

TEST REPORT

Reference No...... : WTF15S0527451E
FCC ID : BRWECX13005
Applicant..... : Horizon Hobby, LLC
Address..... : 4105 Fieldstone Road Champaign, IL 61822 Unite States
Manufacturer : KATUMFEI INDUSTRIAL LTD. (HK)
Address..... : No.99,Shangnan East Road,Fucheng Industrial Town,Huangpu
Community,Shajing Street,Shenzhen City,Guangdong
Product Name..... : ECX Micro Transmitter
Model No..... : ECX13005
Standards..... : FCC CFR47 Part 15 Section 15.247:2014
Date of Receipt sample : May. 28, 2015
Date of Test : Jun. 01 - 13, 2015
Date of Issue..... : Jun. 15, 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:

Waltek Services (Shenzhen) Co., Ltd.

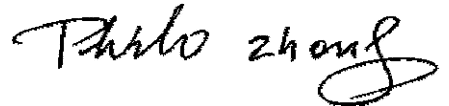
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Zero Zhou /Project Engineer

Approved by:



Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Result
Conduct Emission	15.207	N/A
Radiated Spurious Emissions	15.205(a) 15.209 15.247(d)	PASS
Band edge	15.247(d) 15.205(a)	PASS
20dB Bandwidth	15.247(a)(1)	PASS
Maximum Peak Output Power	15.247(b)(1)	PASS
Frequency Separation	15.247(a)(1)	PASS
Number of Hopping Frequency	15.247(a)(1)(iii)	PASS
Dwell time	15.247(a)(1)(iii)	PASS
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	PASS

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4 General Information

4.1 General Description of E.U.T.

Product Name:	ECX Micro Transmitter
Model No.:	ECX13005
Model Description:	N/A
Frequency Range:	2402-2475.6MHz,92 Channels in total
Type of Modulation:	GFSK,
The lowest oscillator:	26MHz
Antenna installation:	monopole antenna
Antenna Gain:	3dBi

4.2 Details of E.U.T.

Technical Data:	DC 4*1.5V AA battery
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4.3 Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	1	2402.8	2	2403.6	3	2404.4
4	2405.2	5	2406	6	2406.8	7	2407.6
8	2408.4	9	2409.2	10	2410	11	2410.8
12	2411.6	13	2412.4	14	2413.2	15	2414
16	2414.8	17	2415.6	18	2416.4	19	2417.2
20	2418	21	2418.8	22	2419.6	23	2420.4
24	2421.2	25	2422	26	2423.8	27	2423.6
28	2424.4	29	2425.2	30	2426	31	2426.8
32	2427.6	33	2428.4	34	2429.2	35	2430
36	2430.8	37	2431.6	38	2432.4	39	2433.2
40	2434	41	2434.8	42	2435.6	43	2436.4
44	2437.2	45	2438	46	2438.8	47	2439.6
48	2440.4	49	2441.2	50	2442	51	2442.8
52	2443.6	53	2444.4	54	2445.2	55	2446
56	2446.8	57	2447.6	58	2448.4	59	2449.2
60	2250	61	2450.8	62	2451.6	63	2452.4
64	2453.2	65	2454	66	2454.8	67	2455.6
68	2456.4	69	2457.2	70	2458	71	2458.8
72	2459.6	73	2460.4	74	2461.2	75	2462
76	2462.8	77	2463.6	78	2464.4	79	2465.2
80	2466	81	2466.8	82	2467.6	83	2468.4
84	2469.2	85	2470	86	2470.8	87	2471.6
88	2472.4	89	2473.2	90	2774	91	2474.8
92	2475.6						

4.4 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.

Table 1 Tests Carried Out Under FCC part 15.247

Test mode	Low channel	Middle channel	High channel
Transmitting	2402MHz	2439.6MHz	2475.6MHz

4.5 Test Facility

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

- **FCC – Registration No.: 880581**

Waltek Services (Shenzhen) Co., Ltd. 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 – 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.

5 Equipment Used during Test

5.1 Equipments List

3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.15,2014	Sep.14,2015
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.15,2014	Sep.14,2015
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.19,2015	Apr.18,2016
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.15,2014	Sep.14,2015
5	Broad-bandHorn 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)	Top	1GHz-25GHz	EW02014-7	Apr.10,2015	Apr.09,2016
3m Semi-anechoic Chamber for RadiationEmissions Test site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	Sep.15,2014	Sep.14,2015
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	Sep.15,2014	Sep.14,2015
3	Amplifier	Compliance pirection systems inc	PAP-0203	22024	Sep.15,2014	Sep.14,2015
4	Cable	HUBER+SUHNER	CBL2	525178	Sep.15,2014	Sep.14,2015
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	Sep.15,2014	Sep.14,2015
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	Sep.15,2014	Sep.14,2015
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	Sep.15,2014	Sep.14,2015

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated SpuriousEmissions test	± 5.03 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB(Horn antenna 1000M~25000MHz)
Conducted SpuriousEmissions test	± 3.64 dB(AC mains 150KHz~30MHz)

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 C63.4:2003
Test Result:	N/A
Frequency Range:	150kHz to 30MHz
Class/Severity:	Class B
Limit:	66-56 dB μ V between 0.15MHz & 0.5MHz 56 dB μ V between 0.5MHz & 5MHz 60 dB μ V between 5MHz & 30MHz
Detector:	Peak for pre-scan(9kHz Resolution Bandwidth)
Remark	The EUT power is 4*1.5V AA Battery. The test is no need.

7 Radiated Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: DA 00-705

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

7.1 EUT Operation

Operating Environment:

Temperature: 23.5 °C

Humidity: 51.1% RH

Atmospheric Pressure: 101.2kPa

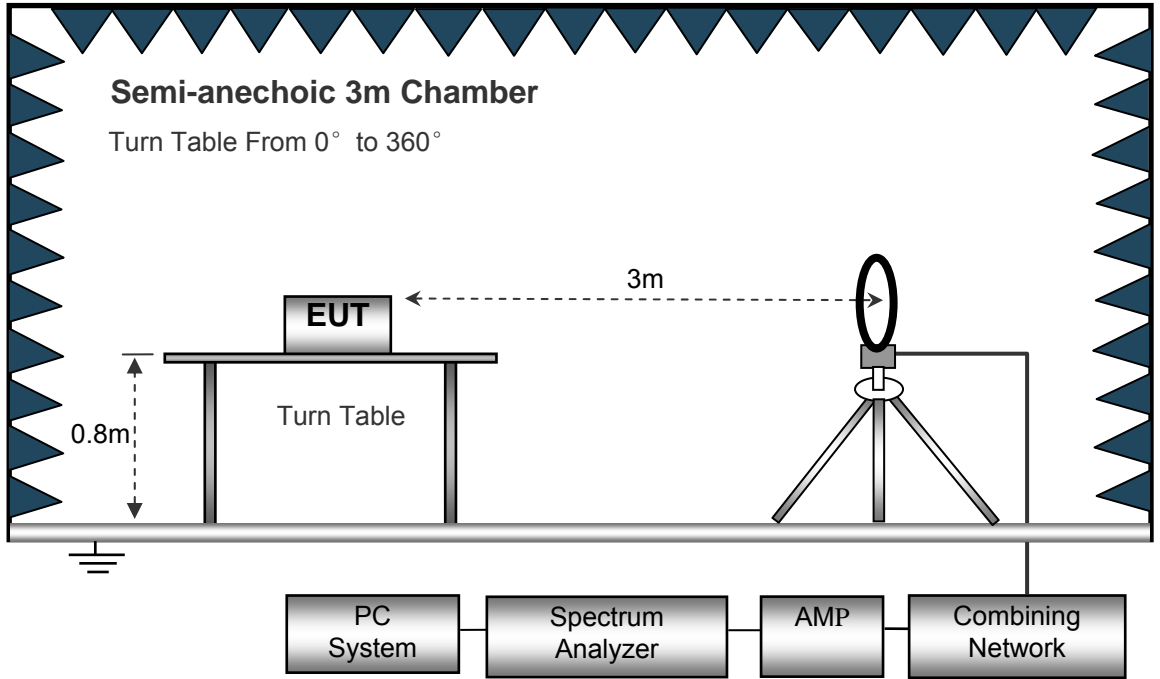
EUT Operation:

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

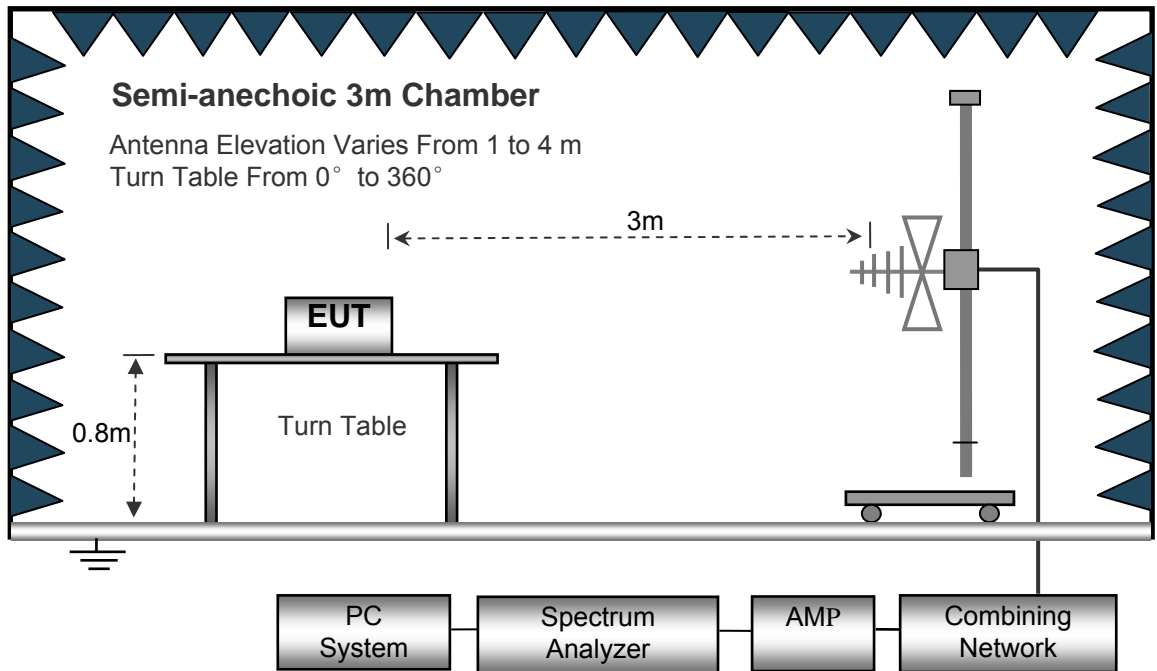
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4: 2003.

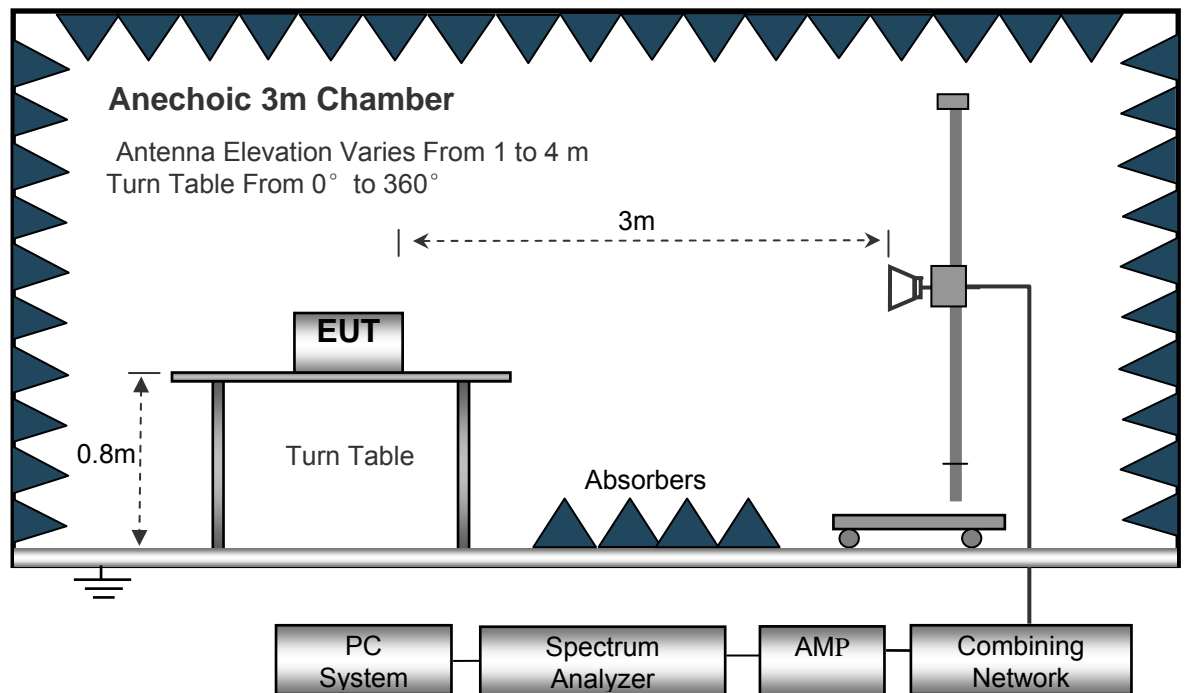
The test setup for emission measurement below 30MHz.



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
 Detector Ave.
 Resolution Bandwidth..... 1MHz
 Video Bandwidth..... 10Hz

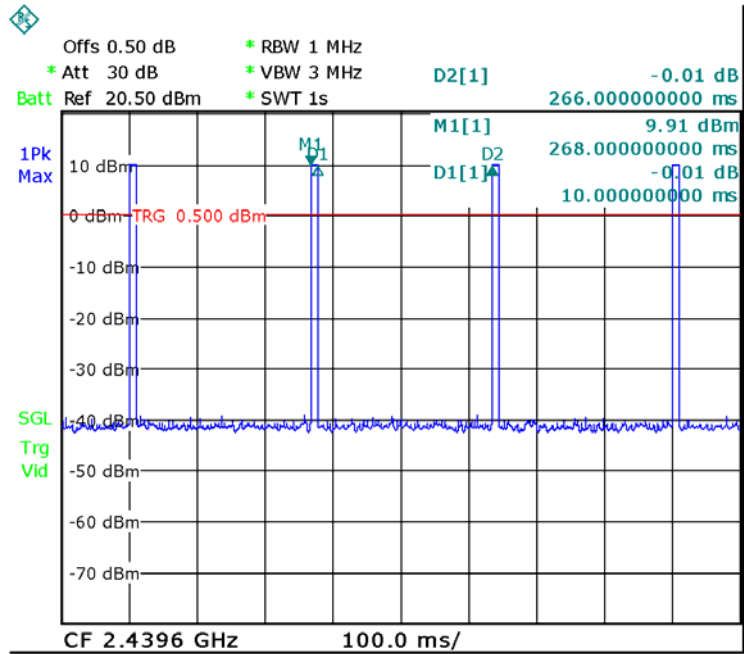
7.4 Test Procedure

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 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

$AV = \text{Peak} - 20\text{Log}_{10}(\text{duty cycle}) = \text{PK} - 28.4$

$\text{Duty Cycle} = (10/266) * 100\% = 3.8\%$



Test Frequency: 26MHz to 30MHz

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

Test Frequency: 30MHz ~ 18GHz

Remark: only the worst data(GFSK modulation mode) were reported.

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB μ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
GFSK Low Channel									
175.66	22.25	QP	152	1.5	H	10.59	32.84	43.53	-10.69
175.66	20.71	QP	148	1.7	V	10.59	31.30	43.53	-12.23
4804.00	54.03	PK	16	1.6	H	-1.08	52.95	74.00	-21.05
4804.00	48.80	PK	16	1.6	V	-1.08	47.72	74.00	-26.28
7206.00	54.83	PK	188	1.3	H	1.34	56.17	74.00	-17.83
7206.00	47.16	PK	188	1.3	V	1.34	48.50	74.00	-25.50

Frequency	PK	Turn table Angle	RX Antenna		Duty cycle Factor	AV	FCC Part 15.247	
			Height	Polar			Limit	Margin
(MHz)	(dB μ V/m)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
4804.00	52.95	0	1.7	H	-28.4	24.55	54.00	-29.45
4804.00	47.72	161	1.1	V	-28.4	19.32	54.00	-34.68
7206.00	56.17	34	1.5	H	-28.4	27.77	54.00	-26.23
7206.00	48.50	172	1.3	V	-28.4	20.10	54.00	-33.90

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB μ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
GFSK Middle Channel									
175.66	22.89	QP	179	1.0	H	10.59	33.48	43.53	-10.05
175.66	19.01	QP	329	1.8	V	10.59	29.60	43.53	-13.93
4882.00	54.08	PK	126	1.5	H	-0.62	53.46	74.00	-20.54
4882.00	46.82	PK	126	1.5	V	-0.62	46.20	74.00	-27.80
7323.00	50.64	PK	88	1.3	H	2.21	52.85	74.00	-21.15
7323.00	45.50	PK	88	1.3	V	2.21	47.71	74.00	-26.29

Frequency	PK	Turn table Angle	RX Antenna		Duty cycle Factor	AV	FCC Part 15.247	
			Height	Polar			Limit	Margin
(MHz)	(dB μ V/m)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
4882.00	53.46	313	1.5	H	-28.4	25.06	54.00	-28.94
4882.00	46.20	118	1.5	V	-28.4	17.80	54.00	-36.20
7323.00	52.85	188	1.5	H	-28.4	24.45	54.00	-29.55
7323.00	47.71	156	1.3	V	-28.4	19.31	54.00	-34.69

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB μ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
GFSK High Channel									
175.66	21.66	QP	2	1.9	H	10.59	32.25	43.53	-11.28
175.66	20.23	QP	174	1.1	V	10.59	30.82	43.53	-12.71
4960.00	52.71	PK	36	1.7	H	-0.24	52.47	74.00	-21.53
4960.00	46.50	PK	36	1.7	V	-0.24	46.26	74.00	-27.74
7440.00	50.97	PK	53	2.0	H	2.84	53.81	74.00	-20.19
7440.00	45.36	PK	53	2.0	V	2.84	48.20	74.00	-25.80

Frequency	PK	Turn table Angle	RX Antenna		Duty cycle Factor	AV	FCC Part 15.247	
			Height	Polar			Limit	Margin
(MHz)	(dB μ V/m)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
4960.00	52.47	159	1.3	H	-28.4	24.07	54.00	-29.93
4960.00	41.26	176	2.0	V	-28.4	17.86	54.00	-36.14
7440.00	53.81	104	1.2	H	-28.4	25.41	54.00	-28.59
7440.00	46.20	229	1.9	V	-28.4	19.80	54.00	-34.20

Test Frequency : 18GHz to 25GHz

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

8 Band Edge Measurement

Test Requirement:	Section 15.247(d) In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method:	DA 00-705
Test Limit:	Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
Test Mode:	Transmitting and Hopping

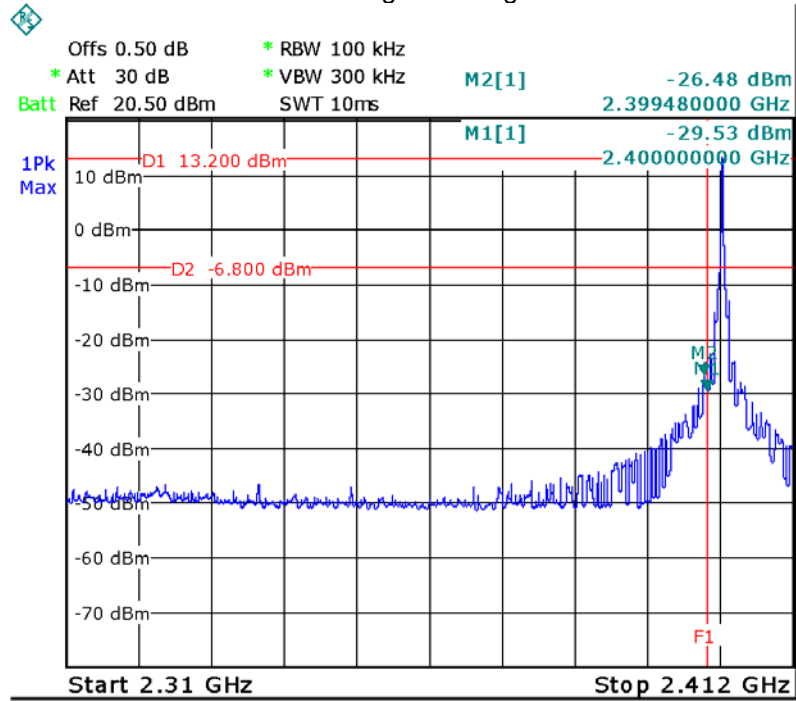
8.1 Test Procedure

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 = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold

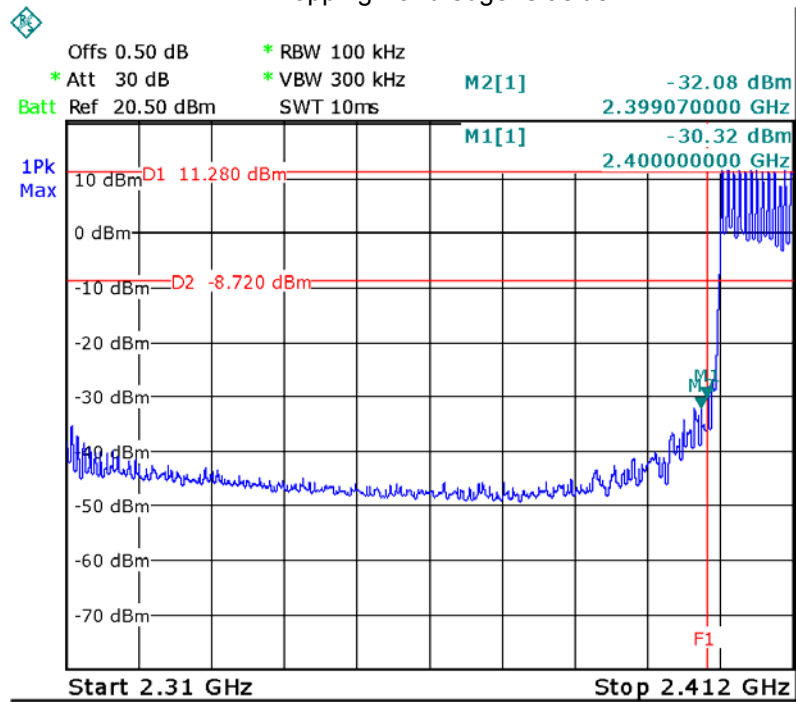
8.2 Test Result

Test plots

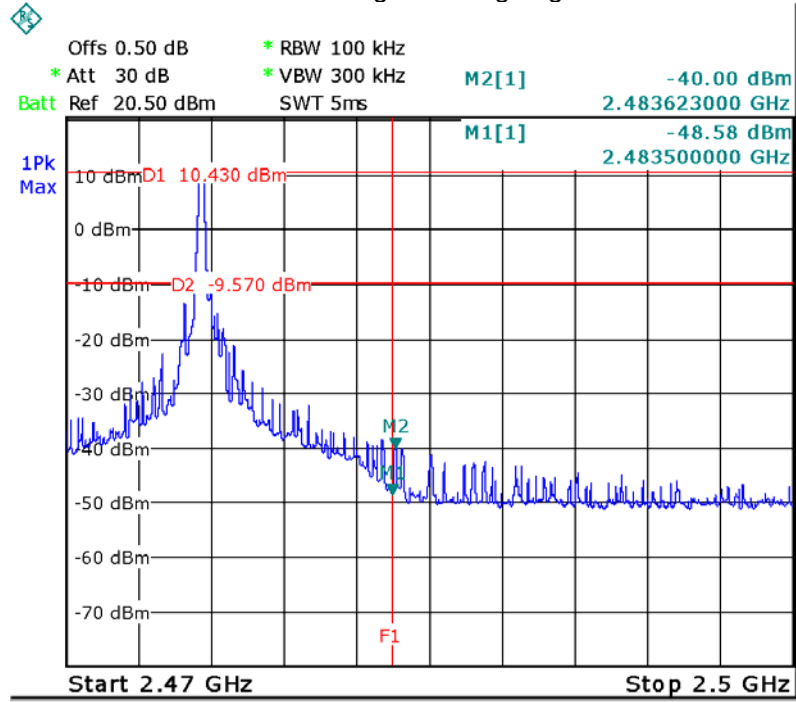
Transmitting Band edge-left side



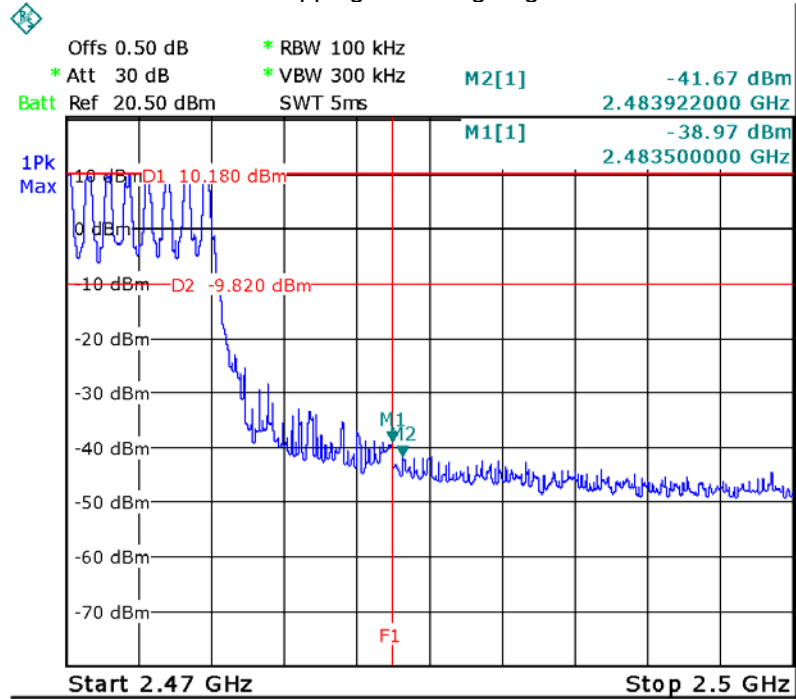
Hopping Band edge-left side



Transmitting Band edge-right side



Hopping Band edge-right side



9 20 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247
Test Method: DA 00-705
Test Mode: Test in fixing operating frequency at low, Middle, high channel.

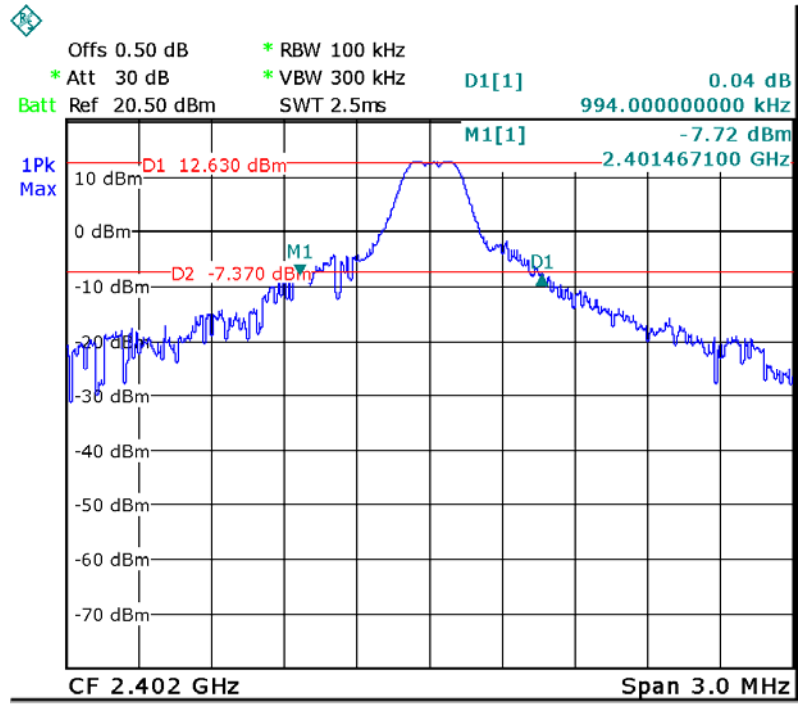
9.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 30kHz, VBW = 100kHz

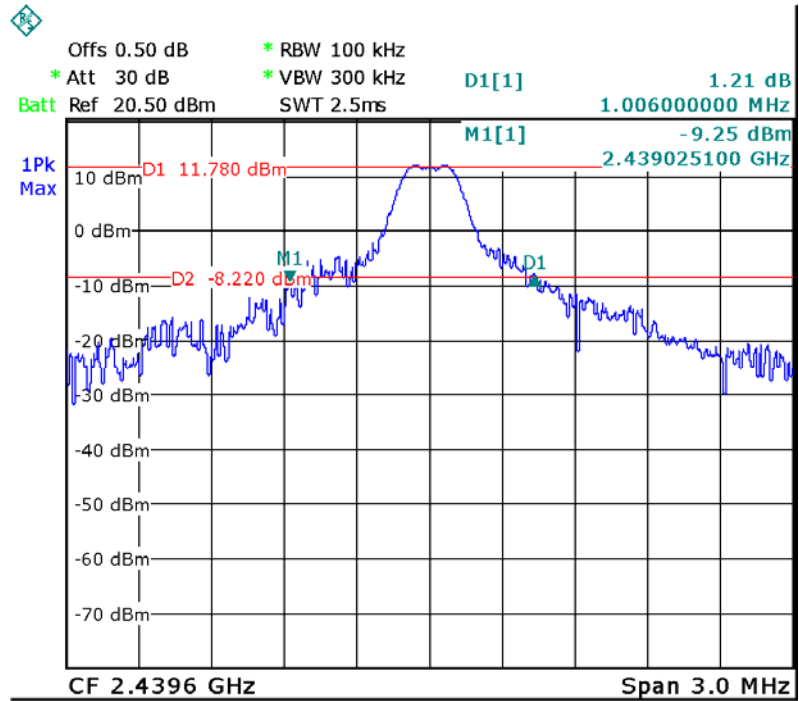
9.2 Test Result

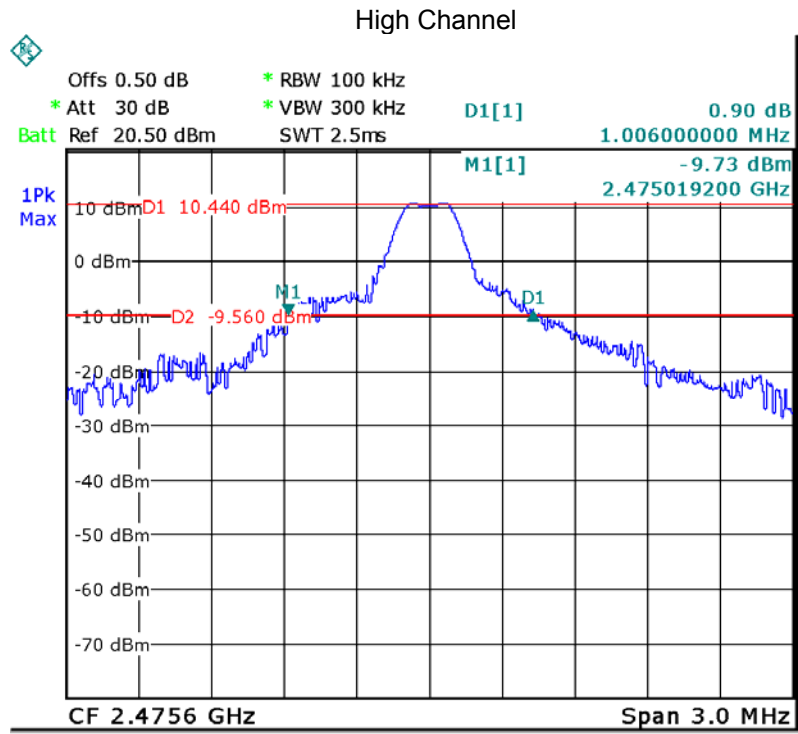
Modulation	Test Channel	Bandwidth
GFSK	Low	0.994MHz
GFSK	Middle	1.006MHz
GFSK	High	1.006MHz

Testplots
Low Channel



Middle Channel





10 Maximum Peak Output Power

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	DA 00-705
Test Limit:	Regulation 15.247 (b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts. Refer to the result "Number of Hopping Frequency" of this document. The 0.125watts (20.97 dBm) limit applies.
Test mode:	Test in fixing frequency transmitting mode.

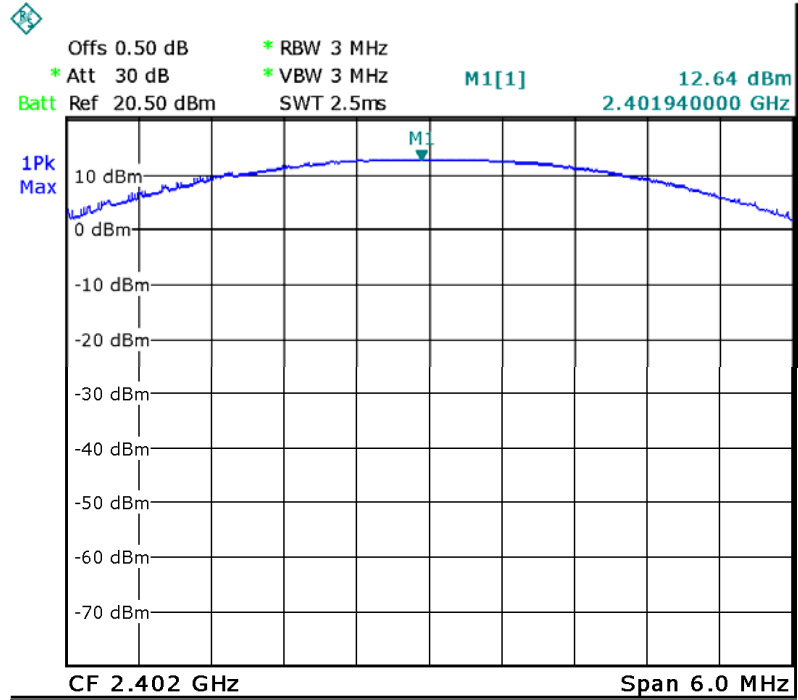
10.1 Test Procedure

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 = 3 MHz. VBW =3 MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

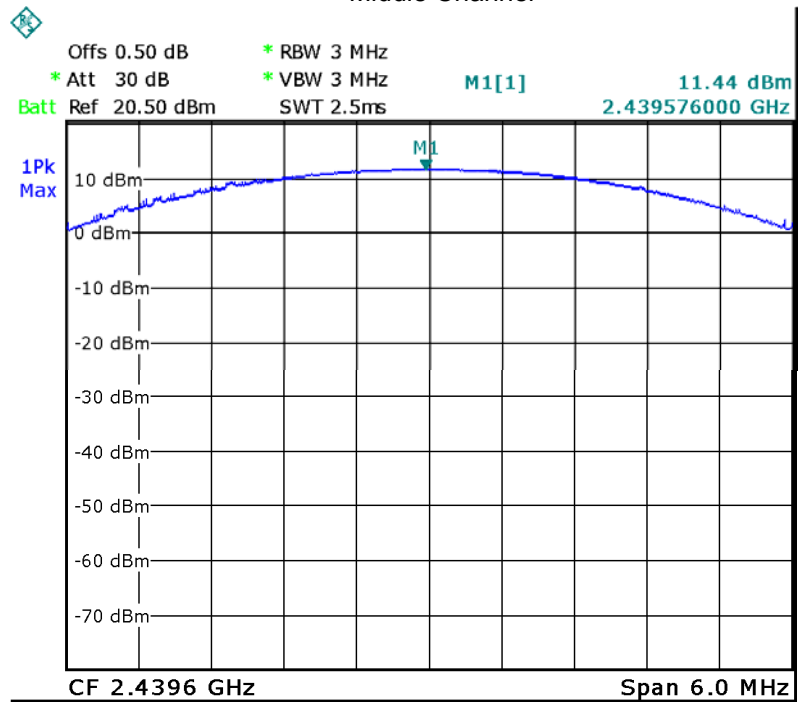
10.2 Test Result

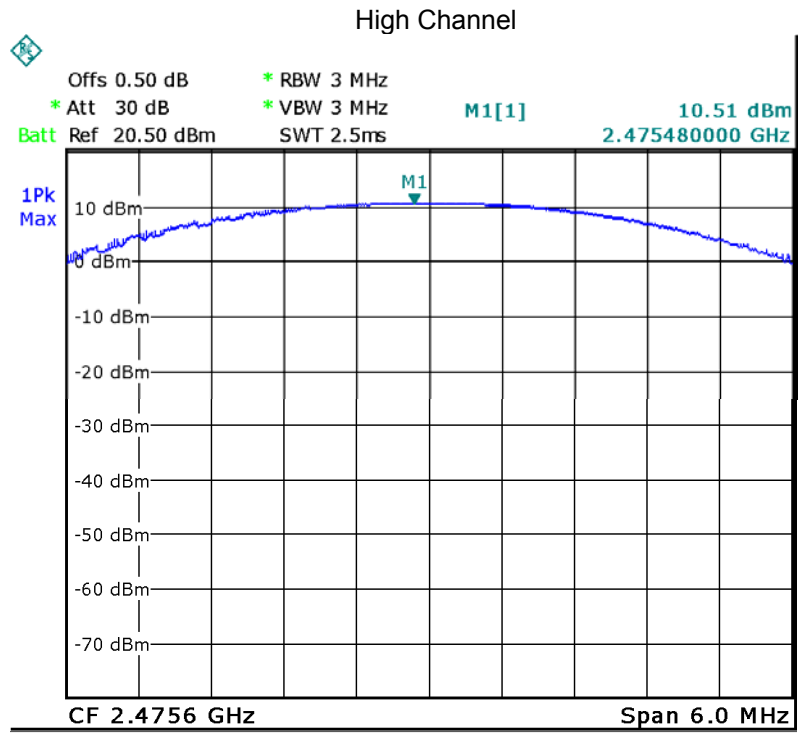
Test Channel	Output Power (dBm)	Limit (dBm)
Low	12.64	20.97
Middle	11.44	20.97
High	10.51	20.97

Testplots Low Channel



Middle Channel





11 Hopping Channel Separation

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: DA 00-705

Test Limit: Regulation 15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 1W.

Test Mode: Test in hopping transmitting operating mode.

11.1 Test Procedure

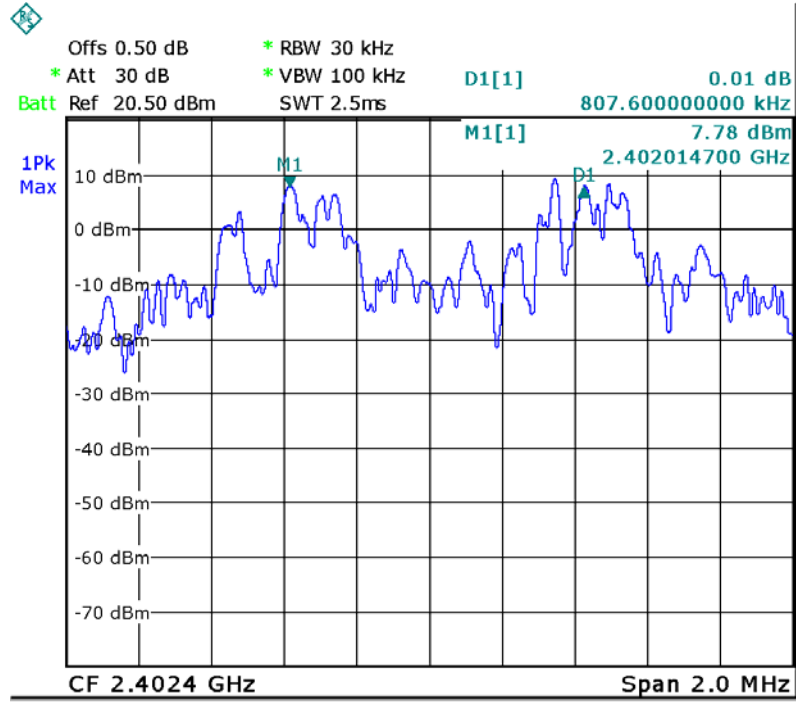
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 30KHz. VBW = 100KHz , Span = 3MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

11.2 Test Result

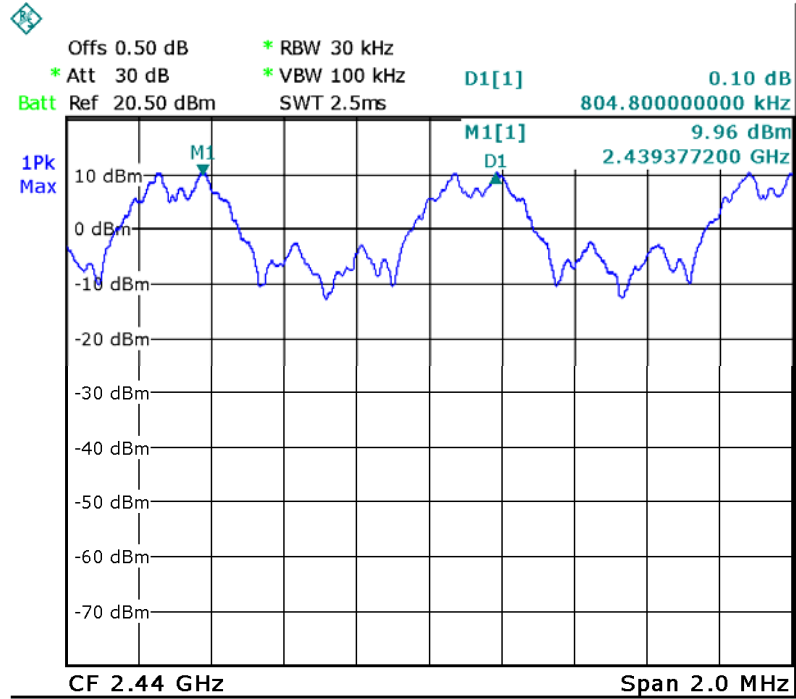
Test Channel	Separation (MHz)	Result
Low	0.808	PASS
Middle	0.805	PASS
High	0.814	PASS

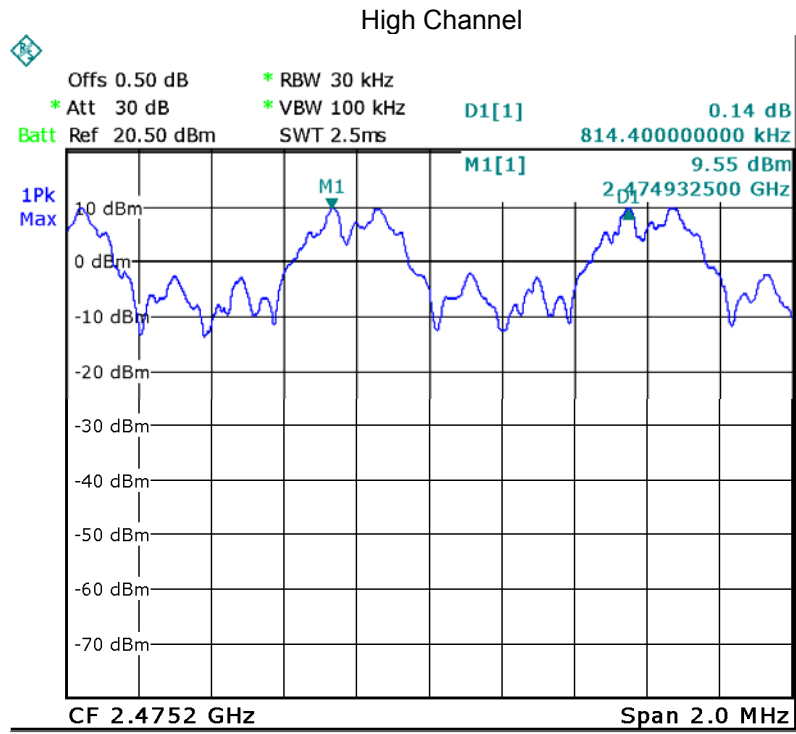
Test plots

Low Channel



Middle Channel





12 Number of Hopping Frequency

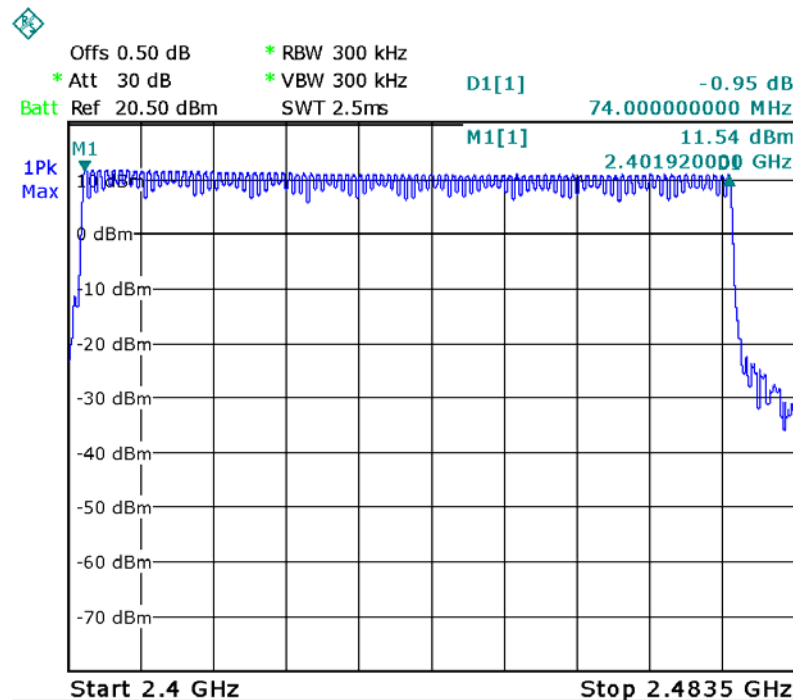
Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	DA 00-705
Test Limit:	Regulation 15.247 (a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.
Test Mode:	Test in hopping transmitting operating mode.

12.1 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 = 1MHz. VBW = 1MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.483GHz. Sweep=auto;

12.2 Test Result

Test Plots: 92 Channels in total



13 Dwell Time

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	DA 00-705
Test Limit:	Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
Test Mode:	Test in hopping transmitting operating mode.

13.1 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 spectrum analyzer span = 0. Centred on a hopping channel;
3. Set RBW = 1MHz and VBW = 3MHz. Sweep = as necessary to capture the entire dwell time per hopping channel.
4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

13.2 Test Result

The test period: $T = 0.4(s) * 92 = 36.8 (s)$

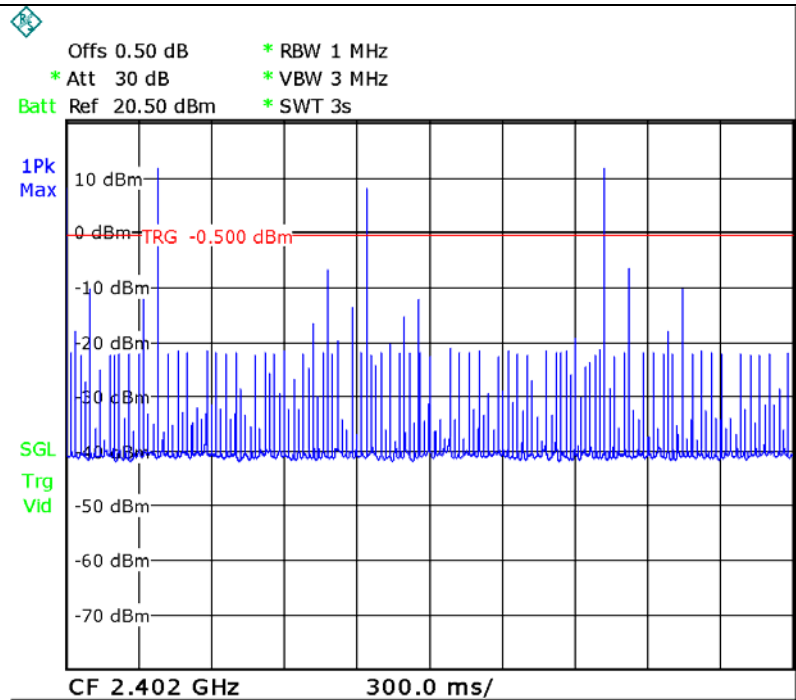
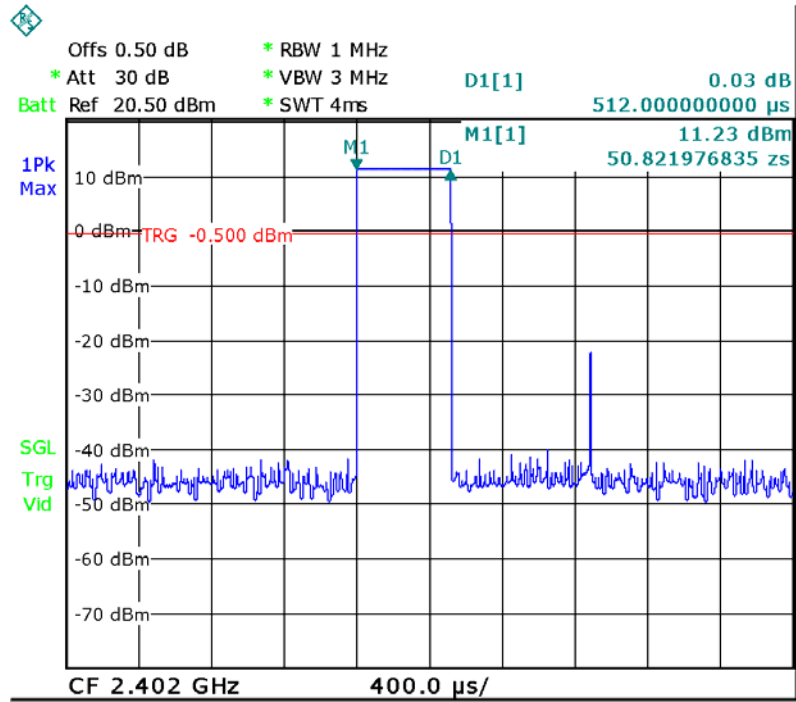
So, the Dwell Time can be calculated as follows:

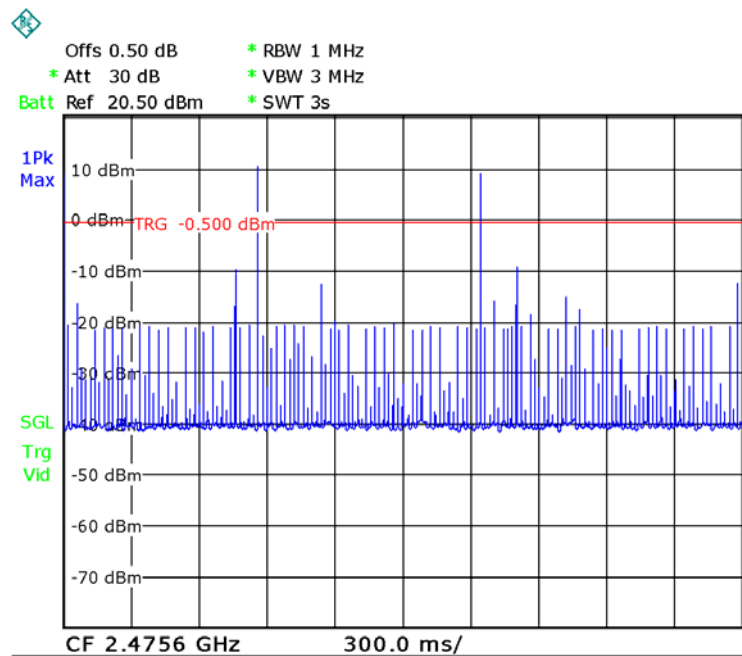
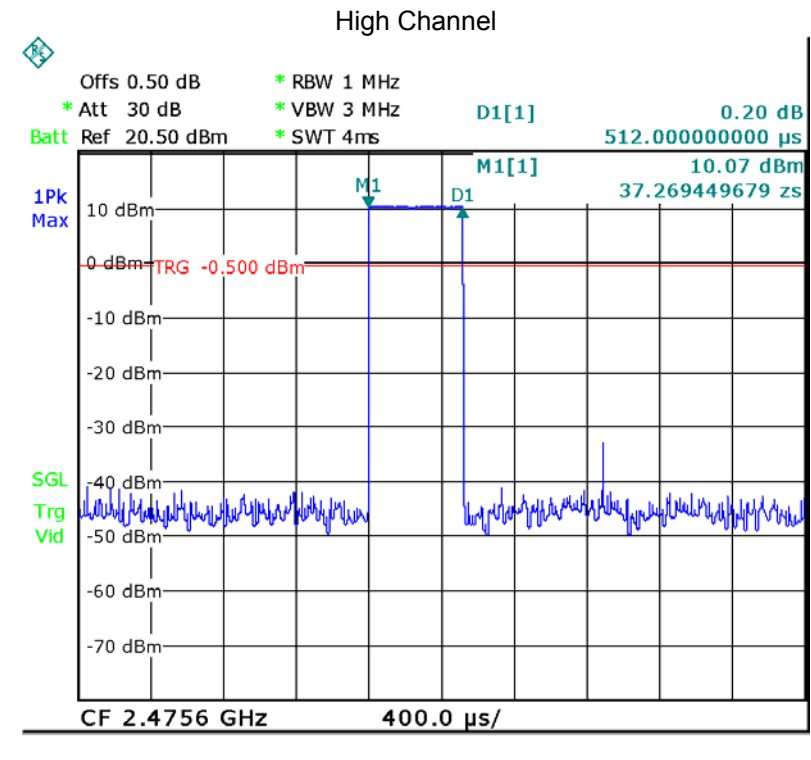
Low channel: Dwell Time = $3(\text{times})/3(s) * 0.512(\text{ms}) * 36.8(s) = 0.019(s)$

High Channel: Dwell Time = $2(\text{times})/3(s) * 0.512(\text{ms}) * 36.8(s) = 0.013(s)$

Channel	Mkr Delta(ms)	Dwell Time(s)	Limits(s)	Result
Low	0.512	0.019	0.400	Pass
High	0.512	0.013	0.400	Pass

Test Plots Low Channel





14 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 monopole antenna, fulfil the requirement of this section.

15 RF Exposure

Test Requirement:	FCC Part 1.1307
Evaluation Method	447498 D01 General RF Exposure Guidance v05r02

15.1 Requirements

1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR where

1. $f(\text{GHz})$ is the RF channel transmit frequency in GHz
2. Power and distance are rounded to the nearest mW and mm before calculation
3. The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

15.2 The procedures / limit

Conducted Peak power(dBm)	Conducted Peak power(mW)	Source-based time-averaged maximum conducted output power(mW)	Minimum test separation distance required for the exposure conditions (mm)	SAR Test Exclusion Thresholds(mW)
12.64	18.37	0.698	5	10

Remark: Max. duty factor is 0.038.

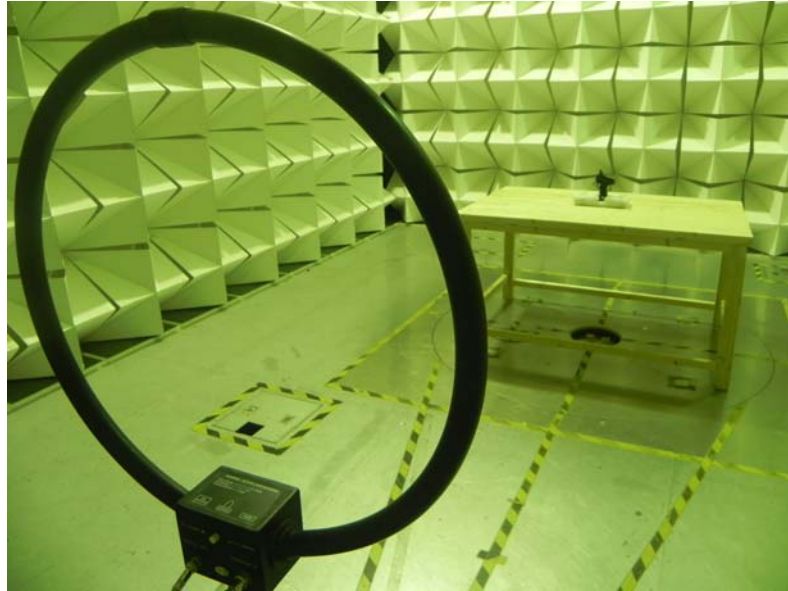
Calculation formula: Source-based time-averaged maximum conducted output power(mW) = Conducted peak power(mW)*0.038

The minimum test separation distance from extremity is 5mm.

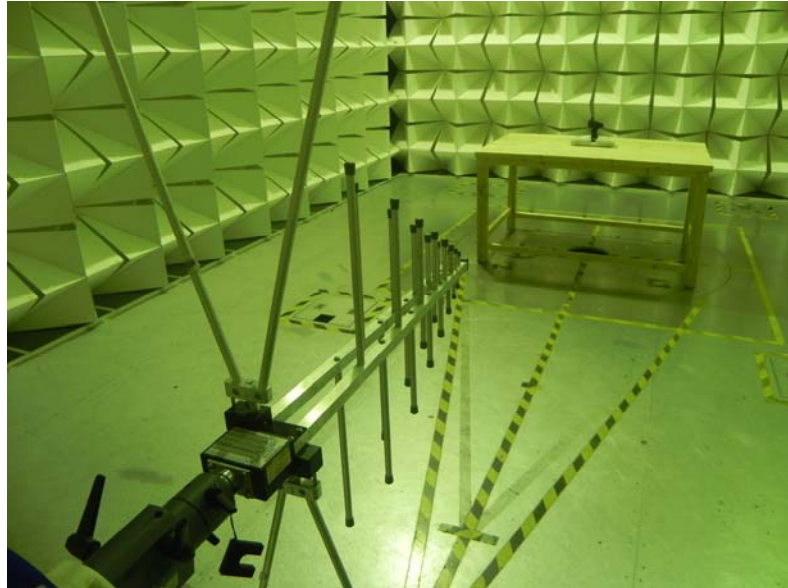
16 Photographs – Model ECX13005 Test Setup

16.1 Photograph – Radiation Spurious Emission Test Setup

Below 30MHz Test site 2#



30MHz-1GHz at Test Site 2#



Above 1GHz at Test Site 1#



17 Photographs - Constructional Details

17.1 Model ECX13005 External View



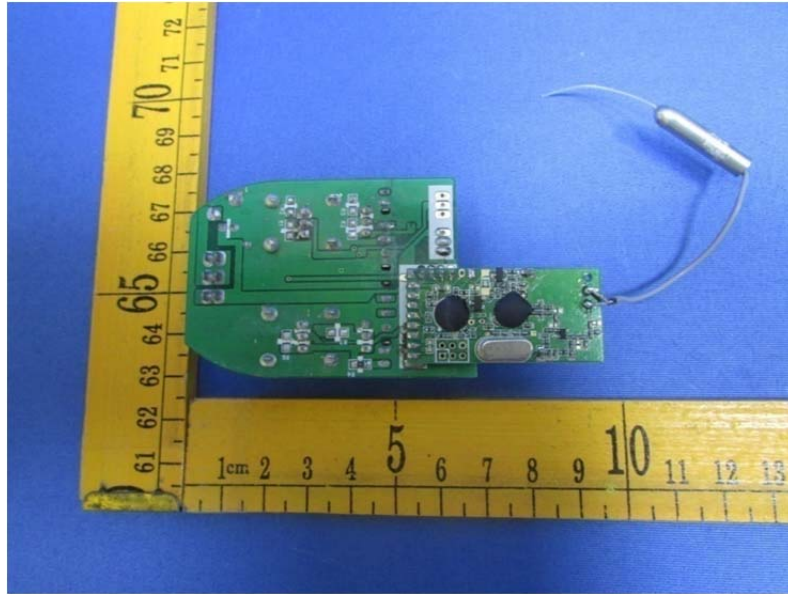


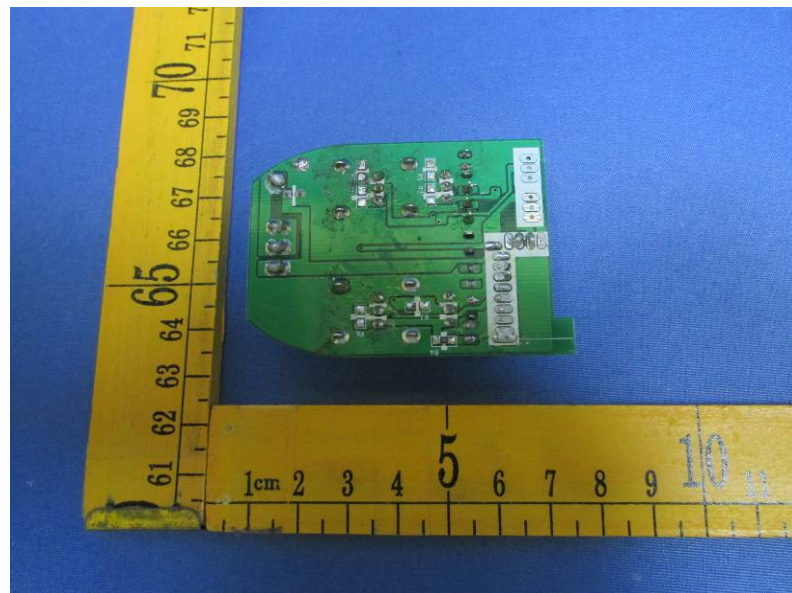
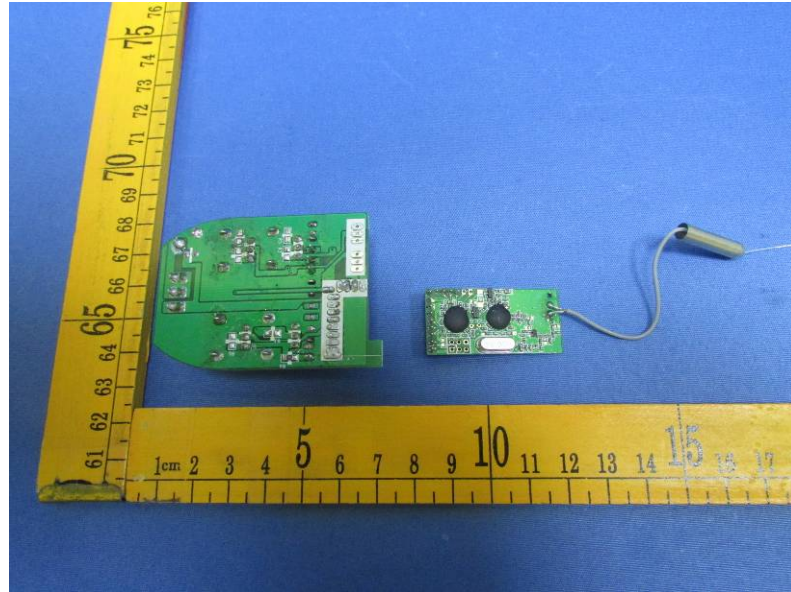


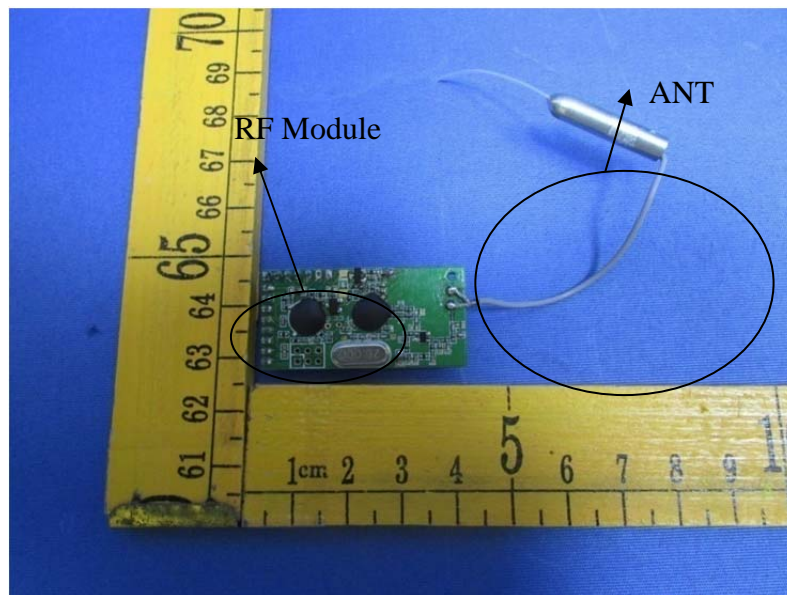
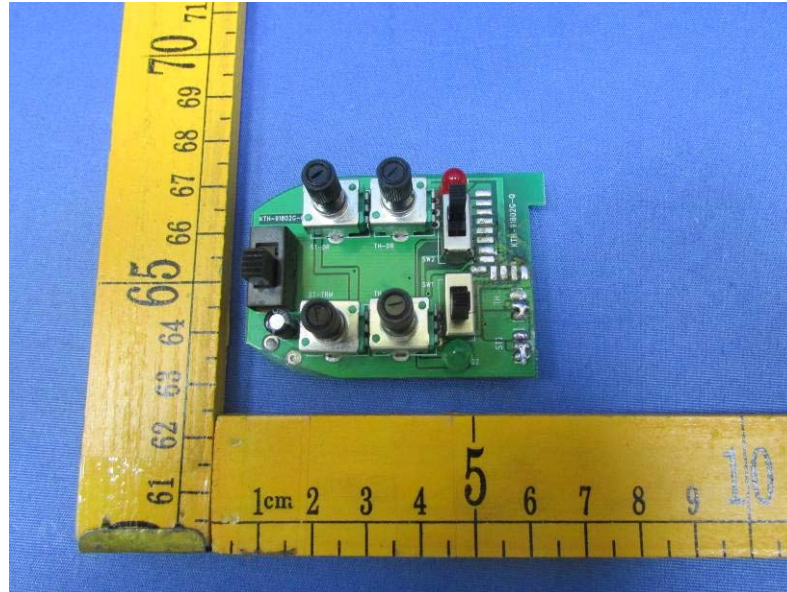
17.2 Model ECX13005 Internal View

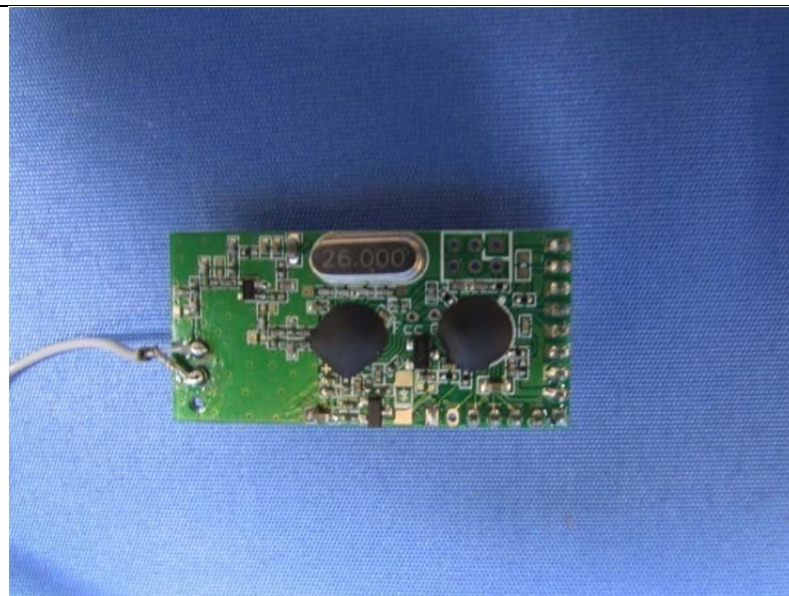
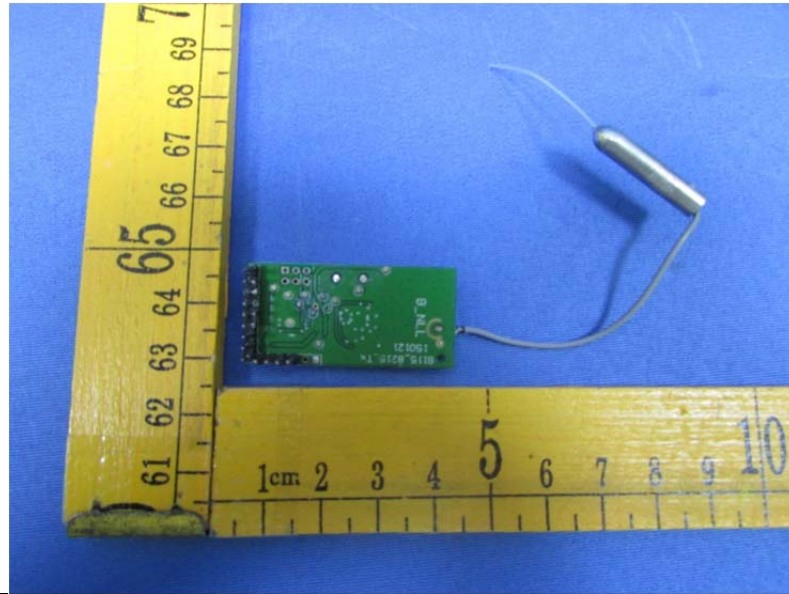


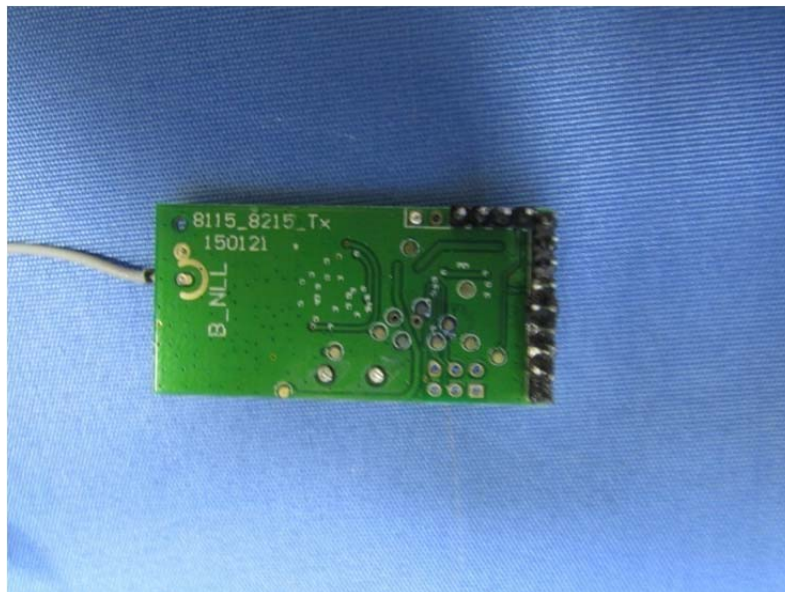












===== End of Report =====