



Test Mode: TX / IEEE 802.11g (CH Mid)

Tested by: Sam Zeng

Ambient temperature: 24°C Relative humidity: 52% RH

Date: March 28, 2017

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1900.000	48.45	-5.63	42.82	74.00	-31.18	V	Peak
2521.000	47.39	-2.22	45.17	74.00	-28.83	V	Peak
3961.000	46.15	1.43	47.58	74.00	-26.42	V	Peak
4762.000	45.34	4.20	49.54	74.00	-24.46	V	Peak
5257.000	43.49	5.44	48.93	74.00	-25.07	V	Peak
6013.000	41.98	6.10	48.08	74.00	-25.92	V	Peak
2098.000	47.33	-4.46	42.87	74.00	-31.13	H	Peak
2467.000	45.79	-2.44	43.35	74.00	-30.65	H	Peak
3223.000	44.57	-0.99	43.58	74.00	-30.42	H	Peak
3871.000	44.87	1.05	45.92	74.00	-28.08	H	Peak
4834.000	42.82	4.44	47.26	74.00	-26.74	H	Peak
5428.000	42.47	5.74	48.21	74.00	-25.79	H	Peak

REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Test Mode: TX / IEEE 802.11g (CH High)

Tested by: Sam Zeng

Ambient temperature: 24°C Relative humidity: 52% RH

Date: March 28, 2017

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1900.000	49.38	-5.63	43.75	74.00	-30.25	V	Peak
2512.000	45.67	-2.24	43.43	74.00	-30.57	V	Peak
3196.000	43.77	-1.03	42.74	74.00	-31.26	V	Peak
3961.000	45.93	1.43	47.36	74.00	-26.64	V	Peak
4762.000	43.97	4.20	48.17	74.00	-25.83	V	Peak
5500.000	42.60	5.87	48.47	74.00	-25.53	V	Peak
2125.000	46.57	-4.31	42.26	74.00	-31.74	H	Peak
2530.000	46.57	-2.21	44.36	74.00	-29.64	H	Peak
3079.000	45.42	-1.23	44.19	74.00	-29.81	H	Peak
4267.000	43.57	2.53	46.10	74.00	-27.90	H	Peak
4672.000	44.12	3.91	48.03	74.00	-25.97	H	Peak
5518.000	41.94	5.88	47.82	74.00	-26.18	H	Peak

REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Test Mode: TX / IEEE 802.11n HT20 MHz (CH Low)

Tested by: Sam Zeng

Ambient temperature: 24°C Relative humidity: 52% RH

Date: March 28, 2017

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2161.000	47.37	-4.12	43.25	74.00	-30.75	V	Peak
2539.000	46.83	-2.19	44.64	74.00	-29.36	V	Peak
3961.000	45.03	1.43	46.46	74.00	-27.54	V	Peak
4753.000	44.34	4.17	48.51	74.00	-25.49	V	Peak
5410.000	43.08	5.71	48.79	74.00	-25.21	V	Peak
6103.000	42.21	6.25	48.46	74.00	-25.54	V	Peak
1297.000	48.40	-7.44	40.96	74.00	-33.04	H	Peak
2242.000	46.18	-3.67	42.51	74.00	-31.49	H	Peak
2530.000	46.85	-2.21	44.64	74.00	-29.36	H	Peak
2800.000	45.70	-1.72	43.98	74.00	-30.02	H	Peak
4564.000	43.16	3.56	46.72	74.00	-27.28	H	Peak
5608.000	42.94	5.92	48.86	74.00	-25.14	H	Peak

REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

Test Mode: TX / IEEE 802.11n HT20 MHz (CH Mid)Tested by: Sam ZengAmbient temperature: 24°C Relative humidity: 52% RHDate: March 28, 2017

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2494.000	46.77	-2.29	44.48	74.00	-29.52	V	Peak
3196.000	44.03	-1.03	43.00	74.00	-31.00	V	Peak
3961.000	44.85	1.43	46.28	74.00	-27.72	V	Peak
4762.000	44.56	4.20	48.76	74.00	-25.24	V	Peak
5626.000	42.83	5.92	48.75	74.00	-25.25	V	Peak
6481.000	42.43	6.86	49.29	74.00	-24.71	V	Peak
2503.000	47.24	-2.25	44.99	74.00	-29.01	H	Peak
3214.000	43.53	-1.00	42.53	74.00	-31.47	H	Peak
3673.000	44.50	0.21	44.71	74.00	-29.29	H	Peak
4348.000	42.85	2.81	45.66	74.00	-28.34	H	Peak
5095.000	44.11	5.15	49.26	74.00	-24.74	H	Peak
5662.000	42.41	5.94	48.35	74.00	-25.65	H	Peak

REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Test Mode: TX / EEE 802.11n HT20 MHz (CH High)

Tested by: Sam Zeng

Ambient temperature: 24°C Relative humidity: 52% RH

Date: March 28, 2017

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2224.000	46.82	-3.77	43.05	74.00	-30.95	V	Peak
2512.000	46.46	-2.24	44.22	74.00	-29.78	V	Peak
3169.000	44.02	-1.08	42.94	74.00	-31.06	V	Peak
3961.000	45.81	1.43	47.24	74.00	-26.76	V	Peak
4762.000	45.98	4.20	50.18	74.00	-23.82	V	Peak
5140.000	43.79	5.23	49.02	74.00	-24.98	V	Peak
2224.000	46.15	-3.77	42.38	74.00	-31.62	H	Peak
2512.000	46.50	-2.24	44.26	74.00	-29.74	H	Peak
3358.000	43.56	-0.76	42.80	74.00	-31.20	H	Peak
4276.000	43.10	2.56	45.66	74.00	-28.34	H	Peak
5050.000	42.69	5.07	47.76	74.00	-26.24	H	Peak
5878.000	42.00	6.03	48.03	74.00	-25.97	H	Peak

REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Test Mode: TX / IEEE 802.11n HT40 MHz (CH Low)

Tested by: Sam Zeng

Ambient temperature: 24°C Relative humidity: 52% RH

Date: March 28, 2017

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2242.000	46.97	-3.67	43.30	74.00	-30.70	V	Peak
2512.000	46.55	-2.24	44.31	74.00	-29.69	V	Peak
3781.000	45.07	0.67	45.74	74.00	-28.26	V	Peak
3961.000	44.89	1.43	46.32	74.00	-27.68	V	Peak
4762.000	44.47	4.20	48.67	74.00	-25.33	V	Peak
5500.000	42.93	5.87	48.80	74.00	-25.20	V	Peak
1333.000	48.00	-7.30	40.70	74.00	-33.30	H	Peak
2233.000	46.73	-3.72	43.01	74.00	-30.99	H	Peak
2530.000	46.47	-2.21	44.26	74.00	-29.74	H	Peak
3214.000	44.55	-1.00	43.55	74.00	-30.45	H	Peak
3736.000	43.53	0.48	44.01	74.00	-29.99	H	Peak
4834.000	42.58	4.44	47.02	74.00	-26.98	H	Peak

REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

Test Mode: TX / IEEE 802.11n HT40 MHz (CH Mid)Tested by: Sam ZengAmbient temperature: 24°C Relative humidity: 52% RHDate: March 28, 2017

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2188.000	45.98	-3.97	42.01	74.00	-31.99	V	Peak
2539.000	46.70	-2.19	44.51	74.00	-29.49	V	Peak
3169.000	44.30	-1.08	43.22	74.00	-30.78	V	Peak
3961.000	45.79	1.43	47.22	74.00	-26.78	V	Peak
4762.000	45.33	4.20	49.53	74.00	-24.47	V	Peak
5554.000	42.82	5.89	48.71	74.00	-25.29	V	Peak
1612.000	47.59	-6.67	40.92	74.00	-33.08	H	Peak
2242.000	46.18	-3.67	42.51	74.00	-31.49	H	Peak
2503.000	46.39	-2.25	44.14	74.00	-29.86	H	Peak
2800.000	45.52	-1.72	43.80	74.00	-30.20	H	Peak
4024.000	43.82	1.67	45.49	74.00	-28.51	H	Peak
5005.000	42.34	4.99	47.33	74.00	-26.67	H	Peak

REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Test Mode: TX / EEE 802.11n HT40 MHz (CH High)

Tested by: Sam Zeng

Ambient temperature: 24°C Relative humidity: 52% RH

Date: March 28, 2017

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2521.000	46.42	-2.22	44.20	74.00	-29.80	V	Peak
3169.000	44.61	-1.08	43.53	74.00	-30.47	V	Peak
3961.000	46.77	1.43	48.20	74.00	-25.80	V	Peak
4762.000	44.39	4.20	48.59	74.00	-25.41	V	Peak
5023.000	43.25	5.02	48.27	74.00	-25.73	V	Peak
5581.000	42.77	5.90	48.67	74.00	-25.33	V	Peak
1729.000	47.07	-6.42	40.65	74.00	-33.35	H	Peak
2242.000	46.61	-3.67	42.94	74.00	-31.06	H	Peak
2494.000	46.06	-2.29	43.77	74.00	-30.23	H	Peak
2926.000	44.73	-1.49	43.24	74.00	-30.76	H	Peak
4006.000	44.23	1.61	45.84	74.00	-28.16	H	Peak
4429.000	43.49	3.10	46.59	74.00	-27.41	H	Peak

REMARKS:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*



7.3. 6dB BANDWIDTH MEASUREMENT

7.3.1. LIMITS

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz. The minimum 6 dB bandwidth shall be at least 500 kHz.

7.3.2. TEST INSTRUMENTS

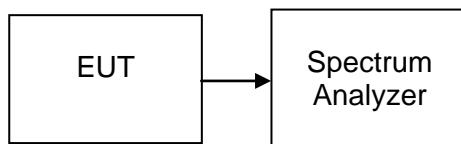
Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2017	02/20/2018

7.3.3. TEST PROCEDURES (please refer to measurement standard)

8.2 Option 2:

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., $RBW = 100 \text{ kHz}$, $VBW \geq 3 \text{ RBW}$, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be $\geq 6 \text{ dB}$.

7.3.4. TEST SETUP





7.3.5. TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	9067	>500	PASS
Mid	2437	9069		PASS
High	2462	9058		PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	16490	>500	PASS
Mid	2437	16480		PASS
High	2462	16500		PASS

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	17660	>500	PASS
Mid	2437	17640		PASS
High	2462	17730		PASS

Test mode: IEEE 802.11n HT40 MHz

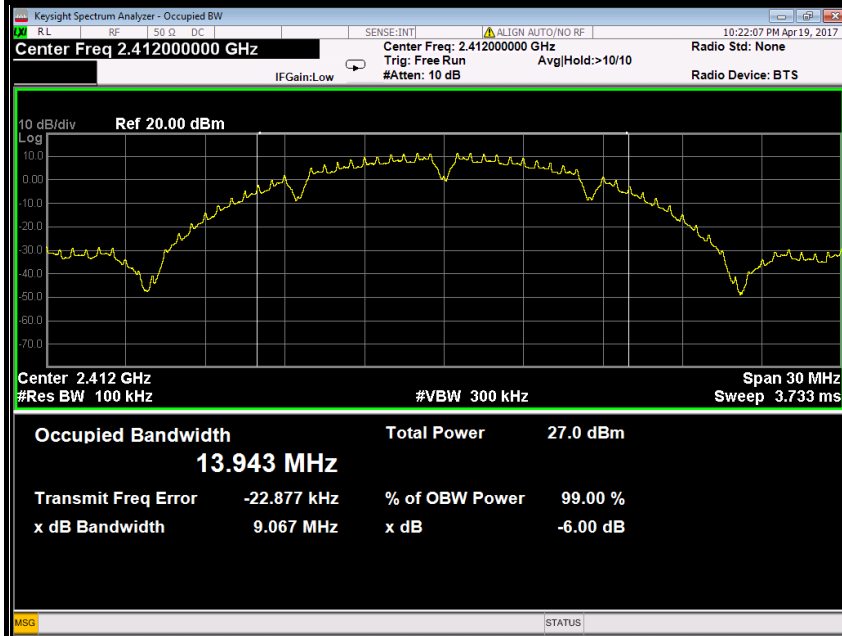
Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2422	36430	>500	PASS
Mid	2437	36380		PASS
High	2452	36430		PASS



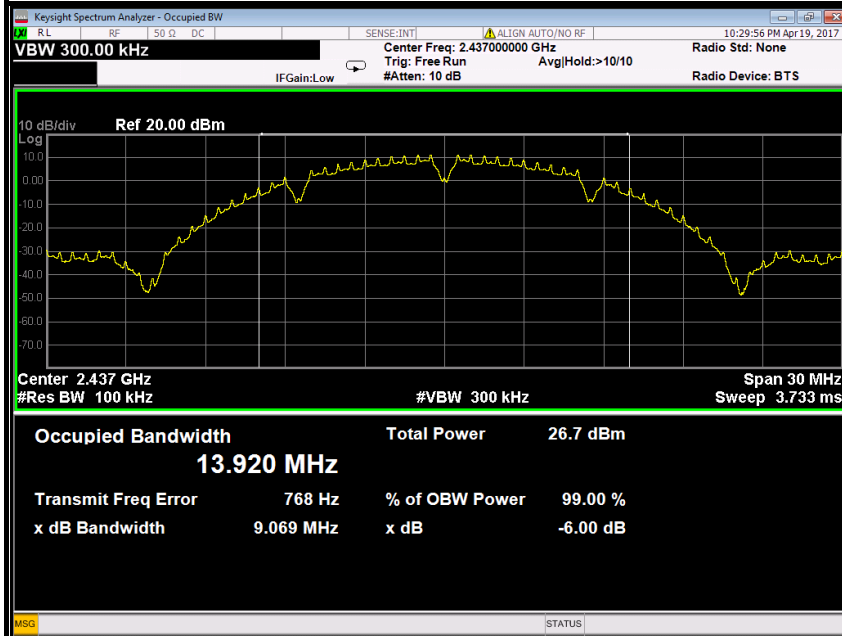
Test Plot

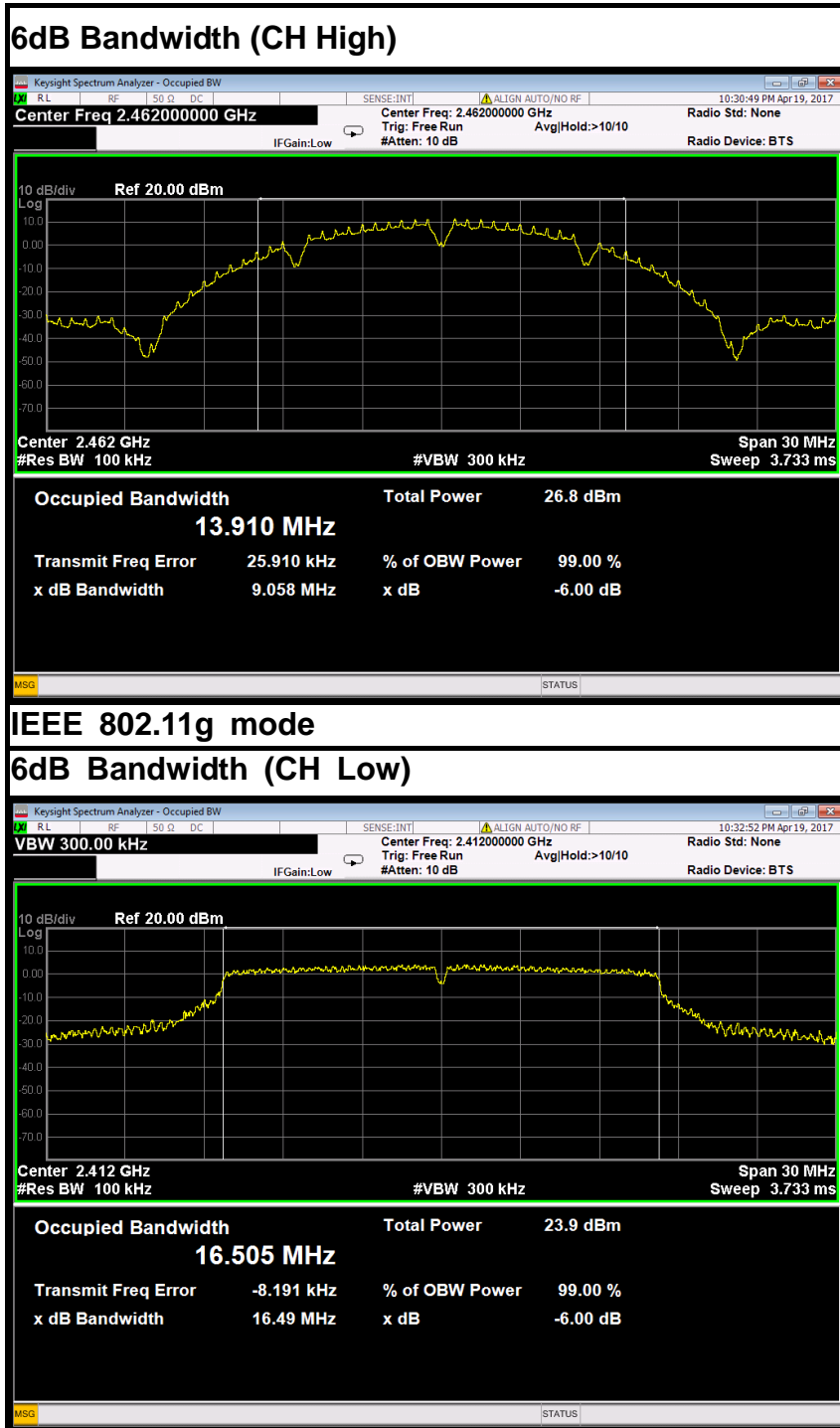
IEEE 802.11b mode

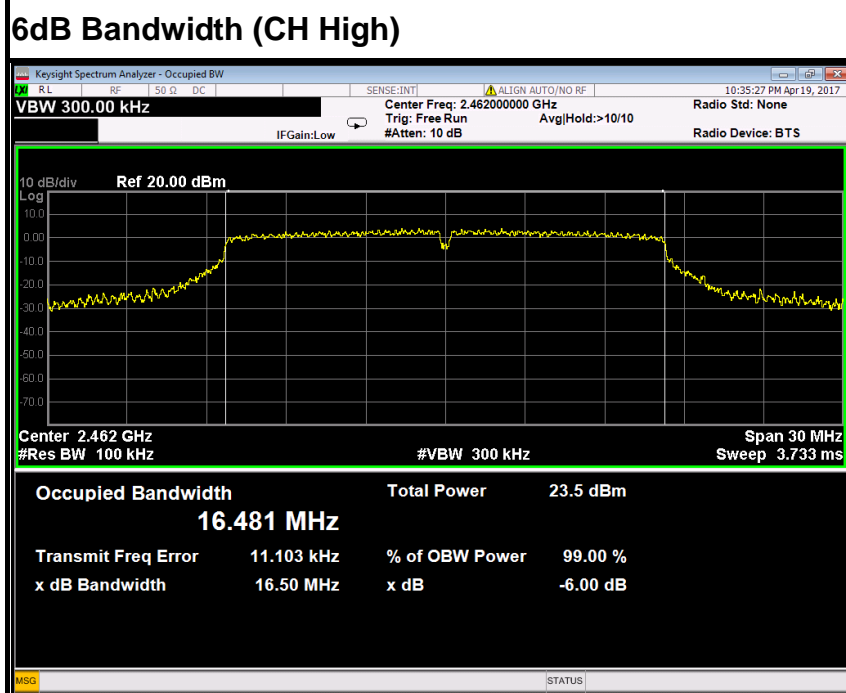
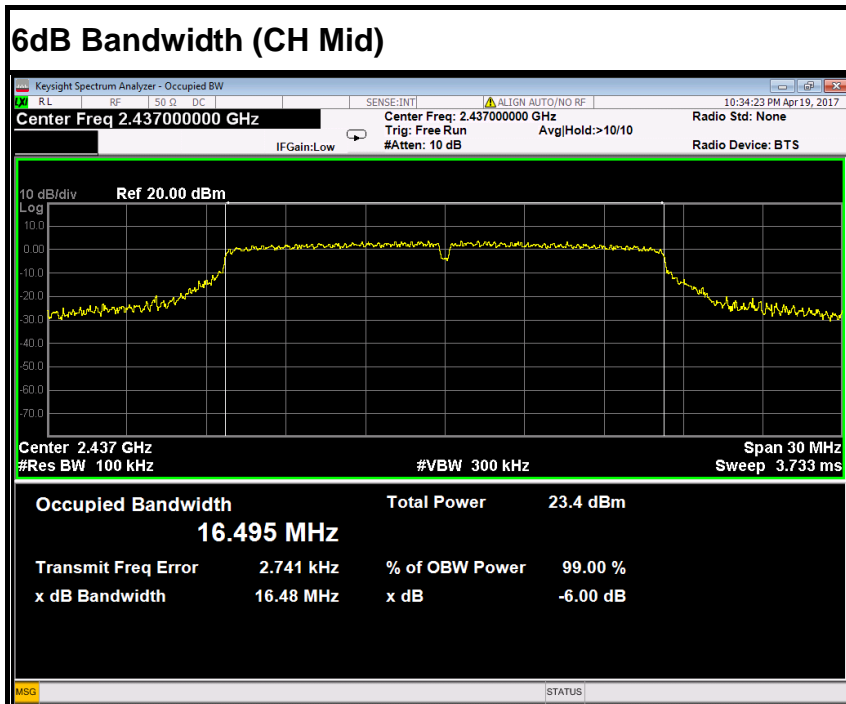
6dB Bandwidth (CH Low)

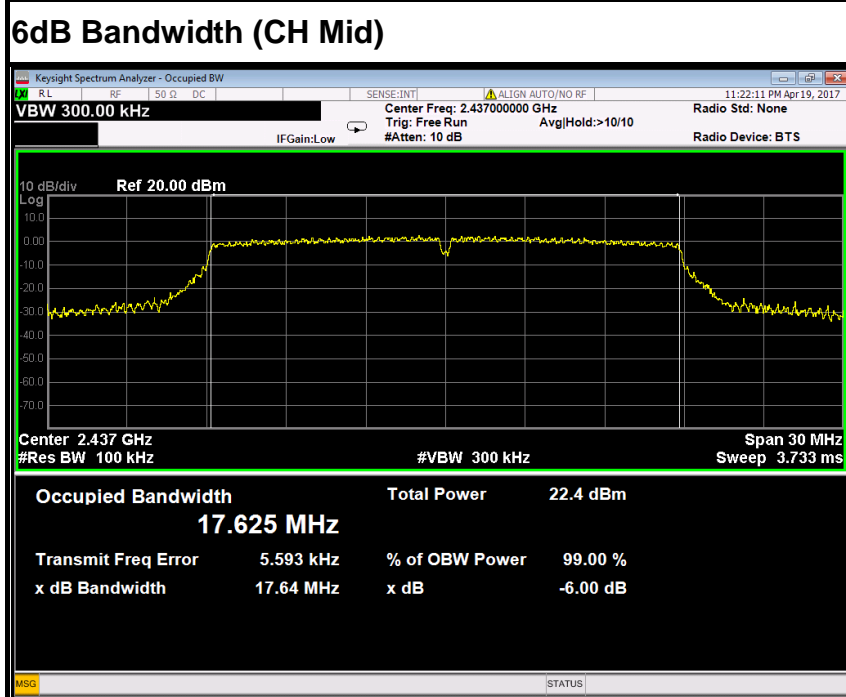
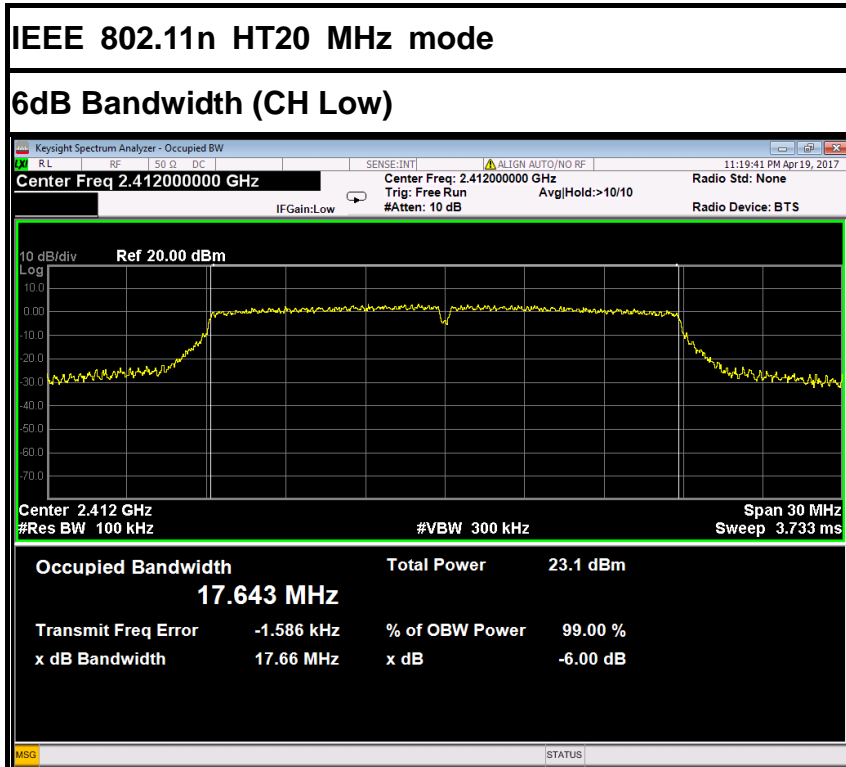


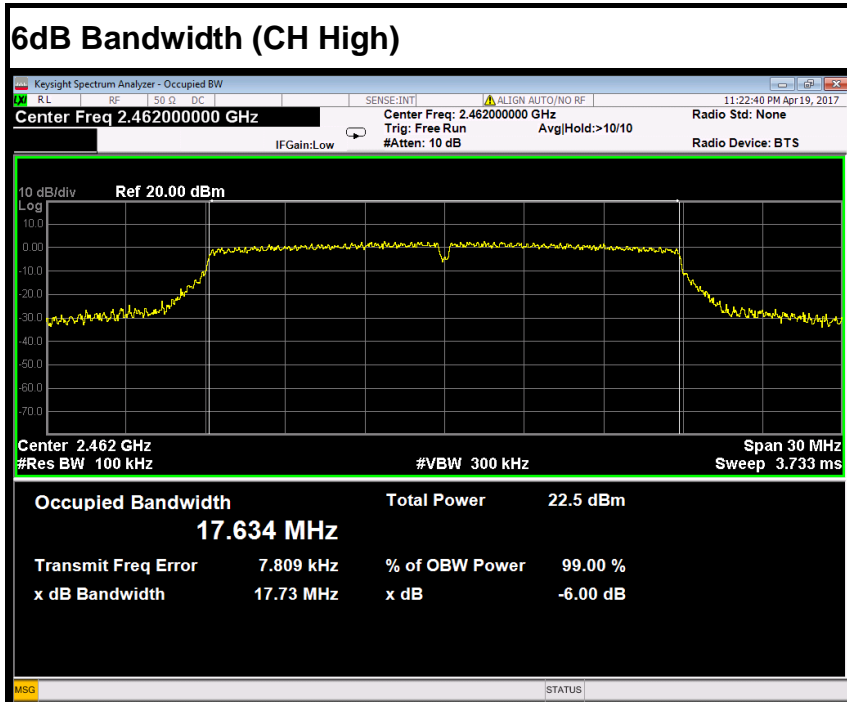
6dB Bandwidth (CH Mid)



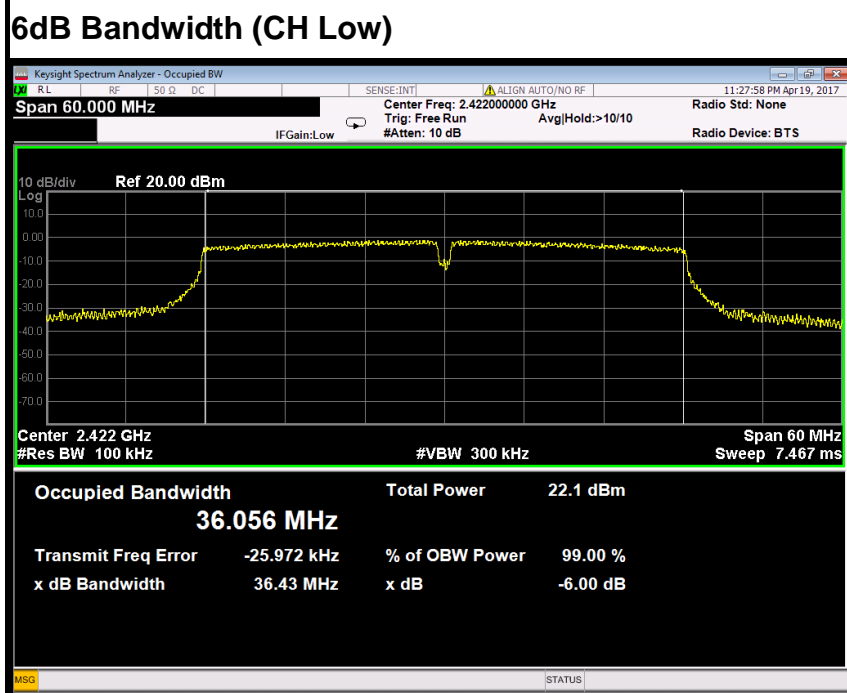


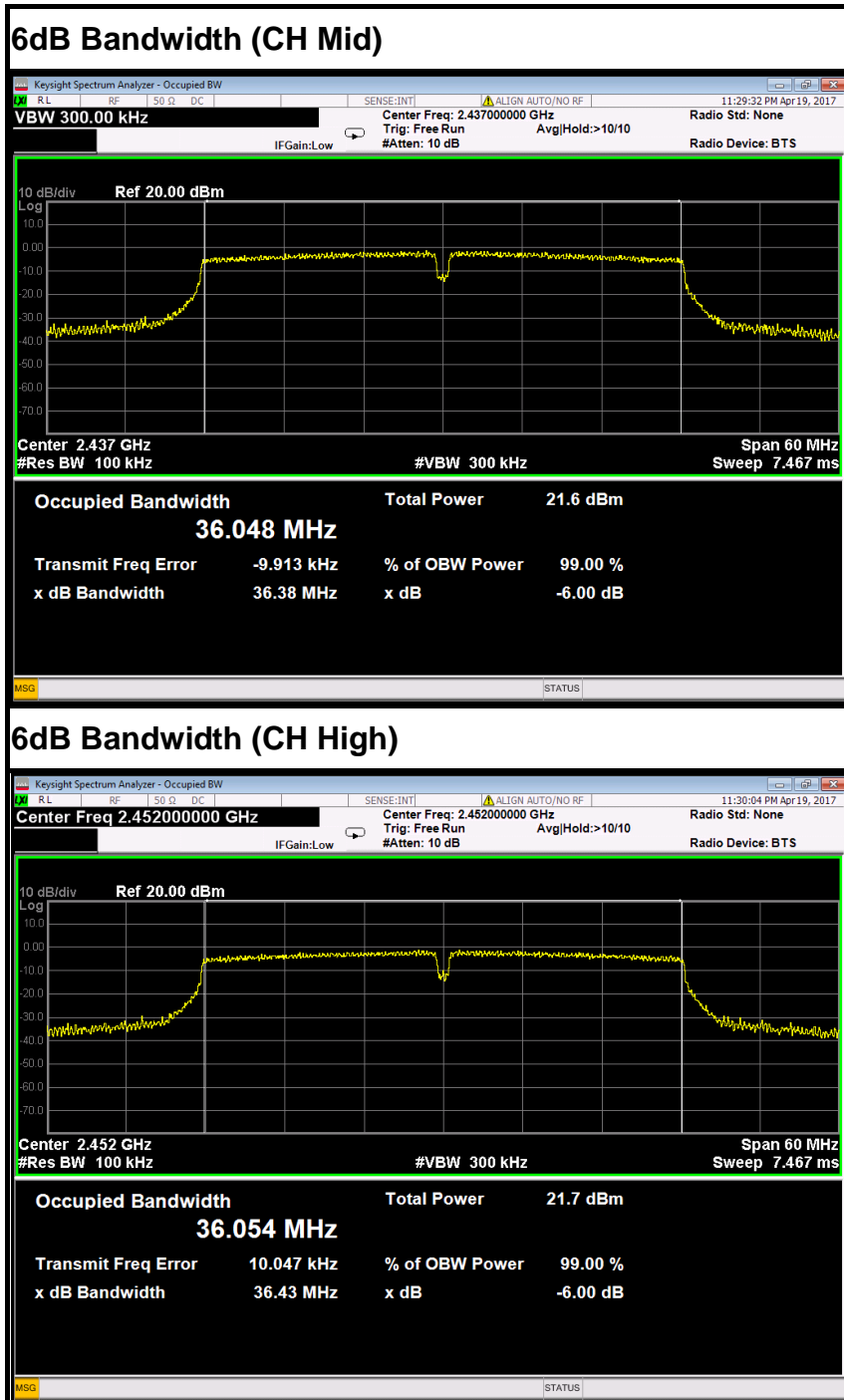






IEEE 802.11n HT40 MHz mode







7.4. ANTENNA GAIN

MEASUREMENT

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For normal WLAN devices, the DSSS mode is used.

MEASUREMENT PARAMETERS

Measurement parameter	
Detector	Peak
Sweep time	Auto
Resolution bandwidth	3 MHz
Video bandwidth	3 MHz
Trace-Mode	Max hold

LIMITS

FCC	IC
Antenna Gain	
6 dBi	



TEST RESULTS

PASS

Please refer to antenna report;



7.5. PEAK OUTPUT POWER

7.5.1. LIMITS

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.5.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Power Meter	Anritsu	ML2495A	1204003	02/21/2017	02/20/2018
Power Sensor	Anritsu	MA2411B	1126150	02/21/2017	02/20/2018

7.5.3. TEST PROCEDURES (please refer to measurement standard)

9.1.1 RBW \geq DTS bandwidth

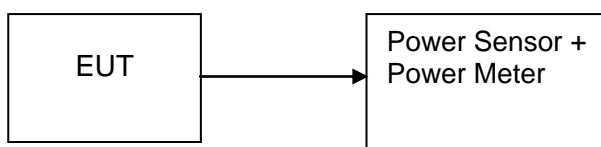
This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the *DTS bandwidth*.

- a) Set the RBW \geq *DTS bandwidth*.
- b) Set VBW \geq 3 RBW.
- c) Set span \geq 3 x RBW
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

9.1.3 PKPM1 Peak power meter method

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

7.5.4. TEST SETUP





7.5.5. TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Peak / AVG	Limit (W)	Result
Low	2412	17.40	0.05495	Peak	1	PASS
Mid	2437	17.40	0.05495			PASS
High	2462	16.50	0.04467			PASS
Low	2412	15.20	0.03311	AVG	1	PASS
Mid	2437	15.50	0.03548			PASS
High	2462	14.60	0.02884			PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Peak / AVG	Limit (W)	Result
Low	2412	22.50	0.17783	Peak	1	PASS
Mid	2437	22.80	0.19055			PASS
High	2462	22.60	0.18197			PASS
Low	2412	13.70	0.02344	AVG	1	PASS
Mid	2437	14.00	0.02512			PASS
High	2462	13.80	0.02399			PASS

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Peak / AVG	Limit (W)	Result
Low	2412	21.60	0.14454	Peak	1	PASS
Mid	2437	23.20	0.20893			PASS
High	2462	23.20	0.20893			PASS
Low	2412	13.30	0.02138	AVG	1	PASS
Mid	2437	12.90	0.01950			PASS
High	2462	13.00	0.01995			PASS

Test mode: IEEE 802.11n HT40 MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Peak / AVG	Limit (W)	Result
Low	2422	21.90	0.15488	Peak	1	PASS
Mid	2437	22.90	0.19498			PASS
High	2452	23.10	0.20417			PASS
Low	2422	12.80	0.01905	AVG	1	PASS
Mid	2437	13.20	0.02089			PASS
High	2452	13.40	0.02188			PASS



7.6. BAND EDGES MEASUREMENT

7.6.1. LIMITS

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

7.6.2. TEST INSTRUMENTS

Radiated Emission Test Site 966(2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
PSA Series Spectrum Analyzer	Agilent	N9010A	MY55370330	02/21/2017	02/20/2018
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/21/2017	02/20/2018
Amplifier	EMEC	EM330	060661	03/18/2017	03/17/2018
High Noise Amplifier	Agilent	8449B	3008A01838	02/21/2017	02/20/2018
Loop Antenna	COM-POWER	AL-130	121044	09/25/2016	09/24/2017
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/21/2017	02/20/2018
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/28/2017	02/27/2018
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	02/28/2017	02/27/2018
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/21/2017	02/20/2018
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The FCC Site Registration number is 101879.

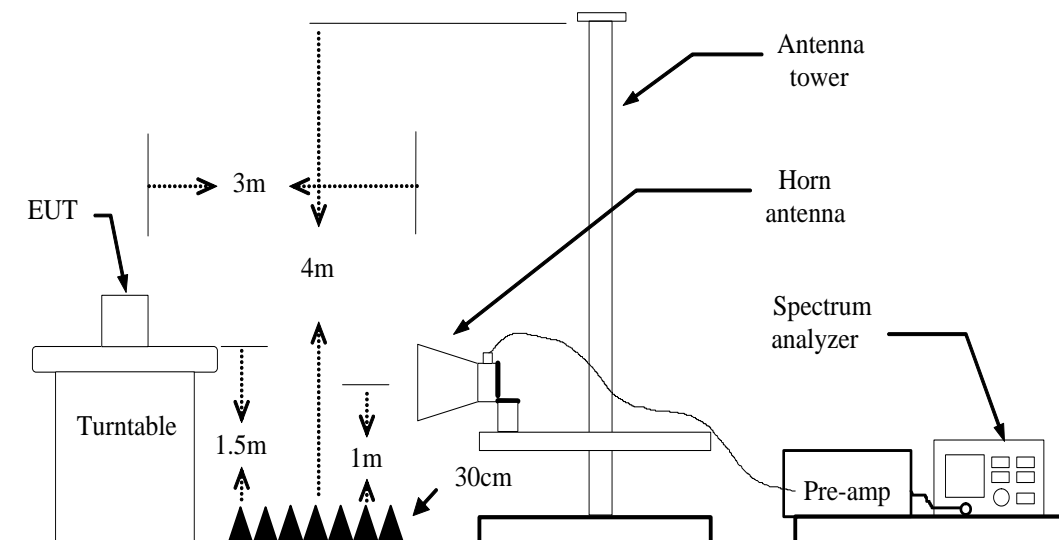
3. N.C.R = No Calibration Required.



7.6.3. TEST PROCEDURES (please refer to measurement standard)

1. The EUT is placed on a turntable, which is 1.5m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO / Detector=PEAK
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

7.6.4. TEST SETUP

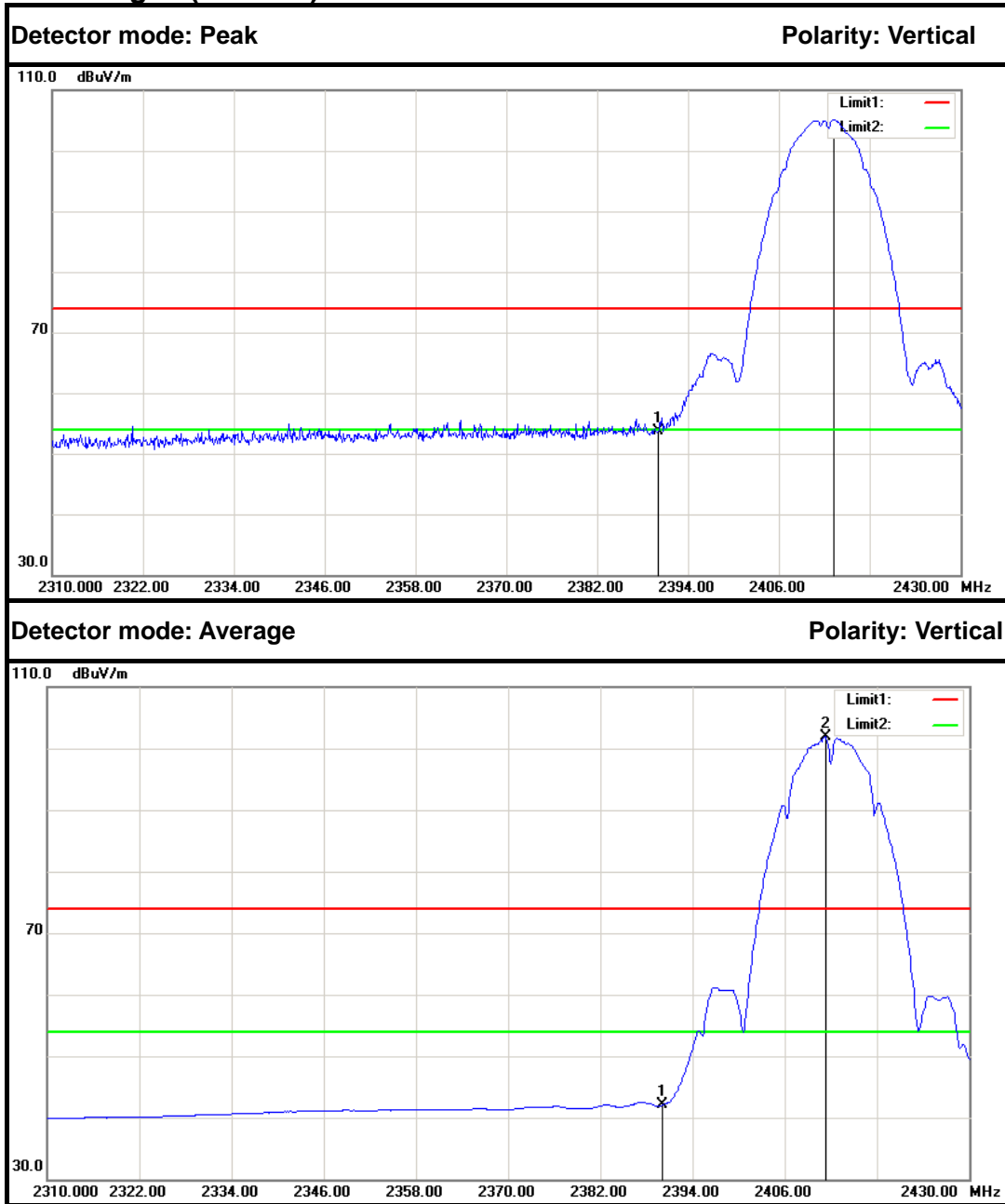




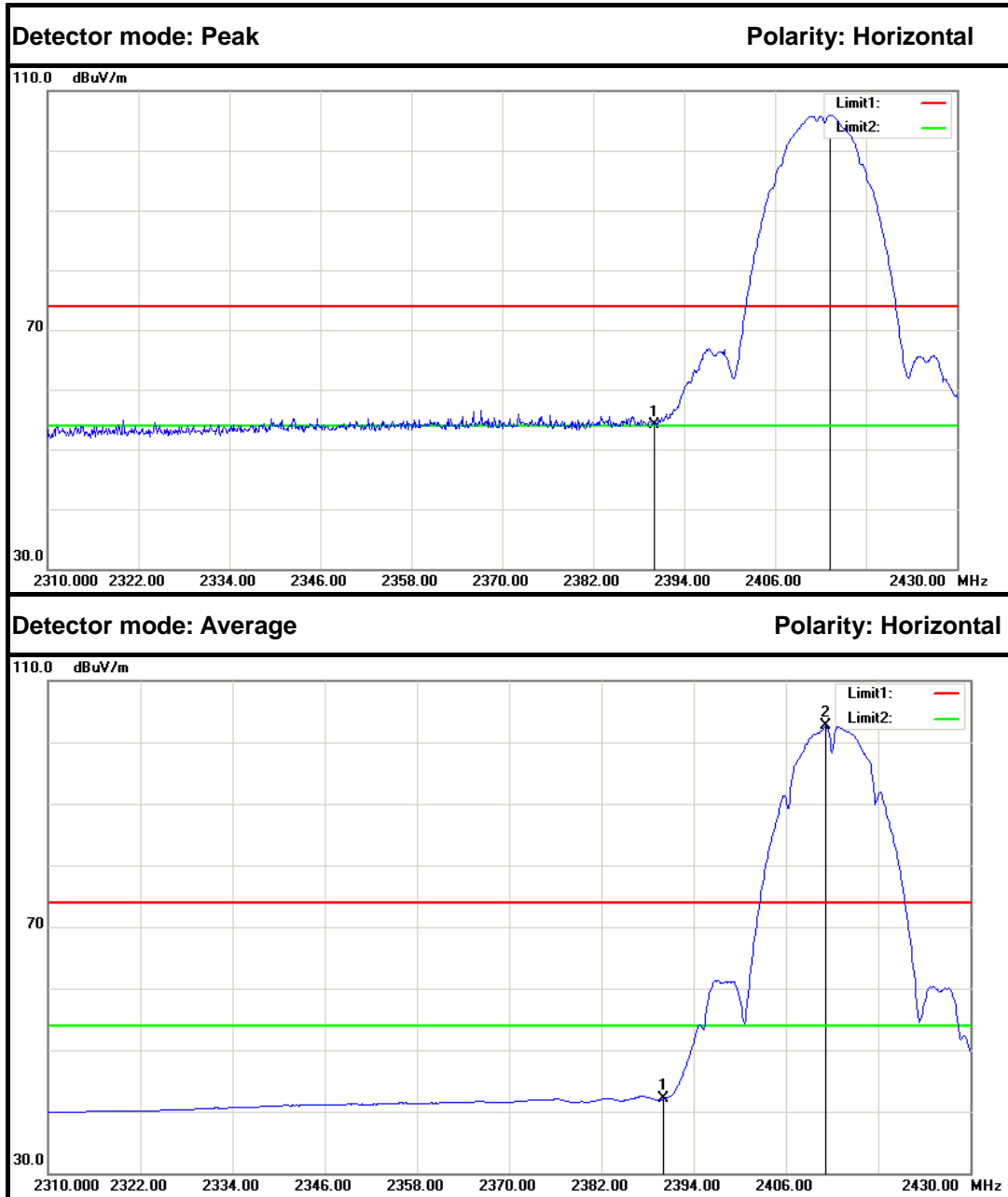
7.6.5. TEST RESULTS

Test Plot

IEEE 802.11b mode
Band Edges (CH Low)



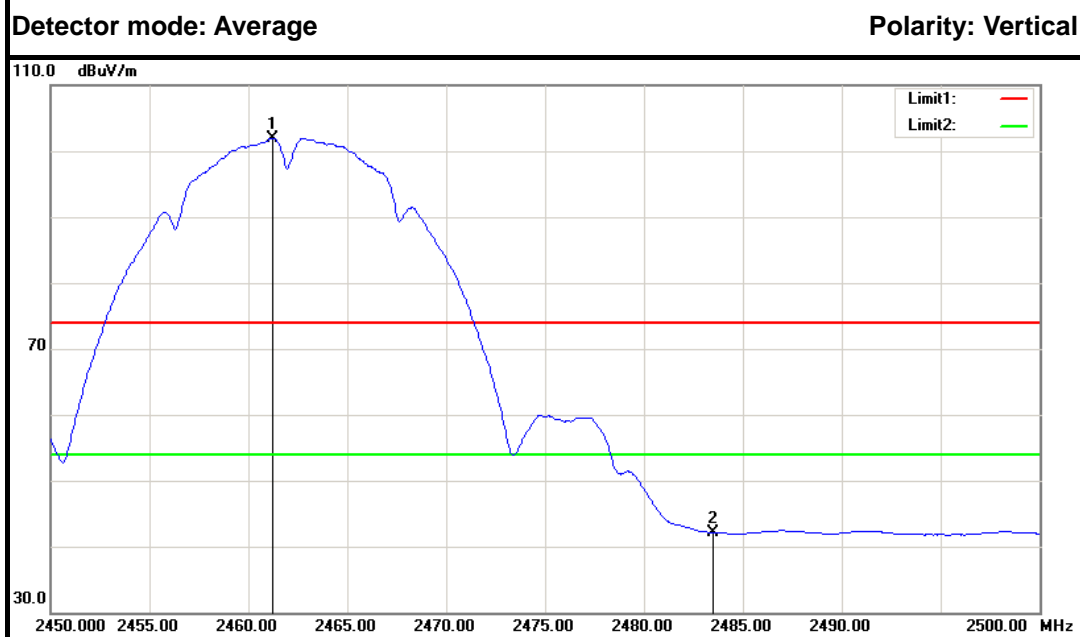
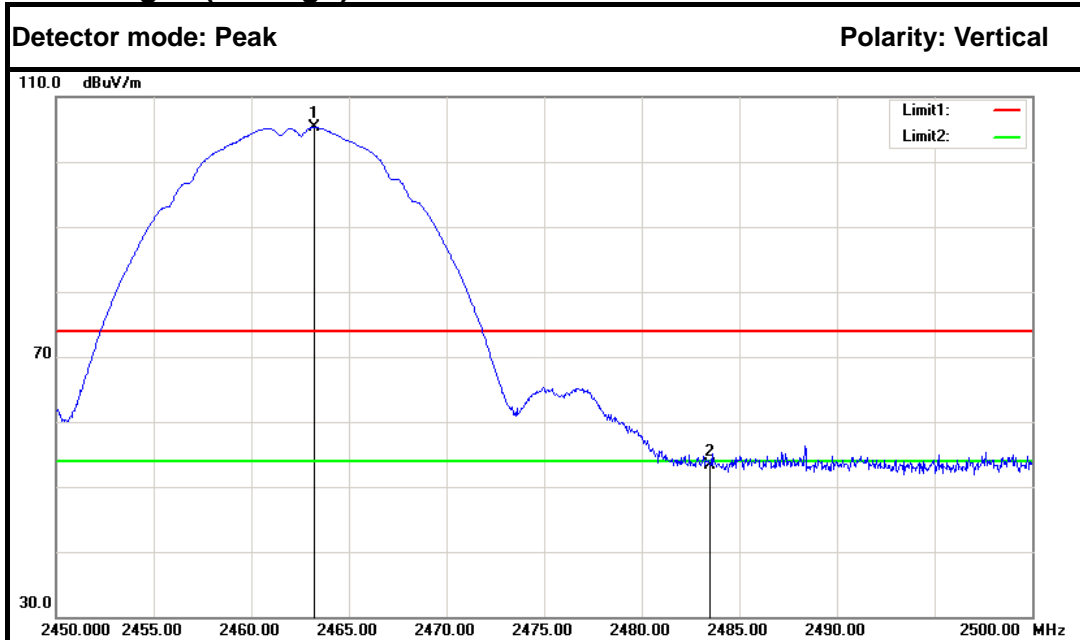
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2390.000	56.57	-2.86	53.71	74.00	-20.29	Peak	Vertical
2.	2413.200	107.82	-2.74	105.08	---	---	Peak	Vertical
3.	2390.000	44.94	-2.86	42.08	54.00	-11.92	Average	Vertical
4.	2411.280	104.58	-2.75	101.83	---	---	Average	Vertical



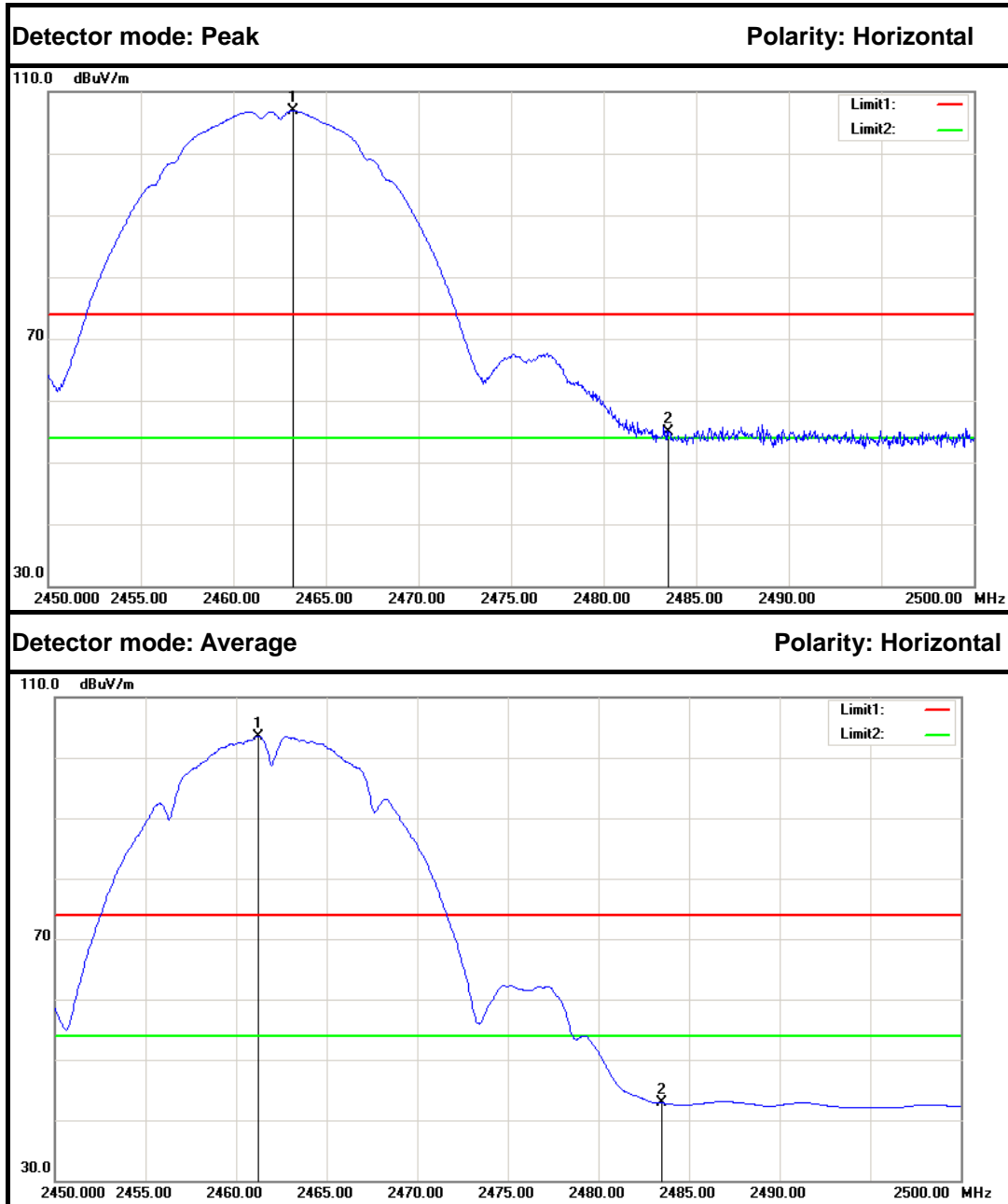
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2390.000	56.96	-2.86	54.10	74.00	-19.90	Peak	Horizontal
2.	2413.200	108.65	-2.74	105.91	---	---	Peak	Horizontal
3.	2390.000	44.90	-2.86	42.04	54.00	-11.96	Average	Horizontal
4.	2411.160	105.40	-2.75	102.65	---	---	Average	Horizontal



Band Edges (CH High)



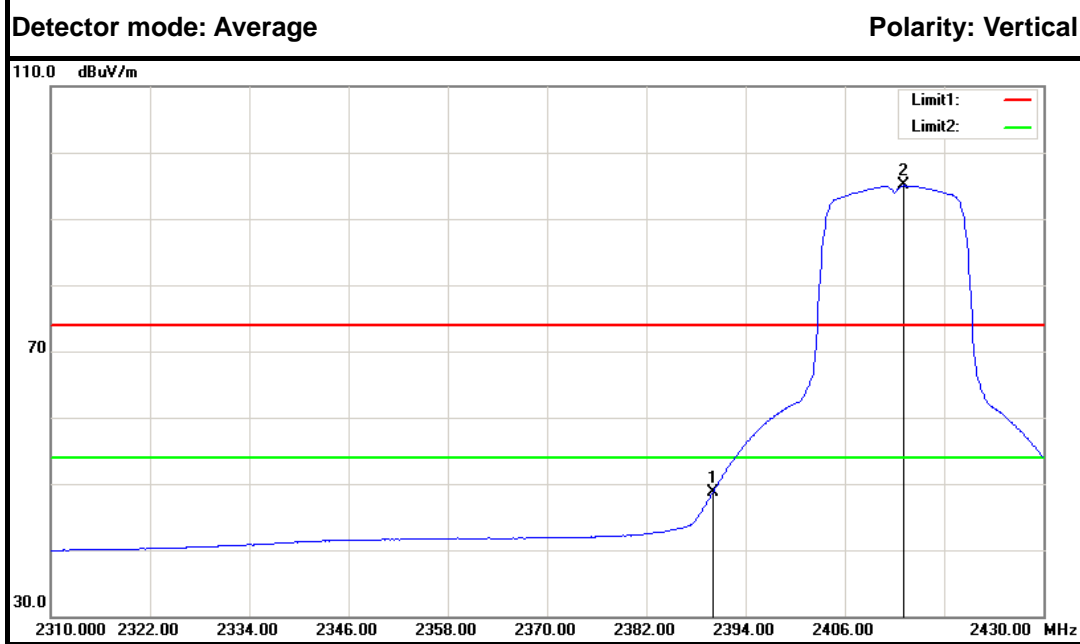
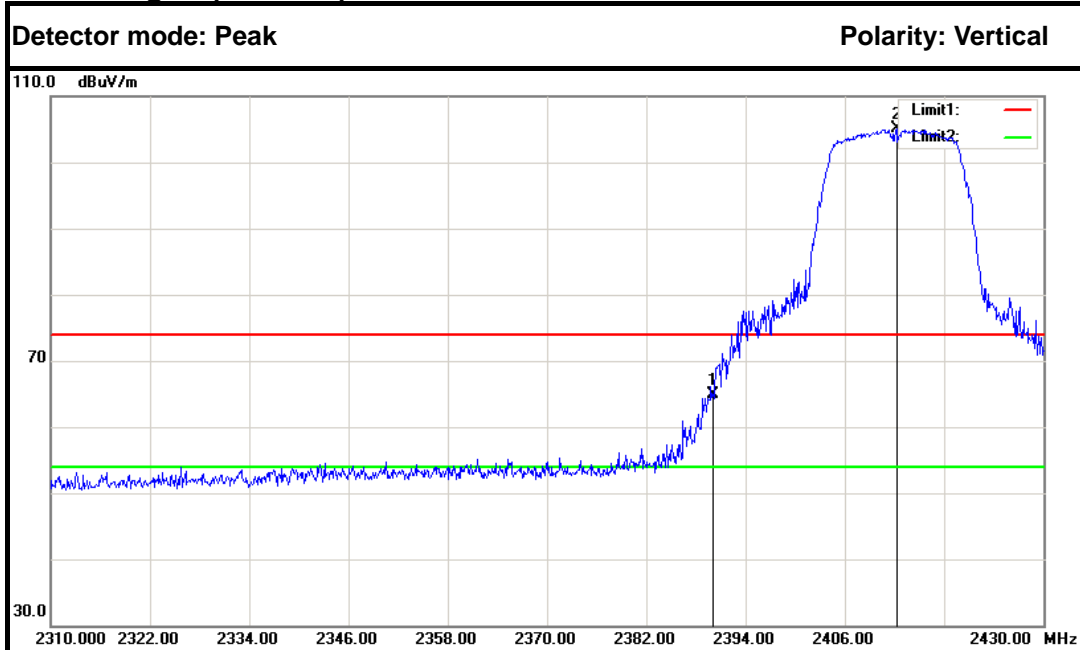
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2463.200	107.75	-2.46	105.29	---	---	Peak	Vertical
2.	2483.500	55.62	-2.35	53.27	74.00	-20.73	Peak	Vertical
3.	2461.200	104.45	-2.47	101.98	---	---	Average	Vertical
4.	2483.500	44.50	-2.35	42.15	54.00	-11.85	Average	Vertical



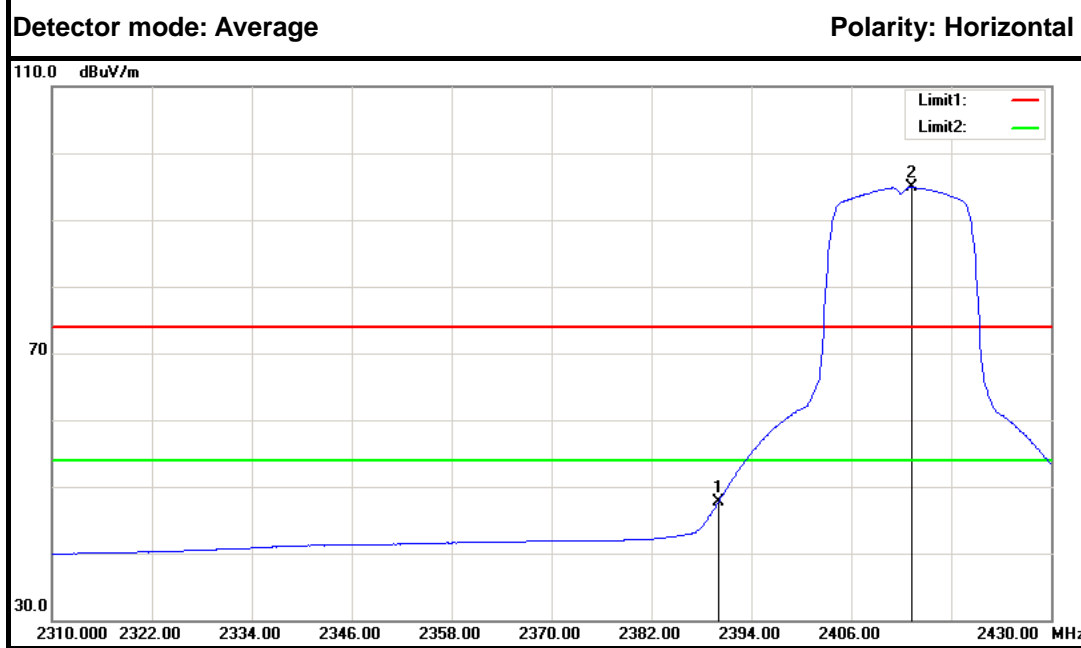
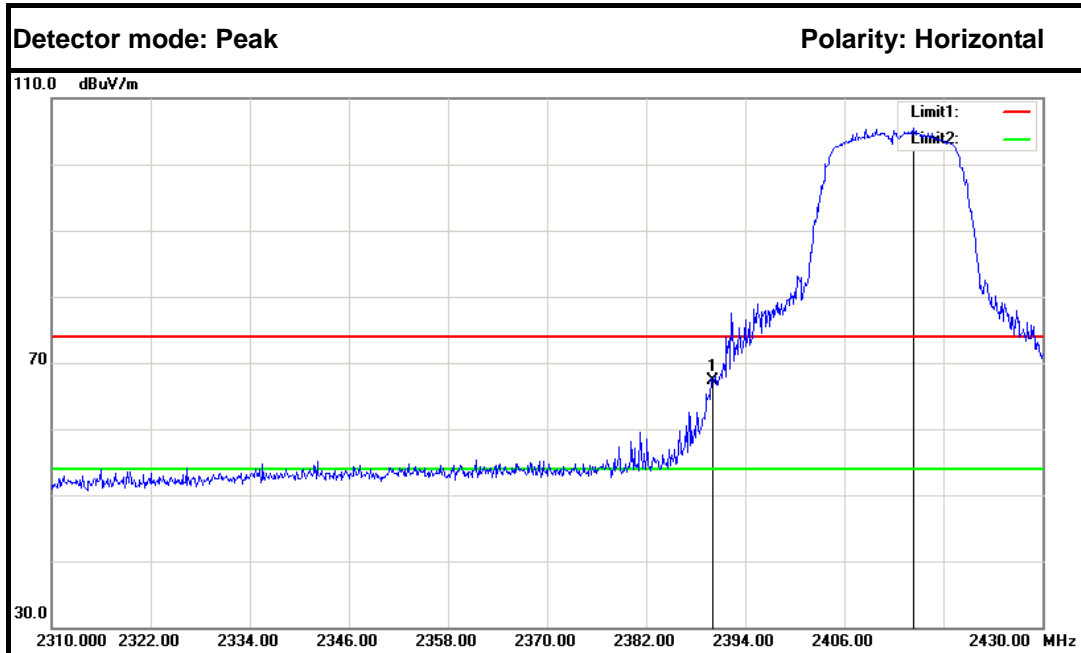
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2463.200	109.34	-2.46	106.88	---	---	Peak	Horizontal
2.	2483.500	57.30	-2.35	54.95	74.00	-19.05	Peak	Horizontal
3.	2461.250	106.00	-2.47	103.53	---	---	Average	Horizontal
4.	2483.500	45.19	-2.35	42.84	54.00	-11.16	Average	Horizontal



**IEEE 802.11g mode
Band Edges (CH Low)**



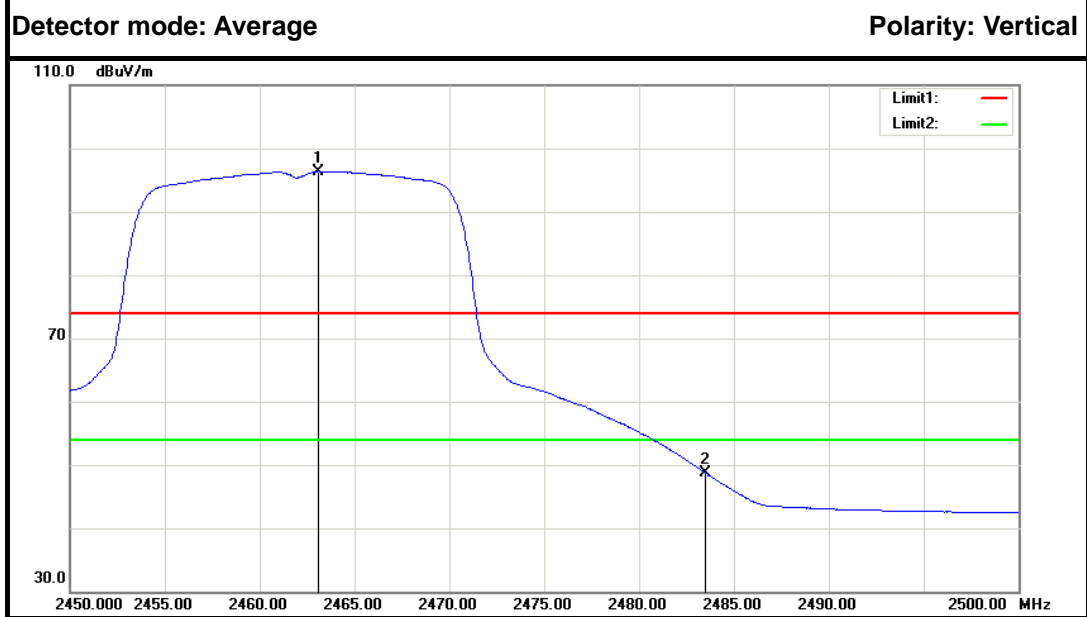
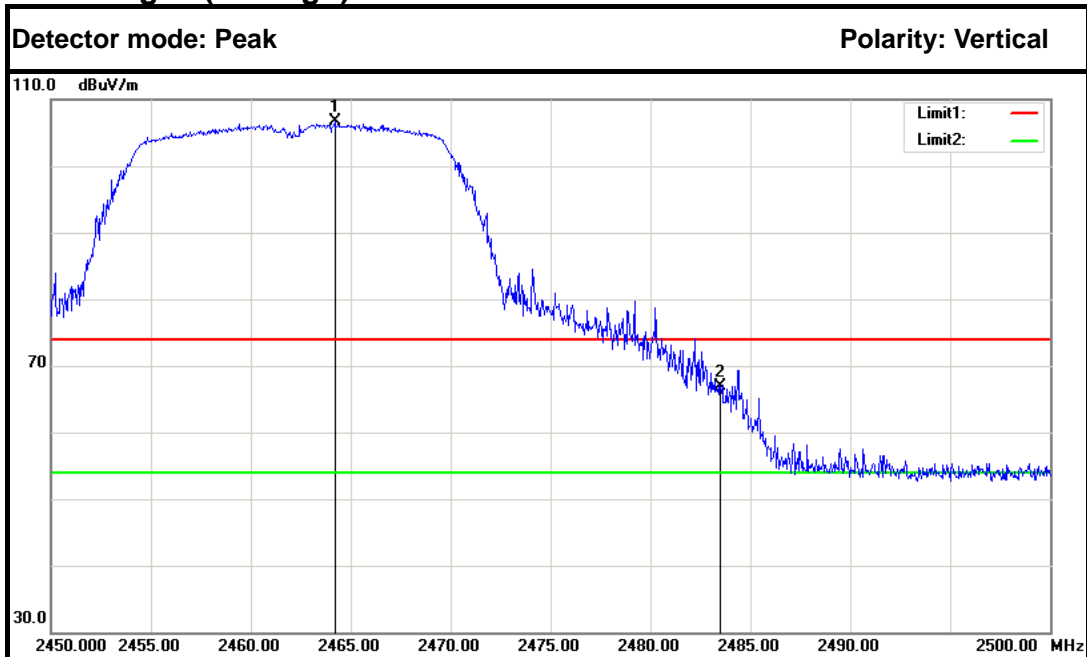
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2390.000	67.85	-2.86	64.99	74.00	-9.01	Peak	Vertical
2.	2412.240	107.75	-2.74	105.01	---	---	Peak	Vertical
3.	2390.000	51.57	-2.86	48.71	54.00	-5.29	Average	Vertical
4.	2413.080	97.76	-2.74	95.02	---	---	Average	Vertical



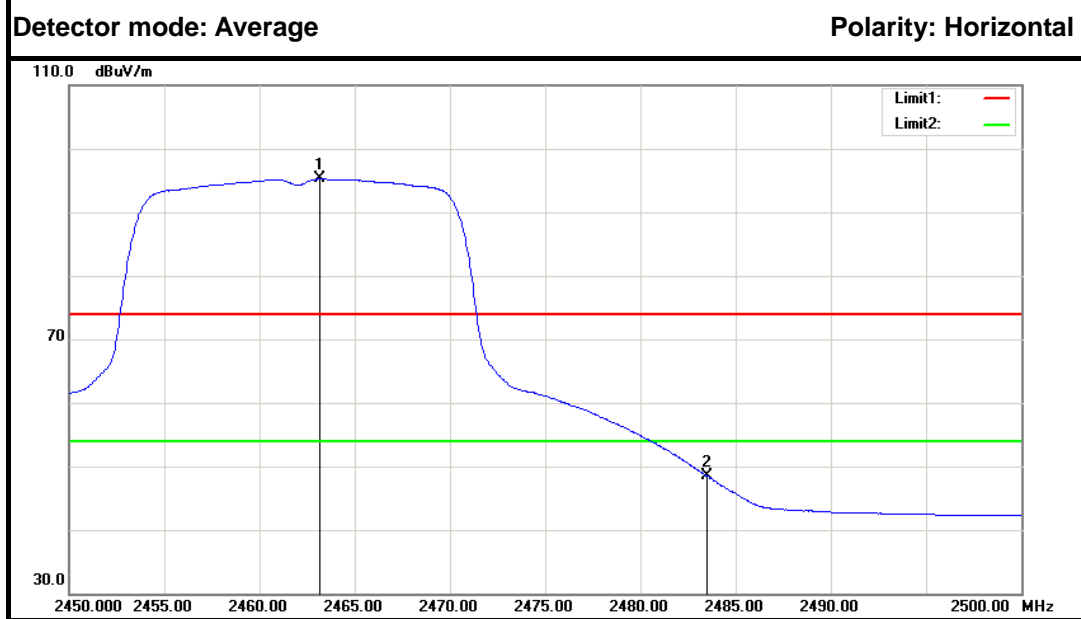
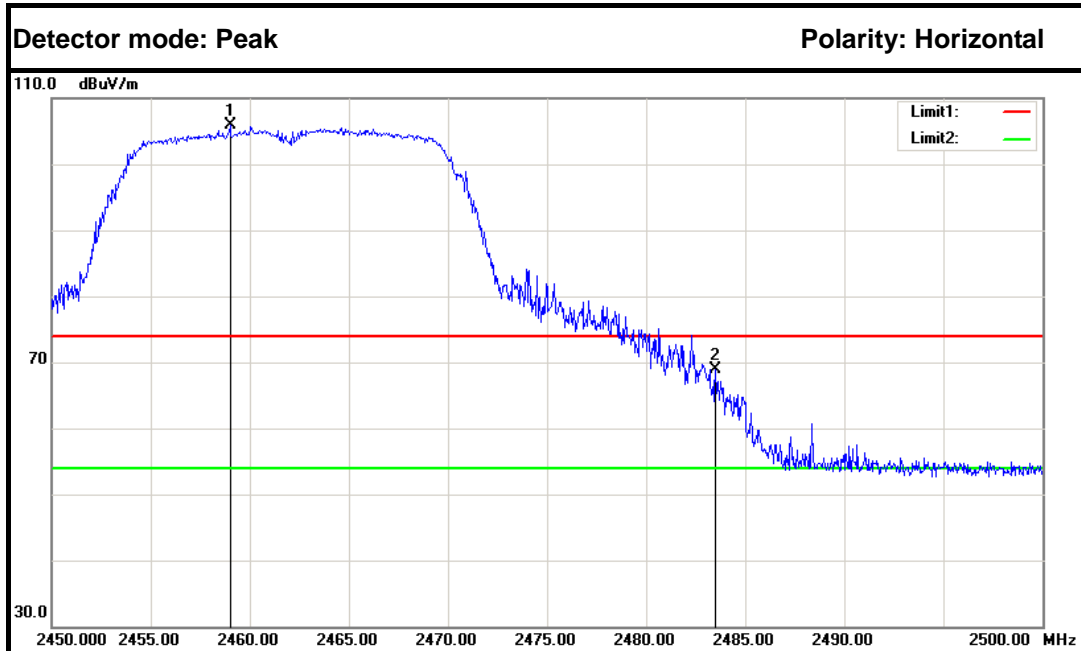
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2390.000	70.12	-2.86	67.26	74.00	-6.74	Peak	Horizontal
2.	2414.400	108.15	-2.73	105.42	---	---	Peak	Horizontal
3.	2390.000	50.55	-2.86	47.69	54.00	-6.31	Average	Horizontal
4.	2413.200	97.65	-2.74	94.91	---	---	Average	Horizontal



Band Edges (CH High)



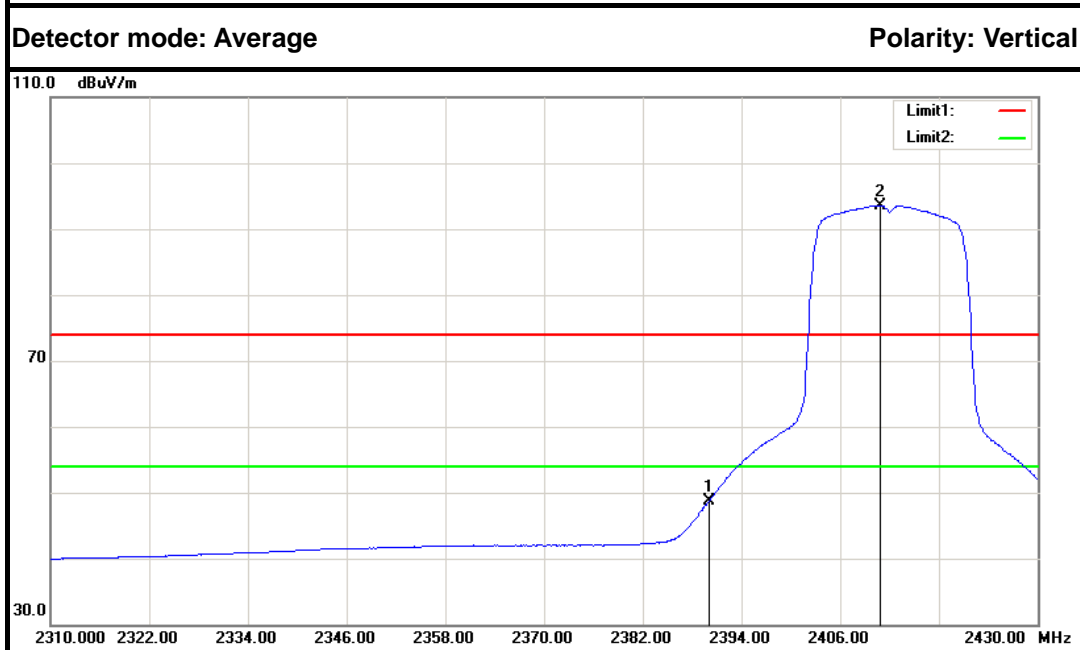
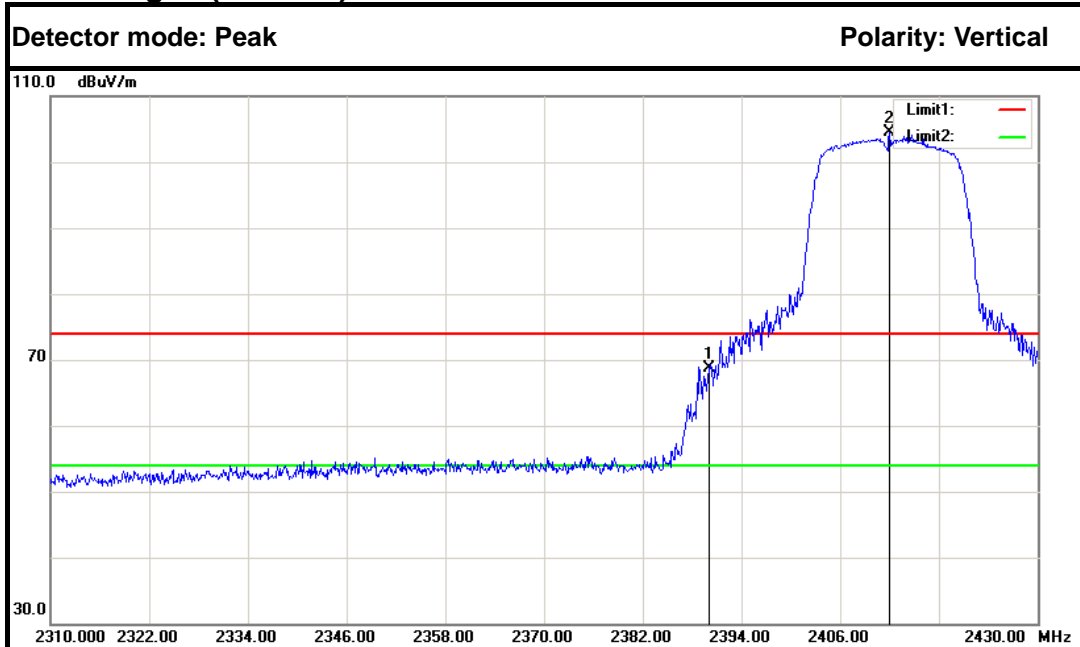
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2464.200	109.18	-2.46	106.72	---	---	Peak	Vertical
2.	2483.500	69.24	-2.35	66.89	74.00	-7.11	Peak	Vertical
3.	2463.100	98.86	-2.46	96.40	---	---	Average	Vertical
4.	2483.500	51.07	-2.35	48.72	54.00	-5.28	Average	Vertical



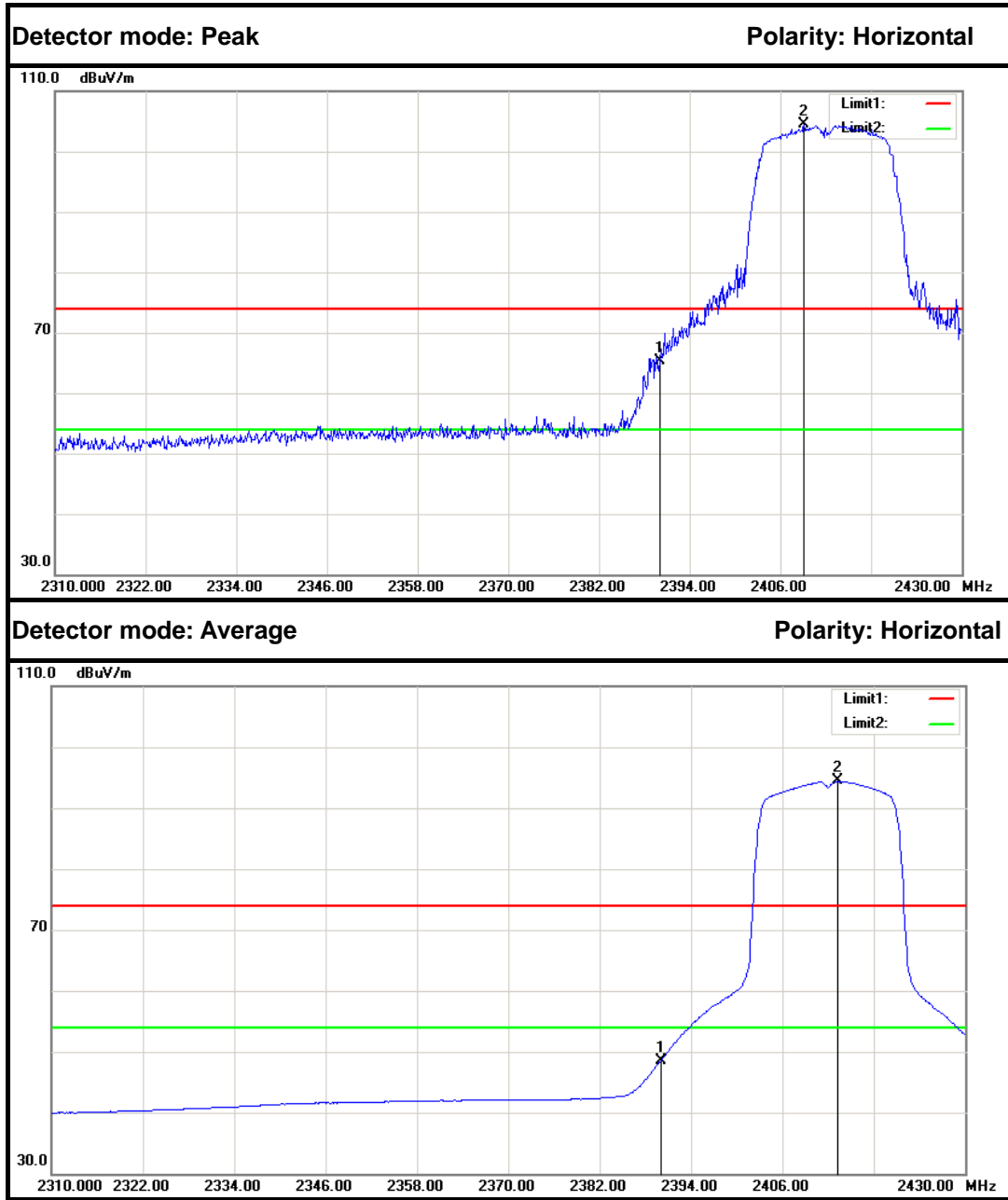
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2459.000	108.40	-2.48	105.92	---	---	Peak	Horizontal
2.	2483.500	71.19	-2.35	68.84	74.00	-5.16	Peak	Horizontal
3.	2463.150	97.72	-2.46	95.26	---	---	Average	Horizontal
4.	2483.500	50.82	-2.35	48.47	54.00	-5.53	Average	Horizontal



IEEE 802.11n HT20 MHz mode
Band Edges (CH Low)



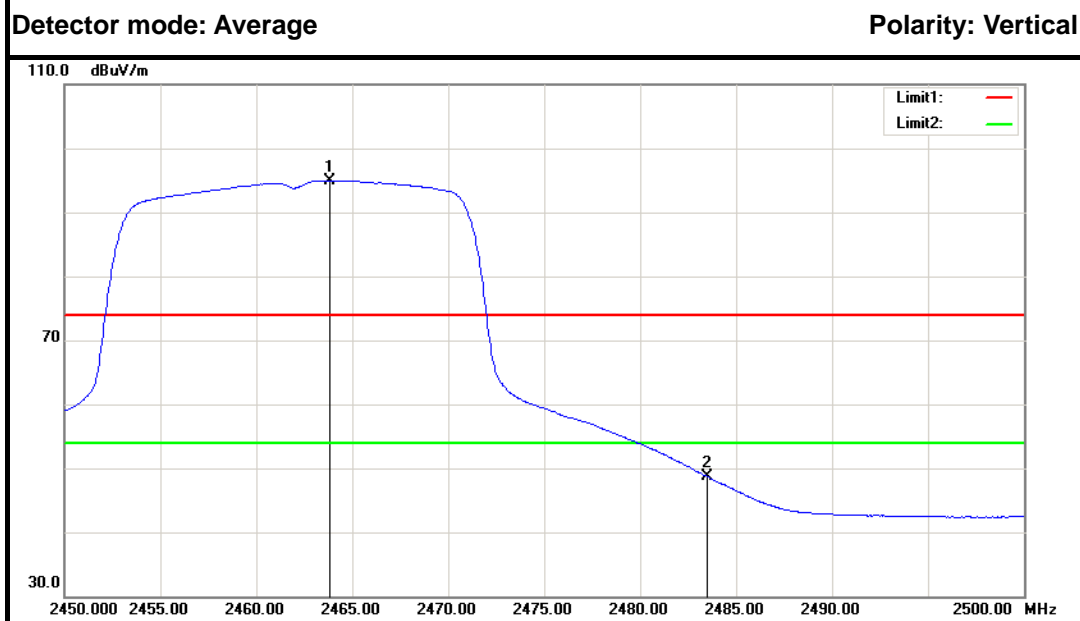
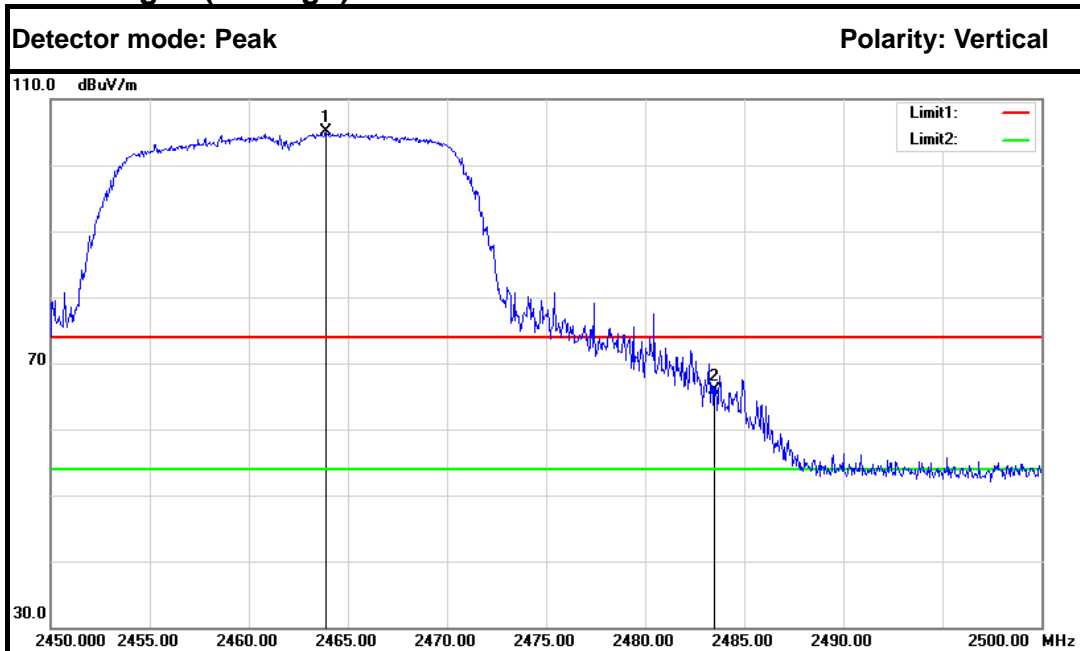
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2390.000	71.61	-2.86	68.75	74.00	-5.25	Peak	Vertical
2.	2412.000	107.17	-2.74	104.43	---	---	Peak	Vertical
3.	2390.000	51.61	-2.86	48.75	54.00	-5.25	Average	Vertical
4.	2410.920	96.34	-2.75	93.59	---	---	Average	Vertical



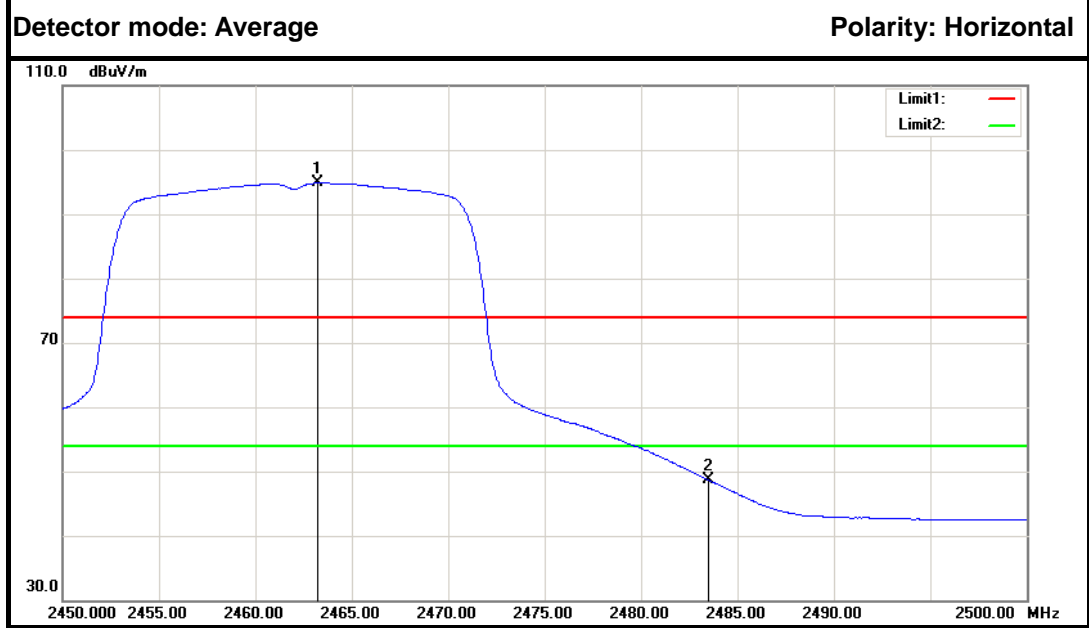
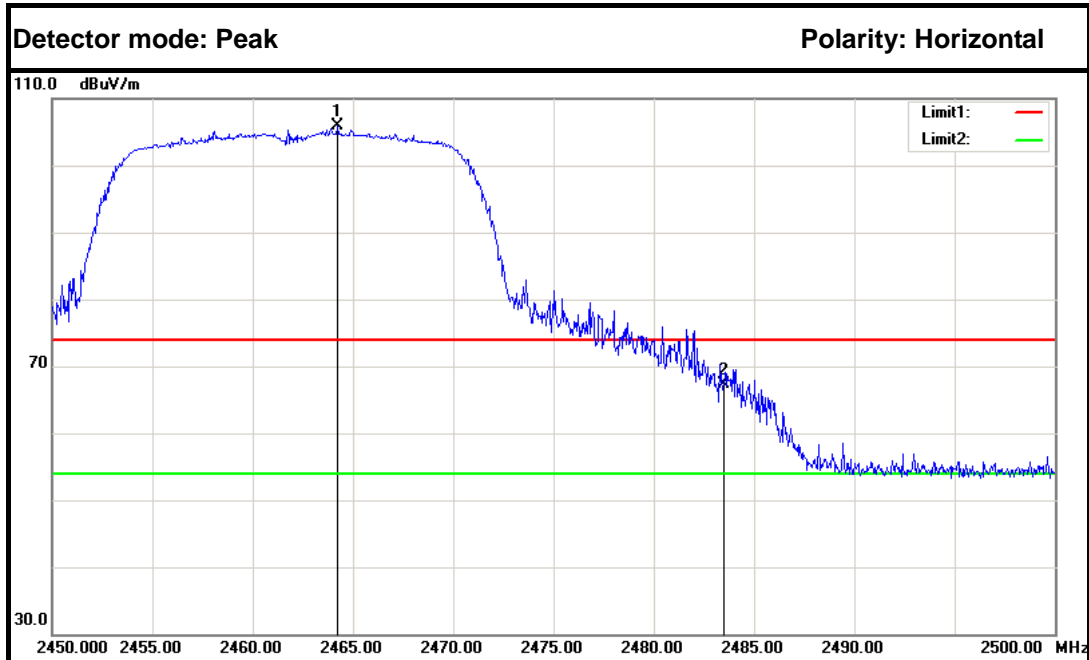
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2390.000	68.12	-2.86	65.26	74.00	-8.74	Peak	Horizontal
2.	2409.120	107.30	-2.76	104.54	---	---	Peak	Horizontal
3.	2390.000	51.42	-2.86	48.56	54.00	-5.44	Average	Horizontal
4.	2413.320	97.15	-2.73	94.42	---	---	Average	Horizontal



Band Edges (CH High)



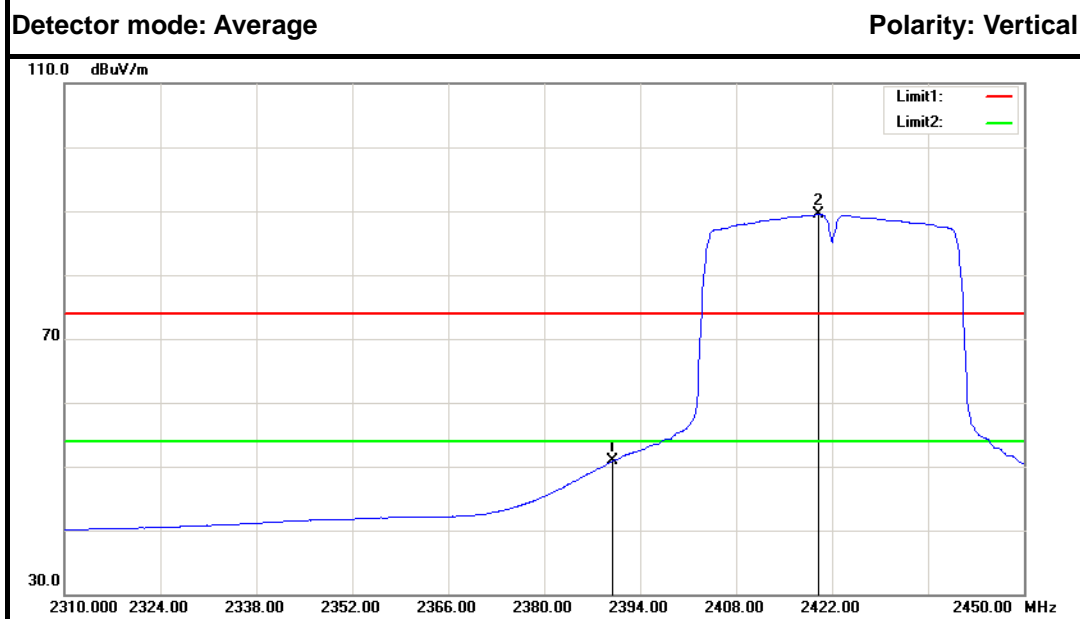
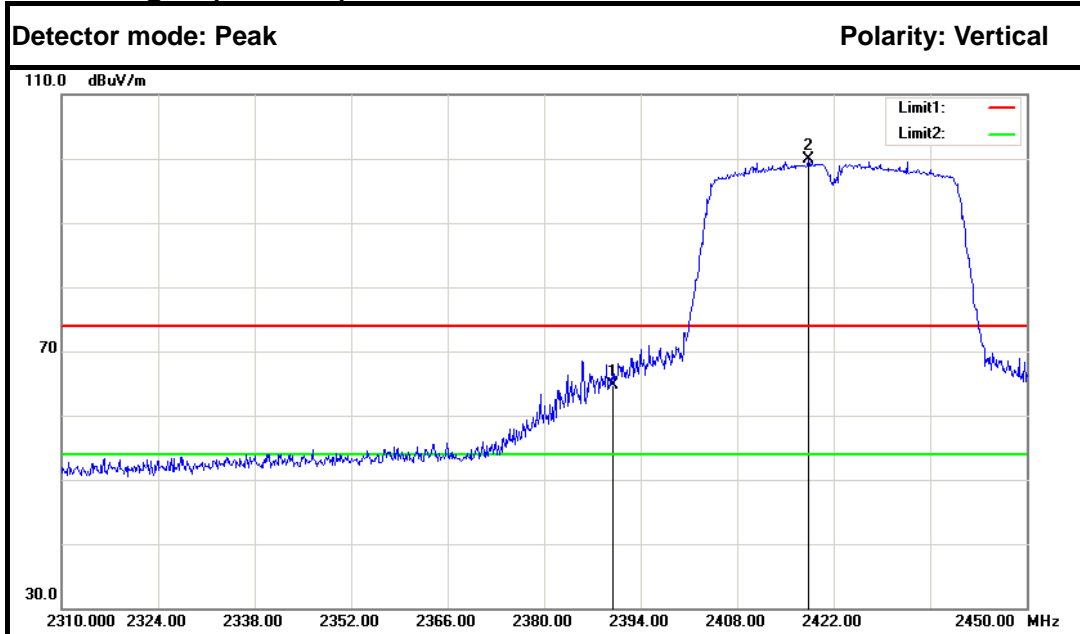
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2463.900	107.48	-2.46	105.02	---	---	Peak	Vertical
2.	2483.500	68.33	-2.35	65.98	74.00	-8.02	Peak	Vertical
3.	2463.800	97.40	-2.46	94.94	---	---	Average	Vertical
4.	2483.500	51.08	-2.35	48.73	54.00	-5.27	Average	Vertical



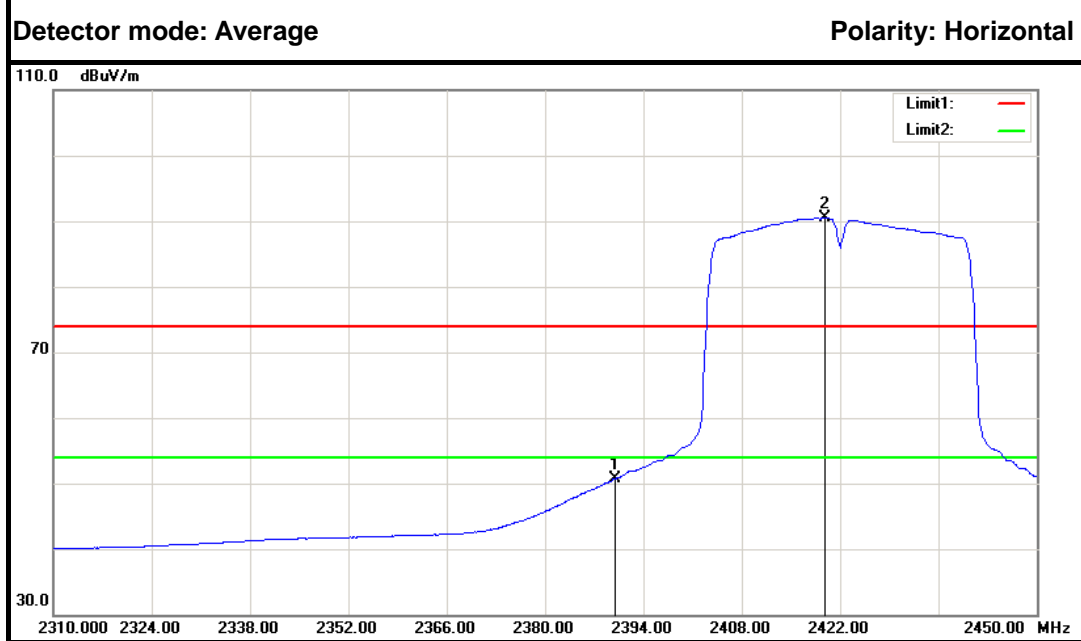
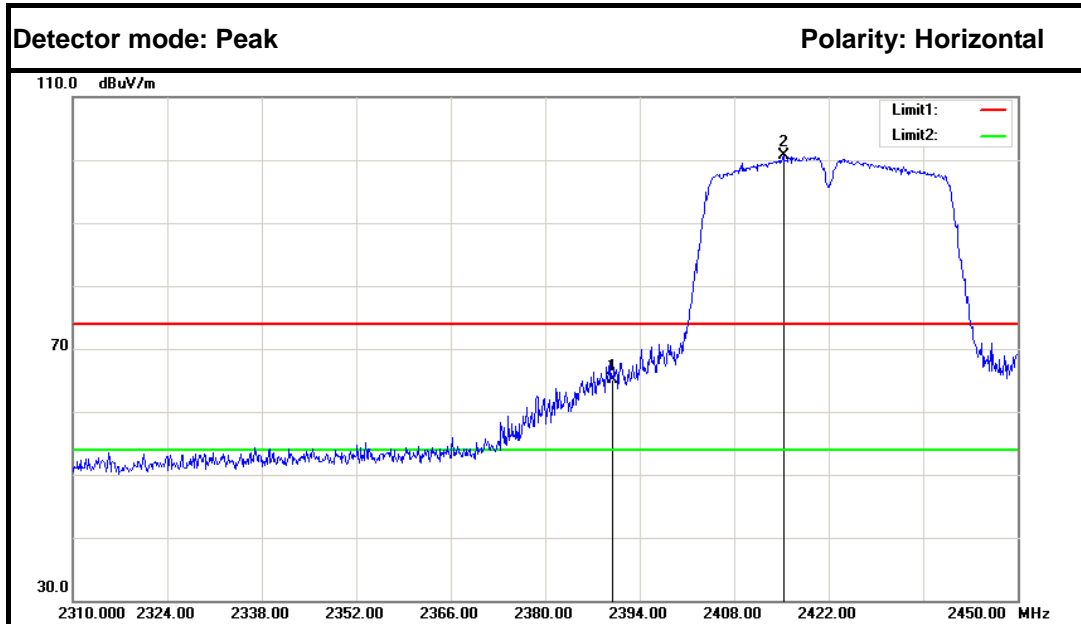
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2464.250	108.30	-2.46	105.84	---	---	Peak	Horizontal
2.	2483.500	69.73	-2.35	67.38	74.00	-6.62	Peak	Horizontal
3.	2463.250	97.31	-2.46	94.85	---	---	Average	Horizontal
4.	2483.500	50.98	-2.35	48.63	54.00	-5.37	Average	Horizontal



IEEE 802.11n HT40 MHz mode
Band Edges (CH Low)



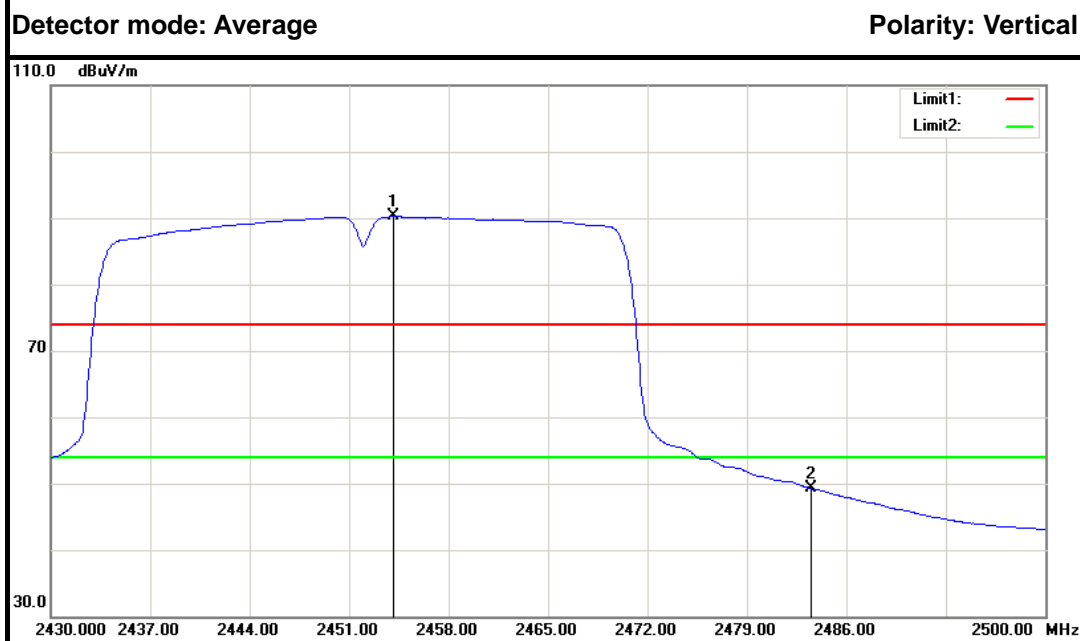
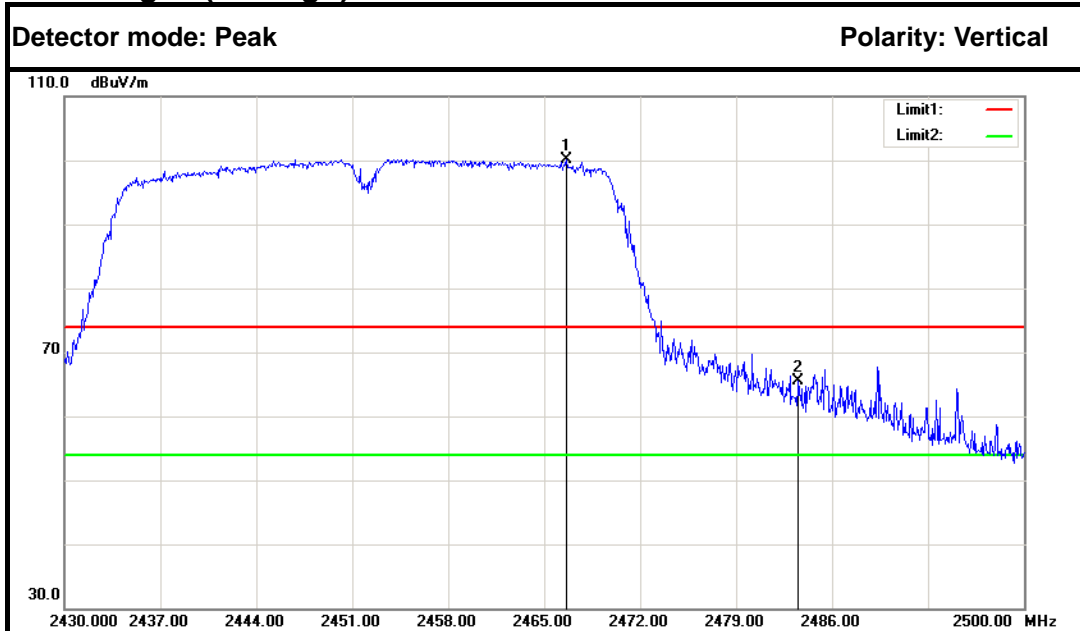
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2390.000	67.56	-2.86	64.70	74.00	-9.30	Peak	Vertical
2.	2418.360	102.60	-2.71	99.89	---	---	Peak	Vertical
3.	2390.000	53.76	-2.86	50.90	74.00	-23.10	Average	Vertical
4.	2420.040	92.15	-2.70	89.45	---	---	Average	Vertical



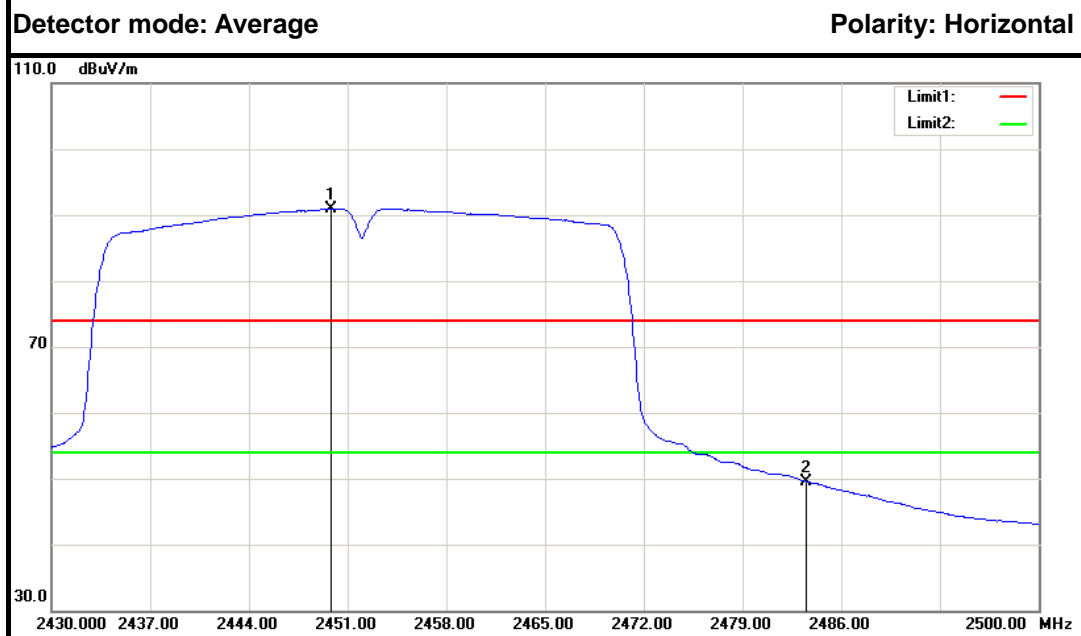
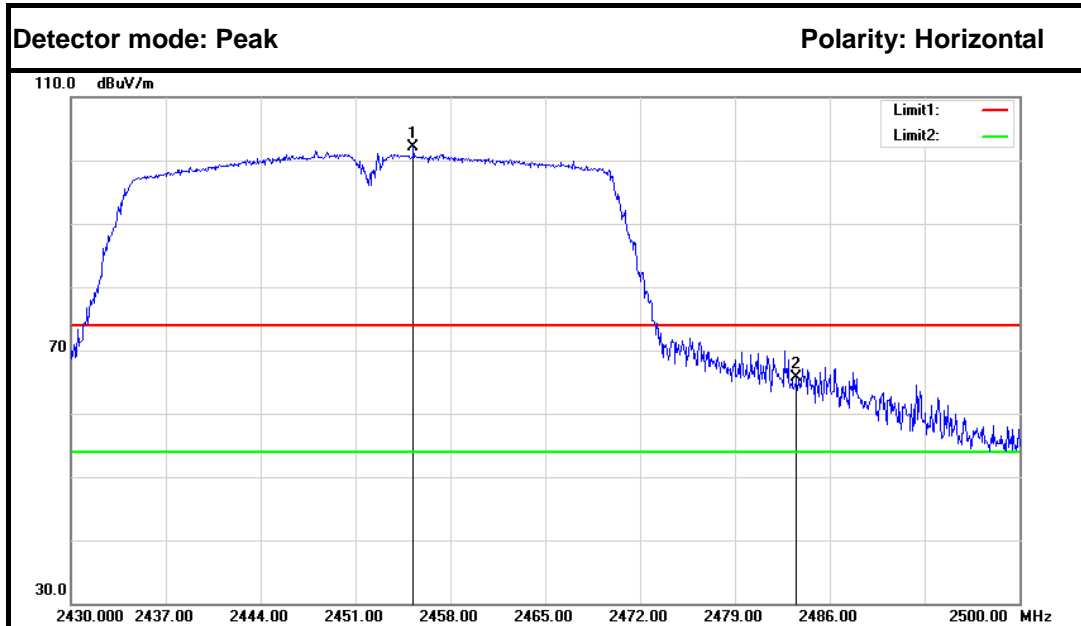
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2390.000	67.97	-2.86	65.11	74.00	-8.89	Peak	Horizontal
2.	2415.280	103.33	-2.72	100.61	---	---	Peak	Horizontal
3.	2390.000	53.64	-2.86	50.78	54.00	-3.22	Average	Horizontal
4.	2419.760	93.19	-2.70	90.49	---	---	Average	Horizontal



Band Edges (CH High)



No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2466.610	102.60	-2.44	100.16	---	---	Peak	Vertical
2.	2483.500	67.75	-2.35	65.40	74.00	-8.60	Peak	Vertical
3.	2454.080	92.74	-2.51	90.23	---	---	Average	Vertical
4.	2483.500	51.55	-2.35	49.20	54.00	-4.80	Average	Vertical



No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2455.270	104.57	-2.51	102.06	---	---	Peak	Horizontal
2.	2483.500	68.09	-2.35	65.74	74.00	-8.26	Peak	Horizontal
3.	2449.810	93.50	-2.53	90.97	---	---	Average	Horizontal
4.	2483.500	51.91	-2.35	49.56	54.00	-4.44	Average	Horizontal



7.7. PEAK POWER SPECTRAL DENSITY MEASUREMENT

7.7.1. LIMITS

According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

7.7.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2017	02/20/2018

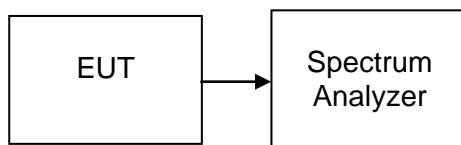
7.7.3. TEST PROCEDURES (please refer to measurement standard)

§15.247(e) specifies a conducted power spectral density (PSD) limit of 8 dBm in any 3 kHz band segment within the fundamental EBW during any time interval of continuous transmission. The same method as used to determine the conducted output power shall be used to determine the power spectral density (i.e., if peak-detected fundamental power was measured then use the peak PSD procedure and if average fundamental power was measured then use the average PSD procedure).

10.2 Method PKPSD (peak PSD)

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

7.7.4. TEST SETUP





7.7.5. TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-1.549	8	PASS
Mid	2437	-4.010		PASS
High	2462	-2.588		PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-7.714	8	PASS
Mid	2437	-7.936		PASS
High	2462	-7.622		PASS

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-8.969	8	PASS
Mid	2437	-9.152		PASS
High	2462	-9.405		PASS

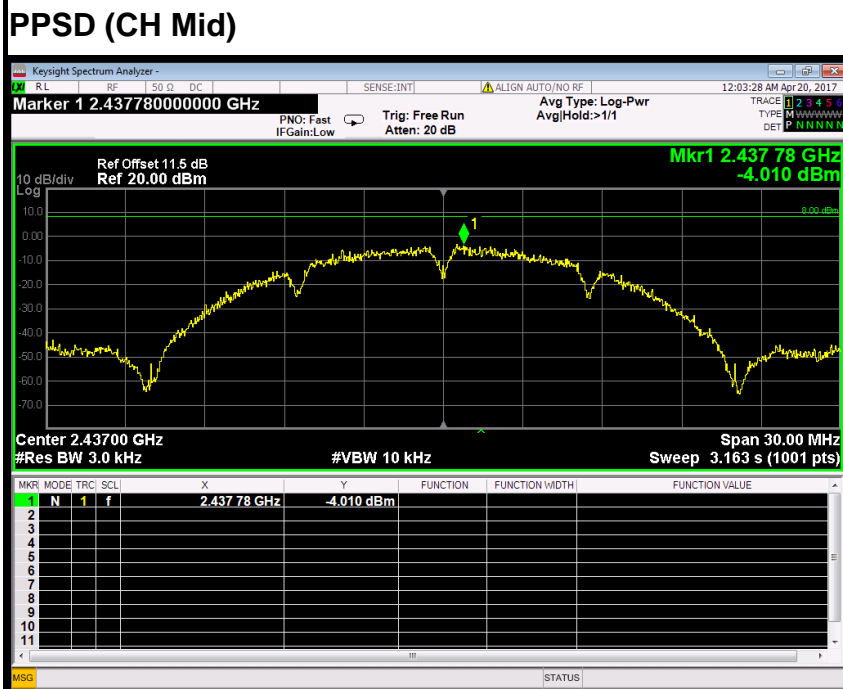
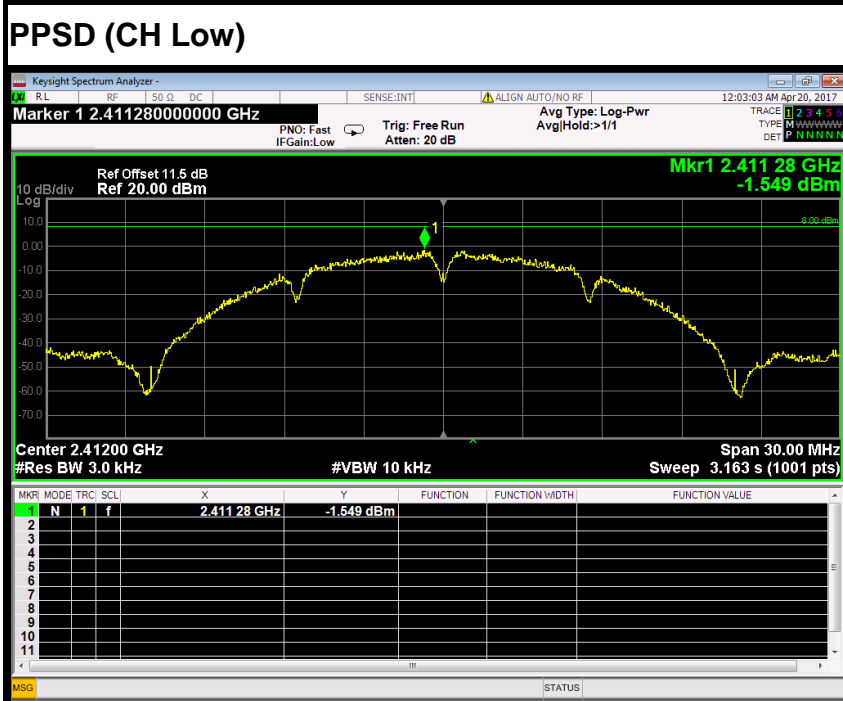
Test mode: IEEE 802.11n HT40 MHz

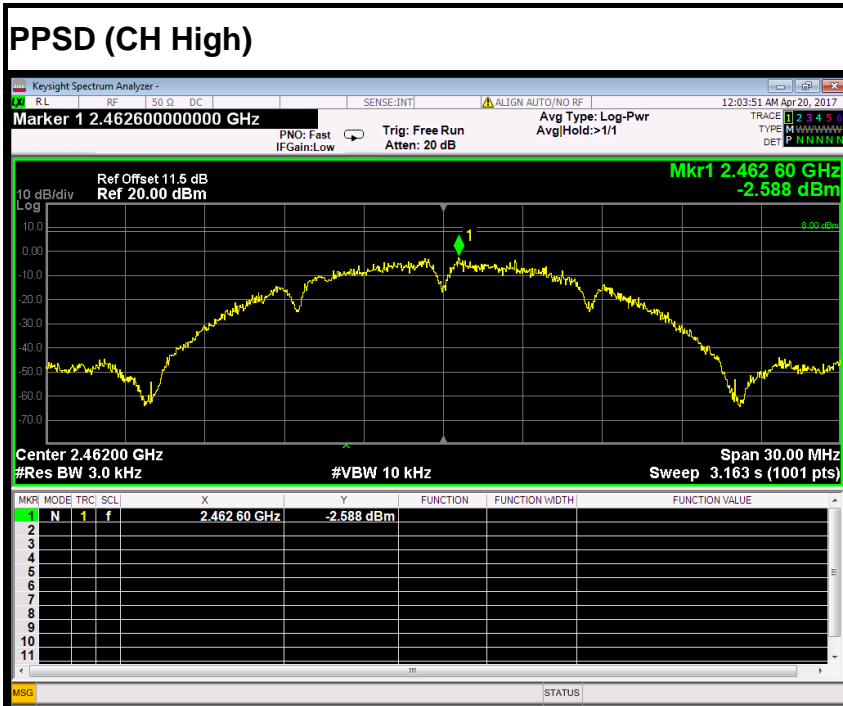
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2422	-11.167	8	PASS
Mid	2437	-10.855		PASS
High	2452	-11.196		PASS



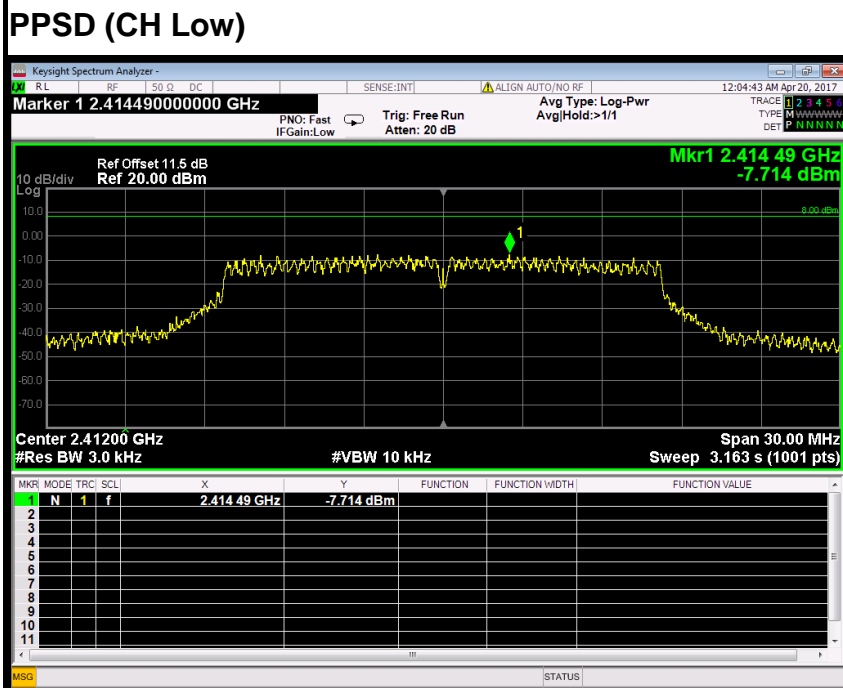
Test Plot

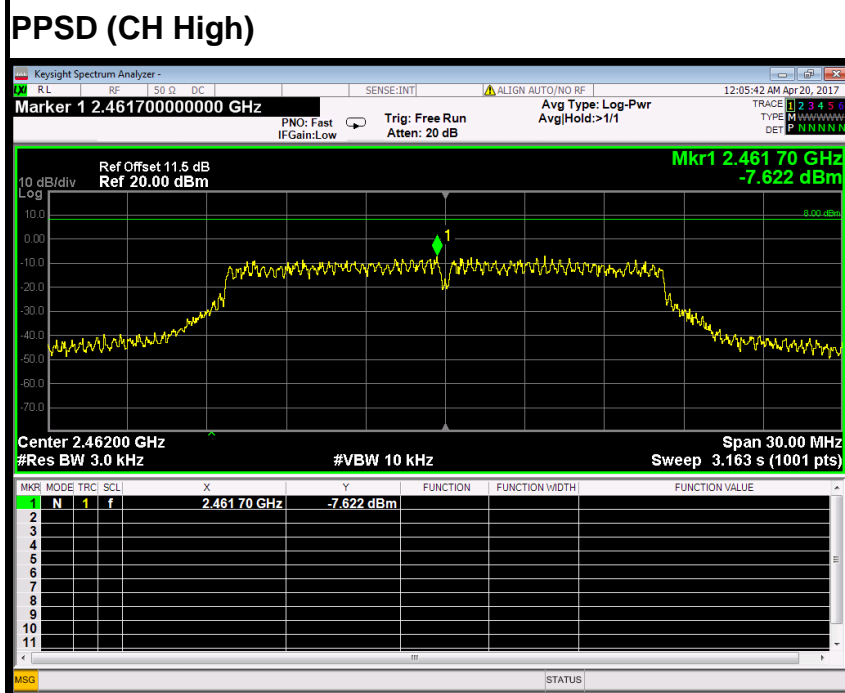
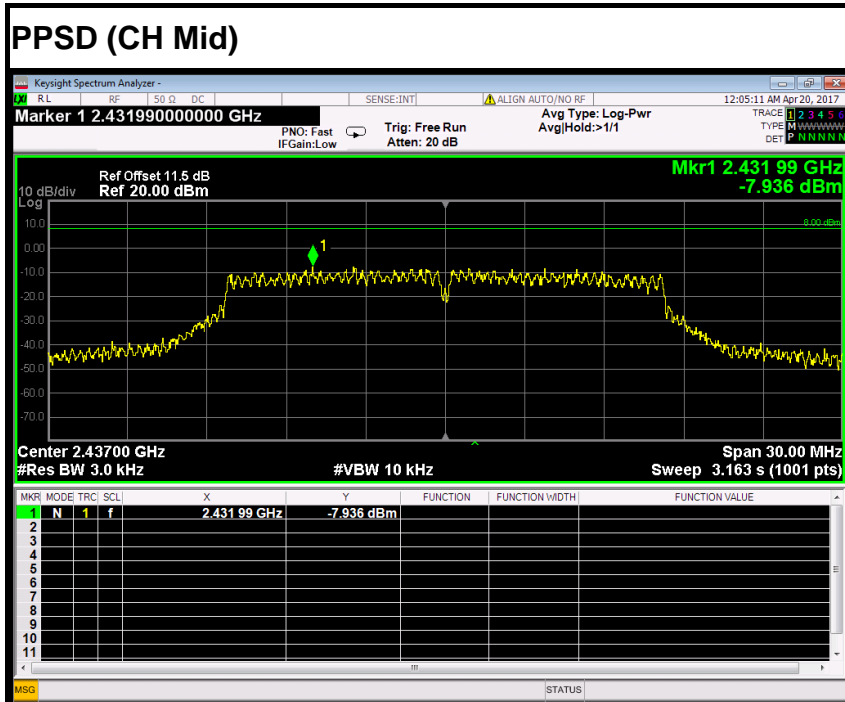
IEEE 802.11b mode





IEEE 802.11g mode







IEEE 802.11n HT20 MHz mode

