



# **TEST REPORT**

Applicant	Yardi Systems Inc.
Address	430 South Fairview Ave Goleta, CA 93117

FCC ID	2BAL9YDIZW
ISED Canada IC	30221-YDIZW
Product Description	IoT Hub
PMN Model/HVIN FVIN	RentCafe Home IQ Hub H4P3-TWC, H4P3-TW 7.19.3
Additional Models	See Section 3.1 for details
Date of tests	Sep 20 – 24, 2024
FCC Test Firm DN Canada CABID	US1028 US0106
The tests have been	carried out according to the requirements of the following standard:

# ☑ FCC Part 15, Subpart C, Section 15.247 ☑ ISED Canada RSS-247 Issue 3

#### CONCLUSION: The submitted sample was found to <u>COMPLY</u> with the test requirement

Prepared by Nisha Patel Wireless Engineer I Approved by Yunus Faziloglu Wireless Manager

Report Issue Date: Oct 7, 2024

Issue Number: 1

This report is governed by, and incorporates by reference, CPS Conditions of Service as posted at the date of issuance of this report at <a href="https://www.cps.bureauveritas.com/terms-conditions">https://www.cps.bureauveritas.com/terms-conditions</a> and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute you unqualified acceptance of the completeness of the report contents.





# TABLE OF CONTENTS

REL	EASE	CONTROL RECORD	. 3
1	SUMN	IARY OF TEST RESULTS	. 4
2	MEAS	UREMENT UNCERTAINTY	. 5
3	GENE	RAL INFORMATION	. 6
3.1	GEN	ERAL DESCRIPTION OF EUT	. 6
3.2	DES	CRIPTION OF TEST MODES	. 7
3.3	MEA	SUREMENT PROCEDURES USED	. 9
3.4	DES	CRIPTION OF SUPPORT EQUIPMENT	. 9
4	TEST	RESULTS	10
4.1	AC L	INE CONDUCTED EMISSIONS	10
	4.1.1	LIMITS	10
	4.1.2	TEST EQUIPMENT USED	10
	4.1.3	TEST PROCEDURES	11
	4.1.4	DEVIATIONS	11
	4.1.5	TEST SETUP	12
	4.1.6	EUT OPERATING CONDITIONS	12
	4.1.7	TEST RESULTS	13
4.2	RAD	IATED SPURIOUS EMISSIONS	17
	4.2.1	LIMITS	17
	4.2.2	TEST EQUIPMENT USED	18
	4.2.3	TEST PROCEDURES	19
	4.2.4	DEVIATIONS	20
	4.2.5	TEST SETUP	20
	4.2.6	EUT OPERATING CONDITIONS	21
	4.2.7	TEST RESULTS	22
5	РНОТ	OGRAPHS OF THE TEST CONFIGURATION	29
6	APPE	NDIX A – MODIFICATIONS	29





# **RELEASE CONTROL RECORD**

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
1	Original release	Oct 7, 2024





# 1 SUMMARY OF TEST RESULTS

EUT was tested against the following requirements:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247), RSS-247					
STANDARI	D SECTION				
47CFR15	RSS	TEST TIPE AND LIMIT	APPLICABLE	RESULI	
15.207	Gen 8.8	AC Power Line Conducted Emissions	Y	Pass	
15.205 15.209	247 3.3 247 5.5 Gen 8.9 Gen 8.10	Radiated Spurious Emissions	Y	Pass	

**Note 1**: This test report includes radiated spurious emissions and AC line conducted emission test data for Class II permissive change filing to a previously certified device in accordance with FCC KDB 178919 D01 Permissive Change Policy v06 and § 2.1043 of the FCC rules.





# 2 MEASUREMENT UNCERTAINTY

The listed uncertainties are the worst-case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results. Values for measurement uncertainty are calculated per ETSI TR 100 028 (2001).

Measurement	Expanded Uncertainty k=2	Maximum allowable uncertainty
Radio frequency (@ 2.4GHz)	3.23 x 10 <sup>-8</sup>	1 x 10 <sup>-7</sup>
RF power, conducted	0.40dB	0.75dB
Maximum frequency deviation: Within 300Hz and 6kHz of audio frequency / Within 6kHz and 25kHz of audio frequency	3.4% 0.3dB	5% 3dB
Adjacent channel power	1.9dB	3dB
Conducted spurious emission of transmitter, valid up to 12.75GHz	2.39dB	3dB
Conducted emission of receivers	1.3dB	3dB
Radiated emission of transmitter, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of transmitter, valid up to 80GHz	3.3dB	6dB
Radiated emission of receiver, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of receiver, valid up to 80GHz	3.3dB	6dB
Humidity	2.37%	5%
Temperature	0.7°C	1.0°C
Time	4.1%	10%
RF Power Density, Conducted	0.4dB	3dB
DC and low frequency voltages	1.3%	3%
Voltage (AC, <10kHz)	1.3%	2%
Voltage (DC)	0.62%	1%
The above reflects a 95% confidence level		

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

One Distribution Center Circle, #1 Littleton, MA





# **3 GENERAL INFORMATION**

## 3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	IoT Hub
MODEL NO.	H4P3-TWC – LTE Version H4P3-TW – Non-LTE Version
NOMINAL VOLTAGE	12VDC via external power supply
MODULATION TYPES	OQPSK
DATA RATES	100kbps
OPERATING FREQUENCY	912MHz, 920MHz
EUT Power Setting	140 (max setting)
ANTENNA TYPE	Surface-mount patch antenna with 0.3dBi peak gain

#### List of Models and Differences

Model	Description	Tested
	Includes the following previously certified two radio modules	
H4P3-TW	FCC ID: 2ABCB-RPICM4, IC: 20953-RPICM4	Y
	FCC ID: 2BAL9YDITRZB, IC: 30221-YDITRZB	
	Same as H4P3-TW with a previously certified cellular modem and	
	two extra antennas.	
H4P3-TWC	FCC ID: XMR201807EG95NA, IC: 10224A-2018EG95NA	Υ
	Includes supporting components for the cellular modem on the	
	base module PCBA	

Port Label	Port Type	No. of Ports	No. of populated	Cable type	Shielded	Ferrites	Length	Max Length
Power	DC	1	1	2-Wire	No	No	2m	2m
	Power							
Ethernet	RJ45	1	1	Cat-6	No	No	5m	100m

Lowest frequency used/generated in the device: 32.768kHz

#### NOTES:

- 1. For a more detailed description of the EUT, please refer to the manufacturer's specifications or the user's manual.
- 2. For photos of the EUT, please refer to External and Internal Photos exhibits.





## 3.2 DESCRIPTION OF TEST MODES

EUT channel list:

CHANNEL	FREQ. (MHZ)
1	912
2	920

1 sample of both the LTE and non-LTE versions of the EUT was provided for testing. External control software was supplied by the customer to put the units into the required test modes. Two DC Power supplies (SWI25-12-N & SWI18-12-N) were supplied by the customer.

Previously certified radio modules referenced in "List of Models and Differences" section of this report, were installed in the device in idle condition during all the testing.

#### EUT configuration modes:

TEST MODE	Description
A	Continuous Transmit at 912MHz, OQPSK, 100kbps (100% Duty-cycle)
В	Continuous Transmit at 920MHz, OQPSK, 100kbps (100% Duty-cycle)

## EUT SETUP BLOCK DIAGRAMS

#### Radiated Emissions EUT Setup



The laptop and Linksys Router were outside of the chamber during testing.

#### **AC Line Conducted Emissions EUT Setup**



Bureau Veritas Consumer Product Services Inc.

One Distribution Center Circle, #1 Littleton, MA





TEST	TEST MODE	AVAILABLE CHANNELS	TESTED CHANNEL	MODULATION TYPE	DATA RATE (kbps)	Notes
RSE<30M	А	1&2	1	OQPSK	100	1,2,3,4
RSE<1G	А, В	1&2	1&2	OQPSK	100	1,2,3
RSE≥1G	А, В	1&2	1&2	OQPSK	100	1,2,3
PLCE	В	1&2	2	OQPSK	100	5

Following channels/modes were selected for the applicable tests below.

Notes:

1) All the final radiated emissions testing was performed on LTE version model, since it was identified as the worst-case model based on pre-scans.

2) For radiated emissions, EUT was positioned on X-axis only since this was identified as the worst-case orientation during original Z-wave certification testing. Please refer to the Radio Report EX0965-2.

 For radiated emissions, EUT was tested only with the SWI25-12-N power supply since this was identified as the worst-case power supply during original Z-wave certification testing. Please refer to the Radio Report EX0965-2.

- 4) For radiated emissions, testing below 30MHz was limited to 1 channel and data rate since no emissions were detected in this range.
- 5) Both LTE and Non-LTE versions were tested only on 1 channel and data rate since emission profile remained similar between different transmit channels and data rates. Testing was performed only with SWI25-12-N power supply since it was identified as the worst-case power supply during original Z-wave certification testing. Please refer to the Radio Report EX0965-2.

RSE<30M: Radiated Spurious Emissions Below 30MHz RSE<1G: Radiated Spurious Emissions Below 1GHz RSE≥1G: Radiated Spurious Emissions Above 1GHz PLCE: Power Line Conducted Emissions

#### **TEST CONDITIONS:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY	DATE OF TEST
RE<1G	21.0°C, 58.0%, 1006mbar 20.9°C, 54.8%, 1010mbar 20.6°C, 50.9%, 1014mbar	12VDC	NP	9/20/2024 9/23/2024 9/24/2024
RE≥1G	20.9°C, 54.8%, 1010mbar	12VDC	NP	9/23/2024
PLCE	20.6°C, 50.9%, 1014mbar	12VDC	NP	9/24/2024





### 3.3 MEASUREMENT PROCEDURES USED

All tests were performed in accordance with the following measurement procedures:

#### FCC KDB 558074 D01 15.247 Meas Guidance v05r02

ANSI C63.10-2013

**RSS-Gen Issue 5** 

#### 3.4 DESCRIPTION OF SUPPORT EQUIPMENT

Support Equipment	Model #	Serial #
Laptop	Dell Latitude E6400	X463M A00
Dell AC Adapter	PA-1900-02D2	U7809
Linksys Power Adapter	AD 2/1A	RH48-1201000DU
Linksys Wireless Router	WRV200	MMH006806414





# 4 TEST RESULTS

## 4.1 AC LINE CONDUCTED EMISSIONS

#### 4.1.1 LIMITS

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBµV)			
	Quasi-peak	Average		
0.15 ~ 0.5	66 to 56	56 to 46		
0.5 ~ 5	56	46		
5 ~ 30	60	50		

**NOTE**: 1. Lower limit applies at the transition frequencies.

2. Limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

## 4.1.2 TEST EQUIPMENT USED

Rev. 9/25/2024								
Conducted Test Sites (Mains / Telco)	FCC Code		VCCI Code			Cat	<b>Calibration Due</b>	Calibrated on
CEMI 1	719150		A-0015			Ш	NA	N/A
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
CEMI-02	9kHz - 2GHz		C-S			II	1/26/2025	1/26/2024
Attenuators	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
20dB20W Attenuator(A#2499)	9KHz-4GHz	766-20	Narda	8710	2499	Ш	12/5/2024	12/5/2023
LISNs/Measurement Probes	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
LISN Asset 2845	9KHz-30MHz	LI-220C	Com-Power	20070054	2708	T	3/15/2025	3/15/2024
Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gauss TDEMI Ultra 40	9kHz-40Ghz	TDEMI Ultra 40	Gauss	2305001	2712	1	7/23/2025	7/23/2024
Meteorological Meters/Chambers		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	Т	12/15/2025	12/15/2022
Asset #2657		1235C97	Control Company	200435369	2657	Т	8/18/2025	8/18/2022
All equipment is calibrated using standards traceable to	NIST or other r	nationally recogni	zed calibration sta	ndard.				





4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit 20dB) were not recorded. RBW of 9kHz and VBW of 30kHz were used during measurement.

## 4.1.4 DEVIATIONS

No deviations from the standard.





4.1.5 TEST SETUP



## Note: 1.Support units were connected to second LISN. 2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to Test Setup Photos exhibit.

## 4.1.6 EUT OPERATING CONDITIONS

EUT was operated according to manufacturer's specifications.





#### 4.1.7 TEST RESULTS

LTE Version model with Power supply: SWI25-12-N EUT Mode: 920MHz, 100kbps, OQPSK



Scan1: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 15.0 s QP, Att AutodB, LISN-LISN\_2845\_Line-L

f	Mag [dBuV]	Limit	Diff	Trans	Name
150 kHz	49.40	66.00	16.60	19.97	FCC15BCQP
408.658142 kHz	48.95	57.68	8.73	19.84	FCC15BCQP
4.2342955 MHz	37.12	56.00	18.88	20.00	FCC15BCQP
8.63148392 MHz	40.90	60.00	19.10	20.03	FCC15BCQP
9.28230118 MHz	41.80	60.00	18.20	20.02	FCC15BCQP
9.599366 MHz	40.57	60.00	19.43	20.02	FCC15BCQP

Scan2: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 15.0 s CAV, Att AutodB, LISN-LISN\_2845\_Line-L

f	Mag [dBuV]	Limit	Diff	Trans	Name
150 kHz	40.50	56.00	15.50	19.97	FCC15BCAV;
408.658142 kHz	44.10	47.68	3.57	19.84	FCC15BCAV;
4.2342955 MHz	32.04	46.00	13.96	20.00	FCC15BCAV;
8.63148392 MHz	35.93	50.00	14.07	20.03	FCC15BCAV;
9.28230118 MHz	37.05	50.00	12.95	20.02	FCC15BCAV;
9.599366 MHz	35.32	50.00	14.68	20.02	FCC15BCAV;

Line, Plot and Data Table



Scan1: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 15.0 s QP, Att AutodB, LISN-LISN\_2845\_Neutral-N

f	Mag [dBuV]	Limit	Diff	Trans	Name
150 kHz	52.07	66.00	13.93	19.98	FCC15BCQP
408.658142 kHz	48.80	57.68	8.87	19.86	FCC15BCQP
4.2301236 MHz	37.39	56.00	18.61	20.03	FCC15BCQP
8.79001633 MHz	41.55	60.00	18.45	20.08	FCC15BCQP
9.28230118 MHz	42.18	60.00	17.82	20.07	FCC15BCQP
9.93311844 MHz	40.25	60.00	19.75	20.06	FCC15BCQP

Scan2: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 15.0 s CAV, Att AutodB, LISN-LISN\_2845\_Neutral-N

f	Mag [dBuV]	Limit	Diff	Trans	Name
150 kHz	42.67	56.00	13.33	19.98	FCC15BCAV;
404.486237 kHz	43.99	47.76	3.77	19.86	FCC15BCAV;
4.2301236 MHz	32.42	46.00	13.58	20.03	FCC15BCAV;
8.79001633 MHz	39.11	50.00	10.89	20.08	FCC15BCAV;
9.28230118 MHz	38.16	50.00	11.84	20.07	FCC15BCAV;
9.93311844 MHz	36.40	50.00	13.60	20.06	FCC15BCAV;

Neutral, Plot and Data Table

ED

ACCREE

ert. No. 162





Non-LTE Version model with Power supply: SWI25-12-N EUT Mode: 920MHz, 100kbps, OQPSK



Scan1: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 15.0 s QP, Att AutodB, LISN-LISN\_2845\_Line-L

f	Mag [dBuV]	Limit	Diff	Trans	Name
154.171906 kHz	48.97	65.77	16.80	19.96	FCC15BCQP
408.658142 kHz	48.88	57.68	8.79	19.84	FCC15BCQP
4.2301236 MHz	37.72	56.00	18.28	20.00	FCC15BCQP
8.79001633 MHz	41.22	60.00	18.78	20.03	FCC15BCQP
9.28230118 MHz	41.65	60.00	18.35	20.02	FCC15BCQP

Scan2: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 15.0 s CAV, Att AutodB, LISN-LISN\_2845\_Line-L

f	Mag [dBuV]	Limit	Diff	Trans	Name
154.171906 kHz	39.89	55.77	15.88	19.96	FCC15BCAV;
412.830048 kHz	44.36	47.59	3.24	19.84	FCC15BCAV;
4.2301236 MHz	32.46	46.00	13.54	20.00	FCC15BCAV;
8.79001633 MHz	38.89	50.00	11.11	20.03	FCC15BCAV;
9.28230118 MHz	37.28	50.00	12.72	20.02	FCC15BCAV;

Line, Plot and Data Table







Scan1: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 15.0 s QP, Att AutodB, LISN-LISN\_2845\_Neutral-N

f	Mag [dBuV]	Limit	Diff	Trans	Name
150 kHz	50.19	66.00	15.81	19.98	FCC15BCQP
412.830048 kHz	49.32	57.59	8.27	19.86	FCC15BCQP
4.2342955 MHz	37.05	56.00	18.95	20.03	FCC15BCQP
8.79001633 MHz	41.50	60.00	18.50	20.08	FCC15BCQP
9.28230118 MHz	42.07	60.00	17.93	20.07	FCC15BCQP
9.44083359 MHz	41.74	60.00	18.26	20.07	FCC15BCQP

Scan2: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 15.0 s CAV, Att AutodB, LISN-LISN\_2845\_Neutral-N

f	Mag [dBuV]	Limit	Diff	Trans	Name
150 kHz	43.07	56.00	12.93	19.98	FCC15BCAV;
412.830048 kHz	44.62	47.59	2.97	19.86	FCC15BCAV;
4.2342955 MHz	31.92	46.00	14.08	20.03	FCC15BCAV;
8.79001633 MHz	39.28	50.00	10.72	20.08	FCC15BCAV;
9.28230118 MHz	38.48	50.00	11.52	20.07	FCC15BCAV;
9.44083359 MHz	39.09	50.00	10.91	20.07	FCC15BCAV;

Neutral, Plot and Data Table





## 4.2 RADIATED SPURIOUS EMISSIONS

## 4.2.1 LIMITS

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emissions limits specified in Section 15.209(a).

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

#### NOTE:

- 1. Lower limit applies at the transition frequencies.
- 2. As specified in 15.35(b), for frequencies above 1000MHz, field strength limits are based on the use of measurement instrumentation employing an average detector function. However, there is also a limit on the peak level of the emissions that is 20 dB above the maximum permitted average emission limit.
- 3. Limit conversion above 30MHz is done by using inverse linear distance extrapolation factor (20dB/decade) as allowed in FCC 15.31(f)(1).

Limit(1m) = Limit(3m) + 20\*log(3/1) = Limit(3m) + 9.5

Limit(0.1m) = Limit(3m) + 20\*log(3/0.1) = Limit(3m) + 29.5

4. Limit conversion below 30MHz is done by using the square of an inverse linear distance extrapolation factor (40 dB/decade) as allowed in FCC 15.31(f)(2).

Limit(3m) = Limit(30m) + 40\*log(30/3) = Limit(30m) + 40

Limit (3m) = Limit (300m) + 40\*log(300/3) = Limit (300m) + 80

5. Adjusted Reading (dBuV/m) = Raw Reading (dBuV) + Transducer(Correction) Factor (dB/m)

Transducer Factor (dB/m) = Antenna Factor (dB/m) - PreAmp Gain (dB) + Cable Loss (dB) + Filter Loss (dB)

6. RSS-GEN Table 6 H-field limits are 51.5dB lower than FCC 15.209(a) E-field limits. Measurements are performed in terms of magnetic field and converted to electric field using the free space impedance of 377Ω (E-field = H-field + 51.5). Therefore resulting pass/fail margin would be the same if an E-field reading is compared to an E-field limit or an H-field reading is compared to an H-field limit.





## 4.2.2 TEST EQUIPMENT USED

Rev. 9/25/2024								
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	<b>Calibration Due</b>	Calibrated on
EMI Chamber 1	719150	2762A-6	A-0015	30-1000MHz	1685	1	9/19/2025	9/19/2024
EMI Chamber 1	719150	2762A-6	A-0015	1-18GHz	1685	1	9/19/2025	9/19/2024
EMI Chamber 2	719150	2762A-7	A-0015	30-1000MHz	1686	1	9/19/2025	9/19/2024
EMI Chamber 2	719150	2762A-7	A-0015	1-18GHz	1686	Т	9/19/2025	9/19/2024
Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gauss TDEMI Ultra 40	9kHz-40Ghz	TDEMI Ultra 40	Gauss	2305001	2712	1	7/23/2025	7/23/2024
Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Red-Black Bilog	30-2000MHz	JB1	Sunol	A091604-2	1106	Т	10/2/2025	10/2/2023
Blue Horn	1-18Ghz	3117	ETS	157647	1861	Т	3/27/2025	3/27/2023
2615 Active Loop Antenna	9KHz-30MHz	6502	EMCO	2049	2615	1	1/18/2025	1/18/2023
Preamps /Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
2862 PA	9KHz-1GHz	310	SONOMA INSTRUMENT	185927		Ш	2/17/2025	2/17/2024
2130 BRF	9KHz-10GHz	BRM18770	Micro-Tronics	1	2130	Ш	4/22/2025	4/22/2024
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
Asset #2054	9kHz - 18GHz		Florida RF			Ш	11/2/2024	11/2/2023
Asset #2595	9KHz-40GHz		Carlisle			Ш	2/17/2025	2/17/2024
Asset #2681	9KHz-18GHz		Pasternack			Ш	12/7/2024	12/7/2023
Asset 2868	9Khz-18GHz		Pasternack			Ш	3/28/2025	3/28/2024
Asset #3011	9KHz-18GHz		Pasternack			11	11/2/2024	11/2/2023
Meteorological Meters/Chambers		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Asset 2848		SD700	EXTECH	A.115171	2848	Т	1/13/2025	1/13/2023
Asset #2847		1235C97	Control Company	200435382	2847	T	8/18/2025	8/18/2022
Asset #2654		1235C97	Control Company	200477432	2654	1	8/18/2025	8/18/2022
All equipment is calibrated using standards traceable to N	ST or other nation	ally recognized	calibration standard.					





#### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 1.5 meters (above 1GHz) and 0.8 meters (below 1GHz) above the ground at a 3 meters semi-anechoic chamber.
- b. For below 30MHz, a loop antenna with its lowest point 1m above the ground was placed 3m away from the EUT and it was rotated 0 and 90 degrees around its vertical axis.
- c. In 30MHz-1GHz range, a biconilog antenna was mounted on a variable-height antenna tower and placed 3m away from the EUT. Antenna height was varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna were investigated. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. In 1GHz-10GHz range, a horn antenna was mounted on a variable-height antenna tower and placed 3m away from the EUT. Antenna height was varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna were investigated. The table was rotated 360 degrees to determine the position of the highest radiation.

Freq. (MHz)	RBW	VBW	Pre-scan	Final
0.009-0.15	200Hz	1kHz	Peak	Not required based on pre-scan data
0.15-30	9kHz	30kHz	Peak	Not required based on pre-scan data
30-1000	120kHz	300kHz	Peak	Quasi Peak
>1000	1MHz	3MHz	Peak	Peak Max Hold and RMS Power Avg (Max Hold)

e. Following bandwidths were used during emissions testing:

Per FCC §15.209(d), limits §15.209(a) are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. If peak measurements in these frequency bands were below the applicable limits, QPk and RMS measurements were not performed.





### 4.2.4 DEVIATIONS

No deviations from the standard.

### 4.2.5 TEST SETUP

#### **Below 30MHz Test Setup**







Bureau Veritas Consumer Product Services Inc.

One Distribution Center Circle, #1 Littleton, MA





#### 1GHz – 10GHz Test Setup



Note: For the actual test configuration, please refer to the Test Setup Photos exhibit.

### 4.2.6 EUT OPERATING CONDITIONS

EUT was operated according to the manufacturer's specifications.





#### 4.2.7 TEST RESULTS

## **Emissions below 30MHz**

**912MHz at 100kbps, OQPSK** No emissions within 10dB of the limit were identified in 9kHz-30MHz range.



Scan1: 9.0 kHz, 100.0 Hz, 150.0 kHz; IF:200Hz, 100.0 ms MaxPeak, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
9.75 kHz	65.02	127.81	62.80	Parallel	100	52.7	18.79	FCC_15.209
45.1 kHz	55.54	114.51	58.97	Parallel	100	21.852	11.26	FCC_15.209
63.35 kHz	52.76	111.56	58.80	Parallel	100	17.5	10.70	FCC_15.209

Scan2: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 100.0 ms MaxPeak, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
160 kHz	59.42	103.52	44.10	Parallel	100	248.451	10.00	FCC_15.209
515 kHz	49.95	73.37	23.41	Parallel	100	89.532	10.12	FCC_15.209

#### 9k-30MHz Parallel, Plot and Data Table



Scan1: 9.0 kHz, 100.0 Hz, 150.0 kHz; IF:200Hz, 100.0 ms MaxPeak, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
10.15 kHz	64.00	127.47	63.46	perpendicular	100	263.256	18.58	FCC_15.209

Scan2: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 100.0 ms MaxPeak, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
157.5 kHz	59.19	103.66	44.47	perpendicular	100	159.461	10.01	FCC_15.209
535 kHz	50.28	73.04	22.75	perpendicular	100	17.399	10.17	FCC_15.209
26.61 MHz	27.34	69.54	42.20	perpendicular	100	105.101	8.94	FCC_15.209

#### 9k-30MHz Perpendicular, Plot and Data Table

Bureau Veritas Consumer Product Services Inc. One Distribution Center Circle, #1 Littleton, MA





#### Emissions in 30MHz-1GHz range 912MHz at 100kbps, OQPSK



Final 1: 30.0 MHz, 50.0 kHz, 835.4 MHz; IF:120kHz, 200.0 ms QP, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
30.6 MHz	31.50	40.00	8.50	V	72.72	100.02	-2.91	FCC_15.209
38.925 MHz	34.01	40.00	5.99	V	30.454	100	-7.95	FCC_15.209
58.725 MHz	33.64	40.00	6.36	V	45.274	100.02	-17.01	FCC_15.209
64.8 MHz	34.00	40.00	6.00	V	278.196	124.35	-16.63	FCC_15.209
104.125 MHz	25.06	43.50	18.44	V	16.28	100.28	-13.52	FCC_15.209
143.25 MHz	32.55	43.50	10.95	V	337.221	113.033	-10.51	FCC_15.209
206.95 MHz	36.89	43.50	6.61	V	65.719	100	-11.07	FCC_15.209
208.5 MHz	40.00	43.50	3.50	V	360	113.658	-12.42	FCC_15.209
835 MHz	23.72	46.00	22.28	V	155.125	250	1.63	FCC_15.209

#### 30-1000MHz Vertical, Plot and Data Table



Final 1: 30.0 MHz, 50.0 kHz, 853.0 MHz; IF:120kHz, 200.0 ms QP, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
30.575 MHz	21.49	40.00	18.51	Н	334.38	100	-2.91	FCC_15.209
104.05 MHz	25.53	43.50	17.97	Н	7.849	306.94	-13.45	FCC_15.209
161.175 MHz	27.79	43.50	15.71	Н	145.18	153.489	-11.14	FCC_15.209
208.725 MHz	40.87	43.50	2.63	Н	0	165.7	-12.56	FCC_15.209
240 MHz	29.04	46.00	16.96	Н	232.82	114.7	-11.58	FCC_15.209
500 MHz	30.65	46.00	15.35	Н	286.898	202.375	-4.51	FCC_15.209
851.025 MHz	29.17	46.00	16.83	Н	160.22	100	3.21	FCC_15.209

#### 30-1000MHz Horizontal, Plot and Data Table

Bureau Veritas Consumer Product Services Inc.

One Distribution Center Circle, #1 Littleton, MA





920MHz at 100kbps, OQPSK



Final 1: 40.9 MHz, 50.0 kHz, 831.6 MHz; IF:120kHz, 200.0 ms QP, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
43.775 MHz	33.64	40.00	6.36	V	360	100	-10.81	FCC_15.209
58.725 MHz	34.36	40.00	5.64	V	61.749	125.375	-17.01	FCC_15.209
64.75 MHz	33.93	40.00	6.07	V	313.052	100	-16.63	FCC_15.209
141.175 MHz	32.14	43.50	11.36	V	58.192	100	-10.43	FCC_15.209
143.25 MHz	31.75	43.50	11.75	V	331.017	100	-10.51	FCC_15.209
161.1 MHz	29.75	43.50	13.75	V	121.921	100	-11.15	FCC_15.209
208.325 MHz	39.91	43.50	3.59	V	360	100	-12.50	FCC_15.209
500 MHz	30.90	46.00	15.10	V	360	100	-4.51	FCC_15.209
831.075 MHz	24.78	46.00	21.22	V	243.479	200	1.28	FCC_15.209

30-1000MHz Vertical, Plot and Data Table



Final 1: 30.0 MHz, 50.0 kHz, 835.4 MHz; IF:120kHz, 200.0 ms QP, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
30.575 MHz	21.37	40.00	18.63	Н	125.328	102.42	-2.91	FCC_15.209
104.025 MHz	24.19	43.50	19.31	Н	360	321.45	-13.28	FCC_15.209
161.1 MHz	27.73	43.50	15.77	Н	110.312	136.3	-11.21	FCC_15.209
208.575 MHz	39.90	43.50	3.60	Н	0	166.9	-12.48	FCC_15.209
274 MHz	27.87	46.00	18.13	Н	198.472	100	-10.02	FCC_15.209
500 MHz	31.31	46.00	14.69	Н	65.288	218.9	-4.51	FCC_15.209
700 MHz	25.46	46.00	20.54	Н	186.113	109.233	-1.43	FCC_15.209
834.95 MHz	24.31	46.00	21.69	Н	0	349.85	1.62	FCC 15.209

#### 30-1000MHz Horizontal, Plot and Data Table

Bureau Veritas Consumer Product Services Inc.

One Distribution Center Circle, #1 Littleton, MA





#### **Emissions above 1GHz**

#### 912MHz at 100kbps, OQPSK



#### Final 1: 1.6 GHz, 50.0 kHz, 9.8 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
1.554 GHz	44.14	74.00	29.86	V	84.615	162.227	31.04	FCC_15.209
1.58225 GHz	50.44	74.00	23.56	V	84.615	181.408	31.22	FCC_15.209
5.8515 GHz	52.96	74.00	21.04	V	206.502	394.407	40.77	FCC_15.209
8.005 GHz	53.38	74.00	20.62	V	115.613	109.127	43.16	FCC_15.209
9.017 GHz	54.73	74.00	19.27	V	315.504	265.235	43.54	FCC_15.209
9.80625 GHz	55.34	74.00	18.66	V	69.638	300	44.93	FCC_15.209

Final 2: 1.6 GHz, 50.0 kHz, 9.8 GHz; IF:1MHz, 100.0 ms RMS, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
1.5525 GHz	25.15	54.00	28.85	V	84.615	100.178	31.04	FCC_15.209
1.58425 GHz	26.04	54.00	27.96	V	84.615	181.408	31.22	FCC_15.209
5.8535 GHz	36.23	54.00	17.77	V	206.502	285.835	40.77	FCC_15.209
8.0025 GHz	37.91	54.00	16.09	V	115.613	200	43.16	FCC_15.209
9.01525 GHz	38.43	54.00	15.57	V	315.504	200	43.54	FCC_15.209
9.8055 GHz	39.19	54.00	14.81	V	69.638	372.081	44.93	FCC_15.209

1-10GHz Vertical, Plot and Data Table



Final 1: 1.5 GHz, 50.0 kHz, 9.8 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
1.538 GHz	43.90	74.00	30.10	Н	147.28	268.215	30.92	FCC_15.209
1.59625 GHz	51.50	74.00	22.50	Н	147.28	222.485	31.26	FCC_15.209
4.89225 GHz	52.30	74.00	21.70	Н	38.496	182.613	39.88	FCC_15.209
5.61975 GHz	53.09	74.00	20.91	Н	100.284	200	40.81	FCC_15.209
8.03125 GHz	53.66	74.00	20.34	Н	168.012	100	43.21	FCC_15.209
9.03775 GHz	54.62	74.00	19.38	Н	164.435	124.069	43.62	FCC_15.209
9.75275 GHz	54.96	74.00	19.04	Н	53.808	147.473	44.56	FCC_15.209
8.02925 GHz	53.63	74.00	20.37	Н	168.012	145.038	43.21	FCC_15.209
9.03775 GHz	54.67	74.00	19.33	Н	164.435	100	43.62	FCC_15.209
9.75275 GHz	55.65	74.00	18.35	Н	53.808	200	44.56	FCC_15.209

Final 2: 1.5 GHz, 50.0 kHz, 9.8 GHz; IF:1MHz, 100.0 ms RMS, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
1.53925 GHz	25.70	54.00	28.30	Н	147.28	231.143	30.92	FCC_15.209
1.5955 GHz	25.86	54.00	28.14	Н	147.28	154.507	31.26	FCC_15.209
4.89625 GHz	36.90	54.00	17.10	Н	38.496	112.389	39.88	FCC_15.209
5.6185 GHz	38.26	54.00	15.74	Н	100.284	100	40.81	FCC_15.209
8.03325 GHz	37.64	54.00	16.36	Н	168.012	167.335	43.21	FCC_15.209
9.03775 GHz	38.51	54.00	15.49	Н	164.435	100	43.62	FCC_15.209
9.75525 GHz	39.00	54.00	15.00	Н	53.808	200	44.56	FCC_15.209
8.03325 GHz	37.64	54.00	16.36	Н	168.012	100	43.21	FCC_15.209
9.037 GHz	38.50	54.00	15.50	Н	164.435	200	43.62	FCC_15.209
9.75675 GHz	39.04	54.00	14.96	Н	53.808	100	44.56	FCC_15.209

1-10GHz Horizontal, Plot and Data Table

TED

ACCRED

ert. No. 162





920MHz at 100kbps, OQPSK



Final 1: 1.6 GHz, 50.0 kHz, 9.8 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
1.58475 GHz	49.91	74.00	24.09	V	89.609	156.961	31.21	FCC_15.209
4.85625 GHz	52.44	74.00	21.56	V	0	129.956	40.13	FCC_15.209
5.804 GHz	53.18	74.00	20.82	V	153.713	100	40.97	FCC_15.209
8.10125 GHz	53.38	74.00	20.62	V	348.178	390.469	43.31	FCC_15.209
8.8275 GHz	54.31	74.00	19.69	V	95.227	145.039	43.89	FCC_15.209
9.78475 GHz	55.91	74.00	18.09	V	326.798	144.892	44.86	FCC_15.209

Final 2: 1.6 GHz, 50.0 kHz, 9.8 GHz; IF:1MHz, 100.0 ms RMS, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
1.58425 GHz	26.76	54.00	27.24	V	89.609	156.961	31.21	FCC_15.209
4.85875 GHz	36.94	54.00	17.06	V	0	193.556	40.13	FCC_15.209
5.802 GHz	37.83	54.00	16.17	V	153.713	112.546	40.97	FCC_15.209
8.10075 GHz	36.84	54.00	17.16	V	348.178	309.384	43.31	FCC_15.209
8.8295 GHz	38.18	54.00	15.82	V	95.227	300	43.89	FCC_15.209
9.78875 GHz	39.36	54.00	14.64	V	326.798	100	44.86	FCC_15.209

1-10GHz Vertical, Plot and Data Table



#### Final 1: 1.6 GHz, 50.0 kHz, 9.8 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
1.59675 GHz	52.25	74.00	21.75	Н	337.076	232.06	31.27	FCC_15.209
2.00525 GHz	51.40	74.00	22.60	Н	142.751	365.22	35.84	FCC_15.209
4.97625 GHz	53.00	74.00	21.00	Н	180.74	176.738	39.62	FCC_15.209
5.82675 GHz	54.00	74.00	20.00	Н	340.268	167.308	40.93	FCC_15.209
8.8495 GHz	54.55	74.00	19.45	Н	138.586	180.768	43.78	FCC_15.209
9.3555 GHz	54.96	74.00	19.04	Н	194.676	170.929	44.02	FCC_15.209
9.7835 GHz	55.47	74.00	18.53	Н	8.765	181.603	44.82	FCC_15.209

Final 2: 1.6 GHz, 50.0 kHz, 9.8 GHz; IF:1MHz, 100.0 ms RMS, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
1.5995 GHz	27.15	54.00	26.85	Н	337.076	232.06	31.27	FCC_15.209
2.00325 GHz	29.86	54.00	24.14	Н	142.751	218.068	35.84	FCC_15.209
4.97775 GHz	38.01	54.00	15.99	Н	180.74	120.854	39.62	FCC_15.209
5.826 GHz	37.13	54.00	16.87	Н	340.268	183.985	40.93	FCC_15.209
8.84675 GHz	38.41	54.00	15.59	Н	138.586	192.046	43.78	FCC_15.209
9.35575 GHz	38.94	54.00	15.06	Н	194.676	124.763	44.02	FCC_15.209
9.7835 GHz	39.70	54.00	14.30	Н	8.765	178.014	44.82	FCC_15.209

1-10GHz Horizontal, Plot and Data Table

TED





# 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the Test Setup Photos exhibit.

# 6 APPENDIX A – MODIFICATIONS

No modifications were made to the EUT during testing.

---END OF REPORT---