

**TEST REPORT****FCC PART 15B****Report Reference No.**.....: **TZ210902558-E**

Compiled by

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Date of issue.....: 2021/11/3

Representative Laboratory Name: Shenzhen Tongzhou Testing Co.,Ltd

Address.....: 1th Floor, Building 1, Haomai High-tech Park, Huating Road 387, Dalang Street, Longhua, Shenzhen, China

Applicant's name.....: **Dongguan YINYAN Electric Tech.LTD**

Address.....: EMAX Industrial Park, Gao-long Industrial Zone, Huanzhuli Village, Changping Town, Dongguan City, Guangdong Province, China

Test specification:Standard: **FCC Part 15B**

TRF Originator.....: Shenzhen Tongzhou Testing Co.,Ltd

Master TRF.....: Dated 2021-06

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Test item description: Tinyhawk 3

Trade Mark: EMAX

Model/Type reference.....: Tinyhawk 3

Listed Models: N/A

Manufacturer: Dongguan YINYAN Electric Tech.LTD

Power Supply.....: 1,DC 5V in
2, DC 3.8V by batteryResult.....: **Pass**



TEST REPORT

Test Report No. : TZ210902558-E	2021/11/3 Date of issue
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Equipment under Test : Tinyhawk 3

Model /Type : Tinyhawk 3

Listed Models : N/A

Applicant : **Dongguan YINYAN Electric Tech.LTD**

Address : EMAX Industrial Park, Gao-long Industrial Zone, Huanzhuli Village, Changping Town, Dongguan City, Guangdong Province, China

Manufacturer : **Dongguan YINYAN Electric Tech.LTD**

Address : EMAX Industrial Park, Gao-long Industrial Zone, Huanzhuli Village, Changping Town, Dongguan City, Guangdong Province, China

Test Result according to the standards on page 4:	Pass
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



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1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15 Subpart B](#)

Unintentional Radiators

[ANSI C63.4-2014](#)

American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz



2. SUMMARY

2.1. General Remarks

Date of receipt of test sample : 2021/9/20

Testing commenced on : 2021/9/20

Testing concluded on : 2021/11/1

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage	<input checked="" type="radio"/> 120V / 60 Hz	<input checked="" type="radio"/> 230V / 50Hz
	<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
	<input type="radio"/> Other (specified in blank below)	

2.3. Short description of the Equipment under Test (EUT)

Tinyhawk 3

For more details, refer to the user's manual of the EUT.

2.4. EUT operation mode

The EUT has been tested under typical operating condition.

Test Item	
EMI	
Mode 1	Normal working(RX Mode) + Charging

2.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

○ - supplied by the manufacturer

● - supplied by the lab

● Adapter	Model :	A8A-05015U-US2
	Input:	100-240V-50/60Hz-0.35A
	Output:	5V1.5A



2.6. Related Submittal(s) / Grant (s)

This test report is intended for HAA filing to comply with the FCC Part 15, Subpart B Rules.

2.7. Modifications

No modifications were implemented to meet testing criteria.

2.8. Test Result Summary

Test Item	Test Requirement	Standard Paragraph	Result
Radiated Emission	FCC PART 15	Section 15.109	PASS
Conducted Emission	FCC PART 15	Section 15.107	PASS



3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Tongzhou Testing Co.,Ltd
1th Floor, Building 1, Haomai High-tech Park, Huating Road 387, Dalang Street, Longhua, Shenzhen, China
The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2014) and CISPR Publication 22.

3.2. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	<u>15-35 ° C</u>
Humidity:	<u>30-60 %</u>
Atmospheric pressure:	<u>950-1050mbar</u>

3.3. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Tongzhou Testing Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Tongzhou Testing Co.,Ltd is reported:

Test Item	Frequency Range	Uncertainty	Note
Radiation Uncertainty	30MHz~1000MHz	±3.92dB	(1)
	1GHz~40GHz	±4.28dB	(1)
Conduction Uncertainty	150kHz~30MHz	±2.71dB	(1)

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



3.4. Equipments Used during the Test

Conducted emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	100849/003	2021/1/4	2022/1/3
2	Artificial Mains	ROHDE & SCHWARZ	ENV 216	101333-IP	2021/1/4	2022/1/3
3	EMI Test Software	ROHDE & SCHWARZ	ESK1	V1.71	N/A	N/A

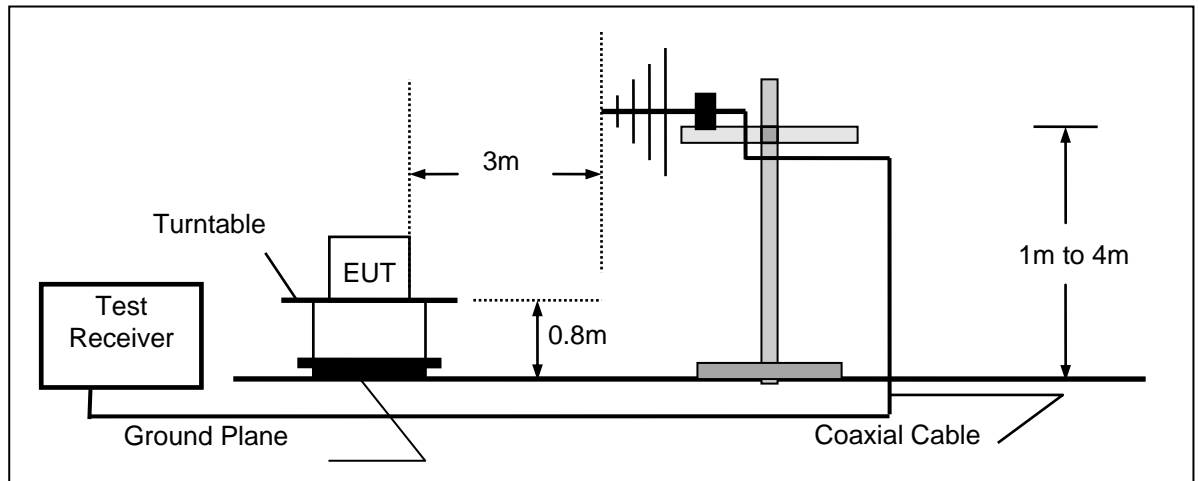
Radiated emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due
1	Test Receiver	R&S	ESCI-7	100849/003	2021/1/4	2022/1/3
2	wideband Antenna	schwarzbeck	VULB 9163	958	2019/11/16	2022/11/15
3	Horn Antenna	schwarzbeck	9120D-1141	1574	2019/11/16	2022/11/15
4	Amplifier	schwarzbeck	BBV 9743	209	2021/1/4	2022/1/3
5	Amplifier	Tonscend	TSAMP-0518SE	--	2021/1/4	2022/1/3
6	Postional Controller	MF	MF7802	--	--	--
7	RE test software	Tonscend	JS32-RE	V2.0.2.0	--	--

4. TEST CONDITIONS AND RESULTS

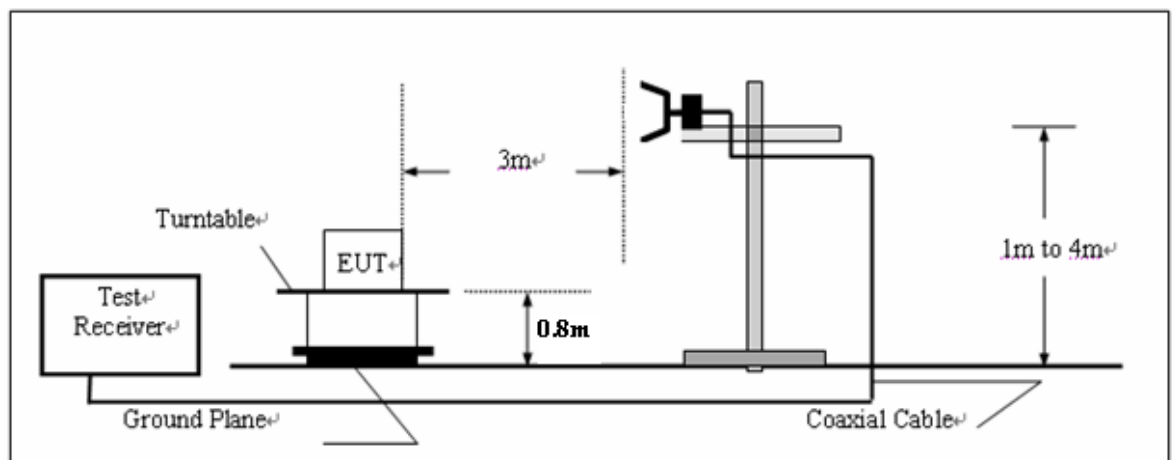
4.1. Radiated Emission Test

TEST CONFIGURATION

Radiated Emission Test Set-Up, Frequency below 1000MHz



Radiated Emission Test Set-Up, Frequency above 1000MHz





Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

RADIATION LIMIT

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

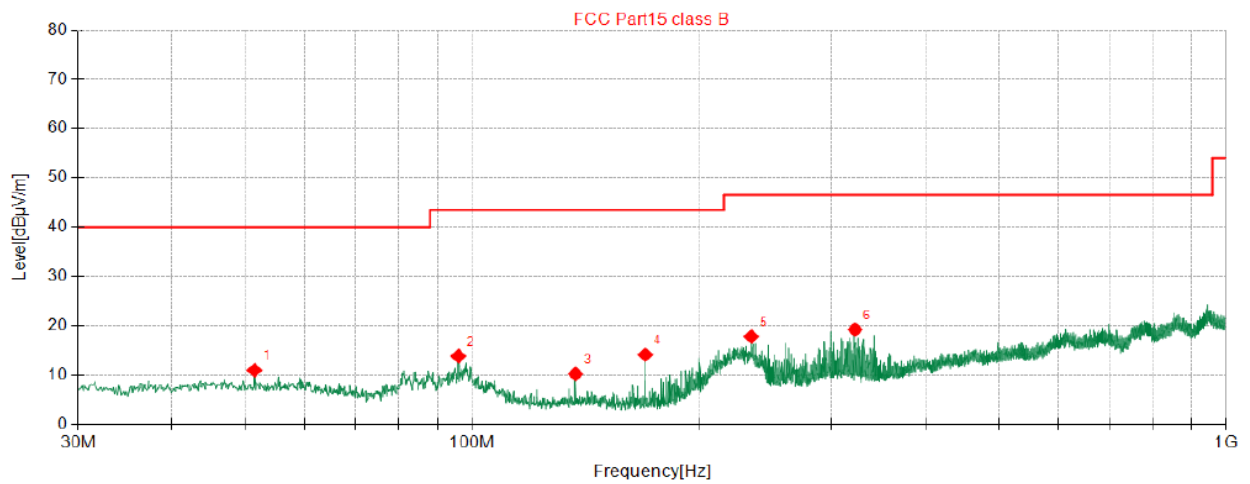
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

Test Procedure

1. The EUT is placed on a turntable, which is 0.8m 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 varied from 1m to 4m to find out the highest emissions.
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.

Radiation Test Results

**Below 1000MHz****Polarization: Horizontal**

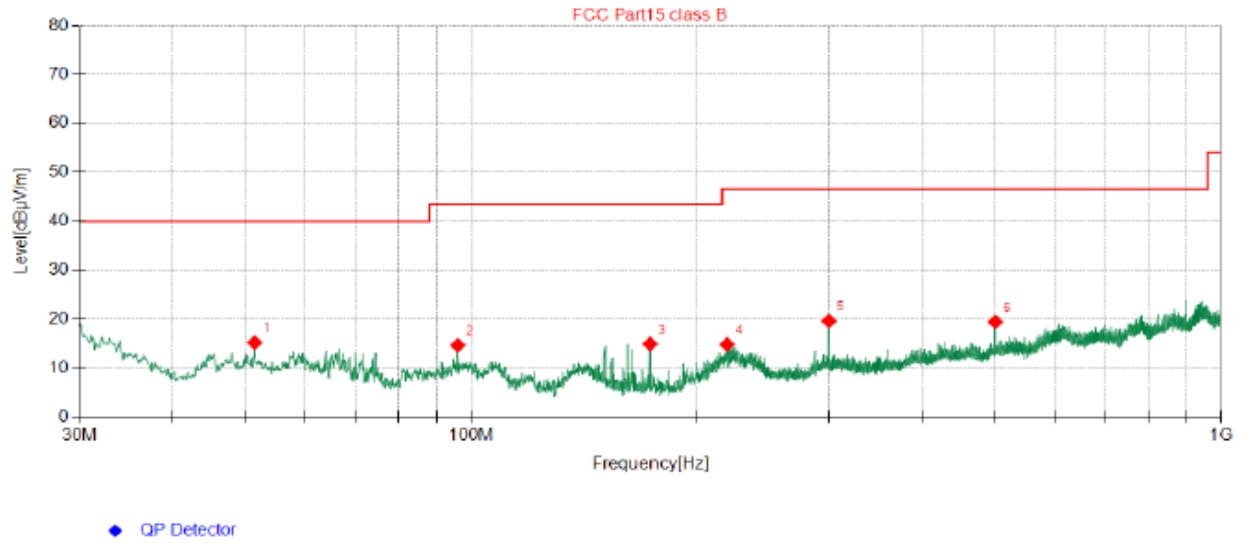
◆ QP Detector

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	51.46	25.37	-14.39	10.98	40.00	29.02	300	13	Horizontal
2	95.96	30.52	-16.67	13.85	43.50	29.65	300	39	Horizontal
3	137.1	29.61	-19.38	10.23	43.50	33.27	300	110	Horizontal
4	169.8	32.22	-18.08	14.14	43.50	29.36	100	269	Horizontal
5	234.7	32.18	-14.35	17.83	46.50	28.67	100	303	Horizontal
6	322.3	31.42	-12.19	19.23	46.50	27.27	100	103	Horizontal

***Note:

1. Level [dBμV/m] = Reading [dBμV] + Factor [dB/m]

2. Margin [dB] = Limit [dBμV/m] - Level [dBμV/m].

**Polarization: Vertical****Suspected Data List**

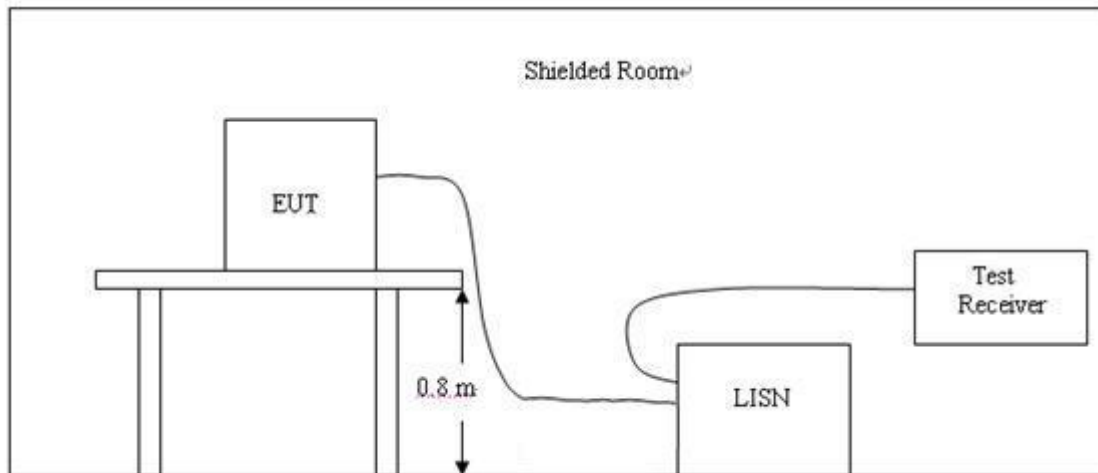
NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	51.46	29.25	-14.05	15.20	40.00	24.80	100	83	Vertical
2	95.96	30.78	-16.11	14.67	43.50	28.83	100	44	Vertical
3	173.3	31.92	-17.00	14.92	43.50	28.58	100	136	Vertical
4	219.3	29.58	-14.76	14.82	46.50	31.68	100	148	Vertical
5	300.0	31.71	-12.11	19.60	46.50	26.90	200	261	Vertical
6	499.9	27.88	-8.46	19.42	46.50	27.08	100	321	Vertical

***Note:

1. Level [dBμV/m] = Reading [dBμV] + Factor [dB/m]
2. Margin [dB] = Limit [dBμV/m] - Level [dBμV/m].

4.2. Conducted Emissions Test

TEST CONFIGURATION



TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4.
- 2 Support equipment, if needed, was placed as per ANSI C63.4.
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- 4 The EUT received power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

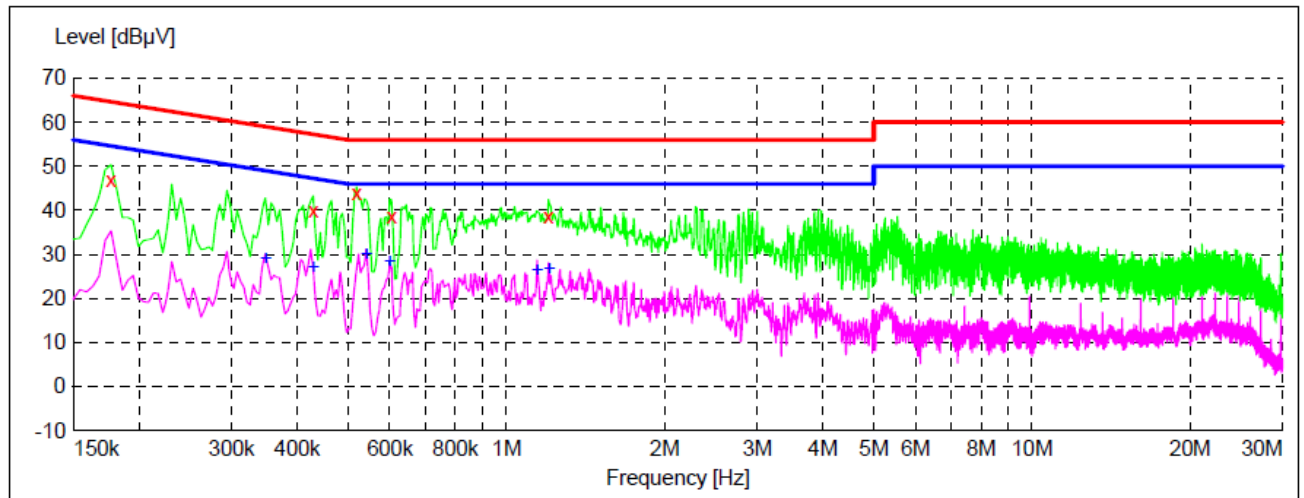
Conducted Power Line Emission Limit

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following :

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

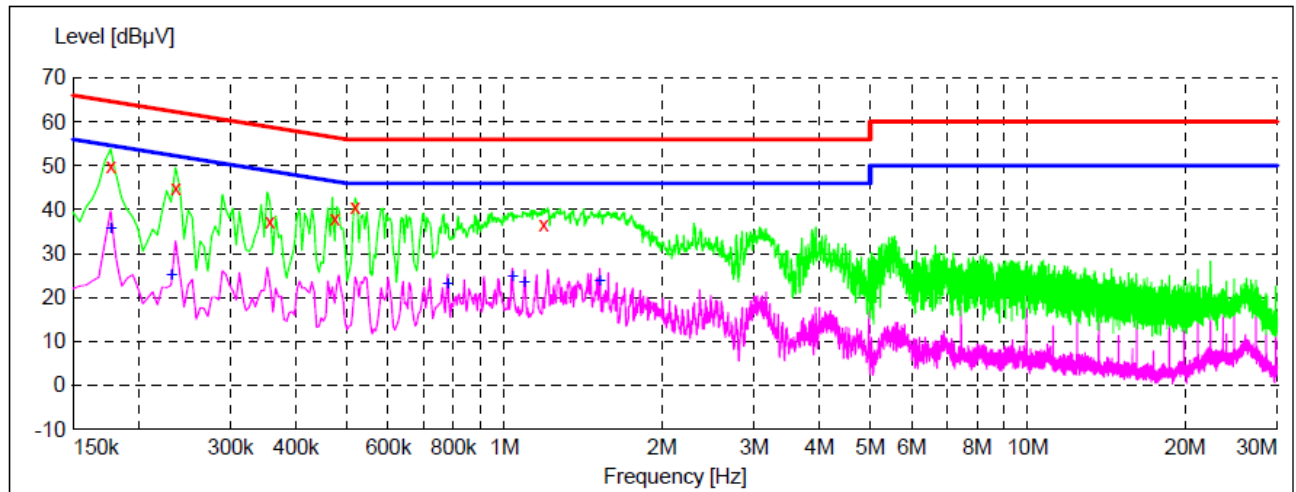
**TEST RESULTS****Live**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.177000	47.00	10.3	65	17.6	QP	L1	GND
0.429000	40.00	10.0	57	17.3	QP	L1	GND
0.519000	43.80	9.9	56	12.2	QP	L1	GND
0.604500	38.60	9.9	56	17.4	QP	L1	GND
1.203000	38.70	9.8	56	17.3	QP	L1	GND
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.348000	29.10	10.1	49	19.9	AV	L1	GND
0.429000	27.10	10.0	47	20.2	AV	L1	GND
0.541500	29.90	9.9	46	16.1	AV	L1	GND
0.600000	28.40	9.9	46	17.6	AV	L1	GND
1.144500	26.30	9.8	46	19.7	AV	L1	GND
1.207500	26.50	9.8	46	19.5	AV	L1	GND

Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.

2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz), Step size: 4 kHz, Scan time: auto.

**Neutral**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.177000	49.90	10.3	65	14.7	QP	N	GND
0.235500	44.90	10.5	62	17.4	QP	N	GND
0.357000	37.40	10.1	59	21.4	QP	N	GND
0.474000	37.90	10.0	56	18.5	QP	N	GND
0.519000	40.70	9.9	56	15.3	QP	N	GND
1.189500	36.50	9.8	56	19.5	QP	N	GND
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.177000	35.60	10.3	55	19.0	AV	N	GND
0.231000	25.10	10.5	52	27.3	AV	N	GND
0.780000	23.10	9.8	46	22.9	AV	N	GND
1.036500	24.80	9.8	46	21.2	AV	N	GND
1.090500	23.20	9.8	46	22.8	AV	N	GND
1.522500	23.80	9.7	46	22.2	AV	N	GND

Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.

2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

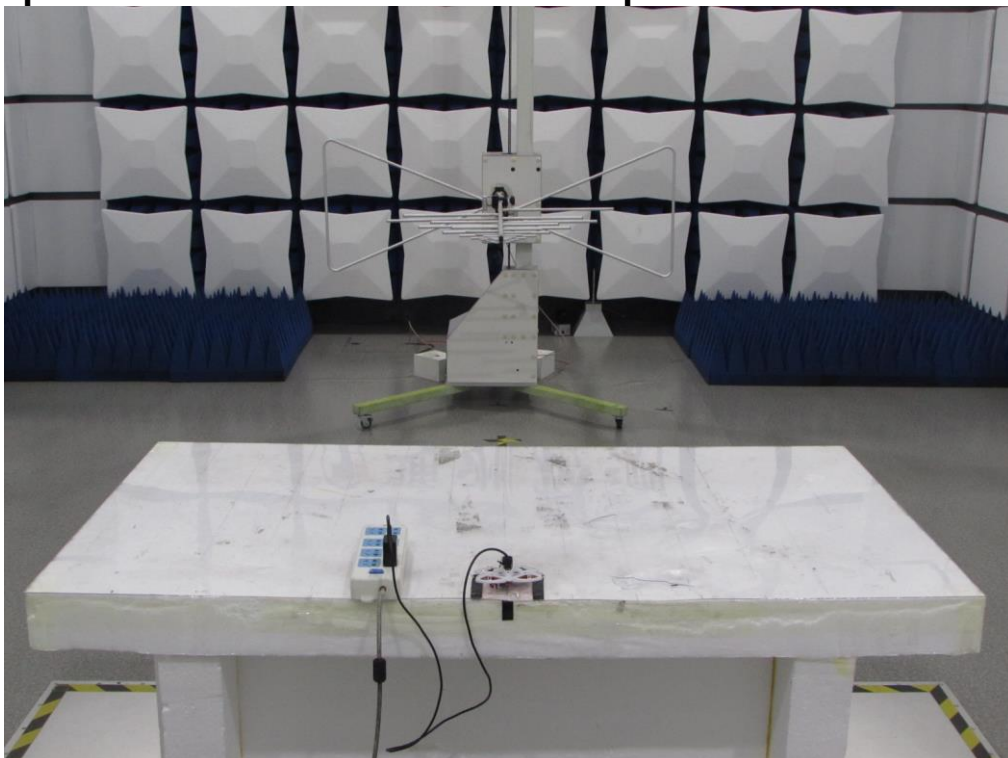
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz), Step size: 4 kHz, Scan time: auto.

5. Test Setup Photos of the EUT

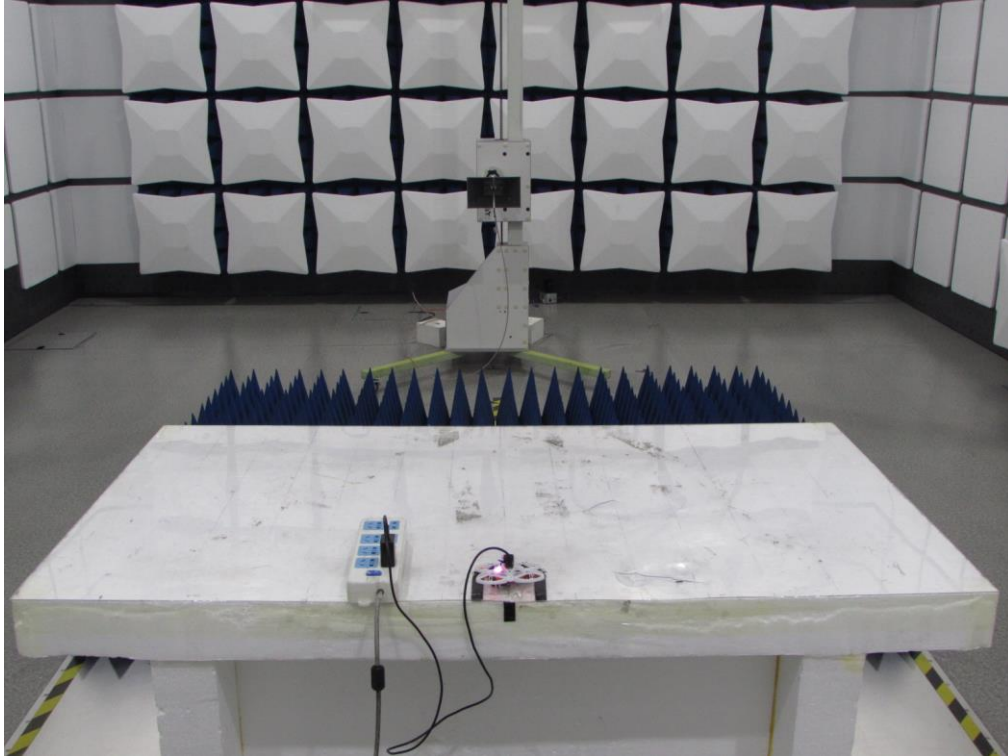
Photograph – Conducted Emission Test Setup



Photograph – Radiated Emission Test Setup-Below 1GHz

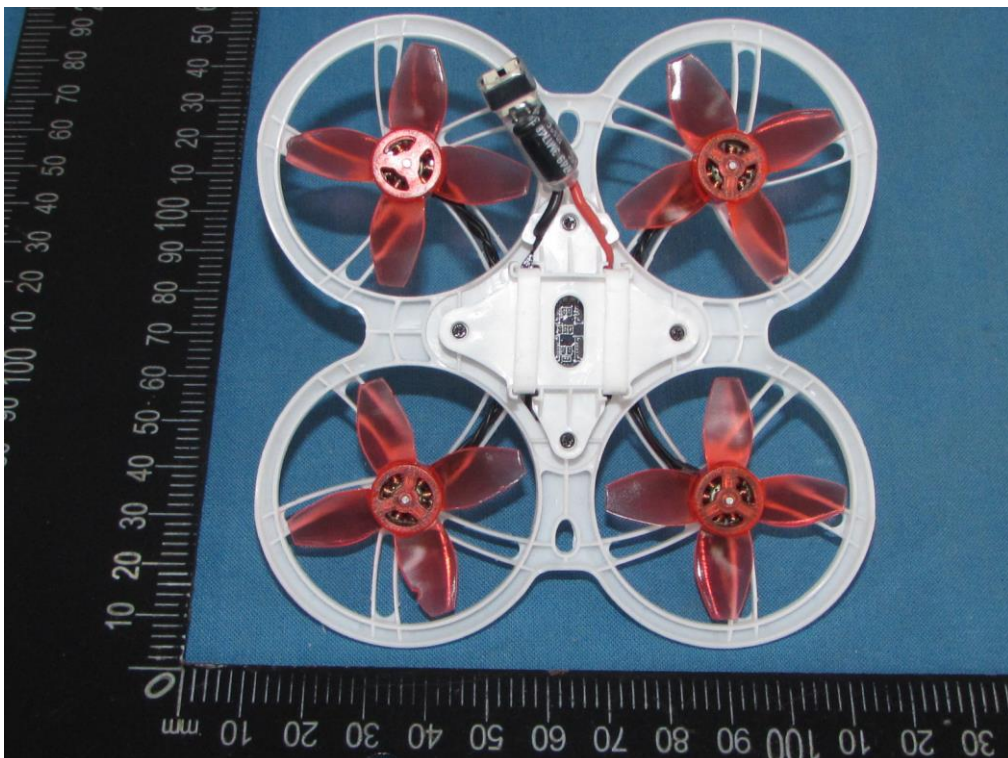


Photograph – Radiated Emission Test Setup-Above 1GHz



6. External and Internal Photos of the EUT

External Photos

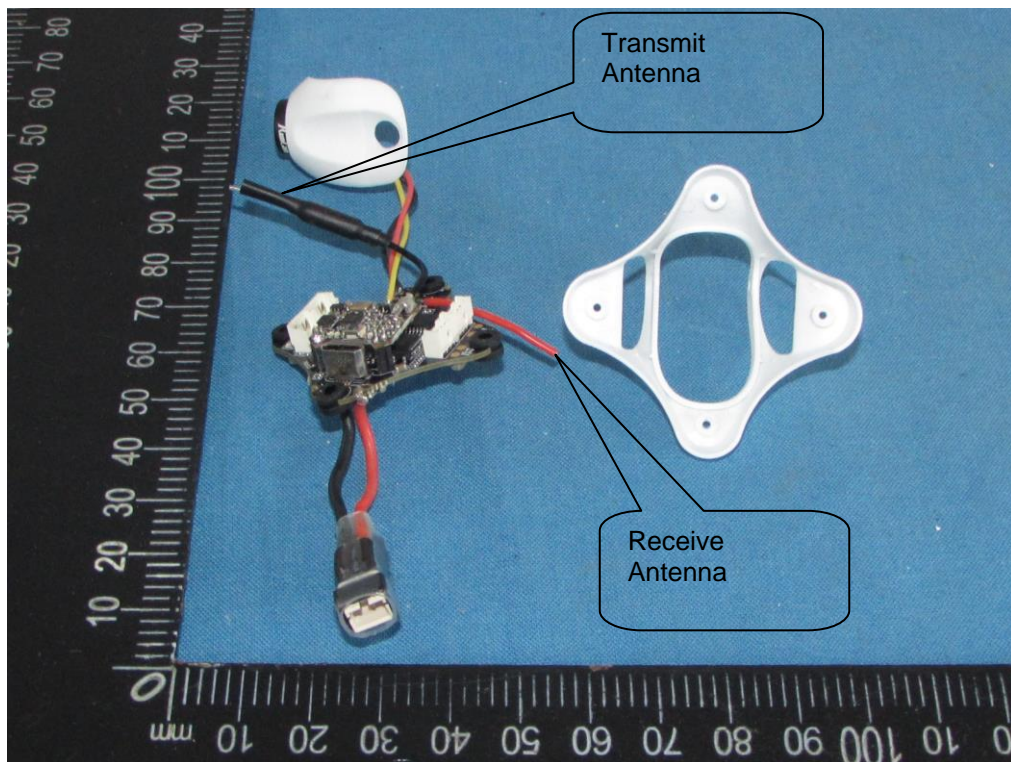
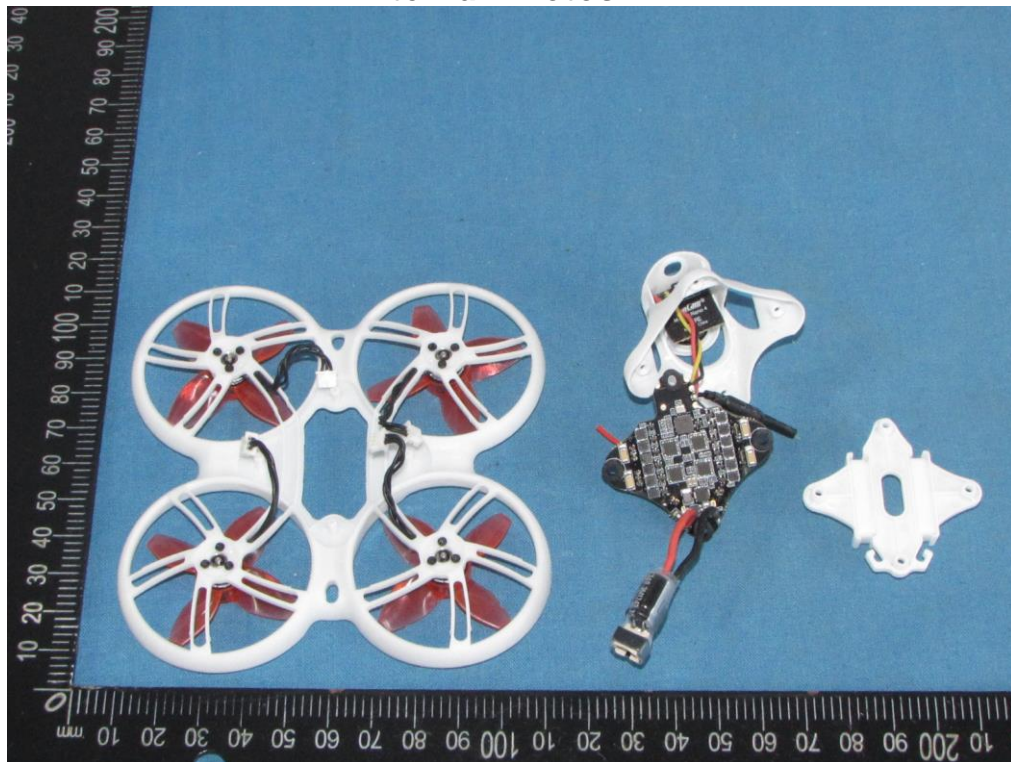


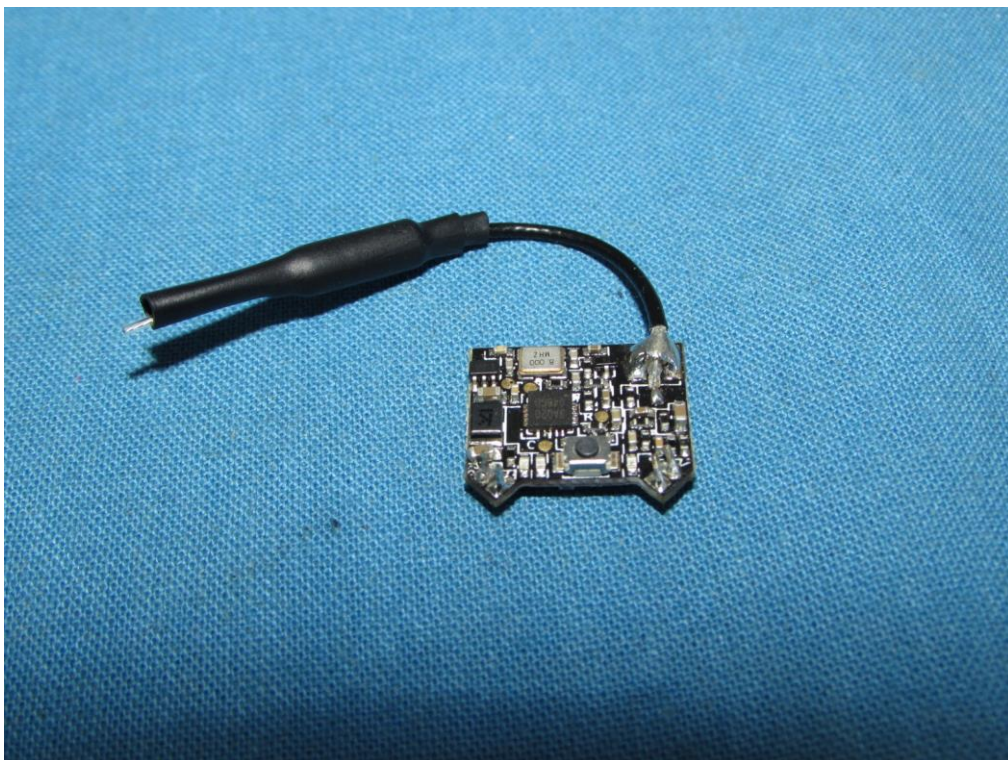
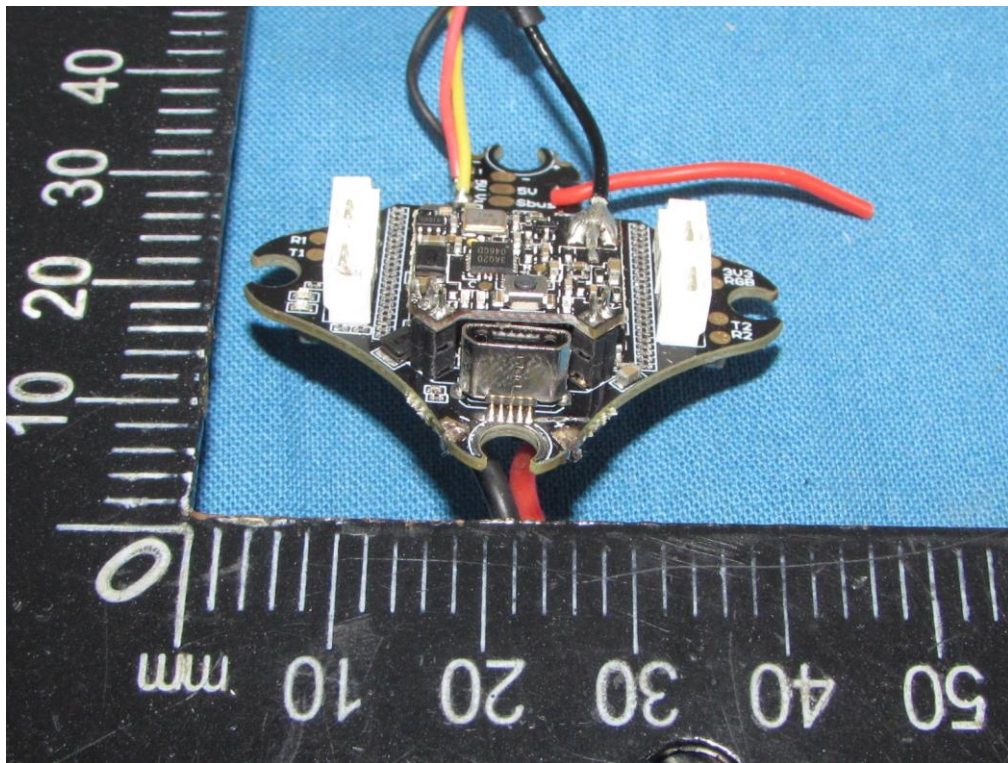


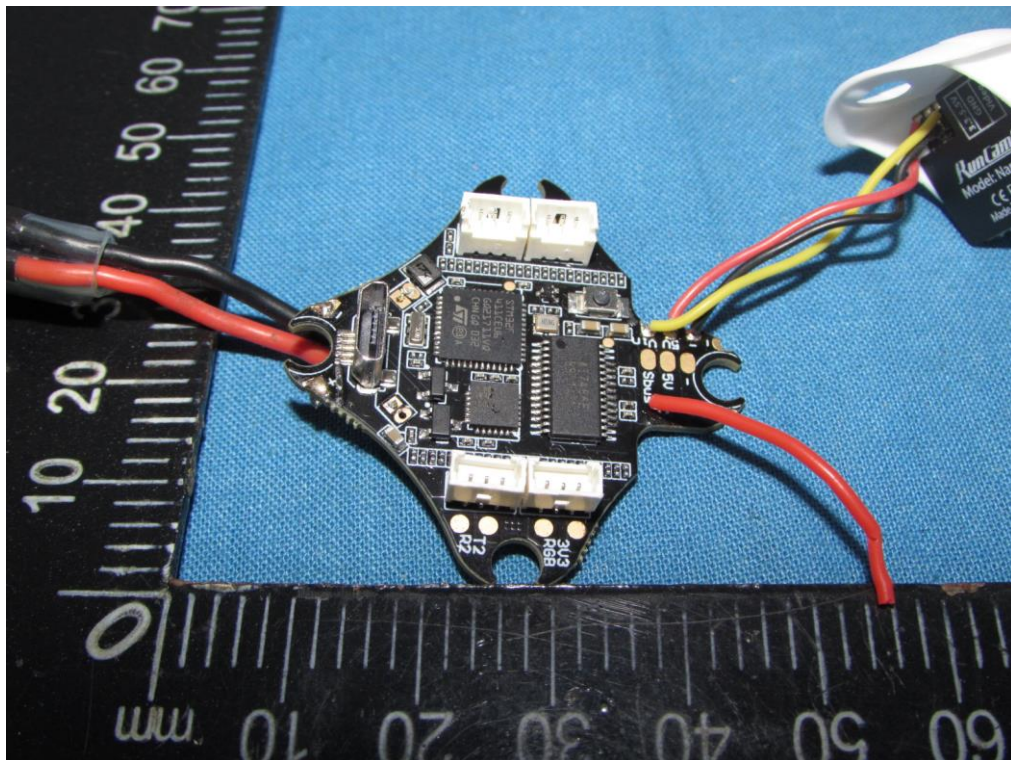
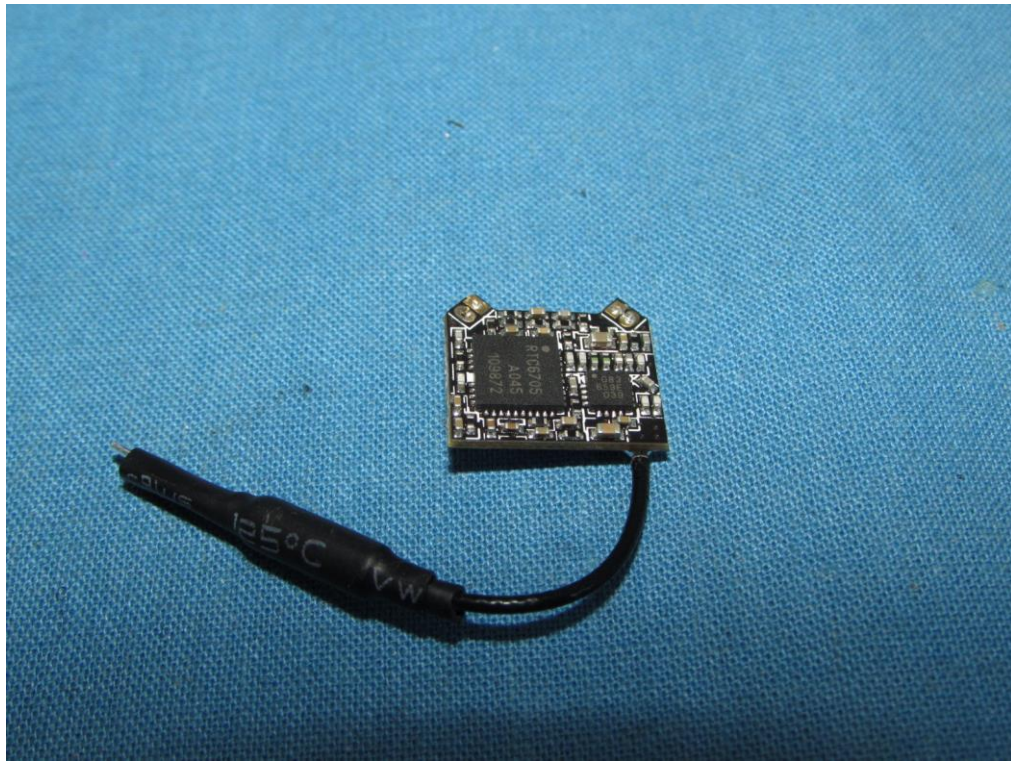


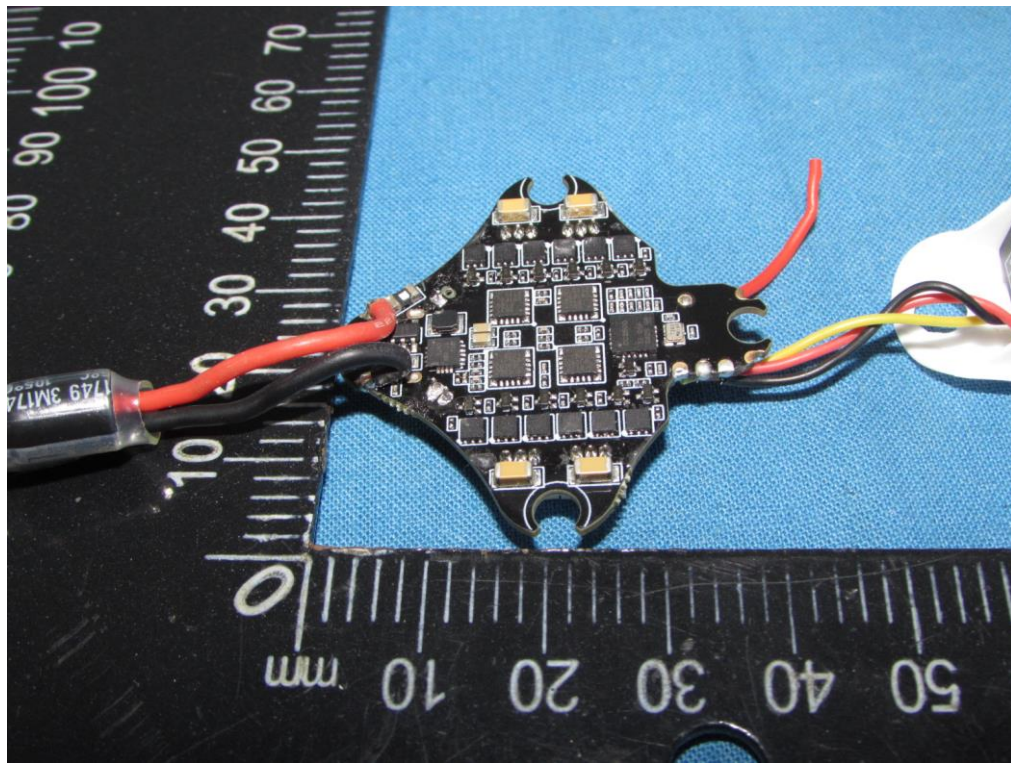


Internal Photos









.....End of Report.....