

FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

For

LED Strip, ColorStrip

MODEL No.: FT121-A, ZW121-A

FCC ID: XBAFT121

Trade Mark: N/A

REPORT NO.: ES160630047E

ISSUE DATE: August 06, 2016

Prepared for

Aeon Labs LLC.

121 Buckingham Drive Unit 36, Santa Claras, CA, United States

Prepared by

EMTEK (SHENZHEN) CO., LTD.

Bldg 69, Majialong Industry Zone, Nanshan District,
Shenzhen, Guangdong, China

TEL: 86-755-26954280

FAX: 86-755-26954282

TABLE OF CONTENTS

1	TEST RESULT CERTIFICATION	3
2	EUT TECHNICAL DESCRIPTION	4
3	SUMMARY OF TEST RESULT	5
4	TEST METHODOLOGY	6
4.1	GENERAL DESCRIPTION OF APPLIED STANDARDS	6
4.2	MEASUREMENT EQUIPMENT USED	6
4.3	DESCRIPTION OF TEST MODES	7
5	FACILITIES AND ACCREDITATIONS	8
5.1	FACILITIES	8
5.2	LABORATORY ACCREDITATIONS AND LISTINGS	8
6	TEST SYSTEM UNCERTAINTY	9
7	SETUP OF EQUIPMENT UNDER TEST	10
7.1	RADIO FREQUENCY TEST SETUP 1	10
7.2	RADIO FREQUENCY TEST SETUP 2	10
7.3	CONDUCTED EMISSION TEST SETUP	12
7.4	BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM	13
7.5	SUPPORT EQUIPMENT	13
8	TEST REQUIREMENTS	14
8.1	BANDWIDTH TEST	14
8.2	PERIODIC OPERATION	16
8.3	RADIATED SPURIOUS EMISSION	18
8.4	CONDUCTED EMISSIONS TEST	29
8.5	ANTENNA APPLICATION	32
9	PHOTOS OF TEST SETUP	33
10	PHOTOS OF THE EUT	36

1 TEST RESULT CERTIFICATION

Applicant: Aeon Labs LLC.
121 Buckingham Drive Unit 36, Santa Claras, CA, United States

Manufacturer: Fantem Technologies(Shenzhen) Co.,Ltd
North, 3/F, Yitao Technology Industrial Park, Baihua Yuan Rd, The Second Industrial
Area, Guangming Sub-district Office, Guangming New District, Shenzhen,
Guangdong, China

EUT Description: LED Strip, ColorStrip

Model Number: FT121-A, ZW121-A

File Number: ES160630047E

Date of Test: July 08, 2016 to August 06, 2016

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 15.249

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

Date of Test : July 08, 2016 to August 06, 2016

Prepared by : 
Joe Xia/Editor

Reviewer : 
Yaping Shen/Supervisor

Approve & Authorized Signer : 
Lisa Wang/Manager

2 EUT TECHNICAL DESCRIPTION

Characteristics	Description
Device Type	Z-WAVE
Modulation:	FSK
Operating Frequency Range(s):	908.40, 908.42MHz
Number of Channels:	2 channels
Channel space:	20KHz
Antenna Type :	Wire antenna(Internal Antenna)
Antenna Gain:	0 dBi
Power supply:	☒ DC supply: DC24V from adapter
	☒ Adapter supply: Model: FY2403000 Input: 100-240~, 50/60Hz Output: 24VDC, 3A

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

3 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
15.207	Conducted Emission	Pass	
15.205 15.209 15.249	Radiated Emission	Pass	
15.249 15.209	Band edge test	Pass	
15.249	20dB Bandwidth	Pass	
15.35(c)	Periodic Operation	Pass	
15.203	Antenna Requirement	Pass	
NOTE1: N/A (Not Applicable) NOTE2: The report use radiated measurements in the restricted frequency bands. In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.			

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: XBAFT121 filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

The system is compliance with Subpart B is authorized under a DOC procedure

4 TEST METHODOLOGY

4.1 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

4.2 MEASUREMENT EQUIPMENT USED

4.2.1 Conducted Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	May 29, 2016
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	May 28, 2016
50Ω Coaxial Switch	Anritsu	MP59B	M20531	May 29, 2016
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	May 28, 2016
Voltage Probe	Rohde & Schwarz	TK9416	May 28, 2016	05/16/2015
I.S.N	Teseq GmbH	ISN T800	30327	May 29, 2016

4.2.2 Radiated Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 29, 2016
Pre-Amplifier	HP	8447D	2944A07999	May 28, 2016
Pre-Amplifier	A.H.	PAM-0126	1415261	May 28, 2016
Bilog Antenna	Schwarzbeck	VULB9163	142	May 28, 2016
Loop Antenna	Schwarzbeck	FMZB 1519	1519-012	May 28, 2016
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	May 29, 2016
Horn Antenna	Schwarzbeck	BBHA 9120	D1177	May 28, 2016
Cable	Schwarzbeck	AK9513	ACRX1	May 29, 2016
Cable	Rosenberger	N/A	FP2RX2	May 29, 2016
Cable	Schwarzbeck	AK9513	CRPX1	May 29, 2016
Cable	Schwarzbeck	AK9513	CRRX2	May 29, 2016
Cable	H+B	0.5M SF104-26.5	289147/4	May 29, 2016
Cable	H+B	3M SF104-26.5	295838/4	May 29, 2016
Cable	H+B	6M SF104-26.5	295840/4	May 29, 2016

4.2.3 Radio Frequency Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.
Spectrum Analyzer	Agilent	E4407B	88156318	May 29, 2016
Signal Analyzer	Agilent	N9010A	My53470879	May 29, 2016
Power meter	Anritsu	ML2495A	0824006	May 29, 2016
Power sensor	Anritsu	MA2411B	0738172	May 29, 2016

Remark: Each piece of equipment is scheduled for calibration once a year.

4.3 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.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those modulation FSK were used for all test.

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

☒ Frequency and Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	908.40	2	908.42		

☒ Test Frequency and Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
2	908.42MHz				

5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

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

Bldg 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.

5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab.

: Accredited by CNAS, 2013.10.29

The certificate is valid until 2016.10.28

The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005)

The Certificate Registration Number is L2291.

Accredited by TUV Rheinland Shenzhen 2015.4

The Laboratory has been assessed according to the requirements ISO/IEC 17025.

Accredited by FCC, April 17, 2013

The Certificate Registration Number is 709623.

Accredited by FCC, July 06, 2016

The Certificate Registration Number is 406365.

Accredited by Industry Canada, November 29, 2012

The Certificate Registration Number is 4480A.

Name of Firm

: EMTEK (SHENZHEN) CO., LTD..

Site Location

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

6 TEST SYSTEM UNCERTAINTY

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

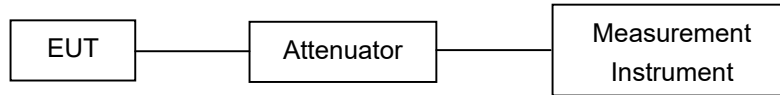
Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0\text{dB}$
Conducted Emissions Test	$\pm 2.0\text{dB}$
Radiated Emission Test	$\pm 2.0\text{dB}$
Power Density	$\pm 2.0\text{dB}$
Occupied Bandwidth Test	$\pm 1.0\text{dB}$
Band Edge Test	$\pm 3\text{dB}$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

Measurement Uncertainty for a level of Confidence of 95%

7 SETUP OF EQUIPMENT UNDER TEST

7.1 RADIO FREQUENCY TEST SETUP 1

The Z-WAVE 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/itself to emit the specified signals for the purpose of measurements.



7.2 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:

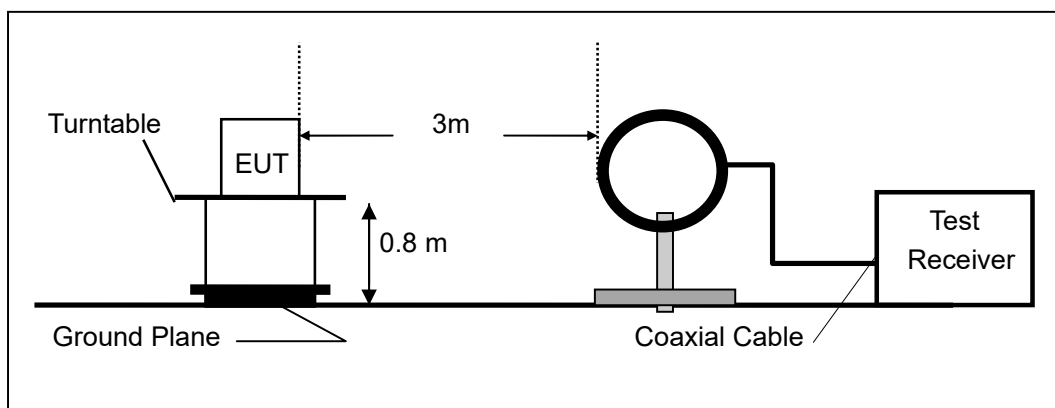
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is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

Above 1GHz:

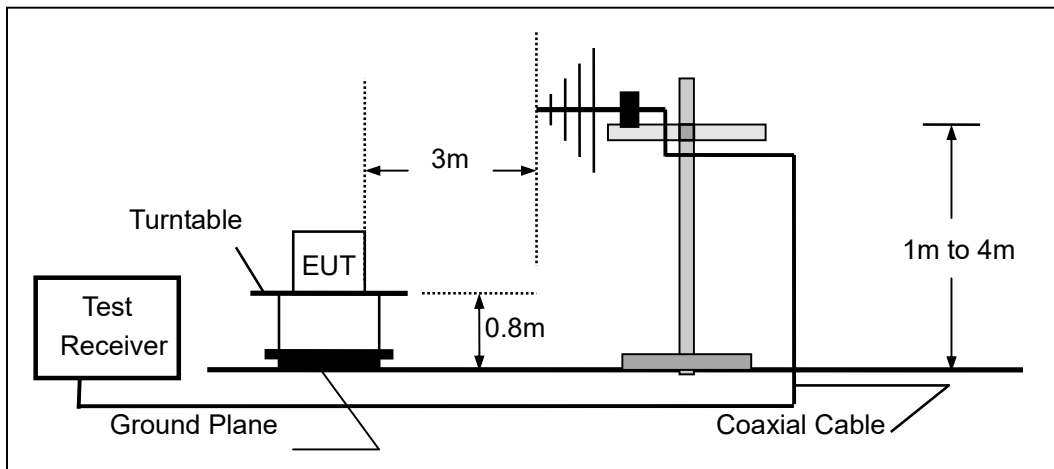
(Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.)

The EUT is placed on a turntable 1.5 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).

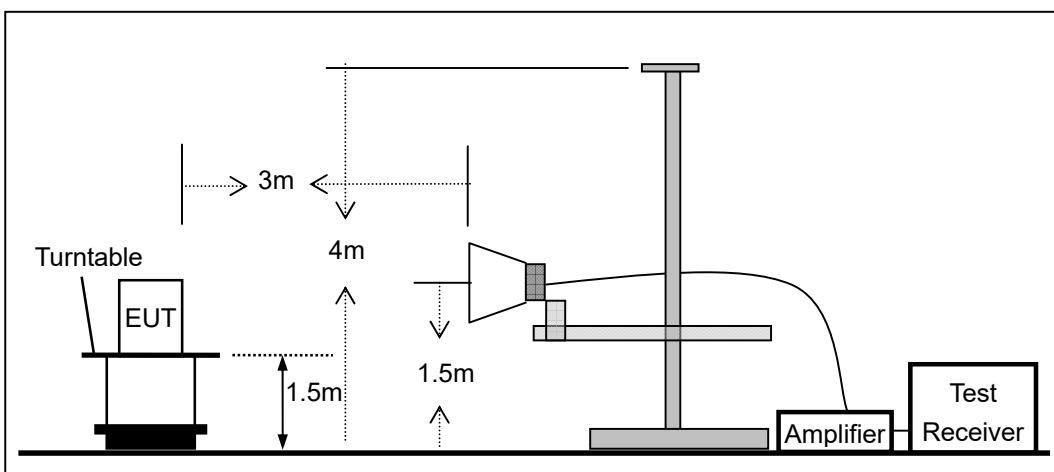
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

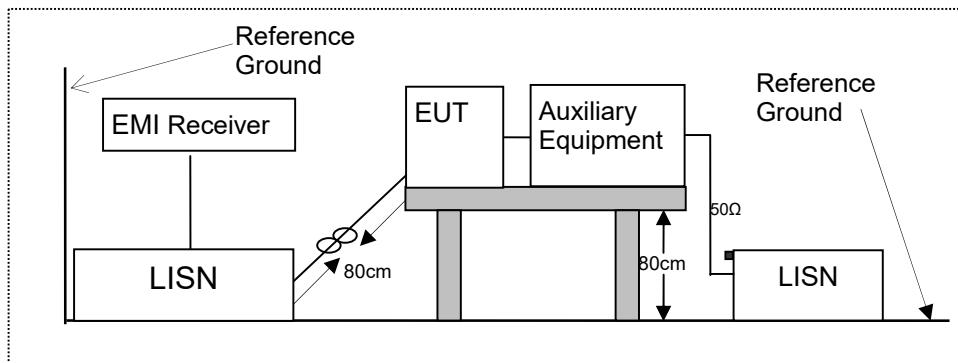


7.3 CONDUCTED EMISSION TEST SETUP

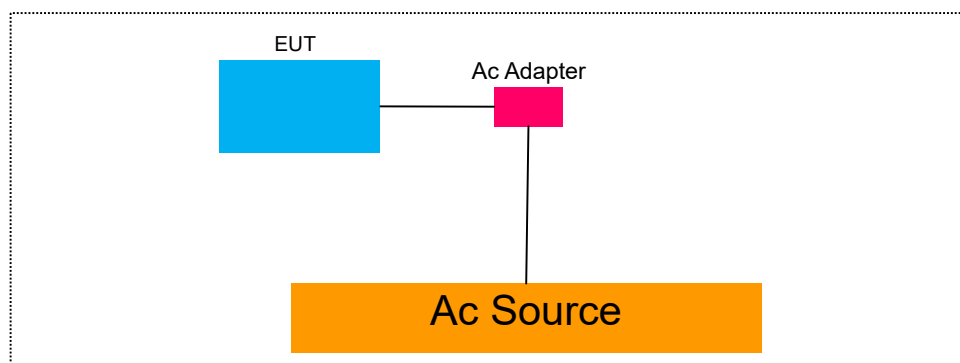
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All 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 0.8 m.

According to the requirements in Section 13.1.4.1 of 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.



7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



7.5 SUPPORT EQUIPMENT

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
N/A	N/A	N/A	N/A	N/A	N/A	N/A

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.

8 TEST REQUIREMENTS

8.1 BANDWIDTH TEST

8.1.1 Applicable Standard

According to FCC Part 15.249

8.1.2 Conformance Limit

N/A

8.1.3 Test Configuration

Test according to clause 7.1 radio frequency test setup

8.1.4 Test Procedure

The EUT was operating in 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% to 5% of the anticipated emission bandwidth

Set the video bandwidth (VBW) = $3 \times \text{RBW}$

Set Span=2 times OBW

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

Allow the trace to stabilize.

X dB Bandwidth: 20 dB

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

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

Set RBW = 1% to 5% of the occupied bandwidth

Set the video bandwidth (VBW) = $3 \times \text{RBW}$

Set Span=2 times OBW

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

Allow the trace to stabilize.

Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used.

Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

Use the 99 % power bandwidth function of the instrument.

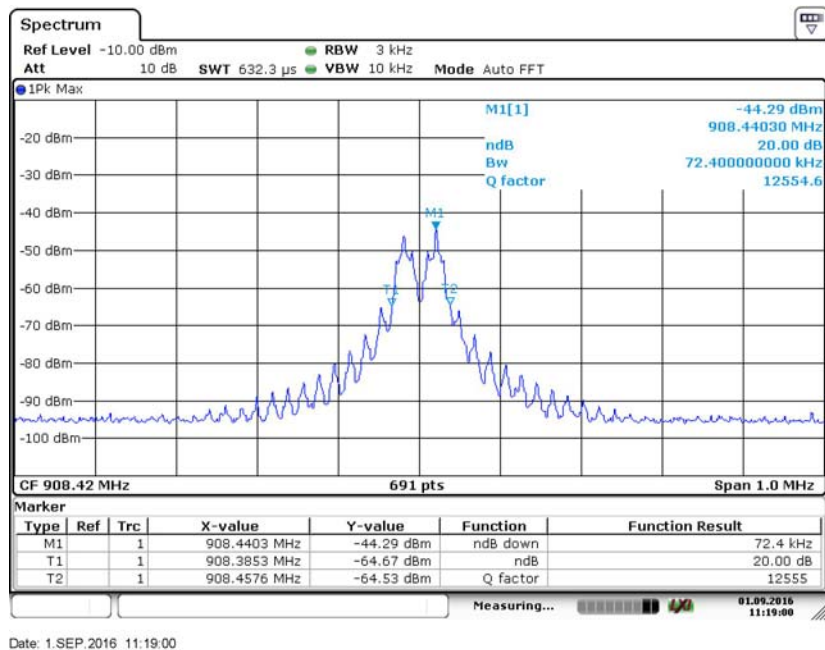
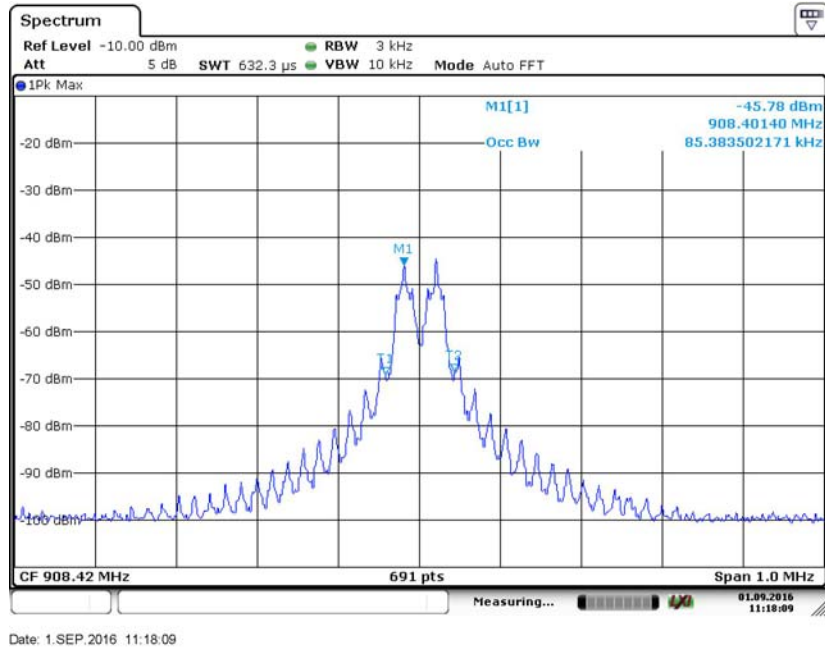
Measure and record the results in the test report.

8.1.5 Test Results

Temperature :	28°C	Test Date :	July 31, 2016
Humidity :	65 %	Test By:	King Kong

Operation Mode	Channel Number	Channel Frequency (MHz)	Emission Bandwidth (KHz)	Occupied Bandwidth(KHz)	Limit (kHz)
FSK	2	908.42	72.4	85.38	N/A

Test Model	Bandwidth Test FSK 908.42MHz
------------	------------------------------------



8.2 PERIODIC OPERATION

8.2.1 Applicable Standard

According to FCC Part 15.35C

8.2.2 Conformance Limit

N/A

8.2.3 Test Configuration

Test according to clause 7.1 radio frequency test setup

8.2.4 Test Procedure

The EUT was operating in 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 = 1MHz

Set the video bandwidth (VBW) = 3MHz

Set Span=0MHz

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = 100ms.

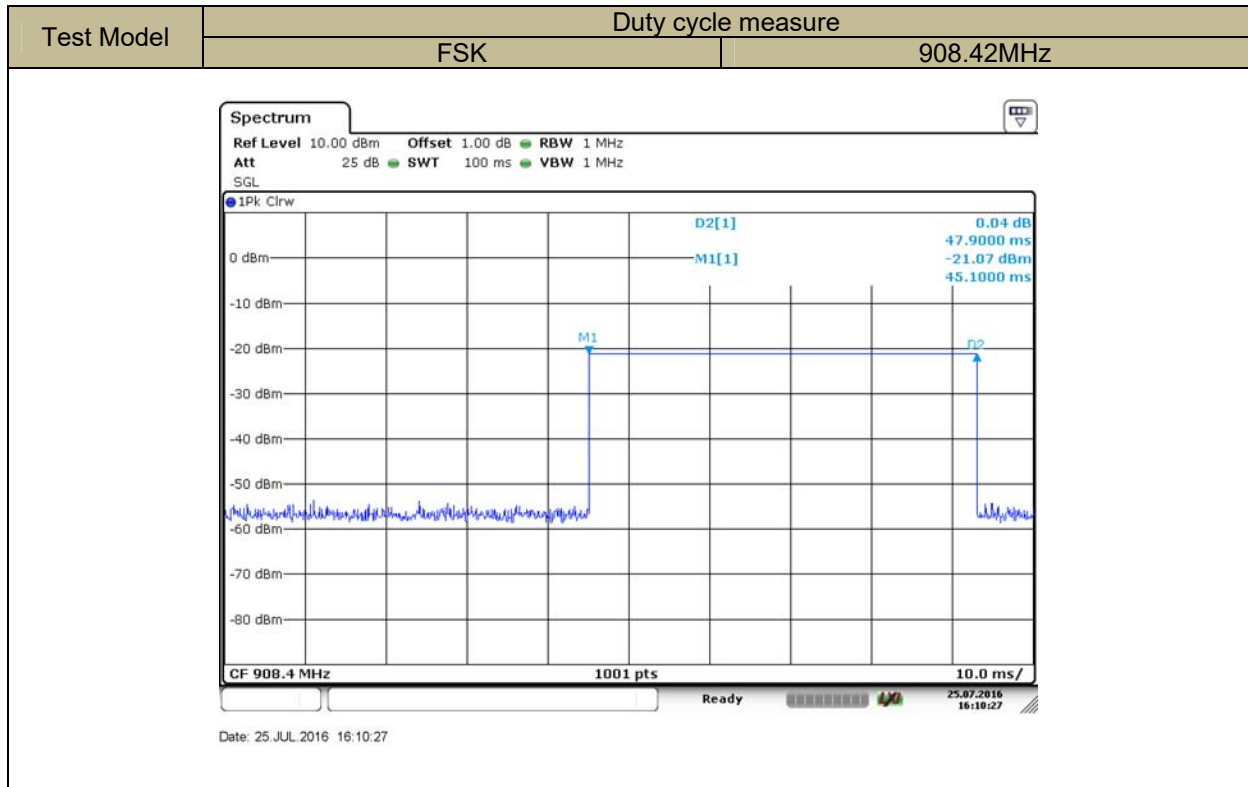
Allow the trace to stabilize.

Measure and record the results in the test report.

8.2.5 Test Results

Temperature :	28°C	Test Date :	July 31, 2016
Humidity :	65 %	Test By:	King Kong
Total transmission time(ms)		100.00	
Length of a complete transmission period(ms)		47.9	
Duty Cycle(%)		47.9	
Duty Cycle Correction Factor(dB)		-6.39	

Note: Duty Cycle(%)=Total On interval in a complete pulse train/ Length of a complete pulse train * %
Duty Cycle Correction Factor(dB)=20 * Log₁₀(Duty Cycle(%))



8.3 RADIATED SPURIOUS EMISSION

8.3.1 Applicable Standard

According to FCC Part 15.249, 15.209 and 15.205.

8.3.2 Conformance Limit

According to FCC Part 15.249: radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

According to FCC Part 15.205, 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 Part 15.205, 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 (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009-0.490	2400/F(KHz)	20 log (uV/m)	300
0.490-1.705	2400/F(KHz)	20 log (uV/m)	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Remark :1. Emission level in dBuV/m=20 log (uV/m)

2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

3. Distance extrapolation factor =40log(Specific distance/ test distance)(dB);

Limit line=Specific limits(dBuV) + distance extrapolation factor.

for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where RBWCF [dB] =10*Ig(100 [kHz]/narrower RBW [kHz]). , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

Field strength of fundamental and Field strength of harmonics Limit:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50(94 dBV/m)	500(54 dBV/m)
2400-2483.5 MHz	50(94 dBV/m)	500(54 dBV/m)
5725-5875 MHz	50(94 dBV/m)	500(54 dBV/m)
24.0-24.25 GHz	250(108 dBV/m)	2500(68 dBV/m)

8.3.3 Test Configuration

Test according to clause 7.2 radio frequency test setup

8.3.4 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:

For Above 1GHz:

The EUT was placed on a turn table which is 1.5m 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 = 1 MHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

For Below 1GHz:

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

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

For Below 30MHz:

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 = 9kHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

For Below 150KHz:

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 = 200Hz

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.

8.3.5 Test Results

■ Spurious Emission below 30MHz (9KHz to 150KHz)

Temperature:	24°C	Test Date:	July 31, 2016
Humidity:	53 %	Test By:	King Kong
Test mode:	TX Mode		

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)	Result
--	--	--	--	--	--
Note: (1)Emission Level= Reading Level+Probe Factor +Cable Loss. (2) Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.					

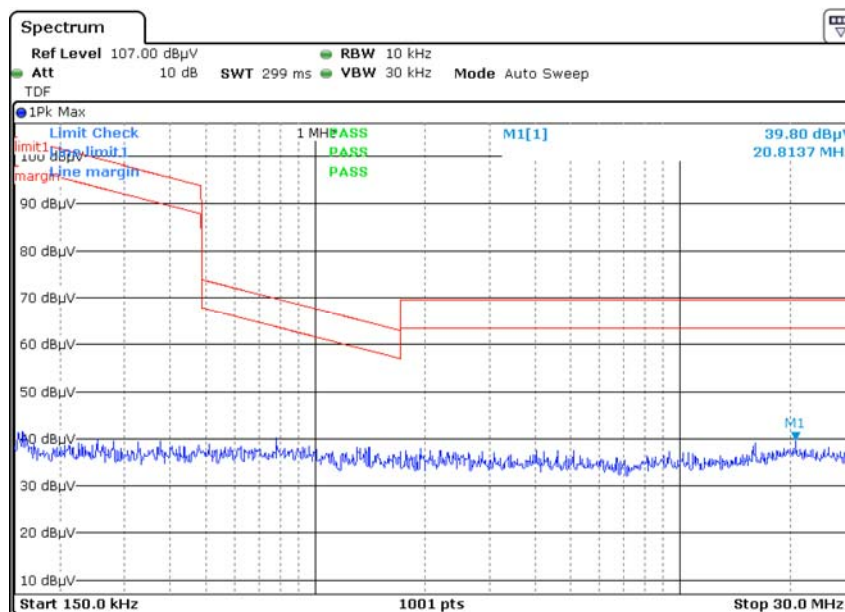
Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor = $40\log(\text{Specific distance}/ \text{test distance})$ (dB);

Limit line=Specific limits(dBuV) + distance extrapolation factor

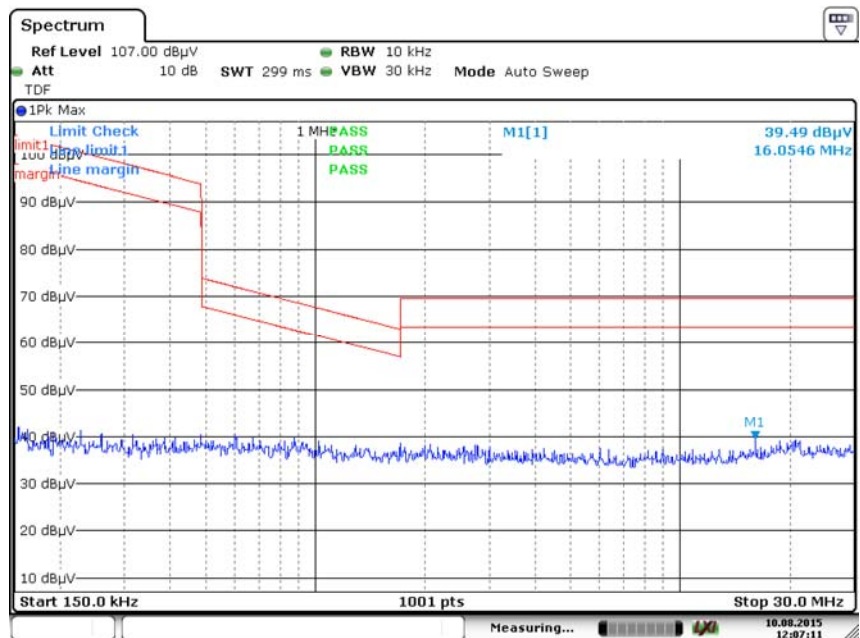
■ Spurious Emission below 30MHz (150KHz to 30MHz)

Test Model	Spurious Emission below 30MHz (150KHz to 30MHz)		
	TX Mode		Polarity: H
	Temperature: 24 °C		Test By: King Kong
	Humidity: 53 %		Test Date: July 31, 2016



Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBμV/m)	Limi 3m (dBμV/m)	Over (dB)	Result
--	--	--	--	--	Pass
--	--	--	--	--	Pass
--	--	--	--	--	Pass
--	--	--	--	--	Pass
--	--	--	--	--	Pass
--	--	--	--	--	Pass
Note: (1)Emission Level= Reading Level+Probe Factor +Cable Loss. (2) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.					

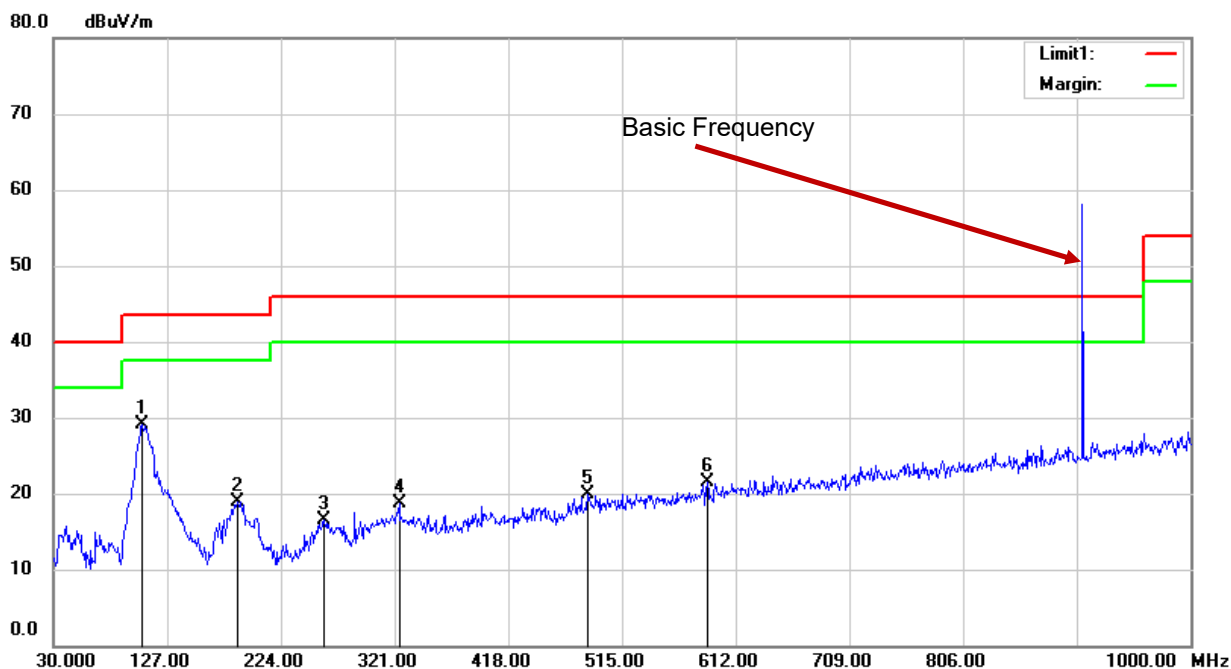
Test Model	Spurious Emission below 30MHz (150KHz to 30MHz)		
	TX Mode		Polarity: V
	Temperature: 24 °C		Test By: King Kong
	Humidity: 53 %		Test Date: July 31, 2016



Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)	Result
--	--	--	--	--	Pass
--	--	--	--	--	Pass
--	--	--	--	--	Pass
--	--	--	--	--	Pass
--	--	--	--	--	Pass
--	--	--	--	--	Pass
Note: (1)Emission Level= Reading Level+Probe Factor +Cable Loss. (2) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.					

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

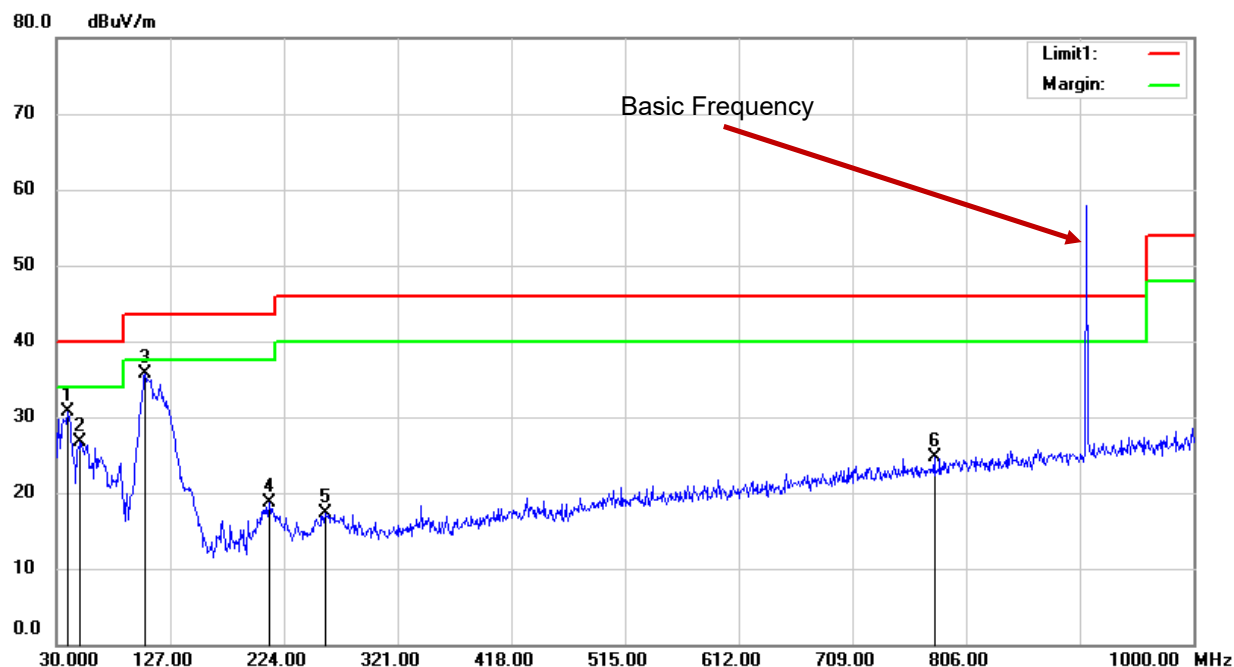
Spurious Emission below 1GHz (30MHz to 1GHz)		
Test Model	FSK	Polarity: H
	908.42MHz	Test By: King Kong
	Temperature: 24℃	Test Date: July 31, 2016
	Humidity: 53 %	



Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)	Limit 3m(dBuV/m)	Over(dB)
105.66	H	29.09	43.50	-14.41
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--

Note: (1) AV Value= Peak Value+AV factor
(2)Emission Level= Reading Level+Probe Factor +Cable Loss.
(3) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Spurious Emission below 1GHz (30MHz to 1GHz)		
Test Model	FSK	Polarity: V
	908.42MHz	Test By: King Kong
	Temperature: 24°C	Test Date: July 31, 2016
	Humidity: 53 %	



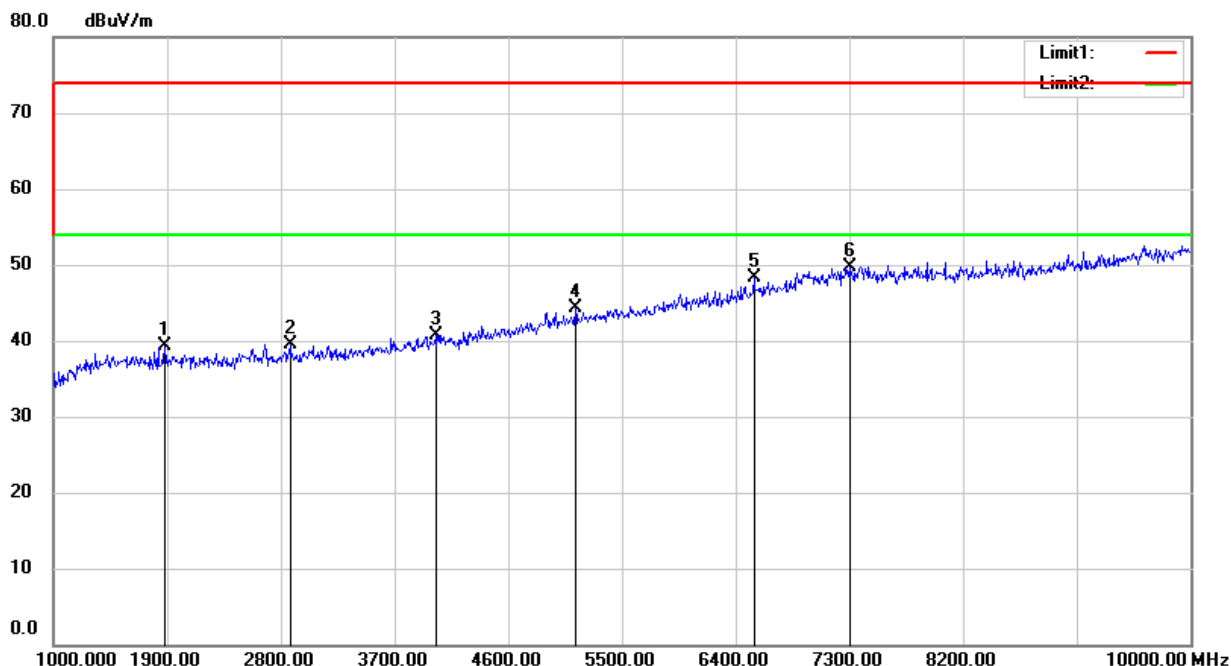
Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)	Limit 3m(dBuV/m)	Over(dB)
39.7000	V	30.70	40.00	-9.30
50.3700	V	26.65	40.00	-13.35
105.66	V	35.66	43.50	-7.84
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--

Note:

- (1) AV Value= Peak Value+AV factor
- (2)Emission Level= Reading Level+Probe Factor +Cable Loss.
- (3) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

■ Spurious Emission Above 1GHz (1GHz to 10GHz)

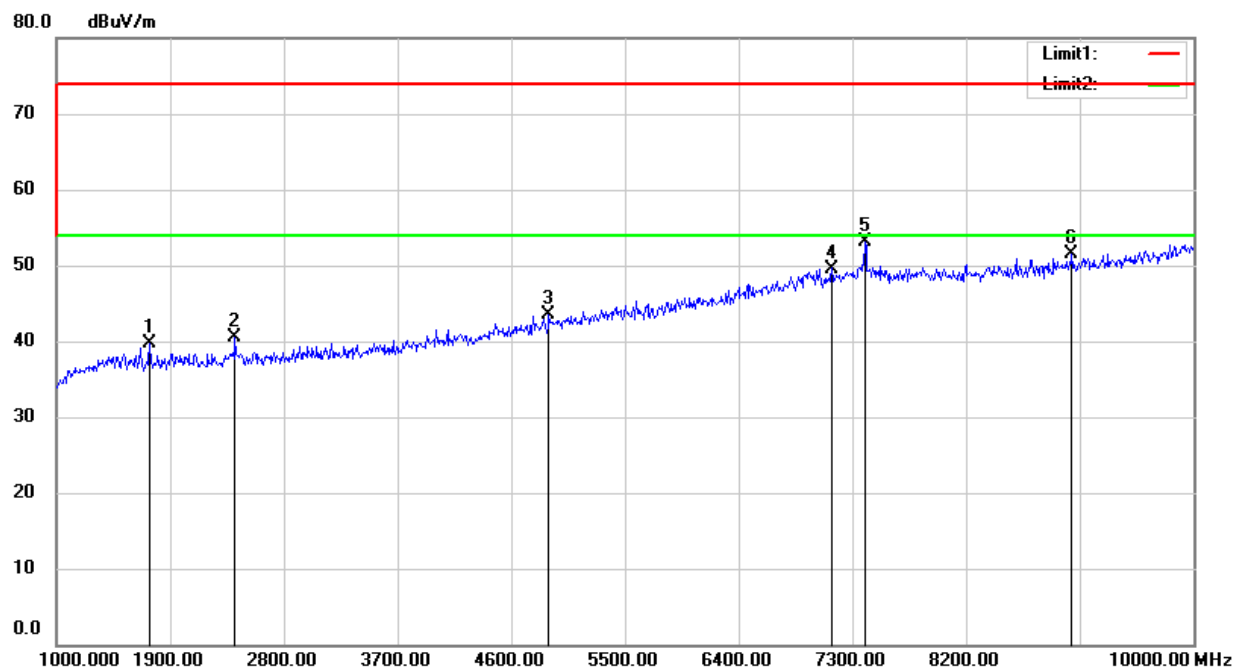
Spurious Emission Above 1GHz (1GHz to 10GHz)		
Test Model	FSK	Polarity: H
	908.42MHz	Test By: King Kong
	Temperature: 24℃	Test Date: July 31, 2016
	Humidity: 53 %	



Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)			Limit 3m(dBuV/m)		Over(dB)	
		PK	AV Factor (dB)	AV	PK	AV	PK	AV
4024.0	H	40.68	-6.39	74	54	-33.32	-19.71	74
5131.0	H	44.32	-6.39	74	54	-29.68	-16.07	74
6544.0	H	48.24	-6.39	74	54	-25.76	-12.15	74
7300.0	H	49.76	-6.39	74	54	-24.24	-10.63	74
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

Note: (1) AV Value= Peak Value+AV factor
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(3) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Spurious Emission Above 1GHz (1GHz to 10GHz)		
Test Model	FSK	Polarity: V
	908.42MHz	Test By: King Kong
	Temperature: 24 °C	Test Date: July 31, 2016
	Humidity: 53 %	

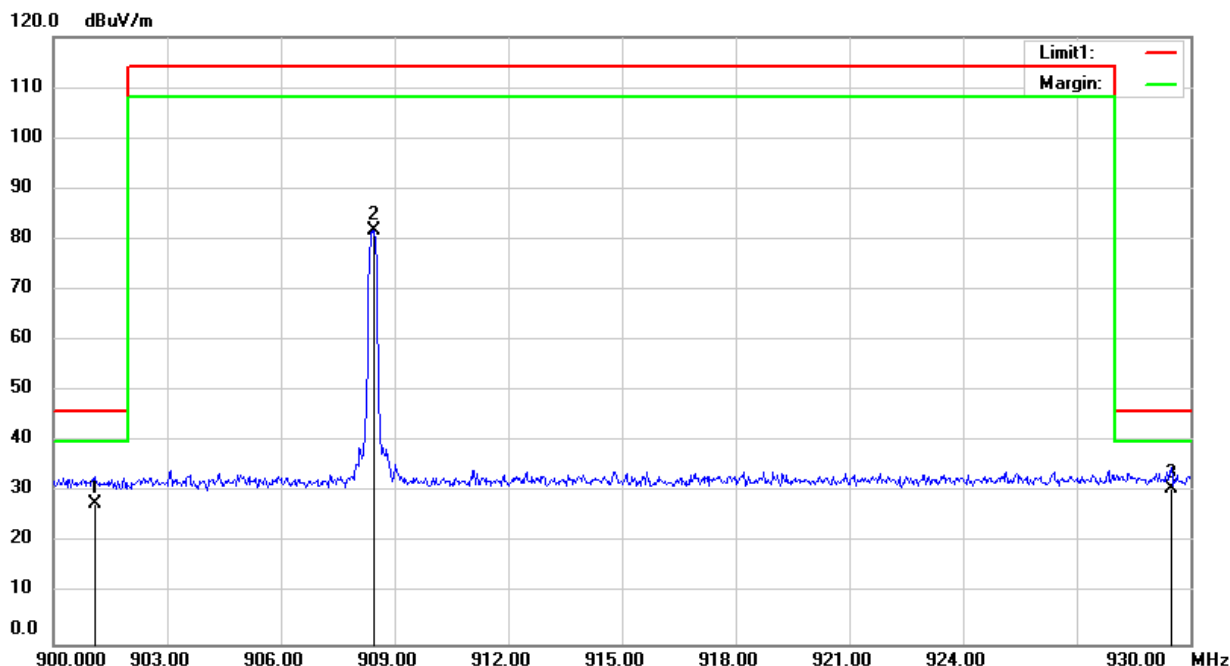


Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)			Limit 3m(dBuV/m)		Over(dB)	
		PK	AV Factor (dB)	AV	PK	AV	PK	AV
2413.0		40.48	-6.39	34.09	74.00	54.00	-33.52	-19.91
4897.0	V	43.43	-6.39	37.04	74.00	54.00	-30.57	-16.96
7138.0	V	49.60	-6.39	43.21	74.00	54.00	-24.40	-10.79
7399.0	V	53.14	-6.39	46.75	74.00	54.00	-20.86	-7.25
9037.0	V	51.53	-6.39	45.14	74.00	54.00	-22.47	-8.86
--	--	--	--	--	--	--	--	--

Note: (1) AV Value= Peak Value+AV factor
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(3) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

■ Transmitter Fundamental Field Strength and outside of the specified frequency bands

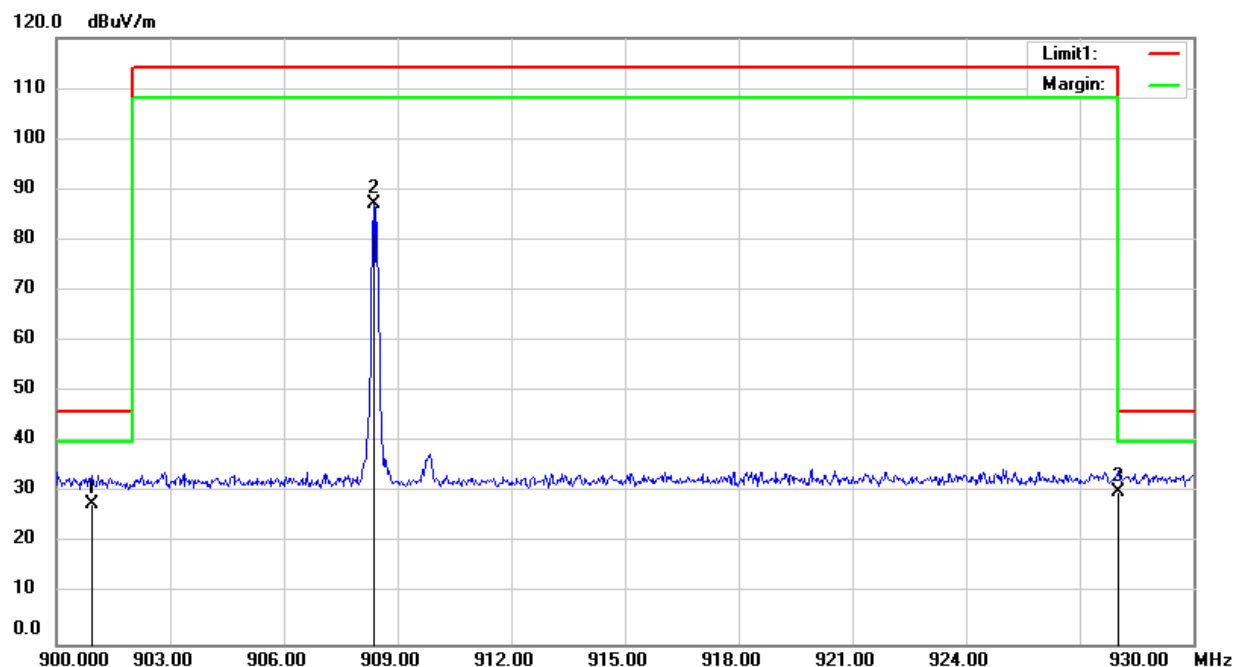
Transmitter Fundamental Field Strength and outside of the specified frequency bands	
Test Model	FSK
	908.42MHz
	Temperature: 24℃
	Humidity: 53 %
	Polarity: H
	Test By: King Kong
	Test Date: July 31, 2016



Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)			Limit 3m(dBuV/m)		Over(dB)	
		PK	AV Factor (dB)	AV	PK	AV	PK	AV
908.42	H	81.87	-6.39	75.48	114	94	-32.13	-18.52
Note: (1) AV Value= Peak Value+AV factor (2)Emission Level= Reading Level+Probe Factor +Cable Loss. (3) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.								

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)	Limit 3m(dBuV/m)	Over(dB)
901.08	H	27.90	46.00	-18.10
929.49	H	30.60	46.00	-15.40
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
Note: (1) AV Value= Peak Value+AV factor (2)Emission Level= Reading Level+Probe Factor +Cable Loss. (3) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.				

Transmitter Fundamental Field Strength and outside of the specified frequency bands	
Test Model	FSK
	908.42MHz
	Temperature: 24℃
	Humidity: 53 %
	Polarity: V
	Test By: King Kong
	Test Date: July 31, 2016



Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)			Limit 3m(dBuV/m)		Over(dB)	
		PK	AV Factor (dB)	AV	PK	AV	PK	AV
908.40	V	87.03	-6.39	80.64	114	94	-26.97	-13.36
Note: (1) AV Value= Peak Value+AV factor (2)Emission Level= Reading Level+Probe Factor +Cable Loss. (3) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.								

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)	Limit 3m(dBuV/m)	Over(dB)
900.93	V	27.60	46.00	-18.40
928.02	V	30.20	46.00	-15.80
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
Note: (1) AV Value= Peak Value+AV factor (2)Emission Level= Reading Level+Probe Factor +Cable Loss. (3) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.				

8.4 CONDUCTED EMISSIONS TEST

8.4.1 Applicable Standard

According to FCC Part 15.207(a)

8.4.2 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.		

8.4.3 Test Configuration

Test according to clause 7.3 conducted emission test setup

8.4.4 Test Procedure

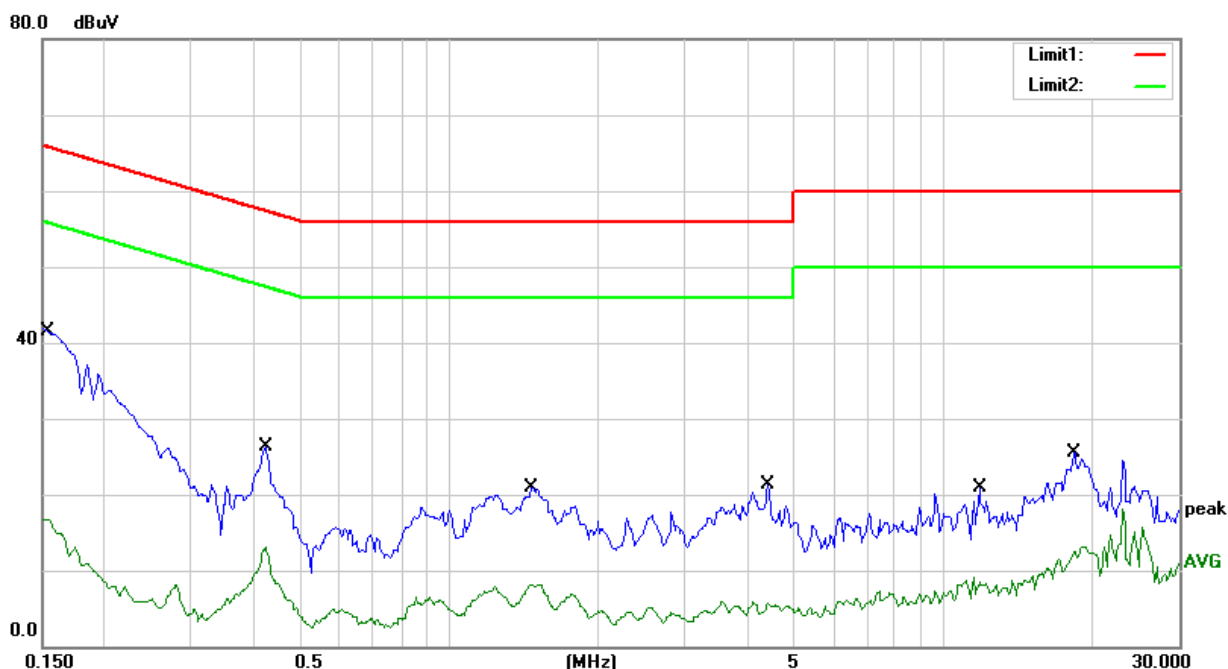
The EUT was placed on a table which is 0.8m above ground plane.
 Maximum procedure was performed on the highest emissions to ensure EUT compliance.
 Repeat above procedures until all frequency measured were complete.

8.4.5 Test Results

Pass

We test the EUT at 120V and 240V, and show the worst result as bellow.

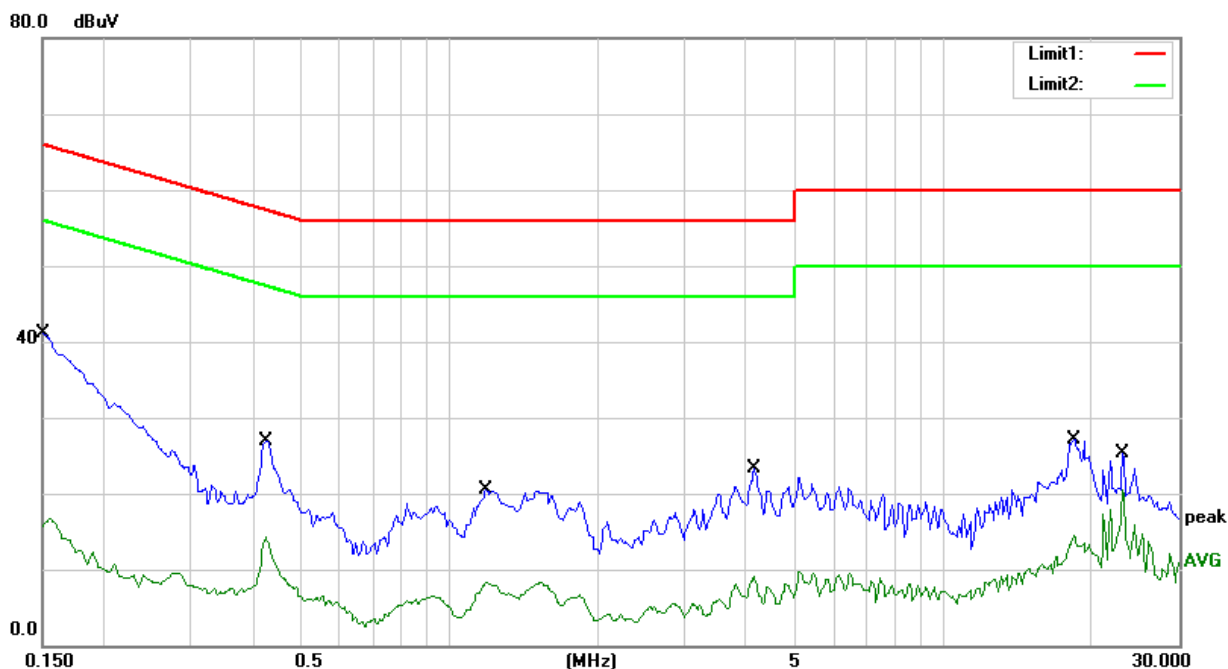
Test Model	Conducted Emissions Test		
	TX mode		Test Line: Line
	Temperature: 24℃		Test By: King Kong
	Humidity: 53 %		Test Date: July 31, 2016



Test Line	Frequency MHz	Emission Level QP dB(μV)	Emission Level AV dB(μV)	Limits QP dB(μV)	Limits AV dB(μV)	Over QP dB(μV)	Over AV dB(μV)
Line	0.16	41.30	16.74	65.70	55.70	-24.40	-38.96
	0.43	26.22	13.07	57.35	47.35	-31.13	-34.28
	1.47	20.94	8.11	56.00	46.00	-35.06	-37.89
	4.42	21.39	5.88	56.00	46.00	-34.61	-40.12
	11.85	20.89	9.08	60.00	50.00	-39.11	-40.92
	18.43	25.44	13.17	60.00	50.00	-34.56	-36.83

Note: (2)Emission Level= Reading Level+ Factor +Cable Loss.
(3) Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Test Model	Conducted Emissions Test		
	TX mode		Test Line: Neutral
	Temperature: 24 °C		Test By: King Kong
	Humidity: 53 %		Test Date: July 31, 2016



Test Line	Frequency MHz	Emission Level QP dB(μV)	Emission Level AV dB(μV)	Limits QP dB(μV)	Limits AV dB(μV)	Over QP dB(μV)	Over AV dB(μV)
Neutral	0.15	41.16	16.74	66.00	56.00	-24.84	-39.26
	0.43	26.92	14.31	57.35	47.35	-30.43	-33.04
	1.19	20.56	8.29	56.00	46.00	-35.44	-37.71
	4.14	23.34	9.20	56.00	46.00	-32.66	-36.80
	18.40	27.11	17.85	60.00	50.00	-32.89	-32.15
	23.13	25.34	20.53	60.00	50.00	-34.66	-29.47
Note: (2)Emission Level= Reading Level+ Factor +Cable Loss. (3) Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.							

8.5 ANTENNA APPLICATION

8.5.1 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.

8.5.2 Result

PASS.

The EUT has 1 antenna: a Wire antenna for Z-WAVE.

- Note:
- ☒ Antenna use a permanently attached antenna which is not replaceable.
 - ☐ Not using a standard antenna jack or electrical connector for antenna replacement
 - ☐ The antenna has to be professionally installed (please provide method of installation)

which in accordance to section 15.203, please refer to the internal photos.

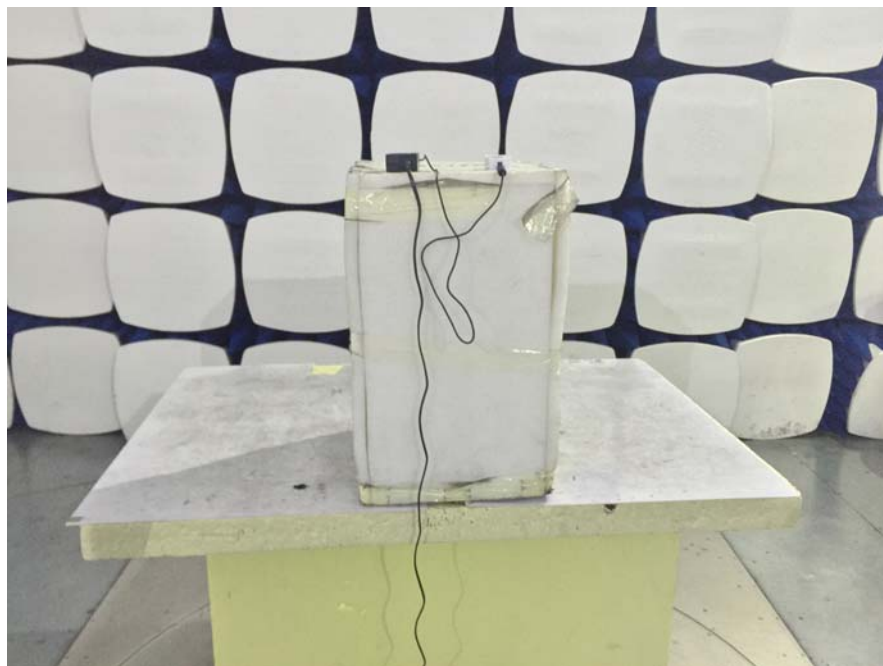
9 PHOTOS OF TEST SETUP

■ For Conducted Emission

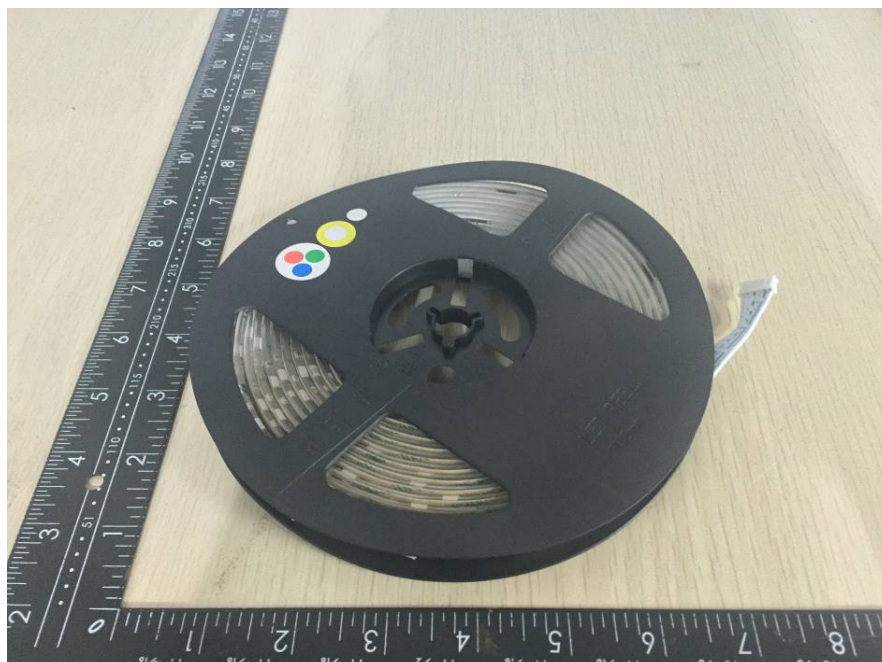


■ For Radiated Spurious Emission





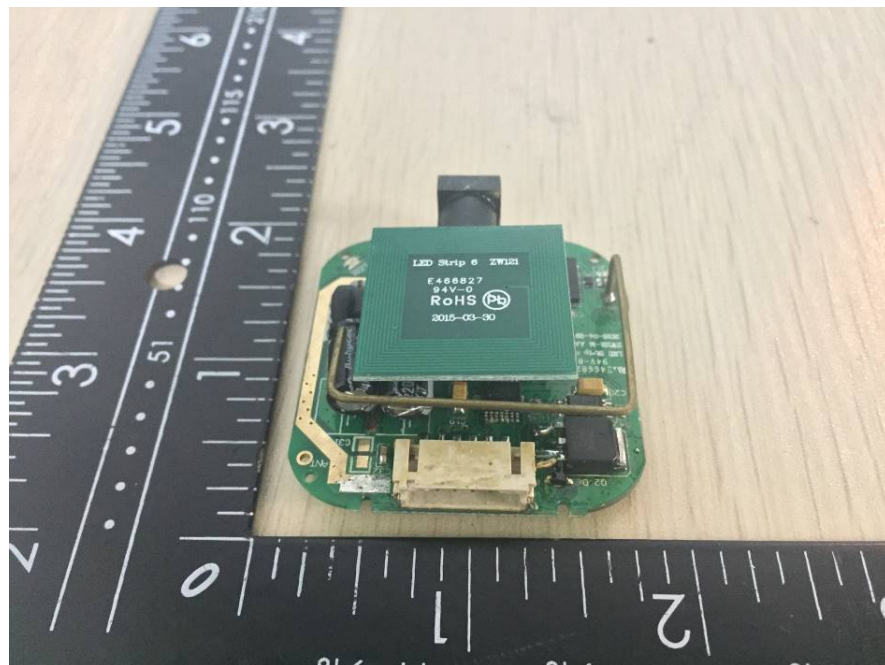
10 PHOTOS OF THE EUT



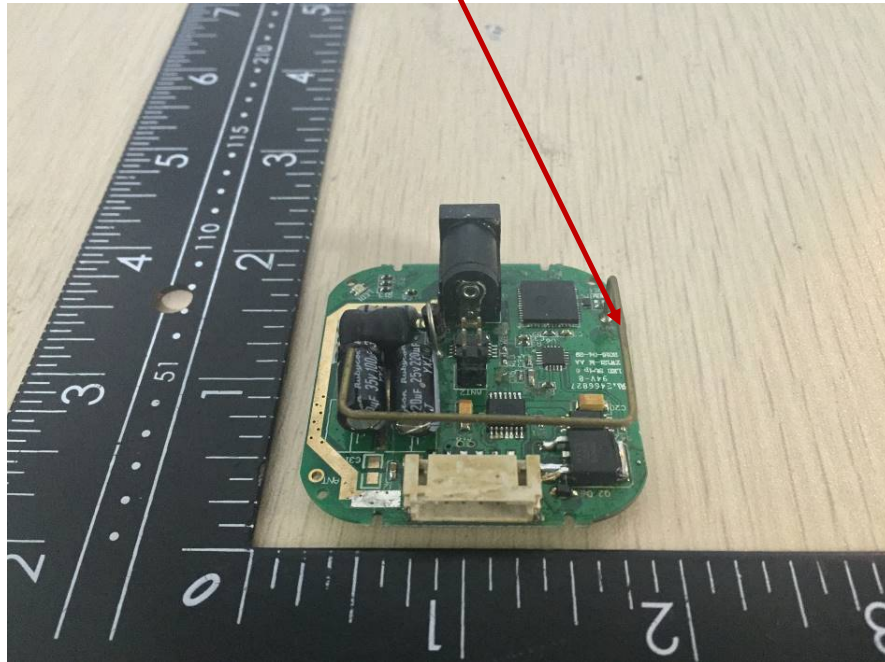




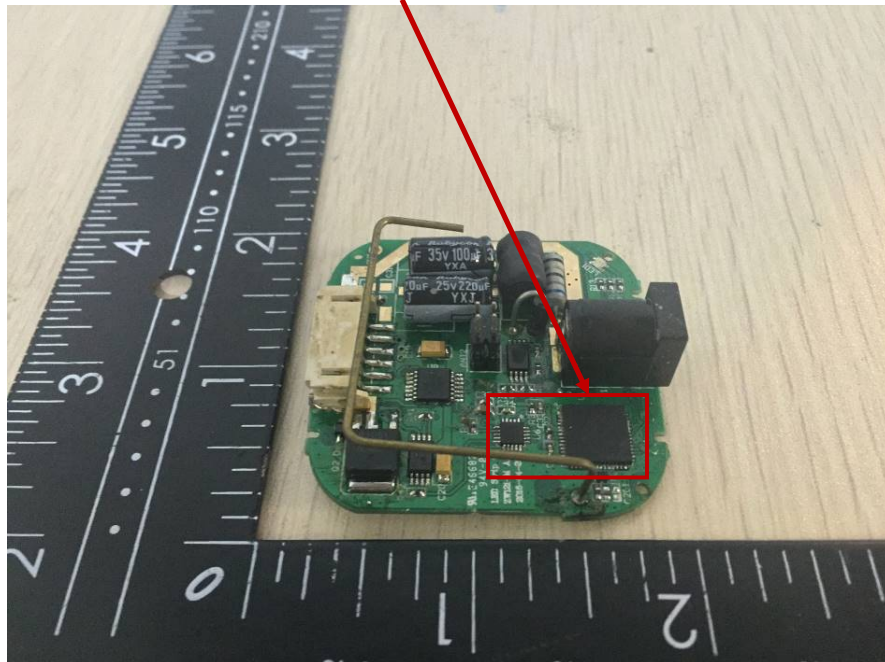




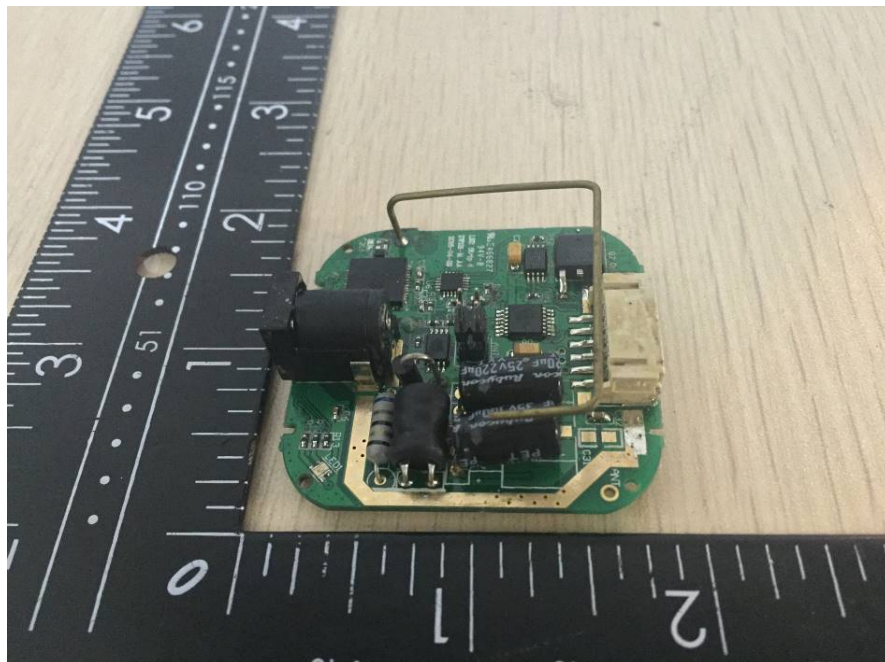
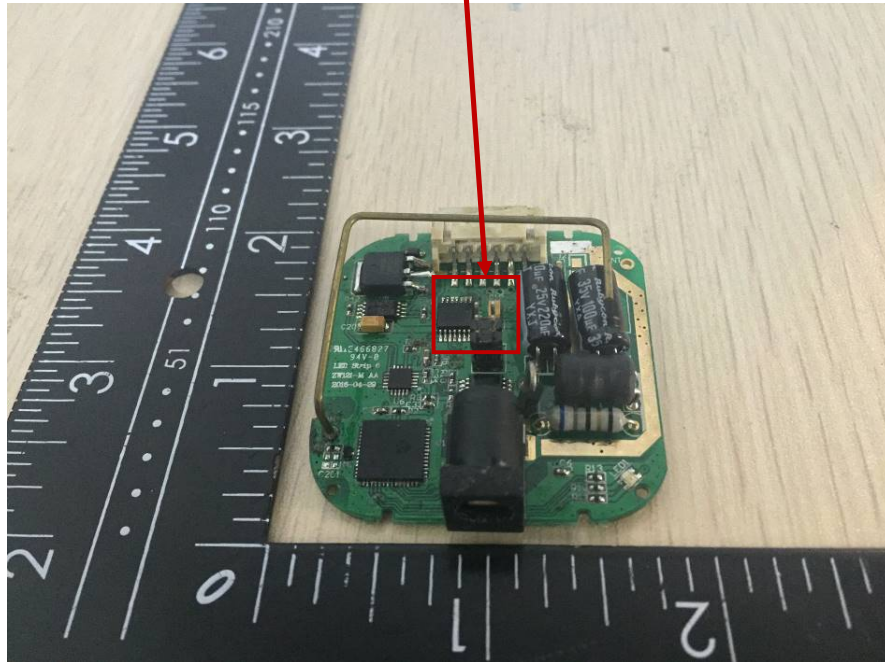
Z-WAVE Antenna

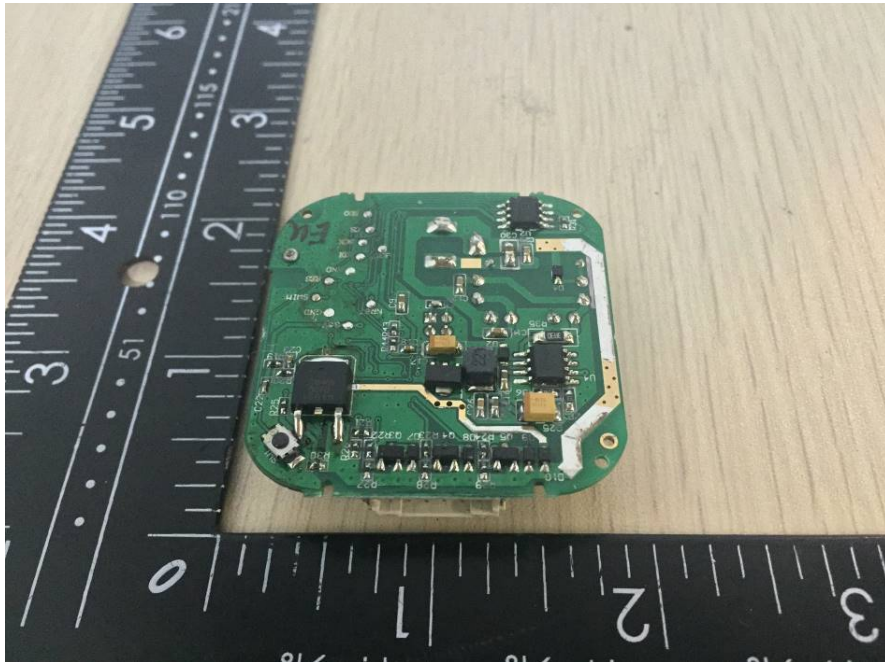


Z-WAVE Module

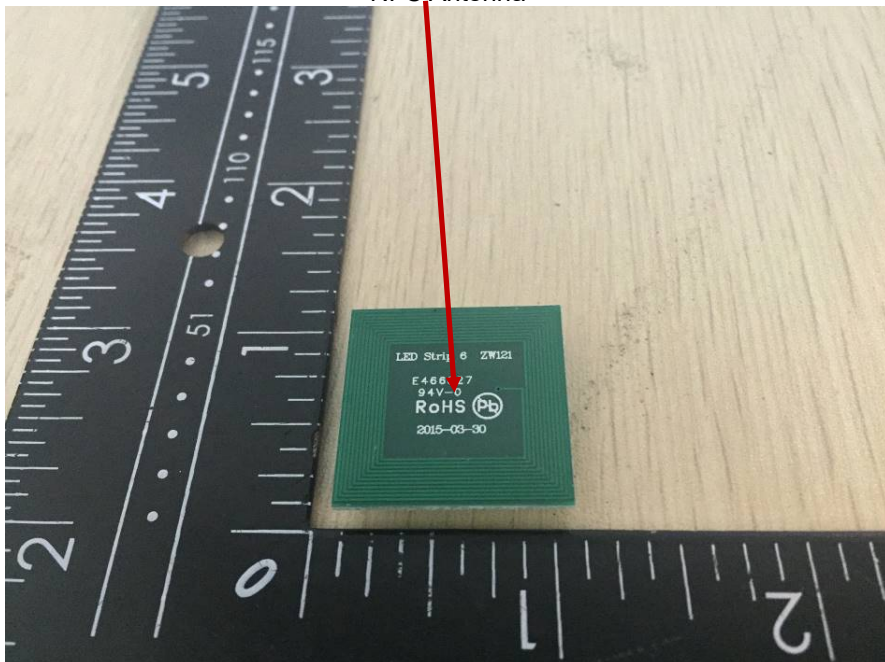


NFC Module





NFC Antenna



Label



BY F A N T E M

LED Strip
Model: FT121-A
Ratings: 24V $\equiv$, Max: 3A
FCC ID: XBAFT121 (908.42MHz)
Designed on Earth, Assembled in China.







LED Strip
Model: ZW121-A
Ratings: 24V $\equiv$, Max: 3A
FCC ID: XBAFT121 (908.42MHz)
Aeon Labs LLC Assembled in China





-----THE END-----