

# Certification of Compliance

## CFR 47 Part 15 Subpart C

Test Report File No. : 07-IST-0117(V1.1) Date of Issue : April 05, 2007

Model(s) : PLAZZO  
Kind of Product : RF Remote Control Unit  
FCC ID : SCBPLZ  
Applicant : Seoby Electronics Co, Ltd.  
Address : 38-2 Anyang2-dong, Manan-gu, Anayang-city Gyeonggi-Do, Korea  
  
Manufacturer : Seoby Electronics Co, Ltd.  
Address : 38-2 Anyang2-dong, Manan-gu, Anayang-city Gyeonggi-Do, Korea

### Test Result

☒ Positive

☐ Negative

Reviewed By

Approved By



S.J.CHO / EMC Group Manager



J.H.LEE / Chief

### Comment(s)

- Investigations requested : Measurement to the relevant clauses of FCC rules and regulations Part 15 Subpart C.

- The test report with appendix consists of 21 pages.

- The test result only responds to the tested sample.

- It is not allowed to copy this report even partly without the allowance of IST EMC Laboratory.

- This equipment as for has been shown to be capable of continued compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4

I assume full responsibility for accuracy and completeness of these data.



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-	

Note:

## INFORMATIONS OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd. (*FCC Filing Lab.*)

Singal-dong, Giheung-gu, Yongin-City

Kyonggi-Do, 400-19, Korea

TEL : +82 31 326 6700

FAX : +82 31 326 6797

## ENVIRONMENTAL CONDITIONS

Temperature

15 °C

Humidity

23 %

Atmospheric pressure

1010 mbar

## POWER SUPPLY SYSTEM USED

Power supply system

DC 3V by Battery(Battery type(Size “AAA”)

(Refer to the product information)

## PRODUCT INFORMATION

Items	Specifications
Model Name	PLAZZO
Frequency	433.92MHz
Channel	1
Frequency drift	±100KHz
Transmitter Power	Max. +0dBm
Antenna	Built-in on the PCB Antenna
Power Supply	2x AAA Alkaline battery
Modulation method	ASK/OOK
Communication method	Simplex
Stand by Current	Below 1uA
Transmit Current	Max. 10mA
Operating Temperature	0°C ~55°C

- EMC suppression device is not used during the test.
- Please refer to user's manual.

## SUMMARY

### Test Descriptions

- Radiated Emission	PASS
- Radiated Emission Result	
- Bandwidth	PASS
- Test Result	
- The Transmission time	PASS
- Test Result	

### Test Date

Begin of Testing : Mar 23, 2007 - End of Testing : Apr 4, 2007

Prepared By

*Note :*

- ■ means the test is applicable,
- □ is not applicable.



C.W.Kim / Project Engineer

## Equipment Under Test

### EUT Type :

- ☐ Table-Top. ☐ Floor-Standing.  
☐ Table-Top and Floor-Standing(Combination).  
☒ Hand held

### Operation – mode of the E.U.T. :

The equipment under test was operated during the measurement under following conditions :

- ☐ Standby Mode  
☒ Operational Condition : ☒ continue Transmit

### Configuration of the equipment under test :

Following peripheral devices and interface cables were connected during the measurement :

Equipment	Type	Brand	Serial No.
RF Remote Control Unit	PLAZZO	Seoby Electronics Co, Ltd.	N/A

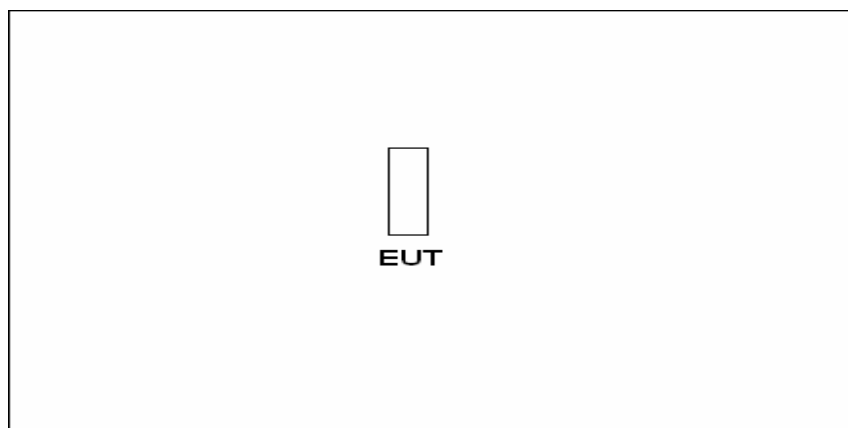
### EUT exercise Software

To get a maximum radiated emission from the EUT, the touch screen o the EUT was pushed to transmit RF signal continuously.

To activate continuous transmission, software was changed as above for testing only.

To get a maximum emission levels from the EUT, the EUT was moved throughout the X, Y, and Z planes.

## Test Set-Up



Radiated Emissions

## Measurement Uncertainty Calculations

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994).

Contribution (Conducted Emissions)	Probability Distribution	Uncertainty (±dB)
		0.15-30MHz
Receiver Specification	Rectangular	1.5
LISN Coupling Specification	Rectangular	1.5
Cable and Input Attenuator Calibration	Normal (k=2)	0.5
Mismatch to Reciver	U-Shaped	-0.8 / +0.7
System Repeatability	Normal (k=1)	0.2
Combined Standard Uncertainty	Normal (k=2)	-1.85 / +1.71
Expanded Uncertainty U	Normal (k=2)	-3.7 / +3.42

$$U_{c,minus} = -1.85, U_{c,plus} = 1.71$$

$$U = -3.70 / +3.42 (k=2, 95.45\% \text{ confidence level})$$

Contribution (Radiated Emissions)	Probability Distribution	Uncertainties(±dB)
		3 m
Antenna		
Factor	Normal (k=2)	0.9968
Frequency Interpolation	Rectangular	0.1039
Height Variation	Rectangular	-2.6 / +1.5
Directivity Difference	Rectangular	-1.0 / +0
Phase Center Location	Rectangular	1.0
Cable Loss	Normal (k=2)	0.5
Receiver		
Voltage Accuracy	Normal (k=2)	2.0
Pulse Response	Rectangular	1.5
Absolute Repetition Rate	Rectangular	1.5
Mismatch to Receiver		
$ \Gamma_{\text{antenna}}  = 0.33$	U-Shaped	-1.0 / +0.9
$ \Gamma_{\text{receiver}}  = 0.33$		
System Repeatability	Std Deviation	0.5
Combined Standard Uncertainty	Normal	-2.6048 / 2.2775
Expanded Uncertainty U	Normal (k=2)	-5.21 / +4.55

$$U_{c,minus} = -2.6048, U_{c,plus} = 2.2775$$

$$U = -5.21 / +4.55 (k=2, 95.45\% \text{ confidence level})$$

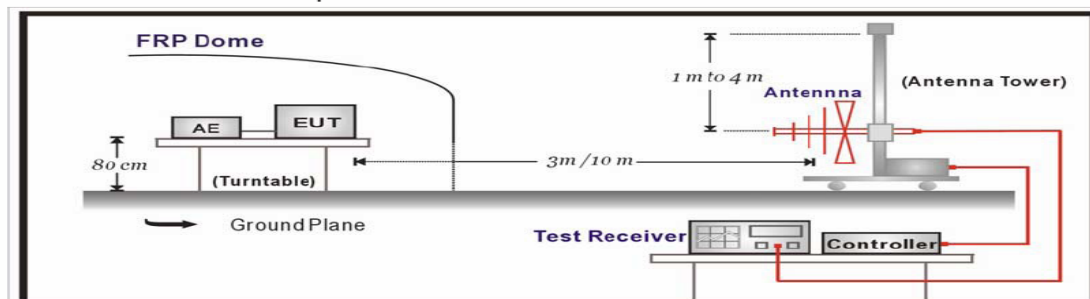
## **Radiated Emissions:**

The measurement was performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120KHz.

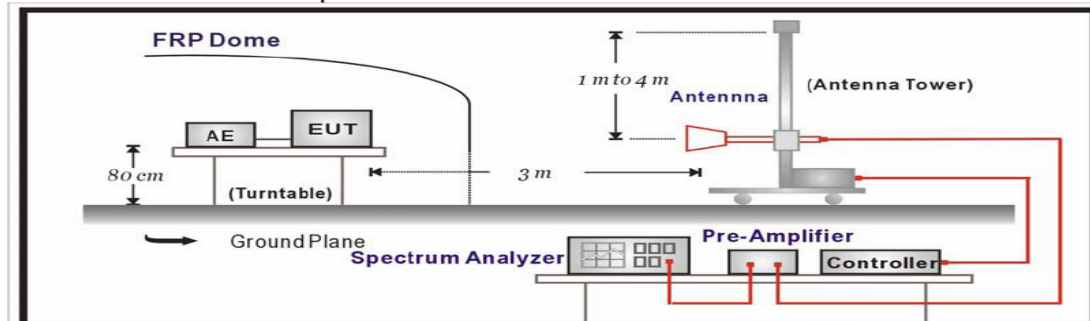
### **Procedure of Test**

Preliminary measurements were made at 3 meter using bi-log antennas, and spectrum analyzer to determine the frequency producing the max. emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn-table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30MHz to 1000MHz using bi-log antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3-meters test distance using bi-log antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuation. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-case emission.(The bandwidth below 1GHz setting on the field strength meter is 120KHz and above 1GHz is 1MHz.)

**Under 1GHz Test Setup:**



**Above 1GHz Test Setup:**



## Limits

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 :

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency (MHz)	μV/meter	dBμV/meter
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

*Remarks : Except as provided in paragraph(g), fundamental emissions from an intentional radiators operating under This section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section 15.231 and 15.241.*

FCC PART 15 subpart C section 15.231:

Fundamental Frequency (MHz)	Field Strength of Fundamental (μV/meter)	Field Strength of Spurious Emissions (μV/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,250**	125 to 375**
174-260	3,750	375
260-470	3,750 to 12,500**	375 to 1,250**
Above 470	12,500	1,250

**\*\* linear interpolations**

*[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = 56.81818(F)-6136.3636; for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F)-7083.3333. The maximum permitted unwanted emission level is 20dB below the maximum permitted Fundamental level.]*

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

Fundamental Frequency (MHz)	Field Strength				Measurement Distance (meter)
	Fundamental		Spurious Emissions		
	PK(dBuV/m)	AV(dBuV/m)	PK(dBuV/m)	AV(dBuV/m)	
433	101.11	81.11	81.13	61.13	3

*Fundamental : Average limit : uV/m at 3 meters = 41.6667(433)-7083.3333 = 11375.15= 20log\*11375.15 = 81.11*

*Peak limit : uV/m at 3 meters = 101.11*

*Spurious Emissions : Average limit : uV/m at 3 meters = 20log\*1139 = 61.13*

*Peak limit : uV/m at 3 meters = 81.13*



## **Radiated Emission**

### ◆**Test Equipment Used**

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESCI	Test Receiver	Rohde & Schwarz	May. 23, 2006	100373
SPECTRUM ANALYZER	E7405A	AGILENT	Jan. 08, 2006	MY420000092
BICONILOG Antenna	VULB 9160	Schwarz beck	Aug. 14, 2006	3047
HORN-Antenna	3115	EMCO	Oct. 03, 2005	9012-3602
HORN-Antenna	SAS-571	A.H. SYSTEMS	Apr. 25, 2005	500
PRE AMPLIFIER	8449B OPT H02	Rohde & Schwarz	Oct. 17, 2006	3008A0530

*Note : 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to RRL, KRISS, KTL and HCT.*

*2. The calibration interval of horn ant. and loop ant. is 24 months*

### **Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

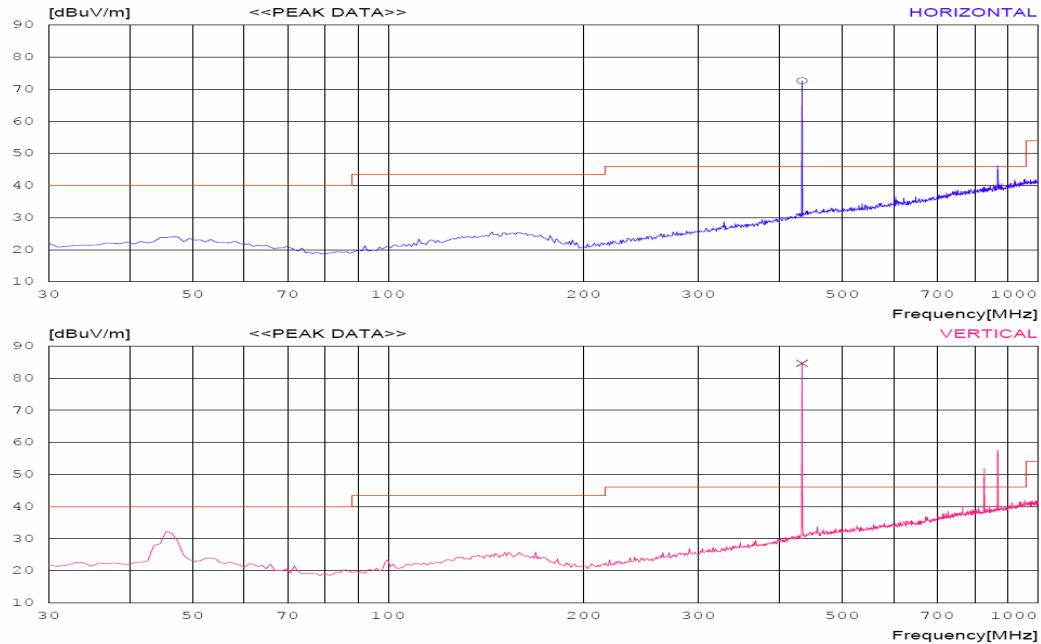
$$\text{Peak} = \text{Reading} + \text{Corrected Factor}$$

Where

Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)

### Radiated Emissions Result

EUT	PLAZZO	PROBE	RF 0.3GHz~1GHz-(X Plane)H/V
POWER	DC 3.3V of battery	NOTE	TX-CH 1(433.92MHz)



Frequency MHz	Reading dBuV	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Total dBuV	Limit dBuV	Margin dB
433.9	53.4(PK)	H	14.8	3.3	0.0	71.5	101.11	29.61
*433.9	65.4(PK)	V	14.8	3.3	0.0	83.5	101.11	17.61
867.1	18.3(PK)	H	22.1	5.2	0.0	45.6	81.13	35.53
867.1	32.0(PK)	V	22.1	5.2	0.0	59.3	81.13	21.83

Frequency MHz	Reading dBuV	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Total dBuV	Limit dBuV	Margin dB
433.9	44.3	H	14.8	3.3	0.0	62.4	81.11	18.71
*433.9	58.6	V	14.8	3.3	0.0	76.7	81.11	4.41
867.1	12.7	H	22.1	5.2	0.0	40.0	61.13	21.13
867.1	25.9	V	22.1	5.2	0.0	53.2	61.13	7.93

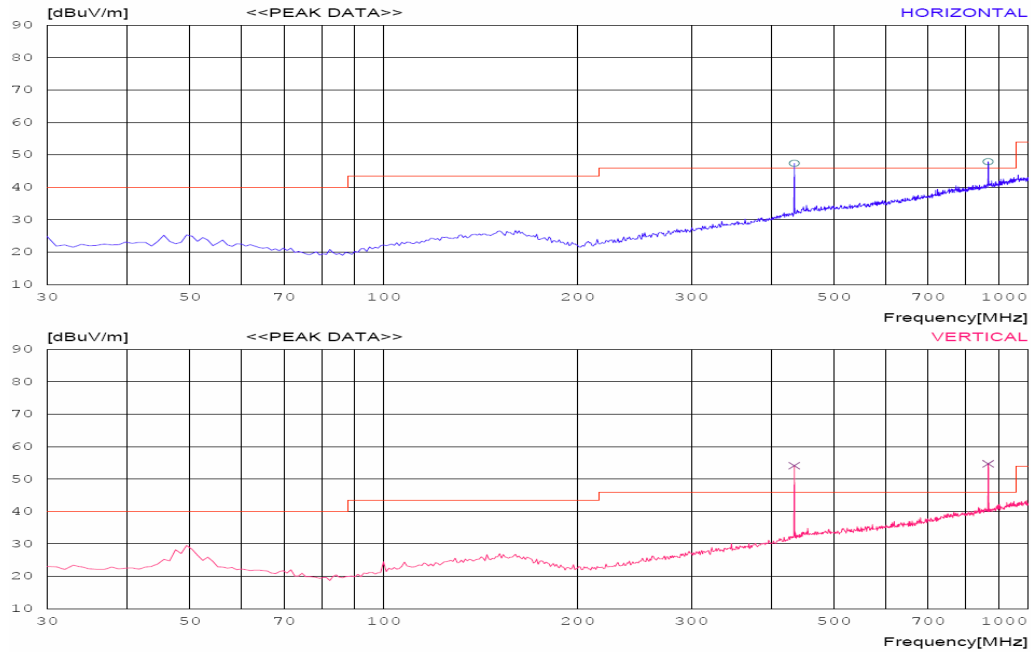
Note : 1. Remark "\*" means that the data is the worst emission level.

2. Reading levels are peak and average value.

3. Measurement level = reading level + correct factor

4. To get a maximum emission level from the EUT, the EUT was moved throughout the X,Y and Z planes, but the worst data was corrected in this report.

EUT	PLAZZO	PROBE	RF 0.3GHz~1GHz-(Y Plane)H/V
POWER	DC 3.3V of battery	NOTE	TX-CH 1(433.92MHz)



Frequency MHz	Reading dBuV	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Total dBuV	Limit dBuV	Margin dB
433.9	27.0(PK)	H	14.8	3.3	0.0	45.1	101.11	56.01
433.9	33.7(PK)	V	14.8	3.3	0.0	51.8	101.11	49.31
867.1	19.9(PK)	H	22.1	5.2	0.0	47.2	81.13	33.93
*867.1	26.7(PK)	V	22.1	5.2	0.0	54.0	81.13	27.13

Frequency MHz	Reading dBuV	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Total dBuV	Limit dBuV	Margin dB
433.9	19.9(AV)	H	14.8	3.3	0.0	38.0	81.11	43.11
433.9	27.5(AV)	V	14.8	3.3	0.0	45.6	81.11	35.51
867.1	12.8(AV)	H	22.1	5.2	0.0	40.1	61.13	21.03
*867.1	19.6(AV)	V	22.1	5.2	0.0	46.9	61.13	14.23

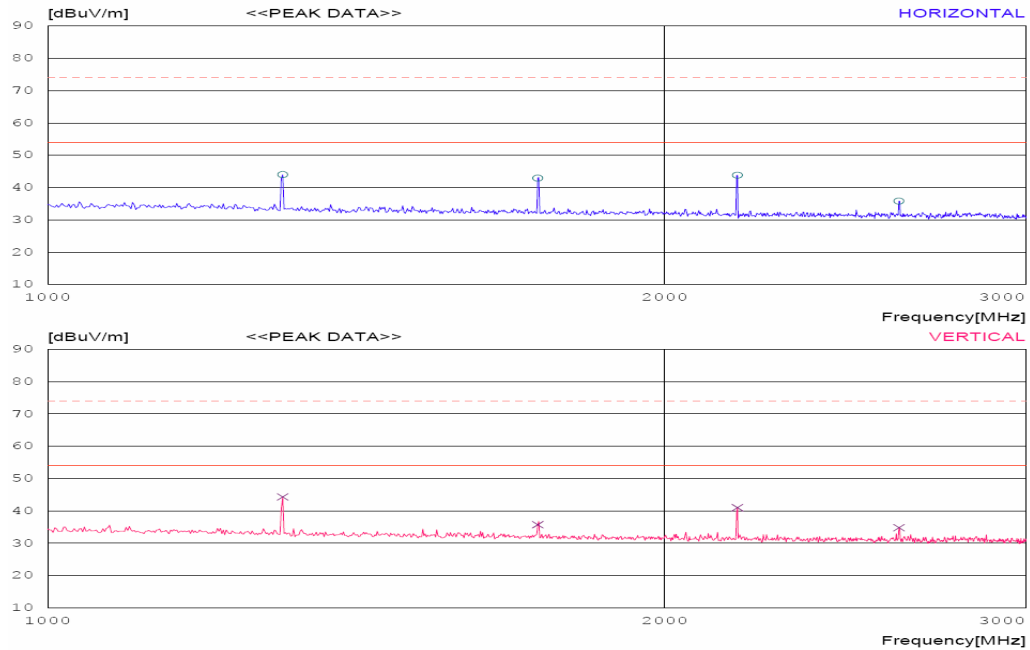
Note : 1. Remark "\*" means that the data is the worst emission level.

2. Reading levels are peak and average value.

3. Measurement level = reading level + correct factor

4. To get a maximum emission level from the EUT, the EUT was moved throughout the X,Y and Z planes, but the worst data was corrected in this report.

EUT	PLAZZO	PROBE	RF Above 1GHz-(X Plane)H/V
POWER	DC 3.3V of battery	NOTE	TX-CH 1(433.92MHz)



Frequency MHz	Reading dBuV(PK)	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Total dBuV	Limit dBuV	Margin dB
1,302.0	44.0	H	6.1	6.0	36.5	19.6	74.0	54.4
1,302.0	44.3	V	6.1	6.0	36.5	19.9	74.0	54.1
1,734.0	42.9	H	6.1	6.0	36.5	18.5	74.0	55.5
1,734.0	35.7	V	6.1	6.0	36.5	11.3	74.0	62.7
*2,170.0	43.8	H	8.3	13.7	36.2	29.6	74.0	44.4
2,170.0	41.0	V	8.3	13.7	36.2	26.8	74.0	47.2
2,602.0	35.8	H	8.3	13.7	36.2	21.6	74.0	52.4
2,602.0	34.8	V	8.3	13.7	36.2	20.6	74.0	53.4

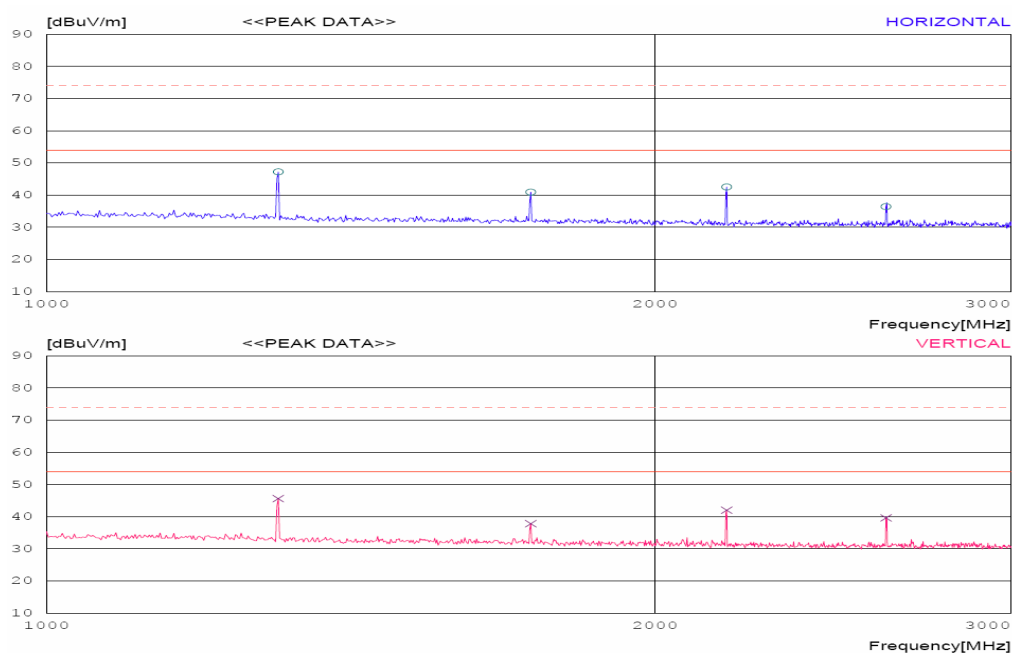
Note : 1. Remark "\*" means that the data is the worst emission level.

2. All reading levels are peak value.

3. Measurement level = reading level + correct factor

4. To get a maximum emission level from the EUT, the EUT was moved throughout the X,Y, and Z planes, but the worst data was corrected in this report.

EUT	PLAZZO	PROBE	RF Above 1GHz-(Y Plane)H/V
POWER	DC 3.3V of battery	NOTE	TX-CH 1(433.92MHz)



Frequency MHz	Reading dBuV(PK)	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Total dBuV	Limit dBuV	Margin dB
1,302.0	47.2	H	6.1	6.0	36.5	22.8	74.0	51.2
1,302.0	45.6	V	6.1	6.0	36.5	21.2	74.0	52.8
1,736.0	40.9	H	6.1	6.0	36.5	16.5	74.0	57.5
1,736.0	37.8	V	6.1	6.0	36.5	13.4	74.0	60.6
2,170.0	42.5	H	8.3	13.7	36.2	28.3	74.0	45.7
*2,170.0	42.0	V	8.3	13.7	36.2	27.8	74.0	46.2
2,602.0	36.4	H	8.3	13.7	36.2	22.2	74.0	51.8
2,602.0	39.6	V	8.3	13.7	36.2	25.4	74.0	48.6

Note : 1. Remark "\*" means that the data is the worst emission level.

2. All reading levels are peak value.

3. Measurement level = reading level + correct factor

4. To get a maximum emission level from the EUT, the EUT was moved throughout the X,Y and Z planes, but the worst data was corrected in this report.

## FCC PART 15.231 REQUIREMENTS

### TEST Equipment

The following test equipment are used during the test:

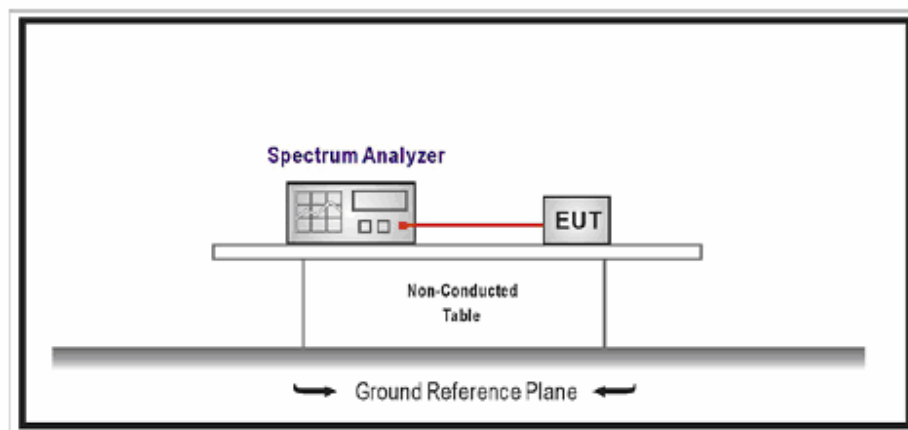
Name	Type	Manufacturer	Calibration. Date	Serial Number
ESCI	Test Receiver	Rohde & Schwarz	May. 23, 2006	100373
SPECTRUM ANALYZER	E7405A	AGILENT	Jan. 08, 2006	MY420000092
SPECTRUM ANALYZER	R3273	ADVANTEST	Dec. 11, 2006	95090431

*Note : 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to RRL, KRISS, KTL and HCT.*

*2. The calibration interval of horn ant. and loop ant. is 24 months*

### Test setup

RF Conducted Measurement:



### APPLICABLE STANDARD

(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.

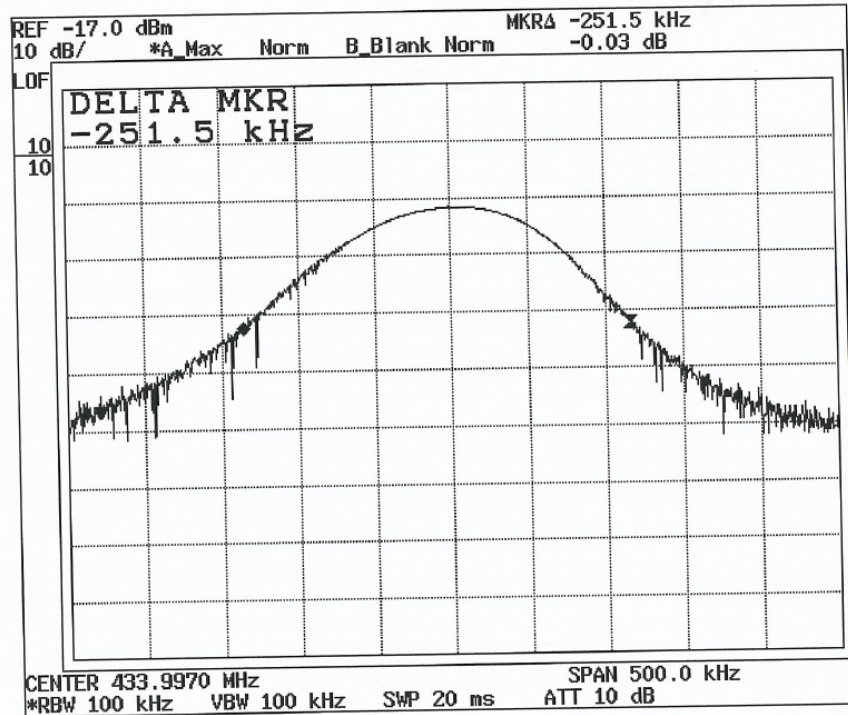
Carrier Frequency (MHz)	Limit		Remark
433.92	$F(\text{MHz}) \times 0.25\%$	1,084,800 Hz	The points 20 dB down from the modulated carrier

### Test specification

According to FCC Part 15 Subpart C paragraph 15.231©:2005

The bandwidth of the Result

Carrier Frequency (MHz)	Bandwidth of the emission	Limit	Remark
433.92	271KHz	1,084,800 Hz	The points 20 dB down from the modulated carrier



## FCC PART 15.231 REQUIREMENTS

### TEST Equipment

The following test equipment are used during the test:

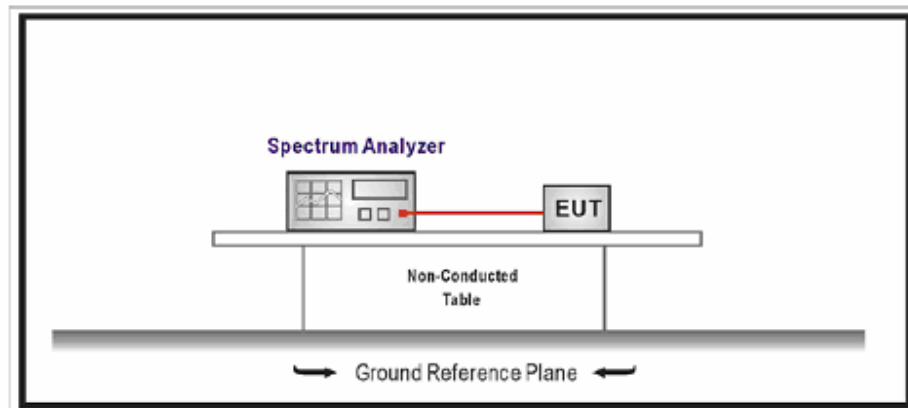
Name	Type	Manufacturer	Calibration. Date	Serial Number
ESCI	Test Receiver	Rohde & Schwarz	May. 23, 2006	100373
SPECTRUM ANALYZER	E7405A	AGILENT	Jan. 08, 2006	MY420000092
SPECTRUM ANALYZER	R3273	ADVANTEST	Dec. 11, 2006	95090431

*Note : 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to RRL, KRISS, KTL and HCT.*

*2. The calibration interval of horn ant. and loop ant. is 24 months*

### Test setup

RF Conducted Measurement:



### APPLICABLE STANDARD

- (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.
- (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.
- (4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition
- (5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

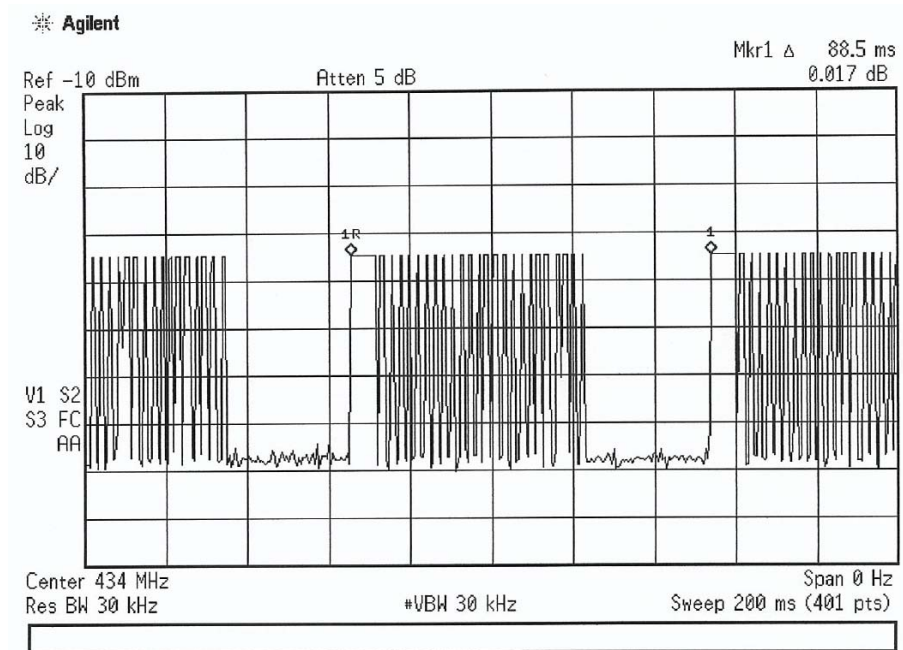
### Test specification

According to FCC Part 15 Subpart C paragraph 15.231©:2005



### The Transmission time of the Result

According to 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



[433.9MHz]

*Note: This EUT operated manually. It is deactivated within less than 5 seconds of being released.*

## **ANTENNA REQUIREMENT**

### **1 Standard Applicable**

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.

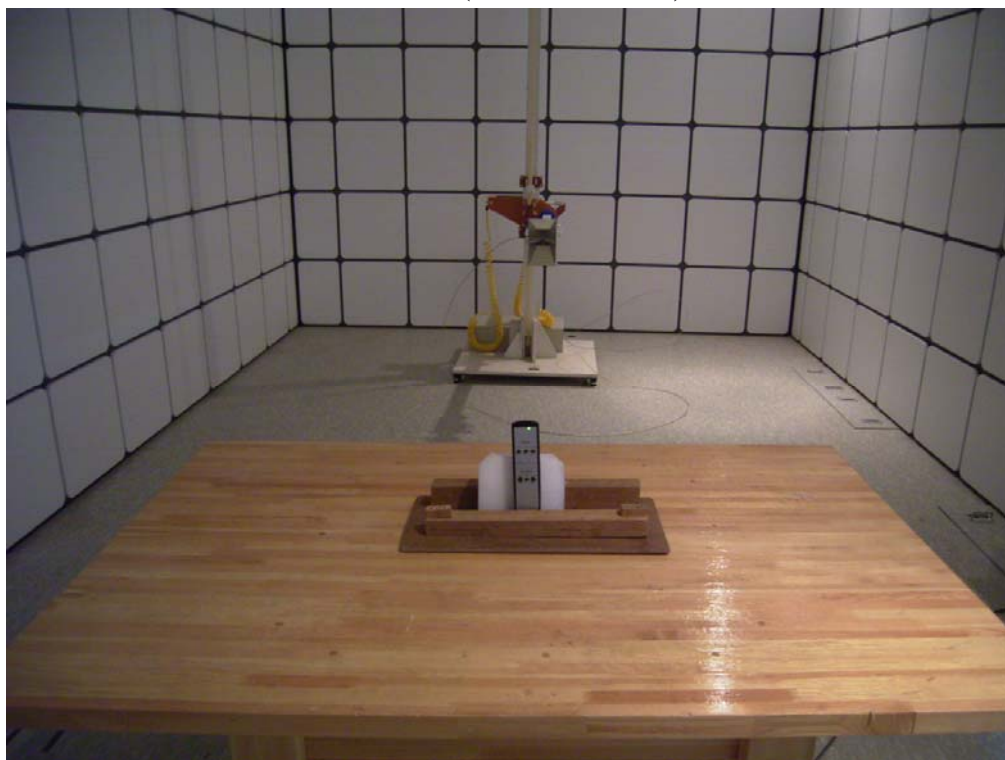
### **2 Antenna Construction**

The antenna is permanently mounted on PCB, no consideration of replacement.

**Appendix A. The Photos of Test Setup**



**Radiated Emissions(30MHz~1000MHz)- Y View**



**Radiated Emissions(1000MHz~3000MHz)- Y View**

**Appendix A. The Photos of Test Setup**



**Radiated Emissions(30MHz~1000MHz)- Z View**



**Radiated Emissions(1000MHz~3000MHz)- Z View**



Appendix B. The Photos of Equipment Under Test



Front View



Rear View