CERTIFICATION TEST REPORT

Report Number. : 12216550-E1V2

Applicant	:	PEOPLENET COMMUNICATIONS CORPORATION 4400 BAKER ROAD, MINNETONKA, MN, 55344, U.S.A.
Model	:	DV423
FCC ID	:	NKS-DV423
EUT Description	:	DIGITAL VIDEO RECORDER
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
May 17, 2018

Prepared by:
UL Verification Services Inc.
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NVLAP TESTING
NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	5/2/2018	Initial Issue	--
V2	5/17/2018	Updated report to address TCB's question	Tina Chu

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: PEOPLENET COMMUNICATIONS CORPORATION
4400 BAKER ROAD,
MINNETONKA, MN, 55344, U.S.A.

EUT DESCRIPTION: DIGITAL VIDEO RECORDER

MODEL: DV423

SERIAL NUMBER: DVR1801000022

DATE TESTED: APRIL 06, 2018 – APRIL 27, 2018

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB 558074 D01 v04, ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☐ Chamber A (IC:2324B-1)	☐ Chamber D (IC:22541-1)
☐ Chamber B (IC:2324B-2)	☐ Chamber E (IC:22541-2)
☒ Chamber C (IC:2324B-3)	☐ Chamber F (IC:22541-3)
	☐ Chamber G (IC:22541-4)
	☐ Chamber H (IC:22541-5)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB
Occupied Channel Bandwidth	±0.39 %

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The equipment under test is a Digital Video Recorder, 4 camera inputs, powered by vehicle battery. It has Wifi, GPS, and cellular modules installed. Cellular module is FCC certified.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412-2462	802.11b	19.42	87.50
	802.11g	23.81	240.44
	802.11n HT20	22.58	181.13
	802.11n HT40	22.39	173.38

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Peak Gain (dBi)
2.4	3.46

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was Tera Term 4.88.

The firmware installed in the EUT during testing was Version 2663.

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5.5. WORST-CASE CONFIGURATION AND MODE

Radiated bandedge were performed with EUT set to transmit at the channels output power.

Radiated harmonics and spurious emissions from 1 GHz to 18GHz were performed with EUT set to transmit at the Low/Middle/High channel with highest output power.

Radiated emission below 30MHz, below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The EUT and the panel antenna (with the label “This side faces the sky”) must be mounted in X-orientation (Flatbed) per installation guide. Therefore, all final radiated testing was performed with the EUT and antenna in X-orientation (Flatbed).

Worst-case data rates as provided by the client were:

802.11b mode: 1 Mbps
802.11g mode: 6 Mbps
802.11n HT20 mode: MCS0
802 11n HT40 mode: MCS0

Wifi and Cellular transmit simultaneously.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop AC/DC Adapter	HP	PPP016C	F1-1005096420C	NA
Laptop	HP	EliteBook 8530p	2CE947GWYF	NA
12 VDC vehicle battery	Optima Batteries	SPR	SC3DM	NA
DC power supply	DuraComm	LP-25	RB1B139142	NA

I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC	1	DC	Unshielded	1.5	AC/DC Adapter to Laptop
2	AC	1	3-prongs	Unshielded	1	AC Mains to AC/DC Adapter
3	AC	1	3-prongs	Unshielded	1.5	DC power supply to AC mains
4	USB	1	RS-232	Unshielded	1.3	USB Adapter to Laptop
5	Antenna	1	SMA	Unshielded	1	EUT to spectrum analyzer
6	DC	1	HF 4 pin	Unshielded	3.6	DC power supply to EUT

I/O CABLES (RADIATED TEST)

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC	1	HF 4 pin	Unshielded	3.6	EUT to Vehicle Battery

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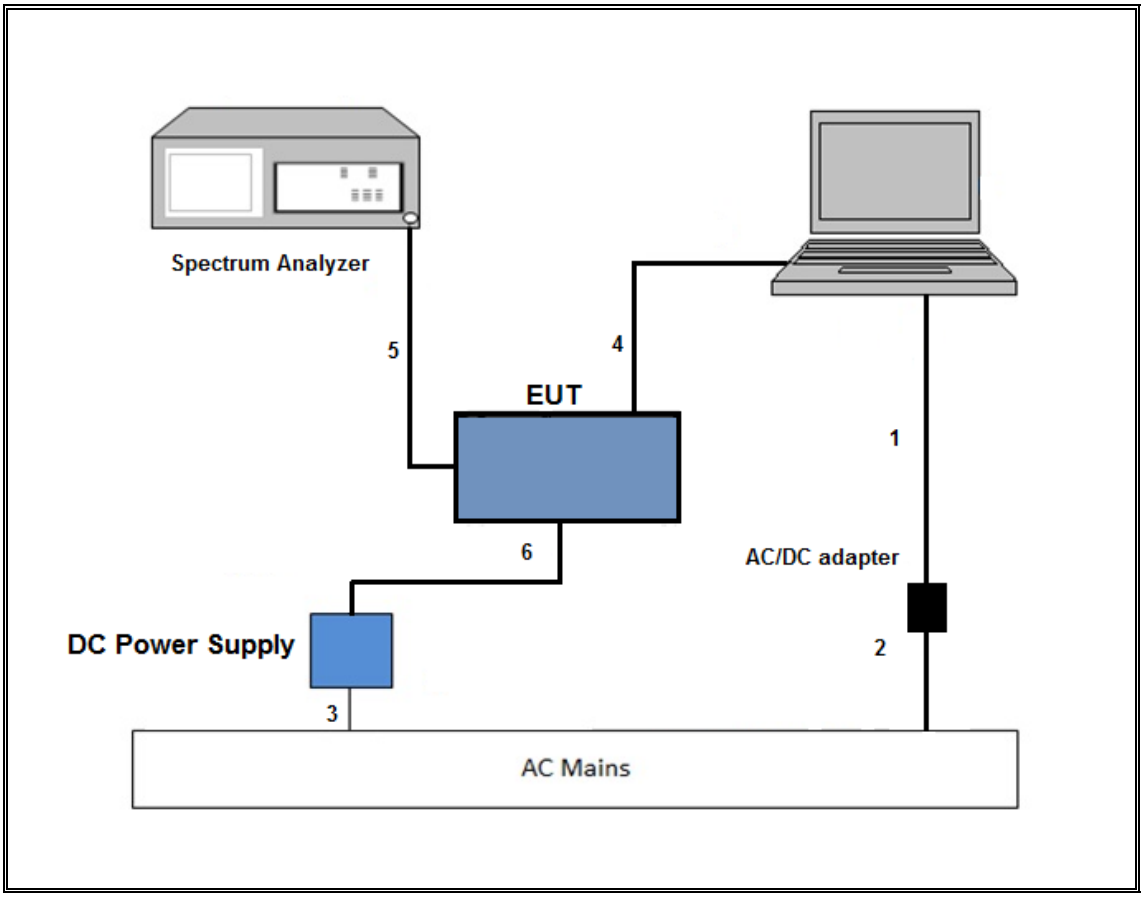
TEST SETUP-CONDUCTED TESTS

EUT powered by DC power supply. Test software exercised the EUT.

SETUP DIAGRAM



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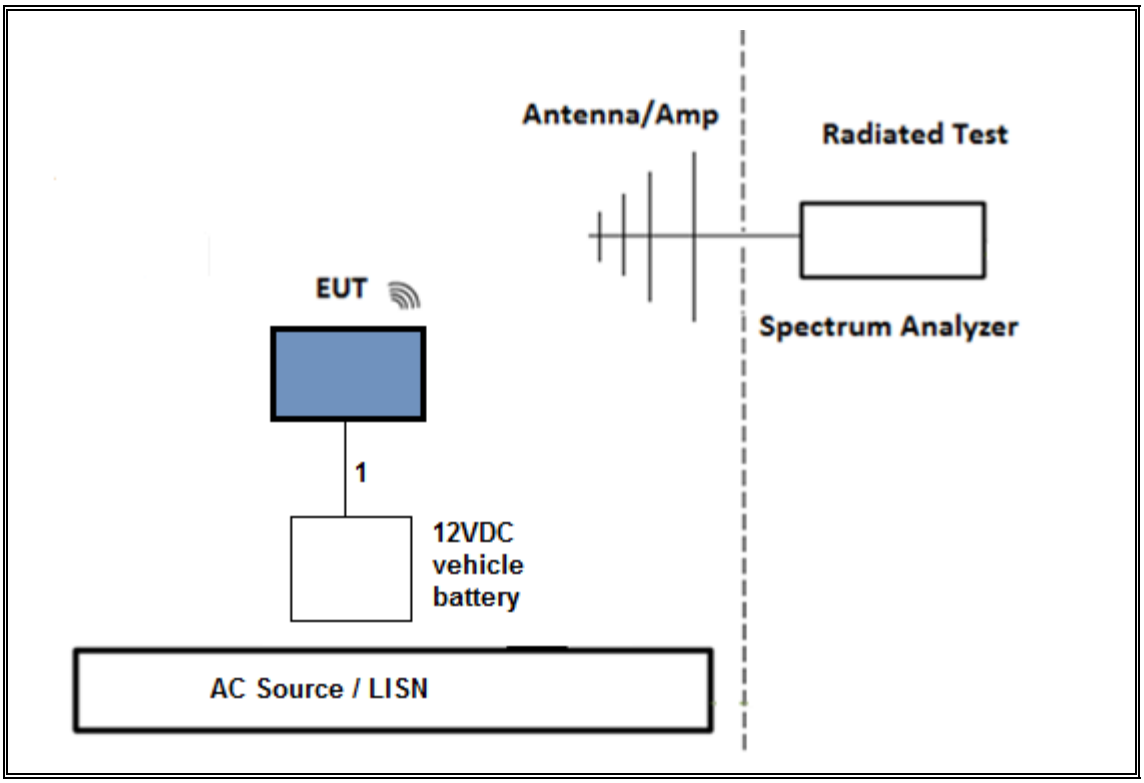
TEST SETUP- RADIATED TEST

EUT powered by external 12 VDC vehicle battery. Test software exercised the EUT.

SETUP DIAGRAM



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Antenna, Active Loop 9kHz-30MHz	Com-Power Corp.	AL-130R	T1866	10/10/2018
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T120	06/26/2018
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T931	02/24/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB1	T243	11/02/2018
Amplifier, 10KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310N	T300	12/11/2018
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1210	07/17/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	T905	02/03/2019
Antenna Horn, 18 to 26GHz	ARA	MWH-1826	T89	01/18/2019
Antenna Horn, 18 to 26GHz	ARA	MWH-1826	T449	06/12/2019
Amplifier, 1 to 26.5GHz 23.5dB gain Minimum	Keysight	8449B	T404	07/23/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A-544	T1113	12/21/2018
Power Meter, P-series single channel	Keysight	N1912A	T1245	05/12/2018
Power Sensor	Keysight	N1921A	T413	06/22/2018
UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC	Ver 9.5, Dec 01, 2016	
Conducted Software	UL	UL EMC	Ver 7.7, Dec 14, 2017	

NOTES:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

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7. MEASUREMENT METHODS

On Time and Duty Cycle: KDB 558074 D01 v04, Section 6.

6 dB BW: KDB 558074 D01 v04, Section 8.1.

99% BW: ANSI C63.10-2013, Section 6.9.3.

Output Power: KDB 558074 D01 v04, Section 9.2.3.2.

Power Spectral Density: KDB 558074 D01 v04, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v04, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v04, Section 12.1.

Band-edge: KDB 558074 D01 v04, Section 12.1.

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8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

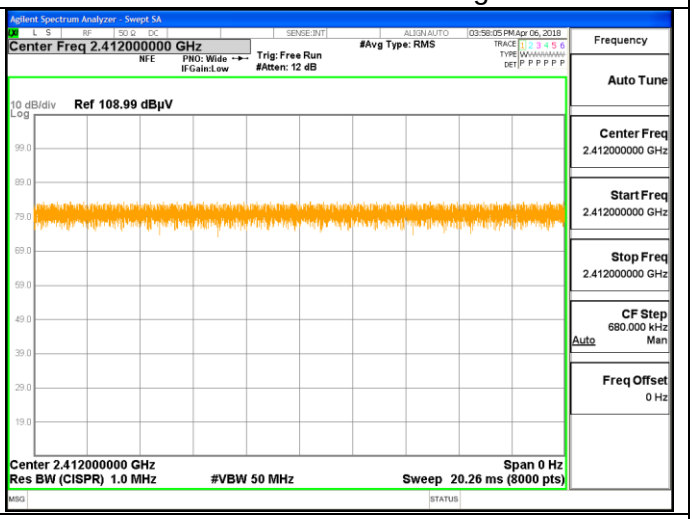
None; for reporting purposes only.

ON TIME AND DUTY CYCLE RESULTS

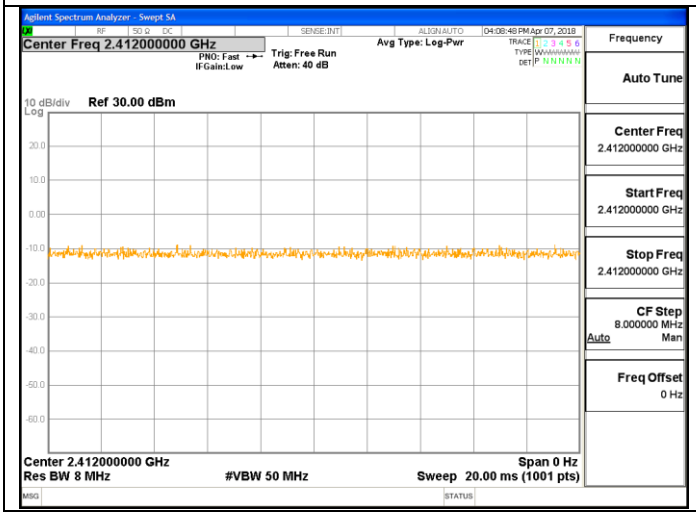
Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
802.11b	1.000	1.000	1.000	100.00%	0.00	0.010
802.11g	1.000	1.000	1.000	100.00%	0.00	0.010
802.11n HT20	1.000	1.000	1.000	100.00%	0.00	0.010
802.11n HT40	1.000	1.000	1.000	100.00%	0.00	0.010

DUTY CYCLE 802.11b

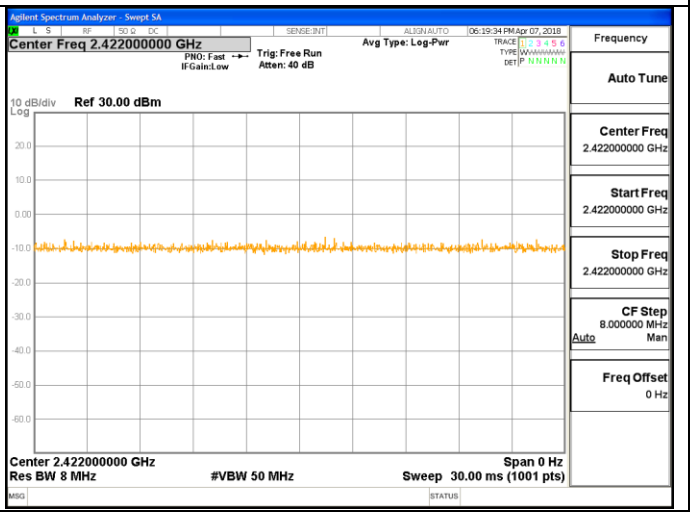
DUTY CYCLE 802.11g



DUTY CYCLE 802.11n HT20



DUTY CYCLE 802.11n HT40



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8.2. 99% BANDWIDTH

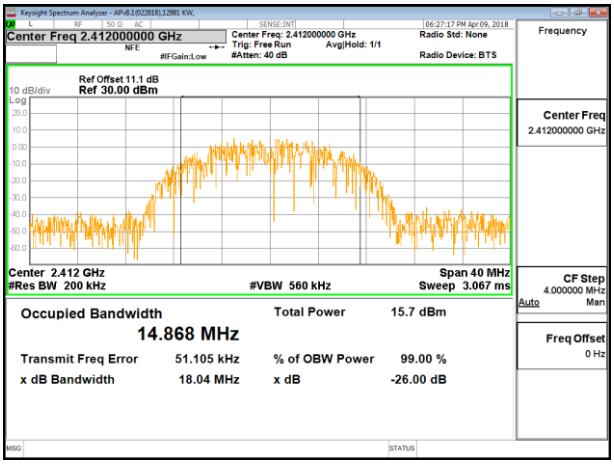
LIMITS

None; for reporting purposes only.

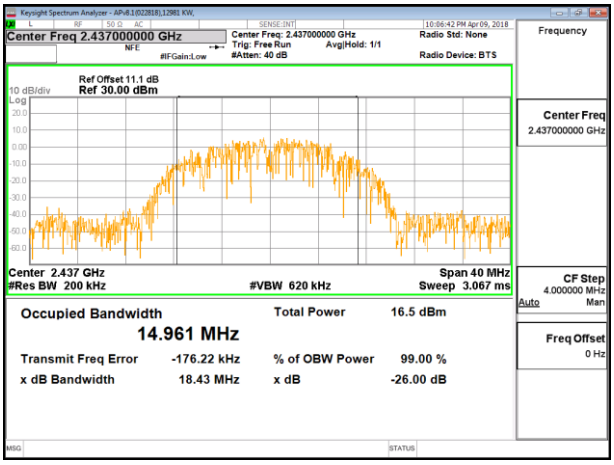
RESULTS

8.2.1. 802.11b MODE

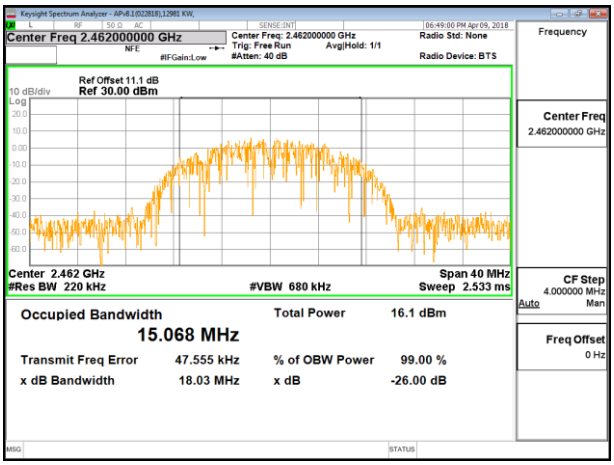
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	14.8680
Mid 6	2437	14.9610
High 11	2462	15.0680



LOW CHANNEL 1



MID CHANNEL 6



HIGH CHANNEL 11

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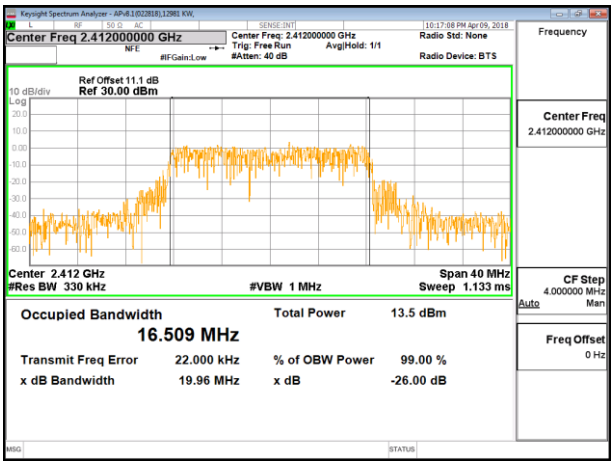
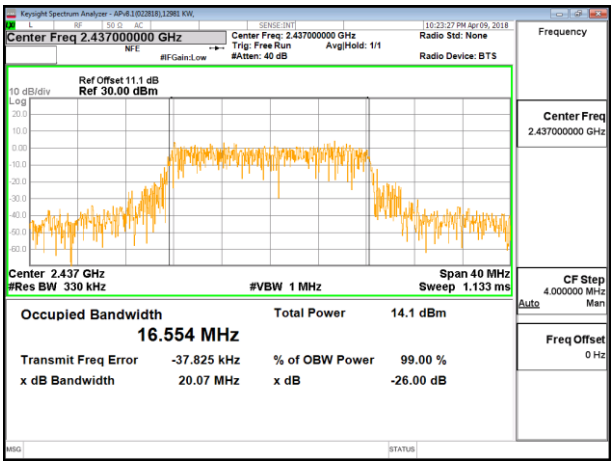
8.2.2. 802.11g MODE

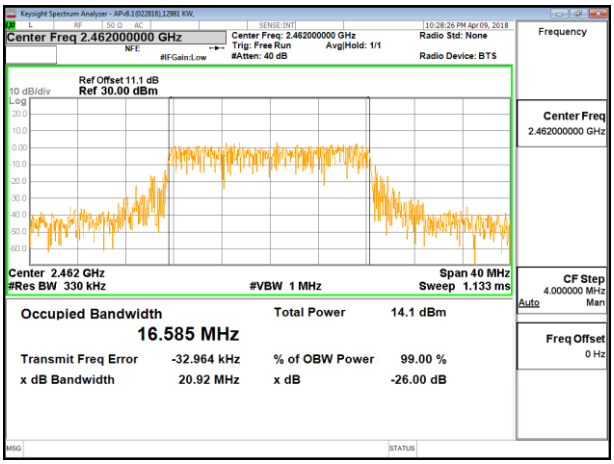
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	16.5090
Mid 6	2437	16.5540
High 11	2462	16.5850



LOW CHANNEL 1



MID CHANNEL 6



HIGH CHANNEL 11

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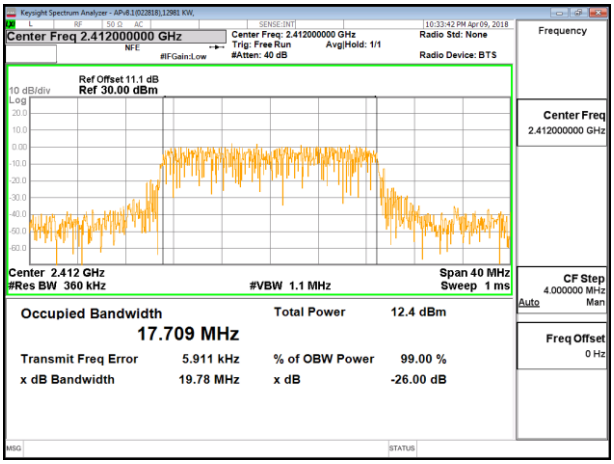
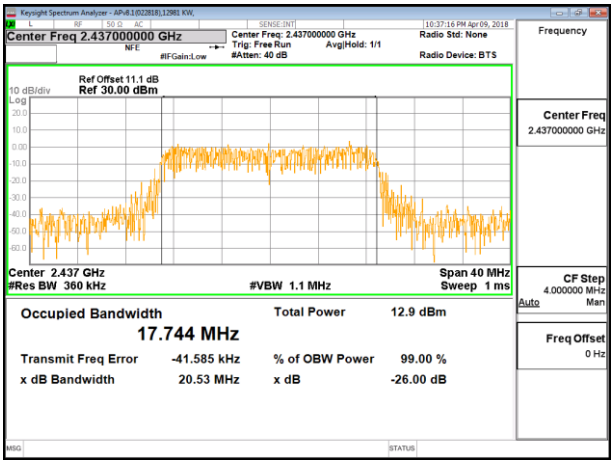
8.2.3. 802.11n HT20 MODE

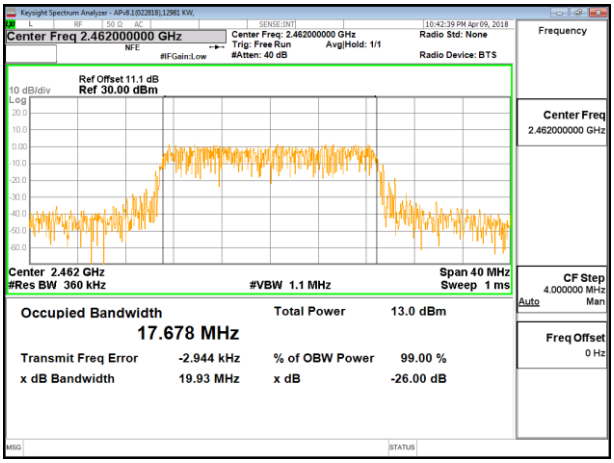
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	17.7090
Mid 6	2437	17.7440
High 11	2462	17.6780



LOW CHANNEL 1



MID CHANNEL 6



HIGH CHANNEL 11

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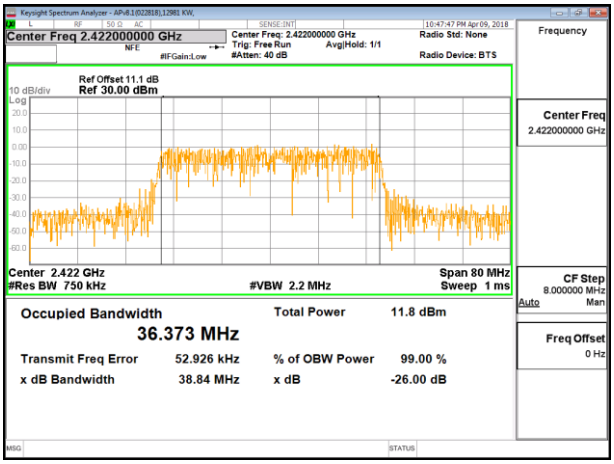
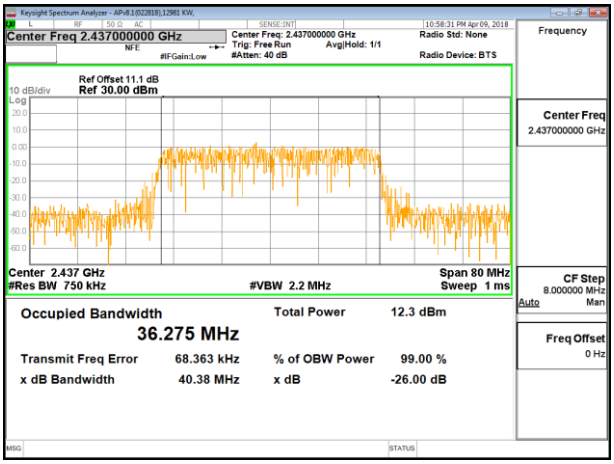
8.2.4. 802.11n HT40 MODE

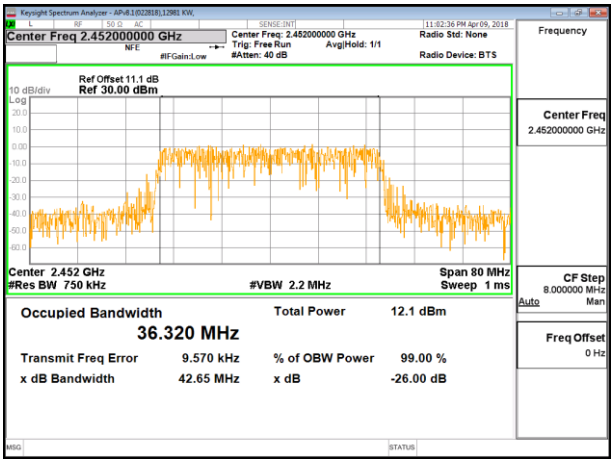
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 3	2422	36.3730
Mid 6	2437	36.2750
High 9	2452	36.3200



LOW CHANNEL 3



MID CHANNEL 6



HIGH CHANNEL 9

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8.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

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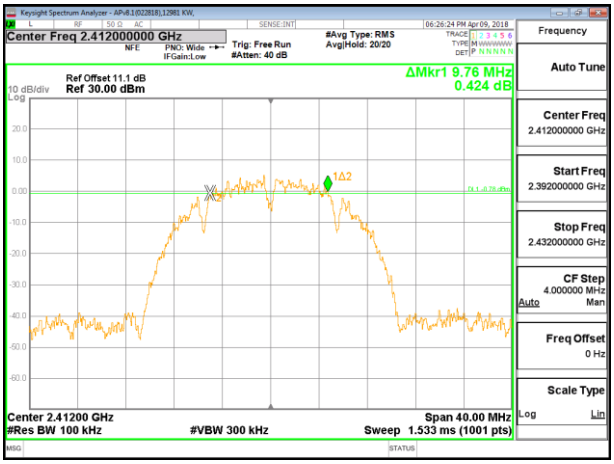
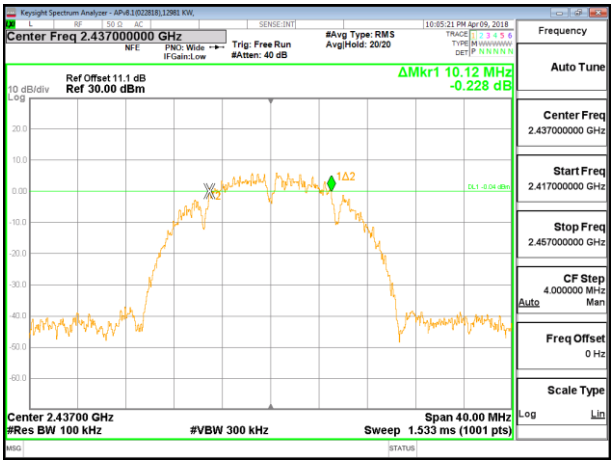
8.3.1. 802.11b MODE

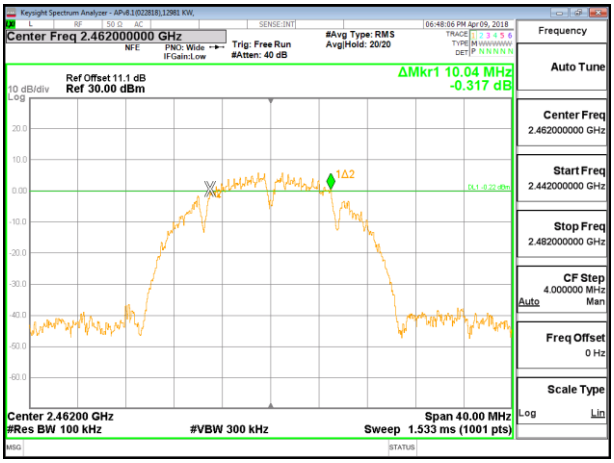
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	9.7600	0.5
Mid 6	2437	10.1200	0.5
High 11	2462	10.0400	0.5



LOW CHANNEL 1



MID CHANNEL 6



HIGH CHANNEL 11

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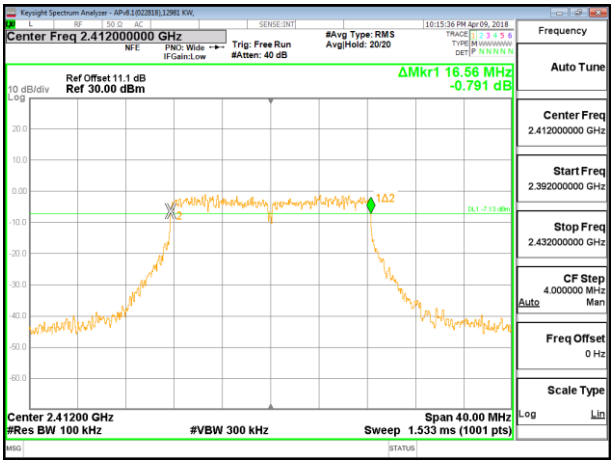
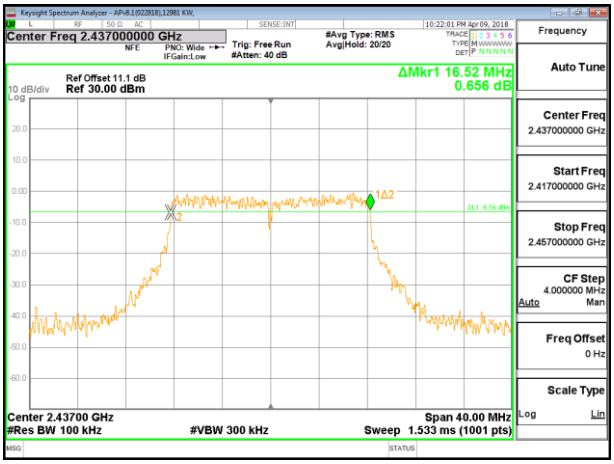
8.3.2. 802.11g MODE

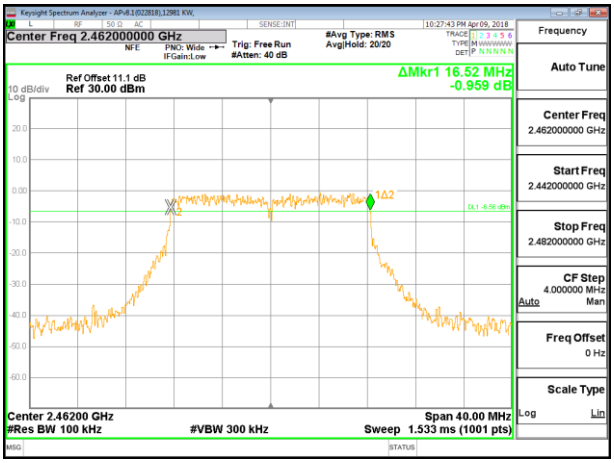
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	16.5600	0.5
Mid 6	2437	16.5200	0.5
High 11	2462	16.5200	0.5



LOW CHANNEL 1



MID CHANNEL 6



HIGH CHANNEL 11

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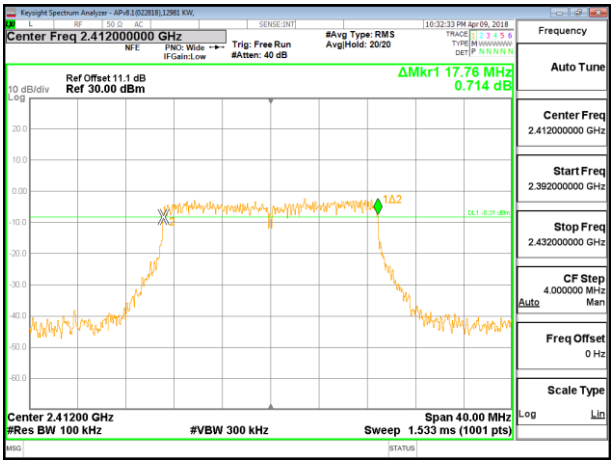
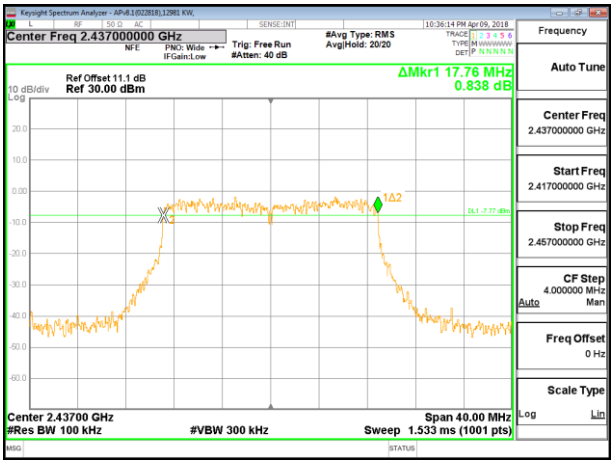
8.3.3. 802.11n HT20 MODE

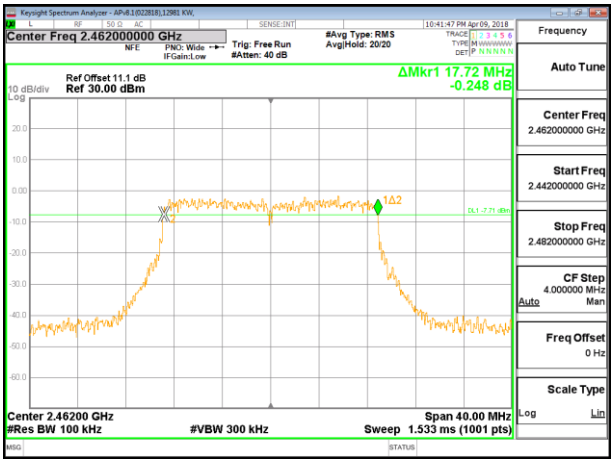
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	17.7600	0.5
Mid 6	2437	17.7600	0.5
High 11	2462	17.7200	0.5



LOW CHANNEL 1



MID CHANNEL 6



HIGH CHANNEL 11

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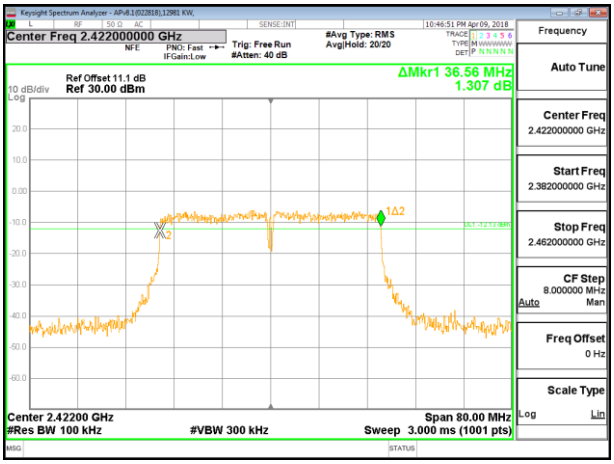
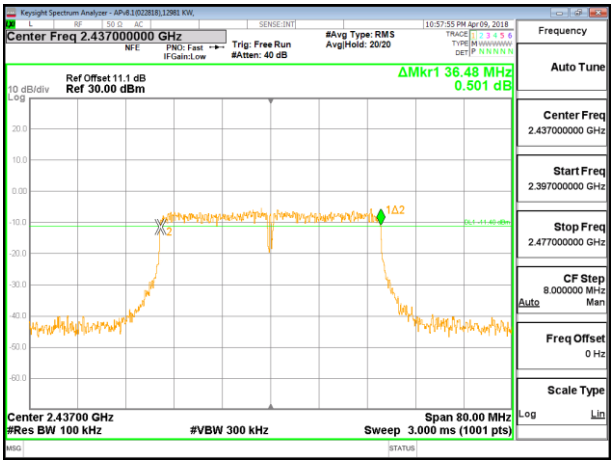
8.3.4. 802.11n HT40 MODE

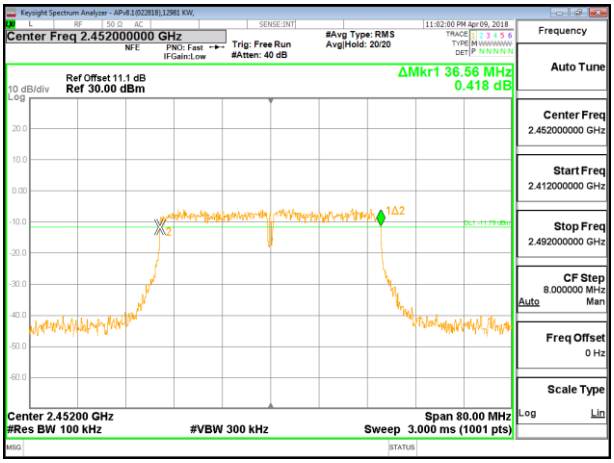
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 3	2422	36.5600	0.5
Mid 6	2437	36.4800	0.5
High 9	2452	36.5600	0.5



LOW CHANNEL 3



MID CHANNEL 6



HIGH CHANNEL 9

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8.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.1 dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the power meter to allow for a gated peak reading of power.

DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

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RESULTS

8.4.1. 802.11b MODE

ID:	12981	Date:	4/9/2018

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
CH1	2412	3.46	30.00	30	36	30.00
CH6	2437	3.46	30.00	30	36	30.00
CH11	2462	3.46	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Measured Power (dBm)	Power Limit (dBm)	Margin (dB)
CH1	2412	19.18	30.00	-10.82
CH6	2437	19.33	30.00	-10.67
CH11	2462	19.42	30.00	-10.58

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8.4.2. 802.11g MODE

ID:	12981	Date:	4/9/2018

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
CH1	2412	3.46	30.00	30	36	30.00
CH6	2437	3.46	30.00	30	36	30.00
CH11	2462	3.46	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Measured Power (dBm)	Power Limit (dBm)	Margin (dB)
CH1	2412	23.56	30.00	-6.44
CH6	2437	23.79	30.00	-6.21
CH11	2462	23.81	30.00	-6.19

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8.4.3. 802.11n HT20 MODE

ID:	12981	Date:	4/9/2018

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
CH1	2412	3.46	30.00	30	36	30.00
CH6	2437	3.46	30.00	30	36	30.00
CH11	2462	3.46	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Measured Power (dBm)	Power Limit (dBm)	Margin (dB)
CH1	2412	22.4	30.00	-7.60
CH6	2437	22.5	30.00	-7.50
CH11	2462	22.58	30.00	-7.42

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8.4.4. 802.11n HT40 MODE

ID:	12981	Date:	4/9/2018

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
CH3	2422	3.46	30.00	30	36	30.00
CH6	2437	3.46	30.00	30	36	30.00
CH9	2452	3.46	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Measured Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
CH3	2422	22.01	22.01	30.00	-7.99
CH6	2437	22.39	22.39	30.00	-7.61
CH9	2452	22.38	22.38	30.00	-7.62

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8.5. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.1 dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the power meter to allow for a gated peak reading of power.

RESULTS

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8.5.1. 802.11b MODE

ID:	12981	Date:	4/9/2018

Channel	Frequency (MHz)	Power (dBm)
CH1	2412	16.16
CH6	2437	16.2
CH11	2462	16.28

8.5.2. 802.11g MODE

ID:	12981	Date:	4/9/2018

Channel	Frequency (MHz)	Power (dBm)
CH1	2412	14.12
CH6	2437	14.32
CH11	2462	14.35

8.5.3. 802.11n HT20 MODE

ID:	12981	Date:	4/9/2018

Channel	Frequency (MHz)	Power (dBm)
CH1	2412	12.92
CH6	2437	13.06
CH11	2462	13.1

8.5.4. 802.11n HT40 MODE

ID:	12981	Date:	4/9/2018

Channel	Frequency (MHz)	Power (dBm)
CH3	2422	11.96
CH6	2437	12.2
CH9	2452	12.3

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8.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

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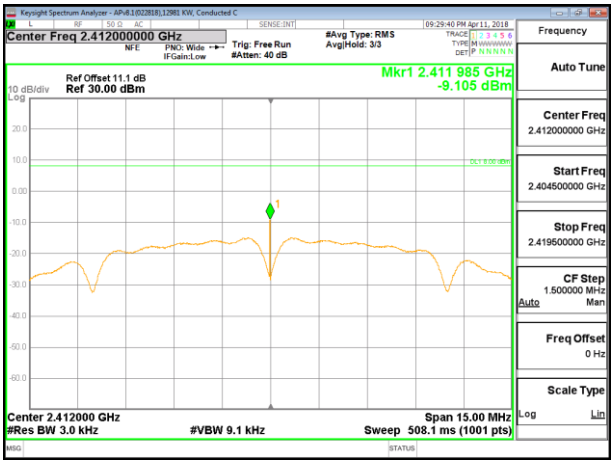
8.6.1. 802.11b MODE

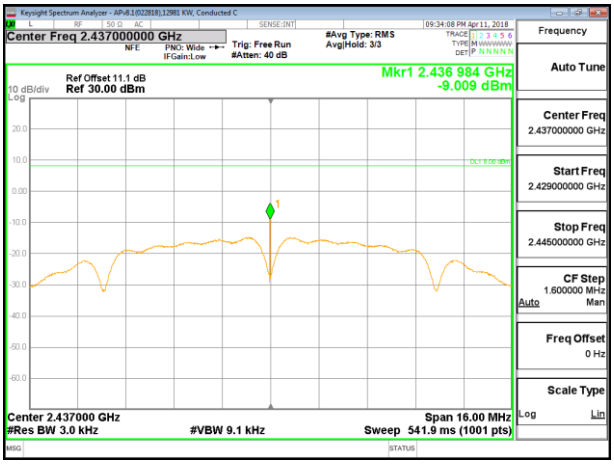
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

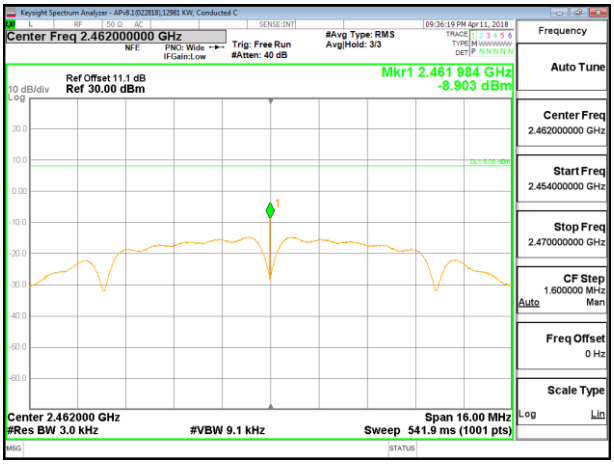
Channel	Frequency (MHz)	Chain 0 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-9.11	-9.11	8.0	-17.1
Mid 6	2437	-9.01	-9.01	8.0	-17.0
High 11	2462	-8.90	-8.90	8.0	-16.9



LOW CHANNEL 1



MID CHANNEL 6



HIGH CHANNEL 11

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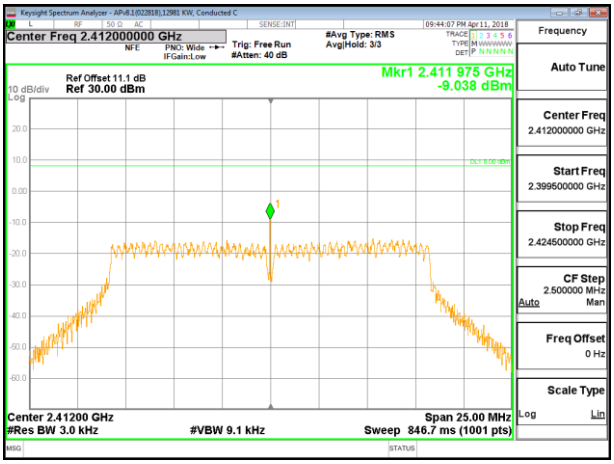
8.6.2. 802.11g MODE

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-9.04	-9.04	8.0	-17.0
Mid 6	2437	-8.55	-8.55	8.0	-16.5
High 11	2462	-8.33	-8.33	8.0	-16.3



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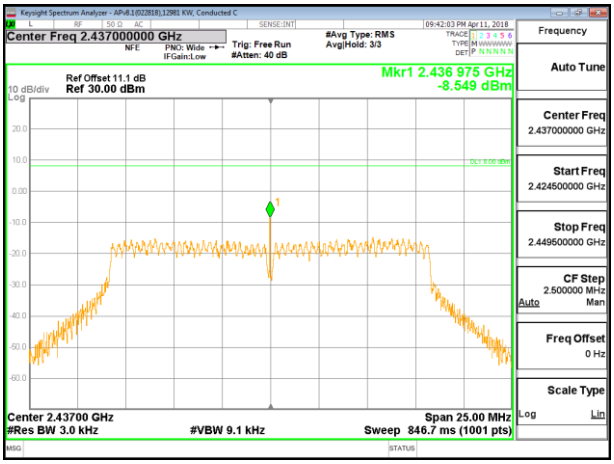

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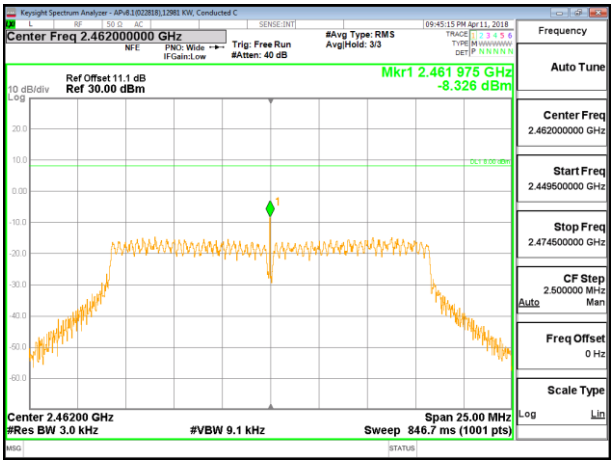

HIGH CHANNEL 11

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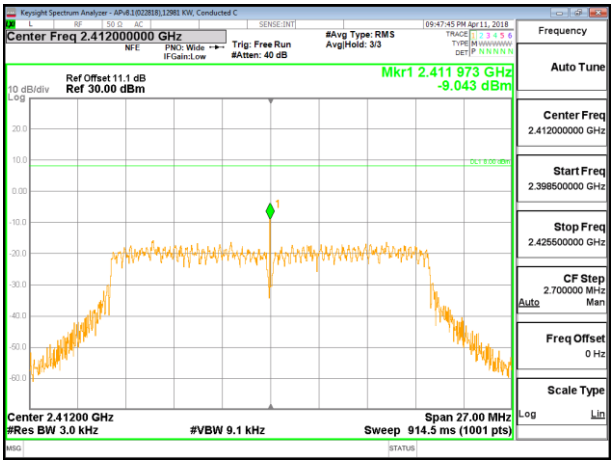
8.6.3. 802.11n HT20 MODE

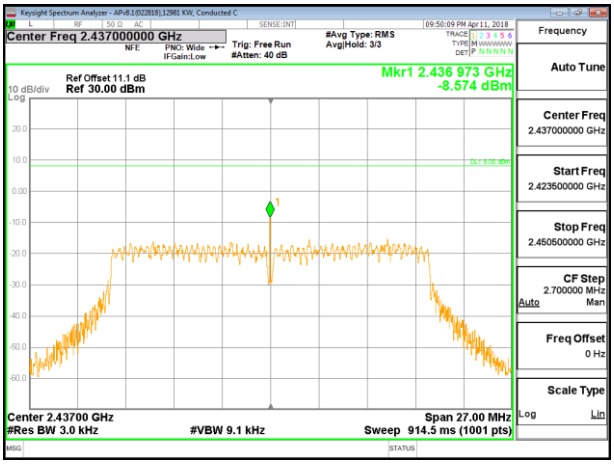
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-9.04	-9.04	8.0	-17.0
Mid 6	2437	-8.57	-8.57	8.0	-16.6
High 11	2462	-8.40	-8.40	8.0	-16.4



LOW CHANNEL 1



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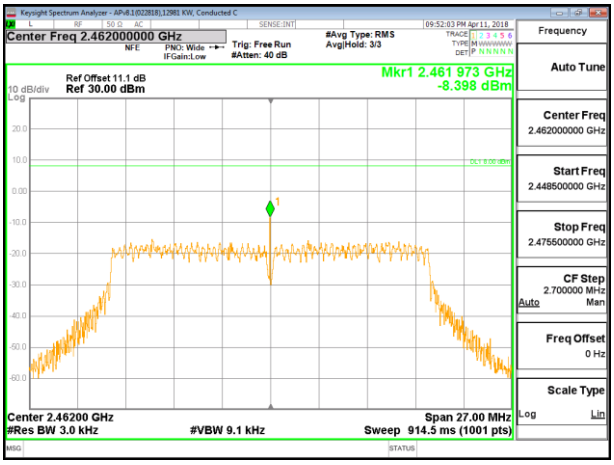

HIGH CHANNEL 11

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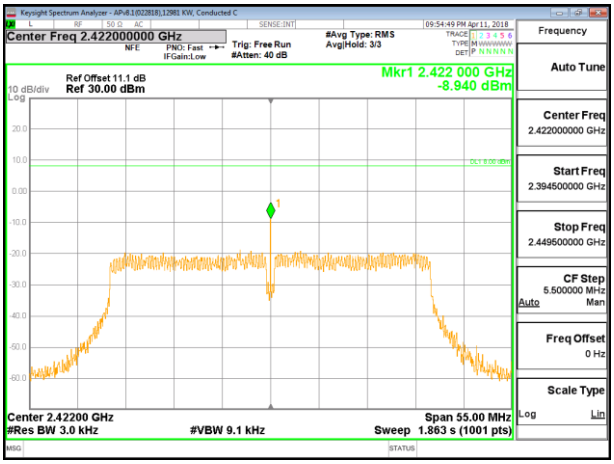
8.6.4. 802.11n HT40 MODE

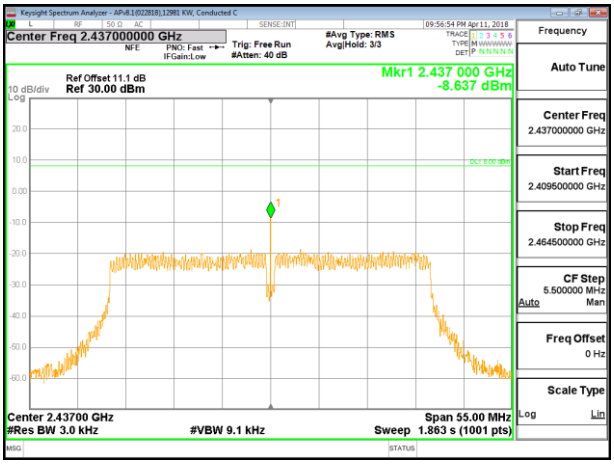
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

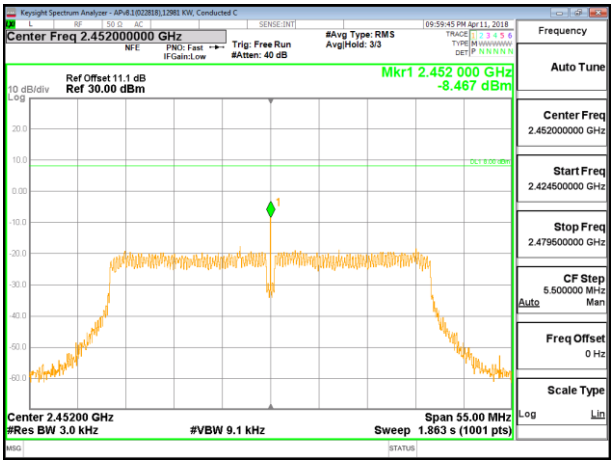
Channel	Frequency (MHz)	Chain 0 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 3	2422	-8.94	-8.94	8.0	-16.9
Mid 6	2437	-8.64	-8.64	8.0	-16.6
High 9	2452	-8.47	-8.47	8.0	-16.5



LOW CHANNEL 3



MID CHANNEL 6



HIGH CHANNEL 9

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8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

RESULTS

Output power was measured based on the use of peak measurement, therefore the required attenuation is 20 dB.

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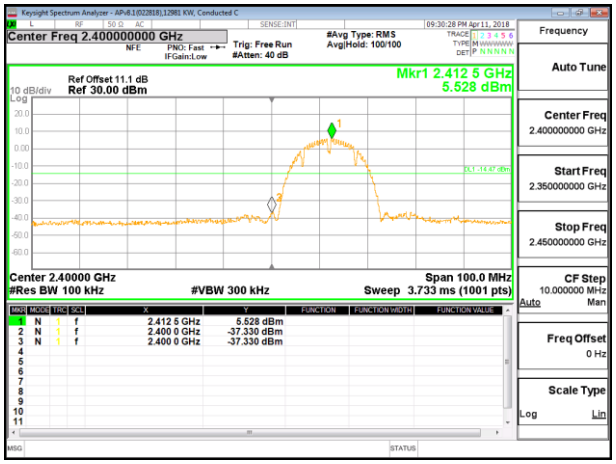
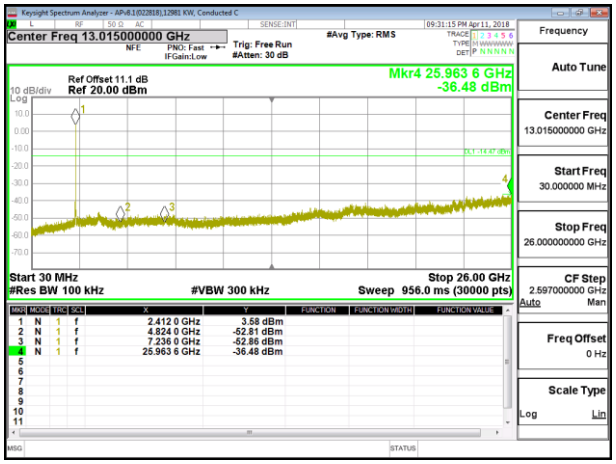
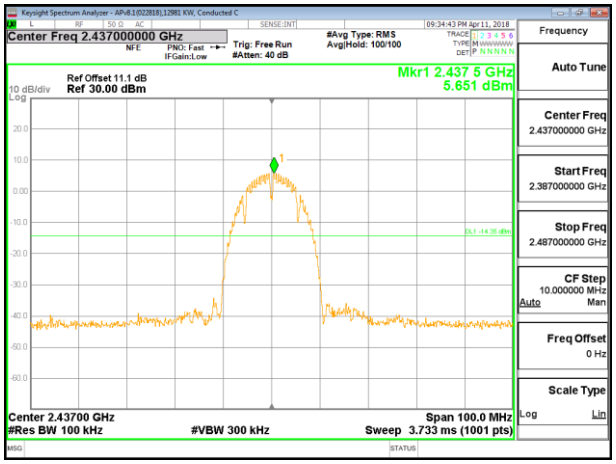
8.7.1. 802.11b MODE



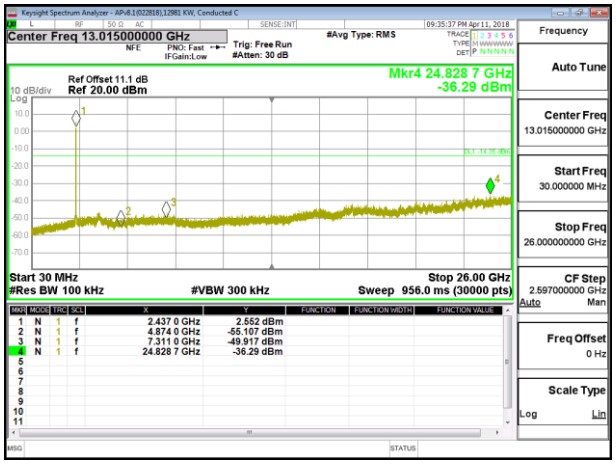
LOW CHANNEL 1 BANDEDGE



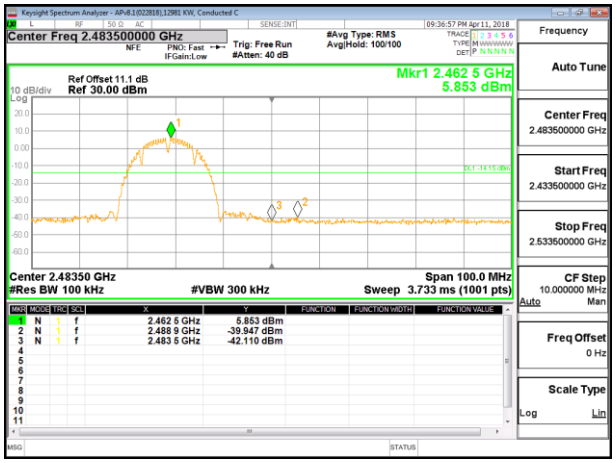
OUT-OF-BAND LOW CHANNEL 1



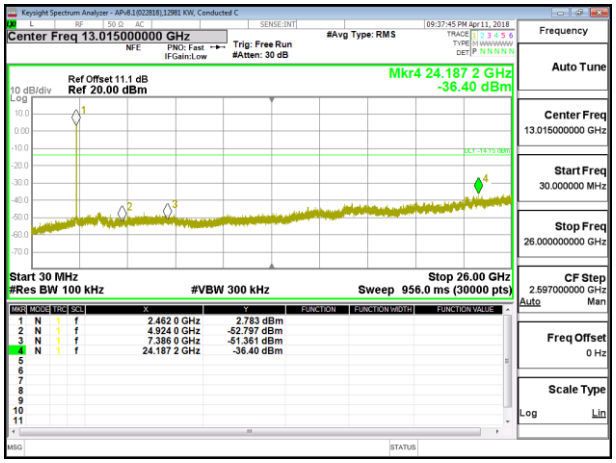
IN-BAND REFERNCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL 11 BANDEDGE



OUT-OF-BAND HIGH CHANNEL 11

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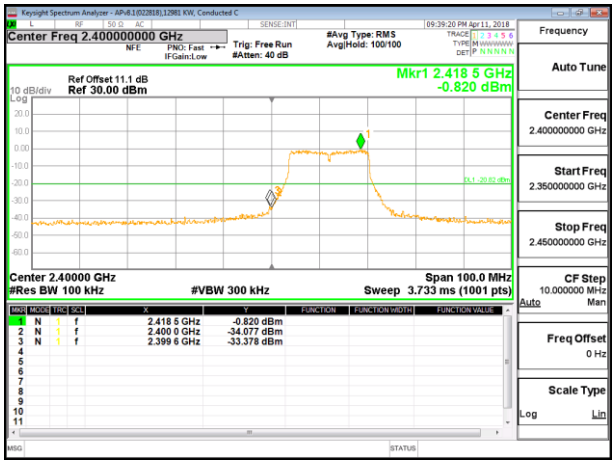
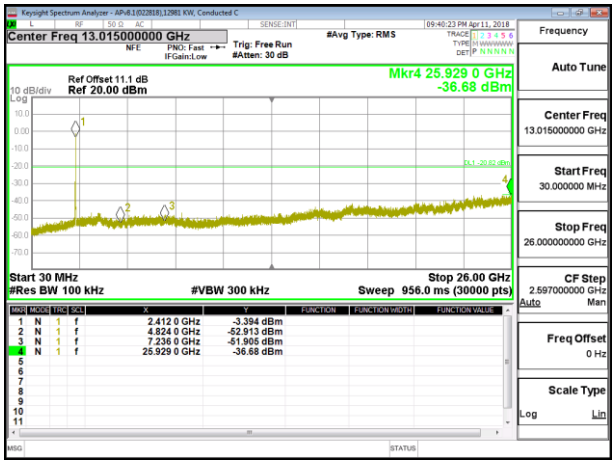
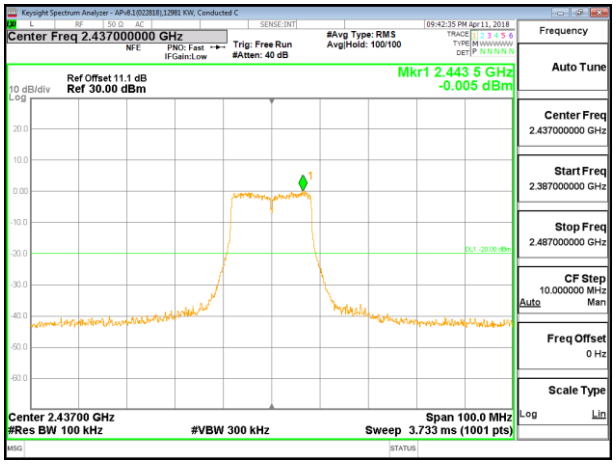
8.7.2. 802.11g MODE



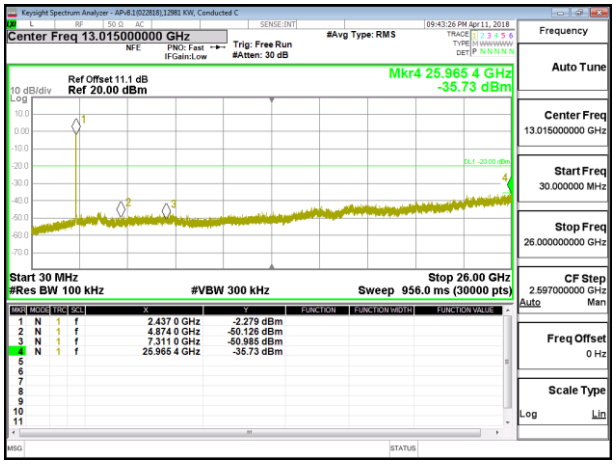
LOW CHANNEL 1 BANDEDGE



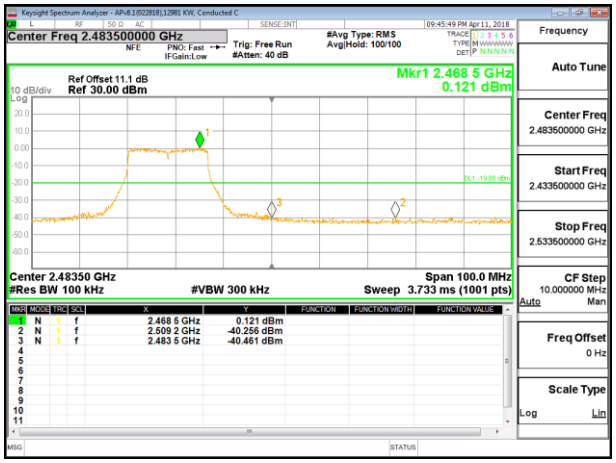
OUT-OF-BAND LOW CHANNEL 1



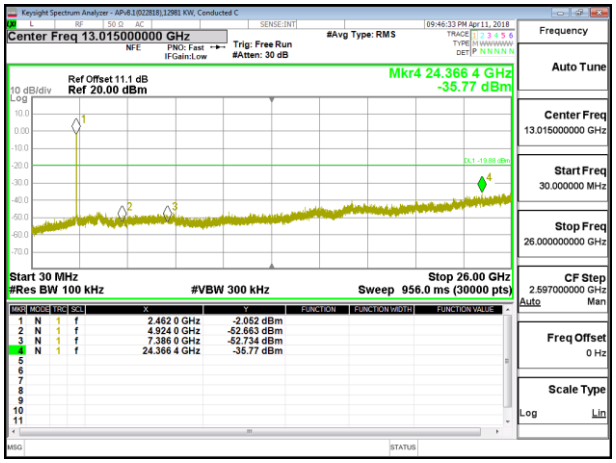
IN-BAND REFERNCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL 11 BANDEDGE



OUT-OF-BAND HIGH CHANNEL 11

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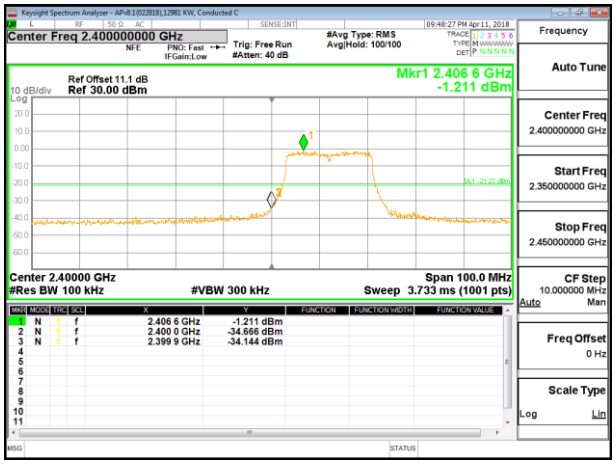
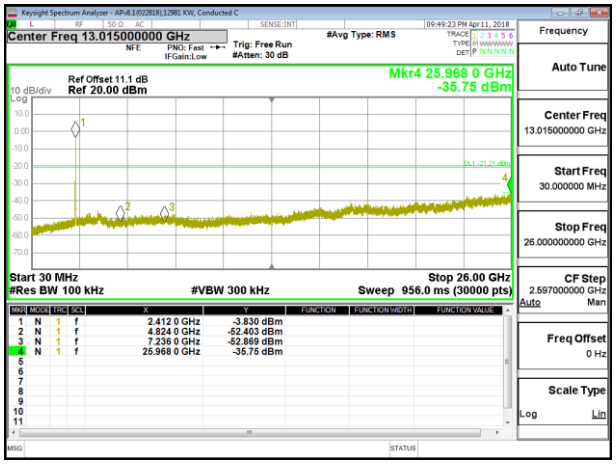
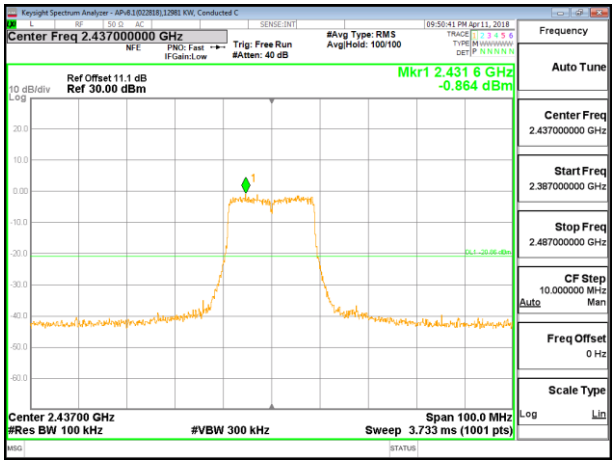
8.7.3. 802.11n HT20 MODE



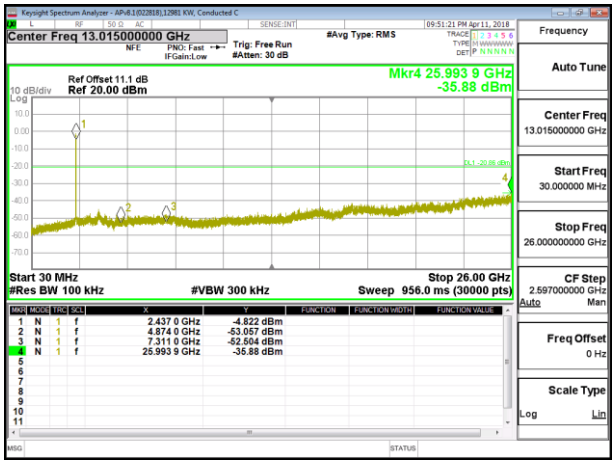
LOW CHANNEL 1 BANDEDGE



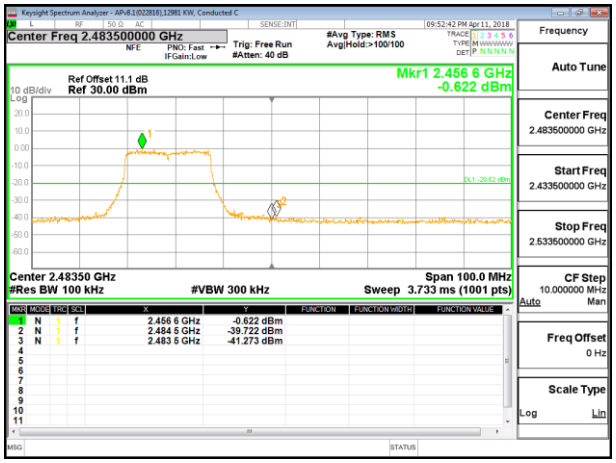
OUT-OF-BAND LOW CHANNEL 1



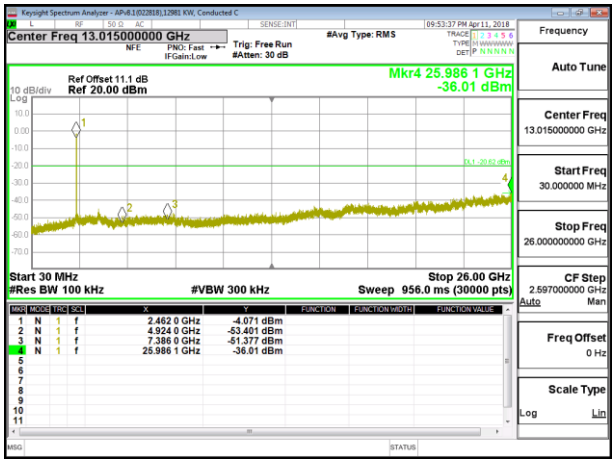
IN-BAND REFERNCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL 11 BANDEDGE



OUT-OF-BAND HIGH CHANNEL 11

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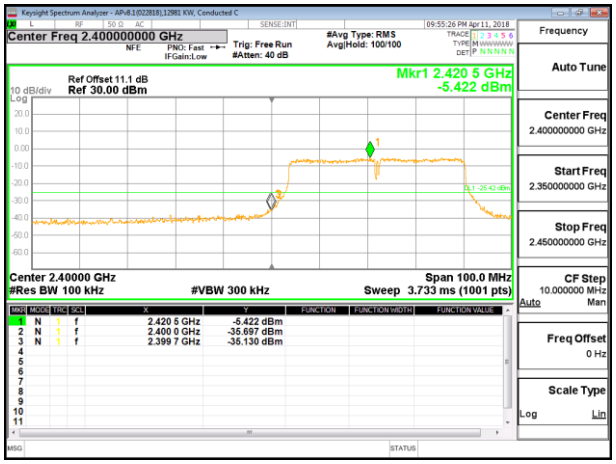
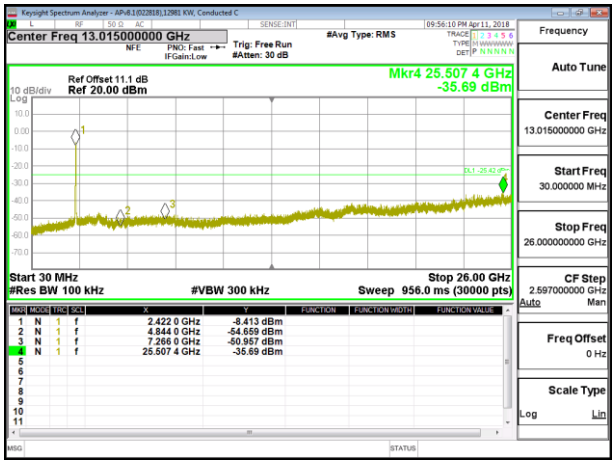
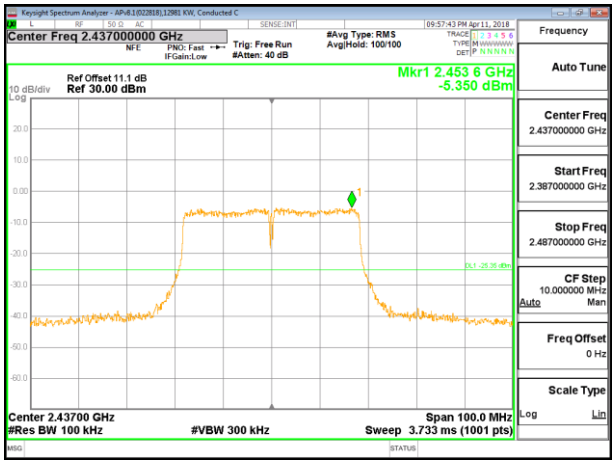
8.7.4. 802.11n HT40 MODE



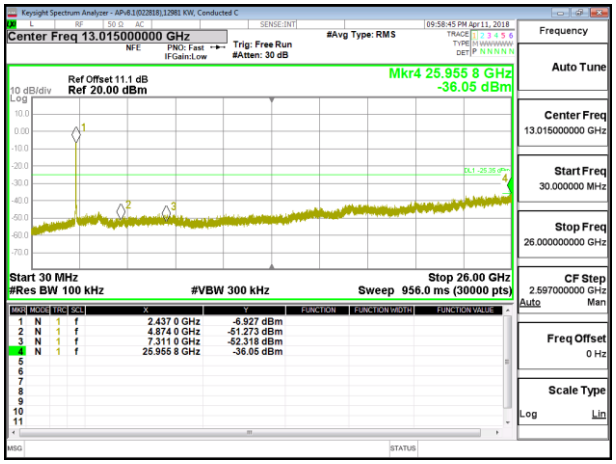
LOW CHANNEL 3 BANDEDGE



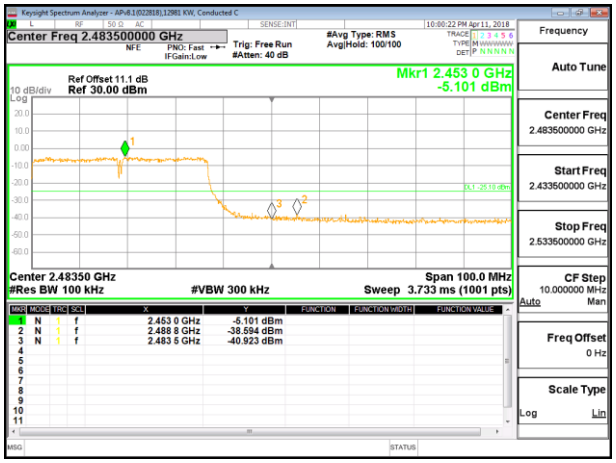
OUT-OF-BAND LOW CHANNEL 3



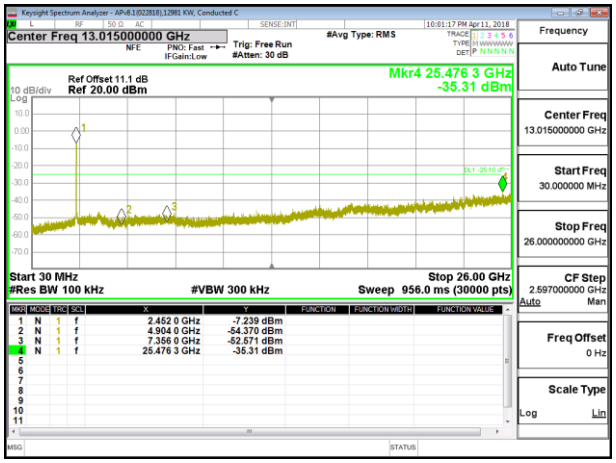
IN-BAND REFERNCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL 9 BANDEDGE



OUT-OF-BAND HIGH CHANNEL 9

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9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300m	2400/F(kHz) @ 300m
0.490-1.705	24000/F(kHz) @ 30m	24000/F(kHz) @ 30m
1.705-30.0	30 @ 30m	30 @ 30m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

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KDB 414788 OATS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

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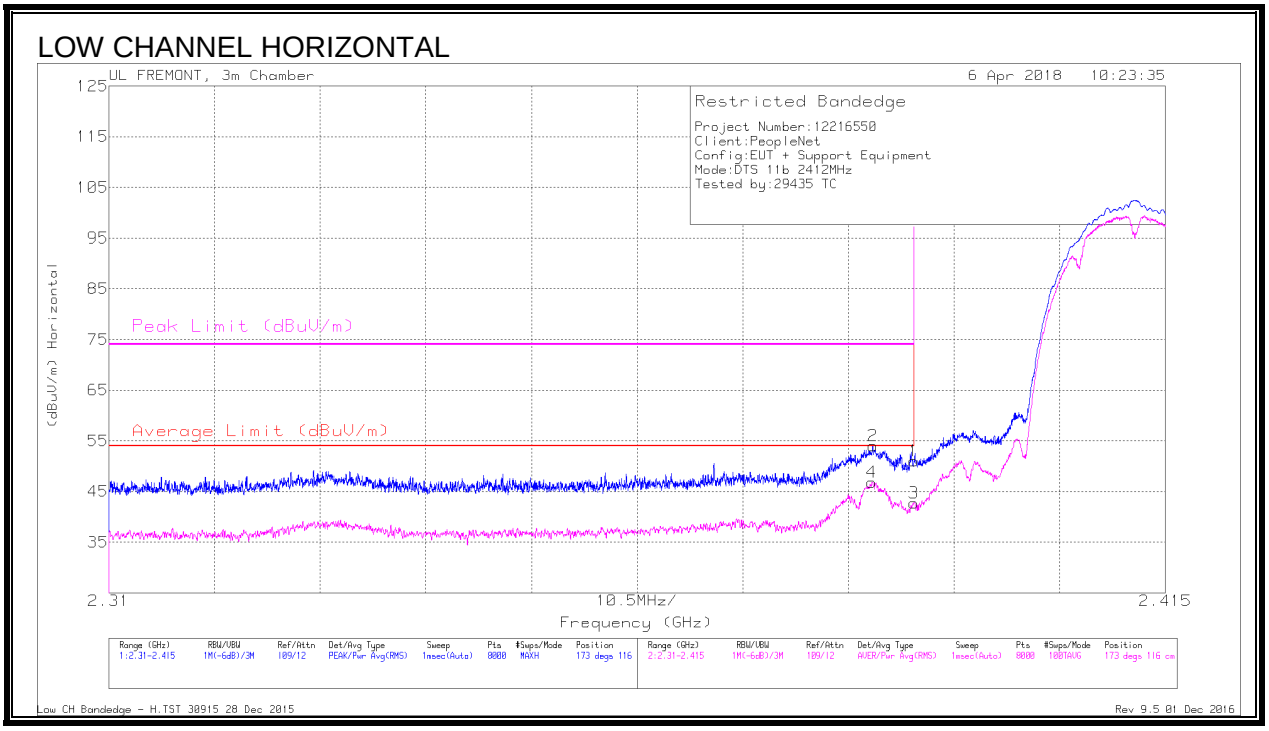
9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. 802.11b MODE IN THE 2.4 GHz BAND

AUTHORIZED BANDEDGE (LOW CHANNEL, CH 1)



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	2.386	43.33	Pk	31.9	-21.2	54.03	-	-	74	-19.97	173	116	H
4	2.386	36.17	RMS	31.9	-21.2	46.87	54	-7.13	-	-	173	116	H
1	2.39	40.49	Pk	31.9	-21.4	50.99	-	-	74	-23.01	173	116	H
3	2.39	32.19	RMS	31.9	-21.4	42.69	54	-11.31	-	-	173	116	H

Pk - Peak detector
RMS - RMS detection

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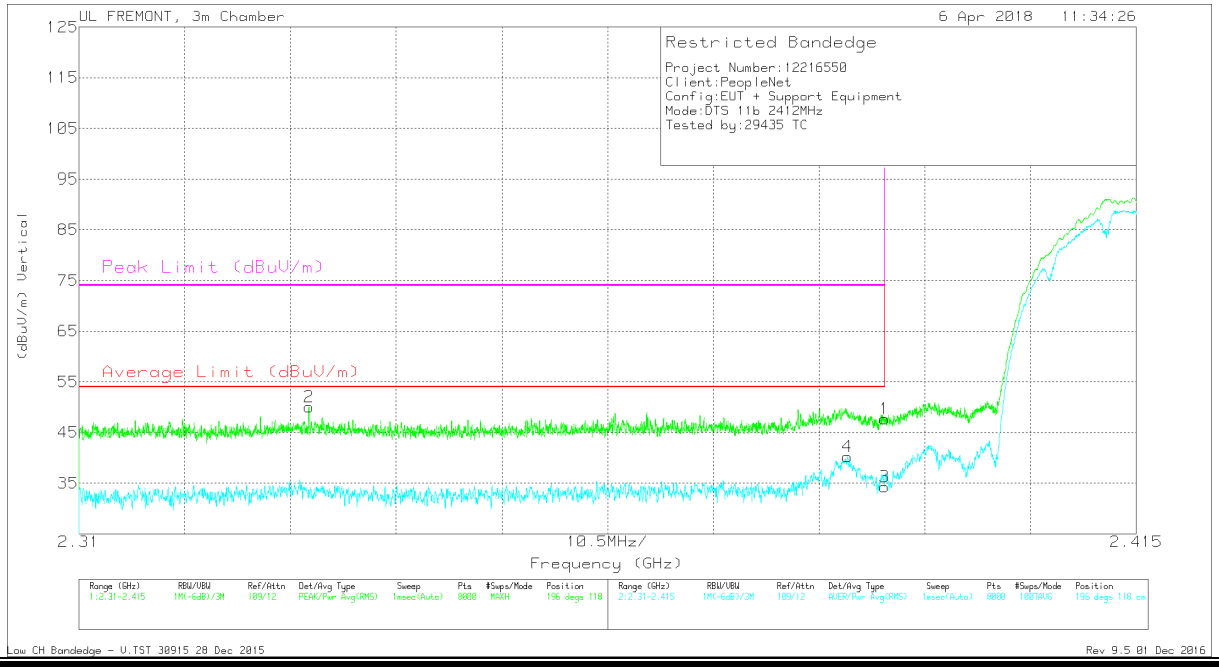
LOW CHANNEL VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	2.333	39.59	Pk	31.7	-21.2	50.09	-	-	74	-23.91	196	118	V
4	2.386	29.49	RMS	31.9	-21.2	40.19	54	-13.81	-	-	196	118	V
1	2.39	37.19	Pk	31.9	-21.4	47.69	-	-	74	-26.31	196	118	V
3	2.39	23.82	RMS	31.9	-21.4	34.32	54	-19.68	-	-	196	118	V

Pk - Peak detector
RMS - RMS detection

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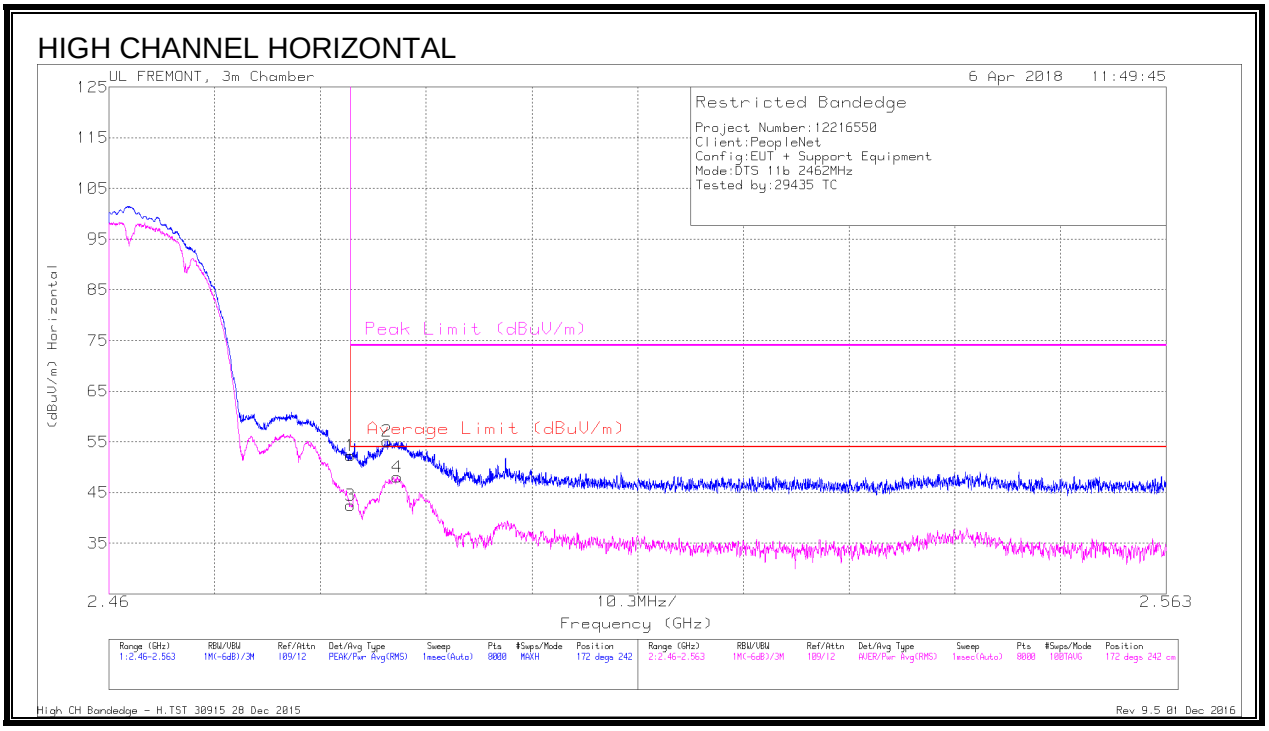
AUTHORIZED BANDEDGE (HIGH CHANNEL, CH 11)



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.484	41.86	Pk	32.2	-21.8	52.26	-	-	74	-21.74	172	242	H
3	2.484	32.02	RMS	32.2	-21.8	42.42	54	-11.58	-	-	172	242	H
2	2.487	44.7	Pk	32.2	-21.8	55.1	-	-	74	-18.9	172	242	H
4	2.488	37.64	RMS	32.2	-21.8	48.04	54	-5.96	-	-	172	242	H

Pk - Peak detector
RMS - RMS detection

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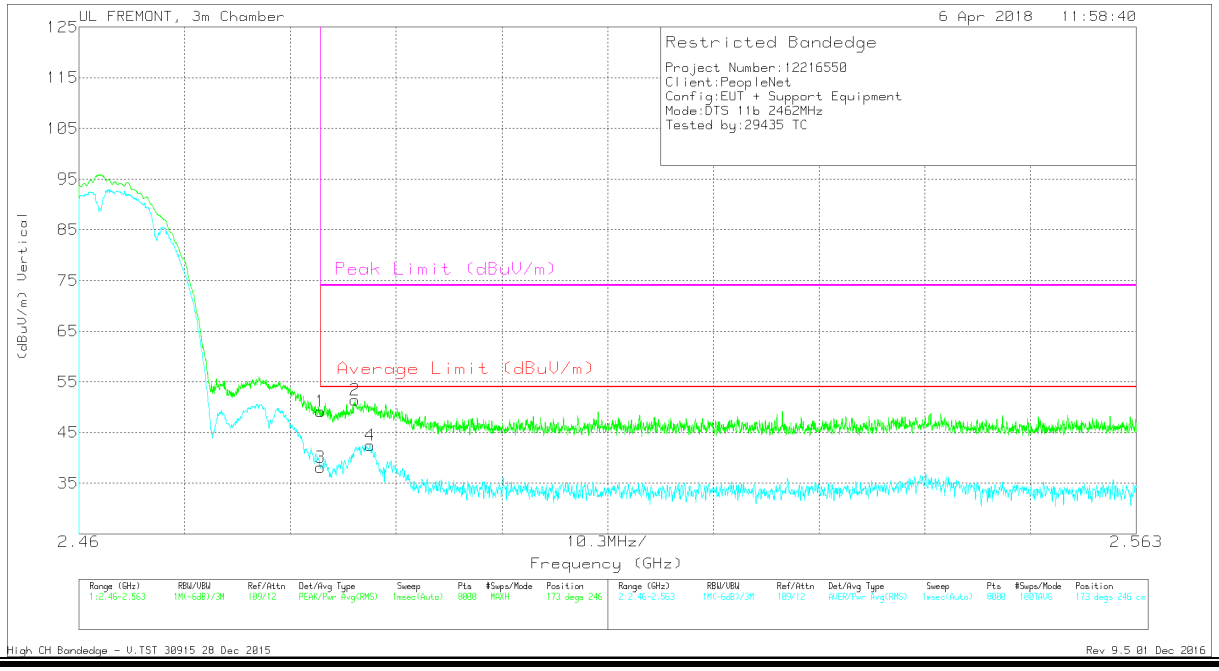
HIGH CHANNEL VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.484	38.78	Pk	32.2	-21.8	49.18	-	-	74	-24.82	173	246	V
3	2.484	27.72	RMS	32.2	-21.8	38.12	54	-15.88	-	-	173	246	V
2	2.487	41	Pk	32.2	-21.8	51.4	-	-	74	-22.6	173	246	V
4	2.488	32.07	RMS	32.2	-21.8	42.47	54	-11.53	-	-	173	246	V

Pk - Peak detector
RMS - RMS detection

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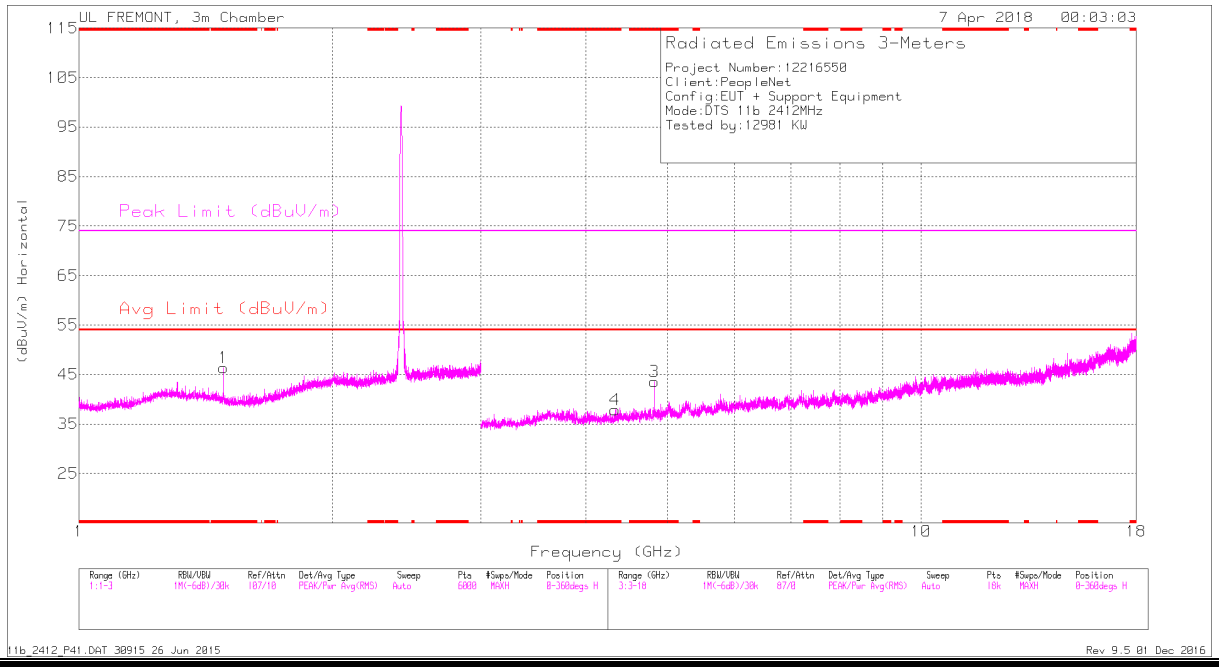
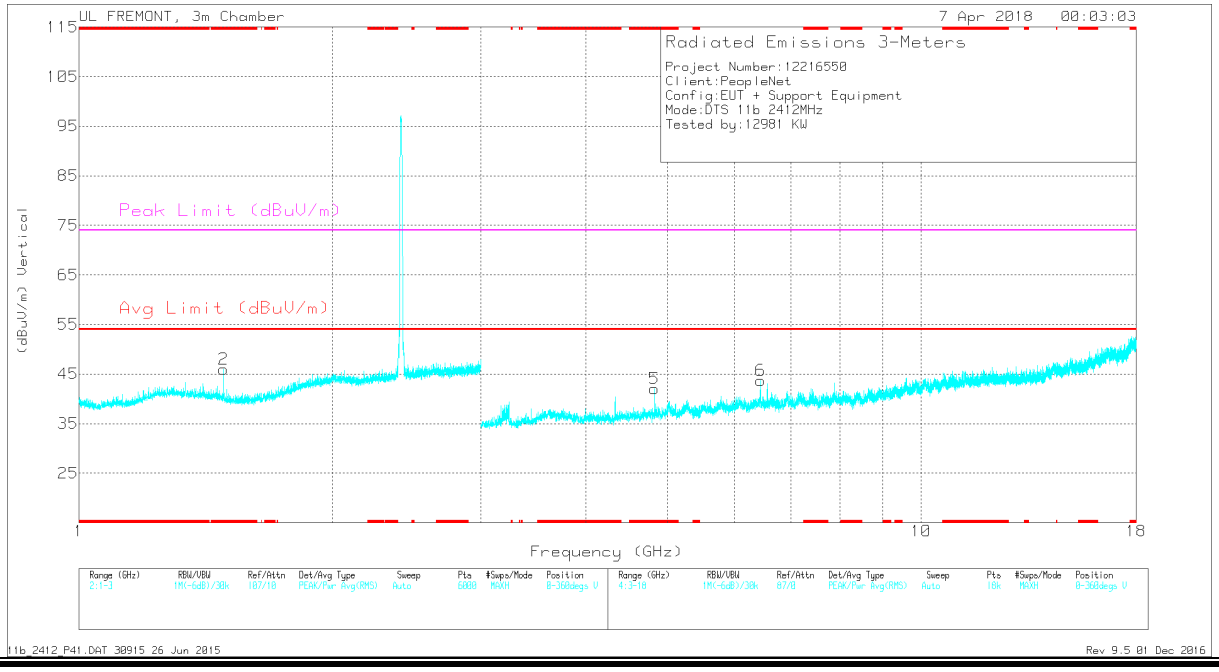
HARMONICS AND SPURIOUS EMISSIONS LOW CHANNEL, CH 1)

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



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DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.485	46.51	PK2	28.4	-21.6	53.31	-	-	74	-20.69	175	340	H
	* 1.485	39.74	MAv1	28.4	-21.6	46.54	54	-7.46	-	-	175	340	H
2	* 1.485	45.34	PK2	28.4	-21.6	52.14	-	-	74	-21.86	3	230	V
	* 1.485	37.69	MAv1	28.4	-21.6	44.49	54	-9.51	-	-	3	230	V
3	* 4.329	38.42	PK2	33.6	-28	44.02	-	-	74	-29.98	66	131	H
	* 4.33	27.32	MAv1	33.6	-28	32.92	54	-21.08	-	-	66	131	H
4	* 4.824	38.12	PK2	34.1	-26.6	45.62	-	-	74	-28.38	24	202	H
	* 4.824	26.44	MAv1	34.1	-26.6	33.94	54	-20.06	-	-	24	202	H
5	* 4.824	37.99	PK2	34.1	-26.6	45.49	-	-	74	-28.51	131	138	V
	* 4.824	26.89	MAv1	34.1	-26.6	34.39	54	-19.61	-	-	131	138	V
6	6.445	34.05	Pk	35.7	-26.1	43.65	-	-	-	-	0-360	200	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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