FCC Part 15C
MEASUREMENT AND TEST REPORT
For

Guangzhou Walkera Technology Co., Ltd

Taishi Industrial Park, Yuwotou Town, Panyu District,
Guangzhou, Guangdong, China

FCC ID: S29WK-2801

December 8, 2008

This Report Concerns: ☒ Original Report	**Equipment Type:** Transmitter for Model Plane
Test Engineer:	Eric Yang
Report Number:	SE08L-187F
Test Date:	December 05, 2008
Reviewed By:	
Prepared By:	**S&E Technologies Laboratory Ltd** Room 407, Block A Shennan Garden, Hi-Tech Industrial Park, Shenzhen 518057, P.R. China. Tel: 86-755-26636573, 26630631 Fax: 86-755-26630557

Note: *This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of S&E Technologies Laboratory Ltd.*

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1-Test Result Certification

Applicant:	Guangzhou Walkera Technology Co., Ltd
	Taishi Industrial Park, Yuwotou Town, Panyu District, Guangzhou, Guangdong, China
Equipment Under Test:	Transmitter for Model Plane
Trade Name:	Walkera
Model:	WK-2801
Operation Frequency:	2405 ~2480 MHz
Antenna Designation:	Non-user replaceable (fixed)
Date of Test:	December 05, 2008

Applicable Standards	
Standard	**Test Result**
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

We hereby certify that:

The above equipment was tested at Guangdong Galanz Enterprise Co. Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.207, 15.209 and Part 15.249.
The test results of this report relate only to the tested sample identified in this report.

2- EUT Description

Product	Transmitter for Model Plane
Trade Name	Walkera
Model Number	WK-2801
Model Difference	N/A
Power Supply	Powered by 8x1.5V AA size batteries
Frequency Range	2405 ~2480 MHz
Antenna Designation	Non-user replaceable (fixed)

Remark: *This submitted test report is intended for FCC ID: S29WK-2801 filing to comply with Section 15.207, 15.209 and 15.249 of the FCC Part 15, Subpart C Rules.*

3-Test Methodology

The tests documented in this report were performed in accordance with ANSI C63.4 (2003) and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.249.

3.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

3.3 General Test Procedures

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.

3.4 FCC Part 15.205 Restricted Bands of Operations

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 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	2655 - 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	(2)
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2] Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

3.5 Description of Test Modes

The EUT has been tested under engineering test mode condition and the EUT staying in continuous transmitting mode.

4- Instrument Calibration

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

5- Facilities and Accreditations

5.1 Facilities

All measurement facilities used to collect the measurement data are located on the address of Guangdong Galanz Enterprise Co. Ltd at 25 South Ronggui Rd., Shunde, Foshan, Guangdong , China.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 Equipment

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn.
Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.
Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.
Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

5.3 Laboratory Accreditation and Listing

CNAS-Lab Cert. No.L 2244

Guangdong Galanz Enterprise Co. Ltd, EMC Laboratory has been accredited by CNAS for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 1999 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is from Jane 08, 2007 to September 29, 2010

FCC-Registration No.: 580210

Guangdong Galanz Enterprise 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. Registration580210, Renewal date December 07, 2009.

5.4 Test Equipment List and Details

Equipment	Manufacture	Model	Serial No.	Calibration Due
EMI Receiver	SCHAFFNER	SMR4503	11725	2009-07-08
Spectrum Analyzer	R&S	FSP 30	100755	2009-11-30
Biconilog Antenna	ETS	3142C	00042672	2009-08-02
Double-Ridged Wave guide horn	ETS	3115	6587	2009-08-02
Amplifier	Agilent	83017A	MY39500438	2009-07-11
Shielding Room	ETS	N/A	N/A	2009-05-30
Semi-Anechoic Chamber	ETS	N/A	N/A	2009-05-24

Remark: *Each piece of equipment is scheduled for calibration once a year.*

6- Setup of Equipment Under Test

6.1 Setup Configuration of EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

6.2 Support Equipment

Device Type	Brand	Model	FCC ID	Series No.	Data Cable	Power Cord
N/A						

Remark:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

7- FCC Part 15.249 Requirements

7.1 Radiated Emissions

Limit

1. Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

Remark: *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections and 15.241.*

2. In the above emission table, the tighter limit applies at the band edges.

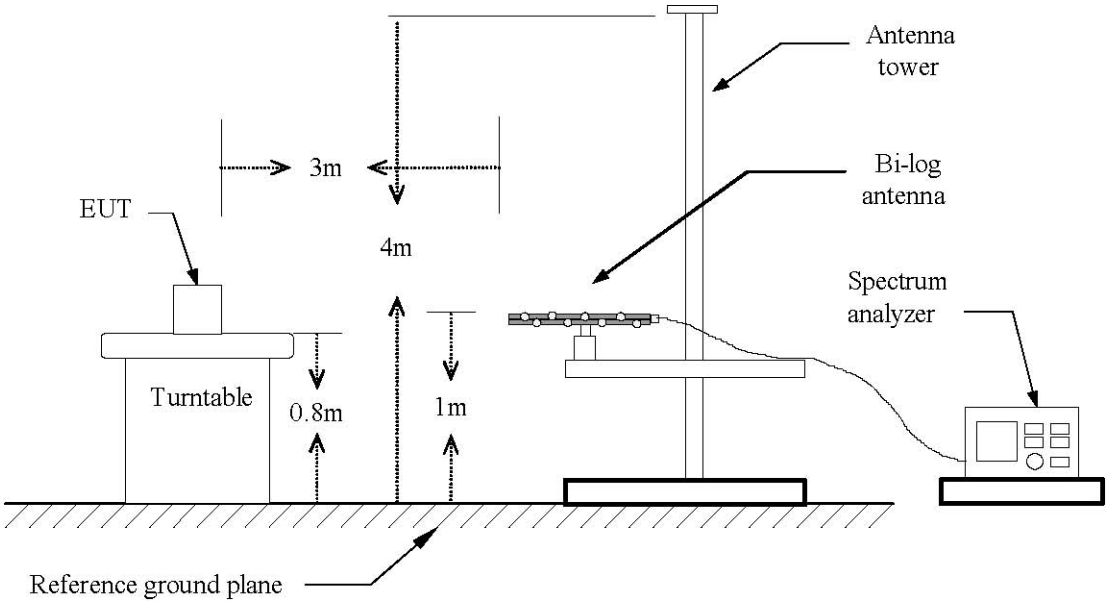
Frequency (Hz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

3. Fundamental and harmonics Emissions Limits

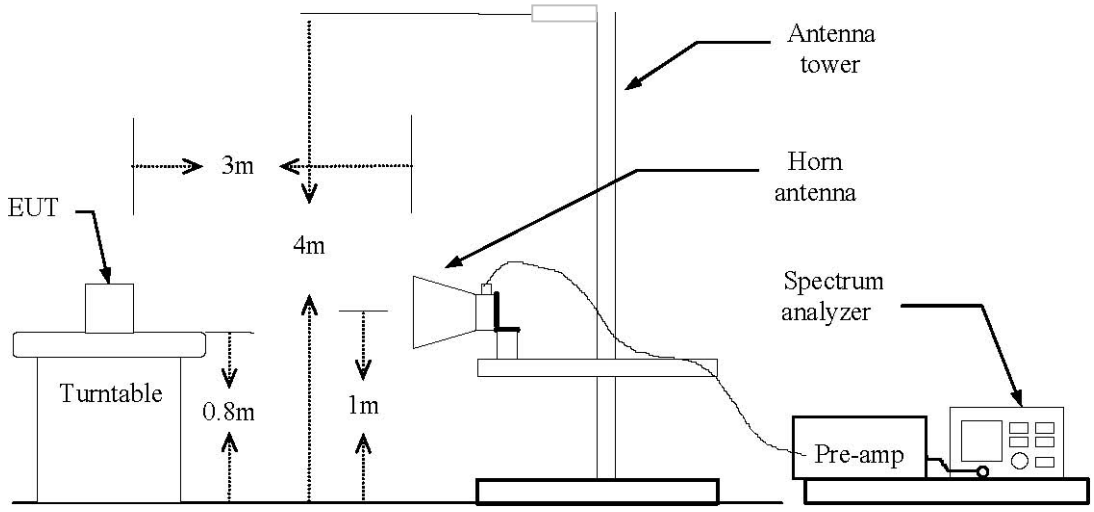
Frequency	Field Strength of Fundamental		Field Strength of Harmonics	
(MHz)	mV/m@3m	dBuV/m@3m	uV/m@3m	dBuV/m@3m
2400-2483.5	50	94.0 (Average)	500	54.0 (Average)
		114.0 (Peak)		74.0 (Peak)

Test Configuration

Below 1 GHz



Above 1 GHz



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 varied from 1m to 4m to find out the highest emissions.
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.

Test Results

Radiated Emission Measurement Result (below 1GHz):

Operation Mode: TX on high channel Test date: December 05, 2008
Temperature: 23°C Humidity: 74 % RH Polarity: Vertical / Horizontal

Freq. (MHz)	Ant.Pol. (H/V)	Detector Mode	Reading (dBuV)	Ant./CL/ Amp.CF (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
79.32	V	QP	6.7	11.6	18.3	40.0	-21.7
173.39	V	QP	22.3	10.7	33.0	43.5	-10.5
86.01	H	QP	5.7	11.8	17.5	40.0	-22.5
175.81	H	QP	18.4	10.8	29.2	43.5	-14.3
-							

Operation Mode: TX on middle channel Test date: December 05, 2008
Temperature: 23°C Humidity: 74 % RH Polarity: Vertical / Horizontal

Freq. (MHz)	Ant.Pol. (H/V)	Detector Mode	Reading (dBuV)	Ant./CL/ Amp.CF (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
76.11	V	QP	5.6	11.6	17.2	40.0	-22.8
171.90	V	QP	20.6	10.7	31.3	43.5	-12.2
84.77	H	QP	5.7	11.8	17.5	40.0	-22.5
173.95	H	QP	17.5	10.8	28.3	43.5	-15.2
-							

Operation Mode: TX on low channel Test date: December 05, 2008
Temperature: 23°C Humidity: 74 % RH Polarity: Vertical / Horizontal

Freq. (MHz)	Ant.Pol. (H/V)	Detector Mode	Reading (dBuV)	Ant./CL/ Amp.CF (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
78.65	V	QP	6.8	11.6	18.4	40.0	-21.6
172.01	V	QP	20.0	10.7	30.7	43.5	-12.8
78.65	H	QP	6.0	11.8	17.8	40.0	-22.2
173.85	H	QP	17.0	10.8	27.8	43.5	-15.7
-							

Remark

(1) Measuring frequencies from 30 MHz to the 1000MHz。

(2) Radiated emissions measured in frequency range from 30MHz to 1000MHz were made with an instrument using Peak/QP detector mode.

(3) Data of measurement within this frequency range shown "-- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

(4) The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1000MHz.

Radiated Emission Measurement Result (Above 1GHz):

Operation Mode: TX on high channel Test date: December 05, 2008
Temperature: 23°C Humidity: 74 % RH Polarity: Vertical / Horizontal

Freq. (MHz)	Ant. Pol. (H/V)	Peak Reading (dBuV)	Ant./CL/ Amp.CF (dB)	Actual FS		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin	
				Peak (dBuV/m)	AV (dBuV/m)			Peak	AV
2480	H	98.1	-3.3	94.8	83.2	114.0	94.0	-19.2	-10.8
2480	V	97.5	-3.3	94.2	82.8	114.0	94.0	-19.8	-11.2
4960	H	48.8	3.8	52.6	37.4	74.0	54.0	-21.4	-16.6
4960	V	48.4	3.8	52.2	37.3	74.0	54.0	-21.8	-16.7
7440	H	46.3	9.5	55.8	41.2	74.0	54.0	-18.2	-12.8
7440	V	45.4	9.5	54.9	41.0	74.0	54.0	-19.1	-13.0
-									

Operation Mode: TX on middle channel Test date: December 05, 2008
Temperature: 23°C Humidity: 74 % RH Polarity: Vertical / Horizontal

Freq. (MHz)	Ant. Pol. (H/V)	Peak Reading (dBuV)	Ant./CL/ Amp.CF (dB)	Actual FS		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin	
				Peak (dBuV/m)	AV (dBuV/m)			Peak	AV
2441	H	98.9	-3.3	95.6	83.9	114.0	94.0	-18.4	-10.1
2441	V	98.1	-3.3	94.8	83.3	114.0	94.0	-19.2	-10.7
4882	H	50.3	3.8	54.1	38.5	74.0	54.0	-19.9	-15.5
4882	V	50.2	3.8	54.0	38.3	74.0	54.0	-20.0	-15.7
7323	H	48.4	9.5	57.9	43.2	74.0	54.0	-16.1	-10.8
7323	V	46.7	9.5	56.2	43.0	74.0	54.0	-17.8	-11.0
-									

Operation Mode: TX on low channel Test date: December 05, 2008
Temperature: 23°C Humidity: 74 % RH Polarity: Vertical / Horizontal

Freq. (MHz)	Ant. Pol. (H/V)	Peak Reading (dBuV)	Ant./CL/ Amp.CF (dB)	Actual FS		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin	
				Peak (dBuV/m)	AV (dBuV/m)			Peak	AV
2405	H	98.4	-3.3	95.1	83.4	114.0	94.0	-18.9	-10.6
2405	V	97.9	-3.3	94.6	83.0	114.0	94.0	-19.4	-11.0
4810	H	50.2	3.8	54.0	38.6	74.0	54.0	-20.0	-15.4
4810	V	49.8	3.8	53.6	38.4	74.0	54.0	-20.4	-15.6
7215	H	49.5	9.5	59.0	43.9	74.0	54.0	-15.0	-10.1
7215	V	48.7	9.5	58.2	43.6	74.0	54.0	-15.8	-10.4
-									

Remark

(1) Measuring frequencies from 1GHz to the 25 GHz。

(2) Data of measurement within this frequency range shown "- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

(3) The IF bandwidth of spectrum analyzer was 1 MHz for measuring above 1 GHz

7.2 Power line Conducted Emission

Limit

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

Test Procedure

Not applicable (Since the EUT is powered by battery)

Test Results

Not applicable (Since the EUT is powered by battery)

7.3 Band Edge

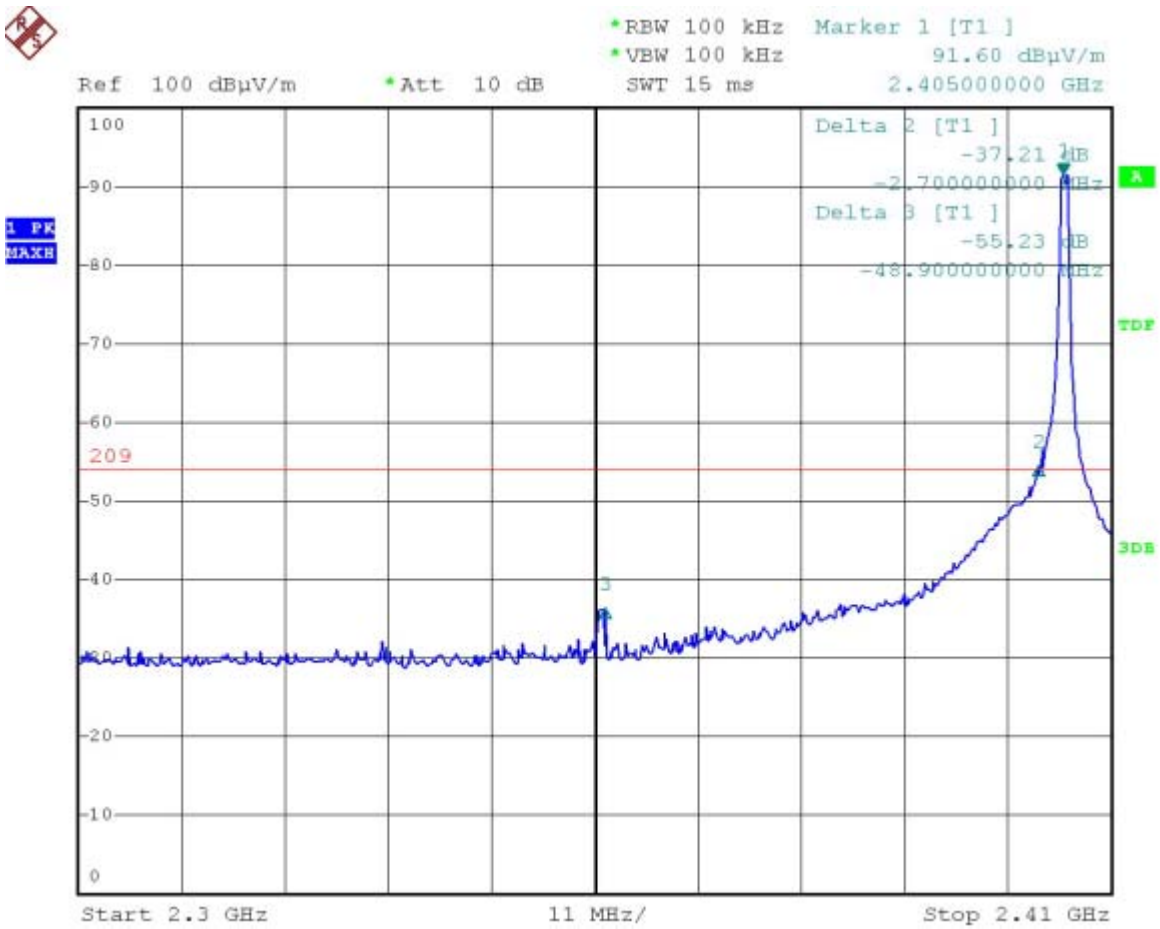
Limit

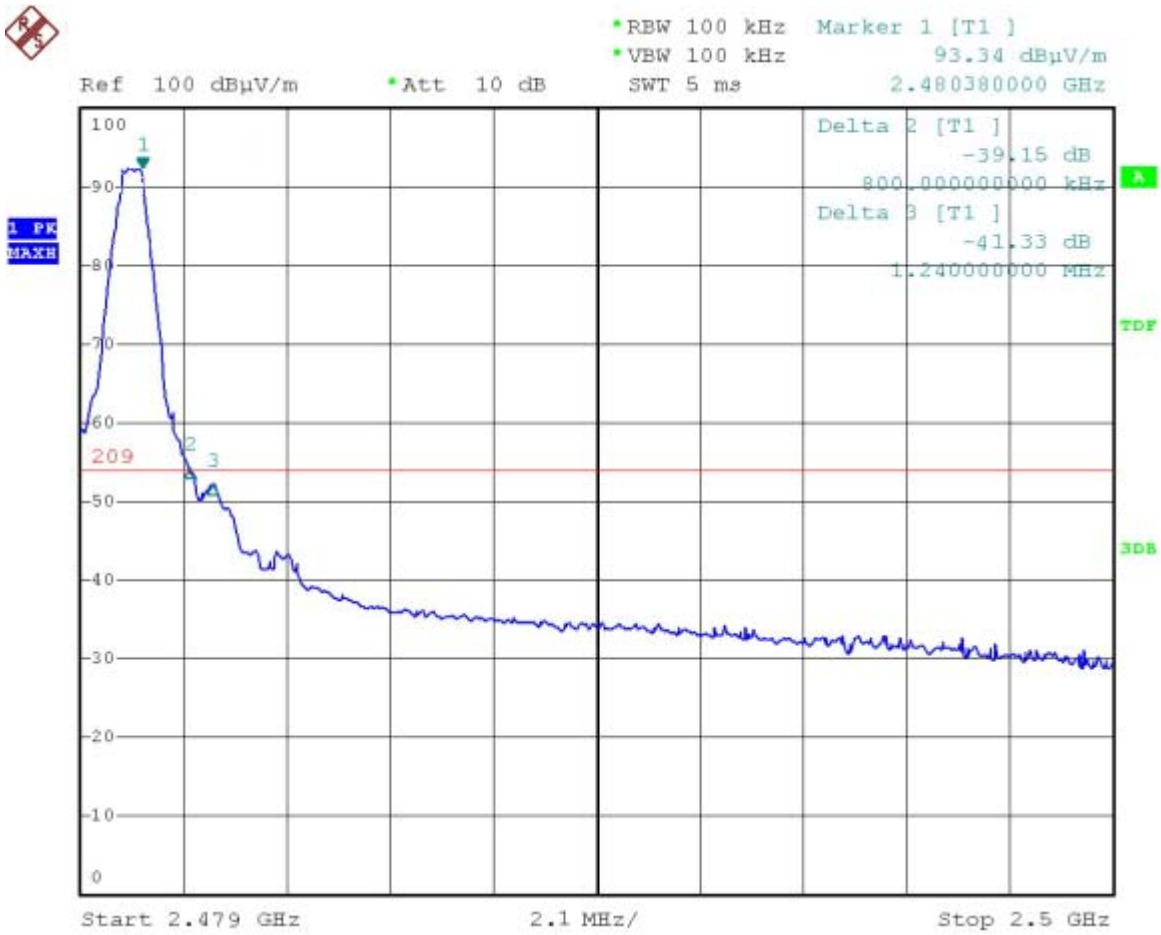
FCC Part 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Measurement Equipment Used

The same as clause 7.1.

Test Results



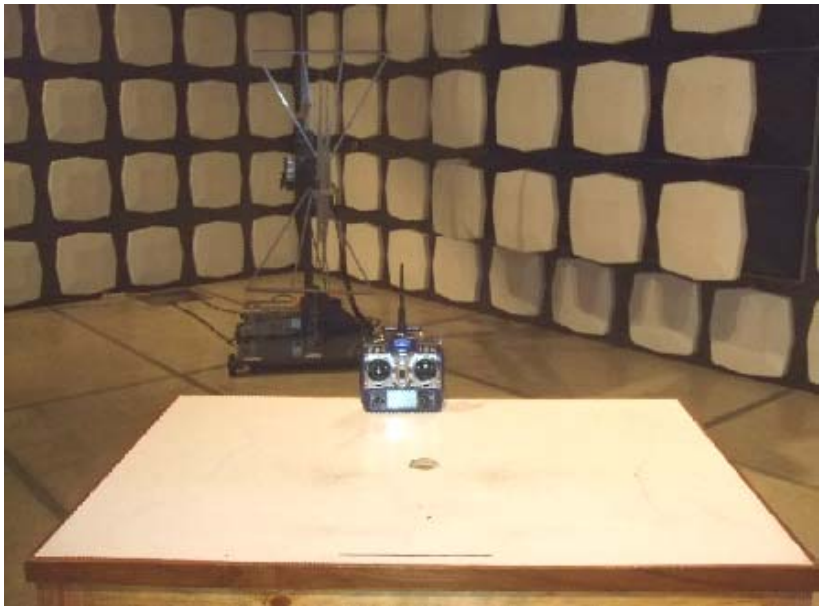


Note:

1. The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209.
2. The average measurement was not performed when the peak measured data under the limit of average detection.

Appendix 1 Photographs of Test Setup

Radiated Emission Test



Appendix 2 Photographs of Constructional Details

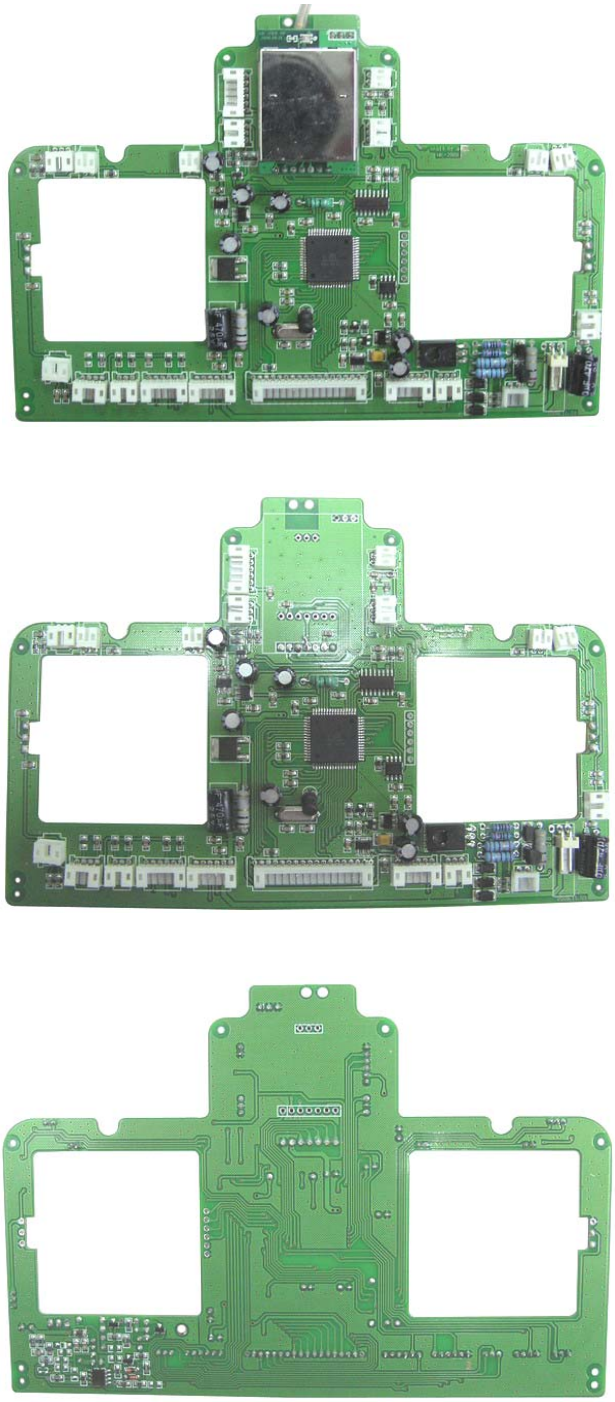
EUT – Front View

EUT – Rear View

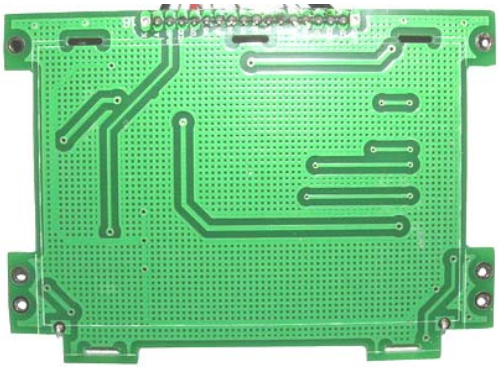
EUT – Top View

EUT – Internal View

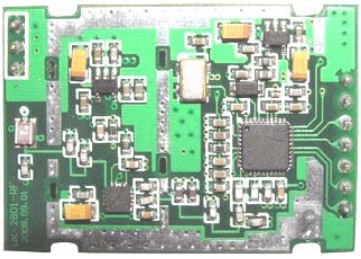
EUT – PCB View (1)

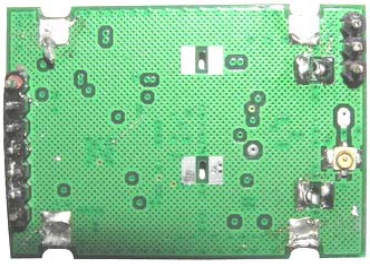


EUT – PCB View (2)

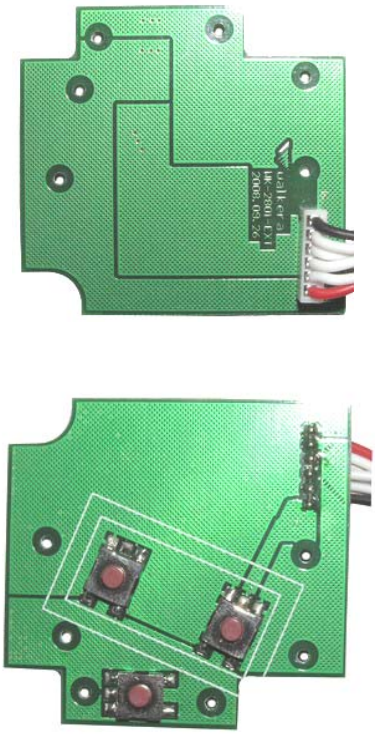


EUT – PCB View (3)

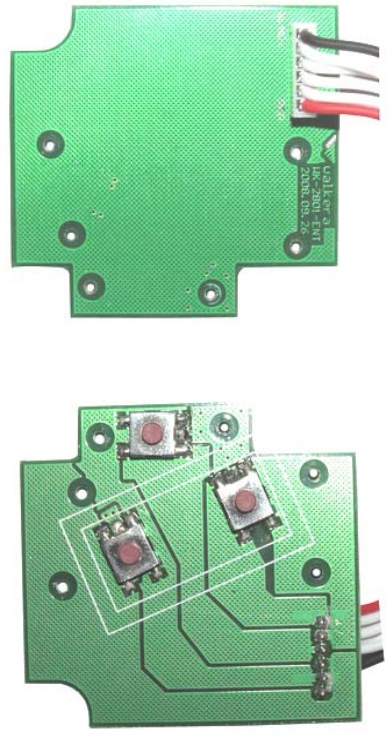




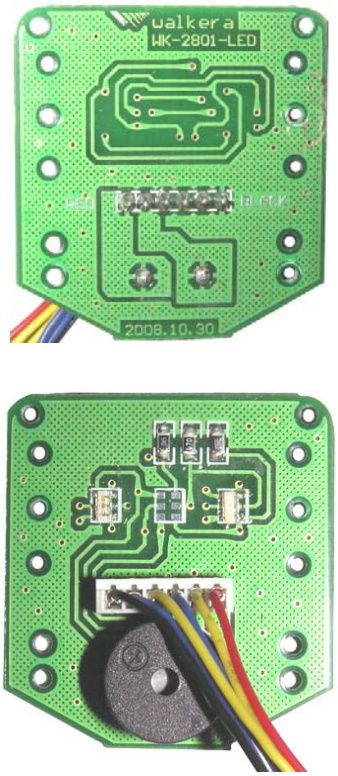
EUT – PCB View (4)



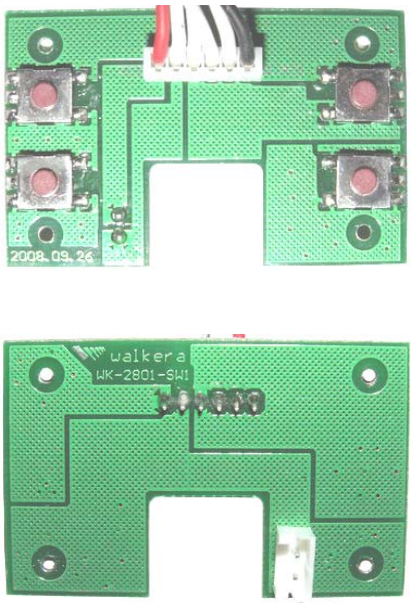
EUT – PCB View (5)



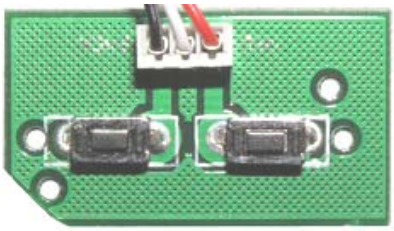
EUT – PCB View (6)

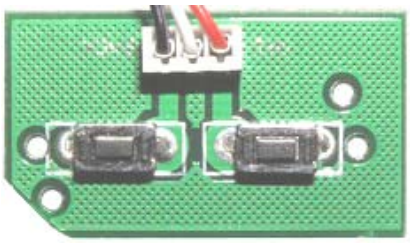


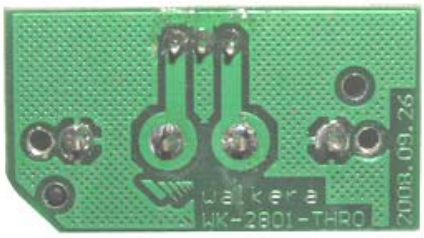
EUT – PCB View (7)

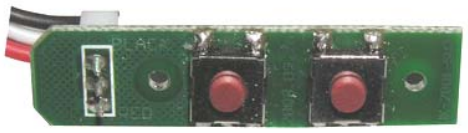


EUT – PCB View (8)









Appendix 3 FCC ID Label

FCC ID: S29WK-2801

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. 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.

Proposed Label Location on EUT

EUT Rear View/proposed FCC Mark Location