

TEST REPORT

Report Number: R14861410-E1

Applicant : Abbott Diabetes Care Inc.
1360 South Loop Rd
Alameda, CA 94502, United States

Model : FreeStyle Libre 2 Sensor / FreeStyle Libre 2 Plus Sensor

FCC ID : QXS-LIB02S2

IC : 12106A-LIB02S2

EUT Description : FreeStyle Libre 2 (Plus) Sensor

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

Date Of Issue:
2024-03-13

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2024-02-05	Initial Issue	Charles Moody
V2	2024-02-29	Updated with Retested Values	Charles Moody
V3	2024-03-13	Revised Applicant Information	Charles Moody

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Abbott Diabetes Care Inc.
1360 South Loop Rd
Alameda, CA 94502, United States

EUT DESCRIPTION: FreeStyle Libre 2 (Plus) Sensor

MODEL: Freestyle Libre 2 Sensor / Freestyle Libre 2 Plus Sensor

SERIAL NUMBER: E07A00730DB71419, E07A00730DB71415

SAMPLE RECEIPT DATE: 2023-12-01 TO 2024-02-13

DATE TESTED: 2024-02-16 TO 2024-02-28

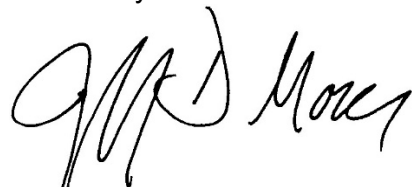
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C: 2024	Complies
ISED RSS-247 Issue 3: 2023	Complies
ISED RSS-GEN Issue 5 + A2: 2021	Complies

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:



Jeffrey Moser
Operations Manager
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 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.) Model tested (see section 6.1)
- 2.) Antenna gain and type (see section 6.3)
- 3.) Supported data rates (see section 6.5)

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	Not Performed	EUT is battery powered

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC 47 CFR Part 2, FCC 47 CFR Part 15, ANSI C63.10-2020, KDB 558074 D01 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, Certificate Number #0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

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

$$\text{Field Strength (dBuV/m)} = \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Preamp Gain (dB)}$$

$$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$$

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is an automatic glucose sensor, taking readings every minute, which a BLE radio. This report covers the full emissions testing of the BLE radio. Both models are electrically identical. The FreeStyle Libre 2 Sensor was used for testing, as this was declared by the client to be worst case.

6.2. 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	-0.86	0.82

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

The radio utilizes an PIFA antenna, with a maximum gain of -1.59 dBi.

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 3.6.0.0.

6.5. WORST-CASE CONFIGURATION AND MODE

The BLE radio only supports 1Mbps. Therefore, all testing was performed in this data rate only.

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

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 as well as mid channel for radiated spurious emissions.

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

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
EE Lab PC Laptop	HP	14-ddq1039wm	5CD941FN5J	6263943
AC Adapter	HP	TPN-CA14	WHGRE0ANJCRFS4	N/A
Transceiver EVM Board (Support PCB)	Texas Instruments	TRF7960 EMV Rev A	N/A	N/A
Battery Pack	N/A	N/A	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Power	1	Solder	Conductive	< 1m	Used to connect EUT to battery pack
2	USB	1	USB A Extension Cord	Shielded	< 1m	Used from Laptop to EVM board.

TEST SETUP

The EUT is placed on the EVM board in order to configure the radio prior to testing. For radiated testing, the EUT is removed from the board and tested without the use of any additional support equipment. The conducted sample uses a battery pack powered by a AA battery to power the unit. The radiated sample has its own internal battery and therefore was tested on its own.

SETUP DIAGRAMS

Please refer to R14861410-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 -11.9.1.3 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)

Conducted 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, Section 6.3
to 6.6, and 6.10.5

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				
90416	Spectrum Analyzer	Keysight Technologies	N9030A	2023-06-09	2024-06-30
207726	Temp/Humid Chamber	Thermotron	SM-32-8200	2024-01-12	2025-01-12
179892	Environmental Meter	Fisher Scientific	15-077-963	2023-07-26	2024-06-31
SOFTEMI	Antenna Port Software	UL	Version 2022.8.16	NA	NA
Power Software	Boonton Power Analyzer	Boonton	Version 3.0.13.0	NA	NA
211057	Real-Time Peak Power Sensor 50MHz to 8GHz	Boonton	RTP5000	2023-08-01	2024-08-01
CBL091	Micro-Coax UTIFLEX Cable Assembly, Low Loss,40Ghz	Carlisle Interconnect Technologies	UFA147A-2-0360-200200	2023-02-17	2024-02-29
**226562	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CentricRF	C18S2-10	2023-02-16	2024-02-29

**NOTE: Testing on this equipment was performed while the equipment was still in calibration.

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 4)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	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				
207640	Gain-loss string: 1-18GHz	Various	Various	2023-05-17	2024-05-17
	Receiver & Software				
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-04-10	2024-04-10
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.
0.009-30MHz					
135144	Active Loop Antenna	ETS-Lindgren	6502	2024-01-24	2025-01-24
30-1000 MHz					
90629	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-01-30	2026-01-30
18-40 GHz					
204704	Horn Antenna, 18-26.5GHz	Com-Power	AH-826	2023-07-20	2025-07-20
Gain-Loss Chains					
91974	Gain-loss string: 0.009-30MHz	Various	Various	2023-05-16	2024-05-16
91976	Gain-loss string: 25-1000MHz	Various	Various	2023-05-16	2024-05-16
135999	Gain-loss string: 18-40GHz	Various	Various	2023-05-16	2024-05-16
Receiver & Software					
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-03-24	2024-03-24
81018	Spectrum Analyzer	Agilent	E4446A	2023-08-01	2024-08-01
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

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

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
86408	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2023-06-19	2025-06-19
	Gain-Loss Chains				
91977	Gain-loss string: 1-18GHz	Various	Various	2023-06-06	2024-06-06
	Receiver & Software				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-02-02	2024-02-29
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
200540	Environmental Meter	Fisher Scientific	15-077-963	2023-07-19	2025-07-19

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

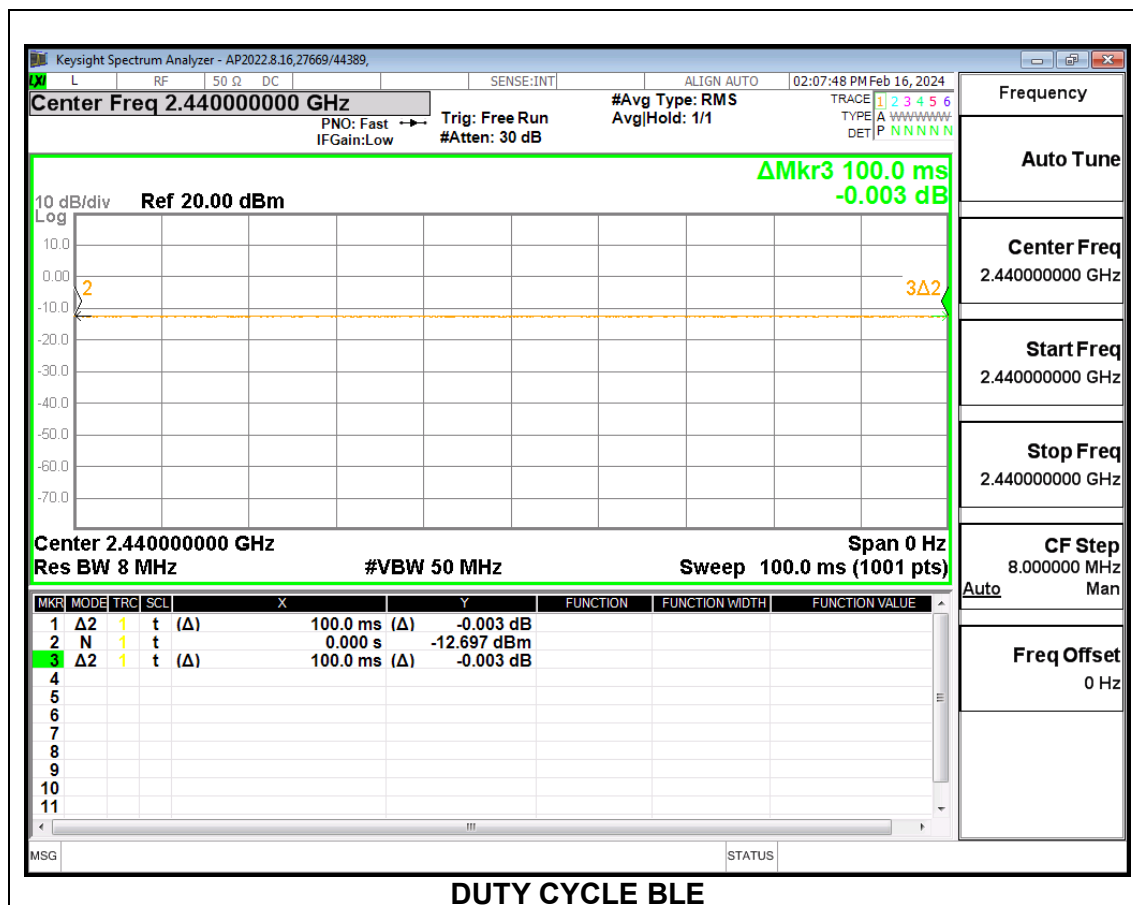
PROCEDURE

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	100.000	100.000	1.000	100.00	0.00	0.010

DUTY CYCLE PLOTS



9.2. 99% BANDWIDTH

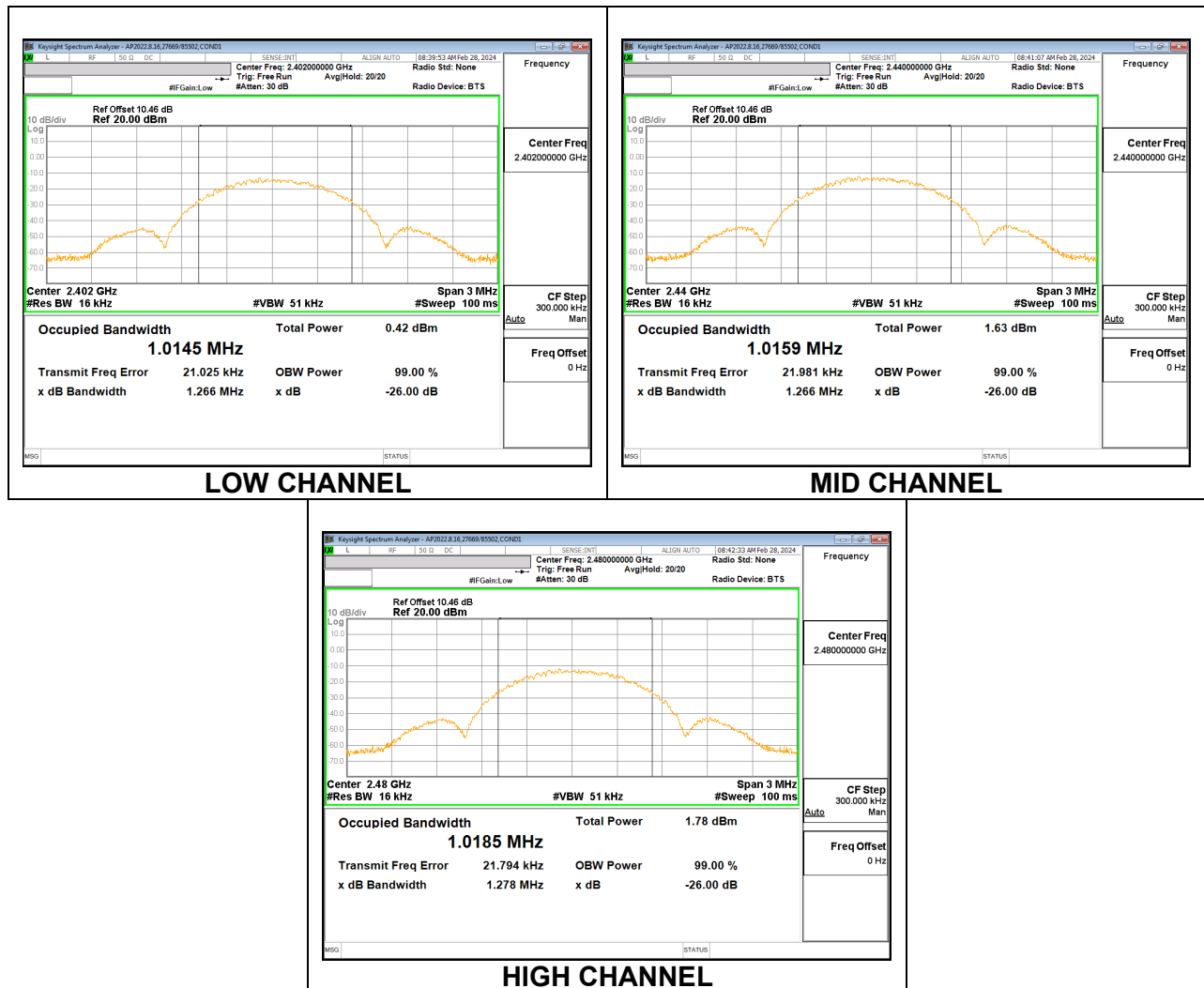
LIMITS

None; for reporting purposes only.

RESULTS

9.2.1. BLE (1Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0145
Middle	2440	1.0159
High	2480	1.0185



9.3. 6 dB BANDWIDTH

LIMITS

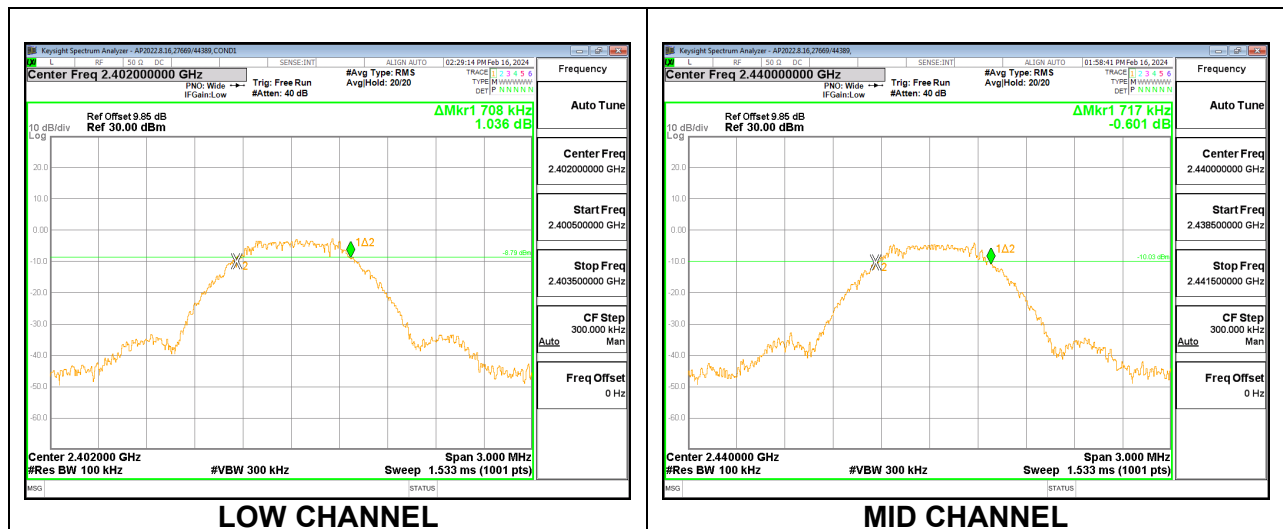
FCC §15.247 (a) (2)
 RSS-247 5.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

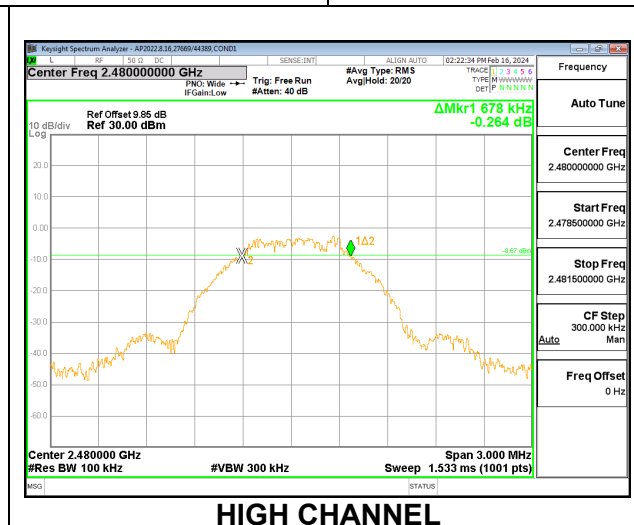
9.3.1. BLE (1Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.708	0.5
Middle	2440	0.717	0.5
High	2480	0.678	0.5



LOW CHANNEL

MID CHANNEL



HIGH CHANNEL

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 10.46 dB (including a 0.61 dB EUT cable, 0.57 dB test cable and a 9.28 dB attenuator) was entered as an offset in the power meter.

The power output was measured on the EUT antenna port using SMA cable 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:	27669
Date:	2024-02-16

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-0.90	30	-30.900
Middle	2440	-0.86	30	-30.860
High	2480	-0.88	30	-30.880

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 10.46 dB (including a 0.61 dB EUT cable, 0.57 dB test cable and a 9.28 dB attenuator) was entered as an offset in the power meter.

The power output was measured on the EUT antenna port using SMA cable 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:	27669
Date:	2024-02-16

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	-1.44
Middle	2440	-2.72
High	2480	-1.41

9.6. POWER SPECTRAL DENSITY

LIMITS

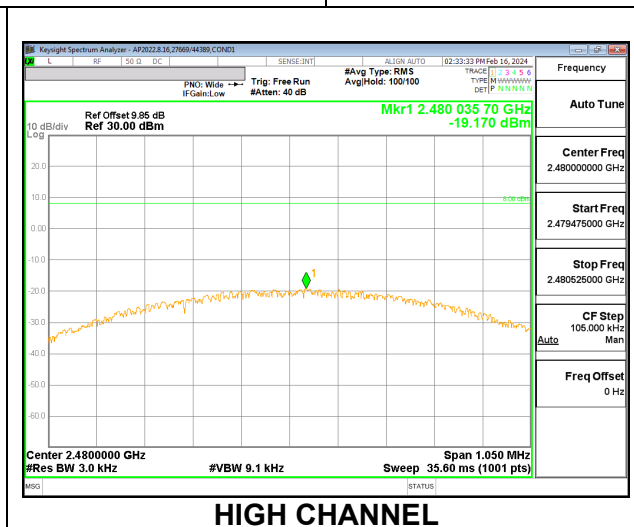
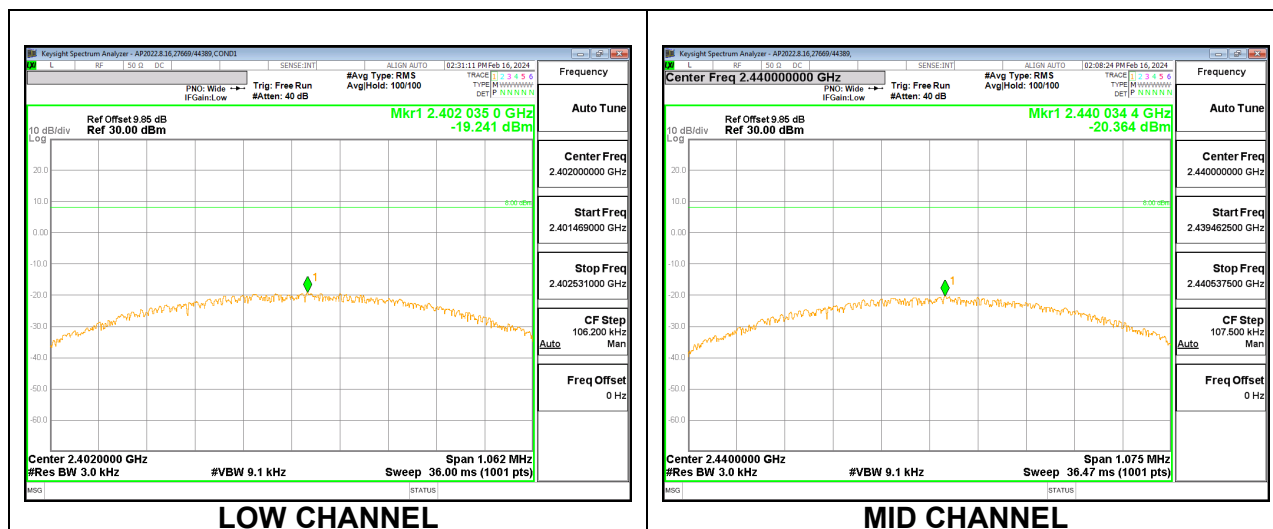
FCC §15.247 (e)
 RSS-247 (5.2) (b)

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	-19.241	8	-27.24
Middle	2440	-20.364	8	-28.36
High	2480	-19.170	8	-27.17



9.7. CONDUCTED SPURIOUS EMISSIONS

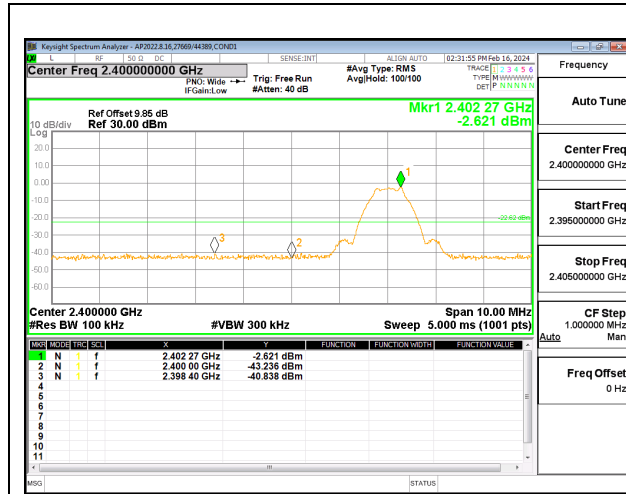
LIMITS

FCC §15.247 (d)
RSS-247 5.5

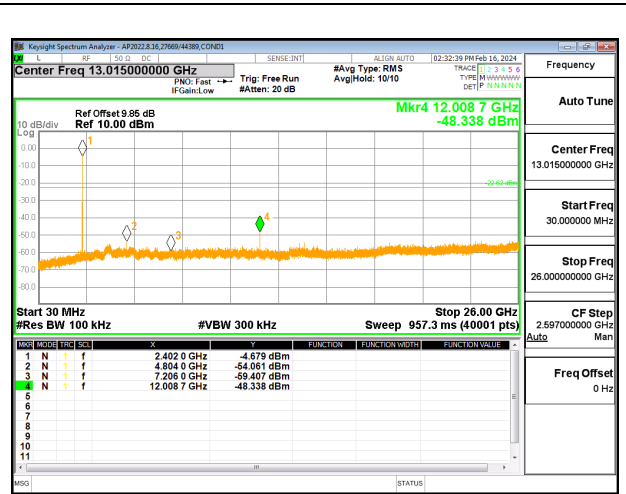
Output power was measured based on the use of a peak measurement; therefore the required attenuation is -20 dBc.

RESULTS

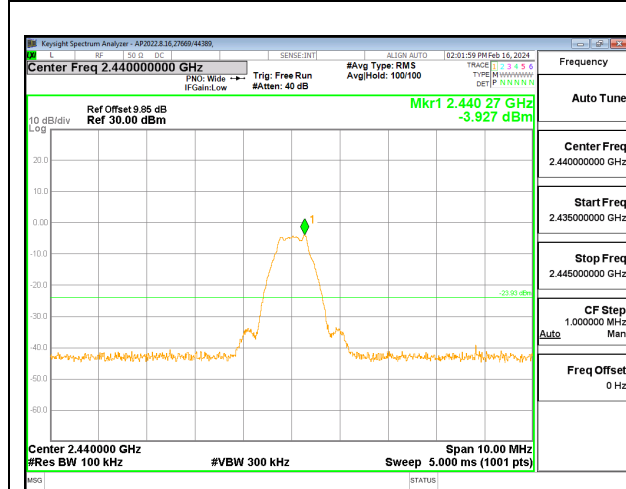
9.7.1. BLE (1Mbps)



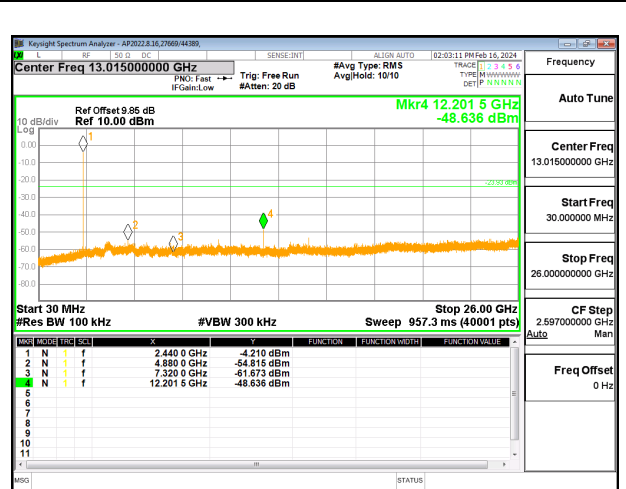
LOW CHANNEL BANDEDGE



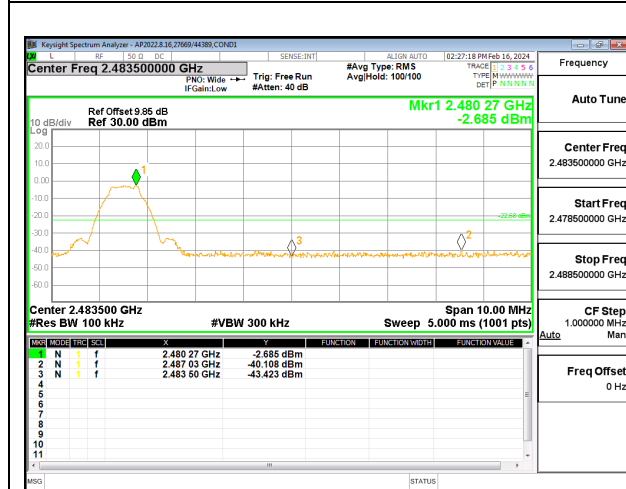
OUT-OF-BAND LOW CHANNEL



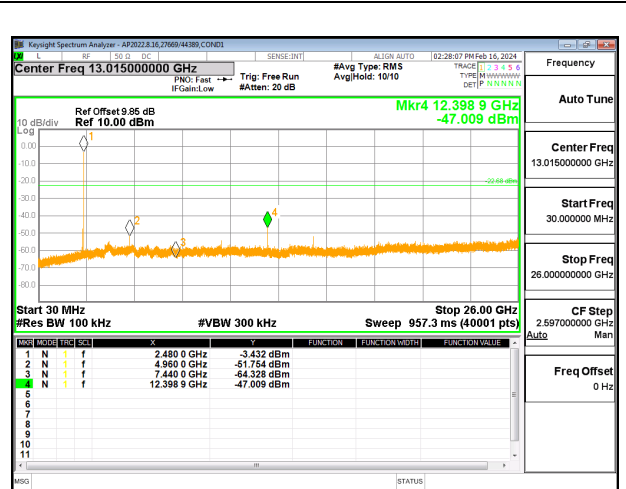
IN-BAND REFERENCE LEVEL



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 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

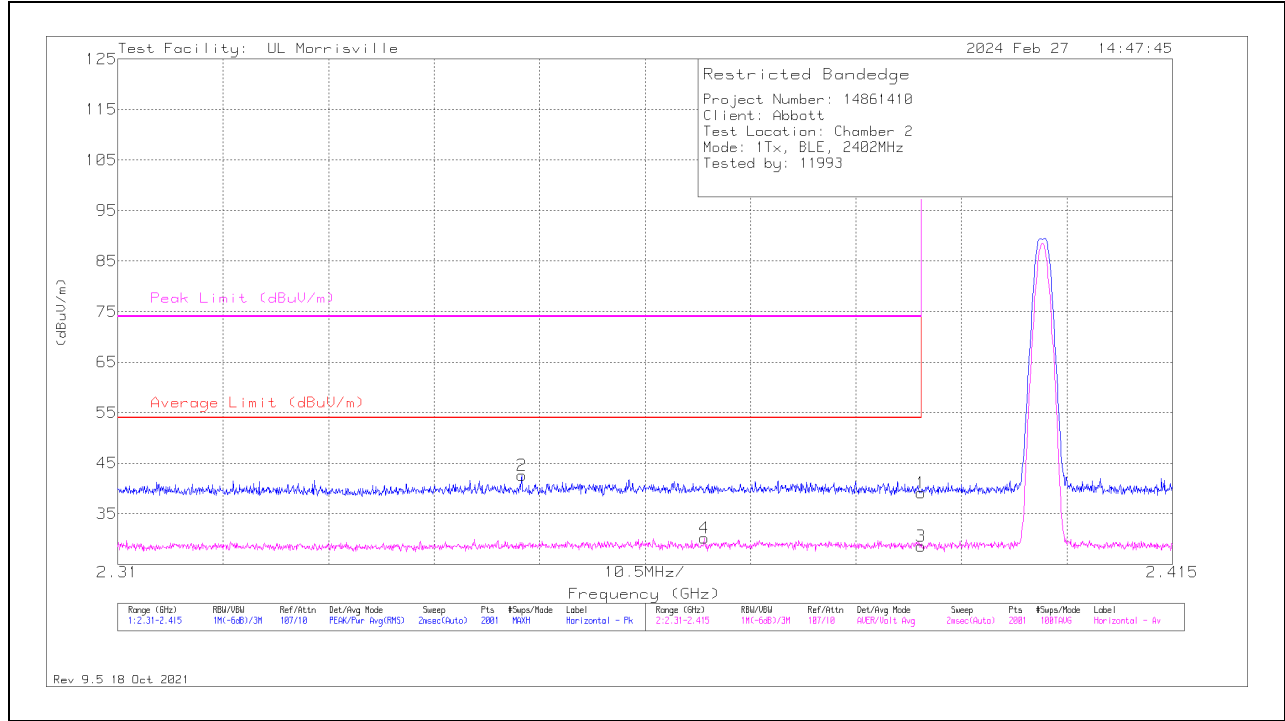
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BLE (1Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	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	31.01	Pk	32.3	-24.2	39.11	-	-	74	-34.89	58	192	H
2	* ** 2.35022	34.34	Pk	32.1	-23.9	42.54	-	-	74	-31.46	58	192	H
3	* ** 2.38996	20.5	ADV	32.3	-24.2	28.6	54	-25.4	-	-	58	192	H
4	* ** 2.36838	22.05	ADV	32.2	-24.1	30.15	54	-23.85	-	-	58	192	H

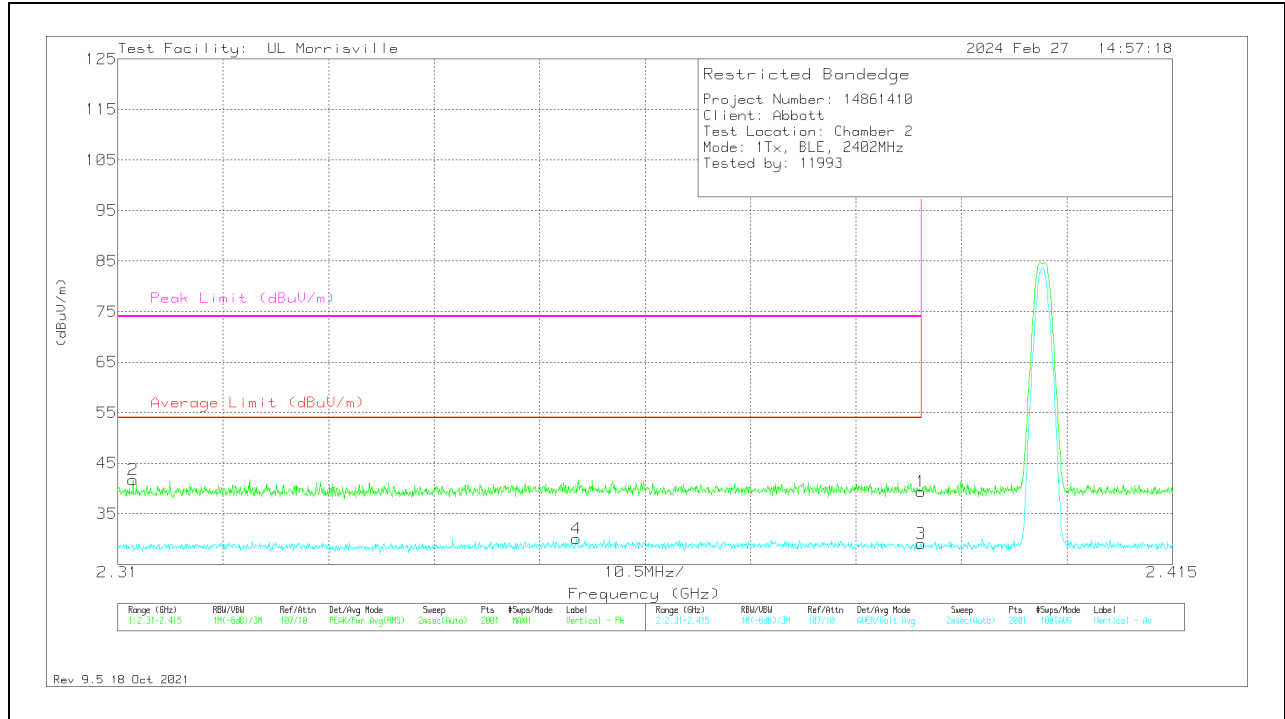
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	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	31.29	Pk	32.3	-24.2	39.39	-	-	74	-34.61	159	399	V
2	* ** 2.31152	33.68	Pk	32.1	-24	41.78	-	-	74	-32.22	159	399	V
3	* ** 2.38996	20.93	ADV	32.3	-24.2	29.03	54	-24.97	-	-	159	399	V
4	* ** 2.35568	21.91	ADV	32.1	-23.9	30.11	54	-23.89	-	-	159	399	V

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

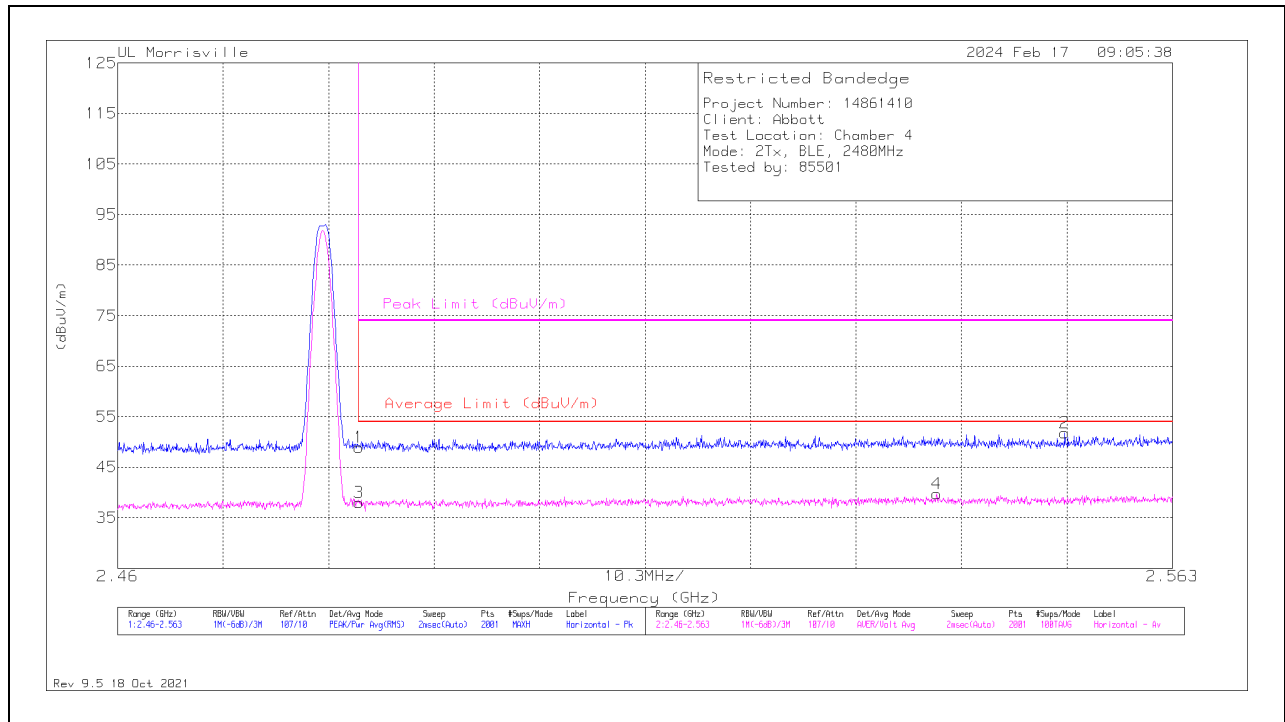
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

BANDEDGE (HIGH CHANNEL)

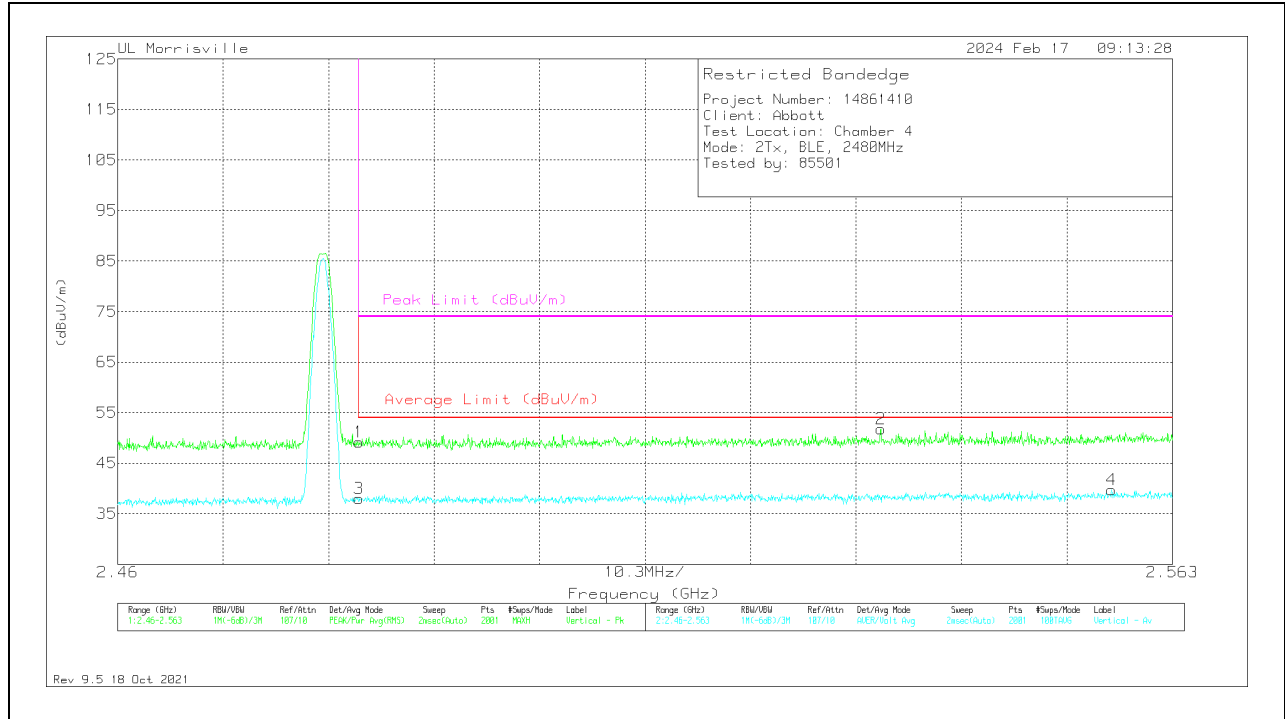
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	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	29.53	Pk	32.3	-12.9	48.93	-	-	74	-25.07	299	118	H
2	** 2.55249	32.4	Pk	32.4	-13	51.8	-	-	74	-22.2	299	118	H
3	* ** 2.48354	18.61	ADV	32.3	-12.9	38.01	54	-15.99	-	-	299	118	H
4	** 2.53998	20.12	ADV	32.5	-12.9	39.72	54	-14.28	-	-	299	118	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

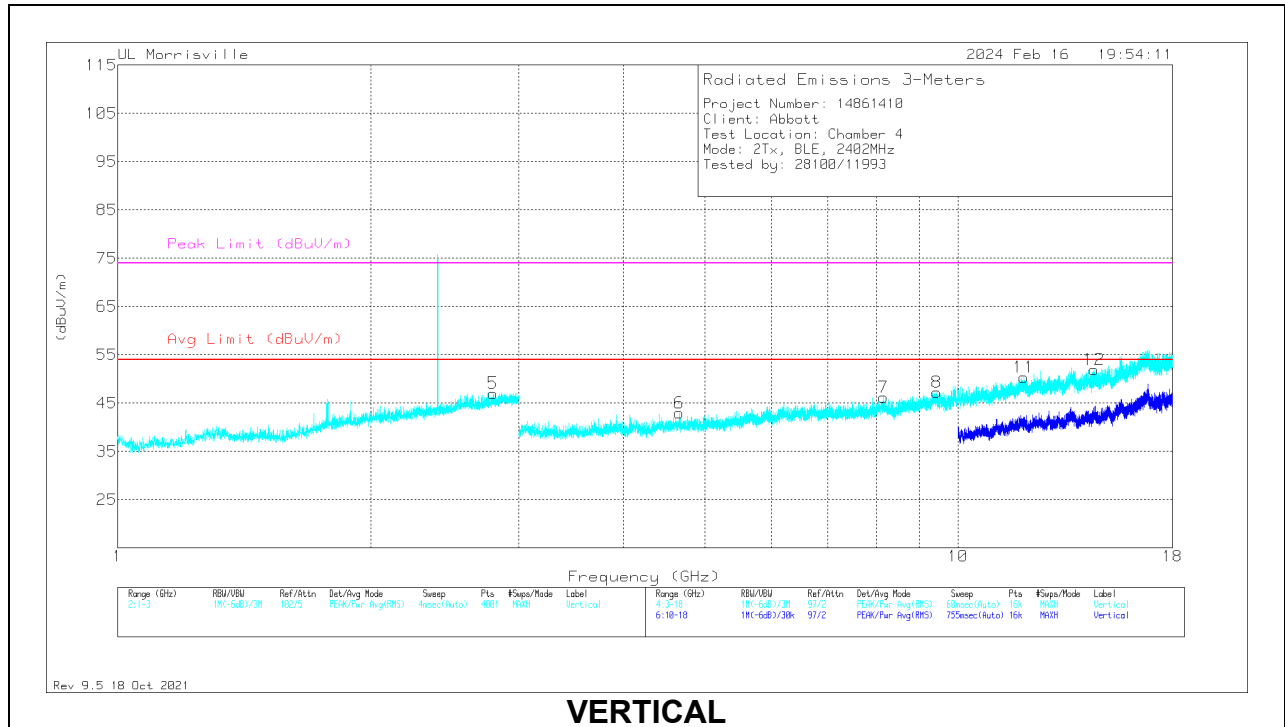
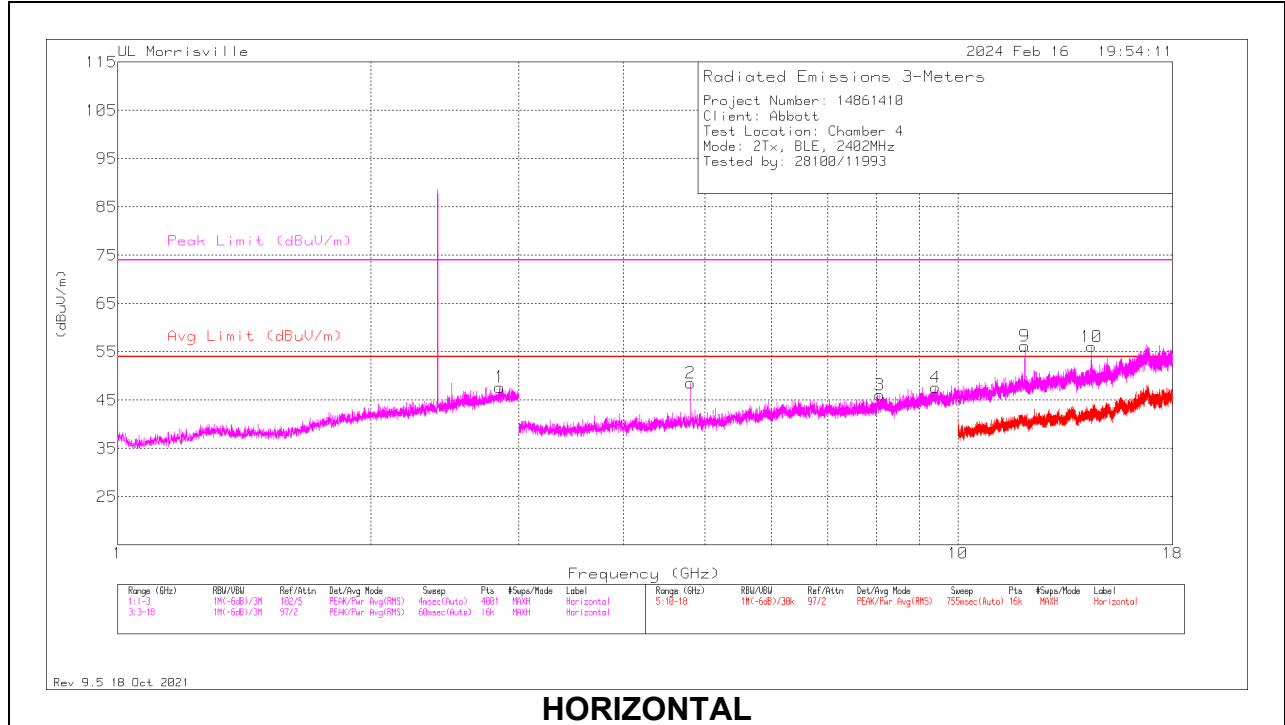


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	29.83	Pk	32.3	-12.9	49.23	-	-	74	-24.77	163	369	V
2	** 2.53452	32.25	Pk	32.4	-12.9	51.75	-	-	74	-22.25	163	369	V
3	* ** 2.48354	18.57	ADV	32.3	-12.9	37.97	54	-16.03	-	-	163	369	V
4	** 2.55708	19.94	ADV	32.5	-12.7	39.74	54	-14.26	-	-	163	369	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



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.848	27.51	Pk	32.4	-12.2	47.71	54	-6.29	74	-26.29	0-360	100	H
5	*** 2.7985	26.76	Pk	32.6	-12.3	47.06	54	-6.94	74	-26.94	0-360	200	V
2	*** 4.80467	41.19	PK2	34.1	-31.6	43.69	-	-	74	-30.31	10	228	H
	*** 4.80554	28.48	ADV	34.1	-31.6	30.98	54	-23.02	-	-	10	228	H
3	*** 8.07375	37.27	Pk	35.8	-27	46.07	54	-7.93	74	-27.93	0-360	100	H
4	*** 9.40594	36.81	Pk	36.6	-25.8	47.61	54	-6.39	74	-26.39	0-360	100	H
9	*** 12.01318	35.59	PK2	38.7	-23.4	50.89	-	-	74	-23.11	186	328	H
	*** 12.01224	23.24	ADV	38.7	-23.5	38.44	54	-15.56	-	-	186	328	H
6	*** 4.65563	40.23	Pk	34.1	-31.3	43.03	54	-10.97	74	-30.97	0-360	200	V
7	*** 8.15719	37.29	Pk	35.8	-26.9	46.19	54	-7.81	74	-27.81	0-360	200	V
8	*** 9.42938	36.1	Pk	36.7	-25.6	47.2	54	-6.8	74	-26.8	0-360	200	V
11	*** 11.98956	35.22	PK2	38.7	-23	50.92	-	-	74	-23.08	312	216	V
	*** 11.98898	22.96	ADV	38.7	-23	38.66	54	-15.34	-	-	312	216	V
10	14.41125	38.27	Pk	39.3	-21.5	56.07	-	-	-	-	0-360	100	H
12	14.52938	33.38	Pk	39.5	-21	51.88	-	-	-	-	0-360	200	V

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

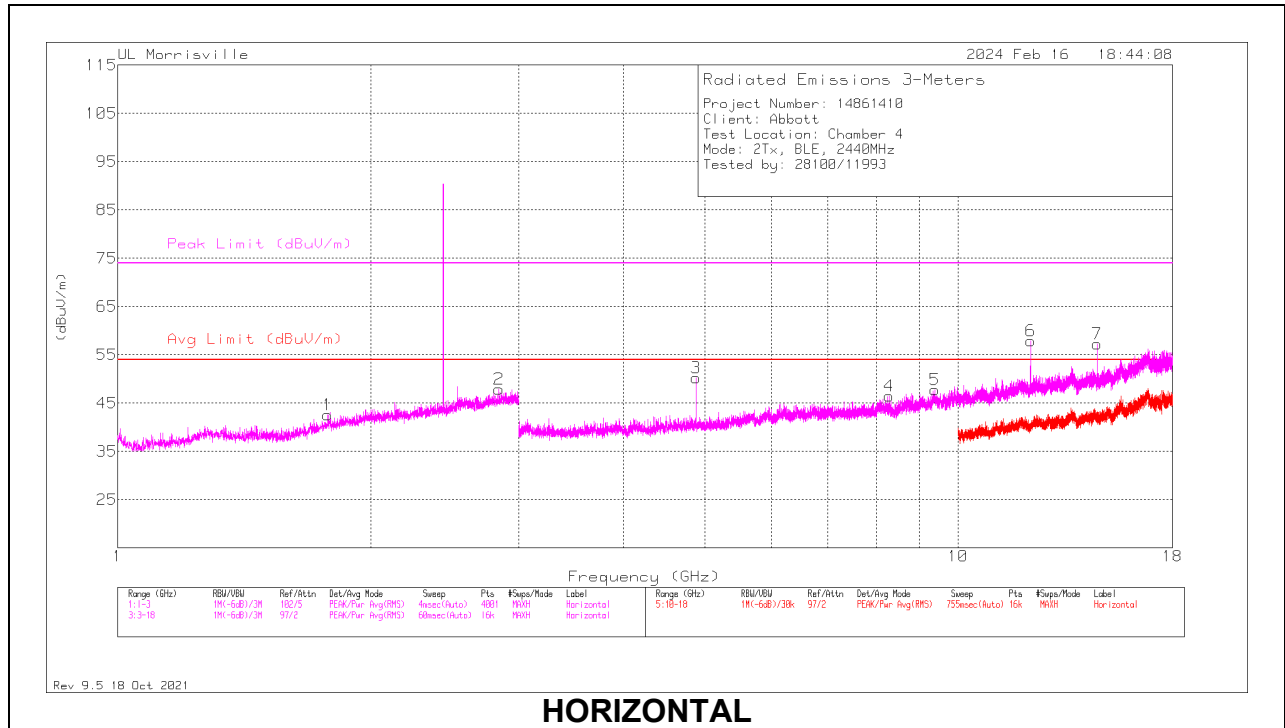
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

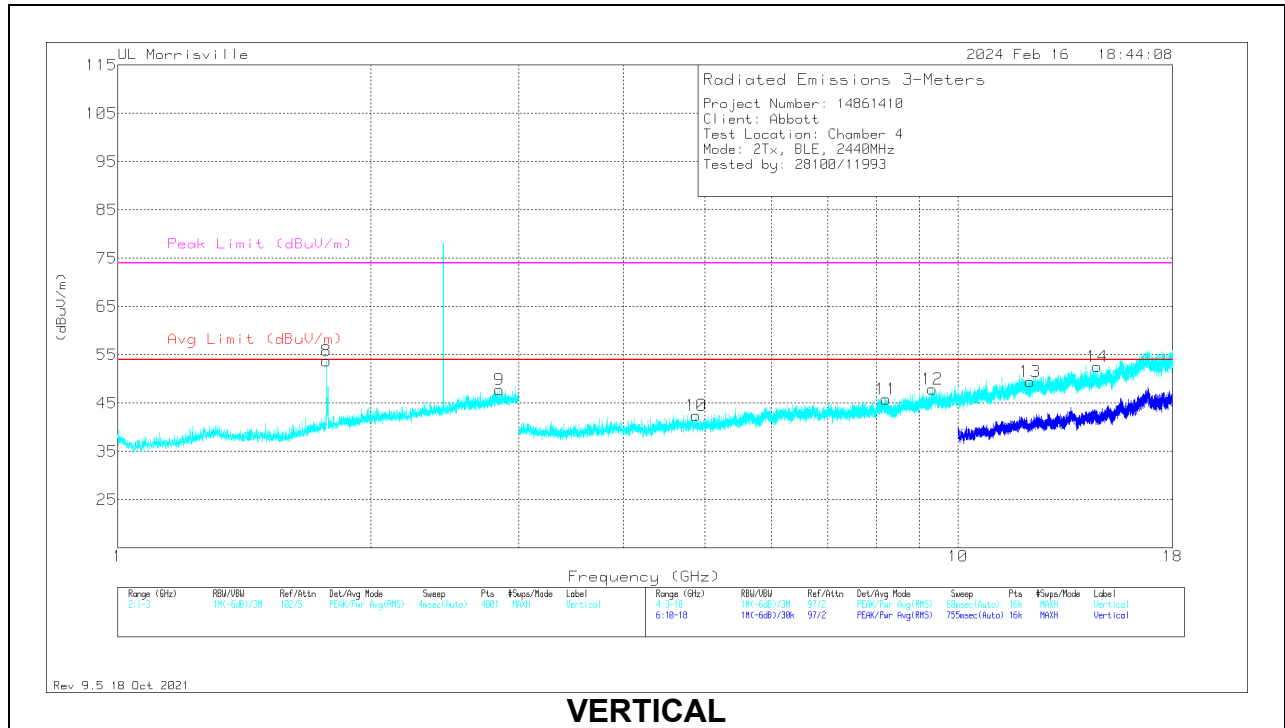
PK2 - Maximum Peak

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)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	** 1.7785	26.62	Pk	29.9	-13.9	42.62	54	-11.38	74	-31.38	0-360	100	H
2	*** 2.843	27.76	Pk	32.3	-12.1	47.96	54	-6.04	74	-26.04	0-360	100	H
8	** 1.76953	27.77	PK2	29.8	-14.1	43.47	-	-	74	-30.53	355	116	V
	** 1.77343	14.93	ADV	29.8	-14.1	30.63	54	-23.37	-	-	355	116	V
9	*** 2.845	27.5	Pk	32.4	-12.1	47.8	54	-6.2	74	-26.2	0-360	200	V
3	*** 4.87997	41.18	PK2	34	-31.4	43.78	-	-	74	-30.22	43	147	H
	*** 4.87916	28.52	ADV	34	-31.4	31.12	54	-22.88	-	-	43	147	H
4	*** 8.28188	37.32	Pk	35.8	-26.6	46.52	54	-7.48	74	-27.48	0-360	100	H
5	*** 9.38813	36.59	Pk	36.6	-25.4	47.79	54	-6.21	74	-26.21	0-360	100	H
6	*** 12.19762	34.77	PK2	38.9	-23.5	50.17	-	-	74	-23.83	134	399	H
	*** 12.19896	22.52	ADV	38.9	-23.5	37.92	54	-16.08	-	-	134	399	H
10	*** 4.87969	39.85	Pk	34	-31.4	42.45	54	-11.55	74	-31.55	0-360	200	V
11	*** 8.20406	36.78	Pk	35.8	-26.8	45.78	54	-8.22	74	-28.22	0-360	200	V
12	*** 9.32438	36.56	Pk	36.4	-25	47.96	54	-6.04	74	-26.04	0-360	200	V
13	*** 12.19179	34.93	PK2	38.9	-23.5	50.33	-	-	74	-23.67	9	201	V
	*** 12.19164	22.58	ADV	38.9	-23.5	37.98	54	-16.02	-	-	9	201	V
14	14.63906	35.24	Pk	39.6	-22.3	52.54	-	-	-	-	0-360	200	V
7	14.64188	39.89	Pk	39.6	-22.2	57.29	-	-	-	-	0-360	100	H

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

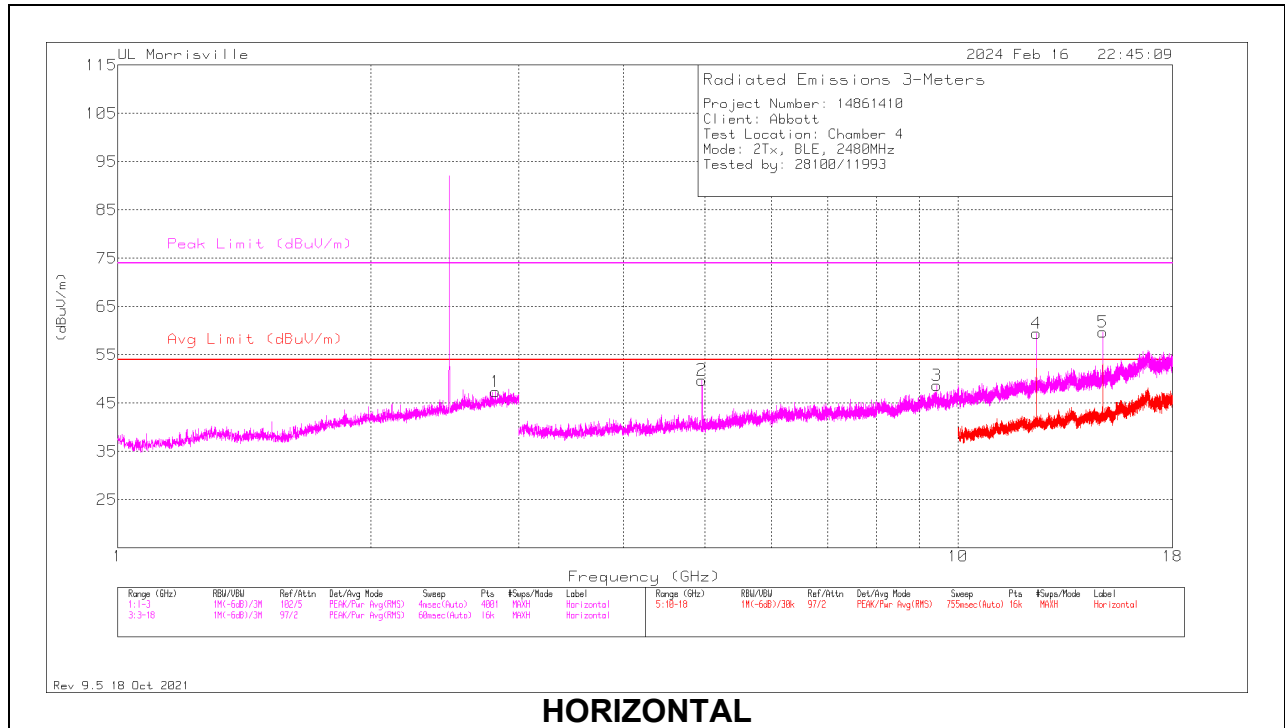
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

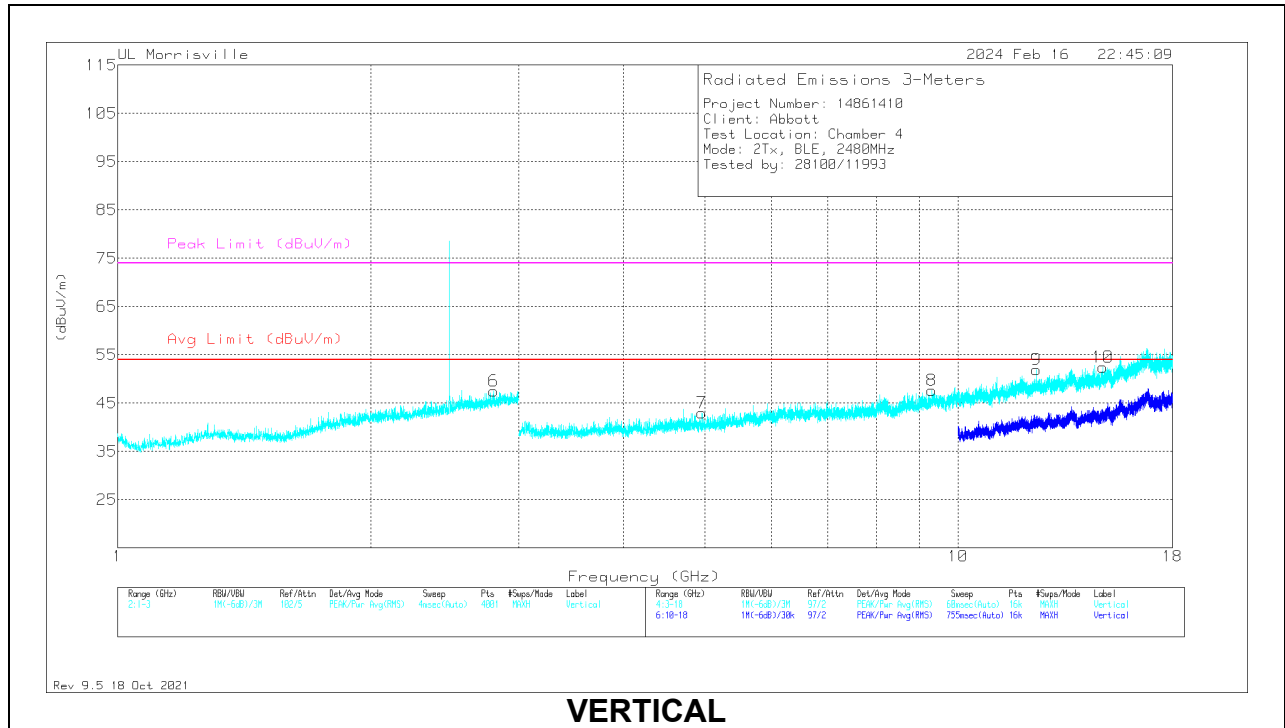
PK2 - Maximum Peak

ADV - Linear Voltage Average

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.816	27.19	Pk	32.4	-12.2	47.39	54	-6.61	74	-26.61	0-360	100	H
6	*** 2.802	27.16	Pk	32.6	-12.3	47.46	54	-6.54	74	-26.54	0-360	100	V
2	*** 4.96096	40.74	PK2	33.9	-31.5	43.14	-	-	74	-30.86	59	356	H
	*** 4.96076	28.04	ADV	33.9	-31.4	30.54	54	-23.46	-	-	59	356	H
3	*** 9.42981	37.25	PK2	36.7	-25.6	48.35	-	-	74	-25.65	1	224	H
	*** 9.42763	25.11	ADV	36.7	-25.6	36.21	54	-17.79	-	-	1	224	H
4	*** 12.40115	36.11	PK2	38.9	-23	52.01	-	-	74	-21.99	286	261	H
	*** 12.40324	23.35	ADV	38.9	-23.1	39.15	54	-14.85	-	-	286	261	H
7	*** 4.95938	40.44	Pk	33.9	-31.4	42.94	54	-11.06	74	-31.06	0-360	100	V
8	*** 9.3075	36.45	Pk	36.4	-25.2	47.65	54	-6.35	74	-26.35	0-360	100	V
9	*** 12.39777	35.45	PK2	38.9	-22.9	51.45	-	-	74	-22.55	132	320	V
	*** 12.39746	23.46	ADV	38.9	-22.9	39.46	54	-14.54	-	-	132	320	V
5	14.88188	41.8	Pk	39.6	-21.7	59.7	-	-	-	-	0-360	200	H
10	14.88188	34.59	Pk	39.6	-21.7	52.49	-	-	-	-	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

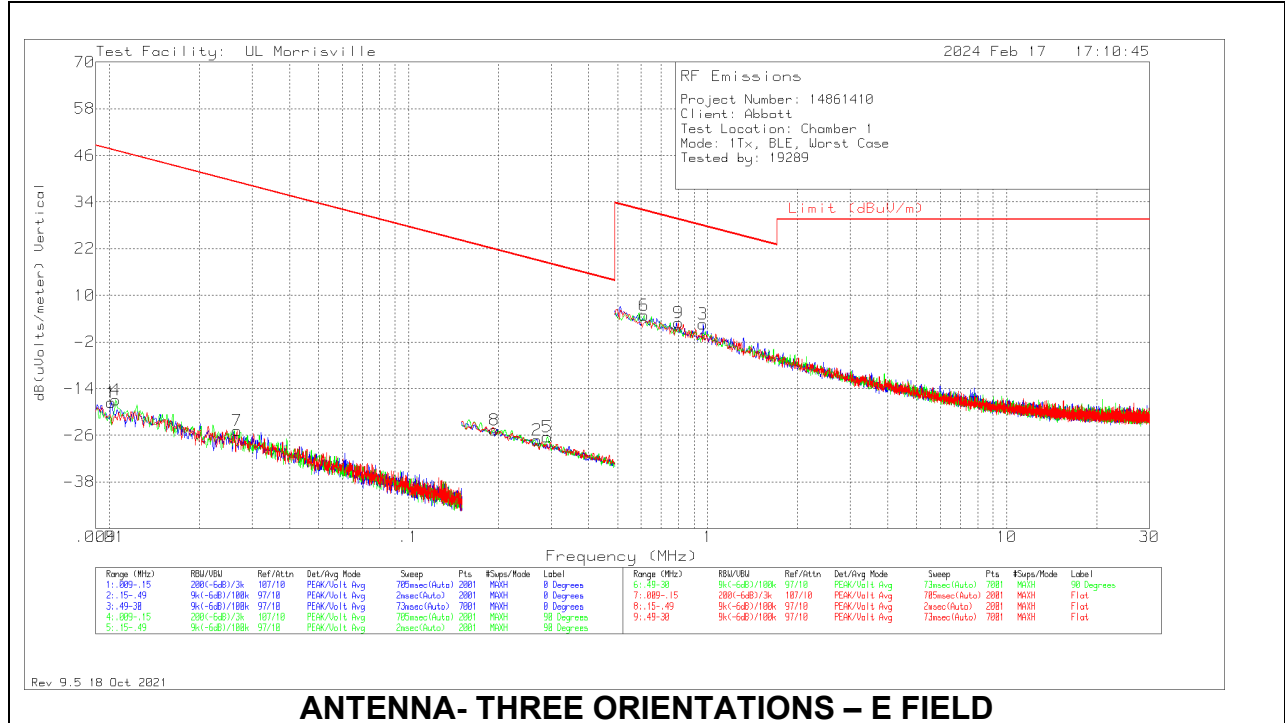
PK2 - Maximum Peak

ADV - Linear Voltage Average

10.3. WORST CASE BELOW 30MHZ

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

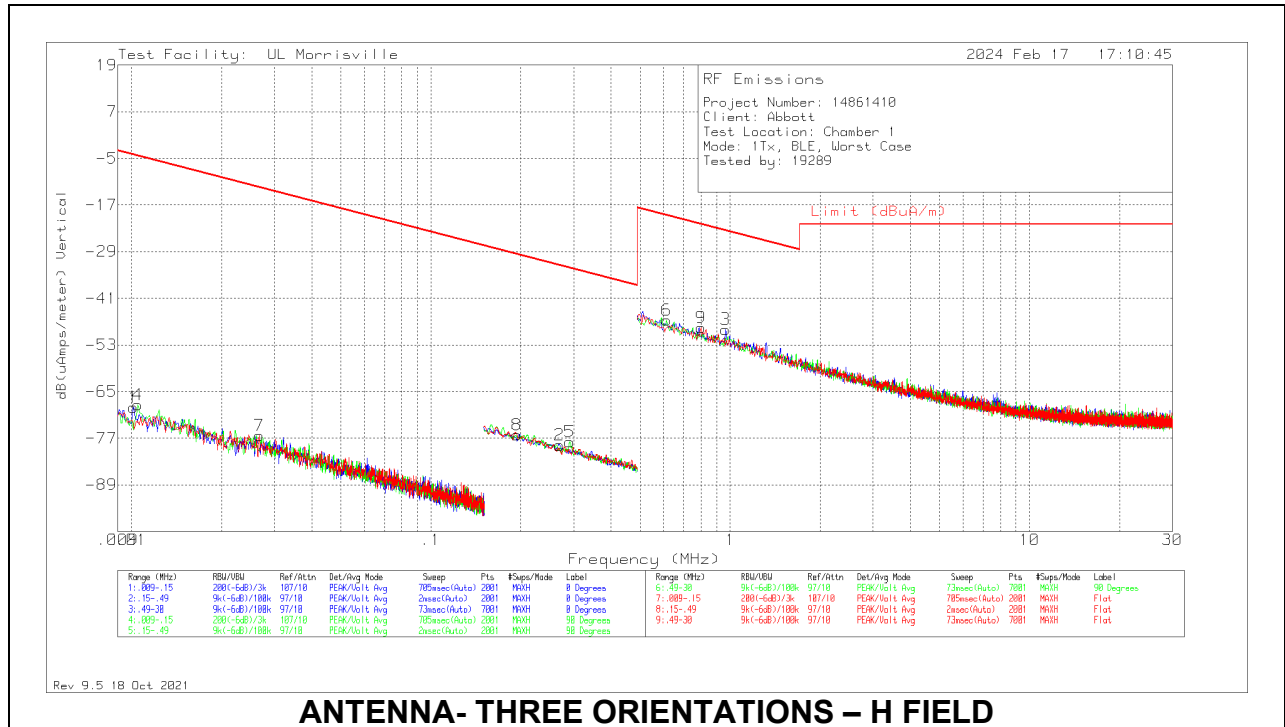


ANTENNA- THREE ORIENTATIONS – E FIELD

Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (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	.01014	43.91	Pk	18.4	.1	-80	-17.59	47.49	67.49	-65.08	0-360	0 degs
2	.26951	41.49	Pk	11.1	.1	-80	-27.31	18.99	38.99	-46.3	0-360	0 degs
3	.96641	31.03	Pk	11.3	.2	-40	2.53	27.9	-	-25.37	0-360	0 degs
4	.01049	44.74	Pk	18.3	.1	-80	-16.86	47.19	67.19	-64.05	0-360	90 degs
5	.29127	42.43	Pk	11.1	.1	-80	-26.37	18.32	38.32	-44.69	0-360	90 degs
6	.61226	33.51	Pk	11.2	.1	-40	4.81	31.87	-	-27.06	0-360	90 degs
7	.02668	41.54	Pk	13.6	.1	-80	-24.76	39.08	59.08	-63.84	0-360	Flat
8	.19403	44.2	Pk	11.1	.1	-80	-24.6	21.85	41.85	-46.45	0-360	Flat
9	.79777	31.7	Pk	11.1	.1	-40	2.9	29.57	-	-26.67	0-360	Flat

Pk - Peak detector



ANTENNA- THREE ORIENTATIONS – H FIELD

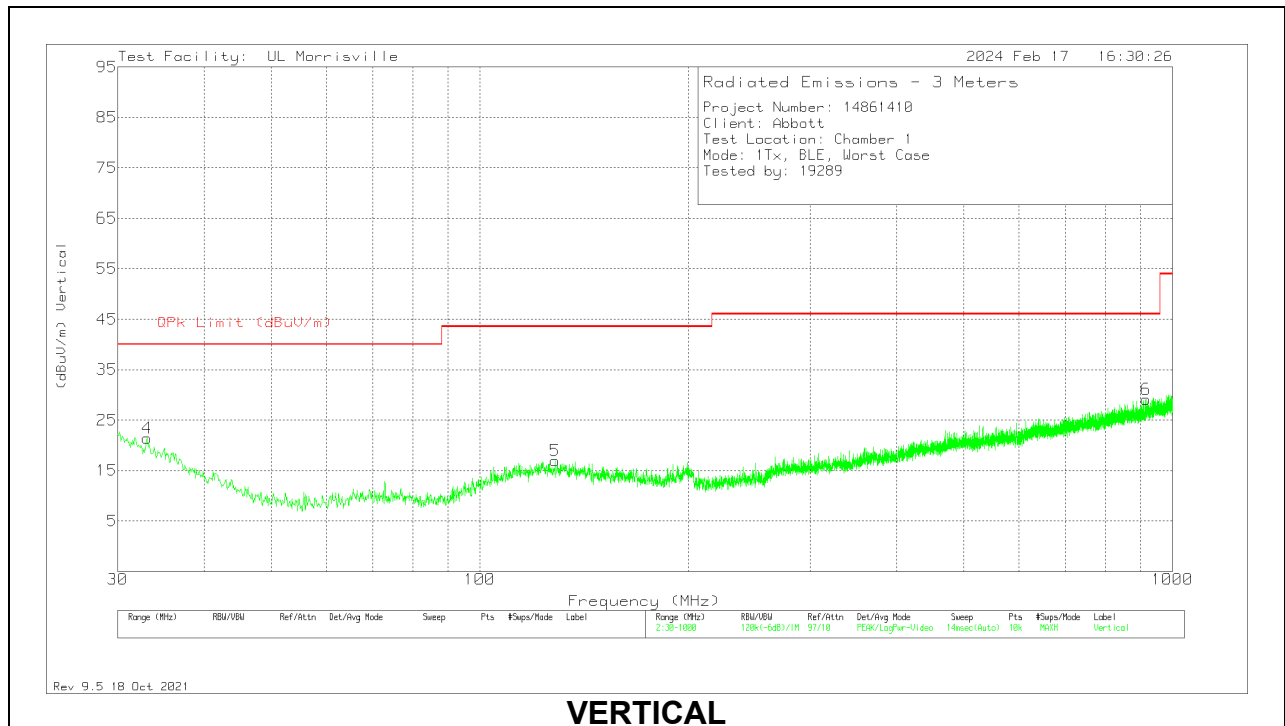
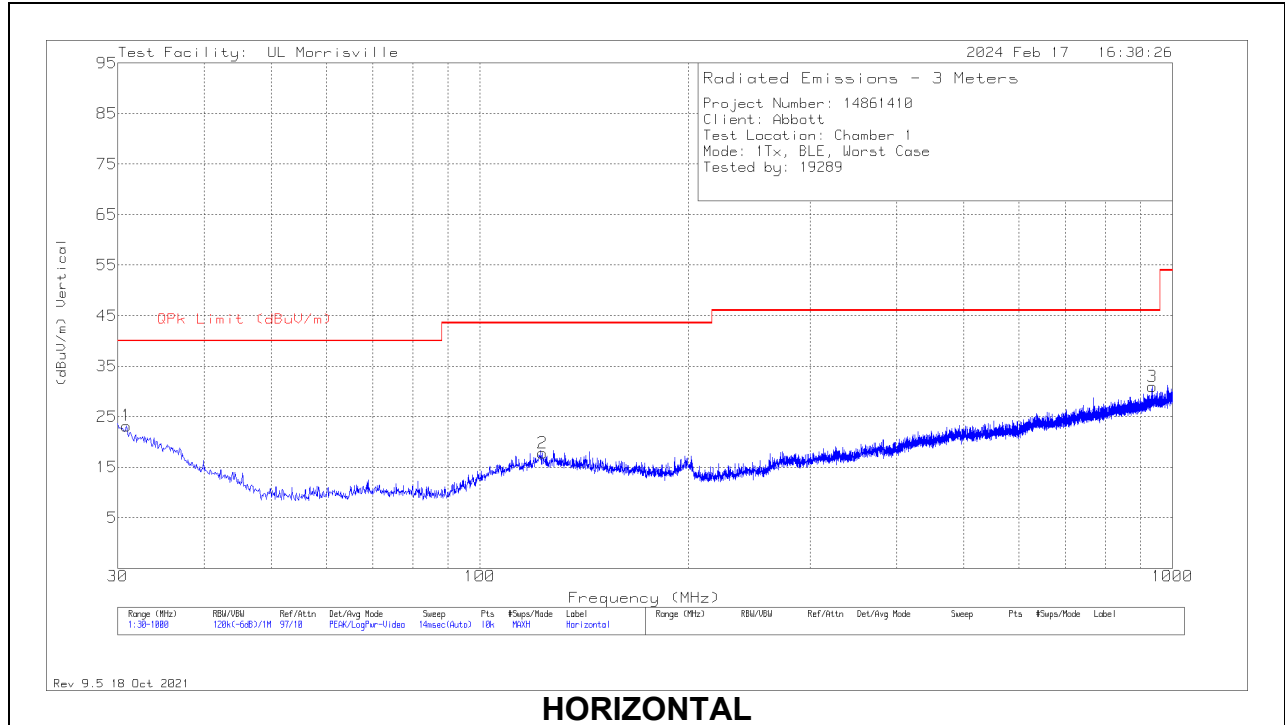
Below 30MHz Data

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	.01014	43.91	Pk	-33.1	.1	-80	-69.09	-4.01	15.99	-65.08	0-360	0 degs
2	.26951	41.49	Pk	-40.4	.1	-80	-78.81	-32.51	-12.51	-46.3	0-360	0 degs
3	.96641	31.03	Pk	-40.2	.2	-40	-48.97	-23.6	-	-25.37	0-360	0 degs
4	.01049	44.74	Pk	-33.2	.1	-80	-68.36	-4.31	15.69	-64.05	0-360	90 degs
5	.29127	42.43	Pk	-40.4	.1	-80	-77.87	-33.18	-13.18	-44.69	0-360	90 degs
6	.61226	33.51	Pk	-40.3	.1	-40	-46.69	-19.63	-	-27.06	0-360	90 degs
7	.02668	41.54	Pk	-37.9	.1	-80	-76.26	-12.42	7.58	-63.84	0-360	Flat
8	.19403	44.2	Pk	-40.4	.1	-80	-76.1	-29.65	-9.65	-46.45	0-360	Flat
9	.79777	31.7	Pk	-40.4	.1	-40	-48.6	-21.93	-	-26.67	0-360	Flat

PK - Peak detector

10.4. WORST CASE BELOW 1 GHZ

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



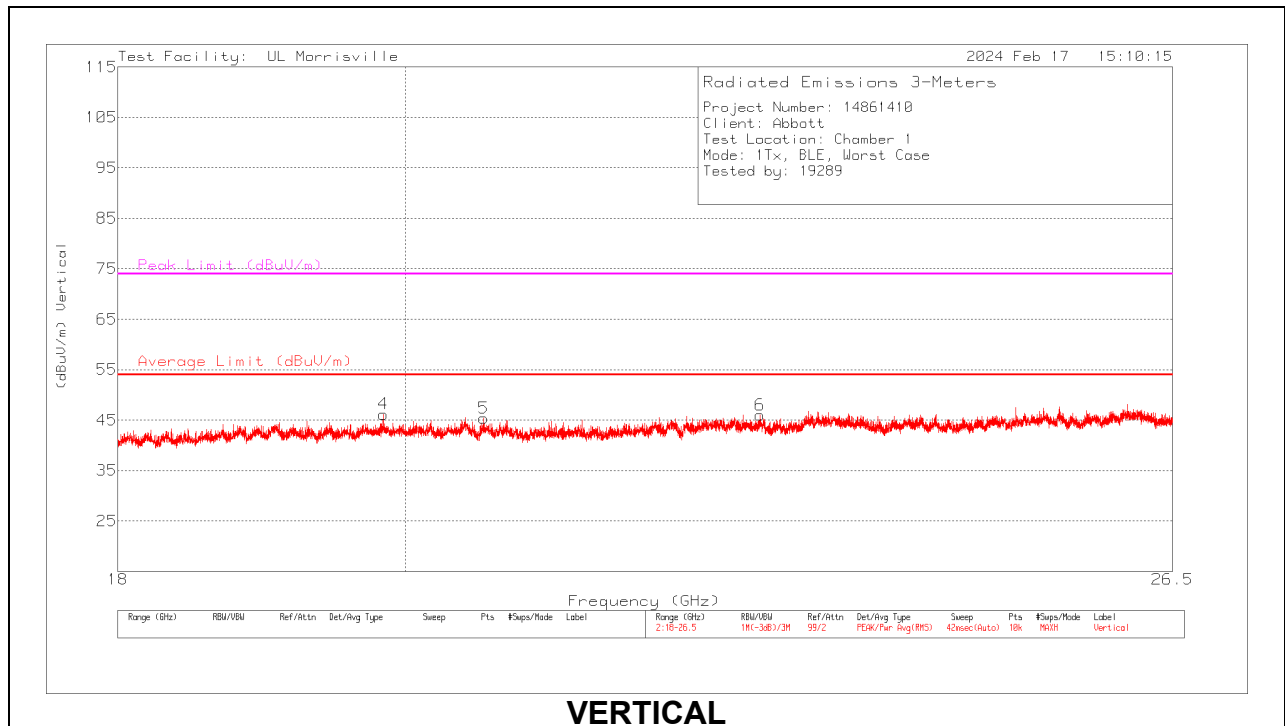
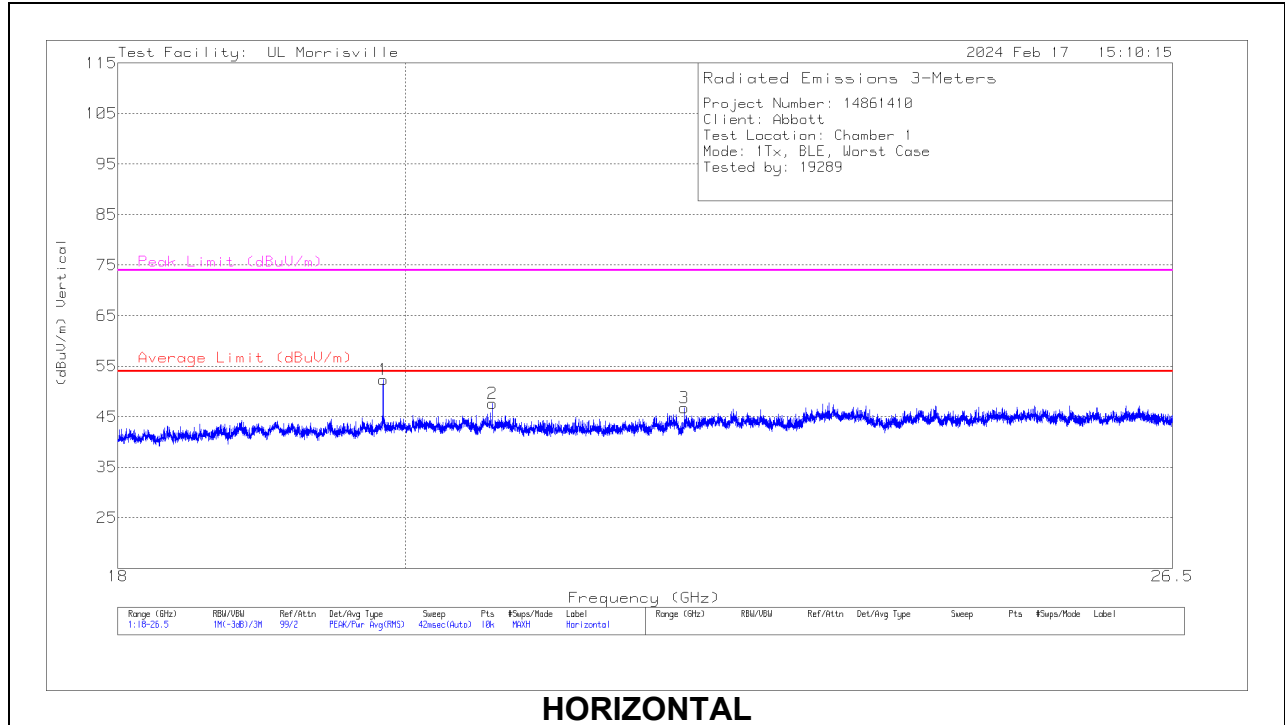
Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90629 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.873	28.71	Pk	26.2	-31.7	23.21	40	-16.79	0-360	299	H
4	33.104	28.39	Pk	24.7	-31.7	21.39	40	-18.61	0-360	100	V
2	123.217	28.5	Pk	20.1	-30.8	17.8	43.52	-25.72	0-360	100	H
5	128.455	27.51	Pk	20.1	-30.7	16.91	43.52	-26.61	0-360	100	V
6	916.095	26.75	Pk	28.6	-26.2	29.15	46.02	-16.87	0-360	100	V
3	935.398	28	Pk	28.8	-25.8	31	46.02	-15.02	0-360	299	H

Pk - Peak detector

10.5. WORST CASE 18-26 GHZ

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	* ** 19.83818	57.67	PK2	33.2	-37.8	53.07	-	-	74	-20.93	314	110	H
	* ** 19.83834	48.55	ADV	33.2	-37.8	43.95	54	-10.05	-	-	314	110	H
2	* ** 20.65173	52.08	Pk	33.6	-38.1	47.58	54	-6.42	74	-26.42	0-360	101	H
3	* ** 22.15608	50.22	Pk	34.3	-37.8	46.72	54	-7.28	74	-27.28	0-360	101	H
4	* ** 19.84177	50.69	Pk	33.2	-37.7	46.19	54	-7.81	74	-27.81	0-360	300	V
5	* ** 20.58374	49.55	Pk	33.7	-37.9	45.35	54	-8.65	74	-28.65	0-360	250	V
6	* ** 22.78247	49.15	Pk	34.1	-37.3	45.95	54	-8.05	74	-28.05	0-360	150	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

11. SETUP PHOTOS

Please refer to R14861410-EP1 for setup photos

END OF TEST REPORT