

# TEST REPORT

Reference No..... : WTS15S0933194E  
FCC ID ..... : SJ8-XASC04  
Applicant..... : RDI Technology (Shenzhen) Co., Ltd.  
Address..... : Building C1, Xintang Industrial Park East Baishixia, Fuyong, Baoan,  
Shenzhen, Guangdong, China  
Manufacturer ..... : The same as above  
Address..... : The same as above  
Product Name..... : Artemis Ceiling Mounted LED Stairwell Fixture/  
Artemis Ceiling Mounted LED Low Occupancy Fixture  
Model No..... : XASC04, XALF04  
Standards..... : FCC CFR47 Part 15 Section 15.231: 2014  
Date of Receipt sample .... : Sep. 08, 2015  
Date of Test ..... : Sep. 08 – Sep.14, 2015  
Date of Issue..... : Sep. 16, 2015  
Test Result..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

**Prepared By:**

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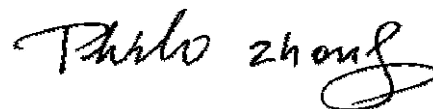
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Compiled by:



Zero Zhou / Project Engineer

Approved by:



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## 2 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207	PASS
Radiated Spurious Emissions	15.205(a) 15.209 15.231(a)	PASS
Periodic Operation	15.231(a)	PASS
Emission Bandwidth	15.231(c)	PASS
Antenna Requirement	15.203	PASS

### 3 Contents

	Page
<b>1 COVER PAGE.....</b>	<b>1</b>
<b>2 TEST SUMMARY .....</b>	<b>2</b>
<b>3 CONTENTS .....</b>	<b>3</b>
<b>4 GENERAL INFORMATION.....</b>	<b>4</b>
4.1 GENERAL DESCRIPTION OF E.U.T.....	4
4.2 DETAILS OF E.U.T.....	4
4.3 TEST MODE .....	4
4.4 TEST FACILITY .....	4
<b>5 EQUIPMENT USED DURING TEST .....</b>	<b>5</b>
5.1 EQUIPMENTS LIST .....	5
5.2 MEASUREMENT UNCERTAINTY.....	5
5.3 TEST EQUIPMENT CALIBRATION .....	5
<b>6 CONDUCTED EMISSION .....</b>	<b>6</b>
6.1 E.U.T. OPERATION .....	6
6.2 EUT SETUP .....	6
6.3 MEASUREMENT DESCRIPTION .....	6
6.4 CONDUCTED EMISSION TEST RESULT.....	7
<b>7 RADIATED SPURIOUS EMISSIONS.....</b>	<b>9</b>
7.1 EUT OPERATION .....	9
7.2 TEST SETUP .....	10
7.3 SPECTRUM ANALYZER SETUP .....	11
7.4 TEST PROCEDURE.....	12
7.5 SUMMARY OF TEST RESULTS .....	13
<b>8 PERIODIC OPERATION .....</b>	<b>15</b>
<b>9 EMISSION BANDWIDTH .....</b>	<b>18</b>
9.1 TEST PROCEDURE.....	18
9.2 TEST RESULT .....	18
<b>10 ANTENNA REQUIREMENT .....</b>	<b>20</b>
<b>11 PHOTOGRAPHS – MODEL XASC04TEST SETUP .....</b>	<b>21</b>
11.1 PHOTOGRAPH – CONDUCTED EMISSION TEST SETUP.....	21
11.2 PHOTOGRAPH – RADIATION SPURIOUS EMISSION TEST SETUP.....	21
<b>12 PHOTOGRAPHS - CONSTRUCTIONAL DETAILS .....</b>	<b>23</b>
12.1 MODEL XASC04- EXTERNAL PHOTOS.....	23
12.2 MODEL XASC04- INTERNAL PHOTOS .....	26

## 4 General Information

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

Product Name	:Artemis Ceiling Mounted LED Stairwell Fixture/ Artemis Ceiling Mounted LED Low Occupancy Fixture
Model No.	:XASC04, XALF04
Model Difference	: The models XASC04, XALF04 are the same circuit and RF module. There only difference is product model name and the function as below. XALF04 is designed as a Low occupancy fixture for other than stairwell locations. These fixtures will dim all the way to off when an area is unoccupied. The XASC04 is dim down to about 7 watts in an unoccupied stairwell but do not dim all the way to off.
Type of Modulation	: GFSK
Frequency Range	: 433.107~434.833 MHz
The Lowest Oscillator	: 26 MHz
Antenna installation	: Monopole Antenna
Remark	:The both models XASC04, XALF04 are tested, and the worst case is model XASC04 and the test data show in report.

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

Technical Data	: (1)AC 90-285V, 60Hz; (2)DC 7.2V, 4500mAh by Ni-MH battery
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### 4.3 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	433.107MHz	/MHz	434.833MHz

### 4.4 Test Facility

The test facility has a test site registered with the following organizations:

- Industry Canada (IC) Registration No.: 11464A**  
 The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.
- FCC – Registration No.: 934118**  
 Shenzhen SEM.Test Technology 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 and the Registration is 934118.

## 5 Equipment Used during Test

### 5.1 Equipments List

Conducted Emissions Test Site						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	100947	Sep-05-2015	Sep-04-2016
2.	LISN	R&S	ENV216	101215	Sep-05-2015	Sep-04-2016
3.	Cable	Top	TYPE16(3.5M)	-	Sep-05-2015	Sep-04-2016
3m Semi-anechoic Chamber for Radiation Emissions Test site						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP	836079/035	May-07-2015	May-06-2016
2	EMI Test Receiver	R&S	ESVB	825471/005	May-07-2015	May-06-2016
3	Pre-amplifier	Agilent	8447F	3113A06717	May-07-2015	May-06-2016
4	Pre-amplifier	Compliance Direction	PAP-0118	24002	May-07-2015	May-06-2016
5	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	Apr-20-2015	Apr-19-2016
6	Horn Antenna	ETS	3117	00086197	Apr-20-2015	Apr-19-2016
7	Horn Antenna	ETS	3116B	00088203	Apr-20-2015	Apr-19-2016
8	Loop Antenna	SCHWARZECK	HFRA 5165	9365	Apr-20-2015	Apr-19-2016

### 5.2 Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Conducted Emissions	150kHz~30MHz	±3.64dB	(1)
Radiated Spurious Emissions	30MHz~1000MHz	±5.03dB	(1)
	1000M~5000MHz	± 5.47 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

### 5.3 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.

## 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 $\mu$ V between 0.15MHz & 0.5MHz 56 dB $\mu$ V between 0.5MHz & 5MHz 60 dB $\mu$ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)

### 6.1 E.U.T. Operation

Operating Environment :

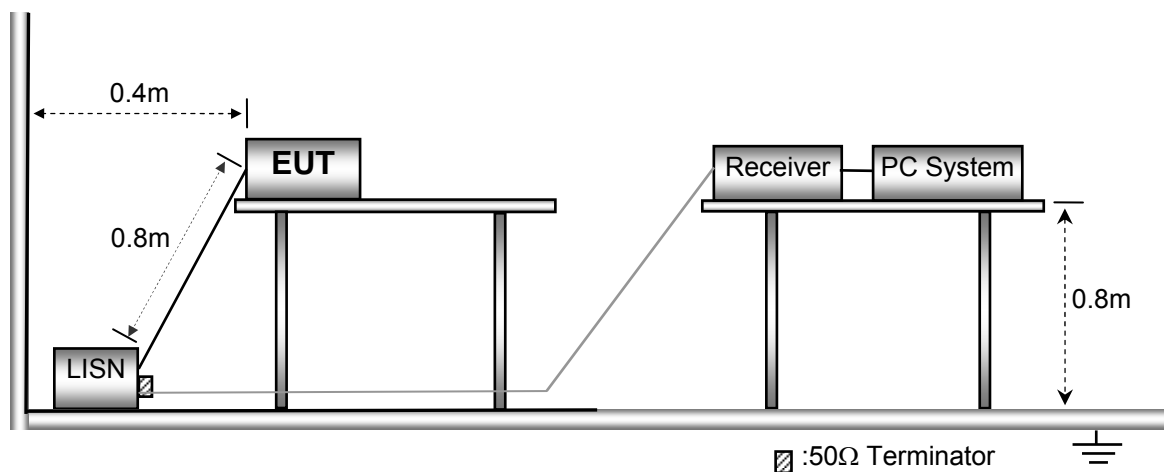
Temperature:	25.5 °C
Humidity:	51 % RH
Atmospheric Pressure:	101.2kPa

EUT Operation :

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

### 6.2 EUT Setup

The EUT was placed on the test table in shielding room.

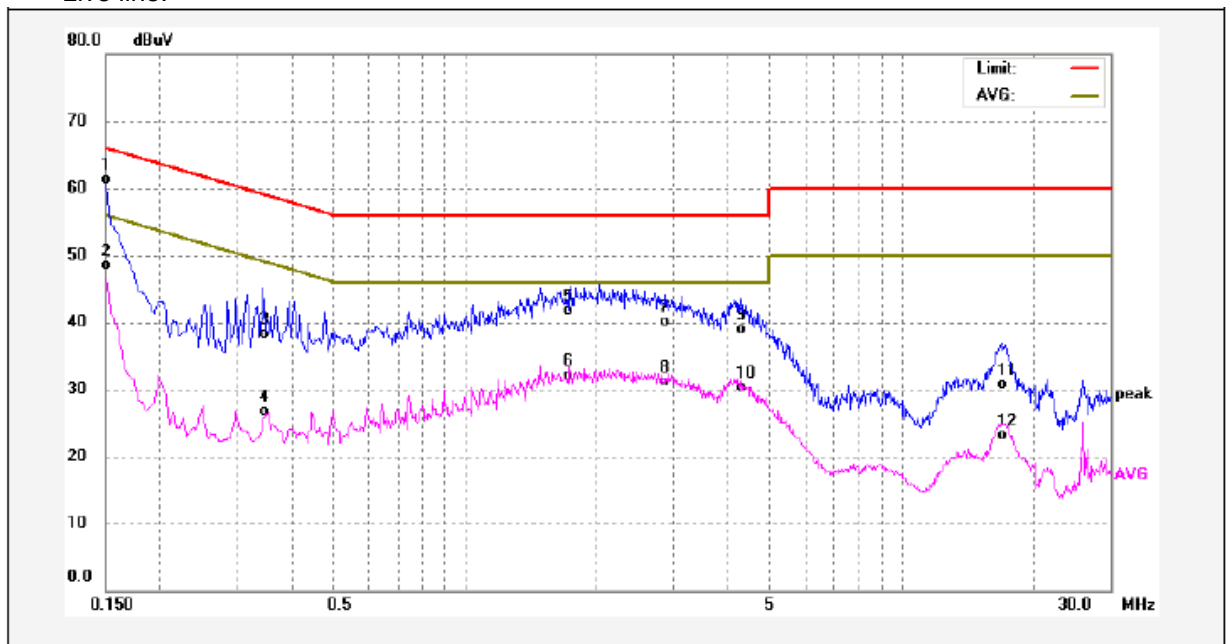


### 6.3 Measurement Description

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.

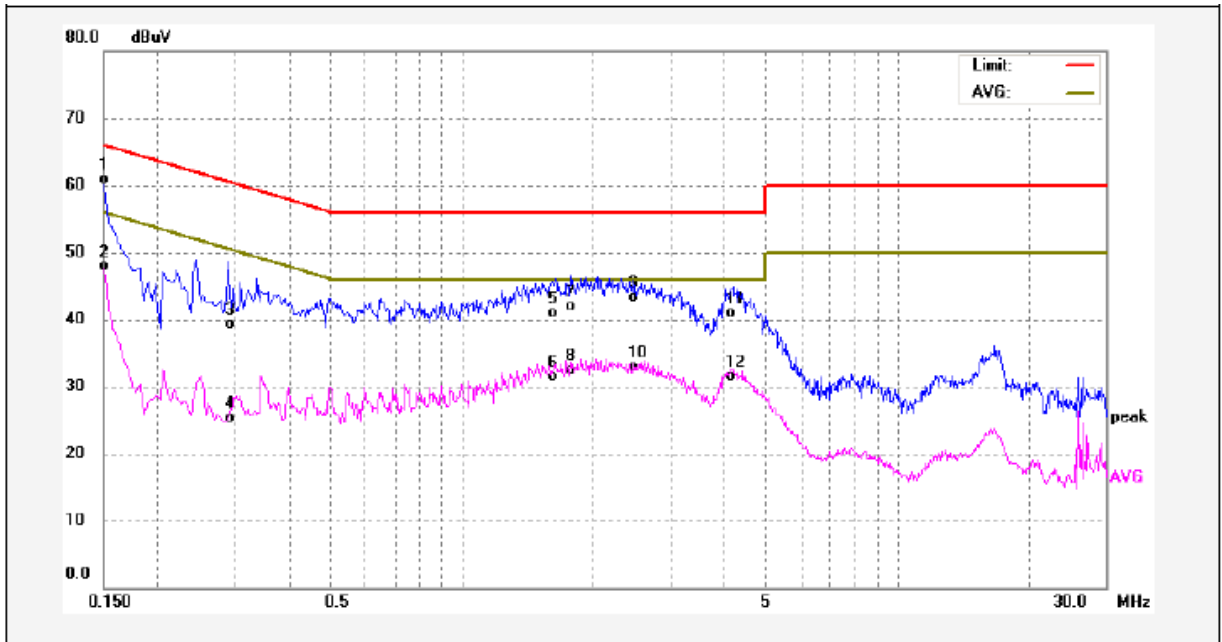
### 6.4 Conducted Emission Test Result

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	51.20	10.10	61.30	65.99	-4.69	QP	
2	0.1500	38.50	10.10	48.60	55.99	-7.39	AVG	
3	0.3460	28.12	10.11	38.23	59.06	-20.83	QP	
4	0.3460	16.52	10.11	26.63	49.06	-22.43	AVG	
5	1.7380	31.56	10.20	41.76	56.00	-14.24	QP	
6	1.7380	21.86	10.20	32.06	46.00	-13.94	AVG	
7	2.8780	29.82	10.21	40.03	56.00	-15.97	QP	
8	2.8780	20.81	10.21	31.02	46.00	-14.98	AVG	
9	4.2540	28.74	10.24	38.98	56.00	-17.02	QP	
10	4.2540	20.03	10.24	30.27	46.00	-15.73	AVG	
11	16.9780	20.13	10.57	30.70	60.00	-29.30	QP	
12	16.9780	12.53	10.57	23.10	50.00	-26.90	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	50.80	10.10	60.90	65.99	-5.09	QP	
2	0.1500	37.90	10.10	48.00	55.99	-7.99	AVG	
3	0.2900	29.10	10.11	39.21	60.52	-21.31	QP	
4	0.2900	15.15	10.11	25.26	50.52	-25.26	AVG	
5	1.6019	30.77	10.20	40.97	56.00	-15.03	QP	
6	1.6019	21.26	10.20	31.46	46.00	-14.54	AVG	
7	1.7740	31.77	10.19	41.96	56.00	-14.04	QP	
8	1.7740	22.36	10.19	32.55	46.00	-13.45	AVG	
9	2.4780	33.12	10.20	43.32	56.00	-12.68	QP	
10	2.4780	22.77	10.20	32.97	46.00	-13.03	AVG	
11	4.1940	30.62	10.23	40.85	56.00	-15.15	QP	
12	4.1940	21.34	10.23	31.57	46.00	-14.43	AVG	



## 7 Radiated Spurious Emissions

Test Requirement: FCC Part15 Paragraph 15.231(a)

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Fundamental Frequency (MHz)	Field Strength of Fundamental (uV/m)	Field Strength of Fundamental (dBuV/m)	Field Strength of Spurious Emission (uV/m)	Field Strength of Spurious Emission (dBuV/m)
44.66-40.70	2250	67	225	47
70-130	1250	62	125	42
130-174	1250 to 3750	62 to 71.48	125 to 375	42 to 51.48
174-260	3750	71.48	375	51.48
260-470	3750 to 12500	71.48 to 81.94	375 to 1250	51.48 to 61.94
Above 470	12500	81.94	1250	61.94
** linear interpolations				

### 7.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 51.1 % RH

Atmospheric Pressure: 101.2kPa

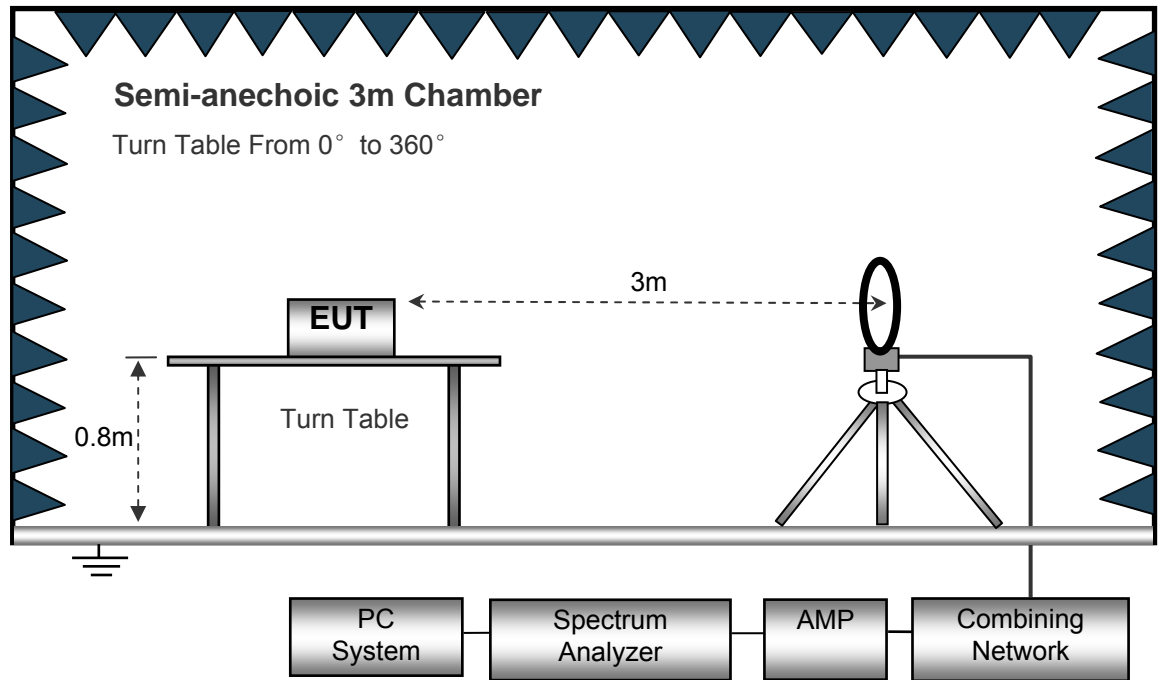
EUT Operation :

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

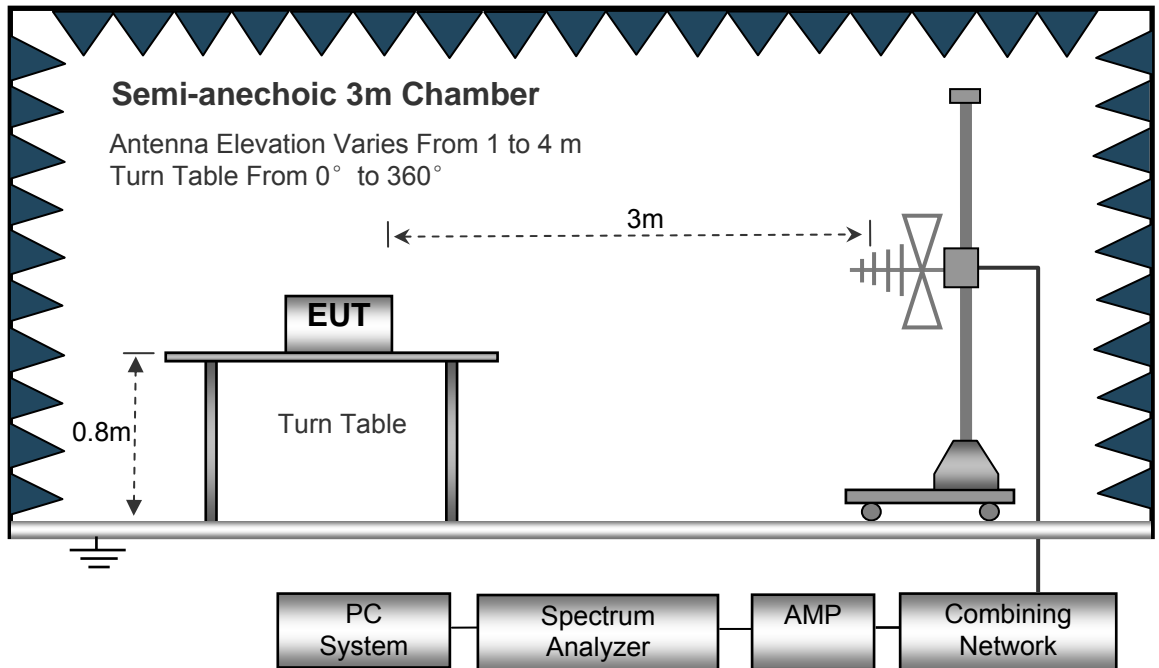
## 7.2 Test Setup

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

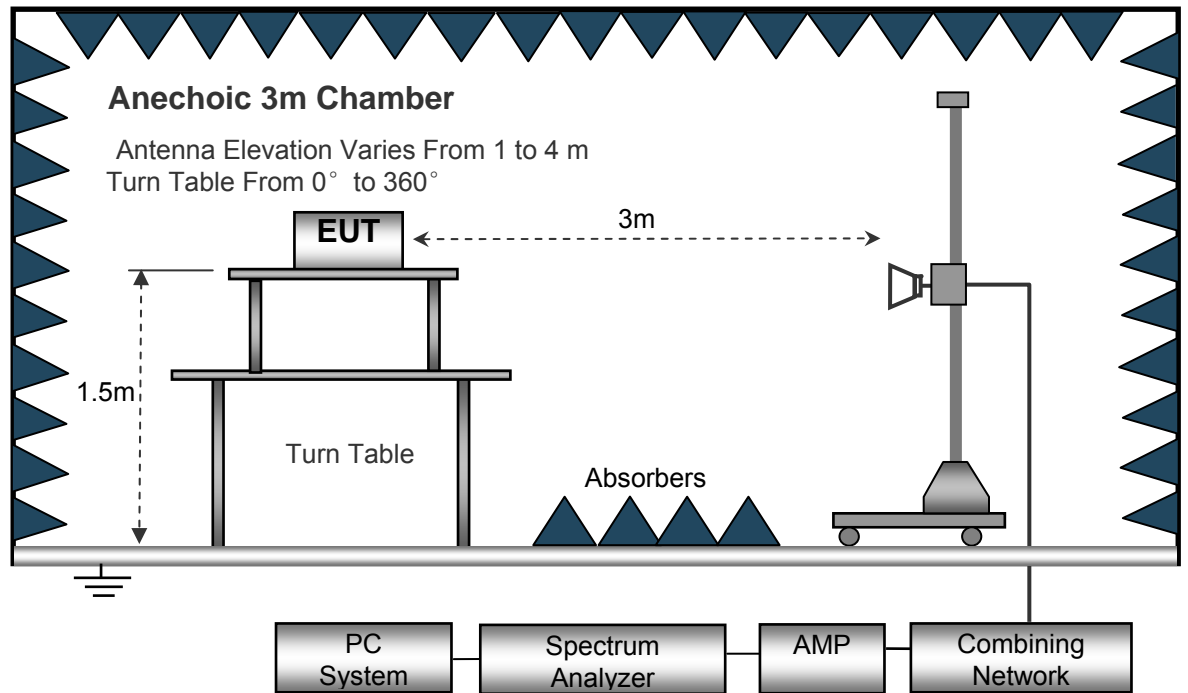
The test setup for emission measurement below 30MHz.



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



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 ~ 1GHz

Sweep Speed .....Auto  
 Detector .....PK  
 Resolution Bandwidth.....100kHz  
 Video Bandwidth.....300kHz

Above 1GHz

Sweep Speed .....Auto  
 Detector .....PK  
 Resolution Bandwidth.....1MHz  
 Video Bandwidth.....3MHz

## 7.4 Test Procedure

1. The EUT is placed on a turntable. For below 1GHz, the EUT is 0.8m above ground plane; For above 1GHz, 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 Summary of Test Results

### Test Frequency :Below 30MHz

The measurements were more than 20 dB below the limit and not reported.

### Test Frequency : 30MHz ~ 5GHz

#### Lower channel: 433.107MHz

Frequency (MHz)	Receiver Reading (PK) (dBμV)	Turn table Angle Degree	RX Antenna		Corrected Factor (dB/m)	Corrected Amplitude (PK) (dBμV/m)	FCC Part 15.231/15.209/205	
			Height (m)	Polar (H/V)			Limit (dBμV/ m)	Margin (dB)
433.107	100.25	85	1.6	H	-7.31	92.94	100.80	-7.86
866.214	65.08	295	1.6	H	0.04	65.12	80.80	-15.68
1819.321	52.16	227	1.5	H	-16.38	35.78	74.00	-38.22
2732.082	58.29	160	1.3	H	-14.87	43.42	74.00	-30.58
433.107	95.17	98	1.6	V	-7.31	87.86	100.80	-12.94
866.214	64.97	118	1.4	V	0.04	65.01	80.80	-15.79
1819.321	53.87	357	1.5	V	-16.38	37.49	74.00	-36.51
2732.082	58.74	227	1.1	V	-14.87	43.87	74.00	-30.13

**AV = Peak +20Log<sub>10</sub>(duty cycle) =PK+(-25.04)** [refer to section 8 for more detail]

Frequency (MHz)	PK (dBμV/m)	RX Antenna Polar (H/V)	Duty cycle Factor (dB)	Calculated AV (dBμV/m)	FCC Part 15.231/209/205	
					Limit (dBμV/m)	Margin (dB)
433.107	92.94	H	-25.04	67.90	80.80	-12.90
866.214	65.12	H	-25.04	40.08	60.80	-20.72
1819.321	35.78	H	-25.04	10.74	54.00	-43.26
2732.082	43.42	H	-25.04	18.38	54.00	-35.62
433.107	87.86	V	-25.04	62.82	80.80	-17.98
866.214	65.01	V	-25.04	39.97	60.80	-20.83
1819.321	37.49	V	-25.04	12.45	54.00	-41.55
2732.082	43.87	V	-25.04	18.83	54.00	-35.17

**Upper channel: 434.833MHz**

Frequency	Receiver Reading (PK)	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude (PK)	FCC Part 15.231/15.209/205	
			Height	Polar			Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)
434.833	99.94	8	1.8	H	-7.28	92.66	100.86	-8.14
869.666	64.87	100	2.0	H	0.05	64.92	80.86	-15.88
1816.259	51.34	131	1.8	H	-16.41	34.93	74.00	-39.07
2733.678	57.99	289	1.4	H	-14.85	43.14	74.00	-30.86
434.833	98.26	171	1.2	V	-7.28	90.98	100.86	-9.82
869.666	63.52	85	1.5	V	0.05	63.57	80.86	-17.23
1816.259	52.06	200	1.2	V	-16.41	35.65	74.00	-38.35
2733.678	56.82	142	1.4	V	-14.85	41.97	74.00	-32.03

$$AV = \text{Peak} + 20\text{Log}_{10}(\text{duty cycle}) = \text{PK} + (-25.04) \text{ [refer to section 8 for more detail]}$$

Frequency	PK	RX Antenna Polar	Duty cycle Factor	Calculated AV	FCC Part 15.231/209/205	
					Limit	Margin
(MHz)	(dBμV/m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
434.833	92.66	H	-25.04	67.62	80.86	-13.18
869.666	64.92	H	-25.04	39.88	60.86	-10.92
1816.259	34.93	H	-25.04	9.89	54.00	-44.11
2733.678	43.14	H	-25.04	18.10	54.00	-35.90
434.833	90.98	V	-25.04	65.94	80.86	-14.86
869.666	63.57	V	-25.04	38.53	60.86	-22.27
1816.259	35.65	V	-25.04	10.61	54.00	-43.39
2733.678	41.97	V	-25.04	16.93	54.00	-37.07

## 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

$$\text{Duty Cycle(\%)} = \text{Total On interval in a complete pulse train} / \text{Length of a complete pulse train} * \%$$

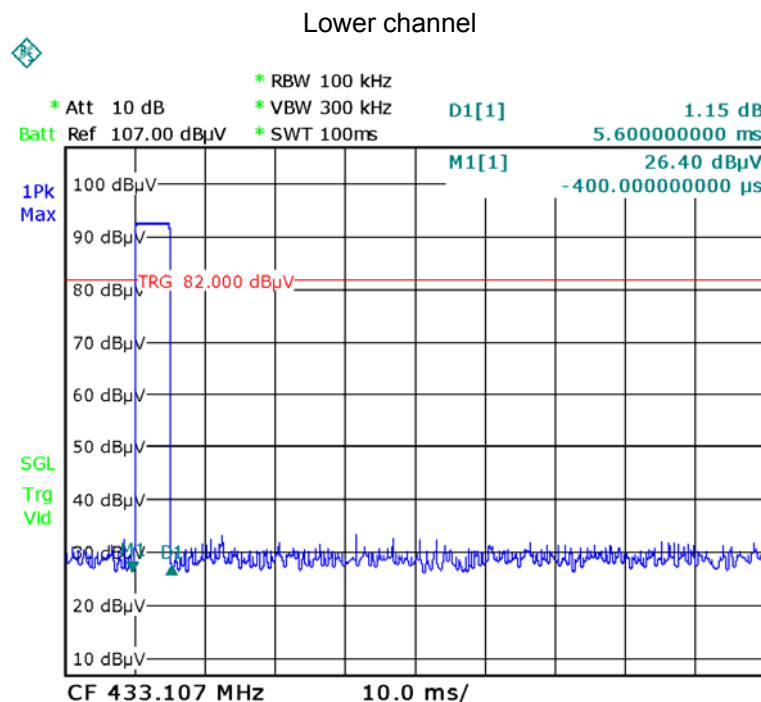
$$\text{Duty Cycle Correction Factor(dB)} = 20 * \text{Log}_{10}(\text{Duty Cycle(\%)})$$

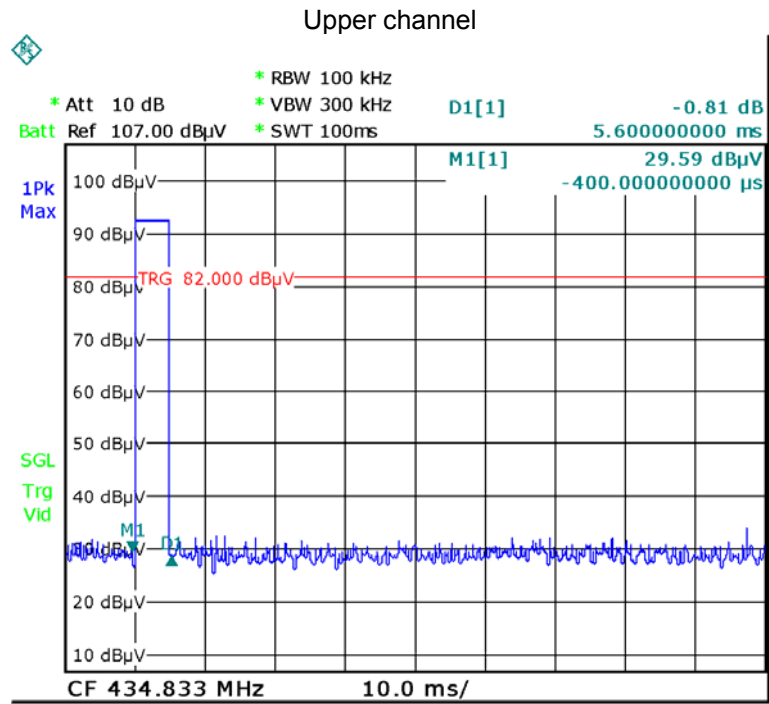
Total transmission time(ms)	5.6
Length of a complete transmission period(ms)	100
Duty Cycle(%)	5.6
Duty Cycle Correction Factor(dB)	-25.04

Refer to the duty cycle plot (as below), This device meets the FCC requirement.

Length of a complete pulse train:

Remark: FCC part15.35(c) required that a complete pulse train is more than 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

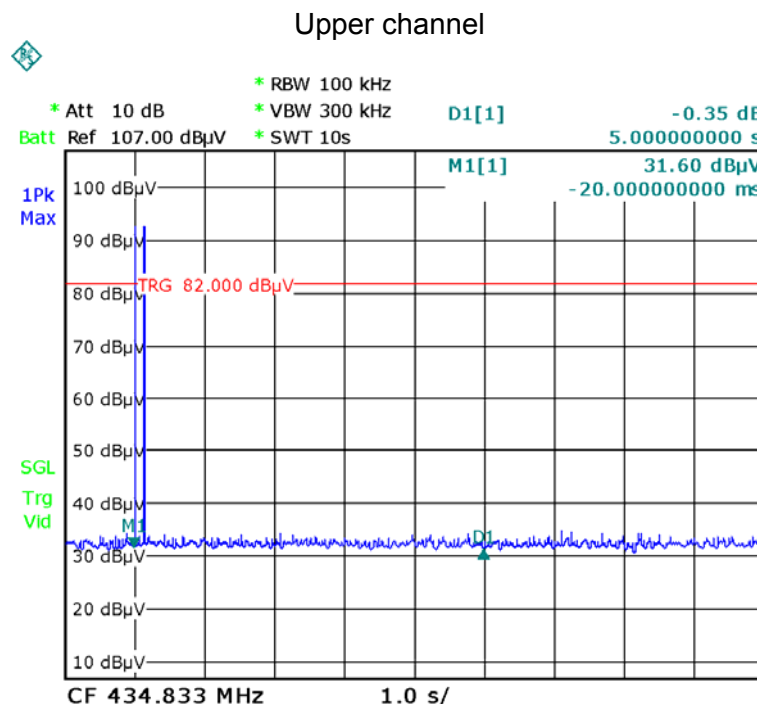
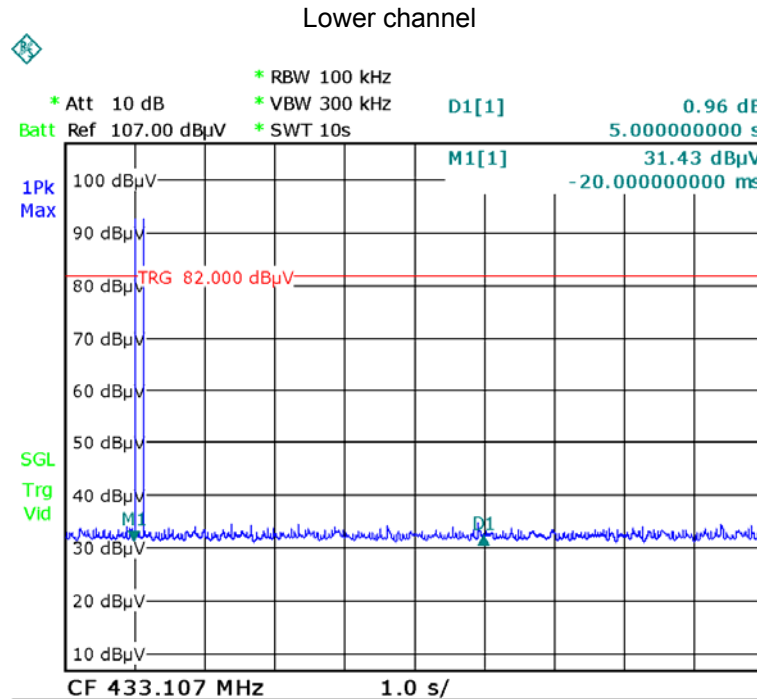






FCC Part15.231(a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

(2)A transmitter activated automatically shall cease transmission within 5 seconds after activation.



## 9 Emission Bandwidth

Test Requirement:	FCC Part15.231(c)
Test Method:	FCC Part15.231(c)
Limit	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency.

### 9.1 Test Procedure

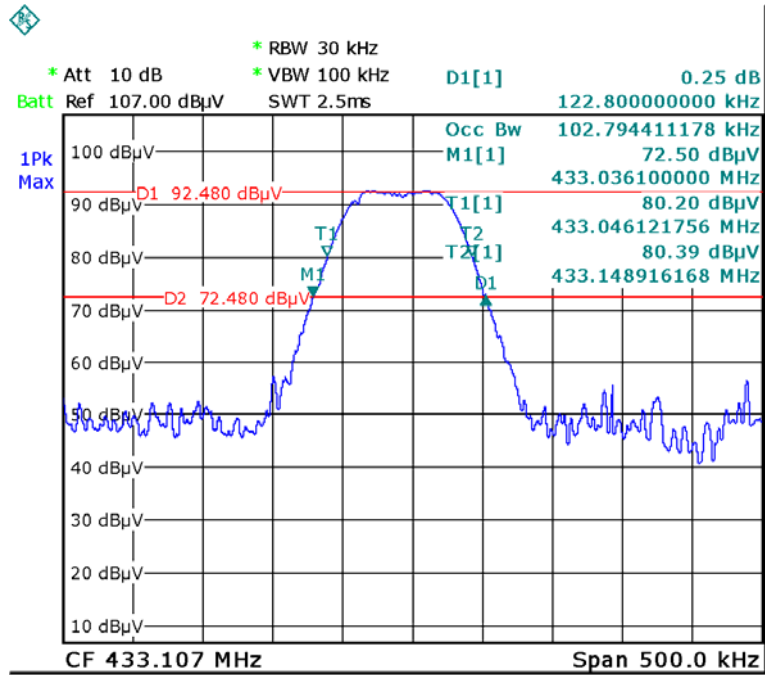
1. The transmitter output (antenna port) was connected to the spectrum analyzer. EUT and its simulators are placed on a table, let EUT working in test mode, then test it.
2. The bandwidth of the fundamental frequency was measure by spectrum analyser with 3kHz RBW and 10kHz VBW. The 20 dB & 99% bandwidth was recorded.

### 9.2 Test Result

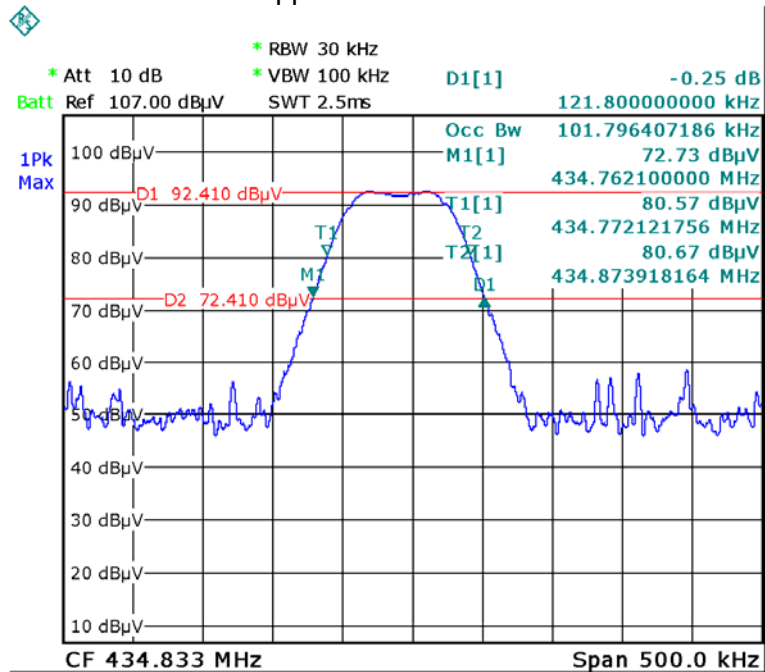
Frequency (MHz)	20dB Bandwidth Emission(KHz)	99% Bandwidth Emission(KHz)	Limit (KHz)	Result
433.107	122.80	102.79	1082.77	Pass
434.833	121.80	101.80	1087.08	Pass

$$\text{Limit} = \text{Center Frequency} * 0.25\%$$

Test Plot  
Lower channel



Upper channel



## **10 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. The use of a permanently attached antenna to the intentional radiator shall be considered sufficient to comply with the provisions of this section. This product use a Monopole antenna with RP SMA connector(the whorl is non-standard, it only apply to this model), fulfill the requirement of this section

## 11 Photographs – Model XASC04 Test Setup

### 11.1 Photograph – Conducted Emission Test Setup



### 11.2 Photograph – Radiation Spurious Emission Test Setup

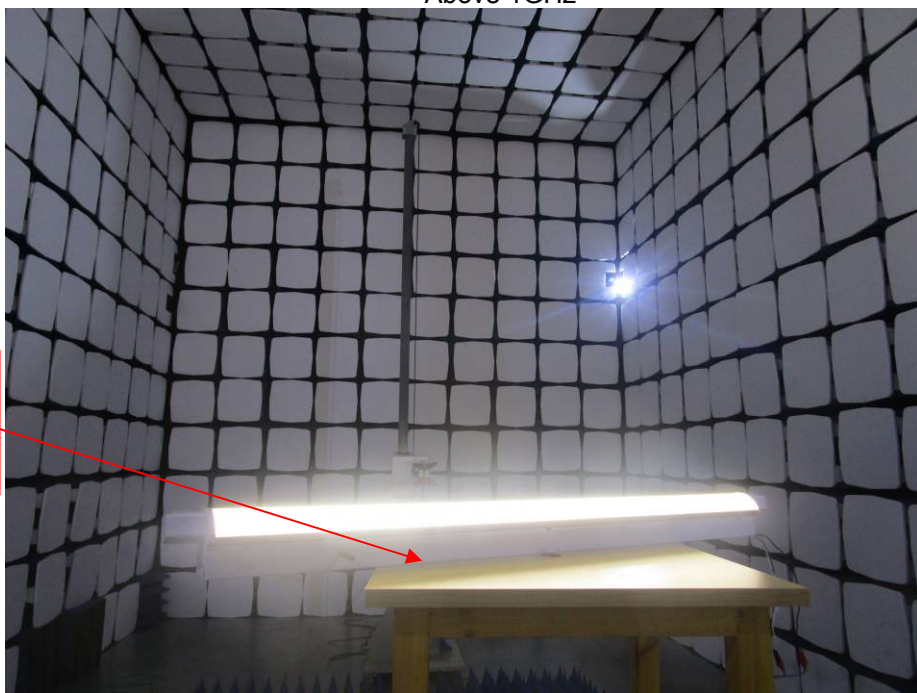
Below 30MHz



30MHz-1GHz



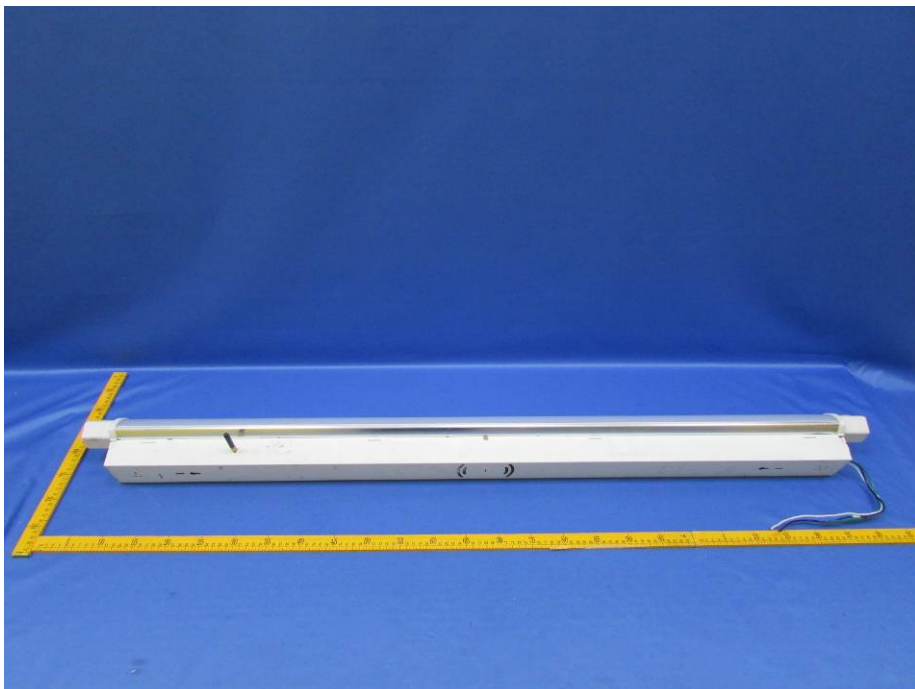
Above 1GHz

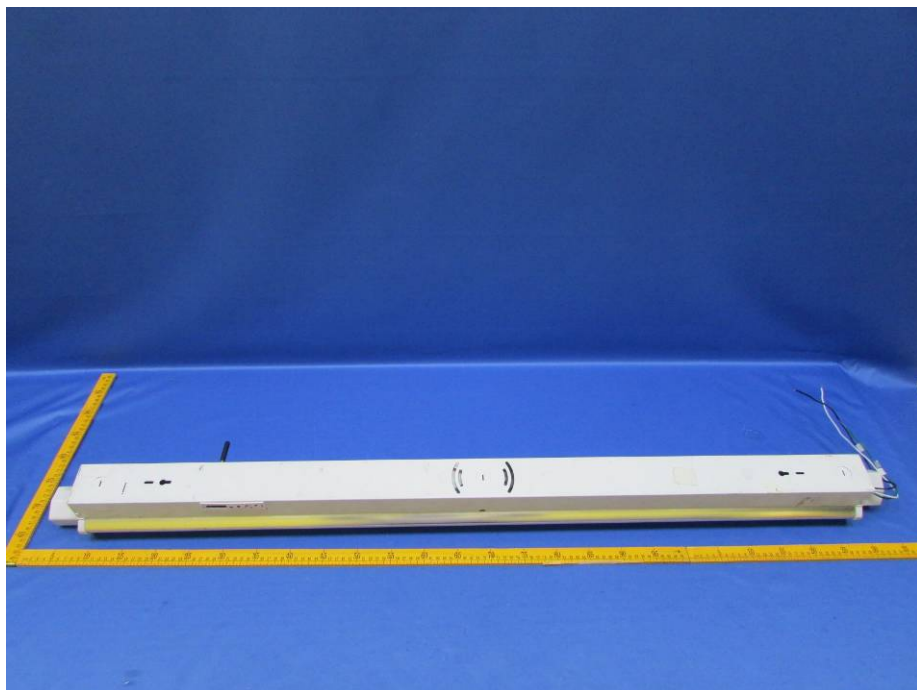
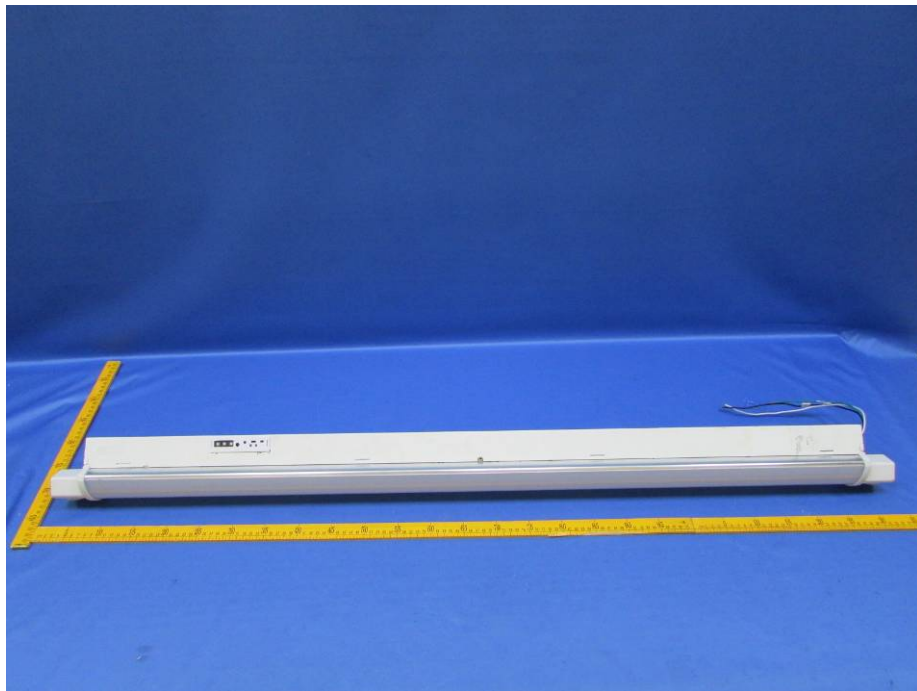


1.5m above  
the ground

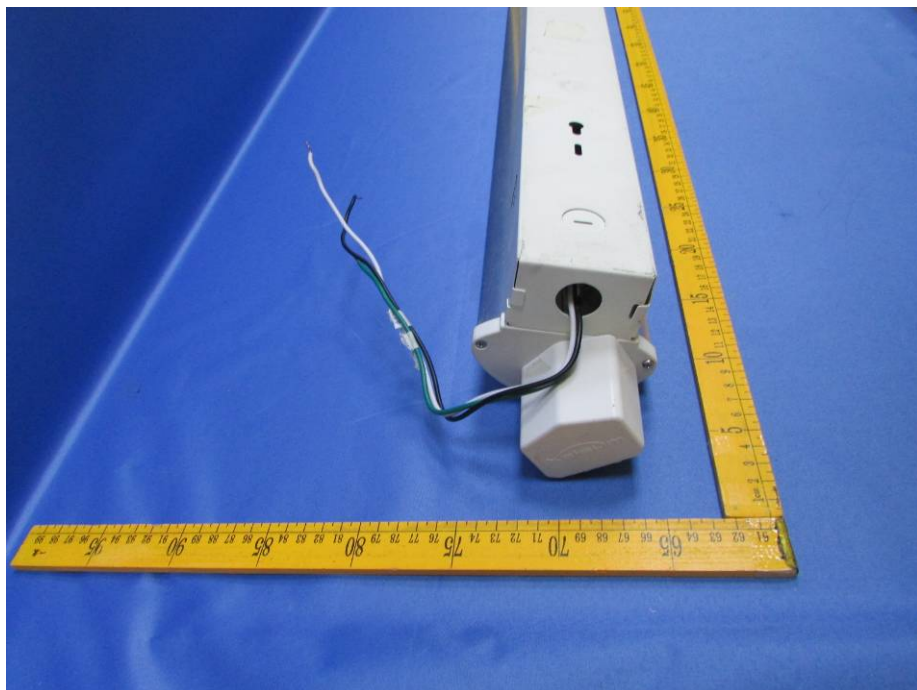
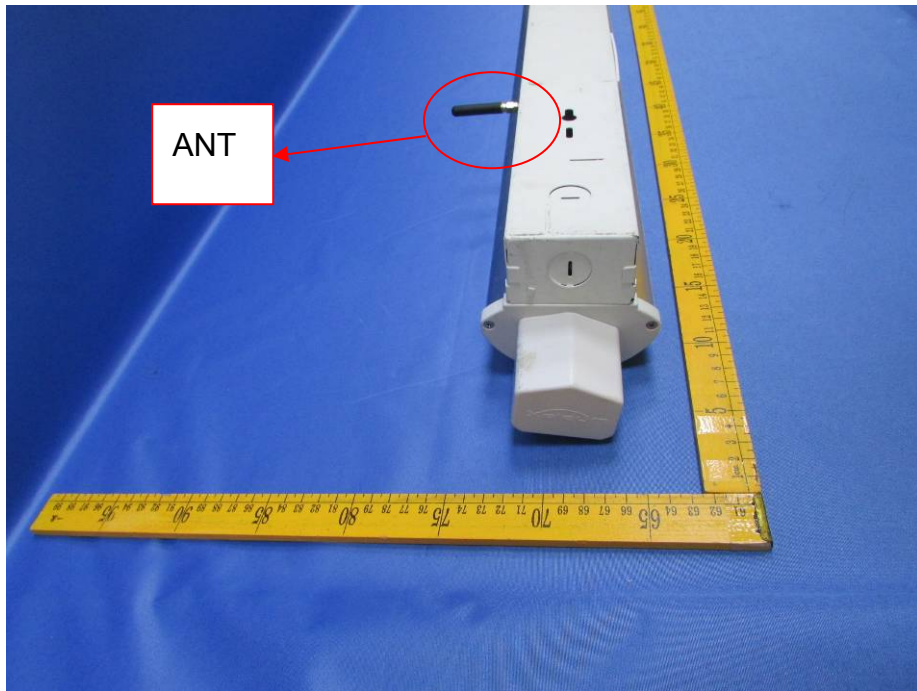
## 12 Photographs - Constructional Details

### 12.1 Model XASC04- External Photos

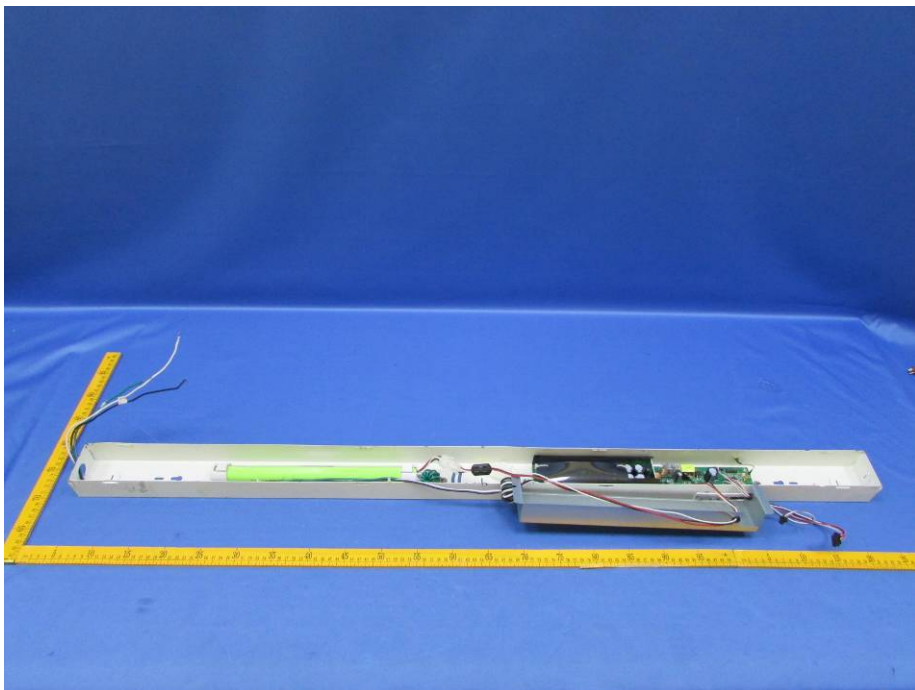
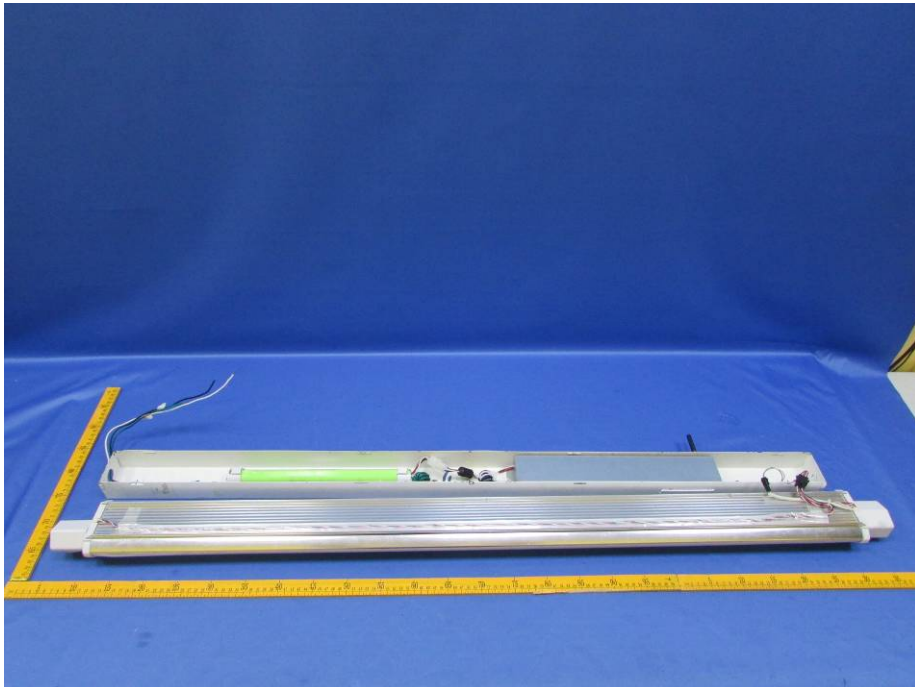


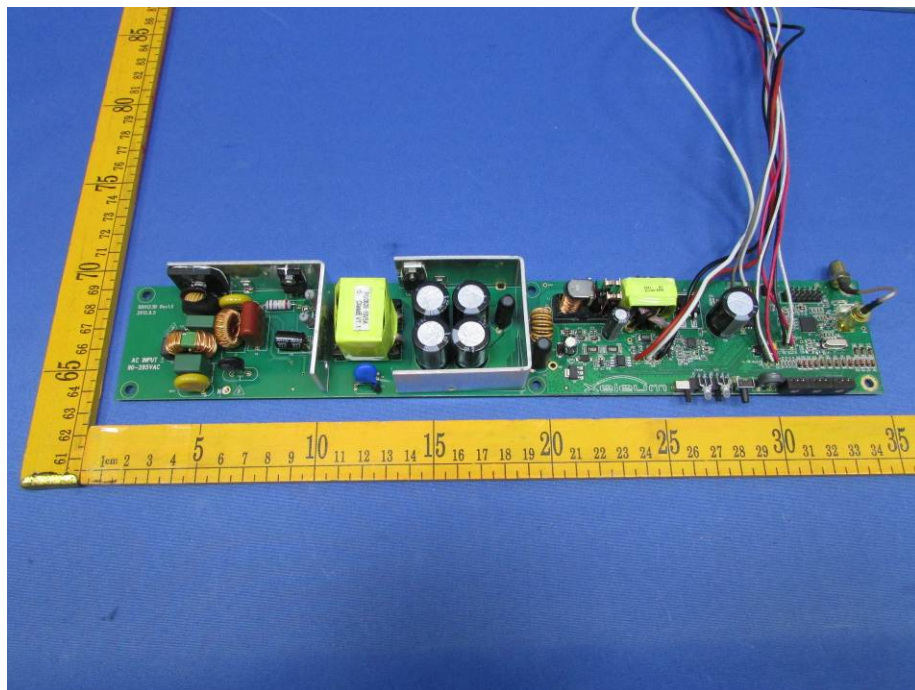
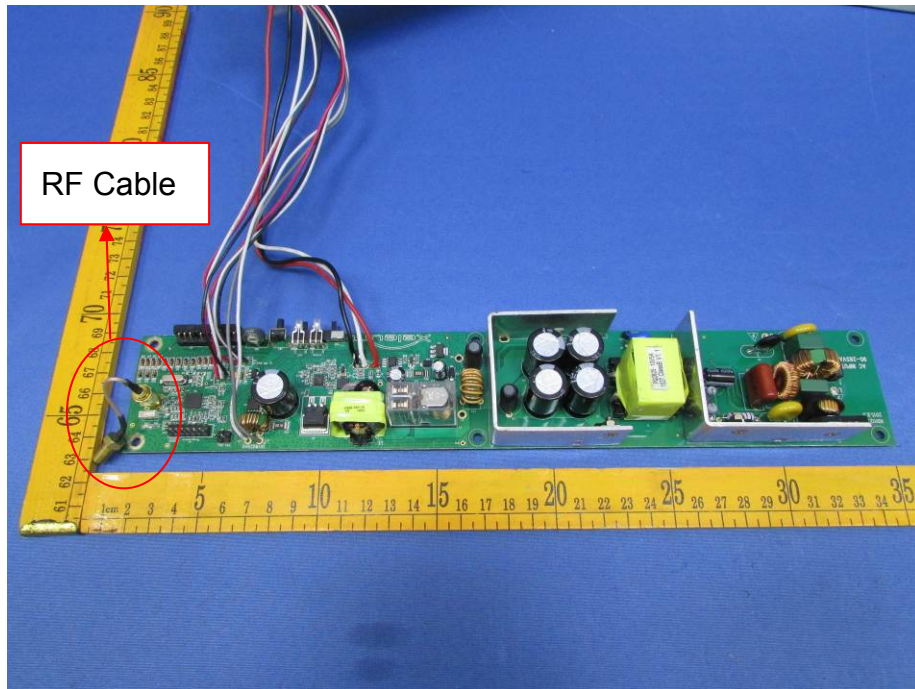


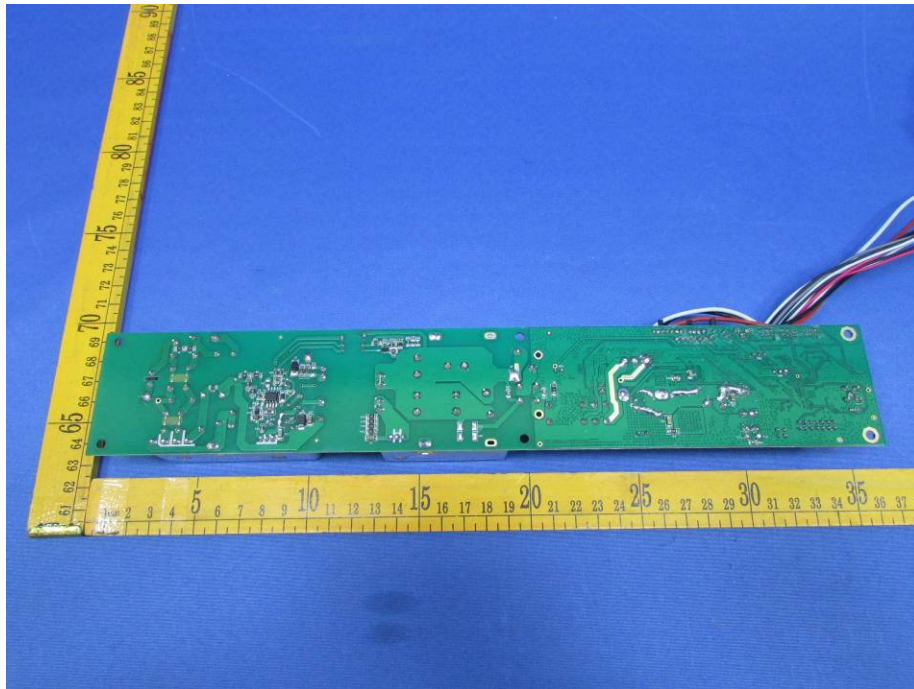




## 12.2 Model XASC04- Internal Photos









====End of Report====