

TEST REPORT

Report Number. : 14523771-E12V2

Applicant : APPLE INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A.

Model : A2849

FCC ID : BCG-E8439A

IC : 579C-E8439A

EUT Description : SMARTPHONE

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
ISED RSS-210 ISSUE 10
ISED RSS-GEN ISSUE 5 + A1 + A2

Date of Issue:
August 10, 2023

Prepared by:
UL VERIFICATION INC..
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888



Revision History

Rev.	Issue Date	Revisions	Revised By
V1	8/8/2023	Initial Issue	Chin Pang
V2	8/10/2023	Address TCB's page 15, section 9 on typo	Chin Pang

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	5
2. TEST METHODOLOGY	7
3. FACILITIES AND ACCREDITATION	7
4. DECISION RULES AND MEASUREMENT UNCERTAINTY	8
4.1. METROLOGICAL TRACEABILITY	8
4.2. DECISION RULES.....	8
4.3. MEASUREMENT UNCERTAINTY.....	8
4.4. SAMPLE CALCULATION	8
5. EQUIPMENT UNDER TEST.....	9
5.1. DESCRIPTION OF EUT	9
5.2. MAXIMUM E-FIELD STRENGTH	9
5.3. WORST-CASE CONFIGURATION AND MODE.....	10
5.4. SUPPORT EQUIPMENT	11
6. TEST AND MEASUREMENT EQUIPMENT	14
7. OCCUPIED BANDWIDTH	15
7.1. PRIMARY ANTENNA	16
7.1.1. READER MODE, Type A 106 Kbps	16
7.1.2. CE MODE, Type A 106 Kbps.....	16
7.1.3. TAG MODE, Type A 106 Kbps	17
7.2. SECONDARY ANTENNA	17
7.2.1. READER MODE, Type A 106 Kbps	17
7.2.2. TAG MODE, Type A 106 Kbps	18
8. RADIATED EMISSION TEST RESULTS.....	19
8.1. LIMITS AND PROCEDURE	19
8.2. PRIMARY ANTENNA FUNDAMENTAL & SPURIOUS EMISSION 0.15-30 MHz.....	21
8.2.1. READER MODE, Type A 106 Kbps	21
8.2.2. TAG MODE, Type A 106 Kbps	24
8.2.3. CE MODE, Type A 106 Kbps.....	28
8.3. PRIMARY ANTENNA TX SPURIOUS EMISSION 30-1000 MHz	32
8.3.1. READER MODE, Type A 106 Kbps	32
8.3.2. TAG MODE, Type A 106 Kbps	34
8.3.3. CE MODE, Type A 106 Kbps.....	36
8.4. SECONDARY ANTENNA FUNDAMENTAL & SPURIOUS EMISSION 0.15-30 MHz..	38
8.4.1. READER MODE, Type A 106 Kbps	38
8.4.2. TAG MODE, Type A 106 Kbps	42
8.5. SECONDARY ANTENNA TX SPURIOUS EMISSION 30-1000 MHz.....	46
8.5.1. READER MODE, Type A 106 Kbps	46
8.5.2. TAG MODE, Type A 106 Kbps	48

9. FREQUENCY STABILITY	50
9.1. PRIMARY ANTENNA	51
9.1.1. READER MODE, Type B 106 Kbps	51
9.1.2. TAG MODE	51
9.1.3. CE MODE, Type B 106 Kbps	52
9.2. SECONDARY ANTENNA	53
9.2.1. READER MODE, Type B 106 Kbps	53
9.2.2. TAG MODE, Type B 106 Kbps	53
10. AC MAINS LINE CONDUCTED EMISSIONS	54
10.1. PRIMARY ANTENNA	55
10.1.1. READER MODE, Type A 106 Kbps, with Antenna	55
10.1.2. READER MODE, Type A 106 Kbps, Antenna Port Terminated	57
10.1.3. CE MODE, Type A 106 Kbps, with Antenna	59
10.1.4. CE MODE, Type A 106 Kbps, Antenna Port Terminated	61
10.1.5. TAG MODE, Type A 106 Kbps, with Antenna	63
10.1.6. TAG MODE, Type A 106 Kbps, Antenna Port Terminated	65
10.2. SECONDARY ANTENNA	67
10.2.1. READER MODE, Type A 106 Kbps, with Antenna	67
10.2.2. READER MODE, Type A 106 Kbps, Antenna Port Terminated	69
10.2.3. TAG MODE, Type A 106 Kbps, with Antenna	71
10.2.4. TAG MODE Type A 106 Kbps, Antenna Port Terminated	73
11. SETUP PHOTOS	75

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A.

EUT DESCRIPTION: SMARTPHONE

MODEL: A2849

BRAND: APPLE

FCC ID: BCG-E8439A

IC: 579C-E8439A

SERIAL NUMBER: GXWK7R7DGH, VV9401QGNV

SAMPLE RECEIPT DATE: MAY 12, 2023

DATE TESTED: JUNE 6, 2023 - JULY 12, 2023

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	Complies
ISED RSS-210 Issue 10, Annex B	Complies
ISED RSS-GEN Issue 5 + A1 + A2	Complies

UL VERIFICATION INC. 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 VERIFICATION INC. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL VERIFICATION INC. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL Verification Services Inc. By:



Chin Pang
Senior Lab Engineer
Consumer Technology Division
UL VERIFICATION INC..

Prepared By:



Francisco Guarnero
Test Engineer
Consumer Technology Division
UL VERIFICATION INC..

2. TEST METHODOLOGY

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

- FCC CFR 47 Part 2
- FCC CFR 47 Part 15
- ANSI C63.10-2013
- KDB 414788 D01 Radiated Test Site v01r01
- RSS-GEN Issue 5 + A1 + A2
- RSS-210 Issue 10

3. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, certification #0751.05, 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 1: 47173 Benicia Street, Fremont, CA 94538, USA	US0104	2324A	550739
☒	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA			
☒	Building 3: 843 Auburn Court, Fremont, CA 94538 USA			
☐	Building 4: 47658 Kato Rd, Fremont, CA 94538 USA			
☐	Building 5: 47670 Kato Rd, Fremont, CA 94538 USA			

4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. 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.

4.2. 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.).

4.3. 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 Bandwidth	1.2%
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.87 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB
Temperature	±0.57 %
Relative Humidity	3.39 %

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

4.4. 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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The Apple iPhone is a smartphone with multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, 5G, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wideband, GPS, NFC, NB UNII, 802.15.4, 802.15.4ab-NB and MSS technologies. The rechargeable battery is not user accessible.

5.2. MAXIMUM E-FIELD STRENGTH

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

Antenna	Frequency Range (MHz)	Mode		Kbps	E Field at 30m distance (dBuV/m)
Primary	13.56	Type A	Reader	106	28.34
			Tag	106	27.39
			CE	106	27.15
Secondary	13.56	Type A	Reader	106	4.29
			Tag	106	4.99

5.3. WORST-CASE CONFIGURATION AND MODE

The fundamental of the EUT was investigated under three orthogonal orientations X (Flatbed), Y (Landscape), and Z (Portrait). The Y (Landscape) orientation was determined to be the worst-case orientation. The EUT has primary and secondary antennas and worst case was investigated on the primary antenna since it has the highest power.

The worst-case position of the EUT was investigated under two configurations: EUT with power supply, EUT with earphones. The EUT with power supply configuration was determined to be worst-case configurations; therefore, all final tests were performed on the EUT with power supply.

In addition, Tag, Reader, and CE mode mode were investigated with Type A, B and F with data rates, such as 106Kbp/s, 212Kbp/s, 424Kbp/s and 848Kbp/s and ISO 15693 configuration to determine the worst case based on the highest power and spurious emissions. Type A 106 Kbps was determined to be the worst case and therefore Type A 106 was selected for all final tests

For below 30MHz testing, investigation was done on three antenna orientations: RX antenna Face-on, Face-off and horizontal (parallel to ground). The worst-case configurations were determined on RX antenna Face-on and Face-off; therefore, all final tests were performed using these two orientations.

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

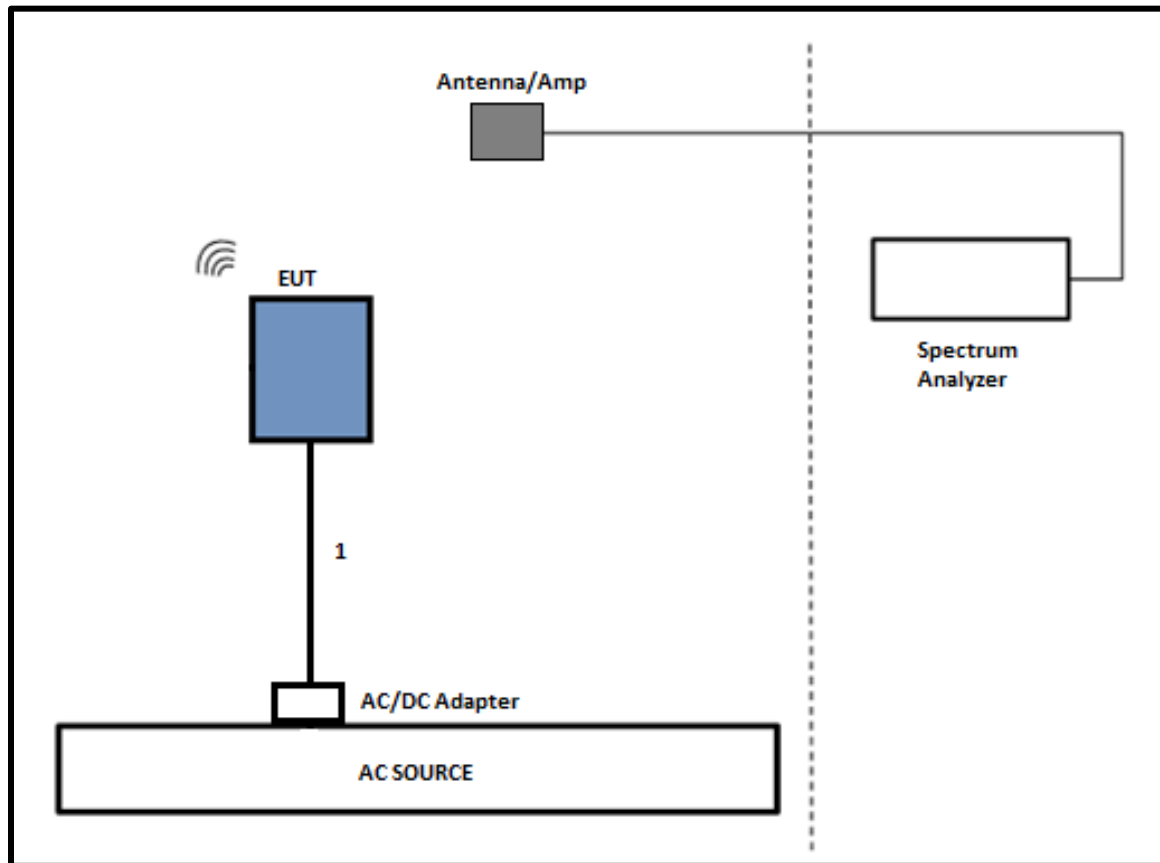
Testing was performed on the parent model and is used to support the application for the parent and variants identified in this report based on the test plan submitted and approved via KDB inquiry by the FCC and by ISED-Canada.

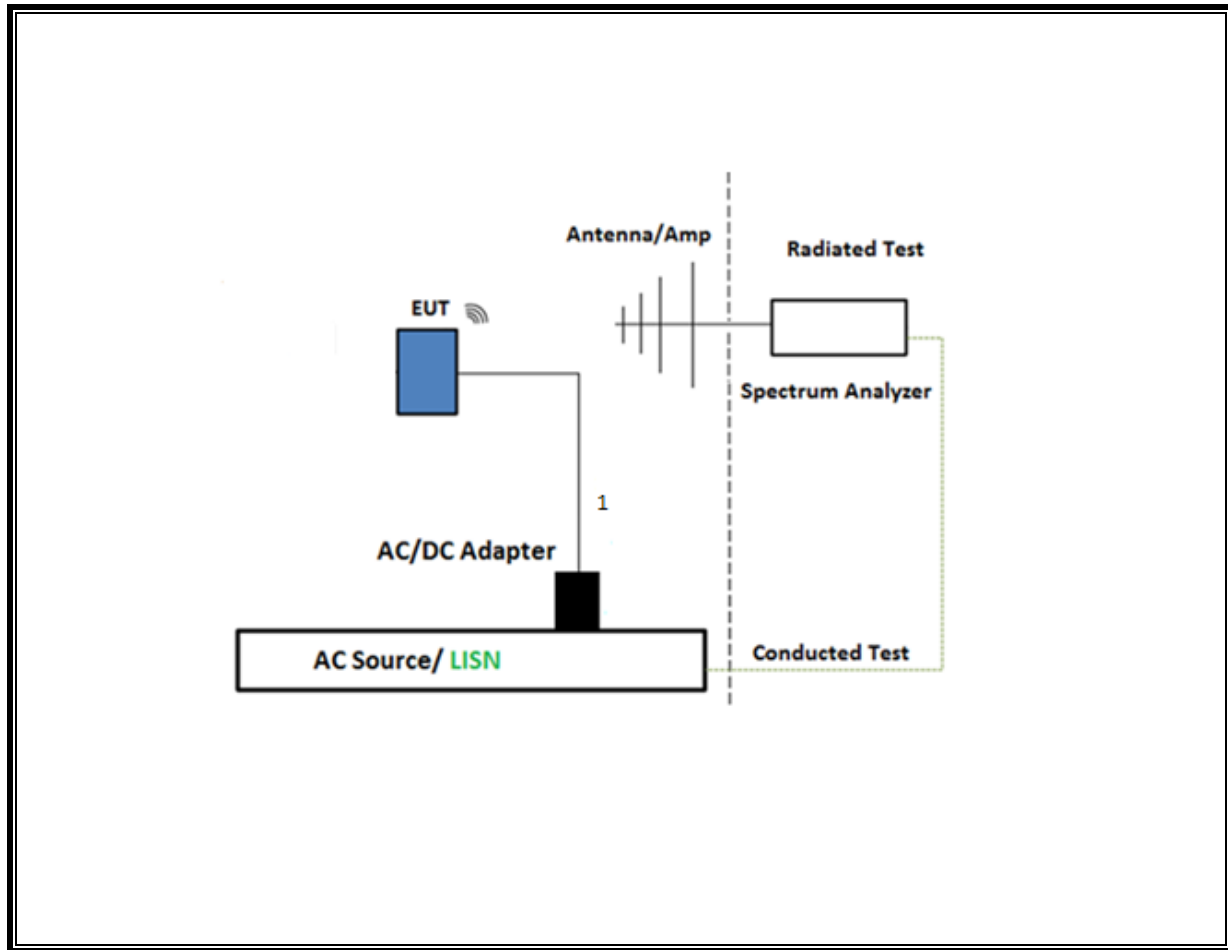
5.4. SUPPORT EQUIPMENT

SUPPORT TEST EQUIPMENT						
Description		Manufacturer	Model	Serial Number		FCC ID/ DoC
EUT AC/DC adapter		Apple	A1720	C3D8417A7R93KVPA8		DoC
I/O CABLES (RF RADIATED AND AC LINE CONDUCTED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shielded	2	N/A

TEST SETUP

The EUT setup is shown as below. Test software exercised the radio card.

SETUP DIAGRAM FOR RADIATED TESTS

SETUP DIAGRAM FOR Below 1GHz and AC LINE CONDUCTED TEST

6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment were utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
*Antenna, Passive Loop 30Hz to 1MHz	Electro-Metrics	EM-6871	170013	07/28/2023	07/28/2022
*Antenna, Passive Loop 100KHz to 30MHz	ETS-Lindgren	EM-6872	170015	07/28/2023	07/28/2022
Antenna, BroadBand Hybrid, 30MHz to 3GHz	SUNOL SCIENCES CORP.	JB3	230634	01/31/2024	01/31/2023
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	222362	8/15/2023	8/15/2022
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	235266	03/21/2024	03/21/2023
Environmental Chamber	Cincinnati Sub Zero - division of Weiss Technik	ZPHS-8-3.5- SCT/WC	89097	12/31/2023	12/31/2022

AC Line Conducted					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESR	93091	02/29/2024	02/29/2023
LISN for Conducted Emissions CISPR-16	FISCHER CUSTOM COMMUNICATIONS	FCC-LISN- 50/250-25-2-01- 480V	175764	01/31/2024	01/31/2023
*Transient Limiter	TE	TBFL1	207996	07/15/2023	07/15/2022
UL AUTOMATION SOFTWARE					
Radiated Software	UL	UL EMC	Ver 9.5, May 1 , 2023		
Conducted Software	UL	UL EMC	2020.8.16		
AC Line Conducted Software	UL	UL EMC	Ver 9.5, Mar 3, 2023		

*Testing is completed before equipment expiration date.

7. OCCUPIED BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 10kHz. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

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

RESULTS

99% and 20dB BW

Primary Antenna

Type A (Reader Mode)

Mode Kbps	Frequency (MHz)	99% Bandwidth (KHz)	20dB Bandwidth (KHz)
106	13.56	21.858	25.18

Type A (CE Mode)

Mode Kbps	Frequency (MHz)	99% Bandwidth (KHz)	20dB Bandwidth (KHz)
106	13.56	21.141	24.93

TAG Mode

Mode Kbps	Frequency (MHz)	99% Bandwidth (KHz)	20dB Bandwidth (KHz)
106	13.56	21.691	25.07

Secondary Antenna

Type A (Reader Mode)

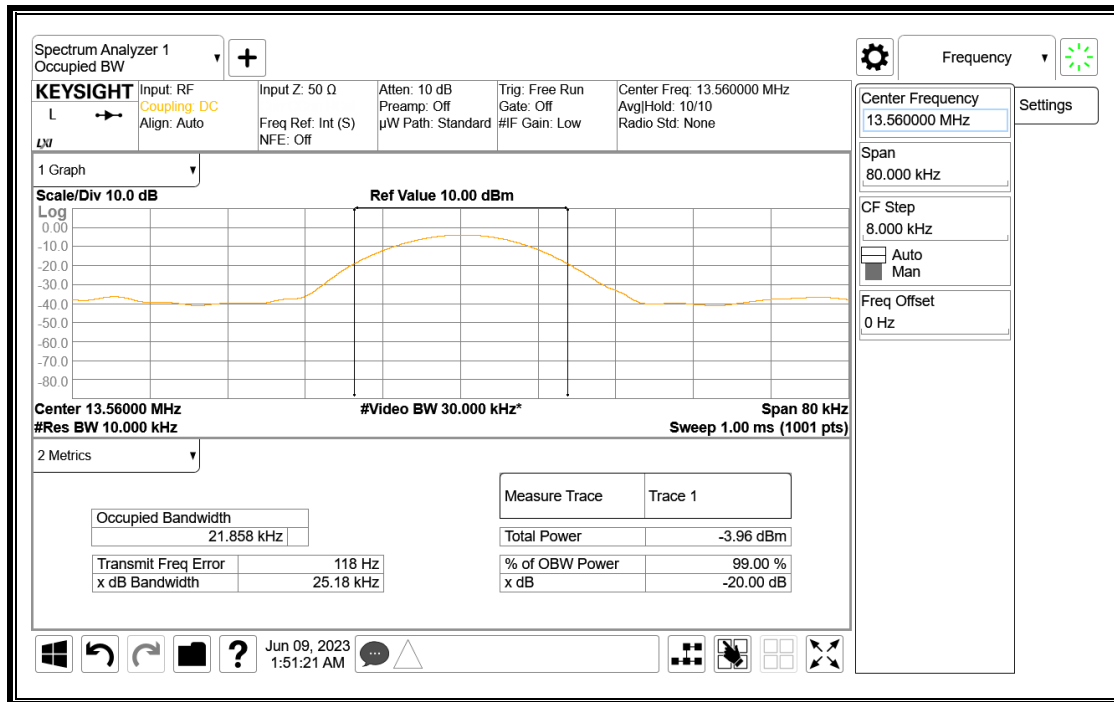
Mode Kbps	Frequency (MHz)	99% Bandwidth (KHz)	20dB Bandwidth (KHz)
106	13.56	21.930	25.22

TAG Mode

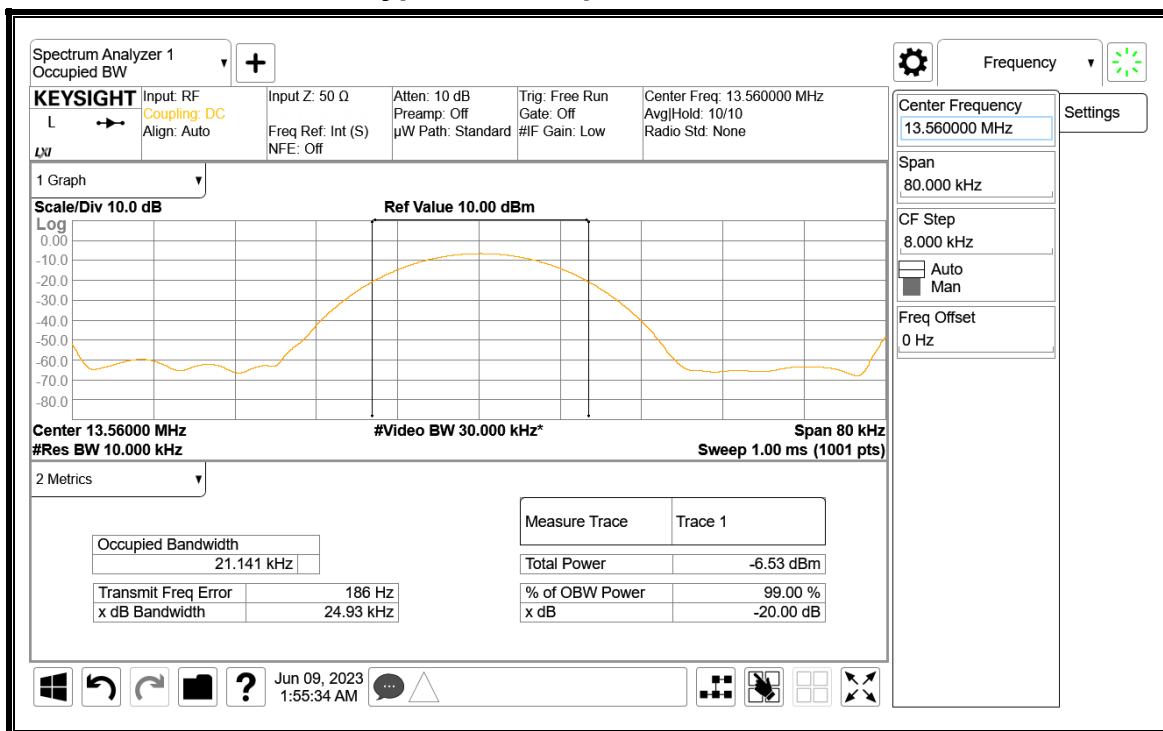
Mode Kbps	Frequency (MHz)	99% Bandwidth (KHz)	20dB Bandwidth (KHz)
106	13.56	21.914	25.14

7.1. PRIMARY ANTENNA

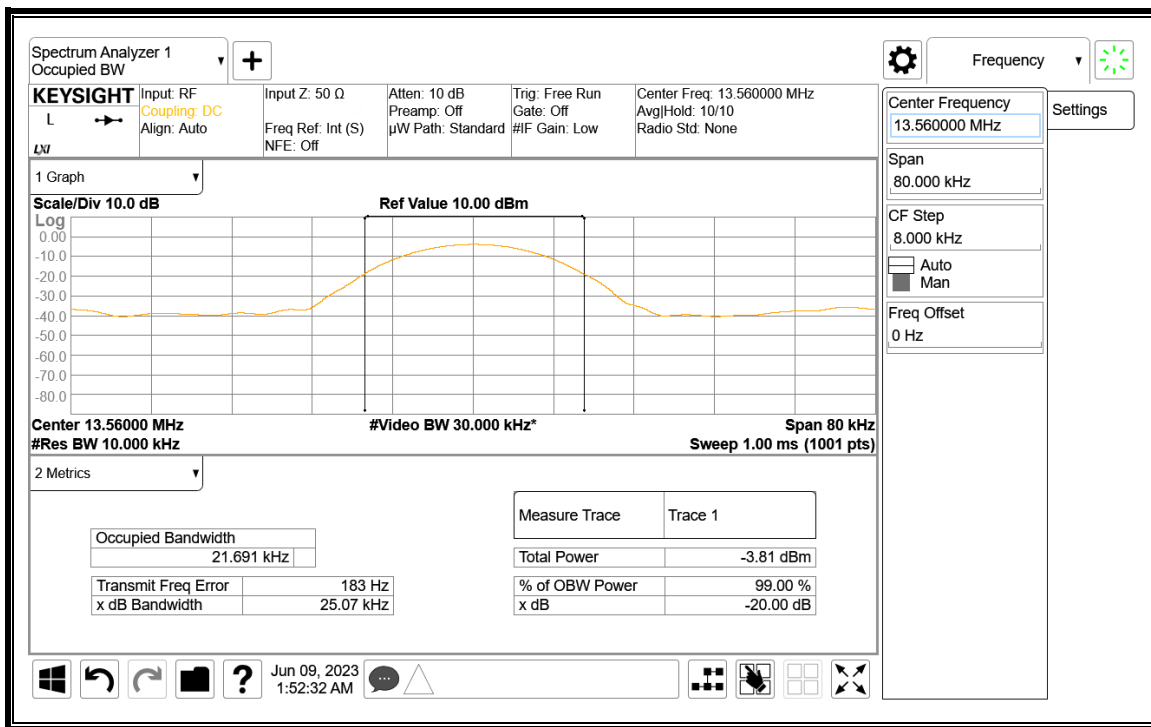
7.1.1. READER MODE, Type A 106 Kbps



7.1.2. CE MODE, Type A 106 Kbps

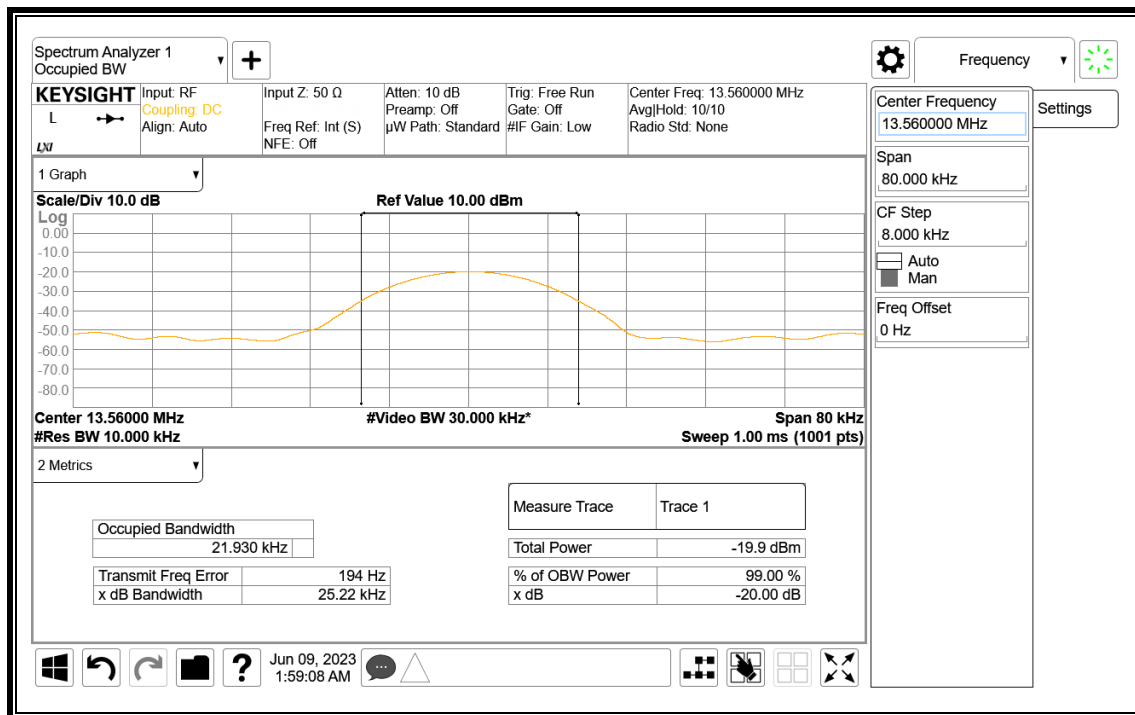


7.1.3. TAG MODE, Type A 106 Kbps

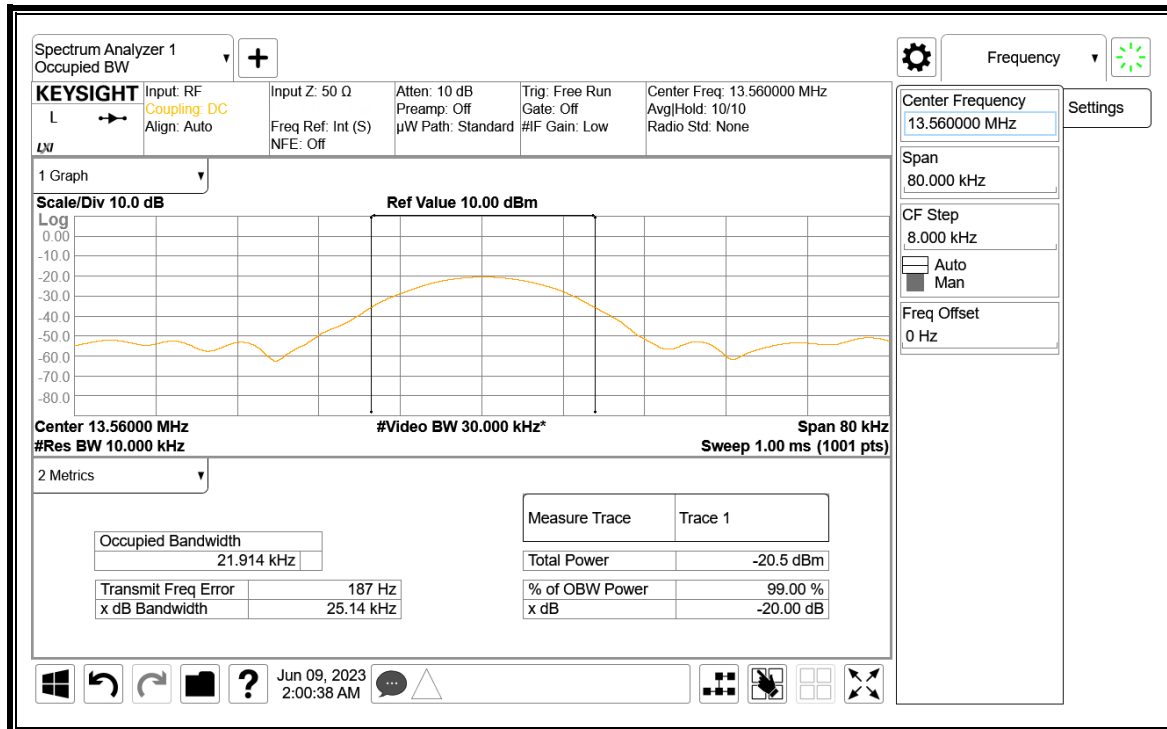


7.2. SECONDARY ANTENNA

7.2.1. READER MODE, Type A 106 Kbps



7.2.2. TAG MODE, Type A 106 Kbps



8. RADIATED EMISSION TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMIT

§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

** 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 field strength from uV/m to dBuV/m is:

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

Note: The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as report in the table) using free space impedance of 377 Ohms. For example, the measurement at frequency X kHz resulted in a level of Y dBuV/m, which is equivalent to $Y - 51.5 = Z$ dBuA/m, which has the same margin, W dB to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

In addition:

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

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

TEST PROCEDURE

ANSI C63.10, 2013

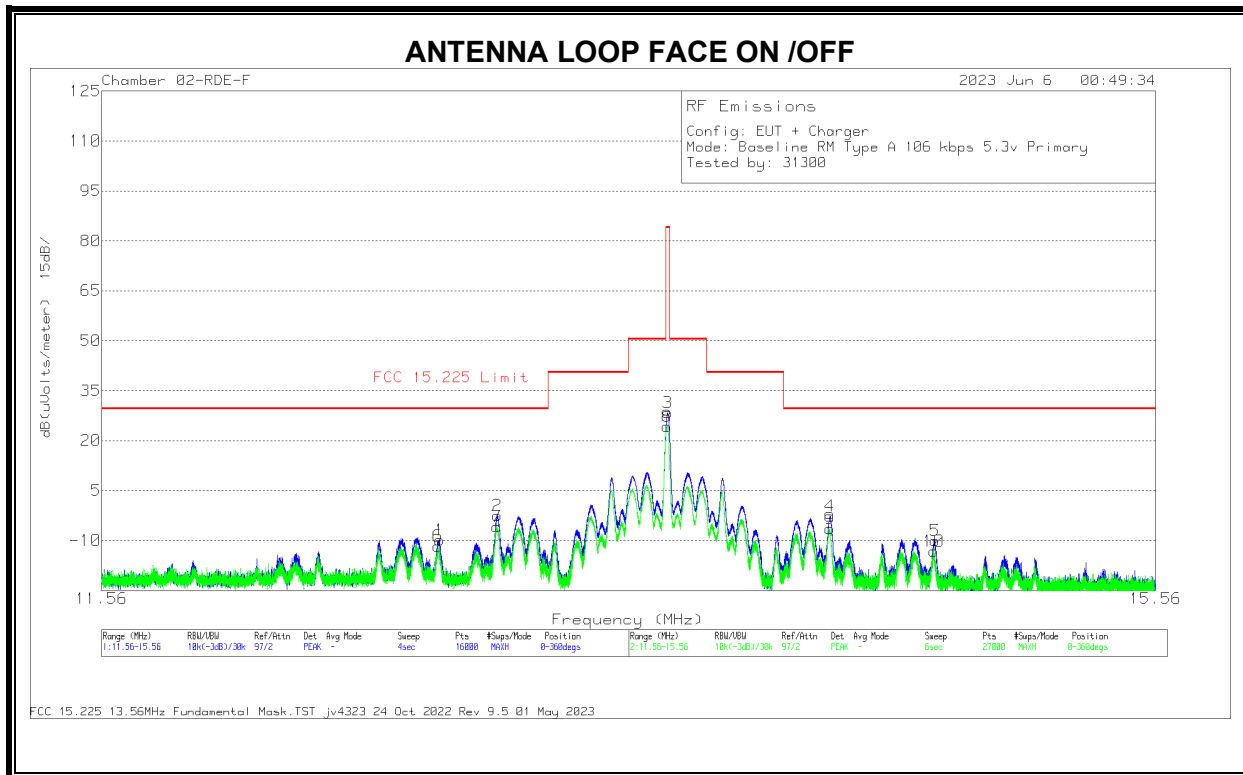
The EUT is an intentional radiator that incorporates a digital device, the highest fundamental frequency generated or used in the device is 13.56 MHz; therefore, the frequency range was investigated from 0.15 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater.

RESULTS

8.2. PRIMARY ANTENNA FUNDAMENTAL & SPURIOUS EMISSION 0.15-30 MHz

8.2.1. READER MODE, Type A 106 Kbps

FUNDAMENTAL

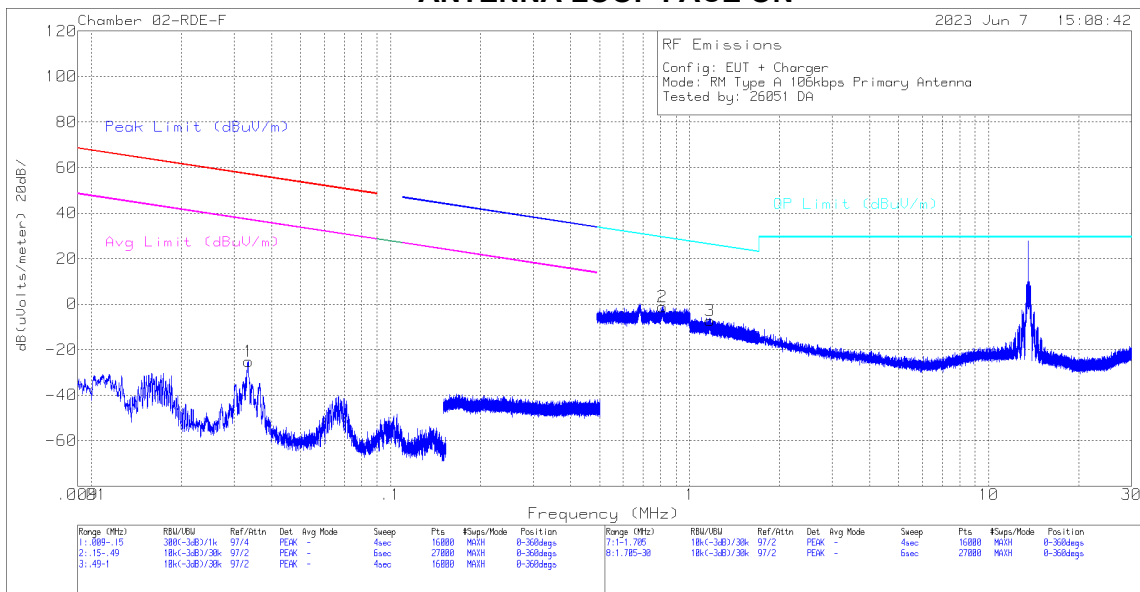


DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF) dB/m	Chamber F port 0 loss dB	Dist Corr (dB) 40Log	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	PK Margin (dB)	Azimuth (Degs)	Polarity
1	12.7155	27.97	Pk	34.4	-32.2	-40	-9.83	29.54	-39.37	0-360	Face-On
2	12.9243	35.24	Pk	34.4	-32.1	-40	-2.46	29.54	-32	0-360	Face-On
3	13.5598	66.24	Pk	34.3	-32.2	-40	28.34	84	-55.66	0-360	Face-On
4	14.1943	35.29	Pk	34.2	-32.1	-40	-2.61	29.54	-32.15	0-360	Face-On
5	14.6213	28.14	Pk	34.1	-32.2	-40	-9.96	29.54	-39.5	0-360	Face-On
6	12.7103	26.18	Pk	34.4	-32.2	-40	-11.62	29.54	-41.16	0-360	Face-Off
7	12.9222	31.78	Pk	34.4	-32.1	-40	-5.92	29.54	-35.46	0-360	Face-Off
8	13.5587	62.2	Pk	34.3	-32.2	-40	24.3	84	-59.7	0-360	Face-Off
9	14.1948	31.38	Pk	34.2	-32.1	-40	-6.52	29.54	-36.06	0-360	Face-Off
10	14.6172	24.8	Pk	34.1	-32.2	-40	-13.3	29.54	-42.84	0-360	Face-Off

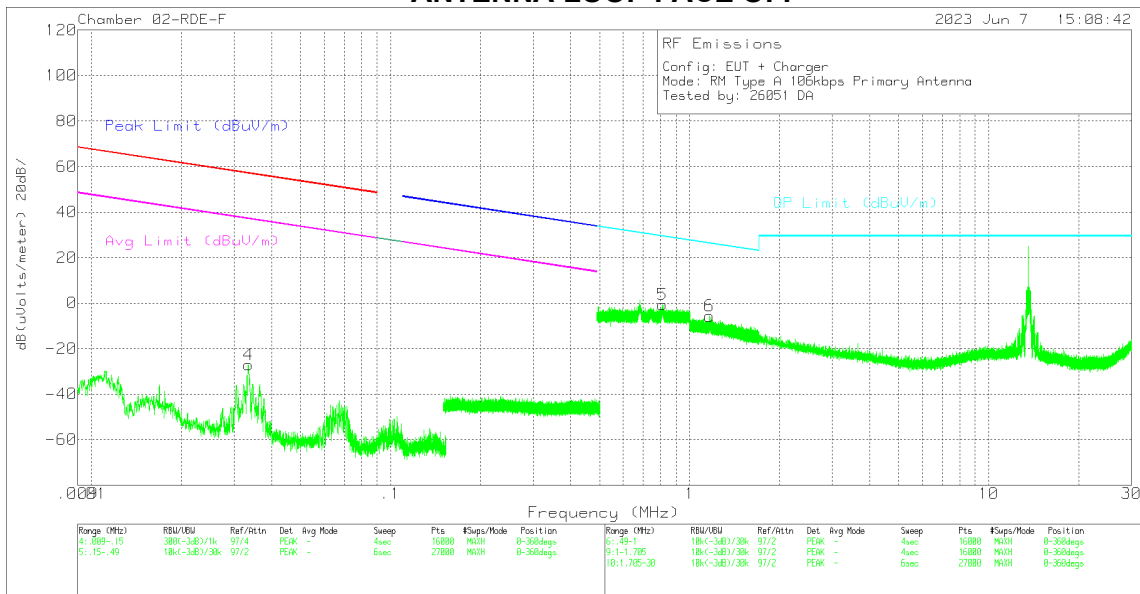
Pk - Peak detector

ANTENNA LOOP FACE ON



FCC 15.209 Below 30MHz.TST jv4323 24 Oct 2022 Rev 9.5 01 May 2023

ANTENNA LOOP FACE OFF



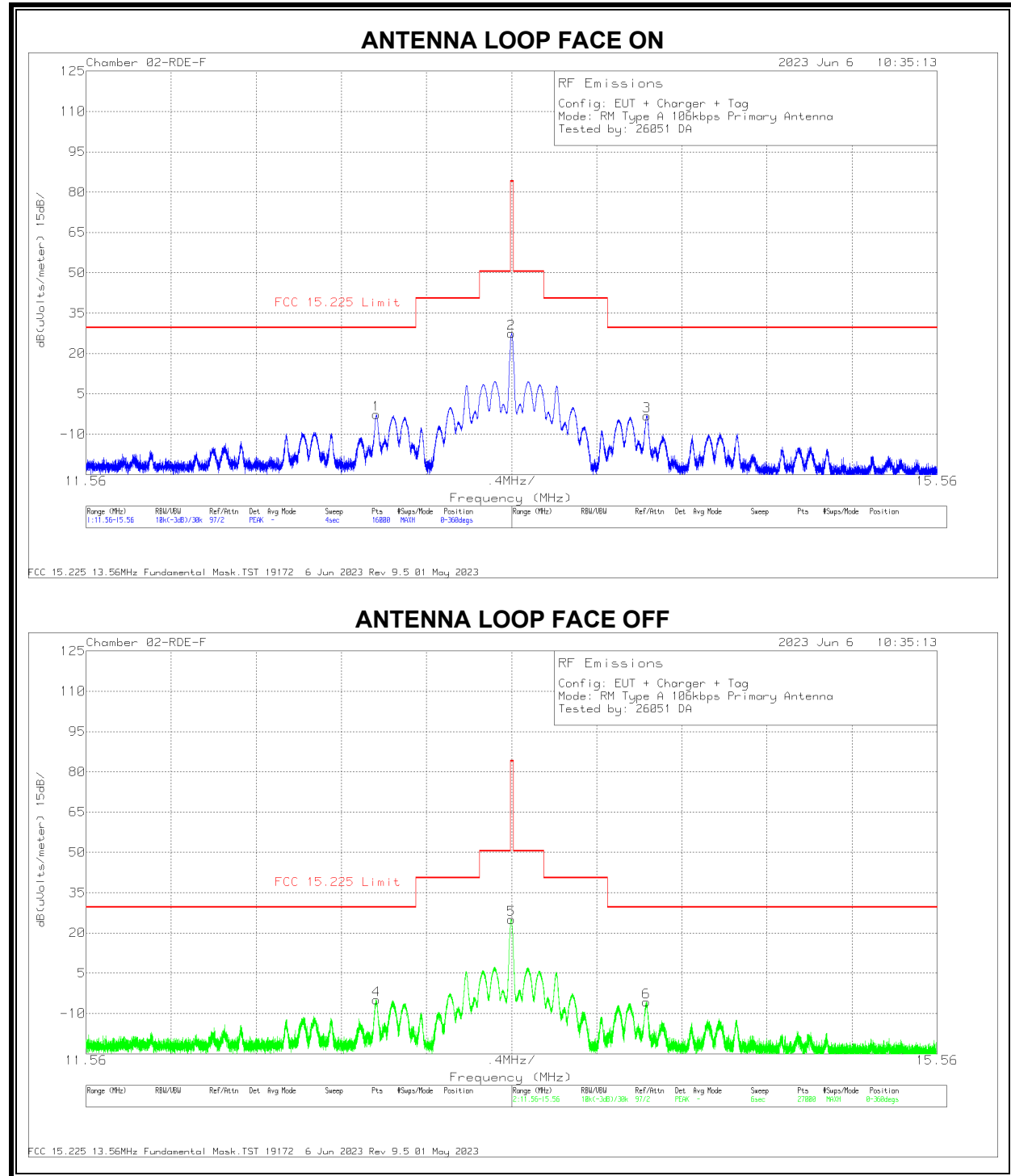
FCC 15.209 Below 30MHz.TST jv4323 24 Oct 2022 Rev 9.5 01 May 2023

DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF) (dB/m)	Cbl/Amp (dB)	Dist Corr 300m (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity
1	.0335	29.14	Pk	57.8	-32.2	-80	-25.26	57.09	-82.35	37.09	-62.35	0-360	Face-On
4	.0335	27.27	Pk	57.8	-32.2	-80	-27.13	57.08	-84.21	37.08	-64.21	0-360	Face-Off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF) (dB/m)	Cbl/Amp (dB)	Dist Corr 30m (dB)	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity
2	.8115	14.83	Pk	56.4	-32.5	-40	-1.27	29.43	-30.7	0-360	Face-On
3	1.1727	19.27	Pk	45.9	-32.4	-40	-7.23	26.24	-33.47	0-360	Face-On
5	.81	15.49	Pk	56.4	-32.5	-40	-.61	29.45	-30.06	0-360	Face-Off
6	1.1662	20.78	Pk	45.9	-32.4	-40	-5.72	26.29	-32.01	0-360	Face-Off

Pk - Peak detector

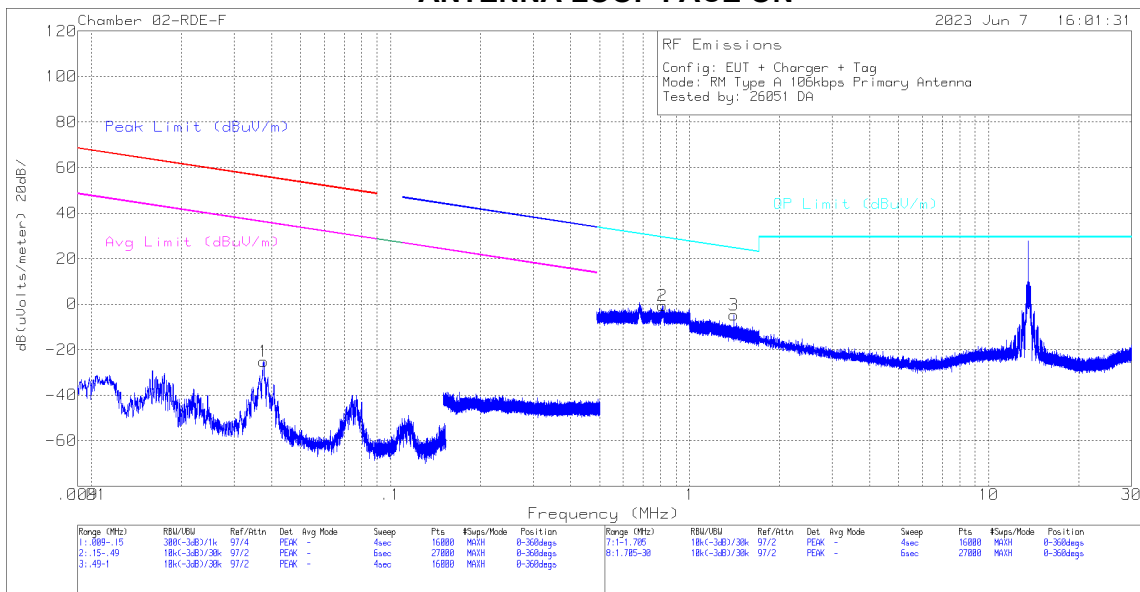
8.2.2. TAG MODE, Type A 106 Kbps**FUNDAMENTAL**

DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF) (dB/m)	Cbl/Amp (dB)	Dist Corr 30m (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Polarity
1	12.9248	34.97	Pk	34.4	-32.1	-40	-2.73	29.54	-32.27	0-360	Face-On
2	13.5598	65.29	Pk	34.3	-32.2	-40	27.39	84	-56.61	0-360	Face-On
3	14.1958	34.7	Pk	34.2	-32.1	-40	-3.2	29.54	-32.74	0-360	Face-On
4	12.9243	32.79	Pk	34.4	-32.1	-40	-4.91	29.54	-34.45	0-360	Face-Off
5	13.5586	62.95	Pk	34.3	-32.2	-40	25.05	84	-58.95	0-360	Face-Off
6	14.1931	32.29	Pk	34.2	-32.1	-40	-5.61	29.54	-35.15	0-360	Face-Off

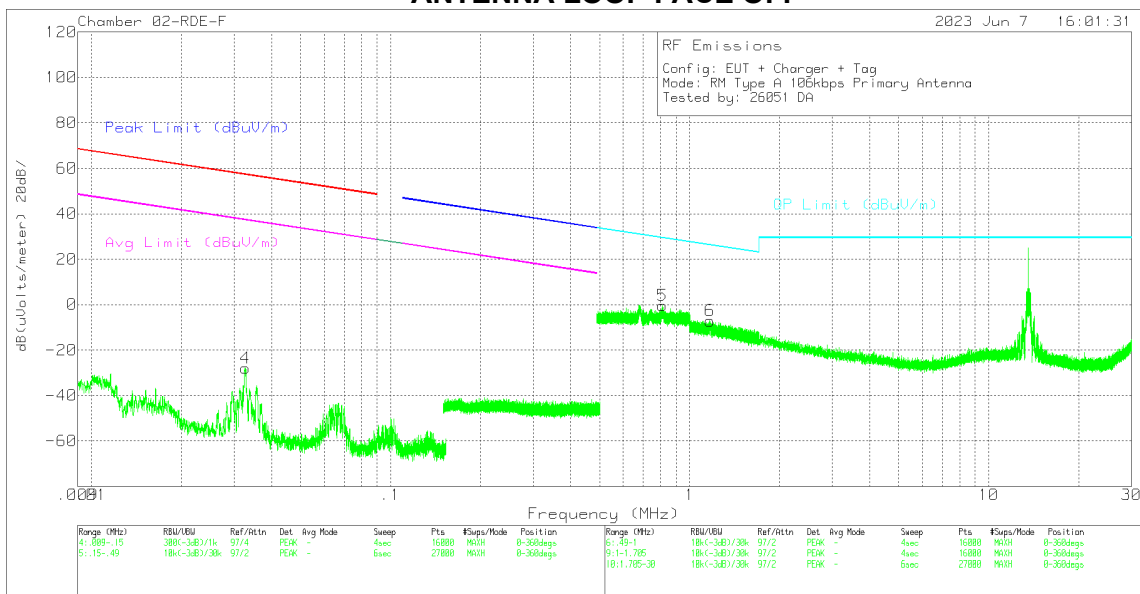
Pk - Peak detector

ANTENNA LOOP FACE ON



FCC 15.209 Below 30MHz.TST jv4323 24 Oct 2022 Rev 9.5 01 May 2023

ANTENNA LOOP FACE OFF



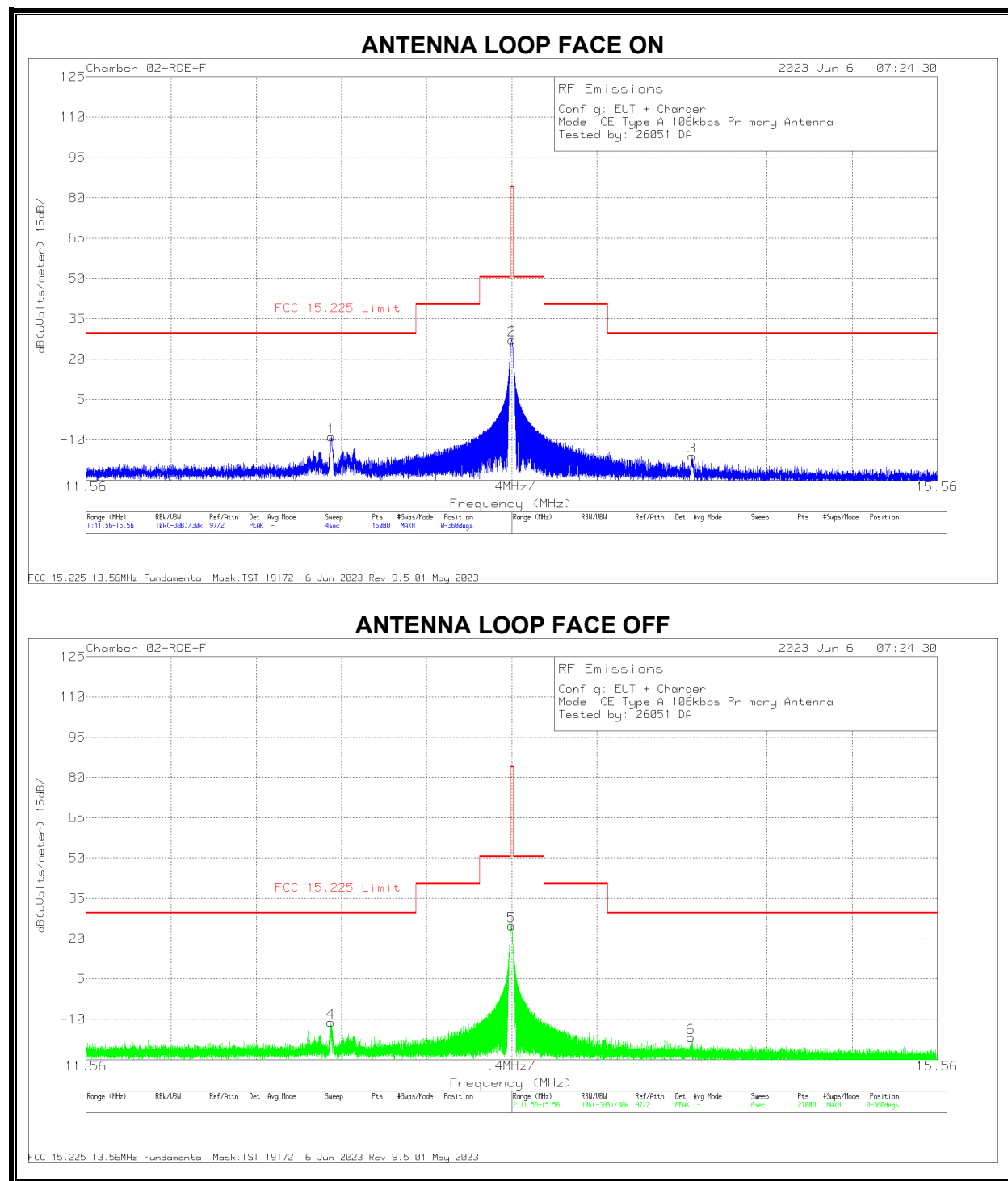
FCC 15.209 Below 30MHz.TST jv4323 24 Oct 2022 Rev 9.5 01 May 2023

DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF) (dB/m)	Cbl/Amp (dB)	Dist Corr 300m (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity
1	.0377	29.75	Pk	57.5	-32.4	-80	-25.15	56.06	-81.21	36.06	-61.21	0-360	Face-On
4	.0327	26.61	Pk	57.8	-32.2	-80	-27.79	57.3	-85.09	37.3	-65.09	0-360	Face-Off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF) (dB/m)	Cbl/Amp (dB)	Dist Corr 30m (dB)	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity
2	.8101	15.41	Pk	56.4	-32.5	-40	-.69	29.45	-30.14	0-360	Face-On
3	1.4056	23.01	Pk	44.7	-32.4	-40	-4.69	24.67	-29.36	0-360	Face-On
5	.812	15.7	Pk	56.4	-32.5	-40	-.4	29.43	-29.83	0-360	Face-Off
6	1.1704	19.4	Pk	45.9	-32.4	-40	-7.1	26.26	-33.36	0-360	Face-Off

Pk - Peak detector

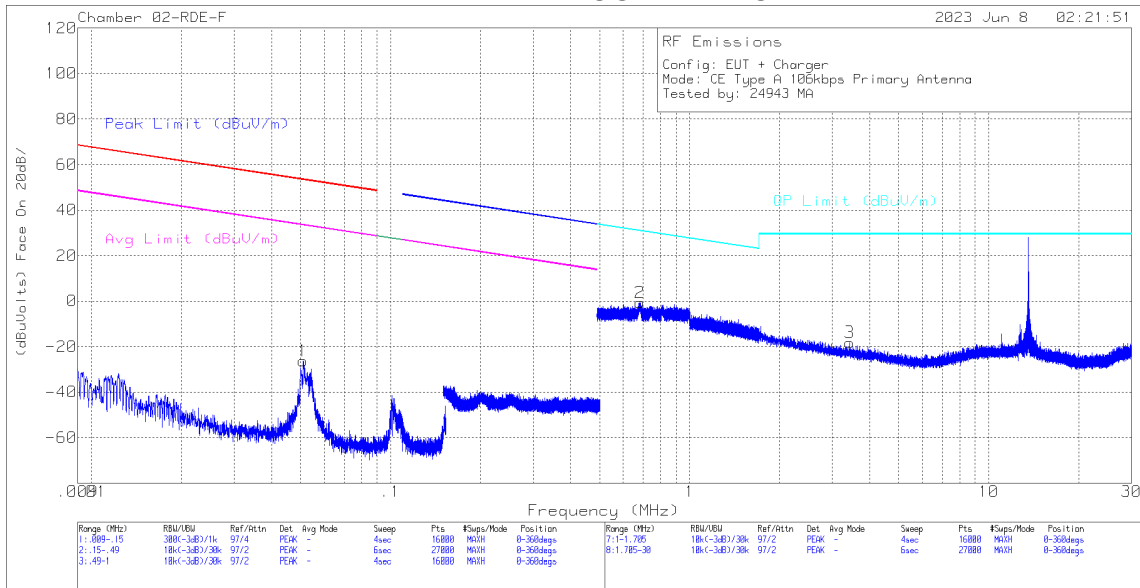
8.2.3. CE MODE, Type A 106 Kbps**FUNDAMENTAL**

DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF) (dB/m)	Cbl/Amp (dB)	Dist Corr 30m (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Polarity
1	12.7135	28.93	Pk	34.4	-32.2	-40	-8.87	29.54	-38.41	0-360	Face-On
2	13.56	65.05	Pk	34.3	-32.2	-40	27.15	84	-56.85	0-360	Face-On
3	14.4078	22.09	Pk	34.1	-32.2	-40	-16.01	29.54	-45.55	0-360	Face-Off
4	12.7106	26.7	Pk	34.4	-32.2	-40	-11.1	29.54	-40.64	0-360	Face-Off
5	13.5579	62.81	Pk	34.3	-32.2	-40	24.91	84	-59.09	0-360	Face-Off
6	14.4031	21.32	Pk	34.1	-32.2	-40	-16.78	29.54	-46.32	0-360	Face-On

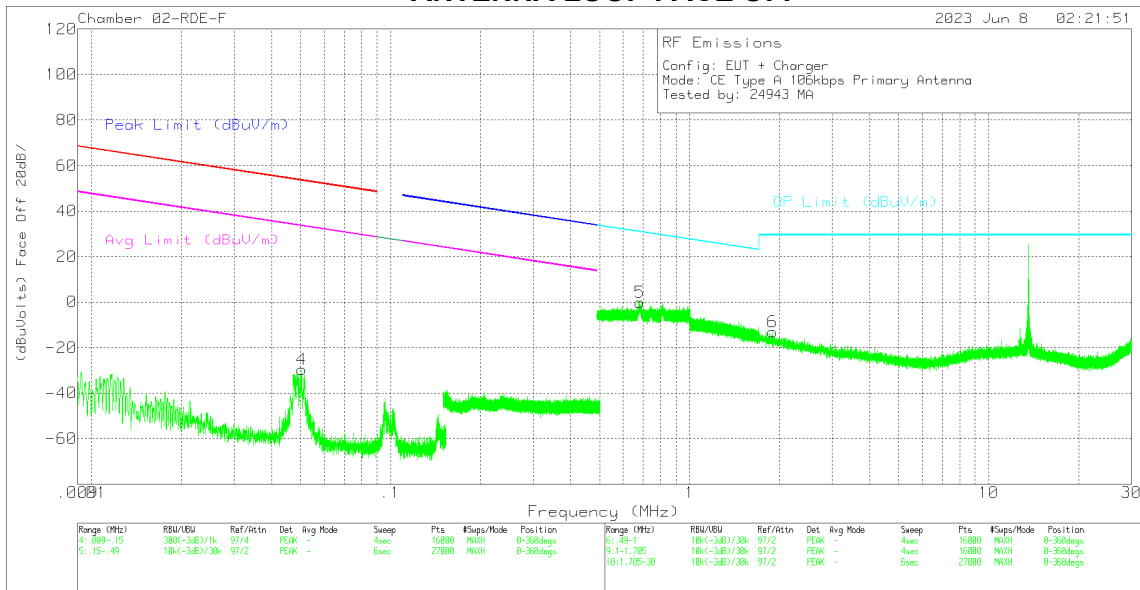
Pk - Peak detector

ANTENNA LOOP FACE ON



FCC 15.209 Below 30MHz.TST jv4323 24 Oct. 2022 Rev 9.5 01 May 2023

ANTENNA LOOP FACE OFF



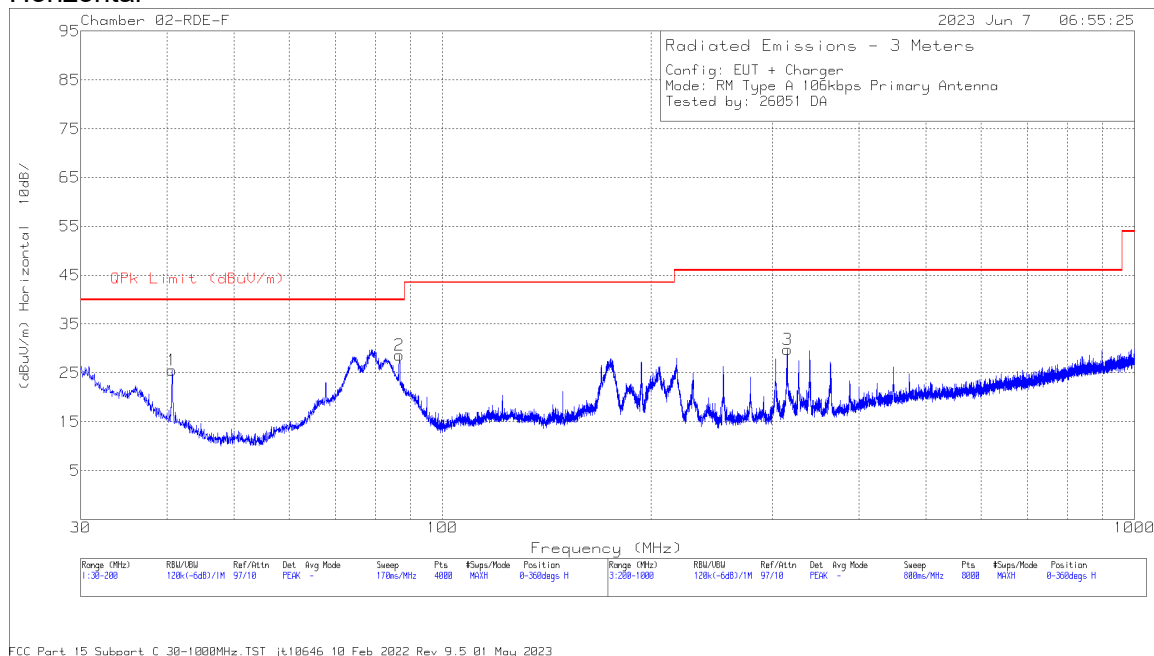
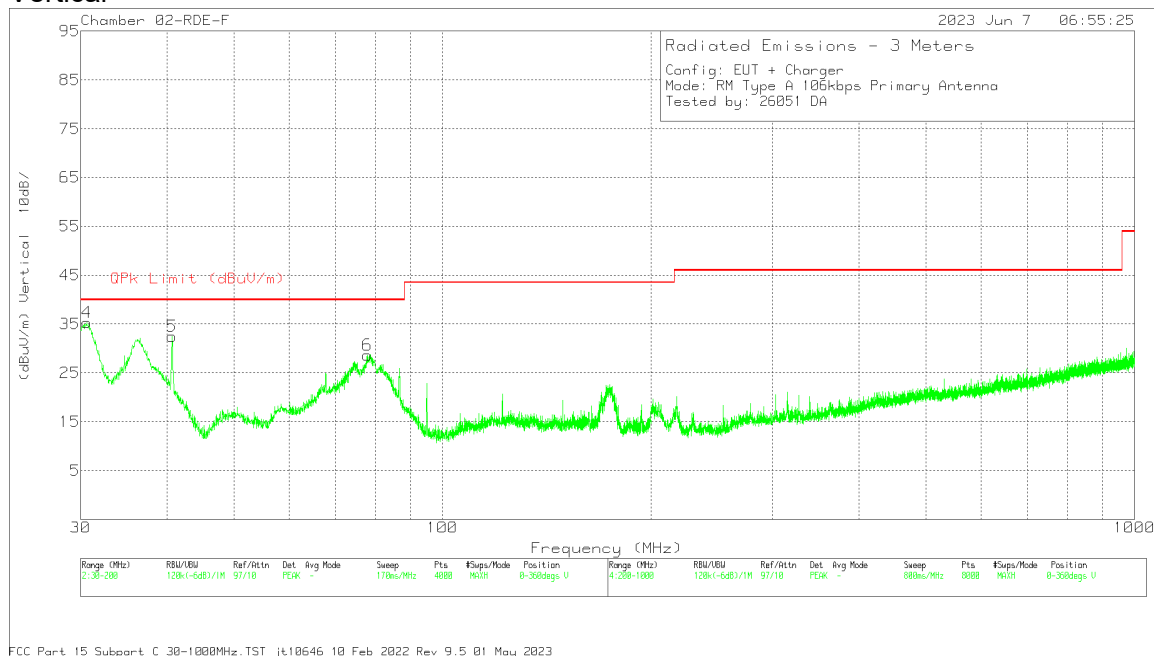
FCC 15.209 Below 30MHz.TST jv4323 24 Oct. 2022 Rev 9.5 01 May 2023

DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF) (dB/m)	Cbl/Amp (dB)	Dist Corr 300m (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity
1	.0511	28.96	Pk	57.1	-32.3	-80	-26.24	53.41	-79.65	33.41	-59.65	0-360	Face-On
4	.0505	25.61	Pk	57.2	-32.3	-80	-29.49	53.52	-83.01	33.52	-63.01	0-360	Face-Off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF) (dB/m)	Cbl/Amp (dB)	Dist Corr 30m (dB)	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity
2	.6826	15.69	Pk	56.3	-32.5	-40	-.51	30.93	-31.44	0-360	Face-On
3	3.4353	16.06	Pk	38.1	-32.3	-40	-18.14	29.5	-47.64	0-360	Face-On
5	.6824	16.06	Pk	56.3	-32.5	-40	-.14	30.93	-31.07	0-360	Face-Off
6	1.8905	17.19	Pk	42.1	-32.3	-40	-13.01	29.5	-42.51	0-360	Face-Off

Pk - Peak detector

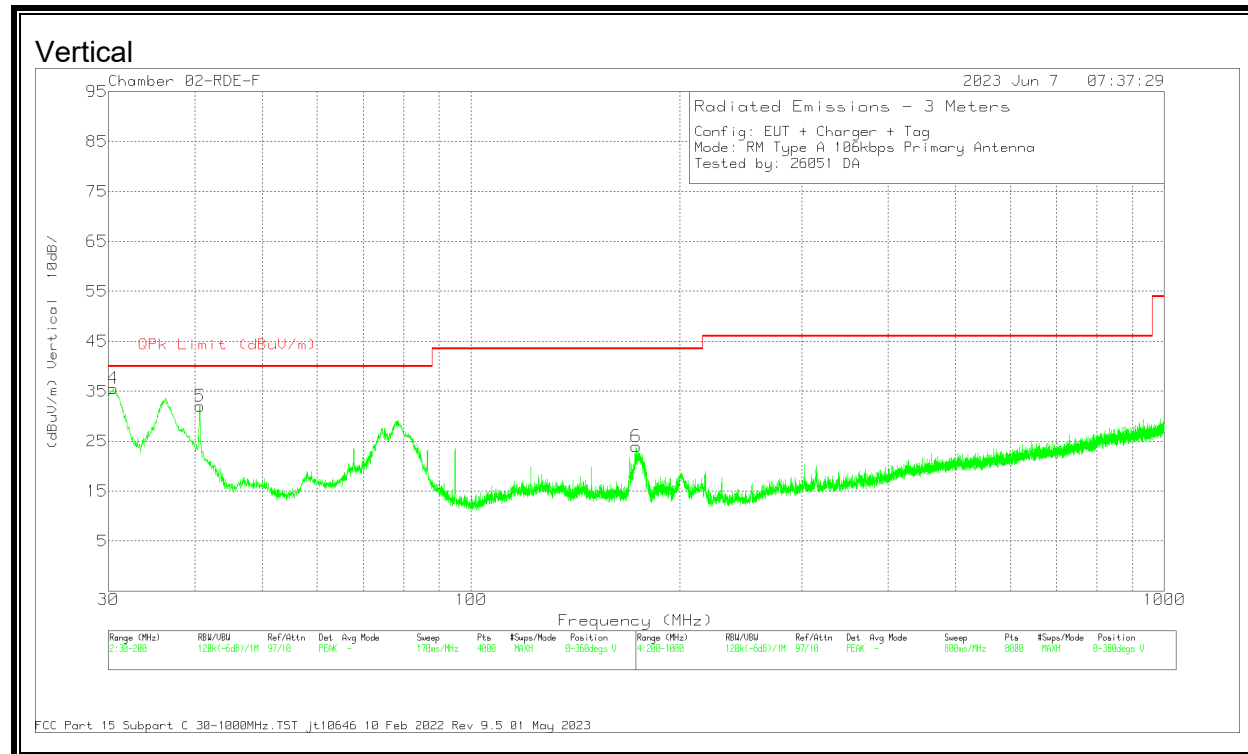
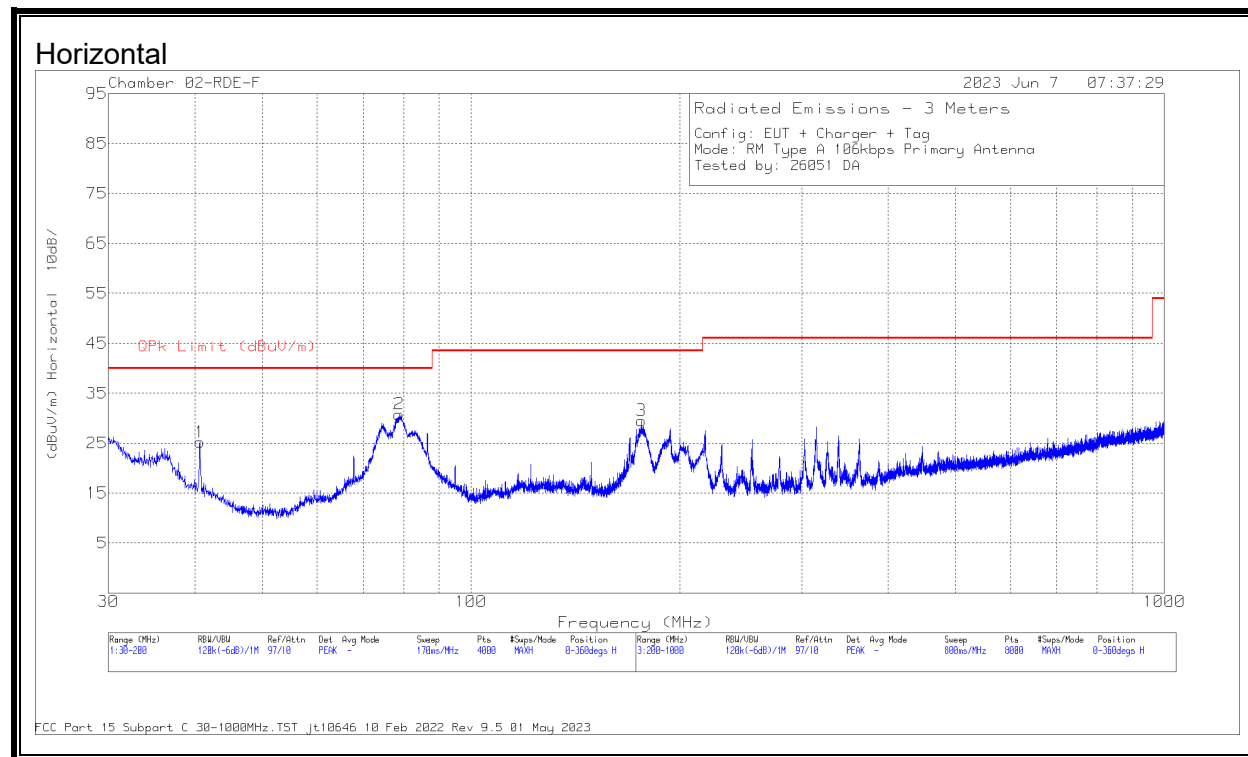
8.3. PRIMARY ANTENNA TX SPURIOUS EMISSION 30-1000 MHz**8.3.1. READER MODE, Type A 106 Kbps****SPURIOUS EMISSION****Horizontal****Vertical**

DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	230634 ACF (dB) 10m H	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	40.6703	37.91	Pk	18.9	-31.3	25.51	40	-14.49	0-360	399	H
2	86.6247	46.39	Pk	13.3	-31	28.69	40	-11.31	0-360	298	H
3	315.115	40.3	Pk	19.5	-30	29.8	46.02	-16.22	0-360	100	H
4	30.5952	40.18	Pk	26.4	-31.3	35.28	40	-4.72	0-360	100	V
	30.359	37.1	Qp	26.6	-31.3	32.4	40	-7.6	73	100	V
5	40.6703	44.94	Pk	18.9	-31.3	32.54	40	-7.46	0-360	100	V
	40.6781	44.12	Qp	18.9	-31.3	31.72	40	-8.28	68	100	V
6	77.8249	46.08	Pk	13.6	-31	28.68	40	-11.32	0-360	100	V

Pk - Peak detector

Qp - Quasi-Peak detector

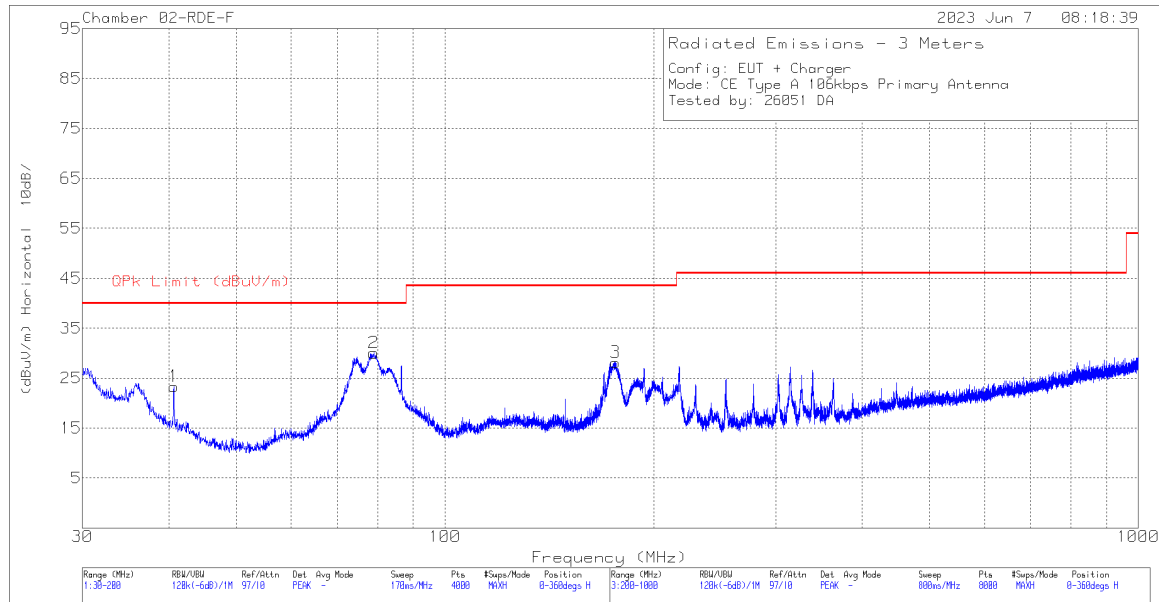
8.3.2. TAG MODE, Type A 106 Kbps**SPURIOUS EMISSION**

DATA

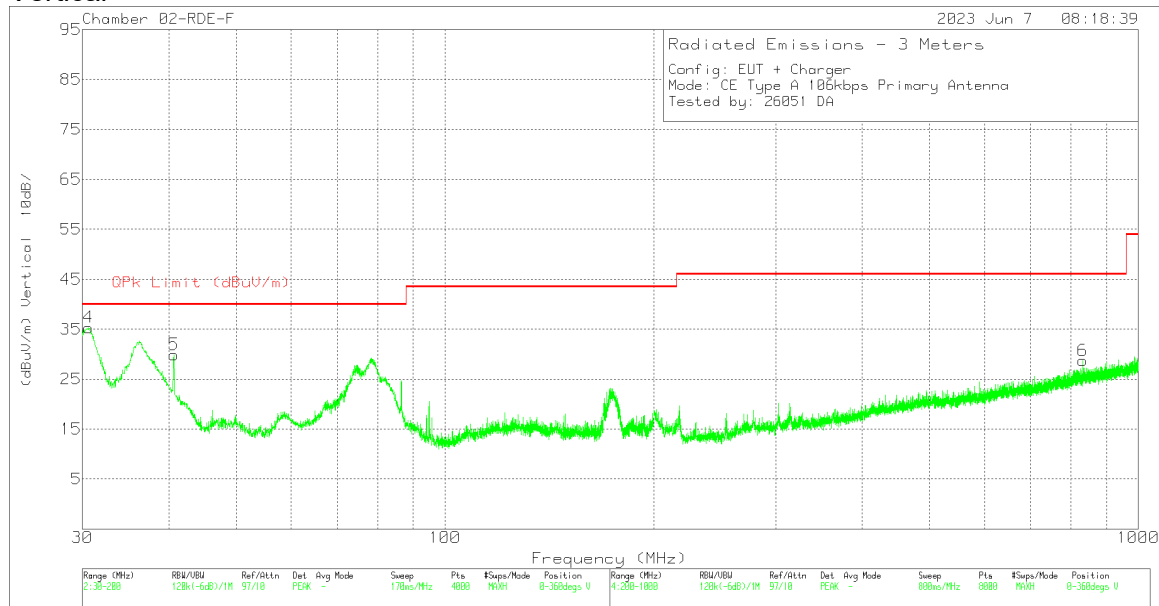
Marker	Frequenc y (MHz)	Meter Reading (dBuV)	Det	230634 ACF (dB) 10m H	Amp/Cbl (dB)	Correcte d Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degr)	Height (cm)	Polarity
1	40.6703	37.59	Pk	18.9	-31.3	25.19	40	-14.81	0-360	298	H
2	78.8026	48.3	Pk	13.5	-31	30.8	40	-9.2	0-360	199	H
3	176.28	42.89	Pk	17.1	-30.5	29.49	43.52	-14.03	0-360	199	H
4	30.4676	40.34	Pk	26.5	-31.3	35.54	40	-4.46	0-360	100	V
	30.6276	36.97	Qp	26.4	-31.3	32.07	40	-7.93	90	110	V
5	40.6703	44.41	Pk	18.9	-31.3	32.01	40	-7.99	0-360	100	V
	40.6779	43.69	Qp	18.9	-31.3	31.29	40	-8.71	67	107	V
6	173.135	37.25	Pk	17.3	-30.6	23.95	43.52	-19.57	0-360	100	V

Pk - Peak detector

Qp - Quasi-Peak detector

8.3.3. CE MODE, Type A 106 Kbps**Horizontal**

FCC Part 15 Subpart C 30-1000MHz.TST_jt10646 10 Feb 2022 Rev 9.5 01 May 2023

Vertical

FCC Part 15 Subpart C 30-1000MHz.TST_jt10646 10 Feb 2022 Rev 9.5 01 May 2023

DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	230634 ACF (dB) 10m H	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	40.6703	35.74	Pk	18.9	-31.3	23.34	40	-16.66	0-360	298	H
2	78.9727	47.57	Pk	13.5	-31	30.07	40	-9.93	0-360	199	H
3	176.28	41.54	Pk	17.1	-30.5	28.14	43.52	-15.38	0-360	199	H
4	30.6377	40.24	Pk	26.4	-31.3	35.34	40	-4.66	0-360	102	V
	30.3791	37.1	Qp	26.6	-31.3	32.4	40	-7.6	32	100	V
5	40.7128	42.4	Pk	18.8	-31.3	29.9	40	-10.1	0-360	102	V
6	831.782	29.72	Pk	27.2	-28.2	28.72	46.02	-17.3	0-360	102	V

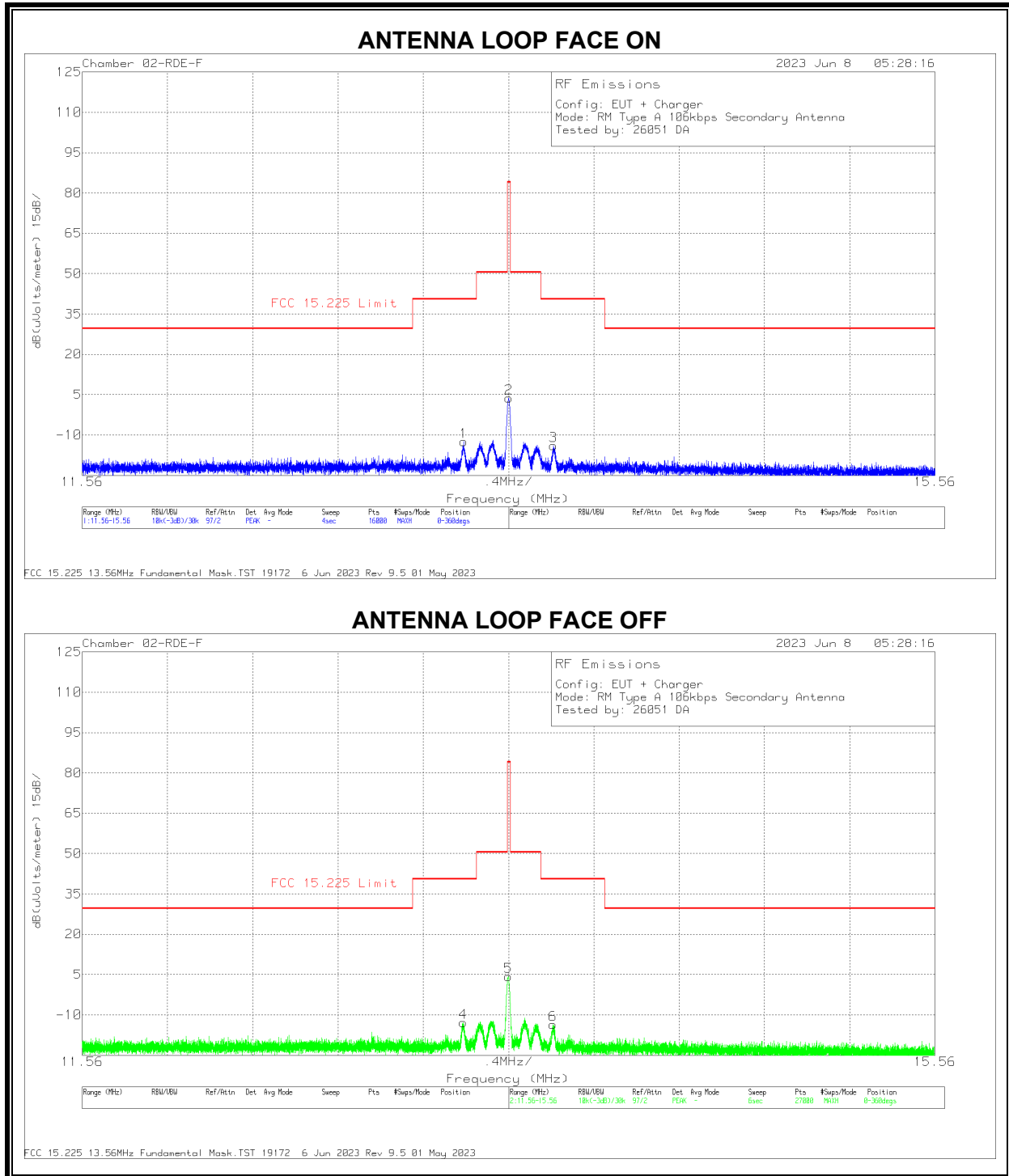
Pk - Peak detector

Qp - Quasi-Peak detector

8.4. SECONDARY ANTENNA FUNDAMENTAL & SPURIOUS EMISSION 0.15-30 MHz

8.4.1. READER MODE, Type A 106 Kbps

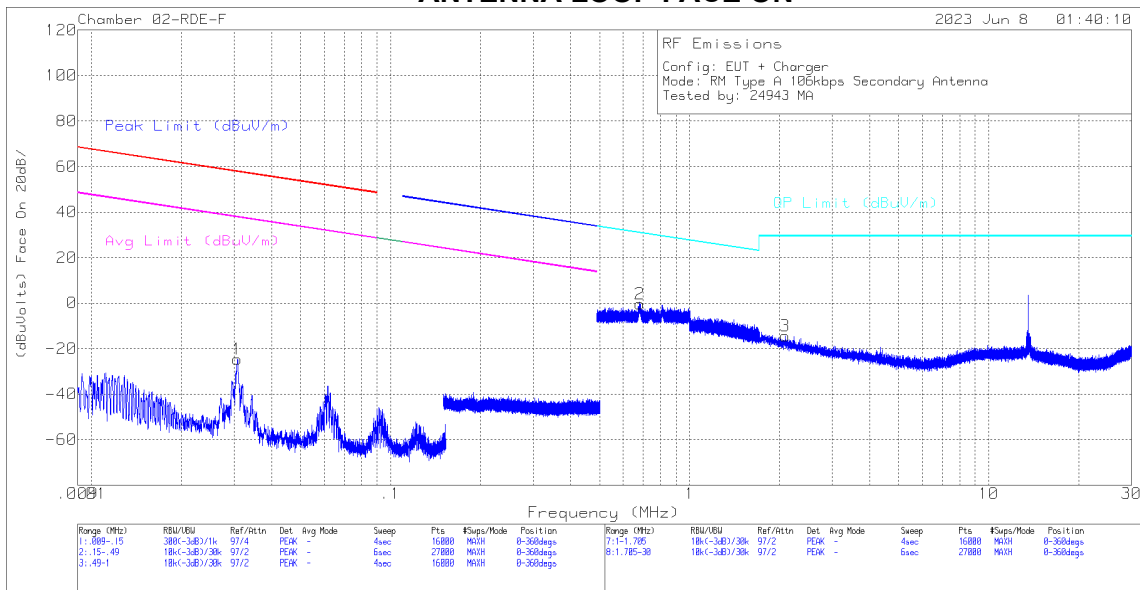
FUNDAMENTAL



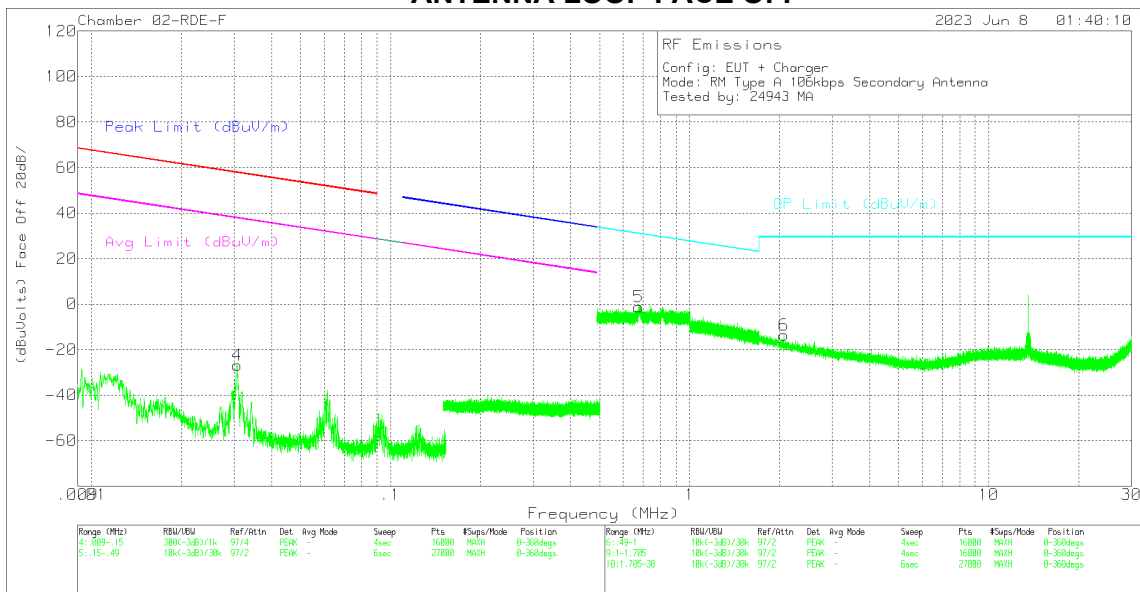
DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF) (dB/m)	Cbl/Amp (dB)	Dist Corr 30m (dB)	Corrected Reading dB(uVolts /meter)	FCC 15.225 Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Polarity
1	13.349	25.16	Pk	34.3	-32	-40	-12.54	40.51	-53.05	0-360	Face-On
2	13.5605	41.36	Pk	34.3	-32	-40	3.66	84	-80.34	0-360	Face-On
3	13.7713	23.89	Pk	34.2	-32.1	-40	-14.01	40.51	-54.52	0-360	Face-On
4	13.3481	24.81	Pk	34.3	-32	-40	-12.89	40.51	-53.4	0-360	Face-Off
5	13.5589	41.99	Pk	34.3	-32	-40	4.29	84	-79.71	0-360	Face-Off
6	13.7674	24.27	Pk	34.2	-32.1	-40	-13.63	40.51	-54.14	0-360	Face-Off

Pk - Peak detector

SPURIOUS EMISSION**ANTENNA LOOP FACE ON**

FCC 15.209 Below 30MHz.TST jv4323 24 Oct 2022 Rev 9.5 01 May 2023

ANTENNA LOOP FACE OFF

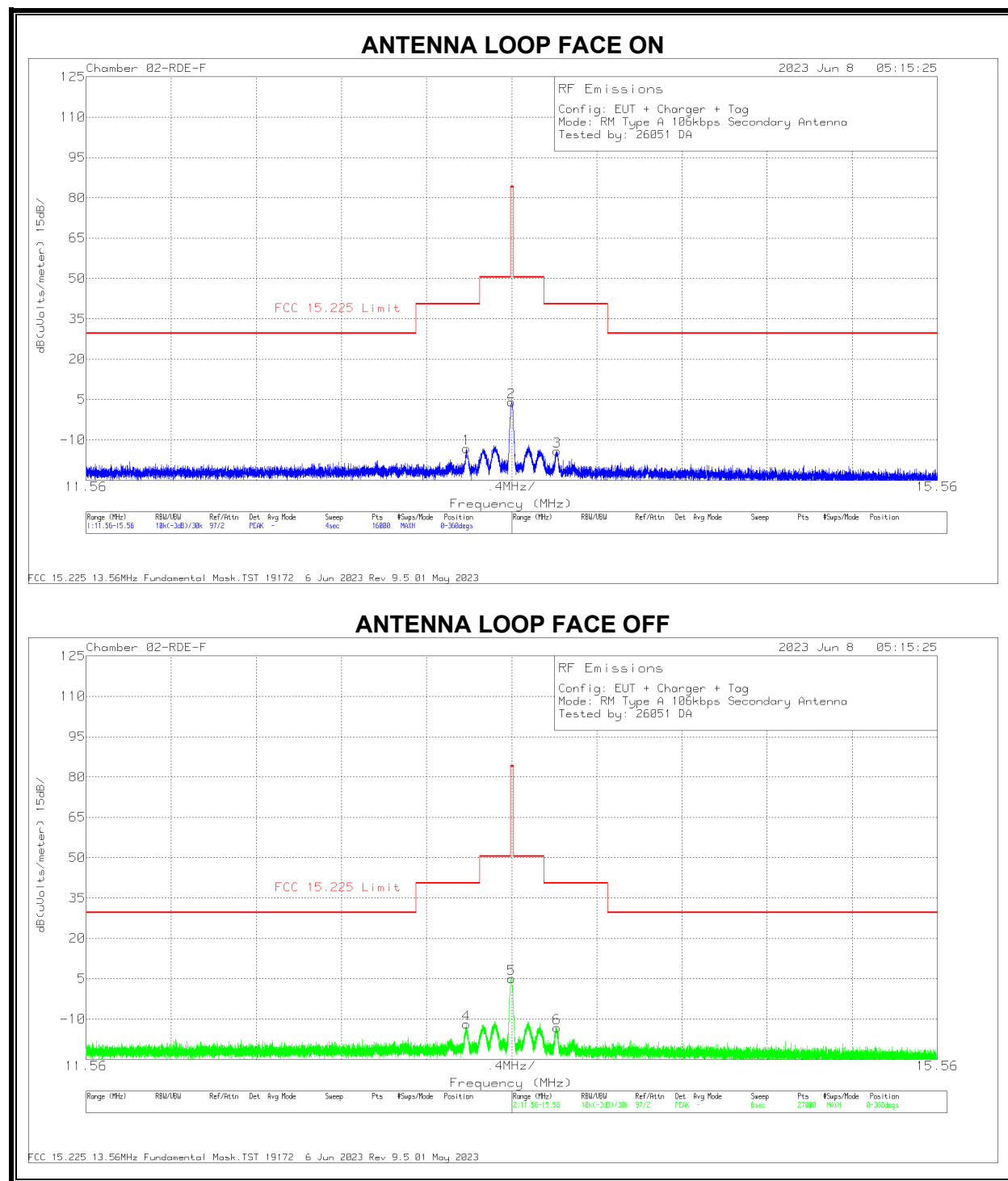
FCC 15.209 Below 30MHz.TST jv4323 24 Oct 2022 Rev 9.5 01 May 2023

DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF) (dB/m)	Cbl/Amp (dB)	Dist Corr 300m (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity
1	.0308	29.37	Pk	58	-32.1	-80	-24.73	57.81	-82.54	37.81	-62.54	0-360	Face-On
4	.0307	27.33	Pk	58	-32.1	-80	-26.77	57.84	-84.61	37.84	-64.61	0-360	Face-Off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF) (dB/m)	Cbl/Amp (dB)	Dist Corr 30m (dB)	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity
2	.6823	15.74	Pk	56.3	-32.5	-40	-4.6	30.93	-31.39	0-360	Face-On
3	2.0833	16.5	Pk	41.3	-32.3	-40	-14.5	29.5	-44	0-360	Face-On
5	.6758	15.08	Pk	56.3	-32.5	-40	-1.12	31.02	-32.14	0-360	Face-Off
6	2.0655	17.41	Pk	41.4	-32.3	-40	-13.49	29.5	-42.99	0-360	Face-Off

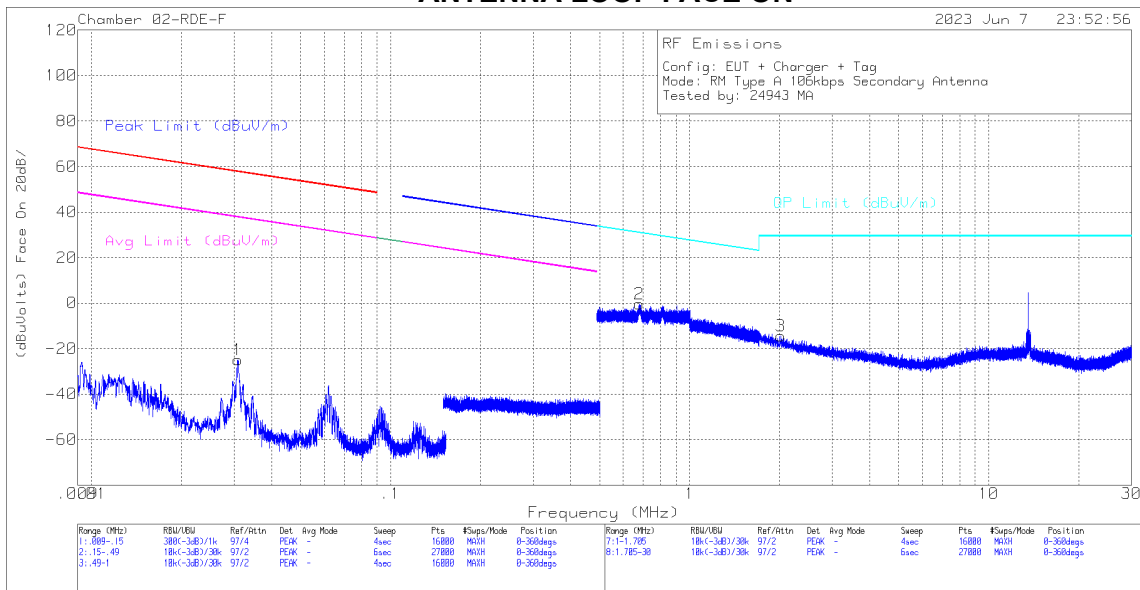
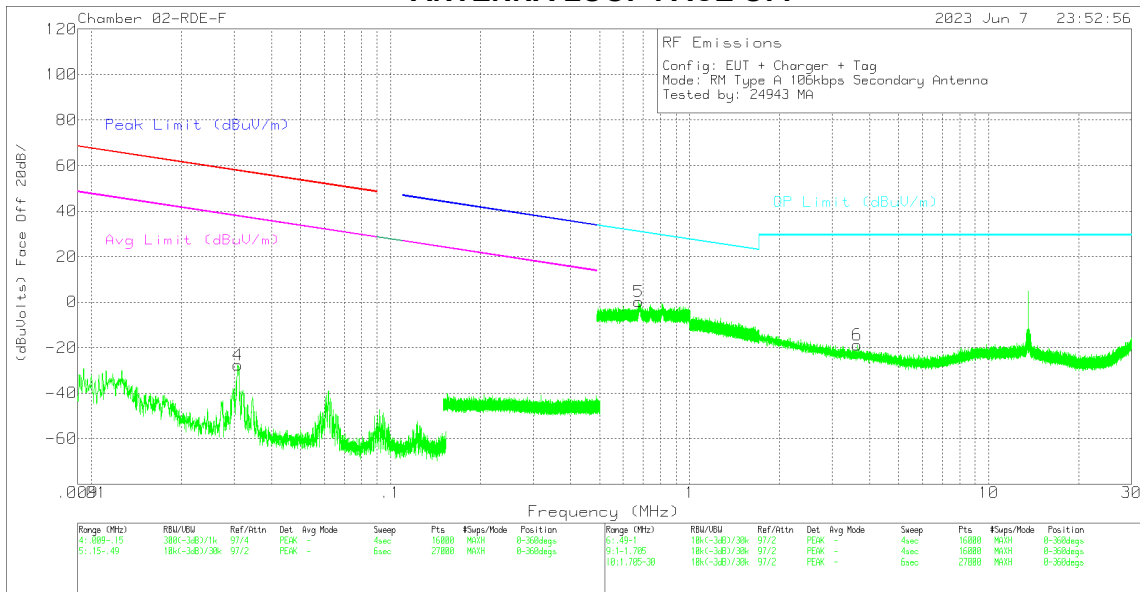
Pk - Peak detector

8.4.2. TAG MODE, Type A 106 Kbps**FUNDAMENTAL**

DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF) (dB/m)	Cbl/Amp (dB)	Dist Corr 30m (dB)	Corrected Reading dB(uVolts /meter)	FCC 15.225 Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Polarity
1	13.3478	24.57	Pk	34.3	-32	-40	-13.13	40.51	-53.64	0-360	Face-On
2	13.5595	41.73	Pk	34.3	-32	-40	4.03	84	-79.97	0-360	Face-On
3	13.773	23.74	Pk	34.2	-32.1	-40	-14.16	40.51	-54.67	0-360	Face-On
4	13.3471	25.84	Pk	34.3	-32	-40	-11.86	40.51	-52.37	0-360	Face-Off
5	13.5587	42.69	Pk	34.3	-32	-40	4.99	84	-79.01	0-360	Face-Off
6	13.7719	24.74	Pk	34.2	-32.1	-40	-13.16	40.51	-53.67	0-360	Face-Off

Pk - Peak detector

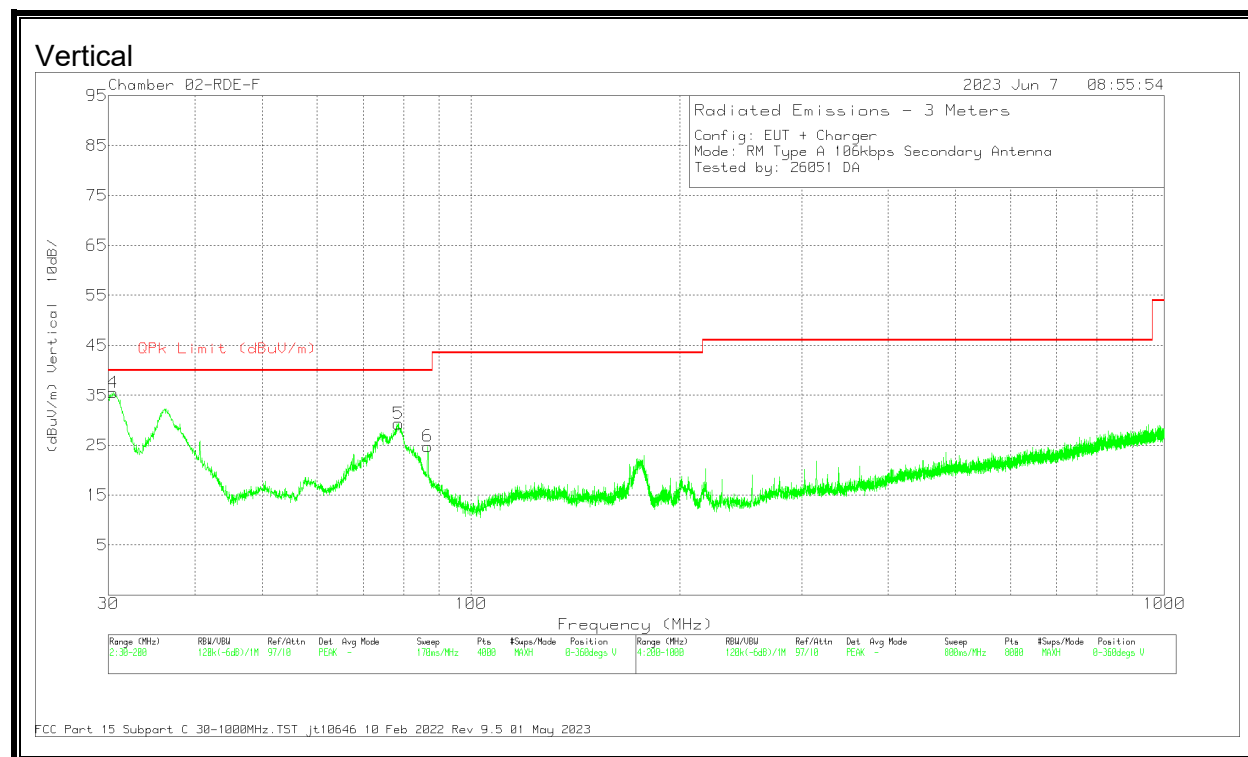
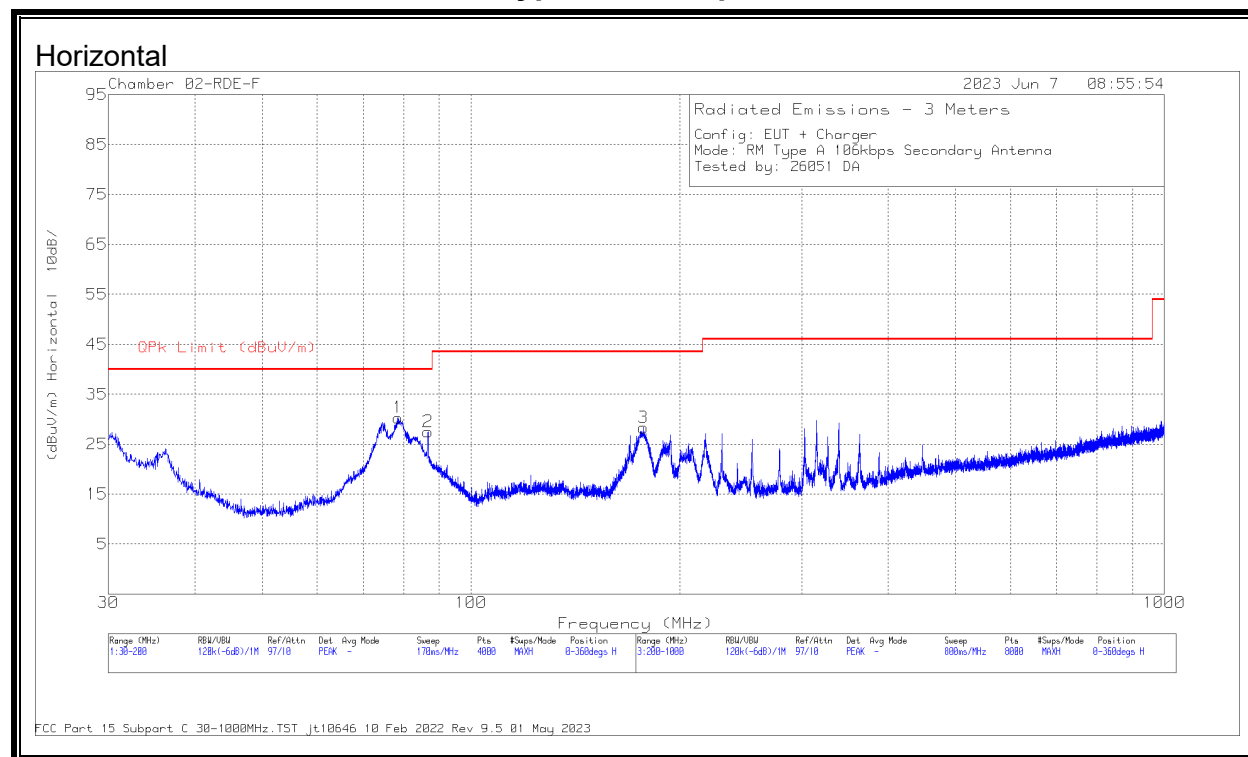
SPURIOUS EMISSION**ANTENNA LOOP FACE ON****ANTENNA LOOP FACE OFF**

DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF) (dB/m)	Cbl/Amp (dB)	Dist Corr 300m (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity
1	.0309	29.21	Pk	58	-32.1	-80	-24.89	57.8	-82.69	37.8	-62.69	0-360	Face-On
4	.0309	26.47	Pk	58	-32.1	-80	-27.63	57.78	-85.41	37.78	-65.41	0-360	Face-Off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF) (dB/m)	Cbl/Amp (dB)	Dist Corr 30m (dB)	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity
2	.6788	15.84	Pk	56.3	-32.5	-40	-.36	30.98	-31.34	0-360	Face-On
3	2.0152	16.4	Pk	41.5	-32.3	-40	-14.4	29.5	-43.9	0-360	Face-On
5	.6756	16.49	Pk	56.3	-32.5	-40	.29	31.02	-30.73	0-360	Face-Off
6	3.6323	15.56	Pk	37.8	-32.3	-40	-18.94	29.5	-48.44	0-360	Face-Off

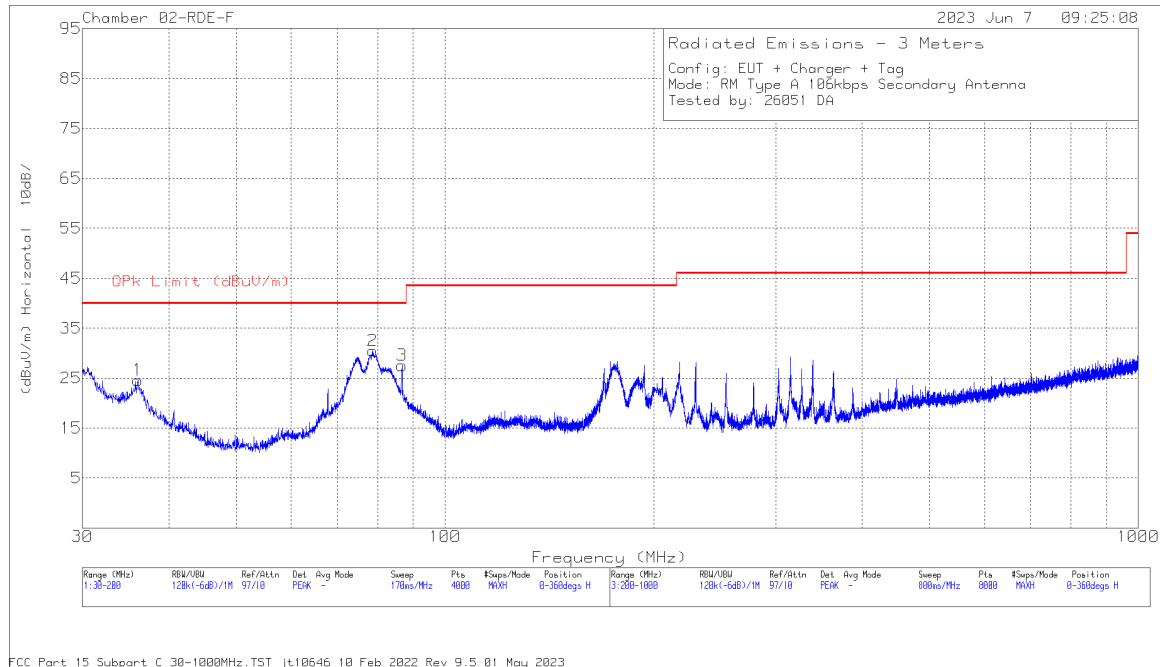
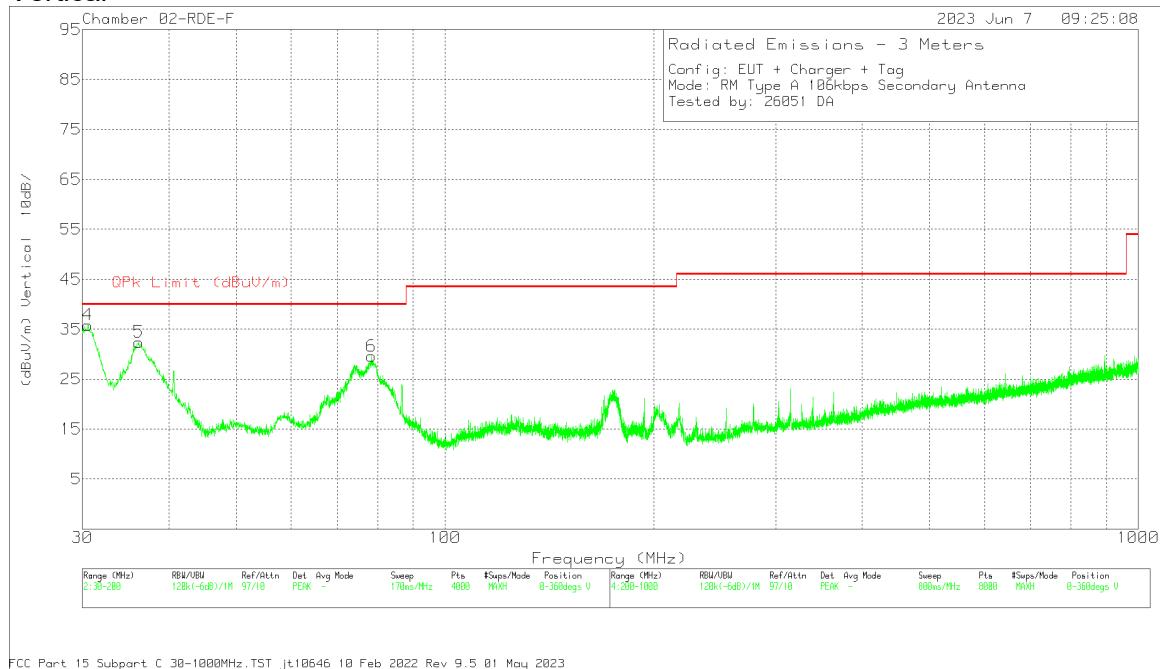
Pk - Peak detector

8.5. SECONDARY ANTENNA TX SPURIOUS EMISSION 30-1000 MHz**8.5.1. READER MODE, Type A 106 Kbps**

DATA

Marker	Frequenc y (MHz)	Meter Reading (dBuV)	Det	230634 ACF (dB) 10m H	Amp/Cbl (dB)	Correcte d Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degr)	Height (cm)	Polarity
1	78.5051	47.8	Pk	13.5	-31	30.3	40	-9.7	0-360	198	H
2	86.7522	45.19	Pk	13.3	-31	27.49	40	-12.51	0-360	198	H
3	177.471	41.7	Pk	17.1	-30.5	28.3	43.52	-15.22	0-360	198	H
4	30.4676	40.33	Pk	26.5	-31.3	35.53	40	-4.47	0-360	100	V
5	78.6326	46.81	Pk	13.5	-31	29.31	40	-10.69	0-360	100	V
6	86.6672	42.46	Pk	13.3	-31	24.76	40	-15.24	0-360	100	V

Pk - Peak detector

8.5.2. TAG MODE, Type A 106 Kbps**Horizontal****Vertical**

DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	230634 ACF (dB) 10m H	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	36.0791	33.52	Pk	22.4	-31.3	24.62	40	-15.38	0-360	198	H
2	78.7601	47.98	Pk	13.5	-31	30.48	40	-9.52	0-360	298	H
3	86.7522	45.25	Pk	13.3	-31	27.55	40	-12.45	0-360	298	H
4	30.5526	40.64	Pk	26.5	-31.3	35.84	40	-4.16	0-360	102	V
5	36.1641	41.43	Pk	22.3	-31.3	32.43	40	-7.57	0-360	102	V
6	78.3775	47.09	Pk	13.5	-31	29.59	40	-10.41	0-360	102	V

Pk - Peak detector

9. FREQUENCY STABILITY

LIMIT

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

IC RSS-210, Annex B.6

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

TEST PROCEDURE

ANSI C63.10-2013 Clause 6.8

RESULTS

No non-compliance noted.

ID:	30606	Date:	07/07/2023
------------	-------	--------------	------------

9.1. PRIMARY ANTENNA**9.1.1. READER MODE, Type A 106 Kbps**

Reference Frequency: EUT Channel 13.56 MHz @ 20°C										
Limit: ± 100 ppm = 1.35600 KHz										
Power Supply	Envir. Temp	Frequency Deviation Measured with Time Elapse								
(VAC)	(°C)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	13.560385	-0.442	13.560371	0.590	13.560275	7.670	13.560384	-0.369	± 100
	40	13.560381	-0.147	13.560377	0.147	13.560381	-0.147	13.560378	0.074	± 100
	30	13.560418	-2.876	13.560422	-3.171	13.560421	-3.097	13.560428	-3.614	± 100
	20	13.560379	0.000	13.560381	-0.147	13.560385	-0.442	13.560383	-0.295	± 100
	10	13.560411	-2.360	13.560399	-1.475	13.560385	-0.442	13.560371	0.590	± 100
	0	13.560354	1.844	13.560359	1.475	13.560361	1.327	13.560361	1.327	± 100
	-10	13.560381	-0.147	13.560385	-0.442	13.560381	-0.147	13.560379	0.000	± 100
	-20	13.560381	-0.147	13.560391	-0.885	13.560379	0.000	13.560388	-0.664	± 100
3.23	20	13.560411	-2.360	13.560402	-1.696	13.560421	-3.097	13.560389	-0.737	± 100
4.37	20	13.560381	-0.147	13.560382	-0.221	13.560379	0.000	13.560377	0.147	± 100

9.1.2. TAG MODE

Reference Frequency: EUT Channel 13.56 MHz @ 20°C										
Limit: ± 100 ppm = 1.35600 KHz										
Power Supply	Envir. Temp	Frequency Deviation Measured with Time Elapse								
(VAC)	(°C)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	13.559951	-0.590	13.559962	-1.401	13.559965	-1.622	13.559967	-1.770	± 100
	40	13.559955	-0.885	13.559947	-0.295	13.559941	0.147	13.55994	0.221	± 100
	30	13.559949	-0.442	13.559937	0.442	13.559962	-1.401	13.559947	-0.295	± 100
	20	13.559943	0.000	13.559949	-0.442	13.559945	-0.147	13.559961	-1.327	± 100
	10	13.559946	-0.221	13.559916	1.991	13.559954	-0.811	13.559963	-1.475	± 100
	0	13.559936	0.516	13.559951	-0.590	13.559934	0.664	13.559942	0.074	± 100
	-10	13.559935	0.590	13.559946	-0.221	13.559951	-0.590	13.559964	-1.549	± 100
	-20	13.559941	0.147	13.559956	-0.959	13.559962	-1.401	13.559957	-1.032	± 100
3.23	20	13.559953	-0.737	13.559946	-0.221	13.559954	-0.811	13.559947	-0.295	± 100
4.37	20	13.559961	-1.327	13.559942	0.074	13.559941	0.147	13.559951	-0.590	± 100

9.1.3. CE MODE, Type A 106 Kbps

Reference Frequency: EUT Channel 13.56 MHz @ 20°C										
Limit: ± 100 ppm = 1.35600 KHz										
Power Supply	Envir. Temp	Frequency Deviation Measured with Time Elapse								
(VAC)	(°C)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	13.560401	-1.991	13.560387	-0.959	13.560391	-1.254	13.560389	-1.106	± 100
	40	13.560436	-4.572	13.560431	-4.204	13.560419	-3.319	13.560431	-4.204	± 100
	30	13.56043	-4.130	13.560429	-4.056	13.560419	-3.319	13.560424	-3.687	± 100
	20	13.560374	0.000	13.560388	-1.032	13.560385	-0.811	13.560377	-0.221	± 100
	10	13.560411	-2.729	13.560421	-3.466	13.560409	-2.581	13.560355	1.401	± 100
	0	13.560385	-0.811	13.560379	-0.369	13.560391	-1.254	13.560388	-1.032	± 100
	-10	13.560443	-5.088	13.560441	-4.941	13.560399	-1.844	13.560391	-1.254	± 100
	-20	13.560371	0.221	13.560387	-0.959	13.560391	-1.254	13.560395	-1.549	± 100
3.23	20	13.560381	-0.516	13.560364	0.737	13.560355	1.401	13.560341	2.434	± 100
4.37	20	13.560375	-0.074	13.560377	-0.221	13.560354	1.475	13.560375	-0.074	± 100

9.2. SECONDARY ANTENNA**9.2.1. READER MODE, Type A 106 Kbps**

Reference Frequency: EUT Channel 13.56 MHz @ 20°C										
Limit: ± 100 ppm = 1.35600 KHz										
Power Supply	Envir. Temp	Frequency Deviation Measured with Time Elapse								
(VAC)	(°C)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	13.559934	-0.737	13.559931	-0.516	13.559928	-0.295	13.559919	0.369	± 100
	40	13.559911	0.959	13.559922	0.147	13.559921	0.221	13.559927	-0.221	± 100
	30	13.559936	-0.885	13.559939	-1.106	13.559941	-1.254	13.559947	-1.696	± 100
	20	13.559924	0.000	13.559935	-0.811	13.559941	-1.254	13.559931	-0.516	± 100
	10	13.559913	0.811	13.559927	-0.221	13.559931	-0.516	13.559941	-1.254	± 100
	0	13.559931	-0.516	13.559941	-1.254	13.559929	-0.369	13.559923	0.074	± 100
	-10	13.559921	0.221	13.559929	-0.369	13.559935	-0.811	13.559918	0.442	± 100
	-20	13.559935	-0.811	13.559931	-0.516	13.559947	-1.696	13.559939	-1.106	± 100
3.23	20	13.559956	-2.360	13.559941	-1.254	13.559935	-0.811	13.559941	-1.254	± 100
4.37	20	13.559943	-1.401	13.559926	-0.147	13.559934	-0.737	13.559941	-1.254	± 100

9.2.2. TAG MODE, Type A 106 Kbps

Reference Frequency: EUT Channel 13.56 MHz @ 20°C										
Limit: ± 100 ppm = 1.35600 KHz										
Power Supply	Envir. Temp	Frequency Deviation Measured with Time Elapse								
(VAC)	(°C)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	13.559945	-1.032	13.559946	-1.106	13.559959	-2.065	13.559947	-1.180	± 100
	40	13.559925	0.442	13.559925	0.442	13.559927	0.295	13.559926	0.369	± 100
	30	13.559918	0.959	13.559926	0.369	13.559931	0.000	13.559935	-0.295	± 100
	20	13.559931	0.000	13.559928	0.221	13.559927	0.295	13.559935	-0.295	± 100
	10	13.559937	-0.442	13.559946	-1.106	13.559971	-2.950	13.559964	-2.434	± 100
	0	13.559946	-1.106	13.559961	-2.212	13.559971	-2.950	13.559969	-2.802	± 100
	-10	13.559945	-1.032	13.559937	-0.442	13.559947	-1.180	13.559951	-1.475	± 100
	-20	13.559931	0.000	13.559943	-0.885	13.559916	1.106	13.559957	-1.917	± 100
3.23	20	13.559934	-0.221	13.559935	-0.295	13.559942	-0.811	13.559965	-2.507	± 100
4.37	20	13.559925	0.442	13.559921	0.737	13.559941	-0.737	13.559961	-2.212	± 100

10. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207

IC RSS-GEN, Section 8.8

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

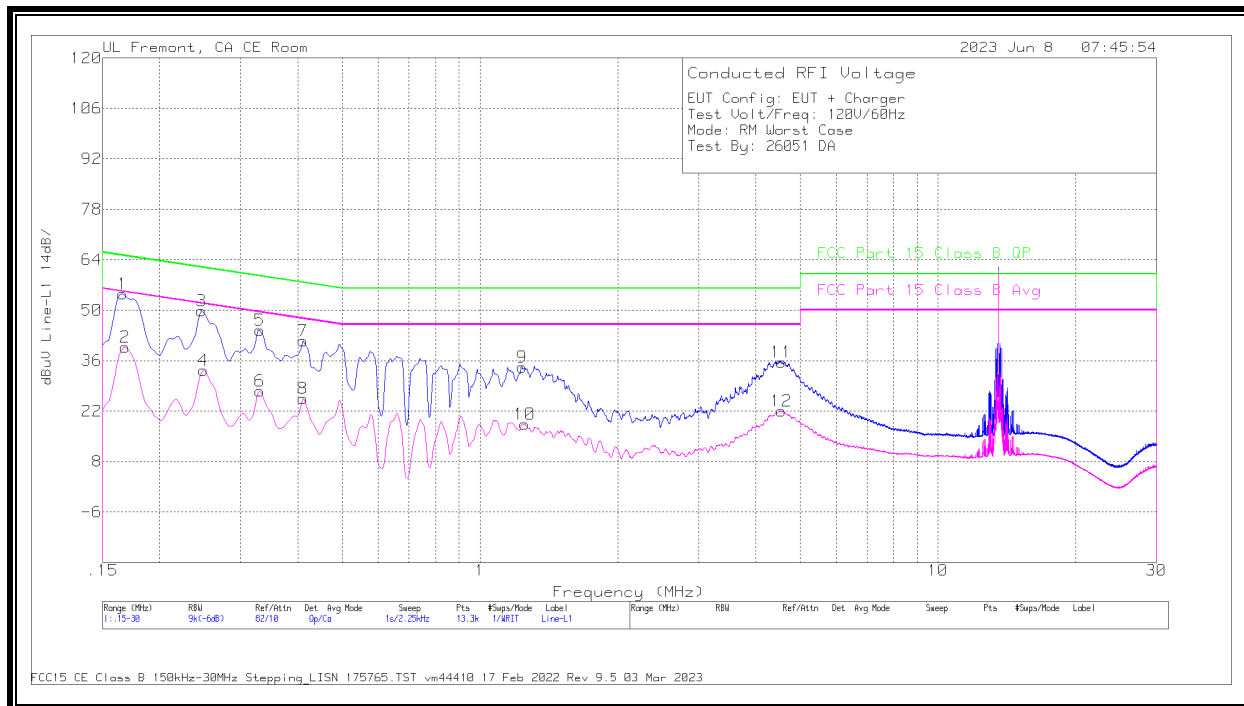
Frequency range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Notes: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

TEST PROCEDURE

ANSI C63.10:2013

RESULTS

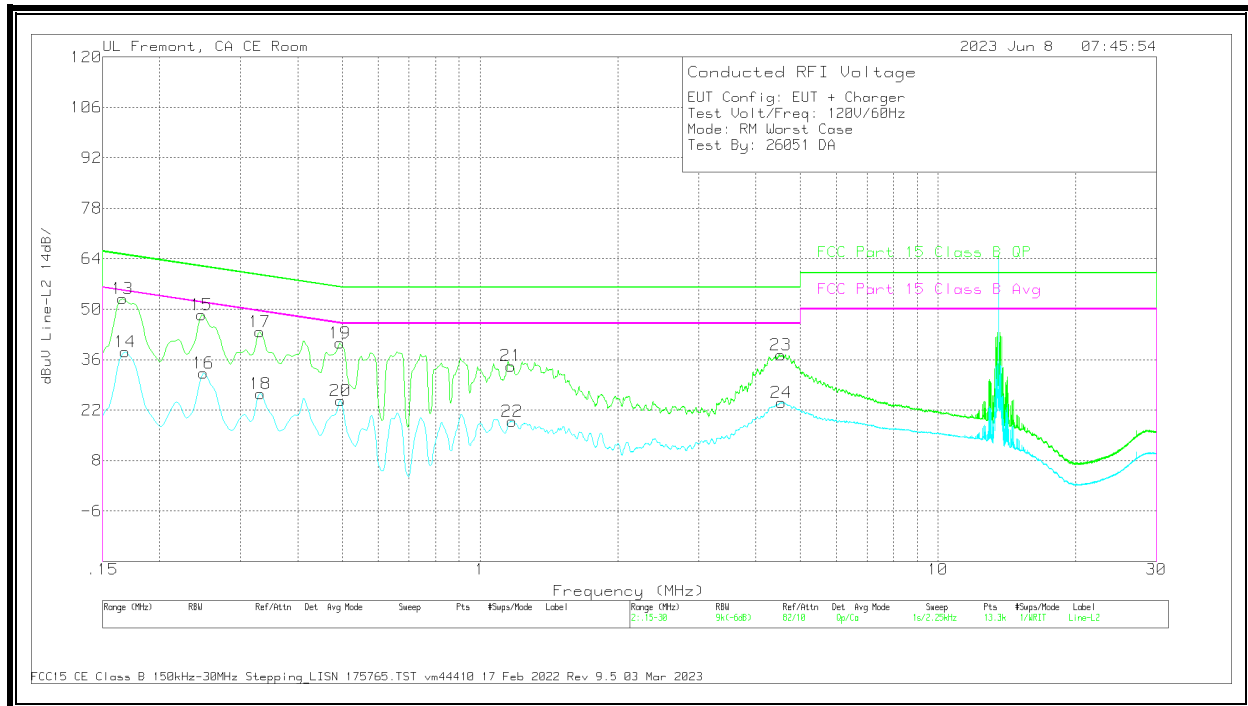
No non-compliance noted:

10.1. PRIMARY ANTENNA**10.1.1. READER MODE, Type A 106 Kbps, with Antenna****LINE 1 RESULTS****Worst Emission**

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L1_LISN.csv dB	C1&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)Margin (dB)
1	0.1658	45.13	Qp	0	0	9.4	54.53	65.17	-10.64	-	-
2	0.168	30.33	Ca	0	0	9.4	39.73	-	-	55.06	-15.33
3	0.2468	40.51	Qp	0	0	9.3	49.81	61.87	-12.06	-	-
4	0.249	24	Ca	0	0	9.3	33.3	-	-	51.79	-18.49
5	0.33	35.2	Qp	0	0	9.3	44.5	59.45	-14.95	-	-
6	0.33	18.24	Ca	0	0	9.3	27.54	-	-	49.45	-21.91
7	0.411	32.02	Qp	0	0.1	9.3	41.42	57.63	-16.21	-	-
8	0.411	16.03	Ca	0	0.1	9.3	25.43	-	-	47.63	-22.2
9	1.2345	24.72	Qp	0	0.1	9.3	34.12	56	-21.88	-	-
10	1.2525	8.97	Ca	0	0.1	9.3	18.37	-	-	46	-27.63
11	4.5443	26.15	Qp	0	0.1	9.3	35.55	56	-20.45	-	-
12	4.5443	12.57	Ca	0	0.1	9.3	21.97	-	-	46	-24.03

Qp - Quasi-Peak detector
 Ca - CISPR average detection

Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section indicate that when the antenna terminal is terminated the fundamental amplitude is lowering below the limit line.

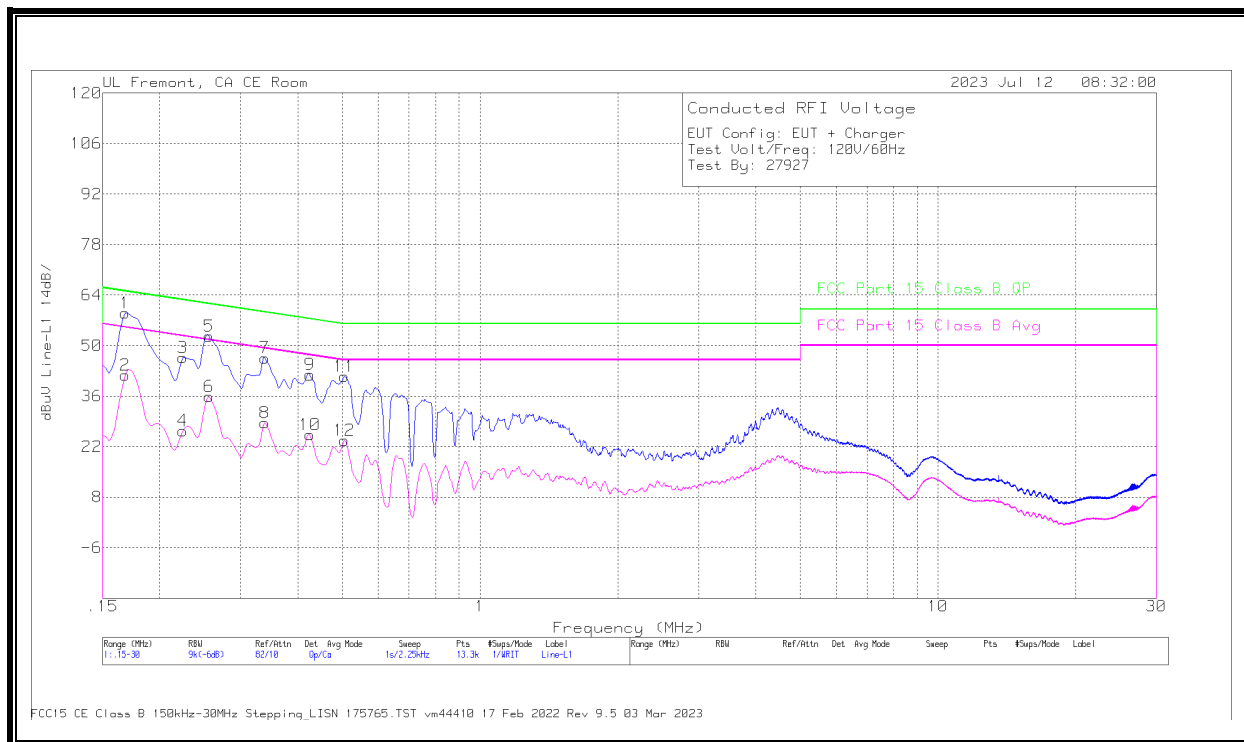
LINE 2 RESULTS**Worst Emission**

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L2_LISN dB	C2&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)Margin (dB)
13	0.1658	43.49	Qp	0	0	9.4	52.89	65.17	-12.28	-	-
14	0.168	28.72	Ca	0	0	9.4	38.12	-	-	55.06	-16.94
15	0.2468	39.16	Qp	0	0	9.3	48.46	61.87	-13.41	-	-
16	0.249	22.92	Ca	0	0	9.3	32.22	-	-	51.79	-19.57
17	0.33	34.43	Qp	0	0	9.3	43.73	59.45	-15.72	-	-
18	0.3311	17.28	Ca	0	0	9.3	26.58	-	-	49.42	-22.84
19	0.4943	31.25	Qp	0	0.1	9.3	40.65	56.1	-15.45	-	-
20	0.4954	15.24	Ca	0	0.1	9.3	24.64	-	-	46.08	-21.44
21	1.1693	24.87	Qp	0	0.1	9.3	34.27	56	-21.73	-	-
22	1.1738	9.5	Ca	0	0.1	9.3	18.9	-	-	46	-27.1
23	4.5353	27.84	Qp	0	0.1	9.3	37.24	56	-18.76	-	-
24	4.5465	14.65	Ca	0	0.1	9.3	24.05	-	-	46	-21.95

Qp - Quasi-Peak detector

Ca - CISPR average detection

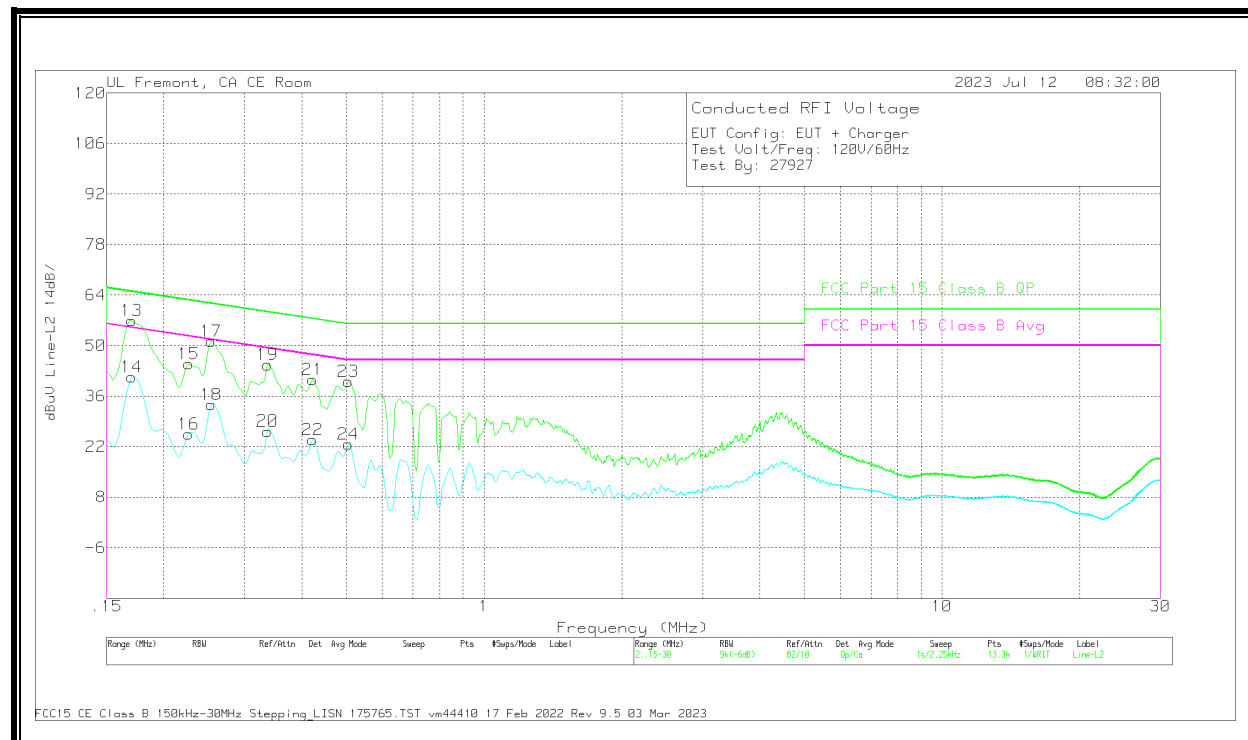
Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section indicates that when the antenna terminal is terminated the fundamental amplitude is lowering below the limit line.

10.1.2. READER MODE, Type A 106 Kbps, Antenna Port Terminated**LINE 1 RESULTS****Worst Emission**

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L1_L1SN.csv dB	C1&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)M argin (dB)
1	.168	49.56	Qp	0	0	9.4	58.96	65.06	-6.1	-	-
2	.168	32.46	Ca	0	0	9.4	41.86	-	-	55.06	-13.2
3	.2243	37.32	Qp	0	0	9.3	46.62	62.66	-16.04	-	-
4	.2243	17.14	Ca	0	0	9.3	26.44	-	-	52.66	-26.22
5	.2558	43.26	Qp	0	0	9.3	52.56	61.57	-9.01	-	-
6	.2558	26.55	Ca	0	0	9.3	35.85	-	-	51.57	-15.72
7	.339	37.31	Qp	0	0	9.3	46.61	59.23	-12.62	-	-
8	.339	19.31	Ca	0	0	9.3	28.61	-	-	49.23	-20.62
9	.4245	32.52	Qp	0	.1	9.3	41.92	57.36	-15.44	-	-
10	.4245	15.95	Ca	0	.1	9.3	25.35	-	-	47.36	-22.01
11	.5055	32.13	Qp	0	.1	9.3	41.53	56	-14.47	-	-
12	.5055	14.36	Ca	0	.1	9.3	23.76	-	-	46	-22.24

Qp - Quasi-Peak detector

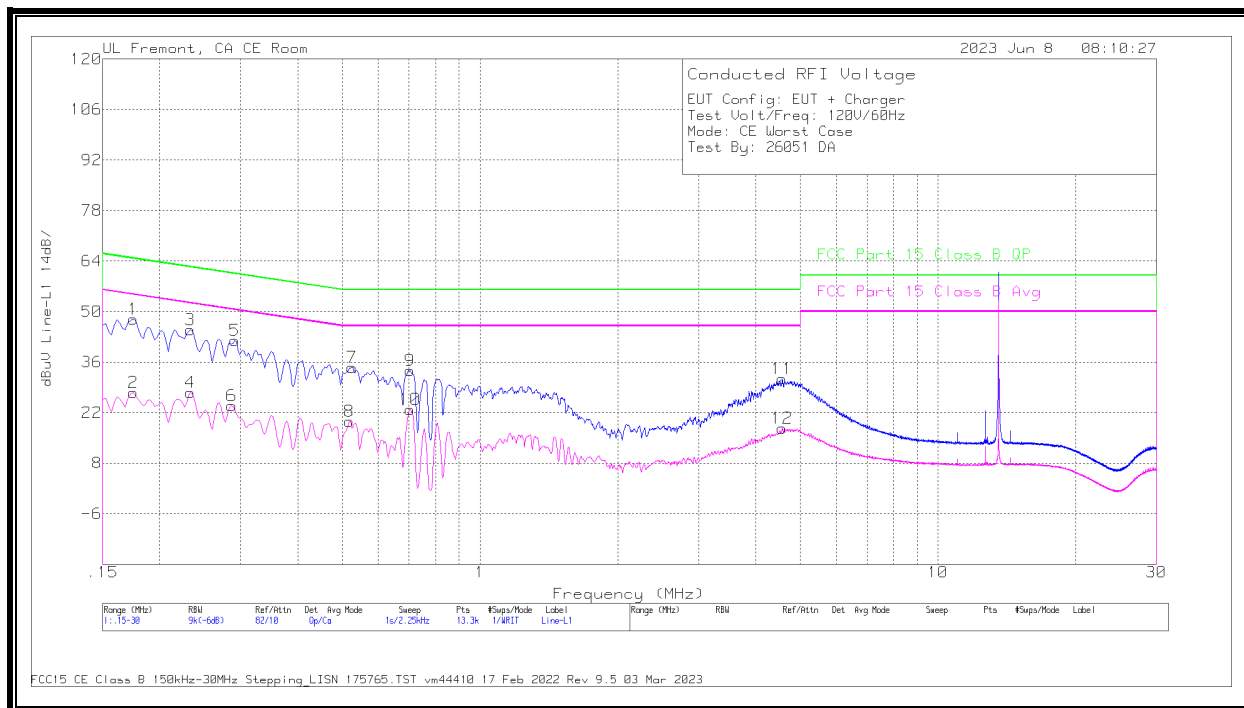
Ca - CISPR average detection

LINE 2 RESULTS**Worst Emission**

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L2_LISN dB	C2&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)M argin (dB)
13	.1703	47.61	Qp	0	0	9.4	57.01	64.95	-7.94	-	-
14	.1703	31.98	Ca	0	0	9.4	41.38	-	-	54.95	-13.57
15	.2265	35.58	Qp	0	0	9.3	44.88	62.58	-17.7	-	-
16	.2265	16.25	Ca	0	0	9.3	25.55	-	-	52.58	-27.03
17	.2535	41.87	Qp	0	0	9.3	51.17	61.64	-10.47	-	-
18	.2535	24.28	Ca	0	0	9.3	33.58	-	-	51.64	-18.06
19	.3368	35.4	Qp	0	0	9.3	44.7	59.28	-14.58	-	-
20	.3368	16.97	Ca	0	0	9.3	26.27	-	-	49.28	-23.01
21	.4223	31.19	Qp	0	.1	9.3	40.59	57.4	-16.81	-	-
22	.4223	14.55	Ca	0	.1	9.3	23.95	-	-	47.4	-23.45
23	.5055	30.62	Qp	0	.1	9.3	40.02	56	-15.98	-	-
24	.5055	13.32	Ca	0	.1	9.3	22.72	-	-	46	-23.28

Qp - Quasi-Peak detector

Ca - CISPR average detection

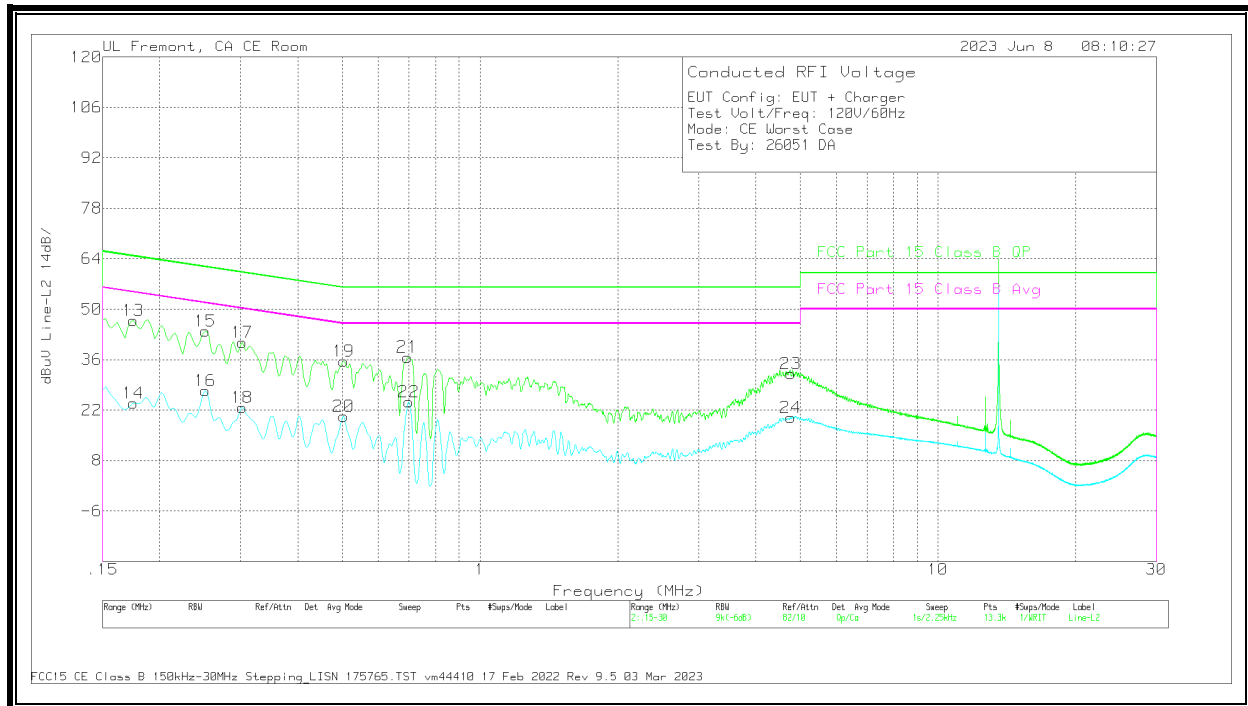
10.1.3. CE MODE, Type A 106 Kbps, with Antenna**LINE 1 RESULTS****Worst Emission**

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L1_LISN.csv dB	C1&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)Margin (dB)
1	0.1748	38.55	Qp	0	0	9.4	47.95	64.73	-16.78	-	-
2	0.1748	18.11	Ca	0	0	9.4	27.51	-	-	54.73	-27.22
3	0.2333	35.65	Qp	0	0	9.3	44.95	62.33	-17.38	-	-
4	0.2333	18.26	Ca	0	0	9.3	27.56	-	-	52.33	-24.77
5	0.2918	32.7	Qp	0	0	9.3	42	60.47	-18.47	-	-
6	0.2873	14.68	Ca	0	0	9.3	23.98	-	-	50.6	-26.62
7	0.5258	25.18	Qp	0	0.1	9.3	34.58	56	-21.42	-	-
8	0.519	10.23	Ca	0	0.1	9.3	19.63	-	-	46	-26.37
9	0.7035	24.29	Qp	0	0.1	9.3	33.69	56	-22.31	-	-
10	0.7035	13.55	Ca	0	0.1	9.3	22.95	-	-	46	-23.05
11	4.569	21.94	Qp	0	0.1	9.3	31.34	56	-24.66	-	-
12	4.569	8.32	Ca	0	0.1	9.3	17.72	-	-	46	-28.28

Qp - Quasi-Peak detector

Ca - CISPR average detection

Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section indicates that when the antenna terminal is terminated the fundamental amplitude is lowering below the limit line.

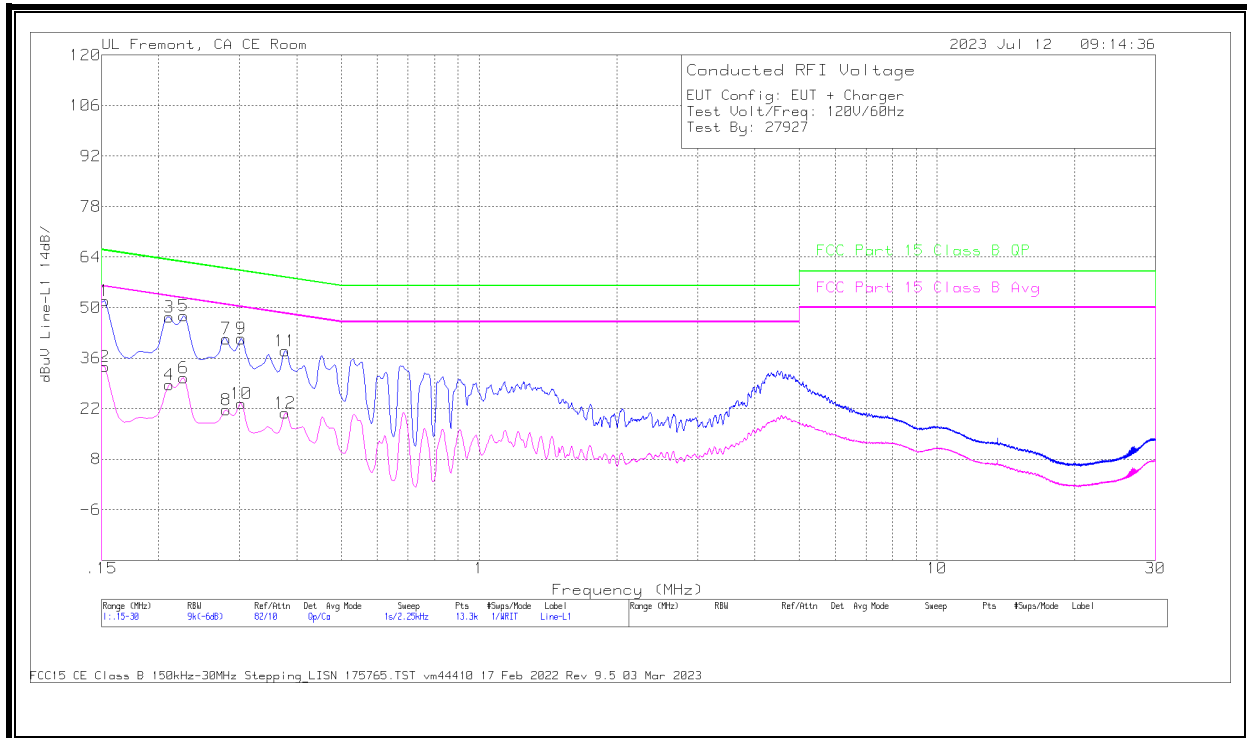
LINE 2 RESULTS**Worst Emission**

Range 2: Line-L2 .15 - 30MHz												
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L2_LISN.csv dB	C1&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)Margin (dB)	
13	0.1748	37.39	Qp	0	0	9.4	46.79	64.73	-17.94	-	-	
14	0.1748	14.58	Ca	0	0	9.4	23.98	-	-	54.73	-30.75	
15	0.2513	34.68	Qp	0	0	9.3	43.98	61.72	-17.74	-	-	
16	0.2513	18.1	Ca	0	0	9.3	27.4	-	-	51.72	-24.32	
17	0.303	31.42	Qp	0	0	9.3	40.72	60.16	-19.44	-	-	
18	0.303	13.37	Ca	0	0	9.3	22.67	-	-	50.16	-27.49	
19	0.5033	26.11	Qp	0	0.1	9.3	35.51	56	-20.49	-	-	
20	0.5033	10.91	Ca	0	0.1	9.3	20.31	-	-	46	-25.69	
21	0.6956	27.3	Qp	0	0.1	9.3	36.7	56	-19.3	-	-	
22	0.699	14.85	Ca	0	0.1	9.3	24.25	-	-	46	-21.75	
23	4.767	22.62	Qp	0	0.1	9.3	32.02	56	-23.98	-	-	
24	4.767	10.5	Ca	0	0.1	9.3	19.9	-	-	46	-26.1	

Qp - Quasi-Peak detector

Ca - CISPR average detection

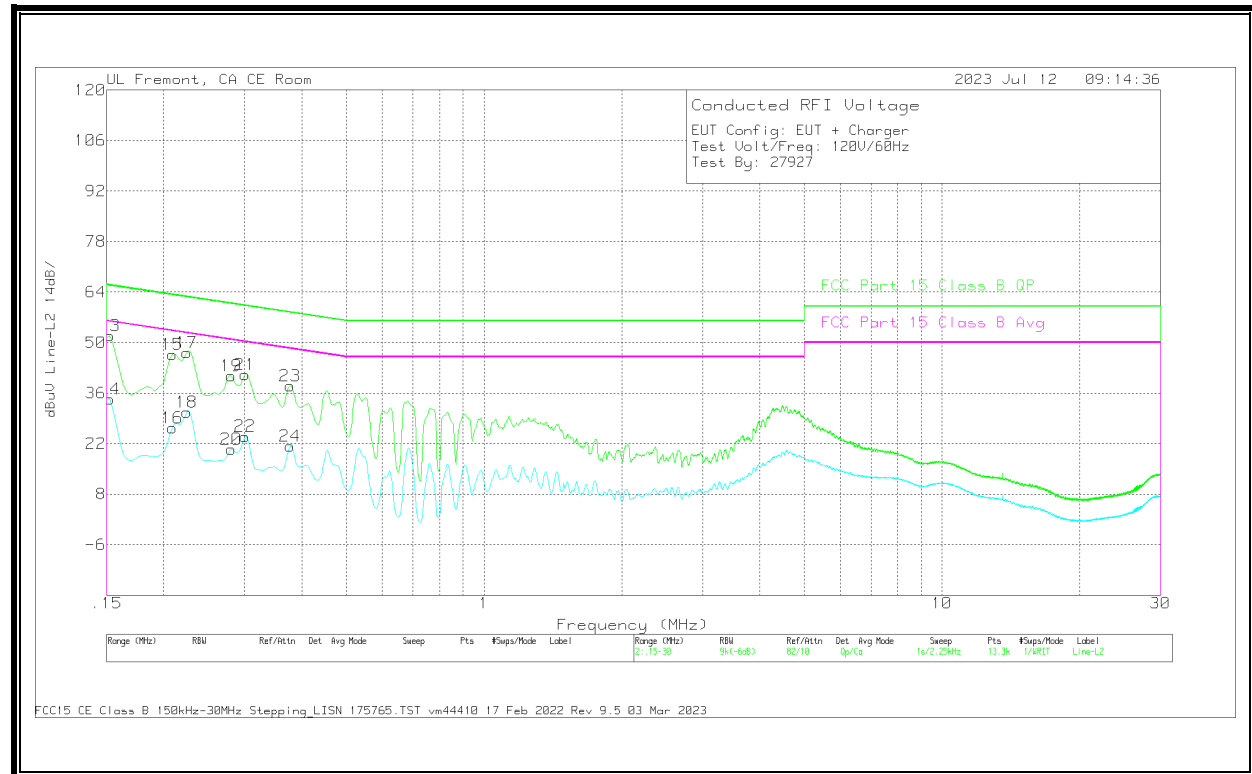
Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section indicates that when the antenna terminal is terminated the fundamental amplitude is lowering below the limit line.

10.1.4. CE MODE, Type A 106 Kbps, Antenna Port Terminated**LINE 1 RESULTS****Worst Emission**

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L1_LISN.csv dB	C1&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)M argin (dB)
1	.1523	42.49	Qp	0	0	9.4	51.89	65.88	-13.99	-	-
2	.1523	24.19	Ca	0	0	9.4	33.59	-	-	55.88	-22.29
3	.2108	37.92	Qp	0	0	9.4	47.32	63.18	-15.86	-	-
4	.2108	19.19	Ca	0	0	9.4	28.59	-	-	53.18	-24.59
5	.2265	38.4	Qp	0	0	9.3	47.7	62.58	-14.88	-	-
6	.2265	21.21	Ca	0	0	9.3	30.51	-	-	52.58	-22.07
7	.2805	32.09	Qp	0	0	9.3	41.39	60.8	-19.41	-	-
8	.2805	12.35	Ca	0	0	9.3	21.65	-	-	50.8	-29.15
9	.303	32.1	Qp	0	0	9.3	41.4	60.16	-18.76	-	-
10	.303	14.18	Ca	0	0	9.3	23.48	-	-	50.16	-26.68
11	.3773	28.56	Qp	0	.1	9.3	37.96	58.34	-20.38	-	-
12	.3773	11.36	Ca	0	.1	9.3	20.76	-	-	48.34	-27.58

Qp - Quasi-Peak detector

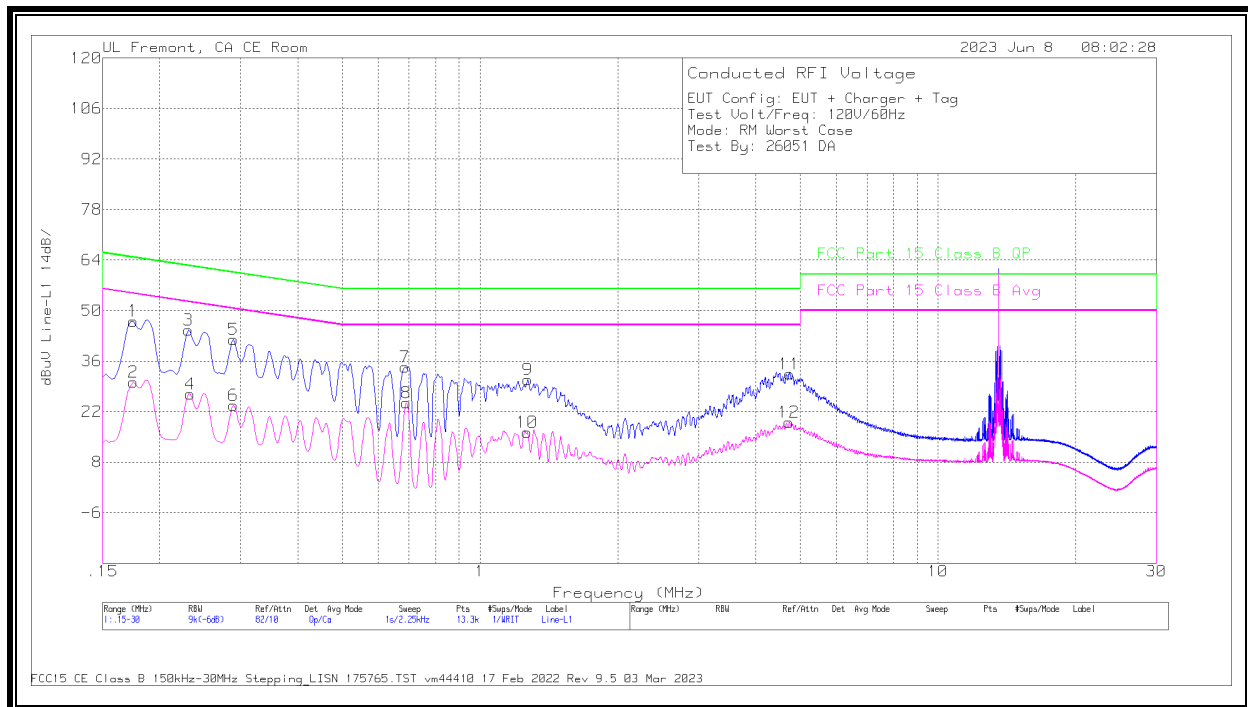
Ca - CISPR average detection

LINE 2 RESULTS**Worst Emission**

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L2 LISN dB	C2&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)M argin (dB)
13	.1523	42.58	Qp	0	0	9.4	51.98	65.88	-13.9	-	-
14	.1523	24.9	Ca	0	0	9.4	34.3	-	-	55.88	-21.58
15	.2085	37.28	Qp	0	0	9.4	46.68	63.26	-16.58	-	-
16	.2085	17.02	Ca	0	0	9.4	26.42	-	-	53.26	-26.84
17	.2243	37.94	Qp	0	0	9.3	47.24	62.66	-15.42	-	-
18	.2243	21.46	Ca	0	0	9.3	30.76	-	-	52.66	-21.9
19	.2805	31.56	Qp	0	0	9.3	40.86	60.8	-19.94	-	-
20	.2805	11.17	Ca	0	0	9.3	20.47	-	-	50.8	-30.33
21	.3008	31.87	Qp	0	0	9.3	41.17	60.22	-19.05	-	-
22	.3008	14.71	Ca	0	0	9.3	24.01	-	-	50.22	-26.21
23	.3773	28.63	Qp	0	.1	9.3	38.03	58.34	-20.31	-	-
24	.3773	11.93	Ca	0	.1	9.3	21.33	-	-	48.34	-27.01

Qp - Quasi-Peak detector

Ca - CISPR average detection

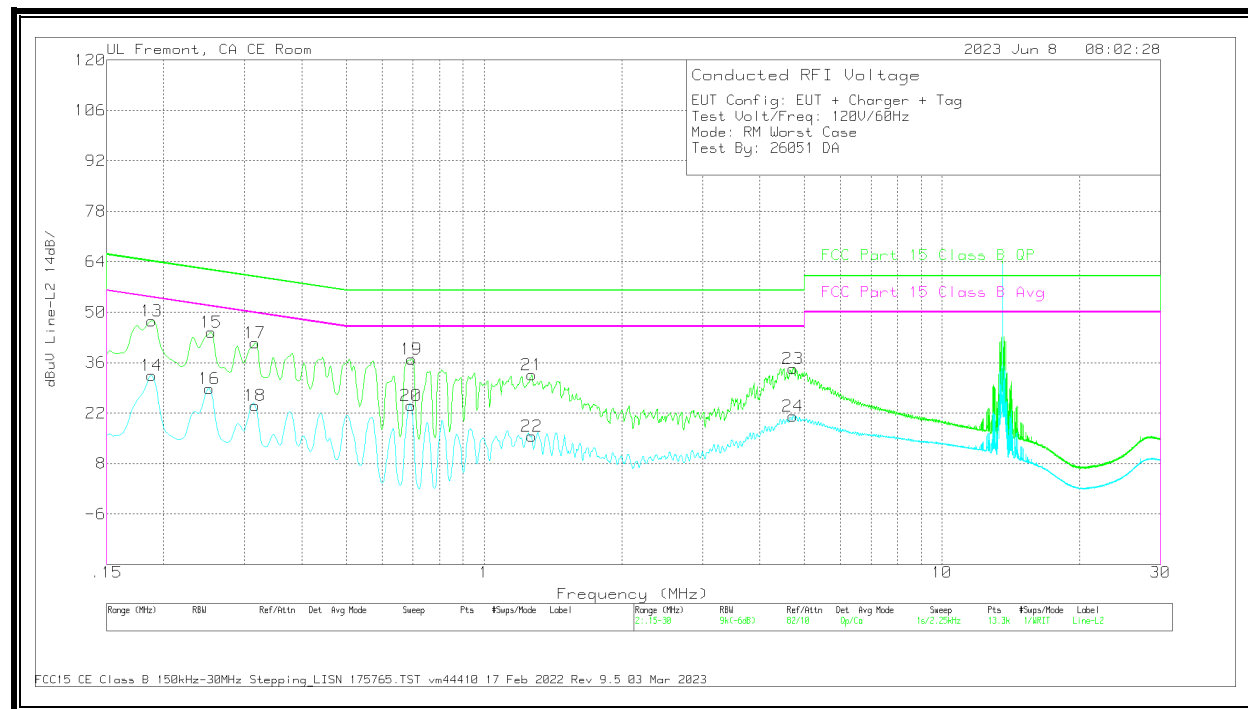
10.1.5. TAG MODE, Type A 106 Kbps, with Antenna**LINE 1 RESULTS****Worst Emission**

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L1_LISN.csv dB	C1&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)Margin (dB)
1	0.1748	37.73	Qp	0	0	9.4	47.13	64.73	-17.6	-	-
2	0.1748	20.73	Ca	0	0	9.4	30.13	-	-	54.73	-24.6
3	0.231	35.3	Qp	0	0	9.3	44.6	62.41	-17.81	-	-
4	0.2333	17.64	Ca	0	0	9.3	26.94	-	-	52.33	-25.39
5	0.2895	32.71	Qp	0	0	9.3	42.01	60.54	-18.53	-	-
6	0.2895	14.43	Ca	0	0	9.3	23.73	-	-	50.54	-26.81
7	0.6855	24.99	Qp	0	0.1	9.3	34.39	56	-21.61	-	-
8	0.69	15.03	Ca	0	0.1	9.3	24.43	-	-	46	-21.57
9	1.2705	21.47	Qp	0	0.1	9.3	30.87	56	-25.13	-	-
10	1.2683	6.81	Ca	0	0.1	9.3	16.21	-	-	46	-29.79
11	4.7355	23.08	Qp	0	0.1	9.3	32.48	56	-23.52	-	-
12	4.731	9.7	Ca	0	0.1	9.3	19.1	-	-	46	-26.9

Qp - Quasi-Peak detector

Ca - CISPR average detection

Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section indicates that when the antenna terminal is terminated the fundamental amplitude is lowering below the limit line.

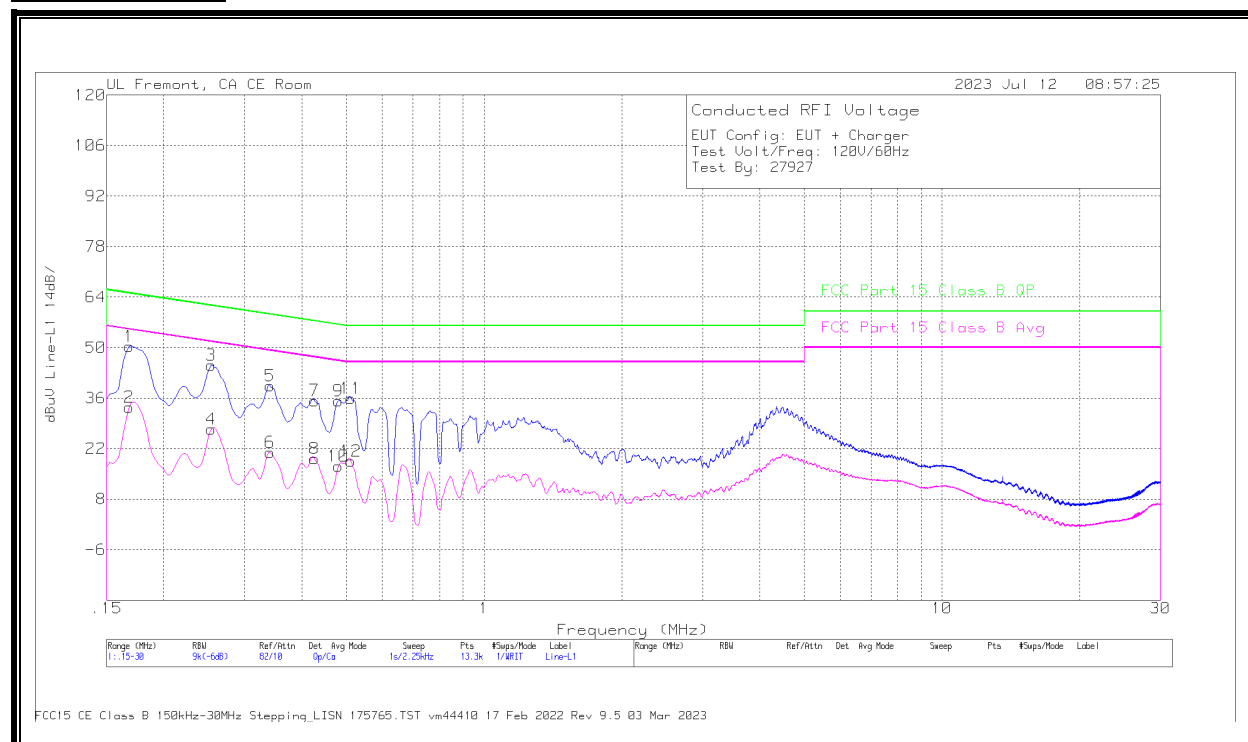
LINE 2 RESULTS**Worst Emission**

Range 2: Line-L2 .15 - 30MHz												
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L2_LISN dB	C2&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)Margin (dB)	
13	0.1883	38.12	Qp	0	0	9.4	47.52	64.11	-16.59	-	-	
14	0.1883	22.98	Ca	0	0	9.4	32.38	-	-	54.11	-21.73	
15	0.2535	35.12	Qp	0	0	9.3	44.42	61.64	-17.22	-	-	
16	0.2513	19.54	Ca	0	0	9.3	28.84	-	-	51.72	-22.88	
17	0.3165	32.17	Qp	0	0	9.3	41.47	59.8	-18.33	-	-	
18	0.3165	14.81	Ca	0	0	9.3	24.11	-	-	49.8	-25.69	
19	0.6945	27.63	Qp	0	0.1	9.3	37.03	56	-18.97	-	-	
20	0.6923	14.76	Ca	0	0.1	9.3	24.16	-	-	46	-21.84	
21	1.2728	23.29	Qp	0	0.1	9.3	32.69	56	-23.31	-	-	
22	1.2705	6.11	Ca	0	0.1	9.3	15.51	-	-	46	-30.49	
23	4.7288	24.99	Qp	0	0.1	9.3	34.39	56	-21.61	-	-	
24	4.731	11.79	Ca	0	0.1	9.3	21.19	-	-	46	-24.81	

Qp - Quasi-Peak detector

Ca - CISPR average detection

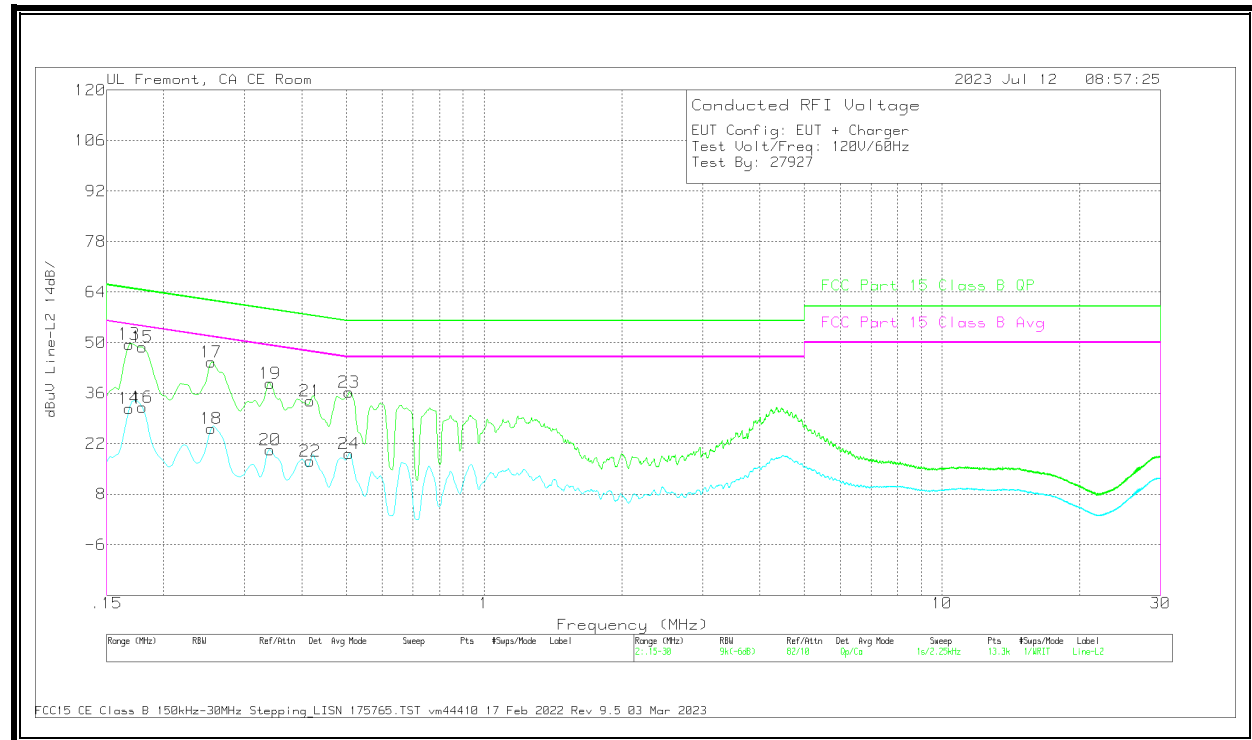
Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section indicates that when the antenna terminal is terminated the fundamental amplitude is lowering below the limit line.

10.1.6. TAG MODE, Type A 106 Kbps, Antenna Port Terminated**LINE 1 RESULTS****Worst Emission**

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L1_L1SN.csv dB	C1&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)M argin (dB)
1	.168	40.93	Qp	0	0	9.4	50.33	65.06	-14.73	-	-
2	.168	24.04	Ca	0	0	9.4	33.44	-	-	55.06	-21.62
3	.2535	35.88	Qp	0	0	9.3	45.18	61.64	-16.46	-	-
4	.2535	18.17	Ca	0	0	9.3	27.47	-	-	51.64	-24.17
5	.3413	29.97	Qp	0	.1	9.3	39.37	59.17	-19.8	-	-
6	.3413	11.53	Ca	0	.1	9.3	20.93	-	-	49.17	-28.24
7	.4268	25.91	Qp	0	.1	9.3	35.31	57.32	-22.01	-	-
8	.4268	9.81	Ca	0	.1	9.3	19.21	-	-	47.32	-28.11
9	.4808	25.85	Qp	0	.1	9.3	35.25	56.33	-21.08	-	-
10	.4808	7.74	Ca	0	.1	9.3	17.14	-	-	46.33	-29.19
11	.5123	26.53	Qp	0	.1	9.3	35.93	56	-20.07	-	-
12	.5123	9.15	Ca	0	.1	9.3	18.55	-	-	46	-27.45

Qp - Quasi-Peak detector

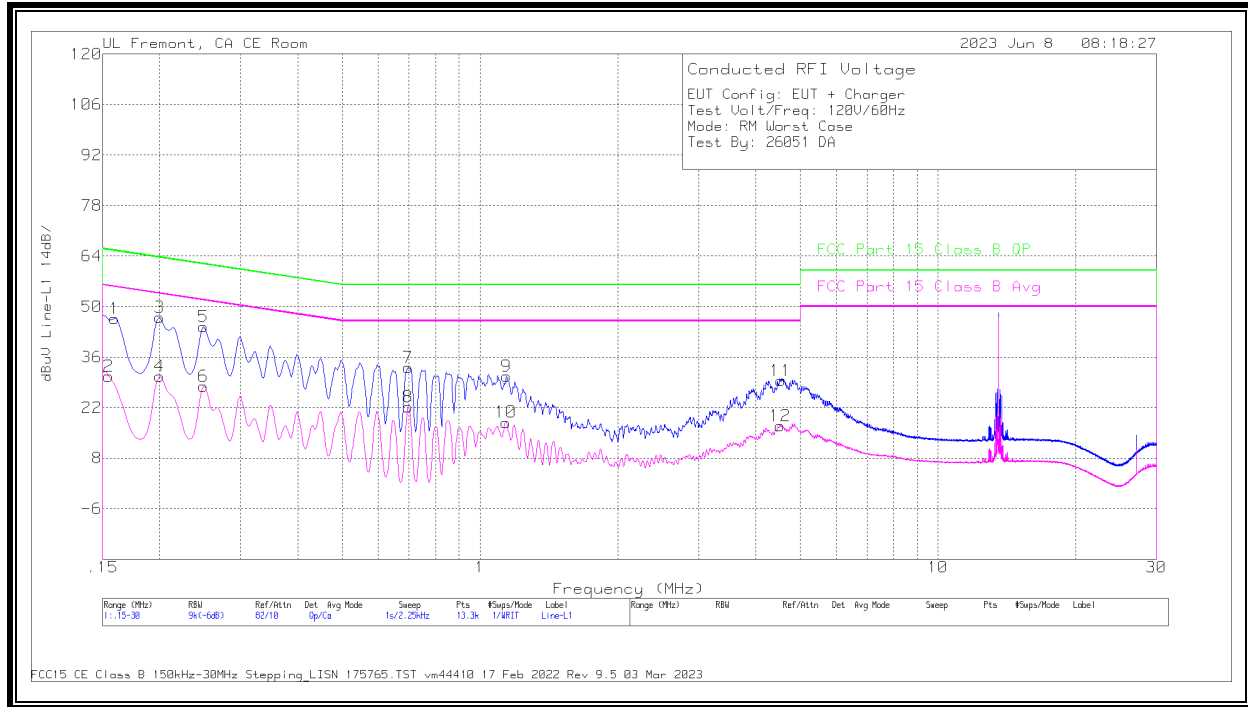
Ca - CISPR average detection

LINE 2 RESULTS**Worst Emission**

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBUV)	Det	L2 LISN dB	C2&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBUV	FCC Part 15 Class B QP dBUV	QP Margin (dB)	FCC Part 15 Class B Avg dBUV	Av(CISPR)M argin (dB)
13	.168	40.16	Qp	0	0	9.4	49.56	65.06	-15.5	-	-
14	.168	22.39	Ca	0	0	9.4	31.79	-	-	55.06	-23.27
15	.1793	39.37	Qp	0	0	9.4	48.77	64.52	-15.75	-	-
16	.1793	22.76	Ca	0	0	9.4	32.16	-	-	54.52	-22.36
17	.2535	35.3	Qp	0	0	9.3	44.6	61.64	-17.04	-	-
18	.2535	16.89	Ca	0	0	9.3	26.19	-	-	51.64	-25.45
19	.3413	29.34	Qp	0	0	9.3	38.64	59.17	-20.53	-	-
20	.3413	10.94	Ca	0	0	9.3	20.24	-	-	49.17	-28.93
21	.4178	24.44	Qp	0	.1	9.3	33.84	57.49	-23.65	-	-
22	.4178	7.73	Ca	0	.1	9.3	17.13	-	-	47.49	-30.36
23	.5078	26.82	Qp	0	.1	9.3	36.22	56	-19.78	-	-
24	.5078	9.84	Ca	0	.1	9.3	19.24	-	-	46	-26.76

Qp - Quasi-Peak detector

Ca - CISPR average detection

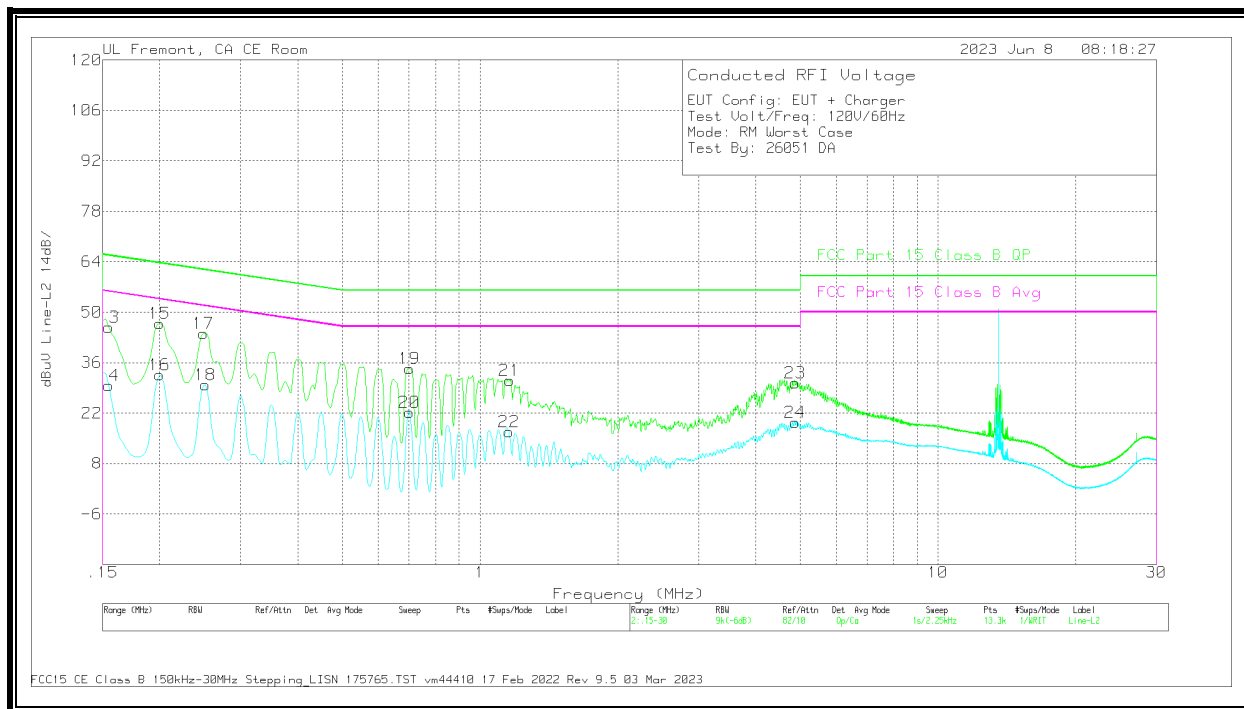
10.2. SECONDARY ANTENNA**10.2.1. READER MODE, Type A 106 Kbps, with Antenna****LINE 1 RESULTS****Worst Emission**

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L1_LISN.csv dB	C1&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)Margin (dB)
1	0.159	37.34	Qp	0	0	9.4	46.74	65.52	-18.78	-	-
2	0.1545	21.3	Ca	0	0	9.4	30.7	-	-	55.75	-25.05
3	0.1995	37.63	Qp	0	0	9.4	47.03	63.63	-16.6	-	-
4	0.1995	21.33	Ca	0	0	9.4	30.73	-	-	53.63	-22.9
5	0.249	35.08	Qp	0	0	9.3	44.38	61.79	-17.41	-	-
6	0.249	18.66	Ca	0	0	9.3	27.96	-	-	51.79	-23.83
7	0.6968	23.67	Qp	0	0.1	9.3	33.07	56	-22.93	-	-
8	0.6968	12.72	Ca	0	0.1	9.3	22.12	-	-	46	-23.88
9	1.1423	21.23	Qp	0	0.1	9.3	30.63	56	-25.37	-	-
10	1.1378	8.53	Ca	0	0.1	9.3	17.93	-	-	46	-28.07
11	4.5375	20.15	Qp	0	0.1	9.3	29.55	56	-26.45	-	-
12	4.5274	7.54	Ca	0	0.1	9.3	16.94	-	-	46	-29.06

Qp - Quasi-Peak detector

Ca - CISPR average detection

Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section indicates that when the antenna terminal is terminated the fundamental amplitude is lowering below the limit line.

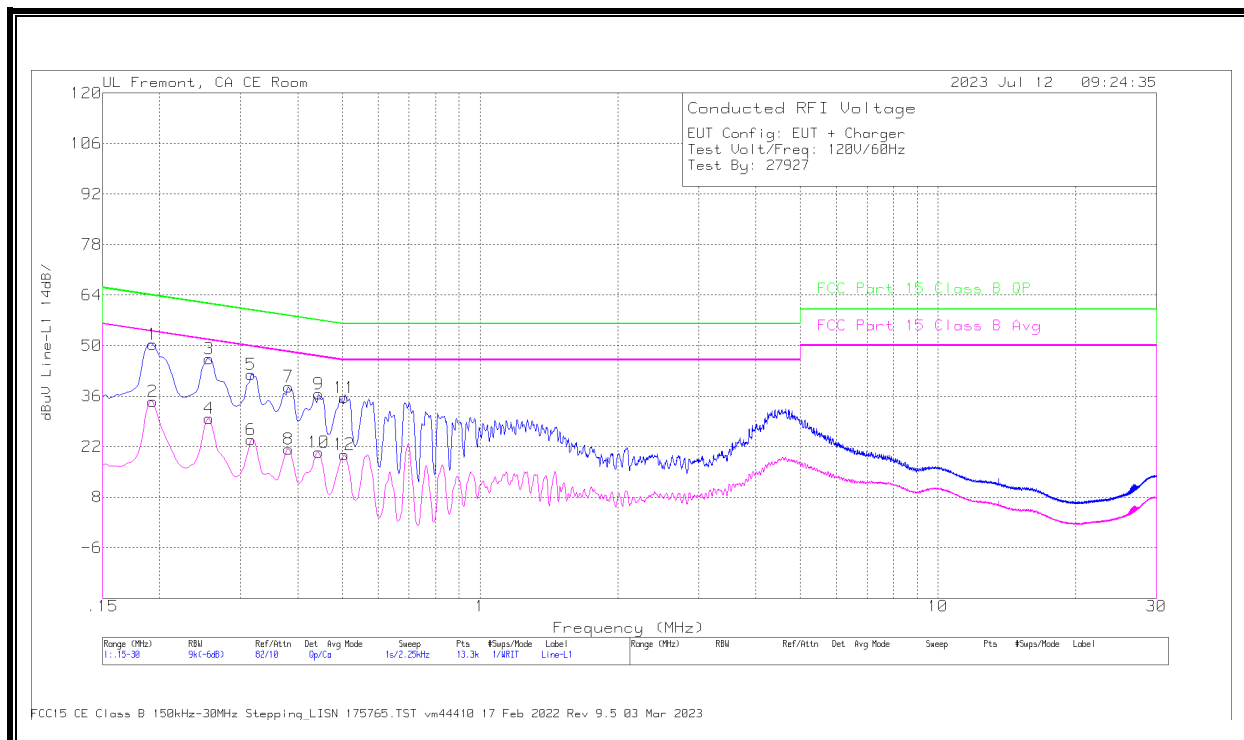
LINE 2 RESULTS**Worst Emission**

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L2_LISN dB	C2&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)Margin (dB)
13	0.1545	36.38	Qp	0	0	9.4	45.78	65.75	-19.97	-	-
14	0.1545	20.29	Ca	0	0	9.4	29.69	-	-	55.75	-26.06
15	0.1995	37.44	Qp	0	0	9.4	46.84	63.63	-16.79	-	-
16	0.1995	23.19	Ca	0	0	9.4	32.59	-	-	53.63	-21.04
17	0.249	34.82	Qp	0	0	9.3	44.12	61.79	-17.67	-	-
18	0.2513	20.5	Ca	0	0	9.3	29.8	-	-	51.72	-21.92
19	0.7013	24.97	Qp	0	0.1	9.3	34.37	56	-21.63	-	-
20	0.7013	12.75	Ca	0	0.1	9.3	22.15	-	-	46	-23.85
21	1.1603	21.61	Qp	0	0.1	9.3	31.01	56	-24.99	-	-
22	1.1558	7.41	Ca	0	0.1	9.3	16.81	-	-	46	-29.19
23	4.8728	21.01	Qp	0	0.1	9.3	30.41	56	-25.59	-	-
24	4.8728	9.94	Ca	0	0.1	9.3	19.34	-	-	46	-26.66

Qp - Quasi-Peak detector

Ca - CISPR average detection

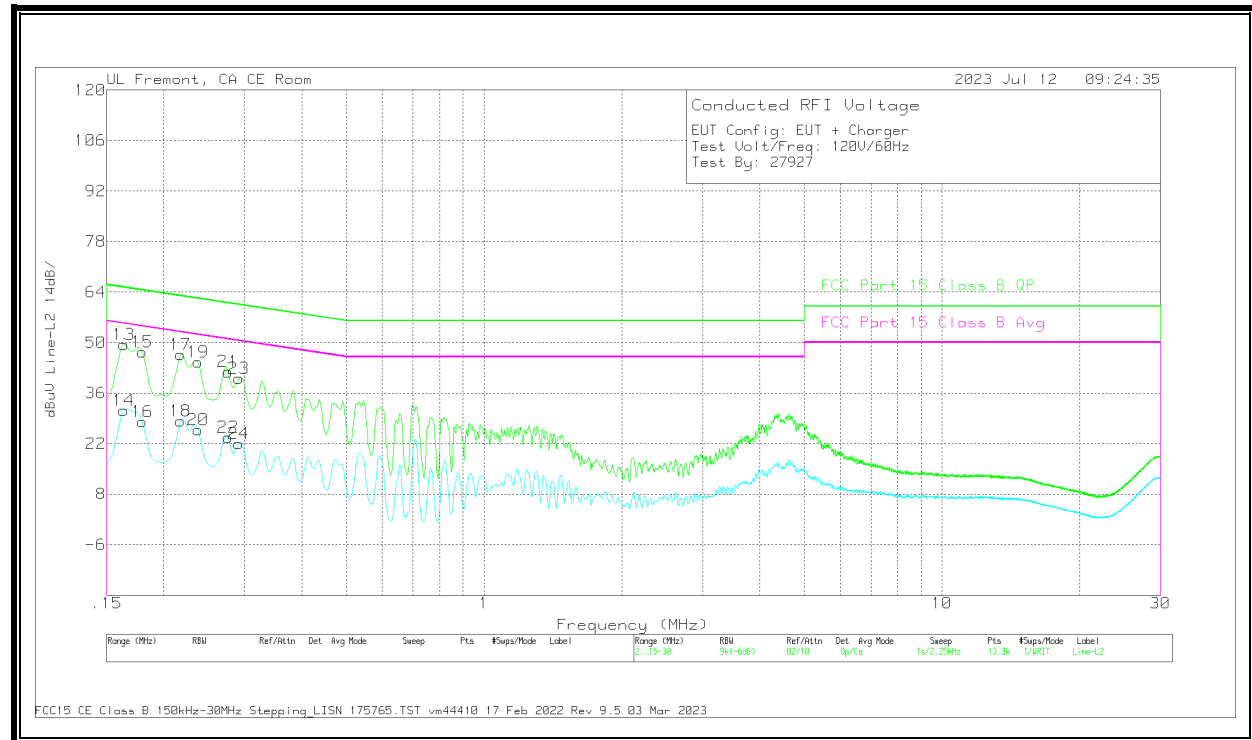
Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section indicates that when the antenna terminal is terminated the fundamental amplitude is lowering below the limit line.

10.2.2. READER MODE, Type A 106 Kbps, Antenna Port Terminated**LINE 1 RESULTS****Worst Emission**

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L1_L1SN.csv dB	C1&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)M argin (dB)
1	.1928	40.97	Qp	0	0	9.4	50.37	63.92	-13.55	-	-
2	.1928	25.18	Ca	0	0	9.4	34.58	-	-	53.92	-19.34
3	.2558	37.06	Qp	0	0	9.3	46.36	61.57	-15.21	-	-
4	.2558	20.56	Ca	0	0	9.3	29.86	-	-	51.57	-21.71
5	.3165	32.67	Qp	0	0	9.3	41.97	59.8	-17.83	-	-
6	.3165	14.56	Ca	0	0	9.3	23.86	-	-	49.8	-25.94
7	.3818	29.21	Qp	0	.1	9.3	38.61	58.24	-19.63	-	-
8	.3818	11.99	Ca	0	.1	9.3	21.39	-	-	48.24	-26.85
9	.4448	27.2	Qp	0	.1	9.3	36.6	56.97	-20.37	-	-
10	.4448	11.09	Ca	0	.1	9.3	20.49	-	-	46.97	-26.48
11	.5055	26.2	Qp	0	.1	9.3	35.6	56	-20.4	-	-
12	.5055	10.44	Ca	0	.1	9.3	19.84	-	-	46	-26.16

Qp - Quasi-Peak detector

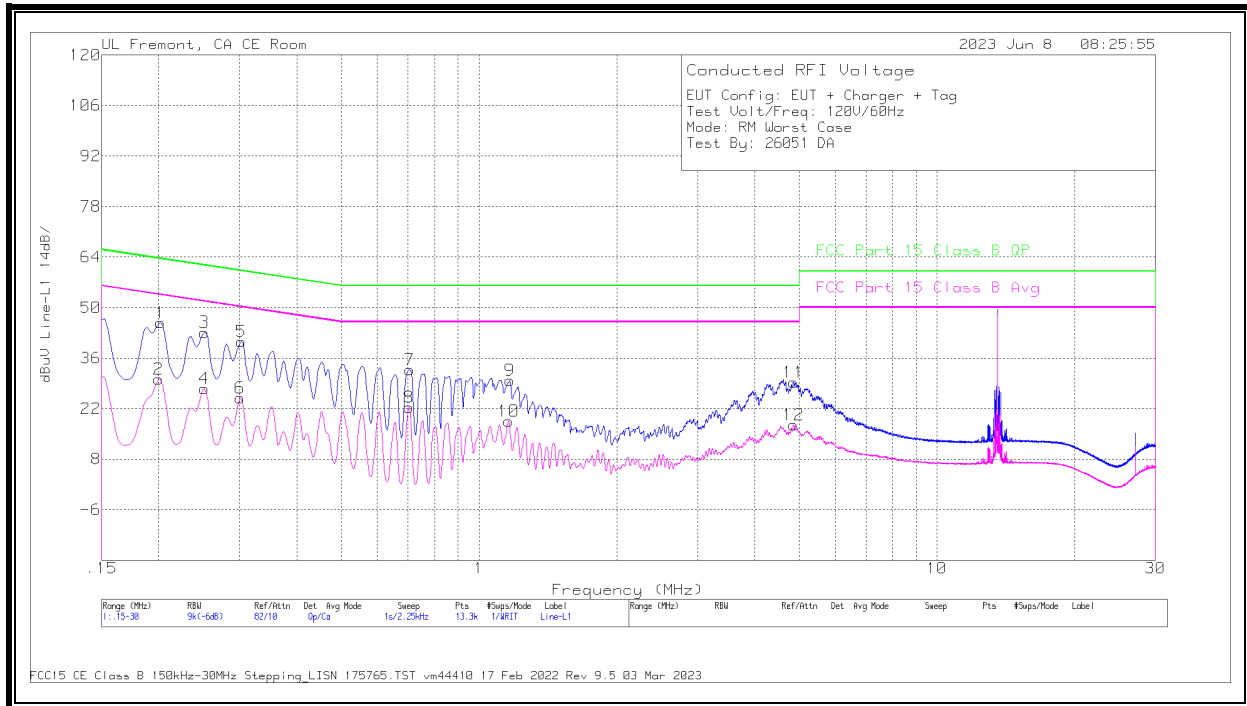
Ca - CISPR average detection

LINE 2 RESULTS**Worst Emission**

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L2_LISN dB	C2&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)M argin (dB)
13	.1635	40.08	Qp	0	0	9.4	49.48	65.28	-15.8	-	-
14	.1635	21.81	Ca	0	0	9.4	31.21	-	-	55.28	-24.07
15	.1793	38.05	Qp	0	0	9.4	47.45	64.52	-17.07	-	-
16	.1793	18.72	Ca	0	0	9.4	28.12	-	-	54.52	-26.4
17	.2175	37.43	Qp	0	0	9.3	46.73	62.91	-16.18	-	-
18	.2175	19.01	Ca	0	0	9.3	28.31	-	-	52.91	-24.6
19	.2378	35.34	Qp	0	0	9.3	44.64	62.17	-17.53	-	-
20	.2378	16.46	Ca	0	0	9.3	25.76	-	-	52.17	-26.41
21	.276	32.62	Qp	0	0	9.3	41.92	60.94	-19.02	-	-
22	.276	14.46	Ca	0	0	9.3	23.76	-	-	50.94	-27.18
23	.2918	30.8	Qp	0	0	9.3	40.1	60.47	-20.37	-	-
24	.2918	12.65	Ca	0	0	9.3	21.95	-	-	50.47	-28.52

Qp - Quasi-Peak detector

Ca - CISPR average detection

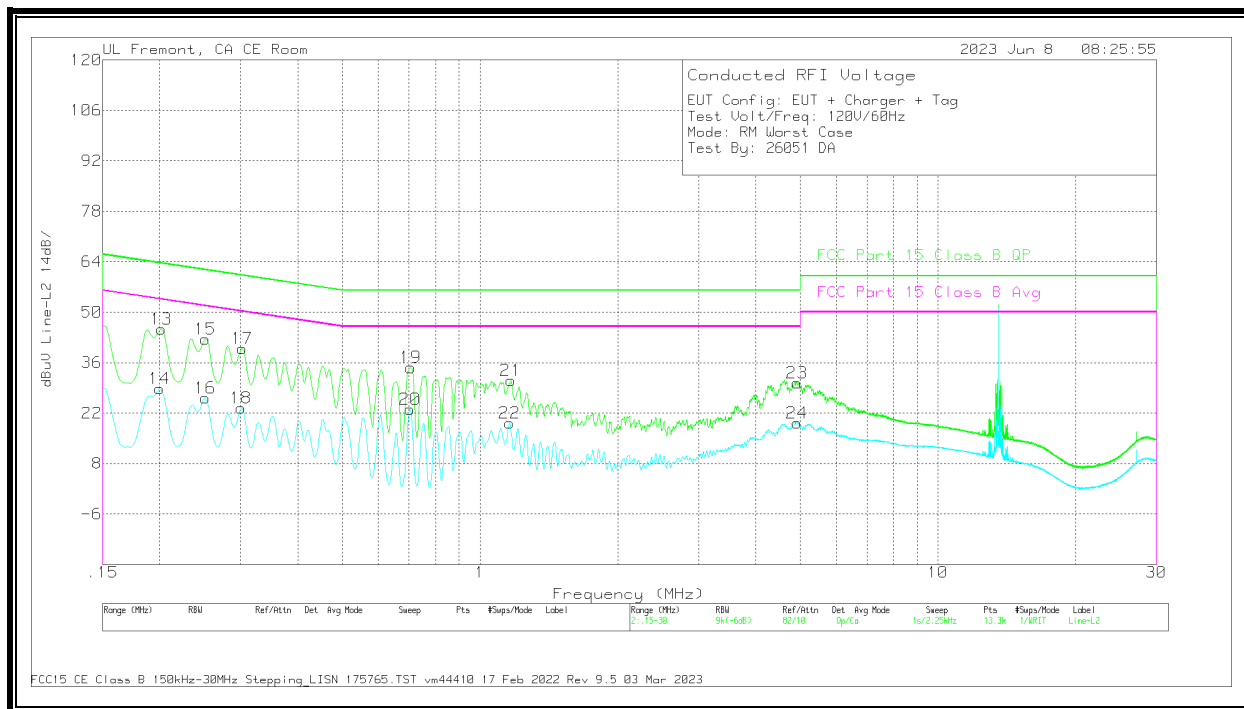
10.2.3. TAG MODE, Type A 106 Kbps, with Antenna**LINE 1 RESULTS****Worst Emission**

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L1_LISN.csv dB	C1&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)Margin (dB)
1	0.2018	36.5	Qp	0	0	9.4	45.9	63.54	-17.64	-	-
2	0.1995	20.86	Ca	0	0	9.4	30.26	-	-	53.63	-23.37
3	0.2513	33.83	Qp	0	0	9.3	43.13	61.72	-18.59	-	-
4	0.2513	18.33	Ca	0	0	9.3	27.63	-	-	51.72	-24.09
5	0.303	31.29	Qp	0	0	9.3	40.59	60.16	-19.57	-	-
6	0.3008	15.66	Ca	0	0	9.3	24.96	-	-	50.22	-25.26
7	0.7058	23.41	Qp	0	0.1	9.3	32.81	56	-23.19	-	-
8	0.7035	12.9	Ca	0	0.1	9.3	22.3	-	-	46	-23.7
9	1.1693	20.38	Qp	0	0.1	9.3	29.78	56	-26.22	-	-
10	1.1603	9.07	Ca	0	0.1	9.3	18.47	-	-	46	-27.53
11	4.8548	19.96	Qp	0	0.1	9.3	29.36	56	-26.64	-	-
12	4.8593	8.15	Ca	0	0.1	9.3	17.55	-	-	46	-28.45

Qp - Quasi-Peak detector

Ca - CISPR average detection

Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section indicates that when the antenna terminal is terminated the fundamental amplitude is lowering below the limit line.

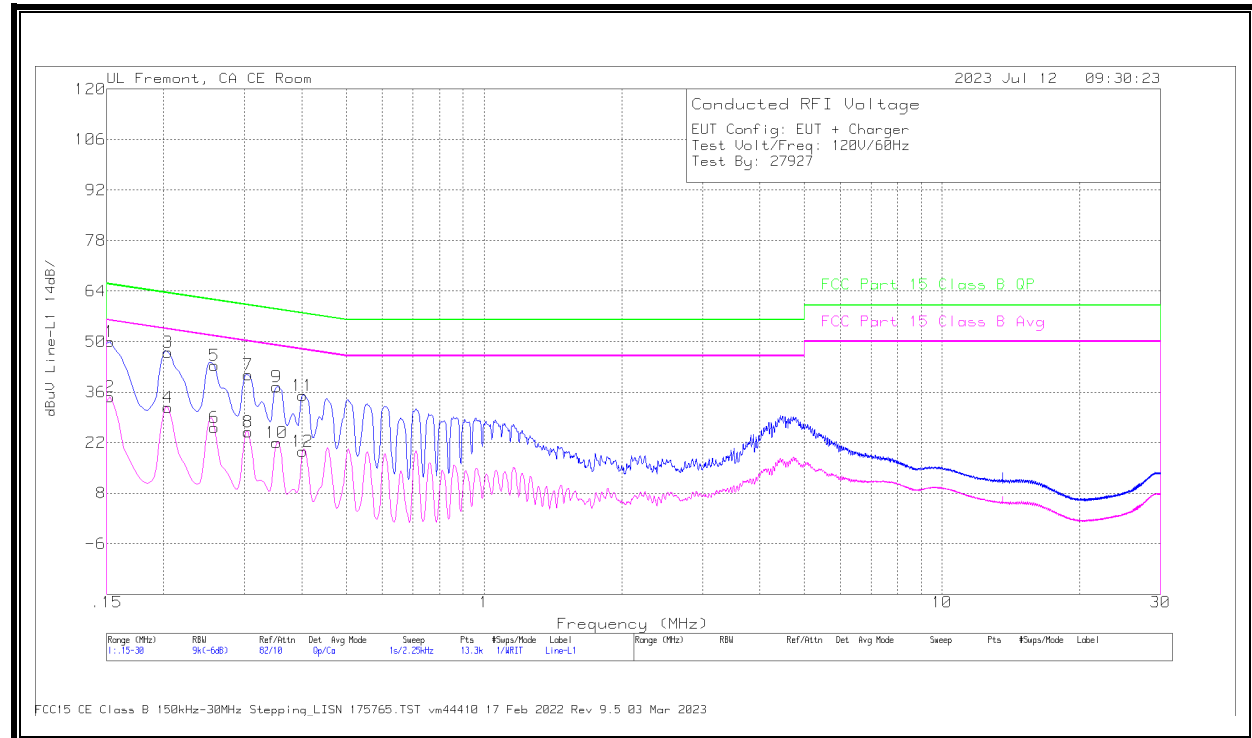
LINE 2 RESULTS**Worst Emission**

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L2_LISN dB	C2&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)Margin (dB)
13	0.2018	35.93	Qp	0	0	9.4	45.33	63.54	-18.21	-	-
14	0.1995	19.32	Ca	0	0	9.4	28.72	-	-	53.63	-24.91
15	0.2513	33.28	Qp	0	0	9.3	42.58	61.72	-19.14	-	-
16	0.2513	16.9	Ca	0	0	9.3	26.2	-	-	51.72	-25.52
17	0.303	30.68	Qp	0	0	9.3	39.98	60.16	-20.18	-	-
18	0.3008	14.15	Ca	0	0	9.3	23.45	-	-	50.22	-26.77
19	0.7058	25.22	Qp	0	0.1	9.3	34.62	56	-21.38	-	-
20	0.7035	13.73	Ca	0	0.1	9.3	23.13	-	-	46	-22.87
21	1.1693	21.64	Qp	0	0.1	9.3	31.04	56	-24.96	-	-
22	1.1603	9.88	Ca	0	0.1	9.3	19.28	-	-	46	-26.72
23	4.929	20.95	Qp	0	0.1	9.3	30.35	56	-25.65	-	-
24	4.929	9.83	Ca	0	0.1	9.3	19.23	-	-	46	-26.77

Qp - Quasi-Peak detector

Ca - CISPR average detection

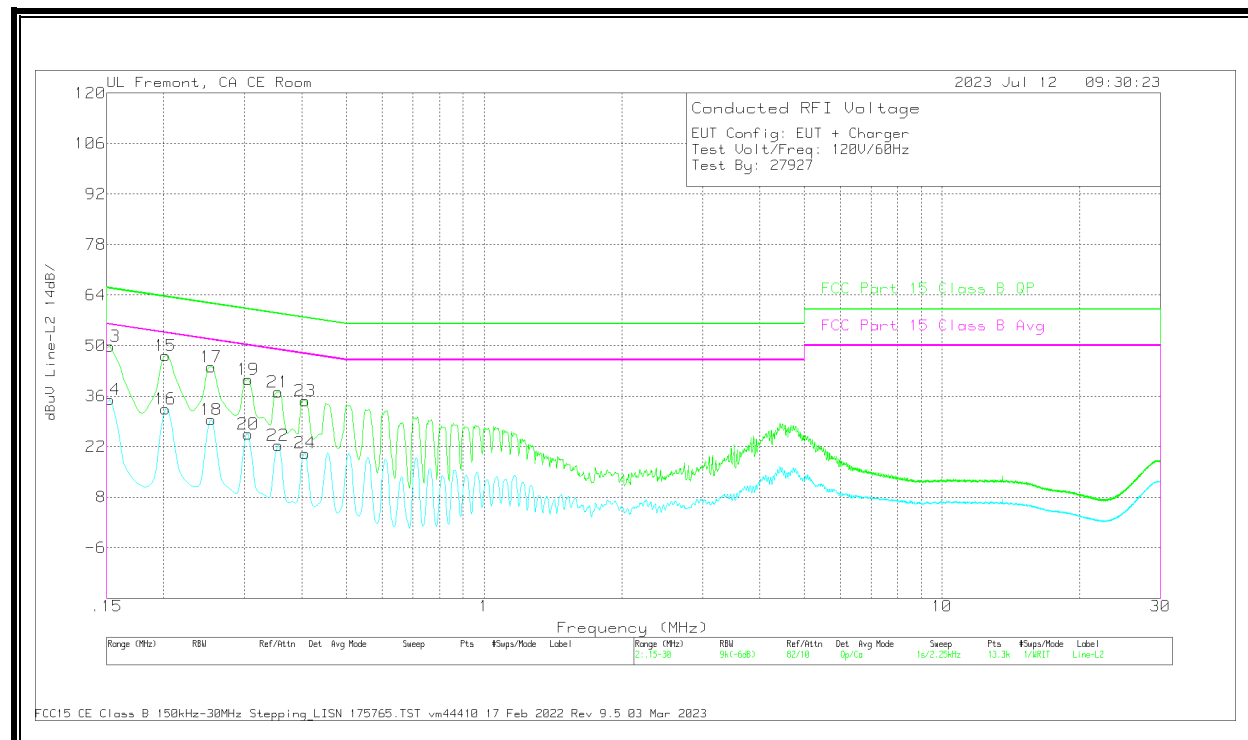
Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section indicates that when the antenna terminal is terminated the fundamental amplitude is lowering below the limit line.

10.2.4. TAG MODE Type A 106 Kbps, Antenna Port Terminated**LINE 1 RESULTS****Worst Emission**

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L1_L1SN.csv dB	C1&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)M argin (dB)
1	.1523	40.59	Qp	0	0	9.4	49.99	65.88	-15.89	-	-
2	.1523	25.25	Ca	0	0	9.4	34.65	-	-	55.88	-21.23
3	.204	37.71	Qp	0	0	9.4	47.11	63.45	-16.34	-	-
4	.204	22.4	Ca	0	0	9.4	31.8	-	-	53.45	-21.65
5	.258	34.02	Qp	0	0	9.3	43.32	61.5	-18.18	-	-
6	.258	16.81	Ca	0	0	9.3	26.11	-	-	51.5	-25.39
7	.3053	31.42	Qp	0	0	9.3	40.72	60.1	-19.38	-	-
8	.3053	15.62	Ca	0	0	9.3	24.92	-	-	50.1	-25.18
9	.3525	28.17	Qp	0	0	9.3	37.47	58.9	-21.43	-	-
10	.3525	12.7	Ca	0	0	9.3	22	-	-	48.9	-26.9
11	.402	25.63	Qp	0	.1	9.3	35.03	57.81	-22.78	-	-
12	.402	10.12	Ca	0	.1	9.3	19.52	-	-	47.81	-28.29

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS**Worst Emission**

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L2 LISN dB	C2&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)M argin (dB)
13	.1523	40.46	Qp	0	0	9.4	49.86	65.88	-16.02	-	-
14	.1523	25.69	Ca	0	0	9.4	35.09	-	-	55.88	-20.79
15	.2018	37.86	Qp	0	0	9.4	47.26	63.54	-16.28	-	-
16	.2018	23.1	Ca	0	0	9.4	32.5	-	-	53.54	-21.04
17	.2535	34.78	Qp	0	0	9.3	44.08	61.64	-17.56	-	-
18	.2535	20.17	Ca	0	0	9.3	29.47	-	-	51.64	-22.17
19	.3053	31.34	Qp	0	0	9.3	40.64	60.1	-19.46	-	-
20	.3053	16.2	Ca	0	0	9.3	25.5	-	-	50.1	-24.6
21	.3548	27.81	Qp	0	0	9.3	37.11	58.85	-21.74	-	-
22	.3548	13.05	Ca	0	0	9.3	22.35	-	-	48.85	-26.5
23	.4065	25.33	Qp	0	.1	9.3	34.73	57.72	-22.99	-	-
24	.4065	10.79	Ca	0	.1	9.3	20.19	-	-	47.72	-27.53

Qp - Quasi-Peak detector

Ca - CISPR average detection

11. SETUP PHOTOS

Please refer to 14523771-EP1V1 for setup photos.

END OF TEST REPORT