

TEST REPORT

Report Number: R15972923-E2

Applicant : Garmin International Inc.
1200 East 151st Street
Olathe, KS 66062-3426, USA

Model : A04537

FCC ID : IPH-04537

IC : 1792A-04537

EUT Description : Portable Sensor

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C: 2025
ISED RSS-210 ISSUE 11: 2024
ISED RSS-GEN ISSUE 5 + A1 + A2: 2021

Date Of Issue:
2025-09-02

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REPORT REVISION HISTORY

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2025-09-02	Initial Issue	Charles Moody

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Garmin International Inc.
1200 East 151st Street
Olathe, KS 66062-3426, USA

EUT DESCRIPTION: Portable Sensor

MODEL: A04537

SERIAL NUMBER: 0651913 / 0684537

SAMPLE RECEIPT DATE: 2024-11-13, 2025-07-30

DATE TESTED: 2024-11-18 to 2024-11-26, 2025-08-11 to 2025-08-29

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C: 2025	Complies
ISED RSS-210 Issue 11: 2024	Complies
ISED RSS-GEN Issue 5 + A1 + 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. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, or any agency of the U.S. government.

Approved & Released For
UL LLC. By:



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Prepared By:



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Lead Project Engineer
Consumer, Medical, and IT Segment
UL LLC.

2. TEST RESULTS SUMMARY

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
15.215 (c)	-	20dB	Complies	None
-	RSS-GEN 6.7	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.249 (a)	RSS-210-B.10(a)	Fundamental Field Strength	Complies	None
15.205, 15.209, 15.249(a)	RSS-GEN 8.9, 8.10	Radiated Emissions	Complies	None.
15.207	RSS-GEN 8.8	AC Mains Conducted Emissions	Complies	None.

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.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC 47 CFR Part 2, FCC 47 CFR Part 15: 2024, ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024, KDB 414788 D01 Radiated Test Site v01r01, ISED RSS-GEN Issue 5 + A1 + A2: 2021, and RSS-210 Issue 11: 2024.

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 Durham, NC 27713, U.S.A	US0067	2180C	703469
<input checked="" type="checkbox"/>	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

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

5.2. DECISION RULES

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

5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
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	0.57%
Time	3.39%

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

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

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

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

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.

$$36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$$

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a portable sensor with BLE and ANT/ANT+. This report covers testing of the ANT/ANT+ radio.

There are three variations of the portable sensor that only differ by the enclosure. All variations were investigated, and the worst-case sensor was tested.

6.2. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) and type, as provided by the manufacturer' are as follows:
The radio utilizes an antenna with the following type and maximum gain:

Type	Frequency Range (MHz)	Maximum Gain (dBi)
PCB Patch	2402-2480	0.35dBi

6.3. SOFTWARE AND FIRMWARE

The software version installed during testing was 4.8.2.

6.4. WORST-CASE CONFIGURATION AND MODE

Radiated Emissions below 30 MHz, above 18GHz, and power line conducted emissions were performed with the EUT set to transmit at the channel with highest output fundamental field strength as worst-case scenario.

Radiated emissions and Equivalent Radiated Power below and above 1GHz were performed with the EUT set to transmit at 2402MHz, 2440MHz, and 2480MHz.

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

The client has declared an operational duty cycle of 14% resulting in a DCCF of -17.08dB. This correction factor is applied to peak measurements when the margin is within 6dB to use as AV calculation.

Sample calculations:

$$\text{DCCF} = 20\log(0.14) = -17.08\text{dB}$$

$$\text{AV} = \text{PK} + \text{DCCF}.$$

6.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	T14 Gen 3	PF4FKW0T	NA
Laptop Charger	Lenovo	ADLX65YLC2D	8SSA10R16970D1SG35A138Y	NA

I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Proprietary	1	4 pin Proprietary	Non-Shielded	<3m	Used for charging only

TEST SETUP

EUT was configured to transmit at default power at the desired frequencies and modes. For final emissions testing, the EUT was connected to AC mains.

SETUP DIAGRAM

Please refer to R15972923-EP1 for setup diagrams

7. MEASUREMENT METHOD

Duty Cycle: ANSI C63.10-2020, Section 11.6

20dB Bandwidth: ANSI C63.10-2020, Section 6.9.2

Occupied Bandwidth: ANSI C63.10-2020, Subclause 6.9.3

Emissions non-restricted frequency bands: ANSI C63.10-2020, Subclause -11.11

General Radiated Spurious Emissions: ANSI C63.10-2020, Section 6.3, 6.5, 6.6

AC Power Line Conducted Emissions: ANSI C63.10-2020, Section 6.2.

Fundamental emission output power: ANSI C63.10-2020, Section 11.9

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 2					
90416	Spectrum Analyzer	Keysight Technologies	N9030A	2024-09-23	2025-09-23
248881	Environmental Meter	Control Company	06-662-4	2024-04-10	2026-04-10
SOFTEMI	Antenna Port Software	UL	Version 2024.2.23	NA	NA
Attenuators					
CBL105	Micro-Coax UTIFLEX Cable Assembly, Low Loss	Carlisle Interconnect Technologies	UFB-197C-0-0160-300300	2024-03-01	2025-03-01

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
70374	EMI Test Receiver	ROHDE & SCHWARZ	ESC17	2024-07-30	2025-07-30
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2024-04-04	2025-04-04
179892	Environmental Meter	Fisher Scientific	15-077-963	2024-08-12	2025-08-12
80391	LISN, 50-ohm/50-uH, 250uH 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250-25-2-01	2024-08-01	2025-08-01
PS216	AC Power Source	Elgar	CW2501M	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		

*NOTE: All conducted testing was performed in November 2024.

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

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	30-1000 MHz				
90628	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-01-02	2026-01-02
	18-40 GHz				
91186	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2024-05-16	2026-05-16
	Gain-Loss Chains				
207639	Gain-loss string: 25-1000MHz	Various	Various	2025-06-13	2026-06-13
225795	Gain-loss string: 18-40GHz	Various	Various	2025-06-13	2026-06-13
	Receiver & Software				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2025-04-21	2026-04-21
90411	Spectrum Analyzer	Keysight	N9030A	2025-07-30	2026-07-30
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	2024-10-02	2025-10-02
	Gain-Loss Chains				
91974	Gain-loss string: 0.009-30MHz	Various	Various	2025-05-31	2026-05-31
	Receiver & Software				
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2025-05-12	2026-05-12
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
241205	Environmental Meter	Fisher Scientific	15-077-963	2025-08-05	2027-08-05

*NOTE: Testing in these chambers were performed in August 2025

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				
88761	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2023-10-05	2025-10-05
	Gain-Loss Chains				
91977	Gain-loss string: 1-18GHz	Various	Various	2025-05-31	2026-05-31
	Receiver & Software				
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2025-07-29	2026-07-29
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
239540	Environmental Meter	Fisher Scientific	15-077-963	2025-08-05	2027-08-05

*NOTE: Testing in this Chamber was performed in August 2025

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

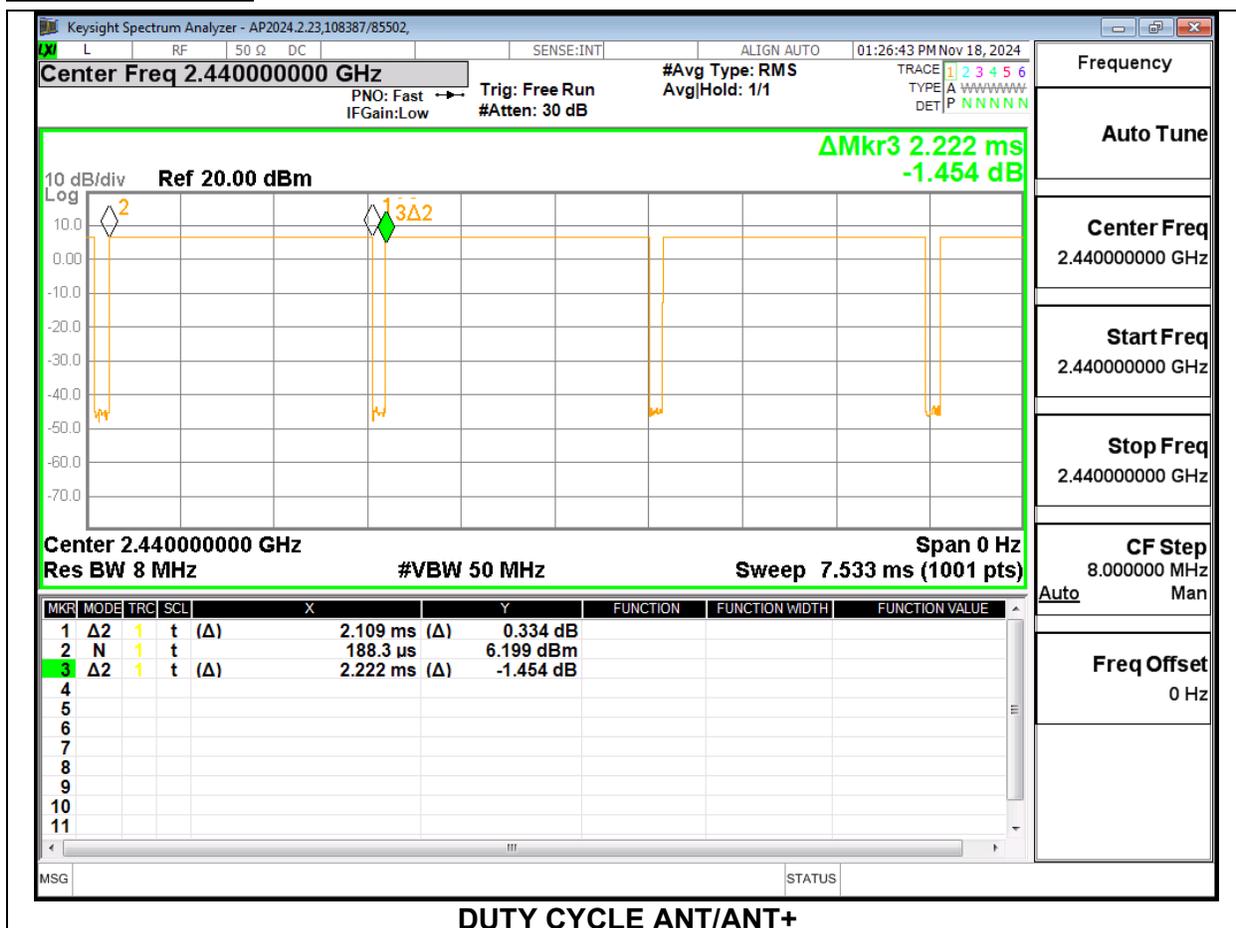
ANSI C63.10 Section 11.6
 KDB 558074 Zero-Span Spectrum Analyzer Method.

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)
ANT/ANT+	2.109	2.222	0.949	94.91%	0.45	0.474

The client has declared an operational duty cycle of 14% corresponding to a DCCF of -17.08dB.
 Sample Calculation: $DCCF = 20\log(0.14) = -17.08\text{dB}$

DUTY CYCLE PLOT



9.2. 99% AND 20dB BANDWIDTH

LIMITS

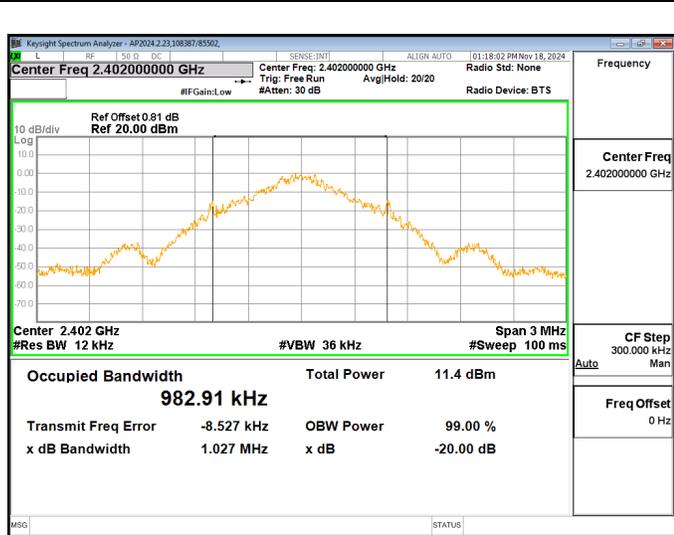
None; for reporting purposes only.

§15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

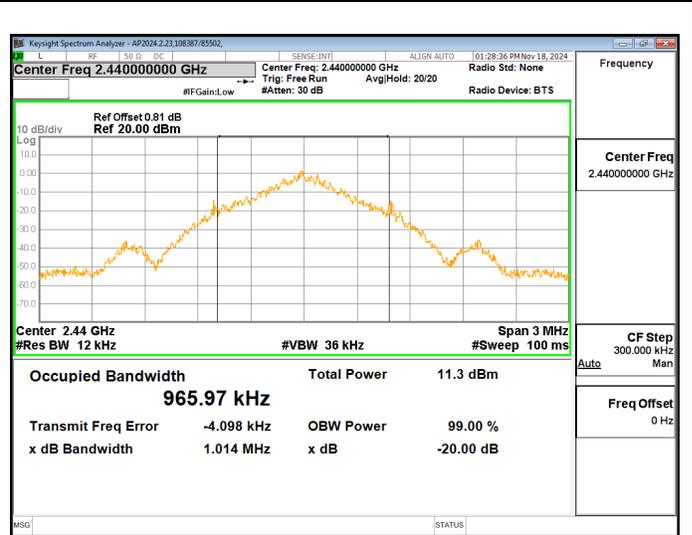
RESULTS

9.2.1. ANT/ANT+

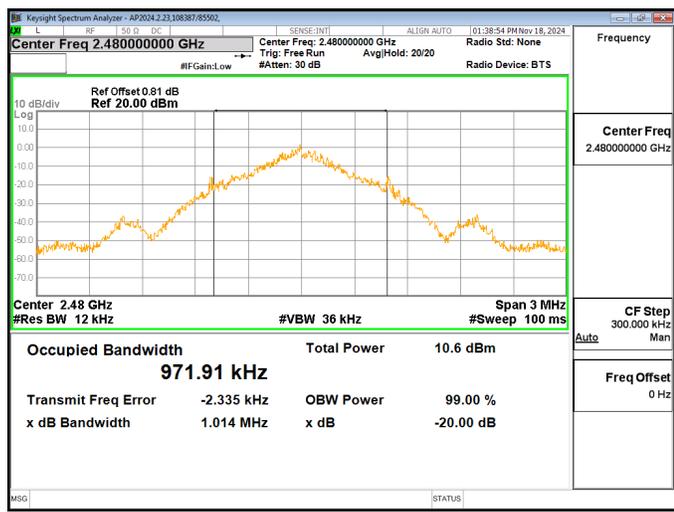
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (kHz)
Low	2402	1.027	982.91
Mid	2440	1.014	965.97
High	2480	1.014	971.91



Low Channel 2402MHz



Mid Channel 2440MHz



High Channel 2480MHz

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10. RADIATED TEST RESULTS

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

FCC 15.249(a), RSS-210 B.10(a)

Frequency Range (MHz)	Field Strength Limit of Fundamental (mV/m) at 3 m	Field Strength Limit of Harmonics (mV/m) at 3 m
2402-2480	50	.5

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

(e) As shown in § 15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

RSS-GEN, Section 8.9 and 8.10

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

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.

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. AV is determined by a calculation: $AV = PK + DCCF$.

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.

10.1. FUNDAMENTAL AND SPURIOUS EMISSIONS (LOW CHANNEL)

10.1.1. FUNDAMENTAL (2402 MHz)

Frequency (GHz)	Meter Reading (dBuV)	Det	88761 (dB/m)	Gain/Loss (dB)	DCCF	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2402													
2.40218	92.94	Pk	31.8	-25.4	0	99.34	-	-	114	-14.66	81	135	H
2.40218	92.94	Pk	31.8	-25.4	-17.08	82.26	94	-11.4	-	-	81	135	H
2.40186	88.08	Pk	31.8	-25.4	0	94.48	-	-	114	-19.52	234	286	V
2.40186	88.08	Pk	31.8	-25.4	-17.08	77.4	94	-16.6	-	-	234	286	V

Pk - Peak detector

The client has declared an operational duty cycle of 14% corresponding to a DCCF of -17.08dB.

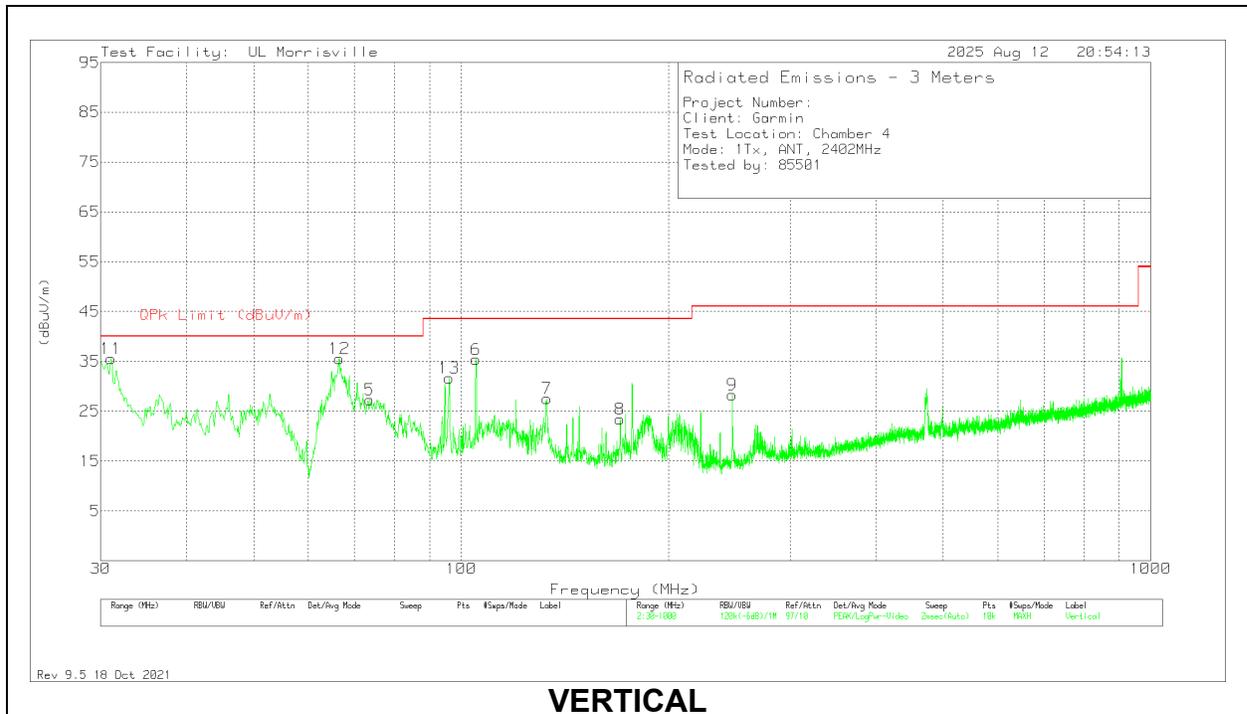
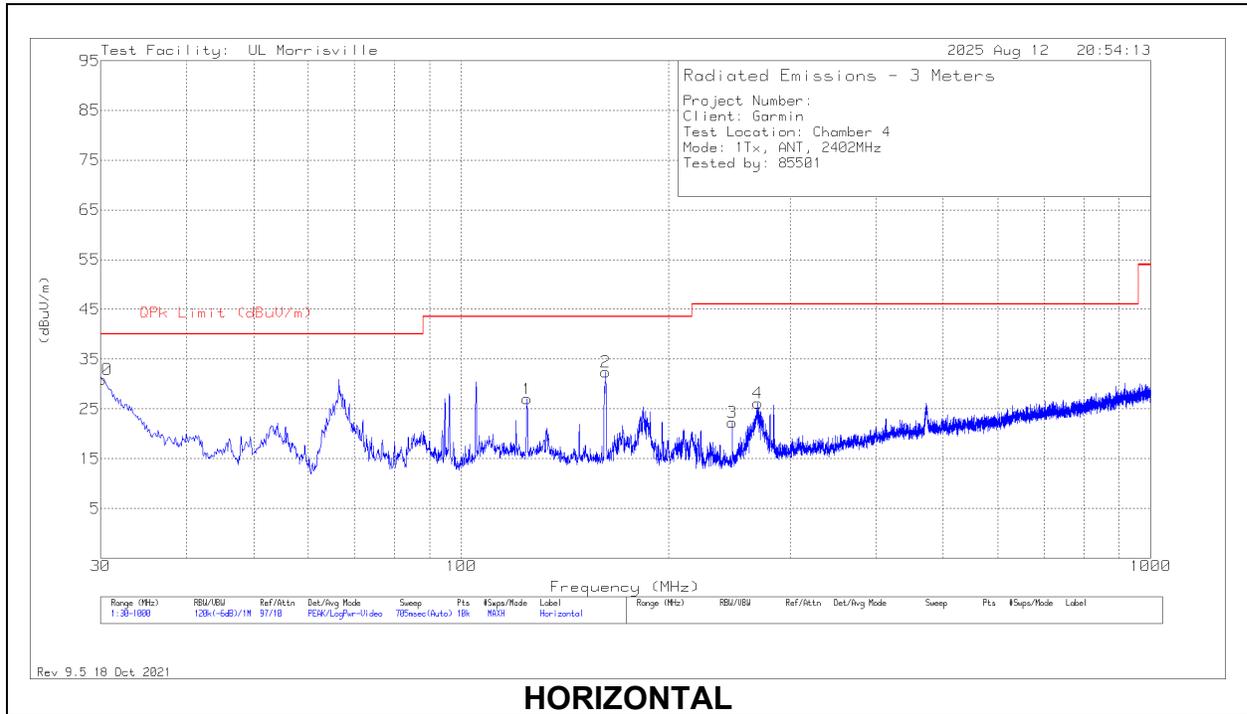
Sample Calculation: $DCCF = 20\log(0.14) = -17.08\text{dB}$

AV calculation:

AV= PK + DCCF.

10.1.2. HARMONICS AND SPURIOUS EMISSIONS BELOW 1 GHz

LOW CHANNEL, 2402 MHz RESULTS



RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90628 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 124.575	37.38	Pk	20.1	-30.5	26.98	43.52	-16.54	0-360	200	H
3	* ** 247.28	35.08	Pk	17.5	-30.3	22.28	46.02	-23.74	0-360	200	H
4	* ** 269.202	36.61	Pk	19.3	-29.7	26.21	46.02	-19.81	0-360	100	H
5	* ** 73.65	44.28	Pk	14.3	-31.3	27.28	40	-12.72	0-360	100	V
7	* ** 133.208	38.45	Pk	19.8	-30.7	27.55	43.52	-15.97	0-360	100	V
8	* ** 169.971	35.28	Pk	18	-29.9	23.38	43.52	-20.14	0-360	100	V
9	* ** 247.28	41.07	Pk	17.5	-30.3	28.27	46.02	-17.75	0-360	100	V
10	30.097	35.27	Pk	26.8	-31.2	30.87	-	-	0-360	200	H
11	31.067	41.92	Pk	26.1	-32.5	35.52	-	-	0-360	100	V
12	66.569	52.33	Pk	14.3	-31.1	35.53	-	-	0-360	100	V
13	96.057	47.45	Pk	15.4	-31.2	31.65	-	-	0-360	100	V
6	105.0295	48.07	Pk	17.8	-30.5	35.37	-	-	0-360	100	V
2	161.92	44.4	Pk	18.4	-30.4	32.4	-	-	0-360	100	H

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

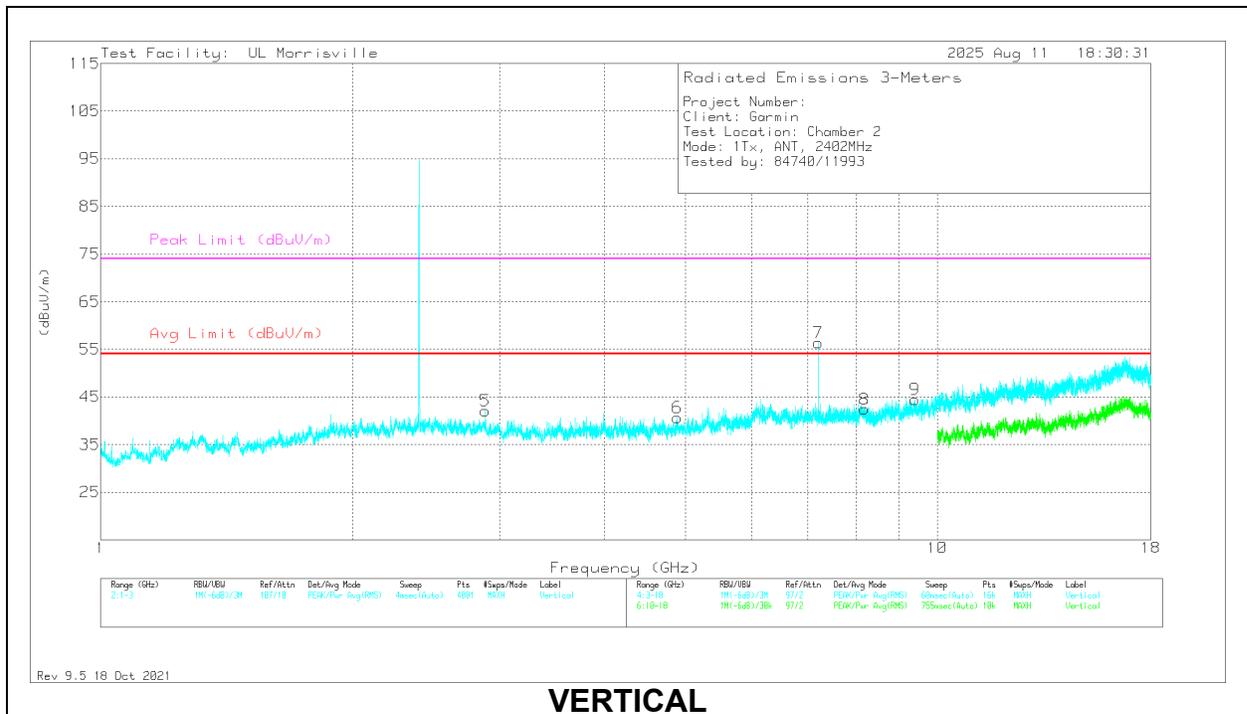
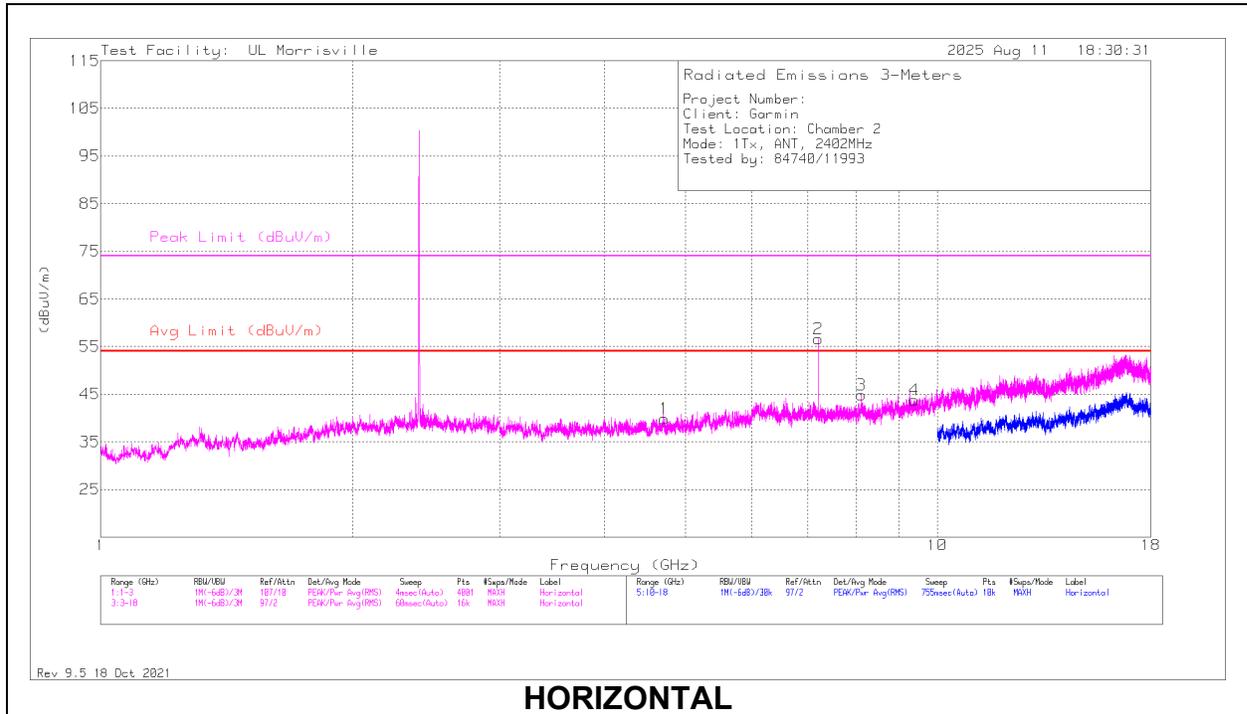
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

Note: Order number is 15972923.

10.1.3. HARMONICS AND SPURIOUS EMISSIONS ABOVE 1 GHz

LOW CHANNEL, 2402 MHz RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	88761 (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
5	* ** 2.8835	36.84	Pk	32.3	-27	42.14	54	-11.86	74	-31.86	0-360	101	V
1	* ** 4.71656	51.12	Pk	34	-45.2	39.92	54	-14.08	74	-34.08	0-360	200	H
3	* ** 8.115	50.1	Pk	35.8	-41.1	44.8	54	-9.2	74	-29.2	0-360	200	H
4	* ** 9.38719	48.55	Pk	36.6	-41.4	43.75	54	-10.25	74	-30.25	0-360	101	H
6	* ** 4.88719	51.33	Pk	34	-44.7	40.63	54	-13.37	74	-33.37	0-360	101	V
8	* ** 8.19094	48.62	Pk	35.7	-41.9	42.42	54	-11.58	74	-31.58	0-360	200	V
9	* ** 9.40781	48.26	Pk	36.6	-40.4	44.46	54	-9.54	74	-29.54	0-360	101	V
2	7.20656	63.74	Pk	35.5	-42.6	56.64	-	-	-	-	0-360	200	H
7	7.20656	63.49	Pk	35.5	-42.6	56.39	-	-	-	-	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

Note: Order number is 15972923.

10.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (MID CHANNEL)

10.2.1. FUNDAMENTAL (2440 MHz)

Frequency (GHz)	Meter Reading (dBuV)	Det	88761 (dB/m)	Gain/Loss (dB)	DCCF	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2440													
2.44016	92.5	Pk	32.1	-25.9	0	98.7	-	-	114	-15.3	86	134	H
2.44016	92.5	Pk	32.1	-25.9	-17.08	80.3	94	-13.7	-	-	86	134	H
2.43984	86.15	Pk	32.1	-26	0	92.25	-	-	114	-21.75	305	307	V
2.43984	86.15	Pk	32.1	-26	-17.08	75.17	94	-18.83	-	-	305	307	V

Pk - Peak detector

The client has declared an operational duty cycle of 14% corresponding to a DCCF of -17.08dB.

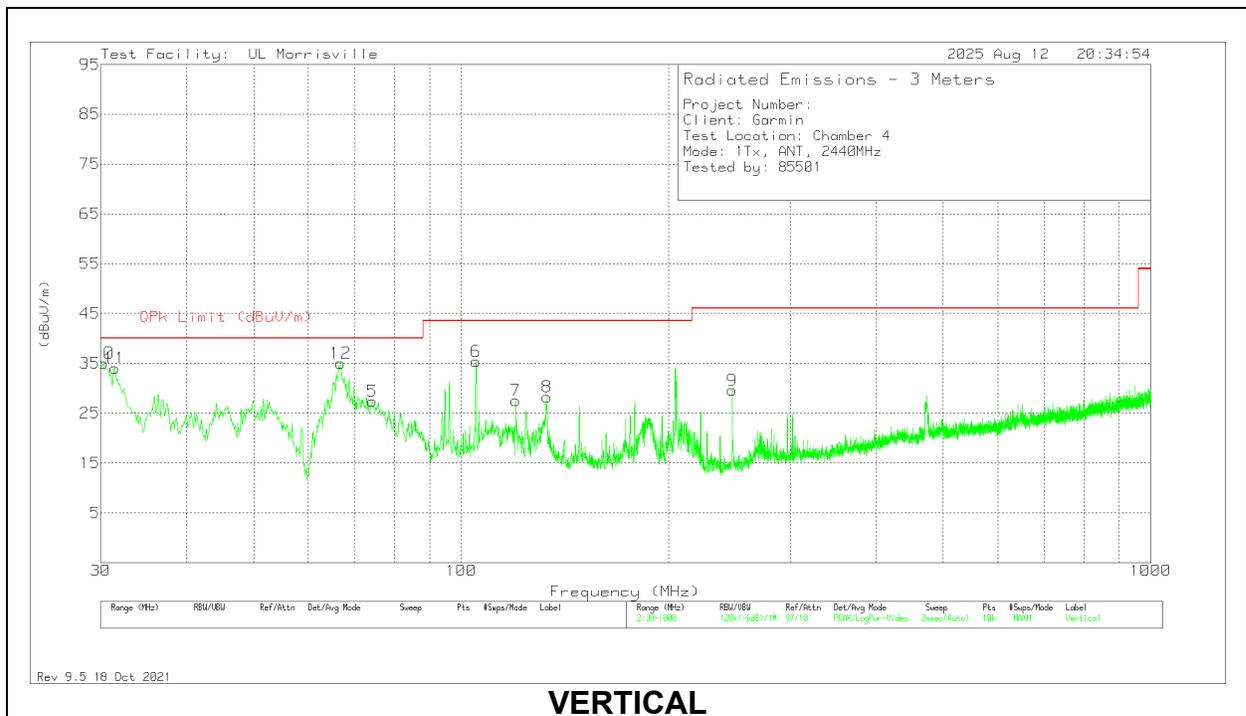
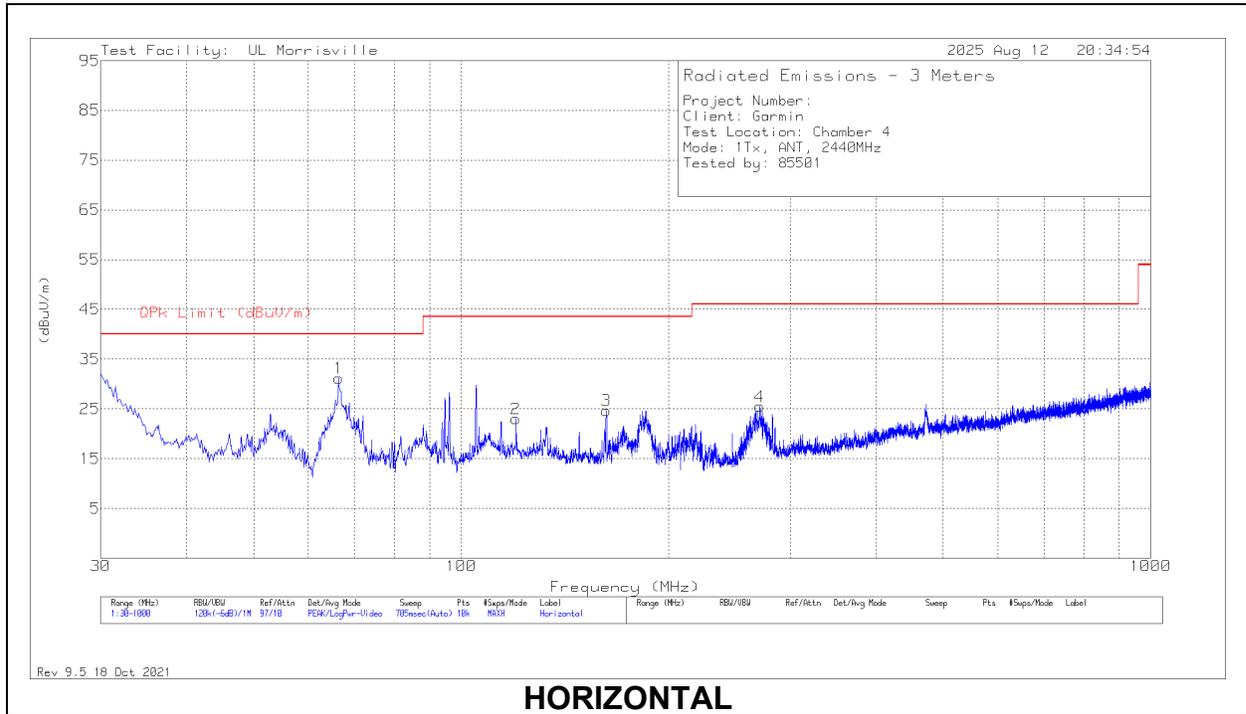
Sample Calculation: $DCCF = 20\log(0.14) = -17.08\text{dB}$

AV calculation:

$AV = PK + DCCF$.

10.2.2. HARMONICS AND SPURIOUS EMISSIONS BELOW 1 GHz

MID CHANNEL, 2440 MHz RESULTS



RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90628 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	*** 120.113	33.28	Pk	20	-30.3	22.98	43.52	-20.54	0-360	100	H
3	*** 162.308	36.56	Pk	18.4	-30.3	24.66	43.52	-18.86	0-360	100	H
4	*** 271.142	35.77	Pk	19.4	-29.7	25.47	46.02	-20.55	0-360	100	H
5	*** 74.329	44.12	Pk	14.2	-30.9	27.42	40	-12.58	0-360	100	V
7	*** 120.016	37.97	Pk	20	-30.4	27.57	43.52	-15.95	0-360	100	V
8	*** 133.208	39.21	Pk	19.8	-30.7	28.31	43.52	-15.21	0-360	100	V
9	*** 247.28	42.4	Pk	17.5	-30.3	29.6	46.02	-16.42	0-360	200	V
10	30.291	39.57	Pk	26.7	-31.2	35.07	-	-	0-360	100	V
11	31.455	40.34	Pk	25.8	-32.1	34.04	-	-	0-360	100	V
1	66.375	48.09	Pk	14.3	-31.2	31.19	-	-	0-360	100	H
12	66.86	51.56	Pk	14.3	-30.8	35.06	-	-	0-360	100	V
6	104.981	48.14	Pk	17.8	-30.5	35.44	-	-	0-360	100	V

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

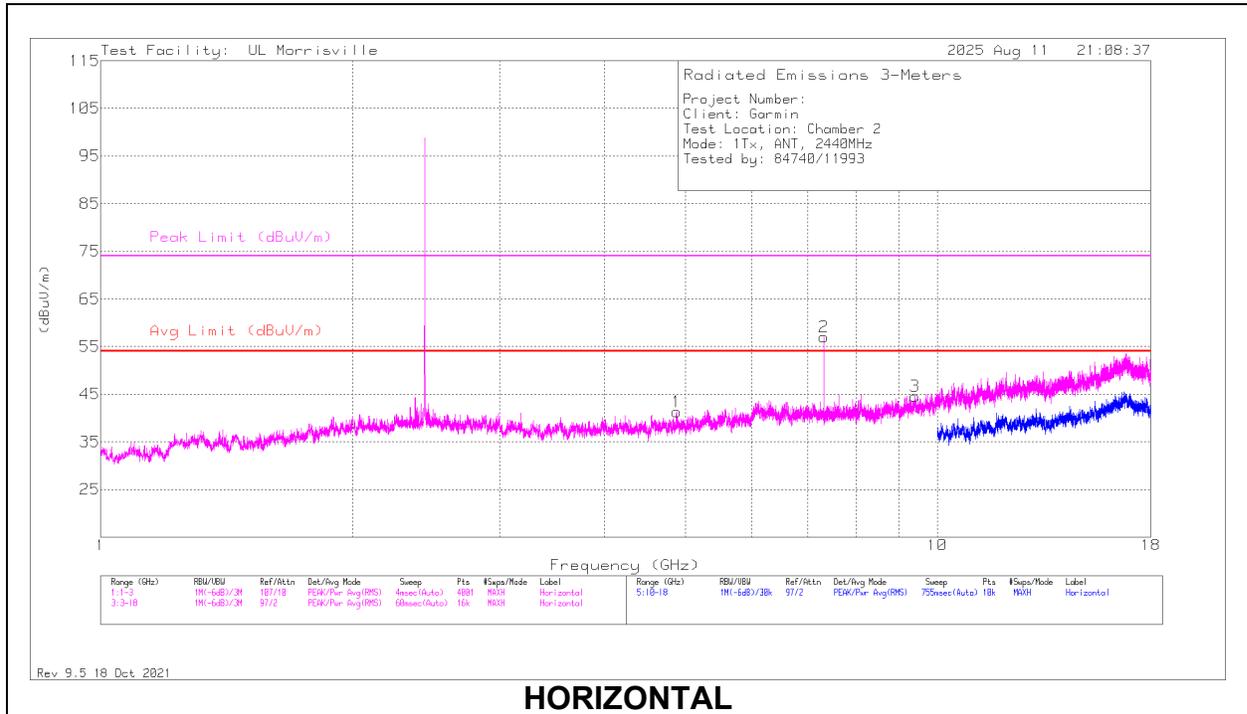
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

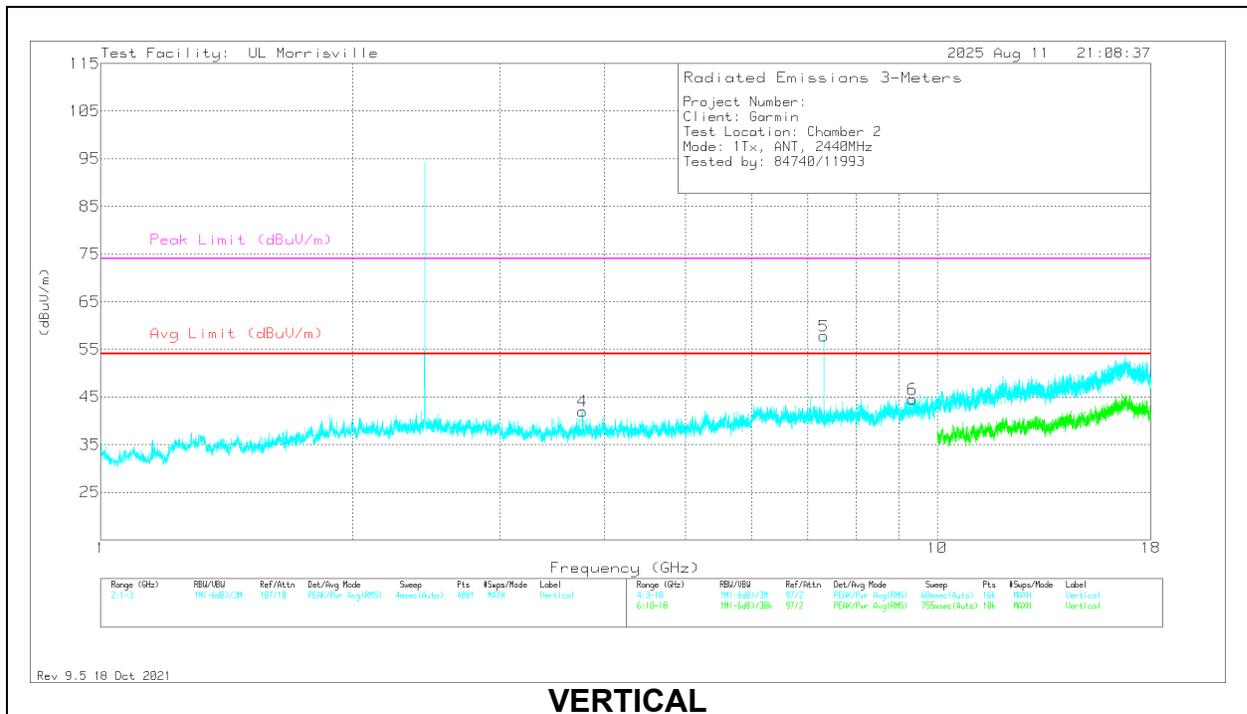
Note: Order number is 15972923.

10.2.3. HARMONICS AND SPURIOUS EMISSIONS ABOVE 1 GHz

MID CHANNEL, 2440 MHz RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	88761 (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	*** 4.88344	51.89	Pk	34	-44.6	0	41.29	54	-12.71	74	-32.71	0-360	200	H
2	*** 7.32047	65.85	PK2	35.6	-43.3	0	58.15	-	-	74	-15.85	230	124	H
	*** 7.32047	65.85	PK2	35.6	-43.3	-17.08	41.07	54	-12.93	-	-	230	124	H
3	*** 9.39938	49	Pk	36.6	-41	0	44.6	54	-9.4	74	-29.4	0-360	200	H
4	*** 3.765	54.48	Pk	33.2	-45.7	0	41.98	54	-12.02	74	-32.02	0-360	101	V
5	*** 7.32051	66.46	PK2	35.6	-43.3	0	58.76	-	-	74	-15.24	218	142	V
	*** 7.32051	66.46	PK2	35.6	-43.3	-17.08	41.68	54	-12.32	-	-	218	142	V
6	*** 9.34594	48.81	Pk	36.5	-40.8	0	44.51	54	-9.49	74	-29.49	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

Note: Order number is 15972923.

10.3. FUNDAMENTAL AND SPURIOUS EMISSIONS (HIGH CHANNEL)

10.3.1. FUNDAMENTAL (2480 MHz)

Frequency (GHz)	Meter Reading (dBuV)	Det	88761 (dB/m)	Gain/Loss (dB)	DCCF	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2480													
2.47985	90.68	Pk	32.2	-25.5	0	97.38	-	-	114	-16.62	329	348	H
2.47985	90.68	Pk	32.2	-25.5	-17.08	80.3	94	-13.7	-	-	329	348	H
2.47985	90.64	Pk	32.2	-25.5	0	97.34	-	-	114	-16.66	16	357	V
2.47985	90.64	Pk	32.2	-25.5	-17.08	80.26	94	-13.74	-	-	16	357	V

PK - Peak detector

The client has declared an operational duty cycle of 14% corresponding to a DCCF of -17.08dB.

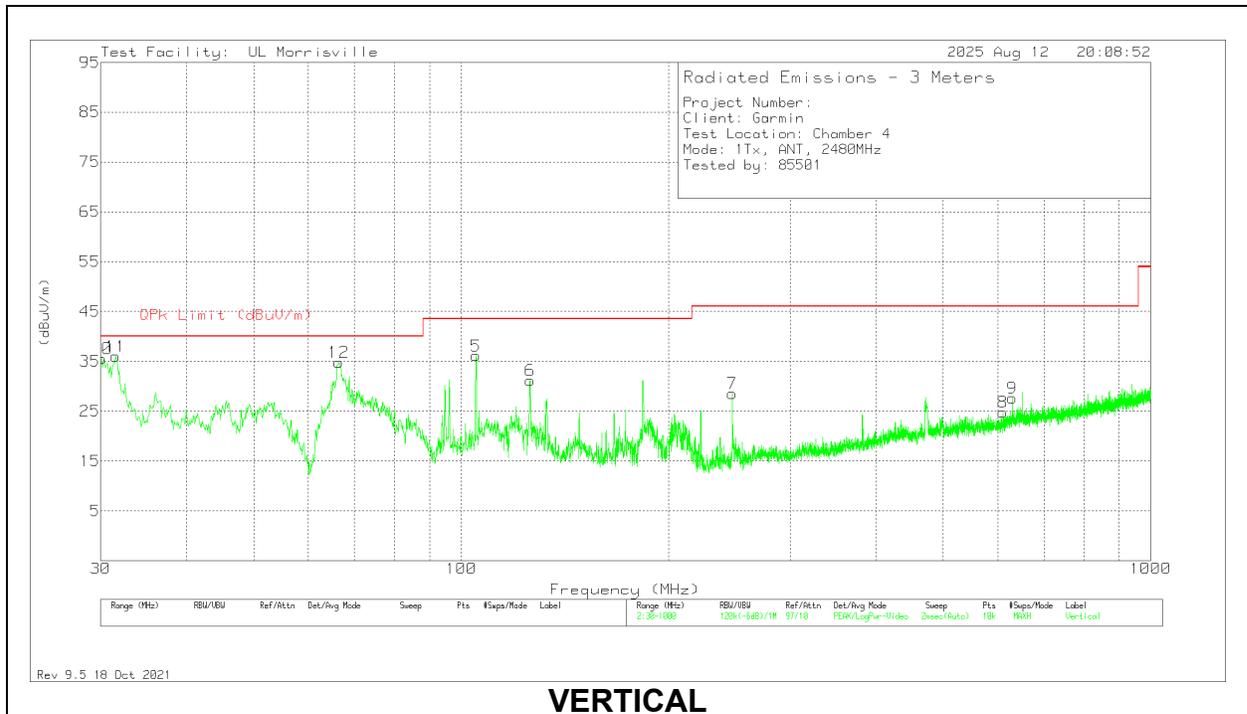
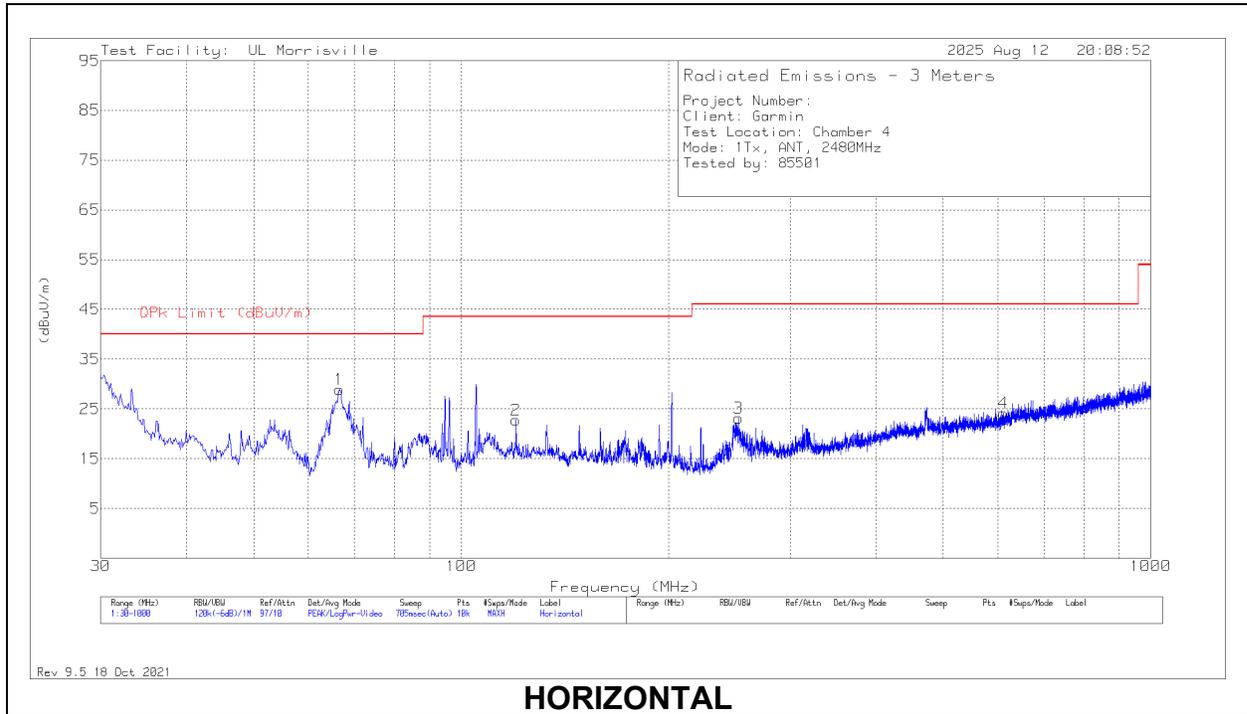
Sample Calculation: $DCCF = 20\log(0.14) = -17.08\text{dB}$

AV calculation:

$AV = PK + DCCF$.

10.3.2. HARMONICS AND SPURIOUS EMISSIONS BELOW 1 GHz

HIGH CHANNEL, 2480 MHz RESULTS



RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90628 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* ** 120.113	33.03	Pk	20	-30.3	22.73	43.52	-20.79	0-360	100	H
3	* ** 252.227	34.95	Pk	17.5	-29.3	23.15	46.02	-22.87	0-360	100	H
4	* ** 612	27.5	Pk	25.1	-28.4	24.2	46.02	-21.82	0-360	300	H
6	* ** 125.836	42.04	Pk	20.1	-31	31.14	43.52	-12.38	0-360	100	V
7	* ** 247.28	41.34	Pk	17.5	-30.3	28.54	46.02	-17.48	0-360	200	V
8	* ** 610.545	27.37	Pk	25	-27.6	24.77	46.02	-21.25	0-360	200	V
10	30.097	39.92	Pk	26.8	-31.2	35.52	-	-	0-360	100	V
11	31.552	42.19	Pk	25.8	-32	35.99	-	-	0-360	100	V
12	66.472	51.74	Pk	14.3	-31.2	34.84	-	-	0-360	100	V
1	66.569	45.71	Pk	14.3	-31.1	28.91	-	-	0-360	100	H
5	105.078	48.81	Pk	17.8	-30.5	36.11	-	-	0-360	100	V
9	629.557	28.71	Pk	25.6	-26.7	27.61	-	-	0-360	100	V

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

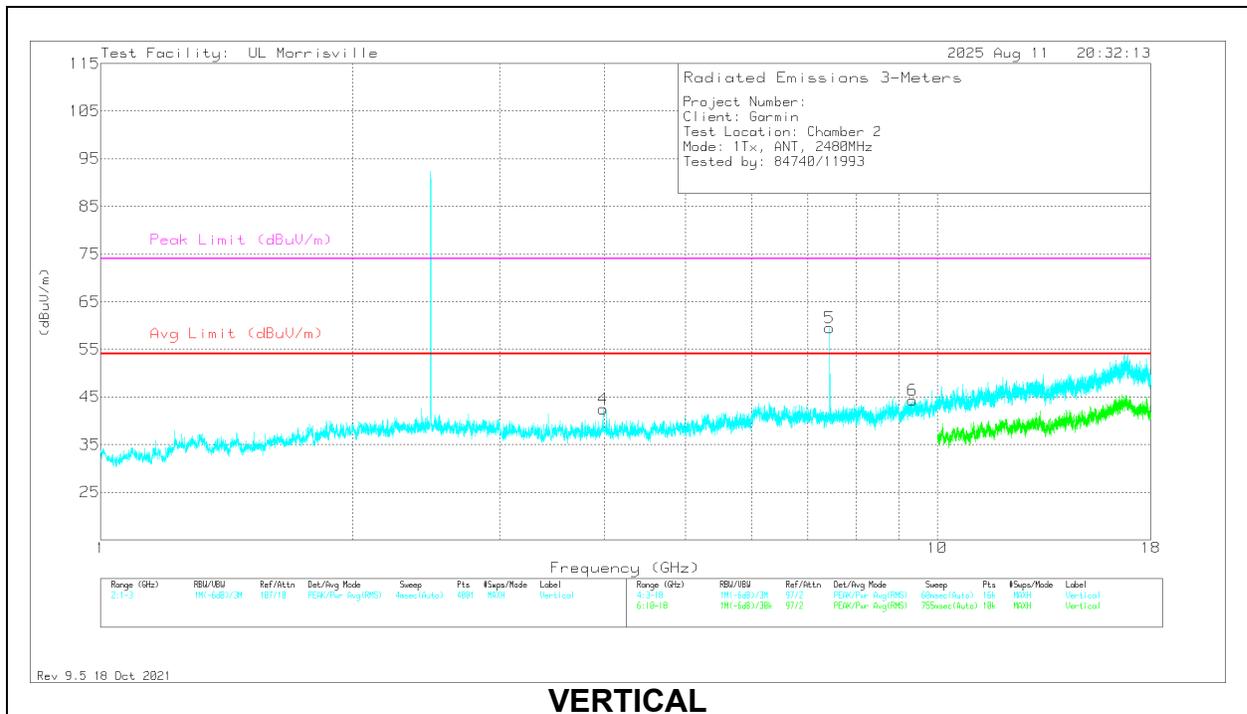
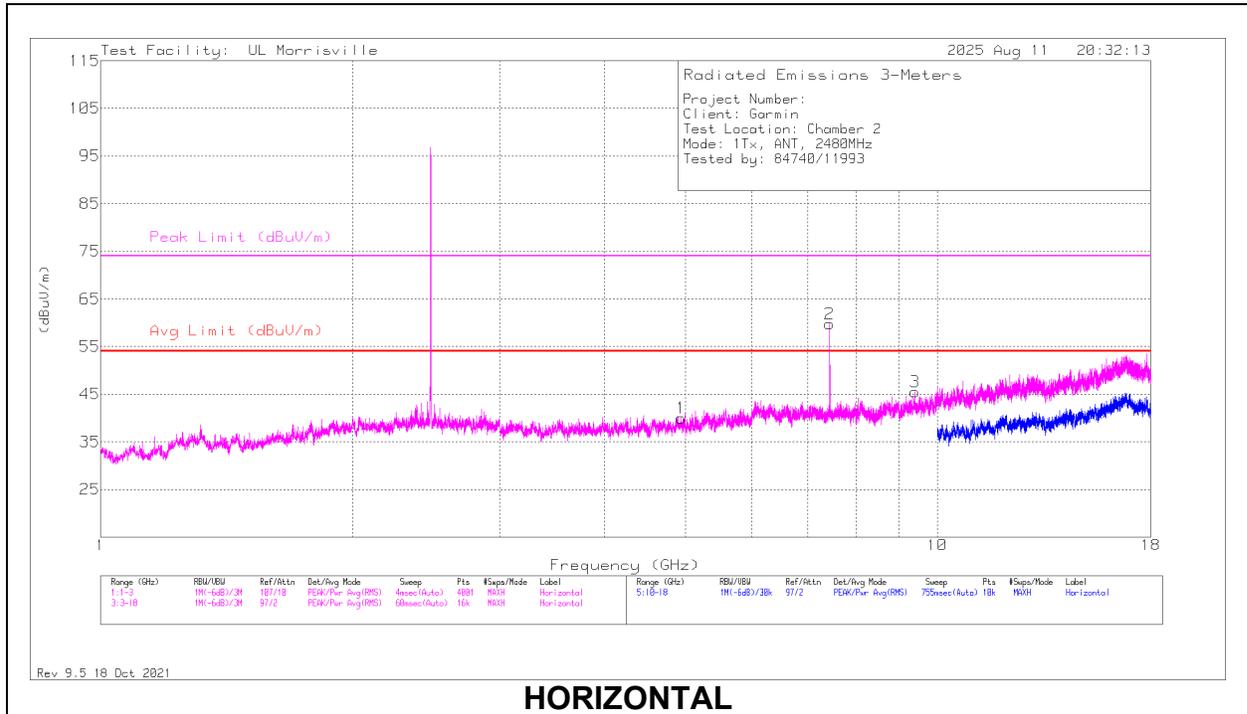
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

Note: Order number is 15972923.

10.3.3. HARMONICS AND SPURIOUS EMISSIONS ABOVE 1 GHz

HIGH CHANNEL, 2480 MHz RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	88761 (dB/m)	Gain/Loss (dB)	DCCF	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.94063	50.95	Pk	33.9	-44.8	0	40.05	54	-13.95	74	-33.95	0-360	200	H
2	* ** 7.44062	67.53	PK2	35.6	-42.6	0	60.53	-	-	74	-13.47	197	125	H
	* ** 7.44062	67.53	PK2	35.6	-42.6	-17.08	43.45	54	-10.55	-	-	197	125	H
3	* ** 9.4125	49.82	Pk	36.6	-40.9	0	45.52	54	-8.48	74	-28.48	0-360	200	H
4	* ** 3.98438	55.21	Pk	33.4	-46.1	0	42.51	54	-11.49	74	-31.49	0-360	101	V
5	* ** 7.43961	67.76	PK2	35.6	-42.5	0	60.86	-	-	74	-13.14	217	138	V
	* ** 7.43961	67.76	PK2	35.6	-42.5	-17.08	43.78	54	-10.22	-	-	217	138	V
6	* ** 9.34313	48.44	Pk	36.5	-40.6	0	44.34	54	-9.66	74	-29.66	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

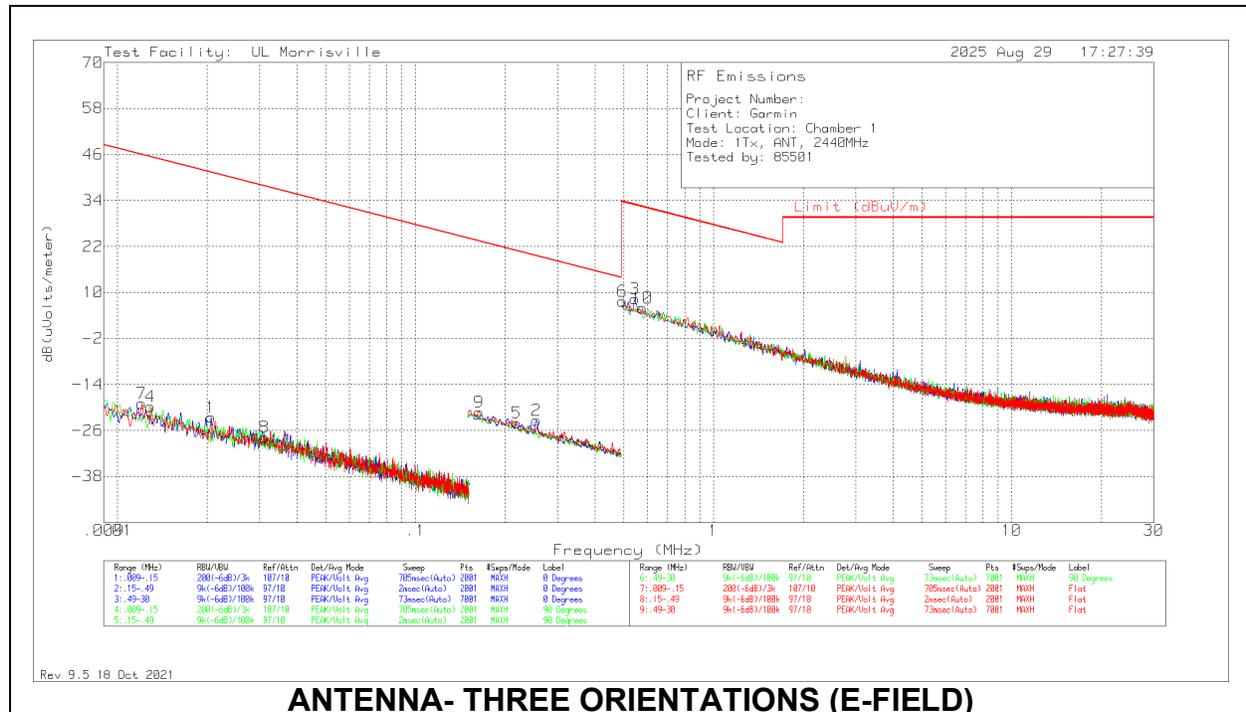
PK2 - Maximum Peak

Note: Order number is 15972923.

10.4. SPURIOUS EMISSIONS BELOW 30 MHz

WORST-CASE CONFIGURATION

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

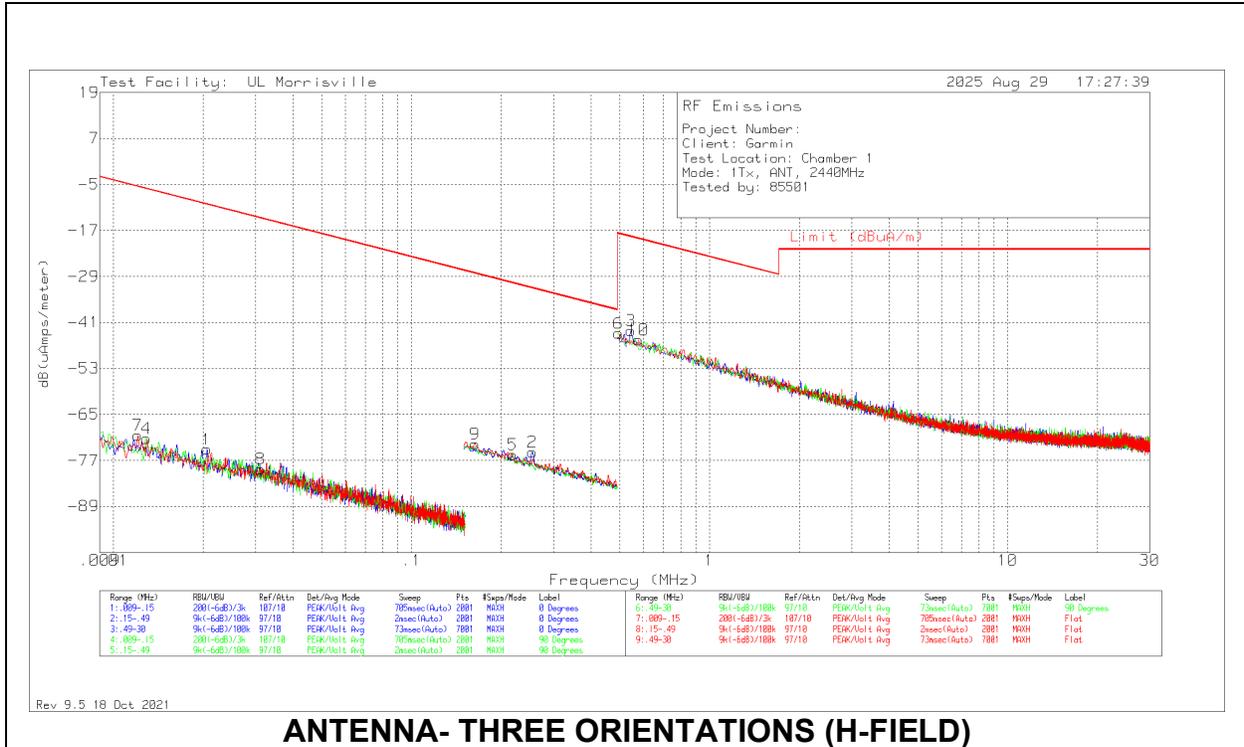


ANTENNA- THREE ORIENTATIONS (E-FIELD)

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ANT (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
7	.01205	43.01	Pk	17.9	.1	-80	-18.99	45.98	65.98	-64.97	0-360	Flat
4	.01291	42.67	Pk	17.5	.1	-80	-19.73	45.39	65.39	-65.12	0-360	90 degs
1	.02057	43.38	Pk	13.9	.1	-80	-22.62	41.34	61.34	-63.96	0-360	0 degs
8	.03122	39.17	Pk	13	.1	-80	-27.73	37.72	57.72	-65.45	0-360	Flat
9	.16343	47.72	Pk	11	.1	-80	-21.18	23.34	43.34	-44.52	0-360	Flat
5	.21868	45.02	Pk	10.9	.1	-80	-23.98	20.81	40.81	-44.79	0-360	90 degs
2	.2543	45.59	Pk	10.9	.1	-80	-23.41	19.5	39.5	-42.91	0-360	0 degs
6	.49422	36.54	Pk	11	.1	-40	7.64	33.73	-	-26.09	0-360	90 degs
3	.54481	37.21	Pk	11	.1	-40	8.31	32.88	-	-24.57	0-360	0 degs
10	.57854	34.78	Pk	11	.1	-40	5.88	32.36	-	-26.48	0-360	Flat

Pk - Peak detector

Note: Order number is 15972923.



ANTENNA- THREE ORIENTATIONS (H-FIELD)

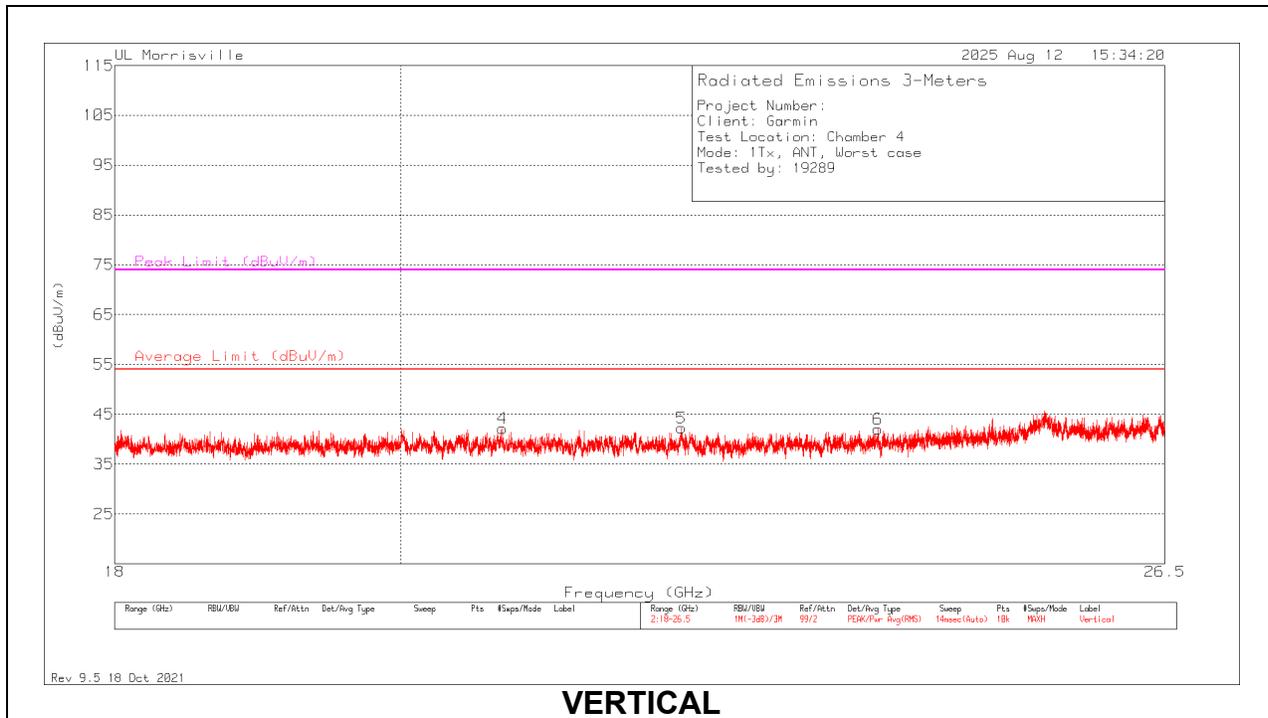
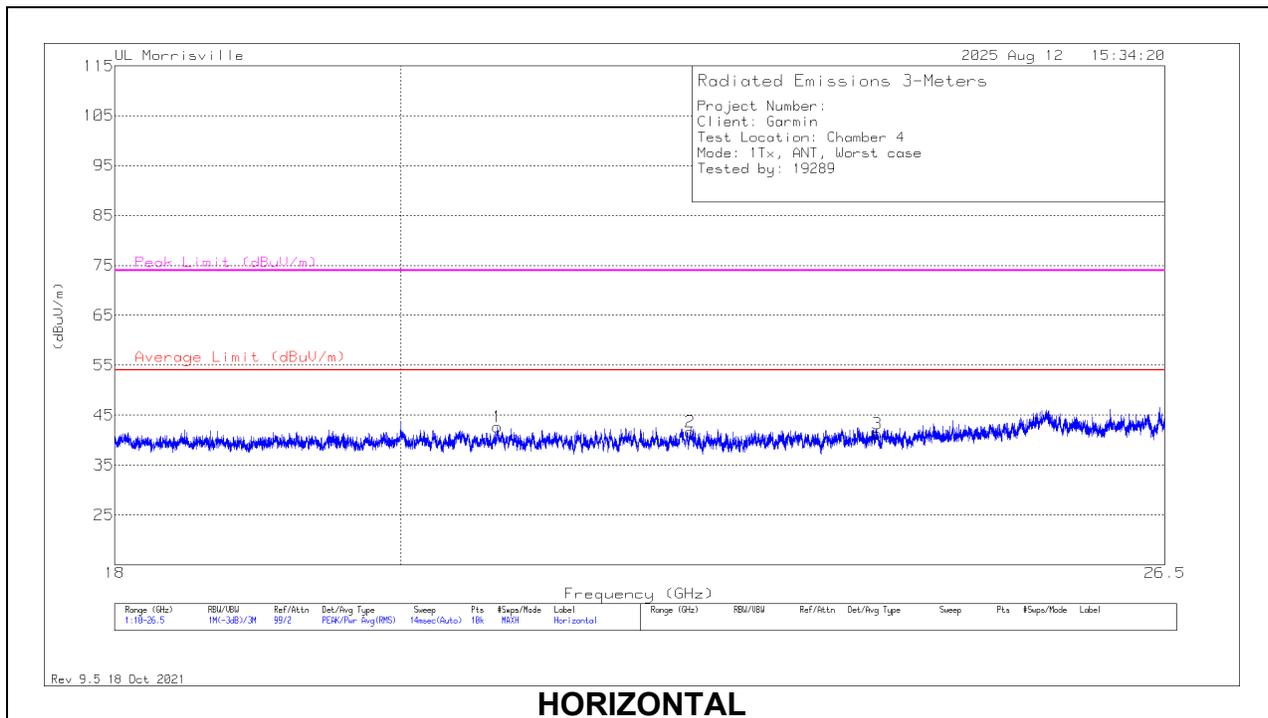
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ANT (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
7	.01205	43.01	Pk	-33.6	.1	-80	-70.49	-5.52	14.48	-64.97	0-360	Flat
4	.01291	42.67	Pk	-34	.1	-80	-71.23	-6.11	13.89	-65.12	0-360	90 degs
1	.02057	43.38	Pk	-37.6	.1	-80	-74.12	-10.16	9.84	-63.96	0-360	0 degs
8	.03122	39.17	Pk	-38.5	.1	-80	-79.23	-13.78	6.22	-65.45	0-360	Flat
9	.16343	47.72	Pk	-40.5	.1	-80	-72.68	-28.16	-8.16	-44.52	0-360	Flat
5	.21868	45.02	Pk	-40.6	.1	-80	-75.48	-30.69	-10.69	-44.79	0-360	90 degs
2	.2543	45.59	Pk	-40.6	.1	-80	-74.91	-32	-12	-42.91	0-360	0 degs
6	.49422	36.54	Pk	-40.5	.1	-40	-43.86	-17.77	-	-26.09	0-360	90 degs
3	.54481	37.21	Pk	-40.5	.1	-40	-43.19	-18.62	-	-24.57	0-360	0 degs
10	.57854	34.78	Pk	-40.5	.1	-40	-45.62	-19.14	-	-26.48	0-360	Flat

Pk - Peak detector

Note: Order number is 15972923.

10.5. WORST CASE 18-26 GHZ

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



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	91186 (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	* ** 20.72367	48.43	Pk	32.7	-38.5	42.63	54	-11.37	74	-31.37	0-360	100	H
2	* ** 22.24787	47.17	Pk	33.4	-38.9	41.67	54	-12.33	74	-32.33	0-360	150	H
3	* ** 23.83838	45.09	Pk	33.9	-37.7	41.29	54	-12.71	74	-32.71	0-360	150	H
4	* ** 20.76363	48.46	Pk	32.7	-39	42.16	54	-11.84	74	-31.84	0-360	300	V
5	* ** 22.17902	46.52	Pk	33.4	-37.7	42.22	54	-11.78	74	-31.78	0-360	300	V
6	* ** 23.84433	45.96	Pk	33.9	-37.8	42.06	54	-11.94	74	-31.94	0-360	300	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

Note: Order number is 15972923.

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.

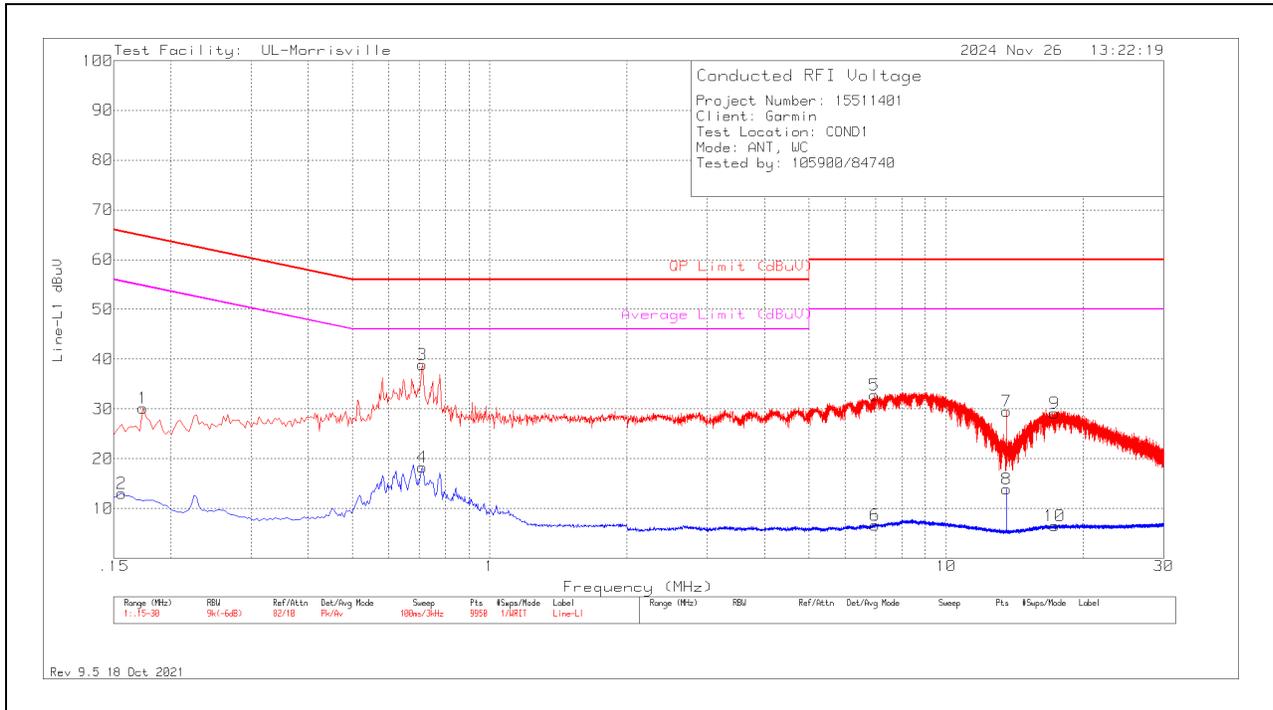
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

11.1. AC Power Line

LINE 1 RESULTS

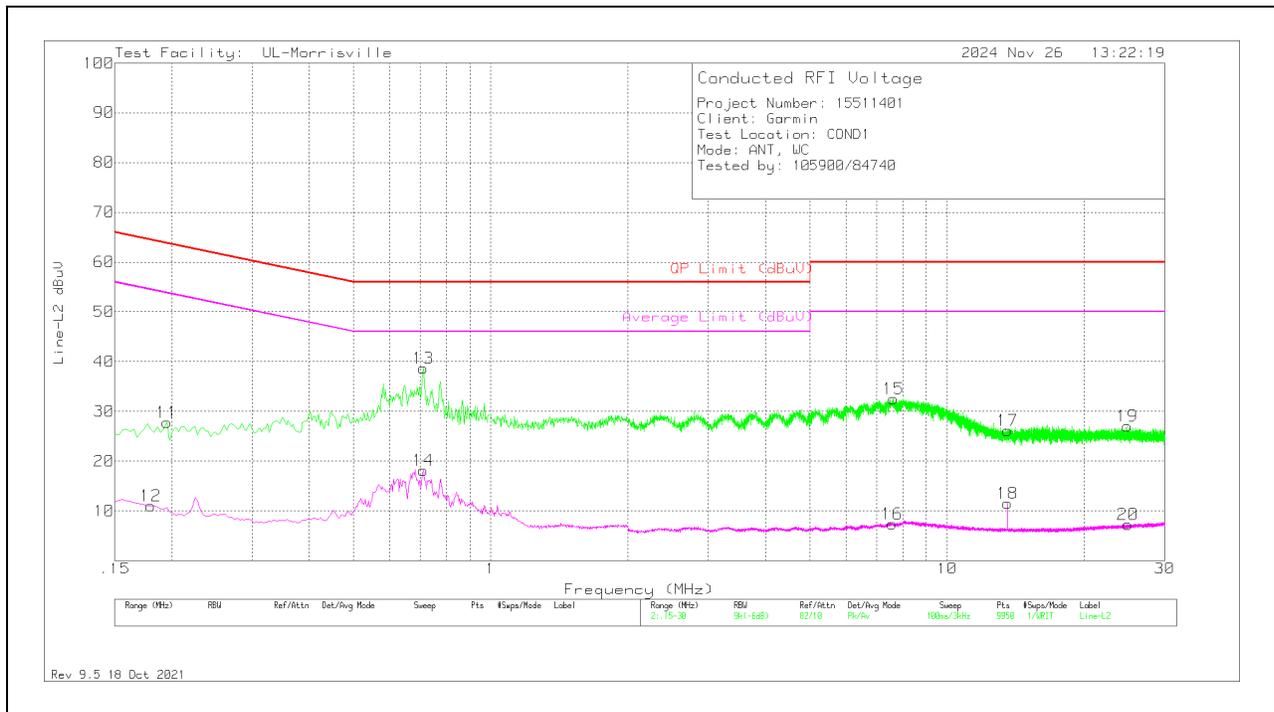


Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.174	20.12	Pk	.2	9.8	30.12	64.77	-34.65	-	-
2	.156	3.06	Av	.2	9.8	13.06	-	-	55.67	-42.61
3	.711	29.14	Pk	0	9.8	38.94	56	-17.06	-	-
4	.711	8.52	Av	0	9.8	18.32	-	-	46	-27.68
5	6.969	22.74	Pk	.1	9.9	32.74	60	-27.26	-	-
6	6.978	-3.34	Av	.1	9.9	6.66	-	-	50	-43.34
7	13.563	19.46	Pk	.1	10	29.56	60	-30.44	-	-
8	13.563	3.81	Av	.1	10	13.91	-	-	50	-36.09
9	17.286	18.89	Pk	.2	10.1	29.19	60	-30.81	-	-
10	17.307	-3.79	Av	.2	10.1	6.51	-	-	50	-43.49

Pk - Peak detector
 Av - Average detection

Note* - Markers 7 and 8 are from RFID signals in the lab and is not related to the EUT.
 Note: Order number is 15972923.

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)
12	.18	1.05	Av	.2	9.8	11.05	-	-	54.49	-43.44
11	.195	17.82	Pk	.2	9.8	27.82	63.82	-36	-	-
13	.711	28.86	Pk	0	9.8	38.66	56	-17.34	-	-
14	.711	8.31	Av	0	9.8	18.11	-	-	46	-27.89
16	7.593	-2.72	Av	.1	10	7.38	-	-	50	-42.62
15	7.626	22.47	Pk	.1	10	32.57	60	-27.43	-	-
17	13.557	16.04	Pk	.1	10	26.14	60	-33.86	-	-
18	13.56	1.42	Av	.1	10	11.52	-	-	50	-38.48
19	24.861	16.41	Pk	.4	10.2	27.01	60	-32.99	-	-
20	24.888	-3.39	Av	.4	10.2	7.21	-	-	50	-42.79

Pk - Peak detector
 Av - Average detection

Markers 17 and 18 are from RFID signals in the lab and are not related to the EUT.
 Note: Order number is 15972923.

12. SETUP PHOTOS

See R15972923-EP1 for Setup Photos.

END OF TEST REPORT