

TEST REPORT

Report Number. : R15203365-E1

Applicant : Vita-Mix Corporation
8615 Usher Rd.
Cleveland, OH 44138, United States

Model : VM0230, VM0231, VM0232, VM0233, VM0234

FCC ID : 2AJEHVM0230

IC : 21814-VM0230

EUT Description : Household Food Preparing Machine

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C: 2024
ISED RSS-210 ISSUE 10: 2019
ISED RSS-GEN ISSUE 5 + A1 + A2: 2021

Date Of Issue:

2024-07-10

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CERT #0751.06

REVISION HISTORY

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2024-04-30	Initial Issue	Charles Moody
V2	2024-07-10	Updated Section 5.4 with Model Differences	Charles Moody

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Vita-Mix Corporation
8615 Usher Rd.
Cleveland, OH 44138, United States

EUT DESCRIPTION: Household Food Preparing Machine

MODEL: VM0230, VM0231, VM0232, VM0233, VM0234

SERIAL NUMBER: Non-Serialized

SAMPLE RECEIPT DATE: 2024-03-26, 2024-04-19

DATE TESTED: 2024-04-09 TO 2024-04-24

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C : 2024	Complies
ISED RSS-210 Issue 10, Annex B: 2019	Complies
ISED RSS-GEN Issue 5 + A1 + A2: 2021	Complies

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

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

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

Approved & Released For
UL LLC By:

Prepared By:



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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2020, KDB 174176, FCC 47 CFR Part 2, FCC 47 CFR Part 15, RSS-GEN Issue 5 + A1 + A2, and RSS-210 Issue 10.

3. 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
<input checked="" type="checkbox"/>	Building 2800 Suite Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A	US0067	27265	825374
<input type="checkbox"/>	Building 12 Laboratory Dr RTP, NC 27709, U.S.A		2180C	

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

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

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)

$$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.

$$36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$$

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a household food preparing machine that contains an NFC radio. This report covers the NFC testing.

5.2. MAXIMUM ELECTRIC FIELD STRENGTH

Testing was performed at a distance of 3m. The transmitter has a maximum peak radiated magnetic field strength as follows:

The maximum E-field reading of the VM0231 at 30m is 29.39 dBuV/m.
The maximum E-field reading of the VM0232 at 30m is 26.11 dBuV/m.
The maximum E-field reading of the VM0234 at 30m is 18.71 dBuV/m.

5.3. SOFTWARE AND FIRMWARE

The firmware installed on the EUT for testing is as follows:

Model X1 and Model X2 User interface: Version 0.26
Model X3 User Interface: Version 0.0.131
Model X4 and Model X5: Version: 0.0.130
HCB = Rev E.6, FW -1.31
HNFC = Rev E.6, FW – 1.16

5.4. WORST-CASE CONFIGURATION AND MODE

The EUT only operates in one orthogonal orientation. Therefore for all testing, the EUT was set to this upright orientation.

The worst case position of the EUT was investigated under two configurations: EUT with the various blender cups attached (Tag-On) and EUT without the blender cup present (Tag-Off). It was determined that the Tag-Off configuration was worst case. Therefore for all final testing, the EUT was tested with the blender cup removed.

For AC Lines testing, a board with the antenna port terminated was used.

The EUT only operates as Type A with a data rate of 106 kbps.

Bandwidth and frequency stability measurements were performed on only one of the models, VM0234, to cover all of the other models. This model has the same radio circuitry as all other models; therefore, this testing can be used to cover all of the models

Radiated emissions and AC Lines emissions testing was performed on the VM0231, VM0232, and VM0234 to cover the VM0230 and VM0233. The VM0231 and the VM0230 share the same radio circuitry, the VM0231 just includes additional switches and programs and therefore was considered to be worst-case. The VM0234 was tested in place of the VM0233 as both of these units shared the same electronic circuitry, the VM0234 just included additional programs not found on the VM0233. Therefore, the VM0234 was considered to be worst case over the VM0233.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are 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

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Bowl	Vita-Mix	VM0192	N/A	N/A
Cup	Vita-Mix	VM0191	N/A	N/A
48oz Container	Vita-Mix	VM0190	N/A	N/A
Steel Container	Vita-Mix	VM0216	N/A	N/A
Food Processor	Vita-Mix	VM0215	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Power	1	AC Wall Plug	Shielded	<3m	Used to Power EUT

TEST SETUP

Test software exercised the radio card.

SETUP DIAGRAM

Please refer to R15203365-EP1 for setup diagrams

6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 2)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
135144	Active Loop Antenna	ETS-Lindgren	6502	2024-01-24	2025-01-24
	30-1000 MHz				
159203	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-03-05	2026-03-05
	Gain-Loss Chains				
91975	Gain-loss string: 0.009-30MHz	Various	Various	2023-06-06	2024-06-06
91978	Gain-loss string: 25-1000MHz	Various	Various	2023-06-06	2024-06-06
	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				
200540	Environmental Meter	Fisher Scientific	15-077-963	2023-07-19	2025-07-19

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	N9030A	2023-08-09	2024-08-30
9911-4442	NFC Probe	EMCO	7405	-	-
179892	Environmental Meter	Fisher Scientific	15-077-963	2023-07-26	2024-06-31

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
179892	Environmental Meter	Fisher Scientific	15-077-963	2023-07-26	2024-06-31
80391	LISN, 50-ohm/50-uH, 250uH 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250-25-2-01	2023-07-31	2024-07-31
75141	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2023-08-01	2024-08-01
52859	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2024-04-04	2025-04-04
PS214	AC Power Source	Elgar	CW2501M	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		

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	2023-05-16	2024-05-16
91976	Gain-loss string: 25-1000MHz	Various	Various	2023-05-16	2024-05-16
Receiver & Software					
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-07-19	2024-07-19
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

7. OCCUPIED BANDWIDTH AND 20dB BANDWIDTH

LIMITS

Occupied Bandwidth: None; for reporting purposes only.

RSS-Gen Issue 5+A1+A2: 2021 Section 6.7

20dB Bandwidth: §15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

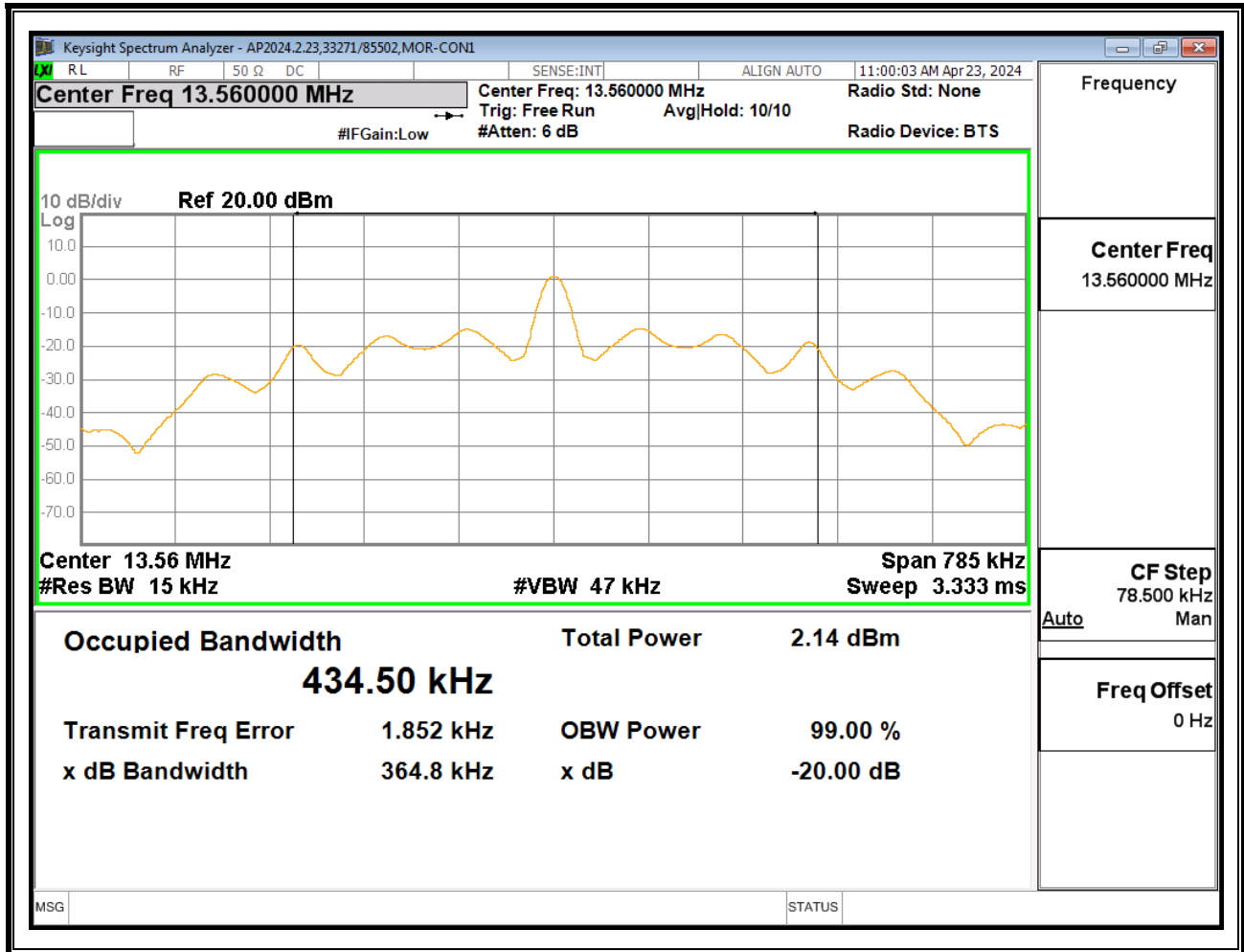
TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1-5% of the EBW. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

99% and 20dB BW

Frequency (MHz)	99% Bandwidth (KHz)	20dB Bandwidth (KHz)
13.56	434.50	364.80



8. RADIATED EMISSION TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMIT

§15.225

ISED RSS-210, Annex B.6

ISED 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)

In addition:

§15.209 (d) The emission limits shown in 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 emission 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, 2020

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

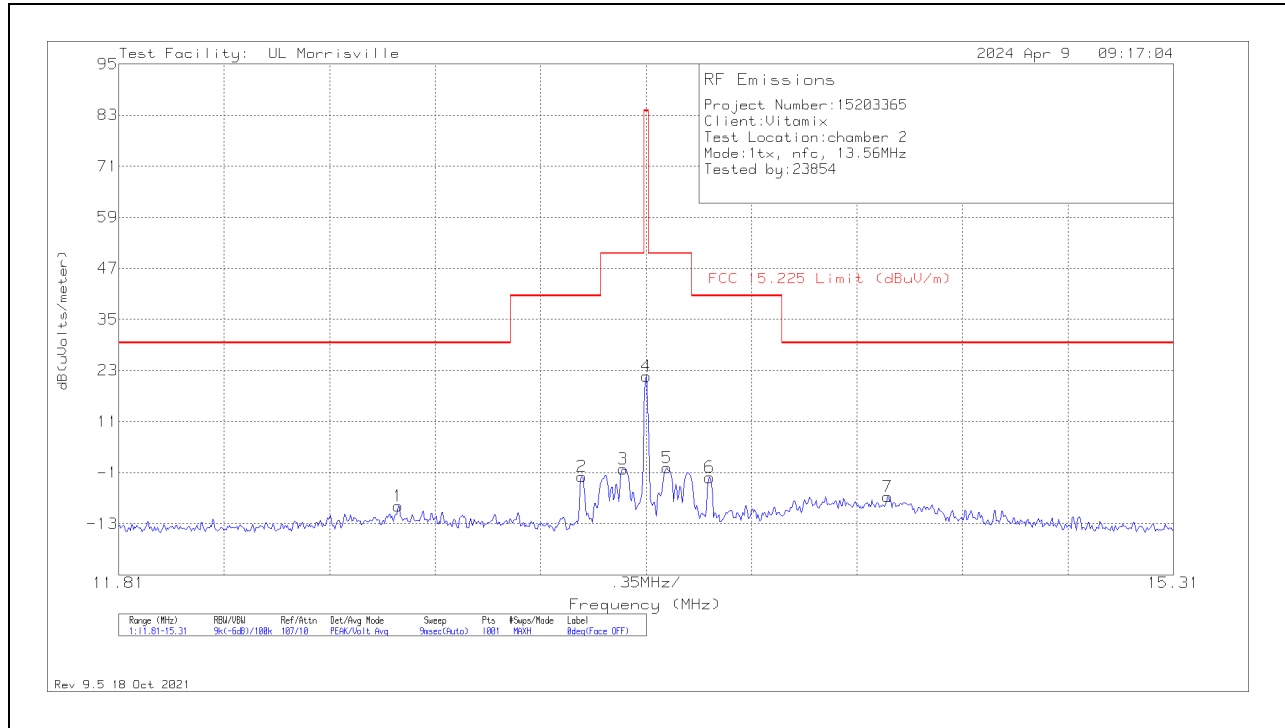
RESULTS

8.1. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.009 - 30 MHz)

8.1.1. FUNDAMENTAL RESULTS

8.1.1.1. VM0231

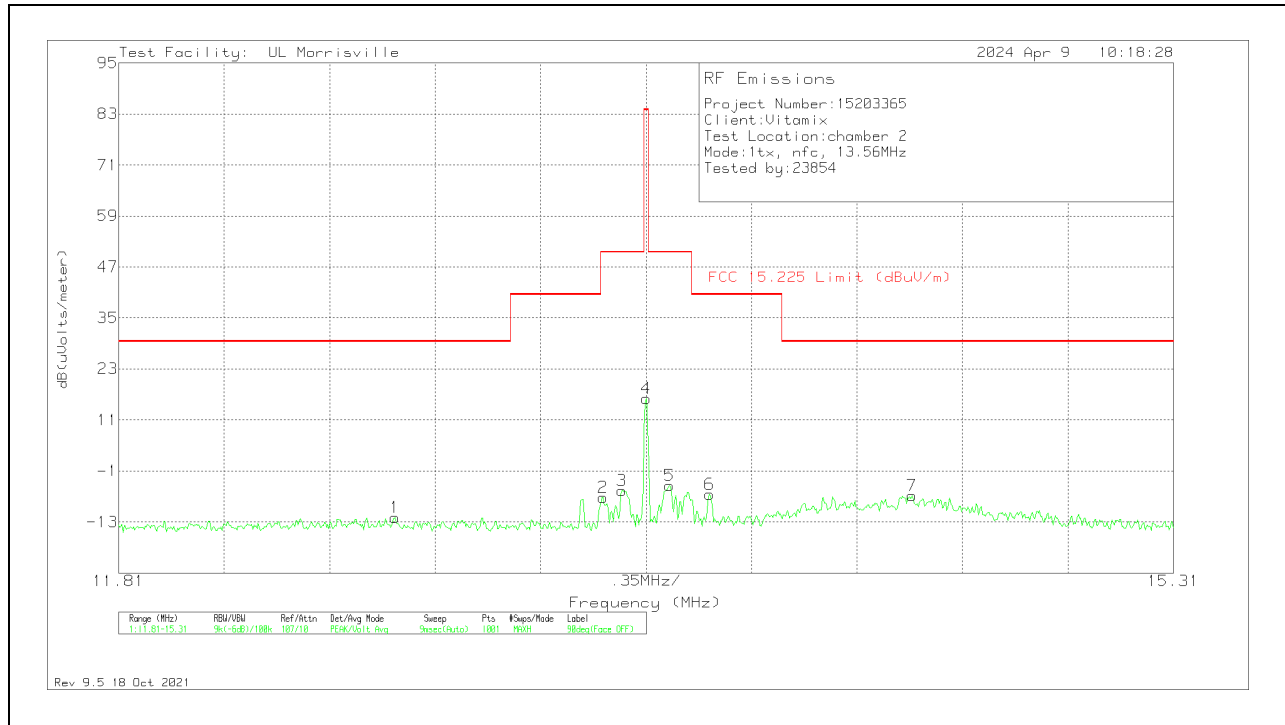
FUNDAMENTAL – Face On, 0 Deg



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	12.7375	19.79	Pk	10.8	.6	-40	-8.81	29.5	-38.31	347	0 degs
2	13.3465	26.77	Pk	10.7	.6	-40	-1.93	40.5	-42.43	347	0 degs
3	13.483	28.53	Pk	10.7	.6	-40	-.17	50.5	-50.67	347	0 degs
4	13.56	50.36	Pk	10.7	.6	-40	21.66	84	-62.34	347	0 degs
5	13.63	28.78	Pk	10.7	.6	-40	.08	50.5	-50.42	347	0 degs
6	13.77	26.55	Pk	10.7	.6	-40	-2.15	40.5	-42.65	347	0 degs
7	14.3615	21.92	Pk	10.7	.7	-40	-6.68	29.5	-36.18	347	0 degs

Pk - Peak detector

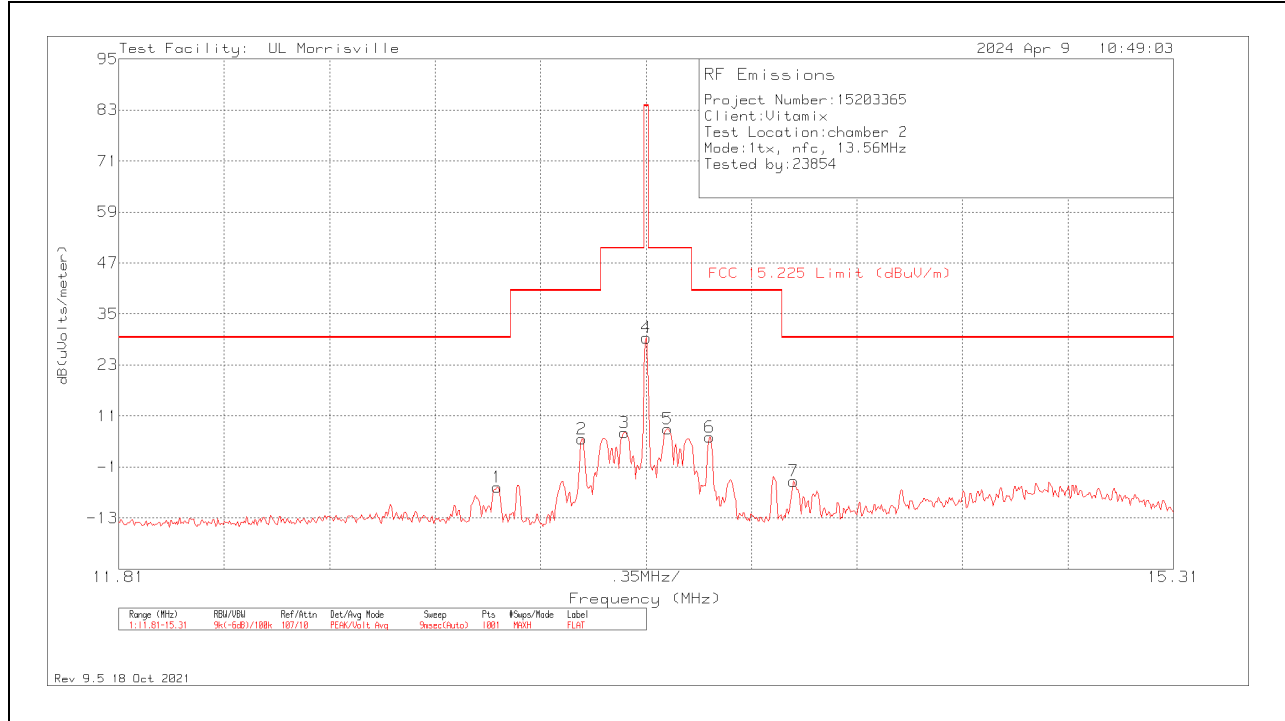
FUNDAMENTAL – Face Off, 90 Deg



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	12.727	16.6	Pk	10.8	.6	-40	-12	29.5	-41.5	90	90 degs
2	13.4165	21.43	Pk	10.7	.6	-40	-7.27	50.5	-57.77	90	90 degs
3	13.4795	23.14	Pk	10.7	.6	-40	-5.56	50.5	-56.06	90	90 degs
4	13.56	44.78	Pk	10.7	.6	-40	16.08	84	-67.92	90	90 degs
5	13.637	24.31	Pk	10.7	.6	-40	-4.39	50.5	-54.89	90	90 degs
6	13.77	22.25	Pk	10.7	.6	-40	-6.45	40.5	-46.95	90	90 degs
7	14.442	21.75	Pk	10.7	.7	-40	-6.85	29.5	-36.35	90	90 degs

Pk - Peak detector

FUNDAMENTAL – Horizontal, Flat

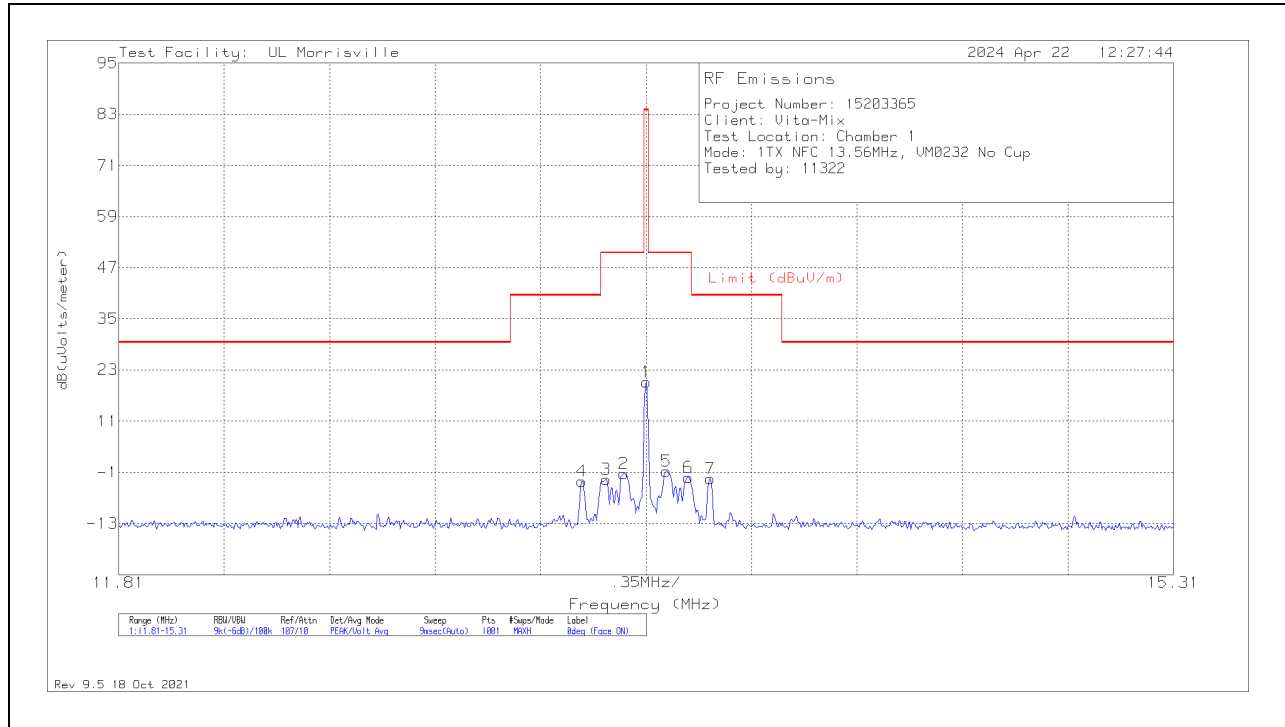


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	13.0665	22.98	Pk	10.7	.6	-40	-5.72	29.5	-35.22	336	Flat
2	13.3465	34.33	Pk	10.7	.6	-40	5.63	40.5	-34.87	336	Flat
3	13.48825	35.77	Pk	10.7	.6	-40	7.07	50.5	-43.43	336	Flat
4	13.56	58.09	Pk	10.7	.6	-40	29.39	84	-54.61	336	Flat
5	13.63175	36.66	Pk	10.7	.6	-40	7.96	50.5	-42.54	336	Flat
6	13.77	34.78	Pk	10.7	.6	-40	6.08	40.5	-34.42	336	Flat
7	14.05	24.24	Pk	10.7	.7	-40	-4.36	29.5	-33.86	336	Flat

PK - Peak detector

8.1.1.2. VM0232

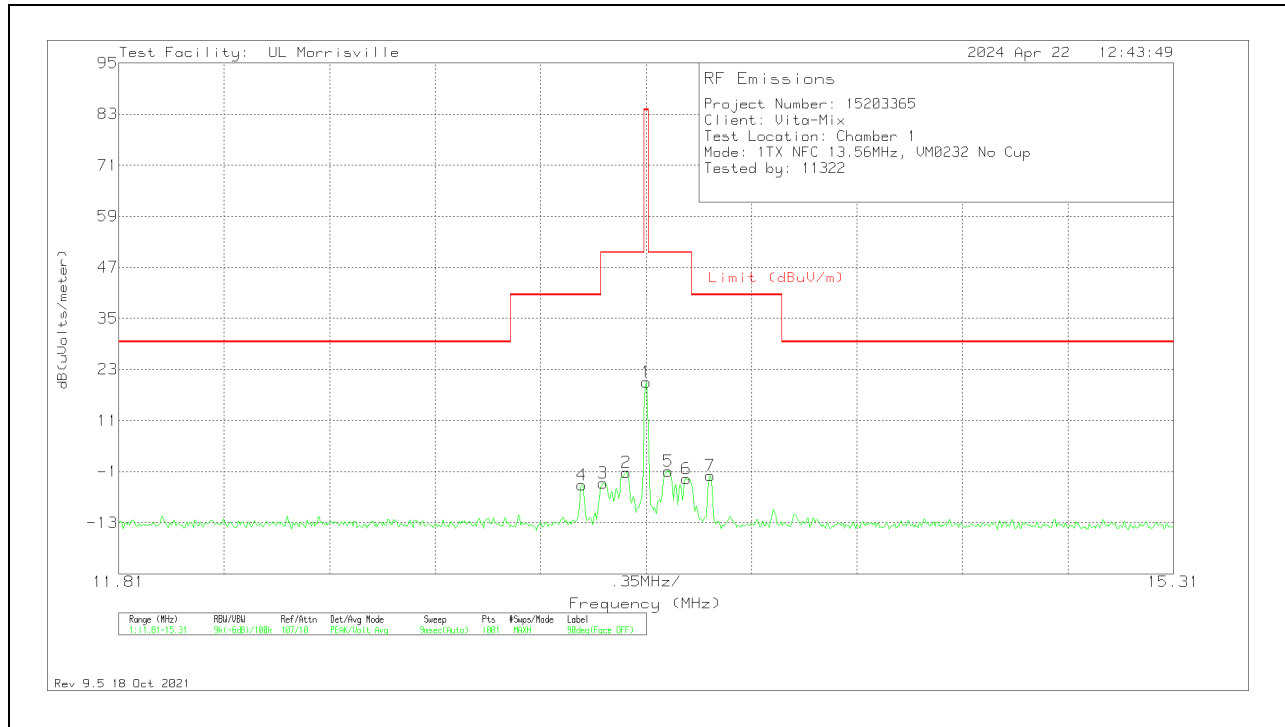
FUNDAMENTAL – Face On, 0 Deg



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
4	13.3465	25.64	Pk	10.7	.6	-40	-3.06	40.5	-43.56	26	0 degs
3	13.427	26.08	Pk	10.7	.6	-40	-2.62	50.5	-53.12	26	0 degs
2	13.4865	27.31	Pk	10.7	.6	-40	-1.39	50.5	-51.89	26	0 degs
1	13.56	48.82	Pk	10.7	.6	-40	20.12	84	-63.88	26	0 degs
5	13.6265	27.93	Pk	10.7	.6	-40	-.77	50.5	-51.27	26	0 degs
6	13.7	26.51	Pk	10.7	.6	-40	-2.19	50.5	-52.69	26	0 degs
7	13.7735	26.17	Pk	10.7	.6	-40	-2.53	40.5	-43.03	26	0 degs

Pk - Peak detector

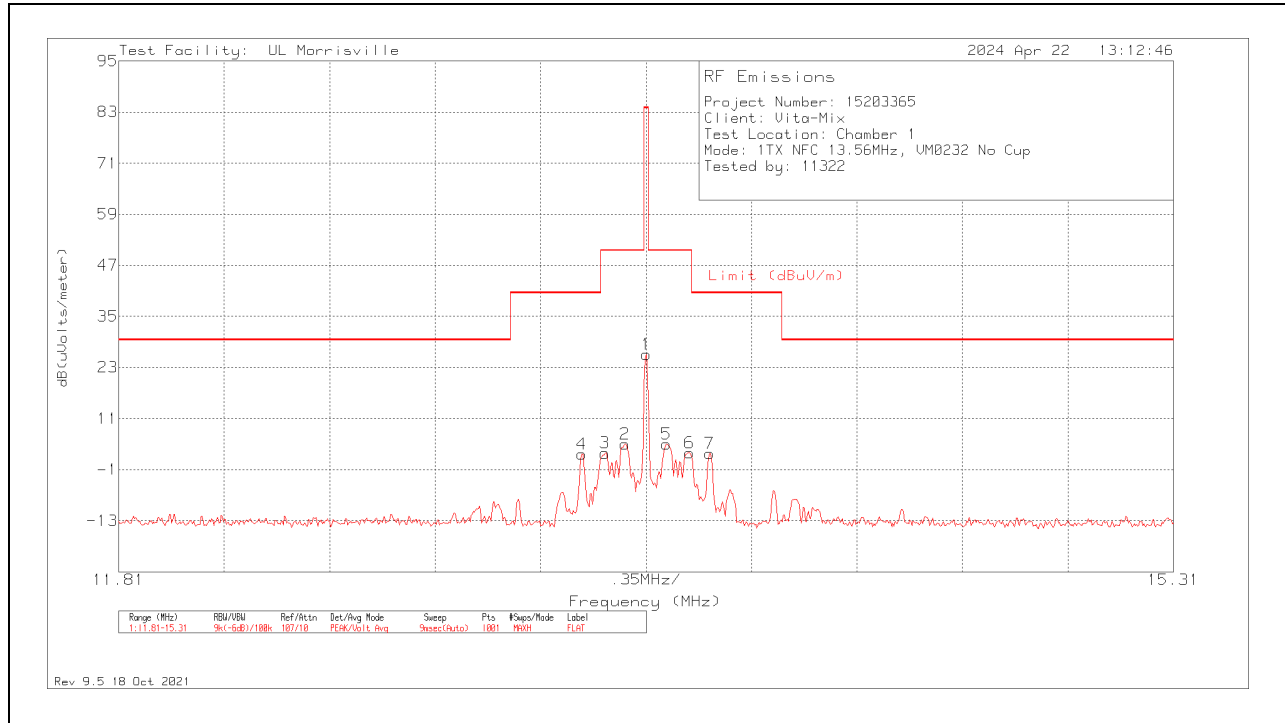
FUNDAMENTAL – Face Off, 90 Deg



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
4	13.3465	24.49	Pk	10.7	.6	-40	-4.21	40.5	-44.71	102	90 degs
3	13.4165	24.98	Pk	10.7	.6	-40	-3.72	50.5	-54.22	102	90 degs
2	13.4935	27.57	Pk	10.7	.6	-40	-1.13	50.5	-51.63	102	90 degs
1	13.56	48.69	Pk	10.7	.6	-40	19.99	84	-64.01	102	90 degs
5	13.6335	27.8	Pk	10.7	.6	-40	-.9	50.5	-51.4	102	90 degs
6	13.693	26.06	Pk	10.7	.6	-40	-2.64	50.5	-53.14	102	90 degs
7	13.7735	26.78	Pk	10.7	.6	-40	-1.92	40.5	-42.42	102	90 degs

Pk - Peak detector

FUNDAMENTAL – Horizontal, Flat

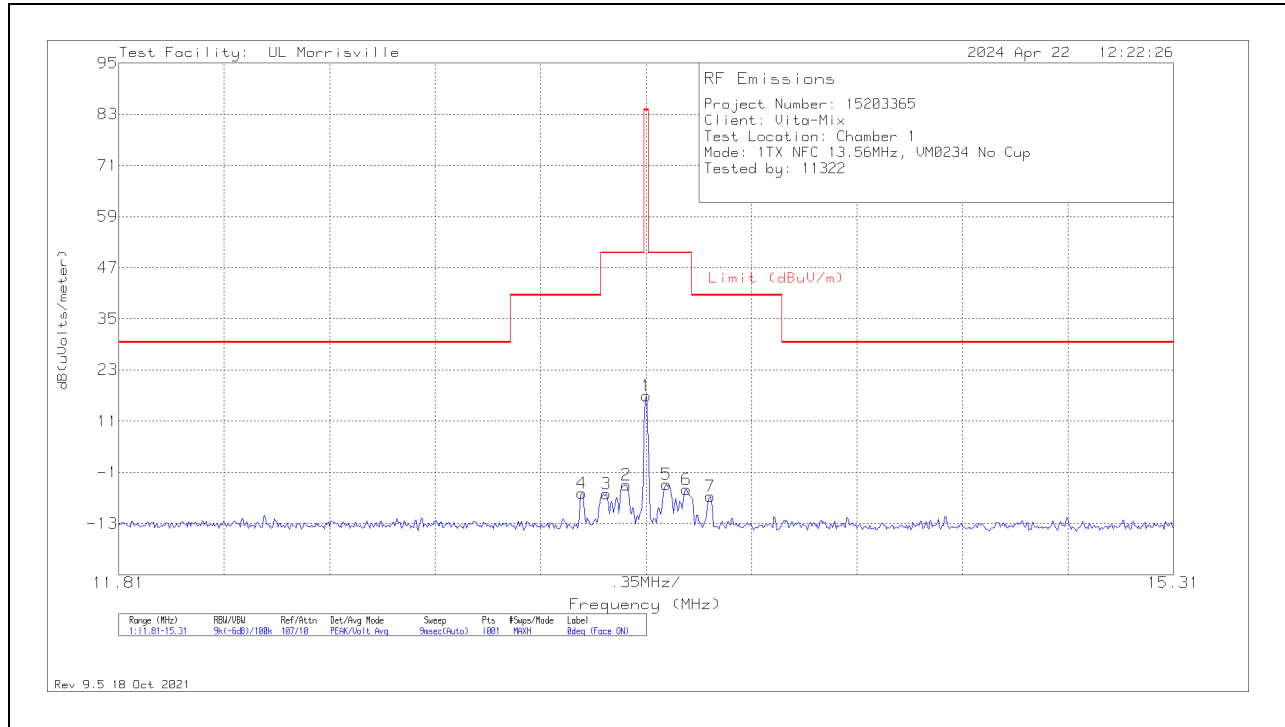


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
4	13.3465	31.36	Pk	10.7	.6	-40	2.66	40.5	-37.84	25	Flat
3	13.4235	31.56	Pk	10.7	.6	-40	2.86	50.5	-47.64	25	Flat
2	13.49	33.66	Pk	10.7	.6	-40	4.96	50.5	-45.54	25	Flat
1	13.56	54.81	Pk	10.7	.6	-40	26.11	84	-57.89	25	Flat
5	13.6265	33.67	Pk	10.7	.6	-40	4.97	50.5	-45.53	25	Flat
6	13.7035	31.68	Pk	10.7	.6	-40	2.98	50.5	-47.52	25	Flat
7	13.77	31.55	Pk	10.7	.6	-40	2.85	40.5	-37.65	25	Flat

Pk - Peak detector

8.1.1.3. VM0234

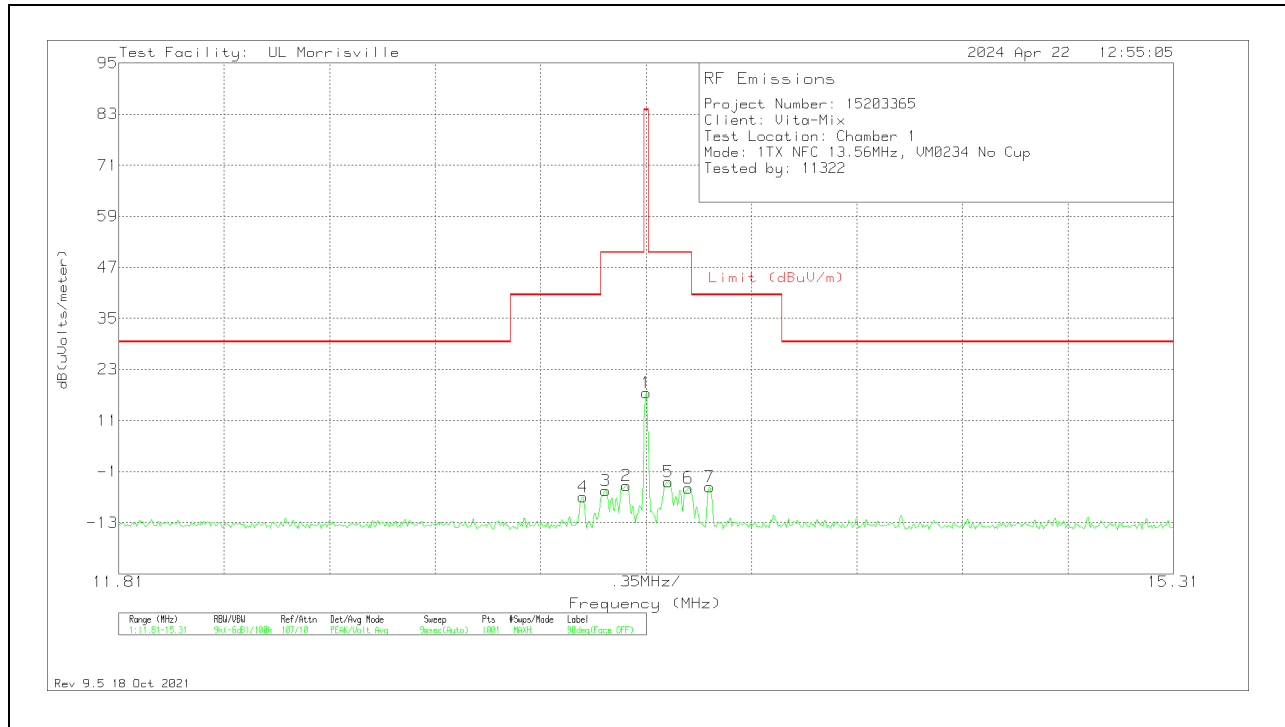
FUNDAMENTAL – Face On, 0 Deg



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
4	13.3465	22.8	Pk	10.7	.6	-40	-5.9	40.5	-46.4	357	0 degs
3	13.427	22.7	Pk	10.7	.6	-40	-6	50.5	-56.5	357	0 degs
2	13.4935	24.65	Pk	10.7	.6	-40	-4.05	50.5	-54.55	357	0 degs
1	13.56	45.58	Pk	10.7	.6	-40	16.88	84	-67.12	357	0 degs
5	13.6265	24.87	Pk	10.7	.6	-40	-3.83	50.5	-54.33	357	0 degs
6	13.693	23.64	Pk	10.7	.6	-40	-5.06	50.5	-55.56	357	0 degs
7	13.7735	22.05	Pk	10.7	.6	-40	-6.65	40.5	-47.15	357	0 degs

Pk - Peak detector

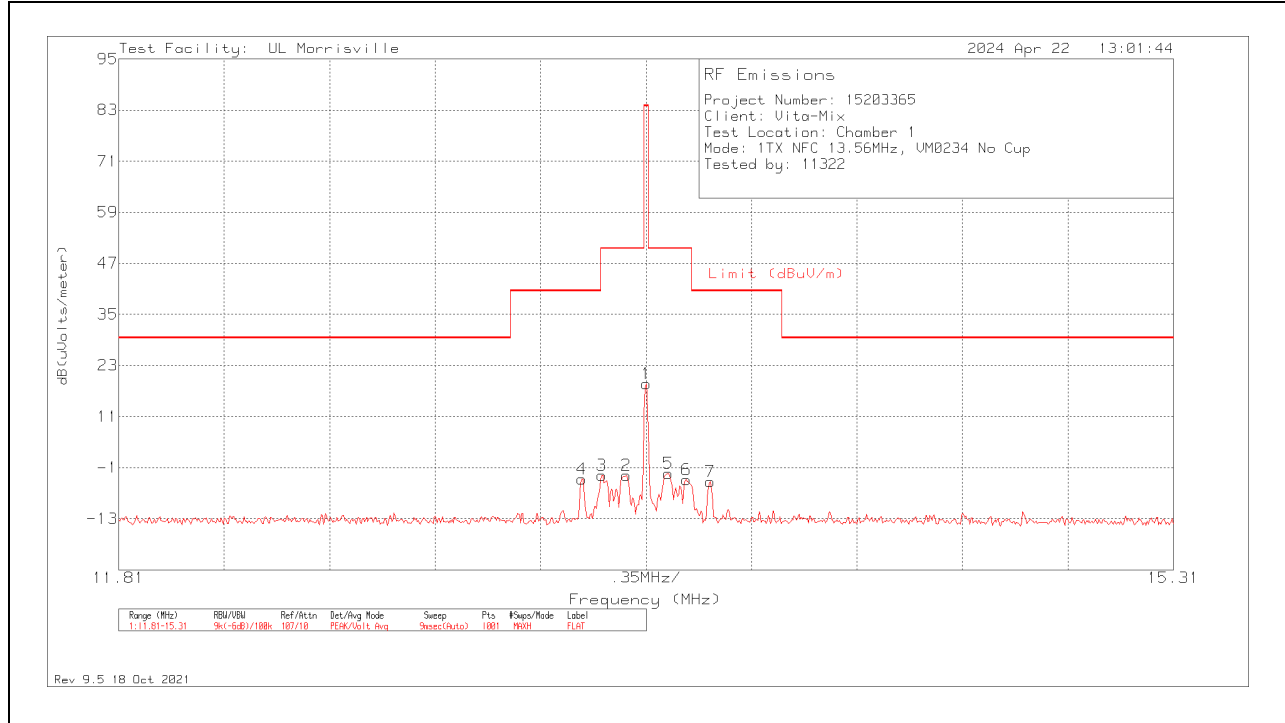
FUNDAMENTAL – Face Off, 90 Deg



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
4	13.35	21.72	Pk	10.7	.6	-40	-6.98	40.5	-47.48	50	90 degs
3	13.42525	23.18	Pk	10.7	.6	-40	-5.52	50.5	-56.02	50	90 degs
2	13.4935	24.44	Pk	10.7	.6	-40	-4.26	50.5	-54.76	50	90 degs
1	13.56	46.16	Pk	10.7	.6	-40	17.46	84	-66.54	50	90 degs
5	13.6335	25.33	Pk	10.7	.6	-40	-3.37	50.5	-53.87	50	90 degs
6	13.7	23.89	Pk	10.7	.6	-40	-4.81	50.5	-55.31	50	90 degs
7	13.77	24.1	Pk	10.7	.6	-40	-4.6	40.5	-45.1	50	90 degs

Pk - Peak detector

FUNDAMENTAL – Horizontal, Flat



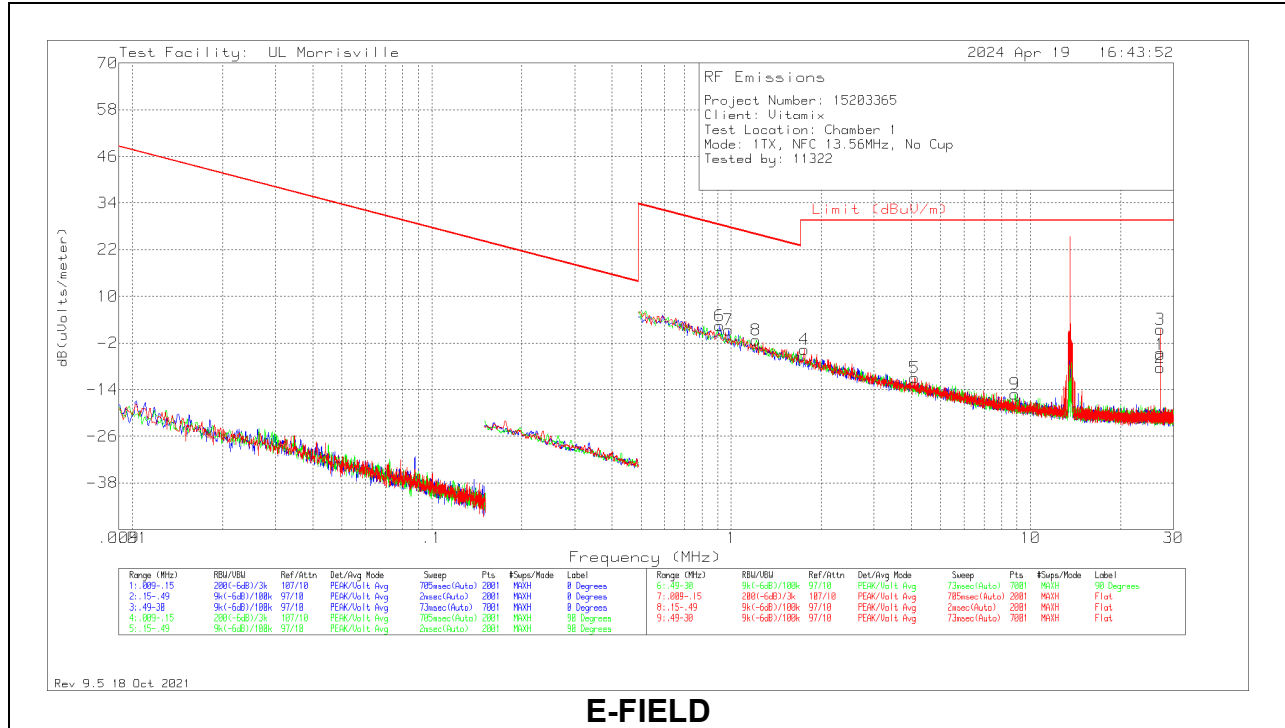
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
4	13.3465	25.05	Pk	10.7	.6	-40	-3.65	40.5	-44.15	352	Flat
3	13.413	25.93	Pk	10.7	.6	-40	-2.77	50.5	-53.27	352	Flat
2	13.4935	25.87	Pk	10.7	.6	-40	-2.83	50.5	-53.33	352	Flat
1	13.56	47.41	Pk	10.7	.6	-40	18.71	84	-65.29	352	Flat
5	13.6335	26.28	Pk	10.7	.6	-40	-2.42	50.5	-52.92	352	Flat
6	13.693	24.79	Pk	10.7	.6	-40	-3.91	50.5	-54.41	352	Flat
7	13.7735	24.45	Pk	10.7	.6	-40	-4.25	40.5	-44.75	352	Flat

Pk - Peak detector

8.1.2. SPURIOUS EMISSION RESULTS

8.1.2.1. VM0231

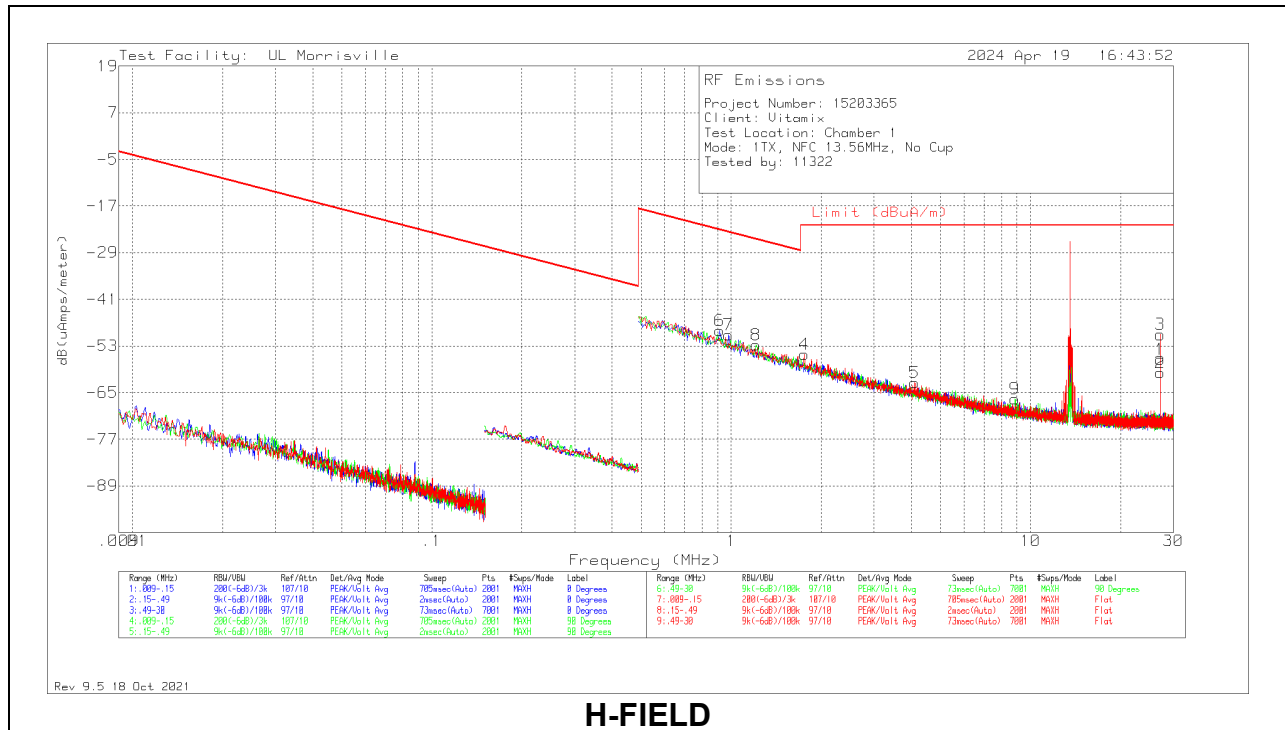
Note: All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance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



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)	Margin (dB)	Azimuth (Degs)	Loop Angle
6	.91582	31.1	Pk	11.2	.2	-40	2.5	28.37	-25.87	0-360	0 degs
7	.97906	29.81	Pk	11.3	.2	-40	1.31	27.79	-26.48	0-360	0 degs
8	1.21094	27.14	Pk	11.4	.2	-40	-1.26	25.94	-27.2	0-360	90 degs
4	1.75058	24.78	Pk	11.4	.2	-40	-3.62	29.54	-33.16	0-360	Flat
5	4.10311	17.09	Pk	11.5	.4	-40	-11.01	29.54	-40.55	0-360	Flat
9	8.87984	13.45	Pk	10.9	.5	-40	-15.15	29.54	-44.69	0-360	90 degs
1	27.12247	25.16	Pk	9	.9	-40	-4.94	29.54	-34.48	0-360	0 degs
2	27.12247	21.75	Pk	9	.9	-40	-8.35	29.54	-37.89	0-360	90 degs
3	27.12669	31.51	Pk	9	.9	-40	1.41	29.54	-28.13	0-360	Flat

Pk - Peak detector

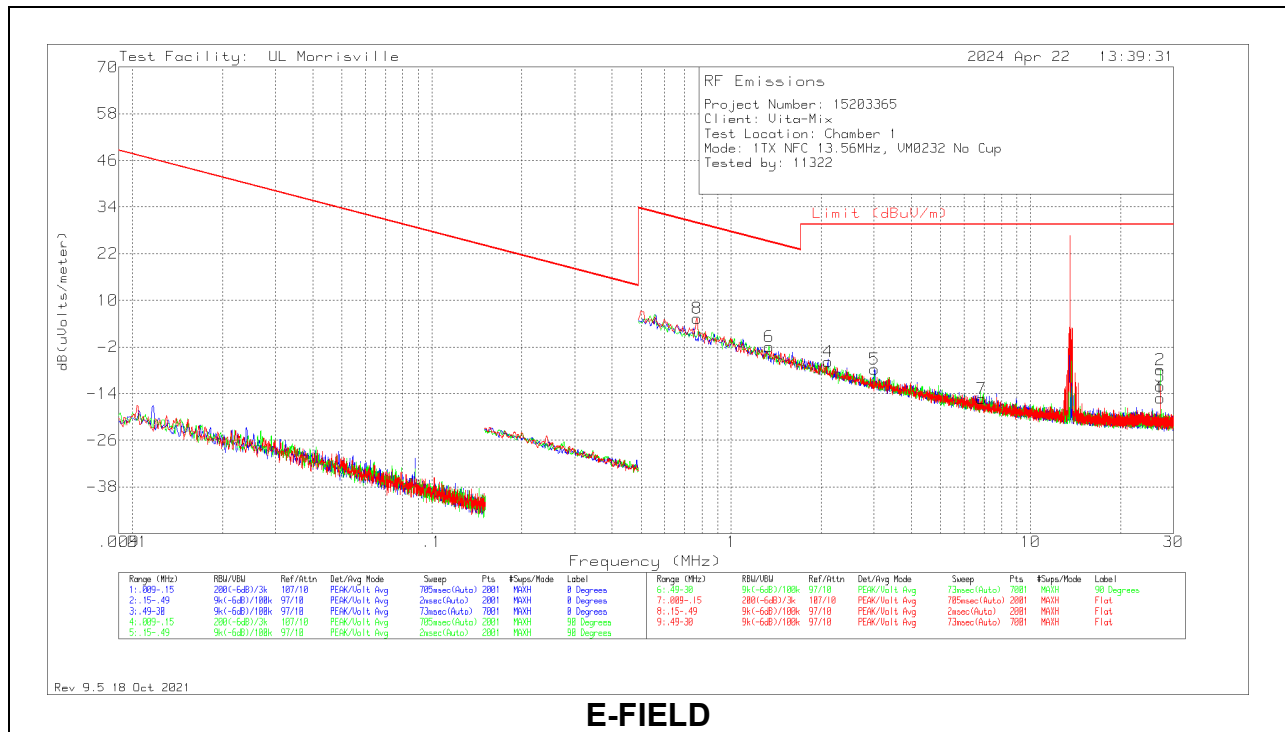


H-FIELD

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)	Margin (dB)	Azimuth (Degs)	Loop Angle
6	.91582	31.1	Pk	-40.3	.2	-40	-49	-23.13	-25.87	0-360	0 degs
7	.97906	29.81	Pk	-40.2	.2	-40	-50.19	-23.71	-26.48	0-360	0 degs
8	1.21094	27.14	Pk	-40.1	.2	-40	-52.76	-25.56	-27.2	0-360	90 degs
4	1.75058	24.78	Pk	-40.1	.2	-40	-55.12	-21.96	-33.16	0-360	Flat
5	4.10311	17.09	Pk	-40	.4	-40	-62.51	-21.96	-40.55	0-360	Flat
9	8.87984	13.45	Pk	-40.6	.5	-40	-66.65	-21.96	-44.69	0-360	90 degs
1	27.12247	25.16	Pk	-42.5	.9	-40	-56.44	-21.96	-34.48	0-360	0 degs
2	27.12247	21.75	Pk	-42.5	.9	-40	-59.85	-21.96	-37.89	0-360	90 degs
3	27.12669	31.51	Pk	-42.5	.9	-40	-50.09	-21.96	-28.13	0-360	Flat

PK - Peak detector

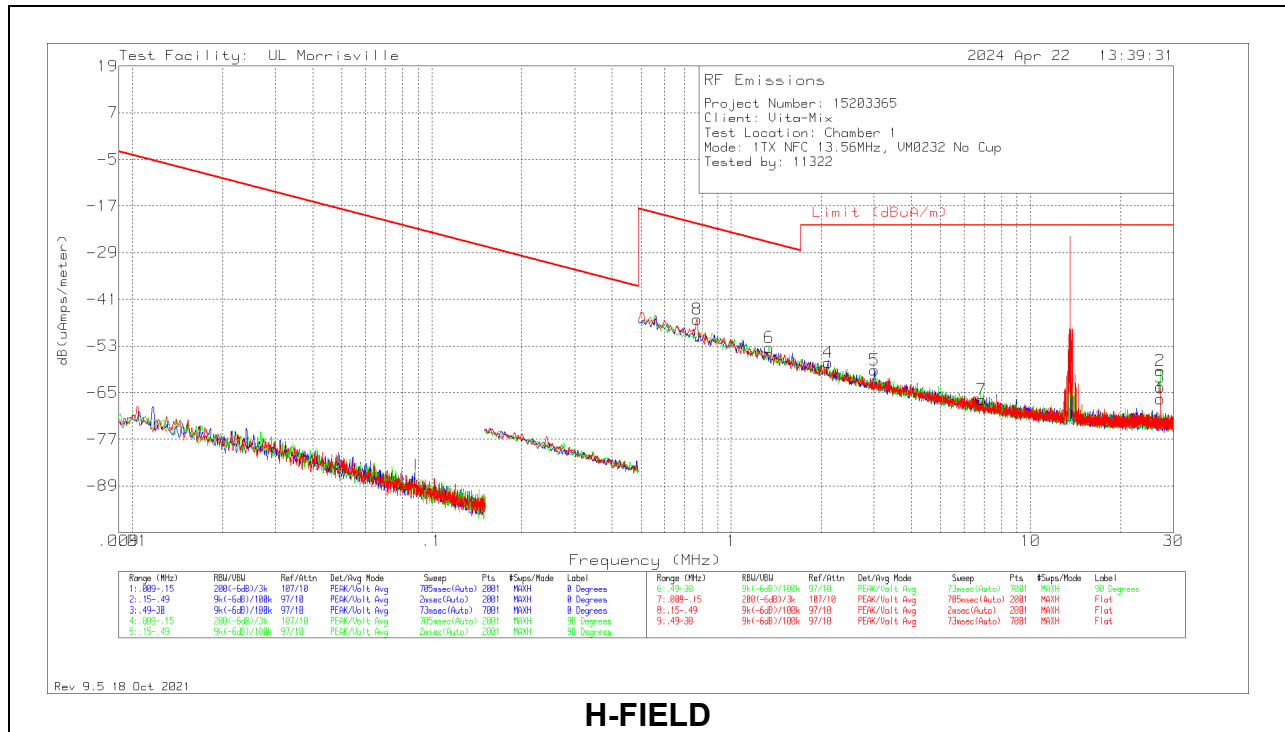
8.1.2.2. VM0232



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)	Margin (dB)	Azimuth (Degs)	Loop Angle
8	.76826	34.13	Pk	11.1	.1	-40	5.33	29.89	-24.56	0-360	Flat
6	1.33742	26.53	Pk	11.4	.2	-40	-1.87	25.08	-26.95	0-360	90 degs
4	2.10894	22.67	Pk	11.4	.2	-40	-5.73	29.54	-35.27	0-360	0 degs
5	3.01538	20.61	Pk	11.4	.3	-40	-7.69	29.54	-37.23	0-360	0 degs
7	6.87302	13.13	Pk	11.1	.5	-40	-15.27	29.54	-44.81	0-360	90 degs
1	27.12669	14.94	Pk	9	.9	-40	-15.16	29.54	-44.7	0-360	0 degs
2	27.12669	22.27	Pk	9	.9	-40	-7.83	29.54	-37.37	0-360	90 degs
3	27.12669	18.06	Pk	9	.9	-40	-12.04	29.54	-41.58	0-360	Flat

Pk - Peak detector

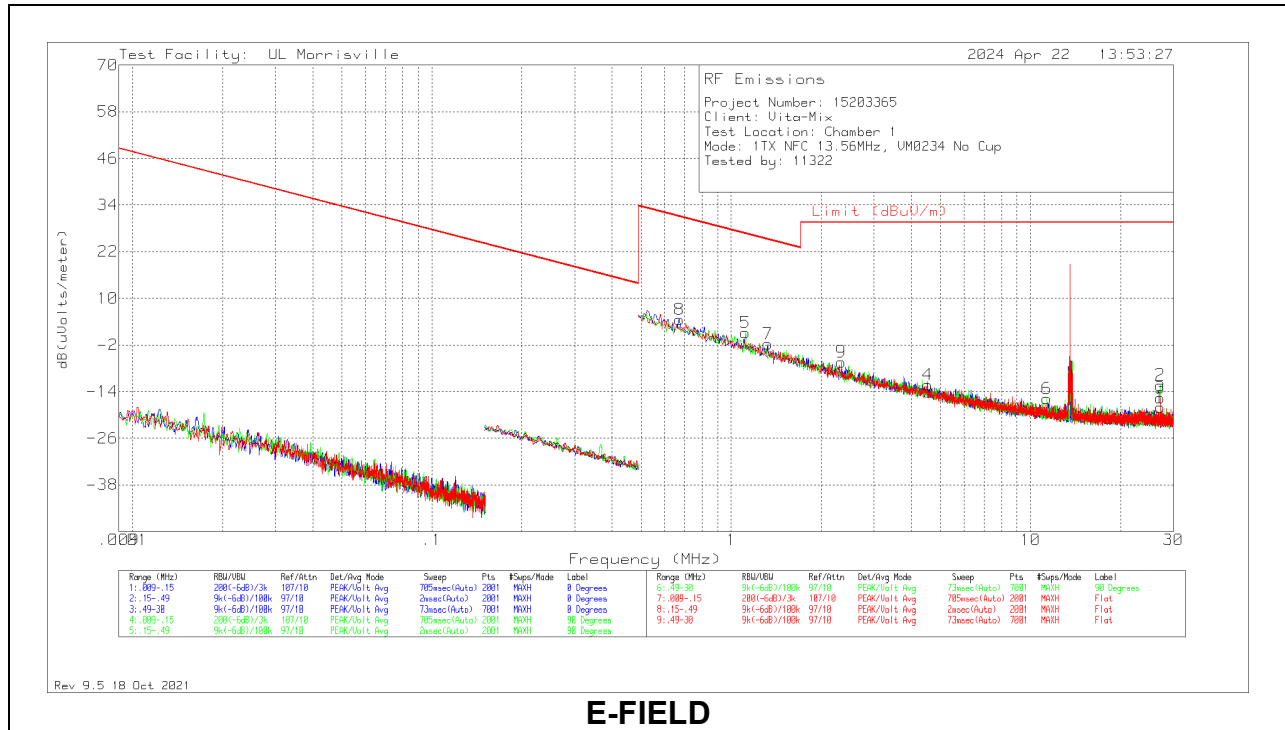


H-FIELD

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)	Margin (dB)	Azimuth (Degs)	Loop Angle
8	.76826	34.13	Pk	-40.4	.1	-40	-46.17	-21.61	-24.56	0-360	Flat
6	1.33742	26.53	Pk	-40.1	.2	-40	-53.37	-26.42	-26.95	0-360	90 degs
4	2.10894	22.67	Pk	-40.1	.2	-40	-57.23	-21.96	-35.27	0-360	0 degs
5	3.01538	20.61	Pk	-40.1	.3	-40	-59.19	-21.96	-37.23	0-360	0 degs
7	6.87302	13.13	Pk	-40.4	.5	-40	-66.77	-21.96	-44.81	0-360	90 degs
1	27.12669	14.94	Pk	-42.5	.9	-40	-66.66	-21.96	-44.7	0-360	0 degs
2	27.12669	22.27	Pk	-42.5	.9	-40	-59.33	-21.96	-37.37	0-360	90 degs
3	27.12669	18.06	Pk	-42.5	.9	-40	-63.54	-21.96	-41.58	0-360	Flat

Pk - Peak detector

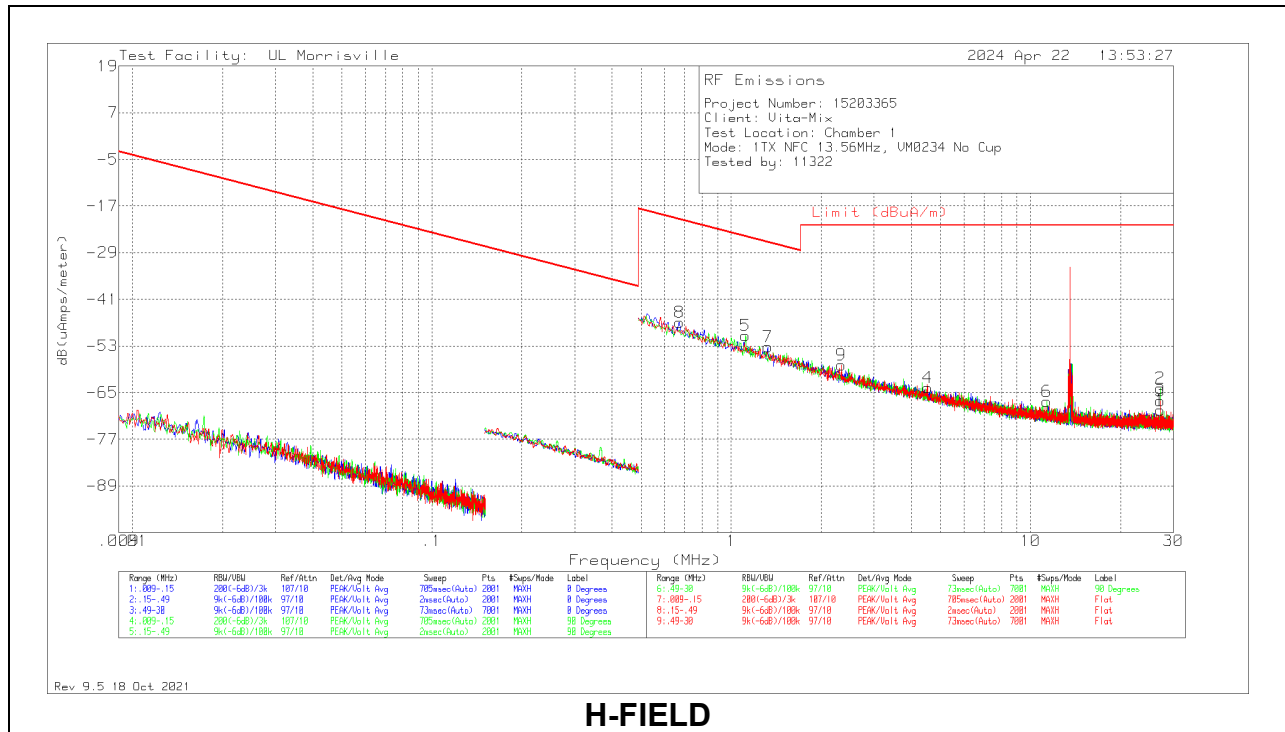
8.1.2.3. VM0234



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)	Margin (dB)	Azimuth (Degs)	Loop Angle
8	.67129	33.21	Pk	11.2	.1	-40	4.51	31.07	-26.56	0-360	0 degs
5	1.11397	29.5	Pk	11.4	.2	-40	1.1	26.67	-25.57	0-360	90 degs
7	1.32477	26.71	Pk	11.4	.2	-40	-1.69	25.16	-26.85	0-360	0 degs
9	2.33661	21.94	Pk	11.4	.3	-40	-6.36	29.54	-35.9	0-360	Flat
4	4.52471	15.85	Pk	11.5	.4	-40	-12.25	29.54	-41.79	0-360	Flat
6	11.33355	12.77	Pk	10.8	.6	-40	-15.83	29.54	-45.37	0-360	90 degs
1	27.12247	12.02	Pk	9	.9	-40	-18.08	29.54	-47.62	0-360	0 degs
2	27.12669	17.77	Pk	9	.9	-40	-12.33	29.54	-41.87	0-360	90 degs
3	27.12669	14.49	Pk	9	.9	-40	-15.61	29.54	-45.15	0-360	Flat

Pk - Peak detector



H-FIELD

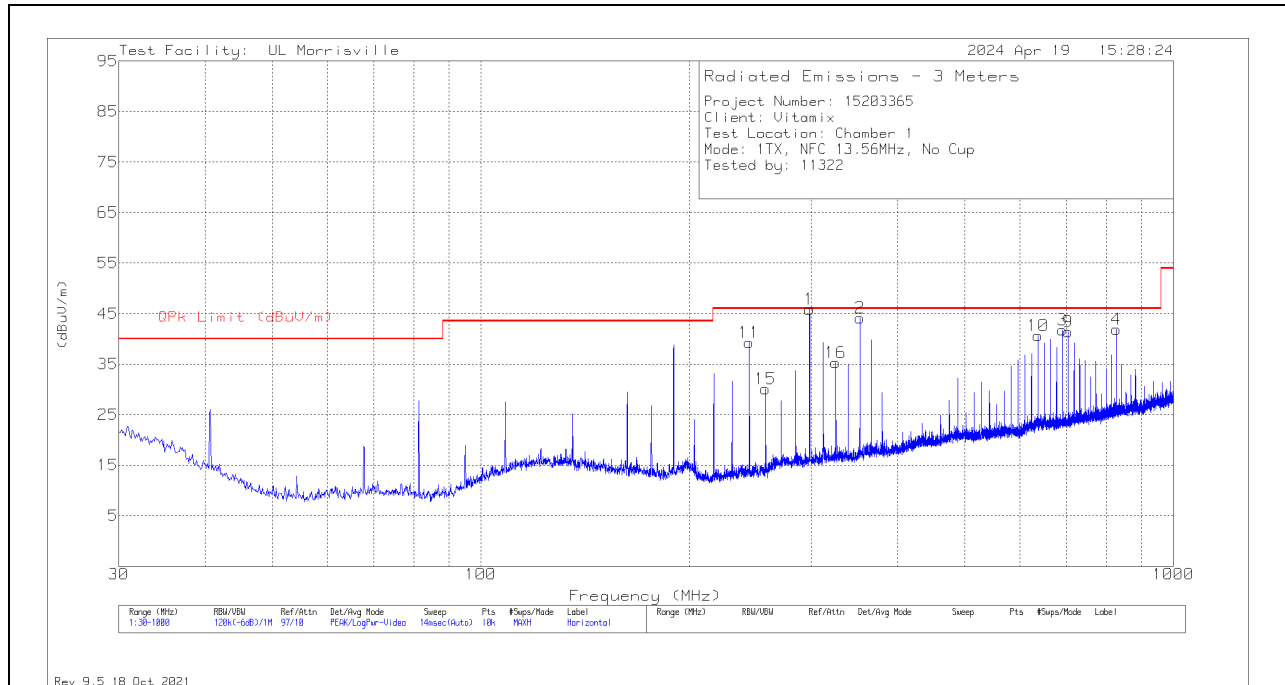
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
8	.67129	33.21	Pk	-40.3	.1	-40	-46.99	-20.43	-26.56	0-360	0 degs
5	1.11397	29.5	Pk	-40.1	.2	-40	-50.4	-24.83	-25.57	0-360	90 degs
7	1.32477	26.71	Pk	-40.1	.2	-40	-53.19	-26.34	-26.85	0-360	0 degs
9	2.33661	21.94	Pk	-40.1	.3	-40	-57.86	-21.96	-35.9	0-360	Flat
4	4.52471	15.85	Pk	-40	.4	-40	-63.75	-21.96	-41.79	0-360	Flat
6	11.33355	12.77	Pk	-40.7	.6	-40	-67.33	-21.96	-45.37	0-360	90 degs
1	27.12247	12.02	Pk	-42.5	.9	-40	-69.58	-21.96	-47.62	0-360	0 degs
2	27.12669	17.77	Pk	-42.5	.9	-40	-63.83	-21.96	-41.87	0-360	90 degs
3	27.12669	14.49	Pk	-42.5	.9	-40	-67.11	-21.96	-45.15	0-360	Flat

PK - Peak detector

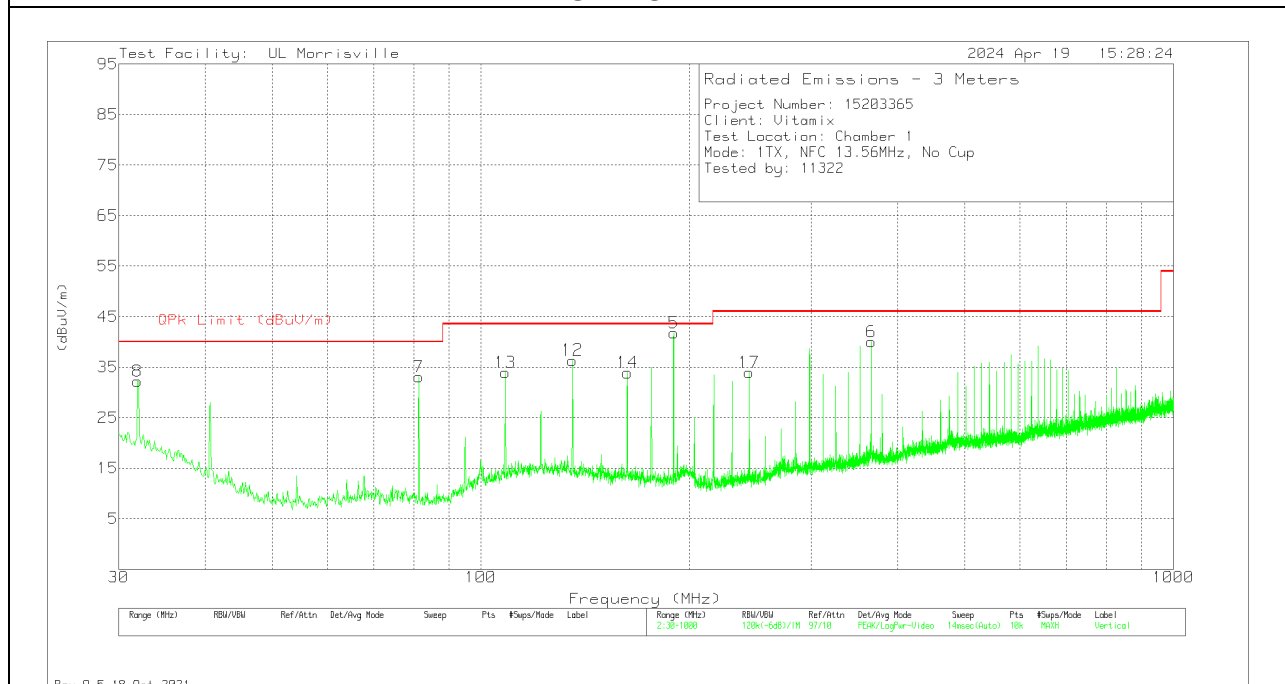
8.2. TX SPURIOUS EMISSION 30 TO 1000 MHz

8.2.1. SPURIOUS EMISSION RESULTS

8.2.1.1. VM0231



HORIZONTAL

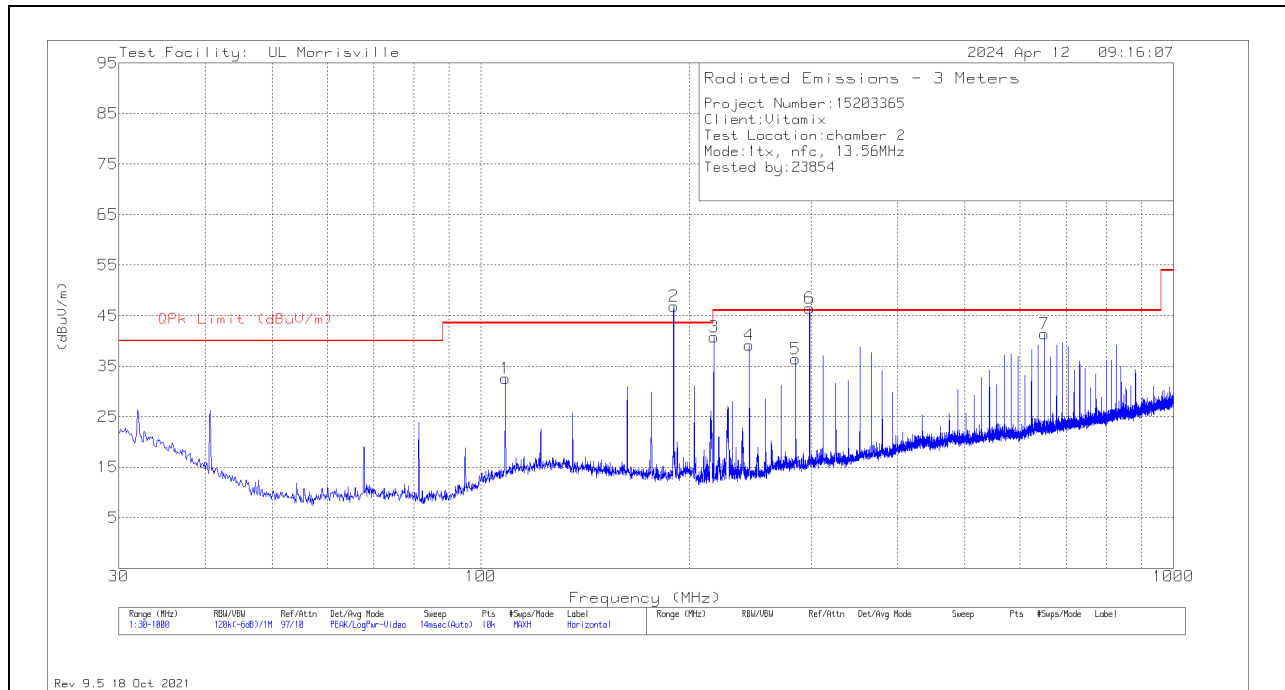


VERTICAL

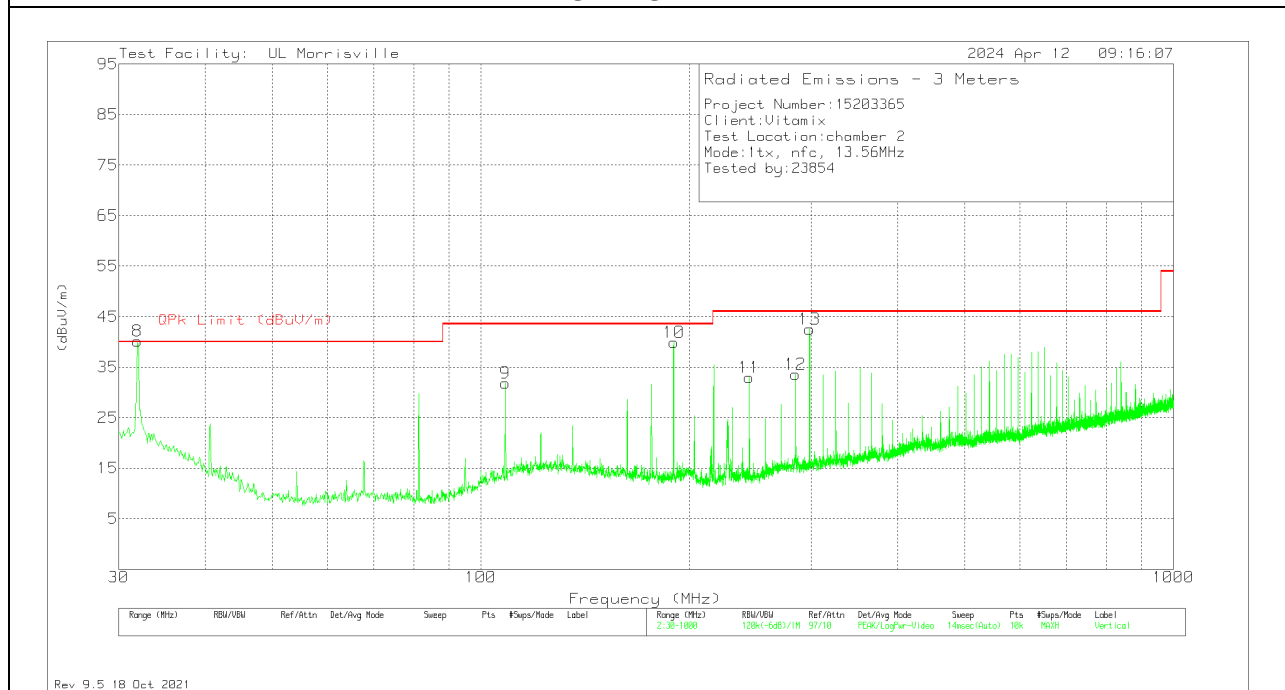
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90629 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
11	* 244.079	51.26	Pk	17.7	-29.7	39.26	46.02	-6.76	0-360	100	H
15	* 257.659	42.25	Pk	17.7	-29.8	30.15	46.02	-15.87	0-360	100	H
16	* 325.462	44.58	Pk	20	-29.3	35.28	46.02	-10.74	0-360	100	H
12	* 135.536	47.17	Pk	19.7	-30.5	36.37	43.52	-7.15	0-360	100	V
13	* 108.473	46.36	Pk	18.6	-31	33.96	43.52	-9.56	0-360	100	V
14	* 162.696	45.59	Pk	18.5	-30.2	33.89	43.52	-9.63	0-360	100	V
17	* 244.079	45.98	Pk	17.7	-29.7	33.98	46.02	-12.04	0-360	100	V
8	31.94	38.28	Pk	25.5	-31.6	32.18	-	-	0-360	100	V
7	81.313	50.36	Pk	13.8	-31.1	33.06	-	-	0-360	100	V
5	189.856	53.92	Pk	17.9	-30.1	41.72	-	-	0-360	100	V
1	298.302	55.82	Pk	19.6	-29.5	45.92	-	-	0-360	100	H
2	352.525	52.58	Pk	20.5	-29	44.08	-	-	0-360	100	H
6	366.105	48.07	Pk	21.1	-29.1	40.07	-	-	0-360	100	V
10	637.317	43.07	Pk	25.9	-28.3	40.67	-	-	0-360	100	H
3	691.54	43.42	Pk	26.2	-27.9	41.72	-	-	0-360	100	H
4	827.243	41.1	Pk	27.9	-27.1	41.9	-	-	0-360	199	H
9	705.217	42.57	Pk	26.5	-27.7	41.37	-	-	0-360	100	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector

8.2.1.2. VM0232



HORIZONTAL



VERTICAL

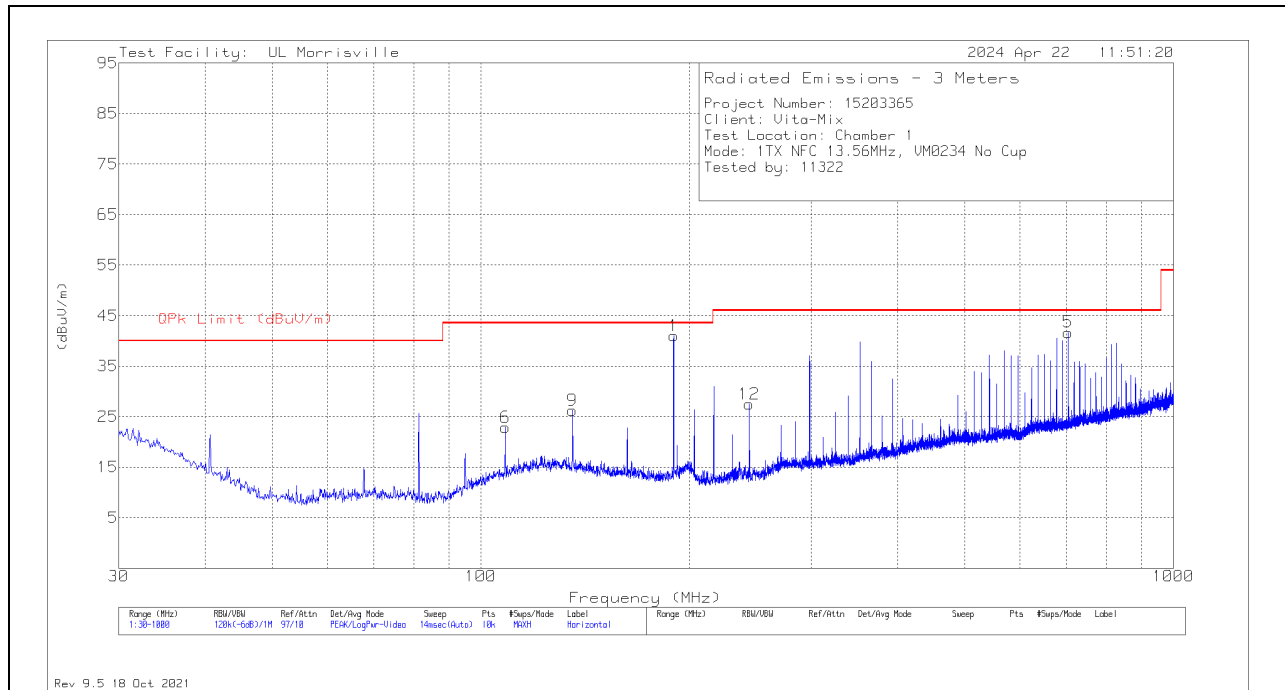
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	159203 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 108.473	44.76	Pk	18.8	-31	32.56	43.52	-10.96	0-360	299	H
4	* 244.079	50.75	Pk	18.1	-29.7	39.15	46.02	-6.87	0-360	101	H
5	* 284.722	45.93	Pk	19.8	-29.3	36.43	46.02	-9.59	0-360	101	H
9	* 108.473	44.01	Pk	18.8	-31	31.81	43.52	-11.71	0-360	101	V
11	* 244.079	44.61	Pk	18.1	-29.7	33.01	46.02	-13.01	0-360	101	V
12	* 284.722	43.12	Pk	19.8	-29.3	33.62	46.02	-12.4	0-360	101	V
8	32.0101	44.18	Qp	26	-31.6	38.58	-	-	0	107	V
2	189.8349	59.43	Qp	17.8	-30.2	47.03	-	-	67	121	H
10	189.8387	52.24	Qp	17.8	-30.2	39.84	-	-	281	185	V
3	216.9569	53.56	Qp	17.1	-29.9	40.76	-	-	51	140	H
6	298.3217	56	Qp	19.9	-29.5	46.4	-	-	37	101	H
13	298.3332	51.88	Qp	19.9	-29.5	42.28	-	-	292	106	V
7	650.8917	44.21	Qp	26.3	-28	42.51	-	-	208	116	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

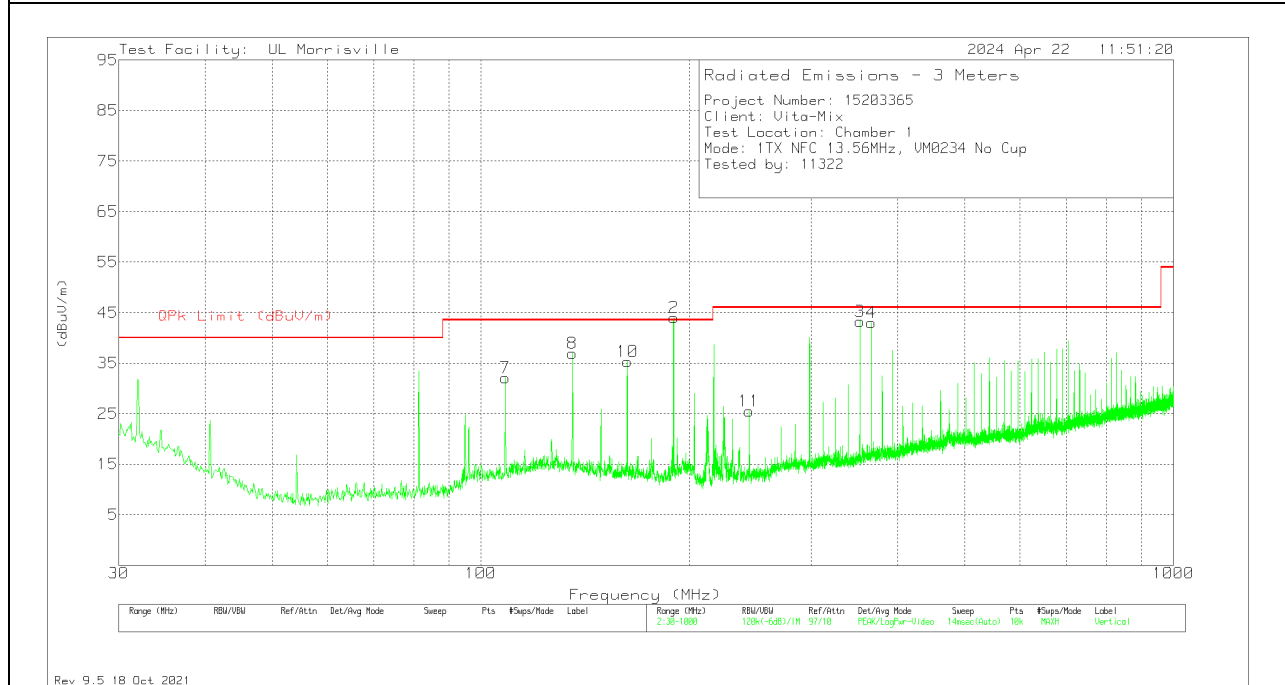
Pk - Peak detector

Qp - Quasi-Peak detector

8.2.1.3. VM0234



HORIZONTAL



VERTICAL

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
6	* 108.473	35.35	Pk	18.6	-31	22.95	43.52	-20.57	0-360	300	H
9	* 135.536	37.07	Pk	19.7	-30.5	26.27	43.52	-17.25	0-360	200	H
12	* 244.079	39.51	Pk	17.7	-29.7	27.51	46.02	-18.51	0-360	100	H
7	* 108.473	44.52	Pk	18.6	-31	32.12	43.52	-11.4	0-360	100	V
8	* 135.536	47.72	Pk	19.7	-30.5	36.92	43.52	-6.6	0-360	100	V
10	* 162.696	46.97	Pk	18.5	-30.2	35.27	43.52	-8.25	0-360	100	V
11	* 244.079	37.48	Pk	17.7	-29.7	25.48	46.02	-20.54	0-360	100	V
1	189.856	53.25	Pk	17.9	-30.1	41.05	-	-	0-360	100	H
2	189.856	56.23	Pk	17.9	-30.1	44.03	-	-	0-360	100	V
3	352.622	51.76	Pk	20.5	-29	43.26	-	-	0-360	100	V
4	366.105	51.03	Pk	21.1	-29.1	43.03	-	-	0-360	100	V
5	705.217	42.91	Pk	26.5	-27.7	41.71	-	-	0-360	100	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 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.

ISED RSS-210, Annex B.6

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

TEST PROCEDURE

ANSI C63.10-2020 Clause 6.8

RESULTS

No non-compliance noted.

9.1. WITHOUT TAG

Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir. Temp	Frequency Deviation Measured with Time Elapse								
(Vdc)	(°C)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
120.00	50	13.5602451	0.885	13.5602374	1.458	13.5602370	1.483	13.5602324	1.823	± 100
120.00	40	13.5602625	-0.398	13.5602607	-0.259	13.5602573	-0.011	13.5602539	0.238	± 100
120.00	30	13.5602937	-2.692	13.5602905	-2.461	13.5602886	-2.322	13.5602839	-1.975	± 100
120.00	20	13.5602571	0.000	13.5602567	0.030	13.5602565	0.044	13.5602564	0.057	± 100
120.00	10	13.5603460	-6.552	13.5603432	-6.347	13.5603404	-6.137	13.5603361	-5.825	± 100
120.00	0	13.5603114	-4.003	13.5603132	-4.132	13.5603148	-4.249	13.5603172	-4.430	± 100
120.00	-10	13.5603325	-5.561	13.5603352	-5.756	13.5603364	-5.845	13.5603378	-5.951	± 100
120.00	-20	13.5603493	-6.799	13.5603498	-6.836	13.5603502	-6.866	13.5603506	-6.891	± 100
102.00	20	13.5602563	0.060	13.5602562	0.073	13.5602559	0.091	13.5602557	0.107	± 100
138	20	13.5602554	0.128	13.5602553	0.134	13.5602552	0.144	13.5602550	0.158	± 100

Tested by: 104463/85501
 Test date: 2024-04-23

10. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207

ISED 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 C63.10:2020

Testing was performed on a terminated and non-terminated sample as per KDB 174176. Testing shows that emissions not related to the fundamental, are compliant when the antenna is attached, and all emissions are compliant when the antenna is terminated.

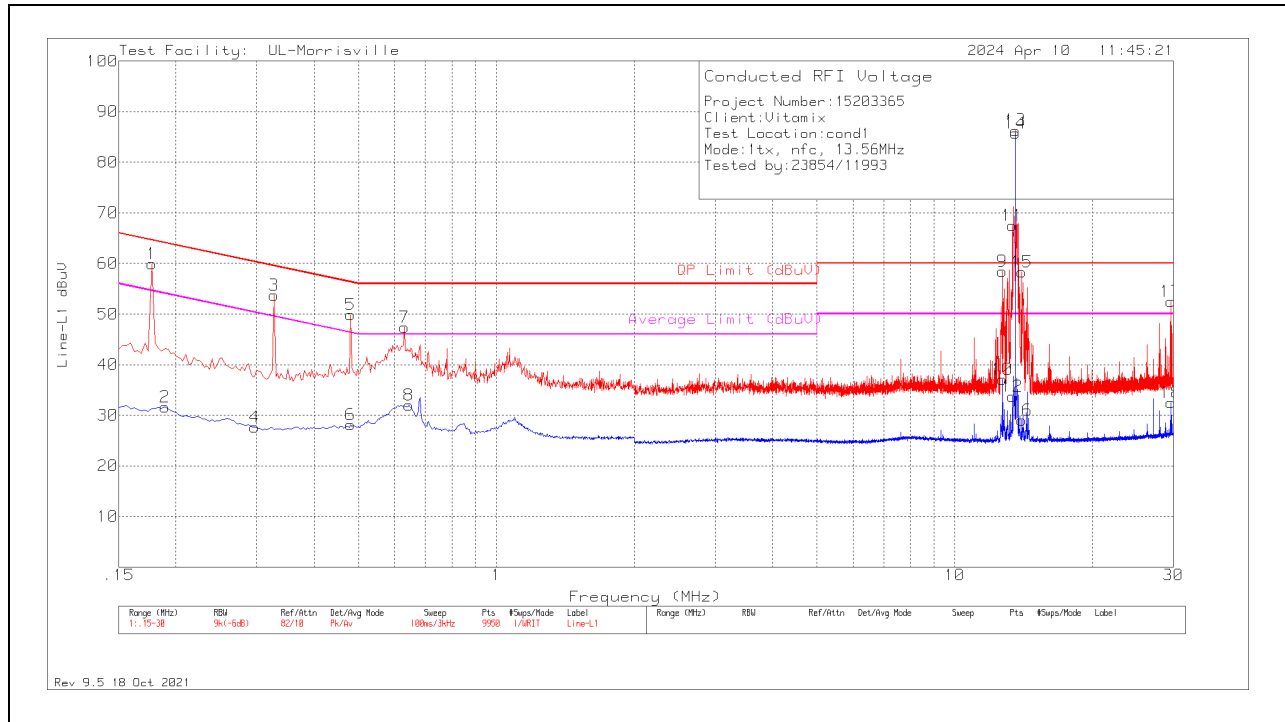
RESULTS

No non-compliance noted:

10.1. NORMAL OPERATION

10.1.1. VM0231

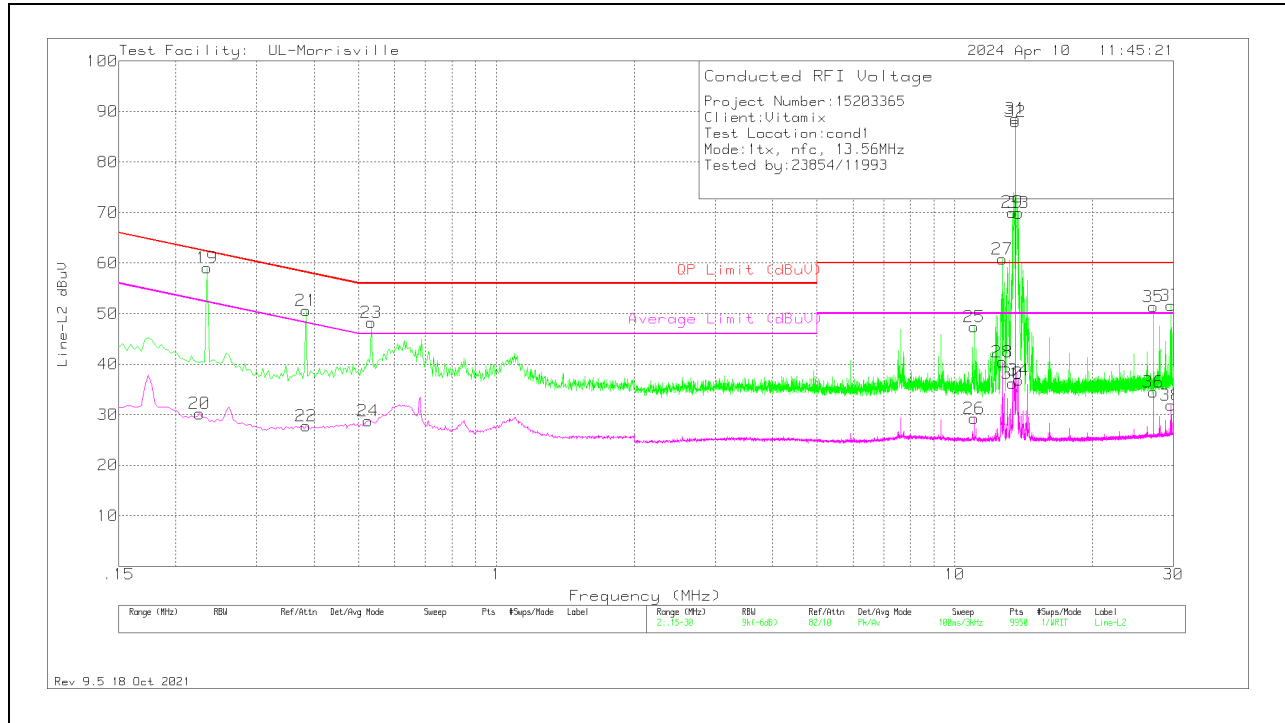
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Filter (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.177	7.17	Qp	.3	.9	29.9	38.27	64.63	-26.36	-	-
2	.189	.75	Av	.2	.8	29.9	31.65	-	-	54.08	-22.43
4	.297	-2.9	Av	.2	.5	29.9	27.7	-	-	50.33	-22.63
3	.327	-2.81	Qp	.2	.5	29.9	27.79	59.53	-31.74	-	-
5	.48	19.58	Pk	.1	.3	29.9	49.88	56.34	-6.46	-	-
6	.48	-2.13	Av	.1	.3	29.9	28.17	-	-	46.34	-18.17
7	.63	17.19	Pk	.1	.2	29.9	47.39	56	-8.61	-	-
8	.645	1.85	Av	.1	.2	29.9	32.05	-	-	46	-13.95
9	12.714	28.95	Qp	.1	.1	29.9	59.05	-	-	-	-
10	12.714	6.95	Av	.1	.1	29.9	37.05	-	-	-	-
11	13.35	35.4	Qp	.2	.1	29.9	65.6	-	-	-	-
12	13.35	3.55	Av	.2	.1	29.9	33.75	-	-	-	-
13	13.56	57.88	Qp	.2	.1	29.9	88.08	-	-	-	-
14	13.56	55.52	Av	.2	.1	29.9	85.72	-	-	-	-
15	13.986	25.5	Qp	.2	.1	29.9	55.7	-	-	-	-
16	13.986	-1.13	Av	.2	.1	29.9	29.07	-	-	-	-
17	29.664	22	Pk	.3	.3	29.9	52.5	60	-7.5	-	-
18	29.664	1.99	Av	.3	.3	29.9	32.49	-	-	50	-17.51

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

LINE 2 RESULTS

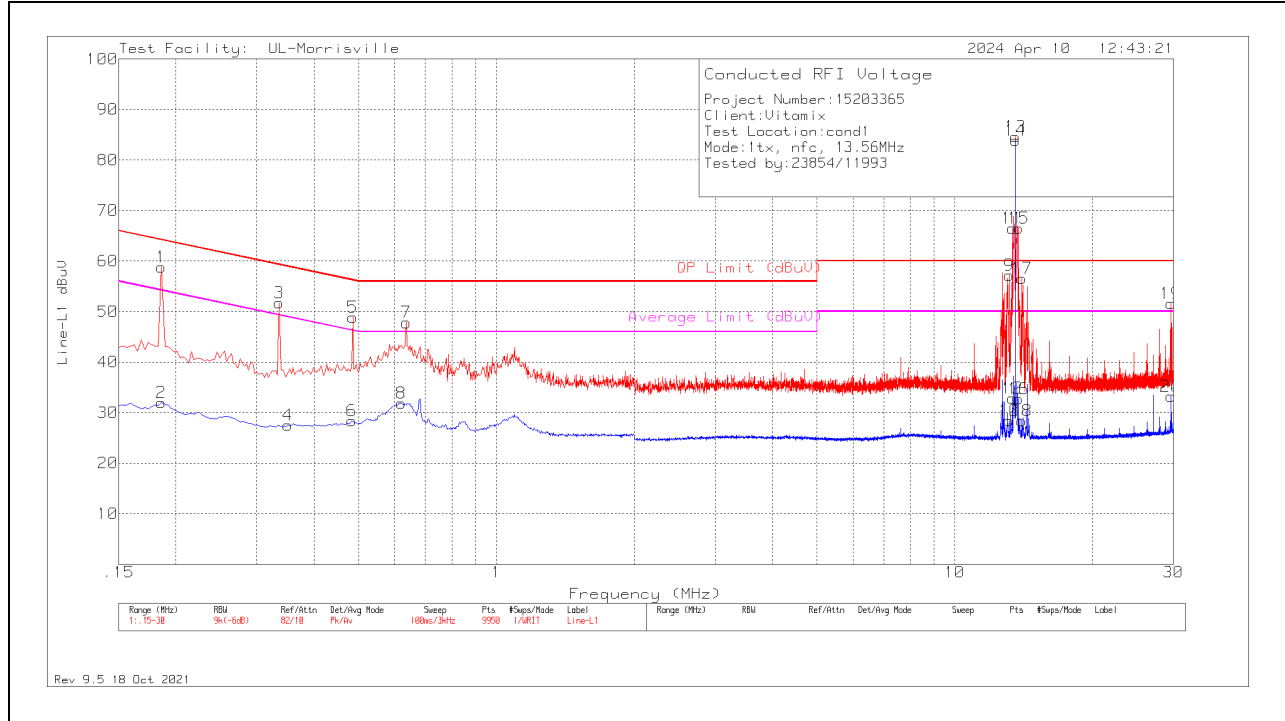


Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Filter (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
20	.225	-6	Av	.2	.7	29.9	30.2	-	-	52.63	-22.43
19	.234	3.35	Qp	.2	.6	29.9	34.05	62.31	-28.26	-	-
21	.384	20.22	Pk	.1	.4	29.9	50.62	58.19	-7.57	-	-
22	.384	-2.66	Av	.1	.4	29.9	27.74	-	-	48.19	-20.45
24	.525	-1.5	Av	.1	.3	29.9	28.8	-	-	46	-17.2
23	.534	17.94	Pk	.1	.3	29.9	48.24	56	-7.76	-	-
25	11.019	17.27	Pk	.1	.1	29.9	47.37	60	-12.63	-	-
26	11.019	-8	Av	.1	.1	29.9	29.3	-	-	50	-20.7
27	12.714	28.94	Qp	.1	.1	29.9	59.04	-	-	-	-
28	12.714	10.34	Av	.1	.1	29.9	40.44	-	-	-	-
30	13.347	6.03	Av	.2	.1	29.9	36.23	-	-	-	-
29	13.35	35.34	Qp	.2	.1	29.9	65.54	-	-	-	-
31	13.56	57.88	Qp	.2	.1	29.9	88.08	-	-	-	-
32	13.56	57.82	Av	.2	.1	29.9	88.02	-	-	-	-
33	13.773	35.38	Qp	.2	.1	29.9	65.58	-	-	-	-
34	13.773	6.6	Av	.2	.1	29.9	36.8	-	-	-	-
35	27.12	20.98	Pk	.3	.2	29.9	51.38	60	-8.62	-	-
36	27.12	4.09	Av	.3	.2	29.9	34.49	-	-	50	-15.51
37	29.664	21.08	Pk	.3	.3	29.9	51.58	60	-8.42	-	-
38	29.664	1.33	Av	.3	.3	29.9	31.83	-	-	50	-18.17

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

10.1.2. VM0232

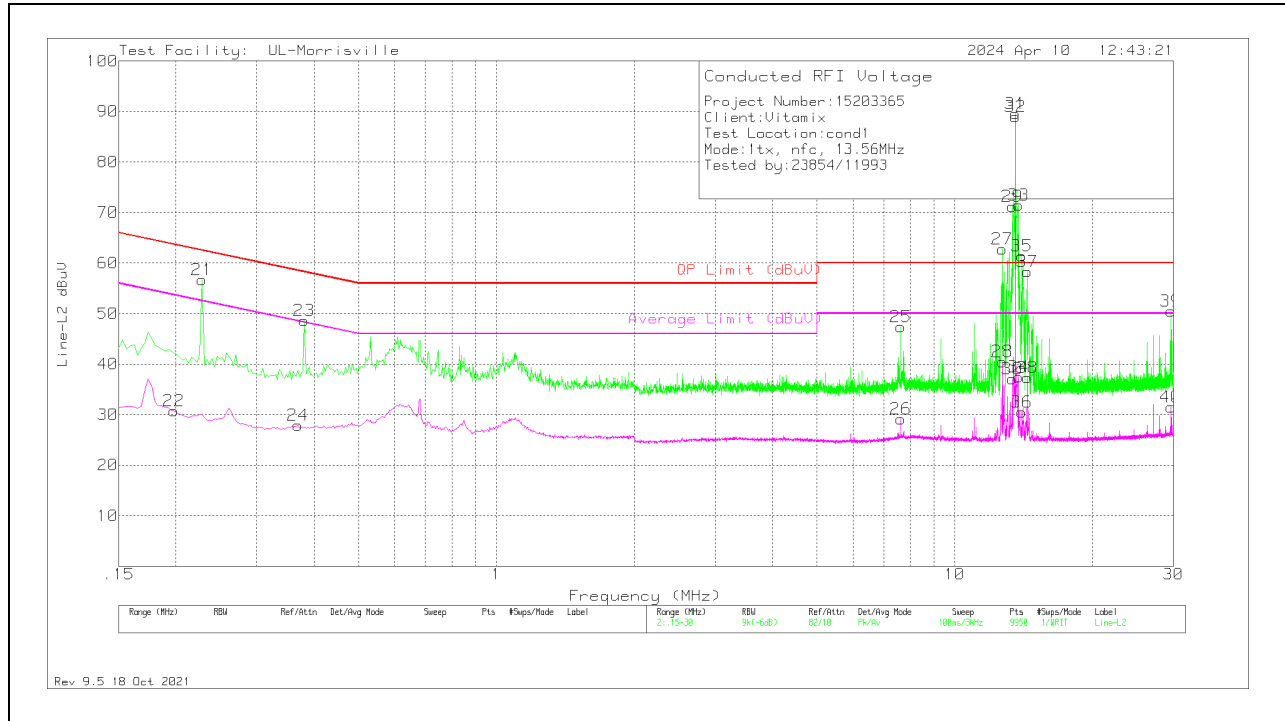
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Filter (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.186	3.92	Qp	.2	.8	29.9	34.82	64.21	-29.39	-	-
2	.186	1.1	Av	.2	.8	29.9	32	-	-	54.21	-22.21
3	.336	21.38	Pk	.1	.4	29.9	51.78	59.3	-7.52	-	-
4	.351	-2.86	Av	.1	.4	29.9	27.54	-	-	48.94	-21.4
6	.483	-1.95	Av	.1	.3	29.9	28.35	-	-	46.29	-17.94
5	.486	18.54	Pk	.1	.3	29.9	48.84	56.24	-7.4	-	-
8	.6195	1.62	Av	.1	.2	29.9	31.82	-	-	46	-14.18
7	.636	17.63	Pk	.1	.2	29.9	47.83	56	-8.17	-	-
9	13.137	22.61	Qp	.1	.1	29.9	52.71	-	-	-	-
10	13.137	-1.67	Av	.1	.1	29.9	28.43	-	-	-	-
11	13.35	31.38	Qp	.2	.1	29.9	61.58	-	-	-	-
12	13.35	2.71	Av	.2	.1	29.9	32.91	-	-	-	-
13	13.56	53.79	Qp	.2	.1	29.9	83.99	-	-	-	-
14	13.56	53.73	Av	.2	.1	29.9	83.93	-	-	-	-
15	13.773	31.16	Qp	.2	.1	29.9	61.36	-	-	-	-
16	13.773	2.51	Av	.2	.1	29.9	32.71	-	-	-	-
17	13.986	21.63	Qp	.2	.1	29.9	51.83	-	-	-	-
18	13.986	-1.81	Av	.2	.1	29.9	28.39	-	-	-	-
19	29.664	21.14	Pk	.3	.3	29.9	51.64	60	-8.36	-	-
20	29.664	2.71	Av	.3	.3	29.9	33.21	-	-	50	-16.79

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

LINE 2 RESULTS

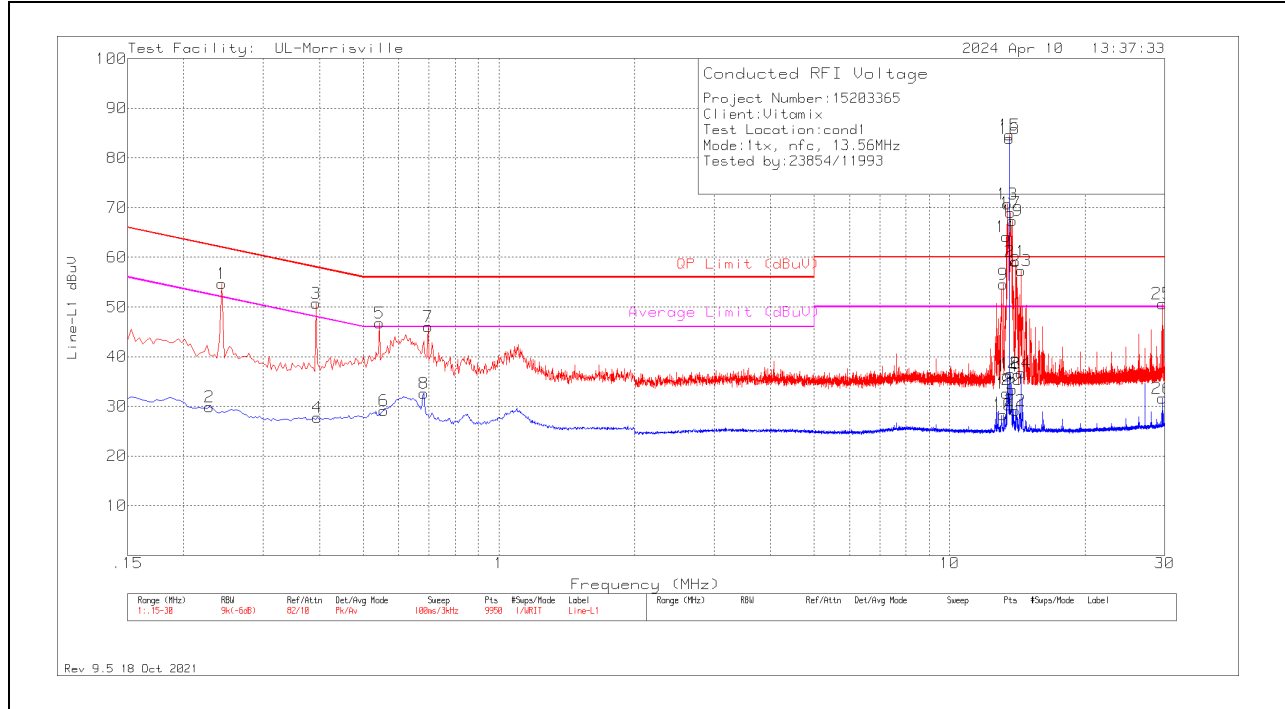


Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Filter (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
22	.198	-16	Av	.2	.8	29.9	30.74	-	-	53.69	-22.95
21	.228	.88	Qp	.2	.7	29.9	31.68	62.52	-30.84	-	-
24	.369	-2.49	Av	.1	.4	29.9	27.91	-	-	48.52	-20.61
23	.381	18.23	Pk	.1	.4	29.9	48.63	58.26	-9.63	-	-
25	7.629	17.28	Pk	.1	.1	29.9	47.38	60	-12.62	-	-
26	7.629	-92	Av	.1	.1	29.9	29.18	-	-	50	-20.82
27	12.714	31.18	Qp	.1	.1	29.9	61.28	-	-	-	-
28	12.714	10.4	Av	.1	.1	29.9	40.5	-	-	-	-
30	13.347	6.85	Av	.2	.1	29.9	37.05	-	-	-	-
29	13.35	36.37	Qp	.2	.1	29.9	66.57	-	-	-	-
31	13.56	58.84	Qp	.2	.1	29.9	89.04	-	-	-	-
32	13.56	58.79	Av	.2	.1	29.9	88.99	-	-	-	-
33	13.773	36.4	Qp	.2	.1	29.9	66.6	-	-	-	-
34	13.773	7.29	Av	.2	.1	29.9	37.49	-	-	-	-
35	13.983	26.55	Qp	.2	.1	29.9	56.75	-	-	-	-
36	13.986	.29	Av	.2	.1	29.9	30.49	-	-	-	-
38	14.406	7.11	Av	.2	.1	29.9	37.31	-	-	-	-
37	14.409	26.44	Qp	.2	.1	29.9	56.64	-	-	-	-
39	29.664	19.95	Pk	.3	.3	29.9	50.45	60	-9.55	-	-
40	29.664	1.03	Av	.3	.3	29.9	31.53	-	-	50	-18.47

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

10.1.3. VM0234

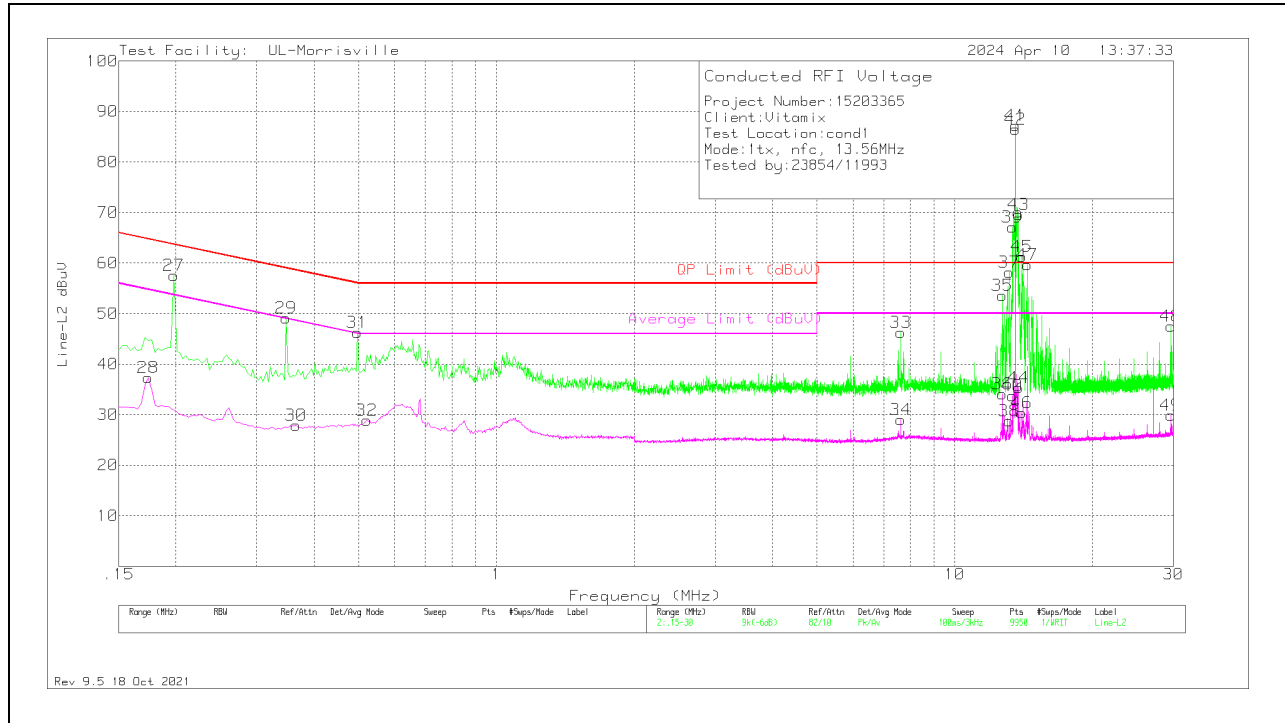
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Filter (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
2	.228	-87	Av	.2	.7	29.9	29.93	-	-	52.52	-22.59
1	.243	2.4	Pk	.2	.6	29.9	54.7	61.99	-7.29	-	-
3	.393	20.32	Pk	.1	.4	29.9	50.72	58	-7.28	-	-
4	.396	-2.6	Av	.1	.4	29.9	27.8	-	-	47.94	-20.14
5	.543	16.51	Pk	.1	.3	29.9	46.81	56	-9.19	-	-
6	.555	-1.2	Av	.1	.3	29.9	29.1	-	-	46	-16.9
8	.681	2.44	Av	.1	.2	29.9	32.64	-	-	46	-13.36
7	.696	15.8	Pk	.1	.2	29.9	46	56	-10	-	-
9	13.137	20.24	Qp	.1	.1	29.9	50.34	-	-	-	-
10	13.137	-1.78	Av	.1	.1	29.9	28.32	-	-	-	-
12	13.347	2.4	Av	.2	.1	29.9	32.6	-	-	-	-
11	13.35	30.01	Qp	.2	.1	29.9	60.21	-	-	-	-
13	13.455	28.38	Qp	.2	.1	29.9	58.58	-	-	-	-
14	13.458	5.94	Av	.2	.1	29.9	36.14	-	-	-	-
15	13.56	53.71	Qp	.2	.1	29.9	83.91	-	-	-	-
16	13.56	53.65	Av	.2	.1	29.9	83.85	-	-	-	-
17	13.668	29.72	Qp	.2	.1	29.9	59.92	-	-	-	-
18	13.668	6.39	Av	.2	.1	29.9	36.59	-	-	-	-
19	13.773	32.65	Qp	.2	.1	29.9	62.85	-	-	-	-
20	13.773	3.14	Av	.2	.1	29.9	33.34	-	-	-	-
21	13.986	24.01	Qp	.2	.1	29.9	54.21	-	-	-	-
22	13.986	-1.06	Av	.2	.1	29.9	29.14	-	-	-	-
24	14.406	6.54	Av	.2	.1	29.9	36.74	-	-	-	-
23	14.409	25.52	Qp	.2	.1	29.9	55.72	-	-	-	-
26	29.661	1.18	Av	.3	.3	29.9	31.68	-	-	50	-18.32
25	29.664	20.18	Pk	.3	.3	29.9	50.68	60	-9.32	-	-

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

LINE 2 RESULTS



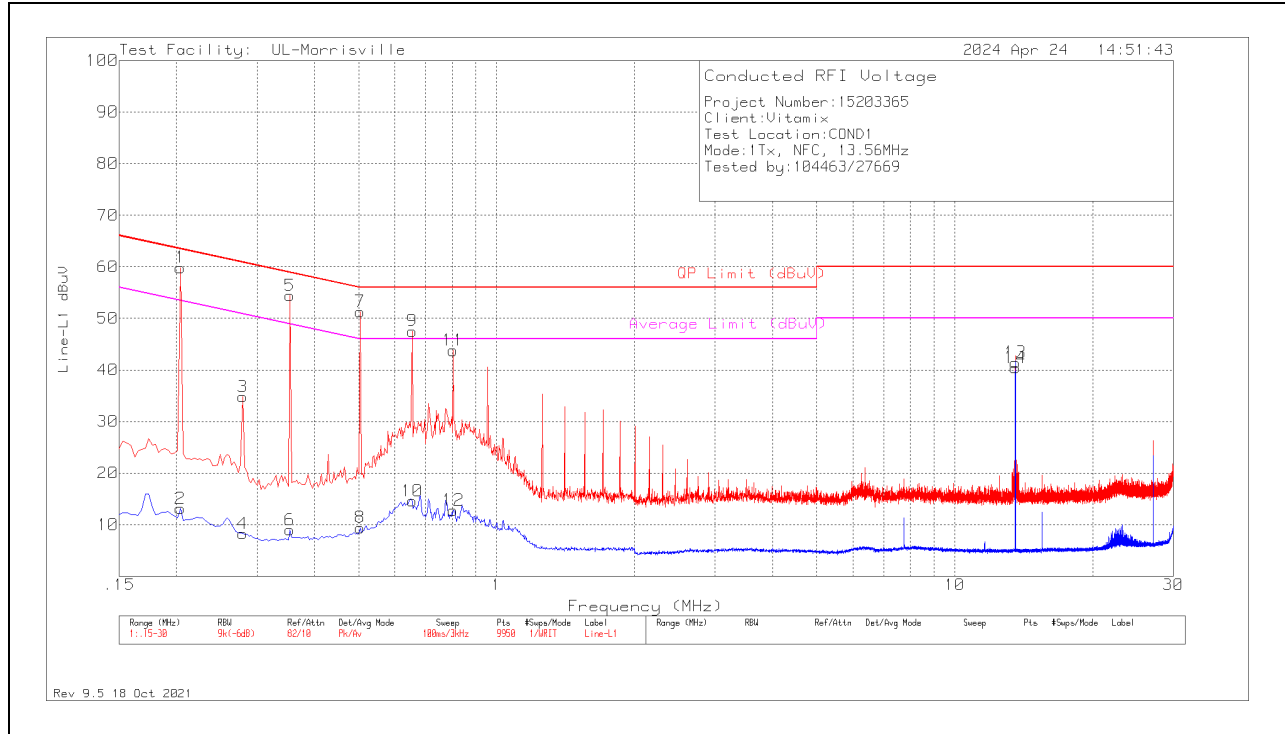
Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Filter (dB)	Atten (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
28	.174	6.2	Av	.3	.9	29.9	37.3	-	-	54.77	-17.47
27	.198	26.7	Pk	.2	.8	29.9	57.6	63.69	-6.09	-	-
29	.348	18.7	Pk	.1	.4	29.9	49.1	59.01	-9.91	-	-
30	.366	-2.55	Av	.1	.4	29.9	27.85	-	-	48.59	-20.74
31	.498	15.97	Pk	.1	.3	29.9	46.27	56.03	-9.76	-	-
32	.522	-1.36	Av	.1	.3	29.9	28.94	-	-	46	-17.06
33	7.629	16.22	Pk	.1	.1	29.9	46.32	60	-13.68	-	-
34	7.629	-1.04	Av	.1	.1	29.9	29.06	-	-	50	-20.94
35	12.714	23.52	Pk	.1	.1	29.9	53.62	-	-	-	-
36	12.714	4.05	Av	.1	.1	29.9	34.15	-	-	-	-
37	13.137	22.98	Qp	.1	.1	29.9	53.08	-	-	-	-
38	13.137	-1.3	Av	.1	.1	29.9	28.8	-	-	-	-
39	13.35	32.69	Qp	.2	.1	29.9	62.89	-	-	-	-
40	13.35	3.49	Av	.2	.1	29.9	33.69	-	-	-	-
41	13.56	56.37	Qp	.2	.1	29.9	86.57	-	-	-	-
42	13.56	56.32	Av	.2	.1	29.9	86.52	-	-	-	-
43	13.773	35.04	Qp	.2	.1	29.9	65.24	-	-	-	-
44	13.773	5.1	Av	.2	.1	29.9	35.3	-	-	-	-
46	13.983	.17	Av	.2	.1	29.9	30.37	-	-	-	-
45	13.986	26.53	Qp	.2	.1	29.9	56.73	-	-	-	-
47	14.409	27.44	Qp	.2	.1	29.9	57.64	-	-	-	-
48	29.664	16.96	Pk	.3	.3	29.9	47.46	60	-12.54	-	-
49	29.664	-.61	Av	.3	.3	29.9	29.89	-	-	50	-20.11

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

10.2. NORMAL OPERATION WITH ANTENNA PORT TERMINATED

10.2.1. VM0231

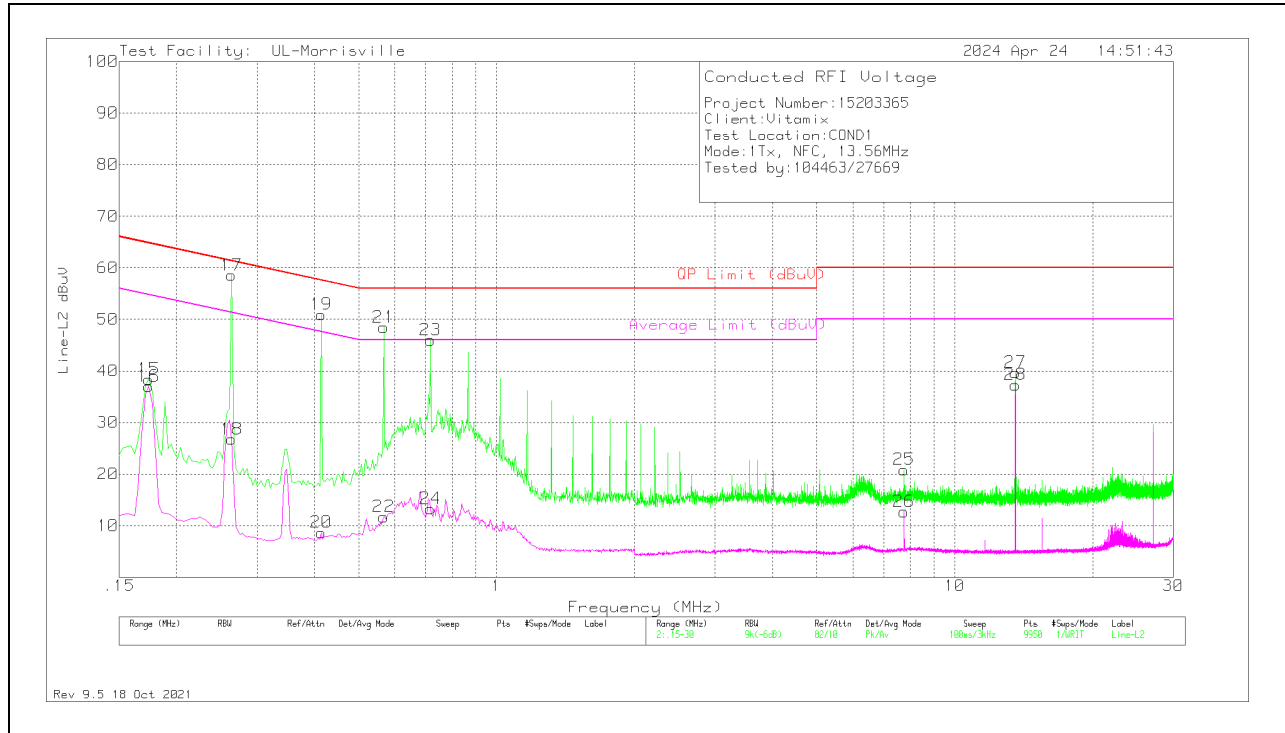
LINE 1 RESULTS



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	.1995	20.84	Qp	.2	9.8	30.84	63.63	-32.79	-	-
2	.204	3.14	Av	.2	9.8	13.14	-	-	53.45	-40.31
3	.279	24.79	Pk	.2	9.8	34.79	60.85	-26.06	-	-
4	.279	-1.74	Av	.2	9.8	8.26	-	-	50.85	-42.59
5	.33784	15.69	Qp	.1	9.8	25.59	59.26	-33.67	-	-
6	.354	-.9	Av	.1	9.8	9	-	-	48.87	-39.87
7	.50778	13.1	Qp	.1	9.8	23	56	-33	-	-
8	.504	-.48	Av	.1	9.8	9.42	-	-	46	-36.58
9	.654	37.65	Pk	.1	9.8	47.55	56	-8.45	-	-
10	.654	4.69	Av	.1	9.8	14.59	-	-	46	-31.41
11	.804	33.9	Pk	.1	9.8	43.8	56	-12.2	-	-
12	.804	2.88	Av	.1	9.8	12.78	-	-	46	-33.22
13	13.563	31.21	Pk	.2	10	41.41	60	-18.59	-	-
14	13.563	30.24	Av	.2	10	40.44	-	-	50	-9.56

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

LINE 2 RESULTS

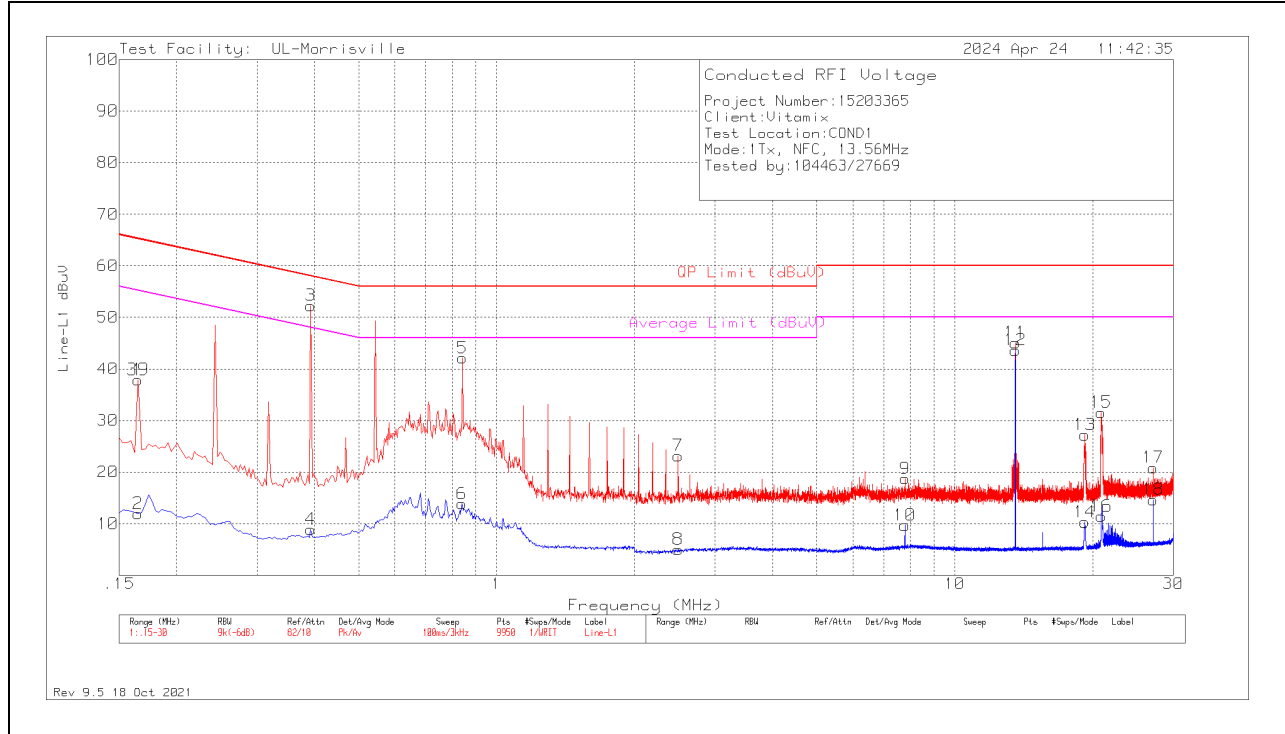


Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
15	.174	28.31	Pk	.3	9.8	38.41	64.77	-26.36	-	-
16	.174	26.94	Av	.3	9.8	37.04	-	-	54.77	-17.73
17	.26296	22.99	Qp	.2	9.8	32.99	61.34	-28.35	-	-
18	.264	16.76	Av	.2	9.8	26.76	-	-	51.3	-24.54
19	.414	41.05	Pk	.1	9.8	50.95	57.57	-6.62	-	-
20	.414	-1.21	Av	.1	9.8	8.69	-	-	47.57	-38.88
21	.567	38.57	Pk	.1	9.8	48.47	56	-7.53	-	-
22	.567	1.83	Av	.1	9.8	11.73	-	-	46	-34.27
23	.717	36.08	Pk	.1	9.8	45.98	56	-10.02	-	-
24	.717	3.38	Av	.1	9.8	13.28	-	-	46	-32.72
25	7.749	10.77	Pk	.1	10	20.87	60	-39.13	-	-
26	7.749	2.62	Av	.1	10	12.72	-	-	50	-37.28
27	13.56	29.5	Pk	.2	10	39.7	60	-20.3	-	-
28	13.56	27.11	Av	.2	10	37.31	-	-	50	-12.69

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

10.2.2. VM0232

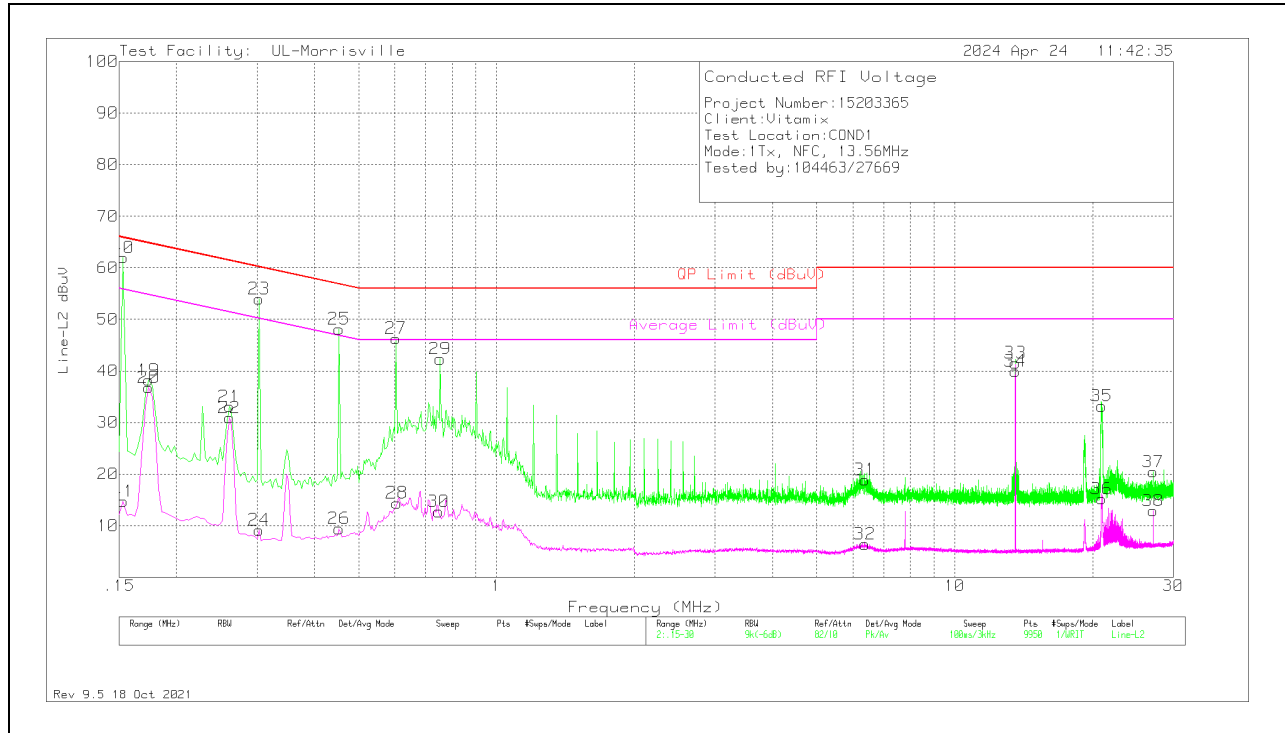
LINE 1 RESULTS



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	.165	27.8	Pk	.3	9.8	37.9	65.21	-27.31	-	-
2	.165	1.83	Av	.3	9.8	11.93	-	-	55.21	-43.28
3	.38022	13.34	Qp	.1	9.8	23.24	58.27	-35.03	-	-
4	.393	-1.02	Av	.1	9.8	8.88	-	-	48	-39.12
6	.84	3.94	Av	.1	9.8	13.84	-	-	46	-32.16
5	.843	32.23	Pk	.1	9.8	42.13	56	-13.87	-	-
7	2.49	13.28	Pk	.1	9.8	23.18	56	-32.82	-	-
8	2.49	-4.88	Av	.1	9.8	5.02	-	-	46	-40.98
10	7.785	-4.1	Av	.1	10	9.69	-	-	50	-40.31
9	7.788	8.64	Pk	.1	10	18.74	60	-41.26	-	-
11	13.56	34.9	Pk	.2	10	45.1	60	-14.9	-	-
12	13.56	33.45	Av	.2	10	43.65	-	-	50	-6.35
14	19.206	0	Av	.2	10.1	10.3	-	-	50	-39.7
13	19.236	16.93	Pk	.2	10.1	27.23	60	-32.77	-	-
15	20.859	21.28	Pk	.2	10.1	31.58	60	-28.42	-	-
16	20.889	1.17	Av	.2	10.1	11.47	-	-	50	-38.53
17	27.12	10.37	Pk	.3	10.2	20.87	60	-39.13	-	-
18	27.12	4.16	Av	.3	10.2	14.66	-	-	50	-35.34

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

LINE 2 RESULTS

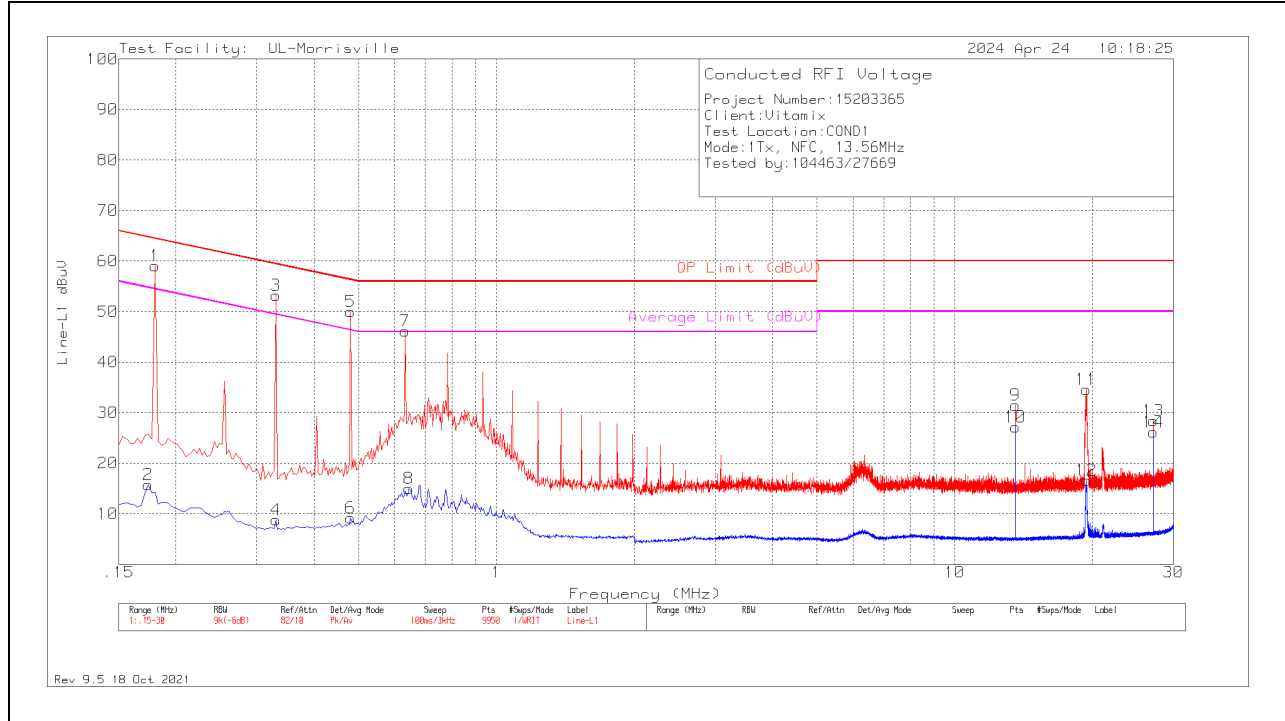


Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
40	.15842	22.91	Qp	.3	9.8	33.01	65.55	-32.54	-	-
41	.153	4.61	Av	.3	9.8	14.71	-	-	55.84	-41.13
19	.174	28.13	Pk	.3	9.8	38.23	64.77	-26.54	-	-
20	.174	26.65	Av	.3	9.8	36.75	-	-	54.77	-18.02
21	.261	23.11	Pk	.2	9.8	33.11	61.4	-28.29	-	-
22	.261	20.92	Av	.2	9.8	30.92	-	-	51.4	-20.48
23	.303	43.96	Pk	.2	9.8	53.96	60.16	-6.2	-	-
24	.303	-86	Av	.2	9.8	9.14	-	-	50.16	-41.02
25	.453	38.23	Pk	.1	9.8	48.13	56.82	-8.69	-	-
26	.453	-47	Av	.1	9.8	9.43	-	-	46.82	-37.39
27	.603	36.39	Pk	.1	9.8	46.29	56	-9.71	-	-
28	.606	4.49	Av	.1	9.8	14.39	-	-	46	-31.61
30	.747	2.83	Av	.1	9.8	12.73	-	-	46	-33.27
29	.753	32.42	Pk	.1	9.8	42.32	56	-13.68	-	-
32	6.363	-3.61	Av	.1	9.9	6.39	-	-	50	-43.61
31	6.375	8.88	Pk	.1	9.9	18.88	60	-41.12	-	-
33	13.563	31.34	Pk	.2	10	41.54	60	-18.46	-	-
34	13.563	29.75	Av	.2	10	39.95	-	-	50	-10.05
35	20.916	22.89	Pk	.2	10.1	33.19	60	-26.81	-	-
36	20.916	4.88	Av	.2	10.1	15.18	-	-	50	-34.82
37	27.12	9.92	Pk	.3	10.2	20.42	60	-39.58	-	-
38	27.12	2.39	Av	.3	10.2	12.89	-	-	50	-37.11

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

10.2.3. VM0234

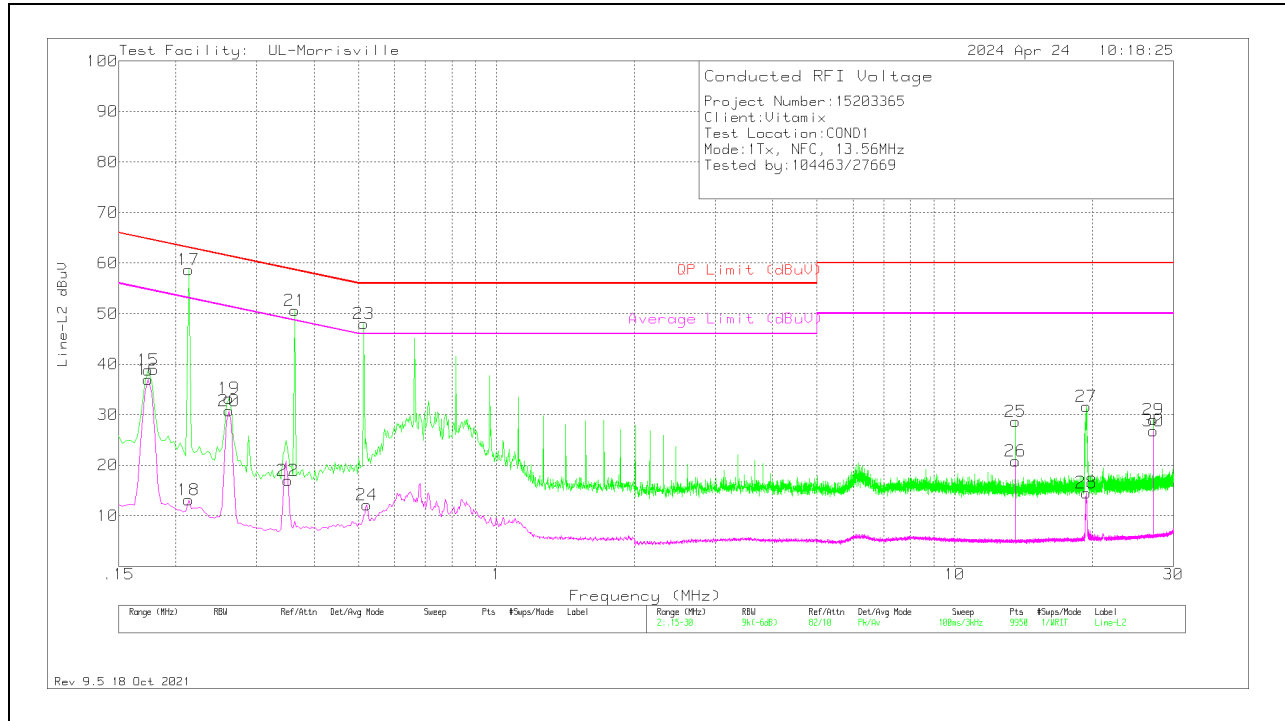
LINE 1 RESULTS



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)
2	.174	5.59	Av	.3	9.8	15.69	-	-	54.77	-39.08
1	.19184	20.01	Qp	.2	9.8	30.01	63.96	-33.95	-	-
3	.33	43.28	Pk	.1	9.8	53.18	59.45	-6.27	-	-
4	.33	-1.17	Av	.1	9.8	8.73	-	-	49.45	-40.72
5	.48	40.12	Pk	.1	9.8	50.02	56.34	-6.32	-	-
6	.48	-.76	Av	.1	9.8	9.14	-	-	46.34	-37.2
7	.633	36.25	Pk	.1	9.8	46.15	56	-9.85	-	-
8	.645	5.05	Av	.1	9.8	14.95	-	-	46	-31.05
9	13.56	21.24	Pk	.2	10	31.44	60	-28.56	-	-
10	13.56	16.91	Av	.2	10	27.11	-	-	50	-22.89
12	19.371	6.31	Av	.2	10.1	16.61	-	-	50	-33.39
11	19.392	24.27	Pk	.2	10.1	34.57	60	-25.43	-	-
13	27.12	17.86	Pk	.3	10.2	28.36	60	-31.64	-	-
14	27.12	15.69	Av	.3	10.2	26.19	-	-	50	-23.81

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

LINE 2 RESULTS



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)
15	.174	28.68	Pk	.3	9.8	38.78	64.77	-25.99	-	-
16	.174	26.9	Av	.3	9.8	37	-	-	54.77	-17.77
17	.2107	19.78	Qp	.2	9.8	29.78	63.18	-33.4	-	-
18	.213	3.15	Av	.2	9.8	13.15	-	-	53.09	-39.94
19	.261	23.26	Pk	.2	9.8	33.26	61.4	-28.14	-	-
20	.261	20.8	Av	.2	9.8	30.8	-	-	51.4	-20.6
22	.351	7.12	Av	.1	9.8	17.02	-	-	48.94	-31.92
21	.363	40.71	Pk	.1	9.8	50.61	58.66	-8.05	-	-
23	.513	38.09	Pk	.1	9.8	47.99	56	-8.01	-	-
24	.522	2.25	Av	.1	9.8	12.15	-	-	46	-33.85
25	13.56	18.43	Pk	.2	10	28.63	60	-31.37	-	-
26	13.56	10.67	Av	.2	10	20.87	-	-	50	-29.13
28	19.365	4.25	Av	.2	10.1	14.55	-	-	50	-35.45
27	19.377	21.29	Pk	.2	10.1	31.59	60	-28.41	-	-
30	27.12	16.34	Av	.3	10.2	26.84	-	-	50	-23.16
29	27.1215	18.54	Pk	.3	10.2	29.04	60	-30.96	-	-

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

11. SETUP PHOTOS

Please refer to R15203365-EP1 for setup photos

END OF TEST REPORT