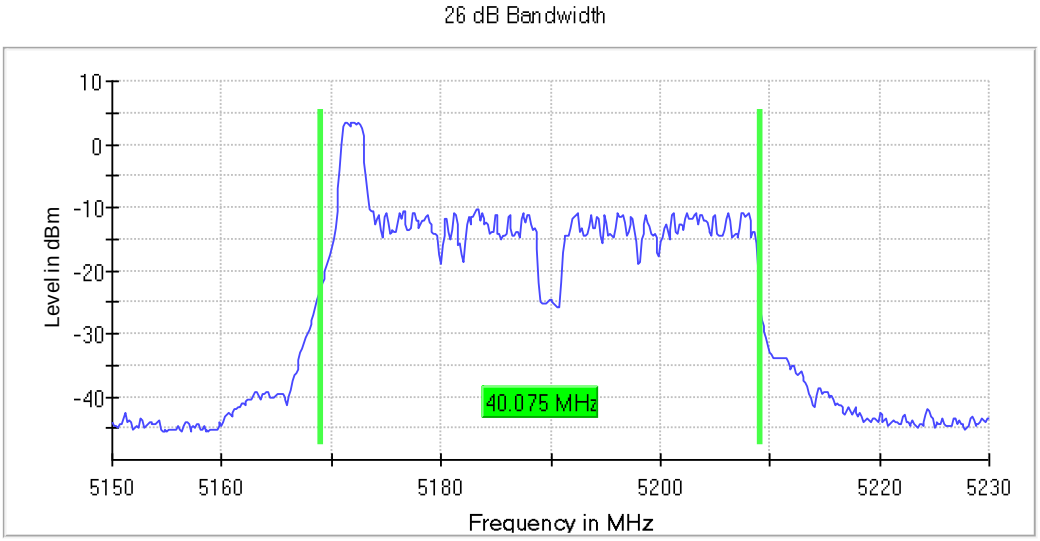
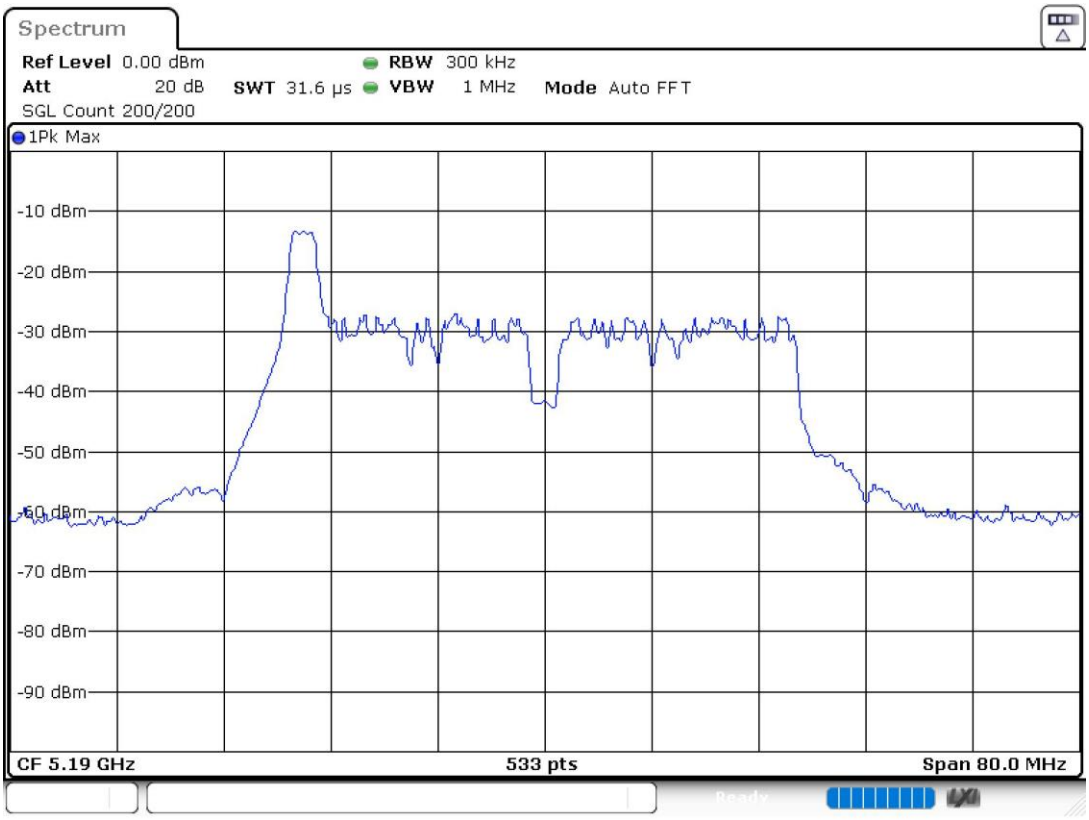
MIMO 802.11 ax40 (HE40) – RU Subcarrier allocation (RU26):

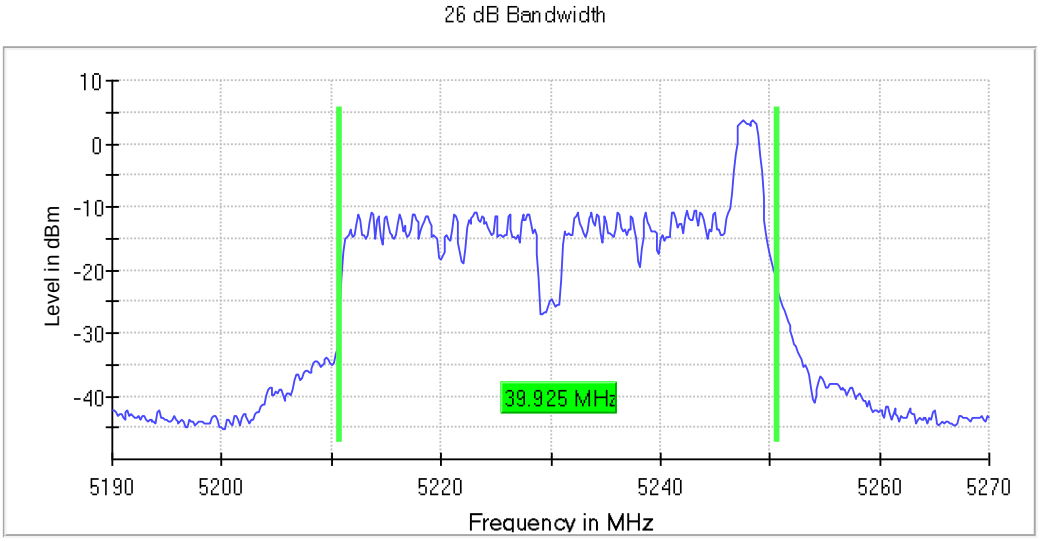
U-NII-1 (5150-5250 MHz)

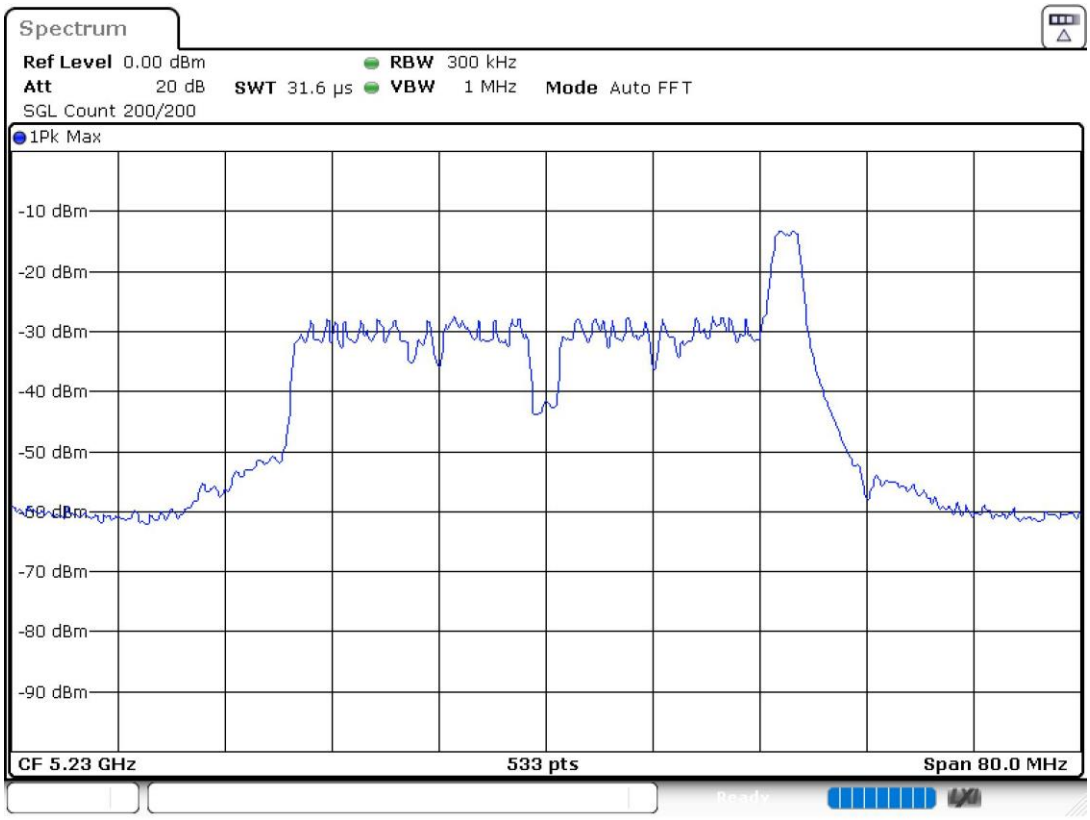
- Low Channel 38 (5190 MHz) / RU26 Offset 0:





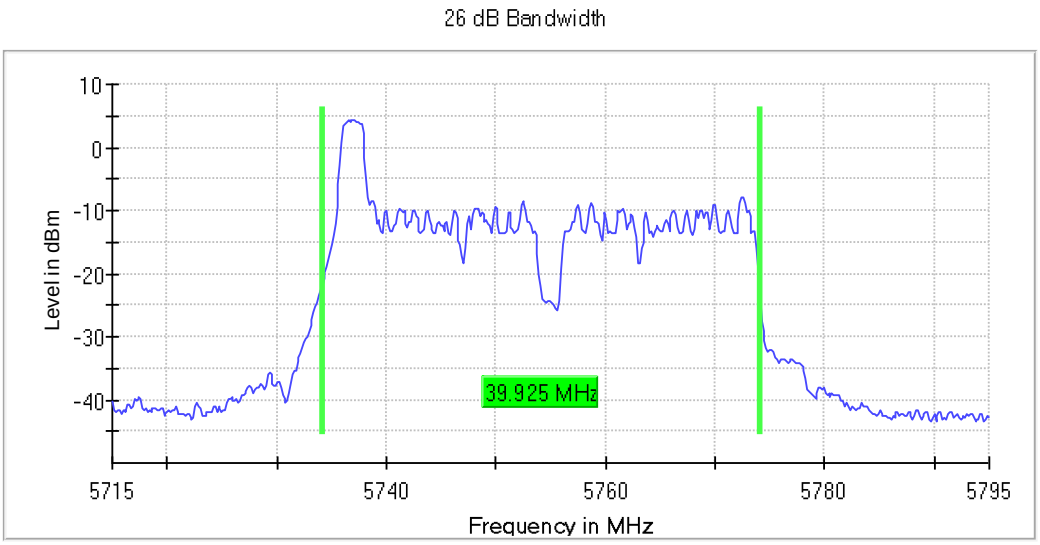
- High Channel 46 (5230 MHz) / RU26 Offset 17:

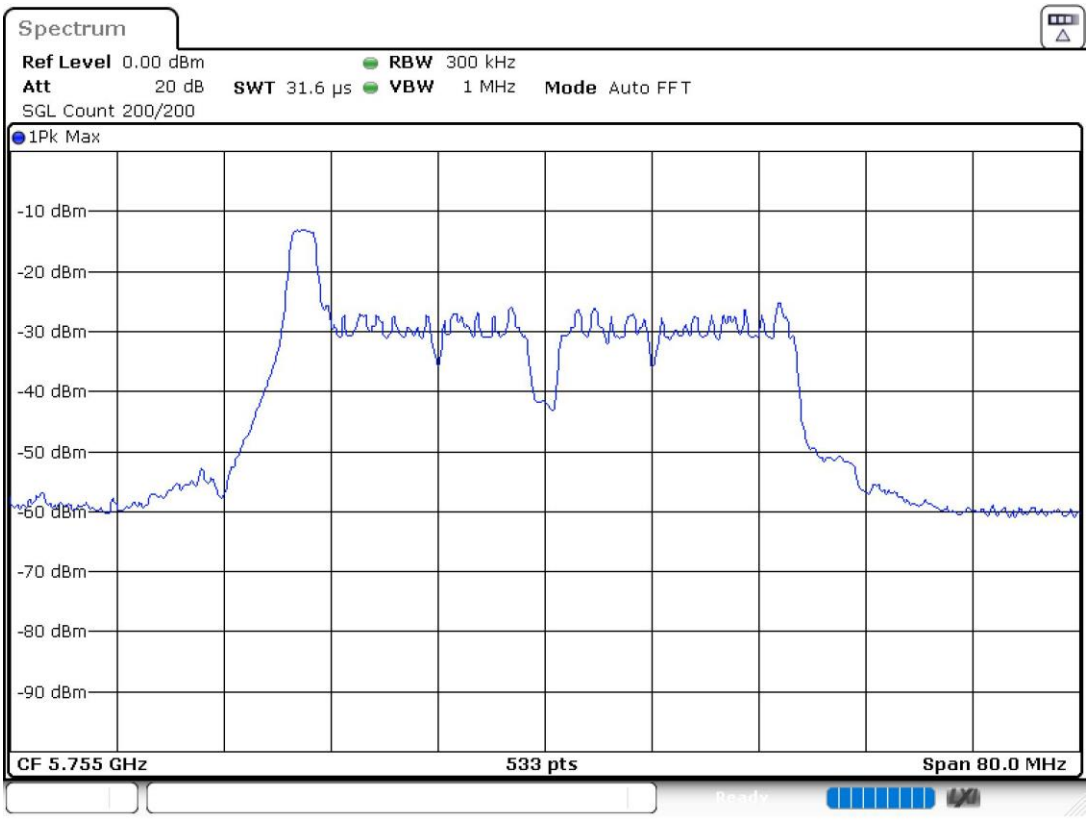




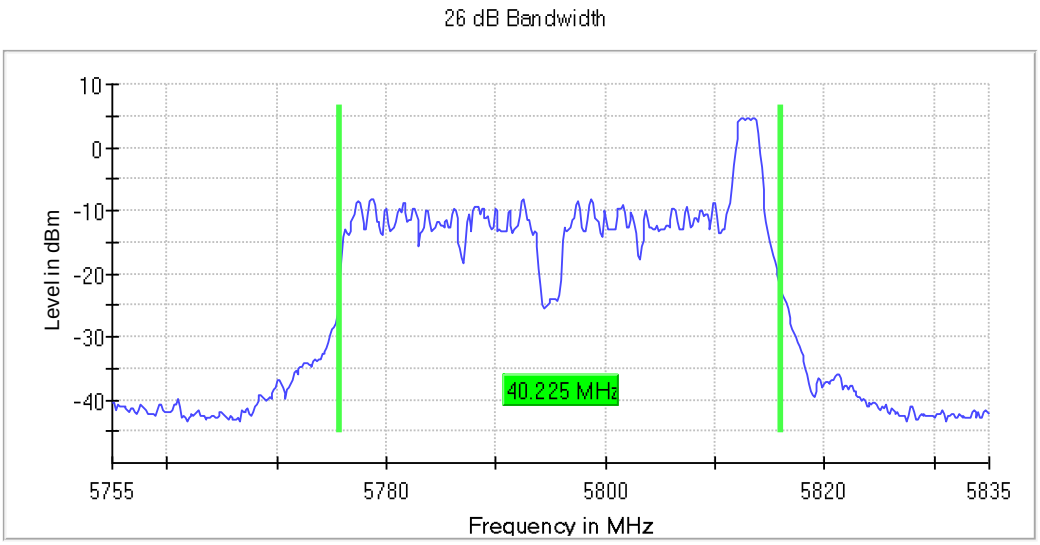
U-NII-3 (5725-5850 MHz)

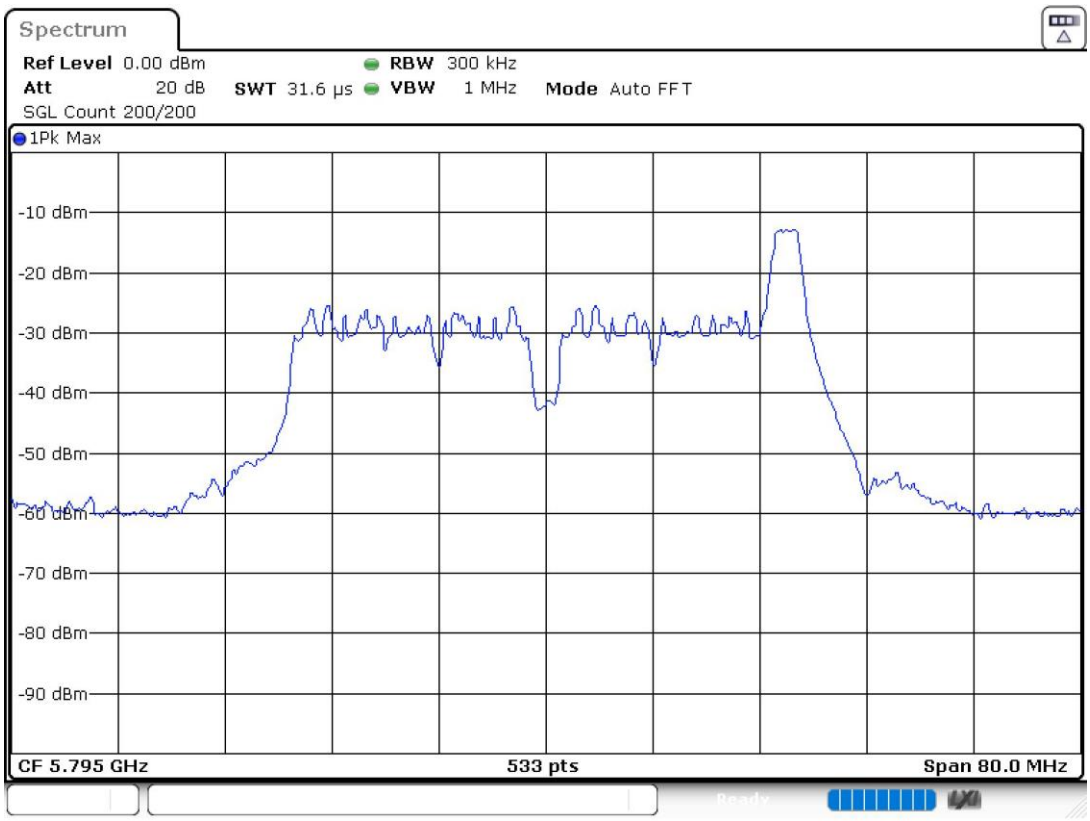
- Low Channel 151 (5755 MHz) / RU26 Offset 0:





- High Channel 159 (5795 MHz) / RU26 Offset 17:

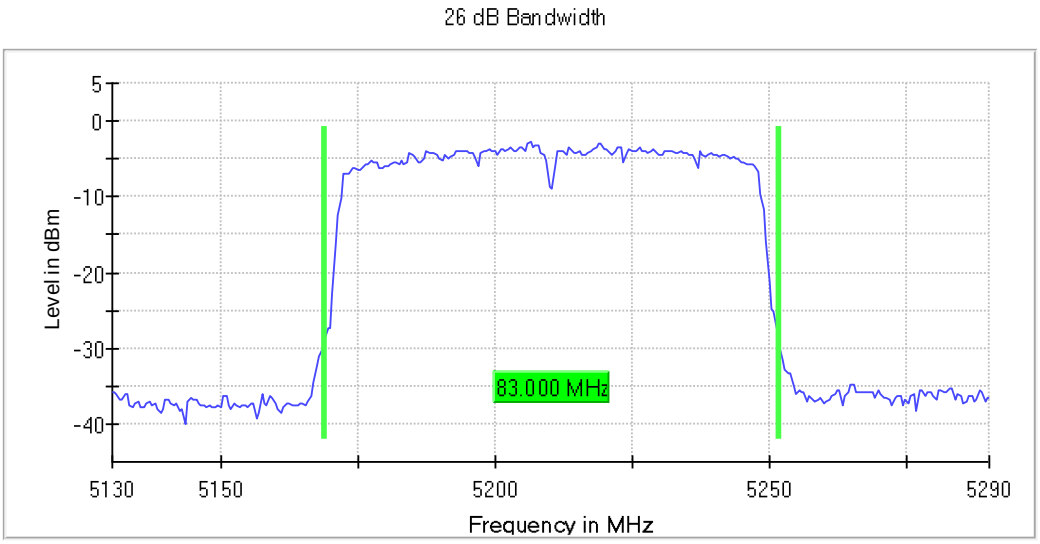


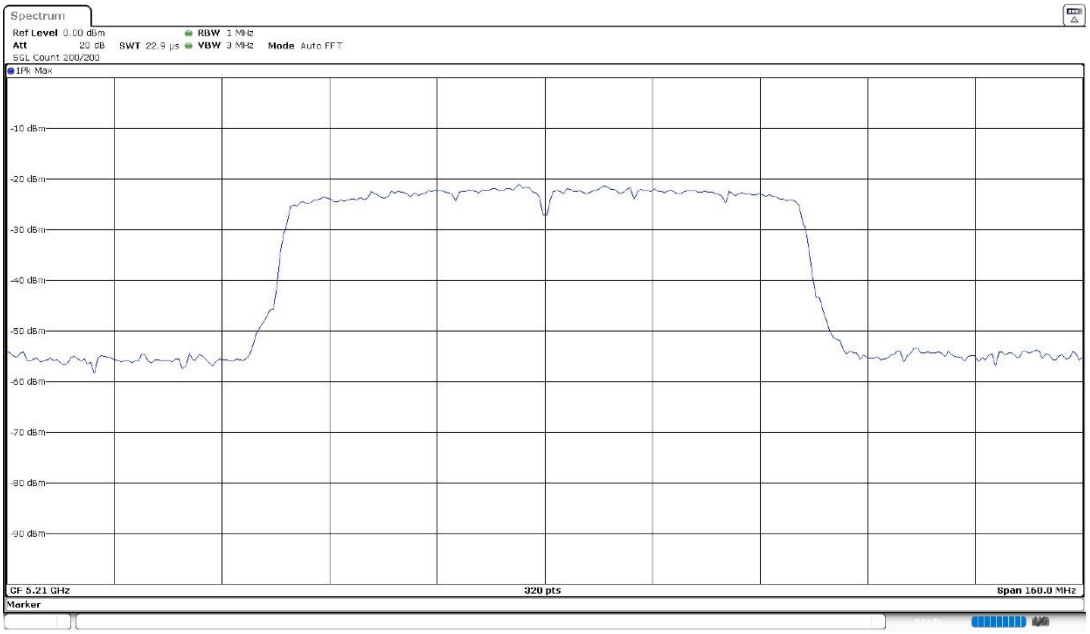


MIMO 802.11 ac80 (VHT80):

U-NII-1 (5150-5250 MHz)

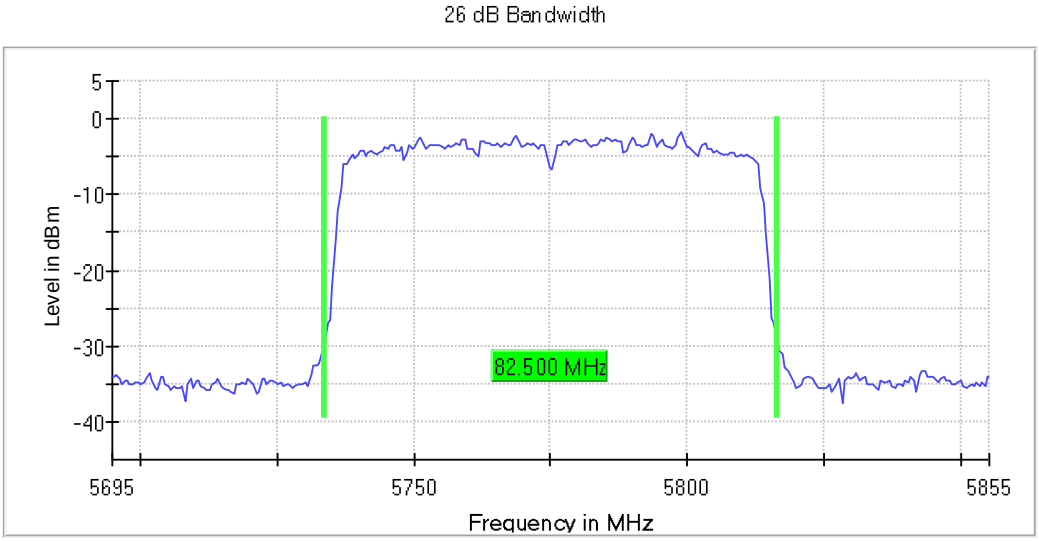
- Single Channel 42 (5210 MHz):

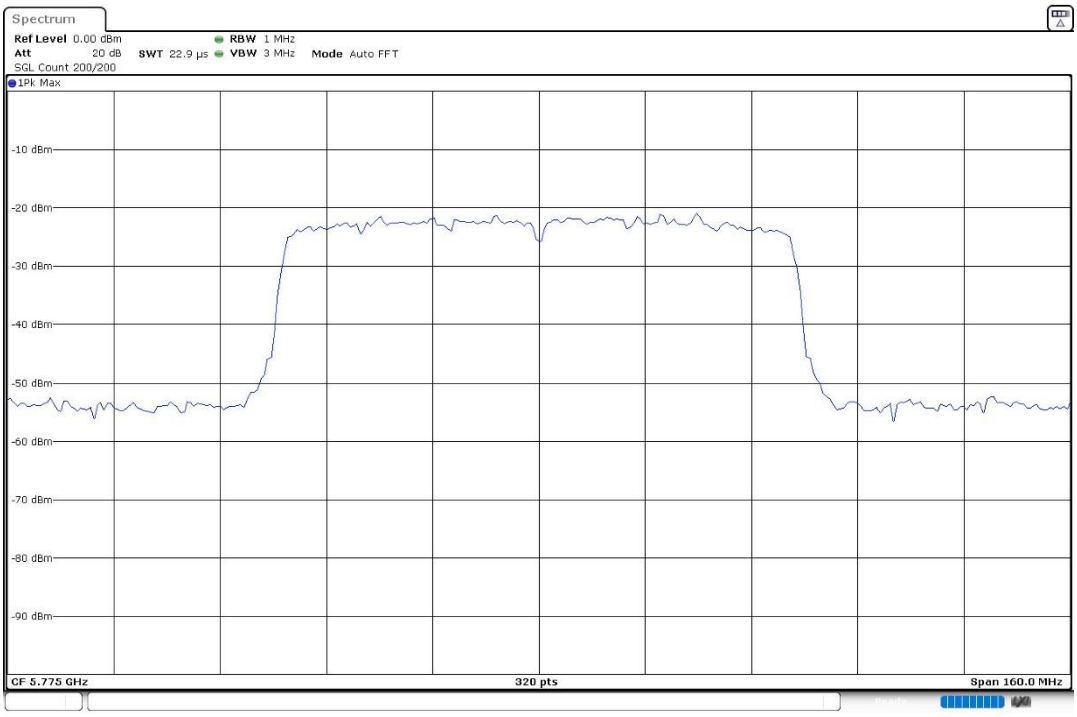




U-NII-3 (5725-5850 MHz)

- Single Channel 155 (5775 MHz):

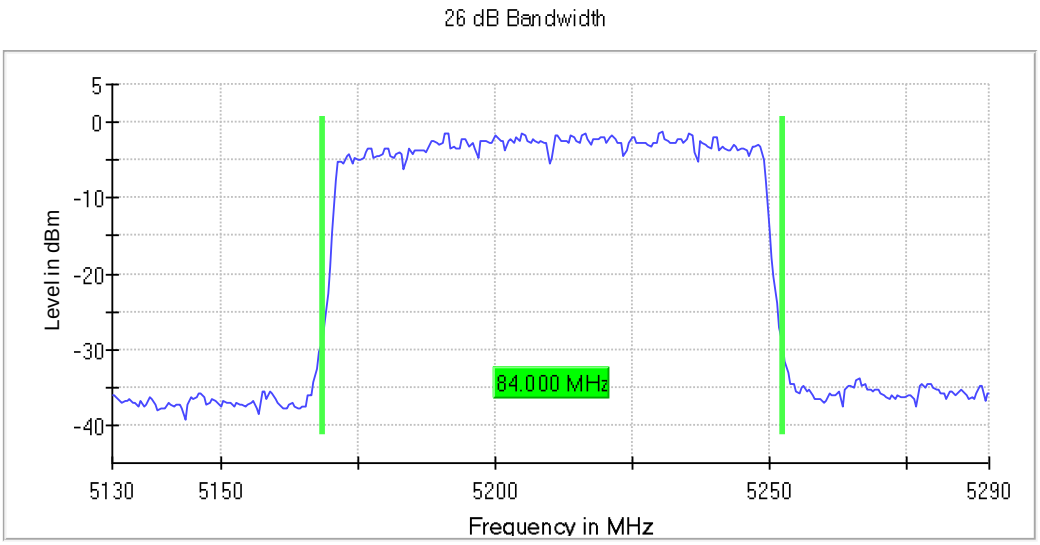


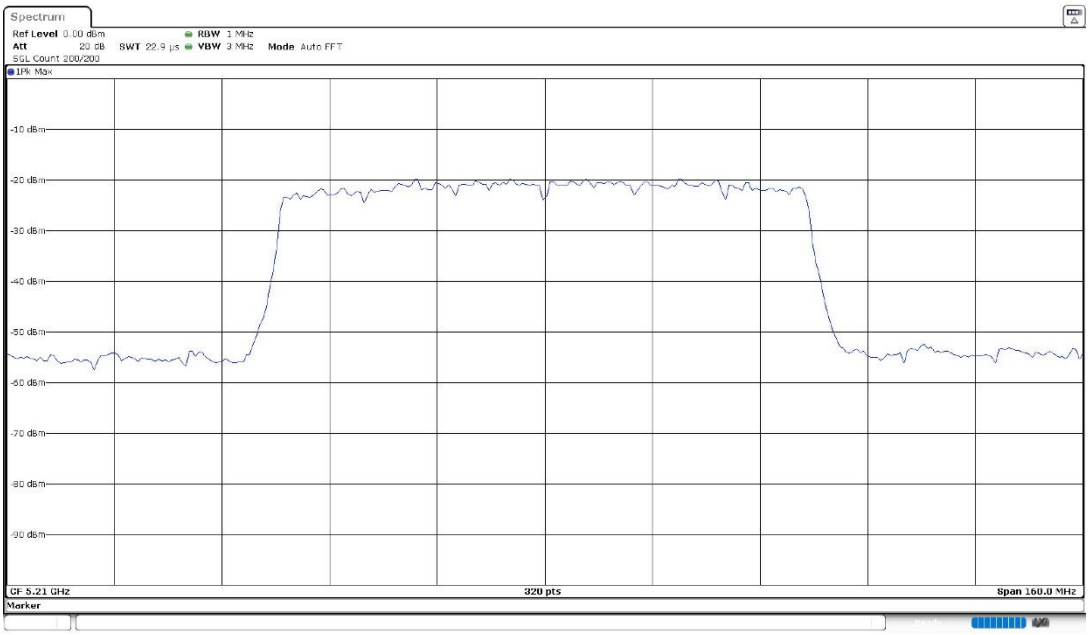


802.11 ax80 (HE80) – SU Full channel allocation:

U-NII-1 (5150-5250 MHz)

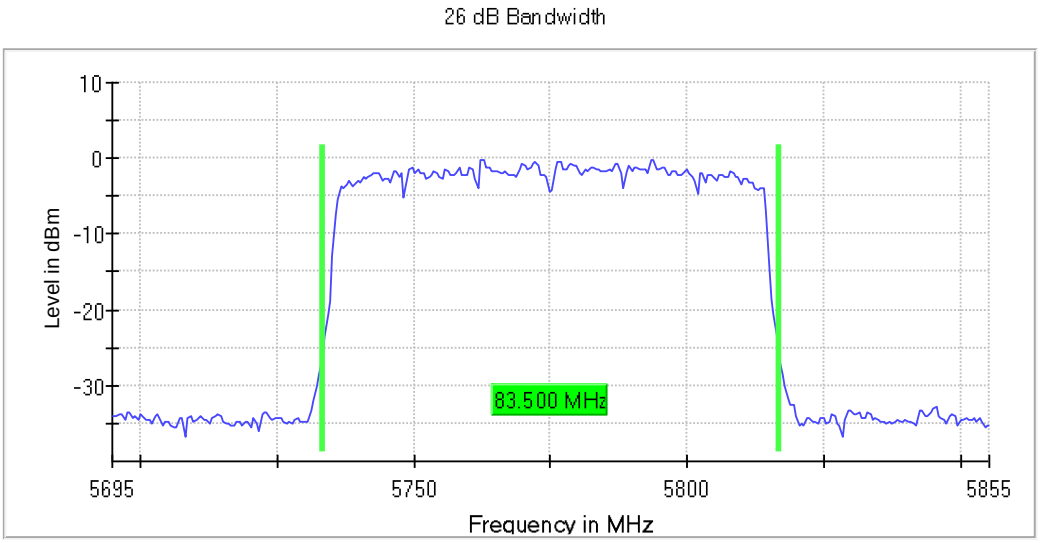
- Single Channel 42 (5210 MHz):

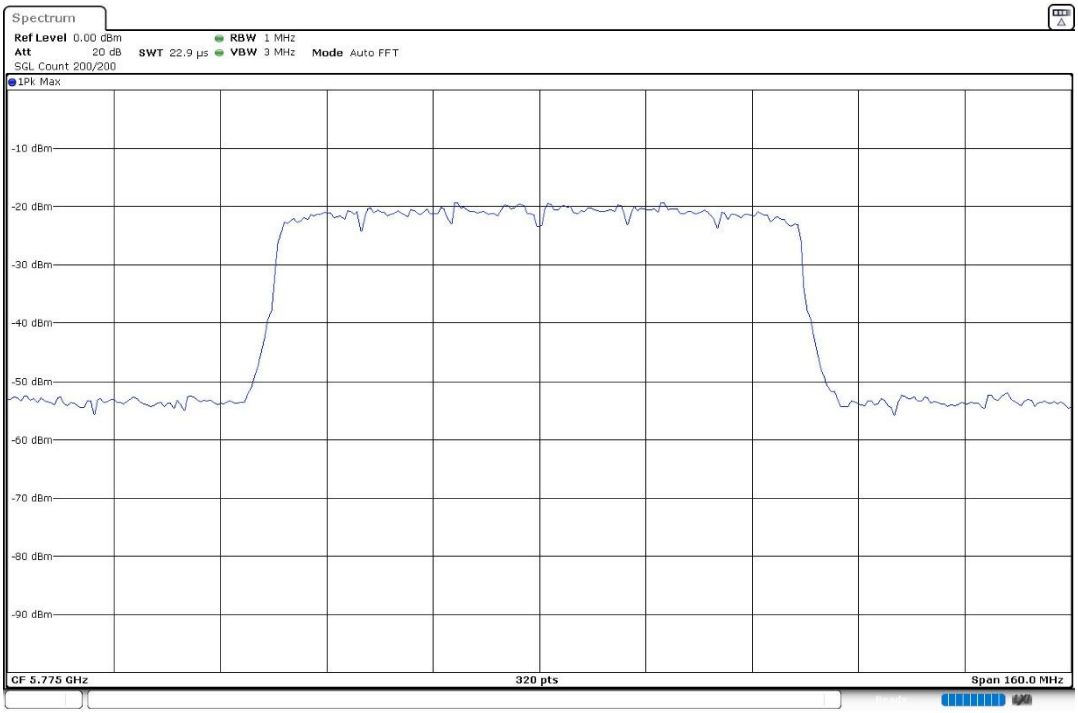




U-NII-3 (5725-5850 MHz)

- 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:	12 Vdc
Type of Power Supply:	External DC (Vehicle Battery).

ANTENNA (*):

Type of Antennas:	External.
Maximum Declared Antenna Gain Chain 0 U-NII-1:	+5 dBi
Maximum Declared Antenna Gain Chain 0 U-NII-3:	+5 dBi
Antenna cable loss for 0.45m cable length:	-0.54 dB
Effective Antenna Gain Chain 0 U-NII-1:	+4.46 dBi
Effective Antenna Gain Chain 0 U-NII-3:	+4.46 dBi
Maximum Declared Antenna Gain Chain 1 U-NII-1:	+5 dBi
Maximum Declared Antenna Gain Chain 1 U-NII-3:	+5 dBi
Antenna cable loss for 0.45m cable length:	-0.54 dB
Effective Antenna Gain Chain 1 U-NII-1:	+4.46 dBi
Effective Antenna Gain Chain 1 U-NII-3:	+4.46 dBi

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

U-NII-1 & U-NII-3:

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

- For power spectral density (PSD) measurements:

$$\text{Directional gain}_{PSD} = G_{ANT} + 10\log(N_{ANT}/N_{SS})\ \text{dBi}$$

$$N_{SS} = 1 \text{ (worst case)}, \quad N_{ANT} = 2, \quad G_{ANT} = +4.46 \text{ dBi}$$

$$\text{Directional gain}_{PSD} = 4.46 + 10\log(2/1) = 4.46 + 10\log(2) = 4.46 + 3.01 = 7.47 \text{ dBi}$$

PSD Antenna Gain MIMO Chain 0 & 1: + 7.47 dBi

- For power measurements:

$$\text{Directional gain}_{POWER} = G_{ANT}\ \text{dBi} \qquad (N_{ANT} < 4)$$

$$\text{Directional gain}_{POWER} = G_{ANT} = 4.46 \text{ dBi}$$

Power Antenna Gain MIMO Chain 0 & 1: + 4.46 dBi

TEST FREQUENCIES (*):

Band U-NII-1:

Technology Tested:	WLAN (IEEE 802.11 a20 / n2040 / ac204080 / ax204080 1x1 & 2x2)	
Modes:	802.11a: 6, 9, 12, 18, 24, 36, 48 & 54 Mbps (SISO, or MIMO with CDD)	
	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).	
	802.11ax HE20: MCS0 to MCS9 (1 or 2 spatial stream) (SISO, or MIMO with CDD without TxBF).	
	802.11ax HE40: MCS0 to MCS9 (1 or 2 spatial stream) (SISO, or MIMO with CDD without TxBF).	
	802.11ax HE80: 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.	
Frequency Range:	5150 - 5250 MHz	
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

Band U-NII-3:

Technology Tested:	WLAN (IEEE 802.11 a20 / n2040 / ac204080 / ax204080 2x2)	
Modes:	802.11a: 6, 9, 12, 18, 24, 36, 48 & 54 Mbps (SISO, or MIMO with CDD)	
	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)	
	802.11ax HE20: MCS0 to MCS9 (1 or 2 spatial stream) (SISO, or MIMO with CDD without TxBF).	
	802.11ax HE40: MCS0 to MCS9 (1 or 2 spatial stream) (SISO, or MIMO with CDD without TxBF).	
	802.11ax HE80: 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.	
Frequency Range:	5725 MHz to 5850 MHz	
Operating Channel Bandwidth:	20 MHz	
Transmission Channels:	Channel	Channel Frequency (MHz)
	Low (149)	5745
	Middle (157)	5785
	High (165)	5825
Operating Channel Bandwidth:	40 MHz	
Transmission Channels:	Channel	Channel Frequency (MHz)
	Low (151)	5755
	High (159)	5795
Operating Channel Bandwidth:	80 MHz	
Transmission Channels:	Single (155)	5775

POWER SETTINGS (*):

U-NII-1. FCC:

Chain 0

Channel	Frequency	a	n	ac	he
36	5180 MHz	9	9	9	9
44	5220 MHz	9	9	9	9
48	5240 MHz	9	9	9	9
38	5190 MHz		9	9	9
46	5230 MHz		9	9	9
42	5210 MHz			9	9

Chain 1

Channel	Frequency	a	n	ac	he
36	5180 MHz	9	9	9	9
44	5220 MHz	9	9	9	9
48	5240 MHz	9	9	9	9
38	5190 MHz		9	9	9
46	5230 MHz		9	9	9
42	5210 MHz			9	9

Chain 0 & 1

Channel	Frequency	a	n	ac	he
36	5180 MHz	6	6	6	6
44	5220 MHz	6	6	6	6
48	5240 MHz	6	6	6	6
38	5190 MHz		6	6	6
46	5230 MHz		6	6	6
42	5210 MHz			6	6

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 / MIMO 2Tx on Chain 0 & 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.
- 802.11ax HE20: MCS0 SISO 1Tx on Chain 0 and 1Tx on Chain 1 / MIMO 2Tx on Chain 0 & 1.
- 802.11ax HE40: MCS0 SISO 1Tx on Chain 0 and 1Tx on Chain 1 / MIMO 2Tx on Chain 0 & 1.
- 802.11ax HE80: 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 spectrum analyzer using a low-loss RF cable. The reading in the spectrum analyzer is corrected taking into account 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).

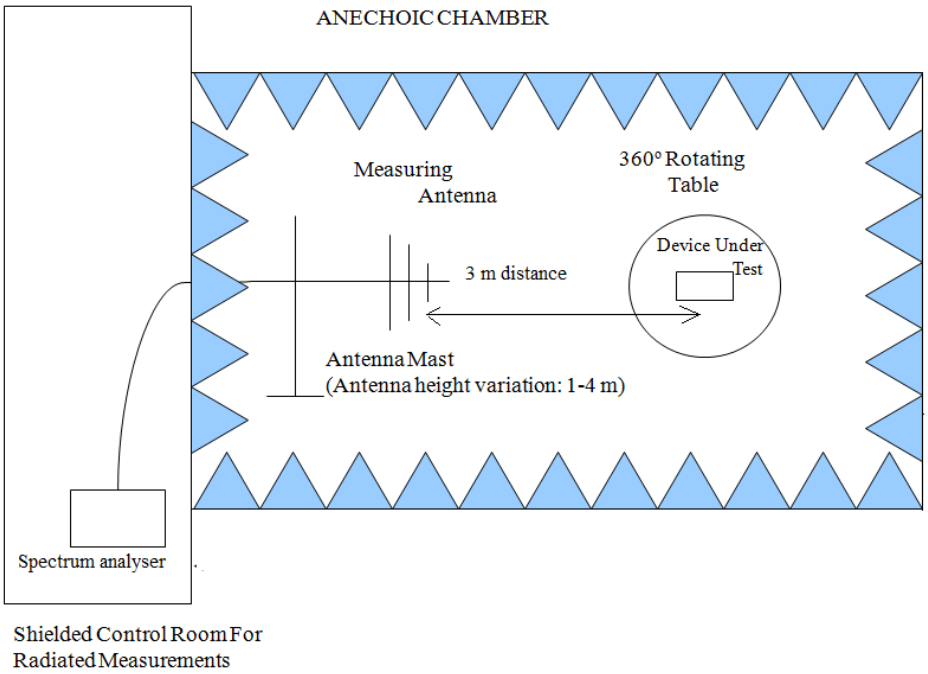
For radiated emissions in the range 17 GHz-40 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

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.

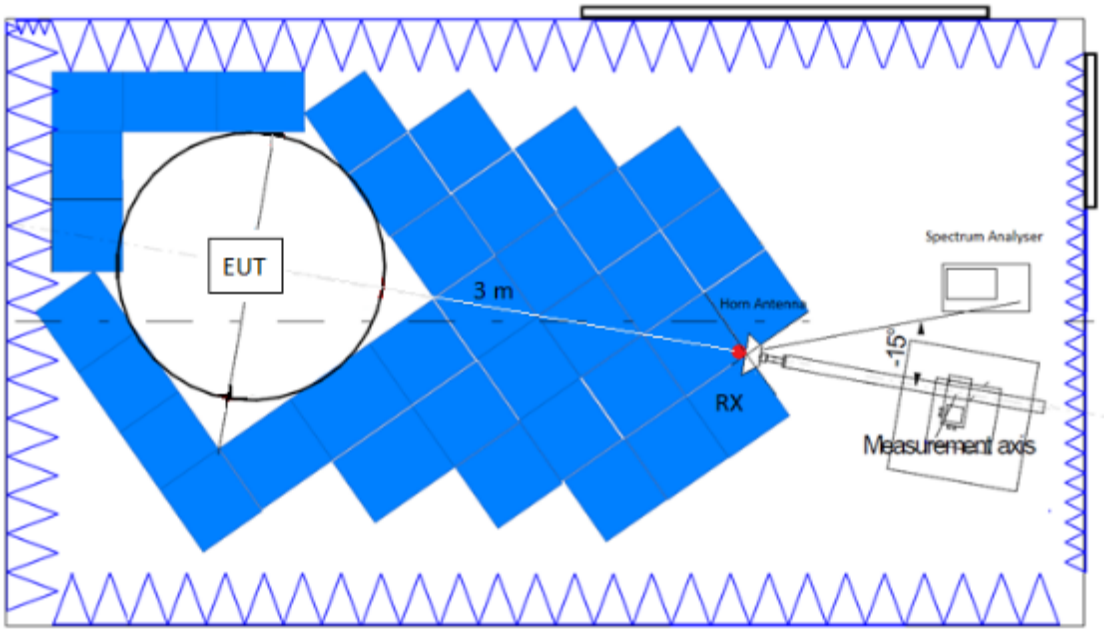
Measurements were made in both horizontal and vertical planes of polarization.

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

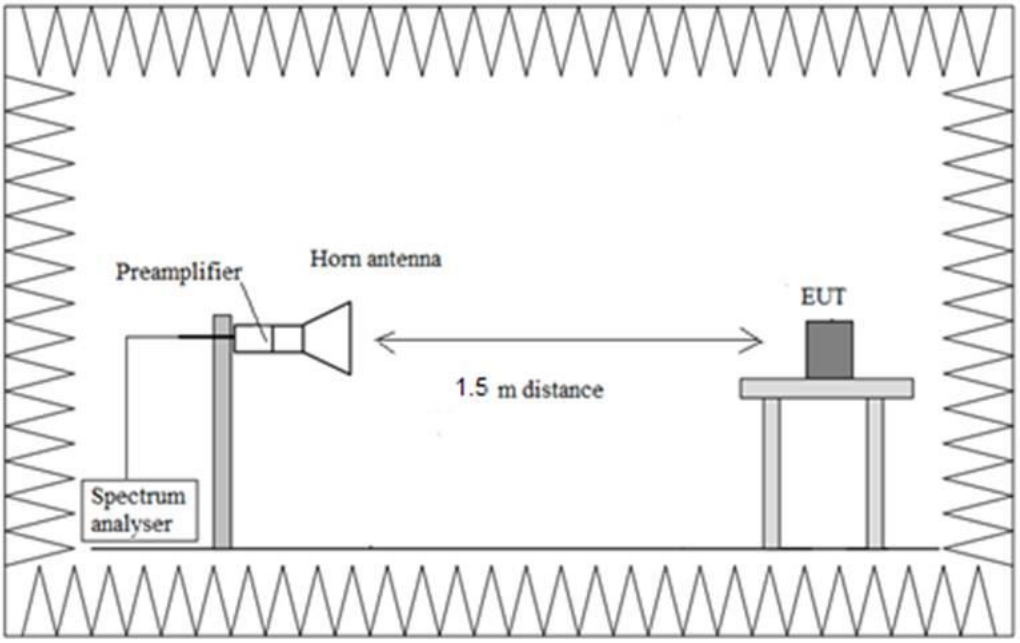
Radiated measurements setup f < 1 GHz:



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

SPECIFICATION:

For client devices in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW (24 dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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.

Antenna Gain:

- SISO Antenna – Chain 0: +4.46 dBi
- SISO Antenna – Chain 1: +4.46 dBi
- MIMO Antennas – Chain 0 & 1: +4.46 dBi

For all operation modes, the antenna gain is less than 6 dBi.

SISO worst case

SISO 802.11 a20:

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

Channels	Low Channel 36 (5180 MHz)	Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted Power RMS (dBm)	5.696	6.299	6.502
Maximum Power E.I.R.P (dBm)	10.156	10.759	10.962
Measurement uncertainty (dB)	< ±1 dB		

SISO 802.11 n20 (HT20):

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

Channels	Low Channel 36 (5180 MHz)	Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted Power RMS (dBm)	5.510	6.108	6.284
Maximum Power E.I.R.P (dBm)	9.970	10.568	10.744
Measurement uncertainty (dB)	< ±1 dB		

SISO 802.11 ac20 (VHT20):

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

Channels	Low Channel 36 (5180 MHz)	Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted Power RMS (dBm)	6.108	6.141	6.285
Maximum Power E.I.R.P (dBm)	10.568	10.601	10.745
Measurement uncertainty (dB)	< ±1 dB		

SISO 802.11 ax20 (HE20) – SU Full channel allocation:

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

Channels	Low Channel 36 (5180 MHz)	Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted Power RMS (dBm)	5.615	6.213	6.378
Maximum Power E.I.R.P (dBm)	10.075	10.673	10.838
Measurement uncertainty (dB)	< ±1 dB		

SISO 802.11 ax20 (HE20) – RU Subcarrier allocation (RU26):

The next RU combinations were tested as worst cases:

Low Channel: RU26 Offset 0
Middle Channel: RU26 Offset 4
High Channel: RU26 Offset 8

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

Channels	Low Channel 36 (5180 MHz)	Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted Power RMS (dBm)	6.387	6.105	7.008
Maximum Power E.I.R.P (dBm)	10.847	10.565	11.468
Measurement uncertainty (dB)	< ±1 dB		

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)	6.214	6.646
Maximum Power E.I.R.P (dBm)	10.674	11.106
Measurement uncertainty (dB)	< ±1 dB	

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)	6.230	6.642
Maximum Power E.I.R.P (dBm)	10.690	11.102
Measurement uncertainty (dB)	< ±1 dB	

SISO 802.11 ax40 (HE40) – SU Full channel allocation:

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted Power RMS (dBm)	6.140	6.578
Maximum Power E.I.R.P (dBm)	10.600	11.038
Measurement uncertainty (dB)	< ±1 dB	

SISO 802.11 ax40 (HE40) – RU Subcarrier allocation (RU26):

The next RU combinations were tested as worst cases:

Low Channel: RU26 Offset 0
High Channel: RU26 Offset 17

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

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted Power RMS (dBm)	6.681	7.103
Maximum Power E.I.R.P (dBm)	11.141	11.563
Measurement uncertainty (dB)	< ±1 dB	

SISO 802.11 ac80 (VHT80):

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

Channel	Single Channel 42 (5210 MHz)
Maximum Conducted Power RMS (dBm)	6.116
Maximum Power E.I.R.P (dBm)	10.576
Measurement uncertainty (dB)	< ±1 dB

SISO 802.11 ax80 (HE80) – SU Full-channel allocation:

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

Channel	Single Channel 42 (5210 MHz)
Maximum Conducted Power RMS (dBm)	6.165
Maximum Power E.I.R.P (dBm)	10.625
Measurement uncertainty (dB)	< ±1 dB

Verdict: PASS

MIMO

MIMO 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)	6.556	6.480	6.394
Maximum Power E.I.R.P (dBm)	11.016	10.940	10.854
Measurement uncertainty (dB)	< ±1 dB		

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)	6.349	6.287	6.178
Maximum Power E.I.R.P (dBm)	10.809	10.747	10.638
Measurement uncertainty (dB)	< ±1 dB		

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)	6.281	6.226	6.145
Maximum Power E.I.R.P (dBm)	10.741	10.686	10.605
Measurement uncertainty (dB)	< ±1 dB		

MIMO 802.11 ax20 (HE20) – SU Full channel allocation:

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

Channels	Low Channel 36 (5180 MHz)	Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted Power RMS (dBm)	5.211	4.898	5.038
Maximum Power E.I.R.P (dBm)	9.671	9.358	9.498
Measurement uncertainty (dB)	< ±1 dB		

MIMO 802.11 ax20 (HE20) – RU Subcarrier allocation (RU26):

The next RU combinations were tested as worst cases:

Low Channel: RU26 Offset 0
Middle Channel: RU26 Offset 4
High Channel: RU26 Offset 8

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)	6.338	5.974	6.189
Maximum Power E.I.R.P (dBm)	10.798	10.434	10.649
Measurement uncertainty (dB)	< ±1 dB		

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)	6.526	6.663
Maximum Power E.I.R.P (dBm)	10.986	11.123
Measurement uncertainty (dB)	< ±1 dB	

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)	6.526	6.644
Maximum Power E.I.R.P (dBm)	10.986	11.104
Measurement uncertainty (dB)	< ±1 dB	

MIMO 802.11 ax40 (HE40) – SU Full channel allocation:

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted Power RMS (dBm)	4.986	5.231
Maximum Power E.I.R.P (dBm)	9.446	9.691
Measurement uncertainty (dB)	< ±1 dB	

MIMO 802.11 ax40 (HE40) – RU Subcarrier allocation (RU26):

The next RU combinations were tested as worst cases:

Low Channel: RU26 Offset 0

High Channel: RU26 Offset 17

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

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted Power RMS (dBm)	6.120	6.307
Maximum Power E.I.R.P (dBm)	10.580	10.767
Measurement uncertainty (dB)	< ±1 dB	

MIMO 802.11 ac80 (VHT80):

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

Channel	Single Channel 42 (5210 MHz)
Maximum Conducted Power RMS (dBm)	6.311
Maximum Power E.I.R.P (dBm)	10.771
Measurement uncertainty (dB)	< ±1 dB

MIMO 802.11 ax80 (HE80) – SU Full channel allocation:

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

Channel	Single Channel 42 (5210 MHz)
Maximum Conducted Power RMS (dBm)	5.315
Maximum Power E.I.R.P (dBm)	9.775
Measurement uncertainty (dB)	< ±1 dB

Verdict: PASS

FCC 15.407 (a)(1)(iv) Transmitter Maximum Power 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.

Antenna Gain:

- SISO Antenna – Chain 0: +4.46 dBi
- SISO Antenna – Chain 1: +4.46 dBi
- MIMO Antennas – Chain 0 & 1:

  Calculation according to KDB 662911 D01 v02r01 Section F)2)f)i).

  PSD Antenna Gain (MIMO): + 7.47 dBi

For all SISO operation modes, the antenna gain is less than 6 dBi.

For MIMO CDD operation modes, the limit was reduced by the amount in dB the antenna gain exceeds 6 dBi. The limit is reduced by 1.47 dB to 9.54 dBm per megagertz.

Preliminary tests determined the SISO worst case: Chain 1.

SISO worst case

SISO 802.11 a20:

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

Channels	Low Channel 36 (5180 MHz)	Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted PSD (dBm/MHz)	-6.174	-5.483	-5.174
Measurement uncertainty (dB)	< ±1.3		

SISO 802.11 n20 (HT20):

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

Channels	Low Channel 36 (5180 MHz)	Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted PSD (dBm/MHz)	-6.571	-5.811	-5.662
Measurement uncertainty (dB)	< ±1.3		

SISO 802.11 ac20 (VHT20):

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

Channels	Low Channel 36 (5180 MHz)	Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted PSD (dBm/MHz)	-6.317	-5.596	-5.444
Measurement uncertainty (dB)	< ±1.3		

SISO 802.11 ax20 (HE20) – SU Full channel allocation:

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

Channels	Low Channel 36 (5180 MHz)	Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
Maximum Conducted PSD (dBm/MHz)	-6.853	-6.087	-5.952
Measurement uncertainty (dB)	< ±1.3		

SISO 802.11 ax20 (HE20) – RU Subcarrier allocation (RU26):

The next RU combinations were tested as worst cases:

Low Channel: RU26 Offset 0
Middle Channel: RU26 Offset 4
High Channel: RU26 Offset 8

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)	3.359	2.064	4.081
Measurement uncertainty (dB)	< ±1.3		

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)	-8.748	-8.433
Measurement uncertainty (dB)	< ±1.3	

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)	-8.658	-8.405
Measurement uncertainty (dB)	< ±1.3	

SISO 802.11 ax40 (HE40) – SU Full channel allocation:

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted PSD (dBm/MHz)	-9.062	-8.619
Measurement uncertainty (dB)	< ±1.3	

SISO 802.11 ax40 (HE40) – RU Subcarrier allocation (RU26):

The next RU combinations were tested as worst cases:

Low Channel: RU26 Offset 0
High Channel: RU26 Offset 17

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

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted PSD (dBm/MHz)	3.564	4.047
Measurement uncertainty (dB)	< ±1.3	

SISO 802.11 ac80 (VHT80):

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

Channel	Single Channel 42 (5210 MHz)
Maximum Conducted PSD (dBm/MHz)	-11.683
Measurement uncertainty (dB)	< ±1.3

SISO 802.11 ax80 (HE80) – SU Full channel allocation:

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

Channel	Single Channel 42 (5210 MHz)
Maximum Conducted PSD (dBm/MHz)	-11.693
Measurement uncertainty (dB)	< ±1.3

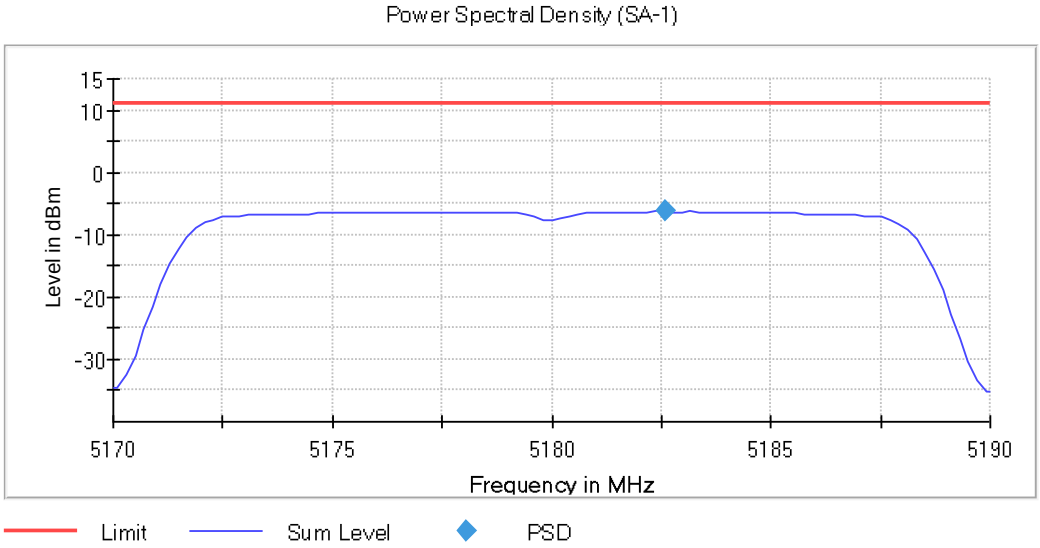
Verdict: PASS

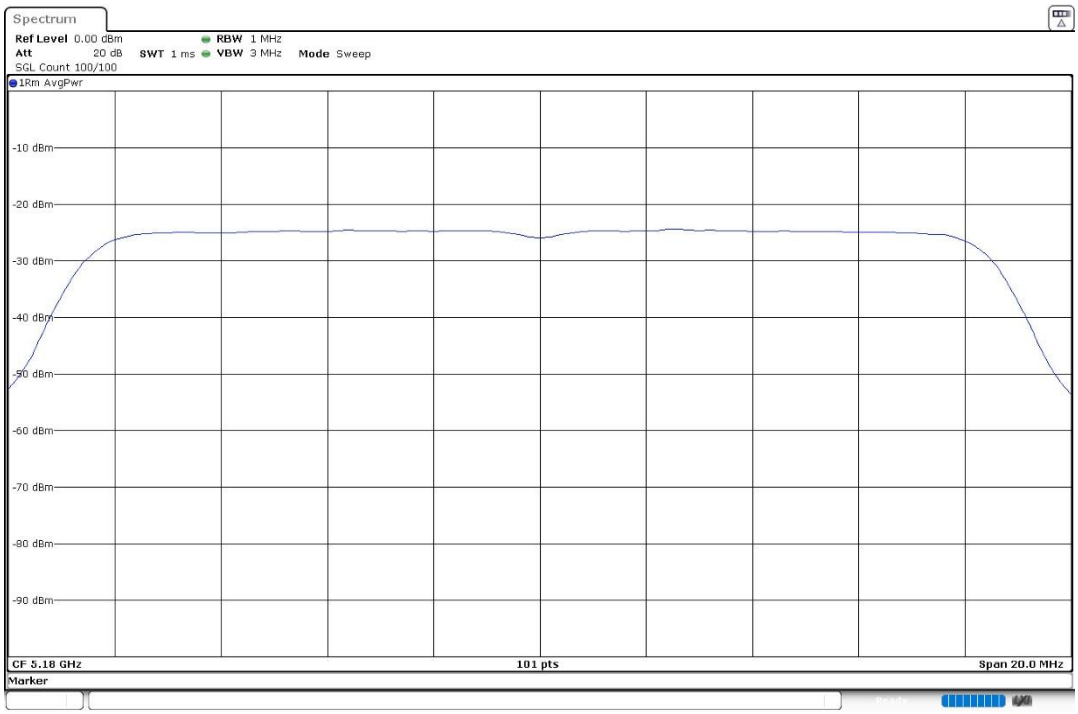
SISO worst case

SISO 802.11 a20:

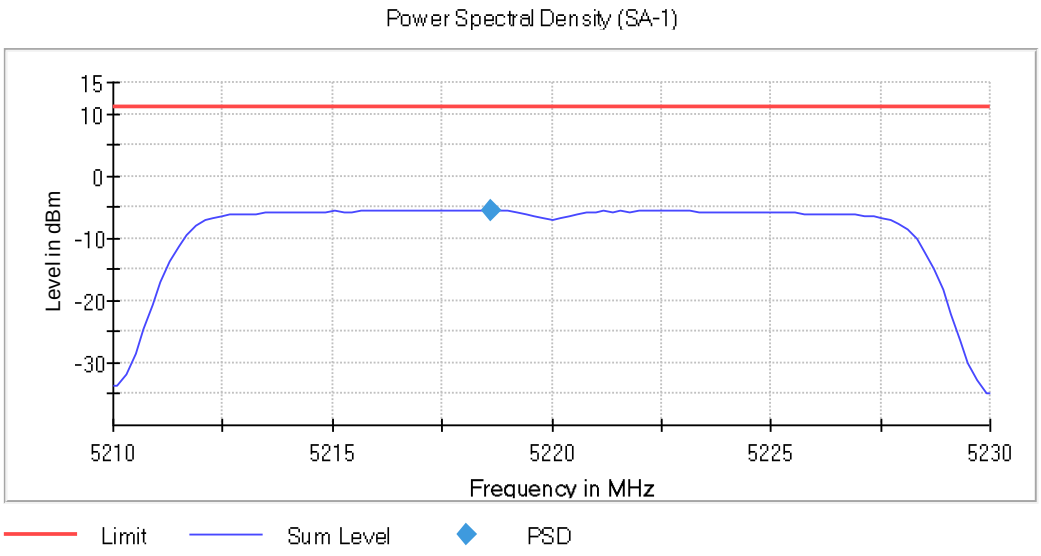
U-NII-1 (5150-5250 MHz)

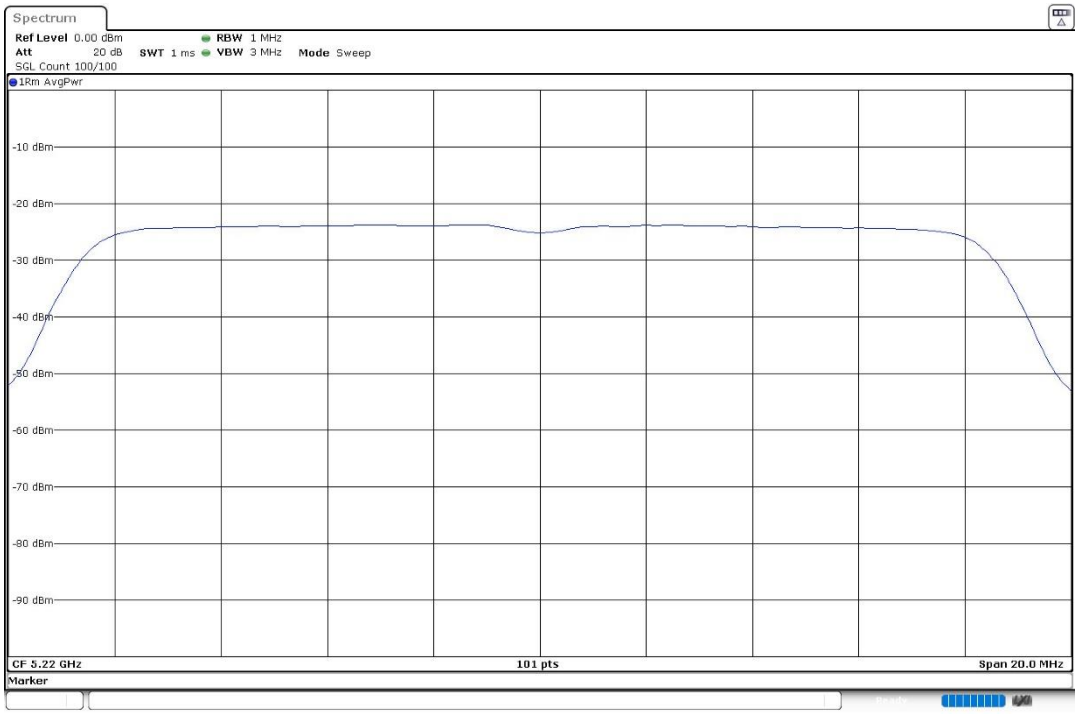
- Low Channel 36 (5180 MHz):



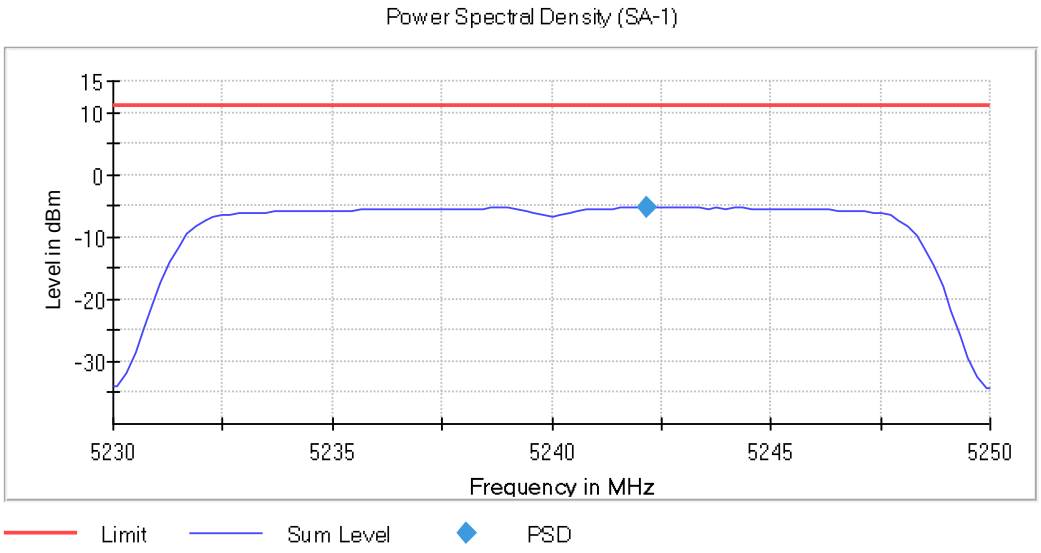


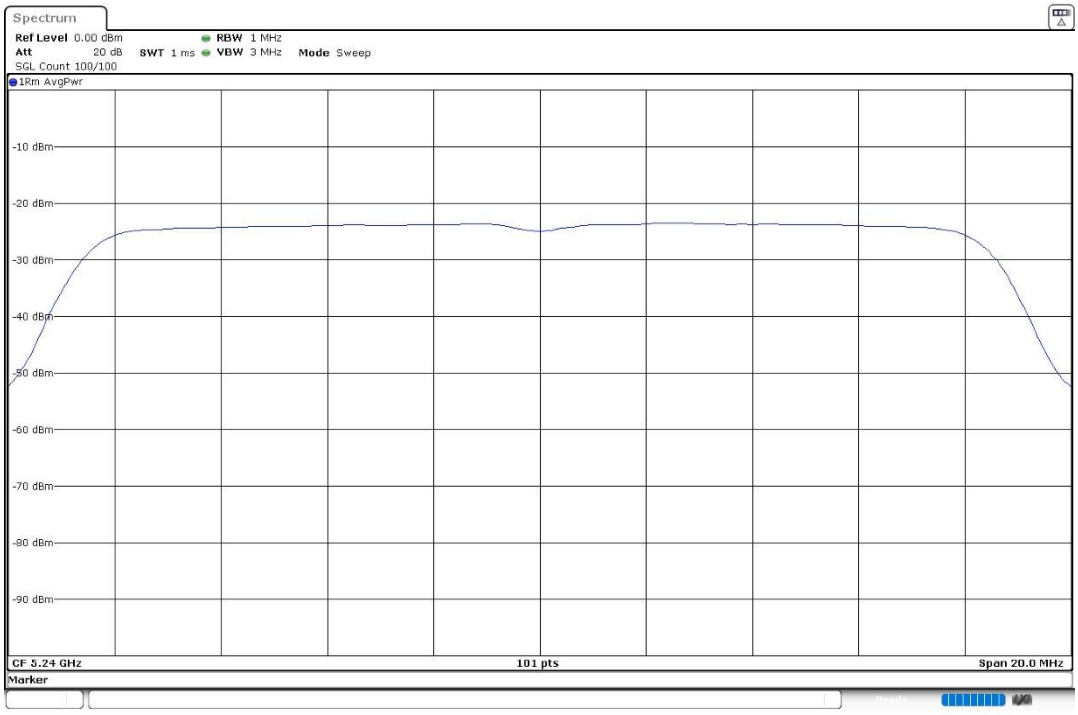
- Channel 44 (5220 MHz):





- High Channel 48 (5240 MHz):

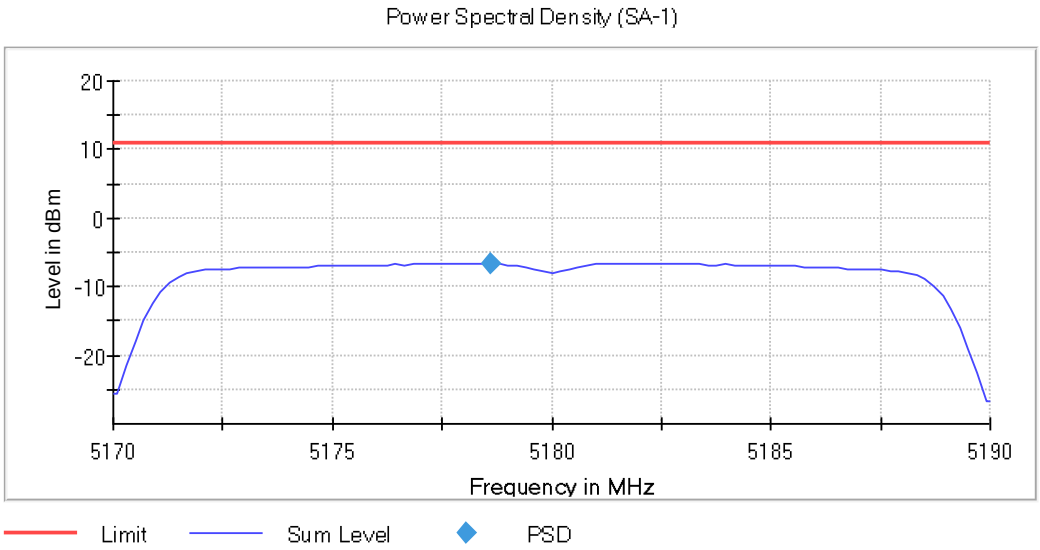


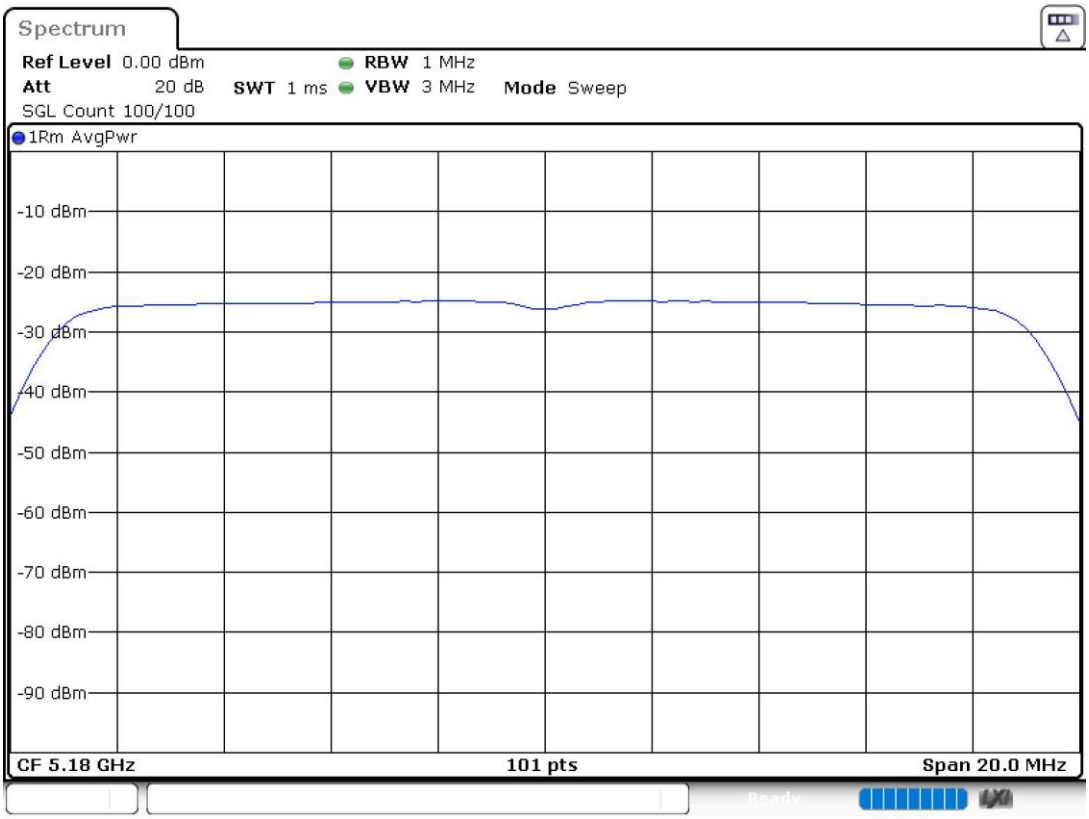


SISO 802.11 n20 (HT20):

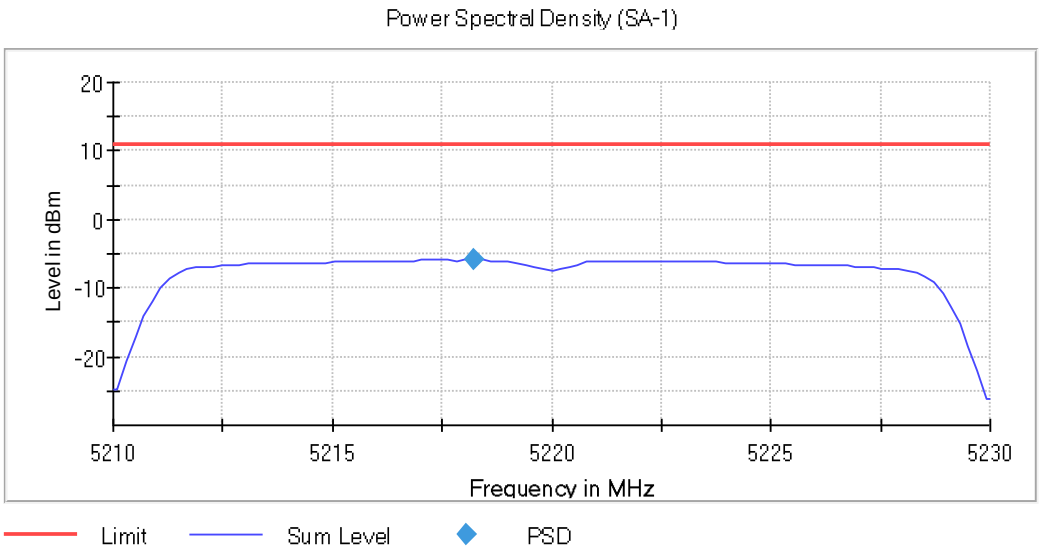
U-NII-1 (5150-5250 MHz)

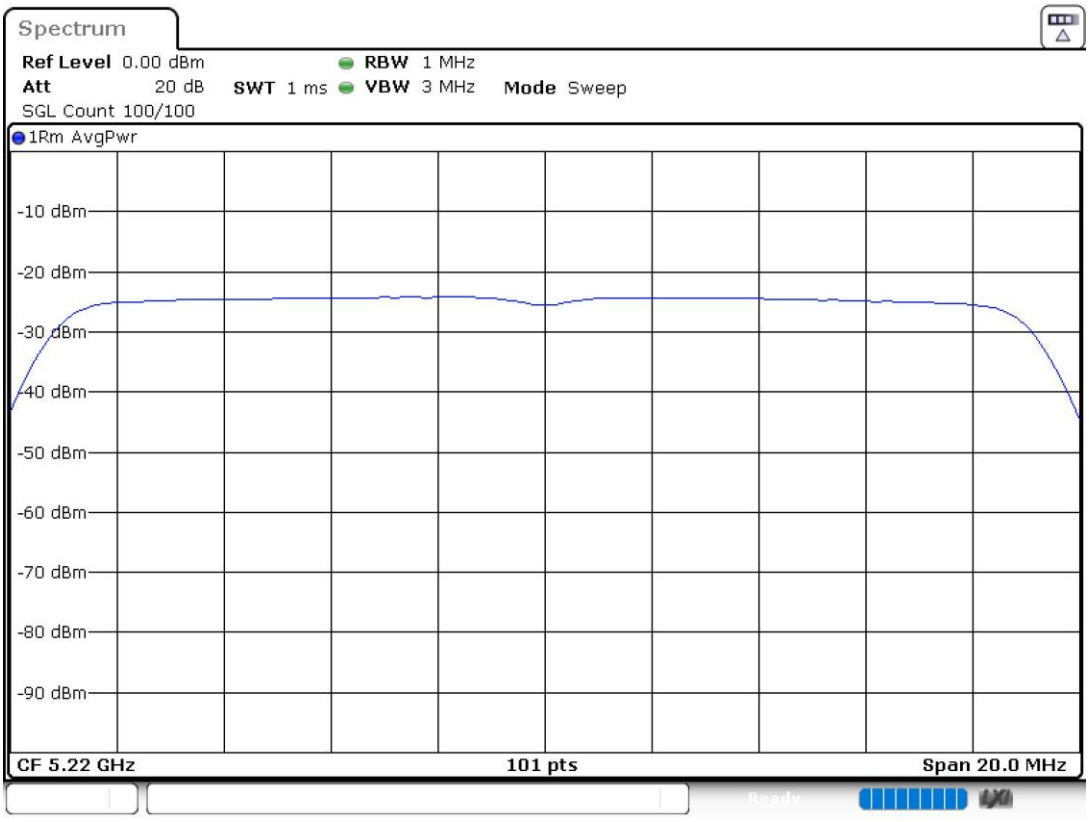
- Low Channel 36 (5180 MHz):



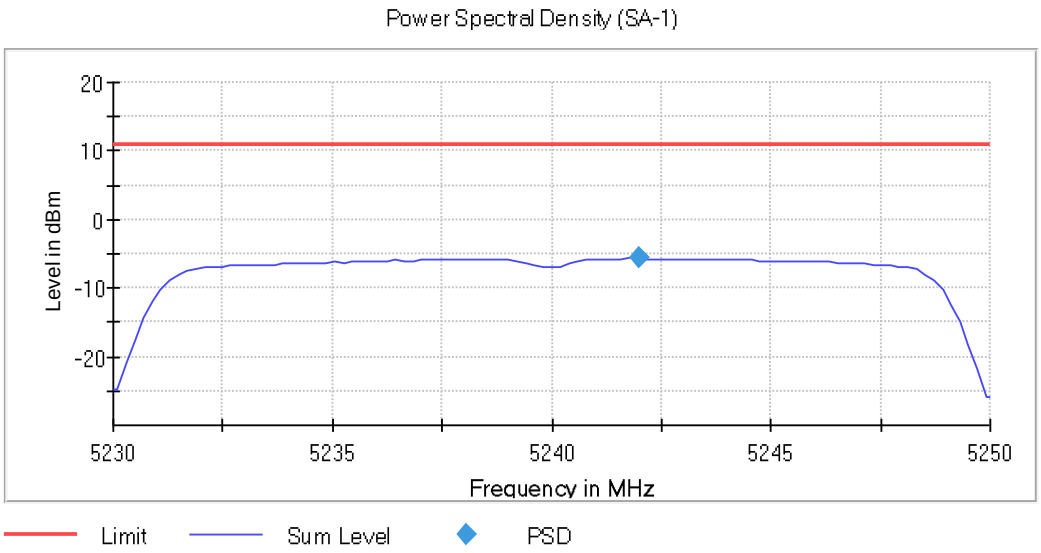


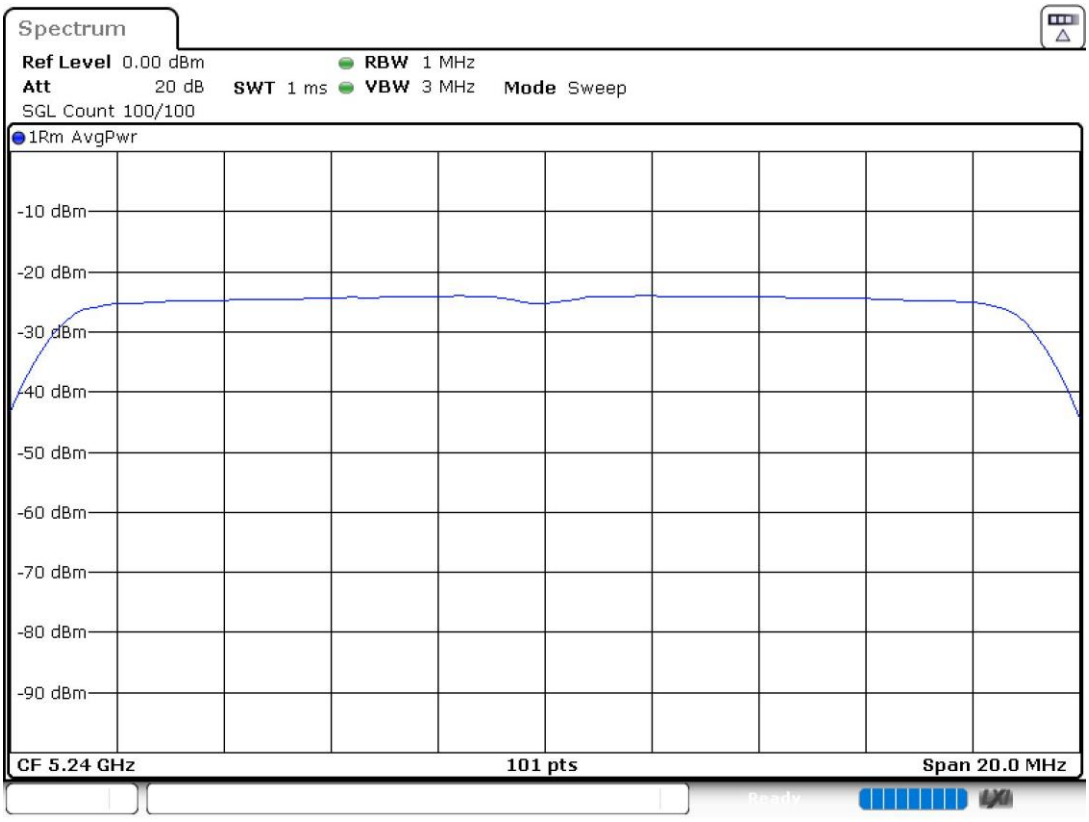
- Channel 44 (5220 MHz):





- High Channel 48 (5240 MHz):

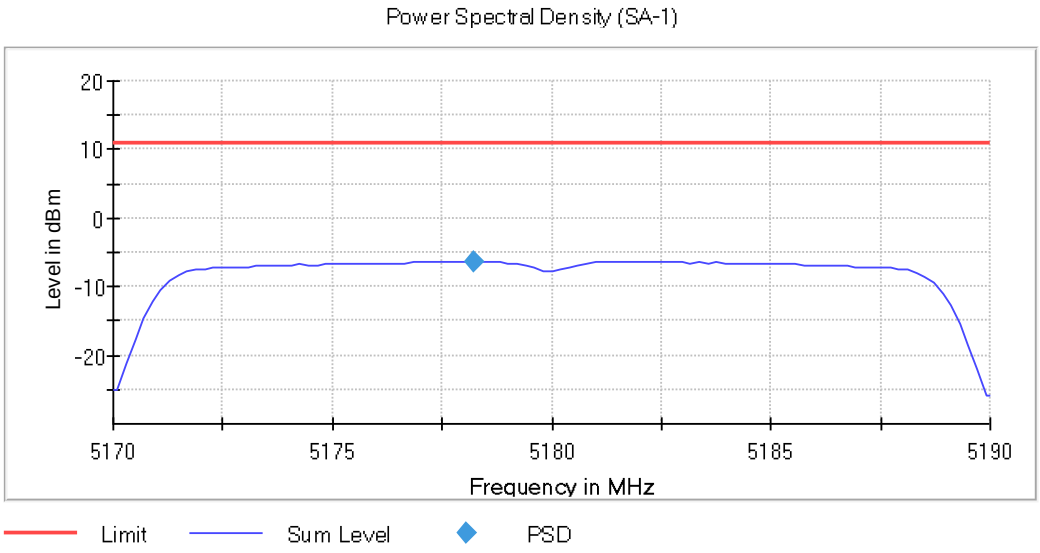


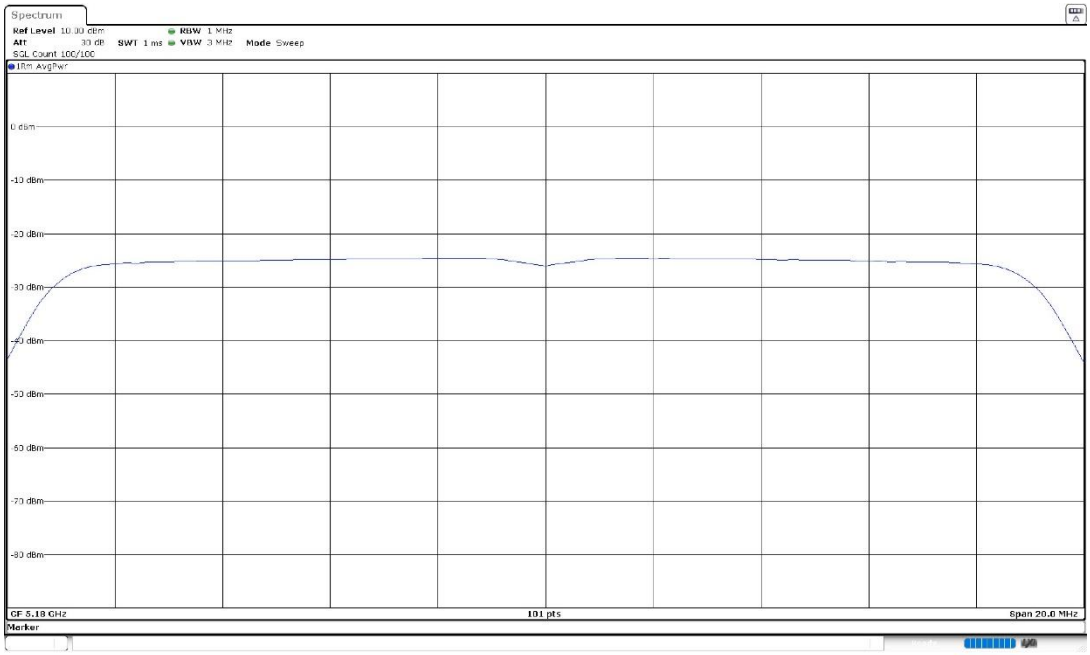


SISO 802.11 ac20 (VHT20):

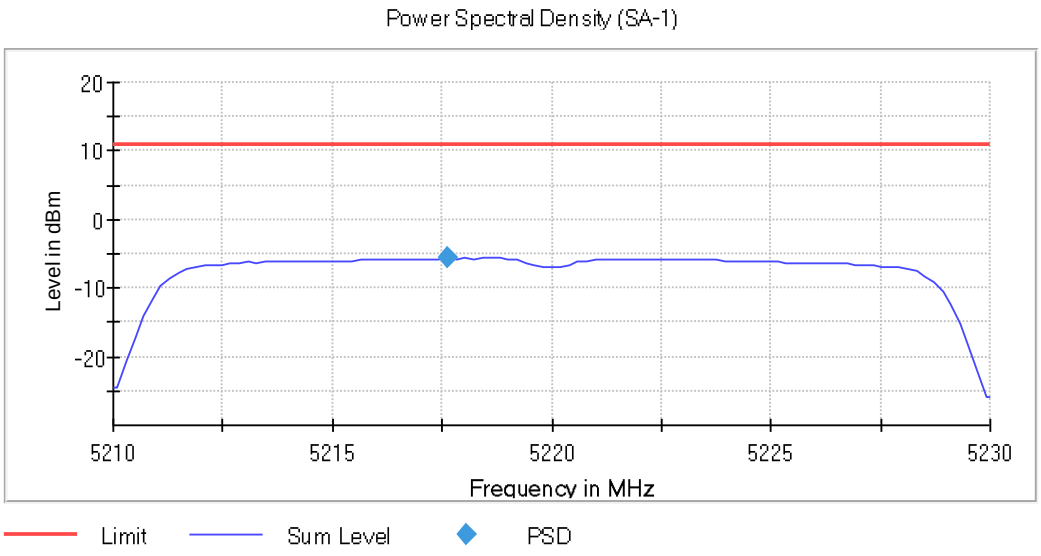
U-NII-1 (5150-5250 MHz)

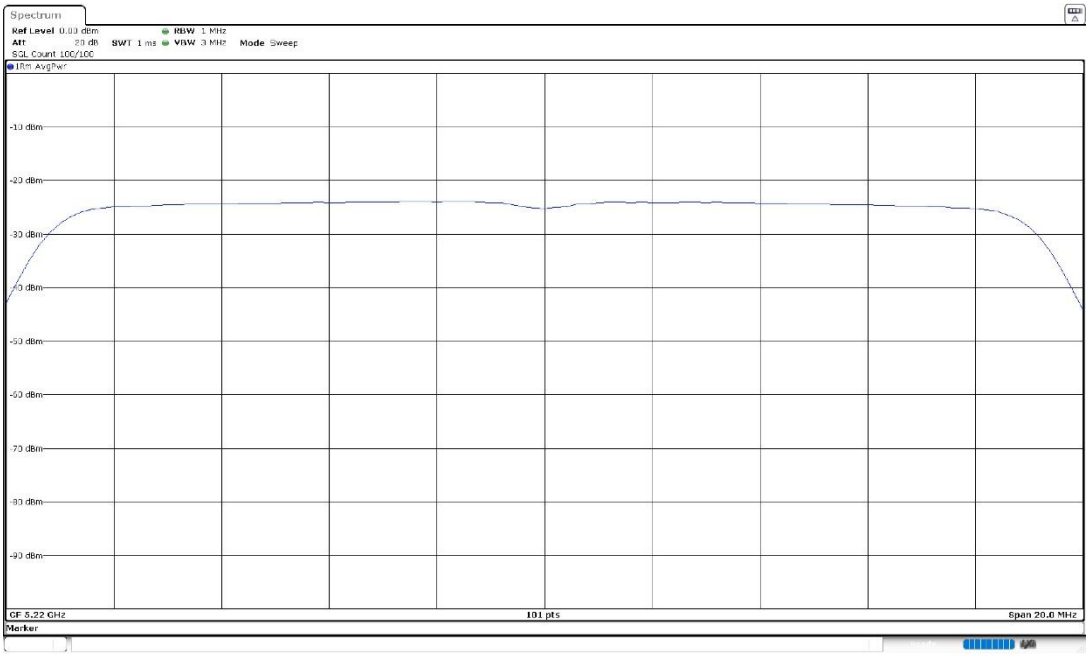
- Low Channel 36 (5180 MHz):



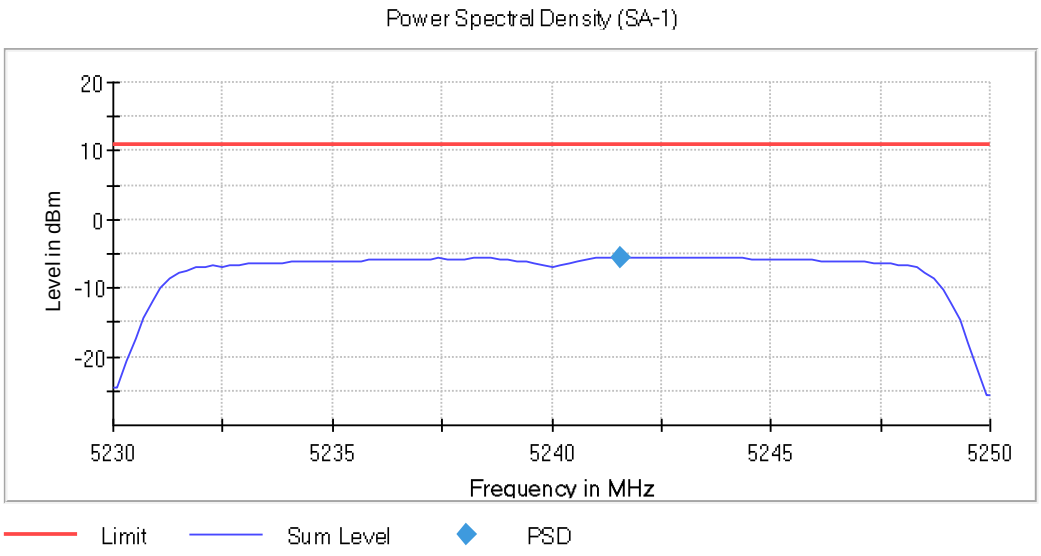


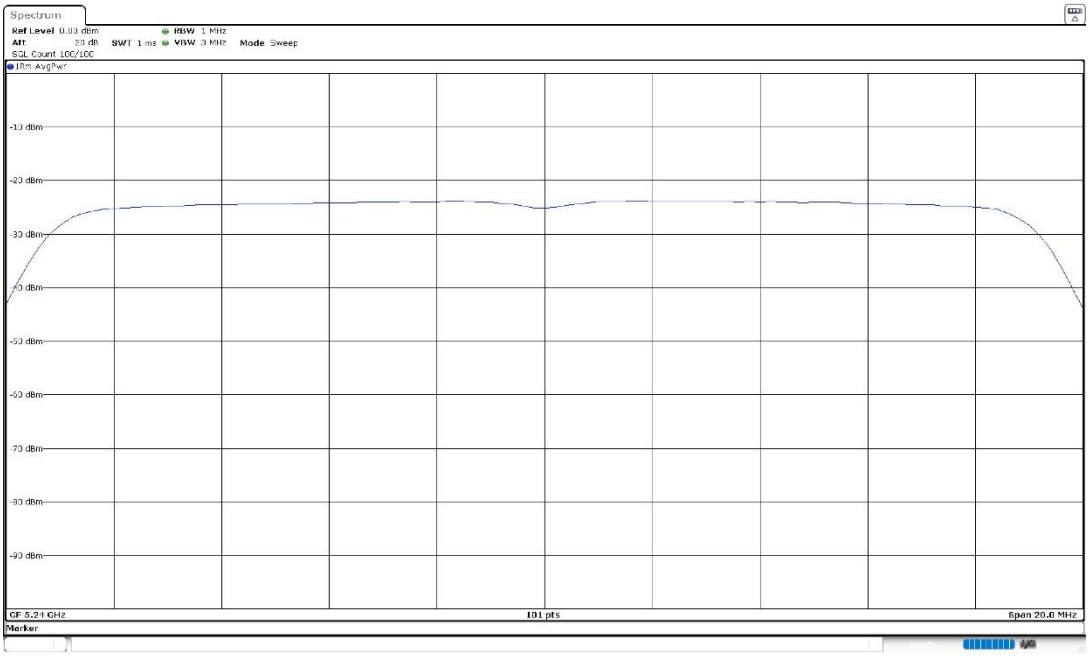
- Channel 44 (5220 MHz):





- High Channel 48 (5240 MHz):

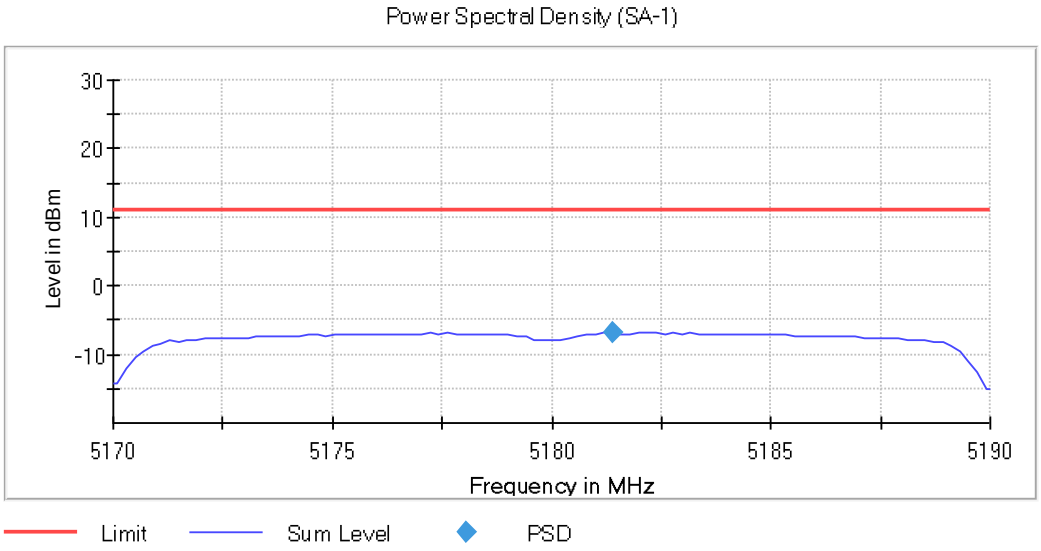


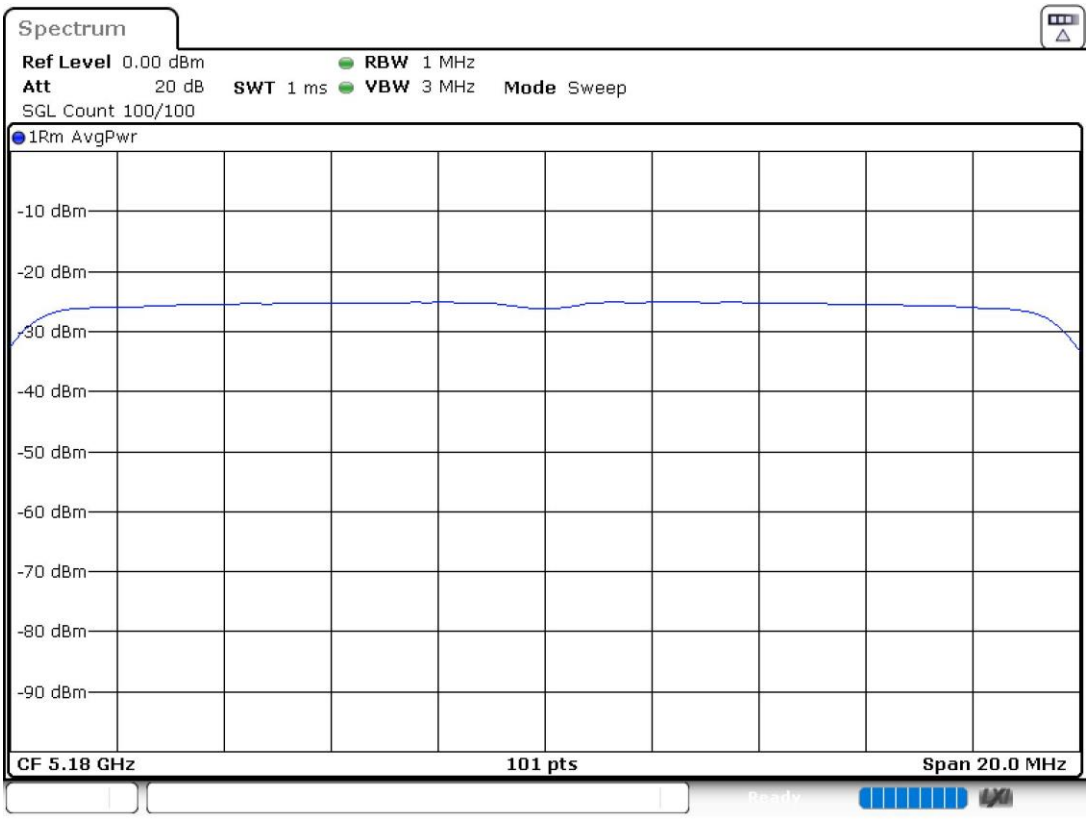


SISO 802.11 ax20 (HE20) – SU Full channel allocation:

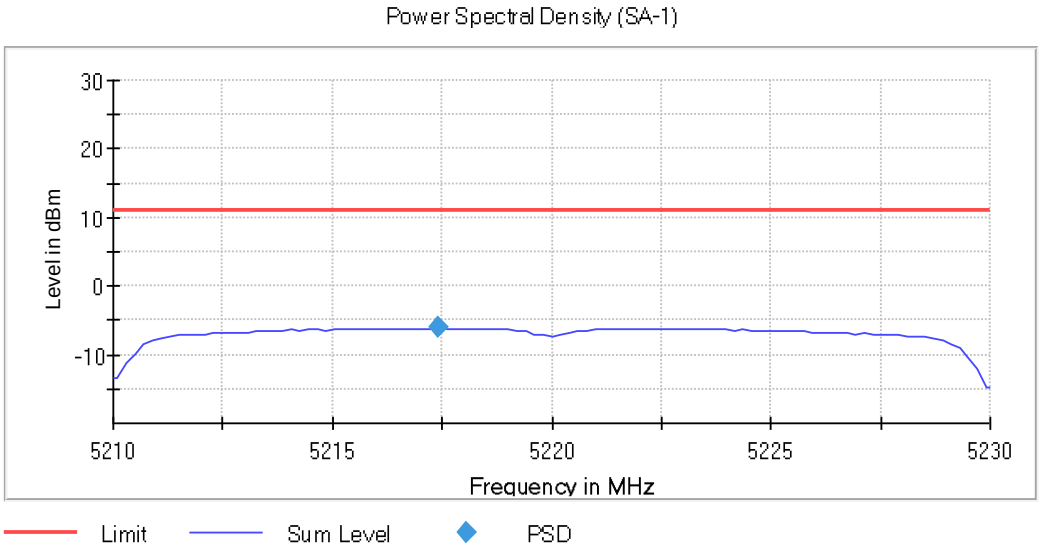
U-NII-1 (5150-5250 MHz)

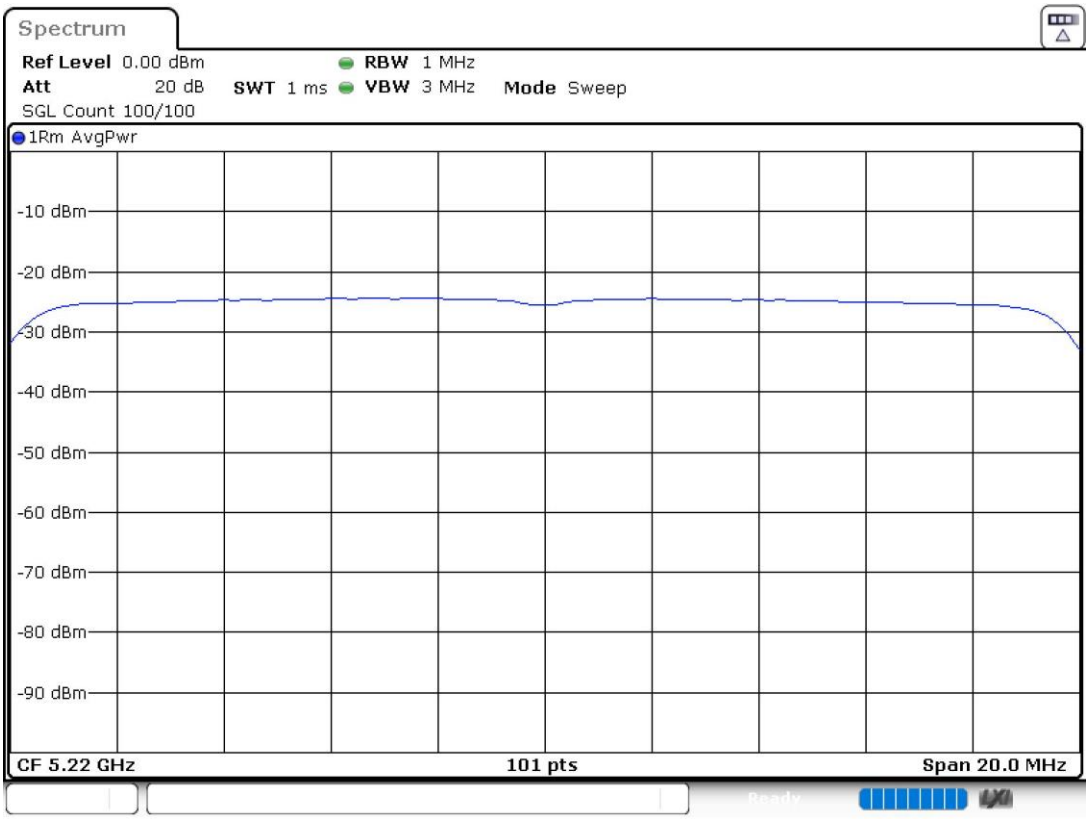
- Low Channel 36 (5180 MHz):



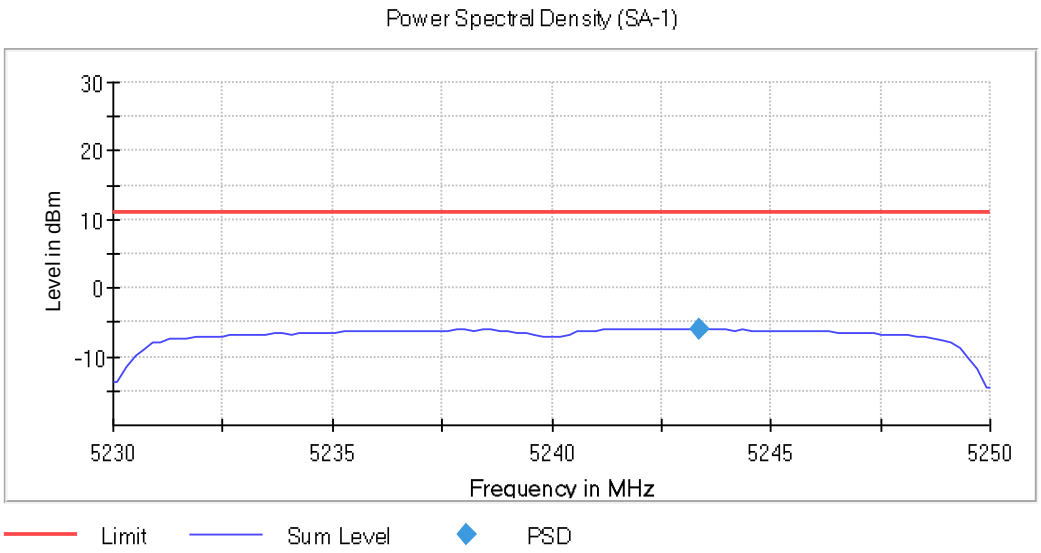


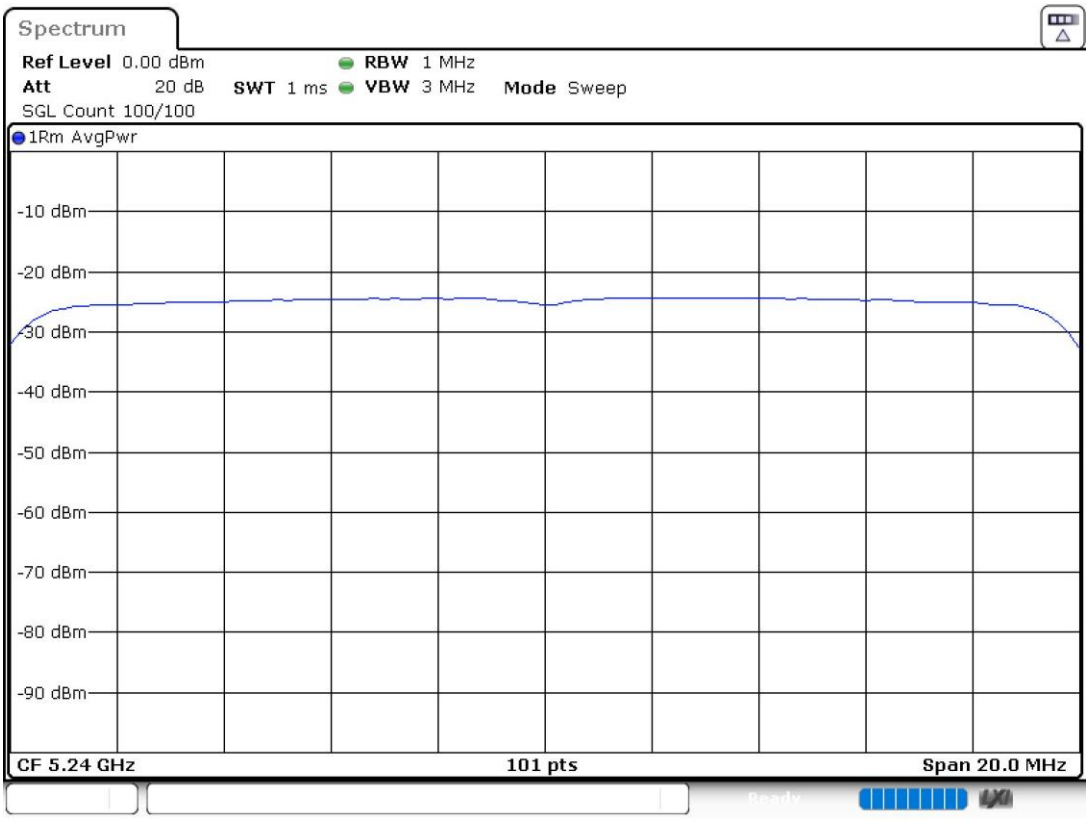
- Channel 44 (5220 MHz):





- High Channel 48 (5240 MHz):

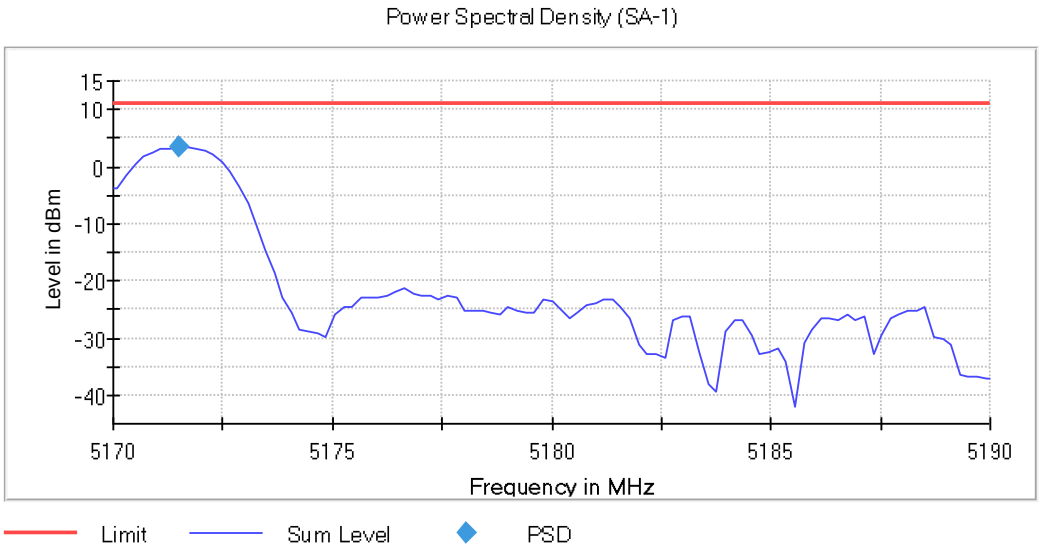


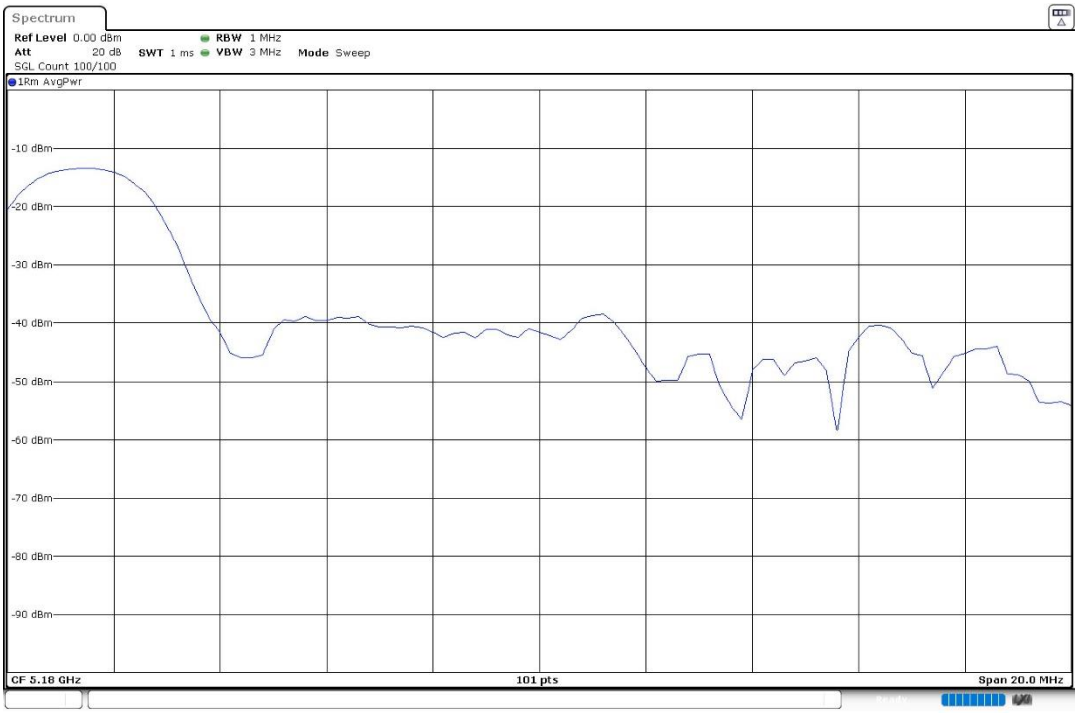


SISO 802.11 ax20 (HE20) – RU Subcarrier allocation (RU26):

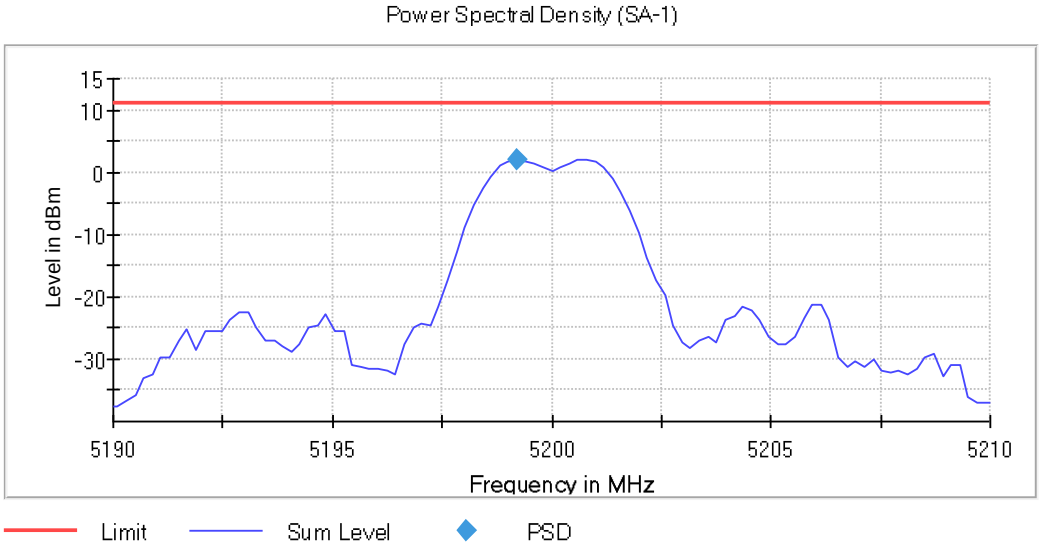
U-NII-1 (5150-5250 MHz)

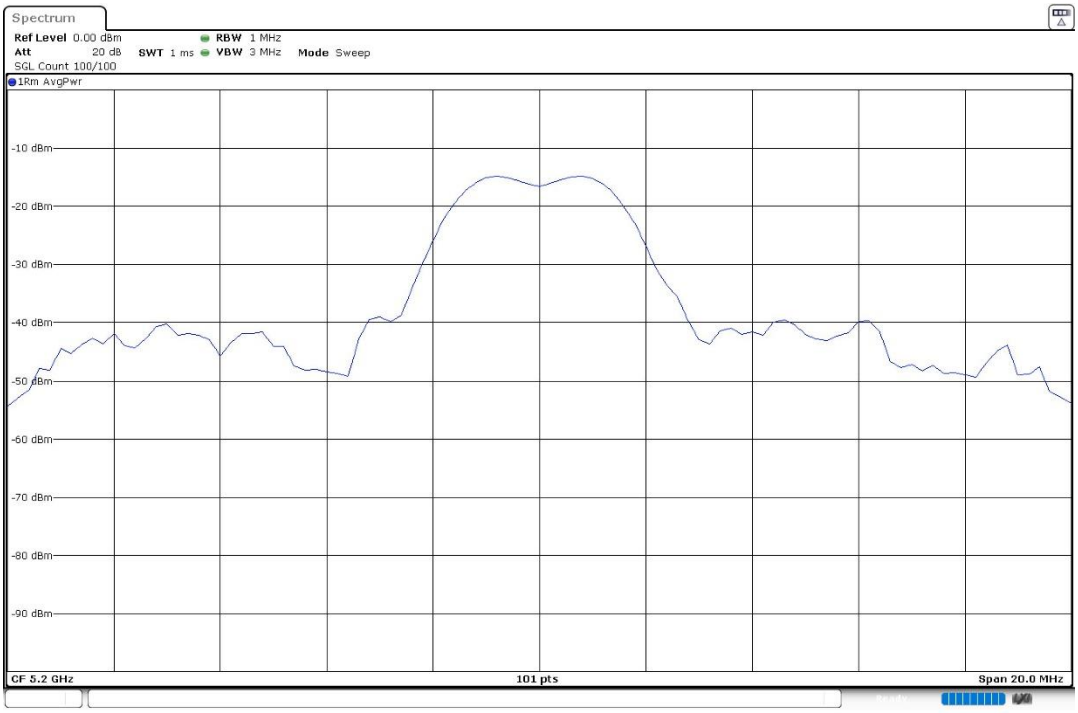
- Low Channel 36 (5180 MHz) / RU26 Offset 0:



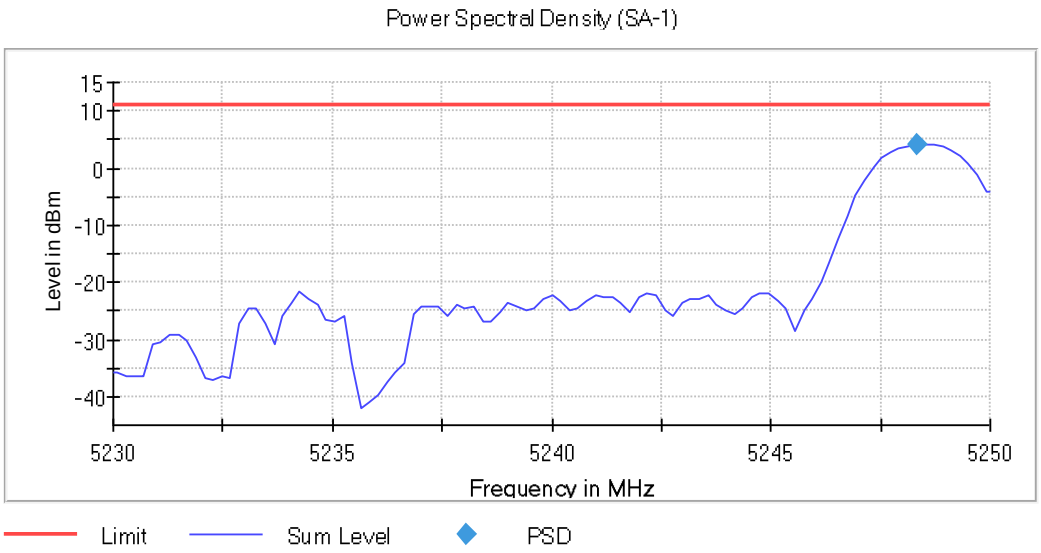


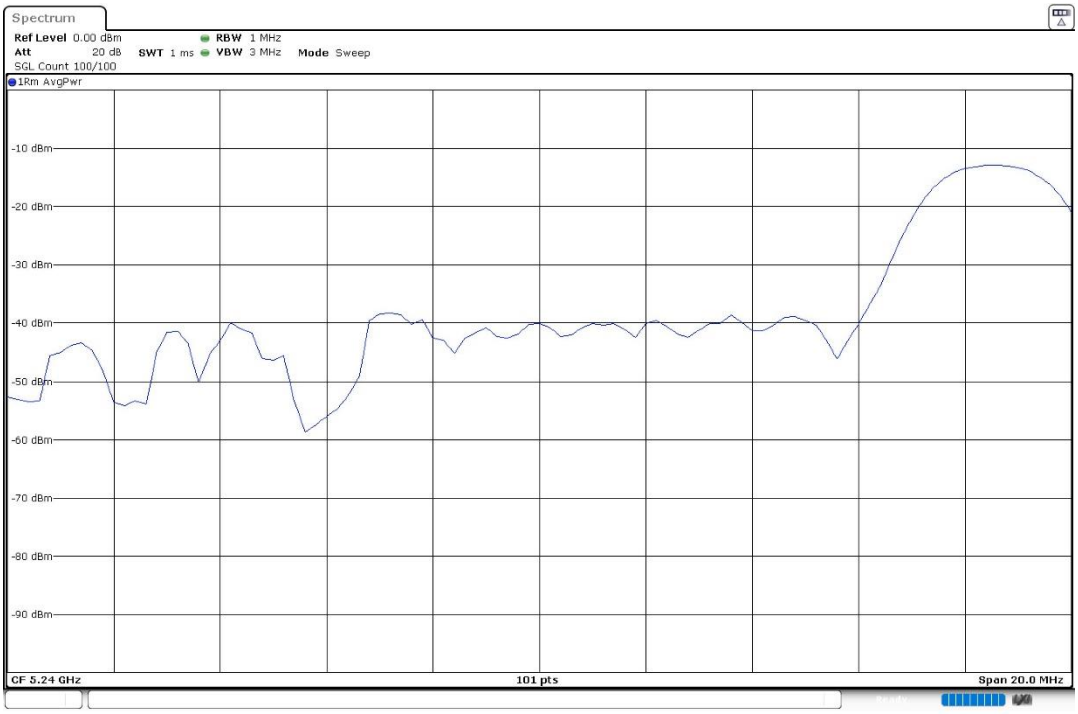
- Channel 40 (5200 MHz) / RU26 Offset 4:





- High Channel 48 (5240 MHz) / RU26 Offset 8:

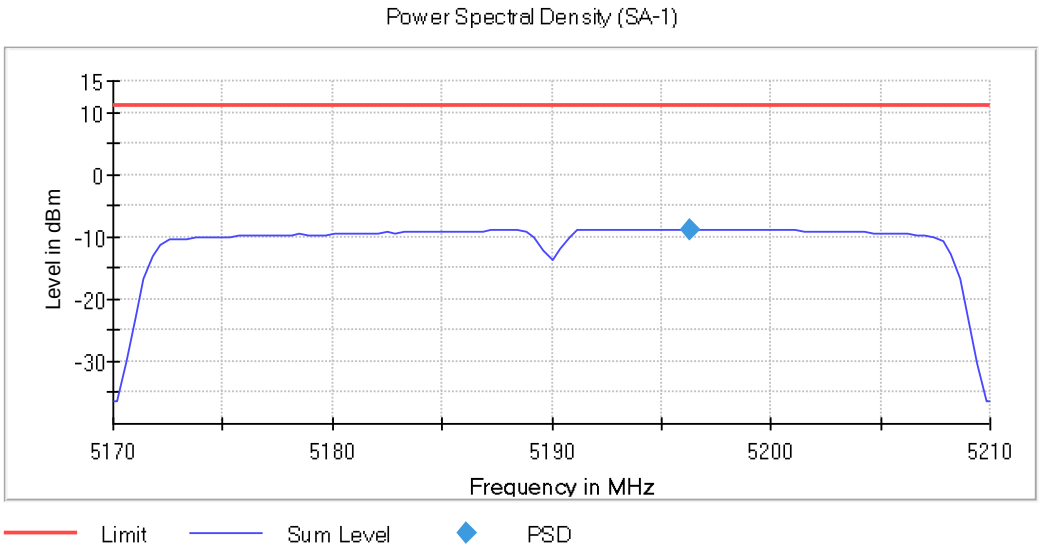


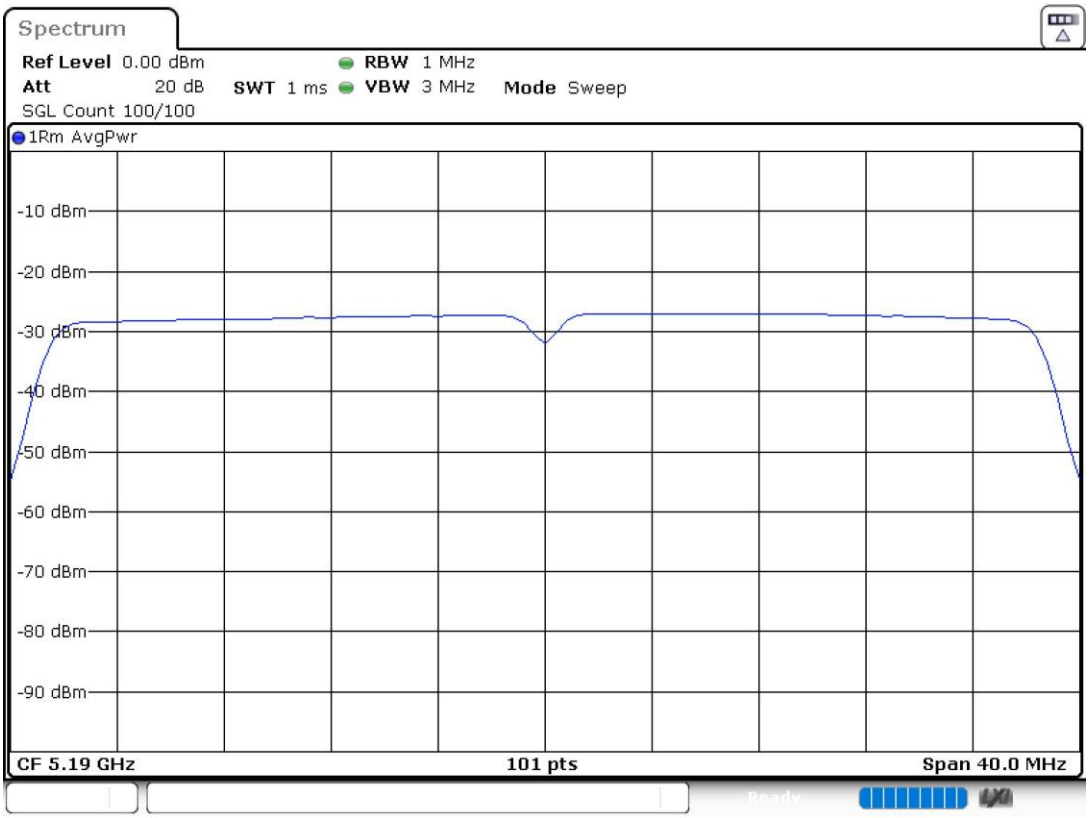


SISO 802.11 n40 (HT40):

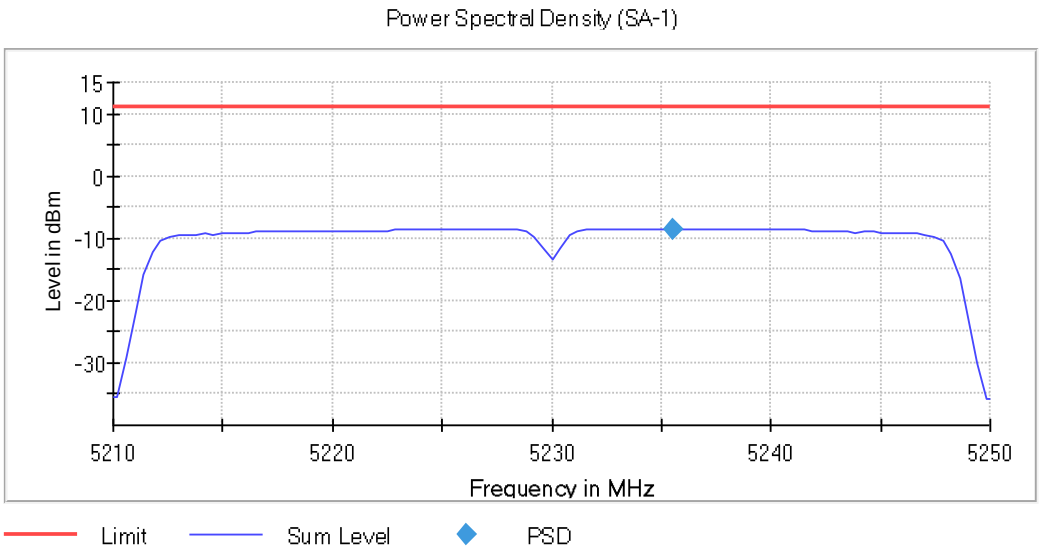
U-NII-1 (5150-5250 MHz)

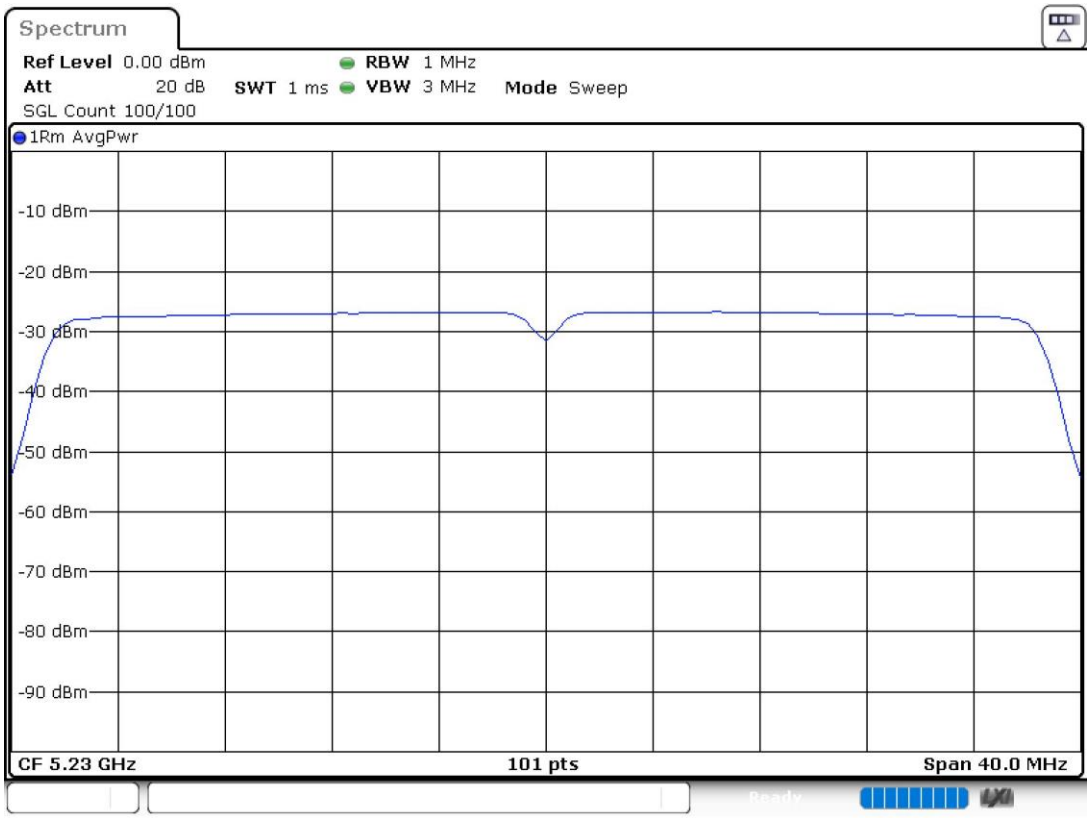
- Low Channel 38 (5190 MHz):





- High Channel 46 (5230 MHz):

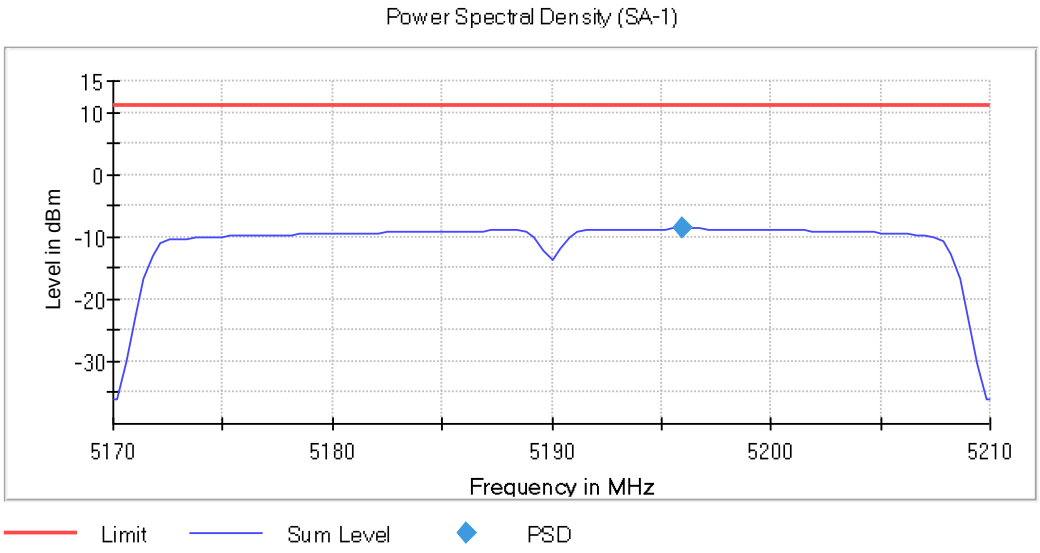


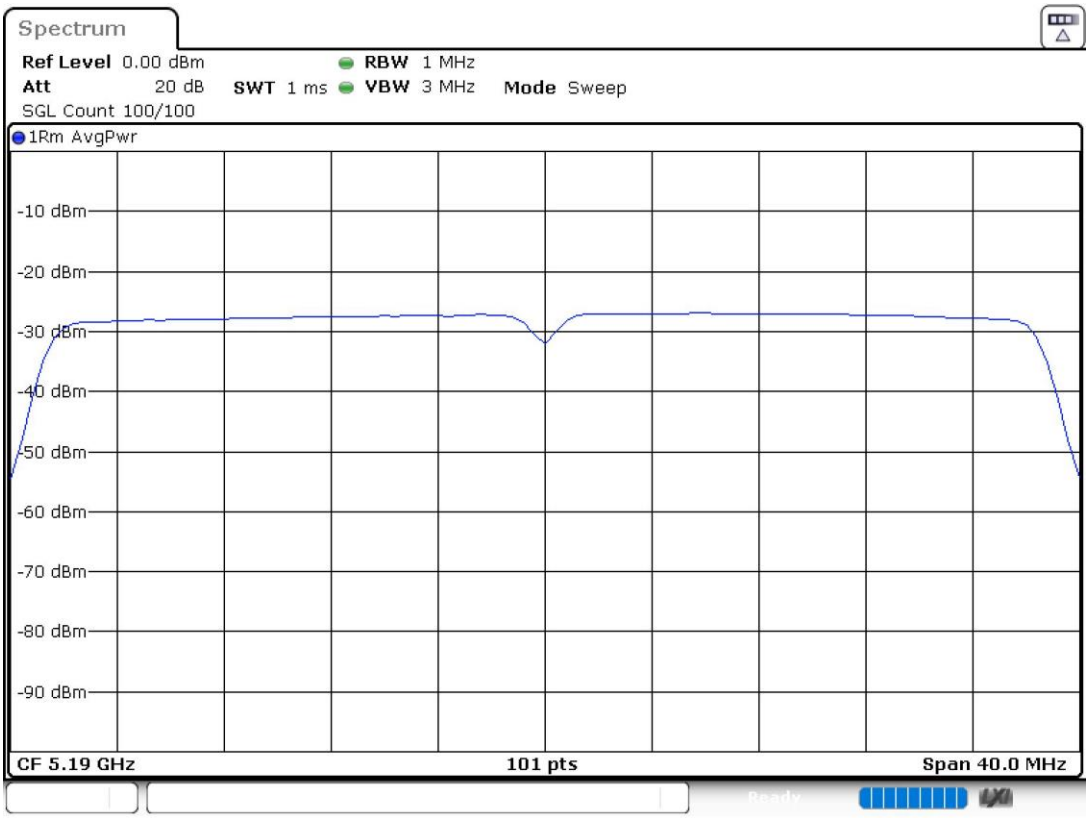


SISO 802.11 ac40 (VHT40):

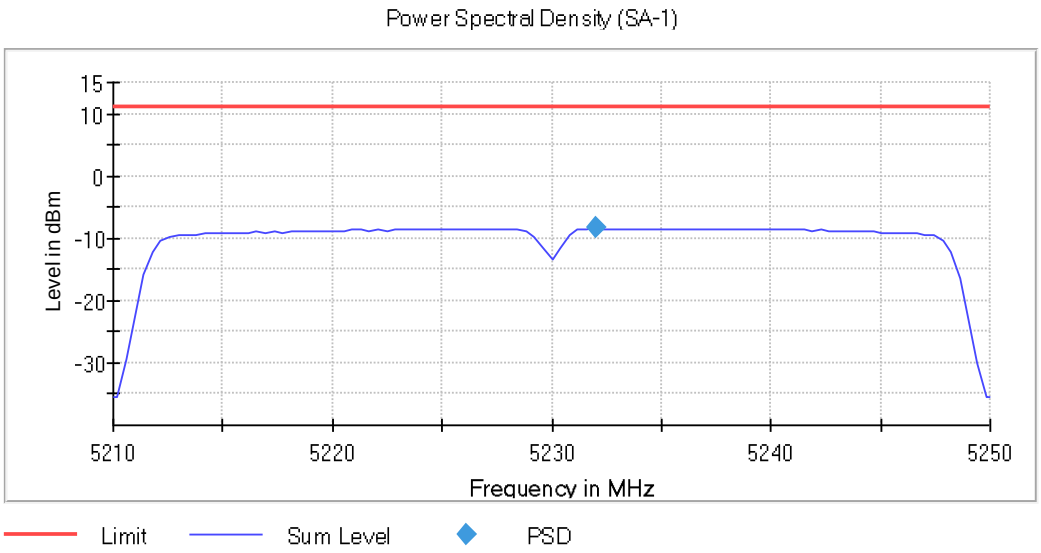
U-NII-1 (5150-5250 MHz)

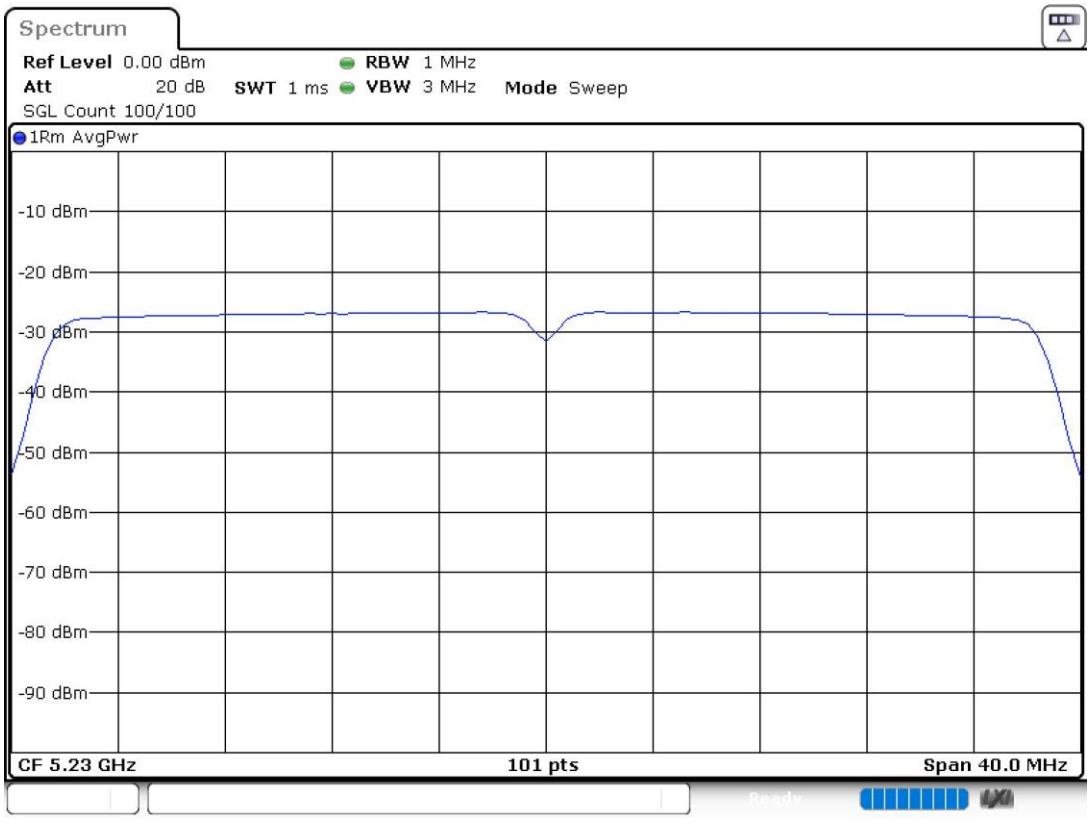
- Low Channel 38 (5190 MHz):





- High Channel 46 (5230 MHz):

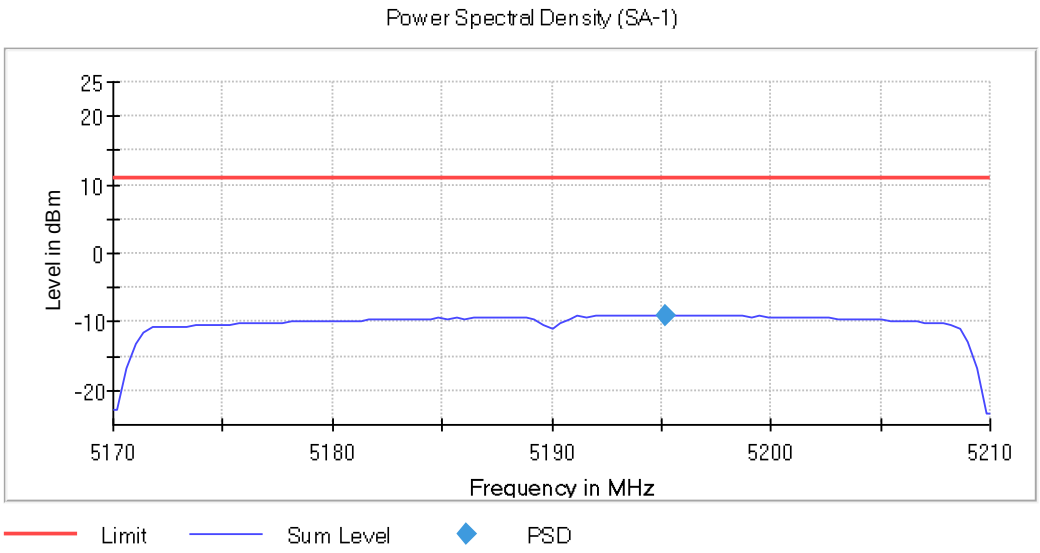


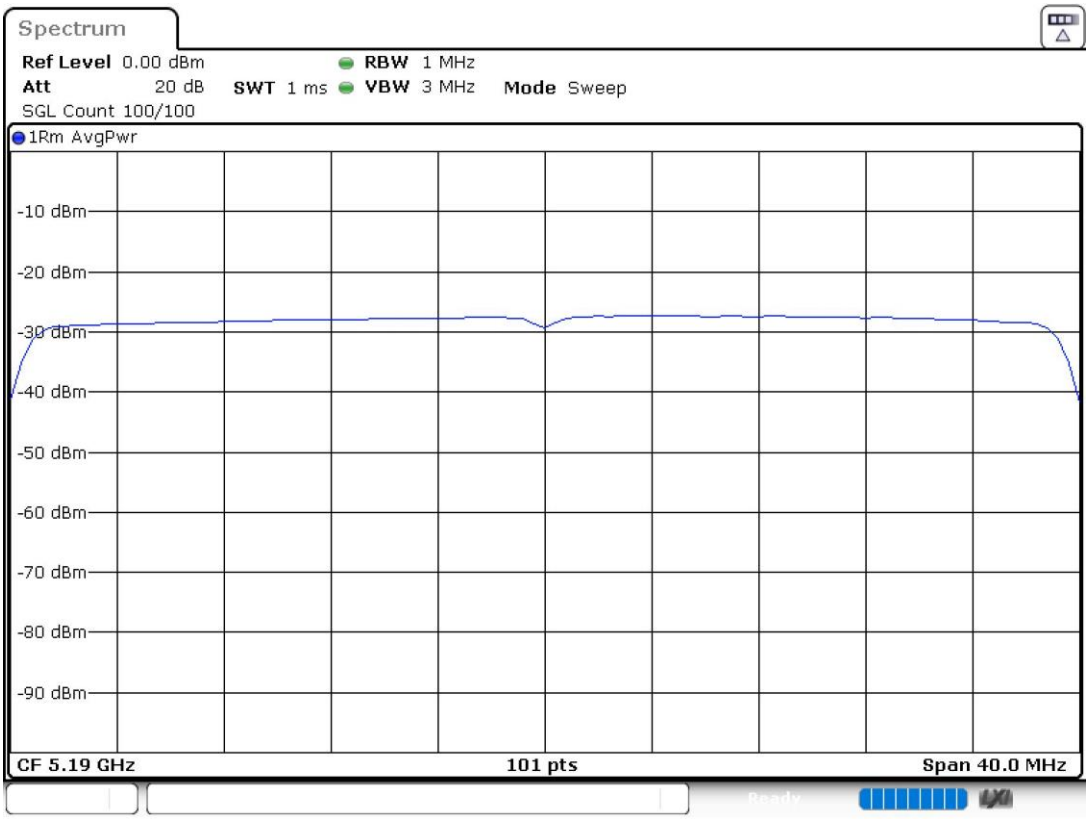


SISO 802.11 ax40 (HE40) – SU Full channel allocation:

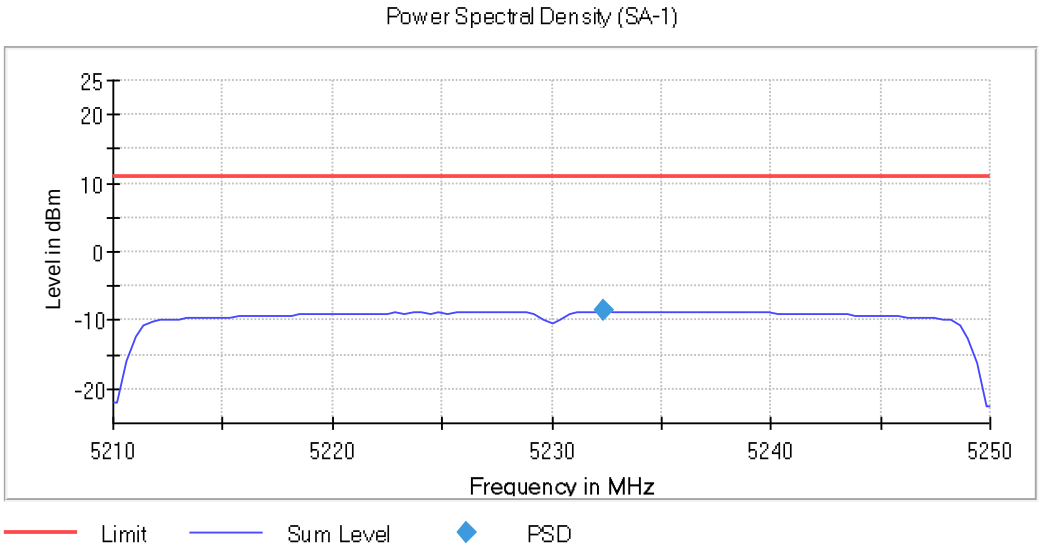
U-NII-1 (5150-5250 MHz)

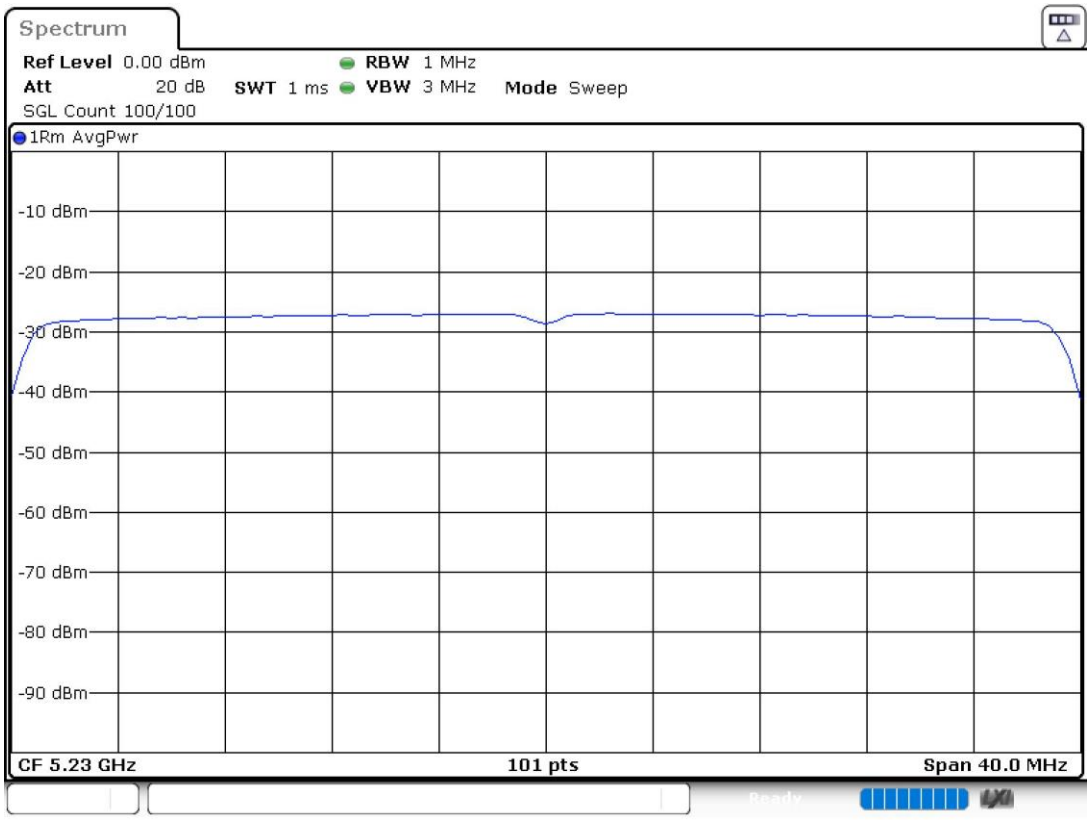
- Low Channel 38 (5190 MHz):





- High Channel 46 (5230 MHz):

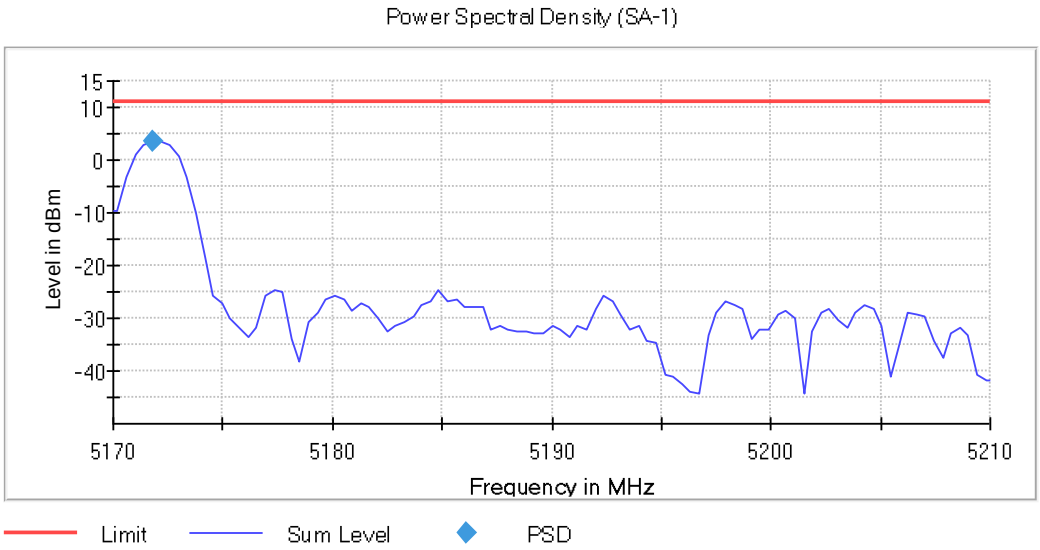


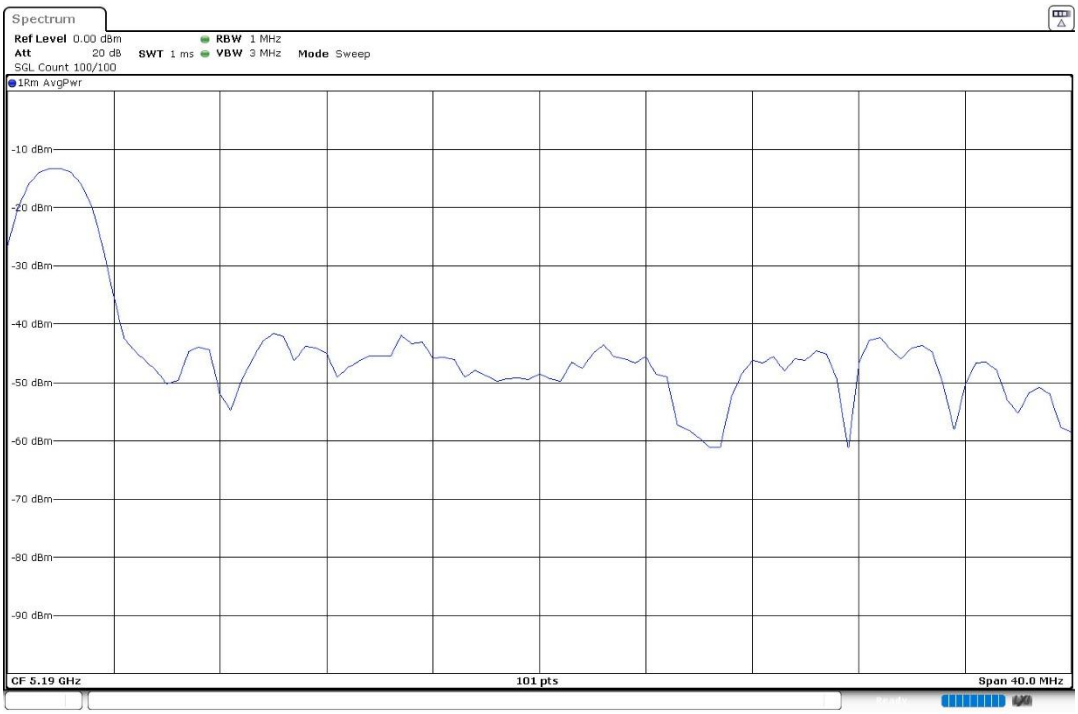


SISO 802.11 ax40 (HE40) – RU Subcarrier allocation (RU26):

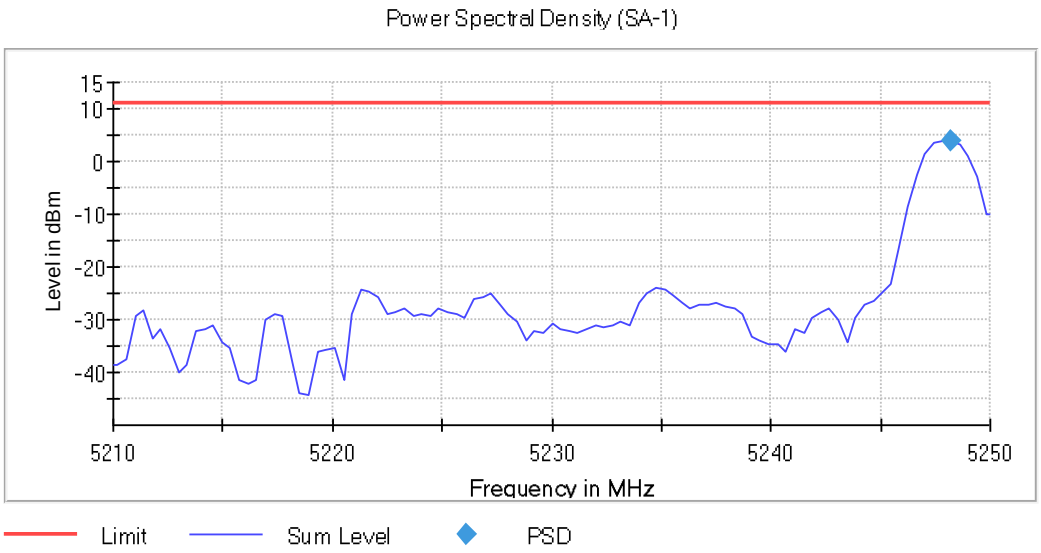
U-NII-1 (5150-5250 MHz)

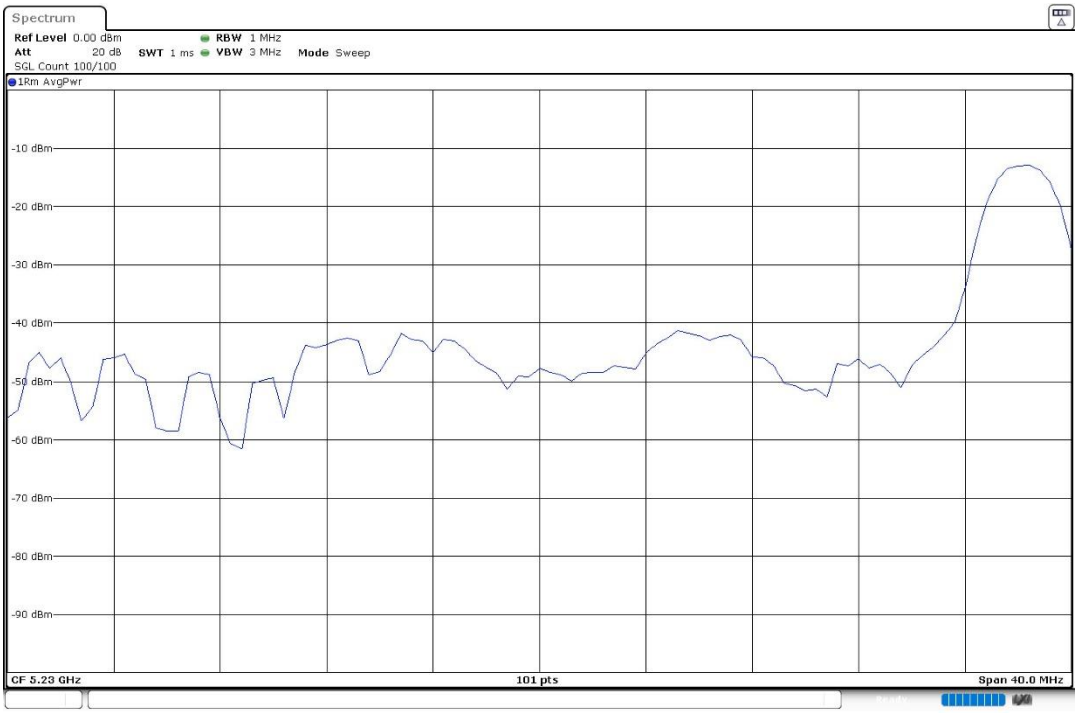
- Low Channel 38 (5190 MHz) / RU26 Offset 0:





- High Channel 46 (5230 MHz) / RU26 Offset 17:

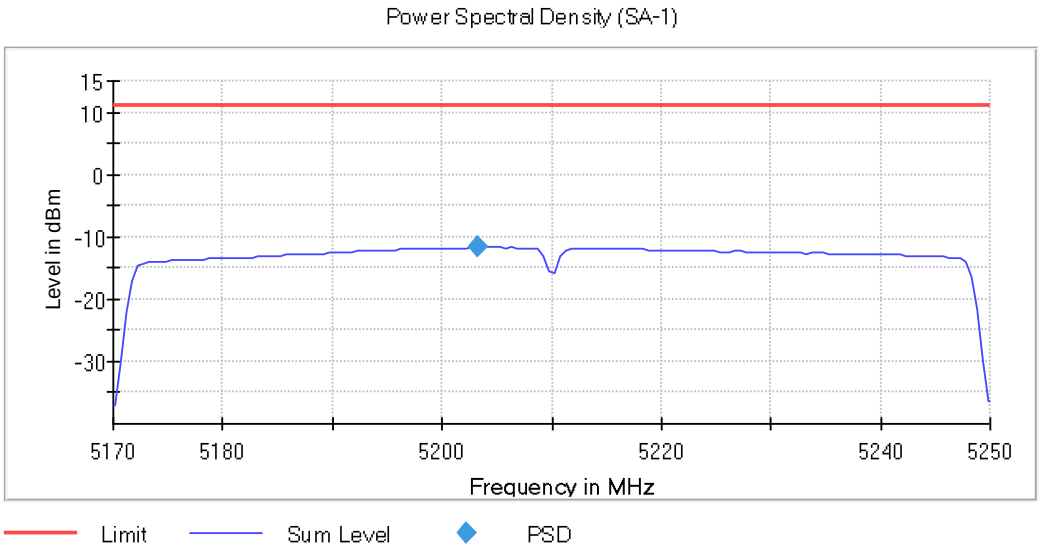


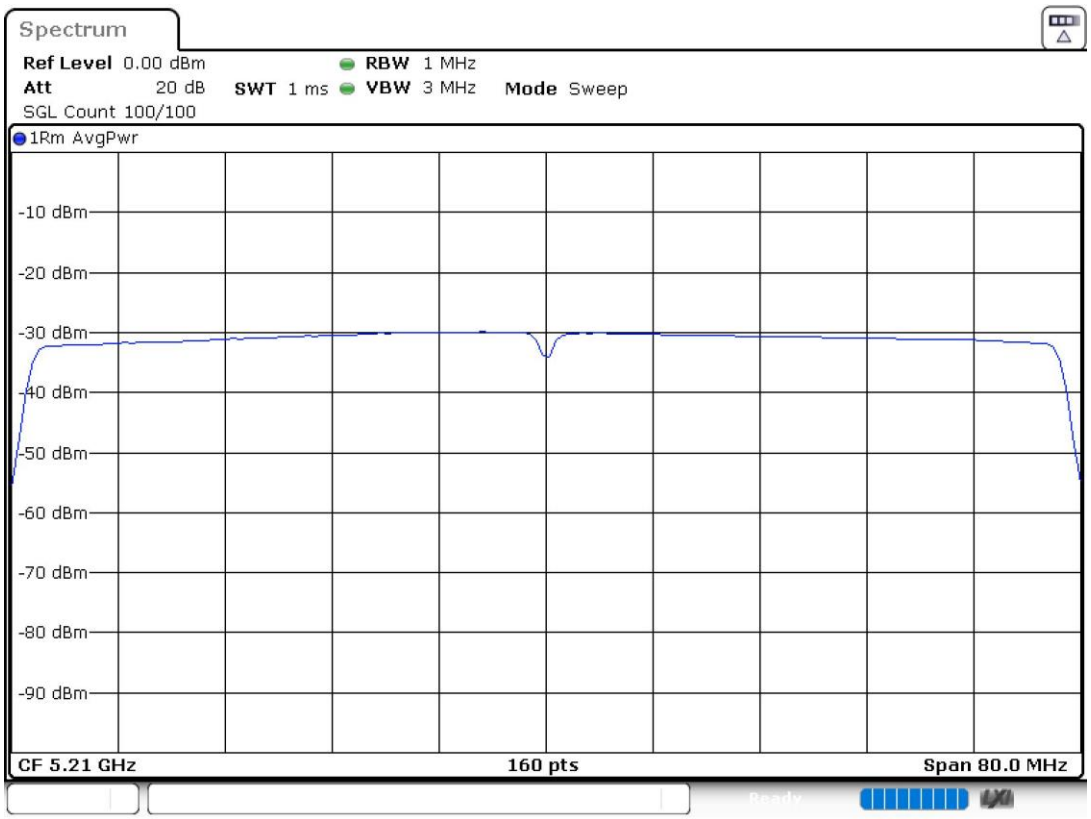


SISO 802.11 ac80 (VHT80):

U-NII-1 (5150-5250 MHz)

- Single Channel 42 (5210 MHz):

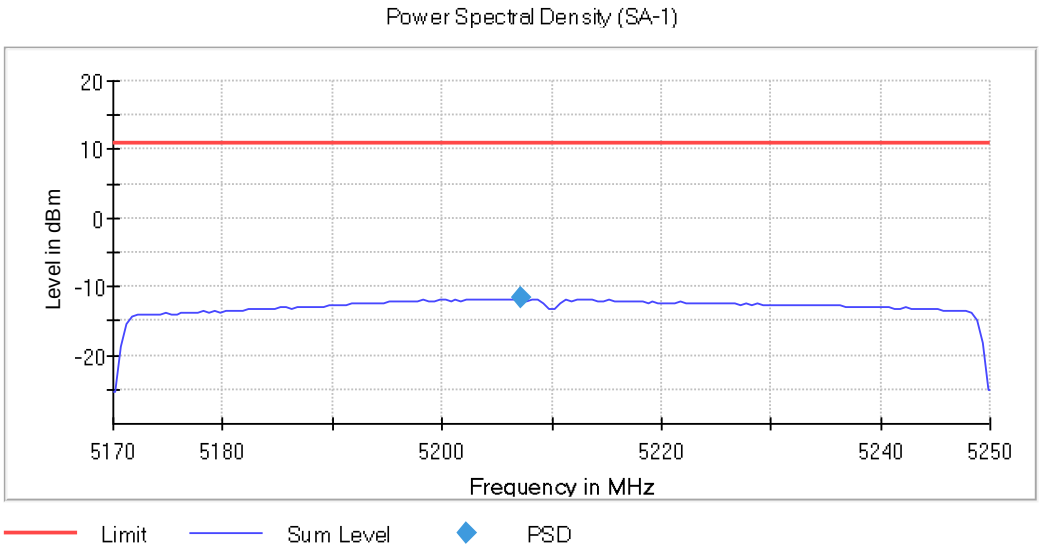


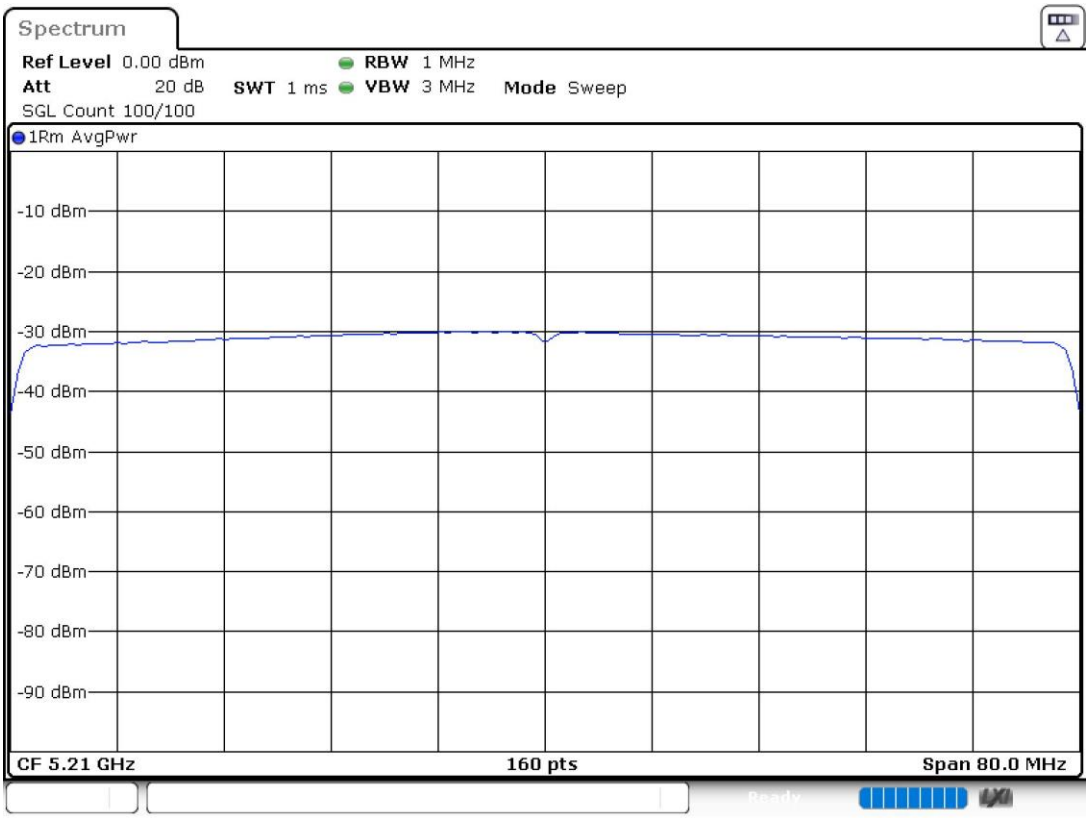


SISO 802.11 ax80 (HE80) – SU Full channel allocation:

U-NII-1 (5150-5250 MHz)

- Single Channel 42 (5210 MHz):





MIMO

MIMO 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)	-5.458	-5.408	-5.588
PSD Limit (dBm/MHz)	9.53		
Measurement uncertainty (dB)	< ±1.3		

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)	-5.912	-5.895	-5.924
PSD Limit (dBm/MHz)	9.53		
Measurement uncertainty (dB)	< ±1.3		

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)	-6.590	-7.076	-6.545
PSD Limit (dBm/MHz)	9.53		
Measurement uncertainty (dB)	< ±1.3		

MIMO 802.11 ax20 (HE20) – SU Full channel allocation:

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)	-6.702	-7.297	-6.685
PSD Limit (dBm/MHz)	9.53		
Measurement uncertainty (dB)	< ±1.3		

MIMO 802.11 ax20 (HE20) – RU Subcarrier allocation (RU26):

The next RU combinations were tested as worst cases:

Low Channel:	RU26 Offset 0
Middle Channel:	RU26 Offset 4
High Channel:	RU26 Offset 8

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)	3.366	1.903	3.233
PSD Limit (dBm/MHz)	9.53		
Measurement uncertainty (dB)	< ±1.3		

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)	-8.672	-8.374
PSD Limit (dBm/MHz)	9.53	
Measurement uncertainty (dB)	< ±1.3	

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)	-8.716	-8.519
PSD Limit (dBm/MHz)	9.53	
Measurement uncertainty (dB)	< ±1.3	

MIMO 802.11 ax40 (HE40) – SU Full channel allocation:

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

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted PSD (dBm/MHz)	-9.828	-9.499
PSD Limit (dBm/MHz)	9.53	
Measurement uncertainty (dB)	< ±1.3	

MIMO 802.11 ax40 (HE40) – RU Subcarrier allocation (RU26):

The next RU combinations were tested as worst cases:

Low Channel: RU26 Offset 0
High Channel: RU26 Offset 17

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

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Conducted PSD (dBm/MHz)	2.070	3.167
PSD Limit (dBm/MHz)	9.53	
Measurement uncertainty (dB)	< ±1.3	

MIMO 802.11 ac80 (VHT80):

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

Channel	Single Channel 42 (5210 MHz)
Maximum Conducted PSD (dBm/MHz)	-11.825
PSD Limit (dBm/MHz)	9.53
Measurement uncertainty (dB)	< ±1.3

MIMO 802.11 ax80 (HE80) – SU Full channel allocation:

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

Channel	Single Channel 42 (5210 MHz)
Maximum Corrected Conducted PSD (dBm)	-13.024
PSD Limit (dBm/MHz)	9.53
Measurement uncertainty (dB)	< ±1.3

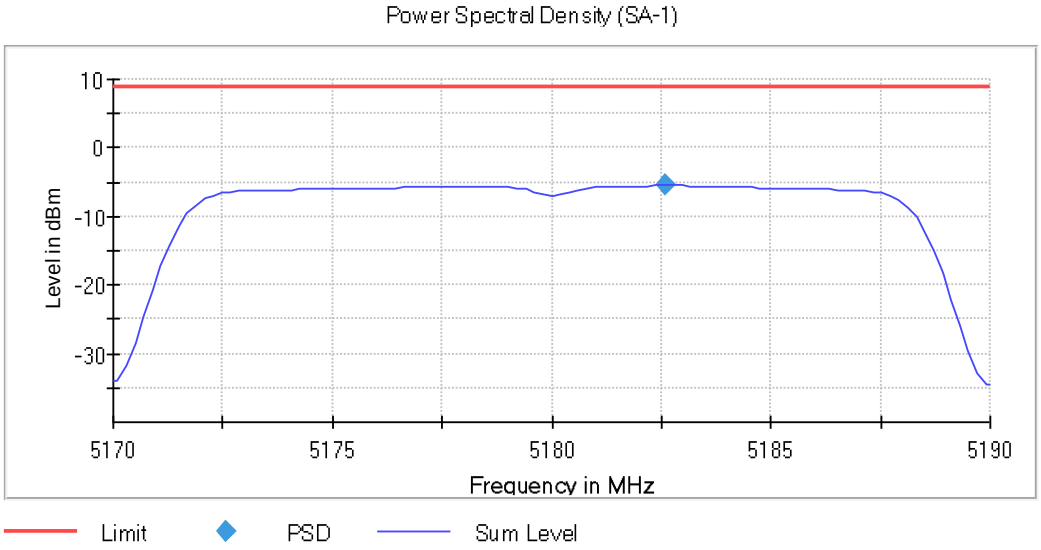
Verdict: PASS

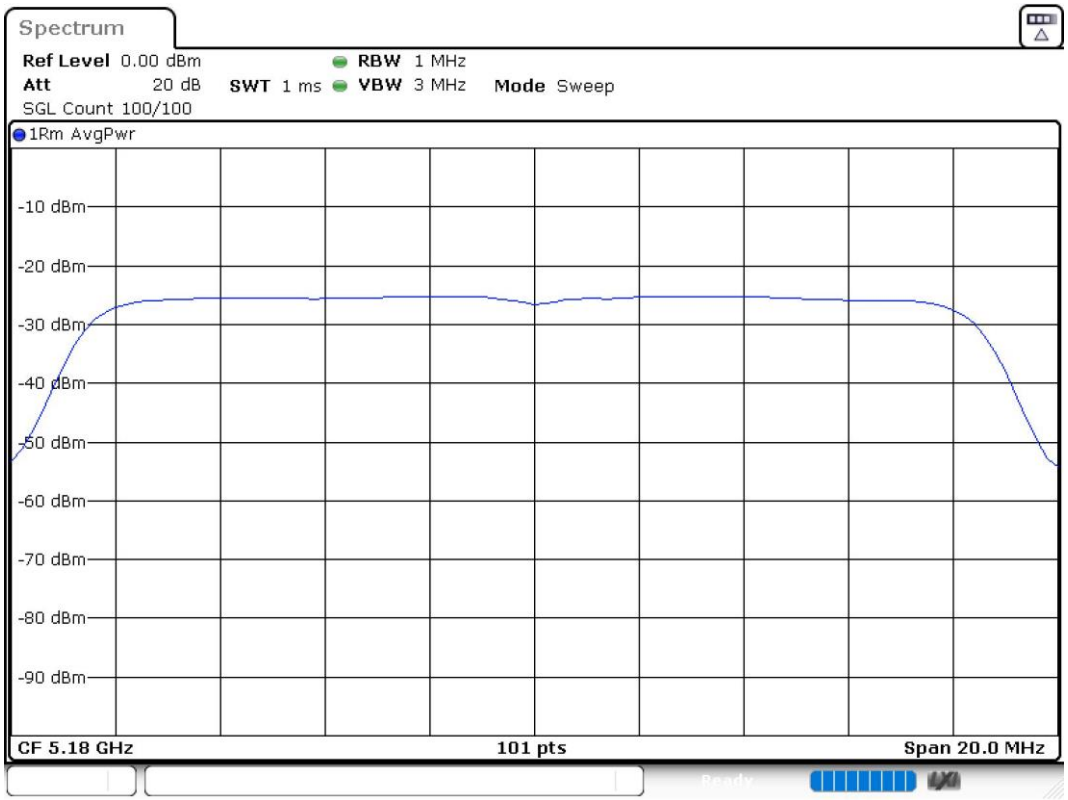
MIMO

MIMO 802.11 a20:

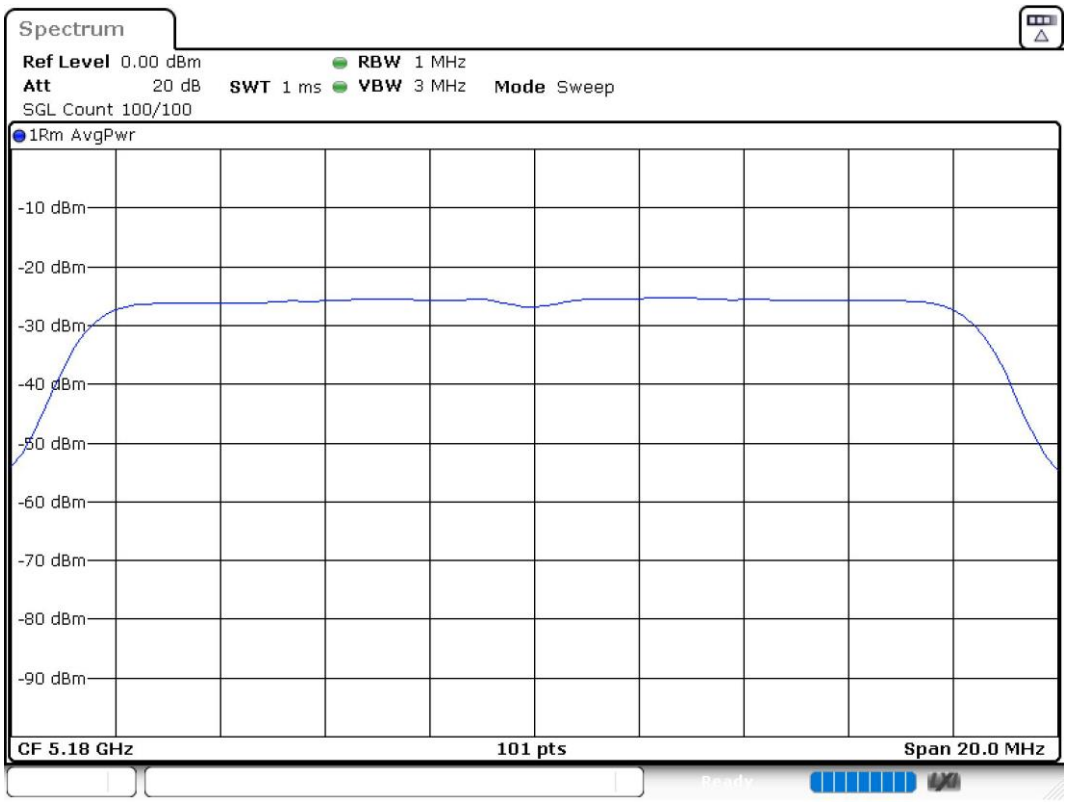
U-NII-1 (5150-5250 MHz)

- Low Channel 36 (5180 MHz):



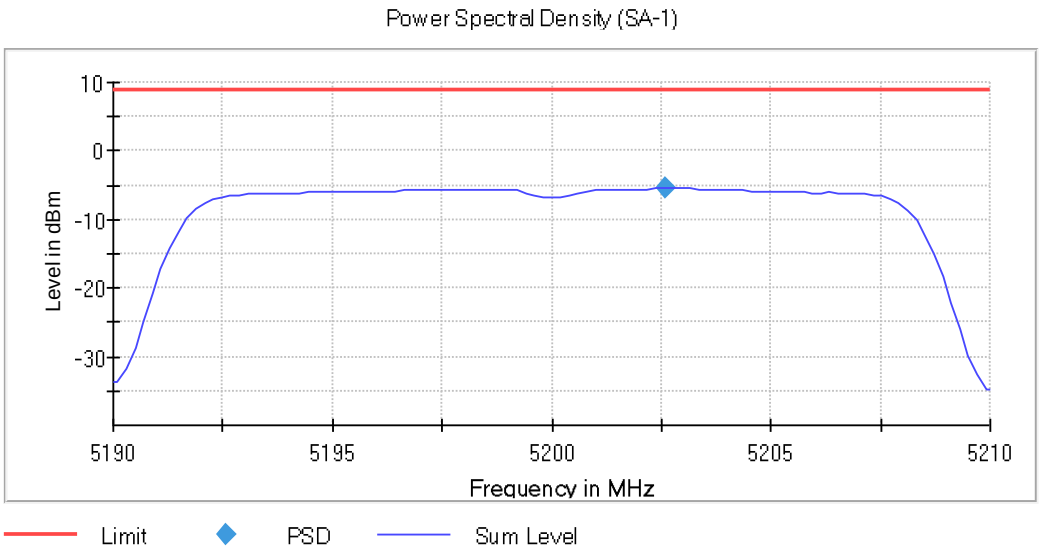


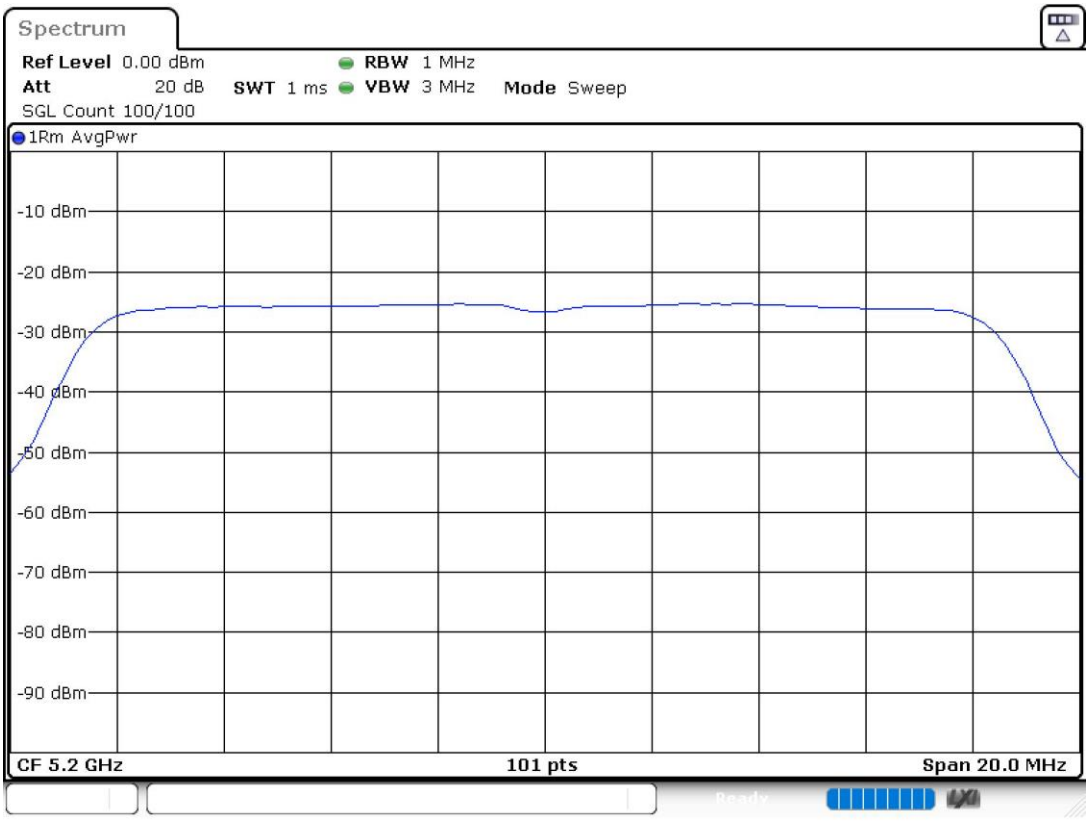
PSD Chain 1


Spectrum
Ref Level 0.00 dBm
RBW 1 MHz
Att 20 dB
SWT 1 ms
VBW 3 MHz
Mode Sweep
SGL Count 100/100
1Rm AvgPwr
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
-90 dBm
CF 5.18 GHz
101 pts
Span 20.0 MHz

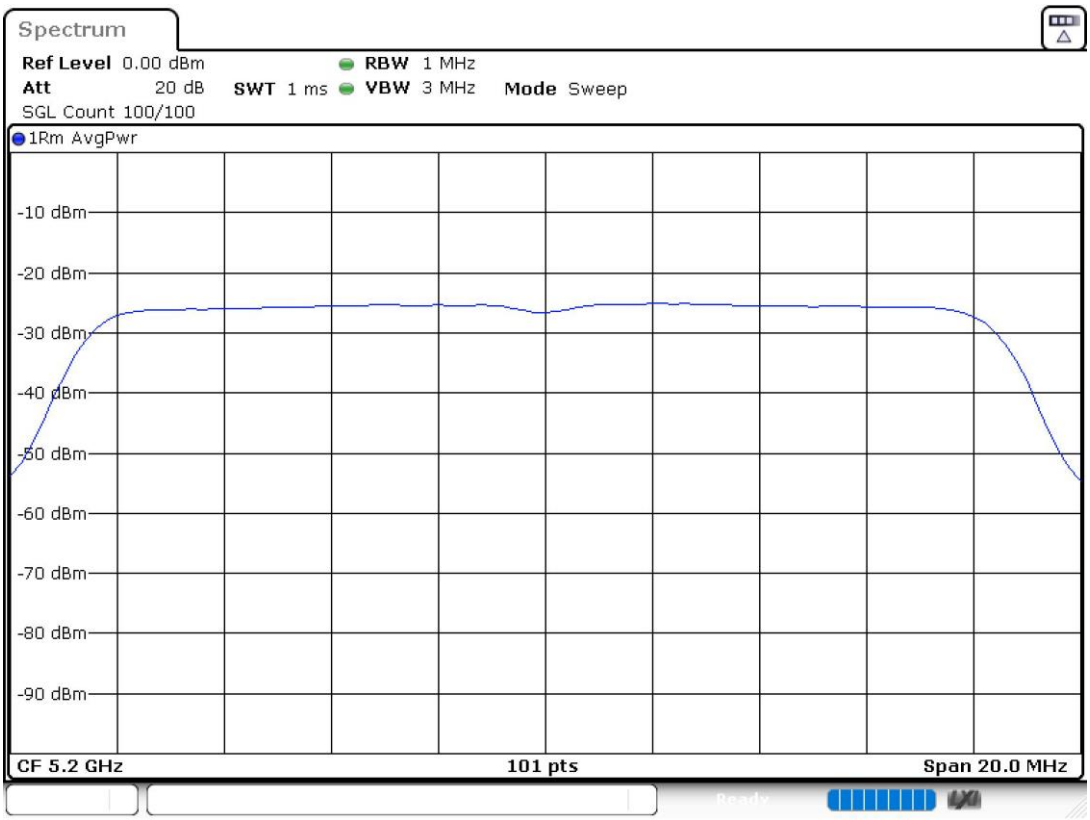
PSD Chain 0

- Channel 40 (5200 MHz):





PSD Chain 1


Spectrum
Ref Level 0.00 dBm
RBW 1 MHz
Att 20 dB
SWT 1 ms
VBW 3 MHz
Mode Sweep
SGL Count 100/100
1Rm AvgPwr
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
-90 dBm
CF 5.2 GHz
101 pts
Span 20.0 MHz

PSD Chain 0