FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

For

Outdoor Wireless LAN Access Point

MODEL NUMBER: AP8030DN

FCC ID: QISAP8030DN

REPORT NUMBER: 4788310840.1-1

ISSUE DATE: July 15, 2018

Prepared for

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	07/15/2018	Initial Issue	
R2	07/15/2018	Upgrade data from sections 7.3 .	Miller. Ma

Summary of Test Results			
Clause	**Test Items**	FCC/IC Rules	Test Results
1	6dB Bandwidth and 99% Bandwidth	FCC 15.247 (a) (2) RSS-247 Clause 5.2 (a)	PASS
2	Peak Conducted Output Power	FCC 15.247 (b) (3) RSS-247 Clause 5.4 (e)	PASS
3	Power Spectral Density	FCC 15.247 (e) RSS-247 Clause 5.2 (b)	PASS
4	Conducted Bandedge and Spurious Emission	FCC 15.247 (d) RSS-247 Clause 5.5	PASS
5	Radiated Bandedge and Spurious Emission	FCC 15.247 (d) FCC 15.209 FCC 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9	PASS
6	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	PASS
7	Antenna Requirement	FCC 15.203 RSS-GEN Clause 8.3	PASS

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	HUAWEI TECHNOLOGIES CO., LTD.
Address:	Administration Building, Huawei Technologies Co., Ltd. Bantian, Longgang District, Shenzhen, P.R. China, 518129

Manufacturer Information

Company Name:	HUAWEI TECHNOLOGIES CO., LTD.
Address:	Administration Building, Huawei Technologies Co., Ltd. Bantian, Longgang District, Shenzhen, P.R. China, 518129

EUT Description

EUT Name:	Outdoor Wireless LAN Access Point
Model:	AP8030DN
Brand Name:	HUAWEI
Sample Status:	Normal
Sample ID:	1358586
Sample Received Date:	January 04, 2018
Date of Tested:	January 04, 2018~July 10, 2018

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

Tested By:

Miller Ma
Engineer Project Associate

Checked By:

Shawn Wen
Operations Leader

Approved By:

Stephen Guo

Operations Manager

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB558074 D01 DTS Meas Guidance v04, KDB414788 D01 Radiated Test Site v01, ANSI C63.10-2013 and KDB 662911 D01 Multiple Transmitter Output v02r01.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	**A2LA (Certificate No.: 4102.01)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA. **FCC (FCC Designation No.: CN1187)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Delcaration of Conformity (DoC) and Certification rules **IC(Company No.: 21320)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with Industry Canada. The Company Number is 21320. **VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793. Facility Name: Chamber D, the VCCI registration No. is G-20019 and R-20004 Shielding Room B, the VCCI registration No. is C-20012 and T-20011

Note 1: All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China

Note 2: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

Note 3: For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30MHz had been correlated to measurements performed on an OATS.

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 recognize national standards.

4.2. MEASUREMENT UNCERTAINTY

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

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.90dB
Uncertainty for Radiation Emission test(include Fundamental emission) (9KHz-30MHz)	2.2dB
Uncertainty for Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	4.52dB
Uncertainty for Radiation Emission test (1GHz to 26GHz)(include Fundamental emission)	5.04dB(1-6GHz)
	5.30dB (6GHz-18Gz)
	5.23dB (18GHz-26Gz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Equipment	Outdoor Wireless LAN Access Point		
EUT Description	The EUT is an Access Point for outdoor use.		
Model Name	AP8030DN		
Radio Technology	IEEE802.11b/g/n HT20/n HT40		
Operation frequency	IEEE 802.11b: 2412MHz—2462MHz IEEE 802.11g: 2412MHz—2462MHz IEEE 802.11n HT20: 2412MHz—2462MHz IEEE 802.11n HT40: 2422MHz—2452MHz		
Modulation	IEEE 802.11b: DSSS(CCK) IEEE 802.11g: OFDM(BPSK, QPSK, 16QAM, 64QAM) IEEE 802.11n HT20: OFDM (BPSK, QPSK, 16QAM, 64QAM) IEEE 802.11n HT40: OFDM (BPSK, QPSK, 16QAM, 64QAM)		
Power Supply	Power Adapter	Input	AC 100~240V, 50~60Hz, 1.0A
		Output	DC 48V, 0.65A
Hardware Version	VER.C		
Software Version	V200		

5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Number of Transmit ANTs (NTX)	IEE Std. 802.11	Channel Number	Max Output Power (dBm)
2412-2462	3	b	1-11[11]	20.95
2412-2462	3	g	1-11[11]	19.13
2412-2462	3	n HT20	1-11[11]	19.09
2422-2452	3	n HT40	3-9[7]	16.90

5.3. CHANNEL LIST

Channel List for 802.11b/g/n (20 MHz)							
Channel	Frequency (MHz)	Channel	Frequenc y(MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	5	2432	9	2452		
2	2417	6	2437	10	2457		
3	2422	7	2442	11	2462		
4	2427	8	2447				

Channel List for 802.11n (40 MHz)							
Channe l	Frequency (MHz)	Channel	Frequenc y(MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	7	2442				
4	2427	8	2447				
5	2432	9	2452				
6	2437						

5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
WiFi TX(802.11b)	CH 1, CH 6, CH 11	2412MHz, 2437MHz, 2462MHz
WiFi TX(802.11g)	CH 1, CH 6, CH 11	2412MHz, 2437MHz, 2462MHz
WiFi TX(802.11n HT20)	CH 1, CH 6, CH 11	2412MHz, 2437MHz, 2462MHz
WiFi TX(802.11n HT40)	CH 3, CH 6, CH 9	2422MHz, 2437MHz, 2452MHz

5.5. THE WORSE CASE CONFIGURATIONS

1TX Mode

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Test Software		cart					
Modulation Mode	Transmit Antenna Number	Test Channel					
		NCB: 20MHz			NCB: 40MHz		
		CH 1	CH 6	CH 11	CH 3	CH 6	CH 9
802.11b	A	19	20	16.5	N/A		
802.11g	A	14	15	13			
802.11n HT20	A	12	14	13			
802.11n HT40	A	N/A	N/A	N/A	11	12	11

2TX Mode

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Test Software		cart					
Modulation Mode	Transmit Antenna Number	Test Channel					
		NCB: 20MHz			NCB: 40MHz		
		CH 1	CH 6	CH 11	CH 3	CH 6	CH 9
802.11b	A&C	15	16	15	N/A		
802.11g	A&C	13	14	13			
802.11n HT20	A&C	13	14	12.5			
802.11n HT40	A&C	N/A	N/A	N/A	11	12	11

3TX Mode

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Test Software		cart					
Modulation Mode	Transmit Antenna Number	Test Channel					
		NCB: 20MHz			NCB: 40MHz		
		CH 1	CH 6	CH 11	CH 3	CH 6	CH 9
802.11b	A&B&C	13	13.5	11.5	N/A		
802.11g	A&B&C	11	13.5	10			
802.11n HT20	A&B&C	10	13.5	10			
802.11n HT40	A&B&C	N/A	N/A	N/A	9	10	9

Remarks: EUT support for diversity and MIMO Transmission, all modes and antennas are pre-scanned, antenna A is worst for 1TX mode worst case, antenna A&C is worst case for 2TX mode, A&B&C is worst case for 3TX mode.

5.6. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	35 ~ 65%	
Atmospheric Pressure:	1025Pa	
Temperature	TN	23 ~ 28°C
Voltage :	VL	N/A
	VN	AC 120V/60Hz
	VH	N/A

Note: VL= Lower Extreme Test Voltage
VN= Nominal Voltage
VH= Upper Extreme Test Voltage
TN= Normal Temperature

5.7. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)	Antenna Technology
A	2412-2462	Omni-Directional	11.5	SISO&MIMO

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)	Antenna Technology
B	2412-2462	Omni-Directional	11.5	SISO&MIMO

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)	Antenna Technology
C	2412-2462	Omni-Directional	11.5	SISO&MIMO

5.8. WORST-CASE CONFIGURATIONS

IEE Std. 802.11	Modulation Technology	Modulation Type	Data Rate (Mbps)	Worst Case (Mbps)
b	DSSS	CCK	11/5.5/2/1	1
g	OFDM	BPSK, QPSK, 16QAM, 64QAM	54/48/36/24/18/12/9/6	6
n HT20	OFDM	BPSK, QPSK, 16QAM, 64QAM	(MCS0~MCS23)	MCS0
n HT40	OFDM	BPSK, QPSK, 16QAM, 64QAM	(MCS0~MCS23)	MCS0

Remarks: EUT support for diversity and MIMO Transmission, all modes and antennas are pre-scanned, antenna A is worst for 1TX mode worst case, antenna A&C is worst case for 2TX mode, A&B&C is worst case for 3TX mode.

5.9. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
1	Laptop	ThinkPad	T460S	SL10K24796 JS
2	RJ45 to Serial Cable	N/A	N/A	N/A
3	Serial to USB Cable	N/A	N/A	N/A

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	GE0/PoE	RJ45	Unshielded	0.5	N/A
2	GE1	RJ45	Unshielded	0.5	N/A
3	SPF	Fiber Optic	Unshielded	N/A	N/A
4	Console	RJ45	Unshielded	0.5	N/A

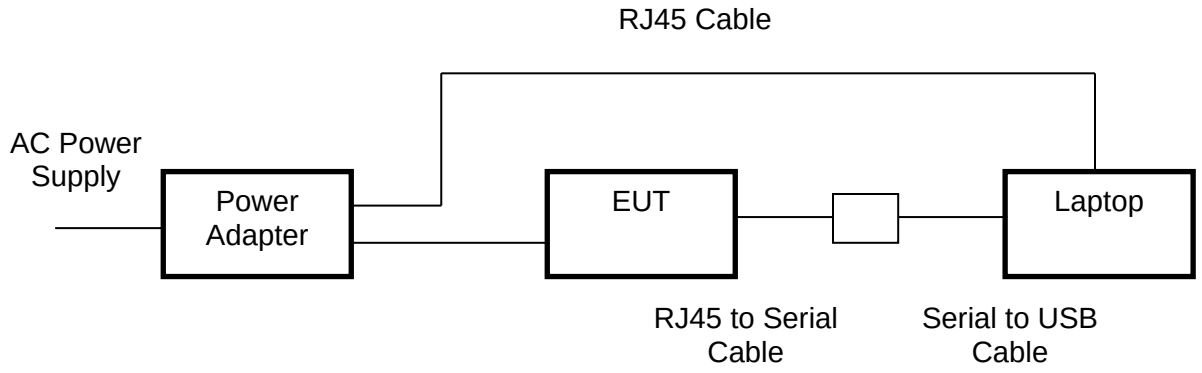
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	Power Adapter	HUAWEI	POE35-54A	Input: AC 100~240, 50/60Hz, 1.0 A Output: DC 48V, 0.65A

TEST SETUP

The EUT can work in engineering mode with software through a Laptop.

SETUP DIAGRAM FOR TESTS



5.10. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	EMI Test Receiver	R&S	ESR3	101961	Dec.12, 2017	Dec.12, 2018
☑	Two-Line V-Network	R&S	ENV216	101983	Jan.16, 2018	Jan.16, 2019
☑	Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Dec.12, 2017	Dec.12, 2018
Software						
Used	Description		Manufacturer	Name	Version	
☑	Test Software for Conducted disturbance		UL	Antenna port	Ver. 7.2	
Radiated Emissions						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Dec.12, 2017	Dec.12, 2018
☑	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Jan.09, 2016	Jan.09, 2019
☑	Preamplifier	HP	8447D	2944A09099	Dec.12, 2017	Dec.12, 2018
☑	EMI Measurement Receiver	R&S	ESR26	101377	Dec.12, 2017	Dec.12, 2018
☑	Horn Antenna	TDK	HRN-0118	130939	Jan. 09, 2016	Jan. 09, 2019
☑	High Gain Horn Antenna	Schwarzbeck	BBHA-9170	691	Jan.06, 2016	Jan.06, 2019
☑	Preamplifier	TDK	PA-02-0118	TRS-305-00066	Dec.12, 2017	Dec.12, 2018
☑	Preamplifier	TDK	PA-02-2	TRS-307-00003	Dec.12, 2017	Dec.12, 2018
☑	Loop antenna	Schwarzbeck	1519B	00008	Mar. 26, 2016	Mar. 26, 2019
Software						
Used	Description		Manufacturer	Name	Version	
☑	Test Software for Radiated disturbance		Farad	EZ-EMC	Ver. UL-3A1	
Other instruments						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	Spectrum Analyzer	Keysight	N9030A	MY55410512	Dec.12, 2017	Dec.12, 2018
☑	Power Meter	Keysight	N9031A	MY55416024	Dec.12, 2017	Dec.12, 2018
☑	Power Sensor	Keysight	N9323A	MY55440013	Dec.12, 2017	Dec.12, 2018
☑	Power Sensor	Keysight	U2021XA	MY57030004	Dec.12, 2017	Dec.12, 2018

6. MEASUREMENT METHODS

No.	Test Item	KDB Name	Section
1	6dB Bandwidth and 99% Bandwidth	KDB 558074 D01 DTS Meas Guidance v04	8.0
2	Peak Output Power	KDB 558074 D01 DTS Meas Guidance v04	9.1.1
3	Power Spectral Density	KDB 558074 D01 DTS Meas Guidance v04	10.2
4	Out-of-band emissions in non-restricted bands	KDB 558074 D01 DTS Meas Guidance v04	11.0
5	Out-of-band emissions in restricted bands	KDB 558074 D01 DTS Meas Guidance v04	12.1
6	Band-edge	KDB 558074 D01 DTS Meas Guidance v04	13.3.2
7	Conducted Emission Test For AC Power Port	ANSI C63.10-2013	7.3

7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

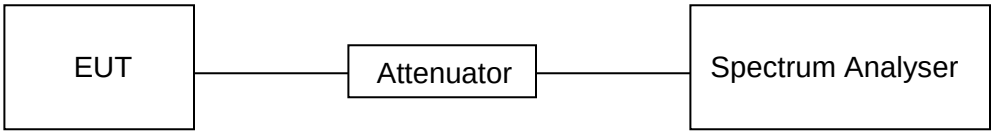
LIMITS

None; for reporting purposes only

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method

TEST SETUP



RESULTS

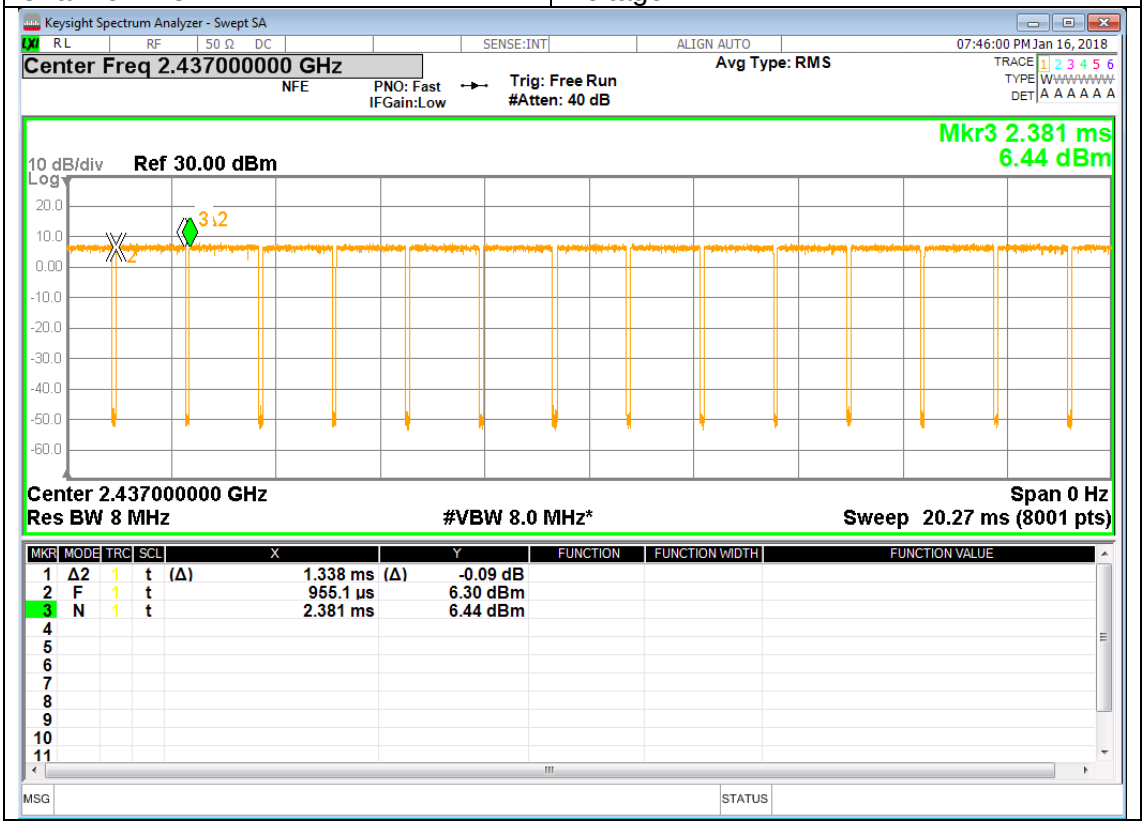
ANTENNA1

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/T Minimum VBW (KHz)
11b	7.843	8.187	0.957982167	96	0.19	0.13
11g	1.338	1.426	0.93828892	94	0.28	0.75
11n20	1.257	1.3378	0.939602332	94	0.27	0.80
11n40	0.6232	0.7063	0.882344613	88	0.54	1.60

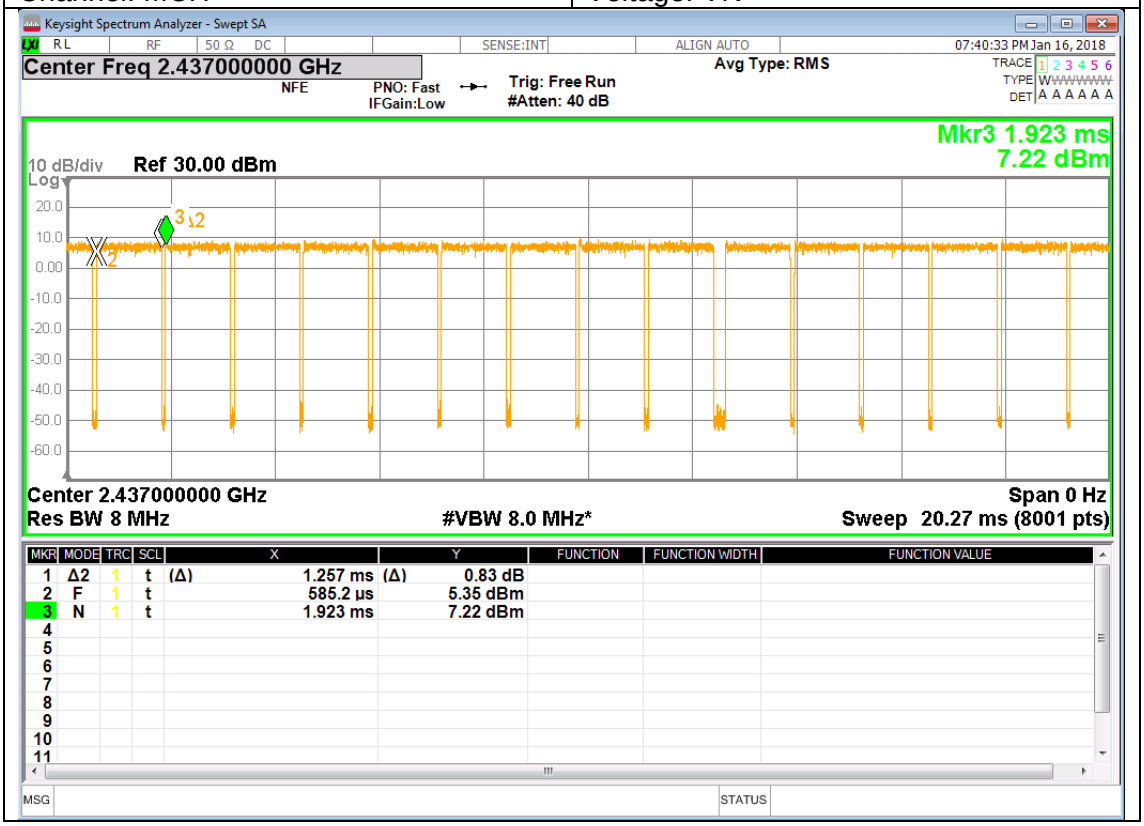
Note: Duty Cycle Correction Factor=10log (1/x).
Where: x is Duty Cycle (Linear)
Where: T is On Time
Antenna A, Antenna B and Antenna C has the same duty cycle, only Antenna A data show here.

Test Case: Duty Cycle	
Mode: 11B 3TX	Ant: Ant A
Channel: MCH	Voltage: VN

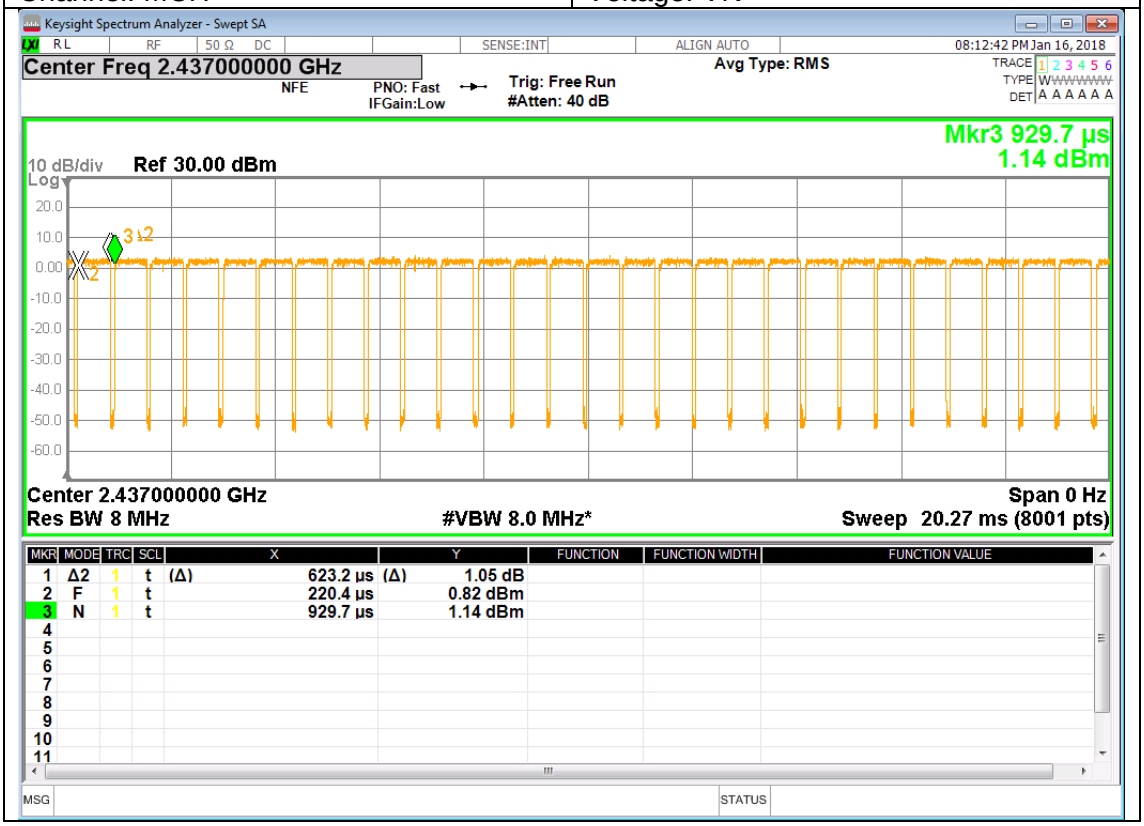
Test Case: Duty Cycle	
Mode: 11G 3TX	Ant: Ant A
Channel: MCH	Voltage: VN



Test Case: Duty Cycle	
Mode: 11N20 3TX	Ant: Ant A
Channel: MCH	Voltage: VN



Test Case: Duty Cycle	
Mode: 11N40 3TX	Ant: Ant A
Channel: MCH	Voltage: VN



7.2. 6 dB DTS BANDWIDTH AND 99% BANDWIDTH

LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(a)(2) RSS-247 5.1 (a)	6 dB Bandwidth	>= 500KHz	2400-2483.5
RSS-Gen Clause 6.6	99% Bandwidth	For reporting purposes only.	2400-2483.5

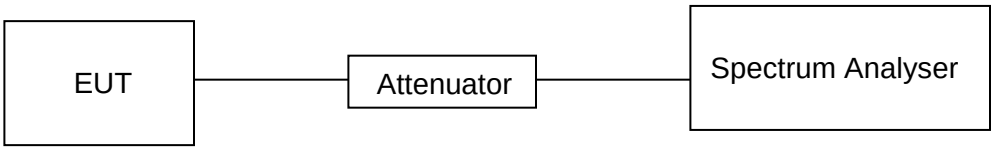
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	For 6dB Bandwidth :100K
VBW	For 6dB Bandwidth : ≥3 × RBW
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB and 99% relative to the maximum level measured in the fundamental emission.

TEST SETUP



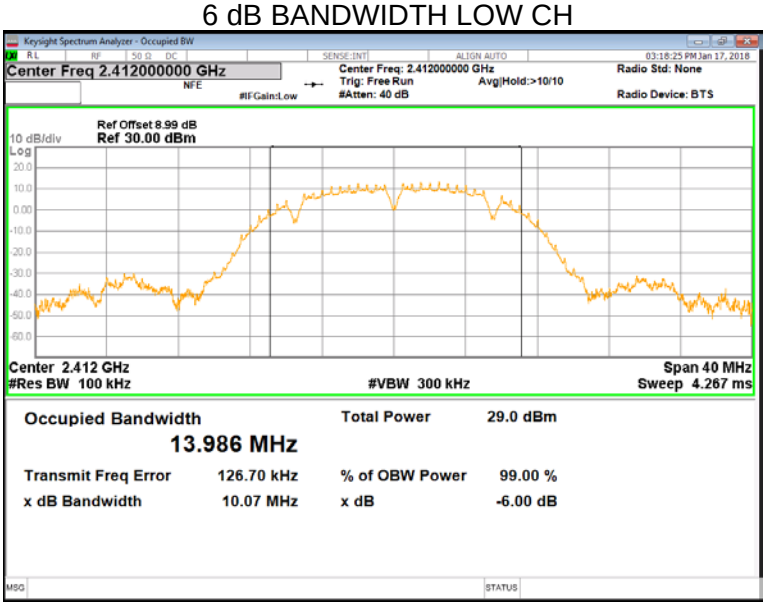
RESULTS

7.2.1. 802.11b SISO MODE

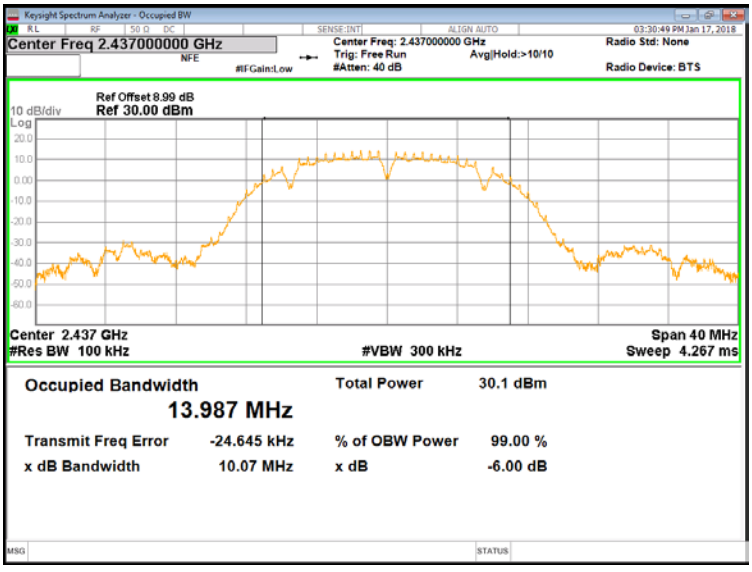
ANTENNA A

Frequency (MHz)	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit For 6dB (kHz)	Result
2412	10.07	13.986	500	Pass
2437	10.07	13.987	500	Pass
2462	10.05	13.740	500	Pass

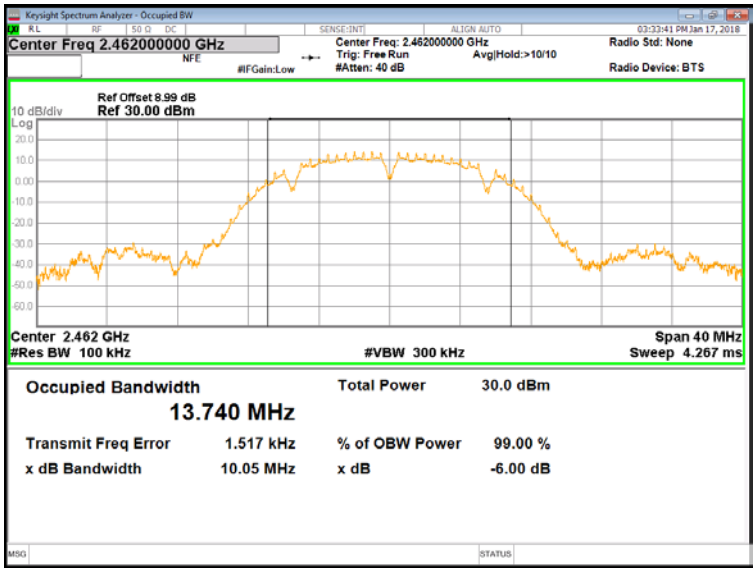
6 dB BANDWIDTH LOW CH



6 dB BANDWIDTH MID CH



6 dB BANDWIDTH HIGH CH

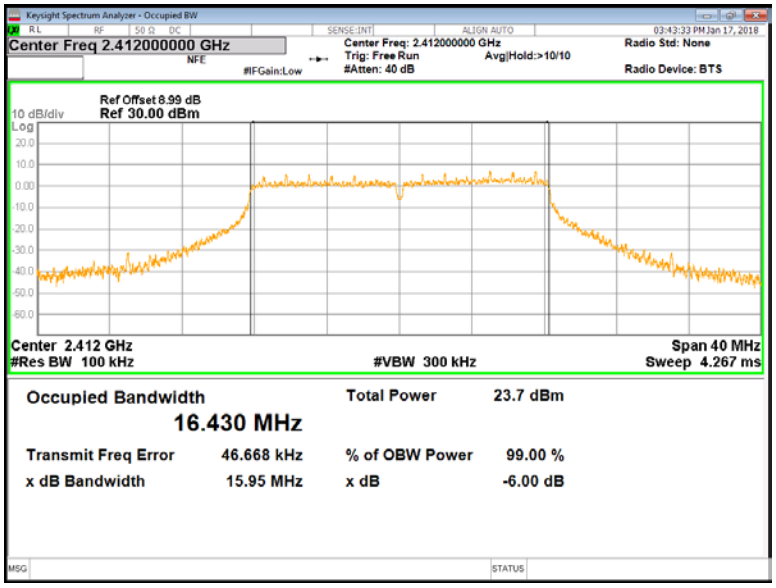


7.2.2. 802.11g SISO MODE

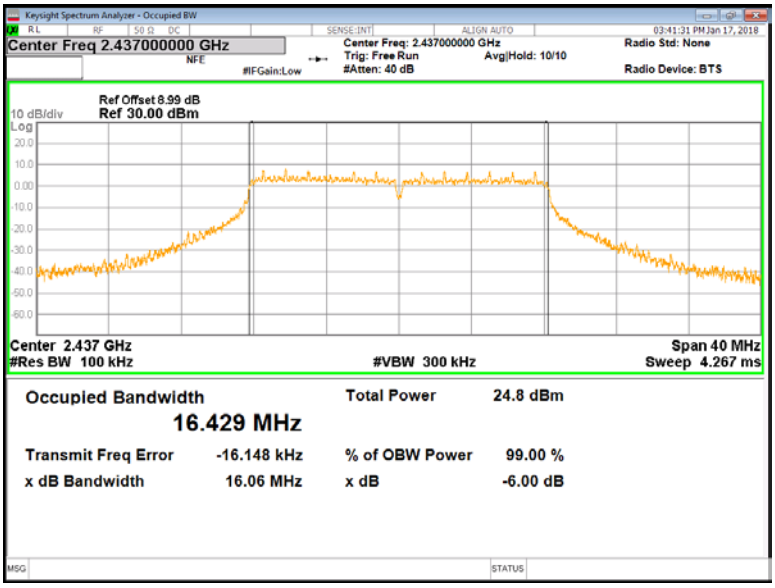
ANTENNA A

Frequency (MHz)	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit For 6dB (kHz)	Result
2422	15.95	16.430	500	Pass
2437	16.06	16.429	500	Pass
2452	16.30	16.348	500	Pass

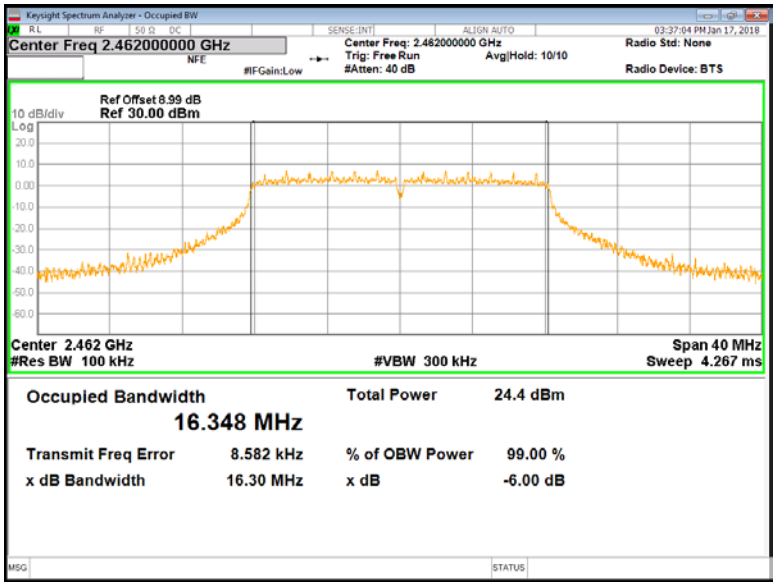
6 dB BANDWIDTH LOW CH



6 dB BANDWIDTH MID CH



6 dB BANDWIDTH HIGH CH

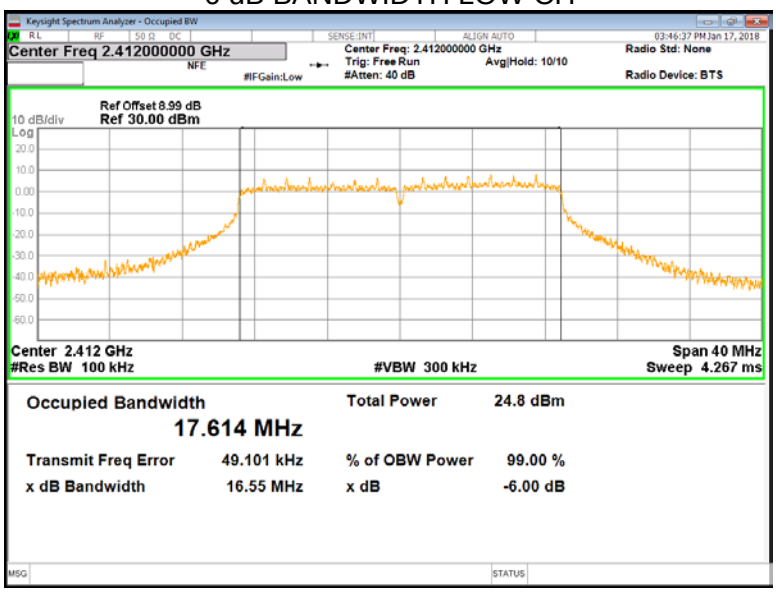


7.2.3. 802.11n20 SISO MODE

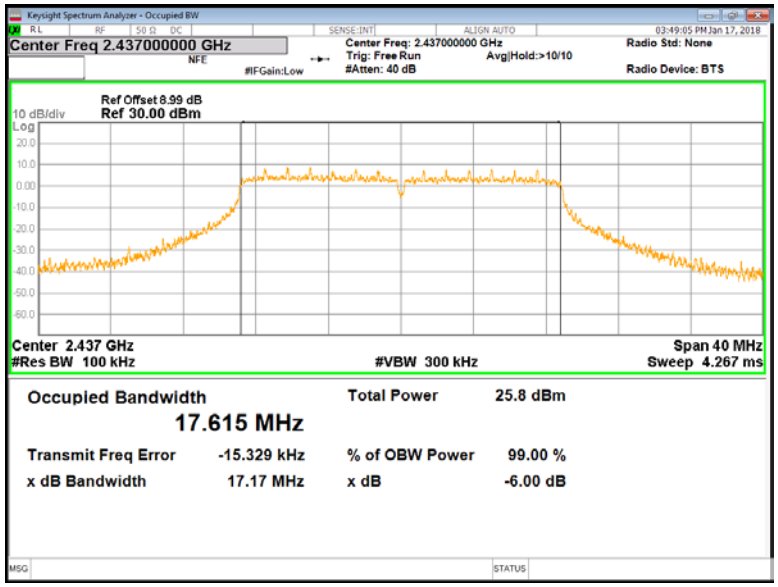
ANTENNA A

Frequency (MHz)	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit For 6dB (kHz)	Result
2412	16.55	17.614	500	Pass
2437	17.17	17.615	500	Pass
2462	16.52	17.548	500	Pass

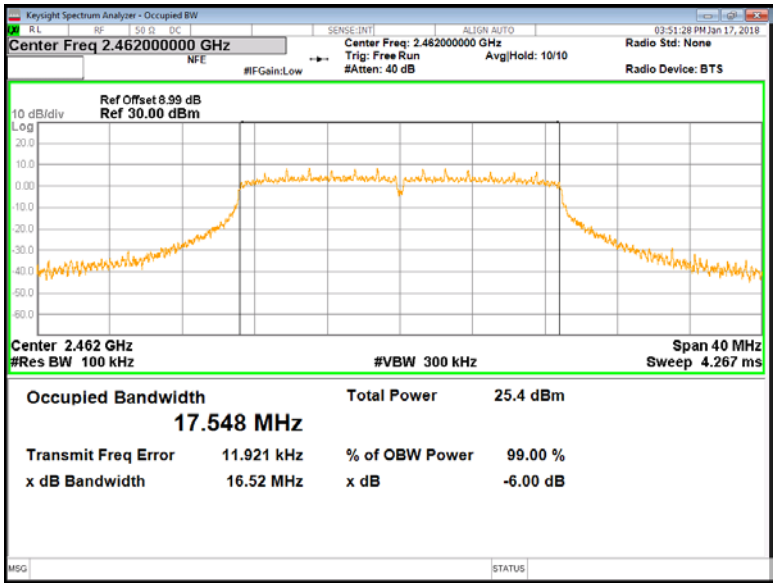
6 dB BANDWIDTH LOW CH



6 dB BANDWIDTH MID CH



6 dB BANDWIDTH HIGH CH

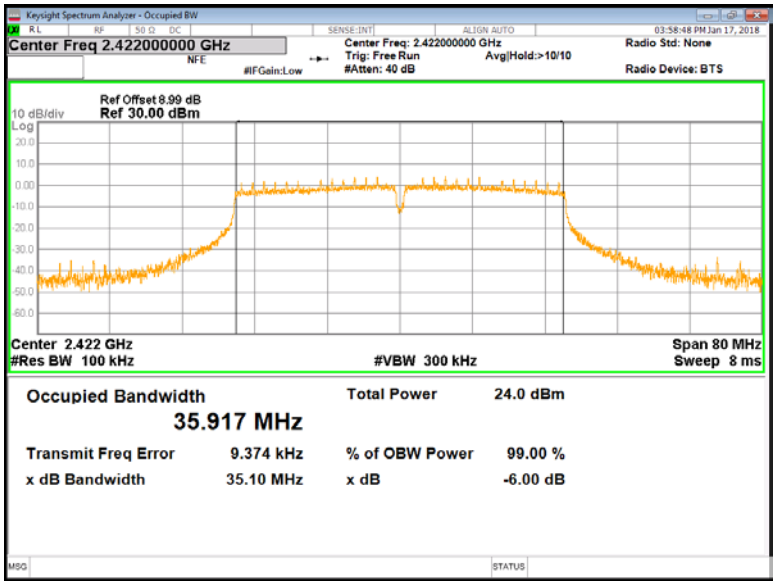


7.2.4. 802.11n40 SISO MODE

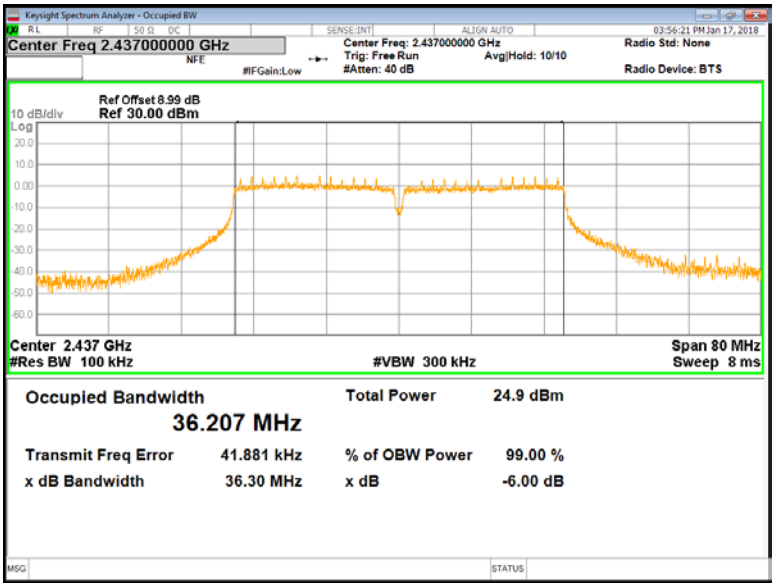
ANTENNA A

Frequency (MHz)	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit For 6dB (kHz)	Result
2422	35.10	35.917	500	Pass
2437	36.30	36.207	500	Pass
2452	35.11	35.980	500	Pass

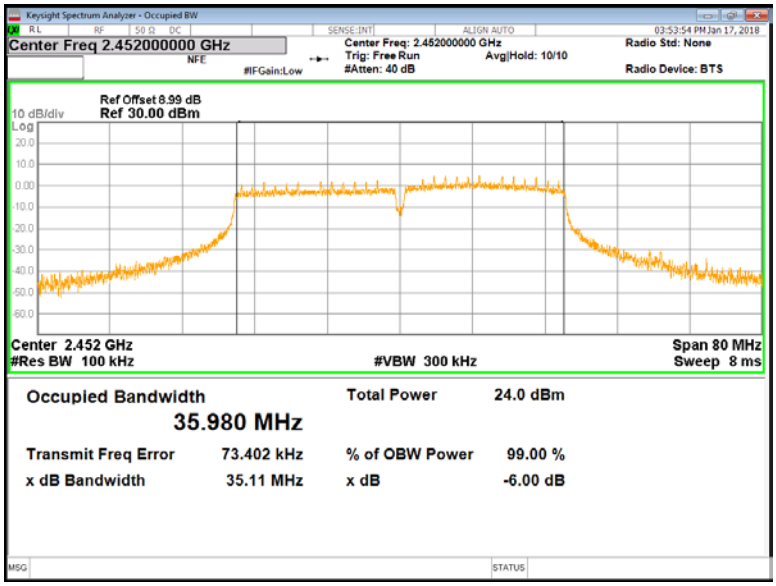
6 dB BANDWIDTH LOW CH



6 dB BANDWIDTH MID CH



6 dB BANDWIDTH HIGH CH



Note: All modes and antennas had been tested, but only the worst data recorded in the report.

7.3. Maximum conducted (average) output power

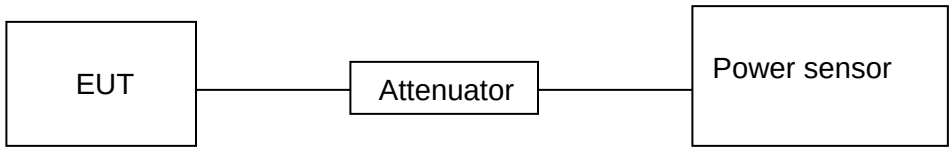
LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(b)(3) RSS-247 5.4 (e)	Conducted Output Power	1 watt or 30dBm (See Note 1/2)	2400-2483.5
Note:	1. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. 2. Limit=30dBm – (Directional gain -6)dBi Directional gain = G_{ANT} + 10 log(N_{ANT}) dBi, where N_{ANT} is the number of outputs, G_{ANT} is the Antenna gain.		

TEST PROCEDURE

Place the EUT on the table and set it in the transmitting mode.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.
Measure average power each channel.

TEST SETUP



RESULTS

7.3.1. 1TX Mode

1TX Mode					
Mode	**Channel**	**Antenna**	**Maximum Conducted Outpower [dBm]**	**Limit [dBm]**	**Verdict**
802.11b	LCH	A	18.97	24.5	PASS
	MCH	A	20.95	24.5	PASS
	HCH	A	17.57	24.5	PASS
802.11g	LCH	A	14.18	24.5	PASS
	MCH	A	16.2	24.5	PASS
	HCH	A	14.98	24.5	PASS
802.11n20	LCH	A	13.14	24.5	PASS
	MCH	A	15.23	24.5	PASS
	HCH	A	13.83	24.5	PASS
802.11n40	LCH	A	12.69	24.5	PASS
	MCH	A	13.6	24.5	PASS
	HCH	A	12.75	24.5	PASS

Note: All the modulation and antennas had been tested, but only the worst data recorded in the report.

7.3.2. 2TX Mode

2TX Mode						
Mode	Channel	Antenna	Maximum Conducted Outpower [dBm]		Limit [dBm]	Verdict
			Single	Total		
802.11b	LCH	A	14.92	18.04	21.5	PASS
		C	15.14			
	MCH	A	16.95	20.09	21.5	PASS
		C	17.21			
	HCH	A	16.13	18.93	21.5	PASS
		C	15.69			
802.11g	LCH	A	13.62	16.41	21.5	PASS
		C	13.17			
	MCH	A	15.3	18.45	21.5	PASS
		C	15.57			
	HCH	A	13.78	16.76	21.5	PASS
		C	13.72			
802.11n20	LCH	A	13.26	16.39	21.5	PASS
		C	13.5			
	MCH	A	15.49	18.6	21.5	PASS
		C	15.68			
	HCH	A	13.21	16.21	21.5	PASS
		C	13.18			
802.11n40	LCH	A	11.71	14.54	21.5	PASS
		C	11.34			
	MCH	A	14.01	16.99	21.5	PASS
		C	13.49			
	HCH	A	11.66	14.85	21.5	PASS
		C	12.02			

Note: All the modulation and antennas had been tested, but only the worst data recorded in the report.

7.3.3. 3TX Mode

3TX Mode						
Mode	Channel	Antenna	Maximum Conducted Outpower [dBm]		Limit [dBm]	Verdict
			Single	Total		
802.11b	LCH	A	12.86	17.39	19.5	PASS
		B	12.34			
		C	12.65			
	MCH	A	14.4	19.00	19.5	PASS
		B	14.1			
		C	14.17			
	HCH	A	12.3	16.56	19.5	PASS
		B	11.55			
		C	11.48			
802.11g	LCH	A	11.05	15.54	19.5	PASS
		B	10.5			
		C	10.75			
	MCH	A	14.57	19.13	19.5	PASS
		B	14.24			
		C	14.27			
	HCH	A	10.75	15.18	19.5	PASS
		B	10.25			
		C	10.21			
802.11n20	LCH	A	10.01	14.51	19.5	PASS
		B	9.51			
		C	9.68			
	MCH	A	14.56	19.09	19.5	PASS
		B	14.18			
		C	14.2			
	HCH	A	10.52	15.07	19.5	PASS
		B	10.19			
		C	10.19			
802.11n40	LCH	A	9.58	14.28	19.5	PASS
		B	9.87			
		C	9.02			
	MCH	A	11.45	15.88	19.5	PASS
		B	11.02			
		C	10.84			
	HCH	A	9.6	14.39	19.5	PASS
		B	9.6			
		C	9.65			

Note: All the modulation and antennas had been tested, but only the worst data recorded in the report.

7.4. POWER SPECTRAL DENSITY

LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC §15.247 (e) RSS-247 5.2 (b)	Power Spectral Density	8 dBm in any 3 kHz band	2400-2483.5
Note:	1. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. 2. Limit=8dBm – (Directional gain -6)dBi Directional gain = G_{ANT} + 10 log(N_{ANT}) dBi, where N_{ANT} is the number of outputs, G_{ANT} is the Antenna gain.		

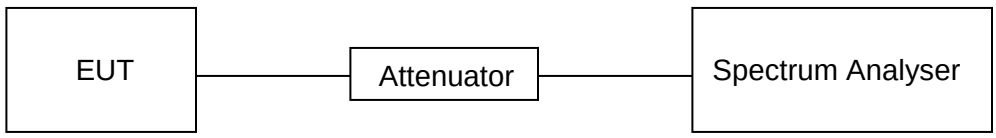
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	3 kHz ≤ RBW ≤ 100 kHz.
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST SETUP



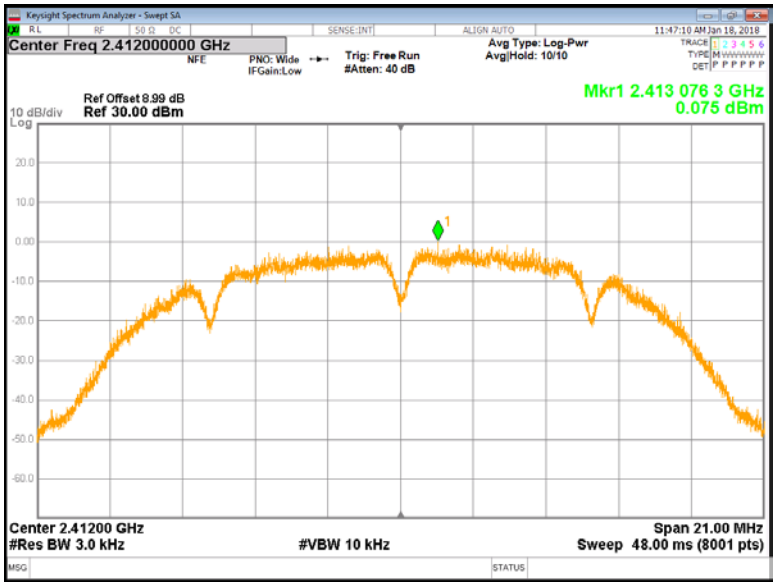
RESULTS

7.4.1. 1TX Mode

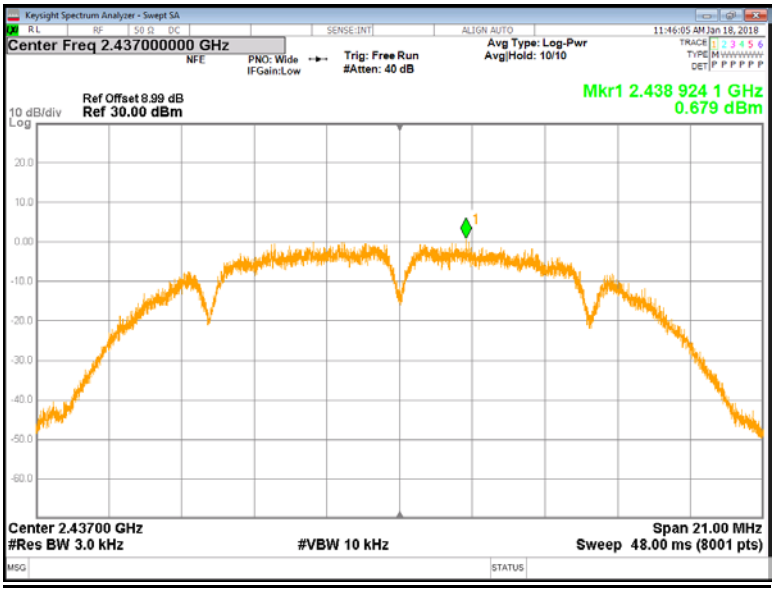
1TX Mode					
Mode	**Channel**	**Antenna**	**Meas.Level [dBm/3kHz]**	**Limit (dBm/3KHz)**	**Verdict**
802.11b	LCH	A	0.075	2.5	PASS
	MCH	A	0.679	2.5	PASS
	HCH	A	0.636	2.5	PASS
802.11g	LCH	A	-6.94	2.5	PASS
	MCH	A	-5.191	2.5	PASS
	HCH	A	-6.976	2.5	PASS
802.11n20	LCH	A	-5.785	2.5	PASS
	MCH	A	-5.409	2.5	PASS
	HCH	A	-6.002	2.5	PASS
802.11n40	LCH	A	-10.37	2.5	PASS
	MCH	A	-8.905	2.5	PASS
	HCH	A	-8.262	2.5	PASS

802.11b

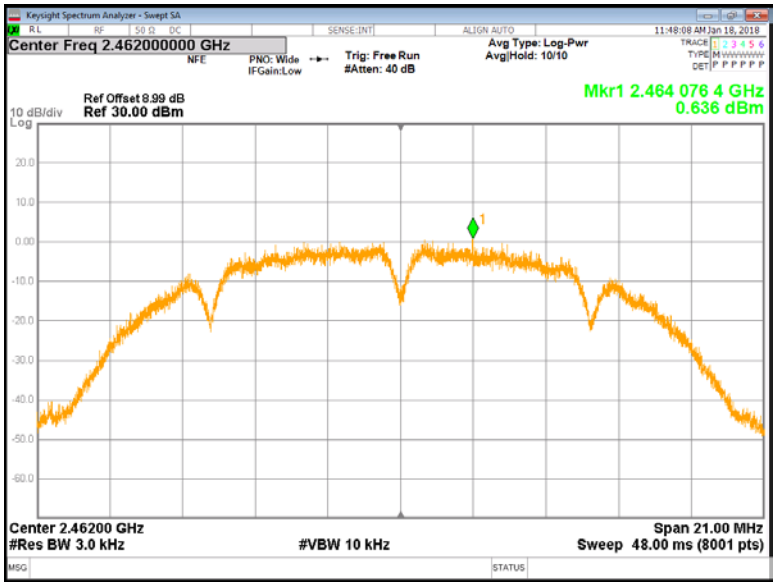
PSD LOW CH



PSD MID CH

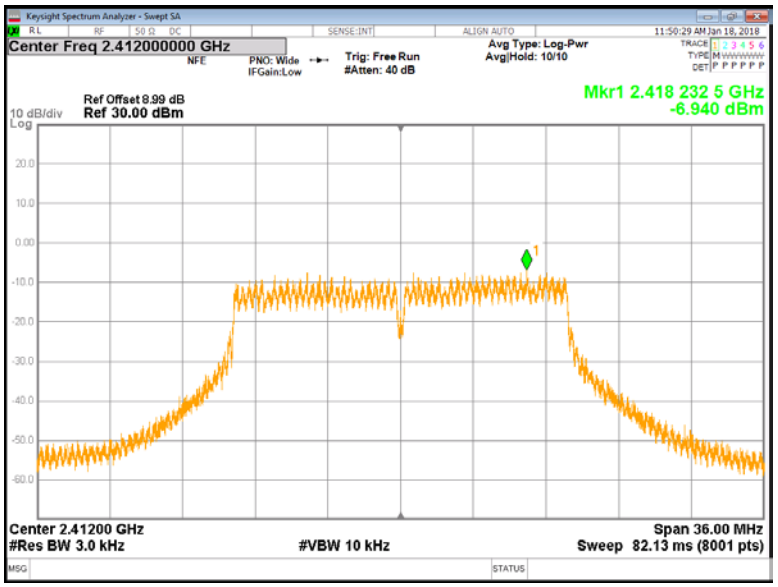


PSD HIGH CH

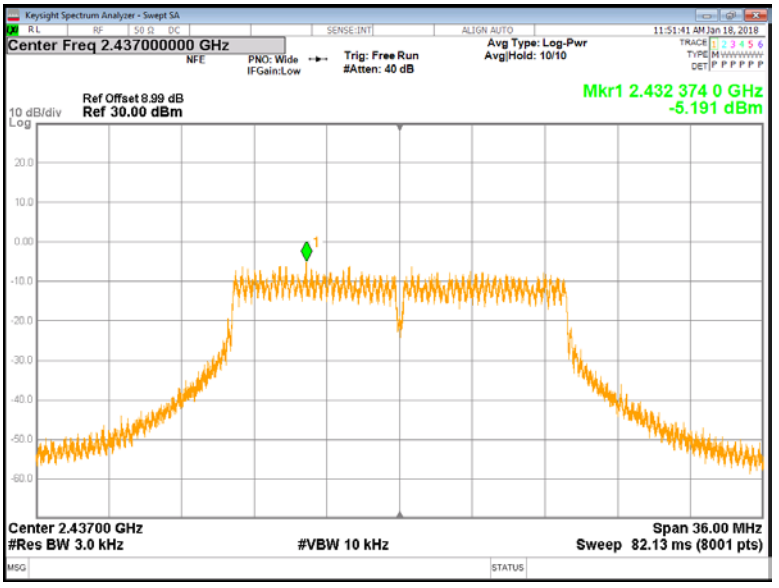


802.11g

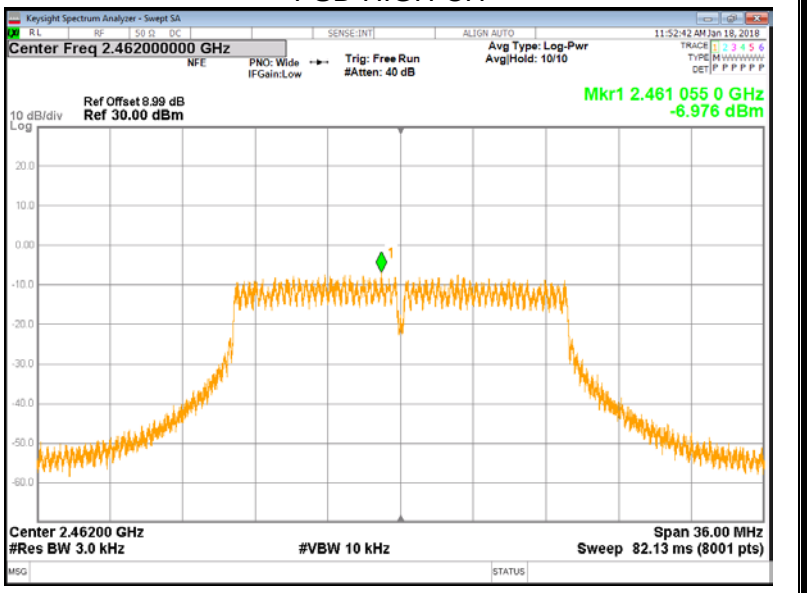
PSD LOW CH



PSD MID CH

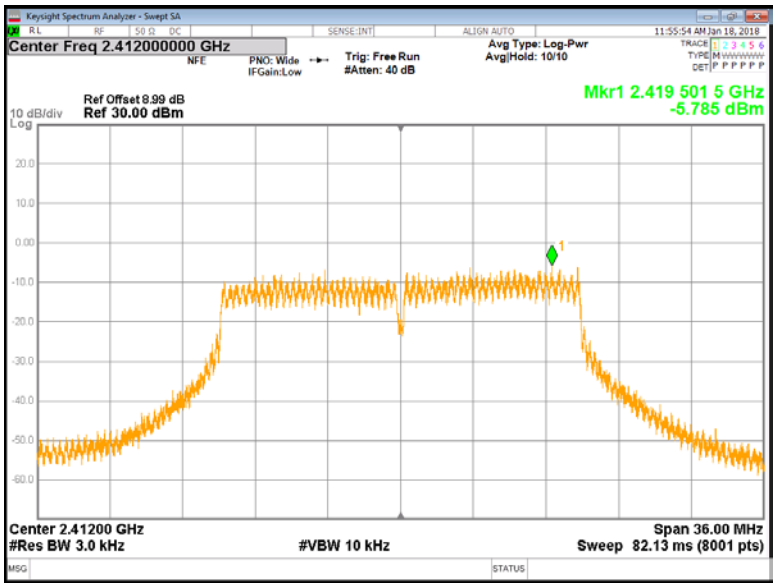


PSD HIGH CH

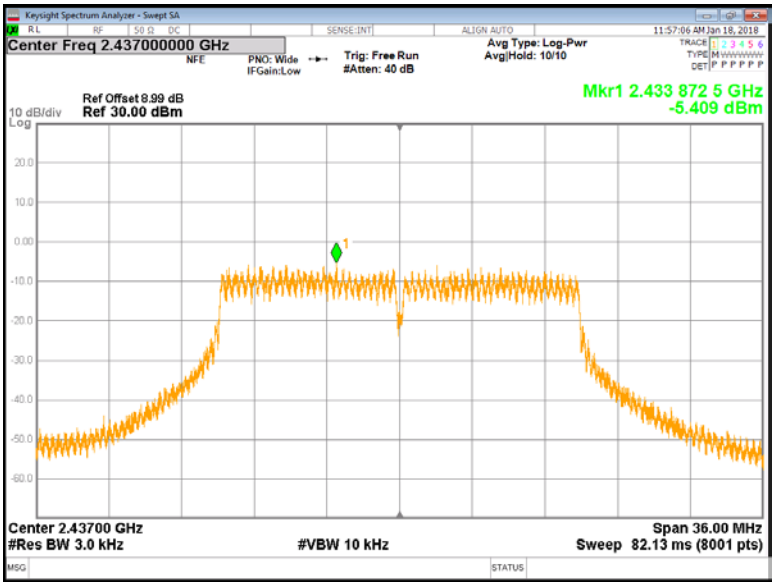


802.11n Ht20

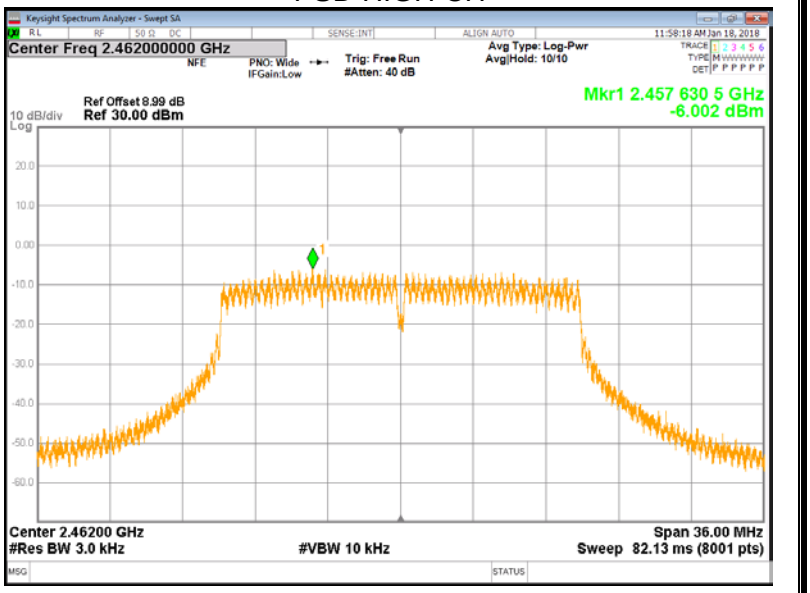
PSD LOW CH



PSD MID CH

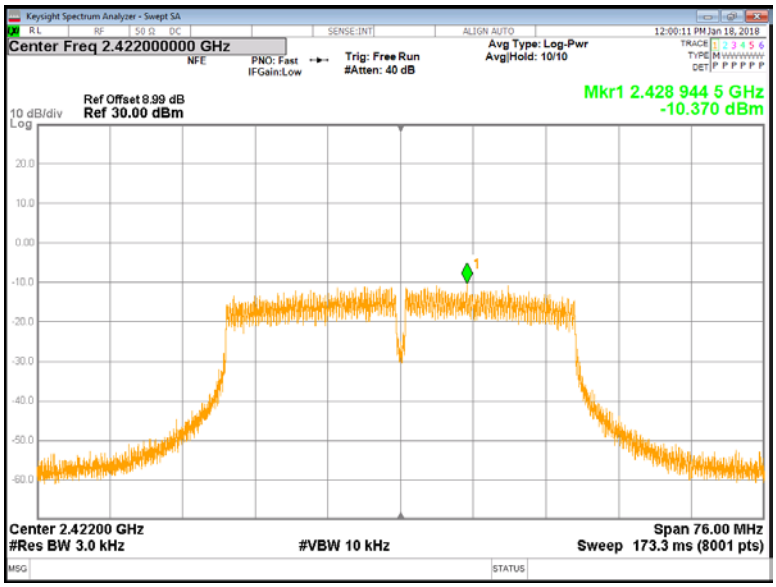


PSD HIGH CH

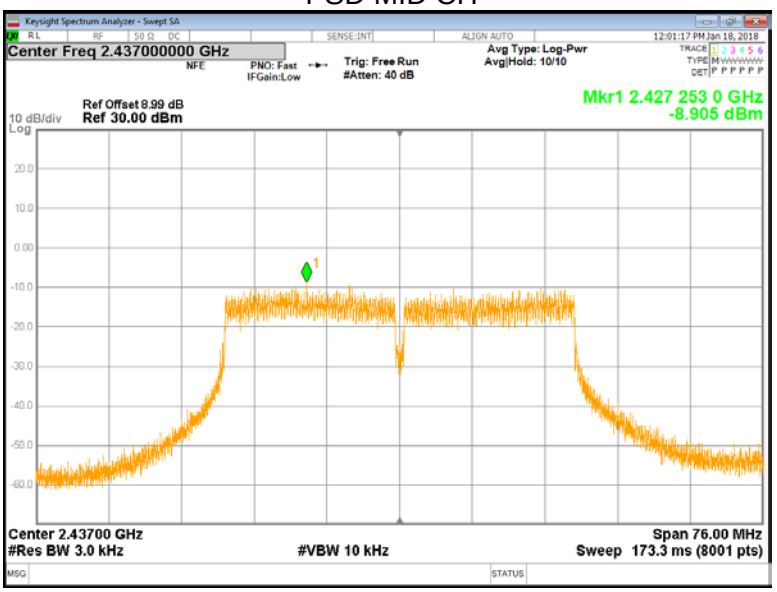


802.11 Ht40

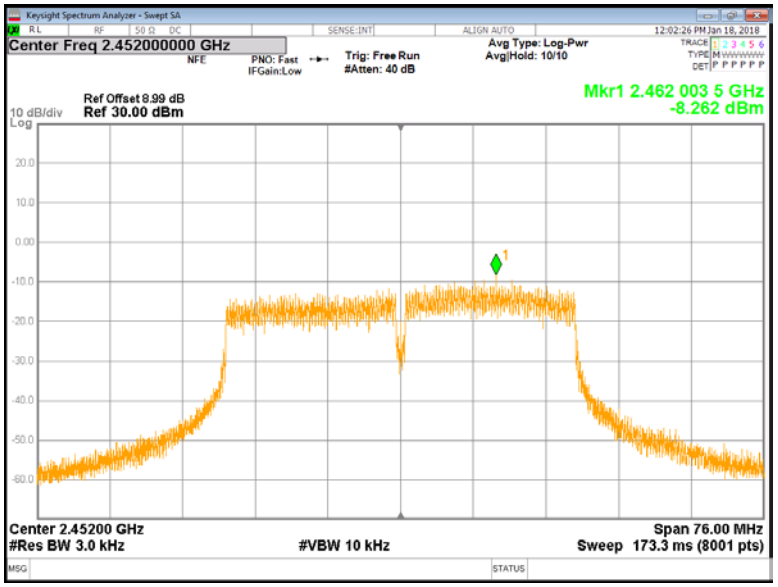
PSD LOW CH



PSD MID CH



PSD HIGH CH



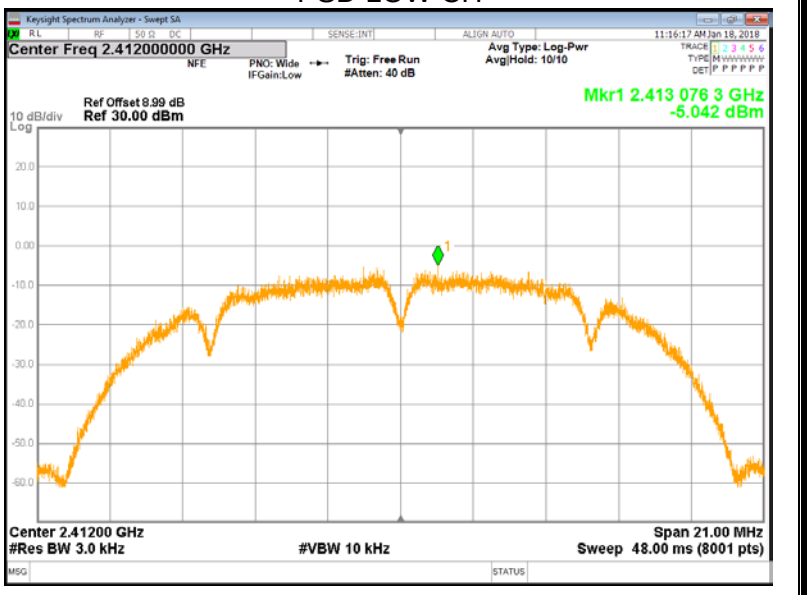
7.4.2. 2TX Mode

2TX Mode						
Mode	**Channel**	**Antenna**	**Meas.Level [dBm/3kHz]**	**Total [dBm/3kHz]**	**Limit (dBm/3KHz)**	**Verdict**
802.11b	LCH	A	-5.042	-1.925	-0.5	PASS
		C	-4.832			
	MCH	A	-5.187	-1.46	-0.5	PASS
		C	-3.857			
	HCH	A	-5.140	-2.67	-0.5	PASS
		C	-6.299			
802.11g	LCH	A	-6.963	-4.06	-0.5	PASS
		C	-7.183			
	MCH	A	-6.736	-4.14	-0.5	PASS
		C	-7.608			
	HCH	A	-6.661	-3.73	-0.5	PASS
		C	-6.819			
802.11n20	LCH	A	-7.419	-4.74	-0.5	PASS
		C	-8.099			
	MCH	A	-7.948	-5.04	-0.5	PASS
		C	-8.146			
	HCH	A	-8.375	-4.82	-0.5	PASS
		C	-7.350			
802.11n40	LCH	A	-10.115	-7.48	-0.5	PASS
		C	-10.882			
	MCH	A	-10.092	-6.86	-0.5	PASS
		C	-9.652			
	HCH	A	-9.800	-7.00	-0.5	PASS
		C	-10.230			

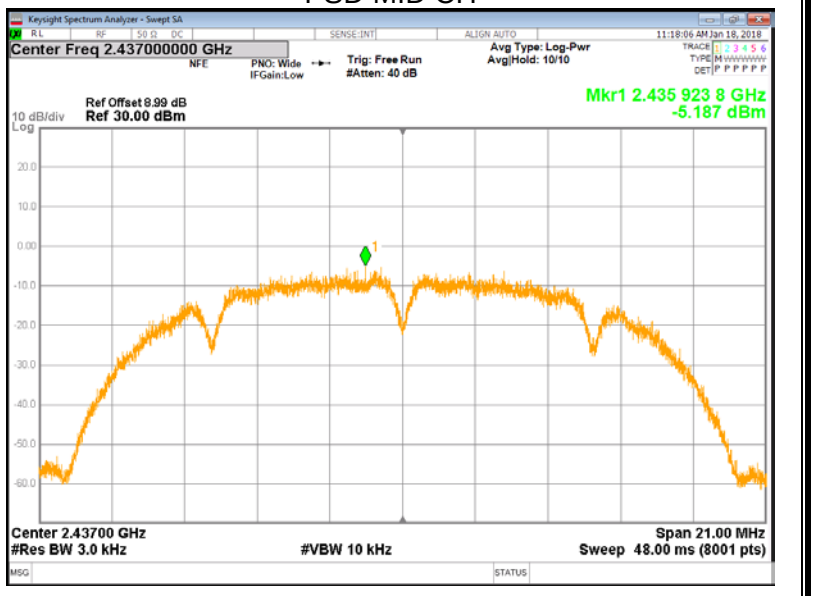
802.11b

Antenna A

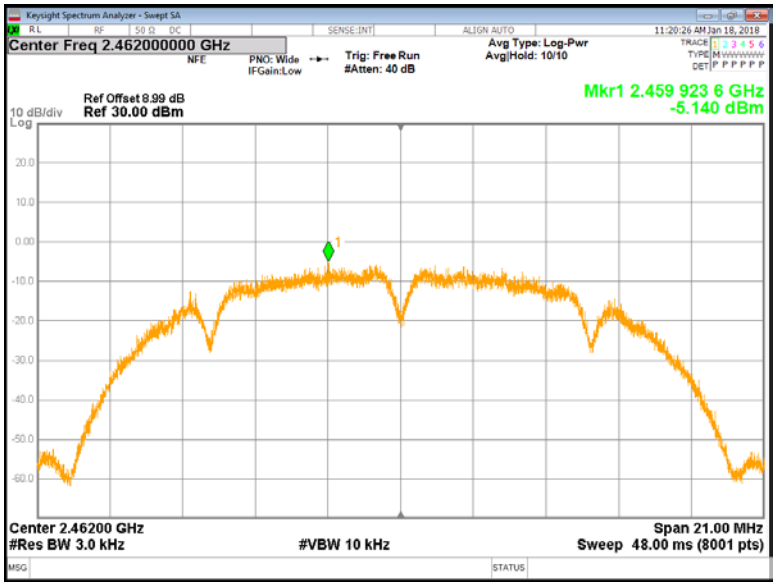
PSD LOW CH



PSD MID CH

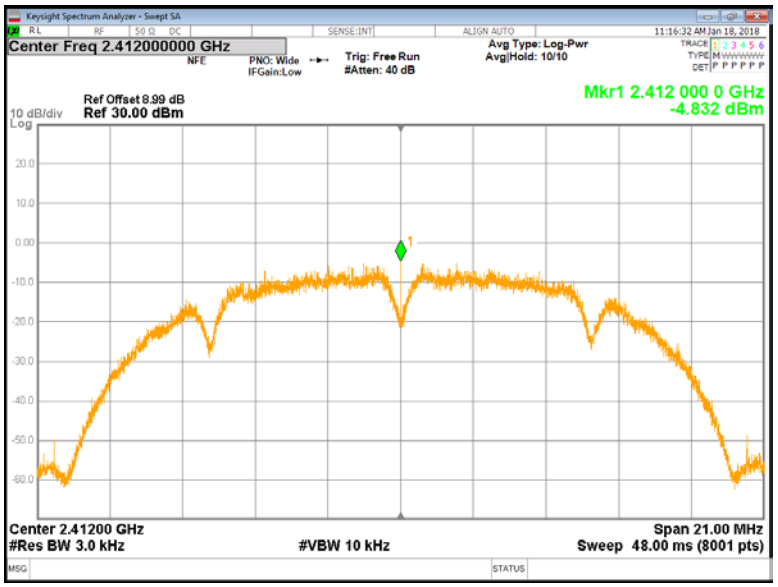


PSD HIGH CH

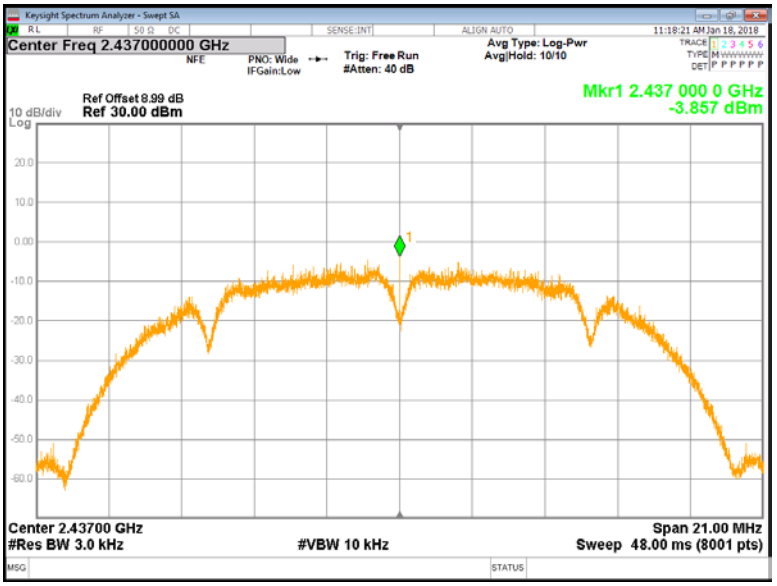


Antenna C

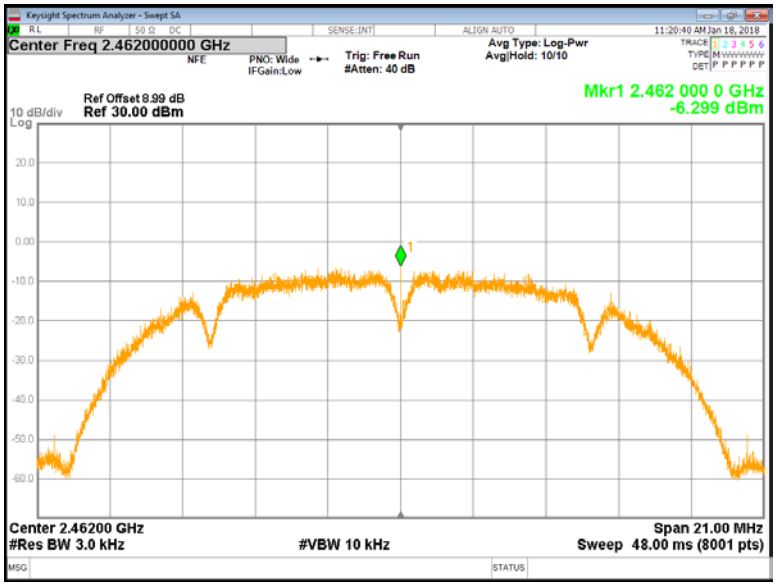
PSD LOW CH



PSD MID CH



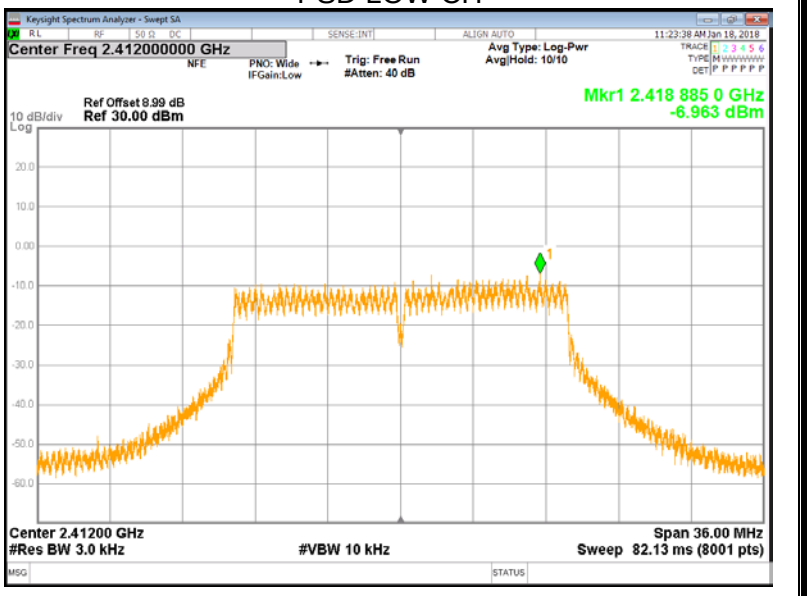
PSD HIGH CH



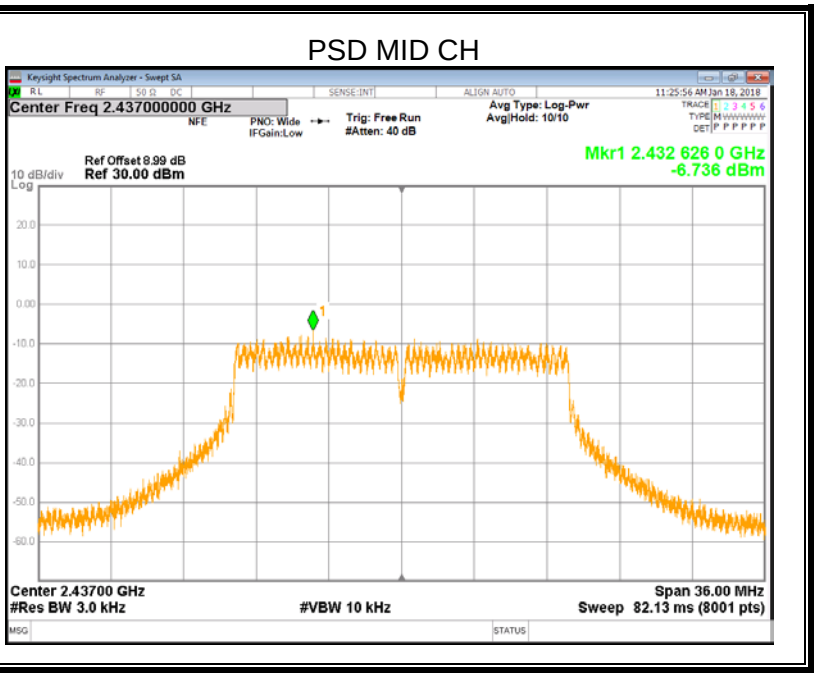
802.11g

Antenna A

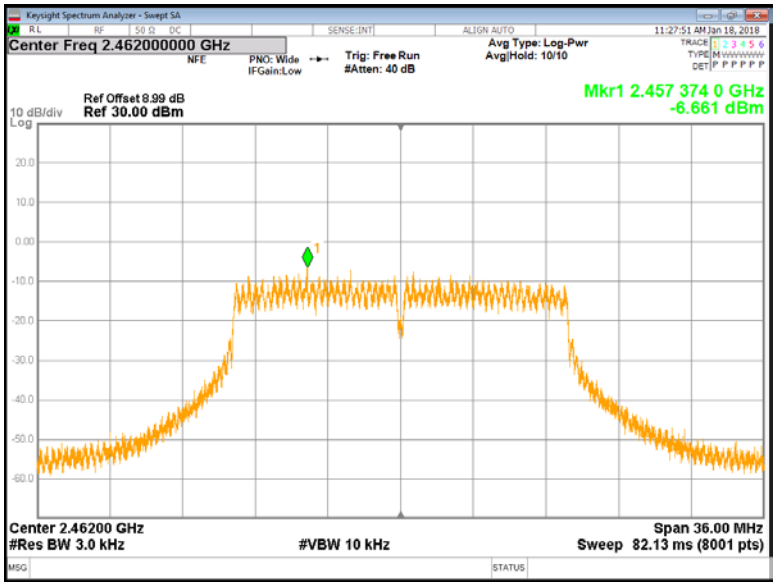
PSD LOW CH



PSD MID CH

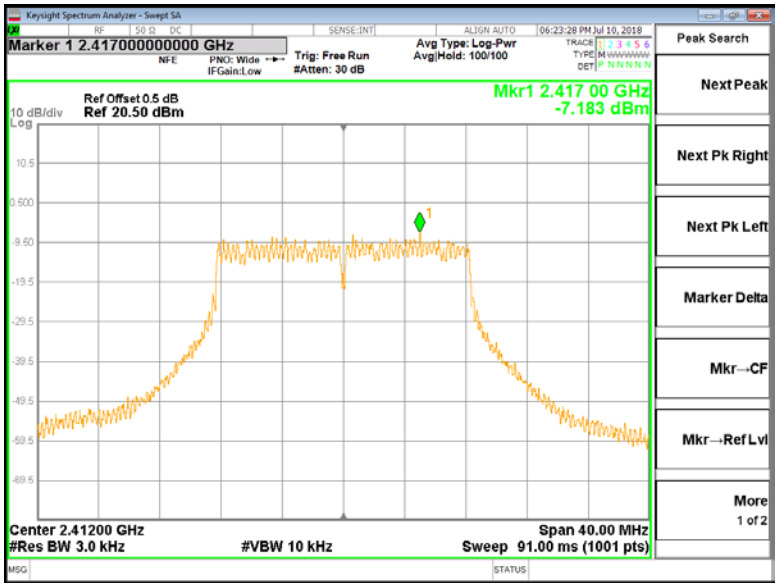


PSD HIGH CH

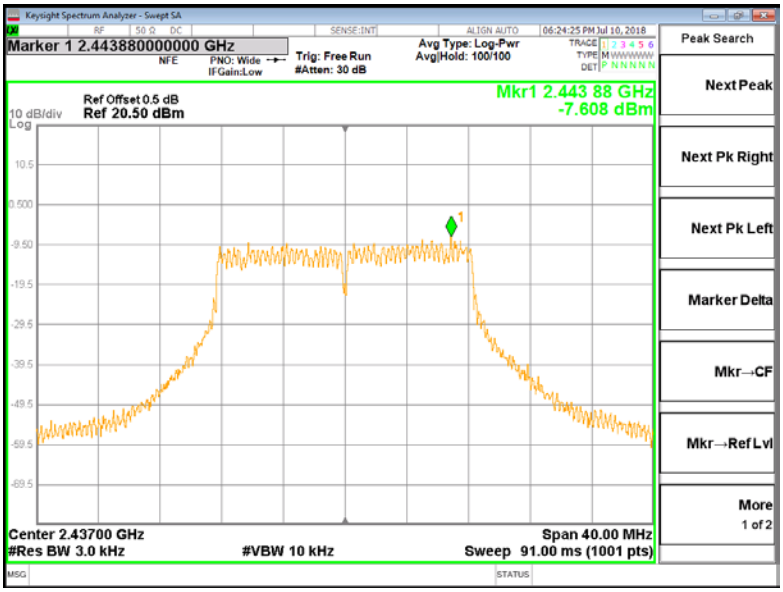


Antenna C

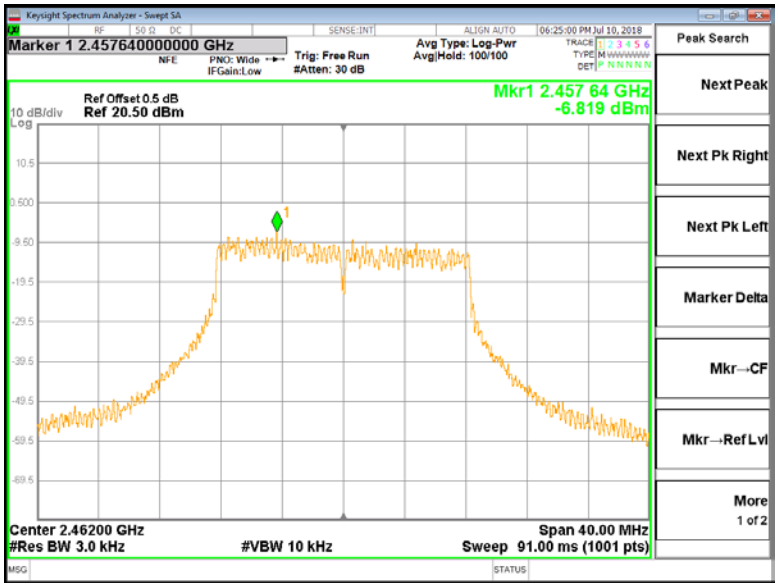
PSD LOW CH



PSD MID CH



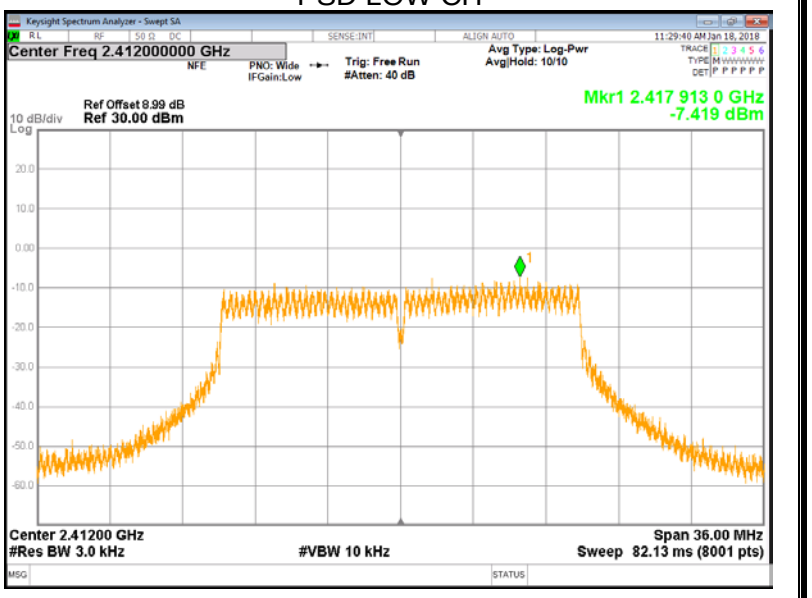
PSD HIGH CH



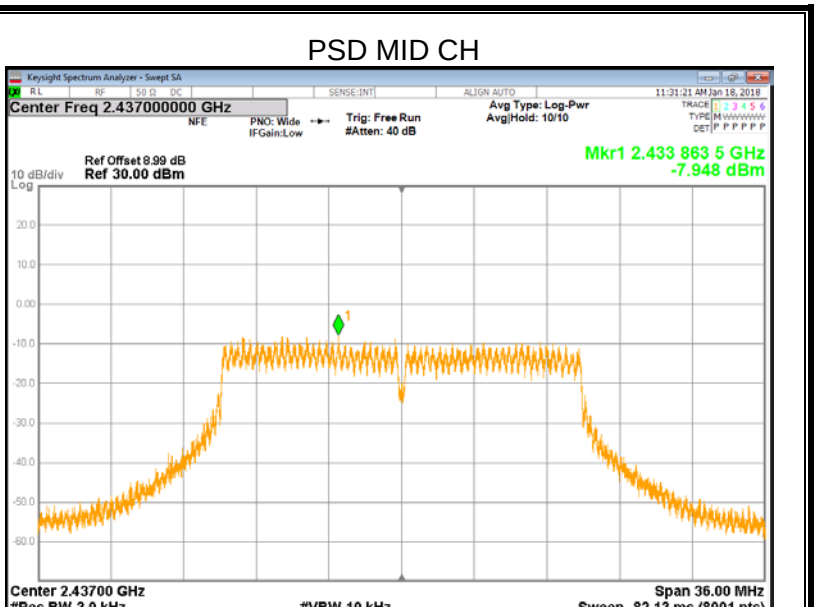
802.11n20

Antenna A

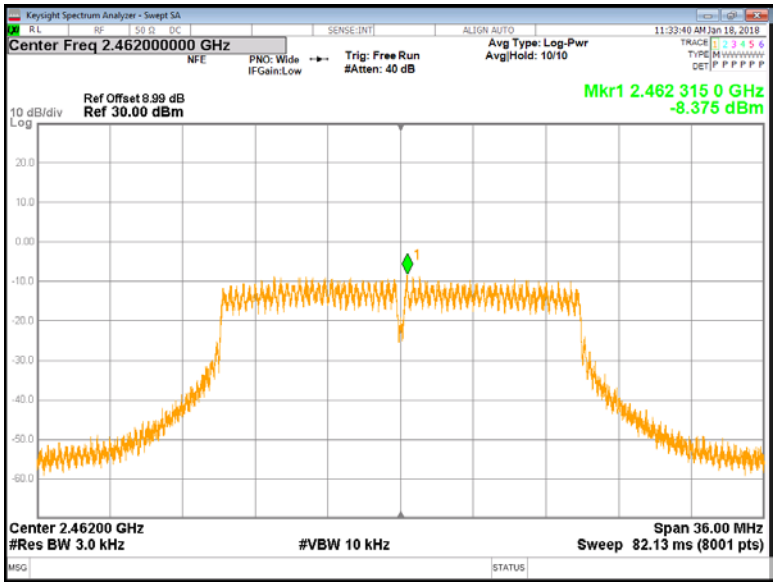
PSD LOW CH



PSD MID CH

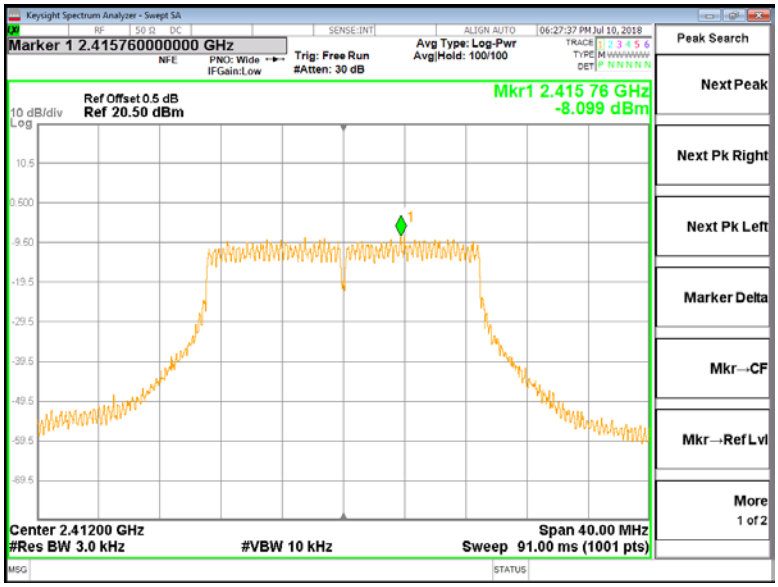


PSD HIGH CH

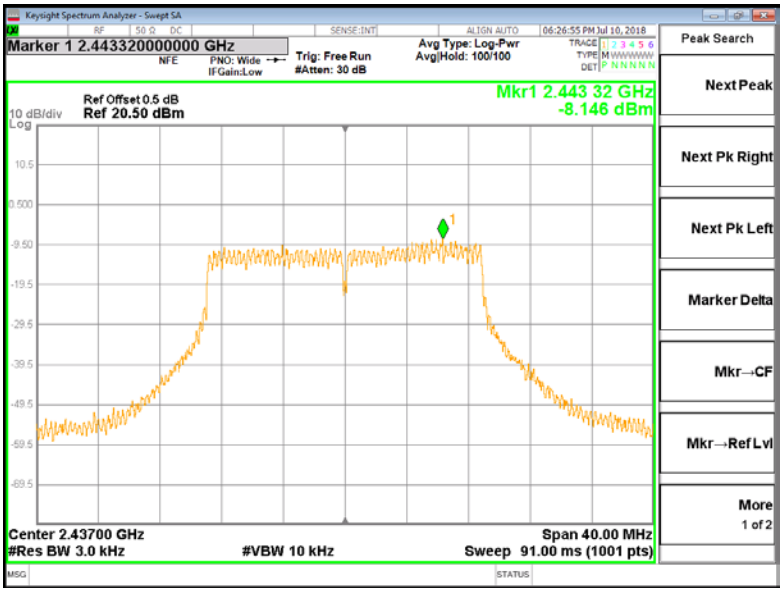


Antenna C

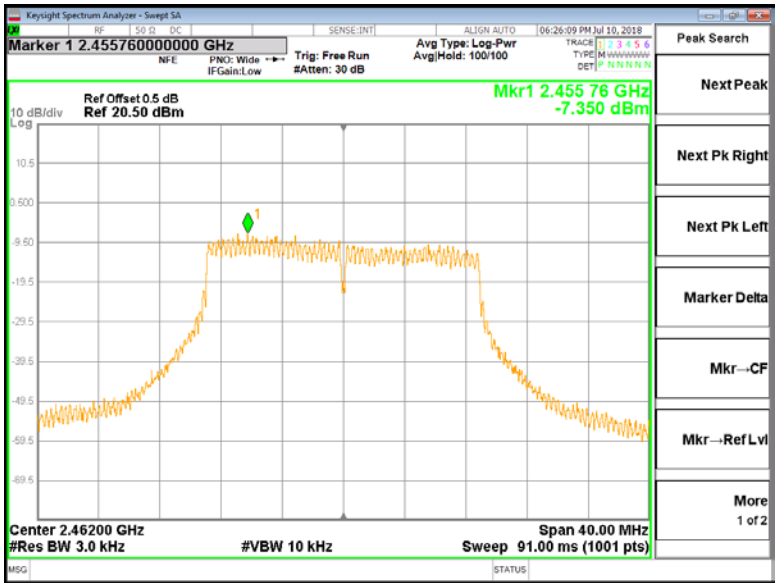
PSD LOW CH



PSD MID CH



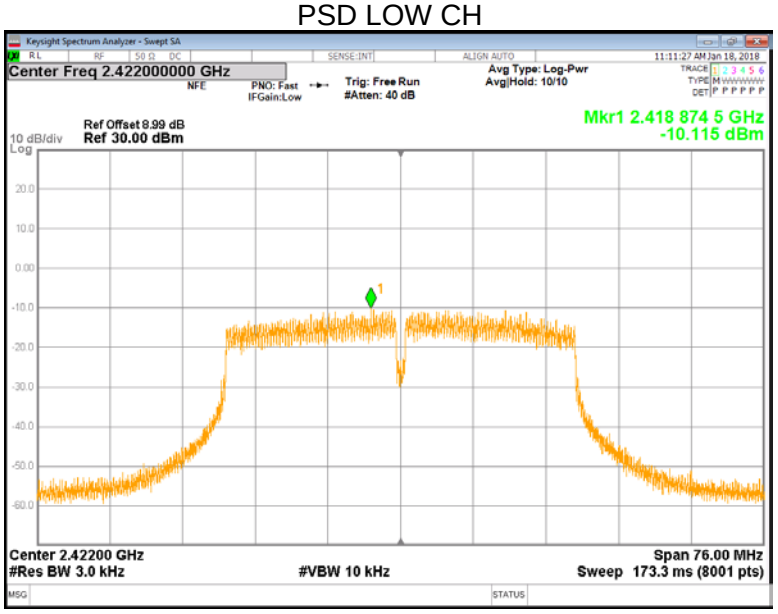
PSD HIGH CH



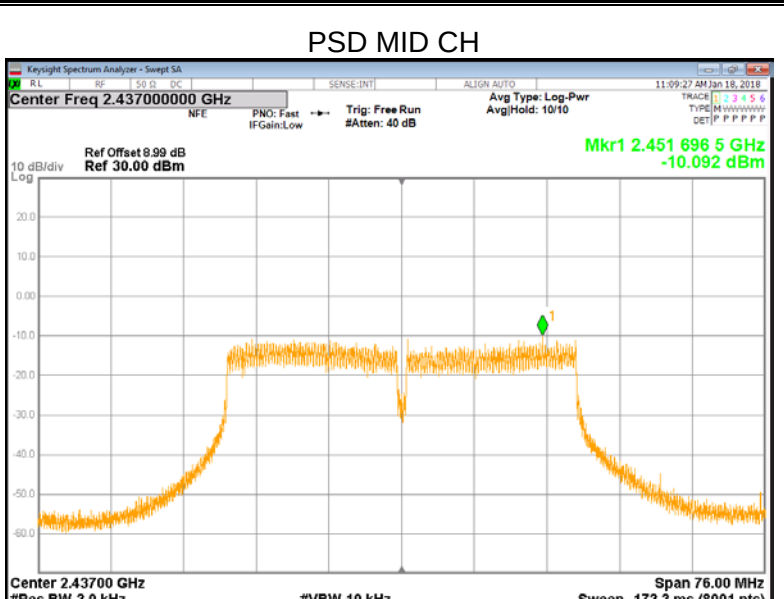
802.11n40

Antenna A

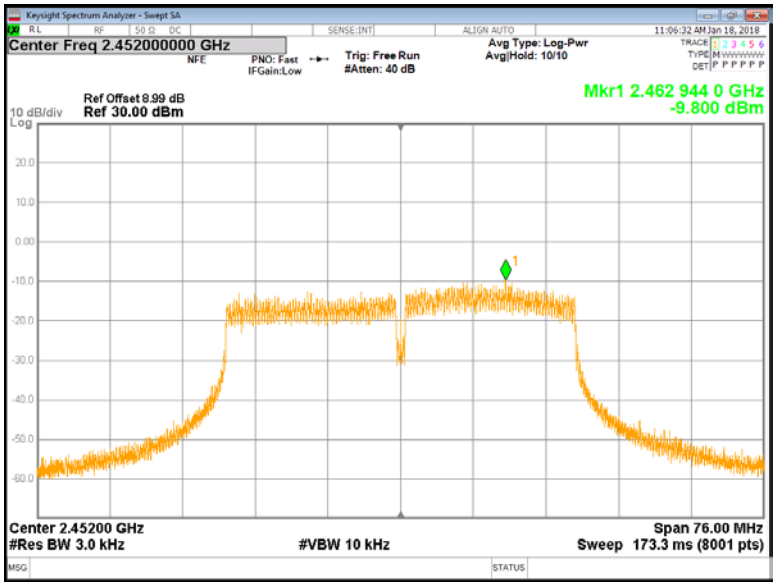
PSD LOW CH



PSD MID CH

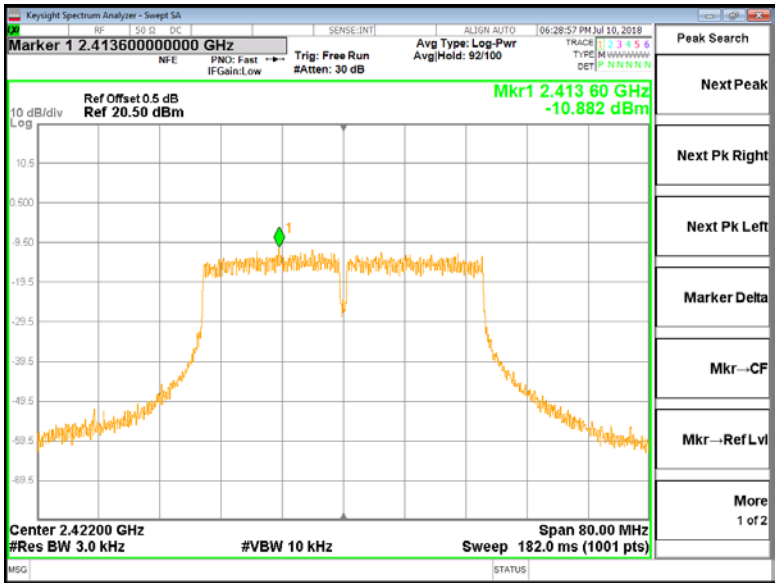


PSD HIGH CH

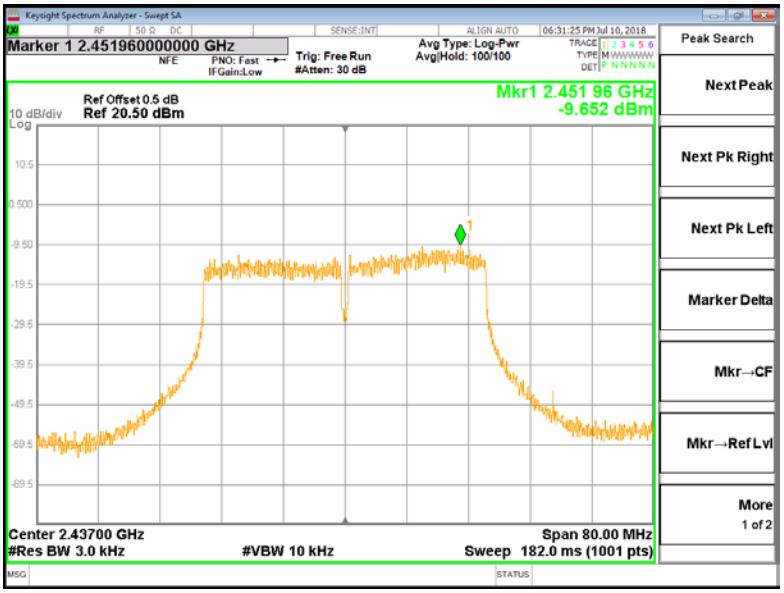


Antenna C

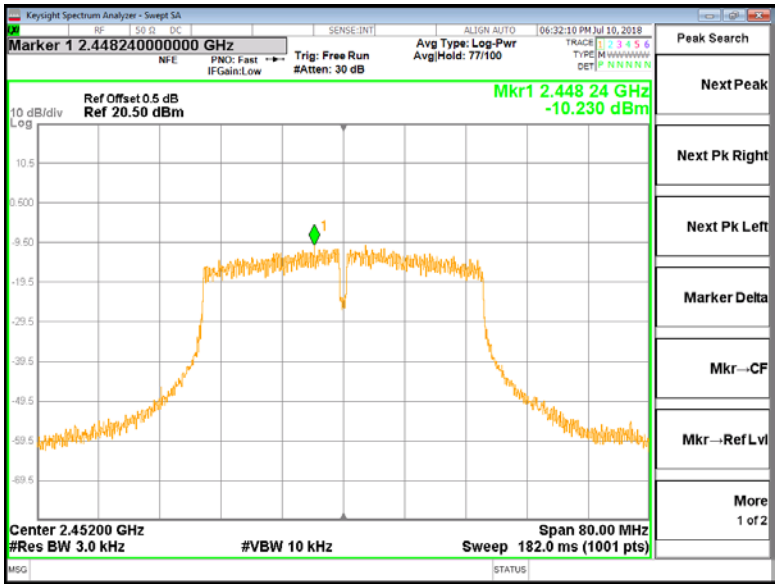
PSD LOW CH



PSD MID CH



PSD HIGH CH



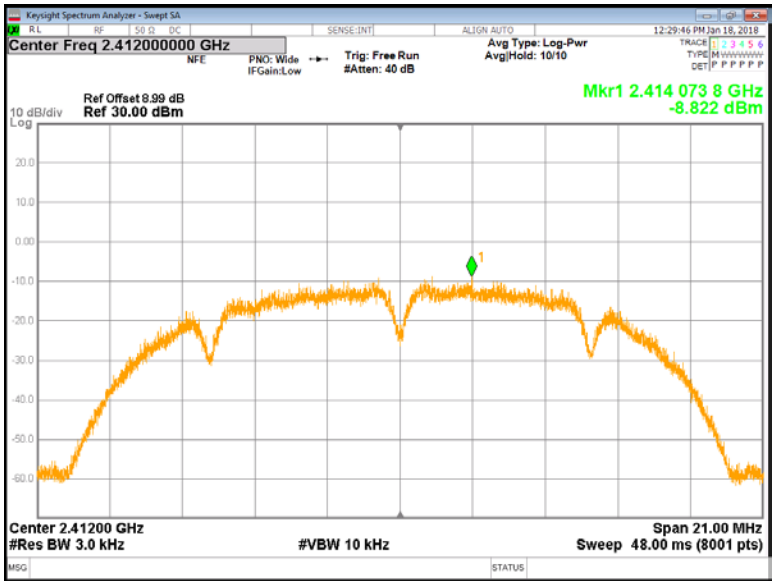
7.4.3. 3TX Mode

3TX Mode						
Mode	**Channel**	**Antenna**	**Meas.Level [dBm/3kHz]**	**Total [dBm/3kHz]**	**Limit (dBm/3KHz)**	**Verdict**
802.11b	LCH	A	-8.822	-4.544	-2.5	PASS
		B	-9.931			
		C	-9.265			
	MCH	A	-8.141	-3.965	-2.5	PASS
		B	-8.776			
		C	-9.380			
	HCH	A	-8.704	-3.99	-2.5	PASS
		B	-8.893			
		C	-8.690			
802.11g	LCH	A	-10.075	-5.316	-2.5	PASS
		B	-10.479			
		C	-9.7380			
	MCH	A	-10.085	-5.016	-2.5	PASS
		B	-9.433			
		C	-9.870			
	HCH	A	-9.965	-5.609	-2.5	PASS
		B	-10.924			
		C	-10.606			
802.11n20	LCH	A	-10.488	-6.098	-2.5	PASS
		B	-10.628			
		C	-11.569			
	MCH	A	-11.120	-6.359	-2.5	PASS
		B	-11.136			
		C	-11.134			
	HCH	A	-11.623	-6.31	-2.5	PASS
		B	-9.848			
		C	-12.114			
802.11n40	LCH	A	-14.217	-9.695	-2.5	PASS
		B	-13.829			
		C	-15.530			
	MCH	A	-14.294	-10.083	-2.5	PASS
		B	-15.523			
		C	-14.833			
	HCH	A	-13.282	-9.036	-2.5	PASS
		B	-14.262			
		C	-13.937			

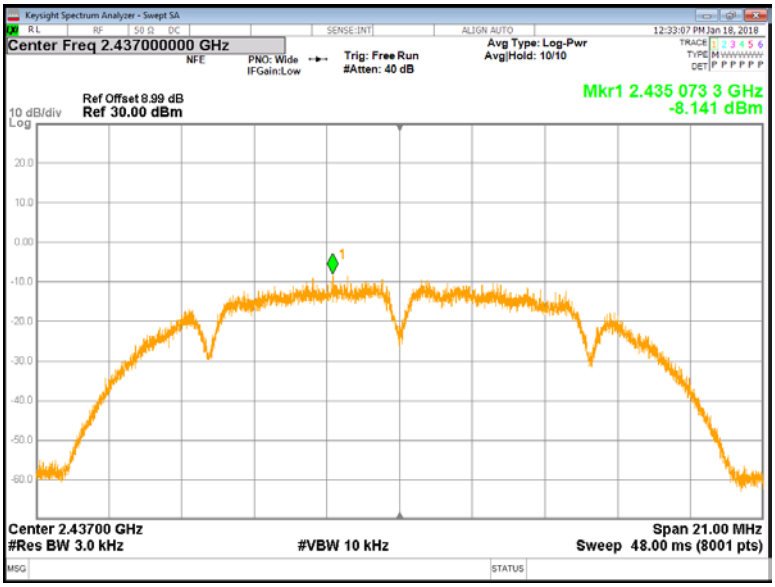
802.11b

Antenna A

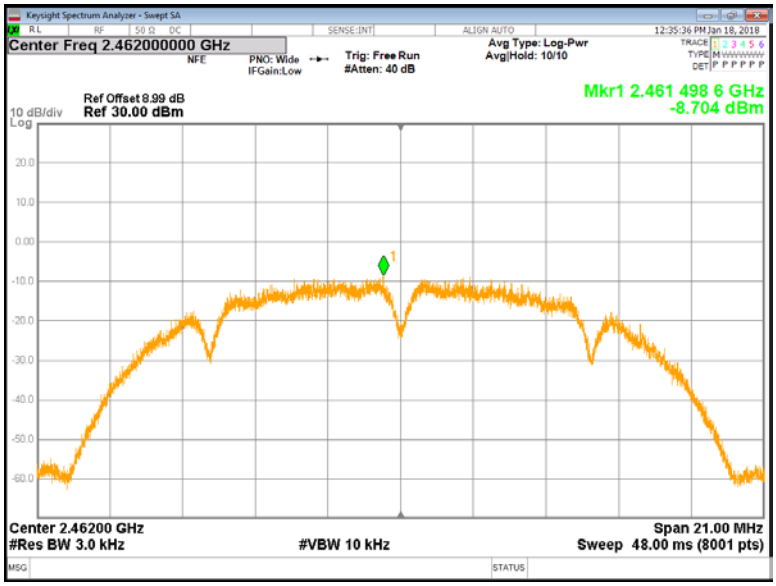
PSD LOW CH



PSD MID CH

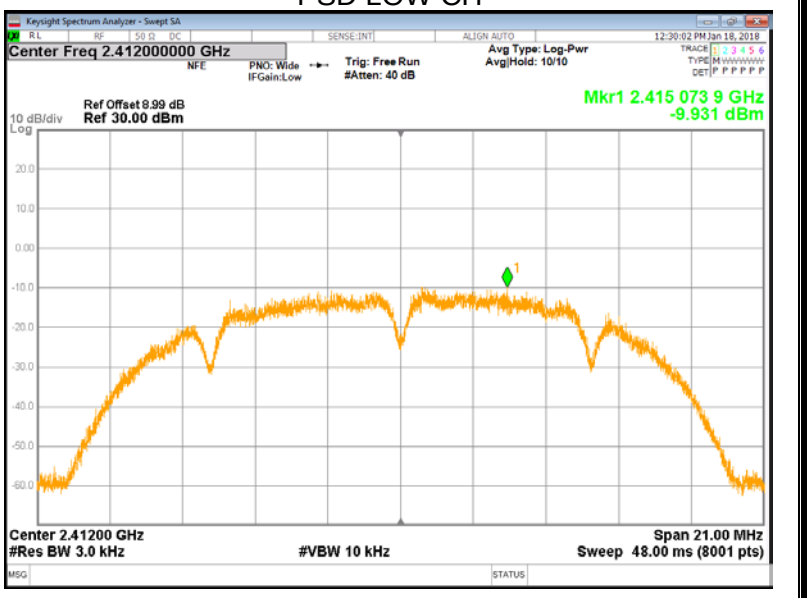


PSD HIGH CH

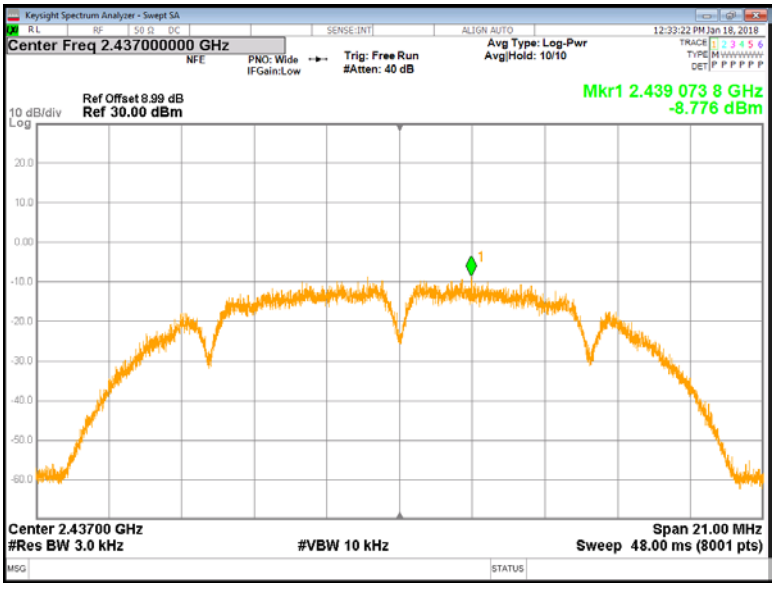


Antenna B

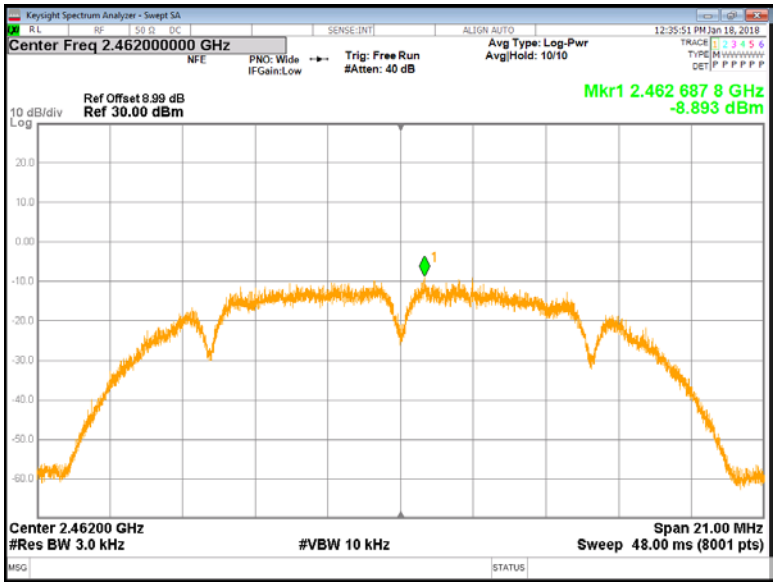
PSD LOW CH



PSD MID CH

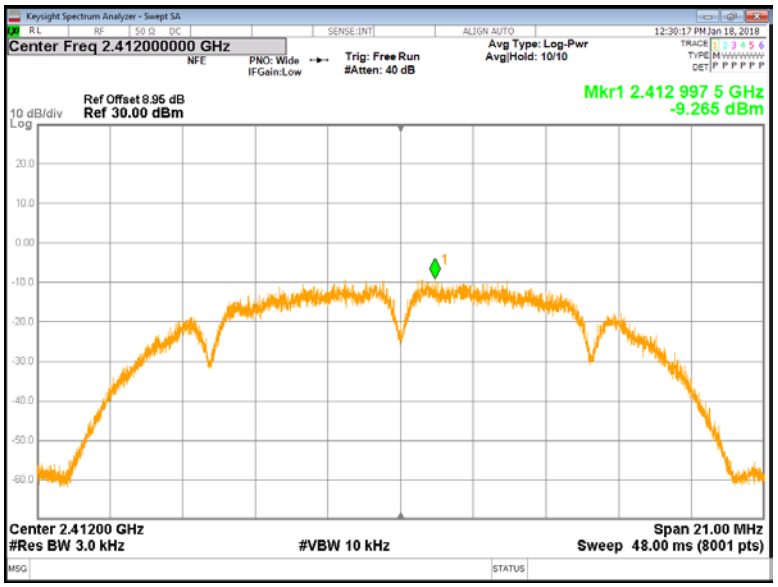


PSD HIGH CH

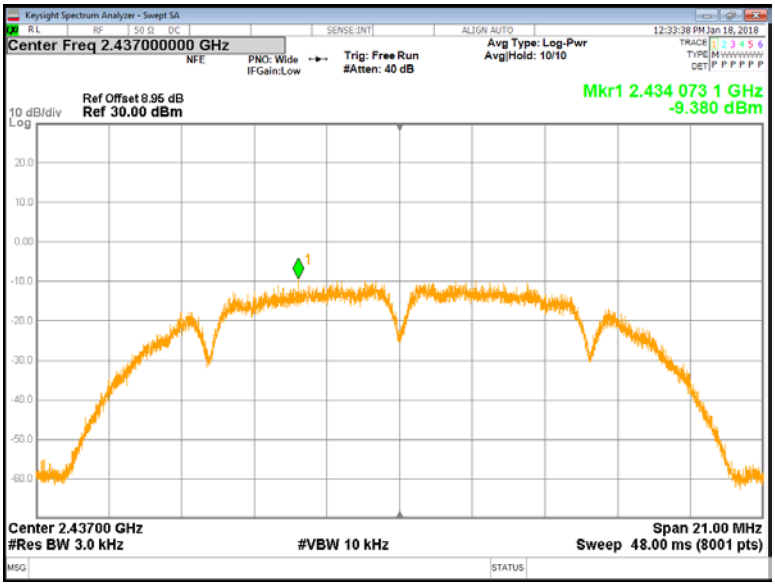


Antenna C

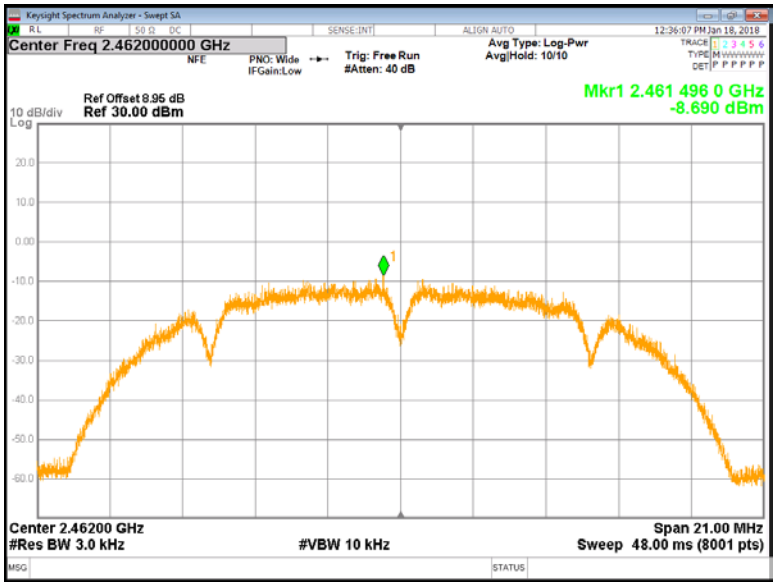
PSD LOW CH



PSD MID CH



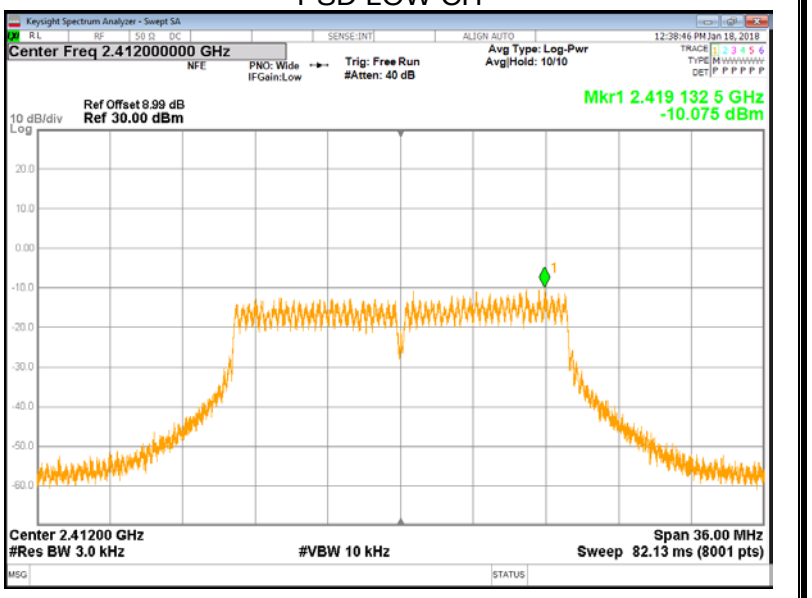
PSD HIGH CH



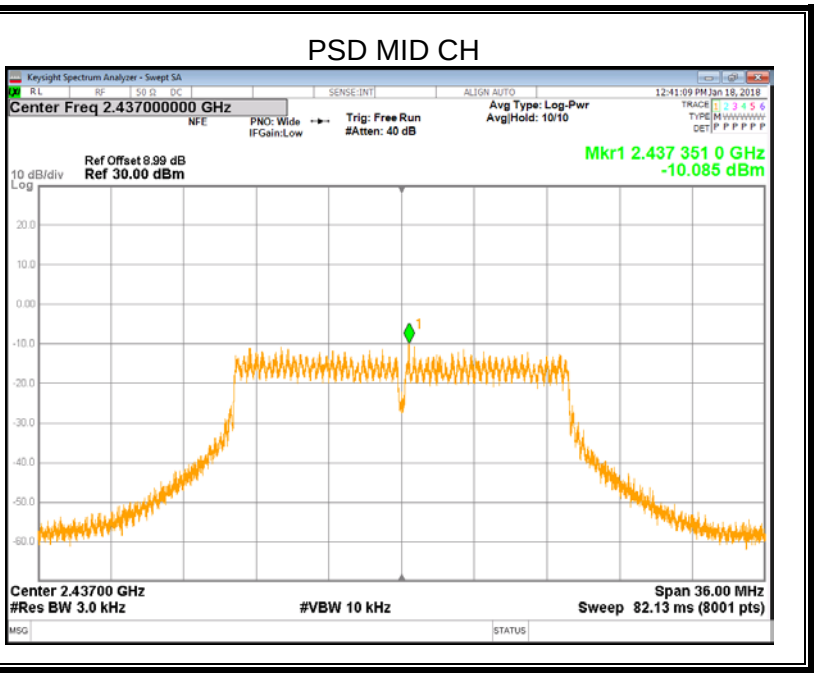
802.11g

Antenna A

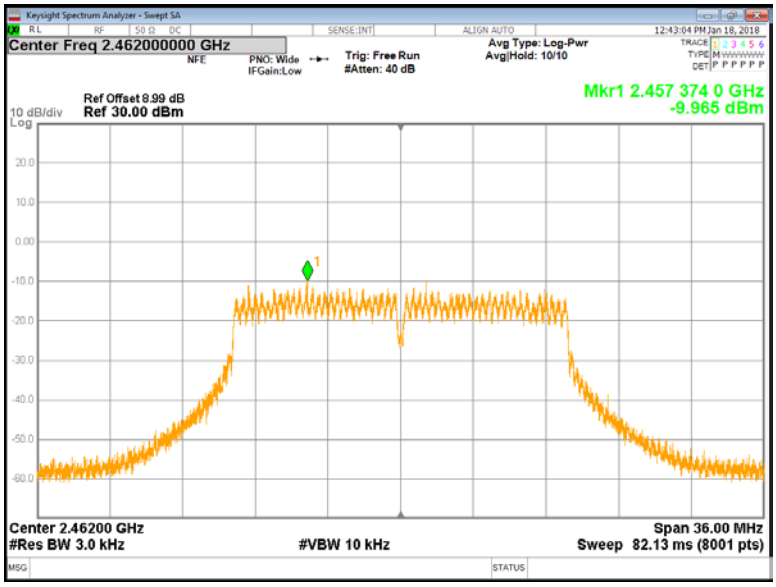
PSD LOW CH



PSD MID CH

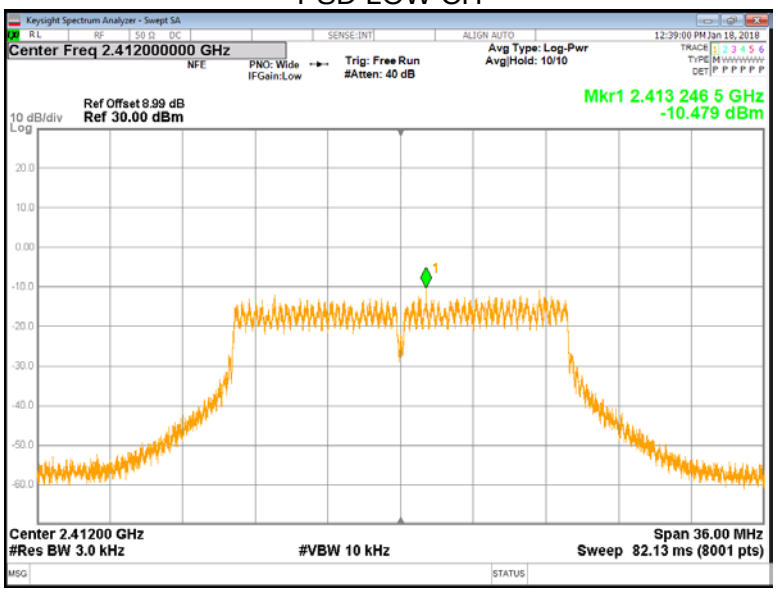


PSD HIGH CH

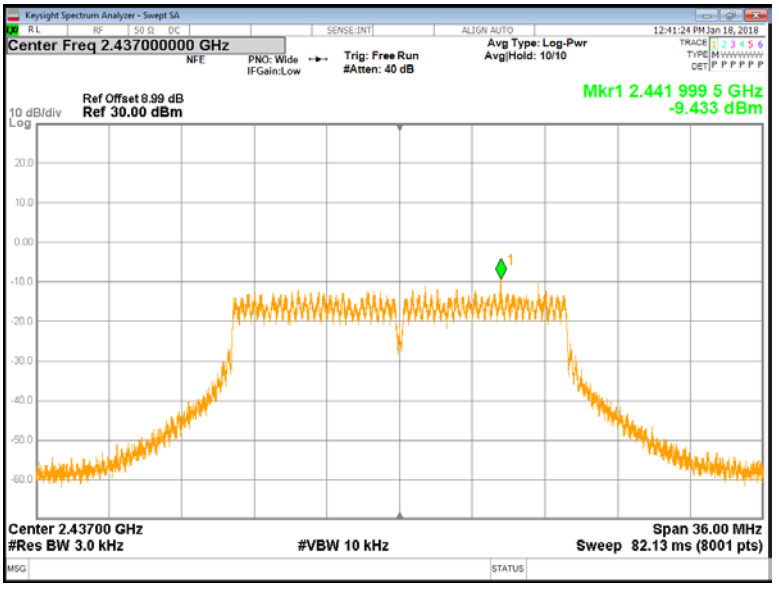


Antenna B

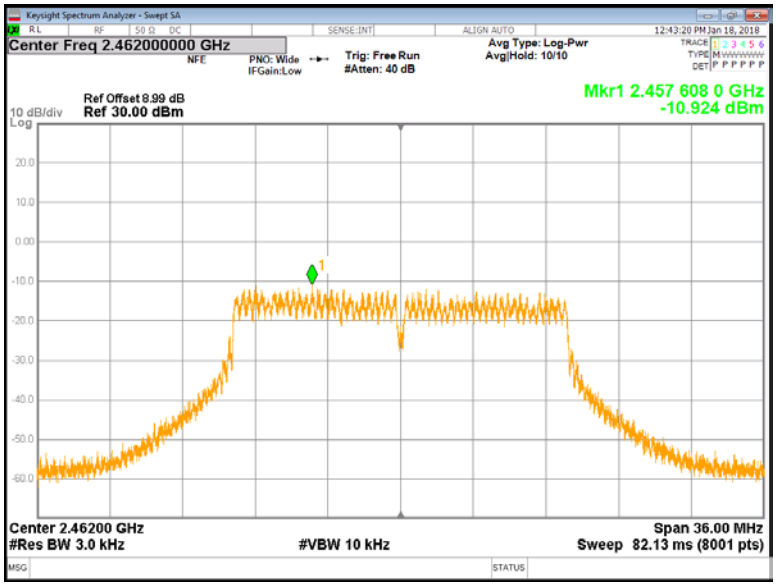
PSD LOW CH



PSD MID CH

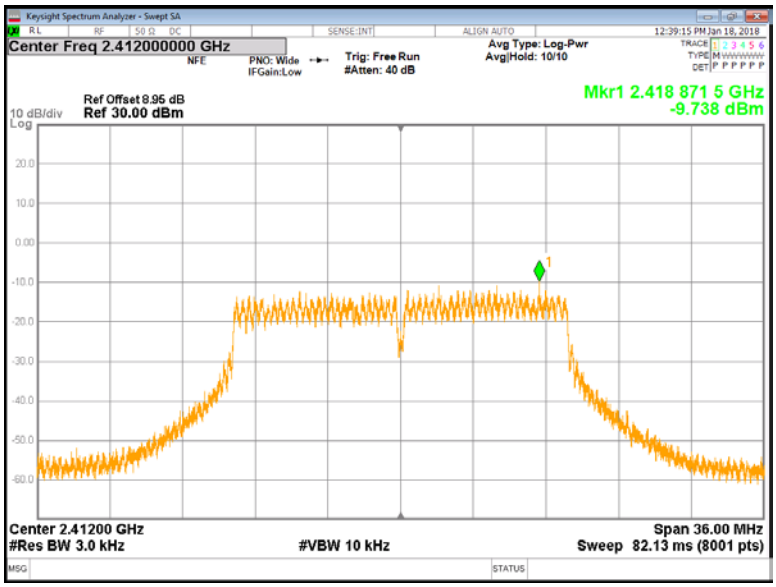


PSD HIGH CH

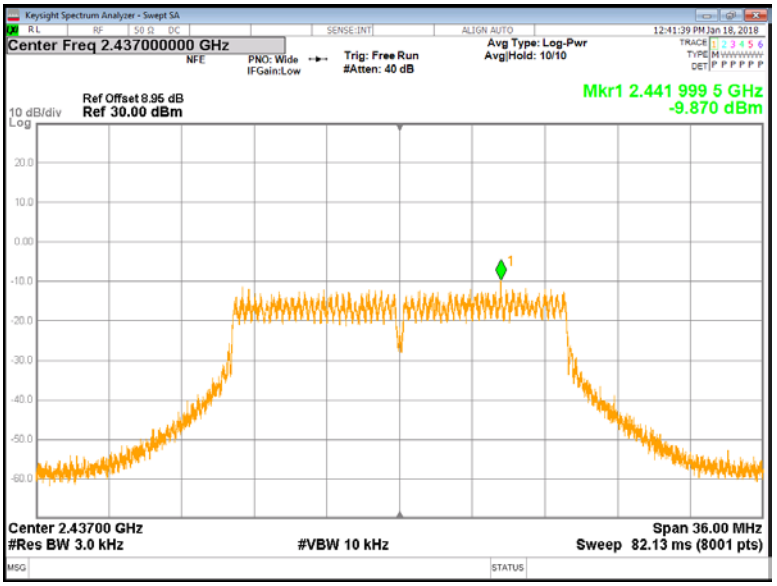


Antenna C

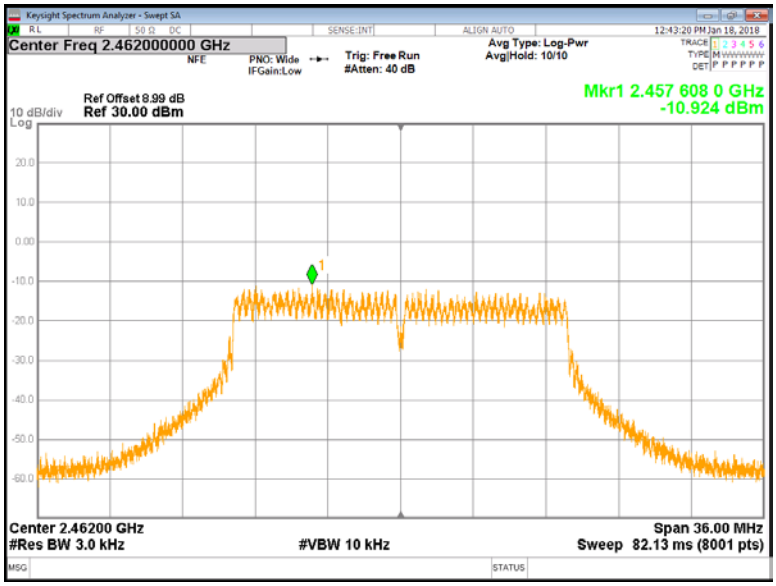
PSD LOW CH



PSD MID CH



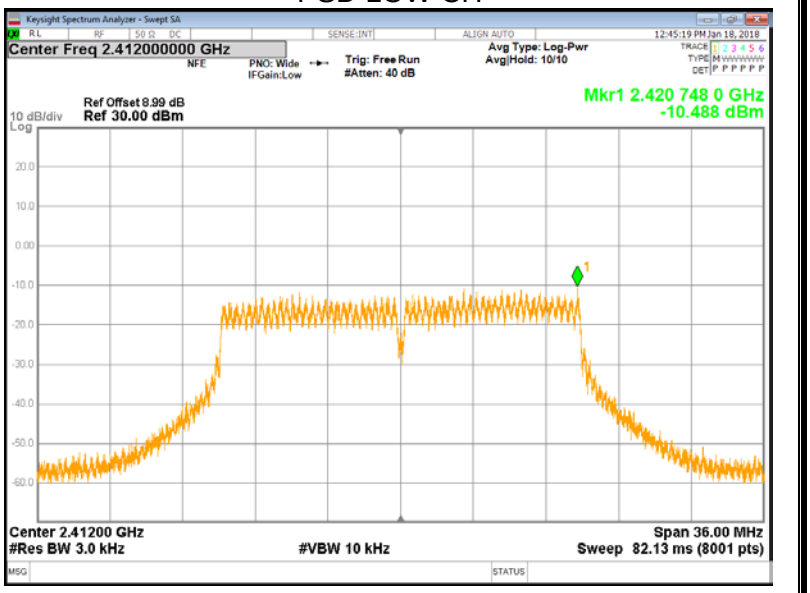
PSD HIGH CH



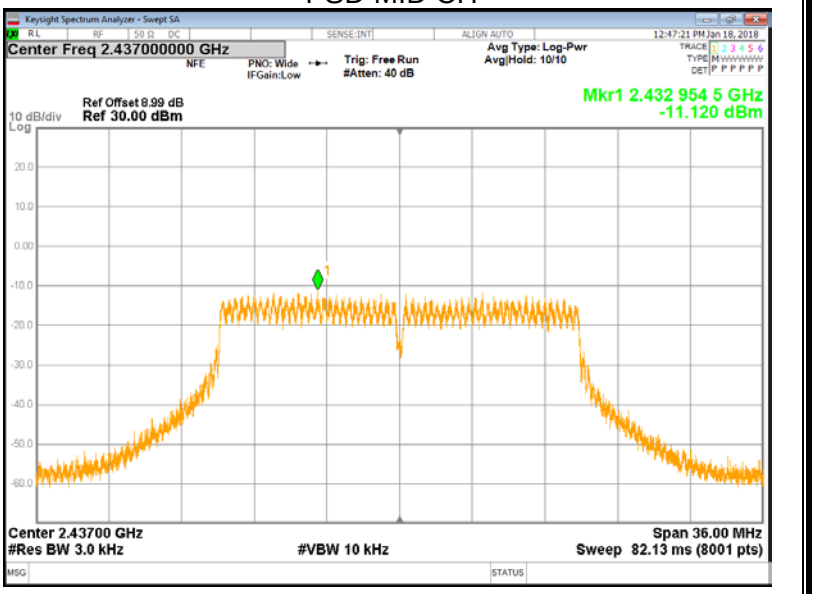
802.11n20

Antenna A

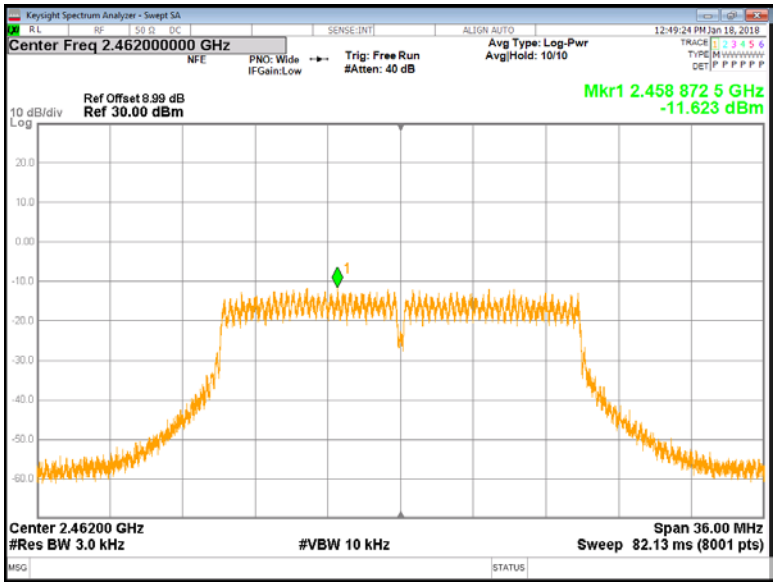
PSD LOW CH



PSD MID CH

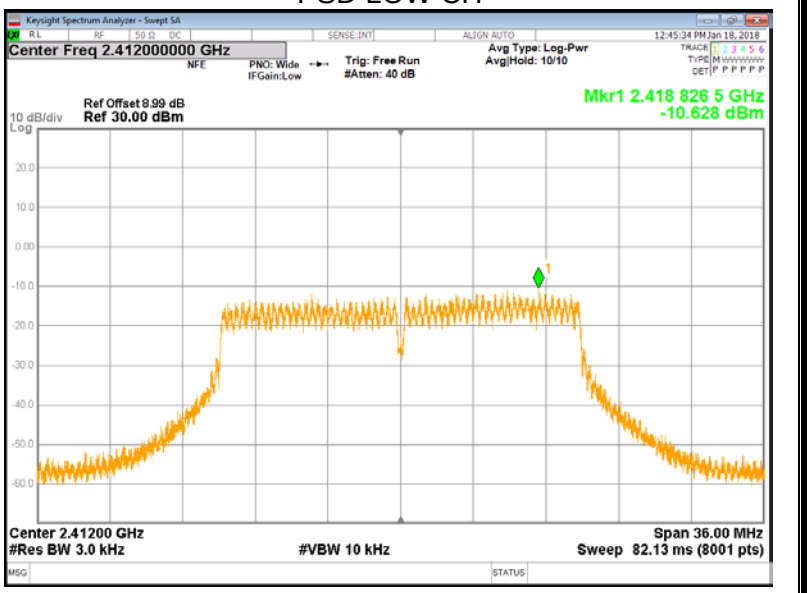


PSD HIGH CH

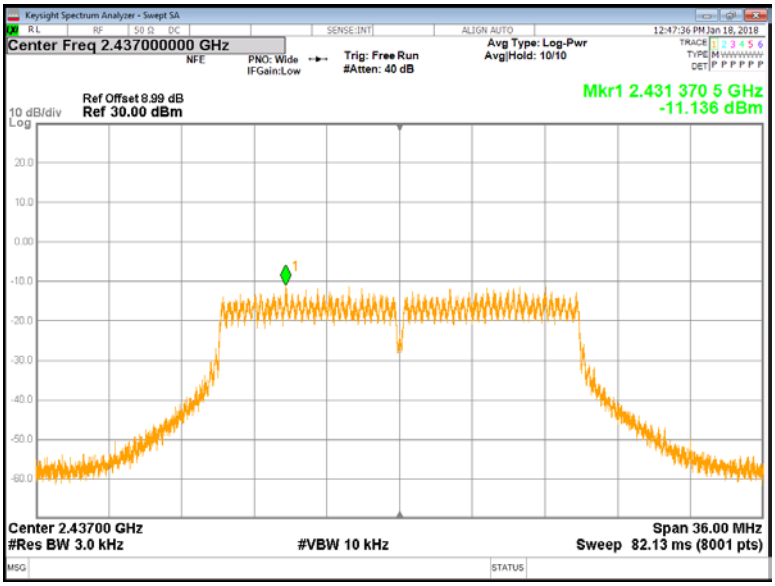


Antenna B

PSD LOW CH



PSD MID CH



PSD HIGH CH