

TEST REPORT

Product : Access Control Reader
Trade mark : N/A
Model/Type reference : FT9361-R
Serial Number : N/A
Report Number : EED32O812610
FCC ID : O5P-FT9361-R
Date of Issue : Sep. 14, 2022
Test Standards : 47 CFR Part 15 Subpart C
Test result : PASS

Prepared for:

VIVOTEK Inc.

**6F., No.192, Lien-Cheng Rd., Chung-Ho, New Taipei City,
235, Taiwan, China**

Prepared by:

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Sep. 14, 2022

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Check No.: 8728150822



1 Version

Version No.	Date	Description
00	Sep. 14, 2022	Original

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3 Test Summary

Test Item	FCC Test Requirement	Test Method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203	ANSI C63.10 2013	Pass
Conducted Emission (150KHz to 30MHz)	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 2013	N/A
Electric Field Strength of Fundamental and Outside the Allocated bands	47 CFR Part 15, Subpart C Section 15.225(a)/(b)/(c)	ANSI C63.10 2013	Pass
Radiated Emission	47 CFR Part 15, Subpart C Section 15.225(d)/15.209	ANSI C63.10 2013	Pass
Frequency Tolerance	47 CFR Part 15, Subpart C Section 15.225(e)	ANSI C63.10 2013	Pass
20dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.215	ANSI C63.10 2013	Pass

Remark:

Company Name and Address shown on Report, the sample(s) and sample Information was/ were provided by the applicant who should be responsible for the authenticity which CTI hasn't verified.

4 General Information

4.1 Client Information

Applicant:	VIVOTEK Inc.
Address of Applicant:	6F., No.192, Lien-Cheng Rd., Chung-Ho, New Taipei City, 235, Taiwan, China
Manufacturer:	VIVOTEK Inc.
Address of Manufacturer:	6F., No.192, Lien-Cheng Rd., Chung-Ho, New Taipei City, 235, Taiwan, China
Factory:	VIVOTEK Inc.
Address of Factory:	6F., No.192, Lien-Cheng Rd., Chung-Ho, New Taipei City, 235, Taiwan, China

4.2 General Description of EUT

Product Name:	Access Control Reader
Test Mode No.:	FT9361-R
Trade mark:	N/A
Product Type:	☐ Mobile ☐ Portable ☒ Fix Location
Operation Frequency:	13.56MHz
Modulation Type:	ASK
Antenna Type:	PCB antenna
Power Supply:	DC 12V
Test Voltage:	DC 12V
Sample Received Date:	Aug. 16, 2022
Sample tested Date:	Aug. 16, 2022 to Aug. 24, 2022

4.3 Test Environment & Test Mode

Operating Environment:	
Radiated Emissions:	
Temperature:	22~25.0 °C
Humidity:	50~55 % RH
Atmospheric Pressure:	1010mbar
Conducted Emissions:	
Temperature:	22~25.0 °C
Humidity:	50~55 % RH
Atmospheric Pressure:	1010mbar
Test Mode:	
Mode a:	Keep EUT working in continuous transmitting mode with 100% duty cycle.

4.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Certification	Supplied by
/	/	/	/	/

4.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd

Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

No tests were sub-contracted.

FCC Designation No.: CN1164

4.6 Deviation from Standards

None.

4.7 Abnormalities from Standard Conditions

None.

4.8 Other Information Requested by the Customer

None.

4.9 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9 x 10 ⁻⁸
2	RF power, conducted	0.46dB (30MHz-1GHz)
		0.55dB (1GHz-18GHz)
3	Radiated Spurious emission test	3.3dB (9kHz-30MHz)
		4.3dB (30MHz-1GHz)
		4.5dB (1GHz-12.75GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	3.8%
7	DC power voltages	0.026%

4.10 Equipment List

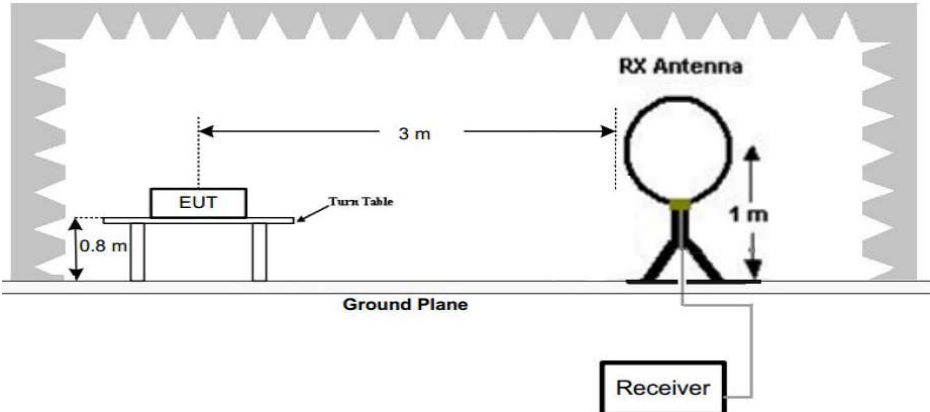
Equipment	Manufacturer	Model No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
3M Chamber & Accessory Equipment	TDK	SAC-3	---	05/22/2022	05/21/2025
Receiver	R&S	ESCI7	100938-003	10/14/2021	10/13/2022
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	9163-618	05/21/2022	05/20/2025
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-076	04/15/2021	04/14/2024
Multi device Controller	maturo	NCD/070/10711112	---	---	---
Horn Antenna	ETS-LINGREN	BBHA 9120D	9120D-1869	04/15/2021	04/14/2024
Microwave Preamplifier	Agilent	8449B	3008A02425	06/23/2021 06/21/2022	06/22/2022 06/20/2023
high-low temperature test chamber	Dong Guang Qin Zhuo	LK-80GA	QZ20150611 879	12-28-2020 12-24-2021	12-27-2021 12-23-2022
Spectrum Analyzer	R&S	FSV40	101200	08-26-2021	08-25-2022

5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part15 C Section 15.203
15.203 requirement:	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
EUT Antenna:	
The antenna is NFC antenna.	

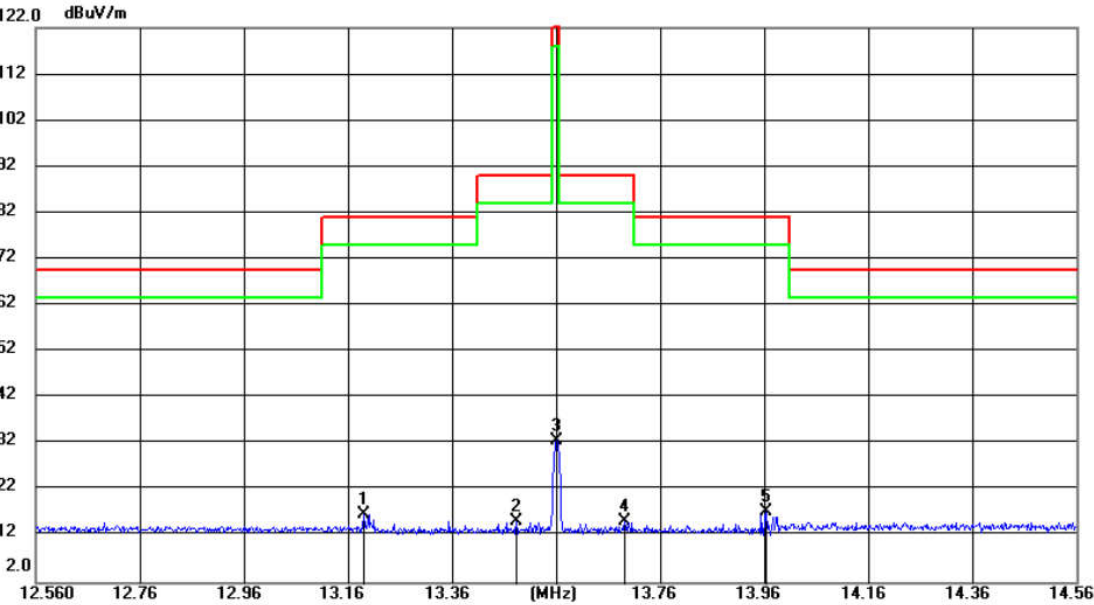
5.2 Electric Field Strength of Fundamental and Outside the Allocated bands

Test Requirement:	47 CFR Part 15, Subpart C Section 15.225(a)/(b)/(c)				
Test Method:	ANSI C63.10: 2013				
Test Site:	3m (Semi-Anechoic Chamber)				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
Limit:	Frequency Range(MHz)	E-field Strength Limit @ 30 m (μV/m)		E-field Strength Limit @ 3 m (dBμV/m)	
	13.560 ± 0.007	15848		124	
	13.410 to 13.553 13.567 to 13.710	334		90	
	13.110 to 13.410 13.710 to 14.010	106		81	
	Note: Where the limits have been defined at one distance, and a signal level measured at another, the limits have been extrapolated using the following formula: Extrapolation(dB)=40log ₁₀ (Measurement Distance/Specification Distance)				
Test Setup:	 Figure 1. Below 30MHz				
Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and				

	then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. 7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
Test Mode:	Transmitting with ASK modulation.
Test Result:	Pass

Measurement Data

X axis positioning



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		13.1900	-3.49	20.35	16.86	81.00	-64.14	peak	100	356
2		13.4839	-4.86	20.35	15.49	90.00	-74.51	peak	100	356
3		13.5617	12.39	20.35	32.74	124.00	-91.26	peak	100	356
4		13.6920	-4.92	20.35	15.43	90.00	-74.57	peak	100	356
5	*	13.9640	-3.04	20.35	17.31	81.00	-63.69	peak	100	119

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier.

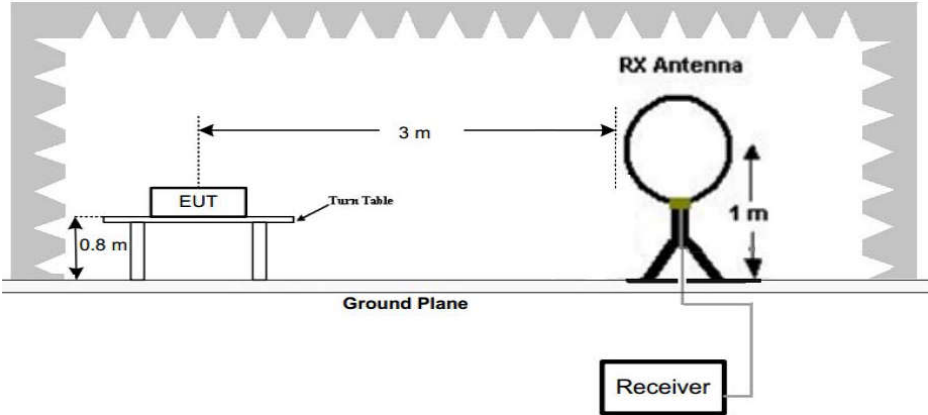
The basic equation with a sample calculation is as follows:

Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

Level = Read Level + Factor,

Over Limit=Level-Limit Line.

5.3 Radiated Emissions

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.225(d),				
Test Method:	ANSI C63.10: 2013				
Test Site:	3m (Semi-Anechoic Chamber)				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Peak	100 kHz	300kHz	Peak
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m) @ 3 m	Remark	
	0.009MHz-0.490MHz	2400/F(kHz) @300m	128.5-93.8	Quasi-peak	
	0.490MHz-1.705MHz	24000/F(kHz) @30m	73.8-63	Quasi-peak	
	1.705MHz-30MHz	30 @30m	70	Quasi-peak	
	30MHz-88MHz	100 @3m	40.0	Quasi-peak	
	88MHz-216MHz	150 @3m	43.5	Quasi-peak	
	216MHz-960MHz	200 @3m	46.0	Quasi-peak	
	960MHz-1GHz	500 @3m	54.0	Quasi-peak	
Note: Where the limits have been defined at one distance, and a signal level measured at another, the limits have been extrapolated using the following formula: Extrapolation(dB)=40log ₁₀ (Measurement Distance/Specification Distance)					
Test Setup:	 Figure 1. Below 30MHz				

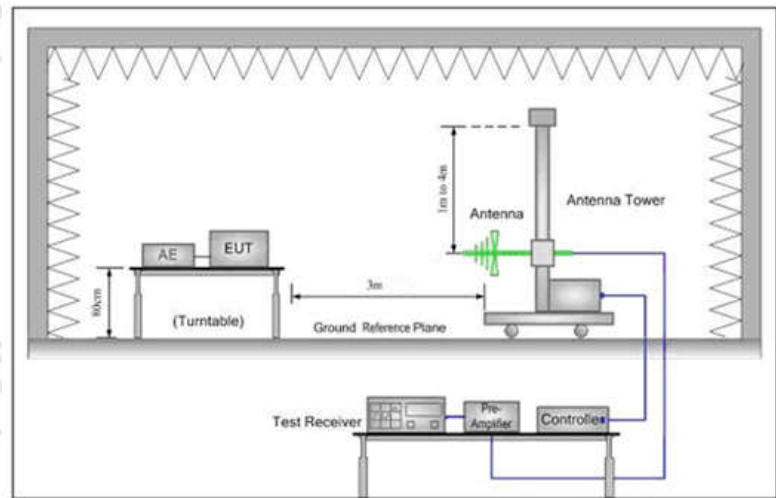


Figure 2. 30MHz to 1GHz

Test Procedure:

5. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
6. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
7. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
8. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Test Mode:

Transmitting with ASK modulation.

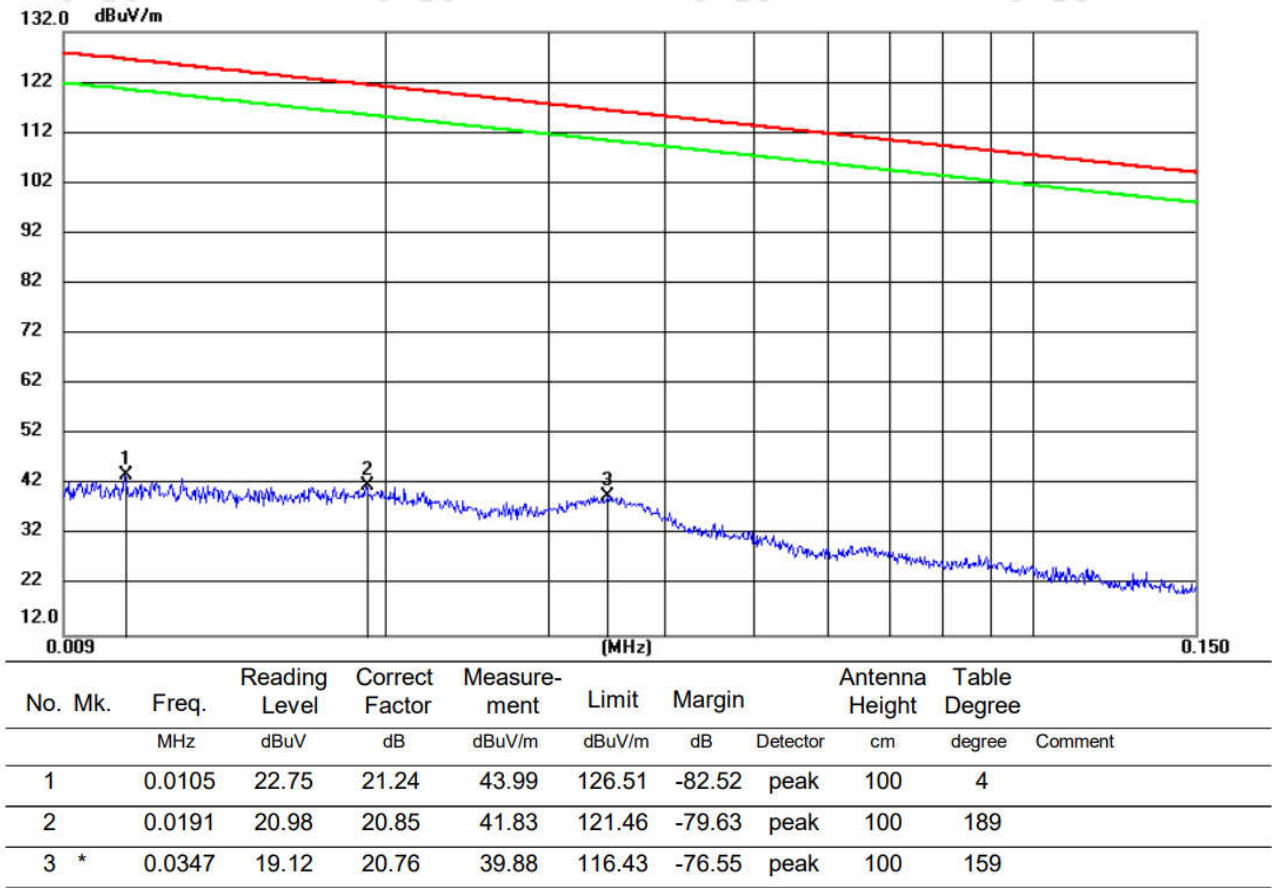
Test Result:

Pass

Measurement Data

X axis positioning

9kHz – 150KHz:



Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

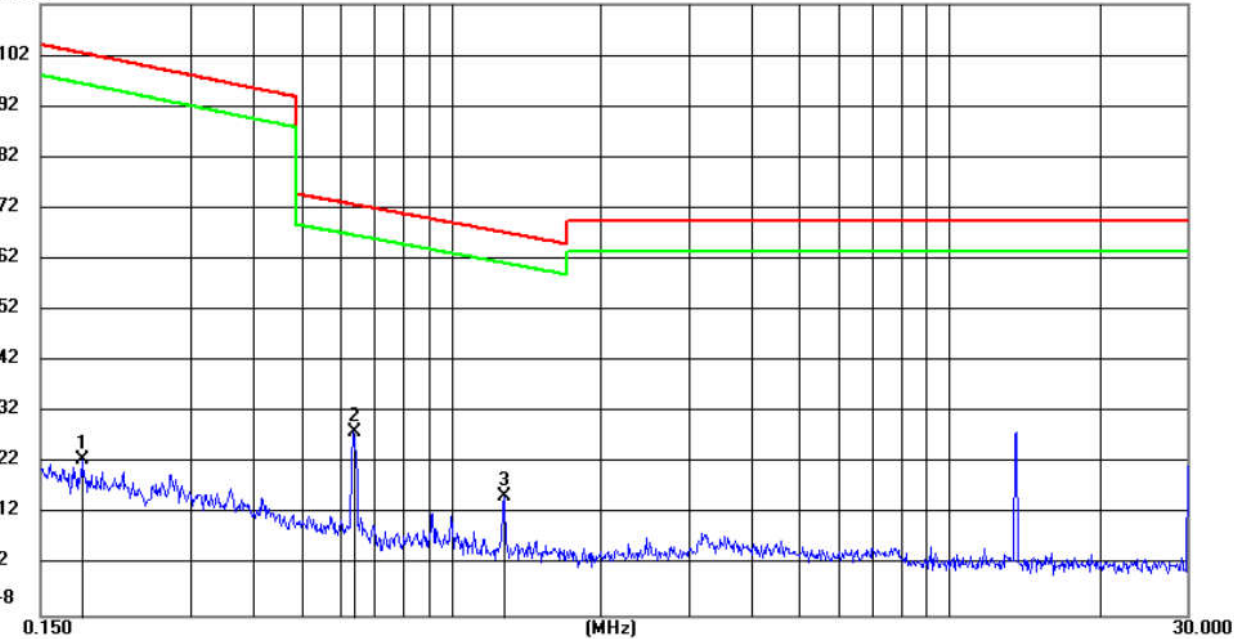
Level = Read Level + Factor,

Over Limit=Level-Limit Line.

X axis positioning

150KHz-30MHz:

112.0 dBuV/m



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Antenna Height	Table Degree
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree
1		0.1815	2.17	20.55	22.72	102.42	-79.70	peak	356
2	*	0.6372	7.83	20.44	28.27	72.73	-44.46	peak	261
3		1.2756	-4.83	20.40	15.57	67.26	-51.69	peak	261

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

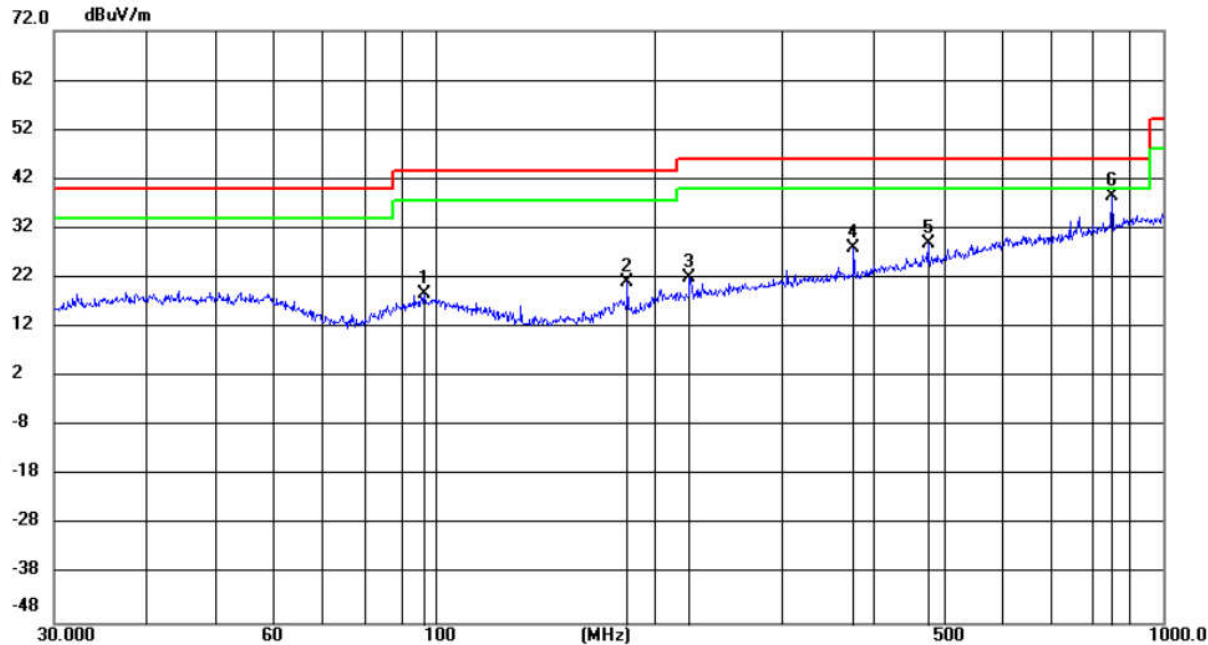
Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

Level = Read Level + Factor,

Over Limit=Level-Limit Line.

30MHz-1GHz

Horizontal



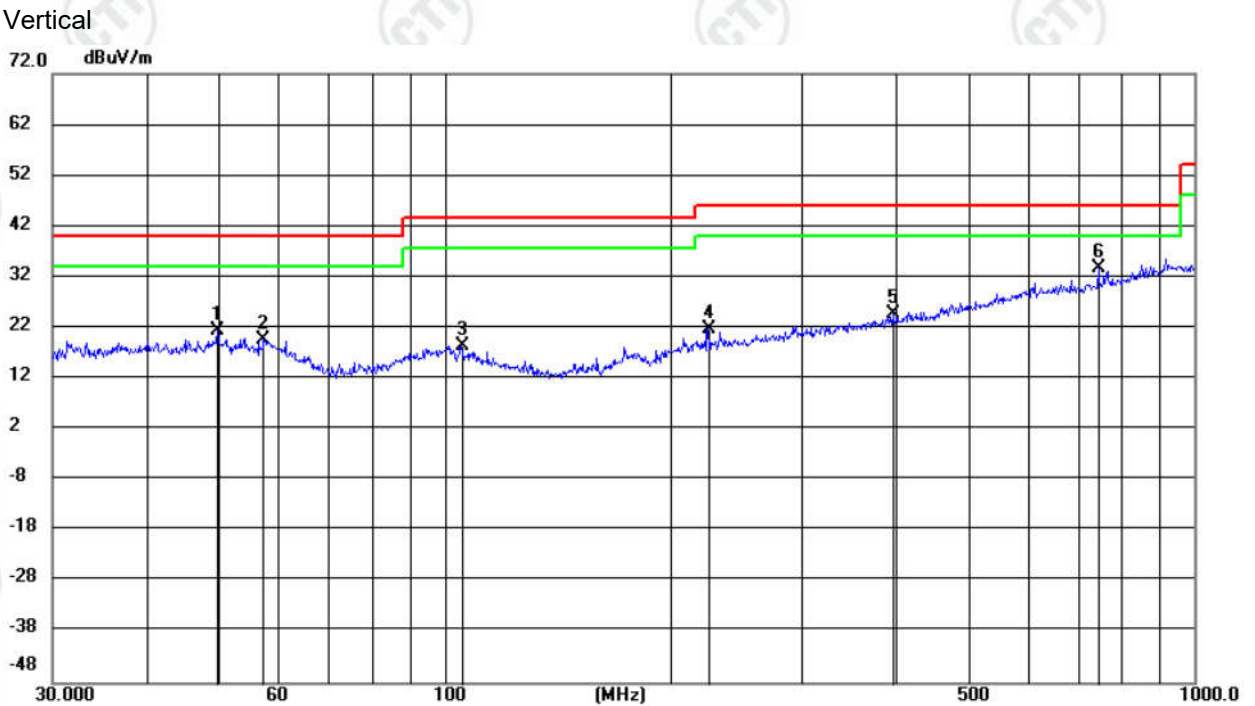
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		96.7749	5.09	13.60	18.69	43.50	-24.81	peak	200	1
2		183.8440	9.70	11.46	21.16	43.50	-22.34	peak	200	356
3		223.7333	7.48	14.60	22.08	46.00	-23.92	peak	100	250
4		375.9385	9.30	18.88	28.18	46.00	-17.82	peak	100	130
5		475.4991	7.92	21.02	28.94	46.00	-17.06	peak	200	281
6	*	851.0353	11.26	27.42	38.68	46.00	-7.32	peak	100	60

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

Level = Read Level + Factor,
Over Limit=Level-Limit Line.



No. Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Antenna Height	Table Degree	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	49.7068	7.07	14.28	21.35	40.00	-18.65	peak	100	69
2	57.3923	6.03	13.75	19.78	40.00	-20.22	peak	100	200
3	105.2718	5.13	13.30	18.43	43.50	-25.07	peak	200	360
4	224.5193	7.05	14.63	21.68	46.00	-24.32	peak	100	356
5	396.2415	5.51	19.31	24.82	46.00	-21.18	peak	200	109
6 *	744.8661	8.25	25.48	33.73	46.00	-12.27	peak	200	49

Remark:

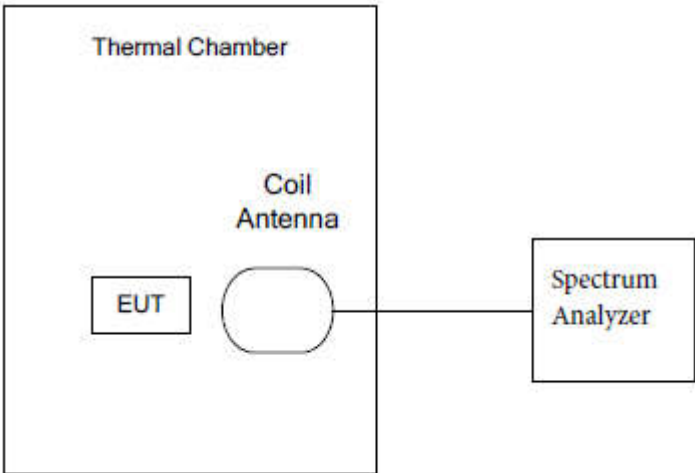
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

Level = Read Level + Factor,

Over Limit=Level-Limit Line.

5.4 Frequency Stability

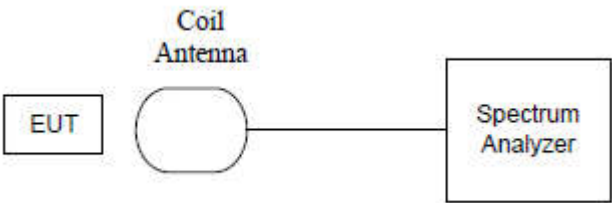
Test Requirement:	47 CFR Part 15 C Section 15.225(e)
Test Method:	ANSI C63.10: 2013
Test Setup:	 The diagram shows a Thermal Chamber containing an EUT (Equipment Under Test) and a Coil Antenna. The Coil Antenna is connected to a Spectrum Analyzer.
Frequency Range:	Operation within the band 13.110-14.010 MHz
Requirements:	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.
Method of Measurement:	The EUT was placed in an environmental test chamber and powered such that control element received normal voltage and the transmitter provided maximum RF output.
Test Result:	The unit does meet the FCC Part 15 C Section 15.225(e) requirements.

Test Frequency: 13.56MHz			Temperature:23°C	
Supply Voltage (V) DC	Test Result (MHz)	Deviation (kHz)	Limit ±0.01% (kHz)	Result
12	13.55971	-0.29	1.3560	Pass
12.5	13.55973	-0.27	1.3560	Pass
11.5	13.55965	-0.35	1.3560	Pass

Test Frequency: 13.56MHz			Normal Voltage:12Vdc	
Temperature (°C)	Test Result (MHz)	Deviation (kHz)	Limit ±0.01% (kHz)	Result
-20	13.55976	-0.24	1.3560	Pass
-10	13.55971	-0.29	1.3560	
0	13.55974	-0.26	1.3560	
10	13.55970	-0.30	1.3560	
20	13.55976	-0.24	1.3560	
30	13.55973	-0.27	1.3560	
40	13.55975	-0.25	1.3560	
50	13.55972	-0.28	1.3560	

Note: Deviation (KHz) = (Test Result-13.56MHz)*1000

5.5 20dB Occupied Bandwidth

Test Requirement:	47 CFR Part 15 C Section 15.215 (C)
Test Method:	ANSI C63.10: 2013
Test Setup:	
Frequency Range:	Operation within the band 13.110 – 14.010 MHz
Requirements:	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 is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the 20 dB bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.
Limit:	For 13.56 MHz the permitted frequency band is 14kHz, so the limit is 11.2 kHz.

Test Data:

20dB bandwidth (kHz)	FL (MHz)	FH (MHz)	Limit(MHz)	Result
1.462	13.559899	13.561361	13.110 – 14.010	Pass

