



Report No: FCC1605227

File reference No: 2016-05-31

Applicant: Dowellin Toys Factory.

Product: RC Drone

Model No: volar-360,volar-360c,volar-360w,volar-360x,volar-360s, volar-x7, volar-x7c,volar-x7w,volar-x7s,venus-x11,volar-x7a, viking-x5, viking-x5c,viking-x5w,viking-x6,viking-x6c, viking-x6w, viking-x6s,volt-x8,volt-x8c,volt-x8w,volt-x8d,volt-x8s, venus-x11c,venus-x11w,venus-x11d,venus-x11a,venus-x11s

Brand Name: DWI DOWELLIN

Test Standards: FCC Part 15.249

Test result: It is herewith confirmed and found to comply with the requirements set up by ANSI C63.4&FCC Part 15 Subpart C, Paragraph 15.249 regulations and RSS-210 for the evaluation of electromagnetic compatibility

Approved By

Jack Chung

Jack Chung

Manager

Dated: May 31, 2016

Results appearing herein relate only to the sample tested

The technical reports is issued errors and omissions exempt and is subject to withdrawal at

SHENZHEN TIMEWAY TESTING LABORATORIES

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Special Statement:

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meet with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

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

CNAS-LAB Code: L2292

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of testing Laboratories.

FCC-Registration No.: 899988

The 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 No.: 899988.

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1.0 General Details

1.1 Test Lab Details

Name : Global United Technology Service Co., Ltd
Address: 2nd Floor, Block No.2, Laodong Industrial Zone,Shenzhen,China
Telephone: (755) 27798480
Fax: (755) 2779 8960
Site on File with the Federal Communications Commission – United States
Registration Number: 600491
For 3m Anechoic Chamber
Site Listed with Industry Canada of Ottawa, Canada
Registration Number: IC: 9079A-02
For 3m Anechoic Chamber

1.2 Applicant Details

Applicant: Dowellin Toys Factory.
Address: 1 Road FengXin ChengHai District, ShanTou City, GuangDong, China
Telephone: 0754-88096811
Fax: 0754-88096810

1.3 Description of EUT

Product: RC Drone
Manufacturer: Dowellin Toys Factory.
Address: 1 Road FengXin ChengHai District, ShanTou City, GuangDong, China
Brand Name: DWI DOWELLIN
Model Number: volar-360
Additional Model Name volar-360c,volar-360w,volar-360x,volar-360s,volar-x7,volar-x7c,volar-x7w,volar-x7s,venus-x11,volar-x7a,viking-x5,viking-x5c,viking-x5w,viking-x6,viking-x6c,viking-x6w,viking-x6s,volt-x8,volt-x8c,volt-x8w,volt-x8d,volt-x8s,venus-x11c,venus-x11w,venus-x11d,venus-x11a,venus-x11s
Input Voltage: DC3V, Two PCS AAA batteries
Modulation Type: GFSK
Operation Frequency 2402-2466MHz
Channel Spacing: 1MHz
Antenna Designation Integral antenna with gain 1.2dBi Max

1.4 Submitted Sample

2 Sample

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1.5 Test Duration

2016-05-23 to 2016-05-31

1.6 Test Uncertainty

Conducted Emissions Uncertainty =3.6dB

Radiated Emissions Uncertainty =4.7dB

1.7 Test Engineer

Terry Tang

The sample tested by _____

Print Name: Terry Tang

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2.0 Test Equipments					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2015-08-22	2016-08-21
TWO Line-V-NETW	R&S	EZH3-Z5	100294	2015-08-22	2016-08-21
TWO Line-V-NETW	R&S	EZH3-Z5	100253	2015-08-22	2016-08-21
ESDV Test Receiver	R&S	ESDV	100008	2015-08-22	2016-08-21
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2015-08-22	2016-08-21
System Controller	CT	SC100	-	--	--
Loop Antenna	EMCO	6502	00042960	2015-08-23	2016-08-22
ESPI Test Receiver	R&S	ESI26	838786/013	2015-08-22	2016-08-21
3m Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W))* 6.4(H)	--	2015-08-23	2016-08-22
Horn Antenna	R&S	BBHA 9170	BBHA9170265	2015-08-24	2016-08-23
Horn Antenna	R&S	BBHA 9120D	9120D-631	2015-08-24	2016-08-23
Power meter	Anritsu	ML2487A	6K00003613	2015-08-22	2016-08-21
Power sensor	Anritsu	MA2491A	32263	2015-08-22	2016-08-21
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2015-08-23	2016-08-21
9*6*6 Anechoic	--	--	N/A	2015-08-24	2016-08-23
EMI Test Receiver	RS	ESCS30	100139	2015-08-22	2016-08-21
RF Cable	SCHWARZBECK	--	--	2015-08-23	2016-08-22
Pre-Amplifier	HP	8447D	2727A05017	2015-08-05	2016-08-04
Pre-Amplifier	EM	EM30265	--	2015-08-05	2016-08-04

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3.0 Technical Details

3.1 Summary of test results

The EUT has been tested according to the following specifications:			
Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.207	Conducted Emission Test	PASS	Complies
FCC Part 15 Subpart C Paragraph 15.249(a) & 15.249(b) Limit	Field Strength of Fundamental	PASS	Complies
FCC Part 15, Paragraph 15.209	Radiated Emission Test	PASS	Complies
FCC Part 15 Subpart C Paragraph 15.249(d) Limit	Band Edge Test	PASS	Complies

3.2 Test Standards

FCC Part 15 Subpart C, Paragraph 15.249 , ANSI C63.4 :2014 and ANSI C63.10 :2013

4.0 EUT Modification

No modification by SHENZHEN TIMEWAY TESTING LABORATORIES

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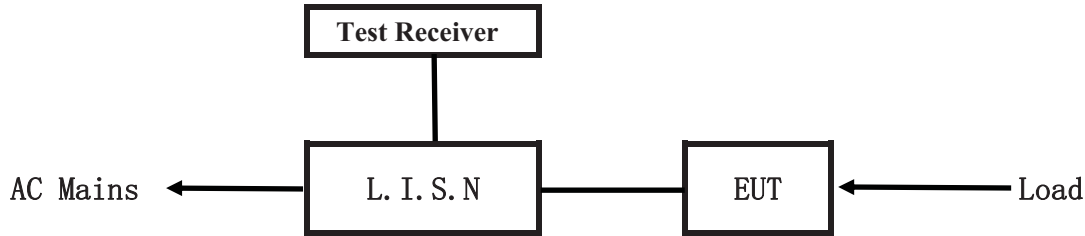
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5. Power Line Conducted Emission Test

5.1 Schematics of the test

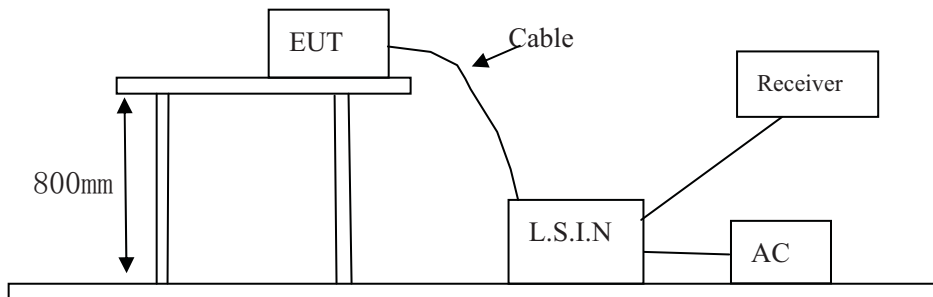


EUT: Equipment Under Test

5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2014. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.4 –2014.

Block diagram of Test setup



5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2014. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

One channels are provided to the EUT

A. EUT

Device	Manufacturer	Model	FCC ID
RC Drone	Dowellin Toys Factory.	volar-360,volar-360c,volar-360w,volar-360x,volar-360s,volar-x7,volar-x7c,volar-x7w,volar-x7s,venus-x11,volar-x7a,viking-x5,viking-x5c,viking-x5w,viking-x6,viking-x6c,viking-x6w,viking-x6s,volt-x8,volt-x8c,volt-x8w,volt-x8d,volt-x8s,venus-x11c,venus-x11w,venus-x11d,venus-x11a,venus-x11s	2AGZ8VOLAR360

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B. Internal Device

Device	Manufacturer	Model	FCC ID/DOC
N/A			

C. Peripherals

Device	Manufacturer	Model	FCC ID/DOC	Cable
N/A				

5.4 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2014

A Setup the EUT and simulators as shown on follow

B Enable AF signal and confirm EUT active to normal condition

5.5 Power line conducted Emission Limit according to Paragraph 15.107 and 15.207

Frequency(MHz)	Class A Limits (dB μ V)		Class B Limits (dB μ V)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ~ 0.50	79.0	66.0	66.0~56.0*	56.0~46.0*
0.50 ~ 5.00	73.0	60.0	56.0	46.0
5.00 ~ 30.00	73.0	60.0	60.0	50.0

- Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The tighter limit shall apply at the transition frequencies

5.6 Test Results

N/A

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz.

Note: Due to Battery operation, this test item not applicable.

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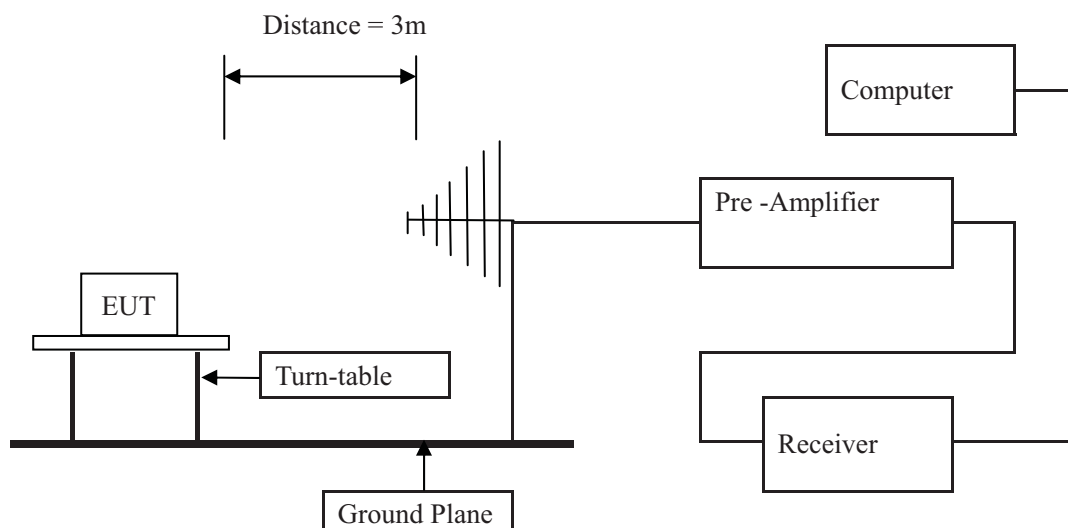


6 Radiated Emission Test

6.1 Test Method and test Procedure:

- (1) The EUT was tested according to ANSI C63.10-2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No. 899988
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2013.
- (3) The frequency spectrum from 30 MHz to 1 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) The antenna polarization: Vertical polarization and Horizontal polarization.

Block diagram of Test setup



6.2 Configuration of The EUT

Same as section 5.3 of this report

6.3 EUT Operating Condition

Same as section 5.4 of this report.

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6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

A FCC Part 15 Subpart C Paragraph 15.249(a) Limit

Fundamental Frequency (MHz)	Field Strength of Fundamental (3m)		Field Strength of Harmonics (3m)		
	mV/m	dBuV/m		uV/m	dBuV/m
2400-2483.5	50	94 (Average)	114 (Peak)	500	54 (Average) 74 (Peak)

- Note:
1. RF Field Strength (dBuV) = 20 log RF Voltage (uV)
 2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
 3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

B. Frequencies in restricted band are complied to limit on Paragraph 15.209.

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

- Note:
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT
 - 4 All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30-1000MHz.As to 1G-18G, the final emission level got using PK. For fundamental measurement, PK detector used.
 5. This is a handheld device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.
 6. New batteries were installed in the equipment under test for radiated emission testing.

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6.5 Test result

A Fundamental & Harmonics Radiated Emission Data

Product:	RC Drone	Test Mode:	Keep transmitting-Low Channel
Test Item:	Fundamental Radiated Emission Data	Temperature:	25°C
Test Voltage:	DC3V	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
2402	96.79(PK)/ 88.11(PK)	H	114/94	-17.21/-5.89
2402	94.06(PK)/ 85.62(PK)	V	114/94	-19.94/-8.38
4804	--	H	74/54	--
7206	--	V	74/54	--
9608	--	H	74/54	--
12010	--	V	74/54	--
14412	--	H	74/54	--
16814	--	V	74/54	--
19216	--	H/V	74/54	--
21618	--	H/V	74/54	--
24020	--	H/V	74/54	--

- Note:
- (1) PK= Peak, AV= Average
 - (2) Emission Level = Reading Level + Antenna Factor + Cable Loss.
 - (3) Margin=Emission-Limits
 - (4) According to section 15.35(b), the peak limit is 20dB higher than the average limit
 - (5) The measured PK value less than the AV limit.
 - (6) For fundamental frequency , RBW 3MHz VBW 10MHz Peak detector is for PK value RMS detector is for AV value

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Product:	RC Drone	Test Mode:	Keep transmitting-Middle Channel
Test Item:	Fundamental Radiated Emission Data	Temperature:	25°C
Test Voltage:	DC3V	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
2434	97.31(PK)/ 88.52(PK)	H	114/94	-16.70/-5.48
2434	94.82(PK)/ 86.29(PK)	V	114/94	-19.18/-7.71
4868	--	H	74/54	--
7302	--	V	74/54	--
9736	--	H	74/54	--
12170	--	V	74/54	--
14604	--	H	74/54	--
17038	--	V	74/54	--
19472	--	H/V	74/54	--
21906	--	H/V	74/54	--
24340	--	H/V	74/54	--

- Note:
- (1) PK= Peak, AV= Average
 - (2) Emission Level = Reading Level + Antenna Factor + Cable Loss.
 - (3)Margin=Emission-Limits
 - (4)According to section 15.35(b), the peak limit is 20dB higher than the average limit
 - (5) The measured PK value less than the AV limit.
 - (6) For fundamental frequency , RBW 3MHz VBW 10MHz Peak detector is for PK value RMS detector is for AV value

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Product:	RC Drone	Test Mode:	Keep transmitting-High Channel
Test Item:	Fundamental Radiated Emission Data	Temperature:	25°C
Test Voltage:	DC3V	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
2466	97.02(PK)/ 88.35(PK)	H	114/94	-16.98/-5.65
2466	94.52(PK)/ 86.20(PK)	V	114/94	-19.48/-7.80
4932	--	H	74/54	--
7396	--	V	74/54	--
9864	--	H	74/54	--
12330	--	V	74/54	--
14796	--	H	74/54	--
17262	--	V	74/54	--
19728	--	H/V	74/54	--
22194	--	H/V	74/54	--
24660	--	H/V	74/54	--

- Note:
- (1) PK= Peak, AV= Average
 - (2) Emission Level = Reading Level + Antenna Factor + Cable Loss.
 - (3)Margin=Emission-Limits
 - (4)According to section 15.35(b), the peak limit is 20dB higher than the average limit
 - (5) The measured PK value less than the AV limit.
 - (6) For fundamental frequency , RBW 3MHz VBW 10MHz Peak detector is for PK value RMS detector is for AV value

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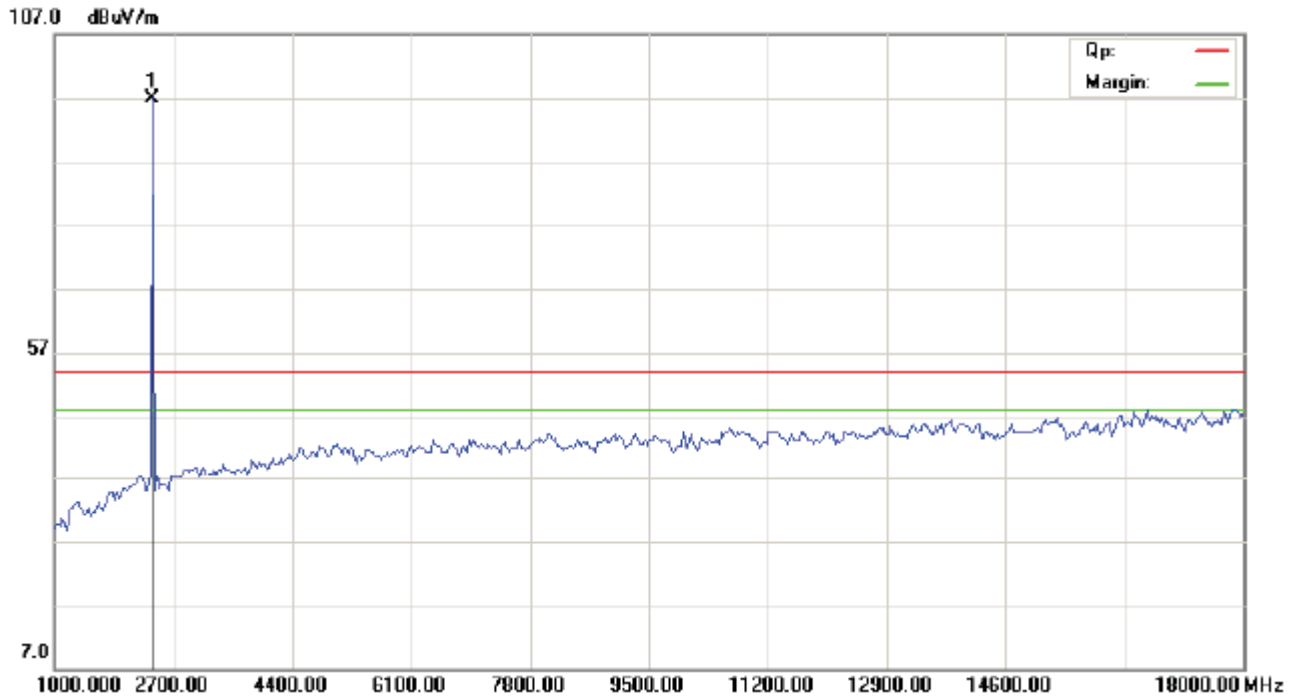
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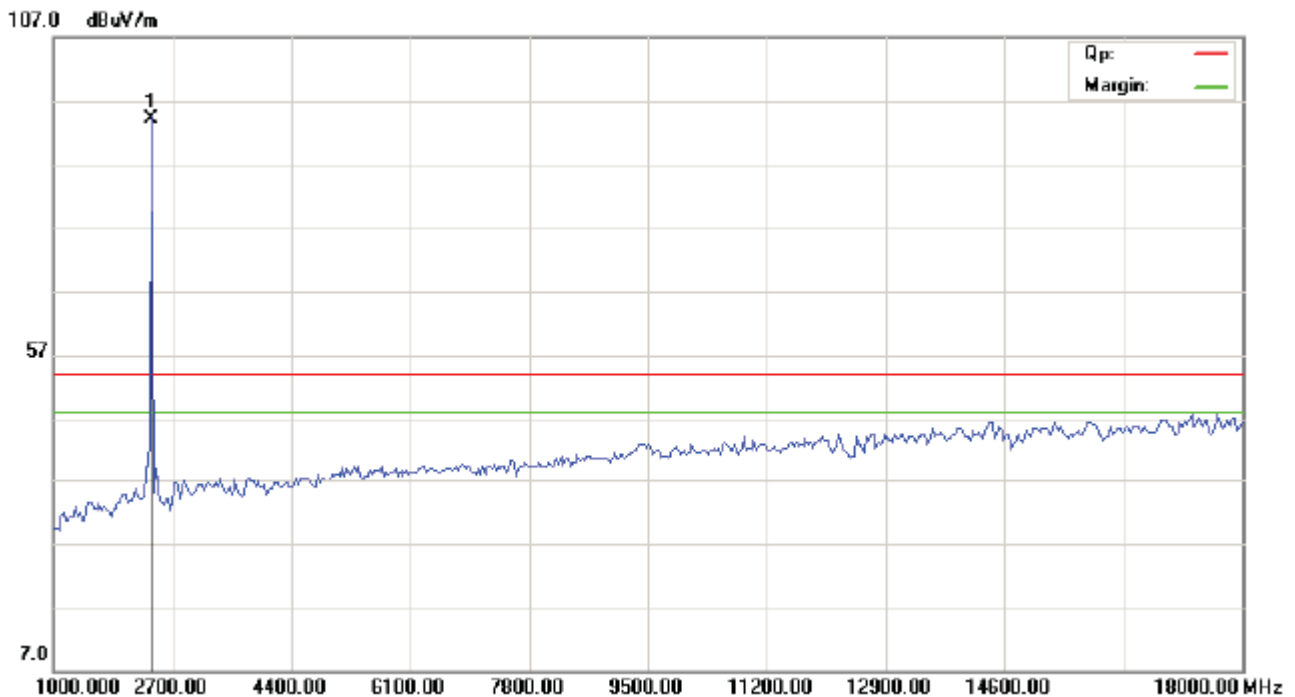


Please refer to the following test plots for details: Low Channel

Horizontal



Vertical



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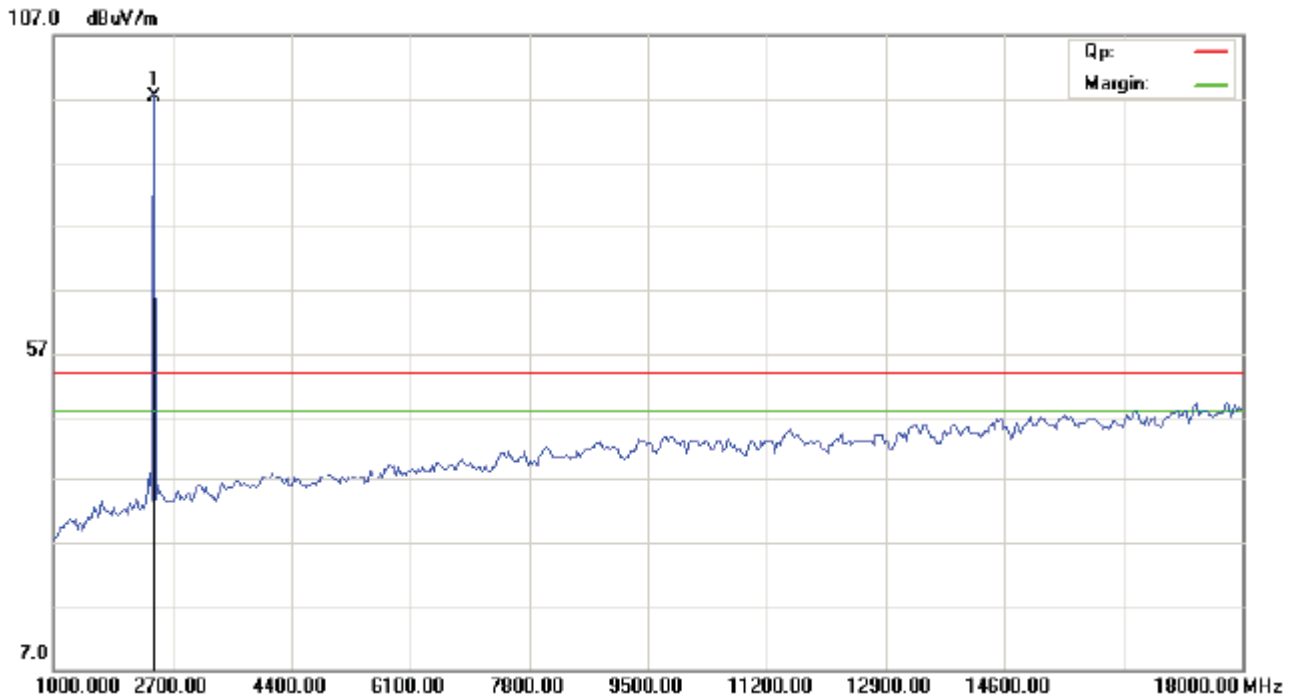
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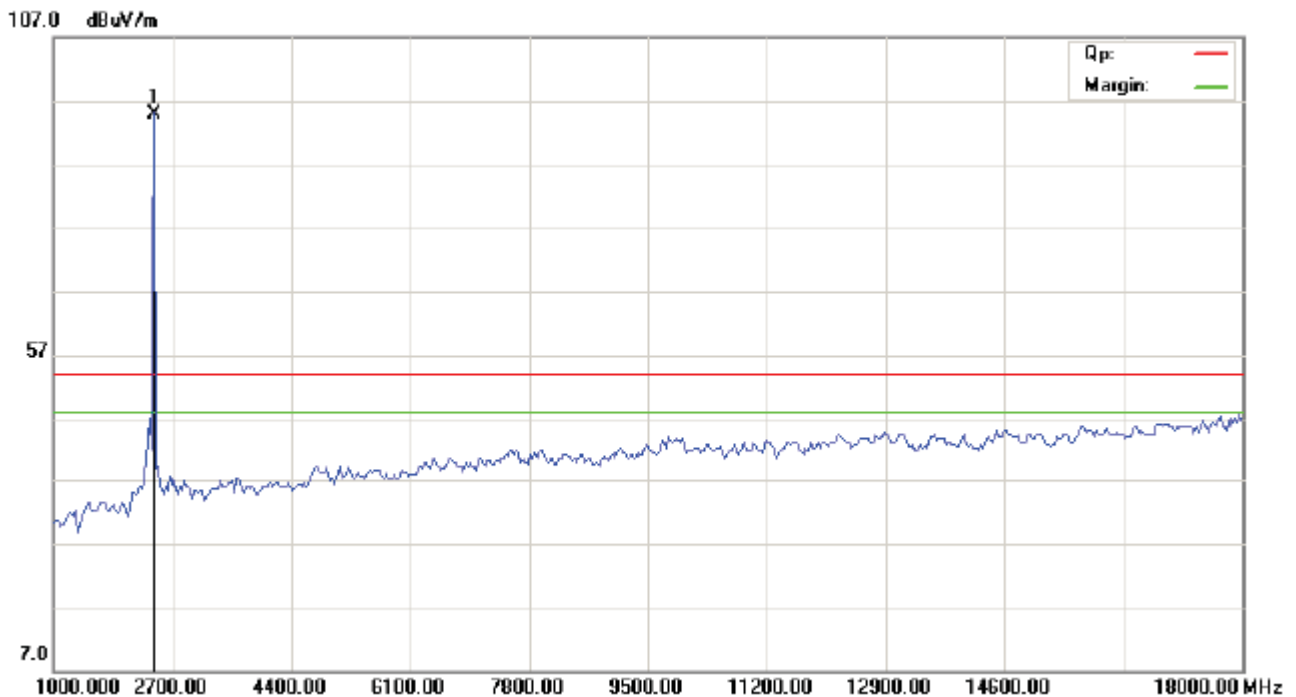


Please refer to the following test plots for details: Middle Channel

Horizontal



Vertical



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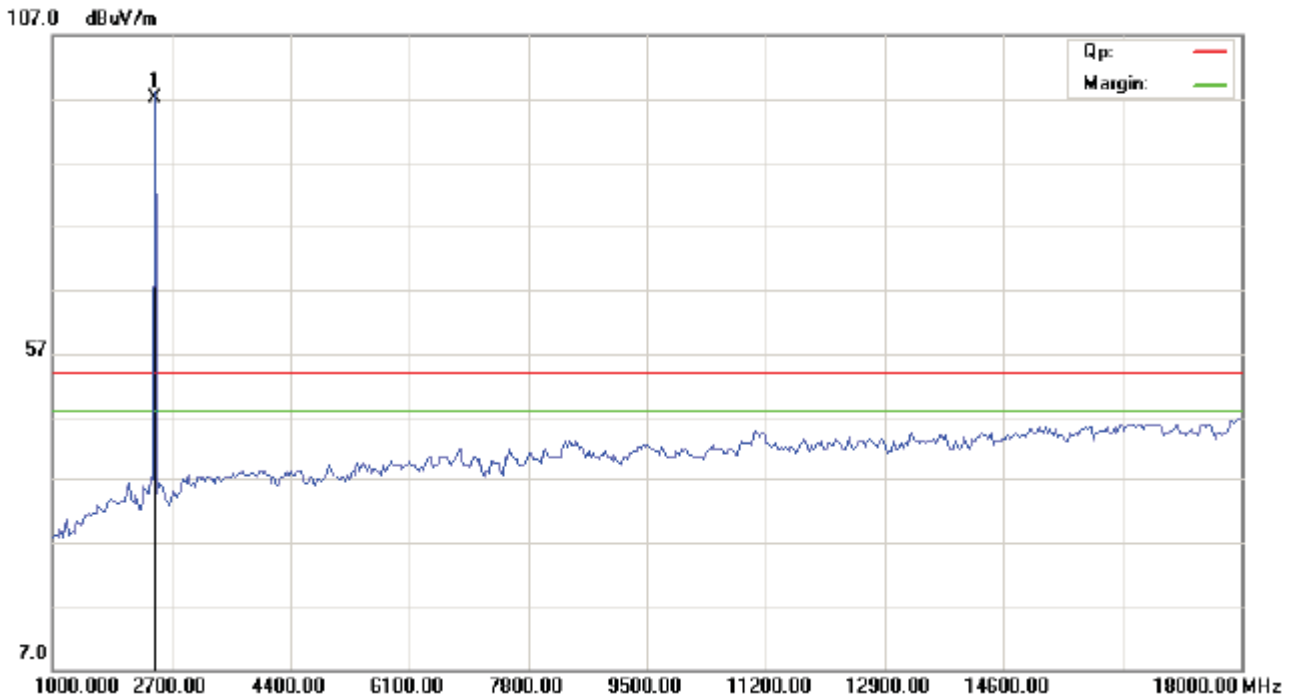
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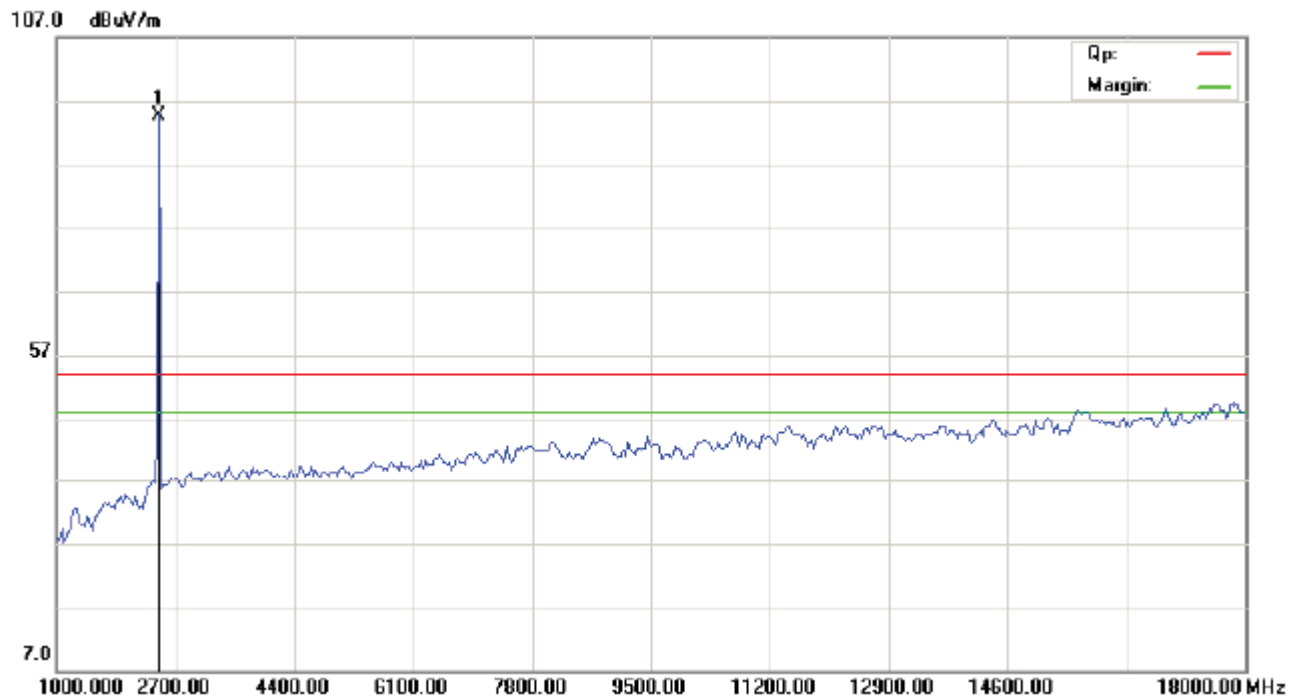


Please refer to the following test plots for details: High Channel

Horizontal



Vertical



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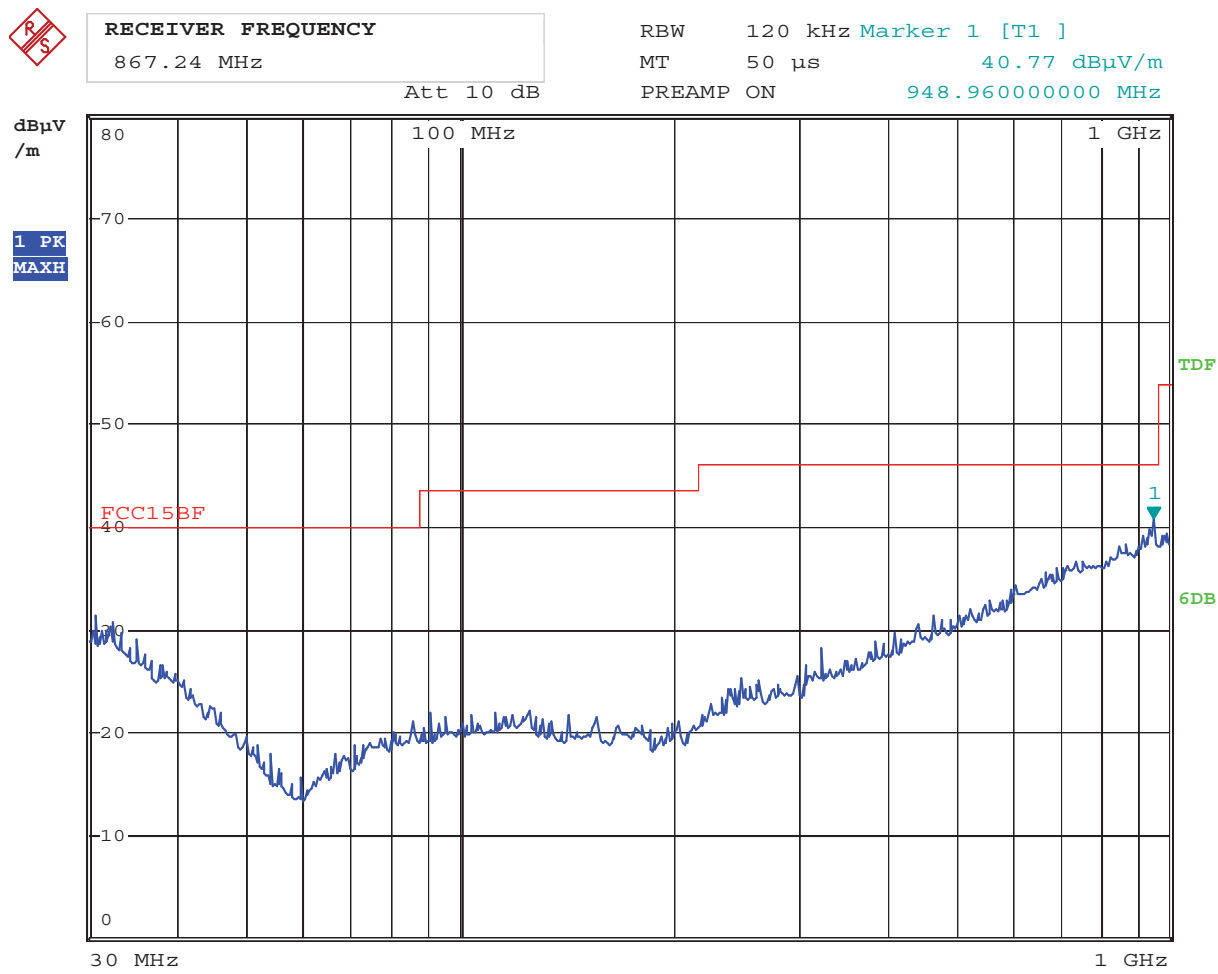


B. General Radiated Emission Data
Radiated Emission In Horizontal (30MHz----1000MHz)

EUT set Condition: Keep Tx transmitting

Results: Pass

Please refer to following diagram for individual



Date: 30.MAY.2016 18:19:14

Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
948.960	40.77	H	46.00

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Radiated Emission In Vertical (30MHz----1000MHz)

EUT set Condition: Keep Tx transmitting

Results: Pass

Please refer to following diagram for individual



MARKER 1

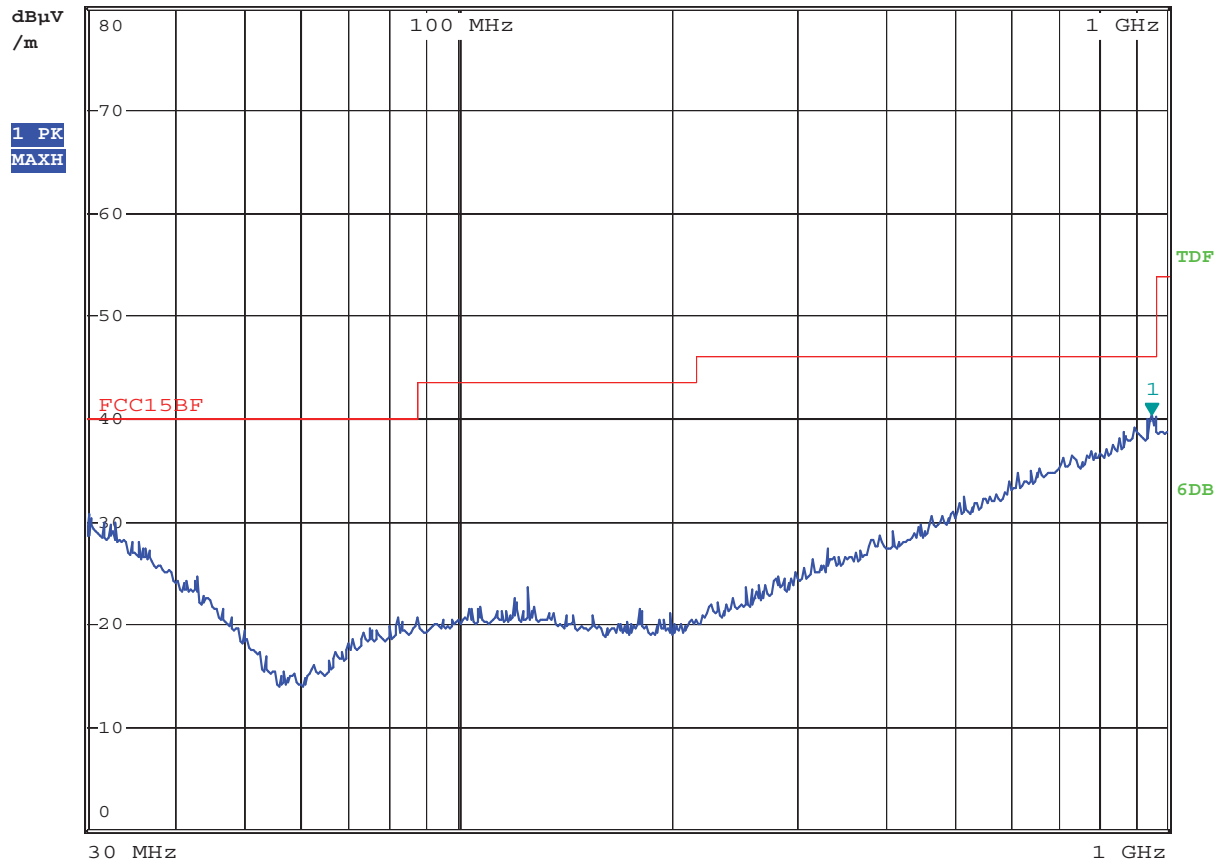
948.96 MHz

Att 10 dB

RBW 120 kHz Marker 1 [T1]

MT 50 μ s 40.44 dB μ V/m

PREAMP ON 948.960000000 MHz



Date: 30.MAY.2016 18:14:52

Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
948.960	40.44	V	46.00

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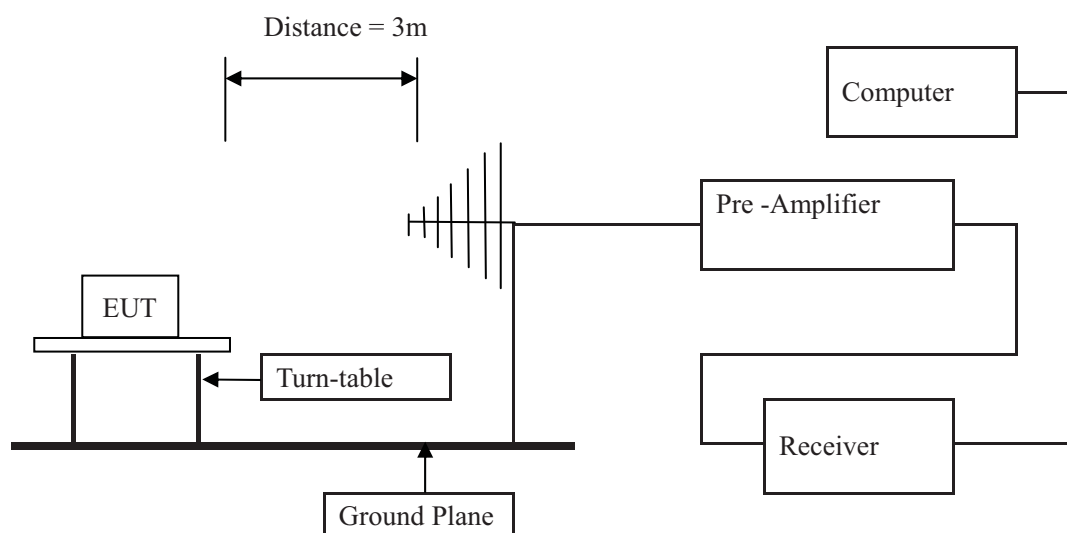


7. Band Edge

7.1 Test Method and test Procedure:

- (1) The EUT was tested according to ANSI C63.10–2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No. 899988
- (2) Set Spectrum as RBW=1MHz, VBW=3MHz and Peak detector used
- (3) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (4) The antenna polarization: Vertical polarization and Horizontal polarization.

7.2 Radiated Test Setup



For the actual test configuration , please refer to the related items – Photos of Testing

7.3 Configuration of The EUT

Same as section 5.3 of this report

7.4 EUT Operating Condition

Same as section 5.4 of this report.

7.5 Band Edge Limit

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 Section 15.209, whichever is the lesser attenuation.

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7.6 Test Result

Product:	RC Drone		Polarity	Horizontal
Mode	Keeping Transmitting		Test Voltage	DC3V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		--	--
2400MHz	PK (dBμV/m)	41.37	Limit	74 dBμV/m
2400MHz	AV (dBμV/m)	--	Limit	54 dBμV/m
2390 MHz	PK (dBμV/m)	47.29	Limit	74 dBμV/m
2390 MHz	AV (dBμV/m)	--	Limit	54 dBμV/m

Product:	RC Drone		Detector	Vertical
Mode	Keeping Transmitting		Test Voltage	DC3V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		--	--
2400MHz	PK (dBμV/m)	40.85	Limit	74 dBμV/m
2400MHz	AV (dBμV/m)	--	Limit	54 dBμV/m
2390 MHz	PK (dBμV/m)	46.82	Limit	74 dBμV/m
2390 MHz	AV (dBμV/m)	--	Limit	54 dBμV/m

Product:	RC Drone		Polarity	Horizontal
Mode	Keeping Transmitting		Test Voltage	DC3V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		--	--
2483.5MHz	PK (dBμV/m)	41.19	Limit	74 dBμV/m
2483.5MHz	AV (dBμV/m)	--	Limit	54 dBμV/m

Product:	RC Drone		Detector	Vertical
Mode	Keeping Transmitting		Test Voltage	DC3V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		--	--
2483.5MHz	PK (dBμV/m)	41.32	Limit	74 dBμV/m
2483.5MHz	AV (dBμV/m)	--	Limit	54 dBμV/m

Note: The PK emission level less than the AV limit. No necessary to record the AV emission level.

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8.0 Antenna Requirement

Applicable Standard

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.

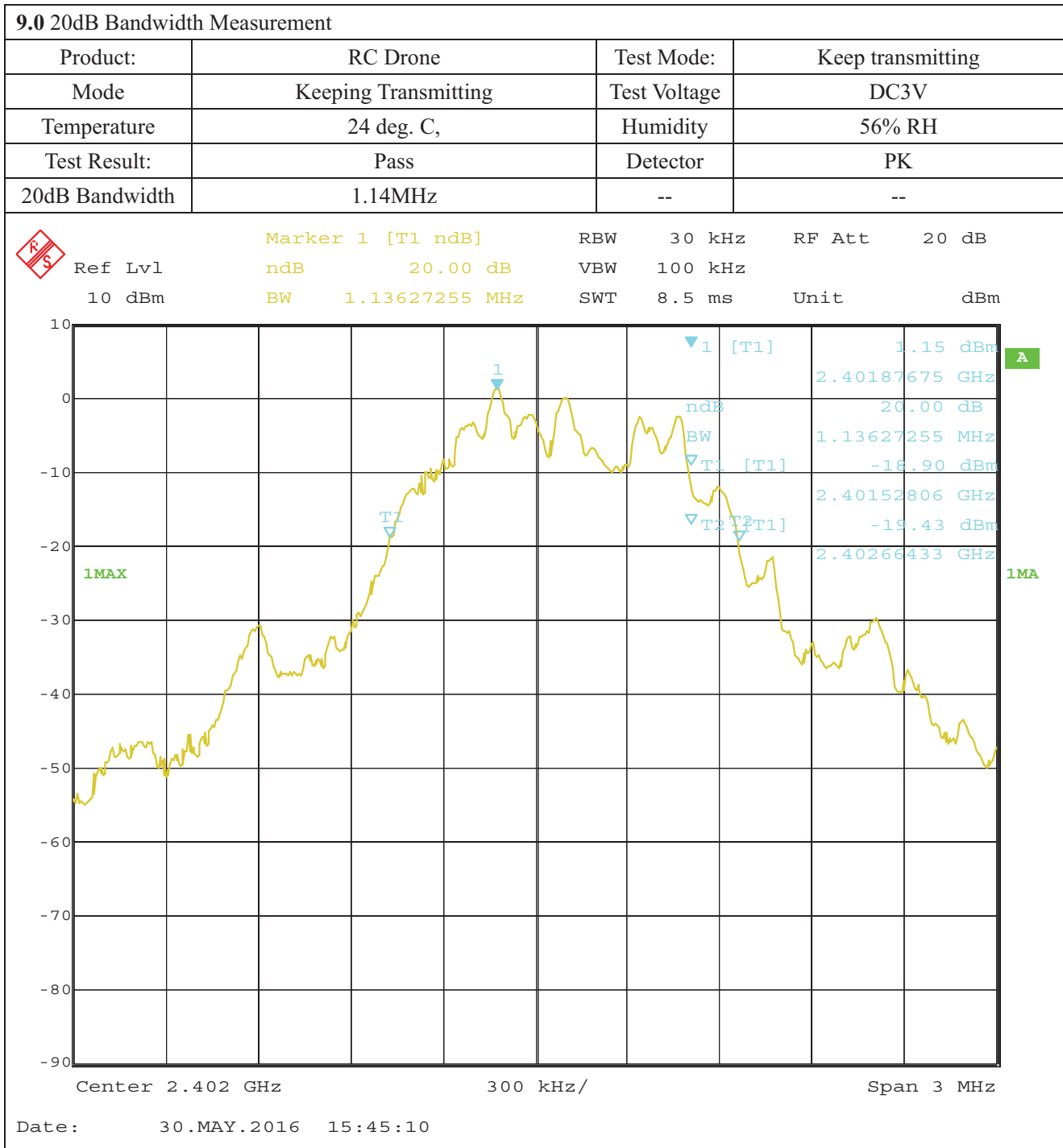
This product has a integral antenna. The antenna gain is 1.2dBi Max. It fulfills the requirement of this section.

Test Result: Pass

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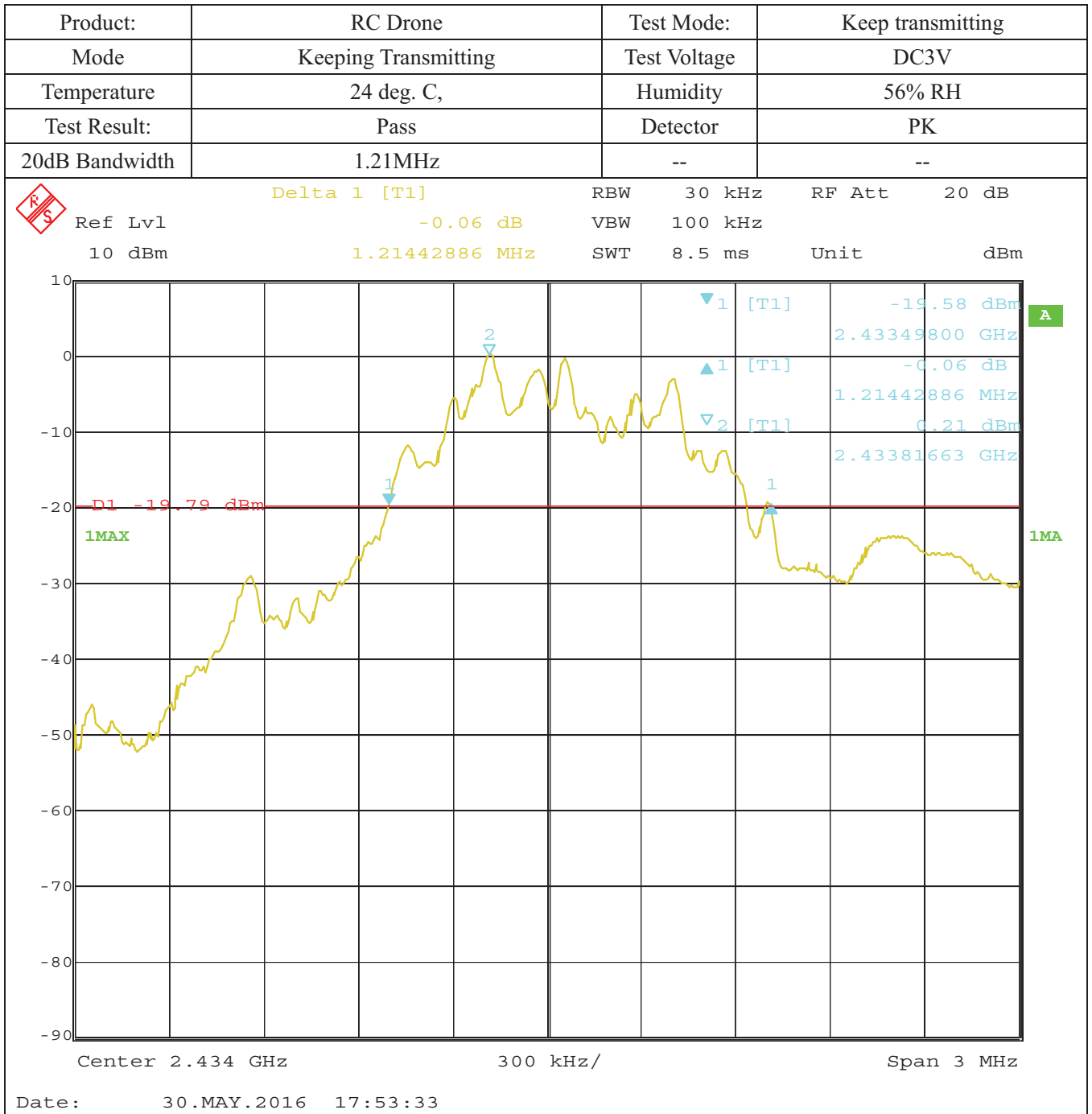
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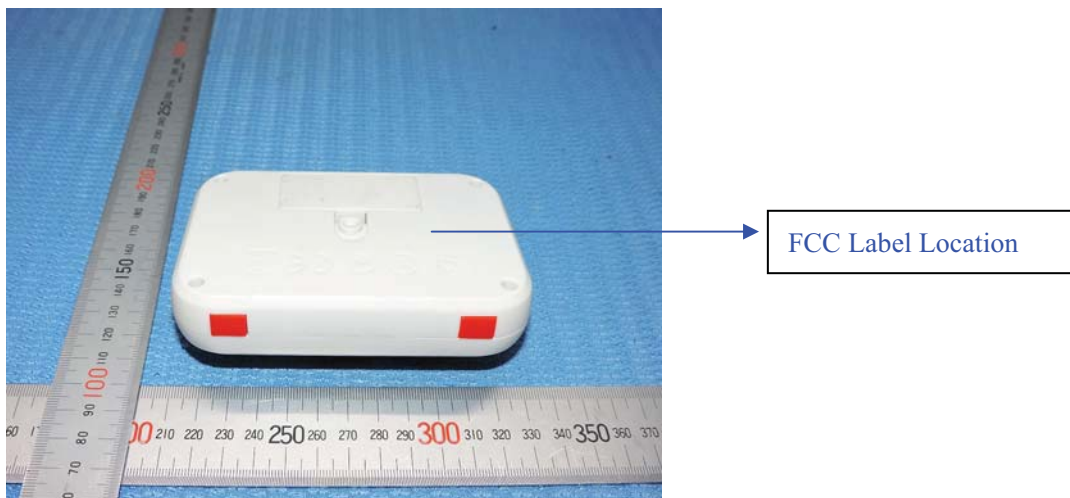
10.0 FCC ID Label

FCC ID: 2AGZ8VOLAR360

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Mark Location:



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11.0 Photo of testing

11.1 Conducted test View--

N/A

11.2 Radiated emission test view



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11.3 Photographs - EUT

Outside view



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Outside view



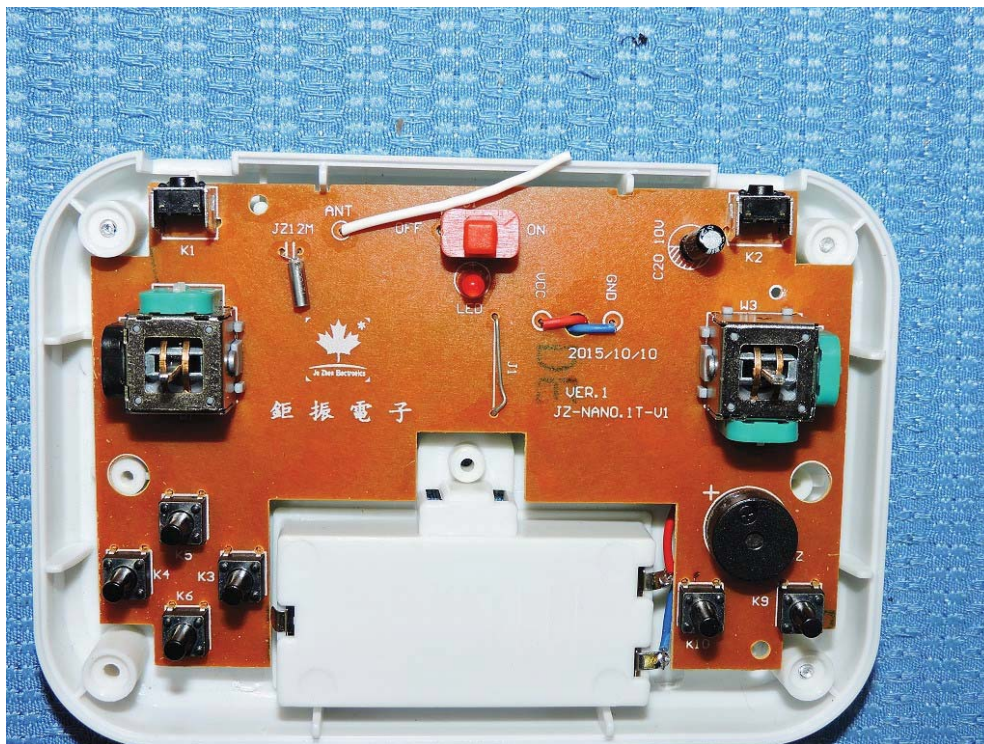
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Inside view



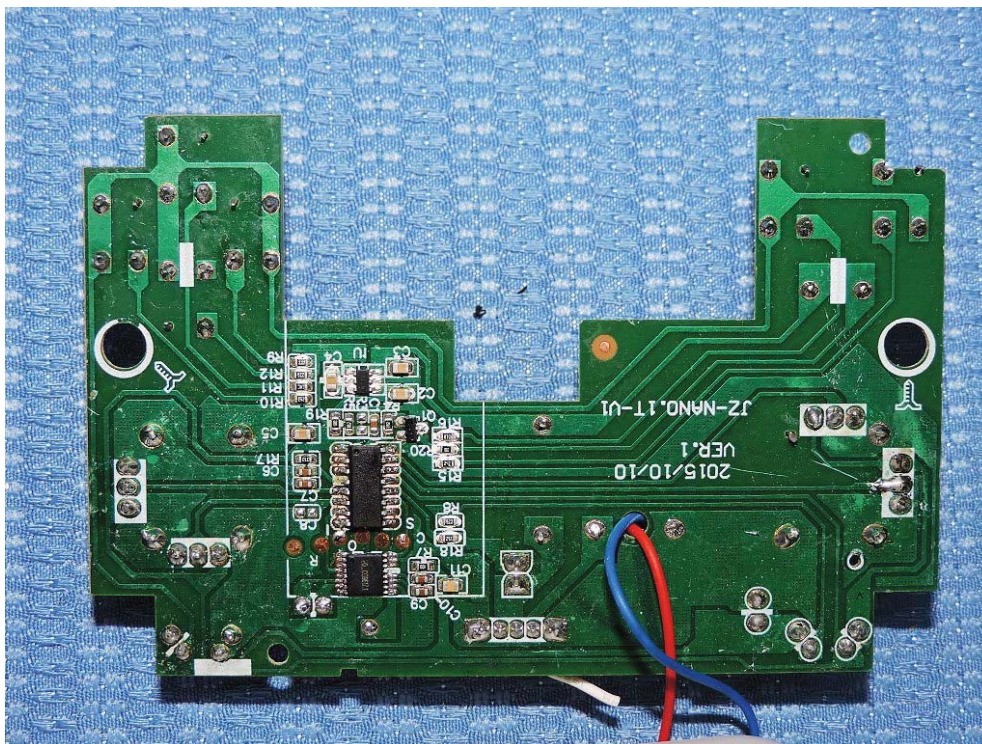
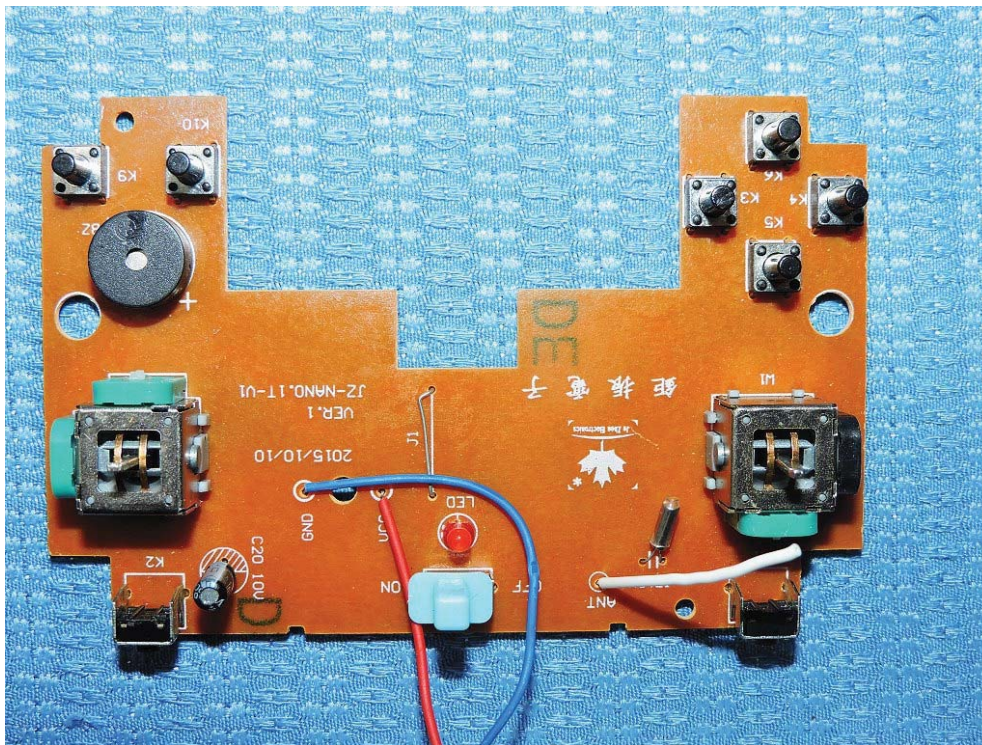
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Inside view



--End of the report--

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