

FCC TEST REPORT

Product : Game caller
Trade mark : ICOTEC
Model/Type reference : GC500
Serial Number : N/A
Ratings : DC 9V by battery
FCC ID : ULD-ICOGC500
Report Number : EESZF11120003-1
Date : Dec. 23, 2013
Regulations : See below

Test Standards	Results
<input checked="" type="checkbox"/> 47 CFR FCC Part 15 Subpart C 15.231:2012	PASS

Prepared for:

ICO Products, LLC
6415 Angola Rd. Holland, OH 43528

Prepared by:

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Approved by: Jing Z.

Approved date: Dec. 23, 2013



Check No.: 1702086212

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N/A means not applicable.

1. GENERAL INFORMATION

Applicant: ICO Products, LLC
6415 Angola Rd. Holland, OH 43528

Manufacturer: ICO Products, LLC
Building 10, 6th District, Huaide Cuigang industrial Park,
Fuyong Town, Baoan District, Shenzhen City, Guangdong
Province, China

Equipment Authorization: Certification

FCC ID: ULD-ICOGC500

Product: Game caller

Trade mark: ICOTEC

Model/Type reference: GC500

Serial Number: N/A

Report Number: EESZF11120003-1

Sample Received Date: Nov. 12, 2013

Sample tested Date: Nov. 12, 2013 to Dec. 23, 2013

The above equipment was tested by Centre Testing International (Shenzhen) Corporation for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, Subpart C and the measurement procedure according to ANSI C63.4:2009.

2. TEST SUMMARY

Clause	Test Item	Rule	Result
1	20dB bandwidth	FCC Part15.231(c)	PASS
2	Time measurement	FCC Part15.231(a)(1)	PASS
3	Radiated Emission	FCC Part15.231(b) & FCC Part15.209(a)	PASS
4	Antenna Requirements	FCC 15.203	PASS*

* Telescope-type antenna with unique antenna connector.

Remark: New battery is used during all test.

3. MEASUREMENT UNCERTAINTY

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Test item	Value (dB)
Radiated disturbance (30MHz to 1GHz)	4.9
Radiated disturbance (1GHz to 6GHz)	4.7

4. PRODUCT INFORMATION

Items	Description
Rating	DC 9V by battery
Equipments Class	Security/Remote Control Transmitter
Modulation	ASK
Frequency Range	433.9MHz
Channel Number	1
Antenna	Telescope-type antenna

5. FACILITIES AND ACCREDITATIONS

5.1 TEST FACILITY

All test facilities used to collect the test data are located at Hongwei Industrial Zone, 70 Area, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4, CISPR 16-1-1 and other equivalent standards.

5.2 TEST EQUIPMENT LIST

Instrumentation: The following list contains equipments used at CTI for testing. The calibrations of the measuring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the manual for the measuring instrument.

Equipment used during the tests:

3M Semi-anechoic Chamber (2)- Radiated disturbance Test				
Equipment	Manufacturer	Model	Serial No.	Due Date
3M Chamber & Accessory Equipment	TDK	SAC-3	---	06/01/2016
Receiver	R&S	ESCI	100435	07/19/2014
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	617	06/25/2014
Multi device Controller	maturo	NCD/070/10711112	---	N/A
Horn Antenna	ETS-LINGREN	3117	00057407	07/19/2014
Microwave Preamplifier	Agilent	8449B	3008A02425	04/16/2014

6. SYSTEM TEST CONFIGURATION

6.1 JUSTIFICATION

For emission testing, the equipment under test (Product) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. It was powered by 9 V DC of battery. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 200Hz from 9kHz to 150kHz, 9kHz from 150kHz to 30MHz and 100kHz or greater for frequencies between 30MHz to 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

The unit was operated standalone and placed in the center of the turntable.

6.2 Product EXERCISING SOFTWARE

No Software was used during testing.

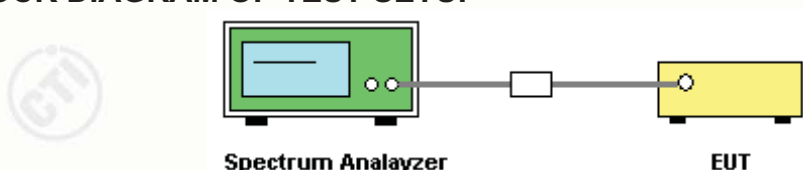
7. 20dB Bandwidth Measurement

7.1 LIMITS

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.

As the center frequency for the device operating is 433.9MHz, thus, the 20dB bandwidth limit is 1.08MHz.

7.2 BLOCK DIAGRAM OF TEST SETUP

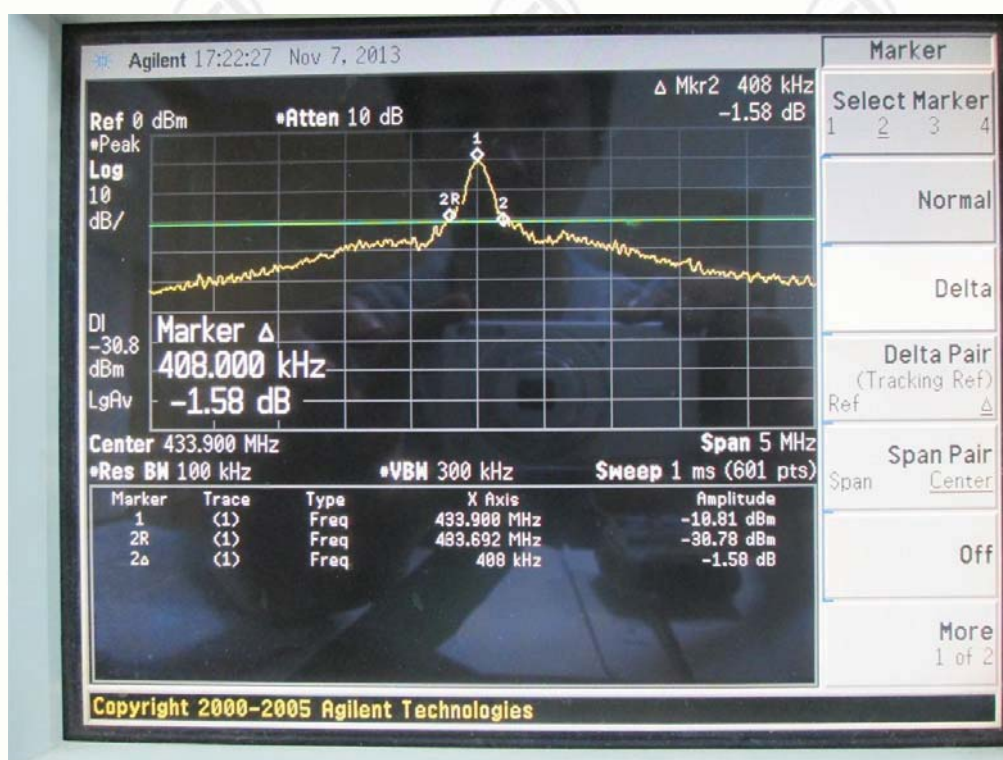


7.3 TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.
3. A PEAK output reading and 20B BW function in spectrum analyzer were taken.

7.4 TEST RESULT

Frequency (MHz)	20dB BW (MHz)	Limit (MHz)	Result (Pass / Fail)
433.900	0.408	1.08	Pass

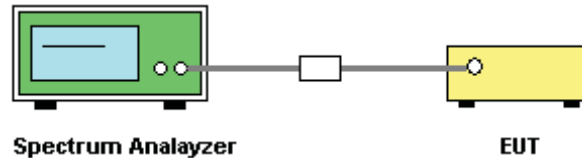


8. Time measurement

8.1 LIMITS

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

8.2 BLOCK DIAGRAM OF TEST SETUP

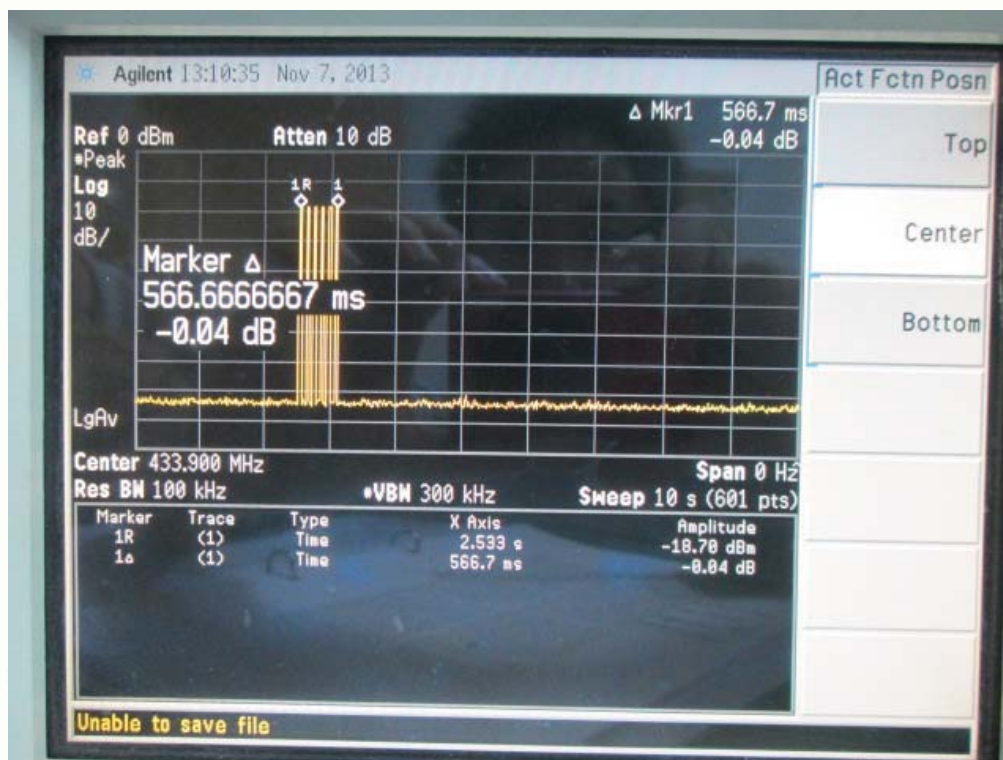


8.3 TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set the center frequency is 433.90MHz and set the Span is 0Hz.
3. Set spectrum analyzer's RBW and VBW to applicable value with Peak.
4. Read the time from transmission to silent from the spectrum analyzer directly.

8.4 TEST RESULT

Frequency (MHz)	Transmission (Turn on) (s)	Limit (s)	Result (Pass / Fail)
433.920	0..567	5	Pass



9. Radiated Emissions Measurement

9.1 LIMITS

FCC Part 15.209(a):

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

FCC Part 15.231(b):

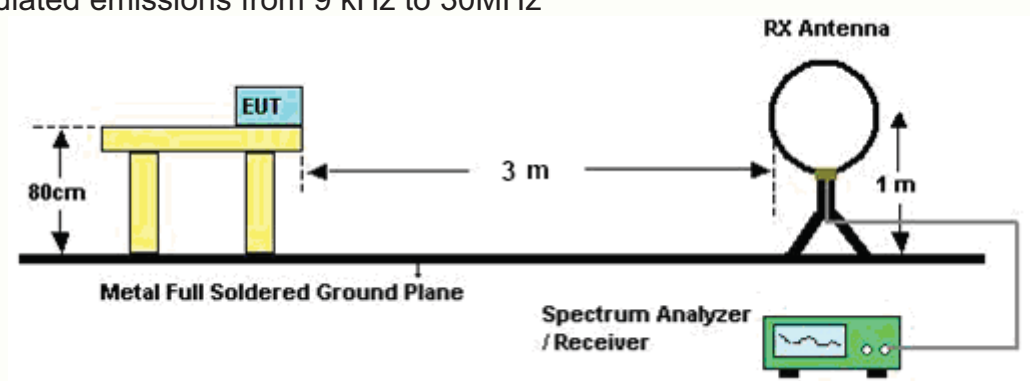
Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
260-470	3750 to 12500*	375 to 1250

Note 1: Linear interpolation in frequency band 260-470 MHz.

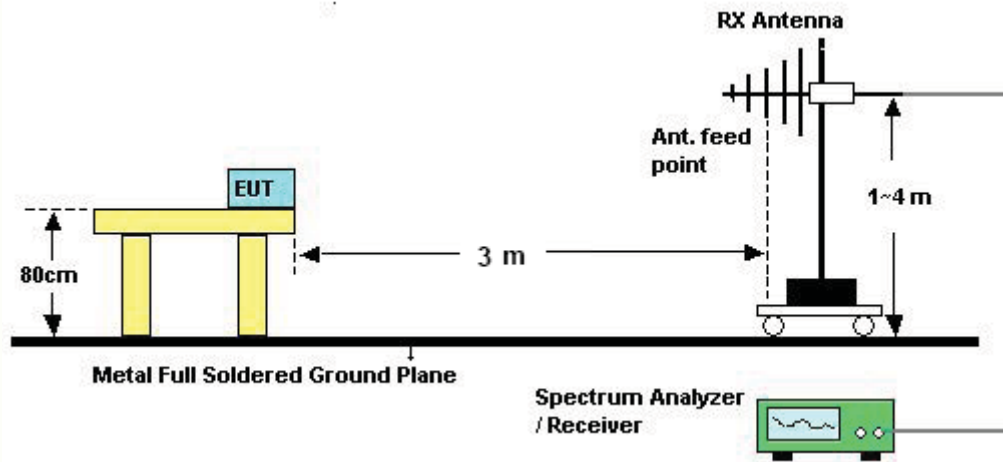
2: The above field strength limits are specified at a distance of 3 meters.

9.2 BLOCK DIAGRAM OF TEST SETUP

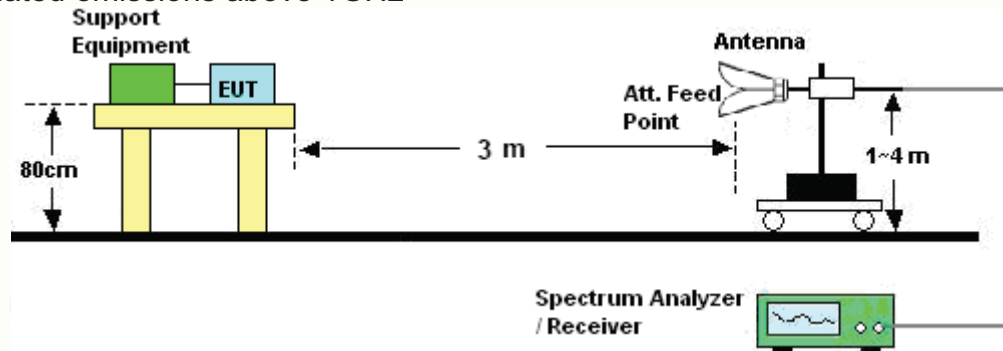
For radiated emissions from 9 kHz to 30MHz



For radiated emissions from 30 - 1000MHz



For radiated emissions above 1GHz



9.3 TEST PROCEDURE

A. 30 - 1000MHz

- The Product was placed on the top of a turntable 0.8 meters above the ground in the chamber, 3 meters away from the antenna (wideband antenna), which was mounted on the top of a variable-height antenna tower. The maximum values of the field strength are recorded by adjusting the polarizations of the test antenna and rotating the turntable.
- For each suspected emission, the Product was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test frequency analyzer system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

B. Below 30MHz and Above 1GHz

- The Product is placed on a turntable 0.8 meters above the ground in the chamber, 3 meters away from the antenna. The maximum values of the field strength are recorded by adjusting the polarizations of the test antenna and rotating the turntable.
- For each suspected emission, the Product was arranged to its worst case and then turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test frequency analyzer system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

9.4 TEST RESULT

Frequency (MHZ)	Polarization (H/V)	Final Emission _PK (dBμV/m)	AV factor (dB)	Final Emission _AV (dBμV/m)	PK Limit (dBμV/m)	AV Limit (dBμV/m)	Result (Pass / Fail)
433.90	H	87.37	-19.7	67.67	100.8	80.8	Pass
433.90	V	95.00	-19.7	75.30	100.8	80.8	Pass

Note 1: The above table only shows the frequencies which peak emission exceed the average limit. The peak data of other frequencies are all below the average limit (please refer to the test graph in following pages), so the average data of other frequencies are deemed to fulfill the average limits and not reported.

Note 2: The emissions below 30MHz are not reported for they are much lower than the limits.

Note 3: Below 1GHz: The total factor = cable loss+ antenna factor.

Above 1GHz: The total factor = cable loss+ antenna factor -amplifier factor.

Final Emission _PK = Reading Level_ PK+ total factor.

Final Emission _AV = Final Emission _PK + AV factor.

Note 4: The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 100ms

Effective period of the cycle = $0.4667\text{ms} \times 16 + 2.867\text{ms} \times 1$
= 10.3342ms

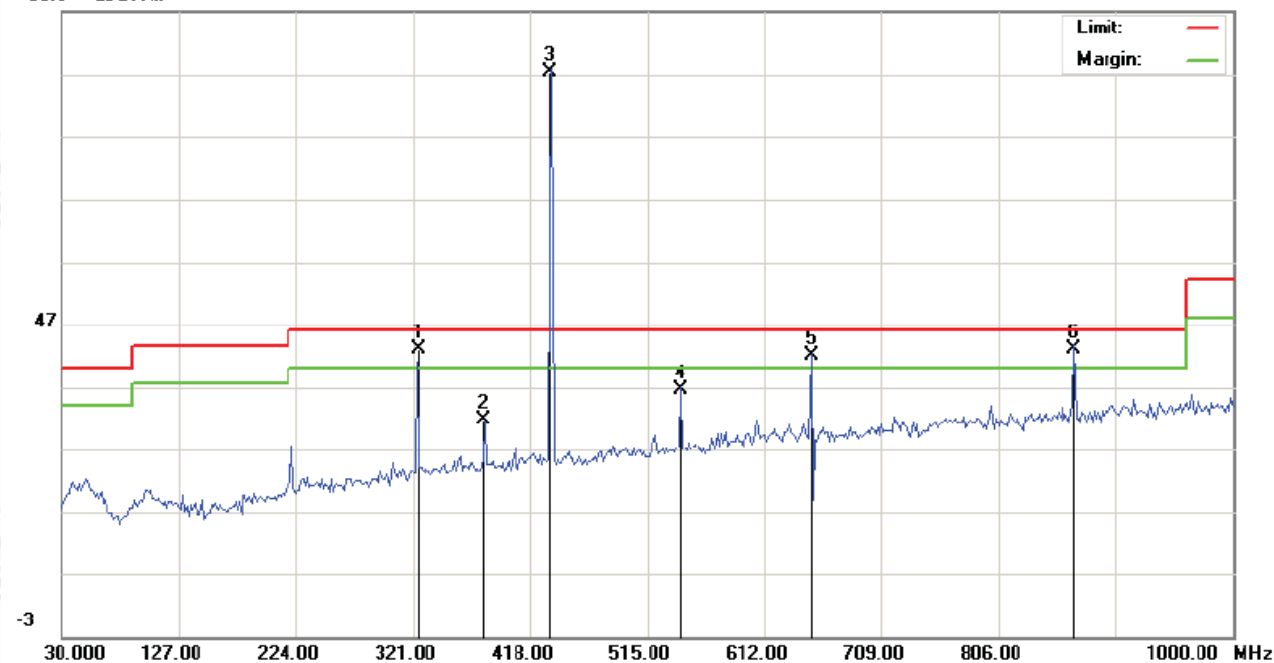
DC = $10.3342\text{ms} / 100\text{ms} \approx 0.1$

Therefore, the averaging factor is found by $20 \log_{10} 0.1 = -19.7 \text{ dB}$

Test graph of radiated emission

H:

96.9 dBuV/m

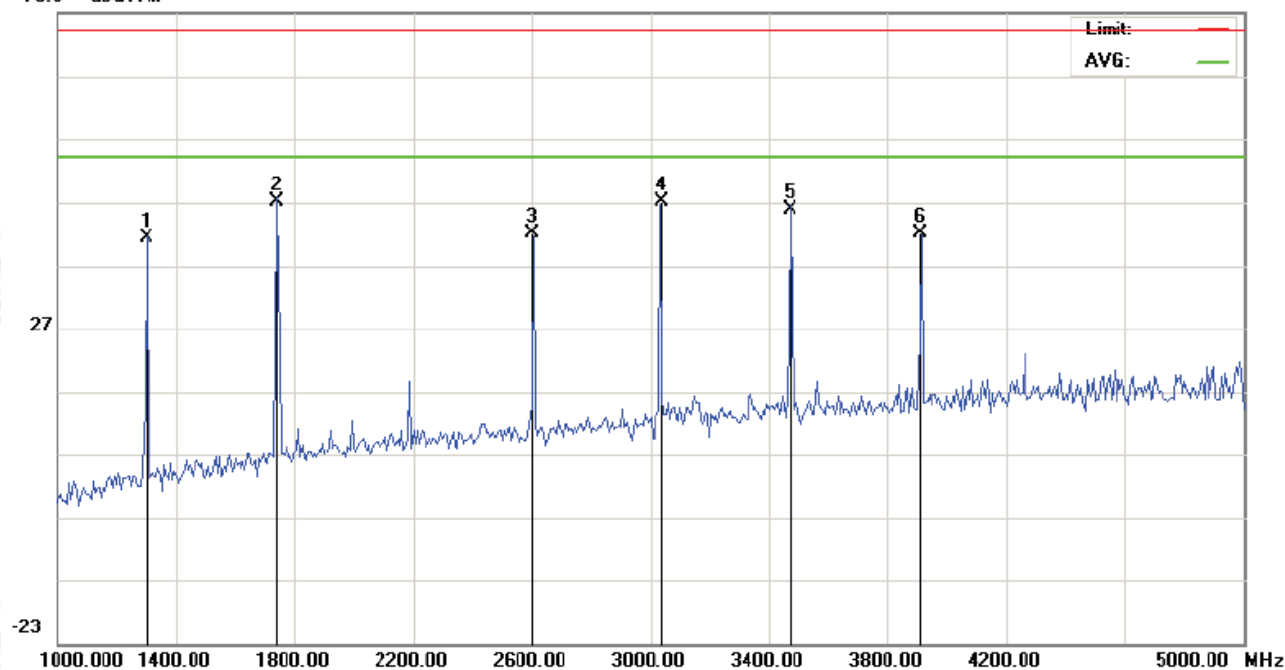


No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	324.8800	27.20	26.30		16.80	44.00	43.10		46.00		-2.90		P	
2	379.2000	13.60			18.11	31.71			46.00		-14.29		P	
■ 3	433.9000	68.50			18.87	87.37								
4	542.1600	15.40			21.06	36.46			46.00		-9.54		P	
5	650.8000	18.96			23.01	41.97			46.00		-4.03		P	
6	868.0800	18.11	17.00		25.95	44.06	42.95		46.00		-3.05		P	

■ : Fundamental frequency

Remark : For fundamental frequency ,RBW set to 1MHz ,VBW set to 3MHz ,Peak detector , for other emission, RBW set to 100kHz ,VBW set to 300kHz ,Peak detector for Pk value test and RBW set to 120kHz VBW set to 300kHz ,QP detector for QP value test.

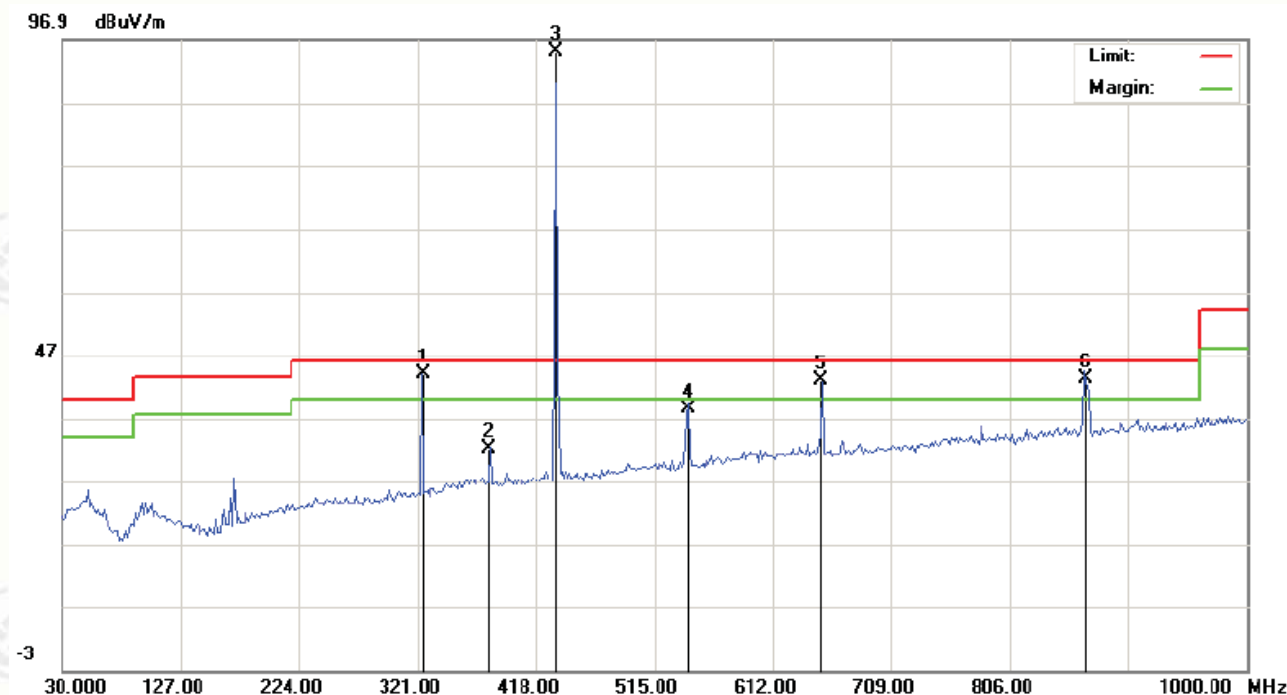
76.9 dBuV/m



No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	peak	AVG	peak	AVG		
1	1296.000	45.50			-4.13	41.37			74.00	54.00	-32.63	-12.63	P	
2	1736.000	47.80			-0.83	46.97			74.00	54.00	-27.03	-7.03	P	
3	2600.000	39.63			2.43	42.06			74.00	54.00	-31.94	-11.94	P	
4	3040.000	43.60			3.42	47.02			74.00	54.00	-26.98	-6.98	P	
5	3472.000	40.69			4.97	45.66			74.00	54.00	-28.34	-8.34	P	
6	3904.000	35.60			6.53	42.13			74.00	54.00	-31.87	-11.87	P	

Remark : RBW set to 1MHz ,VBW set to 3MHz ,Peak detector .

V:

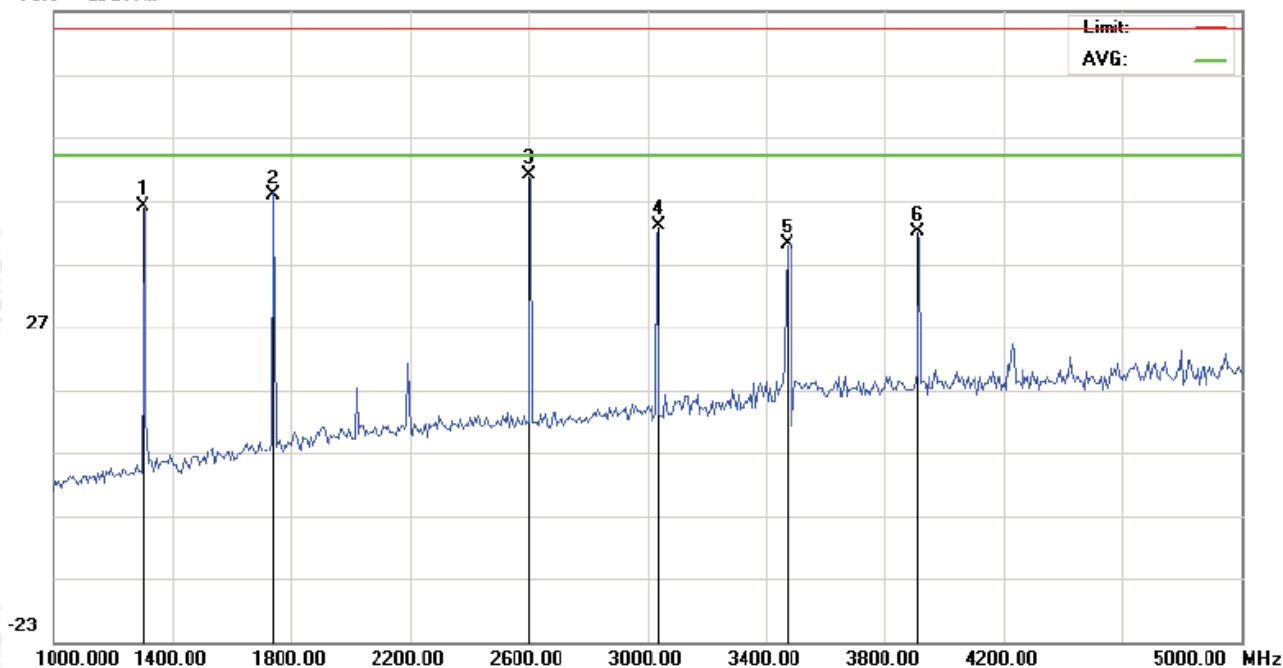


No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	324.8800	27.91	27.20		16.80	44.71	44.00		46.00		-2.00		P	
2	379.2000	14.25			18.11	32.36			46.00		-13.64		P	
■ 3	433.9000	76.13			18.87	95.00								
4	542.1600	17.52			21.06	38.58			46.00		-7.42		P	
5	650.8000	20.90	20.02		23.01	43.91	43.03		46.00		-2.97		P	
6	868.0800	18.13	17.23		25.95	44.08	43.18		46.00		-2.82		P	

■ : Fundamental frequency

Remark : For fundamental frequency ,RBW set to 1MHz ,VBW set to 3MHz ,Peak detector , for other emission, RBW set to 100kHz ,VBW set to 300kHz ,Peak detector for Pk value test and RBW set to 120kHz VBW set to 300kHz ,QP detector for QP value test.

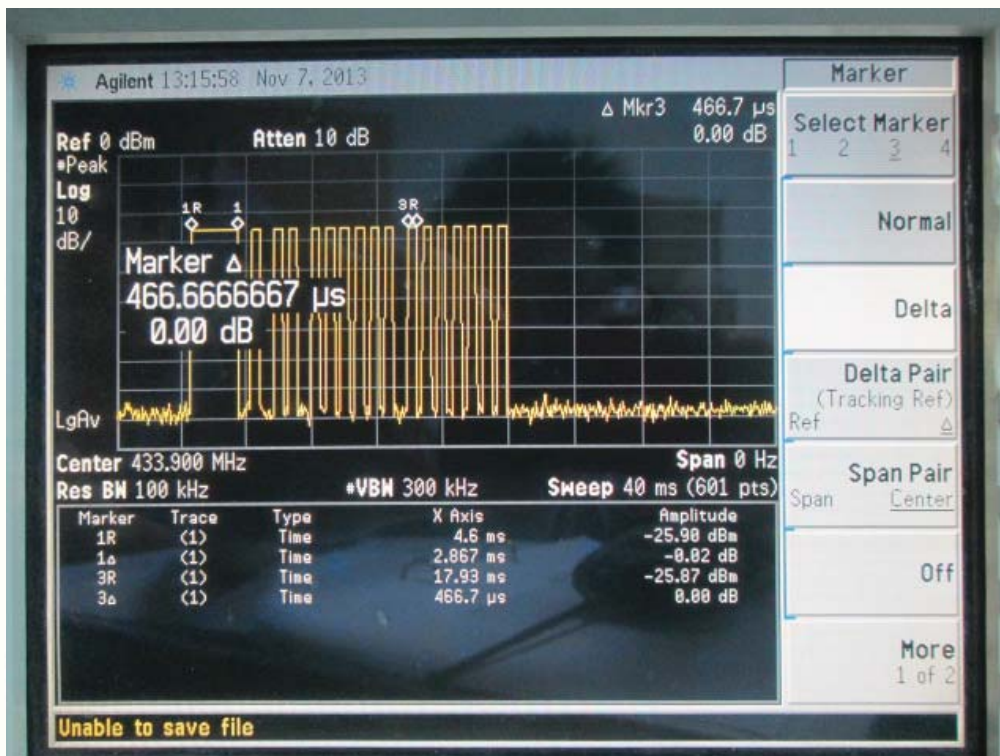
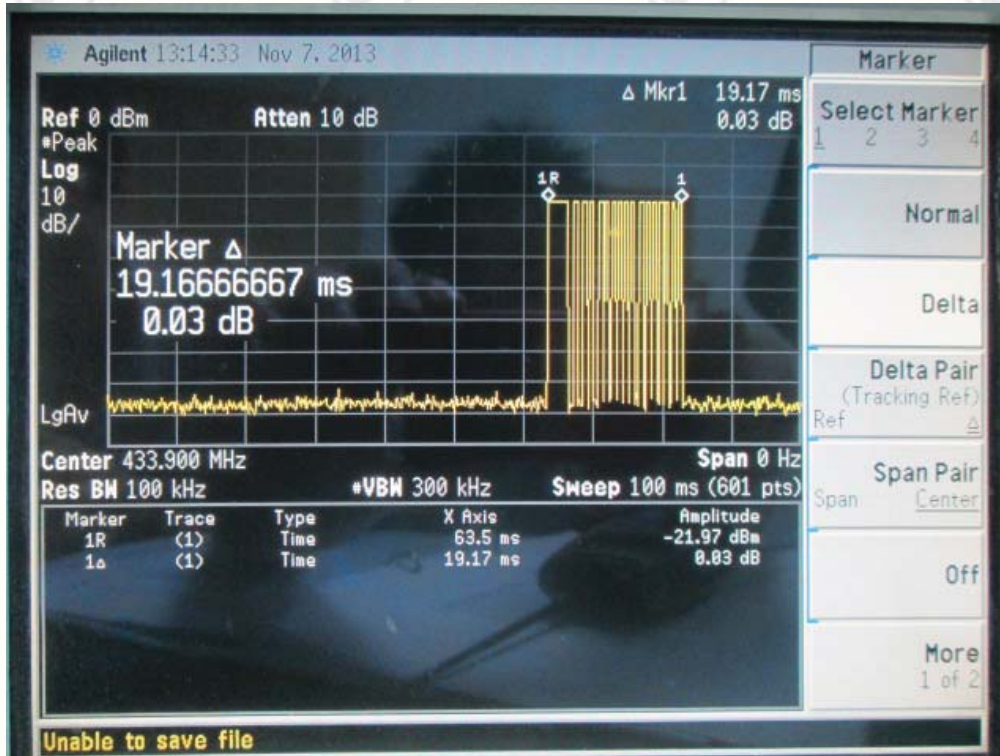
76.9 dBuV/m



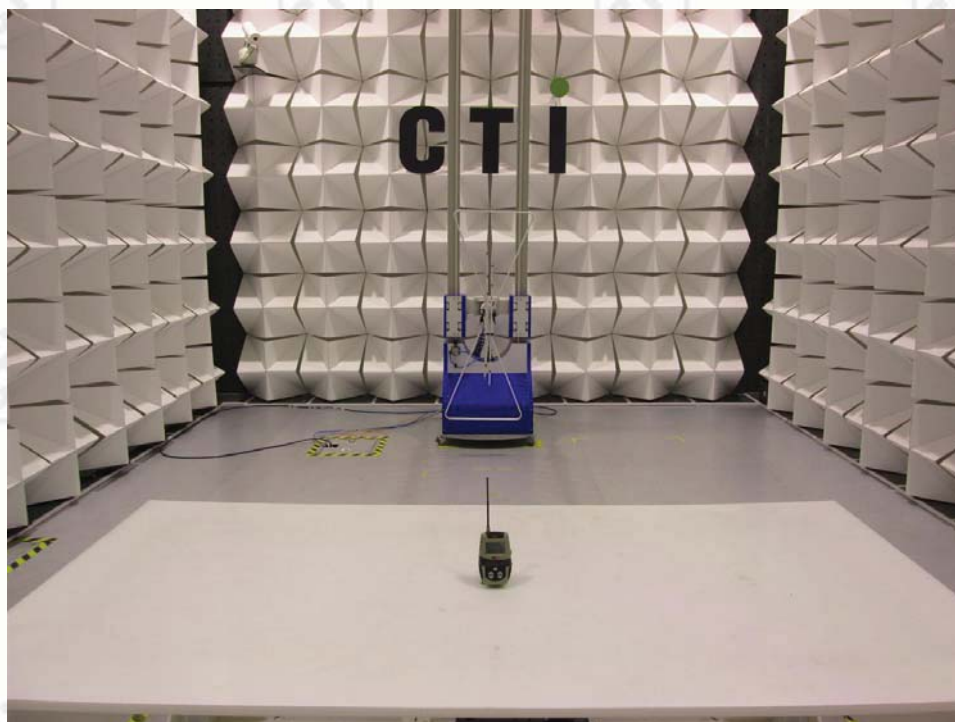
No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	peak	AVG	peak	AVG		
1	1296.000	50.20			-4.13	46.07			74.00	54.00	-27.93	-7.93	P	
2	1736.000	48.60			-0.83	47.77			74.00	54.00	-26.23	-6.23	P	
3	2600.000	48.60			2.43	51.03			74.00	54.00	-22.97	-2.97	P	
4	3040.000	39.68			3.42	43.10			74.00	54.00	-30.90	-10.90	P	
5	3472.000	35.12			4.97	40.09			74.00	54.00	-33.91	-13.91	P	
6	3904.000	35.60			6.53	42.13			74.00	54.00	-31.87	-11.87	P	

Remark : RBW set to 1MHz ,VBW set to 3MHz ,Peak detector .

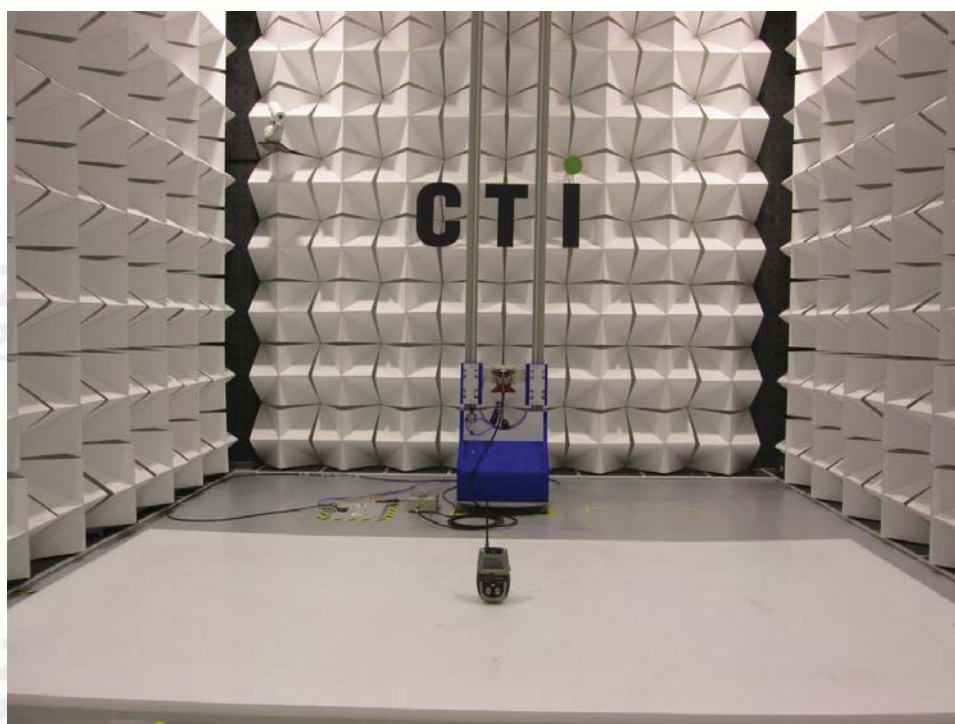
The plots of duty cycle:



APPENDIX 1 PHOTOGRAPHS OF TEST SETUP



TEST SETUP OF RADIATED EMISSION (30MHz-1GHz)



TEST SETUP OF RADIATED EMISSION (Above 1GHz)

APPENDIX 2 EXTERNAL PHOTOGRAPHS OF PRODUCT



Front View of Product

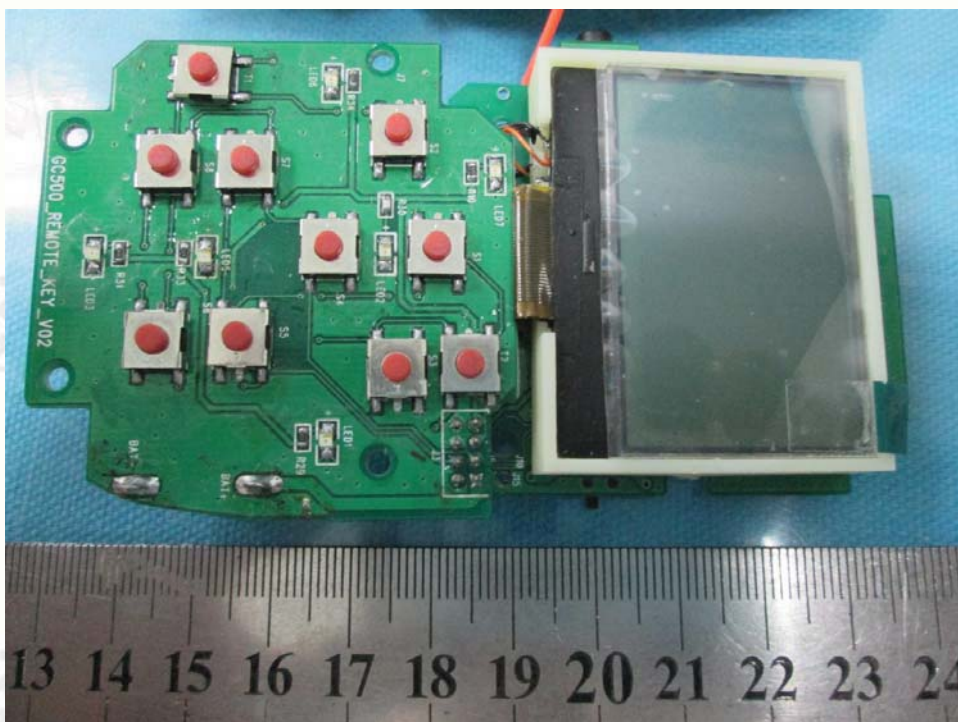


Rear View of Product

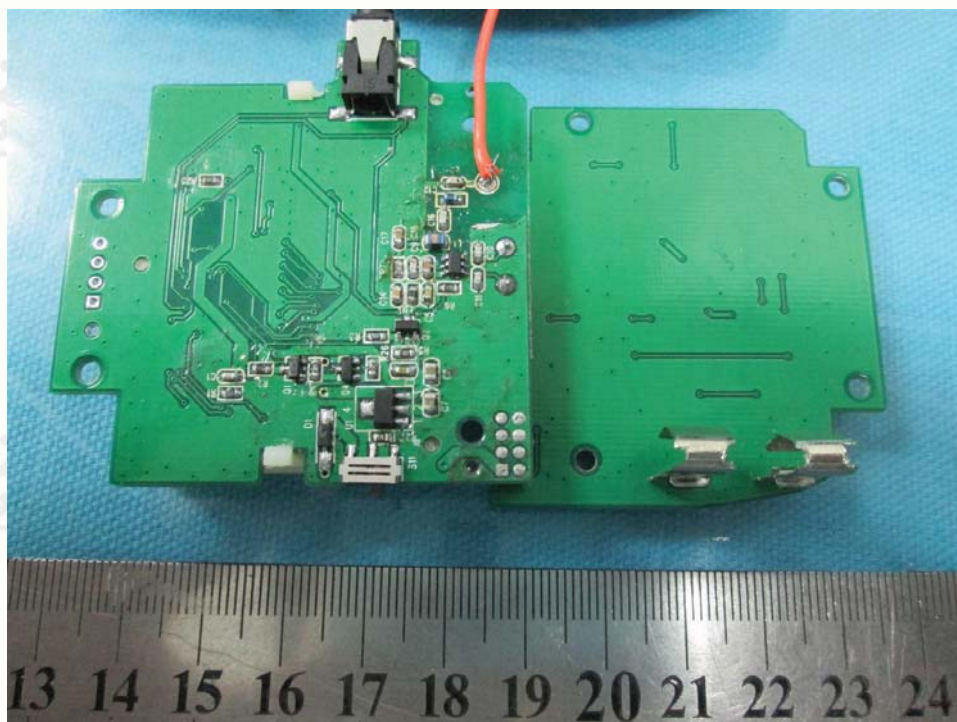
APPENDIX 3 INTERNAL PHOTOGRAPHS OF PRODUCT



Internal View of Product



Front View of PCB



Rear View of PCB

*** End of Report ***

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.