

RF Test Report

Test Report Number STA-24072635-LC-FCC-IC-CO

FCC ID (WLAN module) STJ-SDMAC
IC ID (WLAN module) 5627A-SDMAC
FCC ID (NFC host) STJ-NFCMF5K
IC ID (NFC host) 5627A-NFCMF5K

Applicant ICU Medical, Inc.

Applicant Address 1 951 Calle Amanecer, San Clemente, CA 92673

Applicant Address 2 600 N Field Dr, Lake Forest, IL 60045

Product Name Medfusion 5000 Wireless Syringe Infusion Pump

Model (s) Medfusion 5000

Date of Receipt 09/24/2024

Date of Test 10/11/2024-10/21/2024

Report Issue Date 10/29/2024

Test Standards 47 CFR Part 15.225
 47 CFR Part 15.247
 47 CFR Part 15.407
 RSS-247 Issue 3, Aug 2023
 RSS-210 Issue 11, June 2024

Test Result **PASS**



Issued by:

Vista Compliance Laboratories

1261 Puerta Del Sol, San Clemente, CA 92673 USA

www.vista-compliance.com

Minoush Niknam (Test Engineer)

David Zhang (Technical Manager)

This report is for the exclusive use of the applicant. 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. Note that the results contained in this report pertain only to the test samples identified herein, and the results relate only to the items tested and the results that were obtained in the period between the date of initial receipt of samples and the date of issue of the report. 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 lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested and the results thereof based upon the information provided to us. The applicant has 60 days from date of issuance of this report to notify us of any material error or omission. Failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by any government agencies. This report is not to be reproduced by any means except in full and in any case not without the written approval of Vista Laboratories.

REVISION HISTORY

Report Number	Version	Description	Issued Date
STA-24072635-LC-FCC-IC-CO	01	Initial report	10/29/2024

TABLE OF CONTENTS

1	TEST SUMMARY	4
2	GENERAL INFORMATION.....	5
2.1	Applicant	5
2.2	Product information	5
2.3	Test standard and method.....	6
3	TEST SITE INFORMATION.....	6
4	MODIFICATION OF EUT / DEVIATIONS FROM STANDARDS.....	6
5	TEST CONFIGURATION AND OPERATION	6
5.1	EUT Test Configuration	6
5.2	Supporting Equipment.....	7
6	UNCERTAINTY OF MEASUREMENT	7
7	TEST RESULT	8
7.1	Antenna Requirement.....	8
7.2	<i>Requirement</i>	8
7.3	Radiated Spurious Emissions into Restricted Frequency Bands.....	9
8	EUT AND TEST SETUP PHOTOS.....	16
9	TEST INSTRUMENT LIST	17

1 Test Summary

Test Item	Test Requirement	Test Method	Result
Antenna Requirement	47 CFR Part 15.203	ANSI C63.10: 2013	Pass
Radiated Emissions & Unwanted Emissions into Restricted Frequency Bands	47 CFR Part 15.225 47 CFR Part 15.247 47 CFR Part 15.407 RSS-247 Issue 3, Aug 2023 RSS-210 Issue 11, June 2024	ANSI C63.10: 2013	Pass

2 General Information

2.1 Applicant

Applicant	ICU Medical, Inc.
Applicant Address 1	951 Calle Amanecer, San Clemente, CA 92673
Applicant Address 2	600 N Field Dr, Lake Forest, IL 60045
Manufacturer	ICU Medical, Inc.
Manufacturer Address 1	951 Calle Amanecer, San Clemente, CA 92673
Manufacturer Address 2	600 N Field Dr, Lake Forest, IL 60045

2.2 Product information

Product Name	Medfusion 5000 Wireless Syringe Infusion Pump
Model Number	Medfusion 5000
Integrated Module Model	SX-SDMAC-2832S
Serial Number	G-P3-010
Frequency Band	802.11b/g/n: 2412MHz to 2462MHz 802.11a/n/ac: U-NII-1: 5150-5250MHz; U-NII-2A: 5250-5350MHz U-NII-2C: 5470-5725MHz; U-NII-3: 5725-5850MHz NFC: 13.56MHz
Type of modulation	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11a/n/ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) NFC: ASK
Equipment Class	DTS, NII (WLAN module) DXX (NFC host)
Antenna (S) Information	Antenna #1 (NFC) – Rectangular Near Field Communication (NFC) Antenna, Part Number: 1462362131 Antenna #2 (WLAN) – Dual band Wi-Fi Antenna, Model: FTW6202, Peak Gain: 2.4GHz: 3.00 dBi; 5GHz: 4.45 dBi
Clock Frequencies	N/A
Input Power	100-240Vac, 50/60Hz, 160VA (AC) 12.8 VDC Internal Battery (DC)
Power Adapter Manufacturer/Model	Manufacturer: Delta Electronics, Inc., Model: MDS-030BAC15, - Input: 100-240VAC, 0.8-0.6A, 50-60Hz - Output: 15V, 2A
Power Adapter SN	230W6B1000H
Hardware version	N/A
Software version	N/A
Simultaneous Transmission	NFC and integrated 2.4GHz/5GHz module can transmit simultaneously in the host product (co-location). The simultaneous transmission and co-location have been evaluated in the testing.
Additional Info	The purpose of this report is to address the co-location/simultaneous transmission between integrated certified WLAN module, and the NFC radio in host product (Medfusion 5000). For more test details for each transmitter, please see the filing/test reports under the respective FCC ID/ISED ID.

2.3 Test standard and method

Test standard	47 CFR Part 15.225 47 CFR Part 15.247 47 CFR Part 15.407 RSS-247 Issue 3, Aug 2023 RSS-210 Issue 11, June 2024
Test method	ANSI C63.10-2013 RSS-Gen Issue 5 Amd 2 Feb 2021

3 Test Site Information

Lab performing tests	Vista Laboratories, Inc.
Lab Address	1261 Puerta Del Sol, San Clemente, CA 92673 USA
Phone Number	+1 (949) 393-1123
Website	www.vista-compliance.com

Test Condition	Temperature	Humidity	Atmospheric Pressure
Radiated Emission Testing	23.5°C	58.2%	996 mbar

4 Modification of EUT / Deviations from Standards

N/A

5 Test Configuration and Operation

5.1 EUT Test Configuration

The EUT is an engineering test sample loaded with RF testing firmware specifically designed to support the RF TX/RX measurement in different aspects.

The following software was used for testing and to monitor EUT performance

Software	Description
EMISoft Vasona	EMC/RF Spurious emission test software used during testing
Tera-Term	Send Command for NFC
QRCT	Send Command for WLAN

5.2 Supporting Equipment

Description	Manufacturer	Model #	Serial #	Remark
AC/DC Adapter	Delta Electronics, Inc.	MDS-030BAC15	230W6B1000H	Provided by client
Test Laptop	Dell	Latitude 5400	37917846974	Provided by client
Access Point	Linksys	EA8300	N/A	Provided by lab
USB to ethernet converter	Plugable	N/A	N/A	Provided by client

6 Uncertainty of Measurement

Test item	Measurement Uncertainty (dB)
RF Output Power (Conducted)	±1.2 dB
Power Spectral Density	±0.9 dB
Unwanted Emission (conducted)	±2.6 dB
Occupied Channel Bandwidth	±5 %
Radiated Emission (9KHz-30MHz)	±3.5 dB
Radiated Emission (30MHz-1GHz)	±4.6 dB
Radiated Emission (1-18GHz)	±4.9 dB
Radiated Emission (18-40GHz)	±3.5 dB

7 Test Result

7.1 Antenna Requirement

7.2 Requirement

Per § 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.

7.2.1 Result

Analysis:

- For Wi-Fi: EUT uses internal Dual band Wi-Fi Antenna that is permanently attached; for NFC: EUT uses internal Rectangular NFC Antenna that is permanently attached. These two antenna co-locate with each other.

Conclusion:

- EUT complies with antenna requirement in § 15.203.

7.3 Radiated Spurious Emissions into Restricted Frequency Bands

7.3.1 Requirement

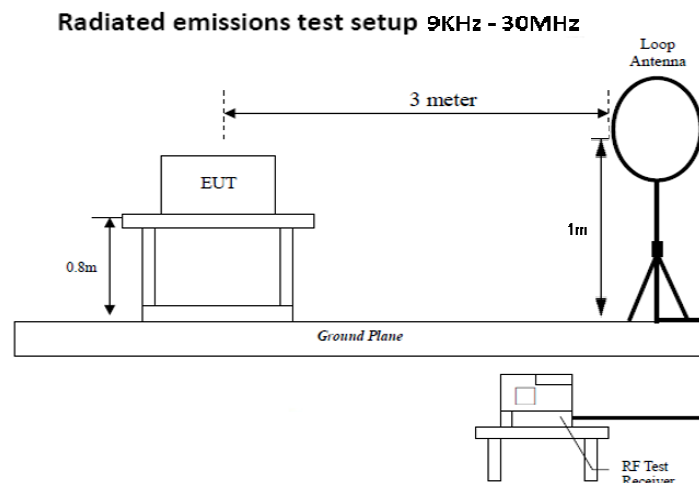
§ 15.247 (d), RSS-247, 5.5

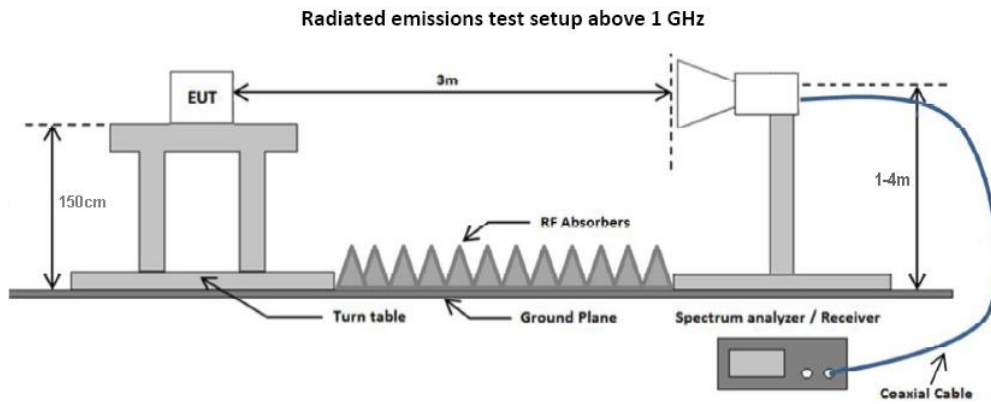
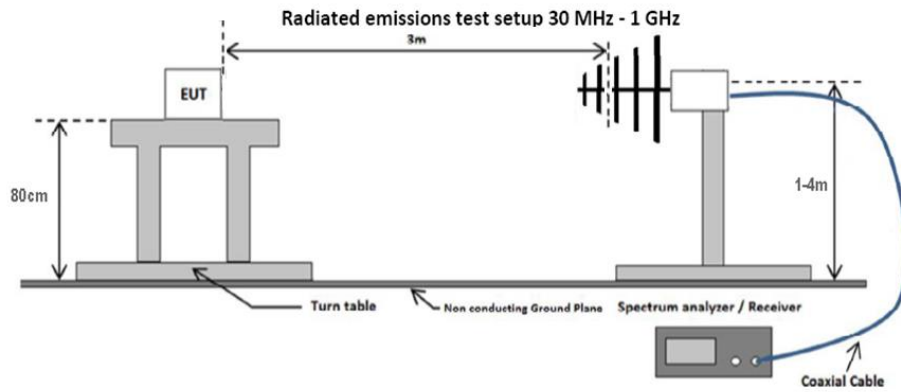
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Frequency Range (MHZ)	Field Strength (μV/m)
0.009~0.490	2400/F(KHz)
0.490~1.705	24000/F(KHz)
1.705~30.0	30
30 – 88	100
88 – 216	150
216 960	200
Above 960	500

7.3.2 Test Setup





7.3.3 Test Procedure

According to section 8.6 in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.12.2.7 Radiated spurious emission measurements in ANSI C63.10-2013 as well as the procedures for maximizing and measuring radiated emissions that are described in ANSI C63.10 was followed. Boresight antenna mast was used during the scanning to point to EUT to maximize the emission. The process will be repeated in 3 EUT orientations.

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
 - a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
 - b. The EUT was then rotated to the direction that gave the maximum emission.
 - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 300 Hz for frequency below 150KHz.
4. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 10 kHz for frequency between 150KHz – 30MHz.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-Peak detection at frequency between 30MHz - 1GHz.
6. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak and average measurement at frequency above 1GHz.
7. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

7.3.4 Test Result

Radiated Emission between 9KHz – 30MHz test result

Note: no substantial emission is found other than the noise floor. Different modes have been verified.

RADIATED EMISSIONS BELOW 1 GHZ

Test Standard:	FCC15.247, 15.209, RSS-247	Mode:	802.11b Mode
Frequency Range:	30 MHz - 1 GHz	Test Date:	10/21/2024
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Engineer:	Minoush Niknam
Remark:	11b-2437MHz with NFC	Test Result:	Pass

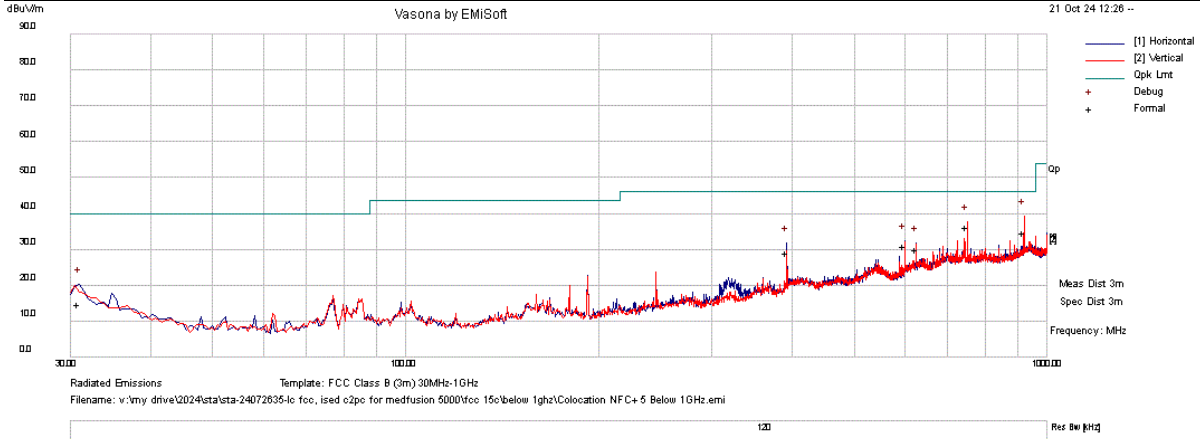


No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	919.994	29.7	4.6	8.6	42.9	Quasi Max	V	101	0	46.0	-3.1	Pass
2	750.072	26.1	4.1	5.8	36.1	Quasi Max	V	100	171	46.0	-9.9	Pass
3	599.522	23.5	3.7	3.6	30.8	Quasi Max	H	317	0	46.0	-15.2	Pass
4	392.753	27.9	2.9	-2.0	28.8	Quasi Max	H	265	0	46.0	-17.2	Pass
5	625.016	21.0	3.8	4.6	29.3	Quasi Max	H	100	76	46.0	-16.7	Pass
6	96.682	25.2	1.4	-13.6	13.0	Quasi Max	V	159	52	43.5	-30.5	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF (dB/m) = Antenna Factor (dB) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

Test Standard:	FCC15.407, 15.209, RSS-247	Mode:	802.11a Mode
Frequency Range:	30 MHz - 1 GHz	Test Date:	10/21/2024
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Engineer:	Minoush Niknam
Remark:	11a-5260MHz with NFC	Test Result:	Pass



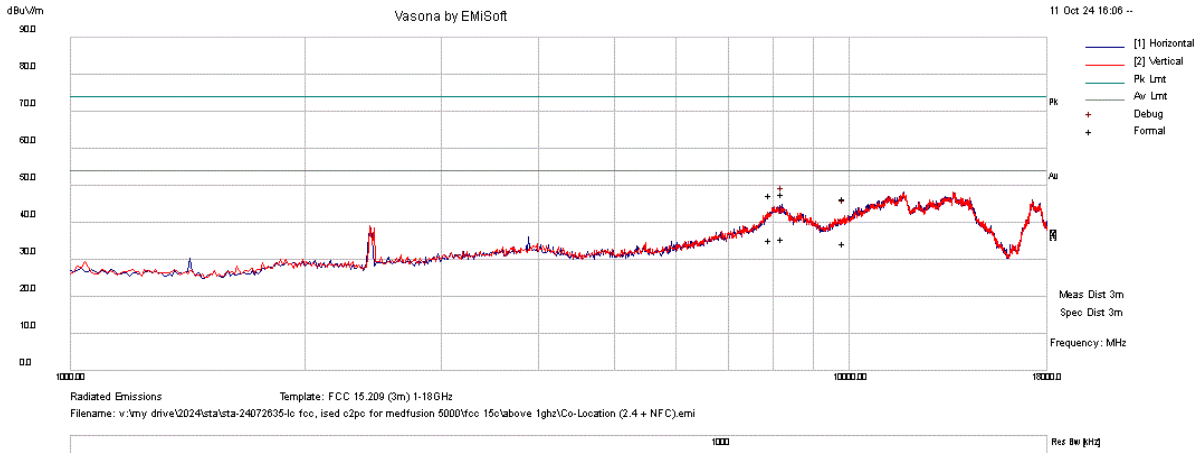
No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	919.993	21.7	4.6	8.6	34.9	Quasi Max	V	406	16	46	-11.1	Pass
2	750.074	26.4	4.1	5.8	36.3	Quasi Max	V	288	162	46	-9.7	Pass
3	599.516	23.6	3.7	3.6	30.9	Quasi Max	H	400	140	46	-15.1	Pass
4	392.755	28.2	2.9	-2	29.1	Quasi Max	H	275	348	46	-16.9	Pass
5	625.032	21.7	3.8	4.6	30.0	Quasi Max	H	204	104	46	-16.0	Pass
6	30.855	20.5	0.3	-5.9	14.9	Quasi Max	H	148	274	40	-25.1	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF (dB/m) = Antenna Factor (dB) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

RADIATED EMISSIONS 1 - 18 GHZ

Test Standard:	FCC15.247, 15.209, RSS-247	Mode:	802.11b Mode
Frequency Range:	1 GHz - 18 GHz	Test Date:	10/11/2024
Antenna Type/Polarity:	Horn/Hor & Ver	Test Engineer:	Minoush Niknam
Remark:	11b-2437MHz with NFC	Test Result:	Pass

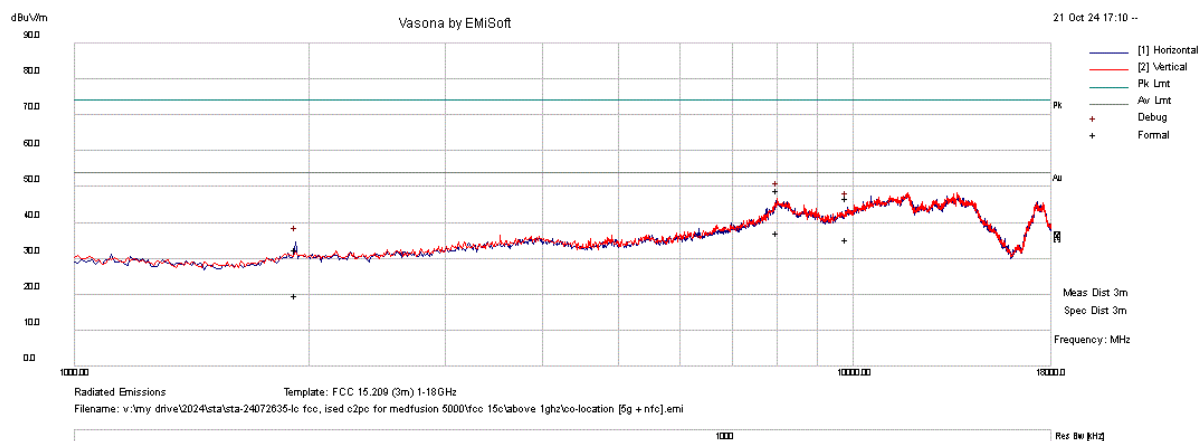


No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	8226.875	17.8	14.2	15.6	47.5	Peak Max	H	133	165	74	-26.5	Pass
2	7916.901	18.6	14.1	14.7	47.4	Peak Max	H	122	160	74	-26.6	Pass
3	9873.041	17.6	16.4	12.5	46.6	Peak Max	V	116	90	74	-27.4	Pass
4	8226.875	5.9	14.2	15.6	35.7	Average Max	H	133	165	54	-18.3	Pass
5	7916.901	6.4	14.1	14.7	35.1	Average Max	H	122	160	54	-18.9	Pass
6	9873.041	5.5	16.4	12.5	34.5	Average Max	V	116	90	54	-19.5	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF (dB/m) = Antenna Factor (dB) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

Test Standard:	FCC15.407, 15.209, RSS-247	Mode:	802.11a Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	10/21/2024
Antenna Type/Polarity:	Horn/Hor & Ver	Test Engineer:	Minoush Niknam
Remark:	11a-5260MHz with NFC	Test Result:	Pass



No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	8003.500	18.9	14.3	15.9	49.1	Peak Max	V	100	72	74	-24.9	Pass
2	9841.787	18.1	16.4	12.5	46.9	Peak Max	H	145	143	74	-27.1	Pass
3	1926.547	26.1	6.3	0.3	32.6	Peak Max	H	164	128	74	-41.4	Pass
4	8003.500	7.2	14.3	15.9	37.3	Average Max	V	100	72	54	-16.7	Pass
5	9841.787	6.4	16.4	12.5	35.3	Average Max	H	145	143	54	-18.7	Pass
6	1926.547	13.4	6.3	0.3	19.9	Average Max	H	164	128	54	-34.1	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF (dB/m) = Antenna Factor (dB) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

Radiated Emission between 18GHz – 40GHz test result

Note: no substantial emission is found other than the noise floor. Different modes have been verified.

8 EUT and Test Setup Photos

See FCC/ISED exhibits

9 Test Instrument List

Equipment	Manufacturer	Model	Instrument Number	Cal. Date	Cal. Due
Semi-Anechoic Chamber	ETS-Lindgren	10M	VL001	5/24/2024	5/24/2027
Shielding Control Room	ETS-Lindgren	Series 81	VL006	N/A1)	N/A1)
Spectrum Analyzer	Keysight	N9020A	MY50110074	5/15/2024	5/15/2026
EMC Test Receiver	R&S	ESL6	100230	5/14/2024	5/14/2025
LISN (9KHz – 30MHz)	EMCO	3816/2	9705-1066	5/28/2024	5/28/2025
Bi-Log Antenna	ETS-Lindgren	3142E	217921	7/25/2024	7/25/2025
Horn Antenna (1-18GHz)	Electro-Metrics	EM-6961	6292	7/22/2024	7/22/2025
Horn Antenna (18-40GHz)	Com-Power	AH-840	101109	7/22/2024	7/22/2025
Temp / Humidity / Pressure Meter	PCE Instruments	PCE-THB 40	R062028	5/17/2024	5/17/2025
RF Attenuator	Pasternack	PE7005-3	VL061	07/29/2024	07/29/2025
EM Center Control	ETS-Lindgren	7006-001	160136	N/A1)	N/A1)
Turn Table	ETS-Lindgren	2181-3.03	VL002	N/A1)	N/A1)
Boresight Antenna Tower	ETS-Lindgren	2171B	VL003	N/A1)	N/A1)
Loop Antenna (9k-30MHz)	Com-Power	AL-130	121012	6/13/2024	6/13/2026
RE test cable (below 6GHz)	Vista	RE-6GHz-01	RE-6GHz-01	07/29/2024	07/29/2025
RE test cable (1-18GHz)	PhaseTrack	II-240	RE-18GHz-01	07/29/2024	07/29/2025
RE test cable (>18GHz)	Sucoflex	104	344903/4	07/29/2024	07/29/2025
Pulse limiter	Com-Power	LIT-930A	531727	07/29/2024	07/29/2025
CE test cable #1	FIRST RF	FRF-C-1002-001	CE-6GHz-01	07/29/2024	07/29/2025
CE test cable#2	FIRST RF	FRF-C-1002-001	CE-6GHz-02	07/29/2024	07/29/2025
USB RF Power Sensor	ETS-Lindgren	7002-006	SN 00151268	5/14/2024	5/14/2026
Agilent Signal Generator	MXG N5182A	N5182A	US47080548	5/15/2024	5/15/2025
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL052	N/A1)	N/A1)
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL053	N/A1)	N/A1)
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL054	N/A1)	N/A1)
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL055	N/A1)	N/A1)
2.4GHz Notch Filter	Micro-Tronics	BRM50702	VL063	N/A1)	N/A1)
5GHz Notch Filter	Micro-Tronics	BRM50716	VL064	N/A1)	N/A1)

Note:

- 1) These pieces of equipment are not for measurement purposes and only require functional verification. Calibration is not required.

---END---