Appendix C: Test results. 802.11 b/g/n20 1x1

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TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal:	10.8-15.6 V
Type of Power Supply:	External DC (Vehicle Battery).

ANTENNA (*):

Type of Antenna:	Ixxat 1.04.0085.00001 BT/WiFi Antenna with SMA Connector (226-2765 RS Components)(Not sold by Sepura)
Maximum Declared Antenna Gain:	+1 dBi

TEST FREQUENCIES (*):

Low Channel:	2412 MHz
Middle Channel:	2442 MHz
High Channel:	2462 MHz

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and it is connected to the TS8997 using a low loss RF cable. The reading of the spectrum analyser is corrected taking into account the cable loss.

RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz and 1 GHz-17 GHz Double ridge horn antenna) is situated at a distance of 3 m and at a distance of 1.5 m for the frequency range 17 GHz-26 GHz (17 GHz-40 GHz horn antenna).

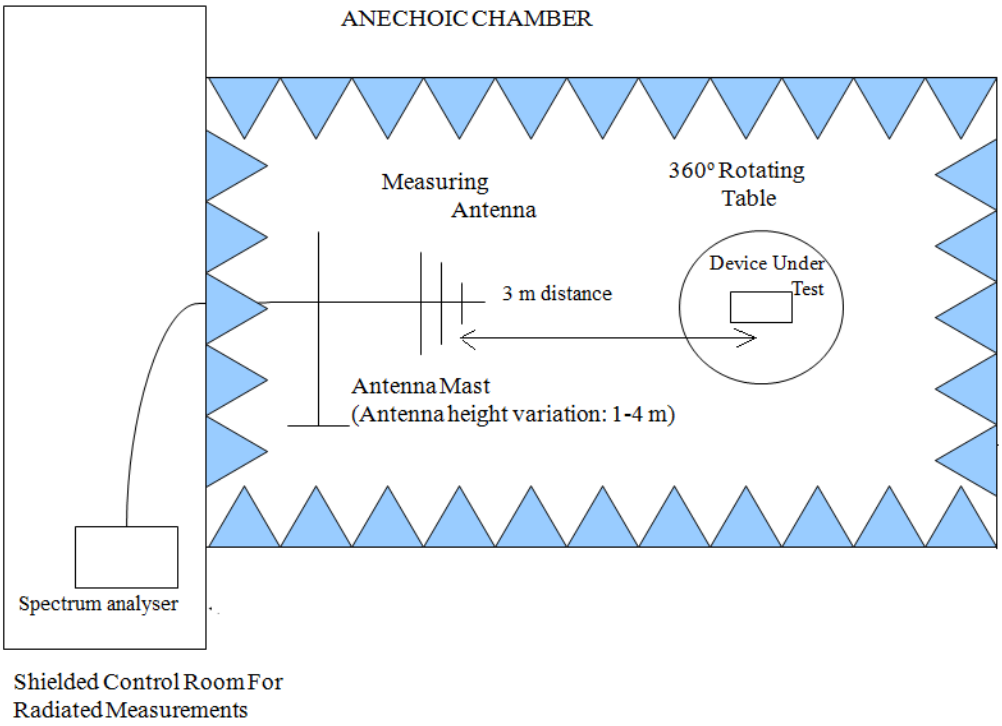
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

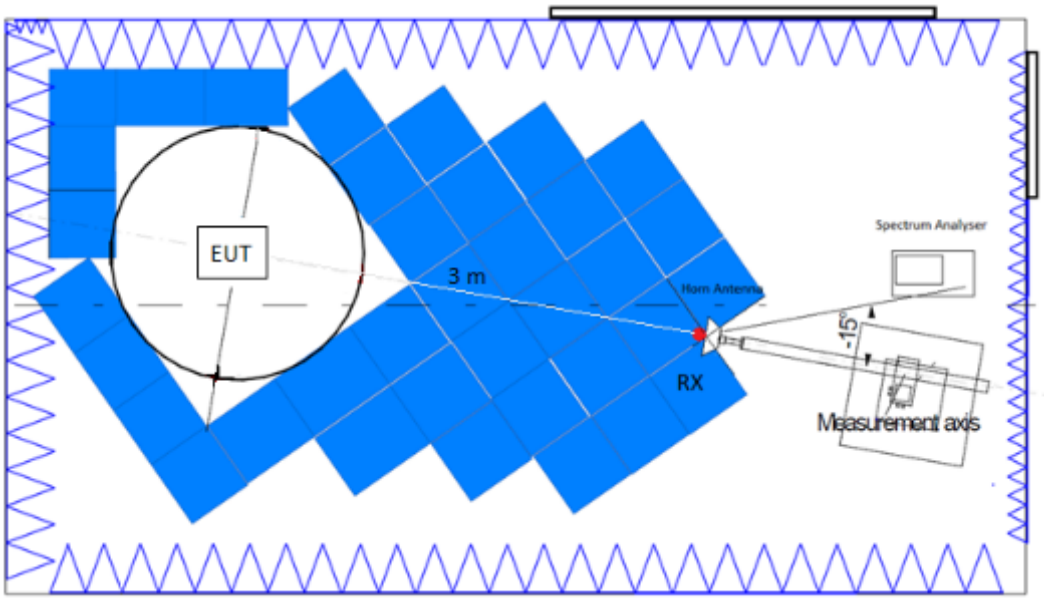
Measurements were made in both horizontal and vertical planes of polarization.

A resolution bandwidth/video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

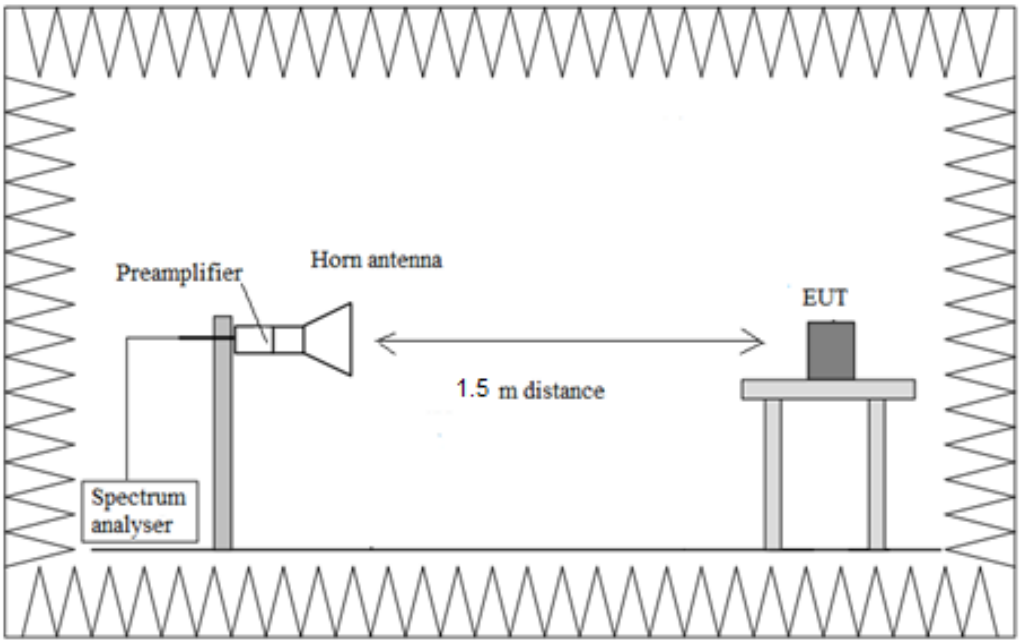
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup f > 17 GHz:



TEST CASES DETAILS

FCC 47 CFR Part 15.247 / RSS-247

RSS-247 5.1 (b) / FCC 15.247 (a) (1) [20dBW] 20 dB Bandwidth

Limits

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Modulation: 802.11b (DSSS 1 Mbit/s)

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Ebw (MHz)
2412.00000	Digital Transmission System (DTS)	20	1	1	13.300
2442.00000					13.300
2462.00000					13.300

Verdict

Pass

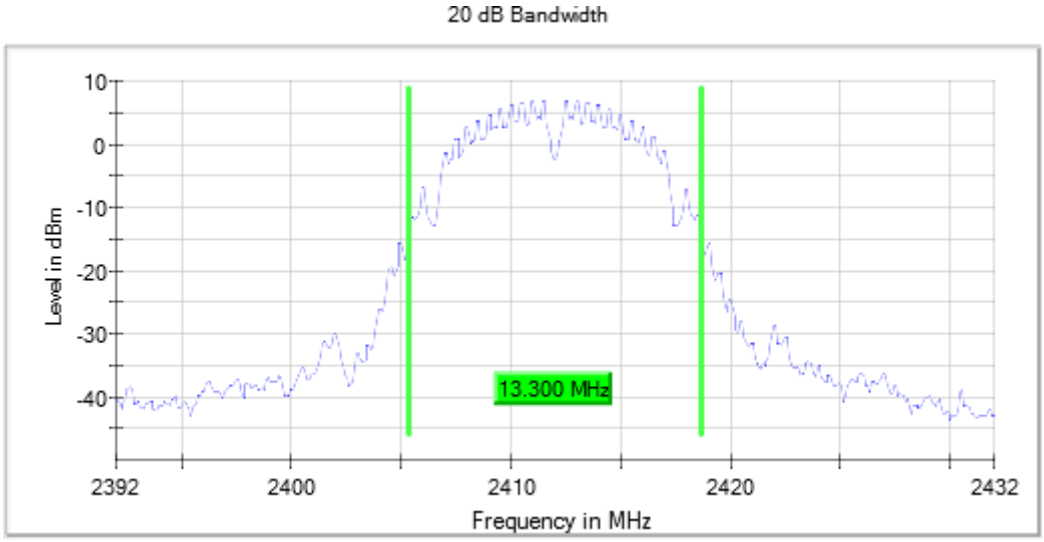
Attachments

Frequency MHz = 2412.00000

Bandwidth MHz = 20 Modulation = 802.11b (DSSS 1 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:

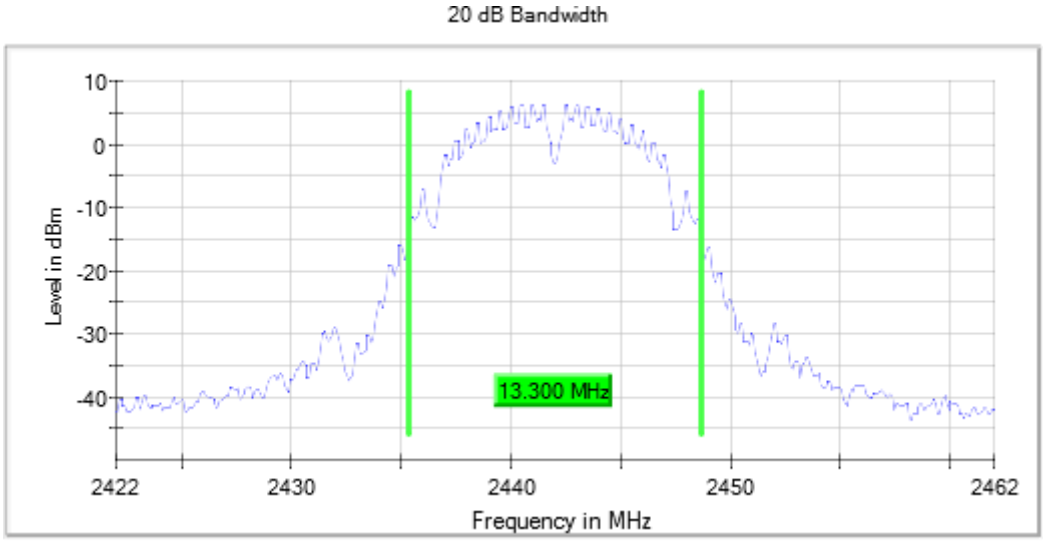


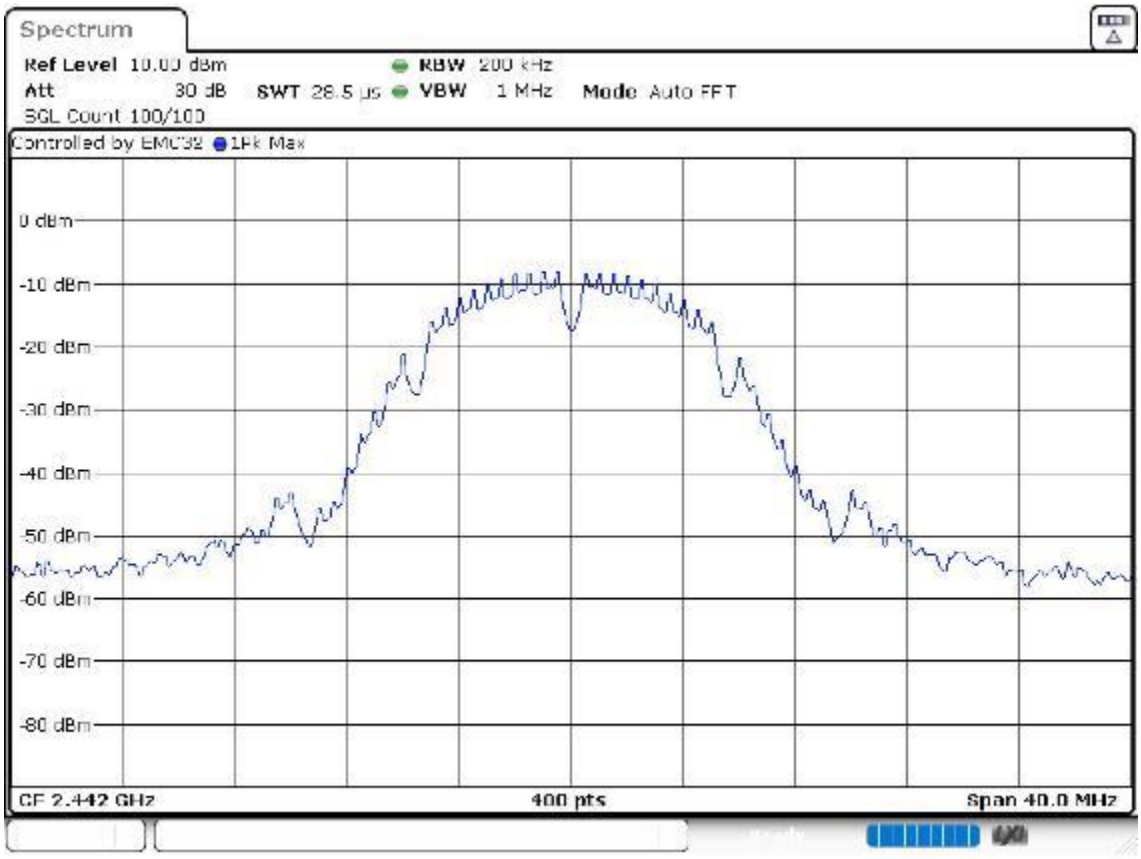
Frequency MHz = 2442.00000

Bandwidth MHz = 20 Modulation = 802.11b (DSSS 1 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:





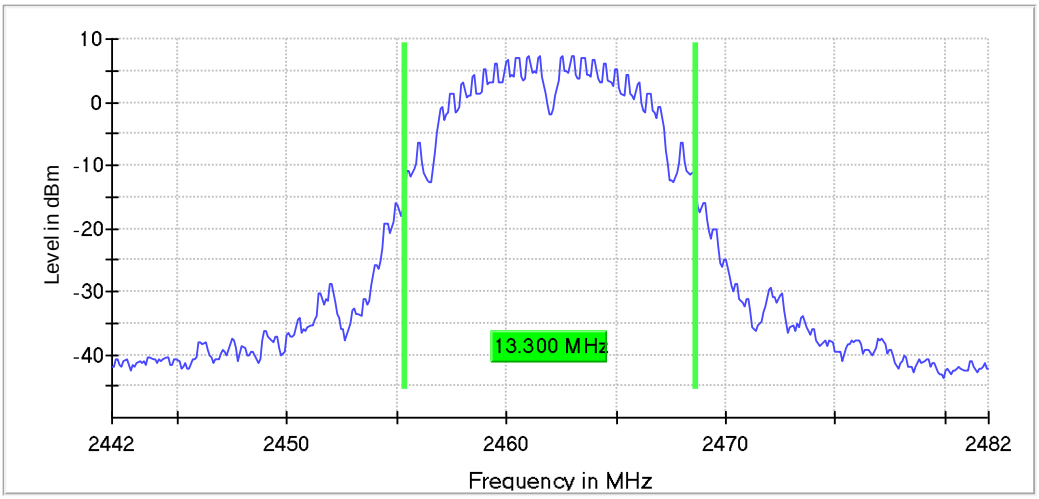
Frequency MHz = 2462.00000

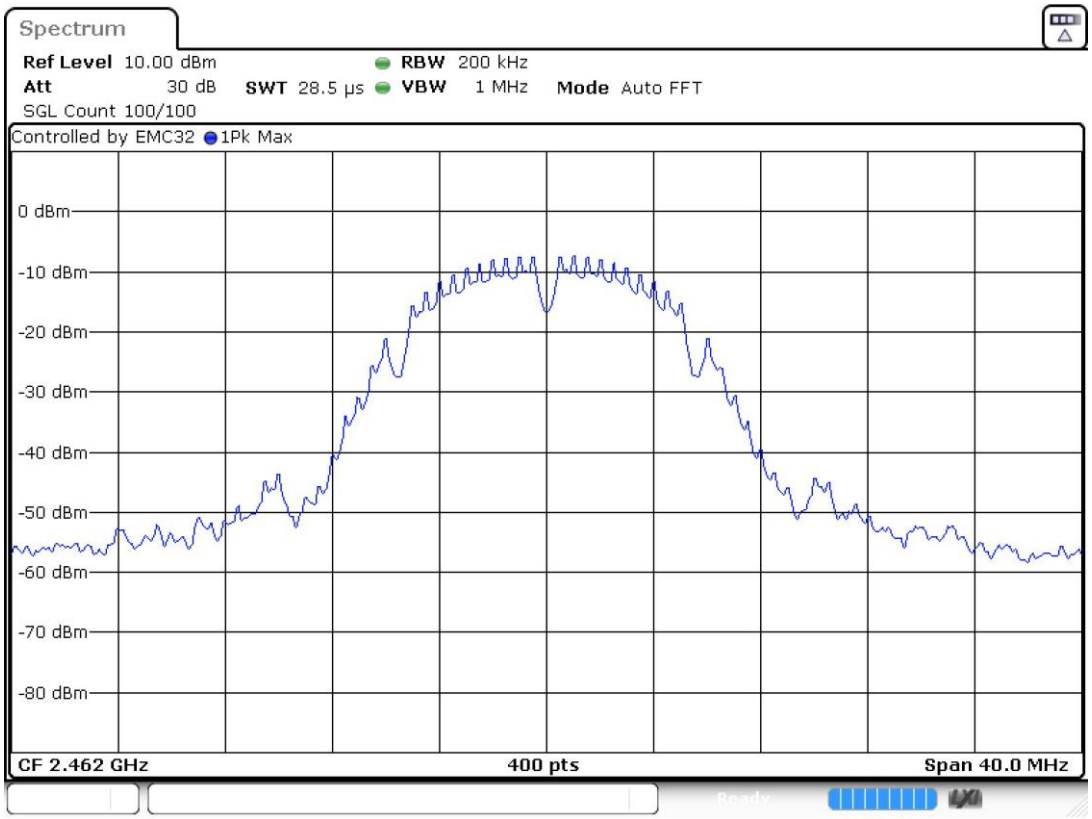
Bandwidth MHz = 20 Modulation = 802.11b (DSSS 1 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:

20 dB Bandwidth





Modulation: 802.11g (OFDM 6 Mbit/s)

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Ebw (MHz)
2412.00000	Digital Transmission System (DTS)	20	1	1	20.000
2442.00000					19.800
2462.00000					20.100

Verdict

Pass

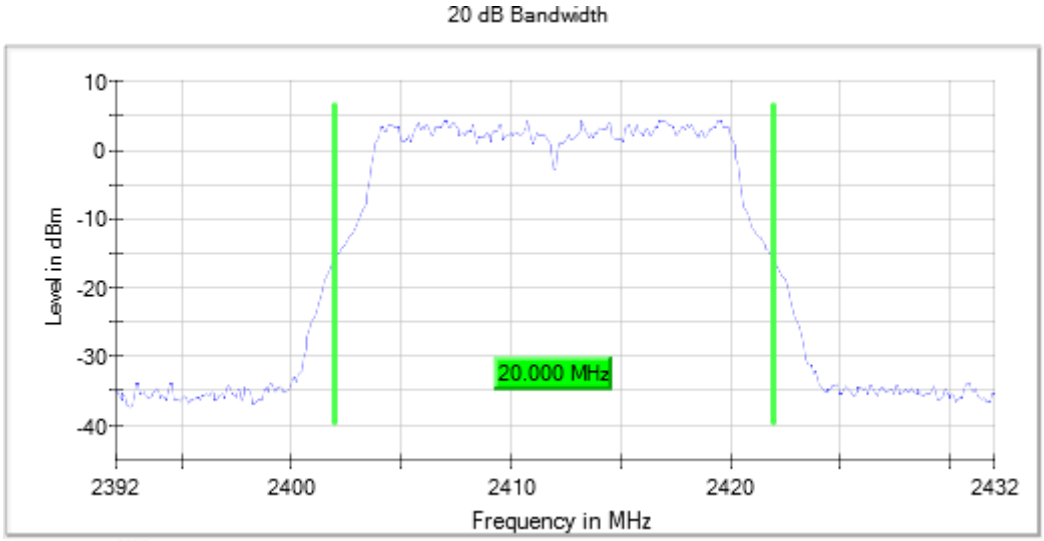
Attachments

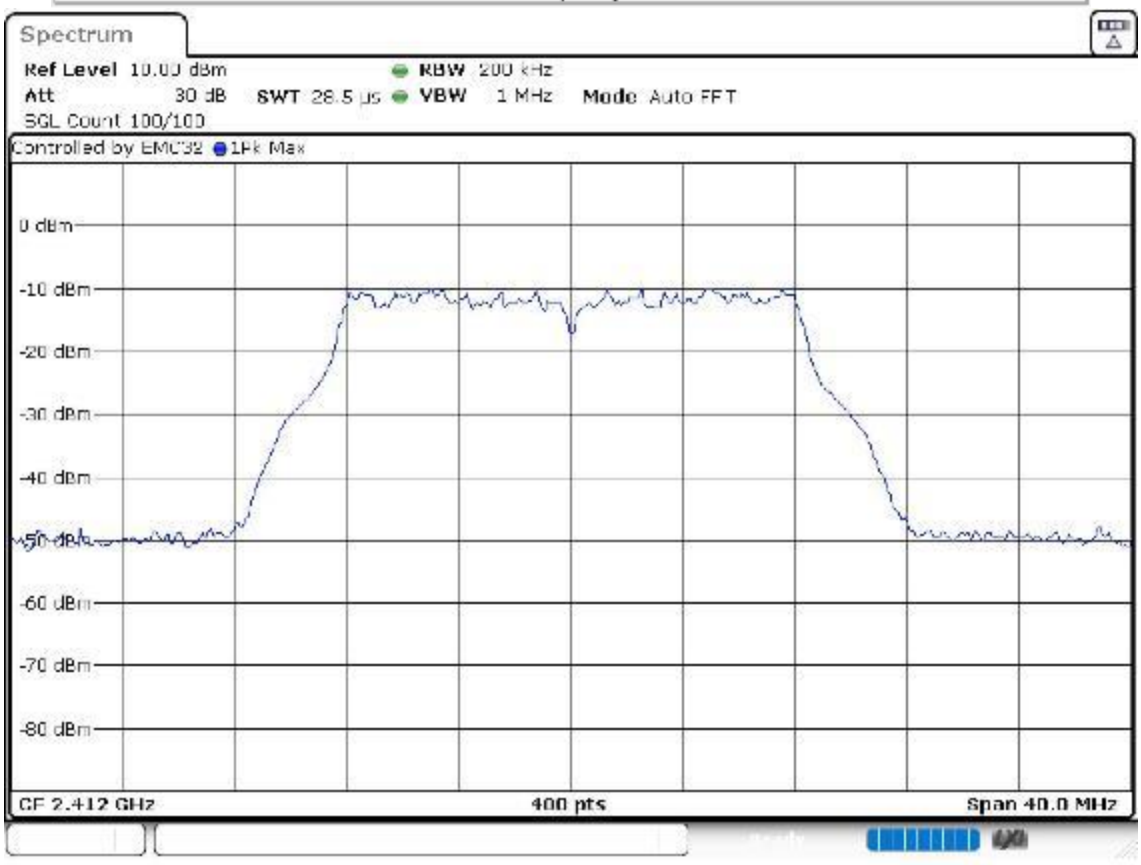
Frequency MHz = 2412.00000

Bandwidth MHz = 20 Modulation = 802.11g (OFDM 6 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:



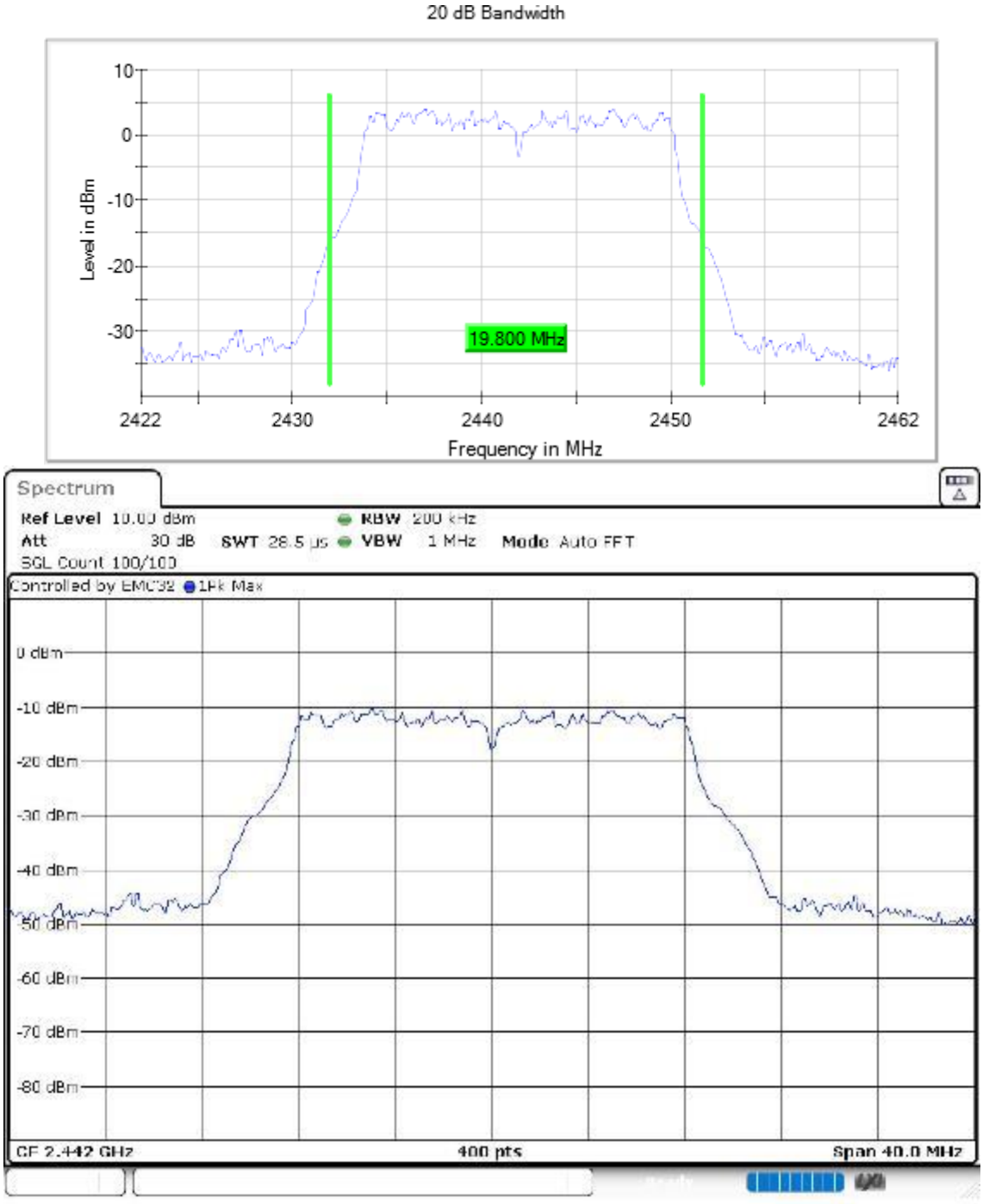


Frequency MHz = 2442.00000

Bandwidth MHz = 20 Modulation = 802.11g (OFDM 6 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:

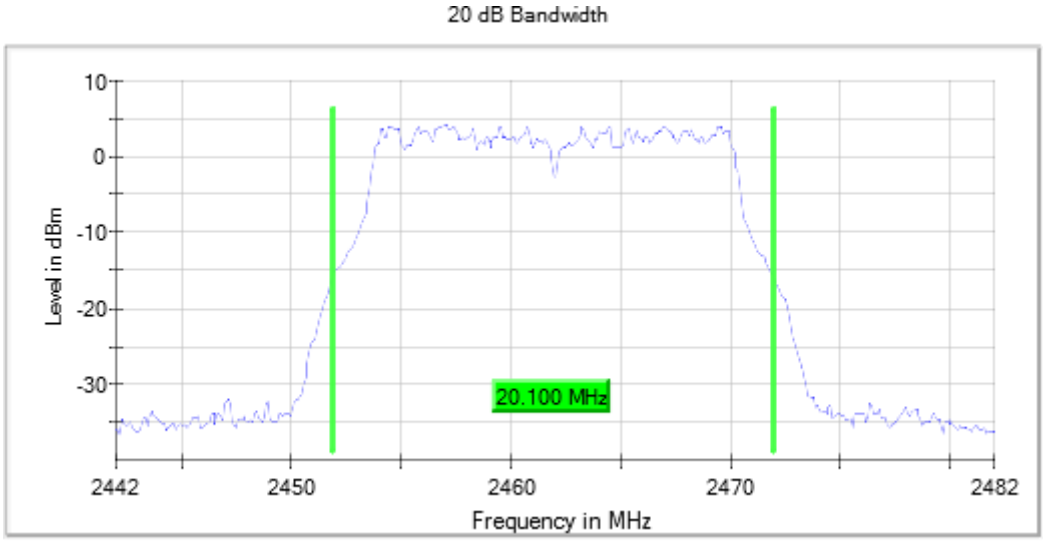


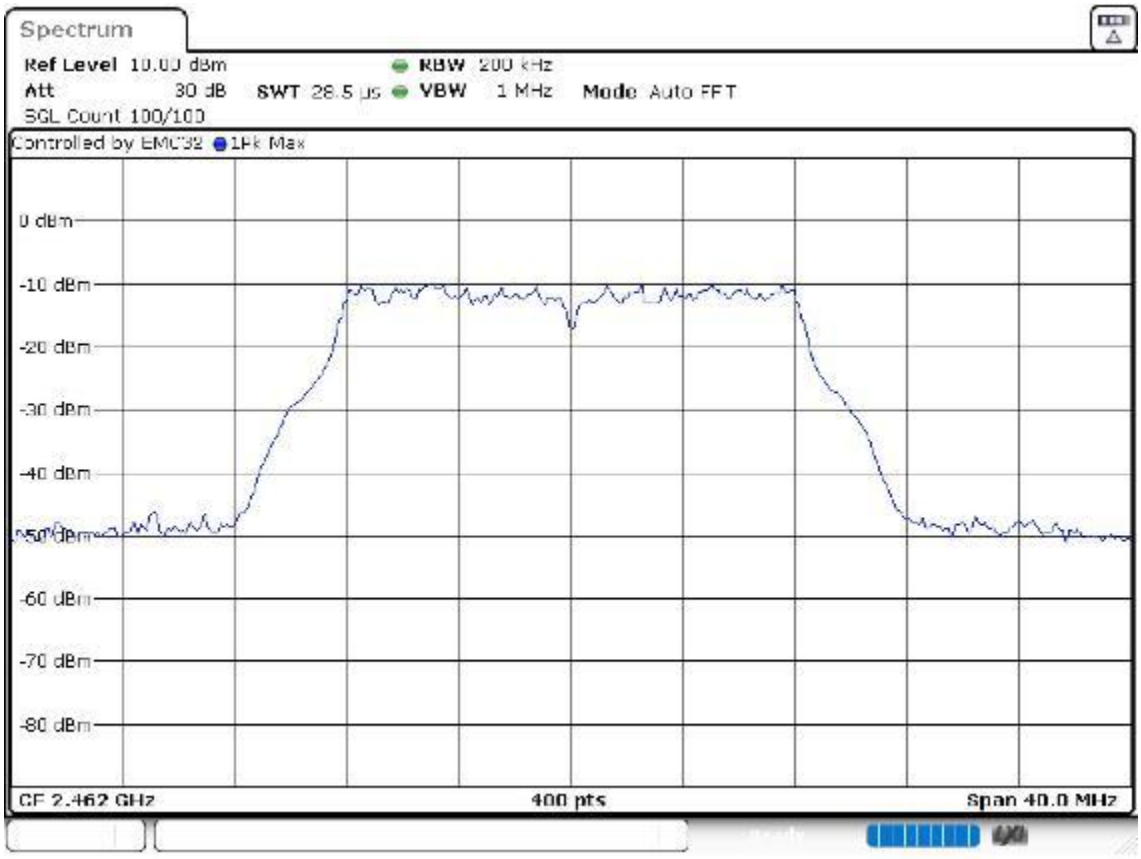
Frequency MHz = 2462.00000

Bandwidth MHz = 20 Modulation = 802.11g (OFDM 6 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:





Modulation: 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Ebw (MHz)
2412.00000	Digital Transmission System (DTS)	20	1	1	20.800
2442.00000					20.700
2462.00000					20.900

Verdict

Pass

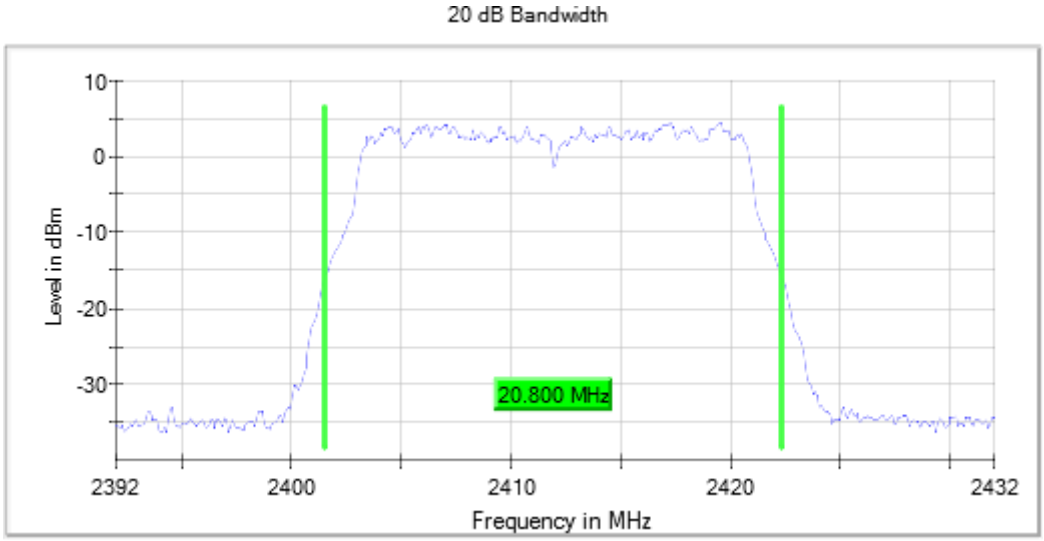
Attachments

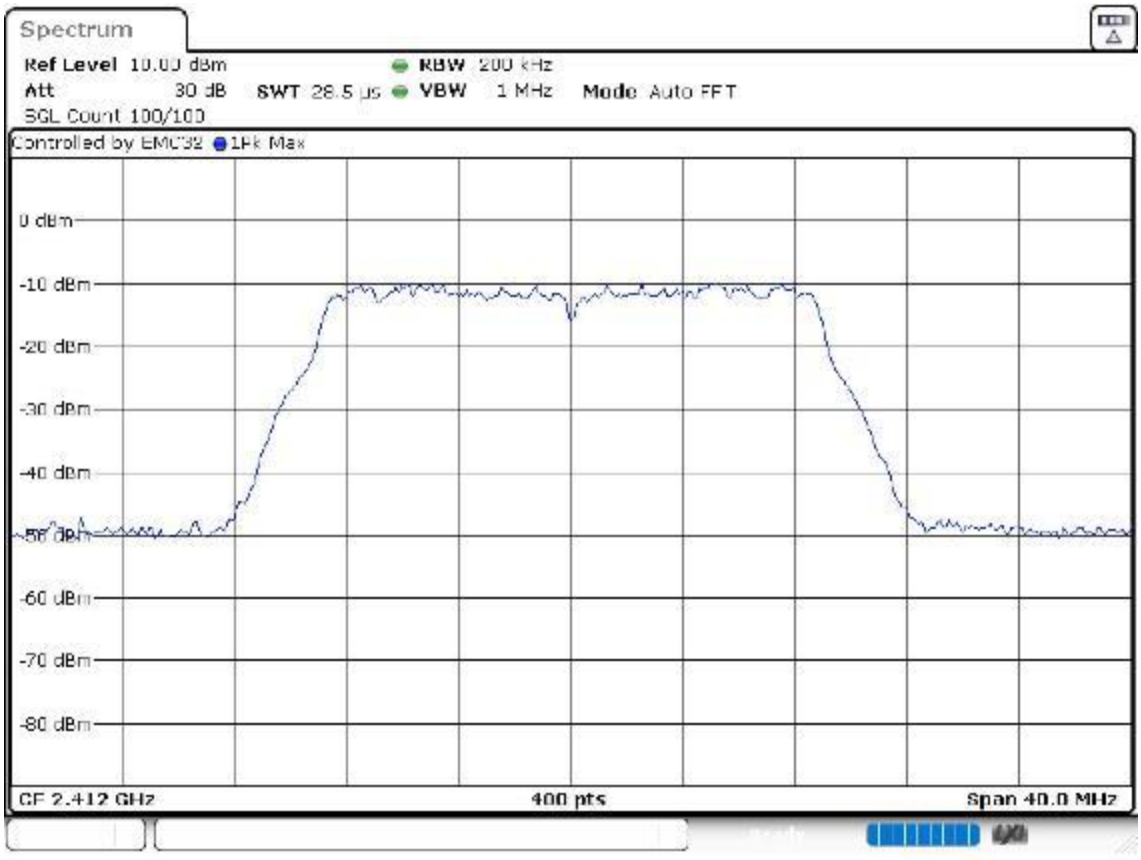
Frequency MHz = 2412.00000

Bandwidth MHz = 20 Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:



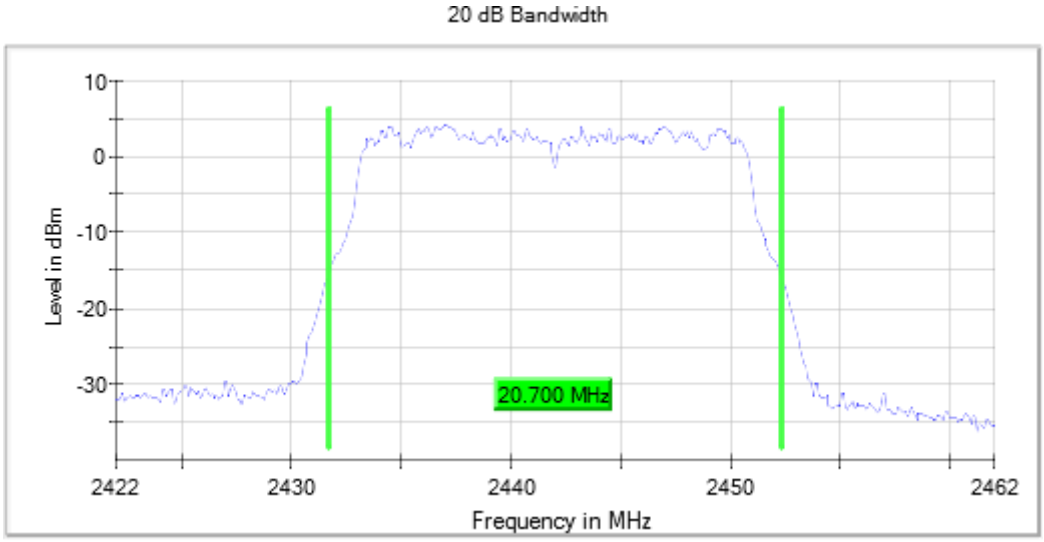


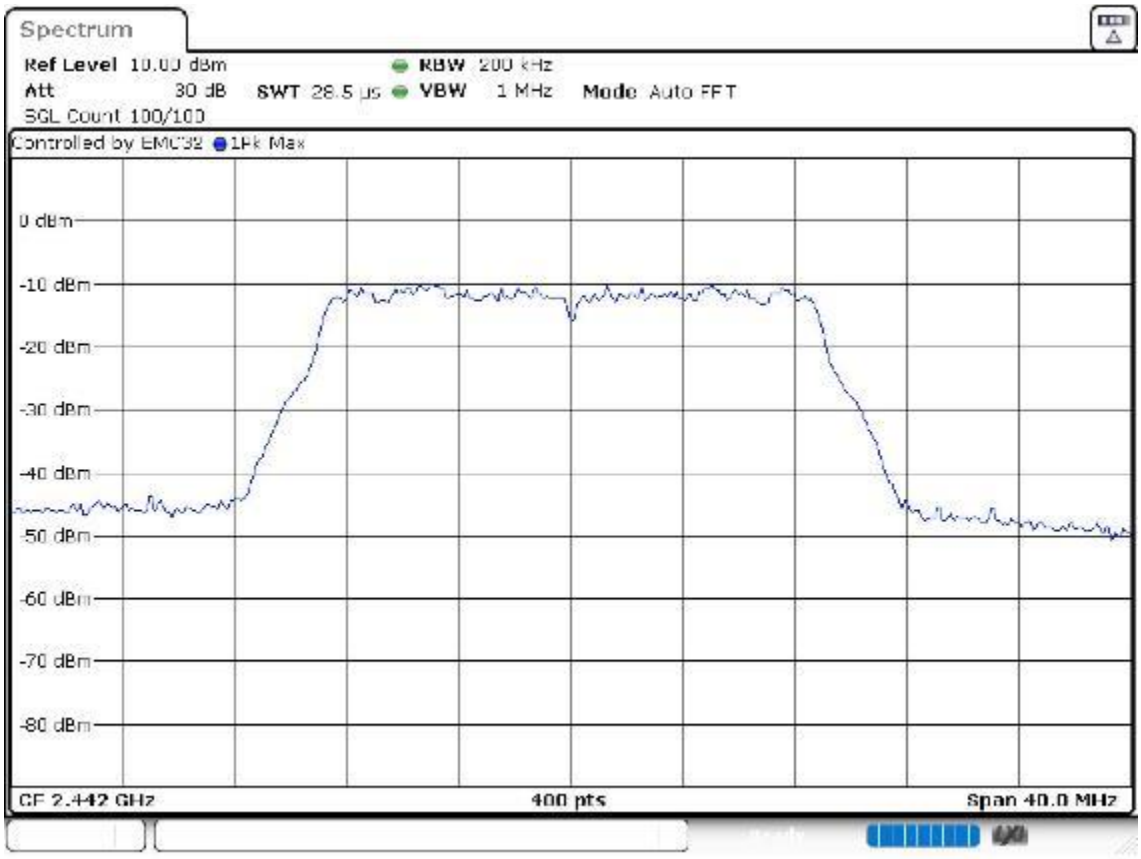
Frequency MHz = 2442.00000

Bandwidth MHz = 20 Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:



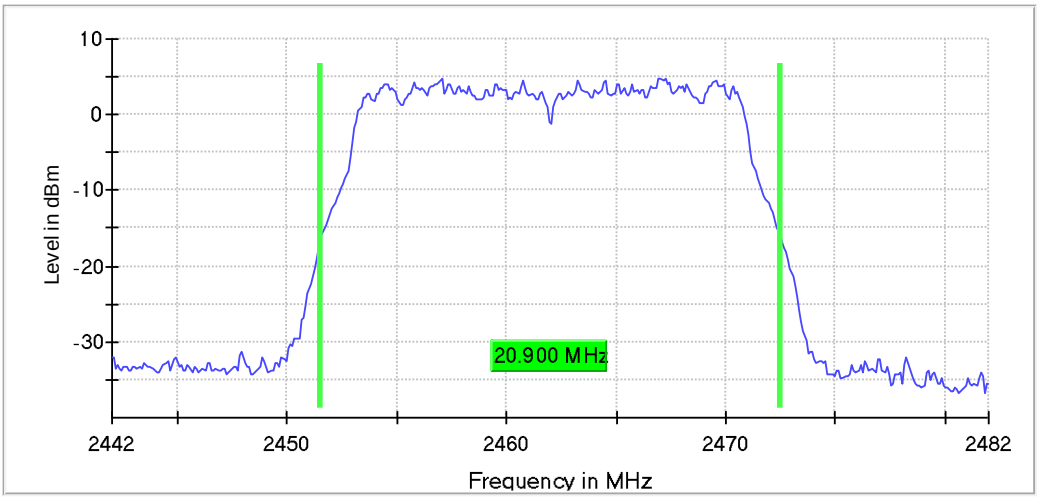


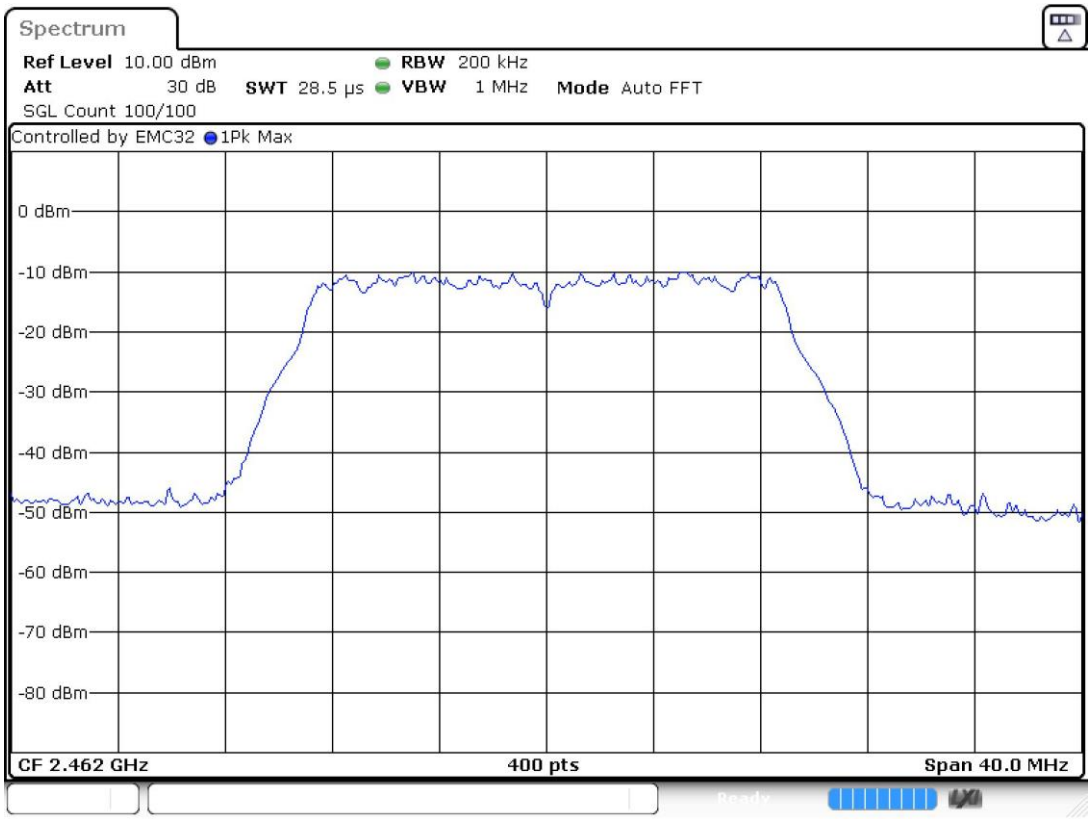
Frequency MHz = 2462.00000

Bandwidth MHz = 20 Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:





RSS-247 5.2 (a) / FCC 15.247 (a) (2) [6dBw] 6 dB Bandwidth

Limits

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

Modulation: 802.11b (DSSS 1 Mbit/s)

Results

Freq (MHz)	BW (MHz)	# of Tx Chains	Port	Ebw (MHz)
2412.00000	20	1	1	8.150
2442.00000				8.650
2462.00000				8.200

Verdict

Pass

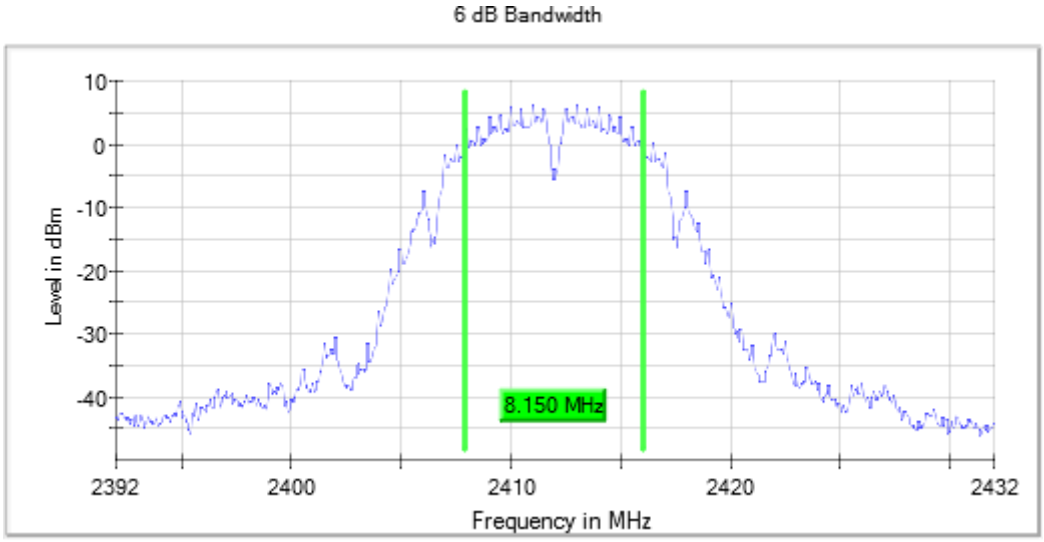
Attachments

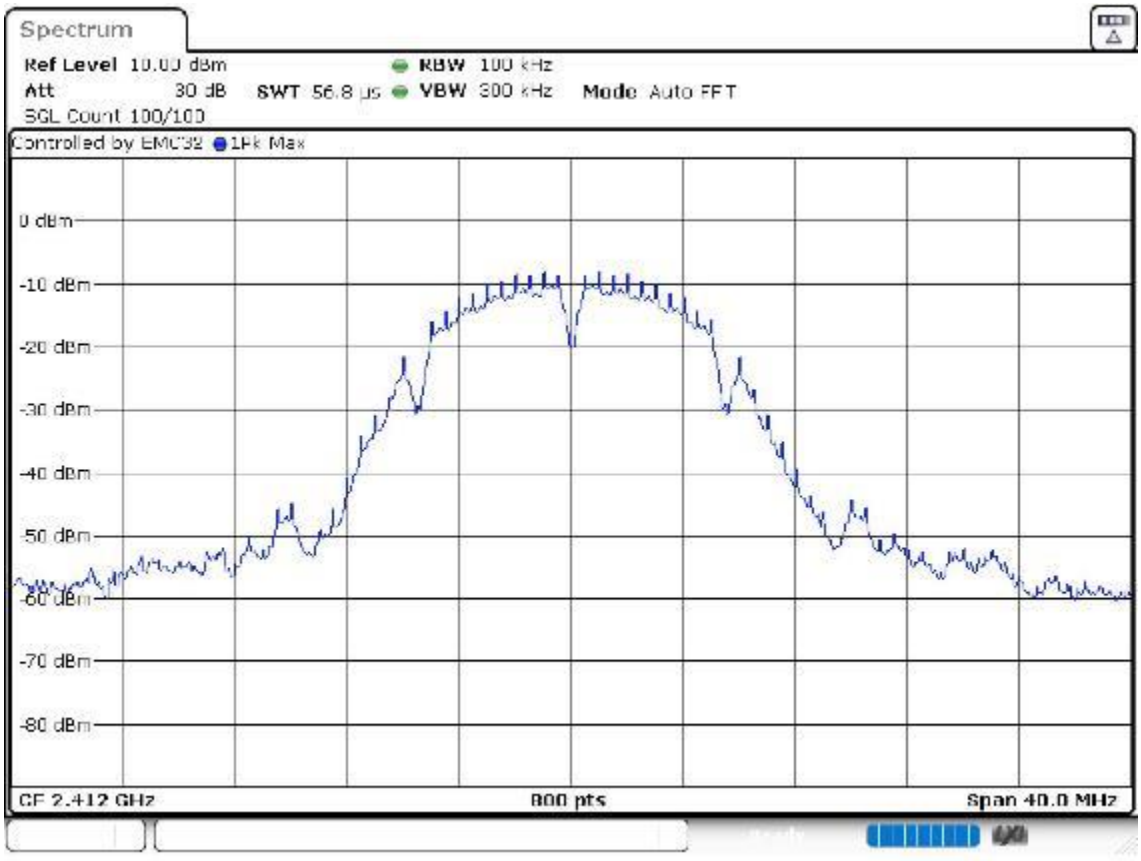
Frequency MHz = 2412.00000 Bandwidth MHz = 20

Modulation = 802.11b (DSSS 1 Mbit/s) Number of Transmission Chains = 1

Active Port = 1

Images:



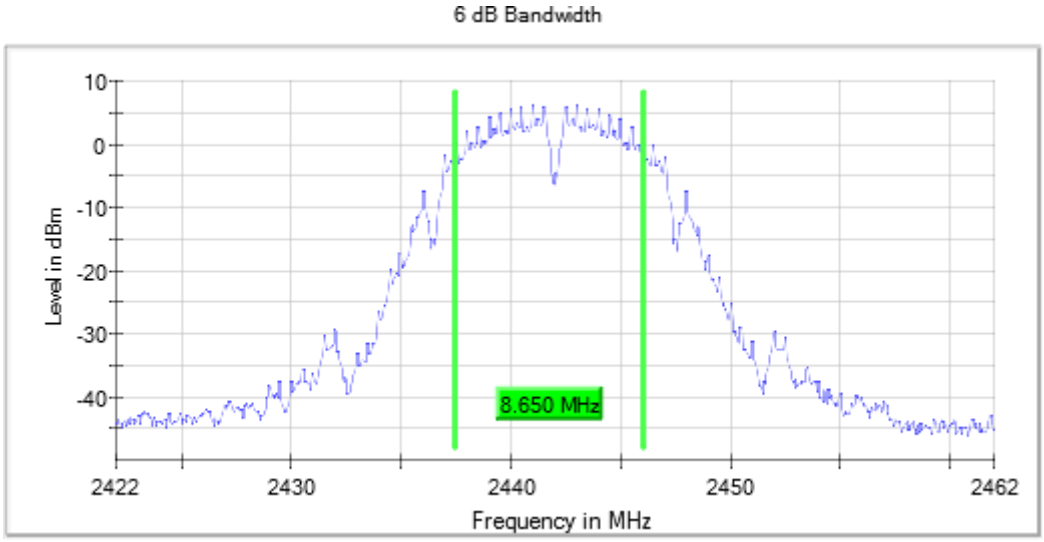


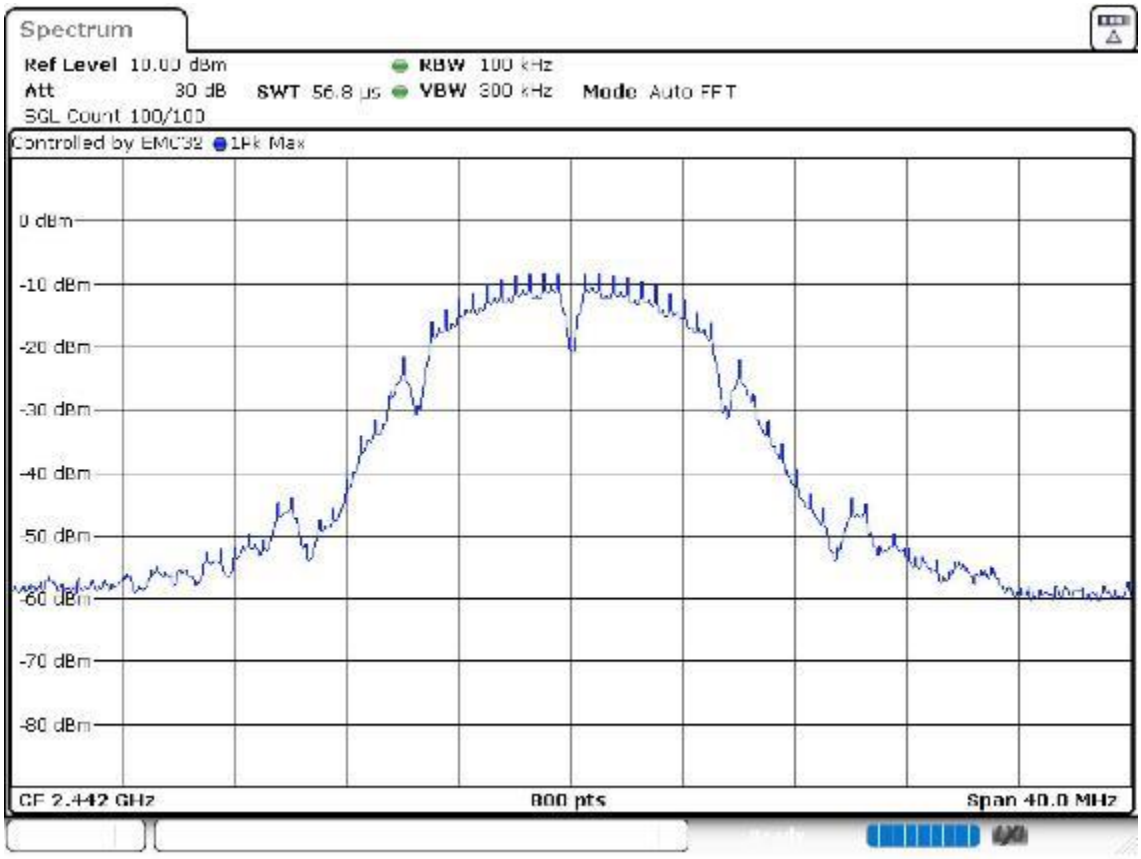
Frequency MHz = 2442.00000 Bandwidth MHz = 20

Modulation = 802.11b (DSSS 1 Mbit/s) Number of Transmission Chains = 1

Active Port = 1

Images:





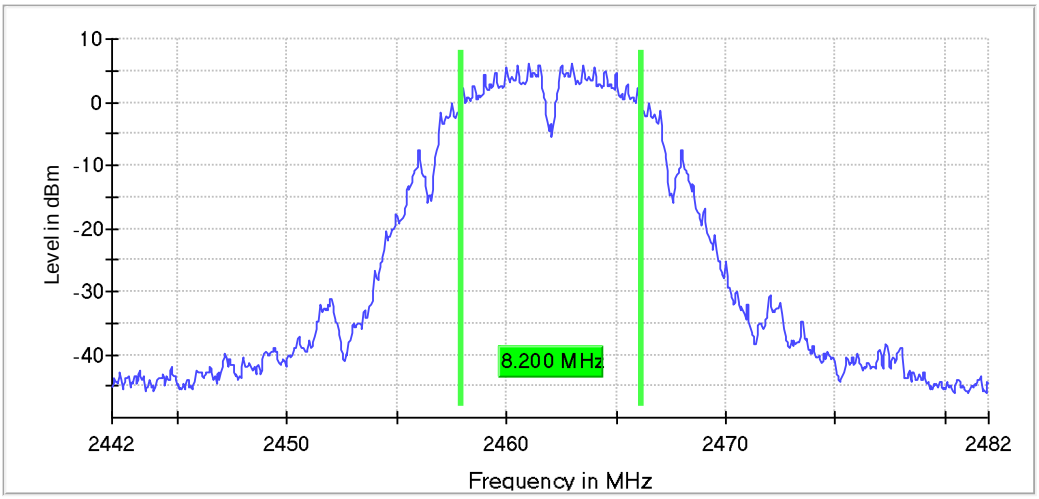
Frequency MHz = 2462.00000 Bandwidth MHz = 20

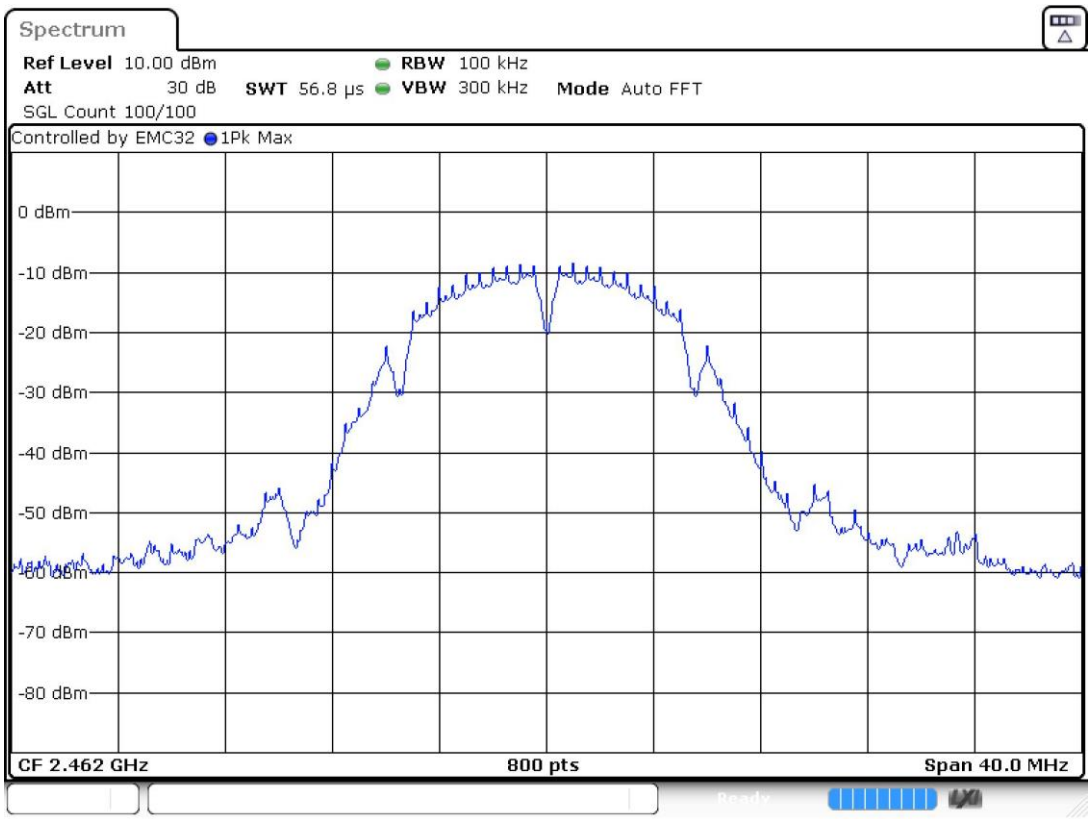
Modulation = 802.11b (DSSS 1 Mbit/s) Number of Transmission Chains = 1

Active Port = 1

Images:

6 dB Bandwidth





Modulation: 802.11g (OFDM 6 Mbit/s)

Results

Freq (MHz)	BW (MHz)	# of Tx Chains	Port	Ebw (MHz)
2412.00000	20	1	1	16.450
2442.00000				16.450
2462.00000				16.450

Verdict

Pass

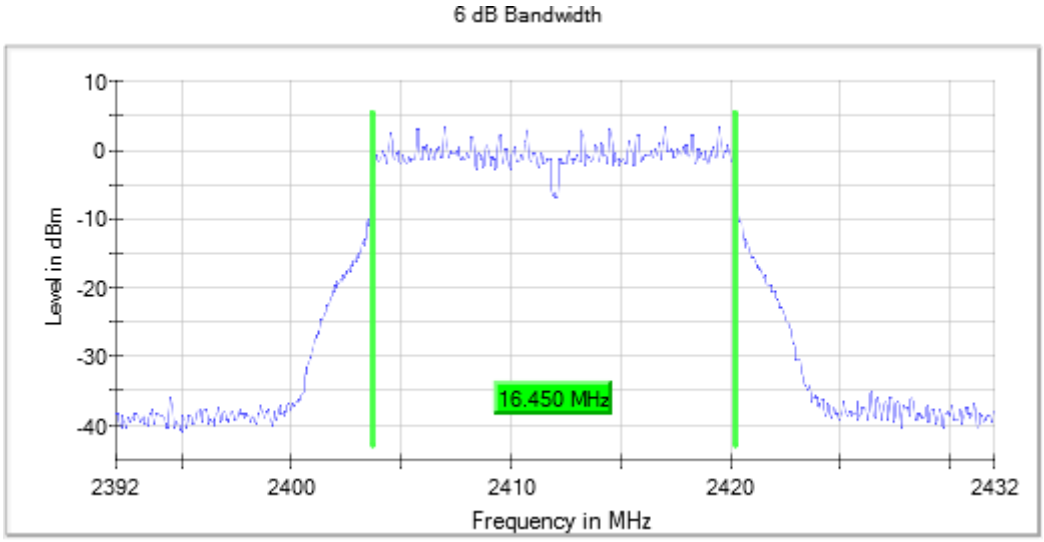
Attachments

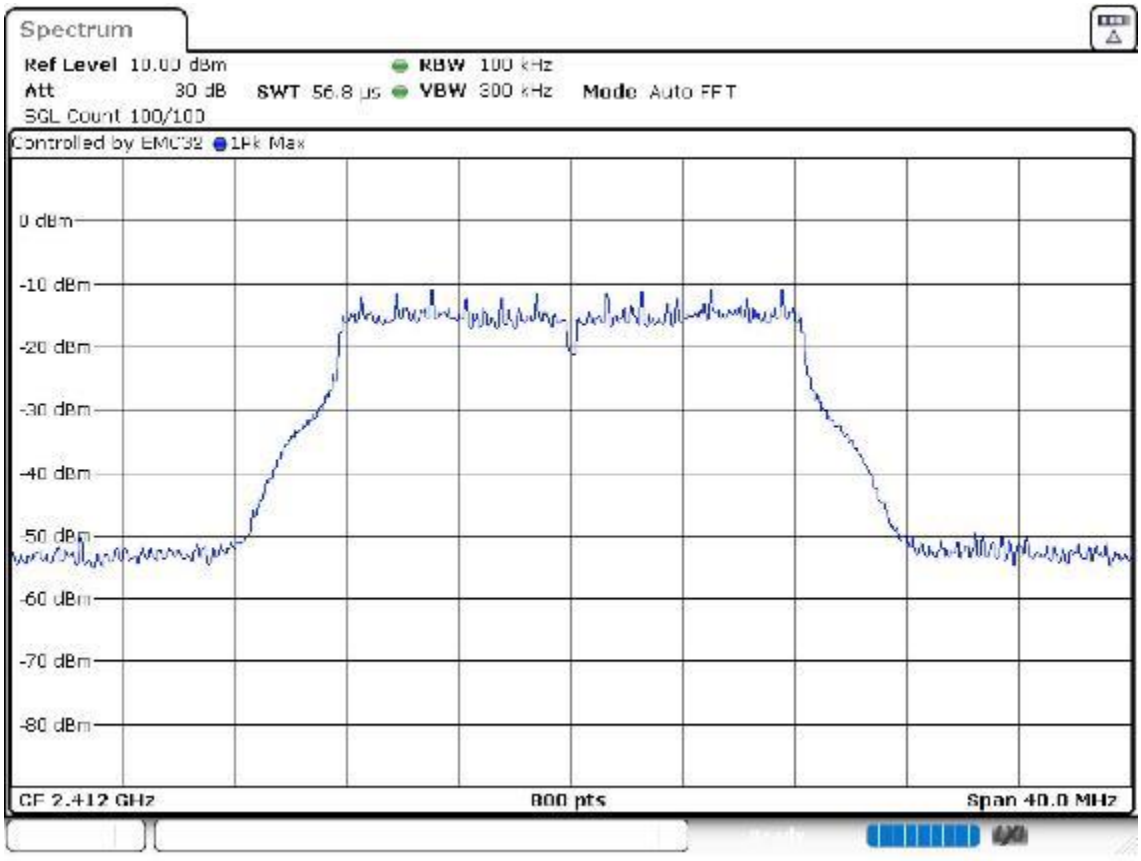
Frequency MHz = 2412.00000 Bandwidth MHz = 20

Modulation = 802.11g (OFDM 6 Mbit/s) Number of Transmission Chains = 1

Active Port = 1

Images:



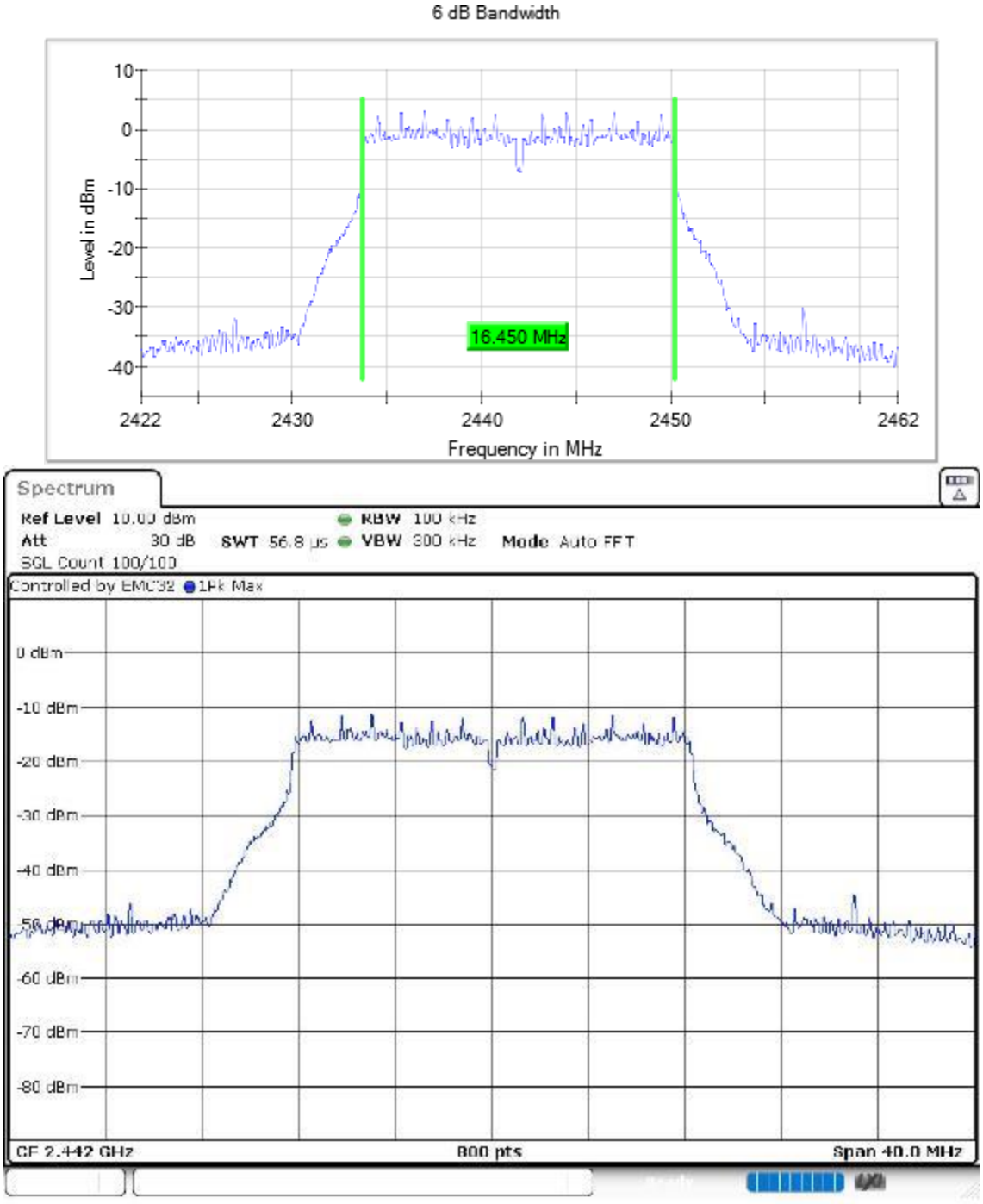


Frequency MHz = 2442.00000 Bandwidth MHz = 20

Modulation = 802.11g (OFDM 6 Mbit/s) Number of Transmission Chains = 1

Active Port = 1

Images:

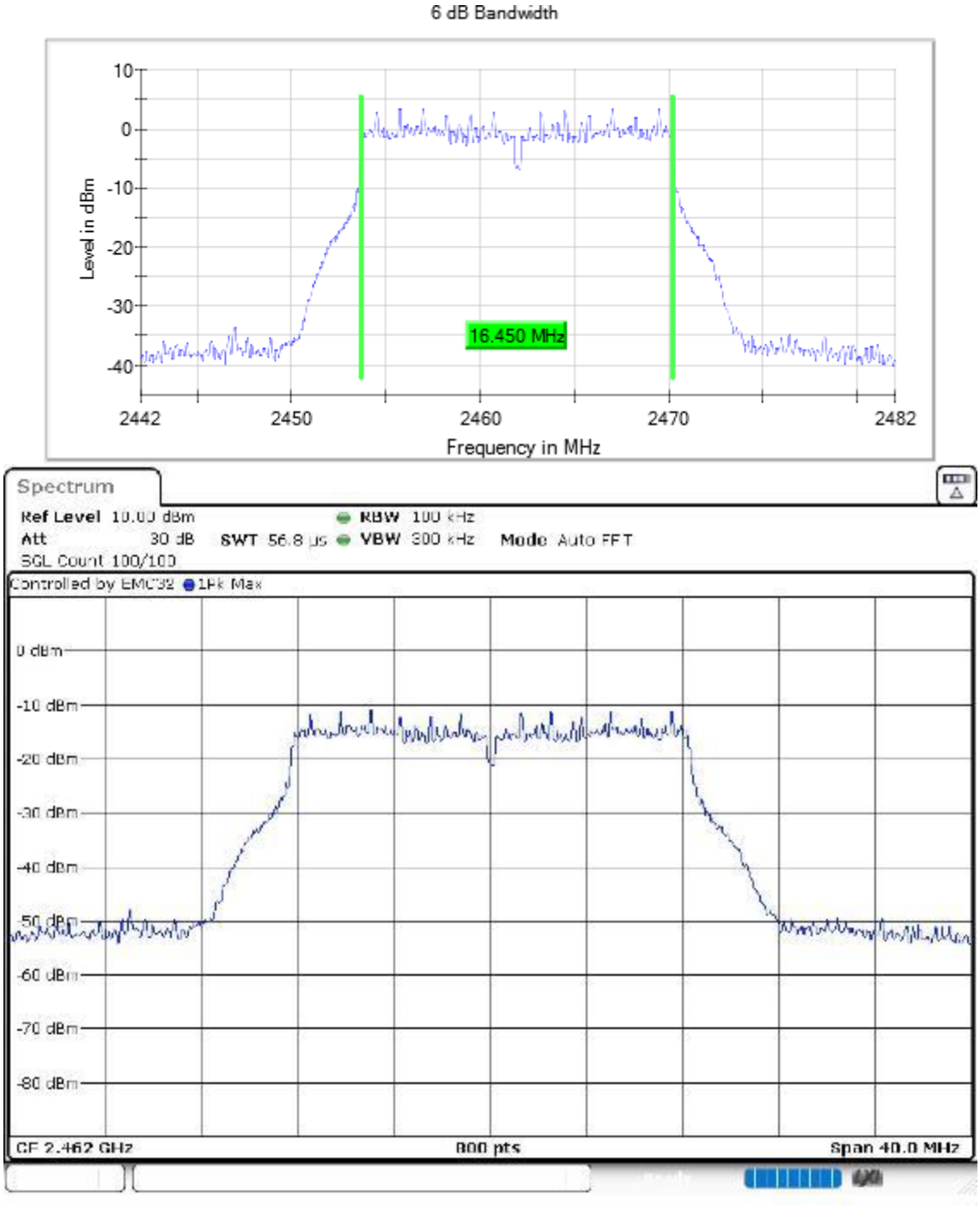


Frequency MHz = 2462.00000 Bandwidth MHz = 20

Modulation = 802.11g (OFDM 6 Mbit/s) Number of Transmission Chains = 1

Active Port = 1

Images:



Modulation: 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Results

Freq (MHz)	BW (MHz)	# of Tx Chains	Port	Ebw (MHz)
2412.00000	20	1	1	17.700
2442.00000				17.650
2462.00000				17.650

Verdict

Pass

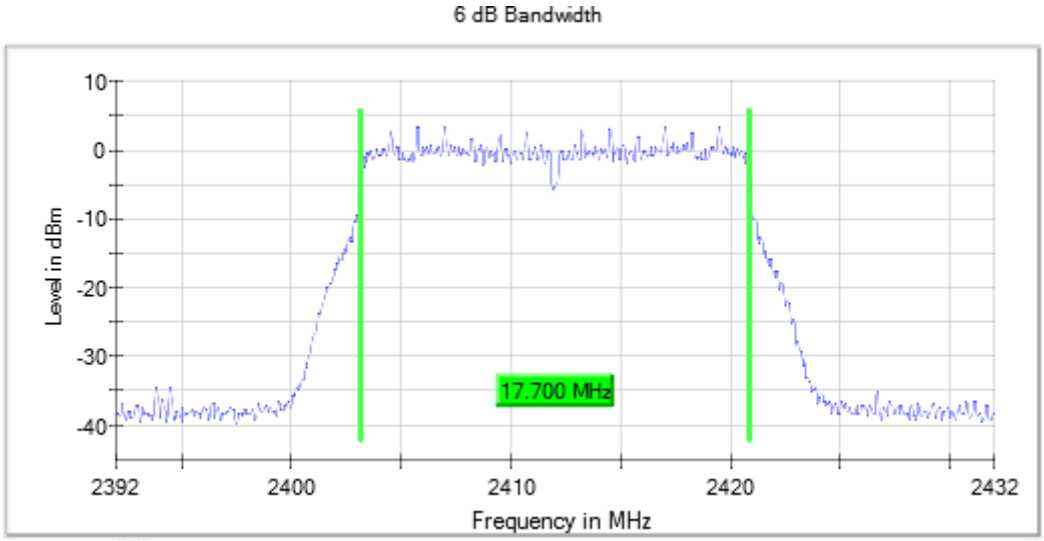
Attachments

Frequency MHz = 2412.00000 Bandwidth MHz = 20

Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s) Number of Transmission Chains = 1

Active Port = 1

Images:

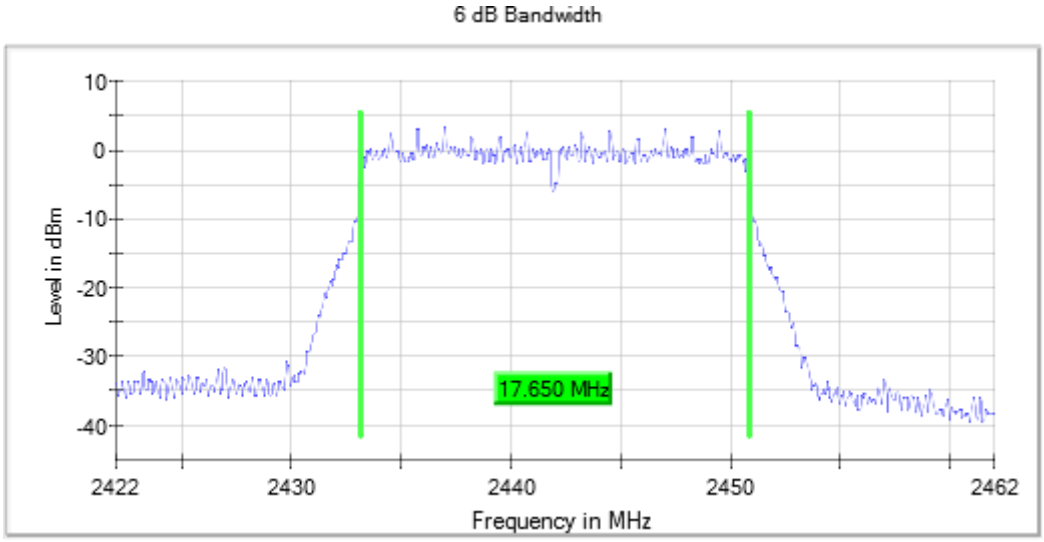


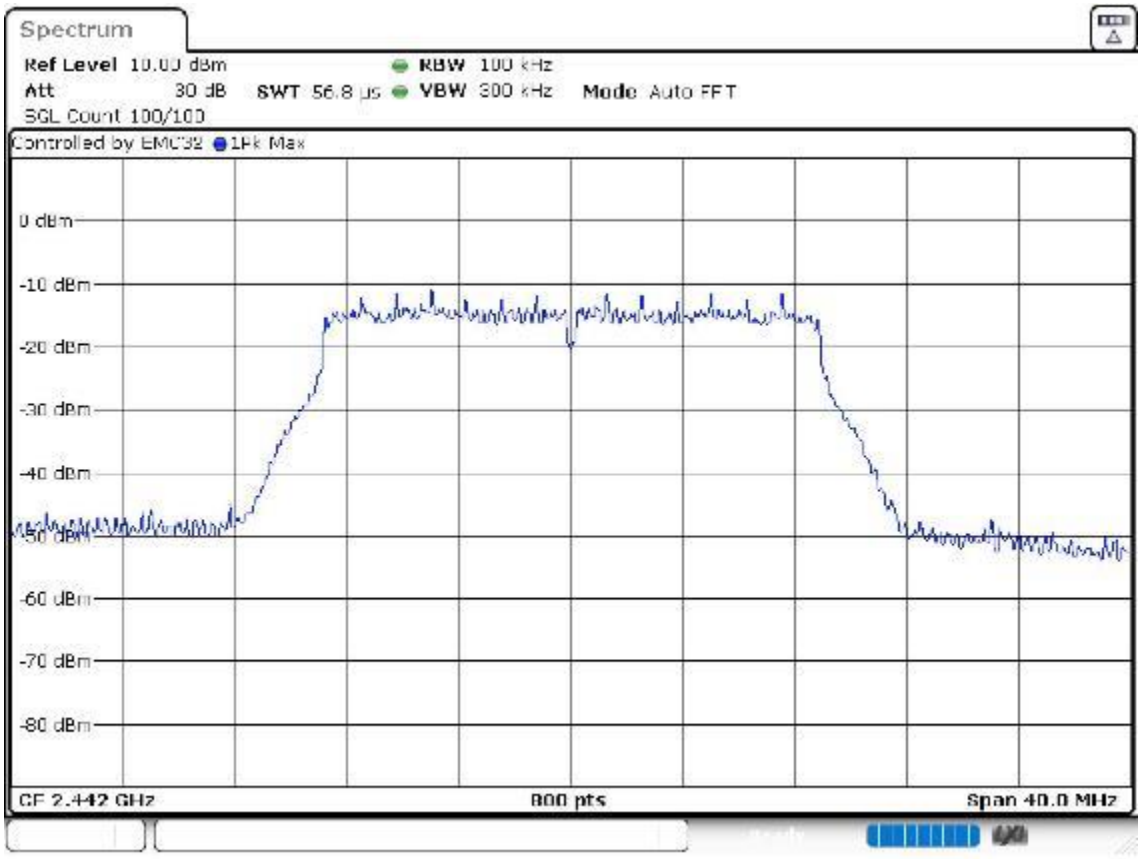
Frequency MHz = 2442.00000 Bandwidth MHz = 20

Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s) Number of Transmission Chains = 1

Active Port = 1

Images:





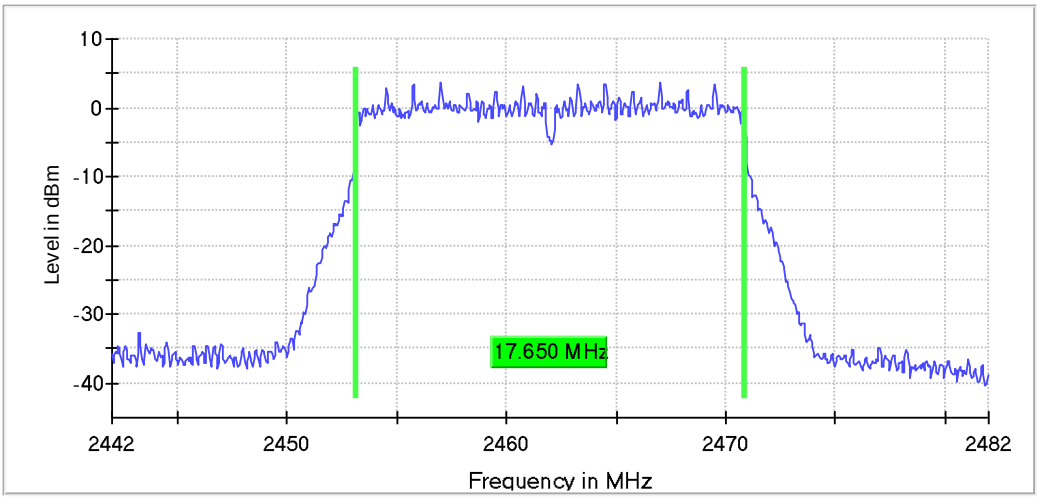
Frequency MHz = 2462.00000 Bandwidth MHz = 20

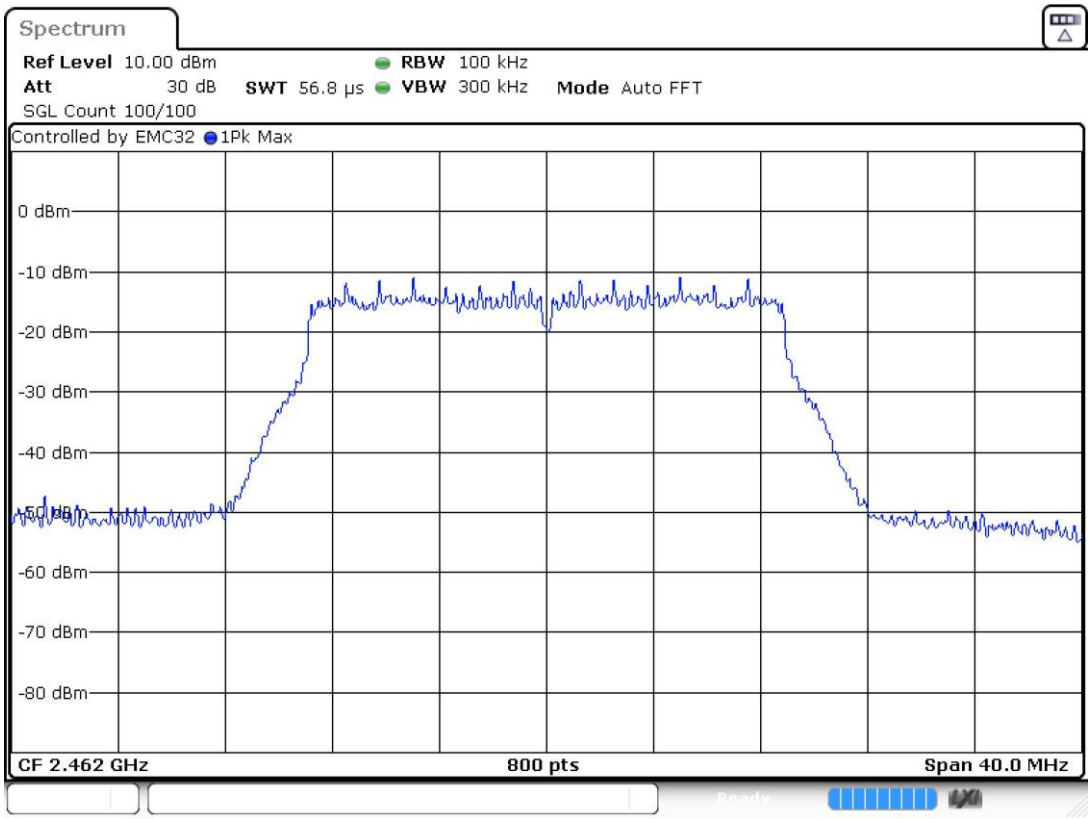
Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s) Number of Transmission Chains = 1

Active Port = 1

Images:

6 dB Bandwidth





RSS-247 5.2 (b) / FCC 15.247 (e) [Psd] Power spectral density

Limits

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.

Modulation: 802.11b (DSSS 1 Mbit/s)

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	PSD (dBm)
2412.00000	Digital Transmission System (DTS)	20	1	1	-2.17
2442.00000					-2.56
2462.00000					-1.525

Verdict

Pass

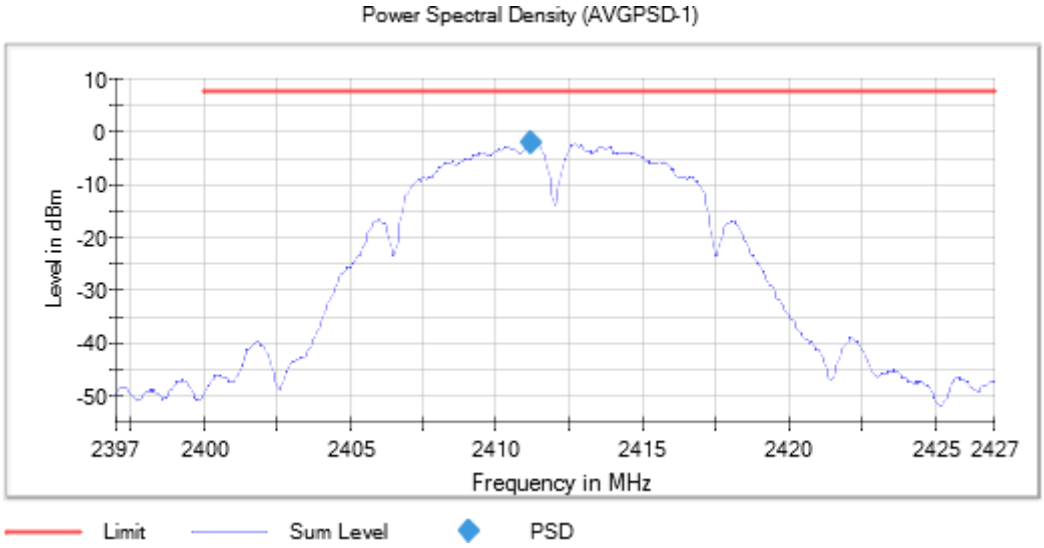
Attachments

Frequency MHz = 2412.00000

Bandwidth MHz = 20 Modulation = 802.11b (DSSS 1 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:

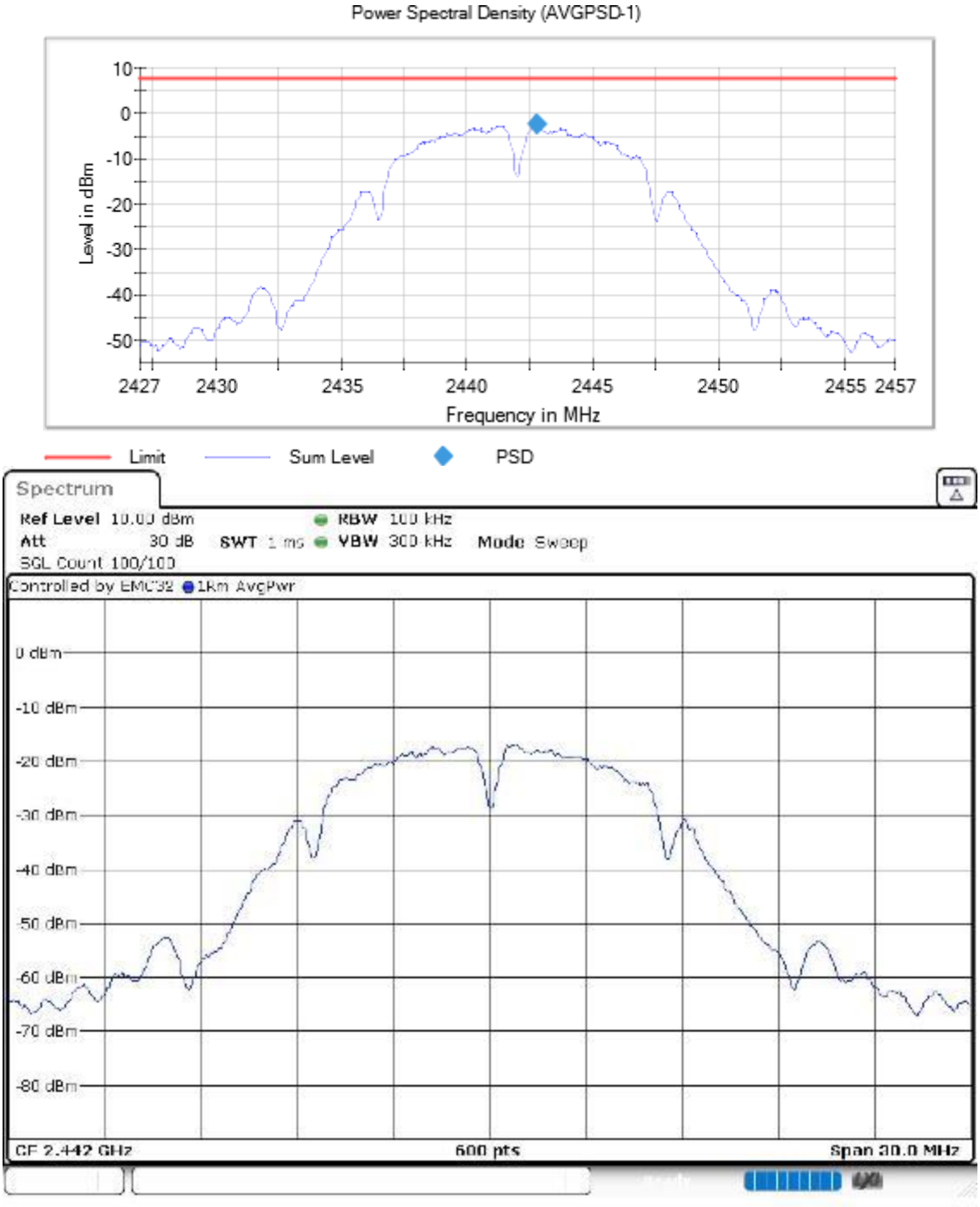


Frequency MHz = 2442.00000

Bandwidth MHz = 20 Modulation = 802.11b (DSSS 1 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:

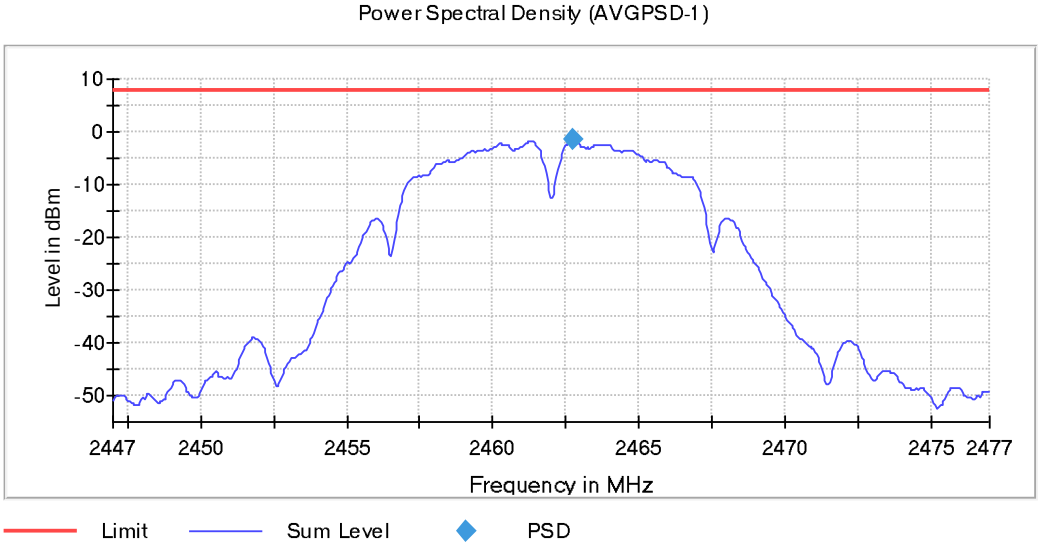


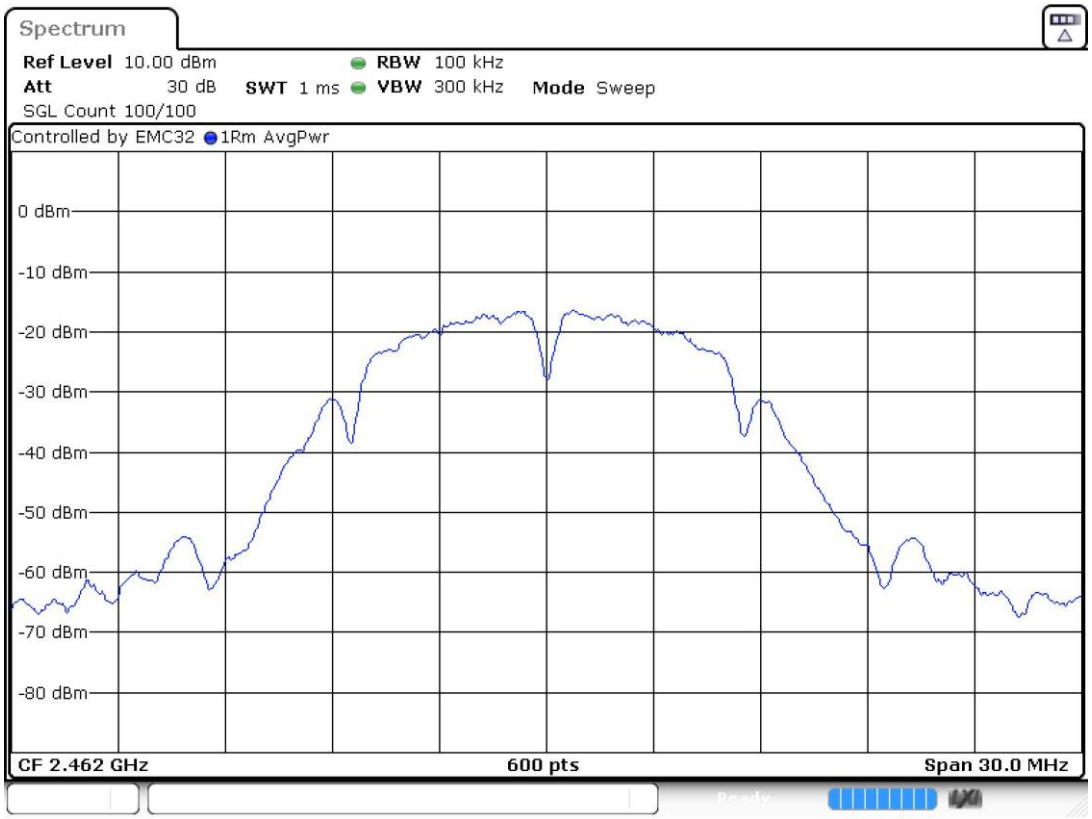
Frequency MHz = 2462.00000

Bandwidth MHz = 20 Modulation = 802.11b (DSSS 1 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:





Modulation: 802.11g (OFDM 6 Mbit/s)

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	PSD (dBm)
2412.00000	Digital Transmission System (DTS)	20	1	1	-5.27
2442.00000					-6.00
2462.00000					-5.46

Verdict

Pass

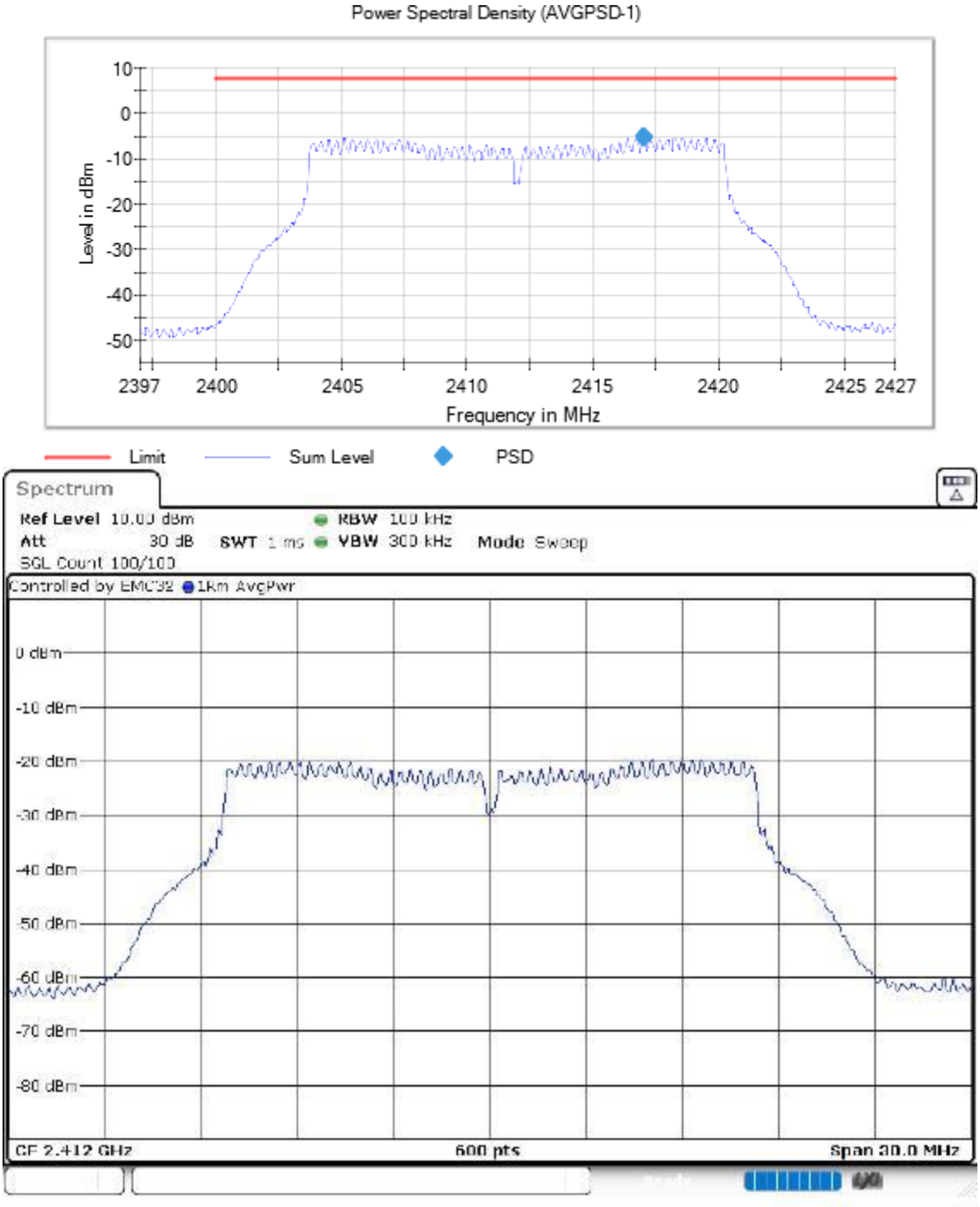
Attachments

Frequency MHz = 2412.00000

Bandwidth MHz = 20 Modulation = 802.11g (OFDM 6 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:

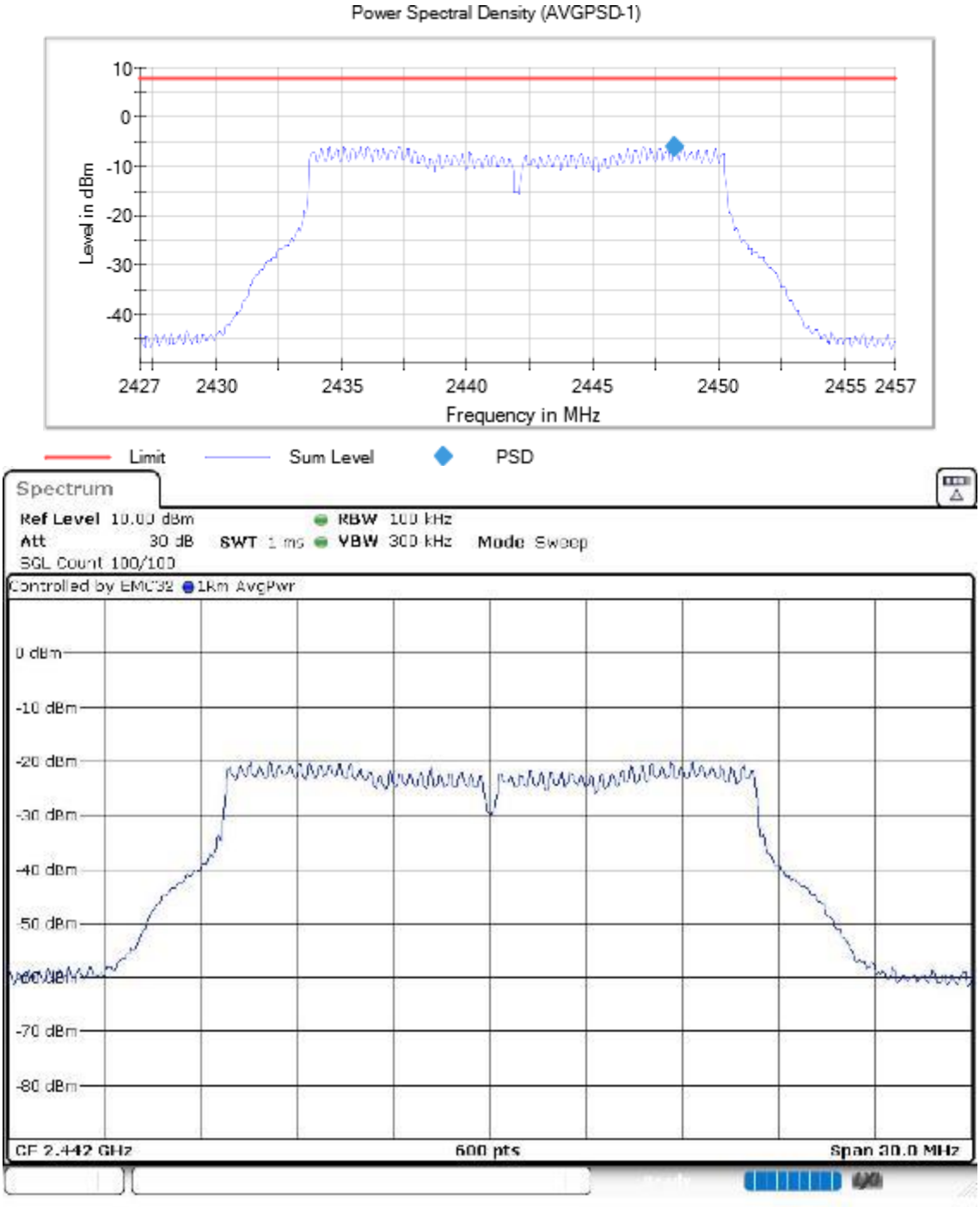


Frequency MHz = 2442.00000

Bandwidth MHz = 20 Modulation = 802.11g (OFDM 6 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:

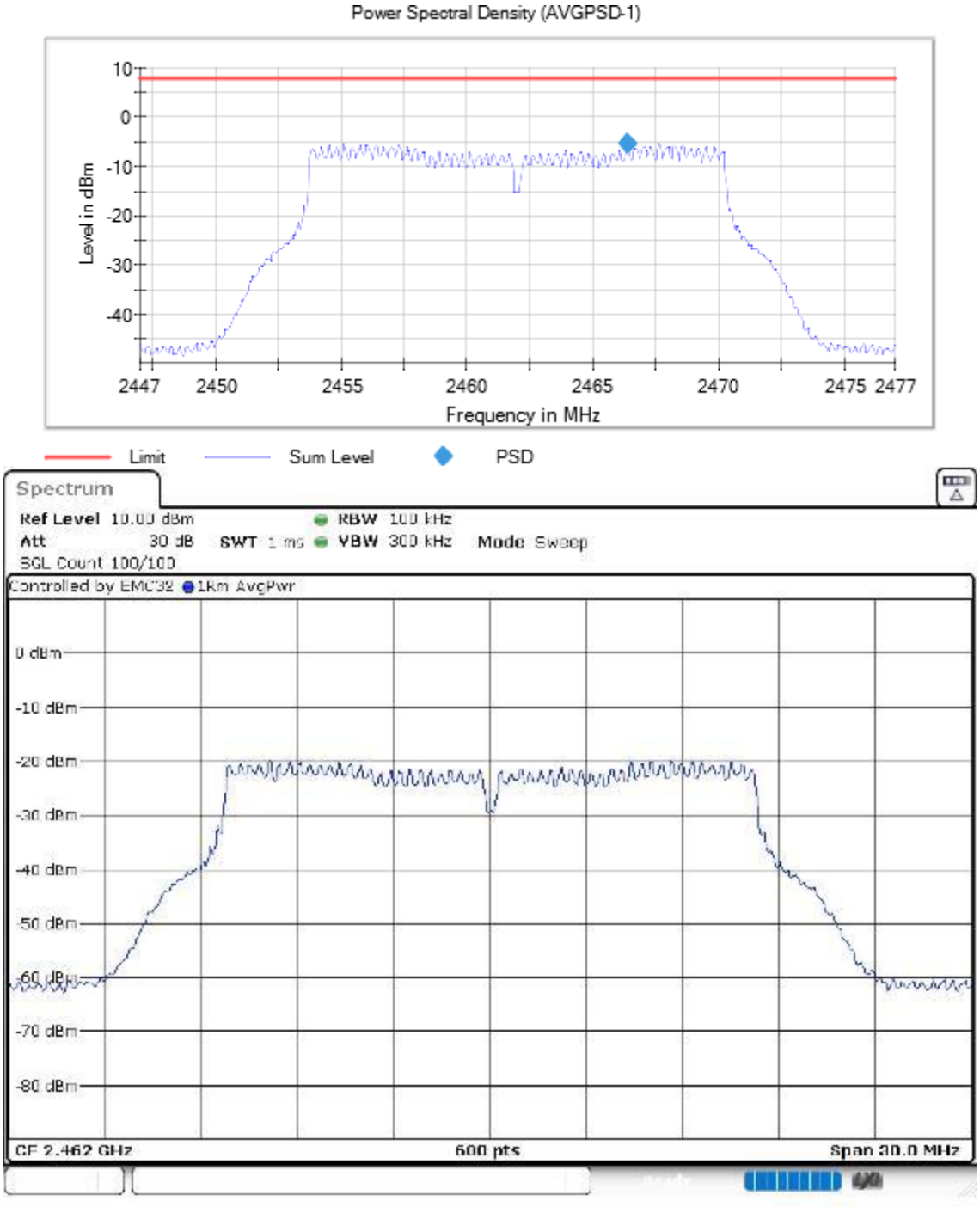


Frequency MHz = 2462.00000

Bandwidth MHz = 20 Modulation = 802.11g (OFDM 6 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:



Modulation: 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	PSD (dBm)
2412.00000	Digital Transmission System (DTS)	20	1	1	-5.63
2442.00000					-6.12
2462.00000					-5.12

Verdict

Pass

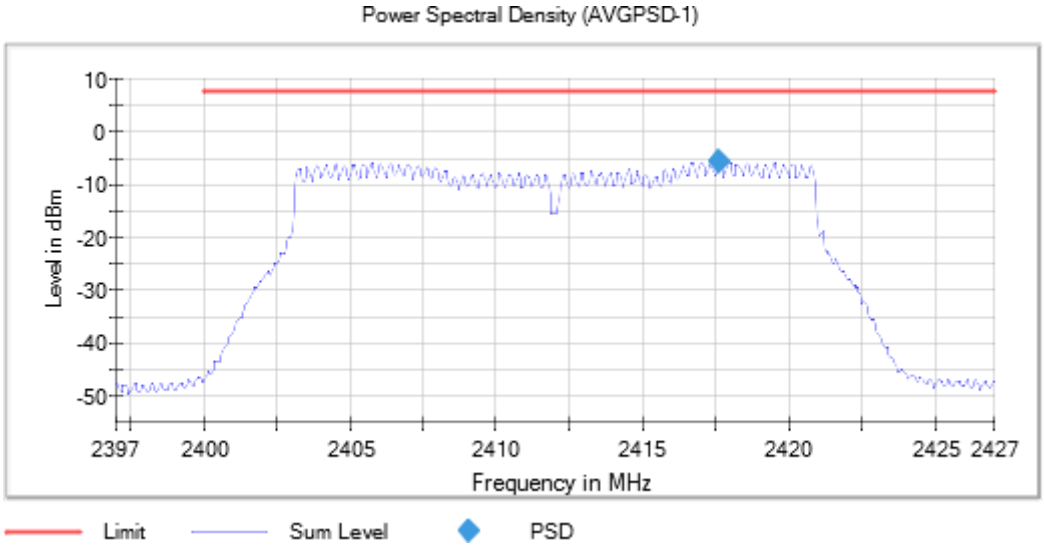
Attachments

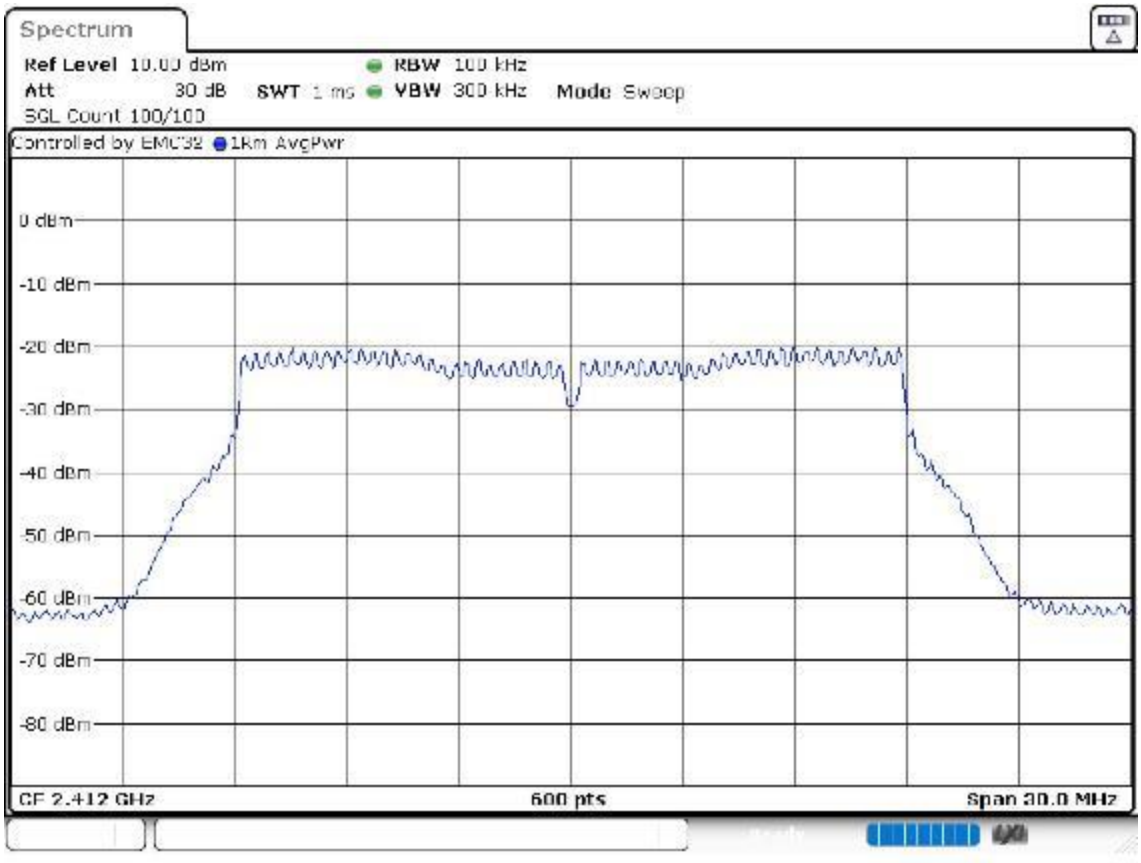
Frequency MHz = 2412.00000

Bandwidth MHz = 20 Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:



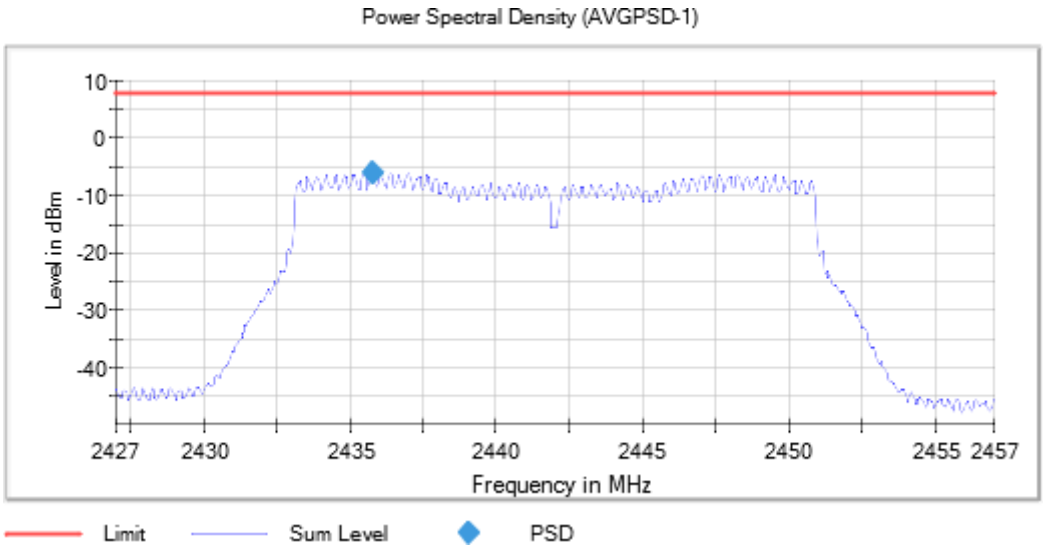


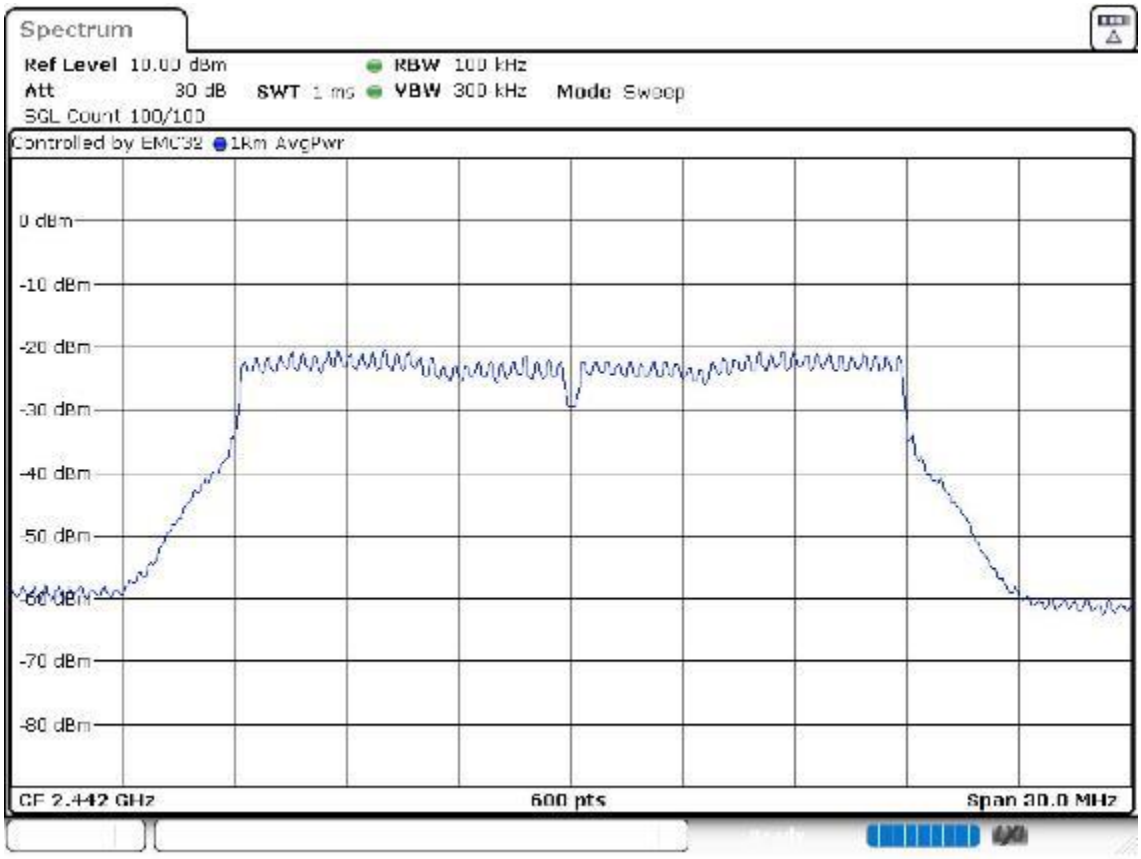
Frequency MHz = 2442.00000

Bandwidth MHz = 20 Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:



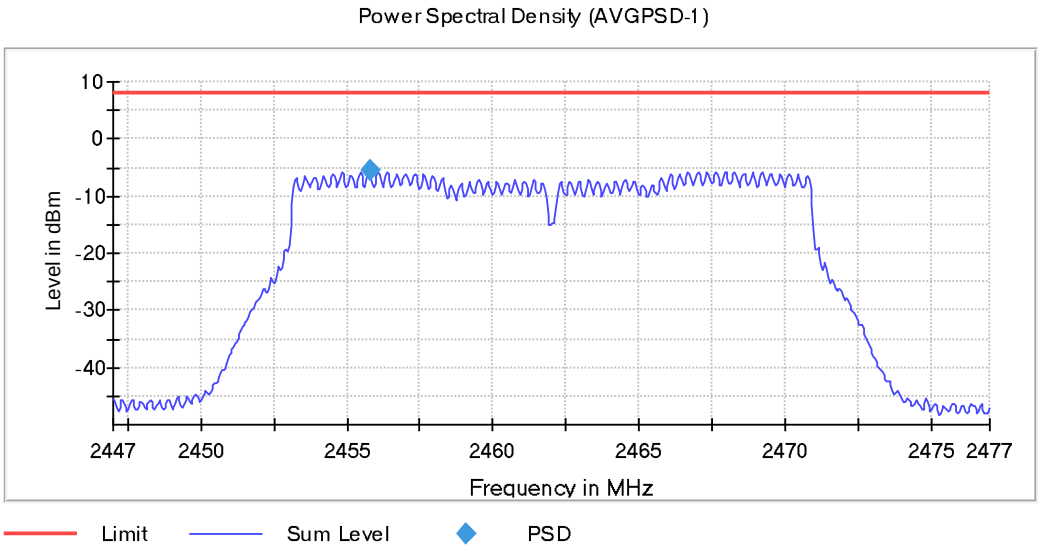


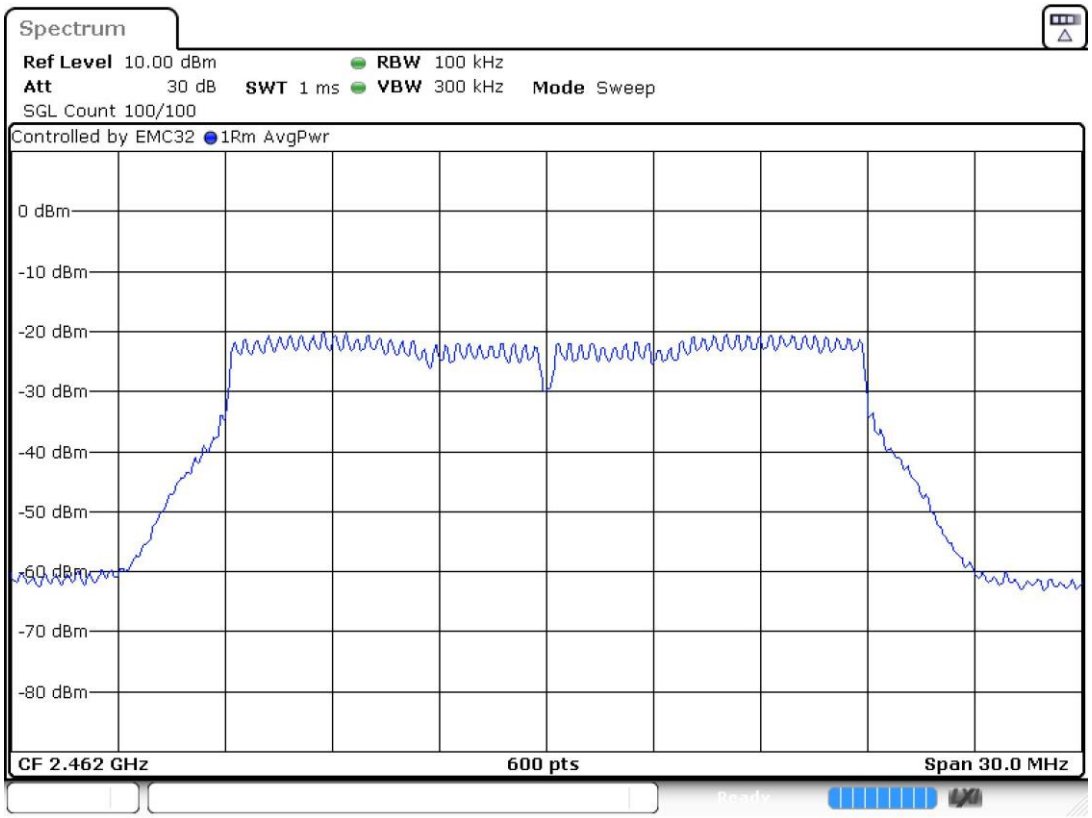
Frequency MHz = 2462.00000

Bandwidth MHz = 20 Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:





RSS-247 5.4 (d) / FCC 15.247 (b) (1) [Avcp] Maximum Average Conducted output Power

Limits

For systems using digital modulation in the 2400-2483.5 MHz band: 1 watt (30 dBm).

The e.i.r.p. shall not exceed 4 W (36 dBm) (Canada).

Modulation: 802.11b (DSSS 1 Mbit/s)

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Avg Power (dBm)	E.I.R.P. (dBm)
2412.00000	Digital Transmission System (DTS)	20	1	1	15.87	16.87
2442.00000	Digital Transmission System (DTS)	20	1	1	15.24	16.24
2462.00000	Digital Transmission System (DTS)	20	1	1	15.41	16.41

Modulation: 802.11g (OFDM 6 Mbit/s)

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Avg Power (dBm)	E.I.R.P. (dBm)
2412.00000	Digital Transmission System (DTS)	20	1	1	15.33	16.33
2442.00000	Digital Transmission System (DTS)	20	1	1	14.67	15.67
2462.00000	Digital Transmission System (DTS)	20	1	1	15.10	16.10

Modulation: 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Avg Power (dBm)	E.I.R.P. (dBm)
2412.00000	Digital Transmission System (DTS)	20	1	1	15.33	16.33
2442.00000	Digital Transmission System (DTS)	20	1	1	14.89	15.89
2462.00000	Digital Transmission System (DTS)	20	1	1	15.68	15.68

Verdict

Pass

RSS-247 5.5 / FCC 15.247 (d) [Bndedge] Band-edge emissions compliance (Transmitter)

Limits

In any 100 kHz bandwidths outside the frequency band in which the 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Modulation: 802.11b (DSSS 1 Mbit/s)

Results

Freq (MHz)	Frequency (MHz)	Level(dBm)	Margin(dB)	Limit(dBm)	Result
2412.00000	2399.225000	-37.231	13.8	-23.386	PASS
	2399.275000	-37.243	13.9	-23.386	PASS
	2399.025000	-37.243	13.9	-23.386	PASS
	2399.525000	-37.272	13.9	-23.386	PASS
	2399.475000	-37.294	13.9	-23.386	PASS
	2399.175000	-37.352	14.0	-23.386	PASS
	2398.975000	-37.391	14.0	-23.386	PASS
	2399.975000	-37.765	14.4	-23.386	PASS
	2399.325000	-37.850	14.5	-23.386	PASS
	2399.425000	-37.933	14.5	-23.386	PASS
	2399.125000	-37.984	14.6	-23.386	PASS
	2399.375000	-38.109	14.7	-23.386	PASS
	2399.075000	-38.280	14.9	-23.386	PASS
	2399.925000	-38.848	15.5	-23.386	PASS
	2397.325000	-39.101	15.7	-23.386	PASS

Freq (MHz)	Frequency(MHz)	Level(dBm)	Margin(dB)	Limit(dBm)	Result
2462.00000	2499.875000	-42.816	19.7	-23.155	PASS
	2499.925000	-42.937	19.8	-23.155	PASS
	2498.675000	-43.017	19.9	-23.155	PASS
	2484.975000	-43.105	19.9	-23.155	PASS
	2483.525000	-43.196	20.0	-23.155	PASS
	2484.925000	-43.280	20.1	-23.155	PASS
	2485.175000	-43.359	20.2	-23.155	PASS
	2484.175000	-43.391	20.2	-23.155	PASS
	2484.425000	-43.394	20.2	-23.155	PASS
	2485.875000	-43.414	20.3	-23.155	PASS
	2484.225000	-43.492	20.3	-23.155	PASS
	2498.725000	-43.517	20.4	-23.155	PASS
	2498.625000	-43.530	20.4	-23.155	PASS
	2489.325000	-43.544	20.4	-23.155	PASS
	2484.475000	-43.577	20.4	-23.155	PASS

Verdict

Pass

Attachments

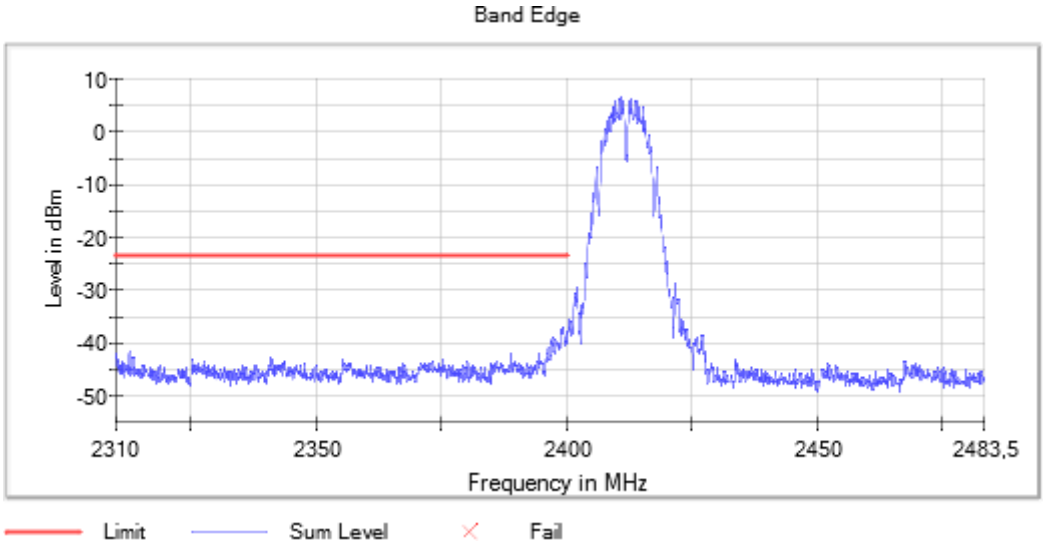
Frequency MHz = 2412.00000

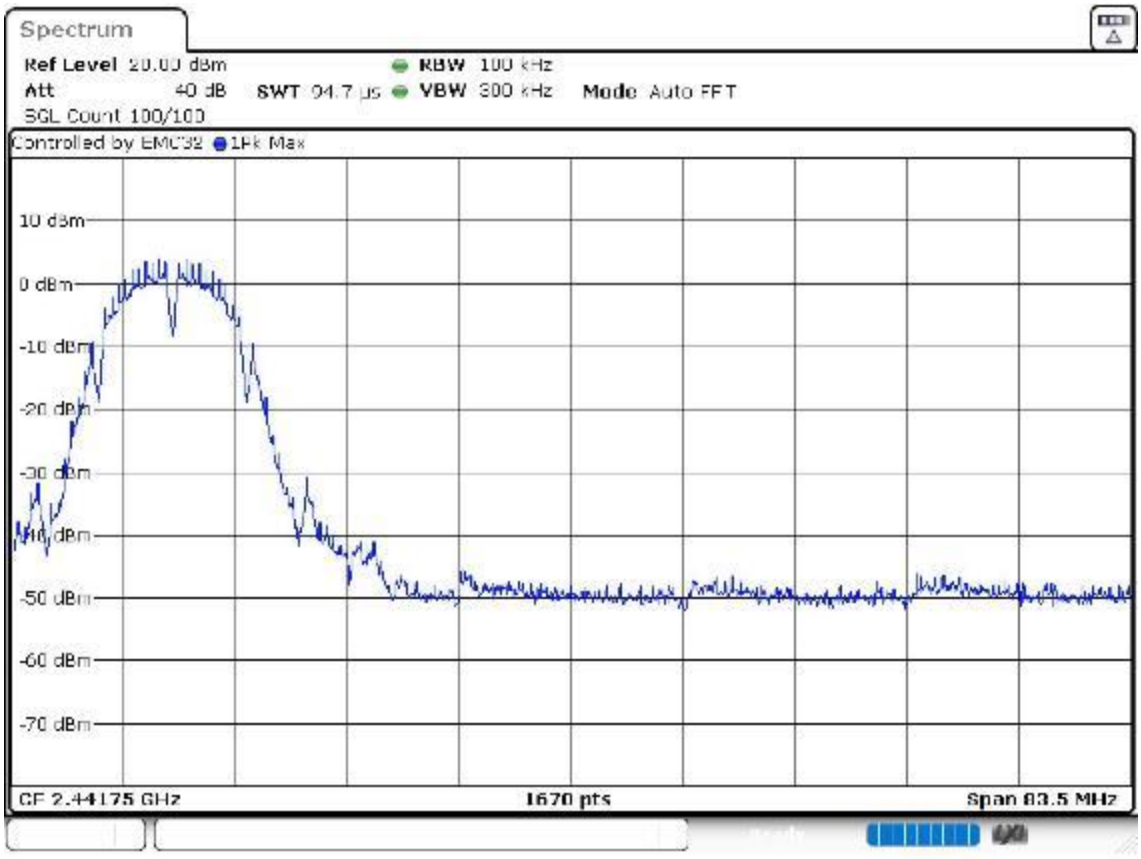
Bandwidth MHz = 20 Modulation = 802.11b (DSSS 1 Mbit/s)

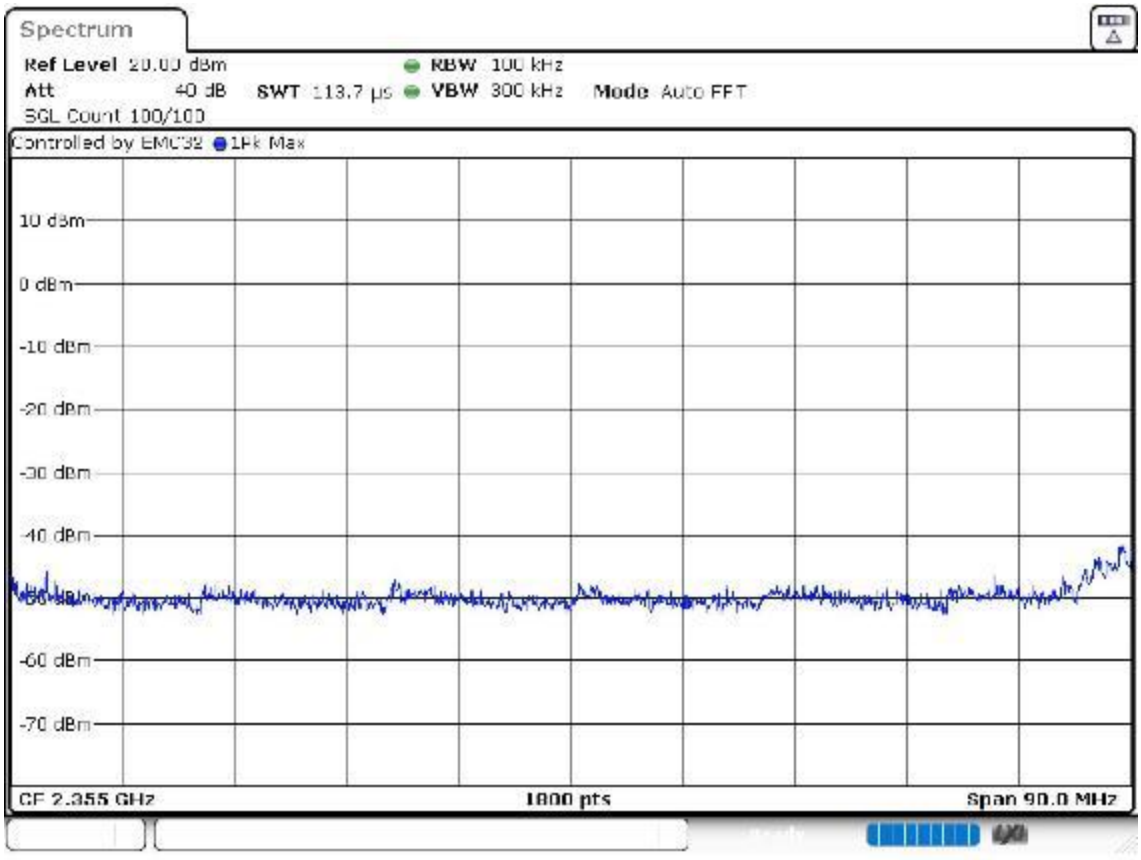
Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:






Spectrum
Ref Level 20.00 dBm
RBW 100 kHz
Att 40 dB
SWT 113.7 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
Controlled by EMC32
1Pk Max
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.355 GHz
1000 pts
Span 90.0 MHz

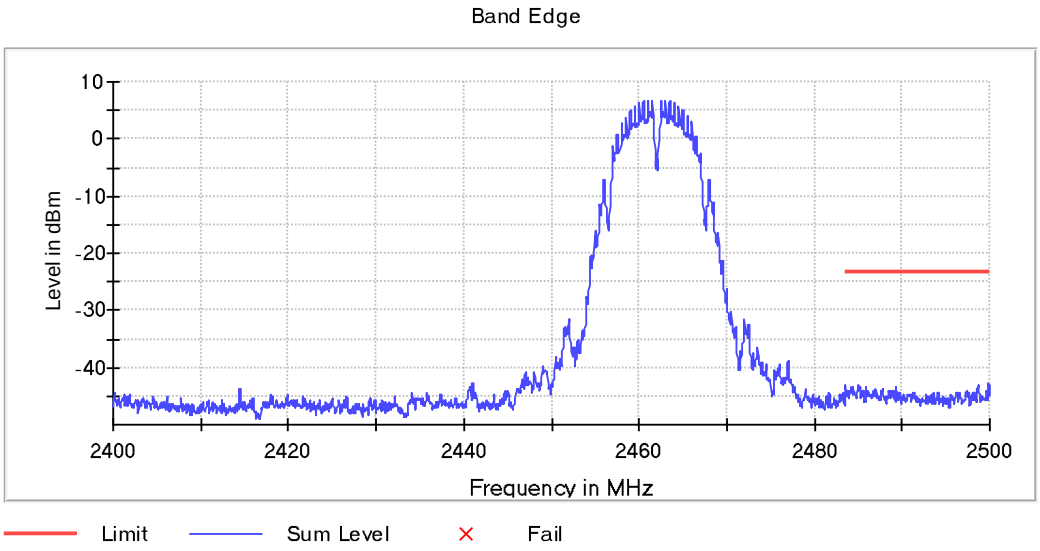
Frequency MHz = 2462.00000

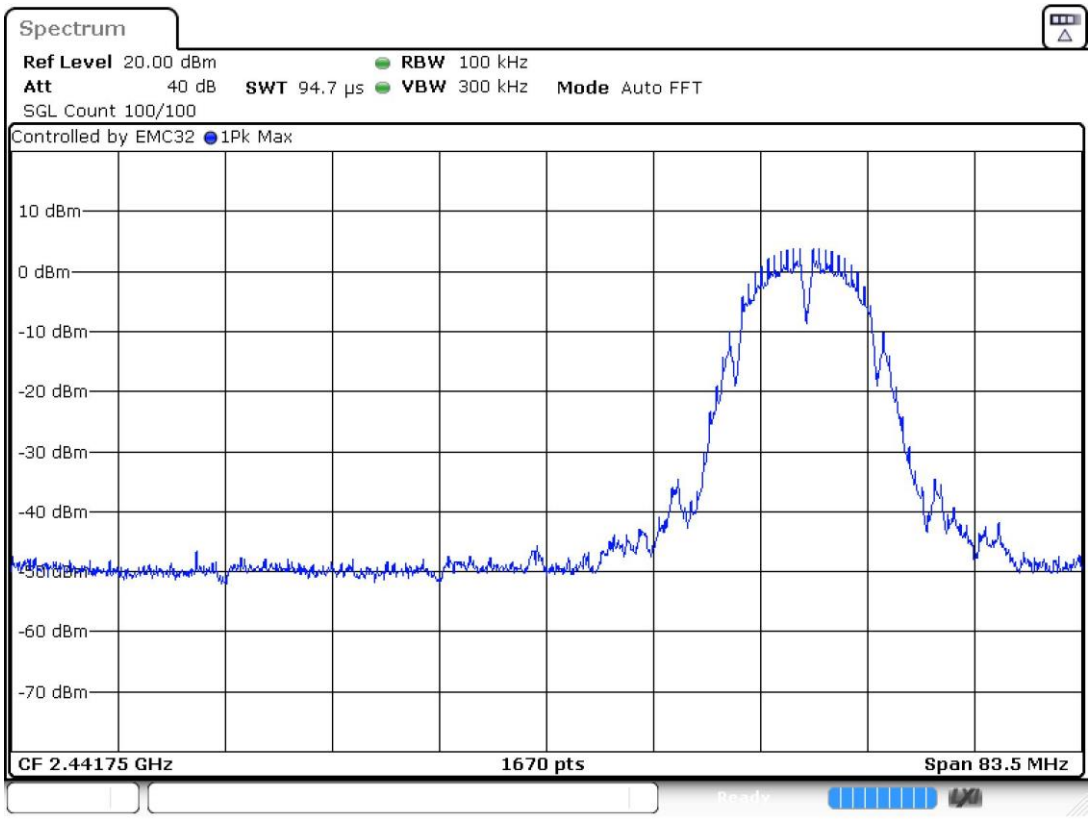
Bandwidth MHz = 20 Modulation = 802.11b (DSSS 1 Mbit/s)

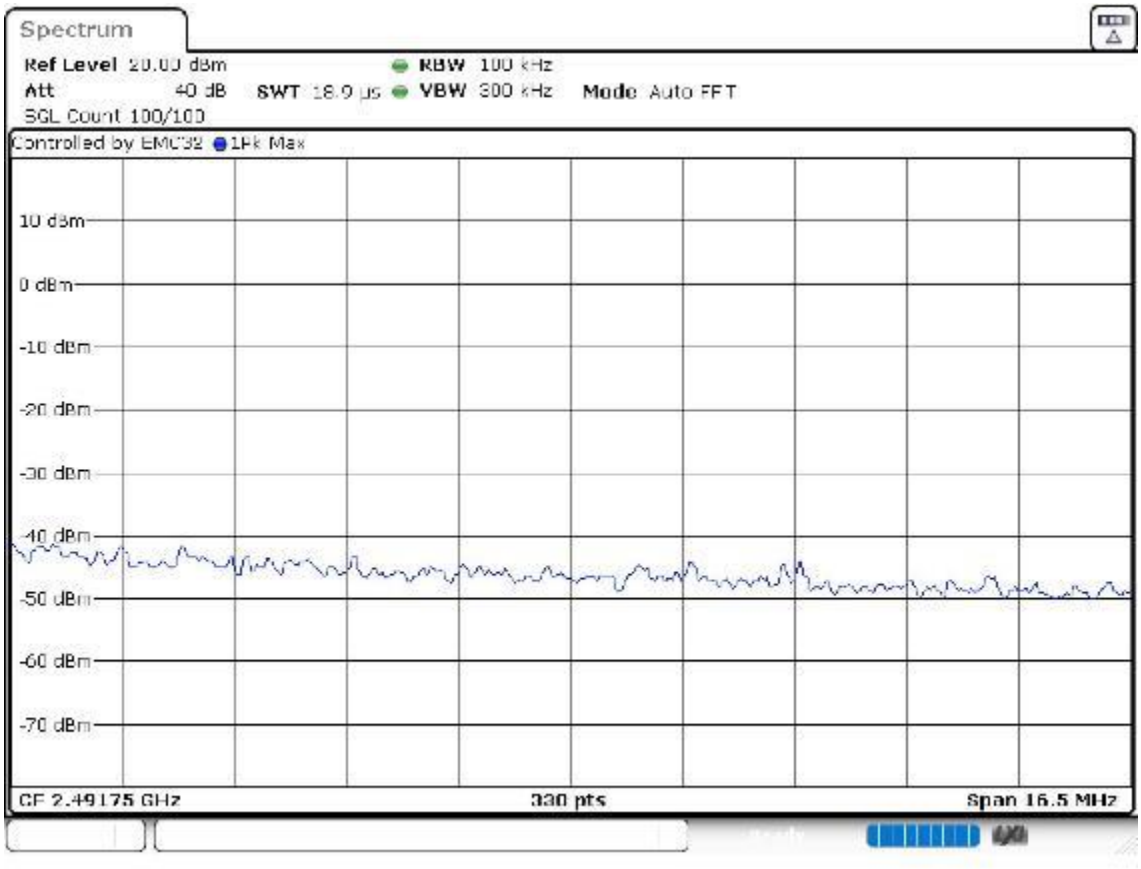
Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:






Spectrum
Ref Level 20.00 dBm
RBW 100 kHz
Att 40 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
Controlled by EMC32
1Pk Max
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.49175 GHz
330 pts
Span 16.5 MHz

Modulation: 802.11g (OFDM 6 Mbit/s)
Results

Freq (MHz)	Frequency(MHz)	Level(dBm)	Margin(dB)	Limit(dBm)	Result
2412.00000	2399.925000	-35.059	8.3	-26.711	PASS
	2399.875000	-35.151	8.4	-26.711	PASS
	2399.675000	-35.187	8.5	-26.711	PASS
	2399.625000	-35.316	8.6	-26.711	PASS
	2399.825000	-36.172	9.5	-26.711	PASS
	2398.925000	-36.222	9.5	-26.711	PASS
	2399.975000	-36.305	9.6	-26.711	PASS
	2398.525000	-36.468	9.8	-26.711	PASS
	2398.475000	-36.543	9.8	-26.711	PASS
	2399.525000	-36.552	9.8	-26.711	PASS
	2398.875000	-36.640	9.9	-26.711	PASS
	2399.475000	-36.669	10.0	-26.711	PASS
	2398.825000	-36.730	10.0	-26.711	PASS
	2397.875000	-36.736	10.0	-26.711	PASS
	2397.925000	-36.739	10.0	-26.711	PASS

Freq (MHz)	Frequency(MHz)	Level(dBm)	Margin(dB)	Limit(dBm)	Result
2462.00000	2483.575000	-37.069	10.6	-26.491	PASS
	2483.525000	-37.381	10.9	-26.491	PASS
	2483.625000	-37.571	11.1	-26.491	PASS
	2484.175000	-37.661	11.2	-26.491	PASS
	2485.125000	-37.754	11.3	-26.491	PASS
	2487.925000	-37.968	11.5	-26.491	PASS
	2487.875000	-38.021	11.5	-26.491	PASS
	2484.225000	-38.141	11.7	-26.491	PASS
	2485.075000	-38.254	11.8	-26.491	PASS
	2485.175000	-38.372	11.9	-26.491	PASS
	2485.625000	-38.547	12.1	-26.491	PASS
	2483.975000	-38.771	12.3	-26.491	PASS
	2485.525000	-38.869	12.4	-26.491	PASS
	2484.125000	-38.900	12.4	-26.491	PASS
	2484.475000	-38.975	12.5	-26.491	PASS

Verdict

Pass

Attachments

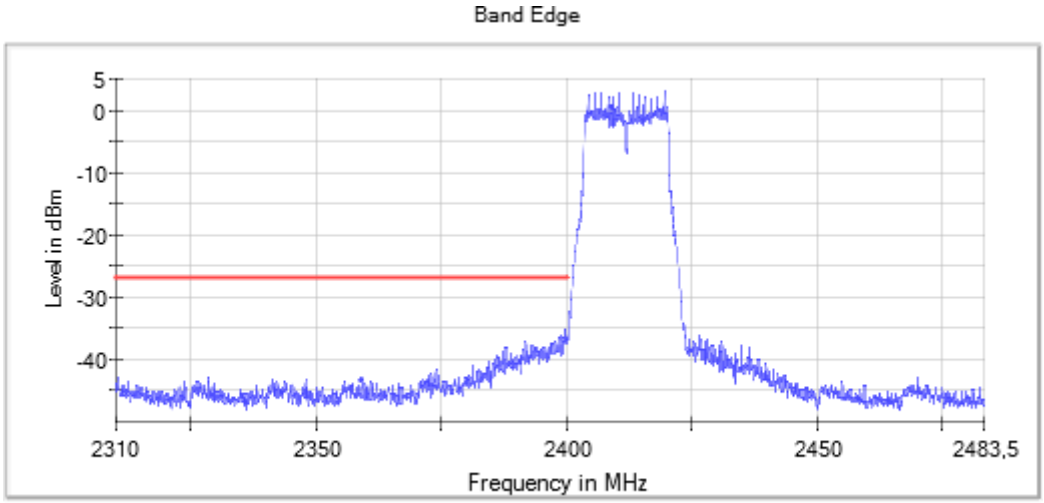
Frequency MHz = 2412.00000

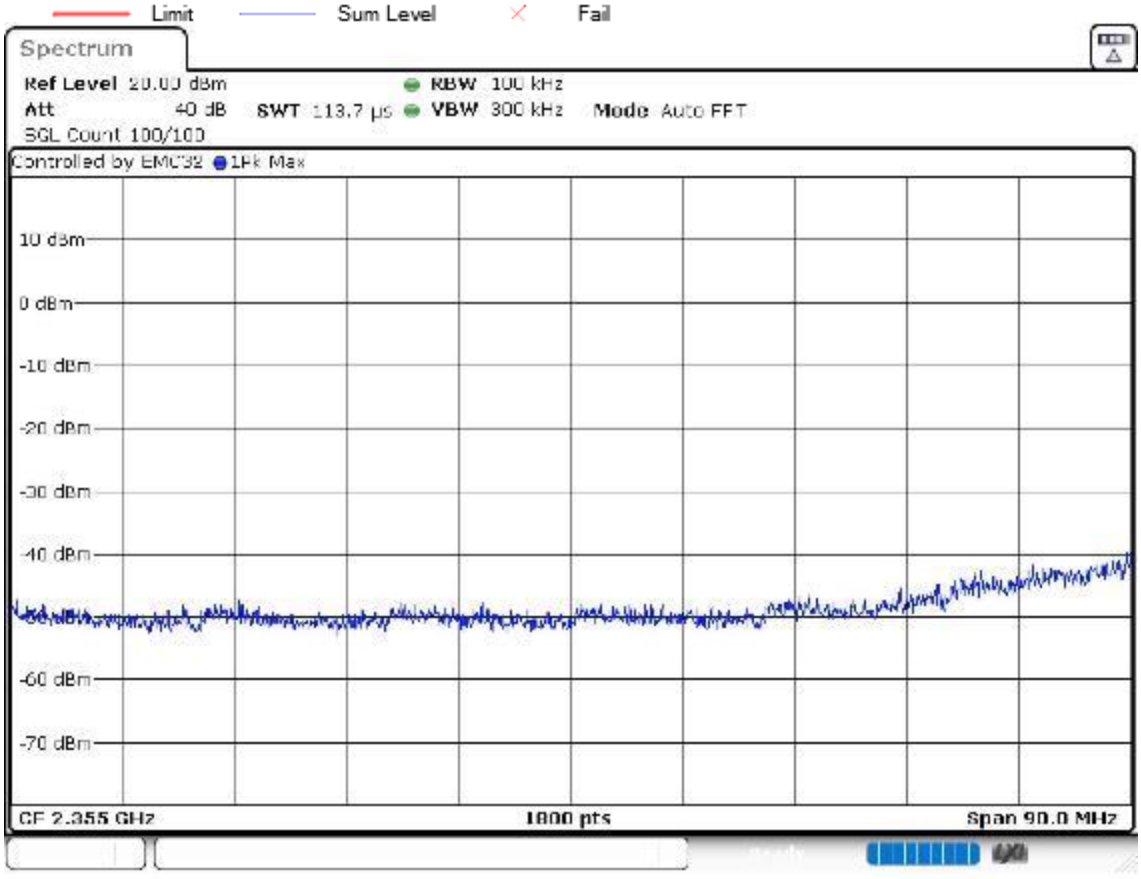
Bandwidth MHz = 20 Modulation = 802.11g (OFDM 6 Mbit/s)

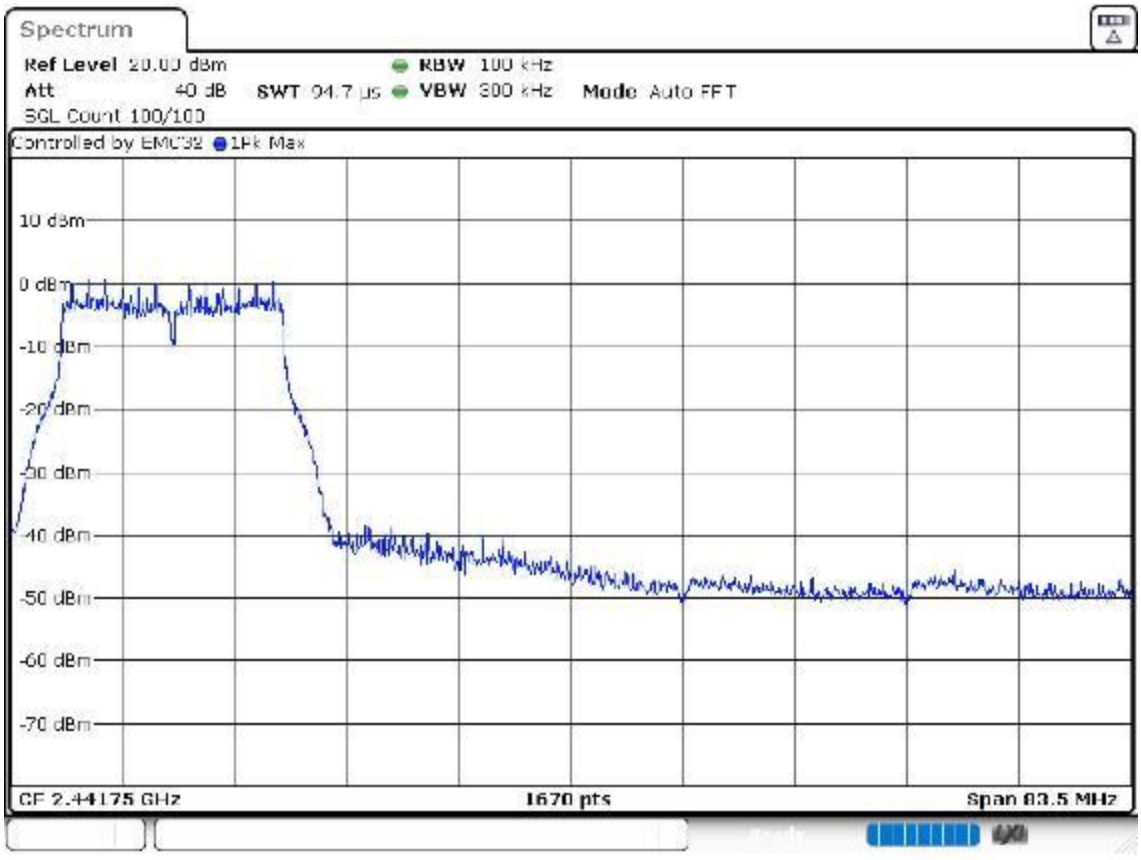
Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:






Spectrum
Ref Level 20.00 dBm
RBW 100 kHz
Att 40 dB
SWT 94.7 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
Controlled by EMC32
1Pk Max
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.44175 GHz
1670 pts
Span 83.5 MHz

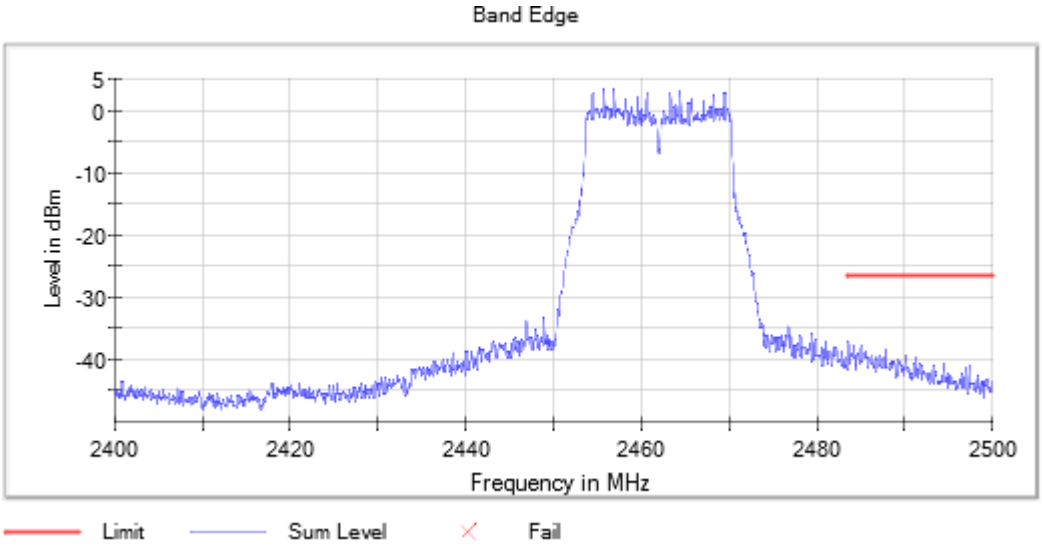
Frequency MHz = 2462.00000

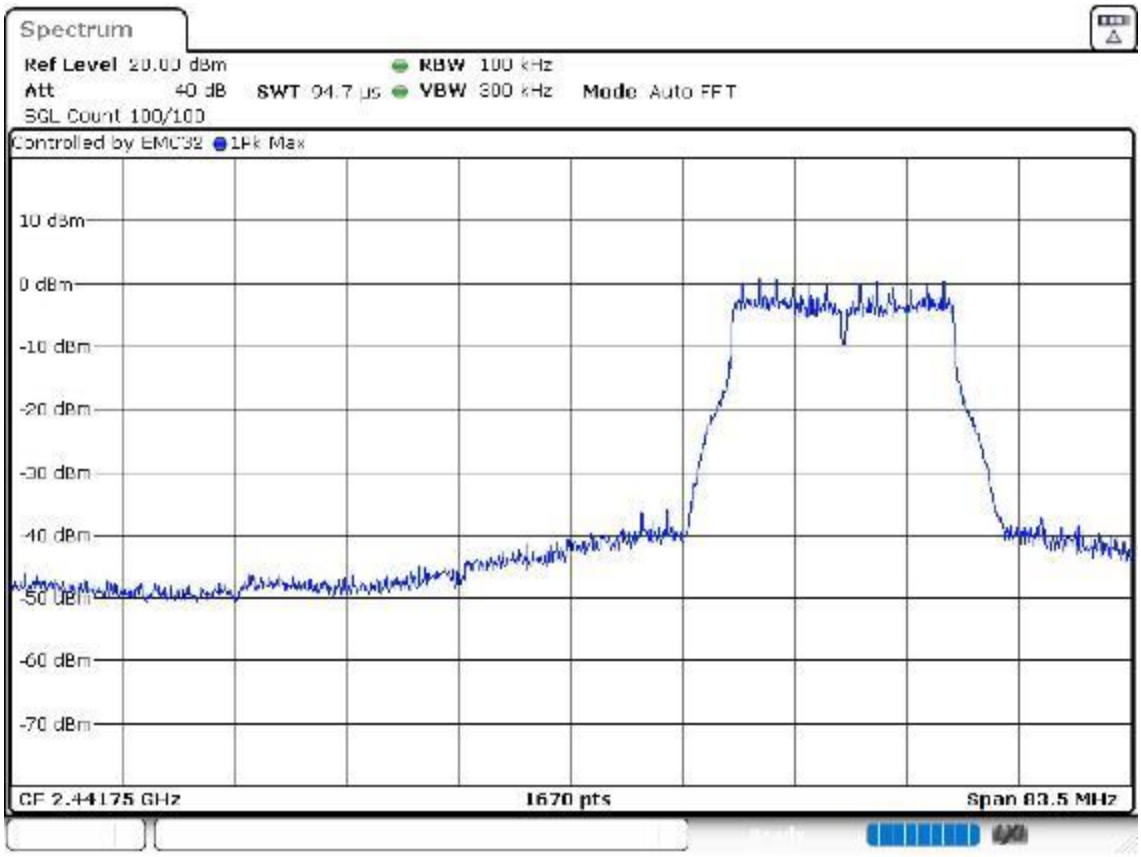
Bandwidth MHz = 20 Modulation = 802.11g (OFDM 6 Mbit/s)

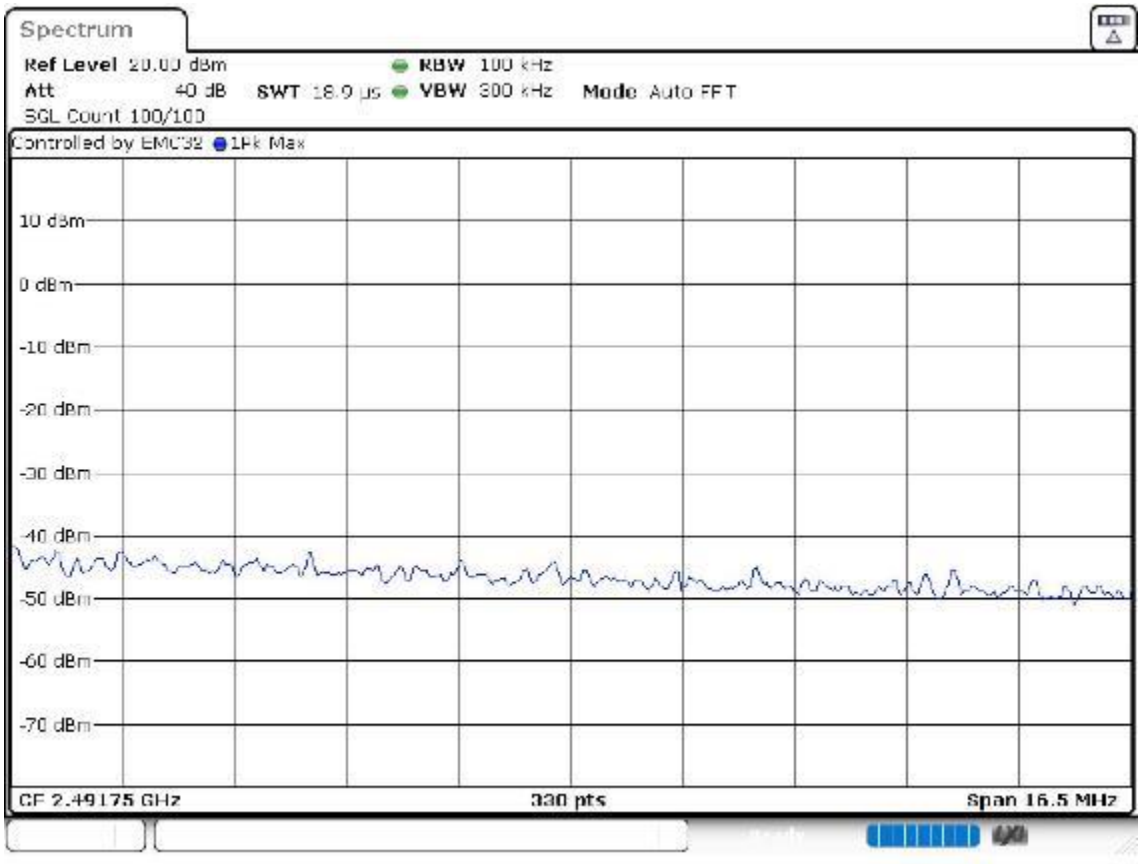
Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:






Spectrum
Ref Level 20.00 dBm
RBW 100 kHz
Att 40 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
Controlled by EMC32
1Pk Max
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.49175 GHz
330 pts
Span 16.5 MHz

Modulation: 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)
Results

Freq (MHz)	Frequency(MHz)	Level(dBm)	Margin(dB)	Limit(dBm)	Result
2412.00000	2399.775000	-35.232	8.6	-26.616	PASS
	2399.825000	-35.376	8.8	-26.616	PASS
	2398.325000	-35.521	8.9	-26.616	PASS
	2398.275000	-35.594	9.0	-26.616	PASS
	2397.325000	-35.749	9.1	-26.616	PASS
	2397.275000	-35.773	9.2	-26.616	PASS
	2399.975000	-35.818	9.2	-26.616	PASS
	2394.175000	-35.834	9.2	-26.616	PASS
	2394.225000	-36.006	9.4	-26.616	PASS
	2399.725000	-36.009	9.4	-26.616	PASS
	2398.225000	-36.492	9.9	-26.616	PASS
	2398.825000	-36.585	10.0	-26.616	PASS
	2397.375000	-36.622	10.0	-26.616	PASS
	2398.175000	-36.691	10.1	-26.616	PASS
	2398.875000	-36.708	10.1	-26.616	PASS

Freq (MHz)	Frequency(MHz)	Level(dBm)	Margin(dB)	Limit(dBm)	Result
2462.00000	2483.775000	-37.035	10.8	-26.203	PASS
	2484.425000	-37.064	10.9	-26.203	PASS
	2483.825000	-37.145	10.9	-26.203	PASS
	2484.475000	-37.423	11.2	-26.203	PASS
	2484.375000	-37.509	11.3	-26.203	PASS
	2486.075000	-37.808	11.6	-26.203	PASS
	2486.125000	-37.814	11.6	-26.203	PASS
	2485.075000	-37.940	11.7	-26.203	PASS
	2485.125000	-37.955	11.8	-26.203	PASS
	2483.525000	-37.971	11.8	-26.203	PASS
	2485.775000	-38.108	11.9	-26.203	PASS
	2484.225000	-38.193	12.0	-26.203	PASS
	2487.625000	-38.259	12.1	-26.203	PASS
	2484.175000	-38.276	12.1	-26.203	PASS
	2485.725000	-38.365	12.2	-26.203	PASS

Verdict

Pass

Attachments

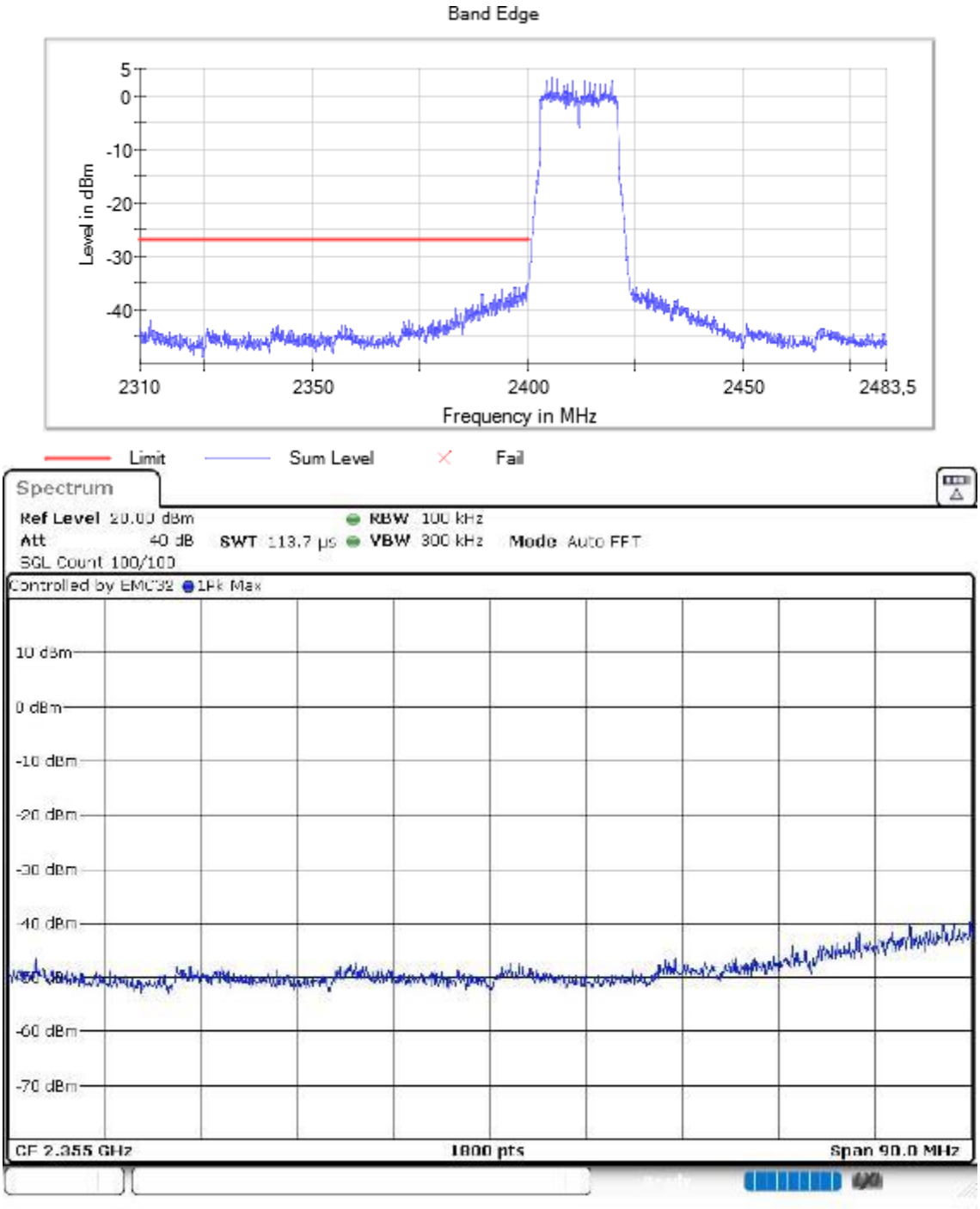
Frequency MHz = 2412.00000

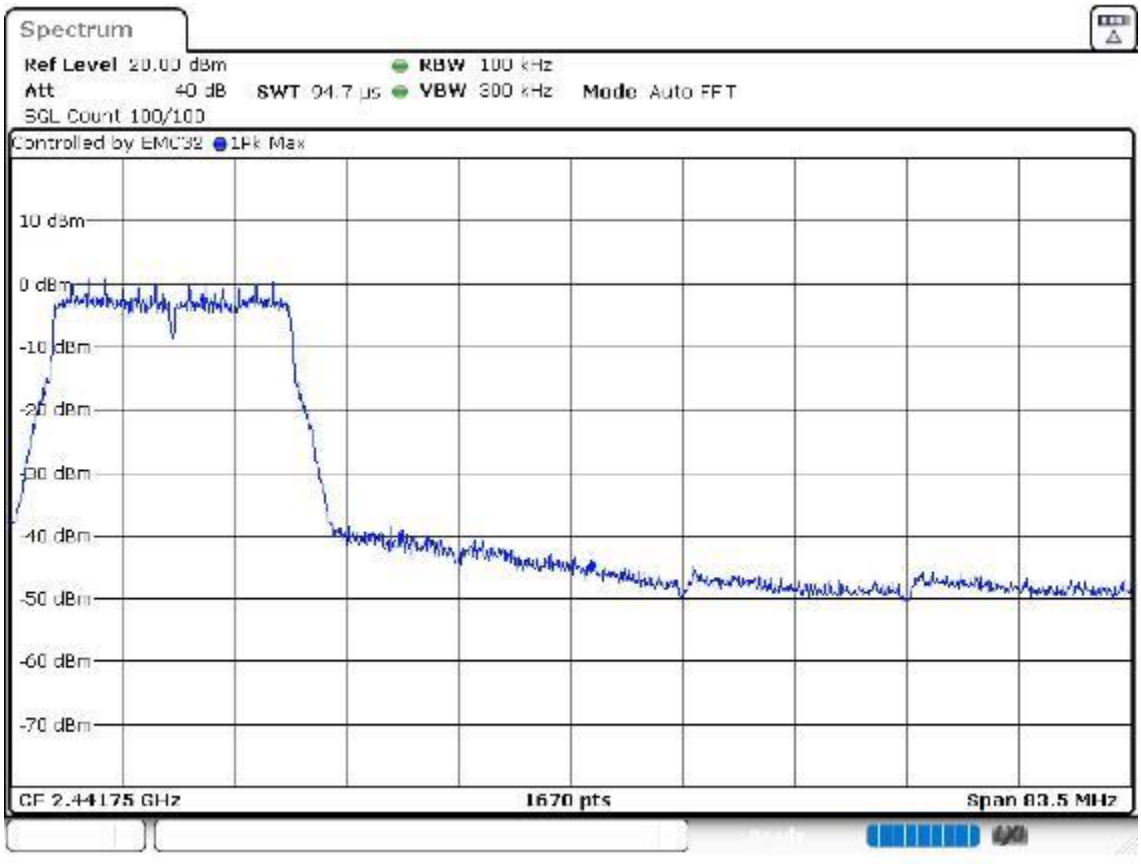
Bandwidth MHz = 20 Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:




Spectrum
Ref Level 20.00 dBm
RBW 100 kHz
Att 40 dB
SWT 94.7 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
Controlled by EMC32
1Pk Max
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.44175 GHz
1670 pts
Span 83.5 MHz

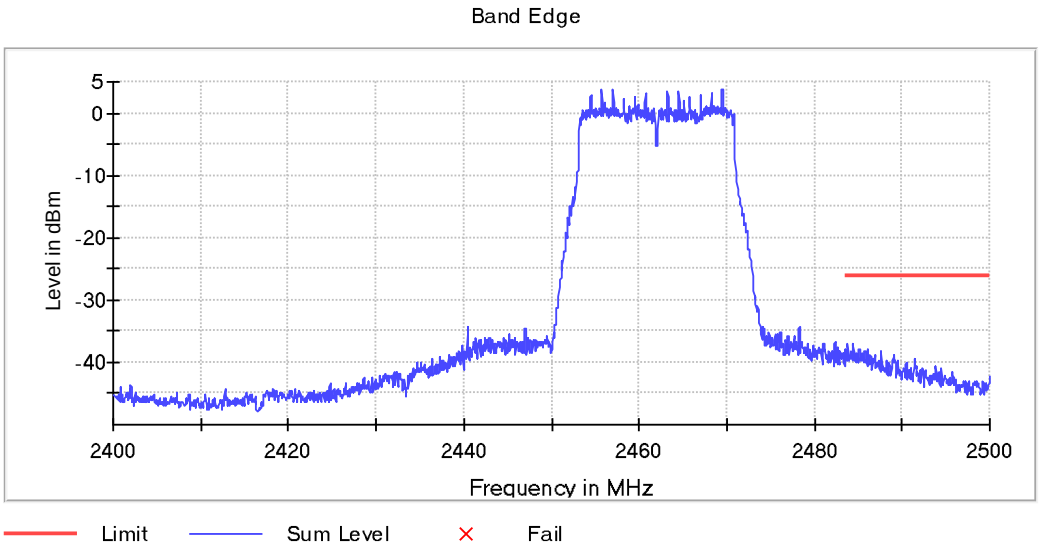
Frequency MHz = 2462.00000

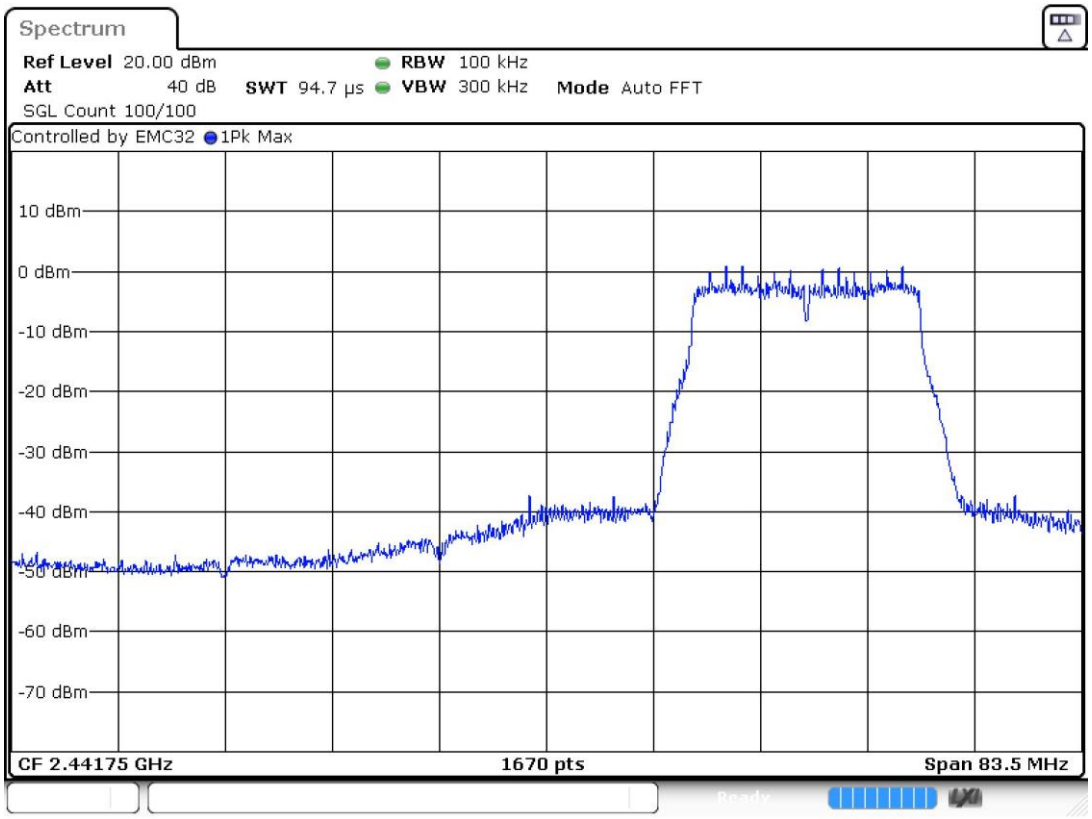
Bandwidth MHz = 20 Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

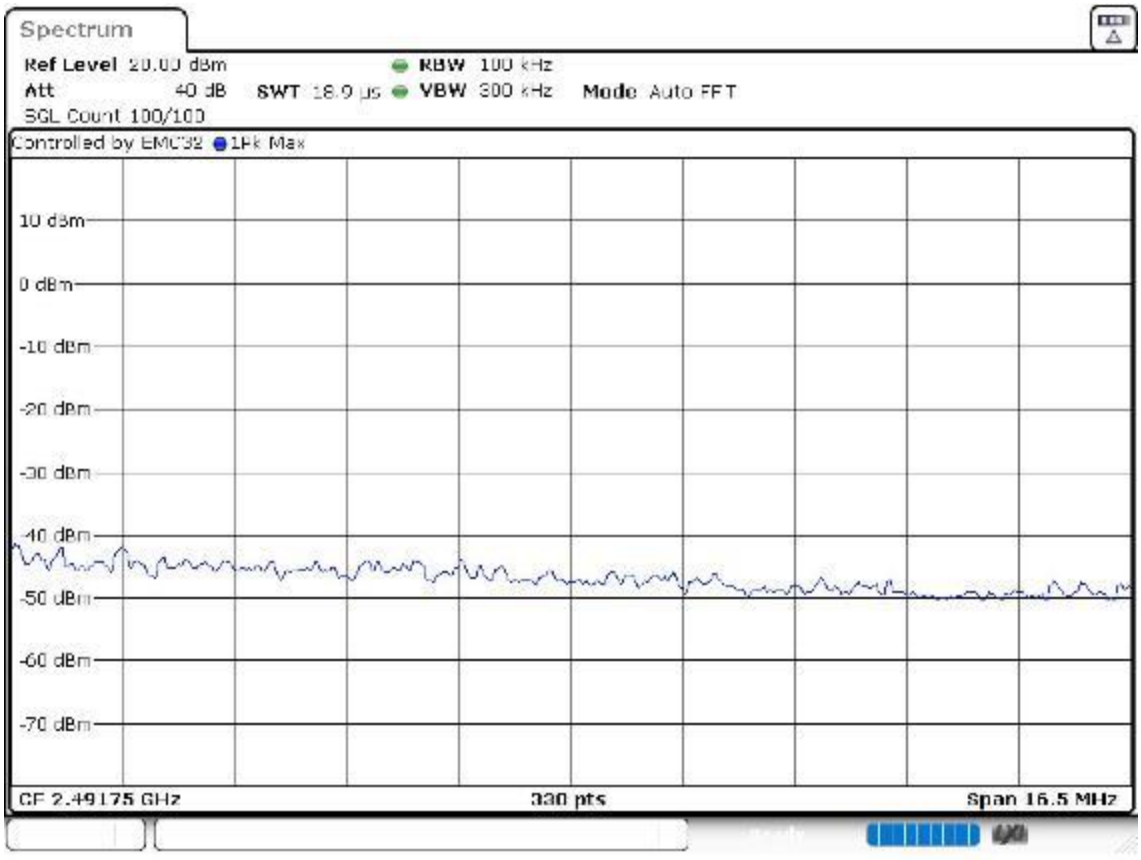
Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:






Spectrum
Ref Level 20.00 dBm
RBW 100 kHz
Att 40 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
Controlled by EMC32
1Pk Max
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.49175 GHz
330 pts
Span 16.5 MHz

RSS-247 5.5 / FCC 15.247 (d) [RSE] Emission limitations radiated (Transmitter)

Limits

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)/RSS-Gen):

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247: Attenuation below the general field strength limits specified in RSS-Gen is not required.

Results

Equipment	Freq Rng (GHz)	# of Tx Chains	Port	Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector
Digital Transmission System (DTS)	[0.03, 1]	1	1	63.980313	24.95	V	PK
					22.89	V	AVG

Verdict

Pass

Attachments

Frequency Range GHz = [0.03, 1]
The spurious frequencies detected do not depend neither on the operating channel nor the modulation mode.

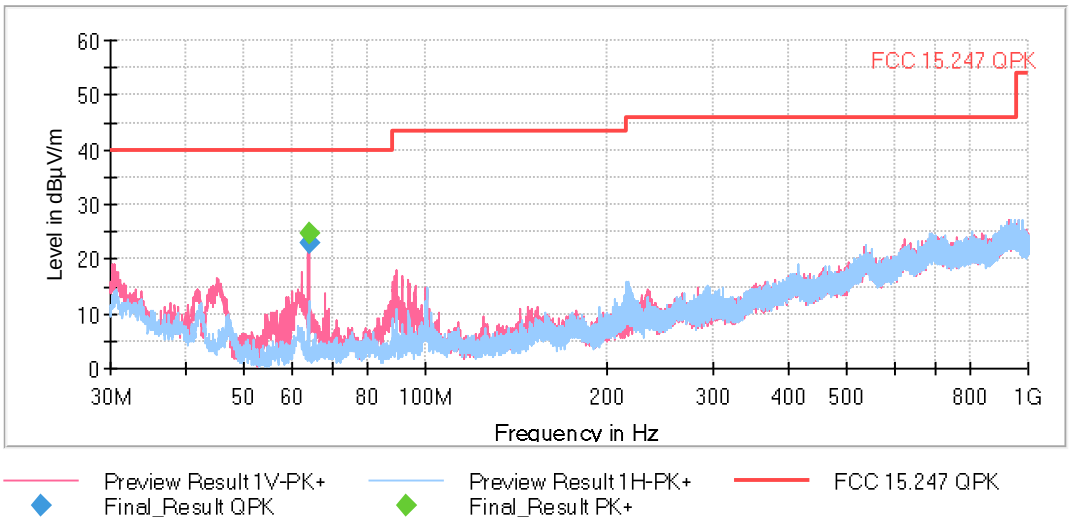
Equipment Type = Digital Transmission System (DTS)

Modulation = 802.11b (DSSS 1 Mbit/s)

Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:



Modulation: 802.11b (DSSS 1 Mbit/s)

Results

Freq (MHz)	Equipment	Freq Rng (GHz)	# of Tx Chains	Port	Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector
2412.00000	Digital Transmission System (DTS)	[1, 3]	1	1	2381.046	64.57	V	PK
					2381.046	46.91	V	AVG
					2389.877	66.07	V	PK
					2389.877	46.93	V	AVG
2462.00000					2483.635	48.80	H	AVG
					2489.169	68.97	H	PK

Verdict

Pass

Attachments

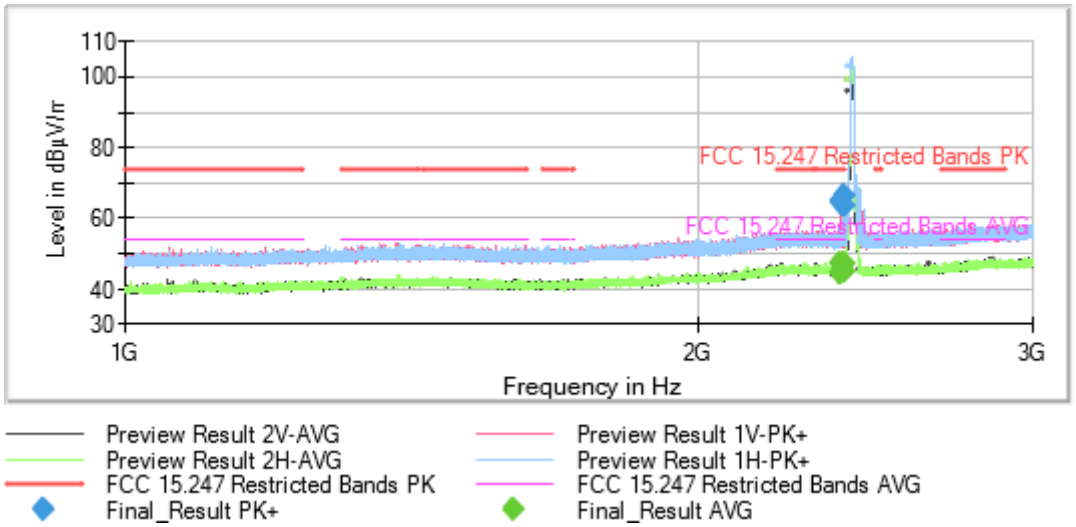
Frequency MHz = 2412.00000

Modulation = 802.11b (DSSS 1 Mbit/s) Frequency Range GHz = [1, 3]

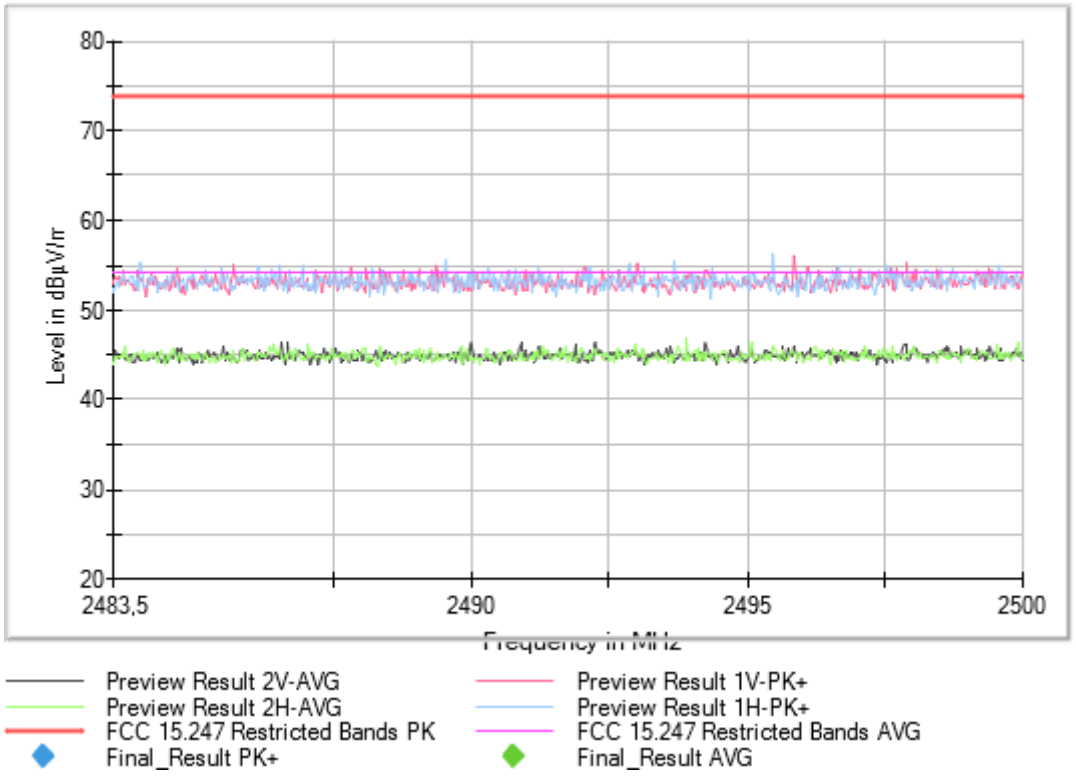
Number of Transmission Chains = 1 Measurement Point = 1

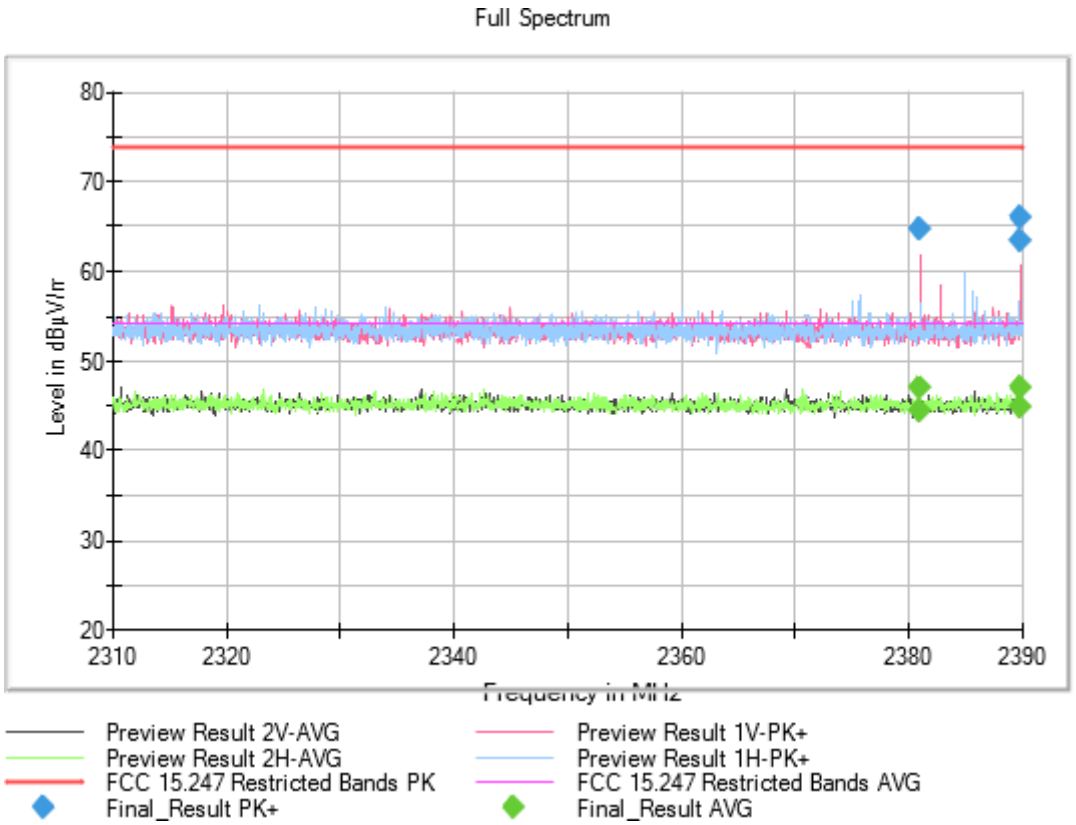
Active Port = 1

Images:



Full Spectrum




Full Spectrum
Level in dBµV/m
80
70
60
50
40
30
20
2310
2320
2340
2360
2380
2390
Frequency in MHz
Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.247 Restricted Bands PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

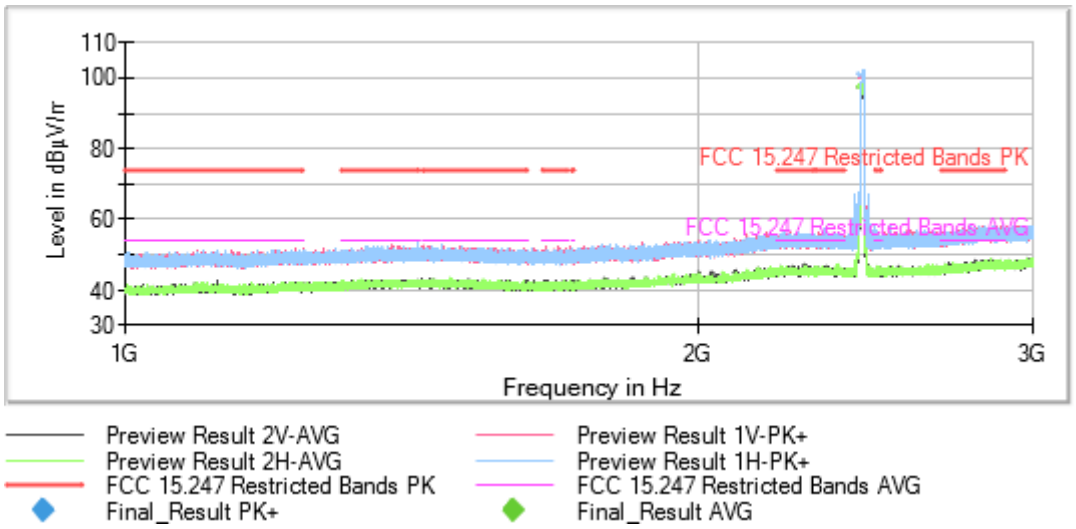
Frequency MHz = 2442.00000

Modulation = 802.11b (DSSS 1 Mbit/s) Frequency Range GHz = [1, 3]

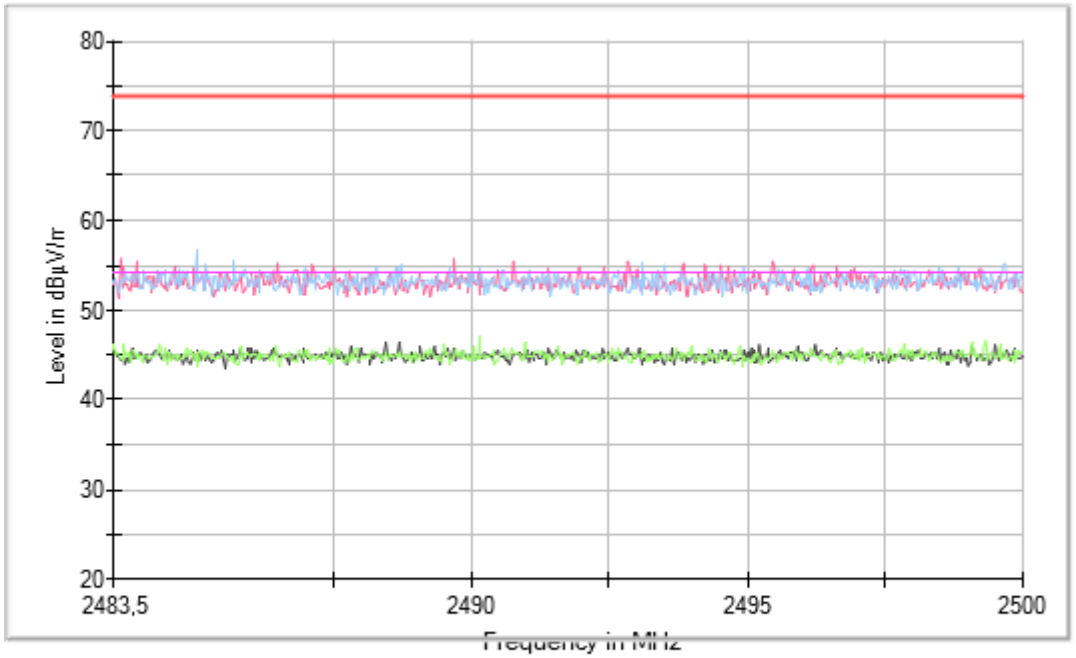
Number of Transmission Chains = 1 Measurement Point = 1

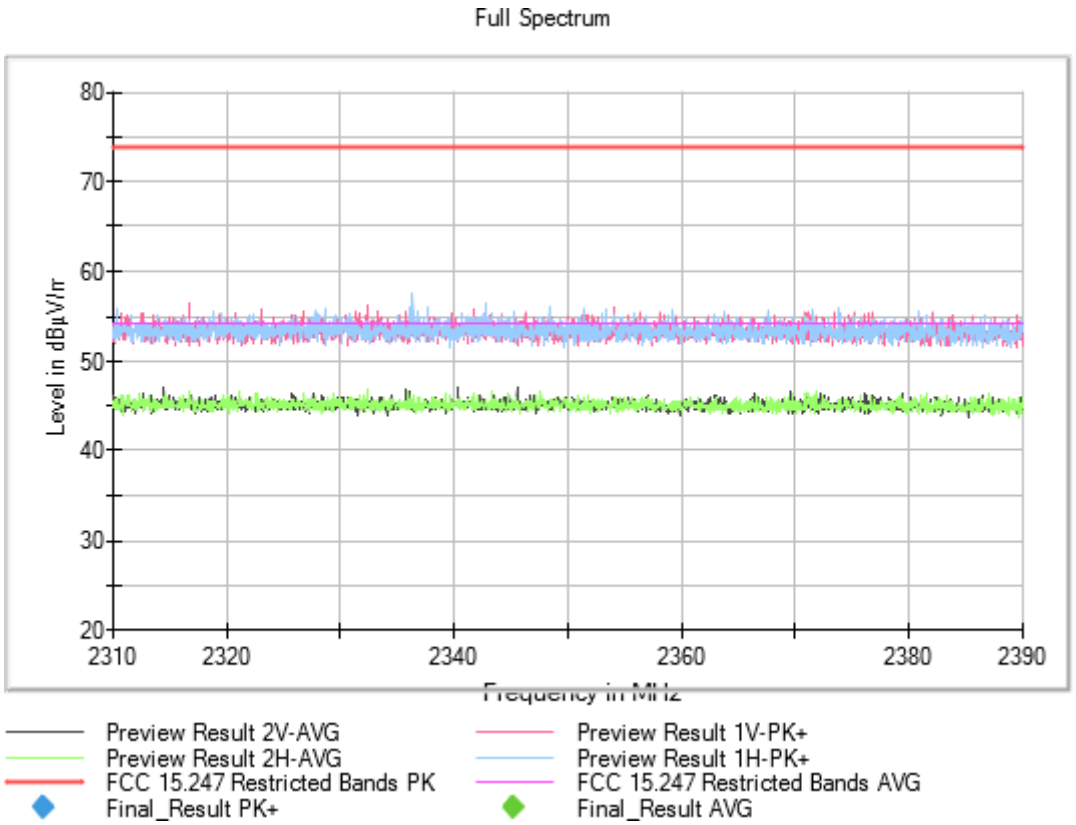
Active Port = 1

Images:



Full Spectrum




Full Spectrum
Level in dBµV/m
80
70
60
50
40
30
20
2310
2320
2340
2360
2380
2390
Frequency in MHz
Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.247 Restricted Bands PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

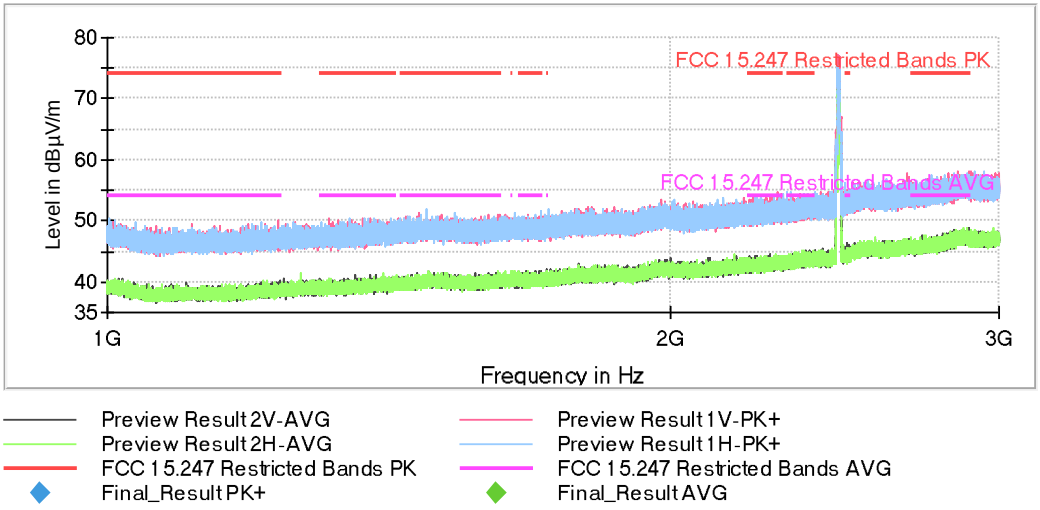
Frequency MHz = 2462.00000

Modulation = 802.11b (DSSS 1 Mbit/s) Frequency Range GHz = [1, 3]

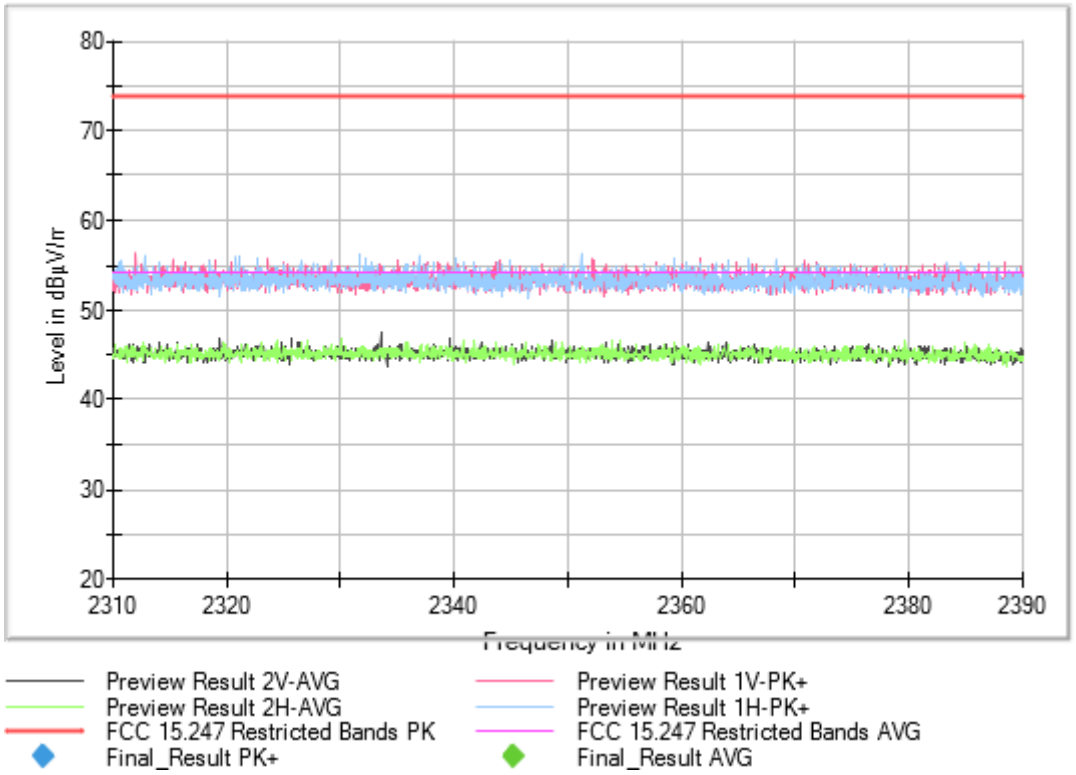
Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

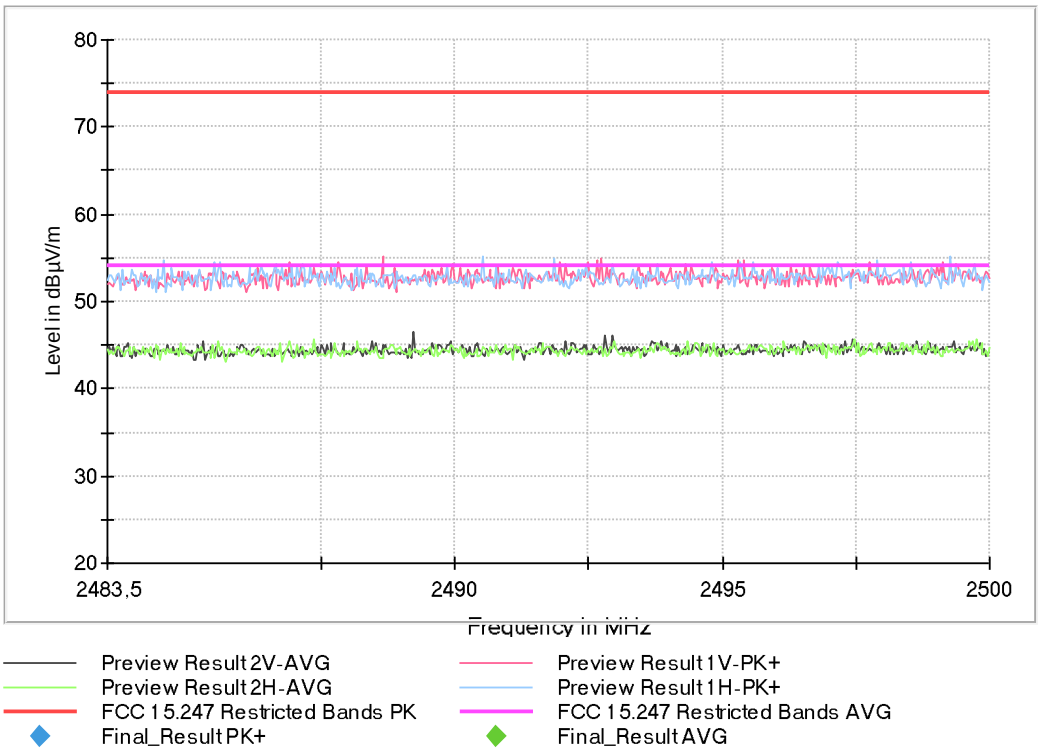
Images:



Full Spectrum



Full Spectrum



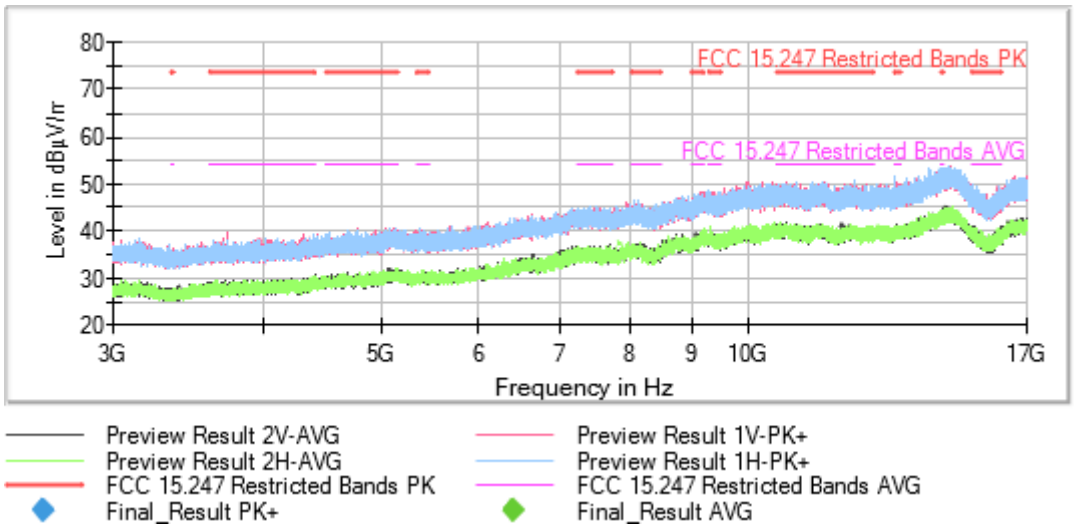
Frequency MHz = 2412.00000

Modulation = 802.11b (DSSS 1 Mbit/s) Frequency Range GHz = [3, 17]

Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [FSW 50]					
	3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

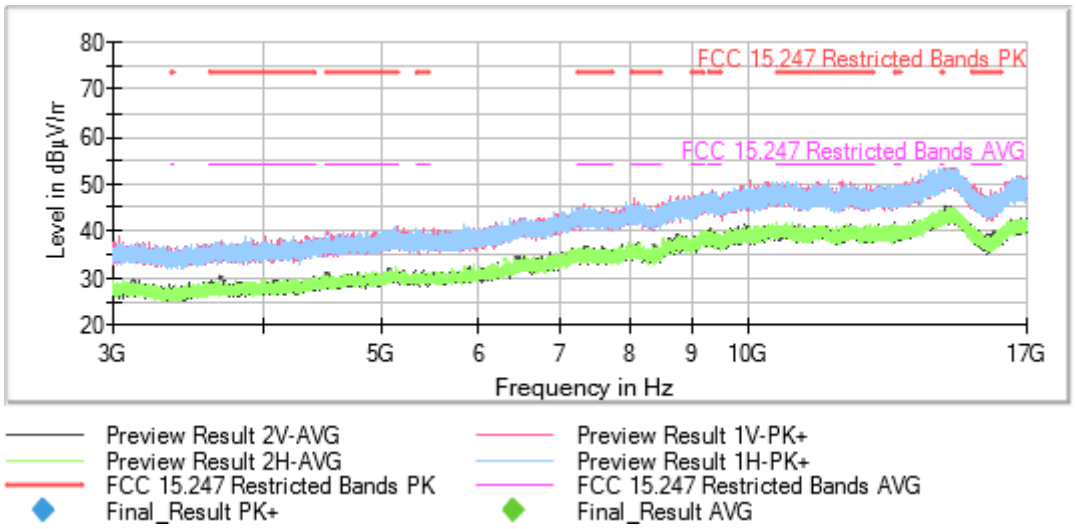
Frequency MHz = 2442.00000

Modulation = 802.11b (DSSS 1 Mbit/s) Frequency Range GHz = [3, 17]

Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [FSW 50]					
	3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

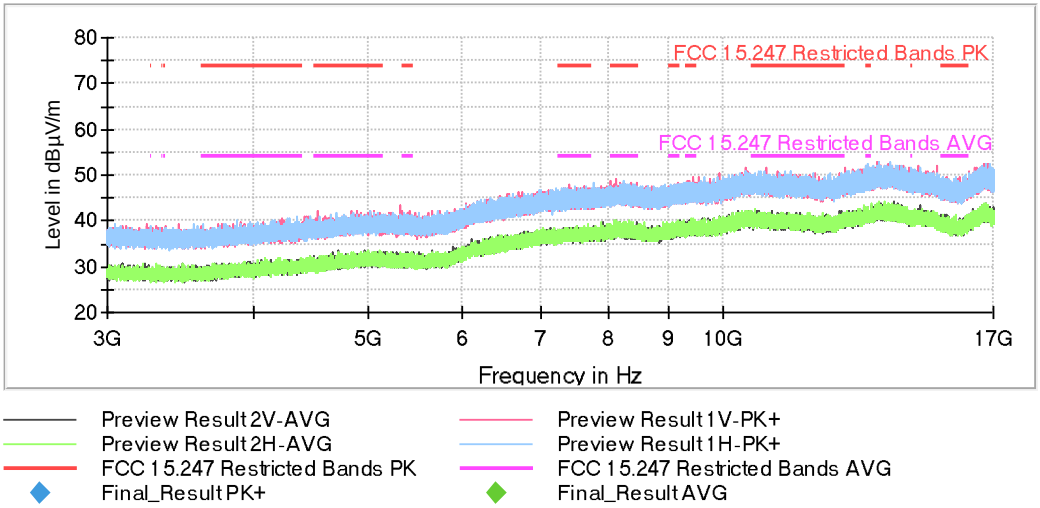
Frequency MHz = 2462.00000

Modulation = 802.11b (DSSS 1 Mbit/s) Frequency Range GHz = [3, 17]

Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [FSW 50]					
	3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Modulation: 802.11g (OFDM 6 Mbit/s)

Results

Freq (MHz)	Equipment	Freq Rng (GHz)	# of Tx Chains	Port	Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector
2412.00000	Digital Transmission System (DTS)	[1, 3]	1	1	2387.415	66.88	H	PK
					2387.415	53.71	H	AVG
					2389.446	64.26	H	PK
					2389.446	52.13	H	AVG
2442.00000					2486.985	58.60	H	PK

Verdict

Pass

Attachments

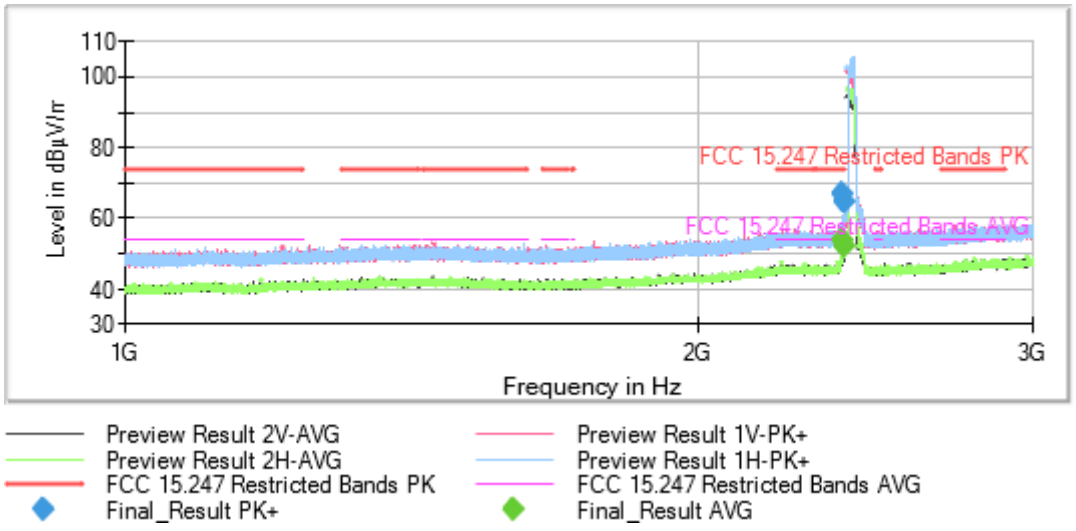
Frequency MHz = 2412.00000

Modulation = 802.11g (OFDM 6 Mbit/s) Frequency Range GHz = [1, 3]

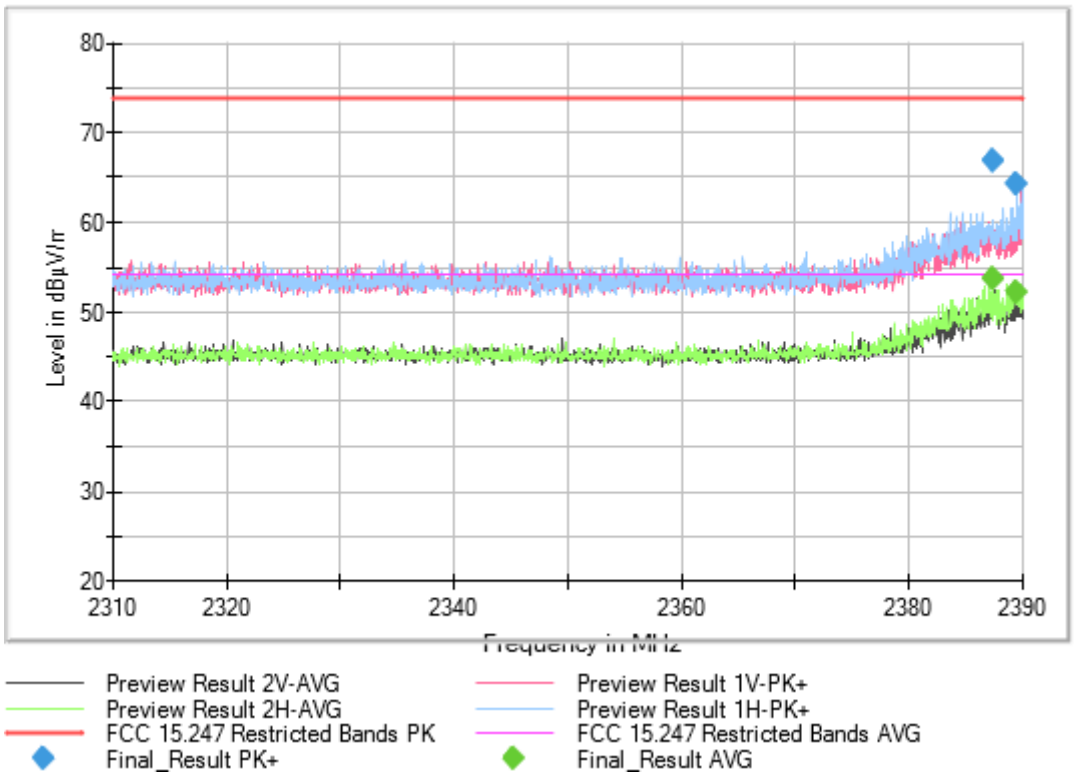
Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:



Full Spectrum




Full Spectrum
80
70
60
50
40
30
20
Level in dBµV/m
2483,5
2490
2495
2500
Frequency in MHz
Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.247 Restricted Bands PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

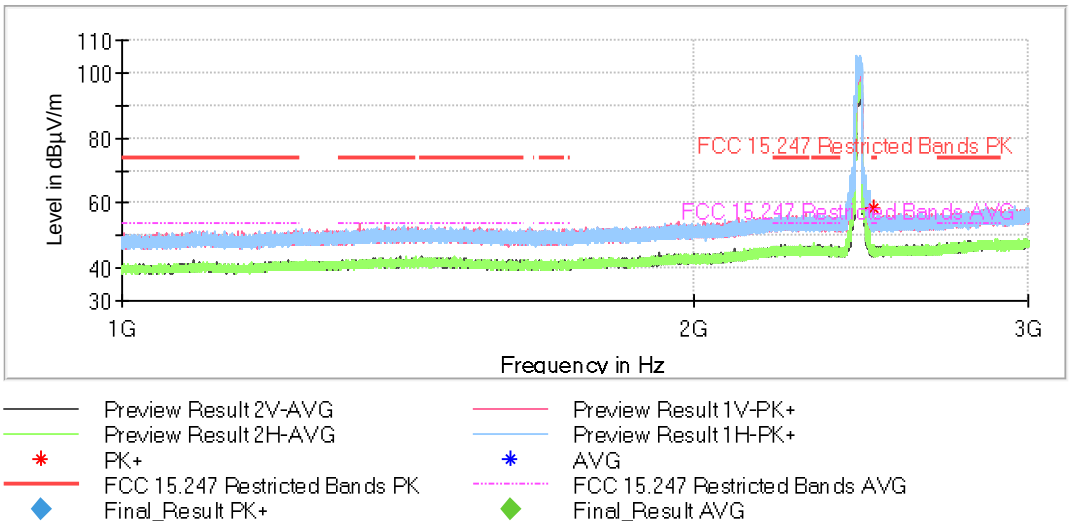
Frequency MHz = 2412.00000

Modulation = 802.11g (OFDM 6 Mbit/s) Frequency Range GHz = [1, 3]

Number of Transmission Chains = 1 Measurement Point = 1

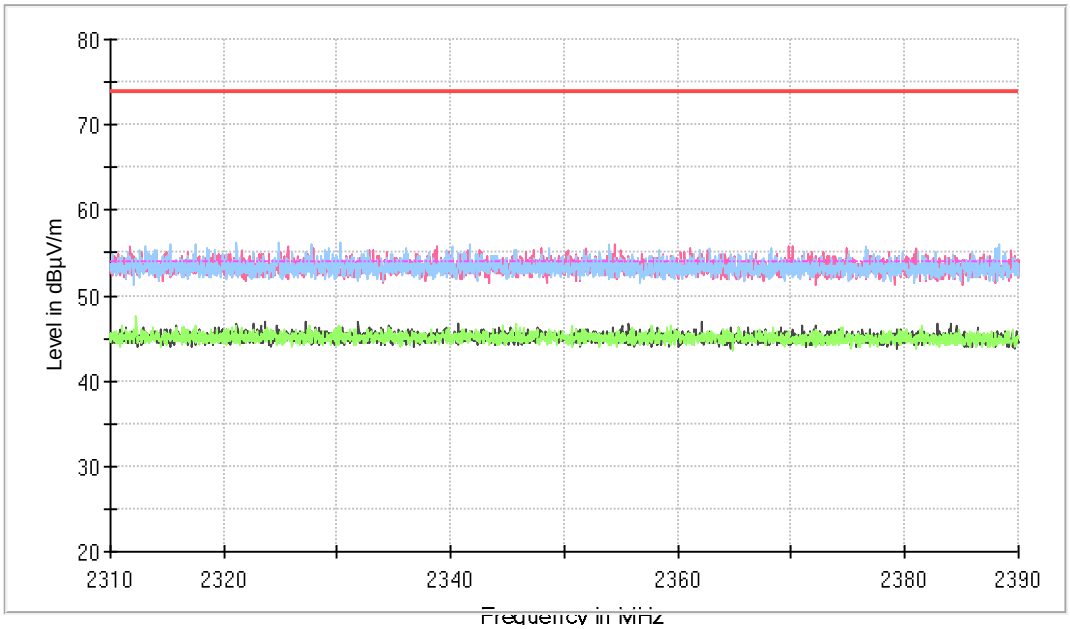
Active Port = 1

Images:



Preview Result 2V-AVG
Preview Result 2H-AVG
PK+
FCC 15.247 Restricted Bands PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
AVG
FCC 15.247 Restricted Bands AVG
Final_Result AVG

Full Spectrum



Preview Result 2V-AVG
Preview Result 2H-AVG
PK+
FCC 15.247 Restricted Bands PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
AVG
FCC 15.247 Restricted Bands AVG
Final_Result AVG

Full Spectrum

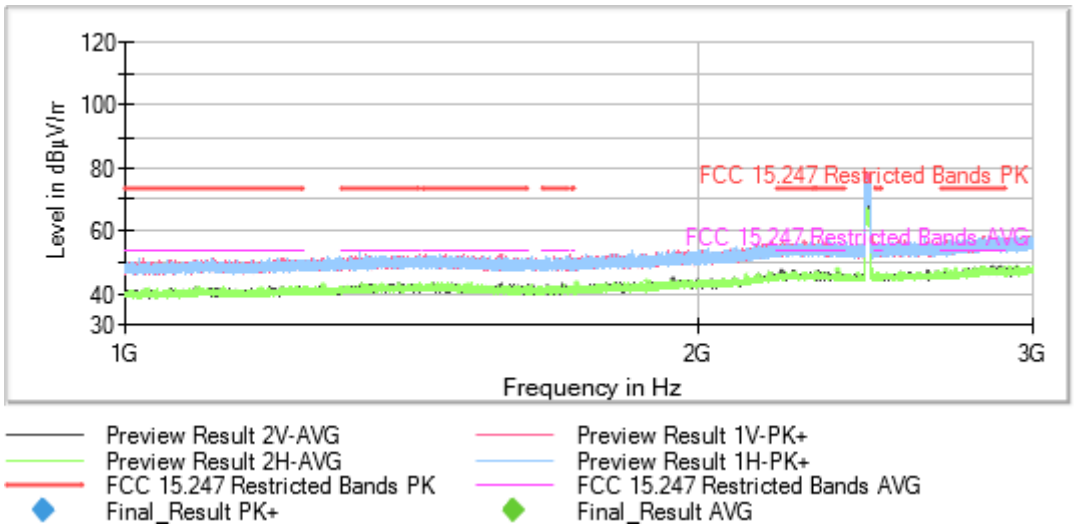
Frequency MHz = 2462.00000

Modulation = 802.11g (OFDM 6 Mbit/s) Frequency Range GHz = [1, 3]

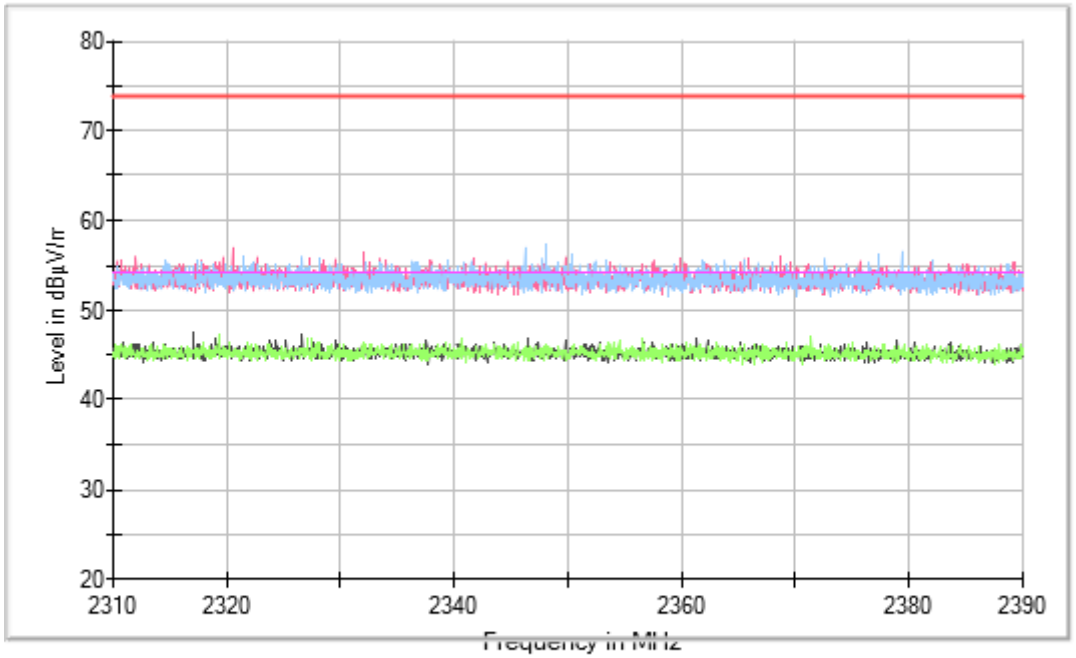
Number of Transmission Chains = 1 Measurement Point = 1

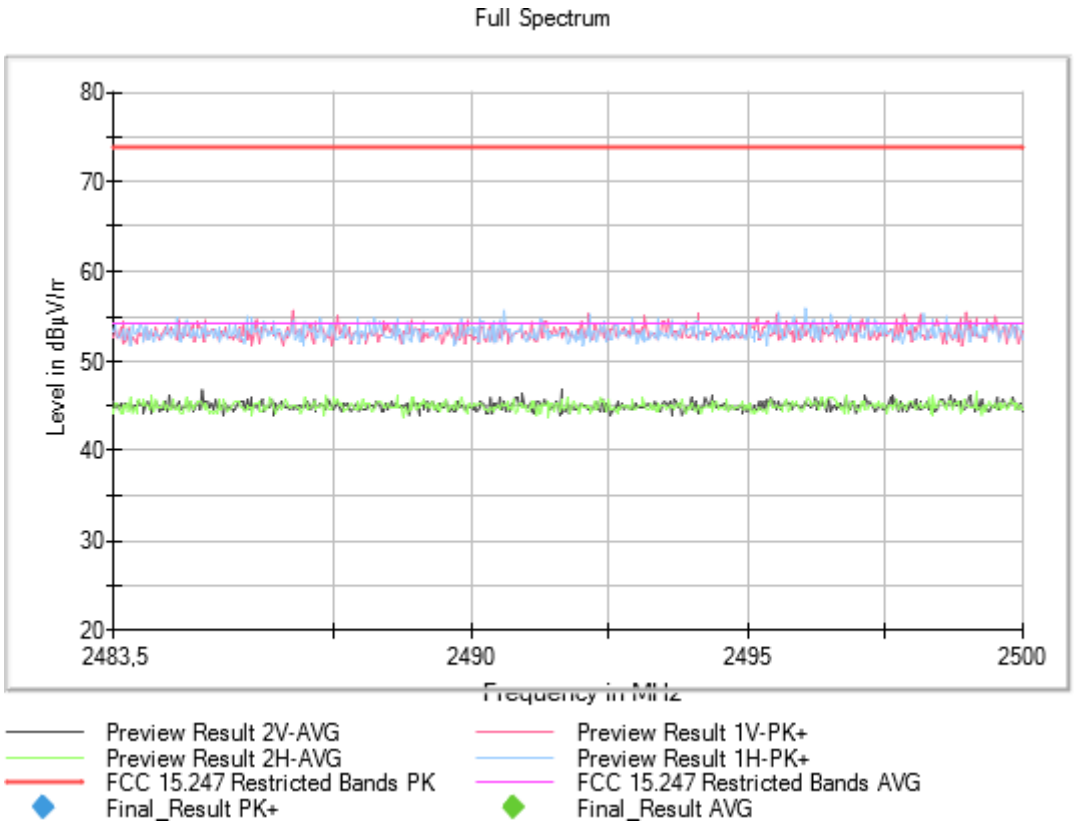
Active Port = 1

Images:



Full Spectrum




Full Spectrum
80
70
60
50
40
30
20
Level in dBµV/m
2483,5
2490
2495
2500
Frequency in MHz
Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.247 Restricted Bands PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

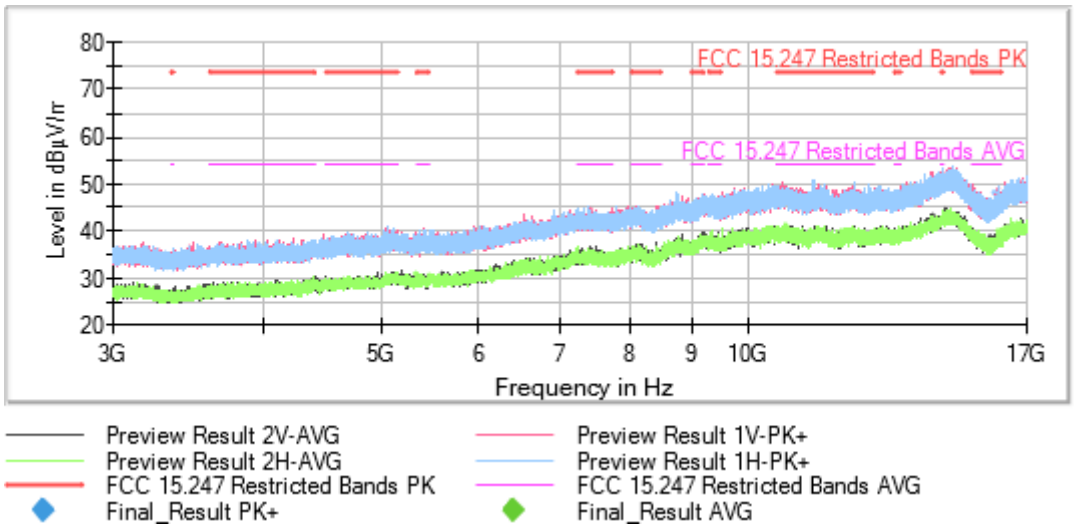
Frequency MHz = 2412.00000

Modulation = 802.11g (OFDM 6 Mbit/s) Frequency Range GHz = [3, 17]

Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [FSW 50]					
	3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

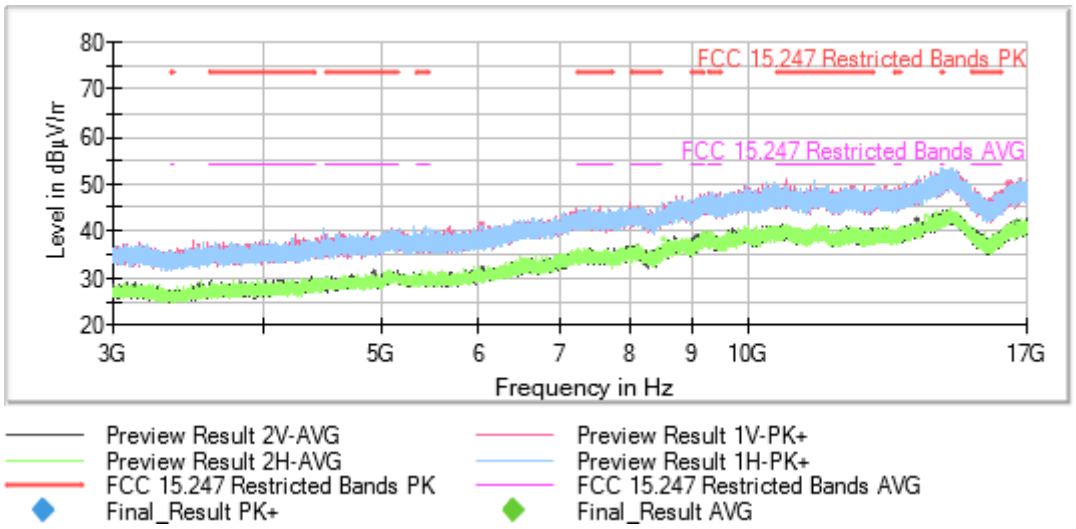
Frequency MHz = 2442.00000

Modulation = 802.11g (OFDM 6 Mbit/s) Frequency Range GHz = [3, 17]

Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [FSW 50]					
	3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

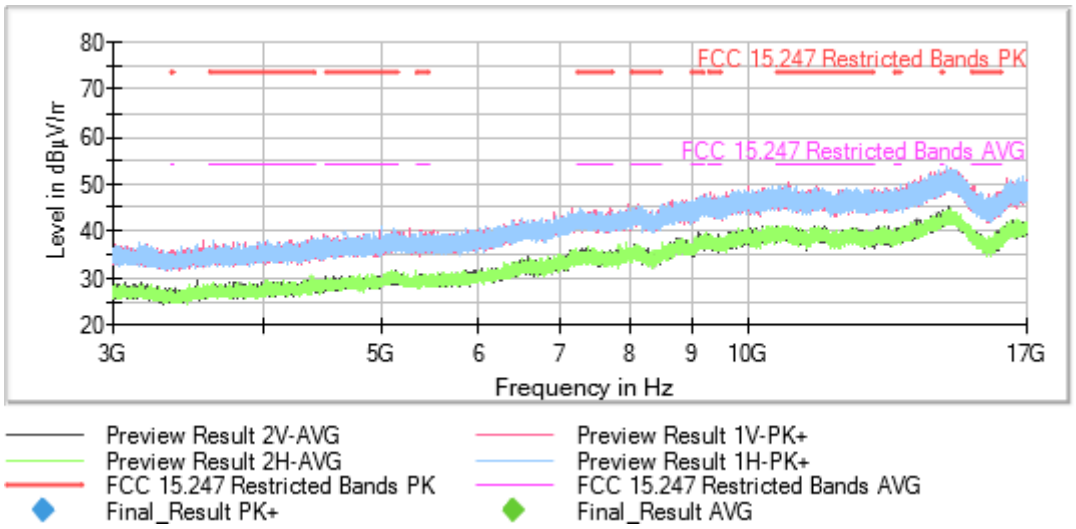
Frequency MHz = 2462.00000

Modulation = 802.11g (OFDM 6 Mbit/s) Frequency Range GHz = [3, 17]

Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [FSW 50]					
	3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Modulation: 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

No spurious frequencies detected at less than 20 dB below the limit.

Verdict

Pass

Attachments

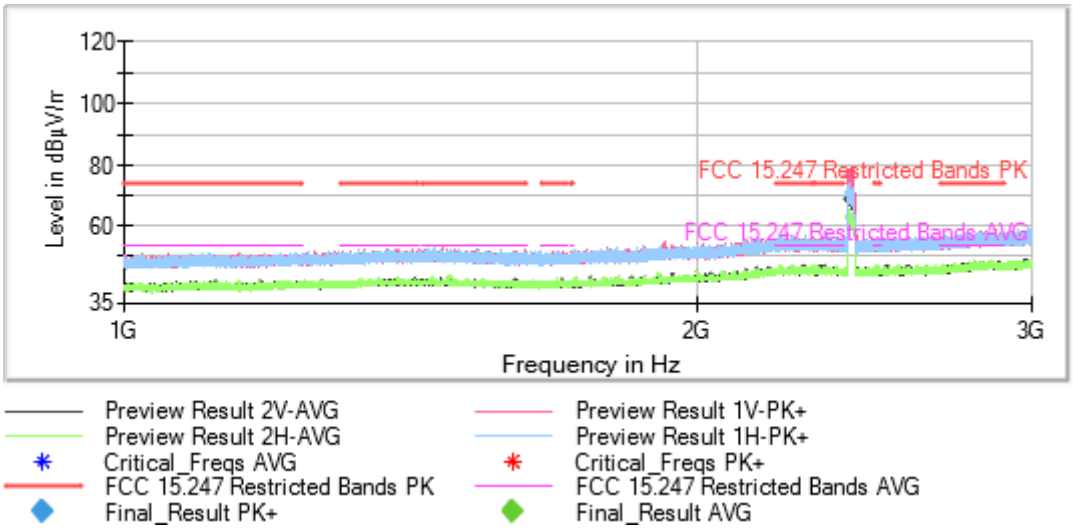
Frequency MHz = 2412.00000

Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s) Frequency Range GHz = [1, 3]

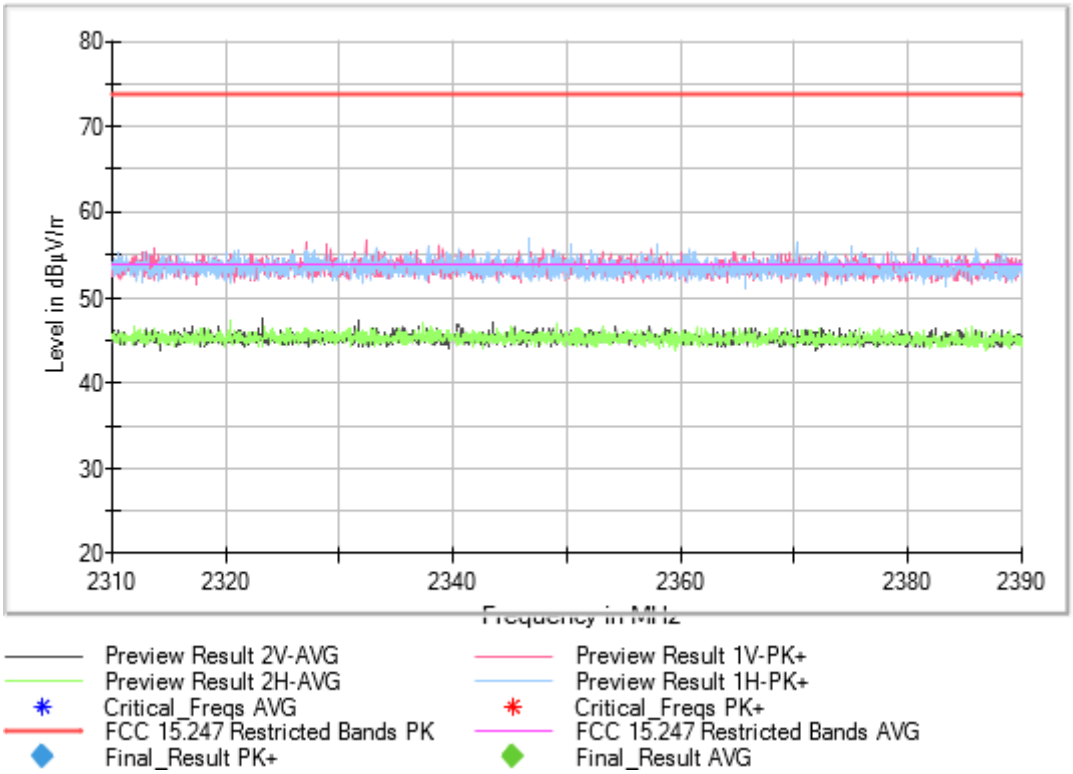
Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:



Full Spectrum




Full Spectrum
80
70
60
50
40
30
20
Level in dBµV/m
2483,5
2490
2495
2500
Preview Result 2V-AVG
Preview Result 2H-AVG
Critical_Freqs AVG
FCC 15.247 Restricted Bands PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
Critical_Freqs PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

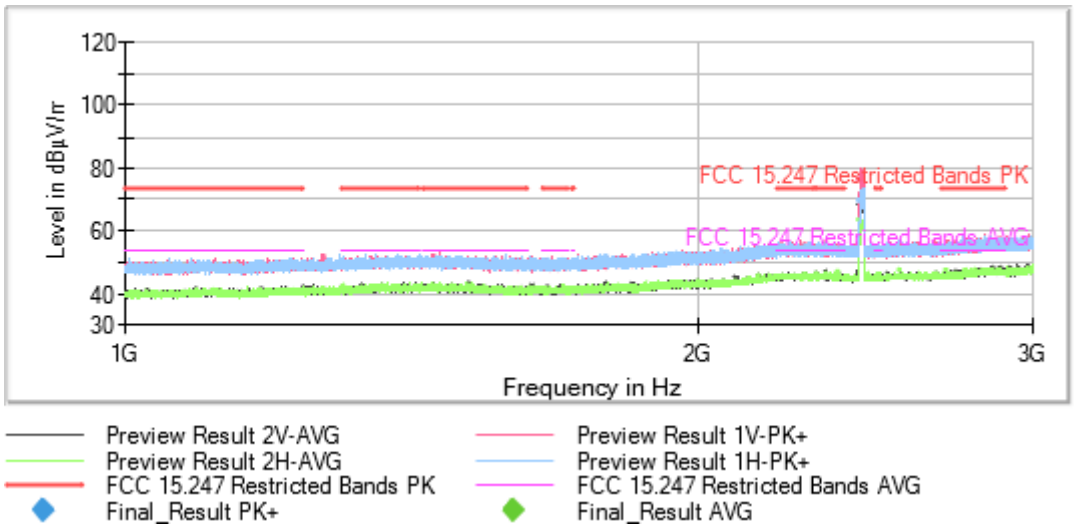
Frequency MHz = 2442.00000

Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s) Frequency Range GHz = [1, 3]

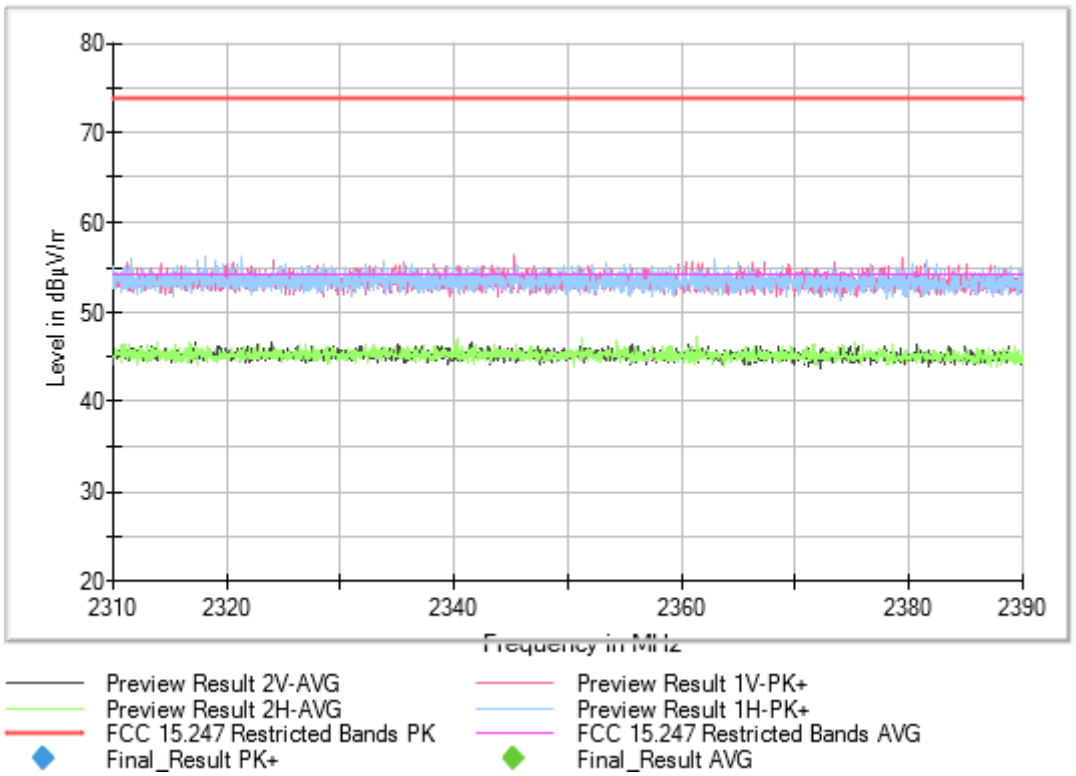
Number of Transmission Chains = 1 Measurement Point = 1

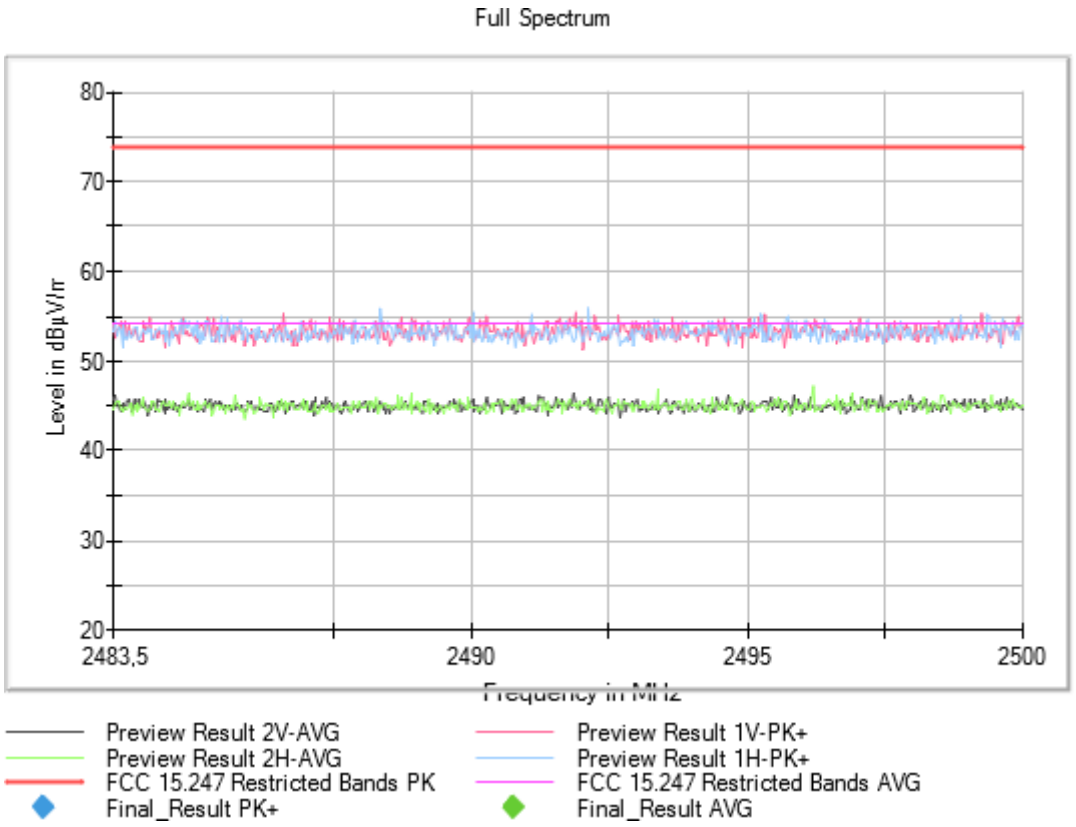
Active Port = 1

Images:



Full Spectrum




Full Spectrum
80
70
60
50
40
30
20
Level in dBµV/m
2483,5
2490
2495
2500
Frequency in MHz
Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.247 Restricted Bands PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

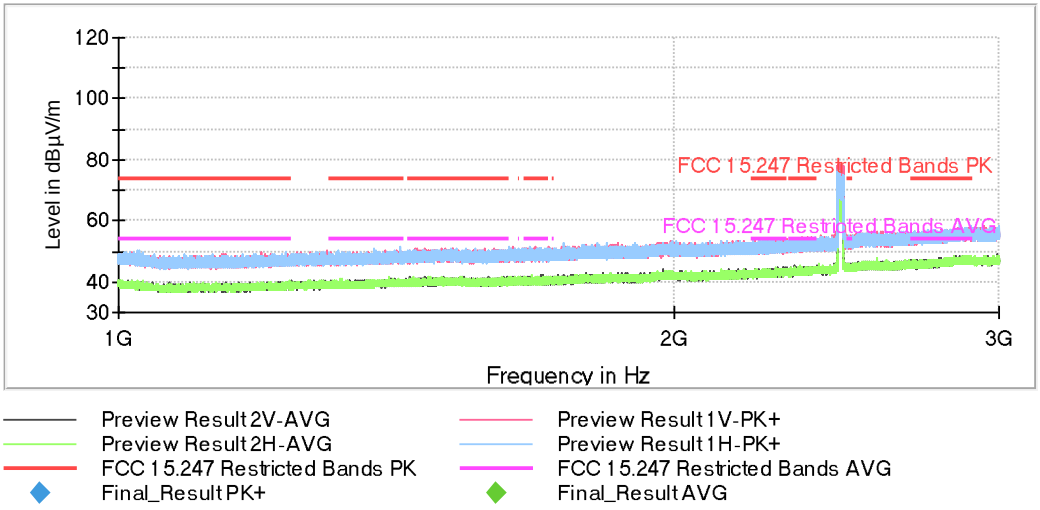
Frequency MHz = 2462.00000

Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s) Frequency Range GHz = [1, 3]

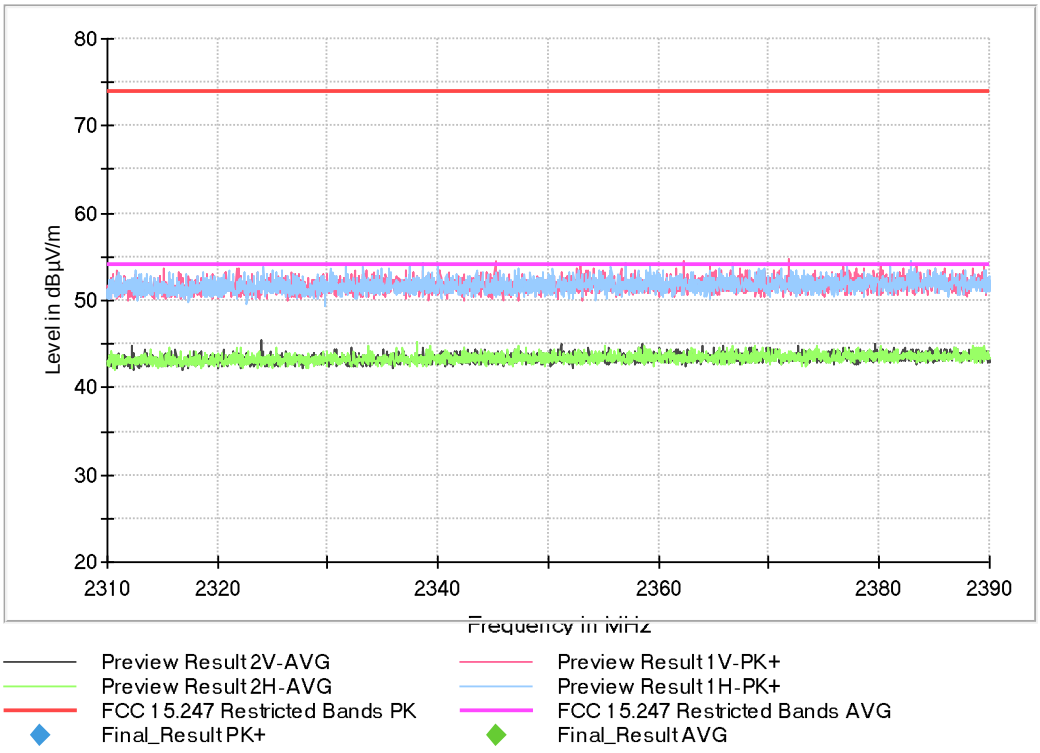
Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

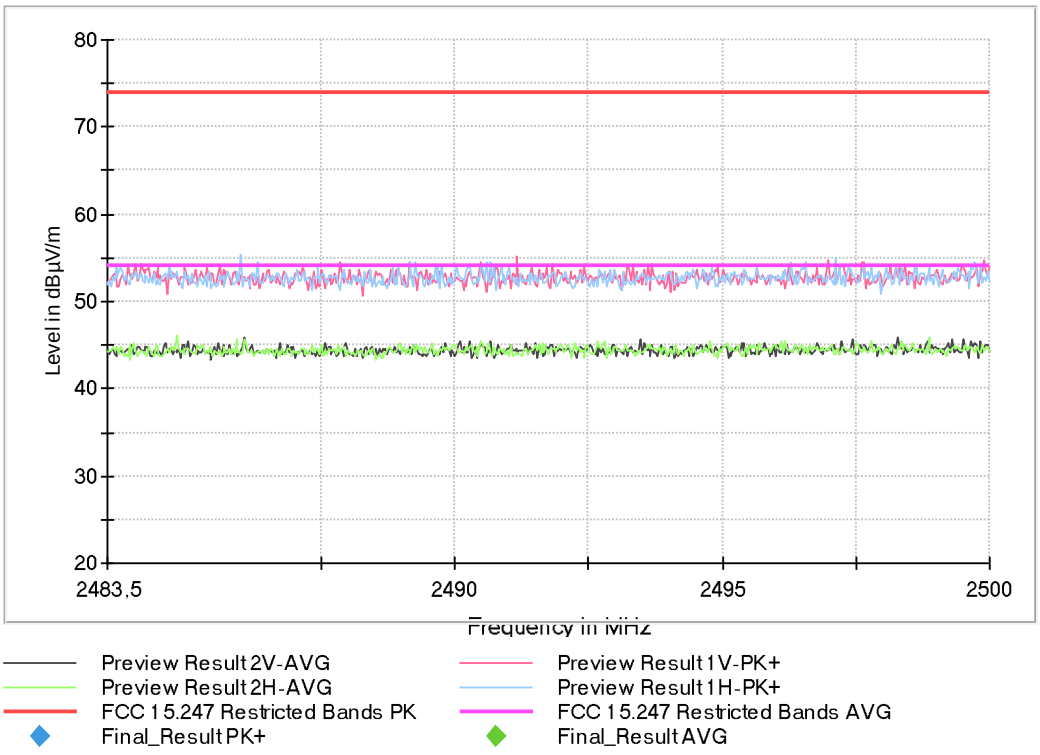
Images:



Full Spectrum



Full Spectrum



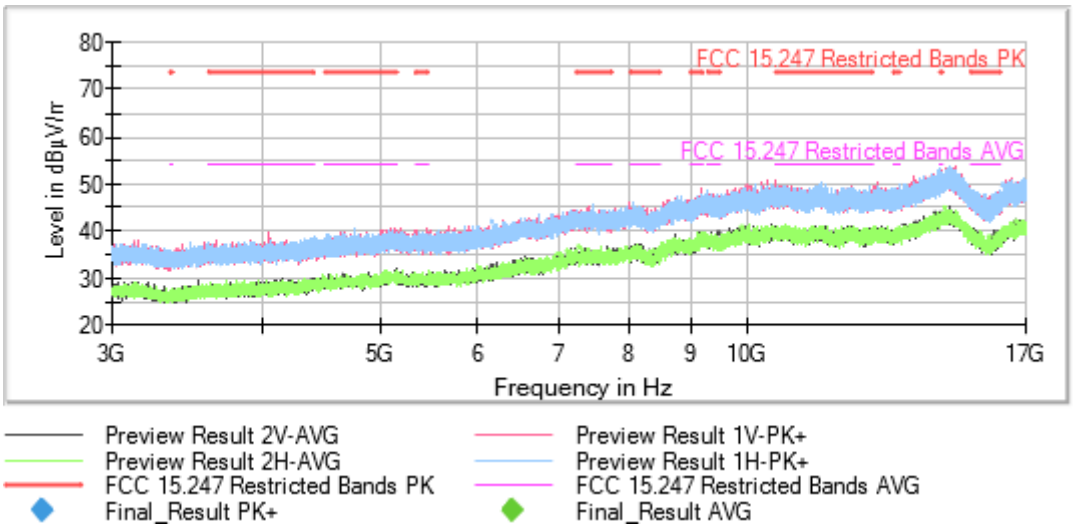
Frequency MHz = 2412.00000

Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s) Frequency Range GHz = [3, 17]

Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [FSW 50]					
	3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

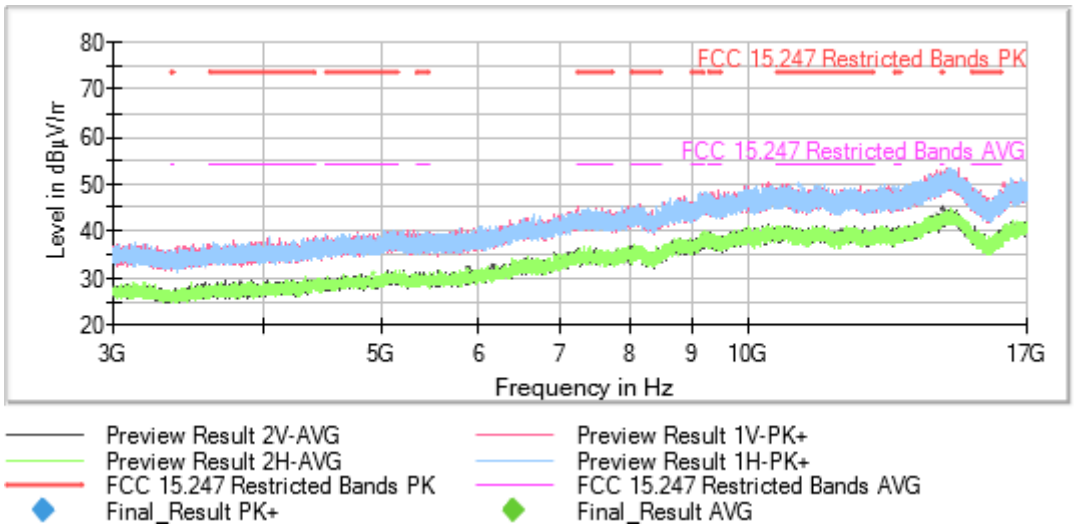
Frequency MHz = 2442.00000

Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s) Frequency Range GHz = [3, 17]

Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [FSW 50]					
	3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

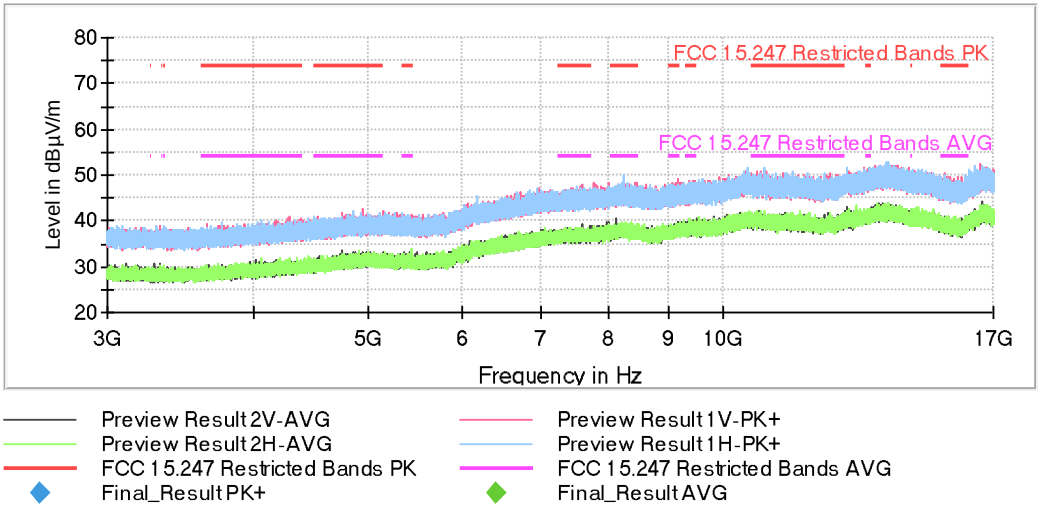
Frequency MHz = 2462.00000

Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s) Frequency Range GHz = [3, 17]

Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:



Tables:

Spectrum Analyzer Parameters

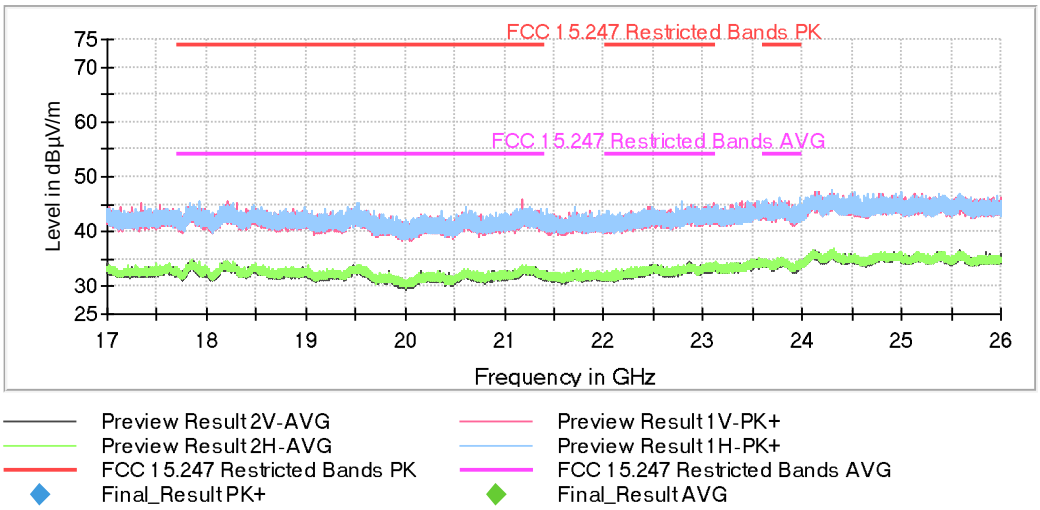
	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [FSW 50]					
	3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Frequency Range GHz = [17, 26]
The spurious frequencies detected do not depend neither on the operating channel nor the modulation mode.

Number of Transmission Chains = 1 Measurement Point = 1

Active Port = 1

Images:



Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [FSW 50]					
	17 GHz - 26 GHz	300 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

99dBw Occupied Channel Bandwidth 99%

Limits

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained.

Modulation: 802.11b (DSSS 1 Mbit/s)

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Occ Ch BW (MHz)
2412.00000	Digital Transmission System (DTS)	20	1	1	11.700
2442.00000					11.700
2462.00000					11.500

Verdict

Pass

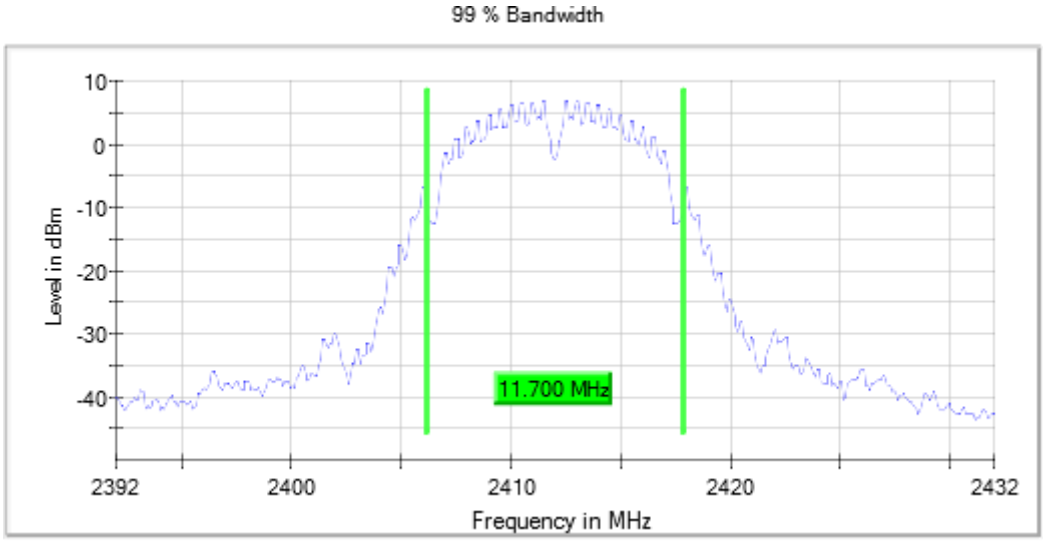
Attachments

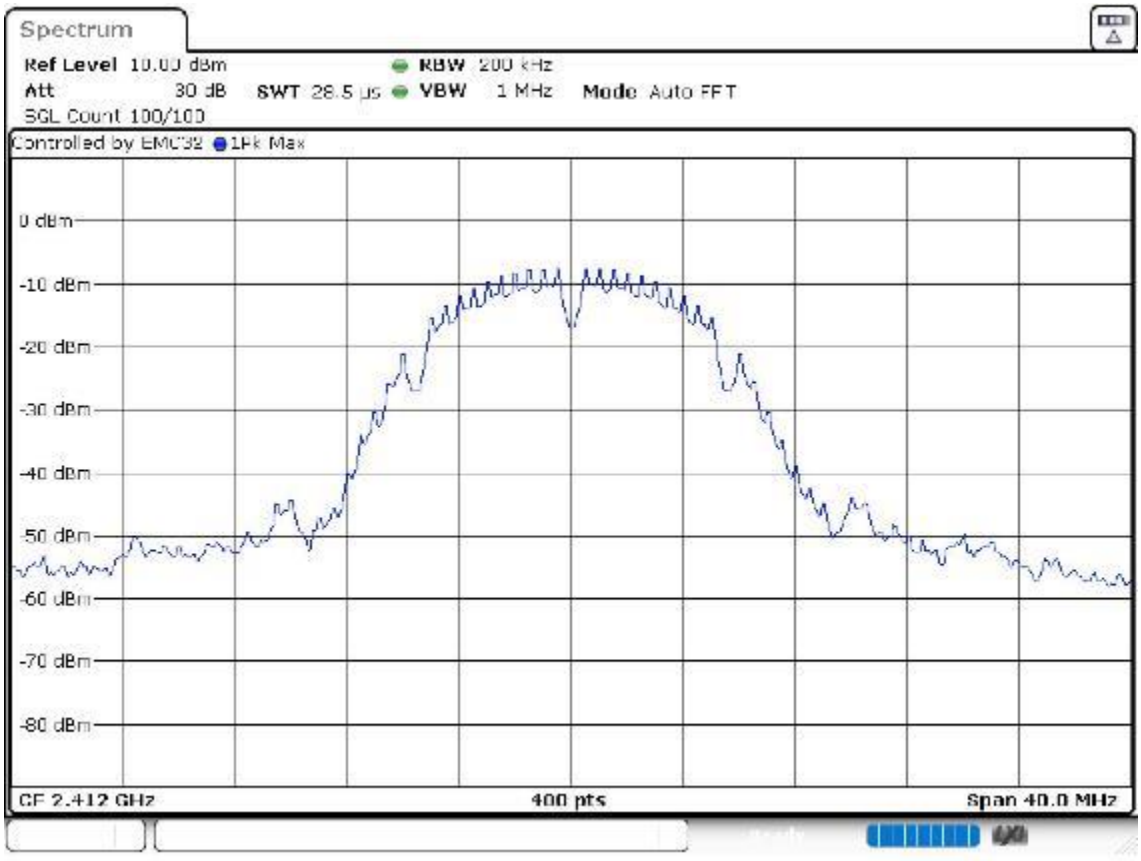
Frequency MHz = 2412.00000

Bandwidth MHz = 20 Modulation = 802.11b (DSSS 1 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:



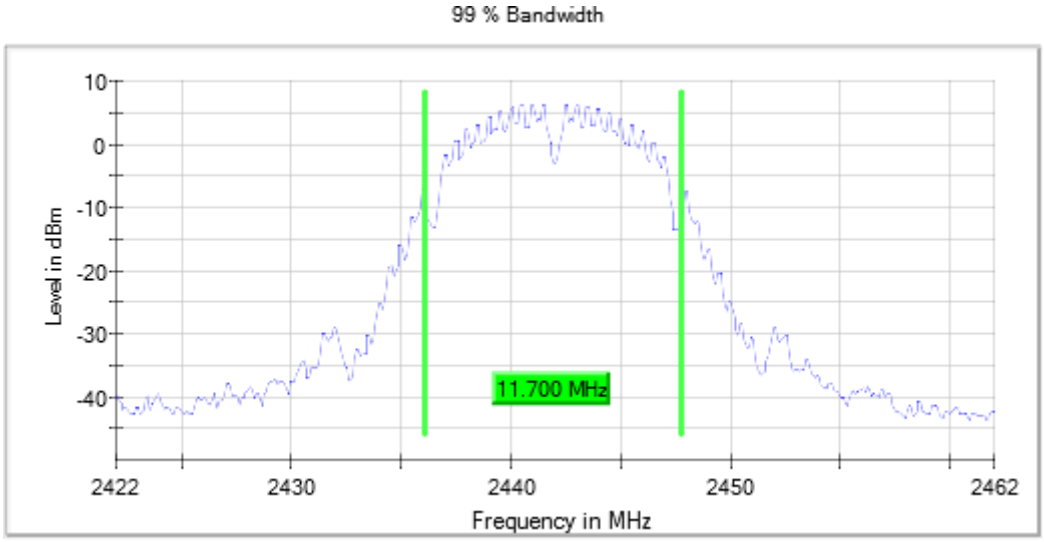


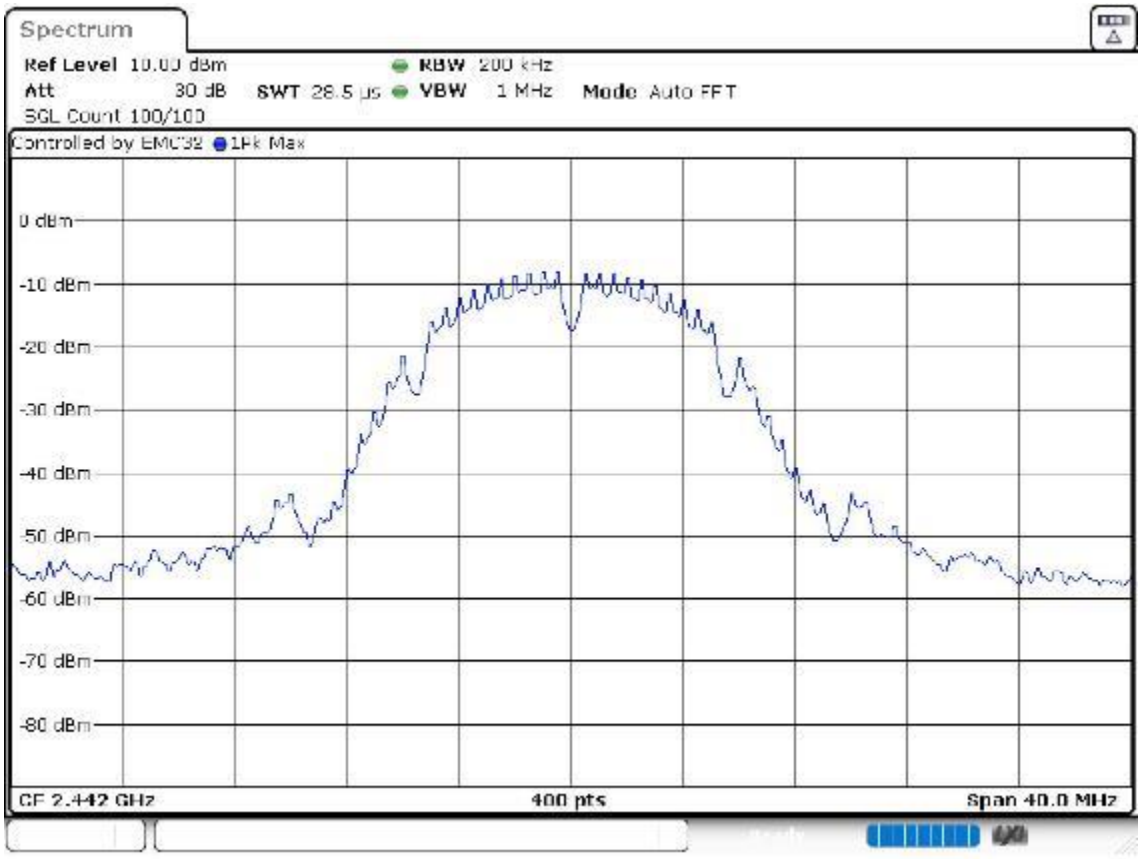
Frequency MHz = 2442.00000

Bandwidth MHz = 20 Modulation = 802.11b (DSSS 1 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:



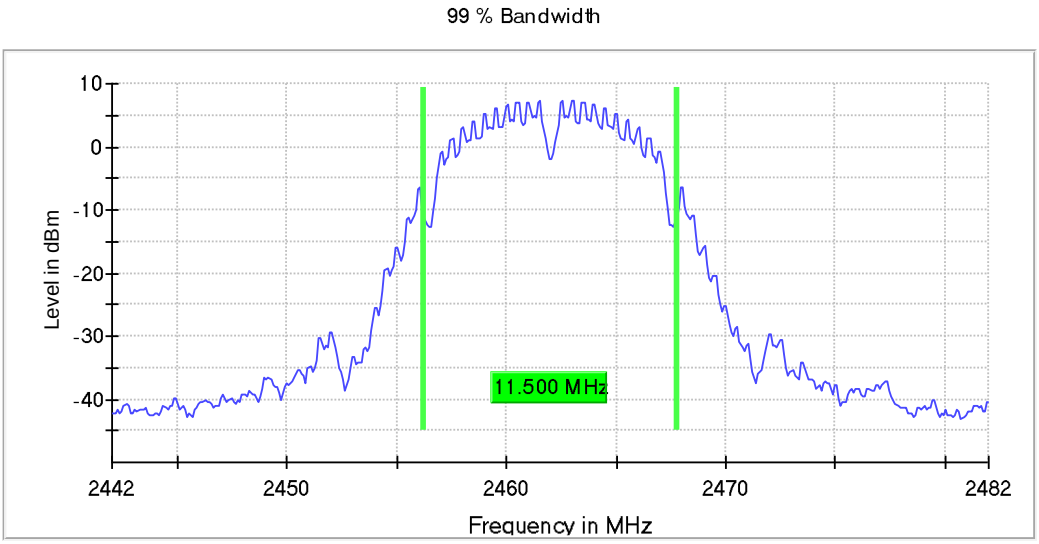


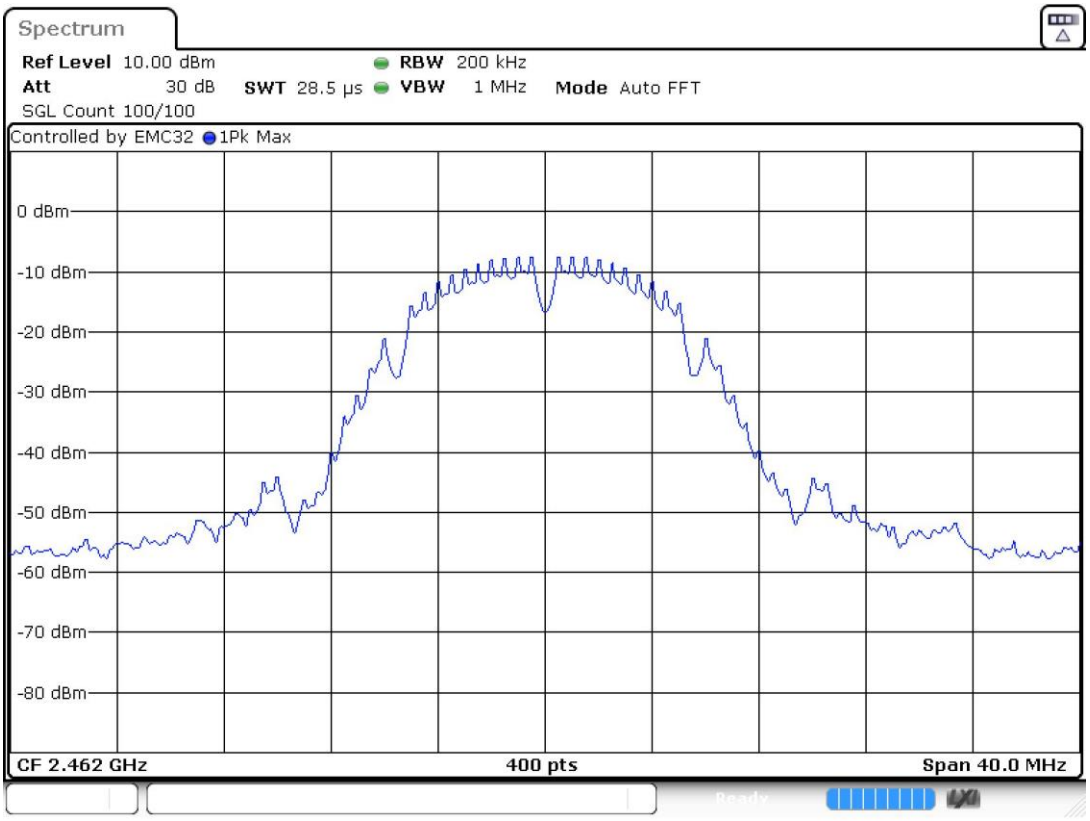
Frequency MHz = 2462.00000

Bandwidth MHz = 20 Modulation = 802.11b (DSSS 1 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:





Modulation: 802.11g (OFDM 6 Mbit/s)

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Occ Ch BW (MHz)
2412.00000	Digital Transmission System (DTS)	20	1	1	16.900
2442.00000					16.800
2462.00000					16.900

Verdict

Pass

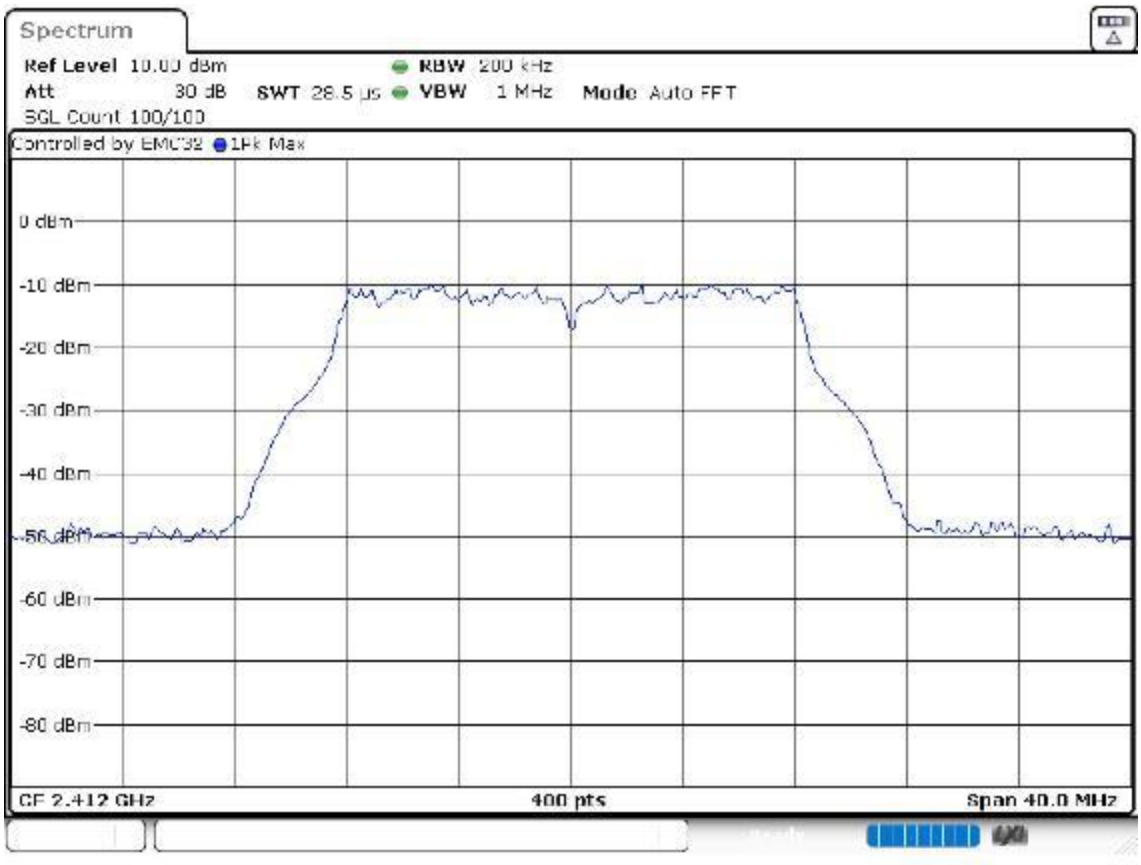
Attachments

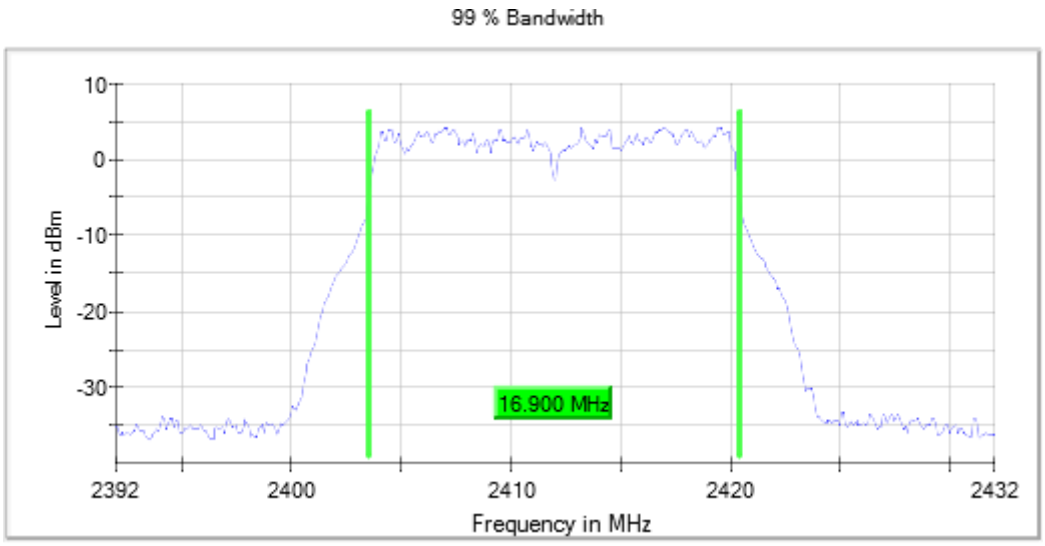
Frequency MHz = 2412.00000

Bandwidth MHz = 20 Modulation = 802.11g (OFDM 6 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:



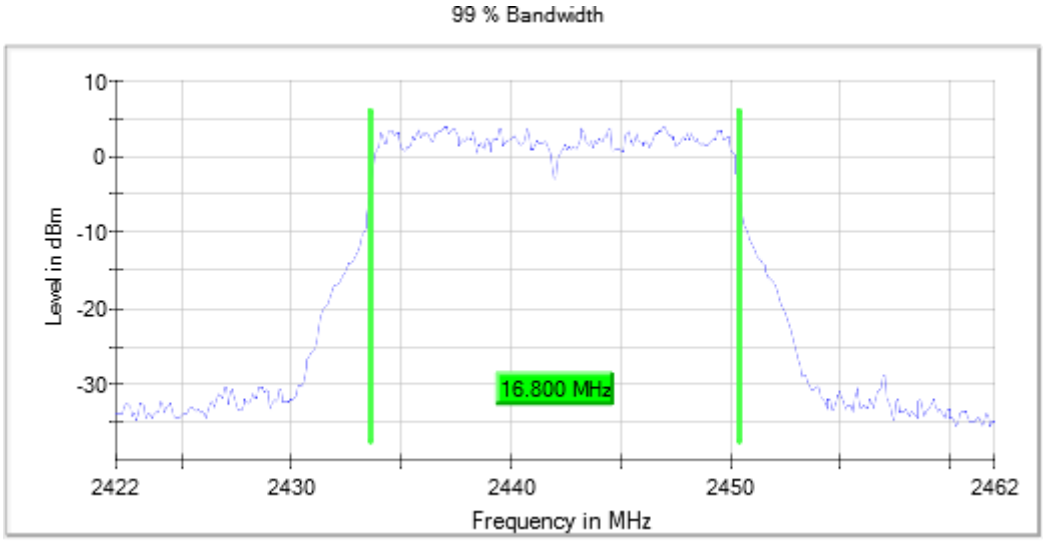


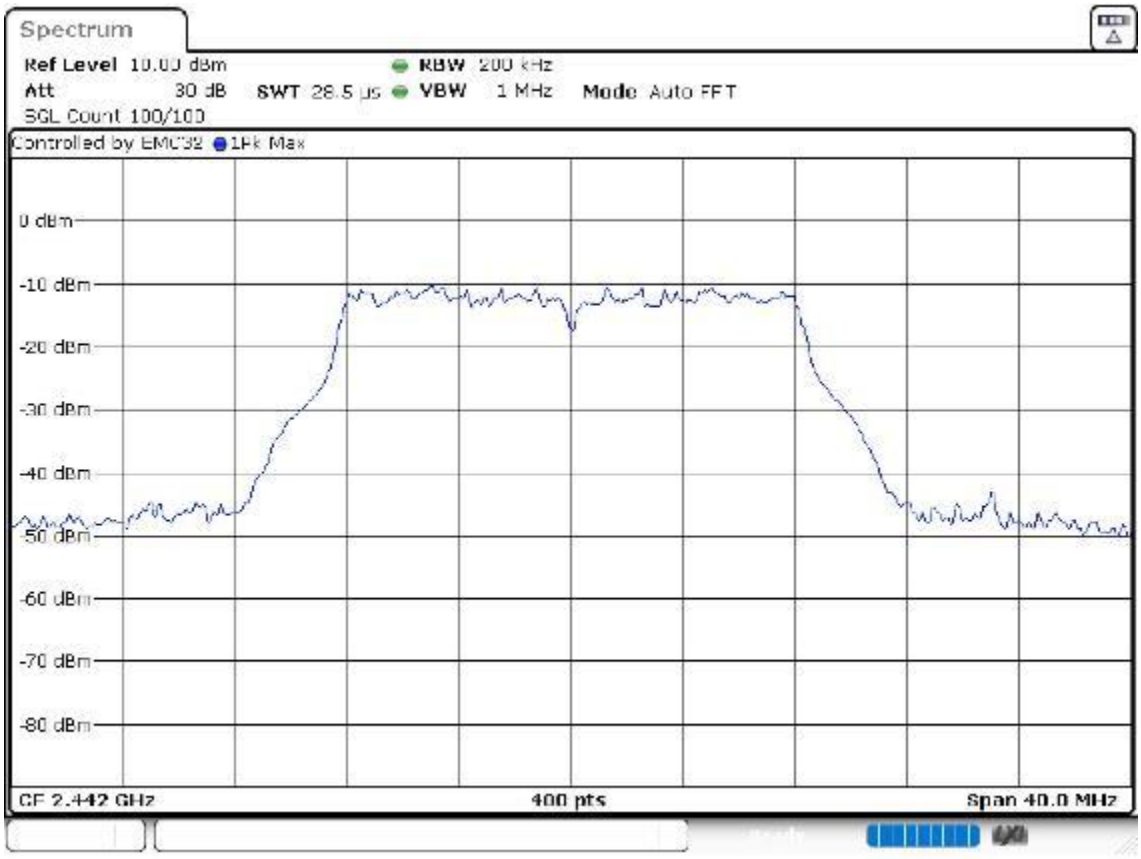
Frequency MHz = 2442.00000

Bandwidth MHz = 20 Modulation = 802.11g (OFDM 6 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:



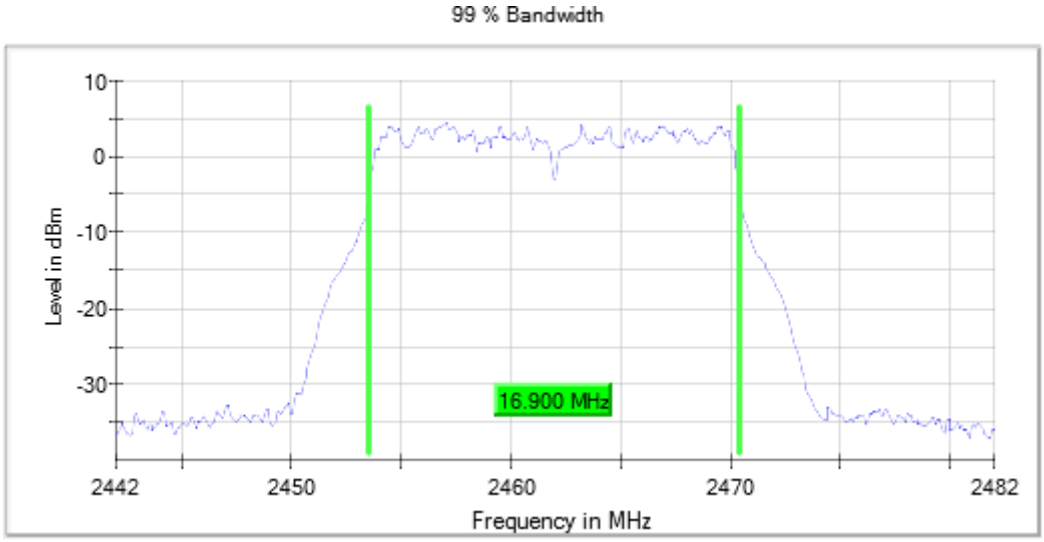


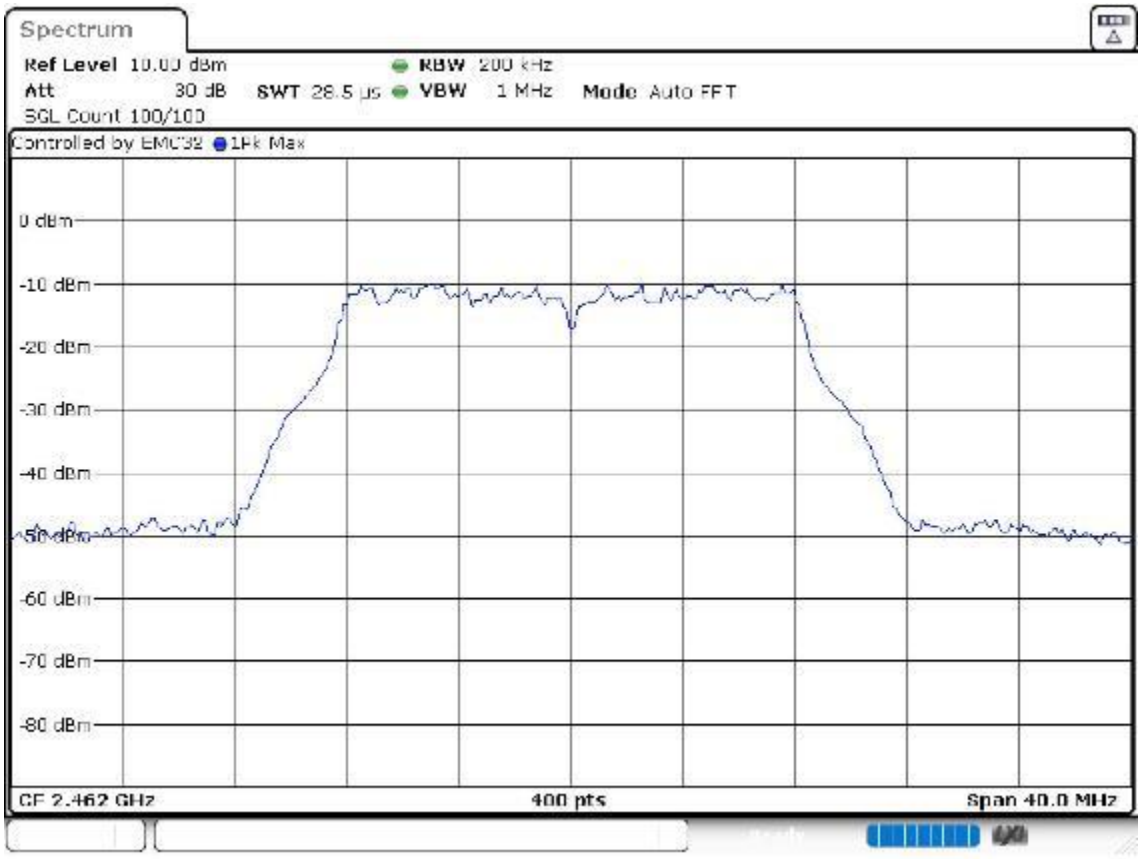
Frequency MHz = 2462.00000

Bandwidth MHz = 20 Modulation = 802.11g (OFDM 6 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:





Modulation: 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Occ Ch BW (MHz)
2412.00000	Digital Transmission System (DTS)	20	1	1	18.200
2442.00000					18.000
2462.00000					18.000

Verdict

Pass

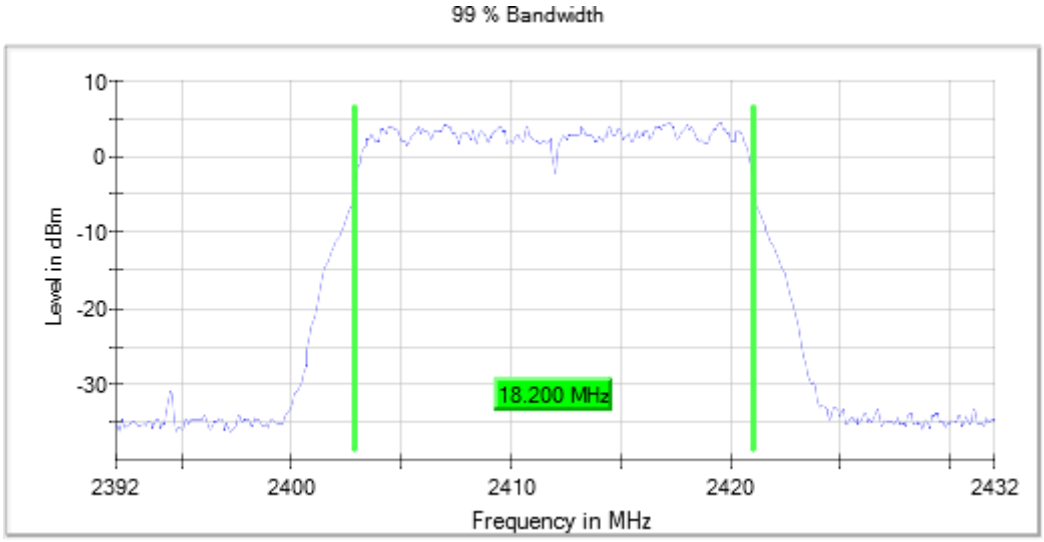
Attachments

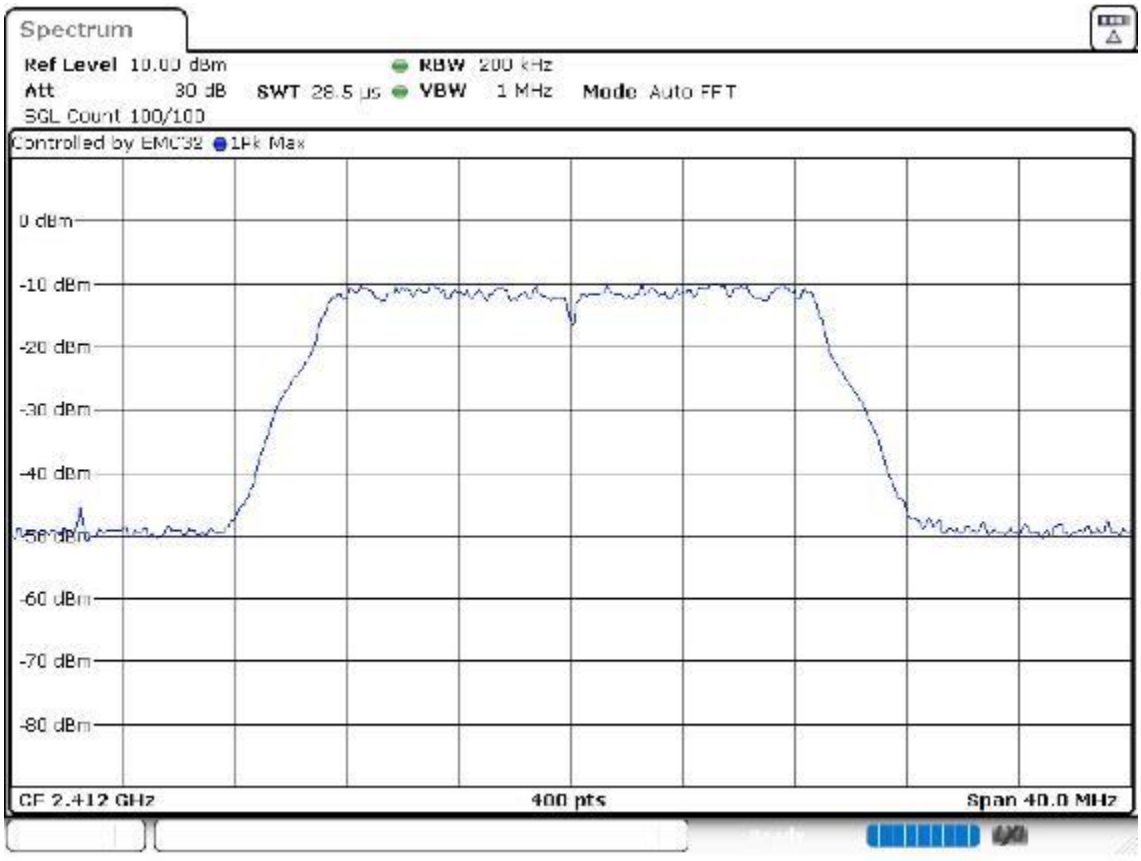
Frequency MHz = 2412.00000

Bandwidth MHz = 20 Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:



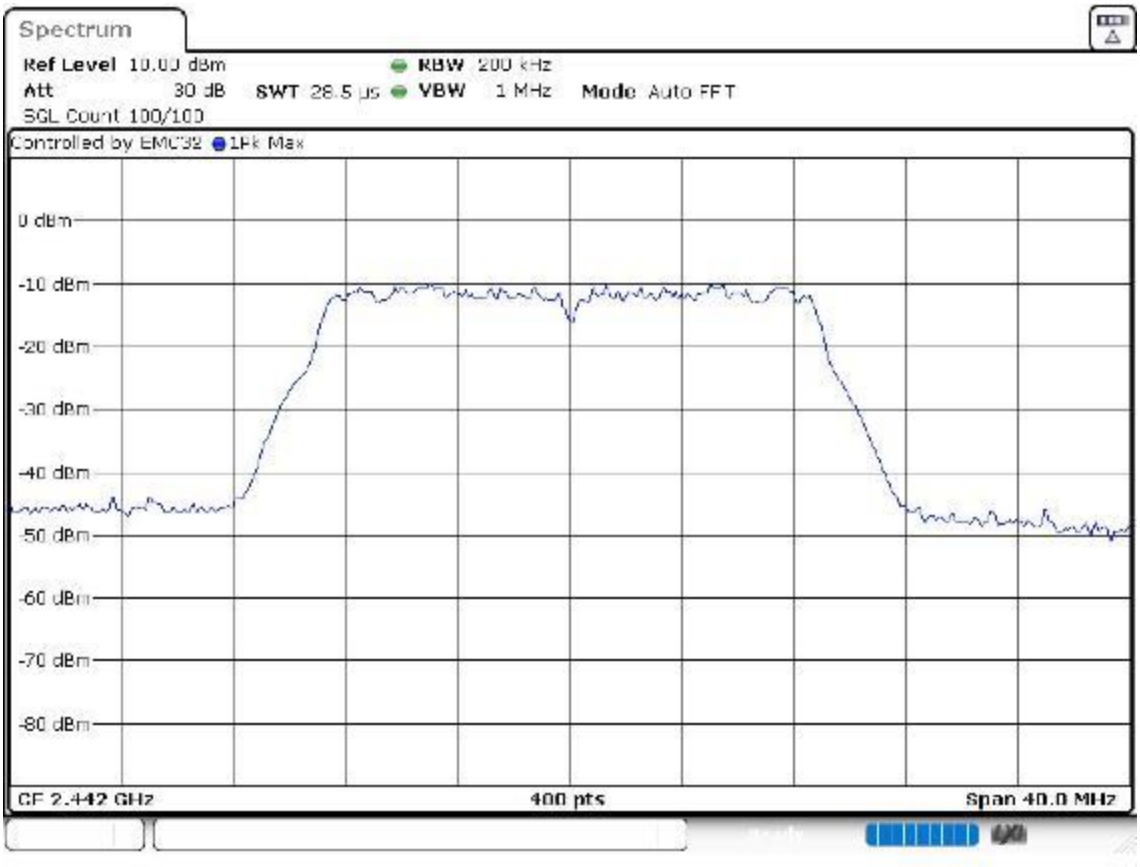


Frequency MHz = 2442.00000

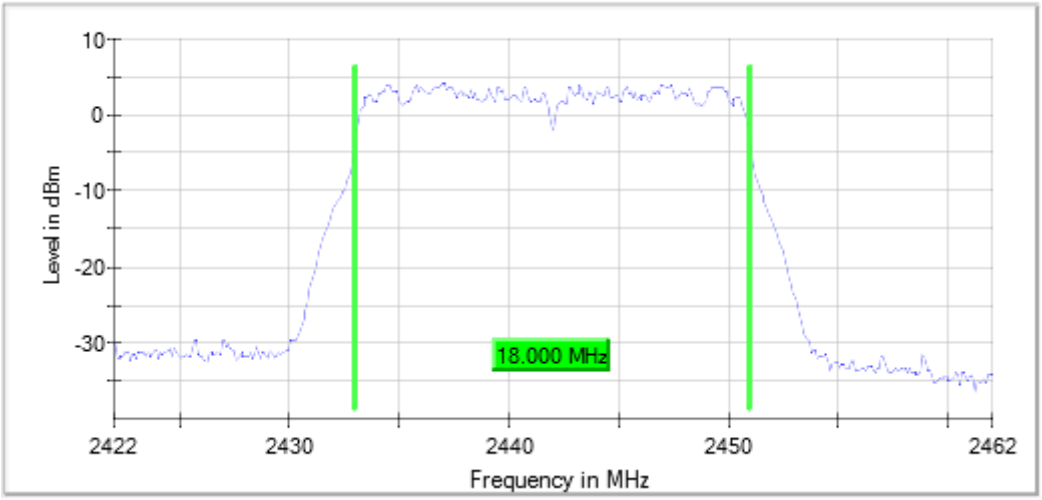
Bandwidth MHz = 20 Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images:



99 % Bandwidth



Frequency MHz = 2462.00000

Bandwidth MHz = 20 Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Number of Transmission Chains = 1 Active Port = 1

Images: