TEST REPORT

Report Number: R15701621-E2a

Applicant	:	HID Global Corporation 611 Center Ridge Dr Austin, TX 78753 USA
Model	:	20V2
FCC ID	:	JQ6-SIGNO20V2
IC	:	2236B-SIGNO20V2
EUT Description	:	Smartcard 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:
2025-06-24

Prepared by:
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CERT #0751.06

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2025-05-29	Initial Issue	Noah Bennett
V2	2025-06-24	Revised Section 6.4 and Section 11 to Revise Worst-Case Exploration	Charles Moody

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: Smartcard Reader

MODEL: 20V2

SERIAL NUMBER: FL0P0U0075WO20TKF8087

SAMPLE RECEIPT DATE: 2025-03-10

DATE TESTED: 2025-03-12 thru 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:

Brian Kiewra
Project Engineer
Consumer, Medical and IT Segment
UL LLC

Prepared By:

Noah Bennett
Engineer Project Associate
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 correctly integrating customer-provided data with measurements performed by UL LLC. Below is a list of the data provided by the customer:

1) Cable loss (section 9)
2) Supported Data-Rates and Power Settings. Orientation of Operation (Section 6.4)
3) 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

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 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..

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.		

This report covers the full testing of the 13.56MHz NFC/HF radio.

6.2. MAXIMUM ELECTRIC FIELD STRENGTH

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

Fundamental Frequency (MHz)	E-Field (dBuV/m)	Mode
13.56	43.26	Tag Off

6.3. SOFTWARE AND FIRMWARE

EUT FW Version: 10.1

EUT HW Version: Rev H

6.4. WORST-CASE CONFIGURATION AND MODE

The EUT is only meant to be installed in one orientation during normal operation. Therefore, radiated tests were done in that orientation only. Additionally, 2 Configurations of power cables, (1) “Pigtail” and (2) “Terminal” were investigated. It was found that (2) “Terminal” was worst-case. Therefore, testing was done using that cable.

The EUT is meant to be powered via an auxiliary device that does not come with the product. Therefore, for AC Lines, the scan was run using a DC power supply as representative. A terminated sample was used for AC Lines.

The worst-case between Tag On configuration and Tag Off configuration was found by measuring the highest fundamental E-Field during pre-testing. It was found that Tag On was worst-case configuration. Therefore, radiated testing was done in Tag On orientation only. The worst-case data rate as provided by the manufacturer as tested was Type A 106 Kbps.

6.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	Yoga 7 16IAP7	PF49WDF9	-
Laptop	Lenovo	T14 Gen3	PF4FKW01	-
Laptop Charger	Lenovo	ADLX65YLC2D	8ssa10R16920L1CZ35T1VXJ	-
USB to Type C cable	ANKER	-	-	-
Laptop	Lenovo	IdeaPad Flex 5 14IAU7	PW0DWR8R	TX2-RTL8852BE

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC	1	Barrel	Unshielded	<3m	Used to connect EUT to DC Power Supply.
2	1	1	Type C	Unshielded	<6m	Programing cable

SETUP DIAGRAM

Please refer to R15701621-EP1a 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 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
	30-1000 MHz				
159203	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-03-05	2026-03-05
	Gain-Loss Chains				
91975	Gain-loss string: 0.009-30MHz	Various	Various	2024-05-10	2025-05-10
91978	Gain-loss string: 25-1000MHz	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: At the time of testing, all equipment was in calibration.

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	2025-04-30
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)		

Test Equipment Used - Wireless Conducted Measurement Equipment

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
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
-	DC Power Supply	Keysight Technologies	E3633A	-	-
SOFTEMI	Antenna Port Software	UL	Version 2024.2.23	NA	NA

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.

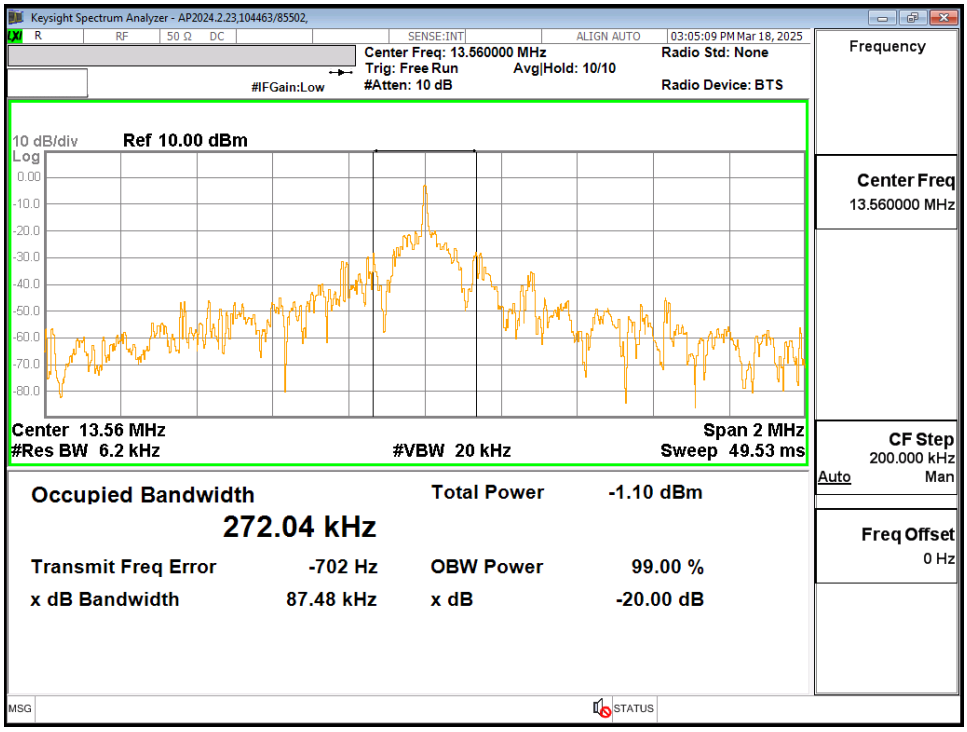
RESULTS

Mode	Frequency (MHz)	20dB Bandwidth* (kHz)	99% Bandwidth (kHz)
Type A (Tag Off)	13.56	98.92	387.14
Type A (Tag On)	13.56	87.48	272.04

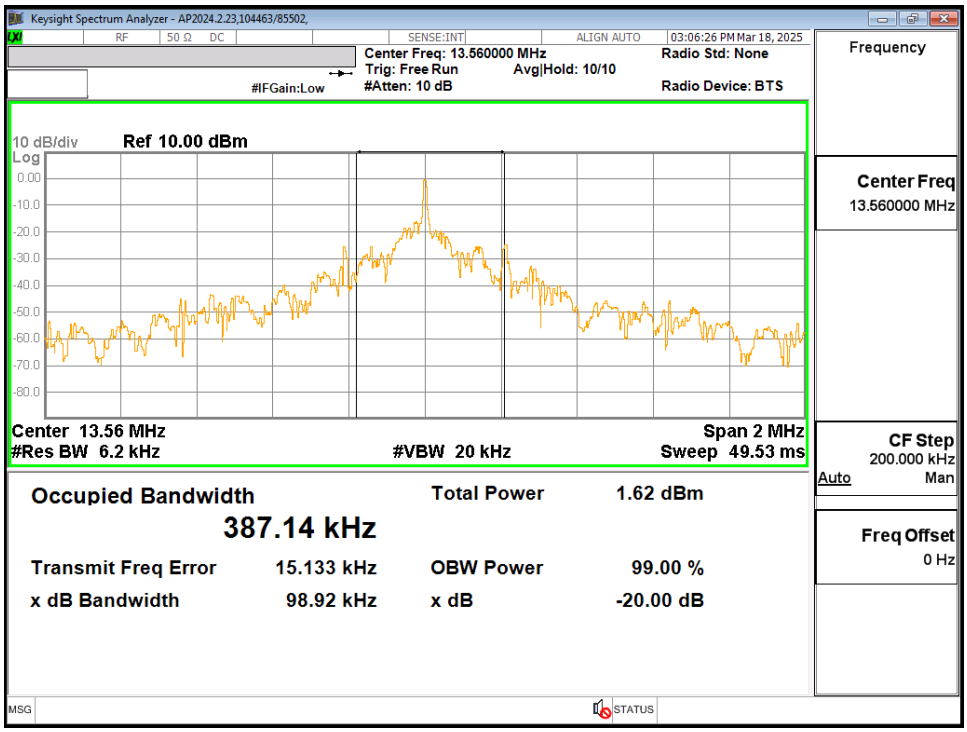
***Note:**

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.

8.1. Type A



Tag On – 99%



Tag Off – 99%

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 <30MHz 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 10^{th} harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater.

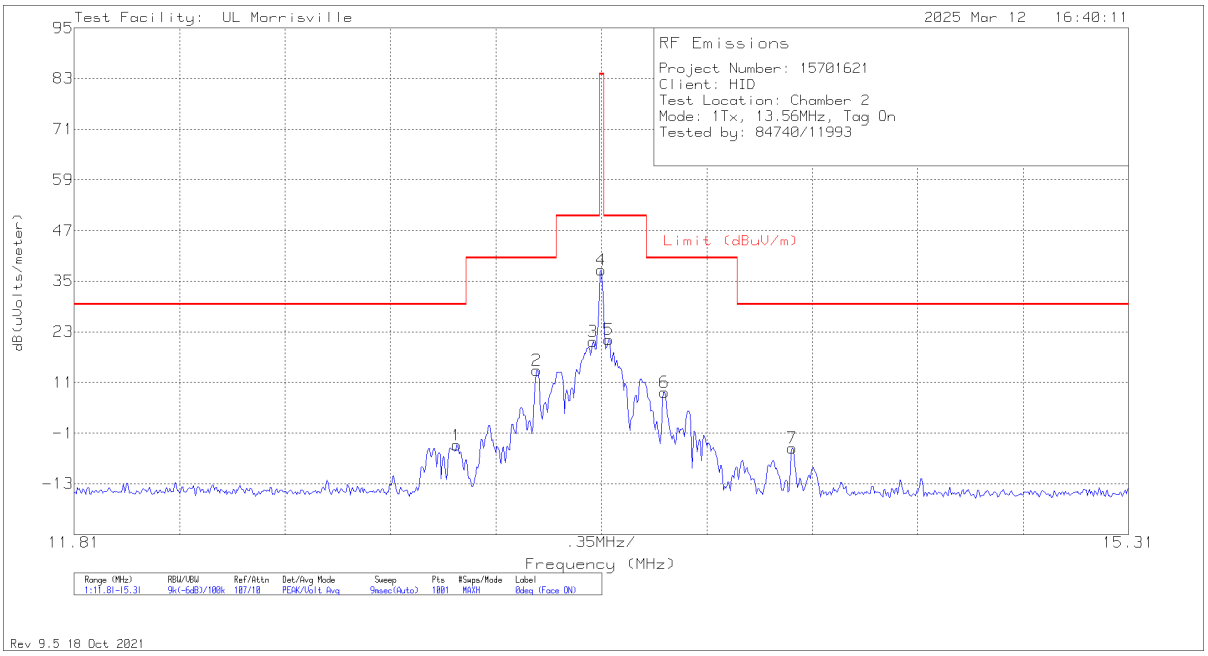
Note: For all Below 30MHz test data, all measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious 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

9.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (<30MHz)

9.2.1. TYPE A, TAG ON

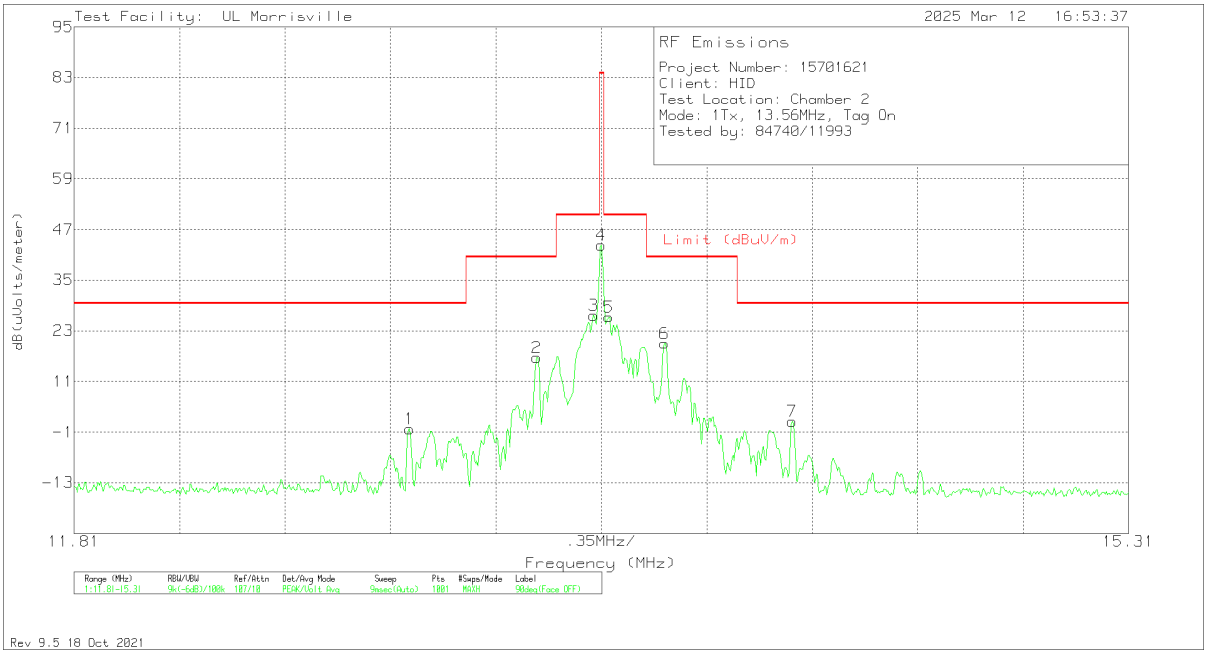
FUNDAMENTAL



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)	Height (cm)	Loop Angle
1	13.0805	25.73	Pk	9.8	.6	-40	-3.87	29.5	-33.37	11	100	0 degs
2	13.3465	43.43	Pk	9.8	.6	-40	13.83	40.5	-26.67	11	100	0 degs
3	13.532	50.29	Pk	9.8	.6	-40	20.69	50.5	-29.81	11	100	0 degs
4	13.56	67.22	Pk	9.8	.6	-40	37.62	84	-46.38	11	100	0 degs
5	13.5845	50.78	Pk	9.8	.6	-40	21.18	50.5	-29.32	11	100	0 degs
6	13.77	38.4	Pk	9.7	.6	-40	8.7	40.5	-31.8	11	100	0 degs
7	14.1935	25.15	Pk	9.7	.6	-40	-4.55	29.5	-34.05	11	100	0 degs

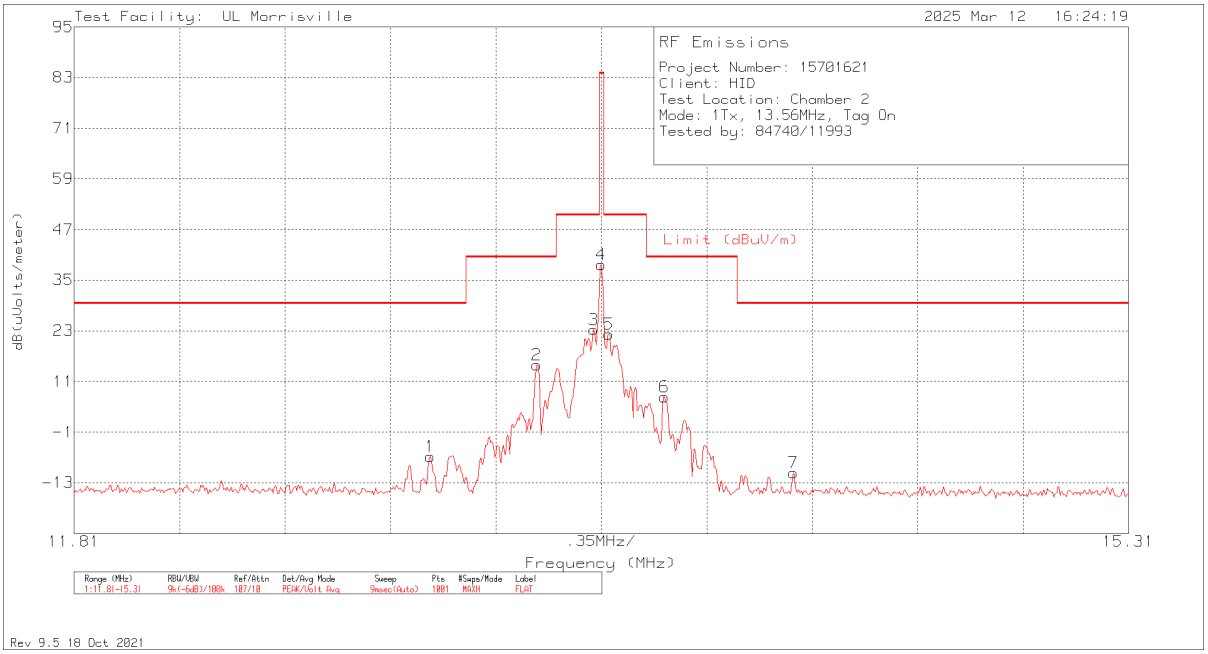
Pk - Peak detector



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)	Height (cm)	Loop Angle
1	12.923	29.36	Pk	9.8	.6	-40	-.24	29.5	-29.74	94	100	90 degs
2	13.3465	46.24	Pk	9.8	.6	-40	16.64	40.5	-23.86	94	100	90 degs
3	13.5355	56.3	Pk	9.8	.6	-40	26.7	50.5	-23.8	94	100	90 degs
4	13.56	72.86	Pk	9.8	.6	-40	43.26	84	-40.74	94	100	90 degs
5	13.5845	55.88	Pk	9.8	.6	-40	26.28	50.5	-24.22	94	100	90 degs
6	13.77	49.74	Pk	9.7	.6	-40	20.04	40.5	-20.46	94	100	90 degs
7	14.1935	31.23	Pk	9.7	.6	-40	1.53	29.5	-27.97	94	100	90 degs

Pk - Peak detector

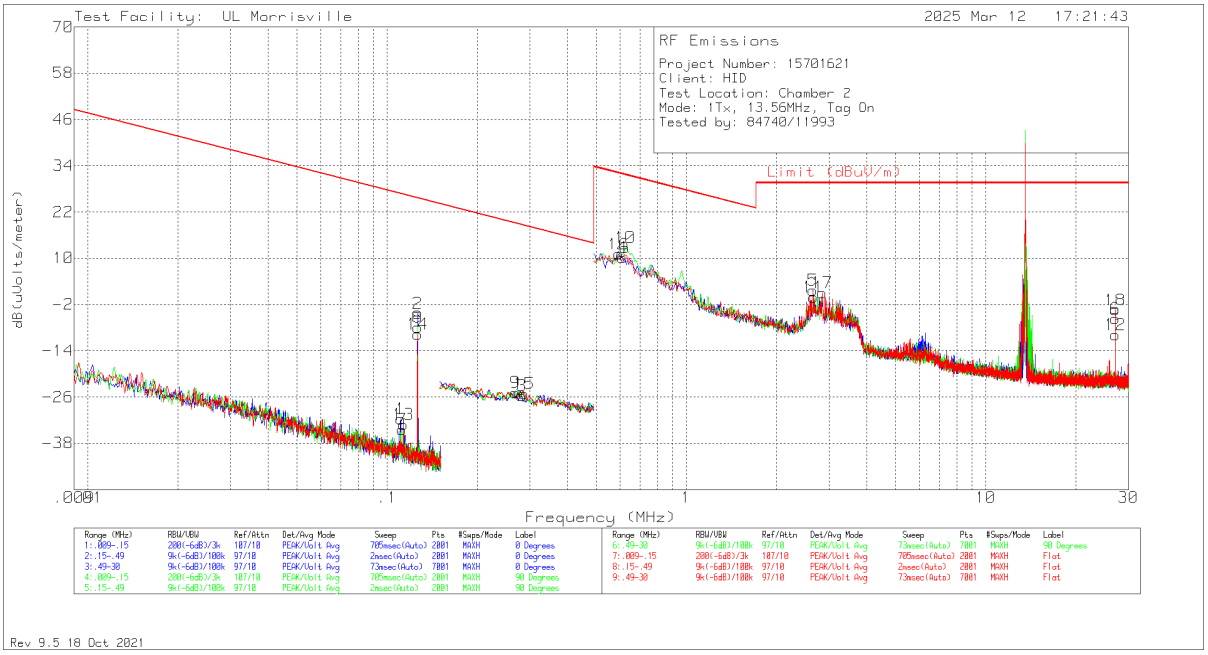


ANTENNA FACE FLAT

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)	Height (cm)	Loop Angle
1	12.993	22.82	Pk	9.8	.6	-40	-6.78	29.5	-36.28	340	100	Flat
2	13.3465	44.5	Pk	9.8	.6	-40	14.9	40.5	-25.6	340	100	Flat
3	13.5355	52.91	Pk	9.8	.6	-40	23.31	50.5	-27.19	340	100	Flat
4	13.56	68.31	Pk	9.8	.6	-40	38.71	84	-45.29	340	100	Flat
5	13.5845	51.83	Pk	9.8	.6	-40	22.23	50.5	-28.27	340	100	Flat
6	13.77	37.02	Pk	9.7	.6	-40	7.32	40.5	-33.18	340	100	Flat
7	14.197	19.03	Pk	9.7	.6	-40	-10.67	29.5	-40.17	340	100	Flat

Pk - Peak detector

SPURIOUS EMISSION – E FIELD (Worst Case Configuration)



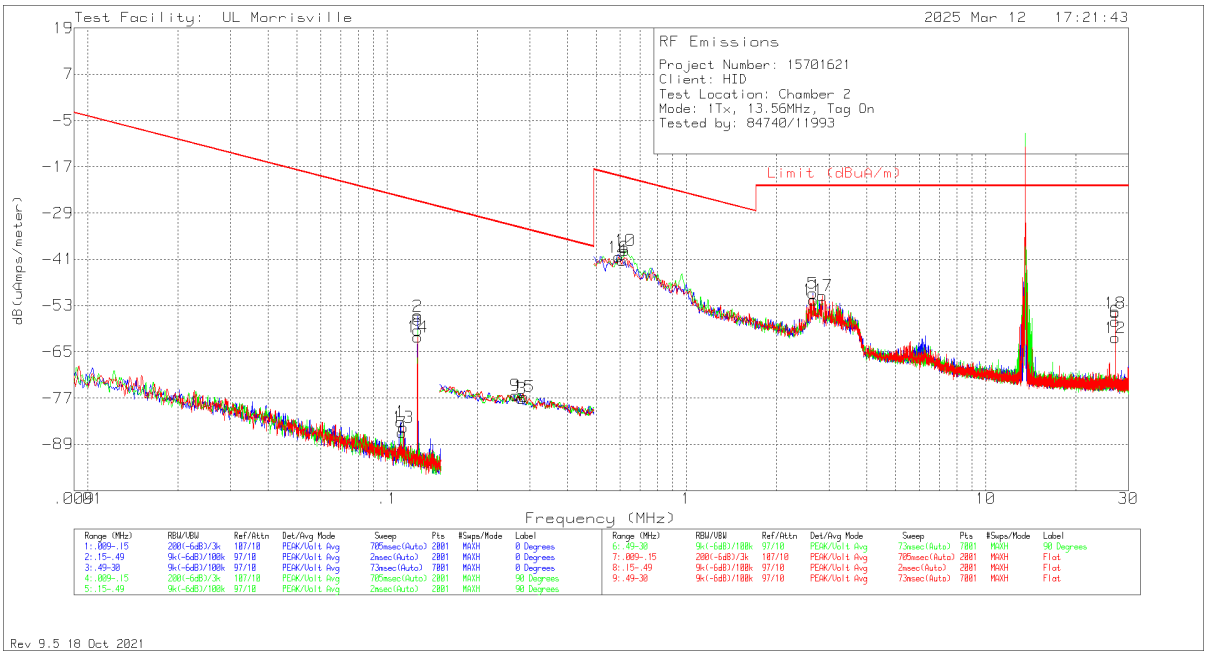
<30MHz SPURIOUS EMISSIONS

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
1	.11089	37.11	Pk	11.1	.1	-80	-31.69	26.71	46.71	-58.4	0-360	0 degs
7	.11209	34.31	Pk	11.1	.1	-80	-34.49	26.61	46.61	-61.1	0-360	90 degs
13	.11344	35.72	Pk	11.1	.1	-80	-33.08	26.51	46.51	-59.59	0-360	Flat
2*	.12636	64.57	Pk	11	.1	-80	-	-	-	-29.9	0-360	0 degs
8*	.12636	60.95	Pk	11	.1	-80	-	-	-	-33.52	0-360	90 degs
14*	.12636	59.17	Pk	11	.1	-80	-	-	-	-35.3	0-360	Flat
9	.26781	44.2	Pk	10.9	.1	-80	-24.8	19.05	39.05	-43.85	0-360	90 degs
3	.28158	43.34	Pk	10.9	.1	-80	-25.66	18.61	38.61	-44.27	0-360	0 degs
15	.2877	43.82	Pk	10.9	.1	-80	-25.18	18.43	38.43	-43.61	0-360	Flat
16	.5954	39.95	Pk	11	.1	-40	11.05	32.11	-	-21.06	0-360	Flat
4	.61226	39.09	Pk	11	.1	-40	10.19	31.87	-	-21.68	0-360	0 degs
10	.62491	41.61	Pk	11	.1	-40	12.71	31.69	-	-18.98	0-360	90 degs
5	2.64859	30.33	Pk	11.1	.2	-40	1.63	29.54	-	-27.91	0-360	0 degs
11	2.65281	28.57	Pk	11.1	.2	-40	-.13	29.54	-	-29.67	0-360	90 degs
17	2.83831	29.73	Pk	11.1	.2	-40	1.03	29.54	-	-28.51	0-360	Flat
6	27.12247	25.82	Pk	7.7	.8	-40	-5.68	29.54	-	-35.22	0-360	0 degs
12	27.12247	21.57	Pk	7.7	.8	-40	-9.93	29.54	-	-39.47	0-360	90 degs
18	27.12247	28.07	Pk	7.7	.8	-40	-3.43	29.54	-	-32.97	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)



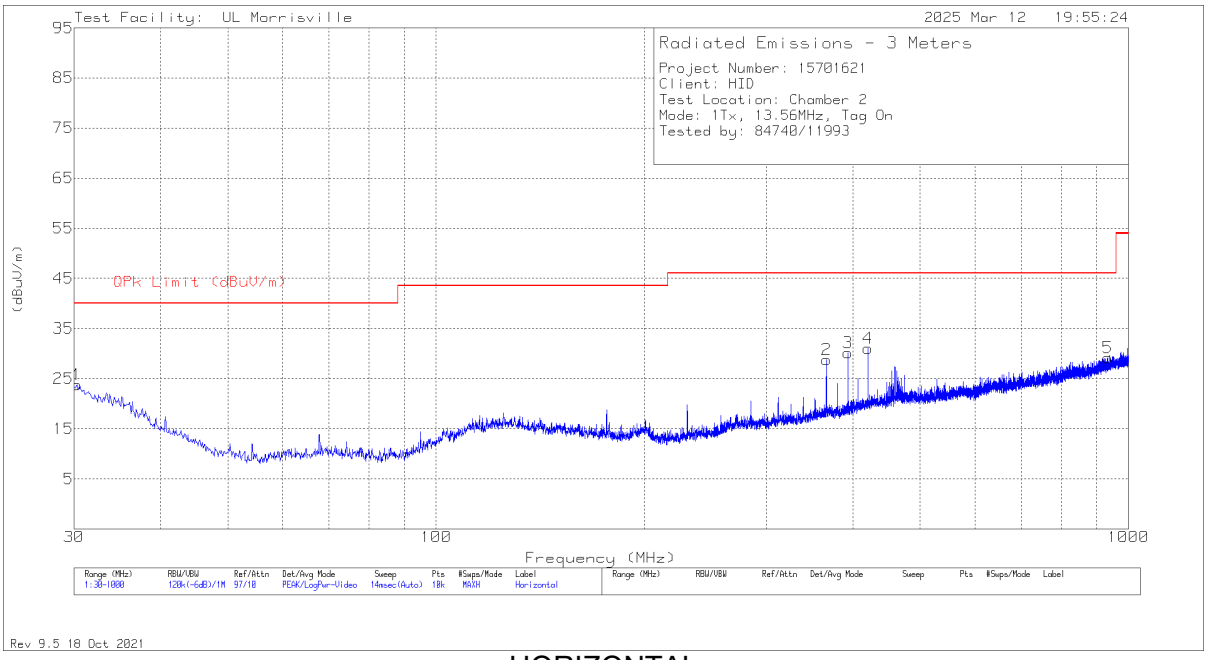
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	.11089	37.11	Pk	-40.4	.1	-80	-83.19	-24.79	-4.79	-58.4	0-360	0 degs
7	.11209	34.31	Pk	-40.4	.1	-80	-85.99	-24.89	-4.89	-61.1	0-360	90 degs
13	.11344	35.72	Pk	-40.4	.1	-80	-84.58	-24.99	-4.99	-59.59	0-360	Flat
2*	.12636	64.57	Pk	-40.5	.1	-80	-	-	-	-29.9	0-360	0 degs
8*	.12636	60.95	Pk	-40.5	.1	-80	-	-	-	-33.52	0-360	90 degs
14*	.12636	59.17	Pk	-40.5	.1	-80	-	-	-	-35.3	0-360	Flat
9	.26781	44.2	Pk	-40.6	.1	-80	-76.3	-32.45	-12.45	-43.85	0-360	90 degs
3	.28158	43.34	Pk	-40.6	.1	-80	-77.16	-32.89	-12.89	-44.27	0-360	0 degs
15	.2877	43.82	Pk	-40.6	.1	-80	-76.68	-33.07	-13.07	-43.61	0-360	Flat
16	.5954	39.95	Pk	-40.5	.1	-40	-40.45	-19.39	-	-21.06	0-360	Flat
4	.61226	39.09	Pk	-40.5	.1	-40	-41.31	-19.63	-	-21.68	0-360	0 degs
10	.62491	41.61	Pk	-40.5	.1	-40	-38.79	-19.81	-	-18.98	0-360	90 degs
5	2.64859	30.33	Pk	-40.4	.2	-40	-49.87	-21.96	-	-27.91	0-360	0 degs
11	2.65281	28.57	Pk	-40.4	.2	-40	-51.63	-21.96	-	-29.67	0-360	90 degs
17	2.83831	29.73	Pk	-40.4	.2	-40	-50.47	-21.96	-	-28.51	0-360	Flat
6	27.12247	25.82	Pk	-43.8	.8	-40	-57.18	-21.96	-	-35.22	0-360	0 degs
12	27.12247	21.57	Pk	-43.8	.8	-40	-61.43	-21.96	-	-39.47	0-360	90 degs
18	27.12247	28.07	Pk	-43.8	.8	-40	-54.93	-21.96	-	-32.97	0-360	Flat

Pk - Peak detector

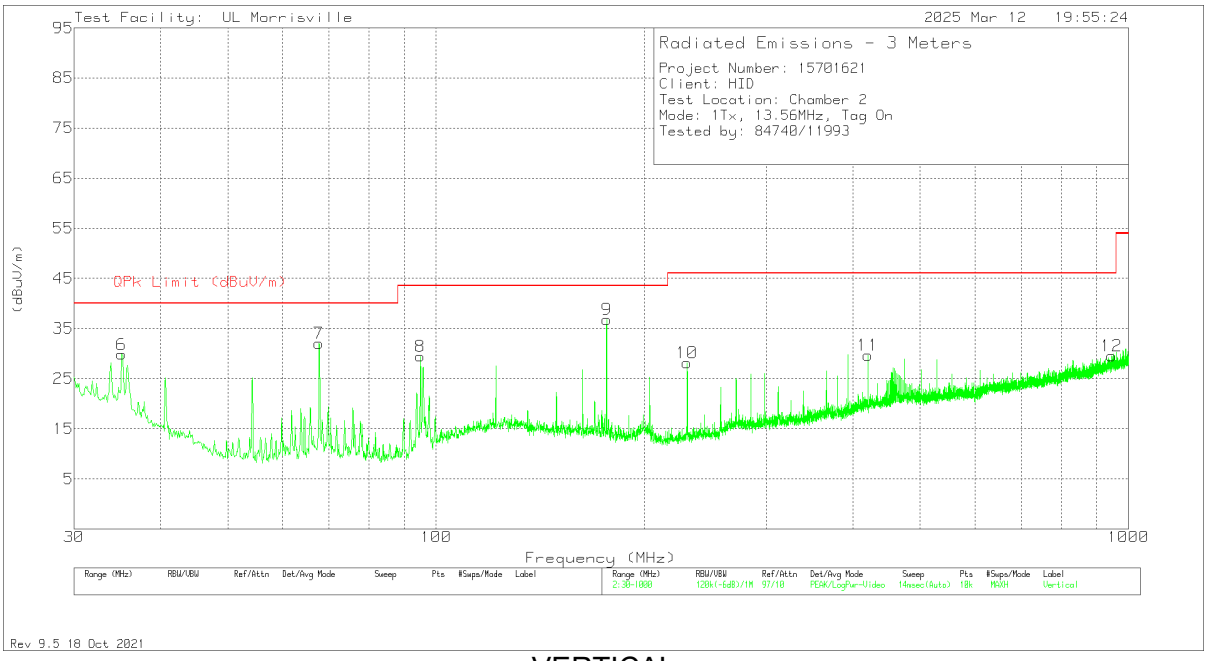
* Indicates fundamental of 125kHz transmitter, not subject to test in this report.

9.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

9.3.1. TYPE A, TAG ON



HORIZONTAL



VERTICAL

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	159203 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.291	28.28	Pk	27.2	-31.7	23.78	40	-16.22	0-360	399	H
6	35.141	37.65	Pk	23.8	-31.6	29.85	40	-10.15	0-360	101	V
7	67.733	48.64	Pk	14.6	-31.2	32.04	40	-7.96	0-360	101	V
8	94.893	44.97	Pk	15.4	-30.9	29.47	43.52	-14.05	0-360	101	V
9	176.276	49.06	Pk	17.9	-30.2	36.76	43.52	-6.76	0-360	101	V
10	230.499	40.23	Pk	17.6	-29.7	28.13	46.02	-17.89	0-360	101	V
2	366.105	36.43	Pk	21.5	-29.1	28.83	46.02	-17.19	0-360	199	H
3	393.265	37.22	Pk	21.8	-28.9	30.12	46.02	-15.9	0-360	100	H
4	420.328	37.04	Pk	22.8	-28.8	31.04	46.02	-14.98	0-360	100	H
11	420.328	35.71	Pk	22.8	-28.8	29.71	46.02	-16.31	0-360	101	V
5	934.137	25.43	Pk	29.5	-25.8	29.13	46.02	-16.89	0-360	199	H
12	946.068	25.63	Pk	29.5	-25.6	29.53	46.02	-16.49	0-360	299	V

Pk - 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.

10.1. TYPE A, WITH TAG

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	13.5598030	3.867	13.5598017	3.958	13.5598008	4.022	13.5598003	4.064	± 100
12.00	40	13.5598254	2.209	13.5598207	2.555	13.5598168	2.848	13.5598137	3.076	± 100
12.00	30	13.5598424	0.960	13.5598390	1.212	13.5598368	1.371	13.5598346	1.534	± 100
12.00	***20***	***13.5598554***	***0.000***	***13.5598505***	***0.364***	***13.5598504***	***0.370***	***13.5598505***	***0.362***	***± 100***
12.00	10	13.5598642	-0.653	13.5598670	-0.860	13.5598701	-1.085	13.5598725	-1.263	± 100
12.00	0	13.5598912	-2.643	13.5598913	-2.646	13.5598914	-2.654	13.5598915	-2.663	± 100
12.00	-10	13.5598943	-2.867	13.5598952	-2.933	13.5598952	-2.936	13.5598947	-2.898	± 100
12.00	-20	13.5598824	-1.989	13.5598798	-1.804	13.5598781	-1.675	13.5598760	-1.521	± 100
10.20	20	13.5598418	1.001	13.5598408	1.075	13.559839	1.208	13.5598384	1.252	± 100
13.2	20	13.55984616	0.680	13.55984211	0.978	13.55984207	0.982	13.55983552	1.464	± 100

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

Note: EUT was tested at the highest extreme supported voltage of 13.2VDC, or 12VDC*110%.

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.

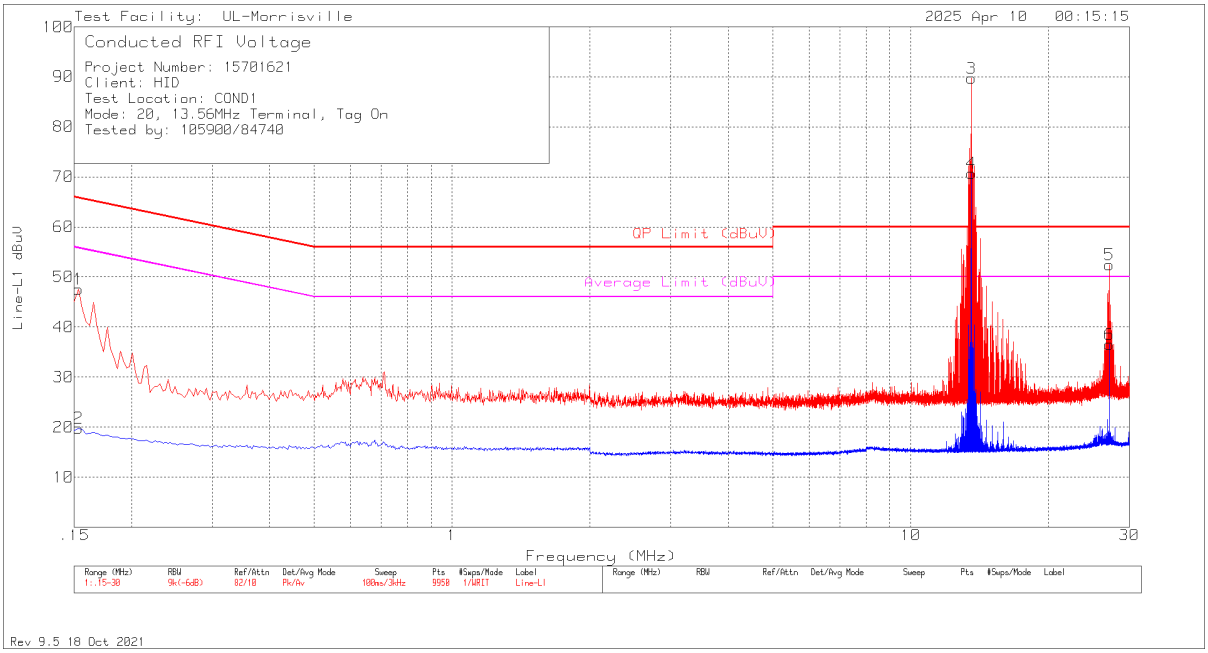
Line conducted data is recorded for both lines.

RESULTS

Note: Both *Pigtail* and *Terminal* Input power cables were tested and reported.

11.1. AC Mains Tag ON

LINE 1 RESULTS

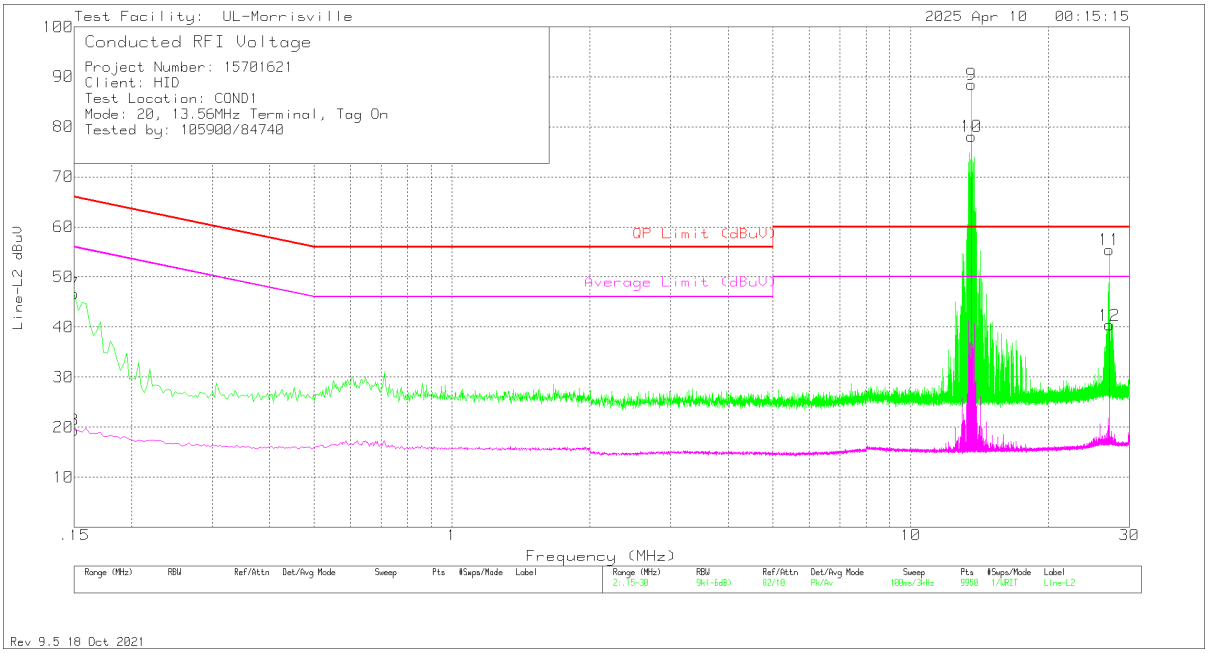


Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	171083 (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.153	27.33	Pk	.2	0	20	47.53	65.84	-18.31	-	-
2	.153	-.38	Av	.2	0	20	19.82	-	-	55.84	-36.02
3*	13.5603	64.63	Qp	.1	.3	20	85.03	**60**	**25.03**	-	-
4*	13.5603	60.83	Ca	.1	.3	20	81.23	-	-	**50**	**31.23**
5	27.126	31.61	Pk	.4	.4	20	52.41	60	-7.59	-	-
6	27.126	15.69	Av	.4	.4	20	36.49	-	-	50	-13.51

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 11.4 shows compliance with an NFC/HF terminated sample.

LINE 2 RESULTS



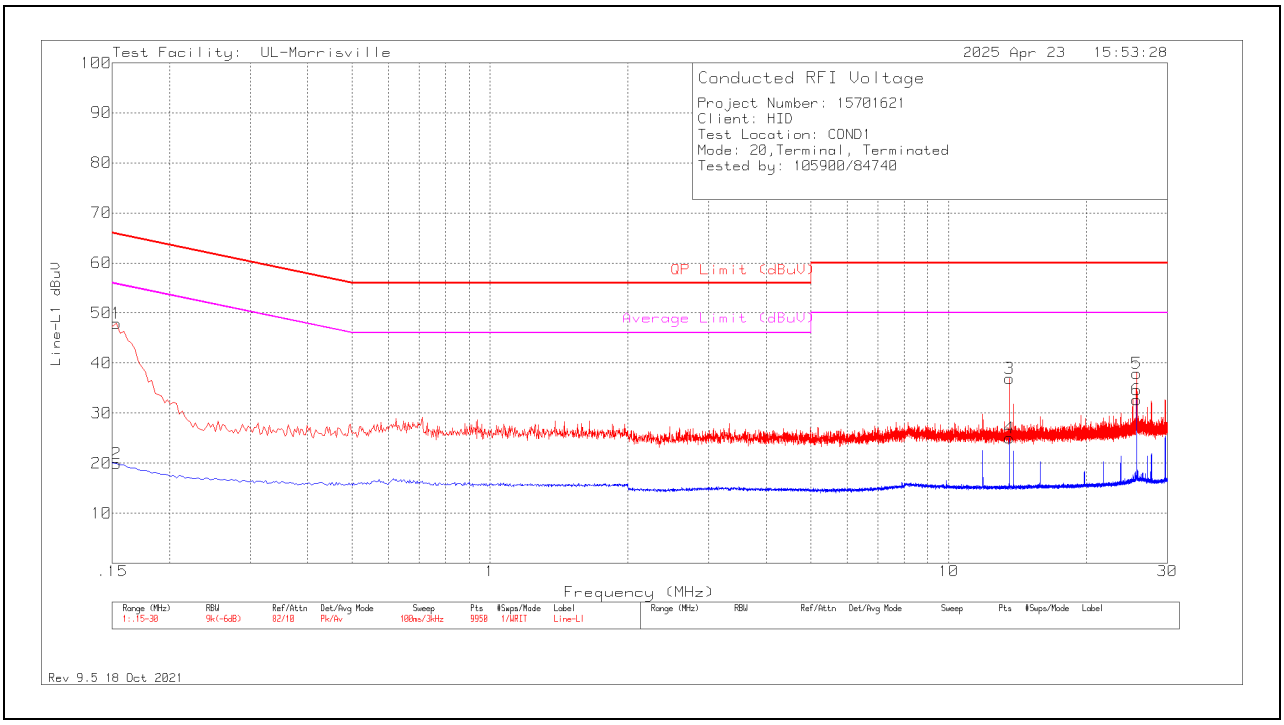
Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	171083 (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
7	.15	26.42	Pk	.3	0	20	46.72	66	-19.28	-	-
8	.15	-.86	Av	.3	0	20	19.44	-	-	56	-36.56
9*	13.56002	64.8	Qp	.1	.3	20	85.2	**60**	**25.2**	-	-
10*	13.56002	61.2	Ca	.1	.3	20	81.6	-	-	**50**	**31.6**
11	27.12071	31.05	Qp	.4	.4	20	51.85	60	-8.15	-	-
12	27.117	19.56	Av	.4	.4	20	40.36	-	-	50	-9.64

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 11.4 shows compliance with an NFC/HF terminated sample.

11.2. NFC/HF Terminated Sample

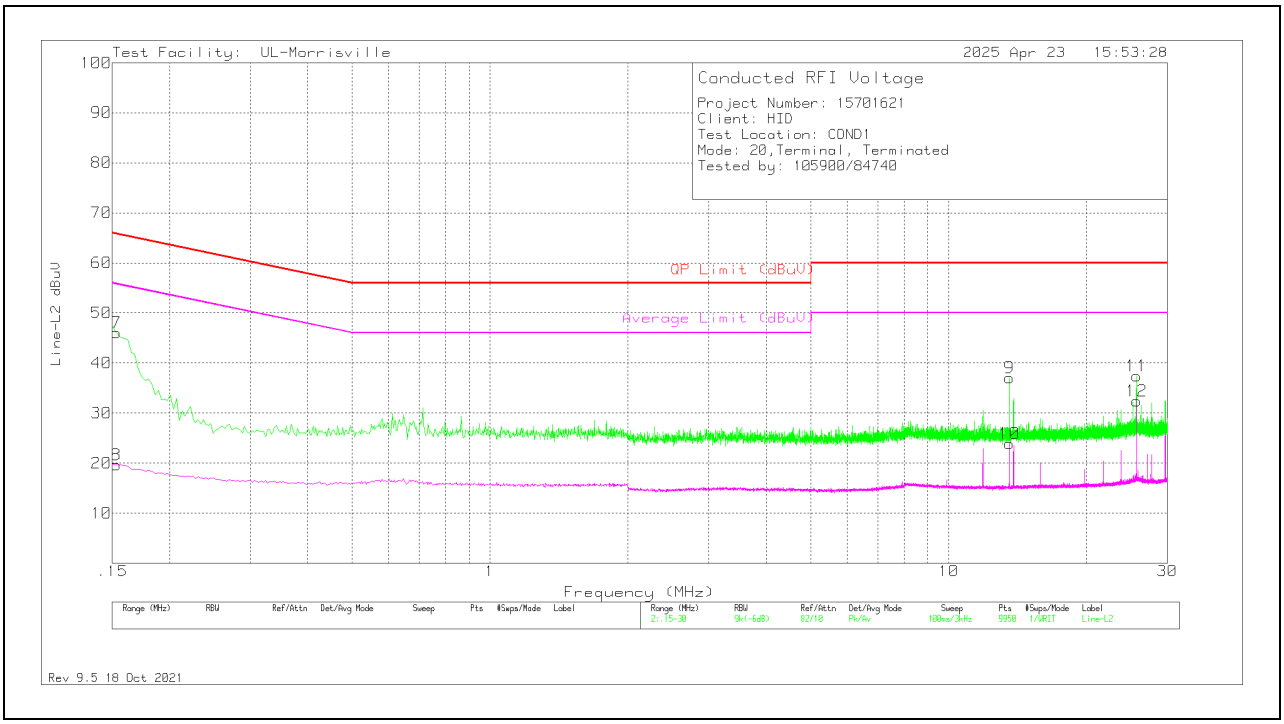
LINE 1 RESULTS



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	27.73	Pk	.2	0	20	47.93	65.84	-17.91	-	-
2	.153	-.26	Av	.2	0	20	19.94	-	-	55.84	-35.9
3	13.56	16.55	Pk	.1	.3	20	36.95	60	-23.05	-	-
4	13.56	4.59	Av	.1	.3	20	24.99	-	-	50	-25.01
6	25.707	11.91	Av	.4	.4	20	32.71	-	-	50	-17.29
5	25.71	17.15	Pk	.4	.4	20	37.95	60	-22.05	-	-

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	25.9	Pk	.2	0	20	46.1	65.84	-19.74	-	-
8	.153	-.55	Av	.2	0	20	19.65	-	-	55.84	-36.19
9	13.56	16.64	Pk	.1	.3	20	37.04	60	-22.96	-	-
10	13.563	3.48	Av	.1	.3	20	23.88	-	-	50	-26.12
11	25.71	16.57	Pk	.4	.4	20	37.37	60	-22.63	-	-
12	25.713	11.66	Av	.4	.4	20	32.46	-	-	50	-17.54

Pk - Peak detector; Av - Average detection;

12. SETUP PHOTOS

Please refer to R15701621-EP1a for setup photos

END OF TEST REPORT