



SLG Asia Test Labs & Service (HK) Limited

Test Report

According to

FCC PART 15 Subpart C

FCC ID: S29ILOOK

Test Report Number: H1M21403-1683-P-15

SLG Asia Test Labs & Service (HK) Limited



TEST REPORT

Summary | FCC Part 15C

Test Report No.: H1M21403-1683-P-15

Date of issue: 23.04.2014

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: Camera of R/C Helicopter

Brand Name: devention, WALKERA

Model and/or type reference.....: iLOOK with TX5803

Rating(s): Input 7-15VDC

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.

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Emphasized conditions or project related conditions:

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1 General Information

1.1 Test Report

Tested by:

23.04.2014

Mr. Karl Lau

Date

Test Engineer

Signature

Approved by:

23.04.2014

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: 20.03.2014
Date of receipt of test item: 20.03.2014
Date (s) of performance of tests: 20.03.2014 - 23.04.2014

1.6 Test item

Description of test item: Camera of R/C Helicopter
Type identification: iLOOK with TX5803
Brand Name: devention, WALKERA

Equipment classification: Portable use
Permitted frequency range: 5725 - 5850 MHz
Operation frequency range: 5733 - 5847 MHz
Lowest Operation frequency: 5733 MHz
Middles Operation frequency: 5809 MHz
Highest Operation frequency: 5847 MHz
Number of Channel: 4 (5733MHz, 5771MHz, 5809MHz, 5847MHz)
Emission designator: F3F
Antenna gain: ≤ 3 dBi
Type of modulation: FSK (Digital modulation)
Operation mode: simplex
Type of antenna: Fixed / non removable
Power supply: Input 7-15VDC

All information was provided by the applicant)



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 (5725-5850MHz)

Requirements according standard:				
FCC Rule	Test description	Results/Notes	Limits/Requirements	Verdict
15.247(a)	Digital modulation	System uses FSK techniques		P
15.247(a) (2)	6dB Bandwidth	> 2116 KHz	> 500kHz	P
15.247(b) (3)	Maximum peak Power	19.36 dBm (86.30 mW) (EIRP) 16.36 dBm (43.25 mW) (Conducted)	Conducted 1W, EIRP limited to 4W	P
15.247(e)	Power Spectral Density	3.76 dBm/3kHz	< 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 5725-5850 MHz	P
15.203	Antenna requirements	Fixed / non removable		P
15.247 (b)/ 15.407 (f)	RF Exposure requirements	Refer to MPE Calculation and statement in user manual	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. Karl Lau
 Operating Environment: 25 °C, 50 %, 990 hPa
 EUT operation: Transmitting in selected channel (worst case)
 Tested model: iLOOK with TX5803
 Test voltage: 15 VDC (worst case mode)

Measurement Equipment Used:

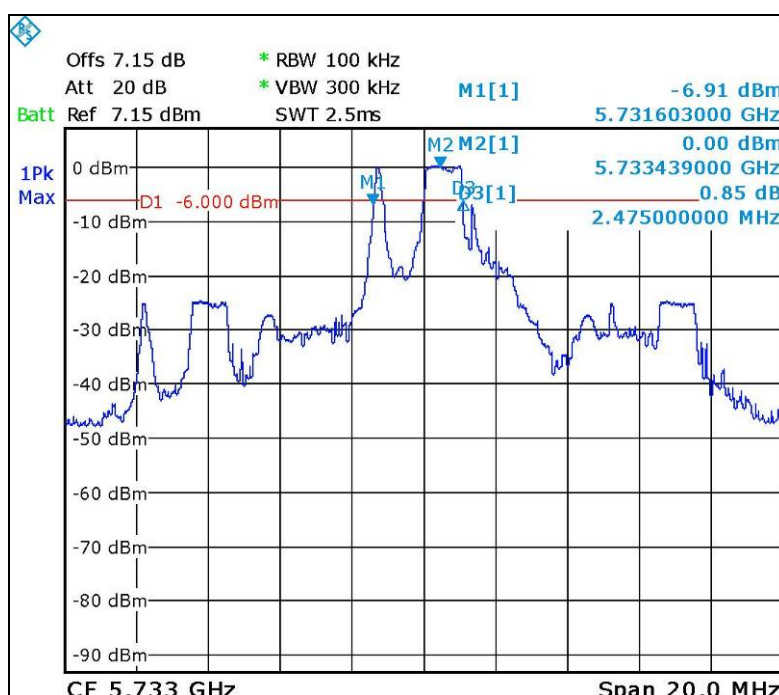
ID No.	Test equipment	Type	Manufacturer	Cal Date	Cal Due Date	Cal Interval (year)
E113	Spectrum Analyzer	FSL6	Rohde & Schwarz	26 Aug 2013	26 Aug 2014	1

Measurement Results:

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

Frequency (MHz)	Resolution bandwidth	6dB bandwidth (kHz)	Limit (kHz)	Results
5733	100kHz	2475	>500	Pass
5809	100kHz	2116	>500	Pass
5847	100kHz	2555	>500	Pass

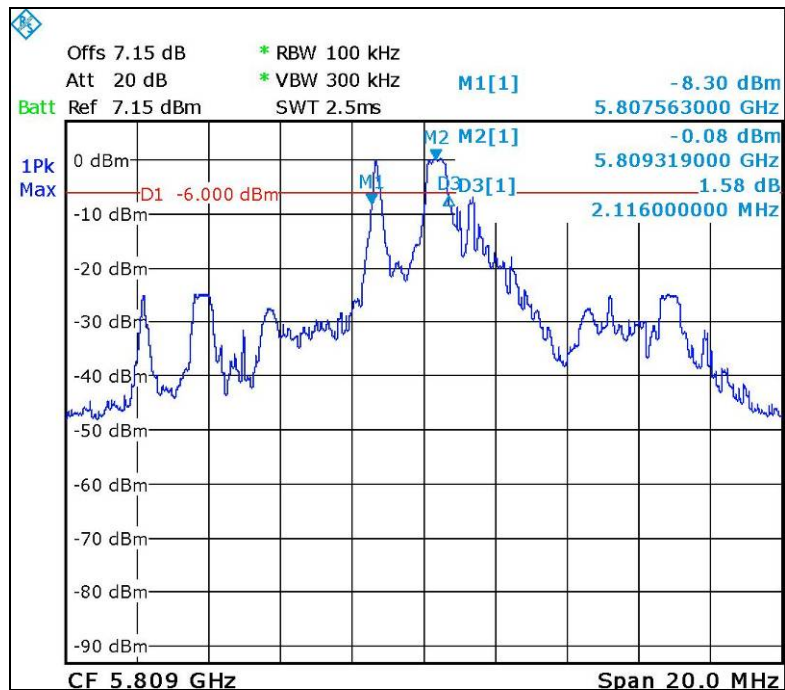
Lowest Operation frequency: 5733 MHz



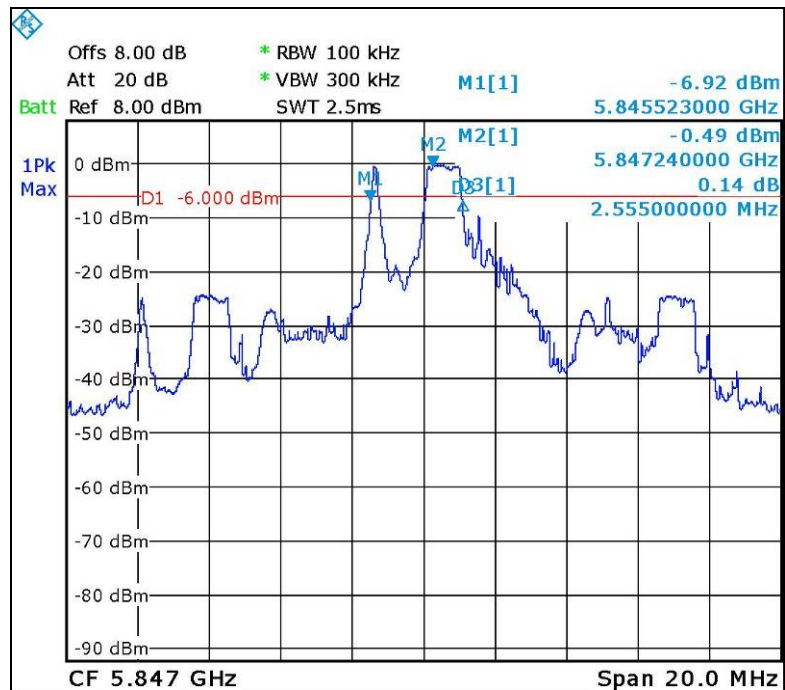


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Middle Operation frequency: 5809 MHz



Highest Operation frequency: 5847 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. Karl Lau](#)
Operating Environment: 25 °C, 50 %, 990 hPa
EUT operation: Transmitting in selected channel (worst case)
Tested model: iLOOK with TX5803
Test voltage: 15 VDC (worst case mode)

Measurement Results:

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

Frequency MHz	Output Power		Antenna Gain dBi	Results	EIRP	
	dBm	mW			dBm	mW
5733	16.36	43.25	3	Pass	19.36	86.30
5809	15.29	33.81	3	Pass	18.29	67.45
5847	14.15	26.00	3	Pass	17.15	51.88

All results were measured with peak power meter.

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 2013	26 Aug 2014	1



3.3. Power Spectral Density

Test requirement: FCC Rules 47 CFR Part 15 Subpart C
Test method: 15.247 clause (e)
Tested by: [Mr. Karl Lau](#)
Operating Environment: 25 °C, 50 %, 990 hPa
EUT operation: Transmitting in selected channel (worst case)
Tested model: iLOOK with TX5803
Test voltage: 15 VDC (worst case mode)

Measurement Results:

FCC part 15.247 (e): Power spectral Density

Frequency MHz	PSD dBm/3kHz	Limit dBm/3kHz	Results
5733	2.43	8	Pass
5809	3.74	8	Pass
5847	3.76	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 PPSD determined from preliminary scans using
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Measurement Equipment Used:

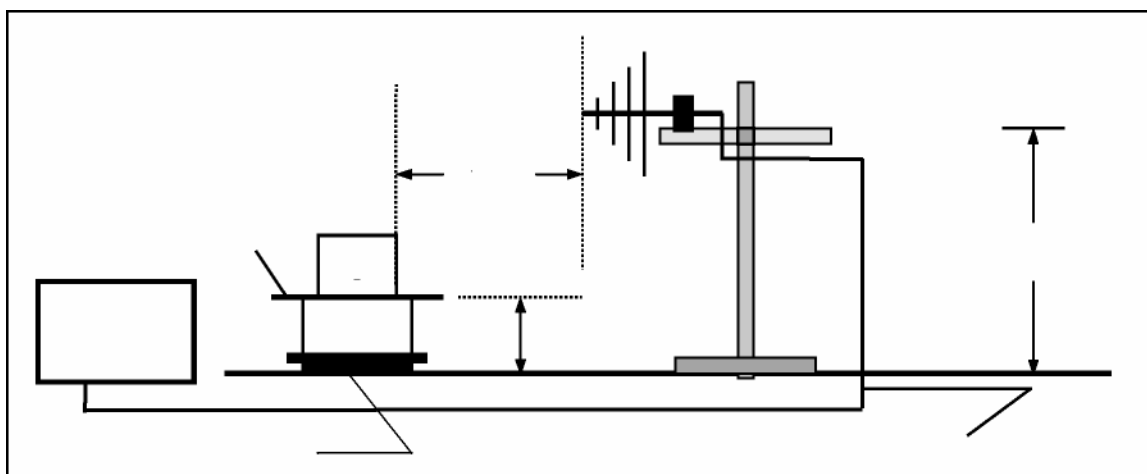
ID No.	Test equipment	Type	Manufacturer	Cal Date	Cal Due Date	Cal Interval (year)
E113	Spectrum Analyzer	FSL6	Rohde & Schwarz	26 Aug 2013	26 Aug 2014	1



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. Karl Lau
Operating Environment: 25 °C, 50 %, 990 hPa
EUT operation: Transmitting in selected channel (worst case)
Tested model: iLOOK with TX5803
Test voltage: 15 VDC (worst case mode)

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.

Measurement Equipment Used:

ID 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 13	5 May 14	1
EMC045	Log.-Periodic Antenna	HL223	Rohde & Schwarz	12 Apr 14	12 Apr 15	1

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Measurement Results:

Low Frequency @ 5733 MHz

Fundamental emission level @3m in 100kHz RBV				114.59		dB μ V/m
Limit for emission outside of restricted bands:				94.59		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	
149.920	40.40	V	43.5	3.10	QP	RB/VB 100kHz
144.128	37.39	H	94.59	57.20	PK	RB/VB 100kHz
240.080	39.07	V	46	6.93	PK	RB/VB 100kHz
613.627	42.36	H	46	3.64	PK	RB/VB 100kHz
1559	40.55	V	54	13.45	Pk	RB/VB 1MHz
1559	36.00	H	54	18.00	Pk	RB/VB 1MHz
11467	48.22	V	54	5.78	Avg	RB/VB 1MHz
11467	50.22	H	54	3.78	Avg	RB/VB 1MHz
17200	48.51	V	94.59	46.08	Pk	RB/VB 1MHz
17200	48.09	H	94.59	46.50	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						

Middle Frequency @ 5809 MHz

Fundamental emission level @3m in 100kHz RBV				113.52		dB μ V/m
Limit for emission outside of restricted bands:				93.52		dB μ V/m
Frequency	Level	Pol	15.209/15.247		Detector	Comments
MHz	dBmV/m	V/H	Limit	Margin	Pk/QP/Avg	
156.800	42.94	V	43.5	0.56	QP	RB/VB 100kHz
144.128	37.54	H	93.52	55.98	Pk	RB/VB 100kHz
240.080	39.44	V	46	6.56	Pk	RB/VB 100kHz
613.627	42.77	H	46	3.23	Pk	RB/VB 100kHz
1559	41.08	V	54	12.92	Pk	RB/VB 1MHz
1559	34.62	H	54	19.38	Pk	RB/VB 1MHz
11619	47.61	V	54	6.39	Avg	RB/VB 1MHz
11619	48.21	H	54	5.79	Avg	RB/VB 1MHz
17432	46.50	V	93.52	47.02	Pk	RB/VB 1MHz
17427	46.23	H	93.52	47.29	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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High Frequency @ 5847 MHz

Fundamental emission level @3m in 100kHz RBV	112.38	dB μ V/m
Limit for emission outside of restricted bands:	92.38	dB μ V/m

Frequency	Level	Pol	15.209/15.247		Detector	Comments
MHz	dBmV/m	V/H	Limit	Margin	Pk/QP/Avg	
156.800	42.27	V	43.5	1.23	QP	RB/VB 100kHz
144.128	41.16	H	92.38	51.22	Pk	RB/VB 100kHz
240.080	41.42	V	46	4.58	Pk	RB/VB 100kHz
613.627	44.75	H	46	1.25	QP	RB/VB 100kHz
1559	34.63	V	54	19.37	Pk	RB/VB 1MHz
1559	35.95	H	54	18.05	Pk	RB/VB 1MHz
11695	50.29	V	54	3.71	Avg	RB/VB 1MHz
11695	52.91	H	54	1.09	Avg	RB/VB 1MHz
17544	45.50	V	92.38	46.88	Pk	RB/VB 1MHz
17542	45.56	H	92.38	46.82	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 1meter 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

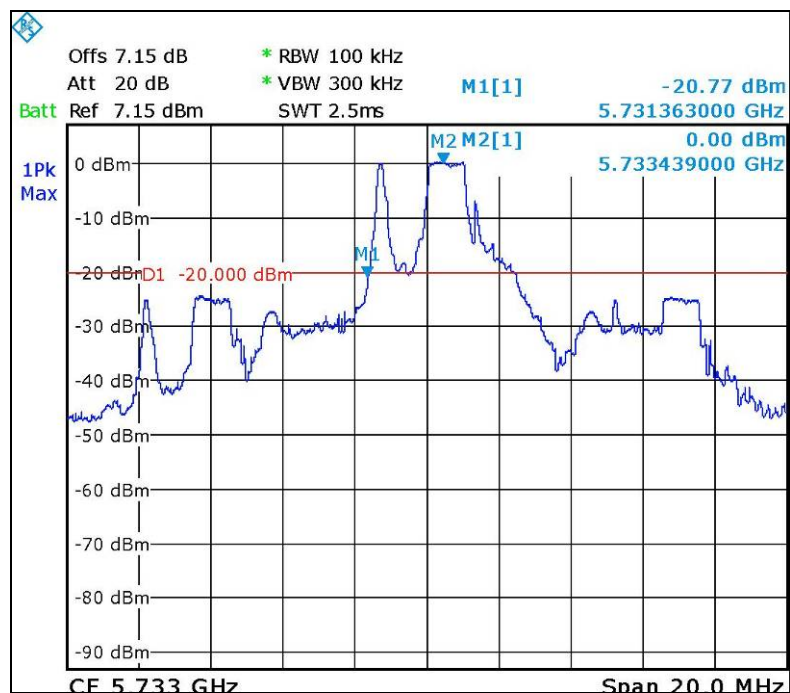
Test requirement: FCC Rules 47 CFR Part 15 Subpart C
 Test method: 15.247 clause (d)
 Tested by: Mr. Karl Lau
 Operating Environment: 25 °C, 50 %, 990 hPa
 EUT operation: Transmitting in selected channel (worst case)
 Tested model: iLOOK with TX5803
 Test voltage: 15 VDC (worst case mode)

Measurement Results:

FCC part 15.247 (d): Band edge requirements

Frequency (MHz)	Resolution bandwidth	20 dB band edge (kHz)	Limit (MHz)	Results
5733	100kHz	5731.3	> 5725	Pass
5847	100kHz	5849.5	< 5850	Pass

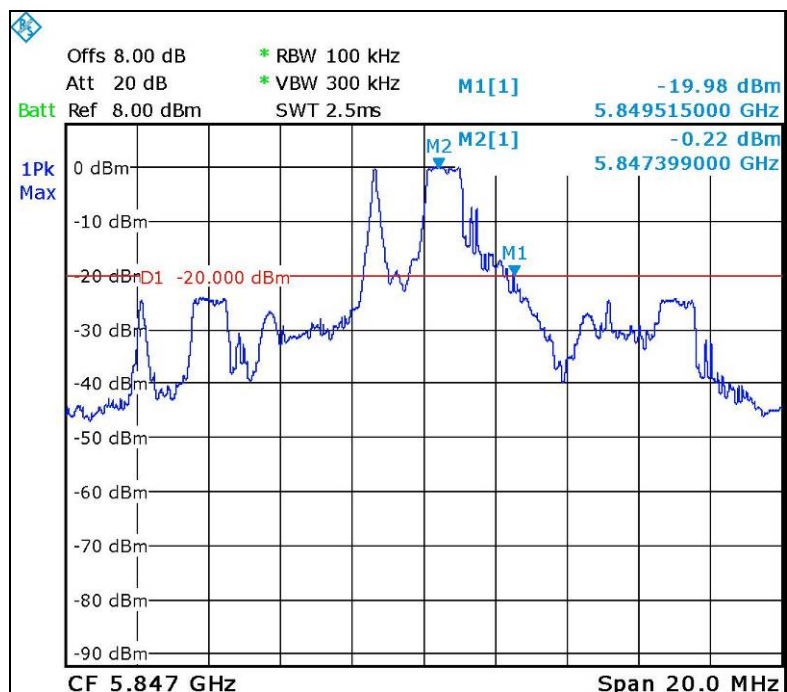
Lowest Operation frequency: 5733 MHz



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Highest Operation frequency: 5847 MHz



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 2013	26 Aug 2014	1

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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 H1M21403-1683-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
H1M21403-1683-P-15	Original Test Report