

## 7.5 Band Edge Emissions

§2.1051, §30.203

### Test Overview

All out of band emissions are measured in a radiated setup while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All modulations were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

***The minimum permissible attenuation level of any spurious emission is -13dBm/1MHz. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be -5 dBm/MHz or lower.***

### Test Procedure Used

ANSI C63.26-2015 Section 5 and ANSI C63.26-2015 Section 6.4  
KDB 842590 D01 v01r02 – Section 4.4.2.4

### Test Settings

1. Start and stop frequency were set such that both upper and lower band edges are measured.
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW = 1MHz
4. VBW  $\geq 3 \times$  RBW
5. Detector = RMS
6. Number of sweep points  $\geq 2 \times$  Span/RBW
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

### Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning.
- 2) Band Edge emissions were measured at a 1 meter distance.
- 3) The spectrum analyzer for each measurement shows an offset value that was determined using the measurement antenna factor, cable loss, far field measurement distance. A sample calculation is shown on the following page.
- 4) This device supports transmission of H-polarized and V-polarized beams from the antenna array in both CP-OFDM and DFT-s-OFDM transmission schemes. SISO and MIMO operation is also supported for some configurations. As part of the testing, all modes were fully investigated and only the worst case has been included in this report.

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- 5) All combinations of 1CC, 2CC, 3CC, and 4CC were fully investigated, and only the worst case has been included in this report.
- 6) All 2CC/3CC/4CC cases were investigated with PCC prioritization feature, which has the higher power PCC at the band edge for the worst case.
- 7) Unless otherwise specified, the radiated band edge plots in this section display the worst case EIRP measurements for the indicated bandwidth–component carrier configuration.
- 8) The plots in this section that display Total Radiated Power (TRP) were obtained from measurements that were performed in accordance with the guidance of Section 4.4.2.4 of KDB 842590 D01 for the Spherical Grid Method.

#### **Sample Analyzer Offset Calculation (at 27.5GHz)**

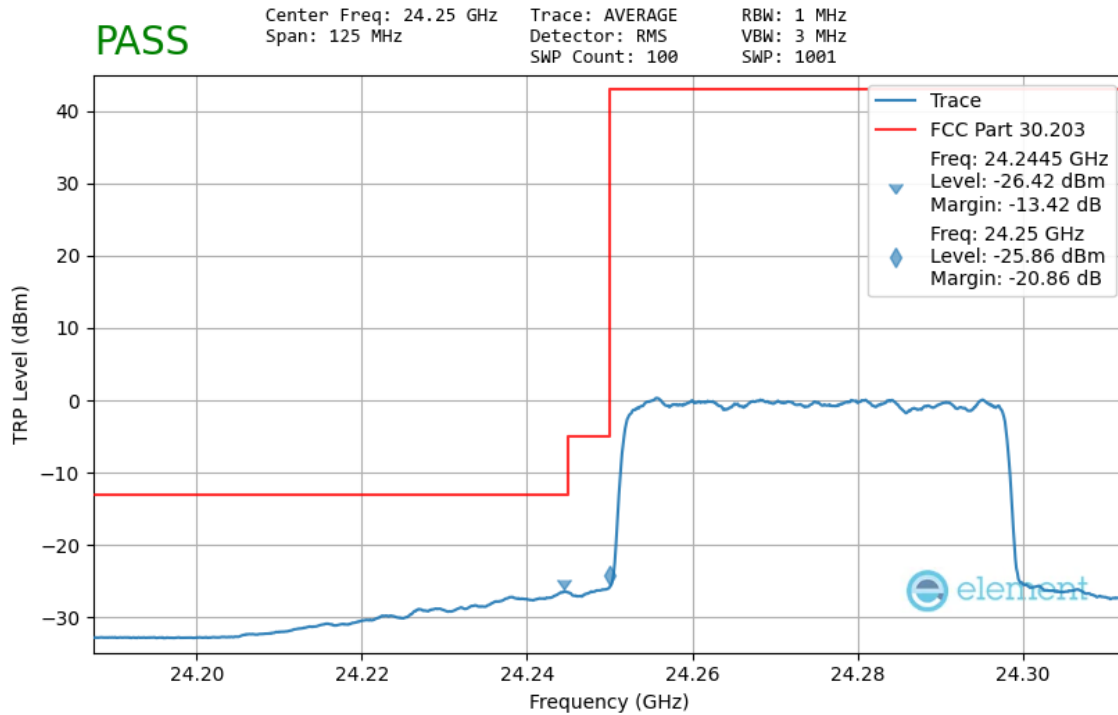
Measurement Antenna Factor = 40.70dB/m

Cable Loss = 8.82dB

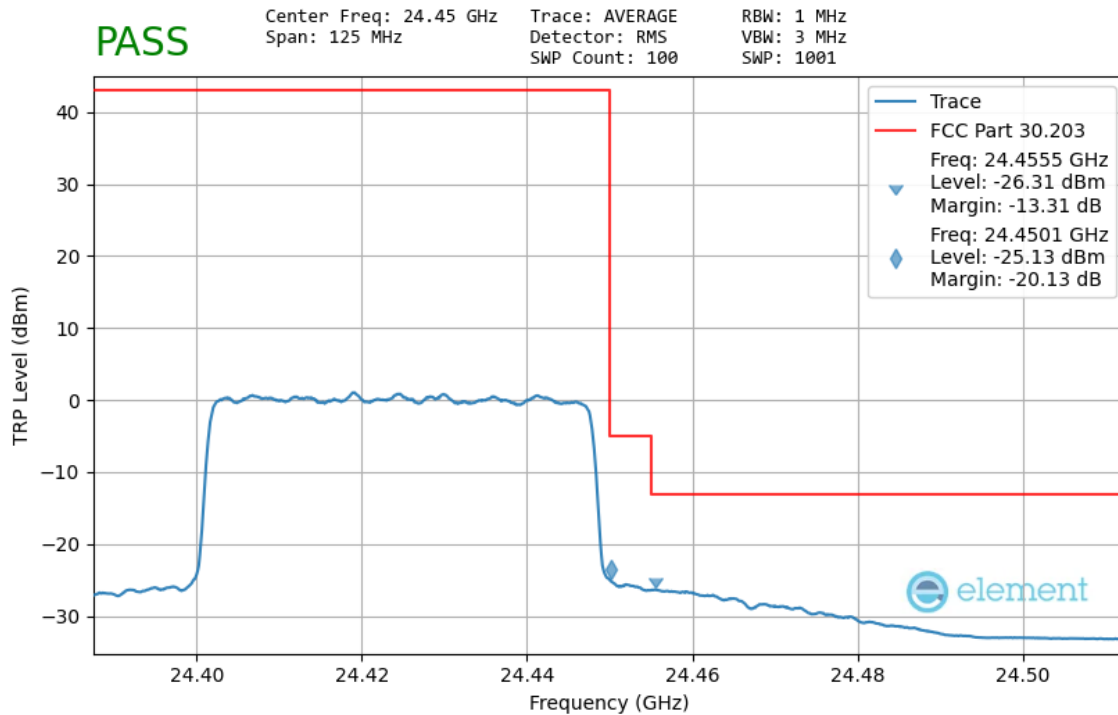
$$\begin{aligned}\text{Analyzer Offset (dB)} &= \text{AF (dB/m)} + \text{CL (dB)} + 107 + 20\log_{10}(D) - 104.8\text{dB, where } D = 1\text{m} \\ &= 40.70\text{dB/m} + 8.82\text{dB} + 107 + 20\log_{10}(1\text{m}) - 104.8\text{dB} \\ &= 51.72\text{dB}\end{aligned}$$

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## Band n258-R1 – Worst-Case

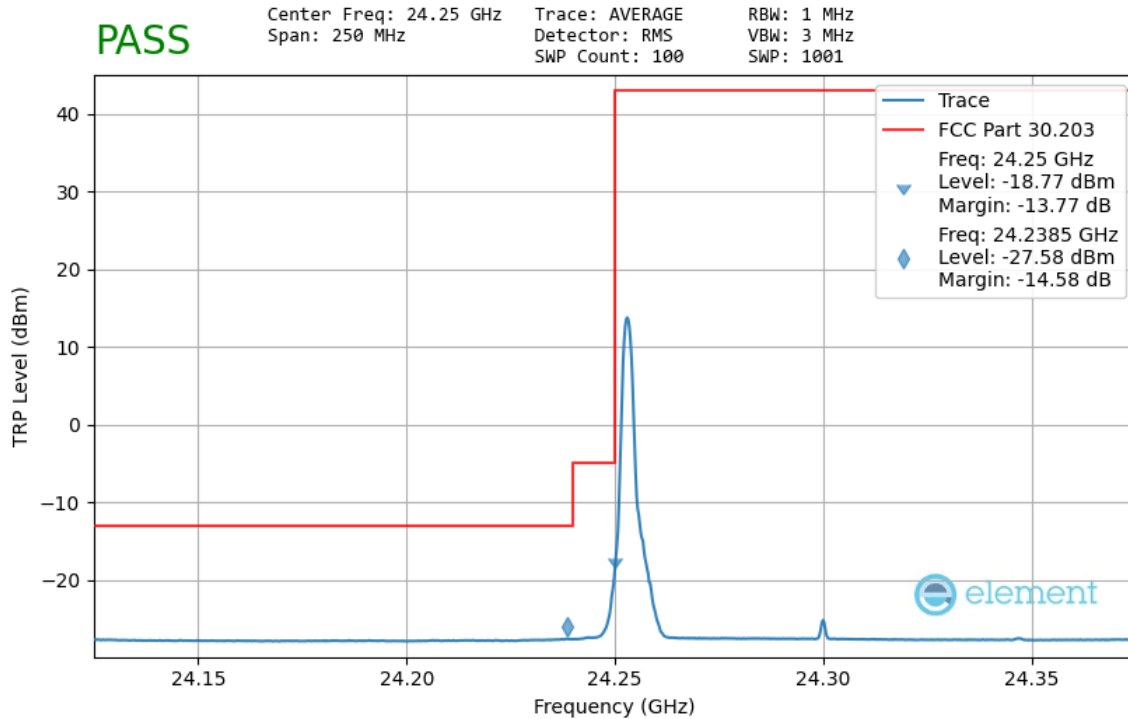


Plot 7-167. Ant 1 Lower Band Edge – TRP (50MHz-1CC – QPSK Full RB)

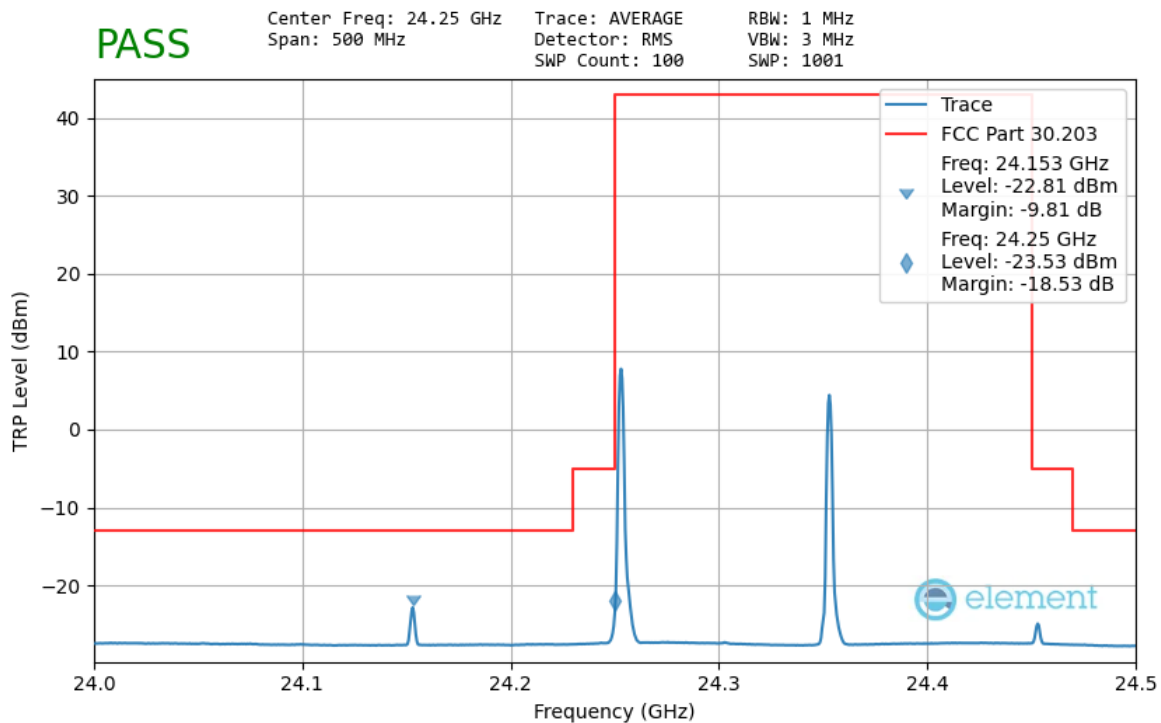


Plot 7-168. Ant 1 Upper Band Edge – TRP (50MHz-1CC – QPSK Full RB)

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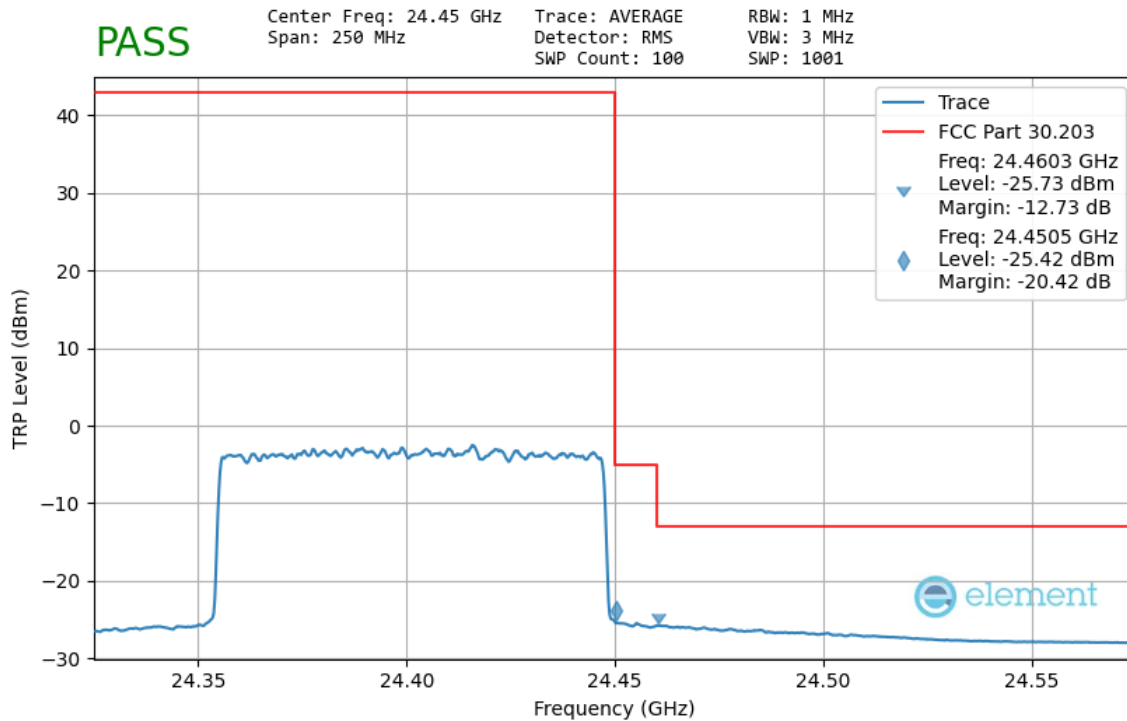


**Plot 7-169. Ant 1 Lower Band Edge – TRP (100MHz-1CC – QPSK 1 RB)**

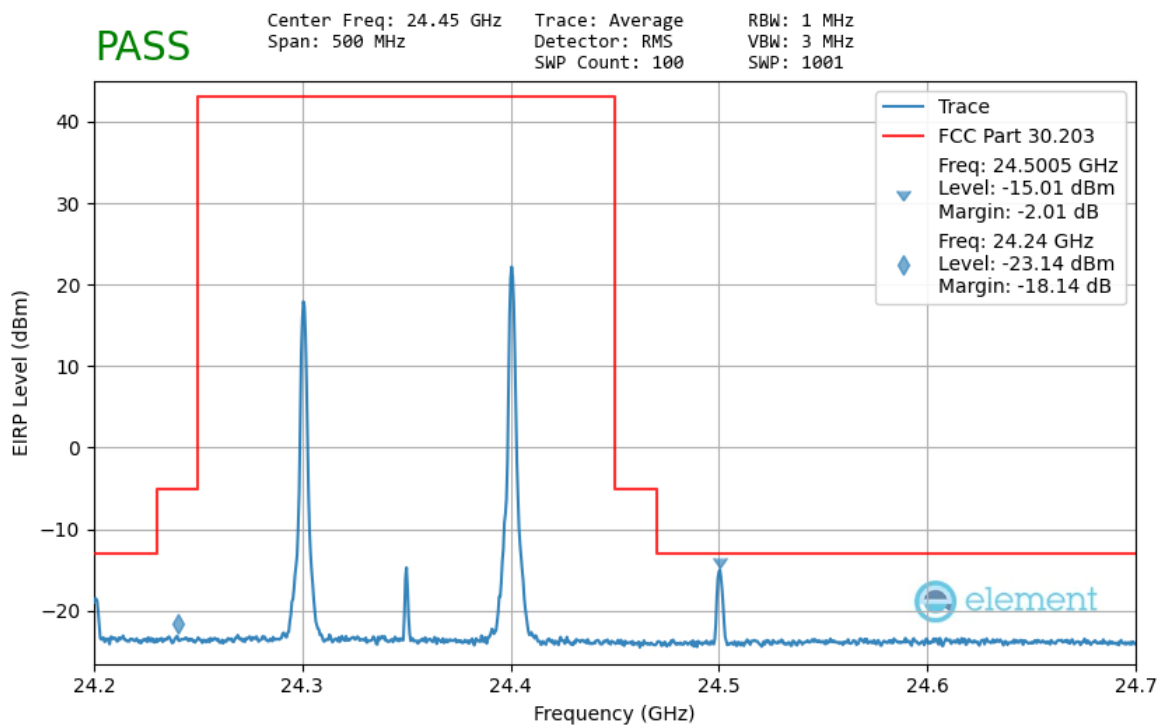


**Plot 7-170. Ant 1 Lower Band Edge – TRP (100MHz-2CC – QPSK 1 RB)**

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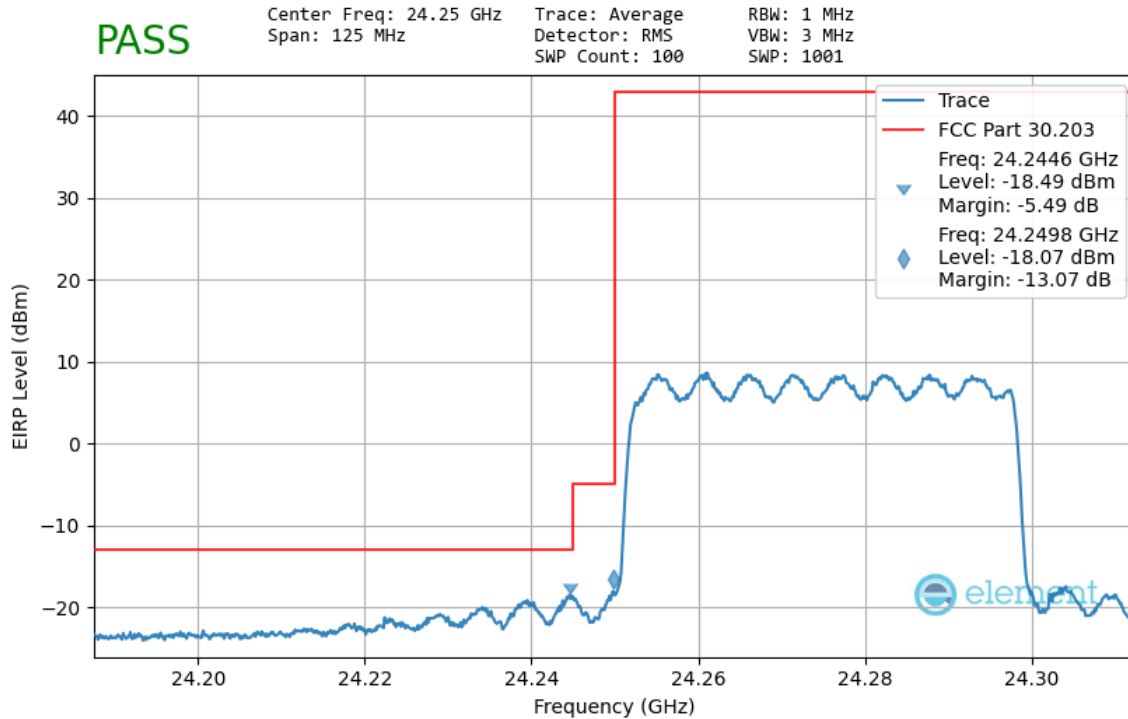


**Plot 7-171. Ant 1 Upper Band Edge – TRP (100MHz-1CC – QPSK Full RB)**

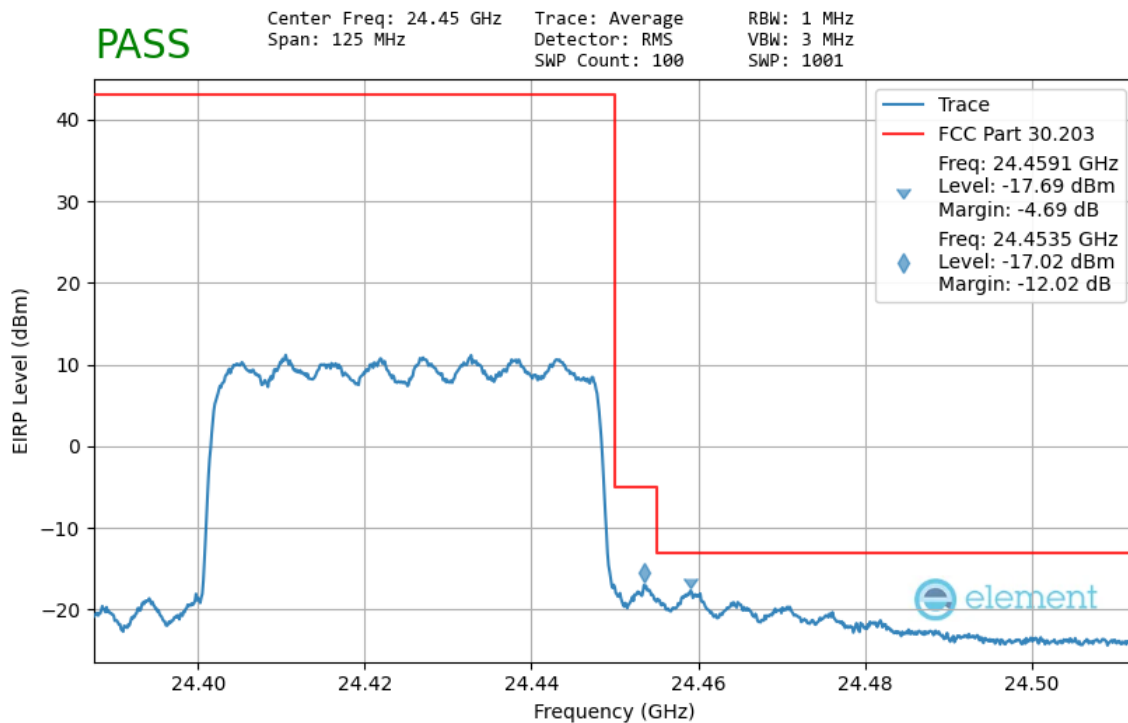


**Plot 7-172. Ant 1 Upper Band Edge (100MHz-2CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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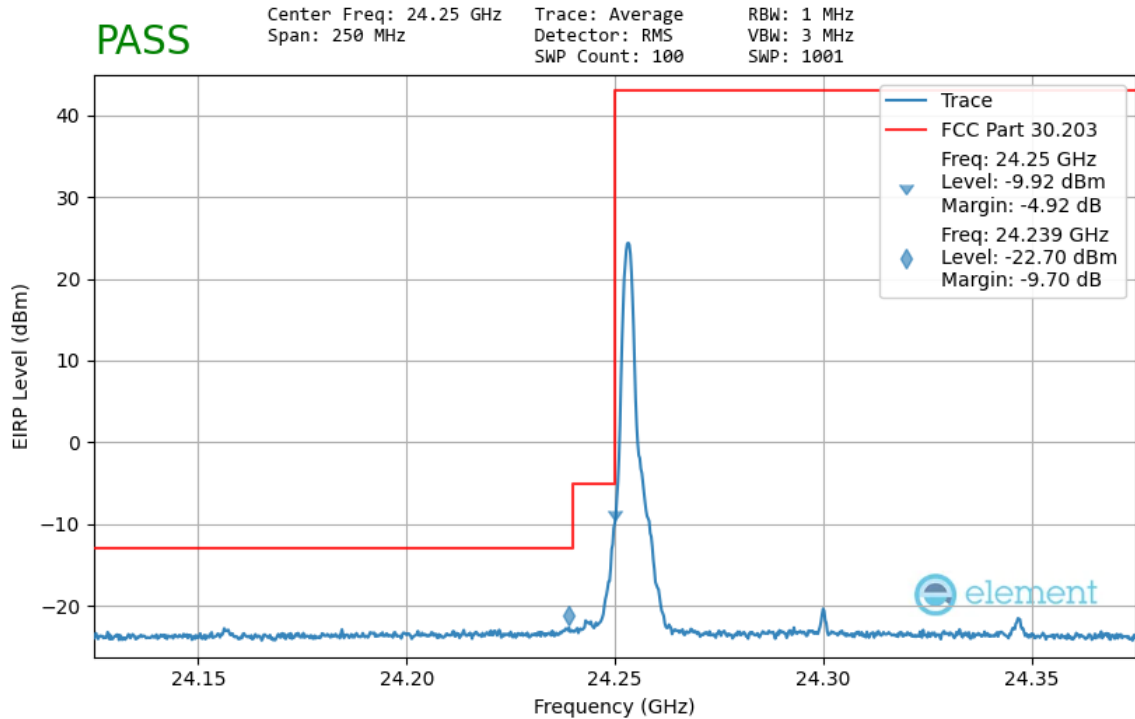


**Plot 7-173. Ant 2 Lower Band Edge (50MHz-1CC – QPSK Full RB)**

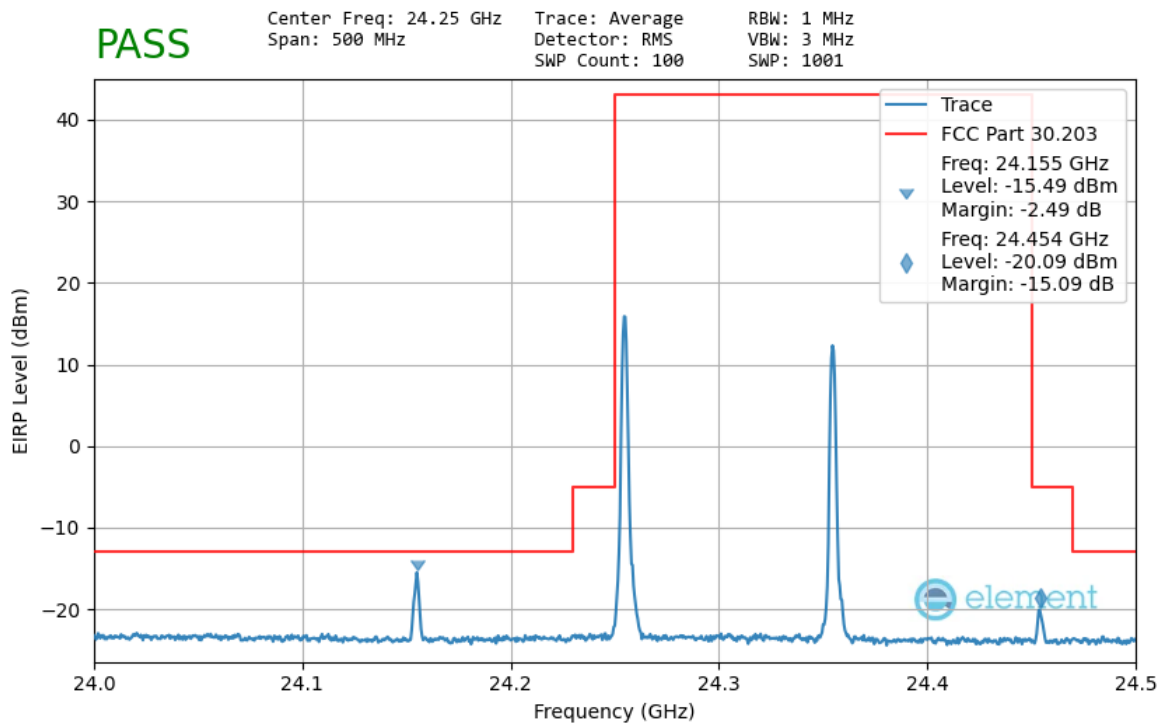


**Plot 7-174. Ant 2 Upper Band Edge (50MHz-1CC – QPSK Full RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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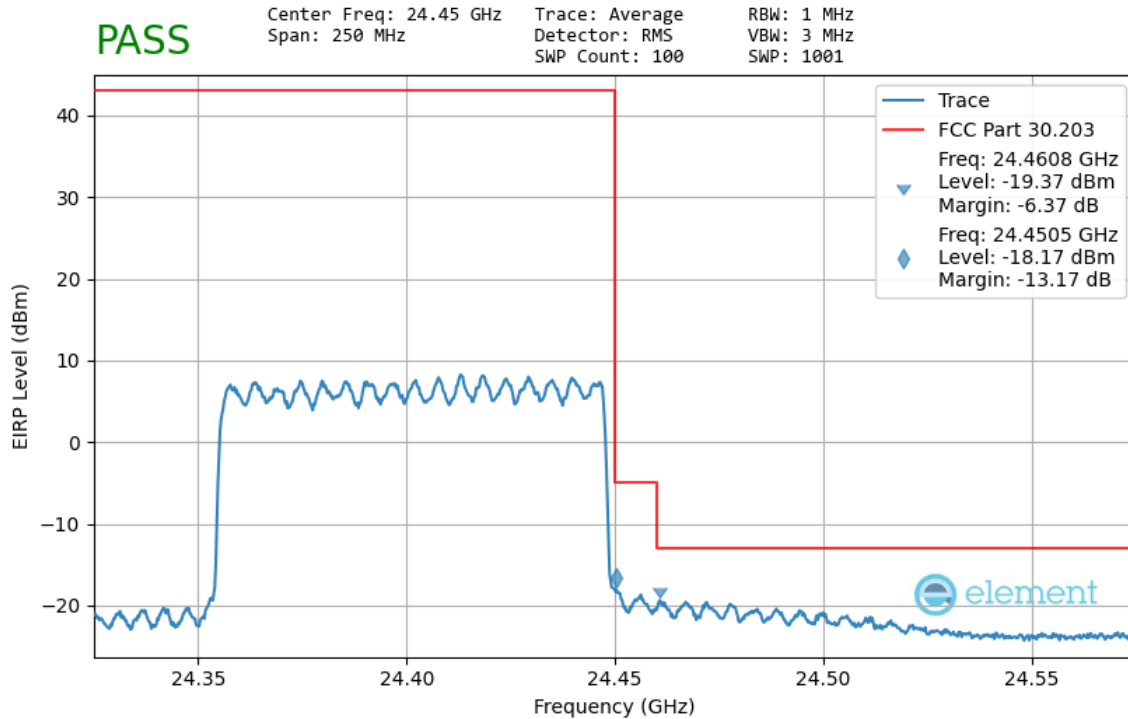


**Plot 7-175. Ant 2 Lower Band Edge (100MHz-1CC – QPSK 1 RB)**

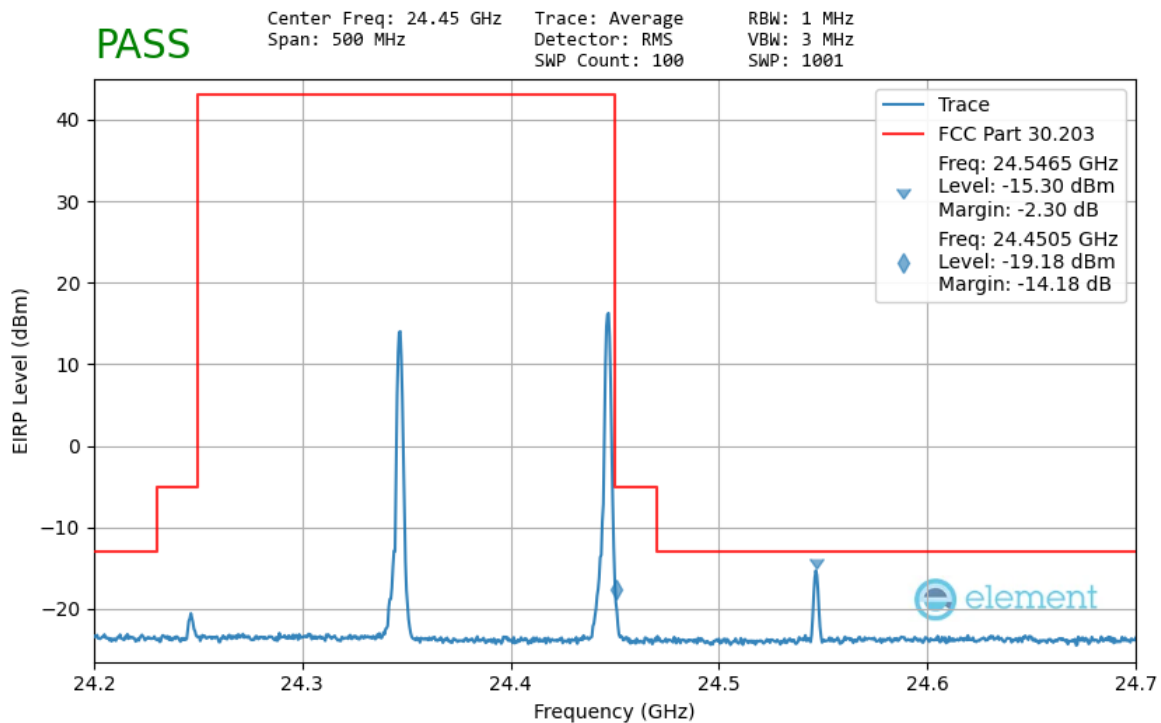


**Plot 7-176. Ant 2 Lower Band Edge (100MHz-2CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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**Plot 7-177. Ant 2 Upper Band Edge (100MHz-1CC – QPSK Full RB)**

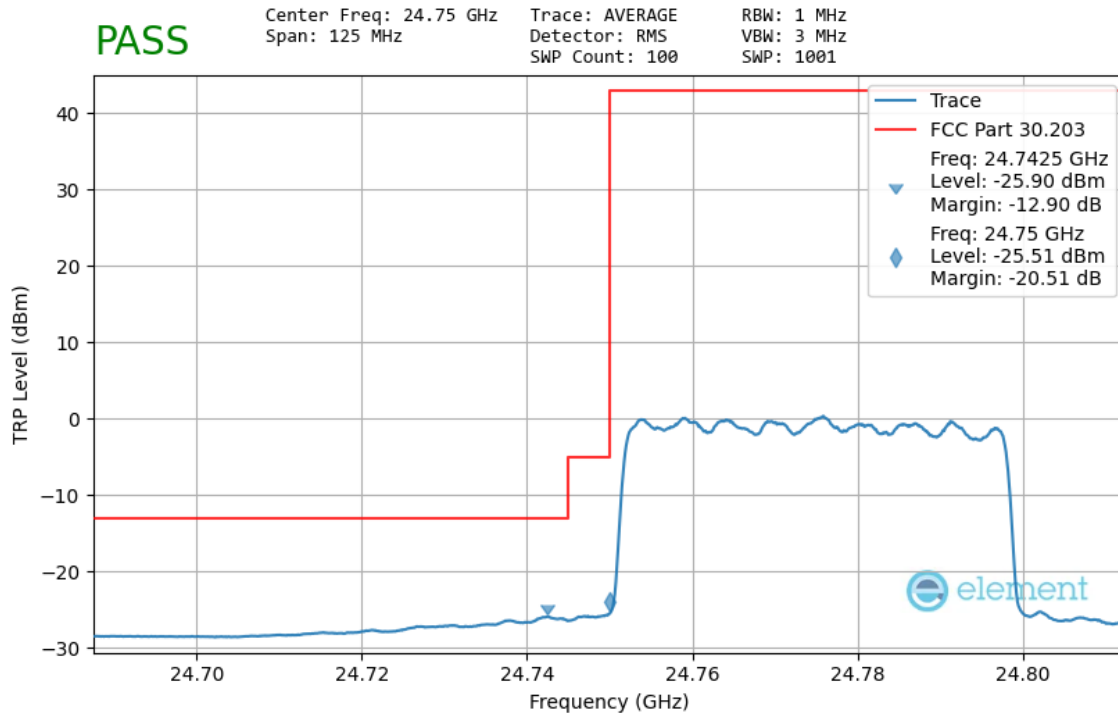


**Plot 7-178. Ant 2 Upper Band Edge (100MHz-2CC – QPSK 1 RB)**

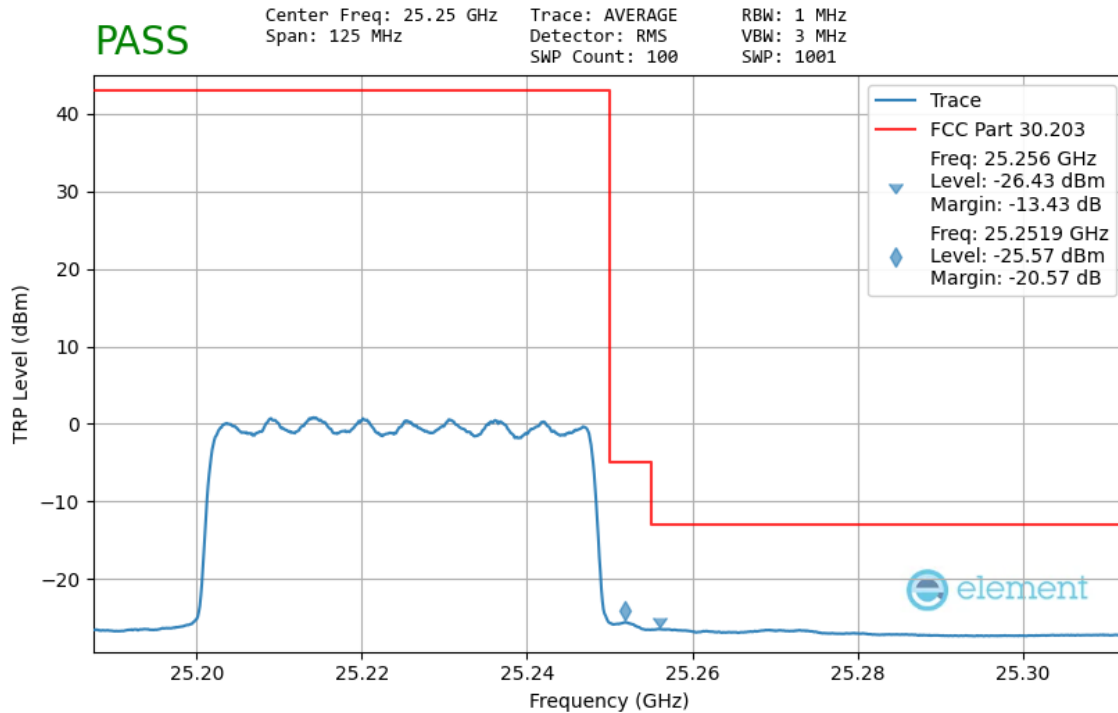
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## Band n258-R2 – Worst-Case

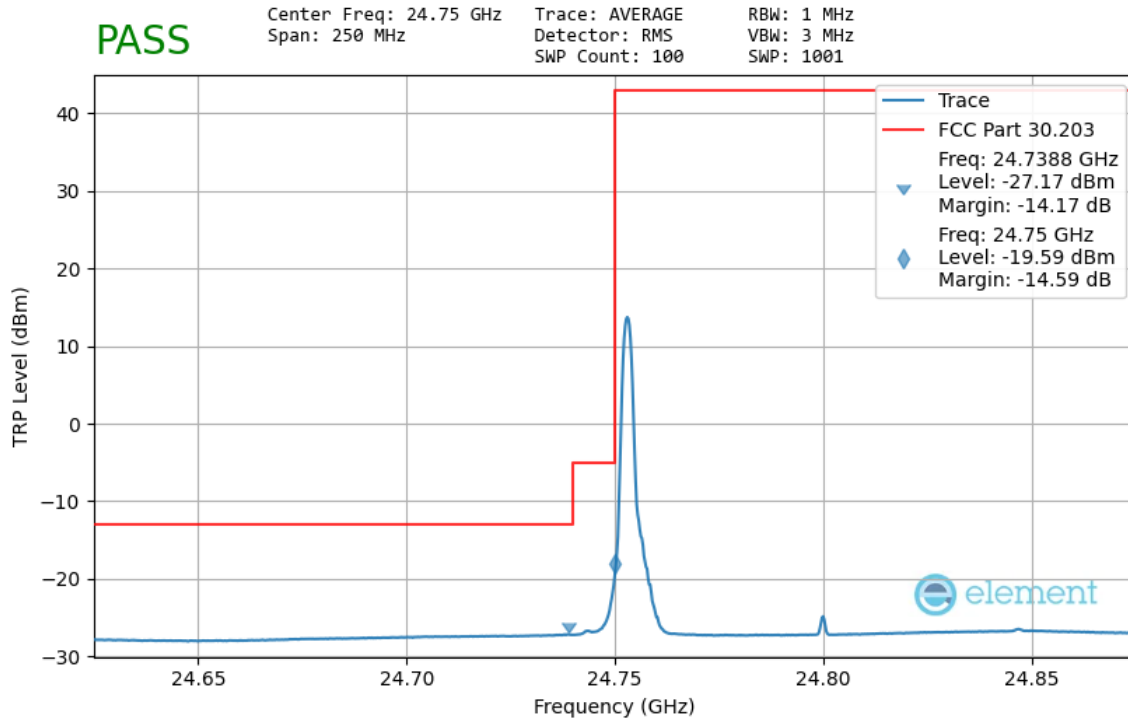


Plot 7-179. Ant 1 Lower Band Edge – TRP (50MHz-1CC – QPSK Full RB)

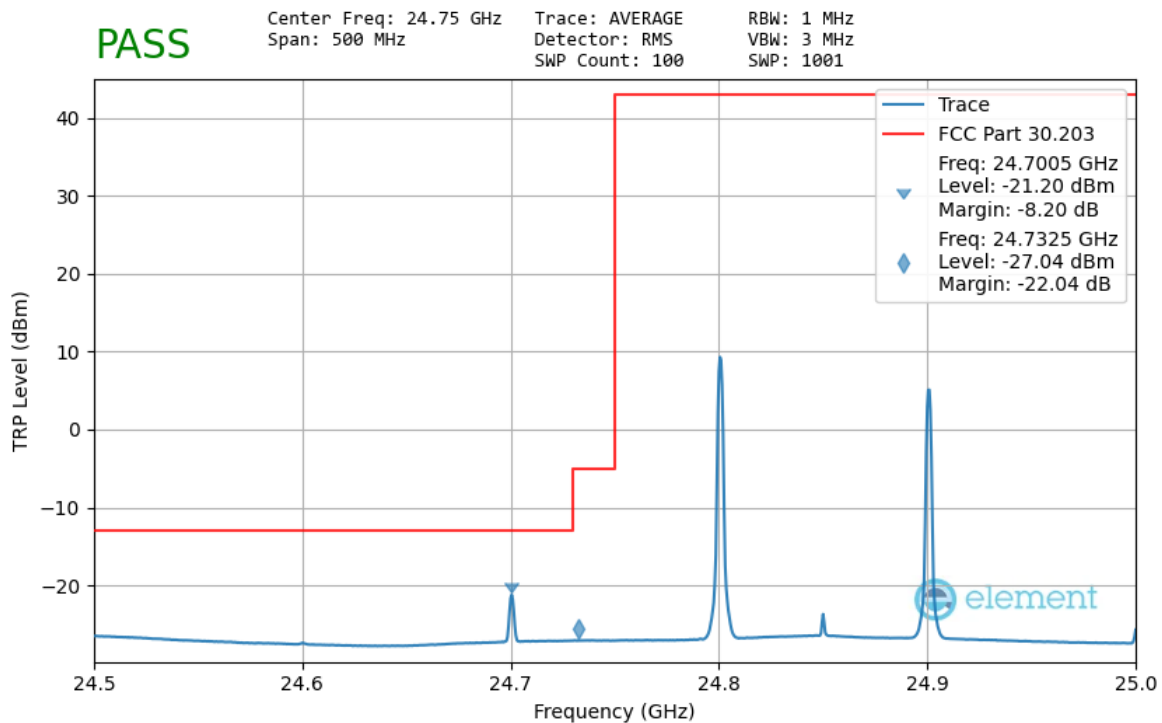


Plot 7-180. Ant 1 Upper Band Edge – TRP (50MHz-1CC – QPSK Full RB)

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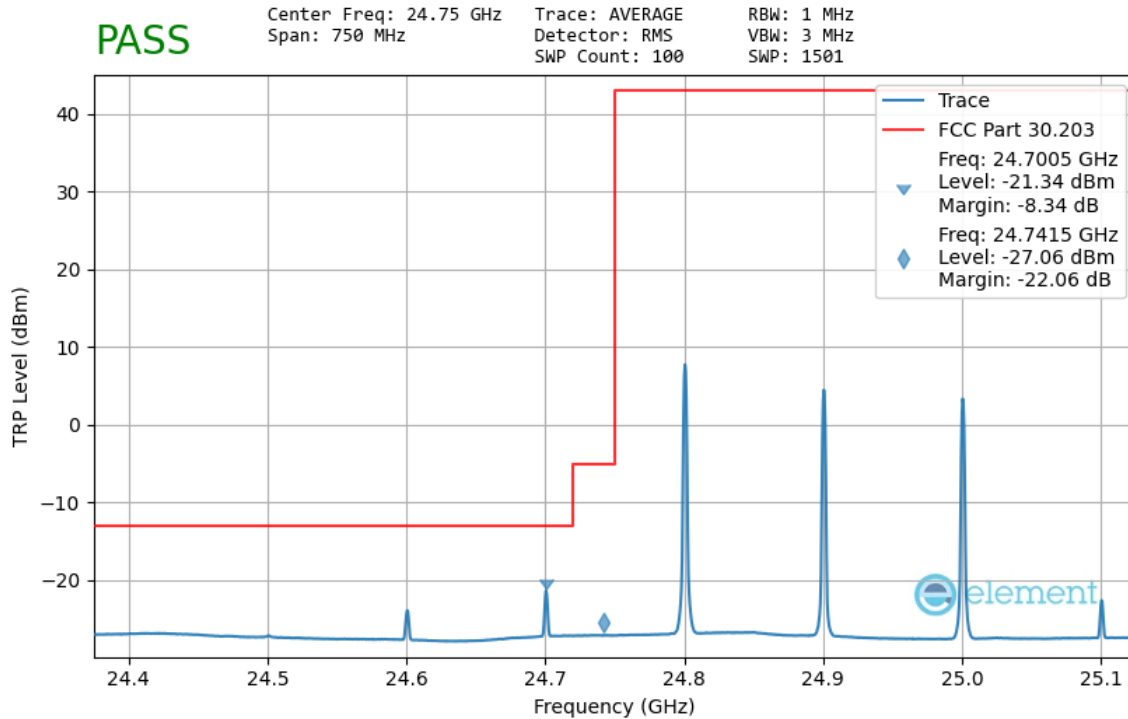


**Plot 7-181. Ant 1 Lower Band Edge – TRP (100MHz-1CC – QPSK 1 RB)**

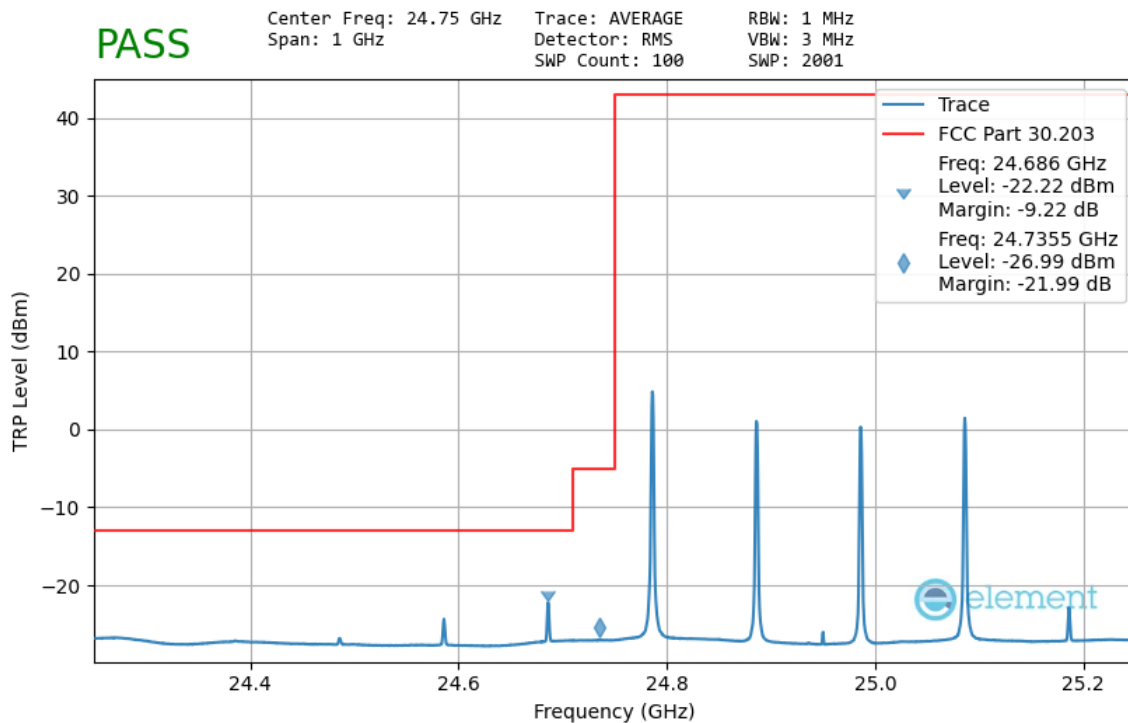


**Plot 7-182. Ant 1 Lower Band Edge – TRP (100MHz-2CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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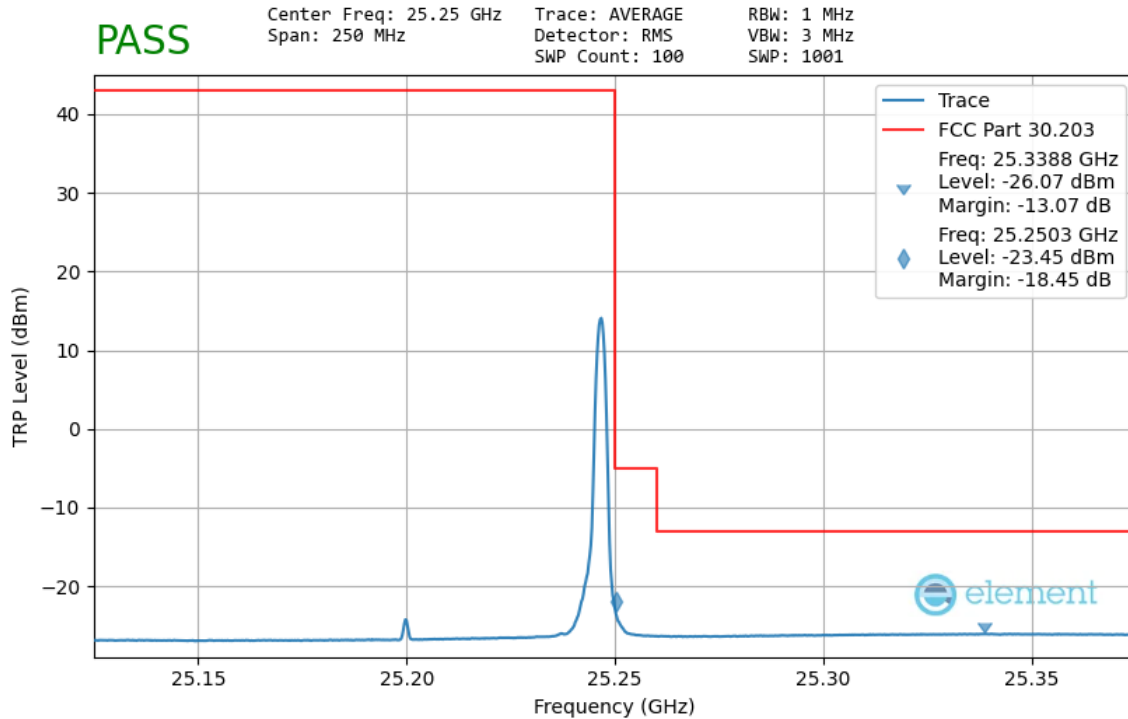


**Plot 7-183. Ant 1 Lower Band Edge – TRP (100MHz-3CC – QPSK 1 RB)**

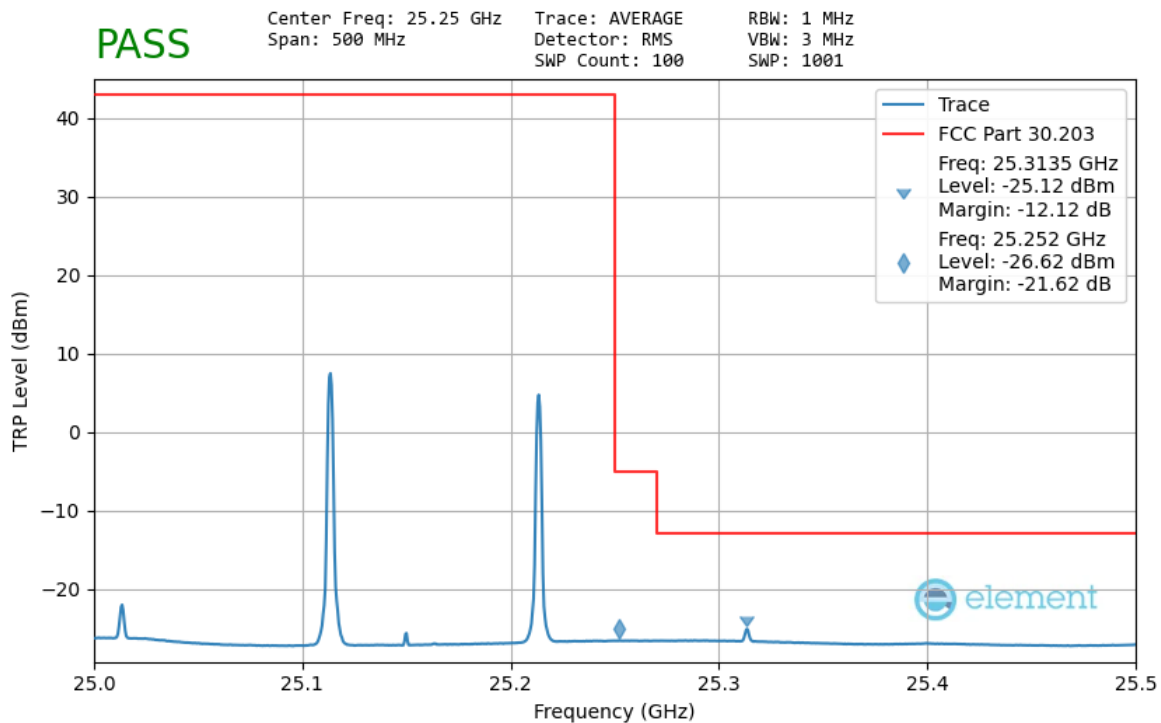


**Plot 7-184. Ant 1 Lower Band Edge – TRP (100MHz-4CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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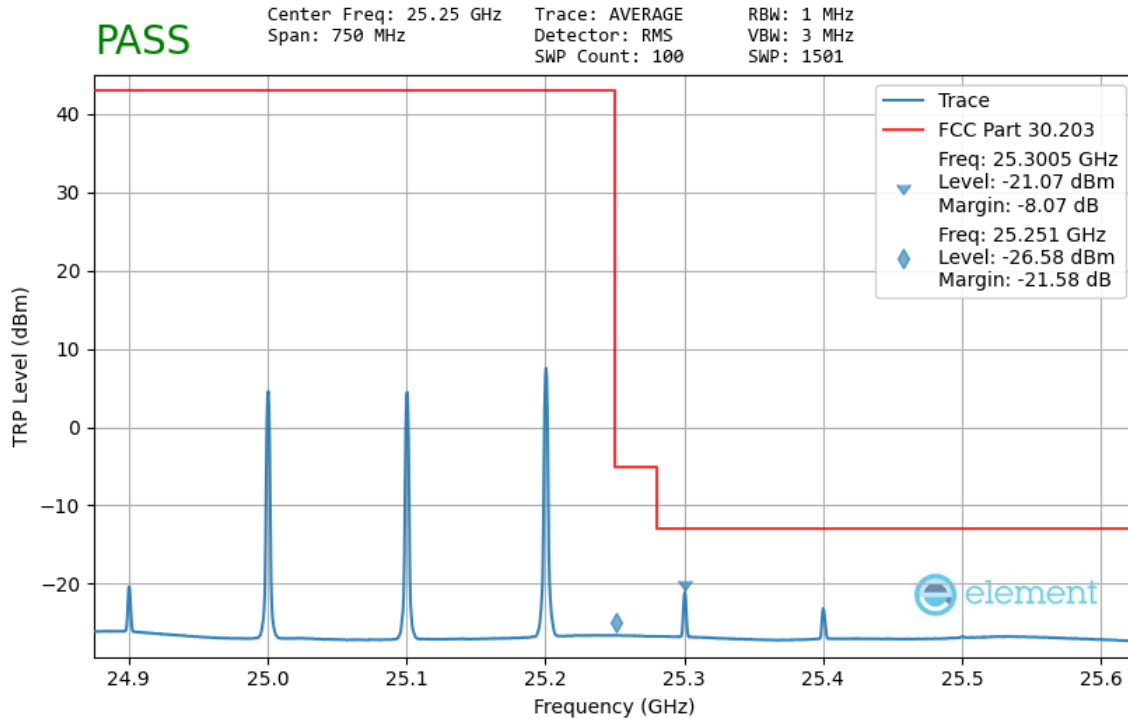


**Plot 7-185. Ant 1 Upper Band Edge – TRP (100MHz-1CC – QPSK 1 RB)**

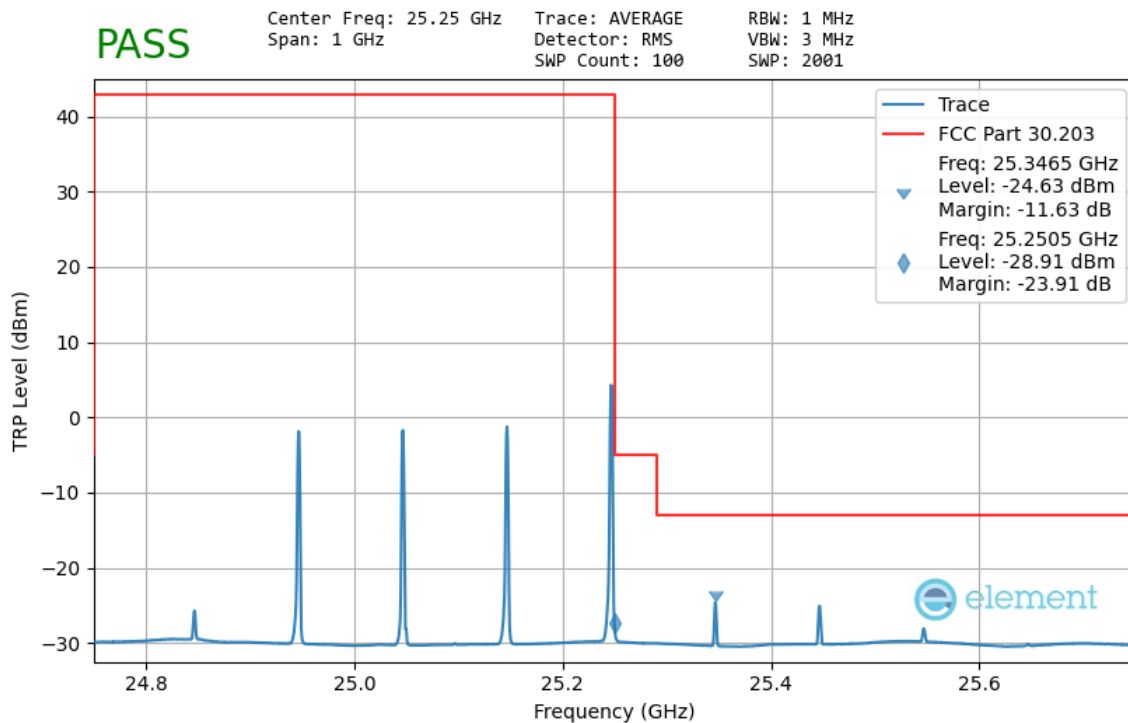


**Plot 7-186. Ant 1 Upper Band Edge – TRP (100MHz-2CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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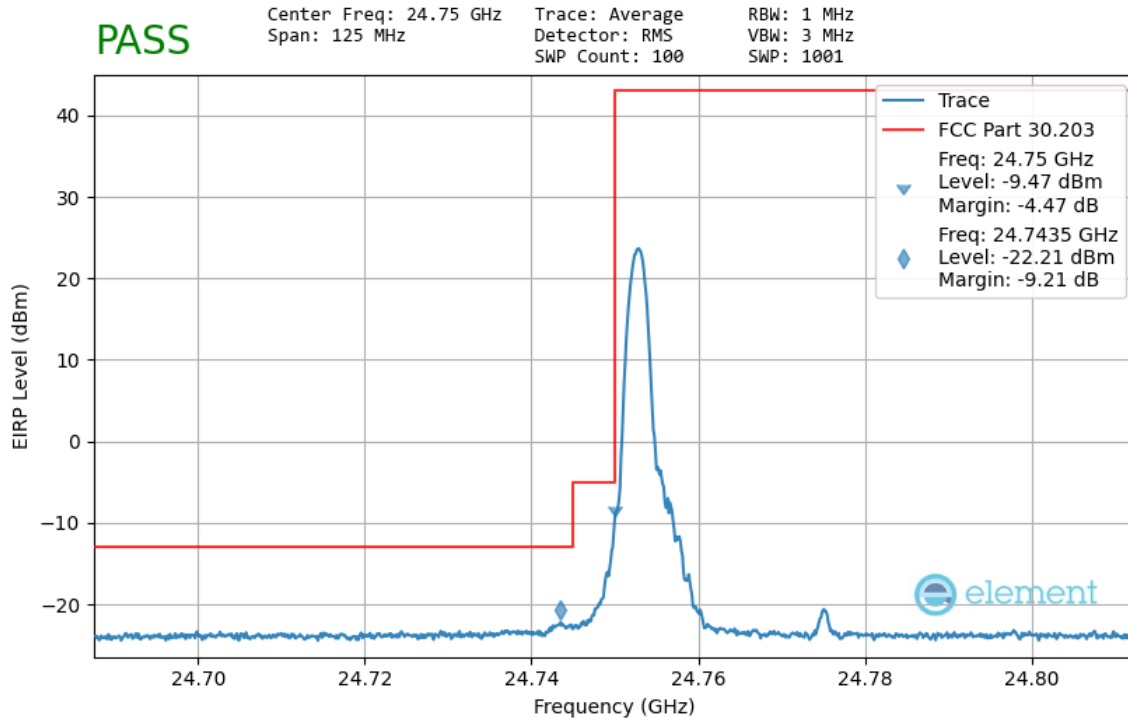


**Plot 7-187. Ant 1 Upper Band Edge – TRP (100MHz-3CC – QPSK 1 RB)**

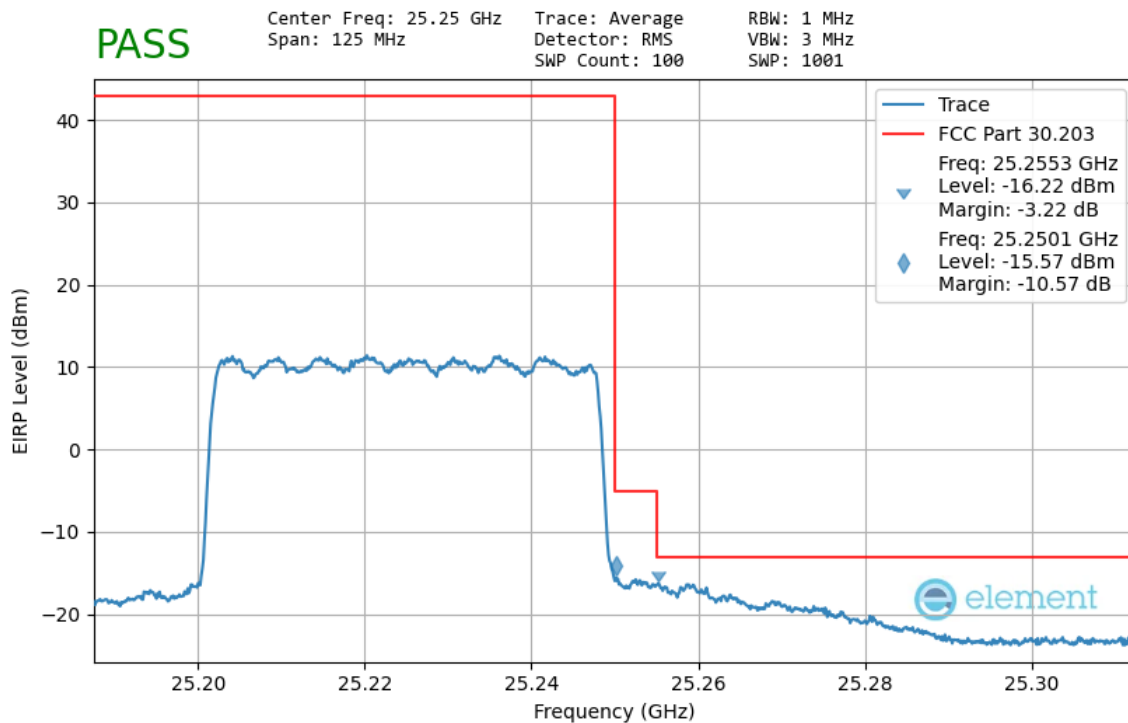


**Plot 7-188. Ant 1 Upper Band Edge – TRP (100MHz-4CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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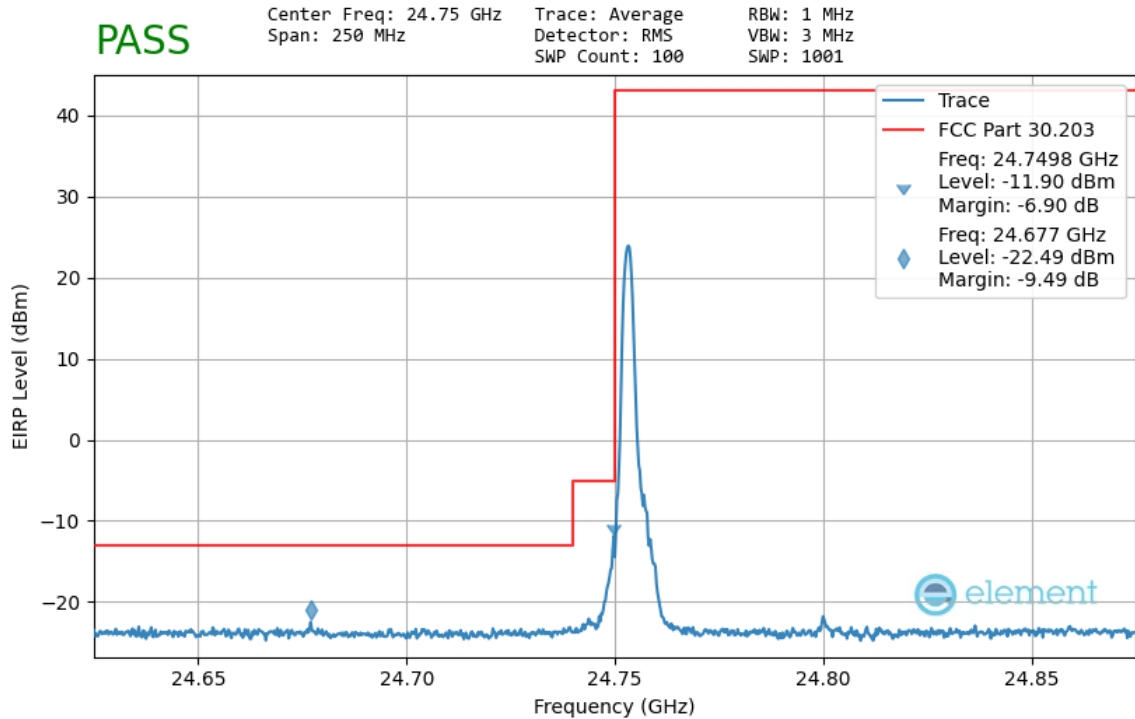


**Plot 7-189. Ant 2 Lower Band Edge (50MHz-1CC – QPSK 1 RB)**

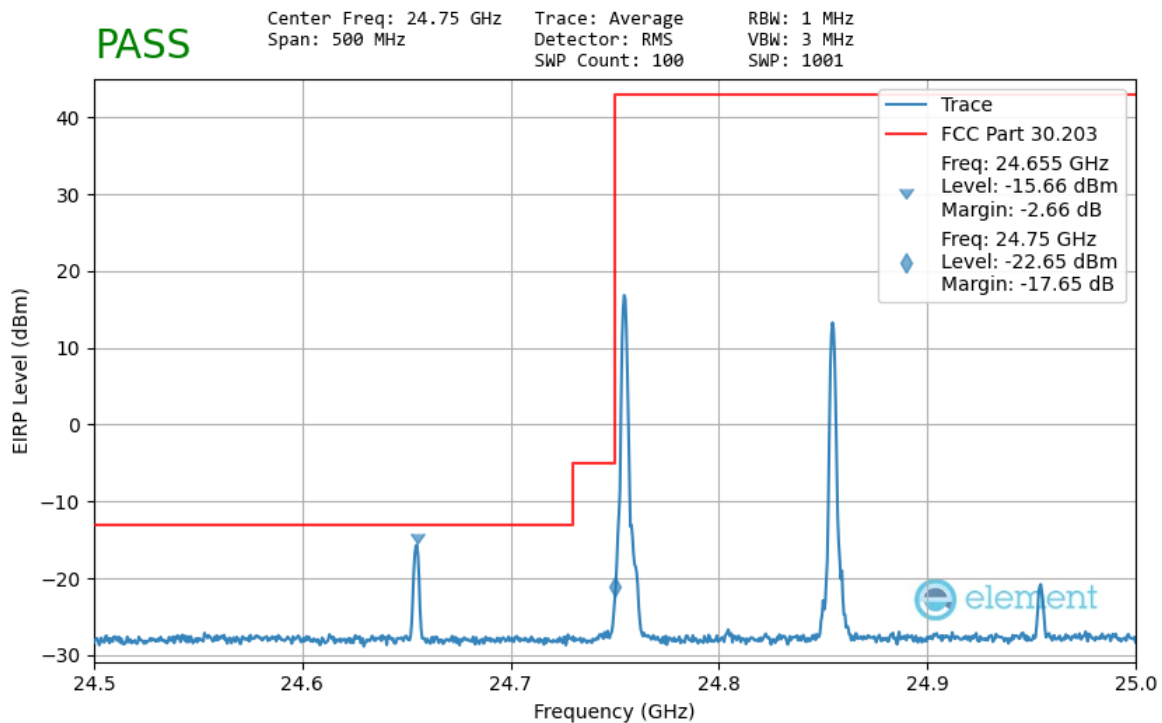


**Plot 7-190. Ant 2 Upper Band Edge (50MHz-1CC – QPSK Full RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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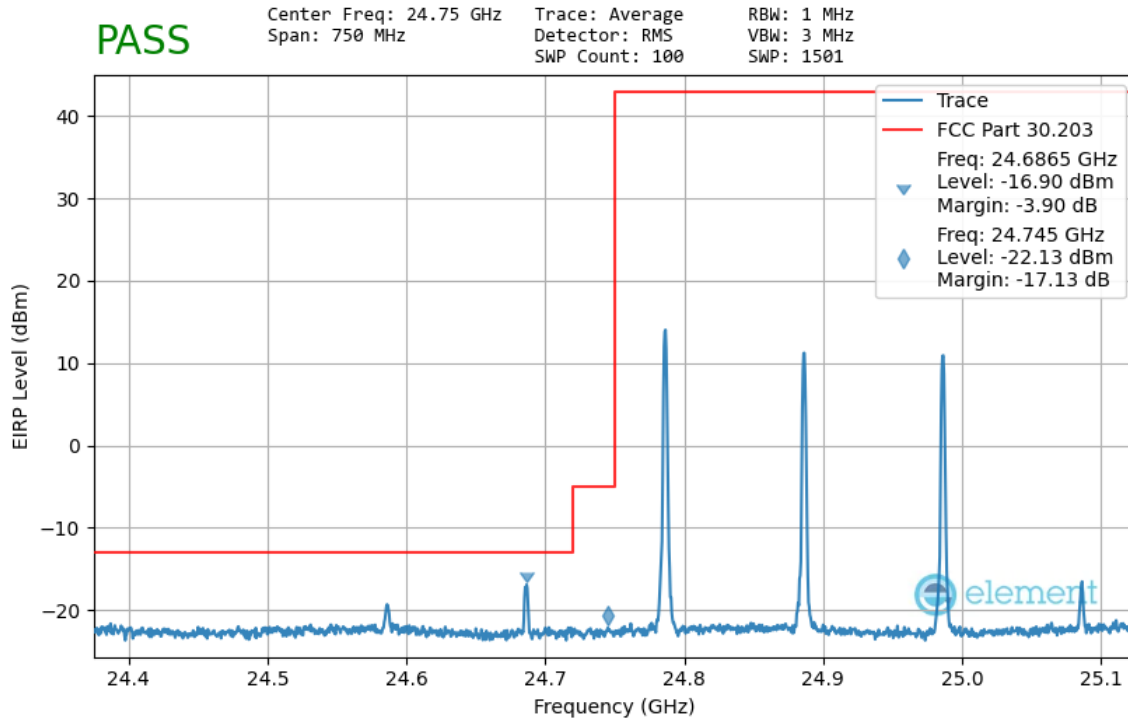


**Plot 7-191. Ant 2 Lower Band Edge (100MHz-1CC – QPSK 1 RB)**

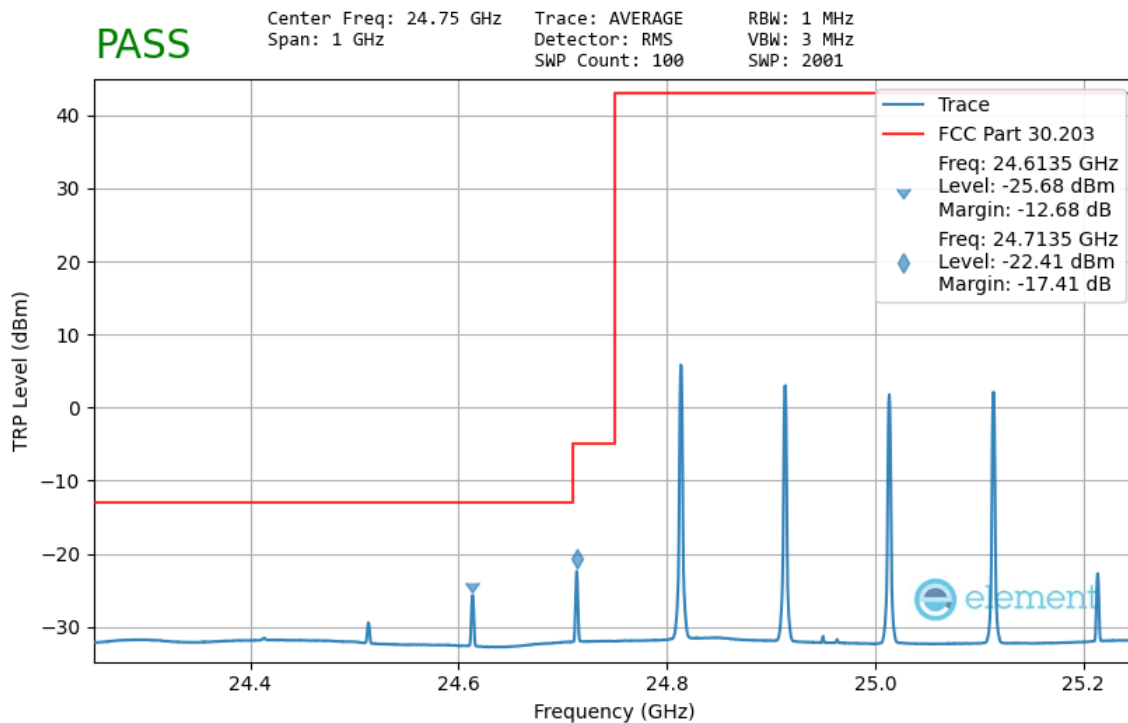


**Plot 7-192. Ant 2 Lower Band Edge (100MHz-2CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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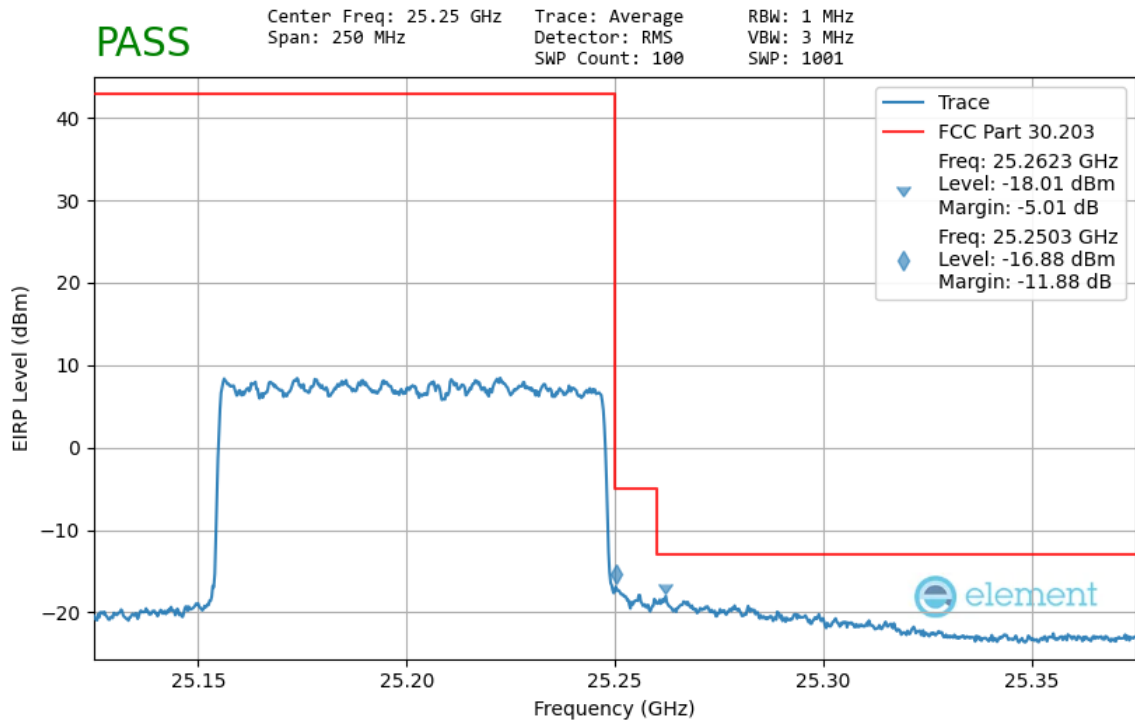
**Plot 7-193. Ant 2 Lower Band Edge (100MHz-3CC – QPSK 1 RB)**



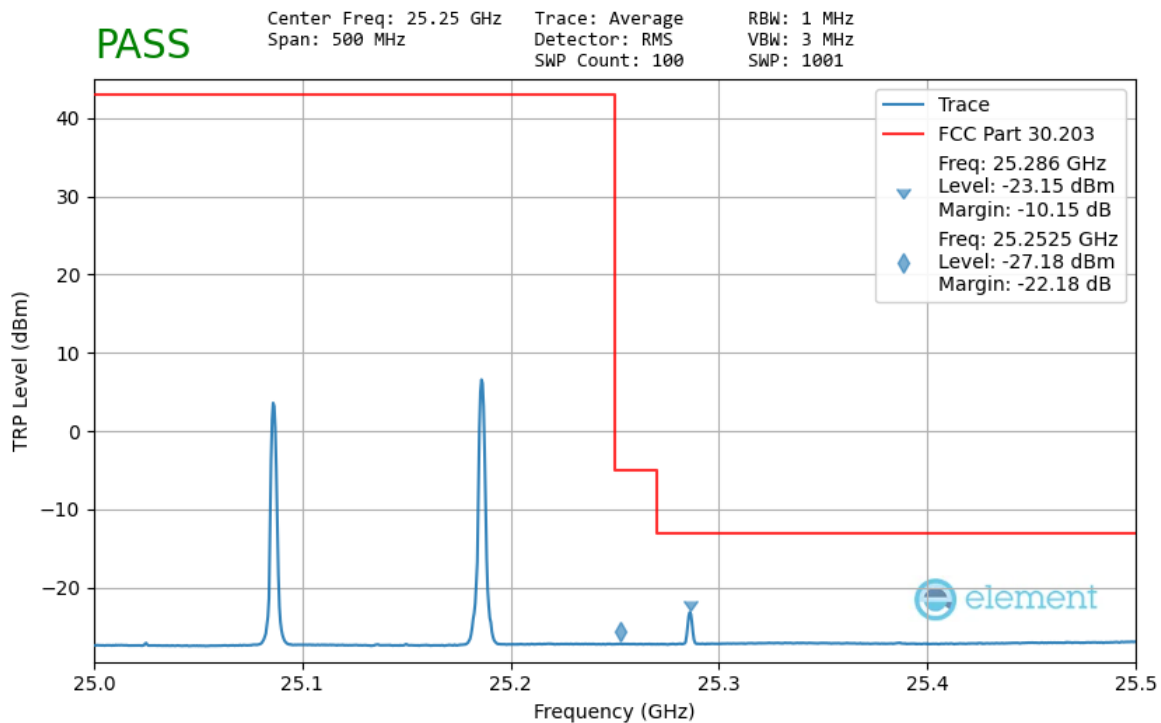
**Plot 7-194. Ant 2 Lower Band Edge – TRP (100MHz-4CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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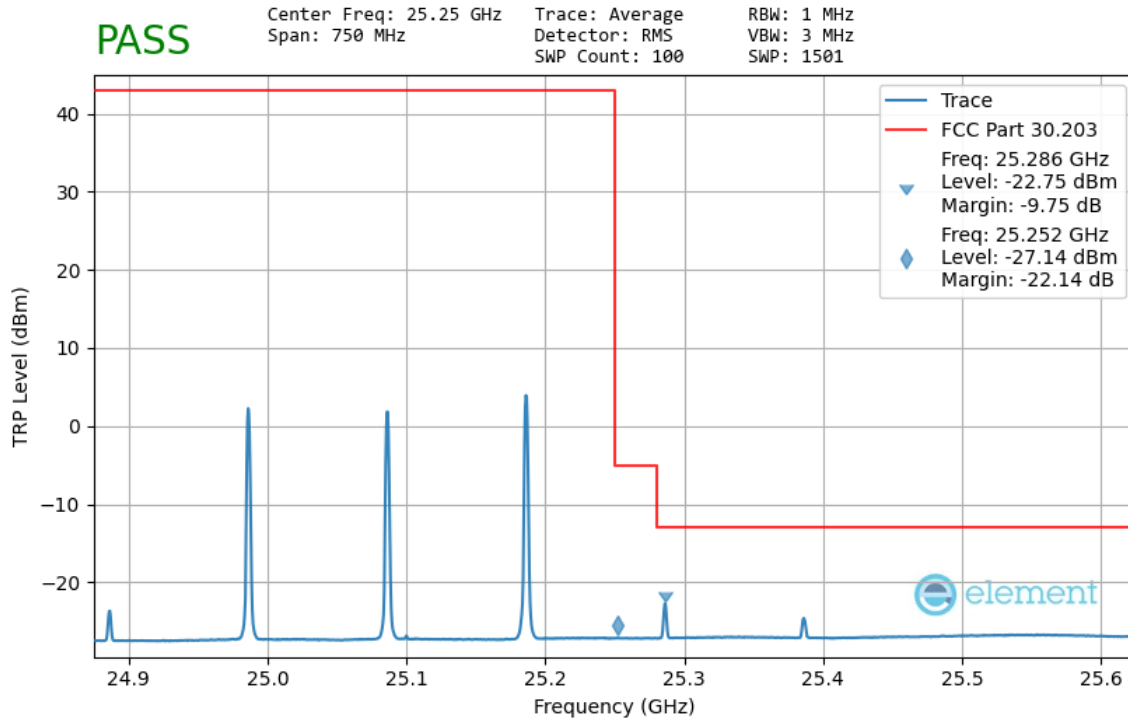


**Plot 7-195. Ant 2 Upper Band Edge (100MHz-1CC – QPSK Full RB)**

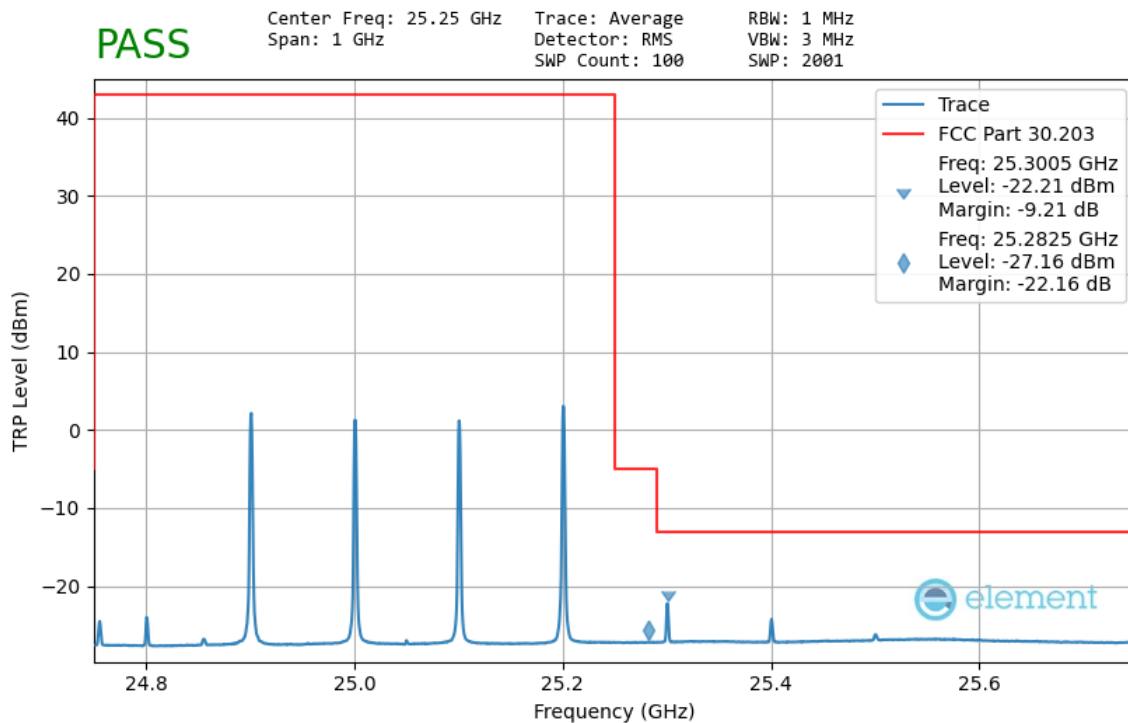


**Plot 7-196. Ant 2 Upper Band Edge – TRP (100MHz-2CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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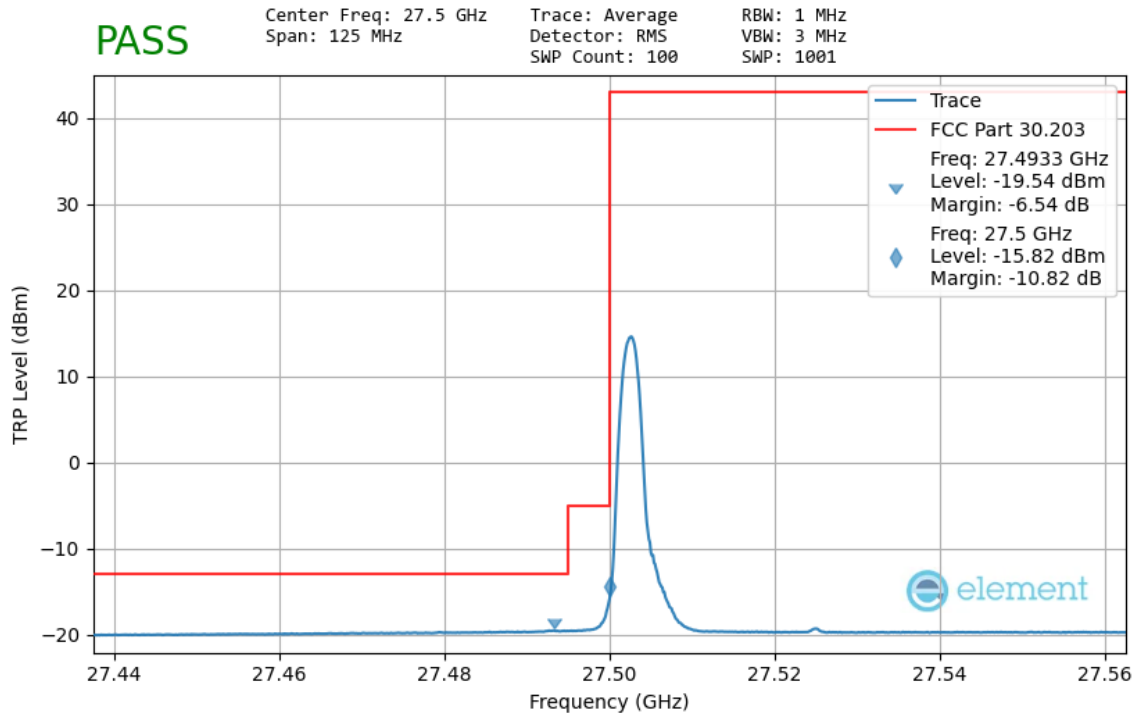
**Plot 7-197. Ant 2 Upper Band Edge – TRP (100MHz-3CC – QPSK 1 RB)**



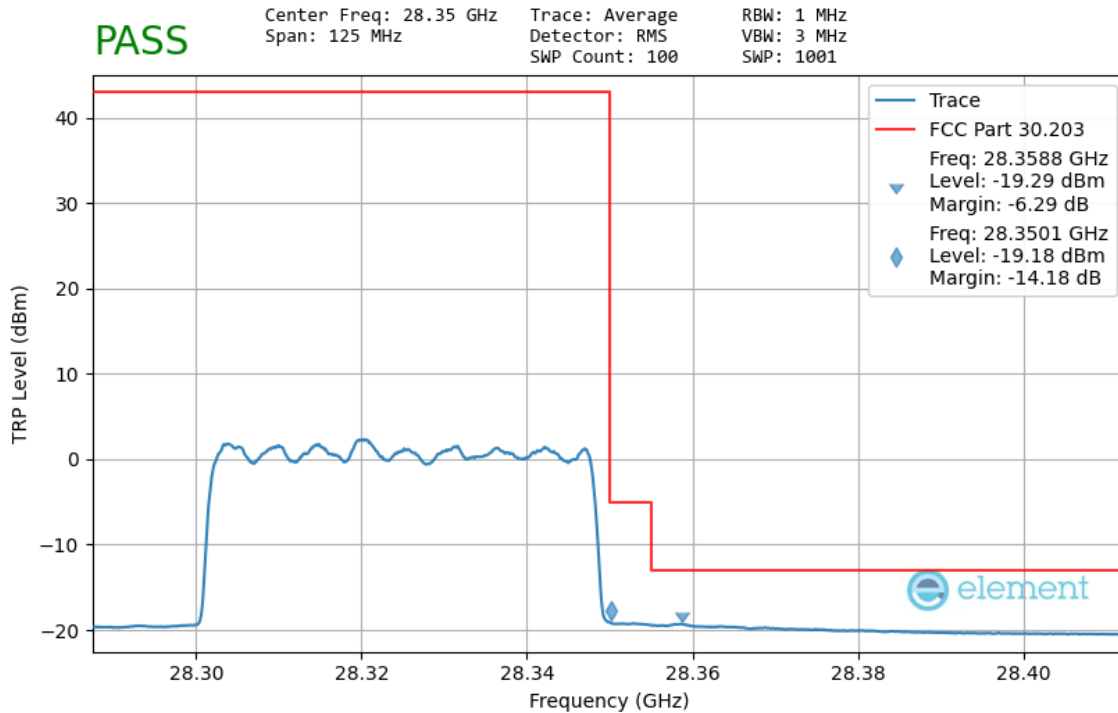
**Plot 7-198. Ant 2 Upper Band Edge – TRP (100MHz-4CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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## Band n261 – Worst-Case

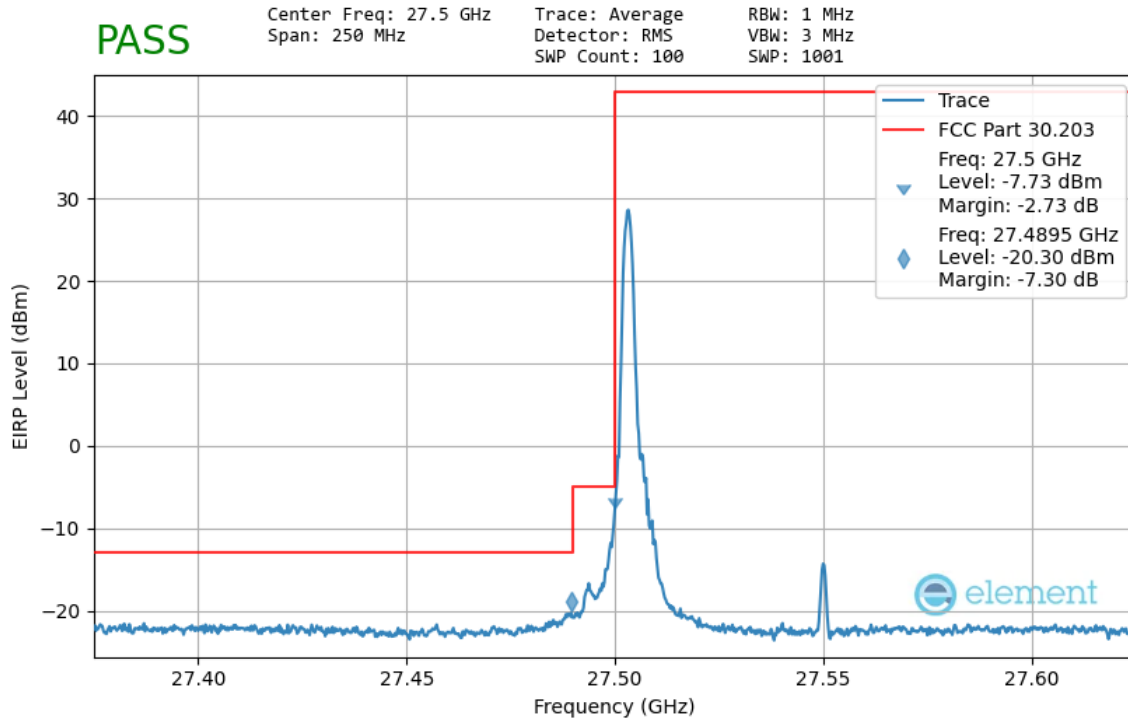


Plot 7-199. Ant 1 Lower Band Edge – TRP (50MHz-1CC – QPSK 1 RB)

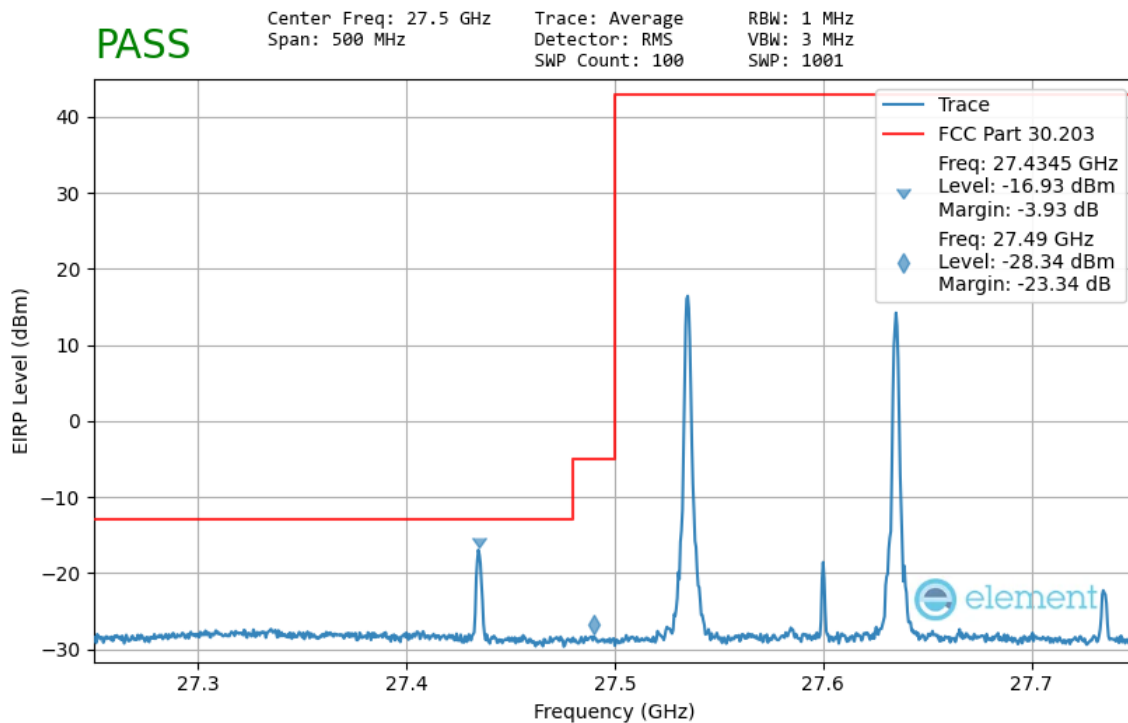


Plot 7-200. Ant 1 Upper Band Edge – TRP (50MHz-1CC – QPSK Full RB)

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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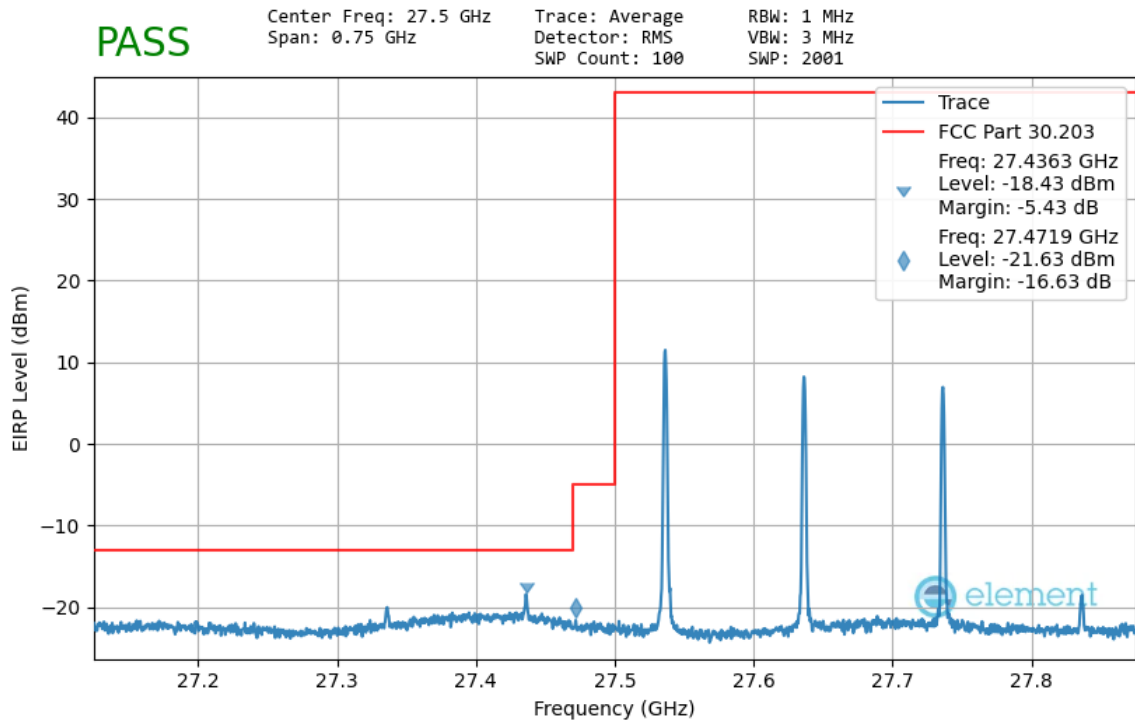


**Plot 7-201. Ant 1 Lower Band Edge (100MHz-1CC – QPSK 1 RB)**

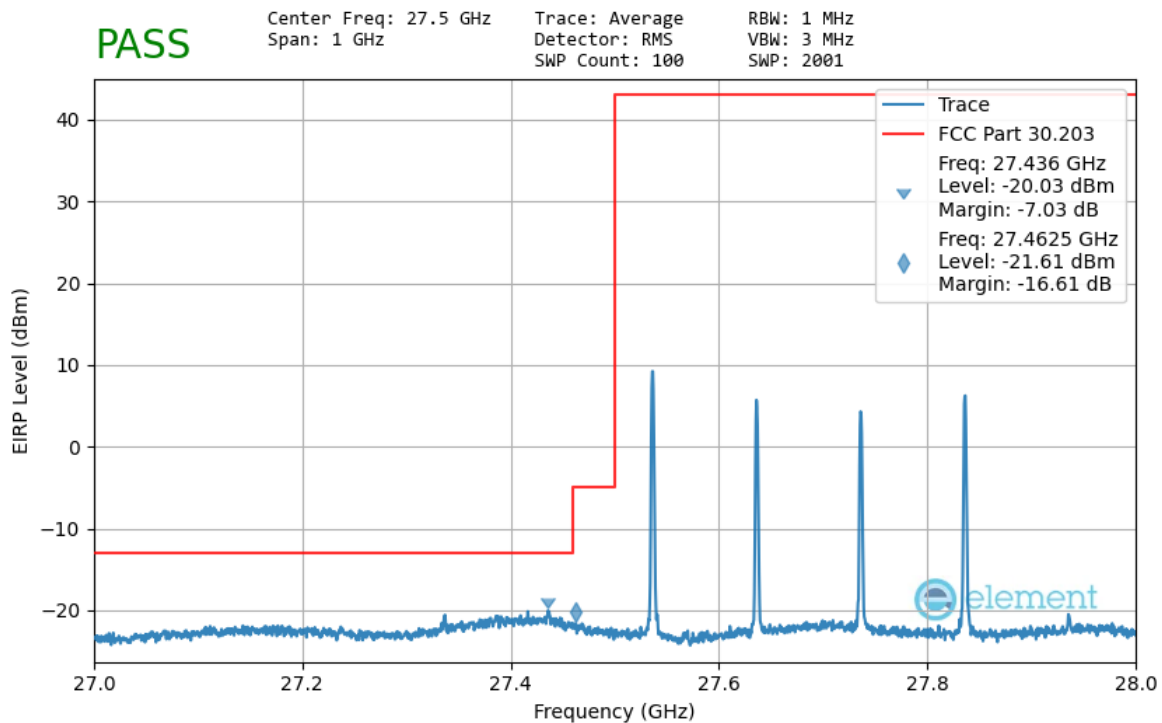


**Plot 7-202. Ant 1 Lower Band Edge (100MHz-2CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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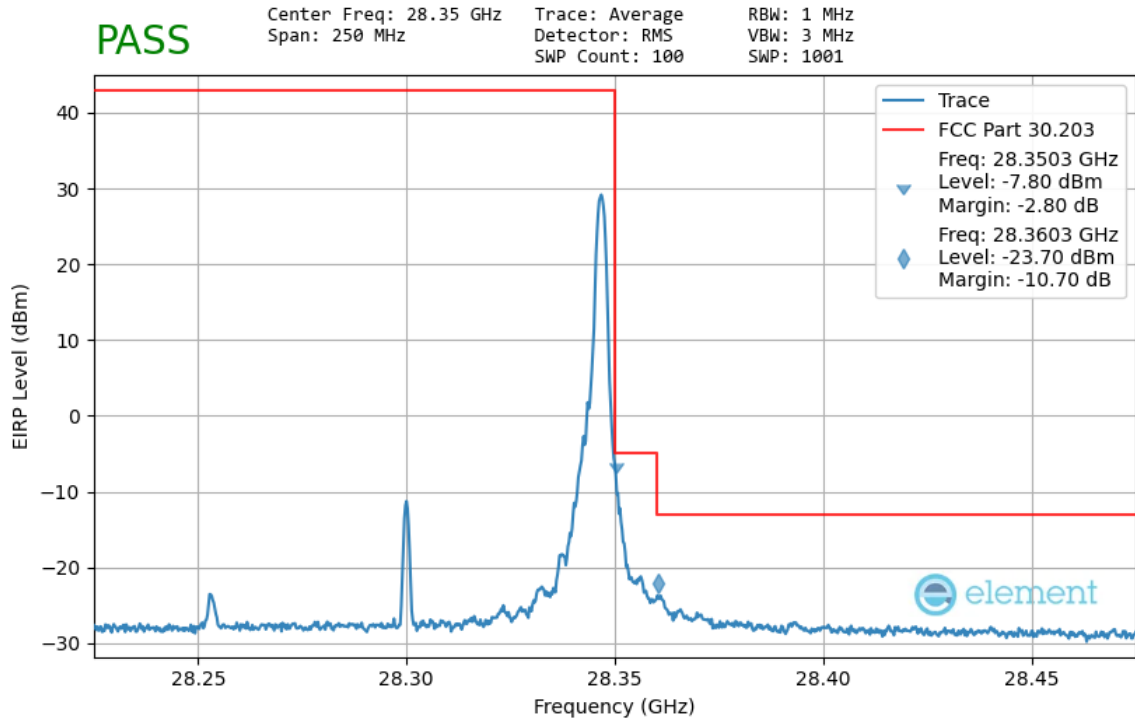


**Plot 7-203. Ant 1 Lower Band Edge (100MHz-3CC – QPSK 1 RB)**

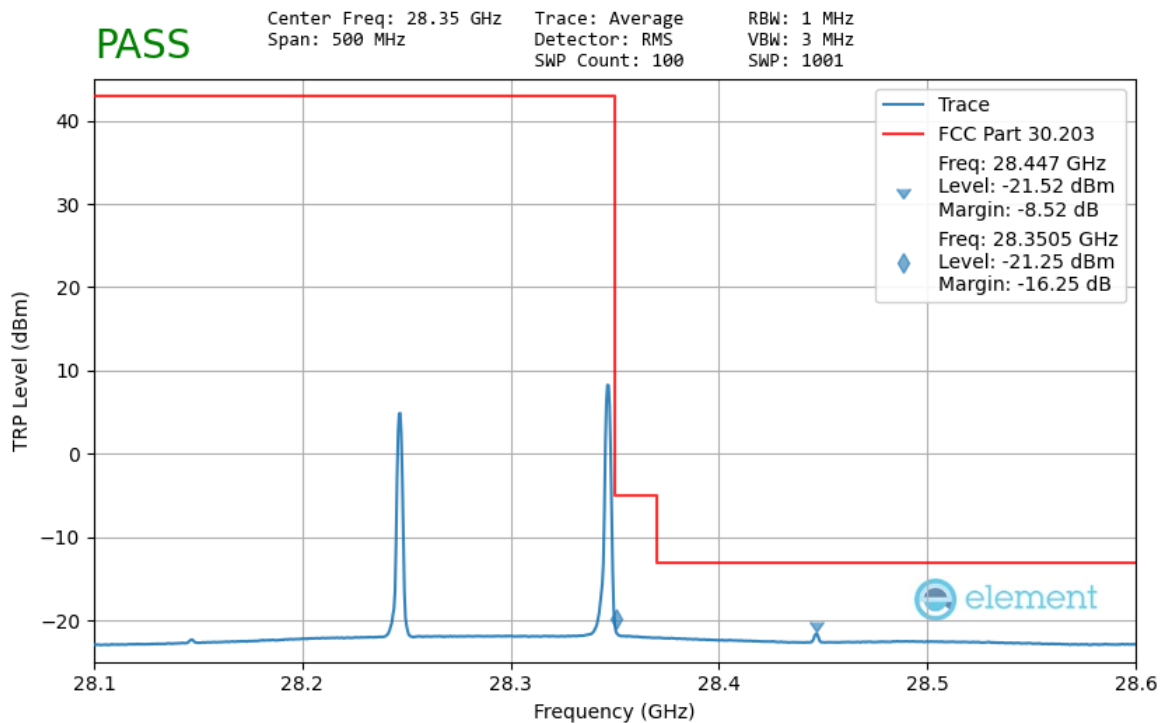


**Plot 7-204. Ant 1 Lower Band Edge (100MHz-4CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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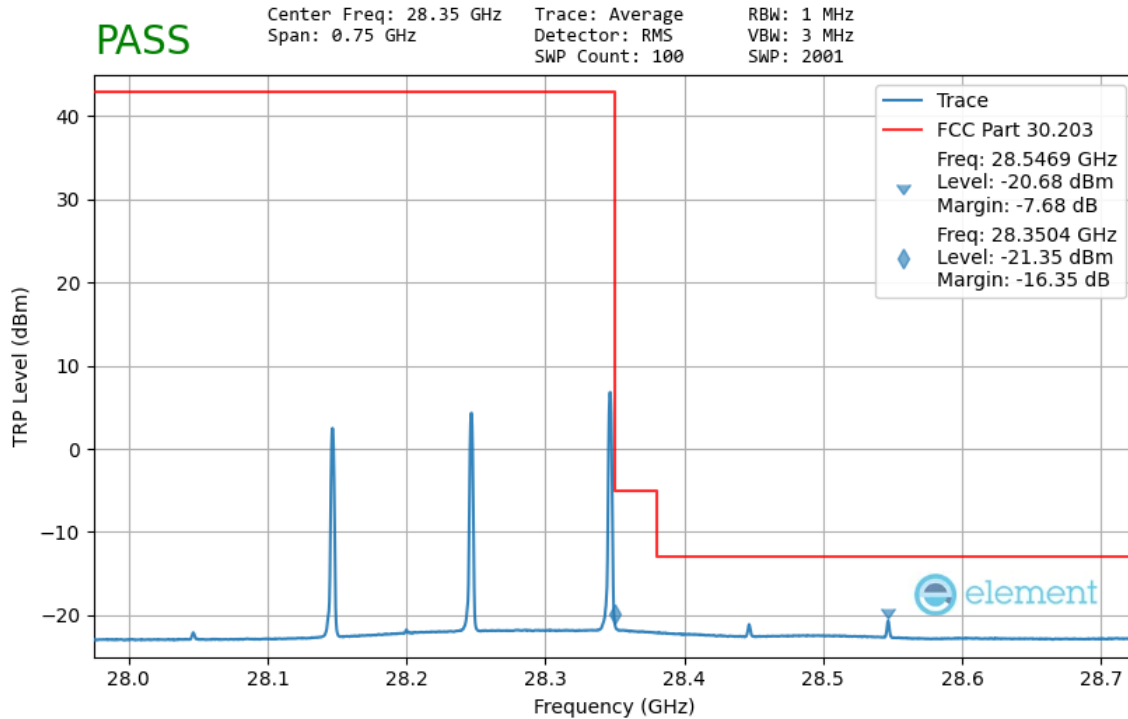


**Plot 7-205. Ant 1 Upper Band Edge (100MHz-1CC – QPSK 1 RB)**

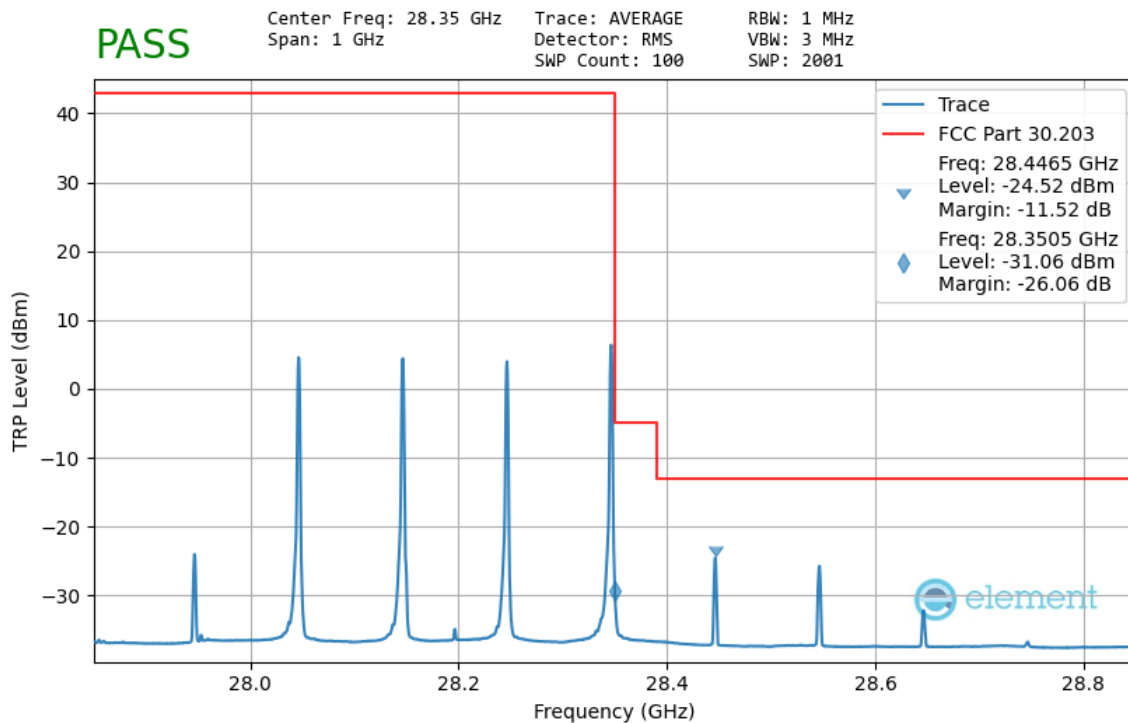


**Plot 7-206. Ant 1 Upper Band Edge – TRP (100MHz-2CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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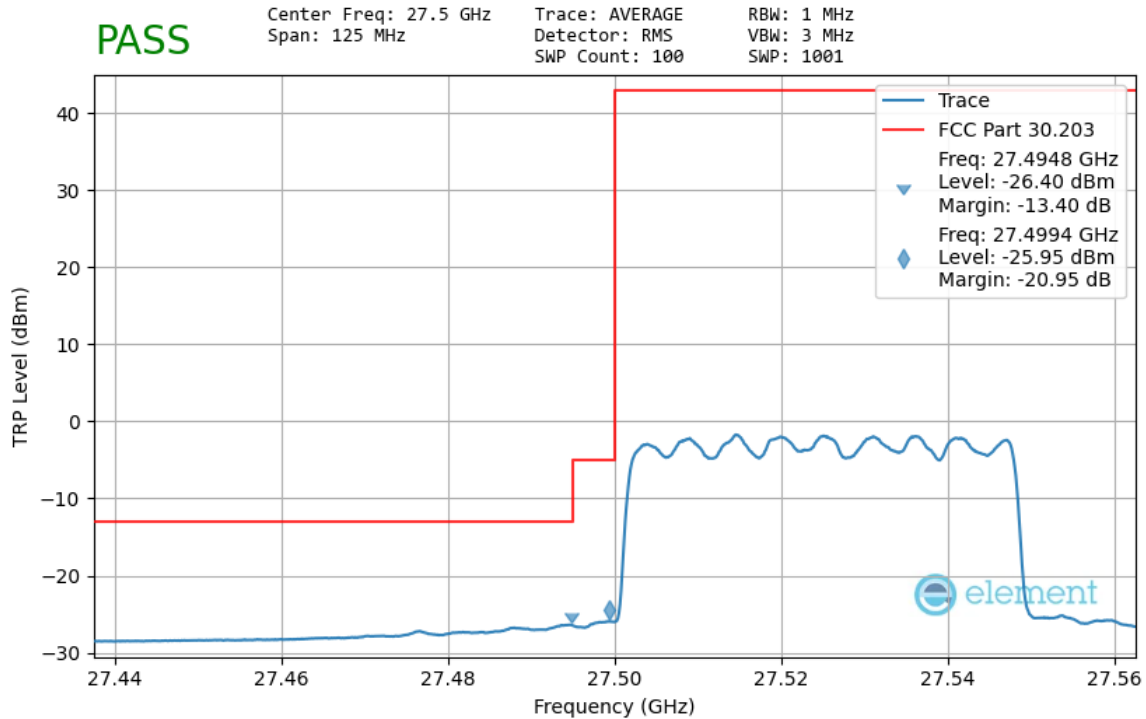


**Plot 7-207. Ant 1 Upper Band Edge – TRP (100MHz-3CC – QPSK 1 RB)**

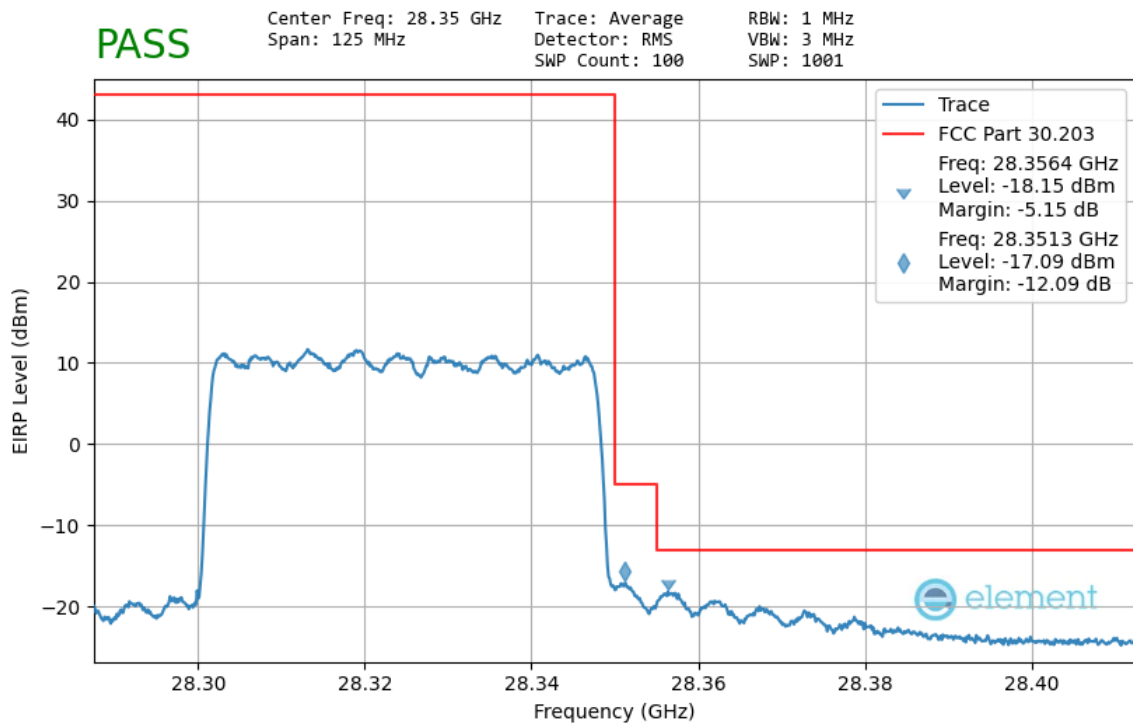


**Plot 7-208. Ant 1 Upper Band Edge – TRP (100MHz-4CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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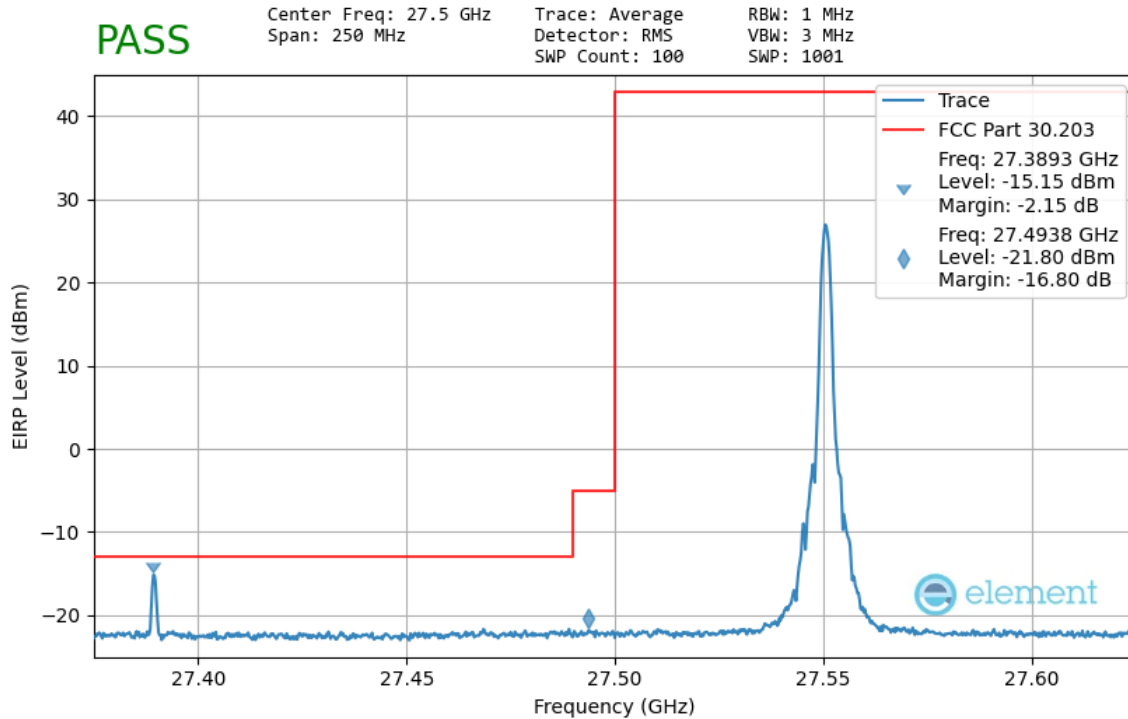
**Plot 7-209. Ant 2 Lower Band Edge – TRP (50MHz-1CC – QPSK Full RB)**



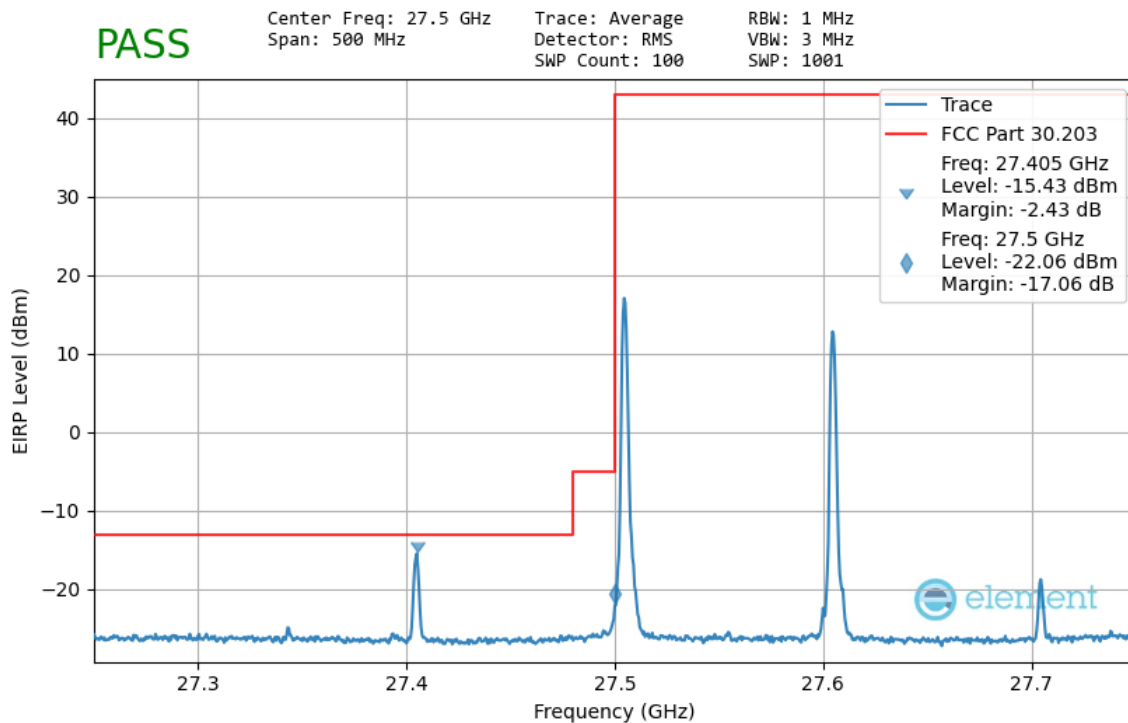
**Plot 7-210. Ant 2 Upper Band Edge (50MHz-1CC – QPSK Full RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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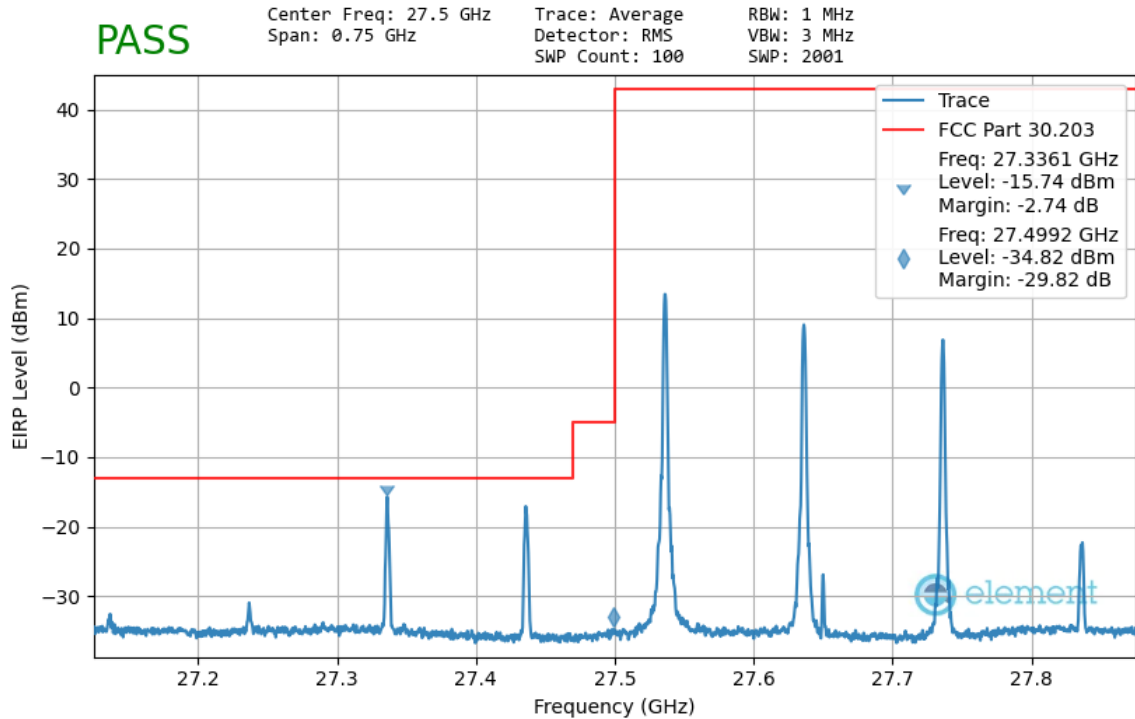


**Plot 7-211. Ant 2 Lower Band Edge (100MHz-1CC – QPSK 1 RB)**

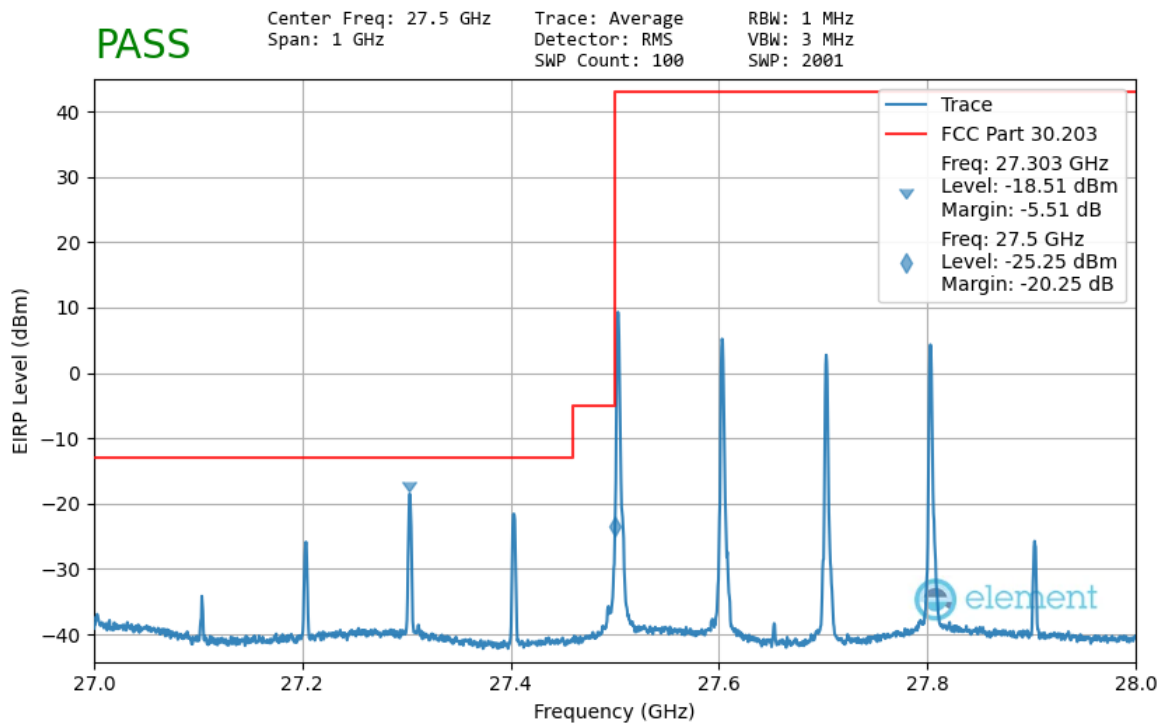


**Plot 7-212. Ant 2 Lower Band Edge (100MHz-2CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2209010098-13.A3L	Test Dates: 9/12/2022 – 11/14/2022	EUT Type: Portable Handset	Page 176 of 214

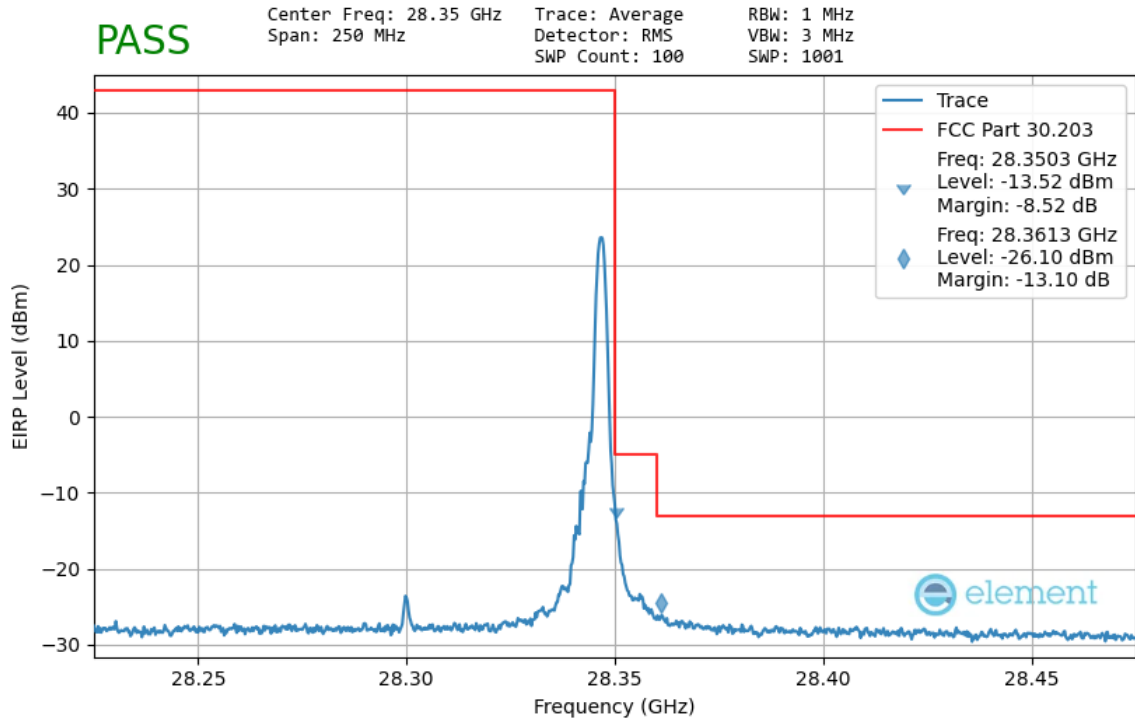


**Plot 7-213. Ant 2 Lower Band Edge (100MHz-3CC – QPSK 1 RB)**

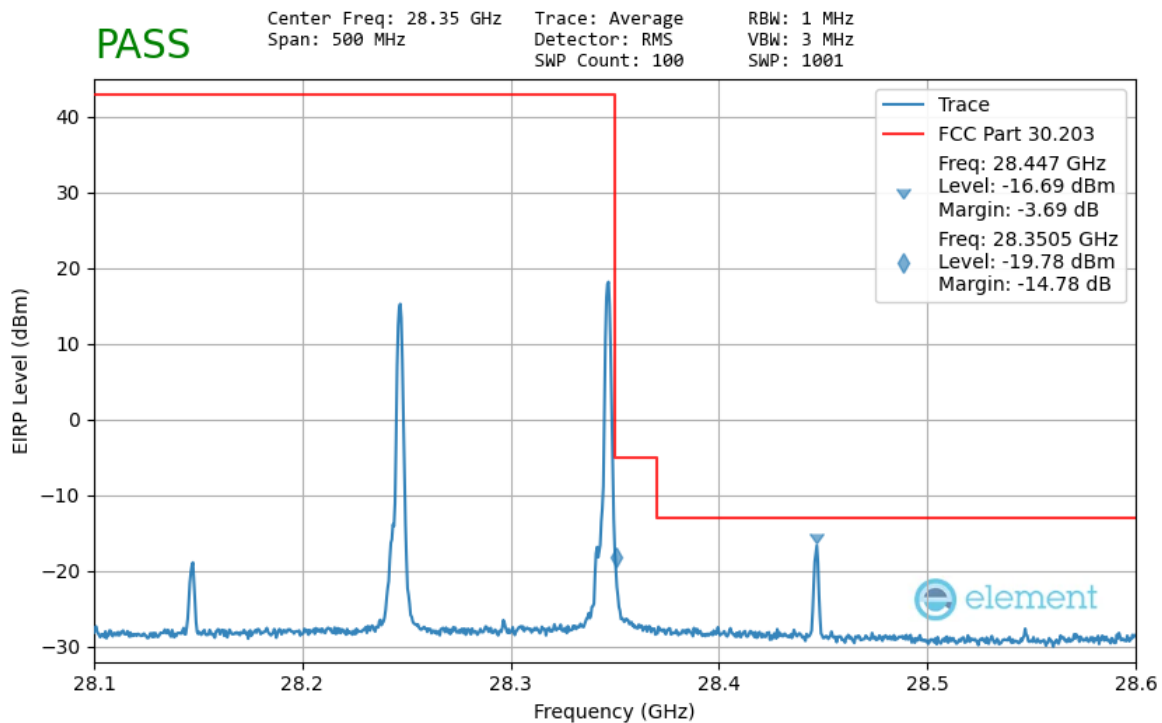


**Plot 7-214. Ant 2 Lower Band Edge (100MHz-4CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2209010098-13.A3L	Test Dates: 9/12/2022 – 11/14/2022	EUT Type: Portable Handset	Page 177 of 214

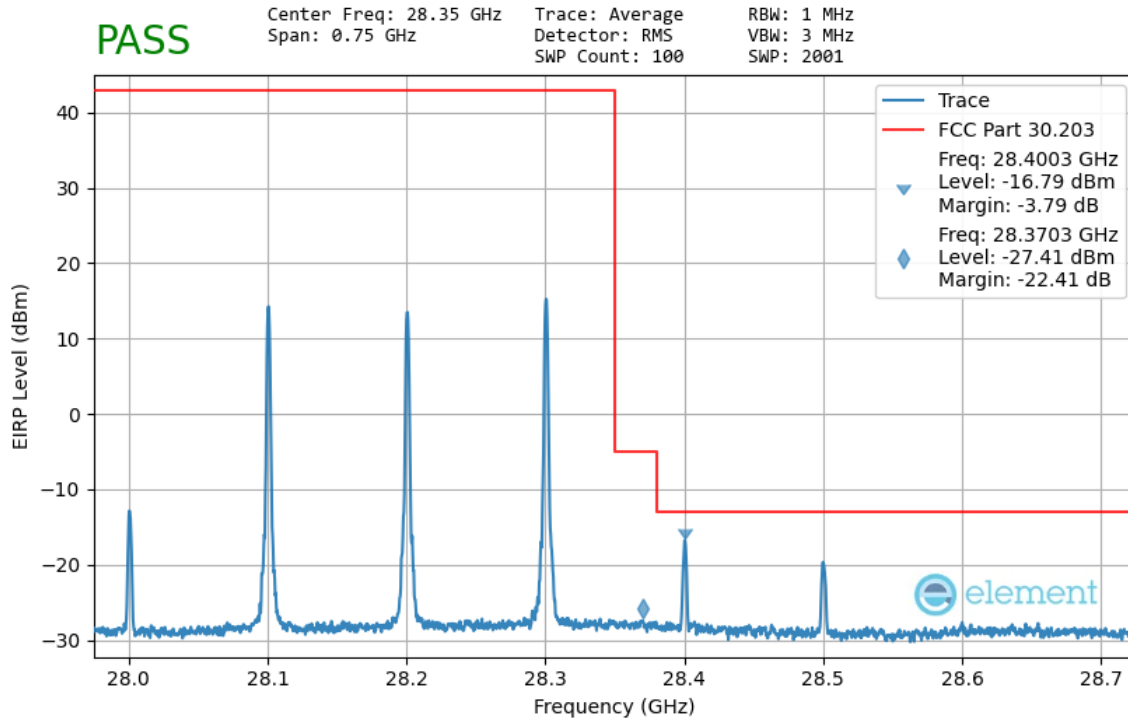


**Plot 7-215. Ant 2 Upper Band Edge (100MHz-1CC – QPSK 1 RB)**

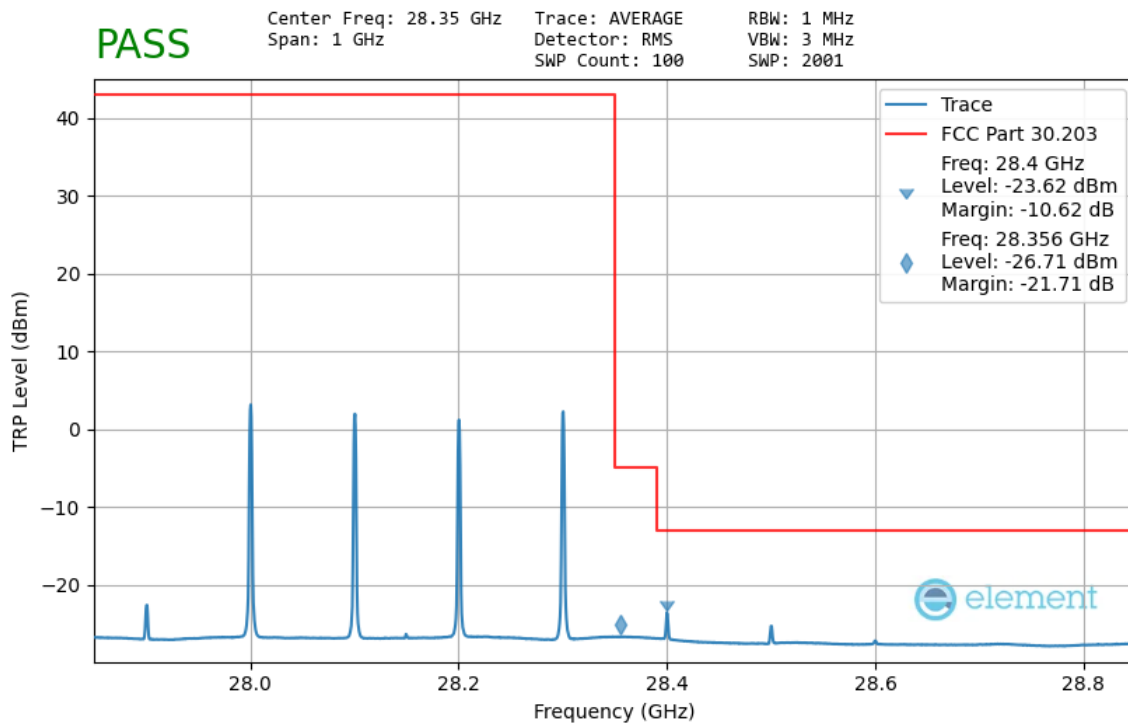


**Plot 7-216. Ant 2 Upper Band Edge (100MHz-2CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2209010098-13.A3L	Test Dates: 9/12/2022 – 11/14/2022	EUT Type: Portable Handset	Page 178 of 214



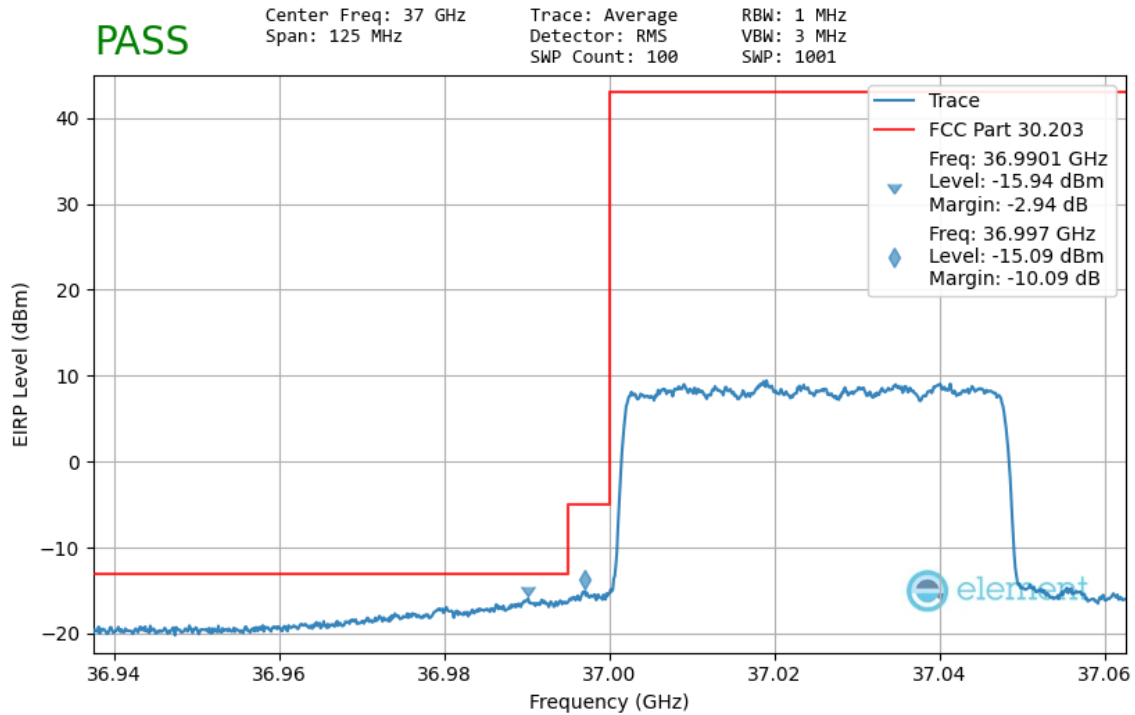
**Plot 7-217. Ant 2 Upper Band Edge (100MHz-3CC – QPSK 1 RB)**



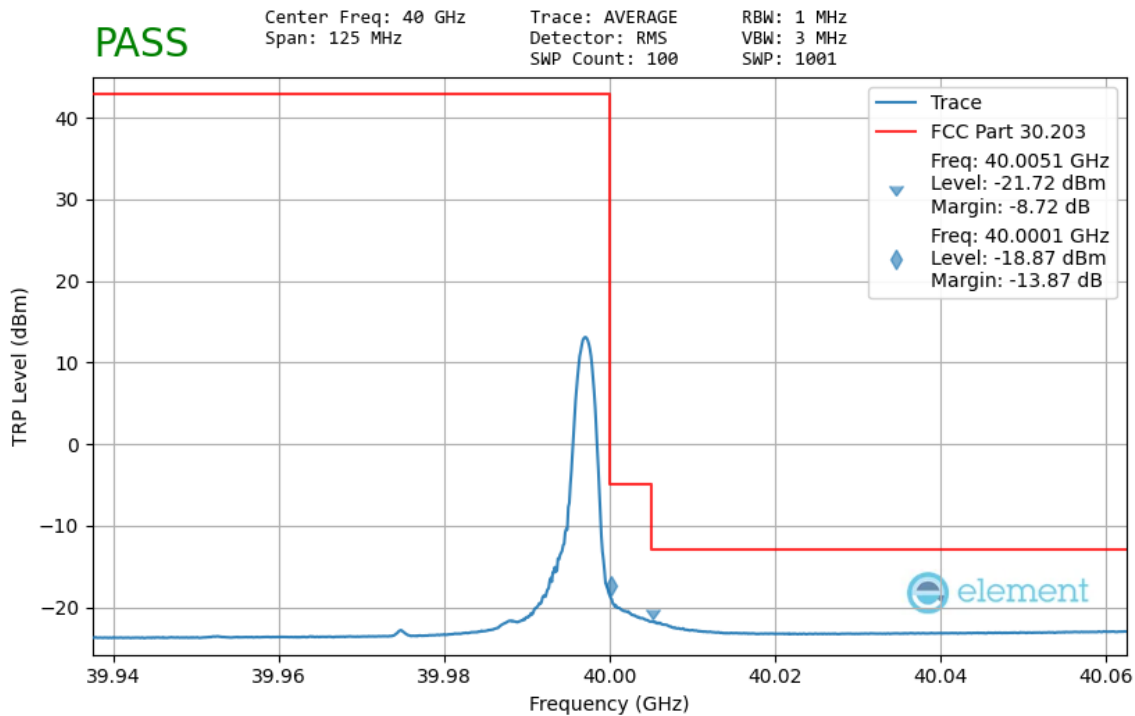
**Plot 7-218. Ant 2 Upper Band Edge – TRP (100MHz-4CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2209010098-13.A3L	Test Dates: 9/12/2022 – 11/14/2022	EUT Type: Portable Handset	Page 179 of 214

## Band n260 – Worst Case

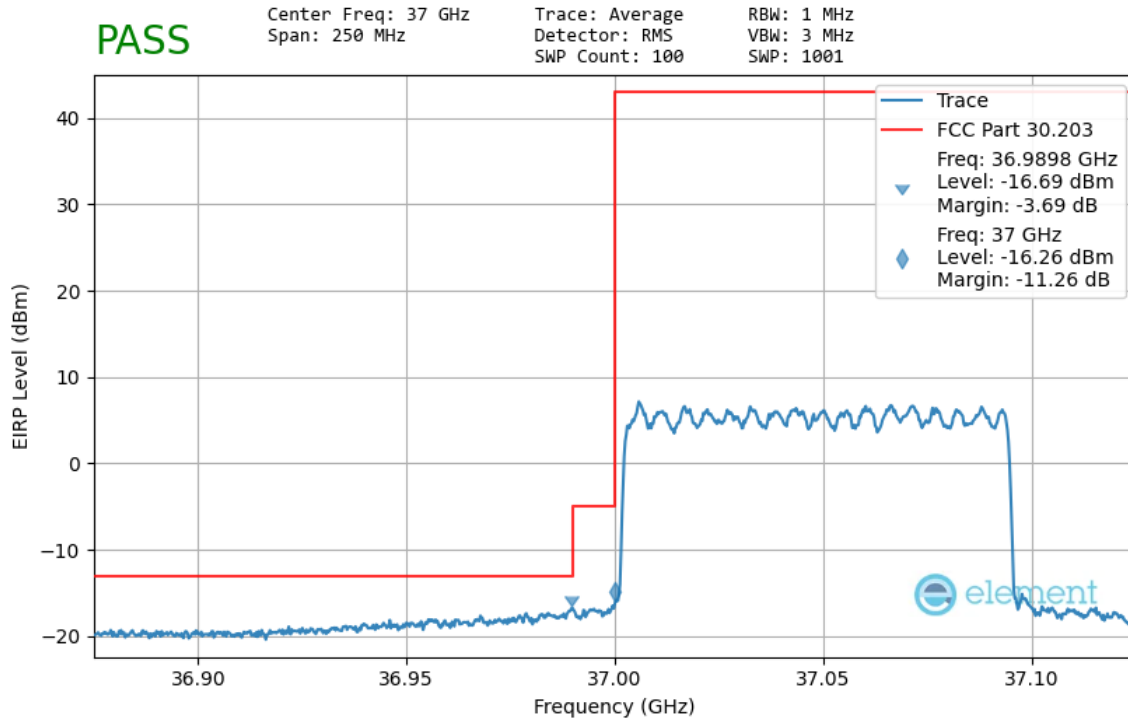


Plot 7-219. Ant 1 Lower Band Edge (50MHz-1CC QPSK Full RB)

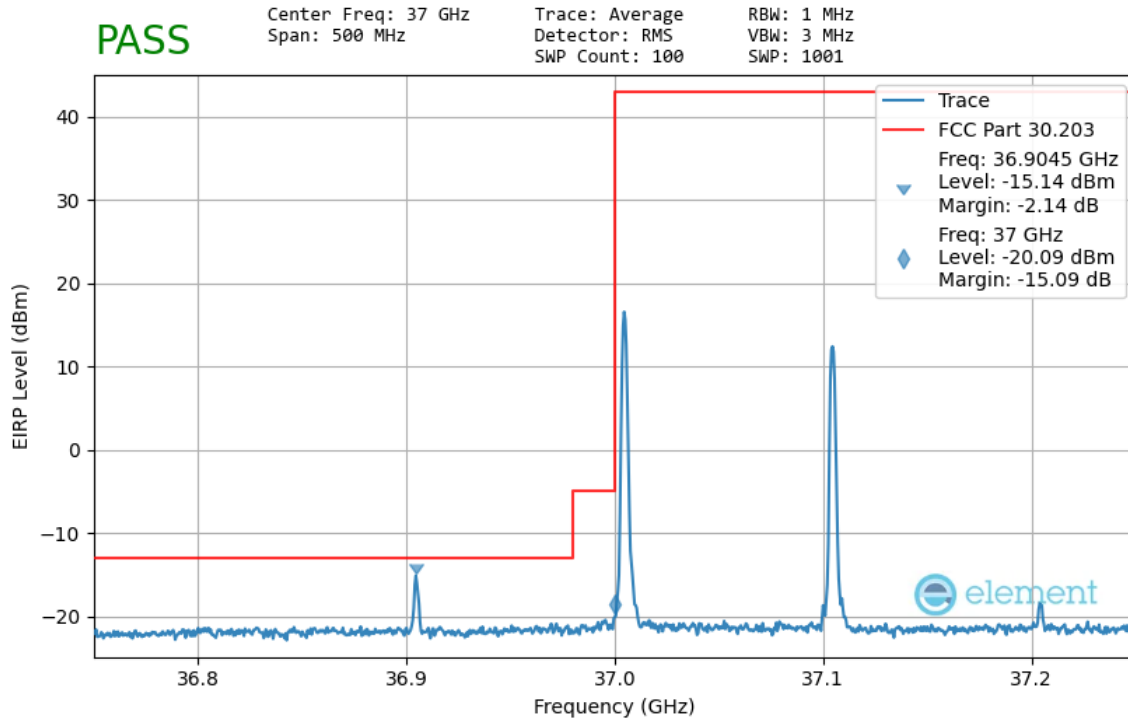


Plot 7-220. Ant 1 Upper Band Edge – TRP (50MHz-1CC – QPSK 1 RB)

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2209010098-13.A3L	Test Dates: 9/12/2022 – 11/14/2022	EUT Type: Portable Handset	Page 180 of 214

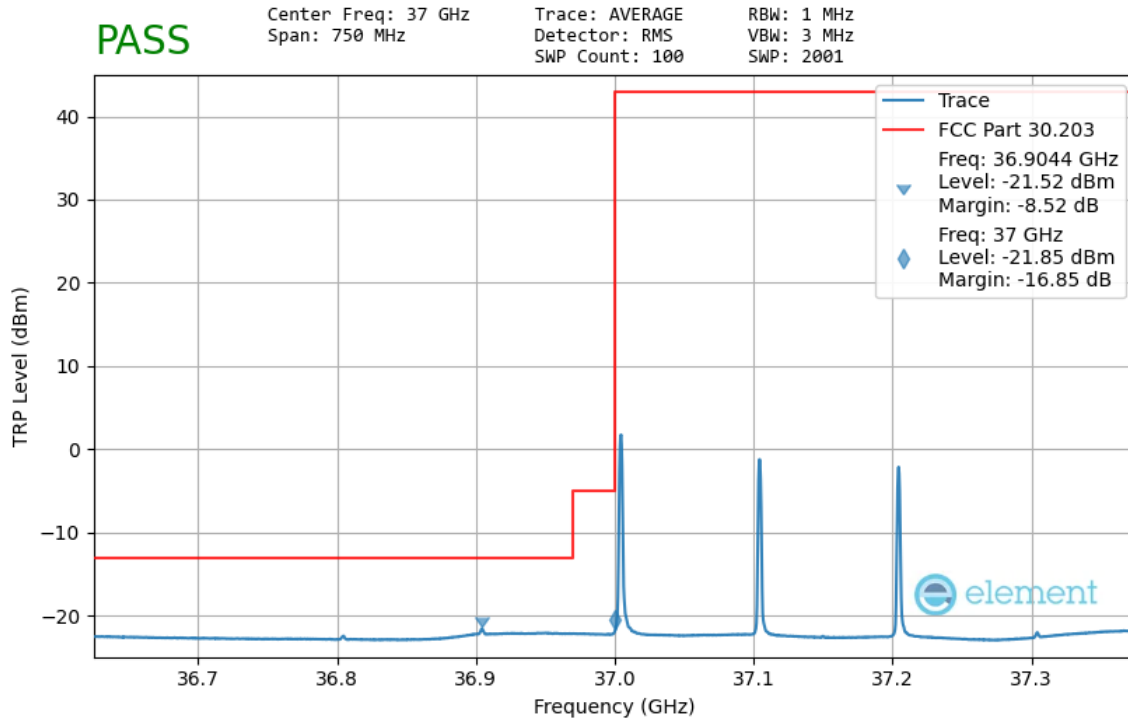


**Plot 7-221. Ant 1 Lower Band Edge (100MHz-1CC – QPSK Full RB)**

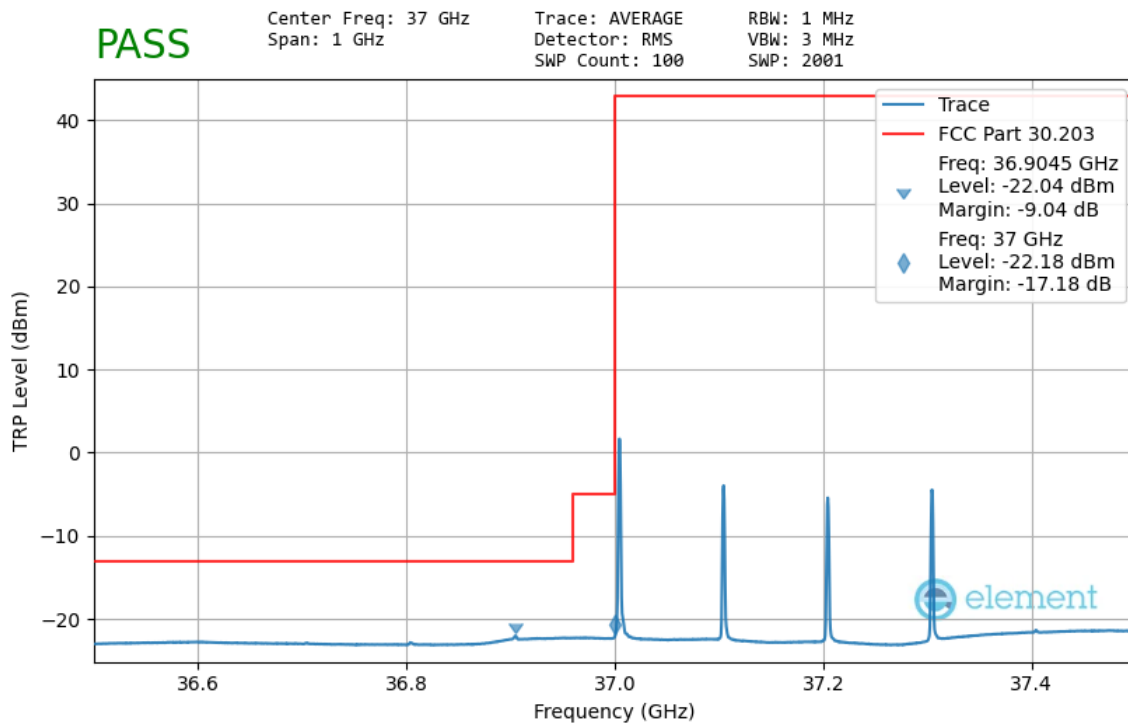


**Plot 7-222. Ant 1 Lower Band Edge (100MHz-2CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2209010098-13.A3L	Test Dates: 9/12/2022 – 11/14/2022	EUT Type: Portable Handset	Page 181 of 214

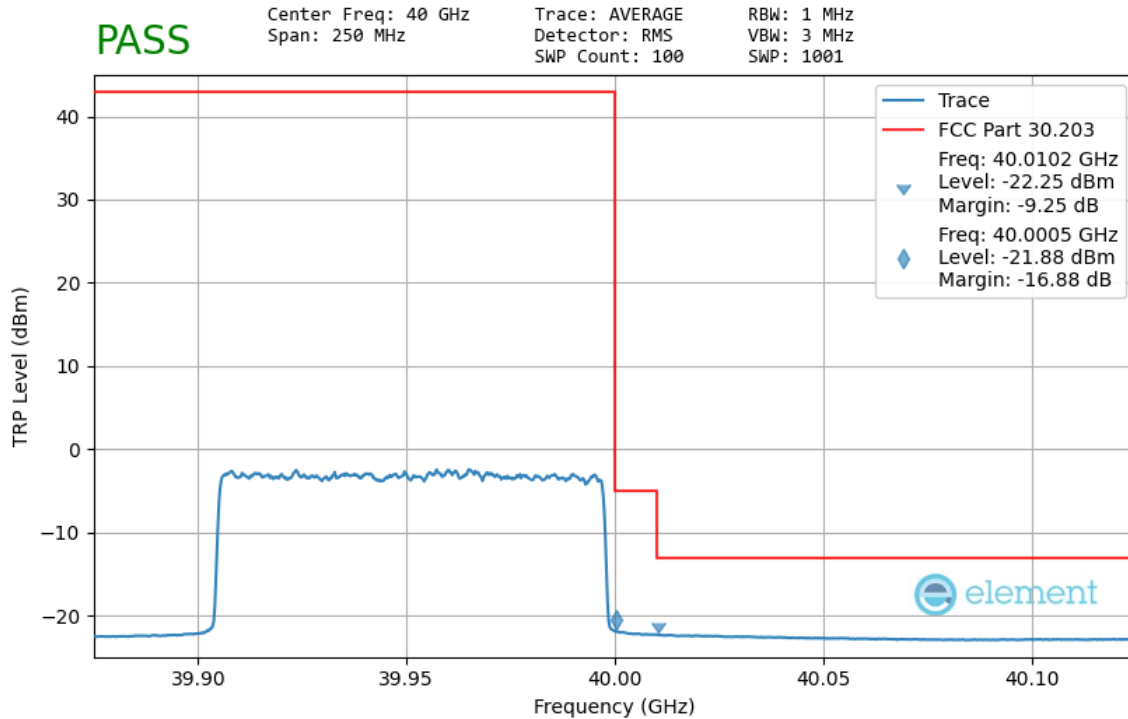


**Plot 7-223. Ant 1 Lower Band Edge – TRP (100MHz-3CC – QPSK 1 RB)**

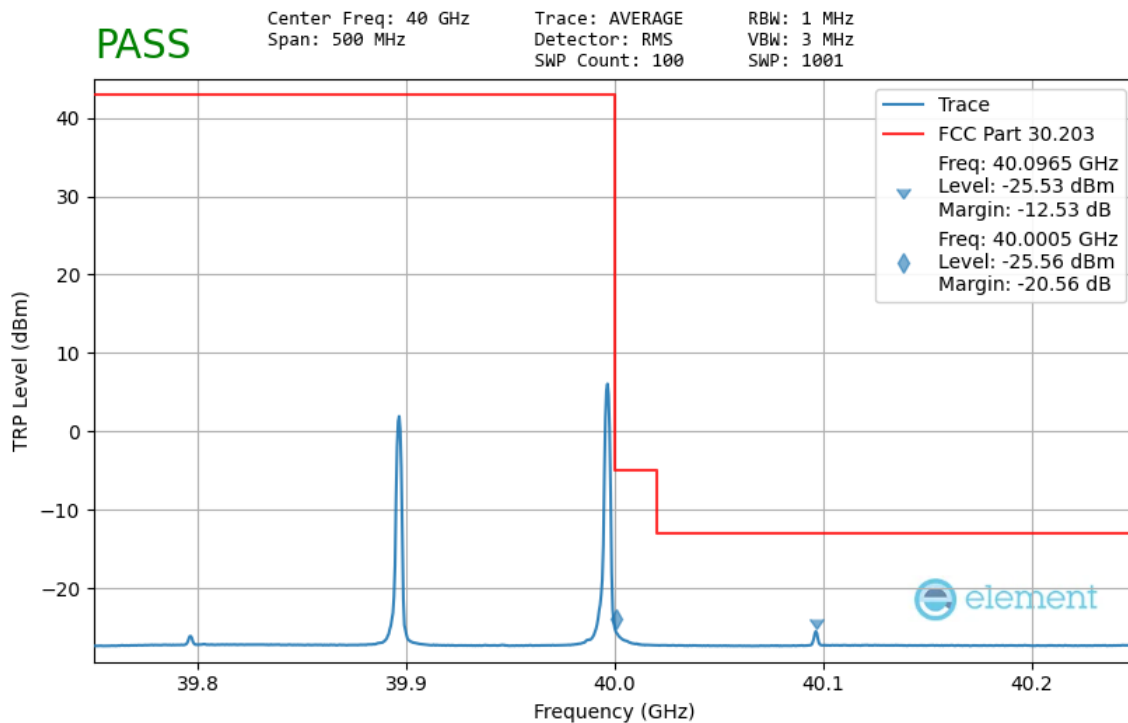


**Plot 7-224. Ant 1 Lower Band Edge – TRP (100MHz-4CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2209010098-13.A3L	Test Dates: 9/12/2022 – 11/14/2022	EUT Type: Portable Handset	Page 182 of 214



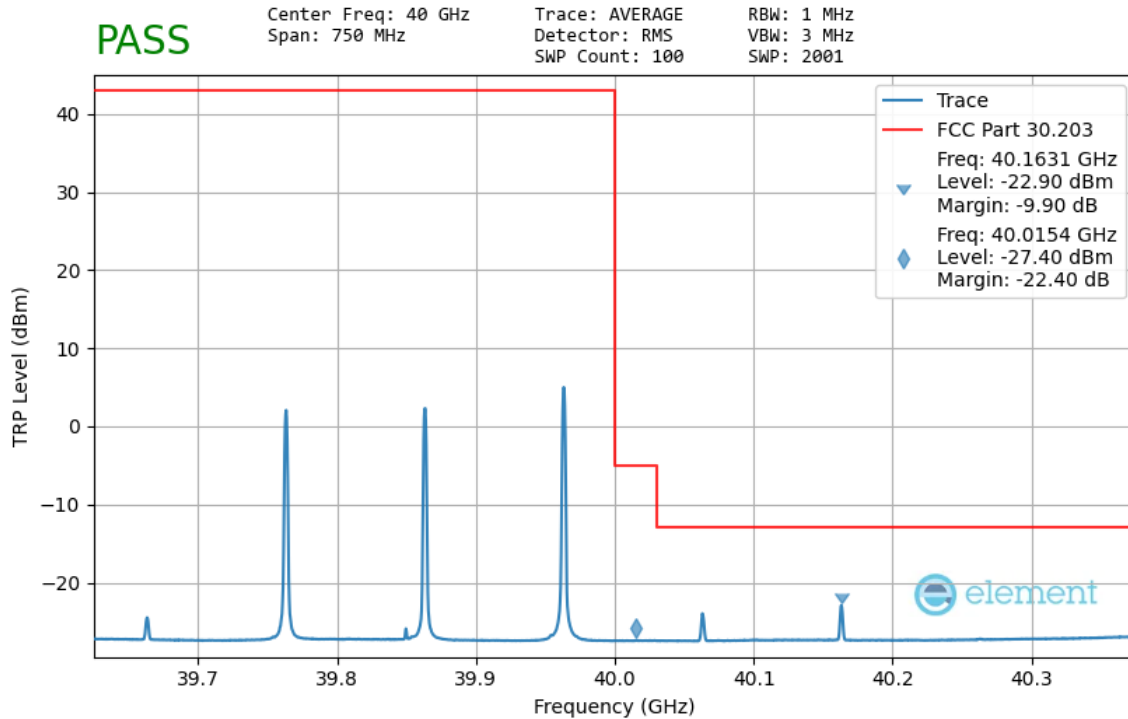
**Plot 7-225. Ant 1 Upper Band Edge – TRP (100MHz-1CC – QPSK Full RB)**



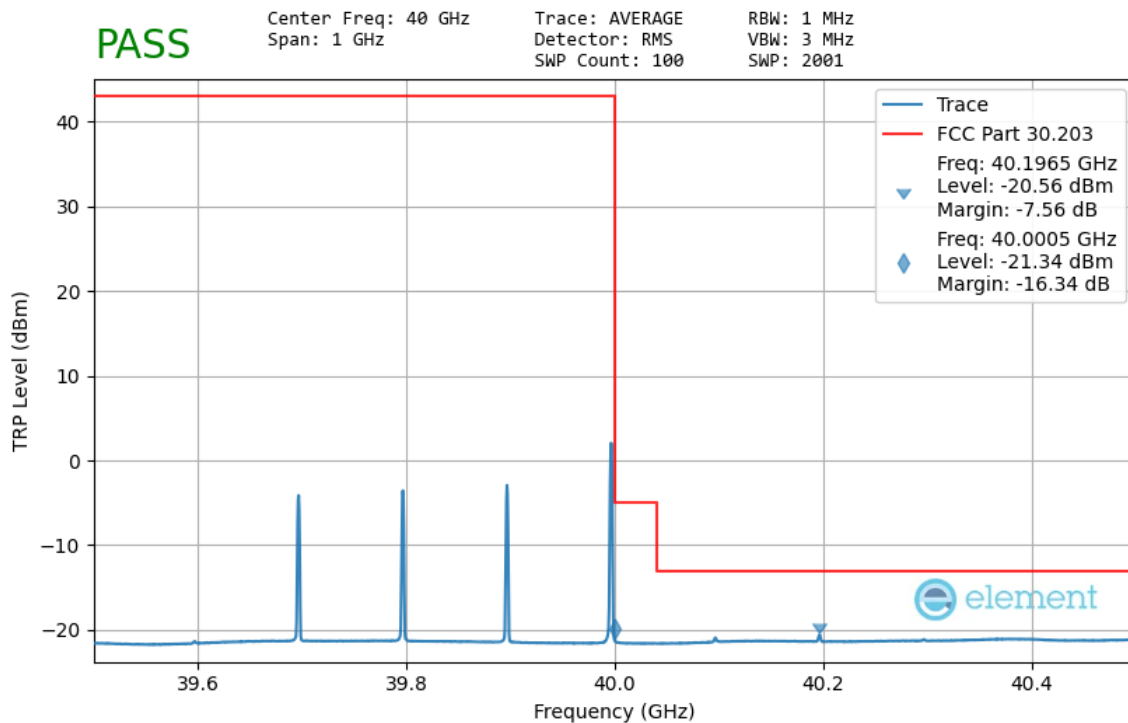
**Plot 7-226. Ant 1 Upper Band Edge – TRP (100MHz-2CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2209010098-13.A3L	Test Dates: 9/12/2022 – 11/14/2022	EUT Type: Portable Handset	Page 183 of 214



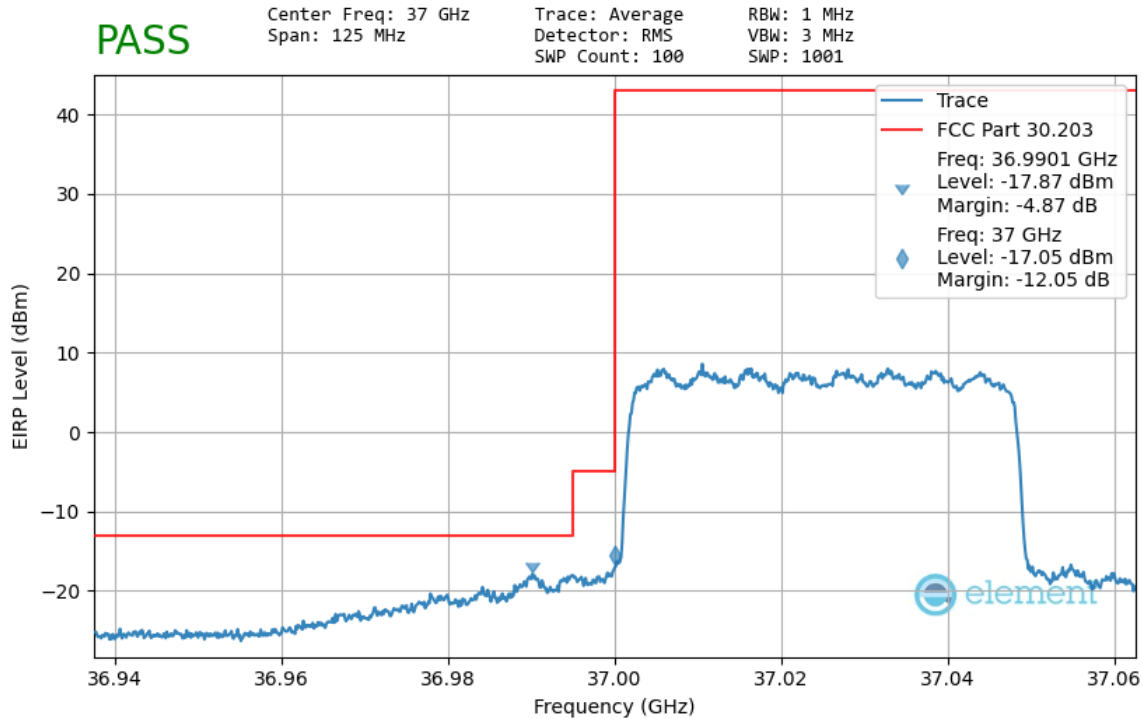


**Plot 7-227. Ant 1 Upper Band Edge – TRP (100MHz-3CC – QPSK 1 RB)**

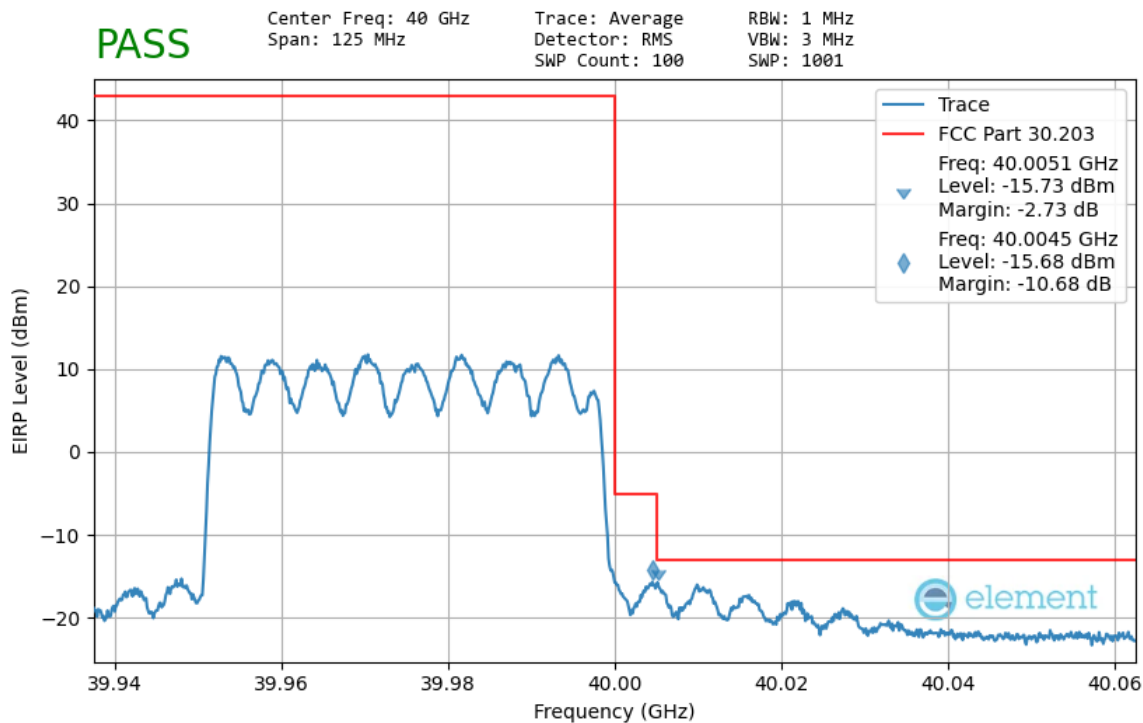


**Plot 7-228. Ant 1 Upper Band Edge – TRP (100MHz-4CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2209010098-13.A3L	Test Dates: 9/12/2022 – 11/14/2022	EUT Type: Portable Handset	Page 184 of 214

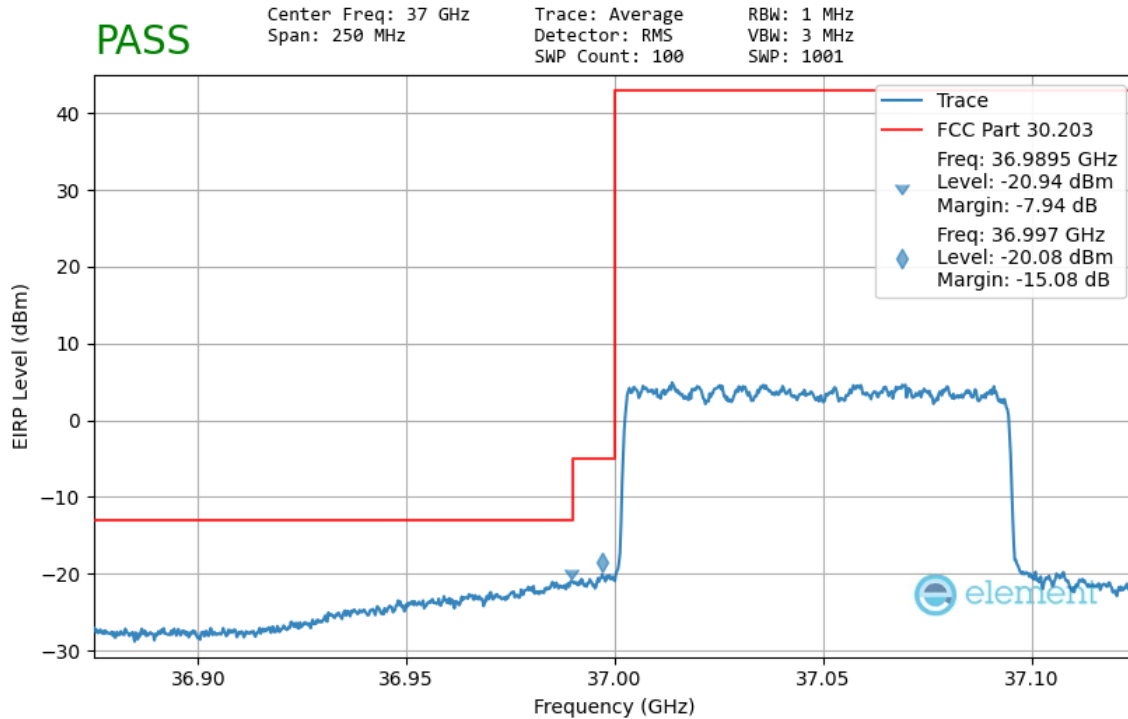


**Plot 7-229. Ant 2 Lower Band Edge (50MHz-1CC – QPSK Full RB)**

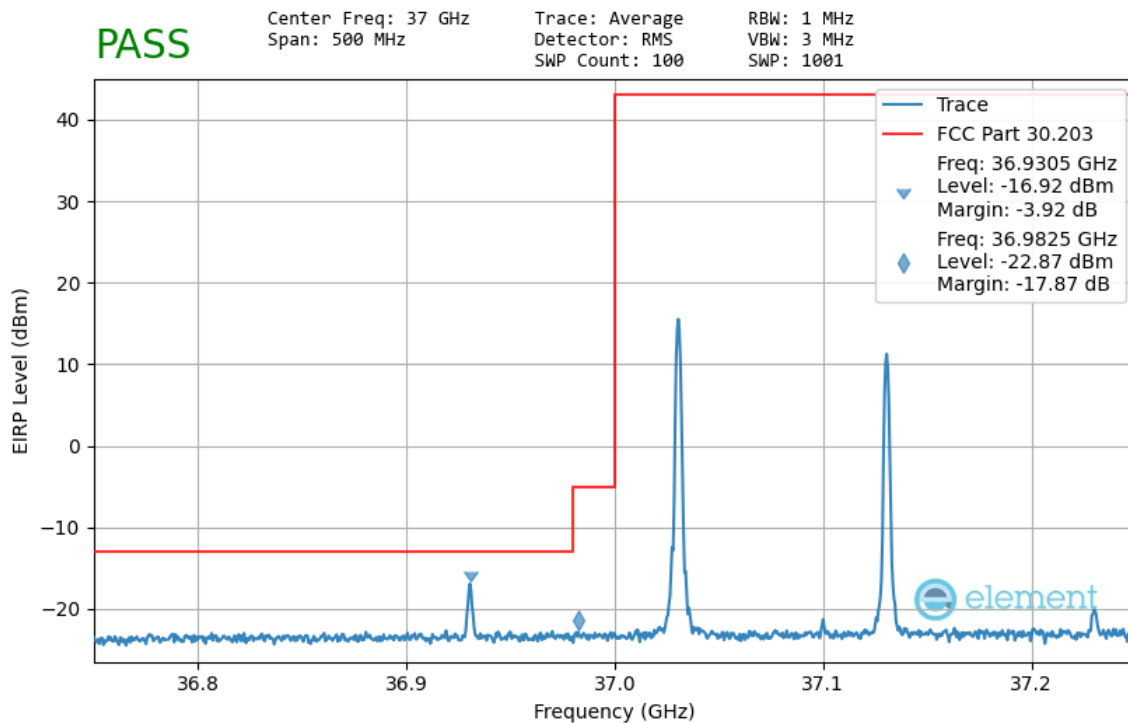


**Plot 7-230. Ant 2 Upper Band Edge (50MHz-1CC – QPSK Full RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2209010098-13.A3L	Test Dates: 9/12/2022 – 11/14/2022	EUT Type: Portable Handset	Page 185 of 214

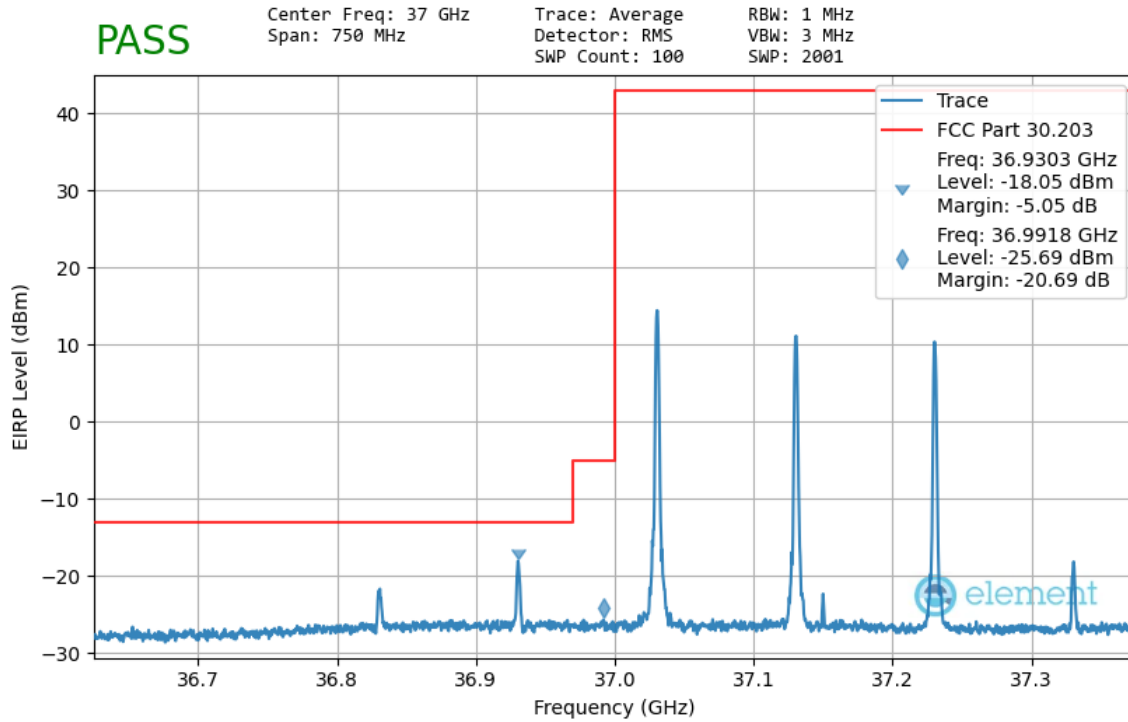


**Plot 7-231. Ant 2 Lower Band Edge (100MHz-1CC – QPSK Full RB)**

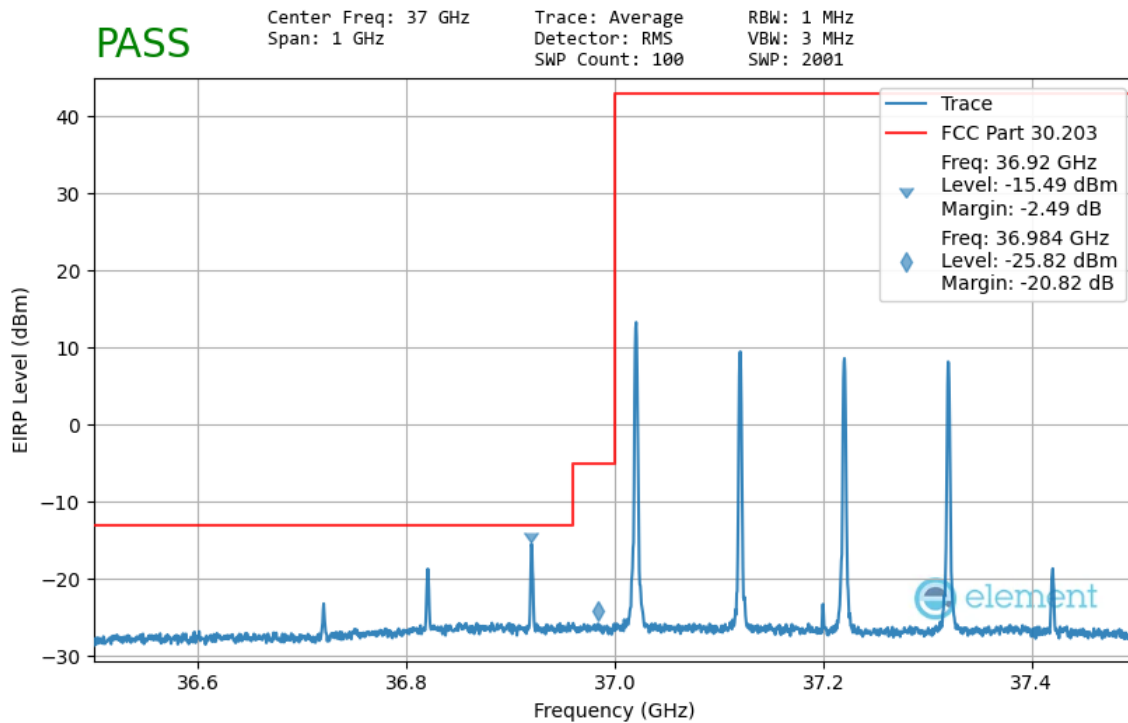


**Plot 7-232. Ant 2 Lower Band Edge (100MHz-2CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2209010098-13.A3L	Test Dates: 9/12/2022 – 11/14/2022	EUT Type: Portable Handset	Page 186 of 214

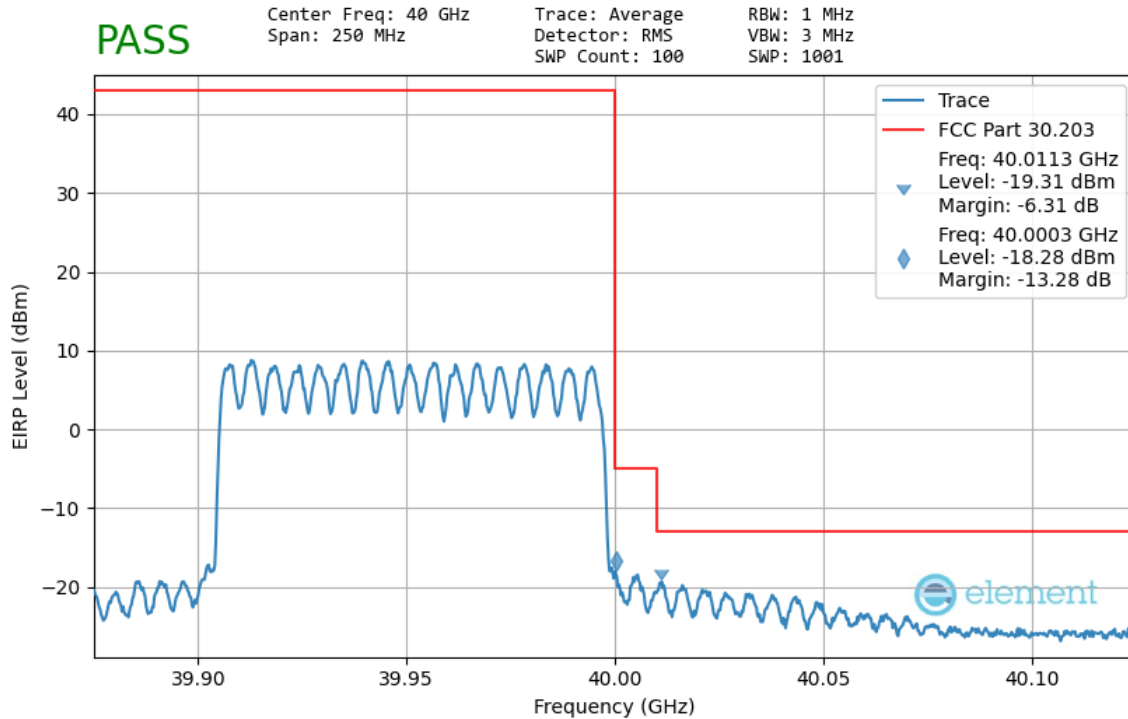


**Plot 7-233. Ant 2 Lower Band Edge (100MHz-3CC – QPSK 1 RB)**

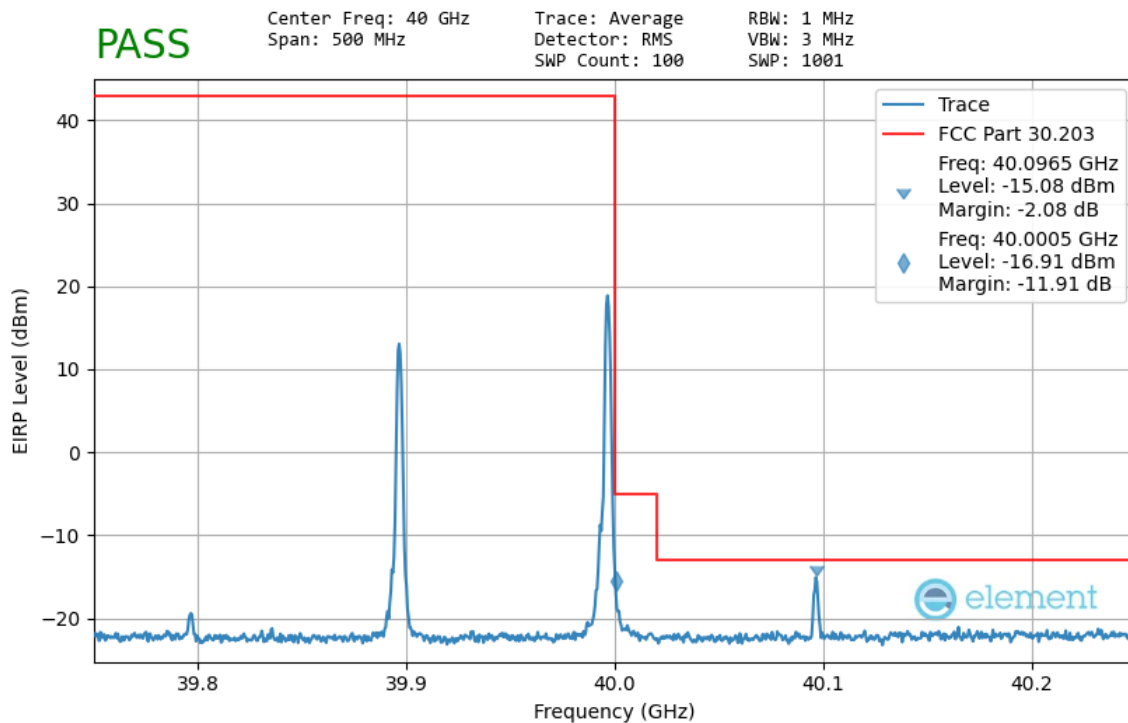


**Plot 7-234. Ant 2 Lower Band Edge (100MHz-4CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2209010098-13.A3L	Test Dates: 9/12/2022 – 11/14/2022	EUT Type: Portable Handset	Page 187 of 214

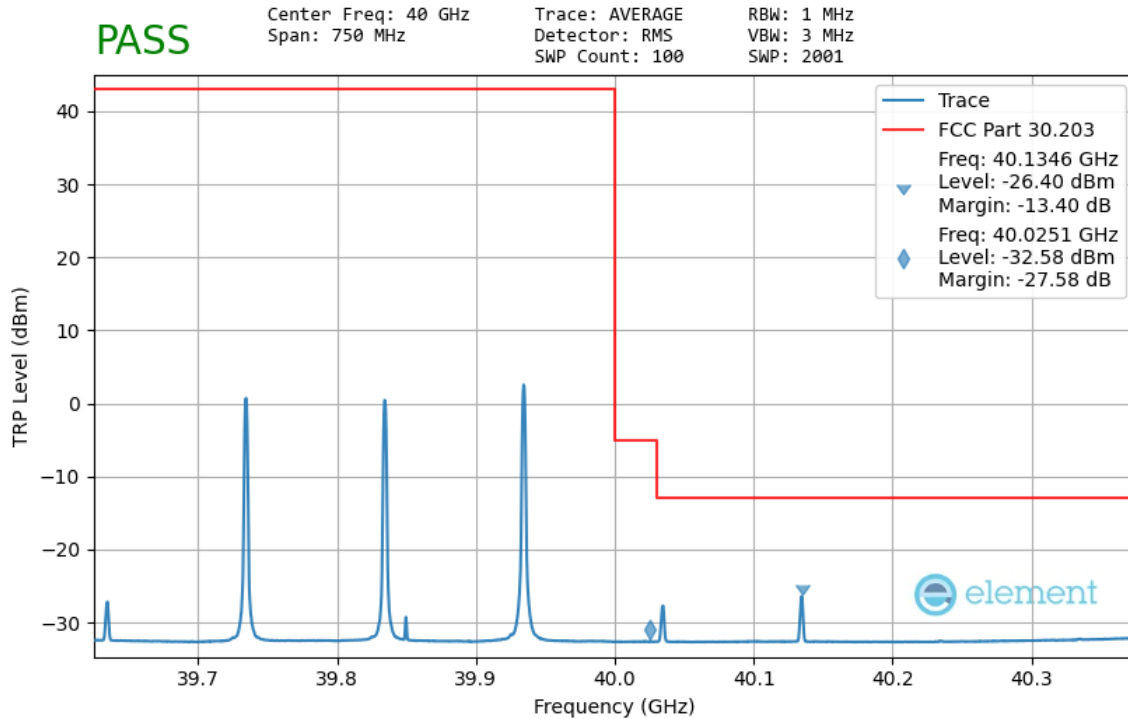


**Plot 7-235. Ant 2 Upper Band Edge (100MHz-1CC – QPSK Full RB)**

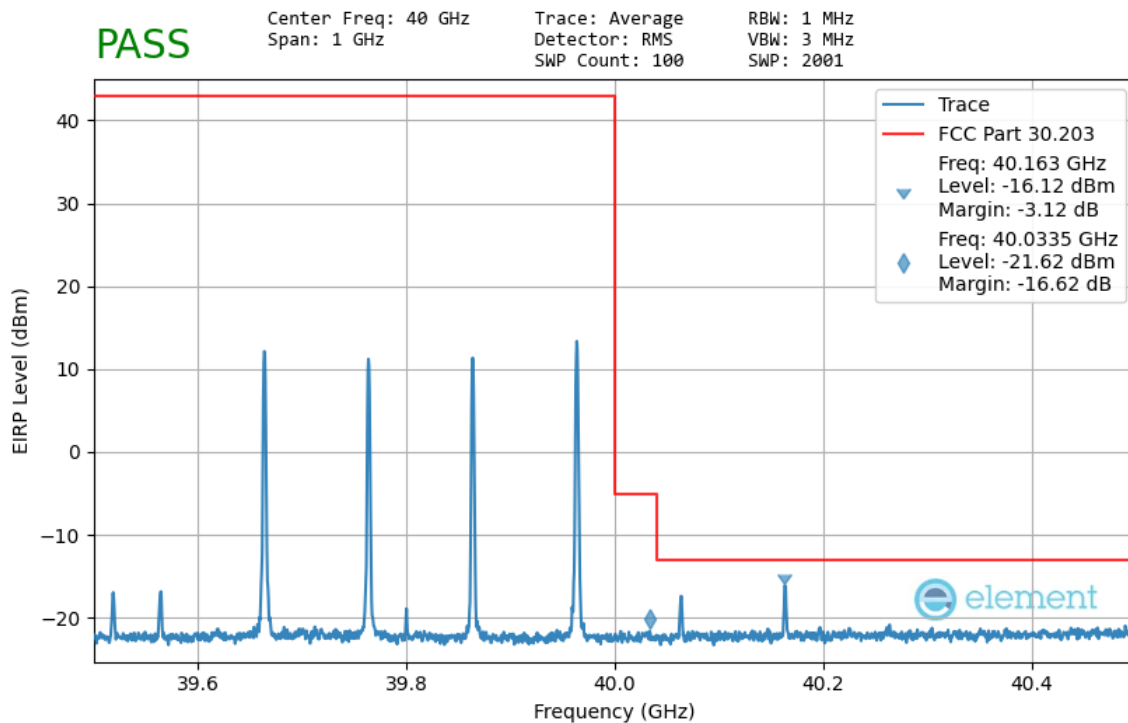


**Plot 7-236. Ant 2 Upper Band Edge (100MHz-2CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2209010098-13.A3L	Test Dates: 9/12/2022 – 11/14/2022	EUT Type: Portable Handset	Page 188 of 214



**Plot 7-237. Ant 2 Upper Band Edge – TRP (100MHz-3CC – QPSK 1 RB)**



**Plot 7-238. Ant 2 Upper Band Edge (100MHz-4CC – QPSK 1 RB)**

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2209010098-13.A3L	Test Dates: 9/12/2022 – 11/14/2022	EUT Type: Portable Handset	Page 189 of 214

## 7.6 Frequency Stability / Temperature Variation

### §2.1055

#### Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

#### Test Procedure Used

ANSI C63.5-2015 Section 5.6  
KDB 842590 D01 v01r02 Section 4.5

#### Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

#### Test Setup

The EUT was measured using horn antenna connected to a spectrum analyzer. The EUT was placed inside an environmental chamber that uses a foam plug to maintain the temperature condition inside the chamber. The horn antenna measured the frequency of the fundamental signal.

#### Test Notes

The Frequency Deviation column in the table below is the amount of deviation measured from the center frequency of the Reference measurement (first row).

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## Frequency Stability Measurements (Band n258-R1)

\$2.1055

OPERATING FREQUENCY: 24,350,040,000 Hz  
CHANNEL: 2018333  
REFERENCE VOLTAGE: 4.28 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.28	+ 20 (Ref)	24,350,676,907	0	0.0000000
100 %		- 30	24,350,685,503	-8,596	-0.0000353
100 %		- 20	24,350,673,100	3,807	0.0000156
100 %		- 10	24,350,692,421	-15,514	-0.0000637
100 %		0	24,350,701,146	-24,239	-0.0000995
100 %		+ 10	24,350,693,263	-16,356	-0.0000672
100 %		+ 30	24,350,702,418	-25,511	-0.0001048
100 %		+ 40	24,350,688,366	-11,459	-0.0000471
100 %		+ 50	24,350,694,012	-17,105	-0.0000702
BATT. ENDPOINT	3.47	+ 20	24,350,654,787	22,120	0.0000908

Table 7-103. Frequency Stability Data (n258-R1)

### Note:

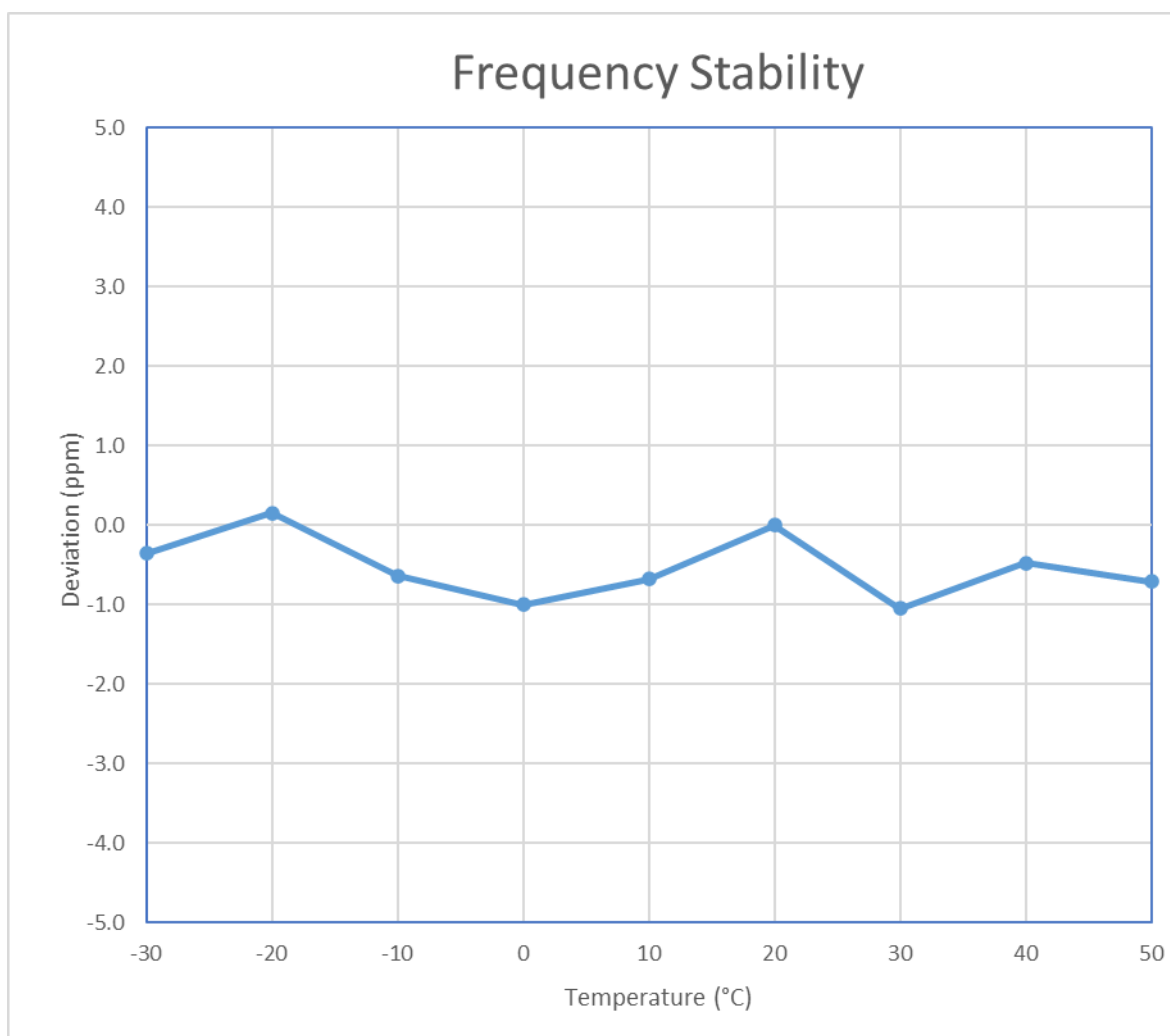
Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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## Frequency Stability Measurements (Band n258-R1)

\$2.1055



**Figure 7-1. Frequency Stability Graph (n258-R1)**

<b>FCC ID:</b> A3LSMS918U	<b>PART 30 MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2209010098-13.A3L	<b>Test Dates:</b> 9/12/2022 – 11/14/2022	<b>EUT Type:</b> Portable Handset	Page 192 of 214



## Frequency Stability Measurements (Band n261)

\$2.1055

OPERATING FREQUENCY: 27,924,960,000 Hz  
CHANNEL: 2077915  
REFERENCE VOLTAGE: 4.28 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.28	+ 20 (Ref)	27,925,607,126	0	0.0000000
100 %		- 30	27,925,600,703	6,423	0.0000230
100 %		- 20	27,925,581,521	25,605	0.0000917
100 %		- 10	27,925,587,569	19,557	0.0000700
100 %		0	27,925,602,566	4,560	0.0000163
100 %		+ 10	27,925,618,305	-11,179	-0.0000400
100 %		+ 30	27,925,614,830	-7,704	-0.0000276
100 %		+ 40	27,925,608,346	-1,220	-0.0000044
100 %		+ 50	27,925,597,767	9,359	0.0000335
BATT. ENDPOINT	3.47	+ 20	27,925,611,572	-4,446	-0.0000159

**Table 7-104. Frequency Stability Data (n261)**

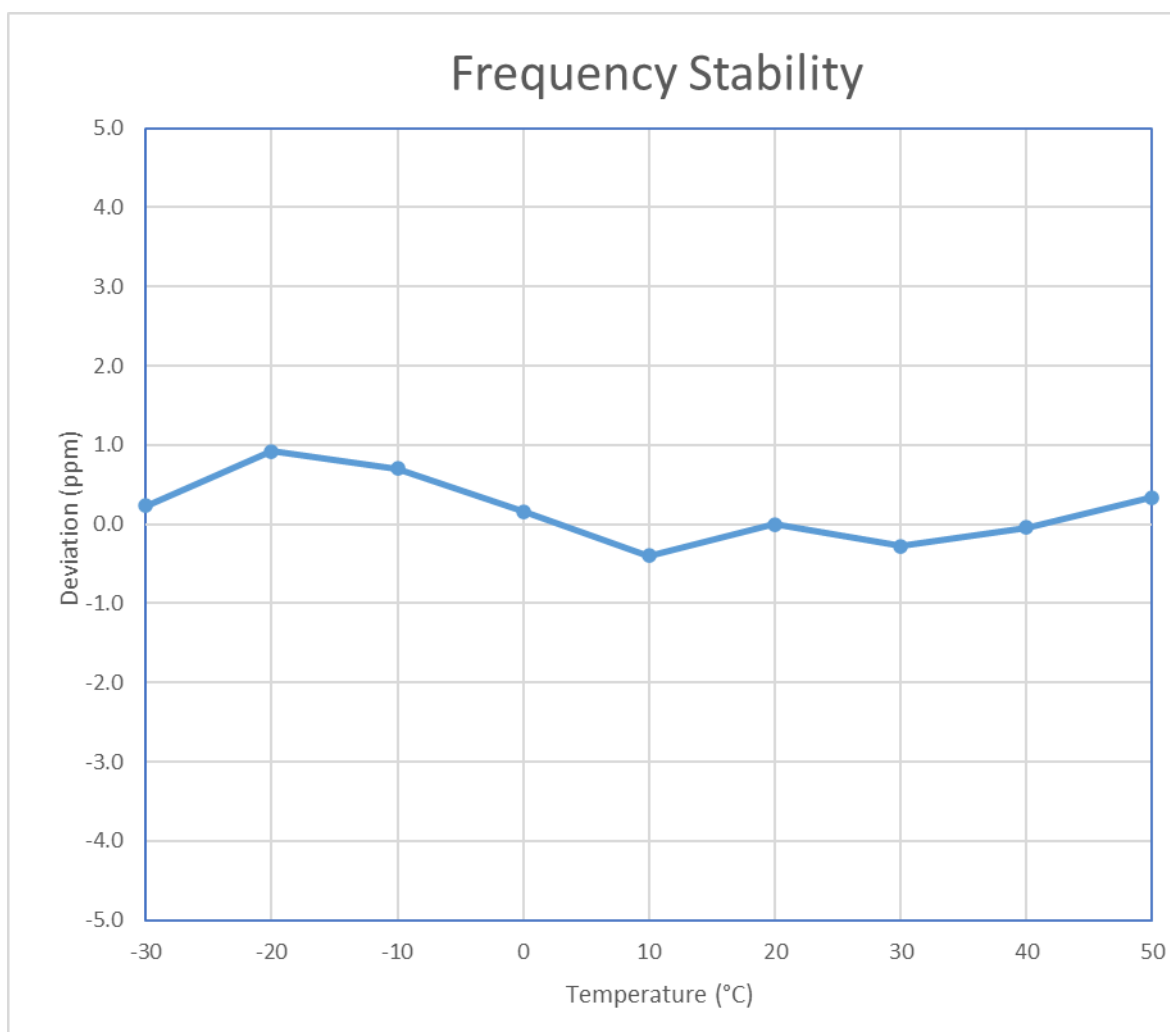
**Note:**

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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## Frequency Stability Measurements (Band n261)

§2.1055



**Figure 7-2. Frequency Stability Graph (n261)**

<b>FCC ID:</b> A3LSMS918U	<b>PART 30 MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Approved by:</b> Technical Manager
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## Frequency Stability Measurements (Band n260)

\$2.1055

OPERATING FREQUENCY: 38,499,960,000 Hz  
CHANNEL: 2254165  
REFERENCE VOLTAGE: 4.28 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.28	+ 20 (Ref)	38,500,645,231	0	0.0000000
100 %		- 30	38,500,616,964	28,267	0.0000734
100 %		- 20	38,500,589,460	55,771	0.0001449
100 %		- 10	38,500,597,236	47,995	0.0001247
100 %		0	38,500,625,394	19,837	0.0000515
100 %		+ 10	38,500,584,185	61,046	0.0001586
100 %		+ 30	38,500,621,799	23,432	0.0000609
100 %		+ 40	38,500,630,394	14,837	0.0000385
100 %		+ 50	38,500,615,867	29,364	0.0000763
BATT. ENDPOINT	3.47	+ 20	38,500,654,824	-9,593	-0.0000249

**Table 7-105. Frequency Stability Data (n260)**

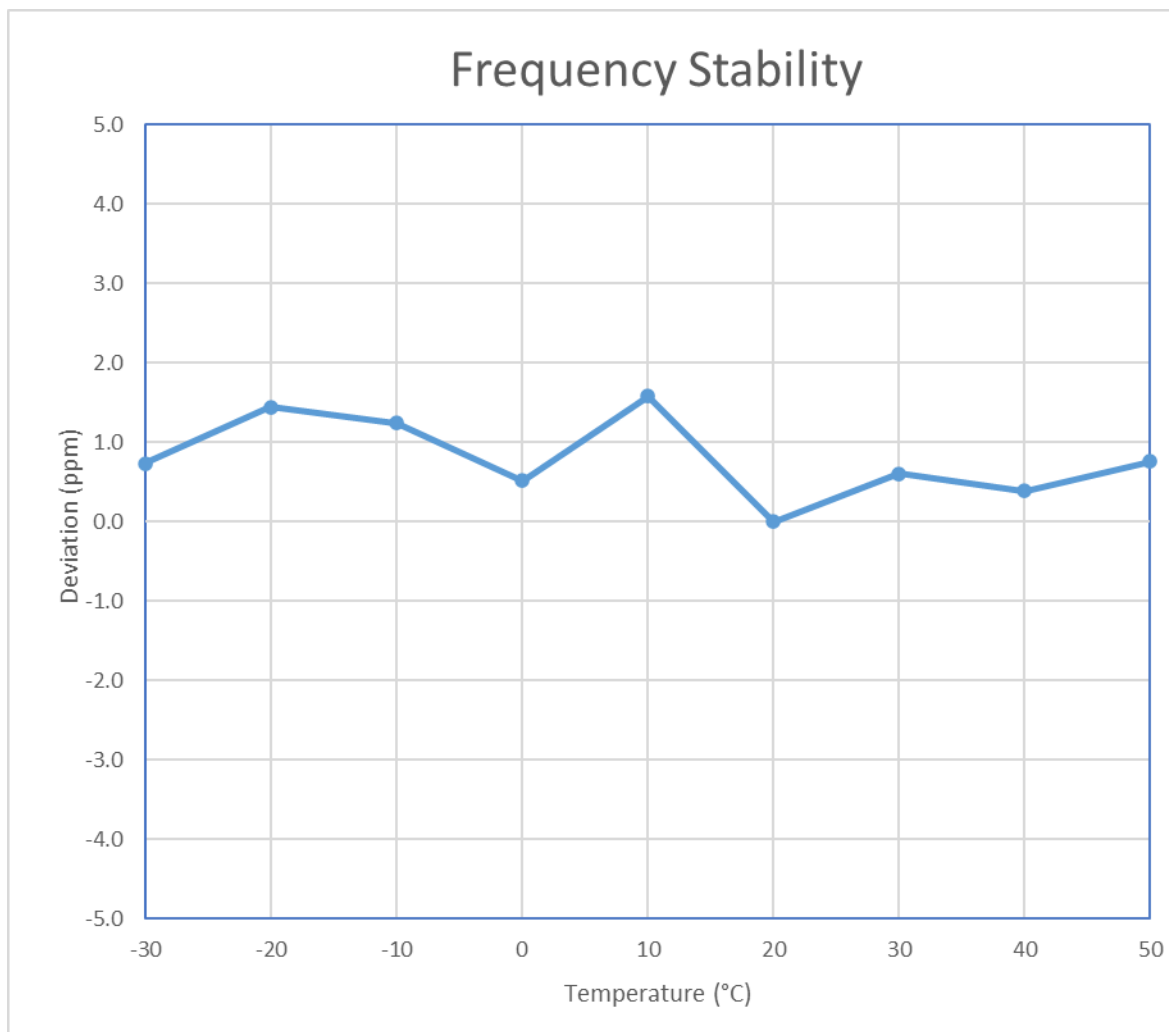
**Note:**

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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## Frequency Stability Measurements (Band n260)

§2.1055



**Figure 7-3. Frequency Stability Graph (n260)**

<b>FCC ID:</b> A3LSMS918U	<b>PART 30 MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2209010098-13.A3L	<b>Test Dates:</b> 9/12/2022 – 11/14/2022	<b>EUT Type:</b> Portable Handset	Page 196 of 214

## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset** **FCC ID: A3LSMS918U** complies with all the requirements of Part 30.

<b>FCC ID:</b> A3LSMS918U	<b>PART 30 MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2209010098-13.A3L	<b>Test Dates:</b> 9/12/2022 – 11/14/2022	<b>EUT Type:</b> Portable Handset	Page 197 of 214

## APPENDIX A – VDI MIXER VERIFICATION CERTIFICATE



**Virginia Diodes, Inc**  
979 2nd St. SE  
Suite 309  
Charlottesville, VA 22902  
Phone: 434-297-3257  
Fax: 434-297-3258

### Certificate of Conformance

To: PCTEST Engineering Laboratory  
7185 Oakland Mills Road  
Columbia, MD 21046  
United States

From: Virginia Diodes, Inc  
979 2nd St. SE  
Suite 309  
Charlottesville, VA 22902

Packing List No: 210808  
Shipping Date: 02/23/21

Today's Date: 02/24/21  
PO Number: 210119.DP1

Quantity Shipped	Unit	Description	Order-Job Number
1	EA	RETEST-WR19SAX SAX 411	21036-01
1	EA	RETEST-WR12SAX SAX 252	21036-02
1	EA	RETEST-WR8.0SAX SAX 253	21036-03
1	EA	RETEST-WR5.1SAX SAX 254	21036-04

The VDI product(s) in this shipment meet(s) the guidelines for performance specifications established in accordance with the corresponding Purchase Order. Data presented in the User Guide, where applicable, has been obtained in accordance with VDI's Quality Management System. All instruments, used to obtain data, which require calibration have been calibrated with equipment traceable to the National Institute of Standards and Technology (NIST) and through NIST to the International System of Units (SI).

  
Authorized Signature  
Virginia Diodes, Inc

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FCC ID: A3LSMS918U	PART 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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## APPENDIX B – TEST SCOPE ACCREDITATION



### SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ELEMENT MATERIALS TECHNOLOGY WASHINGTON DC LLC  
(formerly PCTEST)  
7185 Oakland Mills Road  
Columbia, MD 21046  
RJ Ortanez Phone: 410 290 6652

#### ELECTRICAL

Valid To: May 31, 2024

Certificate Number: 2041.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory at the location listed above, *as well as the three satellite laboratory locations listed below<sup>1</sup>*, to perform the following Electromagnetic Compatibility, SAR, HAC, Telecommunications, OTA, Battery, RF, and Conformance and Protocol testing of wireless devices:

#### Test Technology:

#### Test Method(s)<sup>2</sup>:

##### *Emissions*

Radiated and Conducted

CFR 47, FCC Part 15B (using ANSI C63.4:2014);  
CFR 47, FCC Part 18 (using MP-5:1986);  
CFR 47, FCC Parts 15/C/E (without DFS)/F/G/H  
(using ANSI C63.10:2013);  
CFR 47, FCC Part 15E (with DFS)  
(using FCC KDB 905462 D02 (v02));  
CFR 47, FCC Part 15D (using ANSI C63.17:2013);  
ANSI C63.10:2020; KDB 987594;  
ETSI TS 134 124 Universal Mobile Telecommunications System  
(UMTS); (3GPP TS 34.124); (3GPP TS38.124 NR;  
Electromagnetic Compatibility (EMC) Requirements for Mobile  
Terminals and Ancillary Equipment);  
ETSI TS 136 124 LTE; Evolved Universal Terrestrial Radio Access  
(E-UTRA); (3GPP TS 36.124);  
ETSI TS 151 010-1 Digital Cellular Telecommunications System  
(Phase 2+) (GSM);  
3GPP TS 51.010-1, Section 12 (Conducted and Radiated Spurious  
Emissions); EN55011; EN 55032; CNS 13438 (up to 6 GHz);  
AS/NZS CISPR 11; IEC/CISPR 11; CISPR 32; FCC OET/MP-5;  
ICES-003;  
KS C 9811; KS C 9832;  
VCCI V-3(2016.11);  
VCCI V-3 (2015.04); VCCI 32-1: VCCI-CISPR 32

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5202 Presidents Court, Suite 220 | Frederick, MD 21703-8515 | Phone: 301 644 3248 | Fax: 240 454 9449 | www.A2LA.org

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**Test Technology:**

**Test Method(s):**

Transmitter/Receiver

RSS-111; RSS-112; RSS-117; RSS-119; RSS-123; RSS-125;  
RSS-127; RSS-130; RSS-131; RSS-132; RSS-133; RSS-134;  
RSS-135; RSS-137; RSS-139; RSS-140; RSS-141; RSS-142;  
RSS-170; RSS-181; RSS-182; RSS-191; RSS-192; RSS-194;  
RSS-195; RSS-196; RSS-197; RSS-199; RSS-210; RSS-211;  
RSS-213; RSS-215; RSS-216; RSS-220; RSS-222; RSS-236;  
RSS-238; RSS-243; RSS-244; RSS-246; RSS-247; RSS-248;  
RSS-251; RSS-252; RSS-287; RSS-288; RSS-310; RSS-Gen

SAR/RF Exposure

IEEE 1528-2013; RSS-102;  
EN 50360-2017; EN 62209-1:2016; EN 62209-2:2010/A1:2019;  
IEC 62209-1 2<sup>nd</sup> Edition 2016; IEC 62209-2 2010;  
IEC PAS 63083-2017; EN 50566-2017; IEC 62209-2 AMD 1;  
Australian Communications Authority Radio Communications  
(Electromagnetic Radiation – Human Exposure) Standard 2014;  
ARPANSA RPS S-1(Rev.1):2021; Australia Radiocommunications  
Equipment (General) Rules 2021;  
FCC KDB 447498 D01, D02, D03 and D04;  
FCC KDB 616217 D04;  
FCC KDB 643646 D01;  
FCC KDB 865664 D01 and D02;  
FCC KDB 941225 D01, D05, D05A, D06, and D07;  
EN 50401:2017; EN 50385:2017; IEC 62311:2008;  
IEC 62479:2010; EN 62479:2010; EN 50663:2017;  
EN 62311:2007; EN 62232:2017; IEC 62232:2017;  
IEEE C95.1-1992; IEEE C95.1-2005; IEEE C95.1: 2019;  
IEEE C95.3-2002; IEEE C95.3-2021; IEC/IEEE 63195-1:2022;  
RSS-102 Measurement (SAR, RF Exp., NS, LPD); SPR-003;  
SPR-002; SPR-001; SPR-004; SPR-APD;  
IEC TR 62630:2010; IEEE C95.3.1:2010; IEC TR 63170:2018;  
AS/NZS 2772.2:2016; EN 62209-3: 2019; IEC 62209-3:2019;  
ICNIRP (100kHz – 300 GHz):2020;  
IEC 62311:2019; EN 62311:2020; IEC/IEEE 62209-1528:2020;  
EN IEC/IEEE 62209-1528; IEC PAS 63184:2021;  
RRA Public Notification 2018-18, December 7, 2018  
KS C 3370-1, KS C 3370-2

Hearing Aid Compatibility

ANSI C63.19:2011; ANSI C63.19:2019;  
CTIA Test Plan for Hearing Aid Compatibility v.3.1.1 (2017);  
RSS-HAC; ANSI/TIA-5050-2018

United States Radio

47 CFR FCC Parts 20, 22, 24, 25, 27, 30, 73, 74, 80, 87, 90, 95,  
96, 97, 101 (using ANSI/TIA-603-E, TIA-102.CAAA-E,  
ANSI C63.26:2015)

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**Test Technology:**

European Radio

Taiwan Radio

Korean Radio

Australia/New Zealand Radio

*RF, Protocol, and RRM Conformance*  
5G NR

**Test Method(s)<sup>1</sup>:**

ETSI EN 302 065-1; ETSI EN 302 065-2; ETSI EN 302 065-3;  
ETSI EN 302 065-4; ETSI EN 302 291-1; ETSI EN 302 291-2;  
ETSI EN 302 502; ETSI EN 302 510-1; ETSI EN 302 510-2;  
ETSI EN 302 537; ETSI EN 301 511; ETSI EN 301 839;  
ETSI EN 301 893; ETSI EN 301 893; ETSI EN 301 908-1;  
ETSI EN 301 908-13; ETSI EN 300 220-2;  
ETSI EN 300 220-3-1; ETSI EN 300 220-3-2;  
ETSI EN 300 220-4; ETSI EN 300 328; ETSI EN 300 328;  
ETSI EN 300 330; ETSI EN 300 440; ETSI EN 300 440-2

LP0002; DGT LP0002

Regulations on Radio Equipment  
(MSIT Ordinance MSIT No. 86, Jan. 4, 2022);  
Unlicensed Radio Equipment Established Without Notice  
(MSIT Public Notification 2022-20, May 10, 2022);  
Technical Requirements for the Human Protection against  
Electromagnetic Waves  
(MSIT Public Notification 2019-4, January 16, 2019);  
Equipment to be Subject of the Test Procedure for Electromagnetic  
Field Strength and Specific Absorption Rate  
(RRA Public Notification (2021-16, October 12, 2021);  
Technical Requirements for Radio Equipment for  
Telecommunication Services  
(RRA Public Notification 2022-15 July 29, 2022);  
Technical Requirements for Measurement and Test Procedure of  
Specific Absorption Rate  
(RRA Public Notification 2018-18, Dec 7, 2018);  
Technical Requirements for Measurement of Electromagnetic Field  
Strength (RRA Public Notification 2021-22 Nov 29, 2021);  
KS X 3123; KS X 3142; KS X 3270; KS X 3271

AS/NZS 4268:2017

3GPP TS 38.508-1; 3GPP TS 38.508-2; 3GPP TS 38.521-1;  
3GPP TS 38.521-2; 3GPP TS 38.521-3; 3GPP TS 38.521-4;  
3GPP TS 38.522; 3GPP TS 38.523-1; 3GPP TS 38.523-2;  
3GPP TS 38.523-3; 3GPP TS 38.533; 3GPP TS 34.229-5;  
VZW 5G NR FR2 RFOTA;  
VZW 5G Protocol Pre-Conformance (TS 38.523-1);  
VZW 5G NR FR1 Supp RF;  
VZW 5G NR RF Pre Conformance (TS 38.521-3);  
VZW 5G NR Radio Resource Management (RRM)  
Pre-Conformance (TS 38.533); 5G NR FR1 Performance/DEMOM  
Pre Conformance (TS 38.521-4); VZW 5G NR SA Data Retry;  
VZW 5G NR SA Voice Services Fallback

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**Test Technology:**

5G NR (cont.)

LTE

WCDMA (UTRA)

SVLTE / Multimode

VoLTE

Carrier Aggregation

**Test Method(s):**

VZW 5G NR SA Voice, VZW Video and Messaging; VZW 5G NR SA System Selection; VZW 5G WEA TP; VZW 5G Iconography AT&T 10776 Test Plans(5G/4G/3G/2G)

3GPP TS 36.521-1; 3GPP TS 36.521-3; 3GPP TS 36.523-1; 3GPP 37.571-1; 3GPP 37.571-2; 3GPP TS 34.229-1; ETSI EN 301 908-13 Version 13.1.1 (2019-11); 3GPP Carrier Aggregation; PTCRB NAPRD.03; PTCRB PPMD; PTCRB Cat-M (per RFT132 eMTC); PVG.09 LTE Data Throughput & TR 37.901 Data Throughput Performance; PVG.04 PTCRB Radiated Spurious Emissions; Global Certification Forum (GCF-CC) Certification / LTE Field Test (TS.11); 3GPP Cat-NB & Cat-M; MetroPCS Lab Conformance; AT&T LTE Conformance; AT&T IoT Accelerator Conformance, 19263; VZW Lab Conformance; VZW Supl RF; VZW FR2 Supplementary RF; VZW FR1 Supplementary RF; VZW Supl Signaling Conformance; VZW Supl RRM; VZW LTE LBS Performance; VZW Safe for Network (SFN), VZW Phase 1, VZW Open Development and Field Interoperability Testing (FIT) <sup>3</sup>; VZW Network Extender; VZW PCO; VZW Data Retry; VZW Data Throughput; VZW SMS; VZW AT Commands; VZW CMAS; VZW eMBMS; VZW APN; VZW Cat-M VoLTE; Live Network Extender and Android Test Plan; USCC Lab Conformance; KDDI LTE Device Testing; SoftBank LTE Testing

3GPP TS 34.121-1; 3GPP TS 34.123-1; SoftBank Mobile WCDMA Testing

E911 Data Call Processing; Stress Testing; RSSI for MM Devices; LTE LBS Performance; VZW Multimode Supl Signaling; VZW Multimode SMS; VZW Multimode Data Retry

IMS VoIP; Rich Communication Services (RCS); IMS Registration and Retry; ePDG Live Network; E911 for VoLTE; VZW hVoLTE; VZW VoIP and VT Performance; VZW Interband RRM and Protocol

VZW Carrier Aggregation Supplementary RF; VZW Carrier Aggregation Data Throughout

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**Test Technology:**

UICC

**Test Method(s)<sup>1</sup>:**

USIM/USAT/CSIM/ISIM Interaction Test Plan  
(LTE/WCDMA/GSM/CDMA/MM);  
3GPP TS 31.121; 3GPP TS 31.124;  
ETSI TS 102 230;  
SIM Application Interaction Test Plan;  
UICC USIM ISIM Electrical;  
UICC USIM ISIM Protocol  
(LTE/WCDMA/GSM/CDMA);  
SWP/HCI ETSI TS 102 694-1; ETSI TS 102 695-1

SunSpec Alliance

SunSpec – CSIP (Common Smart Inverter Profile) Conformance  
Test Procedures;  
SunSpec – Advanced Function Inverter Test Lab Specification;  
SunSpec – UL1741 Supplement SA/Rule 21 Implementation  
Guide;  
IEEE 2030.5-2018 Smart Energy Profile Application Protocol

CBRS - OnGo/WinnForum

OnGo Alliance Certification Test Plan;  
WinnForum Conformance and Performance Test Technical  
Specification, WINNF-TS-0122

<sup>1</sup> This accreditation covers testing performed at the main laboratory listed above, and the three satellite laboratories listed below:

ELEMENT MATERIALS TECHNOLOGY WASHINGTON DC LLC  
(formerly PCTEST)  
7195 Oakland Mills Rd, Suite A  
Columbia, MD

**Test Technology:**

*Emissions*  
Radiated and Conducted

**Test Method(s)<sup>1</sup>:**

CFR 47, FCC Part 15B (using ANSI C63.4:2014);  
CFR 47, FCC Part 18 (using MP-5:1986);  
CFR 47, FCC Parts 15/C/E (without DFS)/F/G/H  
(using ANSI C63.10:2013);  
CFR 47, FCC Part 15E (with DFS)  
(using FCC KDB 905462 D02 (v02));  
CFR 47, FCC Part 15D (using ANSI C63.17:2013);  
ANSI C63.10:2020; KDB 987594;  
ETSI TS 134 124 Universal Mobile Telecommunications System  
(UMTS); (3GPP TS 34.124);  
ETSI TS 136 124 LTE; Evolved Universal Terrestrial Radio  
Access (E-UTRA); (3GPP TS 36.124); (3GPP TS38.124 NR;  
Electromagnetic Compatibility (EMC) Requirements for Mobile  
Terminals and Ancillary Equipment);  
ETSI TS 151 010-1 Digital Cellular Telecommunications System  
(Phase 2+) (GSM); 3GPP TS 51.010-1, Section 12 (Conducted  
and Radiated Spurious Emissions); EN55011; EN 55032;

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<u>Test Technology:</u>	<u>Test Method(s) <sup>2</sup>:</u>
Radiated and Conducted (cont.)	CNS 13438 (up to 6 GHz); AS/NZS CISPR 11; IEC/CISPR 11; CISPR 32; FCC OET/MP-5; ICES-003; KS C 9811; KS C 9832; VCCI V-3(2016.11); VCCI V-3 (2015.04); VCCI 32-1; VCCI-CISPR 32
Transmitter/Receiver	RSS-111; RSS-112; RSS-117; RSS-119; RSS-123; RSS-125; RSS-127; RSS-130; RSS-131; RSS-132; RSS-133; RSS-134; RSS-135; RSS-137; RSS-139; RSS-140; RSS-141; RSS-142; RSS-170; RSS-181; RSS-182; RSS-191; RSS-192; RSS-194; RSS-195; RSS-196; RSS-197; RSS-199; RSS-210; RSS-211; RSS-213; RSS-215; RSS-216; RSS-220; RSS-222; RSS-236; RSS-238; RSS-243; RSS-244; RSS-246; RSS-247; RSS-248; RSS-251; RSS-252; RSS-287; RSS-288; RSS-310; RSS-Gen No IS
Hearing Aid Compatibility	ANSI C63.19:2011; ANSI C63.19:2019; CTIA Test Plan for Hearing Aid Compatibility v.3.1.1 (2017); RSS-HAC; ANSI/TIA-5050-2018
United States Radio	47 CFR FCC Parts 20, 22, 24, 25, 27, 30, 73, 74, 80, 87, 90, 95, 96, 97, 101 (using ANSI/TIA-603-E, TIA-102.CAAA-E, ANSI C63.26:2015)
European Radio	ETSI EN 302 065-1; ETSI EN 302 065-2; ETSI EN 302 065-3; ETSI EN 302 065-4; ETSI EN 302 291-1; ETSI EN 302 291-2; ETSI EN 302 502; ETSI EN 302 510-1; ETSI EN 302 510-2; ETSI EN 302 537; ETSI EN 301 511; ETSI EN 301 839; ETSI EN 301 893; ETSI EN 301 893; ETSI EN 301 908-1; ETSI EN 301 908-13; ETSI EN 300 220-1; ETSI EN 300 220-2; ETSI EN 300 328; ETSI EN 300 328; ETSI EN 300 330; ETSI EN 300 440; ETSI EN 300 440-2
Taiwan Radio	LP0002 (2020); DGT LP0002
Korean Radio	Regulations on Radio Equipment (MSIT Ordinance MSIT No. 86, Jan. 4, 2022); Unlicensed Radio Equipment Established Without Notice (MSIT Public Notification 2022-20, May 10, 2022); Technical Requirements for the Human Protection against Electromagnetic Waves (MSIT Public Notification 2019-4, January 16, 2019); Equipment to be Subject of the Test Procedure for Electromagnetic Field Strength and Specific Absorption Rate (RRA Public Notification (2021-16, October 12, 2021); Technical Requirements for Radio Equipment for Telecommunication Services (RRA Public Notification 2022-13 Jun 28, 2022);

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<u>Test Technology:</u>	<u>Test Method(s) <sup>1</sup>:</u>
Korean Radio (cont.)	Technical Requirements for Measurement and Test Procedure of Specific Absorption Rate (RRA Public Notification 2018-18, Dec 7, 2018); Technical Requirements for Measurement of Electromagnetic Field Strength (RRA Public Notification 2021-22 Nov 29, 2021); KS X 3123; KS X 3142; KS X 3270; KS X 3271
Australia/New Zealand Radio	AS/NZS 4268:2017
OTA	CTIA Test Plan for Wireless Device Over-the-Air Performance PTCRB NAPRD03; PTCRB PPMD; VZW OTA Radiated Performance for CDMA & LTE Multimode Devices; VZW LTE Over the Air Radiated Performance Test Plan; VZW Location Determination Test Plan; VZW LTE-LBS Performance Test Plan; T-Mobile Radiated Performance TRD; AT&T 13340 OTA; AT&T IoT Accelerator; USCC CDMA Over The Air Radiated Test Plan; USCC LTE Over The Air Radiated Test Plan; CTIA Test Plan for RF Performance Evaluation of Wi-Fi Mobile Converged Devices (Wi-Fi Alliance); GSMA TS.24 Operator Acceptance Values for Device Antenna Performance; 3GPP TS 34.114 Technical Specification UE/MS OTA Antenna Performance; 3GPP TS 37.544 Technical Specification UTRA & E-UTRA UE OTA Antenna Performance
<i>Wired and Wireless Conformance</i>	
CTIA IoT Security	CTIA Cybersecurity Certification Test Plan for IoT Devices
SunSpec Alliance	SunSpec – CSIP (Common Smart Inverter Profile) Conformance Test Procedures; SunSpec – Advanced Function Inverter Test Lab Specification; SunSpec – UL1741 Supplement SA/Rule 21 Implementation Guide; IEEE 2030.5-2018 Smart Energy Profile Application Protocol
CBRS - OnGo/WinnForum	OnGo Alliance Certification Test Plan; WinnForum Conformance and Performance Test Technical Specification, WINNF-TS-0122

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ELEMENT MATERIALS TECHNOLOGY WASHINGTON DC LLC  
(formerly PCTEST)  
9017-F/G Mendenhall Court  
Columbia, MD 21045

**Test Technology:**

Battery Safety

**Test Method(s) <sup>2</sup>:**

IEEE 1725 Standard for Rechargeable Batteries for Cellular Telephones;  
CTIA Certification Requirements for Battery System Compliance to IEEE 1725;  
- Exclusions: Section 6.2 (DC-DC testing only);  
Section 7 (Certified Adapters only);  
IEEE 1625 Standard for Rechargeable Batteries for Multi-Cell Mobile Computing Devices;  
CTIA Certification Requirements for Battery System Compliance to IEEE 1625;  
UL1642 Standard for Lithium Batteries;  
UL 2054 Household and Commercial Batteries;

IEC 62133-2 Secondary Cells and Batteries containing Alkaline or other Non-Acid Electrolytes – Safety Requirements for Portable Sealed Secondary Cells & Batteries made from them, for use in Portable Applications

IEC 61960-3 Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary lithium and batteries for portable applications – Part 3: Prismatic and cylindrical lithium secondary cells, and batteries made from them

UNDOT  
Battery Transportation Safety

United Nations Document ST/SG/AC.10/11/Section 38.3  
Recommendations on the Transport of Dangerous Goods;  
Manual of Tests and Criteria;  
IEC 62281 – Safety of Primary and Secondary Lithium Cells and Batteries During Transport

Aerospace - Battery Performance and Safety

NASA Specification for Acceptance Testing of Commercial Lithium-Ion Cell Lots Engineering Directorate Propulsion & Power Division, EP-WI-031

Hardware Reliability

CTIA Device Hardware Reliability Test Plan

Determining Battery Life

CTIA Battery Life Test Plan

ESD Immunity

EN/IEC 61000-4-2

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3801 E. Plano Parkway, Ste 150  
Plano, TX 75074

**Test Technology:**

**Test Method(s) <sup>2</sup>:**

Radiated Emissions  
(10 Meter Test Distance)  
(Frequency Range, 30 MHz – 1 GHz)

CFR 47, FCC Parts 15B (using ANSI C63.4:2014);  
EN55011; EN 55032; CNS 13438 (up to 6 GHz); AS/NZS CISPR  
11; IEC/CISPR 11; CISPR 32; FCC OET/MP-5; ICES-003;  
KS C 9811; KS C 9832;  
VCCI V-3(2016.11);  
VCCI V-3 (2015.04); VCCI 32-1; VCCI-CISPR 32

EMC

ETSI EN 301 489-1; ETSI EN 301 489-3; ETSI EN 301 489-17;  
ETSI EN 301 489-19; ETSI EN 301 489-52; EN 55024

2.4 GHz Wi-Fi & BT RF

ETSI EN 300 328

5 GHz W-Fi

ETSI EN 301 893

GPS

ETSI EN 303 413

SRD1

ETSI EN 300 440; ETSI EN 300 330

LTE RF

ETSI EN 301 908-1; ETSI EN 301 908-13

WCDMA RF

ETSI EN 301 908-1; ETSI EN 301 908-2

GSM RF

ETSI EN 301 511

<sup>2</sup> When the date, edition, version, etc. is not identified in the scope of accreditation, laboratories may use the version that immediately precedes the current version for a period of one year from the date of publication of the standard measurement method, per part C., Section 1 of A2LA R101 - *General Requirements- Accreditation of ISO-IEC 17025 Laboratories*.

Testing Activities Performed in Support of FCC Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.<sup>3</sup>:

Rule Subpart/Technology	Test Method	Maximum Frequency
<u>Unintentional Radiators</u> Part 15B	ANSI C63.4:2014	40000 MHz
<u>Industrial, Scientific, and Medical Equipment</u> Part 18	FCC MP-5 (February 1986)	330000 MHz
<u>Intentional Radiators</u> Part 15C	ANSI C63.10:2013	330000 MHz
<u>Unlicensed Personal Communication</u>		

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Testing Activities Performed in Support of FCC Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.3:

Rule Subpart/Technology	Test Method	Maximum Frequency
<u>Systems Devices</u>		
Part 15D	ANSI C63.17:2013	20000 MHz
<u>U-NII without DFS Intentional Radiators</u>		
Part 15E	ANSI C63.10:2013	40000 MHz
<u>U-NII with DFS Intentional Radiators</u>		
Part 15E	FCC KDB 905462 D02 (v02)	40000 MHz
<u>UWB Intentional Radiators</u>		
Part 15F	ANSI C63.10:2013	200000 MHz
<u>BPL Intentional Radiators</u>		
Part 15G	ANSI C63.10:2013	40000 MHz
<u>White Space Device Intentional Radiators</u>		
Part 15H	ANSI C63.10:2013	40000 MHz
<u>Commercial Mobile Services (FCC Licensed Radio Service Equipment)</u>		
Parts 22 (cellular), 24, 25 (below 3 GHz), and 27	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	330000 MHz
<u>General Mobile Radio Services (FCC Licensed Radio Service Equipment)</u>		
Parts 22 (non-cellular), 90 (below 3 GHz), 95 (below 3 GHz), 97 (below 3 GHz), and 101 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	330000 MHz
<u>Citizens Broadband Radio Services (FCC Licensed Radio Service Equipment)</u>		
Part 96	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	330000 MHz
<u>Maritime and Aviation Radio Services</u>		
Parts 80 and 87	ANSI/TIA-603-E; ANSI C63.26:2015	330000 MHz
<u>Microwave and Millimeter Bands Radio Services</u>		
Parts 25, 30, 74, 90 (above 3 GHz), 95 (above 3 GHz), 97 (above 3 GHz), and 101	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	330000 MHz
<u>Broadcast Radio Services</u>		
Parts 73 and 74 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	330000 MHz
<u>RF Exposure</u>		

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Testing Activities Performed in Support of FCC Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.<sup>3</sup>:

Rule Subpart/Technology	Test Method	Maximum Frequency
Devices Subject to SAR Requirements	IEEE Std 1528:2013	6000 MHz
<u>Hearing Aid Compatibility</u> Part 20 (HAC for Commercial Mobile Services)	ANSI C63.19:2011	6000 MHz
<u>Signal Boosters</u> Part 20 (Wideband Consumer Signal Boosters, Provider-specific signal boosters, and Industrial Signal Boosters) Section 90.219	ANSI C63.26:2015	330000 MHz

<sup>3</sup>Accreditation does not imply acceptance to the FCC equipment authorization program. Please see the FCC website (<https://apps.fcc.gov/oetcf/eas/>) for a listing of FCC approved laboratories.

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