



427 West 12800 South
Draper, UT 84020

Test Report Certification

FCC ID	SWX-UNVR
IC ID	6545A-UNVR
Equipment Under Test	UNVR
Test Report Serial Number	TR4858_02
Date of Test(s)	15 and 17 June 2020
Report Issue Date	29 June 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	UNVR
FCC ID	SWX-UNVR
IC ID	6545A-UNVR

On this 29th day of June 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: Joseph W. Jackson



Reviewed By: Alex Macon

Revision History		
Revision	Description	Date
01	Original Report Release	29 June 2020
02	Amendments in Sections 2.1, 2.2, 2.3, 3.5, 5.3 and 5.4	6 July 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	UNVR
Serial Number	E063DACEB406
Dimensions (cm)	44.24 x 32.5 x 4.37

2.2 Description of EUT

The UNVR is a network video recorder that provides up to 30 days of 4K video storage for 15 cameras for full HD video storage for 50 cameras. The UNVR uses the UniFi Protect software and has four 8 TB hard drive bays. The current version of firmware is version 1.0. The UNVR has a Bluetooth transceiver that operates in the 2.4 GHz band. The UNVR is for indoor use, rack mountable and is powered from AC mains power at 120 – 240 Volts, 50/60 Hz.

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: UNVR (Note 1) SN: E063DACEB406	Network Video Recorder	See Section 2.4
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 Power	1	3 Conductor Power Cable/< 3 meters
Data	2	Shielded or Un-Shielded cat 5e cable/< 3 meters

2.5 Operating Environment

Power Supply	120/240 VAC
AC Mains Frequency	50/60 Hz
Temperature	22.7 – 23.2 °C
Humidity	19.5 – 23.3 %
Barometric Pressure	1013 mBar

2.6 Operating Modes

The UNVR was connected to a personal computer laptop and tested using test software in order to enable to constant transmission of the Bluetooth receiver.

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

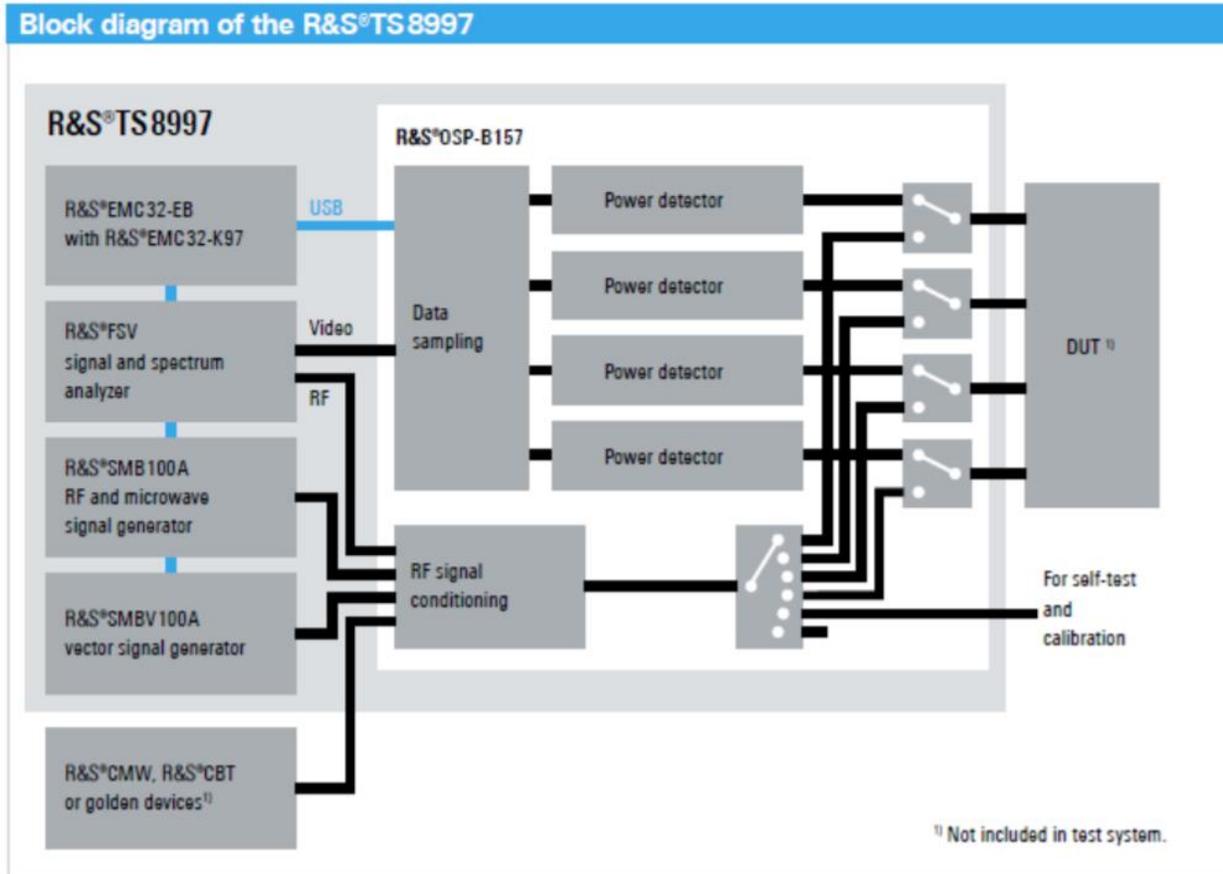


Diagram 1: Test Configuration Block Diagram

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	N/A
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
N/A15.247(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.				

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

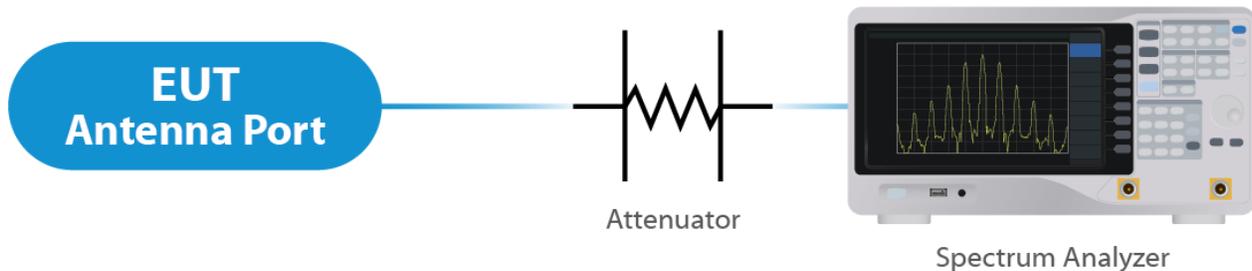
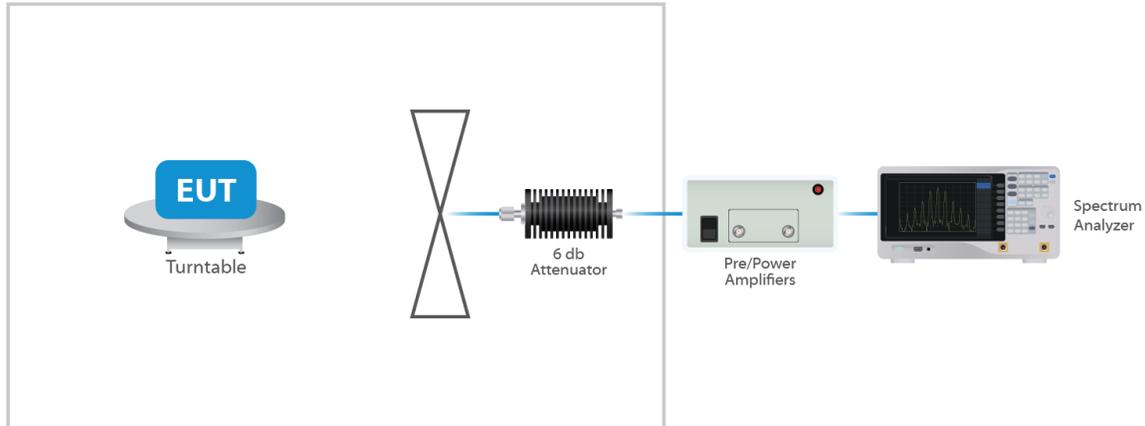


Figure 1: Direct Connect at the Antenna Port Test

4.2 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	7/16/2020
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 2: List of equipment used for Radiated Emissions

Figure 2: Radiated Emissions Test

4.3 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.

4.4 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 a flex integral antenna. The Maximum gain of the antenna is 1.5 dBi. The antenna is not user replaceable.

Results

The EUT complied with the specification

5.2 §15.247(a)(2) Emissions Bandwidth

Frequency (MHz)	Emissions 99% Bandwidth (MHz)	Emissions 6 dB Bandwidth (MHz)
2402	0.995	0.673
2442	0.990	0.673
2480	0.990	0.653

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 in the associated annex report).

5.3 §15.247(b)(3) Maximum Average Output Power

The maximum average RF conducted output power measured for this device was 6.8 dBm or 4.79 mW. The limit is 30 dBm or 1 Watt when using antennas with 6 dBi or less gain. The antenna has a gain of 1.5 dBi.

Frequency (MHz)	TP Setting	Measured Output Power (dBm)	Output Power (mW)
2402	8	5.3	3.39
2442	8	6.7	4.68
2480	8	6.8	4.79

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 example measurement within annex.

5.4 §15.247(d) Spurious Emissions

5.4.1 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 shown in the associated annex report, high, mid and low channels can be seen in the “band edge high” test to ensure worst case was measured.

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)	Detector	Antenna Polarity	Receiver Reading (dBµV)	Correction Factor (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4995.02	Peak	Horizontal	47.50	2.29	49.79	54.0	- 4.21
5999.90	Peak	Horizontal	33.90	5.63	39.53	54.0	- 14.47
15645.71	Peak	Horizontal	28.98	14.57	43.55	54.0	- 10.45
4995.02	Average	Horizontal	50.93	2.29	53.22	74.0	- 20.78
5999.90	Average	Horizontal	42.00	5.63	47.63	74.0	- 26.37
15645.71	Average	Horizontal	38.51	14.57	53.08	74.0	- 20.92

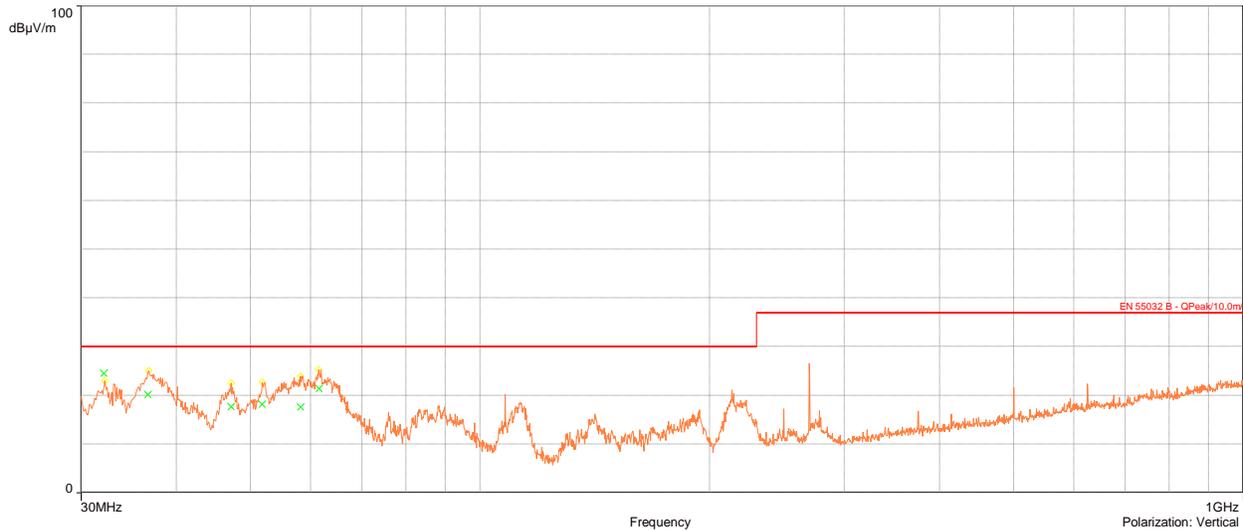
Table 3: Transmitting at the Lowest Frequency

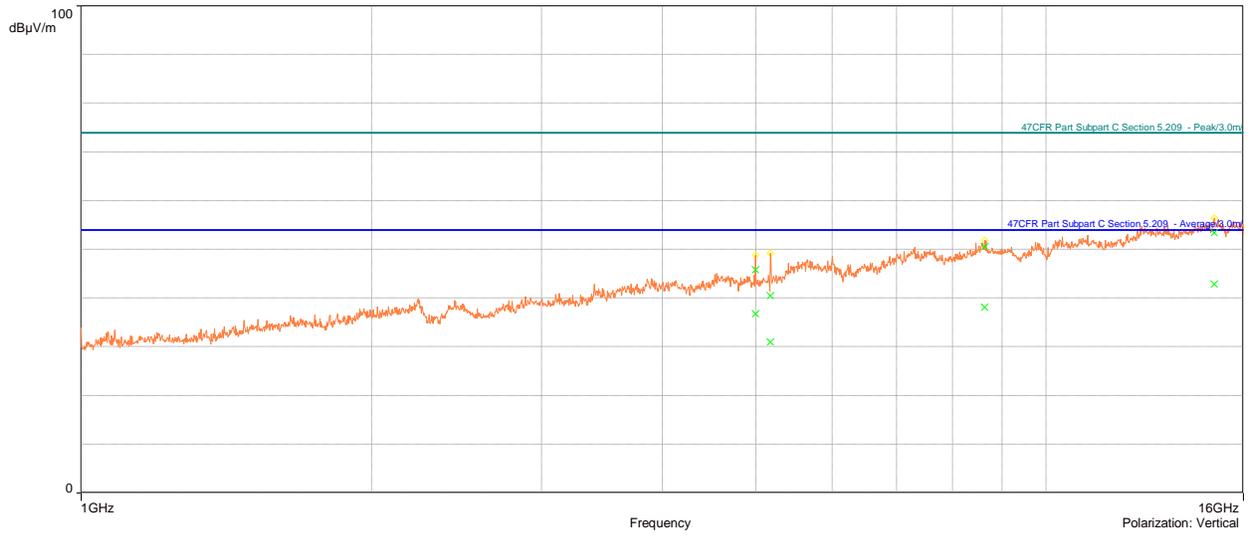
Frequency (MHZ)	Detector	Antenna Polarity	Receiver Reading (dBµV)	Correction Factor (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4994.95	Average	Vertical	34.47	2.29	36.76	54.0	- 17.24
5177.41	Average	Vertical	28.28	2.74	31.02	54.0	- 22.98
8626.91	Average	Vertical	27.20	10.88	38.08	54.0	- 15.92
14924.42	Average	Vertical	27.73	15.12	42.85	54.0	- 11.15
4994.99	Average	Horizontal	47.76	2.29	50.05	54.0	- 3.95
6000.03	Average	Horizontal	33.32	5.63	38.95	54.0	- 15.05
7611.84	Average	Horizontal	28.64	8.48	37.12	54.0	- 16.88
14921.08	Average	Horizontal	27.89	15.13	43.02	54.0	- 10.98
4994.95	Peak	Vertical	43.55	2.29	45.84	74.0	- 28.16
5177.41	Peak	Vertical	37.73	2.74	40.47	74.0	- 33.53
8626.91	Peak	Vertical	39.68	10.88	50.56	74.0	- 23.44
14924.42	Peak	Vertical	38.26	15.12	53.38	74.0	- 20.62
4994.99	Peak	Horizontal	51.95	2.29	54.24	74.0	- 19.76

6000.03	Peak	Horizontal	42.93	5.63	48.56	74.0	- 25.44
7611.84	Peak	Horizontal	39.37	8.48	47.85	74.0	- 26.15
14921.08	Peak	Horizontal	38.17	15.13	53.30	74.0	- 20.70

Table 4: Transmitting at the Middle Frequency

Frequency (MHZ)	Detector	Antenna Polarity	Receiver Reading (dB μ V)	Correction Factor (dB)	Field Strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4994.81	Average	Vertical	41.24	2.29	43.53	54.0	- 10.47
5999.98	Average	Vertical	37.83	5.63	43.46	54.0	- 10.54
14926.94	Average	Vertical	27.70	15.11	42.81	54.0	- 11.19
15640.92	Average	Vertical	28.82	14.58	43.40	54.0	- 10.60
4994.97	Average	Horizontal	47.06	2.29	49.35	54.0	- 4.65
5999.93	Average	Horizontal	41.23	5.63	46.86	54.0	- 7.14
15028.92	Average	Horizontal	28.21	15.28	43.49	54.0	- 10.51
4994.81	Peak	Vertical	47.04	2.29	49.33	74.0	- 24.67
5999.98	Peak	Vertical	45.06	5.63	50.69	74.0	- 23.31
14926.94	Peak	Vertical	37.60	15.11	52.71	74.0	- 21.29
15640.92	Peak	Vertical	40.88	14.58	55.46	74.0	- 18.54
4994.97	Peak	Horizontal	50.65	2.29	52.94	74.0	- 21.06
5999.93	Peak	Horizontal	44.59	5.63	50.22	74.0	- 23.78
15028.92	Peak	Horizontal	38.83	15.28	54.11	74.0	- 19.89

Table 5: Transmitting at the Highest Frequency

Graph 1: Radiated Worst Case Plot 30 – 1000 MHz



Graph 2: Radiated Worse Case 1 – 16 GHz

5.5 §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	-1.914	8.0
2442	-0.838	8.0
2480	-0.700	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 --