FCC Test Report

Part 15 subpart C

Client Information:

Applicant : IPW China Limited

Applicant add. : 5/F, Block B3, Xujingchang Industrial Park, Fuyong, ShenZhen, GuangDong, China

EUT Information:

EUT Name : Pebble Remote Control / Spider Remote

Model No. : Pebble 1-2 / P-SPI-RC

Brand Name : Smart&Green

FCC ID : Y9P-SPI-433

Prepared By:

Asia Institute Technology (Dongguan) Limited

Add. : No.6 Binhe Road, Tianxin Village, Huangjiang, Dongguan, Guangdong, China.

Date of Receipt: Apr. 03, 2013 Date of Test: Apr. 10~ Apr. 17, 2013

Date of Issue : Apr. 18, 2013 Test Result: **Pass**

Test procedure used: ANSI C63.4-2009

This device described above has been tested by Asia Institute Technology (Dongguan) Limited, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

*This test report must not be used by the client to claim product endorsement by any agency of the U.S. government.

Reviewed by: Seal.Chen

Approved by: Jason.Zhu

1 Contents

2 Test Summary

2.1 Compliance with FCC Part 15 subpart C

Test	Test Requirement	Standard Paragraph	Result
Antenna Requirement	FCC Part 15 C:2008	Section 15.203	**PASS**
Conduction Emissions	FCC Part 15 C:2008	Section 15.207(a)	**N/A**
Radiated Emissions	FCC Part 15 C:2008	Section 15.209,15.231(b)	**PASS**
Occupied Bandwidth	FCC Part 15 C:2008	Section 15.231(c)	**PASS**
Transmit time	FCC Part 15 C:2008	Section 15.231(a)	**PASS**
Note: N/A			

2.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, The following measurements uncertainty Levels have estimated based on ANSI C63.4:2009, the maximum value of the uncertainty as below

No.	Item	Uncertainty
1	Conducted Emission Test	±1.20dB
2	Radiated Emission Test	±3.30dB

3 Test Facility

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

.FCC- Registration No: 248337

The 3m Semi-Anechoic Chamber, 3m/10m Open Area Test Site and Shielding Room of Asia Institute Technology (Dongguan) Limited have been registered by Federal Communications Commission (FCC) on Dec.19, 2012.

.Industry Canada(IC)-Registration No: IC6819A-1 & IC6819A-2

The 3m Semi-Anechoic Chamber and 3m/10m Open Area Test Site of Asia Institute Technology (Dongguan) Limited have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing on Nov.07, 2010.

.VCCI- Registration No: 2705

The 3m/10m Open Area Test Site, Shielding Room and 3m Chamber of Asia Institute Technology (Dongguan) Limited have been registered by Voluntary Control Council for Interference on Nov. 29, 2012. The Telecommunication Ports Conducted Disturbance Measurement of Asia Institute Technology (Dongguan) Limited have been registered by Voluntary Control Council for Interference on Sep. 06, 2011.

.TUV Rhineland

Asia Institute Technology (Dongguan) Limited has been assessed on Dec.29, 2012 that it can carry out EMC tests by order and under supervision of TUV Rhineland.

.ITS- Registration No: TMPSHA031

Asia Institute Technology (Dongguan) Limited has been assessed and included in Intertek Shanghai TMP Program regarding Laboratory facilities and test equipment on Jul.22, 2012.

3.1 Deviation from standard

None

3.2 Abnormalities from standard conditions

None

4 General Information

4.1 General Description of EUT

Manufacturer:	OSSOU Metal & Plastic Manufacturing (Shenzhen) Co., Ltd
Manufacturer Address:	5/F, Block B3, Xujingchang Industrial Park, Fuyong, ShenZhen, GuangDong, China
EUT Name:	Pebble Remote Control / Spider Remote
Model No.:	Pebble 1-2 / P-SPI-RC
Operation frequency:	433.92MHz
Modulation Technology:	FSK
Antenna Type:	Built-in Antenna
Brand Name:	Smart&Green
Serial No.:	N/A
Power Supply Range:	DC 3.0V
Power Supply:	DC 3.0V (CR 2032 Lithium Battery)
Power Cord:	N/A
Model description: The models Pebble 1-2 and P-SPI-RC use the same motherboard. The different between the models Pebble 1-2 and P-SPI-RC simply the appearance and color.	

Description of Channel:	
Channel	Frequency (MHz)
01	433.92

4.2 Description of Test conditions

(1) EUT was tested in normal configuration (Please See following Block diagram)

1. Block diagram of EUT configuration(TX Mode)


(2) E.U.T. test conditions:

15.31(e): For intentional radiators, measurements of the variation of the input power or the adiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

(3) Frequency range of radiated measurements:

According to the 15.33, the test range will be up to the tenth harmonic of the highest fundamental frequency.

4.3 EUT Peripheral List

No.	Equipment	Manufacturer	Model No.	Serial No.	Power cord	signal cable
1	N/A	N/A	N/A	N/A	N/A	N/A

4.4 Test Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

5 Equipments List for All Test Items

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	ADVANTEST	R3182	150900201	2013.01.18	2014.01.18
2	EMI Measuring Receiver	R&S	ESPI	1164.6407.03	2012.06.26	2013.06.25
3	Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2012.06.26	2013.06.25
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2012.12.03	2013.12.02
5	TRILOG Super Broadband test Antenna	Schwarzbeck	VULB9160	9160-3206	2012.12.01	2013.11.30
6	Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	452	2012.12.04	2013.12.03
7	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2012.09.26	2013.09.25
8	EMI Test Receiver	R&S	ESCI	100124	2012.06.26	2013.06.25
9	LISN	Kyoritsu	KNW-242	8-837-4	2012.06.26	2013.06.25
10	LISN	Kyoritsu	KNW-407	8-1789-4	2012.06.26	2013.06.25
11	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2012.09.26	2013.09.25
12	Loop Antenna	ARA	PLA-1030/B	1029	2013.03.19	2014.03.18

6 Test Result

6.1 Antenna Requirement

6.1.1 Standard requirement

15.203 Requirement: For intentional device, according to 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.

6.1.2 EUT Antenna

The antenna is integrated on the main PCB and no consideration of replacement.

6.2 Conduction Emissions Measurement

6.2.1 Applied procedures / Limit

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

Note: Decreases with the logarithm of the frequency.

6.2.2 Test procedure

EUT was placed upon a wooden test table 0.8m above the horizontal metal reference plane and 0.4m from the vertical ground plane, and it was connected to an AMN. The closest distance between the boundary of the EUT and the surface of the AMN is 0.8m. All peripherals were connected to another AMN, and placed at a distance of 10cm from each other. A spectrum and receiver was connected to the RF output port of the AMN. Both average and quasi-peak value were detected.

6.2.3 Test results

Because the EUT only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Measurements to demonstrate compliance with the conducted limits are not required for devices.

6.3 Transmit time

6.3.1 Applied procedures / Limit

15.231(a) (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

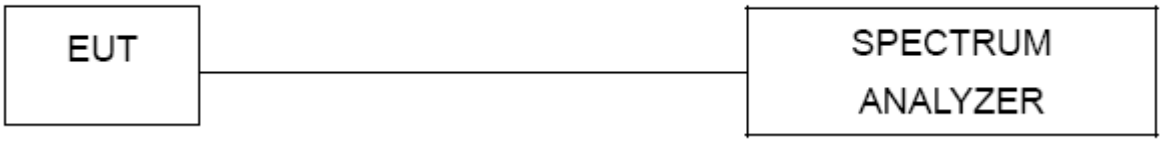
6.3.2 Test procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Spectrum Setting: RBW=100kHz, VBW≧RBW, Sweep time=10s, Detector Function=Peak.

6.3.3 Deviation from standard

No deviation.

6.3.4 Test setup

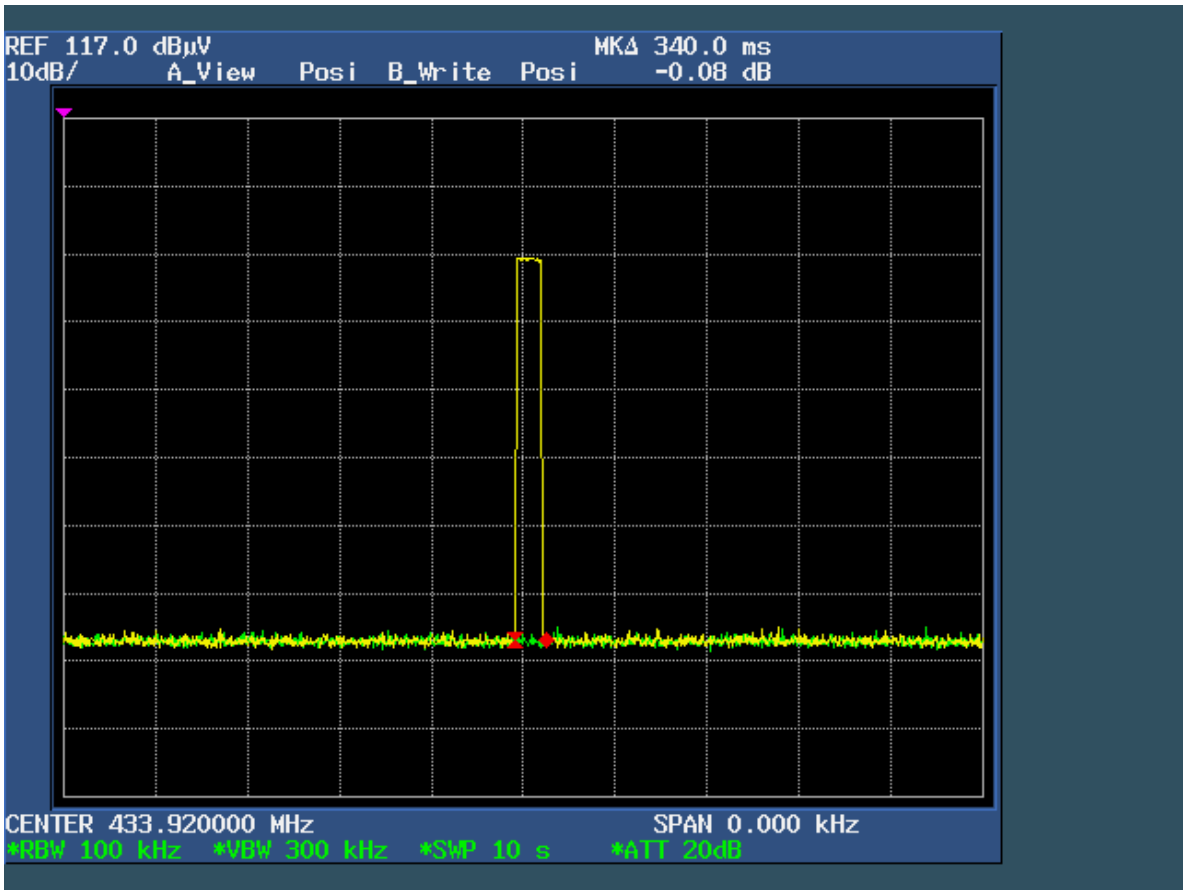


6.3.5 Test results

EUT:	Pebble Remote Control / Spider Remote	Model Name :	Pebble 1-2
Temperature:	23 ℃	Relative Humidity:	60%
Pressure:	1010 hPa	Test Power :	DC 3.0V
Test Mode :	TX CH01		

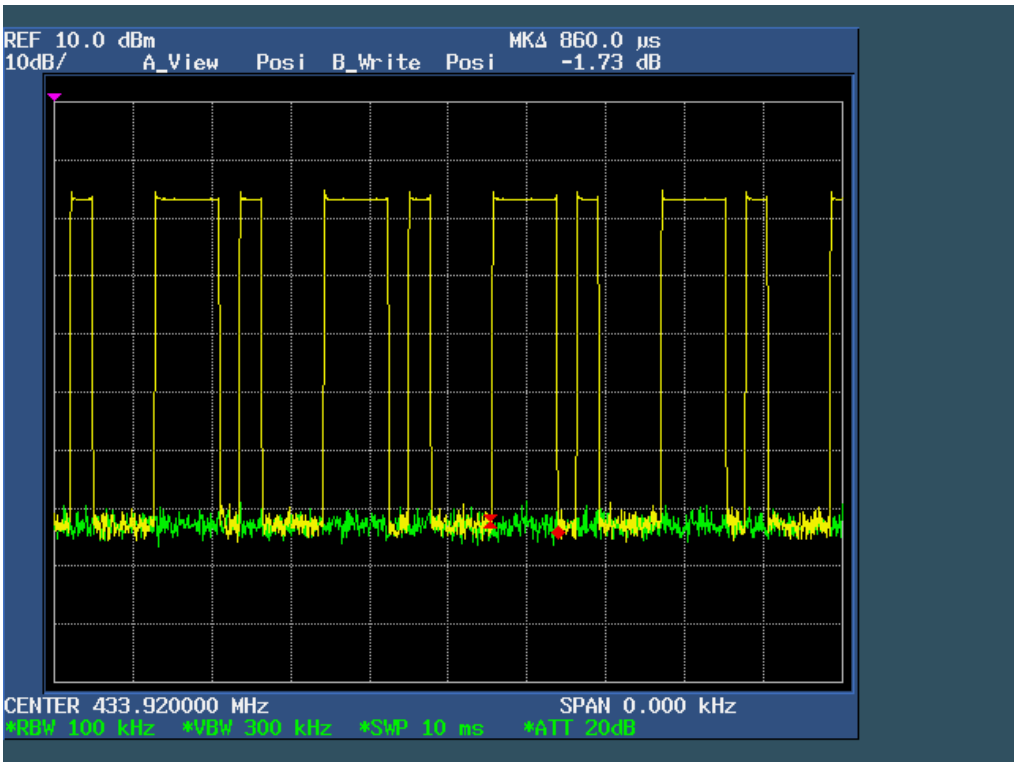
Test Mode	Frequency (MHz)	Transmit time	Limit (s)	Result
CH01	433.92	0.340s	5	Pass

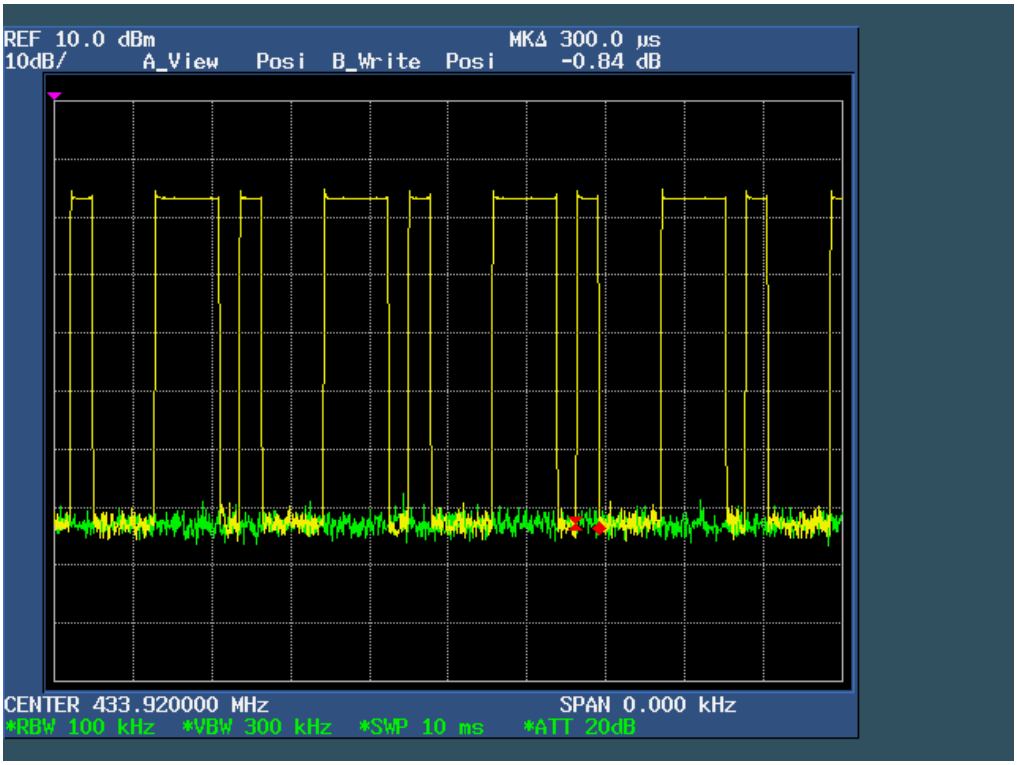
Channel 01: 433.92MHz

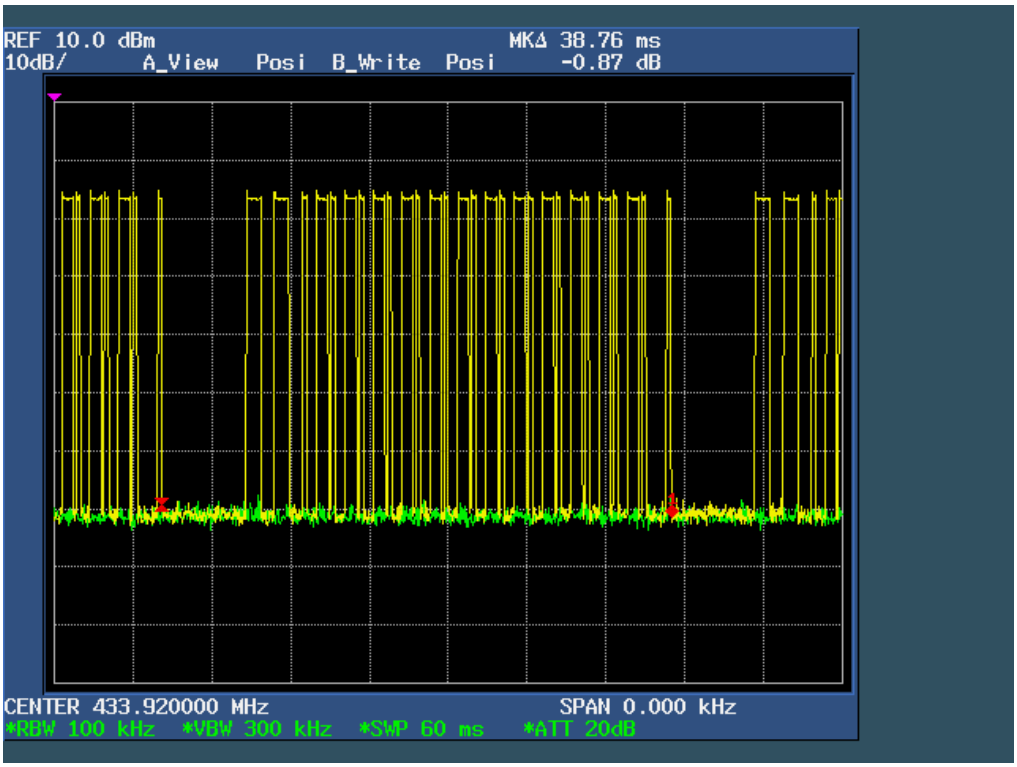


6.3.6 Calculation of Average Factor

The output field strengths of specification in accordance with the FCC rules specify measurements with an average detector. During the test, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instru mentation incorporating an average detector.
The duty cycle is measured in 100 ms or the repetition cycle period, whichever is a shorter time frame.
The duty cycle is measured by placing the spectrum analyzer to set zero span.
Averaging factor in dB =20log (duty cycle)
The duration of one cycle = 38.76ms
The duty cycle is simply the on-time divided by 100ms
Duty Cycle = (0.86ms*14+0.30ms*14) =16.24 ms / 38.76ms
Therefore, the averaging factor is found by 20log0.4190 = -7.56 dB




REF 10.0 dBm
MKΔ 300.0 µs
10dB/ A_View Posi B_Write Posi -0.84 dB
CENTER 433.920000 MHz
SPAN 0.000 kHz
*RBW 100 kHz *VBW 300 kHz *SWP 10 ms *ATT 20dB


REF 10.0 dBm
MKΔ 38.76 ms
10dB/ A_View Posi B_Write Posi -0.87 dB
CENTER 433.920000 MHz
SPAN 0.000 kHz
*RBW 100 kHz *VBW 300 kHz *SWP 60 ms *ATT 20dB

6.4 Radiated Emissions Measurement

6.4.1 Applied procedures / Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Frequency of Emission (MHz)	Field Strength		Measurement Distance (meters)
	μV/m	dBμV/m	
0.009-0.49	2400/F(kHz)		300
0.49-1.705	24000/F(kHz)		30
1.705-30	30		30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

15.231(b) In addition to the provisions of § 15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field strength of fundamental		Field strength of harmonics	
	μV/m	dBμV/m	μV/m	dBμV/m
433.92	10996	80.83	1099.6	60.83

6.4.2 Test procedure

EUT was placed upon a wooden test table which was placed on the turn table 0.8m above the horizontal metal ground plane, and operating in the mode as mentioned above. A receiving antenna was placed 3m away from the EUT. During testing, turn around the turn table and move the antenna from 1m to 4m to find the maximum field-strength reading. All peripherals were placed at a distance of 10cm between each other. Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

6.4.3 Test Result

There is not detected blow 30MHz.

EUT：	Pebble Remote Control / Spider Remote	Model Name ：	Pebble 1-2
Temperature：	23 ℃	Test Data	2013-04-16
Pressure：	1010 hPa	Relative Humidity：	60%
Test Mode ：	TX CH01	Test Voltage ：	DC 3.0 V
Measurement Distance	3 m	Frenqucy Range	30MHz to 1GHz
RBW/VBW	100KHz / 300KHz for spectrum, RBW=120KHz for receiver.		

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
103.8054	23.58	-13.02	10.56	60.83	-50.27	QUASIPEAK
216.7828	27.81	-13.99	13.82	60.83	-47.01	QUASIPEAK
263.8190	24.59	-10.95	13.64	60.83	-47.19	QUASIPEAK
325.5957	35.30	-8.80	26.50	60.83	-34.33	QUASIPEAK
433.9200	73.05	-14.13	58.92	80.83	-21.91	AVERAGE
867.8400	**54.43**	**-5.81**	**48.62**	**60.83**	**-12.21**	**AVERAGE**

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
99.8777	23.52	-13.23	10.29	60.83	-50.54	QUASIPEAK
216.7828	27.18	-13.99	13.19	60.83	-47.64	QUASIPEAK
263.8190	24.59	-10.95	13.64	60.83	-47.19	QUASIPEAK
325.5957	35.30	-8.80	26.50	60.83	-34.33	QUASIPEAK
433.9200	71.93	-14.13	57.80	80.83	-23.03	AVERAGE
867.8400	**53.33**	**-5.81**	**47.52**	**60.83**	**-13.31**	**AVERAGE**

EUT：	Pebble Remote Control / Spider Remote	Model Name ：	Pebble 1-2
Temperature：	23 ℃	Test Data	2013-04-16
Pressure：	1010 hPa	Relative Humidity：	60%
Test Mode ：	TX CH01	Test Voltage ：	DC 3.0 V
Measurement Distance	3 m	Frenqucy Range	1GHz to 5GHz
RBW/VBW	1MHz/1MHz for Peak, 1MHz/10Hz for Average.		

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
1301.76	52.93	-10.33	42.60	60.83	-18.23	PEAK
1735.68	44.06	-9.52	34.54	60.83	-26.29	PEAK
2169.60	53.13	-7.69	45.44	60.83	-15.39	PEAK
3037.44	**48.98**	**-1.59**	**47.39**	**60.83**	**-13.44**	**PEAK**

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
1301.76	54.36	-10.33	44.03	60.83	-16.80	PEAK
1735.68	42.59	-9.52	33.07	60.83	-27.76	PEAK
2169.60	52.62	-7.69	44.93	60.83	-15.90	PEAK
3037.44	**47.34**	**-1.59**	**45.75**	**60.83**	**-15.08**	**PEAK**

Note: Measurement Level = Reading Level + Factor
Average Correct Factor= Ant Factor + Cable Loss+ Averaging factor
Factor=Ant Factor + Cable Loss
Channel 01: 433.92 MHz

6.5 BANDWIDTH TEST

6.5.1 Applied procedures / Limit

15.231(c) 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.
Bandwidth (20dB) Limit = 0.25% * f(MHz) = 0.25% * 433.92MHz = 1084.8kHz

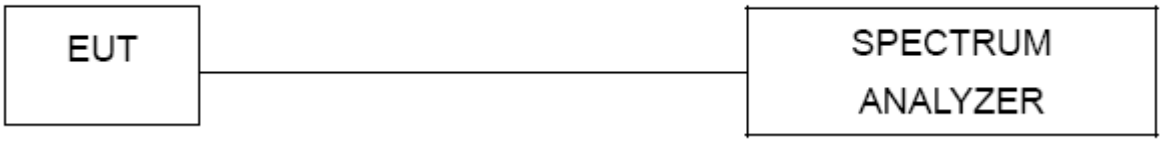
6.5.2 Test procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Spectrum Setting: RBW= 100KHz, VBW≧RBW, Sweep time = Auto.

6.5.3 Deviation from standard

No deviation.

6.5.4 Test setup



6.5.5 Test results

EUT：	Pebble Remote Control / Spider Remote	Model Name ：	Pebble 1-2
Temperature：	23 ℃	Relative Humidity：	60%
Pressure：	1010 hPa	Test Power ：	DC 3.0V
Test Mode ：	CH01		

Test Mode	Test Channel	Frequency (MHz)	20 dB Bandwidth (KHz)	Limit （kHz）	**Result**
TX	CH01	433.92	670.0	1084.8	Pass

Channel 01: 433.92MHz