diameter and approximately 0.8m in height above the ground plane for emission measurement at or below 1GHz and 1.5m in height above the ground plane for emission measurement above 1GHz. If the base unit attached to peripherals, they were connected and operational (as typical as possible).

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Radiated emissions were taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

For any intentional radiator powered by AC power line, measurements of the radiated signal level of the fundamental frequency component of the emission was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Radiated emission measurement for transmitter were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Justification – Cont'd

Emission that are directly caused by digital circuits in the transmit path and transmitter portion were measured, and the limit are according to FCC Part 15 Section 15.209/ RSS-247 2.5. Digital circuitries used to control additional functions other than the operation of the transmitter are subject to FCC Part 15 Section 15.109/ RSS-247 Section 5.5 Limits.

Detector function for radiated emissions was in peak mode. Average readings, when required, were taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in section 4.2.3.
Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF.* The effective period (Teff) was referred to Exhibit 4.6.3. With the resolution bandwidth 1MHz and spectrum analyzer IF bandwidth 3dB, the pulse desensitization factor was 0dB.

The EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT power cord connected to one LISN (Line impedance stabilization network), which provided 50ohm coupling impedance for measuring instrument. Meanwhile, the peripheral or support equipment power cords connected to a separate LISN. The ac powers for all LISNs were obtained from the same power source. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled. Power cords of non-EUT equipment (peripherals) were not bundled. AC power cords of peripheral equipments draped over the rear edge of the table, and routed them down onto the floor of the ac power line conducted emission test site to the second LISN.

All connecting cables of EUT and peripherals were manipulated to find the maximum emission.

All configuration mode (with and without PC connectivity during charging test) and setting of data rate for 802.11b/g/n(HT20) of WiFi mode had been considered, and worst case test data are shown on this test report.

3.1 EUT Exercising Software

The EUT exercise program (if any) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

3.2 Details of EUT and Description of Accessories

Details of EUT:

1 The EUT is powered by 3.7VDC

Description of Accessories:

1. 4GB Micro SD Card
   (Provided by Applicant)
2. USB cable of 1m long
   (Provided by Intertek)
3. Test Mode Software: Putty
   (Provided by Applicant)
4. Notebook (HP Probook 430)
   (Provided by Applicant)

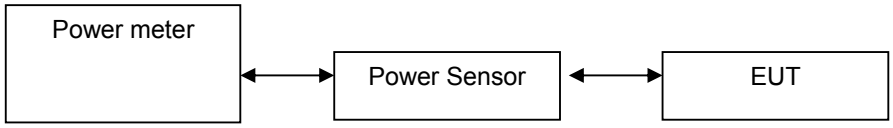
3.3 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test at a level of confidence of 95% has been considered. The values of the Measurement uncertainty for radiated emission test and RF conducted measurement test are ± 5.3dB and ±0.99dB respectively. The value of the Measurement uncertainty for conducted emission test is ±4.2dB.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

EXHIBIT 4
TEST RESULTS

4.0 **Test Results**



4.1 Maximum Conducted (peak) Output Power at Antenna Terminals

The antenna port of the EUT was connected to the input of a power meter.

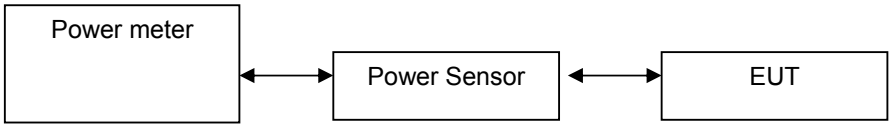
☒ The antenna power of the EUT was connected to the input of a power meter. Power was read directly and cable loss correction was added to the reading to the obtain power at the EUT antenna terminals. The measurement procedure 9.1.2 was used.

☐ The EUT should be configured to transmit continuously (at a minimum duty cycle of 98%) at full power over the measurement duration. The measurement procedure AVG1 was used.

	MHz	Ant 0 (dBm)	Ant1 (dBm)	Ant 0 (mW)	Ant 1 (mW)	SUM Ant 0 + 1 (mW)	SUM Ant 0 + 1 mW to dBm
IEEE 802.11b (DSSS, 1 Mbps) Antenna Gain = 0 dBi	**2412**	**21.8**	**NA**	**149.6**	**NA**	**NA**	**NA**
	2437	**22.1**	**NA**	**160.3**	**NA**	**NA**	**NA**
	2462	**22.0**	**NA**	**156.7**	**NA**	**NA**	**NA**
IEEE 802.11g (OFDM, 6 Mbps) Antenna Gain = 0 dBi	**2412**	**24.9**	**23.0**	**309.0**	**199.5**	**NA**	**NA**
	2437	**25.5**	**23.4**	**354.8**	**218.8**	**NA**	**NA**
	2462	**25.5**	**23.8**	**354.8**	**239.9**	**NA**	**NA**
IEEE 802.11n (HT20, MCS0) Antenna Gain = 0 dBi	**2412**	**24.7**	**23.2**	**295.1**	**208.9**	**504.0**	**27.0**
	2437	**25.3**	**23.6**	**338.8**	**229.1**	**567.9**	**27.5**
	2462	**25.4**	**23.8**	**346.7**	**239.9**	**586.6**	**27.7**

RF Conduct measurement Test Setup

The figure below shows the test setup, which is utilized to make these measurements.



4.1 Maximum Conducted Output Power at Antenna Terminals – Cont'd

Cable loss : 2.1 dB External Attenuation : 0 dB

IEEE 802.11b (DSSS, 1 Mbps)
max. conducted (peak) output level = 22.1 dBm

IEEE 802.11g (OFDM, 6 Mbps)
max. conducted (peak) output level = 25.5 dBm

IEEE 802.11n (HT20, mcs0)
max. conducted (peak) output level = 27.7 dBm

Cable loss, external attenuation: ☒ included in OFFSET function
☐ added to SA raw reading

The transmit signals are correlated with each other,
Directional gain =G_{ant}+10log(N_{ant})dBi=0=3.01=3.01dBi

Limits:
☒ 1W (30dBm) for antennas with gains of 6dBi or less

☐ ___W (___dBm) for antennas with gains more than 6dBi

4.2 Minimum 6dB RF Bandwidth

The antenna port of the EUT was connected to the input of a spectrum analyzer. The EBW measurement procedure was used. A PEAK output reading was taken, a DISPLAY line was drawn 6dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

IEEE 802.11b (DSSS, 1 Mbps)	
Frequency (MHz)	6dB Bandwidth (kHz)
Low Channel: 2412	92000
Middle Channel: 2437	87200
High Channel: 2462	92000

IEEE 802.11g (OFDM, 6 Mbps)		
Frequency (MHz)	6dB Bandwidth (kHz) ANT0	6dB Bandwidth (kHz) ANT1
Low Channel: 2412	16480	16480
Middle Channel: 2437	16480	16480
High Channel: 2462	16480	16480

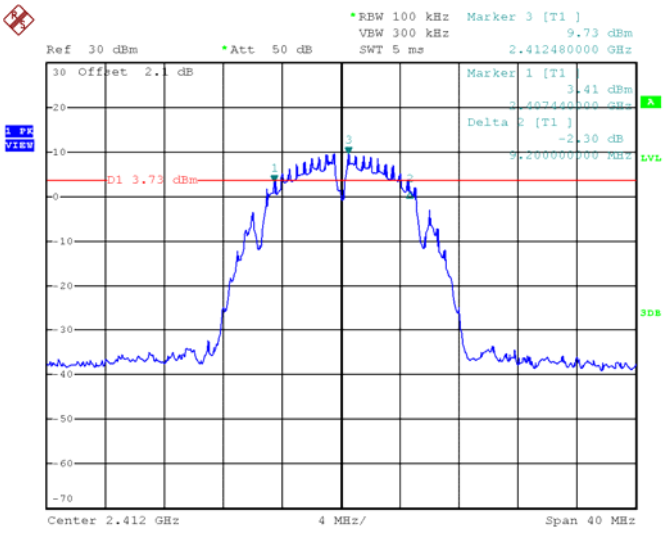
IEEE 802.11n (HT20, MCS0)		
Frequency (MHz)	6dB Bandwidth (kHz) ANT0	6dB Bandwidth (kHz) ANT1
Low Channel: 2412	17760	17760
Middle Channel: 2437	17760	17760
High Channel: 2462	17760	17760

Limits:
6 dB bandwidth shall be at least 500kHz

The plots of 6dB RF bandwidth and occupied bandwidth are saved as below.

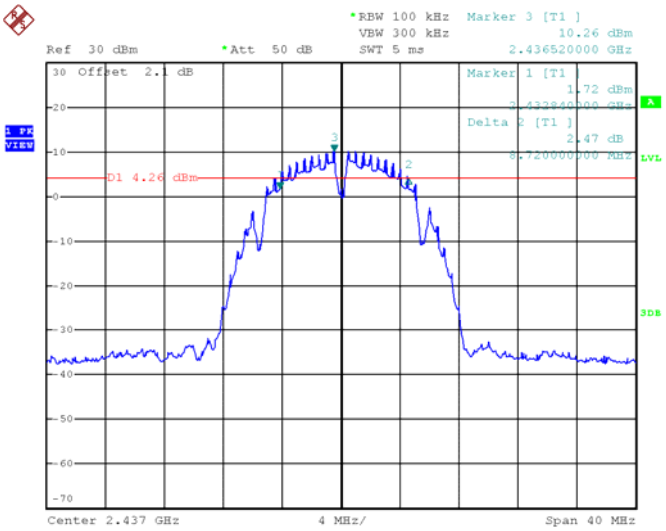
Plots of 6dB RF bandwidth

802.11b, Lowest Channel



Date: 11.JUL.2016 14:21:04

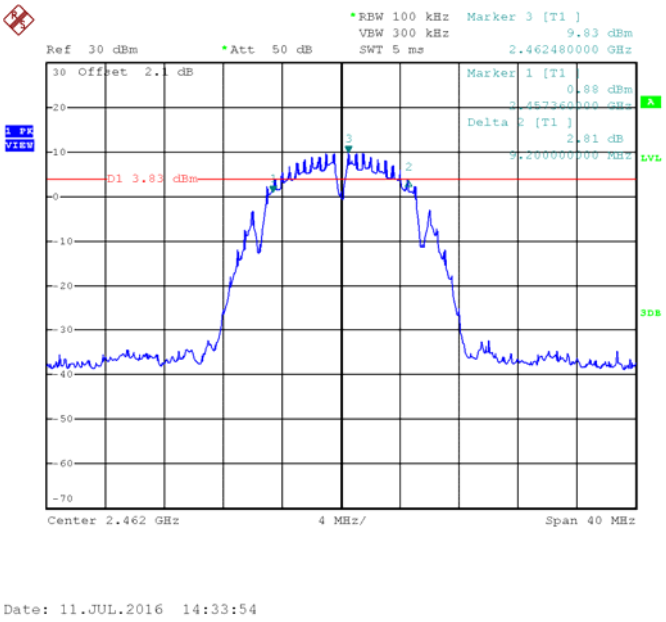
802.11b, Middle Channel



Date: 11.JUL.2016 14:31:06

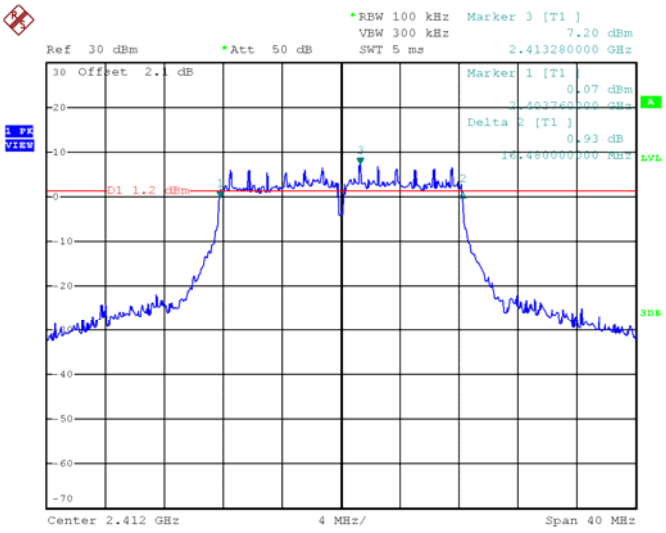
Plots of 6dB RF bandwidth

802.11b, Highest Channel

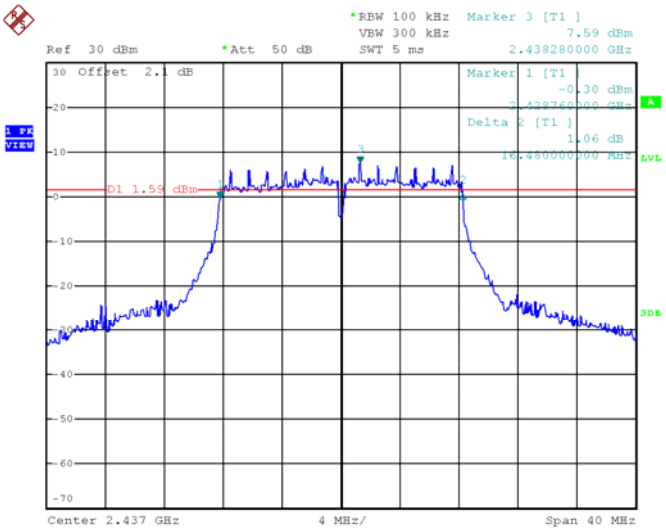


Plots of 6dB RF bandwidth

802.11g, Lowest Channel ANT0

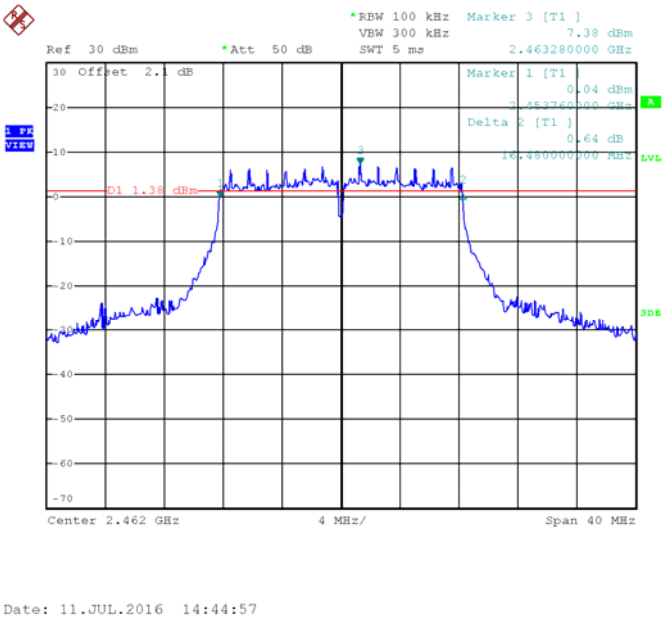


802.11g, Middle Channel ANT0



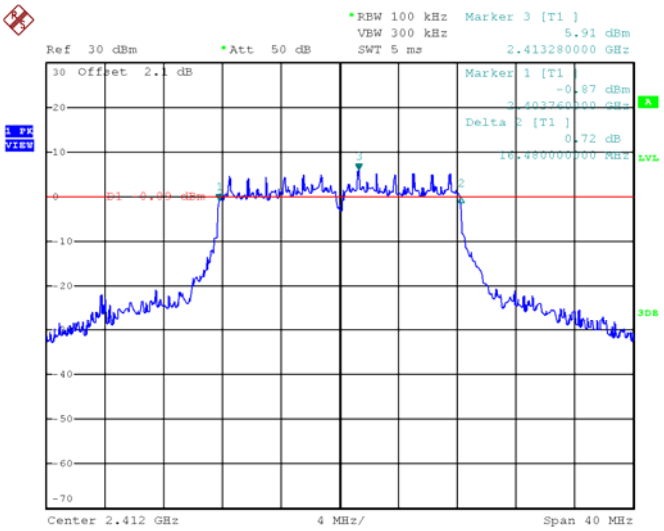
Plots of 6dB RF bandwidth

802.11g, Highest Channel ANT0



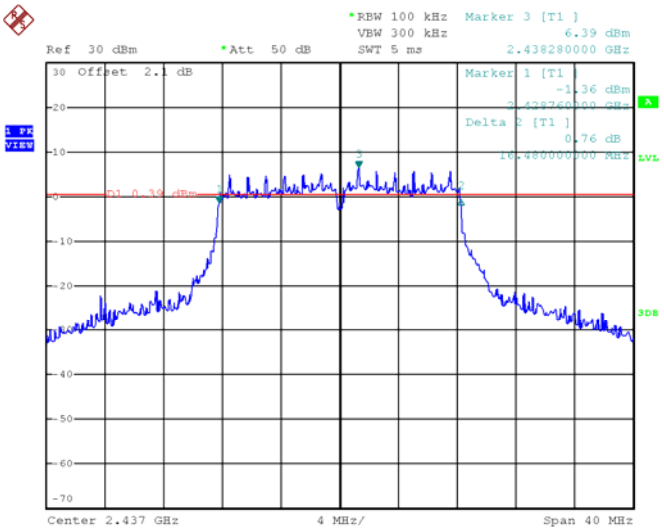
Plots of 6dB RF bandwidth

802.11g, Lowest Channel ANT1



Date: 11.JUL.2016 16:16:42

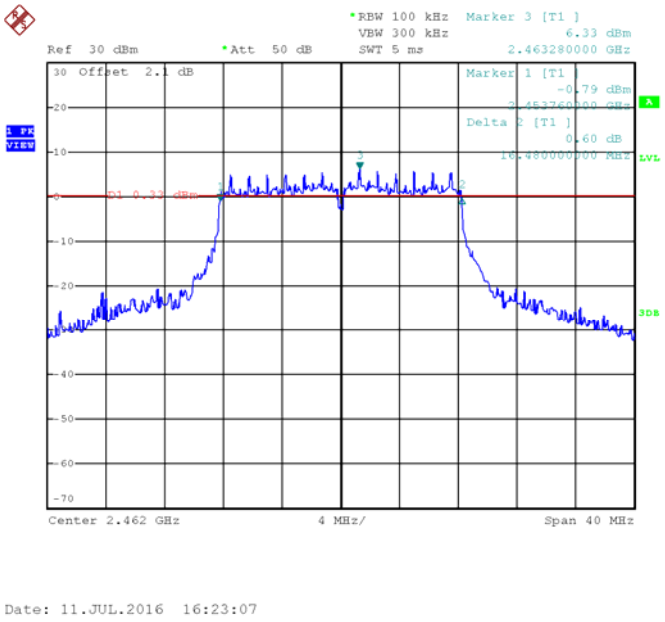
802.11g, Middle Channel ANT1



Date: 11.JUL.2016 16:19:21

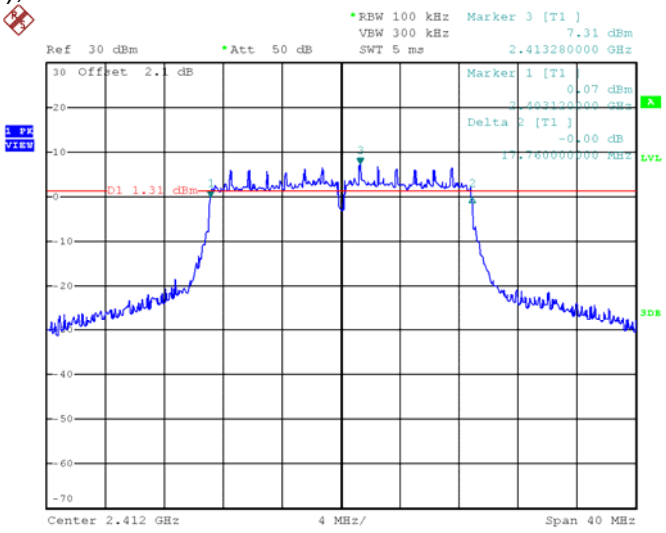
Plots of 6dB RF bandwidth

802.11g, Highest Channel ANT1



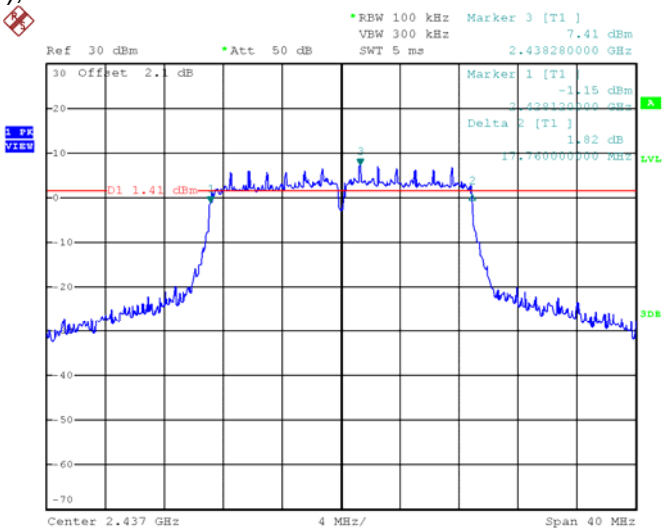
Plots of 6dB RF bandwidth

802.11n(HT20), Lowest Channel ANT0



Date: 11.JUL.2016 14:48:01

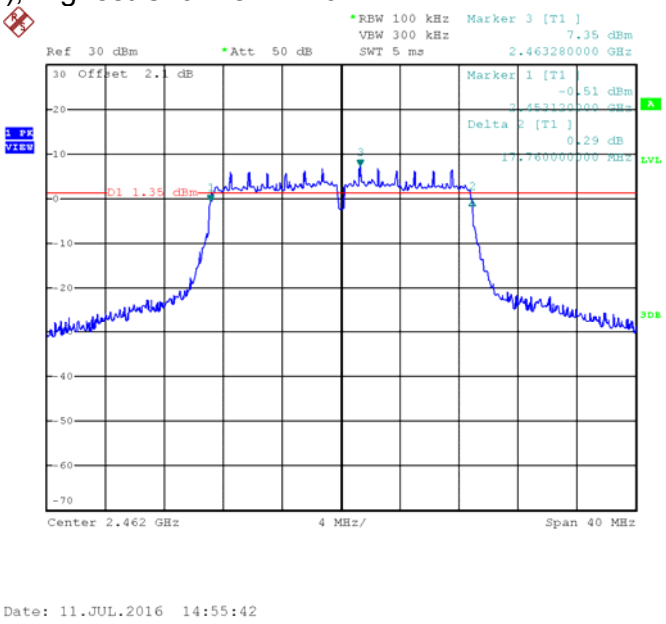
802.11n(HT20), Middle Channel ANT0



Date: 11.JUL.2016 14:52:14

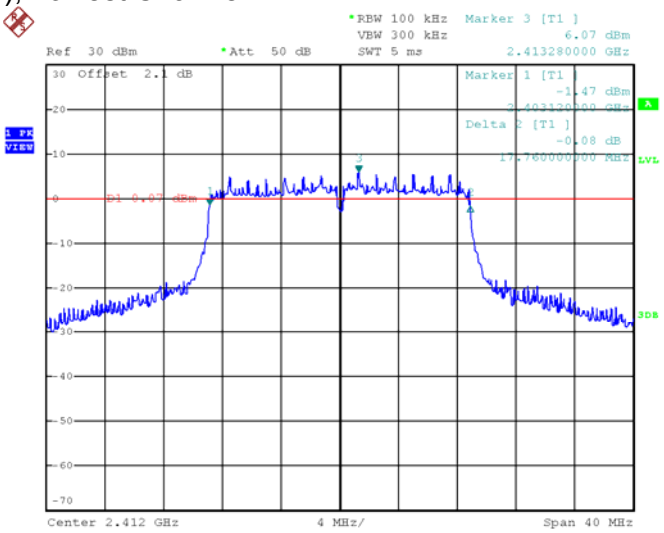
Plots of 6dB RF bandwidth

802.11n(HT20), Highest Channel ANT0



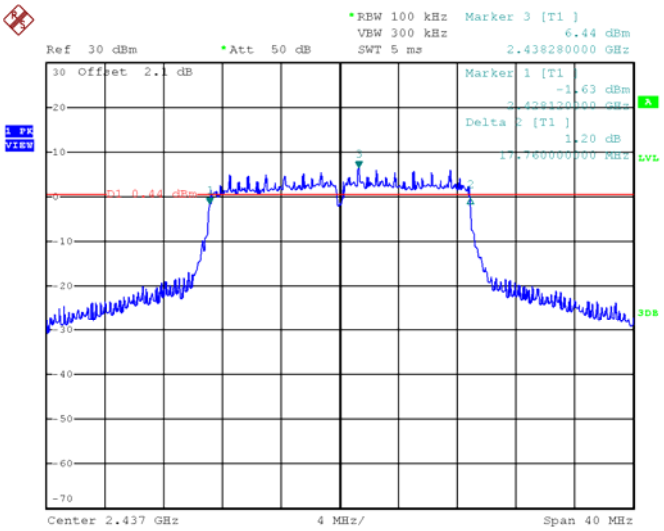
Plots of 6dB RF bandwidth

802.11n(HT20), Lowest Channel ANT1



Date: 11.JUL.2016 16:26:30

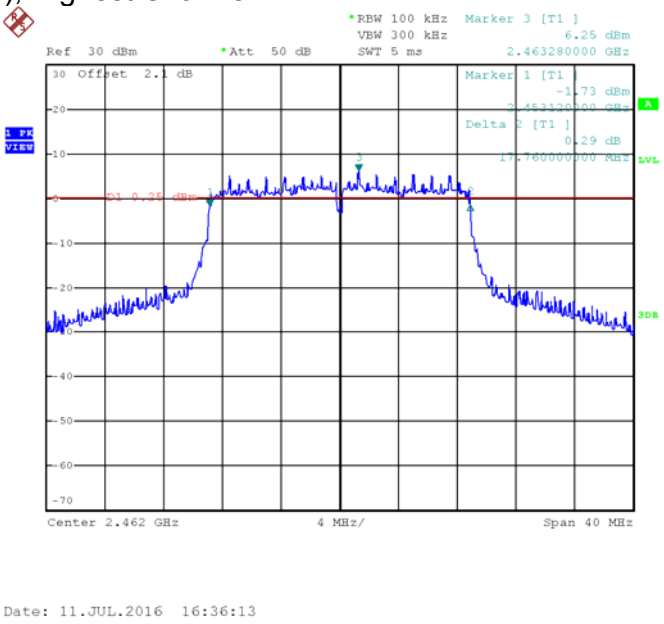
802.11n(HT20), Middle Channel ANT1



Date: 11.JUL.2016 16:33:44

Plots of 6dB RF bandwidth

802.11n(HT20), Highest Channel ANT1



4.3 Maximum Power Spectral Density

Antenna output of the EUT was coupled directly to spectrum analyzer. The measurement procedure 10.2 PKPSD-1 was used. If an external attenuator and/or cable was used, these losses are compensated for using the OFFSET function of the analyser.

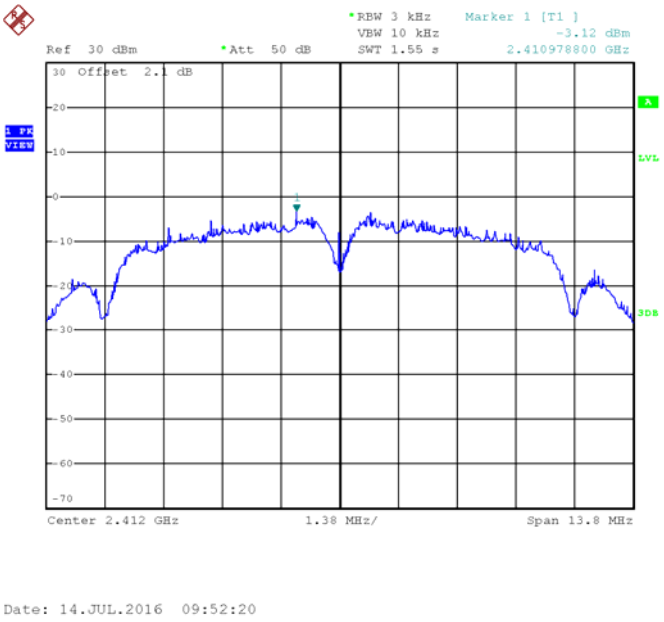
	MHz	Ant 0 (dBm)	Ant1 (dBm)	Ant 0 (mW)	Ant 1 (mW)	SUM Ant 0 + 1 (mW)	SUM Ant 0 + 1 mW to dBm
IEEE 802.11b (DSSS, 1 Mbps) Antenna Gain = 0 dBi	2412	-3.1	NA	0.5	NA	NA	NA
	2437	-3.0	NA	0.5	NA	NA	NA
	2462	-3.3	NA	0.5	NA	NA	NA
IEEE 802.11g (OFDM, 6 Mbps) Antenna Gain = 0 dBi	2412	-7.8	-8.6	0.2	0.1	NA	NA
	2437	-7.2	-8.0	0.2	0.2	NA	NA
	2462	-7.0	-8.2	0.2	0.2	NA	NA
IEEE 802.11n (HT20, MCS0) Antenna Gain = 0 dBi	2412	-7.2	-7.7	0.2	0.2	0.4	-4.0
	2437	-6.5	-7.5	0.2	0.2	0.4	-4.0
	2462	-7.3	-7.7	0.2	0.2	0.4	-4.0

Cable Loss: 2.1dBi

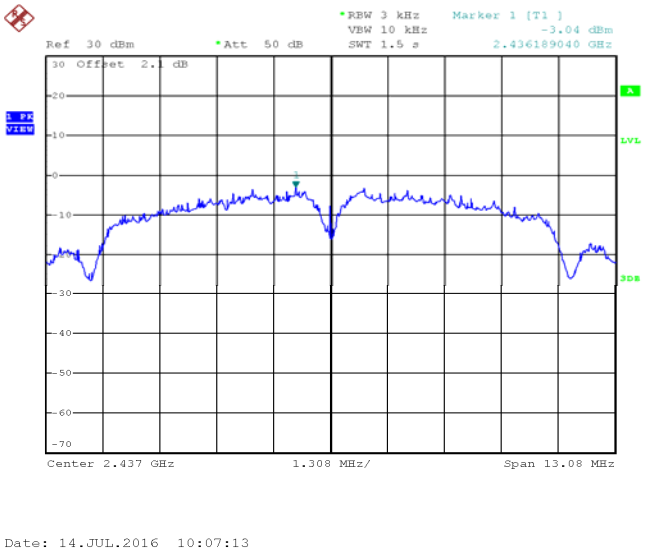
Limit:
8dBm

Plots of power spectral density

802.11b, Lowest channel

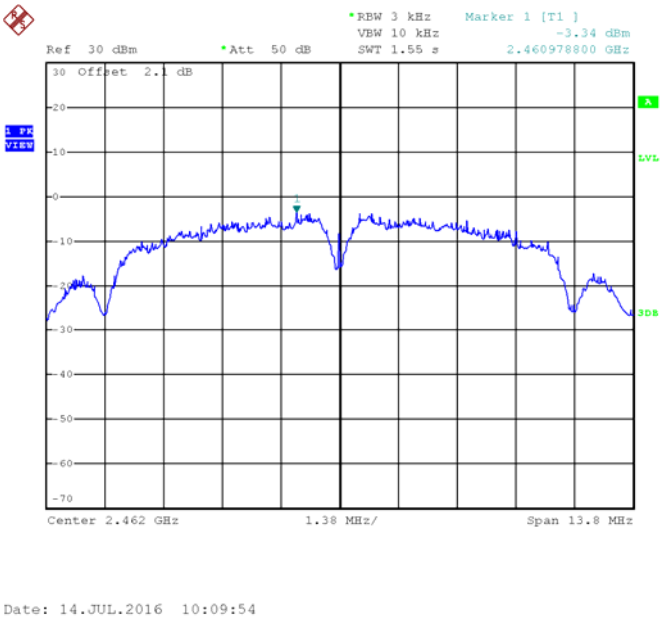


802.11b, Middle channel



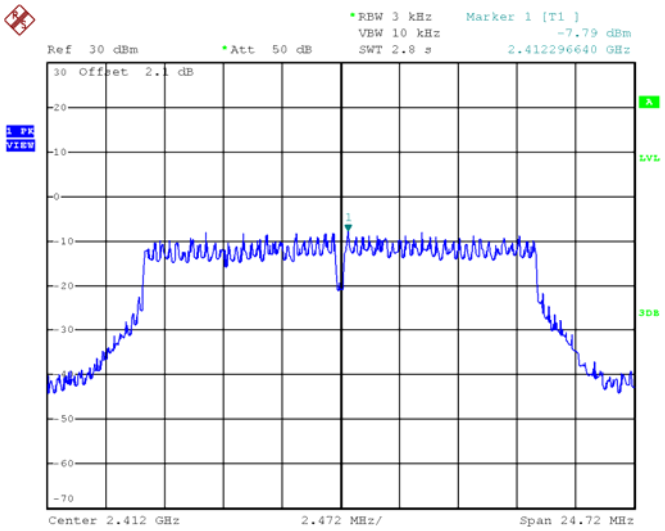
Plots of power spectral density

802.11b, Highest channel

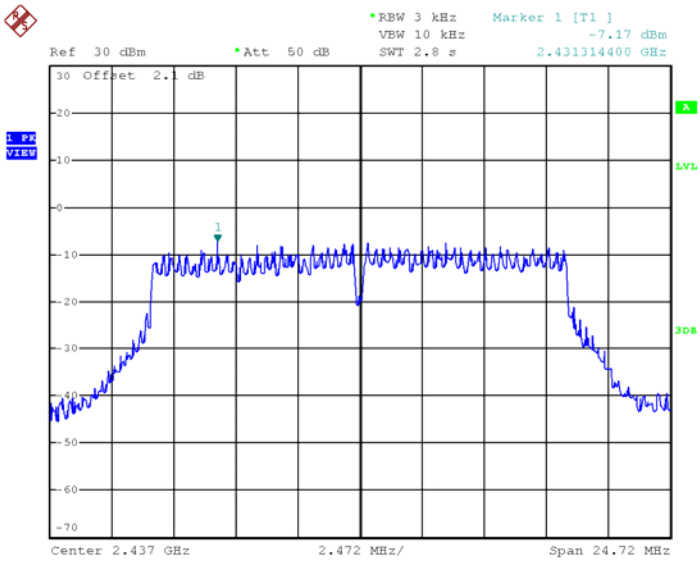


Plots of power spectral density

802.11g, Lowest channel ANT0

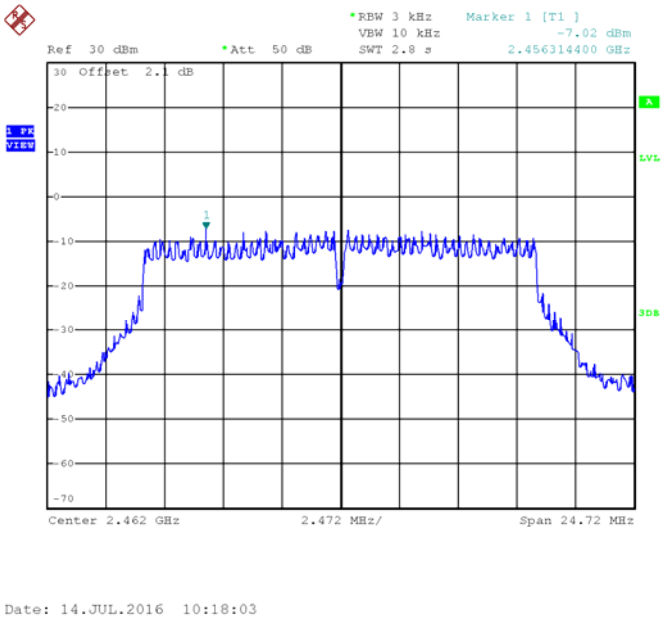


802.11g, Middle channel ANT0



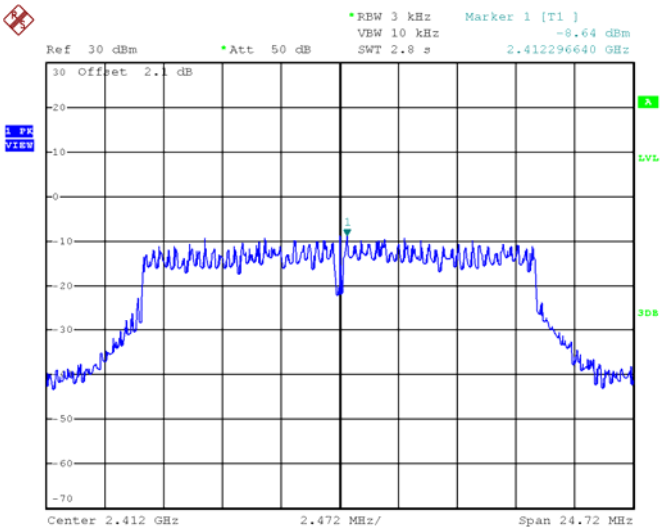
Plots of power spectral density

802.11g, Highest channel ANT0

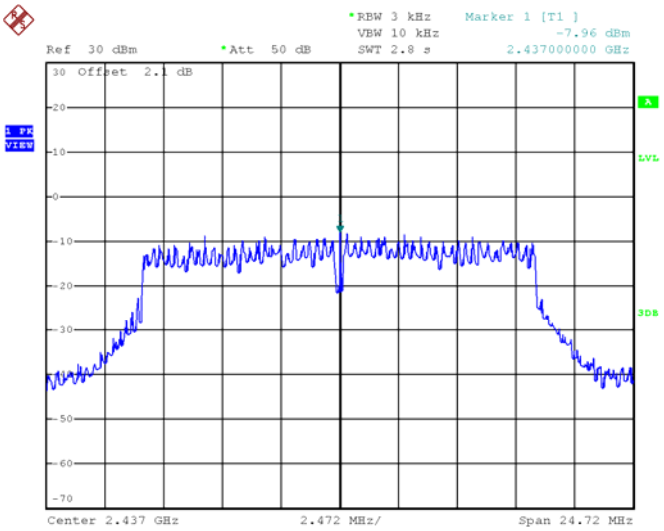


Plots of power spectral density

802.11g, Lowest channel ANT1

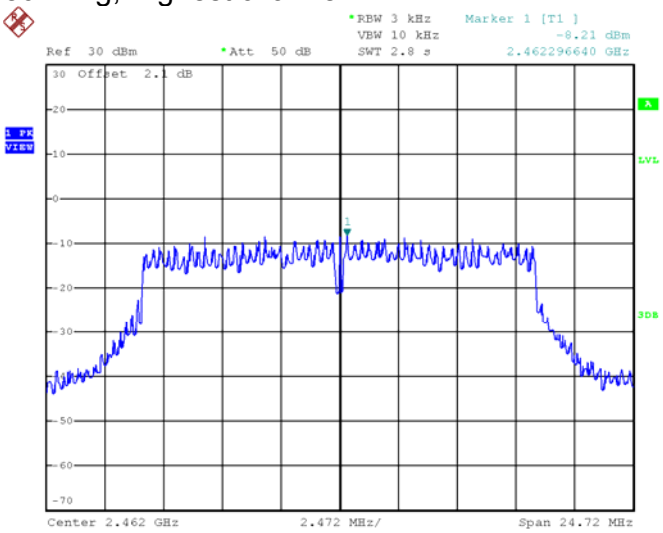


802.11g, Middle channel ANT1



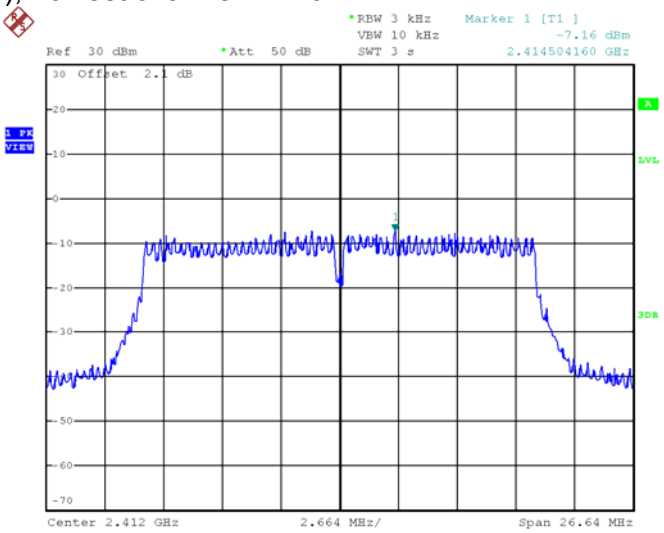
Plots of power spectral density

802.11g, Highest channel ANT1

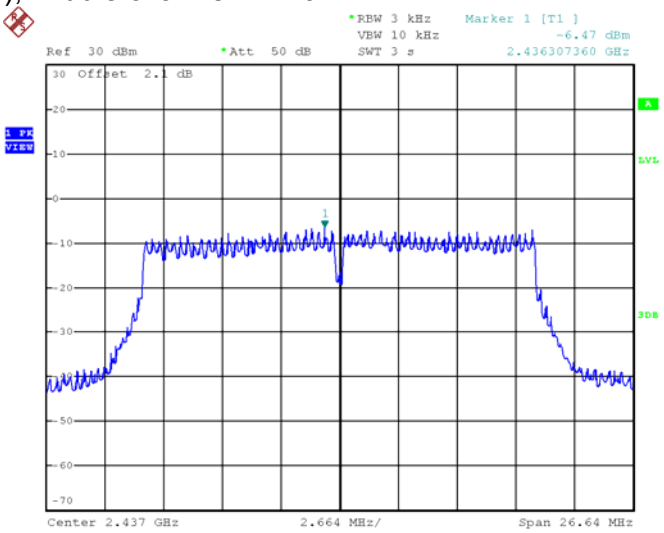


Plots of power spectral density

802.11n(HT20), Lowest channel ANT0

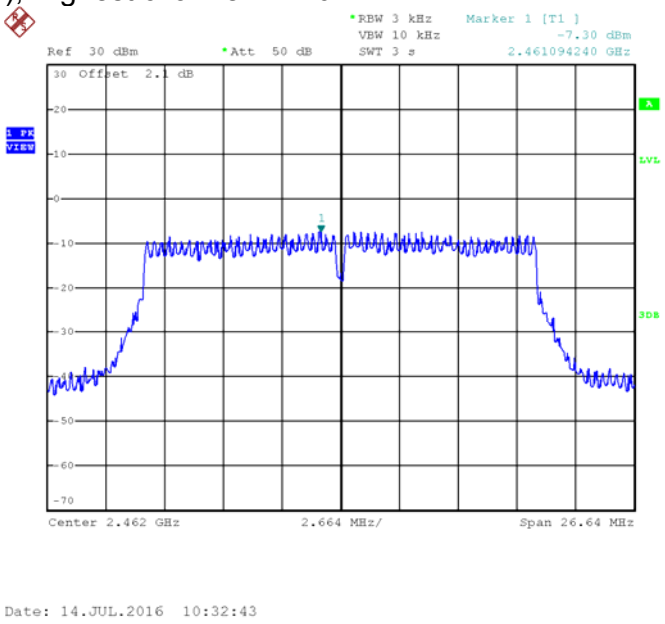


802.11n(HT20), Middle channel ANT0



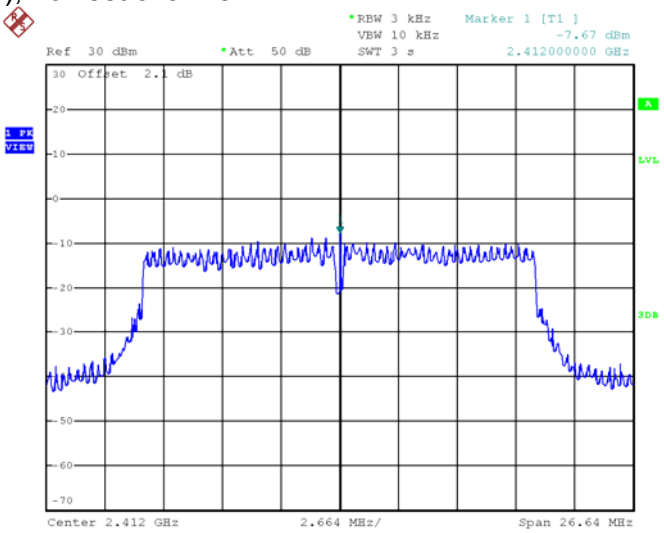
Plots of power spectral density

802.11n(HT20), Highest channel ANT0

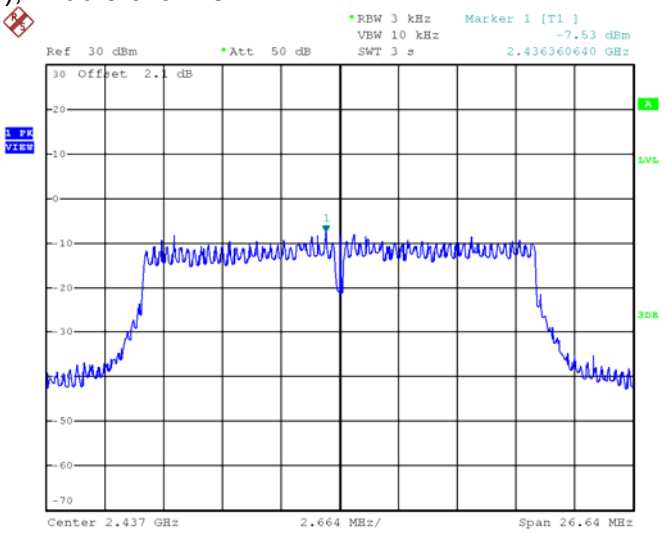


Plots of power spectral density

802.11n(HT20), Lowest channel ANT1

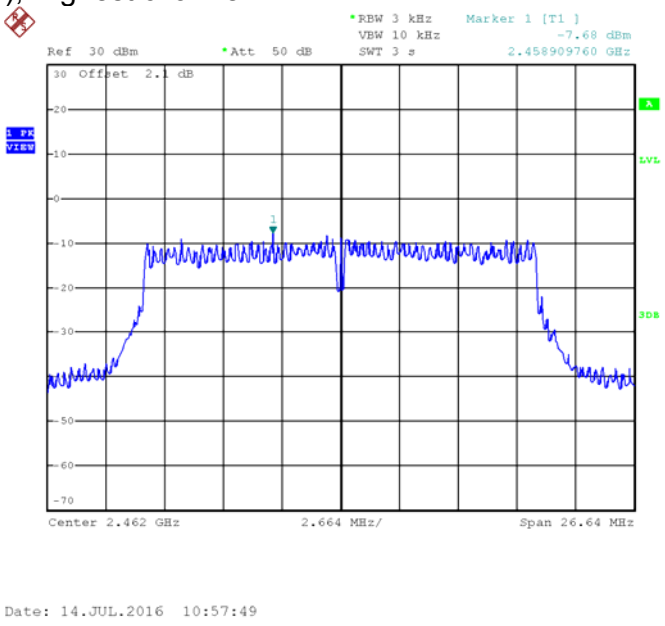


802.11n(HT20), Middle channel ANT1



Plots of power spectral density

802.11n(HT20), Highest channel ANT1



4.4 Out of Band Conducted Emissions

For 802.11b/g/n (HT20):
The maximum conducted (peak) output power was used to demonstrate compliance as described in 9.1. Then the display line (in red) shown in the following plots denotes the limit at 20dB below maximum measured in-band peak PSD level in 100 KHz bandwidth.

The measurement procedures under sections 11 of KDB558074 D01 v03r05 (08-April-2016) were used.

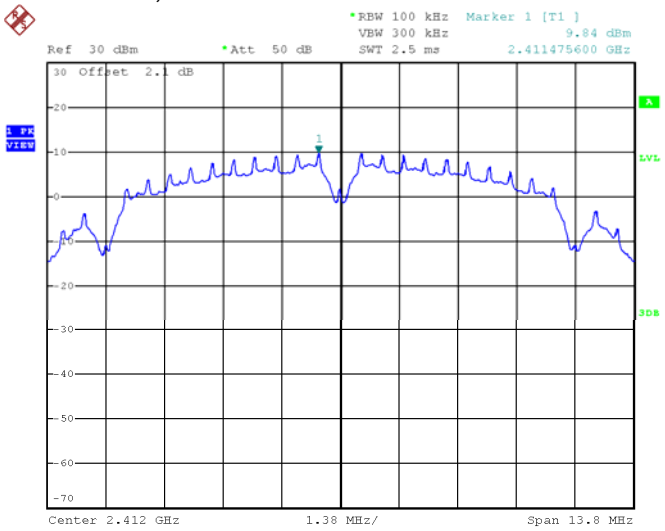
Furthermore, delta measurement technique for measuring bandedge emissions was incorporated in the test of the edge at 2483.5MHz.

Limits:
For 802.11 b/g/n (HT20)
All spurious emission and up to the tenth harmonic was measured and they were found to be at least 20 dB below the maximum measured in-band peak PSD level.

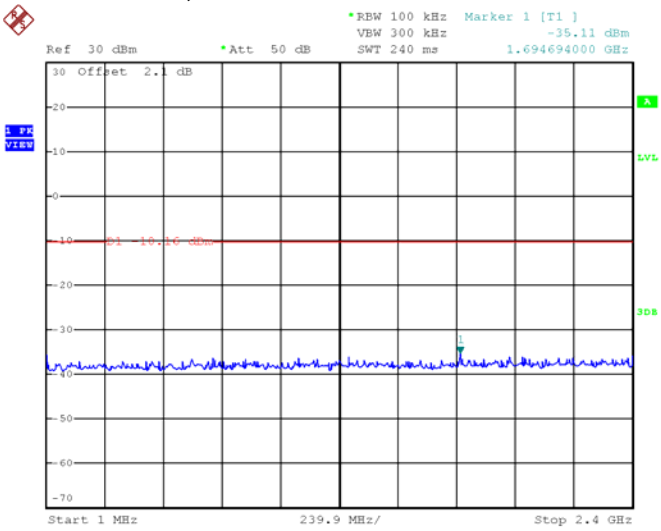
The plots of out of band conducted emissions are as below.

Plots of out of band conducted emissions

802.11b, Lowest Channel, Plot A

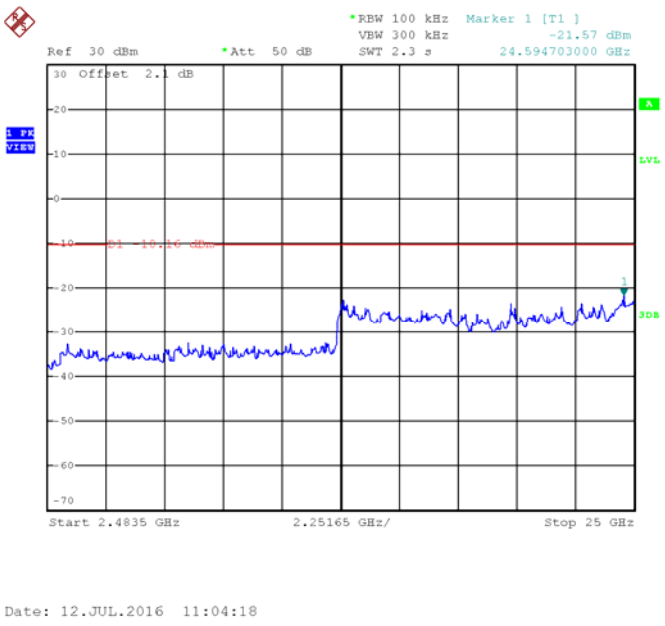


802.11b, Lowest Channel, Plot B



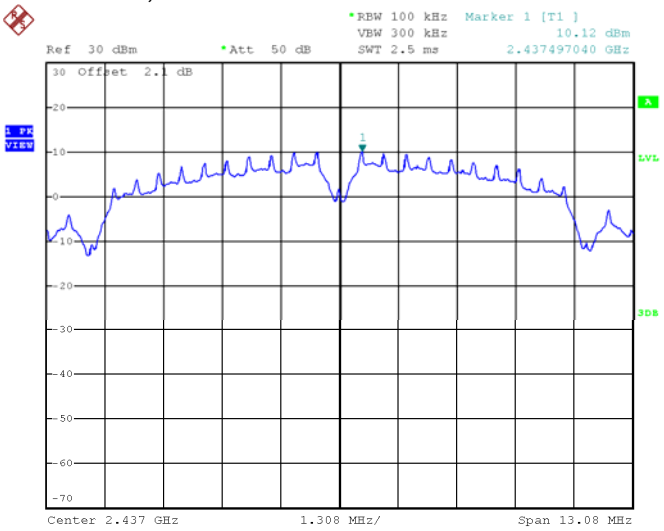
Plots of out of band conducted emissions

802.11b, Lowest Channel, Plot B



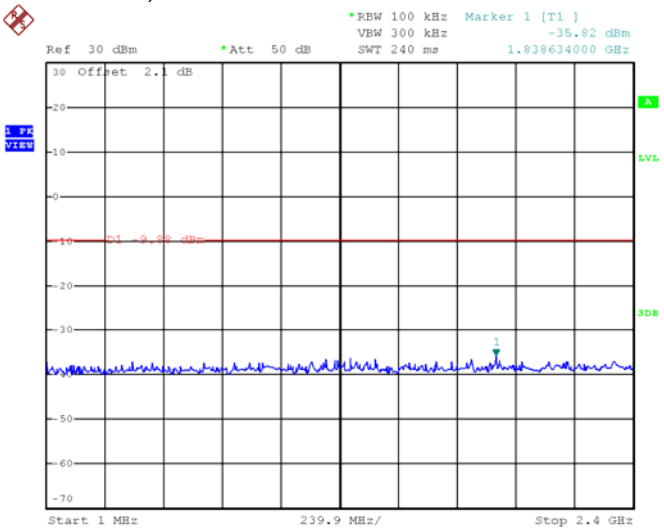
Plots of out of band conducted emissions

802.11b, Middle Channel, Plot A



Date: 12.JUL.2016 10:43:35

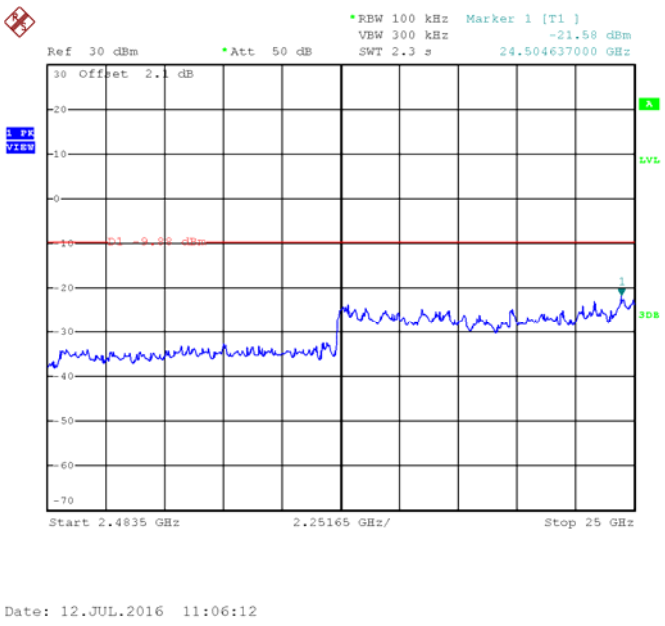
802.11b, Middle Channel, Plot B



Date: 12.JUL.2016 11:07:12

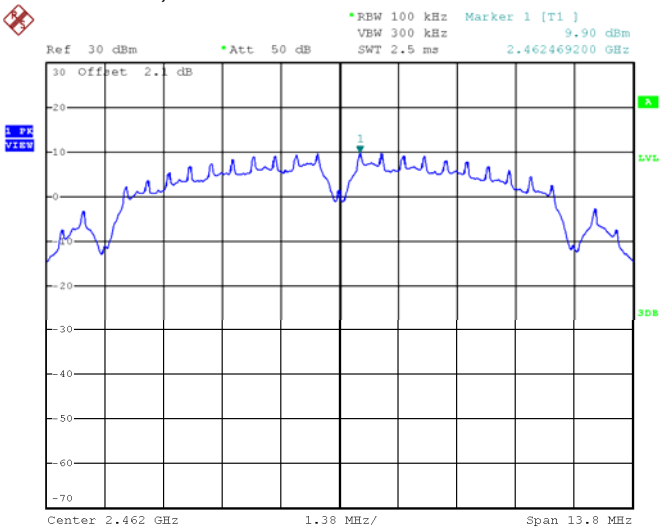
Plots of out of band conducted emissions

802.11b, Middle Channel, Plot C

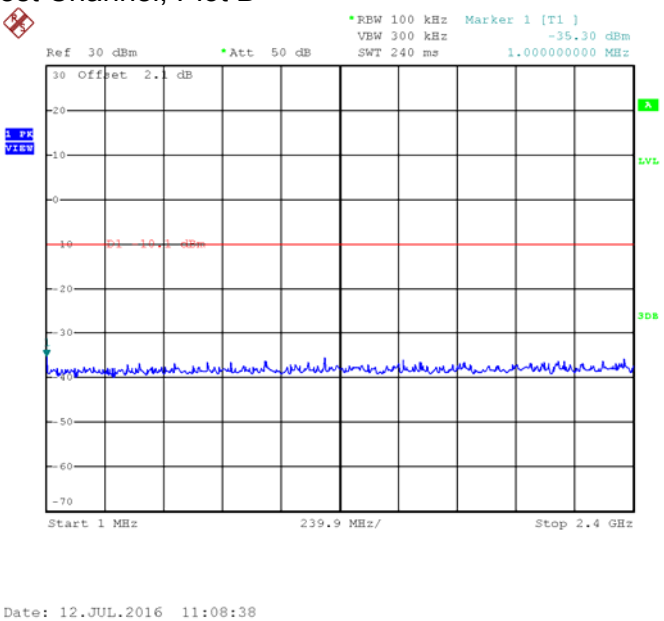


Plots of out of band conducted emissions

802.11b, Highest Channel, Plot A

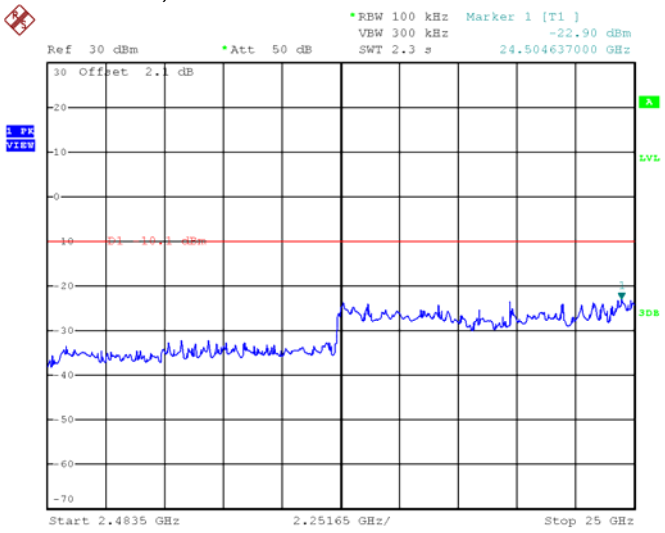


802.11b, Highest Channel, Plot B



Plots of out of band conducted emissions

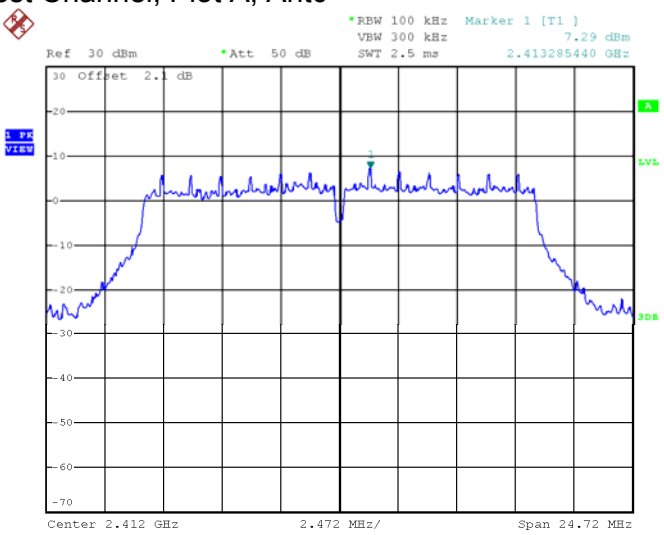
802.11b, Highest Channel, Plot C



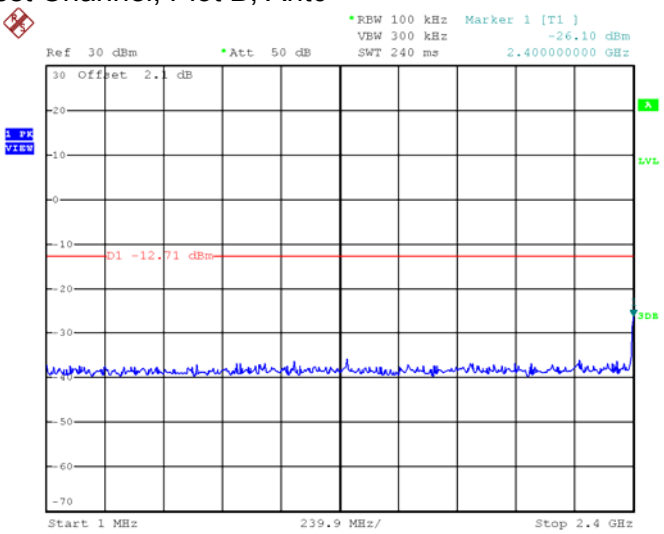
Date: 12.JUL.2016 11:10:25

Plots of out of band conducted emissions

802.11g, Lowest Channel, Plot A, Ant0

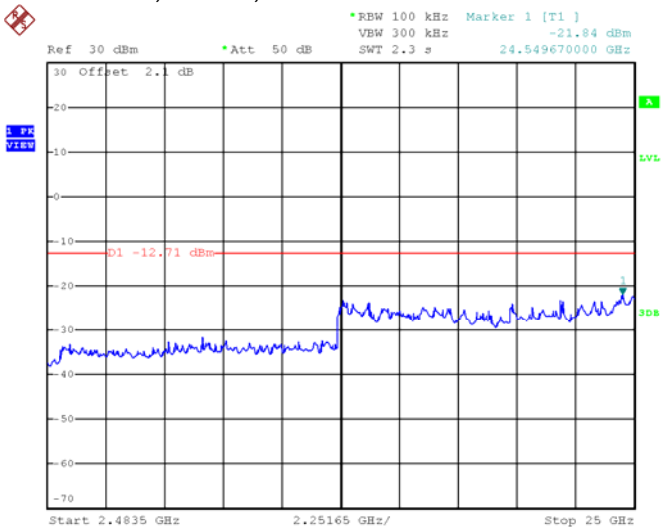


802.11g, Lowest Channel, Plot B, Ant0

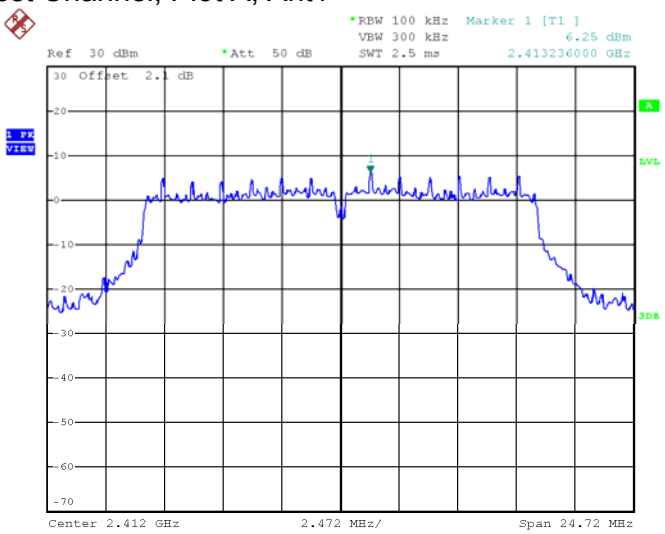


Plots of out of band conducted emissions

802.11g, Lowest Channel, Plot C, Ant0

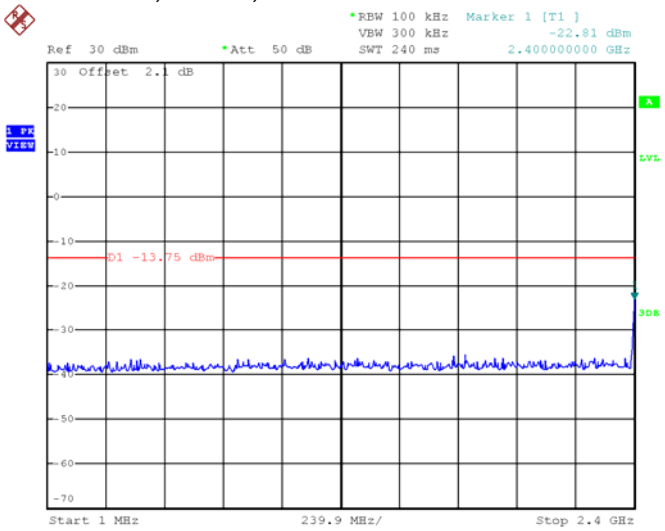


802.11g, Lowest Channel, Plot A, Ant1



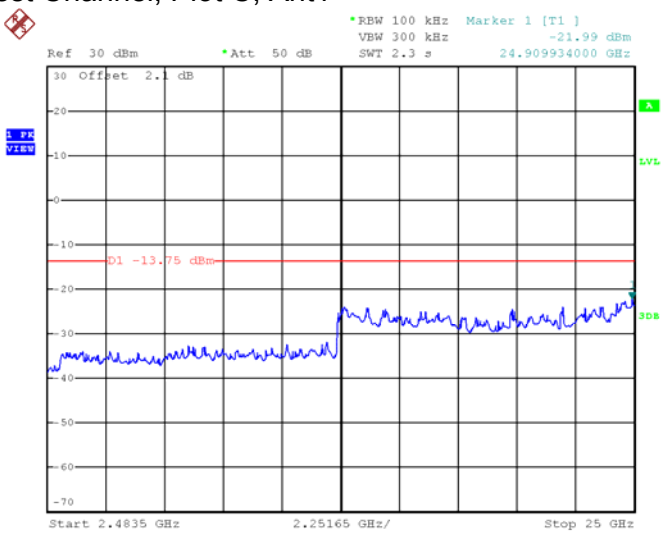
Plots of out of band conducted emissions

802.11g, Lowest Channel, Plot B, Ant1



Date: 11.JUL.2016 17:14:48

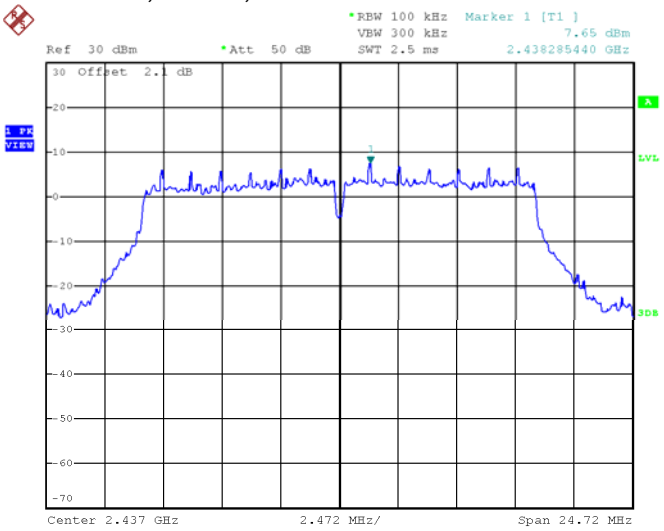
802.11g, Lowest Channel, Plot C, Ant1



Date: 11.JUL.2016 17:25:12

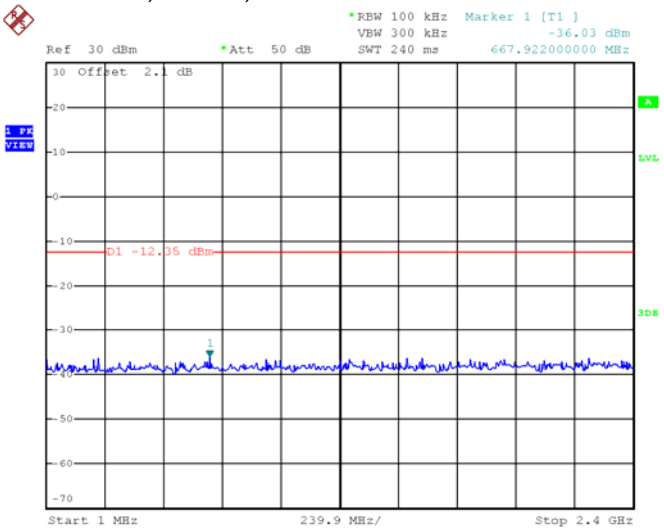
Plots of out of band conducted emissions

802.11g, Middle Channel, Plot A, Ant0



Date: 12.JUL.2016 10:48:16

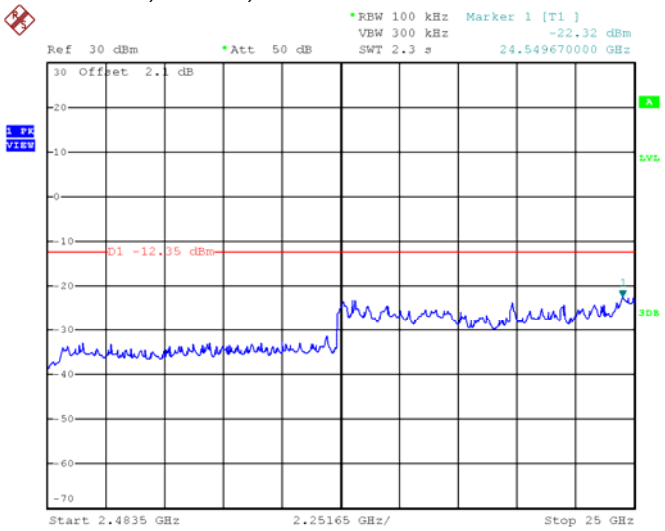
802.11g, Middle Channel, Plot B, Ant0



Date: 12.JUL.2016 11:14:18

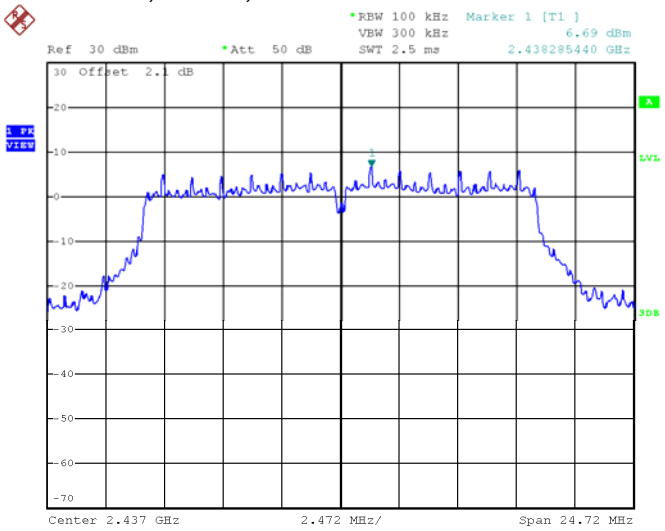
Plots of out of band conducted emissions

802.11g, Middle Channel, Plot C, Ant0



Date: 12.JUL.2016 11:15:21

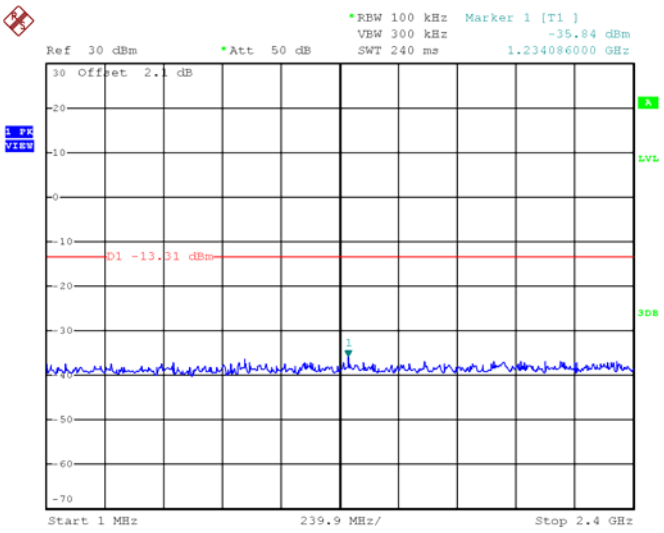
802.11g, Middle Channel, Plot A, Ant1



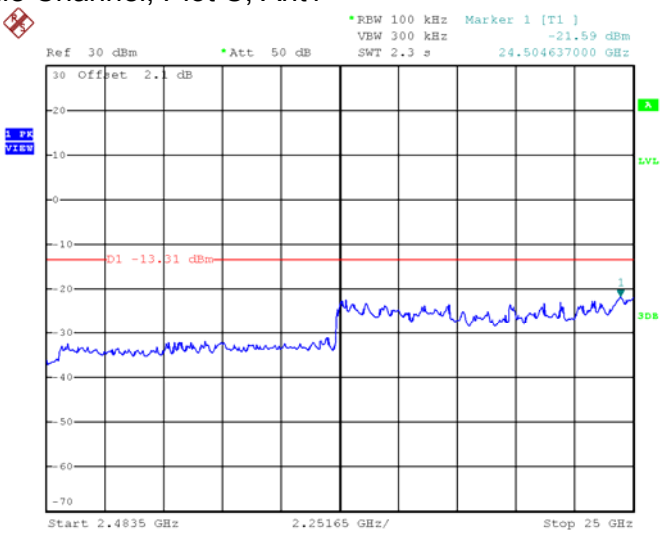
Date: 11.JUL.2016 16:57:51

Plots of out of band conducted emissions

802.11g, Middle Channel, Plot B, Ant1

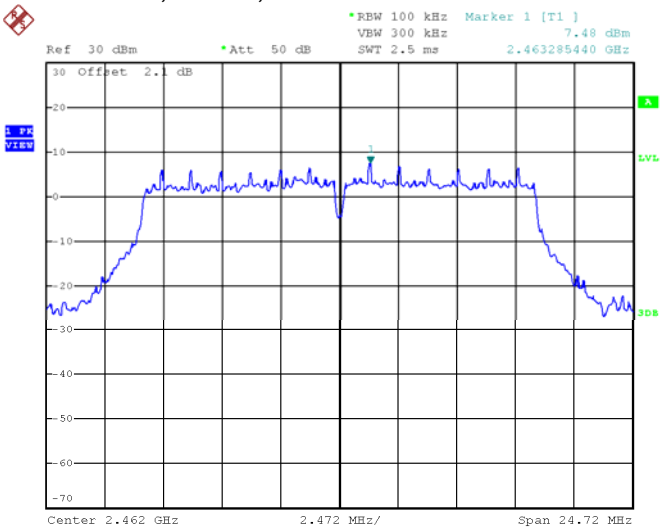


802.11g, Middle Channel, Plot C, Ant1

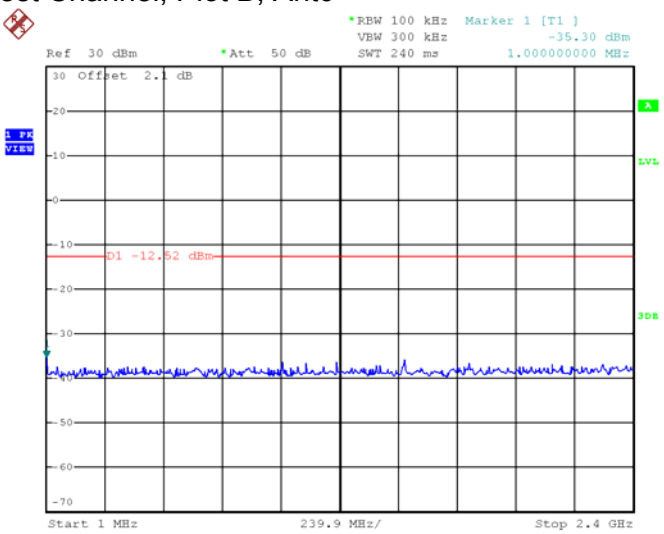


Plots of out of band conducted emissions

802.11g, Highest Channel, Plot A, Ant0

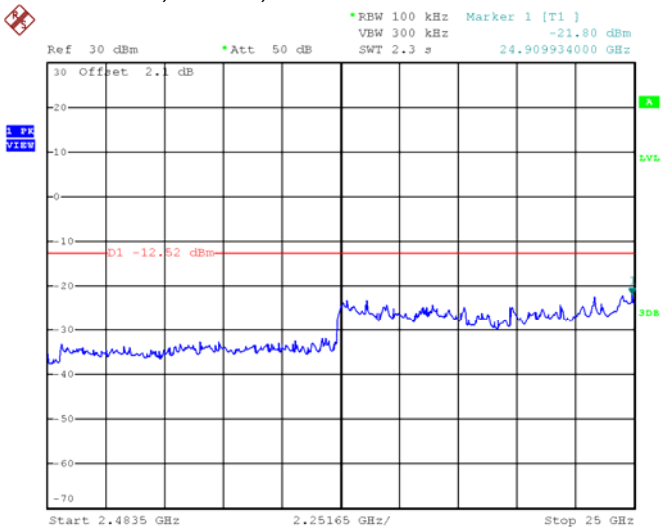


802.11g, Highest Channel, Plot B, Ant0

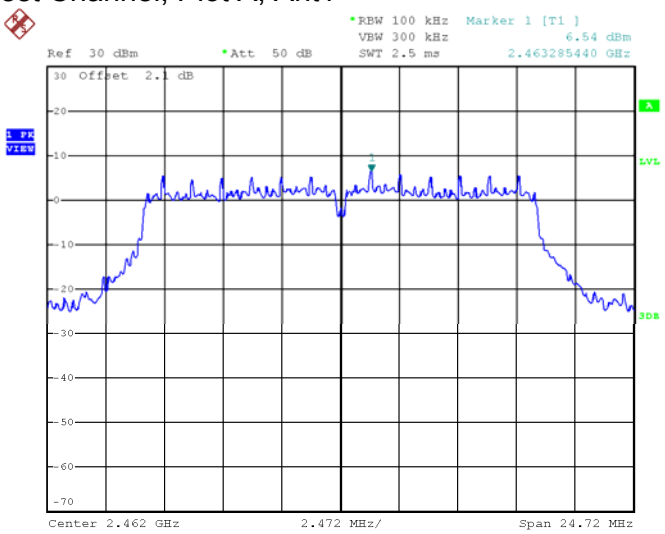


Plots of out of band conducted emissions

802.11g, Highest Channel, Plot C, Ant0

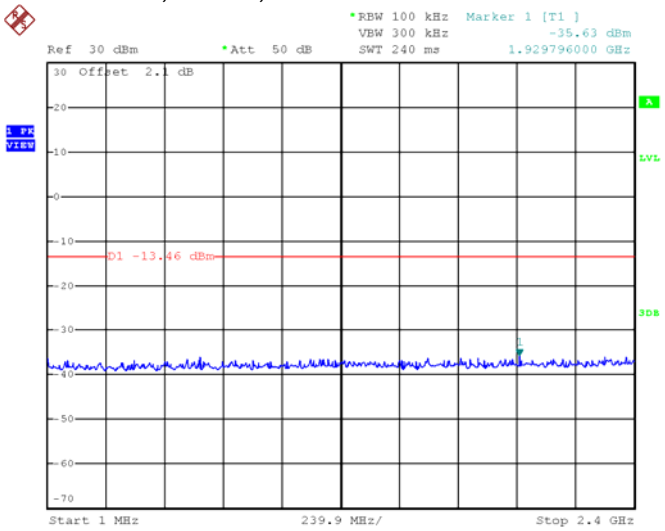


802.11g, Highest Channel, Plot A, Ant1



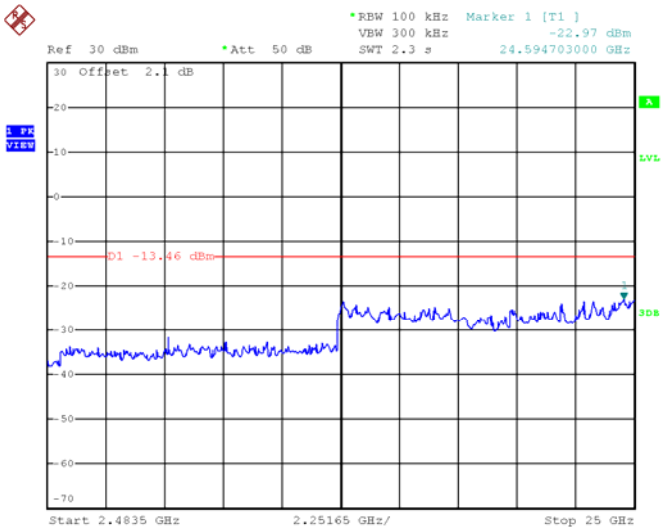
Plots of out of band conducted emissions

802.11g, Highest Channel, Plot B, Ant1



Date: 12.JUL.2016 10:10:01

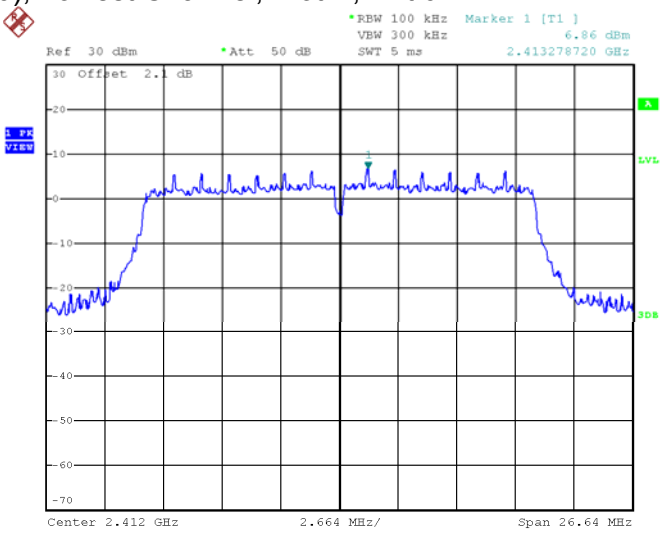
802.11g, Highest Channel, Plot C, Ant1



Date: 12.JUL.2016 10:11:22

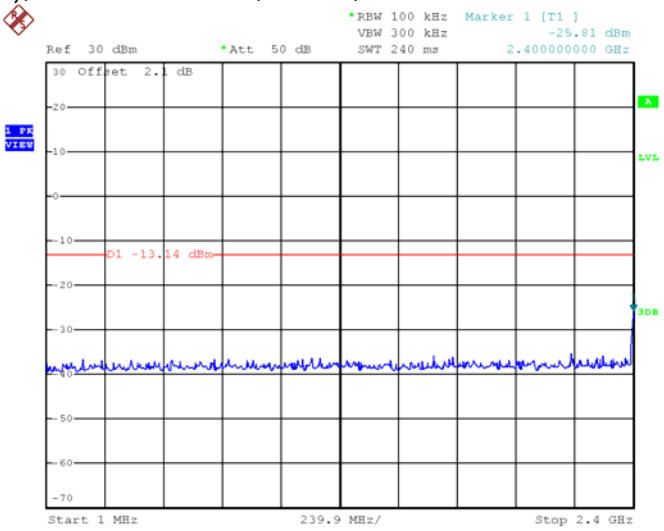
Plots of out of band conducted emissions

802.11n (HT20), Lowest Channel, Plot A, Ant 0



Date: 12.JUL.2016 10:52:00

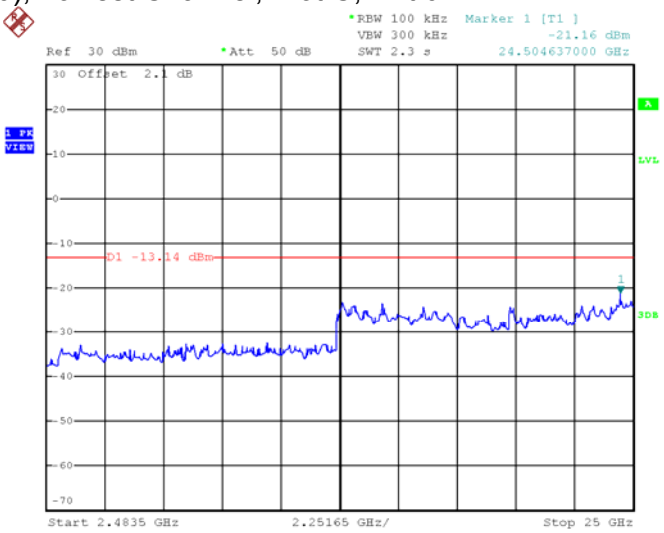
802.11n (HT20), Lowest Channel, Plot B, Ant 0



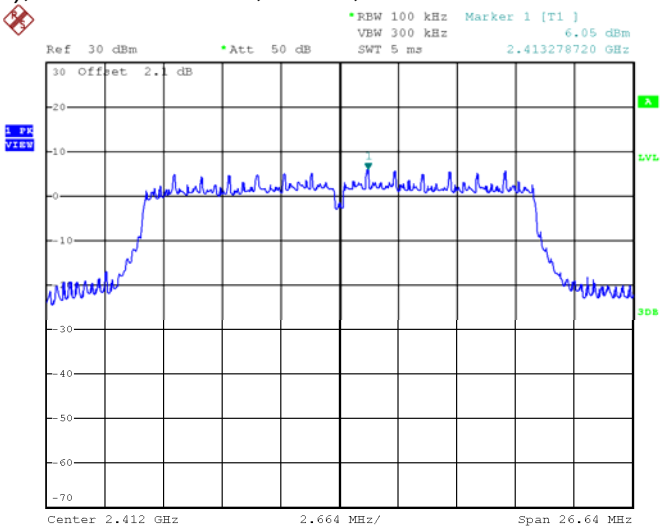
Date: 12.JUL.2016 11:20:05

Plots of out of band conducted emissions

802.11n (HT20), Lowest Channel, Plot C, Ant 0

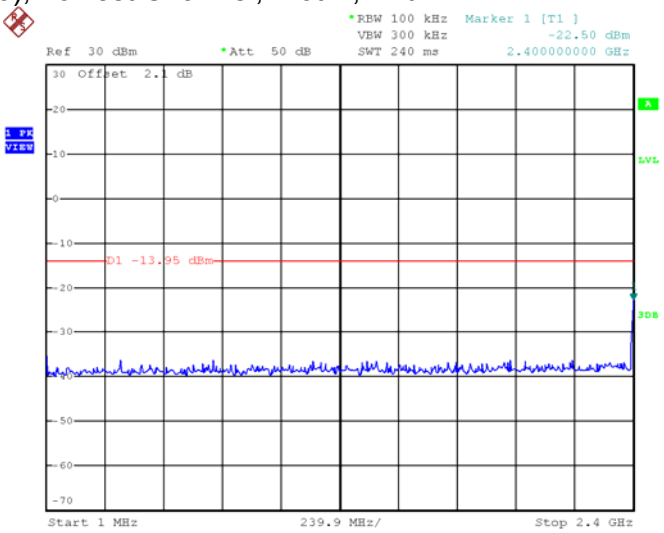


802.11n (HT20), Lowest Channel, Plot A, Ant 1

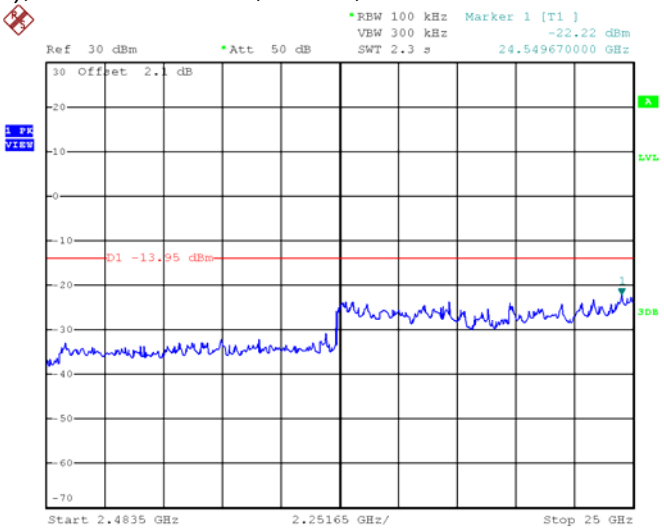


Plots of out of band conducted emissions

802.11n (HT20), Lowest Channel, Plot B, Ant 1

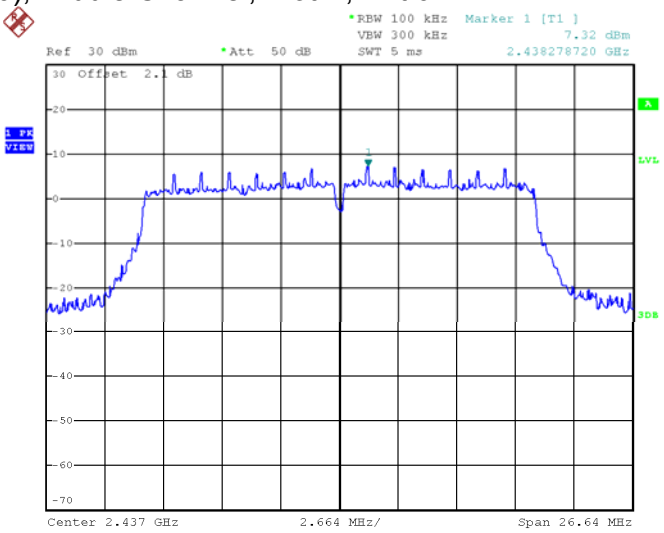


802.11n (HT20), Lowest Channel, Plot C, Ant 1



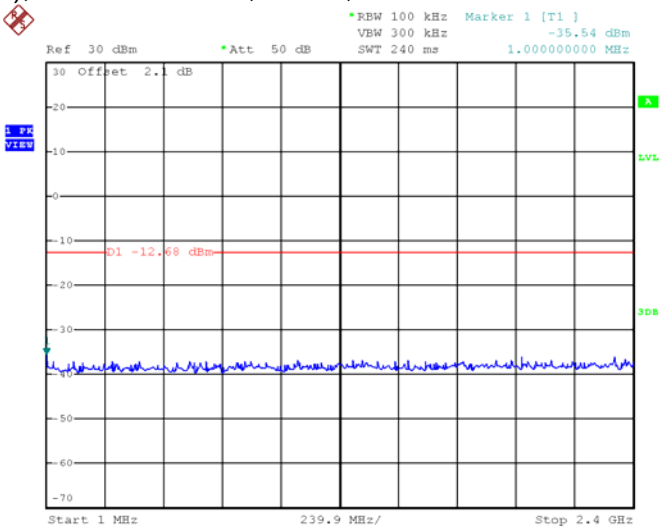
Plots of out of band conducted emissions

802.11n (HT20), Middle Channel, Plot A, Ant 0



Date: 12.JUL.2016 10:53:41

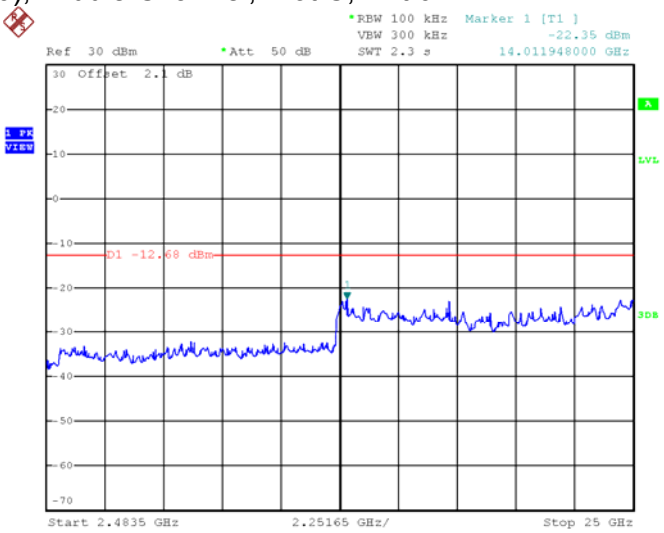
802.11n (HT20), Middle Channel, Plot B, Ant 0



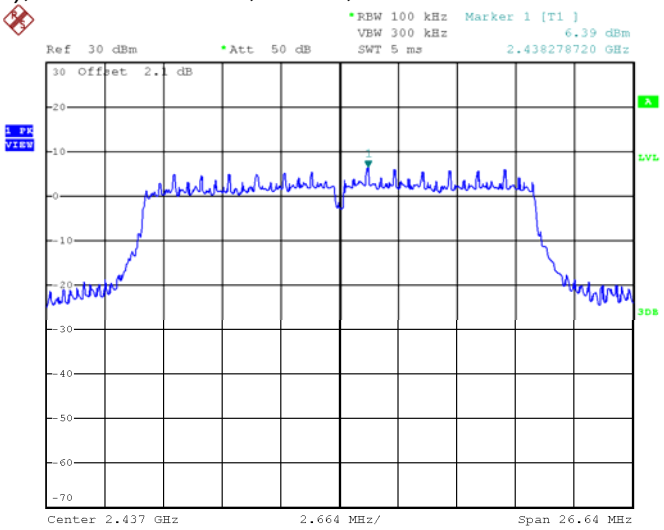
Date: 12.JUL.2016 11:23:20

Plots of out of band conducted emissions

802.11n (HT20), Middle Channel, Plot C, Ant 0

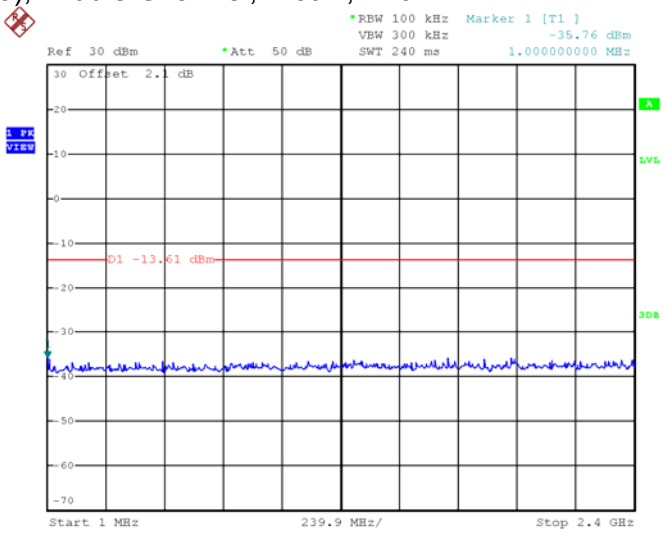


802.11n (HT20), Middle Channel, Plot A, Ant 1

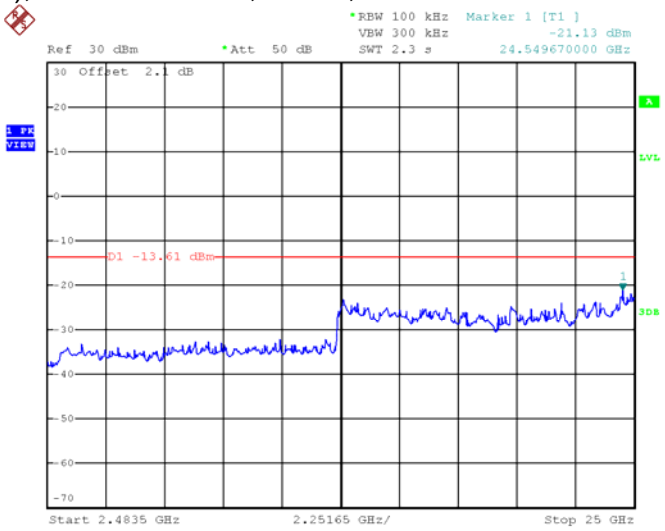


Plots of out of band conducted emissions

802.11n (HT20), Middle Channel, Plot B, Ant 1

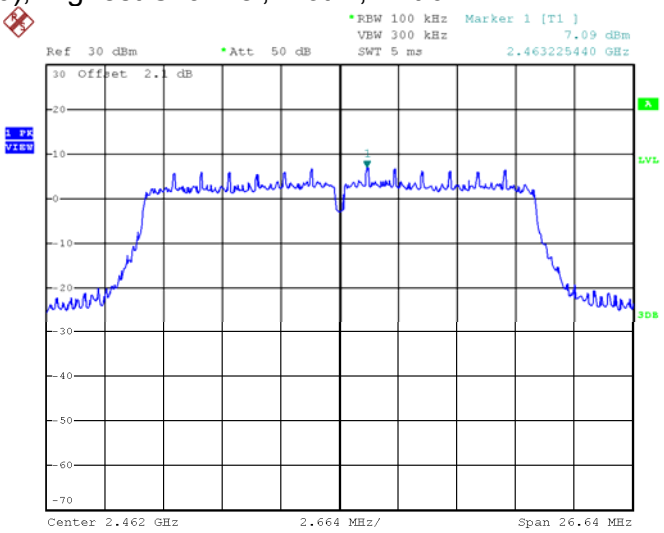


802.11n (HT20), Middle Channel, Plot C, Ant 1



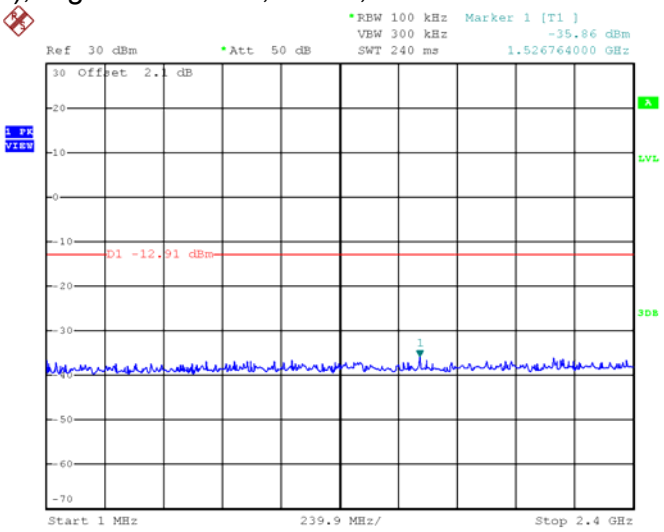
Plots of out of band conducted emissions

802.11n (HT20), Highest Channel, Plot A, Ant 0



Date: 12.JUL.2016 10:55:54

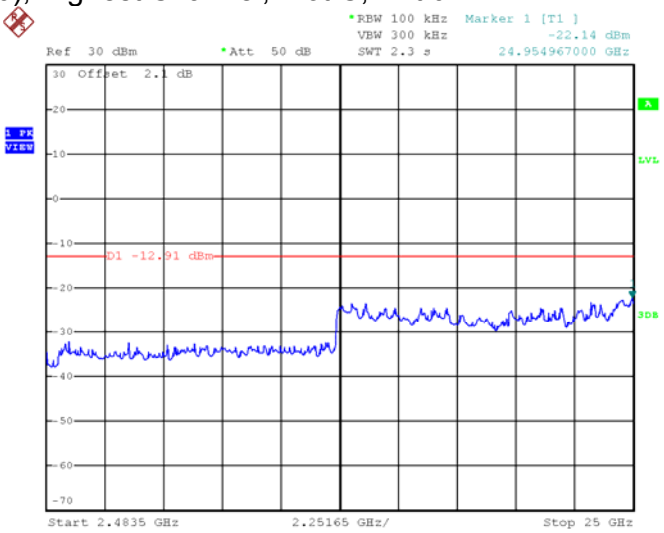
802.11n (HT20), Highest Channel, Plot B, Ant 0



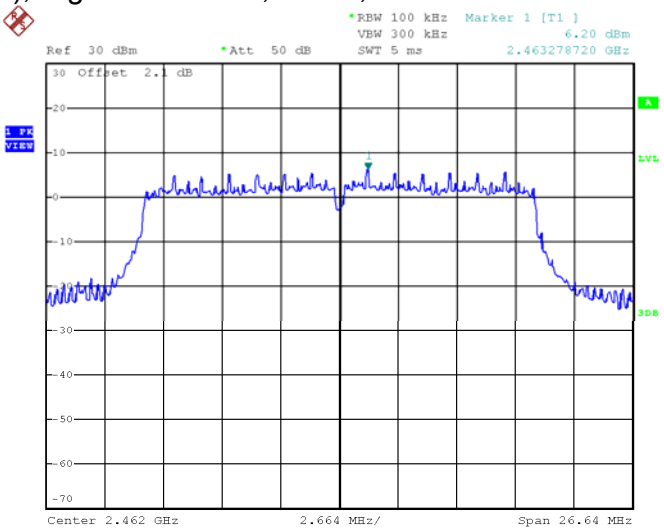
Date: 12.JUL.2016 11:24:28

Plots of out of band conducted emissions

802.11n (HT20), Highest Channel, Plot C, Ant 0

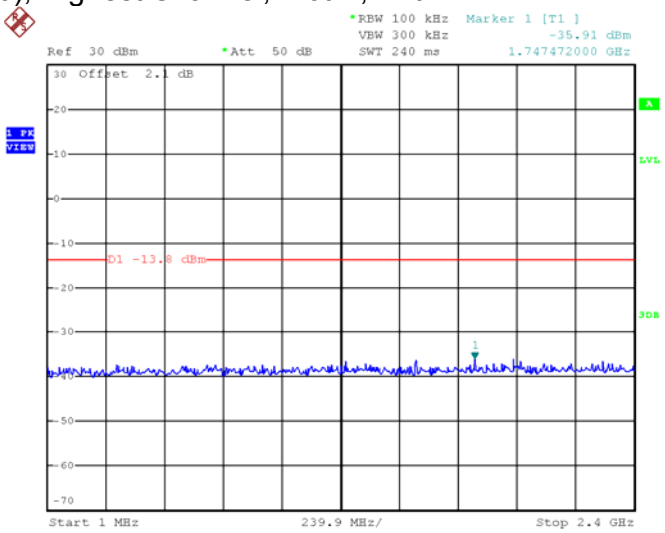


802.11n (HT20), Highest Channel, Plot A, Ant 1

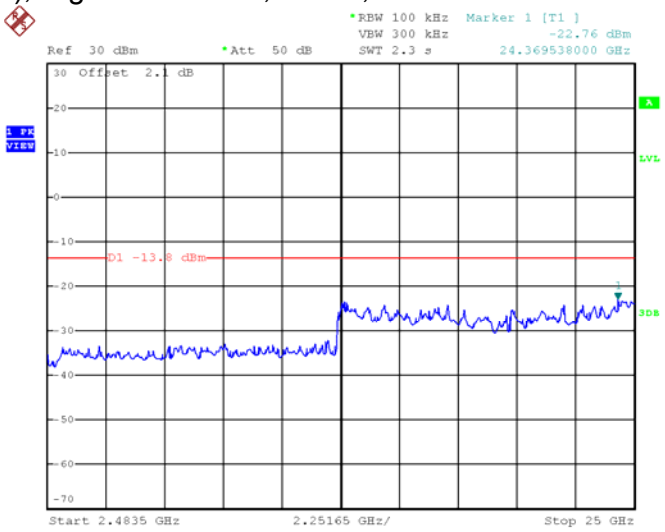


Plots of out of band conducted emissions

802.11n (HT20), Highest Channel, Plot B, Ant 1



802.11n (HT20), Highest Channel, Plot C, Ant 1



4.5 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD + AV

Example
Assume a receiver reading of 62.0 dBμV is obtained. The 0antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29.0 dB is subtracted. The pulse desensitization factor of the spectrum analyzer is 0.0 dB, and the resultant average factor is -10.0 dB. The net field strength for comparison to the appropriate emission limit is 32.0 dBμV/m. This value in dBμV/m is converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0.0 dB
AV = -10 dB

FS = 62.0 + 7.4 + 1.6 – 29.0 + 0.0 + (-10.0) = 32.0 dBμV/m

Level in μV/m = Common Antilogarithm [(32.0 dBμV/m)/20] = 39.8 μV/m

4.6 Transmitter Radiated Emissions in Restricted Bands and Spurious Emissions

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

4.6.1 Radiated Emission Configuration Photograph

Worst Case Restricted Band Radiated Emission
at

2483.5 MHz

The worst case radiated emission configuration photographs are saved with filename: config photos.pdf

4.6.2 Radiated Emission Data

The data in tables 1-10 list the significant emission frequencies, the limit and the margin of compliance.

Judgement -

Passed by 1.2 dB margin compare with average limit

Mode: TX-Channel 01 Ant 0

Table 1
IEEE 802.11b (DSSS, 1 Mbps)

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***2390.000***	***56.1***	***33***	***29.4***	***52.5***	***54.0***	***-1.5***
V	***4824.000***	***50.7***	***33***	***34.9***	***52.6***	***54.0***	***-1.4***
V	***12060.000***	***43.3***	***33***	***40.5***	***50.8***	***54.0***	***-3.2***

Polari-zation	Frequency (MHz)	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***2390.000***	***59.7***	***33***	***29.4***	***56.1***	***74.0***	***-17.9***
V	***4824.000***	***50.7***	***33***	***34.9***	***52.6***	***74.0***	***-21.4***
V	***12060.000***	***43.3***	***33***	***40.5***	***50.8***	***74.0***	***-23.2***

NOTES:
1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.
6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 06 ANT0

Table 2
IEEE 802.11b (DSSS, 1 Mbps)

Radiated Emission Data

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***4874.000***	***50.5***	***33***	***34.9***	***52.4***	***54.0***	***-1.6***
V	***7311.000***	***42.9***	***33***	***37.9***	***47.8***	***54.0***	***-6.2***
V	***12185.000***	***43.1***	***33***	***40.5***	***50.6***	***54.0***	***-3.4***

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***4874.000***	***50.5***	***33***	***34.9***	***52.4***	***74.0***	***-21.6***
V	***7311.000***	***42.9***	***33***	***37.9***	***47.8***	***74.0***	***-26.2***
V	***12185.000***	***43.1***	***33***	***40.5***	***50.6***	***74.0***	***-23.4***

NOTES:
1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.
6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 11 ANT0

Table 3
IEEE 802.11b (DSSS, 1 Mbps)

Radiated Emission Data

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***2483.500***	***55.8***	***33***	***29.4***	***52.2***	***54.0***	***-1.8***
V	***4924.000***	***50.4***	***33***	***34.9***	***52.3***	***54.0***	***-1.7***
V	***7386.000***	***42.0***	***33***	***37.9***	***46.9***	***54.0***	***-7.1***
V	***12310.000***	***43.5***	***33***	***40.5***	***51.0***	***54.0***	***-3.0***

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***2483.500***	***55.8***	***33***	***29.4***	***52.2***	***74.0***	***-21.8***
V	***4924.000***	***50.4***	***33***	***34.9***	***52.3***	***74.0***	***-21.7***
V	***7386.000***	***42.0***	***33***	***37.9***	***46.9***	***74.0***	***-27.1***
V	***12310.000***	***43.5***	***33***	***40.5***	***51.0***	***74.0***	***-23.0***

NOTES:
1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.
6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 01 ANT0

Table 4
IEEE 802.11g (OFDM, 6 Mbps)

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***2390.000***	***56.3***	***33***	***29.4***	***52.7***	***54.0***	***-1.3***
V	***4824.000***	***48.9***	***33***	***34.9***	***50.8***	***54.0***	***-3.2***
V	***12060.000***	***43.0***	***33***	***40.5***	***50.5***	***54.0***	***-3.5***

Polari-zation	Frequency (MHz)	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***2390.000***	***56.3***	***33***	***29.4***	***52.7***	***74.0***	***-21.3***
V	***4824.000***	***48.9***	***33***	***34.9***	***50.8***	***74.0***	***-23.2***
V	***12060.000***	***43.0***	***33***	***40.5***	***50.5***	***74.0***	***-23.5***

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.

6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.

7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 06 ANT0

Table 5
IEEE 802.11g (OFDM, 6 Mbps)

Radiated Emission Data

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***4874.000***	***49.1***	***33***	***34.9***	***51.0***	***54.0***	***-3.0***
V	***7311.000***	***43.3***	***33***	***37.9***	***48.2***	***54.0***	***-5.8***
V	***12185.000***	***43.1***	***33***	***40.5***	***50.6***	***54.0***	***-3.4***

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***4874.000***	***49.1***	***33***	***34.9***	***51.0***	***74.0***	***-23.0***
V	***7311.000***	***43.3***	***33***	***37.9***	***48.2***	***74.0***	***-25.8***
V	***12185.000***	***43.1***	***33***	***40.5***	***50.6***	***74.0***	***-23.4***

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.

6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.

7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 11 ANT0

Table 6
IEEE 802.11g (OFDM, 6 Mbps)

Radiated Emission Data

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***2483.500***	***54.6***	***33***	***29.4***	***51.0***	***54.0***	***-3.0***
V	***4924.000***	***49.5***	***33***	***34.9***	***51.4***	***54.0***	***-2.6***
V	***7386.000***	***43.8***	***33***	***37.9***	***48.7***	***54.0***	***-5.3***
V	***12310.000***	***43.0***	***33***	***40.5***	***50.5***	***54.0***	***-3.5***

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***2483.500***	***54.6***	***33***	***29.4***	***51.0***	***74.0***	***-23.0***
V	***4924.000***	***49.5***	***33***	***34.9***	***51.4***	***74.0***	***-22.6***
V	***7386.000***	***43.8***	***33***	***37.9***	***48.7***	***74.0***	***-25.3***
V	***12310.000***	***43.0***	***33***	***40.5***	***50.5***	***74.0***	***-23.5***

NOTES:
1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.
6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 01 ANT1

Table 7
IEEE 802.11g (OFDM, 6 Mbps)

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***2390.000***	***55.2***	***33***	***29.4***	***51.6***	***54.0***	***-2.4***
V	***4824.000***	***47.9***	***33***	***34.9***	***49.8***	***54.0***	***-4.2***
V	***12060.000***	***42.4***	***33***	***40.5***	***49.9***	***54.0***	***-4.1***

Polari-zation	Frequency (MHz)	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***2390.000***	***55.2***	***33***	***29.4***	***51.6***	***74.0***	***-22.4***
V	***4824.000***	***47.9***	***33***	***34.9***	***49.8***	***74.0***	***-24.2***
V	***12060.000***	***42.4***	***33***	***40.5***	***49.9***	***74.0***	***-24.1***

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

6. Horn antenna is used for the emission over 1000MHz.

7. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.

6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.

7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 06 ANT1

Table 8
IEEE 802.11g (OFDM, 6 Mbps)

Radiated Emission Data

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***4874.000***	***47.9***	***33***	***34.9***	***49.8***	***54.0***	***-4.2***
V	***7311.000***	***43.2***	***33***	***37.9***	***48.1***	***54.0***	***-5.9***
V	***12185.000***	***42.8***	***33***	***40.5***	***50.3***	***54.0***	***-3.7***

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***4874.000***	***47.9***	***33***	***34.9***	***49.8***	***74.0***	***-24.2***
V	***7311.000***	***43.2***	***33***	***37.9***	***48.1***	***74.0***	***-25.9***
V	***12185.000***	***42.8***	***33***	***40.5***	***50.3***	***74.0***	***-23.7***

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

6. Horn antenna is used for the emission over 1000MHz.

7. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.

6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.

7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 11 ANT1

Table 9
IEEE 802.11g (OFDM, 6 Mbps)

Radiated Emission Data

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***2483.500***	***54.5***	***33***	***29.4***	***50.9***	***54.0***	***-3.1***
V	***4924.000***	***49.3***	***33***	***34.9***	***51.2***	***54.0***	***-2.8***
V	***7386.000***	***43.5***	***33***	***37.9***	***48.4***	***54.0***	***-5.6***
V	***12310.000***	***42.8***	***33***	***40.5***	***50.3***	***54.0***	***-3.7***

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***2483.500***	***54.5***	***33***	***29.4***	***50.9***	***74.0***	***-23.1***
V	***4924.000***	***49.3***	***33***	***34.9***	***51.2***	***74.0***	***-22.8***
V	***7386.000***	***43.5***	***33***	***37.9***	***48.4***	***74.0***	***-25.6***
V	***12310.000***	***42.8***	***33***	***40.5***	***50.3***	***74.0***	***-23.7***

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

6. Horn antenna is used for the emission over 1000MHz.

7. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.

6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.

7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 01 ANT0 + ANT1

Table 10
IEEE 802.11n (HT20, MCS0)

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***2390.000***	***56.0***	***33***	***29.4***	***52.4***	***54.0***	***-1.6***
V	***4824.000***	***49.1***	***33***	***34.9***	***51.0***	***54.0***	***-3.0***
V	***12060.000***	***43.3***	***33***	***40.5***	***50.8***	***54.0***	***-3.2***

Polari-zation	Frequency (MHz)	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***2390.000***	***56.0***	***33***	***29.4***	***52.4***	***74.0***	***-21.6***
V	***4824.000***	***49.1***	***33***	***34.9***	***51.0***	***74.0***	***-23.0***
V	***12060.000***	***43.3***	***33***	***40.5***	***50.8***	***74.0***	***-23.2***

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.

6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.

7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 06 ANT0 + ANT1

Table 11
IEEE 802.11n (HT20, MCS0)

Radiated Emission Data

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***4874.000***	***49.3***	***33***	***34.9***	***51.2***	***54.0***	***-2.8***
V	***7311.000***	***43.8***	***33***	***37.9***	***48.7***	***54.0***	***-5.3***
V	***12185.000***	***42.9***	***33***	***40.5***	***50.4***	***54.0***	***-3.6***

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***4874.000***	***49.3***	***33***	***34.9***	***51.2***	***74.0***	***-22.8***
V	***7311.000***	***43.8***	***33***	***37.9***	***48.7***	***74.0***	***-25.3***
V	***12185.000***	***42.9***	***33***	***40.5***	***50.4***	***74.0***	***-23.6***

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.

6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.

7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 11 ANT0 + ANT1

Table 12
IEEE 802.11n (HT20, MCS0)

Radiated Emission Data

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***2483.500***	***56.4***	***33***	***29.4***	***52.8***	***54.0***	***-1.2***
V	***4924.000***	***50.5***	***33***	***34.9***	***52.4***	***54.0***	***-1.6***
V	***7386.000***	***42.6***	***33***	***37.9***	***47.5***	***54.0***	***-6.5***
V	***12310.000***	***43.2***	***33***	***40.5***	***50.7***	***54.0***	***-3.3***

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***2483.500***	***56.4***	***33***	***29.4***	***52.8***	***74.0***	***-21.2***
V	***4924.000***	***50.5***	***33***	***34.9***	***52.4***	***74.0***	***-21.6***
V	***7386.000***	***42.6***	***33***	***37.9***	***47.5***	***74.0***	***-26.5***
V	***12310.000***	***43.2***	***33***	***40.5***	***50.7***	***74.0***	***-23.3***

NOTES:
1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.
6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 01 ANT0

Table 13
IEEE 802.11n (HT20, MCS0)

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***2390.000***	***55.9***	***33***	***29.4***	***52.3***	***54.0***	***-1.7***
V	***4824.000***	***48.9***	***33***	***34.9***	***50.8***	***54.0***	***-3.2***
V	***12060.000***	***43.3***	***33***	***40.5***	***50.8***	***54.0***	***-3.2***

Polari-zation	Frequency (MHz)	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***2390.000***	***55.9***	***33***	***29.4***	***52.3***	***74.0***	***-21.7***
V	***4824.000***	***48.9***	***33***	***34.9***	***50.8***	***74.0***	***-23.2***
V	***12060.000***	***43.3***	***33***	***40.5***	***50.8***	***74.0***	***-23.2***

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

6. Horn antenna is used for the emission over 1000MHz.

7. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.

6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.

7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 06 ANT0

Table 14
IEEE 802.11n (HT20, MCS0)

Radiated Emission Data

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***4874.000***	***49.2***	***33***	***34.9***	***51.1***	***54.0***	***-2.9***
V	***7311.000***	***43.6***	***33***	***37.9***	***48.5***	***54.0***	***-5.5***
V	***12185.000***	***42.6***	***33***	***40.5***	***50.1***	***54.0***	***-3.9***

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***4874.000***	***49.2***	***33***	***34.9***	***51.1***	***74.0***	***-22.9***
V	***7311.000***	***43.6***	***33***	***37.9***	***48.5***	***74.0***	***-25.5***
V	***12185.000***	***42.6***	***33***	***40.5***	***50.1***	***74.0***	***-23.9***

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

6. Horn antenna is used for the emission over 1000MHz.

7. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.

6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.

7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 11 ANT0

Table 15
IEEE 802.11n (HT20, MCS0)

Radiated Emission Data

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***2483.500***	***56.1***	***33***	***29.4***	***52.5***	***54.0***	***-1.5***
V	***4924.000***	***50.4***	***33***	***34.9***	***52.3***	***54.0***	***-1.7***
V	***7386.000***	***42.2***	***33***	***37.9***	***47.1***	***54.0***	***-6.9***
V	***12310.000***	***43.0***	***33***	***40.5***	***50.5***	***54.0***	***-3.5***

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***2483.500***	***56.1***	***33***	***29.4***	***52.5***	***74.0***	***-21.5***
V	***4924.000***	***50.4***	***33***	***34.9***	***52.3***	***74.0***	***-21.7***
V	***7386.000***	***42.2***	***33***	***37.9***	***47.1***	***74.0***	***-26.9***
V	***12310.000***	***43.0***	***33***	***40.5***	***50.5***	***74.0***	***-23.5***

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

6. Horn antenna is used for the emission over 1000MHz.

7. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.

6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.

7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 01 ANT1

Table 16
IEEE 802.11n (HT20, MCS0)

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***2390.000***	***55.6***	***33***	***29.4***	***52.0***	***54.0***	***-2.0***
V	***4824.000***	***48.6***	***33***	***34.9***	***50.5***	***54.0***	***-3.5***
V	***12060.000***	***43.2***	***33***	***40.5***	***50.7***	***54.0***	***-3.3***

Polari-zation	Frequency (MHz)	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***2390.000***	***55.6***	***33***	***29.4***	***52.0***	***74.0***	***-22.0***
V	***4824.000***	***48.6***	***33***	***34.9***	***50.5***	***74.0***	***-23.5***
V	***12060.000***	***43.2***	***33***	***40.5***	***50.7***	***74.0***	***-23.3***

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limsit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

8. Horn antenna is used for the emission over 1000MHz.

9. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.

6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.

7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 06 ANT1

Table 17
IEEE 802.11n (HT20, MCS0)

Radiated Emission Data

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***4874.000***	***49.0***	***33***	***34.9***	***50.9***	***54.0***	***-3.1***
V	***7311.000***	***43.2***	***33***	***37.9***	***48.1***	***54.0***	***-5.9***
V	***12185.000***	***42.4***	***33***	***40.5***	***49.9***	***54.0***	***-4.1***

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***4874.000***	***49.0***	***33***	***34.9***	***50.9***	***74.0***	***-23.1***
V	***7311.000***	***43.2***	***33***	***37.9***	***48.1***	***74.0***	***-25.9***
V	***12185.000***	***42.4***	***33***	***40.5***	***49.9***	***74.0***	***-24.1***

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

8. Horn antenna is used for the emission over 1000MHz.

9. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.

6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.

7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Mode: TX-Channel 11 ANT1

Table 18
IEEE 802.11n (HT20, MCS0)

Radiated Emission Data

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBuV/m)	Average Limit at 3m (dBuV/m)	Margin (dB)
V	***2483.500***	***55.9***	***33***	***29.4***	***52.3***	***54.0***	***-1.7***
V	***4924.000***	***50.3***	***33***	***34.9***	***52.2***	***54.0***	***-1.8***
V	***7386.000***	***42.0***	***33***	***37.9***	***46.9***	***54.0***	***-7.1***
V	***12310.000***	***42.7***	***33***	***40.5***	***50.2***	***54.0***	***-3.8***

Polari-zation	Frequency	Reading (dBuV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBuV/m)	Peak Limit at 3m (dBuV/m)	Margin (dB)
V	***2483.500***	***55.9***	***33***	***29.4***	***52.3***	***74.0***	***-21.7***
V	***4924.000***	***50.3***	***33***	***34.9***	***52.2***	***74.0***	***-21.8***
V	***7386.000***	***42.0***	***33***	***37.9***	***46.9***	***74.0***	***-27.1***
V	***12310.000***	***42.7***	***33***	***40.5***	***50.2***	***74.0***	***-23.8***

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

8. Horn antenna is used for the emission over 1000MHz.

9. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.

6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.

7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Worst Case: EUT Transmitting

Table 19

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
H	31.668	41.6	16	10.0	35.6	40.0	-4.4
H	191.952	30.9	16	16.0	30.9	43.5	-12.6
H	***216.074***	***30.4***	***16***	***17.0***	***31.4***	***46.0***	***-14.6***
H	***288.068***	***32.6***	***16***	***22.0***	***38.6***	***46.0***	***-7.4***

NOTES: 1. Peak detector is used for the emission measurement.

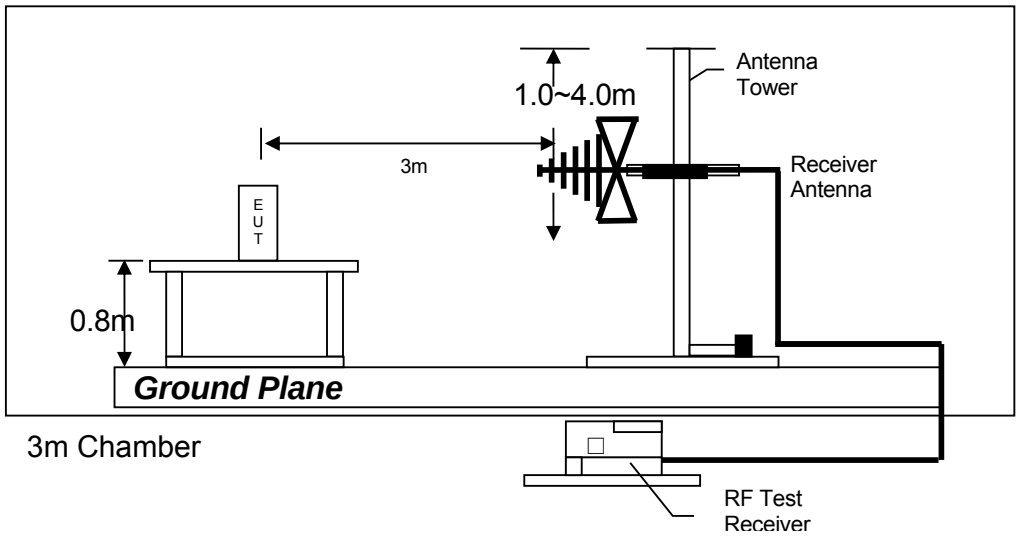
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

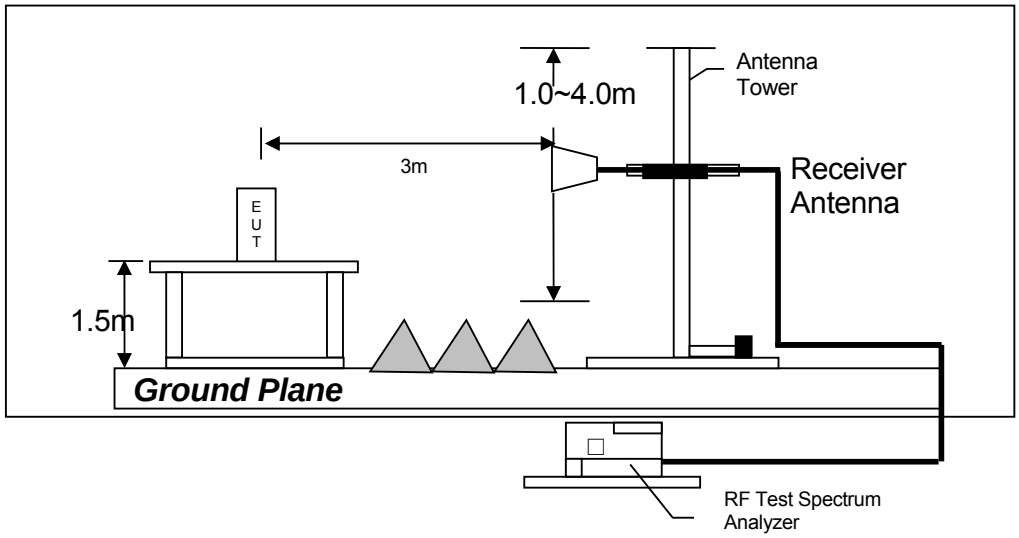
4. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-247 Section 3.3.

Radiated Emission Test Setup

The figure below shows the test setup, which is utilized to make these measurements.



Test setup of radiated emissions up to 1GHz



Test setup of radiated emissions above 1GHz

4.6.3 Transmitter Duty Cycle Calculation

Not applicable – No average factor is required.

4.7 AC Power Line Conducted Emission

☐ Not applicable – EUT is only powered by battery for operation.

☒ EUT connects to AC power line. Emission Data is listed in following pages.

☐ Base Unit connects to AC power line and has transmission. Handset connects to AC power line but has no transmission. Emission Data of Base Unit is listed in following pages.

4.7.1 AC Power Line Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration
at

0.164 MHz

The worst case line conducted configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

4.7.2 AC Power Line Conducted Emission Data

The plot(s) and data in the following pages list the significant emission frequencies, the limit and the margin of compliance

Passed by 6.0 dB margin compare with average limit

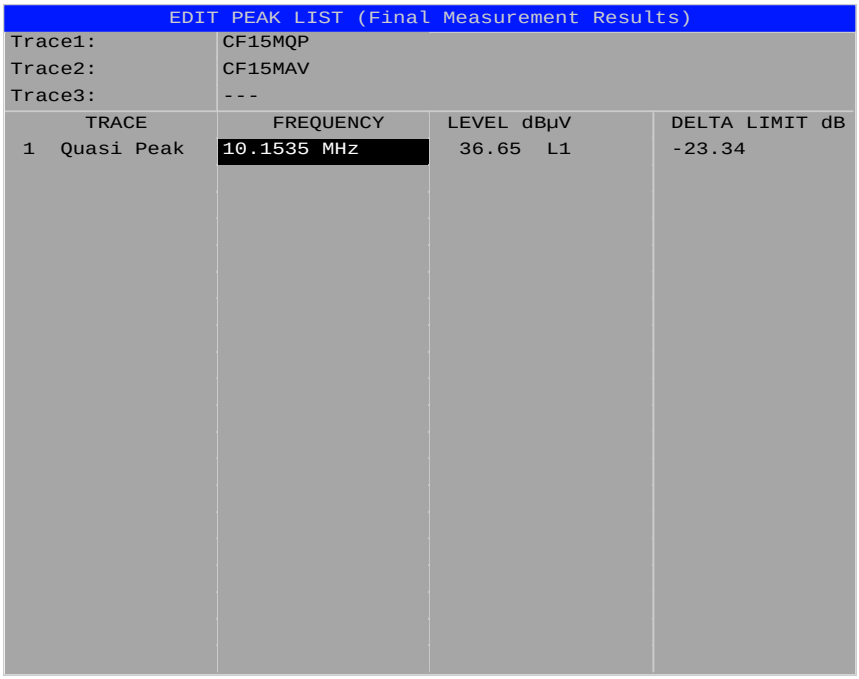
Worst Case: EUT Charging

EDIT PEAK LIST (Final Measurement Results)

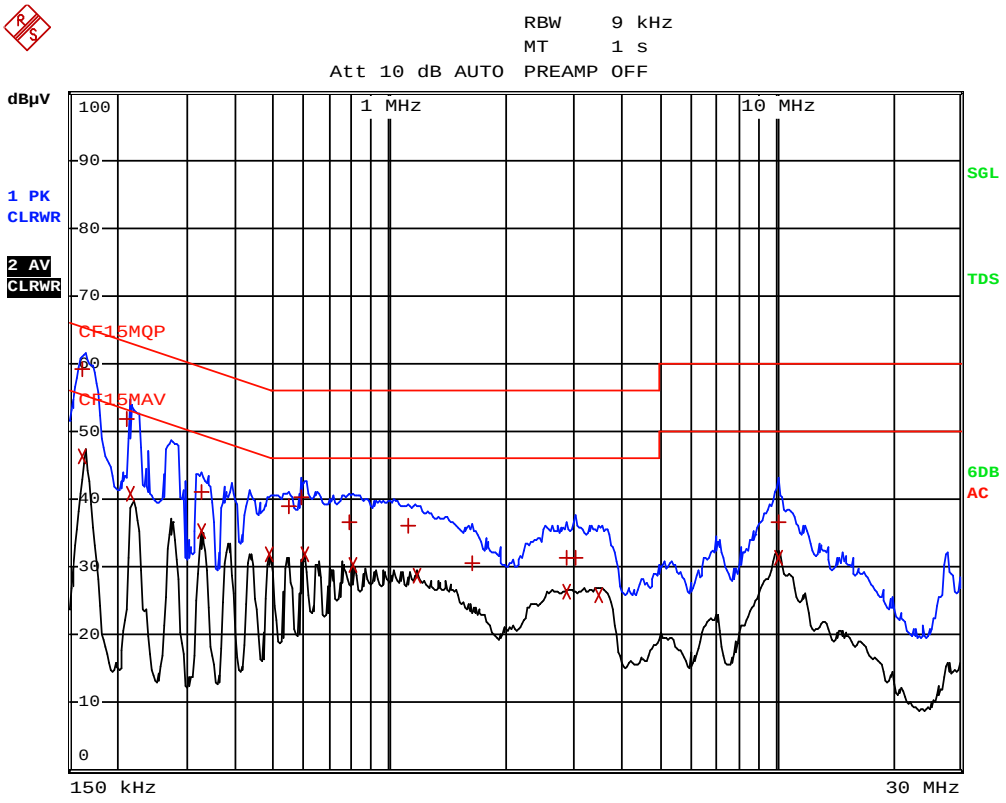
Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	163.5 kHz	59.28	L1	-5.99
2	CISPR Average	163.5 kHz	46.33	L1	-8.95
1	Quasi Peak	213 kHz	51.86	L1	-11.22
2	CISPR Average	217.5 kHz	40.89	N	-12.01
1	Quasi Peak	325.5 kHz	41.17	N	-18.38
2	CISPR Average	325.5 kHz	35.35	L1	-14.21
2	CISPR Average	487.5 kHz	31.90	N	-14.30
1	Quasi Peak	546 kHz	39.01	L1	-16.98
1	Quasi Peak	591 kHz	40.15	L1	-15.84
2	CISPR Average	600 kHz	31.89	N	-14.11
1	Quasi Peak	789 kHz	36.62	L1	-19.37
2	CISPR Average	807 kHz	30.25	N	-15.74
1	Quasi Peak	1.113 MHz	36.15	L1	-19.84
2	CISPR Average	1.1805 MHz	28.68	L1	-17.31
1	Quasi Peak	1.644 MHz	30.50	N	-25.49
1	Quasi Peak	2.886 MHz	31.33	L1	-24.66
2	CISPR Average	2.886 MHz	26.30	N	-19.69
1	Quasi Peak	3.021 MHz	31.36	N	-24.63
2	CISPR Average	3.498 MHz	25.74	L1	-20.25
2	CISPR Average	10.131 MHz	31.30	N	-18.69

Worst Case: EUT Charging



Worst Case: EUT Transmitting



Date: 24.MAY.2016 16:30:27

Conducted Emission Test Setup

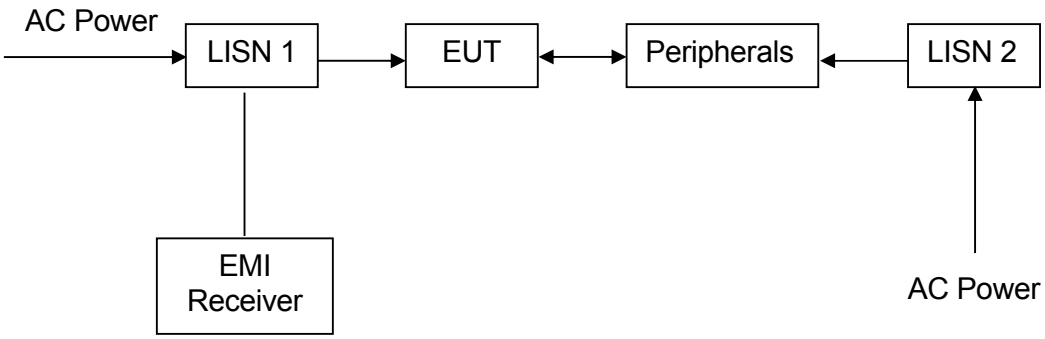


EXHIBIT 5
EQUIPMENT LIST

5.0 **Equipment List**

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Spectrum Analyzer	Biconical Antenna
Registration No.	EW-3156	EW-2188	EW-2512
Manufacturer	R&S	AGILENTTECH	EMCO
Model No.	ESR26	E4407B	3104C
Calibration Date	Nov. 03, 2015	Apr. 25, 2016	Jan 22, 2015
Calibration Due Date	Nov. 03, 2016	Apr. 25, 2017	Jul 22, 2016

Equipment	Log Periodic Antenna	Pyramidal Horn Antenna	Double Ridged Guide Antenna
Registration No.	EW-1042	EW-0905	EW-1133
Manufacturer	EMCO	EMCO	EMCO
Model No.	3148	3160-09	3115
Calibration Date	May 21, 2015	Feb. 12, 2016	Nov. 05, 2015
Calibration Due Date	Nov 21, 2016	Aug. 12, 2017	May 05, 2017

2) Conductive Measurement Test

Equipment	RF Power Meter with Power Sensor (N1921A)	Spectrum Analyzer
Registration No.	EW-2270	EW-2249
Manufacturer	AGILENTTECH	R&S
Model No.	N1911A	FSP30
Calibration Date	Jan. 19, 2016	Nov. 27, 2015
Calibration Due Date	Jan. 19, 2017	Nov. 27, 2016

3) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN
Registration No.	EW-2500	EW-2501
Manufacturer	R&S	R&S
Model No.	ESCI	ENV-216
Calibration Date	Jan. 28, 2016	Jan. 28, 2016
Calibration Due Date	Jan. 28, 2017	Jan. 28, 2017

END OF TEST REPORT