TEST REPORT

Report Number: R15701621-E15e

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-210 ISSUE 11:2024 RSS-GEN ISSUE 5 + A1 + A2: 2021

Date Of Issue:
2025-07-03

Prepared by:
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CERT #0751.06

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
v1	2025-06-10	Initial Issue	Manish Baral
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 Corporation
611 Center Ridge Dr
Austin, TX 78753, USA

EUT DESCRIPTION: Signo V2 Reader

MODEL: 40TV2

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

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

DATE TESTED: 2025-03-19 to 2025-04-23

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C: 2025	
ISED RSS-210 Issue 11: 2024	Refer to Section 3
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:

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Sr. Staff Engineer
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UL LLC

Prepared By:

Manish Baral
Engineer
Consumer, Medical and IT Segment
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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 correctly integrating customer-provided data with measurements performed by UL LLC. Below is a list of the data provided by the customer:

1) Supported Data-Rates and Power Settings. Orientation of Operation (Section 6.4)
2) Software, Firmware and Hardware Versions of EUT (section 6.3)

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) IC RSS-210, Annex B.6 IC RSS-GEN, Section 8.9 (Transmitter)		
Tx Spurious Emissions			
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

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.

5.1. 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.)

5.2. MEASUREMENT UNCERTAINTY

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

PARAMETER	U_{Lab}
Radio Frequency (Spectrum Analyzer)	419.38 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%

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

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

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.

6.1.

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.		

MAXIMUM ELECTRIC FIELD STRENGTH

6.2.

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

Fundamental Frequency (MHz)	E-Field (dBuV/m)	Mode
13.56	47.4	Tag Off

6.3.

SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 10.1

The test utility software used during testing was Rev H

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 was investigated with tag on and tag off and tag off was found to be worst-case; therefore, spurious emissions and radiated carrier H-Field were only performed fully with tag off. 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.

6.4.

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 AC mains 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.

DESCRIPTION OF TEST SETUP

6.5. 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-EP2e for setup diagrams

TEST SETUP

The EUT is connected to a DC power supply during the tests. The EUT was set to continuously be reading for a tag. The tag was placed on the EUT for tag on, and removed for tag off.

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 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	2025-04-30
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 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.

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Common Equipment				
	Conducted Room 1				
90411	Spectrum Analyzer	Keysight Technologies	N9030A	2024-08-01	2025-08-01
179892	Environmental Meter	Fisher Scientific	15-077-963	2024-08-12	2025-08-12
211056	Real-Time Peak Power Sensor 50MHz to 8GHz	Boonton	RTP5000	2024-08-01	2025-08-01
207726	Temp/Humid Chamber	Thermotron	SM-32-8200	2025-01-15	2026-01-15
91212	True RMS Multimeter	Agilent	U1232A	2024-08-01	2025-08-01
-	DC Power Supply	Keysight Technologies	E3633A	-	-
Power Software	Boonton Power Analyzer	Boonton	Version 3.0.13.0	NA	NA
SOFTEMI	Antenna Port Software	UL	Version 2021.5.31	NA	NA
SOFTEMI	Antenna Port Software	UL	Version 2024.2.24	NA	NA

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	2025-04-30
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
52859	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2024-04-04	2025-04-30
236852	CW-AC Power Source	Ametek	CW2501	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		

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

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

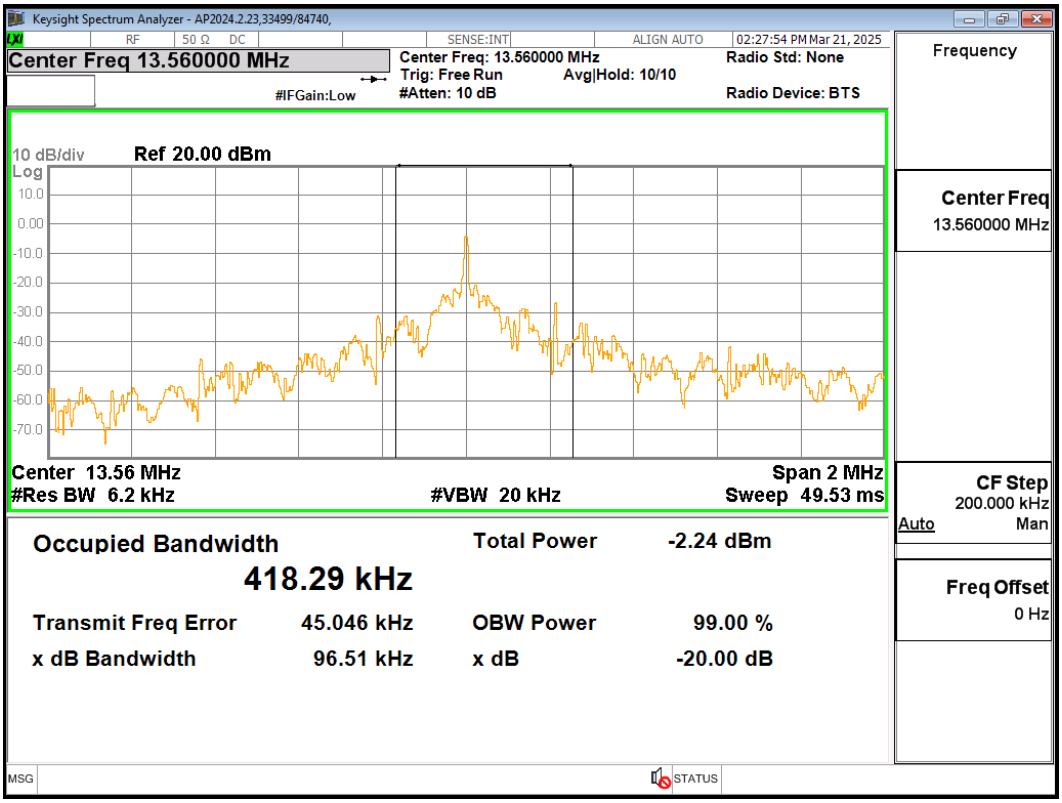
Mode	Frequency (MHz)	20dB Bandwidth* (kHz)	99% Bandwidth (kHz)
Type A (Tag On)	13.56	96.51	418.29
Type A (Tag Off)	13.56	66.36	360.38

***Note:**

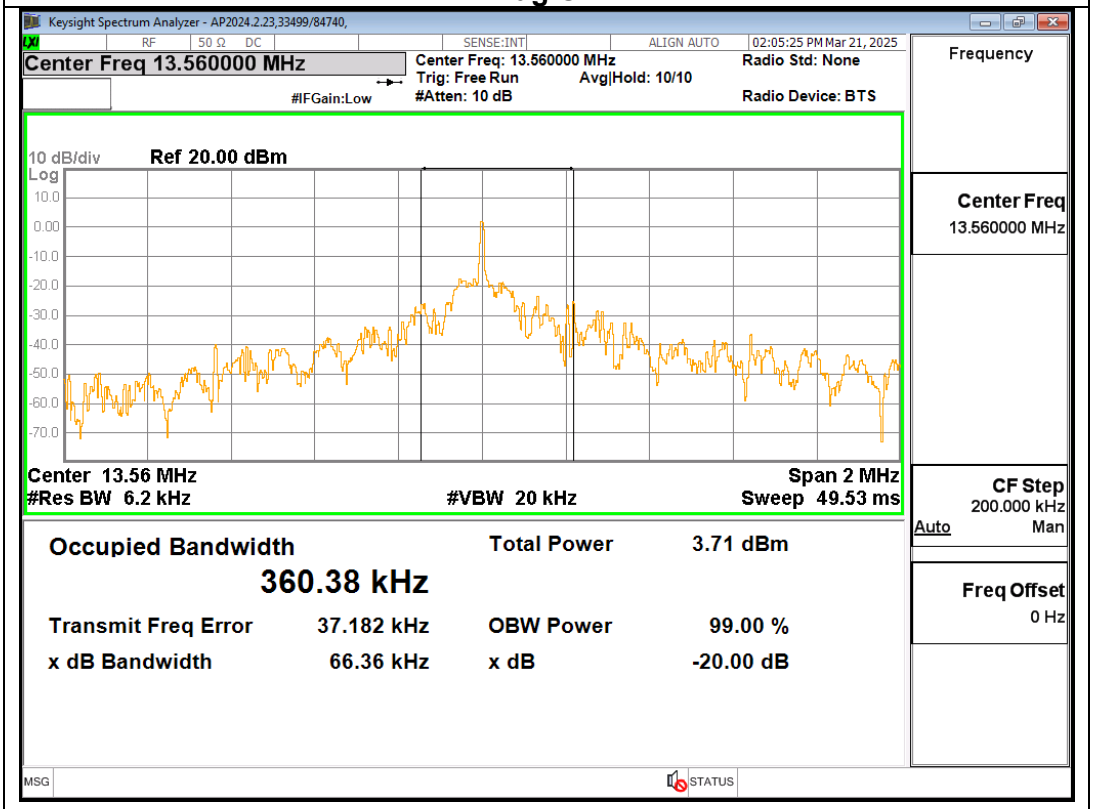
Because the measured signal is CW or CW-like, adjusting the RBW per C63.10 would not be practical, since the measured bandwidth would always follow the RBW.

Type A

8.1.



Tag On



Tag Off

9. RADIATED EMISSION TEST RESULTS

LIMITS AND PROCEDURE

LIMIT

FCC §15.225
IC RSS-210, Annex B.6
IC RSS-GEN, Section 8.9 (Transmitter)

9.1.

(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
Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µA/m)	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	.08	30

** 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 (e) The provisions in §§ 15.31, 15.33, and 15.35, 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*Log (test distance / specification distance)

RESULTS

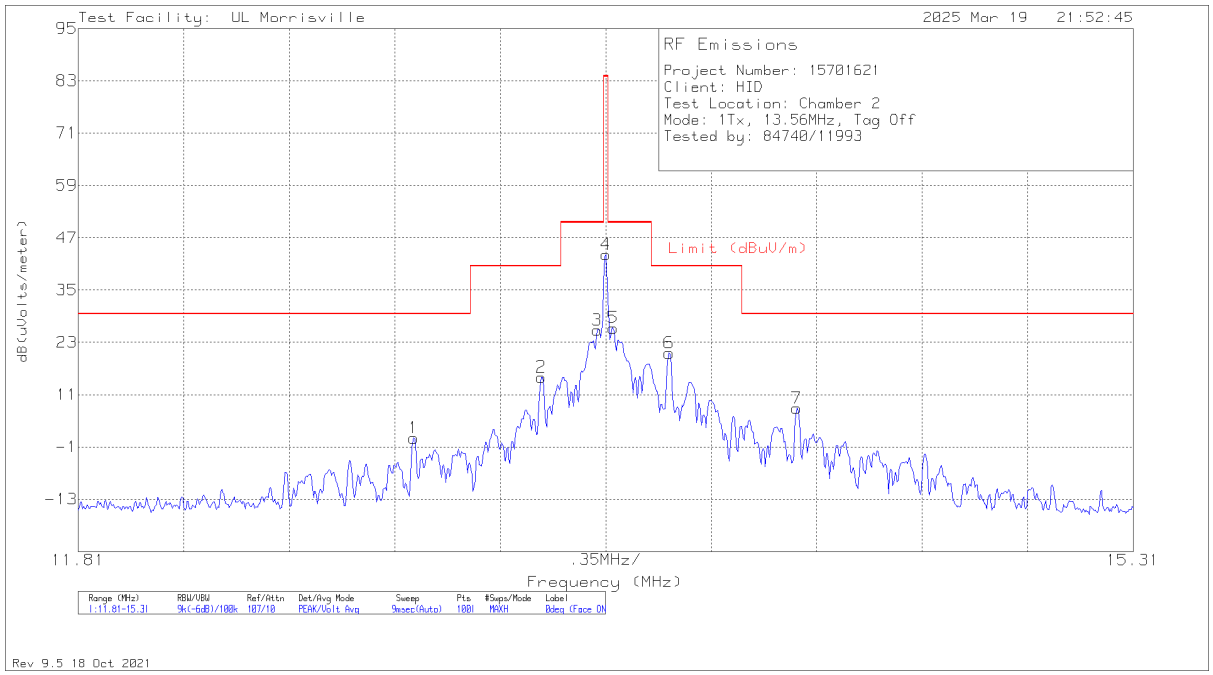
FUNDAMENTAL AND SPURIOUS EMISSIONS (<30MHz)

TYPE A, TAG OFF

FUNDAMENTAL

9.2.

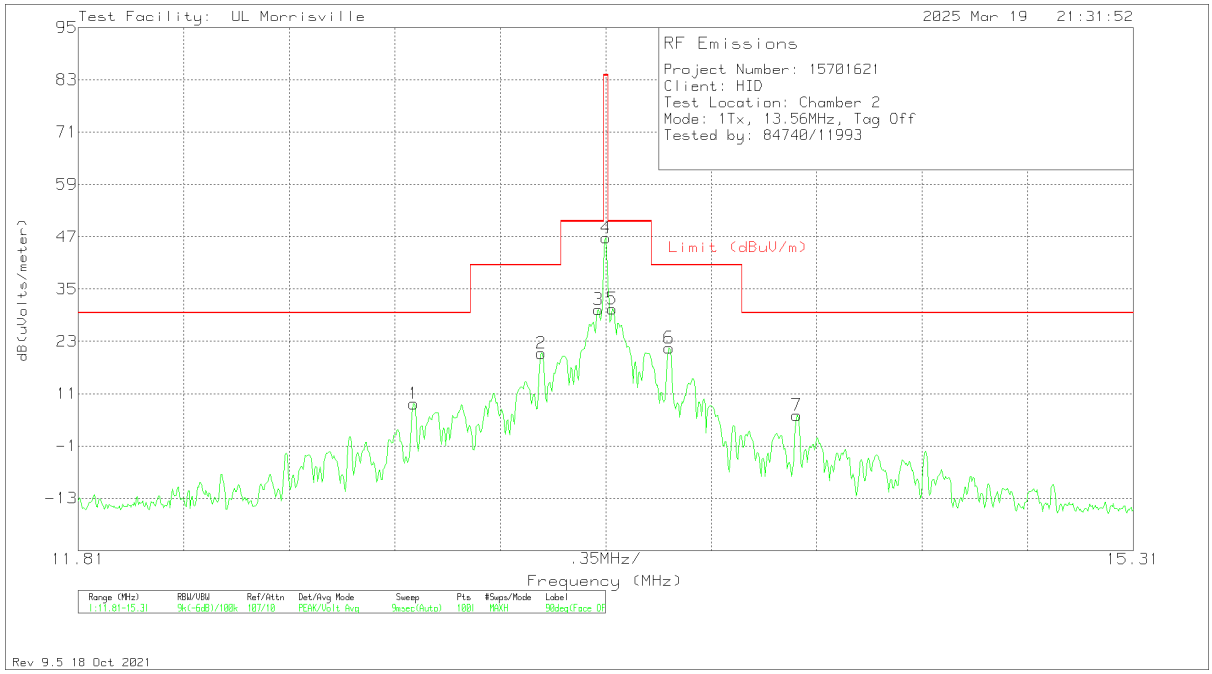
9.2.1.



ANTENNA FACE ON

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	30.64	Pk	9.8	.6	-40	1.04	29.5	-28.46	185	0 degs
2	13.3465	44.58	Pk	9.8	.6	-40	14.98	40.5	-25.52	185	0 degs
3	13.532	55.38	Pk	9.8	.6	-40	25.78	50.5	-24.72	185	0 degs
4	13.56	72.75	Pk	9.8	.6	-40	43.15	84	-40.85	185	0 degs
5	13.5845	55.91	Pk	9.8	.6	-40	26.31	50.5	-24.19	185	0 degs
6	13.77	50.24	Pk	9.7	.6	-40	20.54	40.5	-19.96	185	0 degs
7	14.1935	37.58	Pk	9.7	.6	-40	7.88	29.5	-21.62	185	0 degs

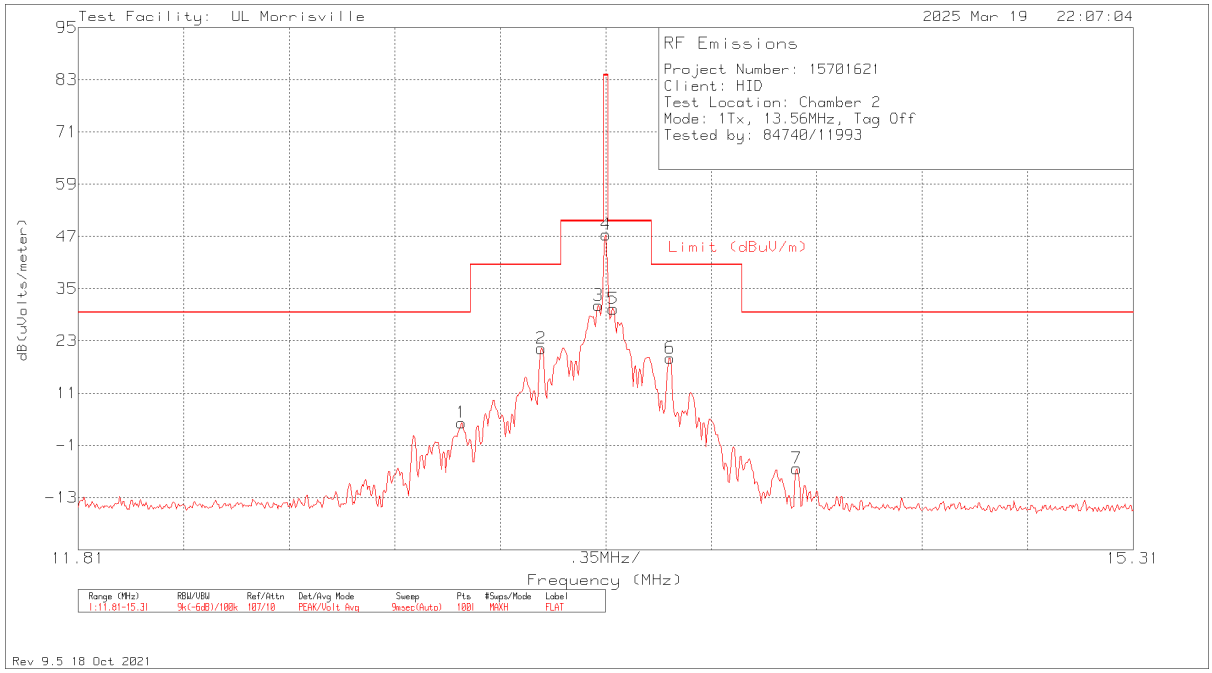
Pk - Peak detector



ANTENNA FACE OFF

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	38.31	Pk	9.8	.6	-40	8.71	29.5	-20.79	113	90 degs
2	13.3465	49.87	Pk	9.8	.6	-40	20.27	40.5	-20.23	113	90 degs
3	13.5355	59.89	Pk	9.8	.6	-40	30.29	50.5	-20.21	113	90 degs
4	13.56	76.33	Pk	9.8	.6	-40	46.73	84	-37.27	113	90 degs
5	13.581	60.05	Pk	9.8	.6	-40	30.45	50.5	-20.05	113	90 degs
6	13.77	51.17	Pk	9.7	.6	-40	21.47	40.5	-19.03	113	90 degs
7	14.1935	35.75	Pk	9.7	.6	-40	6.05	29.5	-23.45	113	90 degs

Pk - Peak detector

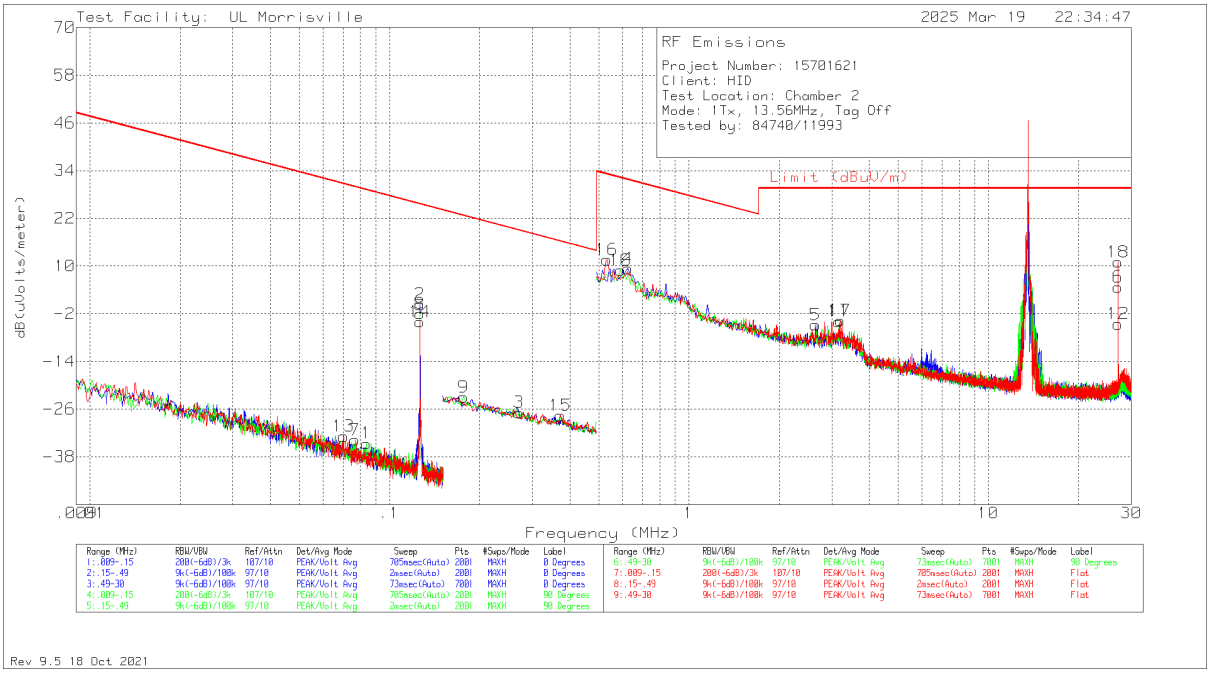


ANTENNA FACE FLAT

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	33.81	Pk	9.8	.6	-40	4.21	29.5	-25.29	277	Flat
2	13.3465	50.87	Pk	9.8	.6	-40	21.27	40.5	-19.23	277	Flat
3	13.5355	60.76	Pk	9.8	.6	-40	31.16	50.5	-19.34	277	Flat
4	13.56	77	Pk	9.8	.6	-40	47.4	84	-36.6	277	Flat
5	13.5845	59.97	Pk	9.8	.6	-40	30.37	50.5	-20.13	277	Flat
6	13.7735	48.74	Pk	9.7	.6	-40	19.04	40.5	-21.46	277	Flat
7	14.1935	23.37	Pk	9.7	.6	-40	-6.33	29.5	-35.83	277	Flat

Pk - Peak detector

SPURIOUS EMISSION – E FIELD (Worst Case Configuration)



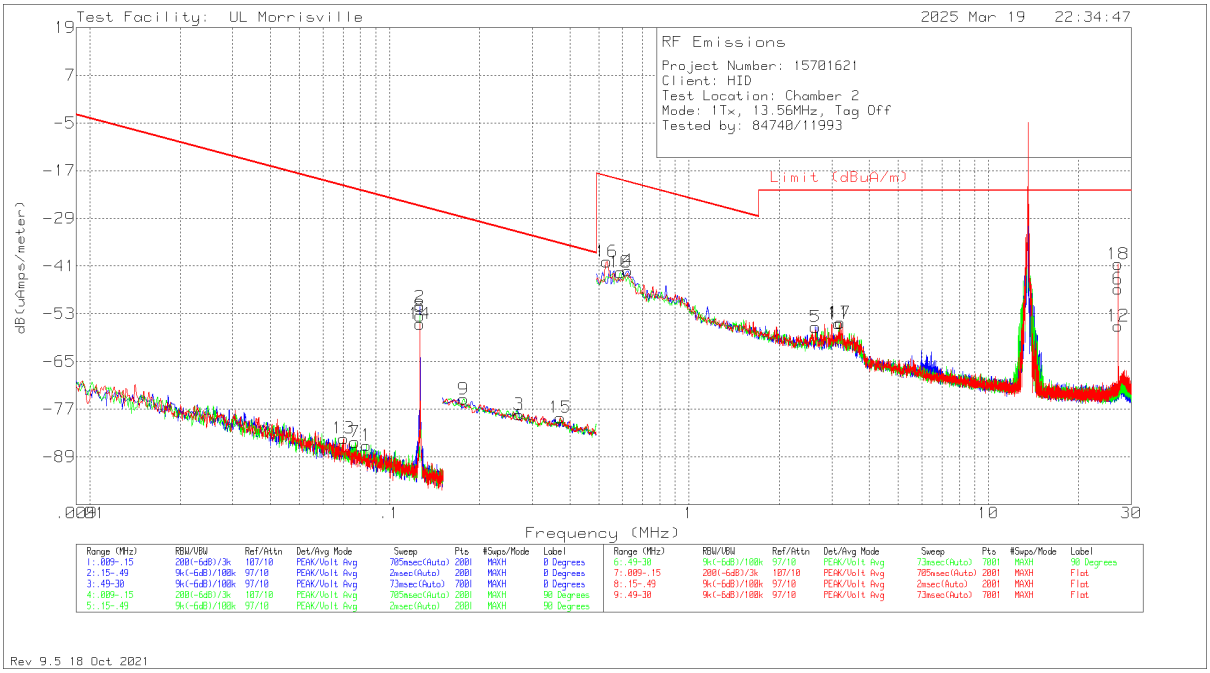
<30MHz SPURIOUS EMISSIONS

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	.07027	35.75	Pk	11.3	.1	-80	-32.85	30.67	50.67	-63.52	0-360	Flat
7	.07666	34.93	Pk	11.2	.1	-80	-33.77	29.91	49.91	-63.68	0-360	90 degs
1	.08383	34.09	Pk	11.2	.1	-80	-34.61	29.14	49.14	-63.75	0-360	0 degs
*2	.12636	69.18	Pk	11	.1	-80	-	-	-	-	0-360	0 degs
*8	.12636	66.91	Pk	11	.1	-80	-	-	-	-	0-360	90 degs
*14	.12636	64.86	Pk	11	.1	-80	-	-	-	-	0-360	Flat
9	.17678	45.9	Pk	11	.1	-80	-23	22.66	42.66	-45.66	0-360	90 degs
3	.27053	42.14	Pk	10.9	.1	-80	-26.86	18.96	38.96	-45.82	0-360	0 degs
15	.37194	41.36	Pk	10.9	.1	-80	-27.64	16.19	36.19	-43.83	0-360	Flat
16	.53216	40.5	Pk	11	.1	-40	11.6	33.08	-	-21.48	0-360	Flat
10	.59118	37.82	Pk	11	.1	-40	8.92	32.17	-	-23.25	0-360	90 degs
4	.62491	38.27	Pk	11	.1	-40	9.37	31.69	-	-22.32	0-360	0 degs
5	2.64438	23.87	Pk	11.1	.2	-40	-4.83	29.54	-	-34.37	0-360	0 degs
11	3.16294	24.65	Pk	11.1	.3	-40	-3.95	29.54	-	-33.49	0-360	90 degs
17	3.19667	24.87	Pk	11.1	.3	-40	-3.73	29.54	-	-33.27	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

* Indicates fundamental of 125kHz transmitter, not subject to test in this report.

SPURIOUS EMISSION – H FIELD (Worst Case Configuration)



<30MHz SPURIOUS EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	Limit (dBuA/m)	Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
13	.07027	35.75	Pk	-40.2	.1	-80	-84.35	-20.83	-0.83	-63.52	0-360	Flat
7	.07666	34.93	Pk	-40.3	.1	-80	-85.27	-21.59	-1.59	-63.68	0-360	90 degs
1	.08383	34.09	Pk	-40.3	.1	-80	-86.11	-22.36	-2.36	-63.75	0-360	0 degs
*2	.12636	69.18	Pk	-40.5	.1	-80	-	-	-	-	0-360	0 degs
*8	.12636	66.91	Pk	-40.5	.1	-80	-	-	-	-	0-360	90 degs
*14	.12636	64.86	Pk	-40.5	.1	-80	-	-	-	-	0-360	Flat
9	.17678	45.9	Pk	-40.5	.1	-80	-74.5	-28.84	-8.84	-45.66	0-360	90 degs
3	.27053	42.14	Pk	-40.6	.1	-80	-78.36	-32.54	-12.54	-45.82	0-360	0 degs
15	.37194	41.36	Pk	-40.6	.1	-80	-79.14	-35.31	-15.31	-43.83	0-360	Flat
16	.53216	40.5	Pk	-40.5	.1	-40	-39.9	-18.42	-	-21.48	0-360	Flat
10	.59118	37.82	Pk	-40.5	.1	-40	-42.58	-19.33	-	-23.25	0-360	90 degs
4	.62491	38.27	Pk	-40.5	.1	-40	-42.13	-19.81	-	-22.32	0-360	0 degs
5	2.64438	23.87	Pk	-40.4	.2	-40	-56.33	-21.96	-	-34.37	0-360	0 degs
11	3.16294	24.65	Pk	-40.4	.3	-40	-55.45	-21.96	-	-33.49	0-360	90 degs
17	3.19667	24.87	Pk	-40.4	.3	-40	-55.23	-21.96	-	-33.27	0-360	Flat
6	27.12247	36.23	Pk	-43.8	.8	-40	-46.77	-21.96	-	-24.81	0-360	0 degs
12	27.12247	26.94	Pk	-43.8	.8	-40	-56.06	-21.96	-	-34.1	0-360	90 degs
18	27.12247	42.49	Pk	-43.8	.8	-40	-40.51	-21.96	-	-18.55	0-360	Flat

Pk - Peak detector

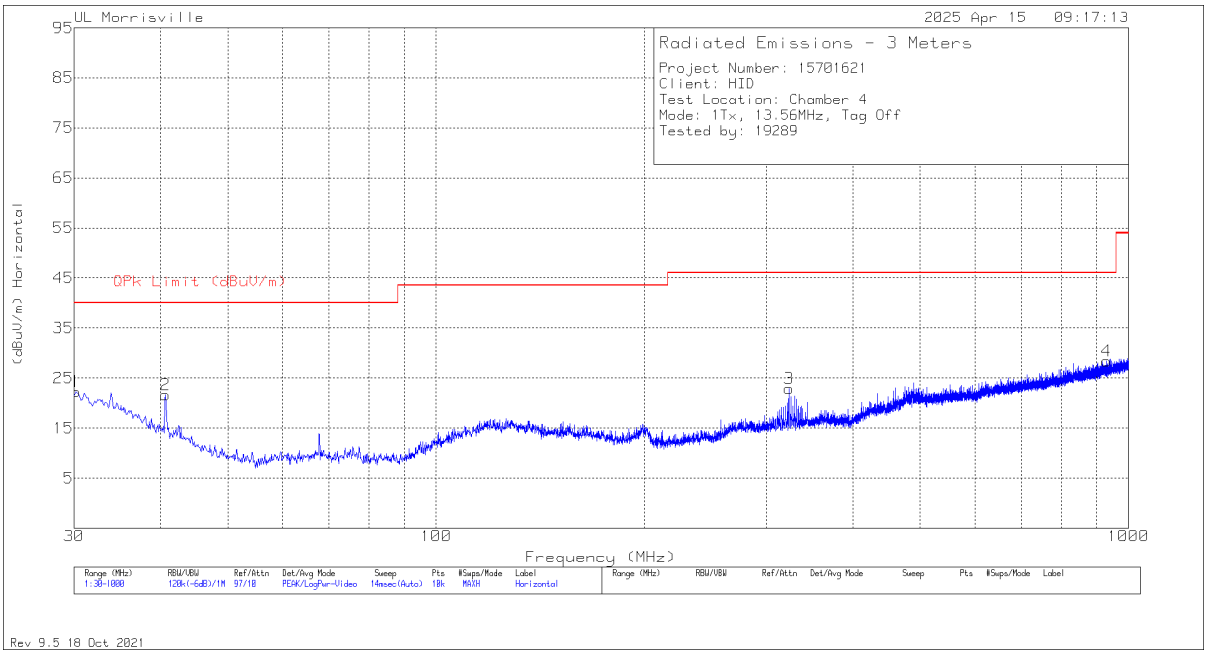
* Indicates fundamental of 125kHz transmitter, not subject to test in this report.

TX SPURIOUS EMISSION 30 TO 1000 MHz

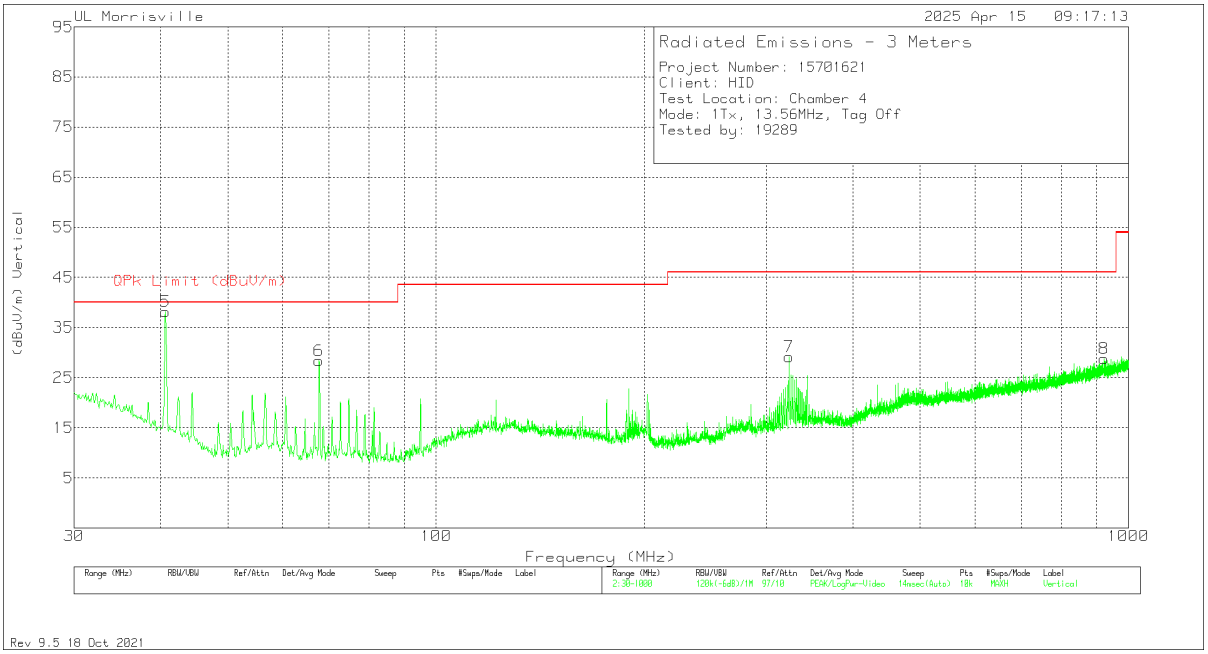
TYPE A, TAG OFF

9.3.

9.3.1.



HORIZONTAL



VERTICAL

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	30.194	27.56	Pk	26.8	-32.1	22.26	40	-17.74	0-360	100	H
2	40.67	34.16	Pk	19.5	-32	21.66	40	-18.34	0-360	100	H
5	40.68252	50.16	Qp	19.5	-32	37.66	40	-2.34	204	102	V
6	67.733	45.76	Pk	14.3	-31.7	28.36	40	-11.64	0-360	100	V
7	323.231	39.32	Pk	20	-30.2	29.12	46.02	-16.9	0-360	100	V
3	323.328	33.11	Pk	20	-30.2	22.91	46.02	-23.11	0-360	100	H
8	921.527	27.39	Pk	28.4	-27	28.79	46.02	-17.23	0-360	100	V
4	930.257	26.88	Pk	28.5	-27	28.38	46.02	-17.64	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 ±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 ±0.01% (±100 ppm).

TEST PROCEDURE

ANSI C63.10-2020 Clause 6.8

RESULTS

No non-compliance noted.

TYPE A, WITH NO TAG

10

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir. Temp	Frequency Deviation Measureed with Time Elapse								
(Vdc)	(ºC)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
12.00	50	13.5598090	1.806	13.5598066	1.980	13.5598024	2.292	13.5597987	2.561	± 100
12.00	40	13.5598191	1.060	13.5598164	1.261	13.5598135	1.469	13.5598104	1.704	± 100
12.00	30	13.5598781	-3.290	13.5598792	-3.372	13.5598675	-2.508	13.5598546	-1.558	± 100
12.00	***20***	***13.5598335***	***0.000***	***13.5598319***	***0.113***	***13.5598310***	***0.183***	***13.5598300***	***0.258***	***± 100***
12.00	10	13.5598665	-2.439	13.5598589	-1.873	13.5598853	-3.825	13.5598800	-3.431	± 100
12.00	0	13.5598714	-2.795	13.5598706	-2.737	13.5598694	-2.646	13.5598678	-2.534	± 100
12.00	-10	13.5598705	-2.732	13.5598742	-3.000	13.5598741	-2.997	13.5598743	-3.008	± 100
12.00	-20	13.5598713	-2.793	13.5598713	-2.788	13.5598717	-2.819	13.5598699	-2.689	± 100
13.20	20	13.5598297	0.280	13.5598299	0.266	13.5598294	0.302	13.5598286	0.357	± 100
10.2	20	13.55982848	0.368	13.55982875	0.348	13.55982876	0.348	13.55982876	0.348	± 100

Tested by: 33499/84740
Test date: 2025-03-19

Note: The highest supported voltage the EUT can safely support is 13.2 VDC, so all testing was completed with the highest extreme supported voltage of 13.2 VDC.

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)
RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	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.

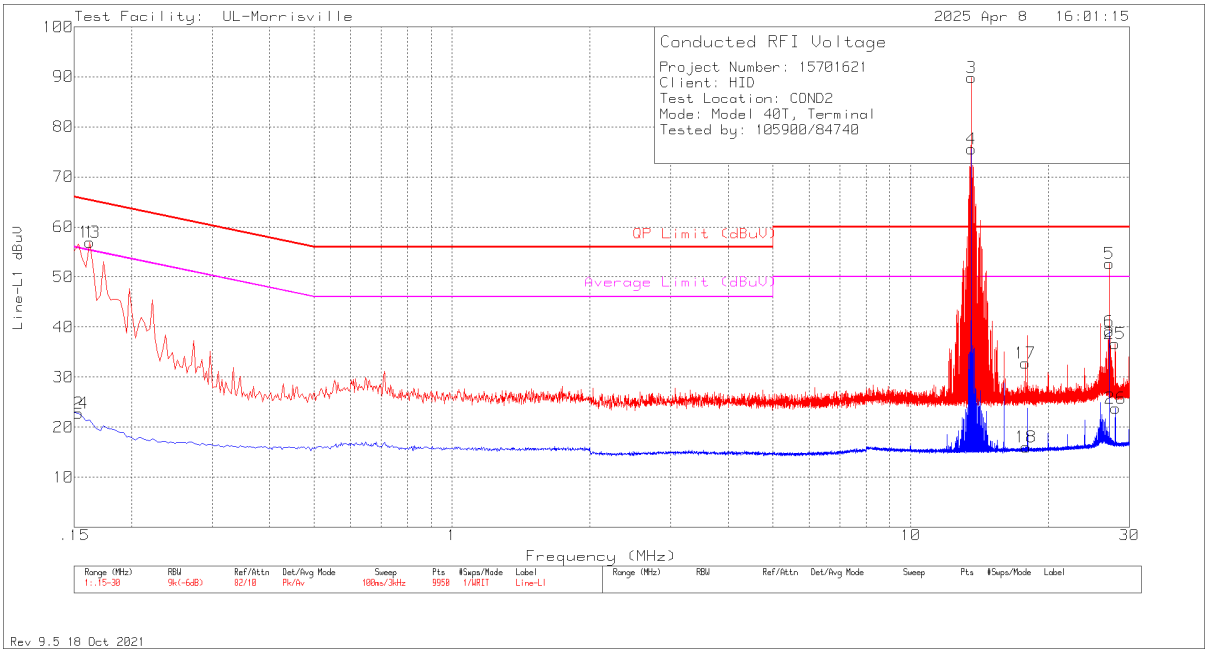
Line conducted data is recorded for both lines.

RESULTS

AC Mains Tag On

LINE 1 RESULTS

11.1.

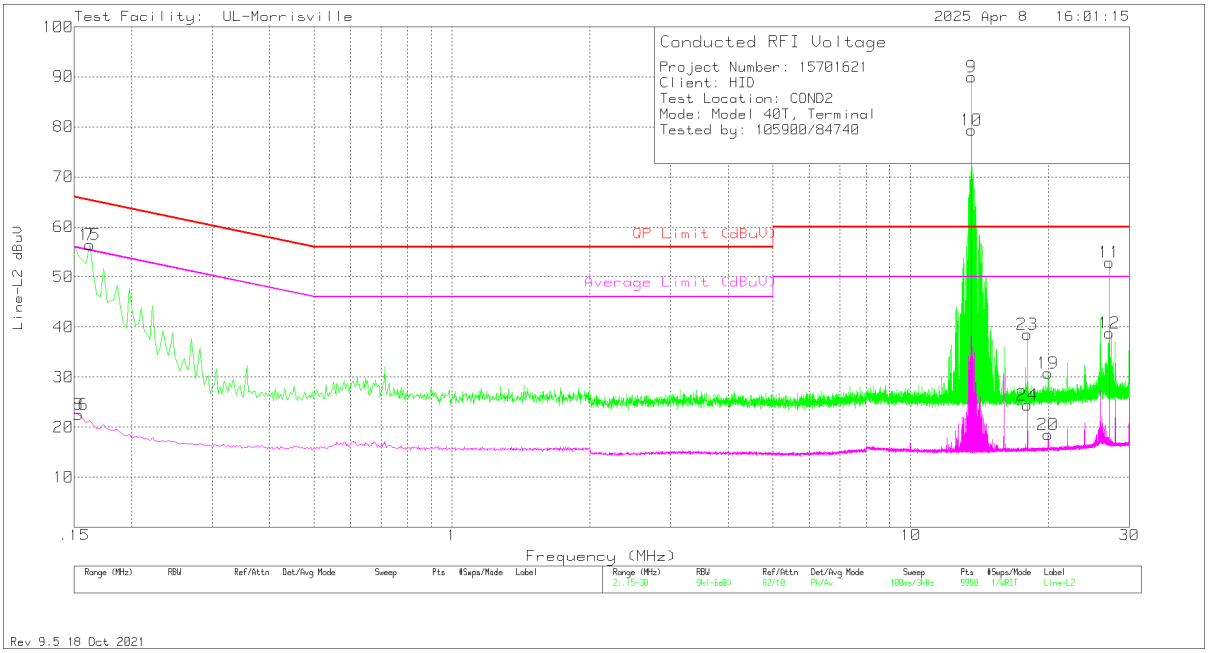


Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	171083 (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
2	.153	2.54	Av	.2	0	20	22.74	-	-	55.84	-33.1
14	.153	2.54	Av	.2	0	20	22.74	-	-	55.84	-33.1
1	.162	36.71	Pk	.2	0	20	56.91	65.36	-8.45	-	-
13	.162	36.71	Pk	.2	0	20	56.91	65.36	-8.45	-	-
3	13.55885	62.17	Qp	.1	.3	20	82.57	**60**	**22.57**	-	-
4	13.55942	58.7	Ca	.1	.3	20	79.1	-	-	**50**	**29.1**
17	17.802	12.34	Pk	.2	.3	20	32.84	60	-27.16	-	-
18	17.865	-4.46	Av	.2	.3	20	16.04	-	-	50	-33.96
5	27.12	31.86	Pk	.4	.4	20	52.66	60	-7.34	-	-
6	27.12	18.32	Av	.4	.4	20	39.12	-	-	50	-10.88
25	27.921	15.91	Pk	.4	.4	20	36.71	60	-23.29	-	-
26	27.99	3.02	Av	.4	.4	20	23.82	-	-	50	-26.18

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 11.3 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)
8	.153	2.36	Av	.2	0	20	22.56	-	-	55.84	-33.28
16	.153	2.36	Av	.2	0	20	22.56	-	-	55.84	-33.28
7	.162	36.25	Pk	.2	0	20	56.45	65.36	-8.91	-	-
15	.162	36.25	Pk	.2	0	20	56.45	65.36	-8.91	-	-
9	13.56061	59.26	Ca	.1	.3	20	79.66	-	-	**50**	**29.66**
10	13.56079	62.98	Qp	.1	.3	20	83.38	**60**	**23.38**	-	-
23	17.949	18.08	Pk	.2	.3	20	38.58	60	-21.42	-	-
24	17.949	3.87	Av	.2	.3	20	24.37	-	-	50	-25.63
19	19.947	10.09	Pk	.3	.4	20	30.79	60	-29.21	-	-
20	19.947	-2.23	Av	.3	.4	20	18.47	-	-	50	-31.53
11	27.12	32.19	Pk	.4	.4	20	52.99	60	-7.01	-	-
12	27.12	17.95	Av	.4	.4	20	38.75	-	-	50	-11.25

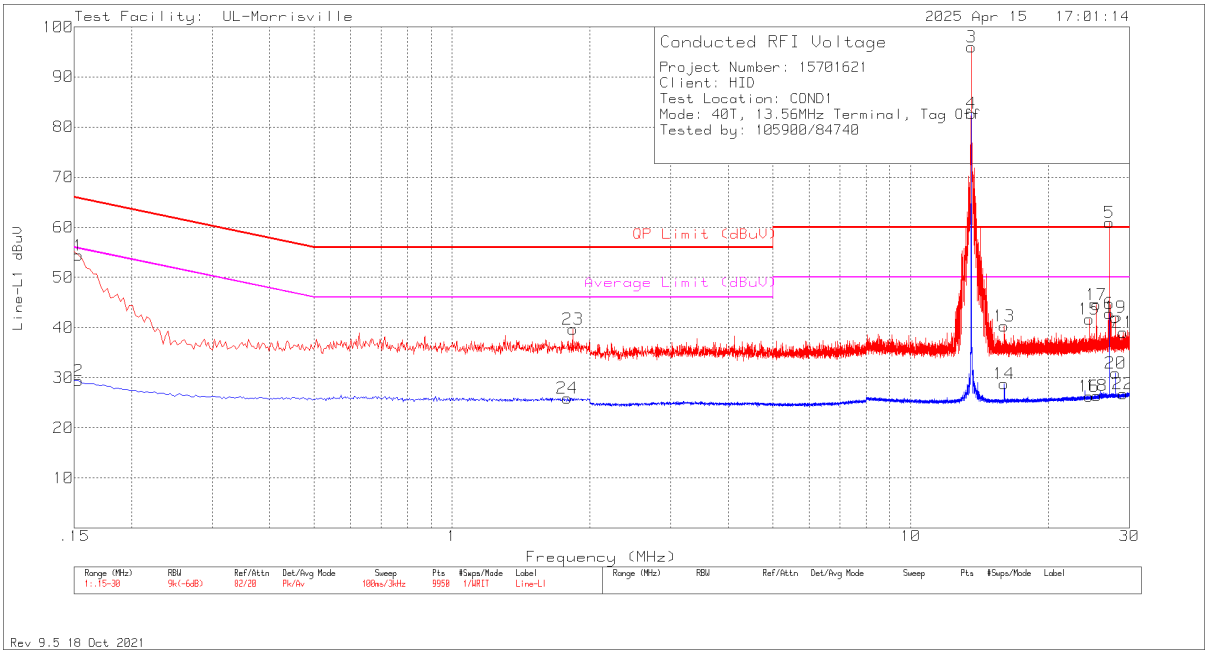
Pk - Peak detector; Av - Average detection;
Qp - Quasi-Peak detector; Ca - CISPR average detection

*Note: Markers 9 and 10 are the fundamentals of the device, and not spurious emissions. Section 11.3 shows compliance with an NFC/HF terminated sample.

AC Mains Tag Off

LINE 1 RESULTS

11.2.

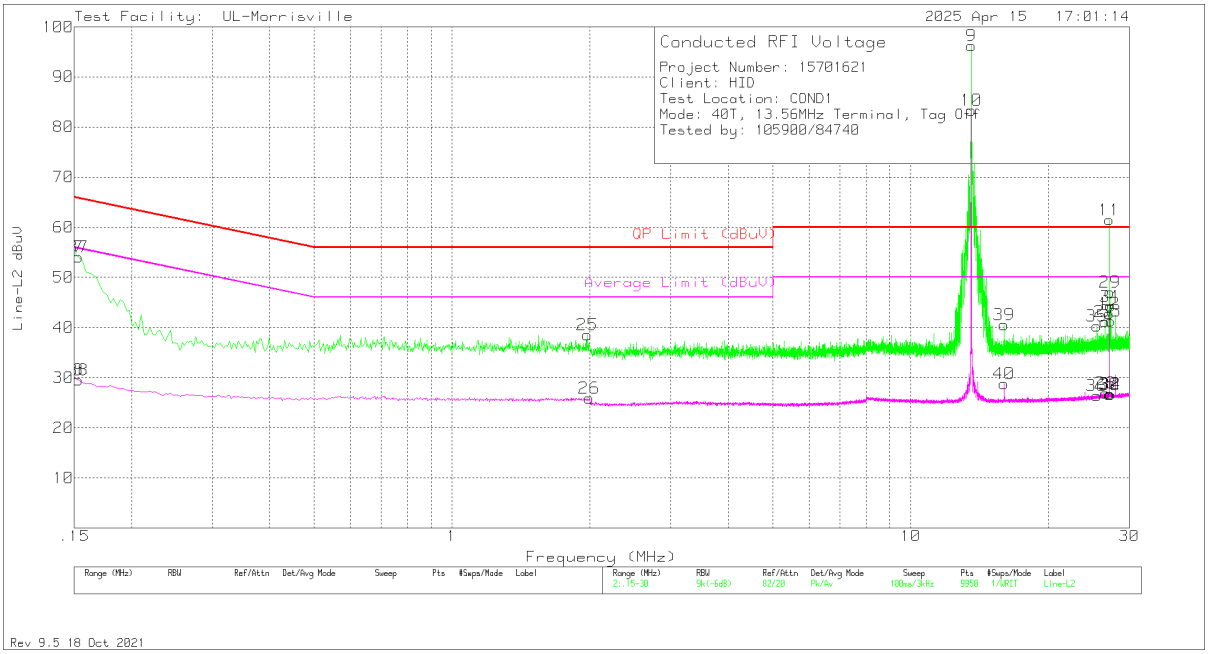


Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	171083 (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.153	34.19	Pk	.2	0	20	54.39	65.84	-11.45	-	-
2	.153	9.16	Av	.2	0	20	29.36	-	-	55.84	-26.48
24	1.782	5.85	Av	0	.1	20	25.95	-	-	46	-20.05
23	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	15.993	8.31	Av	.2	.3	20	28.81	-	-	50	-21.19
13	16.008	19.81	Pk	.2	.3	20	40.31	60	-19.69	-	-
16	24.483	5.58	Av	.3	.4	20	26.28	-	-	50	-23.72
15	24.528	21.02	Pk	.3	.4	20	41.72	60	-18.28	-	-
17	25.425	23.75	Pk	.4	.4	20	44.55	60	-15.45	-	-
18	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
19	27.999	21.21	Pk	.4	.4	20	42.01	60	-17.99	-	-
20	28.014	10.08	Av	.4	.4	20	30.88	-	-	50	-19.12
21	29.043	18.11	Pk	.5	.4	20	39.01	60	-20.99	-	-
22	29.055	5.88	Av	.5	.4	20	26.78	-	-	50	-23.22

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 11.3 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
37	.153	33.9	Pk	.2	0	20	54.1	65.84	-11.74	-	-
38	.153	9.36	Av	.2	0	20	29.56	-	-	55.84	-26.28
25	1.971	18.45	Pk	0	.1	20	38.55	56	-17.45	-	-
26	1.992	5.83	Av	0	.1	20	25.93	-	-	46	-20.07
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**
39	15.99	20	Pk	.2	.3	20	40.5	60	-19.5	-	-
40	16.002	8.29	Av	.2	.3	20	28.79	-	-	50	-21.21
36	25.452	5.58	Av	.4	.4	20	26.38	-	-	50	-23.62
35	25.476	19.45	Pk	.4	.4	20	40.25	60	-19.75	-	-
27	26.541	20.35	Pk	.4	.4	20	41.15	60	-18.85	-	-
28	26.619	6.11	Av	.4	.4	20	26.91	-	-	50	-23.09
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
30	27.153	5.88	Av	.4	.4	20	26.68	-	-	50	-23.32
29	27.174	26.3	Pk	.4	.4	20	47.1	60	-12.9	-	-
32	27.246	5.98	Av	.4	.4	20	26.78	-	-	50	-23.22
31	27.264	23.44	Pk	.4	.4	20	44.24	60	-15.76	-	-
34	27.3	5.81	Av	.4	.4	20	26.61	-	-	50	-23.39
33	27.333	20.54	Pk	.4	.4	20	41.34	60	-18.66	-	-

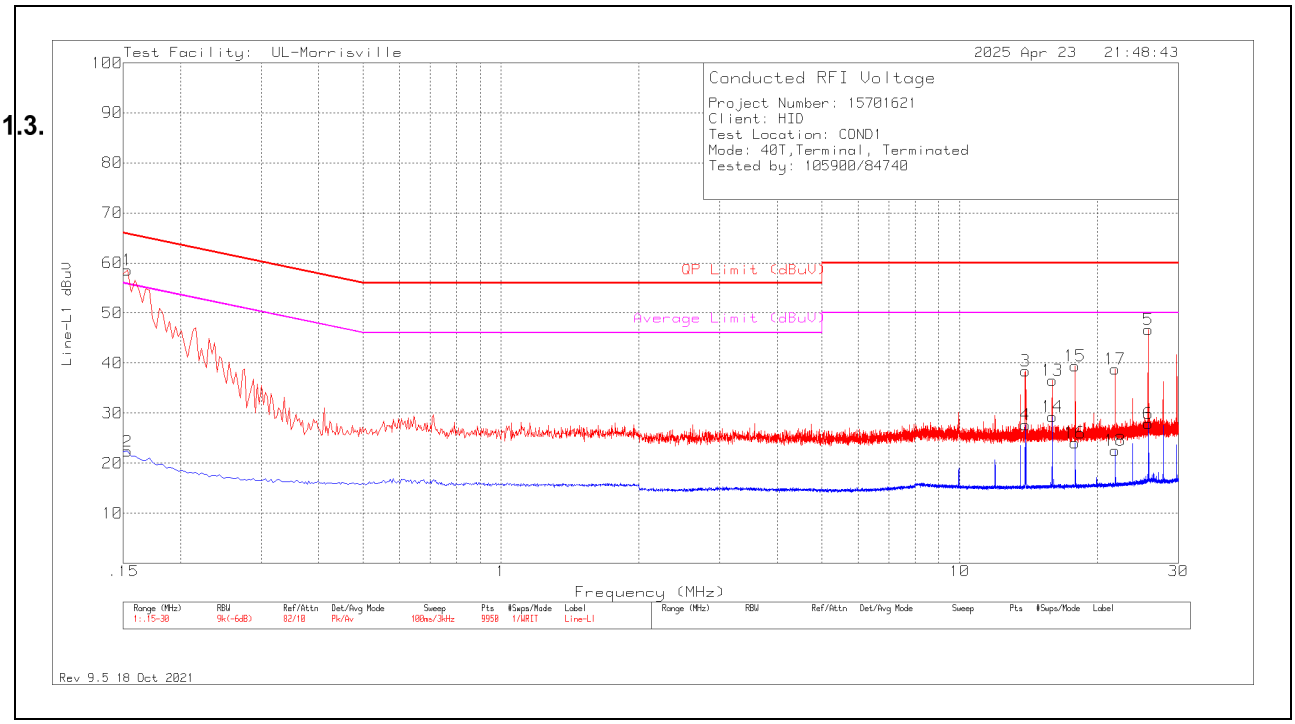
Pk - Peak detector; Av - Average detection;
Qp - Quasi-Peak detector; Ca - CISPR average detection

*Note: Markers 9 and 10 are the fundamentals of the device, and not spurious emissions. Section 11.3 shows compliance with an NFC/HF terminated sample.

NFC/HF Terminated Sample

LINE 1 RESULTS

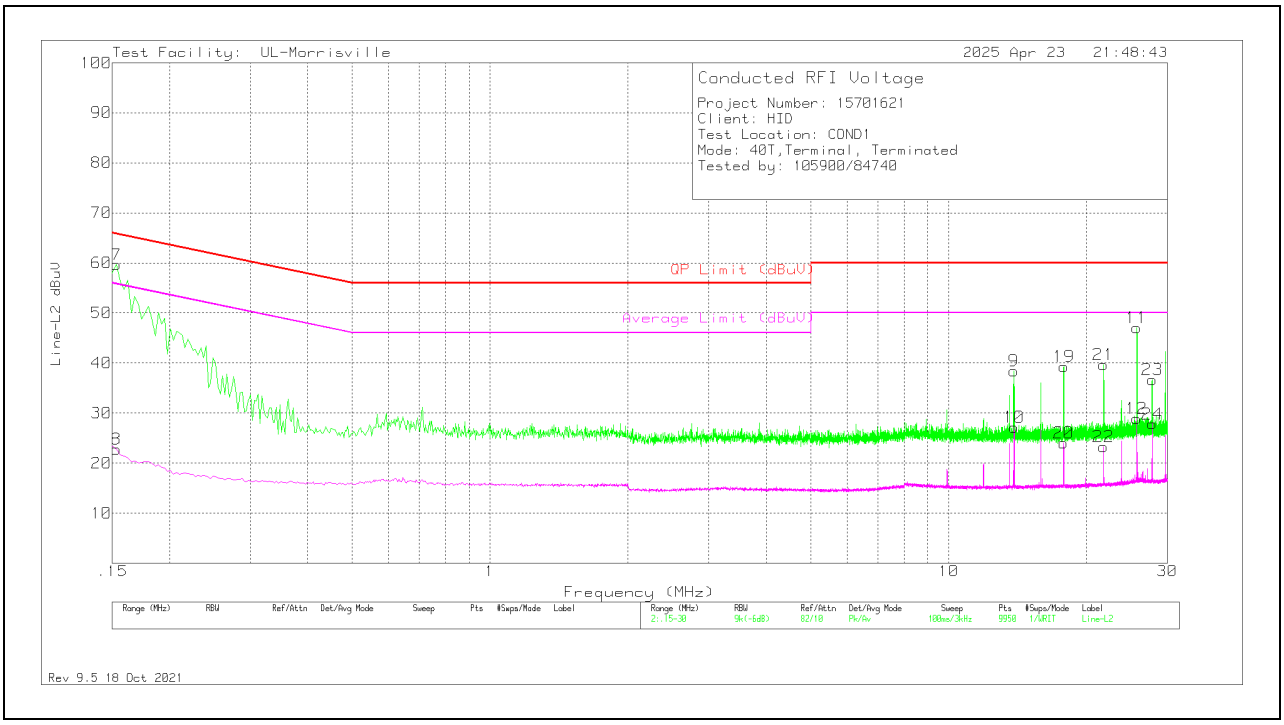
11.3.



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;

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;

12. SETUP PHOTOS

Please refer to R15701621-EP2e for setup photos

END OF TEST REPORT