

FCC PART 15.247  
EMI MEASUREMENT AND TEST REPORT  
For  
**DALAS TIMEPIECE (SHENZHEN) CO., LTD.**  
No.11, YunFeng Rd., QueShan Industrial District, Dalang St., ShenZhen , China

**FCC ID: VRUIPC-S001**

Oct.28,2007

This Report Concerns: Original Report		Equipment Type : IP CAMERA	
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Report No.:		F07100830C	
Receive EUT Date/Test Date:		Oct. 22,2007/ Oct. 22-28,2007	
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## **1. GENERAL INFORMATION**

### **1.1. Report information**

1.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that BEST approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that BEST in any way guarantees the later performance of the product/equipment.

1.1.2. The sample/s mentioned in this report is/are supplied by Applicant, BEST therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through BEST, unless the applicant has authorized BEST in writing to do so.

Test Facility -

The open area test site used to collect the radiated data is located on the address of Shenzhen Academy of Metrology & Quality Inspection (FCC Registered Test Site Number: 97379) on

Longzhu Road, Nanshan , Shenzhen, Guangdong, China.

The Open Area Test Site is constructed and calibrated to meet the FCC requirements.

### **1.2. Measurement Uncertainty**

Available upon request.

## 2. PRODUCT DESCRIPTION

### 2.1. EUT Description

Description : **IP CAMERA**

Applicant : **DALAS TIMEPIECE (SHENZHEN) CO., LTD.**  
No.11, YunFeng Rd., QueShan Industrial District,  
Dalang St., ShenZhen , China

Model Number : IPC-S001

#### **Additional Information**

Frequency : 2412-2462MHz

Power Supply : DC5V ( Supplied by computer )

Maximum : N/A

Range

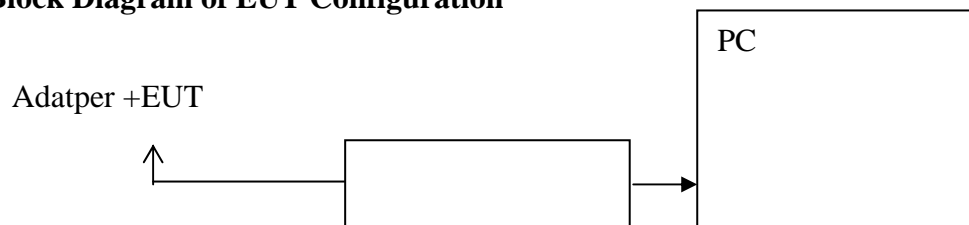
Transmitter : -

Antenna

Current : N/A

Consumption

### 2.2. Block Diagram of EUT Configuration



### 2.3. Support Equipment List

- |    |                      |         |
|----|----------------------|---------|
| 1. | Adapter              | -----   |
| 2. | PC(Lenovo )          | FCC DOC |
| 3. | LCD Monitor(Lenovo ) | FCC DOC |

### 2.4. Test Conditions

Temperature: 23~25

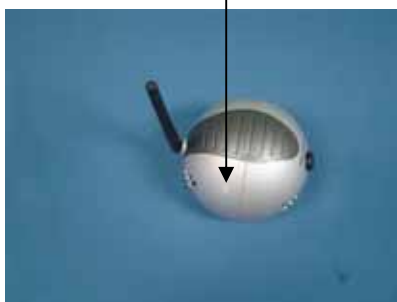
Relative Humidity: 55~63 %

### 3. FCC ID LABEL

**FCC ID: VRUIPC-S001**

**Label Location on EUT**

**EUT Bottom View/ FCC ID Label Location**



#### 4. TEST RESULTS SUMMARY

##### FCC 15 Subpart C, Paragraph 15.247

Test Standards	Test Items	Test Results
FCC Part 15 Subpart C, Paragraph 15.247(d)	Radiated disturbance	Pass
FCC Part 15 Subpart C, Paragraph 15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	Pass
FCC Part 15 Subpart C, Paragraph 15.247(b)	Maximum Peak Output Power	Pass
FCC Part 15, Paragraph 15.247(e)	Power Spectral Density	Pass
FCC Part 15, Paragraph 15.247(d)	Band Edge Measurement Limit: 20dB less than the peak value of fundamental frequency	Pass
FCC Part 15, Paragraph 15.207	Conducted Test	Pass
FCC Part 15, Paragraph 15.203	Antenna Requirement	Pass

Remark: "N/A" means "Not applicable."

##### Modifications

No modification was made.

## 5. TEST EQUIPMENT USED

Equipment/Facilities	Manufacturer	Model #	Serial no.	Date of Cal.	Cal. Interval
Cable	Resenberger	N/A	NO.1	Mar 10 , 2007	1 Year
Cable	SCHWARZBECK	N/A	NO.2	Mar 10 , 2007	1 Year
Cable	SCHWARZBECK	N/A	NO.3	Mar 10 , 2007	1 Year
LISN	Rohde & Schwarz	ESH3-Z5	100305	Mar 10 , 2007	1 Year
50 Coaxial Switch	ANRITSU CORP	MP59B	6200283933	Mar 10, 2007	1 Year
EMI Test Receiver	Rohde & Schwarz	ESP13	100180	Oct.18,2007	1 Year
Spectrum Analyzer	Rohde & Schwarz	FSP40	100273	Sep.10,2007	1 Year
3m Semi-Anechoic Chamber	Albatross Projects	9mx6mx6m	N/A	Feb.20,2007	1 Year
Signal Generator	FLUKE	PM5418 + Y/C	LO747012	Feb.20,2007	1 Year
Signal Generator	FLUKE	PM5418TX	LO738007	Feb.20,2007	1 Year
Loop Antenna	SCHWARZBECK	FMZB1516	113	Jan.30,2007	1 Year
Trilog-Super Broadband Antenna	SCHWARZBECK	VULB9161	9161-4079	Sep.22,2007	1 Year
Broad-Band Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-564	Sep.22,2007	1 Year
Ultra Broadband Antenna	Rohde & Schwarz	HL-562	100110	June.15,2007	1 Year
AMN	Rohde & Schwarz	ESH3-Z5	100196	Oct.11,2007	1 Year
AMN	Rohde & Schwarz	ESH3-Z5	100197	Oct.11,2007	1 Year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	N/A	N/A	N/A
Power Meter	Rohde & Schwarz	NRVD	100041	Feb.20,2007	1 Year
EMI Test Receiver	Rohde & Schwarz	ESCS30	100003	Feb.20,2007	1 Year
Coaxial Cable with N-connectors	SCHWARZBECK	AK9515H	95549	Sep.22,2007	1 Year
Radio Communication Test Set	Rohde & Schwarz	CMS 54	846621/024	Feb.20,2007	1 Year
Modulation Analyzer	Hewlett-Packard	8901B	2303A00362	Feb.20,2007	1 Year
Absorbing clamp	Rohde & Schwarz	MDS-21	N/A	Oct.29,2007	1 Year



## 6. CONDUCTED POWER LINE TEST

### 6.1. Test Equipment

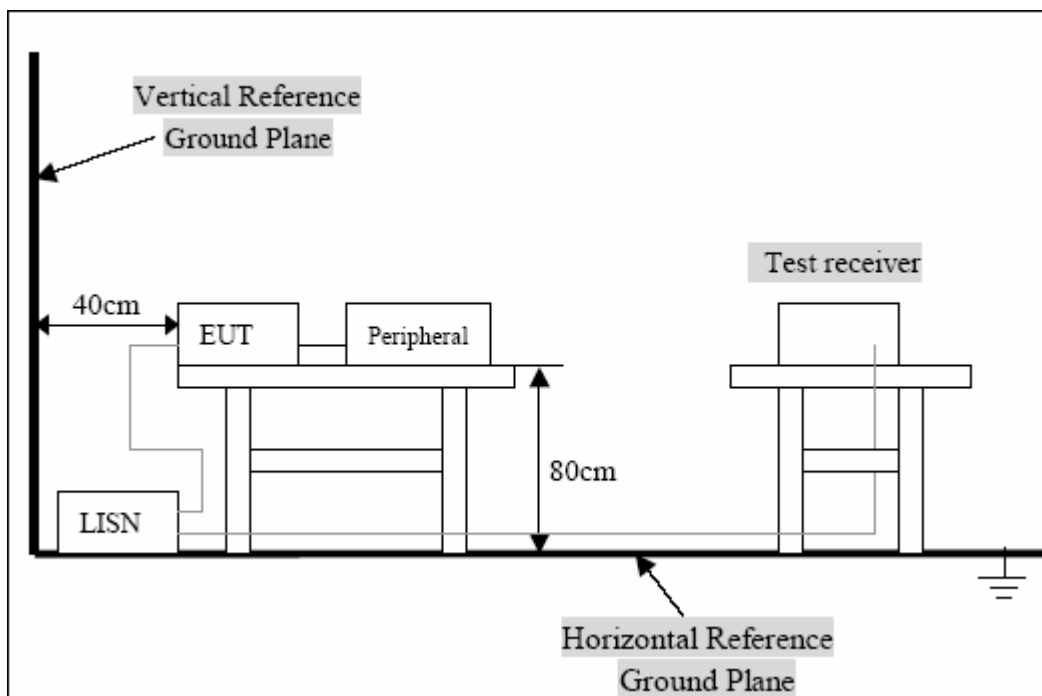
Please refer to section 5 this report.

### 6.2. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uh coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uh coupling impedance with 50ohm termination.

Both sides of A.C. Line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ASIN C63.4:2003 on conducted measurement. Conducted emissions were measured over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9KHz.

### 6.3. Test Setup



For the actual test configuration, Please refer to the related items-Photos of testing

### 6.4. Configuring of the EUT

The EUT was configured according to ASIN C63.4:4-2003. EUT was used DC 5.0V (Power by PC). The operation frequency is from 13.56MHz. Enable the signal transmitted from the external antenna from EUT to receiver. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

A.EUT

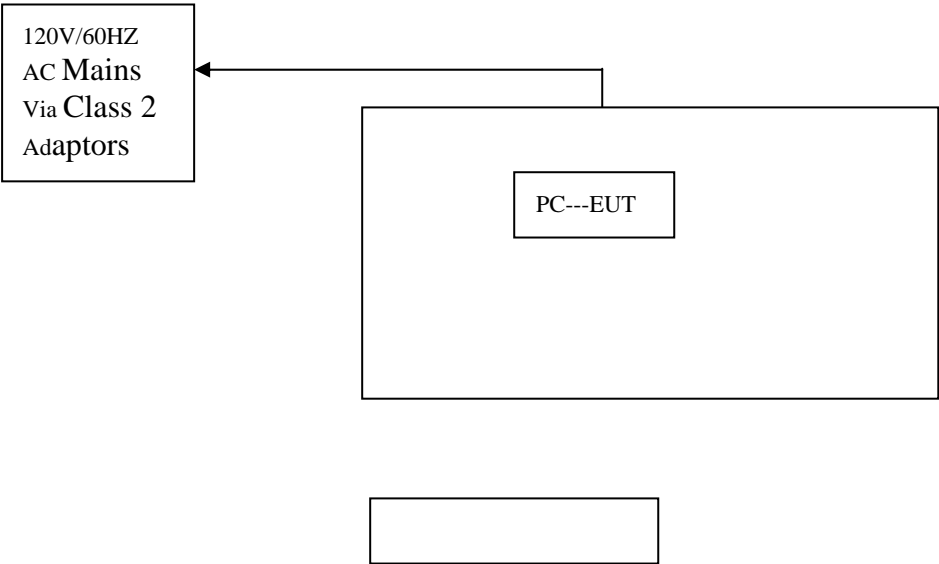
Device	Manufacturer	Model #	FCC ID
Refer to Section 2			

B.Internal Devices

Device	Manufacturer	Model #	FCC ID
N/A			

6.5. EUT Operating Condition

Operating condition is according to ANSI C63.4-2003.  
Setup the EUT and simulators as shown on follow.  
Enable RF signal and confirm EUT active.  
Modulate output capacity of EUT up to specification.



6.6. Conducted Power line Emission Limits

FCC Part 15 Paragraph 15.207 (dBuv)			
Range	Frequency (MHZ)	Class A QP/AV	Class B QP/AV
	0.15-0.5	79/66	65-56/56-46
	0.5-5.0	73/60	56-46
	5.0-3.0	73/60	60-50

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

6.7. Conducted Power Line Test Result

Refer to APPENDIX I Test Curves

## 7. RADIATED DISTURBANCE TEST

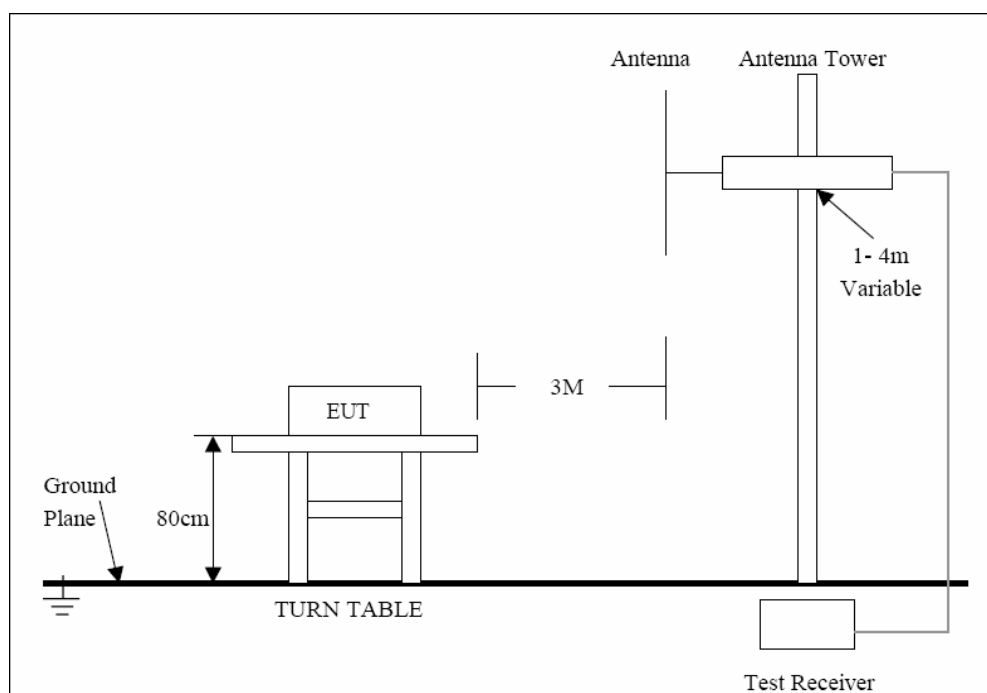
### 7.1. Test Equipment

Please refer to section 5 this report.

### 7.2. Test Procedure

The out of band emission tests were performed in the 3-meter chamber test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part Subpart C limits.

### 7.3. Radiated Test Setup



Setup below 3mMHz, refer to 7.3; For the accrual test configuration, please refer to the related items-photos of Testing.

### 7.4. Configuration of the EUT

Same as section 6.4 of this report

### 7.5. EUT Operating Condition

Same as section 6.5 of this report.

### 7.6. Radiated Emission Limit

radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHZ)	Distance (m)	Field Strength (microvolts/m)
Fundamental	-	50000
Harmonics	-	500
30-88	3	100
88-216	3	150
216-960	3	200
ABOVE 960	3	500

## 7.7. Radiated Emission Test Result

General Radiated Emission Data  
Below 1GHz Worst-Case Data

Ambient temperature: 24° C Relative humidity: 53 % Test mode: 2 (ch6 2437MHz)						
Frequency MHz	Emission QP (dBuV/m)	Read Value (dBuV)	Correction Factor (dB/m)	Polarization	Limits (dBuV/m)	Note
156.352	35.4	23.5	11.9	Horizontal	43.5	---
179.679	36.1	25.2	10.9	Horizontal	43.5	---
274.929	43.6	29.3	14.3	Horizontal	46.0	---
585.951	42.0	22.0	20.0	Horizontal	46.0	---
601.303	43.0	23.0	20.0	Horizontal	46.0	---
674.892	42.1	21.5	20.6	Horizontal	46.0	---
70.821	35.8	28.0	7.8	Vertical	40.0	---
107.755	36.1	22.9	13.2	Vertical	43.5	---
131.082	39.1	25.8	13.3	Vertical	43.5	---
156.352	40.3	28.4	11.9	Vertical	43.5	---
168.016	40.0	28.4	11.6	Vertical	43.5	---
504.308	41.9	22.8	19.1	Vertical	46.0	---
648.156	43.0	22.4	20.6	Vertical	46.0	---
840.601	42.1	19.8	22.3	Vertical	46.0	---

**REMARKS:** 1. Emission level(dBuV/m)=Read Value(dBuV) + Correction Factor(dB/m)  
 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)  
 3. The other emission levels were very low against the limit.

## Emission Up 1GHz

## Radiated Emission Data

Ambient temperature: 24° C						
Relative humidity: 53 %						
Test mode: 1 (ch4 2412MHz)						
Frequency MHz	Emission QP (dBuV/m)	Read Value (dBuV)	Correction Factor (dB/m)	Polarization	Limits (dBuV/m)	Note
2.412	91.5	95.5	-4.0	Horizontal		Fundamental(PK)
2.412	81.5	85.5	-4.0	Horizontal		Fundamental(AV)
2.412	89.5	93.5	-4.0	Vertical		Fundamental(PK)
2.412	80.5	84.5	-4.0	Vertical		Fundamental(AV)
4.824	50.3	48.3	2.0	Horizontal	74.0	Harmonic(PK)
4.824	41.0	39.0	2.0	Horizontal	54.0	Harmonic(AV)
4.824	52.3	50.3	2.0	Vertical	74.0	Harmonic(PK)
4.824	41.3	39.3	2.0	Vertical	54.0	Harmonic(AV)
7.236	52.7	45.3	7.4	Horizontal	74.0	Harmonic(PK)
7.236	41.7	34.3	7.4	Horizontal	54.0	Harmonic(AV)
7.236	49.7	42.3	7.4	Vertical	74.0	Harmonic(PK)
7.236	38.7	31.3	7.4	Vertical	54.0	Harmonic(AV)
9.648	47.5	38.0	9.5	Horizontal	74.0	Harmonic(PK)
9.648	37.5	28.0	9.5	Horizontal	54.0	Harmonic(AV)
9.648	46.1	36.6	9.5	Vertical	74.0	Harmonic(PK)
9.648	36.0	26.5	9.5	Vertical	54.0	Harmonic(AV)

- REMARKS:** 1. Emission level(dBuV/m)=Read Value(dBuV) + Correction Factor(dB/m)  
 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)+Amplifier Factor(dB)  
 3. The other emission levels were very low against the limit

## Radiated Emission Data

Ambient temperature: 24° C						
Relative humidity: 53 %						
Test mode: 2 (ch6 2437MHz)						
Frequency GHz	Emission AV (dBuV/m)	Read Value (dBuV)	Correction Factor (dB/m)	Polarization	Limits (dBuV/m)	Note
Frequency GHz	90.7	94.6	-3.9	Horizontal		Fundamental(PK)
2.437	80.5	84.4	-3.9	Horizontal		Fundamental(PK)
2.437	88.5	92.4	-3.9	Vertical		Fundamental(PK)
2.437	79.5	83.4	-3.9	Vertical		Fundamental(PK)
2.437	51.3	49.2	2.1	Horizontal	74.0	Harmonic(PK)
4.874	41.2	39.1	2.1	Horizontal	54.0	Harmonic(PK)
4.874	51.3	49.2	2.1	Vertical	74.0	Harmonic(PK)
4.874	40.1	38.0	2.1	Vertical	54.0	Harmonic(PK)
7.311	50.1	42.6	7.5	Horizontal	74.0	Harmonic(PK)
7.311	38.7	31.3	7.5	Horizontal	54.0	Harmonic(PK)
7.311	46.5	39.0	7.5	Vertical	74.0	Harmonic(PK)
7.311	36.7	29.2	7.5	Vertical	54.0	Harmonic(PK)
9.748	45.5	35.9	9.6	Horizontal	74.0	Harmonic(PK)
9.748	36.5	26.9	9.6	Horizontal	54.0	Harmonic(PK)
9.748	43.1	33.5	9.6	Vertical	74.0	Harmonic(PK)
9.748	32.0	12.4	9.6	Vertical	54.0	Harmonic(PK)

- REMARKS:** 1. Emission level(dBuV/m)=Read Value(dBuV) + Correction Factor(dB/m)  
 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)+Amplifier Factor(dB)  
 3. The other emission levels were very low against the limit.

## Radiated Emission Data

Ambient temperature: 24° C

Relative humidity: 53 %

Test mode: 2 (ch6 2437MHz)

Frequency GHz	Emission AV (dBuV/m)	Read Value (dBuV)	Correction Factor (dB/m)	Polarization	Limits (dBuV/m)	Note
2.462	90.5	94.2	-3.7	Horizontal		Fundamental(PK)
2.462	80.0	83.7	-3.7	Horizontal		Fundamental(PK)
2.462	86.5	90.2	-3.7	Vertical		Fundamental(PK)
2.462	78.3	82.0	-3.7	Vertical		Fundamental(PK)
4.924	50.3	48.0	2.3	Horizontal	74.0	Harmonic(PK)
4.924	41.5	39.2	2.3	Horizontal	54.0	Harmonic(PK)
4.924	52.3	50.0	2.3	Vertical	74.0	Harmonic(PK)
4.924	41.1	38.8	2.3	Vertical	54.0	Harmonic(PK)
7.386	50.5	42.8	7.7	Horizontal	74.0	Harmonic(PK)
7.386	38.9	31.2	7.7	Horizontal	54.0	Harmonic(PK)
7.386	44.5	36.8	7.7	Vertical	74.0	Harmonic(PK)
7.386	35.7	28.0	7.7	Vertical	54.0	Harmonic(PK)

**REMARKS:** 1. Emission level(dBuV/m)=Read Value(dBuV) + Correction Factor(dB/m)

2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)+Amplifier Factor(dB)

3. The other emission levels were very low against the limit.



8. 6DB BANDWIDTH MEASUREMENT

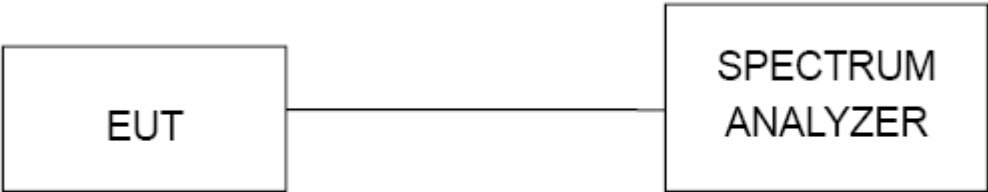
8.1. LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

8.2. Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 100kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

8.3. Test Setup



8.4. Test Data

Test Data			
CHANNEL	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	results
Ch1 , 2412MHz	10.9	0.5	Pass
Ch6 , 2437MHz	8.5	0.5	Pass
Ch11 , 2462MHz	9.1	0.5	Pass

9. MAXIMUM PEAK OUTPUT POWER

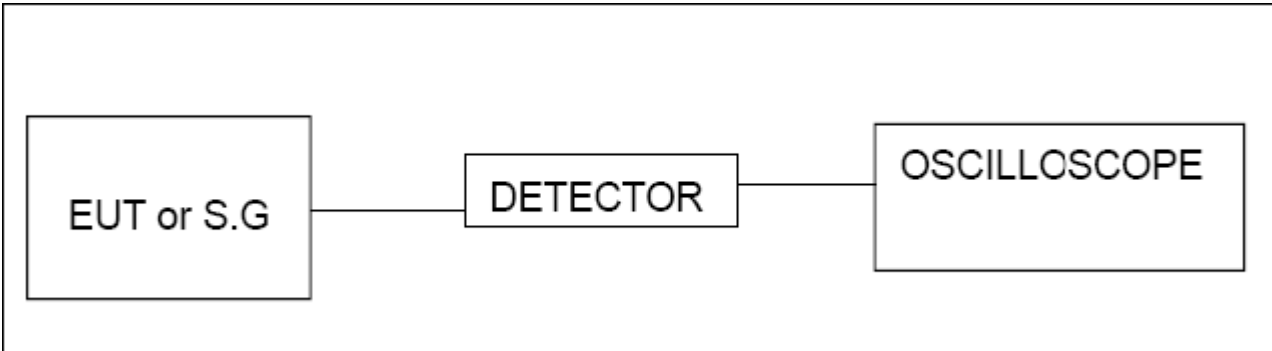
9.1. LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

9.2. TEST PROCEDURES

- 1. A detector was used on the output port of the EUT. An oscilloscope was used to read the response of the detector.
- 2. Replaced the EUT by the signal generator. The center frequency of the S.G was adjusted to the center frequency of the measured channel.
- 3. Adjusted the power to have the same reading on oscilloscope. Record the power level.

9.3. Radiated Test Setup



9.4. Test Data

Test Data

CHANNEL	Peak Power Output (dBm)	LIMIT (dBm)	results
Ch1	-6.0	30dBm	Pass
Ch6	-6.3	30dBm	Pass
Ch11	-7.0	30dBm	Pass

## 10. POWER SPECTRAL DENSITY MEASUREMENT

### 10.1.LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

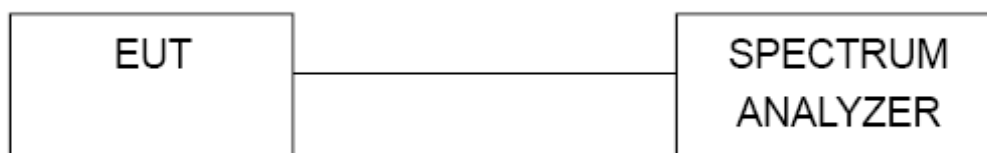
### 10.2.Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz.

The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

### 10.3. TEST SETUP



### 10.4.Test Data

Test Data

CHANNEL	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	results
Ch1	-19.1	8	Pass
Ch6	-17.8	8	Pass
Ch11	-23.6	8	Pass

## **11. BAND EDGES MEASUREMENT**

### **11.1.LIMITS OF BAND EDGES MEASUREMENT**

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### **11.2.TEST PROCEDURE**

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

The spectrum plots (Peak RBW=VBW=100kHz) are attached on the following pages.

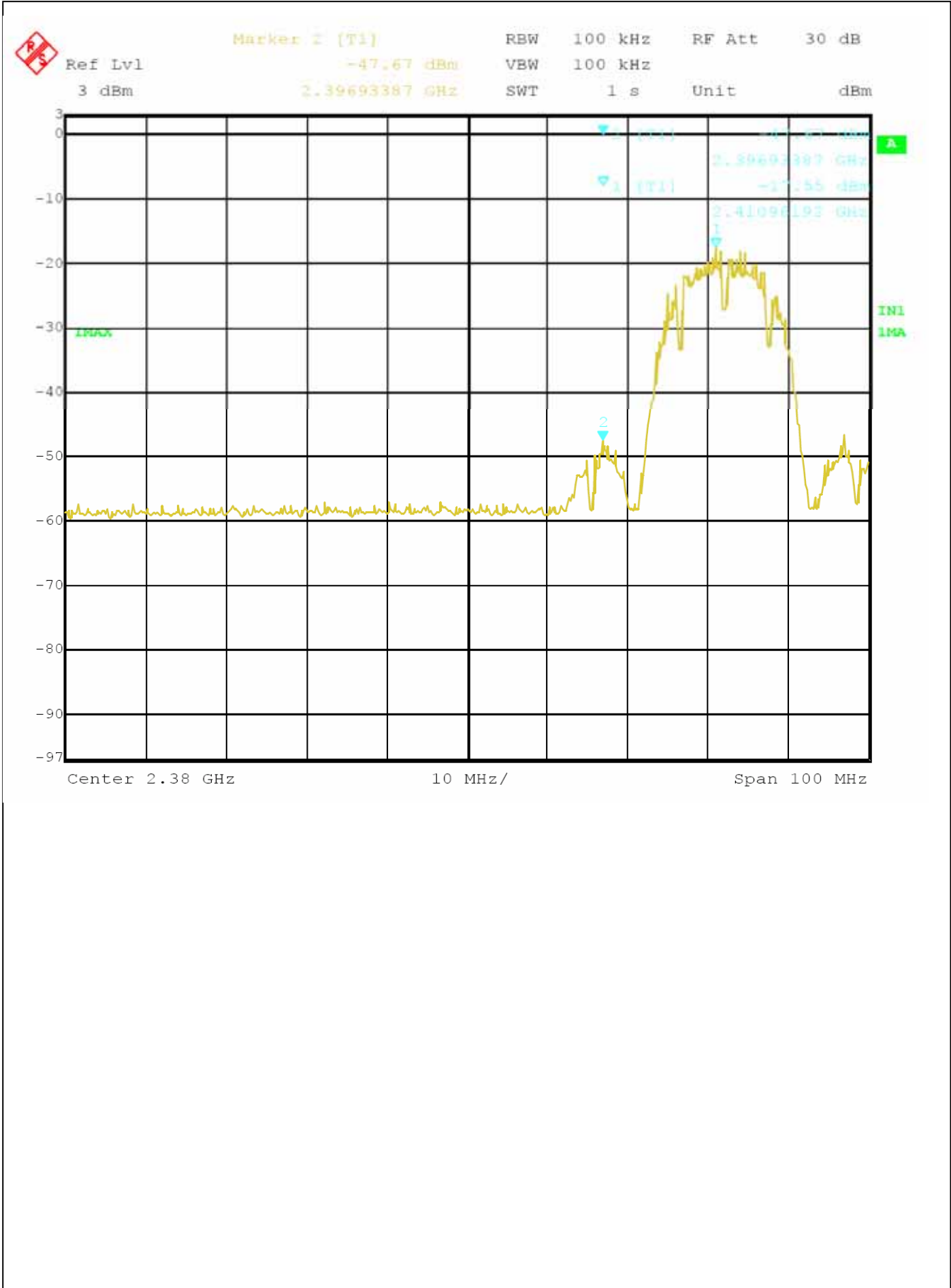
### **11.3.TEST RESULTS**

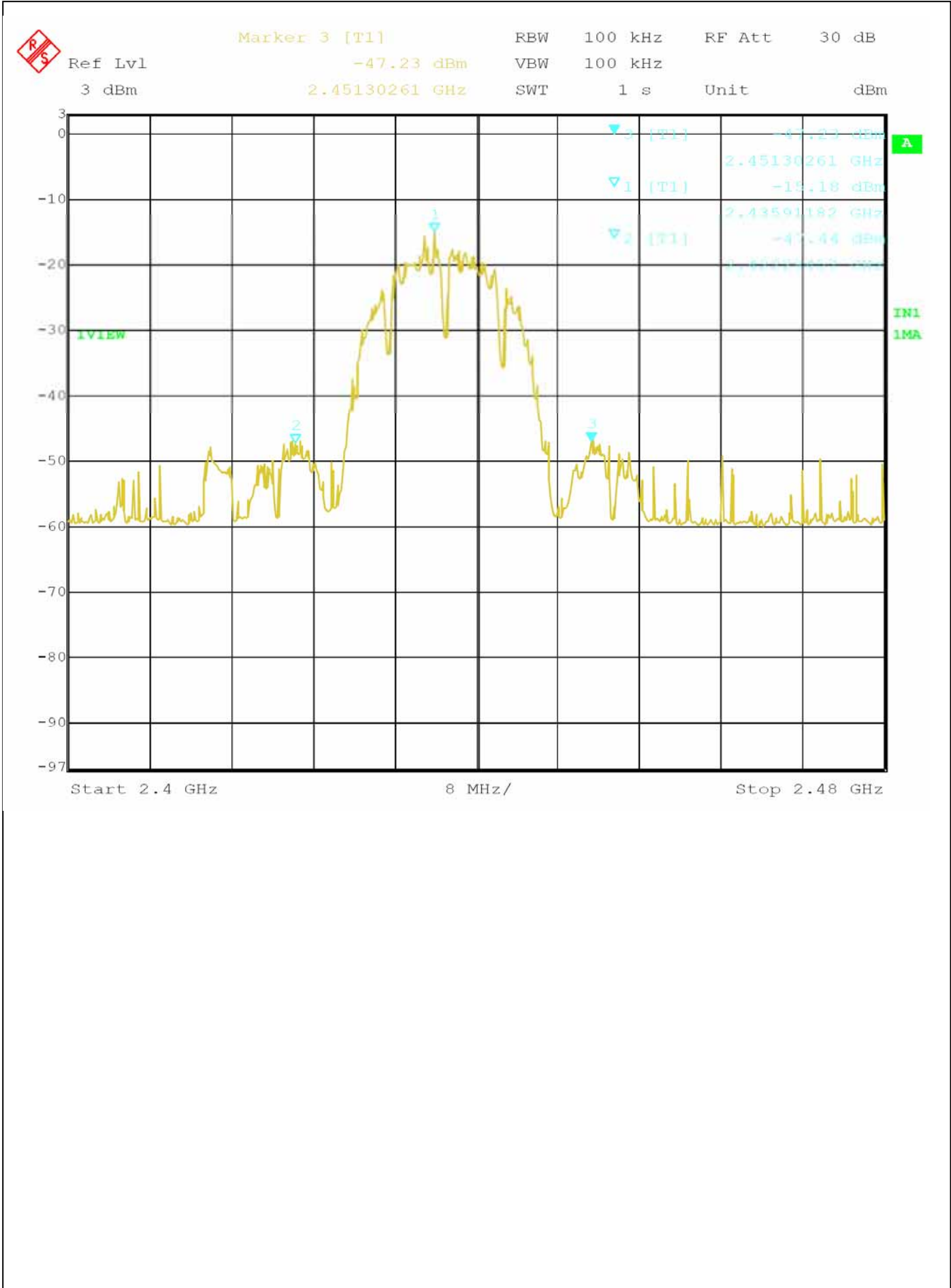
The spectrum plots are attached on the following 3 images. It shows compliance with the requirement in part 15.247(d).

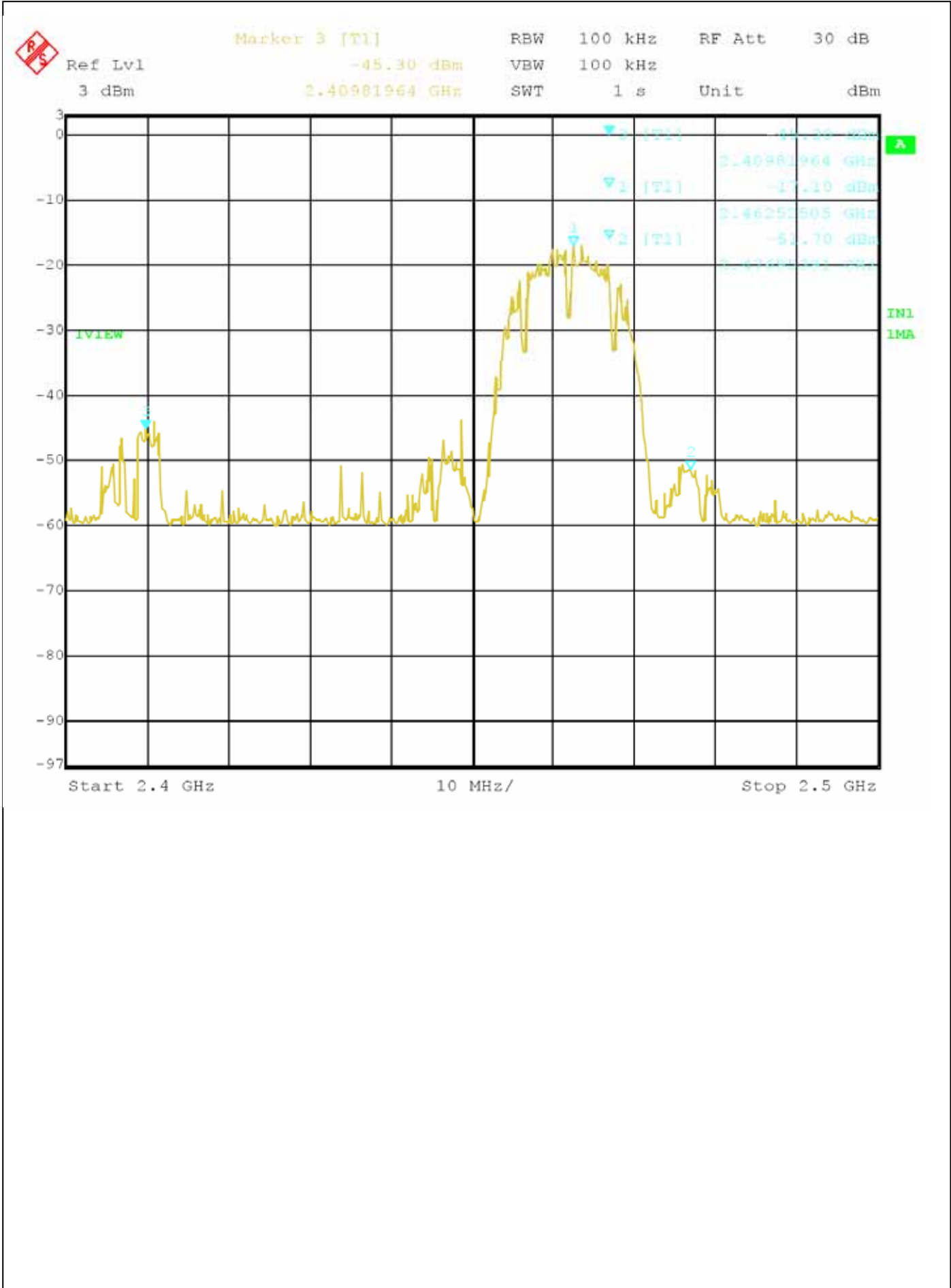
NOTE 1: The band edge emission plot of ch1 shows 30.1dBc. The emission of carrier strength list in the test result of channel 1 is 91.5dBuV/m (Peak), so the maximum field strength in restrict band is  $91.5-30.1=61.4$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of ch6 shows 32.0dBc. The emission of carrier strength list in the test result of channel 1 is 90.7dBuV/m (Peak), so the maximum field strength in restrict band is  $90.7-32.0=58.7$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of ch11 shows 28.2dBc. The emission of carrier strength list in the test result of channel 1 is 90.5dBuV/m (Peak), so the maximum field strength in restrict band is  $90.5-28.2=62.3$ dBuV/m which is under 74dBuV/m limit.







## **12. ANTENNA REQUIREMENT**

### **12.1. STANDARD APPLICABLE**

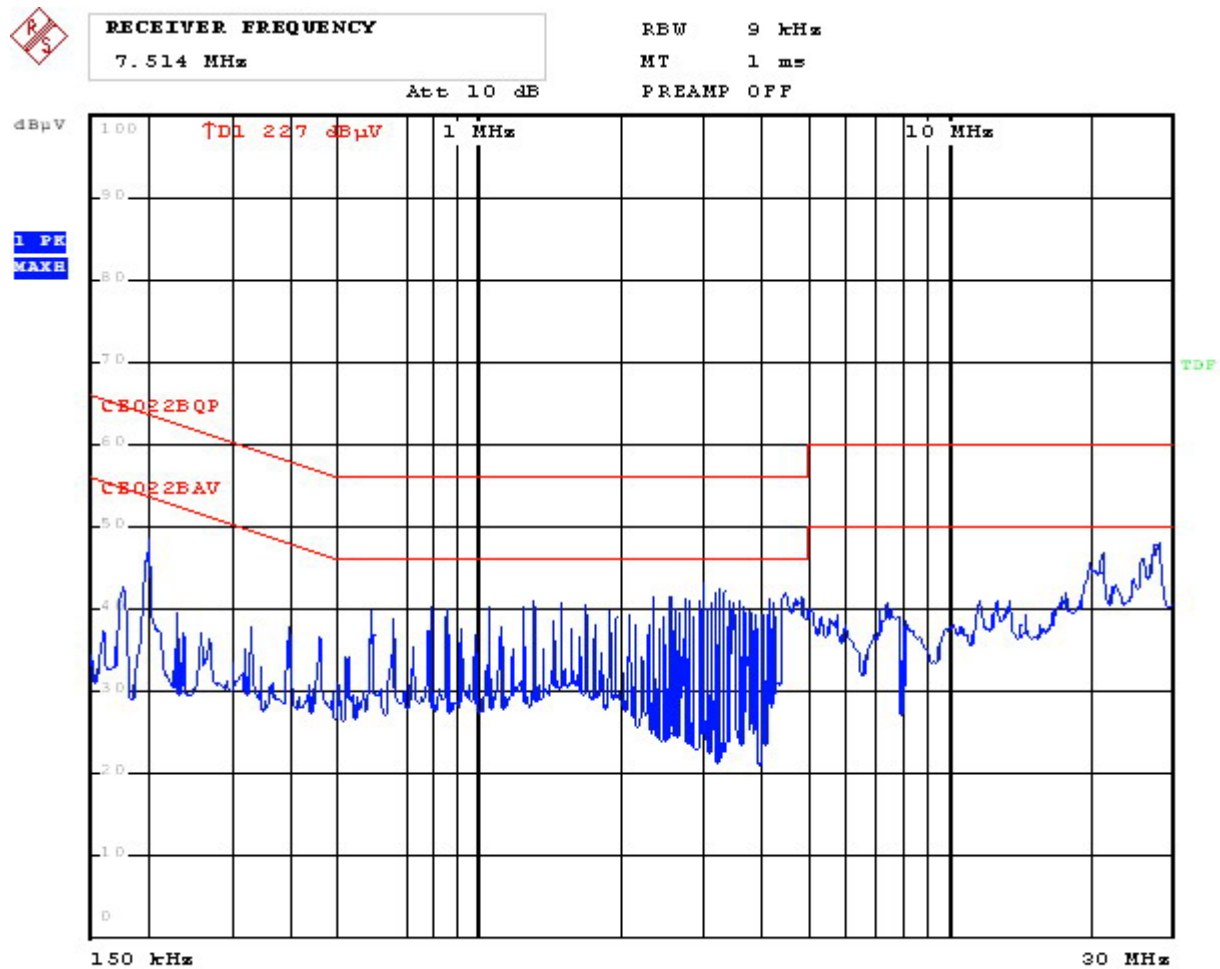
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

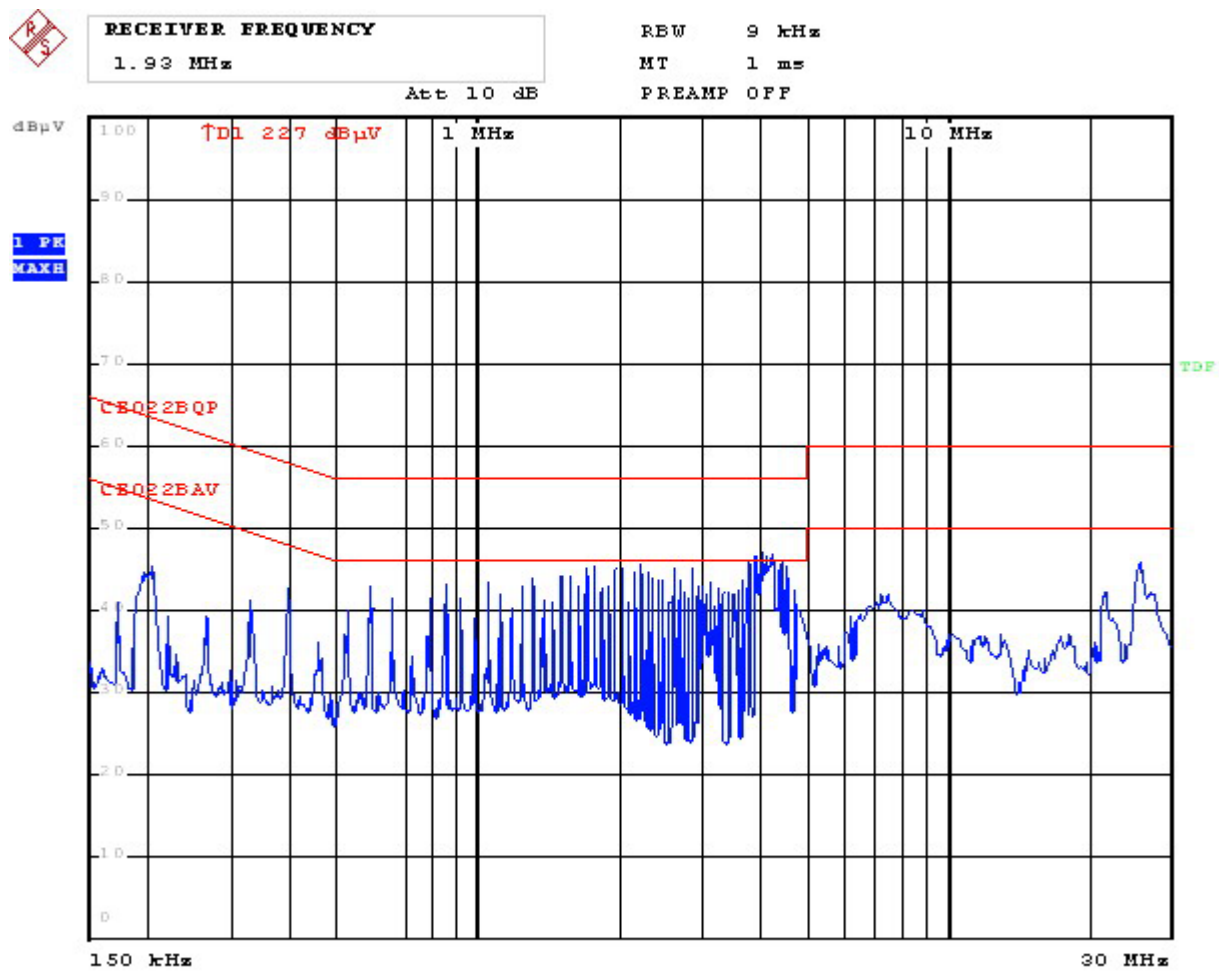
### **12.2. ANTENNA CONNECTED CONSTRUCTION**

The antenna used in this product is Chip antenna without connector. The maximum Gain of the antenna is 3.0dBi.



## **APPENDIX I TEST CURVES**





## **APPENDIX II TEST PICTURE**

**Photo 1 Conducted Disturbance Test**



**Photo 2 Radiated disturbances**



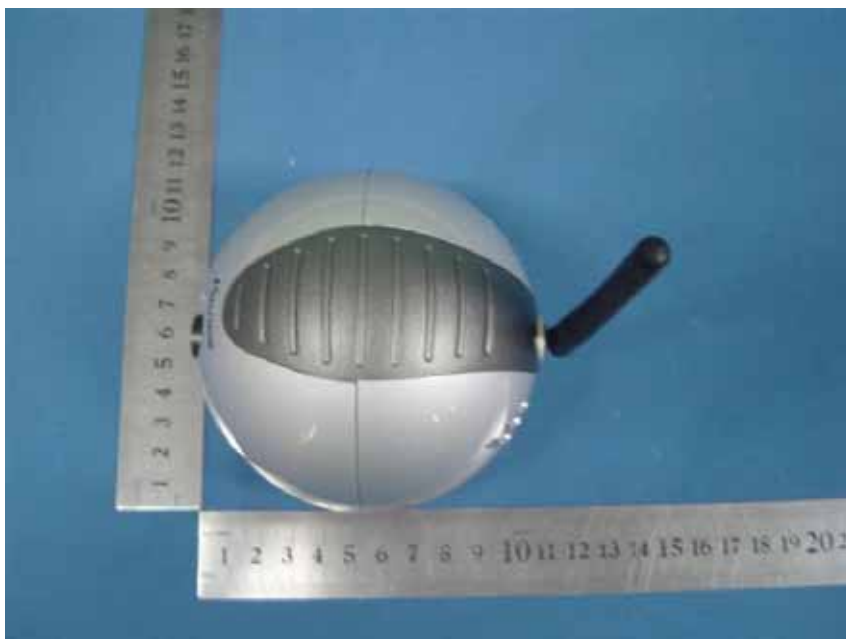
**Photo 3 General Appearance of the EUT**



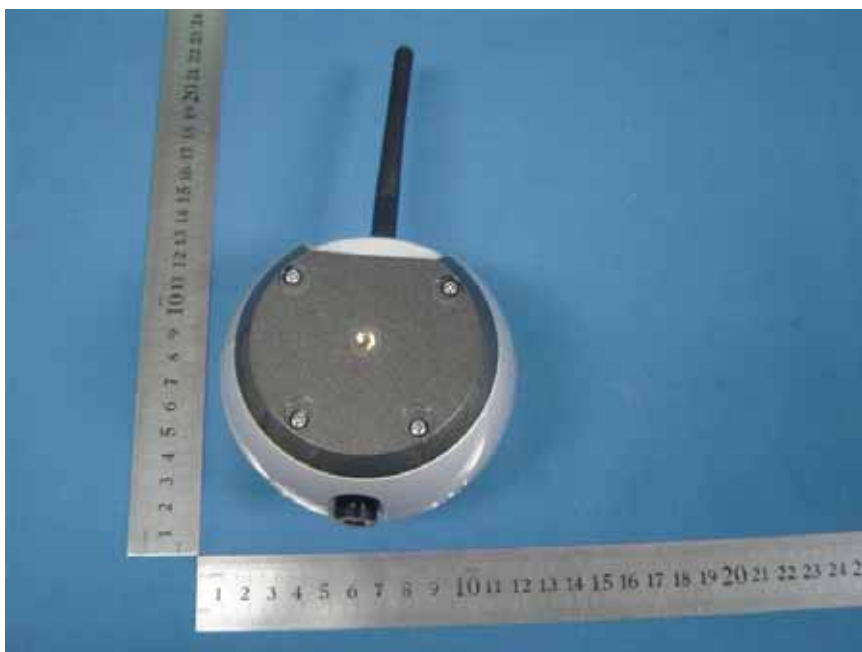
**Photo 4 General Appearance of the EUT(Bottom)**



**Photo5 The rear Side Appearance of the EUT**



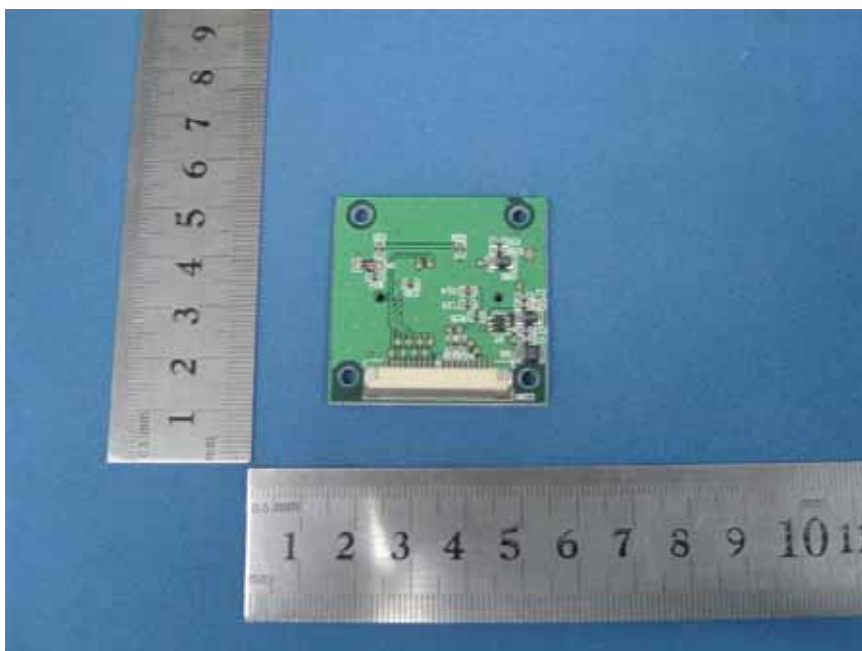
**Photo6 The Bottom Appearance of the EUT**



**Photo 7 General Appearance of the EUT(Inside)**

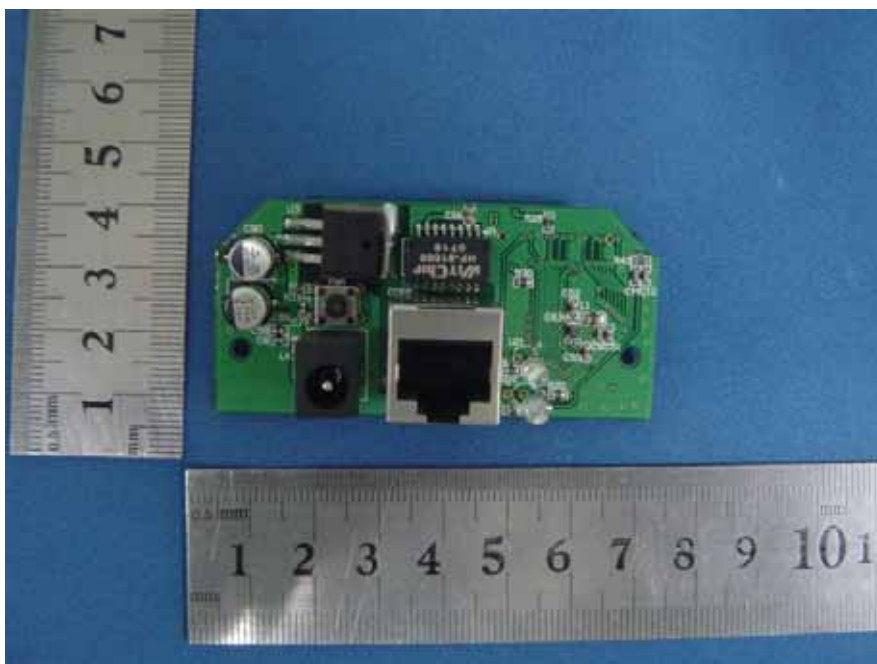


**Photo 8 camera pcb of the EUT**

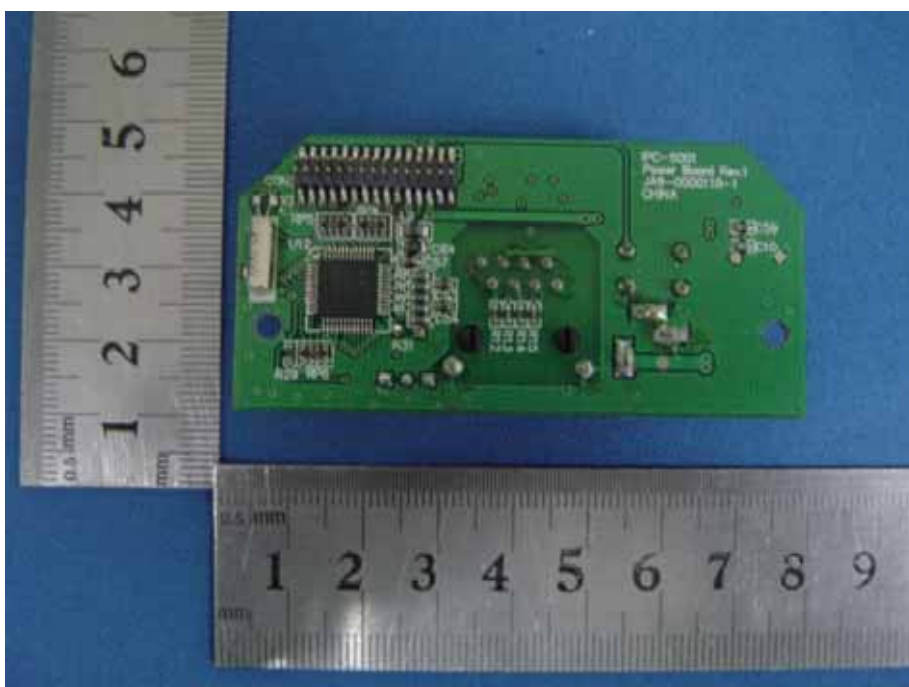


**Photo 9 Power of the EUT**

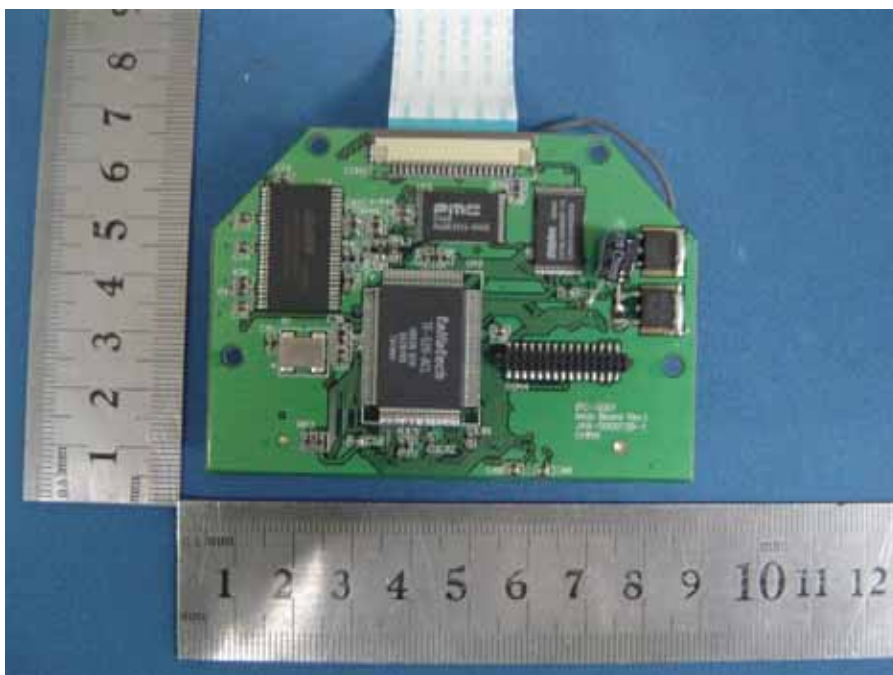




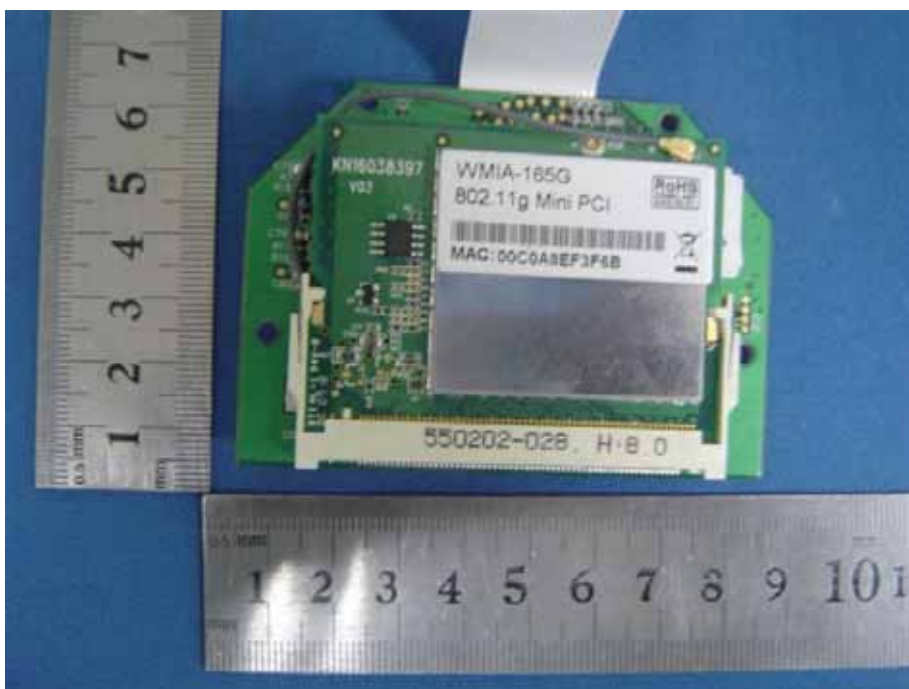
**Photo 10 Power of the EUT**



**Photo 11 Mainboard & RF pcb of the EUT**



**Photo 12 Mainboard & RF pcb of the EUT**



**Photo 13 Mainboard & RF pcb of the EUT**



**Photo 14 Mainboard & RF pcb of the EUT**

