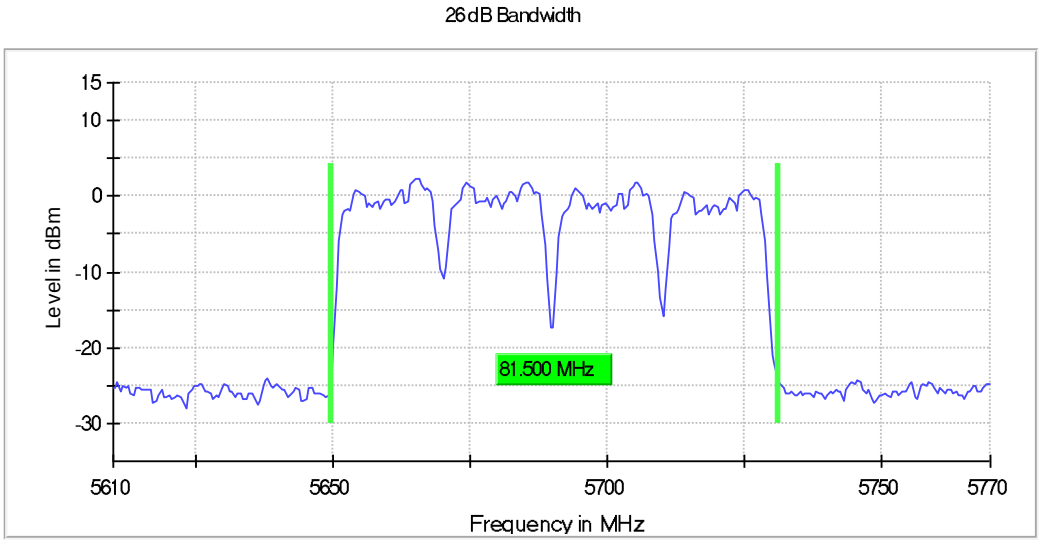
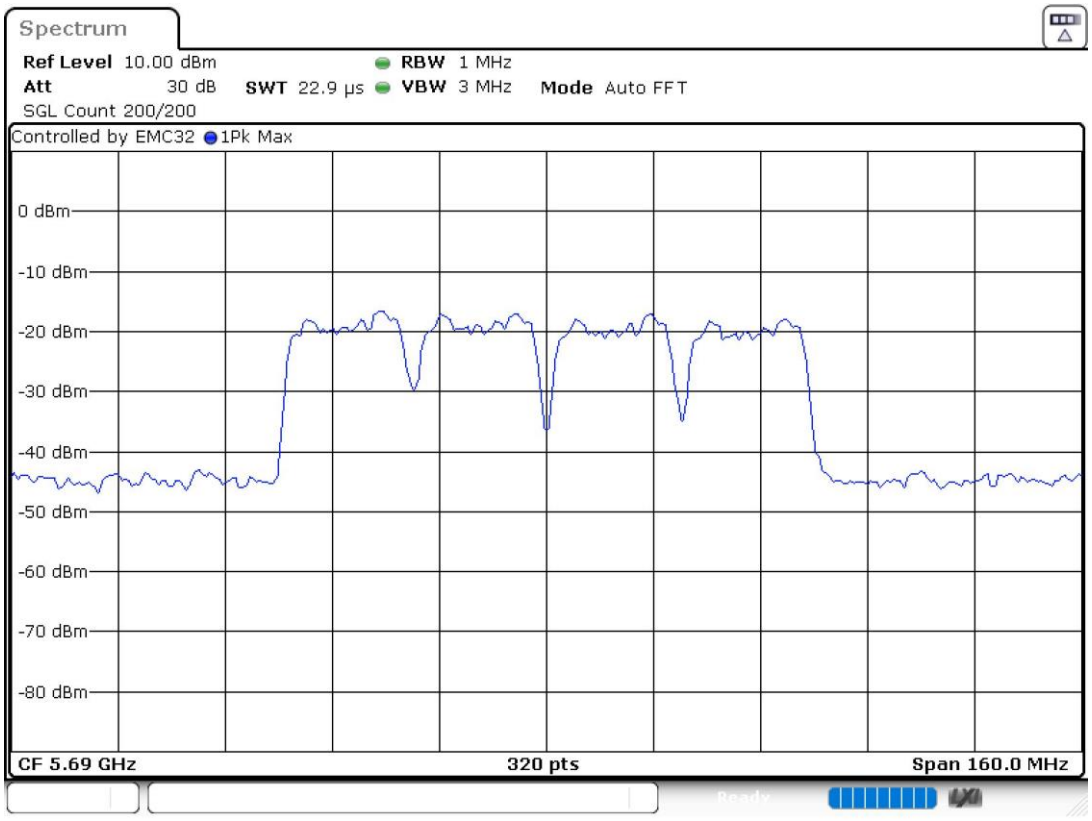
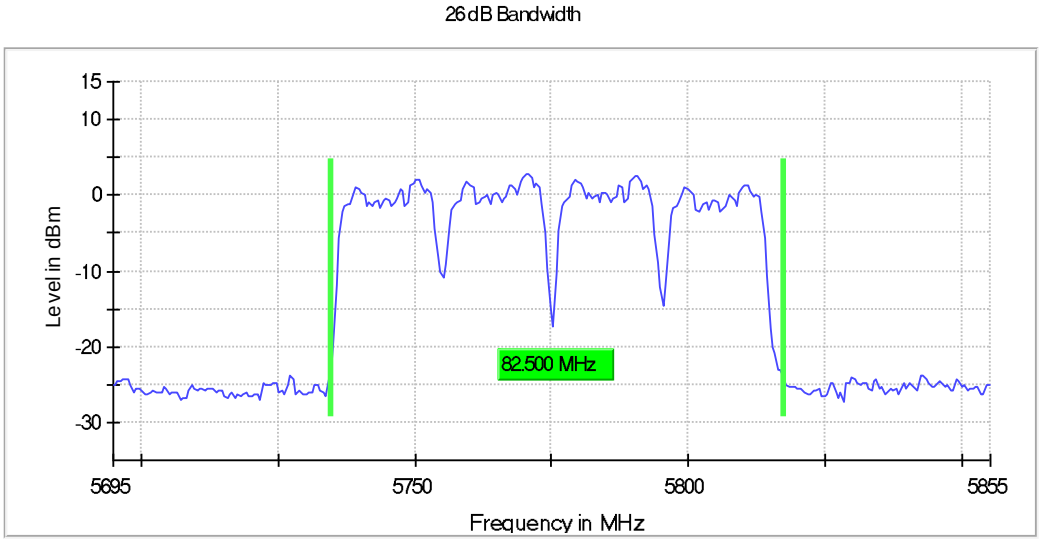
- Straddle Channel 138 (5690 MHz):

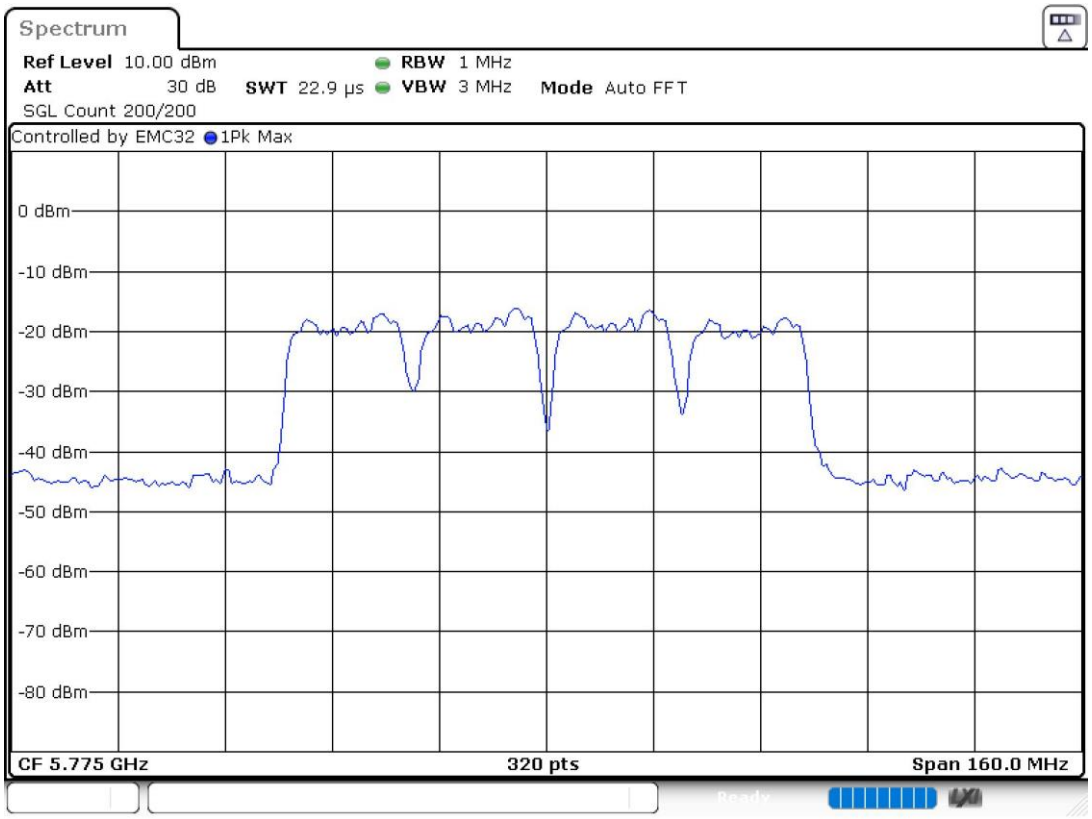




U-NII-3 (5725-5850 MHz)

- Single Channel 155 (5775 MHz):





Appendix B: Tests results for the U-NII-1: 5.15 GHz – 5.25 GHz Band

INDEX

TEST CONDITIONS

(*) Declared by the Client.

POWER SUPPLY (*):

Vnominal:	115 Vac
Type of Power Supply:	AC power

ANTENNA (*):

Type of Antennas:	Monopoles (printed on PCB). 2 antennas.
Maximum Declared Antenna Gain Chain 0:	+3.1 dBi
Maximum Declared Antenna Gain Chain 1:	+5.0 dBi

Directional Antenna Gain Calculations for CDD MIMO In-Band Measurements:

U-NII-1, U-NII-2A, U-NII-2C & U-NII-3:

For 2Tx CDD MIMO modes, in accordance with KDB 662911 D01 v02r01 Section F)2)f)(ii) y F)2)e)ii), directional gain, directional gain was calculated as follows:

$N_{SS} = 1$, $N_{ANT} = 2$, $G_{ANT0} = +3.1$ dBi, $G_{ANT1} = +5.0$ dBi

$$\text{Directional Gain} = 10\log\left[\frac{\sum_{j=1}^{N_{SS}}\left(\sum_{k=1}^{N_{ANT}} g_{j,k}\right)^2}{N_{ANT}}\right] = 10\log\left[\frac{\sum_{j=1}^{1}\left(\sum_{k=1}^{2} g_{j,k}\right)^2}{2}\right]$$

$$= 10\log\left[\frac{\left(g_{1,1}+g_{1,2}\right)^2}{2}\right] = 10\log\left[\frac{\left(10^{\frac{G_1}{20}}+10^{\frac{G_2}{20}}\right)^2}{2}\right] = 10\log\left[\frac{\left(10^{\frac{3.1}{20}}+10^{\frac{5.0}{20}}\right)^2}{2}\right] = 7.12 \text{ dBi}$$

TEST FREQUENCIES (*):

Technology Tested:	WLAN (IEEE 802.11 a20 / n2040 / ac204080 1x1 & 2x2)
Modes:	802.11a: 6, 9, 12, 18, 24, 36, 48 & 54 Mbps (SISO)
	802.11n HT20: MCS0 to MCS23 (1 or 2 spatial stream with either SISO or 2 chain MIMO CDD).
	802.11n HT40: MCS0 to MCS23 (1 or 2 spatial stream with either SISO or 2 chain MIMO CDD).
	802.11ac VHT20: MCS0 to MCS9 (1 or 2 spatial stream) (SISO, or MIMO with CDD without TxBF).
	802.11ac VHT40: MCS0 to MCS9 (1 or 2 spatial stream) (SISO, or MIMO with CDD without TxBF).
	802.11ac VHT80: MCS0 to MCS9 (1 or 2 spatial stream) (SISO, or MIMO with CDD without TxBF).
Setting of cores / ports:	Chain 0, Chain 1, Chain 0 & 1
Beamforming:	No.

Band U-NII-1:

Operating Channel Bandwidth:	20 MHz	
Transmission Channels:	Channels	Channel Frequency (MHz)
	Low (36)	5180
	Middle (40)	5200
	Middle (44)	5220
	High (48)	5240
Operating Channel Bandwidth:	40 MHz	
Transmission Channels:	Channels	Channel Frequency (MHz)
	Low (38)	5190
	High (46)	5230
Operating Channel Bandwidth:	80 MHz	
Transmission Channels:	Channels	Channel Frequency (MHz)
	Single (42)	5210

The test set-up was made in accordance to the general provisions of FCC Unlicensed National Information Infrastructure (U-NII) Devices 789033 D02 General U-NII Test Procedures New Rules v02r01 dated Dec 14, 2017.

The EUT was tested in the following operating mode:

- Continuously transmitting with a modulated carrier at maximum power on all required channels using the supported data rates/modulations types.

The field strength at the band edges was evaluated for each mode on the lowest and highest channels at the rated power for the channel under test.

For all modes, the EUT was configured in test mode using a software application. The application was used to enable a continuous transmission and to select the test channels as required. The client supplied instructions to configure the EUT. The customer supplied a document containing the setup instructions.

The worst cases for testing were identified for output power and spurious levels at the band edges which were selected based on preliminary testing. They correspond to next data rates:

- 802.11a: 6 Mbps SISO 1Tx on Chain 0 and 1Tx on Chain 1.
- 802.11n HT20: MCS0 SISO 1Tx on Chain 0 and 1Tx on Chain 1 / MIMO 2Tx on Chain 0 & 1.
- 802.11n HT40: MCS0 SISO 1Tx on Chain 0 and 1Tx on Chain 1 / MIMO 2Tx on Chain 0 & 1.
- 802.11ac VHT20: MCS0 SISO 1Tx on Chain 0 and 1Tx on Chain 1 / MIMO 2Tx on Chain 0 & 1.
- 802.11ac VHT40: MCS0 SISO 1Tx on Chain 0 and 1Tx on Chain 1 / MIMO 2Tx on Chain 0 & 1.
- 802.11ac VHT80: MCS0 SISO 1Tx on Chain 0 and 1Tx on Chain 1 / MIMO 2Tx on Chain 0 & 1.

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and connected to the TS8997 using a low-loss RF cable. The reading in the spectrum analyzer is corrected considering the internal and external RF cable loss.

For all modes:

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-18 GHz Double ridge horn antenna is situated at a distance of 3 m and a distance of 1.5 m for the frequency range 17 GHz-40 GHz (18 GHz-40 GHz horn antenna).

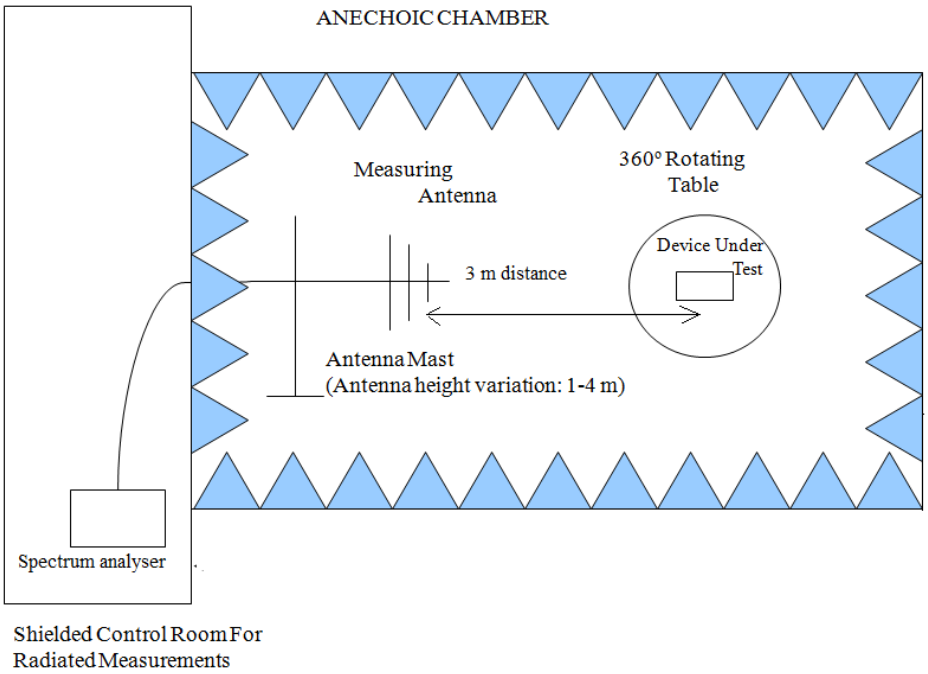
For radiated emissions in the range 17 GHz-40 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

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.

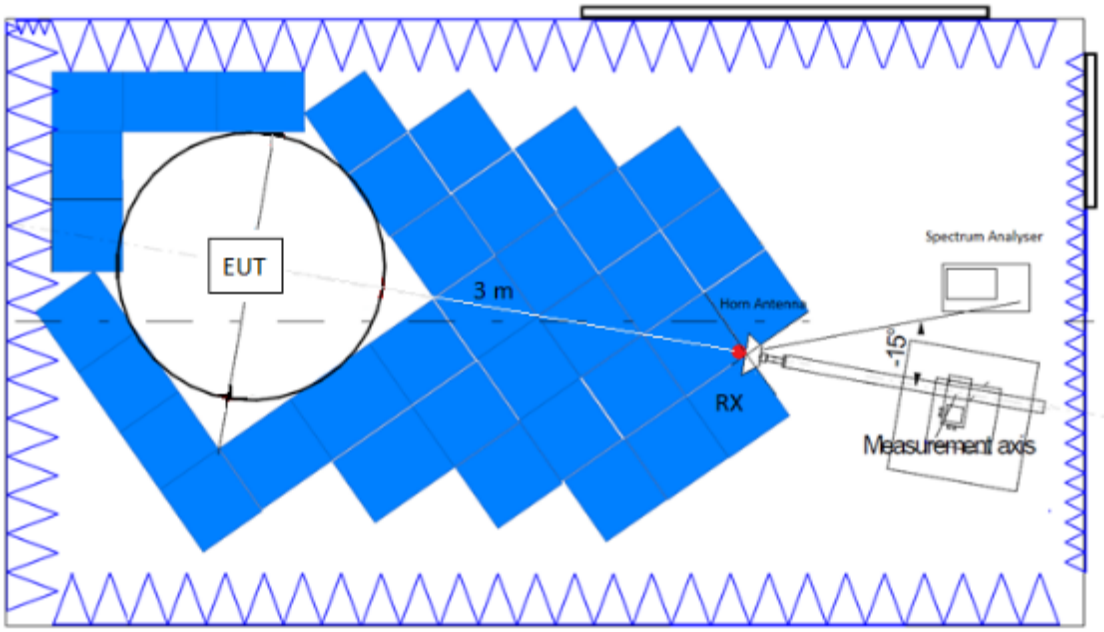
Measurements were made in both horizontal and vertical planes of polarization.

The final measured value, for the given emission, in the tables below incorporates the calibrated antenna factor and cable loss.

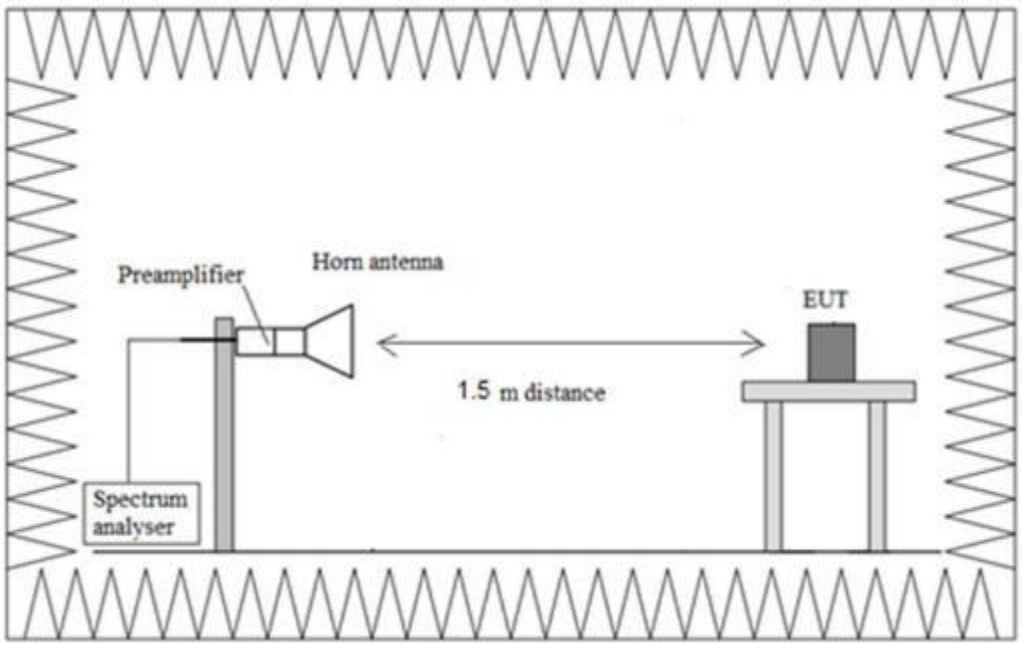
Radiated measurements setup f < 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup f > 17 GHz:



FCC 15.407 (a)(1)(iv) Transmitter Maximum Conducted Output Power/ RSS-247 Clause 6.2.1.1. Transmitter Maximum Equivalent Isotropically Radiated Power

SPECIFICATION:

FCC 15.407:
For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.
For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RSS-247:
The maximum e.i.r.p. shall not exceed 200 mW (23 dBm) or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

RESULTS:

The maximum conducted output power was measured using the method according to clause E) 3) b) (Method PM-G) of 789033 D02 General UNII Test Procedures New Rules v02r01.

The e.i.r.p. levels are calculated by adding the declared maximum antenna gain (dBi).

Preliminary tests determined the SISO worst case: Chain 1.
Preliminary tests determined the MIMO worst case: Chain 0+1.

Antenna Gain:

- SISO Antenna – Chain 0: +3.1 dBi
- SISO Antenna – Chain 1: +5.0 dBi
- MIMO Antennas – Chain 0 & 1: +7.12 dBi

For the SISO technique, the antenna gain is less than 6 dBi.
For the MIMO technique, the antenna gain is higher than 6 dBi.

SISO worst case

SISO 802.11 a20:

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Middle Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted Power RMS (dBm)	15.90	15.32	15.41
Maximum Power E.I.R.P (dBm)	20.90	20.32	20.41

SISO 802.11 n20 (HT20):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Middle Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted Power RMS (dBm)	15.76	15.22	15.34
Maximum Power E.I.R.P (dBm)	20.76	20.22	20.34

SISO 802.11 ac20 (VHT20):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Middle Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted Power RMS (dBm)	13.35	12.75	12.89
Maximum Power E.I.R.P (dBm)	18.35	17.75	17.89

SISO 802.11 n40 (HT40):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted Power RMS (dBm)	15.10	14.95
Maximum Power E.I.R.P (dBm)	20.10	19.95

SISO 802.11 ac40 (VHT40):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted Power RMS (dBm)	12.69	12.11
Maximum Power E.I.R.P (dBm)	17.69	17.11

SISO 802.11 ac80 (VHT80):

U-NII-1 (5150-5250 MHz):

Channel	Single Channel 42 (5210 MHz)
Maximum Conducted Power RMS (dBm)	12.02
Maximum Power E.I.R.P (dBm)	17.02

Verdict: PASS

MIMO

MIMO 802.11 n20 (HT20):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Middle Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted Power RMS (dBm)	15.33	14.70	14.58
Maximum Power E.I.R.P (dBm)	22.45	21.82	21.70

MIMO 802.11 ac20 (VHT20):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Middle Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted Power RMS (dBm)	14.02	13.44	13.36
Maximum Power E.I.R.P (dBm)	21.14	20.56	20.48

MIMO 802.11 n40 (HT40):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted Power RMS (dBm)	14.92	14.38
Maximum Power E.I.R.P (dBm)	22.04	21.50

MIMO 802.11 ac40 (VHT40):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted Power RMS (dBm)	13.93	13.45
Maximum Power E.I.R.P (dBm)	21.05	20.57

MIMO 802.11 ac80 (VHT80):

U-NII-1 (5150-5250 MHz):

Channel	Single Channel 42 (5210 MHz)
Maximum Conducted Power RMS (dBm)	13.90
Maximum Power E.I.R.P (dBm)	21.02

Verdict: PASS

FCC 15.407 (a)(1)(iv) / RSS-247 Clause 6.2.1.1. Transmitter EIRP Spectral Density

SPECIFICATION:

The maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RESULTS:

The maximum Power Spectral Density (PSD) was measured using the method according to clause F) referencing E.2.b) (Method SA-1) of Guidance 789033 D02 General UNII Test Procedures New Rules v02r01.

The result of PSD was measured by setting a marker on the peak of the signal on the spectrum analyzer. The results are in the tables below.

- SISO Antenna – Chain 0: +3.1 dBi
- SISO Antenna – Chain 1: +5.0 dBi
- MIMO Antennas – Chain 0 & 1: +7.12 dBi

For the MIMO technique, the antenna gain is higher than 6 dBi.

Preliminary tests determined the SISO worst case: Chain 1.
Preliminary tests determined the MIMO worst case: Chain 0+1.

SISO worst case

SISO 802.11 a20:

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Middle Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted PSD (dBm/MHz)	4.62	2.77	3.27

SISO 802.11 n20 (HT20):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Middle Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted PSD (dBm/MHz)	4.06	2.40	2.84

SISO 802.11 ac20 (VHT20):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Middle Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted PSD (dBm/MHz)	-0.35	-1.11	-0.51

SISO 802.11 n40 (HT40):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted PSD (dBm/MHz)	0.47	-0.30

SISO 802.11 ac40 (VHT40):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted PSD (dBm/MHz)	-3.92	-4.65

SISO 802.11 ac80 (VHT80):

U-NII-1 (5150-5250 MHz):

Channel	Single Channel 42 (5210 MHz)
Maximum Conducted PSD (dBm/MHz)	-8.06

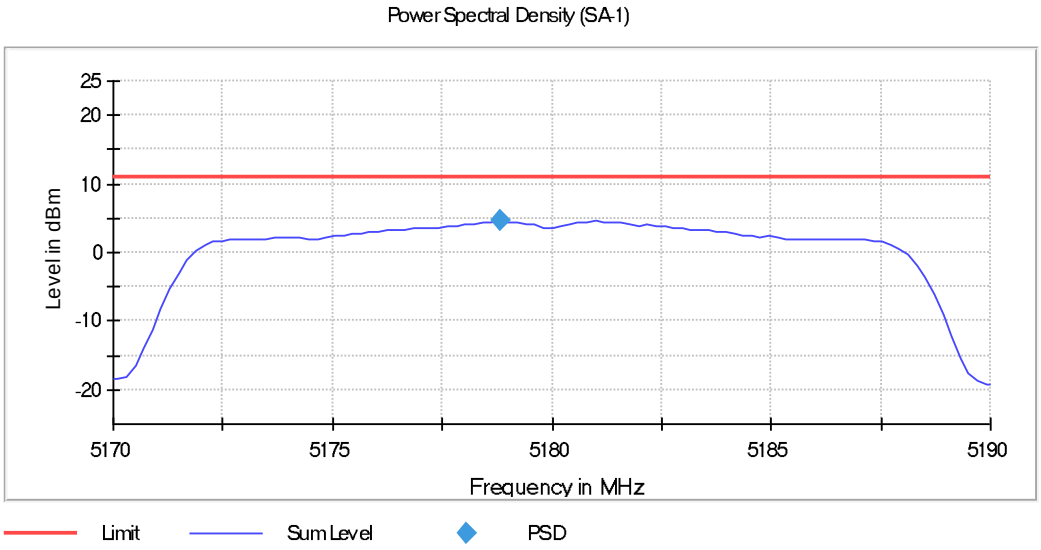
Verdict: PASS

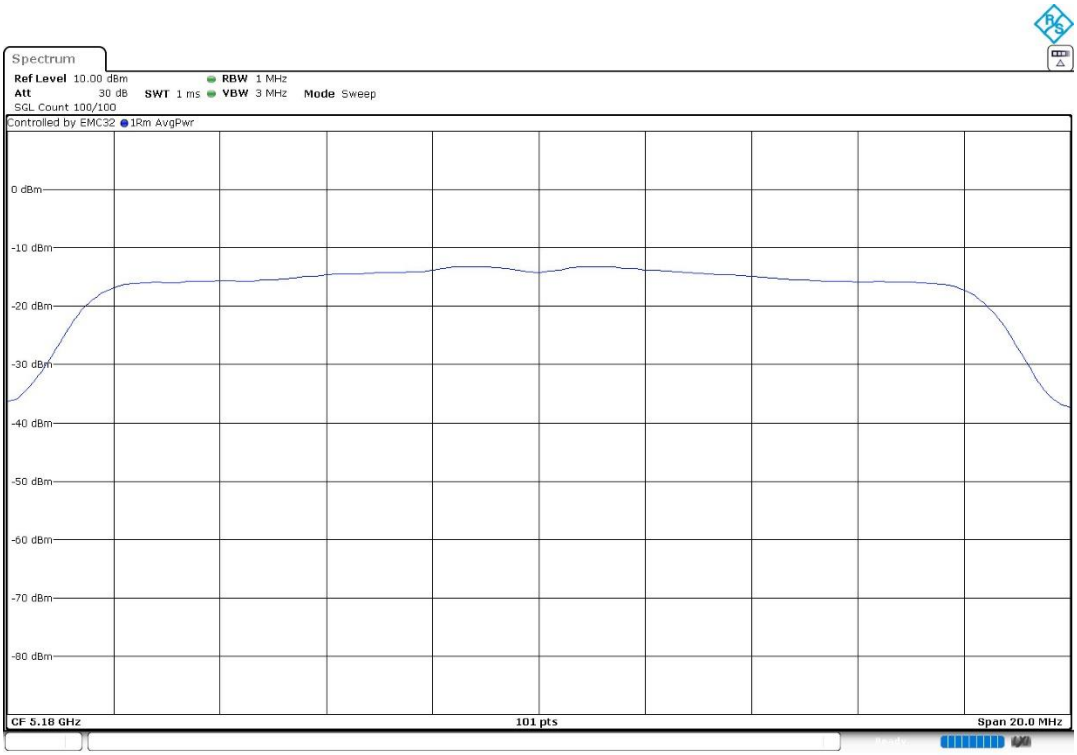
SISO worst case

SISO 802.11 a20:

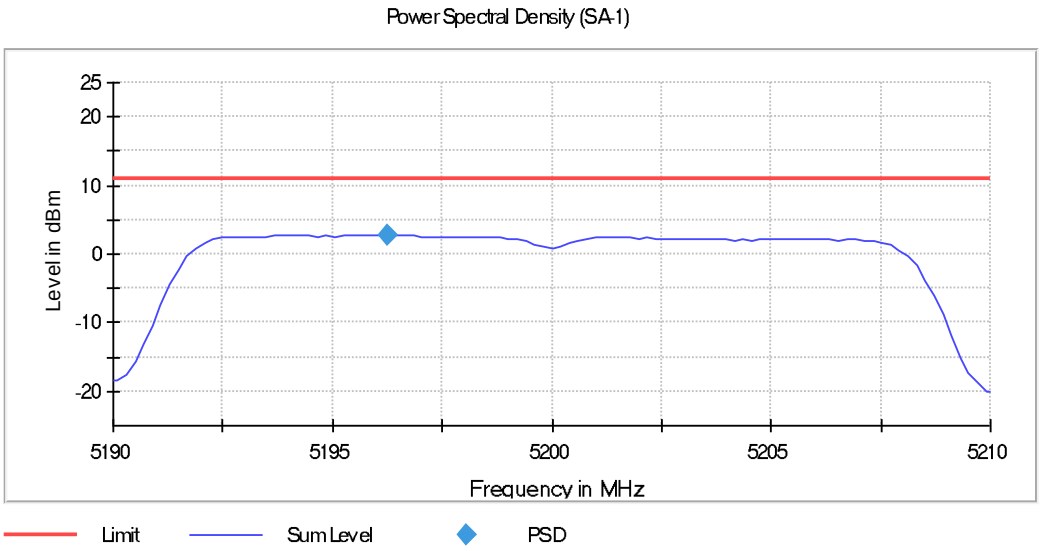
U-NII-1 (5150-5250 MHz)

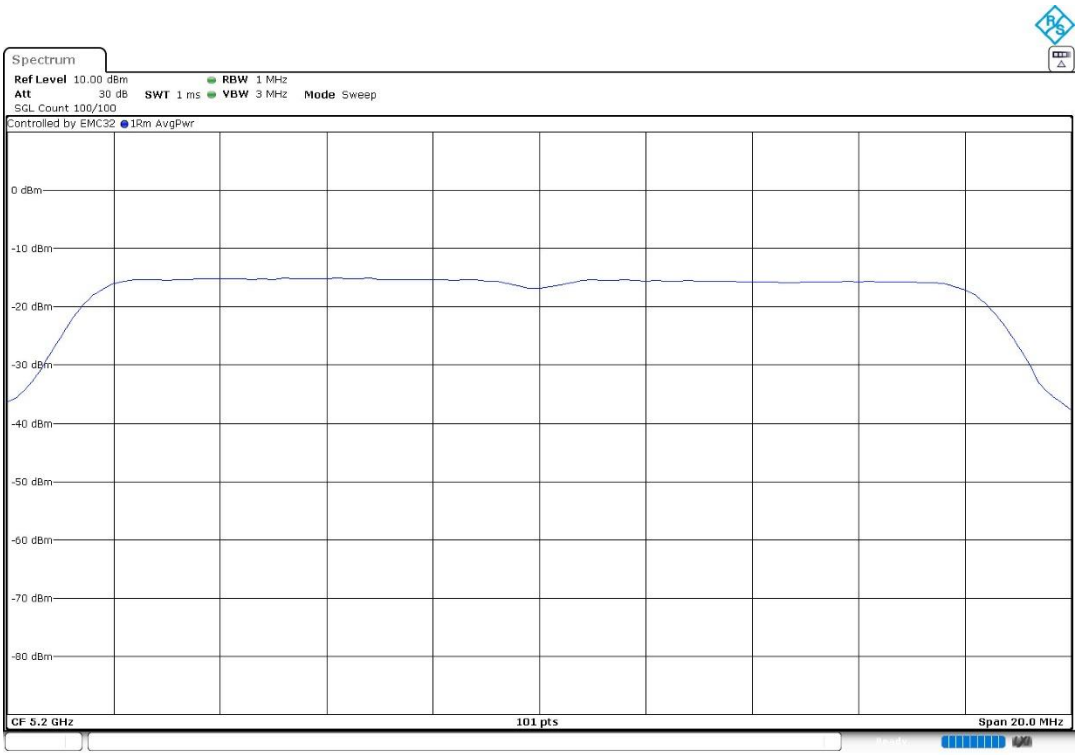
- Low Channel 36 (5180 MHz):



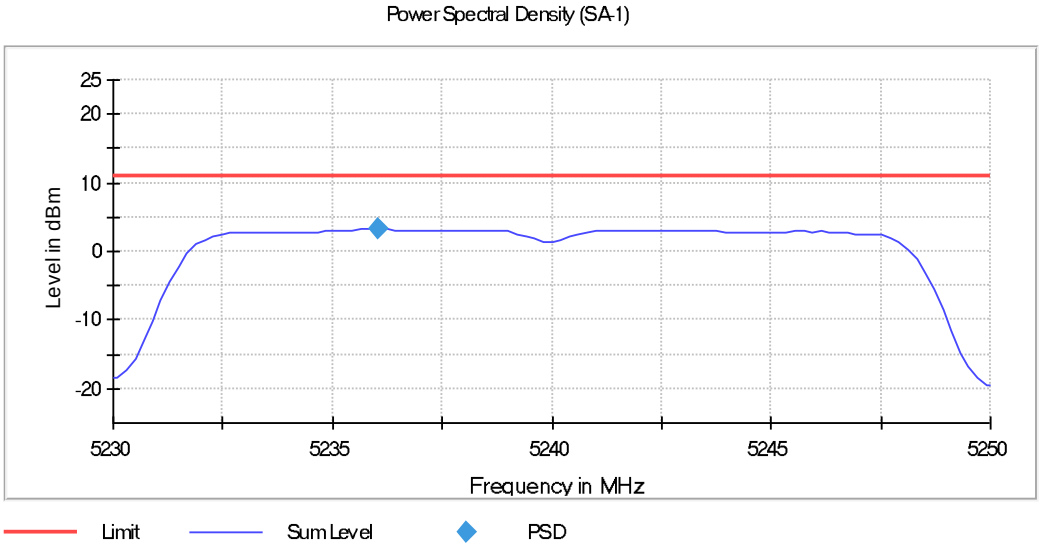


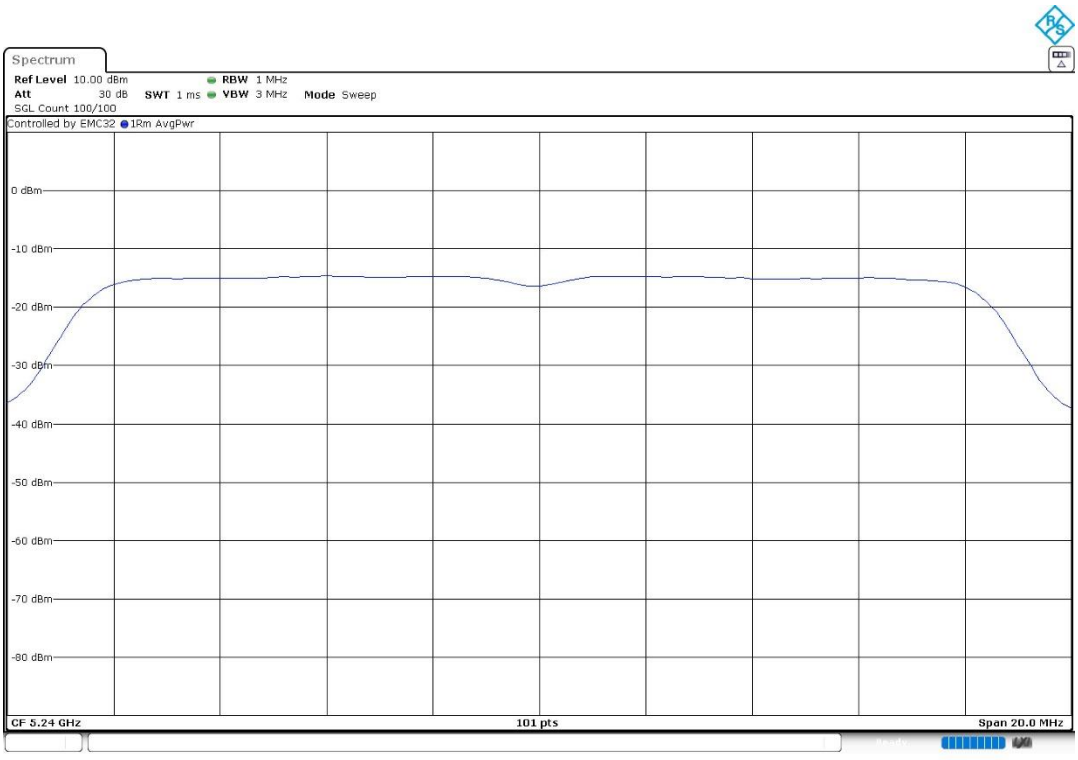
- Middle Channel 40 (5200 MHz):





- High Channel 48 (5240 MHz):

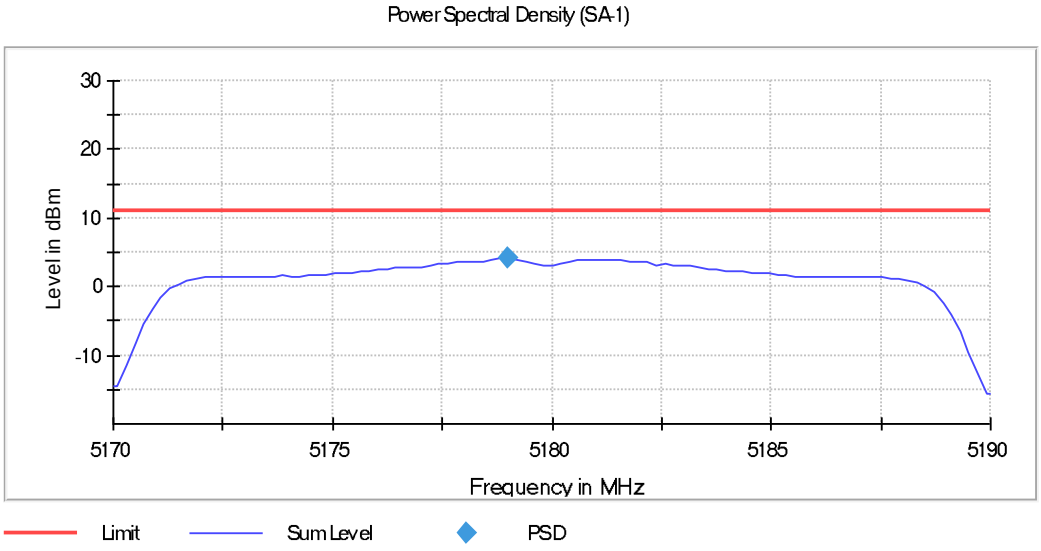


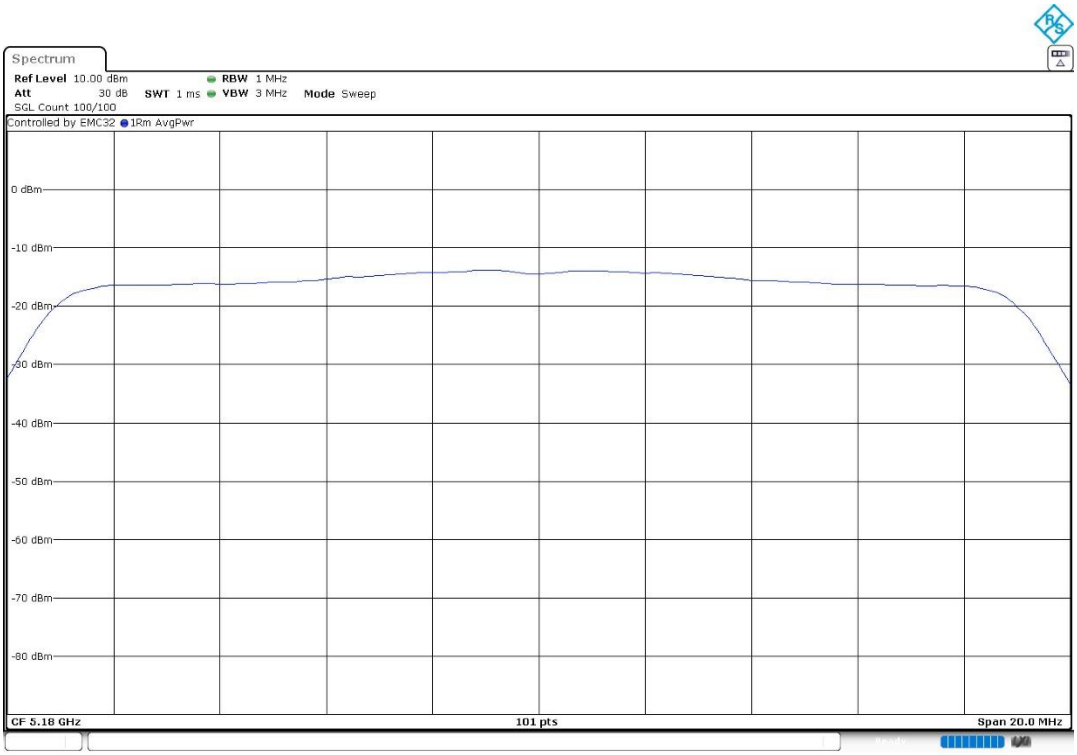


SISO 802.11 n20 (HT20):

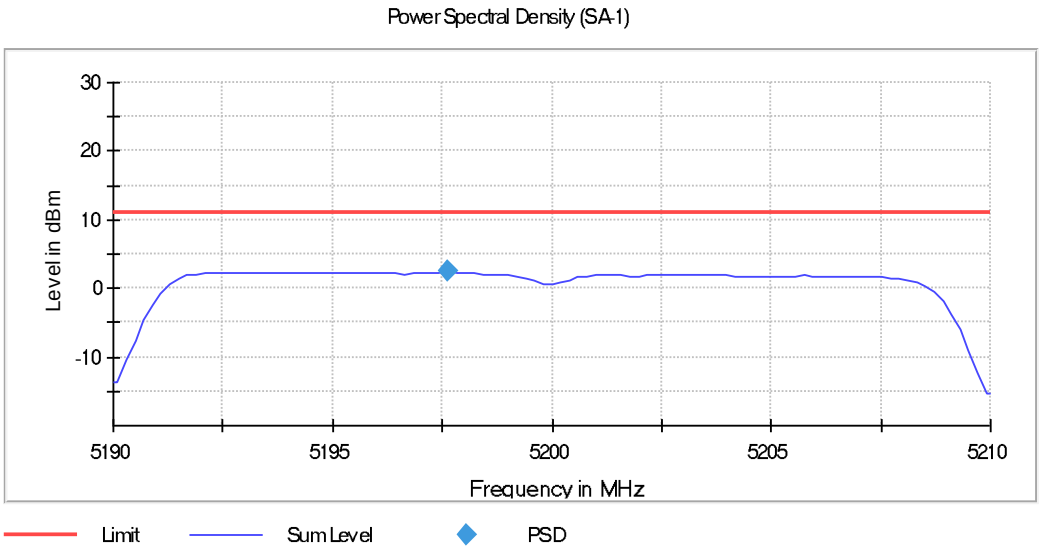
U-NII-1 (5150-5250 MHz)

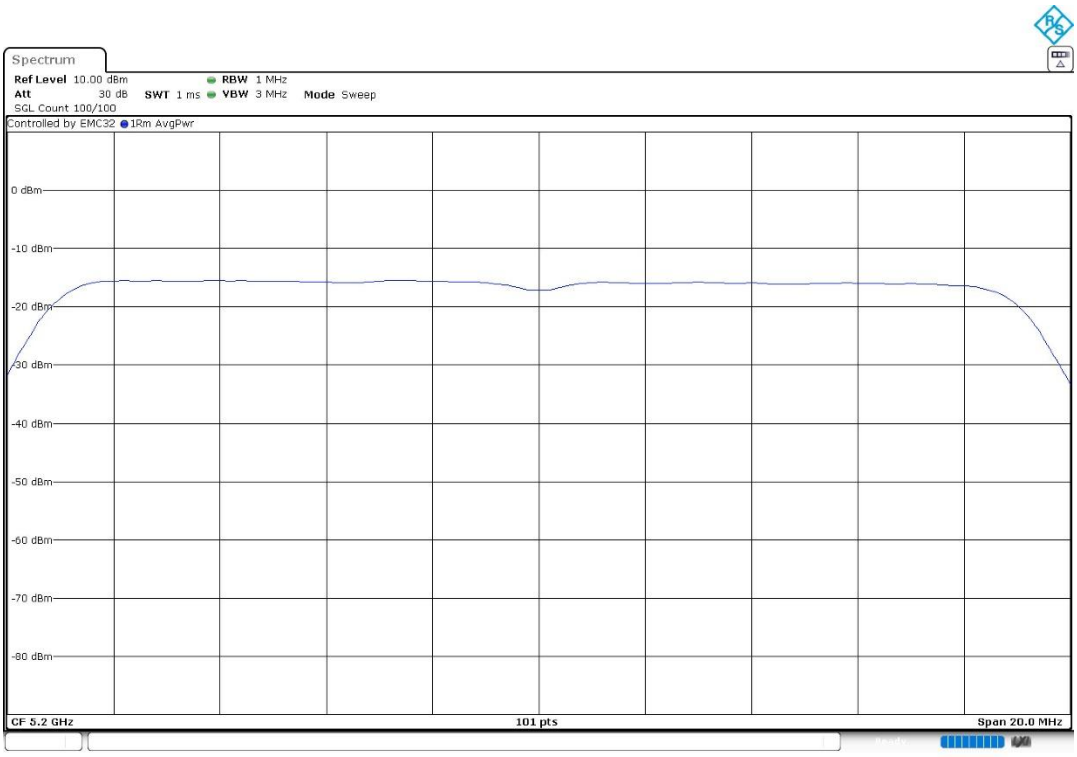
- Low Channel 36 (5180 MHz):



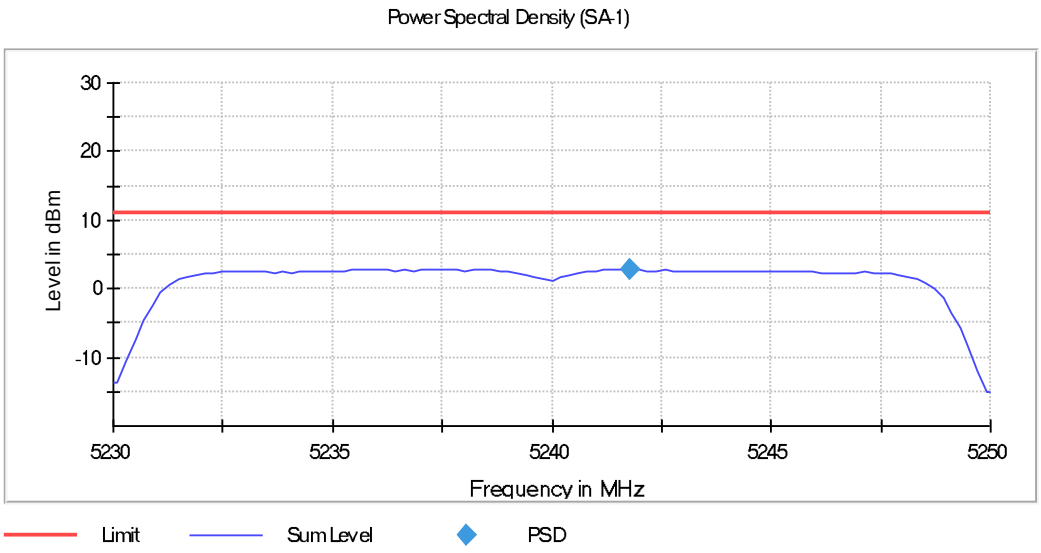


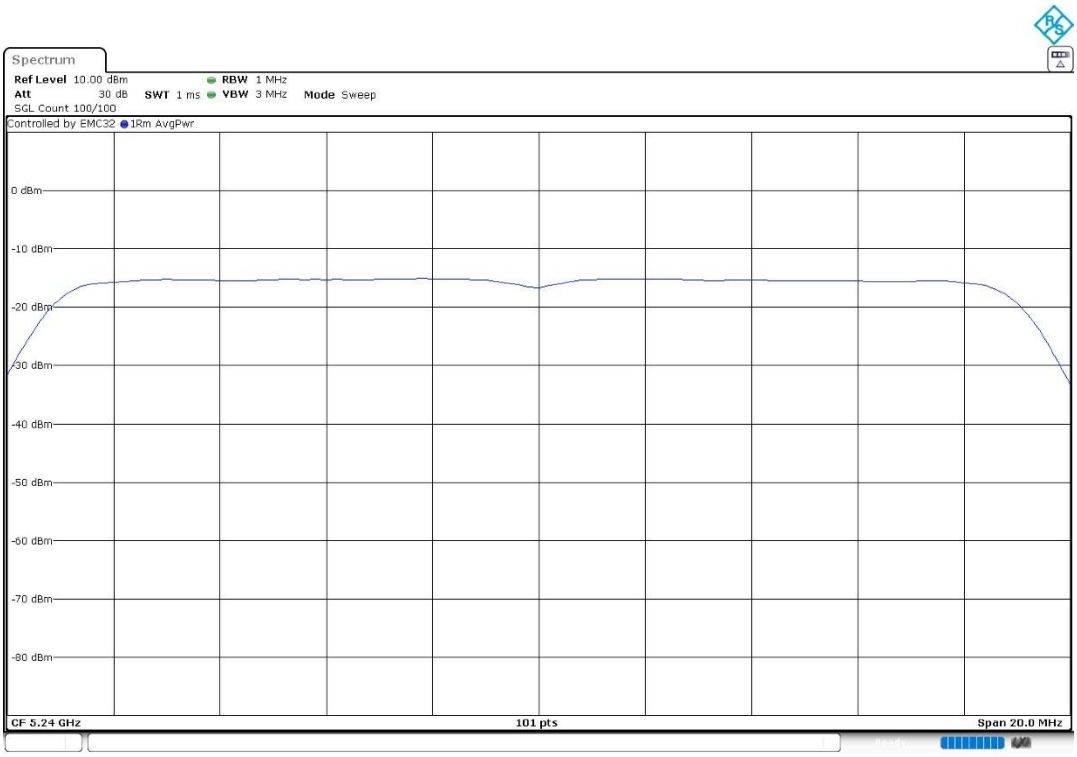
- Middle Channel 40 (5200 MHz):





- High Channel 48 (5240 MHz):

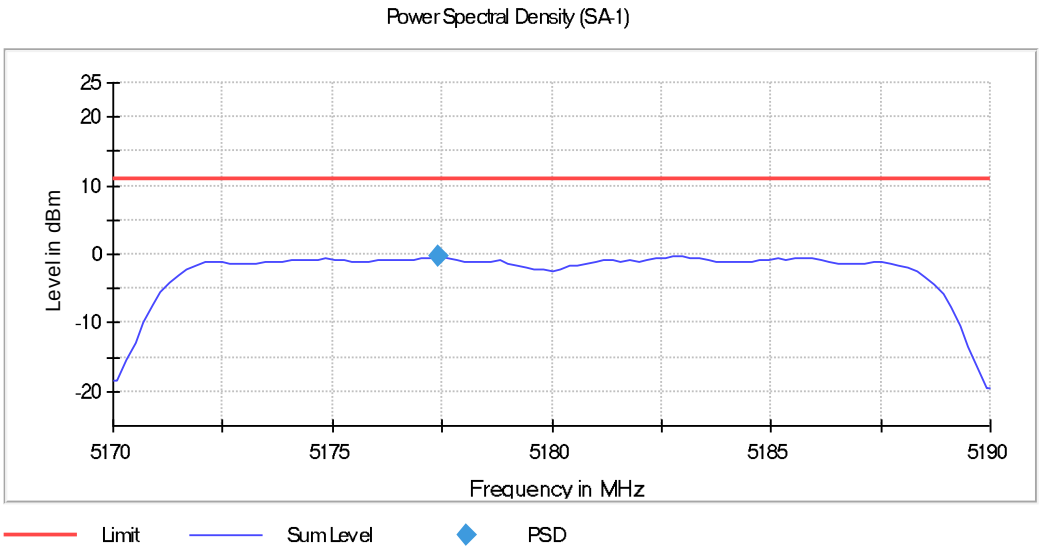


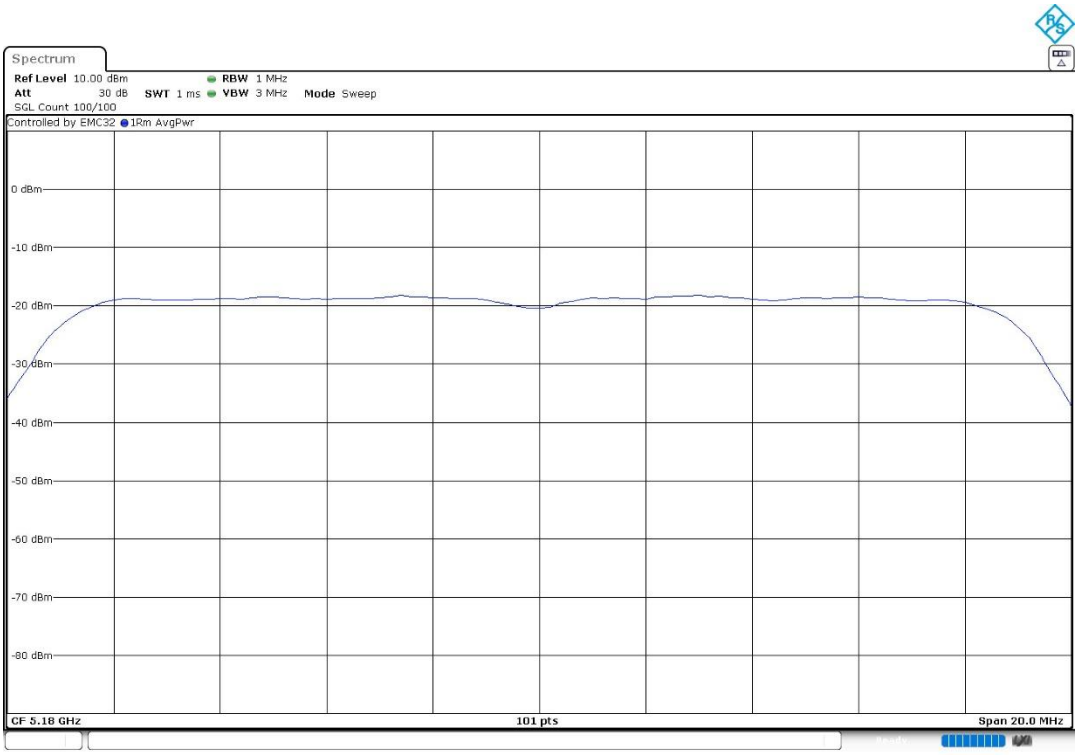


SISO 802.11 ac20 (VHT20):

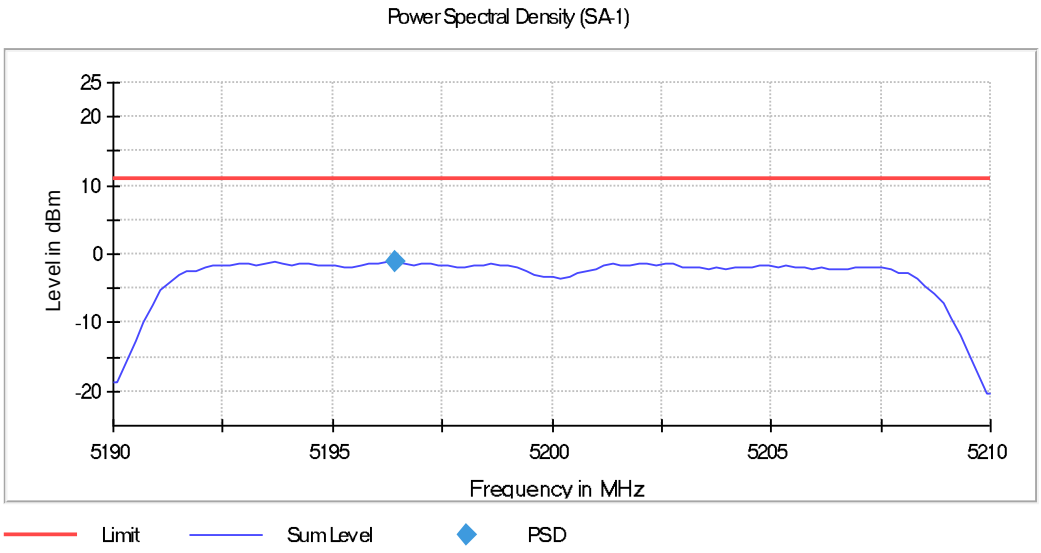
U-NII-1 (5150-5250 MHz)

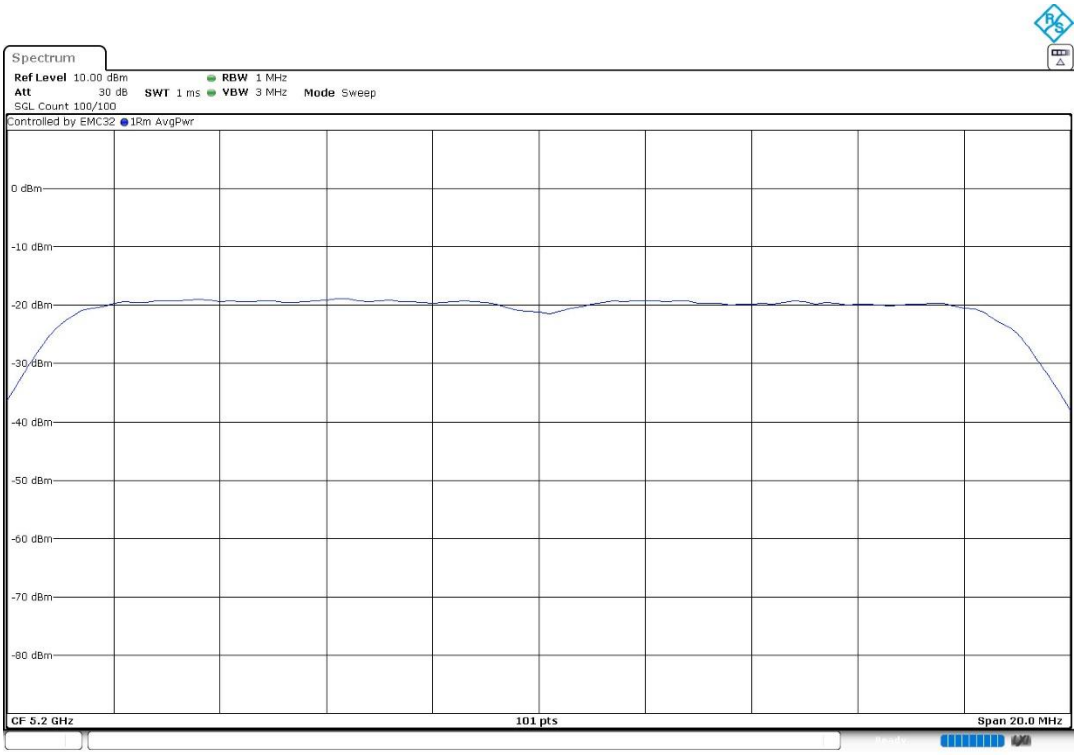
- Low Channel 36 (5180 MHz):



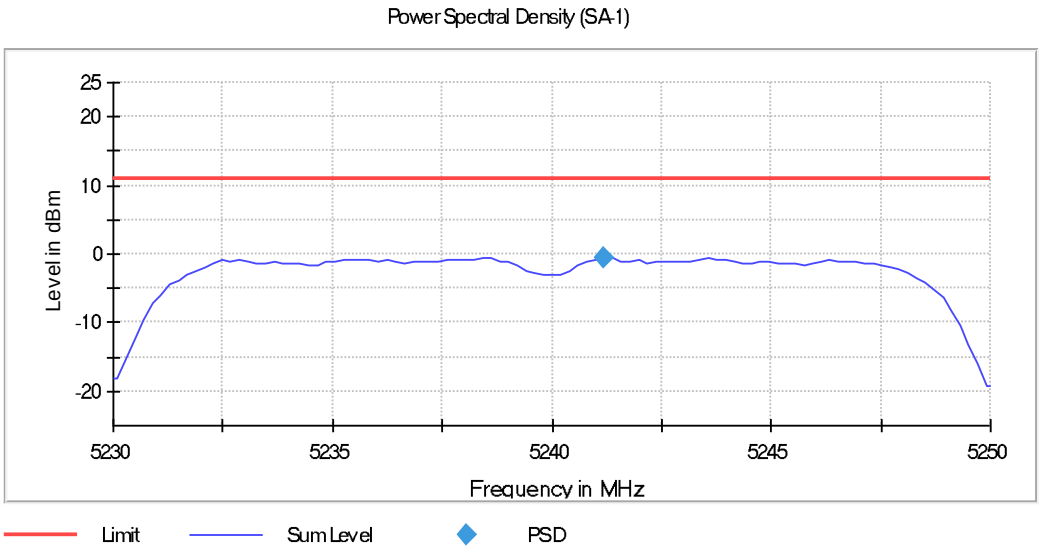


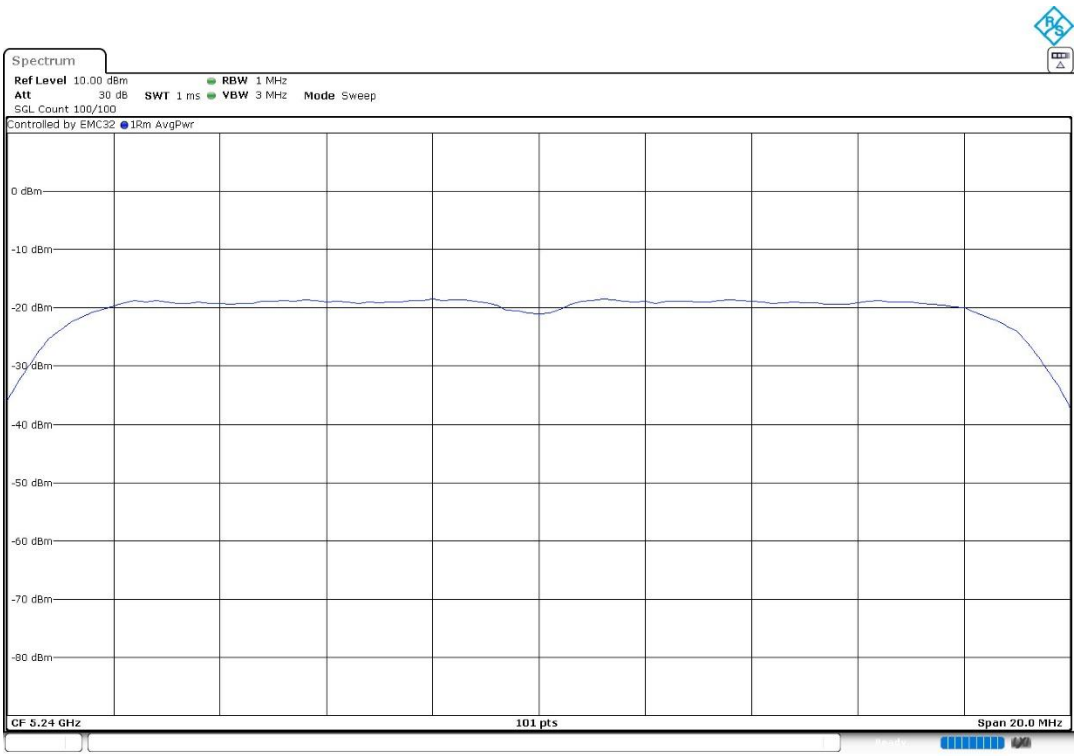
- Middle Channel 44 (5200 MHz):





- High Channel 48 (5240 MHz):

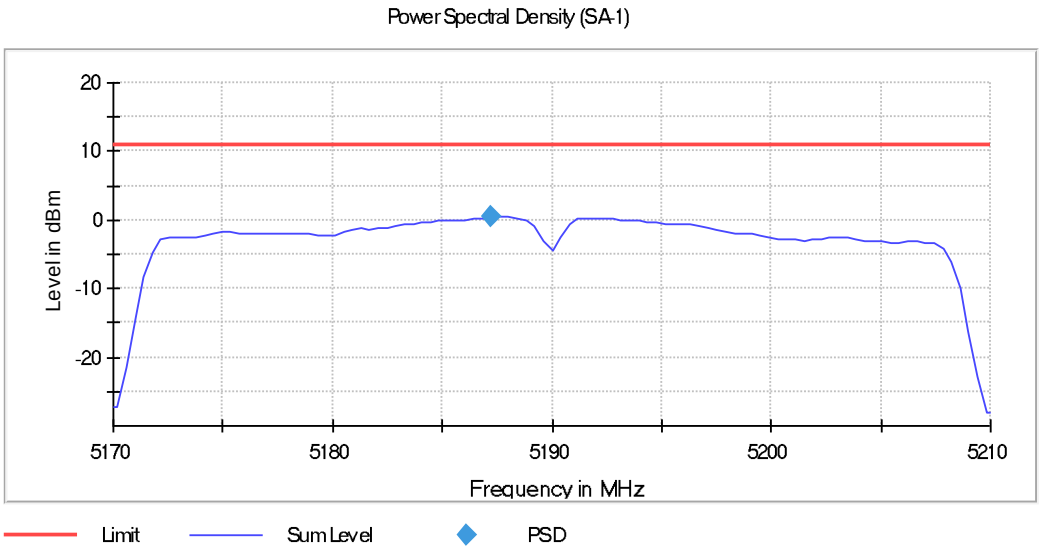


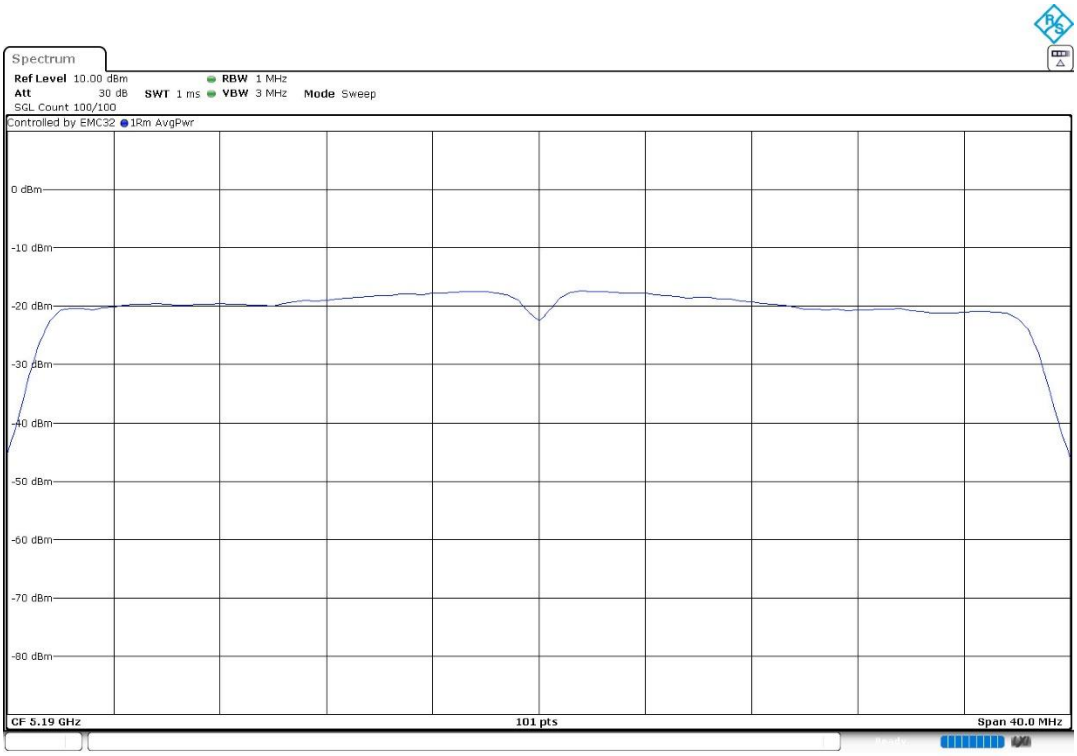


SISO 802.11 n40 (HT40):

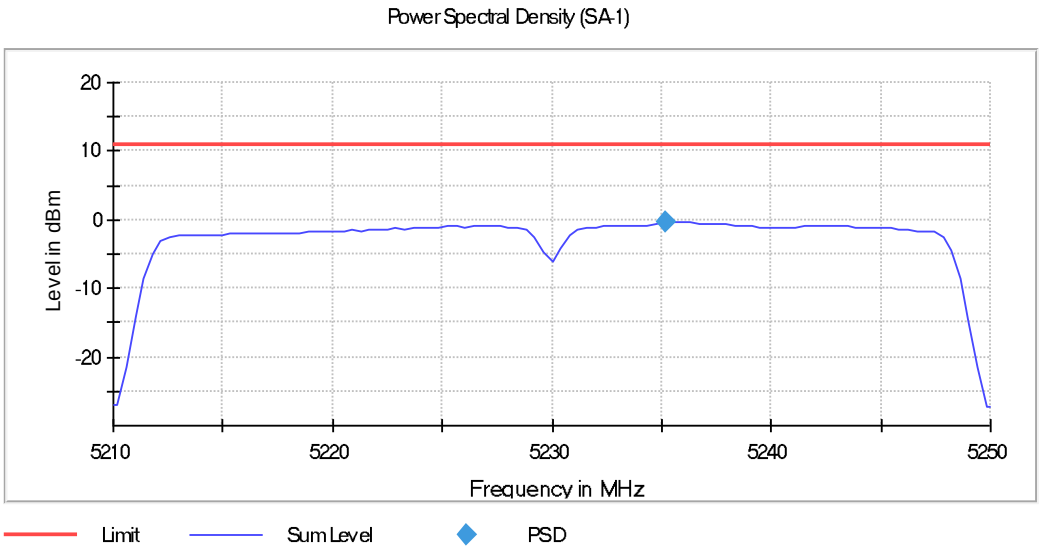
U-NII-1 (5150-5250 MHz)

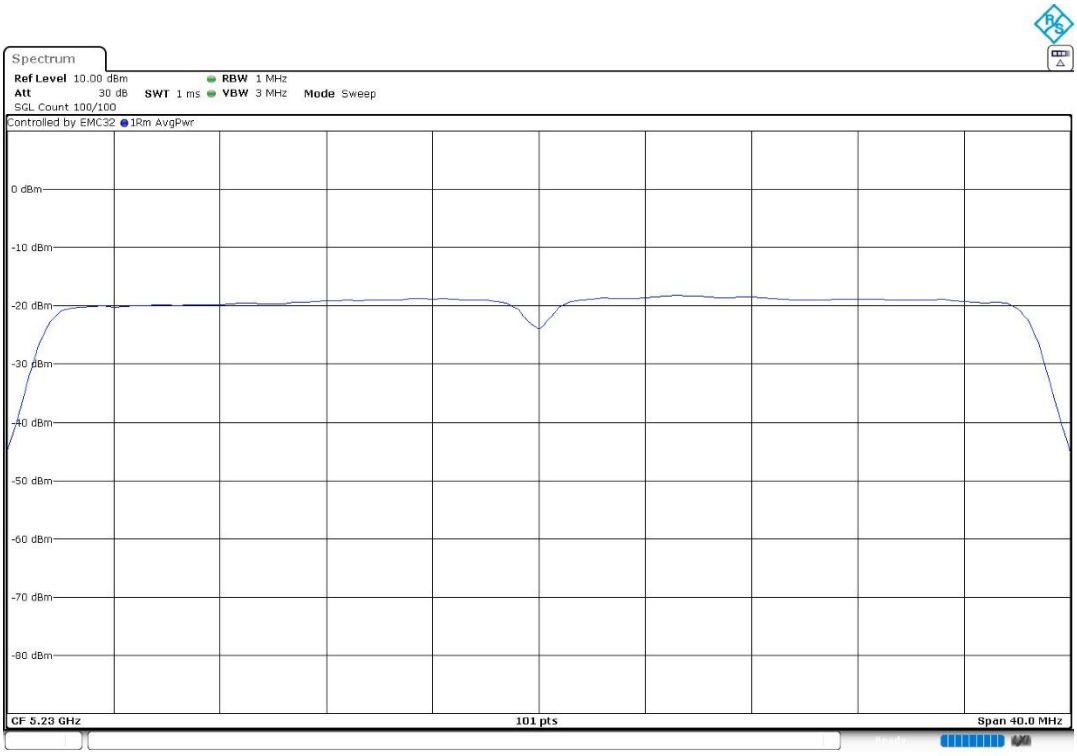
- Low Channel 38 (5190 MHz):





- High Channel 46 (5230 MHz):

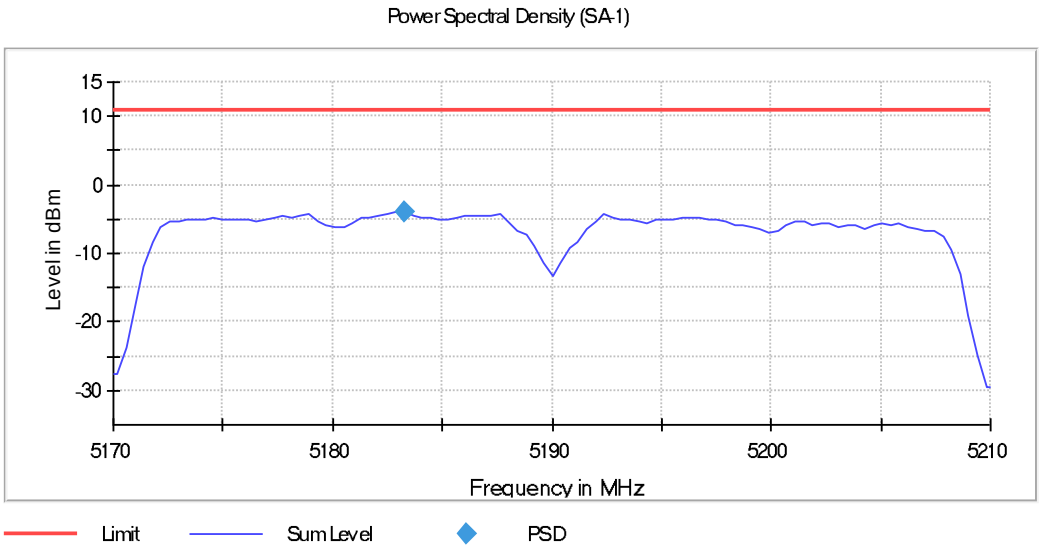


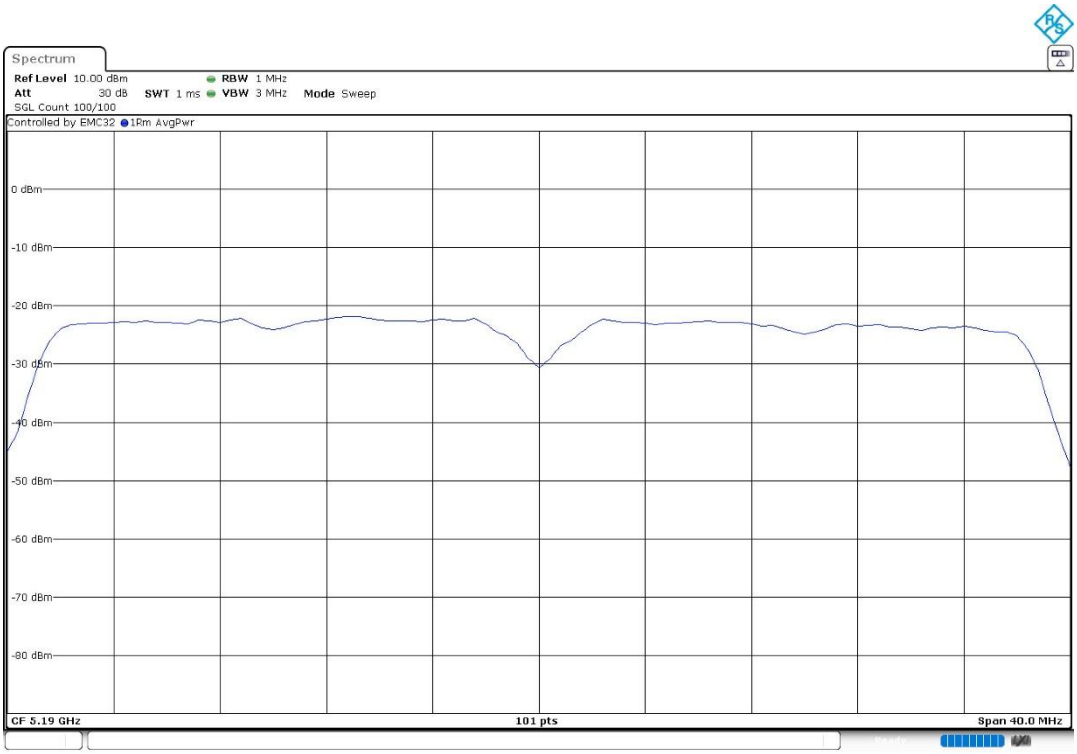


SISO 802.11 ac40 (VHT40):

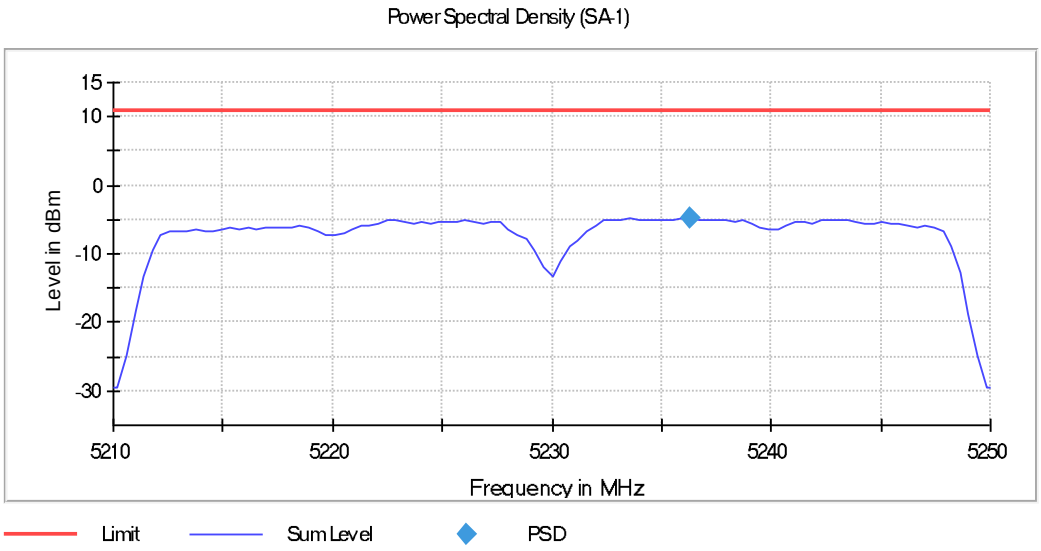
U-NII-1 (5150-5250 MHz)

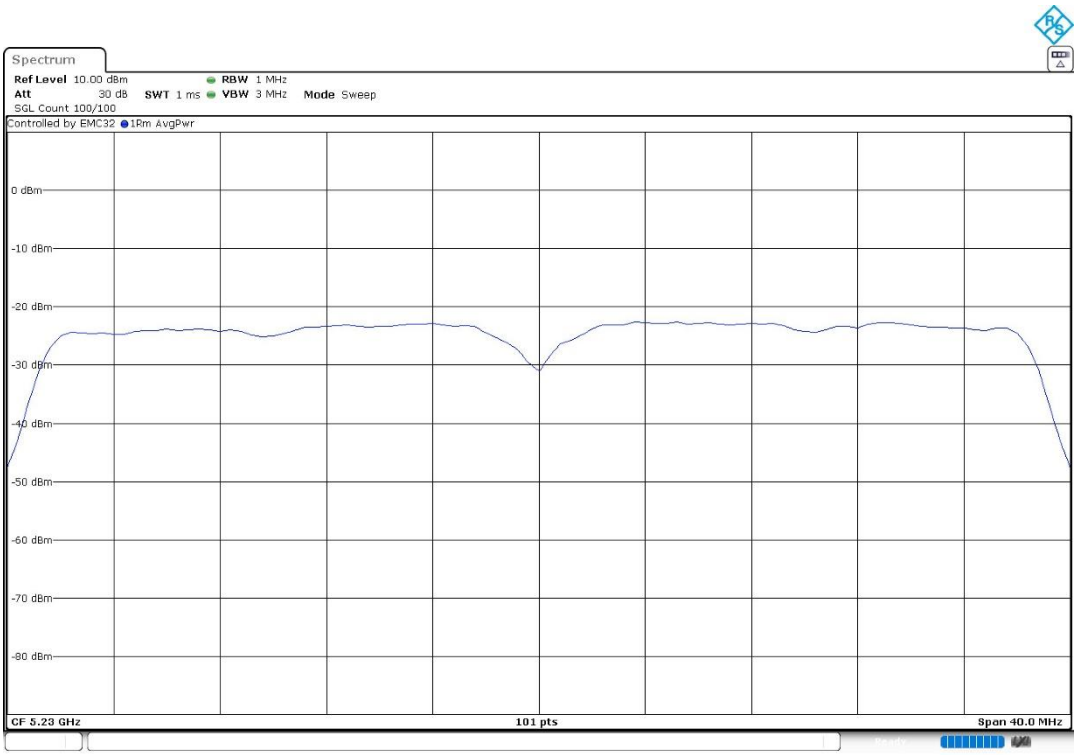
- Low Channel 38 (5190 MHz):





- High Channel 46 (5230 MHz):

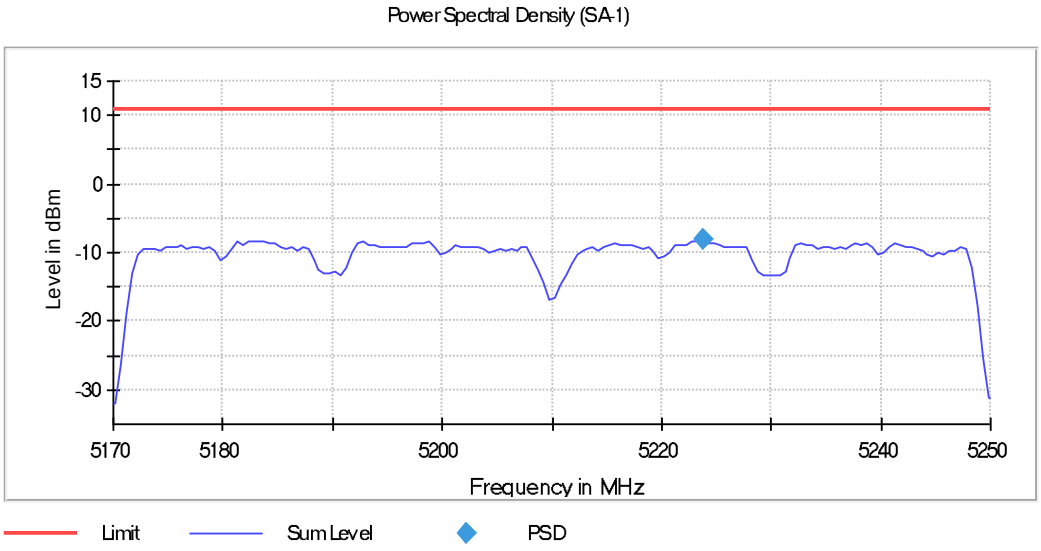


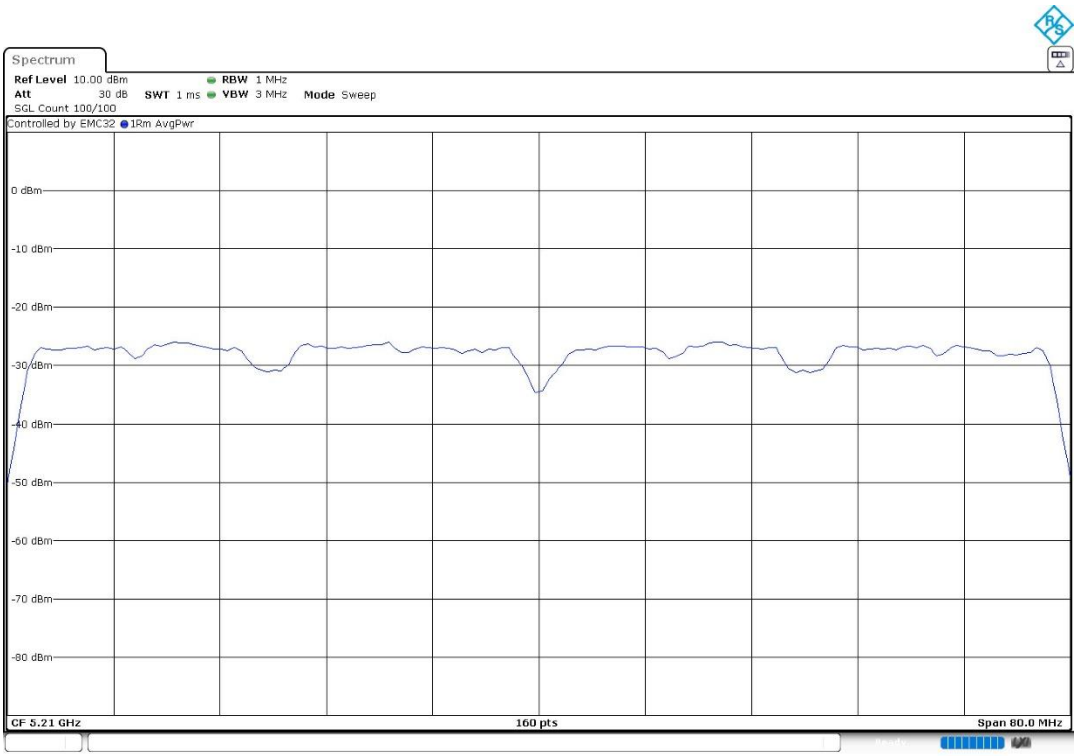


SISO 802.11 ac80 (VHT80):

U-NII-1 (5150-5250 MHz)

- Single Channel 42 (5210 MHz):





MIMO

MIMO 802.11 n20 (HT20):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Middle Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted PSD (dBm/MHz)	3.69	1.78	2.03
PSD Limit (dBm/MHz)	9.88		

MIMO 802.11 ac20 (VHT20):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Middle Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted PSD (dBm/MHz)	0.23	-0.44	0.06
PSD Limit (dBm/MHz)	9.88		

MIMO 802.11 n40 (HT40):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted PSD (dBm/MHz)	-0.20	-1.13
PSD Limit (dBm/MHz)	9.88	

MIMO 802.11 ac40 (VHT40):

U-NII-1 (5150-5250 MHz):

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted PSD (dBm/MHz)	-3.38	-3.33
PSD Limit (dBm/MHz)	9.88	

MIMO 802.11 ac80 (VHT80):

U-NII-1 (5150-5250 MHz):

Channel	Single Channel 42 (5210 MHz)
Maximum Conducted PSD (dBm/MHz)	-6.03
PSD Limit (dBm/MHz)	9.88

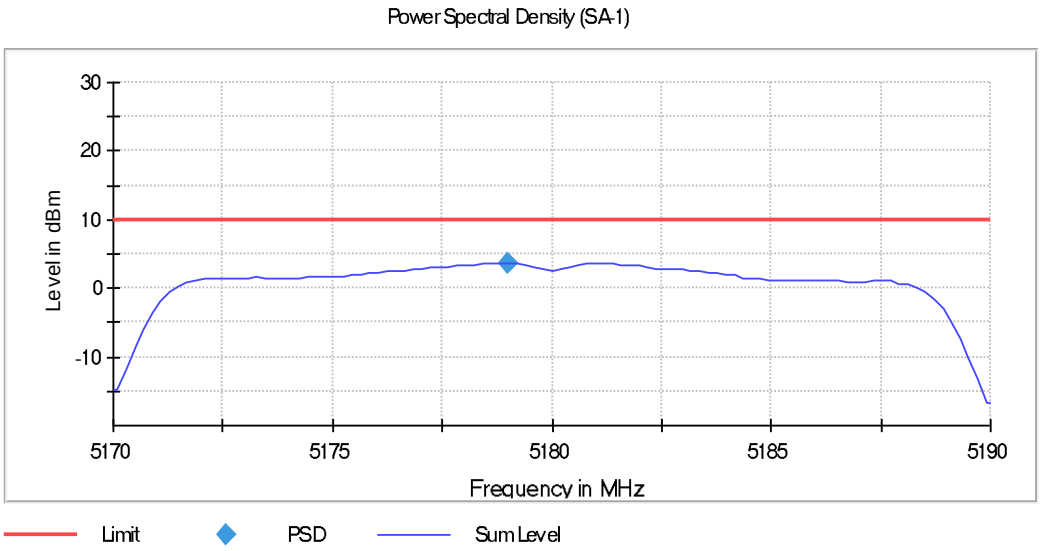
Verdict: PASS

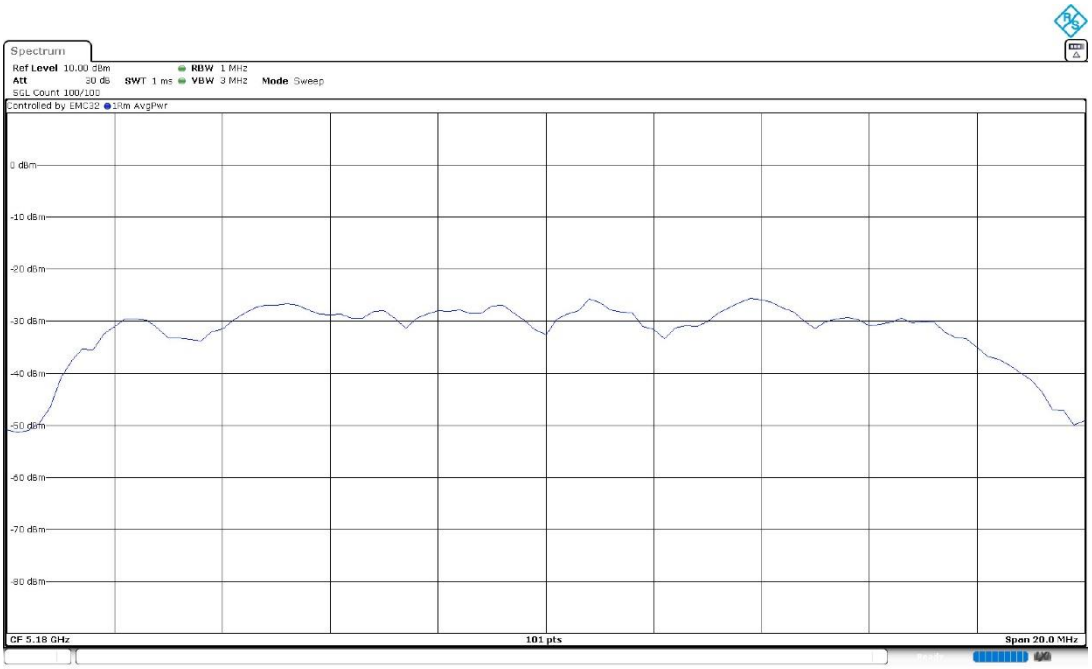
MIMO

MIMO 802.11 n20 (HT20):

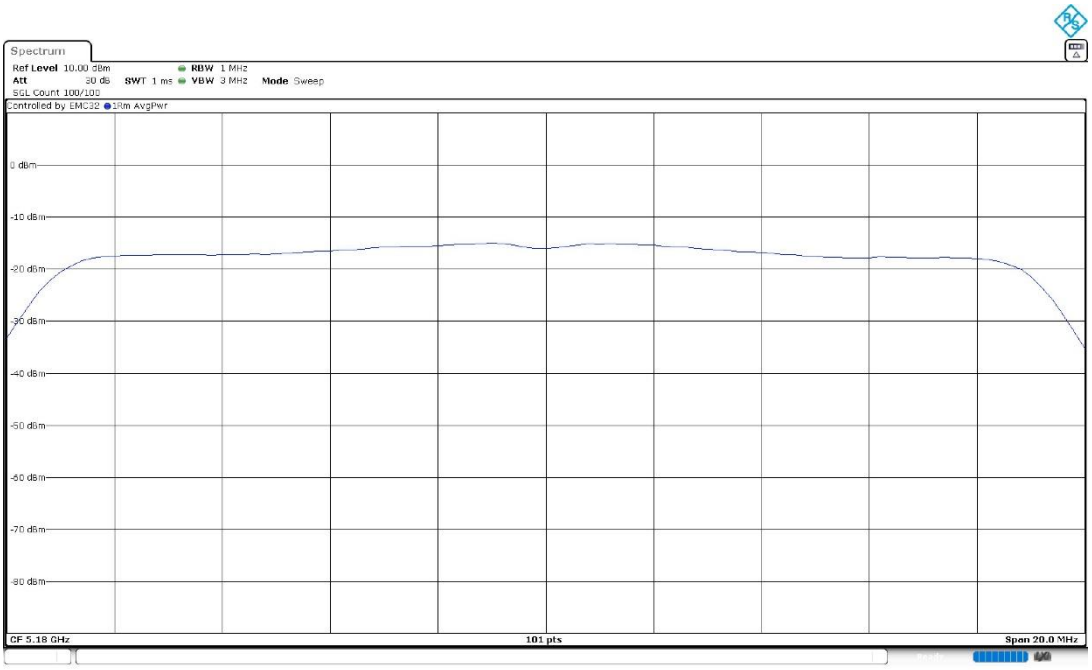
U-NII-1 (5150-5250 MHz)

- Low Channel 36 (5180 MHz):



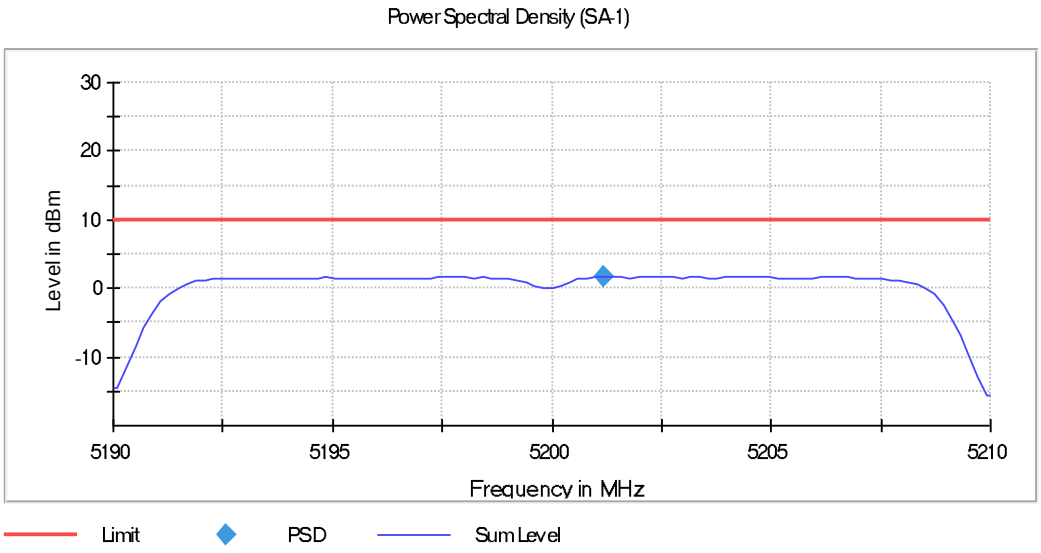


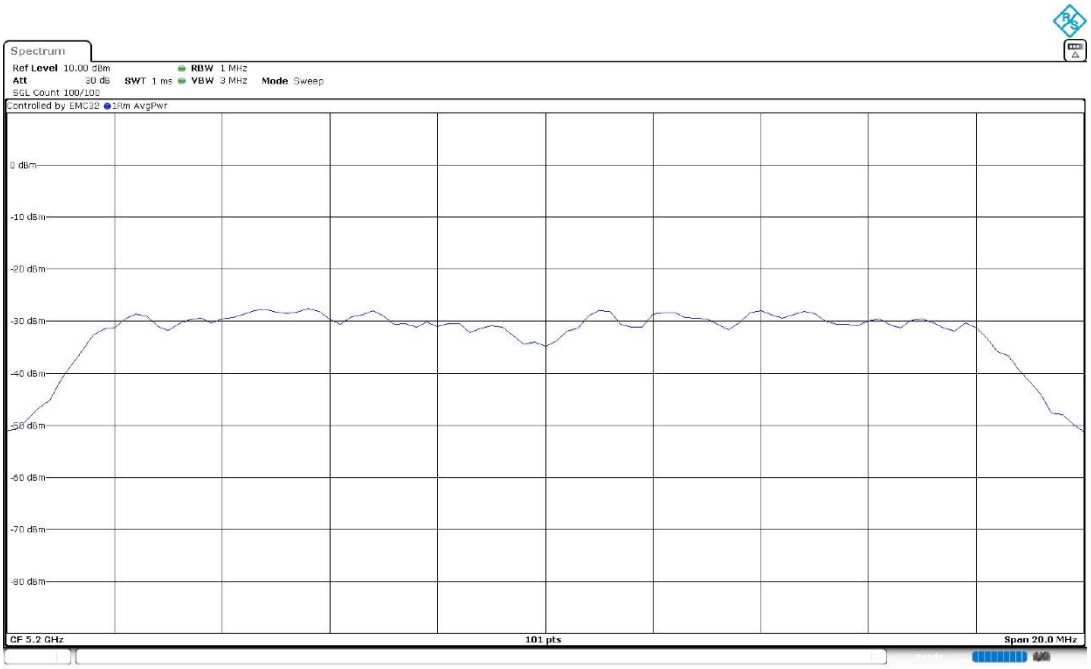
PSD Chain 1


Spectrum
Ref Level 10.00 dBm
RBW 1 MHz
Att 30 dB
SWT 1 ms
VBW 3 MHz
Mode Sweep
SGL Count 100/100
Controlled by EMC32
1Rm AvgPwr
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.18 GHz
101 pts
Span 20.0 MHz

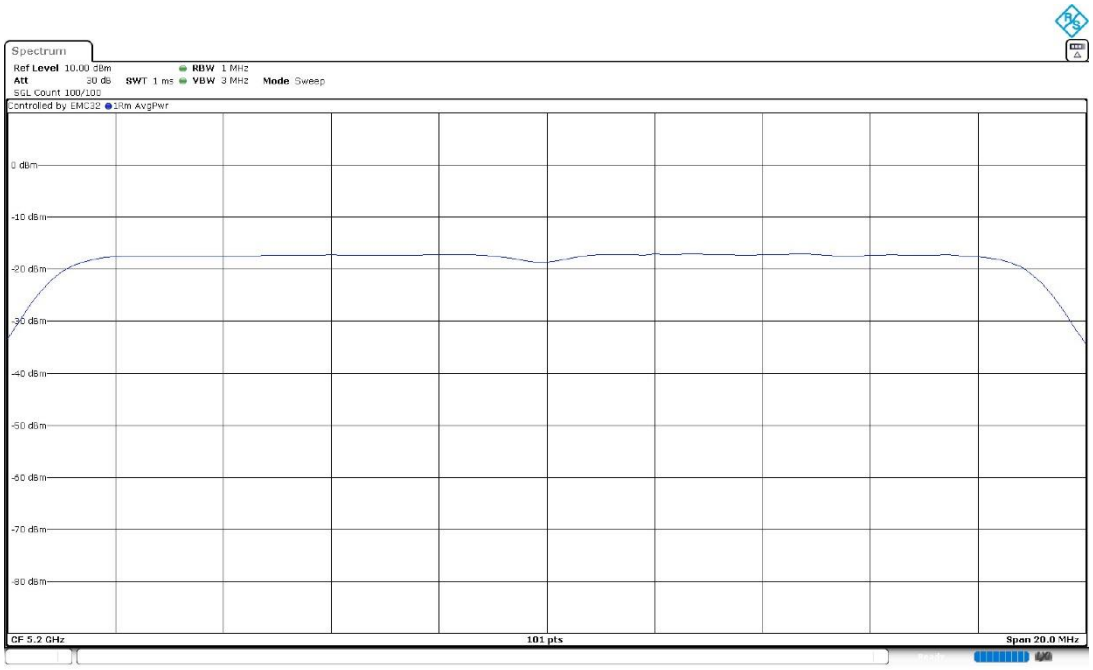
PSD Chain 0

- Middle Channel 40 (5200 MHz):



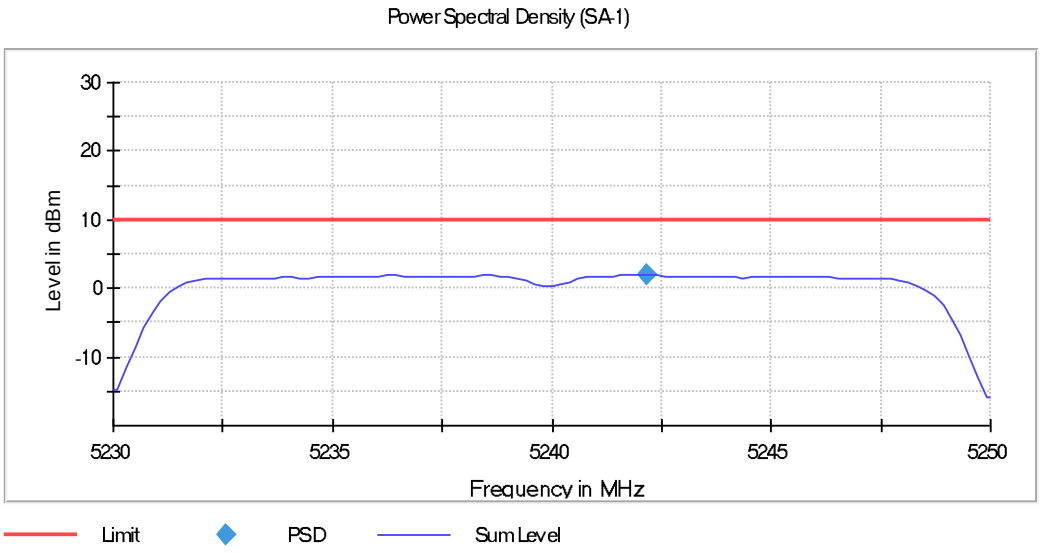


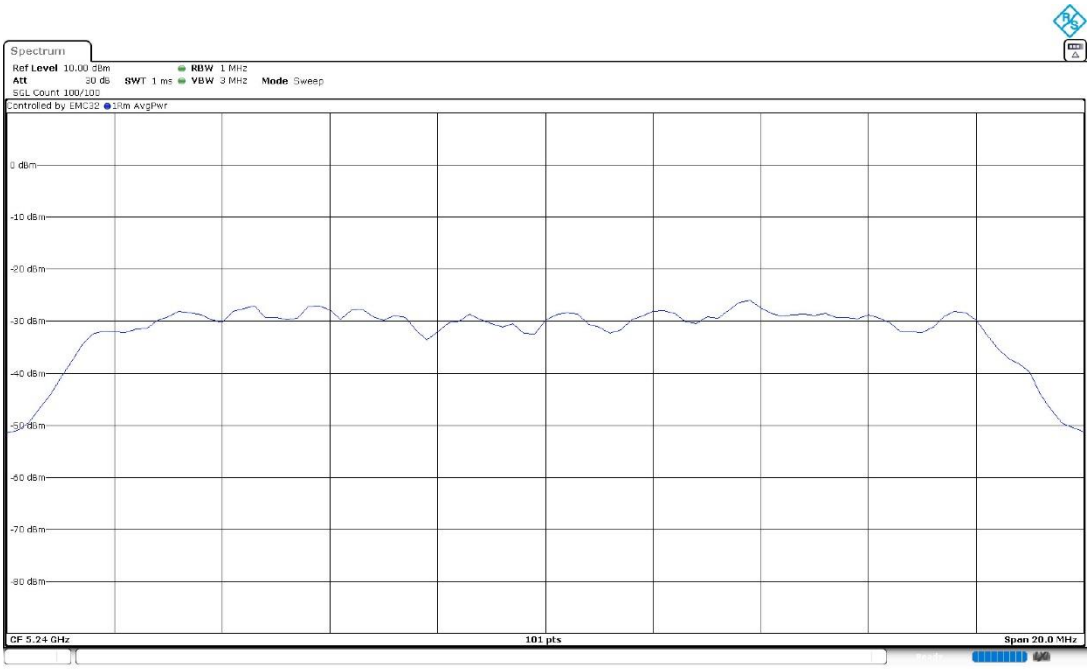
PSD Chain 1


Spectrum
Ref Level 10.00 dBm
RBW 1 MHz
Att 30 dB
SWT 1 ms
VBW 3 MHz
Mode Sweep
SGL Count 100/100
Controlled by EMC32
1Rm AvgPwr
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.2 GHz
101 pts
Span 20.0 MHz

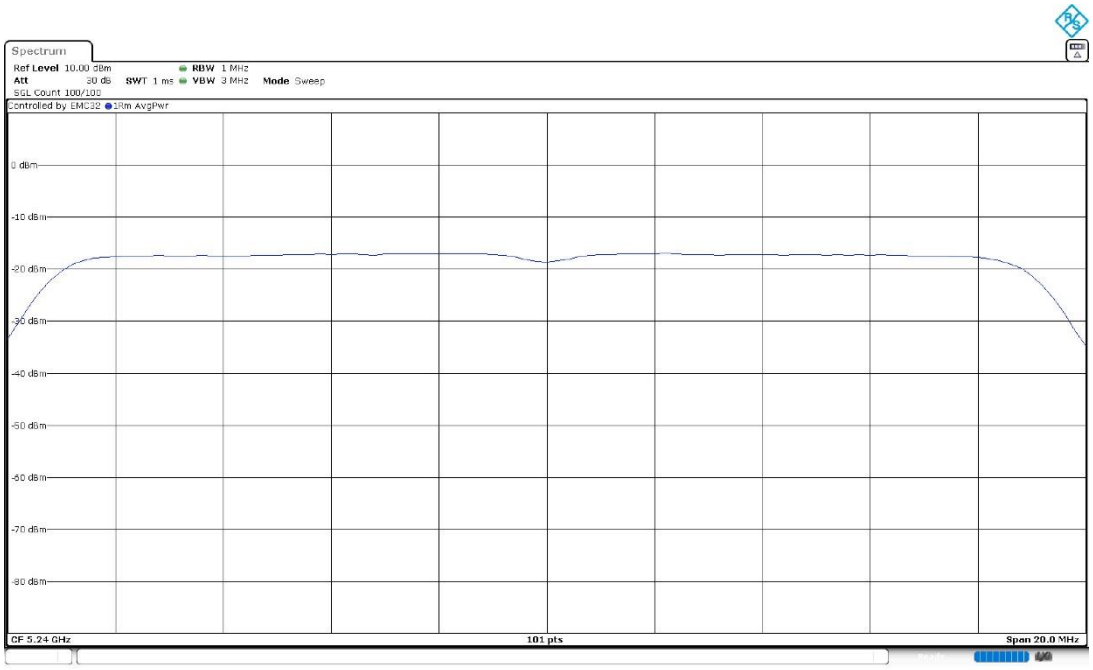
PSD Chain 0

- High Channel 48 (5240 MHz):





PSD Chain 1

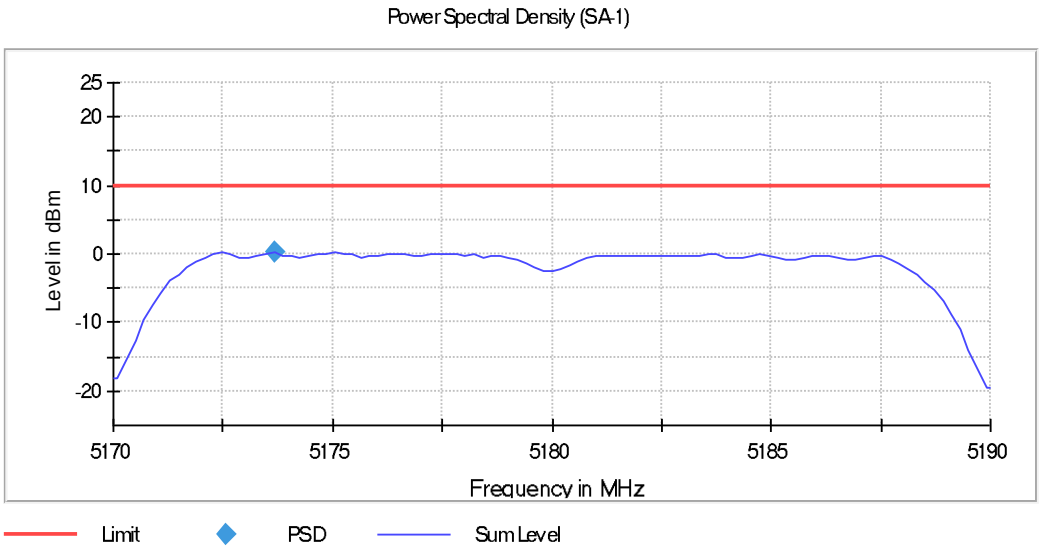

Spectrum
Ref Level 10.00 dBm
RBW 1 MHz
Att 30 dB
SWT 1 ms
VBW 3 MHz
Mode Sweep
SGL Count 100/100
Controlled by EMC32
1Rm AvgPwr
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.24 GHz
101 pts
Span 20.0 MHz

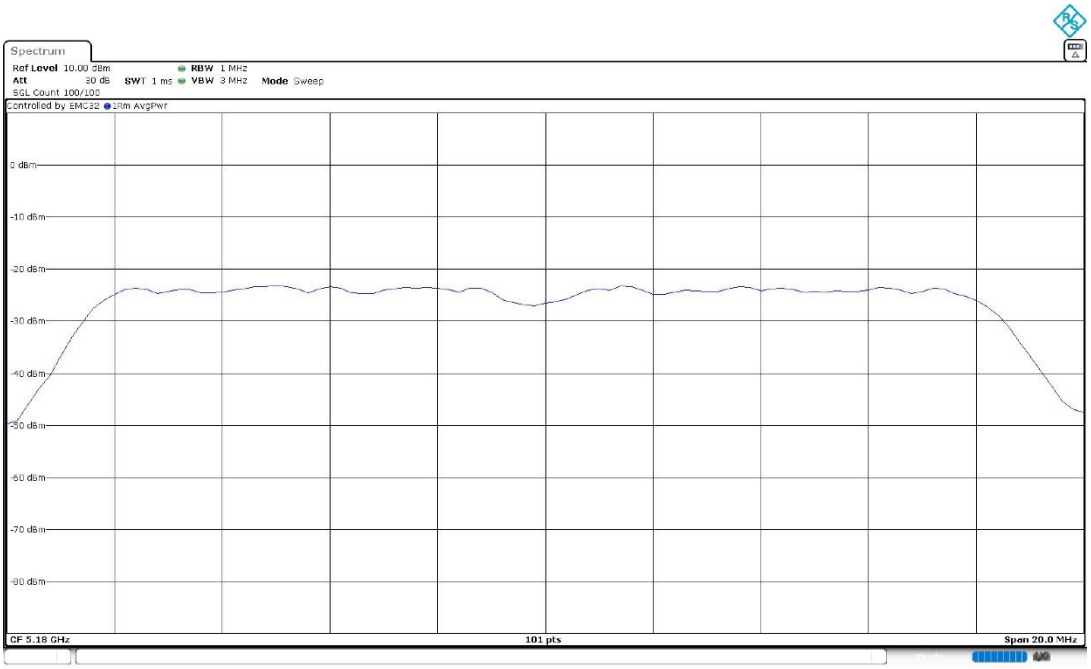
PSD Chain 0

MIMO 802.11 ac20 (VHT20):

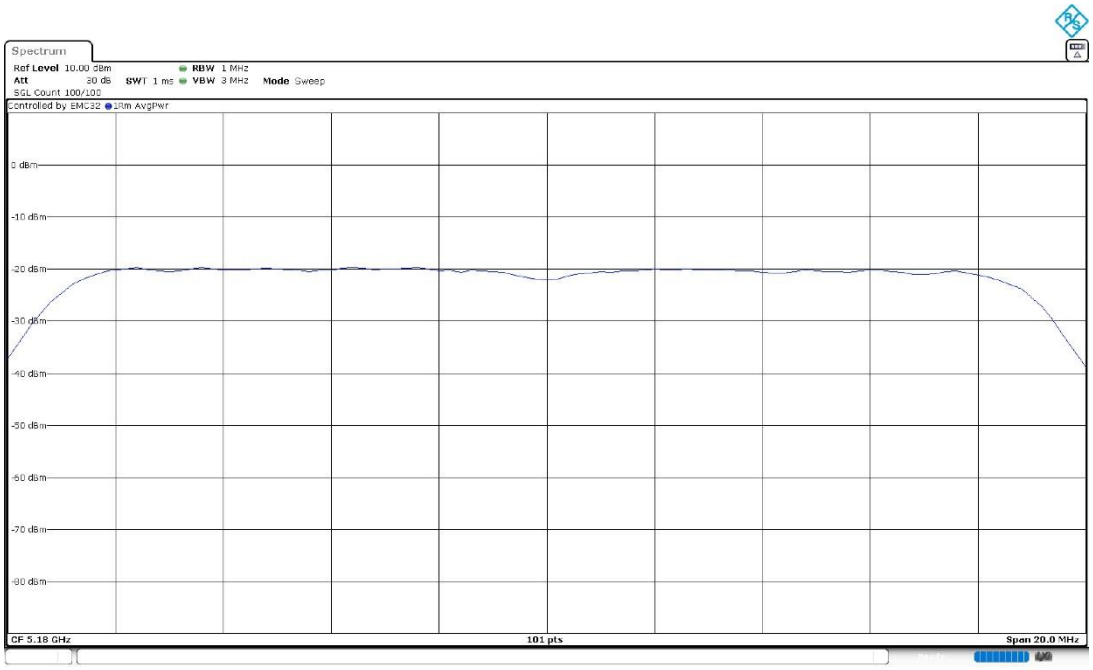
U-NII-1 (5150-5250 MHz)

- Low Channel 36 (5180 MHz):



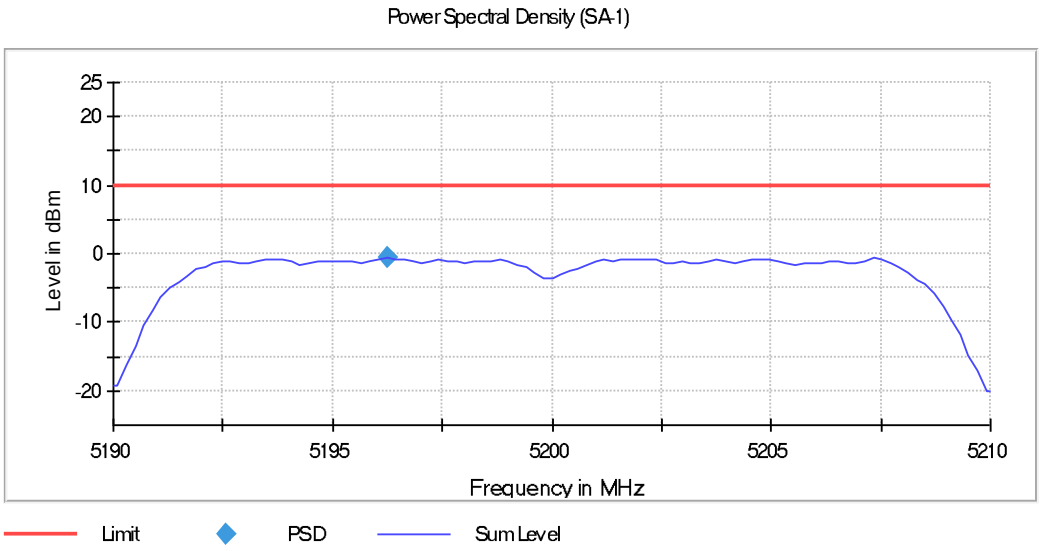


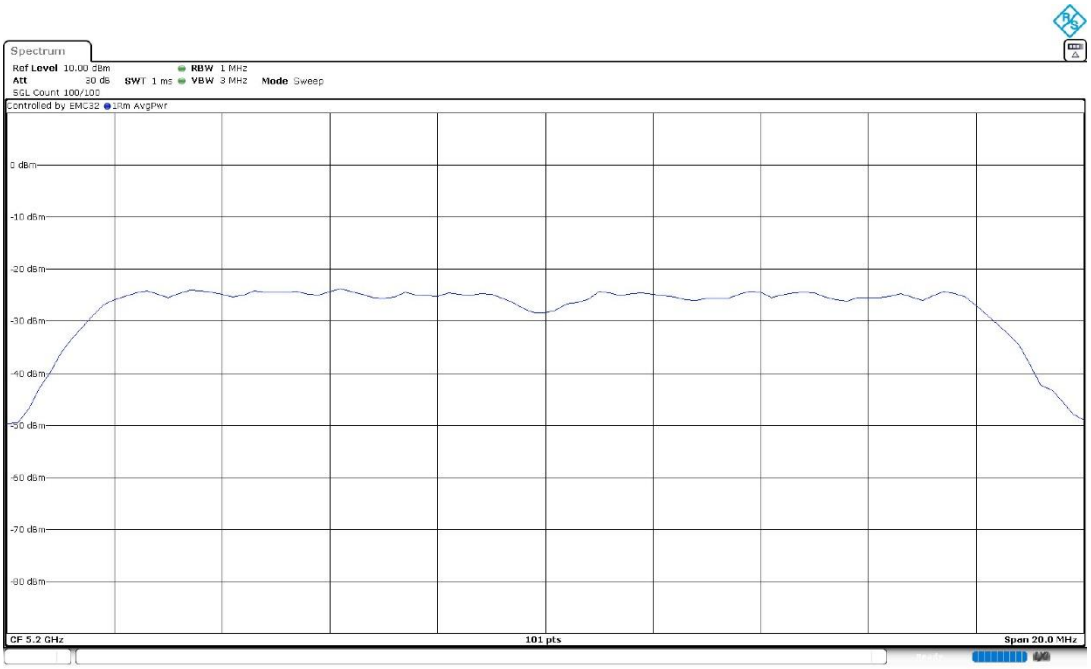
PSD Chain 1


Spectrum
Ref Level 10.00 dBm
RBW 1 MHz
Att 30 dB
SWT 1 ms
VBW 3 MHz
Mode Sweep
SGL Count 100/100
Controlled by EMC32
1Rm AvgPwr
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.18 GHz
101 pts
Span 20.0 MHz

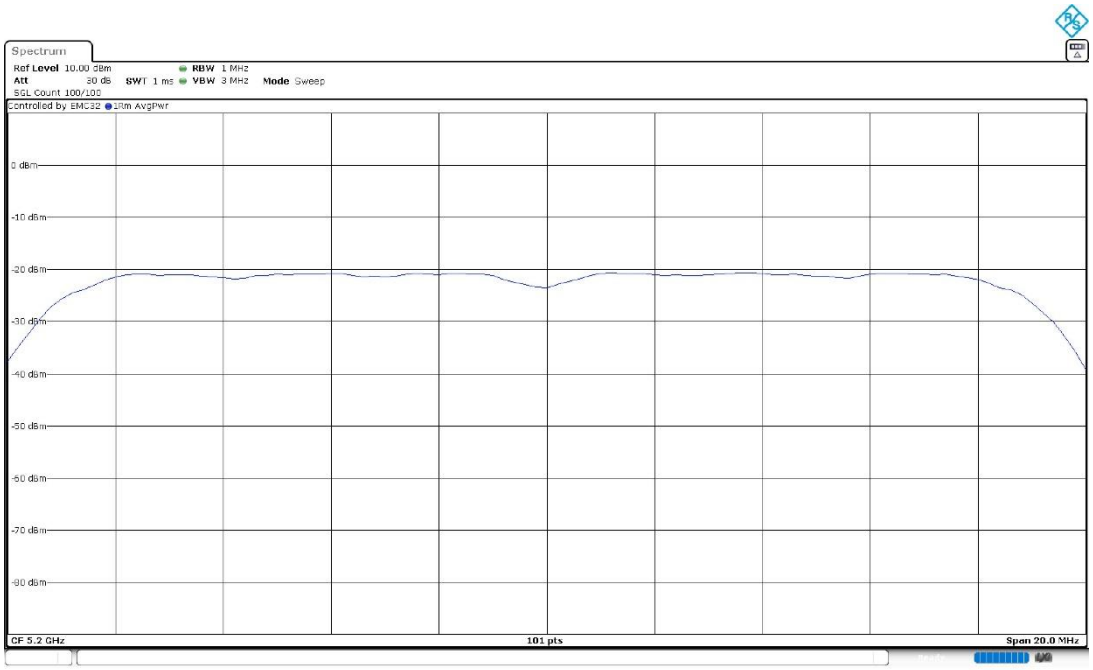
PSD Chain 0

- Middle Channel 40 (5200 MHz):



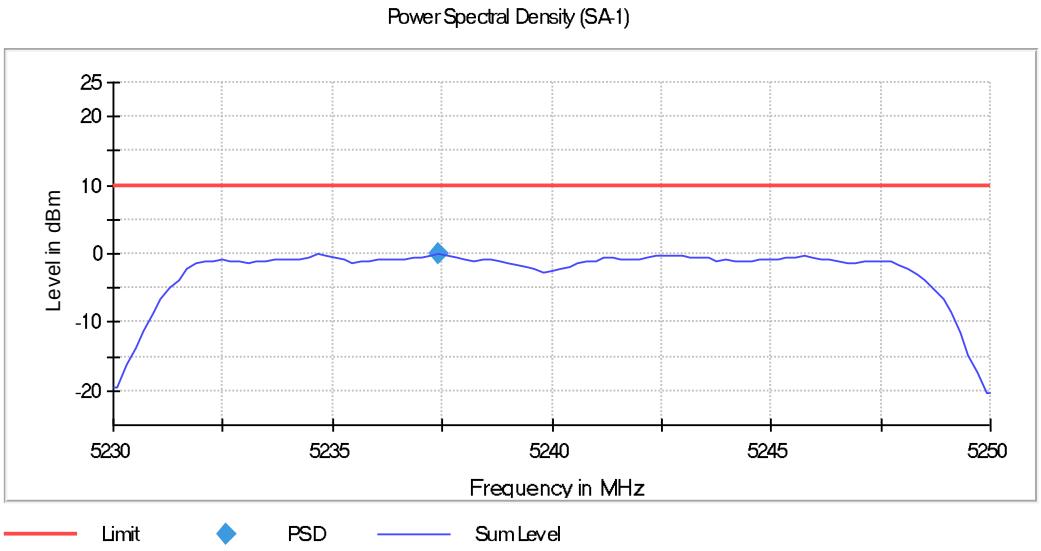


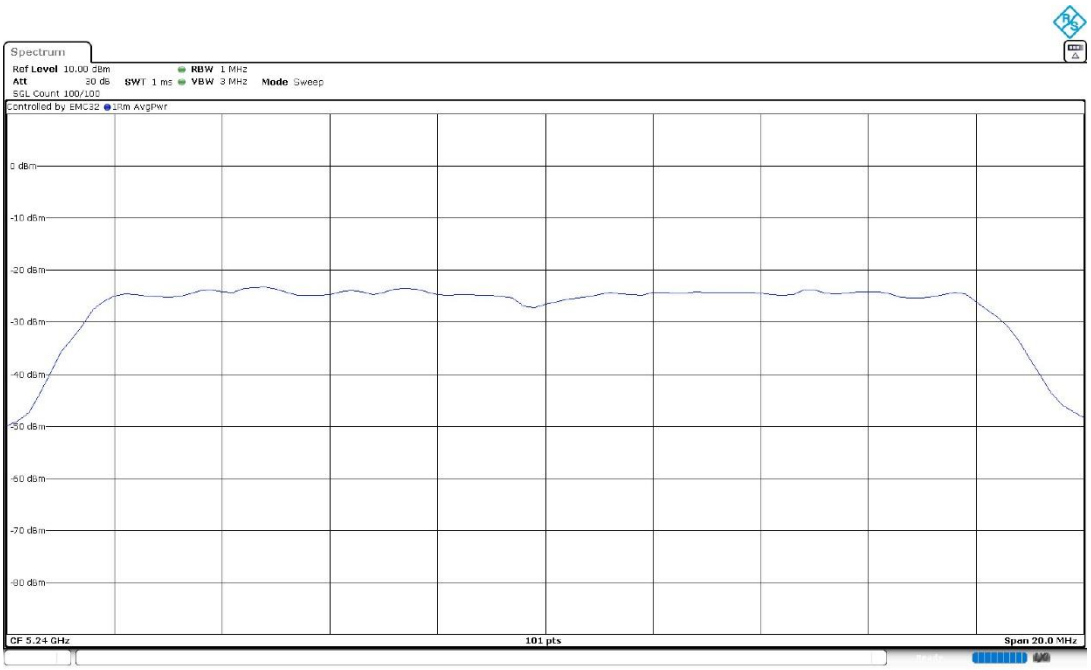
PSD Chain 1


Spectrum
Ref Level 10.00 dBm
RBW 1 MHz
Att 30 dB
SWT 1 ms
VBW 3 MHz
Mode Sweep
SGL Count 100/100
Controlled by EMC32
1Rm AvgPwr
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.2 GHz
101 pts
Span 20.0 MHz

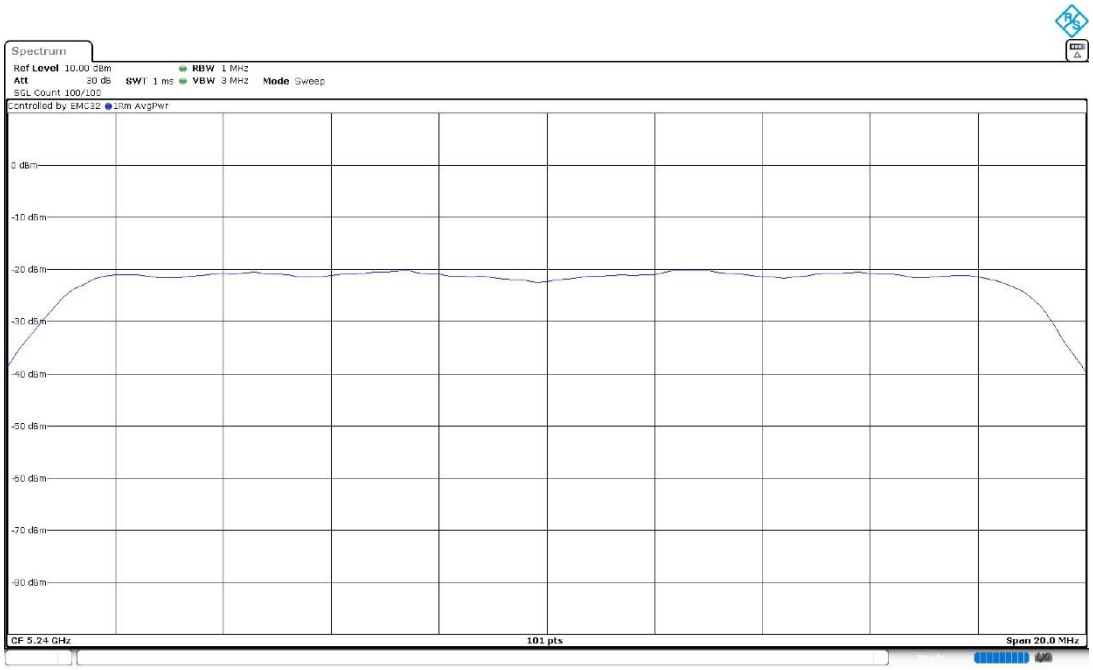
PSD Chain 0

- High Channel 48 (5240 MHz):





PSD Chain 1

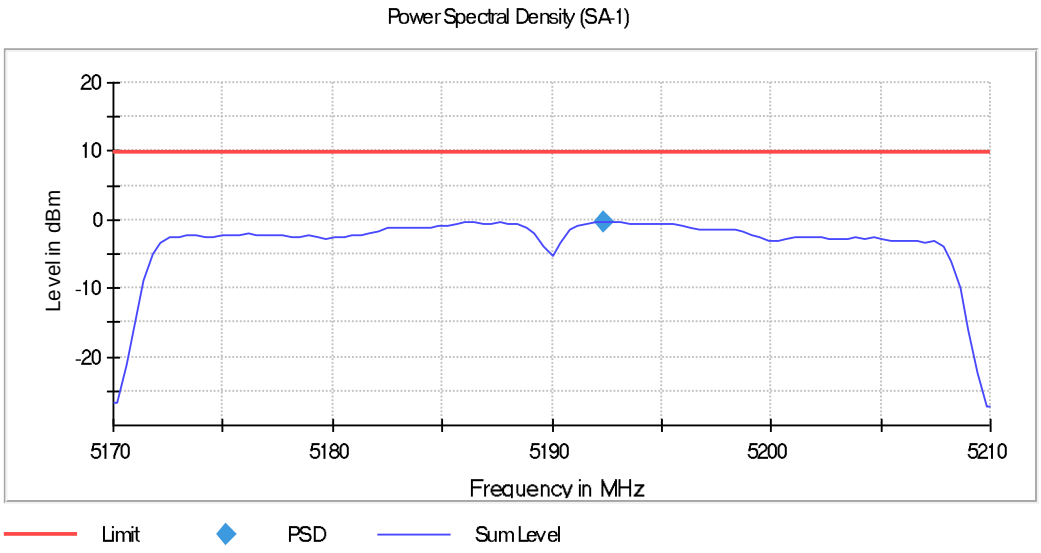

Spectrum
Ref Level 10.00 dBm
RBW 1 MHz
Att 30 dB
SWT 1 ms
VBW 3 MHz
Mode Sweep
SGL Count 100/100
Controlled by EMC32
1Rm AvgPwr
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.24 GHz
101 pts
Span 20.0 MHz

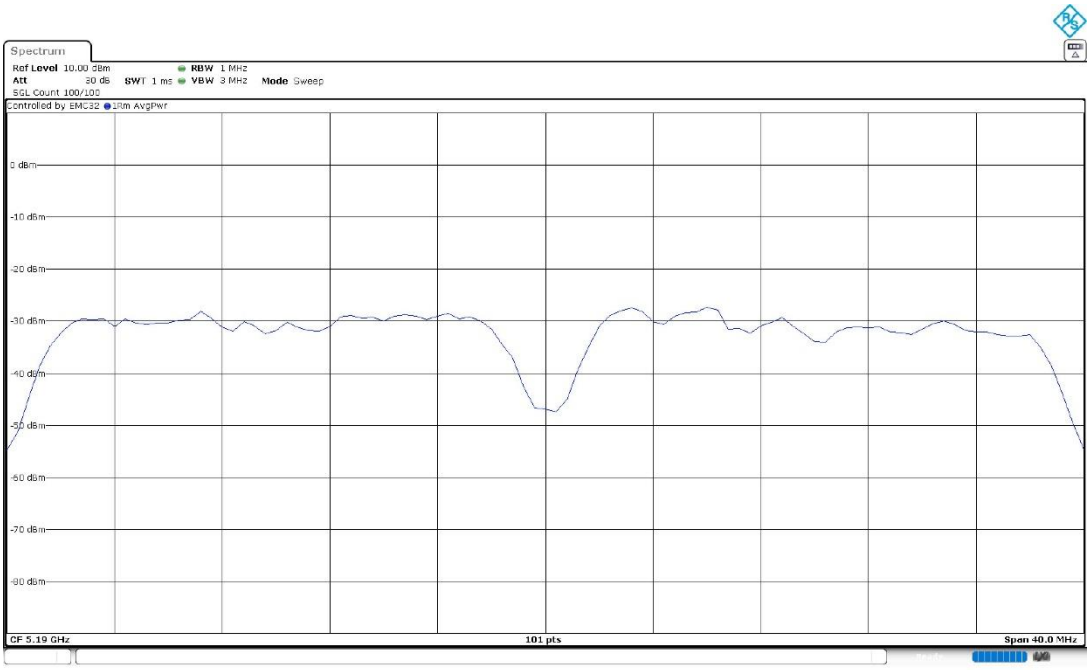
PSD Chain 0

MIMO 802.11 n40 (HT40):

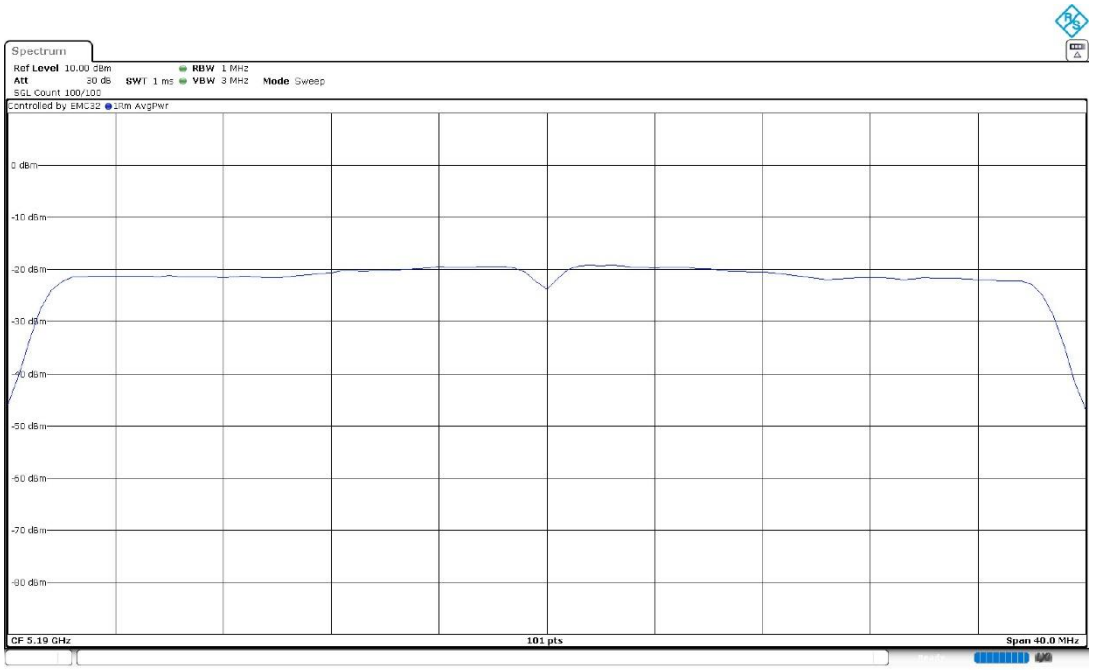
U-NII-1 (5150-5250 MHz)

- Low Channel 38 (5190 MHz):



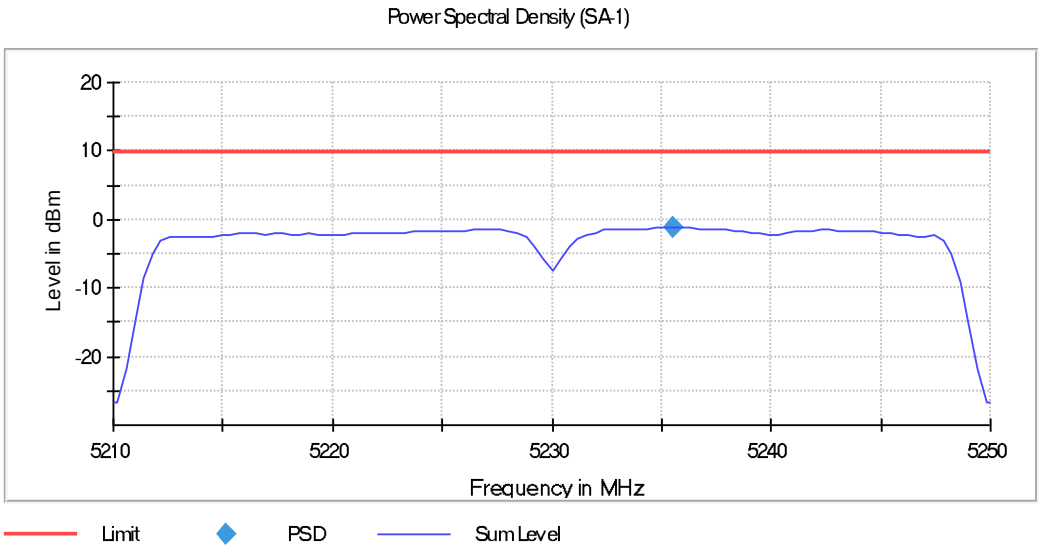


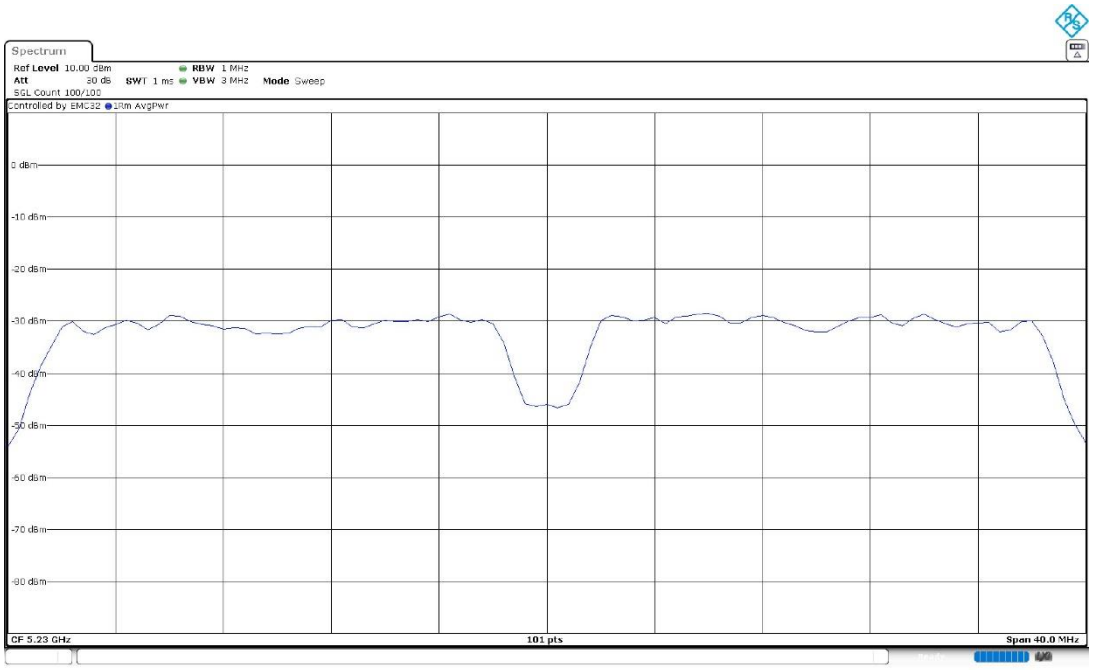
PSD Chain 1


Spectrum
Ref Level 10.00 dBm
RBW 1 MHz
Att 30 dB
SWT 1 ms
VBW 3 MHz
Mode Sweep
SGL Count 100/100
Controlled by EMC32
1Rm AvgPwr
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.19 GHz
101 pts
Span 40.0 MHz

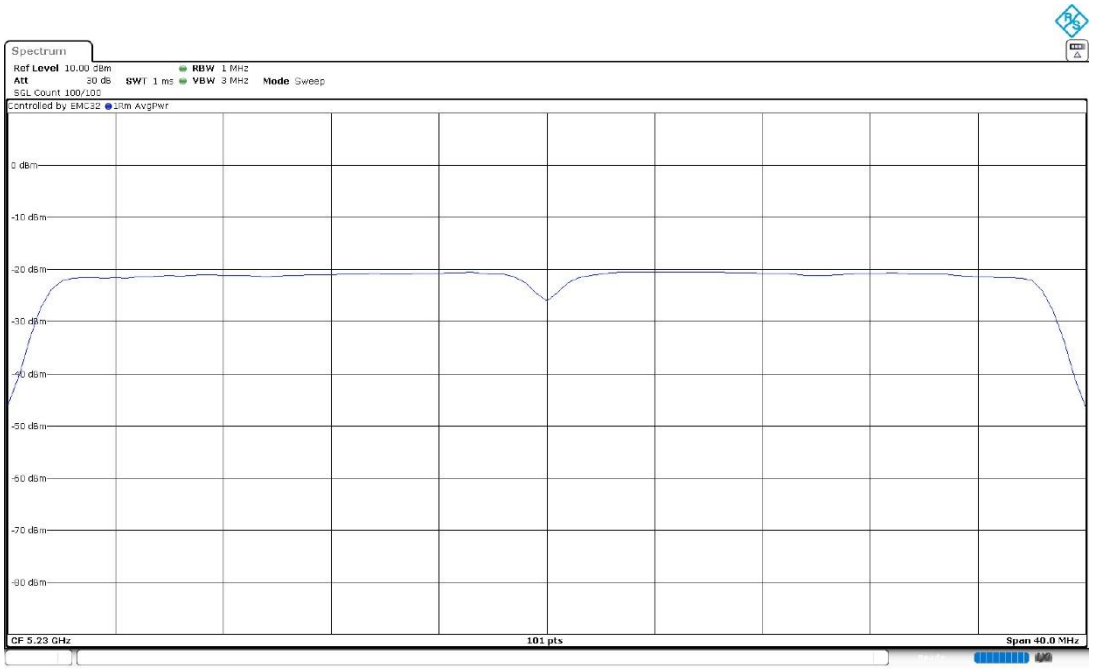
PSD Chain 0

- High Channel 46 (5230 MHz):





PSD Chain 1

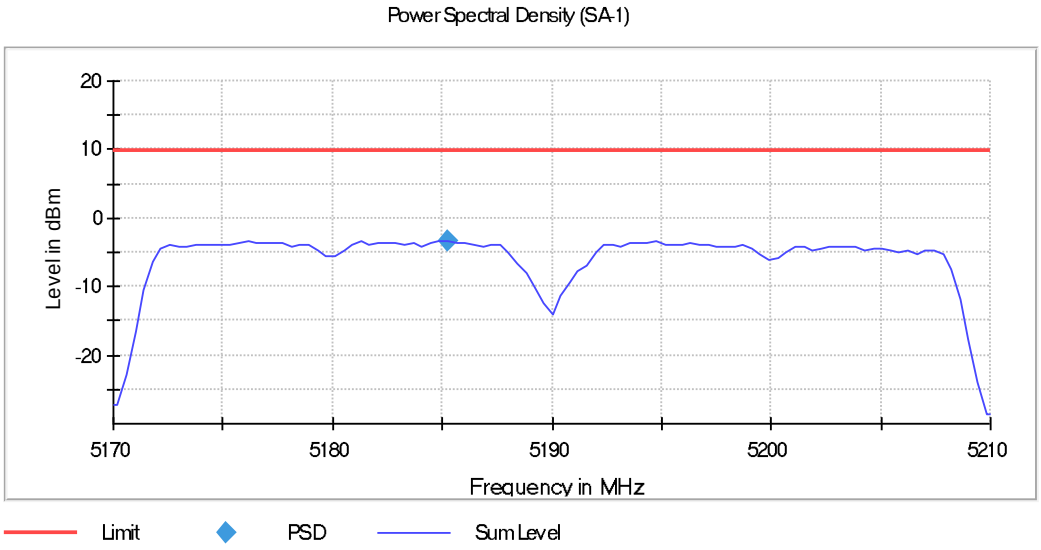

Spectrum
Ref Level 10.00 dBm
RBW 1 MHz
Att 30 dB
SWT 1 ms
VBW 3 MHz
Mode Sweep
SGL Count 100/100
Controlled by EMC32
1Rm AvgPwr
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.23 GHz
101 pts
Span 40.0 MHz

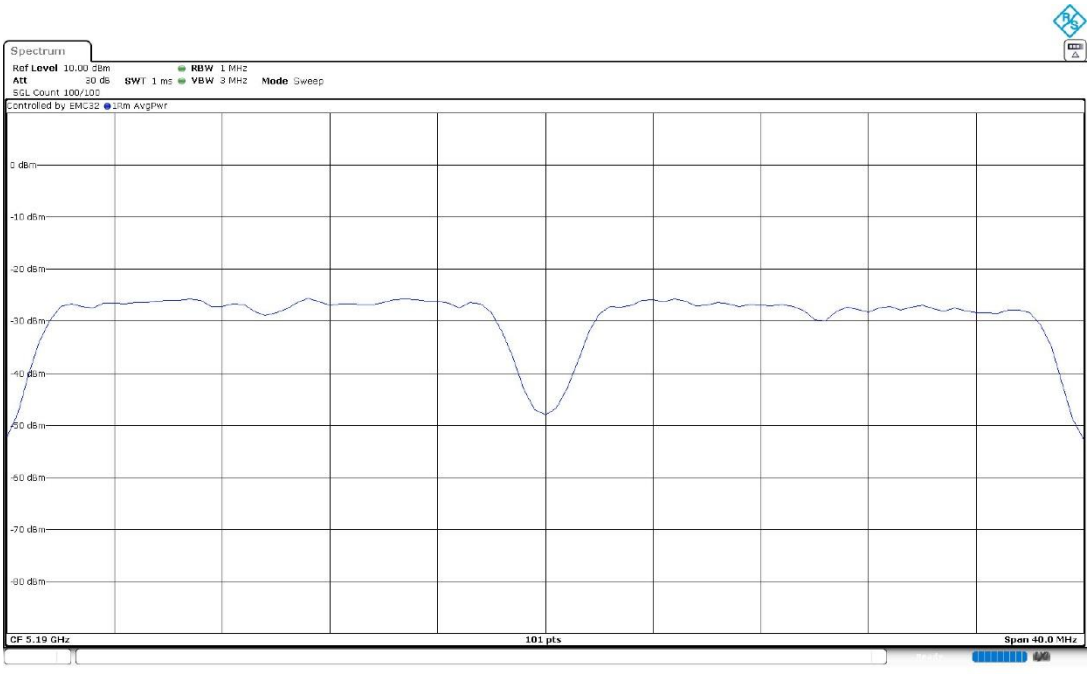
PSD Chain 0

MIMO 802.11 ac40 (VHT40):

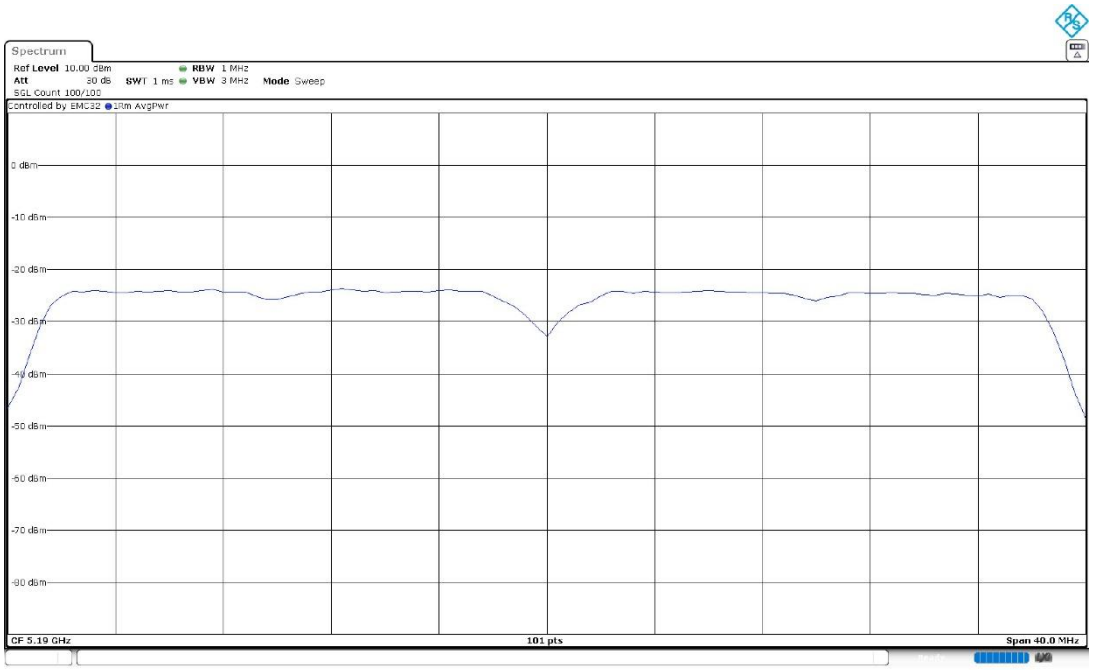
U-NII-1 (5150-5250 MHz)

- Low Channel 38 (5190 MHz):



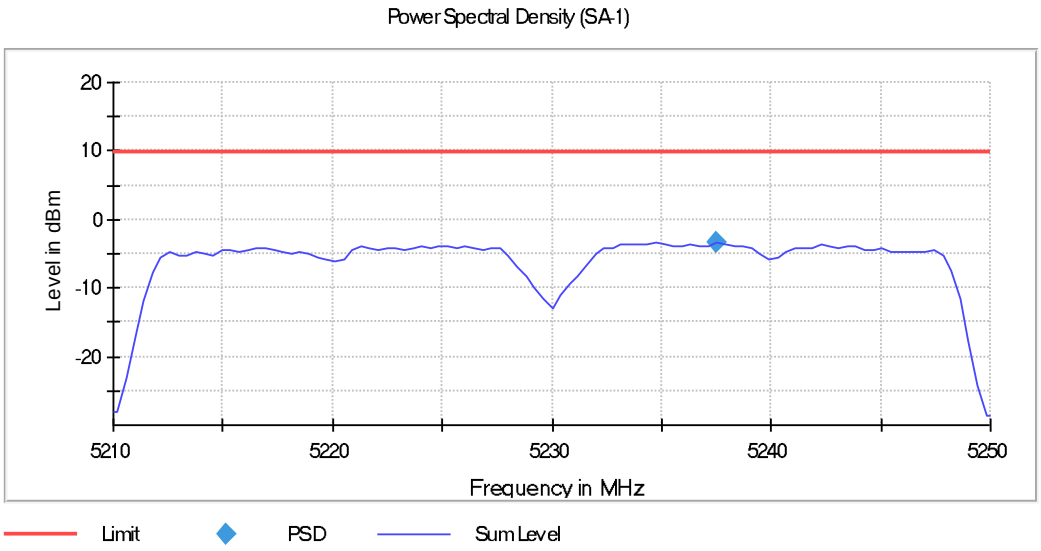


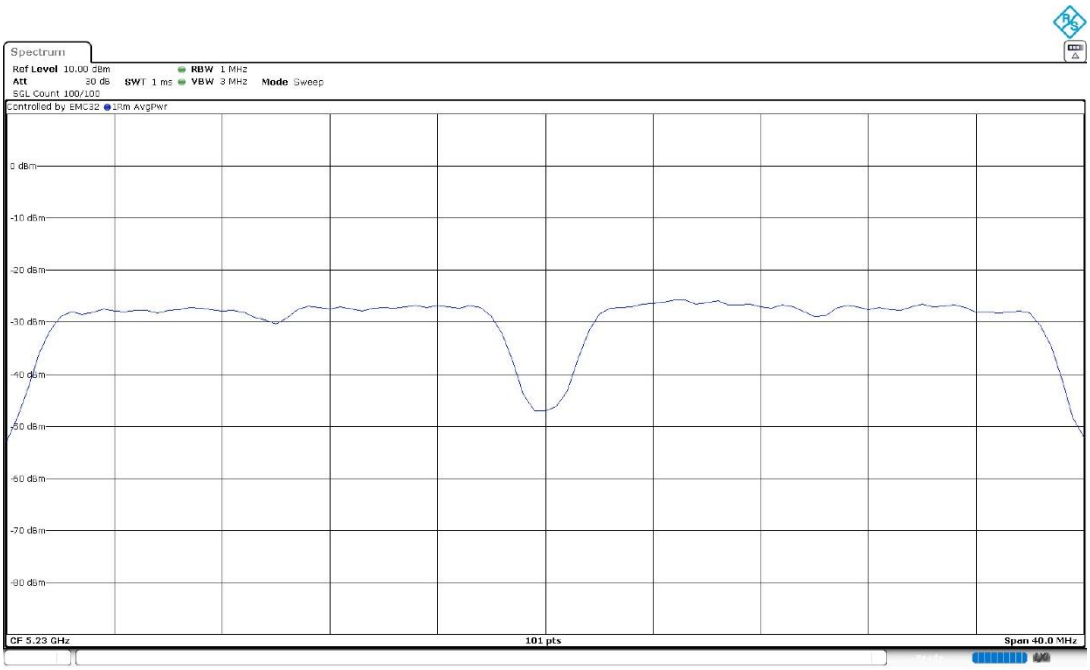
PSD Chain 1


Spectrum
Ref Level 10.00 dBm
RBW 1 MHz
Att 30 dB
SWT 1 ms
VBW 3 MHz
Mode Sweep
SGL Count 100/100
Controlled by EMC32
1Rm AvgPwr
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.19 GHz
101 pts
Span 40.0 MHz

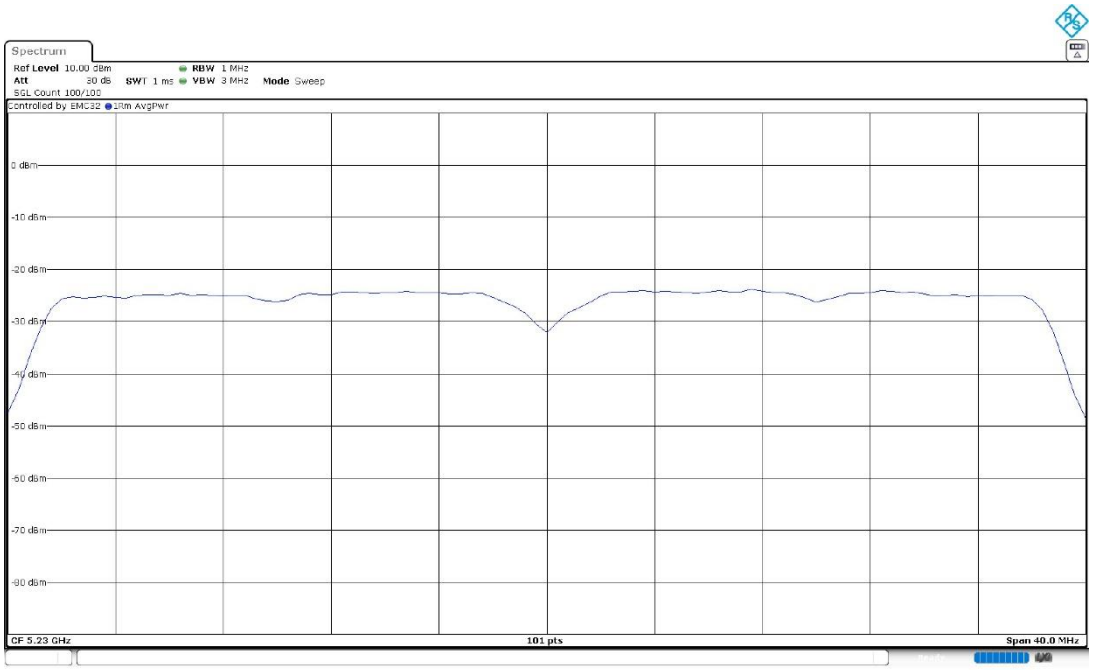
PSD Chain 0

- High Channel 46 (5230 MHz):





PSD Chain 1

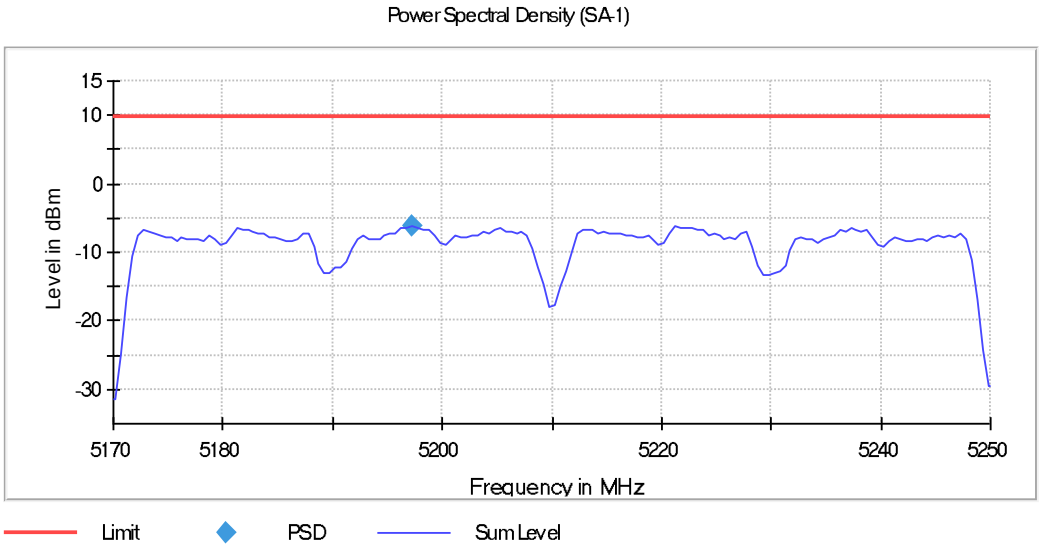

Spectrum
Ref Level 10.00 dBm
RBW 1 MHz
Att 30 dB
SWT 1 ms
VBW 3 MHz
Mode Sweep
SGL Count 100/100
Controlled by EMC32
1Rm AvgPwr
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.23 GHz
101 pts
Span 40.0 MHz

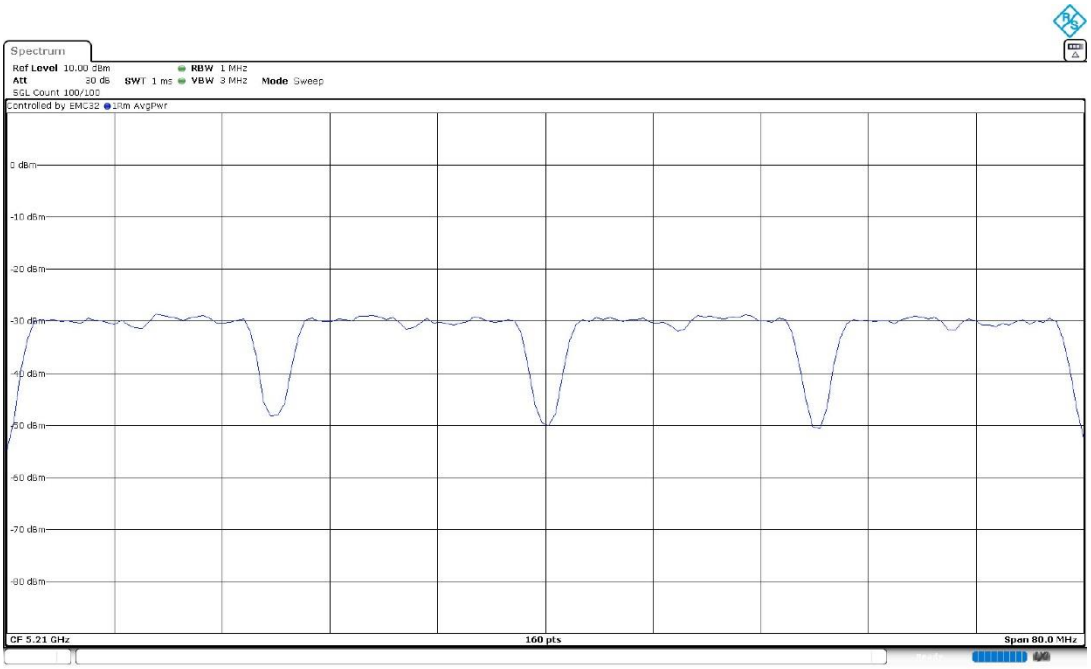
PSD Chain 0

MIMO 802.11 ac80 (VHT80):

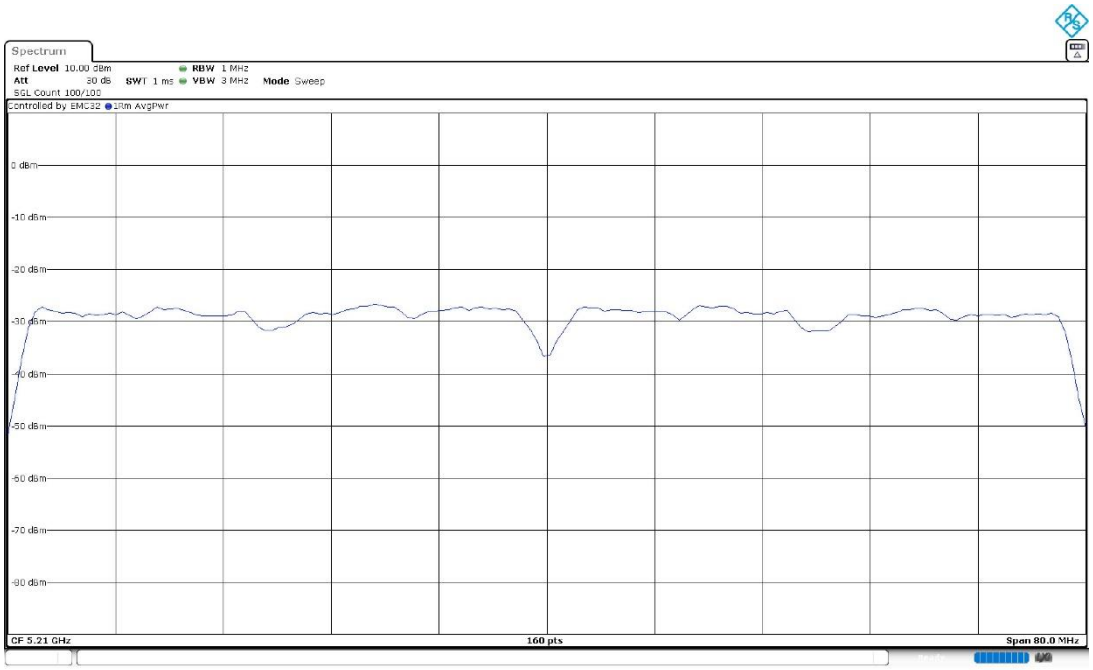
U-NII-1 (5150-5250 MHz)

- Single Channel 42 (5210 MHz):





PSD Chain 1


Spectrum
Ref Level 10.00 dBm
RBW 1 MHz
Att 30 dB
SWT 1 ms
VBW 3 MHz
Mode Sweep
SGL Count 100/100
Controlled by EMC32
1Rm AvgPwr
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.21 GHz
160 pts
Span 80.0 MHz

PSD Chain 0

FCC 15.407 (b)(1) / RSS-247 6.2.1.2. Transmitter Out of Band Radiated Emissions

SPECIFICATION:

For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz (68.23 dBµV/m at 3 m distance).

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 §15.205(c)):

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
960 - 40000	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, specified when measuring with peak detector function.

RESULTS:

The situation and orientation of the equipment under test were varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

All tests were performed in a semi-anechoic chamber at a distance of 1.5 m for the frequency range 17 GHz-40 GHz and a distance of 3m for frequency range 30MHz-17GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

The worst case was determined by measuring the e.i.r.p density (radiated). Test performed on the worst-case:

Preliminary tests determined the SISO worst case: Chain 0.

Test performed on all the supported modes of the EUT, in the worst data rates after preliminary testing.

Worst case mode in terms of spurious emissions is reported below.

SISO worst-case: SISO 802.11 a20

Frequency range 30 MHz - 1 GHz

The spurious emissions below 1 GHz do not depend either on the operating channel or the modulation mode selected in the EUT.

Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBµV/m)	Polarization	Detector
39.487813	39.23	V	Peak
	35.55		QP
45.247188	31.57	V	Peak
	28.23		QP
53.916563	36.44	V	Peak
	32.92		QP
66.253750	32.63	V	Peak
	29.38		QP
85.471875	31.81	V	Peak
	27.79		QP
101.870938	36.73	V	Peak
	32.74		QP
106.720938	36.24	V	Peak
	32.70		QP
141.186250	30.82	V	Peak
	25.45		QP
163.132500	31.00	V	Peak
	25.50		QP
326.062188	30.22	V	Peak
	22.00		QP
353.707188	40.90	V	Peak
	37.39		QP
831.310938	38.66	V	Peak
	30.86		QP

Frequency range 1 - 40 GHz

Spurious frequencies with peak levels above the average limit (54 dBµV/m at 3 m) are measured with an average detector for checking compliance with the average limit.

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

Verdict: PASS

The measurement settings for each range of frequency is as follows:

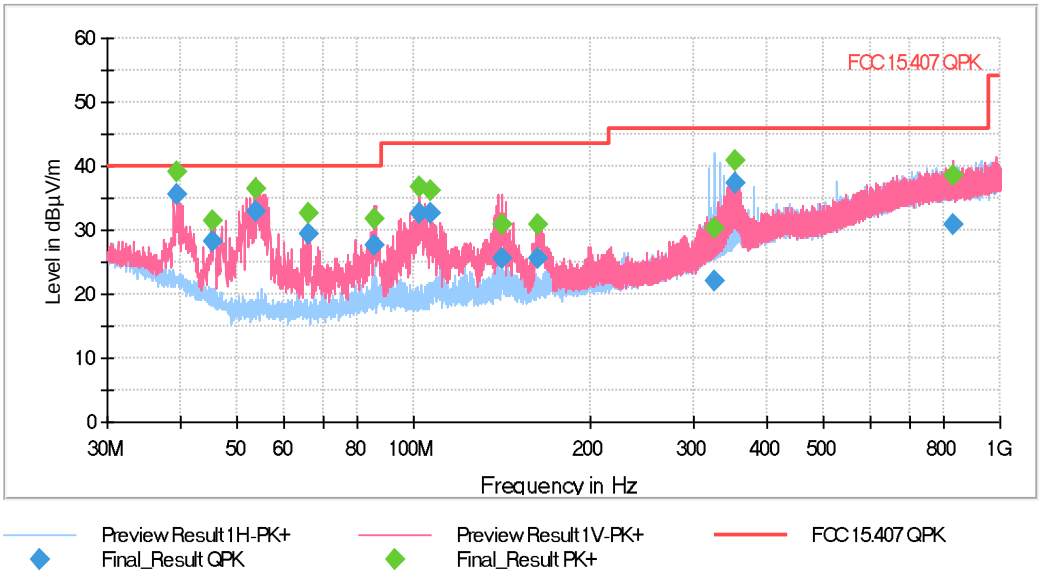
Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [ESW 44]					
30 MHz - 1 GHz	30,312 kHz	PK+	100 kHz	1 s	0 dB
Subrange	**Step Size**	**Detectors**	**Bandwidth**	**Sweep Time**	**Preamp**
Receiver: [ESW 44]					
1 GHz - 6,5 GHz	100 kHz	PK+ ; AVG	1 MHz	1 s	0 dB
Subrange	**Step Size**	**Detectors**	**Bandwidth**	**Sweep Time**	**Preamp**
Receiver: [ESW 44]					
6,5 GHz - 17 GHz	105 kHz	PK+ ; AVG	1 MHz	1 s	30 dB
Subrange	**Step Size**	**Detectors**	**Bandwidth**	**Sweep Time**	**Preamp**
Receiver: [ESW 44]					
17 GHz - 40 GHz	766,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

SISO worst case

SISO 802.11 a20

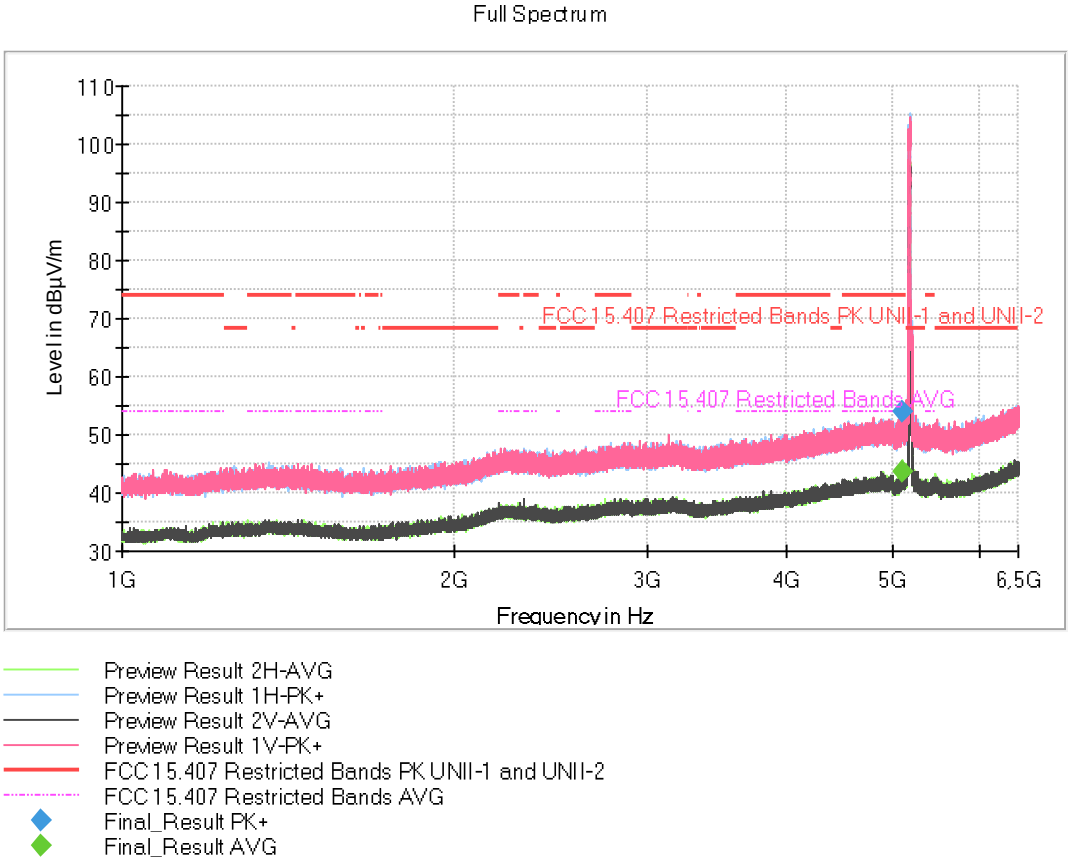
FREQUENCY RANGE 30 MHz - 1 GHz:

This plot is valid for Low, Middle and High Channels.



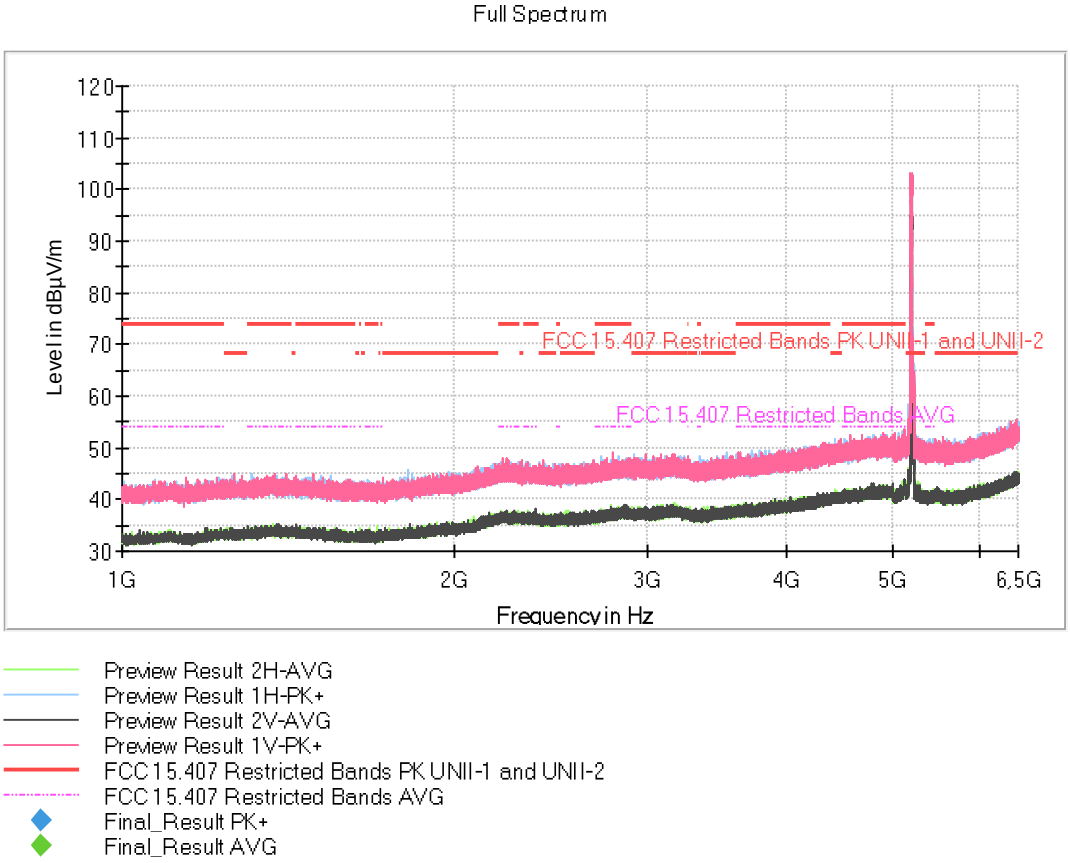
FREQUENCY RANGE 1 - 6.5 GHz:

- Low Channel 36 (5180 MHz):



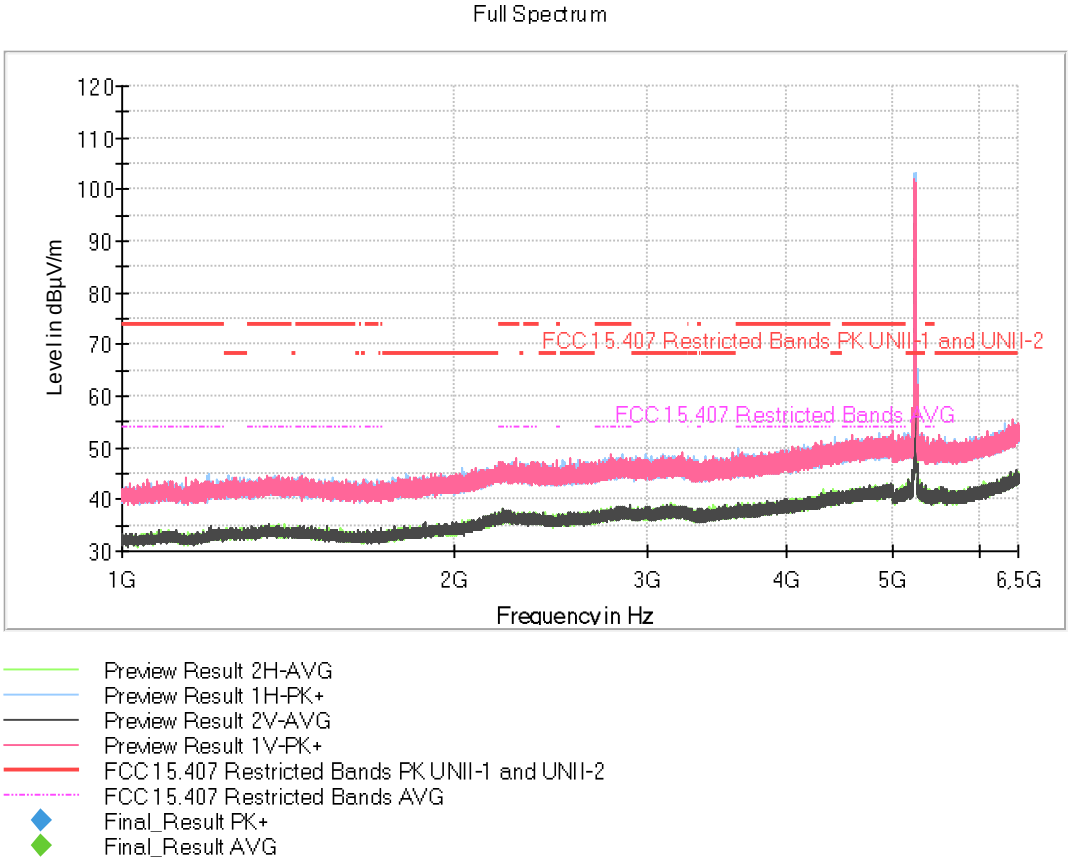
The peak shown in the plot above the limit is the carrier frequency.

- Middle Channel 40 (5200 MHz):



The peak shown in the plot above the limit is the carrier frequency.

- High Channel 48 (5240 MHz):



The peak shown in the plot above the limit is the carrier frequency.