



427 West 12800 South
Draper, UT 84020

Test Report Certification

FCC ID	SWX-U6PRO
IC ID	6545A-U6PRO
Equipment Under Test	U6-Pro
Test Report Serial Number	TR5011_02
Date of Test(s)	23 – 29 July and 11 – 17 August 2020
Report Issue Date	17 August 2020

Test Specification	Applicant
47 CFR FCC Part 15, Subpart C	Ubiquiti Inc. 685 Third Avenue New York, NY 10019 U.S.A.



NVLAP LAB CODE 600241-0

Certification of Engineering Report

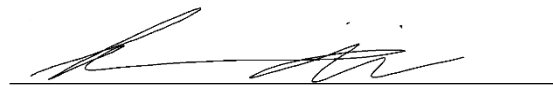
This report has been prepared by Unified Compliance Laboratory (UCL) to document compliance of the device described below with the requirement of Federal Communication Commissions (FCC) Part 15, Subpart C. This report may be reproduced in full. Partial reproduction of this report may only be made with the written consent of the laboratory. The results in this report apply only to the sample tested.

Applicant	Ubiquiti Inc.
Manufacturer	Ubiquiti Inc.
Brand Name	UniFi
Model Number	U6-Pro
FCC ID	SWX-U6PRO
IC ID	6545A-U6PRO

On this 17th day of August 2020, I individually and for Unified Compliance Laboratory certify that the statements made in this engineering report are true, complete and correct to the best of my knowledge and are made in good faith.

Although NVLAP has accredited the Unified Compliance Laboratory testing facilities, this report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government.

Unified Compliance Laboratory



Written By: Alex Macon



Reviewed By: Joseph W. Jackson

Revision History		
Revision	Description	Date
01	Original Report Release	17 August 2020
02	Added KDB 662911 Reference in Table 3.3.1	18 August 2020

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1 Client Information

1.1 Applicant

Company	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A.
Contact Name	Mark Feil
Title	Compliance Manager

1.2 Manufacturer

Company	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A.
Contact Name	Mark Feil
Title	Compliance Manager

2 Equipment Under Test (EUT)

2.1 Identification of EUT

Brand Name	UniFi
Model Number	U6-Pro
Serial Number	7483C29FF2FB
Dimensions (cm)	22.0 x 22.0 x 4.8

2.2 Description of EUT

The U6-Pro is a Wi-Fi 6 access point designed for wide-ranging wireless coverage while maintaining overall network capacity. It delivers an aggregate radio rate of up to 2.7 Gbps with 5 GHz (4x4 MU-MIMO and OFDMA) and 2.4 GHz (2x2 MIMO) radios. U6-Pro uses a sophisticated antenna design with sideways amplification to offer excellent range when mounted horizontally. U6-Pro combines its purpose-built antenna with powerful Wi-Fi 6 features like OFDMA, beamforming, and BSS coloring for reliable long-range wireless performance.

This report covers the circuitry of the device subject to FCC Part 15, Subpart C. The circuitry of the device subject to FCC Part 15 Subpart B was found to be compliant and is covered under a separate Unified Compliance Laboratory test report.

2.3 EUT and Support Equipment

The EUT and support equipment used during the test are listed below.

Brand Name Model Number Serial Number	Description	Name of Interface Ports / Interface Cables
BN: Unifi MN: U6-Pro SN: 7483C29FF2FB	WiFi Access Point	See Section 2.4
BN: Ubiquiti MN: U-POE-af SN: N/A	POE Power Adapter	Shielded or Un-Shielded Cat 5e cable (Note 2)
BN: Dell MN: XPS 13 SN: N/A	Laptop PC	Shielded or Un-Shielded Cat 5e cable (Note 2)

Notes: (1) EUT

(2) Interface port connected to EUT (See Section 2.4)

The support equipment listed above was not modified in order to achieve compliance with this standard.

2.4 Interface Ports on EUT

Name of Ports	No. of Ports Fitted to EUT	Cable Description/Length
AC Mains	1	3 conductor power cord/80 cm
POE (POE Injector)	1	Shielded Cat 5e cable/8 meters
LAN (POE Injector)	1	Unshielded Cat 5e cable/1 meter

2.5 Operating Environment

Power Supply	120 VAC
AC Mains Frequency	60 Hz
Temperature	27.3 – 28.5 °C
Humidity	22.3 – 37.4 %
Barometric Pressure	1015 psi

2.6 Operating Modes

The U6-Pro was tested using test software in order to enable to constant transmission of over 98% All emission modes of 802.11 b/g/n were investigated.

2.7 EUT Exercise Software

Ubiquiti test software and firmware were used to control the transceivers of the EUT. (ART)

2.8 Block Diagram of Test Configuration

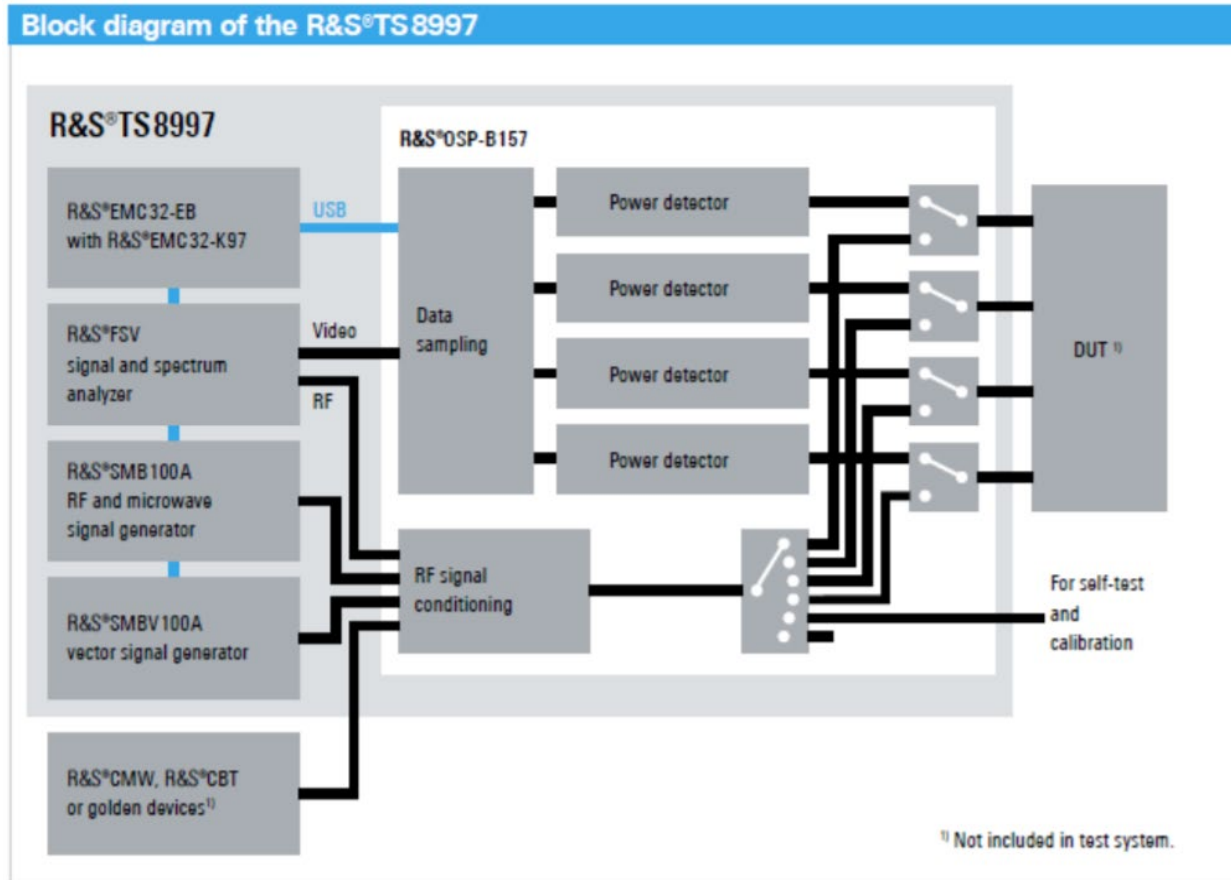


Diagram 1: Test Configuration Block Diagram

2.9 Modification Incorporated/Special Accessories on EUT

There were no modifications made to the EUT during testing to comply with the specification.

2.10 Deviation, Opinions Additional Information or Interpretations from Test Standard

There were no deviations, opinions, additional information or interpretations from the test specification.

3 Test Specification, Method and Procedures

3.1 Test Specification

Title	47 CFR FCC Part 15, Subpart C 15.203, 15.207 and 15.247 Limits and methods of measurement of radio interference characteristics of radio frequency devices.
Purpose of Test	The tests were performed to demonstrate initial compliance

3.2 Methods & Procedures

3.2.1 47 CFR FCC Part 15 Section 15.203

See test standard for details.

3.2.2 47 CFR FCC Part 15 Section 15.207

See test standard for details.

3.2.3 47 CFR FCC Part 15 Section 15.247

See test standard for details.

3.3 FCC Part 15, Subpart C

3.3.1 Summary of Tests

FCC Section	ISED Section	Environmental Phenomena	Frequency Range (MHZ)	Result
15.203	N/A	Antenna requirements	Structural Requirement	Compliant
15.207	RSS-Gen	Conducted Disturbance at Mains Port	0.15 to 30	Compliant
15.247(a)	RSS-247 § 5.2	Bandwidth Requirement	2400 to 2483.5	Compliant
15.247(b)	RSS-247 § 5.4	Peak Output Power	2400 to 2483.5	Compliant
15.247(d)	RSS-247 § 5.4	Antenna Conducted Spurious Emissions	0.009 to 25000	Compliant
15.247(d)	RSS-247 § 5.4	Radiated Spurious Emissions	0.009 to 25000	Compliant
15.247(e)	RSS-247 § 5.2	Peak Power Spectral Density	2400 to 2483.5	Compliant
The testing was performed according to the procedures in ANSI C63.10-2013, KDB 558074 and 47 CFR Part 15. The conducted power was summed per FCC KDB 662911 in sections 5.4 and 5.6.				

3.4 Results

In the configuration tested, the EUT complied with the requirements of the specification.

3.5 Test Location

Testing was performed at the Unified Compliance Laboratory 10-Meter chamber located at 427 West 12800 South, Draper, UT 84020. Unified Compliance Laboratory is accredited by National Voluntary Laboratory Accreditation Program (NVLAP); NVLAP Code 600241-0 which is effective until 30 June 2020. This site has also been registered with Innovations, Science and Economic Development (ISED) department and was accepted under Appendix B, Phase 1 procedures of the APEC Tel MRA for Canadian recognition. ISED No.: 25346, effective until June 30, 2021. Unified Compliance Laboratory has been assigned Conformity Assessment Number US0223 by ISED.

4 Test Equipment

4.1 Conducted Emissions at Mains Ports

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
EMI Receiver	AFJ	FFT3010	UCL-2500	12/14/2018	8/17/2020
LISN	AFJ	LS16C/10	UCL-2512	5/26/2020	5/26/2021

Table 1: List of equipment used for Conducted Emissions Testing at Mains Port

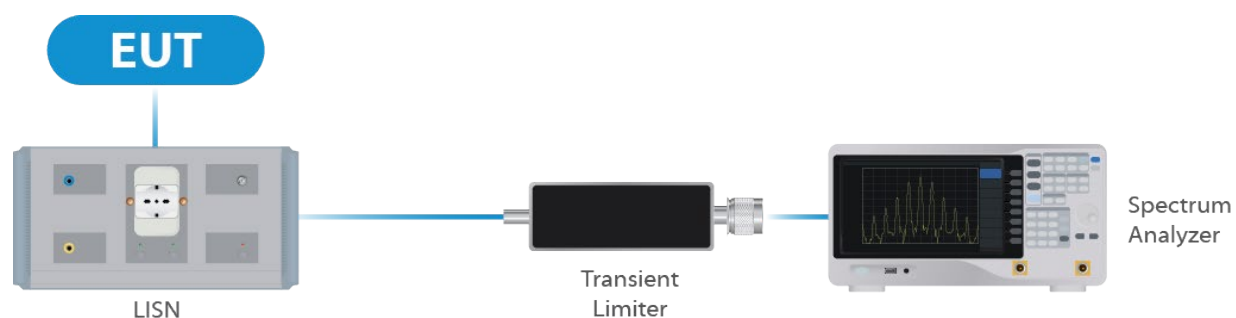


Figure 1: Conducted Emissions Test

4.2 Direct Connect at the Antenna Port Tests

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
Spectrum Analyzer	R&S	FSV40	UCL-2861	06/12/2019	08/12/2020
Signal Generator	R&S	SMB100A	UCL-2864	N/A	N/A
Vector Signal Generator	R&S	SMBV100A	UCL-2873	N/A	N/A
Switch Extension	R&S	OSP-B157WX	UCL-2867	06/13/2019	08/13/2020
Switch Extension	R&S	OSP-150W	UCL-2870	06/14/2019	08/14/2020

Table 2: List of equipment used for Direct Connect at the Antenna Port

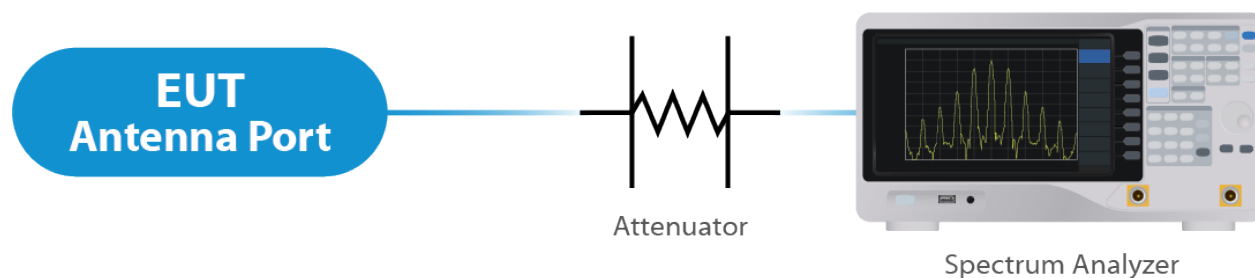


Figure 2: Direct Connect at the Antenna Port Test

4.3 Radiated Emissions

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
Spectrum Analyzer	R&S	FSV40	UCL-2861	06/12/2019	08/12/2020
Pre-Amplifier	Sonoma Instruments	310N	UCL-2889	9/13/2018	9/16/2020
Double Ridge Horn Antenna	Scwarzbeck	BBHA 9120D	UCL-3065	4/11/2019	8/3/2020
Log Periodic	Scwarzbeck	STLP 9129	UCL-3068	4/11/2019	8/3/2020
15 - 40 GHz Horn Antenna	Scwarzbeck	BBHA 9170	UCL-2487	2/15/2017	8/16/2020
18 – 40 GHz Amplifier	Scwarzbeck	BBV 9721	UCL-2490	4/1/2019	8/1/2020
0.5 – 18 GHz Amplifier	Scwarzbeck	BBV 9718C	UCL-2493	4/1/2019	8/1/2020
Loop Antenna	Com-Power	AL-130R	UCL-2596	10/26/2018	8/23/2020
Test Software	UCL	Revision 1	UCL-3108	N/A	N/A

Table 3: List of equipment used for Radiated Emissions

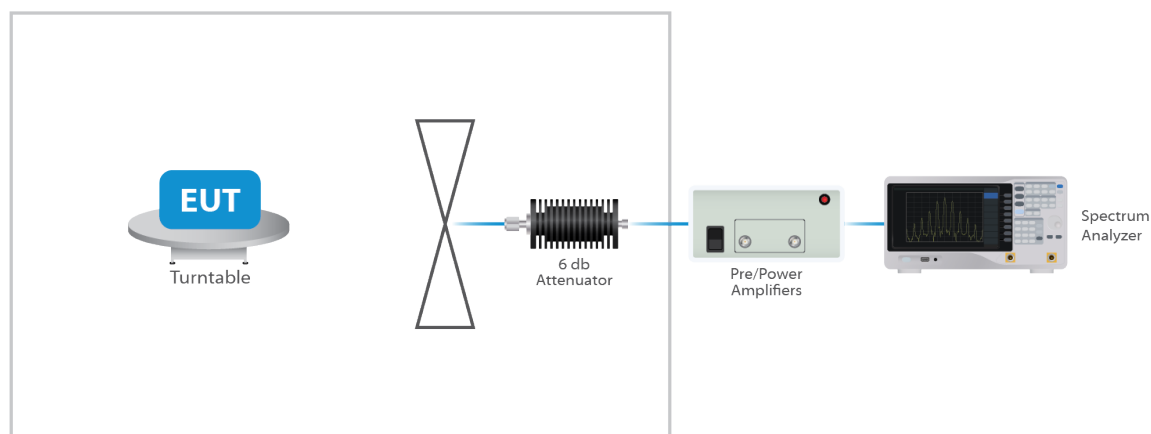


Figure 3: Radiated Emissions Test

4.4 Equipment Calibration

All applicable equipment is calibrated using either an independent calibration laboratory or Unified Compliance Laboratory personnel at intervals defined in ANSI C63.4:2014 following outlined calibration procedures. All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to traceability is on file and is available for examination upon request.

4.5 Measurement Uncertainty

Test	Uncertainty ($\pm$ dB)	Confidence (%)
Conducted Emissions	1.44	95
Radiated Emissions (9 kHz to 30 MHz)	2.50	95
Radiated Emissions (30 MHz to 1 GHz)	3.95	95
Radiated Emissions (1 GHz to 18 GHz)	5.56	95
Radiated Emissions (18 GHz to 40 GHz)	5.16	95
Direct Connect Tests	K Factor	Value
Emissions Bandwidth	2	2.0%
Output Power	2	1.0 dB
Peak Power Spectral Density	2	1.3 dB
Band Edge	2	0.8 dB
Transmitter Spurious Emissions	2	1.8 dB

5 Test Results

5.1 §15.203 Antenna Requirements

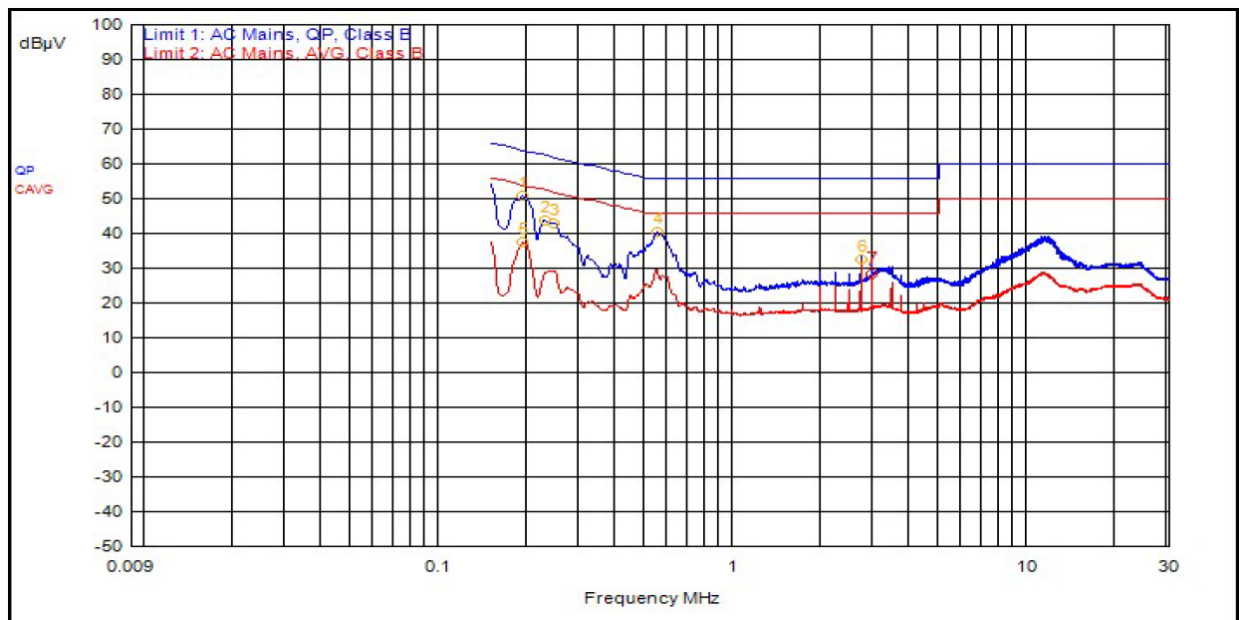
The EUT uses an integral Antenna. The Maximum gain of the antenna is 6 dBi. The antenna is not user replaceable.

Results

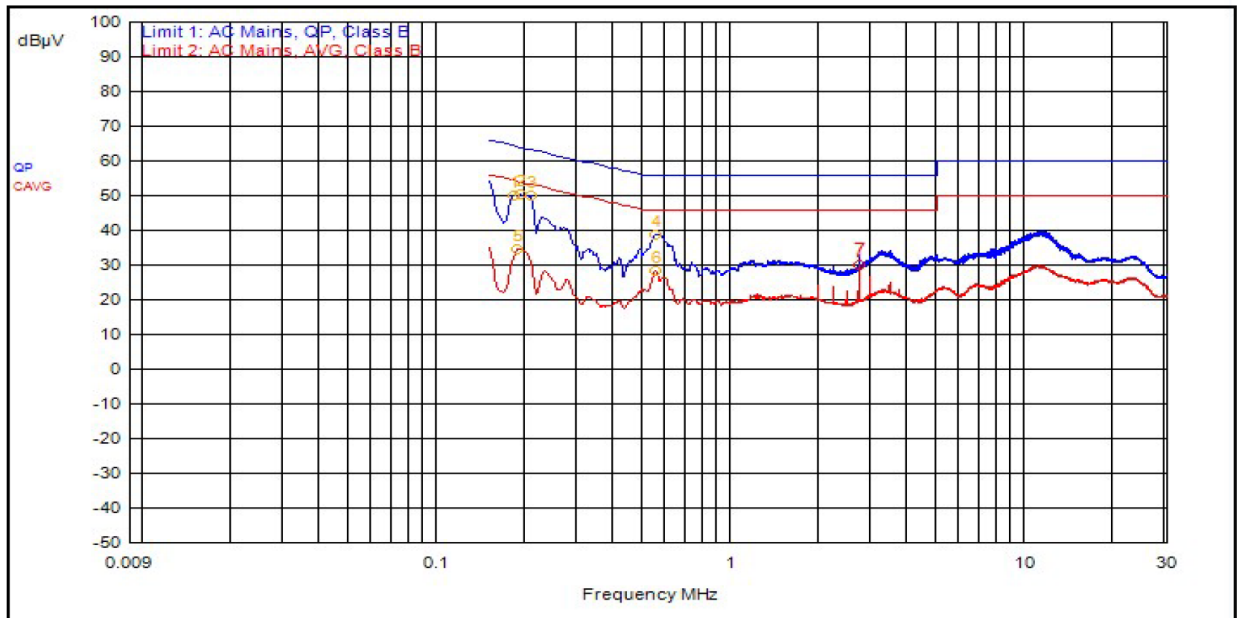
The EUT complied with the specification

5.2 Conducted Emissions at Mains Ports Data

5.2.1 Line 1



5.2.2 Neutral



Result

The EUT complied with the specification limit.

5.3 §15.247(a)(2) Measured Bandwidth

Mode	Frequency (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth (MHz)
b	2412	13.6	9.15
	2437	13.7	9.15
	2462	13.5	9.15
g	2412	16.4	13.95
	2437	16.7	16.4
	2462	16.4	16.4
n 20	2412	17.6	17.25
	2437	17.9	17.65
	2462	17.6	17.4
n 40	2422	36.25	32.1
	2437	36.25	35.2
	2452	36	35.15

Result

In the configuration tested, the 6 dB bandwidth was greater than 500 kHz; therefore, the EUT complied with the requirements of the specification (see spectrum analyzer plots below).

5.4 §15.247(b)(3) Maximum Average Output Power

The maximum average RF conducted output power measured for this device was 25.2 dBm or 331 mW. The limit is 30 dBm or 1 Watt when using antennas with 6 dBi or less gain. The antenna has a gain of 6.0 dBi.

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power	Measured EIRP
CCK 20	2412	Mcs0	13	21.9	27.9
	2437	Mcs0	13	21.7	27.7
	2462	Mcs0	13	21.8	27.8
OFDM 20	2412	Mcs0	12	21.1	27.1
	2417	Mcs0	15.5	24.3	30.3
	2422	Mcs0	17	24.9	30.9
	2427	Mcs0	20	24.8	30.8
	2437	Mcs0	20	25.0	31.0
	2452	Mcs0	17	25	31
	2457	Mcs0	15.5	24.4	30.4
	2462	Mcs0	12	21.4	27.4
HT 20	2412	Mcs0	12	21	27
	2417	Mcs0	15	23.8	29.8
	2422	Mcs0	16.5	24.9	30.9
	2427	Mcs0	18	24.9	30.9
	2432	Mcs0	20	25	31
	2437	Mcs0	20	24.9	30.9
	2447	Mcs0	18	25.2	31.2
	2452	Mcs0	16.5	25.1	31.1
	2457	Mcs0	15.5	24.4	30.4
	2462	Mcs0	12.5	21.9	27.9
HT 40	2422	Mcs0	10.5	19.6	25.6
	2437	Mcs0	12.5	21.8	27.8
	2452	Mcs0	10.5	19.6	25.6

Result

In the configuration tested, the maximum average RF output power was less than 1 watt; therefore, the EUT complied with the requirements of the specification (see spectrum analyzer plots below).

5.5 §15.247(d) Spurious Emissions

5.5.1 Conducted Spurious Emissions

The frequency range from the lowest frequency generated or used in the device to the tenth harmonic of the highest fundamental frequency was investigated to measure any antenna-conducted emissions. The table show the measurement data from spurious emissions noted across the frequency range when transmitting at the lowest frequency, middle frequency and upper frequency. Shown below are plots with the EUT tuned to the upper and lower channels. These demonstrate compliance with the provisions of this section at the band edges.

The emissions must be attenuated 30 dB below the highest power spectral density level measured within the authorized band as measured with a 100 kHz RBW.

Result

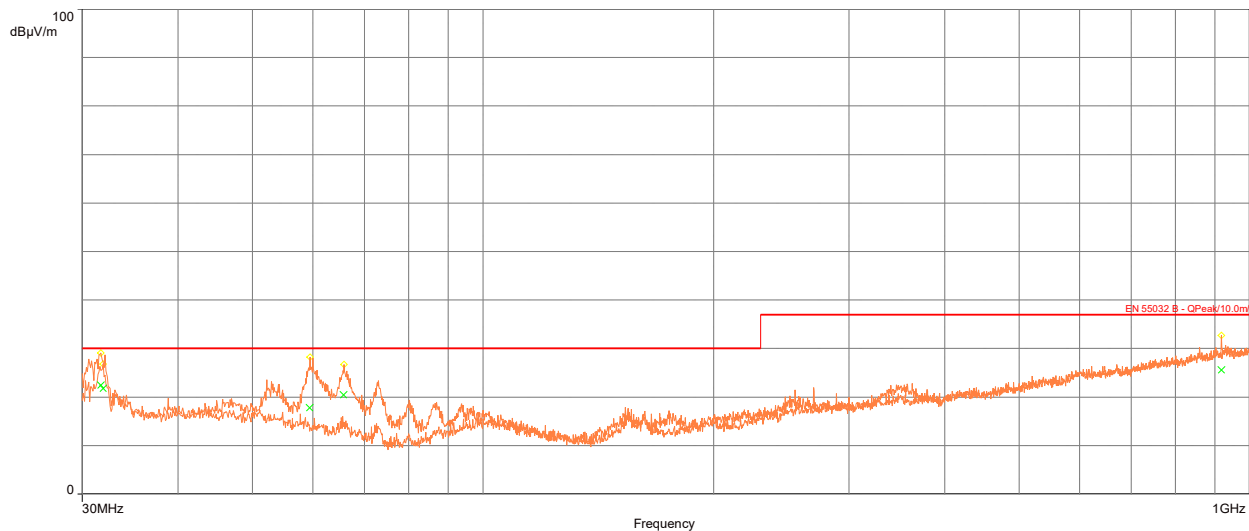
Conducted spurious emissions were attenuated 30 dB or more below the fundamental; therefore, the EUT complies with the specification. All results are within the associated annex.

5.5.2 Radiated Spurious Emissions in the Restricted Bands of §15.205

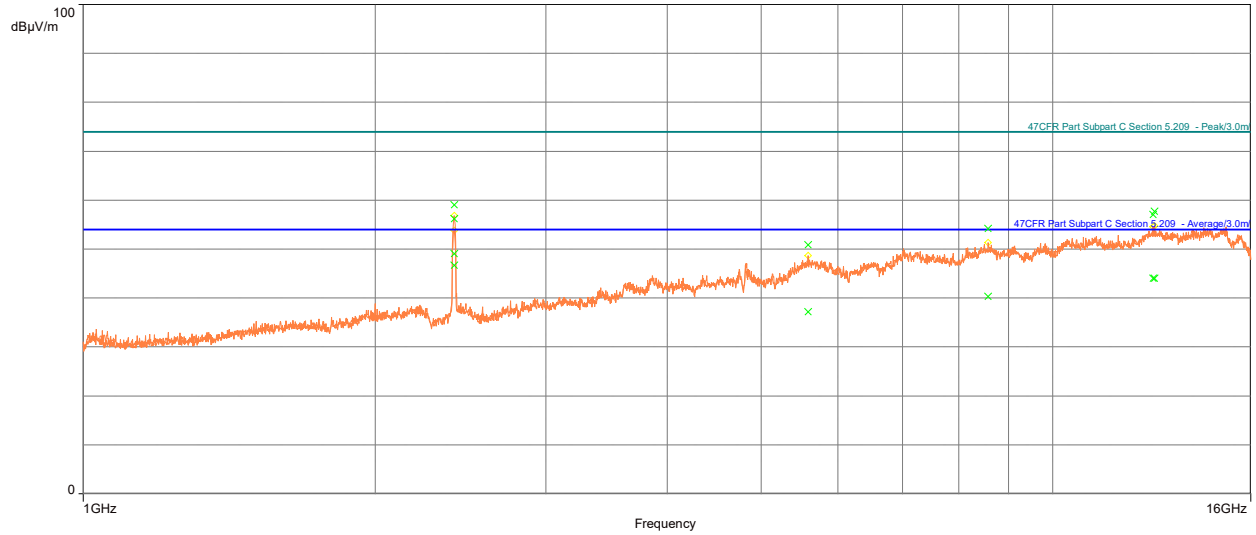
The frequency range from the lowest frequency generated or used in the device to the tenth harmonic of the highest fundamental emissions was investigated to measure any radiated emissions in the restricted bands. The following tables show measurements of any emissions that fell into the restricted bands of §15.205. The tables show the worst-case emissions measured from the EUT. For frequencies above 18.0 GHz, a measurement distance of 1 meter was used. The noise floor was a minimum of 6 dB below the limits. The emissions in the restricted bands must meet the limits specified in §15.209. Tabular data for each of the spurious emissions is shown below for each of the units. Plots of the band edges are also shown.

Result

All emissions in the restricted bands of §15.205 met the limits specified in §15.209; therefore, the EUT complies with the specification.

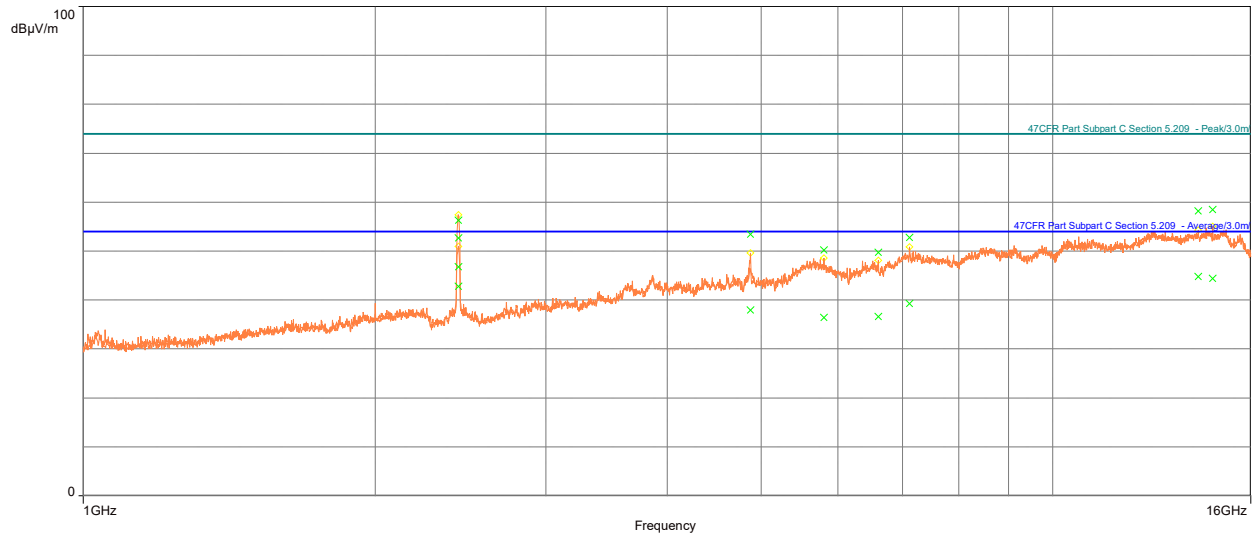


Frequency (MHz)	Det.	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
31.723	QP	22.44	30.00	-7.56	204.00	2.10	Vertical	-11.22
59.416	QP	17.76	30.00	-12.24	85.00	3.07	Vertical	-13.37
65.825	QP	20.46	30.00	-9.54	120.00	2.69	Vertical	-15.22
31.926	QP	21.82	30.00	-8.18	11.00	2.63	Horizontal	-11.17
918.15	QP	25.57	37.00	-11.43	230.00	3.33	Horizontal	1.38



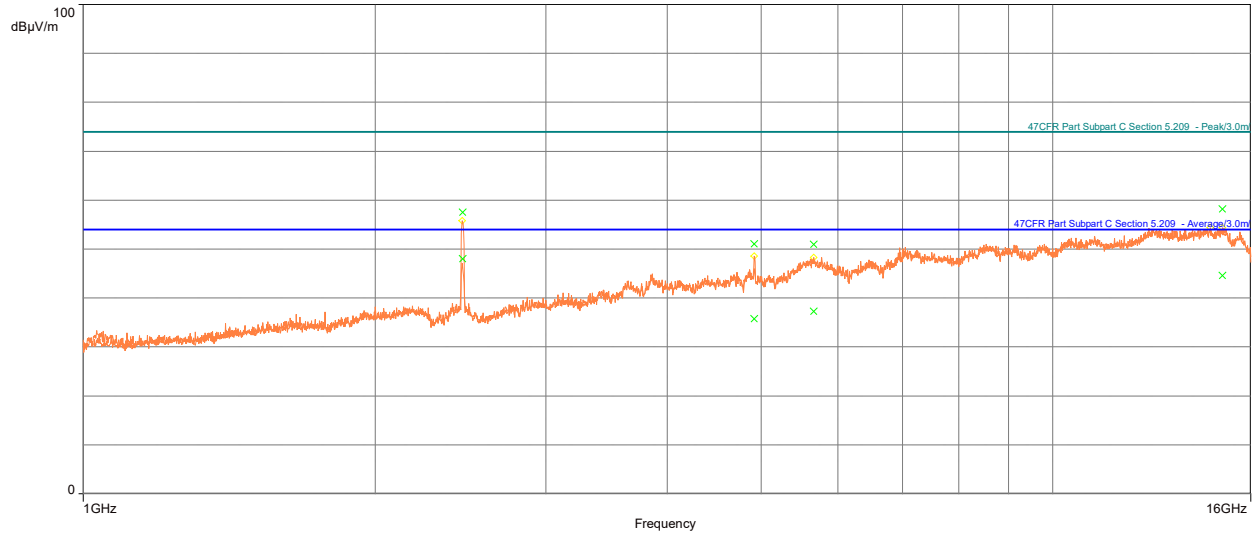
Frequency (MHz)	Det.	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
5590	A	37.17	54.00	-16.83	221.00	1.54	Vertical	6.50
8578.6	A	40.30	54.00	-13.70	34.00	2.14	Vertical	10.90
12731	A	44.03	54.00	-9.97	276.00	2.73	Vertical	14.93
12687	A	43.98	54.00	-10.02	76.00	2.38	Horizontal	14.91
5590	P	50.83	74.00	-23.17	221.00	1.54	Vertical	6.50
8578.6	P	54.19	74.00	-19.81	34.00	2.14	Vertical	10.90
12731	P	57.66	74.00	-16.34	276.00	2.73	Vertical	14.93
12687	P	57.05	74.00	-16.95	76.00	2.38	Horizontal	14.91

Table 4: Transmitting at the Lowest Frequency



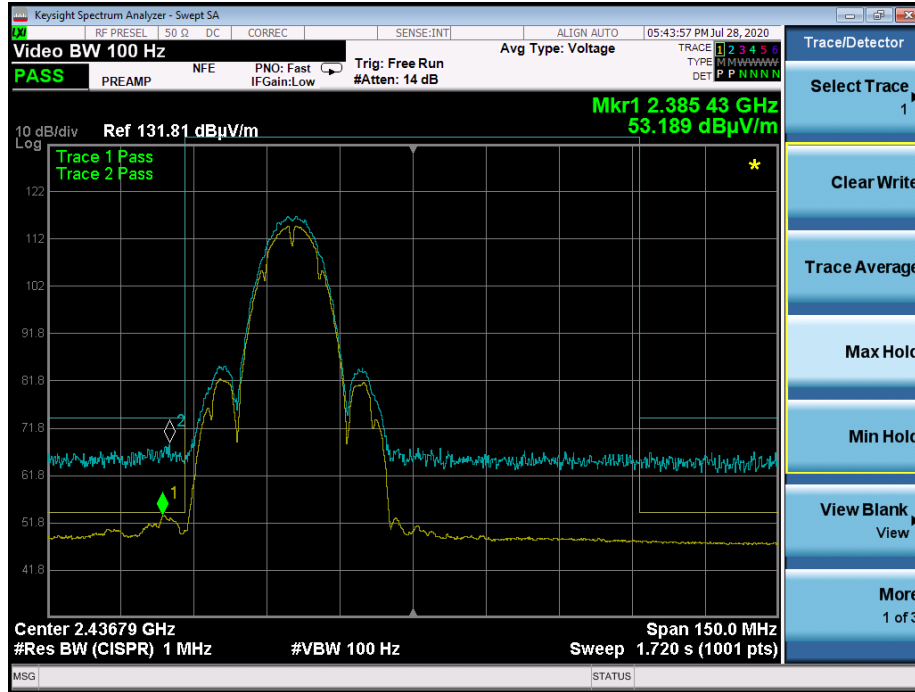
Frequency (MHz)	Det.	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
5807.8	A	36.43	54.00	-17.57	341.00	2.96	Vertical	5.95
6604.3	A	36.57	54.00	-17.43	194.00	3.86	Vertical	6.71
14120	A	44.73	54.00	-9.27	29.00	1.74	Vertical	15.18
4875.3	A	37.94	54.00	-16.06	104.00	2.94	Horizontal	2.22
7112.6	A	39.26	54.00	-14.74	214.00	1.76	Horizontal	9.12
14609	A	44.37	54.00	-9.63	316.00	3.98	Horizontal	15.02
5807.8	P	50.18	74.00	-23.82	341.00	2.96	Vertical	5.95
6604.3	P	49.69	74.00	-24.31	194.00	3.86	Vertical	6.71
14120	P	58.20	74.00	-15.80	29.00	1.74	Vertical	15.18
4875.3	P	53.45	74.00	-20.55	104.00	2.94	Horizontal	2.22
7112.6	P	52.79	74.00	-21.21	214.00	1.76	Horizontal	9.12
14609	P	58.45	74.00	-15.55	316.00	3.98	Horizontal	15.02

Table 5: Transmitting at the Middle Frequency

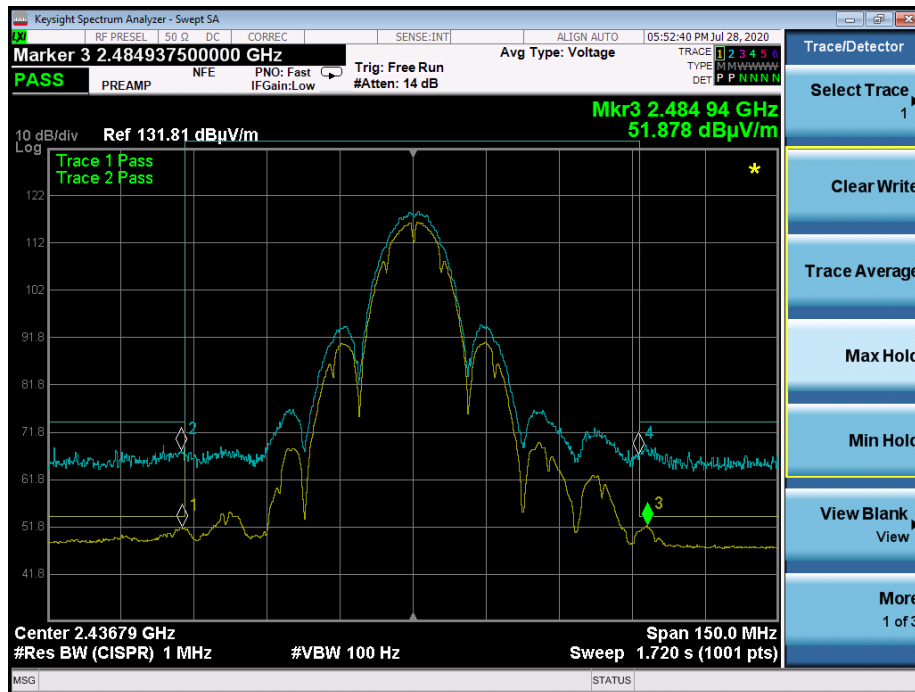


Frequency (MHz)	Det.	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
14958	A	44.61	54.00	-9.39	258.00	2.60	Vertical	15.11
4918.2	A	35.73	54.00	-18.27	114.00	2.24	Horizontal	2.21
5665.6	A	37.30	54.00	-16.70	356.00	2.73	Horizontal	6.64
14958	P	58.22	74.00	-15.78	258.00	2.60	Vertical	15.11
4918.2	P	51.07	74.00	-22.93	114.00	2.24	Horizontal	2.21
5665.6	P	50.99	74.00	-23.01	356.00	2.73	Horizontal	6.64

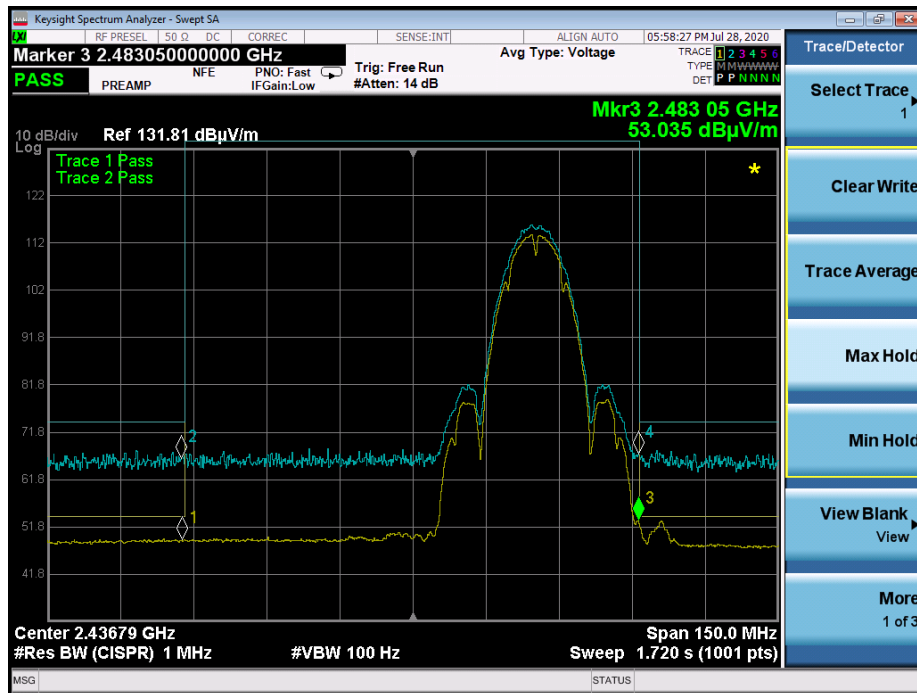
Table 6: Transmitting at the Highest Frequency



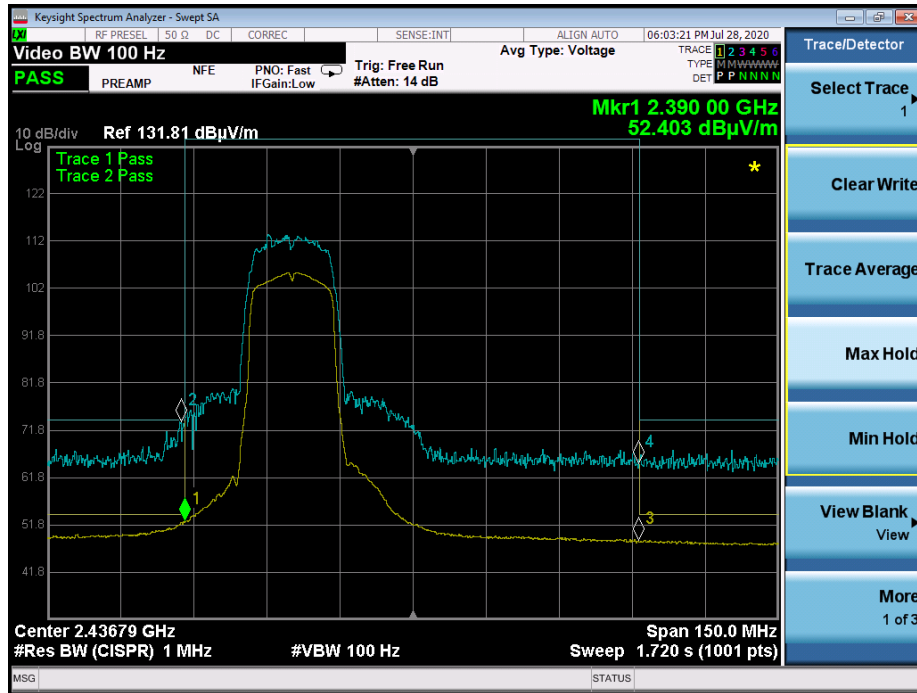
Graph 1: Radiated Lower Channel Band Edge Plot – B Mode



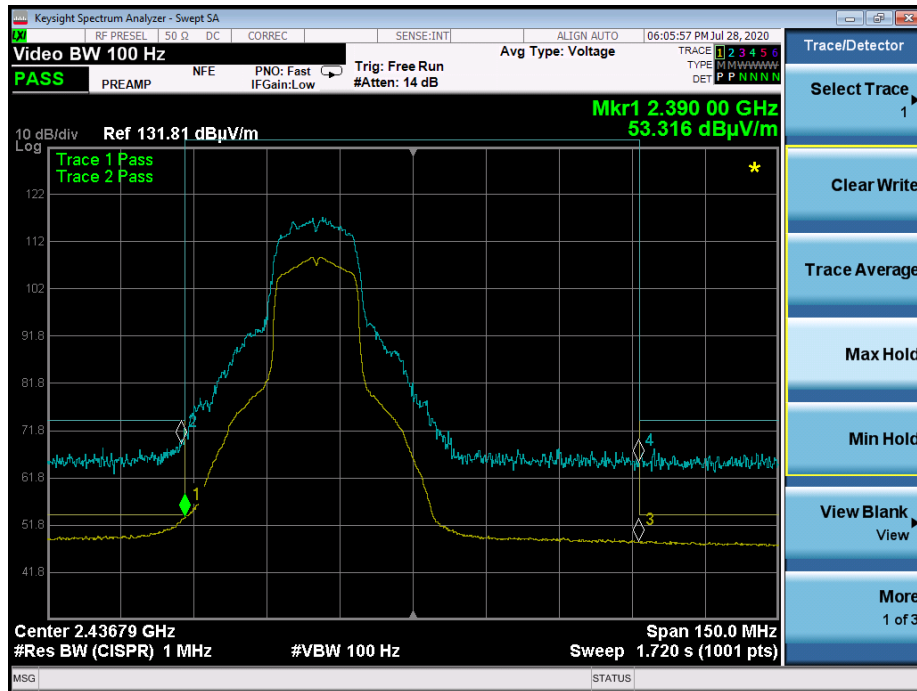
Graph 2: Radiated Middle Channel Band Edge Plot – B Mode



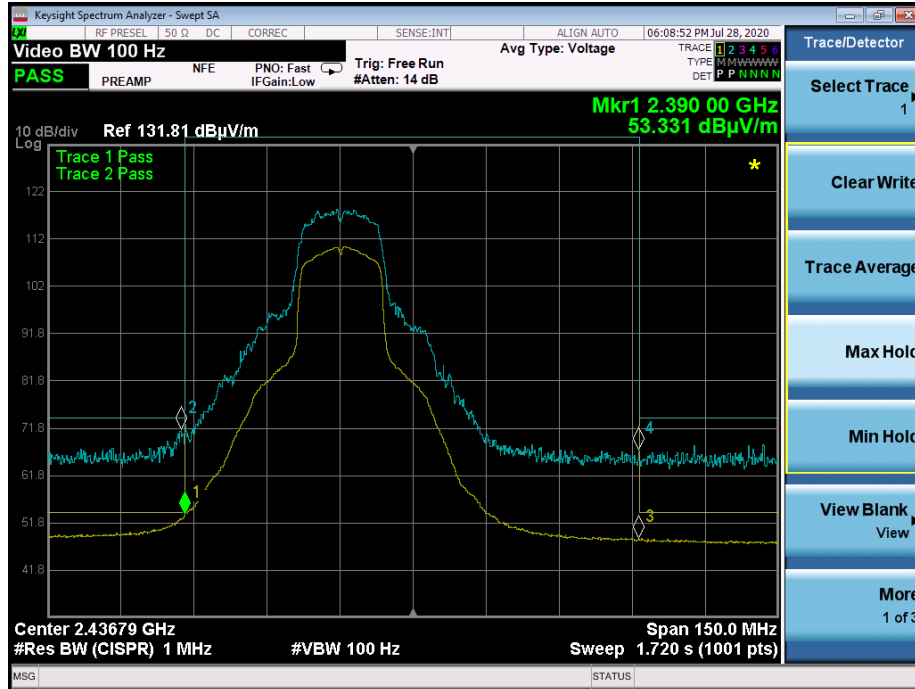
Graph 3: Radiated Upper Channel Band Edge Plot – B Mode



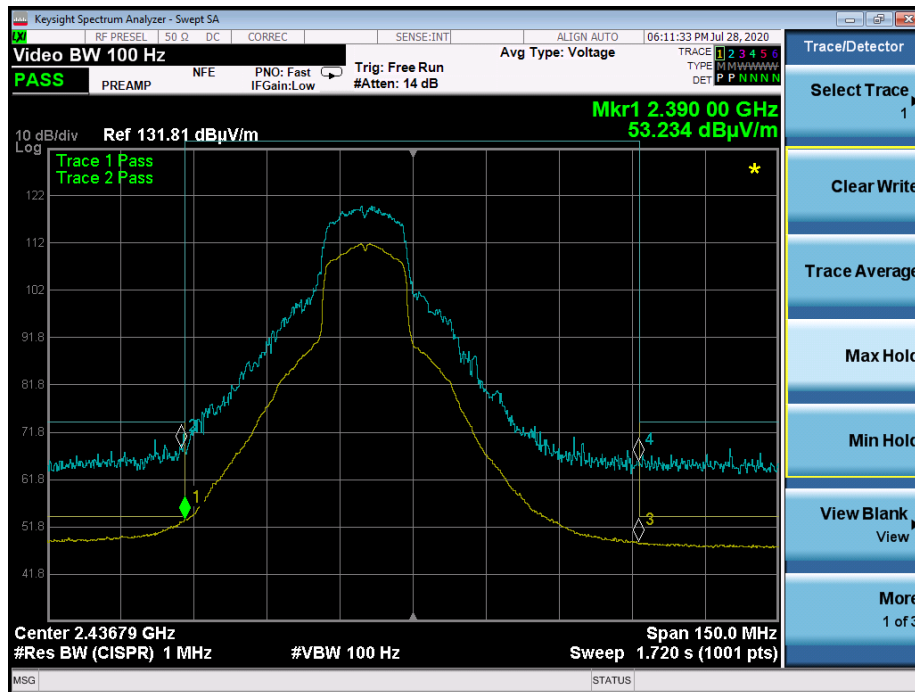
Graph 11: Radiated Lower Channel Band Edge Plot – G Mode



Graph 11: Radiated 2417 MHz Channel Band Edge Plot – G Mode

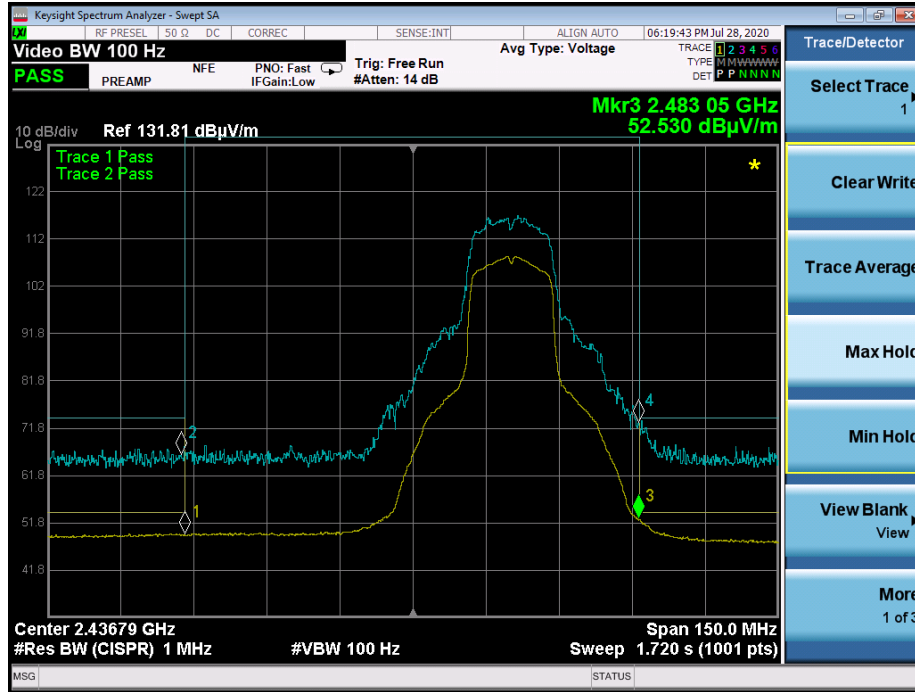


Graph 11: Radiated 2422 MHz Channel Band Edge Plot – G Mode



Graph 11: Radiated 2427 MHz Channel Band Edge Plot – G Mode

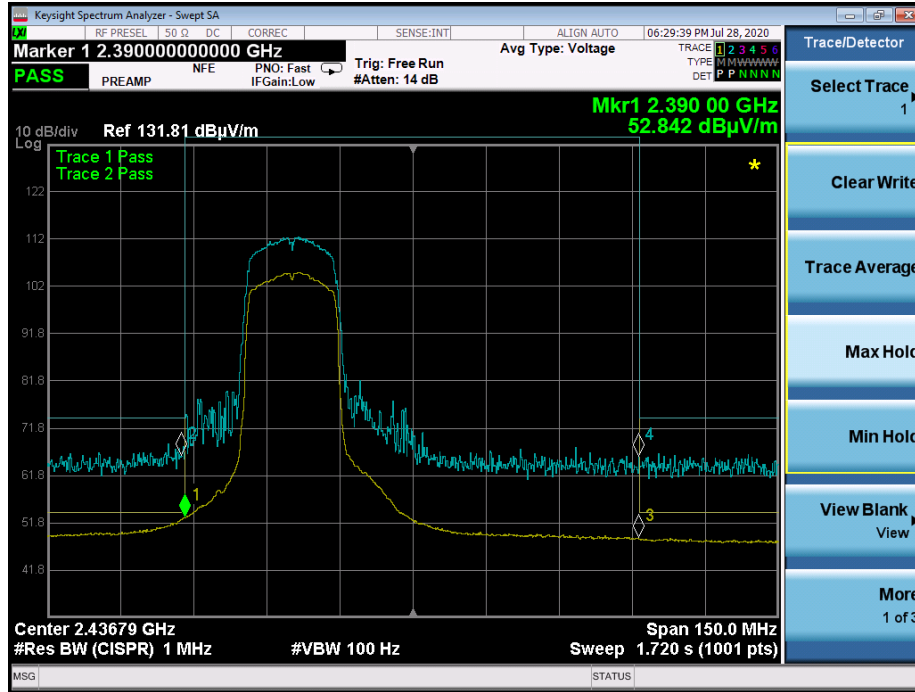




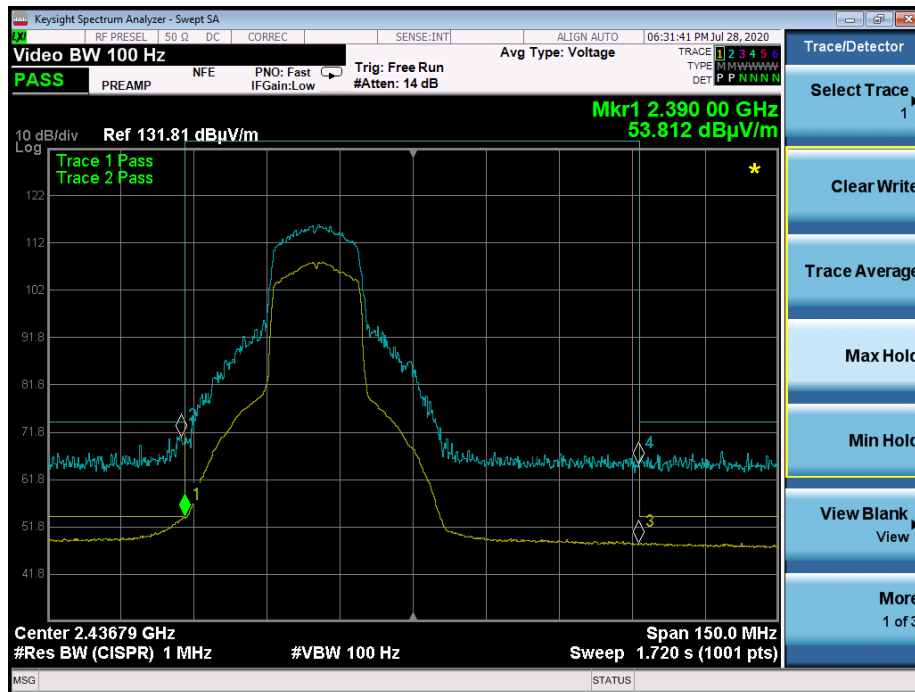
Graph 11: Radiated 2457 MHz Channel Band Edge Plot – G Mode



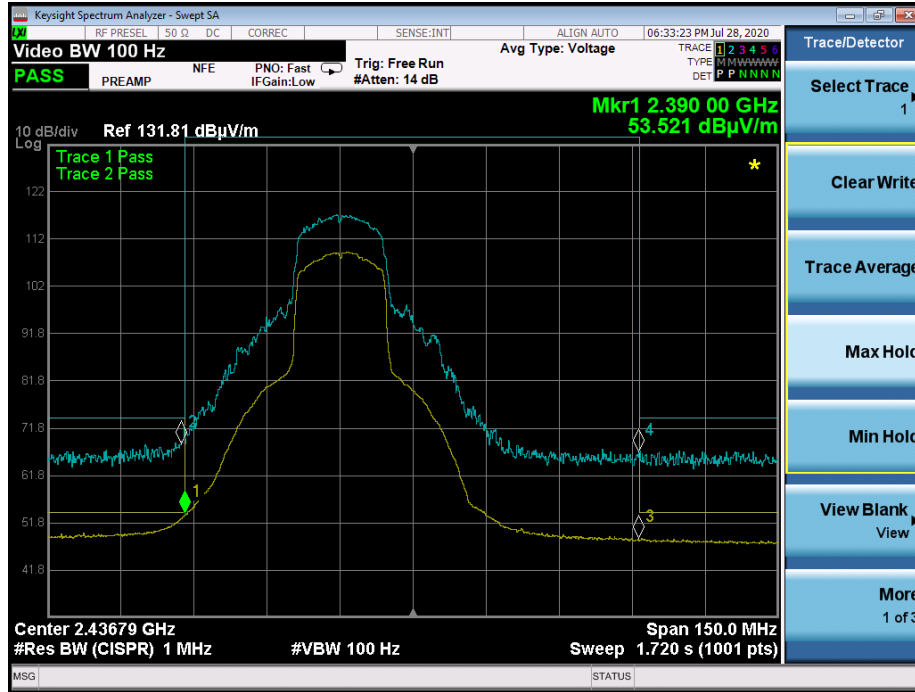
Graph 12: Radiated Upper Channel Band Edge Plot – G Mode



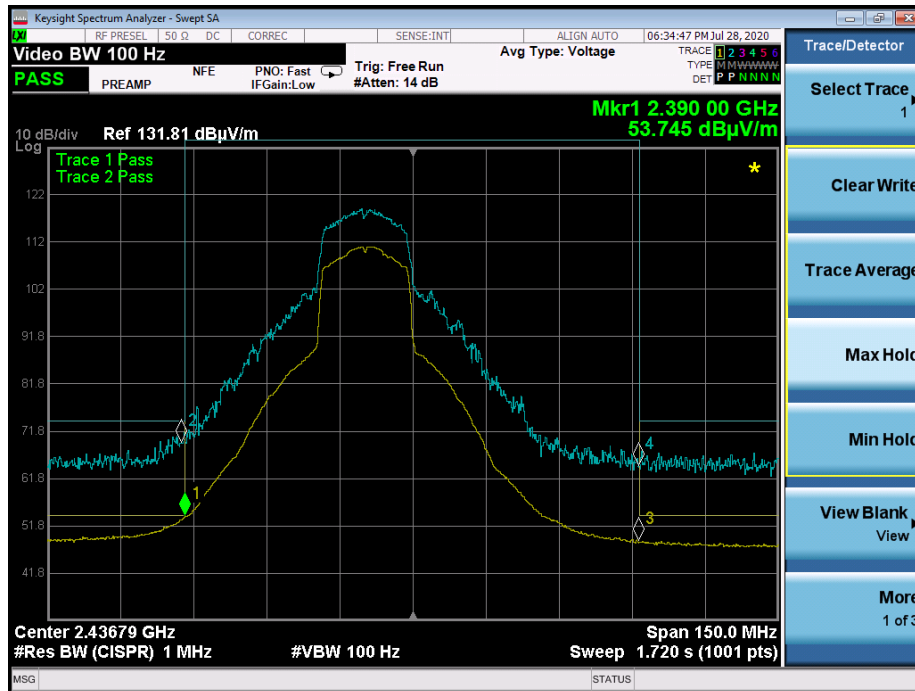
Graph 12: Radiated Low Channel Band Edge Plot – N Mode – 20 MHz



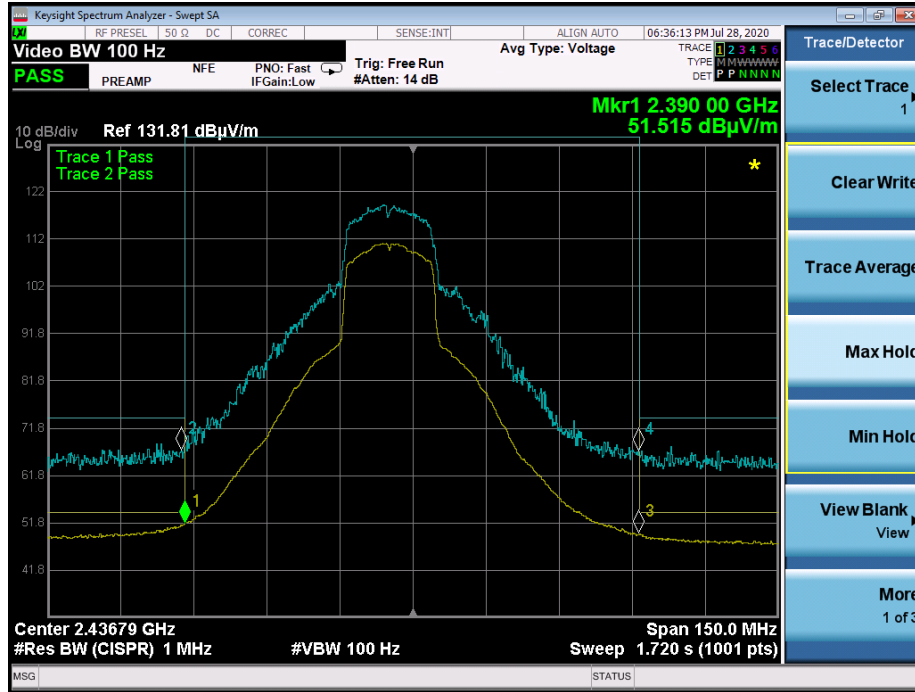
Graph 12: Radiated 2417 MHz Plot – N Mode – 20 MHz



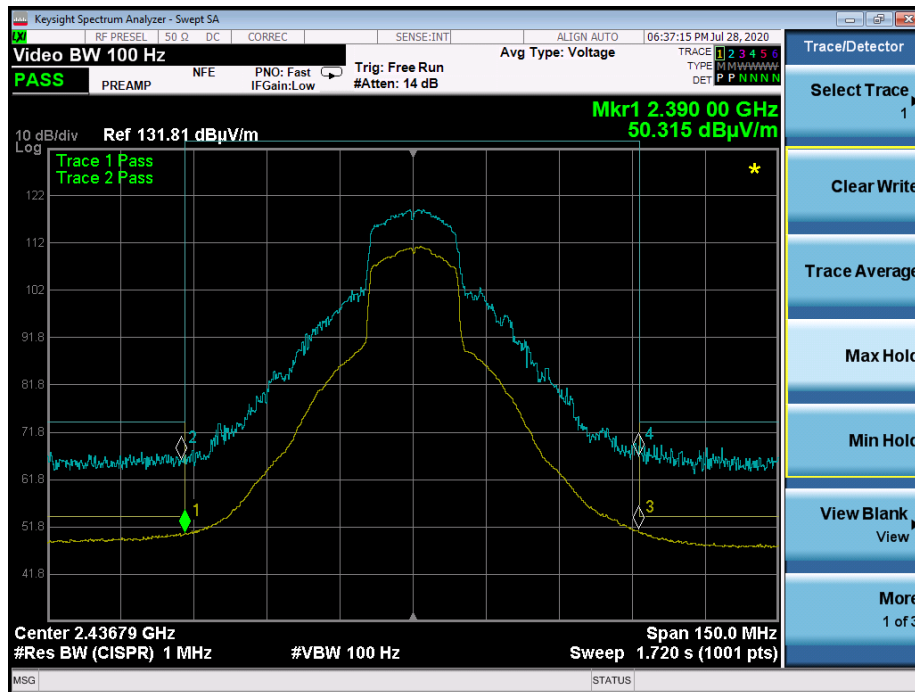
Graph 12: Radiated 2422 MHz Plot – N Mode – 20 MHz



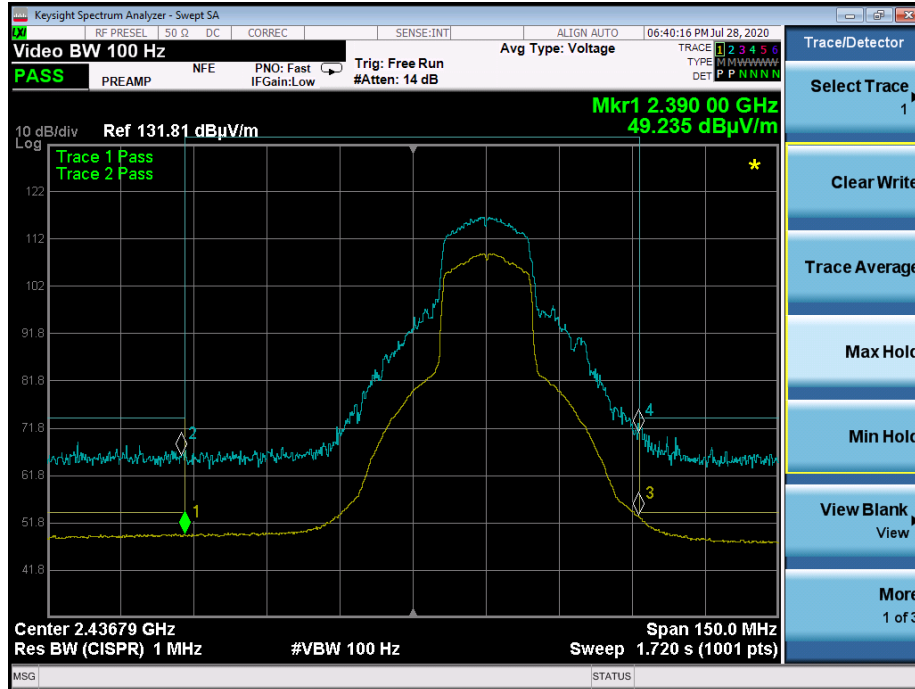
Graph 12: Radiated 2427 MHz Plot – N Mode – 20 MHz



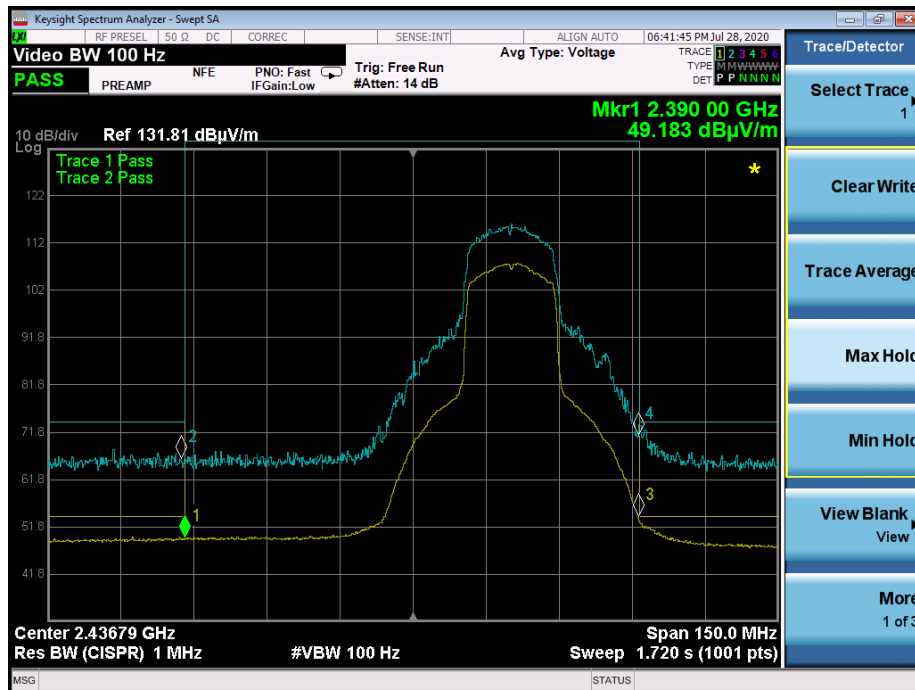
Graph 12: Radiated 2432 MHz Plot – N Mode – 20 MHz



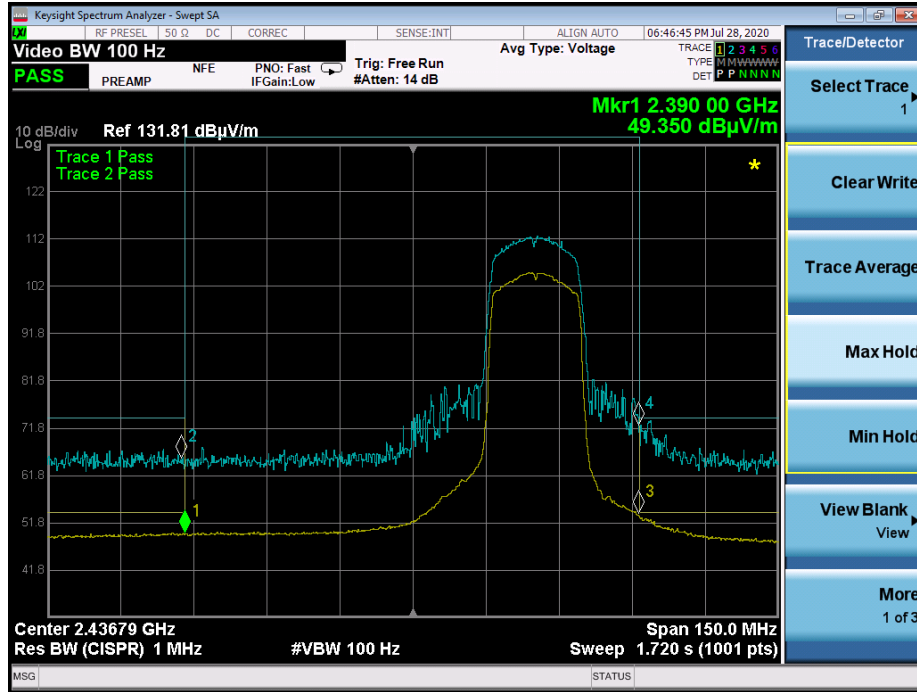
Graph 12: Radiated 2437 MHz Plot – N Mode – 20 MHz



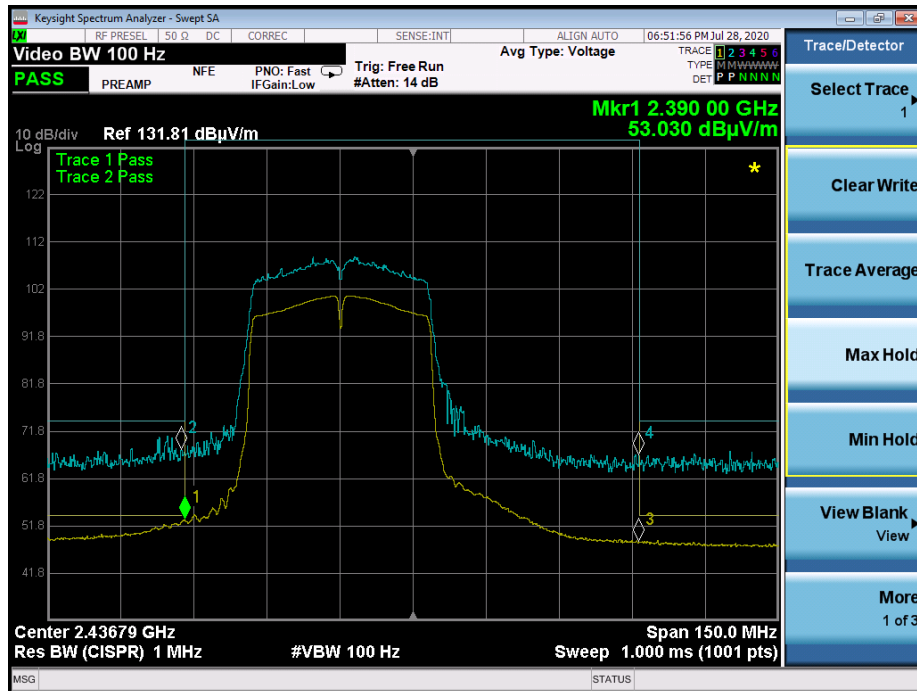
Graph 12: Radiated 2452 MHz Plot – N Mode – 20 MHz



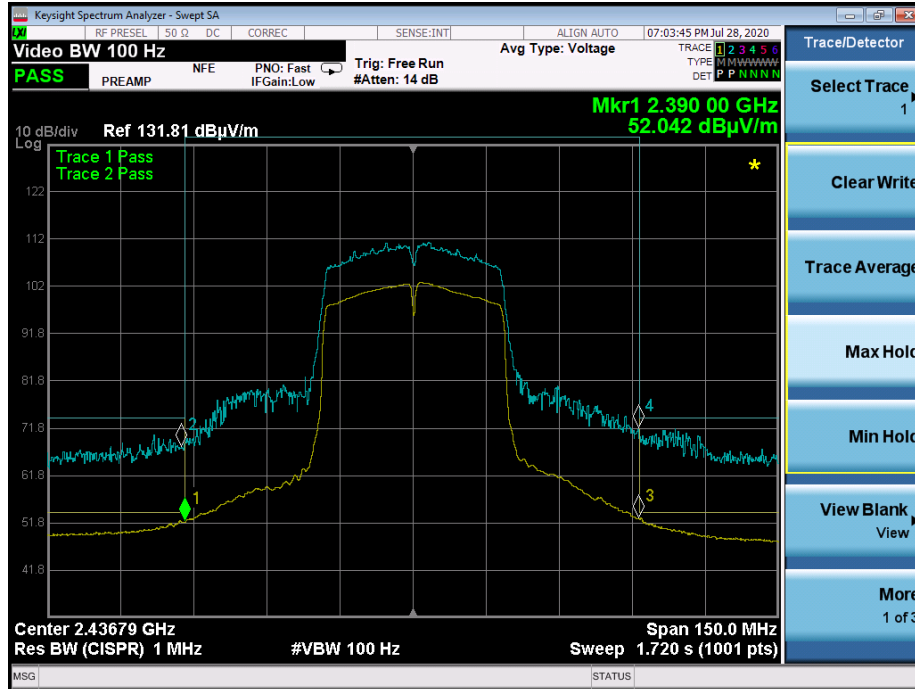
Graph 12: Radiated 2457 MHz Plot – N Mode – 20 MHz



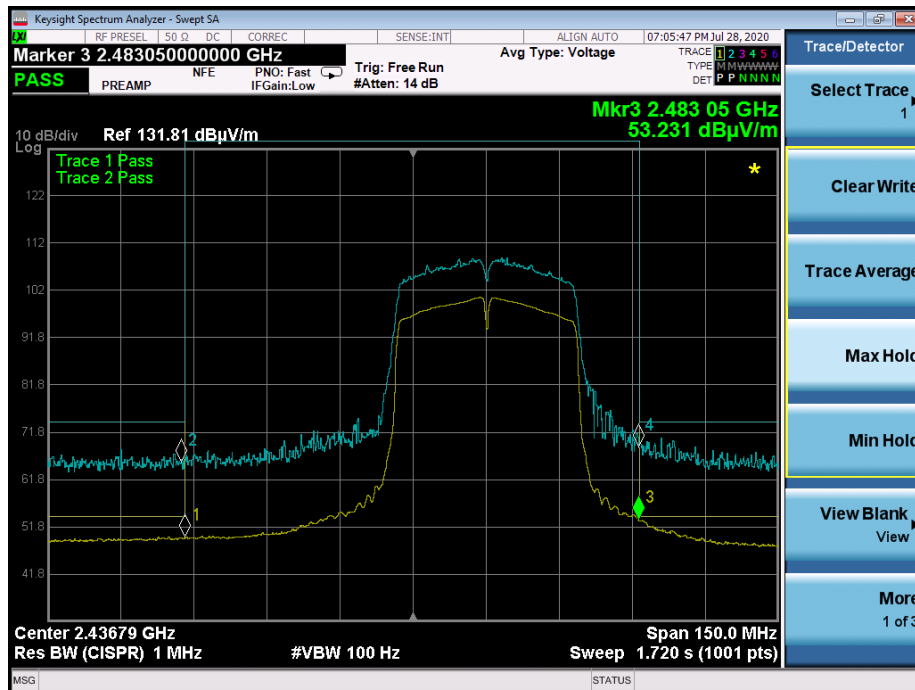
Graph 12: Radiated 2462 MHz Plot – N Mode – 20 MHz



Graph 12: Radiated Low Channel Band Edge Plot – N Mode – 40 MHz



Graph 12: Radiated Mid Channel Band Edge Plot – N Mode – 40 MHz



Graph 12: Radiated Upper Channel Band Edge Plot – N Mode – 40 MHz

5.6 §15.247(e) Maximum Average Power Spectral Density

The maximum average power spectral density conducted from the intentional radiator of the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. Results of this testing are summarized.

Mode	Frequency (MHz)	Measurement (dBm)	Criteria (dBm)
b	2412	7.5	8.0
	2437	5.2	8.0
	2462	7.6	8.0
g	2412	-7.4	8.0
	2437	-3.0	8.0
	2462	-8.0	8.0
n 20	2412	-7.9	8.0
	2437	-4.1	8.0
	2462	-6.7	8.0
n 40	2422	-11.7	8.0
	2437	-9.1	8.0
	2452	-11.5	8.0

Result

The maximum average power spectral density was less than the limit of 8 dBm; therefore, the EUT complies with the specification.

-- End of Test Report --