SGS-CSTC Standards Technical Services Co., Ltd.

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FEDERAL COMMUNICATIONS COMMISSION
Registration number: 282399

TEST REPORT

Application No.:	GZEM1008001642RF
Applicant:	SHANTOU LANYU MODEL INDUSTRIAL CO., LTD
Equipment Under Test (EUT):	
EUT Name:	R/C PLANE SERIES
Item No.:	TW-748, TW-749, TW-747, TW-745, TW-750, TW-751, TW-742, TW-757, TW-758, TW-759 ♣
♣	Please refer to section 3 of this report for details
FCC ID:	U5QLANYU
Standards:	FCC PART 15 Subpart C: 2009
Date of Receipt:	2010-08-17
Date of Test:	2010-08-20 to 2010-09-02
Date of Issue:	2010-09-25
Test Result :	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives.

Stephen Guo 2010.Sep.

CE

Stephen Guo
Manager

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00		2010-09-25		Original

Authorized for issue by:				
Tested By		Daniel He **Daniel He / Project Engineer**		2010-08-20 to 2010-09-02 **Date**
Prepared By		Daniel He **Daniel He / Project Engineer**		2010-09-21 Date
Checked By		Strong Yao **Strong Yao / Reviewer**		2010-09-25 **Date**

3 Test Summary

Test	Test Requirement	Stanadard Paragraph	Result
Field Strength of Fundamental	FCC PART 15:2009	Section 15.249 (a)	PASS
Field Strength of Unwanted Emissions	FCC PART 15:2009	Section 15.249 (a) Section 15.249 (d)	PASS
Occupied Bandwidth	FCC PART 15:2009	Section 15.215(c)	PASS
Band Edges	FCC PART 15:2009	Section 15.249 (d)	PASS

Tx: In this whole report Tx (or tx) means Transmitter.

Rx:In this whole report Rx (or rx) means Receiver.

RF:In this whole report RF means Radiated Frequency.

♣ Item No.: TW-748, TW-749, TW-747, TW-745, TW-750, TW-751, TW-742, TW-757, TW-758, TW-759

According to the declaration of the applicant, the electrical circuit design, layout, components used and internal wiring were identical for all models, with only difference being the appearance and color. Therefore only one model **TW-748** was tested in this report.

4 Contents

5 General Information

5.1 Client Information

Applicant's Name:	SHANTOU LANYU MODEL INDUSTRIAL CO., LTD
Applicant Address:	Floor3, Workshop of Zhong Cheng Marketplace, North Dong Xia Road, Shan Tou City, Guang Dong, China

5.2 General Description of E.U.T

EUTName:	R/C PLANE SERIES
Item No.:	TW-748, TW-749, TW-747, TW-745, TW-750, TW-751, TW-742, TW-757, TW-758, TW-759
Operating Frequency	2410MHz to 2480.8MHz
Channel number:	60

5.3 Details of E.U.T

Power Supply:	For tx: DC 12V (Size "AAA" x 8 batteries) For rx: DC 9.6V (by recharge batteries)

5.4 Description of Support Units

The EUT was tested as an independent unit.

5.5 Standards Applicable for Testing

The customer requested FCC tests for the EUT.

The standard used was FCC PART 15, SUBPART C (2009) section 15.249.

5.6 Other Information Requested by the Customer

None.

5.7 Test Facility

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

- **NVLAP – Lab Code: 200611-0**

  SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

- **FCC – Registration No.: 282399**

  SGS-CSTC Standards Technical Services 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 282399, May 31, 2002.

5.6 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory,
198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663
Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

6 Equipment Used during Test

RE in Chamber						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (YYYY-MM-DD)	Cal.Due date (YYYY-MM-DD)
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	2010-09-06	2011-09-06
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2010-01-25	2011-01-25
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	10036	2010-06-02	2011-06-02
N/A	EMI Test Software	Audix	E3	N/A	N/A	N/A
EMC0514	Coaxial cable	SGS	N/A	N/A	2009-12-09	2010-12-09
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2009-12-20	2010-12-20
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2009-12-20	2010-12-20
EMC0518	Horn Antenna	Rohde & Schwarz	HF906	100096	2010-09-11	2011-09-11
EMC0040	Spectrum Analyzer	Rohde & Schwarz	FSP30	100324	2009-12-05	2010-12-05
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2010-01-25	2011-01-25
EMC0049	Amplifier	Agilent	8447D	2944A10862	2010-04-21	2011-04-21
EMC0075	310N Amplifier	Sonama	310N	272683	2009-10-26	2010-10-26
EMC0523	Active Loop Antenna	EMCO	6502	42963	2009-11-17	2010-11-17
EMC0530	10m Semi- Anechoic Chamber	ETS	N/A	N/A	2010-05-17	2011-05-17

General used equipment						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (YYYY-MM-DD)	Cal.Due date (YYYY-MM-DD)
EMC0006	DMM	Fluke	73	70681569	2009-12-16	2010-12-16
EMC0007	DMM	Fluke	73	70671122	2009-12-16	2010-12-16

7 Test Results

7.1 E.U.T. Operation

Input voltage:	DC 12V (Size “AA” x 8 batteries)
Operating Environment:	
Temperature:	26°C
Humidity:	56% RH
Atmospheric Pressure:	1005mbar
Test frequencies:	According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

EUT channels and frequencies list:

Channel No.	Freq.Band 1 (MHz)	Freq.Band 2 (MHz)	Freq.Band 3 (MHz)	Freq.Band 4 (MHz)
1	2410.00	2428.00	2446.00	2464.00
2	2411.20	2429.20	2447.20	2465.20
3	2412.40	2430.40	2448.40	2466.40
4	2413.60	2431.60	2449.60	2467.60
5	2414.80	2432.80	2450.80	2468.50
6	2416.00	2434.00	2452.00	2469.40
7	2417.20	2435.20	2453.20	2471.20
8	2418.60	2436.40	2454.40	2472.40
9	2419.60	2437.60	2455.60	2473.60
10	2420.80	2438.60	2456.60	2474.80
11	2422.00	2440.00	2458.00	2476.00
12	2423.20	2441.20	2459.20	2477.20
13	2424.40	2442.40	2460.40	2478.40
14	2425.60	2443.50	2461.60	2479.60
15	2426.80	2444.80	2462.80	2480.80

Since the carriers of the EUT are 2410~2480.8 MH and the alignment range of the transmitter is More than 10 MHz. So full test is carried out on the lowest frequency: (2410 MHz), and middle frequency: (2444.8 MHz), the highest frequency: (2480.8 MHz)

7.2 Antenna Requirement

7.2.1 Standard requirement

15.203 requirement:

For intentional device. According to 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.

7.3 Test Procedure & Measurement Data

7.3.1 Field Strength of Fundamental& Field Strength of Unwanted Emissions

Test Requirement:	FCC Part15 C Section 15.249(a) & (d)
Test Method:	Based on FCC Part15 C Section 15.249 & ANSI C63.4:2003
Status	Pre-test the EUT in continuous transmitting mode with setup as stand-alone in X, Y, Z threes axes, found the worst case is X axes and report the data.
Measurement Distance:	3m (Semi-Anechoic Chamber)
Frequency range	30 MHz – 10GHz for transmitting mode. Test instrumentation resolution bandwidth 120 kHz (30 MHz - 1000 MHz), 1 MHz (1000 MHz – 10GHz)
Operation:	Receive antenna scan height 1 - 4 m, polarization Vertical/ Horizontal, a turntable rotate through 360^0 in the horizontal plane and it is used to support the test sample at 0.8m above the ground plane.

Requirements:

FCC Part 15.249(a)

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m @ 3m)	Field Strength of Harmonics (dBuV/m @ 3m)
902 to 928	94.0	54.0
2400 to 2483.5	94.0	54.0
5725 to 5875	94.0	54.0
24000 to 24250	108.0	68.0

FCC Part 15.249(d)

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.

Remark:

The fundamental frequency rang is in the frequency band of the EUT is 2400MHz ~ 2483.5MHz.

The limit for Average field strength dBuv/m for the fundamental frequency = 94.0 dBμV/m.

No fundamental is allowed in the restricted bands.

The limit for average field strength dBμV/m for the harmonics = 54.0 dBμV/m.

The limit for peak field strength dBμV/m for the harmonics = 74.0 dBμV/m.

Emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or 54.0 dBμV/m in 15.209. Here the limit for the other emission is 54.0 dBμV/m.

Test Procedure:

1)9K to 30MHz emissions:

For testing performed with the loop antenna, testing was performed in accordance to ANSI C63.4:2003 section 8.2.1. The centre of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT, During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

2)30MHz to 1GHz emissions:

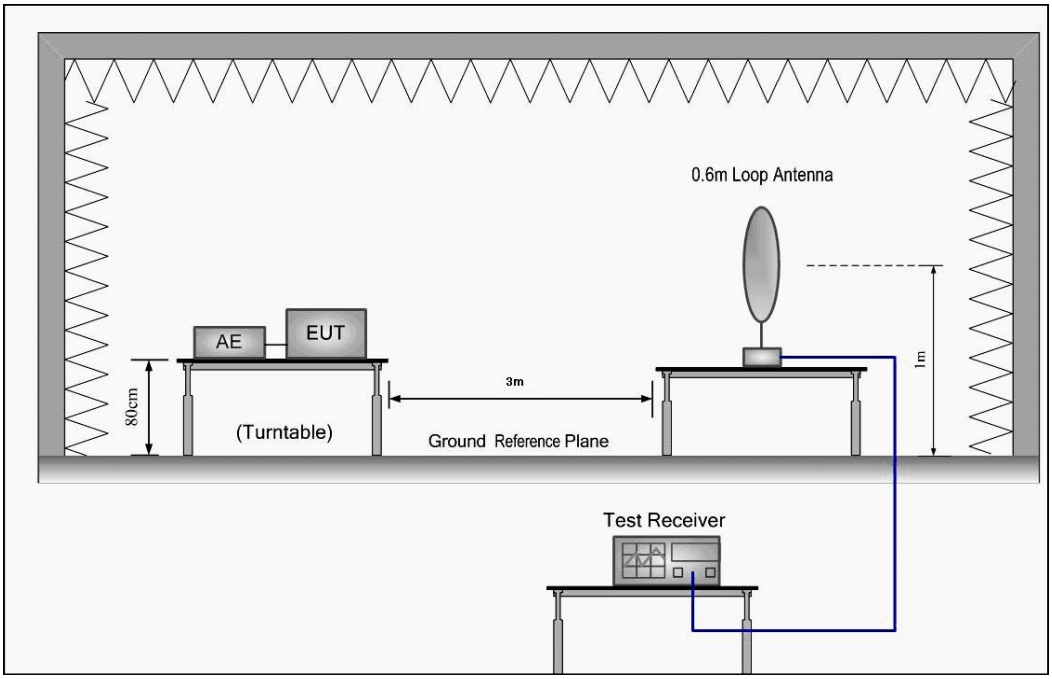
For testing performed with the bi-log type antenna, testing was performed in accordance to ANSI C63.4:2003. The measurement is performed with the EUT rotated 360º, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

3)1GHz to 40GHz emissions:

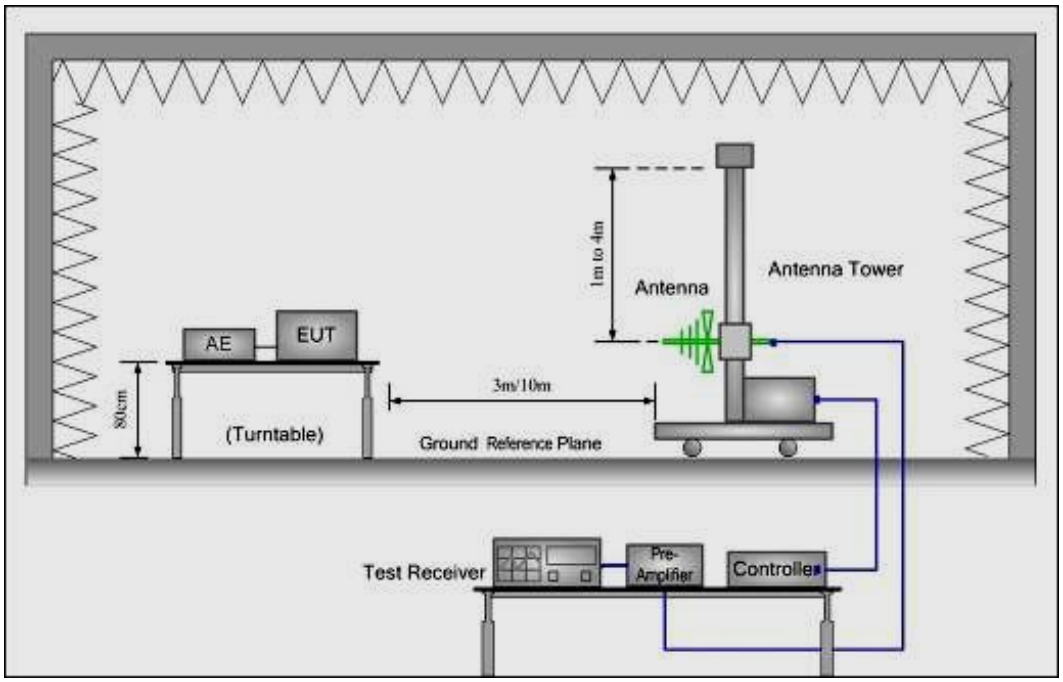
For testing performed with the horn antenna, testing was performed in accordance to ANSI C63.4:2003. The measurement is performed with the EUT rotated 360º, the antenna height scan between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

Test Configuration:

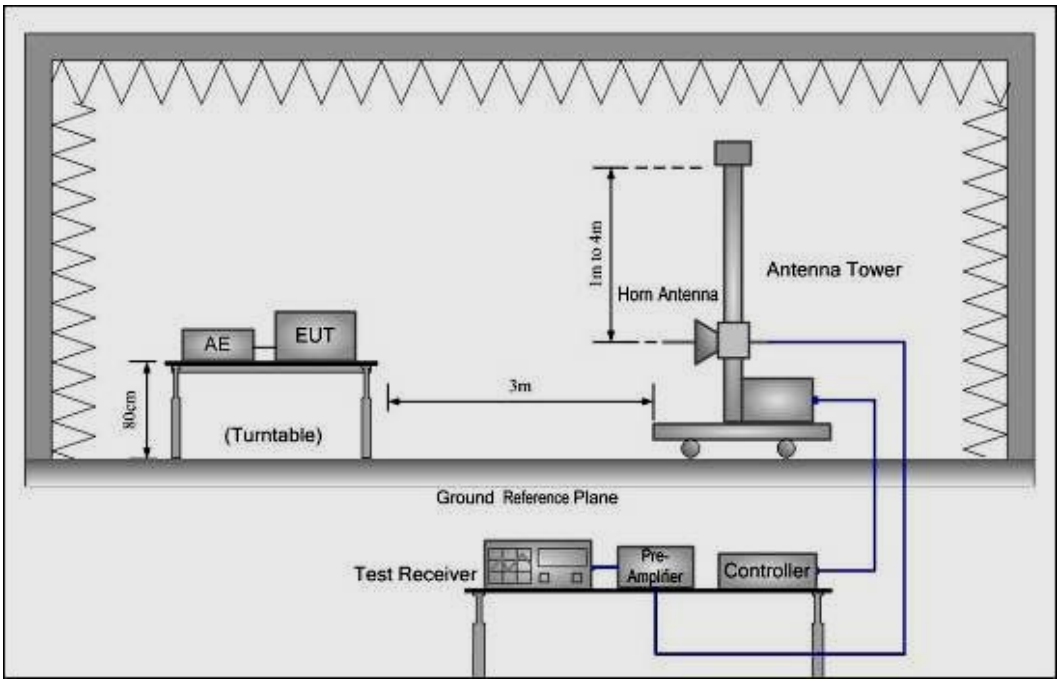
1) 9K to 30MHz emissions:



2) 30MHz to 1GHz emissions:



3) 1GHz to 40GHz emissions:



The field strength is calculated by adding the Antenna Factor, Cable Factor & Per-amplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

The following test results were performed on the Host:

1. Test in Channel (2410MHz), keep in continuously transmitting status.

(a) Antenna polarization: Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
47.46	29.62	14.07	0.6	24.50	19.79	40.0	-20.21	QP
4808.0	44.63	33.79	6.20	33.48	51.14	64.50	-13.36	Average
4808.0	51.63	33.79	6.20	33.48	58.14	64.50	-6.36	PK
2410.0	91.50	29.38	4.30	35.60	89.58	94.0	-4.42	Average
2410.0	104.50	29.38	4.30	35.60	102.58	114.0	-11.42	PK

(b) Antenna polarization: Vertical

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
112.45	29.04	12.15	0.90	24.50	17.59	43.5	-25.91	QP
4808.0	49.00	33.79	6.20	33.48	55.51	65.40	-9.89	Average
4808.0	53.48	33.79	6.20	33.48	59.99	65.40	-5.41	PK
2410.0	87.50	29.38	4.30	35.60	85.58	94	-8.42	Average
2410.0	102.90	29.38	4.30	35.60	100.98	114.0	-13.02	PK

2. Test in Channel (2444.8MHz), keep in continuously transmitting status.

(a) Antenna polarization: Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
44.55	27.94	15.4	0.6	24.5	19.44	42.7	-23.26	QP
4808.0	44.63	33.79	6.20	33.48	51.14	64.50	-13.36	Average
4808.0	51.63	33.79	6.20	33.48	58.14	64.50	-6.36	PK
2444.8	89.90	29.47	4.37	35.60	88.13	94.0	-5.87	Average
2444.8	103.20	29.47	4.37	35.60	101.43	114.0	-12.57	PK

(b) Antenna polarization: Vertical

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
317.12	30.88	14.03	1.6	24.27	22.24	63.55	-41.31	QP
4878.0	47.20	34.01	6.27	33.15	54.33	65.41	-11.08	Average
4808.0	52.91	34.01	6.27	33.15	60.04	65.41	-5.37	PK
2444.8	88.90	29.47	4.37	35.60	87.13	94.0	-6.87	Average
2444.8	104.80	29.47	4.37	35.60	103.03	114.0	-10.97	PK

3. Test in Channel (2480.8MHz), keep in continuously transmitting status.

(a) Antenna polarization: Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
109.54	30.2	12.1	0.9	24.5	18.7	44.57	-25.87	QP
4962.0	36.53	34.29	6.20	32.82	44.20	54.0	-9.80	Average
4962.0	46.49	34.29	6.20	32.82	54.16	74.0	-19.84	PK
2480.8	89.80	29.56	4.40	35.60	88.16	94.0	-5.84	Average
2480.8	104.60	29.56	4.40	35.60	102.96	114.0	-11.04	PK

(b) Antenna polarization: Vertical

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
151.25	37.05	11.08	1.1	24.4	24.83	52.5	-27.67	QP
4962.0	46.40	34.29	6.20	32.82	54.07	65.43	-11.36	Average
4962.0	53.41	34.29	6.20	33.82	61.08	65.43	-4.35	PK
2480.8	85.60	29.56	4.40	35.60	83.96	94.0	-10.04	Average
2480.8	102.60	29.56	4.40	35.60	100.96	114.0	-13.04	PK

Remark:

1). According to 15.249 (e) As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

2）Sweep from 30MHz to 10GHz, find the max radiated emissions and record it, when the emissions are too weak to be detected, it will not be reported.

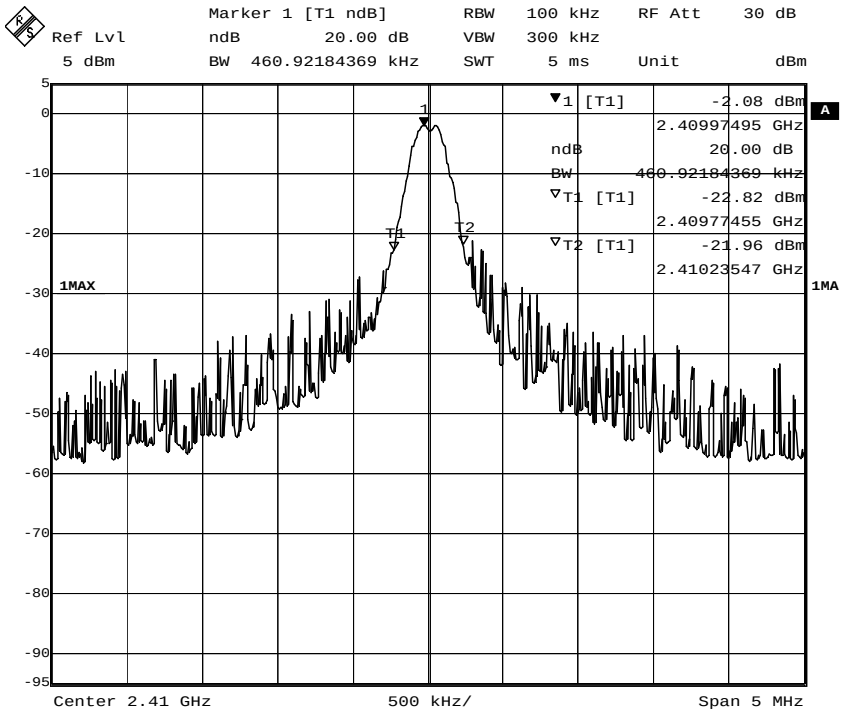
Test results: The unit does meet the FCC requirements.

7.3.2 Occupied Bandwidth & Band Edge

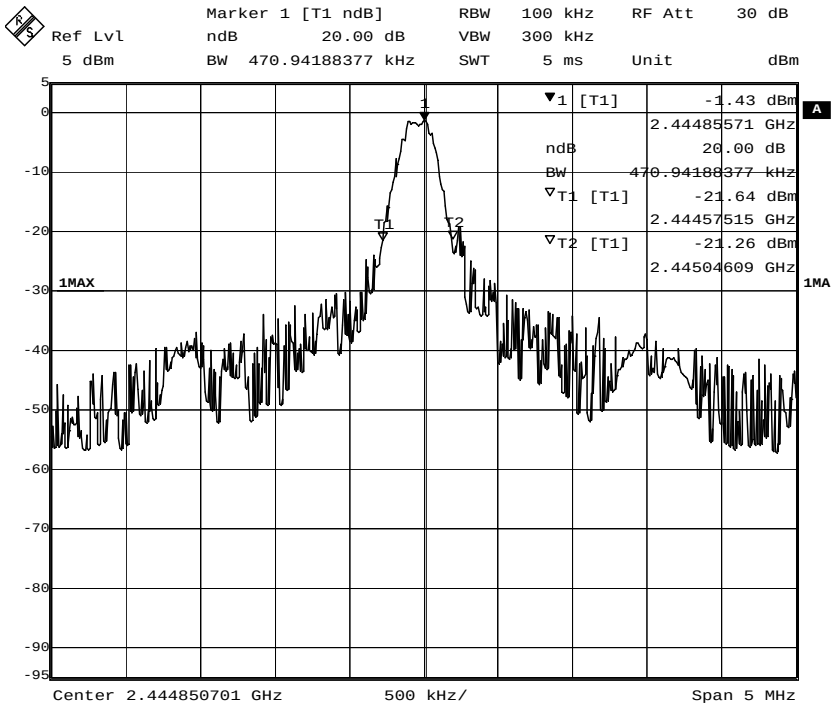
Test Requirement:	FCC Part 15 C Section 15.249
Test Method:	ANSI C63.4:2003 and FCC Part 2.1049
	Operation within the band 2.410 to 2.480.8GHz
Requirements:	15.249 (d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.
Method of measurement:	A small sample of the transmitter output was fed into the Spectrum Analyzer and the attached plot was taken.

1.test in the lowest frequency

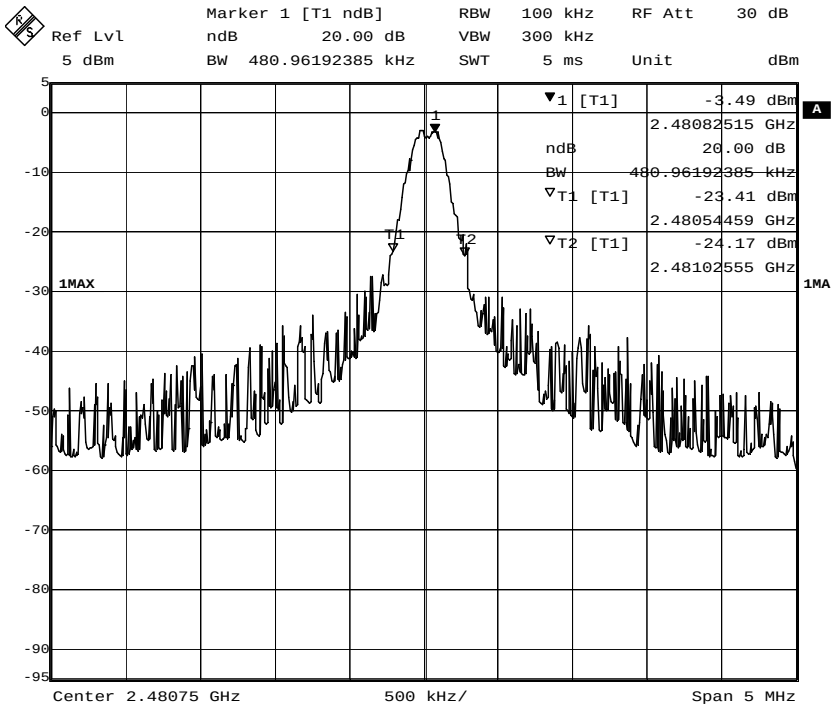
The occupied bandwidth as below:



2.test in the middle frequency



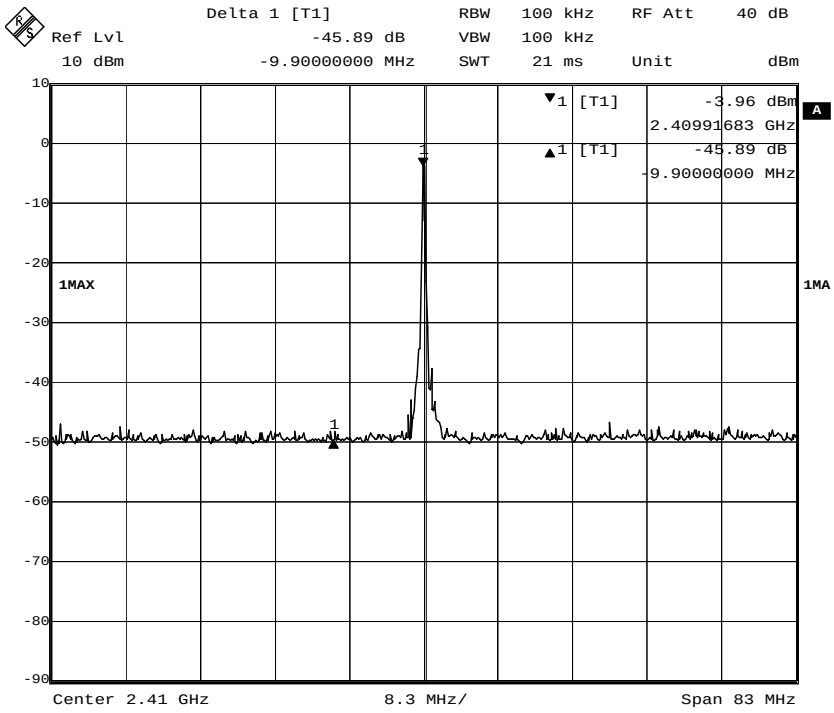
3.test in the highest frequency



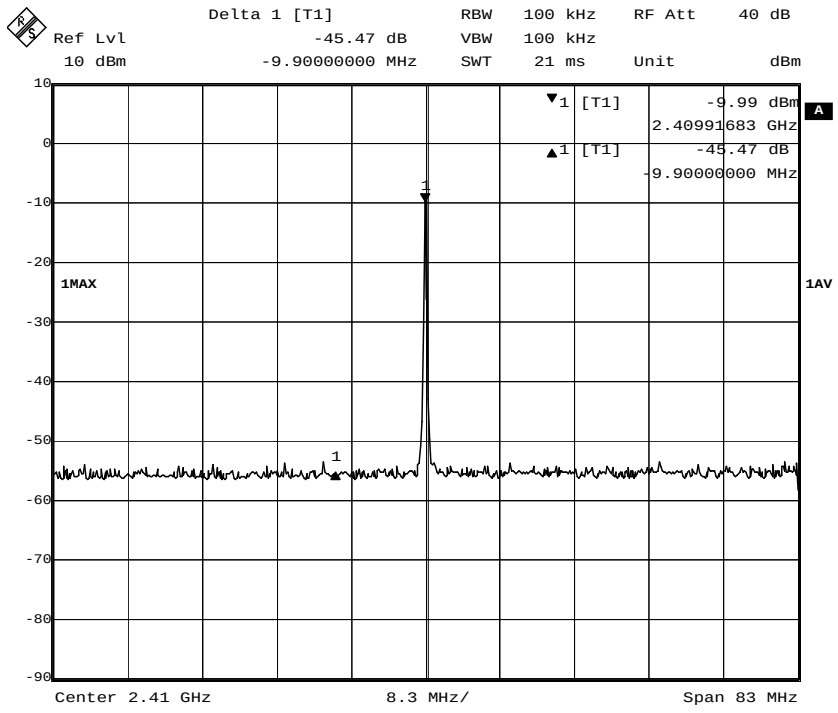
The Band Edge Emission as below:

Band Edge 2.4GHz

Detector mode: Peak



Detector mode: Average

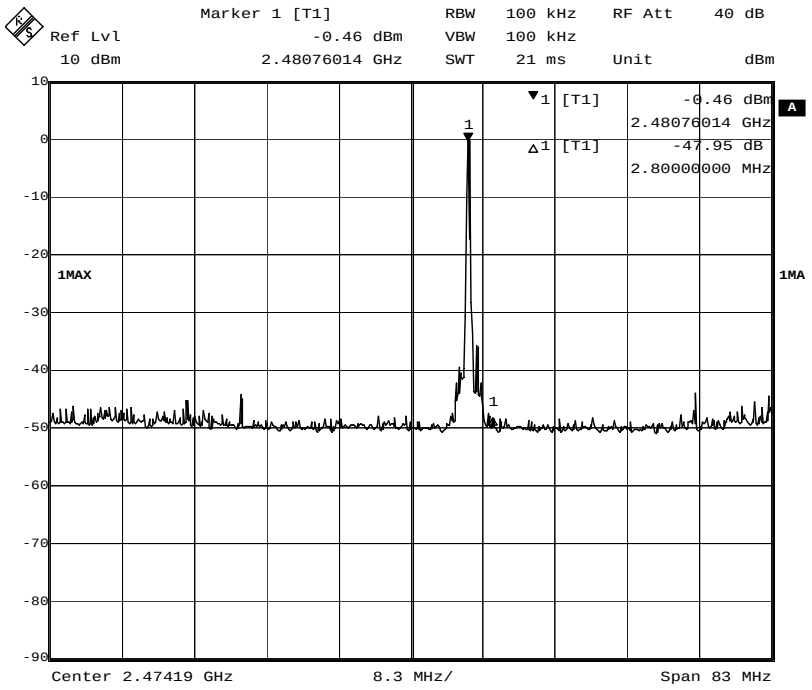


For 2.40GHz band edge checked with 2.41GHz frequency operated, the delta shown at the plots are -45.89dB for peak detector mode and -45.47dB for Average detector mode.

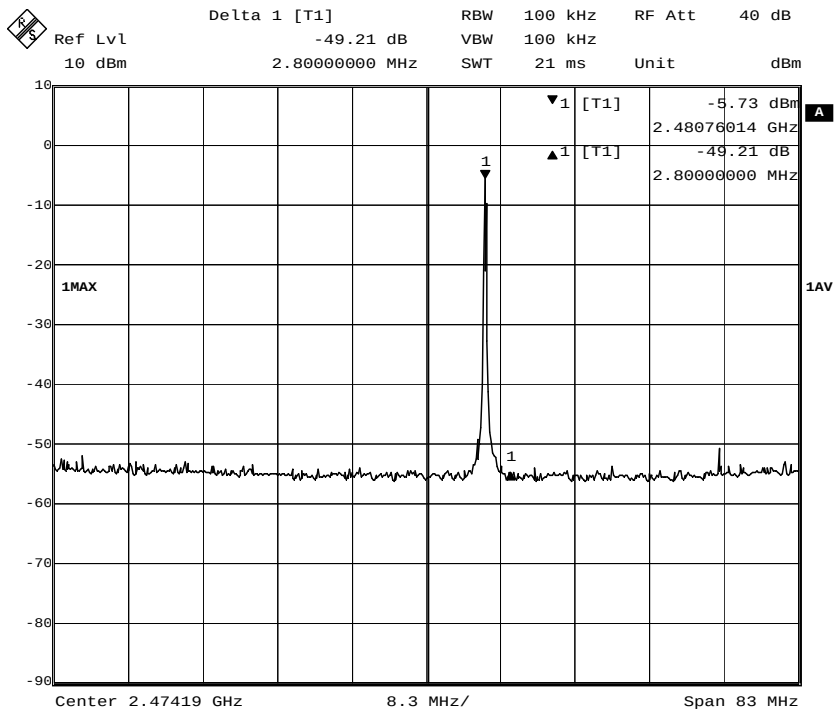
With the peak value 102.58BuV/m and average value at 89.58dBuV/m for the fundamental, the spurious emission level at 2.400GHz were 56.69dBuV/m for peak and 44.11dBuV/m for average.

Highest Band Edge 2.4835GHz

Detector mode: Peak



Detector mode: Average



For 2.4835GHz bandage checked with 2.4808GHz frequency operated, the delta shown at the plots are -47.95dB for peak detector mode and -49.21dB for Average detector mode.

With the peak value 102.96dBuV/m and average value at 88.16dBuV/m for the fundamental, the spurious emission level at 2.4835GHz were 55.01dBuV/m for peak and 38.95dBuV/m for average.

The test result for the Emissions radiated outside of the specified frequency bands; please refer to the section 7.2.1 of this report.

The results: The unit does meet the FCC requirements.

End of the report