

TEST REPORT

Report Number: R14866507-E3

Applicant : WEG Drives and Controls
Av. Prefeito Waldemar Grubba
3000, Vila Lalau
Jaragua Do Sul, SC 89256-900, Brazil

Model : WEGscan 100 / WEGscan 101

FCC ID : 2BDMZ-WEGSCAN100

FCC ID : 2BDMZ-WEGSCAN101

IC : 31830-WEGSCAN100

IC : 31830-WEGSCAN101

EUT Description : Conditioning monitoring IoT sensor

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

Date Of Issue:
2024-03-26

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2024-01-17	Initial Issue	Charles Moody
V2	2024-03-12	Revised Bandedge Plots to Compare Peak Readings to Average Limits	Charles Moody
V3	2024-03-26	Revised Bandedge Plot	Charles Moody

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: WEG Drives and Controls
Av. Prefeito Waldemar Grubba
3000, Vila Lalau
Jaragua Do Sul, SC 89256-900, Brazil

EUT DESCRIPTION: Condition monitoring IoT sensor

MODEL: WEGscan 100 / WEGscan 101

SERIAL NUMBER: 1069530530, 1069530548, 1069530600

SAMPLE RECEIPT DATE: 2023-01-18 TO 2023-11-02

DATE TESTED: 2023-10-30 TO 2023-12-01

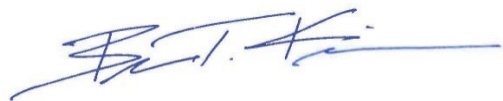
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C: 2023	Refer to Section 2
ISED RSS-247 Issue 3: 2023	Refer to Section 2
ISED RSS-GEN Issue 5 + A2: 2021	Refer to Section 2

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 Services Inc. By:



Brian Kiewra
Project Engineer
Consumer, Medical and IT Segment
UL LLC

Prepared By:



Charles Moody
Engineer
Consumer, Medical and IT Segment
UL LLC

2. TEST RESULTS SUMMARY

This report contains data provided by the applicant 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) Model Differences (see section 6.2)
- 2) Antenna gain and type (see section 6.4)

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	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW	Complies	None.
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power		
See Comment		Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	RSS-247 5.2 (b)	PSD	Complies	None.
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions		
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions		
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions		

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 C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A2, 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)
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
 $36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

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6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a condition monitoring IoT sensor which contains a BLE radio. This report covers the full emissions testing of the BLE Radio.

6.2. MODEL DIFFERENCES

The PCB layout, components and all antennas of the following frequency bands are identical between WEGscan 100 and WEGscan 101. The client has declared the only model differences is the energy source where the WEGscan 100 is battery powered and the WEGscan 101 is powered through a DC power supply. Therefore, the Antenna Port conducted test data of this report on the WEGscan101 may also represent WEGscan100. Full Radiated testing was performed on both models.

6.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE - 1Mbps	4.22	2.64
2402 - 2480	BLE - 2Mbps	4.23	2.65
2402 - 2480	BLE - 125kbps	4.29	2.69
2402 - 2480	BLE - 500kbps	4.26	2.67

6.4. DESCRIPTION OF AVAILABLE ANTENNAS

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

The radio utilizes a PCB antenna, with a maximum gain of -0.79 dBi.

6.5. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was DTM 17.0.2.

The test utility software used during testing was Nordic Direct Test Mode v2.1.0.

6.6. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz and above 18GHz, were performed with the EUT set to transmit at the channel and data rate with highest average output power as worst-case scenario.

AC Mains emissions was completed on the WEGscan 101 model. The WEGscan 100 is exempt from AC Mains testing as the unit is battery powered.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low and high channels, with mid channel added for radiated emissions. Bandedge and radiated emissions between 1 and 18GHz was performed on 125kbps as a worst case average power and power spectral density mode. Additionally 2Mbps was tested for Bandedge as it is the largest bandwidth data rate.

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

Conducted testing was only performed on the WEGscan 101 model; however, it is representative of the WEGscan 100 as the two models are electrically identical. The only difference between the two models is explained in section 6.2

6.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	Yoga 7 16IAP7	PF49WDF9	N/A
Laptop	DELL	G3 3579	4TWZFBV2	N/A
DC Power Supply	Circuit Specialists	CSI3005X5	-	-

I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Bare wire	1	M8	Shielded	<3m	Connects from power supply (bare wire) to PCB (M8 connector)
2	4-pin	1	4-pin	Shielded	<3m	Connects from 4 pin on base of EUT to 4 pin on USB dongle to computer. Not subject to test.

TEST SETUP

The EUT is configured as a standalone device for testing. The WEGscan100 used it's internal battery for testing, whereas the WEGscan101 used a DC Power Supply for testing.

SETUP DIAGRAMS

Please refer to R14866507-EP1 for setup diagrams

7. MEASUREMENT METHOD

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

6 dB BW: ANSI C63.10 Subclause -11.8.1

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Output Power: ANSI C63.10 Subclause -11.9.2.3.1 Method PKPM1 Peak-reading power meter
ANSI C63.10 Subclause -11.9.2.3.2 Method AVGPM-G (Measurement using a
gated RF average-reading power meter)

PSD: ANSI C63.10 Subclause -11.10.2 Method PKPSD (peak PSD)

Emissions non-restricted frequency bands: ANSI C63.10 Subclause -11.11 and 6.10.4

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

General Radiated Spurious Emissions: ANSI C63.10-2013 Section 6.3 to 6.6

8. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Common Equipment				
	Conducted Room 1				
90410	Spectrum Analyzer	Keysight Technologies	N9030A	2023-06-14	2024-06-14
90778	RF Power Meter	Keysight Technologies	N1911A	2023-10-06	2024-10-31
135124	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2023-07-12	2024-07-31
211056	Real-Time Peak Power Sensor 50MHz to 8GHz	Boonton	RTP5000	2023-08-01	2024-08-01
76023	Temp/Humid Chamber	Cincinnati Sub-Zero	ZPH-8-3.5-SCT/AC	2023-01-20	2024-01-20
238710	Environmental Meter	Fisher Scientific	15-077-963	2023-06-27	2024-06-27
220155	DC Regulated Power Supply	Circuit Specialists, Inc.	CSI3005X5	NA	NA
SOFTEMI	Antenna Port Software	UL	Version 2022.8.16	NA	NA
Power Software	Boonton Measurement Buffer Mode Application	Boonton	NA	NA	NA
CBL030	SMA Male to SMA Male Cable Using PE-P141 Coax - 12"	Pasternack	Sucoflex 104PEA	2023-06-27	2024-06-27

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2023-04-04	2024-04-04
179892	Environmental Meter	Fisher Scientific	15-077-963	2023-07-26	2024-06-31
72095	LISN, 50-ohm/50-uH, 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50-25-2-01-550V	2023-08-01	2024-08-01
75141	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2023-08-01	2024-08-01
52859	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2023-04-04	2024-04-04
PS215	AC Power Source	Elgar	CW2501M	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Miscellaneous (if needed)				
35879	DC-18GHz 10dB Pad	Mini Circuits Labs	BW-N10W5+	2023-09-18	2024-09-18

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 2)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
135144	Active Loop Antenna	ETS-Lindgren	6502	2023-01-17	2024-01-17
	30-1000 MHz				
85717	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB1	2023-03-013	2024-03-13
	1-18 GHz				
86408	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2023-06-19	2025-06-19
	18-40 GHz				
204704	Horn Antenna, 18-26.5GHz	Com-Power	AH-826	2023-07-20	2025-07-20
	Gain-Loss Chains				
91975	Gain-loss string: 0.009-30MHz	Various	Various	2023-06-06	2024-06-06
91978	Gain-loss string: 25-1000MHz	Various	Various	2023-06-06	2024-06-06
91977	Gain-loss string: 1-18GHz	Various	Various	2023-06-06	2024-06-06
136042	Gain-loss string: 18-40GHz	Various	Various	2023-06-06	2024-06-06
	Receiver & Software				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-02-02	2024-02-02
90416	Spectrum Analyzer	Keysight	N9030A	2023-06-09	2024-06-30
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
200540	Environmental Meter	Fisher Scientific	15-077-963 s/n 181474409	2023-07-19	2025-07-19

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 WEGscan100 - 125kbps	3.100	3.745	0.828	82.78	1.64	0.323
BLE WEGscan101 - 125kbps	1.500	3.748	0.400	40.02	7.95	0.667
BLE - WEGscan100 - 2Mbps	0.102	0.626	0.163	16.31	15.75	9.804
BLE - WEGscan101 - 2Mbps	0.204	0.625	0.326	32.60	9.74	4.908

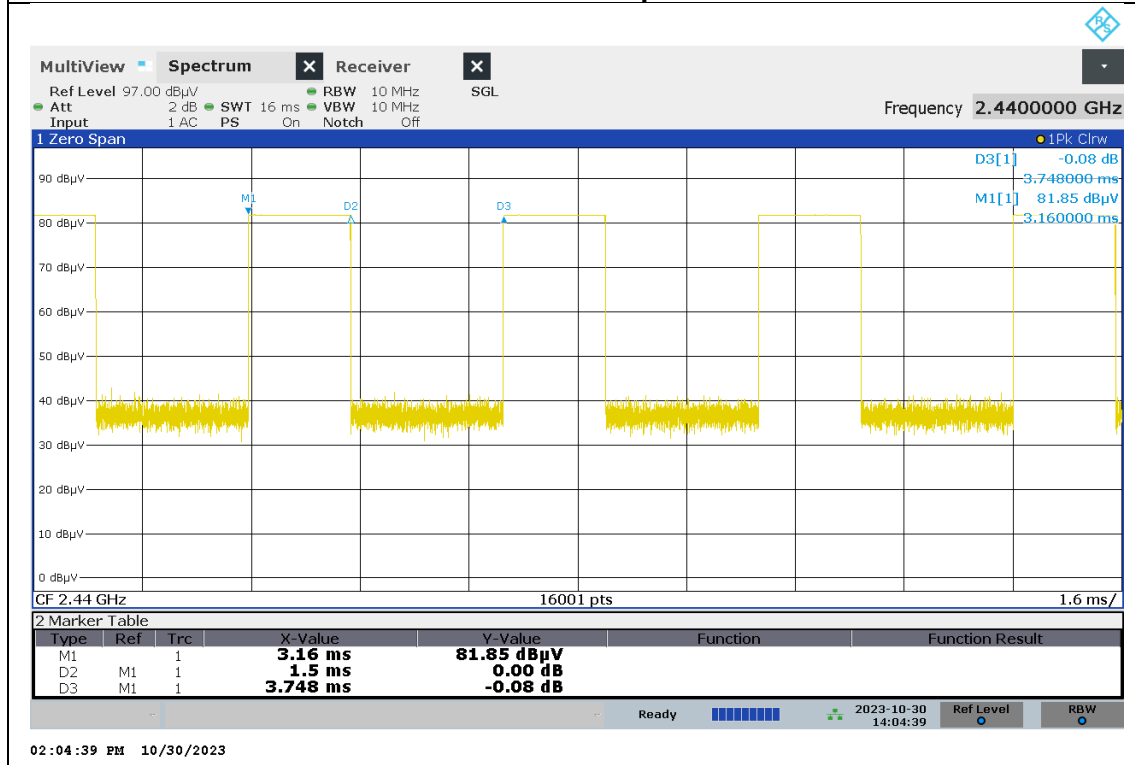
*Note: All Duty Cycle testing was performed in Chamber 2 by 85501/11993.

DUTY CYCLE PLOTS



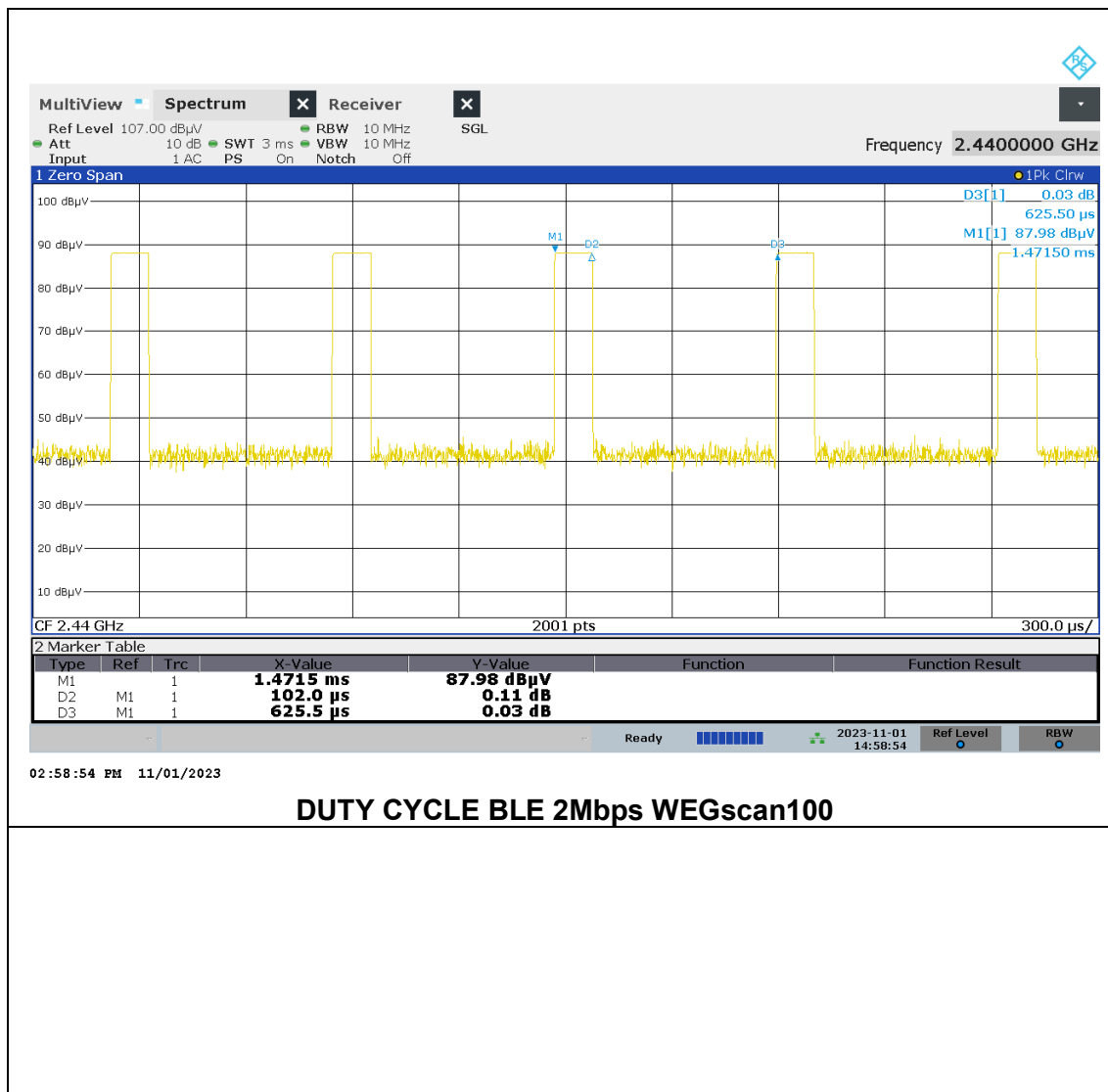
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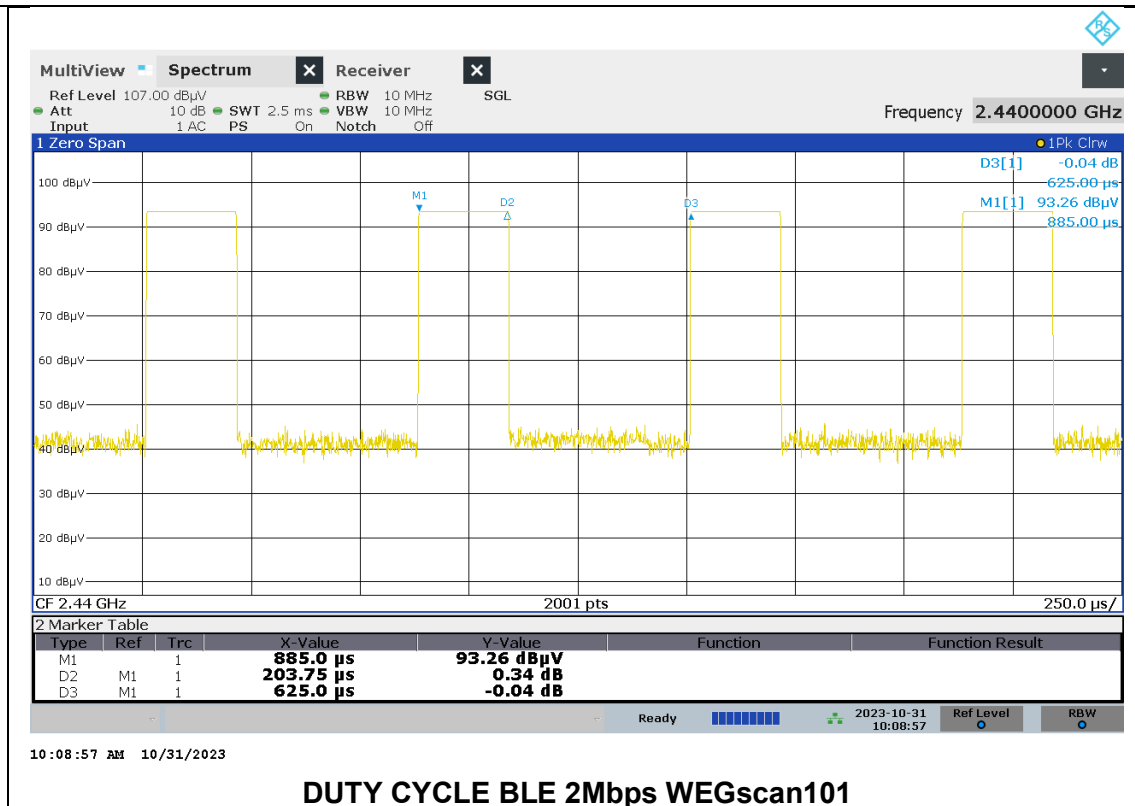
DUTY CYCLE BLE 125 kbps WEGscan100



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DUTY CYCLE BLE 125 kbps WEGscan101





9.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

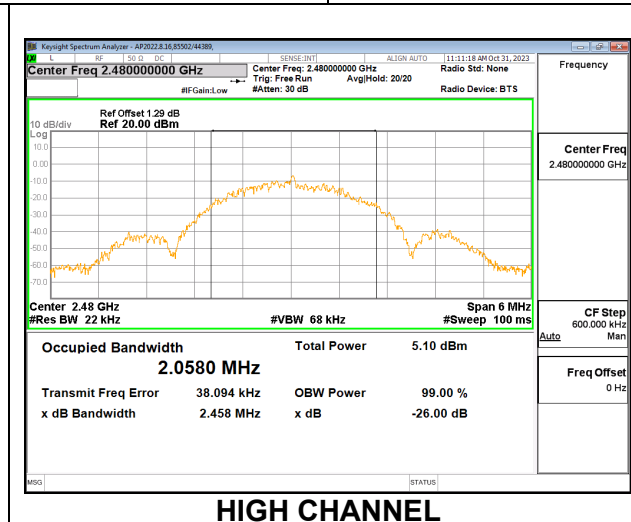
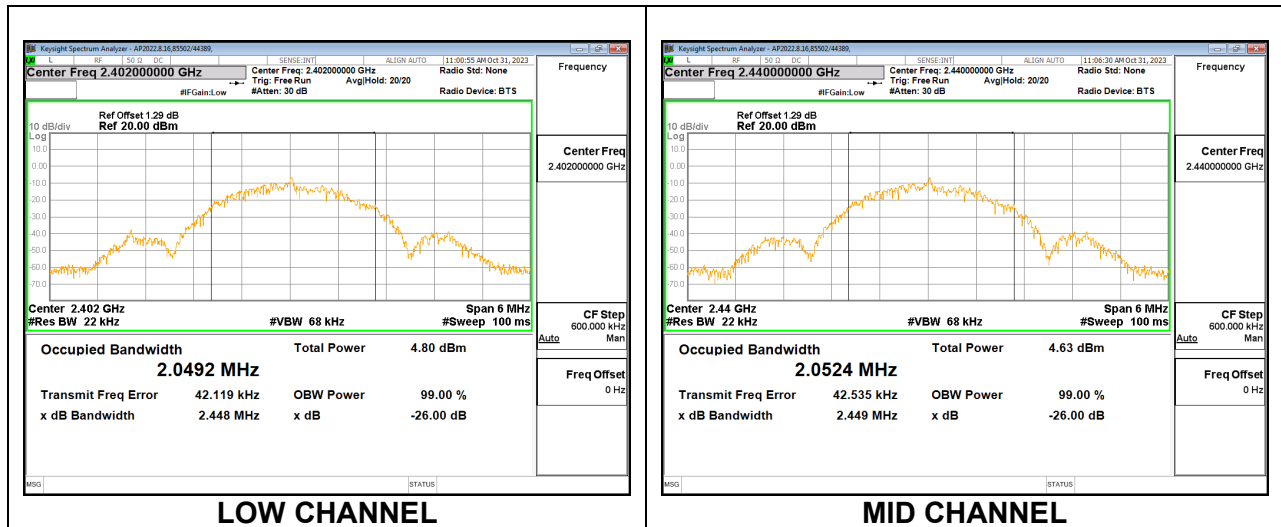
9.2.1. BLE (1Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0481
Middle	2440	1.0506
High	2480	1.0490



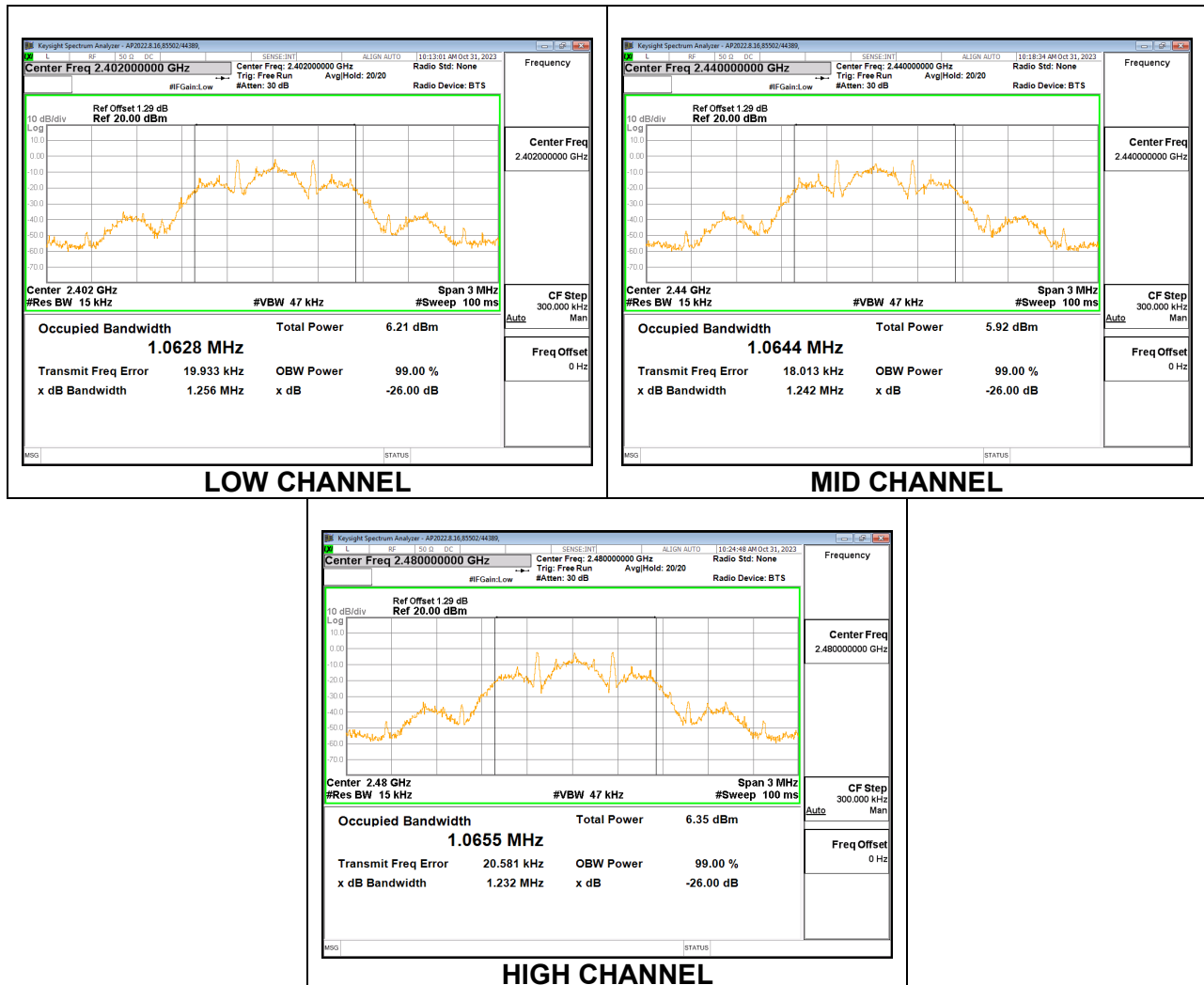
9.2.2. BLE (2Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	2.0492
Middle	2440	2.0524
High	2480	2.0580



9.2.3. BLE (125Kbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0628
Middle	2440	1.0644
High	2480	1.0655



9.2.4. BLE (500Kbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0362
Middle	2440	1.0330
High	2480	1.0399



9.3. 6 dB BANDWIDTH

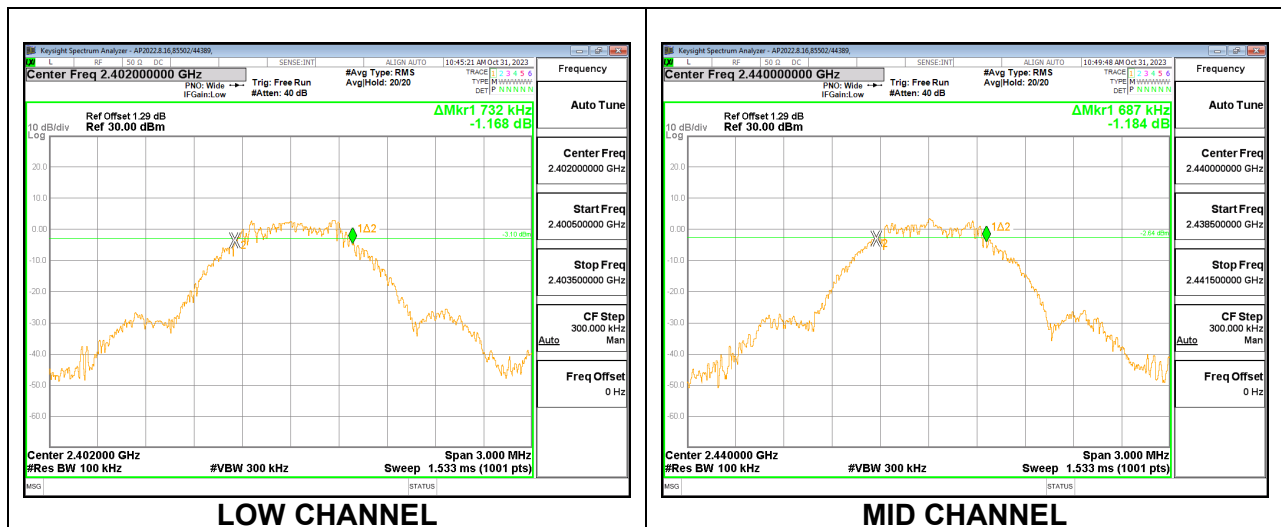
LIMITS

FCC §15.247 (a) (2)
RSS-247 5.2 (a)
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

9.3.1. BLE (1Mbps)

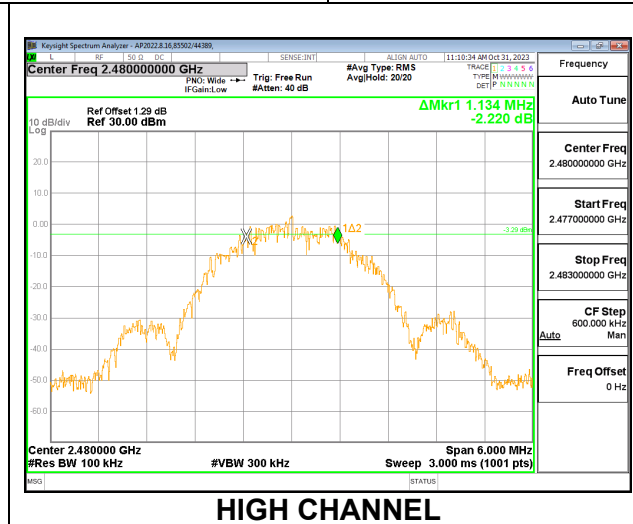
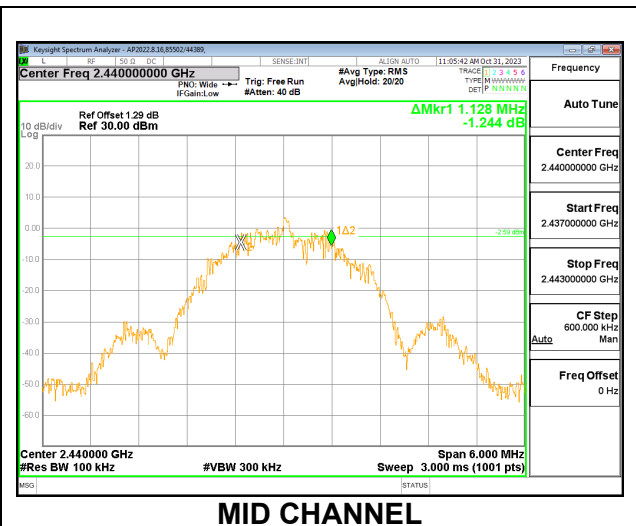
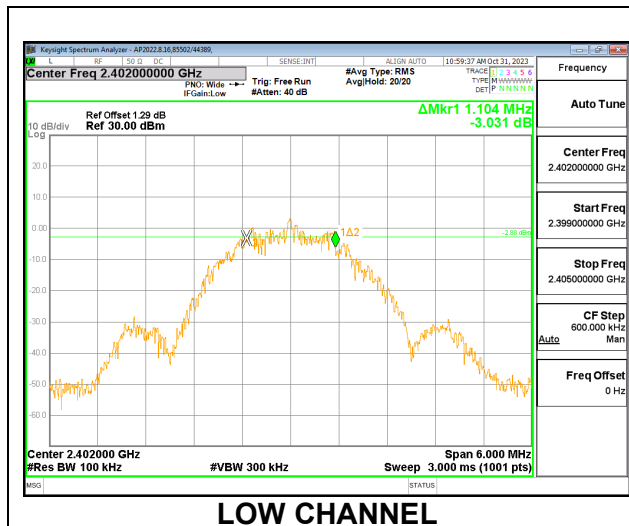
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.7320	0.5
Middle	2440	0.6870	0.5
High	2480	0.6840	0.5



HIGH CHANNEL

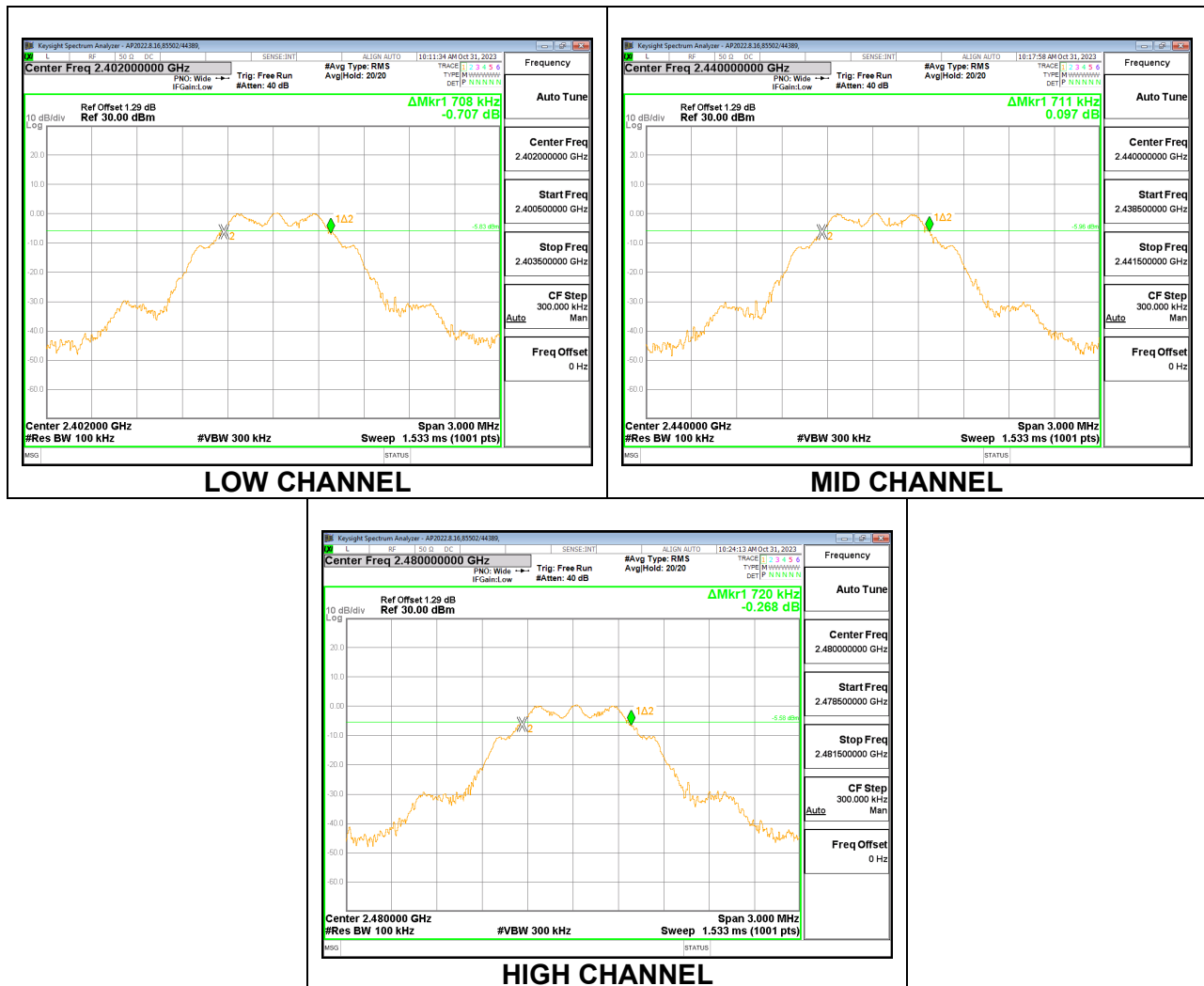
9.3.2. BLE (2Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.1040	0.5
Middle	2440	1.1280	0.5
High	2480	1.1340	0.5



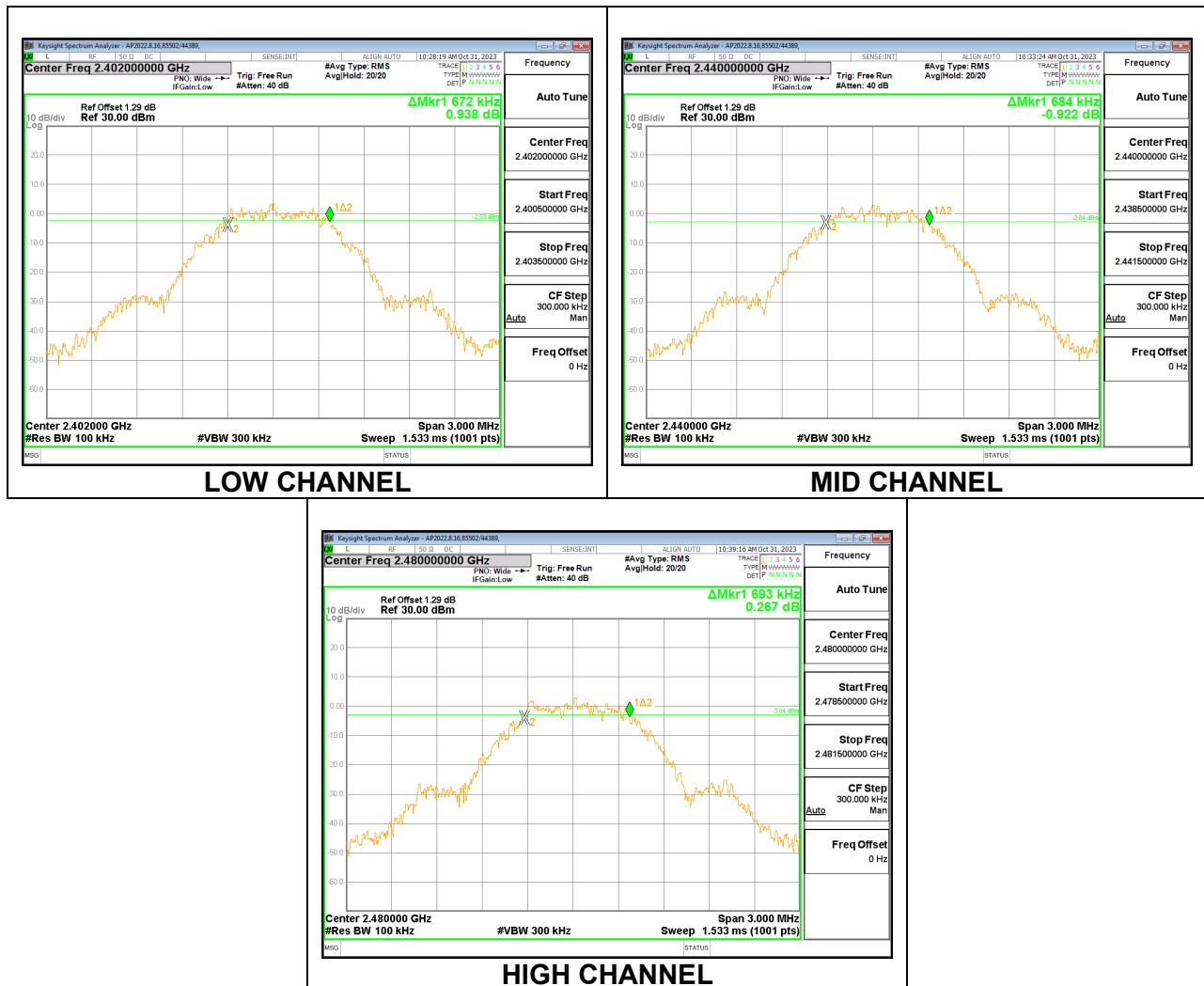
9.3.3. BLE (125Kbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.7080	0.5
Middle	2440	0.7110	0.5
High	2480	0.7200	0.5



9.3.4. BLE (500Kbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6720	0.5
Middle	2440	0.6840	0.5
High	2480	0.6930	0.5



9.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)
RSS-247 5.4 (d)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 0.99 dB (including a 0.99 dB test cable) was entered as an offset in the power meter.

The power output was measured on the EUT antenna port using SMA cable with attenuator connected to a power meter via wideband average power sensor. Peak output power was read directly from the power meter.

RESULTS

9.4.1. BLE (1Mbps)

Tested By:	85502/44389
Date:	2023-11-01

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	3.63	30	-26.370
Middle	2440	3.95	30	-26.050
High	2480	4.22	30	-25.780

9.4.2. BLE (2Mbps)

Tested By:	85502/44389
Date:	2023-11-01

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	3.67	30	-26.330
Middle	2440	3.95	30	-26.050
High	2480	4.23	30	-25.770

9.4.3. BLE (125Kbps)

Tested By:	85502/44389
Date:	2023-11-01

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	3.69	30	-26.310
Middle	2440	4.01	30	-25.990
High	2480	4.29	30	-25.710

9.4.4. BLE (500Kbps)

Tested By:	85502/44389
Date:	2023-11-01

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	3.67	30	-26.330
Middle	2440	3.95	30	-26.050
High	2480	4.26	30	-25.740

9.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 0.99 dB (including a 0.99 dB test cable) was entered as an offset in the power meter.

The power output was measured on the EUT antenna port using SMA cable was connected to a power meter via wideband average power sensor. Gated average output power was read directly from power meter.

RESULTS

9.5.1. BLE (1Mbps)

Tested By:	85502/44389
Date:	2023-11-01

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	3.44
Middle	2440	3.76
High	2480	4.06

9.5.2. BLE (2Mbps)

Tested By:	85502/44389
Date:	2023-11-01

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	3.42
Middle	2440	3.75
High	2480	4.06

9.5.3. BLE (125Kbps)

Tested By:	85502/44389
Date:	2023-11-01

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	3.47
Middle	2440	3.78
High	2480	4.08

9.5.4. BLE (500Kbps)

Tested By:	85502/44389
Date:	2023-11-01

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	3.45
Middle	2440	3.76
High	2480	4.06

9.6. POWER SPECTRAL DENSITY

LIMITS

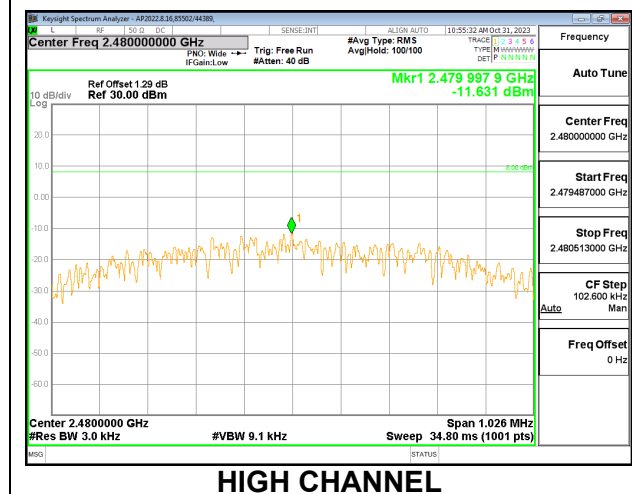
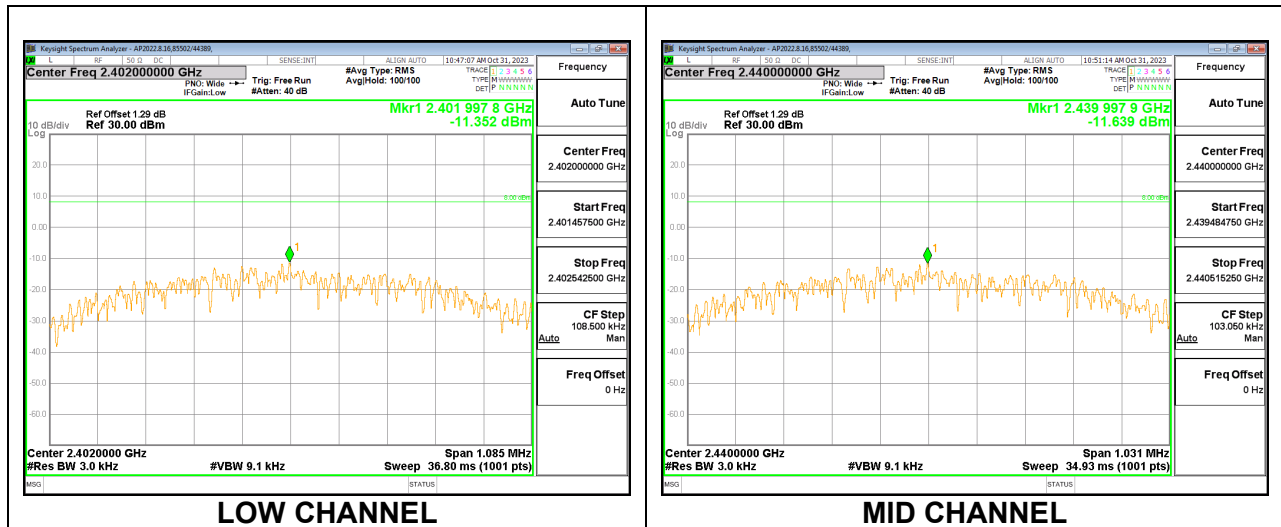
FCC §15.247 (e)
RSS-247 (5.2) (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

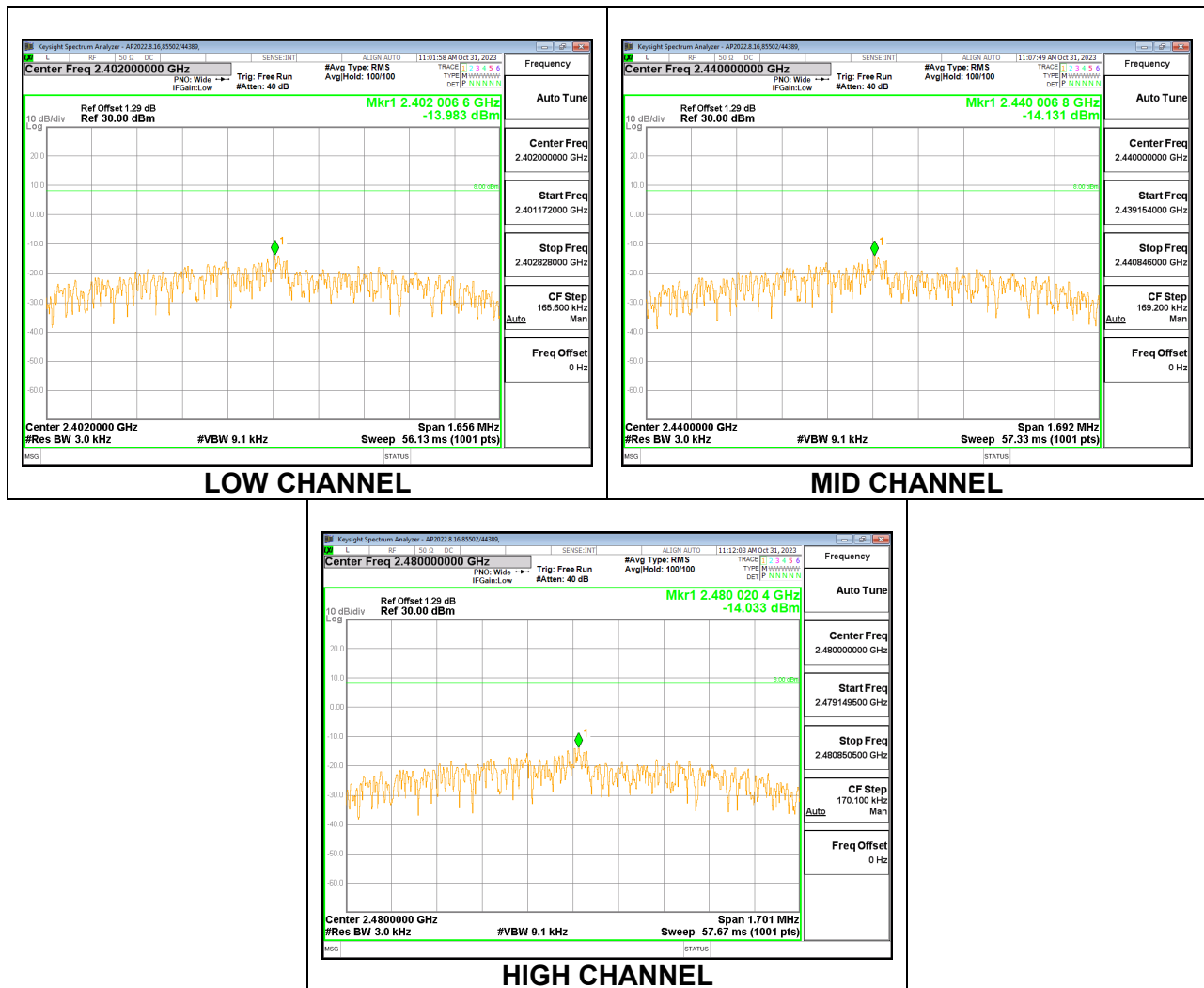
9.6.1. BLE (1Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-11.352	8	-19.35
Middle	2440	-11.639	8	-19.64
High	2480	-11.631	8	-19.63



9.6.2. BLE (2Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-13.983	8	-21.98
Middle	2440	-14.131	8	-22.13
High	2480	-14.033	8	-22.03



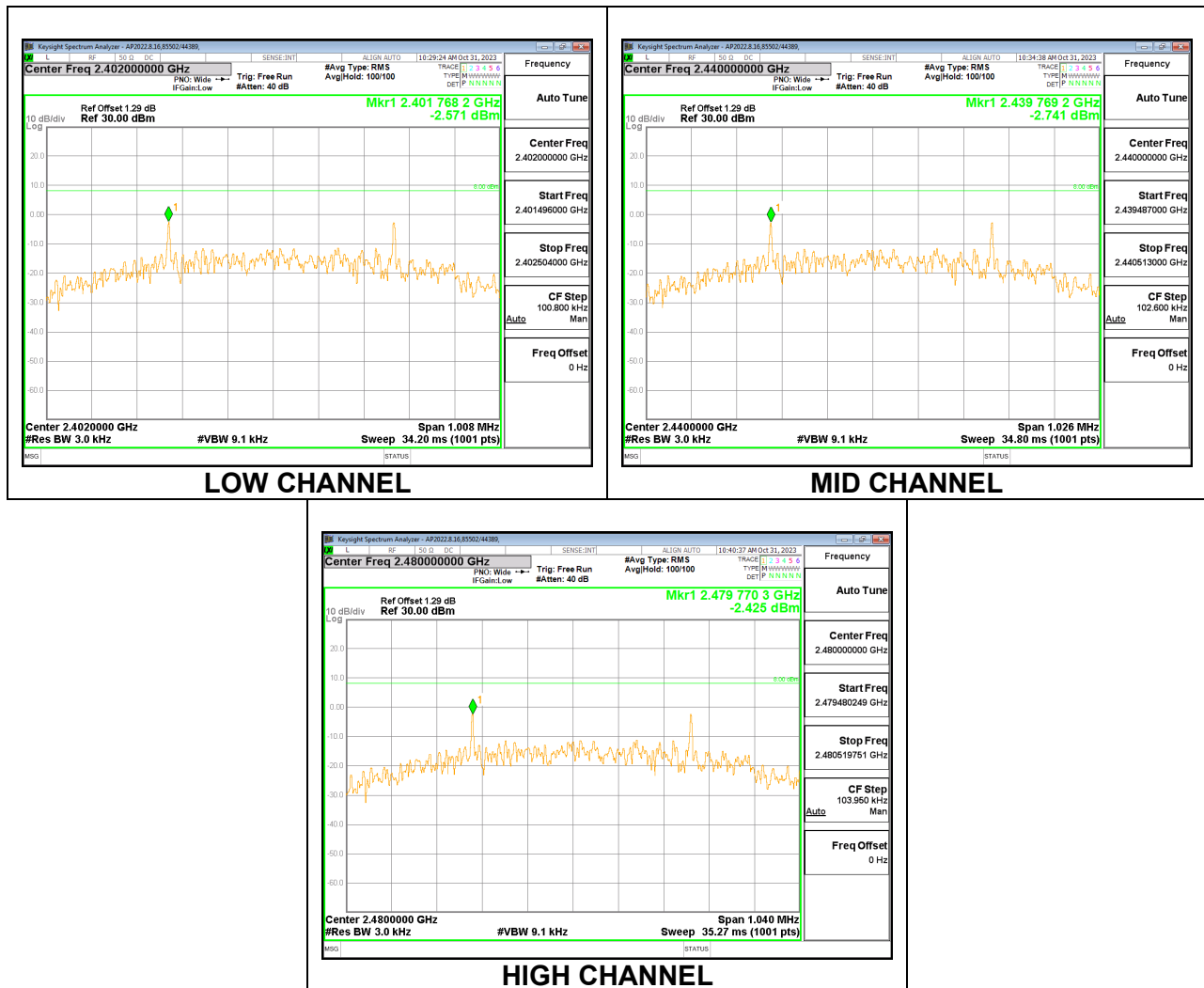
9.6.3. BLE (125Kbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-2.342	8	-10.34
Middle	2440	-2.530	8	-10.53
High	2480	-2.146	8	-10.15



9.6.4. BLE (500Kbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-2.571	8	-10.57
Middle	2440	-2.741	8	-10.74
High	2480	-2.425	8	-10.43



9.7. CONDUCTED SPURIOUS EMISSIONS

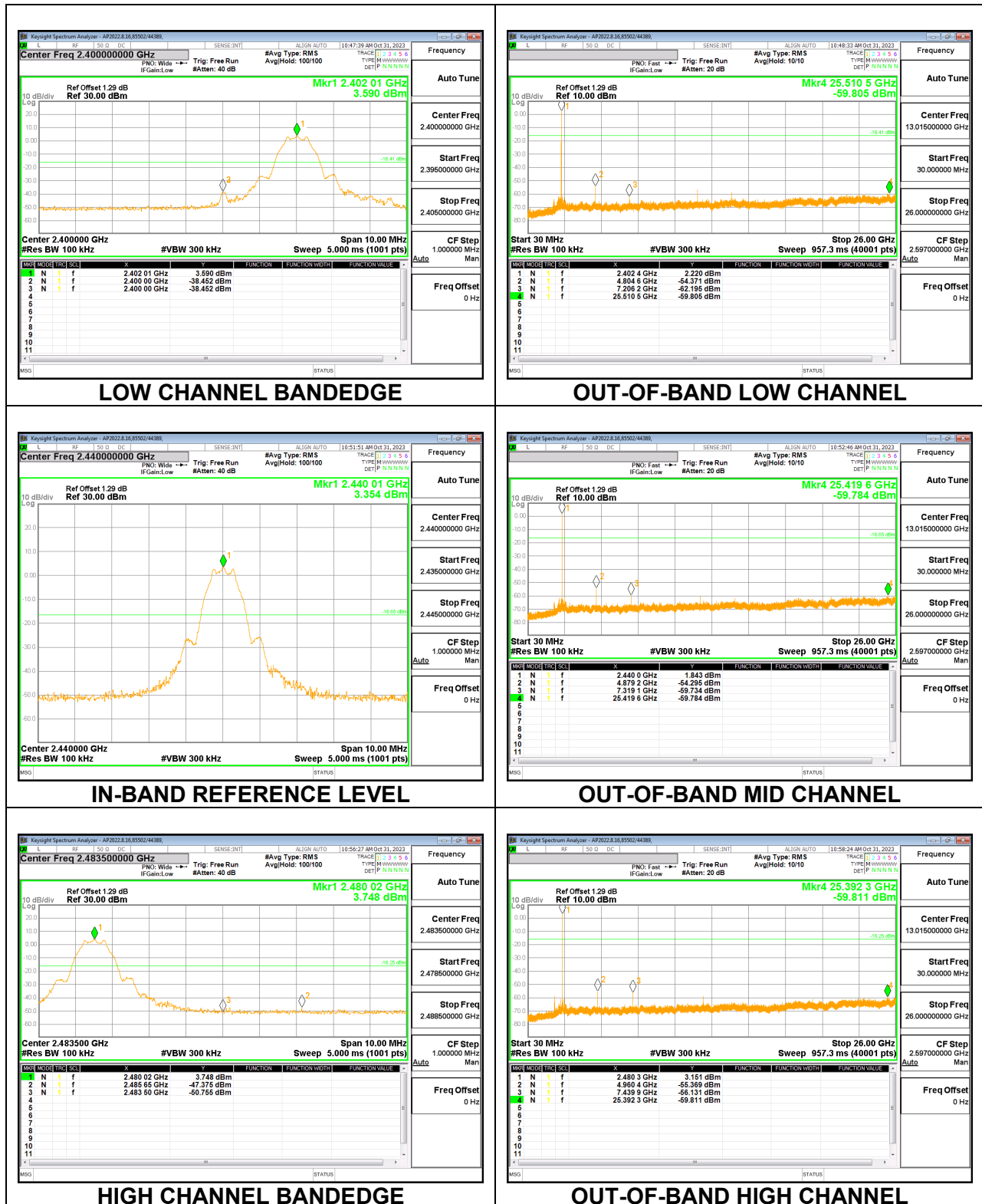
LIMITS

FCC §15.247 (d)
RSS-247 5.5

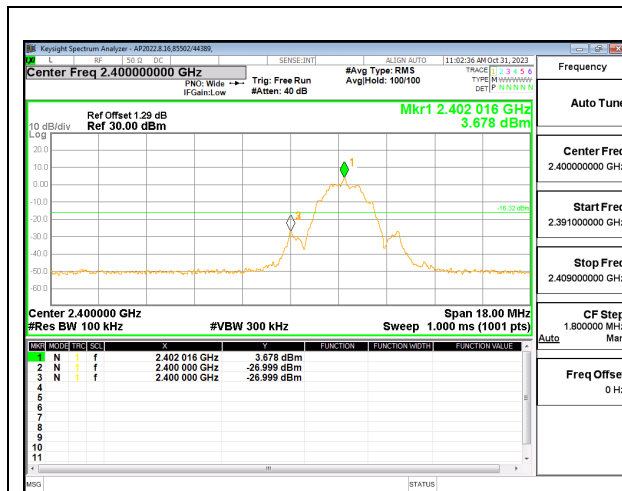
Output power was measured based on the use of a peak measurement, therefore the required attenuation is -20 dBc.

RESULTS

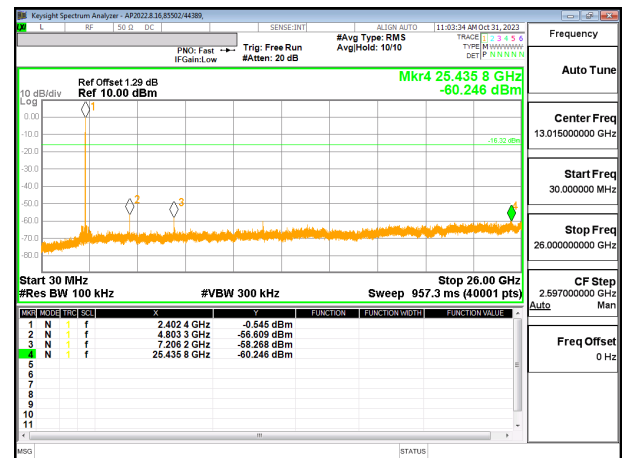
9.7.1. BLE (1Mbps)



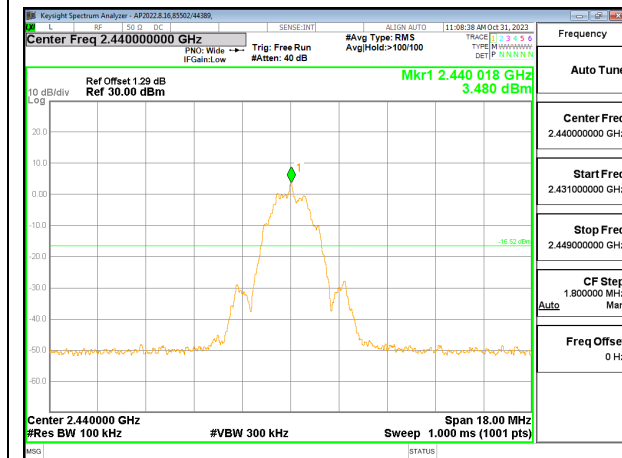
9.7.2. BLE (2Mbps)



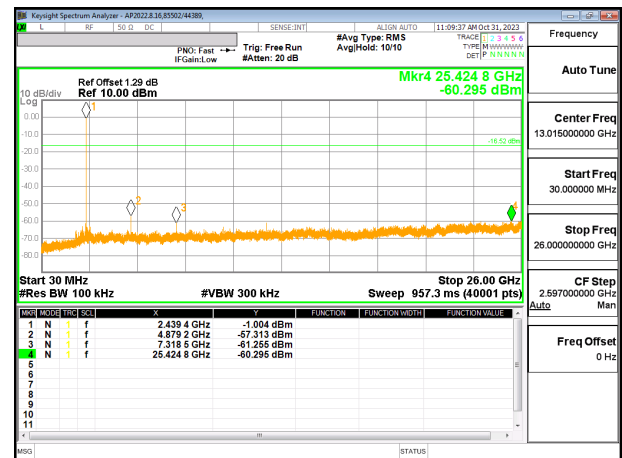
LOW CHANNEL BANDEDGE



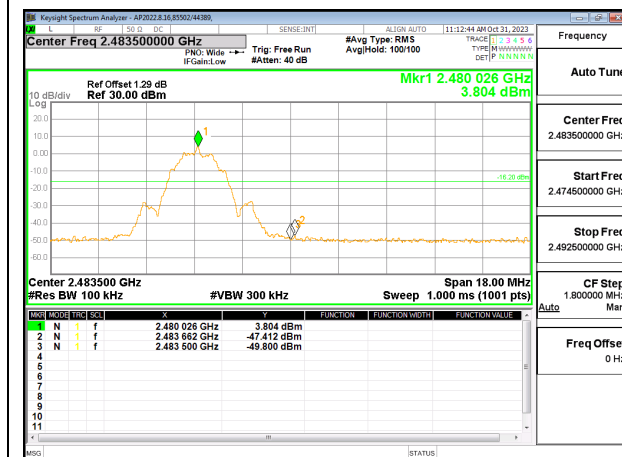
OUT-OF-BAND LOW CHANNEL



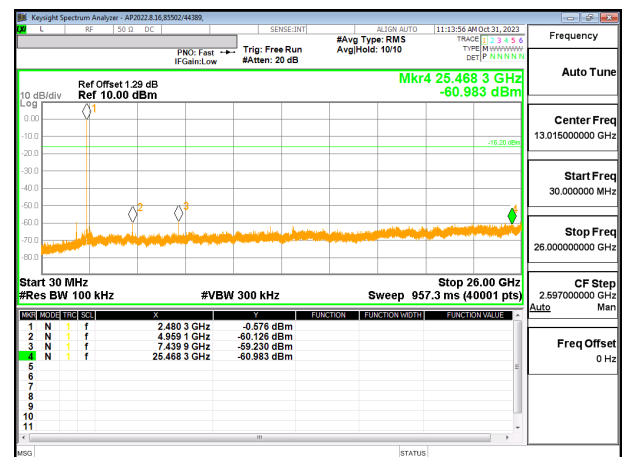
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

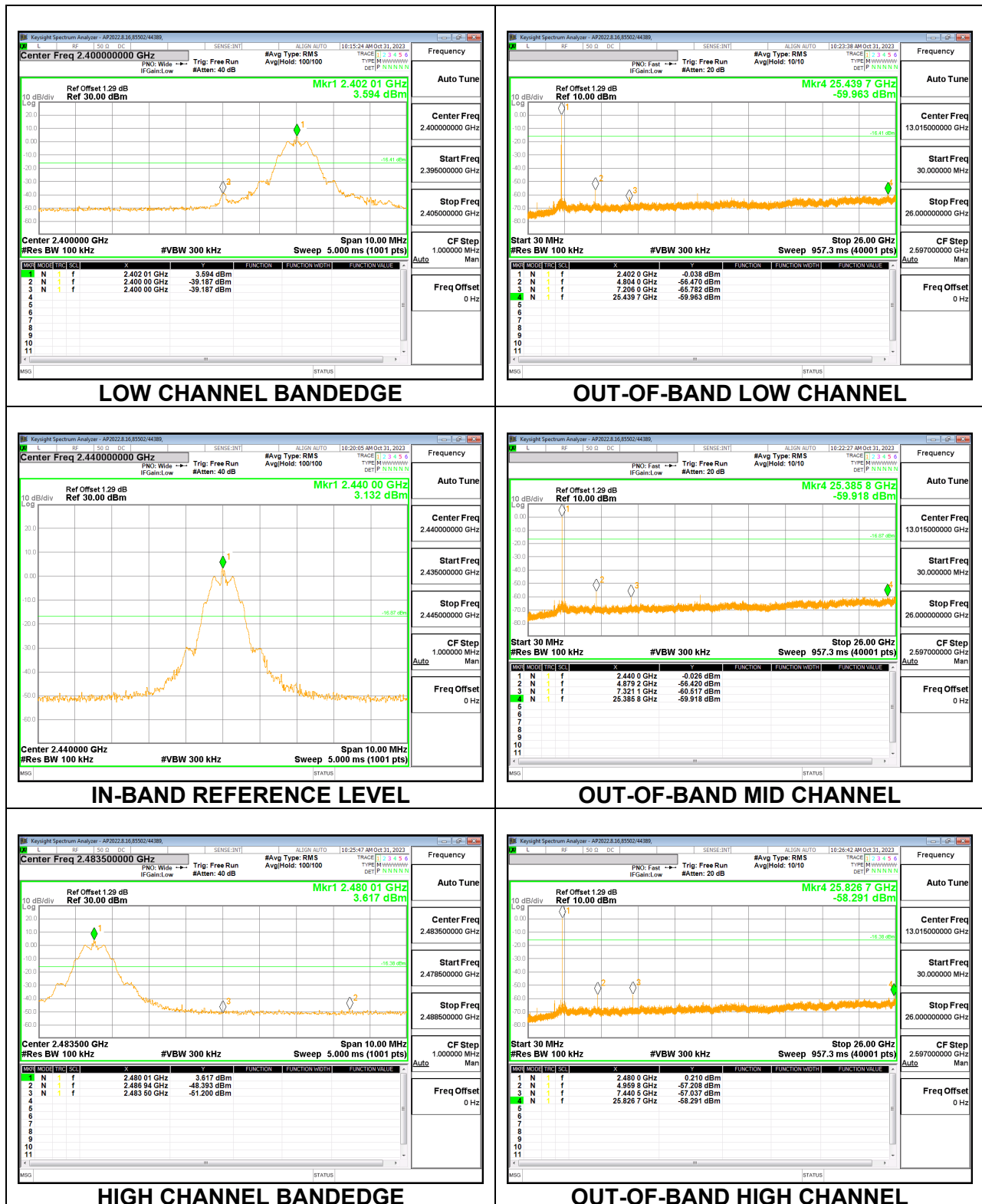


HIGH CHANNEL BANDEDGE

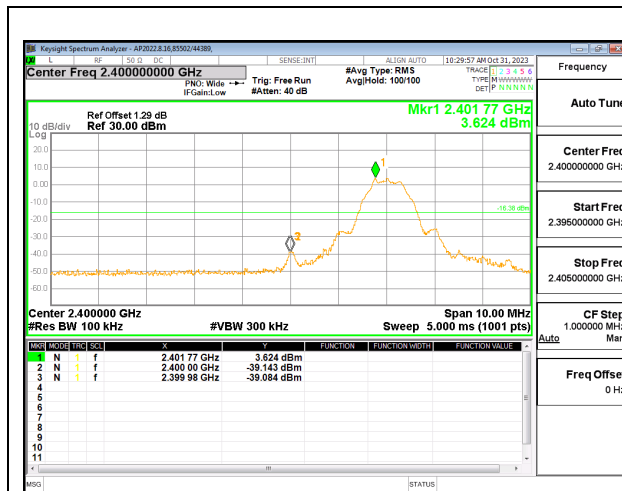


OUT-OF-BAND HIGH CHANNEL

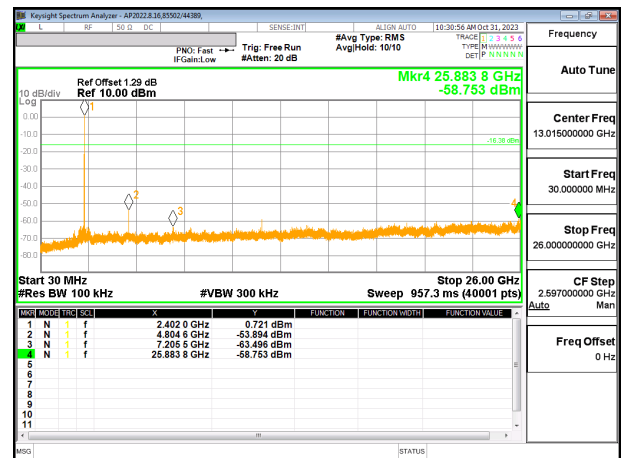
9.7.3. BLE (125Kbps)



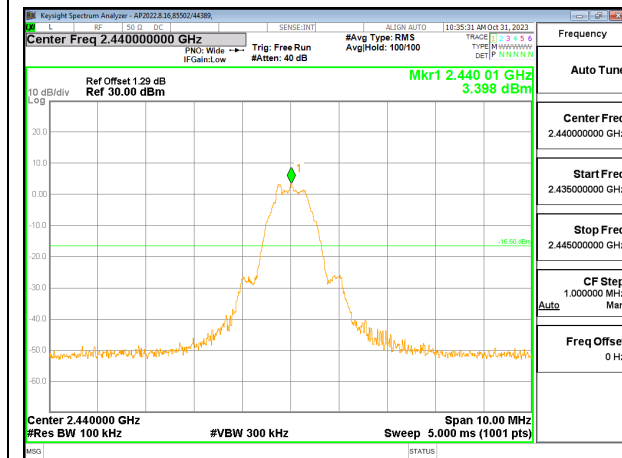
9.7.4. BLE (500Kbps)



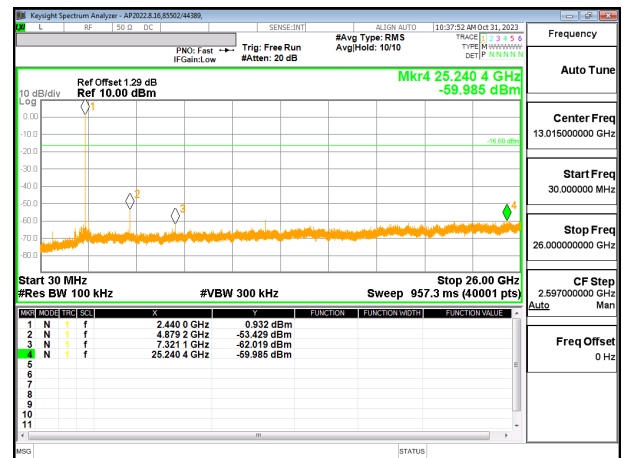
LOW CHANNEL BANDEDGE



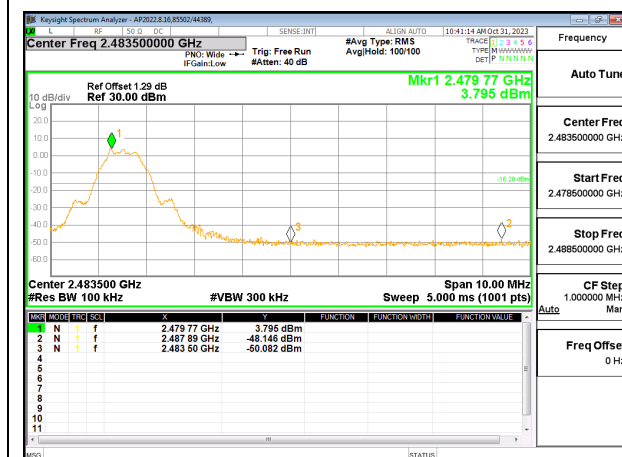
OUT-OF-BAND LOW CHANNEL



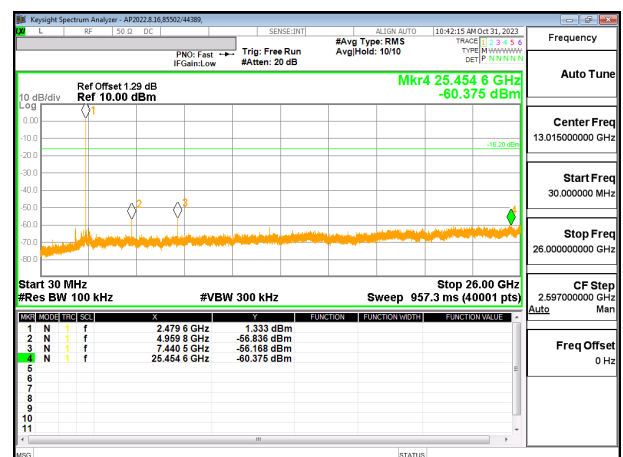
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

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	-
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

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 3MHz 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 average output power 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).

Based 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.

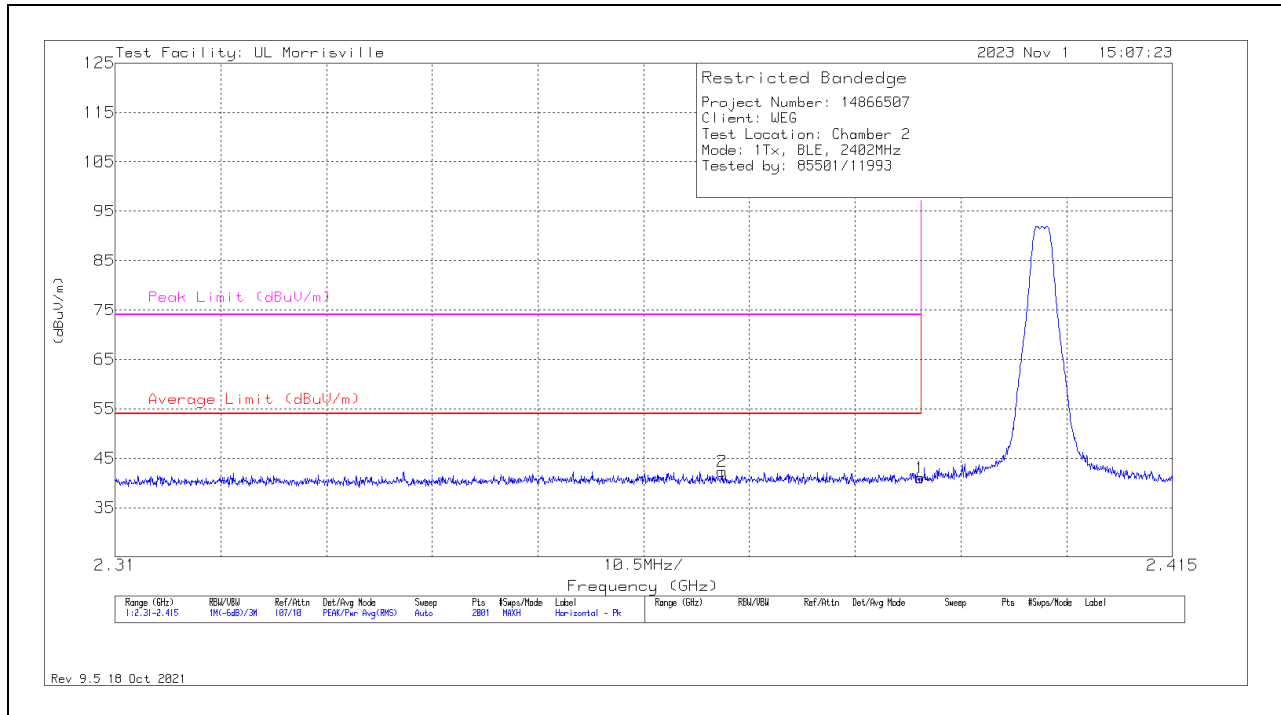
10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BLE (2Mbps)

WEGscan100

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



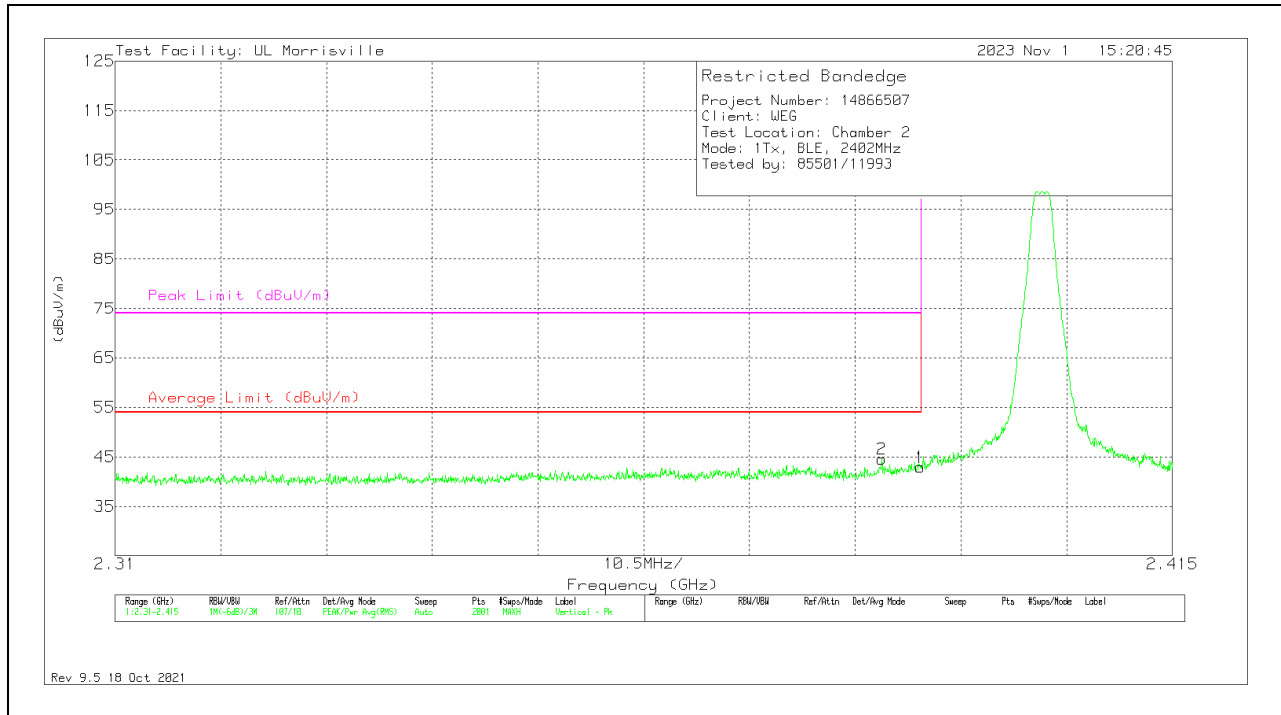
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.95	Pk	32.3	-24.2	41.05	54	-12.95	74	-32.95	116	119	H
2	* ** 2.37027	34.26	Pk	32.2	-24.1	42.36	54	-11.64	74	-31.64	116	119	H

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	*** 2.38613	36.57	Pk	32.2	-24.2	44.57	54	-9.43	74	-29.43	215	170	V
1	*** 2.38996	34.79	Pk	32.3	-24.2	42.89	54	-11.11	74	-31.11	215	170	V

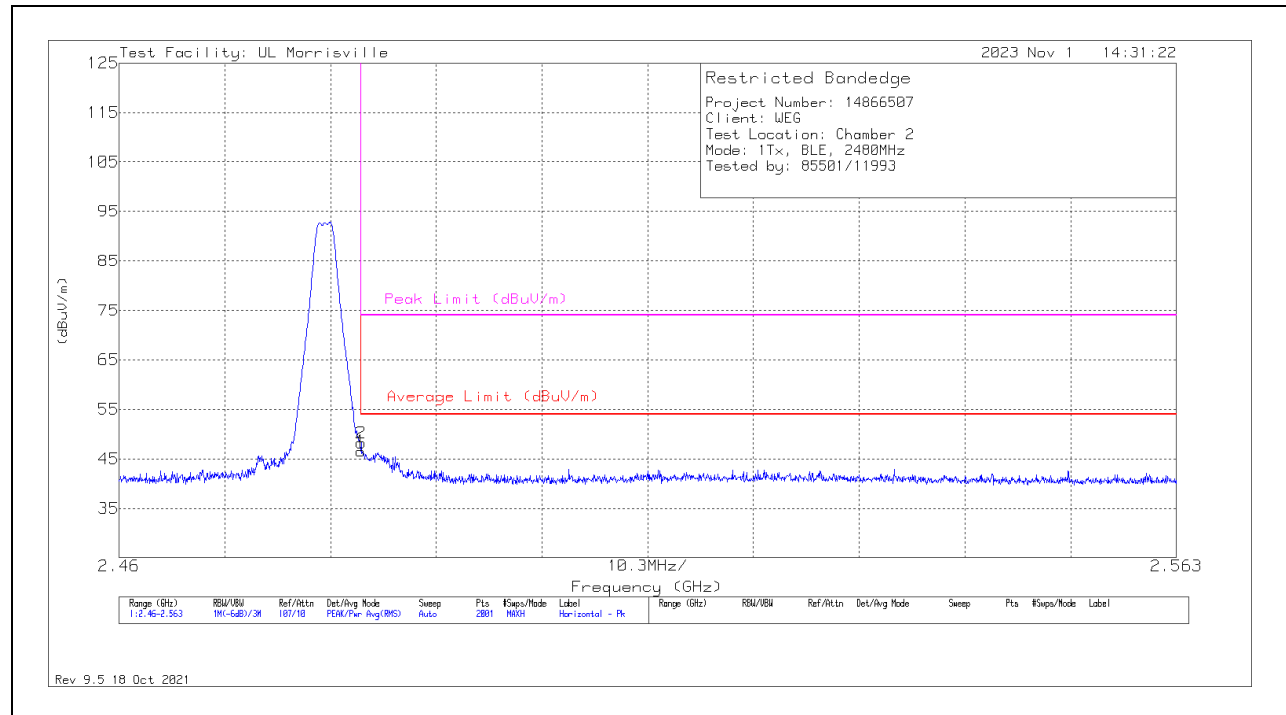
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

BANEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



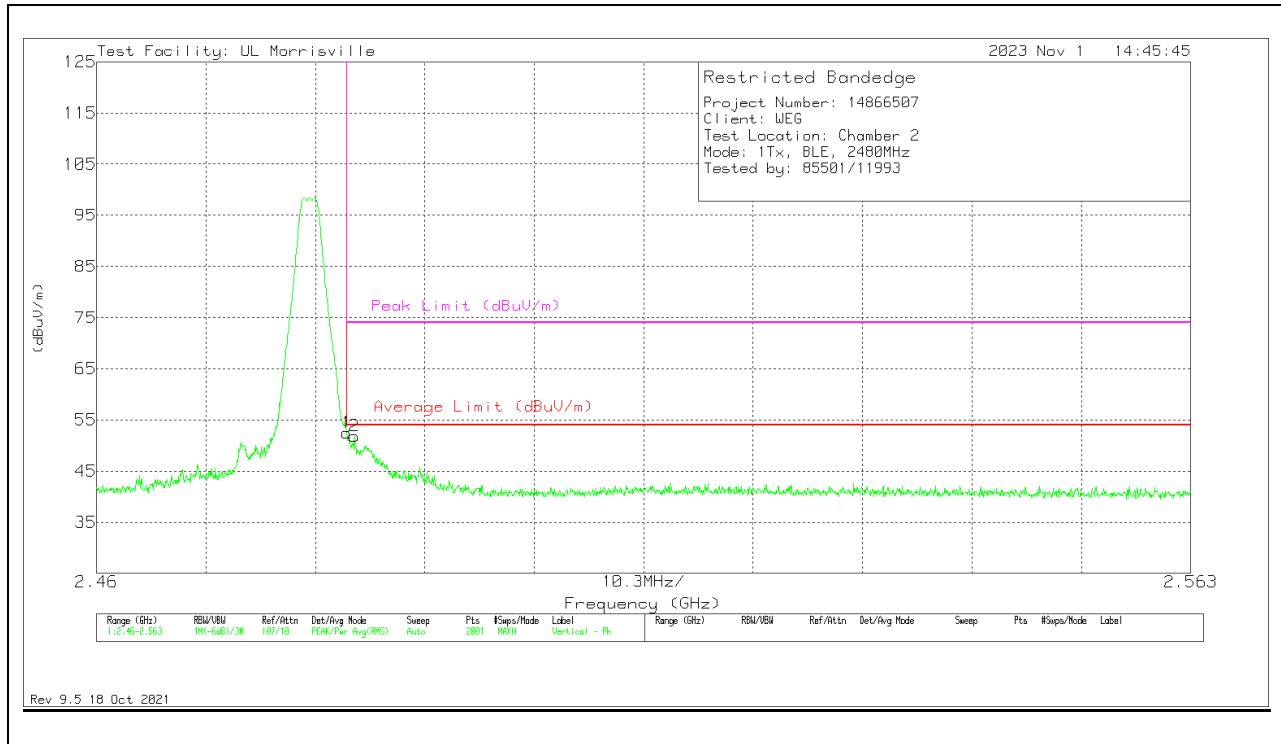
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	38.53	Pk	32.5	-24.5	46.53	54	-7.47	74	-27.47	315	306	H
2	* ** 2.48359	40.26	Pk	32.5	-24.5	48.26	54	-5.74	74	-25.74	315	306	H

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (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	44.49	Pk	32.5	-24.5	52.49	54	-1.51	74	-21.51	233	312	V
2	* ** 2.48426	43.83	Pk	32.5	-24.5	51.83	54	-2.17	74	-22.17	233	312	V

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

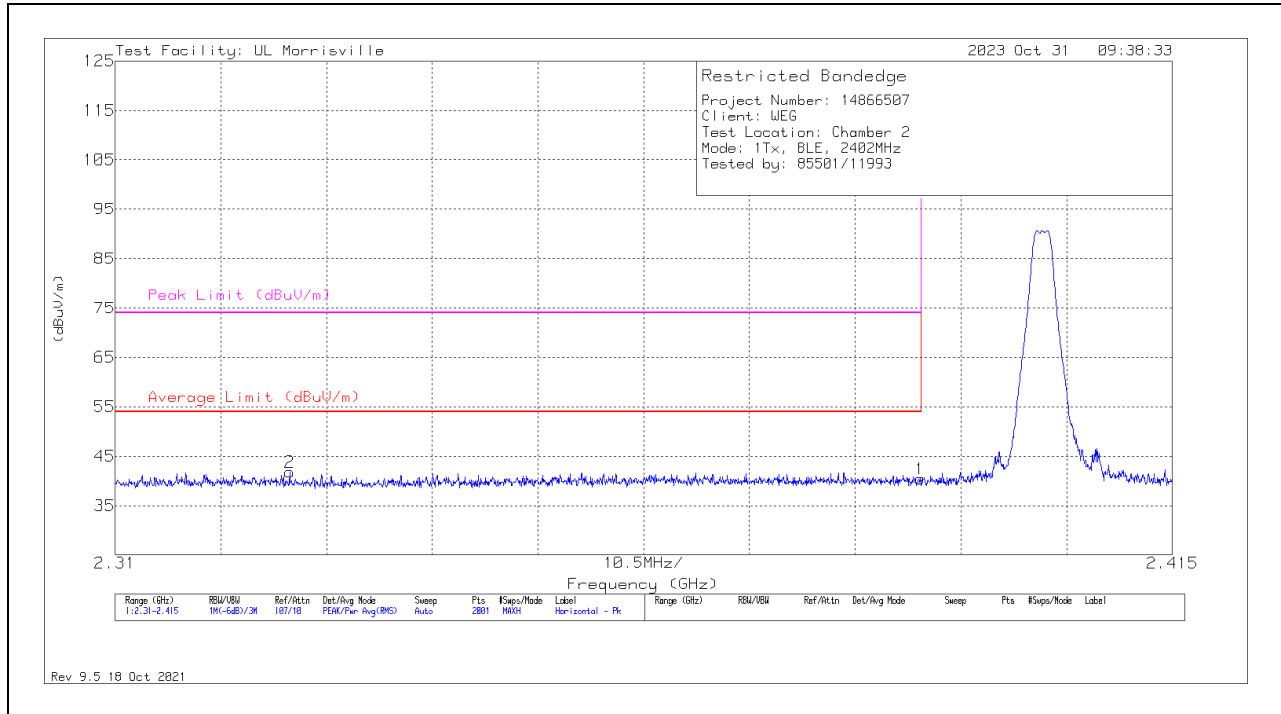
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

WEGscan101

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



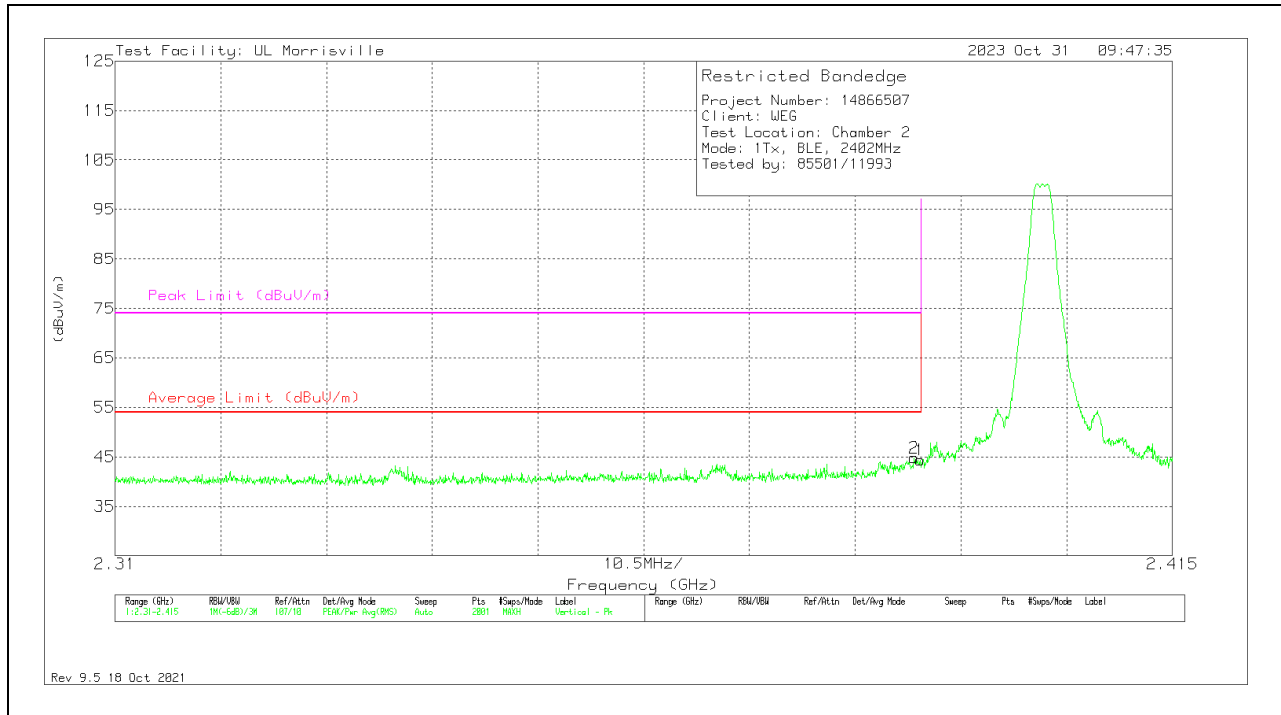
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.38	Pk	32.3	-24.2	40.48	54	-13.52	74	-33.52	96	202	H
2	* ** 2.32733	33.58	Pk	32.1	-23.9	41.78	54	-12.22	74	-32.22	96	202	H

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (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	36.25	Pk	32.3	-24.2	44.35	54	-9.65	74	-29.65	302	145	V
2	* ** 2.38933	36.72	Pk	32.3	-24.2	44.82	54	-9.18	74	-29.18	302	145	V

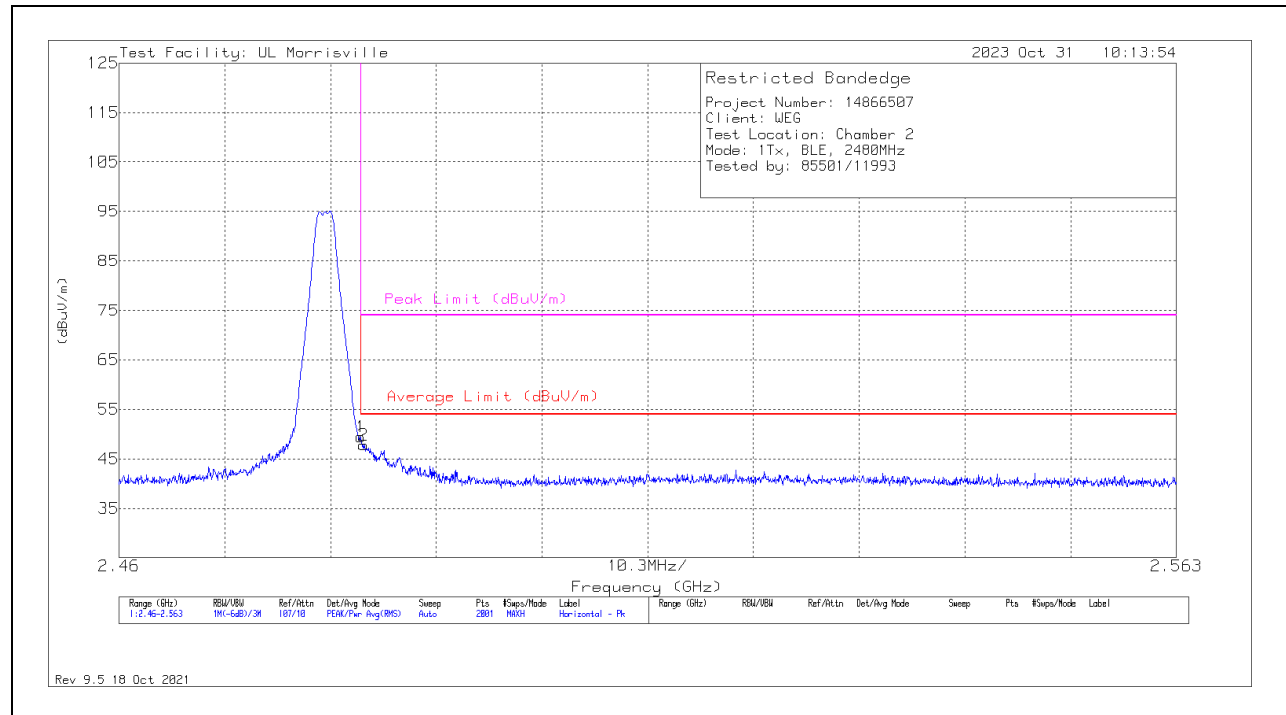
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

BANEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



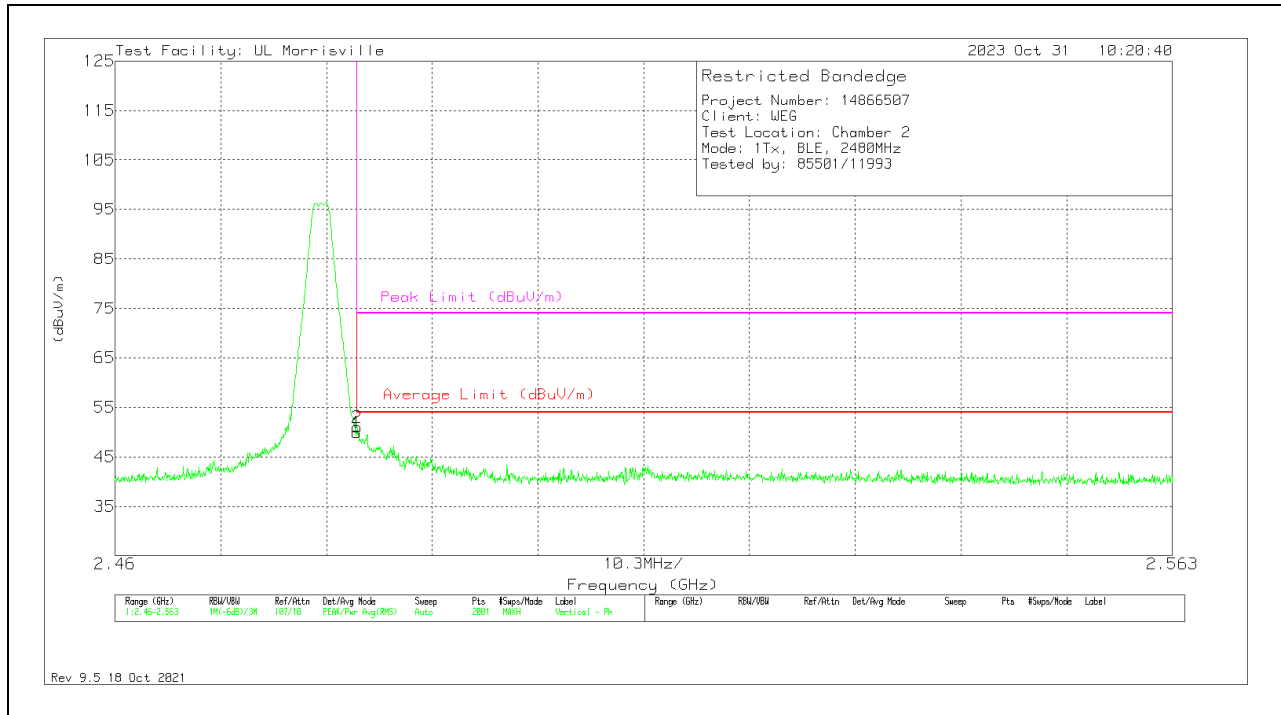
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	41.44	Pk	32.5	-24.5	49.44	54	-4.56	74	-24.56	343	320	H
2	* ** 2.48379	39.8	Pk	32.5	-24.5	47.8	54	-6.2	74	-26.2	343	320	H

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (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	41.89	Pk	32.5	-24.5	49.89	54	-4.11	74	-24.11	272	398	V
2	* ** 2.48359	43.01	Pk	32.5	-24.5	51.01	54	-2.99	74	-22.99	272	398	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

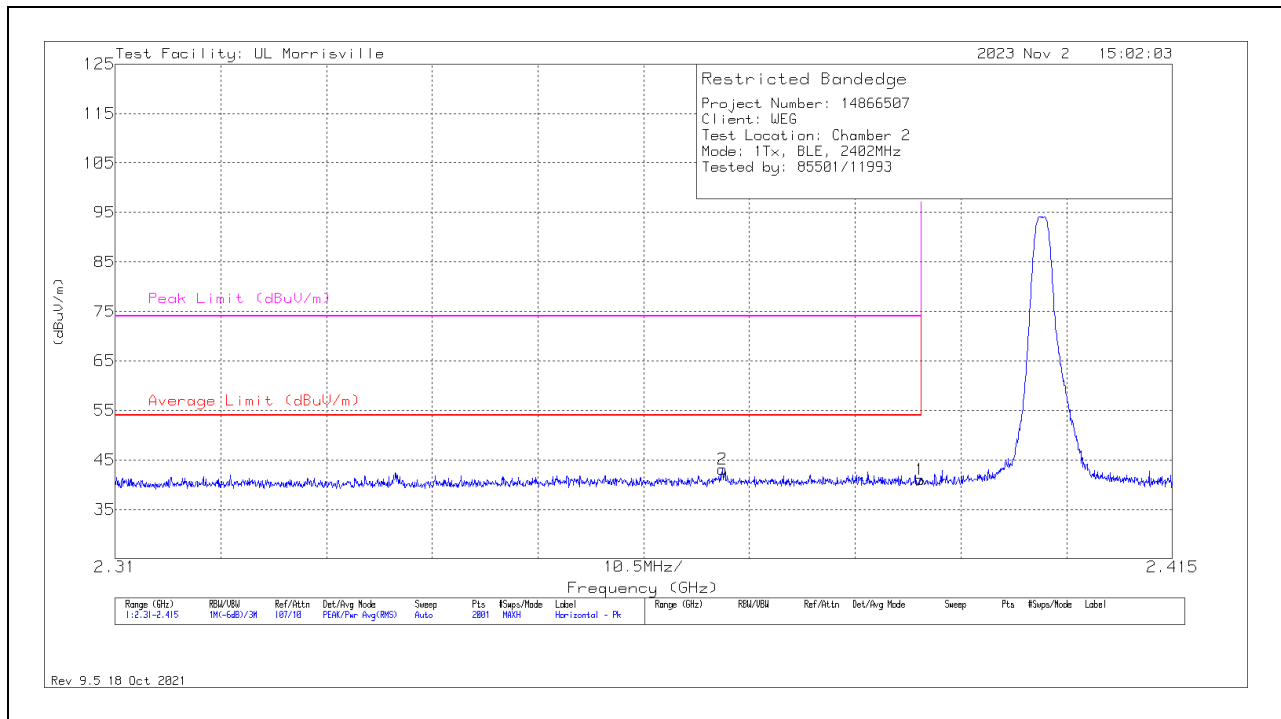
Pk - Peak detector

10.2.2. BLE (125Kbps)

WEGscan100

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



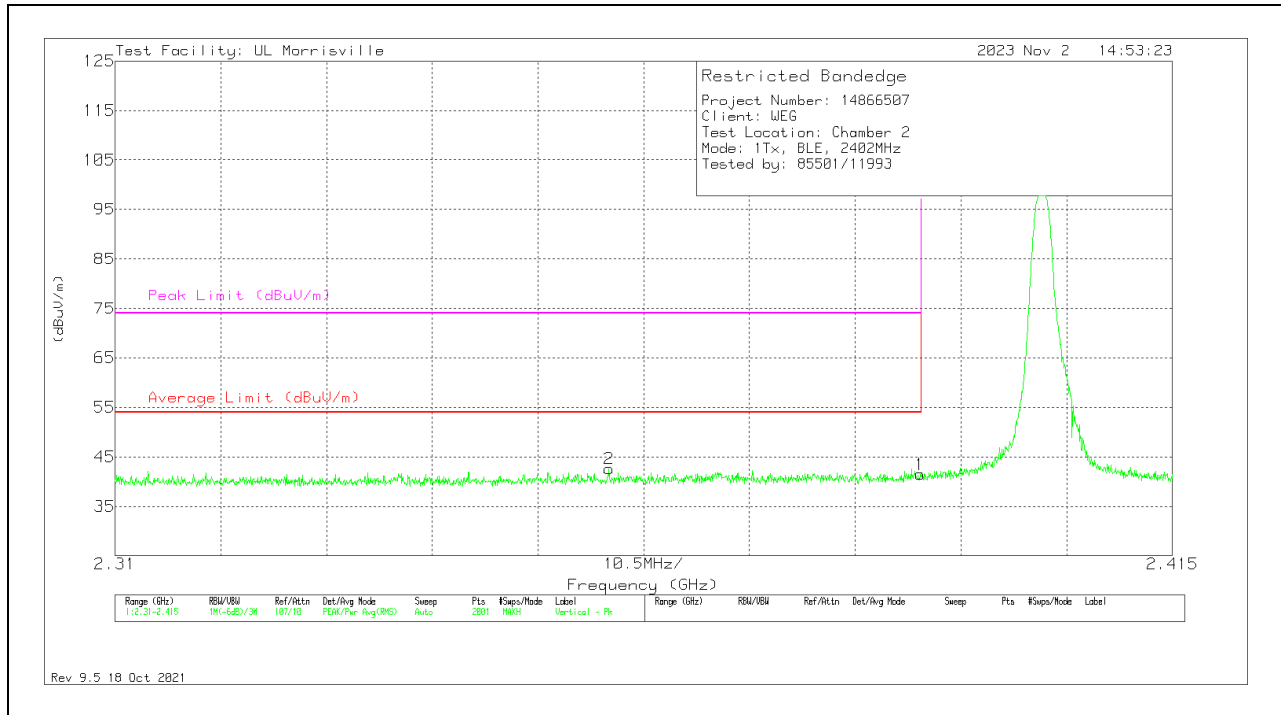
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.93	Pk	32.3	-24.2	41.03	54	-12.97	74	-32.97	166	329	H
2	* ** 2.37032	35.08	Pk	32.2	-24.1	43.18	54	-10.82	74	-30.82	166	329	H

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (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	33.38	Pk	32.3	-24.2	41.48	54	-12.52	74	-32.52	56	373	V
2	* ** 2.35904	34.5	Pk	32.1	-24	42.6	54	-11.4	74	-31.4	56	373	V

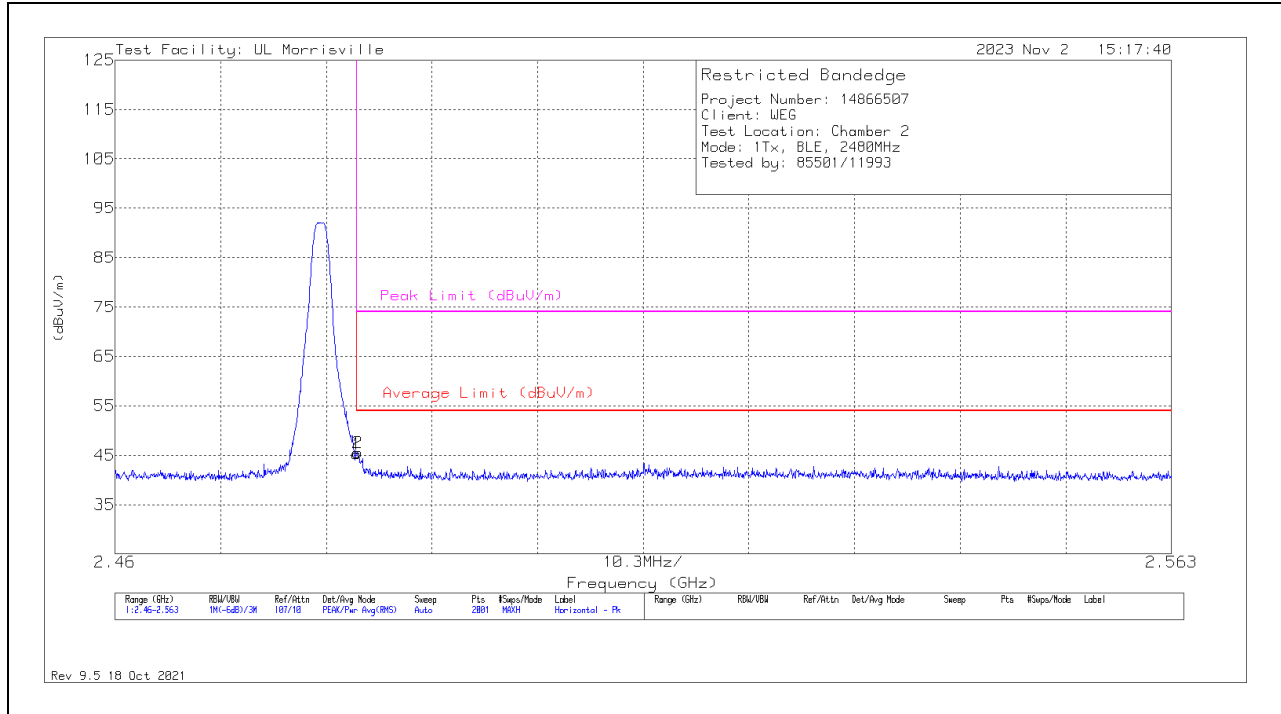
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



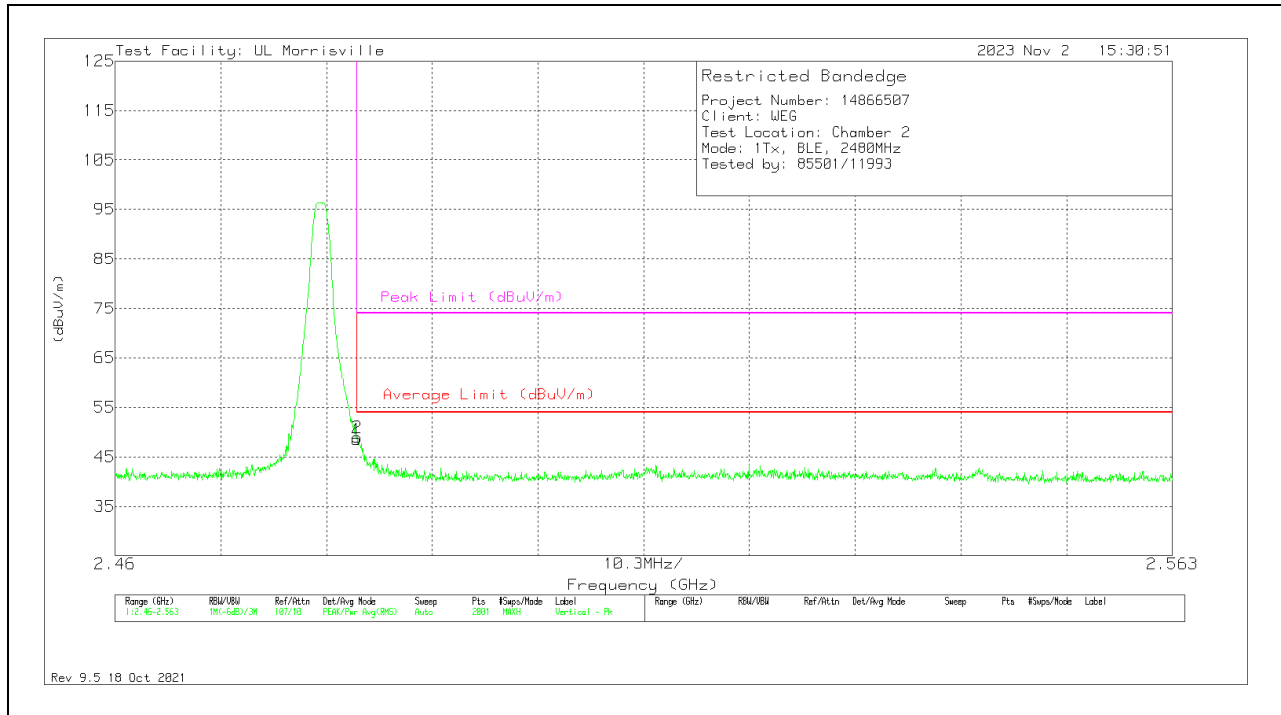
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	37.26	Pk	32.5	-24.5	45.26	54	-8.74	74	-28.74	259	206	H
2	* ** 2.48364	37.53	Pk	32.5	-24.5	45.53	54	-8.47	74	-28.47	259	206	H

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (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	40.54	Pk	32.5	-24.5	48.54	54	-5.46	74	-25.46	42	372	V
2	* ** 2.48359	40.94	Pk	32.5	-24.5	48.94	54	-5.06	74	-25.06	42	372	V

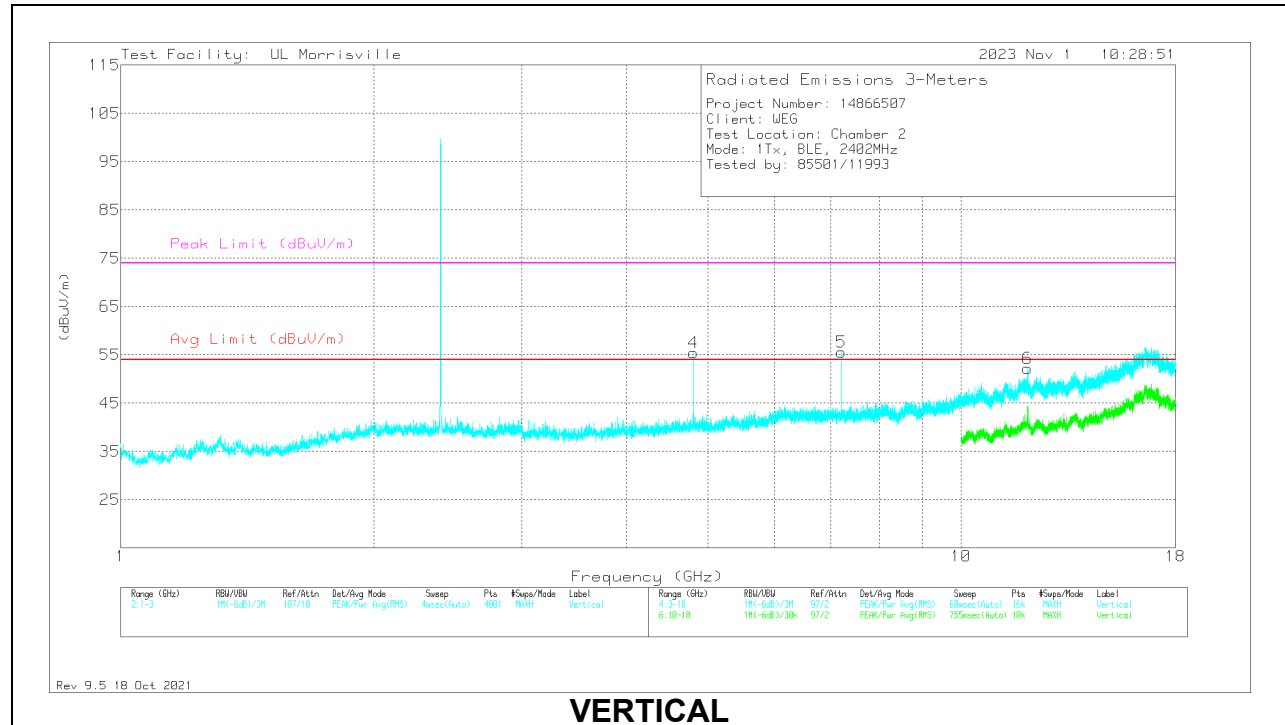
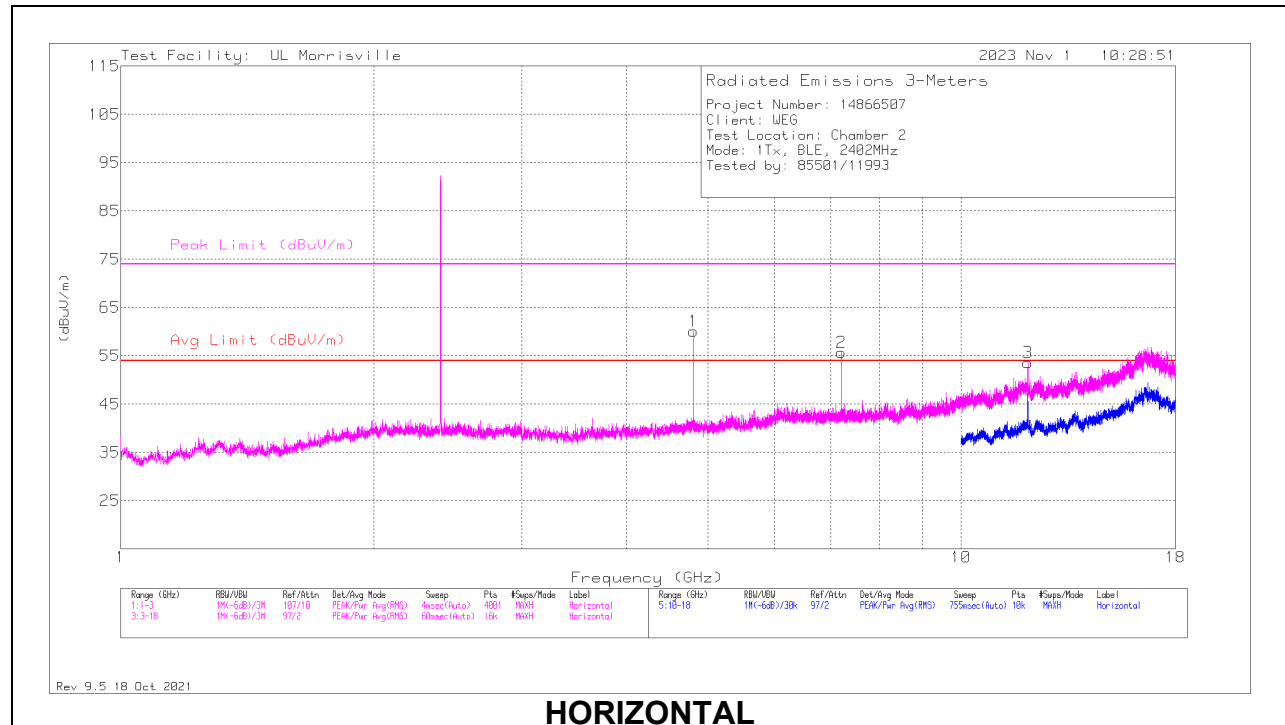
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (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	* ** 4.80448	56.74	PK2	34.2	-30	0	60.94	-	-	74	-13.06	73	110	H
	* ** 4.80428	45.37	ADV	34.2	-30	1.64	51.21	54	-2.79	-	-	73	110	H
3	* ** 12.01131	39.15	PK2	38.9	-22.7	0	55.35	-	-	74	-18.65	7	275	H
	* ** 12.01144	26.22	ADV	38.9	-22.7	1.64	44.06	54	-9.94	-	-	7	275	H
4	* ** 4.80448	52.87	PK2	34.2	-30	0	57.07	-	-	74	-16.93	69	381	V
	* ** 4.80385	41.76	ADV	34.2	-30	1.64	47.6	54	-6.4	-	-	69	381	V
6	* ** 12.01133	38.79	PK2	38.9	-22.7	0	54.99	-	-	74	-19.01	50	314	V
	* ** 12.00876	25.79	ADV	38.9	-22.7	1.64	43.63	54	-10.37	-	-	50	314	V
2	7.20563	47.16	Pk	35.6	-27.1	0	55.66	-	-	-	-	0-360	101	H
5	7.20563	47.08	Pk	35.6	-27.1	0	55.58	-	-	-	-	0-360	101	V

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

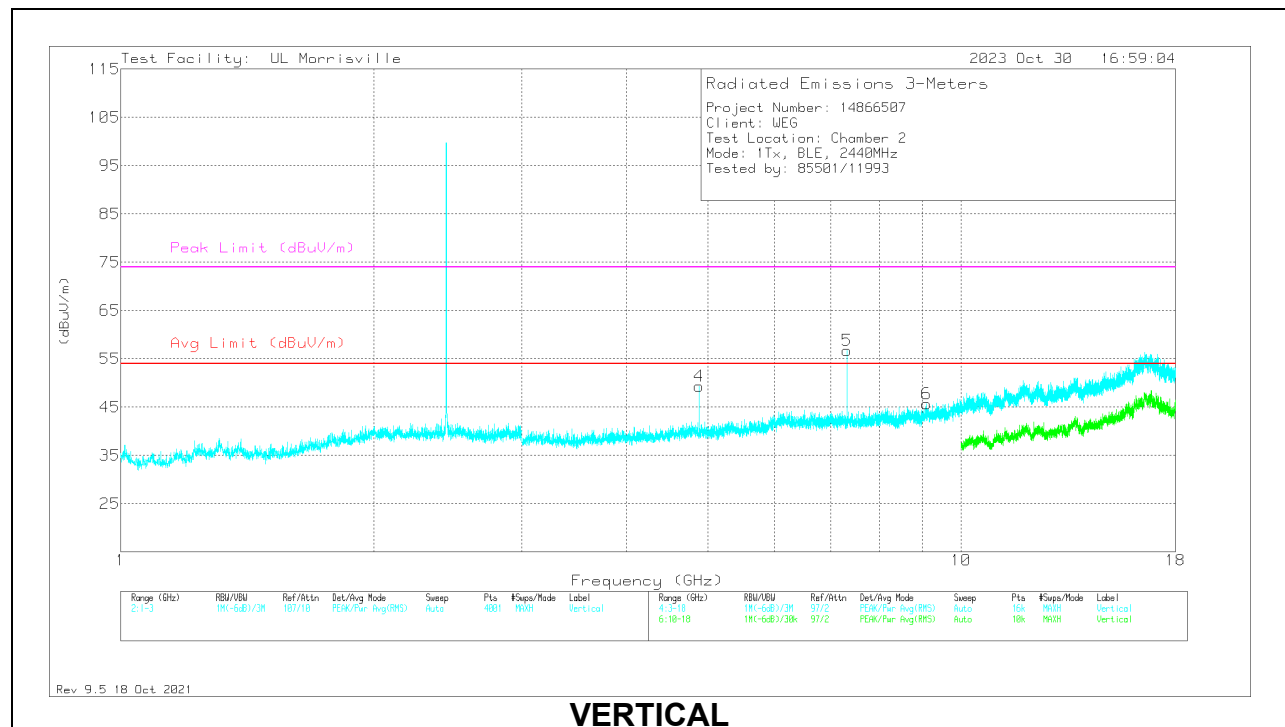
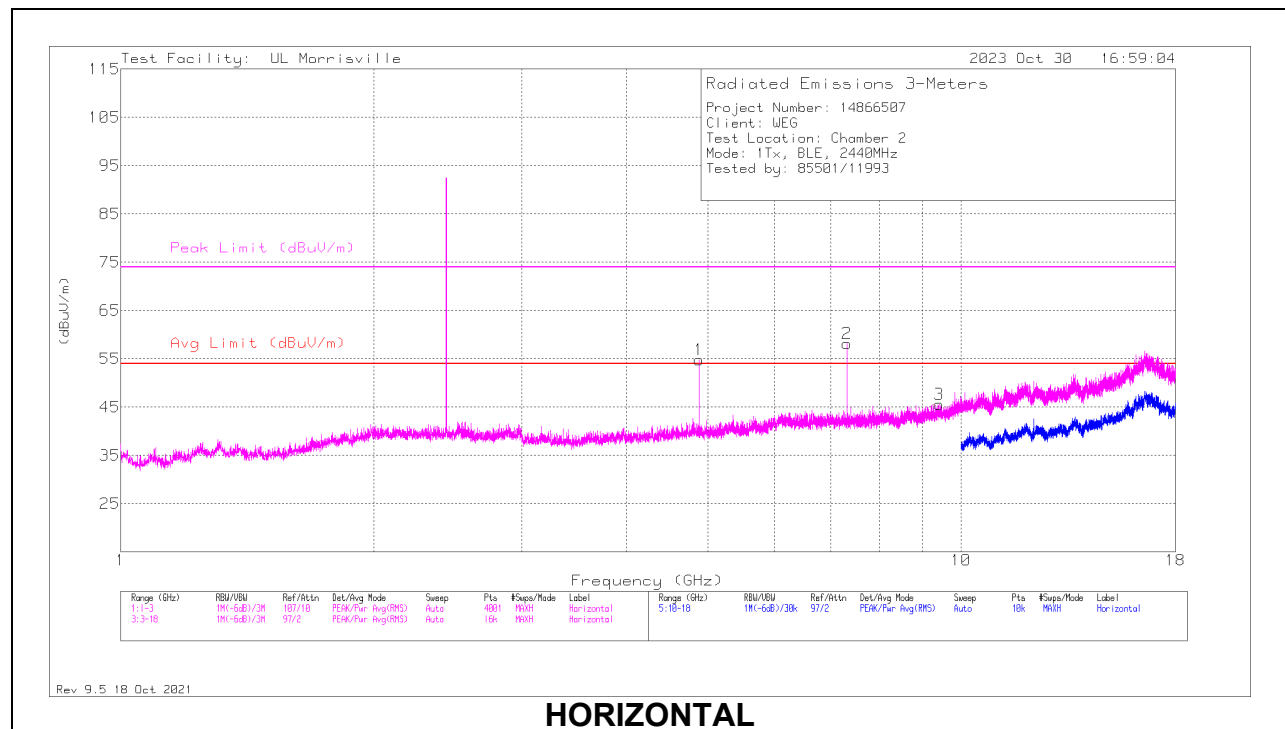
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

PK2 - Maximum Peak

ADV - Linear Voltage Average

MID CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (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	* ** 4.87952	52.75	PK2	34.1	-30.4	0	56.45	-	-	74	-17.55	275	101	H
	* ** 4.87968	41.11	ADV	34.1	-30.4	1.64	46.45	54	-7.55	-	-	275	101	H
2	* ** 7.31928	50.98	PK2	35.6	-26.7	0	59.88	-	-	74	-14.12	98	229	H
	* ** 7.31926	38.46	ADV	35.6	-26.7	1.64	49	54	-5	-	-	98	229	H
3	* ** 9.42	34.72	Pk	36.2	-25.4	0	45.52	54	-8.48	74	-28.48	0-360	101	H
4	* ** 4.87951	45.69	PK2	34.1	-30.4	0	49.39	-	-	74	-24.61	110	349	V
	* ** 4.87986	33.08	ADV	34.1	-30.4	1.64	38.42	54	-15.58	-	-	110	349	V
5	* ** 7.31922	51.87	PK2	35.6	-26.7	0	60.77	-	-	74	-13.23	120	359	V
	* ** 7.3207	39.9	ADV	35.6	-26.7	1.64	50.44	54	-3.56	-	-	120	359	V
6	* ** 9.10219	35.42	Pk	35.9	-25.6	0	45.72	54	-8.28	74	-28.28	0-360	101	V

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

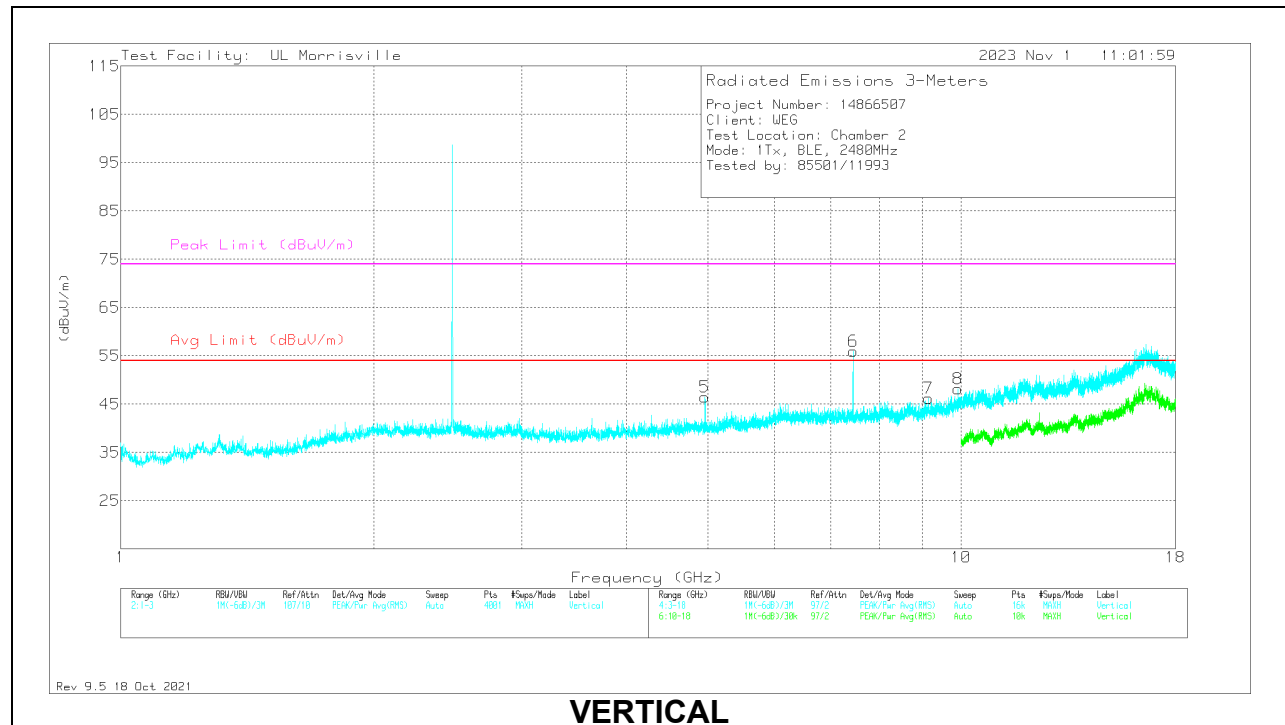
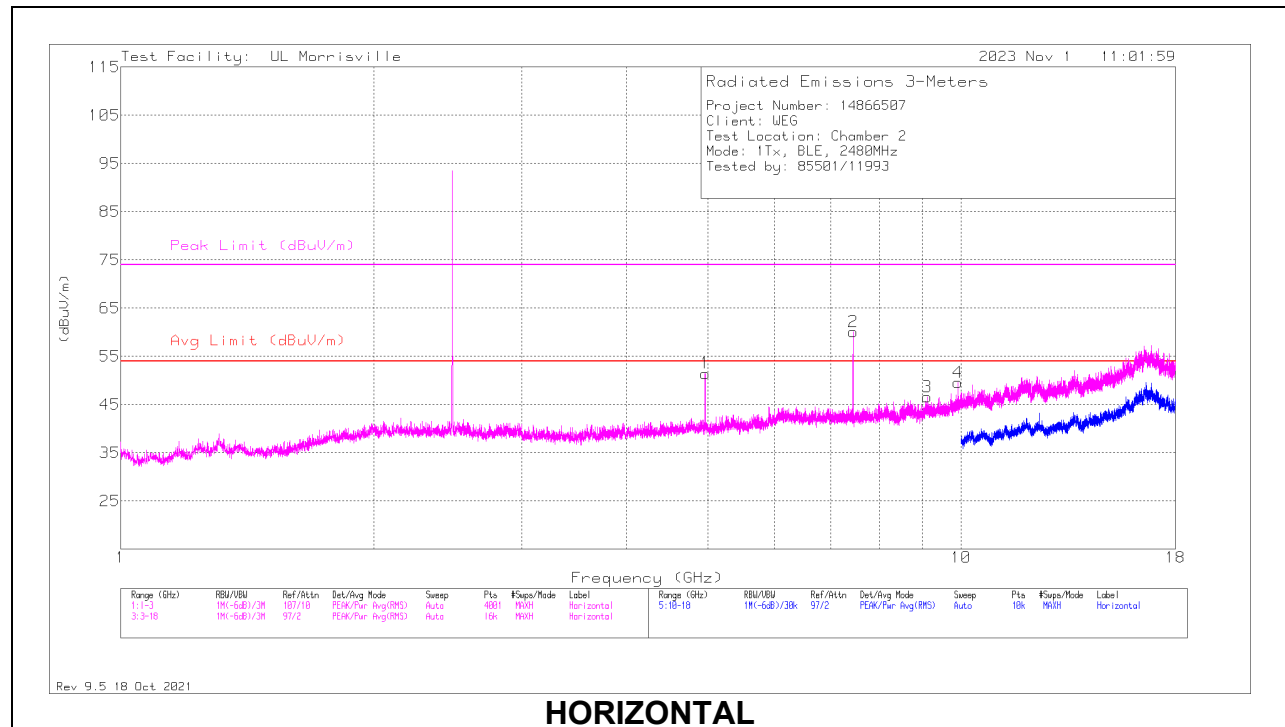
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

PK2 - Maximum Peak

ADV - Linear Voltage Average

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (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	* ** 4.95952	50.11	PK2	34	-30.3	0	53.81	-	-	74	-20.19	355	109	H
	* ** 4.96037	38.33	ADV	34	-30.3	1.64	43.67	54	-10.33	-	-	355	109	H
2	* ** 7.43931	53.11	PK2	35.6	-26.9	0	61.81	-	-	74	-12.19	334	101	H
	* ** 7.44068	40.41	ADV	35.6	-27	1.64	50.65	54	-3.35	-	-	334	101	H
3	* ** 9.12375	35.75	Pk	35.9	-25.1	0	46.55	54	-7.45	74	-27.45	0-360	200	H
5	* ** 4.95938	42.77	Pk	34	-30.3	0	46.47	54	-7.53	74	-27.53	0-360	200	V
6	* ** 7.44004	49.34	PK2	35.6	-26.9	0	58.04	-	-	74	-15.96	270	102	V
	* ** 7.44062	37.24	ADV	35.6	-27	1.64	47.48	54	-6.52	-	-	270	102	V
7	* ** 9.14906	35.25	Pk	35.9	-24.9	0	46.25	54	-7.75	74	-27.75	0-360	101	V
4	9.91969	37.34	Pk	37.1	-24.8	0	49.64	-	-	-	-	0-360	200	H
8	9.91969	35.92	Pk	37.1	-24.8	0	48.22	-	-	-	-	0-360	101	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

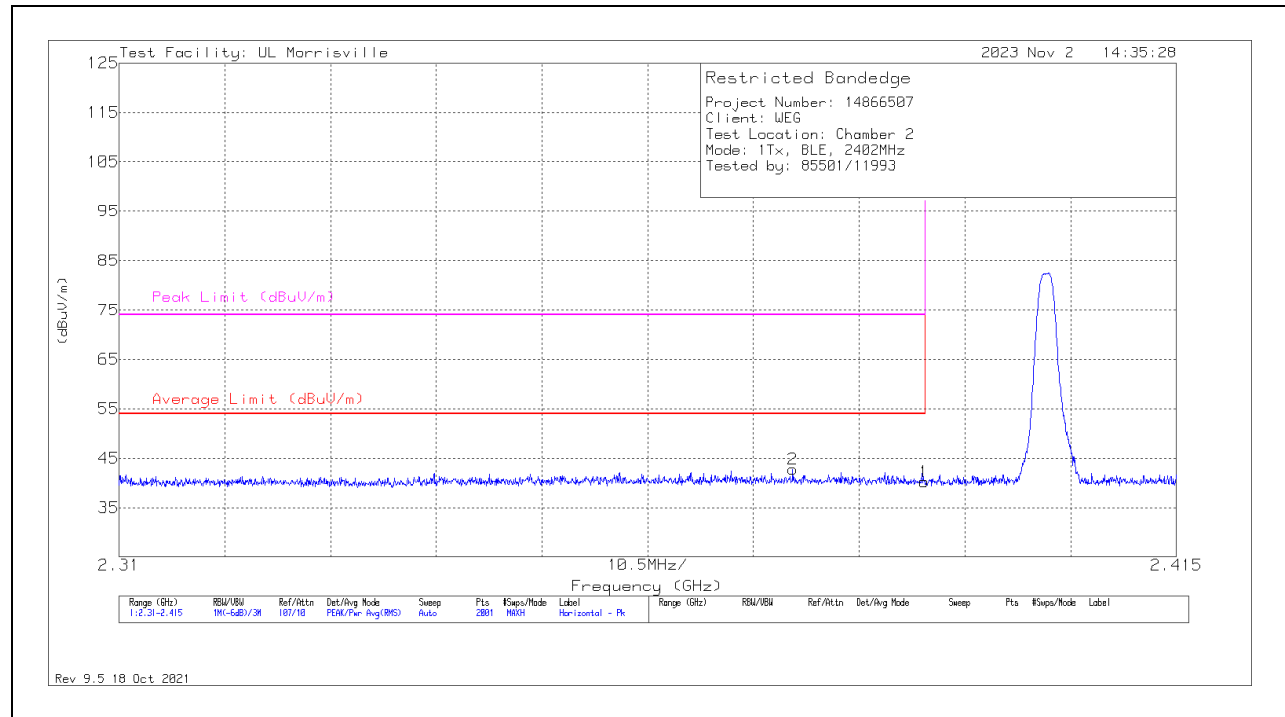
PK2 - Maximum Peak

ADV - Linear Voltage Average

WEGscan101

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



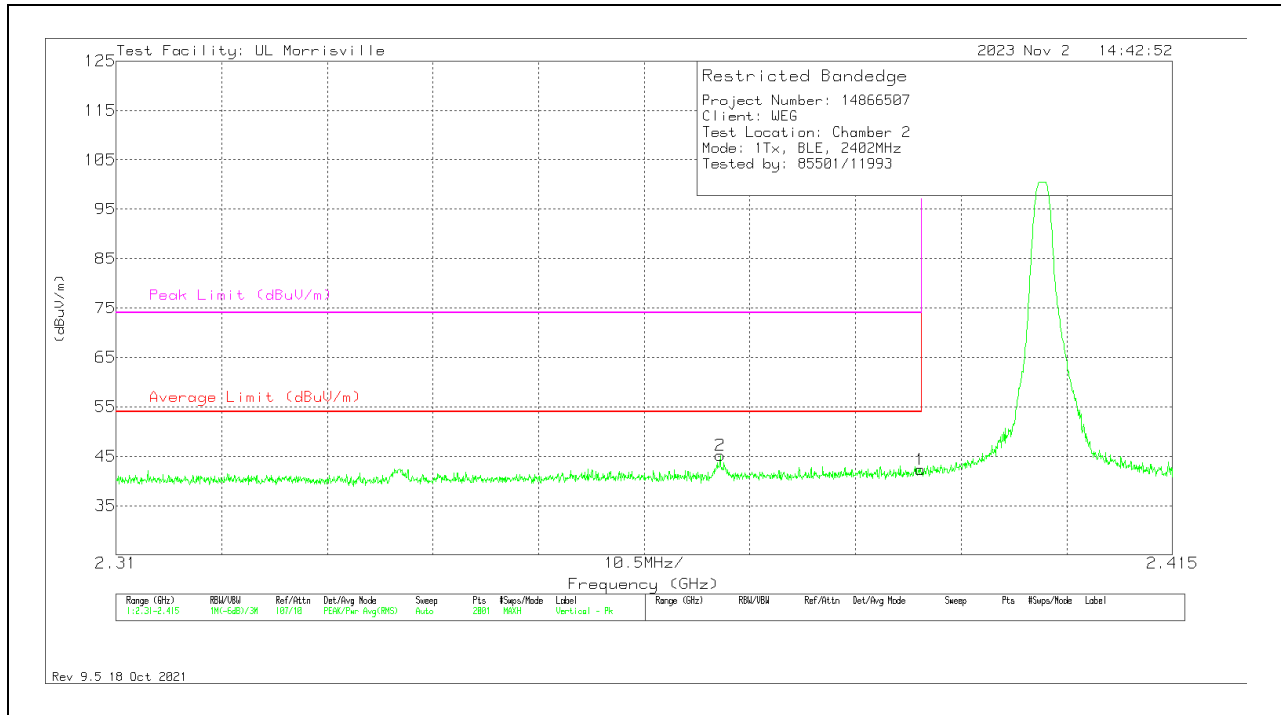
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.2	Pk	32.3	-24.2	40.3	54	-13.7	74	-33.7	24	370	H
2	* ** 2.37689	34.69	Pk	32.2	-24.1	42.79	54	-11.21	74	-31.21	24	370	H

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (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	34.24	Pk	32.3	-24.2	42.34	54	-11.66	74	-31.66	303	211	V
2	* ** 2.37006	37.09	Pk	32.2	-24.1	45.19	54	-8.81	74	-28.81	303	211	V

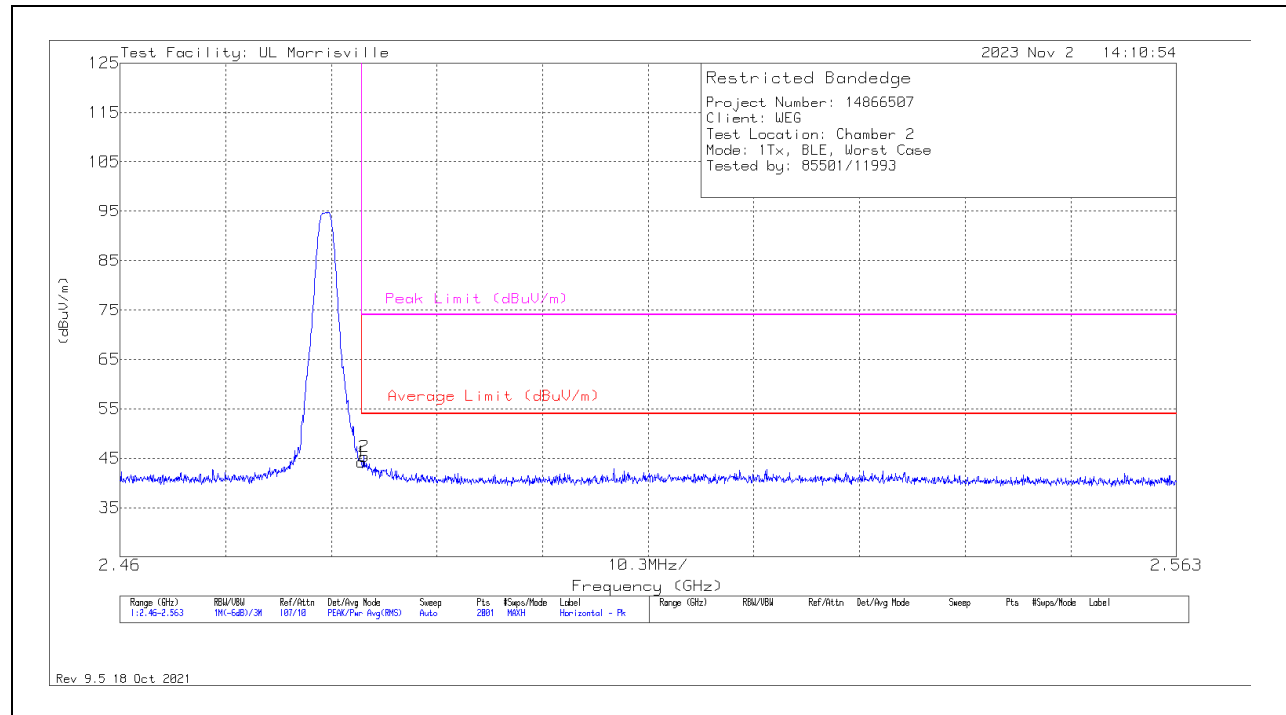
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

BANEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



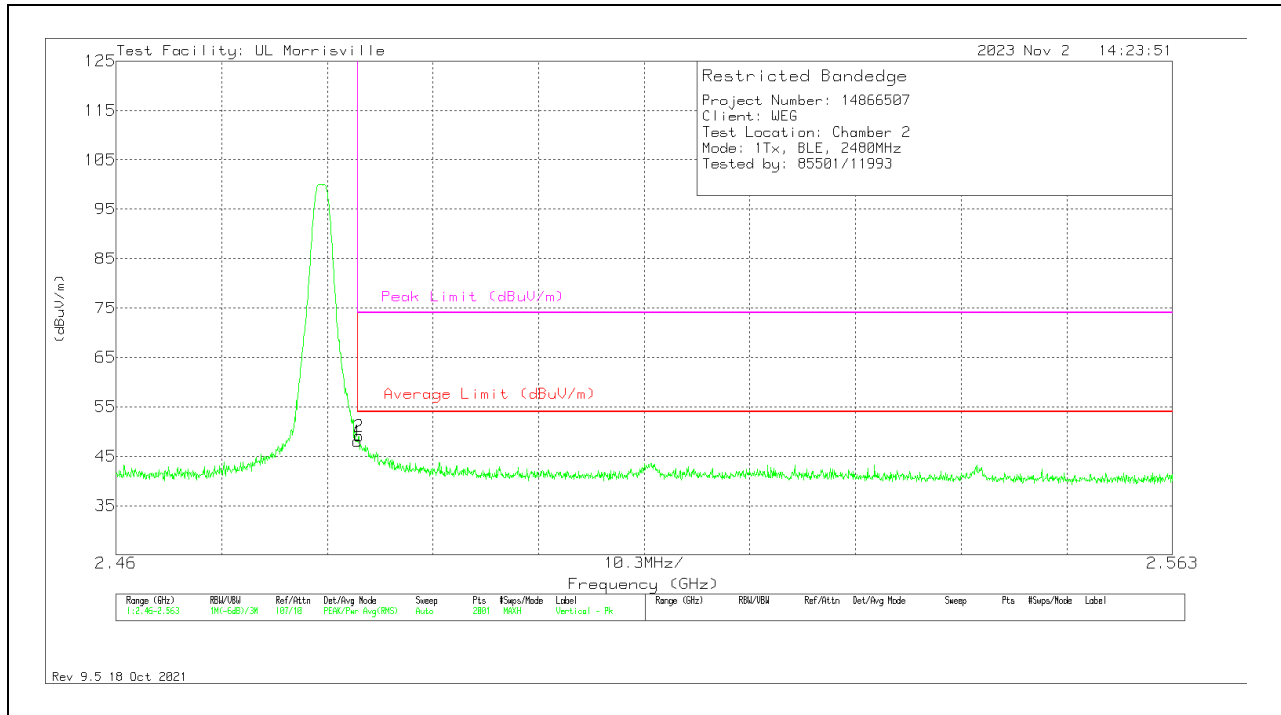
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	36.2	Pk	32.5	-24.5	44.2	54	-9.8	74	-29.8	100	398	H
2	* ** 2.48379	37.38	Pk	32.5	-24.5	45.38	54	-8.62	74	-28.62	100	398	H

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (dB/m)	Gain/Loss (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	40.11	Pk	32.5	-24.5	48.11	54	-5.89	74	-25.89	268	151	V
2	* ** 2.48369	41.11	Pk	32.5	-24.5	49.11	54	-4.89	74	-24.89	268	151	V

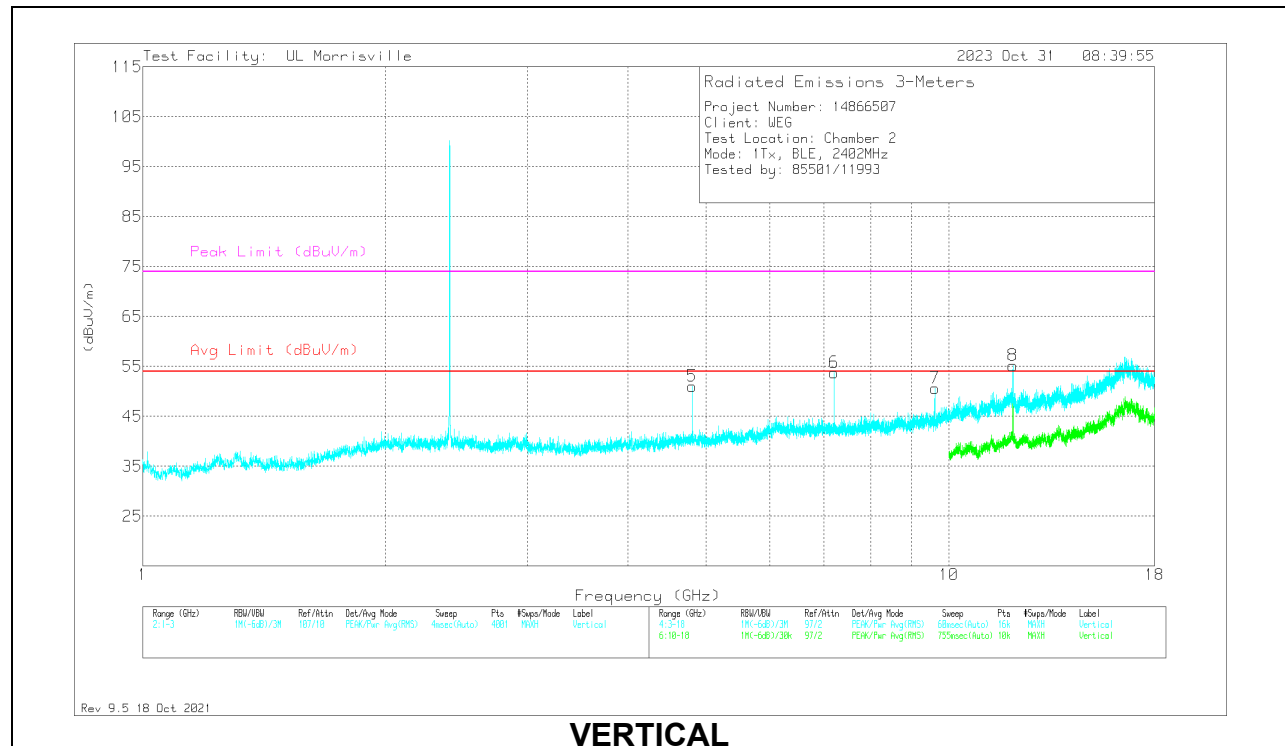
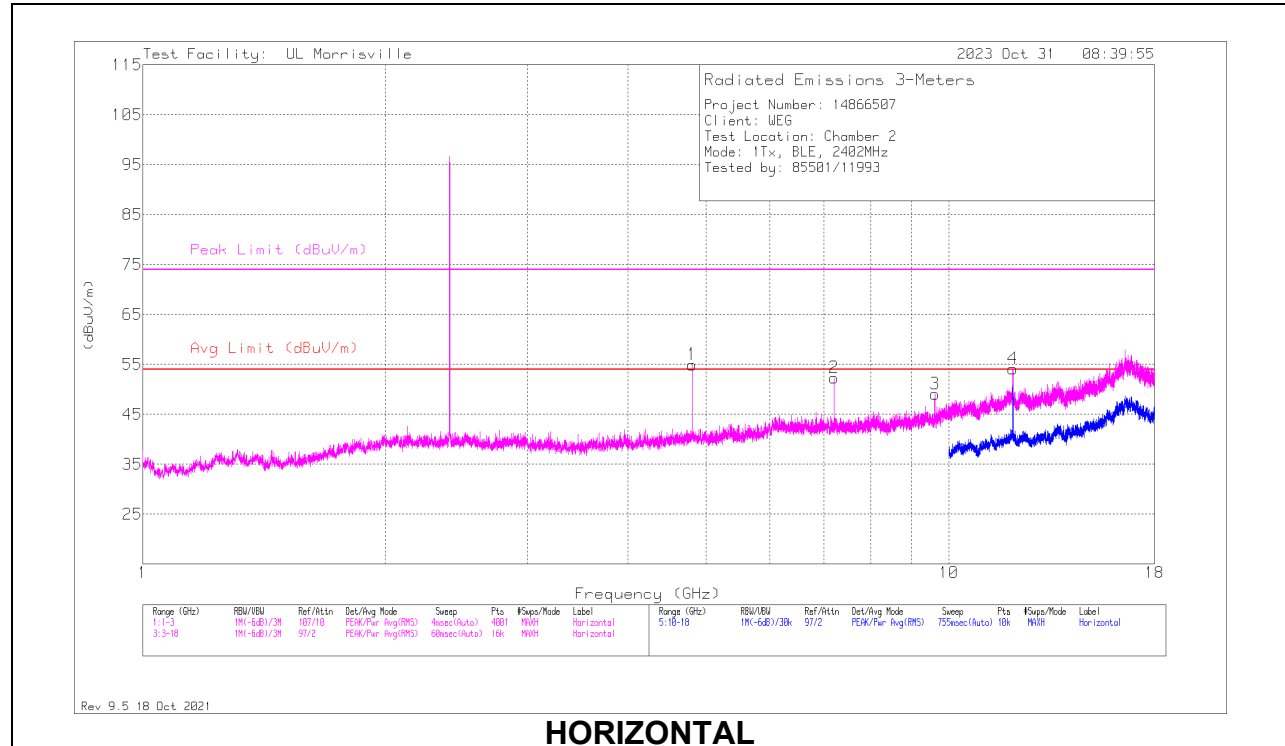
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (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	* ** 4.80353	51.9	PK2	34.2	-30	0	56.1	-	-	74	-17.9	7	355	H
	* ** 4.8042	39.46	ADV	34.2	-30	7.95	51.61	54	-2.39	-	-	7	355	H
4	* ** 12.01144	40.76	PK2	38.9	-22.7	0	56.96	-	-	74	-17.04	355	210	H
	* ** 12.01137	27.42	ADV	38.9	-22.7	7.95	51.57	54	-2.43	-	-	355	210	H
5	* ** 4.80362	50.1	PK2	34.2	-30	0	54.3	-	-	74	-19.7	108	375	V
	* ** 4.80424	37.99	ADV	34.2	-30	7.95	50.14	54	-3.86	-	-	108	375	V
8	* ** 12.01136	38.93	PK2	38.9	-22.7	0	55.13	-	-	74	-18.87	263	357	V
	* ** 12.01139	25.51	ADV	38.9	-22.7	7.95	49.66	54	-4.4	-	-	263	357	V
2	7.20656	43.85	Pk	35.6	-27.1	0	52.35	-	-	-	-	0-360	101	H
6	7.20656	45.28	Pk	35.6	-27.1	0	53.78	-	-	-	-	0-360	101	V
3	9.60938	38.01	Pk	36.5	-25.4	0	49.11	-	-	-	-	0-360	101	H
7	9.60938	39.5	Pk	36.5	-25.4	0	50.6	-	-	-	-	0-360	101	V

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

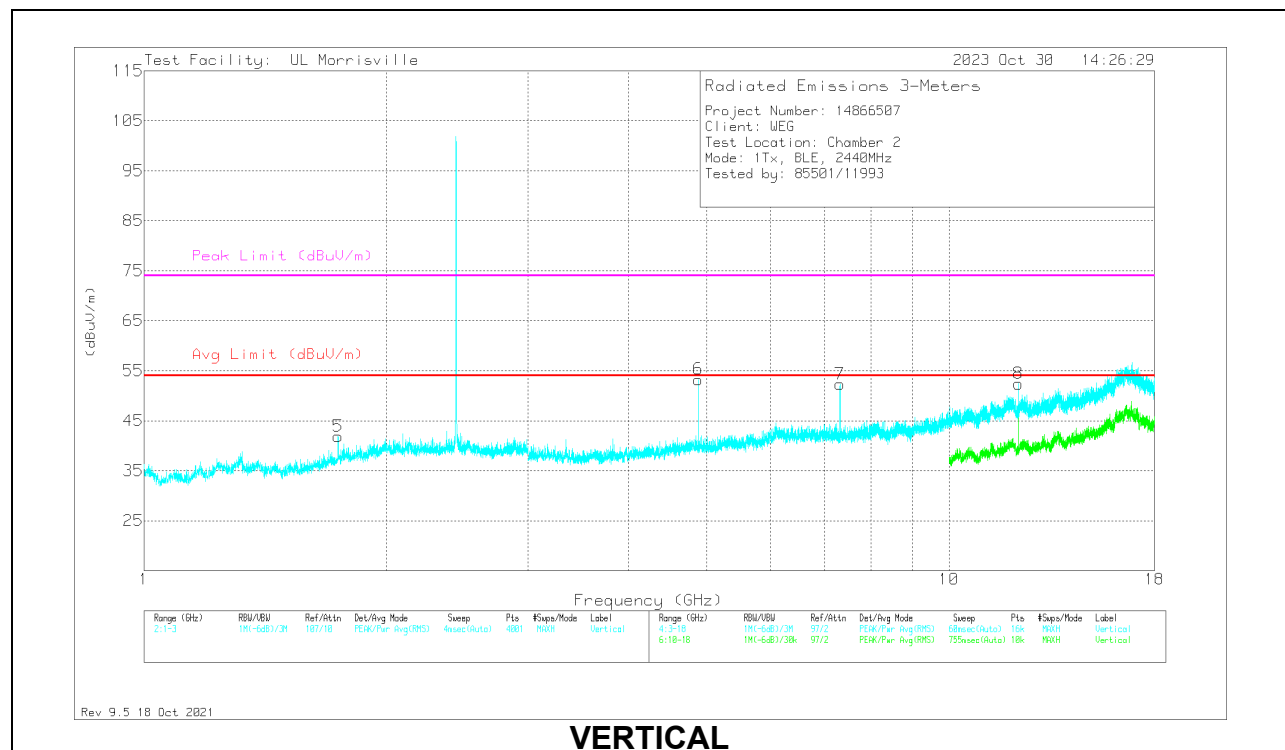
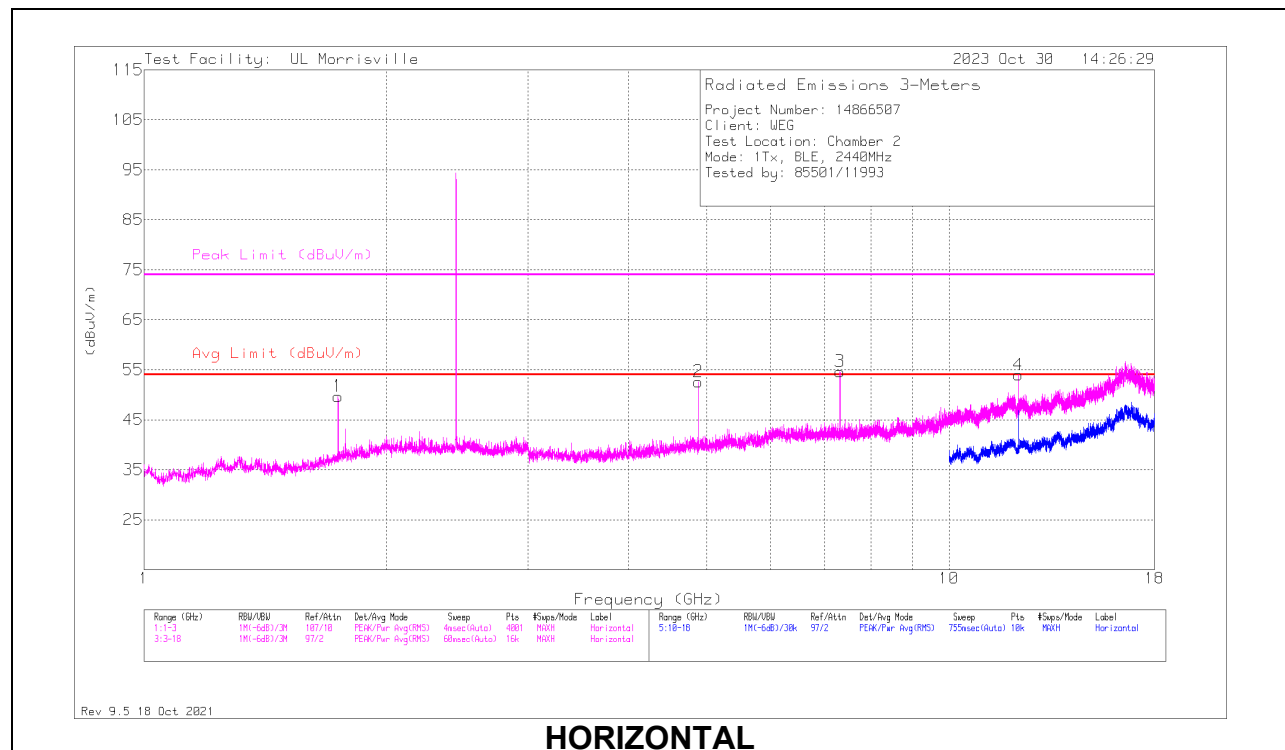
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

PK2 - Maximum Peak

ADV - Linear Voltage Average

MID CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (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	** 1.74007	33.13	PK2	30	-22.5	0	40.63	-	-	74	-33.37	247	156	H
	** 1.74325	19.92	ADV	30	-22.5	7.95	35.37	54	-18.63	-	-	247	156	H
5	** 1.7415	34.36	Pk	30	-22.5	0	41.86	54	-12.14	74	-32.14	0-360	101	V
2	*** 4.88051	51.1	PK2	34.1	-30.4	0	54.8	-	-	74	-19.2	137	222	H
	*** 4.88038	39.3	ADV	34.1	-30.4	7.95	50.95	54	-3.05	-	-	137	222	H
3	*** 7.31937	48.06	PK2	35.6	-26.7	0	56.96	-	-	74	-17.04	228	194	H
	*** 7.32077	35.28	ADV	35.6	-26.7	7.95	52.13	54	-1.87	-	-	228	194	H
4	*** 12.20152	40.96	PK2	38.9	-23.4	0	56.46	-	-	74	-17.54	165	101	H
	*** 12.20145	27.43	ADV	38.9	-23.4	7.95	50.88	54	-3.12	-	-	165	101	H
6	*** 4.87956	51.44	PK2	34.1	-30.4	0	55.14	-	-	74	-18.86	125	102	V
	*** 4.88015	39.32	ADV	34.1	-30.4	7.95	50.97	54	-3.03	-	-	125	102	V
7	*** 7.32084	44.56	PK2	35.6	-26.7	0	53.46	-	-	74	-20.54	360	108	V
	*** 7.3196	30.96	ADV	35.6	-26.7	7.95	47.81	54	-6.19	-	-	360	108	V
8	*** 12.19875	41.49	PK2	38.9	-23.5	0	56.89	-	-	74	-17.11	74	120	V
	*** 12.19893	28.28	ADV	38.9	-23.5	7.95	51.63	54	-2.37	-	-	74	120	V

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

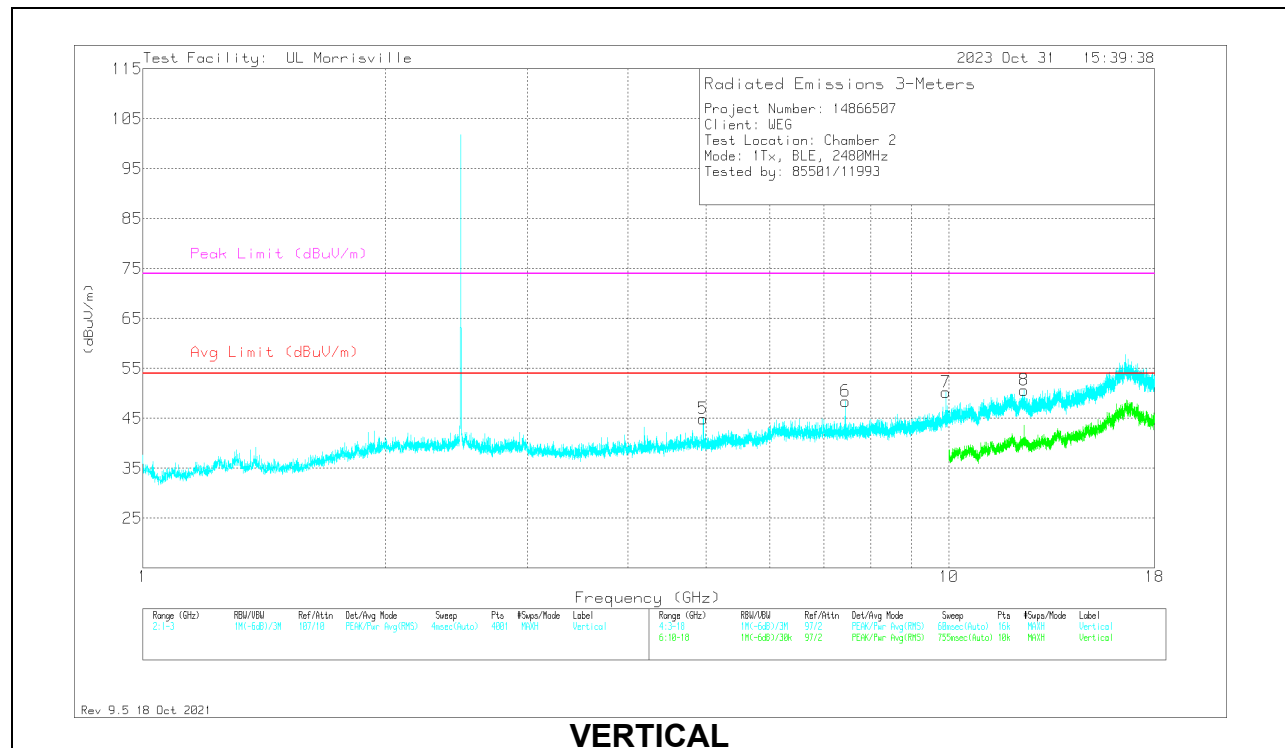
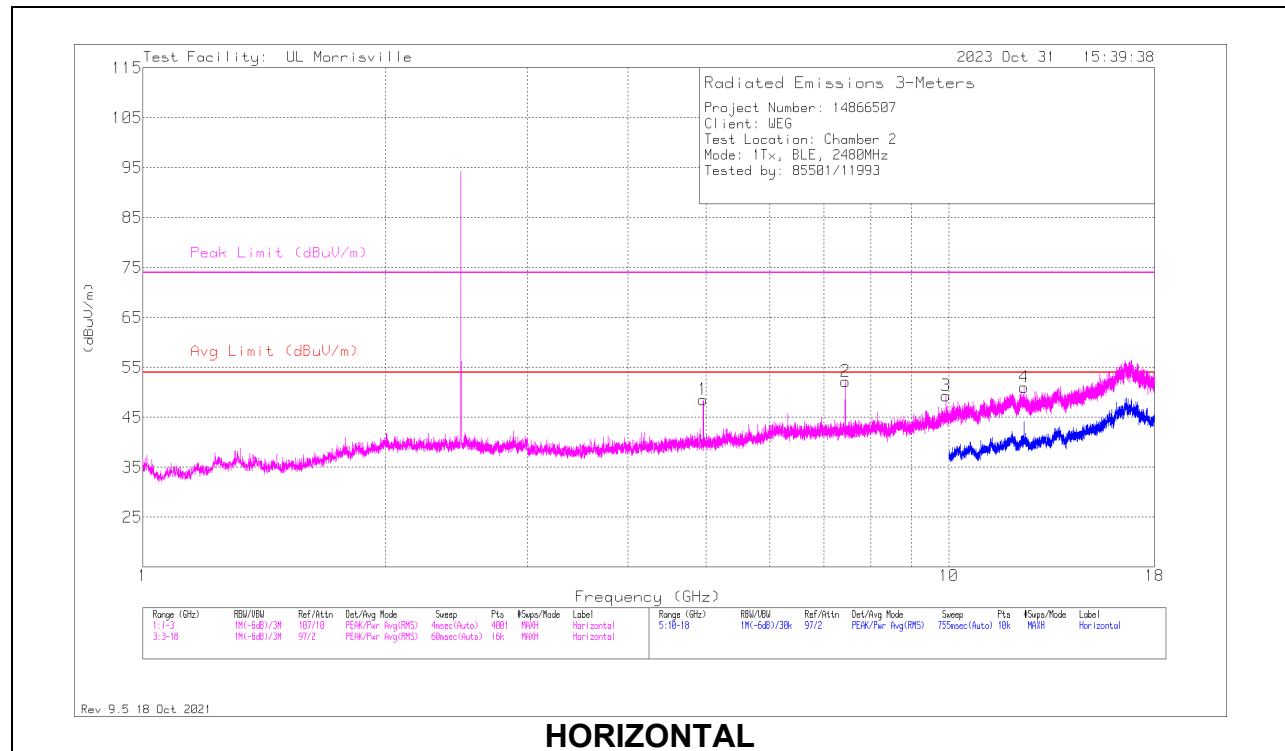
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

PK2 - Maximum Peak

ADV - Linear Voltage Average

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	86408 (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	* ** 4.95951	46.69	PK2	34	-30.3	0	50.39	-	-	74	-23.61	10	102	H
	* ** 4.95969	38.27	ADV	34	-30.3	7.95	49.92	54	-4.08	-	-	10	102	H
2	* ** 7.44087	45.19	PK2	35.6	-27	0	53.79	-	-	74	-20.21	310	101	H
	* ** 7.44064	36.47	ADV	35.6	-27	7.95	53.02	54	-.98	-	-	310	101	H
4	* ** 12.39893	38.05	PK2	38.8	-23.5	0	53.35	-	-	74	-20.65	340	351	H
	* ** 12.39885	27.13	ADV	38.8	-23.5	7.95	50.38	54	-3.62	-	-	340	351	H
5	* ** 4.95938	41.24	Pk	34	-30.3	0	44.94	54	-9.06	74	-29.06	0-360	101	V
6	* ** 7.4393	43.93	PK2	35.6	-26.9	0	52.63	-	-	74	-21.37	204	337	V
	* ** 7.43942	34.35	ADV	35.6	-26.9	7.95	51	54	-3	-	-	204	337	V
8	* ** 12.39882	36.82	PK2	38.8	-23.5	0	52.12	-	-	74	-21.88	39	340	V
	* ** 12.3989	25.19	ADV	38.8	-23.5	7.95	48.44	54	-5.56	-	-	39	340	V
3	9.91875	37.05	Pk	37.1	-24.8	0	49.35	-	-	-	-	0-360	199	H
7	9.91875	37.94	Pk	37.1	-24.8	0	50.24	-	-	-	-	0-360	199	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

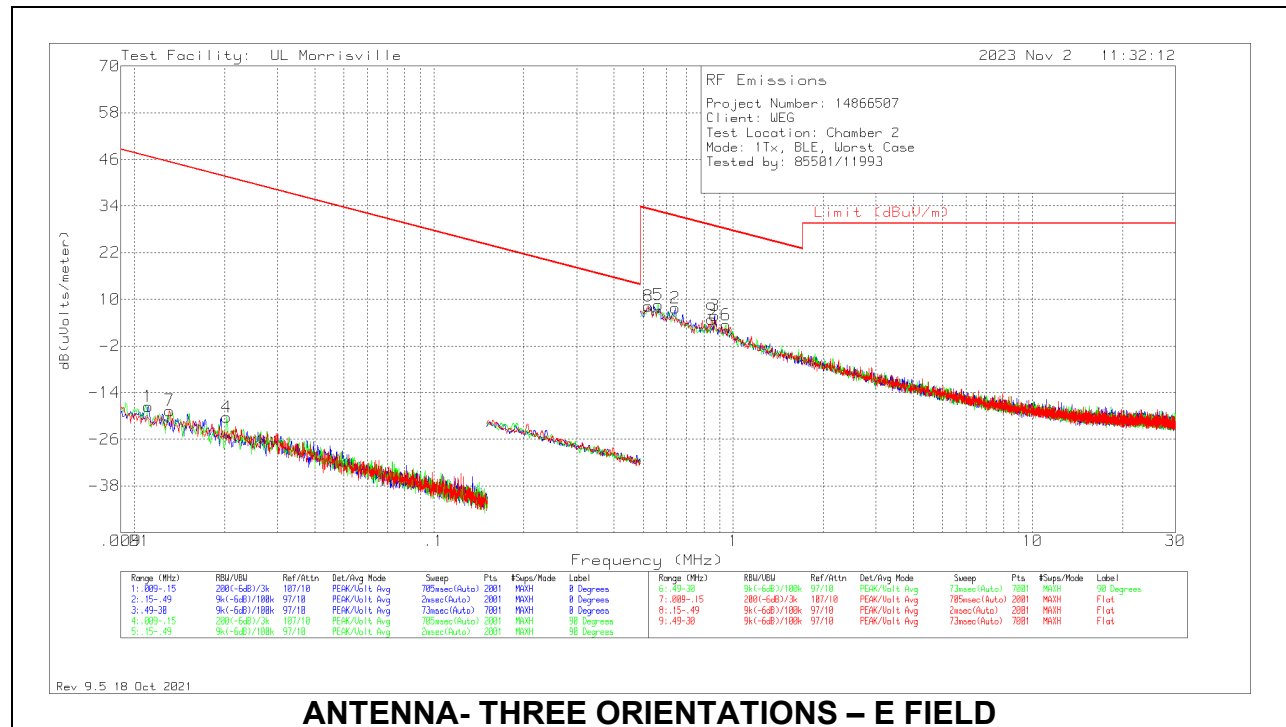
ADV - Linear Voltage Average

10.3. WORST CASE BELOW 30MHZ

WEGscan100

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 $40 \cdot \log(\text{test distance} / \text{specification distance})$.

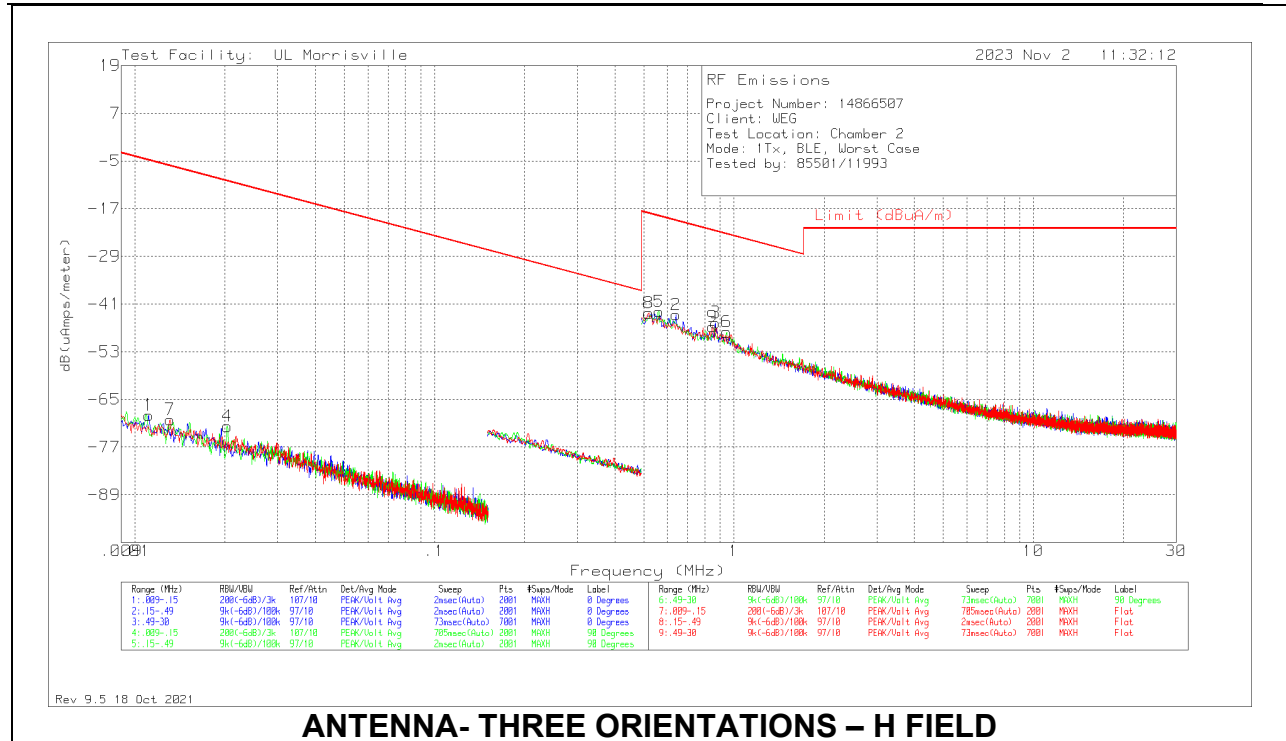


ANTENNA- THREE ORIENTATIONS – E FIELD

Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/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	.01113	43.6	Pk	18.8	.1	-80	-17.5	46.67	66.67	-64.17	0-360	0 degs
7	.01312	43.38	Pk	17.9	.1	-80	-18.62	45.25	65.25	-63.87	0-360	Flat
4	.02036	44.73	Pk	14.9	.1	-80	-20.27	41.43	61.43	-61.7	0-360	90 degs
8	.51951	35.92	Pk	12.2	.1	-40	8.22	33.29	-	-25.07	0-360	Flat
5	.56167	36.29	Pk	12.2	.1	-40	8.59	32.61	-	-24.02	0-360	90 degs
2	.64178	35.5	Pk	12.2	.1	-40	7.8	31.46	-	-23.66	0-360	0 degs
9	.84836	32.39	Pk	12.2	.2	-40	4.79	29.03	-	-24.24	0-360	Flat
3	.86944	33.36	Pk	12.2	.2	-40	5.76	28.82	-	-23.06	0-360	0 degs
6	.94533	31.06	Pk	12.2	.2	-40	3.46	28.09	-	-24.63	0-360	90 degs

Pk - Peak detector



ANTENNA- THREE ORIENTATIONS – H FIELD

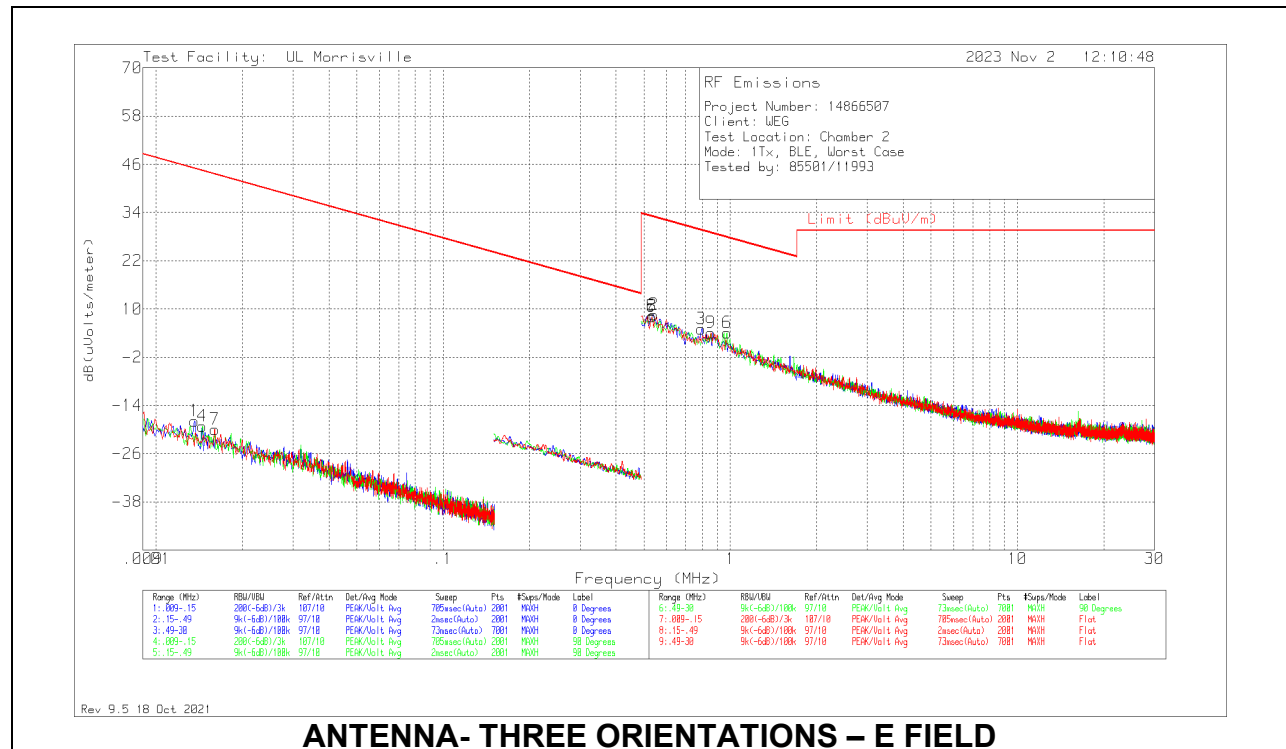
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	.01113	43.6	Pk	-32.7	.1	-80	-69	-4.83	15.17	-64.17	0-360	0 degs
7	.01312	43.38	Pk	-33.6	.1	-80	-70.12	-6.25	13.75	-63.87	0-360	Flat
4	.02036	44.73	Pk	-36.6	.1	-80	-71.77	-10.07	9.93	-61.7	0-360	90 degs
8	.51951	35.92	Pk	-39.3	.1	-40	-43.28	-18.21	-	-25.07	0-360	Flat
5	.56167	36.29	Pk	-39.3	.1	-40	-42.91	-18.89	-	-24.02	0-360	90 degs
2	.64178	35.5	Pk	-39.3	.1	-40	-43.7	-20.04	-	-23.66	0-360	0 degs
9	.84836	32.39	Pk	-39.3	.2	-40	-46.71	-22.47	-	-24.24	0-360	Flat
3	.86944	33.36	Pk	-39.3	.2	-40	-45.74	-22.68	-	-23.06	0-360	0 degs
6	.94533	31.06	Pk	-39.3	.2	-40	-48.04	-23.41	-	-24.63	0-360	90 degs

Pk - Peak detector

WEGscan101

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

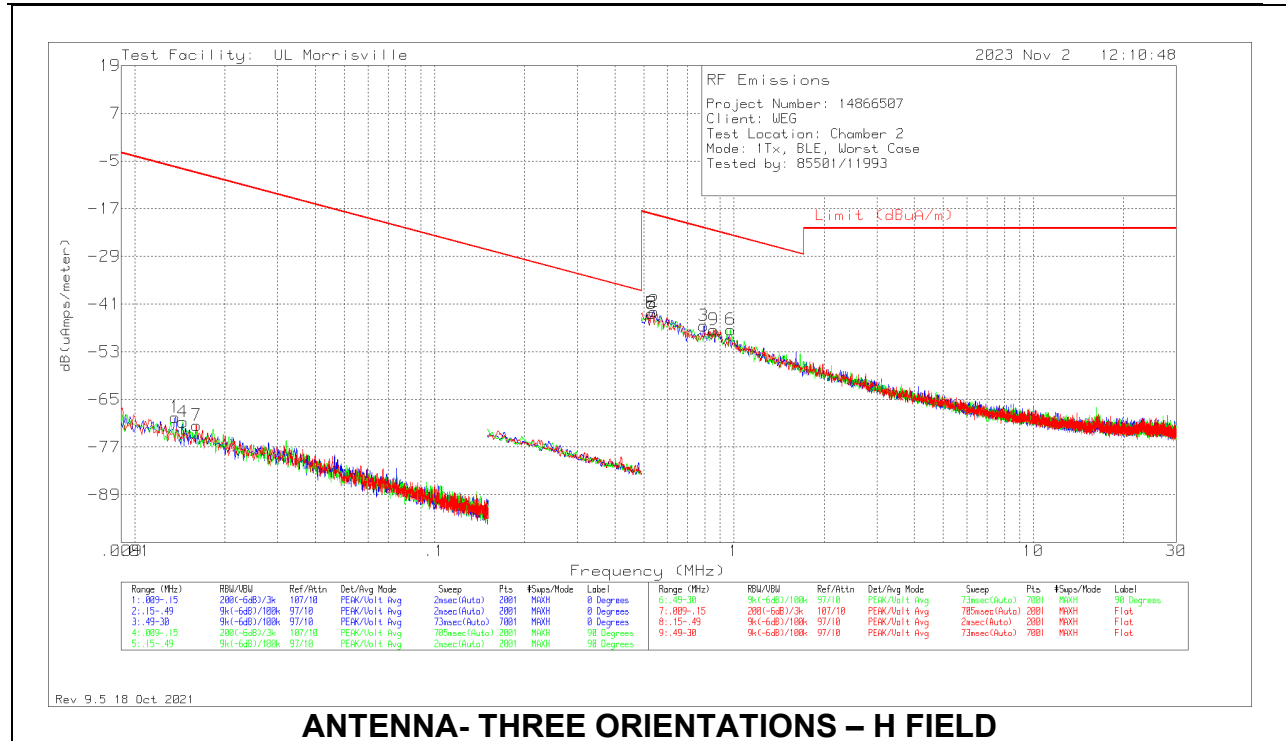
Note: All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance 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 $40 \cdot \log(\text{test distance} / \text{specification distance})$.



Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/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	.01362	44.25	Pk	17.7	.1	-80	-17.95	44.92	64.92	-62.87	0-360	0 degs
4	.01447	43.43	Pk	17.3	.1	-80	-19.17	44.4	64.4	-63.57	0-360	90 degs
7	.01603	43.3	Pk	16.6	.1	-80	-20	43.51	63.51	-63.51	0-360	Flat
5	.53216	35.84	Pk	12.2	.1	-40	8.14	33.08	-	-24.94	0-360	90 degs
8	.53216	35.87	Pk	12.2	.1	-40	8.17	33.08	-	-24.91	0-360	Flat
2	.54059	36.32	Pk	12.2	.1	-40	8.62	32.95	-	-24.33	0-360	0 degs
3	.79355	32.74	Pk	12.2	.1	-40	5.04	29.61	-	-24.57	0-360	0 degs
9	.85679	31.61	Pk	12.2	.2	-40	4.01	28.95	-	-24.94	0-360	Flat
6	.97484	31.67	Pk	12.2	.2	-40	4.07	27.83	-	-23.76	0-360	90 degs

Pk - Peak detector



ANTENNA- THREE ORIENTATIONS – H FIELD

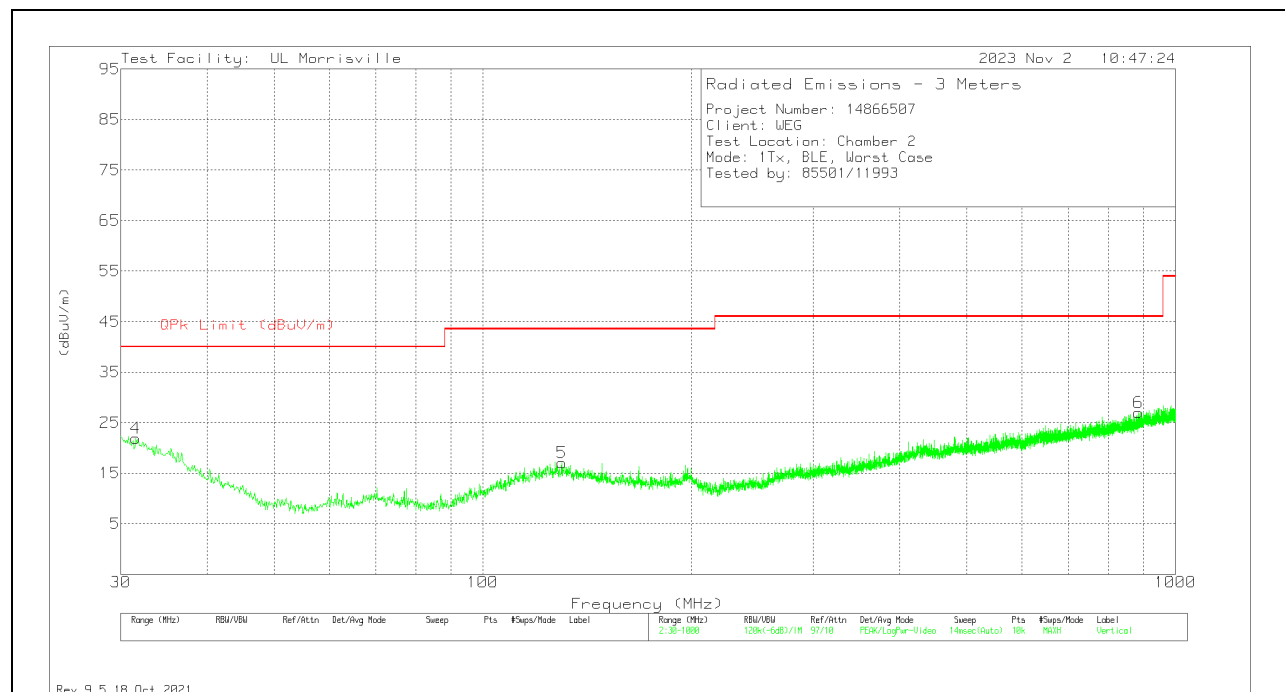
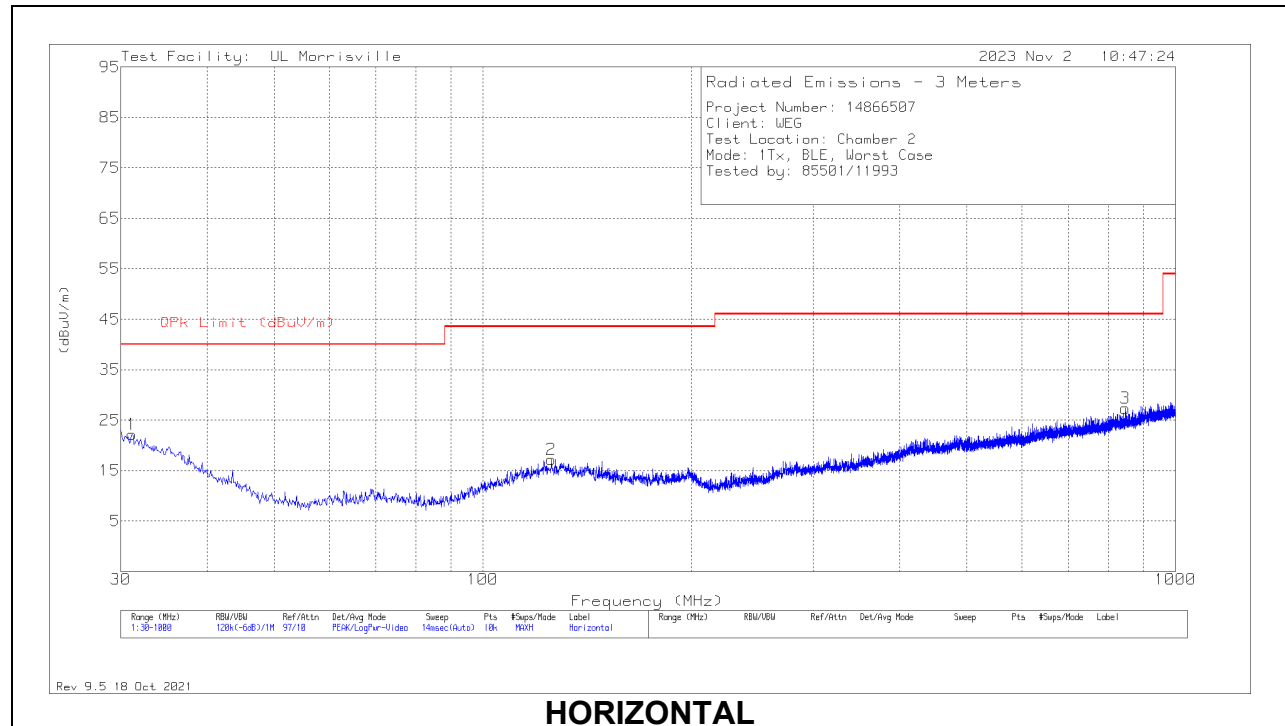
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	.01362	44.25	Pk	-33.8	.1	-80	-69.45	-6.58	13.42	-62.87	0-360	0 degs
4	.01447	43.43	Pk	-34.2	.1	-80	-70.67	-7.1	12.9	-63.57	0-360	90 degs
7	.01603	43.3	Pk	-34.9	.1	-80	-71.5	-7.99	12.01	-63.51	0-360	Flat
5	.53216	35.84	Pk	-39.3	.1	-40	-43.36	-18.42	-	-24.94	0-360	90 degs
8	.53216	35.87	Pk	-39.3	.1	-40	-43.33	-18.42	-	-24.91	0-360	Flat
2	.54059	36.32	Pk	-39.3	.1	-40	-42.88	-18.55	-	-24.33	0-360	0 degs
3	.79355	32.74	Pk	-39.3	.1	-40	-46.46	-21.89	-	-24.57	0-360	0 degs
9	.85679	31.61	Pk	-39.3	.2	-40	-47.49	-22.55	-	-24.94	0-360	Flat
6	.97484	31.67	Pk	-39.3	.2	-40	-47.43	-23.67	-	-23.76	0-360	90 degs

Pk - Peak detector

10.4. WORST CASE BELOW 1 GHZ

WEGscan100

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



VERTICAL

Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	85717 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	31.164	28.01	Pk	25.8	-31.6	22.21	40	-17.79	0-360	99	H
4	31.552	27.94	Pk	25.6	-31.6	21.94	40	-18.06	0-360	101	V
2	* **125.545	28.1	Pk	19.7	-30.6	17.2	43.52	-26.32	0-360	99	H
5	* **129.91	28.2	Pk	19.7	-30.8	17.1	43.52	-26.42	0-360	299	V
3	**845.867	27.11	Pk	27.1	-26.9	27.31	46.02	-18.71	0-360	199	H
6	**884.57	26.05	Pk	27.2	-26.2	27.05	46.02	-18.97	0-360	101	V

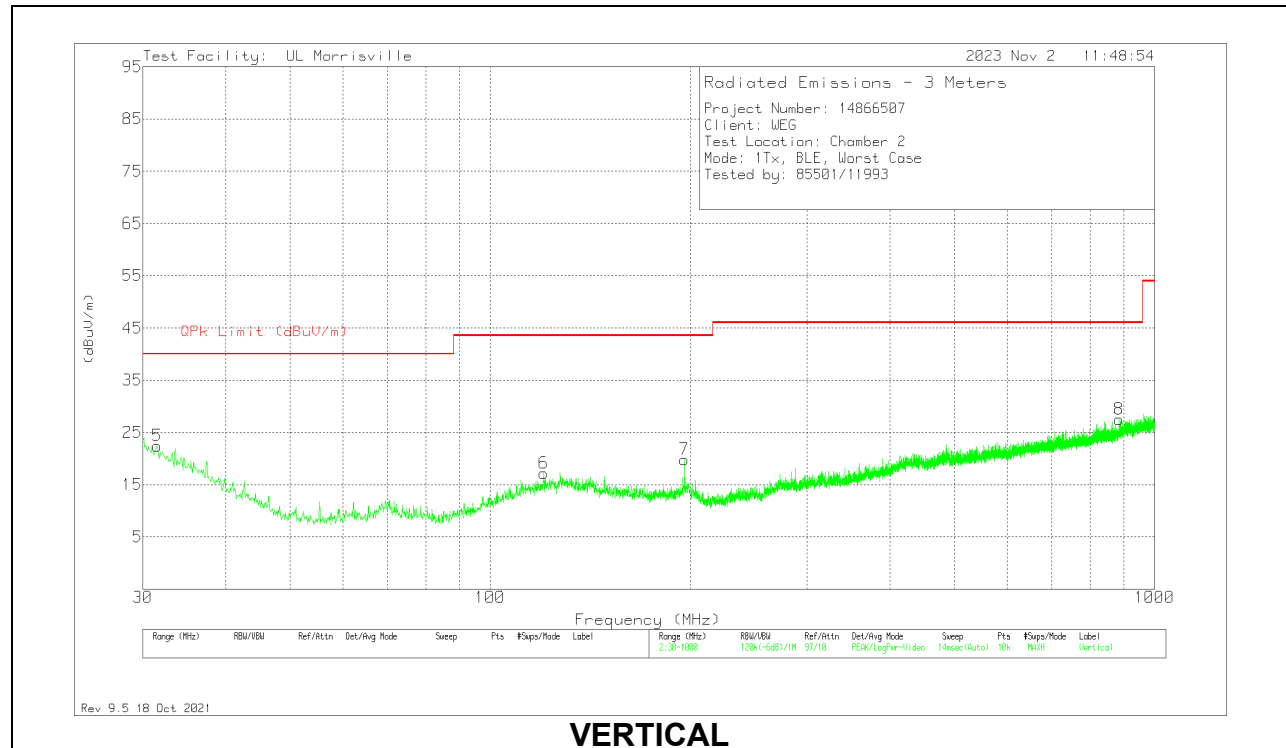
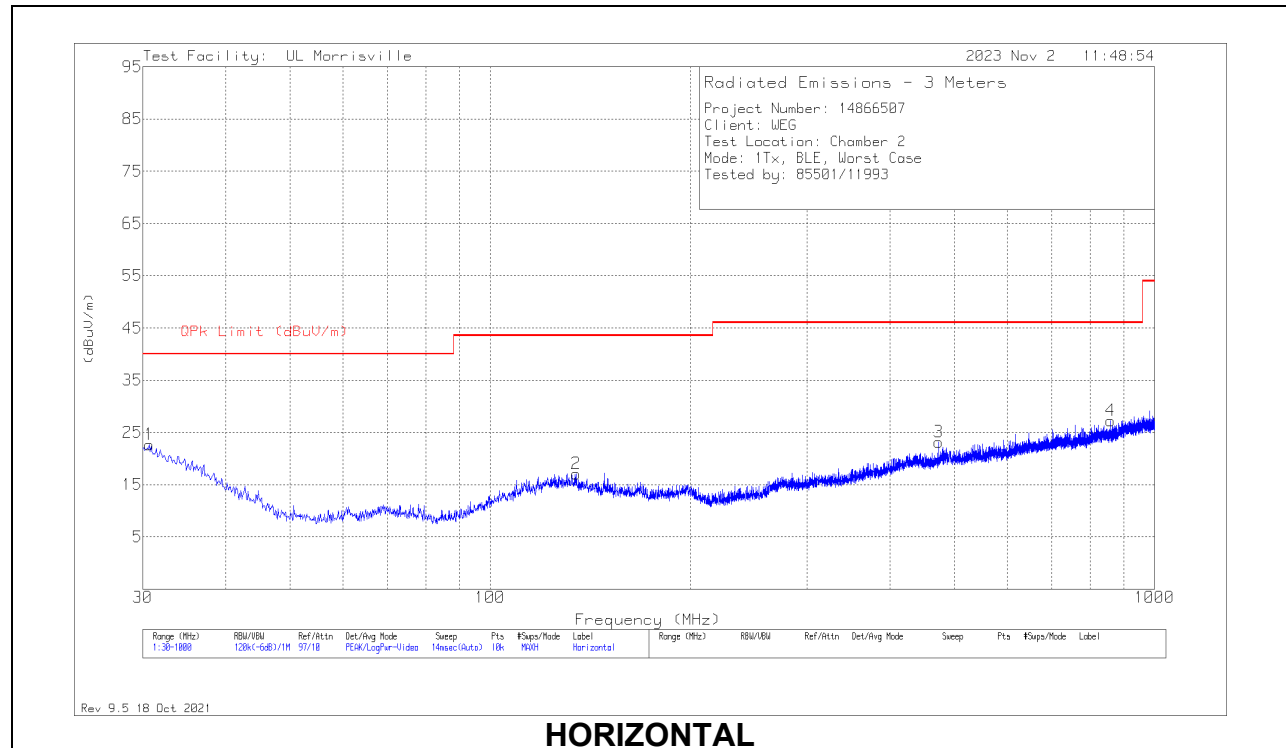
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

WEGscan101

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



Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	85717 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.679	28.29	Pk	26.1	-31.7	22.69	40	-17.31	0-360	299	H
5	31.552	28.42	Pk	25.6	-31.6	22.42	40	-17.58	0-360	101	V
6	* **20.501	28.51	Pk	19.5	-30.8	17.21	43.52	-26.31	0-360	199	V
2	* **134.663	28.28	Pk	19.5	-30.7	17.08	43.52	-26.44	0-360	199	H
7	196.064	31.98	Pk	18.2	-30.4	19.78	43.52	-23.74	0-360	199	V
3	473.581	28.44	Pk	23.1	-28.4	23.14	46.02	-22.88	0-360	399	H
4	**858.962	26.66	Pk	27.1	-26.5	27.26	46.02	-18.76	0-360	399	H
8	**884.861	26.64	Pk	27.2	-26.3	27.54	46.02	-18.48	0-360	101	V

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

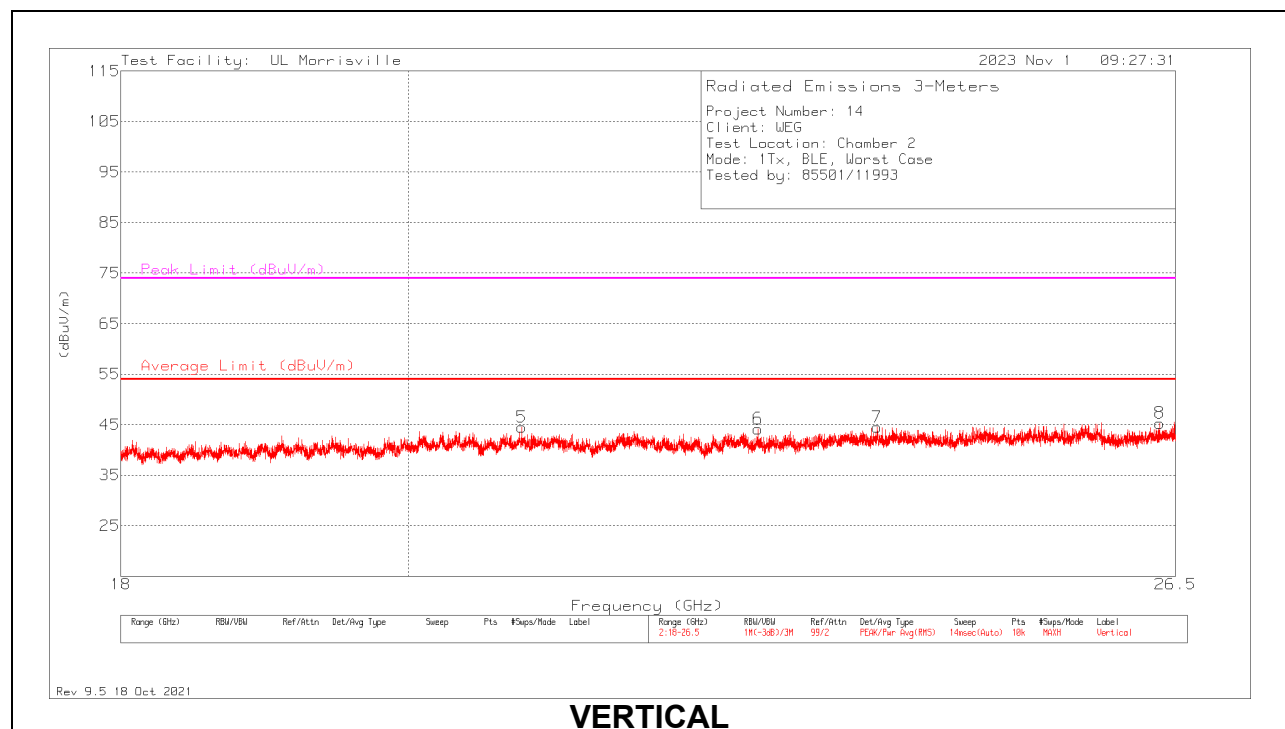
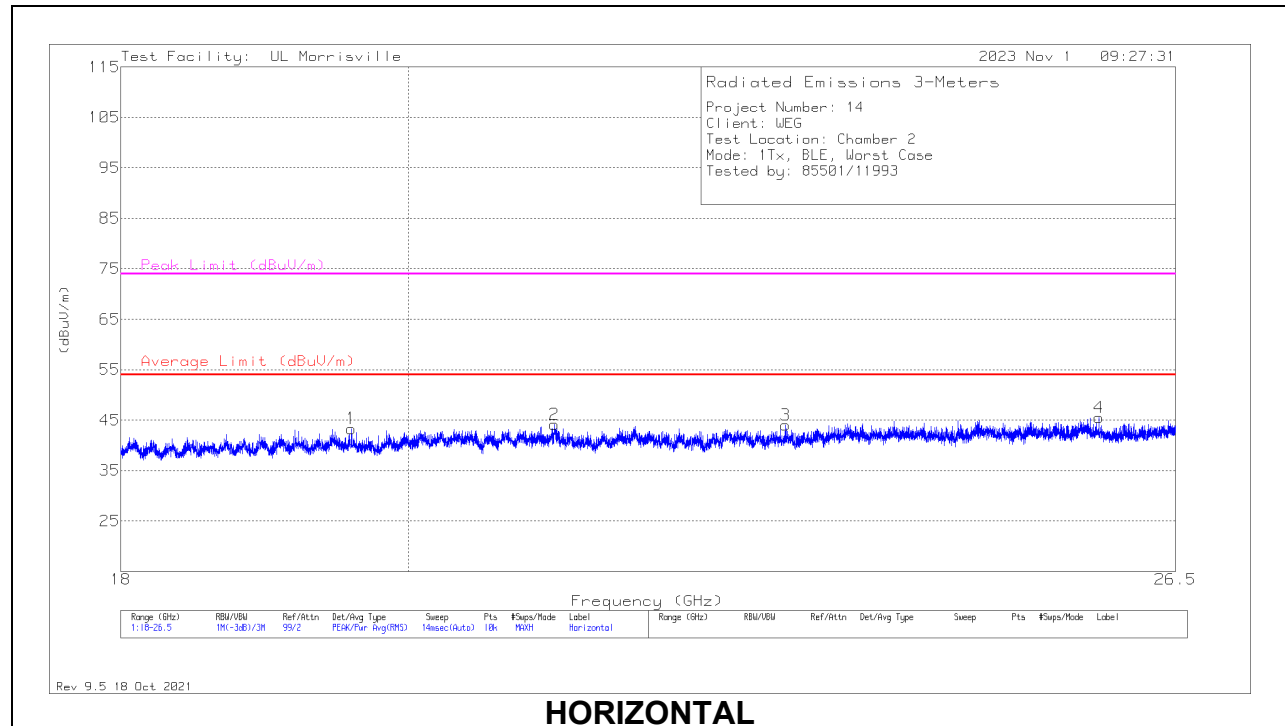
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

10.5. WORST CASE 18-26 GHZ

WEGscan100

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



Page 80 of 87

18 – 26GHz Data

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	204704 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 19.58796	48.23	Pk	33.2	-38.1	43.33	54	-10.67	74	-30.67	0-360	150	H
2	* ** 21.10451	48.47	Pk	33.7	-38	44.17	54	-9.83	74	-29.83	0-360	249	H
3	* ** 22.9679	47.54	Pk	34	-37.5	44.04	54	-9.96	74	-29.96	0-360	249	H
5	* ** 20.85204	49.25	Pk	33.4	-38.1	44.55	54	-9.45	74	-29.45	0-360	300	V
6	* ** 22.73667	47.5	Pk	34.1	-37.4	44.2	54	-9.8	74	-29.8	0-360	150	V
7	* ** 23.75593	47.36	Pk	34.4	-37.3	44.46	54	-9.54	74	-29.54	0-360	101	V
4	25.76808	46.39	Pk	35.3	-36.2	45.49	54	-8.51	74	-28.51	0-360	150	H
8	26.34528	46.32	Pk	35.4	-36.4	45.32	54	-8.68	74	-28.68	0-360	101	V

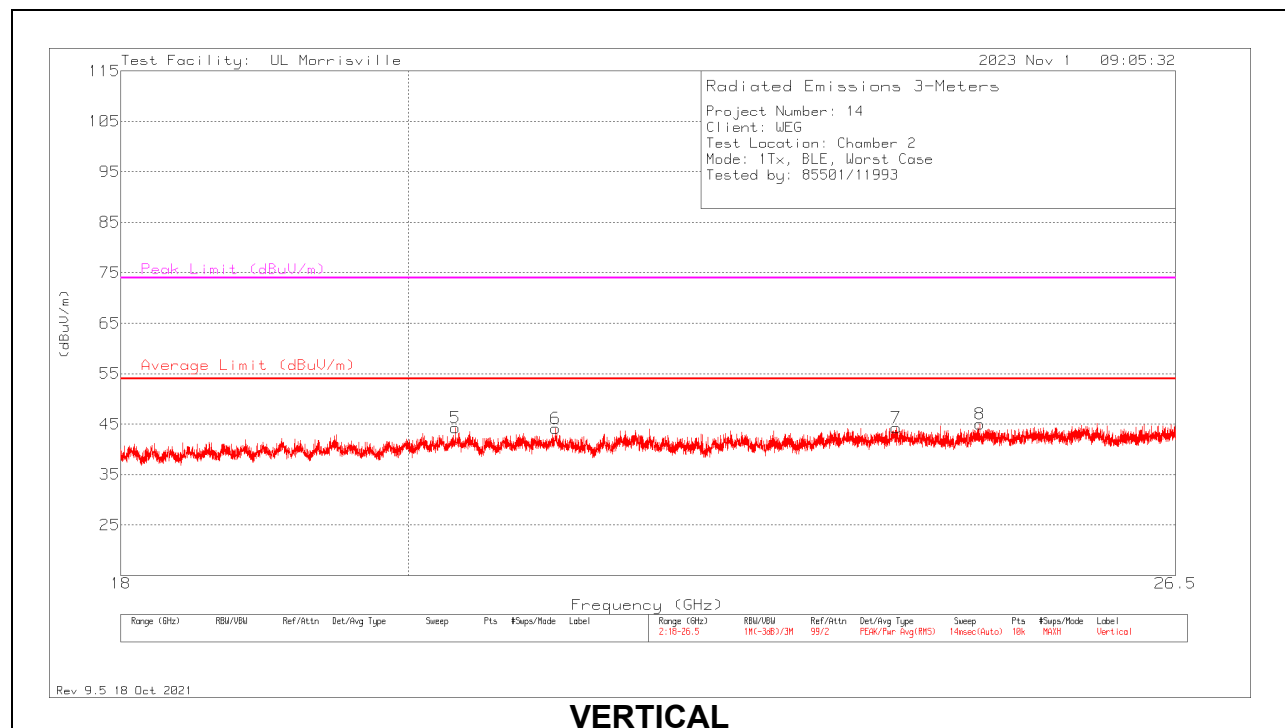
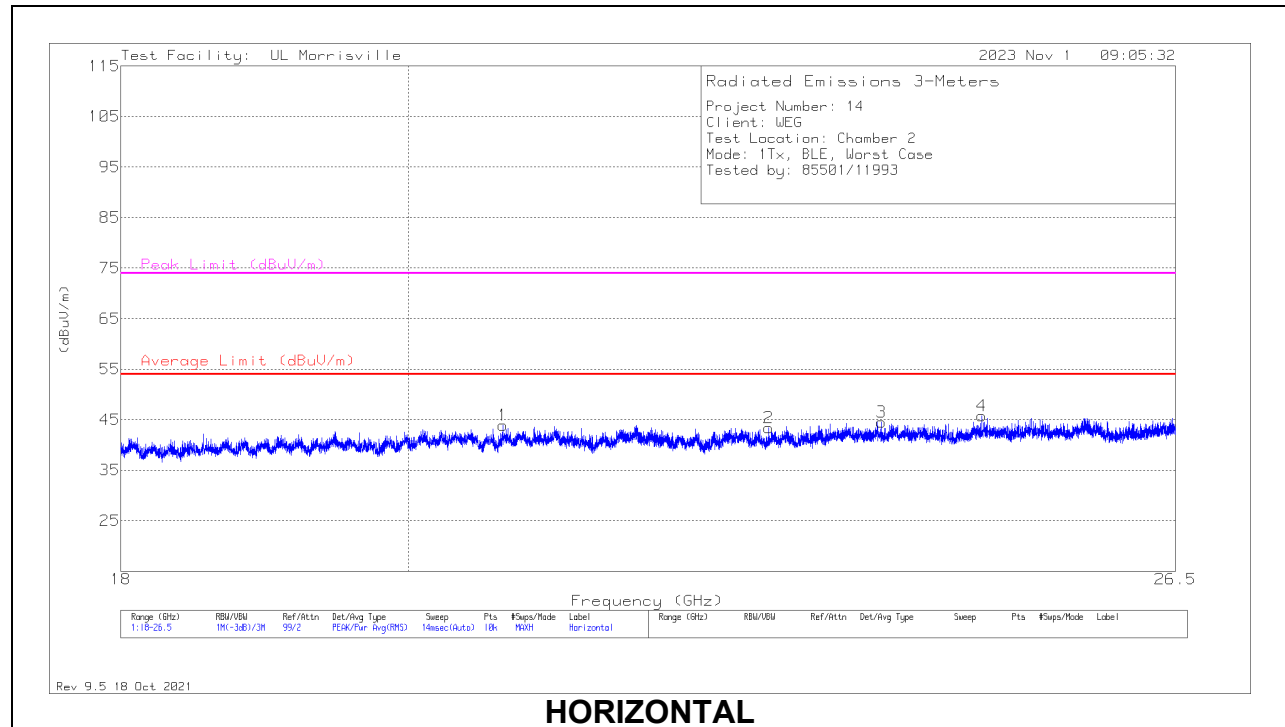
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

WEGscan101

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



18 – 26GHz Data

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	204704 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 20.70837	47.99	Pk	33.6	-37.7	43.89	54	-10.11	74	-30.11	0-360	300	H
2	* ** 22.83018	46.94	Pk	34.1	-37.6	43.44	54	-10.56	74	-30.56	0-360	149	H
3	* ** 23.79333	47.24	Pk	34.4	-37.1	44.54	54	-9.46	74	-29.46	0-360	199	H
5	* ** 20.35049	48.46	Pk	33.6	-37.8	44.26	54	-9.74	74	-29.74	0-360	151	V
6	* ** 21.11046	48.33	Pk	33.7	-37.9	44.13	54	-9.87	74	-29.87	0-360	250	V
7	* ** 23.92084	46.92	Pk	34.4	-37	44.32	54	-9.68	74	-29.68	0-360	300	V
8	24.66722	47.02	Pk	35	-37	45.02	54	-8.98	74	-28.98	0-360	151	V
4	24.68337	47.69	Pk	35.1	-37	45.79	54	-8.21	74	-28.21	0-360	300	H

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)
RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 [*]	56 to 46 [*]
0.5-5	56	46
5-30	60	50

^{*} Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

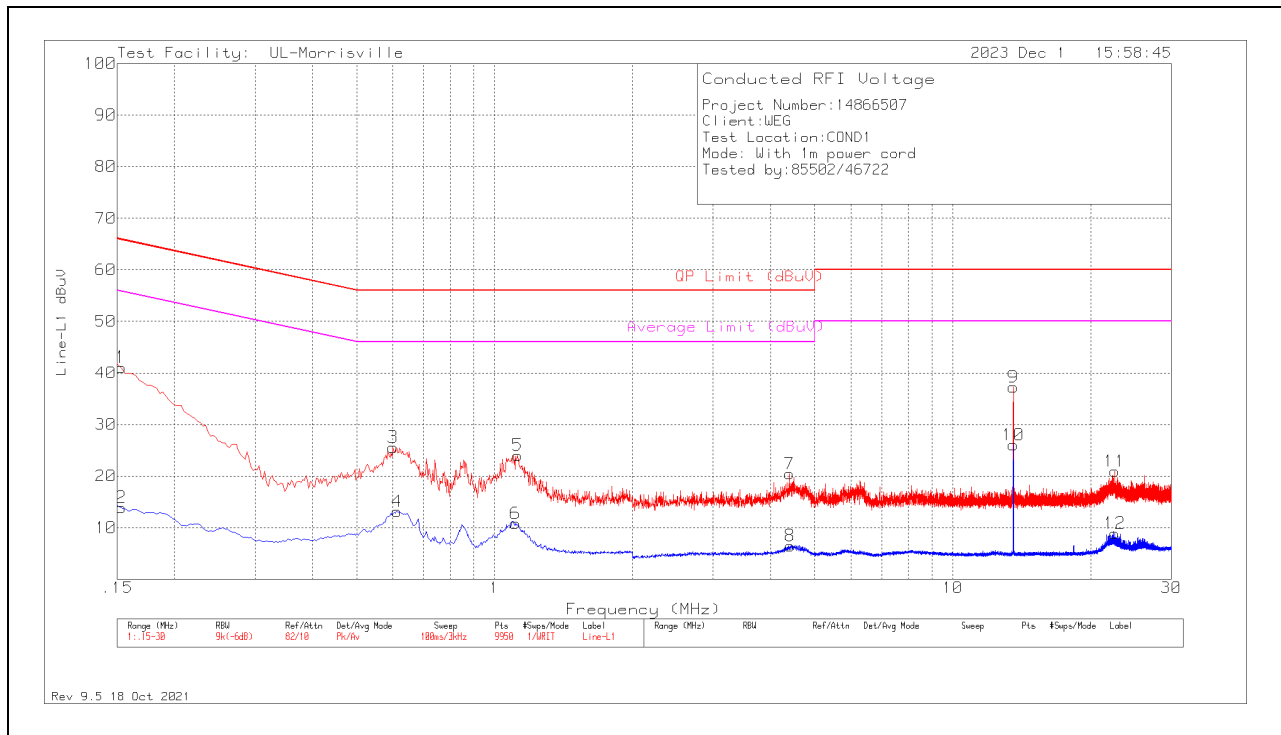
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both lines.

RESULTS

11.1. AC POWER LINE NORM (WEGSCAN101)

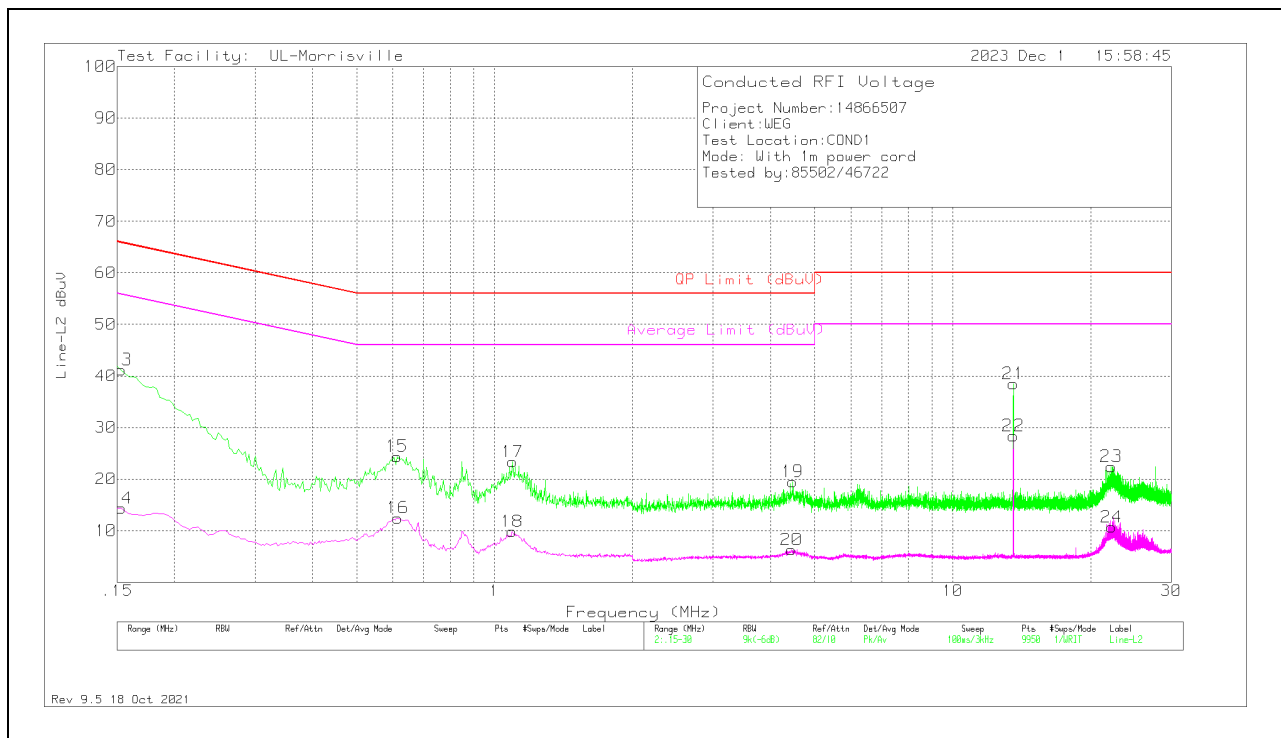
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.153	30.98	Pk	.3	9.8	41.08	65.84	-24.76	-	-
2	.153	3.78	Av	.3	9.8	13.88	-	-	55.84	-41.96
3	.6	15.7	Pk	.1	9.8	25.6	56	-30.4	-	-
4	.612	3.23	Av	.1	9.8	13.13	-	-	46	-32.87
5	1.122	14.12	Pk	.1	9.8	24.02	56	-31.98	-	-
6	1.11	.91	Av	.1	9.8	10.81	-	-	46	-35.19
7	4.398	10.44	Pk	.1	9.9	20.44	56	-35.56	-	-
8	4.413	-3.54	Av	.1	9.9	6.46	-	-	46	-39.54
9	13.563	27.04	Pk	.2	10	37.24	60	-22.76	-	-
10	13.563	15.85	Av	.2	10	26.05	-	-	50	-23.95
11	22.572	10.52	Pk	.2	10.2	20.92	60	-39.08	-	-
12	22.581	-1.52	Av	.2	10.2	8.88	-	-	50	-41.12

Pk - Peak detector
Av - Average detection

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
13	.153	31.08	Pk	.3	9.8	41.18	65.84	-24.66	-	-
14	.153	4.26	Av	.3	9.8	14.36	-	-	55.84	-41.48
15	.612	14.48	Pk	.1	9.8	24.38	56	-31.62	-	-
16	.615	2.56	Av	.1	9.8	12.46	-	-	46	-33.54
17	1.095	13.44	Pk	.1	9.8	23.34	56	-32.66	-	-
18	1.092	-.05	Av	.1	9.8	9.85	-	-	46	-36.15
19	4.473	9.48	Pk	.1	9.9	19.48	56	-36.52	-	-
20	4.449	-3.7	Av	.1	9.9	6.3	-	-	46	-39.7
21	13.56	28.28	Pk	.2	10	38.48	60	-21.52	-	-
22	13.56	18.18	Av	.2	10	28.38	-	-	50	-21.62
23	22.182	12.02	Pk	.2	10.2	22.42	60	-37.58	-	-
24	22.215	.3	Av	.2	10.2	10.7	-	-	50	-39.3

Pk - Peak detector
Av - Average detection

12. SETUP PHOTOS

Please refer to R14866507-EP1 for setup photos

END OF TEST REPORT