

TEST REPORT

Report Number: R15701621-E7c

Applicant : HID Global Corp
611 Center Ridge Dr.
Austin, TX 78753, USA

Model : 40V2

FCC ID : JQ6-SIGNO40V2

IC : 2236B-SIGNO40V2

EUT Description : Signo V2 Reader

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

Date Of Issue:
2025-07-03

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
v1	2025-06-12	Initial Issue	Chandler Stanley
V2	2025-07-03	Revised Section 6.4 and Section 11 to Revise Worst-Case Exploration	Chandler Stanley

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: HID Global Corp
611 Center Ridge Dr.
Austin, TX 78753, USA

EUT DESCRIPTION: Signo V2 Reader

MODEL: 40V2

SERIAL NUMBER: FL0P0U00V2WO40TKF8087 / FL0P0U00WOWO40TKF8087

SAMPLE RECEIPT DATE: 2025-03-10, 2025-04-01, and 2025-04-10

DATE TESTED: 2025-03-14 to 2025-04-29

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C: 2025	Refer to Section 3
ISED RSS-210 Issue 11: 2024	
ISED RSS-GEN Issue 5 + A1 + A2: 2021	

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:



Michael Antola
Sr. Staff Engineer
Consumer, Medical and IT Segment
UL LLC

Prepared By:



Chandler Stanley
Engineer
Consumer, Medical and IT Segment
UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with:

- ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024
- FCC 47 CFR Part 2
- FCC 47 CFR Part 15C
- RSS-GEN Issue 5 + A1 + A2: 2021
- RSS-210 Issue 11: 2024

3. SUMMARY OF TEST RESULTS

Requirement Description	Requirement Clause Number	Result	Remarks
Occupied Bandwidth	FCC §15.215 (c) RSS-Gen 6.7	Compliant	None
Fundamental Measurements.	FCC §15.225 (a-d) FCC §15.209 (d)		
Tx Spurious Emissions	IC RSS-210, Annex B.6 IC RSS-GEN, Section 8.9 (Transmitter)		
Frequency Stability	FCC §15.225 (e) RSS-210, Annex B.6		
AC Mains Line Conducted Emissions	FCC §15.207 IC RSS-GEN, Section 8.8		

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
☐	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)	141.16 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%

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

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

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

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

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 dBuV + 0 dB + 10.1 dB + 0 dB = 46.6 dBuV

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is a smartcard reader typically installed near doorway as part of physical access system, to control access to that door, and it that contains BLE, 13.56 MHz RFID, and 125 kHz RFID radios. This report covers full testing of the 13.56 MHz radio.

6.2. MAXIMUM ELECTRIC FIELD STRENGTH

The transmitter has a maximum peak radiated electric field strength at 30m as follows:

Fundamental Frequency (MHz)	E-Field (dBuV/m)
13.56	49.24

6.3. SOFTWARE AND FIRMWARE

Firmware Version: 10.1
Hardware Version: Rev H

6.4. WORST-CASE CONFIGURATION AND MODE

The EUT is meant to be installed and operated in one orientation; therefore, all testing was performed with the EUT in its intended orientation. The EUT is meant to be powered via an auxiliary device (access controller) that does not come with the product. Therefore, for AC Lines, the scan was run using a DC power supply as representative

The client has declared the worst-case data rate to be 106 kbit/s; therefore, all final tests were performed without a tag and with a tag inducing 106kbit/s data-rate. The EUT only supports Type A.

A terminal cable and pigtail cable were investigated and it was found that the terminal cable is worst-case; therefore, all testing was performed with the terminal cable. All testing was performed for tag on and tag off modes.

The distance between the EUT and tag was also investigated, and the worst-case condition occurs when the tag and EUT are separated by 2 cm; therefore, all final radiated testing was performed with the EUT and tag separated by 2 cm.

6.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Badge 13.56 MHz	NXP Semiconductors	NA	NA	NA

I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Power	1	Terminal	Unshielded	<3m	Supplies Power

SETUP DIAGRAM

Please refer to R15701621-EP3c for setup diagrams

7. 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.
Conducted Room 1					
90411	Spectrum Analyzer	Keysight Technologies	N9030A	2024-08-01	2025-08-01
207726	Temp/Humid Chamber	Thermotron	SM-32-8200	2025-01-15	2026-01-15
179892	Environmental Meter	Fisher Scientific	15-077-963	2024-08-12	2025-08-12
76022	DC Regulated Power Supply	CircuitSpecialists.Com	CSI3005X5	NA	NA
SOFTEMI	Antenna Port Software	UL	Version 2024.2.23	NA	NA
CBL091	Micro-Coax UTiFLEX Cable Assembly, Low Loss,40Ghz	Carlisle Interconnect Technologies	UFA147A-2-0360-200200	2025-03-07	2026-03-07
NA	NFC Probe Kit	EMCO	7405-9911-4442	NA	NA

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	2024-10-02	2025-10-02
Gain-Loss Chains					
91975	Gain-loss string: 0.009-30MHz	Various	Various	2024-05-10	2025-05-10
Receiver & Software					
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2024-03-05	2025-03-31
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

Note*: All equipment was in calibration at the time of testing.

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

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
0.009-30MHz					
135144	Active Loop Antenna	ETS-Lindgren	6502	2024-10-02	2025-10-02
30-1000 MHz					
90628	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-01-02	2026-01-02
Gain-Loss Chains					
207638	Gain-loss string: 0.009-30MHz	Various	Various	2024-05-22	2025-05-22
207639	Gain-loss string: 25-1000MHz	Various	Various	2024-05-22	2025-05-22
Receiver & Software					
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2024-04-16	2025-04-30
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 - 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	2025-04-30
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
236852	CW-AC Power Source	Ametek	CW2501	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		

8. 20dB and 99% BANDWIDTH

LIMITS

§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.

TEST PROCEDURE

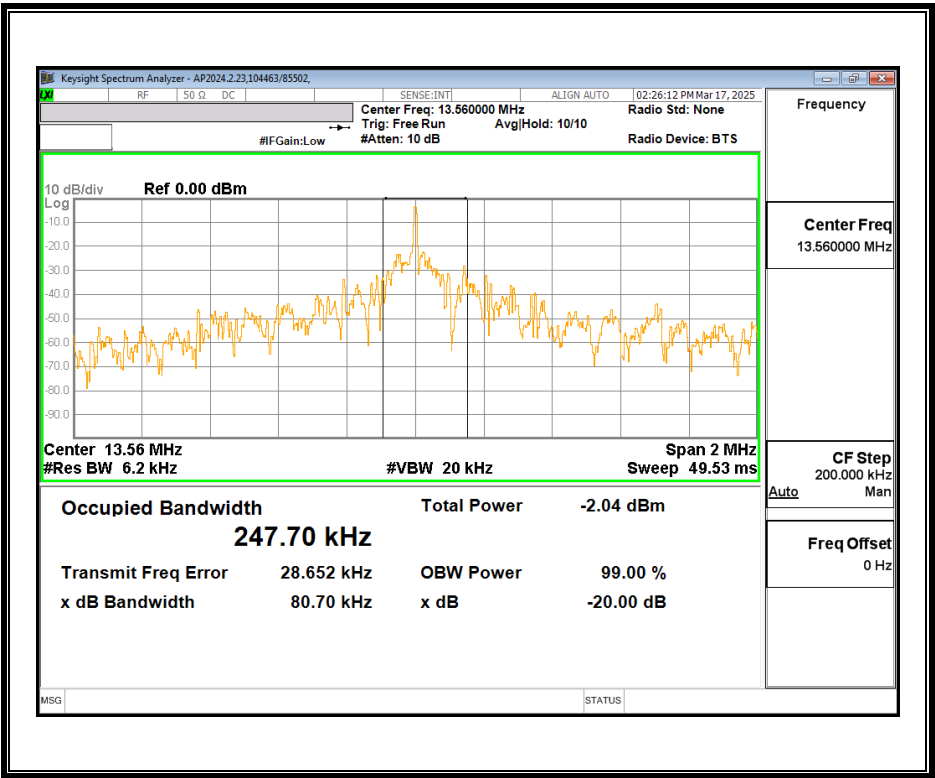
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1-5% of the 20dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

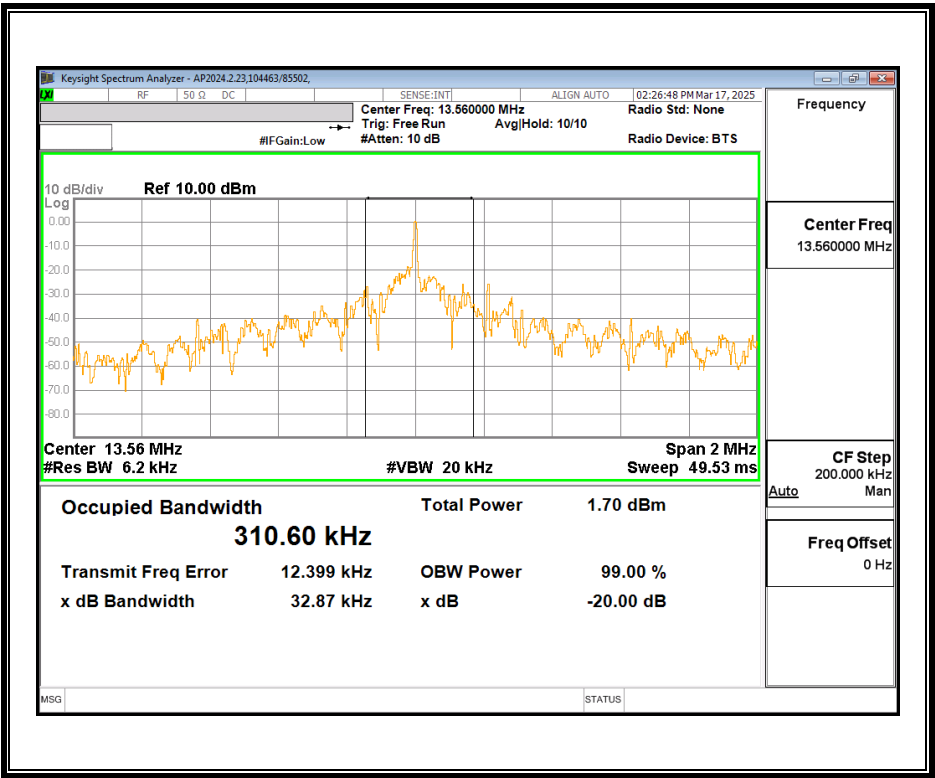
Note*: Because the measured signal is CW or CW-like, adjusting the RBW per C63.10 would not be practical since the measured bandwidth will always follow the RBW.

Mode	Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
Tag On	13.56	80.70	247.7
Tag Off	13.56	32.87	310.6

8.1. Tag On



8.2. Tag Off



9. RADIATED EMISSION TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMIT

FCC §15.225

IC RSS-210, Annex B.6

IC RSS-GEN, Section 8.9 (Transmitter)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz

or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the filed strength from uV/m to dBuV/m is:

Limit (dBuV/m) = 20 log limit (uV/m)

In addition:

§15.209 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

TEST PROCEDURE

ANSI C63.10 - 2020

The EUT is an intentional radiator that incorporates a digital device, the highest fundamental frequency generated or used in the device is 13.56 MHz; therefore, the frequency range was investigated from 9kHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater.

Note: For all Below 30MHz test data, 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 $40 \cdot \log(\text{test distance} / \text{specification distance})$.

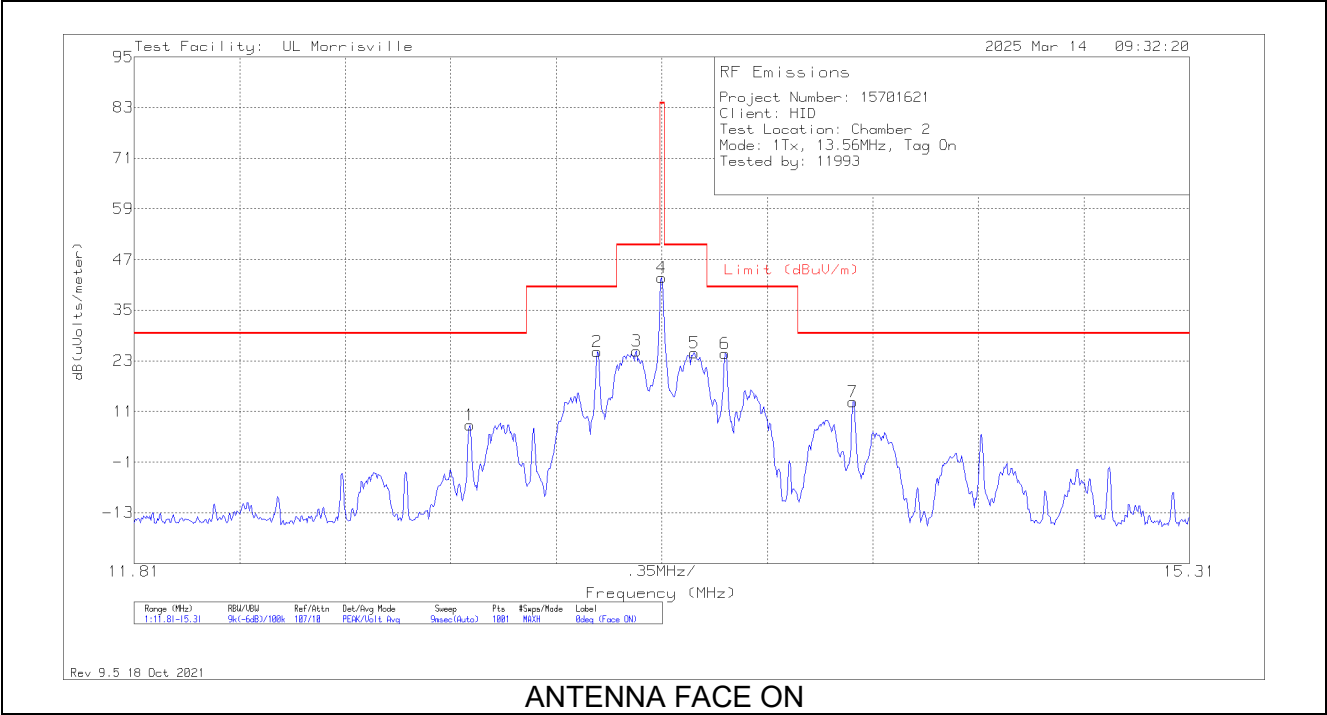
Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open area test site. Therefore, sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

RESULTS

9.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (<30MHz)

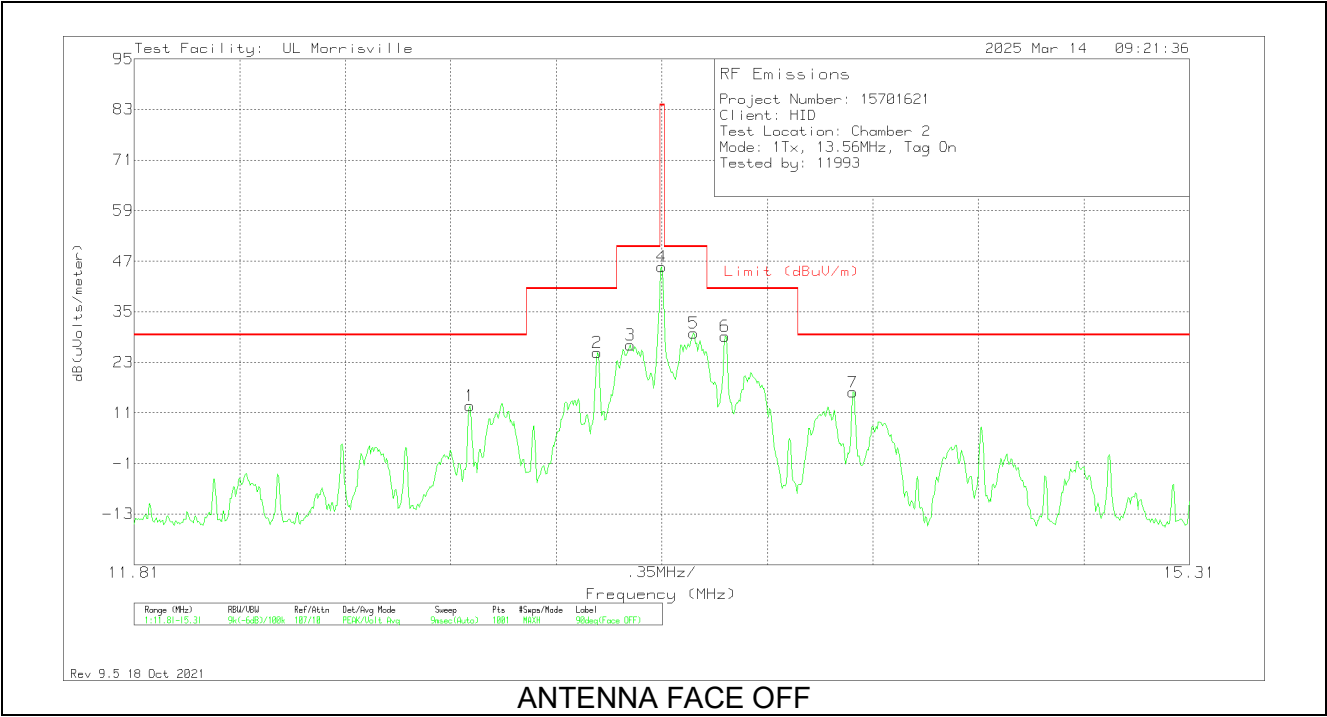
9.2.1. TYPE A, TAG ON

FUNDAMENTAL

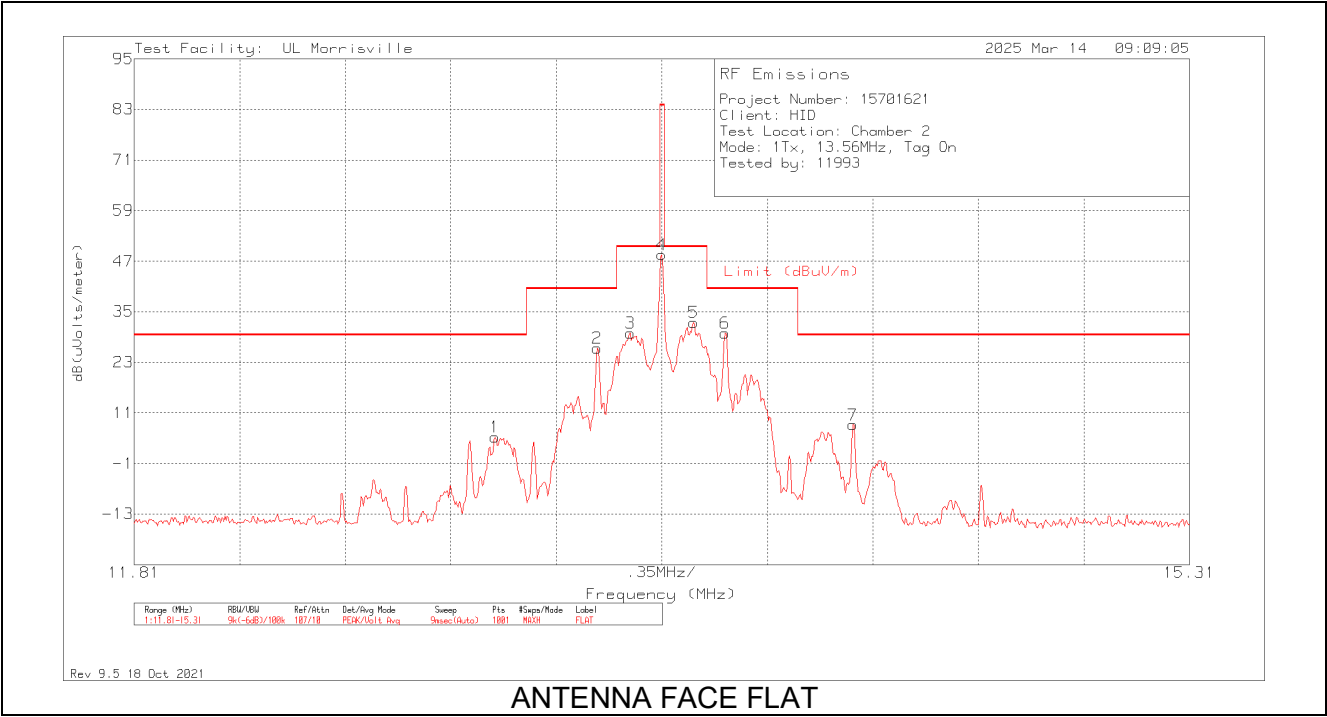


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	12.923	37.44	Pk	9.8	.6	-40	7.84	29.5	-21.66	27	0 degs
2	13.3465	54.77	Pk	9.8	.6	-40	25.17	40.5	-15.33	27	0 degs
3	13.476	54.94	Pk	9.8	.6	-40	25.34	50.5	-25.16	27	0 degs
4	13.56	72.29	Pk	9.8	.6	-40	42.69	84	-41.31	27	0 degs
5	13.6685	54.47	Pk	9.8	.6	-40	24.87	50.5	-25.63	27	0 degs
6	13.77	54.42	Pk	9.7	.6	-40	24.72	40.5	-15.78	27	0 degs
7	14.1935	43.05	Pk	9.7	.6	-40	13.35	29.5	-16.15	27	0 degs

Pk - Peak detector



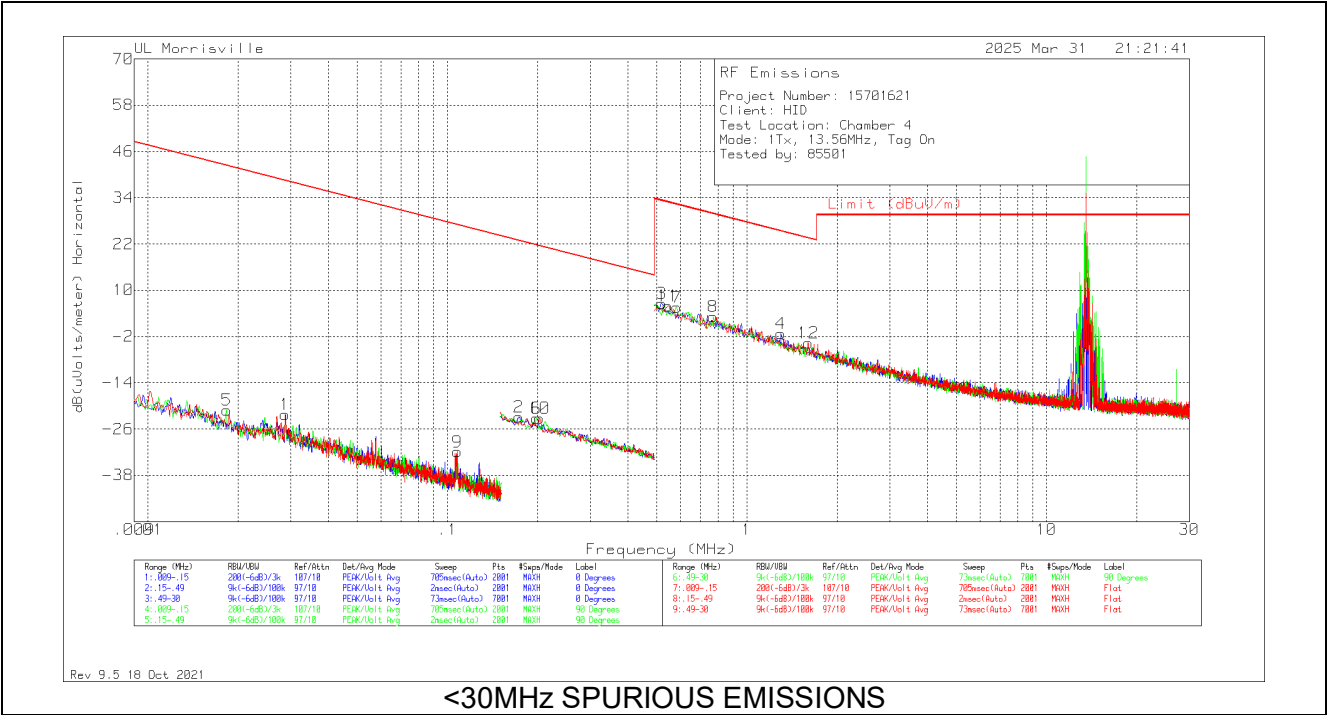
Pk - Peak detector



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	13.007	34.92	Pk	9.8	.6	-40	5.32	29.5	-24.18	291	Flat
2	13.3465	55.96	Pk	9.8	.6	-40	26.36	40.5	-14.14	291	Flat
3	13.455	59.59	Pk	9.8	.6	-40	29.99	50.5	-20.51	291	Flat
4	13.56	78.17	Pk	9.8	.6	-40	48.57	84	-35.43	291	Flat
5	13.665	62.05	Pk	9.8	.6	-40	32.45	50.5	-18.05	291	Flat
6	13.77	59.68	Pk	9.7	.6	-40	29.98	40.5	-10.52	291	Flat
7	14.1935	37.86	Pk	9.7	.6	-40	8.16	29.5	-21.34	291	Flat

Pk - Peak detector

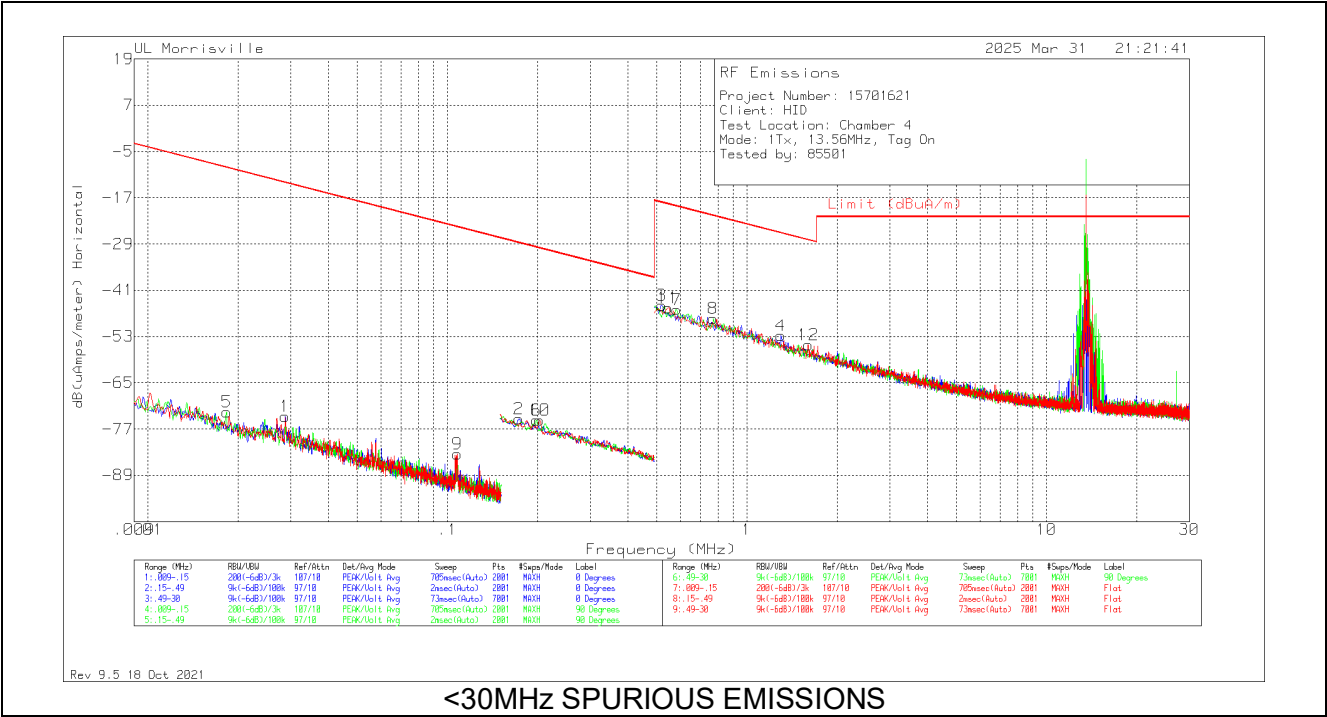
SPURIOUS EMISSION – E FIELD



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
5	.0183	43.98	Pk	14.8	.1	-80	-21.12	42.36	62.36	-63.48	0-360	90 degs
1	.02874	44.48	Pk	13.2	.1	-80	-22.22	38.44	58.44	-60.66	0-360	0 degs
9	.10797	36.89	Pk	11.1	.1	-80	-31.91	26.94	-	-58.85	0-360	Flat
2	.17338	46.02	Pk	11	.1	-80	-22.88	22.82	42.82	-45.7	0-360	0 degs
6	.19803	45.65	Pk	11	.1	-80	-23.25	21.67	41.67	-44.92	0-360	90 degs
10	.20296	45.78	Pk	10.9	.1	-80	-23.22	21.46	41.46	-44.68	0-360	Flat
3	.51951	35.47	Pk	11	.1	-40	6.57	33.29	-	-26.72	0-360	0 degs
11	.54481	34.87	Pk	11	.1	-40	5.97	32.88	-	-26.91	0-360	Flat
7	.58275	34.41	Pk	11	.1	-40	5.51	32.29	-	-26.78	0-360	90 degs
8	.77247	32.01	Pk	11	.2	-40	3.21	29.85	-	-26.64	0-360	90 degs
4	1.29947	27.5	Pk	11	.2	-40	-1.3	25.33	-	-26.63	0-360	0 degs
12	1.60092	25.02	Pk	11.1	.2	-40	-3.68	23.52	-	-27.2	0-360	Flat

Pk - Peak detector

SPURIOUS EMISSION – H FIELD

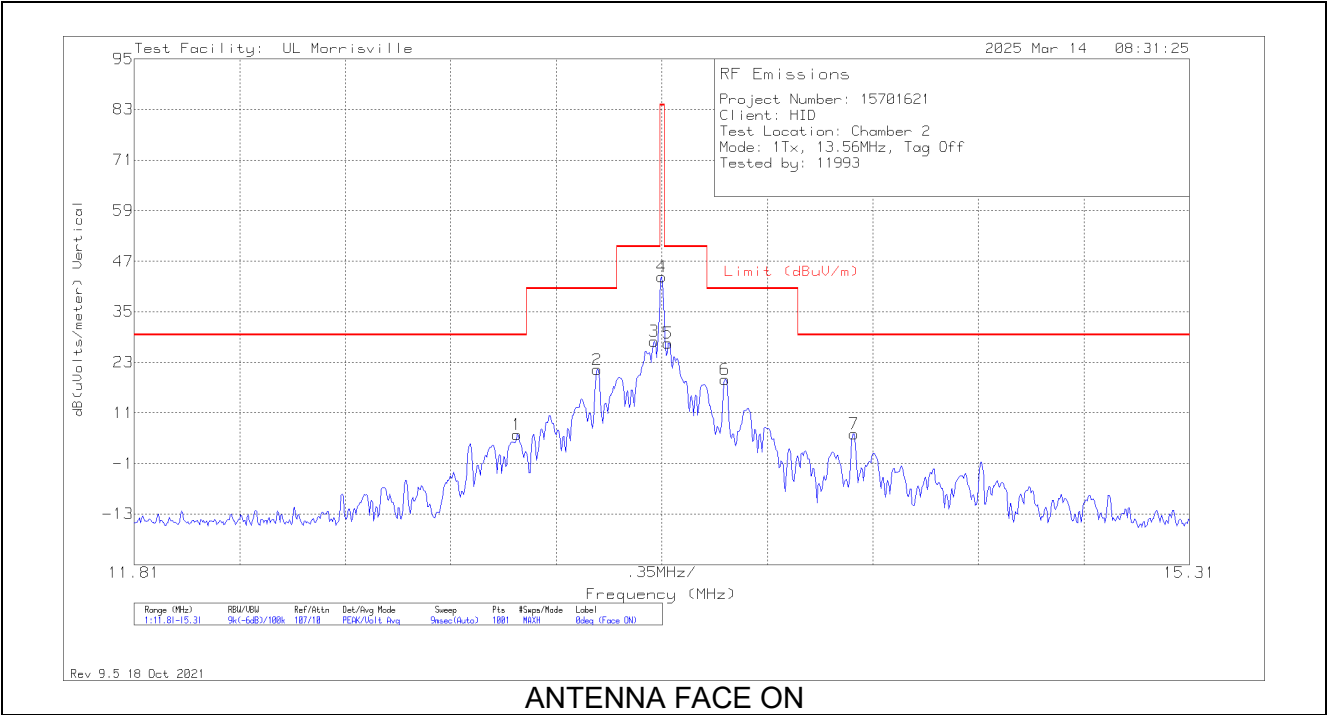


Marker	Frequency (MHz)	Meter Reading (dBUV)	Det	ANT (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBUA/m)	PK Limit (dBUA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
5	.0183	43.98	Pk	-36.7	.1	-80	-72.62	-9.14	10.86	-63.48	0-360	90 degs
1	.02874	44.48	Pk	-38.3	.1	-80	-73.72	-13.06	6.94	-60.66	0-360	0 degs
9	.10797	36.89	Pk	-40.4	.1	-80	-83.41	-24.56	-	-58.85	0-360	Flat
2	.17338	46.02	Pk	-40.5	.1	-80	-74.38	-28.68	-8.68	-45.7	0-360	0 degs
6	.19803	45.65	Pk	-40.5	.1	-80	-74.75	-29.83	-9.83	-44.92	0-360	90 degs
10	.20296	45.78	Pk	-40.6	.1	-80	-74.72	-30.04	-10.04	-44.68	0-360	Flat
3	.51951	35.47	Pk	-40.5	.1	-40	-44.93	-18.21	-	-26.72	0-360	0 degs
11	.54481	34.87	Pk	-40.5	.1	-40	-45.53	-18.62	-	-26.91	0-360	Flat
7	.58275	34.41	Pk	-40.5	.1	-40	-45.99	-19.21	-	-26.78	0-360	90 degs
8	.77247	32.01	Pk	-40.5	.2	-40	-48.29	-21.65	-	-26.64	0-360	90 degs
4	1.29947	27.5	Pk	-40.5	.2	-40	-52.8	-26.17	-	-26.63	0-360	0 degs
12	1.60092	25.02	Pk	-40.4	.2	-40	-55.18	-27.98	-	-27.2	0-360	Flat

Pk - Peak detector

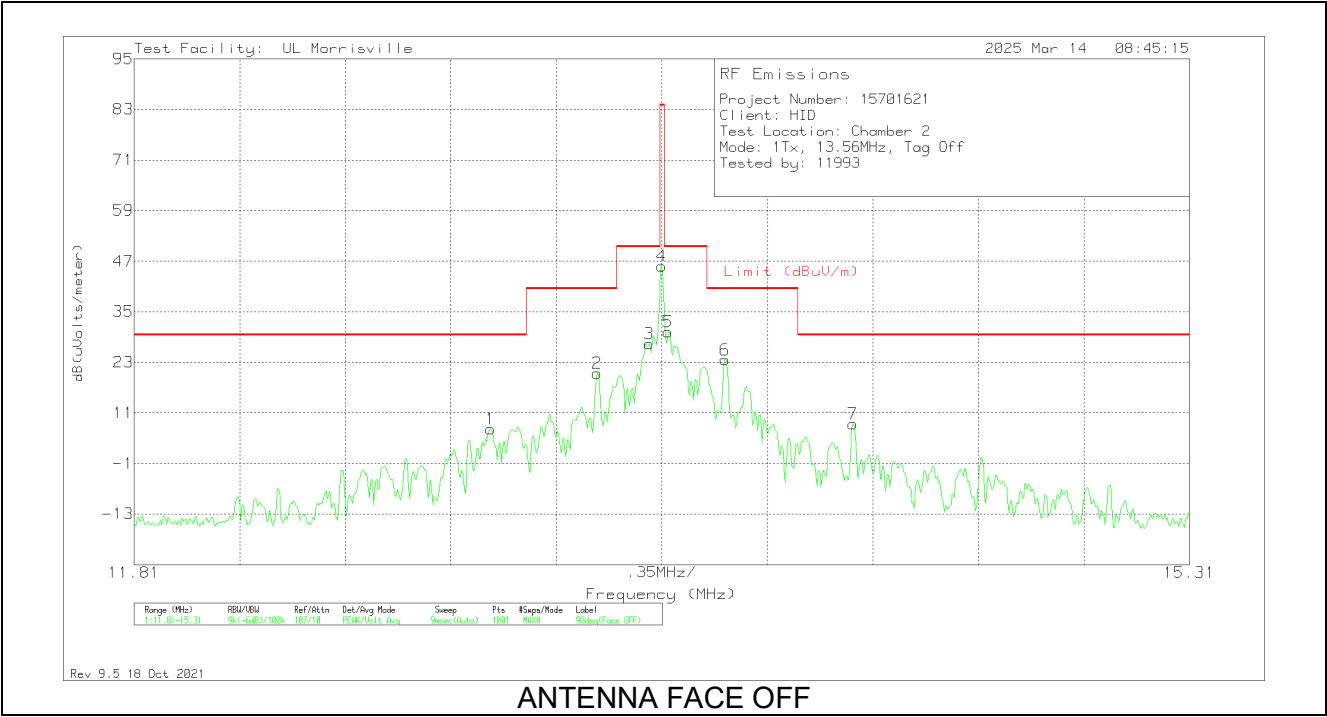
9.2.2. TYPE A, TAG OFF

FUNDAMENTAL



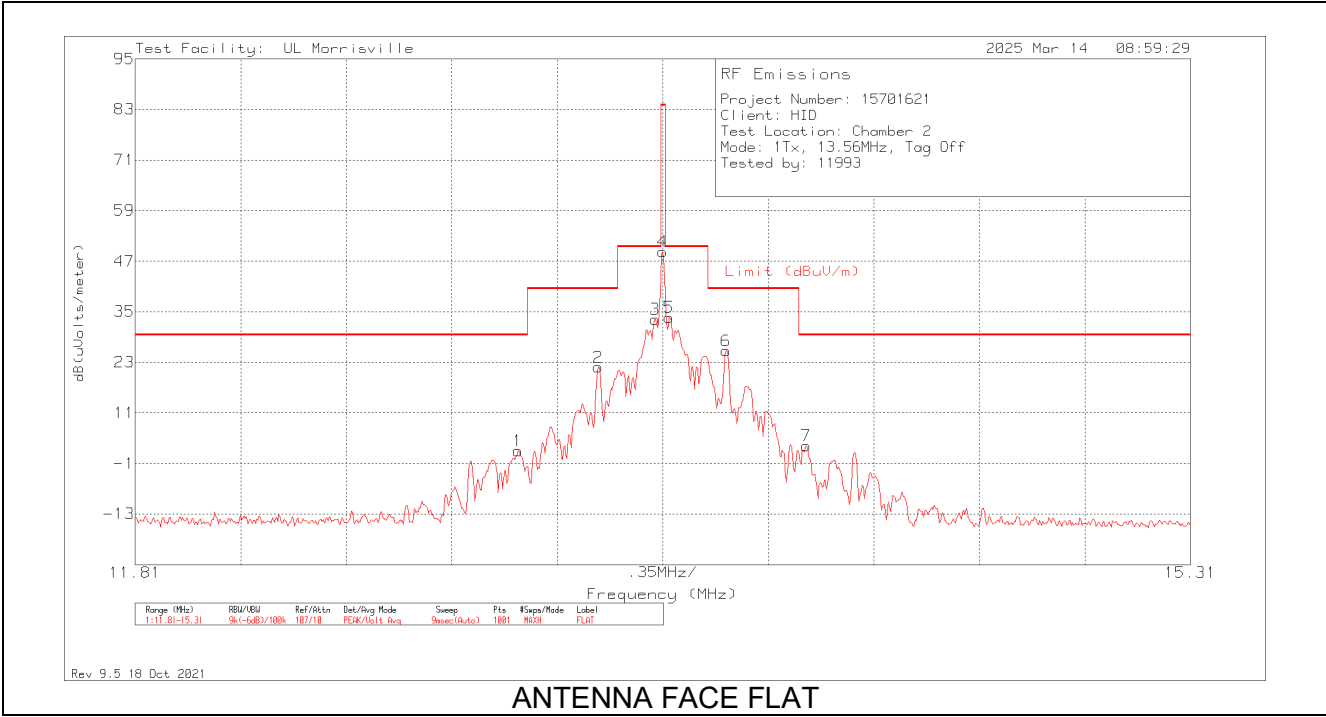
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	13.0805	35.46	Pk	9.8	.6	-40	5.86	29.5	-23.64	15	0 degs
2	13.3465	50.85	Pk	9.8	.6	-40	21.25	40.5	-19.25	15	0 degs
3	13.5355	57.63	Pk	9.8	.6	-40	28.03	50.5	-22.47	15	0 degs
4	13.56	72.86	Pk	9.8	.6	-40	43.26	84	-40.74	15	0 degs
5	13.581	57.2	Pk	9.8	.6	-40	27.6	50.5	-22.9	15	0 degs
6	13.77	48.59	Pk	9.7	.6	-40	18.89	40.5	-21.61	15	0 degs
7	14.197	35.75	Pk	9.7	.6	-40	6.05	29.5	-23.45	15	0 degs

Pk - Peak detector



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	12.993	36.84	Pk	9.8	.6	-40	7.24	29.5	-22.26	113	90 degs
2	13.3465	49.99	Pk	9.8	.6	-40	20.39	40.5	-20.11	113	90 degs
3	13.518	57	Pk	9.8	.6	-40	27.4	50.5	-23.1	113	90 degs
4	13.56	75.46	Pk	9.8	.6	-40	45.86	84	-38.14	113	90 degs
5	13.581	59.8	Pk	9.8	.6	-40	30.2	50.5	-20.3	113	90 degs
6	13.77	53.31	Pk	9.7	.6	-40	23.61	40.5	-16.89	113	90 degs
7	14.1935	38.08	Pk	9.7	.6	-40	8.38	29.5	-21.12	113	90 degs

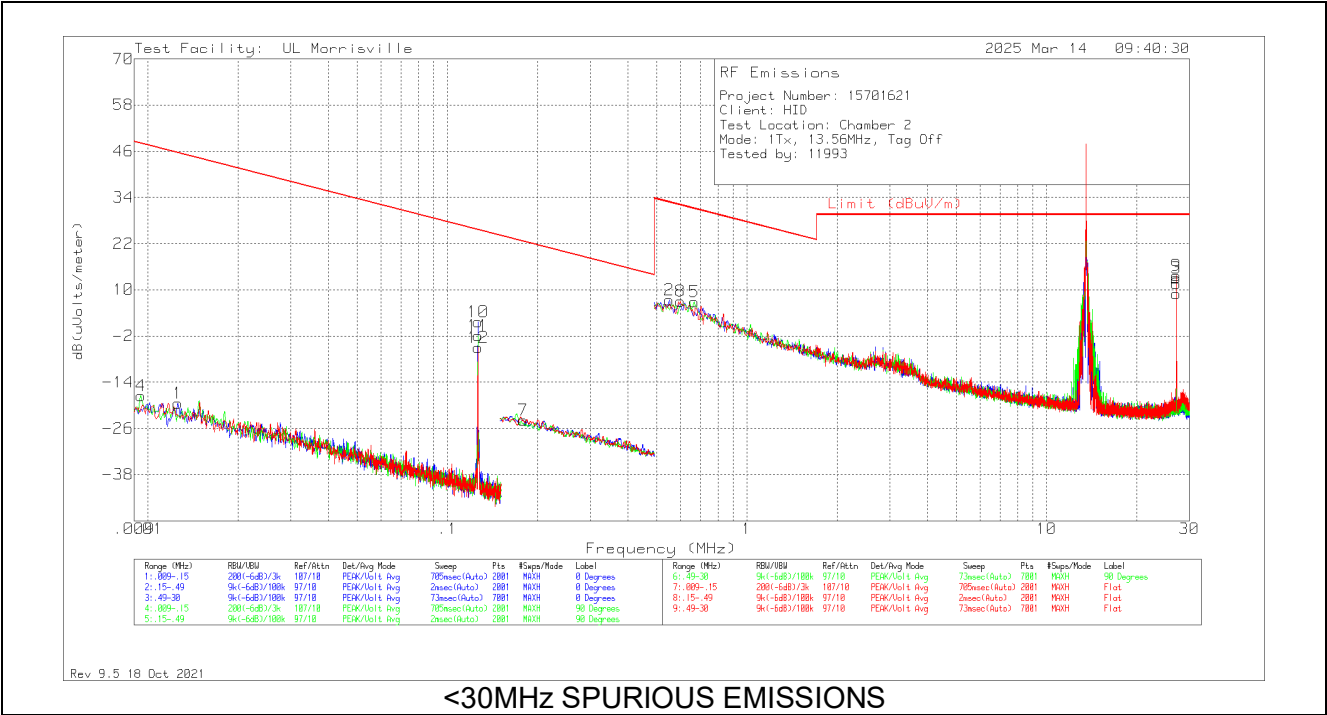
Pk - Peak detector



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	13.0805	31.65	Pk	9.8	.6	-40	2.05	29.5	-27.45	273	Flat
2	13.3465	51.43	Pk	9.8	.6	-40	21.83	40.5	-18.67	273	Flat
3	13.5355	62.79	Pk	9.8	.6	-40	33.19	50.5	-17.31	273	Flat
4	13.56	78.84	Pk	9.8	.6	-40	49.24	84	-34.76	273	Flat
5	13.581	63.2	Pk	9.8	.6	-40	33.6	50.5	-16.9	273	Flat
6	13.77	55.4	Pk	9.7	.6	-40	25.7	40.5	-14.8	273	Flat
7	14.036	32.84	Pk	9.7	.6	-40	3.14	29.5	-26.36	273	Flat

Pk - Peak detector

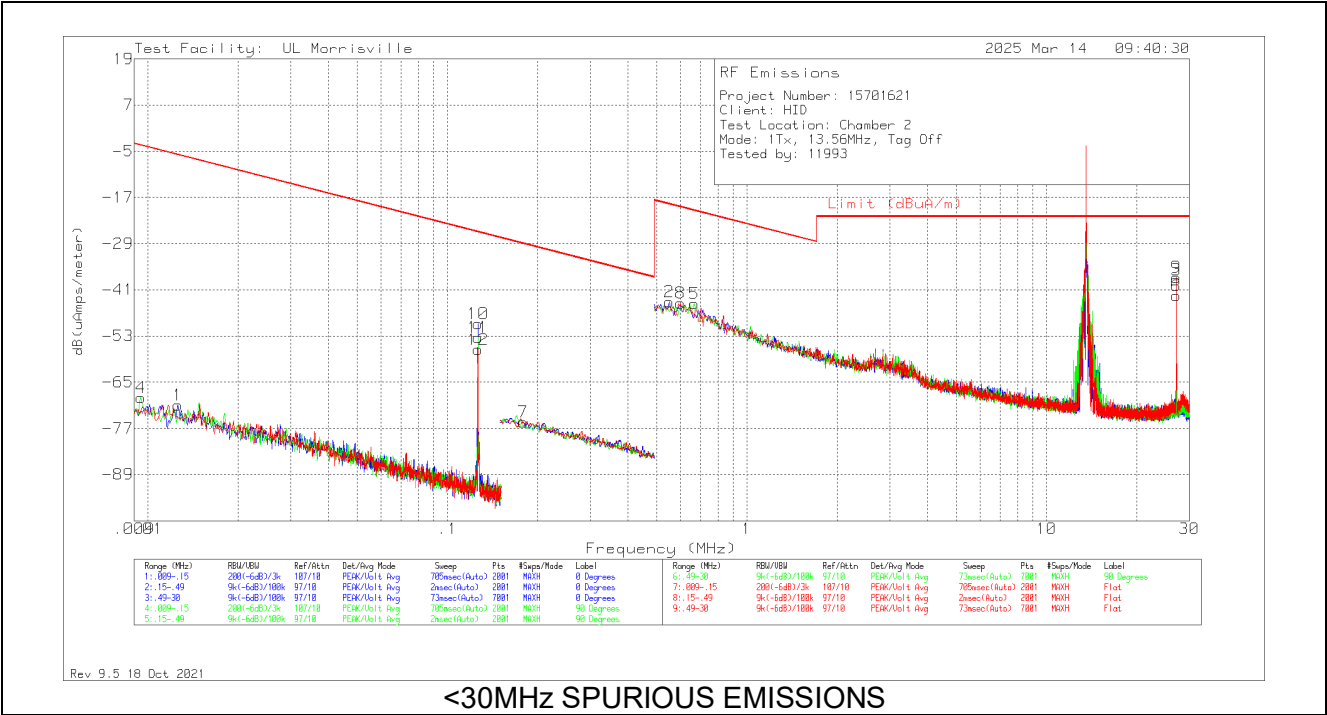
SPURIOUS EMISSION – E FIELD



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
4	.0095	43.75	Pk	18.7	.1	-80	-17.45	48.05	68.05	-65.5	0-360	90 degs
1	.01262	43.29	Pk	17.1	.1	-80	-19.51	45.58	65.58	-65.09	0-360	0 degs
10	.12636	70.58	Pk	11	.1	-80	1.68	-	-	-	0-360	0 degs
11	.12636	67.03	Pk	11	.1	-80	-1.87	-	-	-	0-360	90 degs
12	.12636	63.86	Pk	11	.1	-80	-5.04	-	-	-	0-360	Flat
7	.17899	45.01	Pk	11	.1	-80	-23.89	22.55	42.55	-46.44	0-360	Flat
2	.54902	36.34	Pk	11	.1	-40	7.44	32.81	-	-25.37	0-360	0 degs
8	.59962	35.94	Pk	11	.1	-40	7.04	32.05	-	-25.01	0-360	Flat
5	.66707	35.74	Pk	11	.1	-40	6.84	31.12	-	-24.28	0-360	90 degs
3	27.12247	44.61	Pk	7.7	.8	-40	13.11	29.54	-	-16.43	0-360	0 degs
6	27.12247	40.44	Pk	7.7	.8	-40	8.94	29.54	-	-20.6	0-360	90 degs
9	27.12247	45.28	Pk	7.7	.8	-40	13.78	29.54	-	-15.76	0-360	Flat

Pk - Peak detector
Note*: 125 kHz signal is a fundamental of the EUT; therefore, it has been excluded from the limit.

SPURIOUS EMISSION – H FIELD



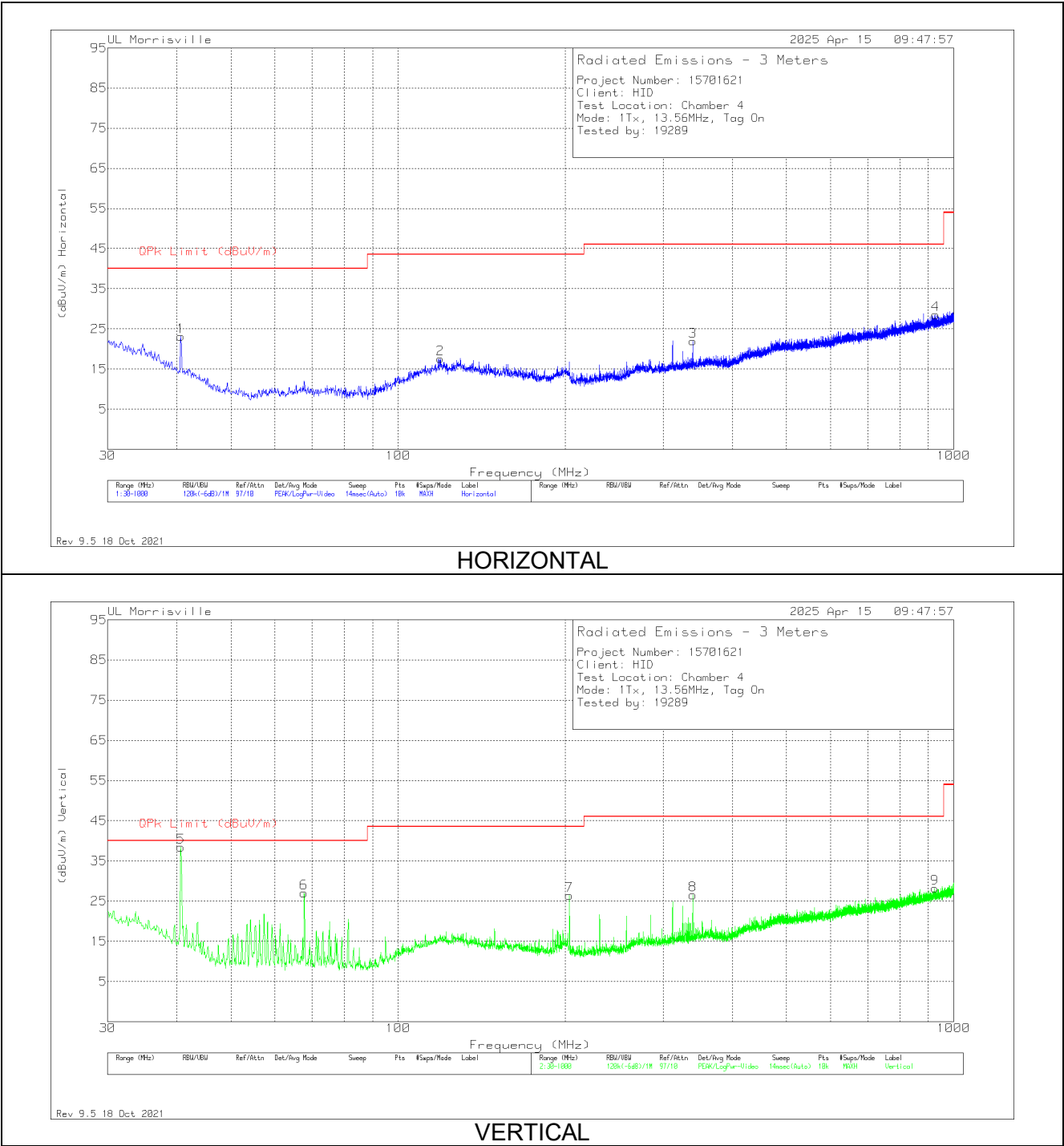
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
4	.0095	43.75	Pk	-32.8	.1	-80	-68.95	-3.45	16.55	-65.5	0-360	90 degs
1	.01262	43.29	Pk	-34.4	.1	-80	-71.01	-5.92	14.08	-65.09	0-360	0 degs
10	.12636	70.58	Pk	-40.5	.1	-80	-49.82	-	-	-	0-360	0 degs
11	.12636	67.03	Pk	-40.5	.1	-80	-53.37	-	-	-	0-360	90 degs
12	.12636	63.86	Pk	-40.5	.1	-80	-56.54	-	-	-	0-360	Flat
7	.17899	45.01	Pk	-40.5	.1	-80	-75.39	-28.95	-8.95	-46.44	0-360	Flat
2	.54902	36.34	Pk	-40.5	.1	-40	-44.06	-18.69	-	-25.37	0-360	0 degs
8	.59962	35.94	Pk	-40.5	.1	-40	-44.46	-19.45	-	-25.01	0-360	Flat
5	.66707	35.74	Pk	-40.5	.1	-40	-44.66	-20.38	-	-24.28	0-360	90 degs
3	27.12247	44.61	Pk	-43.8	.8	-40	-38.39	-21.96	-	-16.43	0-360	0 degs
6	27.12247	40.44	Pk	-43.8	.8	-40	-42.56	-21.96	-	-20.6	0-360	90 degs
9	27.12247	45.28	Pk	-43.8	.8	-40	-37.72	-21.96	-	-15.76	0-360	Flat

Pk - Peak detector

Note*: 125 kHz signal is a fundamental of the EUT; therefore, it has been excluded from the limit.

9.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

9.3.1. TYPE A, TAG ON

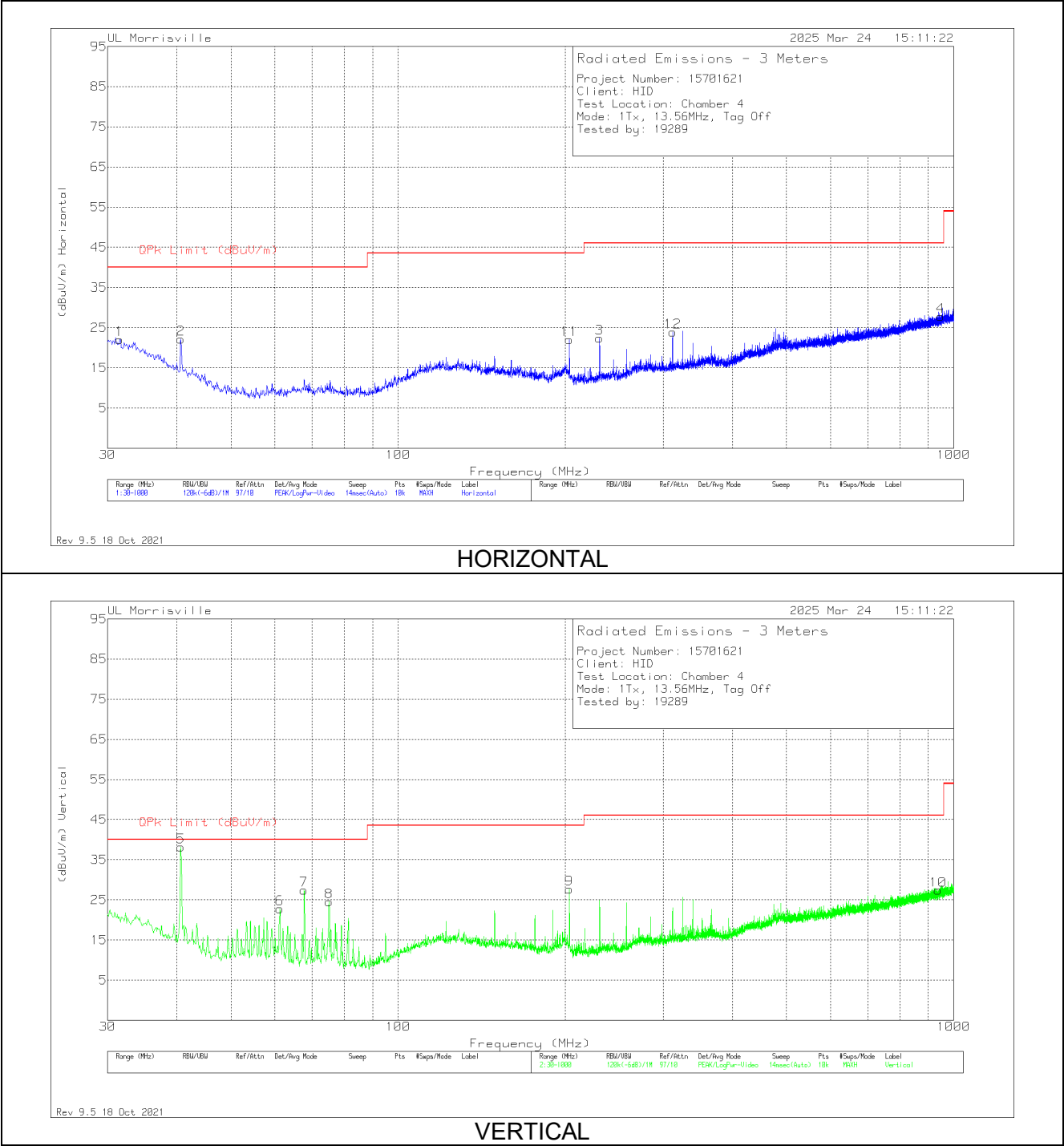


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90628 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	40.67	35.59	Pk	19.5	-32	23.09	40	-16.91	0-360	100	H
5	40.68399	48.69	Qp	19.5	-32	36.19	40	-3.81	203	103	V
6	67.733	44.42	Pk	14.3	-31.7	27.02	40	-12.98	0-360	100	V
2	119.143	28.88	Pk	20	-31.3	17.58	43.52	-25.94	0-360	300	H
7	203.3875	39.6	Pk	17.6	-30.8	26.4	43.52	-17.12	0-360	100	V
3	338.945	31.86	Pk	20.1	-30	21.96	46.02	-24.06	0-360	100	H
8	339.042	36.51	Pk	20.1	-30.1	26.51	46.02	-19.51	0-360	100	V
9	924.728	26.72	Pk	28.5	-27	28.22	46.02	-17.8	0-360	100	V
4	928.317	27.04	Pk	28.5	-27	28.54	46.02	-17.48	0-360	200	H

Pk - Peak detector

Qp - Quasi-Peak detector

9.3.2. TYPE A, TAG OFF



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	31.552	28.24	Pk	25.8	-32	22.04	40	-17.96	0-360	200	H
2	40.67	34.68	Pk	19.5	-32	22.18	40	-17.82	0-360	100	H
5	40.69014	49.49	Qp	19.5	-32	36.99	40	-3.01	241	109	V
6	61.234	40.81	Pk	13.9	-31.9	22.81	40	-17.19	0-360	100	V
7	67.733	44.81	Pk	14.3	-31.7	27.41	40	-12.59	0-360	100	V
8	75.105	41.88	Pk	14.2	-31.6	24.48	40	-15.52	0-360	100	V
11	203.339	35.23	Pk	17.6	-30.8	22.03	43.52	-21.49	0-360	100	H
9	203.339	40.88	Pk	17.6	-30.8	27.68	43.52	-15.84	0-360	100	V
3	230.499	35.87	Pk	17.1	-30.6	22.37	46.02	-23.65	0-360	100	H
12	311.882	34.23	Pk	19.9	-30.2	23.93	46.02	-22.09	0-360	200	H
10	937.823	25.56	Pk	28.6	-26.8	27.36	46.02	-18.66	0-360	100	V
4	947.232	25.7	Pk	28.7	-26.6	27.8	46.02	-18.22	0-360	100	H

Pk - Peak detector

Qp - Quasi-Peak detector

10. FREQUENCY STABILITY

LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency, over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

IC RSS-210, Annex B.6

Carrier frequency stability shall be maintained to $\pm 0.01\%$ (± 100 ppm).

Note* - The high voltage used for this test was declared as the maximum voltage by the manufacturer.

TEST PROCEDURE

ANSI C63.10-2020 Clause 6.8

RESULTS

No non-compliance noted.

Nominal: 12 VDC

Low: 10.2 VDC

High: 13.2 VDC

10.1. Tag On

RESULTS

Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir. Temp	Frequency Deviation Measured with Time Elapse								
(Vdc)	(°C)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
12.00	50	13.5598529	1.362	13.5598504	1.547	13.5598486	1.684	13.5598488	1.664	± 100
12.00	40	13.5598646	0.500	13.5598611	0.763	13.5598571	1.053	13.5598544	1.257	± 100
12.00	30	13.5598761	-0.349	13.5598715	-0.010	13.5598696	0.130	13.5598666	0.351	± 100
12.00	20	13.5598714	0.000	13.5598713	0.008	13.5598716	-0.014	13.5598717	-0.022	± 100
12.00	10	13.5598910	-1.444	13.5598910	-1.446	13.5598909	-1.436	13.5598900	-1.373	± 100
12.00	0	13.5598854	-1.036	13.5598874	-1.181	13.5598888	-1.284	13.5598891	-1.306	± 100
12.00	-10	13.5598703	0.082	13.5598781	-0.497	13.5598791	-0.570	13.5598795	-0.598	± 100
12.00	-20	13.5598751	-0.270	13.5598736	-0.161	13.5598695	0.139	13.5598631	0.614	± 100
10.20	20	13.5598711	0.023	13.5598715	-0.006	13.5598716	-0.018	13.5598718	-0.027	± 100
13.20	20	13.5598714	-0.002	13.5598717	-0.021	13.5598722	-0.058	13.5598721	-0.053	± 100

Tested by: 33499/84740

Test date: 2025-03-31

10.2. Tag Off

Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir. Temp	Frequency Deviation Measured with Time Elapse								
(Vdc)	(°C)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
12.00	50	13.5598636	1.866	13.5598585	2.246	13.5598527	2.669	13.5598472	3.081	± 100
12.00	40	13.5598951	-0.453	13.5598889	0.006	13.5598774	0.847	13.5598670	1.620	± 100
12.00	30	13.5599233	-2.532	13.5599221	-2.444	13.5599148	-1.909	13.5599001	-0.826	± 100
12.00	20	13.5598889	0.000	13.5598820	0.514	13.5598801	0.650	13.5598800	0.660	± 100
12.00	10	13.5598811	0.575	13.5598840	0.363	13.5598891	-0.009	13.5598954	-0.478	± 100
12.00	0	13.5598980	-0.666	13.5599026	-1.007	13.5999083	-2951.279	13.5599146	-1.892	± 100
12.00	-10	13.5599196	-2.260	13.5599203	-2.314	13.5599226	-2.483	13.5599241	-2.597	± 100
12.00	-20	13.5599243	-2.611	13.5599239	-2.581	13.5599216	-2.412	13.5599167	-2.051	± 100
10.20	20	13.5598874	0.112	13.5598808	0.597	13.5598808	0.597	13.5598768	0.896	± 100
13.2	20	13.55987649	0.917	13.55987664	0.906	13.55987458	1.058	13.55987339	1.146	± 100

Tested by: 33499/84740, 85502
Test date: 2025-03-17 to 2025-03-18

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)
RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	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.

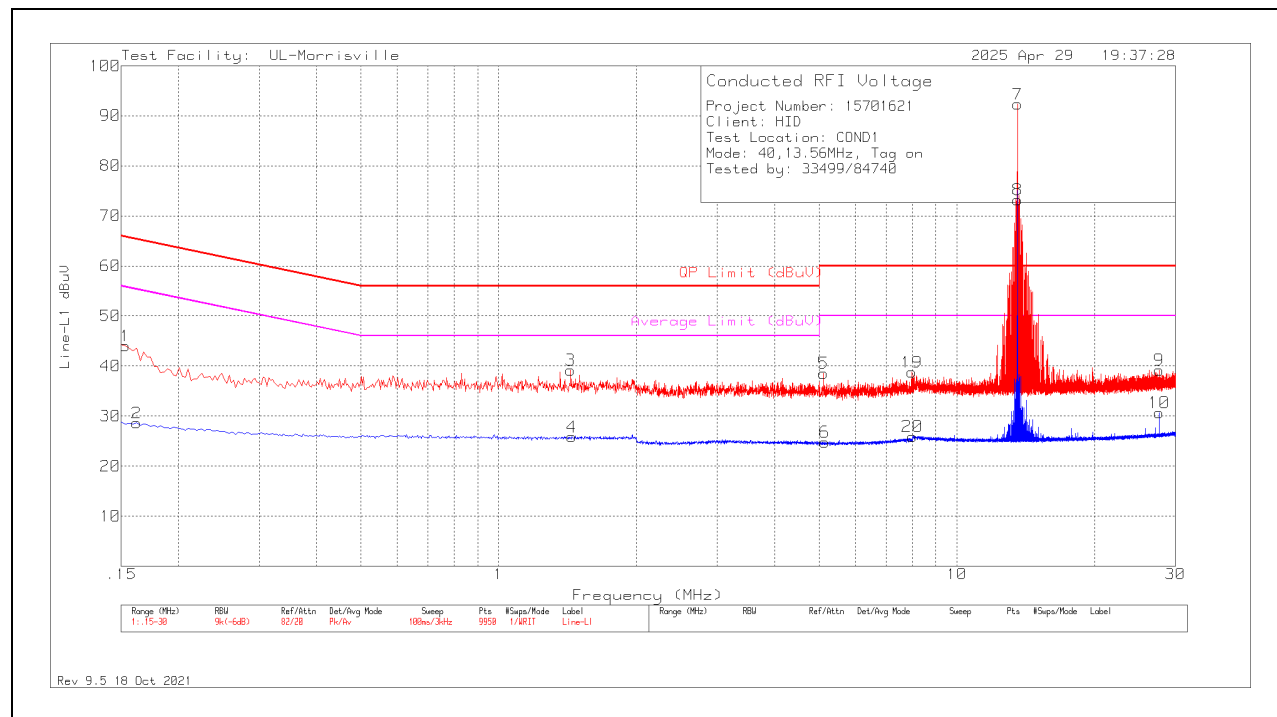
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both lines.

RESULTS

11.1. AC POWER LINE TAG ON

LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	171083 (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.153	23.8	Pk	.2	0	20	44	65.84	-21.84	-	-
2	.162	8.4	Av	.2	0	20	28.6	-	-	55.36	-26.76
3	1.437	19.08	Pk	0	.1	20	39.18	56	-16.82	-	-
4	1.443	5.74	Av	0	.1	20	25.84	-	-	46	-20.16
5	5.115	18.22	Pk	.1	.2	20	38.52	60	-21.48	-	-
6	5.145	4.45	Av	.1	.2	20	24.75	-	-	50	-25.25
19	7.965	18.44	Pk	.1	.2	20	38.74	60	-21.26	-	-
20	8.001	5.65	Av	.1	.2	20	25.95	-	-	50	-24.05
7	13.5605	64.16	Qp	.1	.3	20	84.56	60	24.56	-	-
8	13.5605	3.36	Ca	.1	.3	20	23.76	-	-	50	-26.24
9	27.651	18.41	Pk	.4	.4	20	39.21	60	-20.79	-	-
10	27.651	9.84	Av	.4	.4	20	30.64	-	-	50	-19.36

Pk - Peak detector

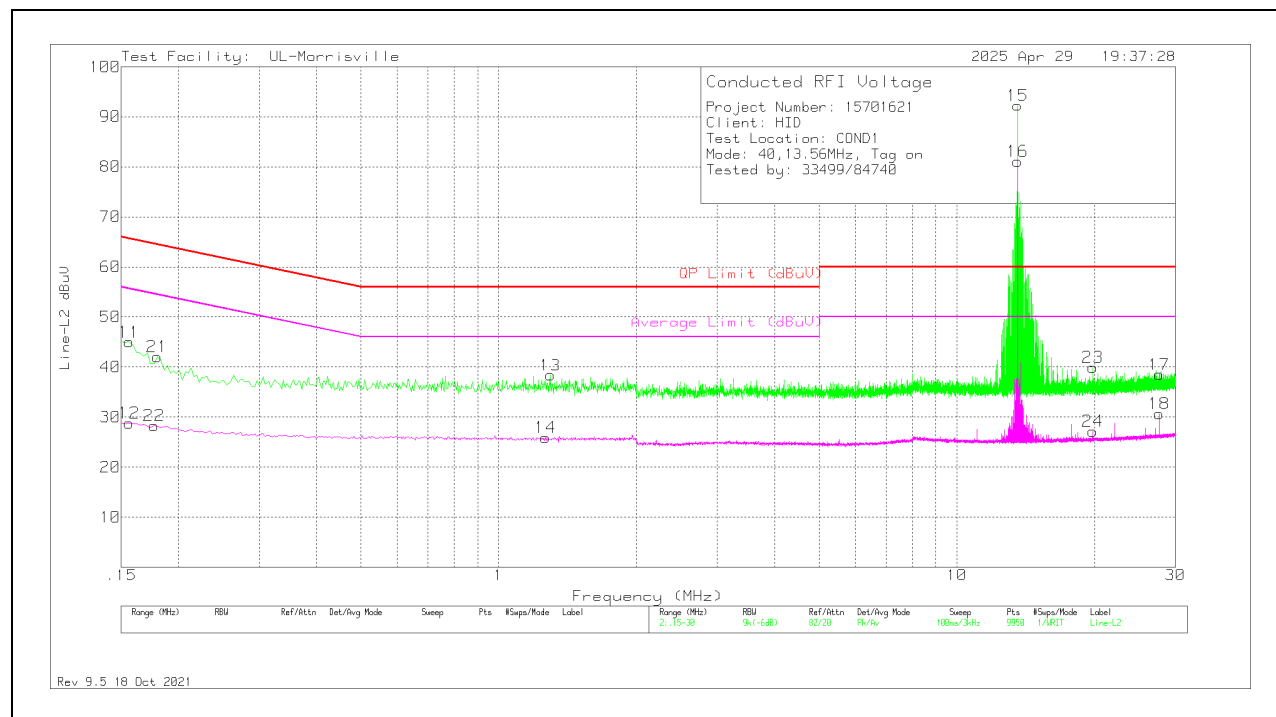
Av - Average detection

Qp - Quasi-Peak detector

Ca - CISPR average detection

NOTE* - Since the fundamental is over the limit, a terminated sample will be used to show compliance. Refer to section 11.3.

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	171083 (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
11	.156	24.79	Pk	.2	0	20	44.99	65.67	-20.68	-	-
12	.156	8.6	Av	.2	0	20	28.8	-	-	55.67	-26.87
22	.177	8.1	Av	.2	0	20	28.3	-	-	54.63	-26.33
21	.18	21.87	Pk	.2	0	20	42.07	64.49	-22.42	-	-
14	1.266	5.76	Av	0	.1	20	25.86	-	-	46	-20.14
13	1.296	18.26	Pk	0	.1	20	38.36	56	-17.64	-	-
15	13.5602	63.94	Qp	.1	.3	20	84.34	60	24.34	-	-
16	13.5602	2.62	Ca	.1	.3	20	23.02	-	-	50	-26.98
23	19.779	19.29	Pk	.2	.4	20	39.89	60	-20.11	-	-
24	19.779	6.51	Av	.2	.4	20	27.11	-	-	50	-22.89
17	27.651	17.69	Pk	.4	.4	20	38.49	60	-21.51	-	-
18	27.651	9.87	Av	.4	.4	20	30.67	-	-	50	-19.33

Pk - Peak detector

Av - Average detection

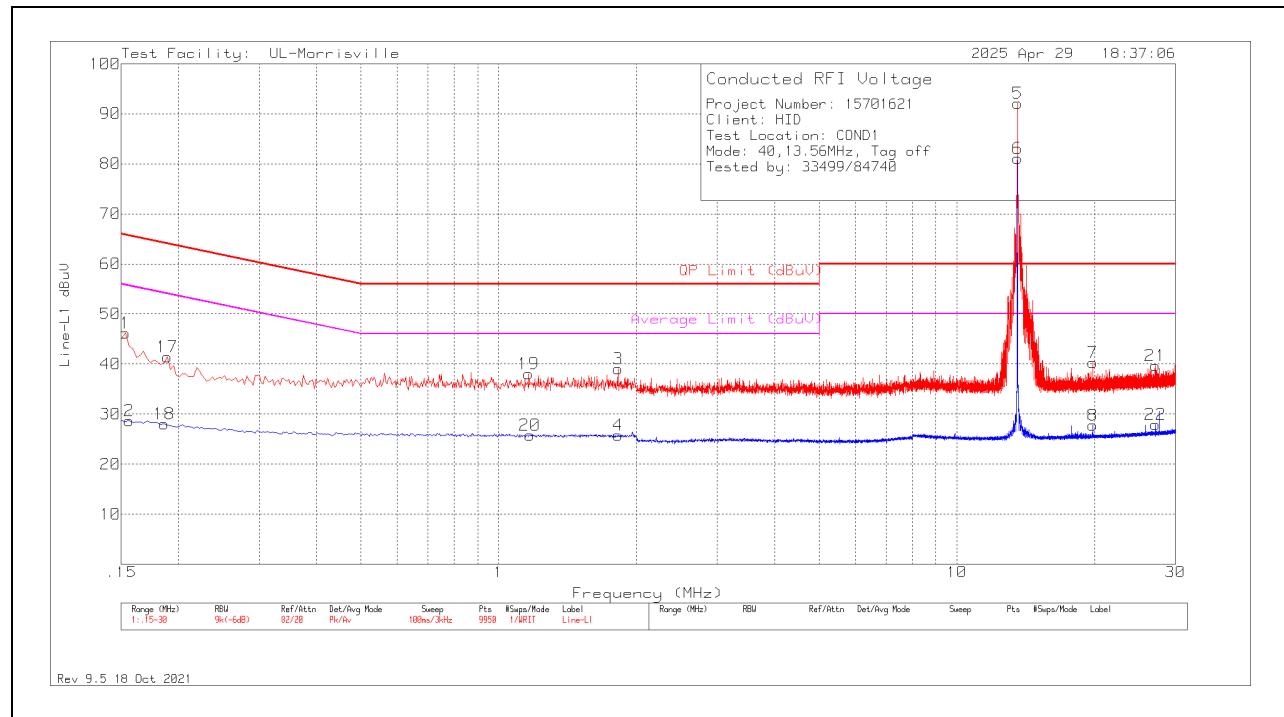
Qp - Quasi-Peak detector

Ca - CISPR average detection

NOTE* - Since the fundamental is over the limit, a terminated sample will be used to show compliance. Refer to section 11.3.

11.2. AC POWER LINE TAG OFF

LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	171083 (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.153	25.96	Pk	.2	0	20	46.16	65.84	-19.68	-	-
2	.156	8.47	Av	.2	0	20	28.67	-	-	55.67	-27
18	.186	7.82	Av	.2	0	20	28.02	-	-	54.21	-26.19
17	.189	21.26	Pk	.2	0	20	41.46	64.08	-22.62	-	-
19	1.164	17.91	Pk	0	.1	20	38.01	56	-17.99	-	-
20	1.17	5.66	Av	0	.1	20	25.76	-	-	46	-20.24
3	1.821	18.9	Pk	0	.1	20	39	56	-17	-	-
4	1.824	5.68	Av	0	.1	20	25.78	-	-	46	-20.22
5	13.5604	70.69	Qp	.1	.3	20	91.09	60	31.09	-	-
6	13.5604	61.52	Ca	.1	.3	20	81.92	-	-	50	31.92
8	19.773	7.13	Av	.2	.4	20	27.73	-	-	50	-22.27
7	19.779	19.67	Pk	.2	.4	20	40.27	60	-19.73	-	-
21	27.12	18.83	Pk	.4	.4	20	39.63	60	-20.37	-	-
22	27.12	7.07	Av	.4	.4	20	27.87	-	-	50	-22.13

Pk - Peak detector

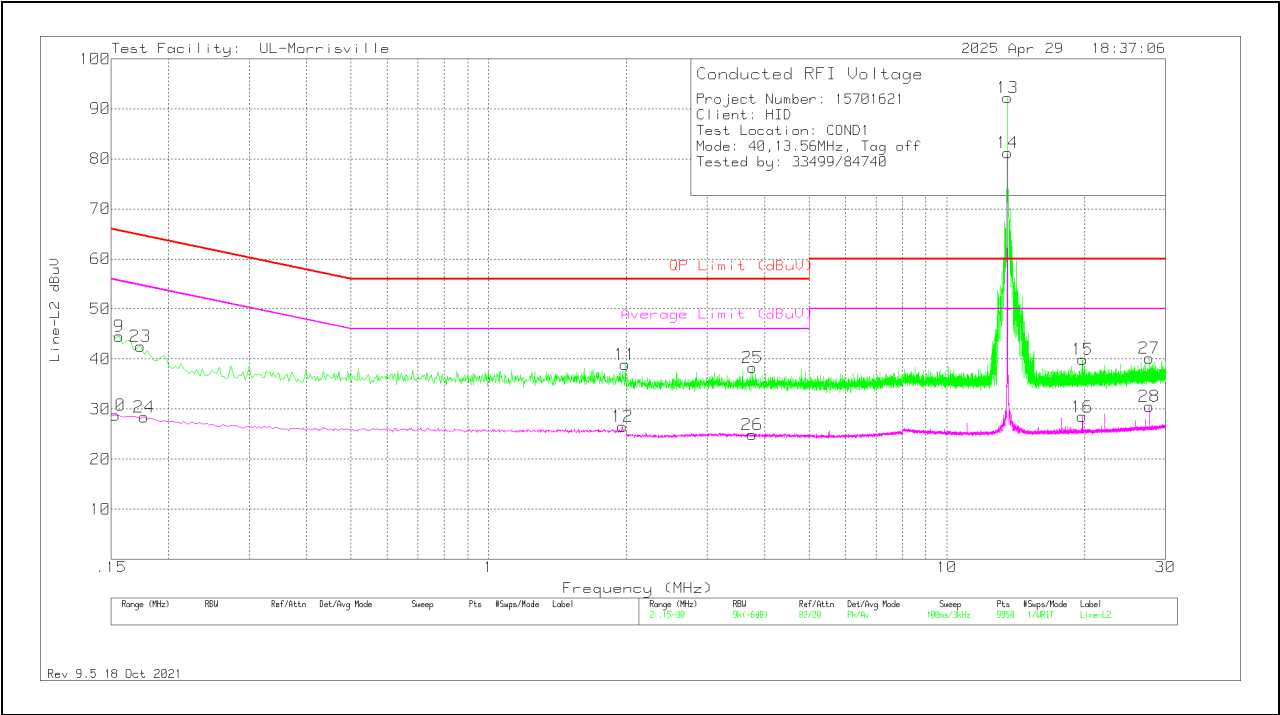
Av - Average detection

Qp - Quasi-Peak detector

Ca - CISPR average detection

NOTE* - Since the fundamental is over the limit, a terminated sample will be used to show compliance. Refer to section 11.3.

LINE 2 RESULTS

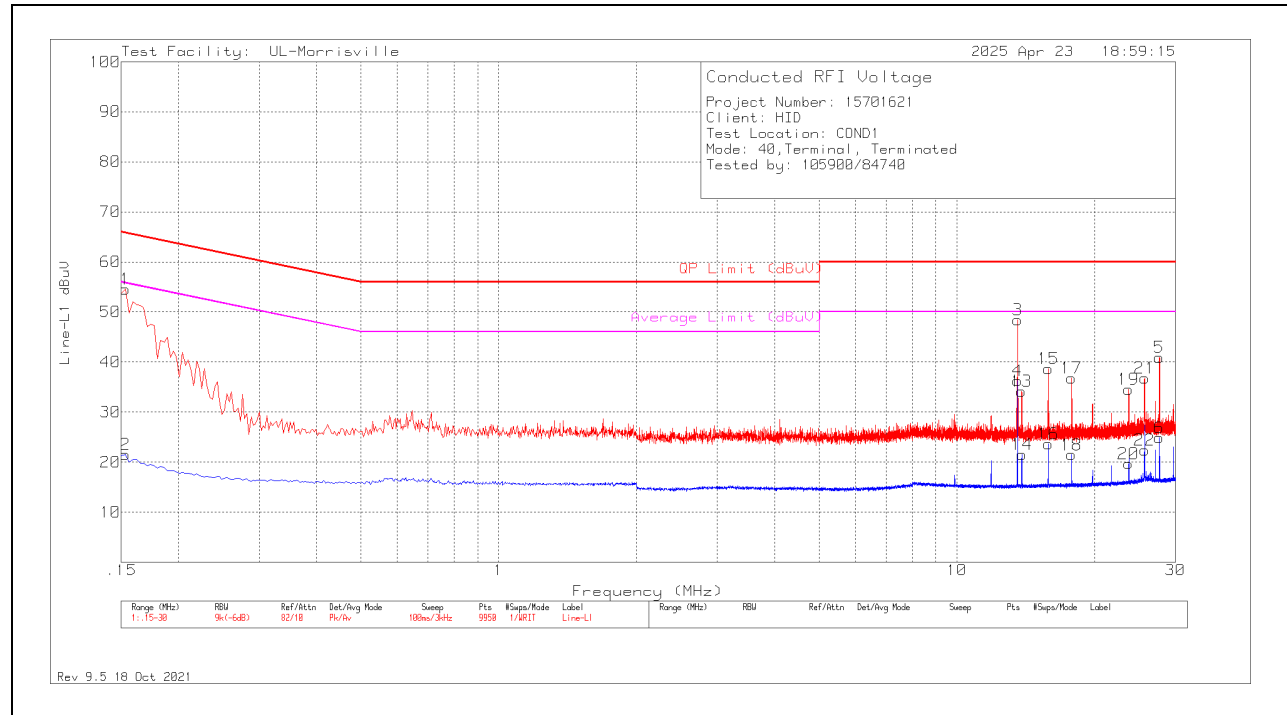


Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	171083 (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
9	.156	24.37	Pk	.2	0	20	44.57	65.67	-21.1	-	-
10	.153	8.54	Av	.2	0	20	28.74	-	-	55.84	-27.1
23	.174	22.34	Pk	.2	0	20	42.54	64.77	-22.23	-	-
24	.177	8.18	Av	.2	0	20	28.38	-	-	54.63	-26.25
12	1.959	6.46	Av	0	.1	20	26.56	-	-	46	-19.44
11	1.986	18.85	Pk	0	.1	20	38.95	56	-17.05	-	-
26	3.762	4.81	Av	0	.1	20	24.91	-	-	46	-21.09
25	3.765	18.18	Pk	0	.1	20	38.28	56	-17.72	-	-
13	13.5603	70.63	Qp	.1	.3	20	91.03	60	31.03	-	-
14	13.5603	61.19	Ca	.1	.3	20	81.59	-	-	50	31.59
16	19.764	7.87	Av	.2	.4	20	28.47	-	-	50	-21.53
15	19.77	19.3	Pk	.2	.4	20	39.9	60	-20.1	-	-
27	27.648	19.34	Pk	.4	.4	20	40.14	60	-19.86	-	-
28	27.651	9.71	Av	.4	.4	20	30.51	-	-	50	-19.49

Pk - Peak detector
Av - Average detection
Qp - Quasi-Peak detector
Ca - CISPR average detection
NOTE* - Since the fundamental is over the limit, a terminated sample will be used to show compliance. Refer to section 11.3.

11.3. TERMINATED SAMPLE

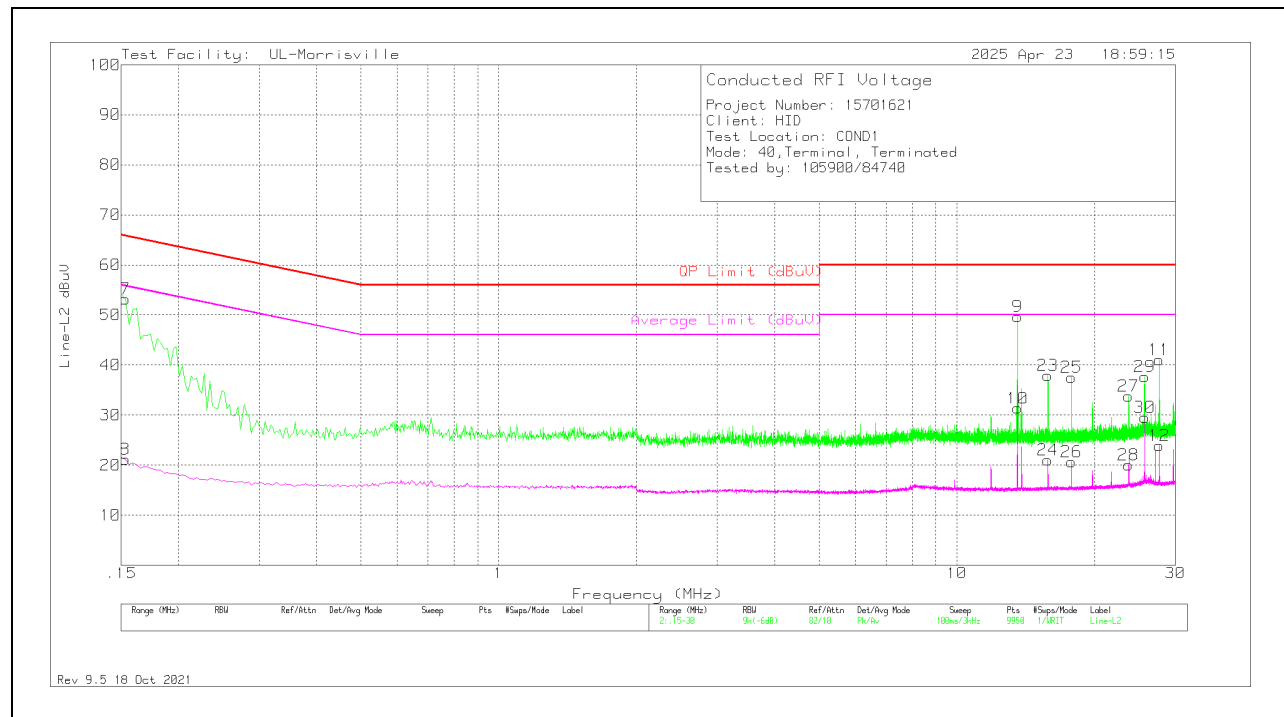
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	171083 (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.153	34.41	Pk	.2	0	20	54.61	65.84	-11.23	-	-
2	.153	1.3	Av	.2	0	20	21.5	-	-	55.84	-34.34
3	13.563	28.02	Pk	.1	.3	20	48.42	60	-11.58	-	-
4	13.563	15.84	Av	.1	.3	20	36.24	-	-	50	-13.76
13	13.851	13.74	Pk	.1	.3	20	34.14	60	-25.86	-	-
14	13.86	1.08	Av	.1	.3	20	21.48	-	-	50	-28.52
15	15.825	18.14	Pk	.2	.3	20	38.64	60	-21.36	-	-
16	15.825	3.13	Av	.2	.3	20	23.63	-	-	50	-26.37
17	17.802	16.31	Pk	.2	.3	20	36.81	60	-23.19	-	-
18	17.805	.96	Av	.2	.3	20	21.46	-	-	50	-28.54
20	23.715	-1	Av	.3	.4	20	19.7	-	-	50	-30.3
19	23.718	13.84	Pk	.3	.4	20	34.54	60	-25.46	-	-
22	25.671	1.55	Av	.4	.4	20	22.35	-	-	50	-27.65
21	25.686	16.02	Pk	.4	.4	20	36.82	60	-23.18	-	-
5	27.666	20.11	Pk	.4	.4	20	40.91	60	-19.09	-	-
6	27.672	4.05	Av	.4	.4	20	24.85	-	-	50	-25.15

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)	171083 (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
7	.153	32.98	Pk	.2	0	20	53.18	65.84	-12.66	-	-
8	.153	.97	Av	.2	0	20	21.17	-	-	55.84	-34.67
9	13.56	29.28	Pk	.1	.3	20	49.68	60	-10.32	-	-
10	13.56	10.95	Av	.1	.3	20	31.35	-	-	50	-18.65
23	15.807	17.45	Pk	.2	.3	20	37.95	60	-22.05	-	-
24	15.807	.52	Av	.2	.3	20	21.02	-	-	50	-28.98
25	17.775	17.08	Pk	.2	.3	20	37.58	60	-22.42	-	-
26	17.775	.15	Av	.2	.3	20	20.65	-	-	50	-29.35
27	23.679	13.09	Pk	.3	.4	20	33.79	60	-26.21	-	-
28	23.682	-.7	Av	.3	.4	20	20	-	-	50	-30
30	25.707	8.7	Av	.4	.4	20	29.5	-	-	50	-20.5
29	25.716	16.84	Pk	.4	.4	20	37.64	60	-22.36	-	-
11	27.654	20.3	Pk	.4	.4	20	41.1	60	-18.9	-	-
12	27.654	3.09	Av	.4	.4	20	23.89	-	-	50	-26.11

Pk - Peak detector
Av - Average detection

12. SETUP PHOTOS

Please refer to R15701621-EP3c for setup photos

END OF TEST REPORT