

TEST REPORT

Report Number: R15147852-E5

Applicant : Stryker Medical
3800 E Central Ave
Portage, MI, 49002-5826, USA

Model : 3009

Contains FCC ID : BT - Z7ALBCA1KU1WA
Wi-Fi - Z7A-SDMACP

Contains IC : BT - 4919E-LBCA1KU1WA
Wi-Fi - 4919-SDMACP

EUT Description : ProCuity Hospital Bed

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C: 2024
FCC 47 CFR PART 15 SUBPART E: 2024
ISED RSS-247 ISSUE 3: 2023
ISED RSS-GEN ISSUE 5 + A1 + A2: 2021

Date Of Issue:
2024-05-16

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REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2024-05-07	Initial Review	Chandler Stanley
V2	2024-05-16	Updated Wi-Fi Software Information	Charles Moody

TABLE OF CONTENTS

REVISION HISTORY	2
1. ATTESTATION OF TEST RESULTS	4
2. TEST RESULTS SUMMARY	6
3. TEST METHODOLOGY	6
4. FACILITIES AND ACCREDITATION	6
5. DECISION RULES AND MEASUREMENT UNCERTAINTY	7
5.1. METROLOGICAL TRACEABILITY	7
5.2. DECISION RULES	7
5.3. MEASUREMENT UNCERTAINTY	7
5.4. SAMPLE CALCULATION	7
6. EQUIPMENT UNDER TEST	8
6.1. DESCRIPTION OF EUT	8
6.2. MAXIMUM OUTPUT POWER	8
6.3. DESCRIPTION OF AVAILABLE ANTENNAS	8
6.4. SOFTWARE AND FIRMWARE	8
6.5. WORST-CASE CONFIGURATION AND MODE	9
6.6. DESCRIPTION OF TEST SETUP	10
7. TEST AND MEASUREMENT EQUIPMENT	11
8. DUTY CYCLE	12
9. RADIATED TEST RESULTS	14
9.1. TRANSMITTER ABOVE 1 GHz	15
9.1.1. HARMONICS AND SPURIOUS EMISSIONS (Scan 1)	15
9.1.2. HARMONICS AND SPURIOUS EMISSIONS (Scan 2)	17
9.1.3. BAND EDGE EMISSIONS (Scan 3)	19
10. SETUP PHOTOS	21
END OF REPORT	21

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Stryker Medical
3800 E Central Ave
Portage, MI, 49002-5826, USA

EUT DESCRIPTION: ProCuity Bed Side

MODEL: 3009

SERIAL NUMBER: MOBS-2 (Contains bedside room interface board S/N: 2430000042)

SAMPLE RECEIPT DATE: 2024-04-08

DATE TESTED: 2024-04-08 TO 2024-04-09

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C: 2024	See Section 2
CFR 47 Part 15 Subpart E: 2024	See Section 2
ISED RSS-247 Issue 3: 2023	See Section 2
ISED RSS-GEN Issue 5 + A1 + A2: 2021	See Section 2

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the U.S. government.

Approved & Released
For UL LLC By:



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Operations Manager
Consumer, Medical and IT Segment
UL LLC

Prepared By:



Chandler Stanley
Engineer
Consumer, Medical and IT Segment
UL LLC

2. TEST RESULTS SUMMARY

This report contains data provided by the customer which can impact the validity of results. UL LLC is only responsible for the validity of results after the integration of the data provided by the customer.

Below is a list of the data provided by the customer:

1. Antenna gain and type (see section 6.3)

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
15.209, 15.205, 15.407 (b)	RSS-GEN 8.9, 8.10, RSS-247 6.2	Radiated Emissions	See Comment	Refer to Note.

Note: The purpose of this report is to show compliance of radios while simultaneously transmitting. These scans were found to be compliant.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC 47 CFR Part 2, FCC 47 CFR Part 15, ANSI C63.10-2020, KDB 558074 D01 v05r02, KDB 662911 D01 v02r01, KDB 789033 D02 v02r01, RSS-GEN Issue 5 + A1 + A2, RSS-247 Issue 3.

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification # 0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
<input checked="" type="checkbox"/>	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
<input type="checkbox"/>	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radio Frequency (Spectrum Analyzer)	141.2 Hz
All emissions, radiated	6.01 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%
Time	3.39%

Uncertainty figures are valid to a confidence level of 95%.

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT, Stryker ProCuity bed series (model 3009) is a powered, adjustable hospital bed that contains a Bluetooth classic and Wi-Fi radio. This report covers the simultaneous transmission of the 2.4 WLAN, BT, and 5 WLAN radios.

6.2. MAXIMUM OUTPUT POWER

The purpose of this report is to show compliance of radios while simultaneously transmitting. Therefore, power measurements are not covered in this report. For the samples used for this test program, it's the responsibility of the applicant to ensure that the EUT yields the same or higher power levels as recorded in the certification reports of each radio.

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) gain and type, as provided by the manufacturer' are as follows:

Antenna	Frequency (MHz)	Gain (dBi)	Type
BT	2400-2483.5	3	Flex
Wi-Fi	2400-2483.5	3	
	5725-5850	4	

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was:

- microprocessor software at Perforce label 300901380925_v02.00.01.001
- radio software at Perforce label 300901380926_v01.00.01.000
- Wi-Fi Software: //depot/R&D/Projects/Gateway4.2/Tools/Wi-Fi Certification/BUILD/mfgtool-gateway.zip

6.5. WORST-CASE CONFIGURATION AND MODE

The EUT is intended to operate in only one orientation; therefore, all final radiated testing was performed with the EUT in this intended orientation of operation.

The following scans were performed for simultaneous transmission based on the worst-case data from the manufacturer's report:

1-18 GHz Harmonics and Spurious Emissions:

Mode	Mode	Mode	Scan Number
BT, GFSK, 2441 MHz, Default Power	11b, 2437 MHz, 1Mbps, Pset18	N/A	1
BT, GFSK, 2480 MHz, Default Power	11n HT20, 5785 MHz, 6Mbps, Pset11	N/A	2

Band Edge:

Mode	Mode	Mode	Scan Number
BT, GFSK, 2480 MHz, Default Power	11n HT20, 2462 MHz, 1Mbps Pset16.5	N/A	3

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Microsoft	Surface Tablet	NA	NA
DC Power Supply	Elektro-Automatik GmbH & Co KG	PSI 9040-60	NA	NA

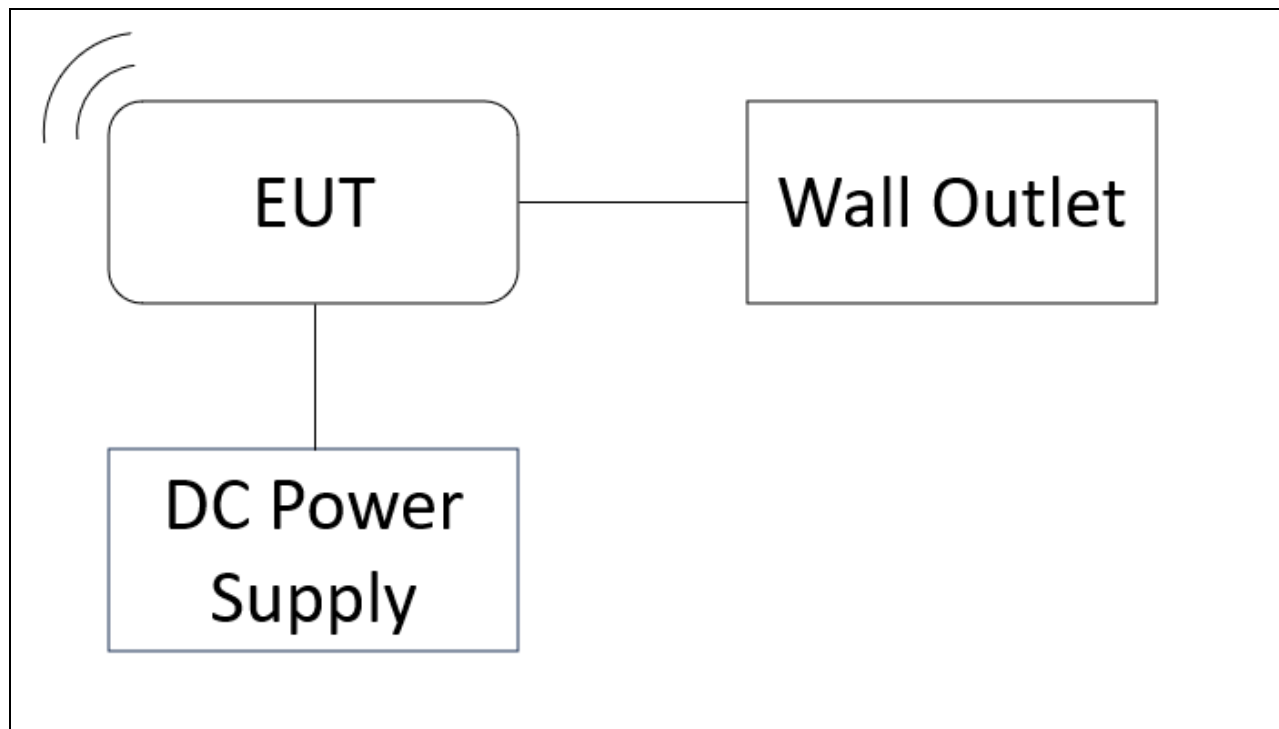
I/O CABLES

N/A

TEST SETUP

For radiated testing, the EUT was connected to a wall outlet. The EUT's PCB containing the Bluetooth radio receives power from the EUT's AC/DC power supply. A DC supply was used to power the PCB containing the WiFi radio. The support laptop was connected to the EUT prior to testing in order to configure the radios. For final testing, the support laptop was disconnected from the EUT.

SETUP DIAGRAM



7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (RTP – Chamber A)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	1-18GHz Range				
88590 (aka AT0068)	Horn Antenna 1-18GHz	ETS-Lindgren	3117	2023-08-07	2024-08-07
Silver Box G/L	Chamber A G/L 1-18GHz			2023-08-25	2024-08-25
	Receiver & Software				
77035 (aka SA0016)	Spectrum Analyzer	Agilent	PXA N9030A	2023-08-03	2024-08-03
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Additional Equipment used				
236492	Temp/Humid/Pressure Meter	Extech	SD700	2023-05-09	2024-05-09
77414 (BRF003)	2.4GHz notch filter, 2W, Fhigh =18GHz	Micro-Tronics	BRM50702	2024-03-12	2025-03-12
77837 (BRF004)	5.5GHz notch filter, 2W, Fhigh =18GHz	Micro-Tronics	BRM50716-01	2024-03-01	2025-03-01

8. DUTY CYCLE

LIMITS

None; for reporting purposes only.

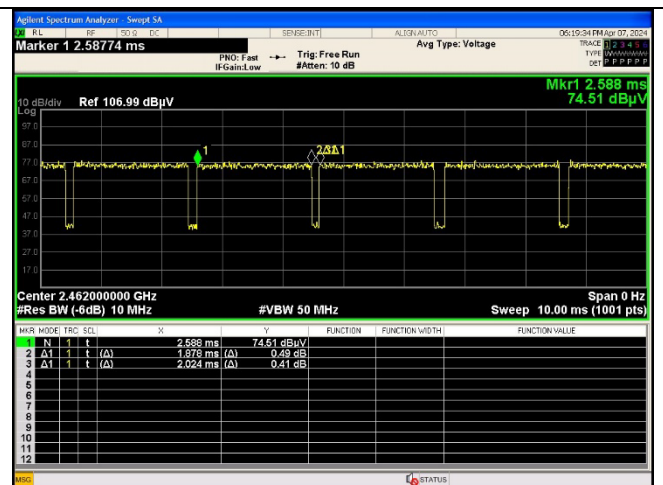
PROCEDURE

ANSI C63.10 Section 11.6

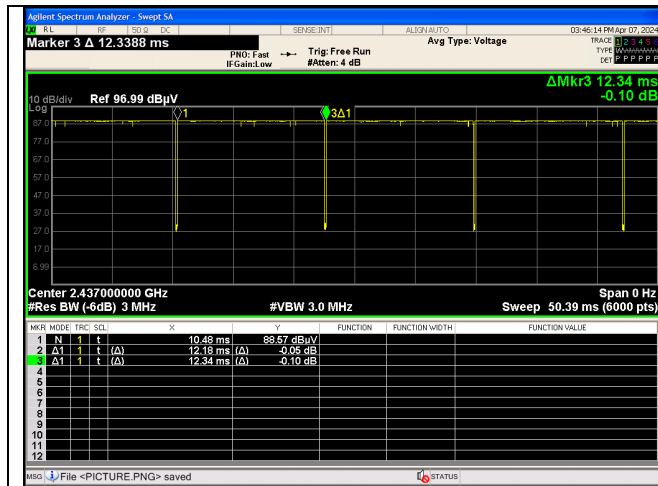
Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor RMS (dB)	Duty Cycle Correction Factor Linear (dB)	1/B Minimum VBW (kHz)
BT, GFSK	100.000	100.000	1.0000	100.00%	0.00	0.00	0.010
11nHT20	1.878	2.024	0.9279	92.79%	0.33	0.65	0.532
11b	12.180	12.340	0.9870	98.70%	0.00	0.00	0.010
5GHz, 11nHT20	1.888	1.994	0.9468	94.68%	0.24	0.47	0.530



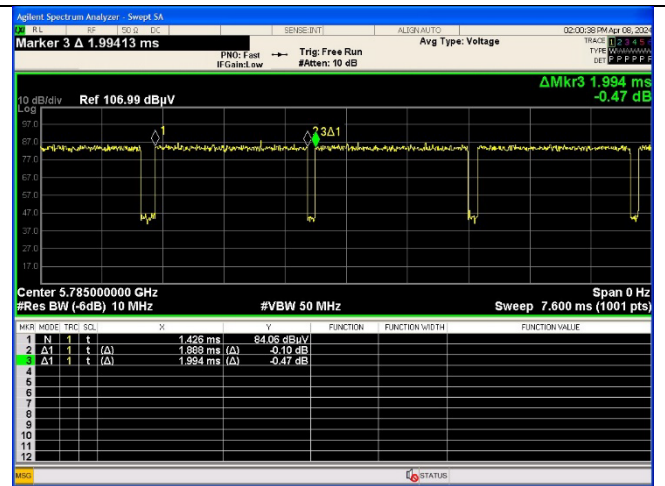
DUTY CYCLE, BT, GFSK



DUTY CYCLE, 11nHT20



DUTY CYCLE, 11b



DUTY CYCLE, 5GHz 11nHT20

****NOTE:** Duty cycle testing was performed from 2024-04-08 to 2024-04-09. The dates listed in the plots are incorrect.

9. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209
FCC §15.407 (b)(1-6)
RSS-GEN, Section 8.9 and 8.10
RSS-248 4.6.2 (a)
RSS-247 Issue 2 Sections:
6.2.4.2 (for 5725-5850 MHz bands)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements. Linear Voltage averaging was used for WiFi and Real World duty cycle correct was used for Bluetooth. See note below.

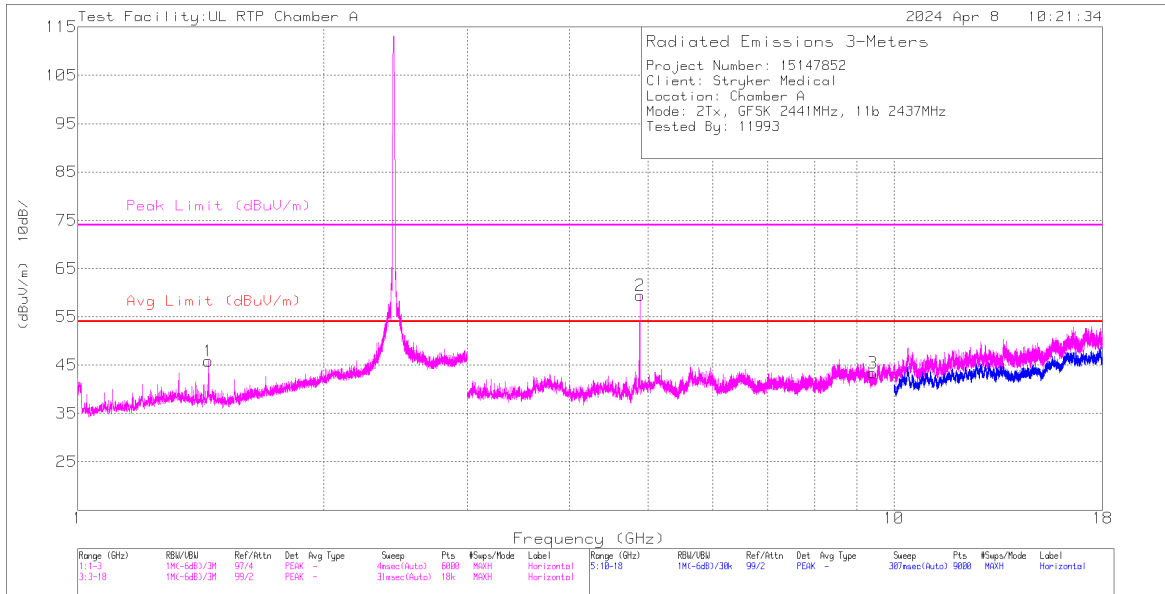
The spectrum from 1 GHz to 18 GHz is investigated with the various radios set to their worst-case operational modes. The scans performed were detailed in section 6.5.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

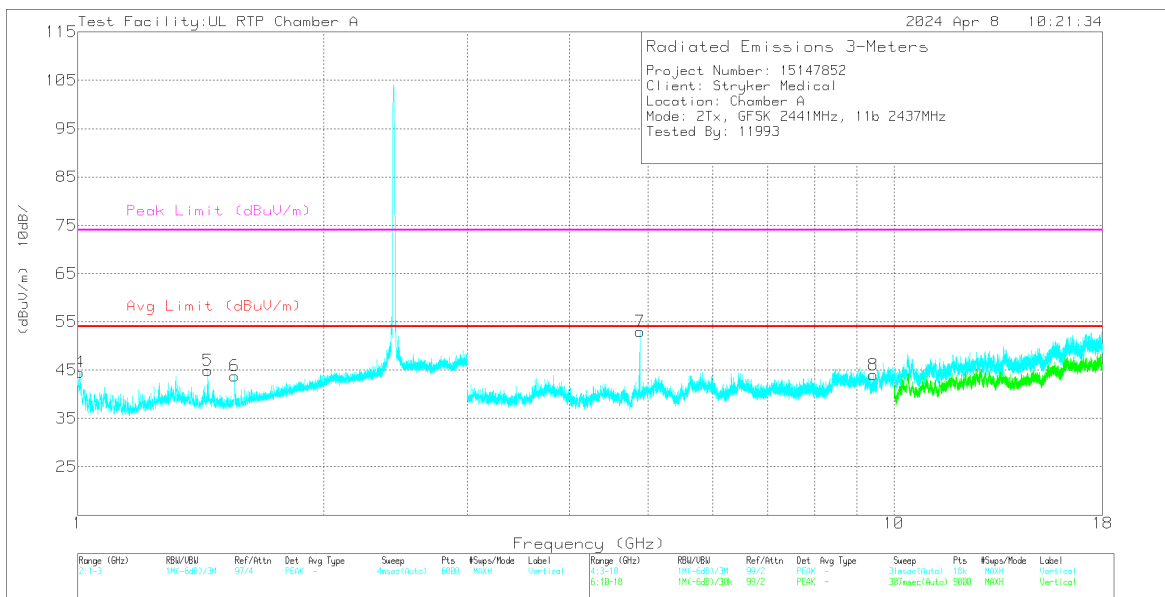
The duty cycle correction for Bluetooth Average measurements is derived from Peak detection with a correction factor based on real world, on time. The worst case (on average) dwell time would be the device transmitting DH5 packets (5/1600 s dwell per hop = 3.125ms per channel) and operating on 20 channels which will have a max. of 2 times on a channel in 100ms. $2 \times 3.125\text{ms} = 6.25\text{ms}$ per 100ms on any channel; $20\log(6.25/100) = -24\text{dB}$.

9.1. TRANSMITTER ABOVE 1 GHz

9.1.1. HARMONICS AND SPURIOUS EMISSIONS (Scan 1)



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn (dB)	Chamber A Port 7 (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 1.446074	35.47	Pk	28	-17.6	0	45.87	54	-8.13	74	-28.13	0-360	100	H
4	*** 1.005668	35.86	Pk	26.7	-18	0	44.56	54	-9.44	74	-29.44	0-360	201	V
5	*** 1.443407	34.53	Pk	28	-17.6	0	44.93	54	-9.07	74	-29.07	0-360	201	V
6	*** 1.557426	33.7	Pk	27.7	-17.6	0	43.8	54	-10.2	74	-30.2	0-360	201	V
2	*** 4.881708	60.32	PK2	34.3	-35	0	59.62	-	-	74	-14.38	273	145	H
	*** 4.881708	60.32	PK2	34.3	-35	-24	35.62	54	-18.38	-	-	273	145	H
7	*** 4.881621	56.61	PK2	34.3	-35	0	55.91	-	-	74	-18.09	38	299	V
	*** 4.881621	56.61	PK2	34.3	-35	-24	31.91	54	-22.09	-	-	38	299	V
3	*** 9.417497	37.36	Pk	36.9	-30.9	0	43.36	54	-10.64	74	-30.64	0-360	100	H
8	*** 9.439164	38.42	Pk	36.9	-31.3	0	44.02	54	-9.98	74	-29.98	0-360	200	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

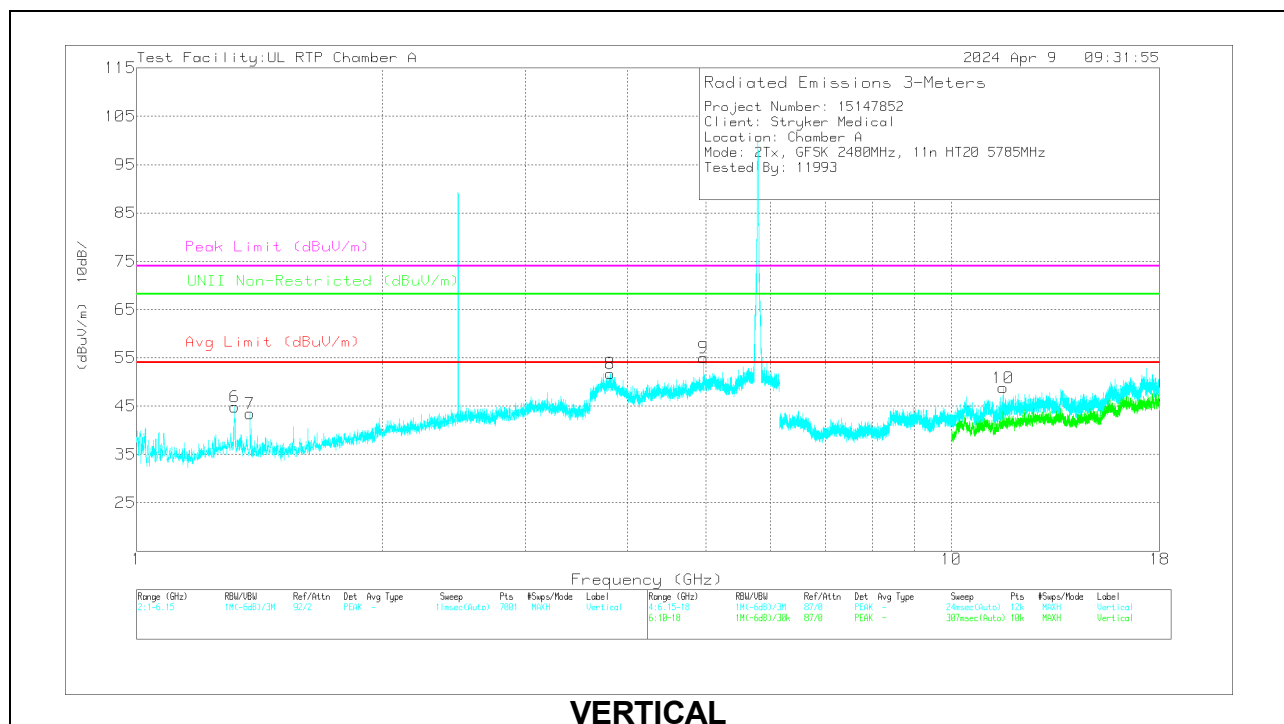
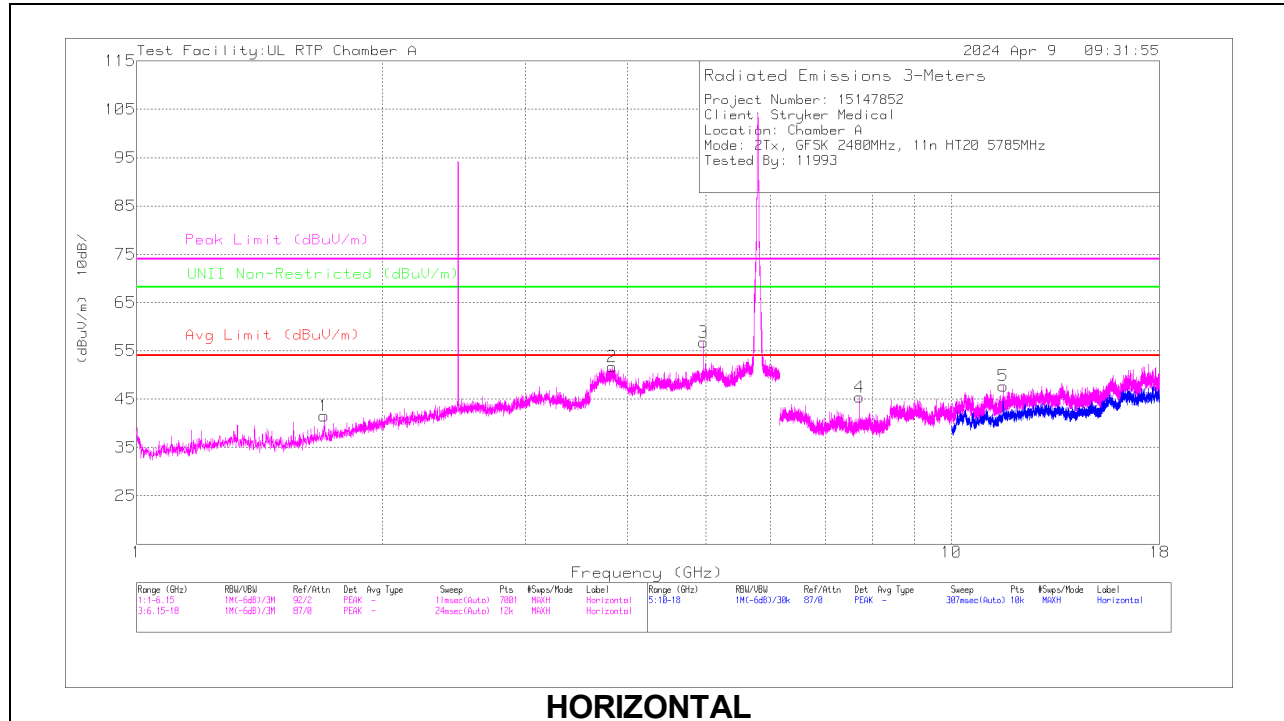
Pk - Peak detector

PK2 - Maximum Peak

**NOTE: Exploration testing found that V1TV average remeasurement failure is related to BT radio only and is not caused by the Wi-Fi radio. Therefore, according to Bluetooth protocol, a -24dB correction factor was applied to the peak measurement to compare to the average limit.

The -24 dB correction is derived from Peak measurements with a correction factor based on real world, on time. The worst case (on average) dwell time would be the device transmitting DH5 packets (5/1600 s dwell per hop = 3.125ms per channel) and operating on 20 channels device which will have max of 2 times on a channel in 100ms. $2 \times 3.125\text{ms} = 6.25\text{ms}$ per 100ms on any channel; $20\log(6.25/100) = -24\text{dB}$.

9.1.2. HARMONICS AND SPURIOUS EMISSIONS (Scan 2)



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn (dB/m)	Chamber A Port 7 (dB)	Correction Factor (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 1.698193	29.96	Pk	29.2	-17.6	-	41.56	54	-12.44	74	-32.44	0-360	101	H
2	*** 3.829352	33.47	PK-U	33.5	-15.3	-	51.67	-	-	74	-22.33	21	318	H
2	*** 3.829352	33.47	PK-U	33.5	-15.3	-24	27.67	54	-26.33	-	-	21	318	H
3	*** 4.95974	44.05	PK-U	34.3	-14.1	-	64.25	-	-	74	-9.75	276	117	H
3	*** 4.95974	44.05	PK-U	34.3	-14.1	-24	40.25	54	-13.75	-	-	276	117	H
6	*** 1.320036	34.06	Pk	28.6	-17.8	-	44.86	54	-9.14	74	-29.14	0-360	101	V
7	*** 1.377421	33.17	Pk	28	-17.7	-	43.47	54	-10.53	74	-30.53	0-360	101	V
8	*** 3.815478	34.07	PK-U	33.5	-15.4	-	52.17	-	-	74	-21.83	49	339	V
8	*** 3.815478	34.07	PK-U	33.5	-15.4	-24	28.17	54	-25.83	-	-	49	339	V
9	*** 4.959724	39.42	PK-U	34.3	-14.1	-	59.62	-	-	74	-14.38	308	101	V
9	*** 4.959724	39.42	PK-U	34.3	-14.1	-24	35.62	54	-18.38	-	-	308	101	V
10	*** 11.570459	44.51	PK-U	38.6	-30.1	-	53.01	-	-	74	-20.99	74	149	V
10	*** 11.570459	44.51	PK-U	38.6	-30.1	-24	29.01	54	-24.99	-	-	74	149	V
5	*** 11.57335	39.23	Pk	38.6	-30.1	-	47.73	54	-6.27	74	-26.27	0-360	101	H
4	*** 7.7142	42.61	Pk	36	-33.2	-	45.41	54	-8.59	74	-28.59	0-360	101	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

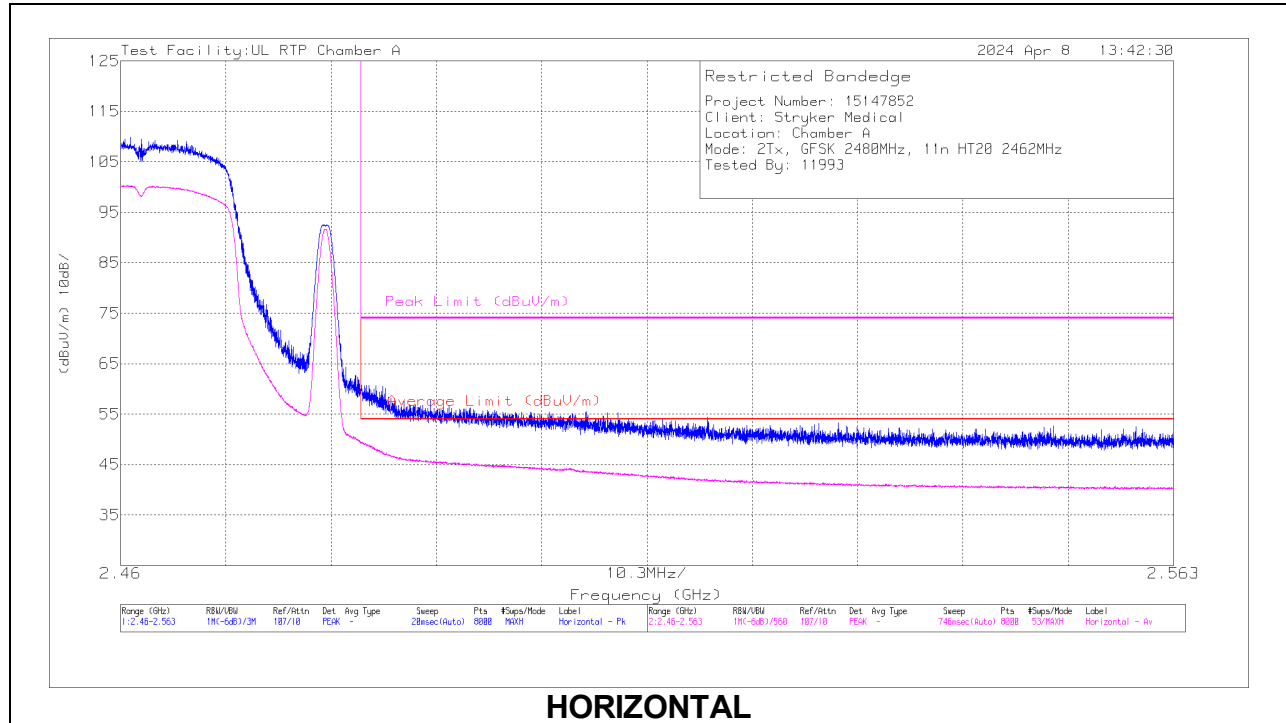
Pk - Peak detector

PK-U - Maximum Peak

**NOTE: Exploration testing found that V1TV average remeasurement failure is related to BT radio only and is not caused by the Wi-Fi radio. Therefore, according to Bluetooth protocol, a -24dB correction factor was applied to the peak measurement to compare to the average limit.

The -24 dB correction is derived from Peak measurements with a correction factor based on real world, on time. The worst case (on average) dwell time would be the device transmitting DH5 packets (5/1600 s dwell per hop = 3.125ms per channel) and operating on 20 channels device which will have max of 2 times on a channel in 100ms. $2 \times 3.125\text{ms} = 6.25\text{ms}$ per 100ms on any channel; $20\log(6.25/100) = -24\text{dB}$.

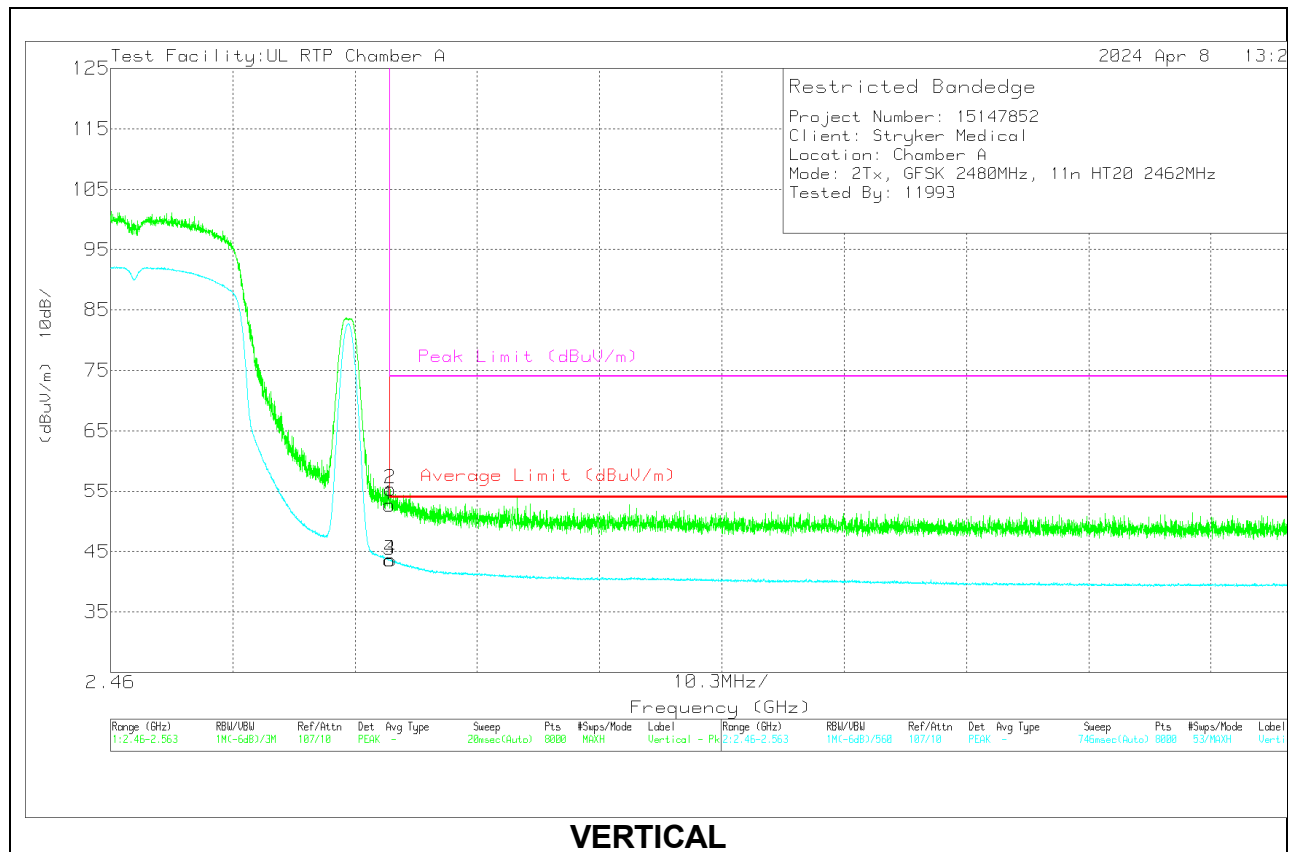
9.1.3. BAND EDGE EMISSIONS (Scan 3)



Frequency (GHz)	Meter Reading (dBuV)	Det	Horn (dB)	Chamber A Port 7 (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2.4835	43.73	Pk	32.5	-17	59.23	-	-	74	-14.77	273	157	H
2.4835	33.92	V1TV	32.5	-17	49.42	54	-4.58	-	-	273	157	H
2.483513	33.98	V1TV	32.5	-17	49.48	54	-4.52	-	-	273	157	H
2.483539	45.23	Pk	32.5	-17	60.73	-	-	74	-13.27	273	157	H

Pk - Peak detector

V1TV - Linear Voltage Average



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn (dB)	Chamber A Port 7 (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	37.22	Pk	32.5	-17	52.72	-	-	74	-21.28	56	148	V
2	* ** 2.483552	39.86	Pk	32.5	-17	55.36	-	-	74	-18.64	56	148	V
3	* ** 2.4835	28.07	V1TV	32.5	-17	43.57	54	-10.43	-	-	56	148	V
4	* ** 2.483591	28.14	V1TV	32.5	-17	43.64	54	-10.36	-	-	56	148	V

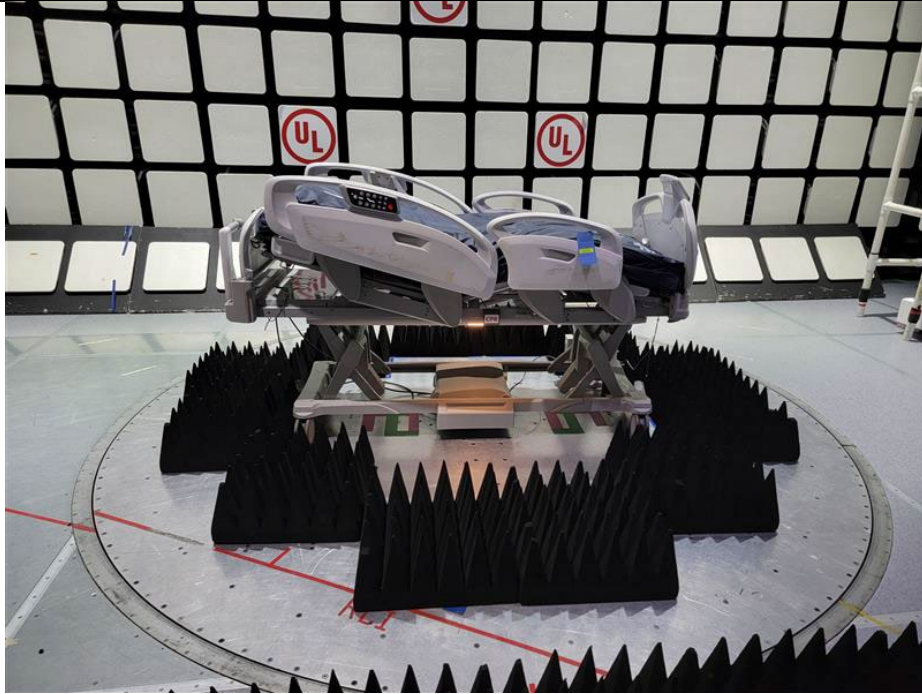
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

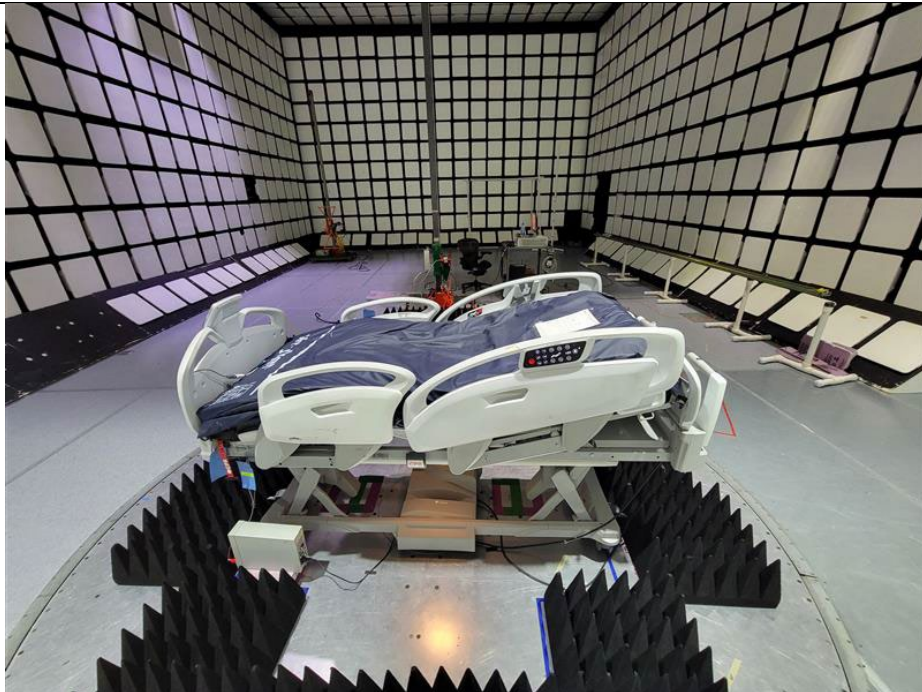
Pk - Peak detector

V1TV - Linear Voltage Average

10. SETUP PHOTOS



RADIATED ABOVE 1GHz TX FRONT



RADIATED ABOVE 1GHz TX BACK

END OF REPORT