

**Measurement Result:**
**W2&W3&W4**

Mode	Frequency	Test Results	Conclusion
802.11a	5180 MHz	Fig.197	P
	5320 MHz	Fig.198	P
	5500 MHz	Fig.199	P
	5700 MHz	Fig.200	P
802.11n HT20	5180 MHz	Fig.201	P
	5320 MHz	Fig.202	P
	5500 MHz	Fig.203	P
	5700 MHz	Fig.204	P

**W2&W3&W4**

802.11ac HT20	5180 MHz	Fig.205	P
	5320 MHz	Fig.206	P
	5500 MHz	Fig.207	P
	5700 MHz	Fig.208	P

**W2&W3&W4**

802.11ax HT20	5180 MHz	Fig.209	P
	5320 MHz	Fig.210	P
	5500 MHz	Fig.211	P
	5700 MHz	Fig.212	P

**W2&W3&W4**

802.11n HT40	5190 MHz	Fig.213	P
	5310 MHz	Fig.214	P
	5510 MHz	Fig.215	P
	5670 MHz	Fig.216	P

**W2&W3&W4**

802.11ac HT40	5190 MHz	Fig.217	P
	5310 MHz	Fig.218	P
	5510 MHz	Fig.219	P
	5670 MHz	Fig.220	P

**W2&W3&W4**

802.11ax HT40	5190 MHz	Fig.221	P
	5310 MHz	Fig.222	P
	5510 MHz	Fig.223	P
	5670 MHz	Fig.224	P

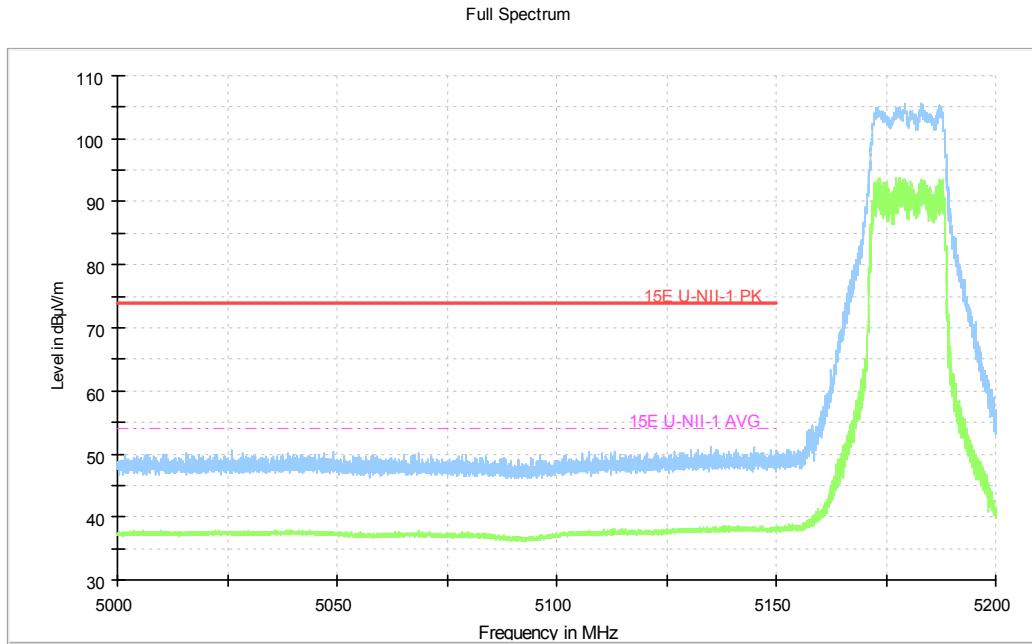
**W2&W3&W4**

802.11ac HT80	5210MHz	Fig.225	P
	5290MHz	Fig.226	P
	5530MHz	Fig.227	P

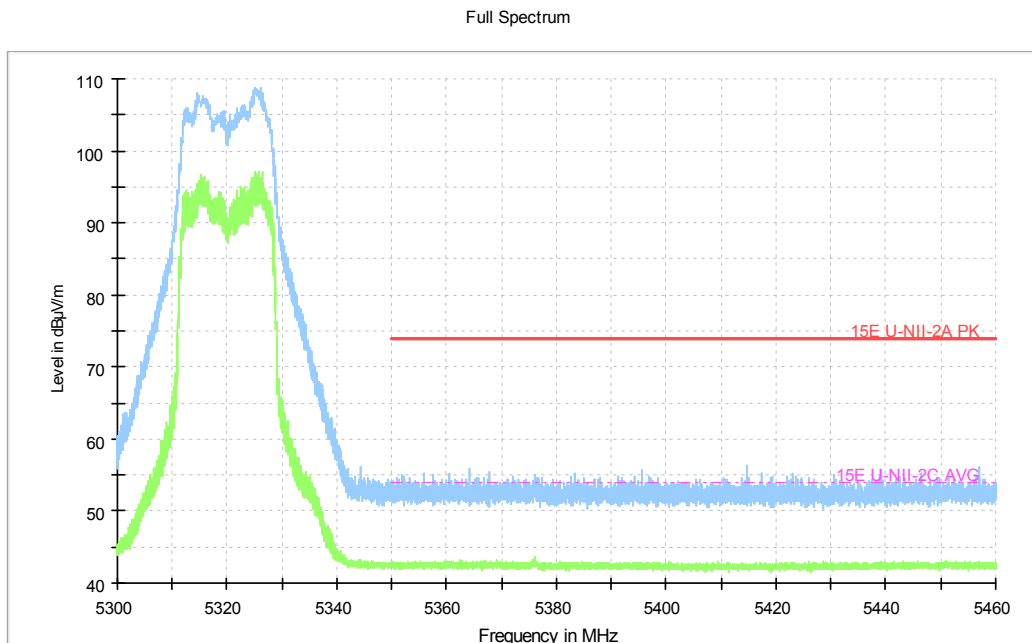
802.11ax HT80	5210MHz	Fig.228	P
	5290MHz	Fig.229	P
	5530MHz	Fig.230	P

**Conclusion: PASS**

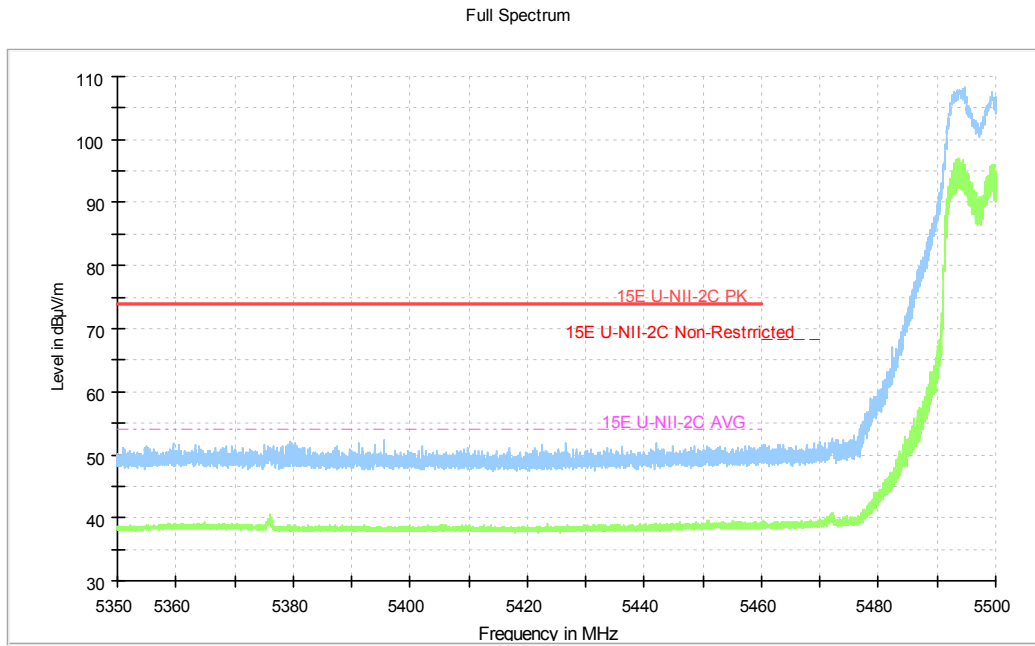
**Test graphs as below:**



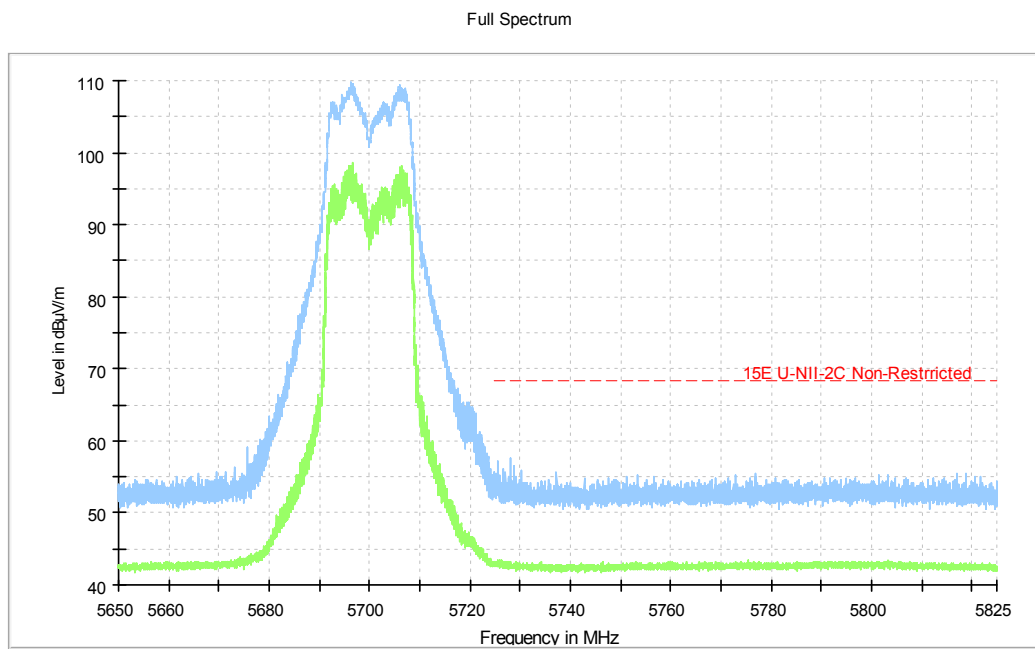
**Fig.197 Band Edges (802.11a, 5180MHz)**



**Fig.198 Band Edges (802.11a, 5320MHz)**

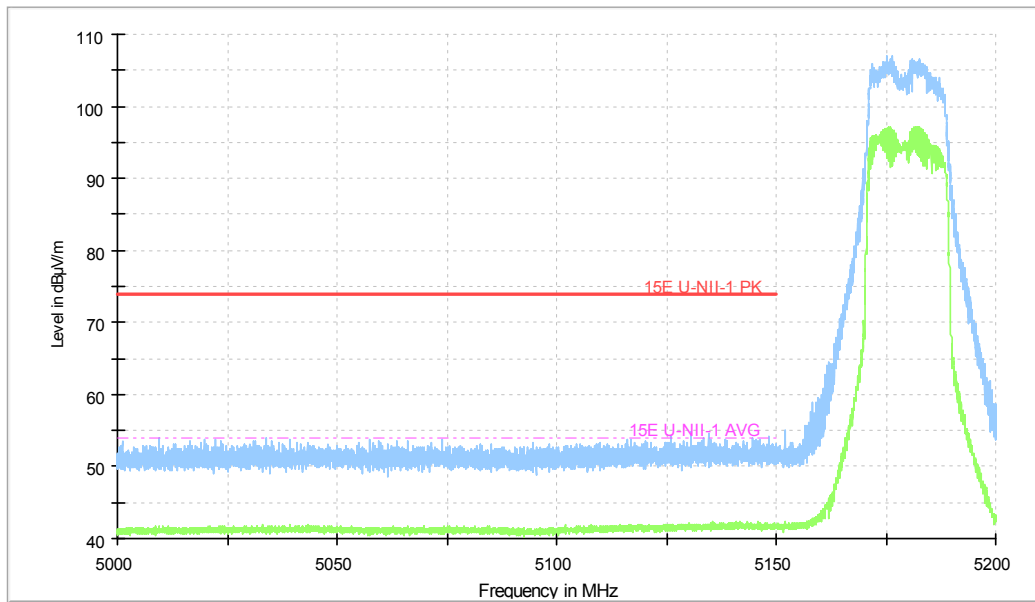


**Fig.199 Band Edges (802.11a, 5500MHz)**



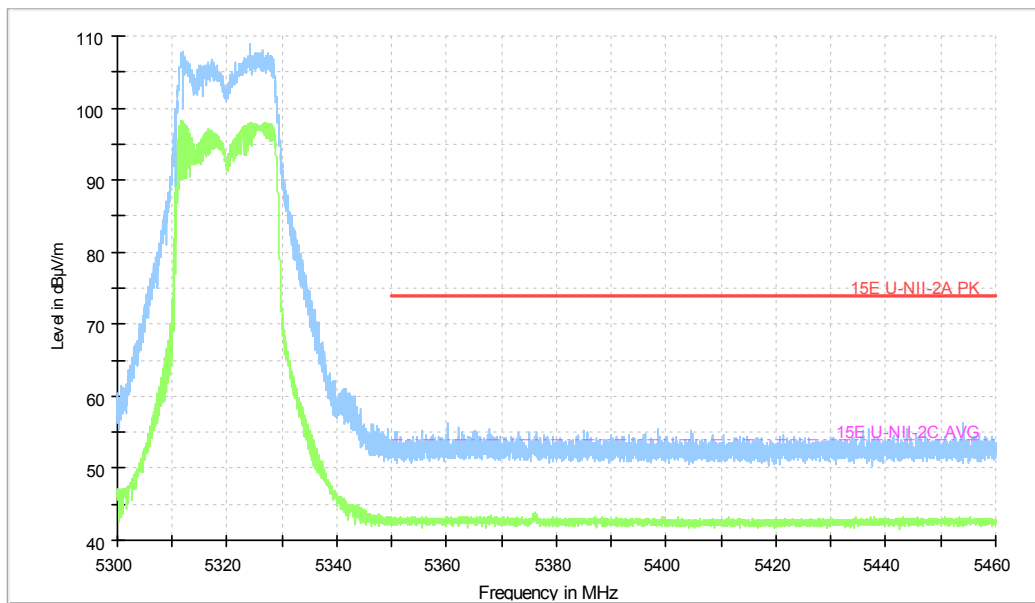
**Fig.200 Band Edges (802.11a, 5700MHz)**

Full Spectrum



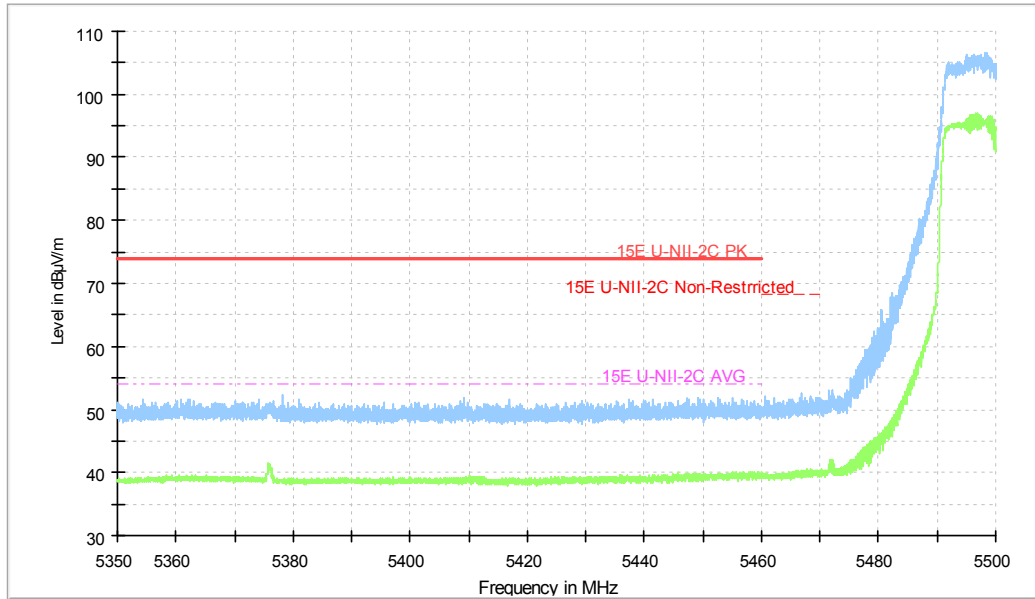
**Fig.201 Band Edges (802.11n-HT20, 5180MHz)**

Full Spectrum



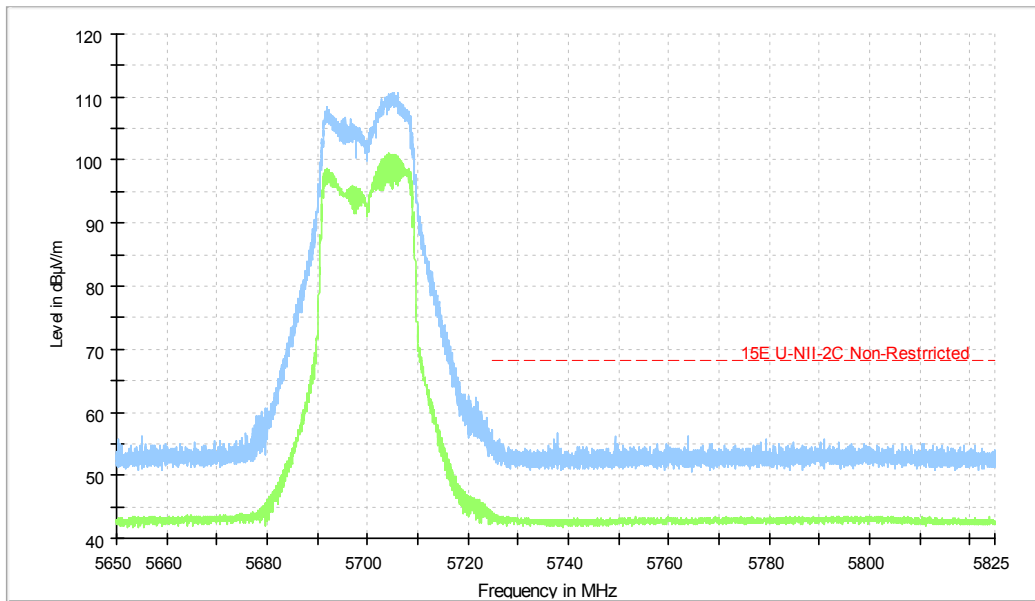
**Fig.202 Band Edges (802.11n-HT20, 5320MHz)**

Full Spectrum



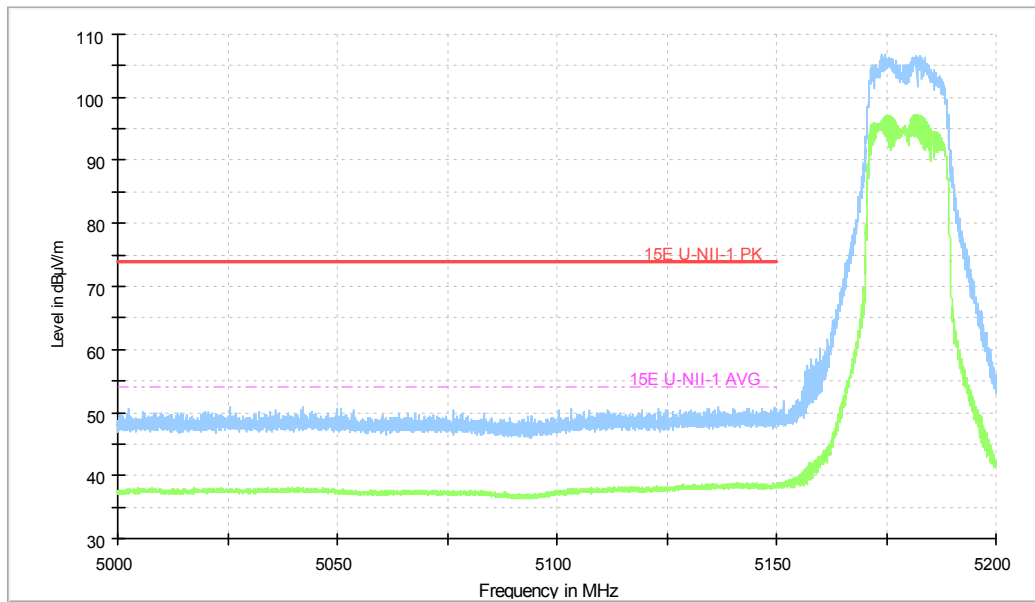
**Fig.203 Band Edges (802.11n-HT20, 5500MHz)**

Full Spectrum



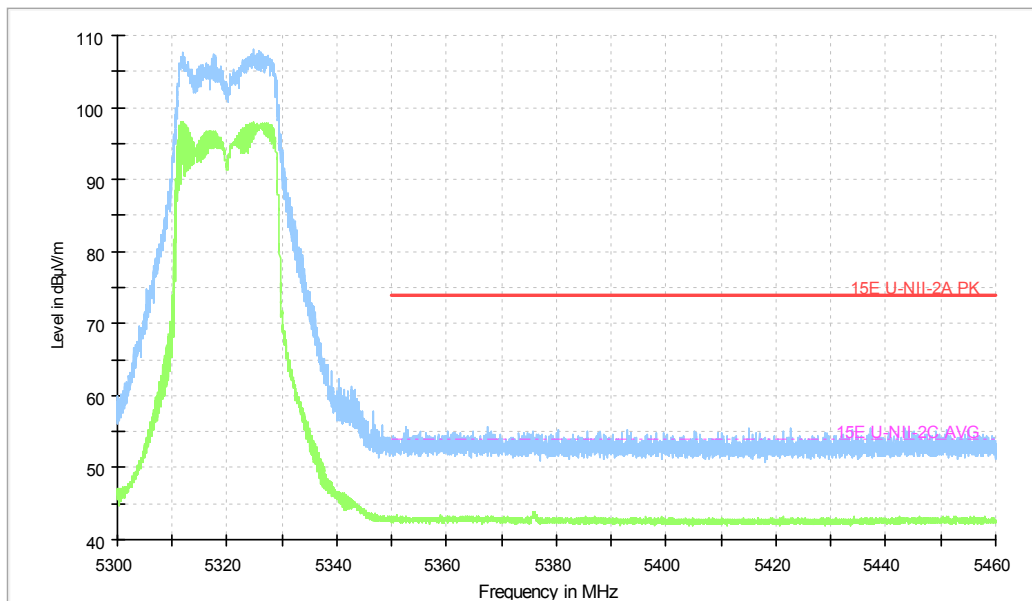
**Fig.204 Band Edges (802.11n-HT20, 5700MHz)**

Full Spectrum

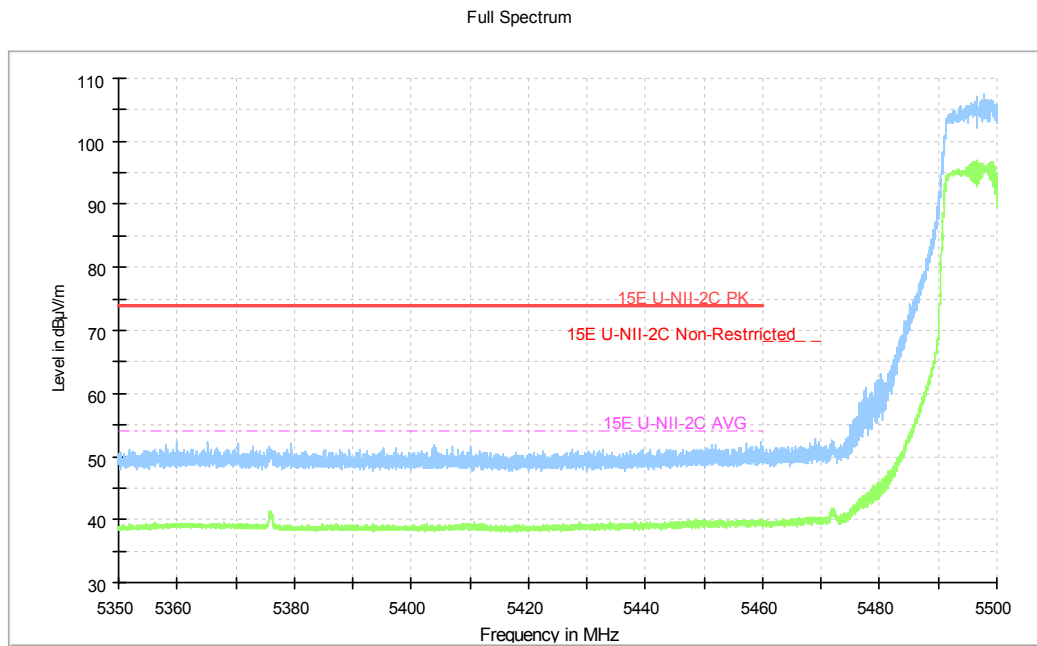


**Fig.205 Band Edges (802.11ac-HT20, 5180MHz)**

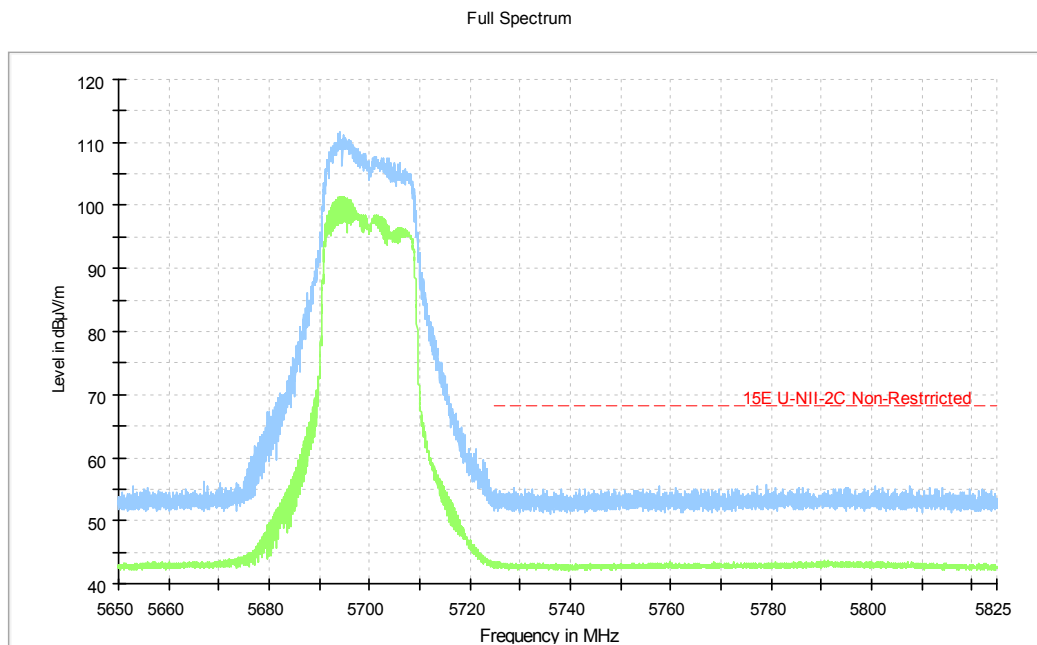
Full Spectrum



**Fig.206 Band Edges (802.11ac-HT20, 5320MHz)**

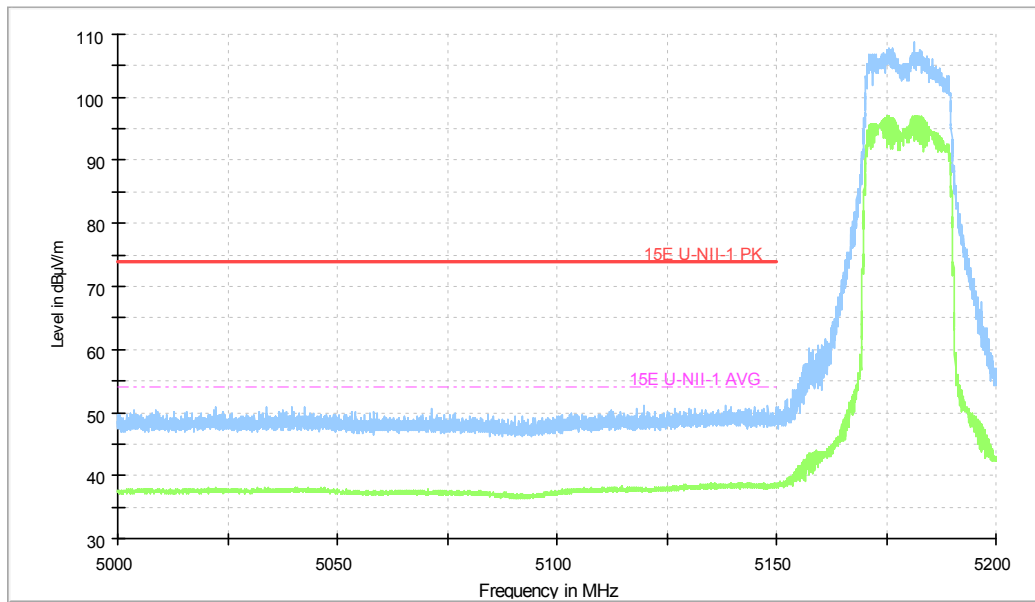


**Fig.207 Band Edges (802.11ac-HT20, 5500MHz)**



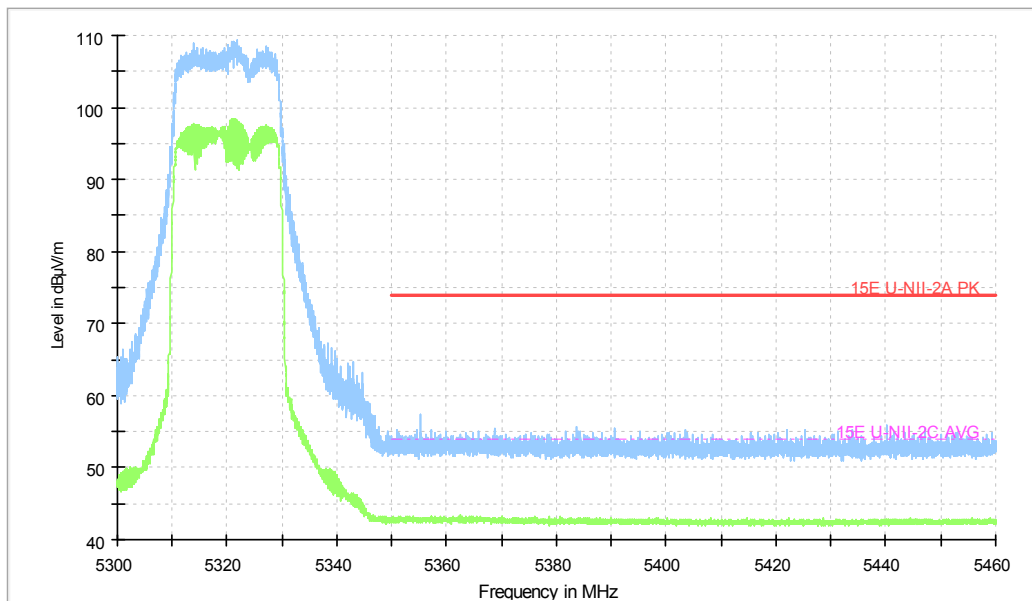
**Fig.208 Band Edges (802.11ac-HT20, 5700MHz)**

Full Spectrum



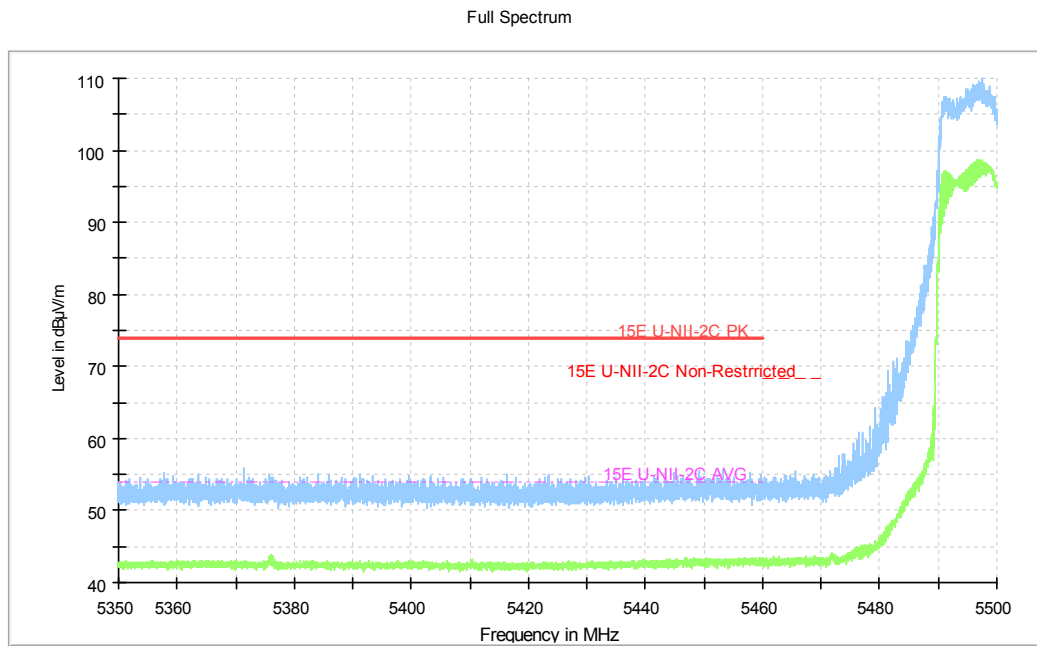
**Fig.209 Band Edges (802.11ax-HT20, 5180MHz)**

Full Spectrum

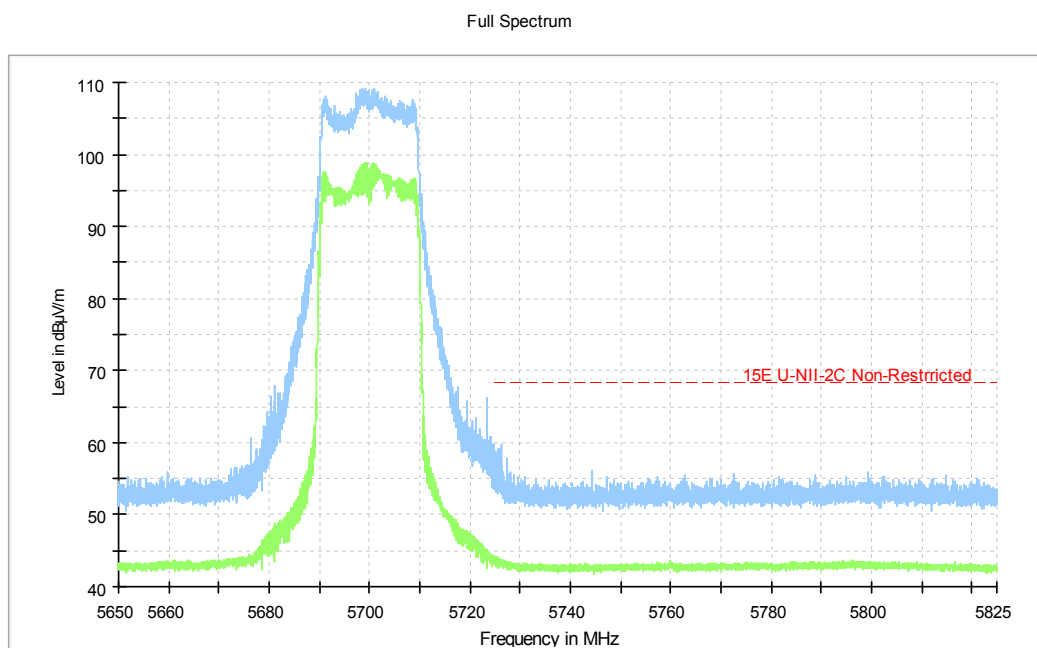


**Fig.210 Band Edges (802.11ax-HT20, 5320MHz)**



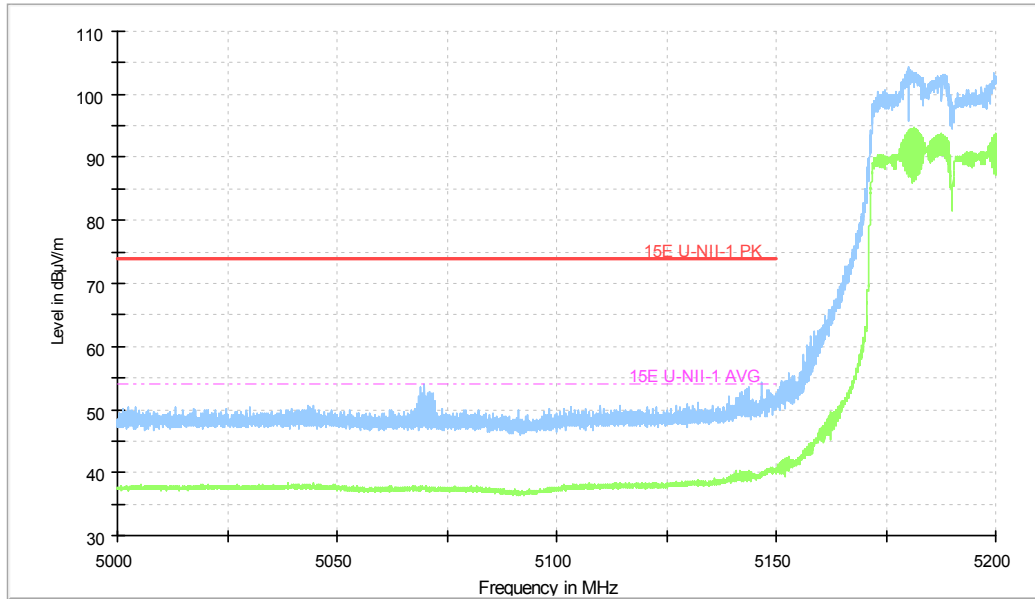


**Fig.211 Band Edges (802.11ax-HT20, 5500MHz)**



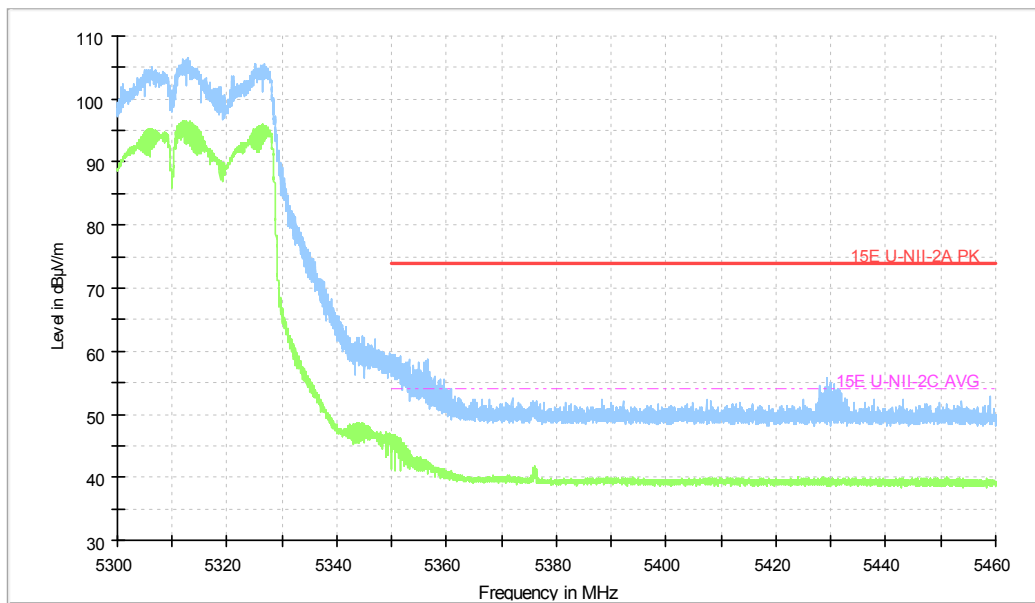
**Fig.212 Band Edges (802.11ax-HT20, 5700MHz)**

Full Spectrum



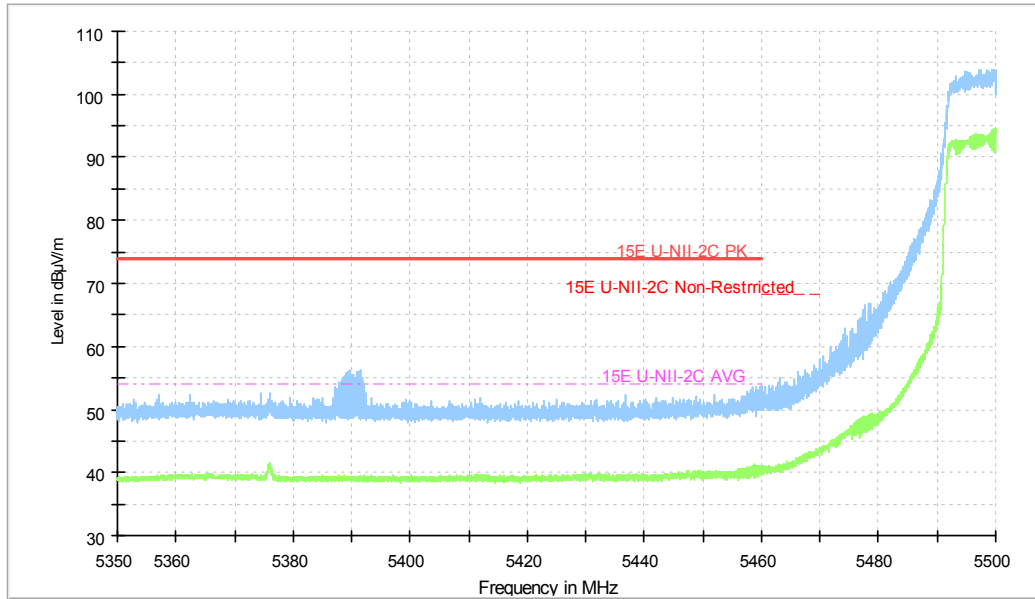
**Fig.213 Band Edges (802.11n-HT40, 5190MHz)**

Full Spectrum



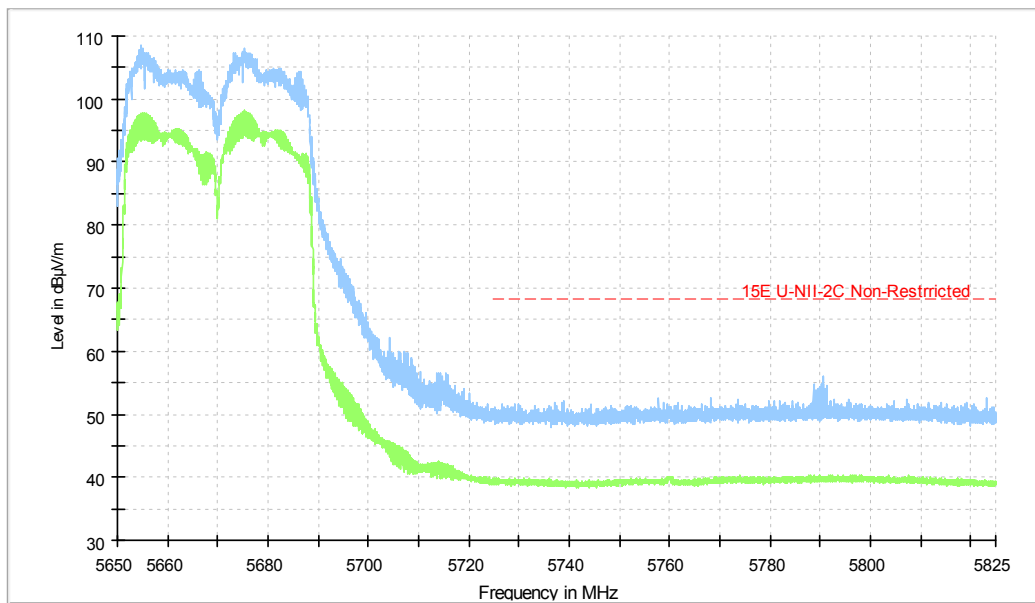
**Fig.214 Band Edges (802.11n-HT40, 5310MHz)**

Full Spectrum



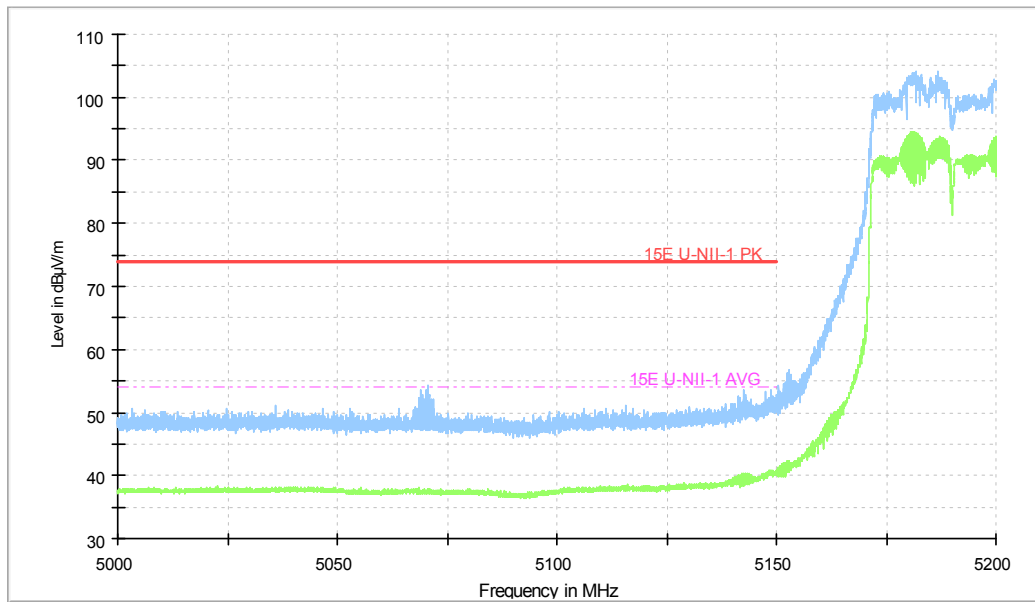
**Fig.215 Band Edges (802.11n-HT40, 5510MHz)**

Full Spectrum



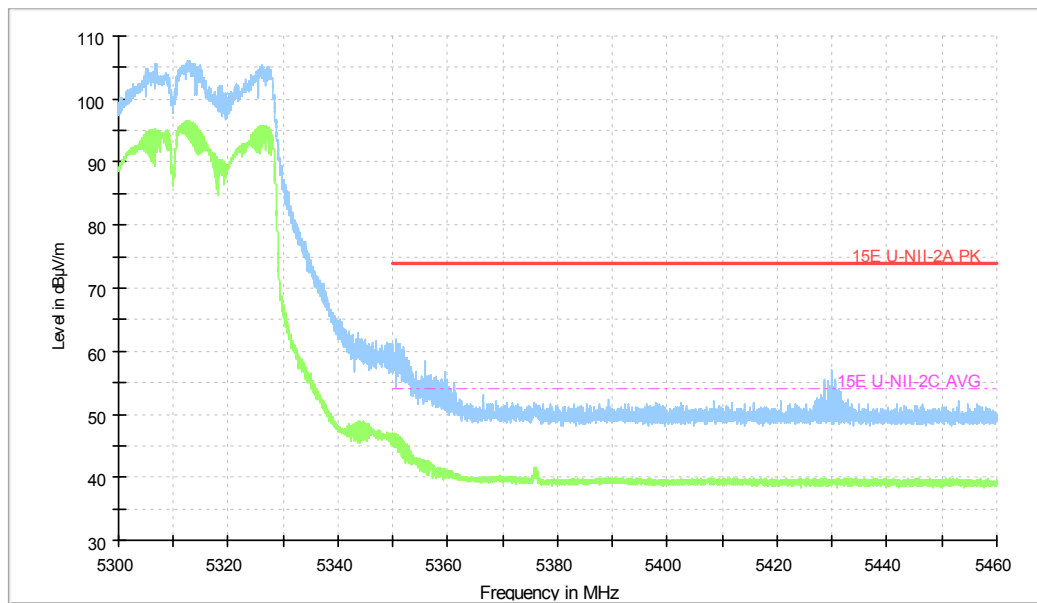
**Fig.216 Band Edges (802.11n-HT40, 5670MHz)**

Full Spectrum



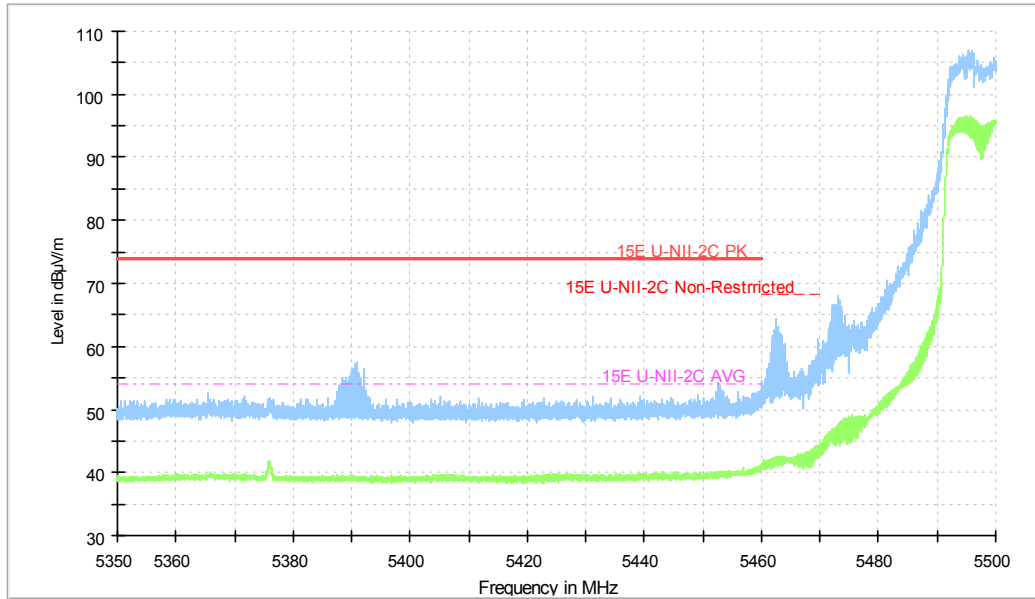
**Fig.217 Band Edges (802.11ac-HT40, 5190MHz)**

Full Spectrum



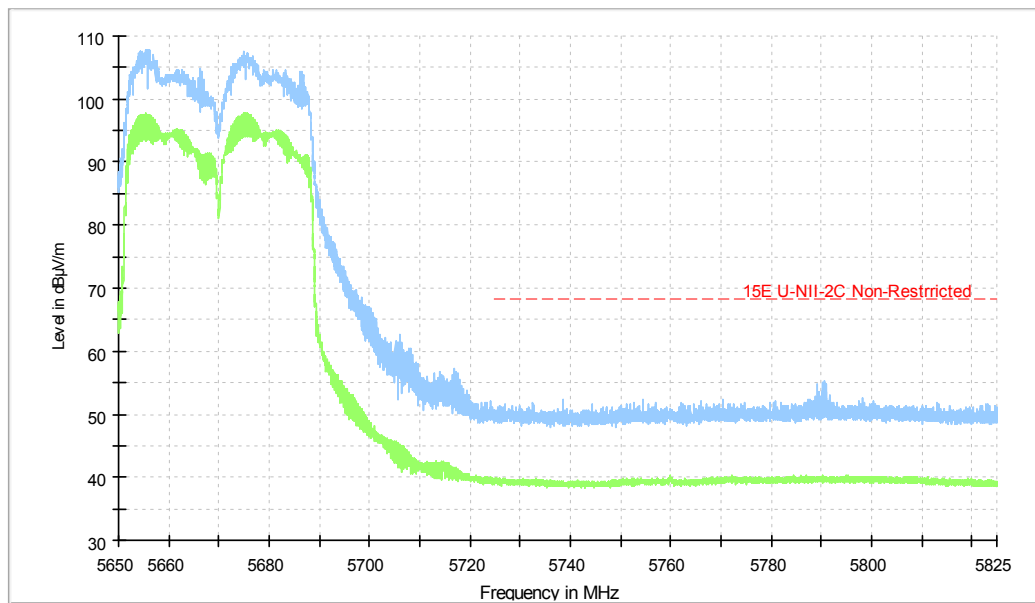
**Fig.218 Band Edges (802.11ac-HT40, 5310MHz)**

Full Spectrum



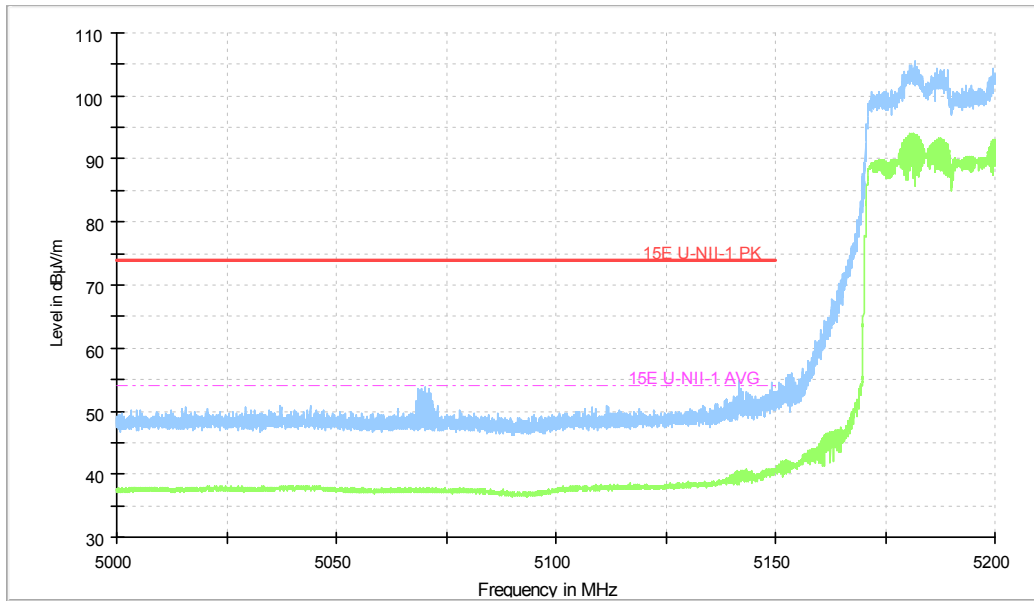
**Fig.219 Band Edges (802.11ac-HT40, 5510MHz)**

Full Spectrum



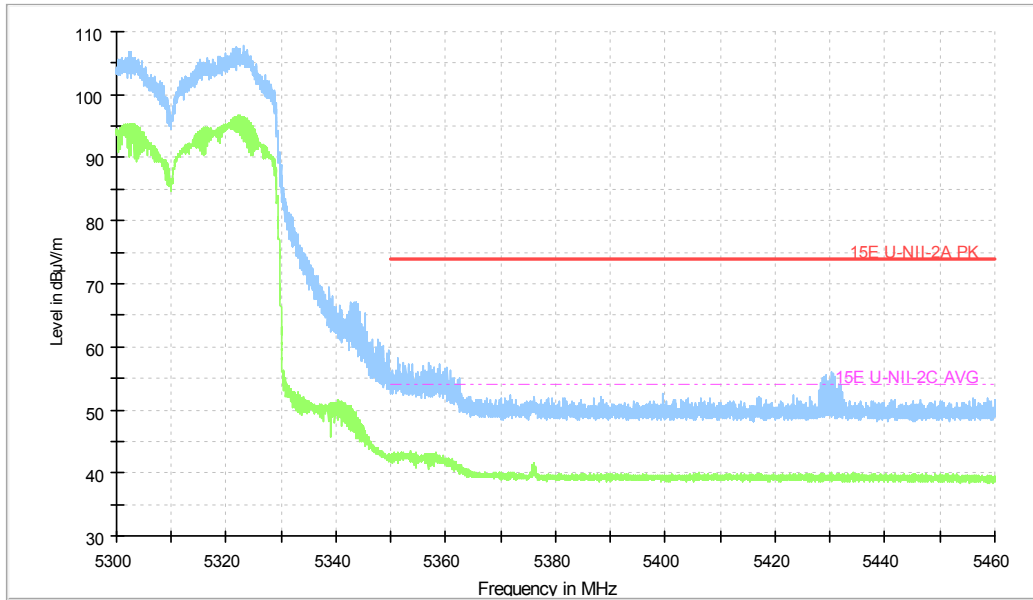
**Fig.220 Band Edges (802.11ac-HT40, 5670MHz)**

Full Spectrum



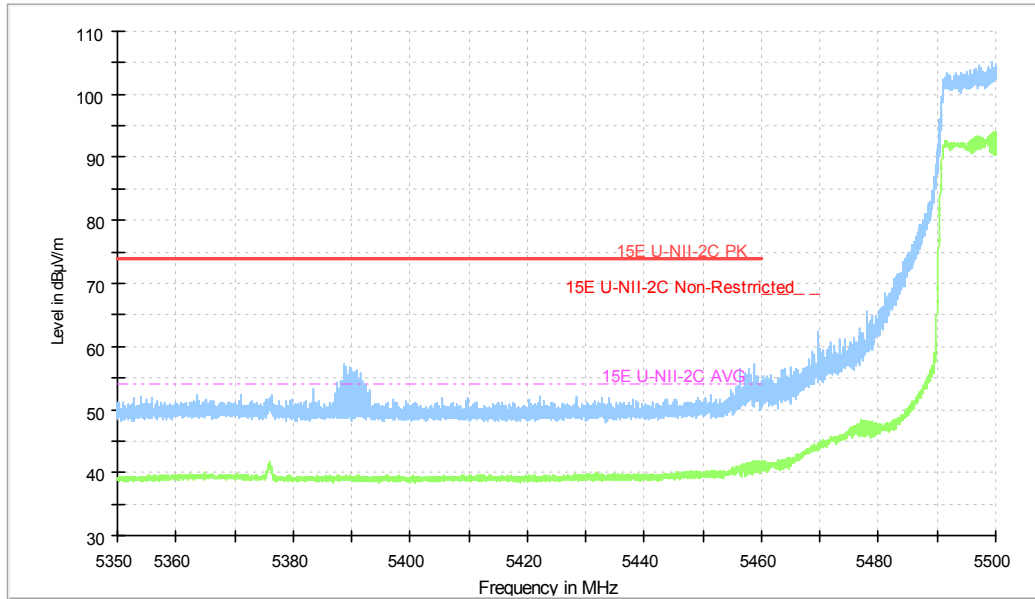
**Fig.221 Band Edges (802.11ax-HT40, 5190MHz)**

Full Spectrum



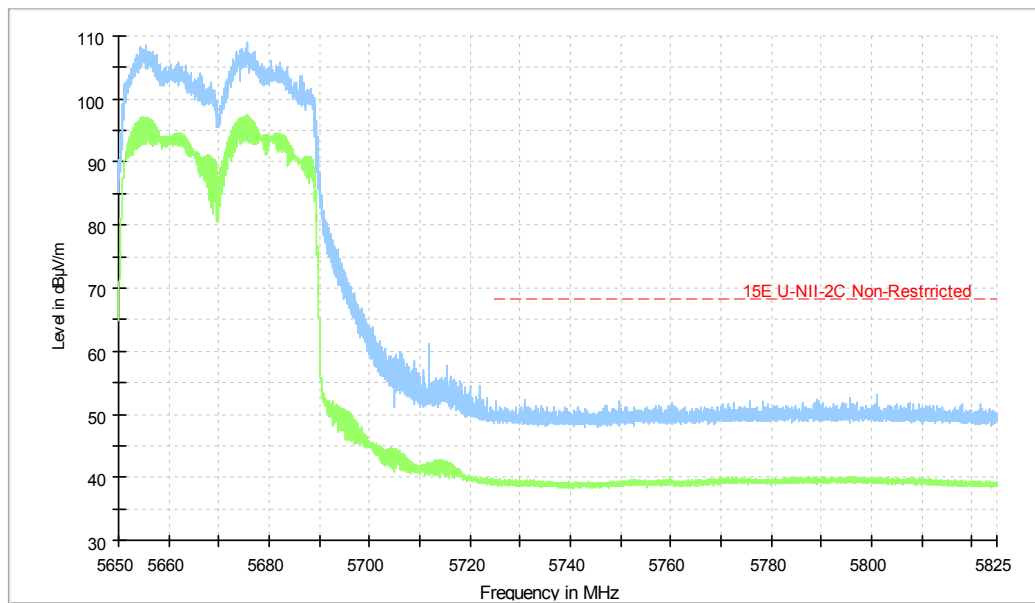
**Fig.222 Band Edges (802.11ax-HT40, 5310MHz)**

Full Spectrum

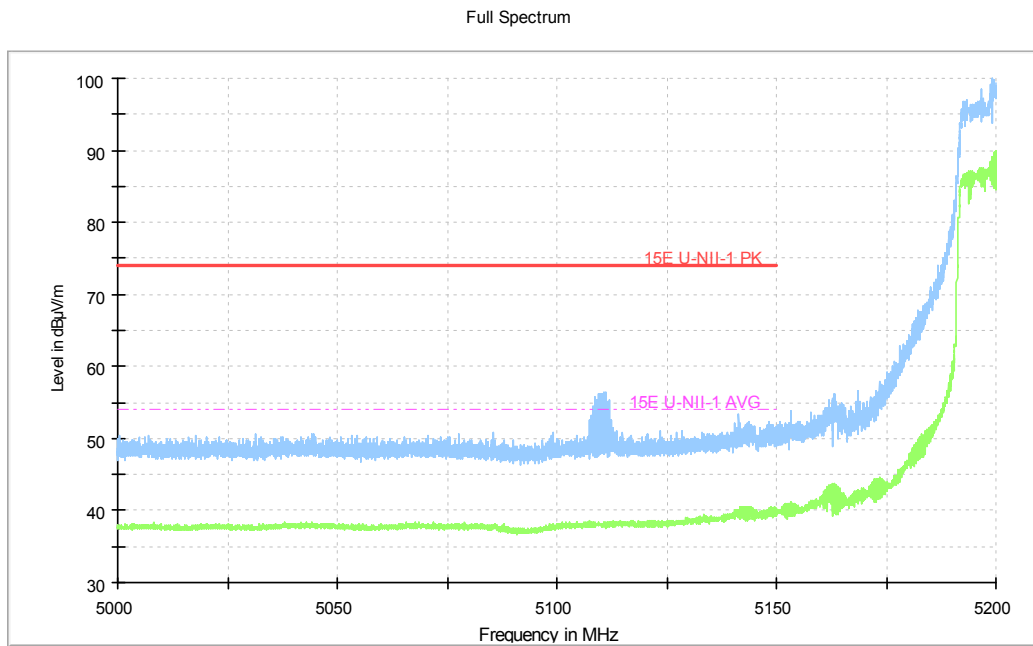


**Fig.223 Band Edges (802.11ax-HT40, 5510MHz)**

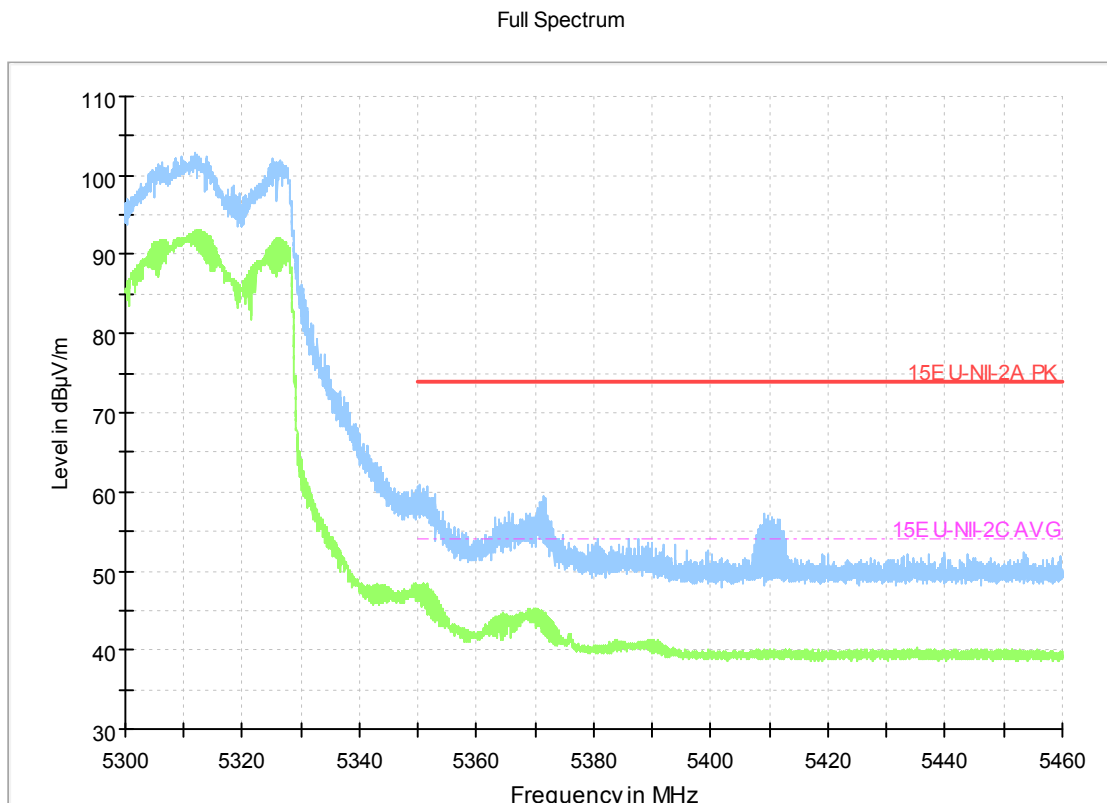
Full Spectrum



**Fig.224 Band Edges (802.11ax-HT40, 5670MHz)**



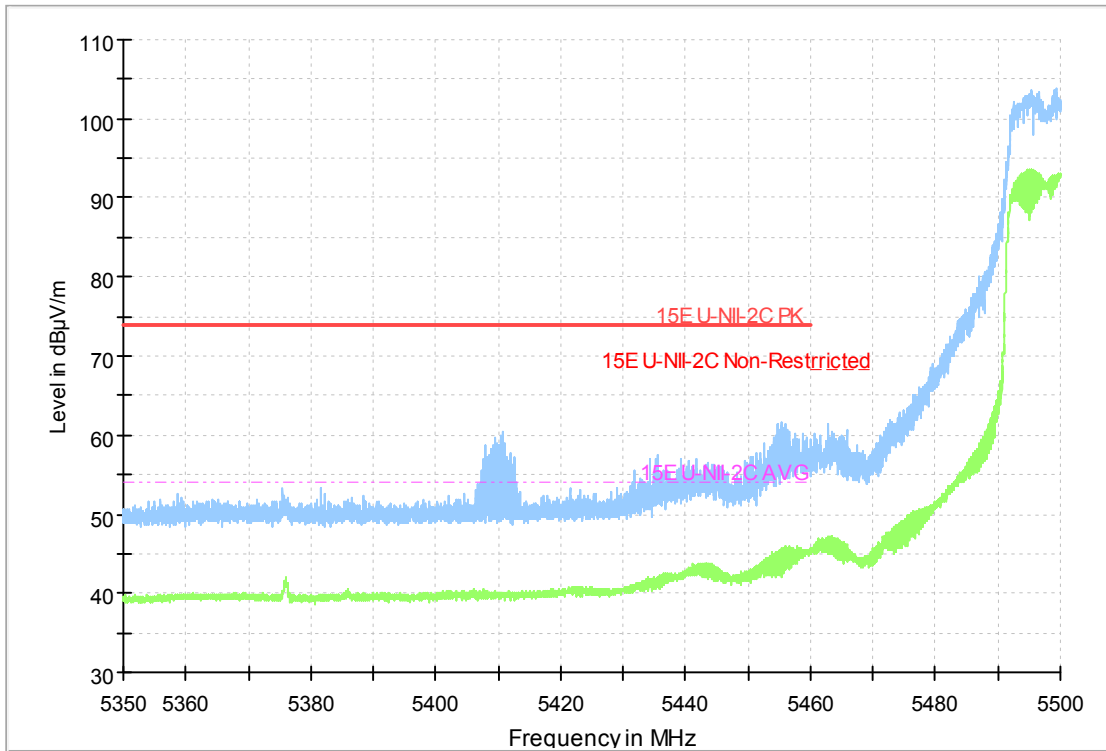
**Fig.225 Band Edges (802.11ac-HT80, 5210MHz)**



**Fig.226 Band Edges (802.11ac-HT80, 5290MHz)**

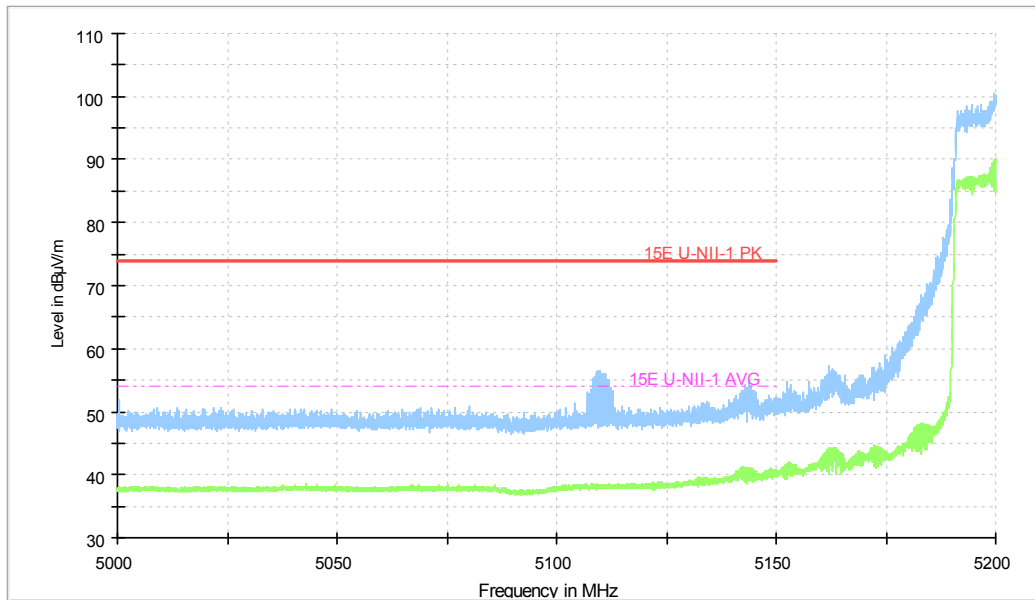


Full Spectrum

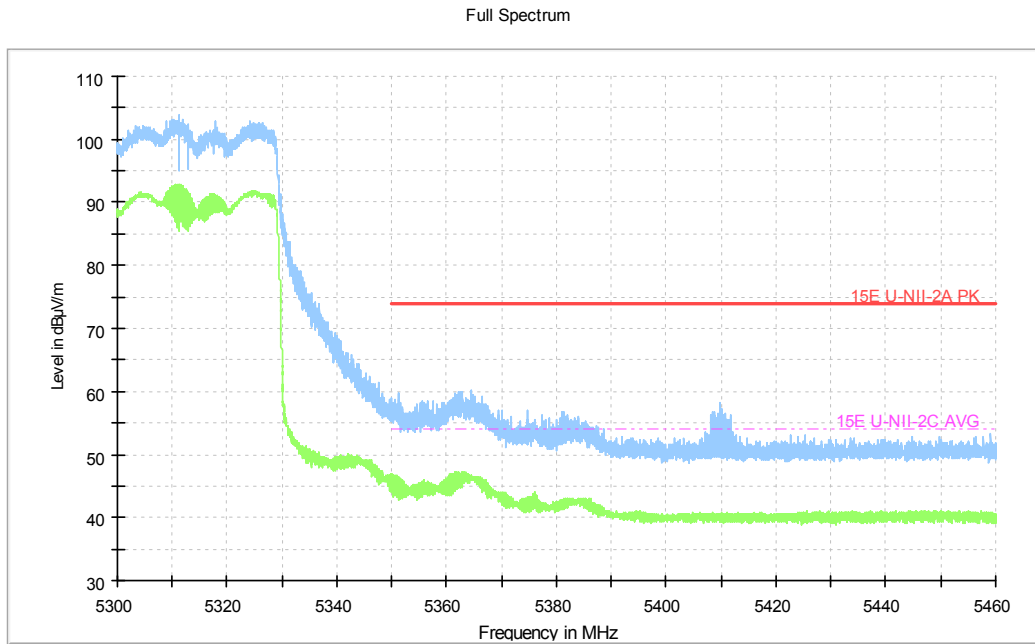


**Fig.227 Band Edges (802.11ac-HT80, 5530MHz)**

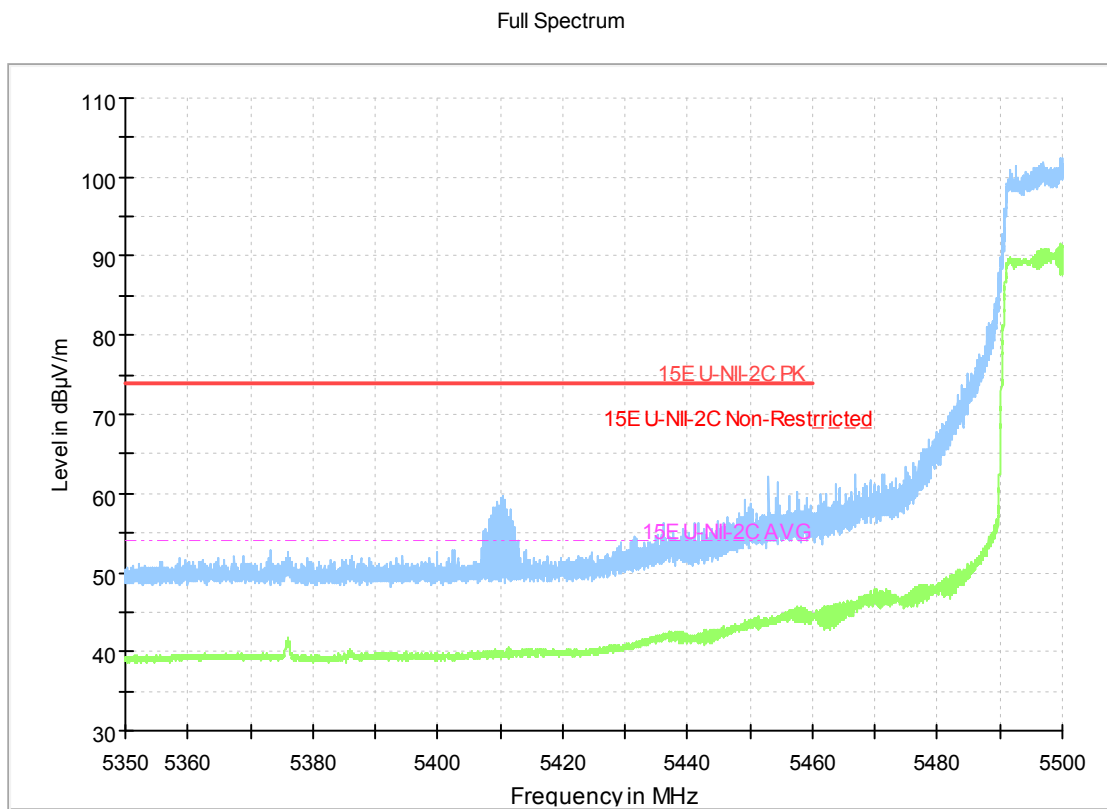
Full Spectrum



**Fig.228 Band Edges (802.11ax-HT80, 5210MHz)**



**Fig.229 Band Edges (802.11ax-HT80, 5290MHz)**



**Fig.230 Band Edges (802.11ax-HT80, 5530MHz)**

## A.6. Transmitter Spurious Emission

**Method of Measurement:** See ANSI C63.10-2013-clause 6.4 & 6.5 & 6.6

**Measurement Limit:**

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	20dB below peak output power

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

**Limit in restricted band:**

Frequency of emission (MHz)	Field strength( $\mu\text{V}/\text{m}$ )	Field strength(dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

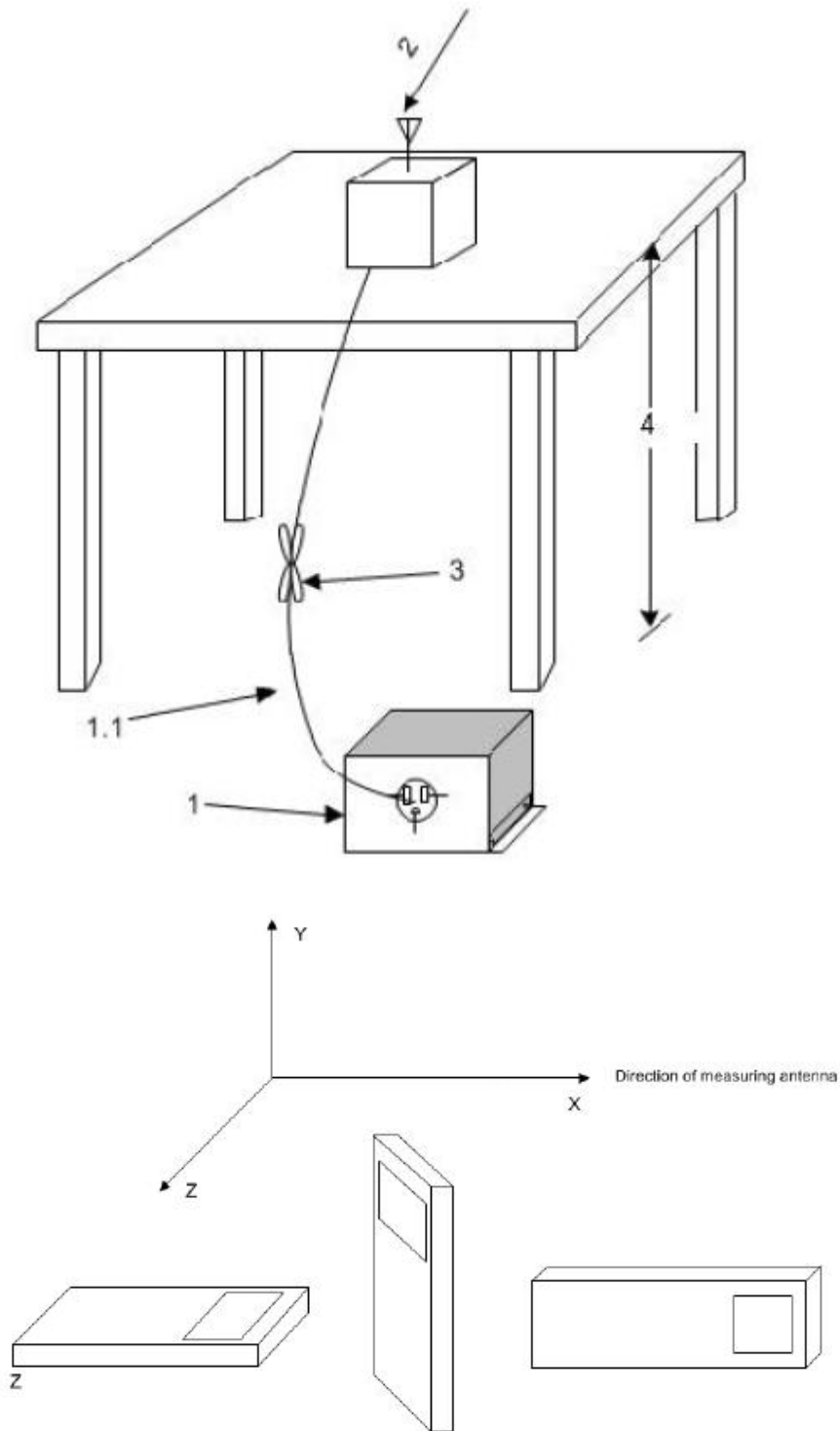
Frequency (MHz)	Field strength( $\mu\text{V}/\text{m}$ )	Measurement distance (m)
0.009 - 0.490	$2400/F(\text{kHz})$	300
0.490 - 1.705	$24000/F(\text{kHz})$	30
1.705 – 30.0	30	30

### Test Condition

#### Set up:

Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m

The EUT and transmitting antenna shall be centered on the turntable.



### Test Condition

The EUT shall be tested 1 near top, 1 near middle, and 1 near bottom. Set the unlicensed wireless device to operate in continuous transmit mode. For unlicensed wireless devices unable to be configured for 100% duty cycle even in test mode, configure the system for the maximum duty cycle supported.

When required for unlicensed wireless devices, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as

appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

### Exploratory radiated emissions measurements

Exploratory radiated measurements shall be performed at the measurement distance or at a closer distance than that specified for compliance to determine the emission characteristics of the EUT and, if applicable, the EUT configuration that produces the maximum level of emissions. The frequencies of maximum emission may be determined by manually positioning the antenna close to the EUT, and then moving the antenna over all sides of the EUT while observing a spectral display. It is advantageous to have prior knowledge of the frequencies of emissions, although this may be determined from such a near-field scan. The near-field scan shall only be used to determine the frequency but not the amplitude of the emissions. Where exploratory measurements are not adequate to determine the worst-case operating modes and are used only to identify the frequencies of the highest emissions, additional preliminary tests can be required.

For emissions from the EUT, the maximum level shall be determined by rotating the EUT and its antenna through 0° to 360°. For each mode of operation required to be tested, the frequency spectrum (based on findings from exploratory measurements) shall be monitored.

Broadband antennas and a spectrum analyzer or a radio-noise meter with a panoramic display are often useful in this type of test. If either antenna height or EUT azimuth are not fully measured during exploratory testing, then complete testing can be required at the OATS or semi-anechoic chamber when the final full spectrum testing is performed.

### Final radiated emissions measurements

The final measurements are using the orientation and equipment arrangement of the EUT based on the measurement results found during the preliminary (exploratory) measurements, the EUT arrangement, appropriate modulation, and modes of operation that produce the emissions that have the highest amplitude relative to the limit shall be selected for the final measurement.

For each mode of operation required to be tested, the frequency spectrum (based on findings from exploratory measurements) shall be monitored. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.

For each mode selected, record the frequency and amplitude of the highest fundamental emission (if applicable), as well as the frequency and amplitude of the six highest spurious emissions relative to the limit. Emissions more than 20 dB below the limit do not need to be reported.

This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

### The receiver references:

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	100KHz/300KHz	5
1000-4000	1MHz/3MHz	15
4000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

$P_{Mea}$  is the field strength recorded from the instrument.

The measurement results are obtained as described below:

Result=  $P_{Mea}$  + Cable Loss + Antenna Factor

Where:

$P_{Mea}$  field strength recorded from the instrument

**Worst case: W2&W3&W4**

**Average**

**802.11a**

Channel 36

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17995.600	46.48	-25.50	46.66	25.32	54.00	7.52	H
17992.300	46.44	-25.50	46.66	25.28	54.00	7.56	V
14472.300	39.74	-28.59	42.46	25.87	54.00	14.26	V
14473.400	39.69	-28.59	42.46	25.82	54.00	14.31	H
5143.000	38.39	-27.61	33.67	32.33	54.00	15.61	V
5150.000	38.37	-27.61	33.67	32.31	54.00	15.63	V

Channel 40

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17985.200	46.32	-25.50	46.66	25.16	54.00	7.68	H
17969.800	46.29	-25.50	46.66	25.13	54.00	7.71	V
14472.300	39.50	-28.59	42.46	25.63	54.00	14.50	H
14499.800	39.23	-28.59	42.46	25.36	54.00	14.77	H
11850.500	34.84	-31.85	39.05	27.64	54.00	19.16	V
11823.000	34.75	-31.85	39.05	27.55	54.00	19.25	V

Channel 48

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17983.000	46.05	-25.50	46.66	24.89	54.00	7.95	V
17986.200	46.02	-25.50	46.66	24.86	54.00	7.98	V
14498.100	39.34	-28.59	42.46	25.47	54.00	14.66	V
14490.500	39.24	-28.59	42.46	25.37	54.00	14.76	V
11918.600	35.05	-31.48	39.09	27.44	54.00	18.95	V
11829.000	34.78	-31.85	39.05	27.58	54.00	19.22	V

## Channel 52

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17996.700	46.34	-25.50	46.66	25.18	54.00	7.66	V
17989.500	46.18	-25.50	46.66	25.02	54.00	7.82	V
14472.300	39.60	-28.59	42.46	25.73	54.00	14.40	V
14497.600	39.52	-28.59	42.46	25.65	54.00	14.48	V
11820.200	35.21	-31.85	39.05	28.01	54.00	18.79	V
11846.000	35.21	-31.85	39.05	28.01	54.00	18.79	V

## Channel 56

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17997.800	46.25	-25.50	46.66	25.09	54.00	7.75	V
17983.000	46.10	-25.50	46.66	24.94	54.00	7.90	V
14487.100	39.46	-28.59	42.46	25.59	54.00	14.54	V
14481.600	39.42	-28.59	42.46	25.55	54.00	14.58	V
11841.600	35.15	-31.85	39.05	27.95	54.00	18.85	V
11867.500	35.13	-31.85	39.05	27.93	54.00	18.87	V

## Channel 64

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17994.000	46.36	-25.50	46.66	25.20	54.00	7.64	V
17985.700	46.25	-25.50	46.66	25.09	54.00	7.75	V
10639.900	42.79	-32.76	38.38	37.17	54.00	11.21	V
14499.200	39.90	-28.59	42.46	26.03	54.00	14.10	V
5376.000	43.61	-27.36	34.09	36.89	54.00	10.39	V
5376.100	43.33	-27.36	34.09	36.61	54.00	10.67	V

## Channel 100

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17996.700	46.26	-25.50	46.66	25.10	54.00	7.74	V
17980.800	46.23	-25.50	46.66	25.07	54.00	7.77	V
14489.900	39.57	-28.59	42.46	25.70	54.00	14.43	V
14491.500	39.41	-28.59	42.46	25.54	54.00	14.59	V
5376.100	40.48	-27.36	34.09	33.76	54.00	13.52	V
5376.000	40.13	-27.36	34.09	33.41	54.00	13.87	V

## Channel 120

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17992.300	46.33	-25.50	46.66	25.17	54.00	7.67	V
17996.200	46.21	-25.50	46.66	25.05	54.00	7.79	V
14489.900	39.42	-28.59	42.46	25.55	54.00	14.58	V
14482.800	39.38	-28.59	42.46	25.51	54.00	14.62	V
11340.000	38.65	-32.42	38.79	32.28	54.00	15.35	V
11339.500	35.70	-32.42	38.79	29.33	54.00	18.30	V

## Channel 140

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17998.300	46.36	-25.50	46.66	25.20	54.00	7.64	V
17996.700	46.23	-25.50	46.66	25.07	54.00	7.77	V
14478.900	39.56	-28.59	42.46	25.69	54.00	14.44	V
14481.100	39.55	-28.59	42.46	25.68	54.00	14.45	V
11340.000	38.97	-32.42	38.79	32.60	54.00	15.03	V
11339.500	36.06	-32.42	38.79	29.69	54.00	17.94	V



**802.11n-HT20**

## Channel 36

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17991.800	46.30	-25.50	46.66	25.14	54.00	7.70	V
17997.800	46.23	-25.50	46.66	25.07	54.00	7.77	H
14485.000	39.49	-28.59	42.46	25.62	54.00	14.51	H
14487.700	39.34	-28.59	42.46	25.47	54.00	14.66	V
5135.400	42.42	-27.61	33.67	36.36	54.00	11.58	V
5145.800	42.41	-27.61	33.67	36.35	54.00	11.59	V

## Channel 40

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17992.800	46.12	-25.50	46.66	24.96	54.00	7.88	V
17993.400	46.11	-25.50	46.66	24.95	54.00	7.89	V
14491.000	39.50	-28.59	42.46	25.63	54.00	14.50	V
14486.000	39.27	-28.59	42.46	25.40	54.00	14.73	V
11836.700	34.78	-31.85	39.05	27.58	54.00	19.22	V
11839.500	34.70	-31.85	39.05	27.50	54.00	19.30	H

## Channel 48

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17979.700	45.83	-25.50	46.66	24.67	54.00	8.17	H
17986.200	45.81	-25.50	46.66	24.65	54.00	8.19	V
14496.500	39.50	-28.59	42.46	25.63	54.00	14.50	H
14497.600	39.28	-28.59	42.46	25.41	54.00	14.72	V
11895.000	34.72	-31.85	39.05	27.52	54.00	19.28	V
11913.100	34.68	-31.48	39.09	27.07	54.00	19.32	H

## Channel 52

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17981.300	46.21	-25.50	46.66	25.05	54.00	7.79	V
17986.200	46.21	-25.50	46.66	25.05	54.00	7.79	V
14494.300	39.53	-28.59	42.46	25.66	54.00	14.47	V
14489.400	39.38	-28.59	42.46	25.51	54.00	14.62	V
11821.300	35.22	-31.85	39.05	28.02	54.00	18.78	V
11820.800	35.12	-31.85	39.05	27.92	54.00	18.88	V

## Channel 56

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17997.200	46.48	-25.50	46.66	25.32	54.00	7.52	V
17996.200	46.32	-25.50	46.66	25.16	54.00	7.68	V
14478.900	39.51	-28.59	42.46	25.64	54.00	14.49	V
14477.200	39.43	-28.59	42.46	25.56	54.00	14.57	V
11836.100	35.12	-31.85	39.05	27.92	54.00	18.88	V
11869.700	35.09	-31.85	39.05	27.89	54.00	18.91	V

## Channel 64

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17979.700	46.54	-25.50	46.66	25.38	54.00	7.46	V
17978.500	46.08	-25.50	46.66	24.92	54.00	7.92	V
10639.900	42.90	-32.76	38.38	37.28	54.00	11.10	V
14481.100	39.40	-28.59	42.46	25.53	54.00	14.60	V
5376.000	43.89	-27.36	34.09	37.17	54.00	10.11	V
5376.000	43.80	-27.36	34.09	37.08	54.00	10.20	V

## Channel 100

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17994.000	46.33	-25.50	46.66	25.17	54.00	7.67	V
17994.500	46.30	-25.50	46.66	25.14	54.00	7.70	V
14472.300	39.40	-28.59	42.46	25.53	54.00	14.60	V
14489.400	39.33	-28.59	42.46	25.46	54.00	14.67	V
5375.900	41.45	-27.36	34.09	34.73	54.00	12.55	V
5375.900	41.26	-27.36	34.09	34.54	54.00	12.74	V

## Channel 120

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17994.500	46.42	-25.50	46.66	25.26	54.00	7.58	V
17994.000	46.41	-25.50	46.66	25.25	54.00	7.59	V
14499.800	39.38	-28.59	42.46	25.51	54.00	14.62	V
14494.300	39.34	-28.59	42.46	25.47	54.00	14.66	V
11340.000	38.80	-32.42	38.79	32.43	54.00	15.20	V
11339.500	35.80	-32.42	38.79	29.43	54.00	18.20	V

## Channel 140

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17987.900	46.47	-25.50	46.66	25.31	54.00	7.53	V
17987.300	46.31	-25.50	46.66	25.15	54.00	7.69	V
14486.000	39.45	-28.59	42.46	25.58	54.00	14.55	V
14487.700	39.30	-28.59	42.46	25.43	54.00	14.70	V
11340.000	38.86	-32.42	38.79	32.49	54.00	15.14	V
11339.500	36.02	-32.42	38.79	29.65	54.00	17.98	V