



SLG Asia Test Labs & Service (HK) Limited

Test Report

According to

FCC PART 15 Subpart C

FCC ID: S29SCOUT-X4

Test Report Number: H1M21410-2192-P-15



TEST REPORT

Summary | FCC Part 15C

Test Report No.: H1M21410-2192-P-15

Date of issue: 14.11.2014

Testing Laboratory name: SLG Asia Test Labs & Service (HK) Limited

Address.....: 26/F., Tamson Plaza, 161 Wai Yip Street,
Kwun Tong, Kowloon, Hong Kong

Applicant's name: GuangZhou Walkera Technology Co., Ltd

Address.....: Taishi Industrial Park, Dongchong Town, Nansha District, 511475
Guangzhou, China

Manufacturer's name: GuangZhou Walkera Technology Co., Ltd

Address.....: Taishi Industrial Park, Dongchong Town, Nansha District, 511475
Guangzhou, China

Test specification

Standard(s) applied: FCC Rules 47 CFR Part 15 Subpart C

Test item description: R/C Helicopter with GPS

Brand Name: devention

Model and/or type reference.....: Scout-X4 (BT-2401A, RX709)

Rating(s): 22.2V, 5400mAh (rechargeable Li-Po battery)

Summary of Test Results

Pass

The Summary of Test Results based on a technical opinion belongs to the applied standard(s).

Disclaimer

Further details of testing are provided in particular chapters of this Test Report.

This document base on General Terms and Conditions of SLG Asia Test Labs & Service (HK) Limited, which the applicant accepted with order confirmation.

Emphasized conditions or project related conditions:

Released Test Reports apply only to the specific samples tested under stated test conditions. It is the applicant's responsibility to assure that additional production units of the tested model(s) are manufactured in same construction and with identical electrical and mechanical components to meet the same quality as tested model(s). The applicant/manufacturer/importer is responsible for any modifications made to the production units which result in non-compliance to the applied and/or relevant regulations. SLG Asia Test Labs & Service (HK) Limited shall have no liability for any deductions, inferences or generalizations drawn by the client or others from any kind of issued reports. Reports are confidential property of the client. As a mutual protection to the applicant, the clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval.



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1 General Information

1.1 Test Report

Tested by:

14.11.2014

Mr. Ray Lam

Date

Test Engineer

Signature

Approved by:

14.11.2014

Mr. F. Schulz

Date

Laboratory Manager

Signature



1.2 Test Location

All tests were carrying by personnel from:

Name: SLG Asia Test Labs & Service (HK) Limited
Address: 26/F., Tamson Plaza, 161 Wai Yip Street
Kwun Tong, Kowloon, Hong Kong

Telephone: +852 2389 2200
Fax: +852 2389 3073

The Test facility for radiated measurements is located at:

Name : Hong Kong Productivity Council
Address: EMC Centre, LG1, HKPC Building, 78 Tat Chee Avenue
Kowloon, Hong Kong

The Hong Kong Laboratory Accreditation Scheme (HOKLAS)
Reg. No.082

FCC registered measurement facility
Reg. No.90656

1.3 Details of applicant

Name: GuangZhou Walkera Technology Co., Ltd
Address: Taishi Industrial Park, Dongchong Town, Nansha District
511475 Guangzhou, China

Contact: Mr. Ya
Telephone: +86-020-84915116
Fax: +86-020-84915117

1.4 Manufacturer

Name: GuangZhou Walkera Technology Co., Ltd
Address: Taishi Industrial Park, Dongchong Town, Nansha District
511475 Guangzhou, China

Contact: Mr. Ya
Telephone: +86-020-84915116
Fax: +86-020-84915117



1.5 Application details

Date of receipt of application: 27.10.2014
Date of receipt of test item: 27.10.2014
Date (s) of performance of tests: 27.10.2014 - 14.11.2014

1.6 Test item

Description of test item: R/C Helicopter with GPS
Type identification: Scout-X4 (BT-2401A, RX709)
Brand Name: devention

Equipment category: Non Specific SRD DSSS transceiver
Equipment classification: Portable use
Permitted frequency range: 2400 – 2483.5 MHz
Operation frequency range: 2405 – 2479 MHz (2.4GHz DSSS Transceiver module RX709)
2405 – 2479 MHz (2.4GHz DSSS Transceiver module BT-2401A)

Lowest Operation frequency: 2405 MHz
Middles Operation frequency: 2441 MHz
Highest Operation frequency: 2479 MHz
Emission designator: F7D
Antenna gain: ≤ 3 dBi
Type of modulation: DSSS
Operation mode: simplex
Type of antenna: integral
Power supply: 22.2V, 5400mAh (rechargeable Li-Po battery)

(All information was provided by the applicant)

Test Configuration:

Part Name	Description	Tested configuration
Scout-X4	Helicopter base with 4 motors	✓
FCS-X4	Main controller	✓
RX709	2.4GHz transceiver module	✓
BT-2401A	2.4GHz transceiver module	✓
GPS	GPS receiver	✓
G-3D gimbal	Controller with camera holder	✓
DEVO F12E	Remote control with video	For function test only
BT-2401B	Bluetooth datalink interface	For function test only
iLook+	5.8GHz camera module	Not included



1.7 General Test Conditions

Environmental reference conditions

If not defined otherwise by the Technical Committee responsible for the generic standard and/or the product standard the climatic conditions during the tests are to be within the limits specified by the manufacturer for the operation of the EUT and the test equipment.

The climatic conditions during the tests were within the following limits:

Temperature	Humidity	Atmospheric pressure
15 °C - 35 °C	30 % - 60 %	860 hPa - 1060 hPa

If explicitly required in the test base (basic) the climatic values are recorded and documented separately for the respective test.

Calibration of measurement and test equipment

All measurement and testing equipment that has a significant influence on the accuracy of qualitative measurements and tests is subject to a periodical in-house system of calibration and servicing that is part of the quality management system of the EMC laboratory of SLG Asia Test Labs & Service (HK) Limited.

Measurement uncertainties

All tests are subject to measurement uncertainties. The overall measurement uncertainty of a measurement is defined as the range of which can be supposed that it contains the true value with a specified probability. This probability is 95 % for the generally specified measurement uncertainty (so-called expanded measurement uncertainty).

The limits for emission measurements and the test levels for immunity tests in the applied standards were defined taking into consideration the accuracy limits for measurement and testing equipment required by the basic standards.

All measurement and test results of the EMC laboratory of SLG Asia Test Labs & Service (HK) Limited fulfil the requirements for measurement uncertainties according to the standards applied.



2 Test result Summary

Digital Transmission system (2400-2483.5MHz)

Requirements according standard:				
FCC Rule	Test description	Results/Notes	Limits/Requirements	Verdict
15.247(a)	Digital Modulation	System uses DSSS techniques		P
15.247(a) (2)	6dB Bandwidth	> 898kHz (BT-2401A) > 938kHz (RX709)	> 500kHz	P
15.247(b) (3)	Maximum Peak Power	BT-2401A: 18.28dBm (EIRP) (67.30 mW) RX709: 15.34dBm (EIRP) (34.20 mW)	EIRP limited to 4W	P
15.247(e)	Power Spectral Density	7.08dBm/3kHz (BT-2401A) 0.75dBm/3kHz (RX709)	< 8dBm/3kHz	P
15.247(d) / 15.209, 15.205	Out-of-Band Emission 30MHz – 25GHz	All signals below Limits	15.209, 15.205 restricted bands, all others < -20dBc	P
15.247(d)	Band-Edge Requirements in 100kHz Bandwidth	All frequencies inside the band	Within range 2400- 2483.5MHz	P
15.B	Radiated Emission For Receiver part	All signals below Limits	15.109	P
15.203	Antenna Requirements	EUT has integral antenna		P
15.247 (b)/ 15.407 (f)	RF Exposure Requirements	Exemption of RF Exposure evaluation. Please refer to attached statement	Refer to OET 65	P

Test case verdicts

P	- Pass	Test item does meet the requirement
F	- Fail	Test item does not meet the requirement
N.A.	- Not Applicable	Test case does not apply to the test object



3 Test results

3.1. 6dB Bandwidth

Test requirement: FCC Rules 47 CFR Part 15 Subpart C
Test method: 15.247 clause (a) (2)
Tested by: [Mr. Ray Lam](#)
Operating environment: 25 °C, 50 %, 990 hPa
Tested modules: 2.4GHz DSSS Transceiver module RX709
2.4GHz DSSS Transceiver module BT-2401A
EUT operation: Transmitting in selected channel (worst case)

Measurement Equipment Used:

ID No.	Test equipment	Type	Manufacturer	Cal Date	Cal Due Date	Cal Interval (year)
E113	Spectrum Analyzer	FSL6	Rohde & Schwarz	26 Aug 2014	26 Aug 2015	1

Measurement Results:

FCC part 15.247 (a) (2): Signal Bandwidth

BT-2401A

Frequency	Resolution bandwidth	6dB bandwidth	Limit	Verdict
MHz	kHz	kHz	kHz	
2405	100	938.00	>500	Pass
2441	100	898.00	>500	Pass
2479	100	928.00	>500	Pass

RX709

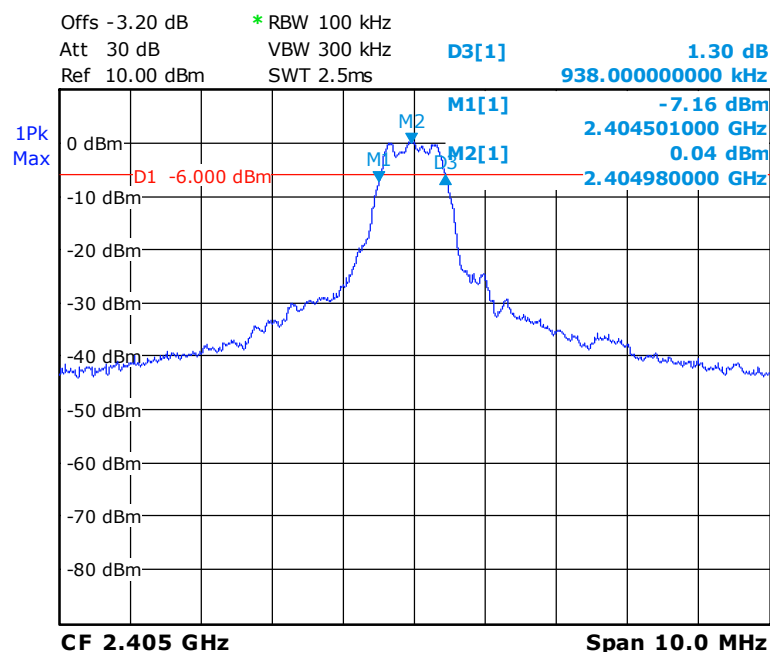
Frequency	Resolution bandwidth	6dB bandwidth	Limit	Verdict
MHz	kHz	kHz	kHz	
2405	100	938.00	>500	Pass
2441	100	938.00	>500	Pass
2479	100	938.00	>500	Pass

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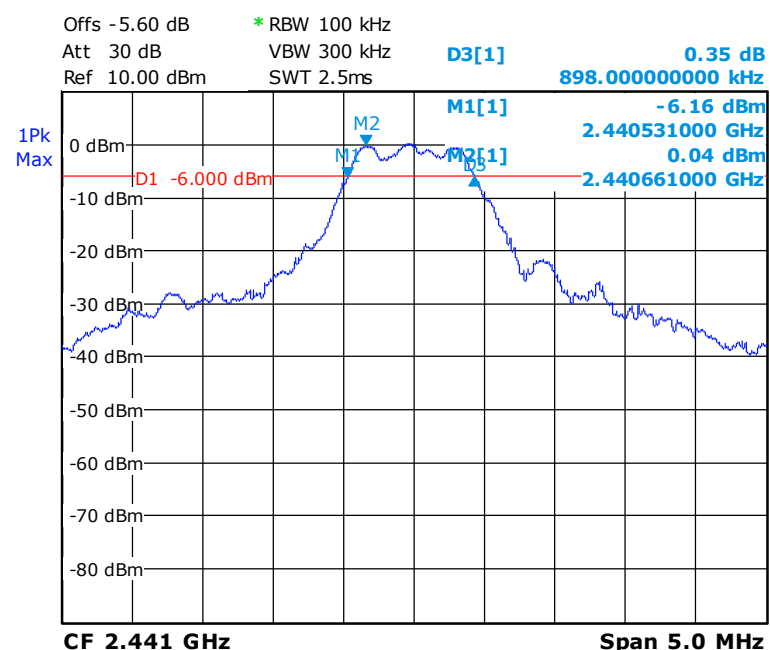


BT-2401A

Lowest Operation frequency: 2405 MHz



Middles Operation frequency: 2441 MHz



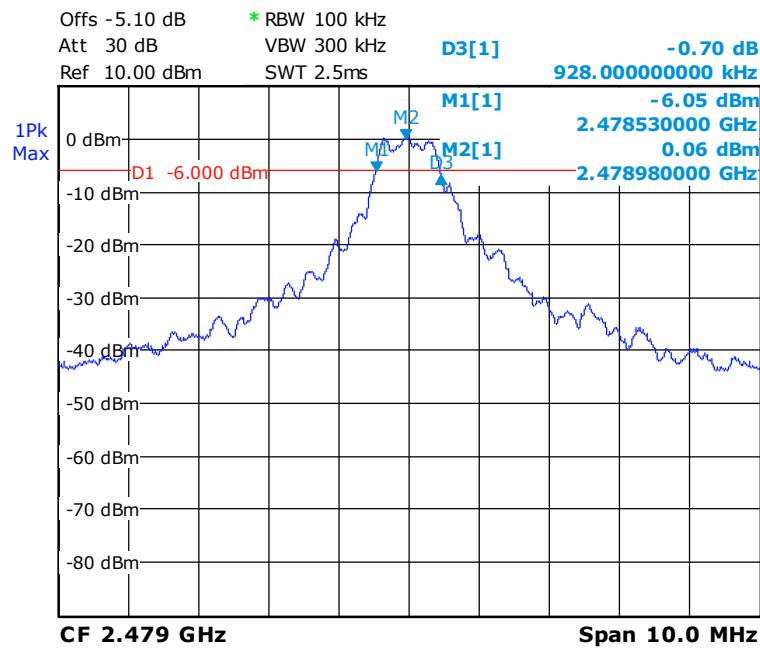
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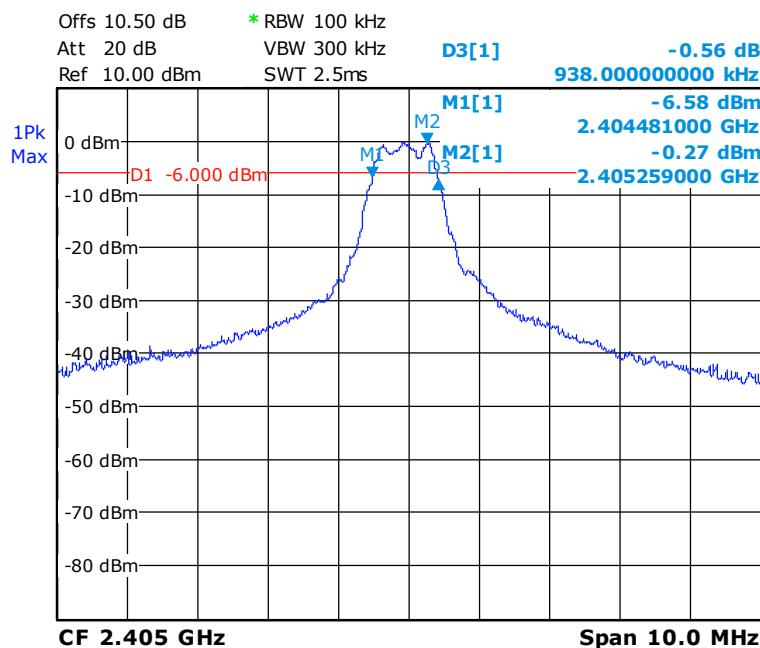


Highest Operation frequency: 2479 MHz



RX709

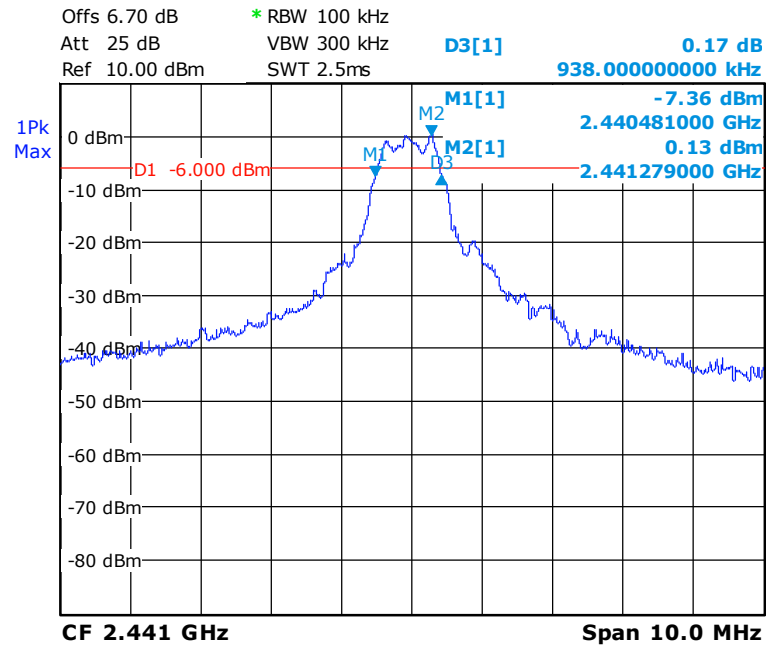
Lowest Operation frequency: 2405 MHz



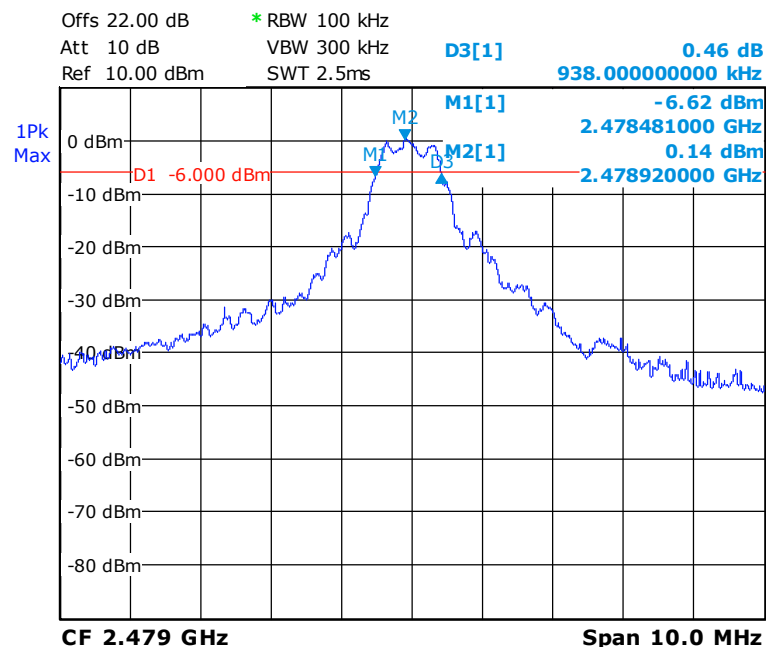


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Middles Operation frequency: 2441 MHz



Highest Operation frequency: 2479 MHz





3.2. Output power

Test requirement: FCC Rules 47 CFR Part 15 Subpart C
Test method: 15.247 clause (b) (3)
Tested by: [Mr. Ray Lam](#)
Operating environment: 25 °C, 50 %, 990 hPa
Tested modules: 2.4GHz DSSS Transceiver module RX709
2.4GHz DSSS Transceiver module BT-2401A
EUT operation: Transmitting in selected channel (worst case)

Measurement Equipment Used:

ID No.	Test equipment	Type	Manufacturer	Cal Date	Cal Due Date	Cal Interval (year)
E113	Spectrum Analyzer	FSL6	Rohde & Schwarz	26 Aug 2014	26 Aug 2015	1

Measurement Results:

FCC part 15.247 (b) (3): Output Power

BT-2401A

Frequency	Output Power		Antenna Gain	EIRP		EIRP Limit	Verdict
MHz	dBm	mW	dBi	dBm	mW	W	
2405	15.28	33.73	3	18.28	67.30	4	Pass
2441	13.61	22.96	3	16.61	45.81	4	Pass
2479	12.82	19.14	3	15.82	38.19	4	Pass

RX709

Frequency	Output Power		Antenna Gain	EIRP		EIRP Limit	Verdict
MHz	dBm	mW	dBi	dBm	mW	W	
2405	12.34	17.14	3	15.34	34.20	4	Pass
2441	12.30	16.98	3	15.3	33.88	4	Pass
2479	9.70	9.33	3	12.7	18.62	4	Pass

All results were measured with peak power meter.



3.3. Power Spectral Density

Test requirement: FCC Rules 47 CFR Part 15 Subpart C
Test method: 15.247 clause (e)
Tested by: [Mr. Ray Lam](#)
Operating environment: 25 °C, 50 %, 990 hPa
Tested modules: 2.4GHz DSSS Transceiver module RX709
2.4GHz DSSS Transceiver module BT-2401A
EUT operation: Transmitting in selected channel (worst case)

Measurement Equipment Used:

ID No.	Test equipment	Type	Manufacturer	Cal Date	Cal Due Date	Cal Interval (year)
E113	Spectrum Analyzer	FSL6	Rohde & Schwarz	26 Aug 2014	26 Aug 2015	1

Measurement Results:

FCC part 15.247 (e): Power spectral Density

BT-2401A

Frequency	PSD	Limit	Verdict
MHz	dBm/3kHz	dBm/3kHz	
2405	7.08	8	Pass
2441	5.41	8	Pass
2479	4.48	8	Pass

RX709

Frequency	PSD	Limit	Verdict
MHz	dBm/3kHz	dBm/3kHz	
2405	0.75	8	Pass
2441	-0.01	8	Pass
2479	-3.54	8	Pass

Note 1: Power spectral density measured using RBW=3kHz, VBW=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PSD determined from preliminary scans using



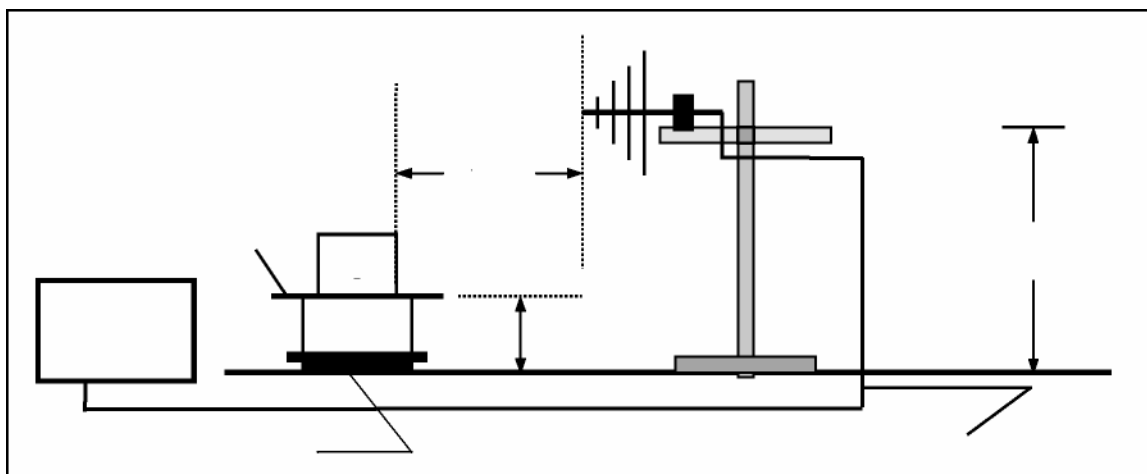
3.4. Out-of-band Emission

Test requirement: FCC Rules 47 CFR Part 15 Subpart C
Test method: 15.247 clause (d)
Tested by: [Mr. Ray Lam](#)
Operating environment: 25 °C, 50 %, 990 hPa
Tested modules: 2.4GHz DSSS Transceiver module RX709
2.4GHz DSSS Transceiver module BT-2401A
EUT operation: Transmitting in selected channel (worst case)

Measurement Equipment Used:

No.	Test equipment	Type	Manufacturer	Cal Date	Cal Due Date	Cal Interval (year)
EMC209	10m Semi-anechoic Chamber	Nil	Frankonia	12 Apr 14	12 Apr 15	1
EMC567	Test Receiver	ESU 26	Rohde & Schwarz	5 Jan 14	5 Jan 15	1
EMC577	Bi-conical Antenna	HK116	Rohde & Schwarz	5 May 14	5 May 15	1
EMC045	Log.-Periodic Antenna	HL223	Rohde & Schwarz	6 May 14	6 May 15	1

Measurement Procedure



The equipment under test is placed on a non metallic table with 0.8 m height. The power supply and the RF connection points are close to the equipment under test at the floor inside a connection box. The cables to this connection box are shielded and below the double floor. The receiving antenna is placed in a height at 1.0 m to 4.0 m and in a distance of 3 m.

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Measurement Results:

BT-2401A

Low Frequency @ 2405 MHz

Fundamental emission level @3m in 100kHz RBV				113.51	dB μ V/m	
Limit for emission outside of restricted bands:				93.51	dB μ V/m	
Frequency	Level	Pol	15.209/15.247		Detector	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	
112.111	25.42	V	93.51	68.09	Pk	RB/VB 100kHz
196.111	22.42	H	93.51	71.09	Pk	RB/VB 100kHz
349.333	34.68	V	93.51	58.83	Pk	RB/VB 100kHz
504.889	31.17	H	93.51	62.34	Pk	RB/VB 100kHz
3897	46.28	V	54.00	7.72	Pk	RB/VB 1MHz
3997	44.80	H	54.00	9.20	Pk	RB/VB 1MHz
4809	42.62	V	54.00	11.38	Avg	RB/VB 1MHz
4809	41.45	H	54.00	12.55	Avg	RB/VB 1MHz
7218	52.98	V	93.51	40.53	Pk	RB/VB 1MHz
7218	52.02	H	93.51	41.49	Pk	RB/VB 1MHz
9622	68.59	V	93.51	24.92	Pk	RB/VB 1MHz
9622	55.99	H	93.51	37.52	Pk	RB/VB 1MHz
12022	40.14	V	54.00	13.86	Avg	RB/VB 1MHz
12028	38.44	H	54.00	15.56	Avg	RB/VB 1MHz
For emission in restricted band, the limit of 15,209 was used. For all other emission, the limit was set 20dB below the level of fundamental and measured in 100kHz.						

Middle Frequency @ 2441 MHz

Fundamental emission level @3m in 100kHz RBV				111.84	dB μ V/m	
Limit for emission outside of restricted bands:				91.84	dB μ V/m	
Frequency	Level	Pol	15.209/15.247		Detector	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	
160.333	24.30	V	91.84	67.54	Pk	RB/VB 100kHz
179.389	22.31	H	91.84	69.53	Pk	RB/VB 100kHz
349.333	33.64	V	91.84	58.20	Pk	RB/VB 100kHz
504.889	32.57	H	91.84	59.27	Pk	RB/VB 100kHz
3260	46.03	V	54.00	7.97	Pk	RB/VB 1MHz
3260	46.44	H	54.00	7.56	Pk	RB/VB 1MHz
4880	40.59	V	54.00	13.41	Avg	RB/VB 1MHz
4880	40.75	H	54.00	13.25	Avg	RB/VB 1MHz
7324	37.23	V	54.00	16.77	Avg	RB/VB 1MHz
7324	31.98	H	54.00	22.02	Avg	RB/VB 1MHz
9767	63.01	V	91.84	28.83	Pk	RB/VB 1MHz
9767	63.68	H	91.84	28.16	Pk	RB/VB 1MHz
12206	39.87	V	54.00	14.13	Avg	RB/VB 1MHz
12206	32.96	H	54.00	21.04	Avg	RB/VB 1MHz
For emission in restricted band, the limit of 15,209 was used. For all other emission, the limit was set 20dB below the level of fundamental and measured in 100kHz.						

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High Frequency @ 2479 MHz

Fundamental emission level @3m in 100kHz RBV	111.05	dB μ V/m
Limit for emission outside of restricted bands:	91.05	dB μ V/m

Frequency	Level	Pol	15.209/15.247		Detector	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	
160.333	24.73	V	91.05	66.32	Pk	RB/VB 100kHz
191.250	22.10	H	91.05	68.95	Pk	RB/VB 100kHz
348.444	33.18	V	91.05	57.87	Pk	RB/VB 100kHz
504.889	31.25	H	91.05	59.80	Pk	RB/VB 100kHz
3310	30.72	V	54.00	23.28	Avg	RB/VB 1MHz
3310	32.18	H	54.00	21.82	Avg	RB/VB 1MHz
4956	37.69	V	54.00	16.31	Avg	RB/VB 1MHz
4956	40.04	H	54.00	13.96	Avg	RB/VB 1MHz
7440	36.21	V	54.00	17.79	Avg	RB/VB 1MHz
7440	34.09	H	54.00	19.91	Avg	RB/VB 1MHz
9917	59.37	V	91.05	31.68	Pk	RB/VB 1MHz
9917	58.81	H	91.05	32.24	Pk	RB/VB 1MHz

For emission in restricted band the limit of 15.209 was used. For all other emission, the limit was set 20dB below the level of fundamental and measured in 100kHz.

RX709

Low Frequency @ 2405 MHz

Fundamental emission level @3m in 100kHz RBV				110.57		dBμV/m
Limit for emission outside of restricted bands:				90.57		dBμV/m
Frequency	Level	Pol	15.209/15.247		Detector	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	
160.333	25.57	V	90.57	65.00	Pk	RB/VB 100kHz
176.667	23.18	H	90.57	67.39	Pk	RB/VB 100kHz
349.333	33.18	V	90.57	57.39	Pk	RB/VB 100kHz
504.889	32.49	H	90.57	58.08	Pk	RB/VB 100kHz
3907	46.22	V	54.00	7.78	Pk	RB/VB 1MHz
3943	44.54	H	54.00	9.46	Pk	RB/VB 1MHz
4809	42.93	V	54.00	11.07	Avg	RB/VB 1MHz
4809	45.87	H	54.00	8.13	Avg	RB/VB 1MHz
7218	54.80	V	90.57	35.77	Pk	RB/VB 1MHz
7218	55.54	H	90.57	35.03	Pk	RB/VB 1MHz
9622	54.65	V	90.57	35.92	Pk	RB/VB 1MHz
9622	53.75	H	90.57	36.82	Pk	RB/VB 1MHz
12022	28.82	V	54.00	25.18	Avg	RB/VB 1MHz
12028	30.20	H	54.00	23.80	Avg	RB/VB 1MHz
14427	50.94	V	90.57	39.63	Pk	RB/VB 1MHz
14427	53.49	H	90.57	37.08	Pk	RB/VB 1MHz

For emission in restricted band, the limit of 15,209 was used. For all other emission, the limit was set 20dB below the level of fundamental and measured in 100kHz.

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Middle Frequency @ 2441 MHz

Fundamental emission level @3m in 100kHz RBV				110.53		dB μ V/m
Limit for emission outside of restricted bands:				90.53		dB μ V/m
Frequency	Level	Pol	15.209/15.247		Detector	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	
160.333	27.25	V	90.53	63.28	Pk	RB/VB 100kHz
180.556	23.56	H	90.53	66.97	Pk	RB/VB 100kHz
349.333	33.49	V	90.53	57.04	Pk	RB/VB 100kHz
504.889	30.79	H	90.53	59.74	Pk	RB/VB 100kHz
3910	45.48	V	54.00	8.52	Pk	RB/VB 1MHz
3993	44.45	H	54.00	9.55	Pk	RB/VB 1MHz
4880	36.64	V	54.00	17.36	Avg	RB/VB 1MHz
4880	27.32	H	54.00	26.68	Avg	RB/VB 1MHz
7324	31.39	V	54.00	22.61	Avg	RB/VB 1MHz
7324	30.15	H	54.00	23.85	Avg	RB/VB 1MHz
9767	51.46	V	90.53	39.07	Pk	RB/VB 1MHz
9767	57.08	H	90.53	33.45	Pk	RB/VB 1MHz
12206	29.28	V	54.00	24.72	Avg	RB/VB 1MHz
12206	26.10	H	54.00	27.90	Avg	RB/VB 1MHz
For emission in restricted band, the limit of 15.209 was used. For all other emission, the limit was set 20dB below the level of fundamental and measured in 100kHz.						

High Frequency @ 2479 MHz

Fundamental emission level @3m in 100kHz RBV				107.93		dB μ V/m
Limit for emission outside of restricted bands:				87.93		dB μ V/m
Frequency	Level	Pol	15.209/15.247		Detector	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	
160.333	25.80	V	87.93	62.13	Pk	RB/VB 100kHz
191.833	22.28	H	87.93	65.65	Pk	RB/VB 100kHz
348.444	36.13	V	87.93	51.80	Pk	RB/VB 100kHz
504.889	33.79	H	87.93	54.14	Pk	RB/VB 100kHz
2880	45.98	V	54.00	8.02	Pk	RB/VB 1MHz
3313	51.06	H	87.93	36.87	Pk	RB/VB 1MHz
4956	29.22	V	54.00	24.78	Avg	RB/VB 1MHz
4956	27.34	H	54.00	26.66	Avg	RB/VB 1MHz
7440	29.98	V	54.00	24.02	Avg	RB/VB 1MHz
7440	33.23	H	54.00	20.77	Avg	RB/VB 1MHz
9917	49.23	V	87.93	38.70	Pk	RB/VB 1MHz
9917	52.23	H	87.93	35.70	Pk	RB/VB 1MHz
For emission in restricted band the limit of 15.209 was used. For all other emission, the limit was set 20dB below the level of fundamental and measured in 100kHz.						

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics which above 5th Harmonics is close to the noise base even antenna close up to 1 meter distance according the measurement of ANSI C63.4. Emissions 20dB lower than the limit are not reported.

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FCC Part 15. Subpart C. §15.209. Radiated Emission Limits

Frequency of Emission [MHz]	Field strength [μV/m]	Field Strength [dBμV/m]
30 – 88	100	40.0
88 – 216	150	43.5
216 – 960	200	46.0
Above 960	500	54.0

FCC Part 15. Subpart C. §15.205. Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
10.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	
13.36-13.41			

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3.5. Band edge requirement

Test requirement: FCC Rules 47 CFR Part 15 Subpart C
Test method: 15.247 clause (d)
Tested by: [Mr. Ray Lam](#)
Operating environment: 25 °C, 50 %, 990 hPa
Tested modules: 2.4GHz DSSS Transceiver module RX709
2.4GHz DSSS Transceiver module BT-2401A
EUT operation: Transmitting in selected channel (worst case)

Measurement Equipment Used:

ID No.	Test equipment	Type	Manufacturer	Cal Date	Cal Due Date	Cal Interval (year)
E113	Spectrum Analyzer	FSL6	Rohde & Schwarz	26 Aug 2014	26 Aug 2015	1

Measurement Results:

BT-2401A

Frequency	Resolution bandwidth	20 dB band edge	Limit	Verdict
MHz	kHz	kHz	MHz	
2405	100	2404.222	> 2400.0	Pass
2479	100	2480.087	< 2483.5	Pass

RX709

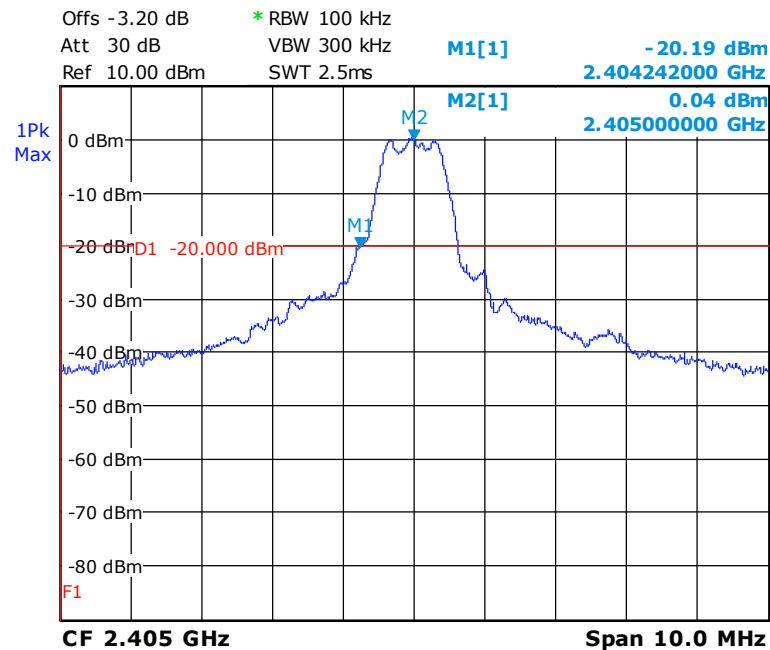
Frequency	Resolution bandwidth	20 dB band edge	Limit	Verdict
MHz	kHz	kHz	MHz	
2405	100	2404.261	> 2400.0	Pass
2479	100	2479.998	< 2483.5	Pass



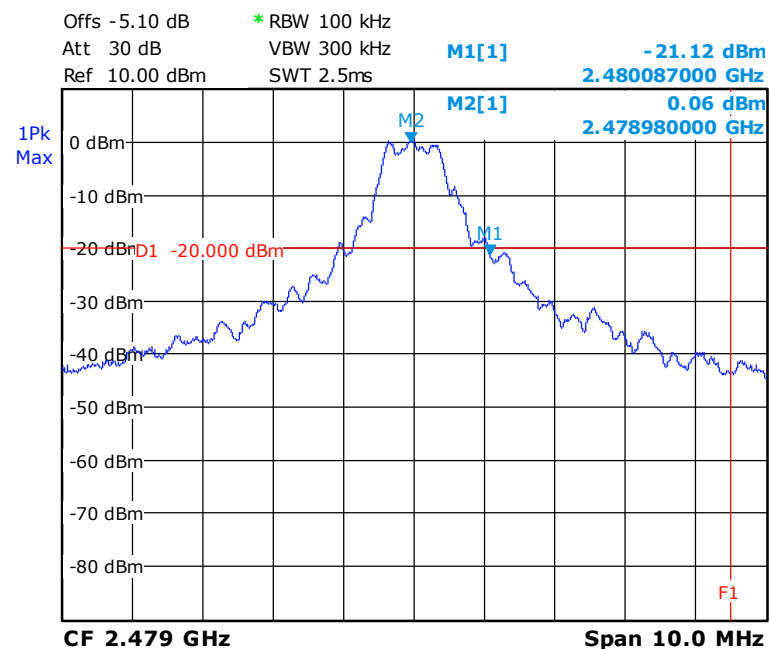
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BT-2401A

Lowest Operation frequency: 2405 MHz



Highest Operation frequency: 2479 MHz



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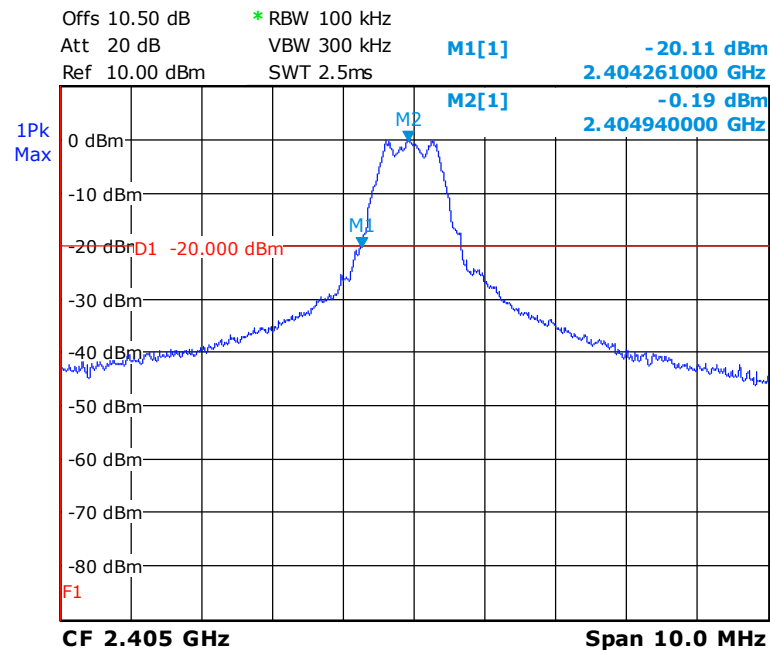
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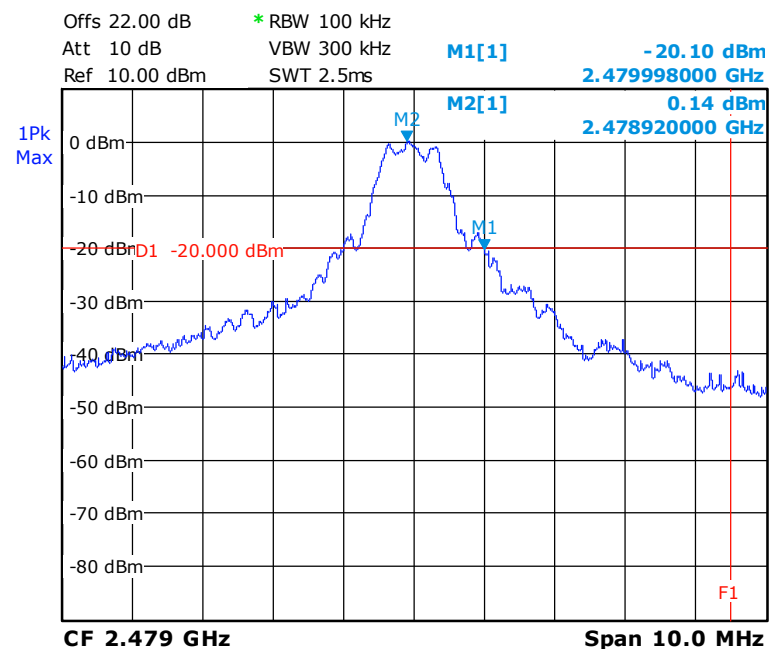
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RX709

Lowest Operation frequency: 2405 MHz



Highest Operation frequency: 2479 MHz



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3.6. Receiver radiated emission

Test requirement: Section 15.109
 Test method: ANSI C63.4 /2/
 Test date: 14.11.2014
 Tested by: Mr. Ray Lam
 Class: B
 EUT operation: Both transceivers were tested together in RX mode, according user manual

Measurement Equipment Used:

No.	Test equipment	Type	Manufacturer	Cal Date	Cal Due Date	Cal Interval (year)
EMC209	10m Semi-anechoic Chamber	Nil	Frankonia	12 Apr 14	12 Apr 15	1
EMC567	Test Reciever	ESU 26	Rohde & Schwarz	5 Jan 14	5 Jan 15	1
EMC577	Bi-conical Antenna	HK116	Rohde & Schwarz	5 May 14	5 May 15	1
EMC045	Log.-Periodic Antenna	HL223	Rohde & Schwarz	6 May 14	6 May 15	1

Measurement results

Calculation of test results:

Such factors like antenna factor and cable loss are already included in the provided measurement results.

Frequency range	Antenna direction	Frequency in MHz	Worst Case Result in dBuV/m	Limit in dBuV/m	Detector PK/QP	Margin to Limit in dB	Verdict
30MHz-200MHz	V	112.111	23.85	43.5	Pk	19.65	Pass
30MHz-200MHz	H	187.750	22.30	43.5	Pk	21.20	Pass
200MHz-1GHz	V	349.333	28.08	46	Pk	17.92	Pass
200MHz-1GHz	H	504.889	31.46	46	Pk	14.54	Pass
1GHz-4GHz	V	3997	37.23	54	Pk	16.77	Pass
1GHz-4GHz	H	4000	37.22	54	Pk	16.78	Pass
4GHz-8GHz	V	7916	39.98	54	Pk	14.02	Pass
4GHz-8GHz	H	7902	39.30	54	Pk	14.70	Pass
8GHz-12.75GHz	V	12733	43.34	54	Pk	10.66	Pass
8GHz-12.75GHz	H	12300	42.46	54	Pk	11.54	Pass

Note: No (further) spurious emissions in the range 20 dB below the limit found.

Limits (Section 15.109)

Frequency range	Limit
30MHz - 88MHz	100uV/m (40dBuV/m)
88MHz - 216MHz	150uV/m (43.5dBuV/m)
216MHz - 960MHz	200uV/m (46dBuV/m)
Above 960MHz	500uV/m (54dBuV/m)



4 Normative references

- /1/ FCC Rules 47 CFR PART 15 Subpart: 2014
Radio Frequency Devices
- /2/ ANSI C63.4-2009
Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and
Electronic Equipment in the Range of 9 kHz to 40 GHz



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5.1 Revision Notes

This revised Report replaces the all former Test Reports based on number H1M21410-2192-P-15. These former Test Reports are not longer valid. Every Revision of the original Report is recorded below and identified by the || symbol beside the text.

Revision No.	Revision
H1M21410-2192-P-15	Original Test Report