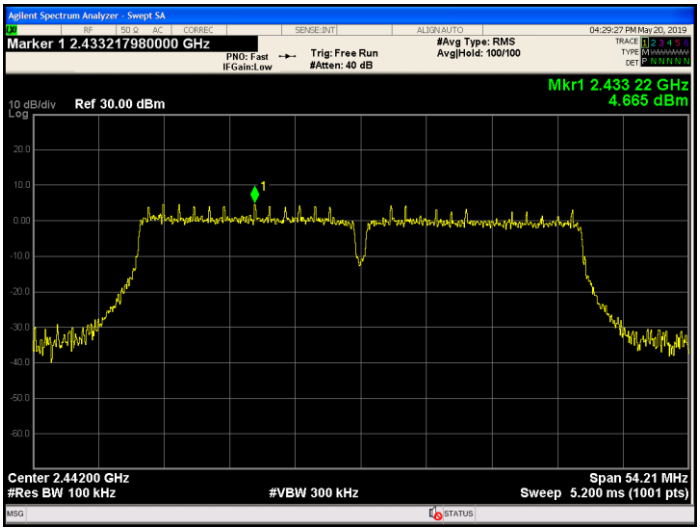

Figure 9-268 Chain 1 Reference Level 802.11n40-Ch.7

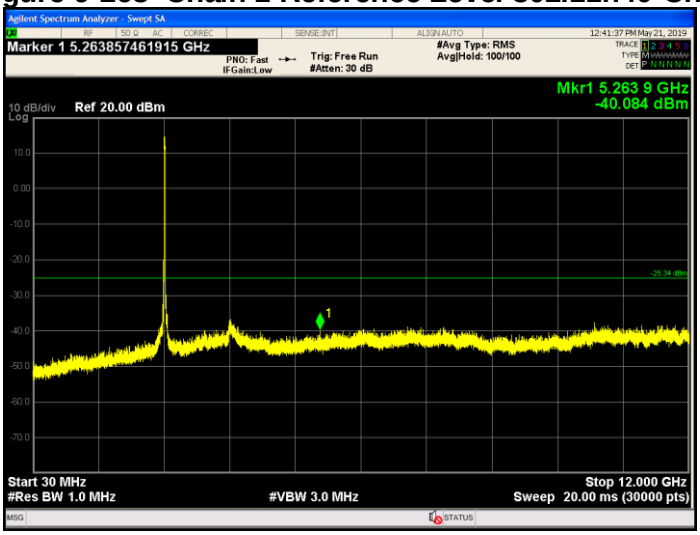

Figure 9-269 Chain 1 Conducted Spurious Emissions 30 MHz-12GHz 802.11n40- Ch.7

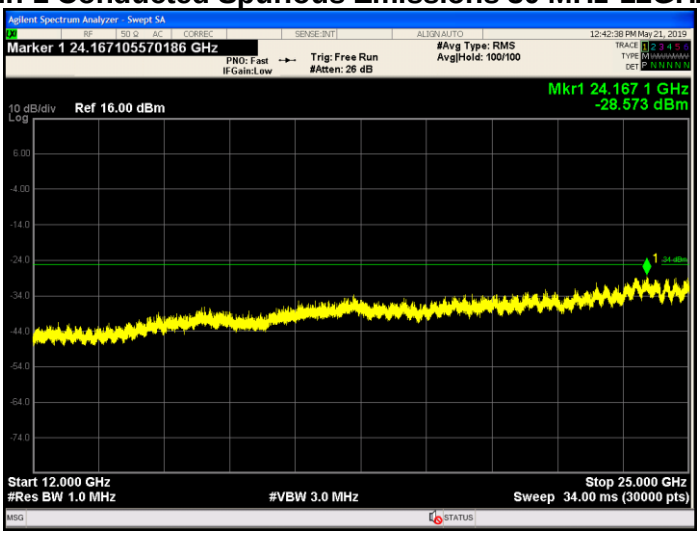

Figure 9-270 Chain 1 Conducted Spurious Emissions 12-25GHz 802.11n40- Ch.7

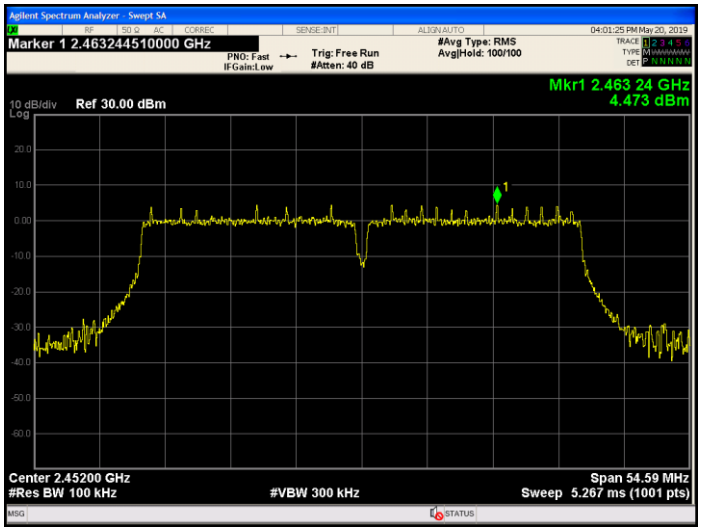

Figure 9-271 Chain 0 Reference Level 802.11n40-Ch.9

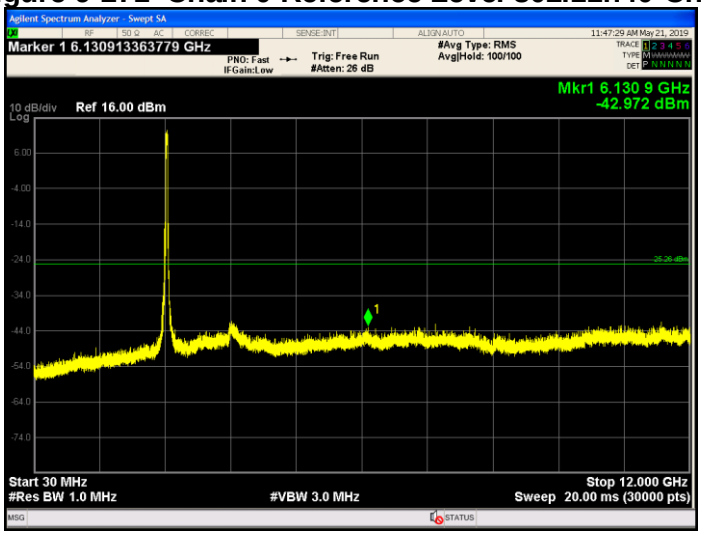

Figure 9-272 Chain 0 Conducted Spurious Emissions 30MHz-12GHz 802.11n40- Ch.9

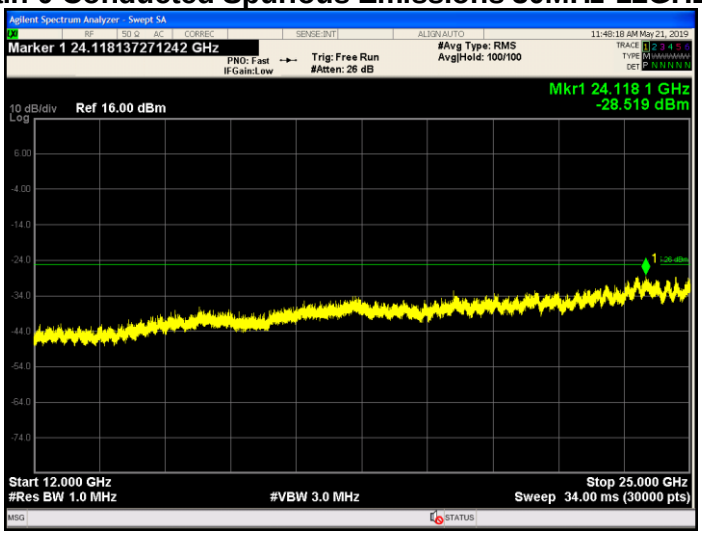

Figure 9-273 Chain 0 Conducted Spurious Emissions 12-25GHz 802.11n40- Ch.9

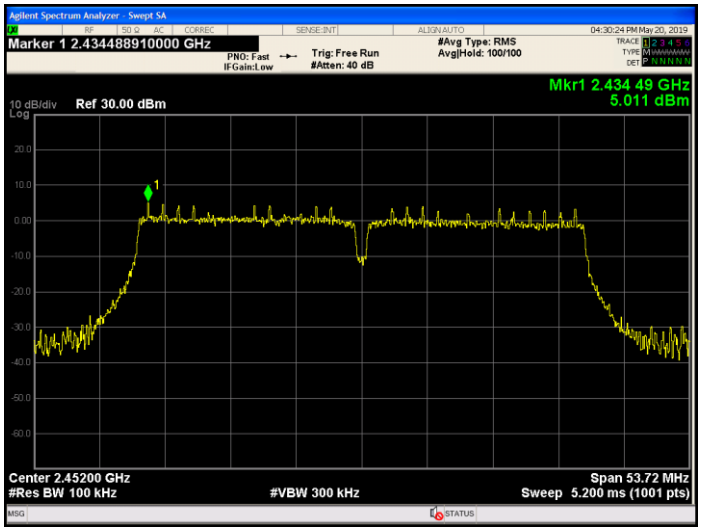

Figure 9-274 Chain 1 Reference Level 802.11n40-Ch.9

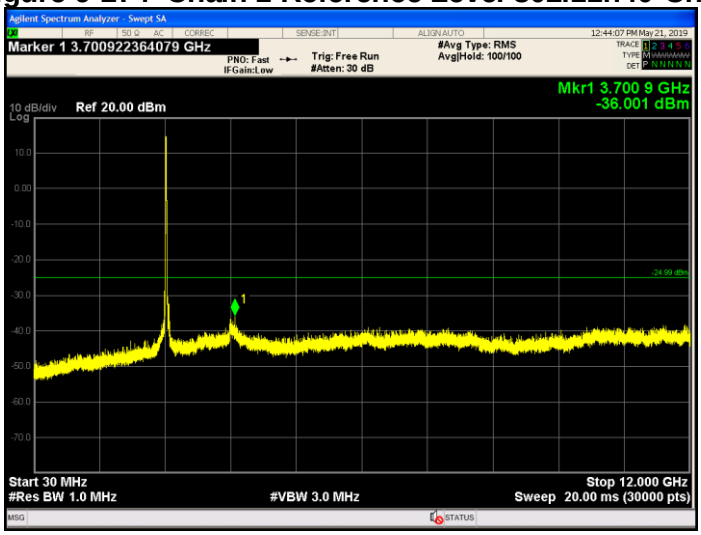

Figure 9-275 Chain 1 Conducted Spurious Emissions 30 MHz-12GHz 802.11n40 - Ch.9

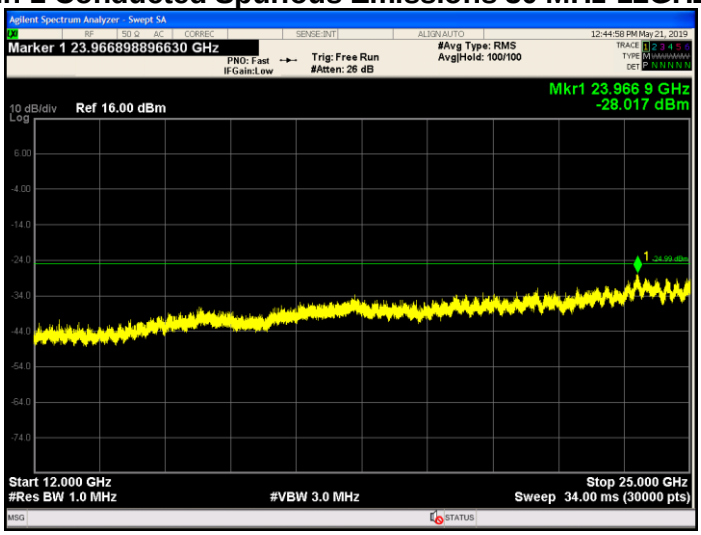

Figure 9-276 Chain 1 Conducted Spurious Emissions 12-25GHz 802.11n40- Ch.9

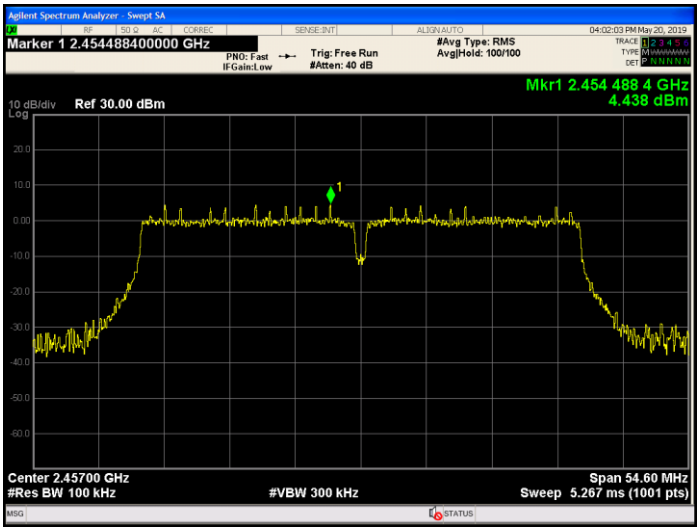

Figure 9-277 Chain 0 Reference Level 802.11n40-Ch.10

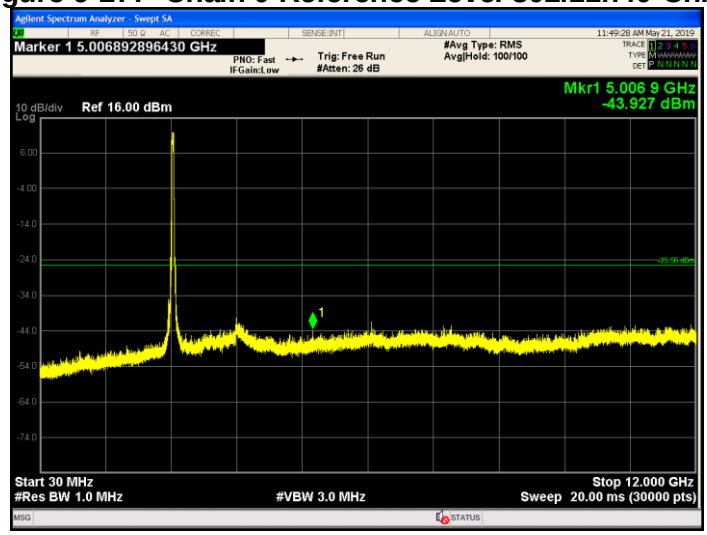

Figure 9-278 Chain 0 Conducted Spurious Emissions 30MHz-12GHz 802.11n40- Ch.10

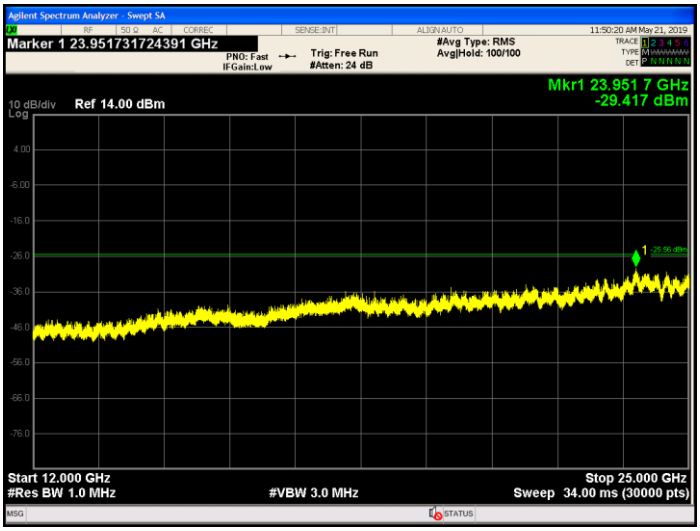

Figure 9-279 Chain 0 Conducted Spurious Emissions 12-25GHz 802.11n40- Ch.10

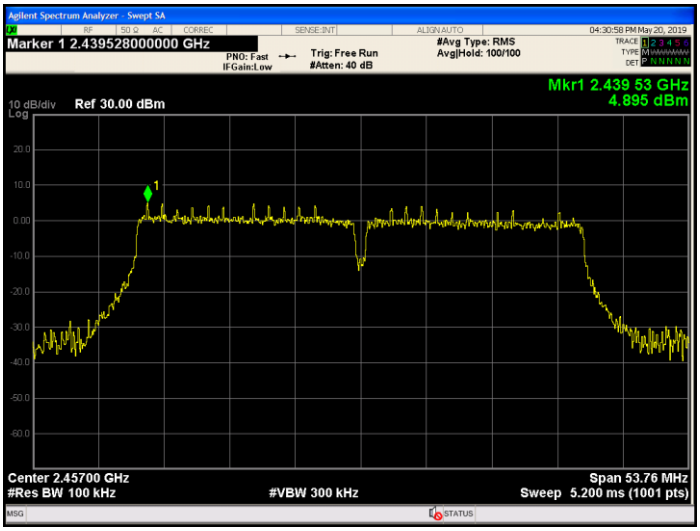

Figure 9-280 Chain 1 Reference Level 802.11n40-Ch.10

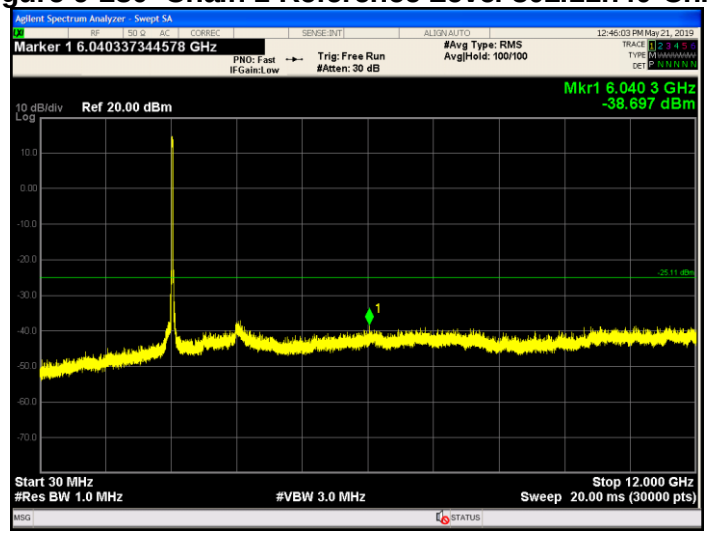

Figure 9-281 Chain 1 Conducted Spurious Emissions 30 MHz-12GHz 802.11n40- Ch.10

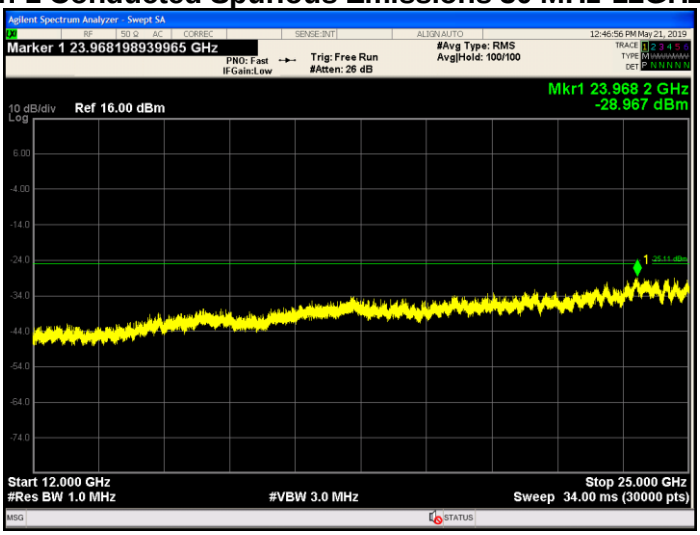

Figure 9-282 Chain 1 Conducted Spurious Emissions 12-25GHz 802.11n40-Ch.10

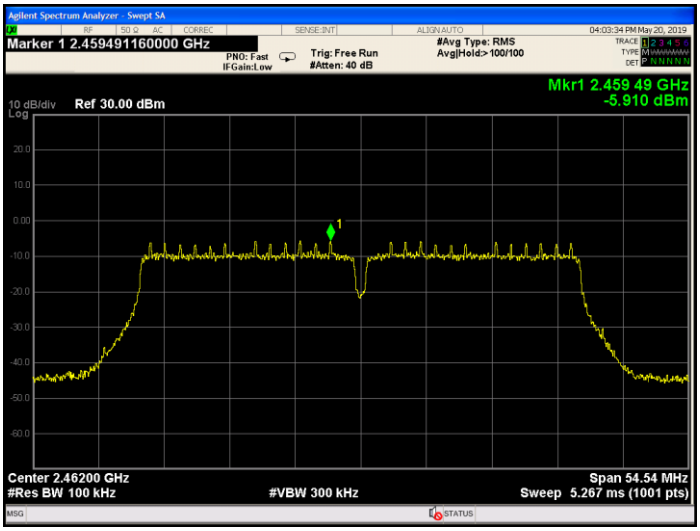

Figure 9-283 Chain 0 Reference Level 802.1n40-Ch.11

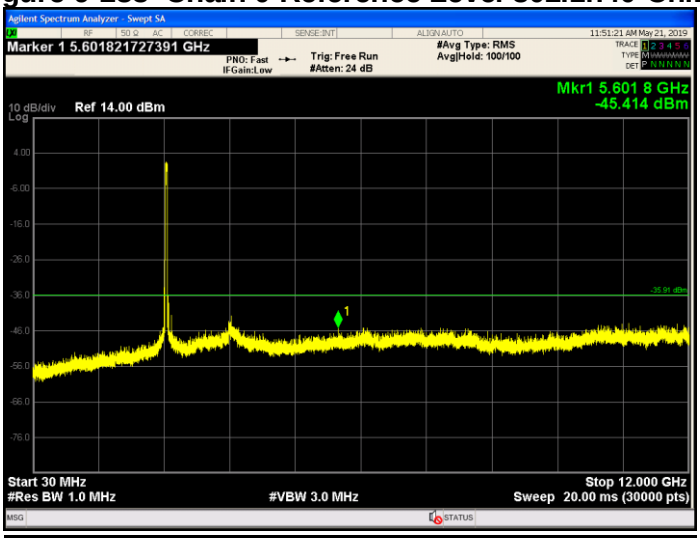

Figure 9-284 Chain 0 Conducted Spurious Emissions 30MHz-12GHz 802.11n40- Ch.11

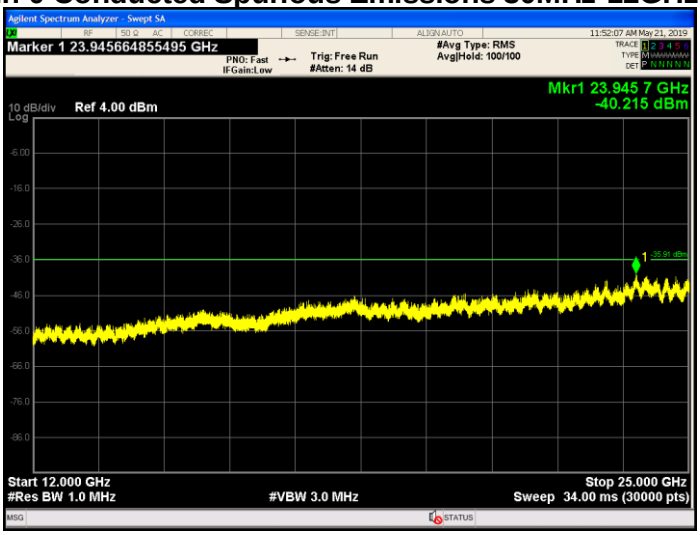

Figure 9-285 Chain 0 Conducted Spurious Emissions 12-25GHz 802.11n40-Ch.11

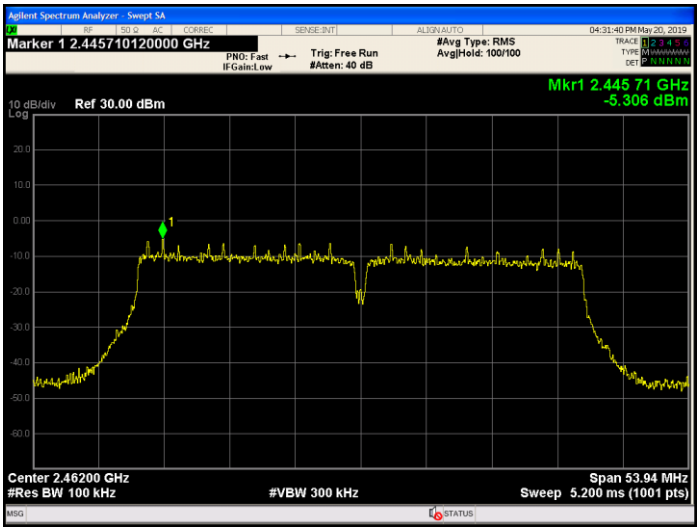

Figure 9-286 Chain 1 Reference Level 802.11n40-Ch.11

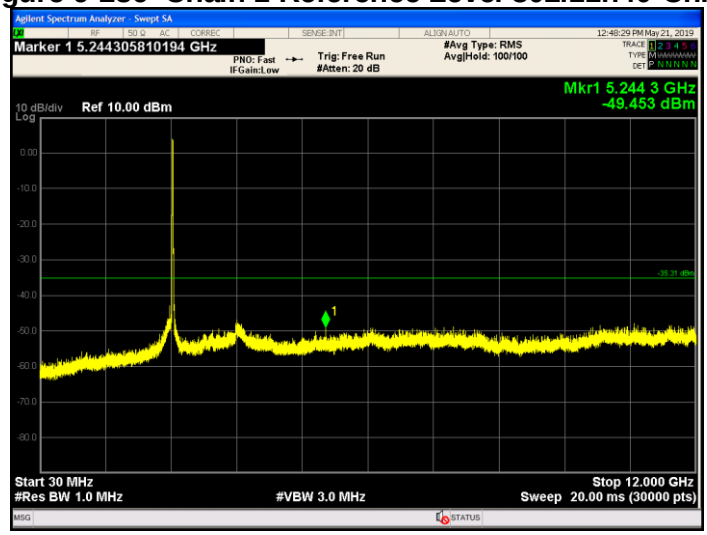

Figure 9-287 Chain 1 Conducted Spurious Emissions 30 MHz-12GHz 802.11n40- Ch.11

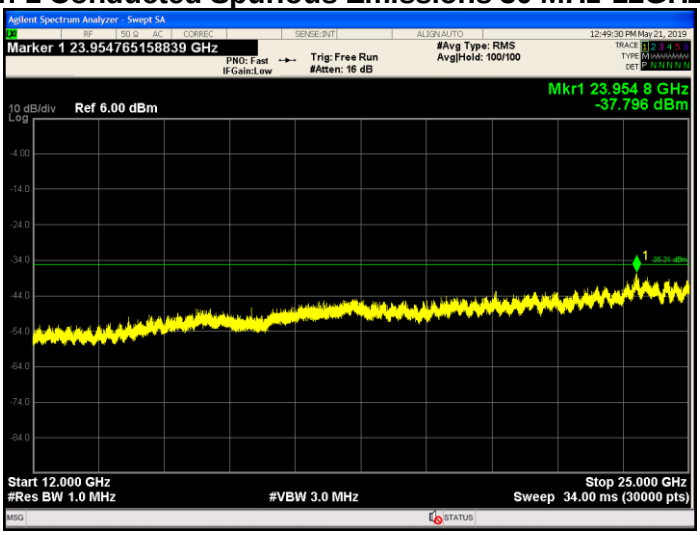

Figure 9-288 Chain 1 Conducted Spurious Emissions 12-25GHz 802.11n40-Ch.11

9.7 Conducted Band Edge Emissions

9.7.1 Test Requirement:

FCC CFR 47 Rule Part 15.247 (d)

ISED RSS-247 [5.5]

9.7.2 Test Method:

Measurements were performed according to the procedure defined in KDB 558074 - Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 V05 and ANSI C63.10 2013.

Spectrum analyzer settings:

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation
RBW = 100 kHz
VBW = 300 kHz
Sweep = auto couple
Detector function = Peak
Trace = Max Hold
The trace was allowed to stabilize. The marker was set on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge. The delta marker function was set and the marker-to-peak function moved to the peak of the in-band emission.

9.7.3 Limits:

All spurious emissions at least 30dBc since average power measurements are reported.

9.7.4 Test Result:

Pass.

9.7.5 Test Data:

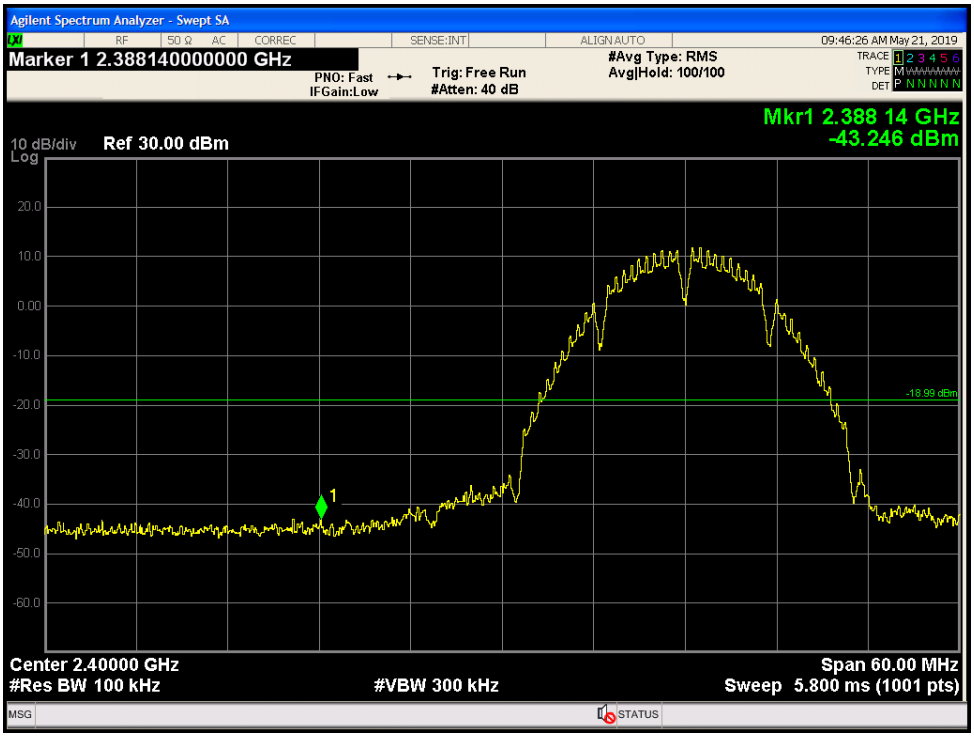

Figure 9-289 Chain 0 Conducted Band Edge 802.11b - Ch.1

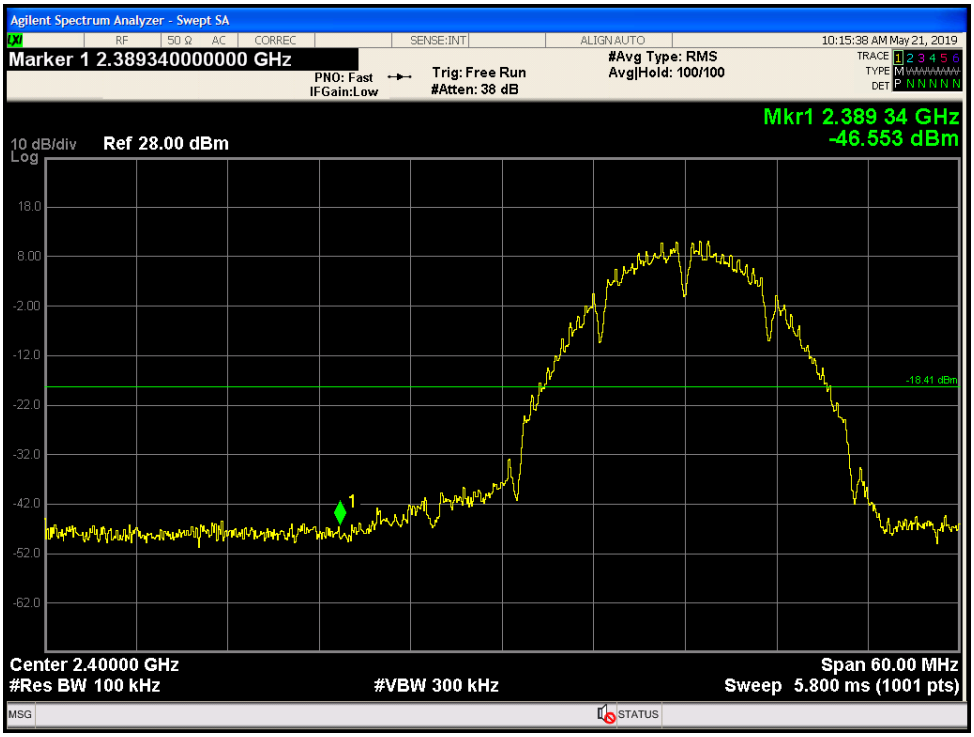

Figure 9-290 Chain 1 Conducted Band Edge 802.11b - Ch.1

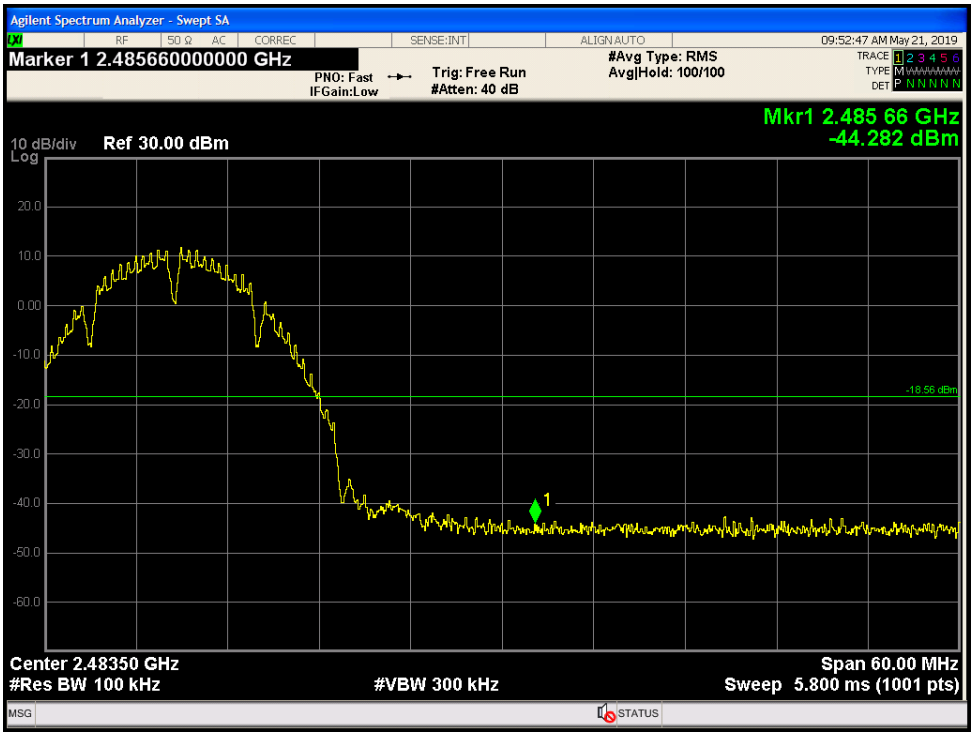

Figure 9-291 Chain 0 Conducted Band Edge 802.11b - Ch.11

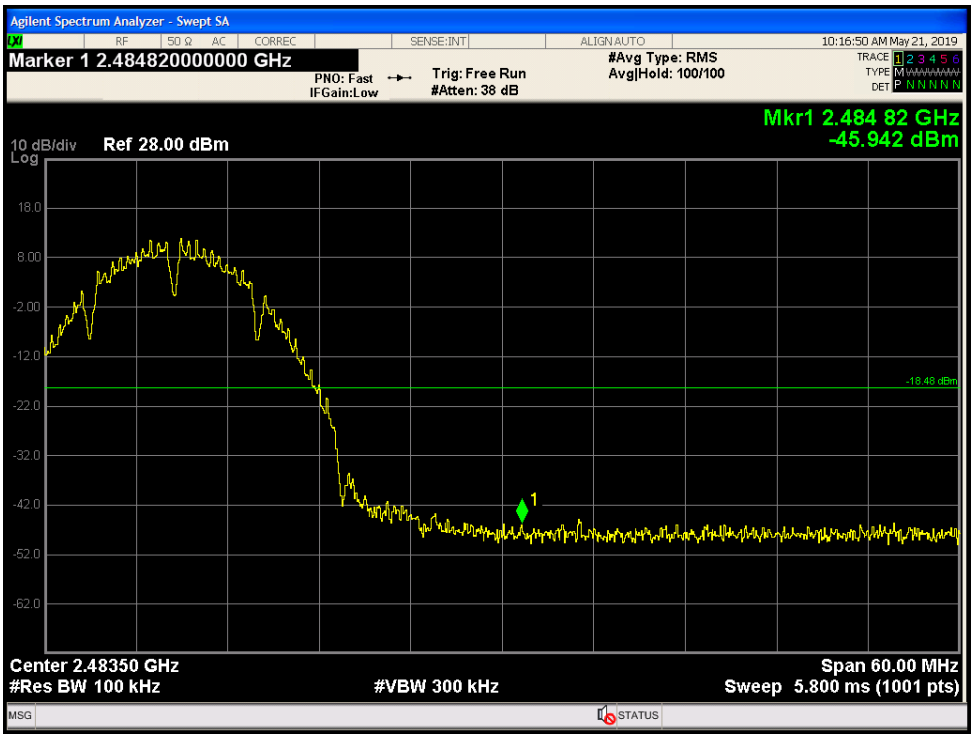

Figure 9-292 Chain 1 Conducted Band Edge 802.11b - Ch.11

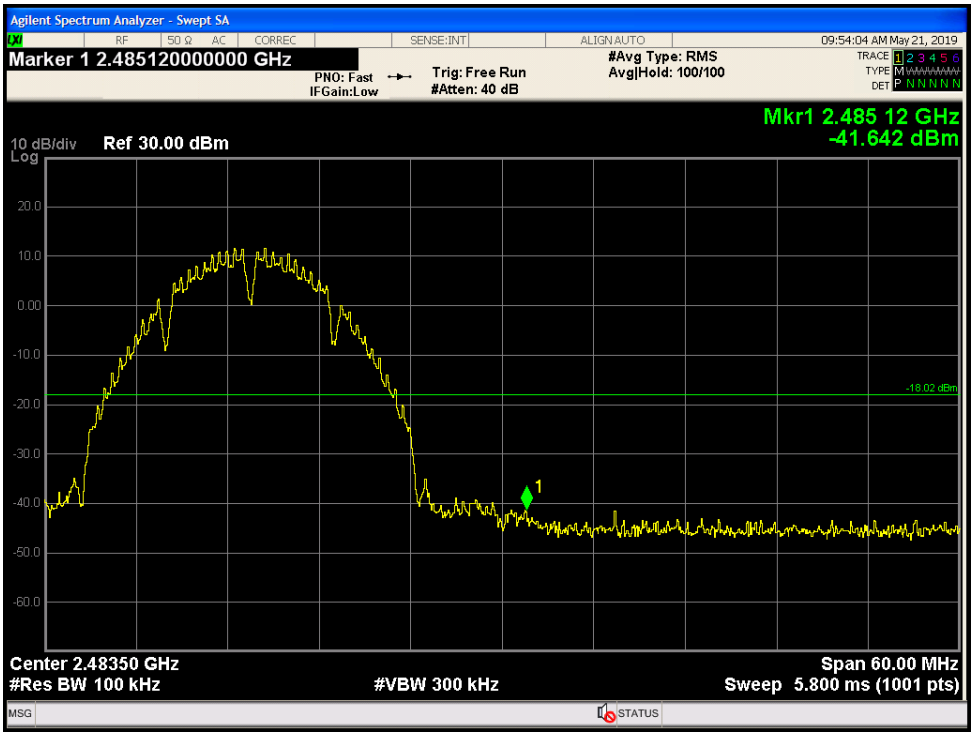

Figure 9-293 Chain 0 Conducted Band Edge 802.11b - Ch.12

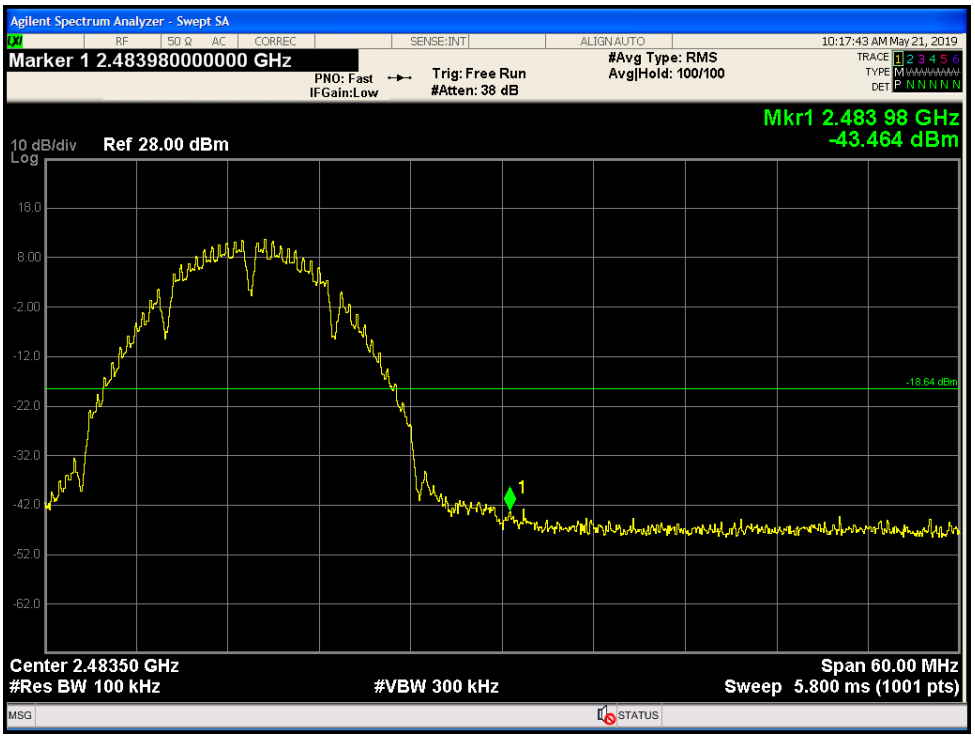

Figure 9-294 Chain 1 Conducted Band Edge 802.11b - Ch.12

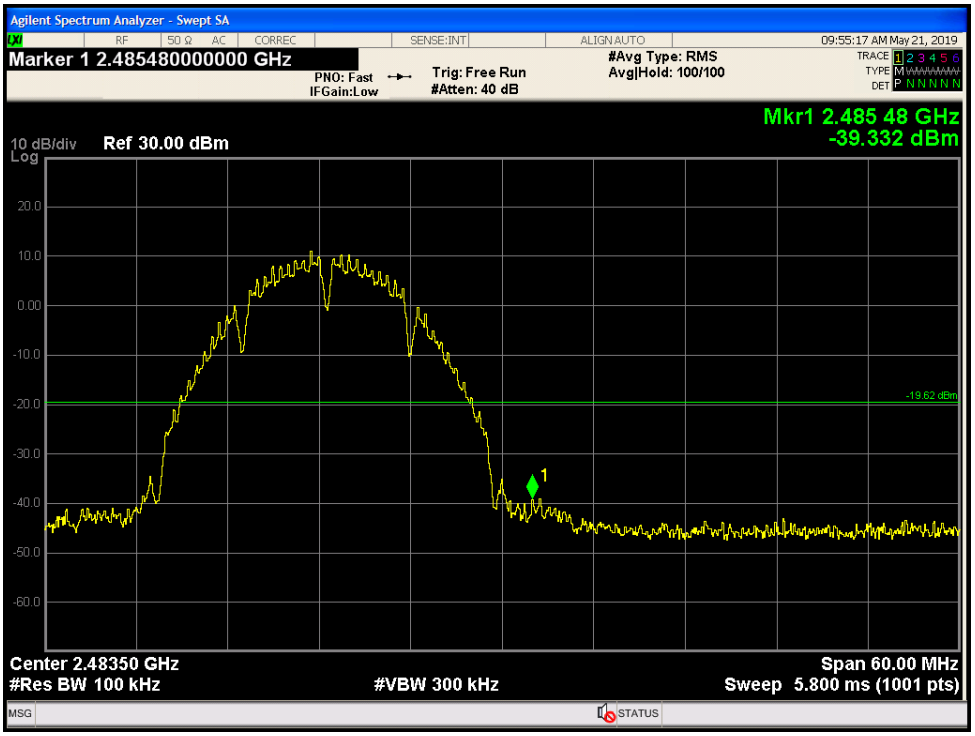

Figure 9-295 Chain 0 Conducted Band Edge 802.11b - Ch.13

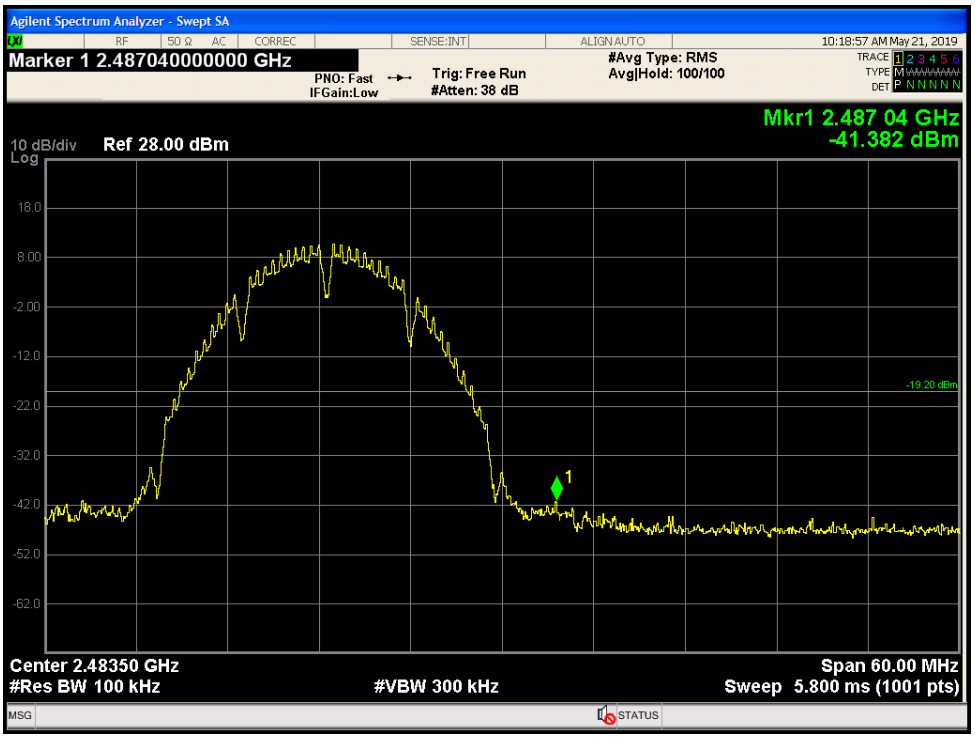

Figure 9-296 Chain 1 Conducted Band Edge 802.11b - Ch.13

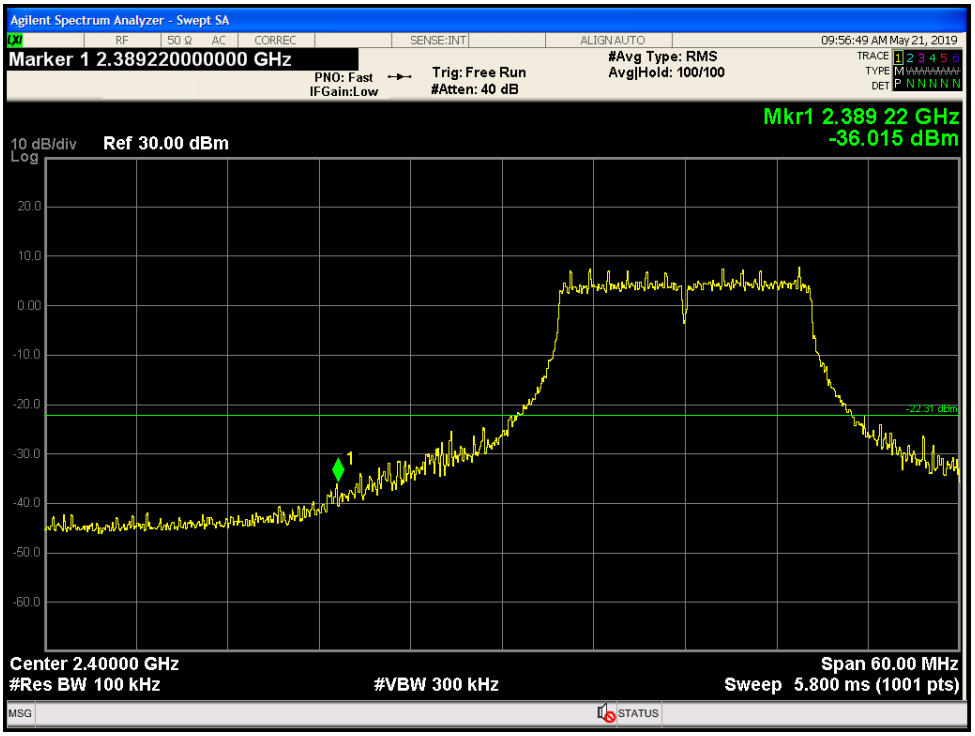

Figure 9-297 Chain 0 Conducted Band Edge 802.11g - Ch.1

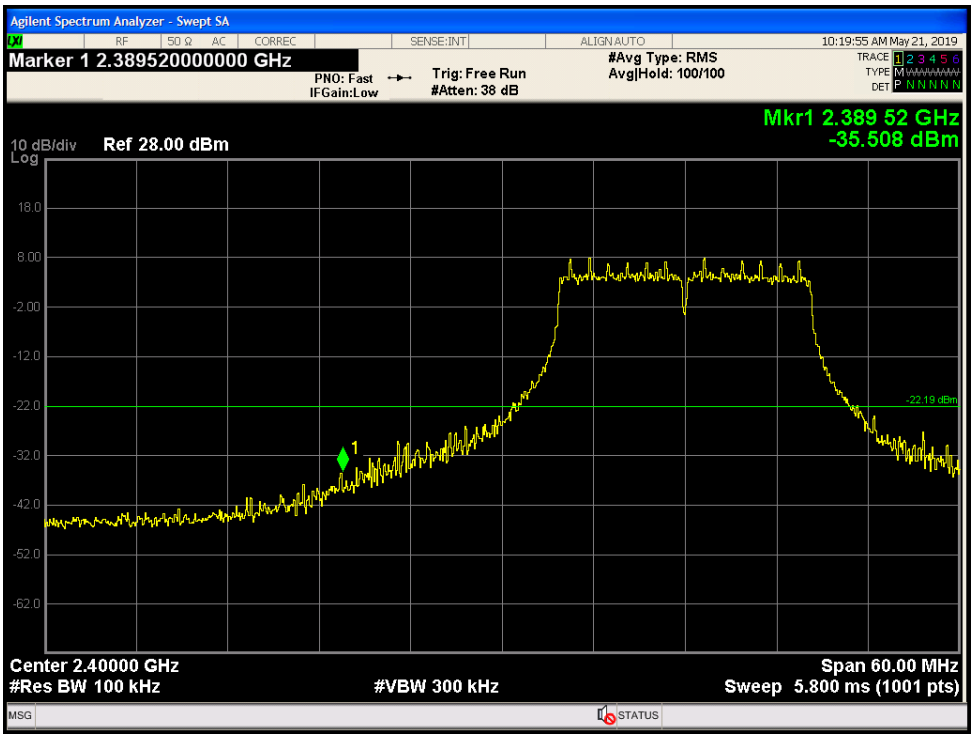

Figure 9-298 Chain 1 Conducted Band Edge 802.11g - Ch.1

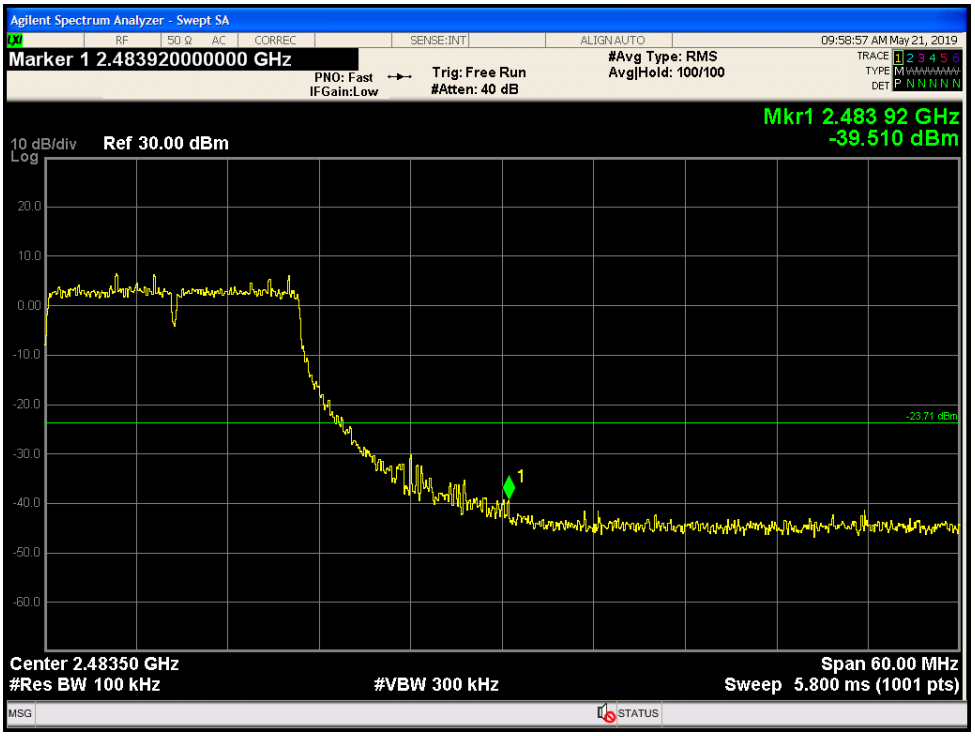

Figure 9-299 Chain 0 Conducted Band Edge 802.11g- Ch.11

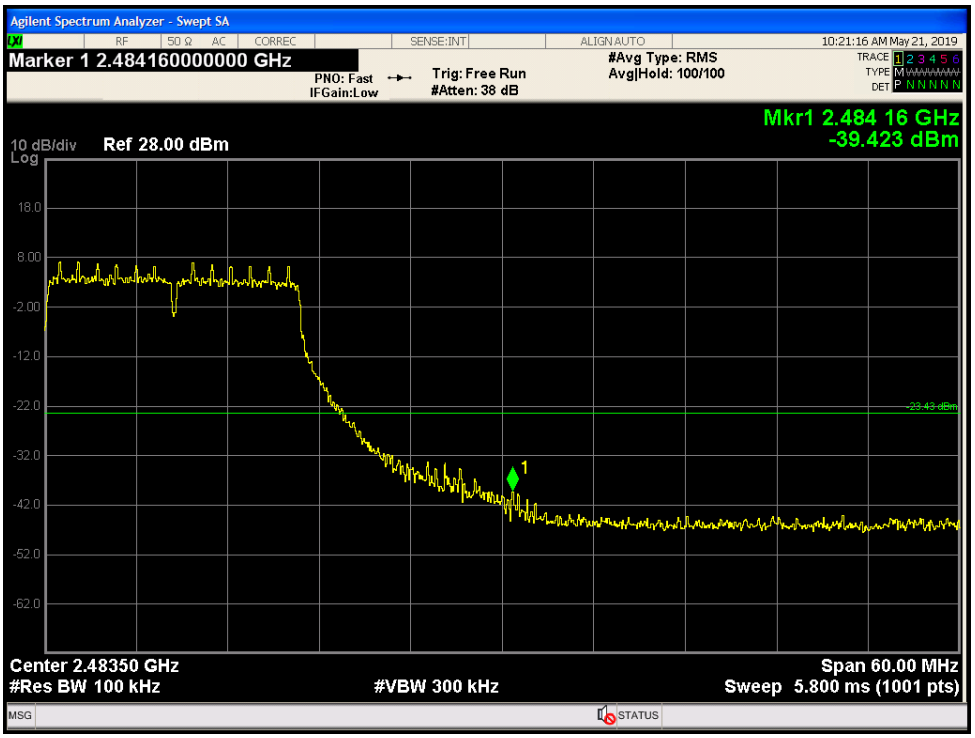

Figure 9-300 Chain 1 Conducted Band Edge 802.11g- Ch.11

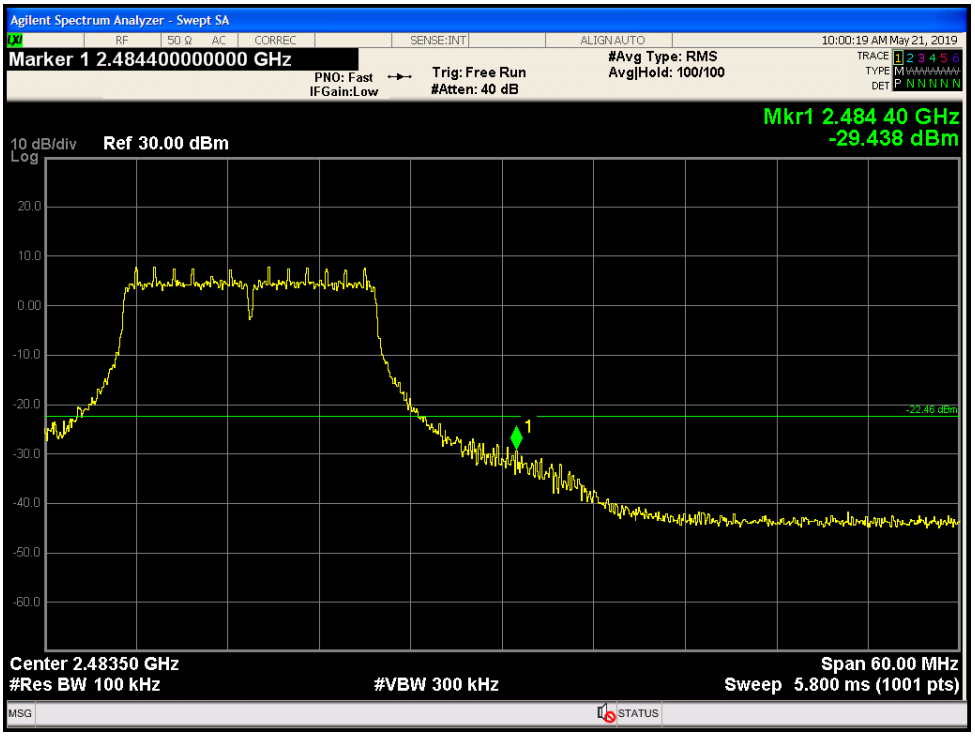

Figure 9-301 Chain 0 Conducted Band Edge 802.11g- Ch.12

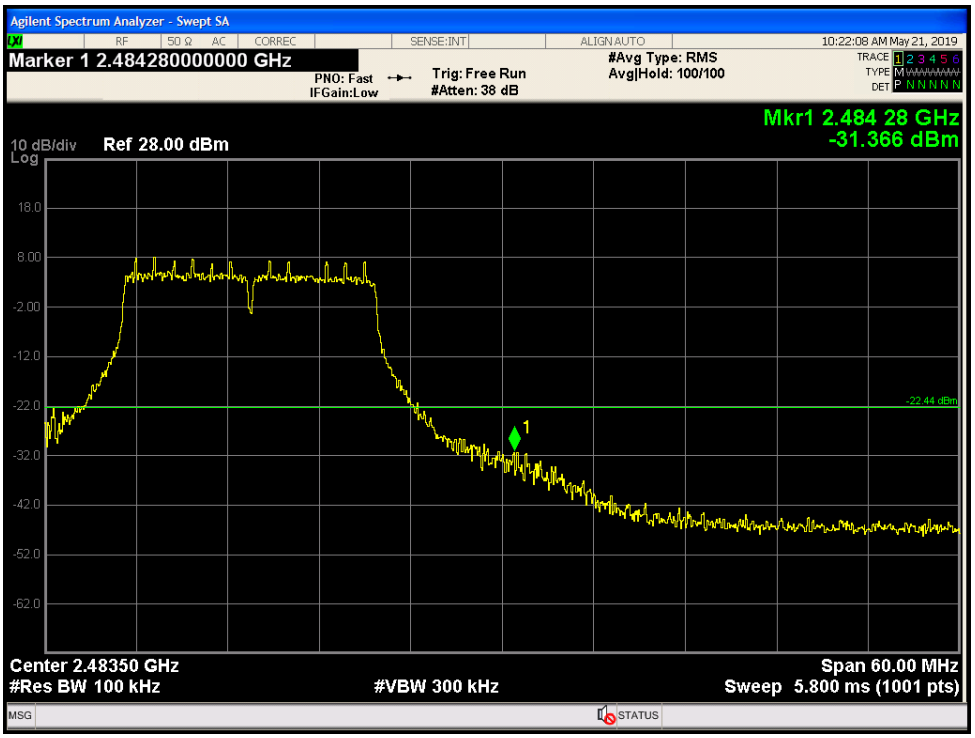

Figure 9-302 Chain 1 Conducted Band Edge 802.11g- Ch.12

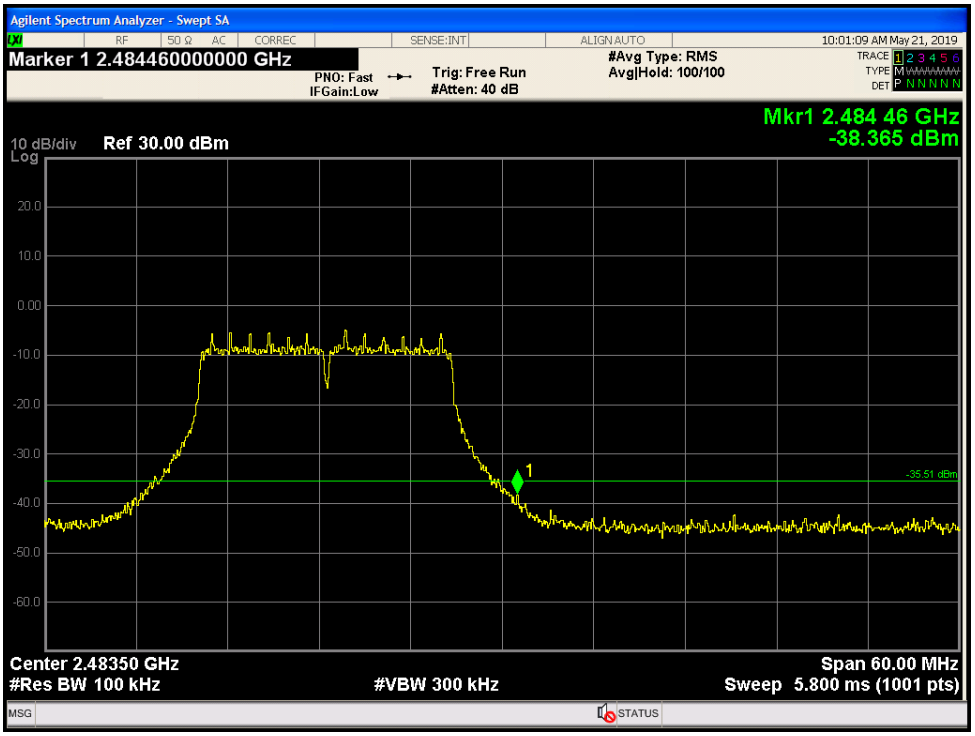

Figure 9-303 Chain 0 Conducted Band Edge 802.11g- Ch.13

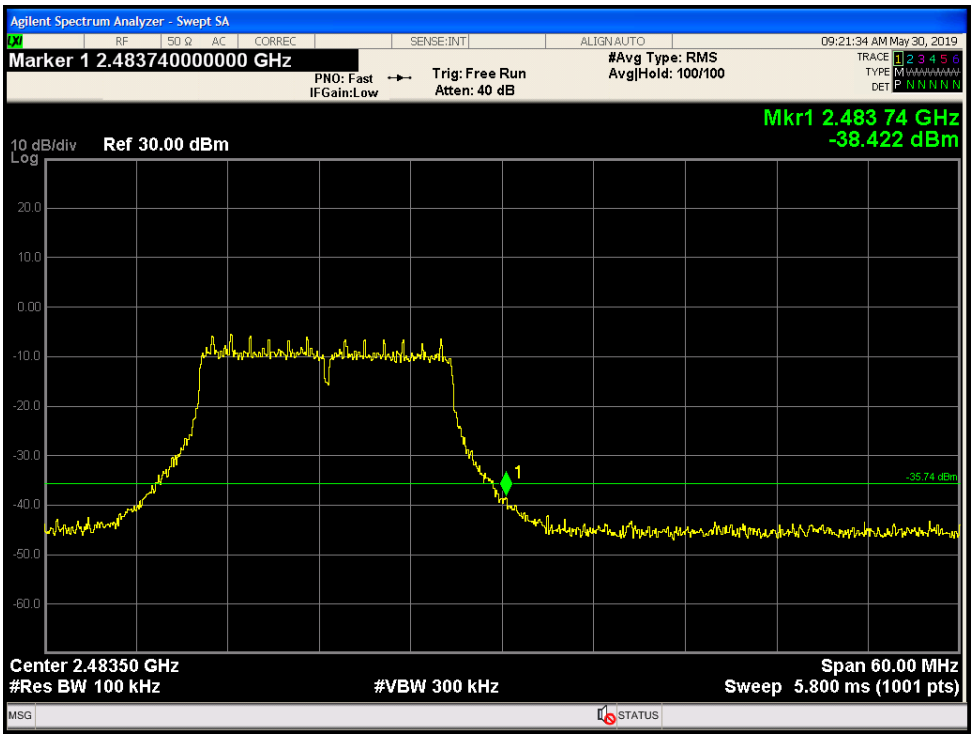

Figure 9-304 Chain 1 Conducted Band Edge 802.11g- Ch.13

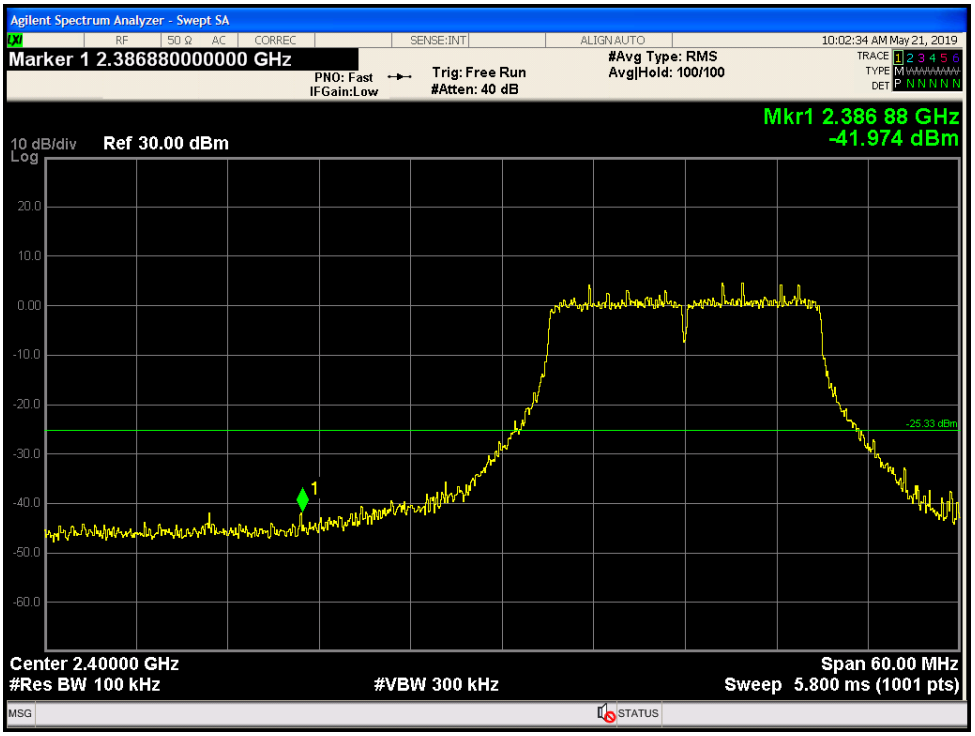

Figure 9-305 Chain 0 Conducted Band Edge 802.11n20 - Ch.1

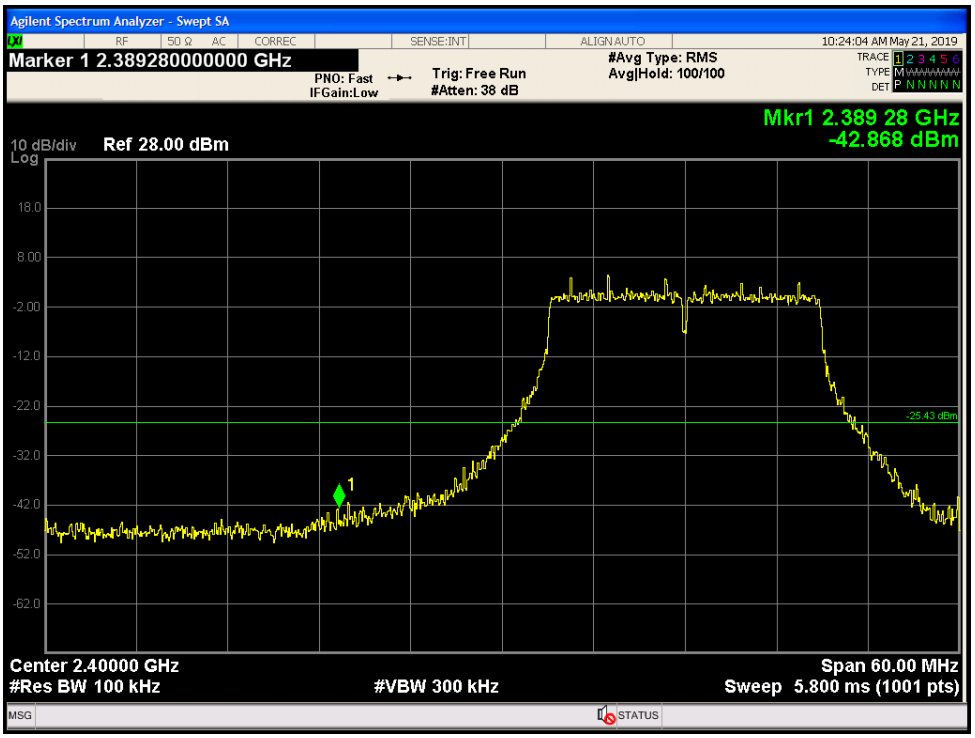

Figure 9-306 Chain 1 Conducted Band Edge 802.11n20- Ch.1

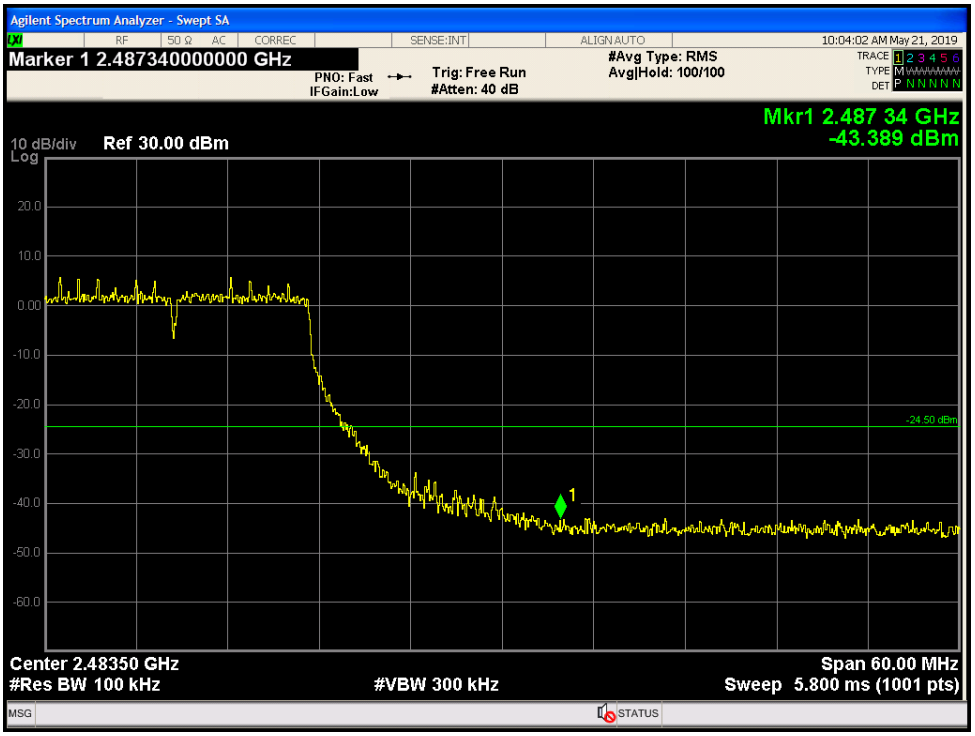

Figure 9-307 Chain 0 Conducted Band Edge 802.11n20- Ch.11

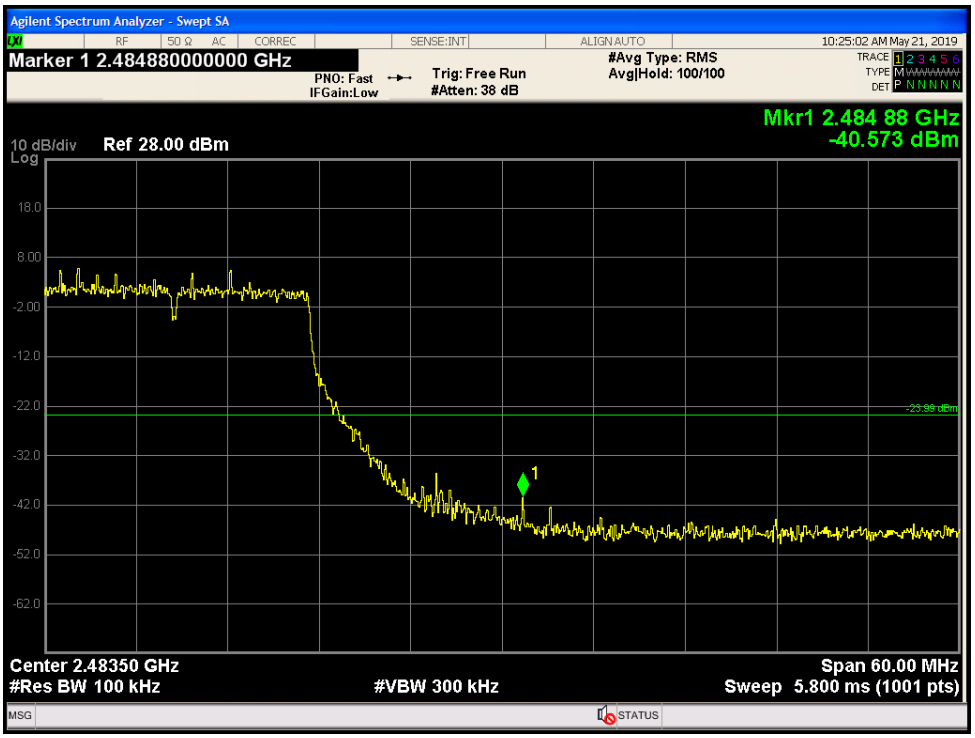

Figure 9-308 Chain 1 Conducted Band Edge 802.11n20- Ch.11

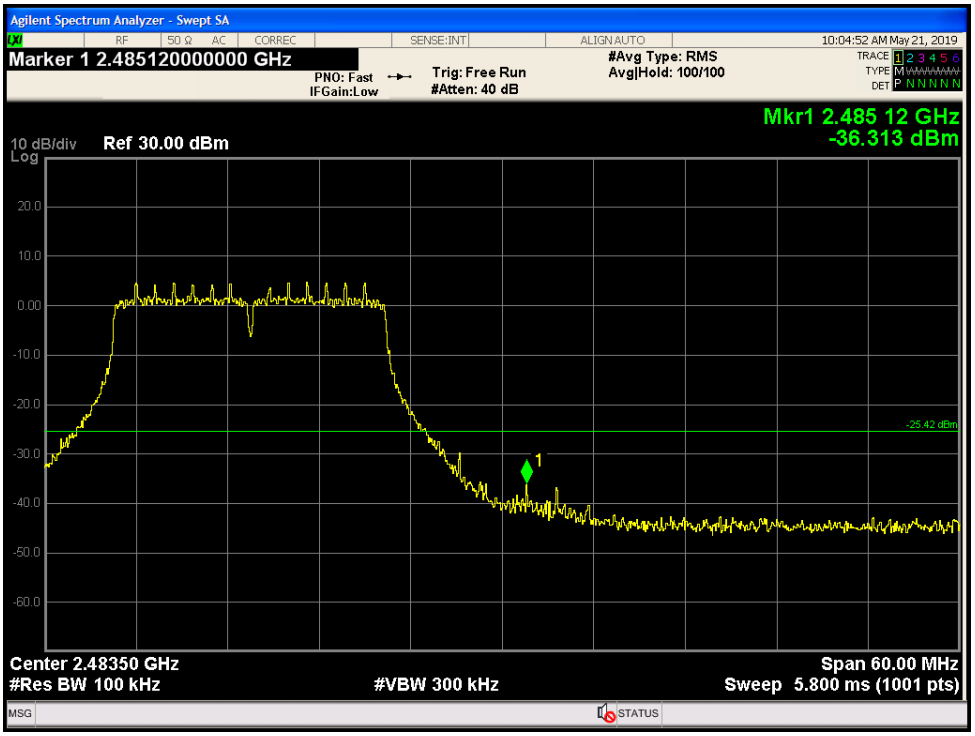

Figure 9-309 Chain 0 Conducted Band Edge 802.11n20- Ch.12

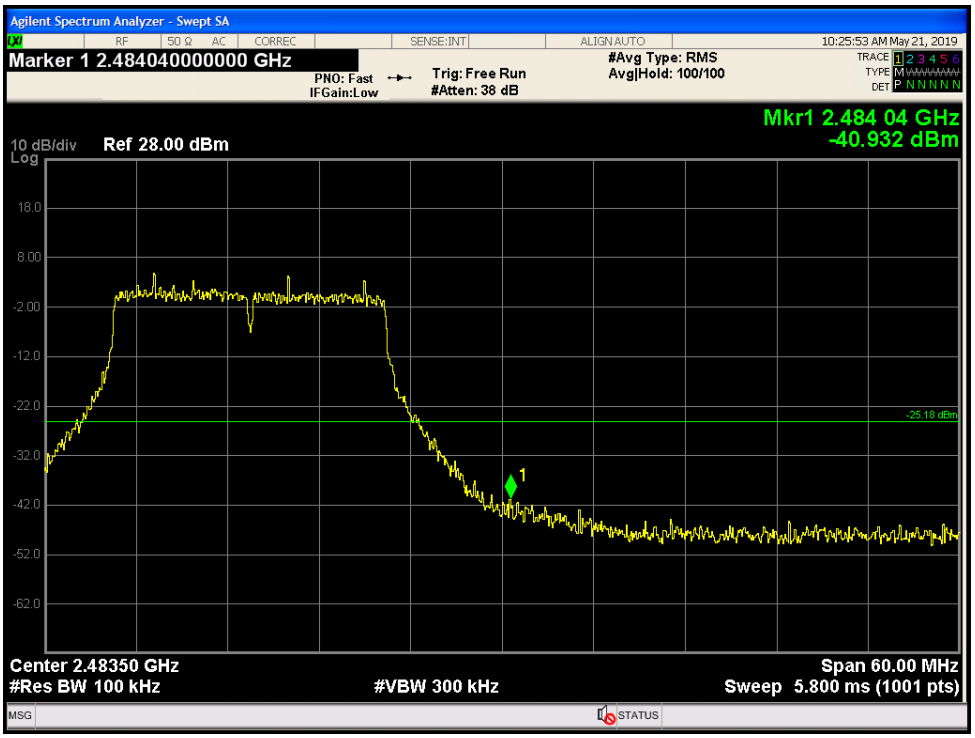

Figure 9-310 Chain 1 Conducted Band Edge 802.11n20- Ch.12

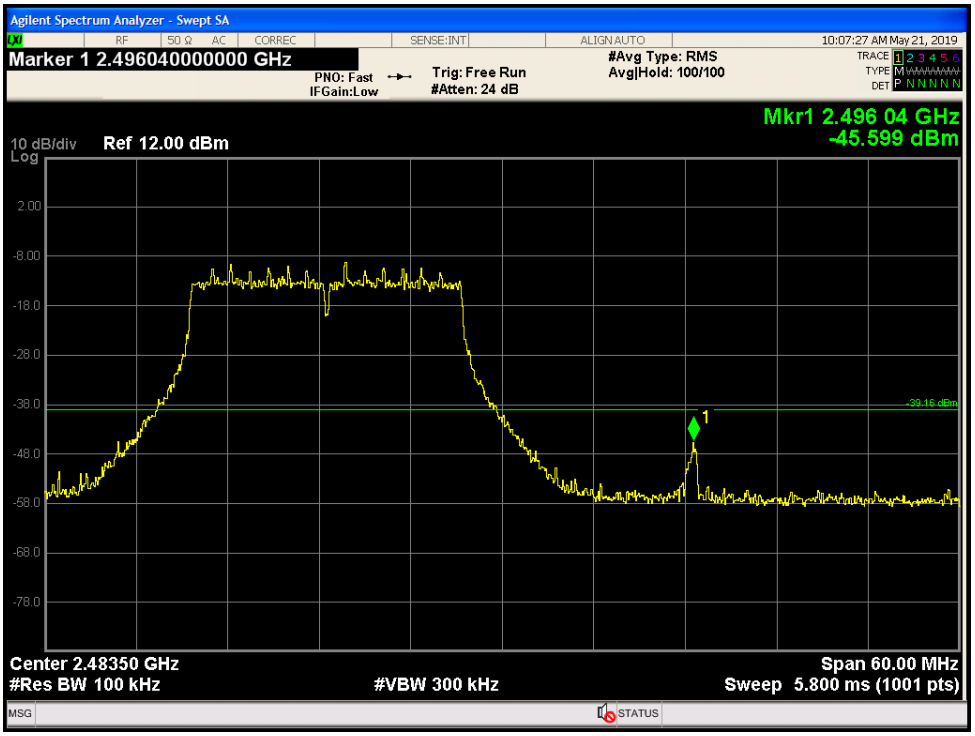

Figure 9-311 Chain 0 Conducted Band Edge 802.11n20- Ch.13

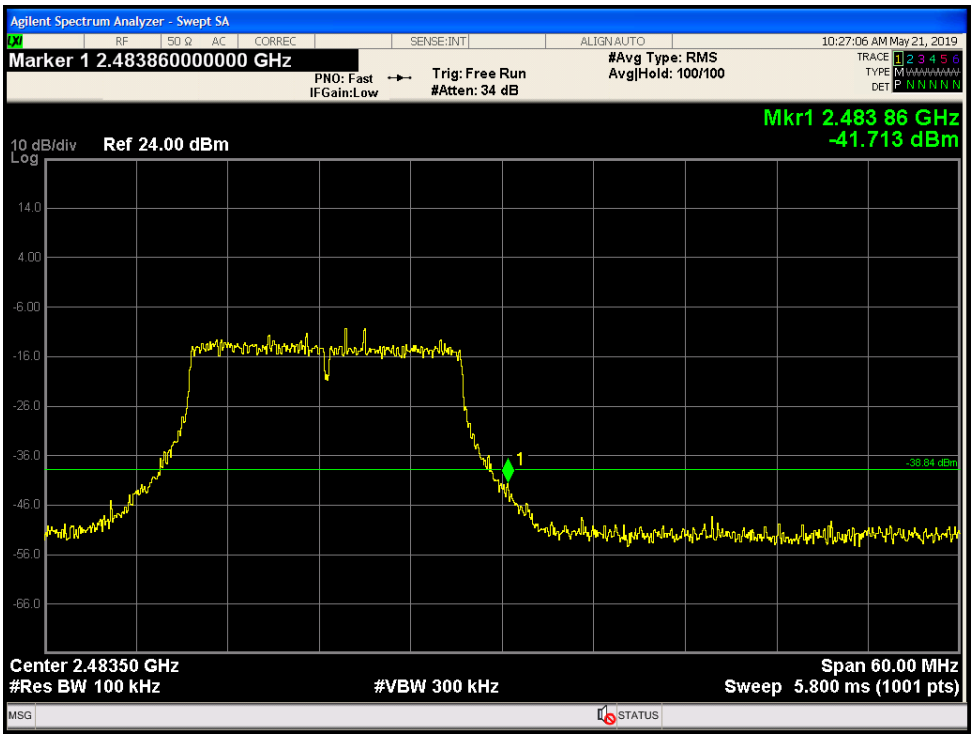

Figure 9-312 Chain 1 Conducted Band Edge 802.11n20- Ch.13

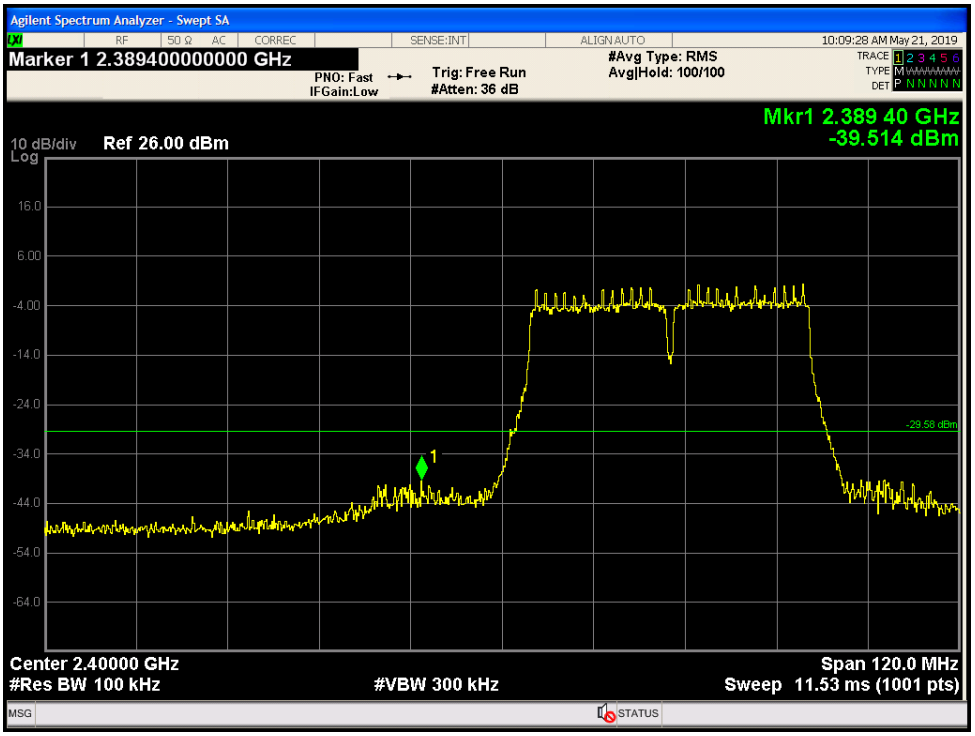

Figure 9-313 Chain 0 Conducted Band Edge 802.11n40 - Ch.3

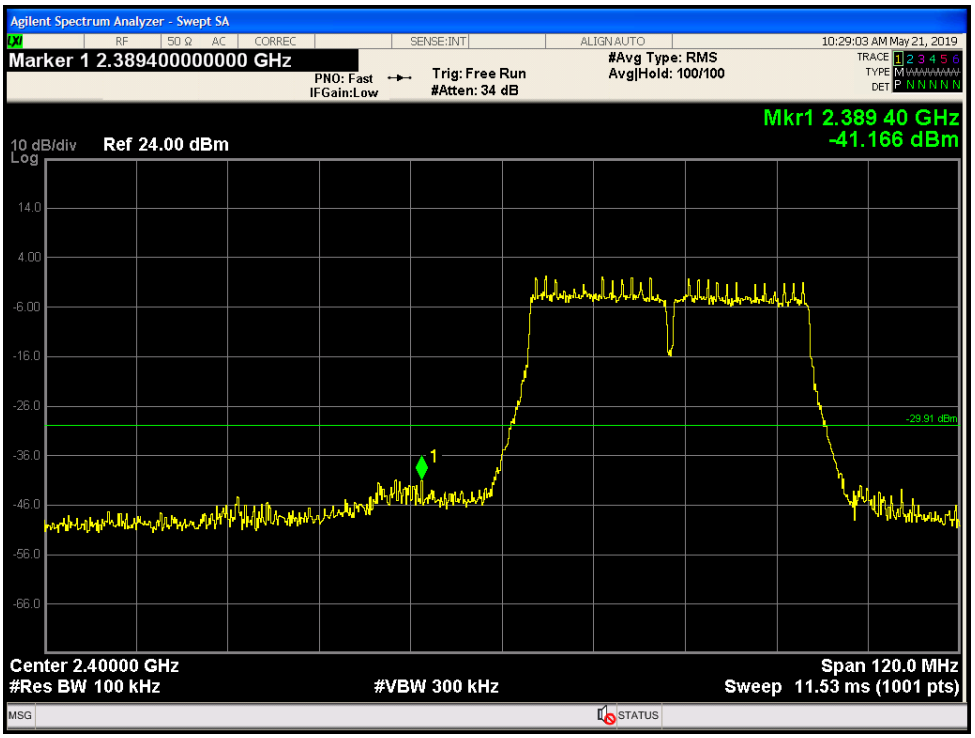

Figure 9-314 Chain 1 Conducted Band Edge 802.11n40- Ch.3

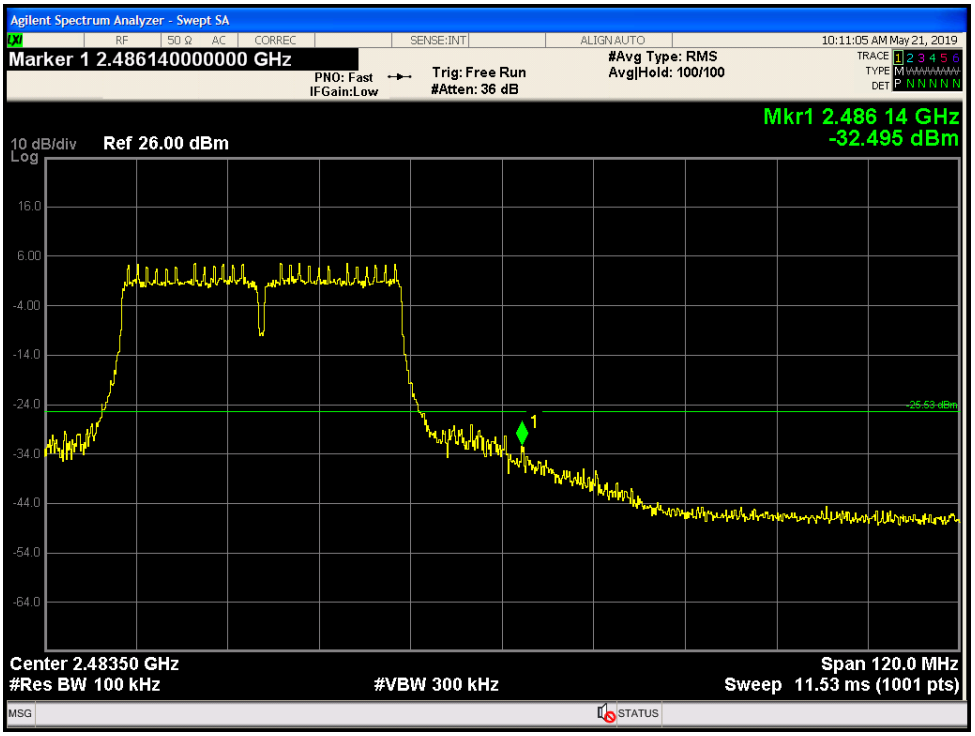

Figure 9-315 Chain 0 Conducted Band Edge 802.11n40- Ch.9

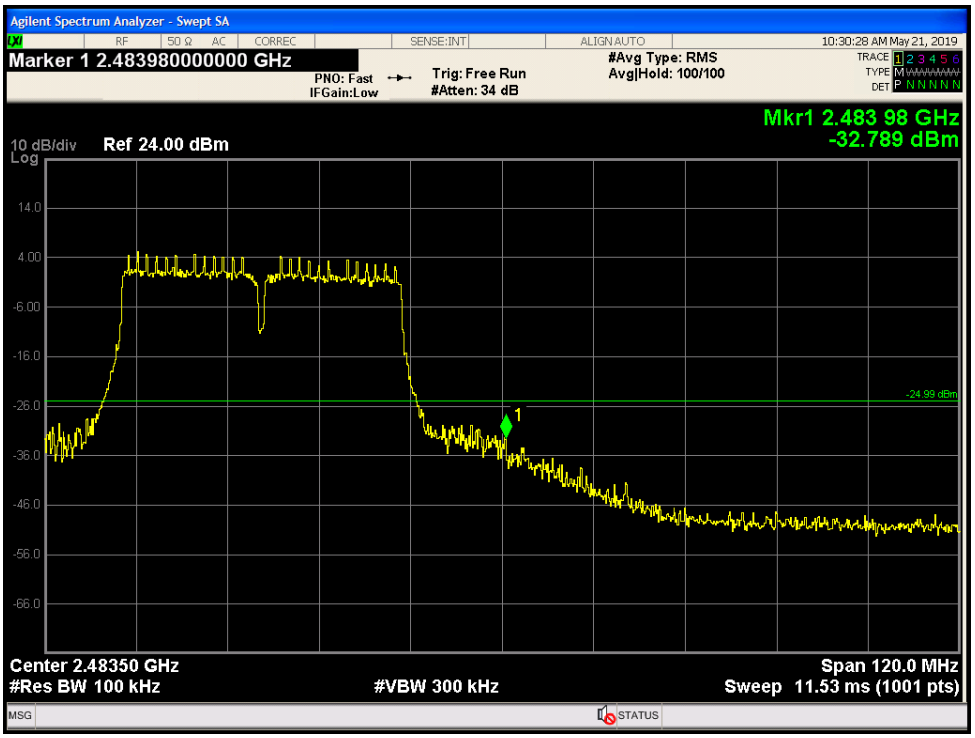

Figure 9-316 Chain 1 Conducted Band Edge 802.11n40- Ch.9

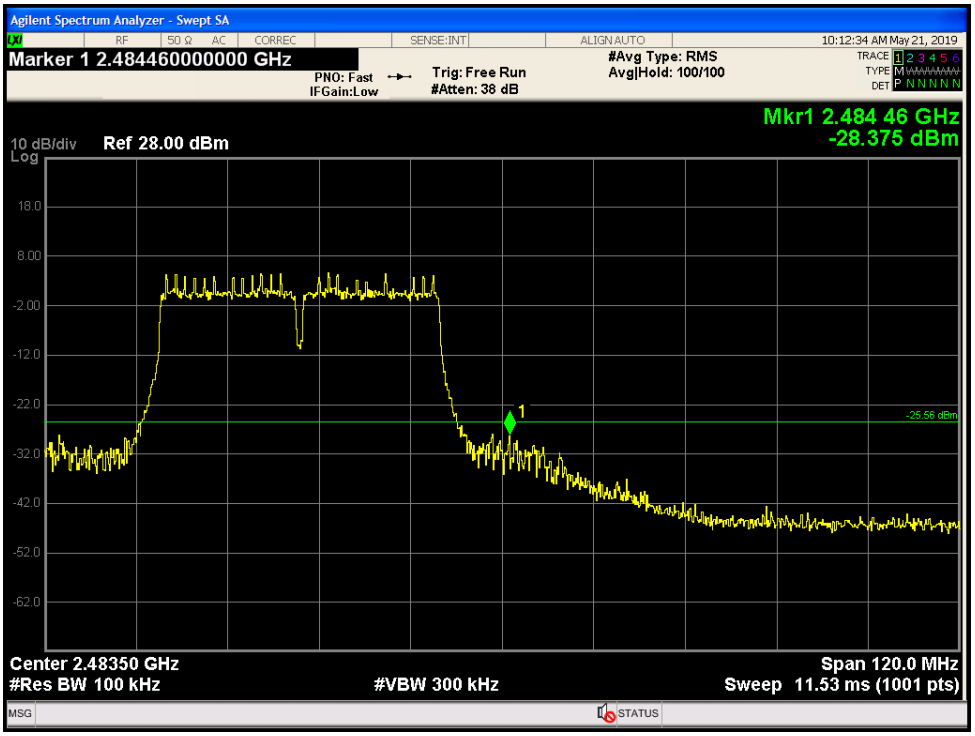

Figure 9-317 Chain 0 Conducted Band Edge 802.11n40- Ch.10

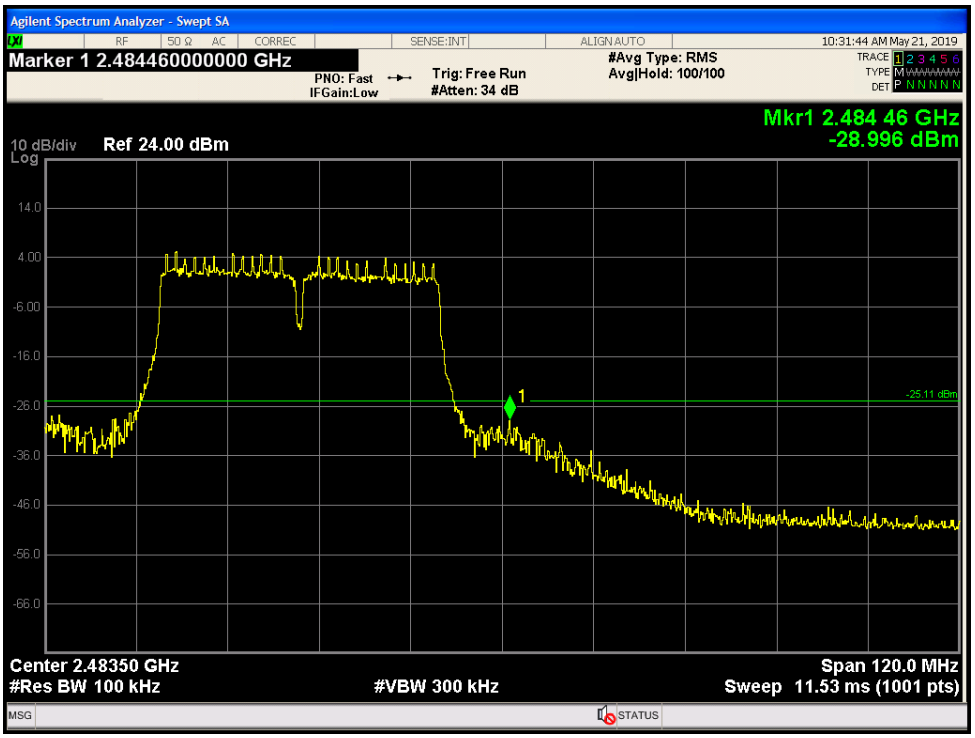

Figure 9-318 Chain 1 Conducted Band Edge 802.11n40- Ch.10

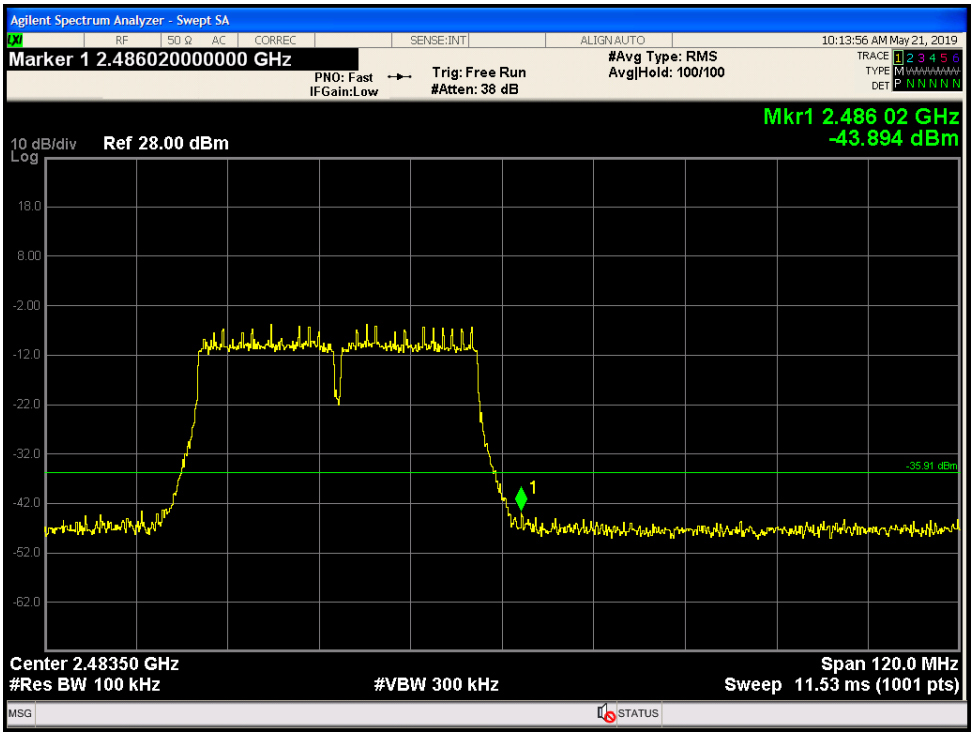

Figure 9-319 Chain 0 Conducted Band Edge 802.11n40- Ch.11

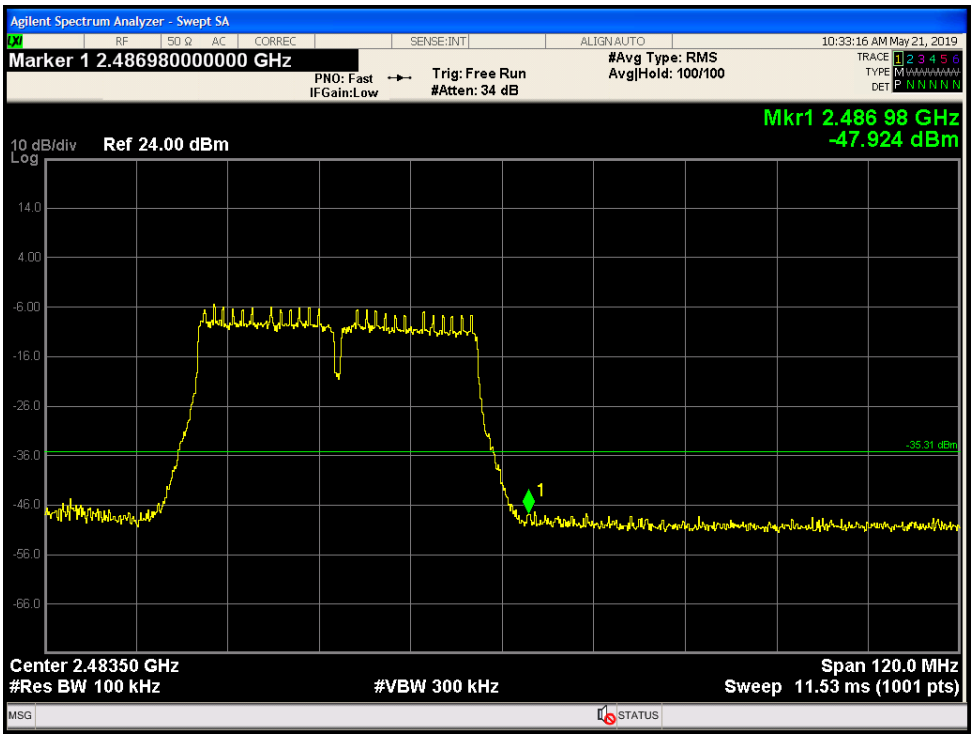

Figure 9-320 Chain 1 Conducted Band Edge 802.11n40- Ch.11

9.8 Radiated Spurious and Band Edge Emissions

9.8.1 Test Requirement:

FCC CFR 47 Rule Part 15.247 (d)
ISED RSS-247 [5.5] and RSS GEN [8.9]

9.8.2 Test Method:

Measurements were performed according to the procedure defined in KDB 558074 - Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 V05 and ANSI C63.10: 2013.

Radiated spurious measurements are made from 9kHz/30MHz to the 10th harmonic of the fundamental frequency of the transmitter. Measurements below 30MHz were not performed since the radio circuitry of the EUT does not contain clocks below 30MHz.The limit for radiated spurious emissions is per 15.209 and RSS-247 [5.5]. Additionally, emissions found in the restricted bands as listed in 15.205 were tested for compliance per limits in 15.209 and RSS-Gen.

The EUT was tested near the low, middle and high channels of operation in each sub band. Guidelines in ANSI C63.10:2013 were followed with respect to maximizing the emissions.

A pre-amp and a high pass filter were required for this test to provide the measuring system with sufficient sensitivity. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength.

Both horizontal and vertical antenna polarizations were investigated. Worst-case maximized data for both polarizations is shown in this test report.

All tests were performed in MIMO transmission mode to measure the worst case for both antennas

Radiated Spurious Emissions

Spectrum Analyzer Settings:

30 MHz- 1 GHz:

RBW= 120 kHz
VBW ≥ 3 X RBW
Trace Mode: Peak Detector (Max Hold). Final measurements performed using QP Detector.
Span= 30 MHz- 1 GHz
Sweep time= Auto
Sweep points ≥ 2 x Span/RBW

Above 1 GHz:

RBW= 1 MHz
VBW= 3 MHz
Trace Mode: Peak Detector (Max Hold) and RMS Average Detector (Max Hold)
Span= 1- 18 GHz and 18- 26.5 GHz.
Sweep time= Auto
Sweep points ≥ 2 x Span/RBW

Final Measurements above 1 GHz

Peak Measurements

Spectrum Analyzer Settings:

RBW= 1 MHz
VBW= 3 MHz
Trace Mode: Peak Detector (Max Hold)
Span= wide enough to encompass the emission
Sweep Points ≥ 2 × Span/RBW
Sweep Time = Auto

RMS Average Measurements

Spectrum Analyzer Settings:

RBW= 1 MHz
VBW≥ 3 × RBW
Detector= RMS
Span= wide enough to encompass the emission
Sweep points≥ 2 × Span/RBW
Sweep time = auto
Trace= Average at least 100 traces
Trace Averaging Type= power (RMS)
The duty cycle correction factor is added to the emission level.

Restricted Band-Edge Emissions

Peak Measurements

Spectrum Analyzer Settings:

RBW= 1 MHz
VBW= 3 MHz
Trace Mode: Peak Detector (Max Hold)
Span= 2310 – 2500 MHz
Sweep Points = 401
Sweep Time = Auto

Average Measurements (Reduced Video Bandwidth Method)

Spectrum Analyzer Settings:

RBW= 1 MHz
VBW= 2 kHz
VBW Mode = Linear
Trace Mode: Peak Detector (Max Hold)
Span= 2310 – 2500 MHz
Sweep Points = 401
Sweep Time = Auto
Sweep Count = 200

Sample Calculation:

Field Strength Level: Amplitude (Analyzer level) + AFCL (Antenna Factor and Cable losses) – Amplifier Gain = 50dBuV + 33 dB – 25 dB = 58dBuV/m

Duty Cycle:

Duty Cycle (%) = $[(T_{on}) / (T_{on} + T_{off})] * 100$
If duty cycle >98% then the correction factor is 0, else the correction factor is calculated as follows.
Duty Cycle Correction Factor = 10 log*(1/DC) =10 log (1/0.92) =0.36dB

Average Measurements:

Average Amplitude + AFCL (Antenna Factor and Cable Losses) – Amplifier Gain + Duty Cycle Correction Factor = 50 dBµV + 33 dB – 25 dB + 0.36 dB = 58.36 dBµV/m

9.8.3 Limits:

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (meters)	Corrected Field Strength for 3m measurement distance (dBµV/m)
0.009-0.490	2400/F (kHz)	300	48.5- 13.8
0.490-1.705	24000/F (kHz)	30	33.8- 23.0
1.705-30	30	30	29.5
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
960-1000	500	3	54
Above 1000 (Restricted Frequency Bands)	500	3	54 (Average) 74 (Peak)

9.8.4 Test Result:

Pass.

9.8.5 Test Data:

9.8.5.1 Emissions in 30 MHz- 1 GHz range

All channels and modes were tested, and worst-case results shown here.

RSE 30-1000 MHz							
Mode	**Tx Freq (MHz)**	**Spurious Frequency (MHz)**	**Raw Quasi-Peak Amplitude (dBµV/m)**	**System Correction Factor (dB)**	**Corrected Quasi-Peak Field Strength (dBµV/m)**	**Quasi-Peak Limit (dBµV/m)**	**Quasi-Peak Margin (dB)**
802.11b	2412	179.74	9.60	19	28.6	43.52	-14.92
802.11b	2412	387.84	15.75	24.1	39.85	46.02	-6.17
802.11b	2412	679.89	6.44	29.8	36.24	46.02	-9.78
802.11b	2412	710.89	-0.69	30.4	29.71	46.02	-16.31

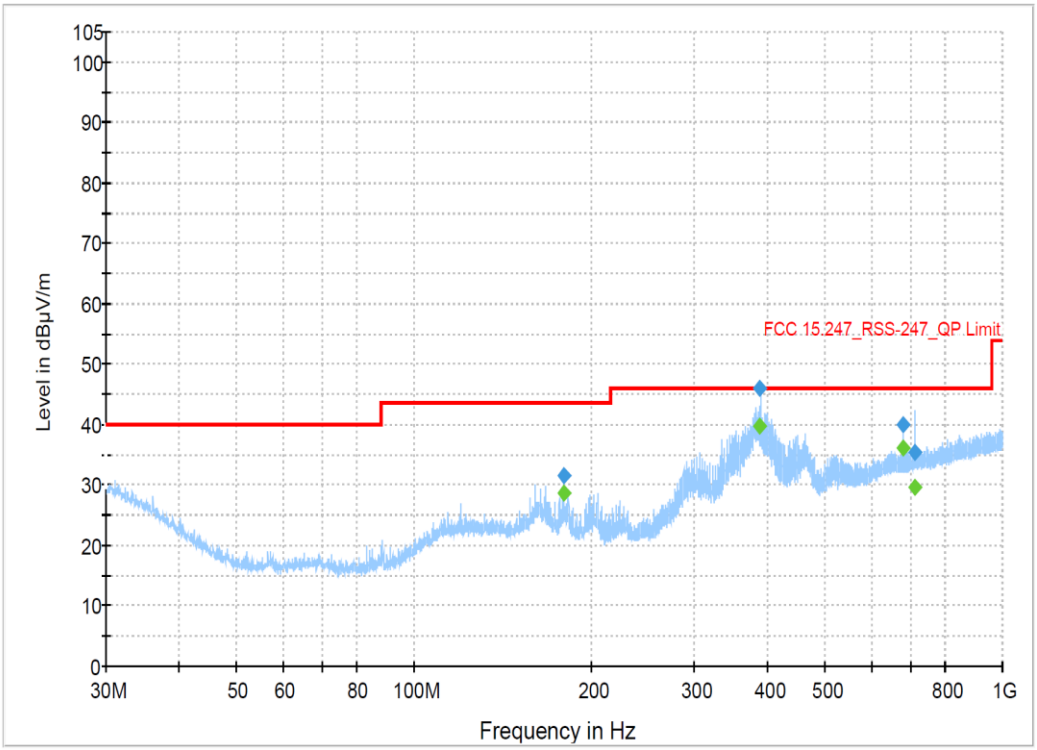

Figure 9-321 Radiated Spurious Emissions 30–1000 MHz 802.11b - Ch. 1

9.8.5.2 Emissions in 1-18 GHz range

802.11b RSE 1 - 18GHz Average Data						
Carrier Frequency (MHz)	**Frequency (MHz)**	**Raw Avg. Amplitude (dBµV)**	**Correction Factor (incl DCF=0dB) (dB)**	**Corrected Avg. Field Strength (dBµV/m)**	**Average Limit (dBµV/m)**	**Margin (dB)**
2412	3399.9	26.28	5.0	31.28	54	N/A
2412	9648.0	30.48	13.7	44.18	54	N/A
2412	17981.4	20.16	21.2	41.36	54	-12.64
2437	3399.6	26.26	5.0	31.26	54	N/A
2437	9748.0	29.82	13.9	43.72	54	N/A
2437	17801.6	20.59	20.0	40.59	54	-13.41
2462	3399.5	26.30	5.0	31.3	54	N/A
2462	7680.0	24.19	11.1	35.29	54	-18.71
2462	9848.0	27.78	13.8	41.58	54	N/A
2462	17787.6	20.44	19.9	40.34	54	-12.58
2467	9868.0	29.23	13.9	43.13	54	N/A
2467	17884.8	20.54	20.9	41.44	54	-12.56
2472	9888.0	26.62	14.0	40.62	54	N/A
2472	17881.0	20.39	21.0	41.39	54	-12.61
802.11b RSE 1 – 18GHz Peak Data						
Carrier Frequency (MHz)	**Frequency (MHz)**	**Raw Peak Amplitude (dBµV)**	**Correction Factor (dB)**	**Corrected Peak Field Strength (dBµV/m)**	**Peak Limit (dBµV/m)**	**Margin (dB)**
2412	3401.3	37.14	5.0	42.14	74	N/A
2412	9648.0	35.1	13.7	48.80	74	N/A
2412	17975.5	31.31	21.1	52.41	74	-21.59
2437	3399.5	36.96	5.0	41.96	74	N/A
2437	9748.0	35.79	13.9	49.69	74	N/A
2437	17805.0	31.92	20.0	51.92	74	-22.08
2462	3400.1	37.58	5.0	42.58	74	N/A
2462	7688.8	32.89	11.1	43.99	74	-30.01
2462	9848.0	36.3	13.8	50.10	74	N/A
2462	17788.2	32.11	19.9	52.01	74	-21.99
2467	9868.0	35.88	13.9	49.78	74	N/A
2467	17876.5	31.62	20.9	52.52	74	-21.48
2472	9888.0	35.97	14.0	49.97	74	N/A
2472	17866.2	32.37	20.8	53.17	74	-20.83

Note: N/A implies that the emission frequency lies in a non-restricted band