FCC TEST REPORT

FCC ID : **XABS220**

Applicant : **Heddolf Products Ltd.**
Adress of Applicant : Unit A 17/F, 83 Hung To Road, Kwun Tong, Kowloon, Hong Kong

Equipment Under Test (EUT) :

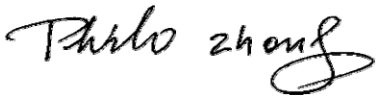
Product description : Remote Control

Model No. : S220

Standards : FCC 15 Subpart C Paragraph 15.231

Date of Test : April.21,2009

Project Engineer **:** Olic huang

Reviewed By **:** 

Prepared By:
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2 Contents

3 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Periodic operation	FCC PART 15: 2007	ANSI C63.4: 2003	Note	PASS
Band Edge	FCC PART 15: 2007	ANSI C63.4: 2003	Note	PASS
Radiated Emission (30MHz to 5GHz)	FCC PART 15: 2007	ANSI C63.4: 2003	N/A	PASS
Conducted Emission (150KHz to 30MHz)	FCC PART 15: 2007	ANSI C63.4: 2003	N/A	N/A

Note: denote that for more details, please refer to the section Periodic operation and Band Edge.

4 General Information

4.1 Client Information

Applicant:	Heddolf Products Ltd.
Address:	Unit A 17/F, 83 Hung To Road, Kwun Tong, Kowloon, Hong Kong
Manufacturer:	SAP Products Limited
Address:	Block 2, Yun He Industrial Zone, Dong Jiang Road, Zhang Cun, DongCheng District, Dongguan City, Guang Dong, China.

4.2 General Description of E.U.T.

Product description:	Remote Control
Model No.:	S220

4.3 Details of E.U.T.

Power Supply:	DC 9.0V
Modulation :	ASK
Working Frequency:	310MHz

4.4 Description of Support Units

The EUT has been tested as an independent unit.

4.5 Standards Applicable for Testing

The customer requested FCC tests for a Remote Control . The standards used were FCC 15 Paragraph 15.231, Paragraph 15.205, Paragraph 15.31,Paragraph 15.33, Paragraph 15.35.

4.6 Test Facility

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

- **IC – Registration No.:IC7760**

Waltek Services(Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration IC7760,July 24,2008.

- **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, June 24, 2008. compliance

4.7 Test Location

All Emissions testswere performed at:-
Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building,West Baima Rd., Songgang Street, Baoan District, Shenzhen518105, China.

5 Equipment Used during Test

Equipment	Brand Name	Model	Related standards	Cal.Intal Months	Last Cal. Date	Serial No
3m Semi-anechoic chamber						
EMC Analyzer	Agilent	E7405A	ISO9001:2000	12	Aug-08	MY45114943
Active Loop Antenna	Beijing Dazhi	ZN30900A	ISO 9001	12	Jul -08	-
Trilog Broadband Antenne	SCHWARZBECK MESS-ELEKTROM	VULB9163	EN/ISO/IEC 17025 DIN EN ISO9001	12	Aug-08	336
Broad-band Horn Antenna	SCHWARZBECK MESS-ELEKTROM	BBHA 9120 D	EN/ISO/IEC 17025 DIN EN ISO9001	12	Aug-08	667
Broadband Preamplifier	SCHWARZBECK MESS-ELEKTROM	BBV 9718	EN/ISO/IEC 17025 DIN EN ISO9001	12	Aug-08	9718-148
10m Coaxial Cable with N-male Connectors usable	SCHWARZBECK MESS-ELEKTROM	AK 9515 H	EN/ISO/IEC 17025 DIN EN ISO9001	12	Aug-08	-
10m 50 Ohm Coaxial Cable with N-plug,individual length,usable up to 3(5)GHz, Connectors	SCHWARZBECK MESS-ELEKTROM	AK 9513	EN/ISO/IEC 17025 DIN EN ISO9001	12	Aug-08	-
Positioning Controller	C&C LAB	CC-C-IF	ISO9001	12	Aug-08	MF7802108
Color Monitor	SUNSPO	SP-14C	ISO9001	12	Aug-08	-
EMI Shielded Room						
Test Receiver	ROHDE&SCHWARZ	ESPI	ISO9001	12	Jul-08	101155
Two-Line V-Network	ROHDE&SCHWARZ	ENV216	ISO9001 EN/ISO/IEC 17025	12	Jul-08	100115
Absorbing Clamp	ROHDE&SCHWARZ	MDS-21	ISO9001 EN/ISO/IEC 17025	12	Jul-08	100205
10m 50 Ohm Coaxial Cable with N-plug,individual length,usable up to 3(5)GHz, Connectors	SCHWARZBECK MESS-ELEKTROM	AK 9514	EN/ISO/IEC 17025 DIN EN ISO9001	12	Aug-08	-

6 Conducted Emission Test

Product Name:	Remote control
Test Requirement:	FCC Part15 Paragraph 15.207
Test Method:	Based on ANSI C63.4: 2003
Test Date:	---------
Frequency Range:	150kHz to 30MHz
Class:	Class B
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

6.1 Test Equipment

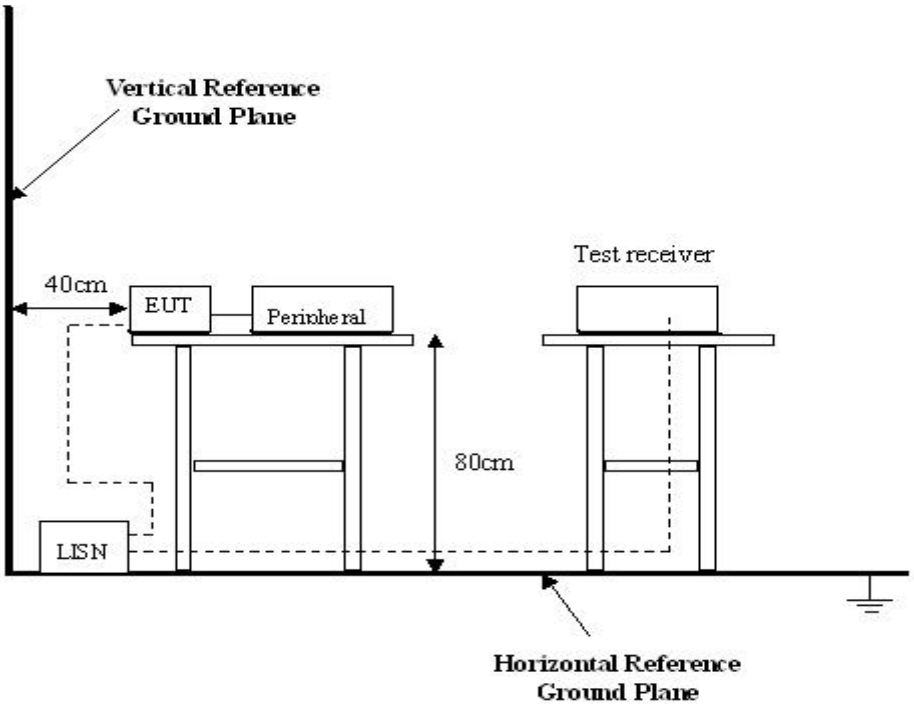
Please refer to Section 5 this report.

6.2 Test Procedure

1. The EUT was tested according to ANSI C63.4: 2003. The frequency spectrum from 150kHz to 30MHz was investigated.
2. The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.3 Conducted Test Setup

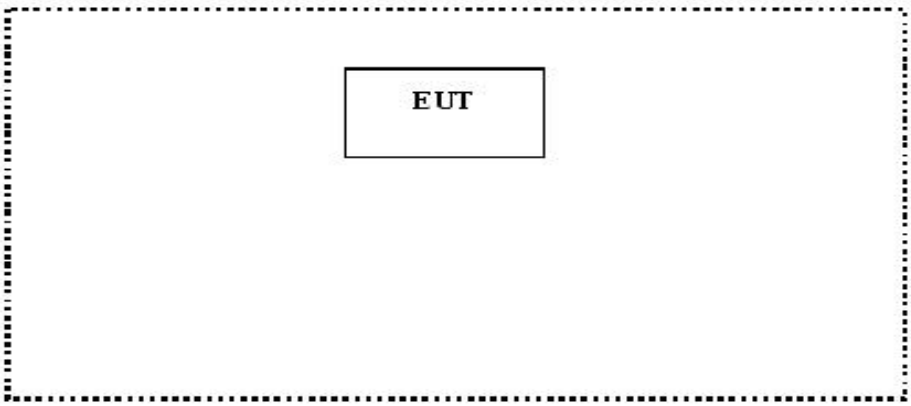
The conducted emission tests were performed using the setup accordance with the ANSI C63.4: 2003, The specification used in this report was the FCC Part15 Paragraph 15.207 limits.



6.4 EUT Operating Condition

Operating condition is according to ANSI C63.4: 2003.

A. Setup the EUT and simulators as shown on follow.
B. Enable RF signal and confirm EUT active.
C. Modulate output capacity of EUT up to specification.



6.5 Conducted Emission Limits

66-56 dBμV between 0.15MHz & 0.5MHz
56 dBμV between 0.5MHz & 5MHz
60 dBμV between 5MHz & 30MHz

Note: In the above limits, the tighter limit applies at the band edges.

6.6 Conducted Emission Test Data

Own to the EUT operation with battery, the test was not performed.

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7 Radiation Emission Test

Product Name:	Remote control
Test Requirement:	FCC Part15 Paragraph 15.231
Test Method:	Based on ANSI C63.4: 2003
Test Date:	April.21,2009
Frequency Range:	30MHz to 5GHz
Measurement Distance:	3m

7.1 Test Equipment

Please refer to Section 5 this report.

7.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

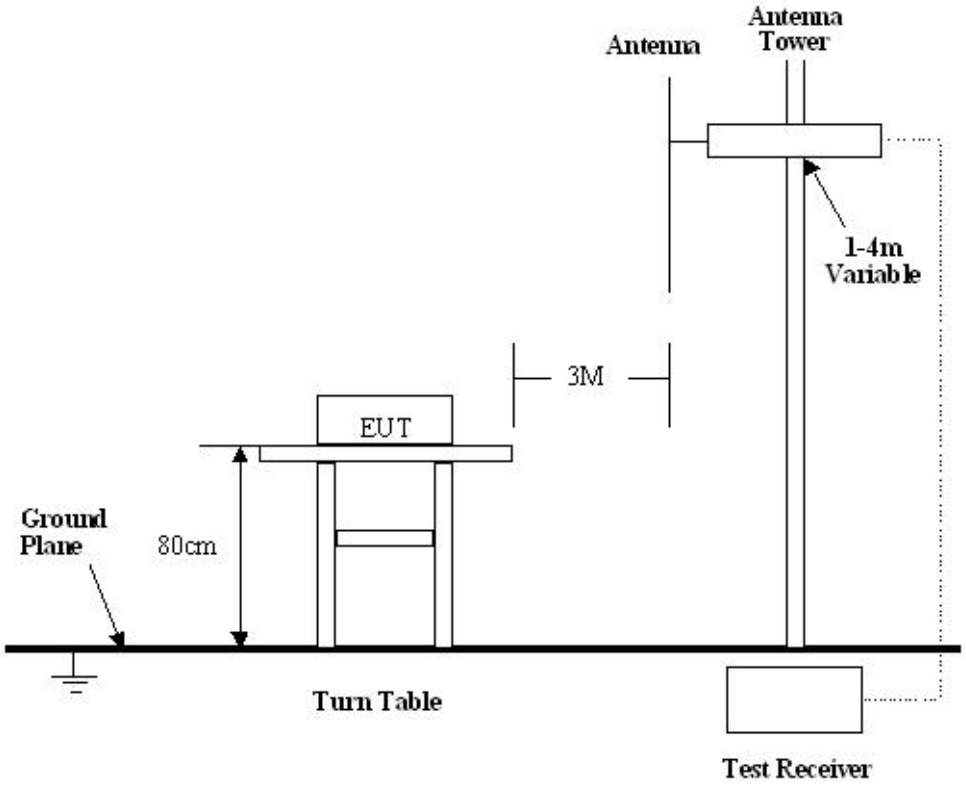
Based on ANSI C63.4: 2003, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Waltek EMC Lab is +/-5.03dB.

7.3 Test Procedure

1. New battery were installed in the equipment under test for radiated emissions test.
2. This is a handhold device,The radiation emission should be tested under 3-axes position(lying,side and stand),After pre-test,It was found that the worse radiation emission was get at the lying position.
3. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.
4. All data was recorded in the peak and average detection mode.
5. The EUT was under working mode during the final qualification test and the configuration was used to represent the worst case results.

7.4 Radiated 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 specification used in this report was the FCC Part15 Paragraph 15.231, Paragraph 15.209 limits.



7.5 Spectrum Analyzer Setup

According to FCC Part15 Paragraph 15.231 Rules, the system was tested to 5000 MHz.

Below 1GHz

Start Frequency..... 30 MHz
Stop Frequency..... 1000 MHz
Sweep Speed Auto
IF Bandwidth..... 120 kHz
Video Bandwidth..... 100 kHz
Quasi-Peak Adapter Bandwidth ..... 120 kHz
Quasi-Peak Adapter Mode ..... Normal
Resolution Bandwidth ..... 100 kHz

Above 1GHz

Start Frequency 1GHz
Stop Frequency 5GHz
Sweep Speed Auto
IF Bandwidth ..... 120 kHz
Video Bandwidth ..... 1 MHz
Quasi-Peak Adapter Bandwidth ..... 120 kHz
Quasi-Peak Adapter Mode ..... Normal
Resolution Bandwidth 1MHz

7.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBμV means the emission is 7dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Class B Limit

7.7 Summary of Test Results

According to the data in section 7.10, the EUT complied with the FCC Part15 Paragraph 15.231 standards.

7.8 EUT Operating Condition

Same as section 6.4 of this report.

7.9 Radiated Emissions Limit

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	\1\ 1,250 to 3,750	\1\ 125 to 375
174-260	3,750	375
260-470	\1\ 3,750 to 12,500.	\1\ 375 to 1,250
Above 470	12,500	1,250

7.10 Radiated Emissions Test Result

Formula of conversion factors:the field strength at 3m was egtablished by adding
The meter reading of the spectrum analyer (which is set to read in units of dBuV)
To the antenna correction factor supplied by the antenna manufacturer. The antenna
Correction factors are stared in terms of dB.The gain of the pressletor was accounted
For in the spectrum analyser meter reading.

Example:

Freq(MHz)	Meter Reading +ACF=FS
33	20dBuV+10.36dB=30.36dBuV/m @3m

7.10.1 Radiated Emission Test Data

Test Item:	Radiated Emission Test Data
Test Voltage:	DC 9.0V
Test Mode:	TX On
Temperature:	25.5 °C
Humidity:	51%RH
Test Result:	PASS

Note1:

AV = Peak+20Log$_{10}$(duty cycle) = Peak – 7.75

So the Radiated Emission Test Data as the table follow.For more details of the calculation , please refer the section 9 of the Periodic operation .

7.10.2 Radiation Emission test data record

Frequency (MHz)	Detector	Antenna Polarization	Emission Level (dBuV/m)	FCC 15 Subpart C Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
310	Peak	Vertical	79.1	95.32	16.22	1.3	130
310	Peak	Horizontal	78.77	95.32	16.55	1.4	40
620	Peak	Vertical	59	75.32	16.32	1.3	45
930	Peak	Vertical	60.11	75.32	15.21	1.5	60
1240	Peak	Vertical	50.1	74	23.9	1.3	45
1550	Peak	Vertical	33.05	74	40.95	2	110
1860	Peak	Vertical	32.03	74	41.97	1.6	120
2170	Peak	Vertical	33.33	74	40.67	1.4	45
2480	Peak	Vertical	31.52	74	42.48	1.5	90
2790	Peak	Vertical	31.01	74	42.99	2	130
3100	Peak	Vertical	31.02	74	42.98	1.6	45
620	Peak	Horizontal	59.31	75.32	16.01	1.5	110
930	Peak	Horizontal	58.99	75.32	16.33	1.3	120
1240	Peak	Horizontal	41.03	74	32.97	1.3	45
1550	Peak	Horizontal	34.96	74	39.04	1.5	90
1860	Peak	Horizontal	34.58	74	39.42	1.3	130
2170	Peak	Horizontal	32.21	74	41.79	2	45
2480	Peak	Horizontal	33.72	74	40.28	1.6	110
2790	Peak	Horizontal	32.54	74	41.46	1.4	120
3100	Peak	Horizontal	34.25	74	39.75	1.5	45
310	AV	Vertical	71.35	75.32	3.97	2	90
310	AV	Horizontal	71.02	75.32	4.3	1.6	130
620	AV	Vertical	51.25	55.32	4.07	1.5	40
930	AV	Vertical	52.36	55.32	2.96	1.3	45
1240	AV	Vertical	42.35	54	11.65	1.6	60
1550	AV	Vertical	25.3	54	28.7	1.5	45
1860	AV	Vertical	24.28	54	29.72	1.3	110
2170	AV	Vertical	25.58	54	28.42	1.3	120
2480	AV	Vertical	23.77	54	30.23	1.5	45

2790	AV	Vertical	23.26	54	30.74	1.3	90
3100	AV	Vertical	23.27	54	30.73	2	45
620	AV	Horizontal	51.56	55.32	3.76	1.6	110
930	AV	Horizontal	51.24	55.32	4.08	1.4	120
1240	AV	Horizontal	33.28	54	20.72	1.5	45
1550	AV	Horizontal	27.21	54	26.79	2	90
1860	AV	Horizontal	26.83	54	27.17	1.6	130
2170	AV	Horizontal	24.46	54	29.54	1.5	40
2480	AV	Horizontal	25.97	54	28.03	1.3	45
2790	AV	Horizontal	24.79	54	29.21	1.3	60
3100	AV	Horizontal	26.5	54	27.5	1.3	45

Where F is the frequency in MHz,The formulas for calculating the maximum permitted fundamental field strengths are as follows:

(1). For the band 130-174MHz,uV/m at 3 meters=56.81818(F)-6136.3636;

(2). For the band 260-470MHz,uV/m at 3 meters=41.6667(F)-7083.3333.

Sample calculation of limit @ 310.00MHz

41.6667 (310.00)- 7083.3333=5833.3437uV/m

20log(5833.3437)=75.32dBuV/m(AV) limit @ 310.00MHz

And

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

AV = Peak +20Log_{10}(duty cycle)

8 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. The use of a permanently attached antenna to the intentional radiator shall be considered sufficient to comply with the provisions of this section. This product has a permanent antenna, fulfill the requirement of this section

9 Periodic Operation

The duty cycle was determined by the following equation:
To calculate the actual field intensity,The duty cycle correction factor in decibel is needed for later use and can be obtained from following conversion

Duty Cycle(%)=
Total On interval in a complete pulse train/ Length of a complete pulse train * %

Duty Cycle Correction Factor(dB)=20 * Log_{10}(Duty Cycle(%))

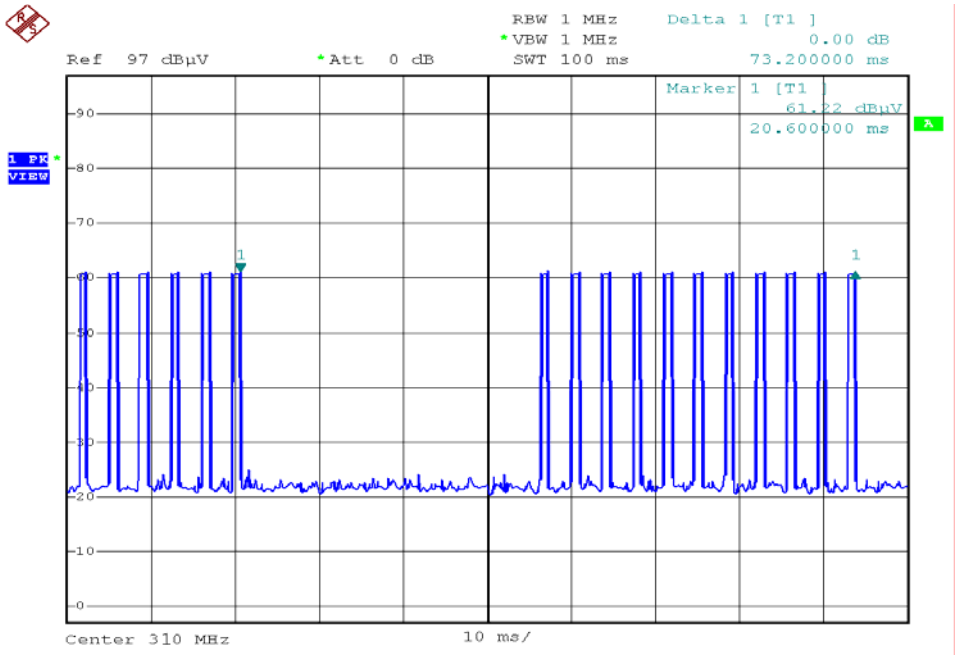
Pulse Train	Number of Pulse	T(ms)	Total Time(ms)
Long Pulse	--	--	---
Short Pulse	11	1.00	11.00msec

Total On interval in a complete pulse train	73.20msec
Length of a complete pulse train	11.00msec
Duty Cycle(%)	15.03%
Duty Cycle Correction Factor(dB)	7.75

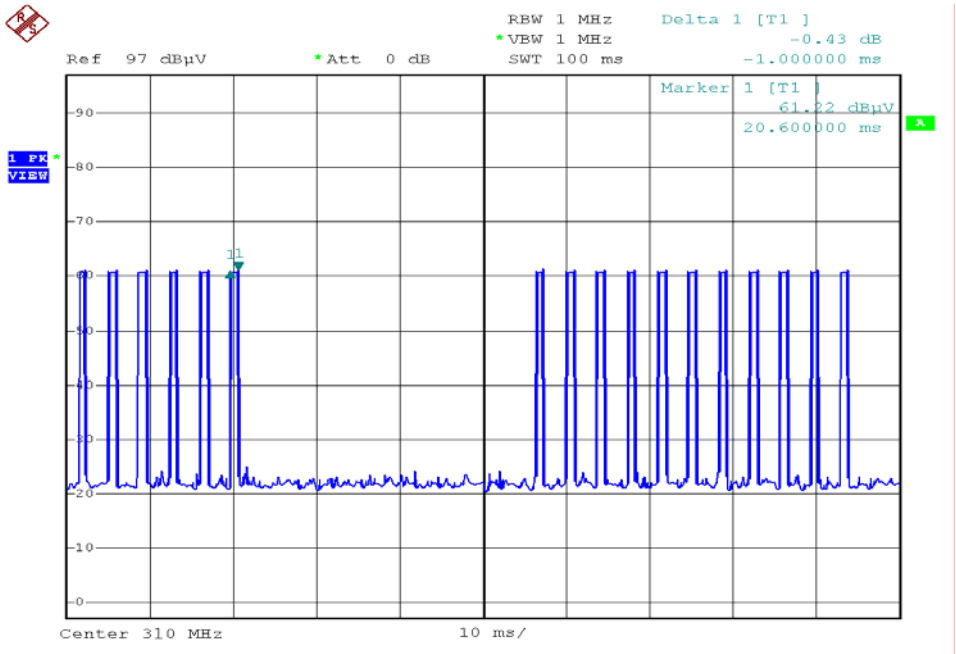
Note: the EUT has the same Periodic Operation.

Refer to the duty cycle plot (as below),This device does meet the FCC requirement.

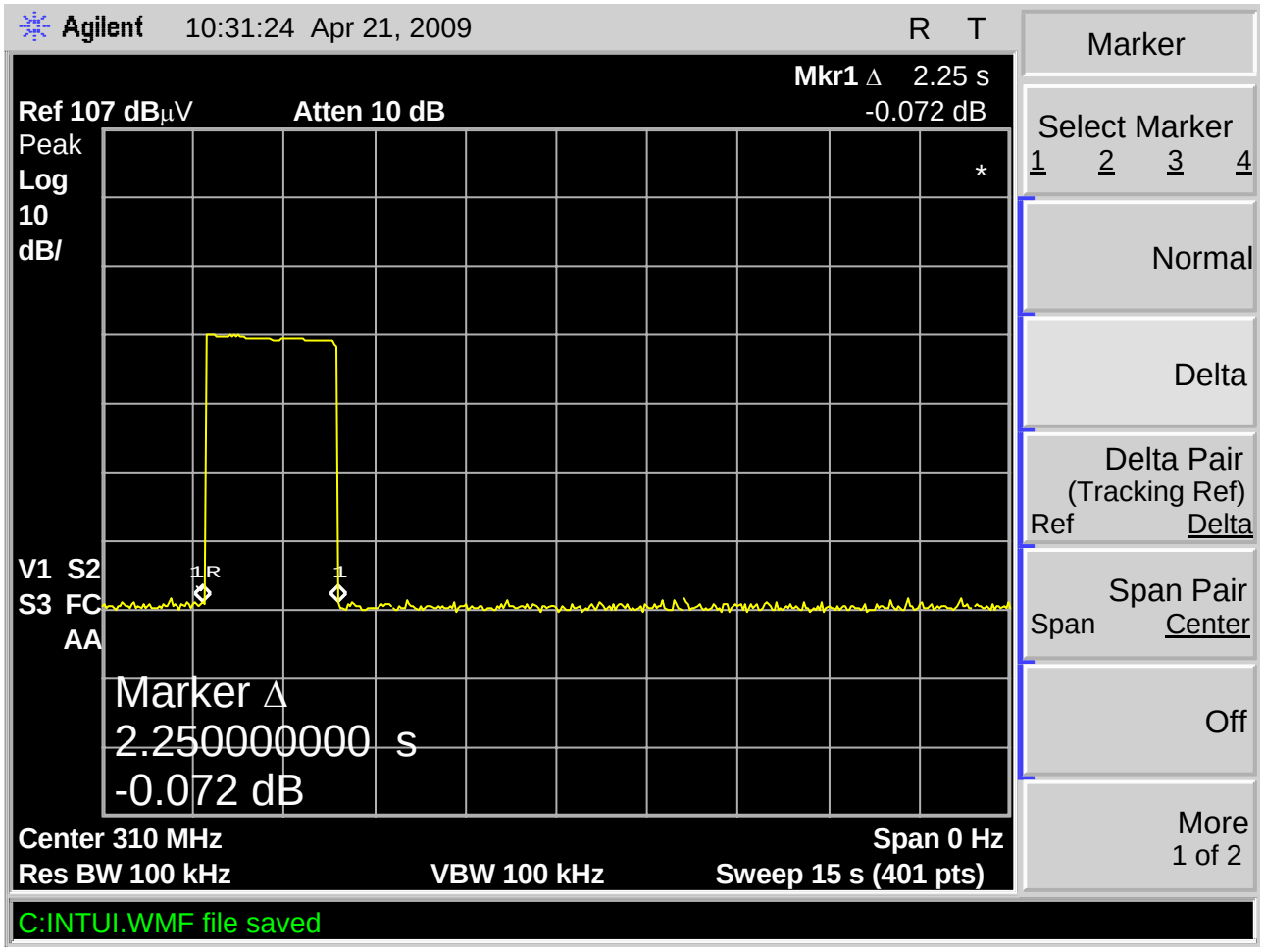
Length of a complete pulse train:



Short Pulse:



Refer to the plot (as below),We find a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter is 2.25 seconds, within not more than 5 seconds of being released.



10 Band Edge

Test Requirement:	FCC Part15 C
Test Method:	Based on ANSI C63.4: 2003
Test Date:	April.20,2009
Test mode:	TX On
Temperature:	25.5 °C
Humidity:	51%RH

10.1 Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer.EUT and its simulators are placed on a table, let EUT working in test mode,then test it.
2. The bandwidth of the fundamental frequency was measure by spectrum analyser with 100KHz RBW and 100KHz VBW.The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power 20dB.

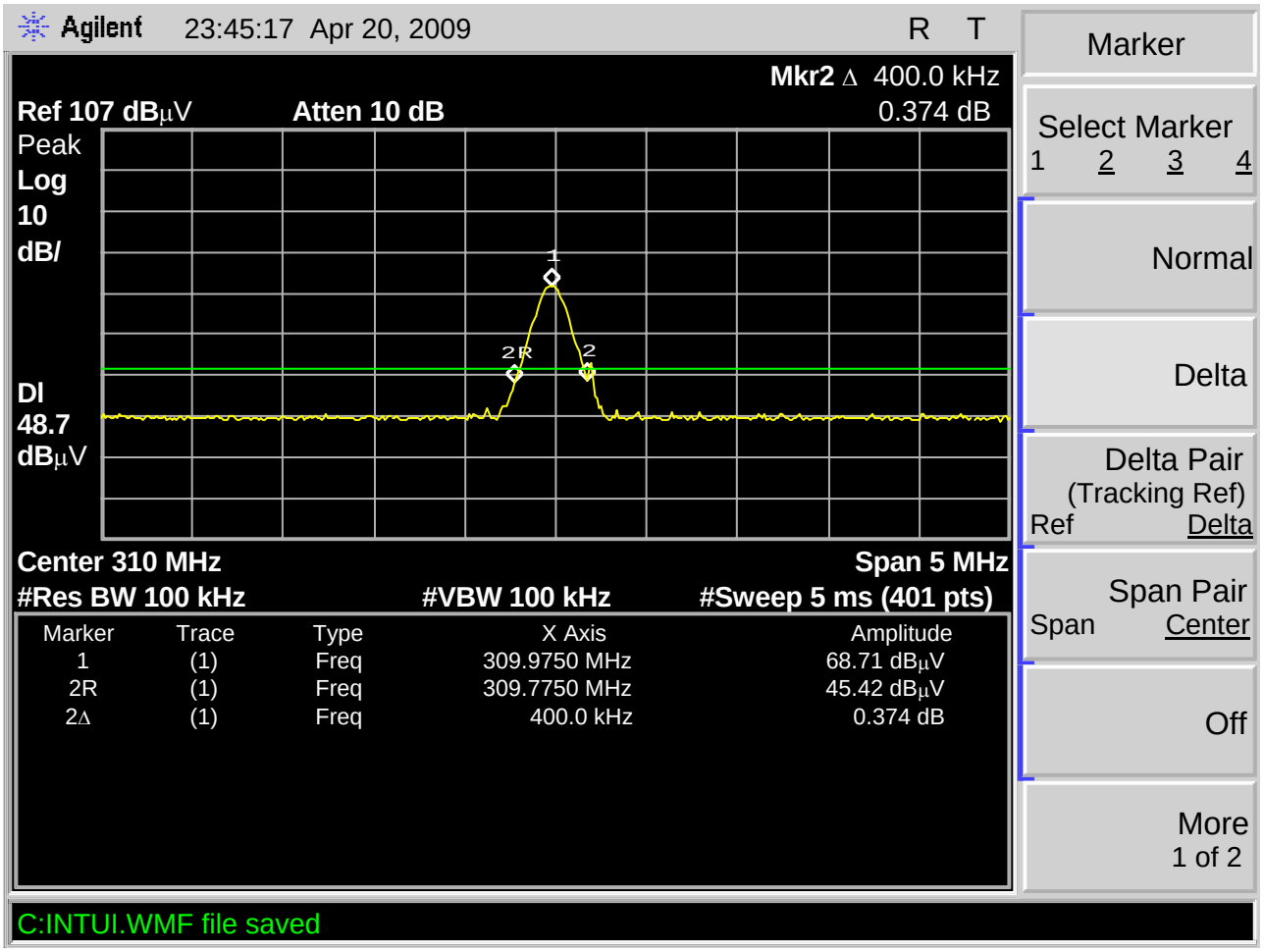
10.2 Band Edge

Requirements: The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Frequency (MHz)	Bandwidth Emission (KHz)	Limit (KHz)	Result
310.00	400.00	775.00	Pass

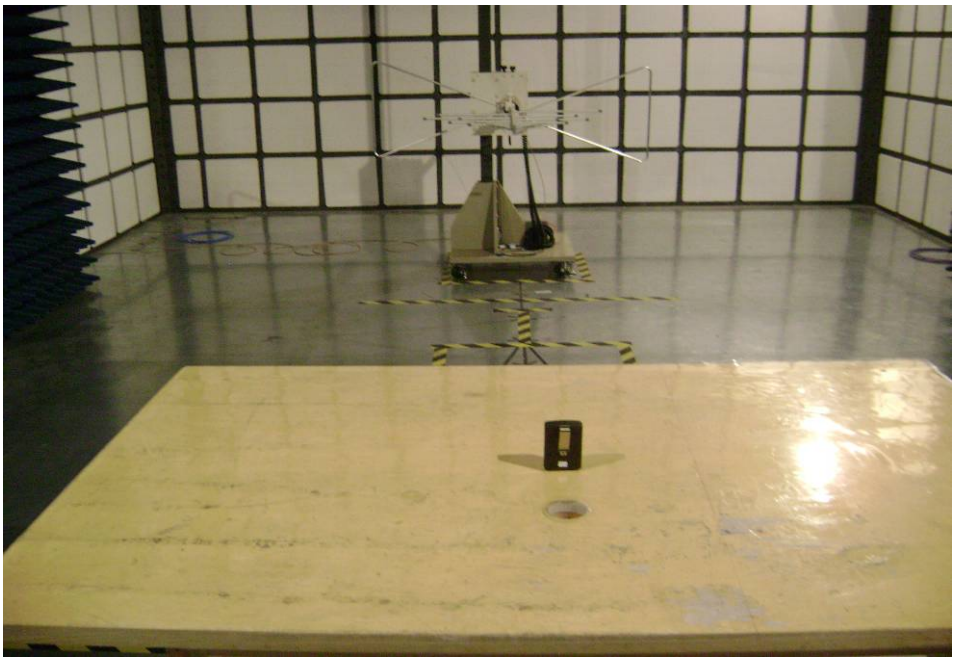
10.3 Band Edge Test Result

310.00MHz TX

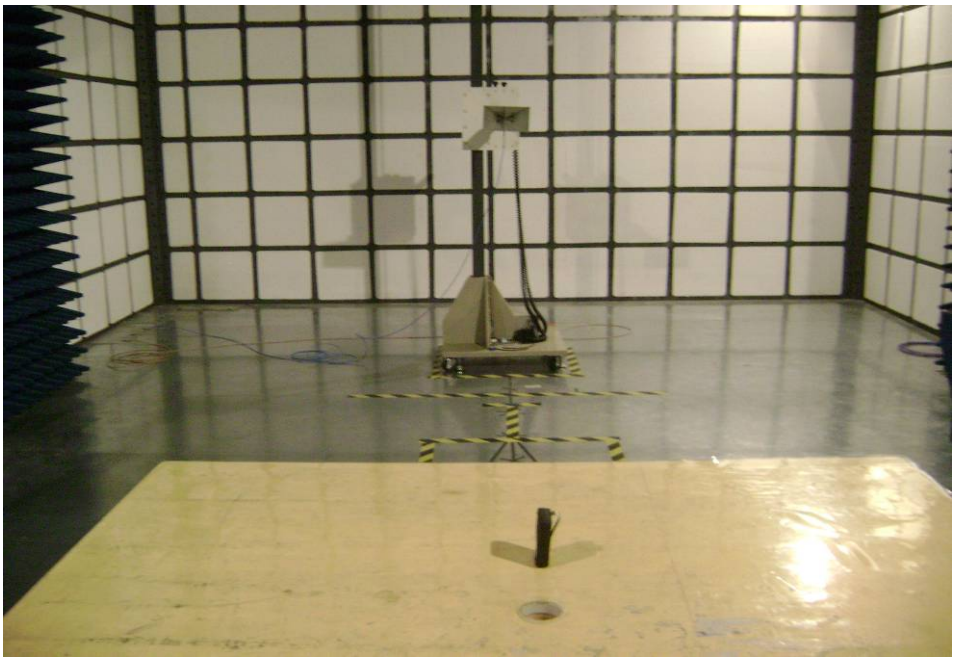


11 Photographs of Testing

11.1 Radiation Emission Test View For 30MHz-1000MHz



11.2 Radiation Emission Test View For 1GHz-5GHz

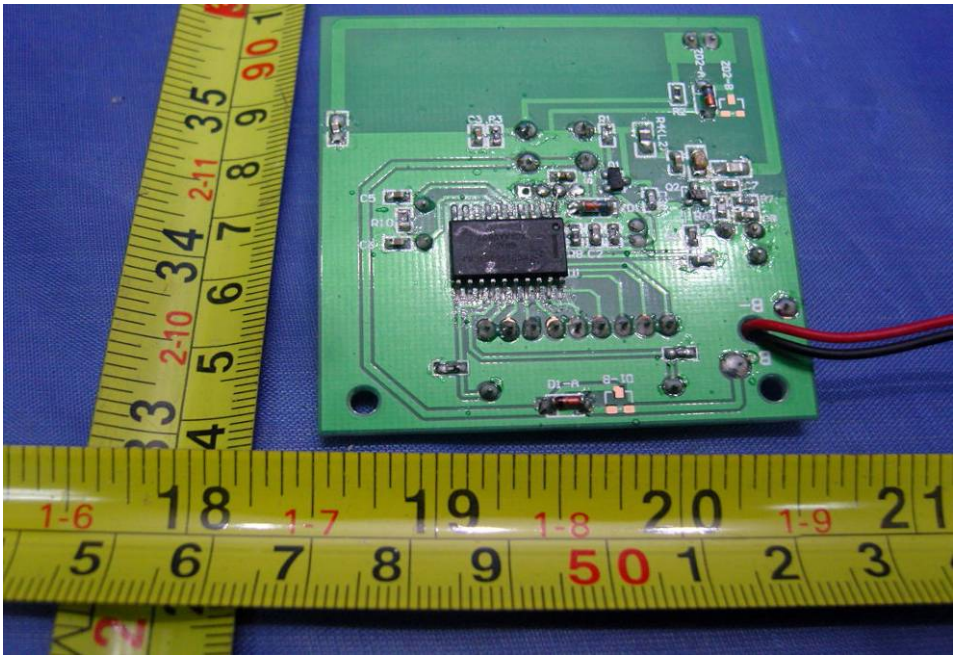


12 Photographs - Constructional Details

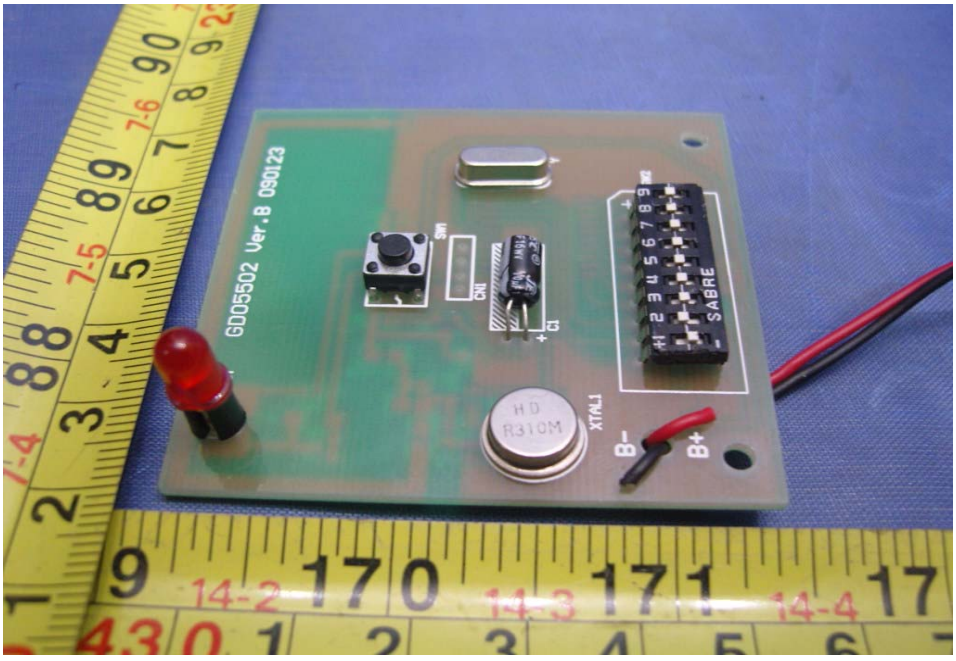
12.1 EUT - Front View

12.2 EUT - Back View

12.3 PCB-Front View



12.4 PCB-Back View



13 FCC ID Label

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 Bottom View/proposed FCC Label Location