TEST REPORT

Report Number: R15444913-E1

Applicant	:	Garmin International Inc 1200 E 151st St Olathe, Kansas 66062-3426, United States
Model	:	A05000
FCC ID	:	IPH-05000
IC	:	1792A-05000
EUT Description	:	Device
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C: 2024 ISED RSS-247 ISSUE 3: 2023 ISED RSS-GEN ISSUE 5 + A1 + A2: 2021 ISED RSS-210 ISSUE 11:2024

Date Of Issue:
2024-08-30

Prepared by:
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12 Laboratory Dr.
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CERT #0751.06

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2024-08-30	Initial Issue	Chandler Stanley

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UL LLC
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Garmin International Inc
1200 E 151st St
Olathe, Kansas 66062-3426, United States

EUT DESCRIPTION: Device

MODEL: A05000

SERIAL NUMBER: 3477224577

SAMPLE RECEIPT DATE: 2024-08-13

DATE TESTED: 2024-08-15, 2024-08-16 and 2024-08-19

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C: 2024	Refer to Section 2
ISED RSS-247 Issue 3: 2023	Refer to Section 2
ISED RSS-GEN Issue 5 + A1 + A2: 2021	Refer to Section 2
ISED RSS-210 Issue 11:2024	Refer to 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.

Approved & Released For
UL LLC By:

Brian Kiewra
Project Engineer
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)

BLE				
FCC Clause	**ISED Clause**	**Requirement**	**Result**	**Comment**
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	RSS-GEN 6.7	99% OBW	Not Performed	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW		None.
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power		
See Comment		Average power		Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	RSS-247 5.2 (b)	PSD		None.
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions		
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	Complies	
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	Not Performed	
ANT/ANT+				
FCC Clause	**ISED Clause**	**Requirement**	**Result**	**Comment**
15.249 (a)	RSS-210 B.10 (a)	Fundamental/harmonic measurements	Not Performed	None.
15.249 (d)	RSS-210 B.10 (b)	Radiated Emissions	See Comment	Band Edge is Compliant

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2020, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A1 + A2, RSS-210 Issue 11, and 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
☐	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
☒	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	U_{Lab}
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%

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. EUT DESCRIPTION

The EUT is a device that contains a BLE and ANT/ANT+ radio and a GNSS receiver. This report covers the full radiated emissions testing of the BLE and ANT/ANT+ radios with the exception for ranges above 1GHz for ANT/ANT+.

6.2. MAXIMUM OUTPUT POWER

Not Performed.

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

The radio utilizes an Inverted F antenna, with a maximum gain of -1.537 dBi.

6.4. SOFTWARE AND FIRMWARE

Software Version: 4.09

6.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz and above 18GHz were performed with the EUT set to transmit at the channel and mode that had the highest recorded power and PSD as the worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit on low and high channels, as well as middle channel for radiated spurious emissions. Band edge and radiated spurious emissions were performed on the worst-case power and PSD mode. For BLE, band edge was also tested at 2Mbps since this has the widest bandwidth.

ANT/ANT+ was tested at its only data-rate. ANT/ANT+ was only tested below 1GHz for spurious emissions, while full radiated testing was performed for BLE.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC adapter	Sony	XQZ-UC11-101-236-21	3223W09206247	NA

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Proprietary	1	Proprietary	Shielded	<3m	Charges to USB C

TEST SETUP

For testing, the EUT was programmed to transmit at the desired frequencies and power settings. The EUT was connected to AC Line via a charging cable as worst-case.

SETUP DIAGRAMS

Please refer to 15444913-EP1 for setup diagrams

7. MEASUREMENT METHOD

On Time and Duty Cycle: ANSI C63.10, Section 11.6 : Zero-Span Spectrum Analyzer Method.

Radiated emissions restricted frequency bands: ANSI C63.10 Subclause -11.12.1, and 6.10.5

General radiated emissions: ANSI C63.10 Subclause - 6.3-6.6

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8. 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 (Morrisville – Chamber 4)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
0.009-30MHz					
135144	Active Loop Antenna	ETS-Lindgren	6502	2024-01-24	2025-01-24
30-1000 MHz					
90628	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-01-02	2026-01-02
1-18 GHz					
89509	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2023-05-23	2025-05-23
Gain-Loss Chains					
207638	Gain-loss string: 0.009-30MHz	Various	Various	2024-05-22	2025-05-22
207639	Gain-loss string: 25-1000MHz	Various	Various	2024-05-22	2025-05-22
207640	Gain-loss string: 1-18GHz	Various	Various	2024-05-22	2025-05-22
Receiver & Software					
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2024-04-16	2025-04-16
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Additional Equipment used					
241204	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 1)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
18-40 GHz					
204704	Horn Antenna, 18-26.5GHz	Com-Power	AH-826	2023-07-20	2025-07-20
Gain-Loss Chains					
135999	Gain-loss string: 18-40GHz	Various	Various	2024-05-08	2025-05-08
Receiver & Software					
81018	Spectrum Analyzer	Agilent	E4446A	2024-07-31	2025-07-31
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Additional Equipment used					
241205	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

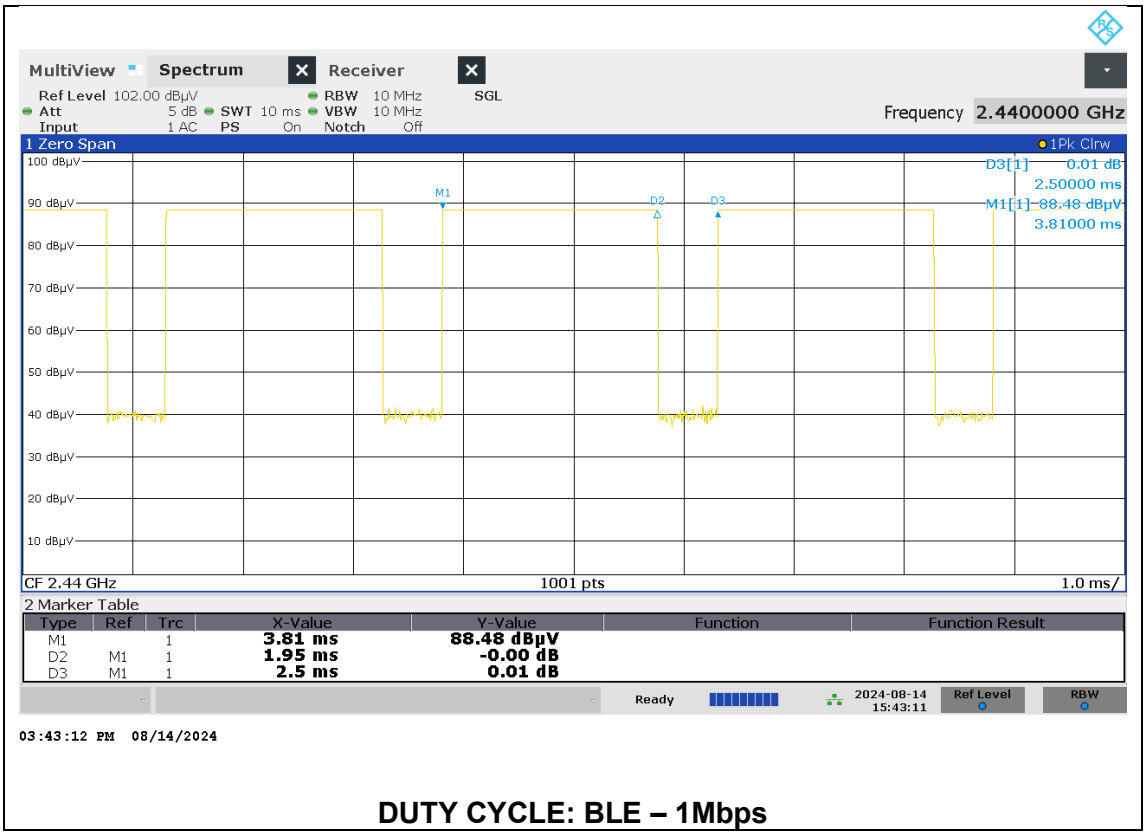
PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

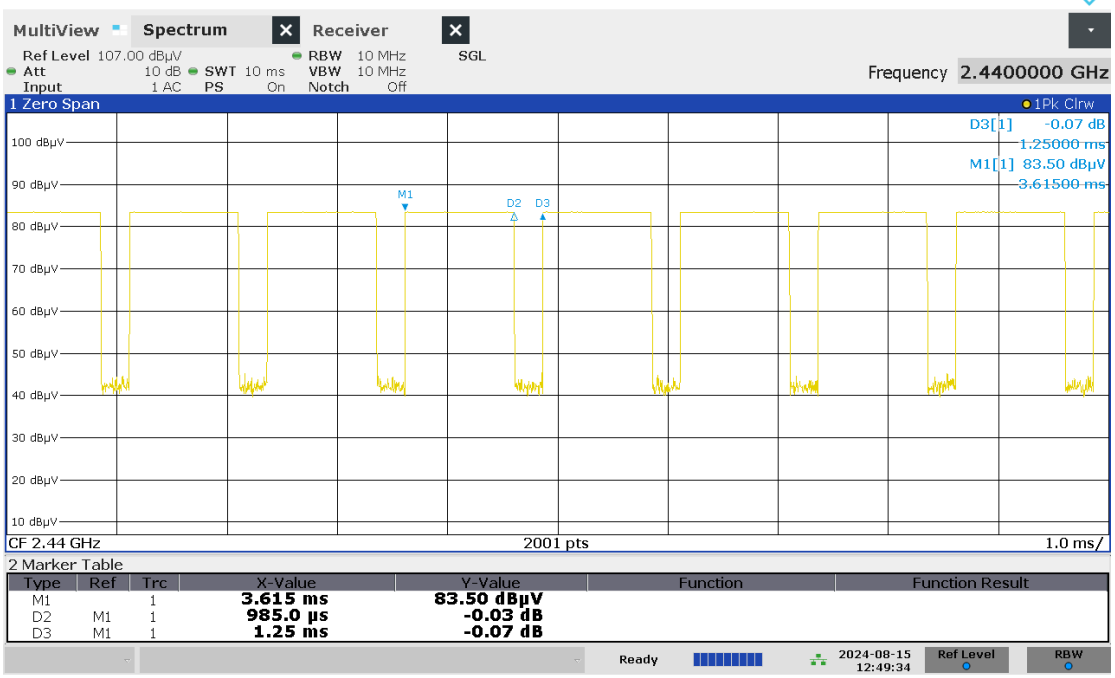
ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
BLE - 1 Mbps	1.950	2.500	0.780	78.00	2.16	0.513
BLE - 2 Mbps	0.985	1.250	0.788	78.80	2.07	1.015
ANT/ANT+	2.090	2.230	0.937	93.72	0.56	0.478

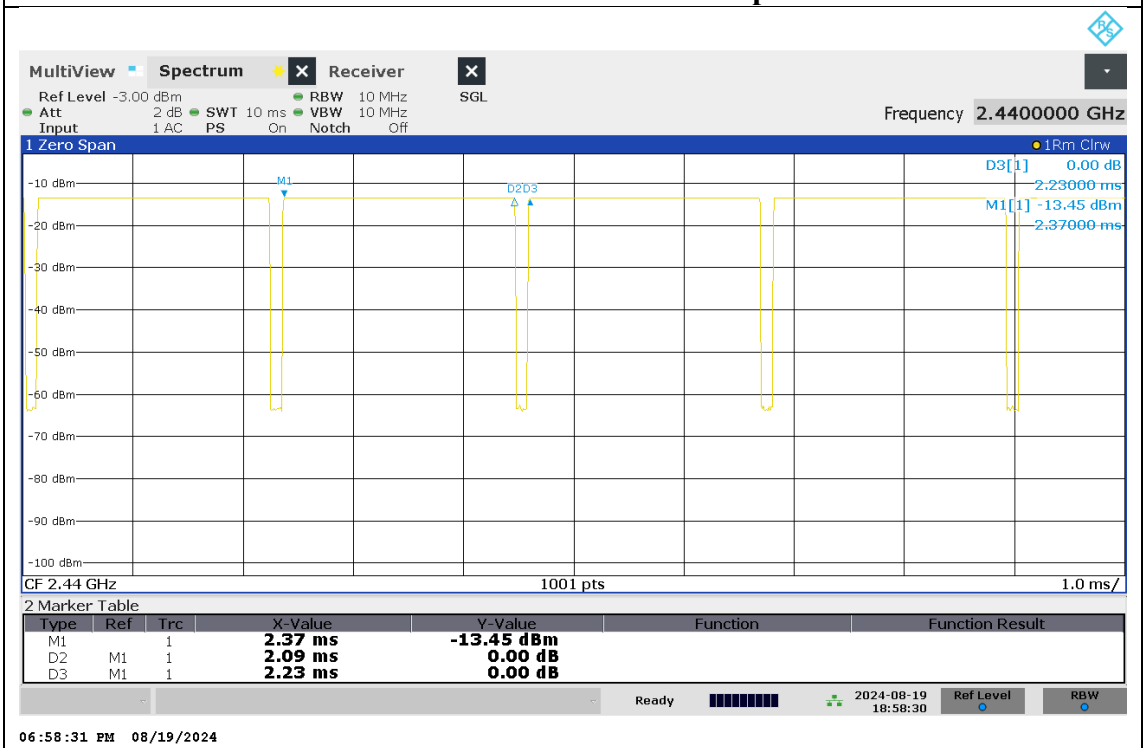
DUTY CYCLE PLOTS
Tested By: 11993 and 85501



DUTY CYCLE: BLE – 1Mbps



DUTY CYCLE: BLE – 2Mbps



DUTY CYCLE: ANT/ANT+

10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209
RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (uA/m) at 3 m	Field Strength Limit (dBuA/m) at 3 m
0.009-0.490	6.37/F(kHz) @ 300 m	-
0.490-1.705	63.7/F(kHz) @ 30 m	-
1.705 - 30	0.08 @ 30m	-

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 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 measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak or average (9-90kHz and 110-490kHz).

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.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest power spectral density was tested.

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.

3D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel).

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

KDB 414788 Open Field Site (OFS) and Chamber Correlation Justification

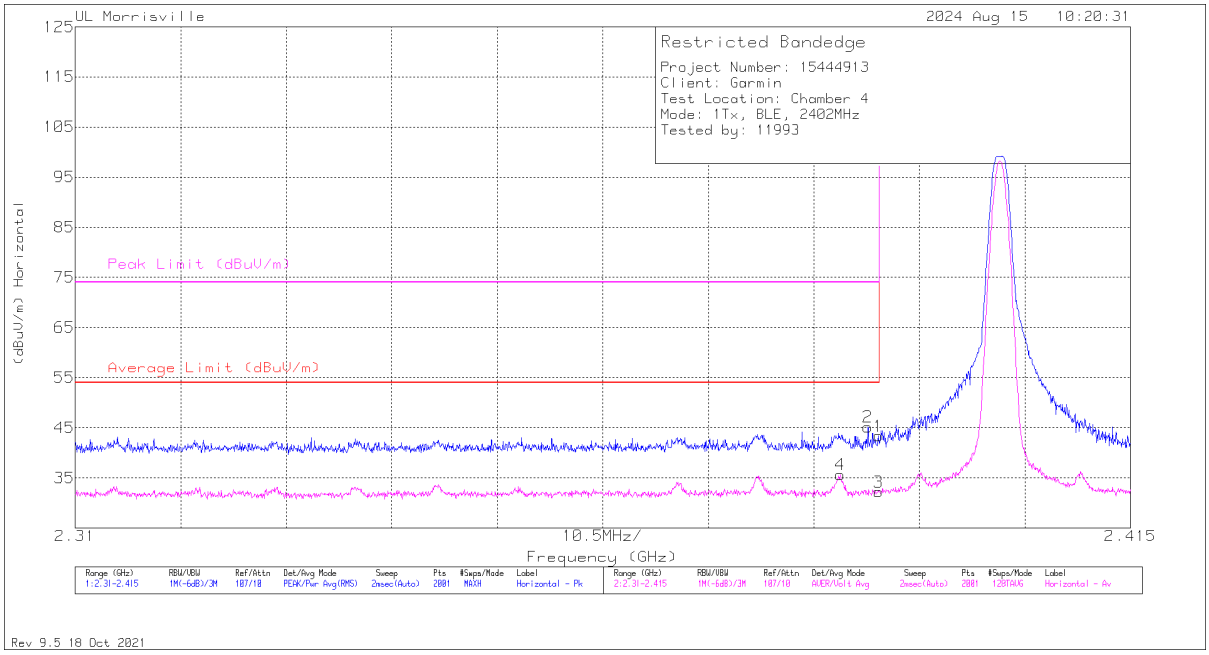
OFS and chamber correlation testing had been performed and chamber measured test result is the worst-case test result.

10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BLE (1Mbps)

BANDEDGE (LOW CHANNEL)

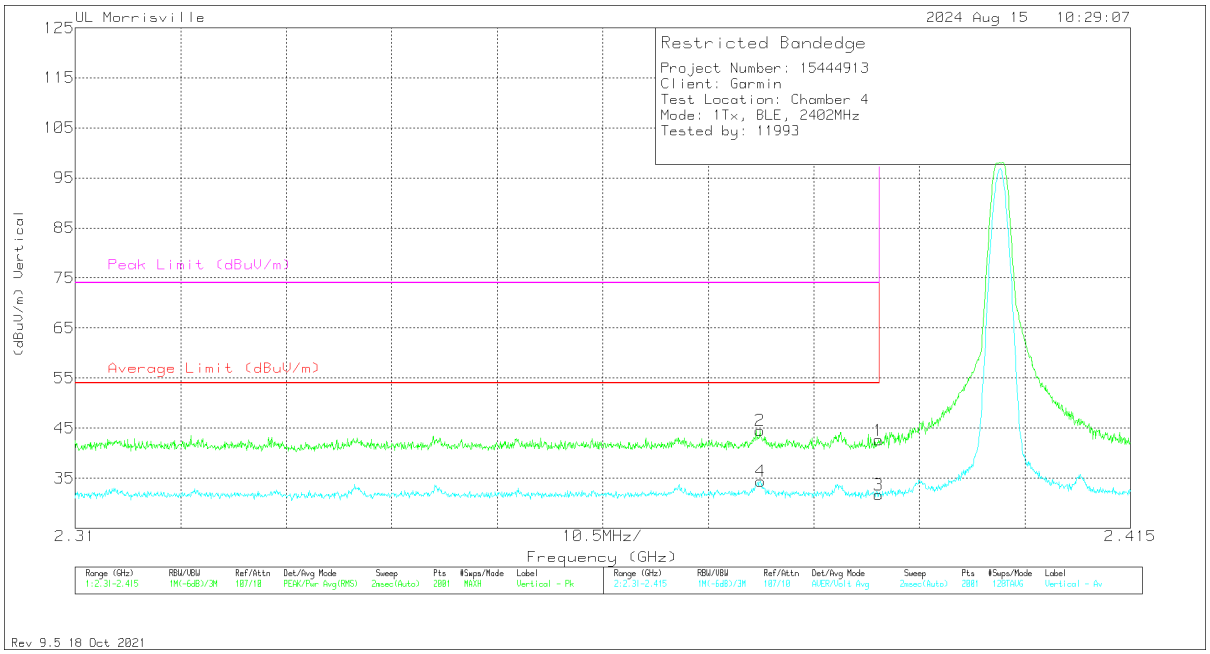
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	34.53	Pk	32	-23.2	0	43.33	-	-	74	-30.67	223	271	H
2	* ** 2.38886	36.35	Pk	32	-23.2	0	45.15	-	-	74	-28.85	223	271	H
3	* ** 2.38996	21.23	ADV	32	-23.2	2.16	32.19	54	-21.81	-	-	223	271	H
4	* ** 2.38613	24.76	ADV	32	-23.3	2.16	35.62	54	-18.38	-	-	223	271	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

VERTICAL RESULT

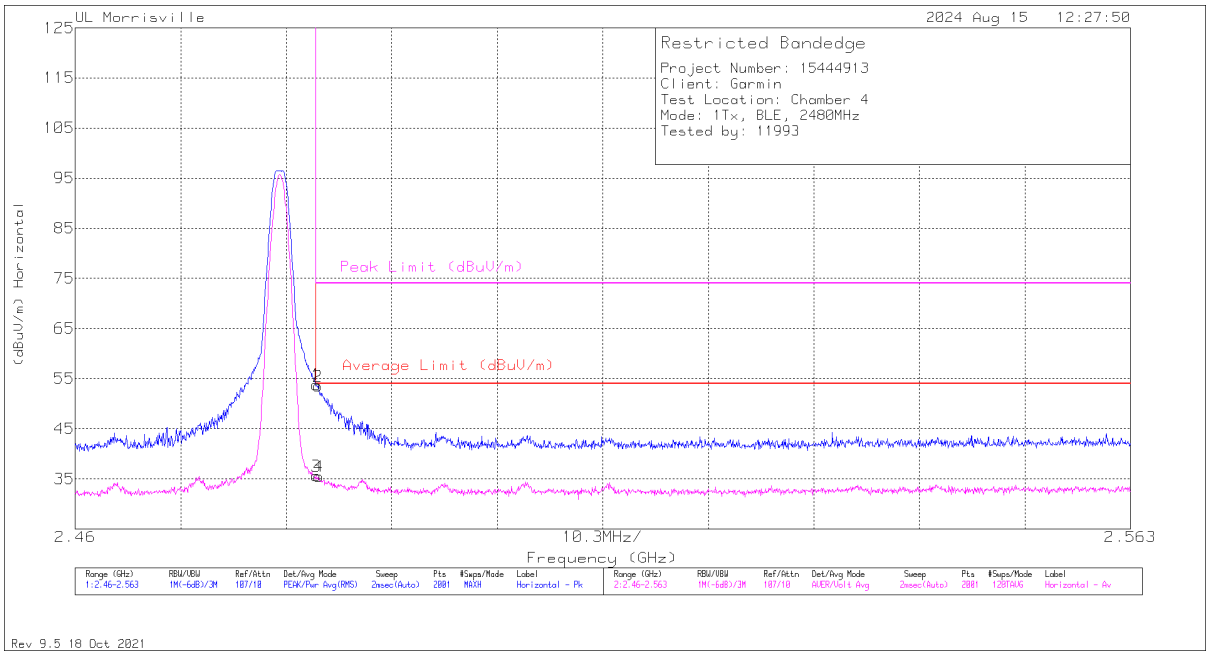


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	33.78	Pk	32	-23.2	0	42.58	-	-	74	-31.42	275	284	V
2	* ** 2.37815	35.51	Pk	32	-23	0	44.51	-	-	74	-29.49	275	284	V
3	* ** 2.38996	20.72	ADV	32	-23.2	2.16	31.68	54	-22.32	-	-	275	284	V
4	* ** 2.3782	23.23	ADV	32	-23	2.16	34.39	54	-19.61	-	-	275	284	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

BANDEDGE (HIGH CHANNEL)

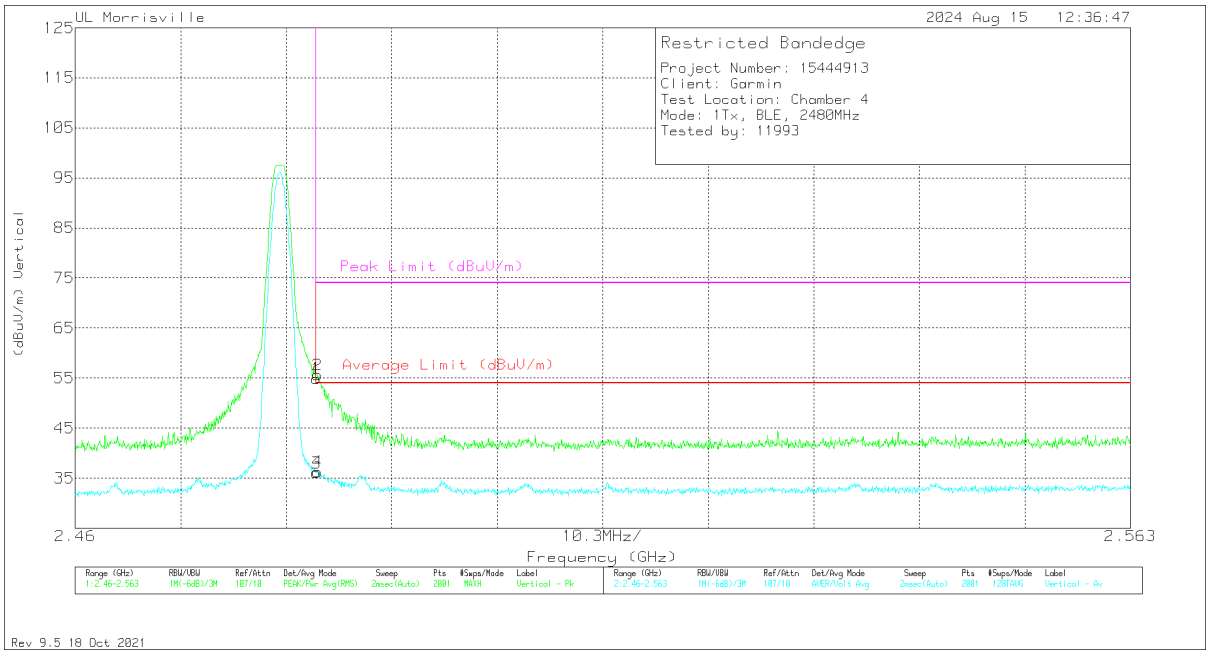
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	44.26	Pk	32.3	-22.8	0	53.76	-	-	74	-20.24	258	132	H
2	* ** 2.48369	43.97	Pk	32.3	-22.8	0	53.47	-	-	74	-20.53	258	132	H
3	* ** 2.48354	23.91	ADV	32.3	-22.8	2.16	35.57	54	-18.43	-	-	258	132	H
4	* ** 2.48379	23.79	ADV	32.3	-22.8	2.16	35.45	54	-18.55	-	-	258	132	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

VERTICAL RESULT

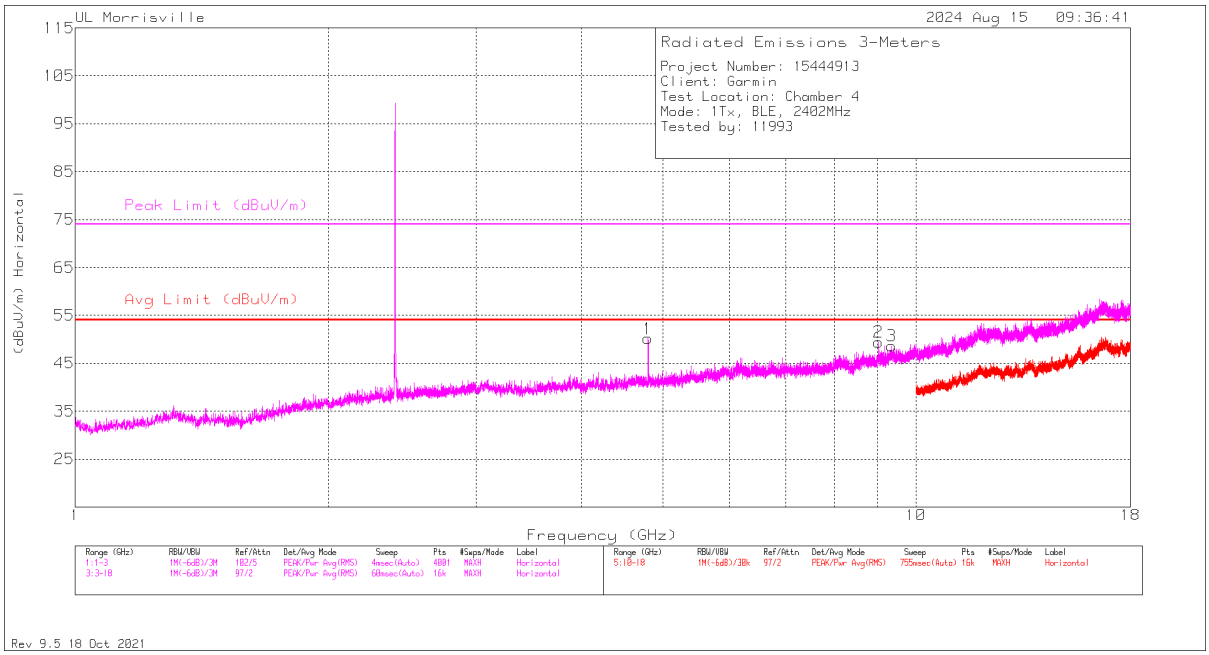


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	45.37	Pk	32.3	-22.8	0	54.87	-	-	74	-19.13	225	120	V
2	* ** 2.48364	46.1	Pk	32.3	-22.8	0	55.6	-	-	74	-18.4	225	120	V
3	* ** 2.48354	24.41	ADV	32.3	-22.8	2.16	36.07	54	-17.93	-	-	225	120	V
4	* ** 2.48364	24.65	ADV	32.3	-22.8	2.16	36.31	54	-17.69	-	-	225	120	V

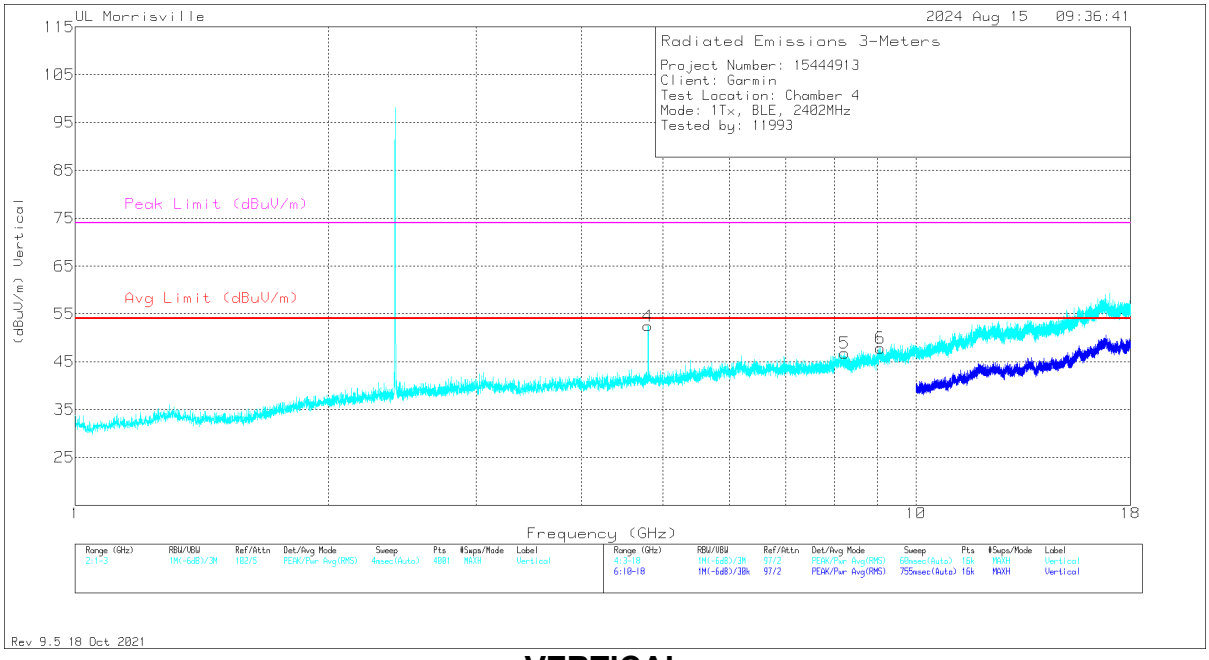
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



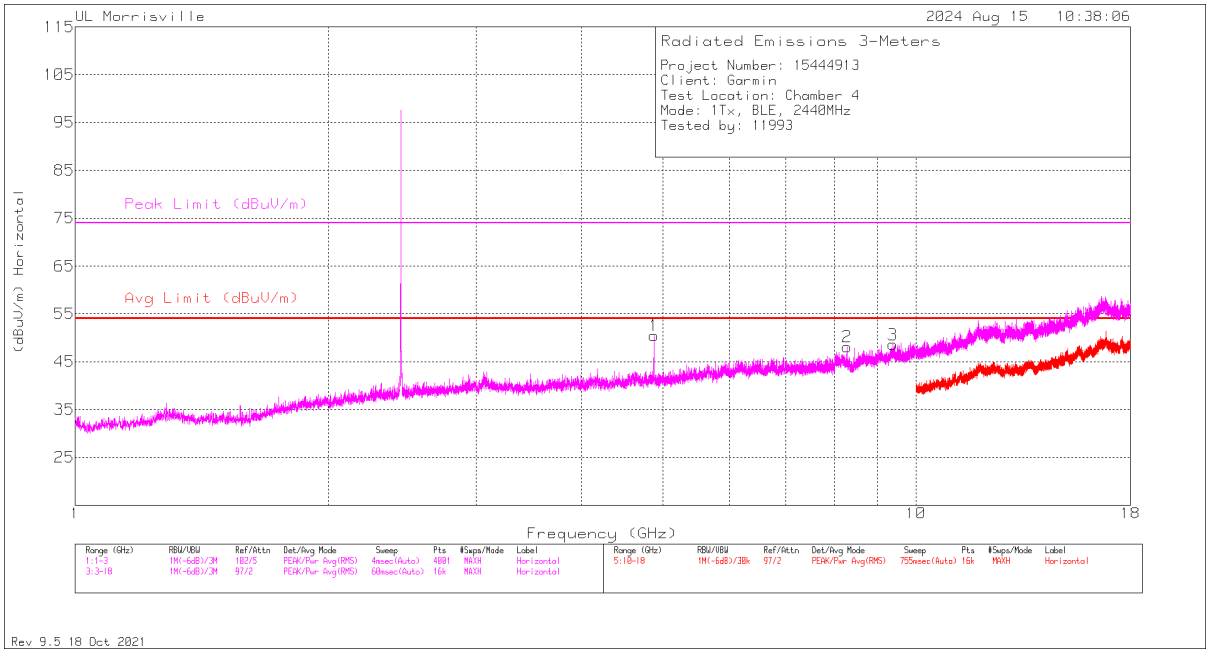
VERTICAL

RADIATED EMISSIONS

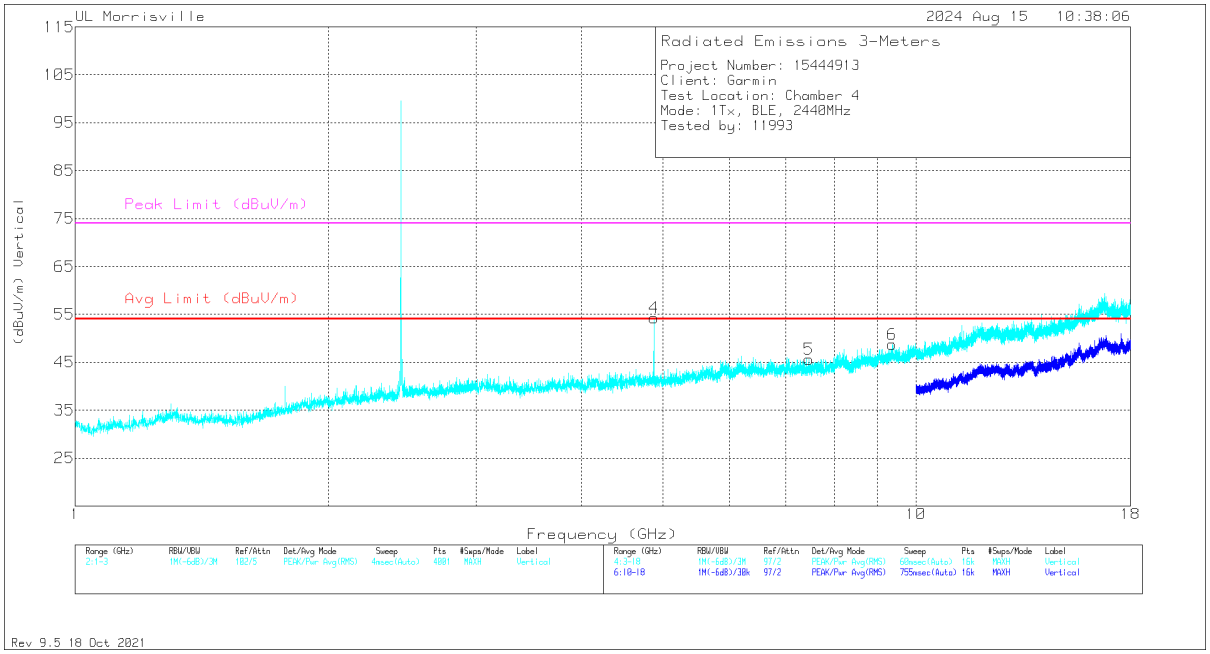
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.80347	49.88	PK2	34.1	-31.4	0	52.58	-	-	74	-21.42	271	167	H
	* ** 4.80384	42.16	ADV	34.1	-31.4	2.16	47.02	54	-6.98	-	-	271	167	H
2	* ** 9.02347	37.08	PK2	36.2	-24.2	0	49.08	-	-	74	-24.92	289	280	H
	* ** 9.02358	24.21	ADV	36.2	-24.2	2.16	38.37	54	-15.63	-	-	289	280	H
3	* ** 9.35886	37.38	PK2	36.5	-24.5	0	49.38	-	-	74	-24.62	289	100	H
	* ** 9.36043	25.19	ADV	36.5	-24.5	2.16	39.35	54	-14.65	-	-	289	100	H
4	* ** 4.8045	52.59	PK2	34.1	-31.4	0	55.29	-	-	74	-18.71	253	229	V
	* ** 4.80418	45.78	ADV	34.1	-31.4	2.16	50.64	54	-3.36	-	-	253	229	V
5	* ** 8.22938	37.44	Pk	35.8	-26.4	0	46.84	54	-7.16	74	-27.16	0-360	200	V
6	* ** 9.07875	36.08	Pk	36.3	-24.5	0	47.88	54	-6.12	74	-26.12	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
ADV - Linear Voltage Average

MID CHANNEL RESULTS



HORIZONTAL



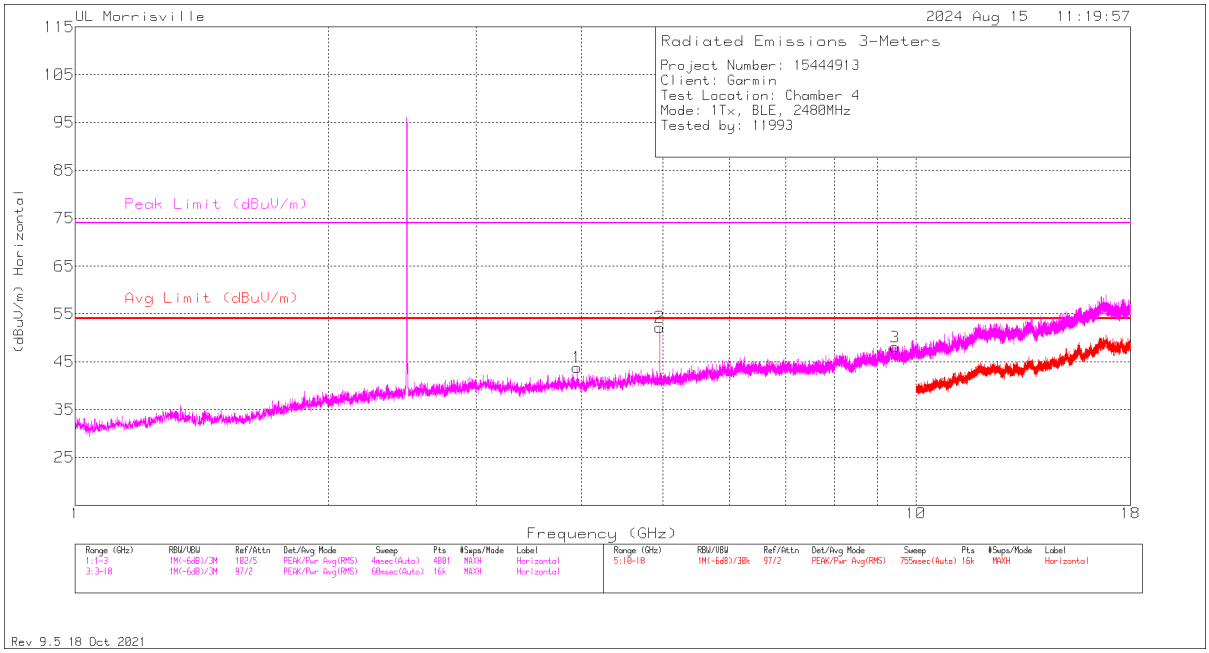
VERTICAL

RADIATED EMISSIONS

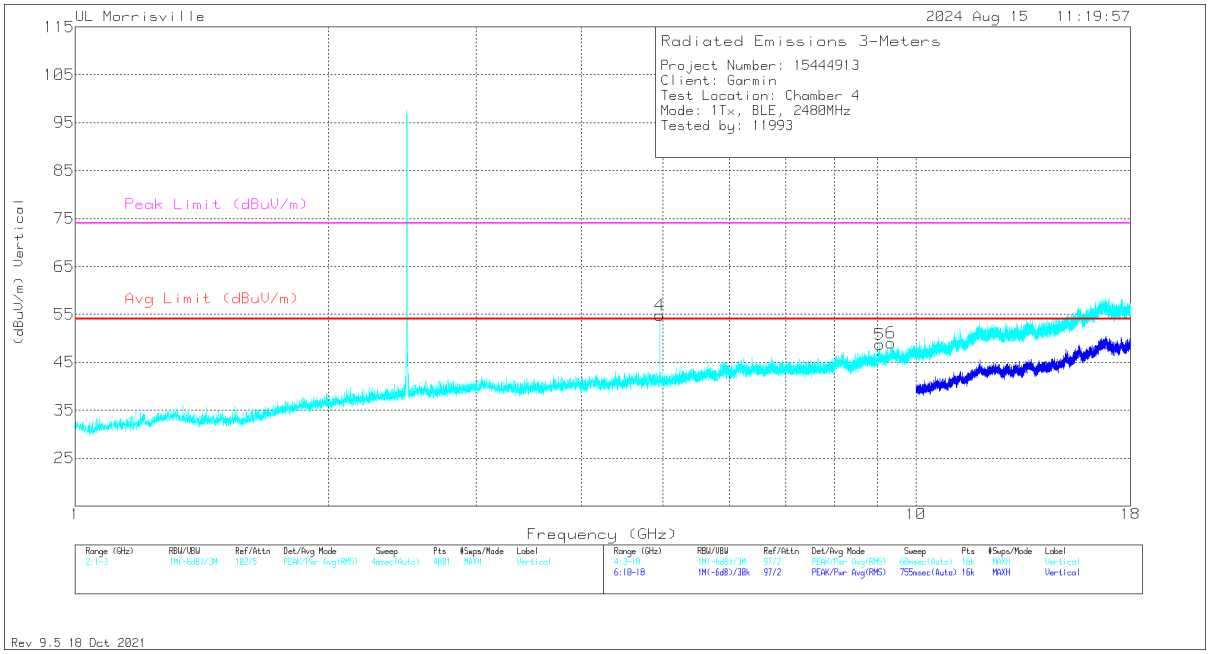
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.87934	50.16	PK2	34	-31	0	53.16	-	-	74	-20.84	277	100	H
	* ** 4.8798	42.25	ADV	34	-31	2.16	47.41	54	-6.59	-	-	277	100	H
2	* ** 8.28014	38.28	PK2	35.8	-26.4	0	47.68	-	-	74	-26.32	154	389	H
	* ** 8.28178	25.9	ADV	35.8	-26.4	2.16	37.46	54	-16.54	-	-	154	389	H
3	* ** 9.3909	38.96	PK2	36.6	-24.8	0	50.76	-	-	74	-23.24	96	343	H
	* ** 9.39086	25.05	ADV	36.6	-24.8	2.16	39.01	54	-14.99	-	-	96	343	H
4	* ** 4.88038	52.45	PK2	34	-31	0	55.45	-	-	74	-18.55	259	201	V
	* ** 4.87981	45.41	ADV	34	-31	2.16	50.57	54	-3.43	-	-	259	201	V
6	* ** 9.36564	36.83	PK2	36.5	-24.6	0	48.73	-	-	74	-25.27	122	141	V
	* ** 9.36834	24.63	ADV	36.5	-24.6	2.16	38.69	54	-15.31	-	-	122	141	V
5	* ** 7.45969	37.49	Pk	35.7	-27.6	0	45.59	54	-8.41	74	-28.41	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
ADV - Linear Voltage Average

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

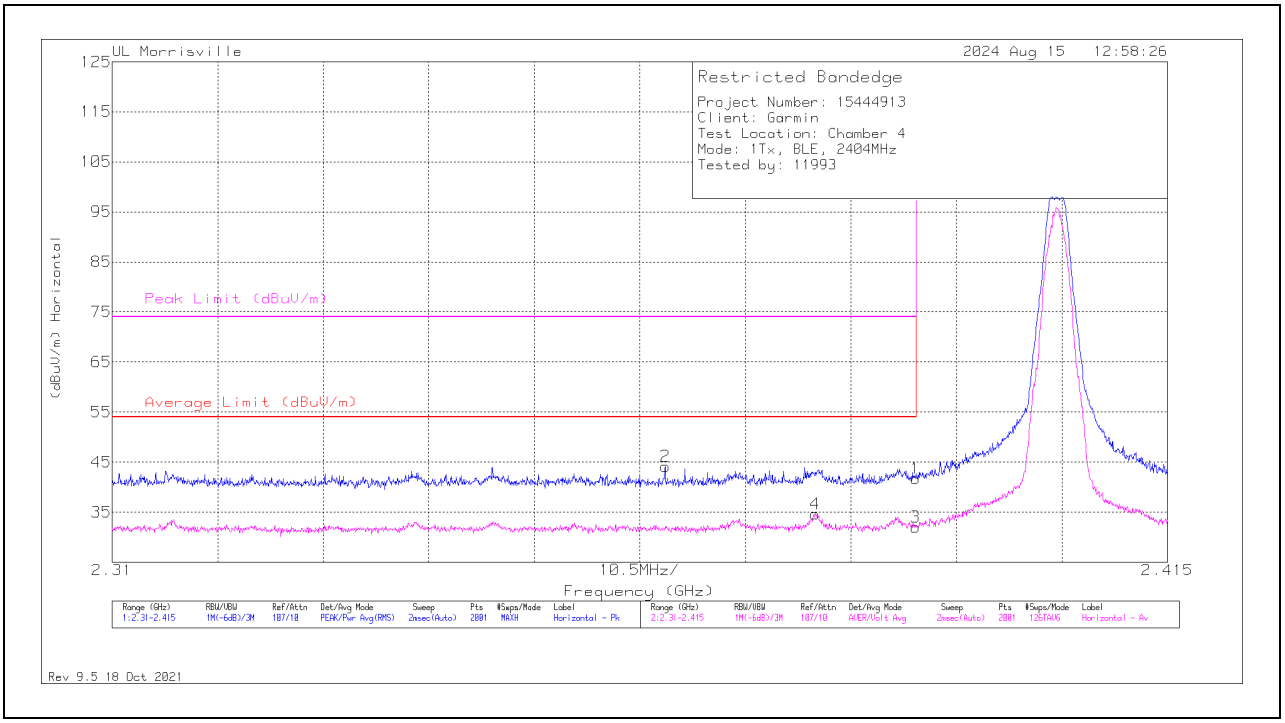
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* ** 4.95947	50.87	PK2	33.9	-30.8	0	53.97	-	-	74	-20.03	320	101	H
	* ** 4.9602	43.45	ADV	33.9	-30.8	2.16	48.71	54	-5.29	-	-	320	101	H
3	* ** 9.44846	37.31	PK2	36.7	-25.1	0	48.91	-	-	74	-25.09	281	193	H
	* ** 9.4483	25.04	ADV	36.7	-25.1	2.16	38.8	54	-15.2	-	-	281	193	H
4	* ** 4.96043	53.31	PK2	33.9	-30.8	0	56.41	-	-	74	-17.59	254	213	V
	* ** 4.95974	46.47	ADV	33.9	-30.8	2.16	51.73	54	-2.27	-	-	254	213	V
5	* ** 9.04865	37.14	PK2	36.2	-24	0	49.34	-	-	74	-24.66	191	397	V
	* ** 9.04792	24.03	ADV	36.2	-24	2.16	38.39	54	-15.61	-	-	191	397	V
6	* ** 9.34543	36.87	PK2	36.5	-24.3	0	49.07	-	-	74	-24.93	270	110	V
	* ** 9.34574	24.38	ADV	36.5	-24.3	2.16	38.74	54	-15.26	-	-	270	110	V
1	* ** 3.9525	41.73	Pk	33.4	-31.3	0	43.83	54	-10.17	74	-30.17	0-360	100	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

10.2.2. BLE (2Mbps)

BANDEDGE (LOW CHANNEL)

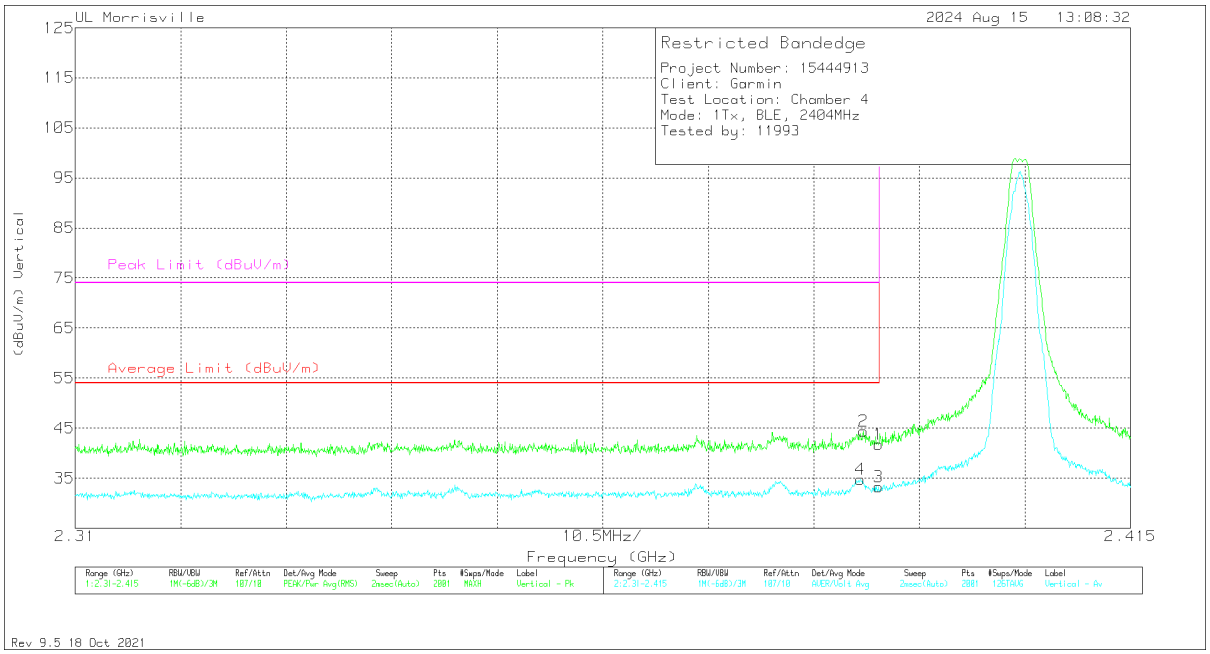
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.94	Pk	32	-23.2	0	41.74	-	-	74	-32.26	254	101	H
2	* ** 2.36502	35.37	Pk	31.9	-23.1	0	44.17	-	-	74	-29.83	254	101	H
3	* ** 2.38996	21.17	ADV	32	-23.2	2.07	32.04	54	-21.96	-	-	254	100	H
4	* ** 2.37993	23.56	ADV	32	-23	2.07	34.63	54	-19.37	-	-	254	100	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

VERTICAL RESULT

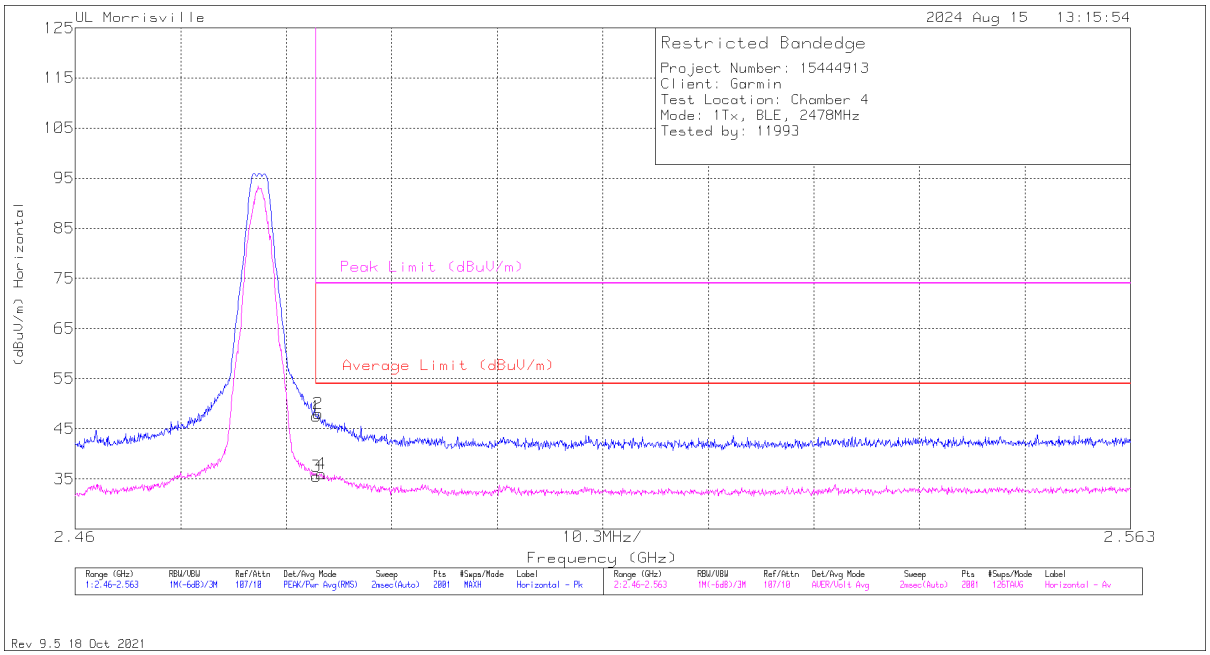


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.99	Pk	32	-23.2	0	41.79	-	-	74	-32.21	225	105	V
2	* ** 2.38844	35.55	Pk	32	-23.2	0	44.35	-	-	74	-29.65	225	105	V
3	* ** 2.38996	22.4	ADV	32	-23.2	2.07	33.27	54	-20.73	-	-	225	105	V
4	* ** 2.38812	23.85	ADV	32	-23.2	2.07	34.72	54	-19.28	-	-	225	105	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

BANDEDGE (HIGH CHANNEL)

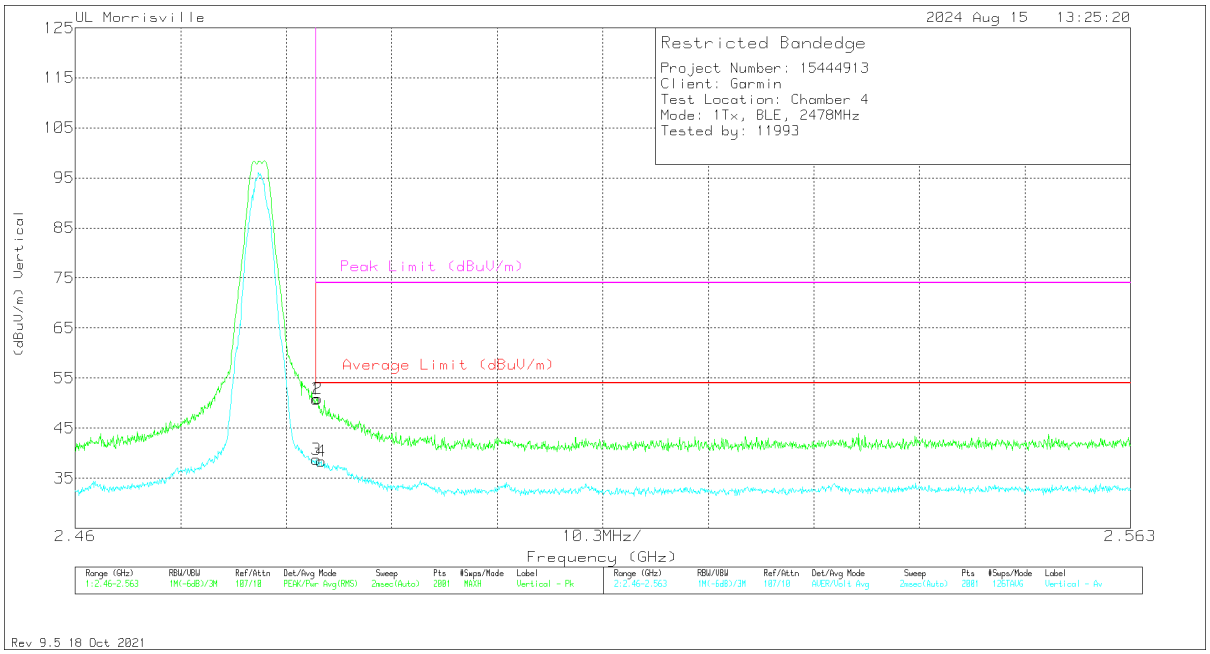
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	37.97	Pk	32.3	-22.8	0	47.47	-	-	74	-26.53	260	132	H
2	* ** 2.48374	38.5	Pk	32.3	-22.8	0	48	-	-	74	-26	260	132	H
3	* ** 2.48354	23.94	ADV	32.3	-22.8	2.07	35.51	54	-18.49	-	-	260	132	H
4	* ** 2.48405	24.43	ADV	32.3	-22.8	2.07	36	54	-18	-	-	260	132	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

VERTICAL RESULT



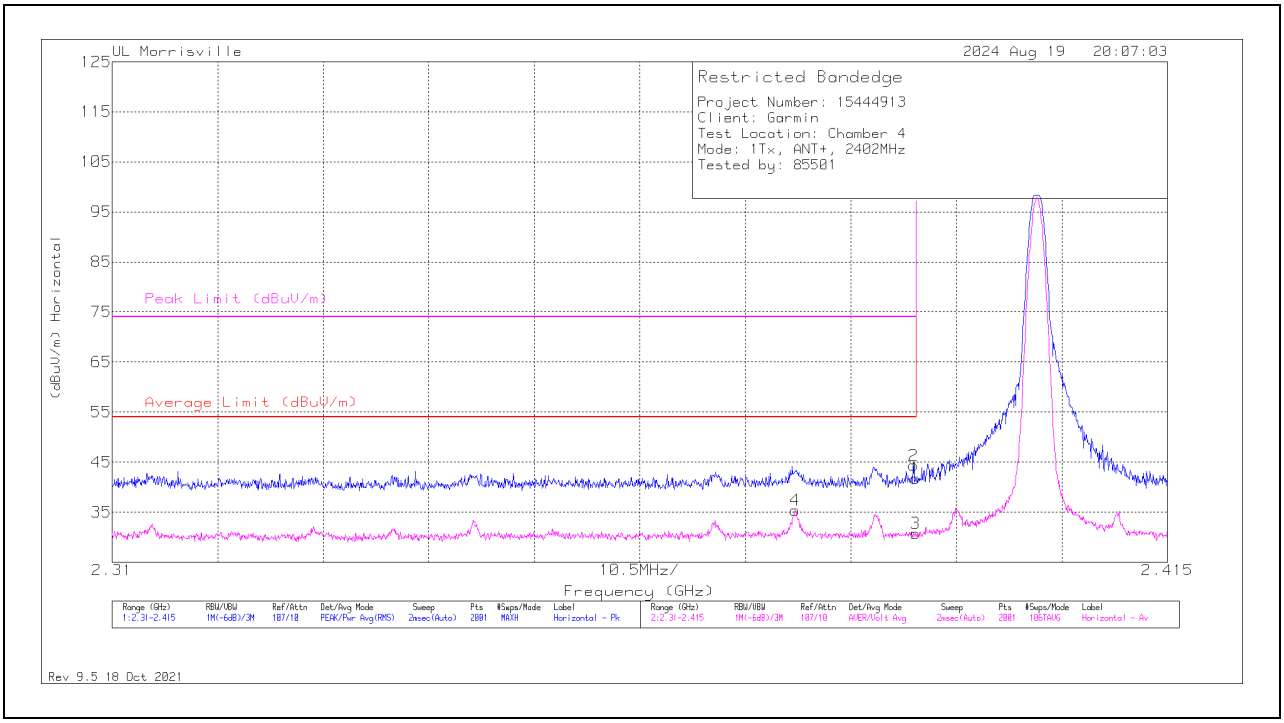
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	41.23	Pk	32.3	-22.8	0	50.73	-	-	74	-23.27	225	118	V
2	* ** 2.48364	41.37	Pk	32.3	-22.8	0	50.87	-	-	74	-23.13	225	118	V
3	* ** 2.48354	27.16	ADV	32.3	-22.8	2.07	38.73	54	-15.27	-	-	225	118	V
4	* ** 2.484	26.8	ADV	32.3	-22.8	2.07	38.37	54	-15.63	-	-	225	118	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

10.2.3. ANT/ANT+

BANDEDGE (LOW CHANNEL)

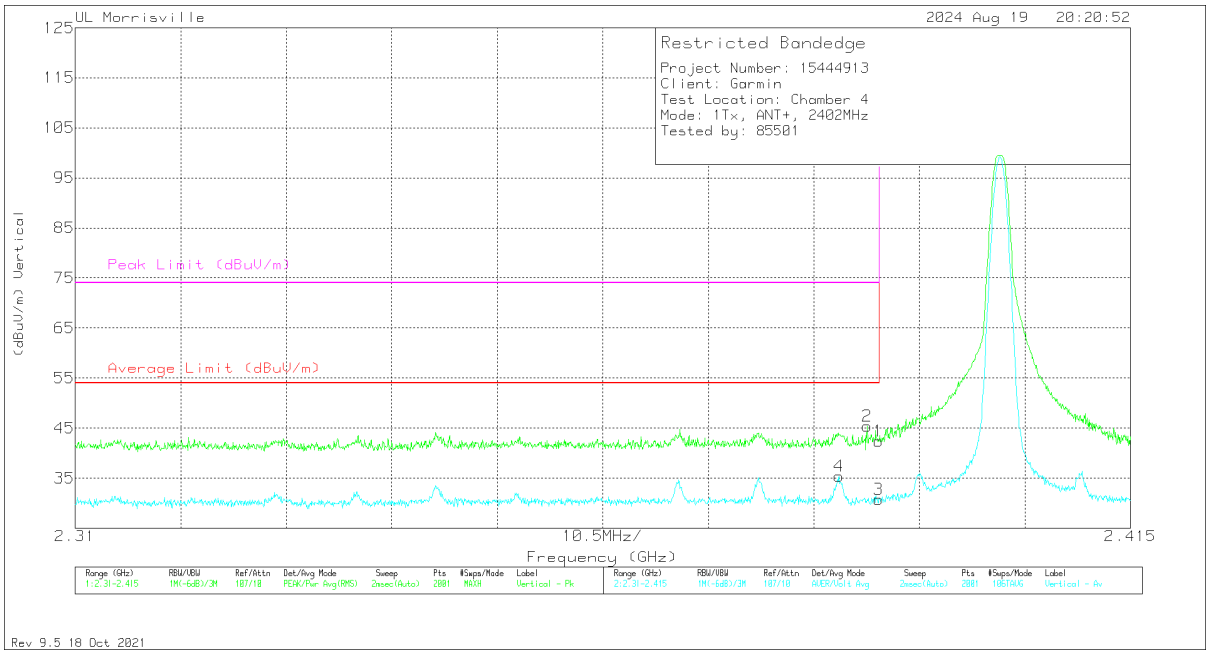
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.92	Pk	32	-23.2	0	41.72	-	-	74	-32.28	249	125	H
2	* ** 2.38975	35.53	Pk	32	-23.2	0	44.33	-	-	74	-29.67	249	125	H
3	* ** 2.38996	21.37	ADV	32	-23.2	.56	30.73	54	-23.27	-	-	249	125	H
4	* ** 2.37794	25.78	ADV	32	-23	.56	35.34	54	-18.66	-	-	249	125	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

VERTICAL RESULT

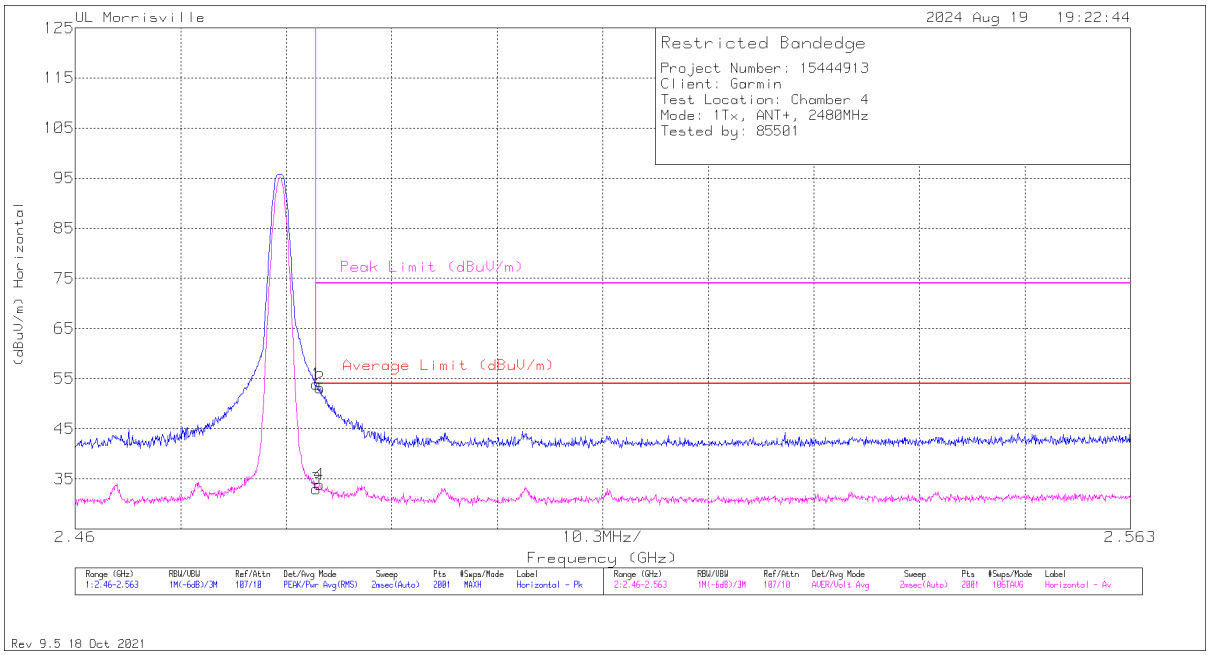


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	33.62	Pk	32	-23.2	0	42.42	-	-	74	-31.58	220	149	V
2	* ** 2.3888	36.6	Pk	32	-23.2	0	45.4	-	-	74	-28.6	220	149	V
3	* ** 2.38996	21.38	ADV	32	-23.2	.56	30.74	54	-23.26	-	-	220	149	V
4	* ** 2.38602	26.05	ADV	32	-23.2	.56	35.41	54	-18.59	-	-	220	149	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

BANDEDGE (HIGH CHANNEL)

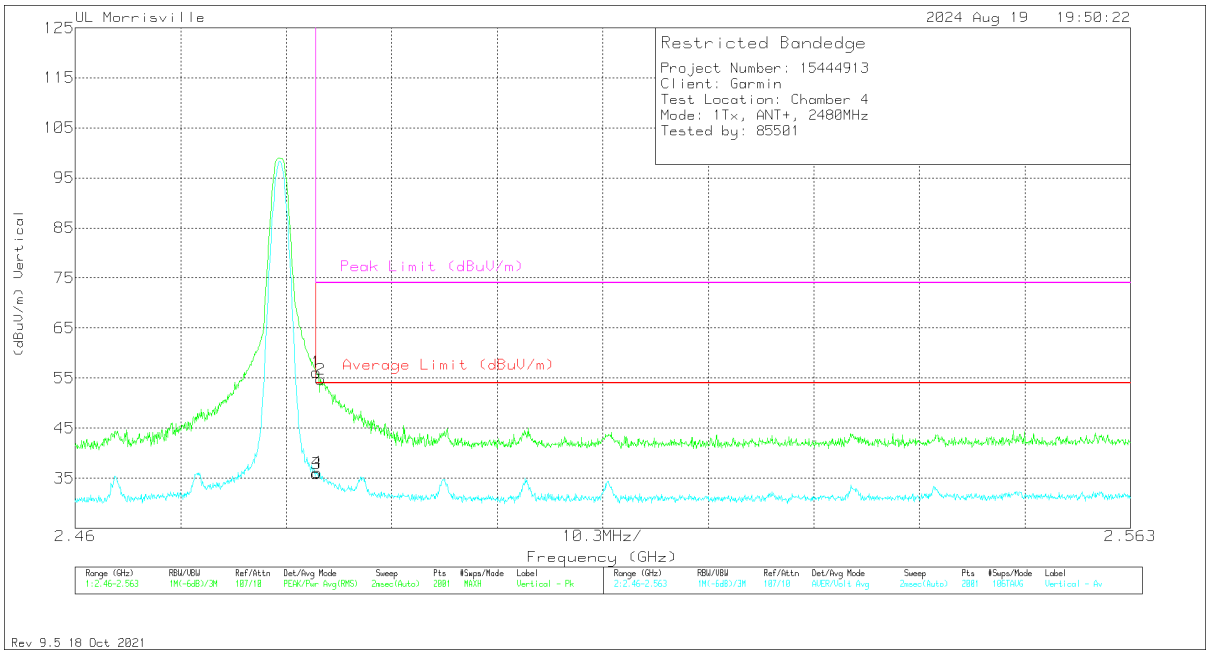
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	44.43	Pk	32.3	-22.8	0	53.93	-	-	74	-20.07	193	102	H
2	* ** 2.4839	43.65	Pk	32.3	-22.8	0	53.15	-	-	74	-20.85	193	102	H
3	* ** 2.48354	22.95	ADV	32.3	-22.8	.56	33.01	54	-20.99	-	-	193	102	H
4	* ** 2.48384	23.77	ADV	32.3	-22.8	.56	33.83	54	-20.17	-	-	193	102	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

VERTICAL RESULT



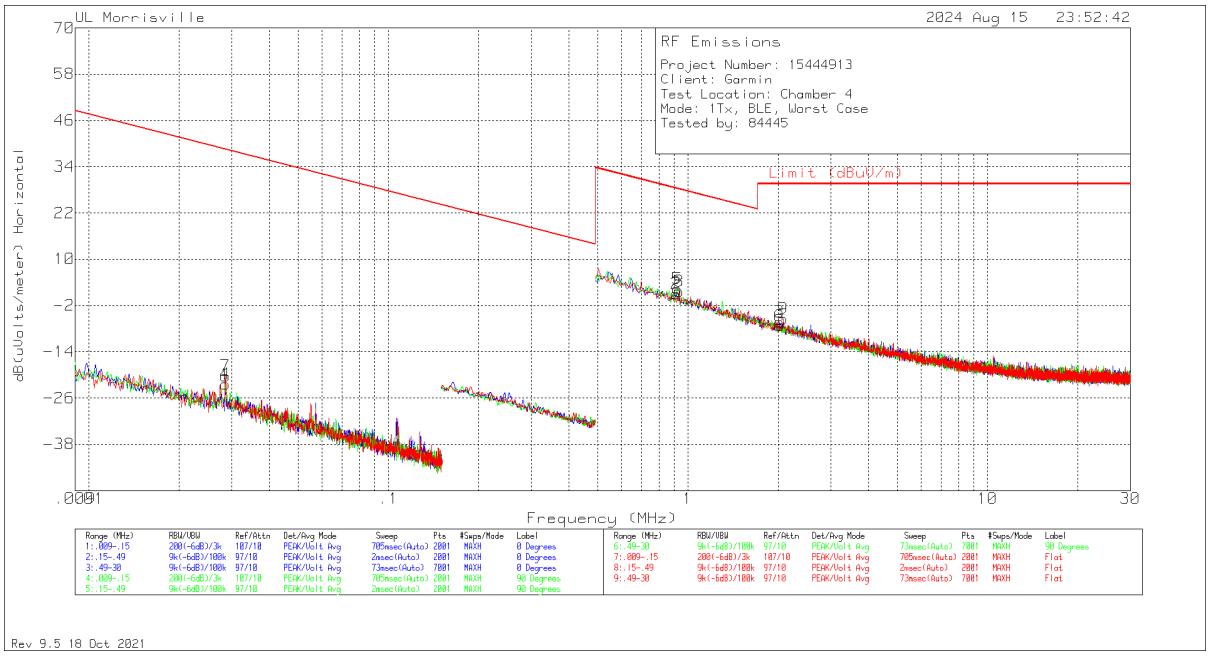
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	46.64	Pk	32.3	-22.8	0	56.14	-	-	74	-17.86	237	104	V
2	* ** 2.48395	45.23	Pk	32.3	-22.8	0	54.73	-	-	74	-19.27	237	104	V
3	* ** 2.48354	25.84	ADV	32.3	-22.8	.56	35.9	54	-18.1	-	-	237	104	V
4	* ** 2.48359	26.08	ADV	32.3	-22.8	.56	36.14	54	-17.86	-	-	237	104	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

10.3. WORST CASE BELOW 30MHZ (BLE)

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

Note: All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were 40*Log (test distance / specification distance).

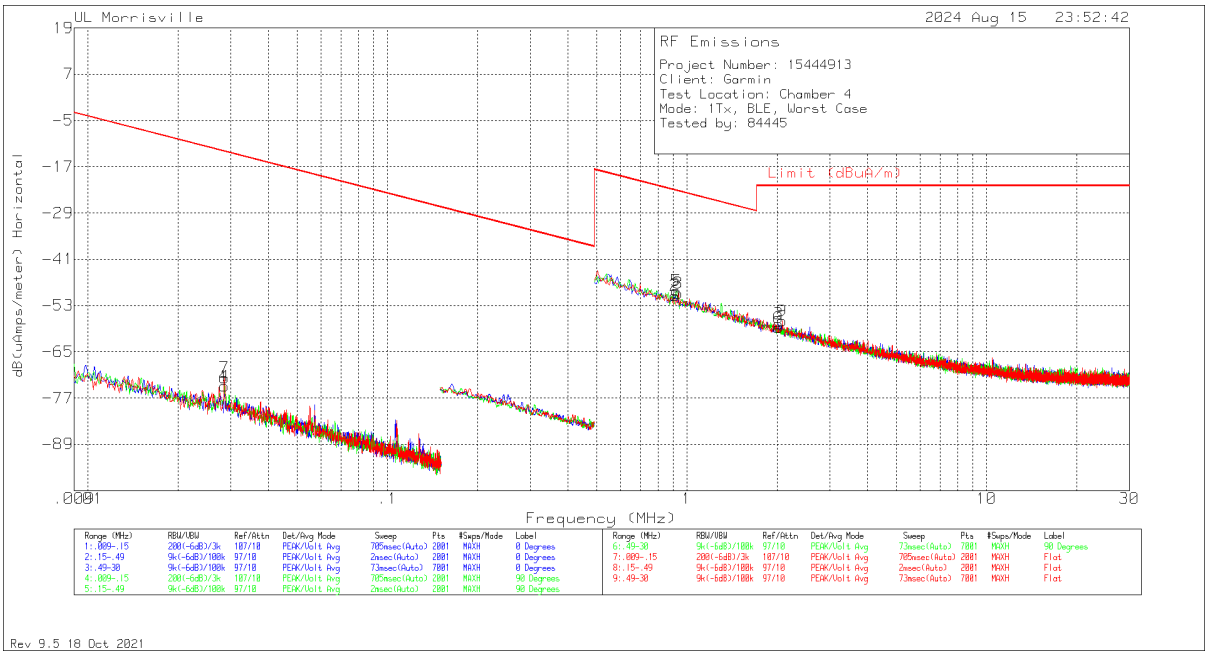


ANTENNA - THREE ORIENTATIONS – E FIELD

Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	QP/AV Limit (dBuV/m)	PK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	.02853	43.9	Pk	13.6	.1	-80	-22.4	38.5	58.5	-60.9	0-360	0 degs
4	.02853	43.85	Pk	13.6	.1	-80	-22.45	38.5	58.5	-60.95	0-360	90 degs
7	.02853	46.08	Pk	13.6	.1	-80	-20.22	38.5	58.5	-58.72	0-360	Flat
2	.9116	29.59	Pk	11.2	.2	-40	.99	28.41	-	-27.42	0-360	0 degs
5	.92003	30.95	Pk	11.2	.2	-40	2.35	28.33	-	-25.98	0-360	90 degs
8	.93268	30.28	Pk	11.2	.2	-40	1.68	28.21	-	-26.53	0-360	Flat
6	2.02041	21.12	Pk	11.4	.2	-40	-7.28	29.54	-	-36.82	0-360	90 degs
3	2.02462	22.16	Pk	11.4	.2	-40	-6.24	29.54	-	-35.78	0-360	0 degs
9	2.08365	22.87	Pk	11.4	.2	-40	-5.53	29.54	-	-35.07	0-360	Flat

Pk - Peak detector



ANTENNA - THREE ORIENTATIONS – H FIELD

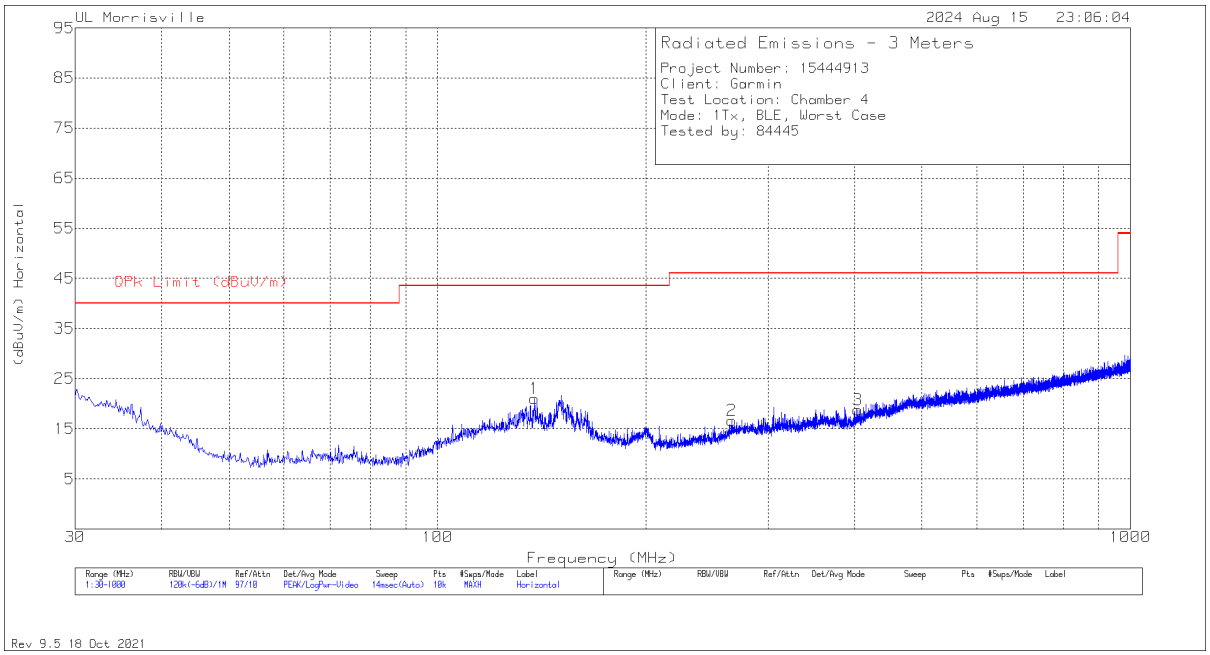
Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	.02853	43.9	Pk	-37.9	.1	-80	-73.9	-13	7	-60.9	0-360	0 degs
4	.02853	43.85	Pk	-37.9	.1	-80	-73.95	-13	7	-60.95	0-360	90 degs
7	.02853	46.08	Pk	-37.9	.1	-80	-71.72	-13	7	-58.72	0-360	Flat
2	.9116	29.59	Pk	-40.3	.2	-40	-50.51	-23.09	-	-27.42	0-360	0 degs
5	.92003	30.95	Pk	-40.3	.2	-40	-49.15	-23.17	-	-25.98	0-360	90 degs
8	.93268	30.28	Pk	-40.3	.2	-40	-49.82	-23.29	-	-26.53	0-360	Flat
6	2.02041	21.12	Pk	-40.1	.2	-40	-58.78	-21.96	-	-36.82	0-360	90 degs
3	2.02462	22.16	Pk	-40.1	.2	-40	-57.74	-21.96	-	-35.78	0-360	0 degs
9	2.08365	22.87	Pk	-40.1	.2	-40	-57.03	-21.96	-	-35.07	0-360	Flat

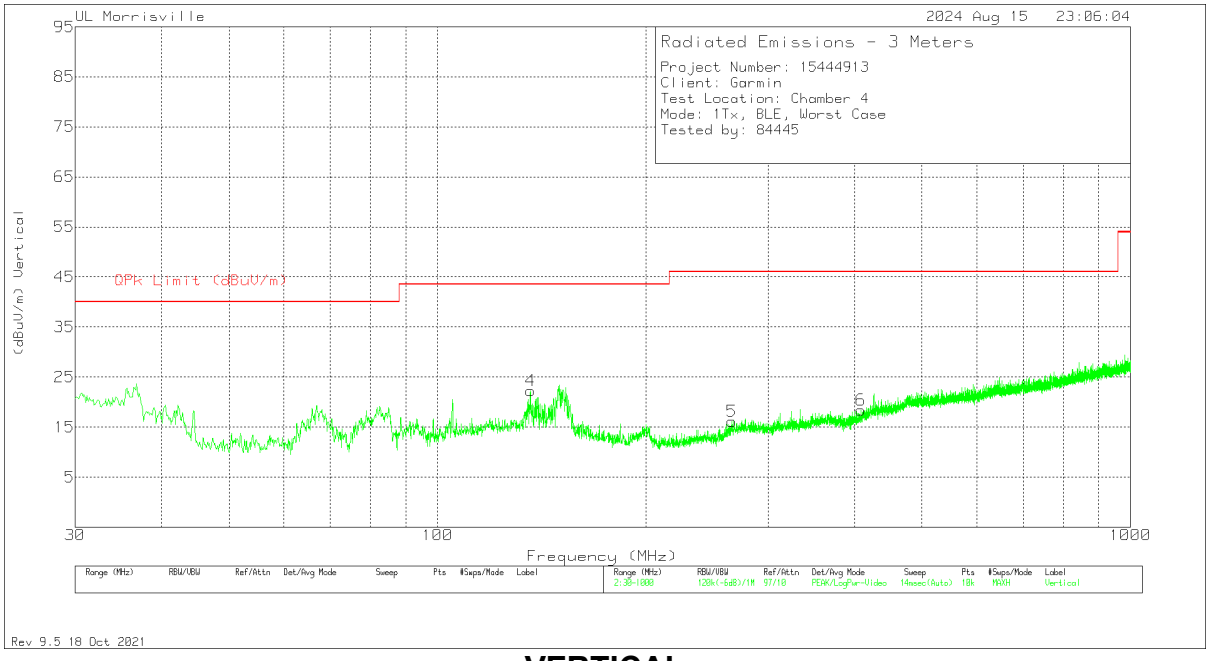
Pk - Peak detector

10.4. WORST CASE BELOW 1 GHZ (BLE)

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



HORIZONTAL



VERTICAL

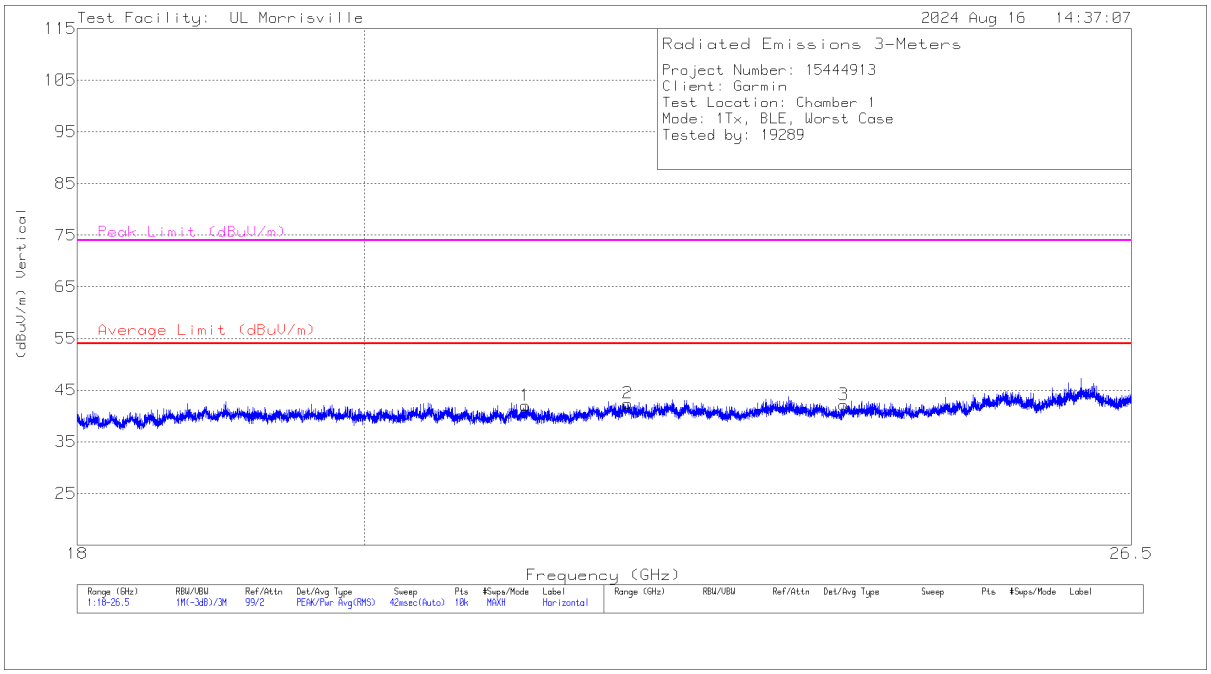
Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90628 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 137.864	32.76	Pk	19.4	-31.1	21.06	43.52	-22.46	0-360	100	H
2	* ** 265.807	28	Pk	19	-30.3	16.7	46.02	-29.32	0-360	100	H
3	* ** 403.935	26.84	Pk	21.8	-29.9	18.74	46.02	-27.28	0-360	100	H
4	* ** 136.215	33.92	Pk	19.6	-31.2	22.32	43.52	-21.2	0-360	100	V
5	* ** 265.807	27.46	Pk	19	-30.3	16.16	46.02	-29.86	0-360	100	V
6	* ** 408.3	26.35	Pk	21.9	-29.8	18.45	46.02	-27.57	0-360	100	V

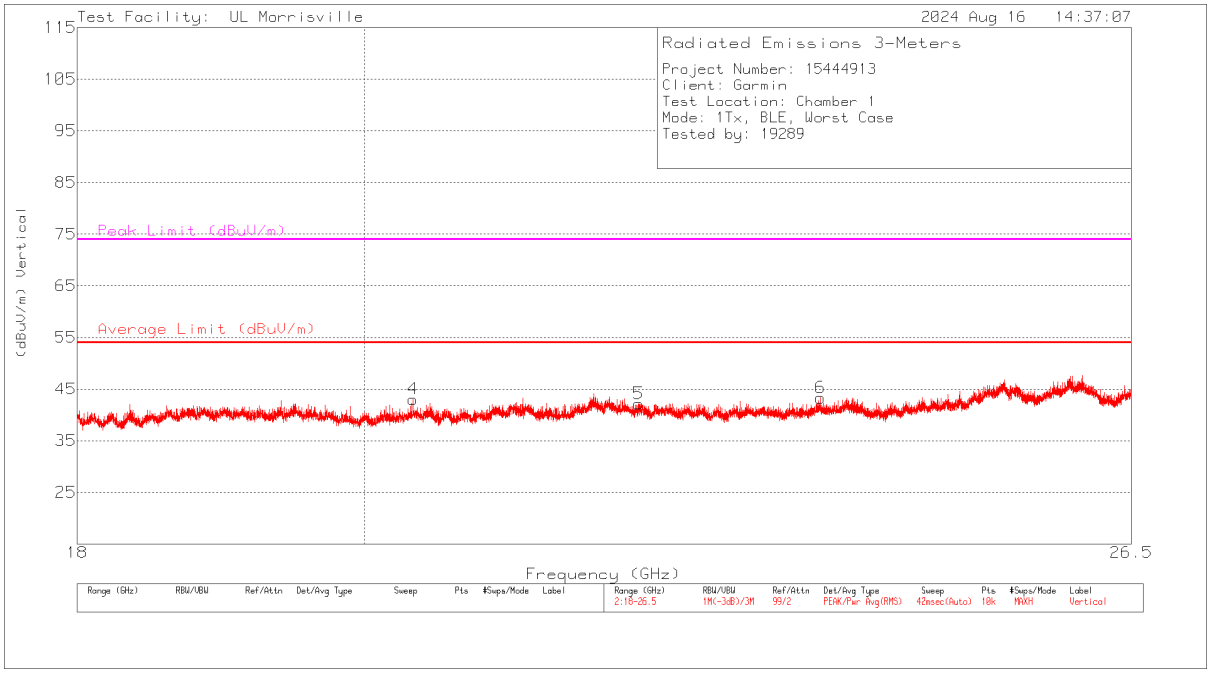
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

10.5. WORST CASE 18-26 GHZ (BLE)

SPURIOUS EMISSIONS 18-26 GHz (WORST-CASE CONFIGURATION)



HORIZONTAL



VERTICAL

18 – 26GHz Data

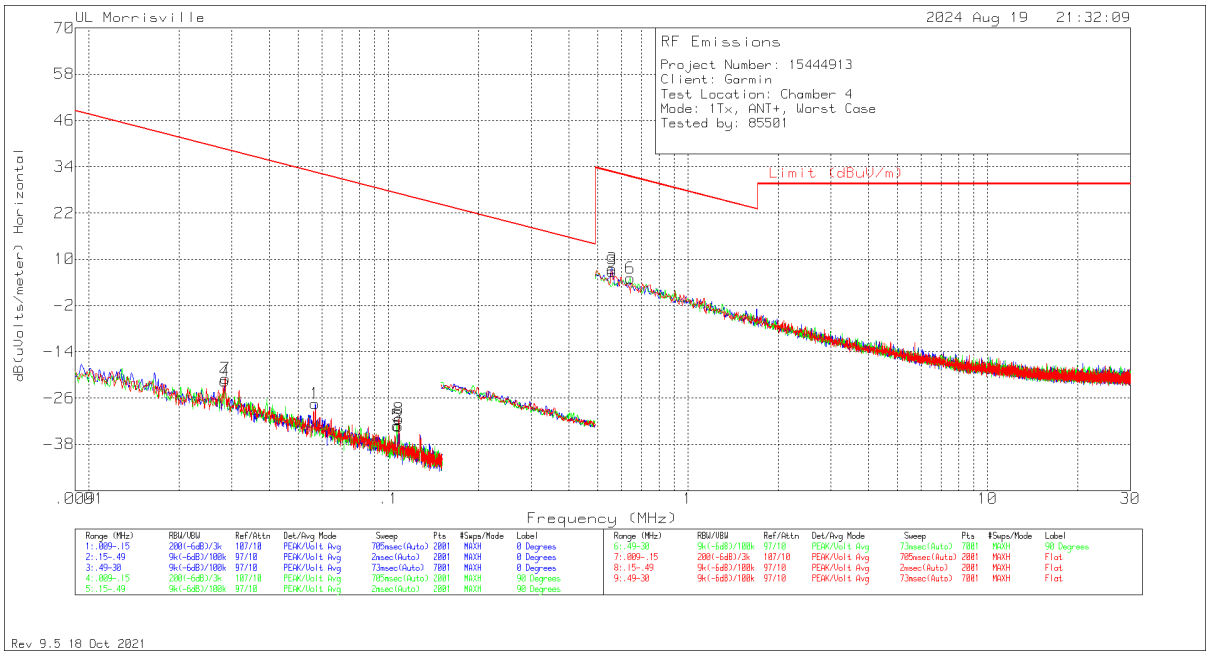
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	204704 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 21.21693	48.4	Pk	33.6	-40	0	42	54	-12	74	-32	0-360	249	H
2	* ** 22.02775	48.45	Pk	34.2	-40.2	0	42.45	54	-11.55	74	-31.55	0-360	200	H
3	* ** 23.84487	47.69	Pk	34.4	-39.9	0	42.19	54	-11.81	74	-31.81	0-360	249	H
4	* ** 20.36106	49.55	Pk	33.6	-40.1	0	43.05	54	-10.95	74	-30.95	0-360	200	V
5	* ** 22.11784	48.05	Pk	34.3	-40.2	0	42.15	54	-11.85	74	-31.85	0-360	300	V
6	* ** 23.64174	48.62	Pk	34.6	-39.9	0	43.32	54	-10.68	74	-30.68	0-360	250	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

10.6. WORST CASE BELOW 30MHZ (ANT/ANT+)

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

Note: All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were 40*Log (test distance / specification distance).

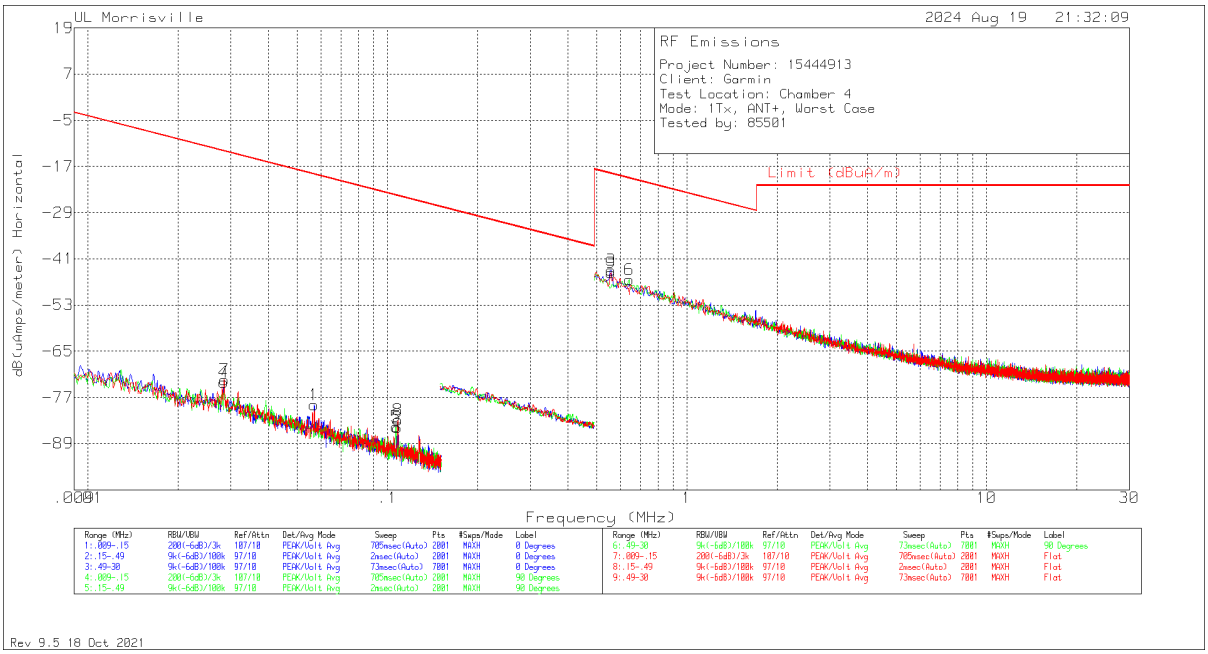


ANTENNA - THREE ORIENTATIONS – E FIELD

Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	QP/AV Limit (dBuV/m)	PK Limit (dBuV/m)	Margin (dB)	Loop Angle
4	.02845	44.75	Pk	13.6	.1	-80	-21.55	38.52	58.52	-60.07	90 degs
7	.02853	45.4	Pk	13.6	.1	-80	-20.9	38.5	58.5	-59.4	Flat
1	.057	40.86	Pk	11.6	.1	-80	-27.44	32.49	52.49	-59.93	0 degs
5	.1067	35.74	Pk	11.1	.1	-80	-33.06	27.04	-	-60.1	90 degs
2	.10776	35.43	Pk	11.1	.1	-80	-33.37	26.96	-	-60.33	0 degs
8	.10861	37.47	Pk	11.1	.1	-80	-31.33	26.89	-	-58.22	Flat
3	.55746	36.35	Pk	11.1	.1	-40	7.55	32.68	-	-25.13	0 degs
9	.55746	35.63	Pk	11.1	.1	-40	6.83	32.68	-	-25.85	Flat
6	.64178	33.83	Pk	11.2	.1	-40	5.13	31.46	-	-26.33	90 degs

Pk - Peak detector



ANTENNA - THREE ORIENTATIONS – H FIELD

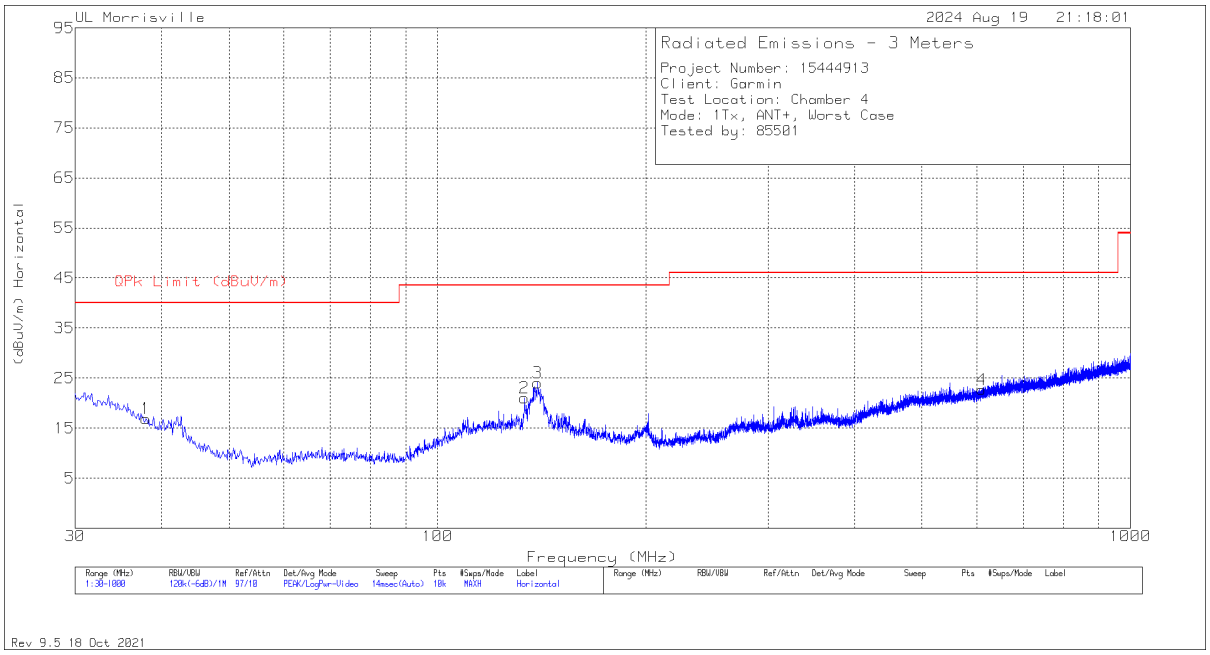
Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
4	.02845	44.75	Pk	-37.9	.1	-80	-73.05	-12.98	7.02	-60.07	0-360	90 degs
7	.02853	45.4	Pk	-37.9	.1	-80	-72.4	-13	7	-59.4	0-360	Flat
1	.057	40.86	Pk	-39.9	.1	-80	-78.94	-19.01	.99	-59.93	0-360	0 degs
5	.1067	35.74	Pk	-40.4	.1	-80	-84.56	-24.46	-	-60.1	0-360	90 degs
2	.10776	35.43	Pk	-40.4	.1	-80	-84.87	-24.54	-	-60.33	0-360	0 degs
8	.10861	37.47	Pk	-40.4	.1	-80	-82.83	-24.61	-	-58.22	0-360	Flat
3	.55746	36.35	Pk	-40.4	.1	-40	-43.95	-18.82	-	-25.13	0-360	0 degs
9	.55746	35.63	Pk	-40.4	.1	-40	-44.67	-18.82	-	-25.85	0-360	Flat
6	.64178	33.83	Pk	-40.3	.1	-40	-46.37	-20.04	-	-26.33	0-360	90 degs

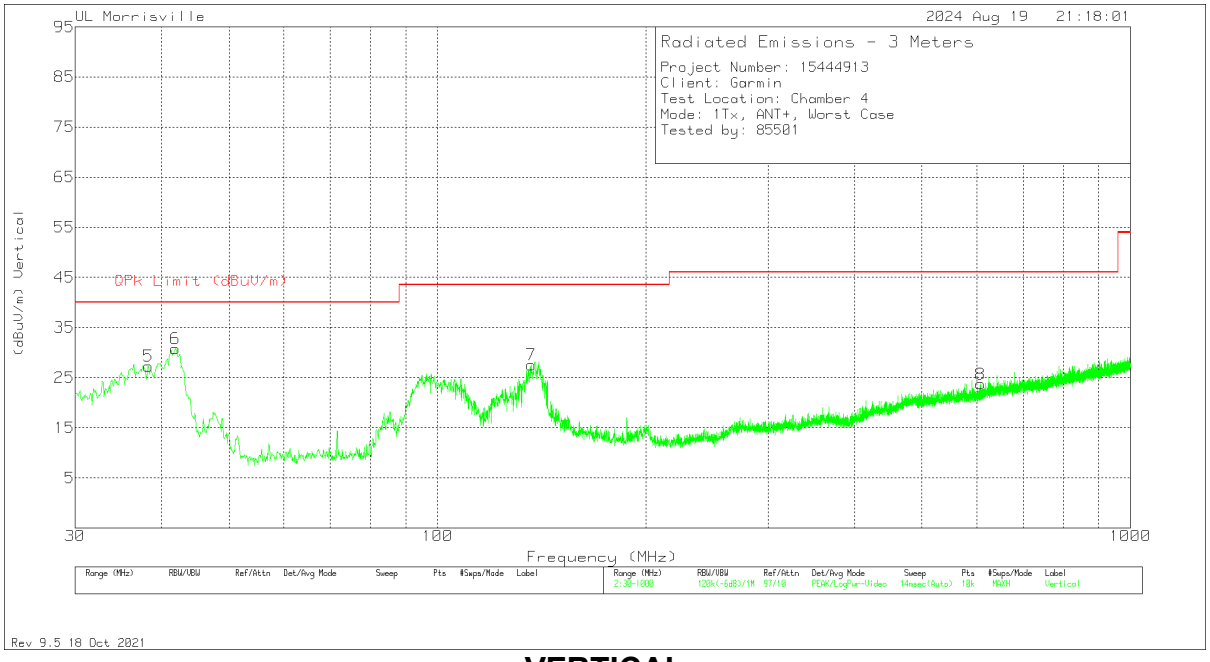
Pk - Peak detector

10.7. WORST CASE BELOW 1 GHZ (ANT/ANT+)

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



HORIZONTAL



VERTICAL

Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90628 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 37.954	27.47	Pk	21.5	-32.1	16.87	40	-23.13	0-360	200	H
2	* ** 133.499	32.42	Pk	19.8	-31.2	21.02	43.52	-22.5	0-360	100	H
4	* ** 609.769	26.91	Pk	25	-29.2	22.71	46.02	-23.31	0-360	100	H
5	* ** 38.245	38.08	Pk	21.3	-32.1	27.28	40	-12.72	0-360	100	V
7	* ** 136.603	39.26	Pk	19.5	-31.2	27.56	43.52	-15.96	0-360	100	V
8	* ** 608.023	27.92	Pk	24.9	-29.1	23.72	46.02	-22.3	0-360	100	V
6	41.834	43.99	Pk	18.7	-31.9	30.79	40	-9.21	0-360	100	V
3	139.416	35.82	Pk	19.3	-31.1	24.02	43.52	-19.5	0-360	100	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

11. SETUP PHOTOS

Please refer to R15444913-EP1 for setup photos

END OF TEST REPORT