

TEST REPORT

Product Name : SIRIUS Contactless Transit Reader
Model Number : SR128
FCC ID : 2AKLKSR128

Prepared for : Land Transport Authority
Address : 71 Chai Chee Street. Singapore 468981

Prepared by : EMTEK (SHENZHEN) CO., LTD.
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Report Number : ENS2208220084W00101R
Date(s) of Tests : August 23, 2022 to September 16, 2022
Date of issue : September 16, 2022

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TEST RESULT CERTIFICATION

Applicant : Land Transport Authority
Address : 71 Chai Chee Street. Singapore 468981
Manufacturer : STYL Solutions Pte Ltd
Address : 81 Ubi Avenue 4, #05-07, UB.One Building Singapore 408830
EUT : SIRIUS Contactless Transit Reader
Model Name : SR128
Trademark : N/A

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C	PASS

The above equipment was tested by EMTEK(SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2 and Part 15.225.

The test results of this report relate only to the tested sample identified in this report.

Date of Test : August 23, 2022 to September 16, 2022

Prepared by :

Luo Pei Ye

Luo peiye/Editor

Reviewer :

Joe Xia

Joe Xia /Supervisor

Approve & Authorized Signer :

Lisa Wang

Lisa Wang/Manager



1 EUT TECHNICAL DESCRIPTION

Characteristics	Description
EUT:	SIRIUS Contactless Transit Reader
Model Name:	SR128
Device Type:	NFC
Modulation:	ASK modulation
Operating Frequency Range(s):	13.553-13.567MHz
Channel Frequency:	13.56MHz
Number of Channels:	1 channel
Antenna Type :	Induction coil antenna
Antenna Gain:	Refer to manufacturer user manual/operating manual
Power Supply:	DC12V from adapter
Test Voltage:	AC 120V/60Hz
Adapter :	Model :YHY-12002500 P/N:DS120030C6-G Input:AC100-240V,50/60Hz,1.5AMax Output:DC12V,2.5A
Temperature Range:	-10°C ~ +60°C

Note: for more details, please refer to the User's manual of the EUT.

2 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
2.1049	Occupied Bandwidth	PASS	
15.225(e)	Frequency stability	PASS	
15.225(d) 15.209	Radiated Spurious Emissions	PASS	
15.207	Conducted Emission	PASS	
NOTE1: N/A (Not Applicable)			

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: **2AKLKSR128** filing to comply with Section 15.225 of the FCC Part 15, Subpart C Rules.



3 TEST METHODOLOGY

3.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:
FCC 47 CFR Part 2, Subpart J
FCC 47 CFR Part 15, Subpart C

3.2 MEASUREMENT EQUIPMENT USED

3.2.1 Conducted Emission Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
EMI Test Receiver	Rohde & Schwarz	ESCI	101045	2022/5/14	1Year
PULSE LIMITER	Rohde & Schwarz	ESH3-Z2	100107	2022/5/14	1Year
AMN	Rohde & Schwarz	ESH3-Z5	100191	2022/5/15	1Year
AMN	Schwarzbeck	NNLK 8129	8129203	2022/5/15	1Year
V-Network	Rohde & Schwarz	ESH3-Z6	100011	2022/5/15	1Year
V-Network	Rohde & Schwarz	ESH3-Z6	100253	2022/5/15	1Year

3.2.2 Radiated Emission Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Pre-Amplifier	HP	8447F	2944A07999	2022/5/14	1Year
EMI Test Receiver	Rohde & Schwarz	ESCI	101414	2022/5/14	1Year
Bilog Antenna	Schwarzbeck	VULB9163	712	2022/7/5	2 Year
Horn antenna	Schwarzbeck	BBHA9120D	9120D-1178	2022/7/4	2 Year
Pre-Amplifie	Lunar EM	LNA1G18-48	J1011131010 001	2022/5/15	1Year
Spectrum Analyzer	Rohde & Schwarz	FSV40	100967	2022/5/14	1Year
Horn antenna	Schwarzbeck	BBHA9170	9170-399	2021/6/12	2 Year
Loop Antenna	Schwarzbeck	FMZB1519	1519-012	2021/6/12	2 Year

3.2.3 Radio Frequency Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Signal Analyzer	Agilent	N9010A	MY53470879	2022/5/14	1Year
Vector Signal Generater	Agilent	N5182B	MY53050878	2022/5/14	1Year
Analog Signal Generator	Agilent	N5171B	MY53050553	2022/5/14	1Year
Power Meter	Agilent	PS-X10-100	\	2022/5/15	1Year
Blocking Box	THEDA	AD211	TW5451140	2022/5/14	1Year
Switchgroup	THEDA	ETF-025(VASC6)	TW5451008	N/A	N/A
MIMO Matrix Switch	THEDA	4P5TM18	TW5451009	N/A	N/A
Temperature&Humidity Chamber	ESPEC	EL-02KA	12107166	2022/7/3	1 Year

3.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting mode is programmed.



4 FACILITIES AND ACCREDITATIONS

4.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

Building 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

4.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab.

: **Accredited by CNAS**

The Certificate Registration Number is L2291.

The Laboratory has been assessed and proved to be in compliance with CNAS-CL01 (identical to ISO/IEC 17025:2017)

Accredited by FCC

Designation Number: CN1204

Test Firm Registration Number: 882943

Accredited by A2LA

The Certificate Number is 4321.01.

Accredited by Industry Canada

The Conformity Assessment Body Identifier is CN0008

Name of Firm

: EMTEK (SHENZHEN) CO., LTD.

Site Location

: Building 69, Majialong Industry Zone,
Nanshan District, Shenzhen, Guangdong, China

5 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Conducted Emissions Test	$\pm 2.0\text{dB}$
Radiated Emission Test	$\pm 2.0\text{dB}$
Occupied Bandwidth Test	$\pm 1.0\text{dB}$
All emission, radiated	$\pm 3\text{dB}$
Temperature	$\pm 0.5^\circ\text{C}$
Humidity	$\pm 3\%$

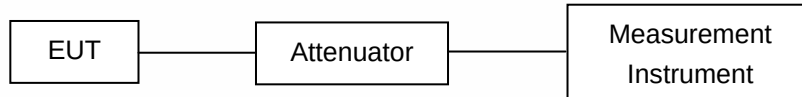
Measurement Uncertainty for a level of Confidence of 95%



6 SETUP OF EQUIPMENT UNDER TEST

6.1 RADIO FREQUENCY TEST SETUP 1

The component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



6.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

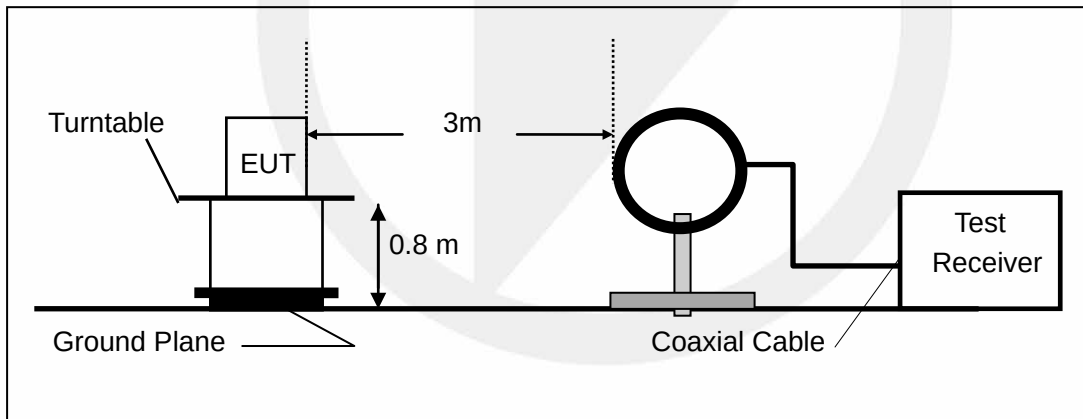
Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

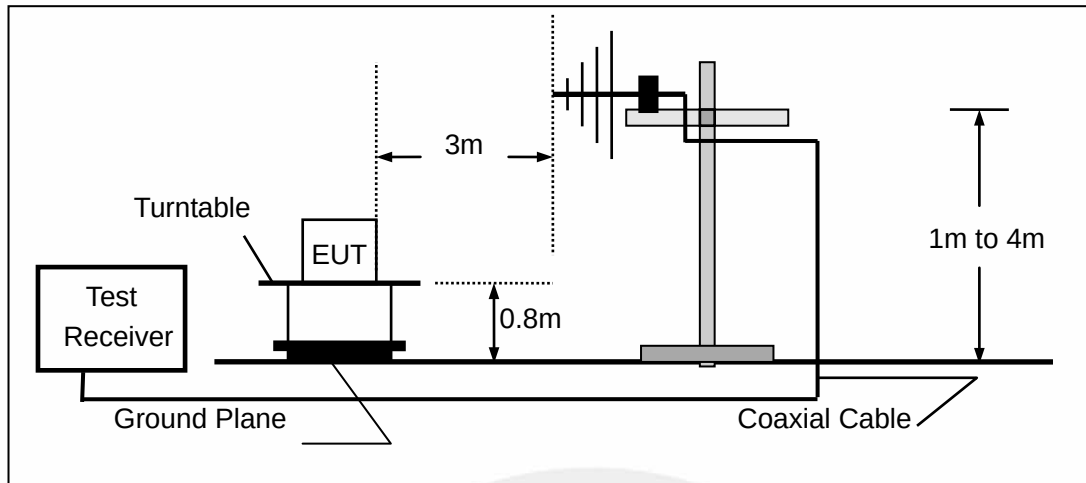
Above 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



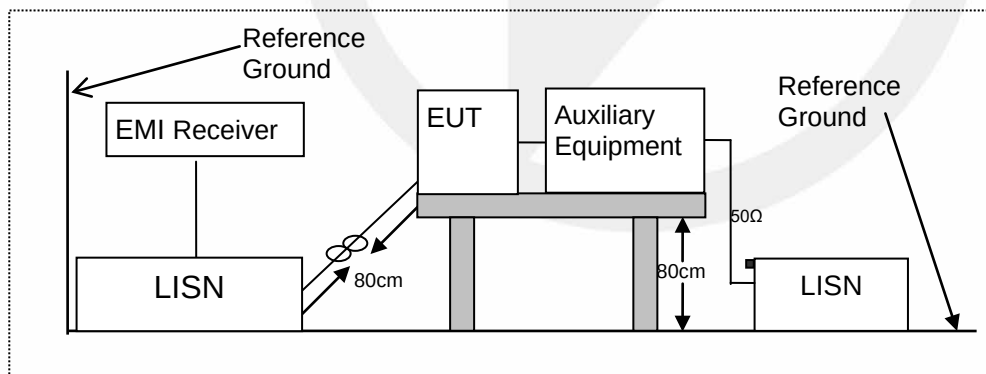
(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



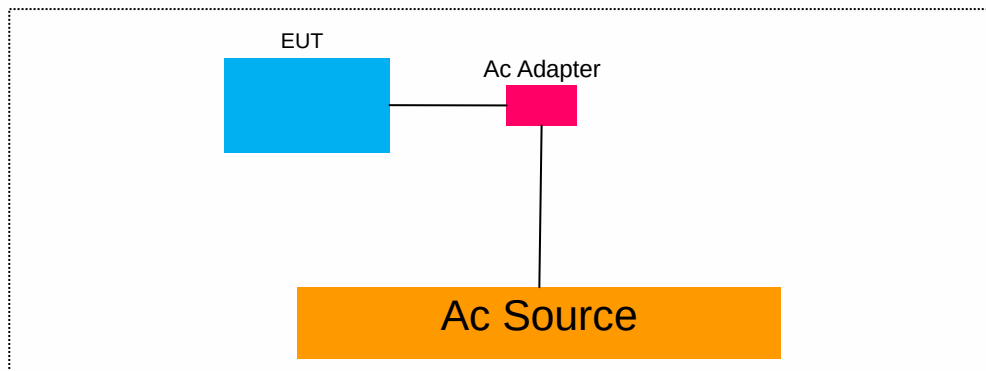
6.3 CONDUCTED EMISSION TEST SETUP

The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN. Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



6.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



6.5 SUPPORT EQUIPMENT

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/
/	/	/	/

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	LENOVO	M713A	SA12582190

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
3. Unless otherwise denoted as EUT in 『Remark』 column , device(s) used in tested system is a support equipment

7 TEST REQUIREMENTS

7.1 OCCUPIED BANDWIDTH

7.1.1 Applicable Standard

According to FCC Part 2.1049

7.1.2 Conformance Limit

No limit requirement.

7.1.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

7.1.4 Test Procedure

The EUT was operating in transmit mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 1% occupied bandwidth (30Hz).

Set the video bandwidth (VBW) = 3 times RBW .

Set Span= approximately 2 to 3 times the occupied bandwidth

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 99% down one side of the emission. Reset the markerdelta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 99% bandwidth of the emission.

If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

Measure and record the results in the test report.

7.1.5 Test Results

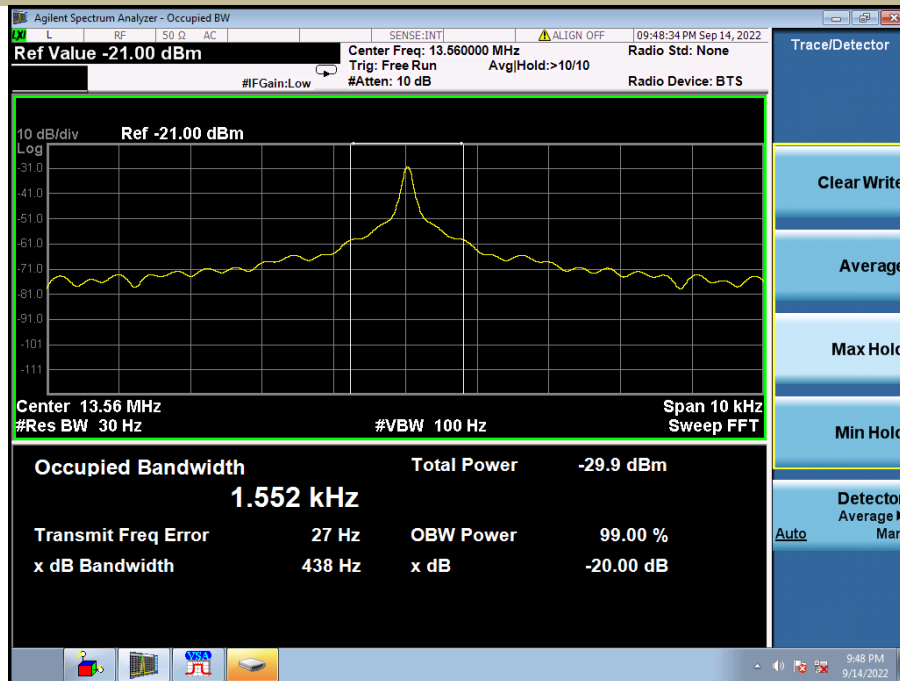
Temperature :	25°C	Test Date :	September 14, 2022
Humidity :	65 %	Test By:	LPY

Modulation Mode	Channel Number	Channel Frequency (MHz)	-20dB Measurement Bandwidth (kHz)	Limit (kHz)	Verdict
ASK	0	13.56	0.438	N/A	PASS
Note: N/A (Not Applicable)					

Test Model

-20dB Bandwidth
Channel 0: 13.56MHz

ASK Modulation



7.2 FREQUENCY STABILITY

7.2.1 Applicable Standard

According to FCC Part 2.1055

7.2.2 Conformance Limit

According to part 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.

7.2.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

7.2.4 Test Procedures

Connect the EUT to frequency analyzer via the antenna connector.
EUT was placed at temperature chamber and connected to an external power supply.
Temperature and voltage condition shall be tested to confirm frequency stability.

(a) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(b) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point, which shall be specified by the manufacturer.

7.2.5 Test Results

pass

Operation Mode	Channel Number	Test Condition		Channel Frequency (MHz)	Freq.Dev. (Hz)	Deviation (ppm)	Limit (ppm)
		Voltage (V)	Temp (°C)				
		Vnom	-20	13.559844	-16	-11.50	100
			-10	13.559978	-22	-1.62	100
			0	13.559965	-35	-2.58	100
			10	13.559945	-55	-4.06	100
			20	13.559963	-37	-2.73	100
			30	13.559932	-68	-5.01	100
			40	13.560085	85	6.27	100
			50	13.560094	94	6.93	100
85% Vnom	20	13.559932	-68	-5.01	100		
115% Vnom	20	13.559978	-22	-1.62	100		
VERDICT				PASS			

7.3 RADIATED SPURIOUS EMISSION

7.3.1 Applicable Standard

According to FCC Part 15.225 and 15.209

7.3.2 Conformance Limit

Field Strength of Fundamental Emissions and Spectrum Mask					
Emissions	($\mu\text{V/m}$)@30m	(dB $\mu\text{V/m}$)@30m	(dB $\mu\text{V/m}$)@10m	(dB $\mu\text{V/m}$)@3m	(dB $\mu\text{V/m}$)@1m
Fundamental	15848	84.0	103.1	124.0	143.1
Quasi peak measurement of the fundamental.					

Spectrum Mask					
Freq. of Emission (MHz)	($\mu\text{V/m}$)@30m	(dB $\mu\text{V/m}$)@30m	(dB $\mu\text{V/m}$)@10m	(dB $\mu\text{V/m}$)@3m	(dB $\mu\text{V/m}$)@1m
1.705~13.110	30	29.5	48.6	69.5	88.6
13.110~13.410	106	40.5	59.6	80.5	99.6
13.410~13.553	334	50.5	69.6	90.5	109.6
13.553~13.567	15848	84.0	103.1	124.0	143.1
13.567~13.710	334	50.5	69.6	90.5	109.6
13.710~14.010	106	40.5	59.6	80.5	99.6
14.010~30.000	30	29.5	48.6	69.5	88.6

According to FCC Part15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

According to FCC Part15.205, the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table

Restricted Frequency(MHz)	Field Strength ($\mu\text{V/m}$)	Field Strength (dB $\mu\text{V/m}$)	Measurement Distance
0.009-0.490	2400/F(KHz)	48.5 - 13.8	300
0.490-1.705	24000/F(KHz)	33.8 - 23.0	30
1.705-30	30	29.5	30
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

7.3.3 Test Configuration

Test according to clause 6.2 radio frequency test setup 2

7.3.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 100 kHz for $f < 1$ GHz (30MHz to 1GHz), 200Hz for $f < 150$ KHz (9KHz to 150KHz), 9KHz for $f < 30$ MHz (150KHz to 30KHz)

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.

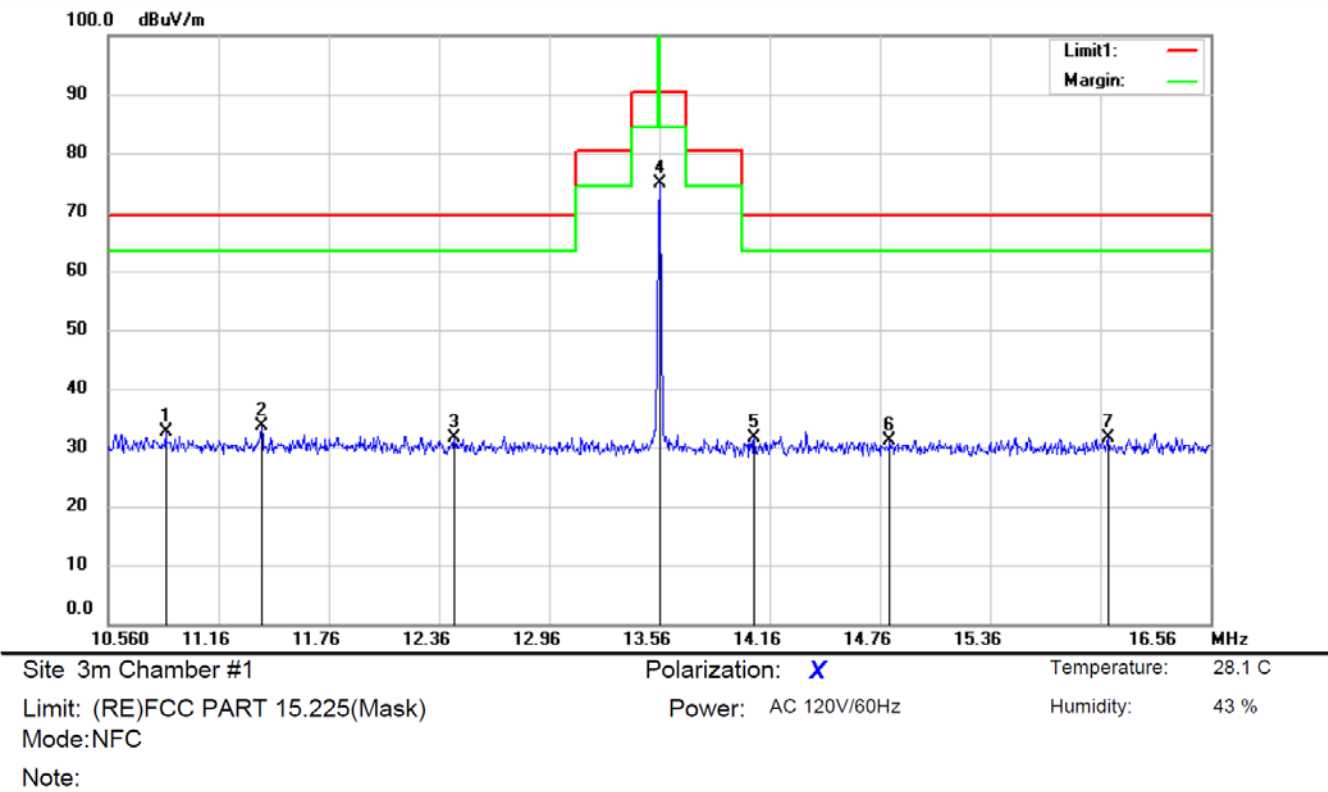
Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{dwell time}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Repeat above procedures until all frequency measured was complete.

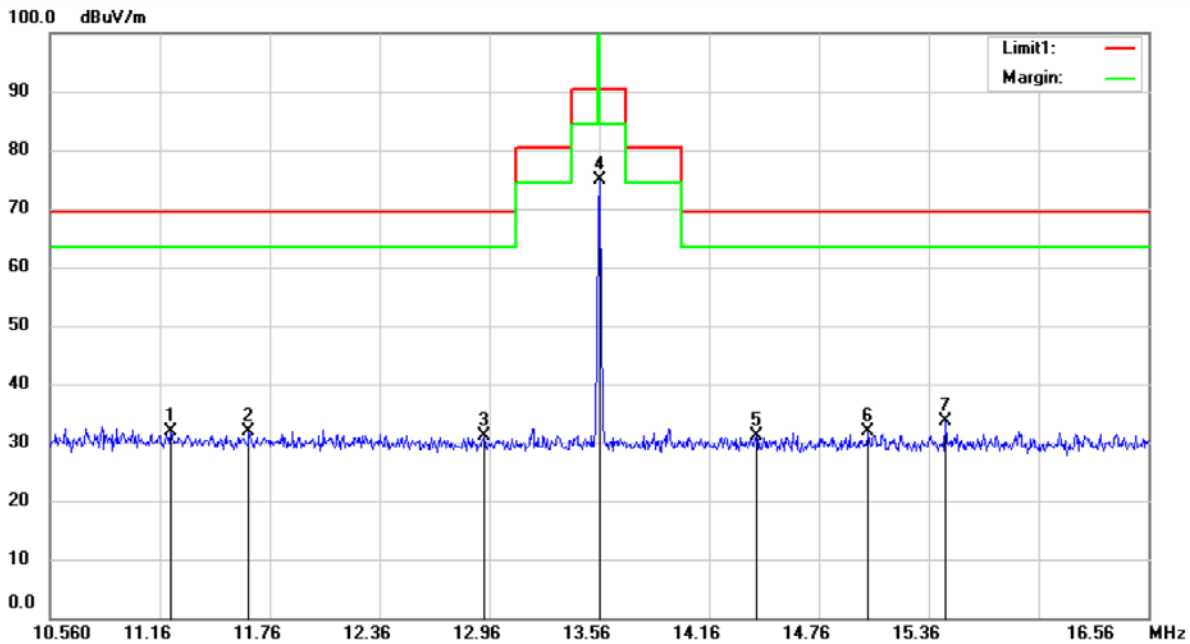
7.3.5 Test Results

pass

Field Strength of Fundamental Emissions and Spectrum Mask



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		10.8720	11.96	20.56	32.52	69.50	-36.98	peak		
2	*	11.3940	13.08	20.52	33.60	69.50	-35.90	peak		
3		12.4440	11.14	20.41	31.55	69.50	-37.95	peak		
4		13.5600	54.51	20.32	74.83	124.00	-49.17	peak		
5		14.0760	11.37	20.29	31.66	69.50	-37.84	peak		
6		14.8140	10.93	20.25	31.18	69.50	-38.32	peak		
7		16.0020	11.37	20.23	31.60	69.50	-37.90	peak		



Site 3m Chamber #1

Polarization: Y

Temperature: 28.1 C

Limit: (RE)FCC PART 15.225(Mask)

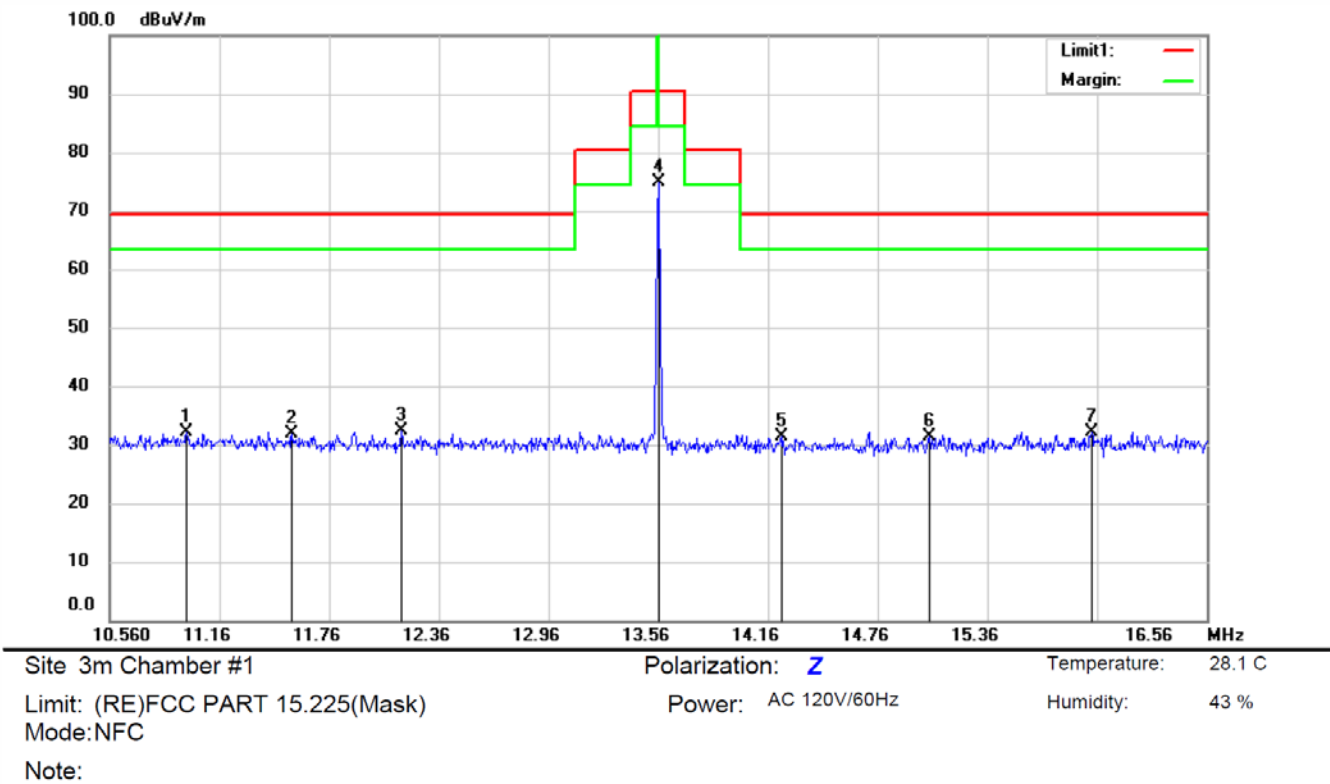
Power: AC 120V/60Hz

Humidity: 43 %

Mode:NFC

Note:

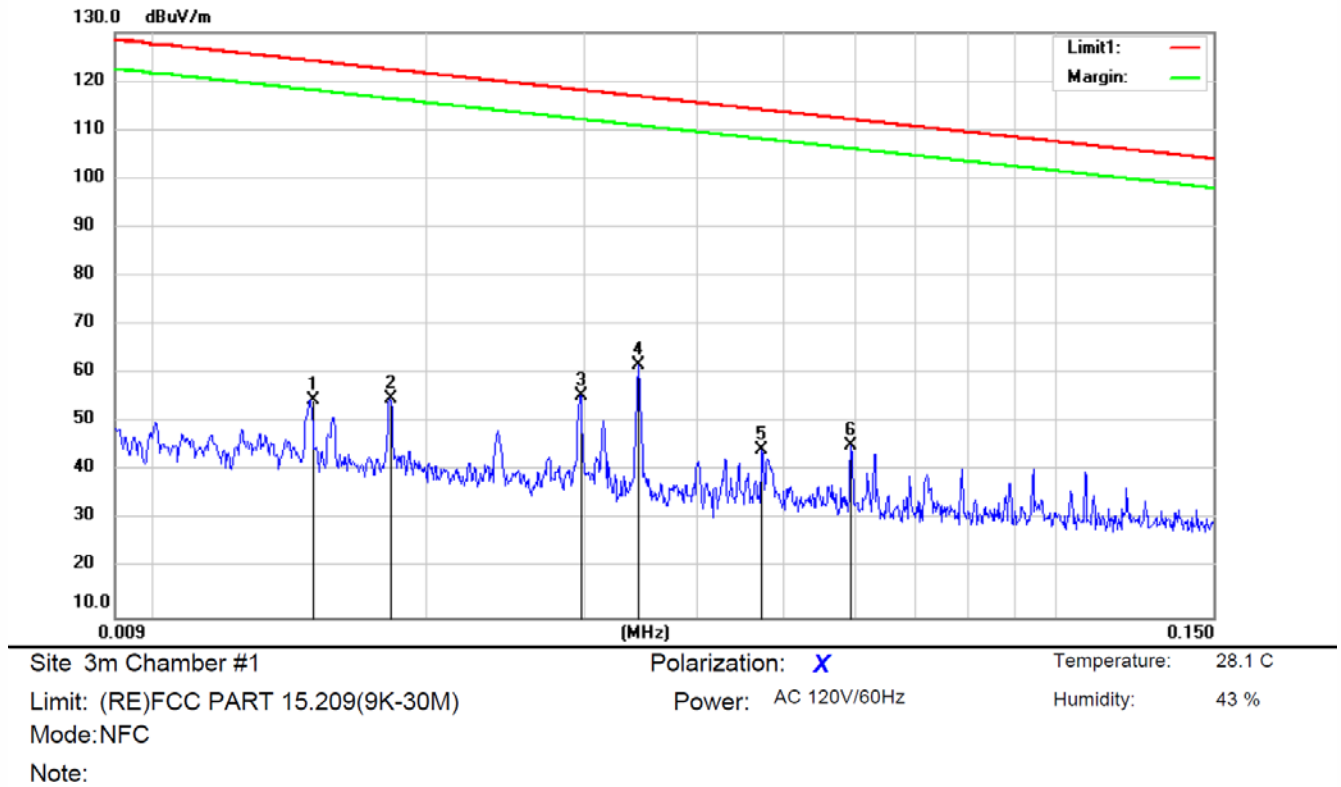
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		11.2200	11.37	20.54	31.91	69.50	-37.59	peak		
2		11.6460	11.29	20.49	31.78	69.50	-37.72	peak		
3		12.9300	10.66	20.36	31.02	69.50	-38.48	peak		
4		13.5600	54.58	20.32	74.90	124.00	-49.10	peak		
5		14.4180	10.84	20.27	31.11	69.50	-38.39	peak		
6		15.0300	11.71	20.24	31.95	69.50	-37.55	peak		
7	*	15.4500	13.27	20.24	33.51	69.50	-35.99	peak		



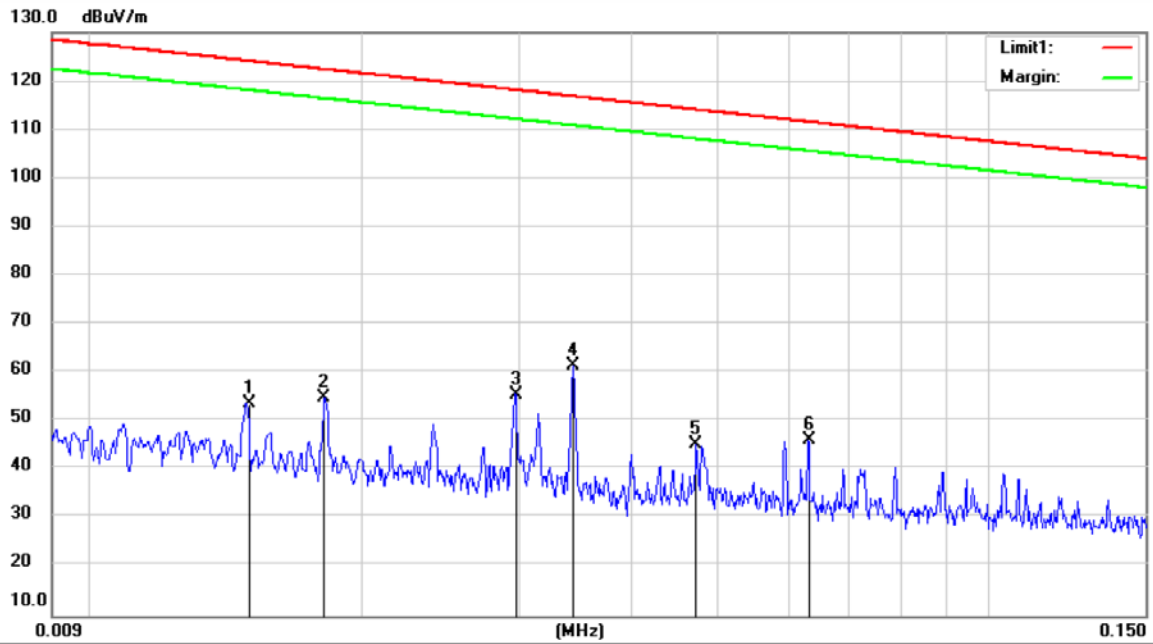
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		10.9800	11.56	20.56	32.12	69.50	-37.38	peak		
2		11.5560	11.36	20.51	31.87	69.50	-37.63	peak		
3	*	12.1560	11.88	20.44	32.32	69.50	-37.18	peak		
4		13.5600	54.57	20.32	74.89	124.00	-49.11	peak		
5		14.2320	11.10	20.29	31.39	69.50	-38.11	peak		
6		15.0420	11.12	20.24	31.36	69.50	-38.14	peak		
7		15.9300	12.02	20.23	32.25	69.50	-37.25	peak		

■ Spurious Emission below 150kHz (9KHz to 150kHz)

All mode have been tested, and the worst result was report as below:



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		0.0150	33.84	20.59	54.43	124.07	-69.64	peak		
2		0.0182	34.29	20.59	54.88	122.39	-67.51	peak		
3		0.0296	34.90	20.59	55.49	118.16	-62.67	peak		
4	*	0.0343	41.15	20.65	61.80	116.89	-55.09	peak		
5		0.0472	23.42	20.85	44.27	114.11	-69.84	peak		
6		0.0593	24.44	20.80	45.24	112.13	-66.89	peak		



Site 3m Chamber #1

Polarization: Y

Temperature: 28.1 C

Limit: (RE)FCC PART 15.209(9K-30M)

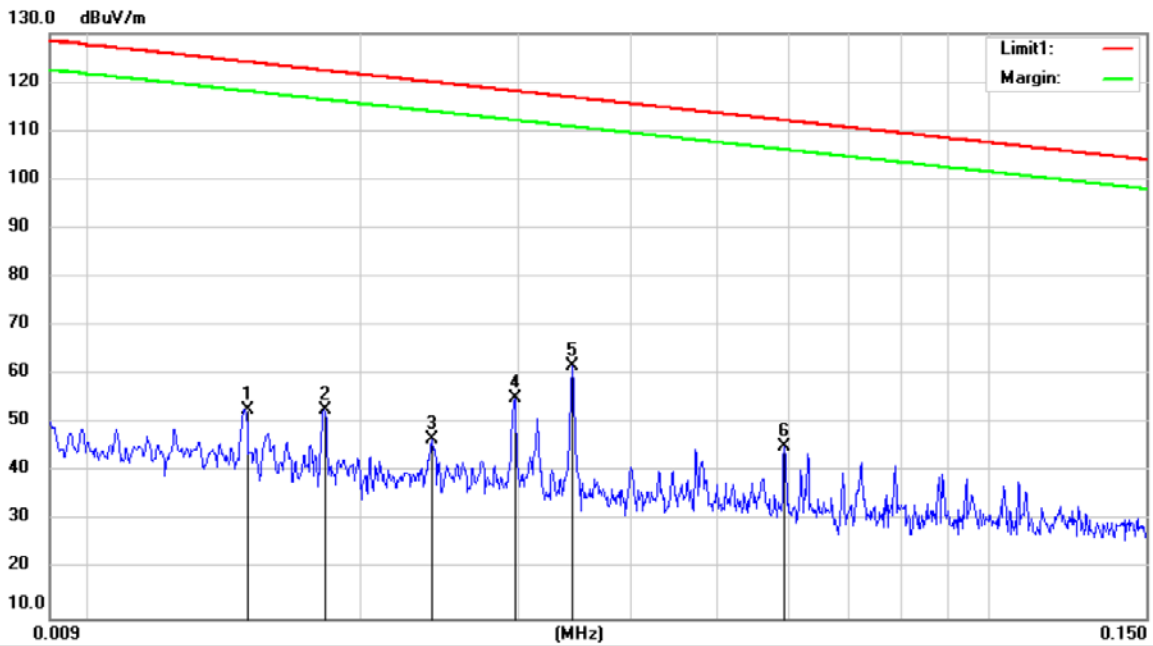
Power: AC 120V/60Hz

Humidity: 43 %

Mode:NFC

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		0.0150	33.20	20.59	53.79	124.07	-70.28	peak		
2		0.0181	34.25	20.59	54.84	122.43	-67.59	peak		
3		0.0296	35.01	20.59	55.60	118.16	-62.56	peak		
4	*	0.0343	40.82	20.65	61.47	116.89	-55.42	peak		
5		0.0472	24.34	20.85	45.19	114.11	-68.92	peak		
6		0.0630	25.29	20.76	46.05	111.61	-65.56	peak		



Site 3m Chamber #1

Polarization: Z

Temperature: 28.1 C

Limit: (RE)FCC PART 15.209(9K-30M)

Power: AC 120V/60Hz

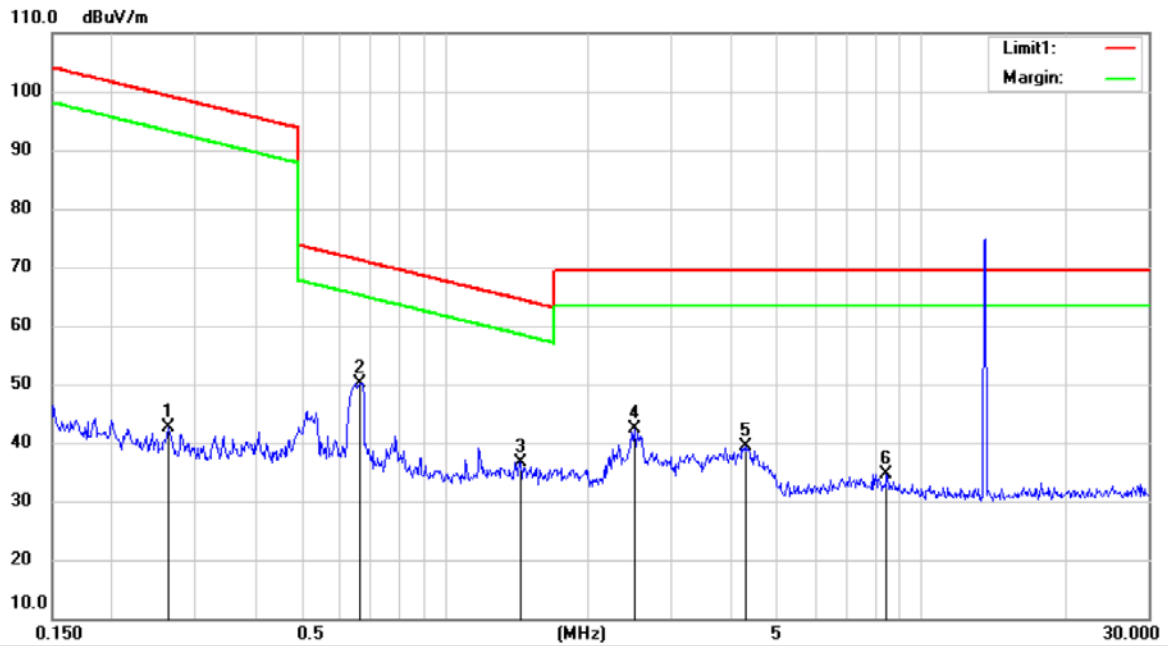
Humidity: 43 %

Mode:NFC

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		0.0150	32.28	20.59	52.87	124.07	-71.20	peak		
2		0.0182	32.16	20.59	52.75	122.39	-69.64	peak		
3		0.0240	26.06	20.59	46.65	119.99	-73.34	peak		
4		0.0297	34.43	20.59	55.02	118.14	-63.12	peak		
5	*	0.0343	41.10	20.65	61.75	116.89	-55.14	peak		
6		0.0593	24.50	20.80	45.30	112.13	-66.83	peak		

■ Spurious Emission below 30MHz (150KHz to 30MHz)
All mode have been tested, and the worst result was report as below:



Site 3m Chamber #1

Polarization: X

Temperature: 28.1 C

Limit: (RE)FCC PART 15.209(9K-30M)

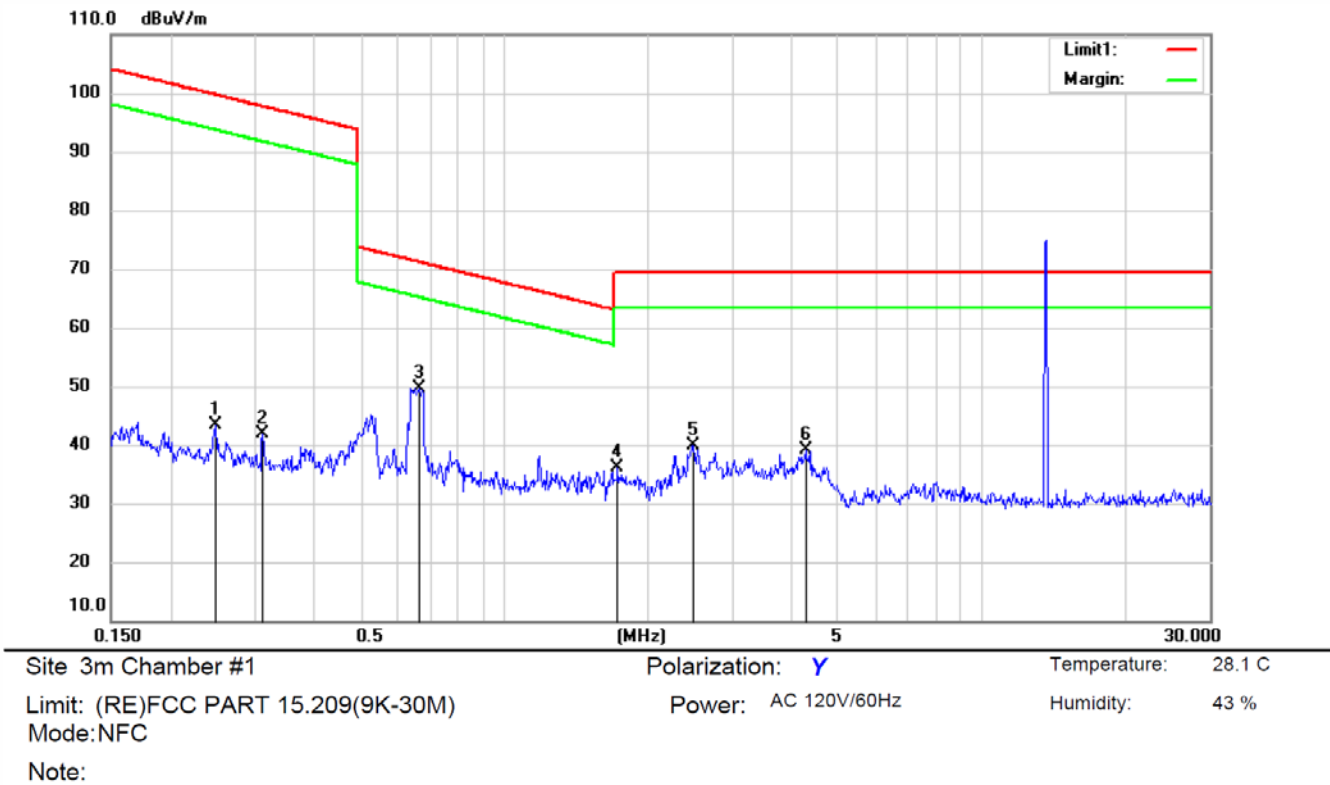
Power: AC 120V/60Hz

Humidity: 43 %

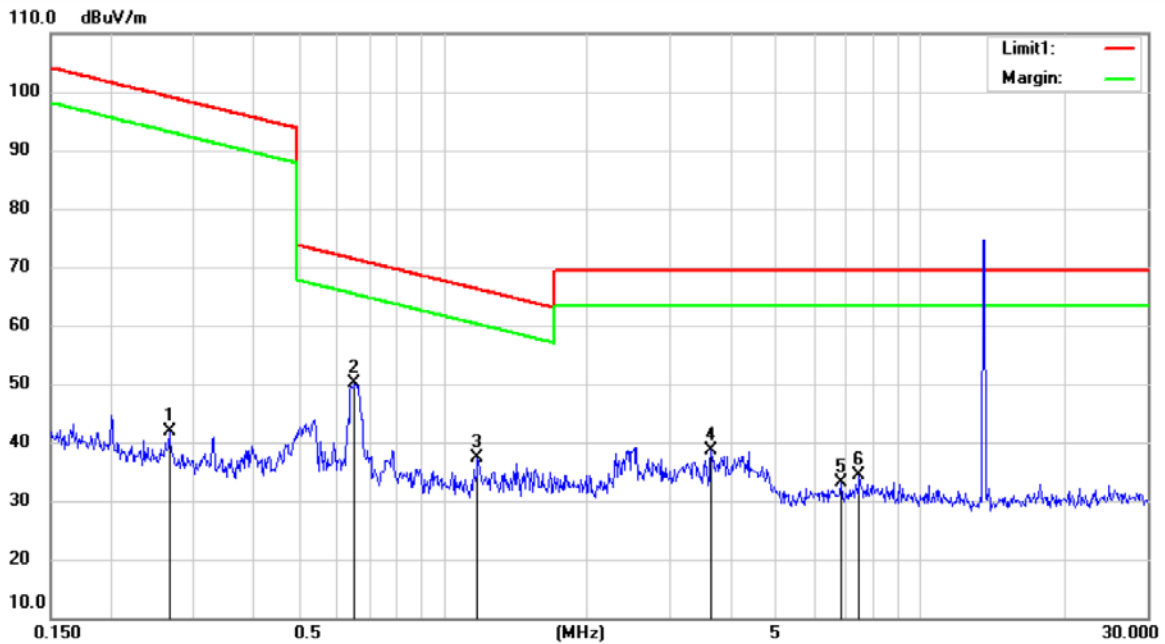
Mode:NFC

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		0.2630	22.17	20.52	42.69	99.20	-56.51	peak		
2	*	0.6648	29.16	21.00	50.16	71.16	-21.00	peak		
3		1.4410	15.67	20.92	36.59	64.46	-27.87	peak		
4		2.5000	21.68	20.72	42.40	69.50	-27.10	peak		
5		4.2918	18.82	20.59	39.41	69.50	-30.09	peak		
6		8.4561	14.11	20.55	34.66	69.50	-34.84	peak		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		0.2481	22.89	20.49	43.38	99.71	-56.33	peak		
2		0.3116	21.22	20.61	41.83	97.73	-55.90	peak		
3	*	0.6613	28.71	21.00	49.71	71.20	-21.49	peak		
4		1.7253	15.26	20.86	36.12	69.50	-33.38	peak		
5		2.4868	19.11	20.72	39.83	69.50	-29.67	peak		
6		4.2692	18.56	20.59	39.15	69.50	-30.35	peak		



Site 3m Chamber #1

Polarization: Z

Temperature: 28.1 C

Limit: (RE)FCC PART 15.209(9K-30M)

Power: AC 120V/60Hz

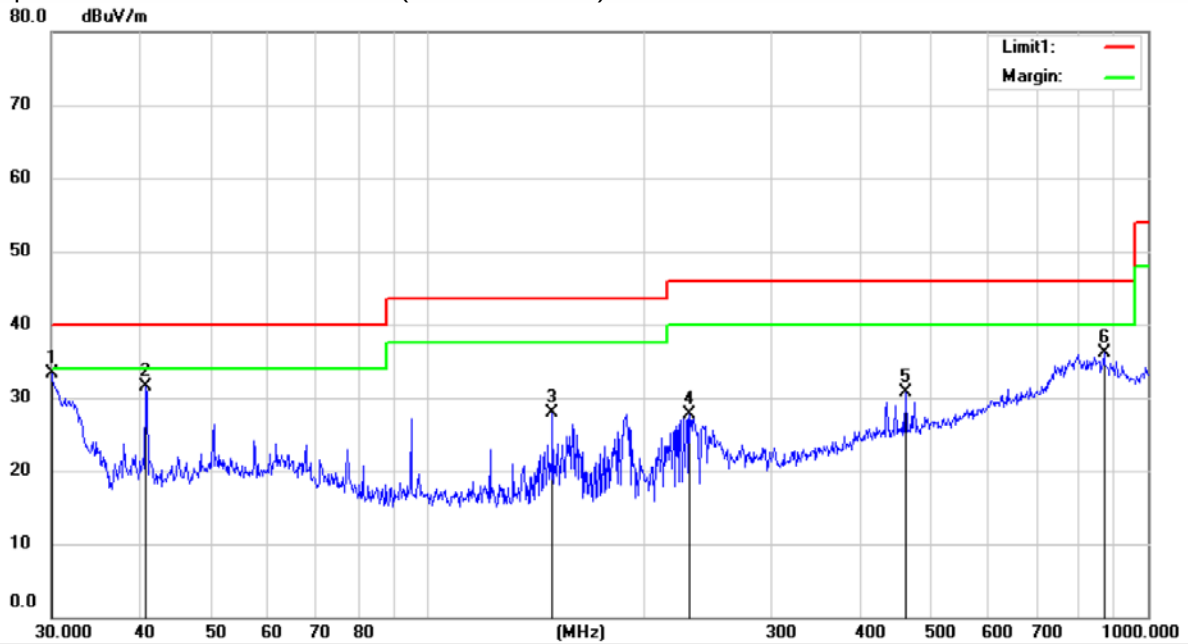
Humidity: 43 %

Mode:NFC

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		0.2658	21.26	20.52	41.78	99.11	-57.33	peak		
2	*	0.6508	29.08	21.00	50.08	71.34	-21.26	peak		
3		1.1781	16.38	20.97	37.35	66.20	-28.85	peak		
4		3.6418	17.92	20.61	38.53	69.50	-30.97	peak		
5		6.8051	12.53	20.67	33.20	69.50	-36.30	peak		
6		7.4465	13.63	20.65	34.28	69.50	-35.22	peak		

■ Spurious Emission Above 30MHz (30MHz to 1GHz)



Site 3m Chamber #1

Polarization: Vertical

Temperature: 28.1 C

Limit: (RE)FCC PART 15 CLASS B

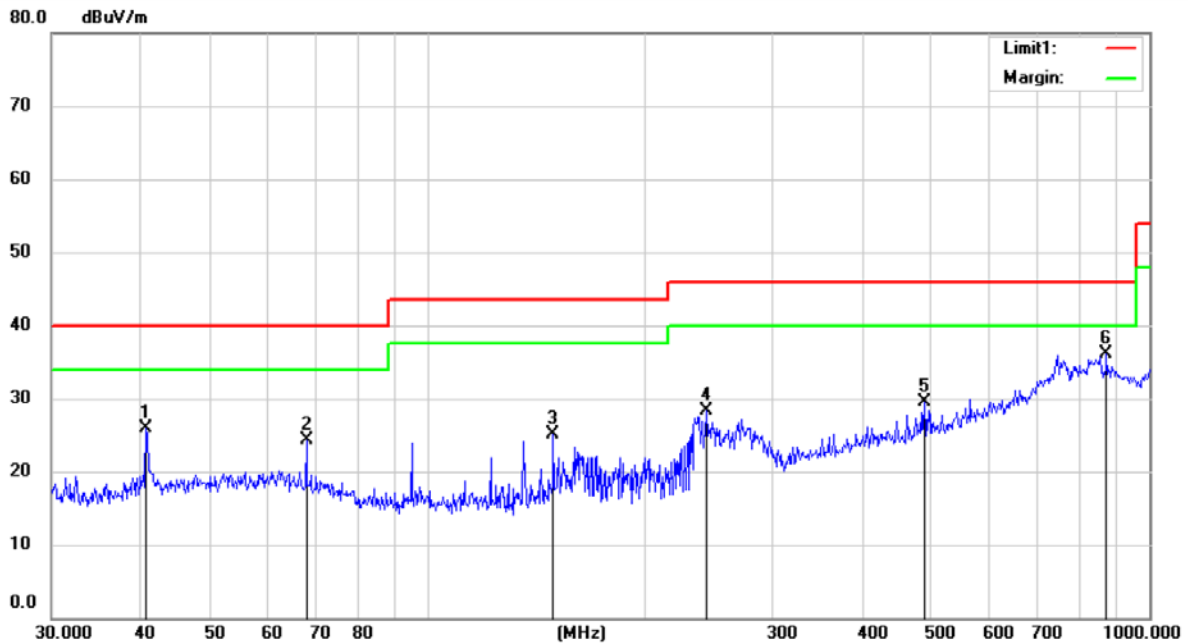
Power: AC 120V/60Hz

Humidity: 43 %

Mode:NFC

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1	*	30.0395	43.08	-9.79	33.29	40.00	-6.71	QP		
2		40.6838	39.75	-8.27	31.48	40.00	-8.52	QP		
3		149.1585	37.57	-9.73	27.84	43.50	-15.66	QP		
4		231.0080	36.29	-8.51	27.78	46.00	-18.22	QP		
5		461.1312	32.79	-2.06	30.73	46.00	-15.27	QP		
6		869.1302	29.73	6.30	36.03	46.00	-9.97	QP		



Site 3m Chamber #1

Polarization: **Horizontal**

Temperature: 28.1 C

Limit: (RE)FCC PART 15 CLASS B

Power: AC 120V/60Hz

Humidity: 43 %

Mode:NFC

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		40.6838	34.13	-8.27	25.86	40.00	-14.14	QP		
2		67.7940	32.59	-8.21	24.38	40.00	-15.62	QP		
3		149.1585	34.93	-9.73	25.20	43.50	-18.30	QP		
4		244.1251	36.09	-7.81	28.28	46.00	-17.72	QP		
5		488.1702	31.22	-1.63	29.59	46.00	-16.41	QP		
6	*	873.3310	30.05	6.07	36.12	46.00	-9.88	QP		

7.4 CONDUCTED EMISSION TEST

7.4.1 Applicable Standard

According to FCC Part 15.207(a)

7.4.2 Conformance Limit

Conducted Emission Limit		
Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50
Note: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.		

7.4.3 Test Configuration

Test according to clause 7.3 conducted emission test setup

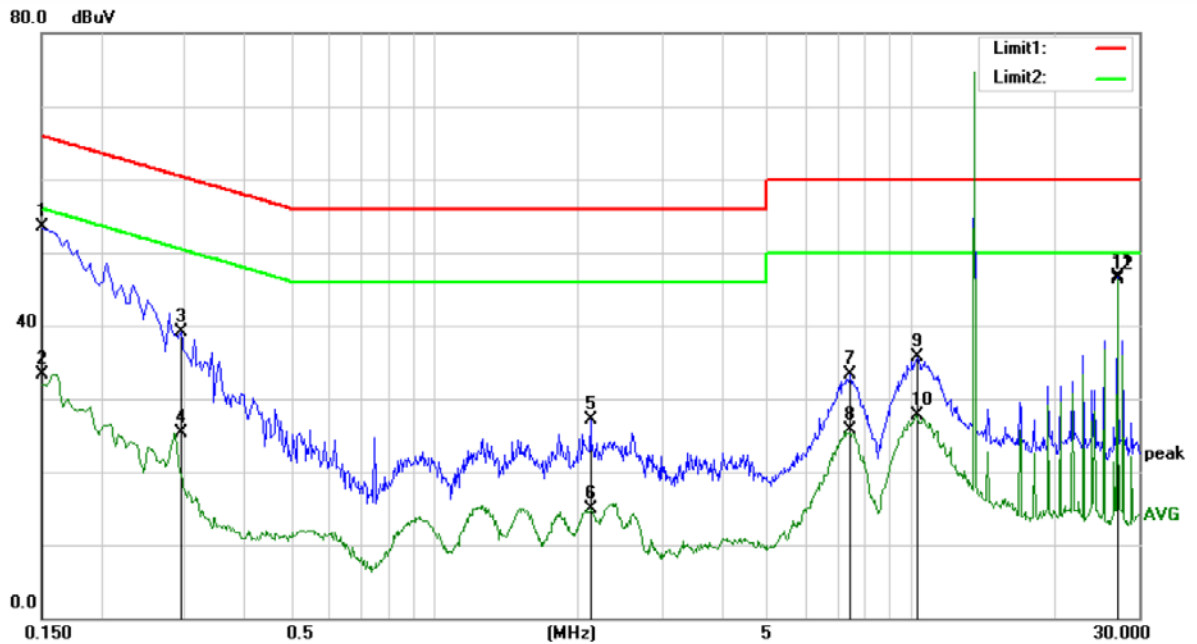
7.4.4 Test Procedure

The EUT was placed on a table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Repeat above procedures until all frequency measured were complete.

7.4.5 Test Results

Pass

The 120V & 240V voltage have been tested, and the worst result recorded was report as below:



Site Conduction #2

Phase: **N**

Temperature: 25.1

Limit: (CE)FCC PART 15 class B_QP

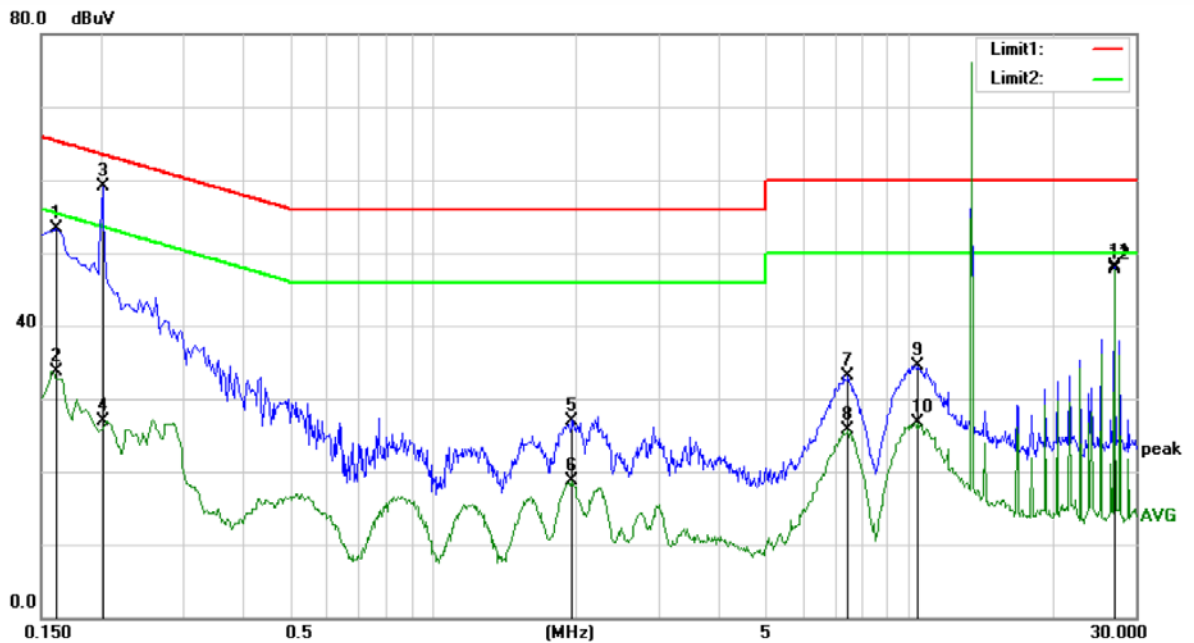
Power: AC 120V/60Hz

Humidity: 45 %

Mode: NFC mode

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	43.22	10.25	53.47	65.91	-12.44	QP	
2		0.1500	23.04	10.25	33.29	56.00	-22.71	AVG	
3		0.2940	28.94	10.18	39.12	60.37	-21.25	QP	
4		0.2940	15.12	10.18	25.30	50.41	-25.11	AVG	
5		2.1260	16.90	10.17	27.07	56.00	-28.93	QP	
6		2.1260	4.78	10.17	14.95	46.00	-31.05	AVG	
7		7.4500	23.00	10.38	33.38	60.00	-26.62	QP	
8		7.4500	15.27	10.38	25.65	50.00	-24.35	AVG	
9		10.3300	25.23	10.44	35.67	60.00	-24.33	QP	
10		10.3300	17.33	10.44	27.77	50.00	-22.23	AVG	
11		27.1220	35.98	10.72	46.70	60.00	-13.30	QP	
12	*	27.1220	35.53	10.72	46.25	50.00	-3.75	AVG	



Site Conduction #2

Phase: **L1**

Temperature: 25.1

Limit: (CE)FCC PART 15 class B_QP

Power: AC 120V/60Hz

Humidity: 45 %

Mode: NFC mode

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1620	43.00	10.27	53.27	65.28	-12.01	QP	
2		0.1620	23.42	10.27	33.69	55.36	-21.67	AVG	
3		0.2020	48.80	10.36	59.16	63.46	-4.30	QP	
4		0.2020	16.51	10.36	26.87	53.53	-26.66	AVG	
5		1.9620	16.84	10.16	27.00	56.00	-29.00	QP	
6		1.9620	8.61	10.16	18.77	46.00	-27.23	AVG	
7		7.4700	22.82	10.38	33.20	60.00	-26.80	QP	
8		7.4700	15.30	10.38	25.68	50.00	-24.32	AVG	
9		10.4860	24.14	10.44	34.58	60.00	-25.42	QP	
10		10.4860	16.31	10.44	26.75	50.00	-23.25	AVG	
11		27.1220	37.45	10.72	48.17	60.00	-11.83	QP	
12	*	27.1220	36.98	10.72	47.70	50.00	-2.30	AVG	

8 ANTENNA APPLICATION

8.1.1 Antenna Requirement

Standard	Requirement
FCC CRF Part 15.203	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 shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR Section 15.203, 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. if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

8.2 RESULT

The EUT'S antenna is coil antenna, The antenna's gain: Refer to manufacturer user manual/operating manual and meets the requirement. and the antenna can't be replaced by the user, which in accordance to section 15.203.

--- End of Report ---