

TEST REPORT

Report Number: R15701621-E3e

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

Model : 40TV2

FCC ID : JQ6-SIGNO40TV2

IC : 2236B-SIGNO40TV2

EUT Description : Signo V2 Reader

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

Date Of Issue:
2025-07-09

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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2025-06-10	Initial Issue	Manish Baral
V2	2025-07-03	Revised Worst-Case Declaration Statement	Chandler Stanley
V3	2025-07-08	Updated Bandwidth Plots and Tables	Chandler Stanley
V4	2025-07-09	Updated Bandwidth Plots and Tables	Chandler Stanley

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: Signo V2 Reder

MODEL: 40TV2

SERIAL NUMBER: 40TTKS-00-00000, 40TTKS-00-000000

SAMPLE RECEIPT DATE: 2025-03-10 and 2025-03-17

DATE TESTED: 2025-03-19 TO 2025-3-26

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C: 2025	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.

Approved & Released
For UL LLC By:

Prepared By:



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Project Engineer
Consumer, Medical and IT Segment
UL LLC



Manish Baral
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
- 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

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.

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

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 2800 Suite Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A	US0067	27265	825374

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

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

5.2. DECISION RULES

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

5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U _{Lab}
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%

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

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

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

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

Signo Reader is a smartcard reader typically installed near doorway as part of physical access system, to control access to that door. A user will approach the door and present a BLE or RFID credentials to the reader with intention of entering the door. The reader will read the credential and send its data to a connected access control panel, which determine whether or not grant the user access to the door. Optionally, a personal identification number (PIN) may also be required, in which case the user will enter the PIN on the reader's keypad.

The EUT supports the following technologies:

Wireless technologies	Frequency Band(s)	Operating mode(s)
NFC	13.56MHz	Type A 106, 212, 424 & 848 Kbps
	125KHz	4 Kbps
Bluetooth	2.4 GHz	LE 1 & 2 Mbps

Notes:

1. The EUT operated in a 1x1 SISO mode.
2. The EUT only supports 1 type(s) of NFC tag.

6.2. MAXIMUM ELECTRIC FIELD STRENGTH

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

Fundamental Frequency (kHz)	E-Field (dBuV/m)
125	0.28

6.3. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 10.1

The test utility software used during testing was 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 125 kHz RFID signal only supports a 4-kbps data-rate. 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 2.5 cm; therefore, all final radiated testing was performed with the EUT and tag separated by 2.5 cm.

6.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Badge 125 kHz	HID	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-EP2e 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 - 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

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

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Version 9.5 - Chapter 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
	Gain-Loss Chains				
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	2025-04-16
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
241204	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
70374	EMI Test Receiver	ROHDE & SCHWARZ	ESCI7	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
52859	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2024-04-04	2025-04-04
236852	CW-AC Power Source	Ametek	CW2501	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		

8. OCCUPIED BANDWIDTH

LIMITS

FCC §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.

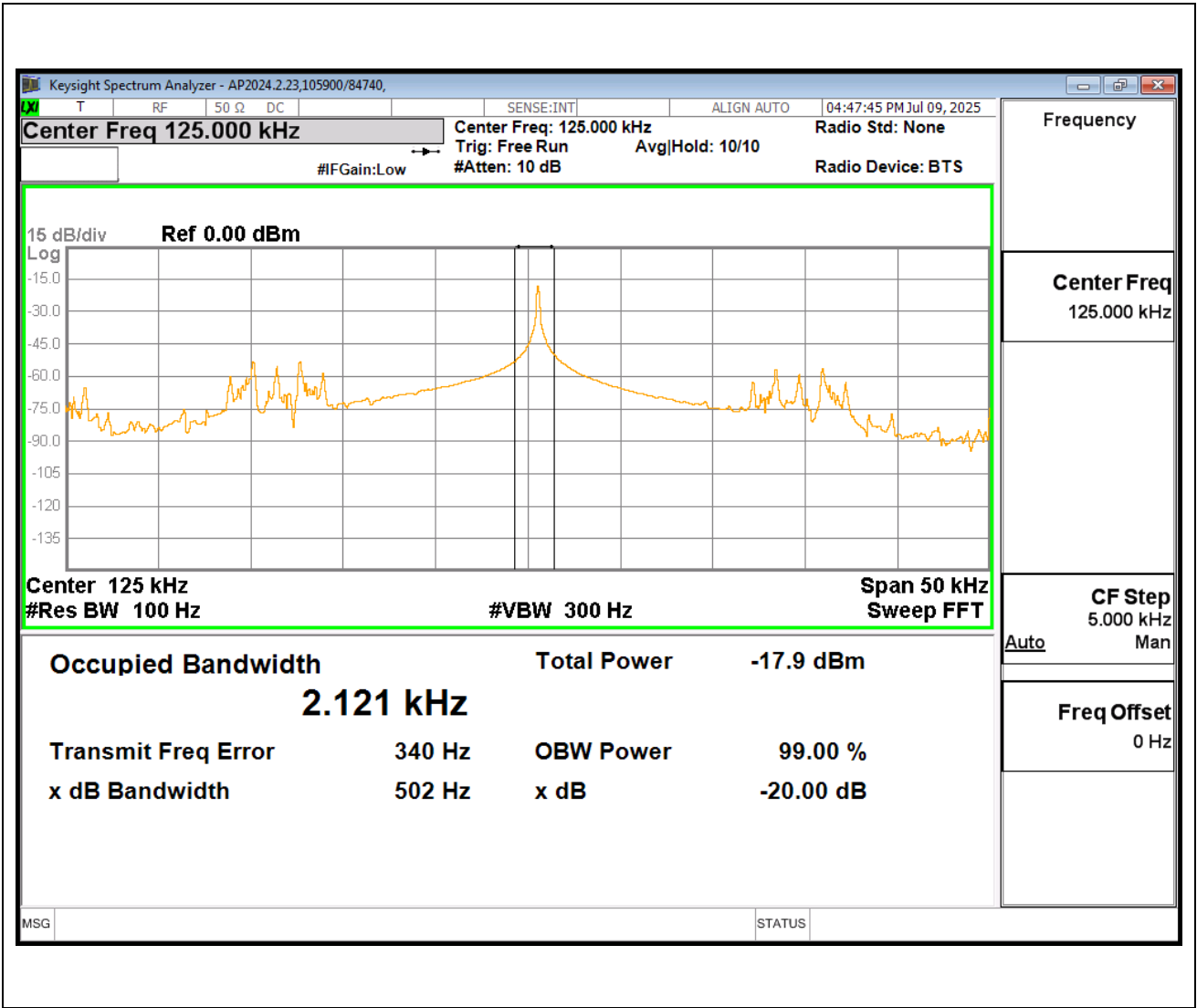
TEST PROCEDURE

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.

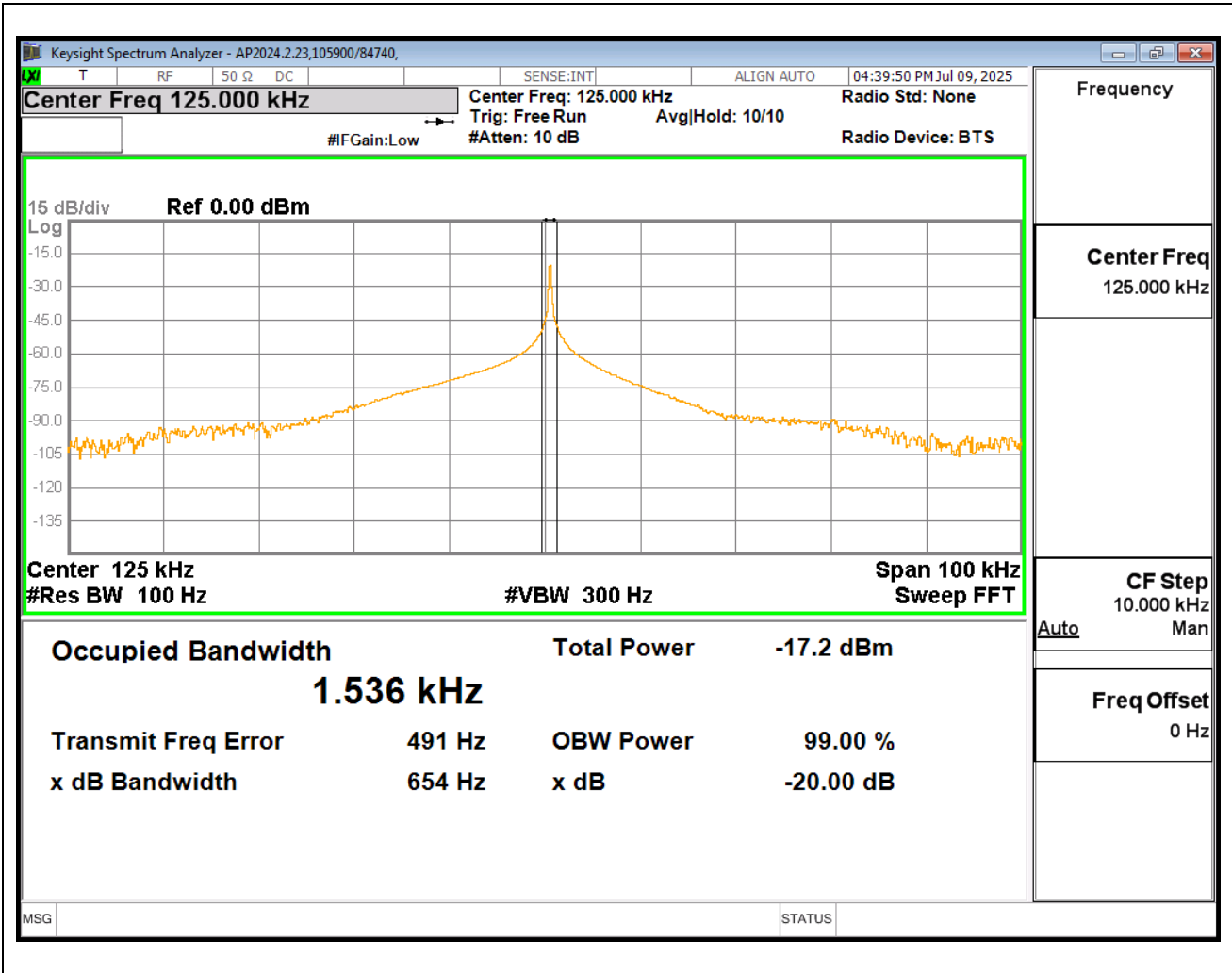
8.1. Tag On



Tag On

Frequency (KHz)	99% Bandwidth (kHz)	20dB Bandwidth (Hz)
125	2.121	502

8.2. Tag Off



Tag Off

Frequency (KHz)	99% Bandwidth (kHz)	20dB Bandwidth (Hz)
125	1.536	654

9. RADIATED EMISSION TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMIT

FCC §15.209 (a)

Frequency (MHz)	Field Strength (microvolts/meter)	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 to 216	150	3
216 to 960	200	3
Above 960 MHz	500	3
Note: The lower limit shall apply at the transition frequency.		

IC RSS-GEN, Section 8.9 (Transmitter)

Frequency (MHz)	Field Strength (microamps/meter)	Measurement Distance (m)
0.009–0.490	6.37/F(kHz)	300
0.490–1.705	63.7/F(kHz)	30
1.705–30.0	0.08	30
Note: The lower limit shall apply at the transition frequency.		

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz measurements. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements for the 30-1000 MHz range, 9 kHz for peak detection measurements or 9 kHz for quasi-peak detection measurements for the 0.15-30 MHz range and 200 Hz for peak detection measurements or 200 Hz for quasi-peak detection measurements for the 9 to 150 kHz range. Peak detection is used unless otherwise noted as quasi-peak.

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.

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

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.

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

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

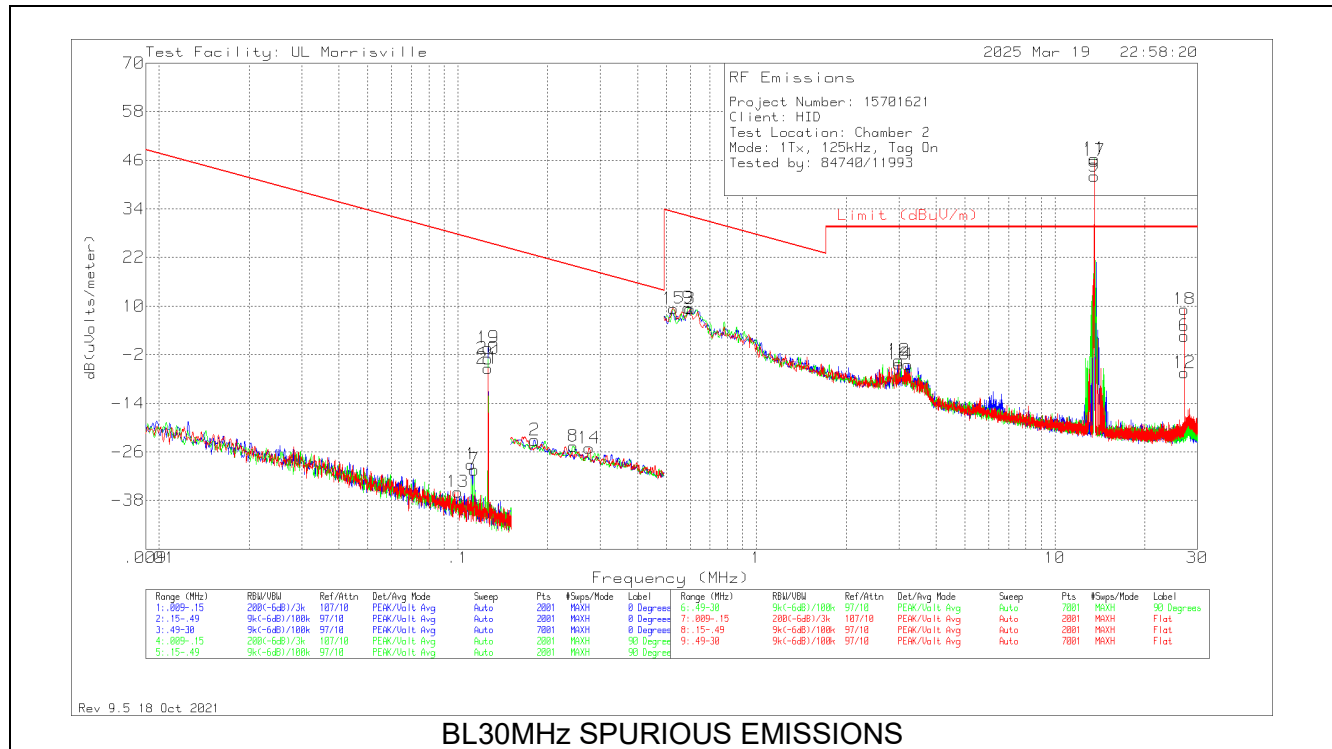
Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field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

RESULTS

9.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (Below 30MHz)

9.2.1. Tag On

SPURIOUS EMISSION – E FIELD

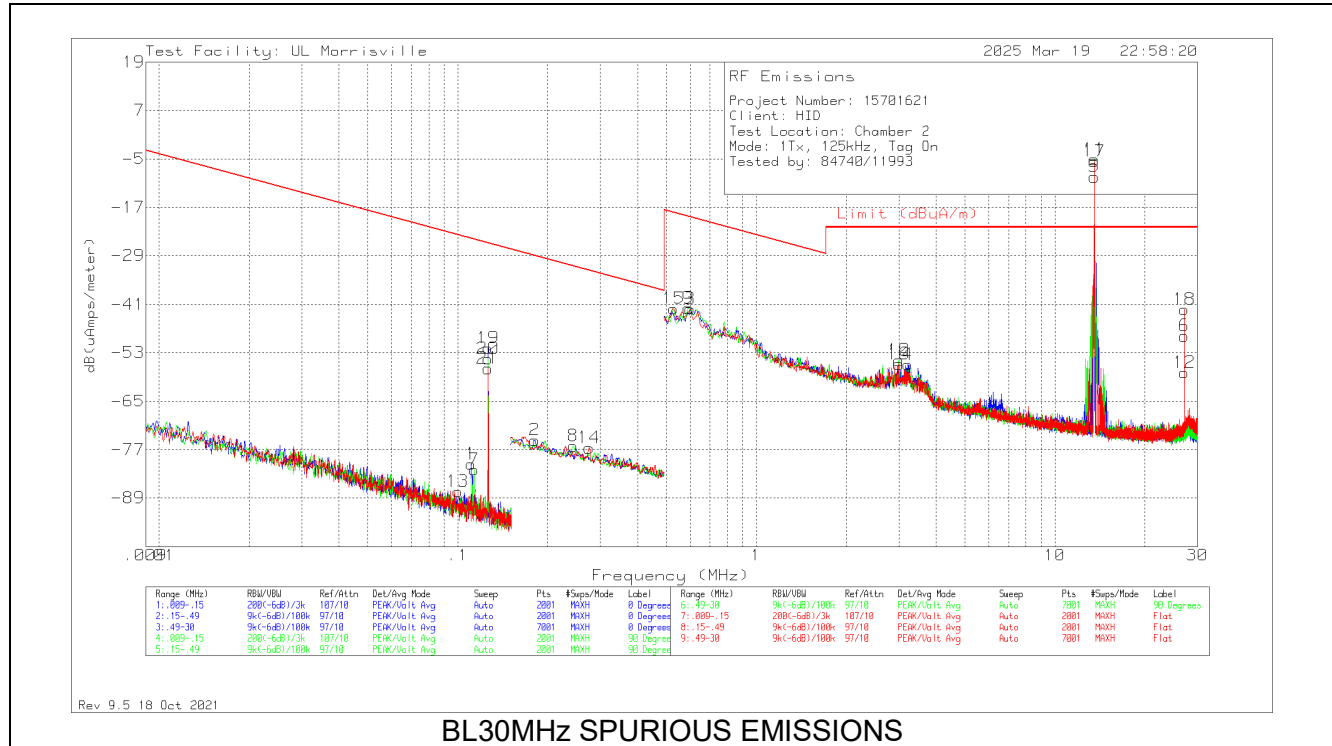


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	QP/AV Limit (dBuV/m)	PK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
13	.10009	32.93	Pk	11.1	.1	-80	-35.87	27.6	-	-63.47	0-360	Flat
1	.11089	39.75	Pk	11.1	.1	-80	-29.05	26.71	46.71	-55.76	0-360	0 degs
7	.11344	38.39	Pk	11.1	.1	-80	-30.41	26.51	46.51	-56.92	0-360	90 degs
19	.12636	68.55	Pk	11	.1	-80	-.35	25.57	45.57	-25.92	0-360	0 degs
20	.12636	65.91	Pk	11	.1	-80	-2.99	25.57	45.57	-28.56	0-360	90 degs
21	.12636	63.49	Pk	11	.1	-80	-5.41	25.57	45.57	-30.98	0-360	Flat
2	.18111	45.75	Pk	11	.1	-80	-23.15	22.45	42.45	-45.6	0-360	0 degs
8	.24359	44.39	Pk	10.9	.1	-80	-24.61	19.87	39.87	-44.48	0-360	90 degs
14	.27538	43.92	Pk	10.9	.1	-80	-25.08	18.81	38.81	-43.89	0-360	Flat
15	.52794	38.3	Pk	11	.1	-40	9.4	33.15	-	-23.75	0-360	Flat
9	.59118	38.38	Pk	11	.1	-40	9.48	32.17	-	-22.69	0-360	90 degs
3	.59962	38.26	Pk	11	.1	-40	9.36	32.05	-	-22.69	0-360	0 degs
10	3.00274	25.19	Pk	11.1	.3	-40	-3.41	29.54	-	-32.95	0-360	90 degs
16	3.00274	24.29	Pk	11.1	.3	-40	-4.31	29.54	-	-33.85	0-360	Flat
4	3.22197	24.15	Pk	11.1	.3	-40	-4.45	29.54	-	-33.99	0-360	0 degs
5	13.5596	71.65	Pk	9.8	.6	-40	-	-	-	-	0-360	0 degs
11	13.5596	75.96	Pk	9.8	.6	-40	-	-	-	-	0-360	90 degs
17	13.5596	75.46	Pk	9.8	.6	-40	-	-	-	-	0-360	Flat
6	27.12247	34.12	Pk	7.7	.8	-40	2.62	29.54	-	-26.92	0-360	0 degs
12	27.12247	25.05	Pk	7.7	.8	-40	-6.45	29.54	-	-35.99	0-360	90 degs
18	27.12247	40.72	Pk	7.7	.8	-40	9.22	29.54	-	-20.32	0-360	Flat

Pk – Peak Detector

Note – Markers 5, 11, 17 mark the 13.56 MHz fundamental.

SPURIOUS EMISSION – H FIELD



BL30MHz SPURIOUS EMISSIONS

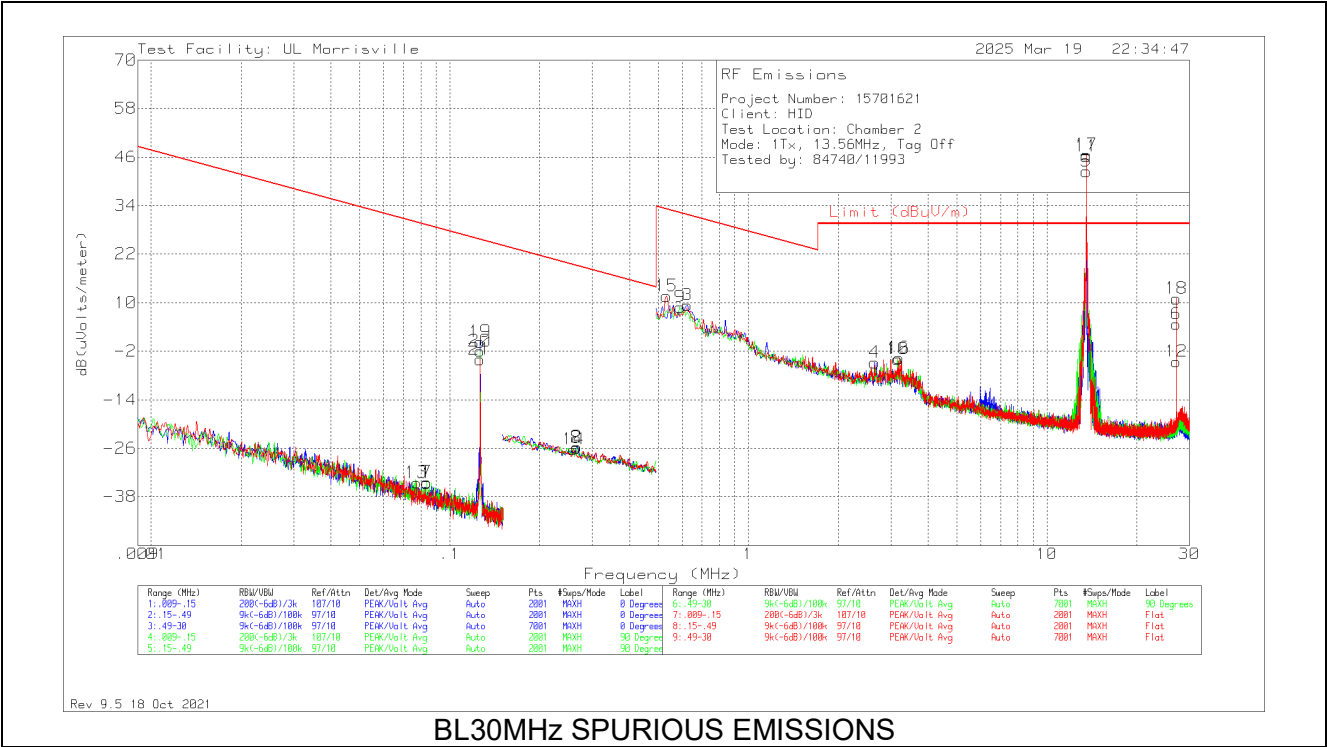
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
13	.10009	32.93	Pk	-40.4	.1	-80	-87.37	-23.9	-	-63.47	0-360	Flat
1	.11089	39.75	Pk	-40.4	.1	-80	-80.55	-24.79	-4.79	-55.76	0-360	0 degs
7	.11344	38.39	Pk	-40.4	.1	-80	-81.91	-24.99	-4.99	-56.92	0-360	90 degs
19	.12636	68.55	Pk	-40.5	.1	-80	-51.85	-25.93	-5.93	-25.92	0-360	0 degs
20	.12636	65.91	Pk	-40.5	.1	-80	-54.49	-25.93	-5.93	-28.56	0-360	90 degs
21	.12636	63.49	Pk	-40.5	.1	-80	-56.91	-25.93	-5.93	-30.98	0-360	Flat
2	.18111	45.75	Pk	-40.5	.1	-80	-74.65	-29.05	-9.05	-45.6	0-360	0 degs
8	.24359	44.39	Pk	-40.6	.1	-80	-76.11	-31.63	-11.63	-44.48	0-360	90 degs
14	.27538	43.92	Pk	-40.6	.1	-80	-76.58	-32.69	-12.69	-43.89	0-360	Flat
15	.52794	38.3	Pk	-40.5	.1	-40	-42.1	-18.35	-	-23.75	0-360	Flat
9	.59118	38.38	Pk	-40.5	.1	-40	-42.02	-19.33	-	-22.69	0-360	90 degs
3	.59962	38.26	Pk	-40.5	.1	-40	-42.14	-19.45	-	-22.69	0-360	0 degs
10	3.00274	25.19	Pk	-40.4	.3	-40	-54.91	-21.96	-	-32.95	0-360	90 degs
16	3.00274	24.29	Pk	-40.4	.3	-40	-55.81	-21.96	-	-33.85	0-360	Flat
4	3.22197	24.15	Pk	-40.4	.3	-40	-55.95	-21.96	-	-33.99	0-360	0 degs
5	13.5596	71.65	Pk	-41.7	.6	-40	-	-	-	-	0-360	0 degs
11	13.5596	75.96	Pk	-41.7	.6	-40	-	-	-	-	0-360	90 degs
17	13.5596	75.46	Pk	-41.7	.6	-40	-	-	-	-	0-360	Flat
6	27.12247	34.12	Pk	-43.8	.8	-40	-48.88	-21.96	-	-26.92	0-360	0 degs
12	27.12247	25.05	Pk	-43.8	.8	-40	-57.95	-21.96	-	-35.99	0-360	90 degs
18	27.12247	40.72	Pk	-43.8	.8	-40	-42.28	-21.96	-	-20.32	0-360	Flat

Pk – Peak Detector

Note – Markers 5, 11, 17 mark the 13.56 MHz fundamental.

9.2.2. Tag Off

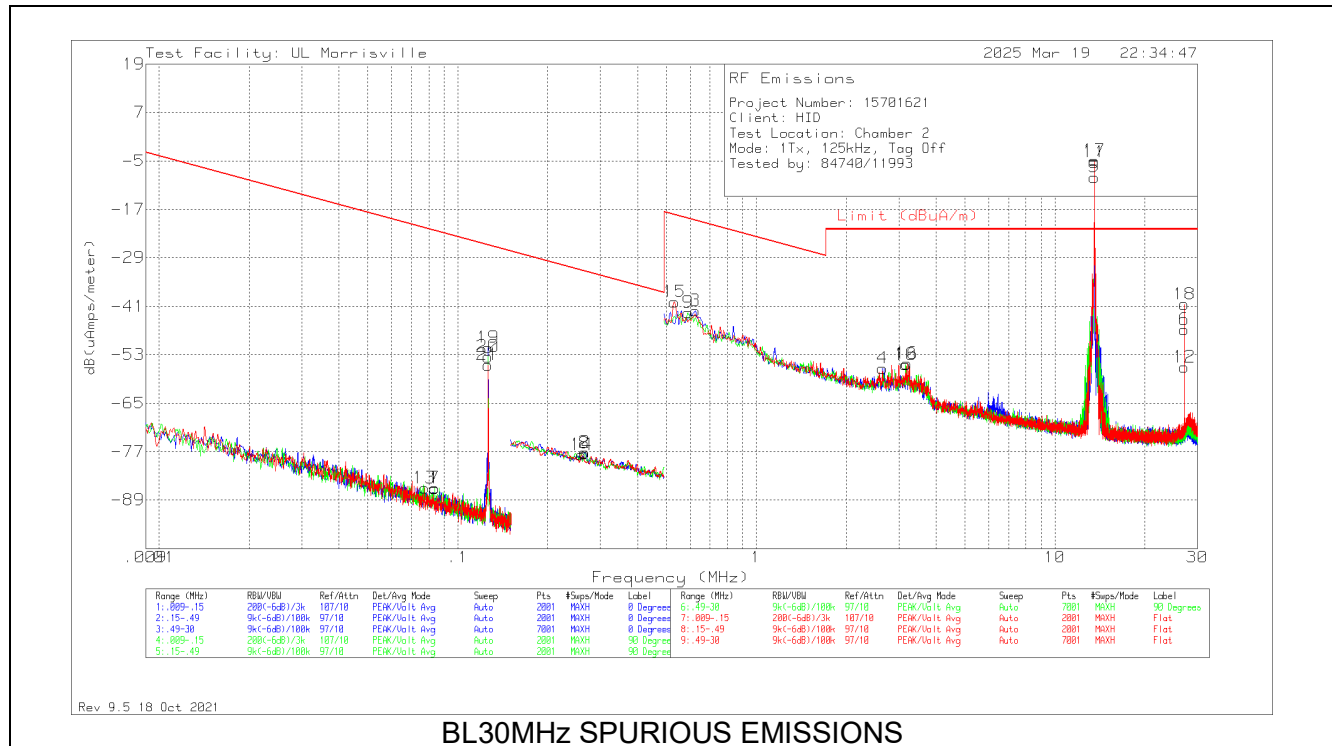
SPURIOUS EMISSION – E FIELD



Marker	Frequency (MHz)	Meter Reading (dBUV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
13	.07744	34.18	Pk	11.2	.1	-80	-34.52	29.82	49.82	-64.34	0-360	Flat
1	.08383	34.09	Pk	11.2	.1	-80	-34.61	29.14	49.14	-63.75	0-360	0 degs
7	.08383	34.25	Pk	11.2	.1	-80	-34.45	29.14	49.14	-63.59	0-360	90 degs
19	.12636	69.18	Pk	11	.1	-80	.28	25.57	45.57	-25.29	0-360	0 degs
20	.12636	66.91	Pk	11	.1	-80	-1.99	25.57	45.57	-27.56	0-360	90 degs
21	.12636	64.86	Pk	11	.1	-80	-4.04	25.57	45.57	-29.61	0-360	Flat
14	.25948	42.72	Pk	10.9	.1	-80	-26.28	19.32	39.32	-45.6	0-360	Flat
8	.26603	43.08	Pk	10.9	.1	-80	-25.92	19.11	39.11	-45.03	0-360	90 degs
2	.26654	43.29	Pk	10.9	.1	-80	-25.71	19.09	39.09	-44.8	0-360	0 degs
15	.53216	40.5	Pk	11	.1	-40	11.6	33.08	-	-21.48	0-360	Flat
9	.59118	37.82	Pk	11	.1	-40	8.92	32.17	-	-23.25	0-360	90 degs
3	.62491	38.27	Pk	11	.1	-40	9.37	31.69	-	-22.32	0-360	0 degs
4	2.64438	23.87	Pk	11.1	.2	-40	-4.83	29.54	-	-34.37	0-360	0 degs
10	3.16294	24.65	Pk	11.1	.3	-40	-3.95	29.54	-	-33.49	0-360	90 degs
16	3.19667	24.87	Pk	11.1	.3	-40	-3.73	29.54	-	-33.27	0-360	Flat
5	13.5596	72.04	Pk	9.8	.6	-40	-	-	-	-	0-360	0 degs
11	13.5596	75.77	Pk	9.8	.6	-40	-	-	-	-	0-360	90 degs
17	13.5596	76.18	Pk	9.8	.6	-40	-	-	-	-	0-360	Flat
6	27.12247	36.23	Pk	7.7	.8	-40	4.73	29.54	-	-24.81	0-360	0 degs
12	27.12247	26.94	Pk	7.7	.8	-40	-4.56	29.54	-	-34.1	0-360	90 degs
18	27.12247	42.49	Pk	7.7	.8	-40	10.99	29.54	-	-18.55	0-360	Flat

Pk – Peak Detector
Note – Markers 5, 11, 17 mark the 13.56 MHz fundamental.

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)	Height (cm)	Loop Angle
13	.07744	34.18	Pk	-40.3	.1	-80	-86.02	-21.68	-1.68	-64.34	0-360	401	Flat
1	.08383	34.09	Pk	-40.3	.1	-80	-86.11	-22.36	-2.36	-63.75	0-360	401	0 degs
7	.08383	34.25	Pk	-40.3	.1	-80	-85.95	-22.36	-2.36	-63.59	0-360	401	90 degs
19	.12636	69.18	Pk	-40.5	.1	-80	-51.22	-25.93	-5.93	-25.29	0-360	401	0 degs
20	.12636	66.91	Pk	-40.5	.1	-80	-53.49	-25.93	-5.93	-27.56	0-360	401	90 degs
21	.12636	64.86	Pk	-40.5	.1	-80	-55.54	-25.93	-5.93	-29.61	0-360	401	Flat
14	.25948	42.72	Pk	-40.6	.1	-80	-77.78	-32.18	-12.18	-45.6	0-360	401	Flat
8	.26603	43.08	Pk	-40.6	.1	-80	-77.42	-32.39	-12.39	-45.03	0-360	401	90 degs
2	.26654	43.29	Pk	-40.6	.1	-80	-77.21	-32.41	-12.41	-44.8	0-360	401	0 degs
15	.53216	40.5	Pk	-40.5	.1	-40	-39.9	-18.42	-	-21.48	0-360	401	Flat
9	.59118	37.82	Pk	-40.5	.1	-40	-42.58	-19.33	-	-23.25	0-360	401	90 degs
3	.62491	38.27	Pk	-40.5	.1	-40	-42.13	-19.81	-	-22.32	0-360	401	0 degs
4	2.64438	23.87	Pk	-40.4	.2	-40	-56.33	-21.96	-	-34.37	0-360	401	0 degs
10	3.16294	24.65	Pk	-40.4	.3	-40	-55.45	-21.96	-	-33.49	0-360	401	90 degs
16	3.19667	24.87	Pk	-40.4	.3	-40	-55.23	-21.96	-	-33.27	0-360	401	Flat
5	13.5596	72.04	Pk	-41.7	.6	-40	-9.06	-	-	-	0-360	401	0 degs
11	13.5596	75.77	Pk	-41.7	.6	-40	-5.33	-	-	-	0-360	401	90 degs
17	13.5596	76.18	Pk	-41.7	.6	-40	-4.92	-	-	-	0-360	401	Flat
6	27.12247	36.23	Pk	-43.8	.8	-40	-46.77	-21.96	-	-24.81	0-360	401	0 degs
12	27.12247	26.94	Pk	-43.8	.8	-40	-56.06	-21.96	-	-34.1	0-360	401	90 degs
18	27.12247	42.49	Pk	-43.8	.8	-40	-40.51	-21.96	-	-18.55	0-360	401	Flat

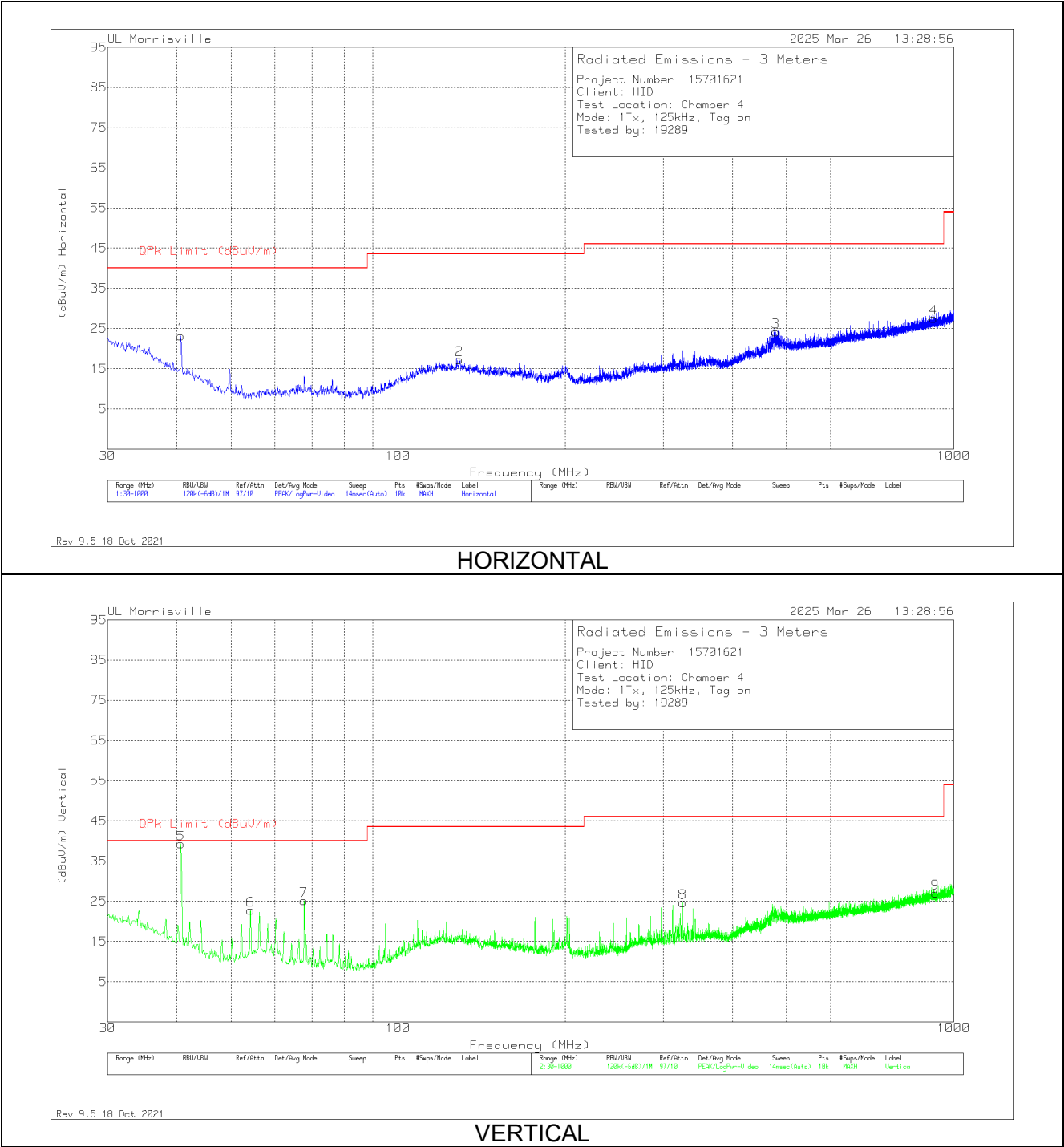
Pk – Peak Detector

Note – Markers 5, 11, 17 mark the 13.56 MHz fundamental.

9.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

9.3.1. Tag On

SPURIOUS EMISSION



DATA

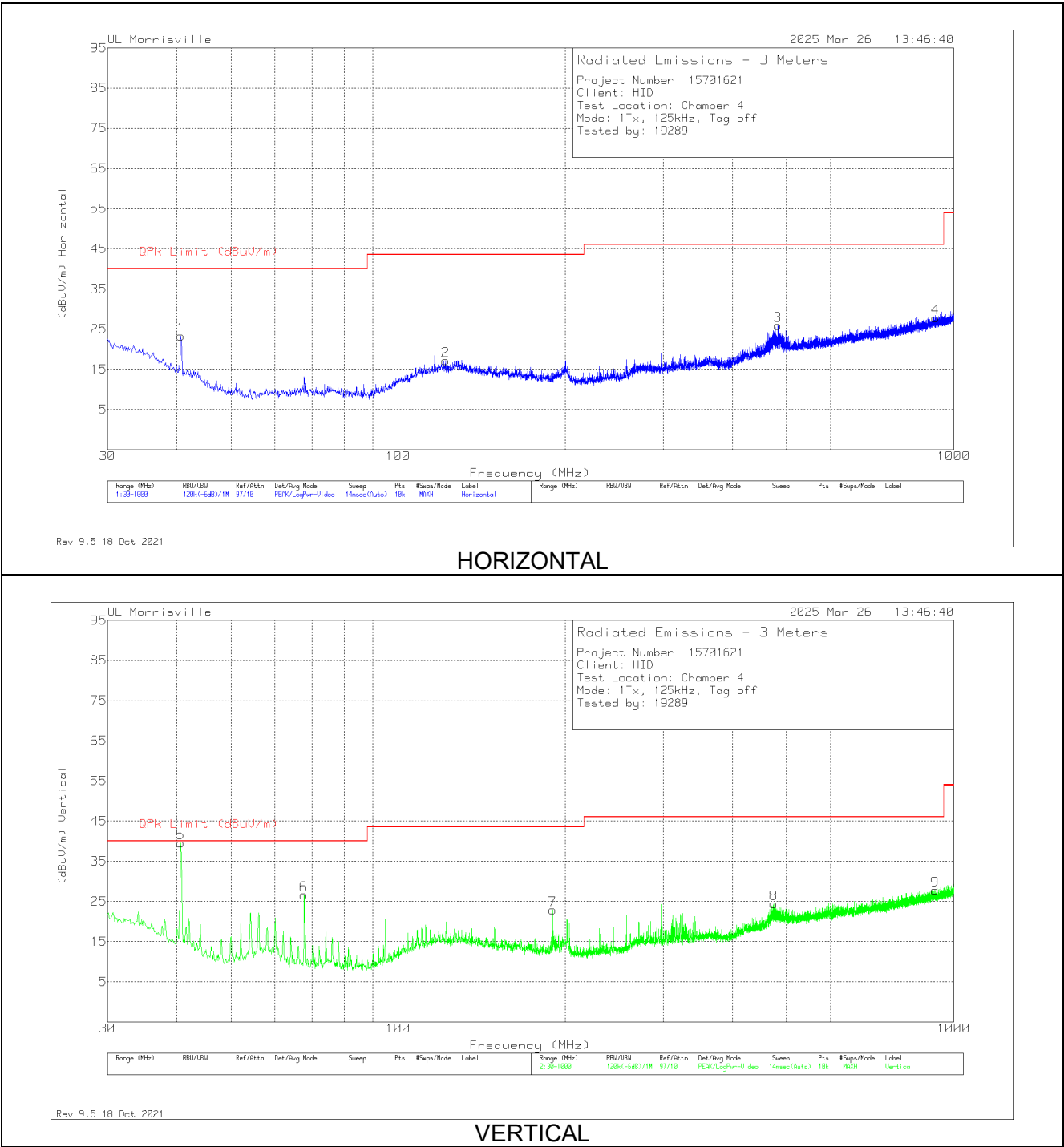
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90628 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	40.67	35.61	Pk	19.5	-32	23.11	40	-16.89	0-360	300	H
5	40.69254	48.92	Qp	19.5	-32	36.42	40	-3.58	164	100	V
6	54.25	41.17	Pk	13.5	-31.9	22.77	40	-17.23	0-360	100	V
7	67.733	42.53	Pk	14.3	-31.7	25.13	40	-14.87	0-360	100	V
2	128.843	28.46	Pk	20	-31.2	17.26	43.52	-26.26	0-360	200	H
8	325.462	34.74	Pk	20.1	-30.2	24.64	46.02	-21.38	0-360	100	V
3	478.722	29.93	Pk	23.8	-29.6	24.13	46.02	-21.89	0-360	100	H
4	920.557	26.03	Pk	28.4	-26.9	27.53	46.02	-18.49	0-360	300	H
9	926.668	25.52	Pk	28.5	-27	27.02	46.02	-19	0-360	200	V

Pk - Peak detector

Qp - Quasi-Peak detector

9.3.2. Tag Off

SPURIOUS EMISSION



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90628 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	40.67	35.8	Pk	19.5	-32	23.3	40	-16.7	0-360	300	H
5	40.68534	51.22	Qp	19.5	-32	38.72	40	-1.28	241	100	V
6	67.733	44.1	Pk	14.3	-31.7	26.7	40	-13.3	0-360	100	V
2	121.665	28.17	Pk	20.1	-31.1	17.17	43.52	-26.35	0-360	100	H
7	189.856	36.49	Pk	17.3	-30.9	22.89	43.52	-20.63	0-360	100	V
8	474.648	30.44	Pk	23.7	-29.7	24.44	46.02	-21.58	0-360	200	V
3	482.893	31.57	Pk	23.8	-29.5	25.87	46.02	-20.15	0-360	100	H
9	925.698	26.3	Pk	28.5	-27	27.8	46.02	-18.22	0-360	100	V
4	927.056	26.26	Pk	28.5	-27	27.76	46.02	-18.26	0-360	100	H

Pk - Peak detector

Qp - Quasi-Peak detector

10. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207

IC RSS-GEN, Section 8.8

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Notes:
1. The lower limit shall apply at the transition frequencies
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

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.

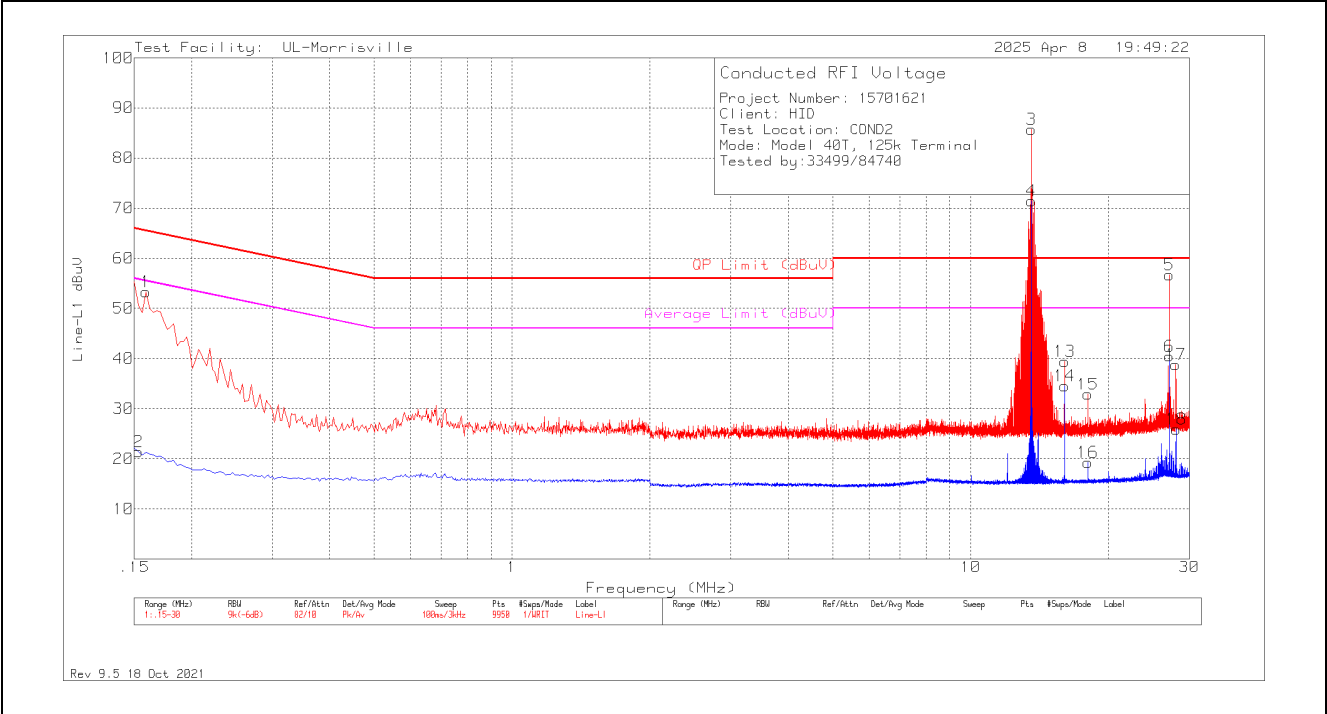
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

No non-compliance noted:

10.1. AC Mains Tag On

LINE 1 RESULTS

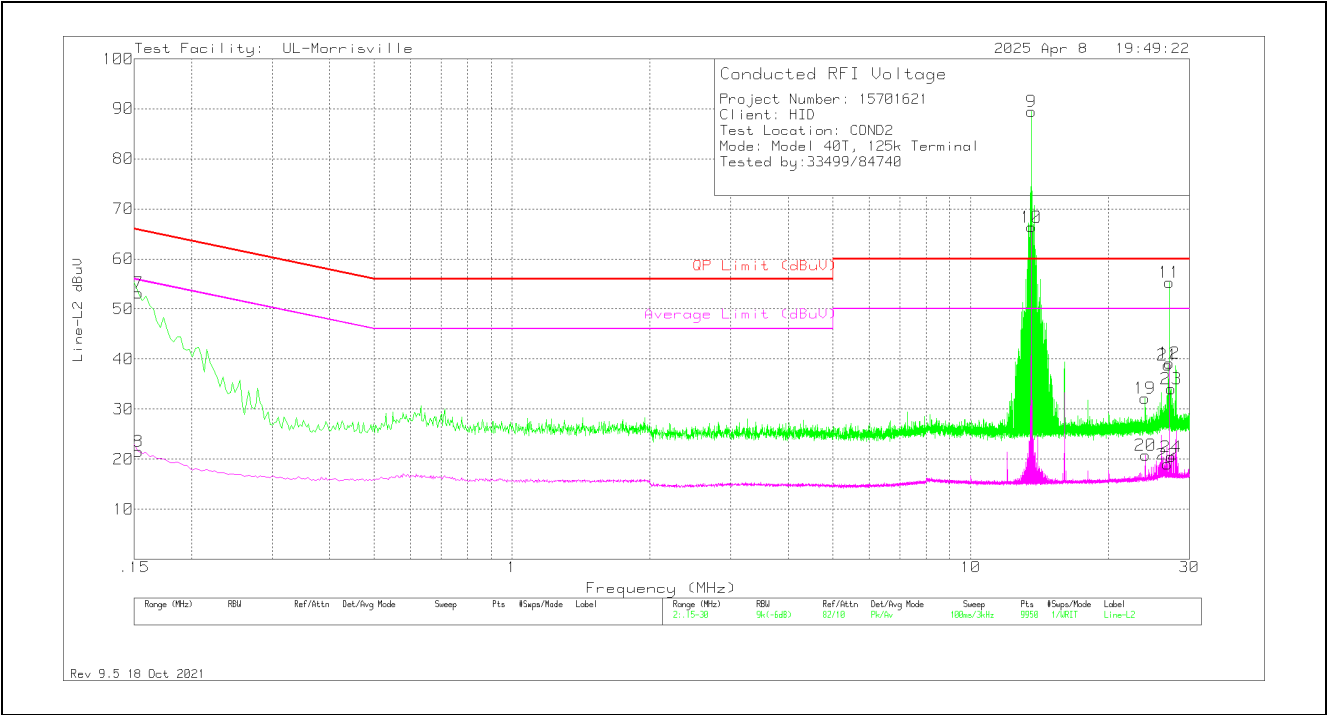


Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	171083 (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
2	.153	1.24	Av	.2	0	20	21.44	-	-	55.84	-34.4
1	.159	33.07	Pk	.2	0	20	53.27	65.52	-12.25	-	-
3	13.5604	64.55	Qp	.1	.3	20	84.95	60	24.95	-	-
4	13.5604	-51	Ca	.1	.3	20	19.89	-	-	50	-30.11
13	16.032	18.88	Pk	.2	.3	20	39.38	60	-20.62	-	-
14	16.032	14.09	Av	.2	.3	20	34.59	-	-	50	-15.41
15	18.021	12.36	Pk	.2	.3	20	32.86	60	-27.14	-	-
16	18.021	-1.21	Av	.2	.3	20	19.29	-	-	50	-30.71
5	27.1208	27.54	Qp	.4	.4	20	48.34	60	-11.66	-	-
6	27.12	19.68	Av	.4	.4	20	40.48	-	-	50	-9.52
17	28.029	17.99	Pk	.4	.4	20	38.79	60	-21.21	-	-
18	28.059	5.08	Av	.4	.4	20	25.88	-	-	50	-24.12

*Note: Markers 7 and 8 are the fundamentals of the device, and not spurious emissions. Section 10.3 shows compliance with an NFC/HF terminated sample.

Pk - Peak detector
Av - Average detection
Qp - Quasi-Peak detector
Ca - CISPR average detection

LINE 2 RESULTS



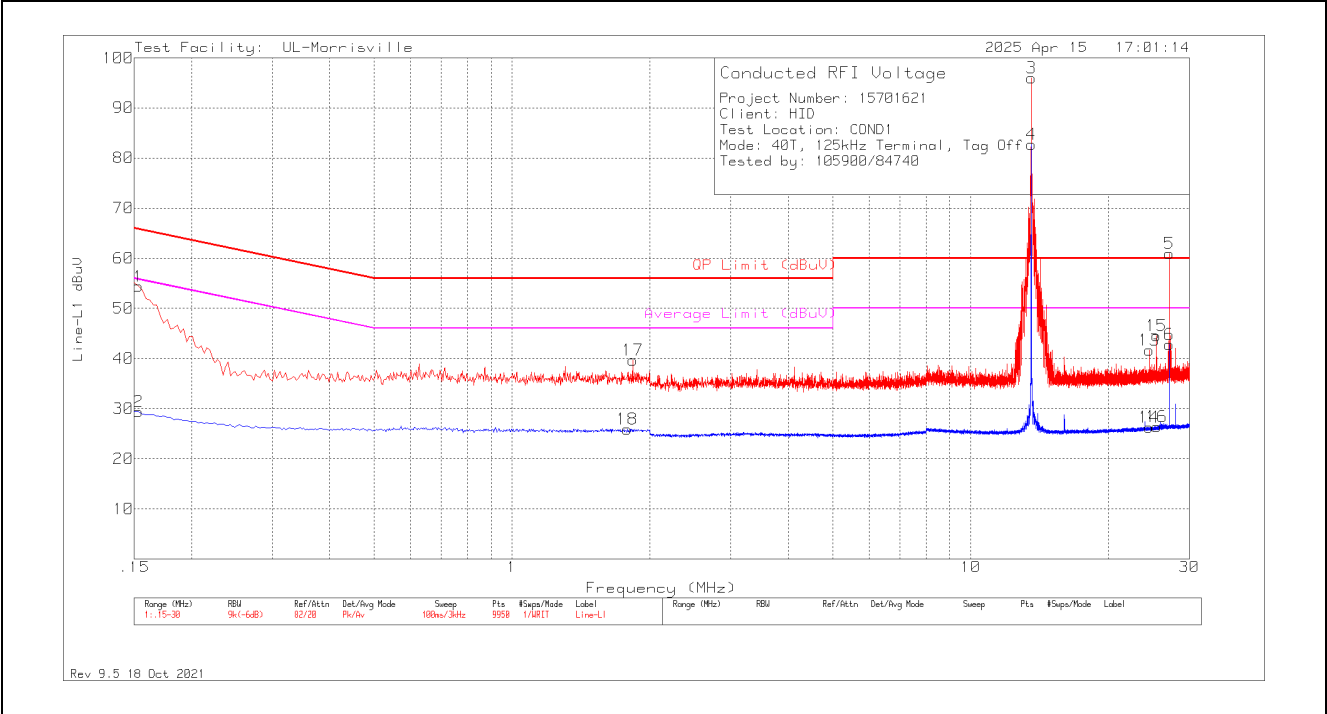
Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	171083 (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
7	.153	33.03	Pk	.2	0	20	53.23	65.84	-12.61	-	-
8	.153	1.29	Av	.2	0	20	21.49	-	-	55.84	-34.35
10	13.5604	-1.16	Ca	.1	.3	20	19.24	-	-	50	-30.76
9	13.5604	65.66	Qp	.1	.3	20	86.06	60	26.06	-	-
19	24.009	11.5	Pk	.3	.4	20	32.2	60	-27.8	-	-
20	24.042	.07	Av	.3	.4	20	20.77	-	-	50	-29.23
22	26.874	-1.84	Av	.4	.4	20	18.96	-	-	50	-31.04
21	26.91	17.96	Pk	.4	.4	20	38.76	60	-21.24	-	-
11	27.1211	27.63	Qp	.4	.4	20	48.43	60	-11.57	-	-
12	27.123	18.37	Av	.4	.4	20	39.17	-	-	50	-10.83
24	27.372	-.34	Av	.4	.4	20	20.46	-	-	50	-29.54
23	27.396	13.2	Pk	.4	.4	20	34	60	-26	-	-

Pk - Peak detector
Av - Average detection
Qp - Quasi-Peak detector
Ca - CISPR average detection

*Note: Markers 18 and 19 are the fundamentals of the device, and not spurious emissions. Section 10.3 shows compliance with an NFC/HF terminated sample.

10.2. AC Mains Tag Off

LINE 1 RESULTS

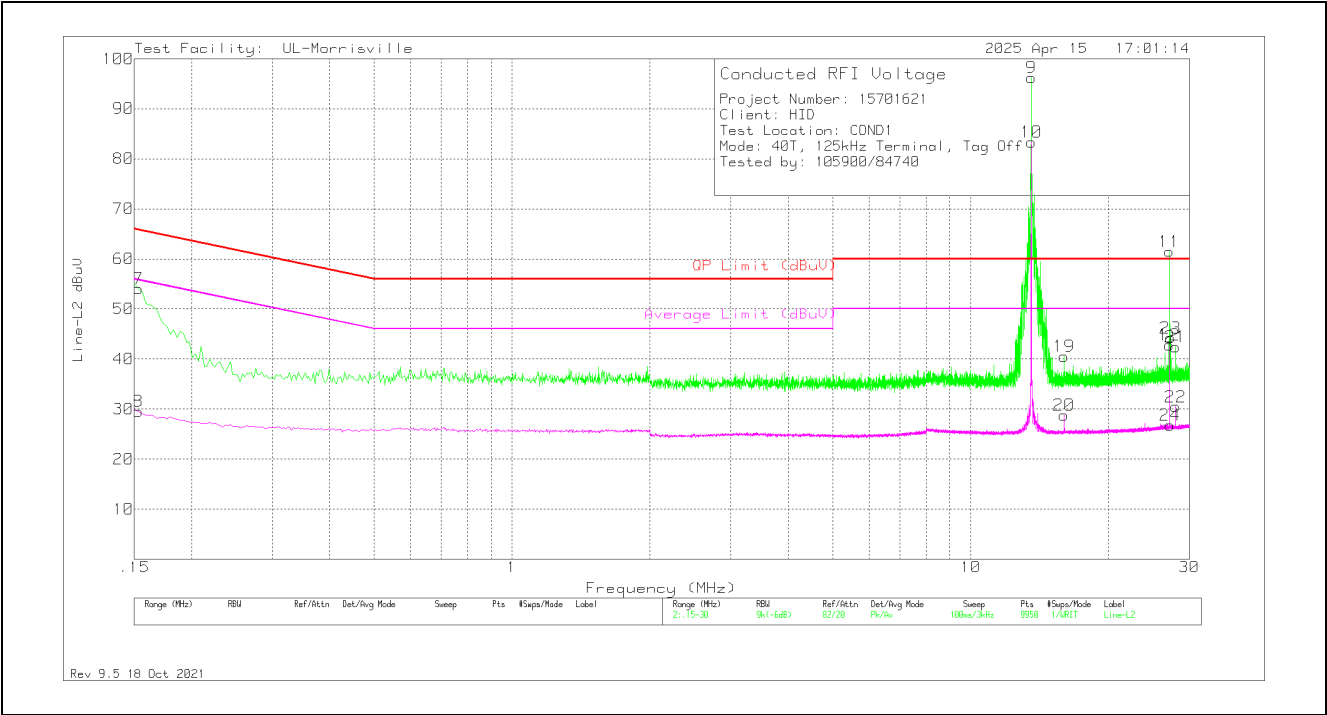


Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	171083 (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.153	34.19	Pk	.2	0	20	54.39	65.84	-11.45	-	-
2	.153	9.16	Av	.2	0	20	29.36	-	-	55.84	-26.48
18	1.782	5.85	Av	0	.1	20	25.95	-	-	46	-20.05
17	1.833	19.56	Pk	0	.1	20	39.66	56	-16.34	-	-
3	13.56025	73.4	Qp	.1	.3	20	93.8	60	33.8	-	-
4	13.56025	63.54	Ca	.1	.3	20	83.94	-	-	50	33.94
14	24.483	5.58	Av	.3	.4	20	26.28	-	-	50	-23.72
13	24.528	21.02	Pk	.3	.4	20	41.72	60	-18.28	-	-
15	25.425	23.75	Pk	.4	.4	20	44.55	60	-15.45	-	-
16	25.491	5.59	Av	.4	.4	20	26.39	-	-	50	-23.61
5	27.12122	38.05	Qp	.4	.4	20	58.85	60	-1.15	-	-
6	27.12	22.03	Av	.4	.4	20	42.83	-	-	50	-7.17

Pk - Peak detector
Av - Average detection
Qp - Quasi-Peak detector
Ca - CISPR average detection

*Note: Markers 3 and 4 are the fundamentals of the device, and not spurious emissions. Section 10.3 shows compliance with an NFC/HF terminated sample.

LINE 2 RESULTS



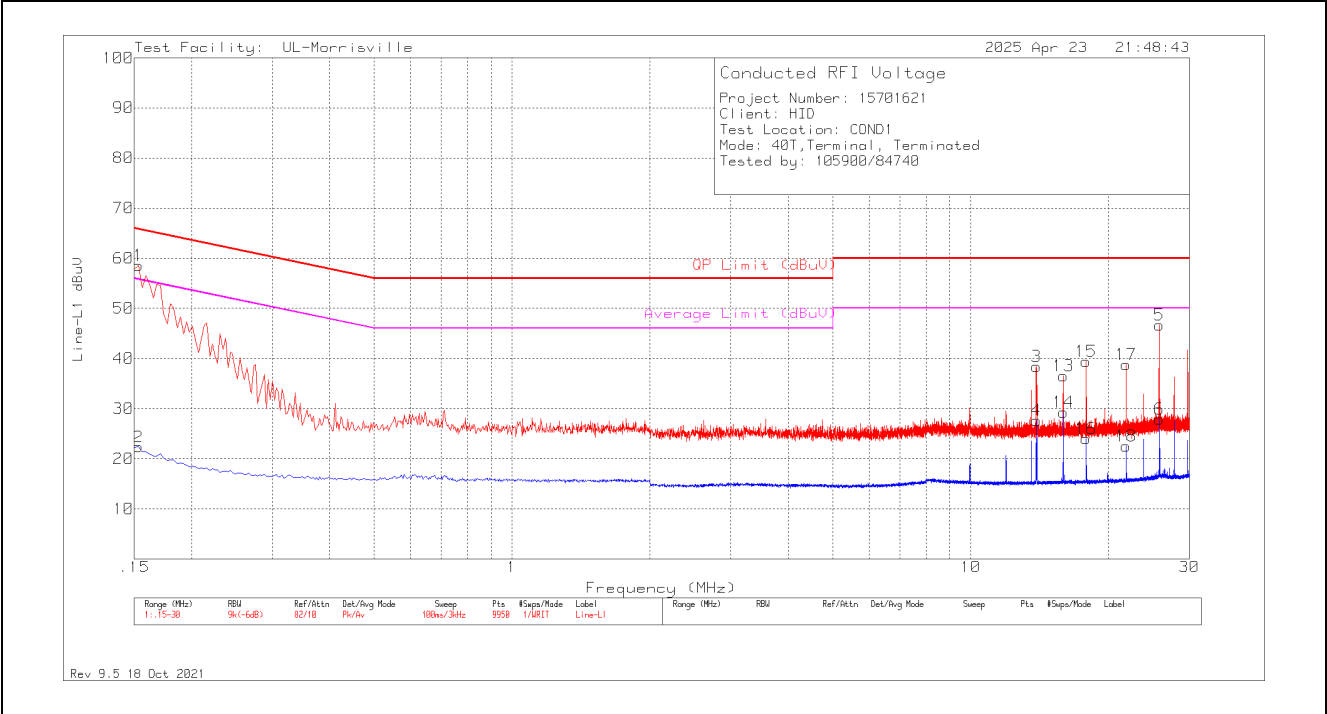
Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	171083 (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
7	.153	33.9	Pk	.2	0	20	54.1	65.84	-11.74	-	-
8	.153	9.36	Av	.2	0	20	29.56	-	-	55.84	-26.28
9	13.56032	73.67	Qp	.1	.3	20	94.07	60	34.07	-	-
10	13.56032	64.01	Ca	.1	.3	20	84.41	-	-	50	34.41
19	15.99	20	Pk	.2	.3	20	40.5	60	-19.5	-	-
20	16.002	8.29	Av	.2	.3	20	28.79	-	-	50	-21.21
11	27.1196	38.25	Qp	.4	.4	20	59.05	60	-.95	-	-
12	27.12	21.98	Av	.4	.4	20	42.78	-	-	50	-7.22
24	27.246	5.98	Av	.4	.4	20	26.78	-	-	50	-23.22
23	27.264	23.44	Pk	.4	.4	20	44.24	60	-15.76	-	-
21	27.981	21.58	Pk	.4	.4	20	42.38	60	-17.62	-	-
22	28.005	9.67	Av	.4	.4	20	30.47	-	-	50	-19.53

Pk - Peak detector
Av - Average detection
Qp - Quasi-Peak detector
Ca - CISPR average detection

*Note: Markers 9 and 10 are the fundamentals of the device, and not spurious emissions. Section 10.3 shows compliance with an NFC/HF terminated sample.

10.3. AC Mains Terminated Sample

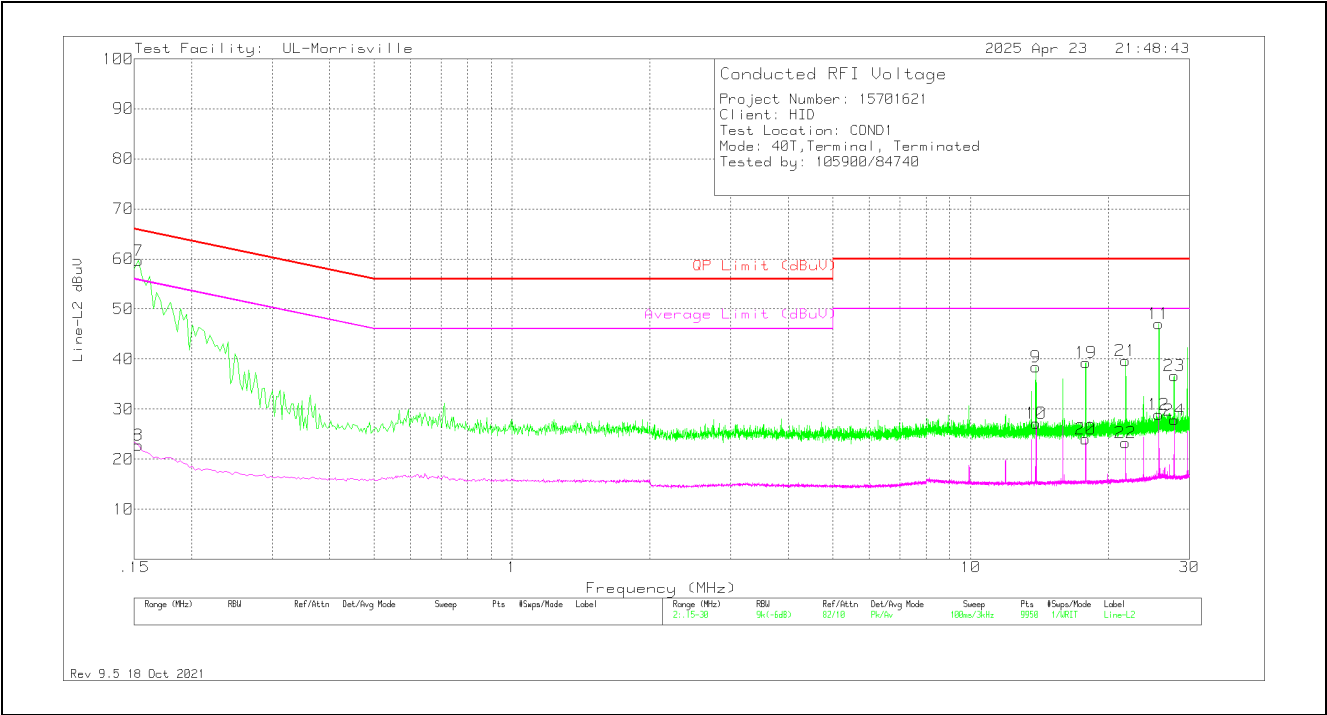
LINE 1 RESULTS



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	38.4	Pk	.2	0	20	58.6	65.84	-7.24	-	-
2	.153	2.14	Av	.2	0	20	22.34	-	-	55.84	-33.5
3	13.899	18.01	Pk	.1	.3	20	38.41	60	-21.59	-	-
4	13.935	7.24	Av	.1	.3	20	27.64	-	-	50	-22.36
13	15.921	16.01	Pk	.2	.3	20	36.51	60	-23.49	-	-
14	15.921	8.82	Av	.2	.3	20	29.32	-	-	50	-20.68
16	17.856	3.56	Av	.2	.3	20	24.06	-	-	50	-25.94
15	17.862	18.95	Pk	.2	.3	20	39.45	60	-20.55	-	-
17	21.813	18.1	Pk	.3	.4	20	38.8	60	-21.2	-	-
18	21.816	1.79	Av	.3	.4	20	22.49	-	-	50	-27.51
6	25.761	7.13	Av	.4	.4	20	27.93	-	-	50	-22.07
5	25.779	25.86	Pk	.4	.4	20	46.66	60	-13.34	-	-

Pk - Peak detector
Av - Average detection
Qp - Quasi-Peak detector
Ca - CISPR 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	39.44	Pk	.2	0	20	59.64	65.84	-6.2	-	-
8	.153	2.54	Av	.2	0	20	22.74	-	-	55.84	-33.1
9	13.866	17.99	Pk	.1	.3	20	38.39	60	-21.61	-	-
10	13.896	6.76	Av	.1	.3	20	27.16	-	-	50	-22.84
20	17.817	3.48	Av	.2	.3	20	23.98	-	-	50	-26.02
19	17.832	18.79	Pk	.2	.3	20	39.29	60	-20.71	-	-
21	21.771	18.98	Pk	.3	.4	20	39.68	60	-20.32	-	-
22	21.777	2.55	Av	.3	.4	20	23.25	-	-	50	-26.75
11	25.716	26.24	Pk	.4	.4	20	47.04	60	-12.96	-	-
12	25.728	8.1	Av	.4	.4	20	28.9	-	-	50	-21.1
23	27.78	15.86	Pk	.4	.4	20	36.66	60	-23.34	-	-
24	27.786	7.04	Av	.4	.4	20	27.84	-	-	50	-22.16

Pk - Peak detector
Av - Average detection
Qp - Quasi-Peak detector
Ca - CISPR average detection

11. SETUP PHOTOS

Please refer to 15701621-EP2e for setup photos

END OF TEST REPORT