

July 18, 2023

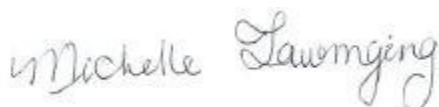
Burnham Holdings Engineering Company, LLC
2930 Old Tree Dr
Lancaster, PA 17603

Dear Peter Cloonan,

Enclosed is the Wireless test report for compliance testing of the Burnham Holdings Engineering Company, LLC, xUSB-Connect (also branded as NYB-Connect, PAT-Connect) as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Part 15 Subpart C for Intentional Radiators.

Thank you for using the services of Eurofins Electrical and Electronic Testing NA, Inc. If you have any questions regarding these results or if we can be of further service to you, please feel free to contact me.

Sincerely yours,
EUROFINS ELECTRICAL AND ELECTRONIC TESTING NA, INC.



Michelle Tawmging
Documentation Department

Reference: (\Burnham Holdings Engineering Company, LLC\WIR121164-FCC247 BLE Rev. 4)



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Electromagnetic Compatibility Criteria Test Report

for the

**Burnham Holdings Engineering Company, LLC
xUSB-Connect (also branded as NYB-Connect, PAT-Connect)**

Tested under
the FCC Certification Rules
contained in
15.247 Subpart C for Intentional Radiators

Report: WIR121164-FCC247 BLE Rev. 4

July 18, 2023

Prepared For:

**Burnham Holdings Engineering Company, LLC
2930 Old Tree Dr
Lancaster, PA 17603**

Prepared By:
Eurofins Electrical and Electronic Testing NA, Inc.
914 W. Patapsco Avenue
Baltimore, MD 21230

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Donald Salguero, Project Engineer
Wireless Lab

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules Part 15.247 under normal use and maintenance.



Michael Griffiths
Manager, Wireless Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	November 1, 2022	Initial Issue
1	November 16, 2022	Updated company address and name throughout; added FCC ID
2	May 16, 2023	Updates per TCB Comments
3	July 5, 2023	Updates per TCB Comments
4	July 18, 2023	Updated Antenna Gain to -2dBi

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Executive Summary

A. Purpose of Test

An EMC Wireless evaluation was performed to determine compliance of the Burnham Holdings Engineering Company, LLC xUSB-Connect (also branded as NYB-Connect, PAT-Connect), with the requirements of Part 15, §15.247. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the xUSB-Connect (also branded as NYB-Connect, PAT-Connect). Burnham Holdings Engineering Company, LLC should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the xUSB-Connect (also branded as NYB-Connect, PAT-Connect), has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, §15.247, in accordance with Burnham Holdings Engineering Company, LLC, quote number 9USB0607R1. All tests were conducted using measurement procedure ANSI C63.10-2013.

FCC Reference 47 CFR Part 15.247:2005	Description	Compliance
Title 47 of the CFR, Part 15 §15.203	Antenna Requirement	Compliant
Title 47 of the CFR, Part 15 §15.207(a)	Conducted Emission Limits	Compliant
Title 47 of the CFR, Part 15 §15.247(a)(2)	6dB Occupied Bandwidth	Compliant
Title 47 of the CFR, Part 15 §15.247(b)	Peak Power Output	Compliant
Title 47 of the CFR, Part 15 §15.247(c)	Spurious Emissions in Non-restricted Bands	Compliant
Title 47 of the CFR, Part 15 §15.247(d); §15.209; §15.205	Radiated Spurious Emissions Requirements	Compliant
Title 47 of the CFR, Part 15; §15.247(e)	Peak Power Spectral Density	Compliant
Title 47 of the CFR, Part 15 §15.247(i)	RF Human Exposure, SAR Exclusion	See Eurofins test report “WIR121164-RF Exposure FCC”

Table 1. Executive Summary of EMC Wireless Part 15.247 Compliance Testing

Equipment Configuration

A. Overview

Eurofins Electrical and Electronic Testing NA, Inc. was contracted by Burnham Holdings Engineering Company, LLC to perform testing on the xUSB-Connect (also branded as NYB-Connect, PAT-Connect), under Burnham Holdings Engineering Company, LLC's quote number 9USB0607R1,

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Burnham Holdings Engineering Company, LLC, xUSB-Connect (also branded as NYB-Connect, PAT-Connect).

The results obtained relate only to the item(s) tested.

Model(s) Tested:	xUSB-Connect (also branded as NYB-Connect, PAT-Connect)
Model(s) Covered:	xUSB-Connect (also branded as NYB-Connect, PAT-Connect)
EUT Specifications:	Primary Power: 24 Vdc and 24 Vac options
	FCC ID: 2A9E3-CST111639
	Type of Modulations: Bluetooth V4
	Equipment Code: DTS
	Peak RF Output Power: 8.55 dBm; 0.00716 W
	EUT Frequency Ranges: 2402 – 2480 MHz
	Transmit Speeds: 1Mbps
	Antenna Type: PCB
	Antenna Gain: -2 dBi
	Firmware Version: 1.20221013_01
Analysis:	The results obtained relate only to the item(s) tested.
Environmental Test Conditions:	Temperature: 15-35° C
	Relative Humidity: 30-60%
	Barometric Pressure: 860-1060 mbar
Evaluated by:	Donald Salguero
Report Date(s):	July 18, 2023

Table 2. EUT Summary Table

BLE Channel #	Frequency (MHz)	Tested Channels	BLE Channel #	Frequency (MHz)	Tested Channels
37	2402	x	18	2442	
00	2404		19	2444	
01	2406		20	2446	
02	2408		21	2448	
03	2410		22	2450	
04	2412		23	2452	
05	2414		24	2454	
06	2416		25	2456	
07	2418		26	2458	
08	2420		27	2460	
09	2422		28	2462	
10	2424		29	2464	
38	2426		30	2466	
11	2428		31	2468	
12	2430		32	2470	
13	2432		33	2472	
14	2434		34	2474	
15	2436		35	2476	
16	2438		36	2478	
17	2440	x	39	2480	x

Table 3. EUT Supported Channel List

B. References

CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
ANSI C63.4:2014	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ISO/IEC 17025:2017	General Requirements for the Competence of Testing and Calibration Laboratories
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
KDB 558074 v04	Guidance For Performing Compliance Measurements On Digital Transmission Systems (DTS) Operating Under Section 15.247

Table 4. References

C. Test Site

All testing was performed at Eurofins Electrical and Electronic Testing NA, Inc., 914 W. Patapsco Avenue, Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Eurofins Electrical and Electronic Testing NA, Inc. has been accredited by the American Association for Laboratory Accreditation (A2LA) (Certificate #: 0591.01) in accordance with ISO/IEC 17025:2017.

Eurofins Electrical and Electronic Testing NA, Inc. is part of the Eurofins Electrical & Electronics (E&E) global compliance network.

D. Measurement Uncertainty

Test Method	Typical Expanded Uncertainty	K	Confidence Level
Radiated Emissions, (30 MHz – 1 GHz)	±3.20	2	95%
Radiated Emissions, (1 GHz – 6 GHz)	±2.52	2	95%
Conducted Emission Voltage	±2.03	2	95%
RF Frequencies	±4.52 Hz	2	95%
RF Power Conducted Emissions	±2.32 dB	2	95%
RF Power Conducted Spurious Emissions	±2.25 dB	2	95%
RF Power Radiated Emissions	±3.01 dB	2	95%

Table 5. Uncertainty Calculations Summary

E. Description of Test Sample

The xUSB-Connect (also branded as NYB-Connect, PAT-Connect), is the Equipment Under Test (EUT). The product is sold as a commissioning, diagnostic and Boiler service tool and Remote Monitoring System. The Service tool is a Bluetooth Adaptor connected to the boiler control via an RS485 modbus connection and to a mobile device app using Bluetooth. This device is used by contractors. Additionally, the Remote Monitoring System uses both Bluetooth as described above and Wi-Fi communicates to home router.

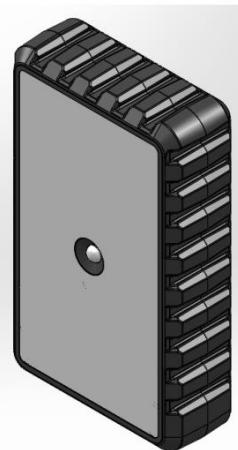


Figure 1. Block Diagram of Test Configuration

The firmware installed in the EUT during testing was 1.20221013_01

F. Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

Ref. ID	Name/Description	Manufacturer	Model Number	Customer Supplied Calibration Data
-	24vdc power supply	TRI-MAG	L6R06H-240	-

Table 6. Support Equipment

G. Mode of Operation

Bluetooth Adaptor Mode: runs Bluetooth version is v4.0, 2400 to 2483 MHz. Communicates bluetooth to smart phone App. Bluetooth mode will run automatically continuously. Output power setting of 4dBm across all channels

Test Software: nRF Connect – Direct Test Mode v2.0.3

H. Method of Monitoring EUT Operation

LED light.

I. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

J. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Burnham Holdings Engineering Company, LLC upon completion of testing.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.203 Antenna Requirement

Test Requirement:

§ 15.203: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

- a.) Antenna must be permanently attached to the unit.
- b.) Antenna must use a unique type of connector to attach to the EUT.
- c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

Test Results:

The EUT was tested is **compliant** with § 15.203 Antenna Requirement. EUT uses built-in antenna.

Antenna Gain: -2dBi
Antenna Type: PCB

Test Engineer:

Donald Salguero

Test Date:

October 17, 2022

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207(a) Conducted Emissions Limits

Test Requirement(s):

§ 15.207 (a): For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	§ 15.207(a), Conducted Limit (dB μ V)	
	Quasi-Peak	Average
* 0.15- 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

Table 7. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Procedure:

The EUT was placed on a 0.8 m-high wooden table inside a screen room. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 Ω /50 μ H Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.4-2014 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz"*. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω /50 μ H LISN as the input transducer to an EMC/field intensity meter. For the purpose of this testing, the transmitter was turned on. Scans were performed with the transmitter on.

Test Results:

The EUT was tested is **compliant** with § 15.207(a) Conducted Emissions Limits. Measured emissions were below applicable limits.

Test Engineer:

Donald Salguero

Test Date:

October 4, 2022

Test Data

Conducted Emissions Datasheet						
METrak Number	121164		Test Specification	FCC Part 15, Subpart B, Section 15.107		
Customer	US Boiler Company		Equipment Class	Classss B		
EUT Name	USB-Connect		Engineer	Donald Salguero		
Model/Part Number	N/A		Test Date(s)	10/4/2022		
Serial Number	N/A		Temperature	20.9 C		
Mode of Operation	120VAC 60Hz		Relative Humidity	68%		
Notes:						
Start Frequency		150khz		30MHz		
Line Under Test		Line				
Frequency	Quasi-Peak Measurement	Correction Factor	Corrected Measurement	Quasi-Peak Limit	Margin	Result
MHz	dB μ V	dB	dB μ V	dB μ V	dB	Pass/Fail
0.202	32.09	10.16	42.25	64.52	-22.27	PASS
0.262	27.39	10.1	37.48	62.81	-25.32	PASS
8.457	17.1	10.03	27.13	60	-32.87	PASS
11.736	20.31	10.08	30.38	60	-29.62	PASS
15.386	32.17	10.12	42.29	60	-17.71	PASS
22.99	15.23	10.28	25.51	60	-34.49	PASS
Frequency	Average Measurement	Correction Factor	Corrected Measurement	Average Limit	Margin	Result
MHz	dB μ V	dB	dB μ V	dB μ V	dB	Pass/Fail
0.202	13.79	10.16	23.95	54.52	-30.57	PASS
0.262	12.73	10.1	22.83	52.81	-29.98	PASS
8.457	11.99	10.03	22.02	50	-27.98	PASS
11.736	13.91	10.08	23.98	50	-26.02	PASS
15.386	13.92	10.12	24.04	50	-25.96	PASS
22.99	9.94	10.28	20.21	50	-29.79	PASS

Table 8. CEV Line Datasheet

Conducted Emissions Datasheet						
METrak Number	121164		Test Specification	FCC Part 15, Subpart B, Section 15.107		
Customer	US Boiler Company			Equipment Class	Classs B	
EUT Name	USB-Connect			Engineer	Donald Salguero	
Model/Part Number	N/A			Test Date(s)	10/4/2022	
Serial Number	N/A			Temperature	20.9C	
Mode of Operation	120VAC 60Hz			Relative Humidity	68%	
Notes:						
Start Frequency		150kHz			30MHz	
Line Under Test		Neutral				
Frequency	Quasi-Peak Measurement	Correction Factor	Corrected Measurement	Quasi-Peak Limit	Margin	Result
MHz	dB μ V	dB	dB μ V	dB μ V	dB	Pass/Fail
0.189	30.71	10.21	40.91	64.88	-23.96	PASS
0.252	23.64	10.11	33.74	63.07	-29.33	PASS
8.376	17.61	10.04	27.65	60	-32.35	PASS
11.696	18.52	10.07	28.59	60	-31.41	PASS
15.552	26.44	10.12	36.56	60	-23.44	PASS
22.907	15.17	10.28	25.45	60	-34.55	PASS
Frequency	Average Measurement	Correction Factor	Corrected Measurement	Average Limit	Margin	Result
MHz	dB μ V	dB	dB μ V	dB μ V	dB	Pass/Fail
0.189	13.42	10.21	23.62	54.88	-31.25	PASS
0.252	10.23	10.11	20.34	53.07	-32.73	PASS
8.376	12.26	10.04	22.3	50	-27.7	PASS
11.696	13.25	10.07	23.32	50	-26.68	PASS
15.552	13.59	10.12	23.7	50	-26.3	PASS
22.907	9.72	10.28	20	50	-30	PASS

Table 9. CEV Neutral Datasheet

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(a)(2) 6 dB Bandwidth

Test Requirements: § 15.247(a)(2): Operation under the provisions of this section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

For systems using digital modulation techniques, the EUT may operate in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

Test Procedure: The transmitter was on and transmitting at the highest output power. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW = 100kHz, VBW = 3*RBW. The 6 dB Bandwidth was measured and recorded. The measurements were performed on the low, mid and high channels.

Test Results: The EUT was tested is **compliant** with § 15.247(a)(2) 6 dB Bandwidth. No anomalies noted.

Test Engineer: Donald Salguero

Test Date: October 17, 2022

Test Data

TX Channel	Frequency (MHz)	-6dB Bandwidth (kHz)	99% Bandwidth (kHz)	Limit (kHz)
37	2402	709.143	1052.2	> 500
17	2440	716.135	1057.5	> 500
39	2480	710.21	1054.2	> 500

Table 10. OBW Test Results

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) Peak Power Output

Test Requirements: **§15.247(b):** The maximum peak output power of the intentional radiator shall not exceed the following:

Digital Transmission Systems (MHz)	Output Limit (Watts)
2400–2483.5	1.000

Table 11. Output Power Requirements from §15.247(b)

§15.247(c): if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in the 9, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Procedure: Testing was performed on a radiated setup due to unavailability of a RF conducted port. The EUT was placed on a RF invisible table with a height of 1.5m. Receive antenna height and EUT position was varied until the max level was found. The EUT was configured to measure the low, mid and high channels of each band at the maximum power level.

Measured field strength was then converted to conducted power thru following formulas:

$$\text{EIRP} = E + 20\log(d) - 104.77$$

$$P = \text{EIRP} - G$$

Where,

E is field strength (dBuV/m)

D is measuring distance (m)

EIRP is equivalent isotropically radiated power (dBm)

P is conducted power (dBm)

G is antenna gain (dBi)

Test Results: The EUT was tested is **compliant** with § 15.247(b) Peak Power Output. No anomalies noted.

Test Engineer: Donald Salguero

Test Date: October 17, 2022

Test Data

TX Channel	Frequency (MHz)	Uncorrected Field Strength (dBuV)	ACF (dB/m)	Cable Loss (dB)	Corrected Field Strength (dBuV/m)	Measurement Distance (m)	EIRP (dBm)	Antenna Gain (dBi)	Conducted Power (dBm)	Limit (dBm)	Margin (dB)
37	2402	61.57	32.109	6.138	99.817	3	4.59	-2.0	6.59	30	-23.41
17	2440	63.38	32.258	6.138	101.776	3	6.55	-2.0	8.55	30	-21.45
39	2480	62.79	32.405	6.142	101.337	3	6.11	-2.0	8.11	30	-21.89

Table 12. OP Test Results

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.209 Radiated Spurious Emissions Requirements and Band Edge

Test Requirements: **§15.247(d); §15.205:** Emissions outside the frequency band.

§15.205(a): Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090–0.110-----	16.42–16.423	399.9–410	4.5–5.15
¹ 0.495–0.505-----	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905-----	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128-----	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775-----	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775-----	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218-----	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825-----	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225-----	123–138	2200–2300	14.47–14.5
8.291–8.294-----	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366-----	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675-----	156.7–156.9	2655–2900	22.01–23.12
8.41425–8.41475-----	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293-----	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025-----	240–285	3345.8–3358.36.	43–36.5
12.57675–12.57725-----	322–335.4	3600–4400	(²)

Table 13. Restricted Bands of Operation

¹ Until February 1, 1999, this restricted band shall be 0.490 – 0.510 MHz.

² Above 38.6

Test Requirement(s): **§ 15.209 (a):** Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in Table 9.

Frequency (MHz)	§ 15.209(a), Radiated Emission Limits (dB μ V) @ 3m
30 - 88	40.00
88 - 216	43.50
216 - 960	46.00
Above 960	54.00

Table 14. Radiated Emissions Limits Calculated from FCC Part 15, § 15.209 (a)

Test Procedures:

The transmitter was turned on. Measurements were performed of the low, mid and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance and compared to a 3 m limit line.

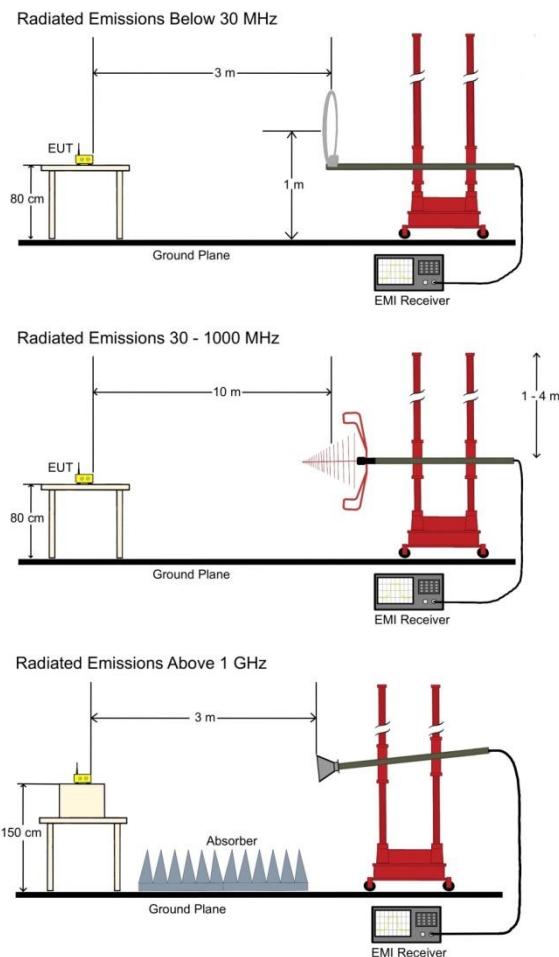


Figure 2. Radiated Emissions Test Setup

Radiated Band Edge Measurements

Test Procedures: The transmitter was turned on. Measurements were performed of the low and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance and compared to a 3 m limit line.

Test Results: The EUT was tested is **compliant** with § 15.209 Radiated Spurious Emissions Requirements and Band Edge. Measured emissions were below applicable limits.

Test Engineer: Donald Salguero

Test Date: October 17, 2022

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) Spurious Emissions in Non-restricted Bands

Test Requirement:

15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Procedure:

For intentional radiators with a digital device portion which operates below 10 GHz, the spectrum was investigated as per §15.33(a)(1) and §15.33(a)(4); i.e., the lowest RF signal generated or used in the device up to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

The transmitter was turned on. Measurements were performed of the low and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance and compared to a 3 m limit line.

Test Results:

The EUT was tested is **compliant** with § 15.247(d) Spurious Emissions in Non-restricted Bands. Measured emissions were below applicable limits.

Test Engineer:

Donald Salguero

Test Date:

October 18, 2022

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(e) Peak Power Spectral Density

Test Requirements: **§15.247(e):** For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure: Testing was performed on a radiated setup due to unavailability of a RF conducted port. The EUT was placed on a RF invisible table with a height of 1.5m. Receive antenna height and EUT position was varied until the max level was found. The EUT was configured to measure the low, mid and high channels of each band at the maximum power level.

Measured field strength was then converted to conducted power thru following formulas:

$$\text{EIRP} = E + 20\log(d) - 104.77$$

$$P = \text{EIRP} - G$$

Where,

E is field strength (dBuV/m)

D is measuring distance (m)

EIRP is equivalent isotropically radiated power (dBm)

P is conducted power (dBm)

G is antenna gain (dBi)

The RBW was set to 3 kHz and a VBW set to 10 kHz or greater. The spectrum analyzer was set to an auto sweep time and a peak detector was used. Measurements were carried out at the low, mid and high channels.

Test Results: The EUT was tested is **compliant** with § 15.247(e) Peak Power Spectral Density. No anomalies noted.

Test Engineer: Donald Salguero

Test Date: October 17, 2022

Test Data

TX Channel	Frequency (MHz)	Uncorrected Field Strength (dBuV)	ACF (dB/m)	Cable Loss (dB)	Corrected Field Strength (dBuV/m)	Measurement Distance (m)	EIRP PSD (dBm)	Antenna Gain (dBi)	Conducted PSD (dBm)	Limit (dBm)	Margin (dB)
37	2402	45.33	32.109	6.138	83.577	3	-11.65	-2.0	-9.65	8	-17.65
17	2440	44.92	32.258	6.138	83.316	3	-11.91	-2.0	-9.91	8	-17.91
39	2480	43.91	32.405	6.142	82.457	3	-12.77	-2.0	-10.77	8	-18.77

Table 15. PSD Test Results

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Conducted Emissions Equipment List						
Asset Number	Description	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due Date
1T9987	Thermometer/Hygrometer/Barometer	Fisher Scientific	14-650-118, 15557603	200659491	10/26/2020	10/26/2022
1T6658	Spectrum Analyzer	Agilent Technologies	E4407B	US41443517	9/7/2021	3/7/2023
1T8908	LISN	Com-Power	LI-150C	201223	4/12/2021	10/12/2022
1T8909	LISN	Com-Power	LI-150C	201228	4/12/2021	10/12/2022
1T7450	Transient Limiter	Com-Power	LIT-153A	22010020	FVR	FVR
1T8834	Conducted Comb Generator	Com-Power	CGC-255E	311358	9/10/2021	3/10/2023

Table 16. CEV Equipment List

Radiated Emissions Equipment List						
Asset Number	Description	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due Date
1T4300	SEMI-ANECHOIC CHAMBER (NSA)	EMC TEST SYSTEMS	NONE	NONE	8/19/2021	8/31/2023
1T4300B	Semi-Anechoic 3m Chamber sVSWR	EMC TEST SYSTEMS	NONE	NONE	9/30/2021	9/30/2023
1T4751	Antenna - Bilog	Sunol Sciences	JB6	A101910	6/1/2022	12/1/2023
1T4483	Antenna; Horn	ETS-Lindgren	3117	56658	1/31/2022	7/31/2023
1T4576	Antenna, Active Horn	Com-Power	AHA-118	711065	7/8/2022	1/31/2024
1A1161	DRG Horn Antenna	ETS Lindgren	3116C-PA	158461	7/15/2022	7/15/2023
1T8743	Preamplifier	A.H. Systems, Inc.	PAM-0118P	419	2015-03-11T04:00:00	2016-03-11T05:00:00
1T4681	Spectrum Analyzer (PSA)	Agilent Technologies	E4448A	MY46180897	10/15/2021	4/15/2023
1T4409	EMI Receiver	Rohde & Schwarz	ESIB7	100207	2/16/2022	8/31/2023

Table 17. REE Equipment List

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

End of Report