



427 West 12800 South
Draper, UT 84020

Test Report Certification

FCC ID	SWX-EFG
IC ID	6545A-EFG
Equipment Under Test	EFG
Test Report Serial Number	TR8653_01
Date of Test(s)	18 – 20 October; 1 and 17 November 2023
Report Issue Date	20 November 2023

Test Specification	Applicant
47 CFR FCC Part 15, Subpart C	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 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	UBIQUITI
Model Number	EFG
FCC ID	SWX-EFG
IC ID	6545A-EFG

On this 20th day of November 2023, 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 U.S. federal government.

Unified Compliance Laboratory



Written By: Joseph W. Jackson



Reviewed By: Richard L. Winter

Revision History		
Revision	Description	Date
01	Original Report Release	20 November 2023

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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	Alex Macon
Title	Compliance

1.2 Manufacturer

Company	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A.
Contact Name	Alex Macon
Title	Compliance

2 Equipment Under Test (EUT)

2.1 Identification of EUT

Brand Name	UBIQUITI
Model Number	EFG
Serial Number	B4FBE40B0C39
Dimensions (cm)	44.2 x 28.6 x 4.0

2.2 Description of EUT

The Enterprise Fortress Gateway (EFG) is a powerful rackmount security gateway for medium to large sized networks. The EFG has one GbE LAN port, one GbE WAN port, two 10G SFP+ ports, one 25G SFP 28 LAN port and one SFP 28 WAN Port. The EFG is rack mountable and is powered by a 120 – 240 AC mains. In addition, the EFG has two redundant AC main power supplies for reliable power operation. The EFG has a Bluetooth LE transmitter for management control and operation.

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: UBIQUITI MN: EFG SN: B4FBE40B0C39	Security Gateway	See Section 2.4
BN: Dell MN: XPS SN: N/A	Laptop Personal Computer	Unshielded Cat 5e cable/1 meters

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	2	3 conducted power cord/180 cm
LAN	1	Unshielded Cat 5e cable/8 meters

WAN	1	Unshielded Cat 5e cable/8 meters
LAN	2 1	SFP+ 10 G Fiber /3+ meters SFP+ 25 G Fiber /3+ meters
WAN	1	SFP+ 25 G Fiber /3+ meters

2.5 Operating Environment

Power Supply	120 Volts AC Mains
AC Mains Frequency	60 Hz
Temperature	22.1 – 23.5 °C
Humidity	18.2 – 34.6 %
Barometric Pressure	1016 mBar

2.6 Operating Modes

The EFG was connected to a personal computer laptop and tested using test software in order to enable to constant duty cycle greater or equal to 98% of the Bluetooth transceiver.

2.7 EUT Exercise Software

EUT firmware version 1.0 was used to operate the transmitter using a constant transmit mode.

2.8 Block Diagram of Test Configuration

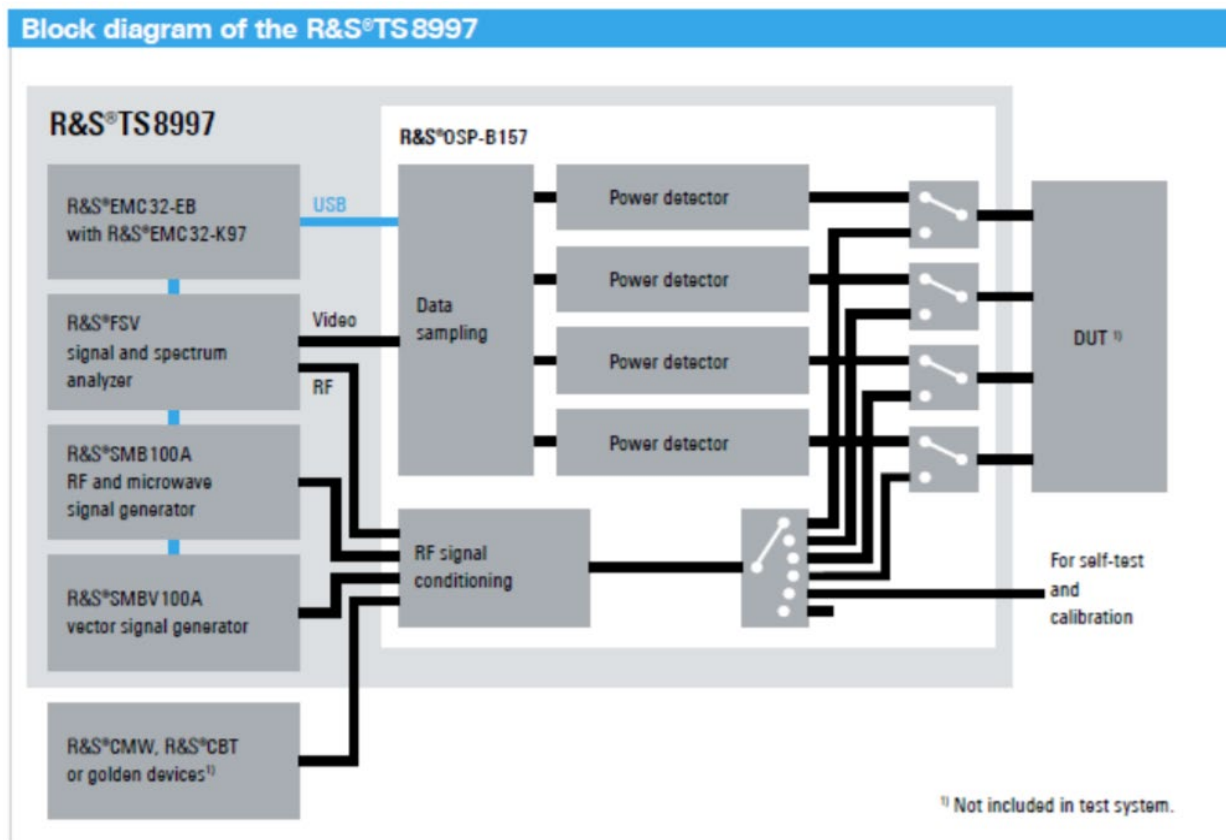


Diagram 1: Test Configuration Block Diagram

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 26000	N/A
15.247(d)	RSS-247 § 5.4	Radiated Spurious Emissions	0.009 to 26000	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. Where applicable, KDB 662911 was followed to sum required measurements.

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 3-Meter and 10-Meter chambers 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 2024. 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 30 June 2024.

Unified Compliance Laboratory has been assigned Designation Number US5037 by the FCC and 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-6754	2/22/2023	2/22/2024
LISN	AFJ	LS16C/10	UCL-6749	12/6/2021	12/6/2023
ISN	Teseq	ISN T800	UCL-2974	6/27/2022	6/27/2024
LISN	Com-Power	LIN-120C	UCL-2612	1/24/2023	1/24/2024
AC Power Source	Laplace Instruments	AC1000A	UCL-2857	N/A	N/A
Test Software	UCL	Revision 1	UCL-3107	N/A	N/A

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

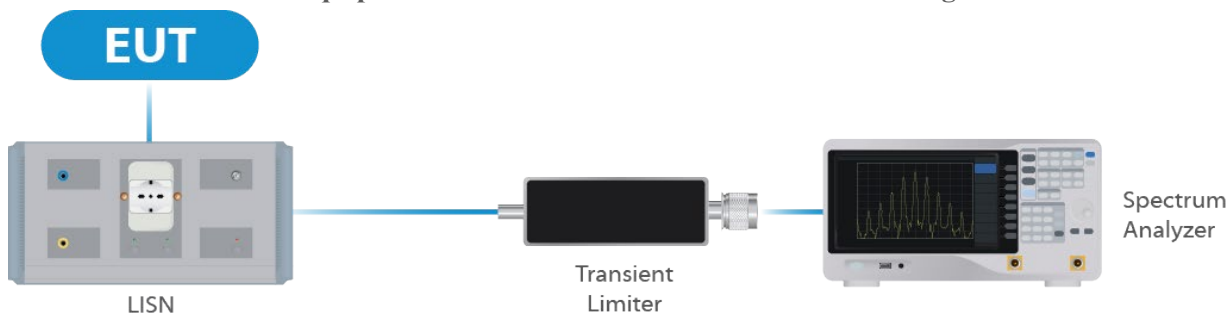


Figure 1: Conducted Emissions Test

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	11/7/2022	11/7/2023
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	2/22/2023	2/22/2024
Switch Extension	R&S	OSP-150W	UCL-2870	2/22/2023	2/22/2024

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

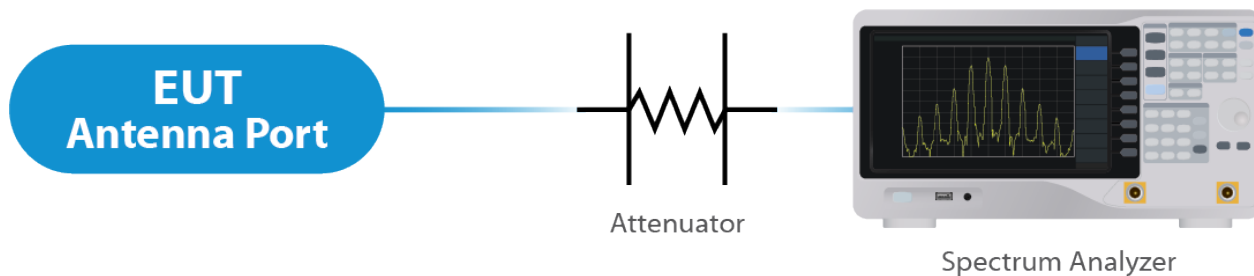


Figure 2: Direct Connect at the Antenna Port Test

4.3 Radiated Emissions

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
EMI Receiver	Keysight	N9038A	UCL-2778	1/27/2023	1/27/2024
Pre-Amplifier 9 kHz – 1 GHz	Sonoma Instruments	310N	UCL-2889	10/7/2021	10/7/2023
Broadband Antenna	Scwarzbeck	VULB 9163	UCL-3062	2/22/2023	2/22/2025
Broadband Antenna	Scwarzbeck	VULB 9163	UCL-3071	1/11/2023	1/11/2025
Double Ridge Horn Antenna	Scwarzbeck	BBHA 9120D	UCL-3065	9/22/2022	9/22/2024
Log Periodic	Scwarzbeck	STLP 9129	UCL-3068	1/27/2023	1/27/2025
15 - 40 GHz Horn Antenna	Scwarzbeck	BBHA 9170	UCL-2487	6/09/2022	6/09/2024
1 – 18 GHz Amplifier	Com-Power	PAM 118A	UCL-3833	12/9/2022	12/9/2023
Test Software	UCL	Revision 1	UCL-3108	N/A	N/A

Table 3: List of equipment used for Radiated Emissions

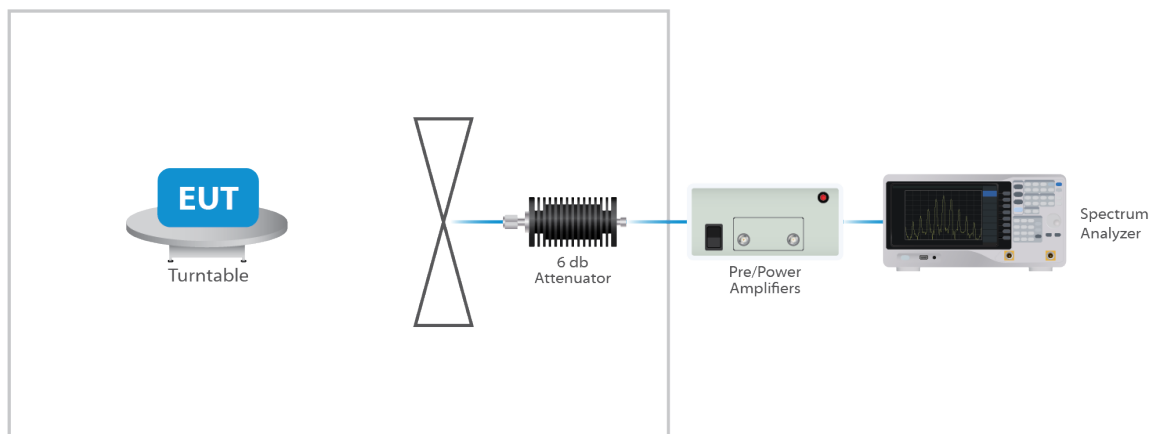


Figure 3: Radiated Emissions Test

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)	4.38	95
Radiated Emissions (1 GHz to 18 GHz)	4.37	95
Radiated Emissions (18 GHz to 40 GHz)	3.93	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

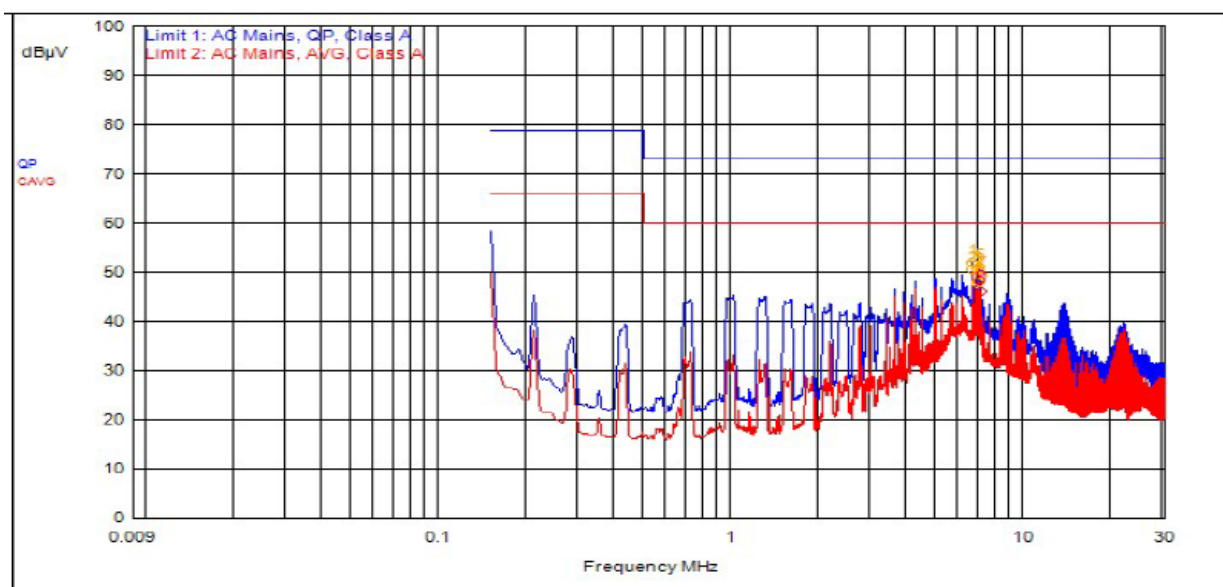
5.1 §15.203 Antenna Requirements

The EUT uses an internal integral antenna. As per the manufacturer, the Maximum gain of the antenna is 3.0 dBi. The antenna is not user replaceable.

Results

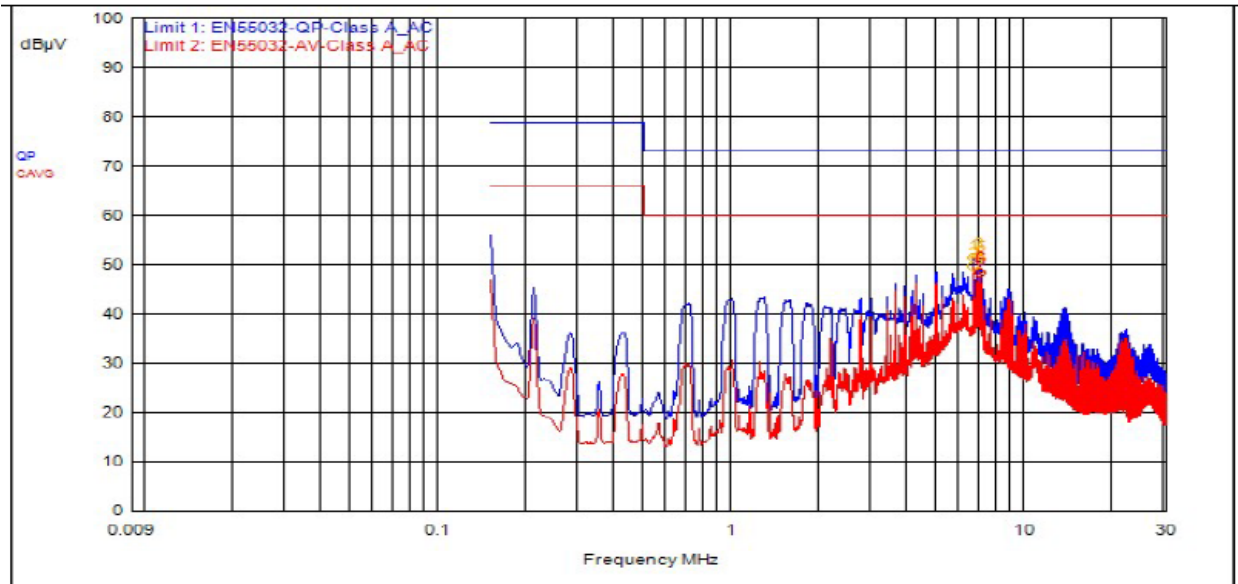
The EUT complied with the specification

5.2 Conducted Emissions at Mains Ports Data



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit 1	Limit 1 Dist.	Limit 2	Limit 2 Dist.	P/F
MU	MHz	dB	dB	dB	Type	dBµV	dBµV	dBµV	dB	dBµV	dB	P/F
1	6.579	12.32	0.10		QPeak	39.51	51.93	73.00	-21.07			
5	6.951	12.32	0.20		QPeak	38.60	51.12	73.00	-21.88			
3	6.858	12.32	0.20		QPeak	38.11	50.63	73.00	-22.37			
7	7.047	12.32	0.20		QPeak	36.93	49.45	73.00	-23.55			
2	6.579	12.32	0.10		C_AVG	38.11	50.53			60.00	-9.47	
4	6.855	12.32	0.20		C_AVG	35.16	47.68			60.00	-12.32	
6	6.951	12.32	0.20		C_AVG	35.51	48.03			60.00	-11.97	
8	7.047	12.32	0.20		C_AVG	33.70	46.22			60.00	-13.78	

Graph 1: Conducted Emissions Plot - Neutral



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit 1	Limit 1 Dist.	Limit 2	Limit 2 Dist.	P/F
MU	MHz	dB	dB	dB	Type	dBµV	dBµV	dBµV	dB	dBµV	dB	P/F
3	6.858	9.63	0.00		QPeak	42.08	51.71	73.00	-21.29			
1	6.576	9.62	0.00		QPeak	41.88	51.50	73.00	-21.50			
5	6.951	9.63	0.00		QPeak	41.55	51.18	73.00	-21.82			
2	6.579	9.62	0.00		C_AVG	40.19	49.81			60.00	-10.19	
4	6.858	9.63	0.00		C_AVG	38.90	48.53			60.00	-11.47	
6	6.954	9.63	0.00		C_AVG	38.80	48.43			60.00	-11.57	

Graph 2: Conducted Emissions Plot – Line 1

Result

The EUT complied with the specification limit.

5.3 §15.247(a)(2) Emissions Bandwidth

Frequency (MHz)	Emissions 6 dB Bandwidth (MHz)	Emissions 99% Bandwidth (MHz)
2402	0.63	1.00
2442	0.67	0.99
2480	0.61	0.99

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 plot within the Annex).

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

The maximum average RF conducted output power measured for this device was 7.51 dBm or 5.64 mW. The limit is 30 dBm or 1 Watt when using antennas with 6 dBi or less gain. The antenna has a gain of 3.0 dBi.

Frequency (MHz)	Measured Output Power (dBm)	Output Power (mW)
2402	5.28	3.37
2442	6.68	4.66
2480	7.51	5.64

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 plot within the Annex).

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 within the Annex are plot(s) 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

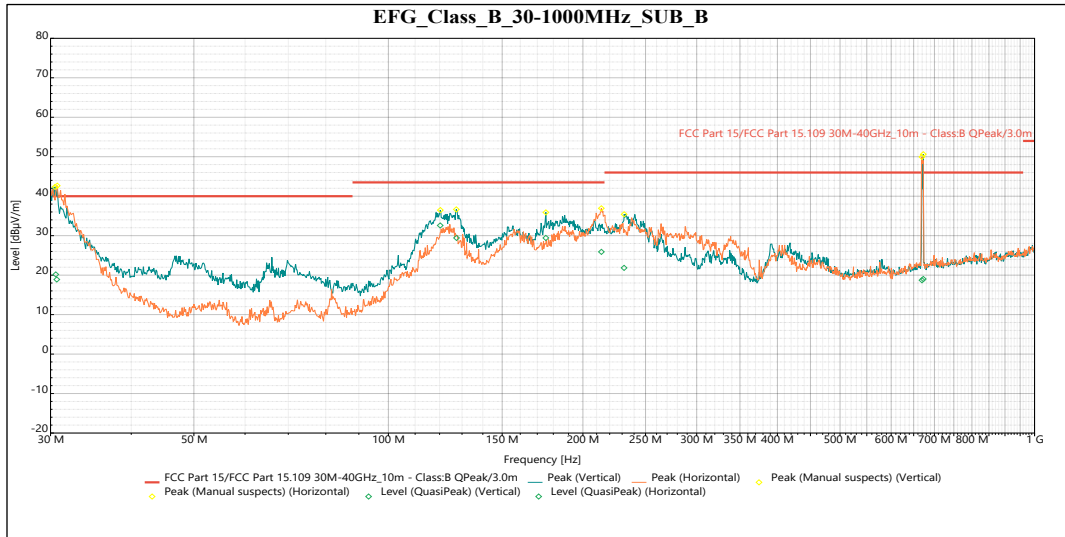
Conducted spurious emissions were attenuated 30 dB or more below the fundamental; therefore, the EUT complies with the specification.

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 bans 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

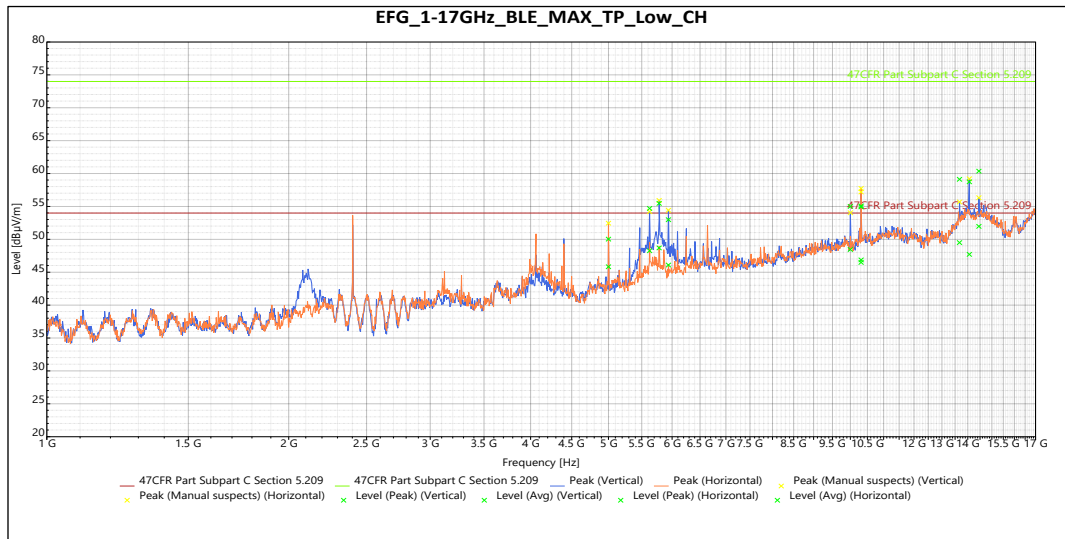
All emissions in the restricted bands of §15.205 met the limits specified in §15.209; therefore, the EUT complies with the specification.



QuasiPeak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin	Azimuth (°)	Height	Pol.	Correction (dB)
30.566 MHz	20.178	40	-19.822	262	1.143	Vertical	-8.097
120.28 MHz	32.588	43.5	-10.912	310	1.143	Vertical	-14.567
127.47 MHz	29.428	43.5	-14.072	358	1.143	Vertical	-14.239
175.25 MHz	29.434	43.5	-14.066	9	1.138	Vertical	-16.582
231.6 MHz	21.837	46	-24.163	114	1.138	Vertical	-16.542
672.7 MHz	19.03	46	-26.97	259	2.039	Vertical	-6.919
30.677 MHz	18.898	40	-21.102	306	3.302	Horizontal	-8.184
213.62 MHz	25.905	43.5	-17.595	254	1.882	Horizontal	-17.291
669.54 MHz	18.719	46	-27.281	34	1.5	Horizontal	-6.953

Table 4: Radiated Emissions 30 – 1000 MHz



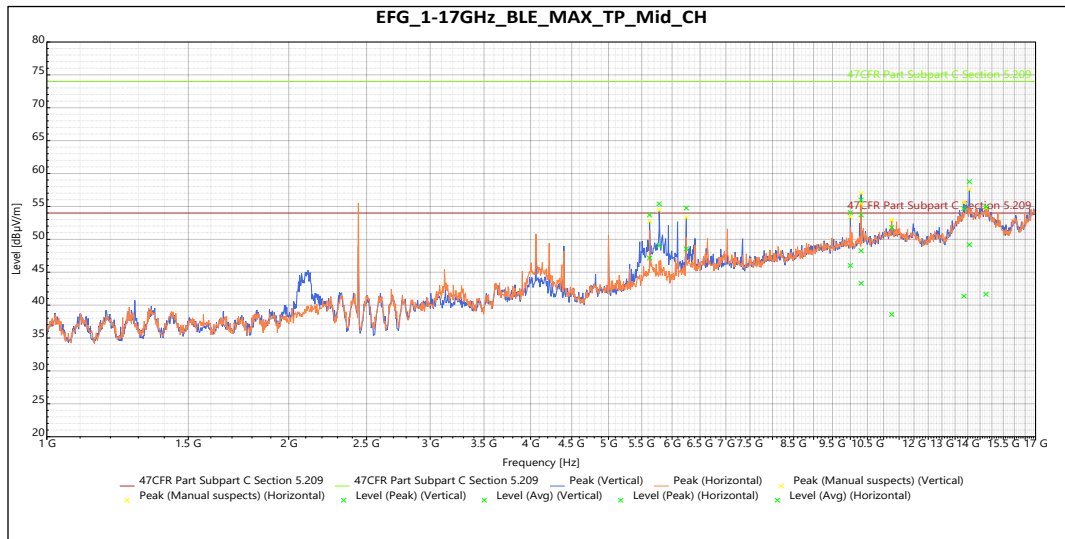
Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
5.6252 GHz	54.703	74	-19.297	58	1.638	Vertical	-4.751
5.7811 GHz	55.473	74	-18.527	266	1.638	Vertical	-4.418
5.9375 GHz	52.986	74	-21.014	275	1.643	Vertical	-4.105
9.9996 GHz	55.014	74	-18.986	109	1.638	Vertical	5.66
10.313 GHz	55.092	74	-18.908	240	1.643	Vertical	6.447
13.672 GHz	59.126	74	-14.874	299	1.643	Vertical	10.124
14.063 GHz	58.747	74	-15.253	296	1.643	Vertical	11.092
14.453 GHz	60.372	74	-13.628	296	1.638	Vertical	11.661
4.9999 GHz	50.041	74	-23.959	273	2.645	Horizontal	-5.643
10.312 GHz	54.931	74	-19.069	71	1.638	Horizontal	6.446

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
5.6252 GHz	48.267	54	-5.733	58	1.638	Vertical	-4.751
5.7811 GHz	48.697	54	-5.303	266	1.638	Vertical	-4.418
5.9375 GHz	46.101	54	-7.899	275	1.643	Vertical	-4.105
9.9996 GHz	48.461	54	-5.539	109	1.638	Vertical	5.66
10.313 GHz	46.879	54	-7.121	240	1.643	Vertical	6.447
13.672 GHz	49.51	54	-4.49	299	1.643	Vertical	10.124
14.063 GHz	47.716	54	-6.284	296	1.643	Vertical	11.092
14.453 GHz	51.983	54	-2.017	296	1.638	Vertical	11.661
4.9999 GHz	45.837	54	-8.163	273	2.645	Horizontal	-5.643
10.312 GHz	46.496	54	-7.504	71	1.638	Horizontal	6.446

Table 5: Radiated Emissions at the Lowest Frequency 1 – 17 GHz



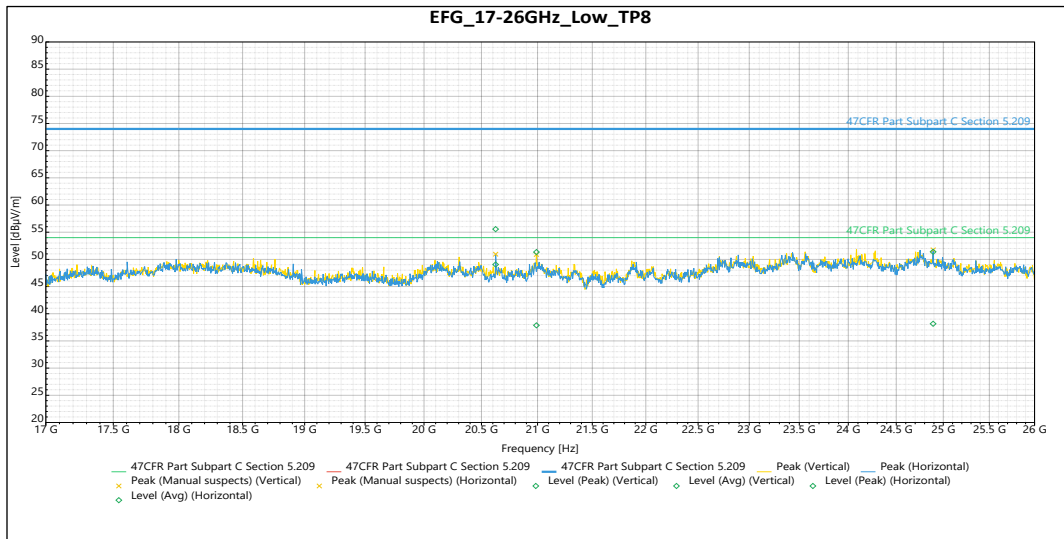
Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
5.6248 GHz	53.71	74	-20.29	274	1.643	Vertical	-4.751
5.7812 GHz	55.398	74	-18.602	270	1.5	Vertical	-4.418
6.2501 GHz	54.756	74	-19.244	306	2.142	Vertical	-3.404
9.9996 GHz	54.071	74	-19.929	108	2.146	Vertical	5.66
10.312 GHz	55.997	74	-18.003	251	1.638	Vertical	6.446
13.845 GHz	54.663	74	-19.337	358	4	Vertical	10.732
14.063 GHz	58.776	74	-15.224	268	2.142	Vertical	11.092
10.313 GHz	53.73	74	-20.27	65	1.643	Horizontal	6.447
11.259 GHz	51.812	74	-22.188	187	1.643	Horizontal	7.435
14.751 GHz	54.963	74	-19.037	165	2.65	Horizontal	11.393

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
5.6248 GHz	47.159	54	-6.841	274	1.643	Vertical	-4.751
5.7812 GHz	49.074	54	-4.926	270	1.5	Vertical	-4.418
6.2501 GHz	48.552	54	-5.448	306	2.142	Vertical	-3.404
9.9996 GHz	46.039	54	-7.961	108	2.146	Vertical	5.66
10.312 GHz	48.277	54	-5.723	251	1.638	Vertical	6.446
13.845 GHz	41.37	54	-12.63	358	4	Vertical	10.732
14.063 GHz	49.176	54	-4.824	268	2.142	Vertical	11.092
10.313 GHz	43.319	54	-10.681	65	1.643	Horizontal	6.447
11.259 GHz	38.577	54	-15.423	187	1.643	Horizontal	7.435
14.751 GHz	41.646	54	-12.354	165	2.65	Horizontal	11.393

Table 6: Radiated Emissions at the Middle Frequency 1 – 17 GHz



Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
20.99 GHz	51.347	74	-22.653	224	Vertical	0.784
20.625 GHz	55.573	74	-18.427	254	Horizontal	-0.151
24.891 GHz	51.403	74	-22.597	12	Horizontal	0.897

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
20.99 GHz	37.872	54	-16.128	224	Vertical	0.784
20.625 GHz	49.06	54	-4.94	254	Horizontal	-0.151
24.891 GHz	38.165	54	-15.835	12	Horizontal	0.897

Table 8: Radiated Emissions at the Lowest Frequency 17 – 26 GHz (worse case)

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.

Frequency (MHz)	Measurement (dBm)	Criteria (dBm)
2402	-1.21	8.0
2442	0.14	8.0
2480	0.81	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 --