

TEST REPORT

Report Number: R15440806-E3

Applicant : RF IDEAS
425 N. Martingale Road
Suite 1680
Schaumburg, IL 60173, USA

Model : MD30L00

FCC ID : M9MMD30L00

IC : 6571A-MD30L00

EUT Description : Dual Band RFID Card Reader

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

Date Of Issue:

2025-03-04

Prepared by:

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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2024-10-23	Initial Issue	Chandler Stanley
V2	2024-11-05	Updated Company Name	Chandler Stanley
V3	2025-02-25	Added Note Regarding Tested Mode	Charles Moody
V4	2025-03-04	Revised OBW Plot and RSS-210 References	Charles Moody

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: RF IDEAS
425 N. Martingale Road, Suite 1680
Schaumburg, IL 60173, USA

EUT DESCRIPTION: Dual Band RFID Card Reader

MODEL: MD30L00

SERIAL NUMBER: WLDA000109, WLDA000118, WLDA000157, WLDA000158,
WLSA000026, WLSA000027, WLSA000029

SAMPLE RECEIPT DATE: 2024-08-30

DATE TESTED: 2024-09-04 to 2025-03-04

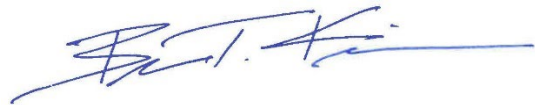
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C: 2024	Complies
ISED RSS-210 Issue 11: 2024	Complies
ISED RSS-GEN Issue 5 + A1 + A2: 2021	Complies

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document.

Approved & Released For
UL LLC. By:



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

Prepared By:



Chandler Stanley
Engineer
Consumer, Medical and IT Segment.
UL LLC.

2. TEST METHODOLOGY

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

- ANSI C63.10-2020
- 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. Below is a list of the data provided by the customer:

Requirement Description	Requirement Clause Number	Result	Remarks
Occupied Bandwidth	For Reporting Purposes Only	Passed	None.
Fundamental Measurements.	FCC §15.225 (a-d) FCC §15.209 (d)		
Tx Spurious Emissions	IC RSS-210, Section 8.2 IC RSS-GEN, Section 8.9 (Transmitter)		
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 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)	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%

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 dual band RFID card reader capable of reading both 125 kHz and 13.56 MHz credentials and Legic Secure Segment credentials via Bluetooth communication. This report covers the full emissions testing of the 125kHz RFID radio.

6.2. MAXIMUM ELECTRIC FIELD STRENGTH

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

Fundamental Frequency (kHz)	E-Field at 30-Meters (dBuV/m)
125 kHz	-13.24

6.3. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was:

For USB: FW: WN5020600UPX7L0

For Serial: FW: WN5020600SPX7L0

6.4. WORST-CASE CONFIGURATION AND MODE

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

The only operational mode was used for full testing of the 125 kHz RFID radio.

6.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List			
Description	Manufacturer	Model	Serial Number
Laptop	HP	Resolve 810	A000247
Laptop Charger	HP	PPP009L-E	WCNXA0C1R6WIVK
USB to RS232 Serial Adapter	Cables Unlimited	USB-2920	N/A
Badge 125kHz	RF IDEAS	N/A	23993

I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Hardwired	1	USB/Serial	Unshielded	>3m	Cable Splits to USB and Serial and Connects to Laptop.

SETUP DIAGRAM

Please refer to R15440806-EP2 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 - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2024-04-04	2025-04-04
248881	Environmental Meter	Control Company	06-662-4	2024-04-10	2026-04-10
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
75141	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2024-08-01	2025-08-01
52859	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2024-04-04	2025-04-04
PS216	AC Power Source	Elgar	CW2501M	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	2024-01-12	2025-01-12
248881	Environmental Meter	Control Company	06-662-4	2024-04-10	2026-04-10
SOFTEMI	Antenna Port Software	UL	Version 2022.8.16	NA	NA
Additional Equipment used					
CBL013	Micro-Coax UTiFLEX Cable Assembly, Low Loss	CARLISLE INTERCONNECT TECHNOLOGIES	UFB293C-0-2400-300300	2024-03-21	2025-03-21

****NOTE:** Testing on this equipment was performed while equipment was in calibration.

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 1)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
0.009-30MHz					
135144	Active Loop Antenna	ETS-Lindgren	6502	2024-01-24	2025-01-24
30-1000 MHz					
90629	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-01-30	2026-01-30
Gain-Loss Chains					
91974	Gain-loss string: 0.009-30MHz	Various	Various	2024-05-08	2025-05-08
91976	Gain-loss string: 25-1000MHz	Various	Various	2024-05-08	2025-05-08
Receiver & Software					
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2024-03-05	2025-03-05
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Additional Equipment used					
241205	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05

8. OCCUPIED BANDWIDTH

LIMITS

Reporting Purposes Only

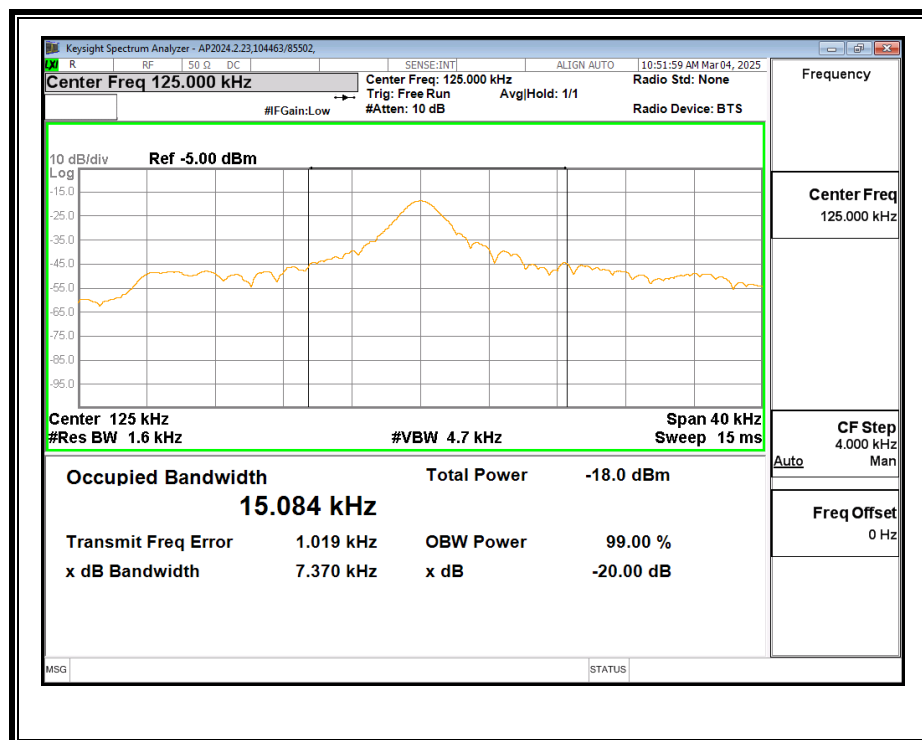
TEST PROCEDURE

C63.10 6.9.2 and 6.9.3

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

Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
0.125	7.370	15.084



Tested By: 104463/85502

8.2. TAG OFF

RESULTS

Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
0.125	0.861	10.403



Test Information
Date: 2024-09-04
Project: 15440806
Tested By: 105900/84740

9. RADIATED EMISSION TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMIT

FCC §15.209 (a)

IC RSS-GEN, Section 8.9 (Transmitter)

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.		

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.

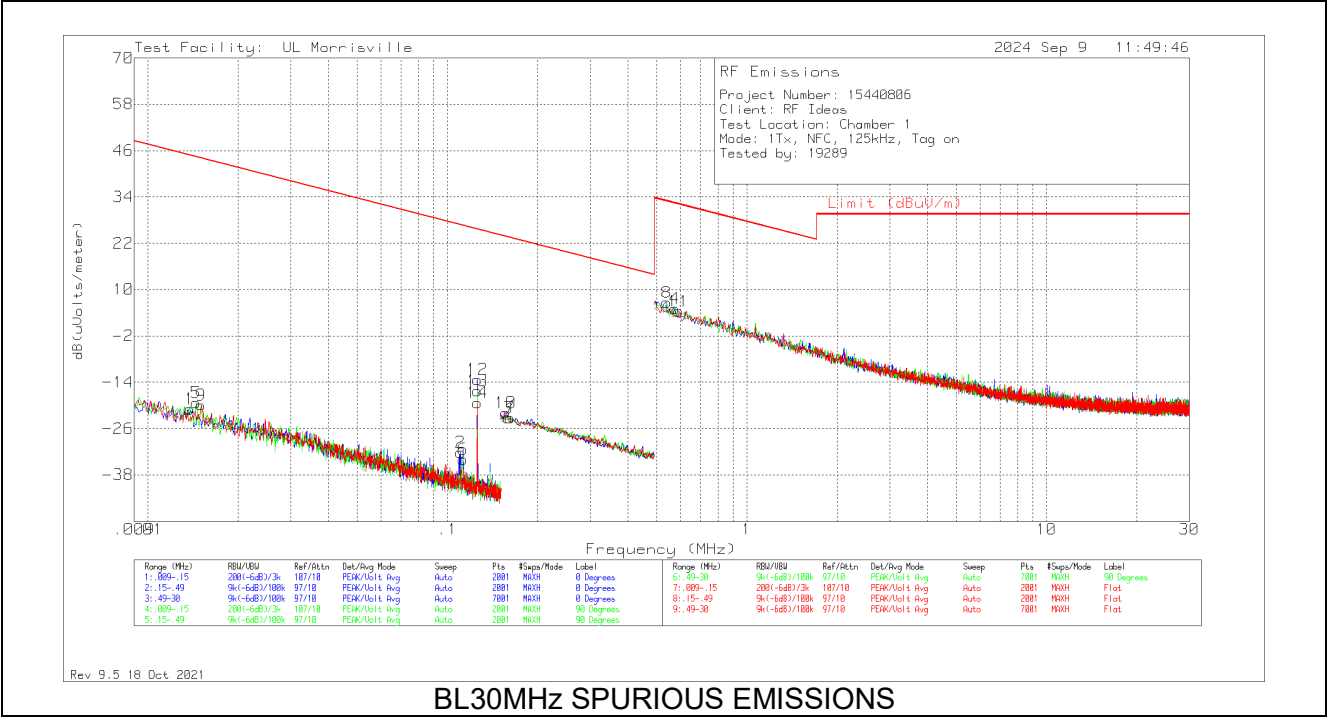
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

9.2. SPURIOUS EMISSIONS (Below 30MHz)

Note: 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).

9.2.1. TAG ON

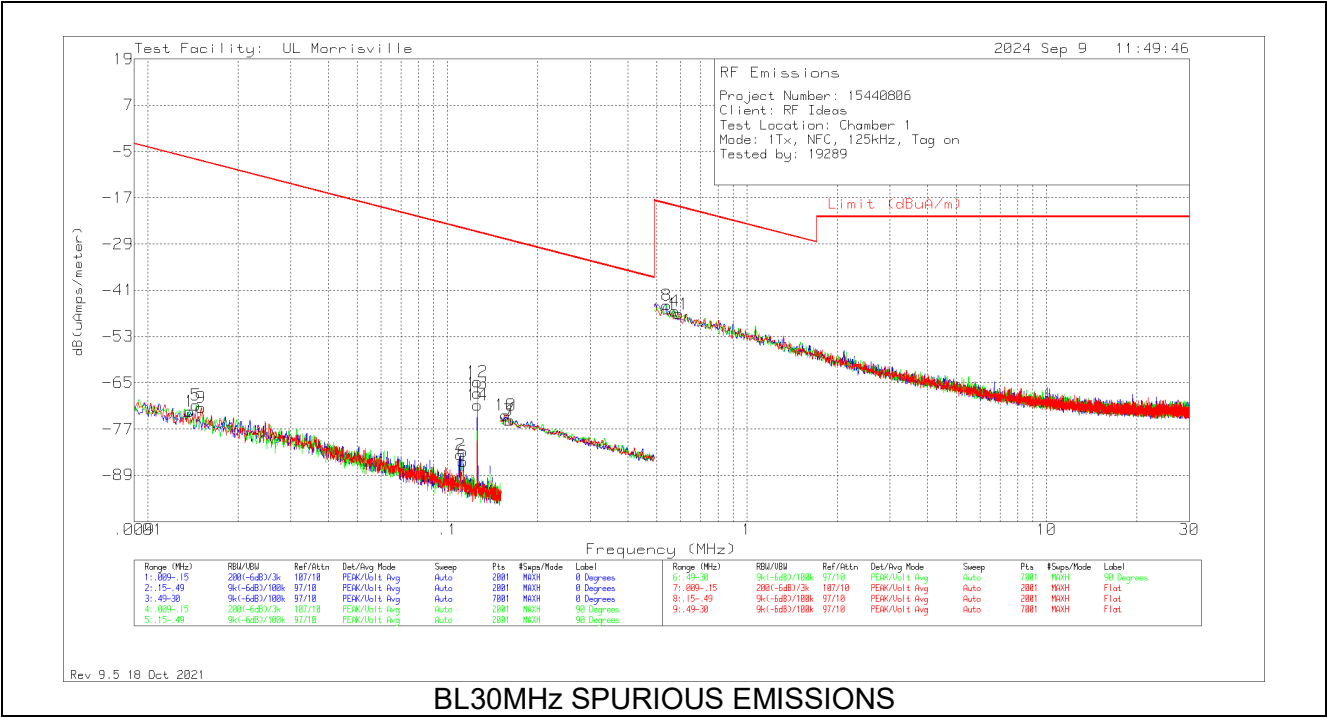
SPURIOUS EMISSION – E FIELD



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/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	.01383	42.24	Pk	16.7	.1	-80	-20.96	44.79	64.79	-65.75	0-360	0 degs
5	.01447	44.11	Pk	16.5	.1	-80	-19.29	44.4	64.4	-63.69	0-360	90 degs
9	.01504	43.82	Pk	16.2	.1	-80	-19.88	44.06	64.06	-63.94	0-360	Flat
2	.11039	36.68	Pk	11.1	.1	-80	-32.12	26.75	46.75	-58.87	0-360	0 degs
6	.11294	34.85	Pk	11.1	.1	-80	-33.95	26.55	46.55	-60.5	0-360	90 degs
12	.12587	55.56	Pk	11.1	.1	-80	-13.24	25.61	45.61	-38.85	0-360	0 degs
13	.12587	52.6	Pk	11.1	.1	-80	-16.2	25.61	45.61	-41.81	0-360	90 degs
14	.12587	49.46	Pk	11.1	.1	-80	-19.34	25.61	45.61	-44.95	0-360	Flat
10	.15655	46.87	Pk	11.1	.1	-80	-21.93	23.71	43.71	-45.64	0-360	Flat
3	.15918	45.66	Pk	11.1	.1	-80	-23.14	23.57	43.57	-46.71	0-360	0 degs
7	.16216	45.56	Pk	11.1	.1	-80	-23.24	23.41	43.41	-46.65	0-360	90 degs
8	.54059	35.45	Pk	11.1	.1	-40	6.65	32.95	-	-26.3	0-360	90 degs
4	.57432	33.92	Pk	11.1	.1	-40	5.12	32.42	-	-27.3	0-360	0 degs
11	.59118	33.08	Pk	11.2	.1	-40	4.38	32.17	-	-27.79	0-360	Flat

Pk - Peak detector

SPURIOUS EMISSION – H FIELD

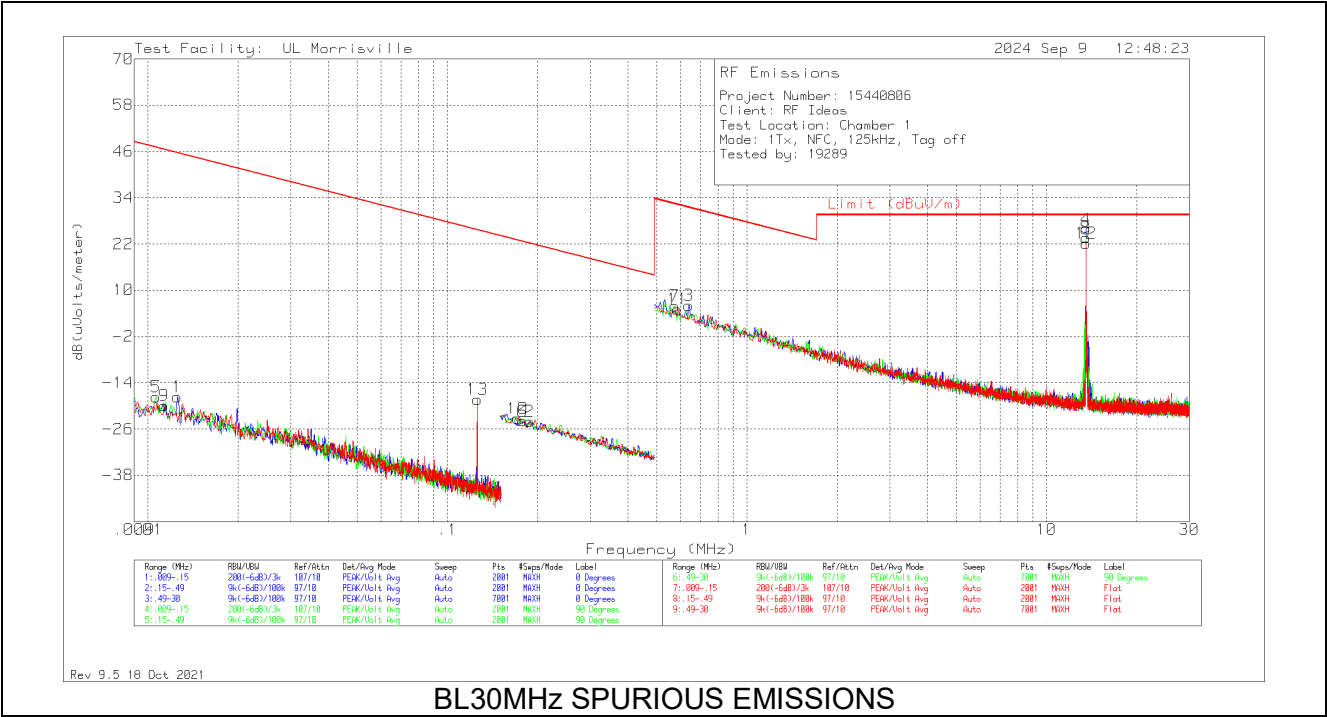


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	.01383	42.24	Pk	-34.8	.1	-80	-72.46	-6.71	13.29	-65.75	0-360	0 degs
5	.01447	44.11	Pk	-35	.1	-80	-70.79	-7.1	12.9	-63.69	0-360	90 degs
9	.01504	43.82	Pk	-35.3	.1	-80	-71.38	-7.44	12.56	-63.94	0-360	Flat
2	.11039	36.68	Pk	-40.4	.1	-80	-83.62	-24.75	-4.75	-58.87	0-360	0 degs
6	.11294	34.85	Pk	-40.4	.1	-80	-85.45	-24.95	-4.95	-60.5	0-360	90 degs
12	.12587	55.56	Pk	-40.4	.1	-80	-64.74	-25.89	-5.89	-38.85	0-360	0 degs
13	.12587	52.6	Pk	-40.4	.1	-80	-67.7	-25.89	-5.89	-41.81	0-360	90 degs
14	.12587	49.46	Pk	-40.4	.1	-80	-70.84	-25.89	-5.89	-44.95	0-360	Flat
10	.15655	46.87	Pk	-40.4	.1	-80	-73.43	-27.79	-7.79	-45.64	0-360	Flat
3	.15918	45.66	Pk	-40.4	.1	-80	-74.64	-27.93	-7.93	-46.71	0-360	0 degs
7	.16216	45.56	Pk	-40.4	.1	-80	-74.74	-28.09	-8.09	-46.65	0-360	90 degs
8	.54059	35.45	Pk	-40.4	.1	-40	-44.85	-18.55	-	-26.3	0-360	90 degs
4	.57432	33.92	Pk	-40.4	.1	-40	-46.38	-19.08	-	-27.3	0-360	0 degs
11	.59118	33.08	Pk	-40.3	.1	-40	-47.12	-19.33	-	-27.79	0-360	Flat

Pk - Peak detector

9.2.2. TAG OFF

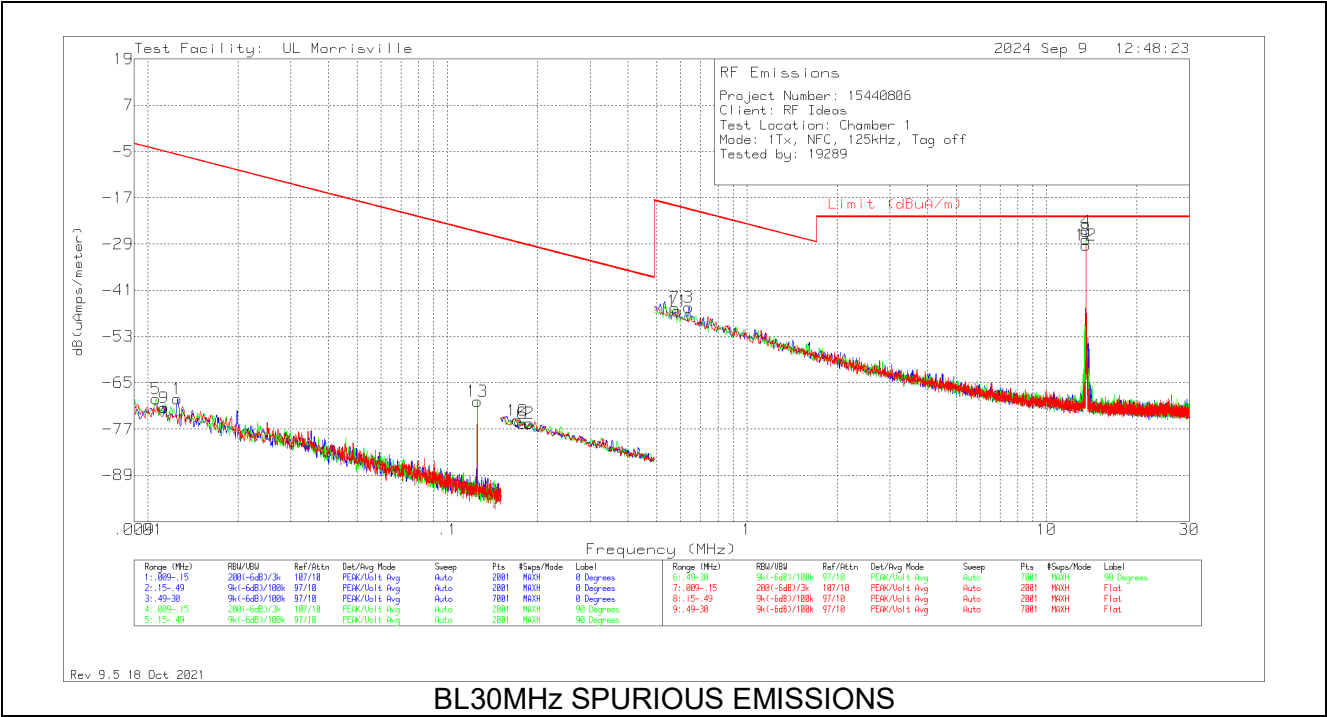
SPURIOUS EMISSION – E FIELD



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	QP/AV Limit (dBuV/m)	PK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
5	.01063	44.02	Pk	18.2	.1	-80	-17.68	47.07	67.07	-64.75	0-360	90 degs
9	.01134	41.99	Pk	17.9	.1	-80	-20.01	46.51	66.51	-66.52	0-360	Flat
1	.01255	44.91	Pk	17.3	.1	-80	-17.69	45.63	65.63	-63.32	0-360	0 degs
13	.12587	50.44	Pk	11.1	.1	-80	-18.36	25.61	45.61	-43.97	0-360	Flat
10	.17159	45.53	Pk	11.1	.1	-80	-23.27	22.91	42.91	-46.18	0-360	Flat
6	.17822	44.86	Pk	11.1	.1	-80	-23.94	22.59	42.59	-46.53	0-360	90 degs
2	.18791	44.76	Pk	11.1	.1	-80	-24.04	22.13	42.13	-46.17	0-360	0 degs
7	.57432	34.67	Pk	11.1	.1	-40	5.87	32.42	-	-26.55	0-360	90 degs
11	.58697	33.79	Pk	11.2	.1	-40	5.09	32.23	-	-27.14	0-360	Flat
3	.63967	34.72	Pk	11.2	.1	-40	6.02	31.48	-	-25.46	0-360	0 degs
4	13.5596	54.54	Pk	10.7	.6	-40	25.84	29.54	-	-3.7	0-360	0 degs
8	13.5596	52.35	Pk	10.7	.6	-40	23.65	29.54	-	-5.89	0-360	90 degs
12	13.5596	50.83	Pk	10.7	.6	-40	22.13	29.54	-	-7.41	0-360	Flat

Pk - Peak detector

SPURIOUS EMISSION – H FIELD



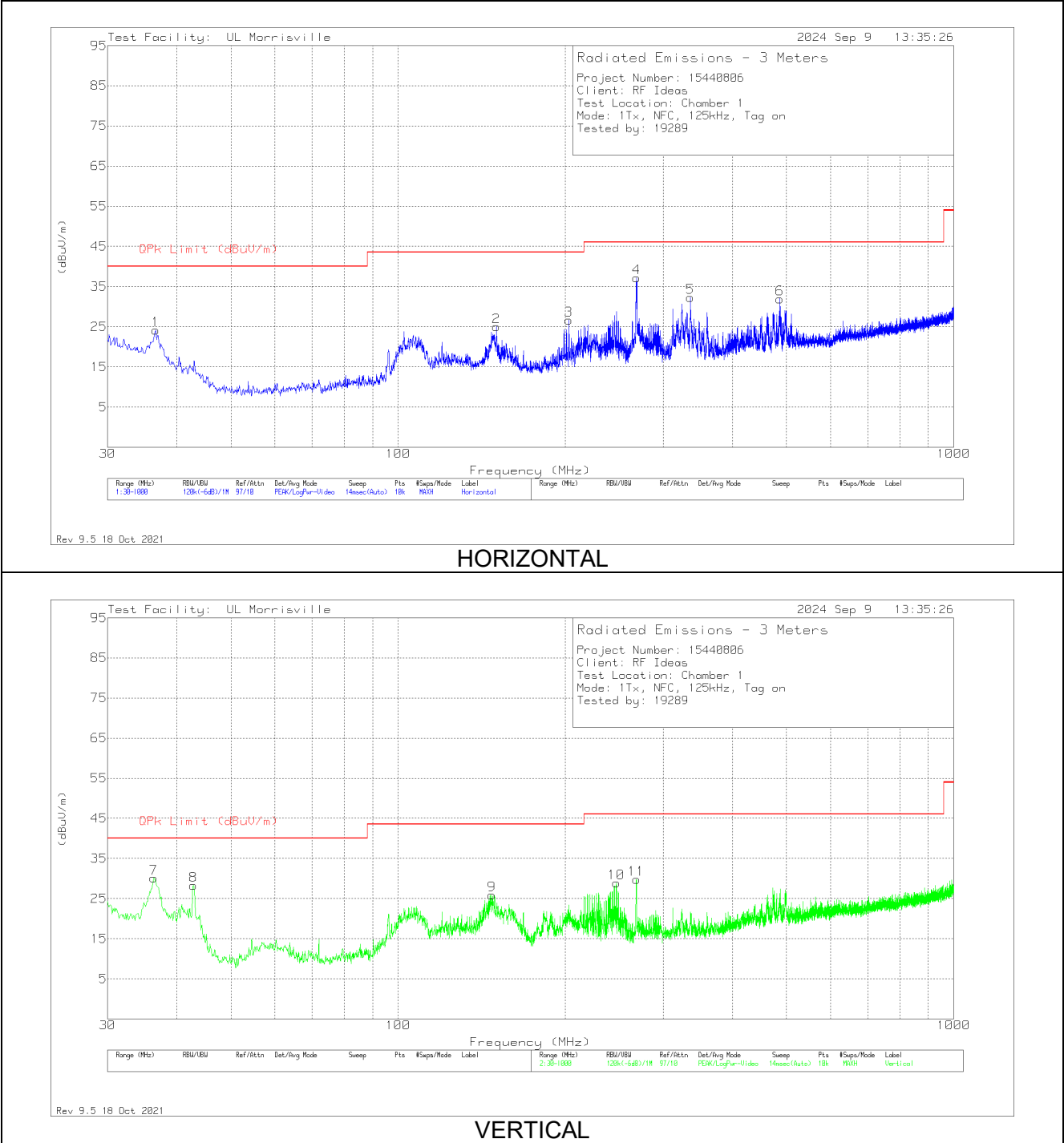
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
5	.01063	44.02	Pk	-33.3	.1	-80	-69.18	-4.43	15.57	-64.75	0-360	90 degs
9	.01134	41.99	Pk	-33.6	.1	-80	-71.51	-4.99	15.01	-66.52	0-360	Flat
1	.01255	44.91	Pk	-34.2	.1	-80	-69.19	-5.87	14.13	-63.32	0-360	0 degs
13	.12587	50.44	Pk	-40.4	.1	-80	-69.86	-25.89	-5.89	-43.97	0-360	Flat
10	.17159	45.53	Pk	-40.4	.1	-80	-74.77	-28.59	-8.59	-46.18	0-360	Flat
6	.17822	44.86	Pk	-40.4	.1	-80	-75.44	-28.91	-8.91	-46.53	0-360	90 degs
2	.18791	44.76	Pk	-40.4	.1	-80	-75.54	-29.37	-9.37	-46.17	0-360	0 degs
7	.57432	34.67	Pk	-40.4	.1	-40	-45.63	-19.08	-	-26.55	0-360	90 degs
11	.58697	33.79	Pk	-40.3	.1	-40	-46.41	-19.27	-	-27.14	0-360	Flat
3	.63967	34.72	Pk	-40.3	.1	-40	-45.48	-20.02	-	-25.46	0-360	0 degs
4	13.5596	54.54	Pk	-40.8	.6	-40	-25.66	-21.96	-	-3.7	0-360	0 degs
8	13.5596	52.35	Pk	-40.8	.6	-40	-27.85	-21.96	-	-5.89	0-360	90 degs
12	13.5596	50.83	Pk	-40.8	.6	-40	-29.37	-21.96	-	-7.41	0-360	Flat

Pk - Peak detector

9.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

9.3.1. TAG OFF

SPURIOUS EMISSION



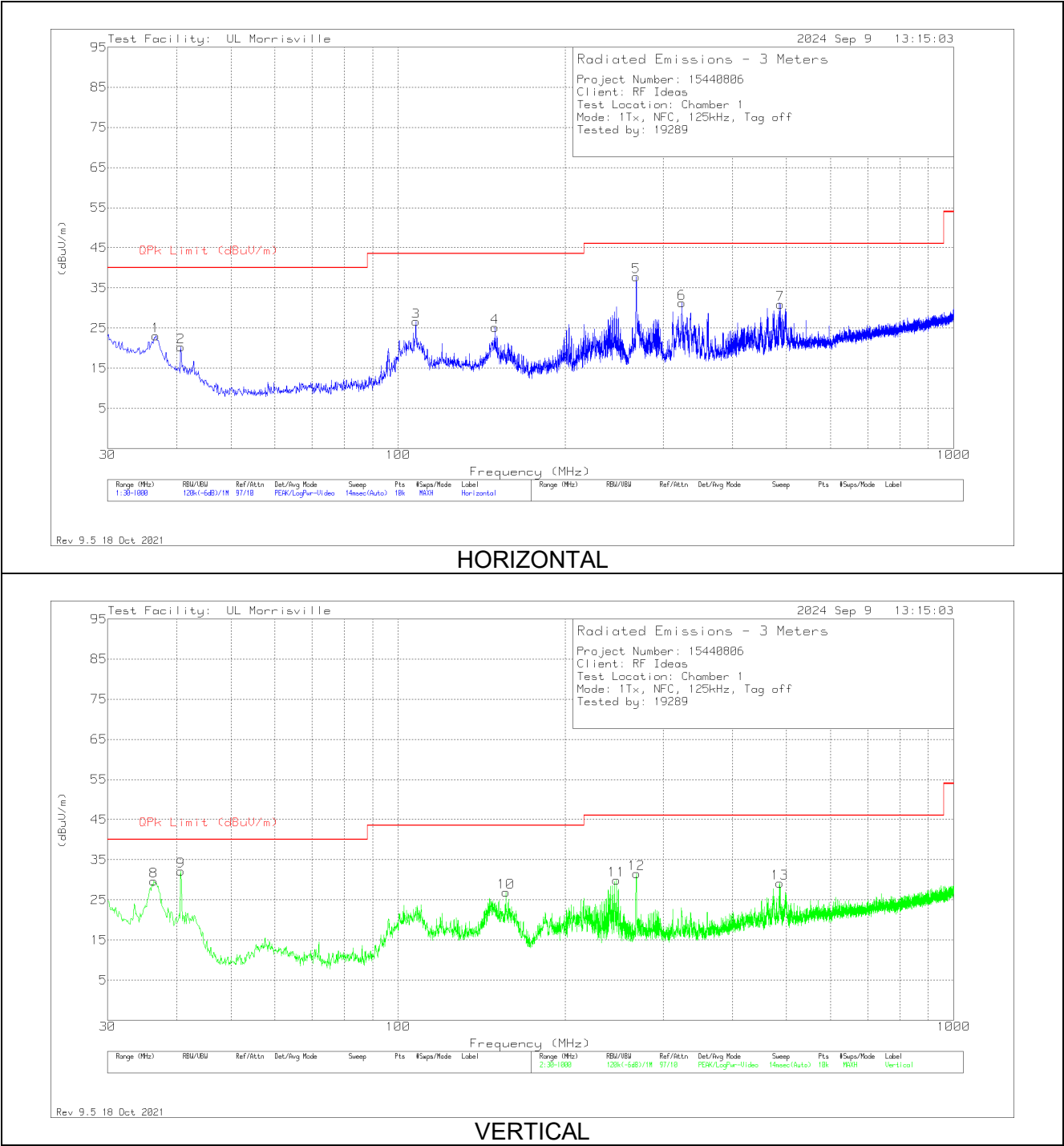
DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90629 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7	36.305	39.4	Pk	22.5	-31.8	30.1	40	-9.9	0-360	100	V
1	36.596	33.83	Pk	22.3	-32	24.13	40	-15.87	0-360	200	H
8	42.804	41.65	Pk	17.8	-31.2	28.25	40	-11.75	0-360	100	V
9	147.467	37.19	Pk	18.9	-30.2	25.89	43.52	-17.63	0-360	100	V
2	150.377	36.78	Pk	18.8	-30.6	24.98	43.52	-18.54	0-360	200	H
3	202.951	38.52	Pk	18.1	-30	26.62	43.52	-16.9	0-360	200	H
10	246.989	40.86	Pk	17.7	-29.6	28.96	46.02	-17.06	0-360	100	V
4	268.426	47.36	Pk	19.1	-29.3	37.16	46.02	-8.86	0-360	100	H
11	268.426	39.97	Pk	19.1	-29.3	29.77	46.02	-16.25	0-360	100	V
5	335.744	41.73	Pk	20	-29.4	32.33	46.02	-13.69	0-360	100	H
6	486.482	36.04	Pk	24	-28.1	31.94	46.02	-14.08	0-360	100	H

Pk - Peak detector

9.3.2. TAG OFF

SPURIOUS EMISSION



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90629 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
8	36.305	39	Pk	22.5	-31.8	29.7	40	-10.3	0-360	100	V
1	36.596	32.78	Pk	22.3	-32	23.08	40	-16.92	0-360	399	H
2	40.67	32.59	Pk	19.3	-31.6	20.29	40	-19.71	0-360	299	H
9	40.67	44.46	Pk	19.3	-31.6	32.16	40	-7.84	0-360	100	V
3	107.697	39	Pk	18.4	-30.8	26.6	43.52	-16.92	0-360	299	H
4	149.31	36.4	Pk	18.8	-30	25.2	43.52	-18.32	0-360	199	H
10	156.391	38.8	Pk	18.5	-30.4	26.9	43.52	-16.62	0-360	100	V
11	247.086	41.84	Pk	17.7	-29.6	29.94	46.02	-16.08	0-360	100	V
5	268.232	48.07	Pk	19.1	-29.4	37.77	46.02	-8.25	0-360	100	H
12	268.426	41.74	Pk	19.1	-29.3	31.54	46.02	-14.48	0-360	100	V
6	324.104	40.23	Pk	20	-29	31.23	46.02	-14.79	0-360	100	H
13	486.385	33.3	Pk	24	-28.1	29.2	46.02	-16.82	0-360	100	V
7	487.355	35.28	Pk	24	-28.4	30.88	46.02	-15.14	0-360	100	H

Pk - 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 50μH/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 (dBμV)	
	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.

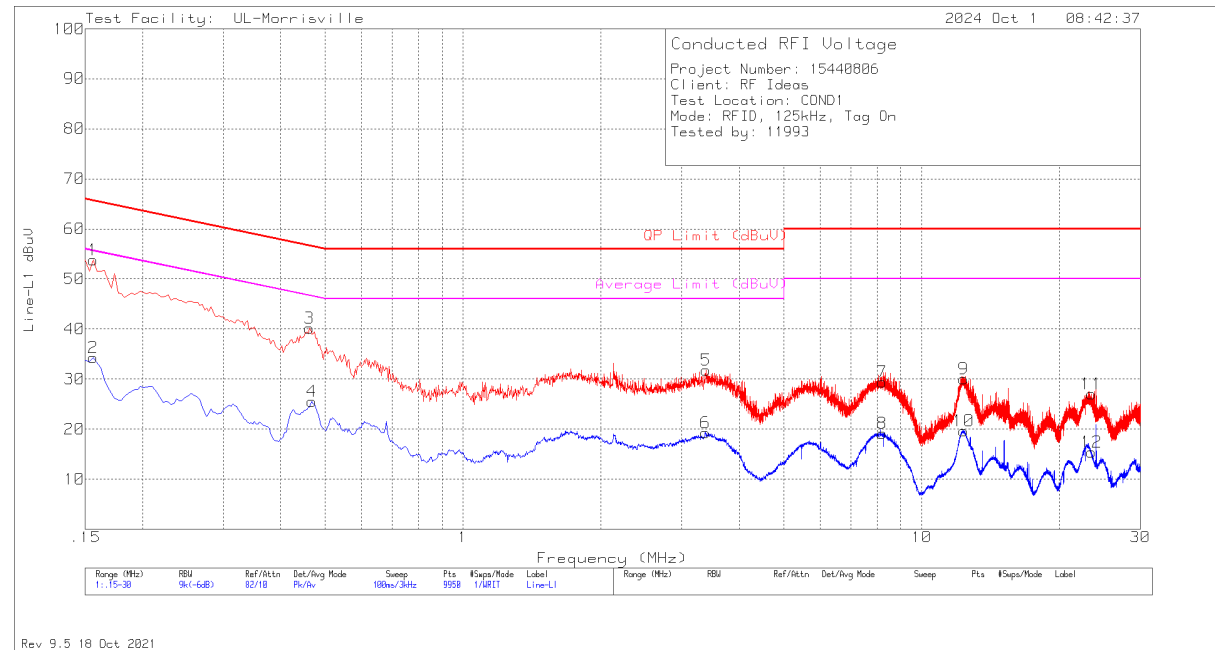
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

No non-compliance noted:

10.1.1. TAG ON

LINE 1 RESULTS

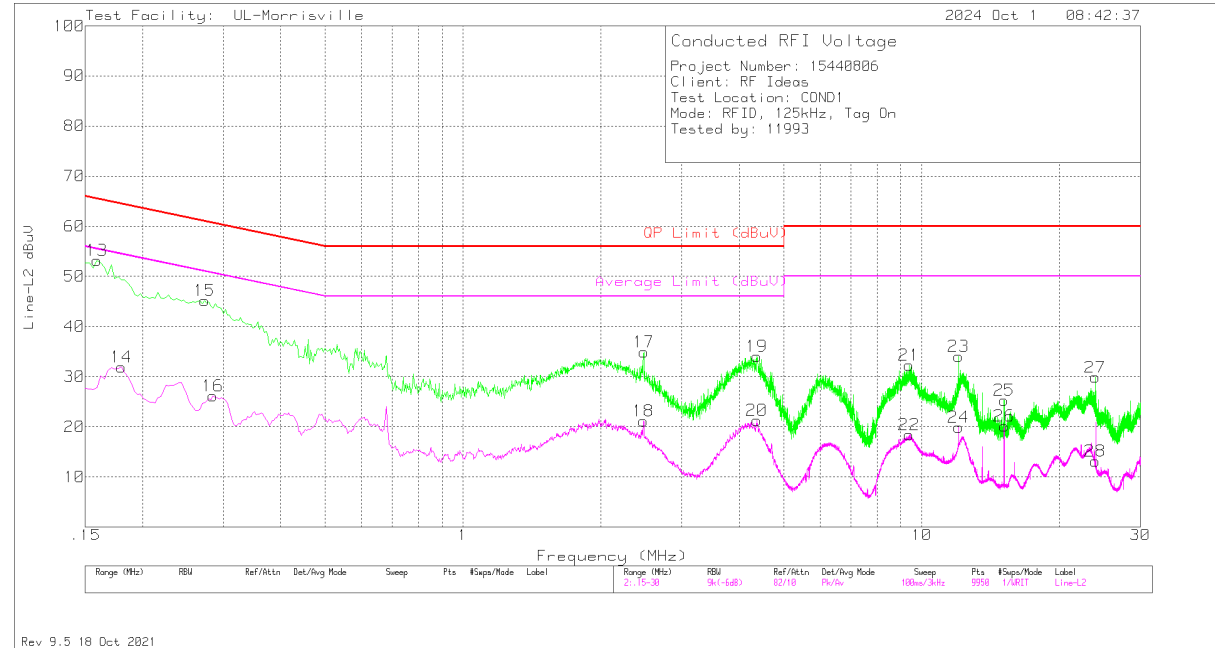


Emissions

Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.156	43.79	Pk	.2	9.8	53.79	65.67	-11.88	-	-
2	.156	24.25	Av	.2	9.8	34.25	-	-	55.67	-21.42
3	.462	30.4	Pk	0	9.8	40.2	56.66	-16.46	-	-
4	.468	15.75	Av	0	9.8	25.55	-	-	46.55	-21
6	3.378	9.49	Av	0	9.8	19.29	-	-	46	-26.71
5	3.39	22	Pk	0	9.8	31.8	56	-24.2	-	-
7	8.208	19.36	Pk	.1	10	29.46	60	-30.54	-	-
8	8.208	9	Av	.1	10	19.1	-	-	50	-30.9
9	12.348	19.94	Pk	.1	10	30.04	60	-29.96	-	-
10	12.357	9.58	Av	.1	10	19.68	-	-	50	-30.32
12	23.445	4.85	Av	.3	10.2	15.35	-	-	50	-34.65
11	23.463	16.53	Pk	.3	10.2	27.03	60	-32.97	-	-

Pk - Peak detector
Av - Average detection

LINE 2 RESULTS



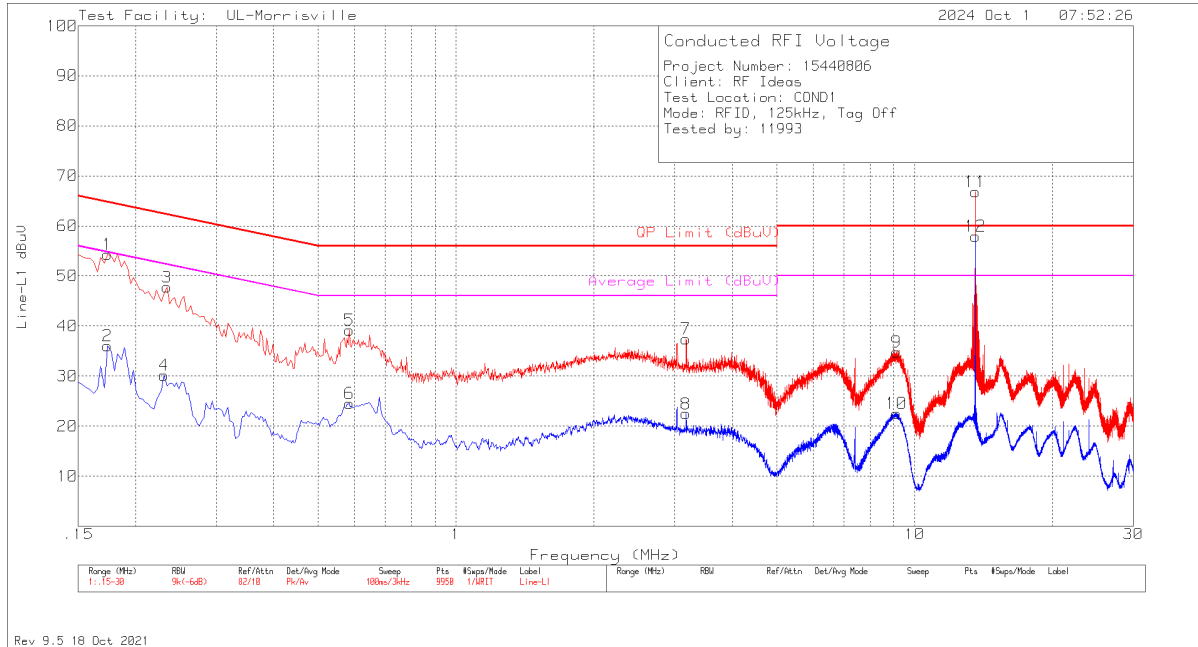
Emissions

Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
13	.159	43.15	Pk	.2	9.8	53.15	65.52	-12.37	-	-
14	.18	21.95	Av	.2	9.8	31.95	-	-	54.49	-22.54
15	.273	35.33	Pk	.1	9.8	45.23	61.03	-15.8	-	-
16	.285	16.27	Av	.1	9.8	26.17	-	-	50.67	-24.5
18	2.475	11.32	Av	0	9.8	21.12	-	-	46	-24.88
17	2.478	25.07	Pk	0	9.8	34.87	56	-21.13	-	-
20	4.374	11.3	Av	.1	9.9	21.3	-	-	46	-24.7
19	4.377	24.08	Pk	.1	9.9	34.08	56	-21.92	-	-
21	9.393	22.21	Pk	.1	10	32.31	60	-27.69	-	-
22	9.402	8.32	Av	.1	10	18.42	-	-	50	-31.58
24	12.039	9.79	Av	.1	10	19.89	-	-	50	-30.11
23	12.042	23.97	Pk	.1	10	34.07	60	-25.93	-	-
25	15.129	14.95	Pk	.2	10.1	25.25	60	-34.75	-	-
26	15.132	9.8	Av	.2	10.1	20.1	-	-	50	-29.9
27	23.913	19.35	Pk	.3	10.2	29.85	60	-30.15	-	-
28	23.931	2.66	Av	.3	10.2	13.16	-	-	50	-36.84

Pk - Peak detector
Av - Average detection

10.1.2. TAG OFF

LINE 1 RESULTS



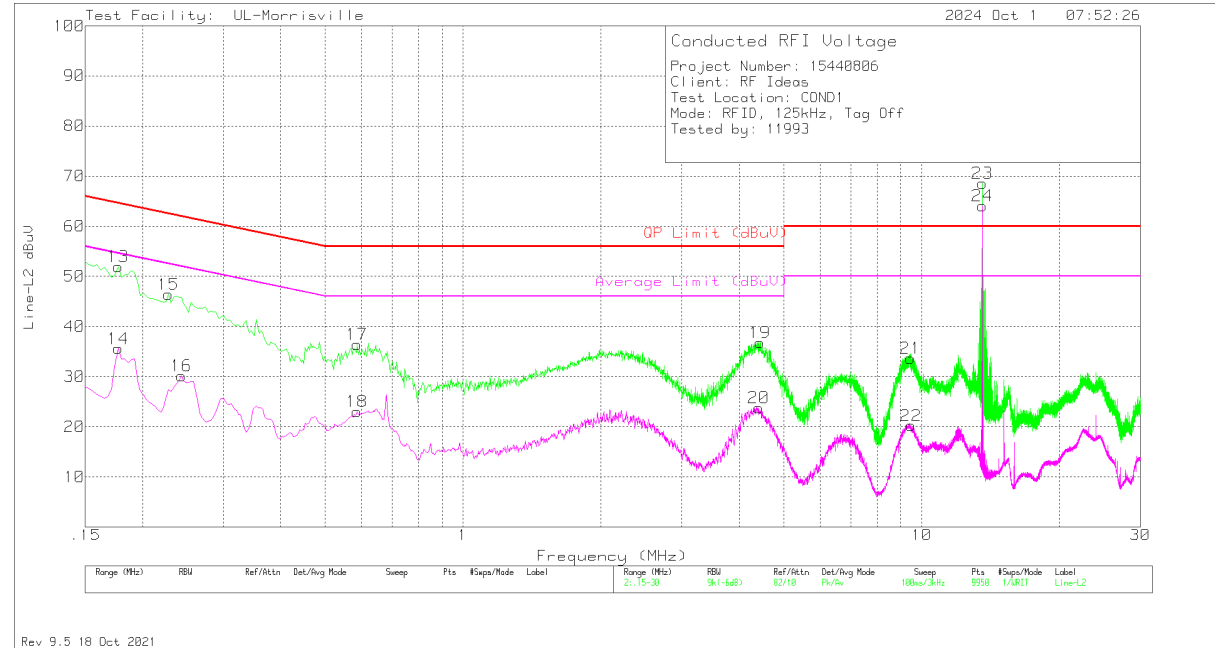
Emissions

Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.174	44.29	Pk	.2	9.8	54.29	64.77	-10.48	-	-
2	.174	26.08	Av	.2	9.8	36.08	-	-	54.77	-18.69
4	.231	20.31	Av	.1	9.8	30.21	-	-	52.41	-22.2
3	.234	37.85	Pk	.1	9.8	47.75	62.31	-14.56	-	-
5	.585	29.34	Pk	0	9.8	39.14	56	-16.86	-	-
6	.585	14.77	Av	0	9.8	24.57	-	-	46	-21.43
7	3.174	27.62	Pk	0	9.8	37.42	56	-18.58	-	-
8	3.174	12.66	Av	0	9.8	22.46	-	-	46	-23.54
10	9.132	12.42	Av	.1	10	22.52	-	-	50	-27.48
9	9.135	24.71	Pk	.1	10	34.81	60	-25.19	-	-
11	13.56	53.12	Qp	.1	10	63.22	60	3.22	-	-
12	13.56	45.21	Ca	.1	10	55.31	-	-	50	5.31

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

NOTE* - Since the fundamental is over the limit, a terminated sample will be used to show compliance. Refer to section 10.1.3.

LINE 2 RESULTS



Emissions

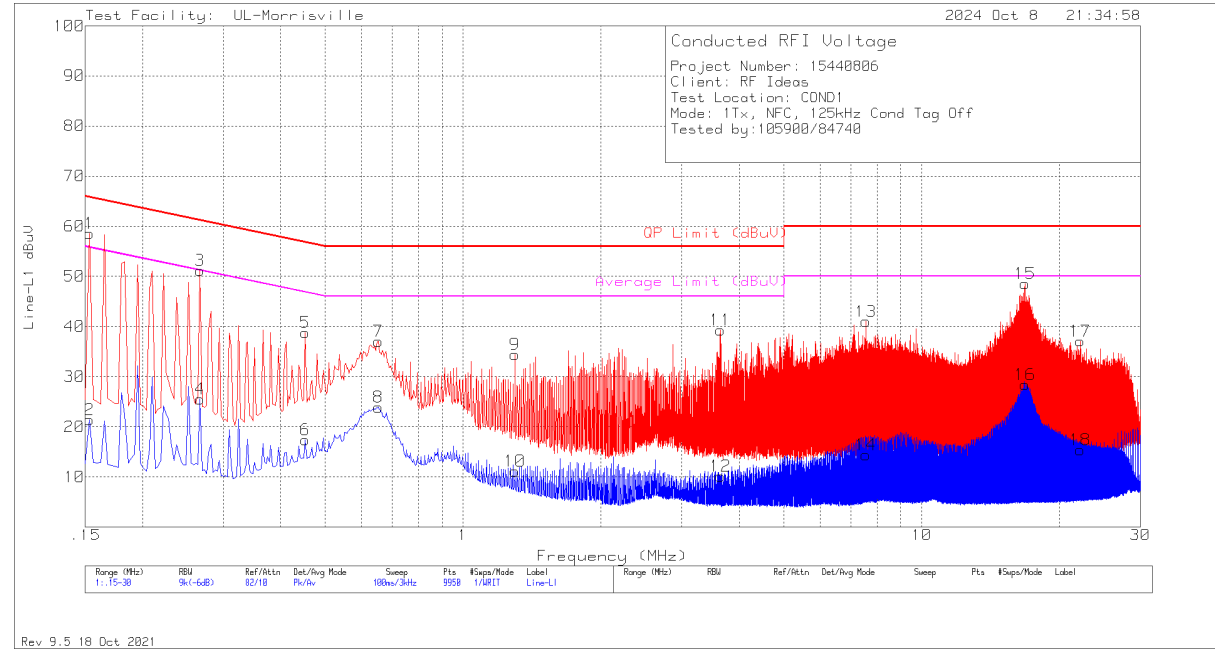
Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
13	.177	41.9	Pk	.2	9.8	51.9	64.63	-12.73	-	-
14	.177	25.6	Av	.2	9.8	35.6	-	-	54.63	-19.03
15	.228	36.48	Pk	.1	9.8	46.38	62.52	-16.14	-	-
16	.243	20.24	Av	.1	9.8	30.14	-	-	51.99	-21.85
17	.588	26.64	Pk	0	9.8	36.44	56	-19.56	-	-
18	.588	13.24	Av	0	9.8	23.04	-	-	46	-22.96
20	4.413	13.78	Av	.1	9.9	23.78	-	-	46	-22.22
19	4.44	26.76	Pk	.1	9.9	36.76	56	-19.24	-	-
21	9.465	23.61	Pk	.1	10	33.71	60	-26.29	-	-
22	9.483	10.11	Av	.1	10	20.21	-	-	50	-29.79
23	13.5605	55.28	Qp	.1	10	65.38	60	5.38	-	-
24	13.5605	56.4	Ca	.1	10	66.5	-	-	50	16.5

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

NOTE* - Since the fundamental is over the limit, a terminated sample will be used to show compliance. Refer to section 10.1.3.

10.1.3. **TERMINATED SAMPLE**

LINE 1 RESULTS

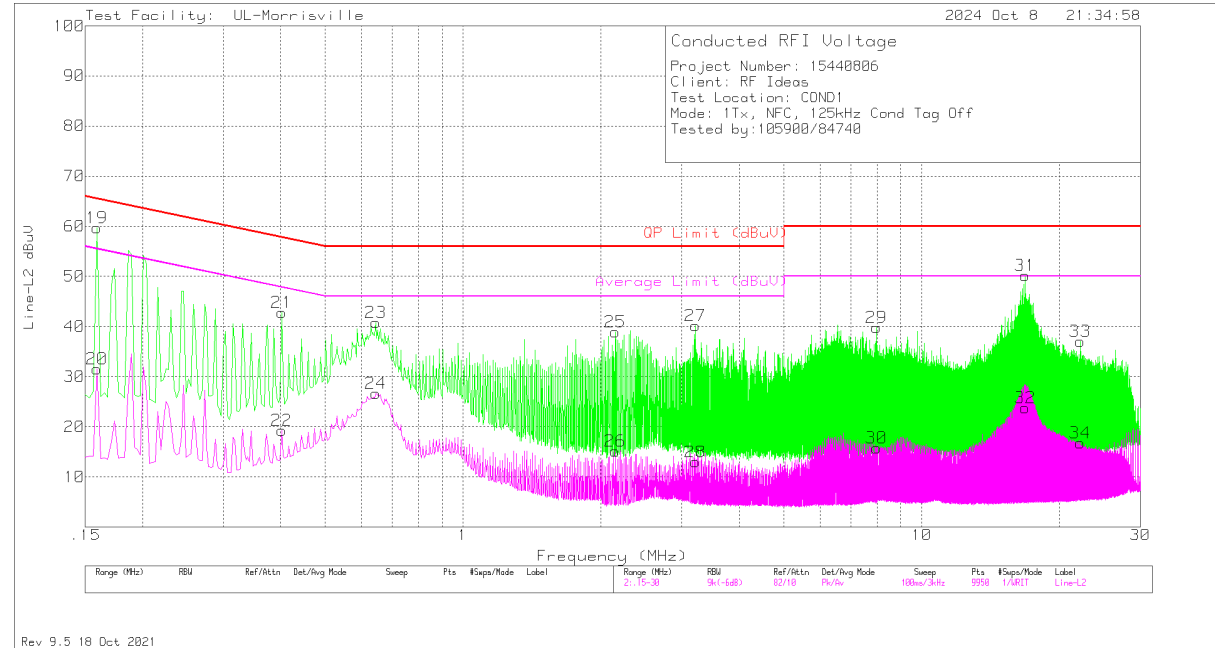


Emissions

Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.153	48.59	Pk	.2	9.8	58.59	65.84	-7.25	-	-
2	.153	11.35	Av	.2	9.8	21.35	-	-	55.84	-34.49
3	.267	41.32	Pk	.1	9.8	51.22	61.21	-9.99	-	-
4	.267	15.6	Av	.1	9.8	25.5	-	-	51.21	-25.71
5	.453	28.91	Pk	.1	9.8	38.81	56.82	-18.01	-	-
6	.453	7.51	Av	.1	9.8	17.41	-	-	46.82	-29.41
7	.654	27.21	Pk	0	9.8	37.01	56	-18.99	-	-
8	.654	14.06	Av	0	9.8	23.86	-	-	46	-22.14
9	1.299	24.58	Pk	0	9.8	34.38	56	-21.62	-	-
10	1.299	1.37	Av	0	9.8	11.17	-	-	46	-34.83
11	3.639	29.43	Pk	0	9.9	39.33	56	-16.67	-	-
12	3.639	.23	Av	0	9.9	10.13	-	-	46	-35.87
13	7.56	30.89	Pk	.1	10	40.99	60	-19.01	-	-
14	7.56	4.27	Av	.1	10	14.37	-	-	50	-35.63
15	16.821	38.22	Pk	.2	10.1	48.52	60	-11.48	-	-
16	16.821	18.07	Av	.2	10.1	28.37	-	-	50	-21.63
17	22.182	26.6	Pk	.3	10.2	37.1	60	-22.9	-	-
18	22.182	4.9	Av	.3	10.2	15.4	-	-	50	-34.6

Pk - Peak detector
Av - Average detection

LINE 2 RESULTS



Emissions

Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
19	.16161	37.65	Qp	.2	9.8	47.65	65.38	-17.73	-	-
20	.159	21.57	Av	.2	9.8	31.57	-	-	55.52	-23.95
21	.402	32.93	Pk	.1	9.8	42.83	57.81	-14.98	-	-
22	.402	9.34	Av	.1	9.8	19.24	-	-	47.81	-28.57
23	.645	30.96	Pk	0	9.8	40.76	56	-15.24	-	-
24	.645	16.87	Av	0	9.8	26.67	-	-	46	-19.33
25	2.145	29.13	Pk	0	9.8	38.93	56	-17.07	-	-
26	2.145	5.39	Av	0	9.8	15.19	-	-	46	-30.81
27	3.216	30.42	Pk	0	9.8	40.22	56	-15.78	-	-
28	3.216	3.16	Av	0	9.8	12.96	-	-	46	-33.04
29	7.98	29.68	Pk	.1	10	39.78	60	-20.22	-	-
30	7.98	5.7	Av	.1	10	15.8	-	-	50	-34.2
31	16.836	39.92	Pk	.2	10.1	50.22	60	-9.78	-	-
32	16.836	13.47	Av	.2	10.1	23.77	-	-	50	-26.23
33	22.2	26.56	Pk	.3	10.2	37.06	60	-22.94	-	-
34	22.2	6.24	Av	.3	10.2	16.74	-	-	50	-33.26

Pk - Peak detector
Av - Average detection
Qp - Quasi-Peak detector

11. SETUP PHOTOS

Please refer to R15440806-EP2 for setup photos.

END OF TEST REPORT