

FCC TEST REPORT  
For  
ECRYSTAL CORPORATION  
Remote Control  
Model No.: CRC1305

Prepared for : ECRYSTAL CORPORATION  
Address : 1617 E Adams Blvd, Los Angeles, CA 90011, USA

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.  
Address : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue,  
Bao'an District, Shenzhen, Guangdong, China

Date of receipt of test sample : December 10, 2013  
Number of tested samples : 1  
Serial number : Prototype  
Date of Test : December 10, 2013 – March 01, 2014  
Date of Report : March 01, 2014

**FCC TEST REPORT**  
**FCC CFR 47 PART 15 C(15.231): 2012****Report Reference No. .... : LCS131210272TF**

Date of Issue ..... : March 01, 2014

**Testing Laboratory Name..... : Shenzhen LCS Compliance Testing Laboratory Ltd.**Address ..... : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue,  
Bao'an District, Shenzhen, Guangdong, ChinaTesting Location/ Procedure..... : Full application of Harmonised standards ☒  
Partial application of Harmonised standards ☐  
Other standard testing method ☐**Applicant's Name..... : ECRYSTAL CORPORATION**

Address ..... : 1617 E Adams Blvd, Los Angeles, CA 90011, USA

**Test Specification**

Standard ..... : FCC CFR 47 PART 15 Subpart C: 2012, ANSI C63.4-2003

**Test Report Form No..... : LCSEMC-1.0**

TRF Originator ..... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF ..... : Dated 2011-03

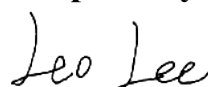
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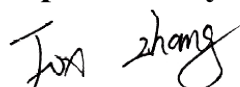
**Test Item Description. .... : Remote Control**

Trade Mark ..... : ECRYSTAL

Model/ Type reference..... : CRC1305

Ratings ..... : DC 3.7V by battery(3100mAh)  
Recharge Voltage: DC 5V/1AResult ..... : **Positive****Compiled by:**

Leo Lee/ File administrators

**Supervised by:**

Fox Zhang/ Technique principal

**Approved by:**

Gavin Liang/ Manager

## FCC--TEST REPORT

**Test Report No. : LCS131210272TF**March 01, 2014

Date of issue

Type / Model..... : CRC1305

EUT..... : Remote Control

**Applicant..... : ECRYSTAL CORPORATION**

Address..... : 1617 E Adams Blvd, Los Angeles, CA 90011, USA

Telephone..... : /

Fax..... : /

**Manufacturer..... : SHANGHAI HUIBO AUTOMATIC GAUGE CO., LTD**

Address..... : Room 1611, 19 WuNing Road, ShangHai, China

Telephone..... : /

Fax..... : /

**Factory..... : SHANGHAI HUIBO AUTOMATIC GAUGE CO., LTD**

Address..... : Room 1611, 19 WuNing Road, ShangHai, China

Telephone..... : /

Fax..... : /

**Test Result****Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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# 1. GENERAL INFORMATION

## 1.1. Description of Device (EUT)

|                       |                                                             |
|-----------------------|-------------------------------------------------------------|
| EUT                   | : Remote Control                                            |
| Model Number          | : CRC1305                                                   |
| Power Supply          | : DC 3.7V by battery(3100mAh)<br>Recharge Voltage: DC 5V/1A |
| Frequency Range       | : 433.92MHz                                                 |
| Modulation Type       | : FSK                                                       |
| Antenna Type and Gain | : Integral Antenna, 0dBi                                    |

## 1.2. Objective

The primary objective of the manufacturer is compliance with Subpart C of Part 15 of FCC Rules for the radiated and conducted emissions of intentional radiators and Industry Canada RSS-210 for Low Power, License-Exempt Radio Communication Devices. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules and Industry Canada Radio Standards Procedure RSP-100.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

## 1.3. Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106kPa

#### 1.4. Host System Configuration List and Details

| Manufacturer | Description | Model | Serial Number | Certificate |
|--------------|-------------|-------|---------------|-------------|
| Lenovo       | Notebook    | B470  | WB05067151    | DOC         |

#### 1.5. External I/O Cable

| I/O Port Description | Quantity | Cable |
|----------------------|----------|-------|
| --                   | --       | --    |

#### 1.6. Description of Test Facility

##### Site Description

EMC Lab.

: Accredited by CNAS, June 04, 2010

The Certificate Registration Number. is L4595.

Accredited by FCC, July 14, 2011

The Certificate Registration Number. is 899208.

Accredited by Industry Canada, May. 02, 2011

The Certificate Registration Number. is 9642A-1

#### 1.7. Statement of The Measurement Uncertainty

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with NAMAS document NIS 81.

| Test Item              |   | Frequency Range | Uncertainty         | Note |
|------------------------|---|-----------------|---------------------|------|
| Radiation Uncertainty  | : | 9KHz~30MHz      | $\pm 3.10\text{dB}$ | (1)  |
|                        |   | 30MHz~200MHz    | $\pm 2.96\text{dB}$ | (1)  |
|                        |   | 200MHz~1000MHz  | $\pm 3.10\text{dB}$ | (1)  |
|                        |   | 1GHz~26.5GH     | $\pm 4.20\text{dB}$ | (1)  |
| Conduction Uncertainty | : | 150kHz~30MHz    | $\pm 1.63\text{dB}$ | (1)  |
| Power disturbance      | : | 30MHz~300MHz    | $\pm 1.60\text{dB}$ | (1)  |

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

## 2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd..

### 2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

### 2.2. EUT Exercise

The EUT was operated in the normal operating mode. The TX frequency that was fixed which was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.231 under the FCC Rules Part 15 Subpart C.

### 2.3. General Test Procedures

#### 2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4

### 2.4. Instrument Calibration

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

### 2.5. Test Mode

The EUT has been tested under engineering mode. The field strength of radiation emission was measured in the following position: EUT stand-up position (Y axis), lie-down position (X, Z axis).

The worst case of X axis was reported. For radiated emission, the EUT receiving DC 3.7V power by a new battery during the testing. For line power conducted emission, the EUT received DC 3.7V power by battery and charged by notebook via USB.

### **3. SYSTEM TEST CONFIGURATION**

#### **3.1. Justification**

The system was configured for testing in a continuous transmit condition.

#### **3.2. EUT Exercise Software**

N/A

#### **3.3. Special Accessories**

N/A

#### **3.4. Block Diagram/Schematics**

Please refer to the related document

#### **3.5. Equipment Modifications**

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

#### **3.6. Test Setup**

Please refer to the test setup photo.



## 4. SUMMARY OF TEST RESULTS

| Rules          | Description of test    | Result    |
|----------------|------------------------|-----------|
| §15.203        | Antenna Requirement    | Compliant |
| §15.205        | Restricted Band        | Compliant |
| §15.209        | General Requirement    | Compliant |
| §15.231 (b)    | Radiated Emissions     | Compliant |
| §15.231 (c)    | 20dB Bandwidth Testing | Compliant |
| §15.231 (a)(1) | Deactivation Testing   | Compliant |
| §15.231        | Duty cycle Factor      | Compliant |
| §15.207        | Conducted Emissions    | Compliant |

## 5. TEST ITEMS AND RESULTS

### 5.1. Transmitter Deactivation Time

FCC 15.231 (a)

#### 5.1.1. Limit

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

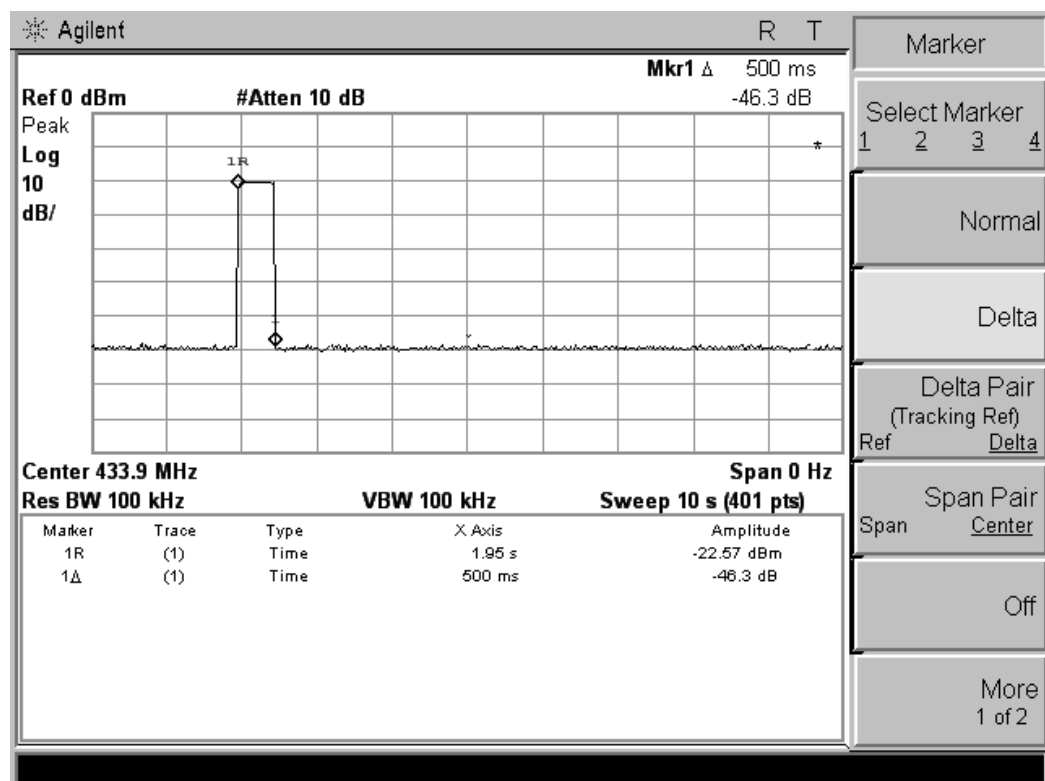
#### 5.1.2. Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

#### 5.1.3. Test Results

If a button is pressed, the device transmits only one telegram and the telegram is 1000 ms long and detail please refer to below plot.

| Frequency (MHz) | Activation Time (s) | Limit: not more than 5 seconds of being released (s) | Conclusion |
|-----------------|---------------------|------------------------------------------------------|------------|
| 433.92          | 0.5                 | 5                                                    | PASS       |



## 5.2. Transmitter Field Strength of Emissions

### 5.2.1. Limit

#### FCC §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 (microvolt/meter) | Field Strength of spurious emissions (microvolt/meter) |
|-----------------------------|-------------------------------------------------|--------------------------------------------------------|
| 40.66-40.70                 | 2,250                                           | 225                                                    |
| 70-130                      | 1,250                                           | 125                                                    |
| 130-174                     | 1,250 to 3,370                                  | 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                                                  |

[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,  $\mu\text{V/m}$  at 3 meters =  $56.81818(F) - 6136.3636$ ; for the band 260-470 MHz,  $\mu\text{V/m}$  at 3 meters =  $41.6667(F) - 7083.3333$ . The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz                        | MHz                 | MHz             | GHz              |
|----------------------------|---------------------|-----------------|------------------|
| 0.090 - 0.110              | 16.42 - 16.423      | 399.9 - 410     | 4.5 - 5.15       |
| <sup>1</sup> 0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614       | 5.35 - 5.46      |
| 2.1735 - 2.1905            | 16.80425 - 16.80475 | 960 - 1240      | 7.25 - 7.75      |
| 4.125 - 4.128              | 25.5 - 25.67        | 1300 - 1427     | 8.025 - 8.5      |
| 4.17725 - 4.17775          | 37.5 - 38.25        | 1435 - 1626.5   | 9.0 - 9.2        |
| 4.20725 - 4.20775          | 73 - 74.6           | 1645.5 - 1646.5 | 9.3 - 9.5        |
| 6.215 - 6.218              | 74.8 - 75.2         | 1660 - 1710     | 10.6 - 12.7      |
| 6.26775 - 6.26825          | 108 - 121.94        | 1718.8 - 1722.2 | 13.25 - 13.4     |
| 6.31175 - 6.31225          | 123 - 138           | 2200 - 2300     | 14.47 - 14.5     |
| 8.291 - 8.294              | 149.9 - 150.05      | 2310 - 2390     | 15.35 - 16.2     |
| 8.362 - 8.366              | 156.52475 -         | 2483.5 - 2500   | 17.7 - 21.4      |
| 8.37625 - 8.38675          | 156.52525           | 2655 - 2900     | 22.01 - 23.12    |
| 8.41425 - 8.41475          | 156.7 - 156.9       | 3260 - 3267     | 23.6 - 24.0      |
| 12.29 - 12.293             | 162.0125 - 167.17   | 3332 - 3339     | 31.2 - 31.8      |
| 12.51975 - 12.52025        | 167.72 - 173.2      | 3345.8 - 3358   | 36.43 - 36.5     |
| 12.57675 - 12.57725        | 240 - 285           | 3600 - 4400     | ( <sup>2</sup> ) |
| 13.36 - 13.41              | 322 - 335.4         |                 |                  |

1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

2 Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) 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:

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|-----------------|-----------------------------------|-------------------------------|
| 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                             |

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

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

#### 5.2.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter                        | Setting                                        |
|-------------------------------------------|------------------------------------------------|
| Attenuation                               | Auto                                           |
| Start Frequency                           | 1000 MHz                                       |
| Stop Frequency                            | 10th carrier harmonic                          |
| RB / VB (Emission in restricted band)     | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |
| RB / VB (Emission in non-restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |

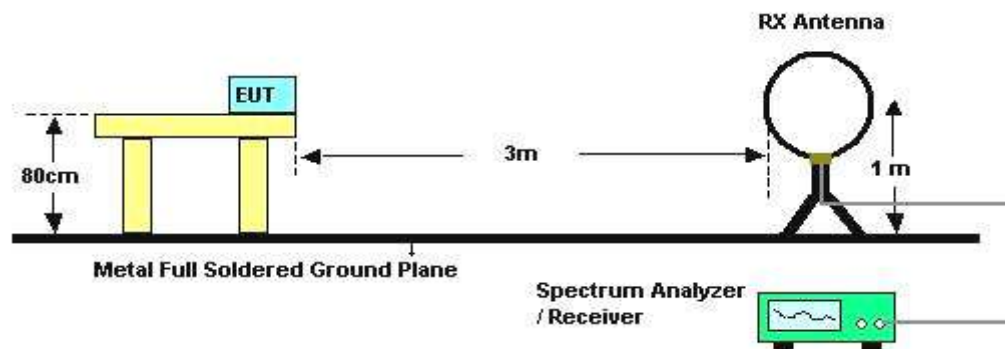
| Spectrum Parameter     | Setting                          |
|------------------------|----------------------------------|
| Attenuation            | Auto                             |
| Start ~ Stop Frequency | 9kHz~150kHz / RB 200Hz for QP    |
| Start ~ Stop Frequency | 150kHz~30MHz / RB 9kHz for QP    |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |

### 5.2.3. Test Procedures

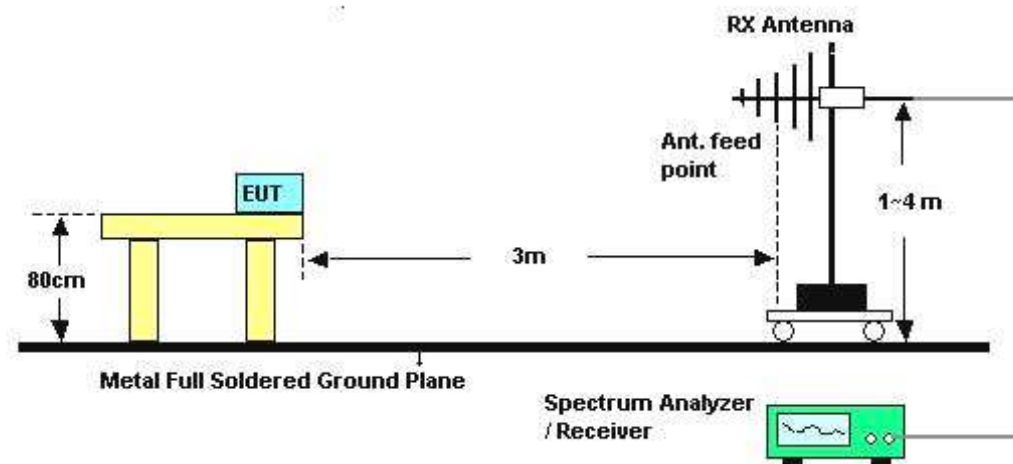
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 m to 4 m) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

### 5.2.4. Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



#### 5.2.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

#### 5.2.6. Results of Radiated Emissions (9kHz~30MHz)

|               |      |                |               |
|---------------|------|----------------|---------------|
| Temperature   | 25°C | Humidity       | 60%           |
| Test Engineer | Tree | Configurations | Automatically |

| Freq. (MHz) | Level (dBuV) | Over Limit (dB) | Over Limit (dBuV) | Remark   |
|-------------|--------------|-----------------|-------------------|----------|
| -           | -            | -               | -                 | See Note |

Note:

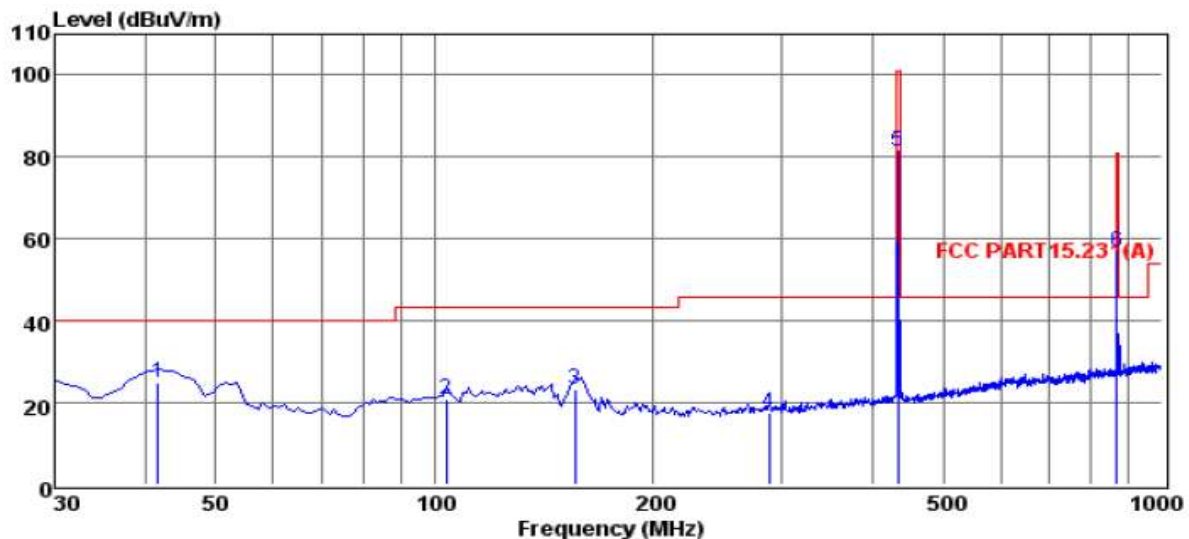
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

## 5.2.7. Results of Radiated Emissions (30MHz~1GHz)

|               |      |                |                       |
|---------------|------|----------------|-----------------------|
| Temperature   | 25°C | Humidity       | 60%                   |
| Test Engineer | Tree | Configurations | Fundamental Emissions |



Env./Ins: 24°C/56%  
 EUT: Remote Control  
 M/N: CRC1305  
 Power Rating: DC 3.7V  
 Test Mode: TX  
 Operator: Tree  
 Memo:  
 pol: VERTICAL

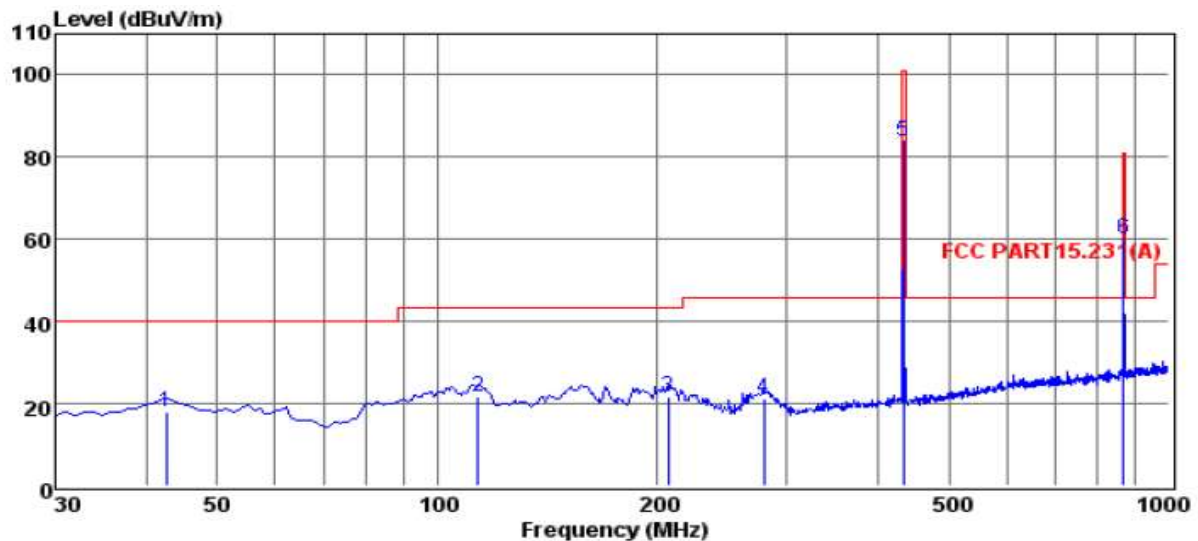
|   | Freq   | Reading | CabLos | Antfac | Measured | Limit  | Over   | Remark |
|---|--------|---------|--------|--------|----------|--------|--------|--------|
|   | MHz    | dBuV    | dB     | dB/m   | dBuV/m   | dBuV/m | dB     |        |
| 1 | 41.64  | 10.97   | 0.50   | 13.57  | 25.04    | 40.00  | -14.96 | QP     |
| 2 | 103.72 | 7.40    | 0.61   | 12.82  | 20.83    | 43.50  | -22.67 | QP     |
| 3 | 156.10 | 13.97   | 0.76   | 8.51   | 23.24    | 43.50  | -20.26 | QP     |
| 4 | 288.02 | 3.50    | 1.05   | 12.83  | 17.38    | 46.00  | -28.62 | QP     |
| 5 | 433.85 | 64.82   | 1.18   | 15.53  | 81.53    | 100.82 | -19.29 | Peak   |
| 6 | 867.70 | 34.30   | 1.87   | 20.76  | 56.93    | 80.82  | -23.89 | Peak   |

Note: 1. All readings are Quasi-peak values.

2. Measured= Reading + Antenna Factor + Cable Loss

3. The emission that are 20db below the official limit are not reported

| Fundamental and Harmonics Average Result |                     |                                     |                        |                         |            |
|------------------------------------------|---------------------|-------------------------------------|------------------------|-------------------------|------------|
| Freq(MHz)                                | Peak Level (dBμV/m) | AV Factor(dBμV/m) (see Section 5.4) | Average Level (dBμV/m) | Limit(dBμV/m) (average) | Conclusion |
| 433.92                                   | 81.53               | -13.19                              | 68.34                  | 80.8                    | PASS       |
| 867.84                                   | 56.93               | -13.19                              | 43.74                  | 60.8                    | PASS       |



Env./Ins: 24°C/56%  
 EUT: Remote Control  
 M/N: CRC1305  
 Power Rating: DC 3.7V  
 Test Mode: TX  
 Operator: Tree  
 Memo:  
 pol: HORIZONTAL

|   | Freq   | Reading | CabLos | Antfac | Measured | Limit  | Over   | Remark |
|---|--------|---------|--------|--------|----------|--------|--------|--------|
|   | MHz    | dBuV    | dB     | dB/m   | dBuV/m   | dBuV/m | dB     |        |
| 1 | 42.61  | 4.00    | 0.50   | 13.56  | 18.06    | 40.00  | -21.94 | QP     |
| 2 | 113.42 | 9.35    | 0.65   | 11.64  | 21.64    | 43.50  | -21.86 | QP     |
| 3 | 206.54 | 9.95    | 0.99   | 10.78  | 21.72    | 43.50  | -21.78 | QP     |
| 4 | 279.29 | 7.54    | 1.01   | 12.65  | 21.20    | 46.00  | -24.80 | QP     |
| 5 | 433.85 | 67.20   | 1.18   | 15.53  | 83.91    | 100.82 | -16.91 | Peak   |
| 6 | 867.70 | 37.50   | 1.87   | 20.76  | 60.13    | 80.82  | -20.69 | Peak   |

Note: 1. All readings are Quasi-peak values.

2. Measured= Reading + Antenna Factor + Cable Loss

3. The emission that are 20dB below the official limit are not reported

#### Fundamental and Harmonics Average Result

| Freq(MHz) | Peak Level (dBUV/m) | AV Factor(dBUV/m) (see Section 5.4) | Average Level (dBUV/m) | Limit(dBUV/m) (average) | Conclusion |
|-----------|---------------------|-------------------------------------|------------------------|-------------------------|------------|
| 433.92    | 83.91               | -13.19                              | 70.72                  | 80.8                    | PASS       |
| 867.84    | 60.13               | -13.19                              | 46.94                  | 60.8                    | PASS       |



## 5.2.8. Results of Radiated Emissions (Above1GHz)

|               |      |                |                                           |
|---------------|------|----------------|-------------------------------------------|
| Temperature   | 25°C | Humidity       | 60%                                       |
| Test Engineer | Tree | Configurations | Harmonics Emissions/<br>Spurious Emission |

| Freq.<br>MHz | Measured<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | Remark  | Pol.       |
|--------------|--------------------|-----------------|--------------|---------|------------|
| 1304.67      | 43.89              | 74              | -30.11       | Peak    | Horizontal |
| 1304.67      | 30.70              | 54              | -23.30       | Average | Horizontal |
| 2601.41      | 46.37              | 74              | -27.63       | Peak    | Horizontal |
| 2601.41      | 33.18              | 54              | -20.82       | Average | Horizontal |
| 1305.13      | 44.64              | 74              | -29.36       | Peak    | Vertical   |
| 1305.13      | 31.45              | 54              | -22.55       | Average | Vertical   |
| 2601.28      | 46.72              | 74              | -27.28       | Peak    | Vertical   |
| 2601.28      | 33.53              | 54              | -20.47       | Average | Vertical   |

1. Measuring frequencies from 9k~10th harmonic (ex. 5GHz), No emission found between lowest internal used/generated frequency to 30MHz.
2. Radiated emissions measured in frequency range from 9k~10th harmonic (ex. 5GHz) were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

### 5.3. 20dB Bandwidth Emissions

FCC 15.231 (c)

#### 5.3.1. Limit

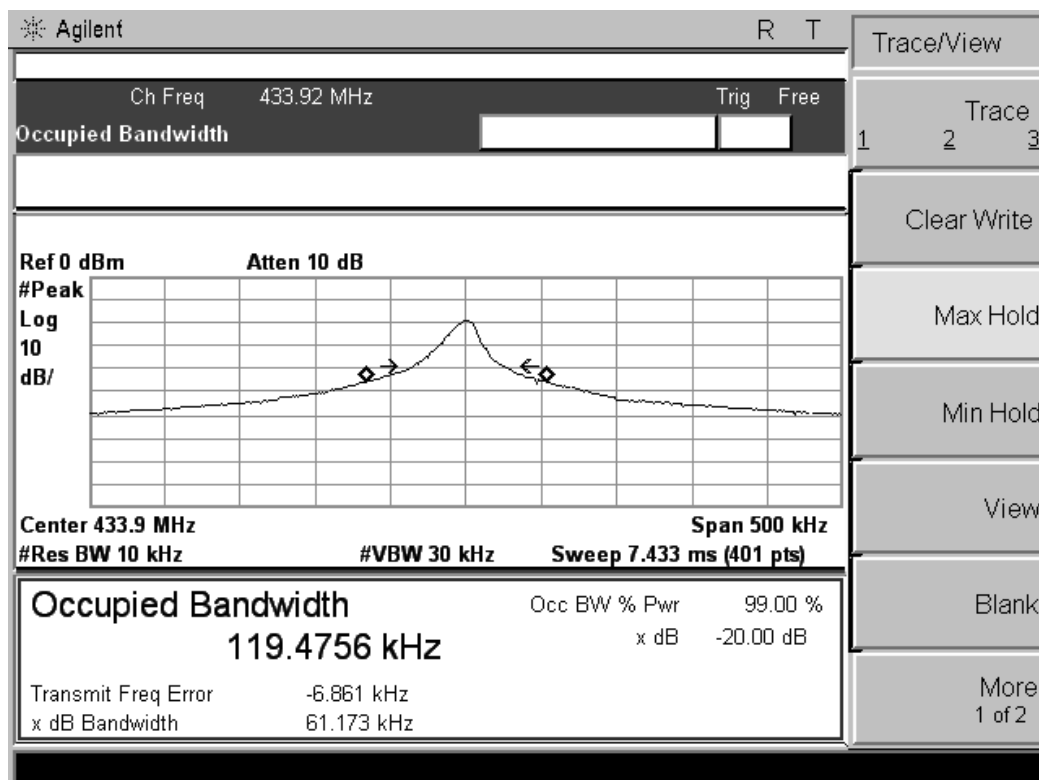
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

#### 5.3.2. Test Procedure

With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

#### 5.3.3. Test Data

| Center Frequency of operation<br>MHz  | Maximum allowed<br>bandwidth<br>kHz                                                                                                            | Measured 20dB<br>bandwidth<br>kHz | Result |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------|
| 433.92                                | 1084.8                                                                                                                                         | 61.173                            | PASS   |
| <b>Maximum allowed<br/>bandwidth:</b> | <input checked="" type="checkbox"/> 0.25% of the centre operating frequency<br><input type="checkbox"/> 0.5% of the centre operating frequency |                                   |        |
| <b>RBW:</b>                           | <input checked="" type="checkbox"/> 10kHz <input type="checkbox"/> 100kHz <input type="checkbox"/> other kHz                                   |                                   |        |
| <b>VBW:</b>                           | <input checked="" type="checkbox"/> 30kHz <input type="checkbox"/> 300kHz <input type="checkbox"/> other kHz                                   |                                   |        |



## 5.4. Duty cycle

### 5.4.1. Limit

No dedicated limit specified in the Rules.

### 5.4.2. Test Procedure

5.4.2.1. Place the EUT on the table and set it in transmitting mode.

5.4.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

5.4.2.3. Set centre frequency of spectrum analyzer=operating frequency.

5.4.2.4. Set the spectrum analyzer as RBW=100kHz, VBW=300KHz, Span=0Hz, Adjust Sweep=100ms.

5.4.2.5. Repeat above procedures until all frequency measured was complete.

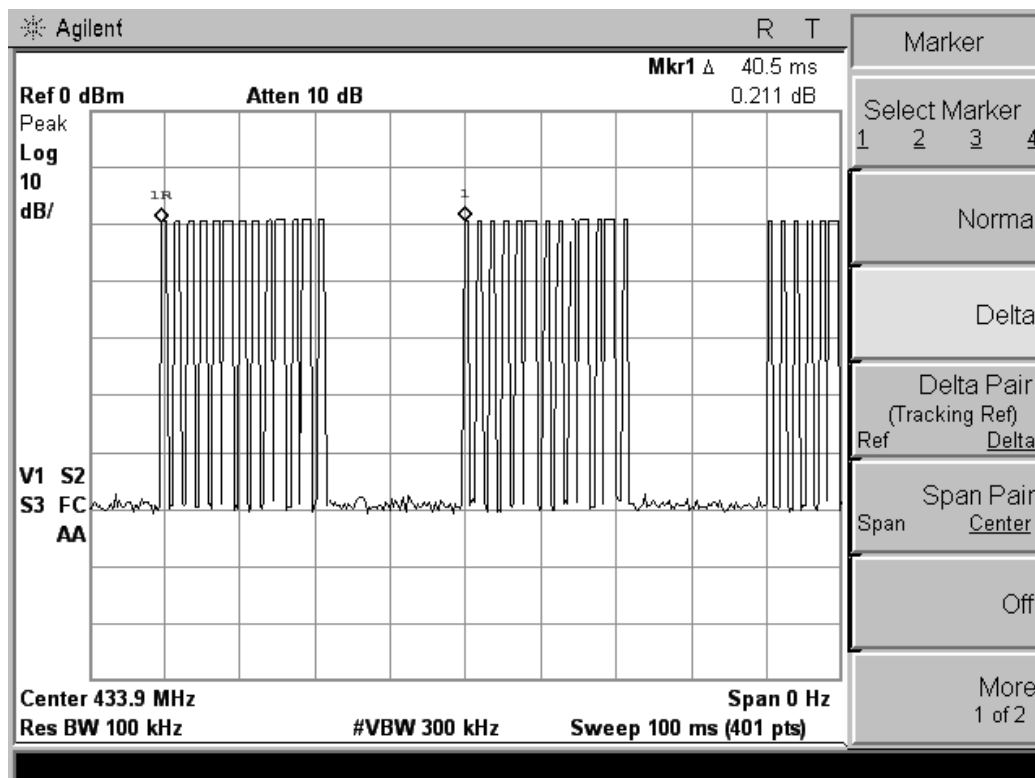
### 5.4.3. Test Data

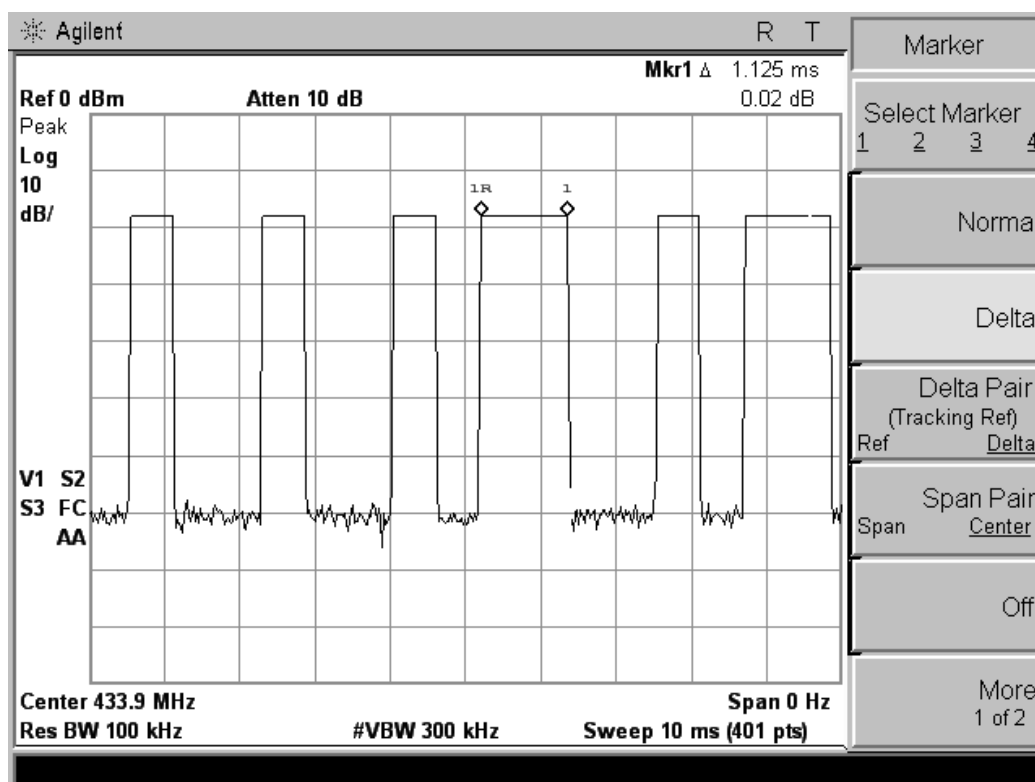
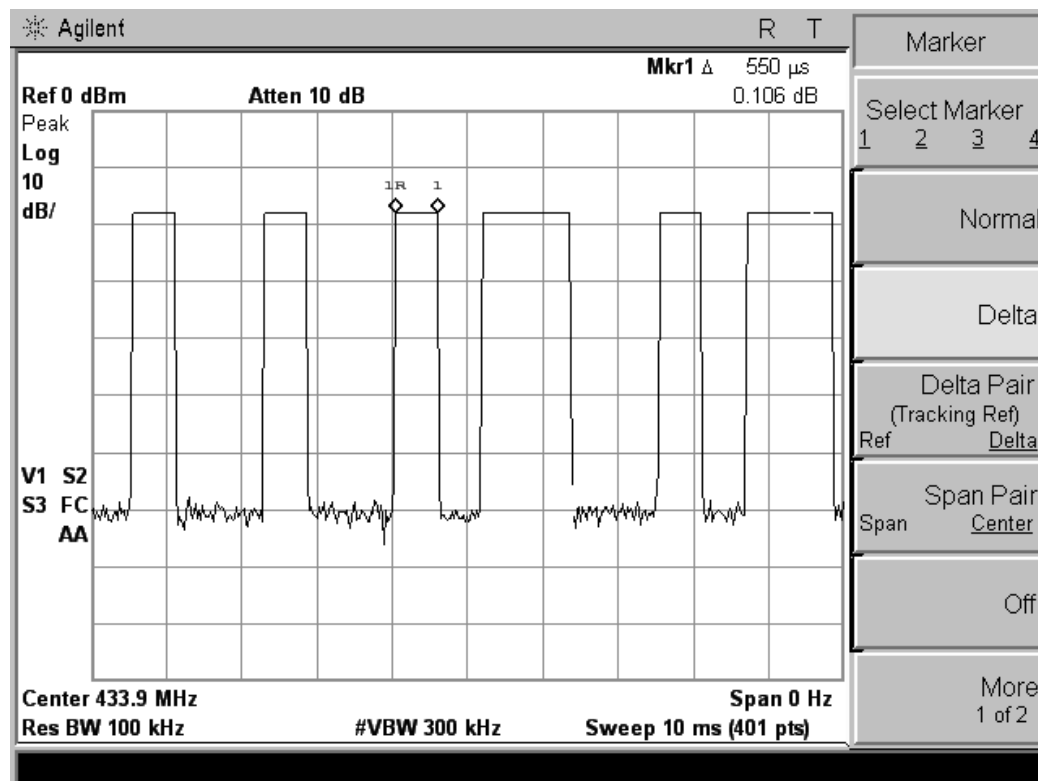
$$T_{on} = (1.125 \times 3) + (0.55 \times 10) = 8.875(\text{ms})$$

$$T_p = 40.5(\text{ms})$$

$$\text{Average Correction Factory} = 20\log(T_{on}/T_p) = 20\log(8.875/40.5) = -13.19\text{dB}$$

*Note: The signal bandwidth was measured and less than 100kHz RBW so PDCF factor is not required to correct the fundamental signal peak result.*





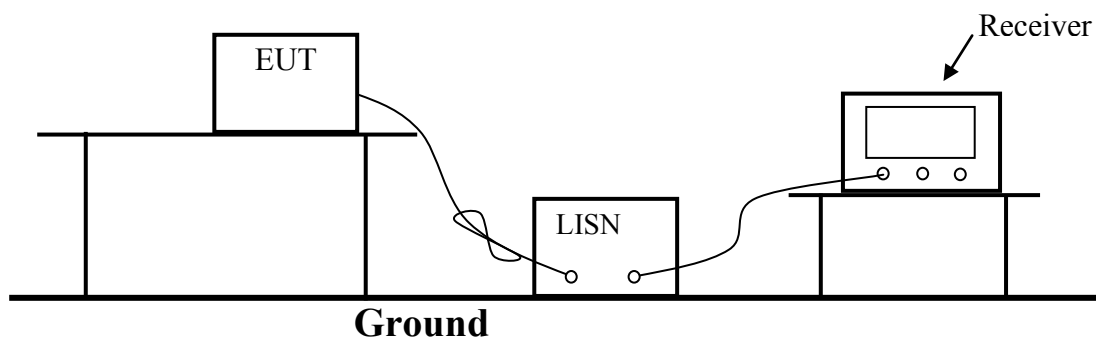
## 5.5. Power line conducted emissions

### 5.4.1 Standard Applicable

According to §15.207 (a) or RSS-Gen: For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

| Frequency Range (MHz) | Limits (dB $\mu$ V) |          |
|-----------------------|---------------------|----------|
|                       | Quasi-peak          | Average  |
| 0.15 to 0.50          | 66 to 56            | 56 to 46 |
| 0.50 to 5             | 56                  | 46       |
| 5 to 30               | 60                  | 50       |

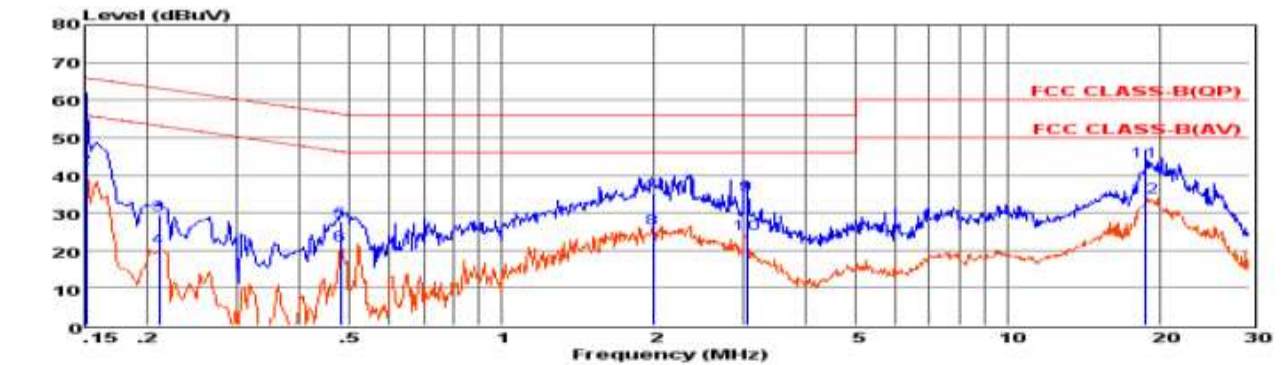
### 5.4.2 Block Diagram of Test Setup



### 5.4.3 Test Results

PASS.

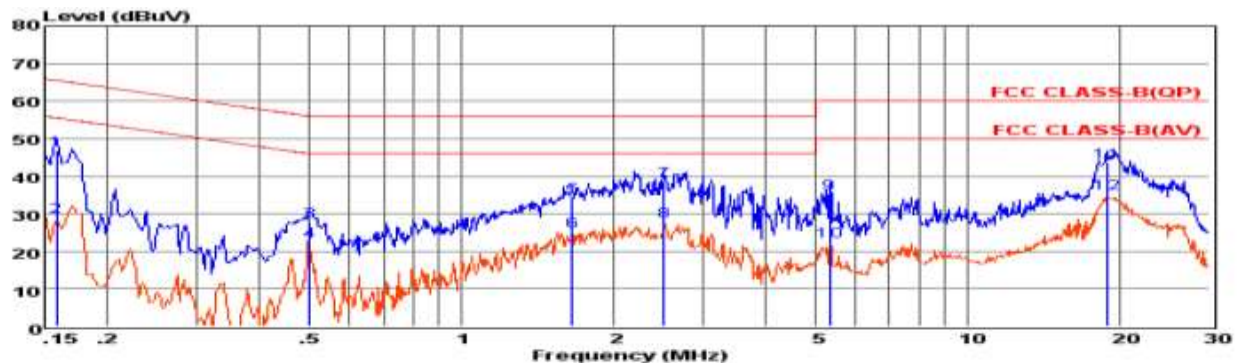
The test data please refer to following page.



Env. Ins: 24\*/56%  
EUT: Remote Control  
M/N: CRC1305  
Power Rating: AC 120V/60Hz  
Test Mode: TX  
Operator: Tree  
Memo:  
Pol: LINE

|    | Freq      | Reading | LisnFac | CabLos | Measured | Limit | Over   | Remark  |
|----|-----------|---------|---------|--------|----------|-------|--------|---------|
|    | MHz       | dBuV    | dB      | dB     | dBuV     | dBuV  | dB     |         |
| 1  | 0.15080   | 47.84   | 9.57    | 0.02   | 57.43    | 65.96 | -8.53  | QP      |
| 2  | 0.15081   | 32.43   | 9.57    | 0.02   | 42.02    | 55.96 | -13.94 | Average |
| 3  | 0.21055   | 19.92   | 9.63    | 0.03   | 29.58    | 63.18 | -33.60 | QP      |
| 4  | 0.21056   | 11.25   | 9.63    | 0.03   | 20.91    | 53.18 | -32.27 | Average |
| 5  | 0.48119   | 17.97   | 9.62    | 0.04   | 27.63    | 56.32 | -28.69 | QP      |
| 6  | 0.48120   | 11.68   | 9.62    | 0.04   | 21.34    | 46.32 | -24.98 | Average |
| 7  | 1.99065   | 25.42   | 9.64    | 0.05   | 35.11    | 56.00 | -20.89 | QP      |
| 8  | 1.99165   | 16.14   | 9.64    | 0.05   | 25.83    | 46.00 | -20.17 | Average |
| 9  | 3.04142   | 24.96   | 9.64    | 0.06   | 34.66    | 56.00 | -21.34 | QP      |
| 10 | 3.04152   | 14.58   | 9.64    | 0.06   | 24.28    | 46.00 | -21.72 | Average |
| 11 | 118.72102 | 33.73   | 9.75    | 0.11   | 43.59    | 60.00 | -16.41 | QP      |
| 12 | 118.72152 | 24.30   | 9.75    | 0.11   | 34.16    | 50.00 | -15.84 | Average |

Remarks: 1. Measured = Reading + Lisn Factor + Cable Loss.  
2. The emission levels that are 20dB below the official limit are not reported.



Env. Ins: 24\*/56%  
EUT: Remote Control  
M/N: CRC1305  
Power Rating: AC 120V/60Hz  
Test Mode: TX  
Operator: Tree  
Memo:  
Pol: NEUTRAL

|    | Freq      | Reading | LisnFac | CabLos | Measured | Limit | Over   | Remark  |
|----|-----------|---------|---------|--------|----------|-------|--------|---------|
|    | MHz       | dBuV    | dB      | dB     | dBuV     | dBuV  | dB     |         |
| 1  | 0.15816   | 37.25   | 9.68    | 0.02   | 46.95    | 65.56 | -18.61 | QP      |
| 2  | 0.15817   | 19.48   | 9.68    | 0.02   | 29.18    | 55.56 | -26.38 | Average |
| 3  | 0.50203   | 18.20   | 9.62    | 0.04   | 27.86    | 56.00 | -28.14 | QP      |
| 4  | 0.50204   | 13.03   | 9.62    | 0.04   | 22.69    | 46.00 | -23.31 | Average |
| 5  | 1.65370   | 24.78   | 9.63    | 0.05   | 34.46    | 56.00 | -21.54 | QP      |
| 6  | 1.65470   | 15.58   | 9.63    | 0.05   | 25.26    | 46.00 | -20.74 | Average |
| 7  | 2.51327   | 28.93   | 9.64    | 0.05   | 38.62    | 56.00 | -17.38 | QP      |
| 8  | 2.51357   | 18.32   | 9.64    | 0.05   | 28.01    | 46.00 | -17.99 | Average |
| 9  | 5.33317   | 25.70   | 9.67    | 0.06   | 35.43    | 60.00 | -24.57 | QP      |
| 10 | 5.33357   | 13.02   | 9.67    | 0.06   | 22.75    | 50.00 | -27.25 | Average |
| 11 | 118.82048 | 33.76   | 9.84    | 0.11   | 43.71    | 60.00 | -16.29 | QP      |
| 12 | 118.82058 | 25.55   | 9.84    | 0.11   | 35.50    | 50.00 | -14.50 | Average |

Remarks: 1. Measured = Reading + Lisn Factor + Cable Loss.  
2. The emission levels that are 20dB below the official limit are not reported.

## 5.6. Antenna Requirement

FCC 15.203

### 5.5.1. Standard Applicable

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 or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The directional gains of antenna used for transmitting is 0dBi, and EUT uses an integral antenna which is permanently attached.

### 5.5.2. Result

Compliant.

## 6. LIST OF MEASURING EQUIPMENTS

| Instrument                 | Manufacturer   | Model No.         | Serial No.  | Characteristics | Cal. Date     | Due Date      |
|----------------------------|----------------|-------------------|-------------|-----------------|---------------|---------------|
| EMC Receiver               | R&S            | ESCS 30           | 100174      | 9kHz – 2.75GHz  | July 15, 2013 | July 14, 2014 |
| LISN                       | MESS Tec       | NNB-2/16Z         | 99079       | 9KHz-30MHz      | June 18, 2013 | June 17, 2014 |
| LISN<br>(Support Unit)     | EMCO           | 3819/2NM          | 9703-1839   | 9KHz-30MHz      | June 18, 2013 | June 17, 2014 |
| RF Cable-CON               | UTIFLEX        | 3102-26886-4      | CB049       | 9KHz-30MHz      | June 18, 2013 | June 17, 2014 |
| ISN                        | SCHAFFNER      | ISN ST08          | 21653       | 9KHz-30MHz      | July 15, 2013 | July 14, 2014 |
| 3m Semi Anechoic Chamber   | SIDT FRANKONIA | SAC-3M            | 03CH03-HY   | 30M-1GHz<br>3m  | June 18, 2013 | June 17, 2014 |
| Amplifier                  | SCHAFFNER      | COA9231A          | 18667       | 9kHz-2GHz       | July 15, 2013 | July 14, 2014 |
| Amplifier                  | Agilent        | 8449B             | 3008A02120  | 1GHz-26.5GHz    | July 15, 2013 | July 14, 2014 |
| Amplifier                  | MITEQ          | AMF-6F-26040<br>0 | 9121372     | 26.5GHz-40GHz   | July 15, 2013 | July 14, 2014 |
| Spectrum Analyzer          | Agilent        | E4407B            | MY41440292  | 9k-26.5GHz      | June 18, 2013 | June 17, 2014 |
| Loop Antenna               | R&S            | HFH2-Z2           | 860004/001  | 9k-30MHz        | June 18, 2013 | June 17, 2014 |
| By-log Antenna             | SCHAFFNER      | CBL 6112D         | 22237       | 30MHz-1GHz      | June 18, 2013 | June 17, 2014 |
| Horn Antenna               | EMCO           | 3115              | 6741        | 1GHz-18GHz      | June 18, 2013 | June 17, 2014 |
| Horn Antenna               | SCHWARZBECK    | BBHA9170          | BBHA9170154 | 15GHz-40GHz     | June 18, 2013 | June 17, 2014 |
| RF Cable-R03m              | Jye Bao        | RG142             | CB021       | 30MHz-1GHz      | June 18, 2013 | June 17, 2014 |
| RF Cable-HIGH              | SUHNER         | SUCOFLEX<br>106   | 03CH03-HY   | 1GHz-40GHz      | June 18, 2013 | June 17, 2014 |
| Spectrum Meter             | R&S            | FSP 30            | 100023      | 9kHz-30GHz      | July 15, 2013 | July 14, 2014 |
| Power Meter                | R&S            | NRVS              | 100444      | DC-40GHz        | July 15, 2013 | July 14, 2014 |
| Power Sensor               | R&S            | NRV-Z51           | 100458      | DC-30GHz        | July 15, 2013 | July 14, 2014 |
| Power Sensor               | R&S            | NRV-Z32           | 10057       | 30MHz-6GHz      | July 15, 2013 | July 14, 2014 |
| AC Power Source            | HPC            | HPA-500E          | HPA-9100024 | AC 0~300V       | June 18, 2013 | June 17, 2014 |
| DC power Source            | GW             | GPC-6030D         | C671845     | DC 1V-60V       | June 18, 2013 | June 17, 2014 |
| Temp. and Humidity Chamber | Giant Force    | GTH-225-20-S      | MAB0103-00  | N/A             | June 18, 2013 | June 17, 2014 |
| RF CABLE-1m                | JYE Bao        | RG142             | CB034-1m    | 20MHz-7GHz      | June 18, 2013 | June 17, 2014 |
| RF CABLE-2m                | JYE Bao        | RG142             | CB)35-2m    | 20MHz-1GHz      | June 18, 2013 | June 17, 2014 |
| Vector signal Generator    | R&S            | SMU200A           | 102098      | 100kHz~6GHz     | June 18, 2013 | June 17, 2014 |
| Signal Generator           | R&S            | SMR40             | 10016       | 10MHz~40GHz     | June 18, 2013 | June 17, 2014 |
| Oscilloscope               | Tektonix       | TDS380            | B016197     | 400MHz/2GRS     | June 18, 2013 | June 17, 2014 |



## 7. MANUFACTURER/ APPROVAL HOLDER DECLARATION

The following identical model(s):

|    |    |    |    |
|----|----|----|----|
| -- | -- | -- | -- |
|----|----|----|----|

Belong to the tested device:

Product description : Remote Control

Model name : CRC1305

-----THE END OF REPORT-----