



Report No: FCC1504189
File reference No: 2015-06-30

Applicant: Joysway Hobby (HK) Ltd.

Product: 2.4GHz Pistol Radio Control System

Model No: J2C81,J2C82,J2C83,J2C84,J2C85,J2C86,J2C87,J2C88,J2C89

Brand Name: Joysway

Test Standards: FCC Part 15 Subpart C, Paragraph 15.249

Test result: It is herewith confirmed and found to comply with the requirements set up by ANSI C63.10&FCC Part 15 Subpart C, Paragraph 15.249 regulations for the evaluation of electromagnetic compatibility

Approved By

Jack Chung

Jack Chung

Manager

Dated: June 30, 2015

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

Room 512-519, 5/F., East Tower, Building 4, Anhua Industrial Zone, Futian District,
Shenzhen, Guangdong, China

Tel (755) 83448688, Fax (755) 83442996, E-Mail:info@timewaytech.com



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.

IC- Registration No.: IC5205A-02

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration IC No.: 5205A-02.

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1.0 General Details

1.1 Test Lab Details

Name : SHENZHEN TIMEWAY TESTING LABORATORIES.
Address: Room 512-519,5/F., East Tower,Building 4, Anhua Industrial Zone, Futian District,Shenzhen, Guangdong China
Telephone: (755) 83448688
Fax: (755) 83442996
Site on File with the Federal Communications Commission – United States
Registration Number: 899988
For 3m & 10 m OATS
Site Listed with Industry Canada of Ottawa, Canada
Registration Number: IC: 5205A-02
For 3m & 10 m OATS

1.2 Applicant Details

Applicant: Joysway Hobby (HK) Ltd.
Address: Unit A, 10/F., Capital Commercial Building, No. 446-448 Shanghai Street, Mongkok, Kowloon, Hongkong
Telephone: +86-769-23296899
Fax: +86-769-88735015

1.3 Description of EUT

Product: 2.4GHz Pistol Radio Control System
Manufacturer: Dongguan Weihao Hobby Technology Co., Ltd
Brand Name: Joysway
Model Number: J2C81
Additional Model Name J2C82, J2C83, J2C84, J2C85, J2C86, J2C87, J2C88, J2C89
Additional Brand Name N/A
Rating: DC9V
Modulation Type: GFSK
Operation Frequency 2403MHz-2450MHz
Antenna Designation Integral Antenna with Gain 2.5dBi

1.4 Submitted Sample

1 Sample

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1.5 Test Duration

2015-04-24 to 2015-06-30

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	2014-08-21	2015-08-20
TWO Line-V-NETW	R&S	EZH3-Z5	100294	2014-08-22	2015-08-21
TWO Line-V-NETW	R&S	EZH3-Z5	100253	2014-08-22	2015-08-21
Ultra Broadband ANT	R&S	HL562	100157	2014-08-23	2015-08-22
ESDV Test Receiver	R&S	ESDV	100008	2014-08-22	2015-08-21
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2014-08-21	2015-08-20
System Controller	CT	SC100	-	--	--
Printer	EPSON	PHOTO EX3	CFNH234850	--	--
Computer	IBM	8434	1S8434KCE99BLXLO*	-	-
Loop Antenna	EMCO	6502	00042960	2014-08-22	2015-08-21
ESPI Test Receiver	R&S	ESI26	838786/013	2014-08-22	2015-08-21
3m OATS	--	--	N/A	2014-08-21	2015-08-20
Horn Antenna	R&S	BBHA 9170	BBHA9170265	2014-08-23	2015-08-22
Horn Antenna	R&S	BBHA 9120D	9120D-631	2014-08-23	2015-08-22
Power meter	Anritsu	ML2487A	6K00003613	2014-08-22	2015-08-21
Power sensor	Anritsu	MA2491A	32263	2014-08-22	2015-08-21
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2014-08-23	2015-08-22
LISN	AFJ	LS16C	10010947251	2014-08-21	2015-08-20
LISN (Three Phase)	Schwarebeck	NSLK 8126	8126453	2014-08-22	2015-08-21
9*6*6 Anechoic	--	--	N/A	2014-08-21	2015-08-20
EMI Test Receiver	RS	ESCS30	100139	2014-08-22	2015-08-21

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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	N/A	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 Technology Consulting Co.,Ltd

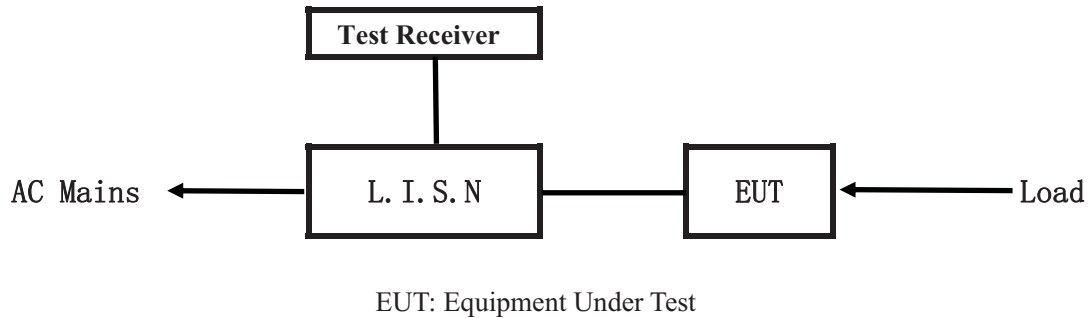
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5. Power Line Conducted Emission Test

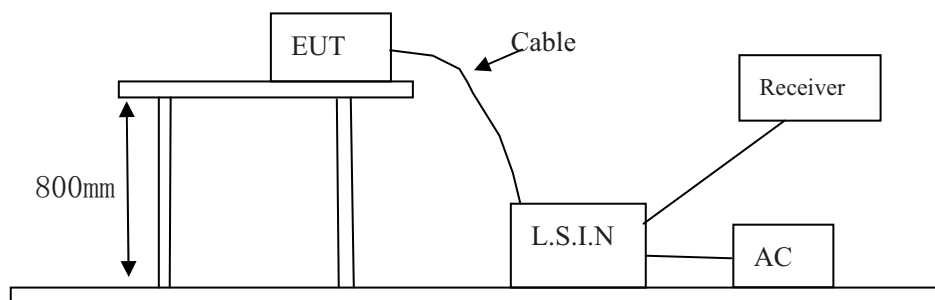
5.1 Schematics of the test



5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2013. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.10 -2013.

Block diagram of Test setup



5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.10-2013. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

A. EUT

Device	Manufacturer	Model	FCC ID
2.4GHz Pistol Radio Control System	Dongguan Weihao Hobby Technology Co., Ltd	J2C81,J2C82,J2C83, J2C84,J2C85,J2C86, J2C87,J2C88,J2C89	ZDTJ2C0001

B. Internal Device

Device	Manufacturer	Model	FCC ID/DOC
N/A			

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C. Peripherals

Device	Manufacturer	Model	FCC ID/DOC	Cable
--	--	--	--	--

5.4 EUT Operating Condition

Operating condition is according to ANSI C63.10 -2013

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 15.207

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

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

Note: EUT powered by battery, this test item not applicable.

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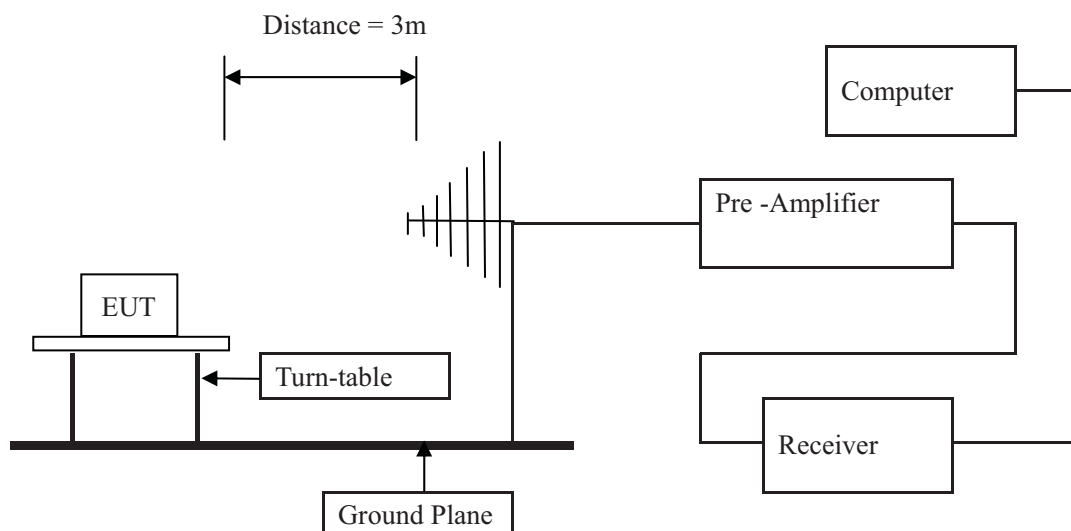
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6 Radiated Emission Test

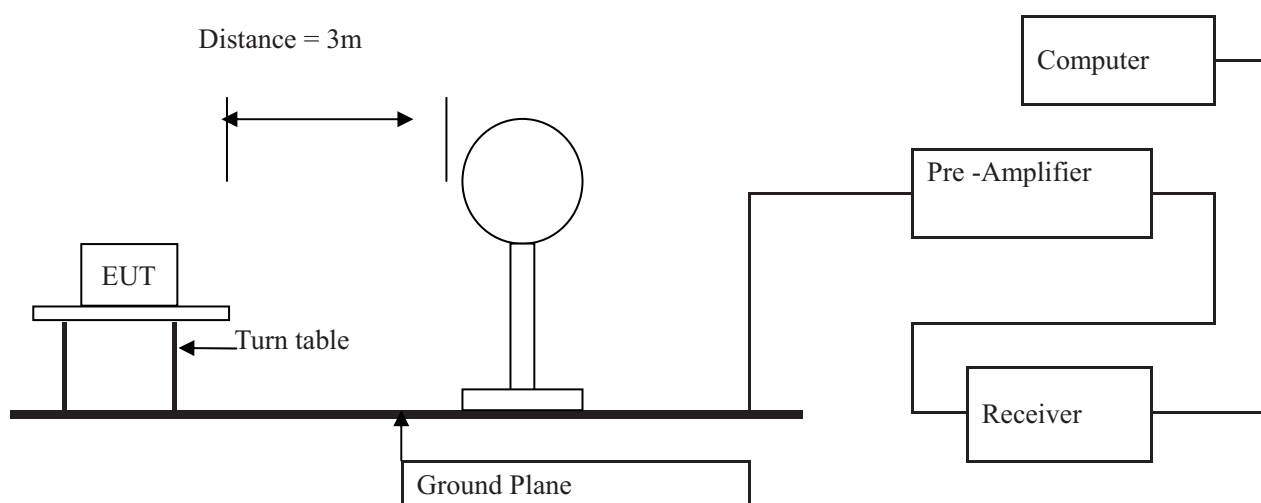
6.1 Test Method and test Procedure:

- (1) The EUT was tested according to ANSI C63.10-2013. The radiated test was performed at Timeway 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



Block diagram of Test setup for frequency below 30MHz



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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.

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-25G, the final emission level got using PK and AV detector.
 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 battery is used during all test.

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6.5 Test result

A Fundamental & Harmonics Radiated Emission Data

Product:	2.4GHz Pistol Radio Control System	Test Mode:	Low Channel- keep transmitting
Test Item:	Fundamental and Harmonic Radiated Emission Data	Temperature:	25℃
Test Voltage:	DC9V	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
2403	89.28 (PK)/	H	114/94	-4.72
2403	90.52 (PK)/	V	114/94	-3.48
4806	--	H/V	74/54	--
7209	--	H/V	74/54	--
9612	--	H/V	74/54	--
12015	--	H/V	74/54	--
14418	--	H/V	74/54	--
16821	--	H/V	74/54	--
19224	--	H/V	74/54	--
21627	--	H/V	74/54	--
24030	--	H/V	74/54	--

Note: Fundamental Radiated Emissions Measured with PK detector, RBW=3MHz, VBW=10MHz

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Product:	2.4GHz Pistol Radio Control System	Test Mode:	Middle Channel- keep transmitting
Test Item:	Fundamental and Harmonic Radiated Emission Data	Temperature:	25°C
Test Voltage:	DC9V	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
2425	88.48 (PK)	H	114/94	-5.52
2425	88.58 (PK)	V	114/94	-5.42
4850	--	H	74/54	--
7275	--	V	74/54	--
9700	--	H/V	74/54	--
12125	--	H/V	74/54	--
14550	--	H/V	74/54	--
16975	--	H/V	74/54	--
19400	--	H/V	74/54	--
21825	--	H/V	74/54	--
24250	--	H/V	74/54	--

Note: Fundamental Radiated Emissions Measured with PK detector, RBW=3MHz, VBW=10MHz

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Product:	2.4GHz Pistol Radio Control System	Test Mode:	High Channel- keep transmitting
Test Item:	Fundamental and Harmonic Radiated Emission Data	Temperature:	25°C
Test Voltage:	DC9V	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
2450	87.56 (PK)	H	114/94	-6.44
2450	87.69 (PK)	V	114/94	-6.31
4900	--	H/V	74/54	--
7350	--	H/V	74/54	--
9800	--	H/V	74/54	--
12250	--	H/V	74/54	--
14700	--	H/V	74/54	--
17150	--	H/V	74/54	--
19600	--	H/V	74/54	--
22050	--	H/V	74/54	--
24500	--	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) Note: Fundamental Radiated Emissions Measured with PK detector, RBW=3MHz, VBW=10MHz

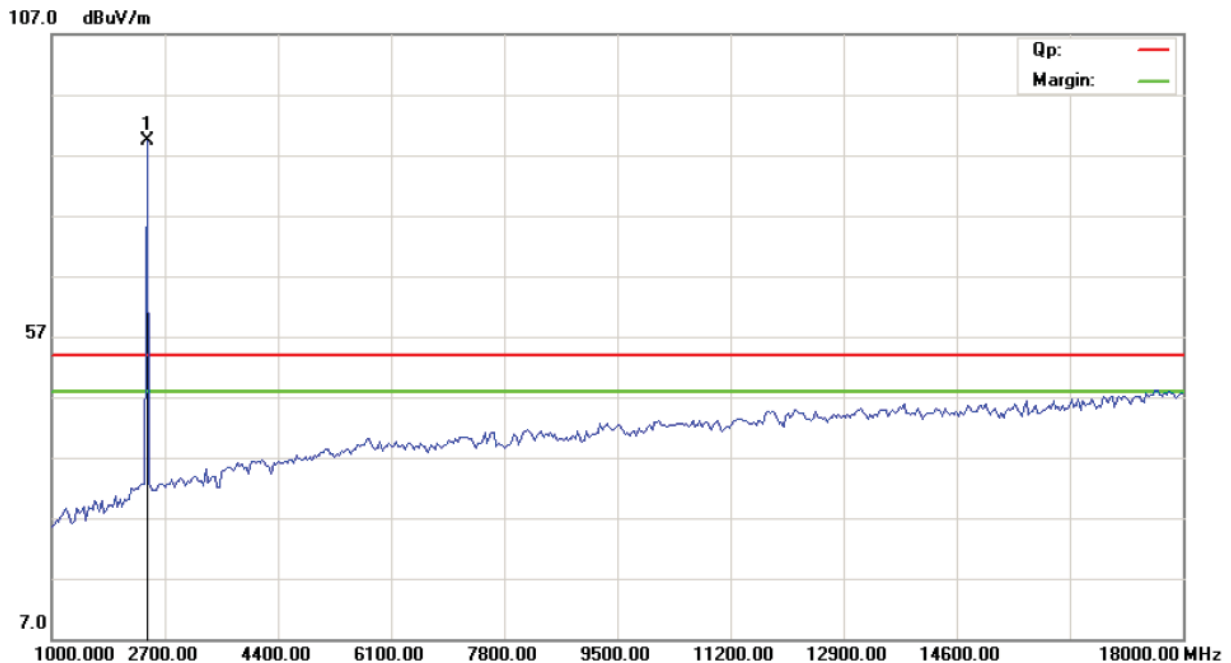
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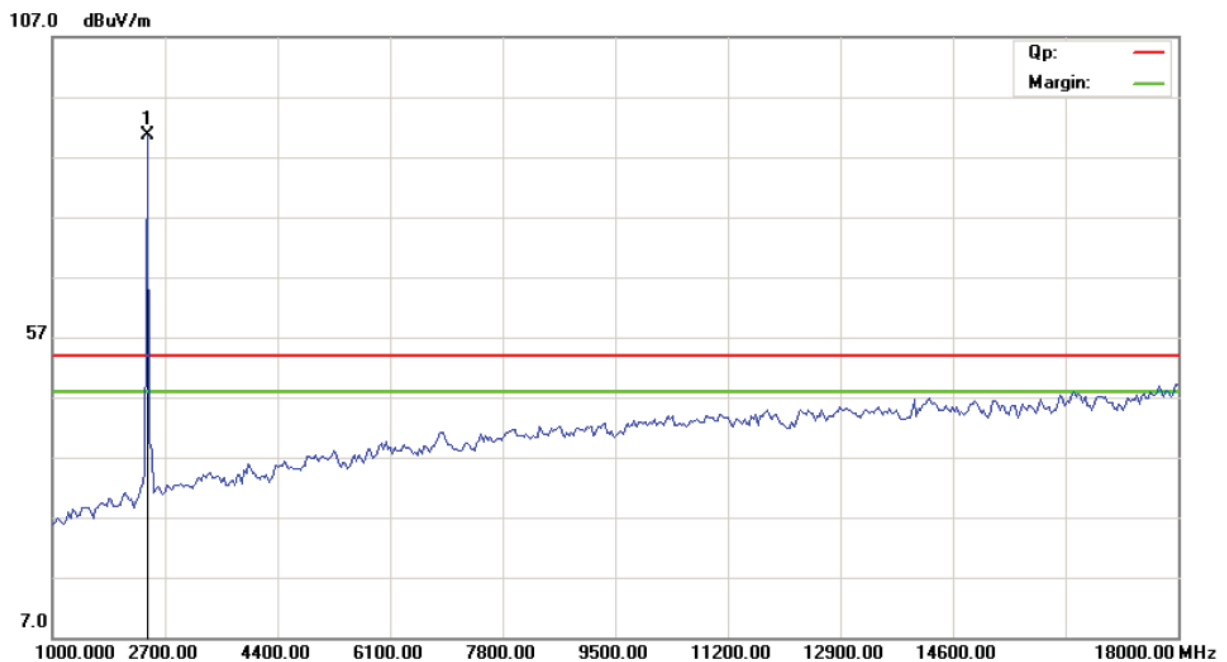
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Please refer to the following test plots for details:

Low Channel: Horizontal



Low Channel : Vertical

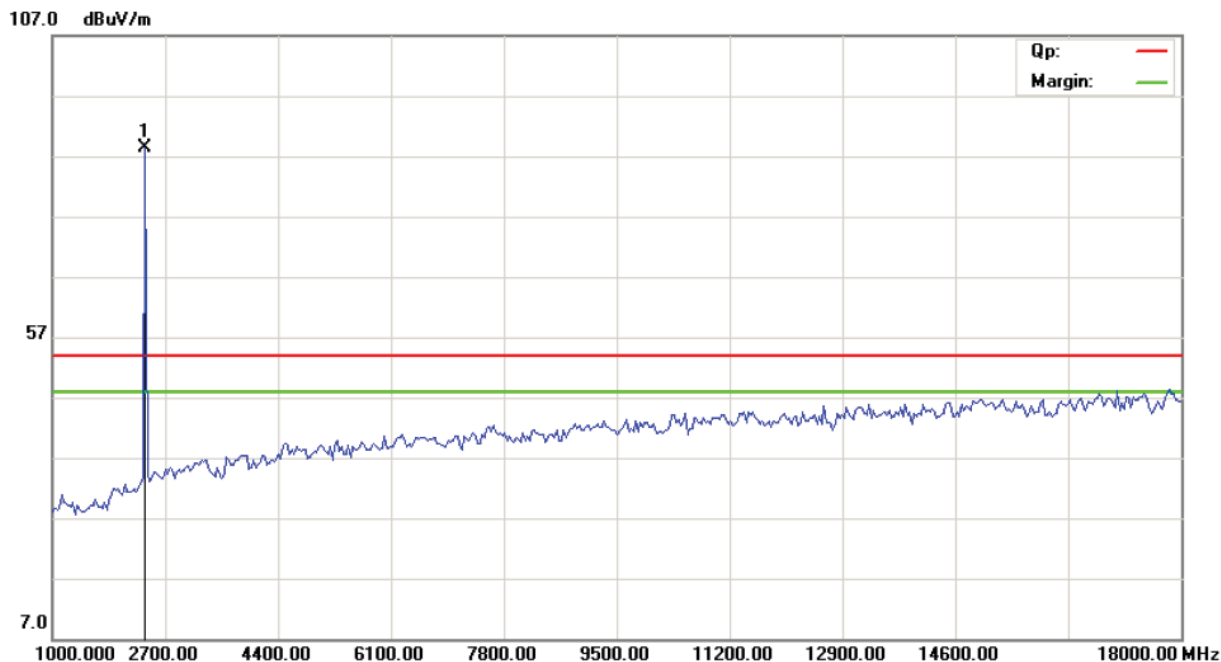


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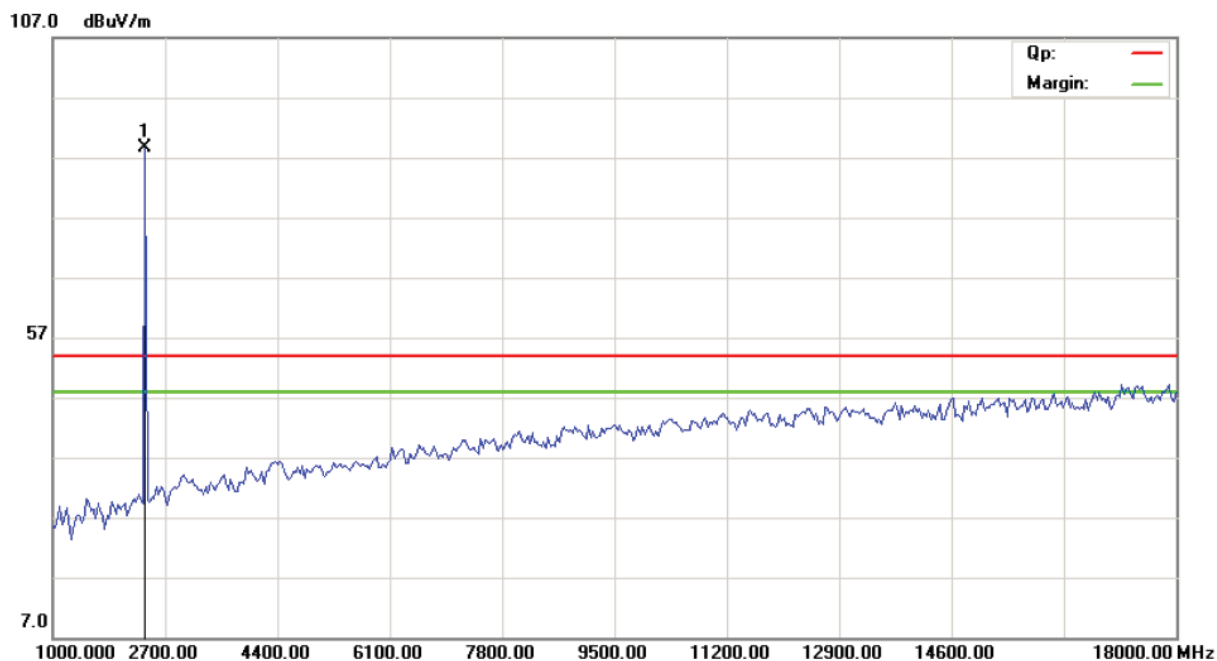
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Middle Channel : Horizontal



Middle Channel : Vertical

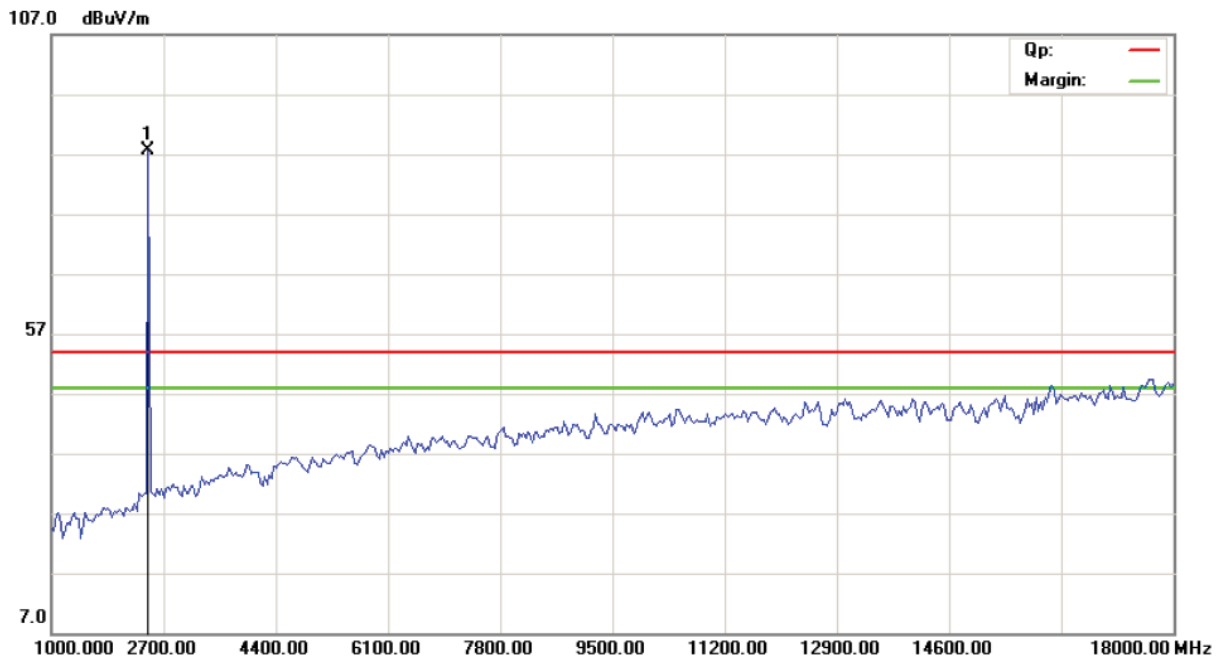


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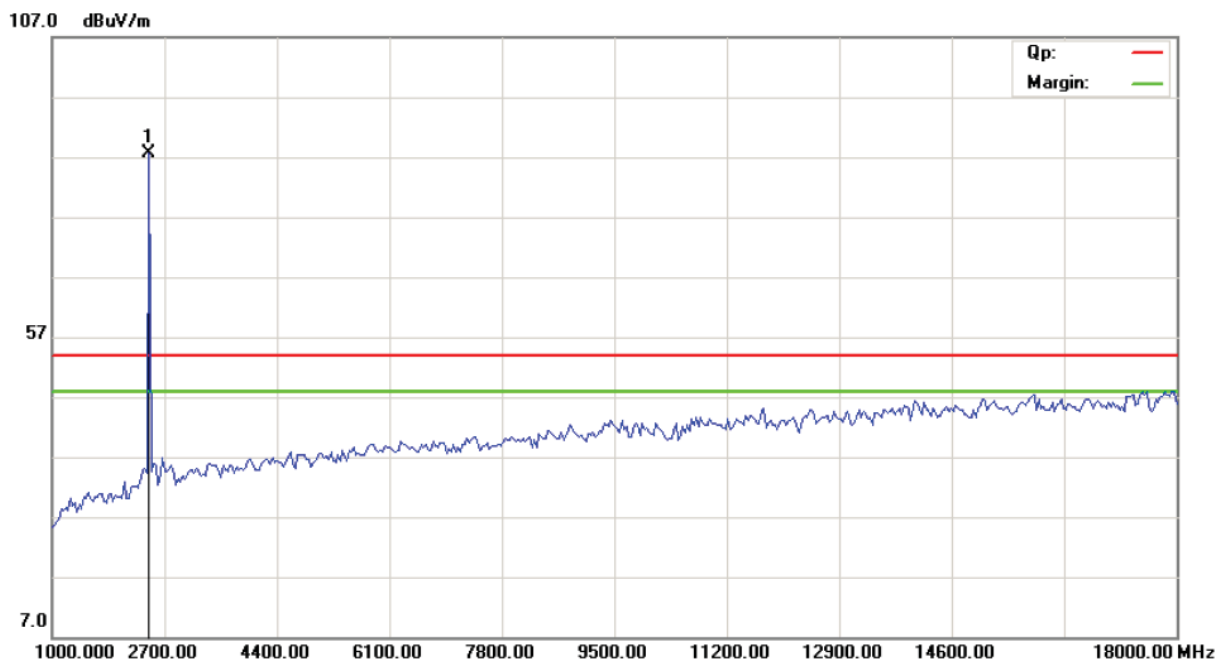
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High Channel : Horizontal



High Channel : Vertical



Note: for the radiated emissions from 18-25GHz, it was the floor noise.

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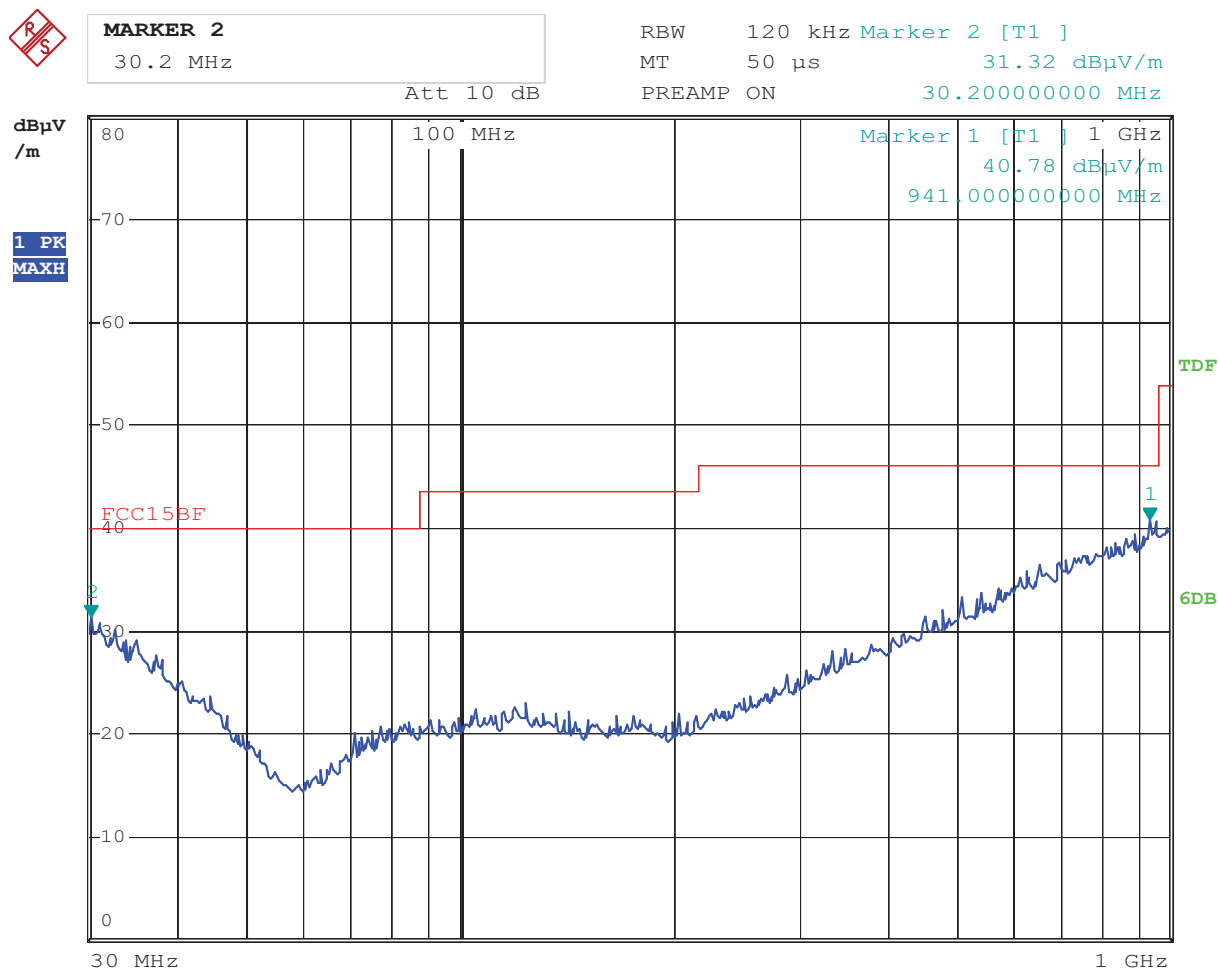


General Radiated Emission Data
Radiated Emission In Horizontal (30MHz----1000MHz)

EUT set Condition: Keep Tx transmitting

Results: Pass

Please refer to following diagram for individual



Date: 30.JUN.2015 16:45:34

Frequency (MHz)	Level@3m (dB µ V/m)	Antenna Polarity	Limit@3m (dB µ V/m)
30.200	31.32	H	40.00
941.000	40.78	H	46.00

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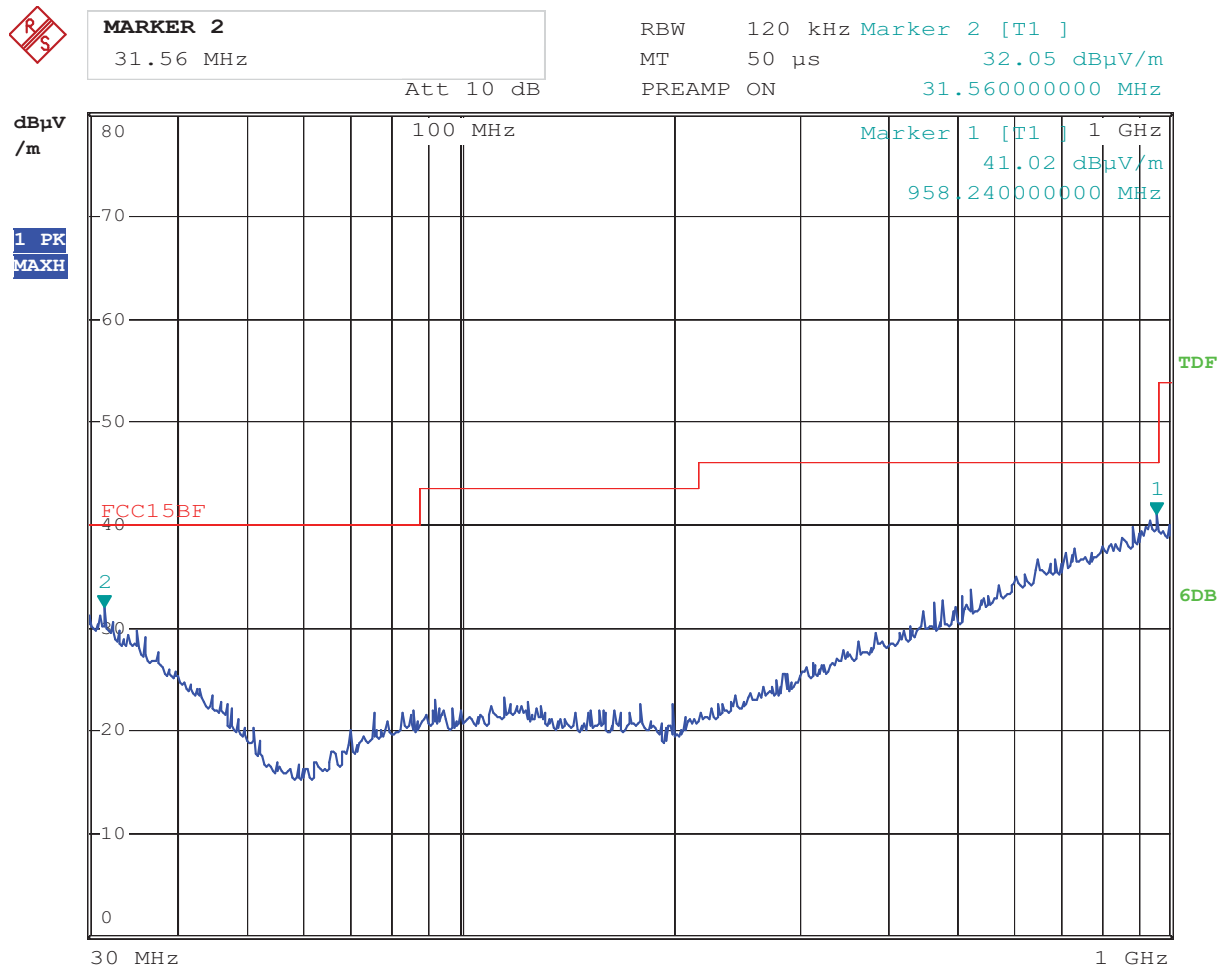


Radiated Emission In Vertical 30MHz----1000MHz)

EUT set Condition: Keep Tx transmitting

Results: Pass

Please refer to following diagram for individual



Date: 30.JUN.2015 16:42:52

Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
31.560	32.05	V	40.00
958.240	41.02	V	46.00

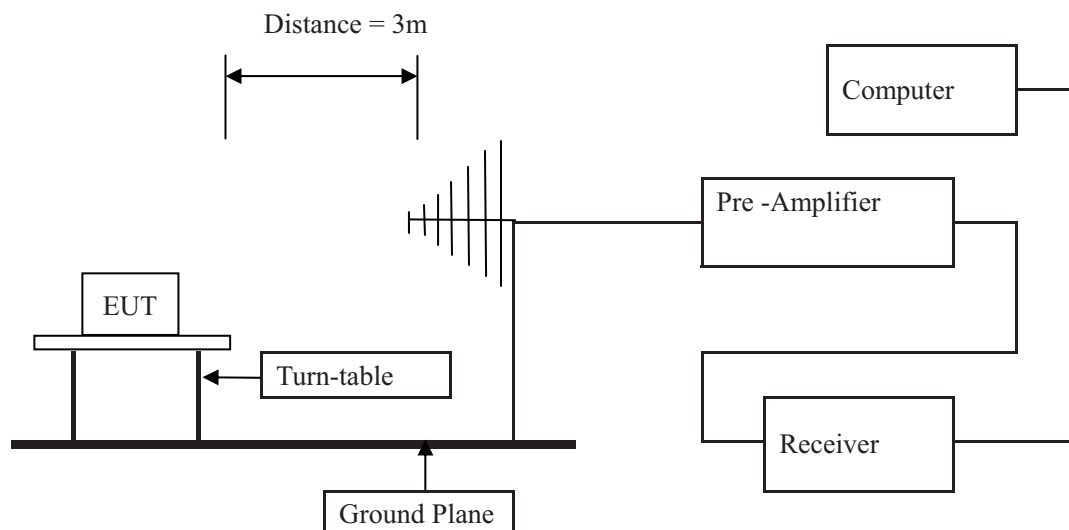
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7. Band Edge

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 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.

Test frequency ranger: 30MHz to 25GHz, only worse case is reported

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7.6 Test Result

Horizontal:

Product:	2.4GHz Pistol Radio Control System		Test Mode:	Low Channel- keep transmitting
Mode	Keeping Transmitting		Test Voltage	DC9V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2390MHz	PK (dBμV/m)	37.3	Limit	74(dBμV/m)
	AV(dBμV/m)	--		54(dBμV/m)
2400MHz	PK (dBμV/m)	45.3	Limit	74(dBμV/m)
	AV(dBμV/m)	--		54(dBμV/m)

Vertical:

Product:	2.4GHz Pistol Radio Control System		Test Mode:	Low Channel- keep transmitting
Mode	Keeping Transmitting		Test Voltage	DC9V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2390MHz	PK (dBμV/m)	38.7	Limit	74(dBμV/m)
	AV(dBμV/m)	--		54(dBμV/m)
2400MHz	PK (dBμV/m)	46.8	Limit	74(dBμV/m)
	AV(dBμV/m)	--		54(dBμV/m)

Horizontal:

Product:	2.4GHz Pistol Radio Control System		Test Mode:	High Channel- keep transmitting
Mode	Keeping Transmitting		Test Voltage	DC9V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2483.5MHz	PK (dBμV/m)	40.16	Limit	74(dBμV/m)
	AV(dBμV/m)	--		54(dBμV/m)

Vertical:

Product:	2.4GHz Pistol Radio Control System		Test Mode:	High Channel- keep transmitting
Mode	Keeping Transmitting		Test Voltage	DC9V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2483.5MHz	PK (dBμV/m)	39.55	Limit	74(dBμV/m)
	AV(dBμV/m)	--		54(dBμV/m)

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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.

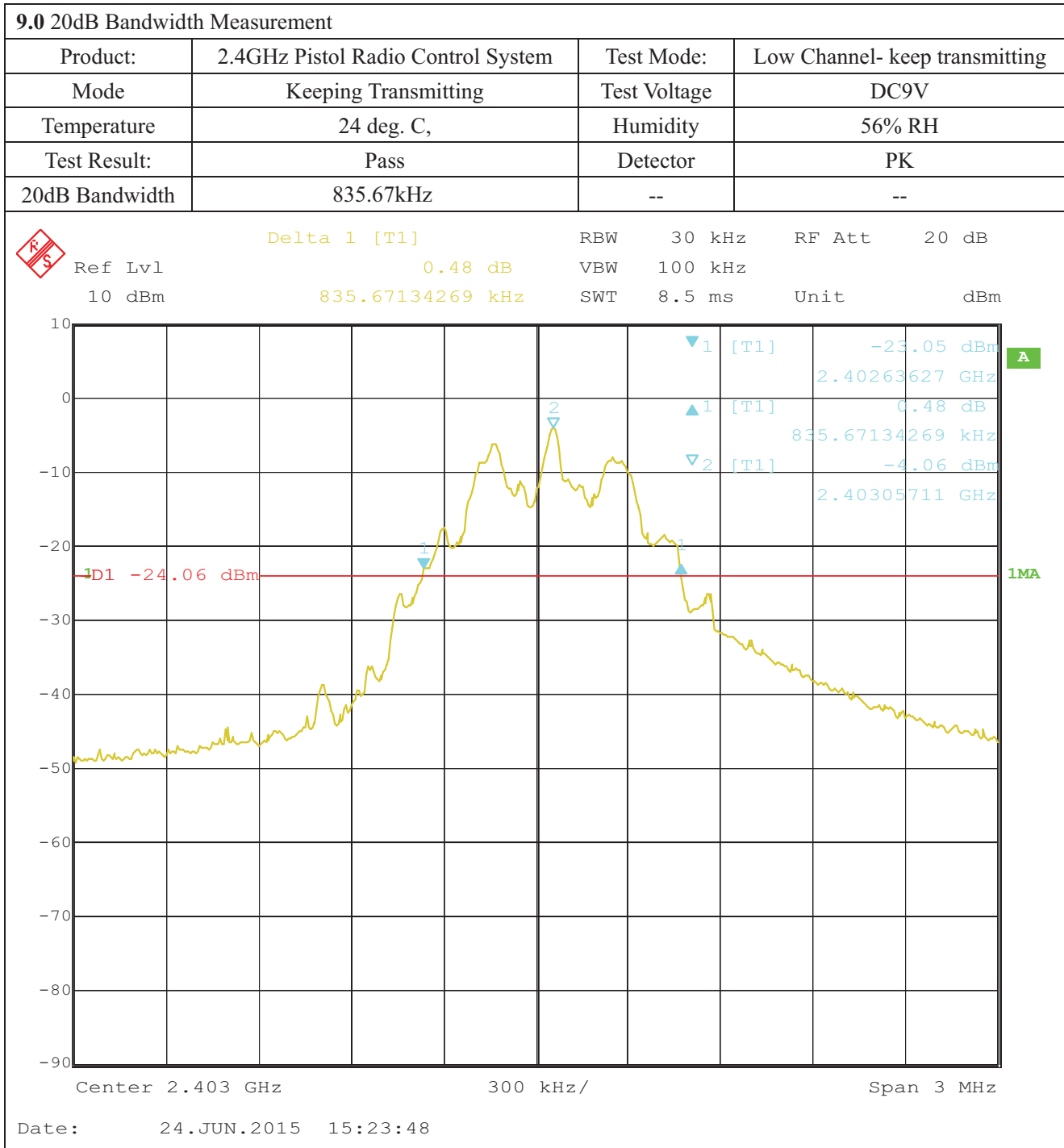
This product has a Integral Ant . The antenna gain is 2.5dBi. It fulfill the requirement of this section.

Test Result: Pass

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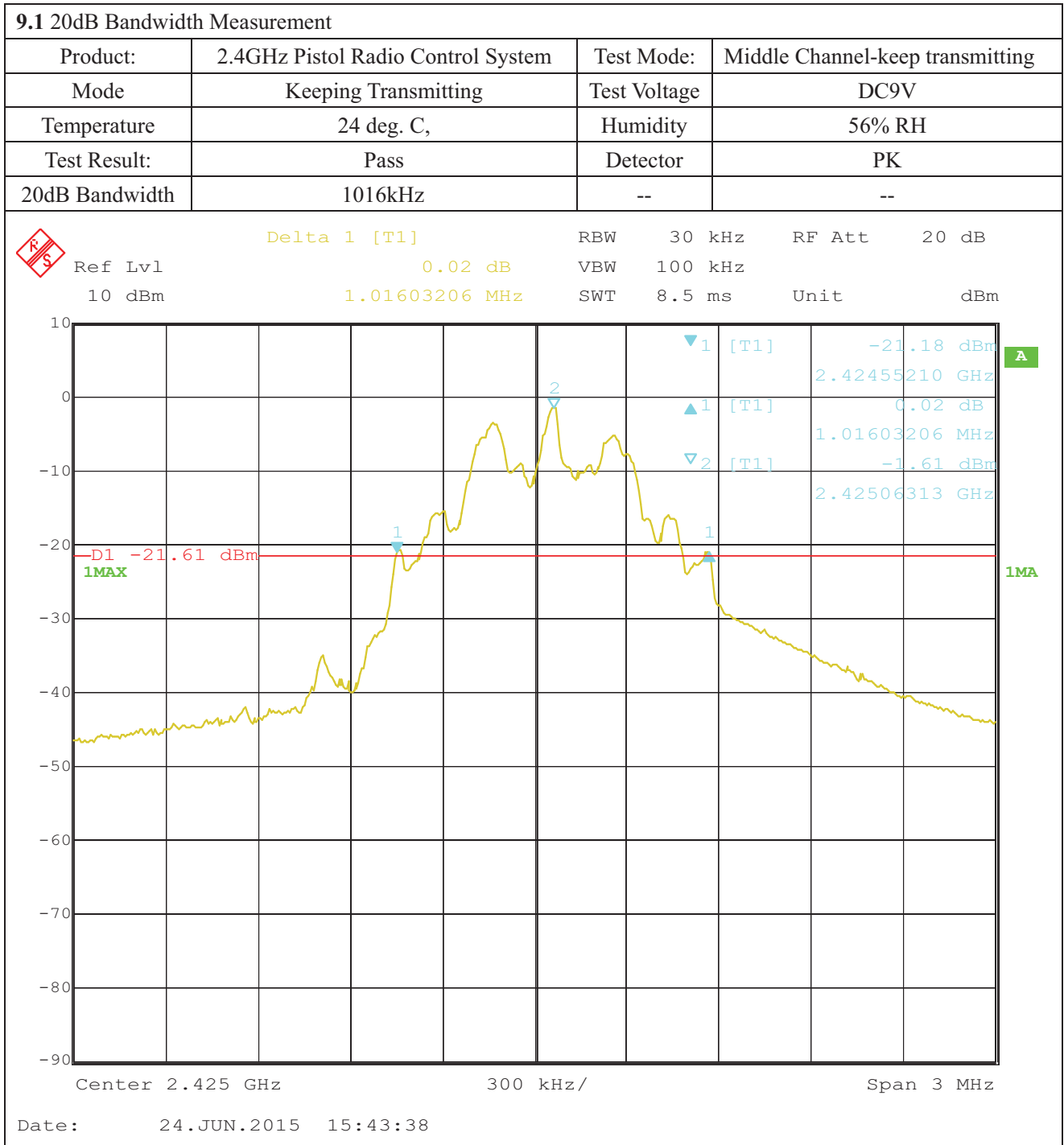
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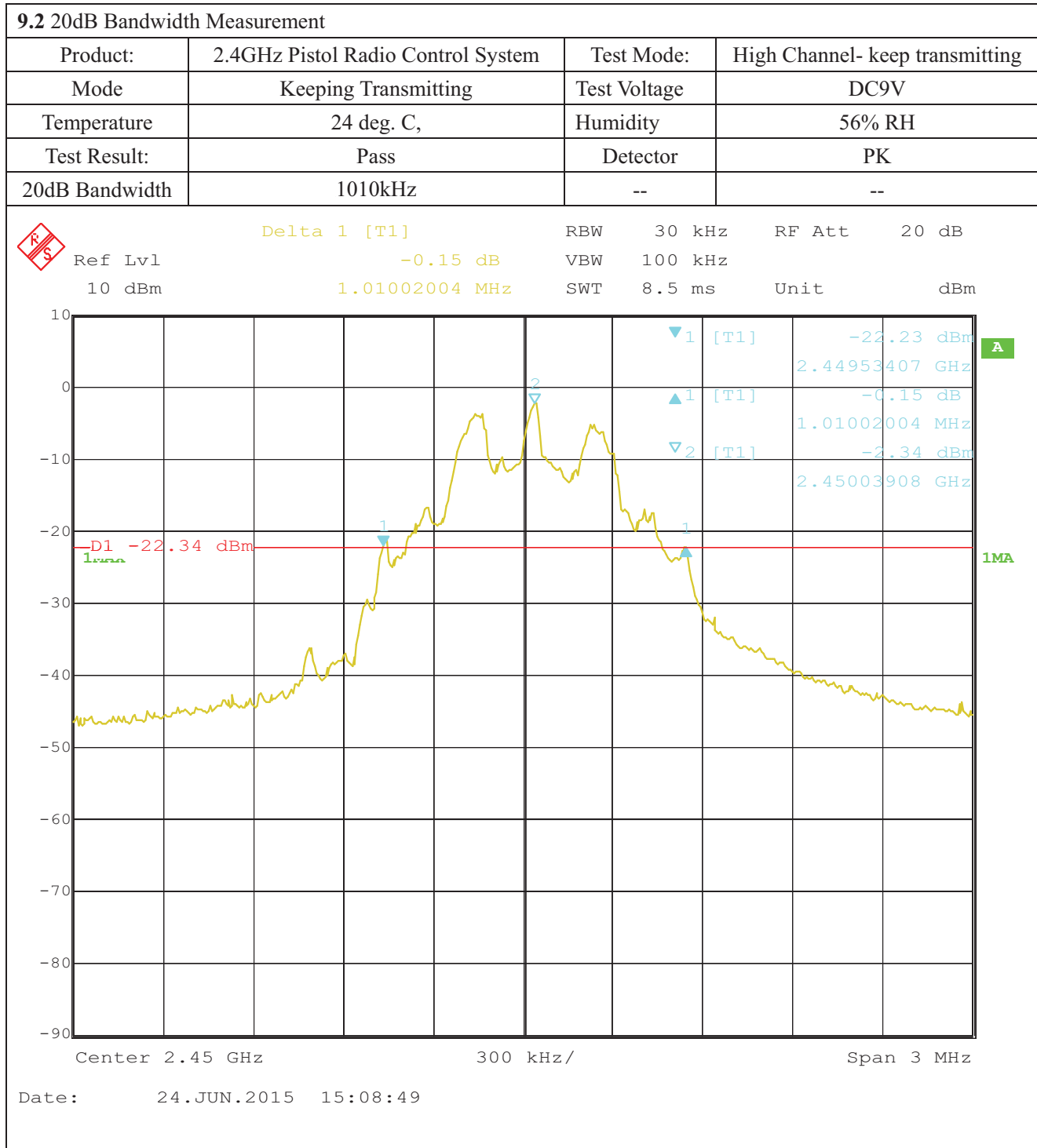
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10.0 FCC ID Label

FCC ID: ZDTJ2C0001

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:



FCC ID Label Location

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11.0 Photo of testing

11.1 Conducted test View—N/A

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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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Interior View

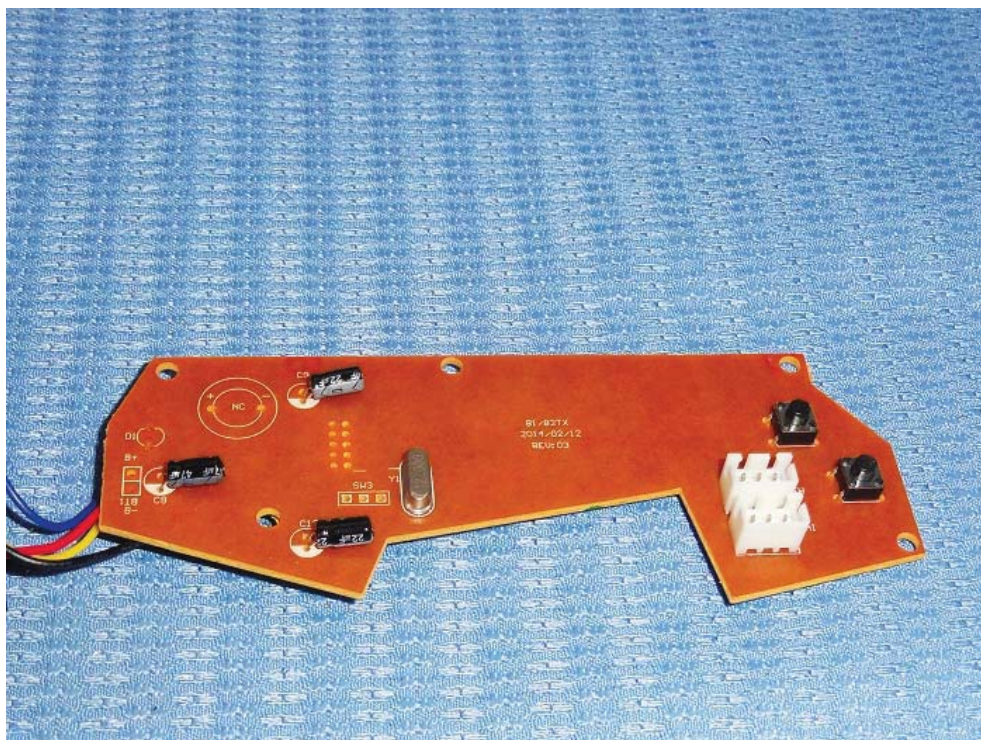
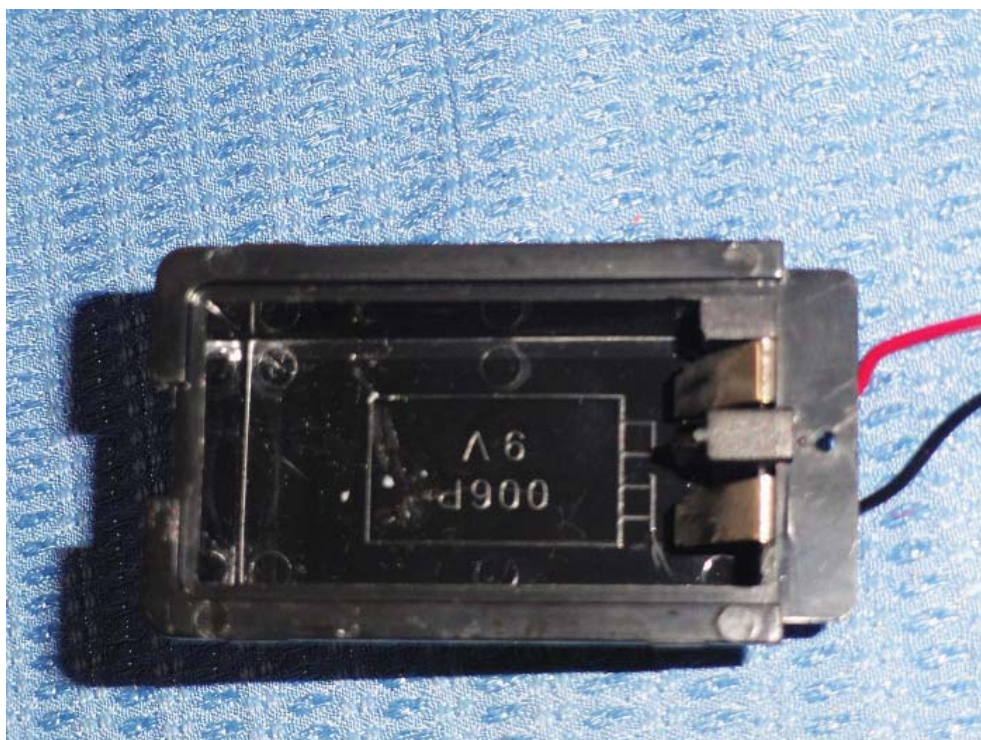


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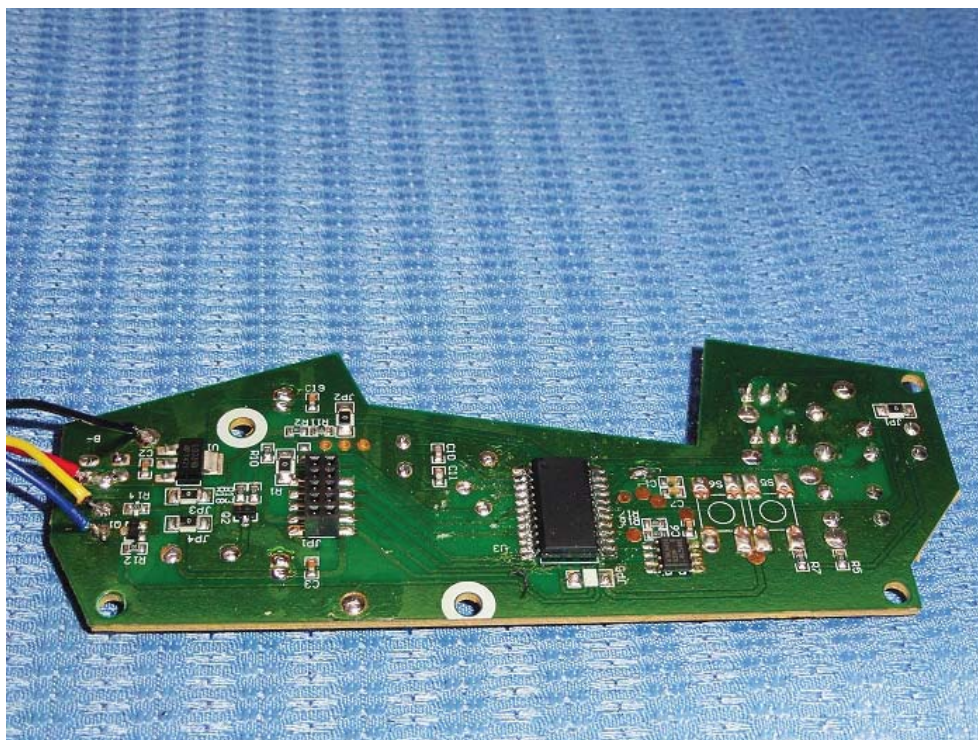


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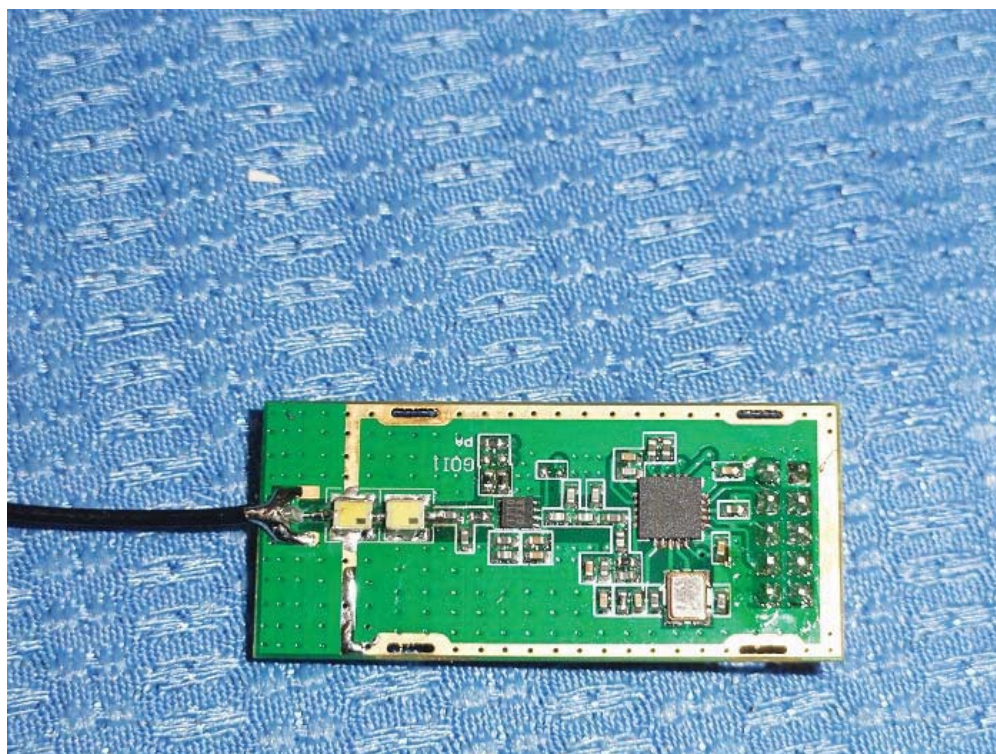
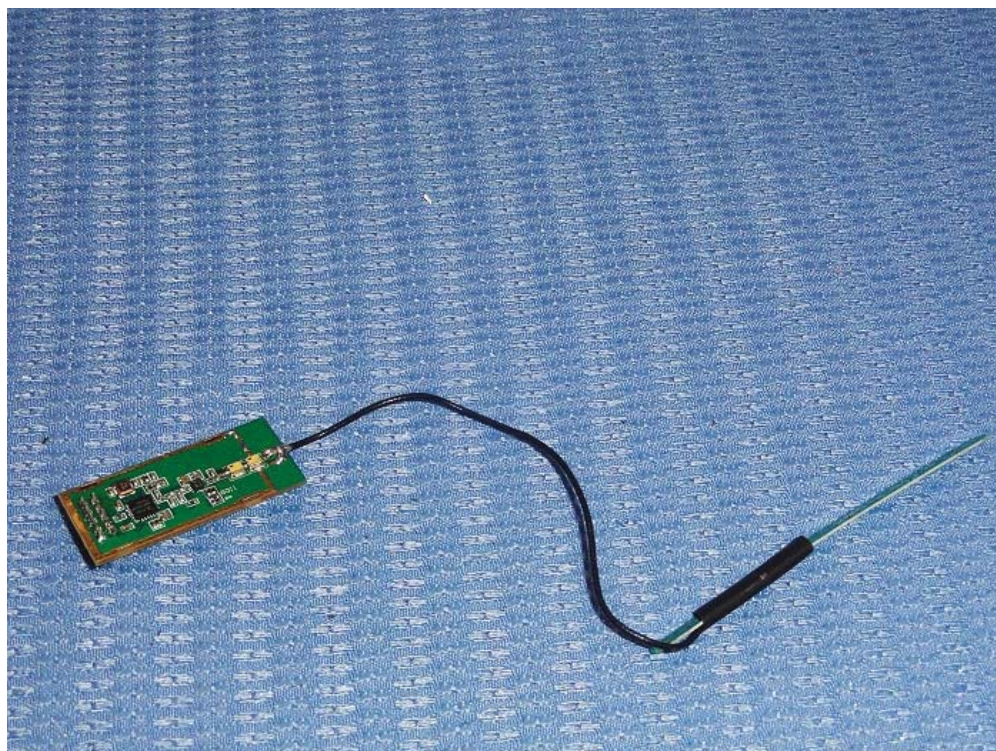


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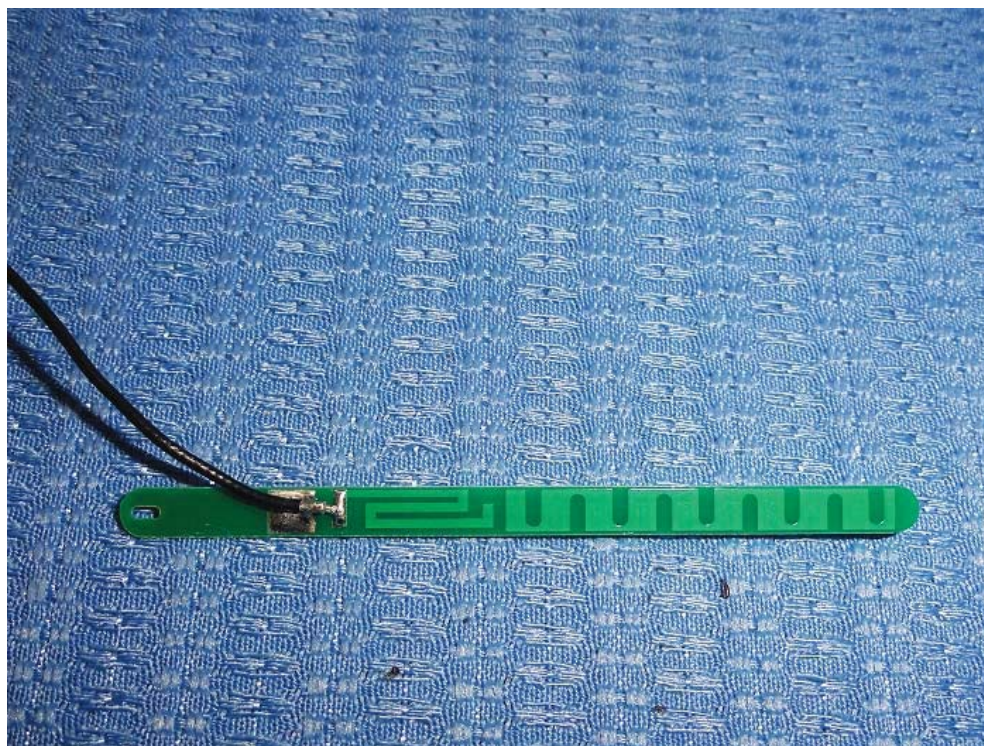
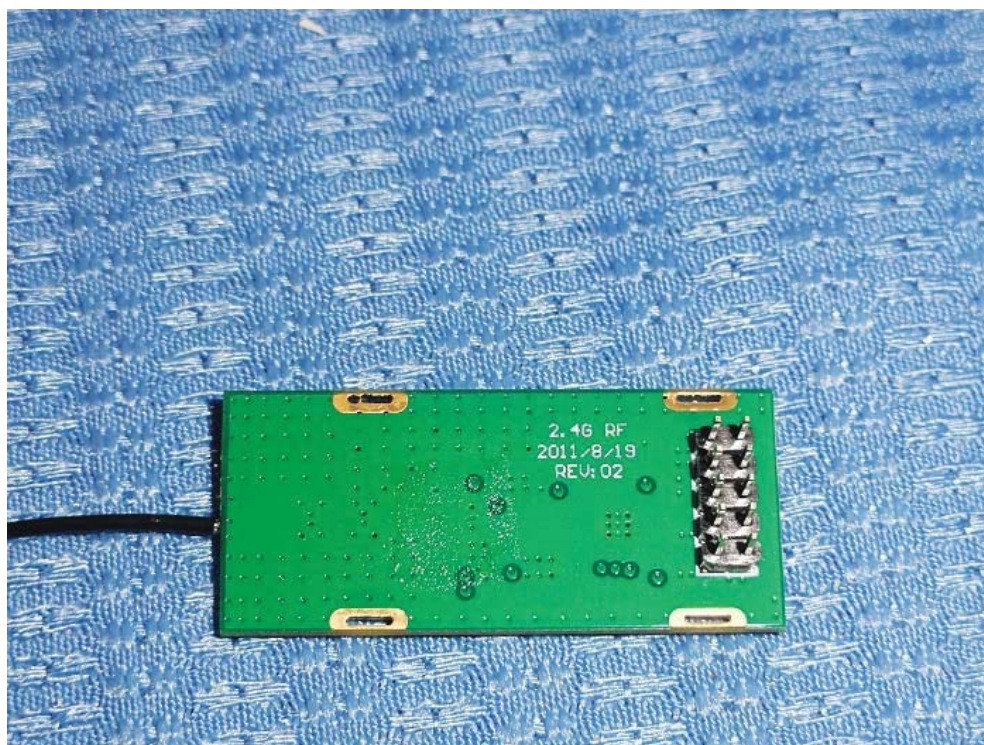


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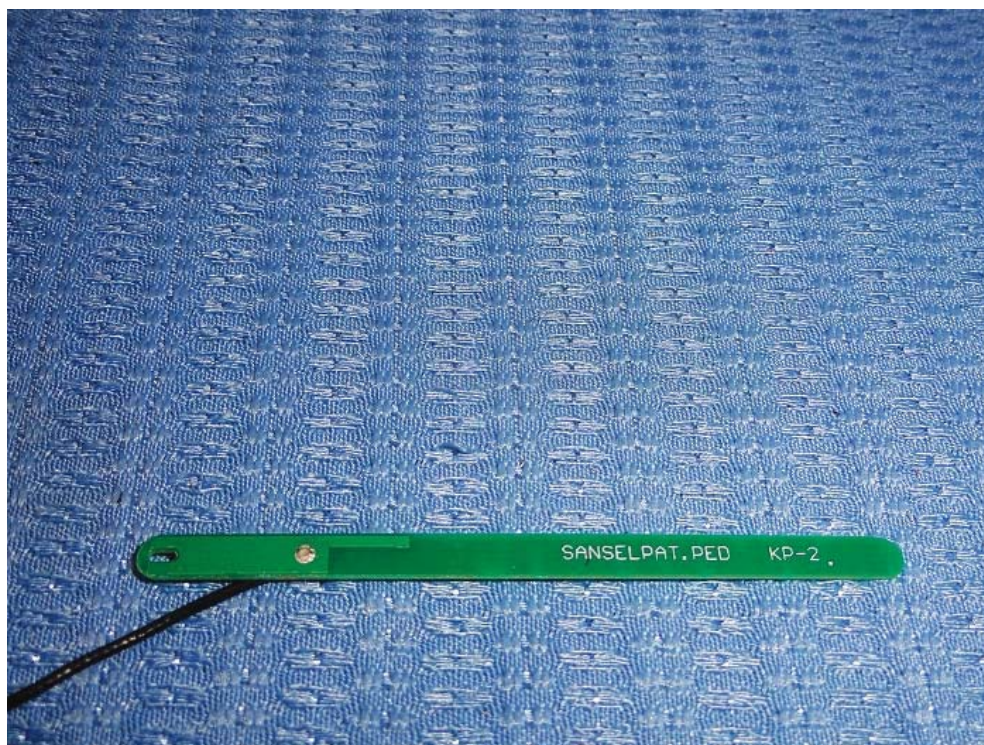


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Interior View



--End of the report--

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