# **TEST REPORT**

Reference No	:	WTS15S1239484E
FCC ID	:	XBAZW069
Applicant	:	Aeon Labs LLC.
Address	:	121 Buckingham Drive Unit 36 Santa Claras California United States
Manufacturer	:	Fantem Technologies (Shenzhen) Co., Ltd
Address	:	North,3/F, Yitoa Technology Industrial Park, Baihua Yuan Rd., The Second Industrial Area, Guangming Sub-district Office, Guangming New District, Shenzhen, Guangdong, China
Product Name	:	Smart Strip Gen5,Strip Gen5
Model No	:	ZW069-A02,ZW072-A02
Brand	:	N/A
Standards	:	FCC CFR47 Part 15 Section 15.249: 2015
Date of Receipt sample	:	Dec.11, 2015
Date of Test	:	Dec.12, 2015 ~ Jan. 19, 2016
Date of Issue	:	Jan. 26, 2016
Test Result	:	Pass
reproduced, except in full, wi	ithou instit	ort refer only to the sample(s) tested, this test report cannot be t prior written permission of the company. The report would be invalid that and the signatures of compiler and approver.  Prepared By:
Address: 1/F., Fukangtai I		Valtek Services (Shenzhen) Co., Ltd. ing, West Baima Road, Songgang Street, Baoan District, Shenzhen, Guangdong, China Tel:+86-755-83551033 Fax:+86-755-83552400
Compiled by:		Approved by:
( a	Ze	Thelo zhous
Zero Zhou / Test Engir	neer	Philo Zhong / Manager

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## 2 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207	PASS
	15.249(a)	
Radiated Emission	15.209	PASS
	15.205(a)	
Periodic Operation	15.35(c)	PASS
	15.249	
Band Edge	15.205	PASS
	15.209	
20dB Bandwidth	15:215(c)	PASS
Antenna Requirement	15.203	PASS

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### 4 General Information

### 4.1 General Description of E.U.T.

Product Name: Smart Strip Gen5, Strip Gen5

Model No.: ZW069-A02,ZW072-A02

Model Differences: ZW069-A02 comes with an power detector function more than

ZW072-A02

Type of Modulation: FSK

Frequency Range: 908.40MHz,908.42MHz

The Lowest Oscillator: 4.096MHz

Antenna installation: Embedded Antenna

Remark: Both model are tested, and the worst case is model ZW069-A02

and the test data recorded in report.

#### 4.2 Details of E.U.T.

Technical Data: AC 125V 60Hz Max: 15A

#### 4.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

#### IC – Registration No.:7760A-1

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A-1, Octorber 15, 2015.

#### • FCC Test Site 1#- Registration No.: 880581

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, April 29, 2014.

#### • FCC Test Site 2#- Registration No.: 328995

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 328995, December 3, 2014.

#### 4.3.1 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	Lower channel	Middle channel	Upper channel
Transmitting	908.40MHz	/	908.42MHz

## 5 Equipment Used during Test

## 5.1 Equipments List

Conducted Emissions Test Site 1#									
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date			
1.	EMI Test Receiver	R&S	ESCI	100947	Sep.15,2015	Sep.14,2016			
2.	LISN	R&S	ENV216	101215	Sep.15,2015	Sep.14,2016			
3.	Cable	Тор	TYPE16(3.5M)	-	Sep.15,2015	Sep.14,2016			
3m Ser	mi-anechoic Chamber	for Radiation Emis	sions Test site	1#					
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date			
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.15,2015	Sep.14,2016			
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.15,2015	Sep.14,2016			
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.19,2015	Apr.18,2016			
4	Coaxial Cable (below 1GHz)	Тор	TYPE16(13M)	-	Sep.15,2015	Sep.14,2016			
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.19,2015	Apr.18,2016			
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Apr.19,2015	Apr.18,2016			
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Mar.17,2015	Mar.16,2016			
8	Coaxial Cable (above 1GHz)	Тор	1GHz-25GHz	EW02014-7	Apr.10,2015	Apr.09,2016			
3m Ser	mi-anechoic Chamber	for Radiation Emis	sions Test site	2#					
Item	Equipment	Manufacturer	Model No.	Serial No	Last Calibration Date	Calibration Due Date			
1	Test Receiver	R&S	ESCI	101296	Sep.15,2015	Sep.14,2016			
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	Sep.15,2015	Sep.14,2016			
3	Amplifier	Compliance pirection systems inc	PAP-0203	22024	Sep.15,2015	Sep.14,2016			
4	Cable	HUBER+SUHNER	CBL2	525178	Sep.15,2015	Sep.14,2016			
RF Cor	nducted Testing								
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date			
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	Sep.15,2015	Sep.14,2016			
2.	Spectrum Analyzer	R&S	FSL6	100959	Sep.15,2015	Sep.14,2016			

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	(9k-6GHz)					
3.	Signal Analyzer	Agilent	N9010A	MY50520207	Sep.15,2015	Sep.14,2016

## 5.2 Description of Support Units

Equipment	permanent assets	Note	
Light Load	Waltek	Max 1875W	

### **5.3 Measurement Uncertainty**

Parameter	Uncertainty
Radio Frequency	± 1 x 10 <sup>-6</sup>
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
	± 5.03 dB
Radiated Spurious	(Bilog antenna 30M~1000MHz)
Emissions test	± 5.47 dB
	(Horn antenna 1000M~25000MHz)

## 5.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

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### 6 Conducted Emission

Test Requirement: FCC CFR 47 Part 15 Section 15.207

Test Method: ANSI C63.10:2013

Test Result: PASS

Frequency Range: 150kHz to 30MHz

Class/Severity: Class B

Limit: 66-56 dB<sub>µ</sub>V between 0.15MHz & 0.5MHz

56 dB<sub>μ</sub>V between 0.5MHz & 5MHz60 dB<sub>μ</sub>V between 5MHz & 30MHz

Detector: Peak for pre-scan (9kHz Resolution Bandwidth)

### 6.1 E.U.T. Operation

Operating Environment:

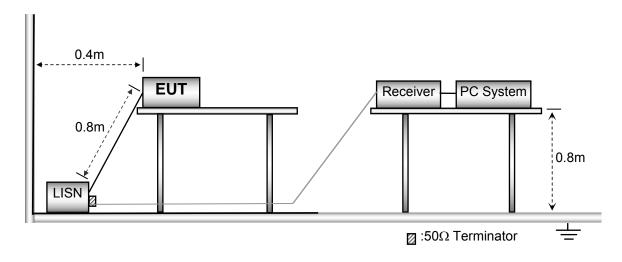
Temperature:  $25.5 \,^{\circ}\text{C}$  Humidity:  $51 \,^{\circ}\text{RH}$  Atmospheric Pressure:  $101.2 \,^{\circ}\text{kPa}$ 

**EUT Operation:** 

The test was performed in transmitting mode, the test data were shown in the report.

#### 6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013

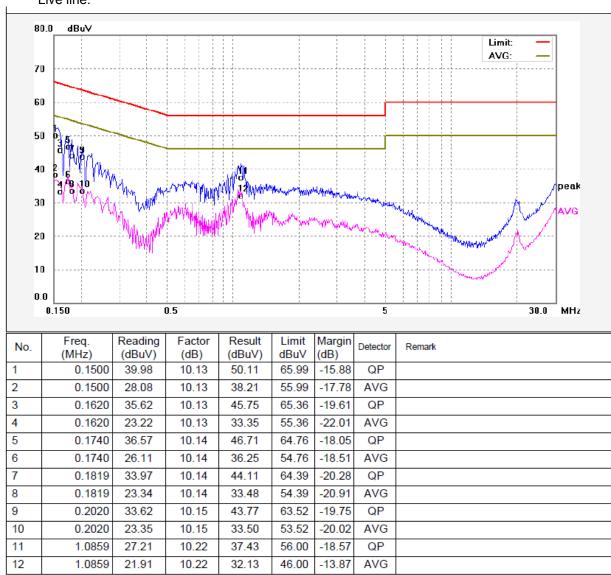


#### 6.3 Measurement Description

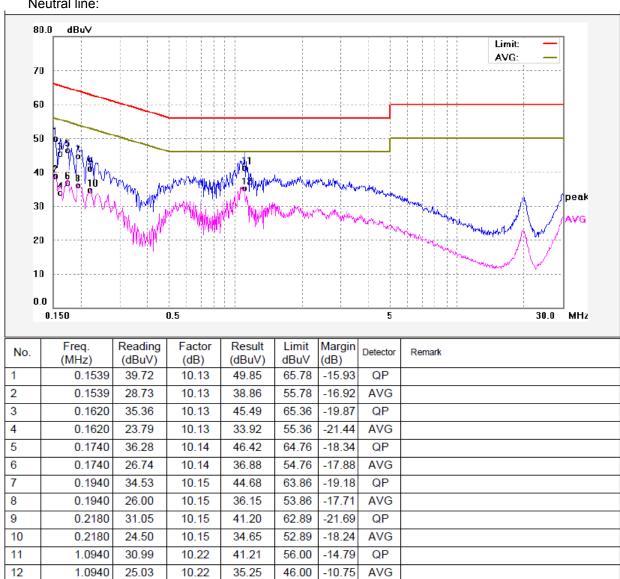
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

#### 6.4 Test Result

#### Live line:



#### Neutral line:



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## 7 Radiation Emission Test

Test Requirement: FCC Part15 Paragraph 15.249&15.209&15.205

Test Method: ANSI 63.10: 2013

Measurement Distance: 3m

Test Result: PASS

15.249(a)Limit:

Fundamental frequency	Field strength	of fundamental	Field strength of harmonics		
	mV/m dBuV/m		uV/m	dBuV/m	
902-928 MHz	50	94	500	54	
2400-2483.5 MHz	50	94	500	54	
5725-5875 MHz	50	94	500	54	
24.0-24.25 GHz	250	108	2500	68	

#### 15.209 Limit:

13.203 EIIIII.					
_	Field Strei	ngth	Field Strength Limit at 3m Measurement Dist		
Frequency (MHz)	uV/m	Distance (m)	uV/m	dBuV/m	
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	20log <sup>(2400/F(kHz))</sup> + 80	
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	20log <sup>(24000/F(kHz))</sup> + 40	
1.705 ~ 30	30	30	100 * 30	20log <sup>(30)</sup> + 40	
30 ~ 88	100	3	100	20log <sup>(100)</sup>	
88 ~ 216	150	3	150	20log <sup>(150)</sup>	
216 ~ 960	200	3	200	20log <sup>(200)</sup>	
Above 960	500	3	500	20log <sup>(500)</sup>	

Note: RF Voltage(dBuV)=20 log<sub>10</sub> RF Voltage(uV)

## 7.1 EUT Operation

Operating Environment:

Temperature: 23.5 °C
Humidity: 51.1 % RH
Atmospheric Pressure: 101.2kPa

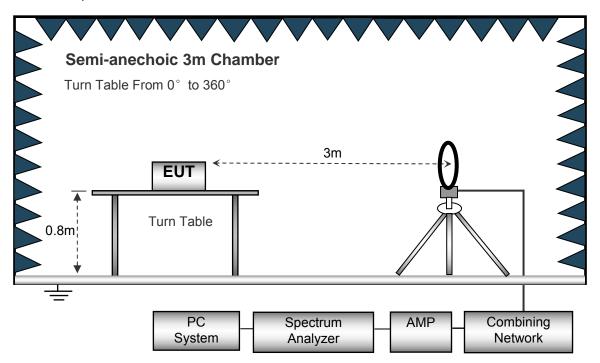
**EUT Operation:** 

The test was performed in transmitting mode, the test data were shown in the report.

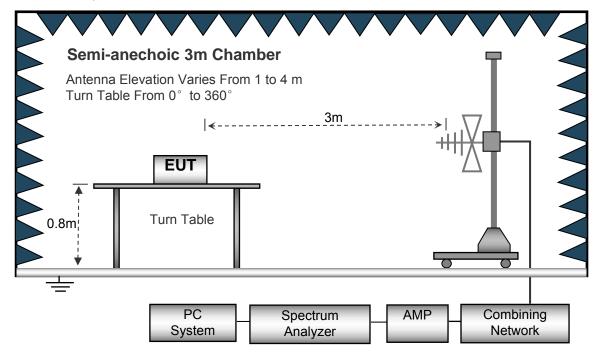
### 7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10: 2013.

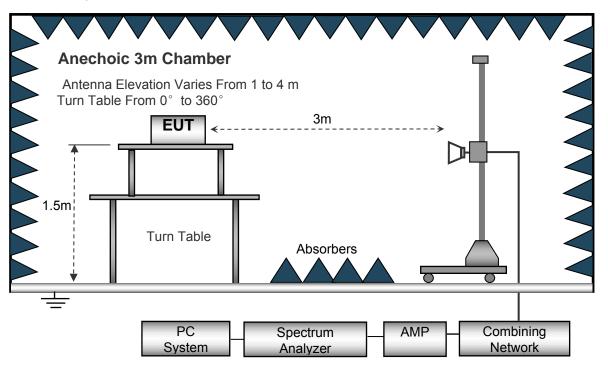
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30MHz to 1GHz.



The test setup for emission measurement above 1 GHz.



## 7.3 Spectrum Analyzer Setup

Below 30MHz		
	Sweep Speed	Auto
	IF Bandwidth	.10kHz
	Video Bandwidth	.10kHz
	Resolution Bandwidth	10kHz
30MHz ~ 1GH	Z	
	Sweep Speed	Auto
	Detector	.PK
	Resolution Bandwidth	.100kHz
	Video Bandwidth	. 300kHz
Above 1GHz		
	Sweep Speed	Auto
	Detector	.PK
	Resolution Bandwidth	.1MHz
	Video Bandwidth	.3MHz
	Detector	.Ave.
	Resolution Bandwidth	.1MHz
	Video Bandwidth	.10Hz
	Video Bandwidth	. 10Hz

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#### 7.4 Test Procedure

1. The EUT is placed on a turntable. For below 1GHz, the EUT is 0.8m above ground plane; For above1GHz, the EUT is 1.5m above ground plane.

- 2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
- 4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 6. Repeat above procedures until the measurements for all frequencies are complete.
- 7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

### 7.5 Test Result

Test Frequency :4.096MHz ~ 30MHz

	Measurement	LIPETECTOR I	Correct	Extrapolation factor	Measurement results	FCC Part 15.249/209/205	
Frequency (MHz)	results		factor		(calculated)	Limit	Margin
(1411.12)	dBµV/m@3m	PK/QP	dB/m	dB	dBµV/m @30m	dBµV/m @30m	dB
6.202	25.14	QP	21.76	40.00	6.90	29.54	-22.64
8.198	24.39	QP	21.04	40.00	5.43	29.54	-24.11
26.695	27.99	QP	20.31	40.00	8.30	29.54	-21.24

Test Frequency: 30MHz ~ 10GHz

Frequency Receiver Reading Detect		Turn	RX Antenna		Corrected	0	FCC Part 15.249/209/205		
	Reading	Detector	table Angle	Height	Polar	Factor	Corrected Amplitude	Limit	Margin
(MHz)	(dBµV)	(PK/QP)	Degree	(m)	(H/V)	(dB/m)	(dBµV/m)	(dBµV/m)	(dB)
342.52	39.21	QP	216	1.1	V	-11.40	27.81	46.00	-18.19
908.42	91.06	PK	123	1.2	Н	0.97	92.03	114.00	-21.97
908.42	88.14	PK	298	1.5	V	0.97	89.11	114.00	-24.89
1816.84	64.21	PK	53	1.5	Н	-13.21	51.00	74.00	-23.00
1816.84	68.05	PK	142	1.9	V	-13.21	54.84	74.00	-19.16
2725.26	69.30	PK	250	1.8	Н	-13.08	56.22	74.00	-17.78
2725.26	64.82	PK	329	1.8	V	-13.08	51.74	74.00	-22.26
3633.68	65.33	PK	26	1.4	Н	-9.08	56.25	74.00	-17.75
3633.68	64.07	PK	144	1.3	V	-9.08	54.99	74.00	-19.01

AV = Peak +20Log10(duty cycle) =PK+(-9.27) [refer to section 8 for more detail]

AV - Feak (20L0g fo(duty cycle) - FK (-9.27) [felet to section 6 for more detail]						
Frequency	PK	RX Antenna	Duty cycle	AV	FCC Part 15.249/209/205	
Frequency	FR	Polar Factor		Av	Limit	Margin
(MHz)	(dBµV/m)	(H/V)	(dB)	(dBµV/m)	(dBµV/m)	(dB)
908.42	92.03	Н	-9.27	82.76	94.00	-11.24
908.42	89.11	V	-9.27	79.84	94.00	-14.16
1816.84	51.00	Н	-9.27	41.73	54.00	-12.27
1816.84	54.84	V	-9.27	45.57	54.00	-8.43
2725.26	56.22	Н	-9.27	46.95	54.00	-7.05
2725.26	51.74	V	-9.27	42.47	54.00	-11.53
3633.68	56.25	Н	-9.27	46.98	54.00	-7.02
3633.68	54.99	V	-9.27	45.72	54.00	-8.28

## 8 Periodic Operation

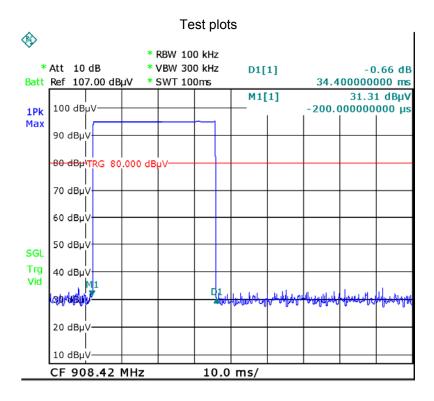
The duty cycle was determined by the following equation:

To calculate the actual field intensity,the duty cycle correction factor in decibel is needed for later use and can be obtained from following conversion

Duty Cycle(%)=Total On interval in a complete pulse train/ Length of a complete pulse train \* % Duty Cycle Correction Factor(dB)=20 \* Log<sub>10</sub>(Duty Cycle)

Total transmission time(ms)	34.40
Length of a complete transmission period(ms)	100
Duty Cycle(%)	34.40
Duty Cycle Correction Factor(dB)	-9.27

Refer to the duty cycle plot (as below)



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## 9 Band Edge

Test Requirement: 15.249(d):Emissions radiated outside of the specified frequency

bands, except for harmonics, shall be attenuated by at least 50 dB

below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Test Method: ANSI C63.10:2013

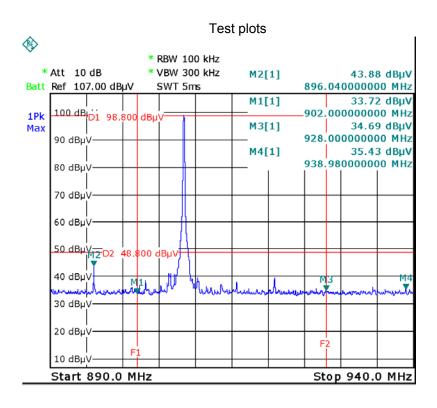
Test Mode: Transmitting

#### 9.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto
 Detector function = peak, Trace = max hold

#### 9.2 Test Result



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## 10 20 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.215(c)

Test Method: ANSI C63.10:2013

Test Mode: Transmitting

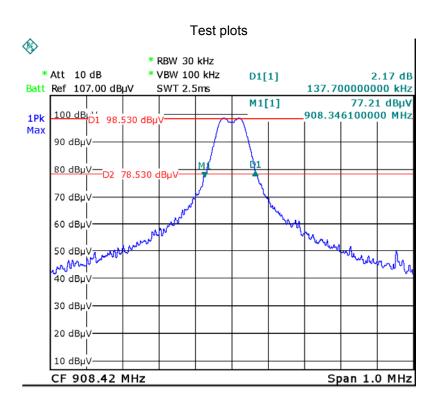
#### 10.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer: RBW = 30kHz, VBW = 100kHz

#### 10.2 Test Result

Frequency (MHz)	Bandwidth Emission (kHz)
908.42	137.70



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## 11 Antenna Requirement

According to the FCC Part 15 Paragraph 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. This product has a Embedded Antenna, fulfil the requirement of this section.

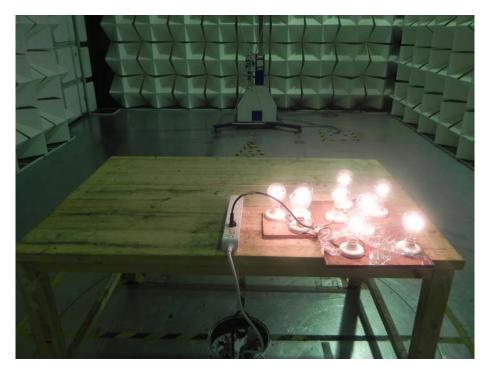
## 12 Photographs- Model ZW069-A02 Test Setup

## 12.1 Photograph – Radiation Emission

Test frequency 4.096MHz to 30MHz at test site 2#



Test frequency from 30MHz to 1GHz at test site 2#



Test frequency above 1GHz at test site 1#



## 12.2 Photograph – Conducted Emission Test Setup at Test Site 1#



## 13 Photographs - Constructional Details

## 13.1 Model ZW069-A02 - External Photos





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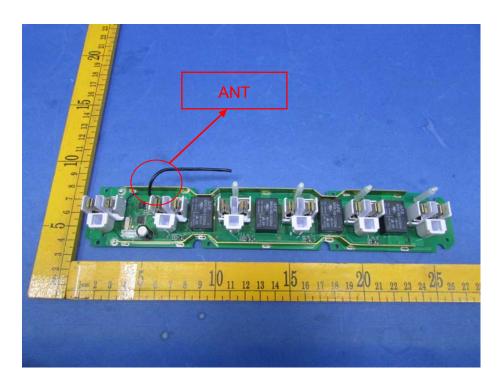




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#### 13.2 Model ZW069-A02 - Internal Photos





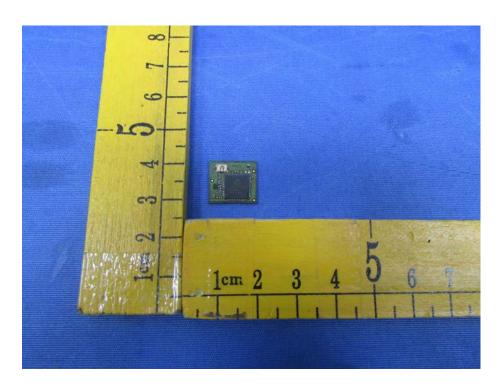
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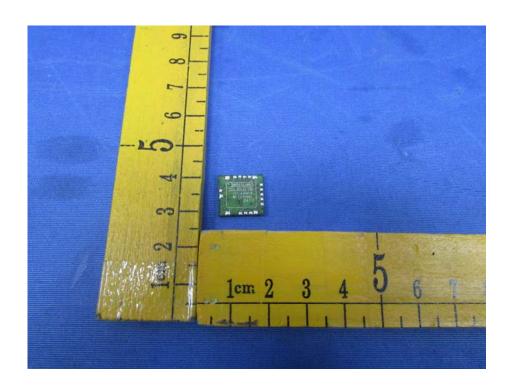


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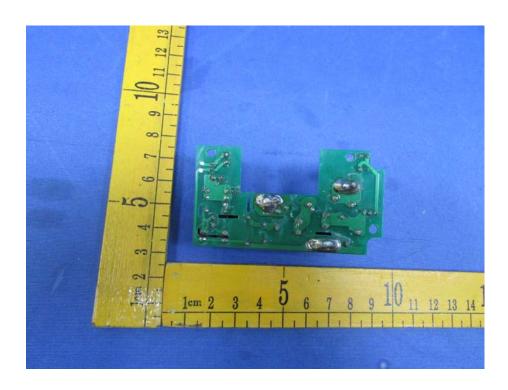


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=====End of Report=====