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No.: DM120868

**Applicant:** Hong Kong China Electric Manufacture Co., Ltd.

12/F Mongkok Harbour Centre, 638 Shanghai Street, Hong

Kong

**Description of Sample(s):** Submitted sample(s) said to be

Product: Fan Remoter

Brand Name: N/A
Model Number: RT01A
FCC ID: ZJF-RT01A

**Date Sample(s) Received:** 2015-08-28

**Date Tested:** 2015-09-01 to 2015-09-06

**Investigation Requested:** Perform ElectroMagnetic Interference measurement in

accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2014 and ANSI C63.4: 2009 for FCC Certification.

Conclusion(s): The submitted product <u>COMPLIED</u> with the requirements of

Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this

Test Report.

Remark(s):

LONG Yun Jian, Along
Authorized Signatory
troMagnetic Compatibility Departs

ElectroMagnetic Compatibility Department For and on behalf of



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## 1.0 General Details

# 1.1 Equipment Under Test [EUT] Description of Sample(s)

Submitted sample(s) said to be

Product: Fan Remoter

Manufacturer: Zhongshan Kong Luen Wah Hoi Electrical

Science and Technology Development Zone Ming Zhong Town

Zhongshan, Guangdong, China

Brand Name: N/A Model Number: RT01A

Rating: 12Vd.c. (Alkaline Battery 23A\*1)

#### 1.1.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Fan Remoter of Hong Kong China Electric Appliance Manufacture Co., Ltd.. The EUT is a wireless remote control operating at 315.05MHz. Test was conducted under Tx mode.

#### 1.2 Date of Order

2015-08-28

#### 1.3 Submitted Sample(s):

1 Sample

#### 1.4 Test Duration

2015-09-01 to 2015-09-06

#### 1.5 Country of Origin

China

#### 1.6 Antenna Details

Antenna Type: Meader line antenna

Antenna Gain: 3dBi

## STC (Dongguan) Company Limited

68 Fumin Nan Road, Dalang, Dongguan, China. (Zip Code: 523 770)

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## 2.0 <u>Technical Details</u>

## 2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2014 and ANSI C63.4:2009 for FCC Certification. This is a manually operated transmitter, Press the button to start sending signals.

#### 2.2 Test Standards and Results Summary Tables

EMISSION Results Summary										
Test Condition	Test Requirement	Test Method	Class /	7	est Resu	lt				
			Severity	Pass	Failed	N/A				
Field Strength of Fundamental Emissions & Spurious Emissions	FCC 47CFR 15.231(a)	ANSI C63.4:2009	N/A	$\boxtimes$						
20dB Bandwidth of Fundamental Emission	FCC 47CFR 15.231(c)	ANSI C63.4:2009	N/A	$\boxtimes$						
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.4:2009	N/A	$\boxtimes$						

Note: N/A - Not Applicable



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## 3.0 Test Results

#### 3.1 Emission

#### 3.1.1 Radiated Emissions

Test Requirement: FCC 47CFR 15.231(a)
Test Method: ANSI C63.4:2009
Test Date: 2015-09-01

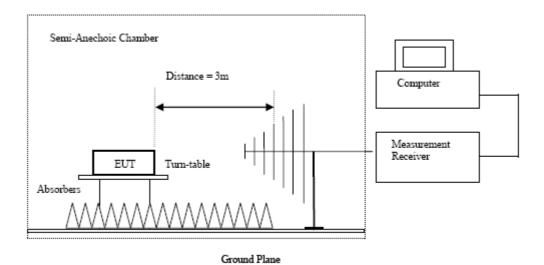
Mode of Operation: Tx mode

#### **Test Method:**

The sample was placed 0.8m above the ground plane of semi-anechoic chamber\*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

\*: Semi-anechoic chamber located on the STC (Dongguan) Company Ltd. 68 Fumin Nan Road, Dalang, Dongguan, Guangdong, PRC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 629686.

#### **Test Setup:**



- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz hom antennas are used.

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## Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.231a]:

Frequency Range of	Field Strength of	Field Strength of
Fundamental	Fundamental Emission	Spurious Emission
	[Average]	[Average]
[MHz]	$[\mu V/m]$	$[\mu V/m]$
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,750 *	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

<sup>&</sup>lt;sup>1</sup>Linear interpolations.

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

#### Results of Tx mode: PASS

Field Strength of Fundamental Emissions									
Peak Value									
Frequency Measured Correction Field Field Limit					Limit	E-Field			
	Level @3m	Factor	Strength	Strength	@3m	Polarity			
MHz	$dB\mu V$	dB/m	dBμV/m_	μV/m	μV/m				
315.05	38.6	15.9	54.5	529.1	60,451.3	Vertical			

Field Strength of Spurious Emissions									
			Peak Value						
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field			
	Level @3m	Factor	Strength	Strength		Polarity			
MHz	dΒμV	dB/m	dBμV/m	μV/m	μV/m				
630.10	20.8	22.1	42.9	139.5	6,045.1	Vertical			
+ 1575.25	14.1	31.8	45.9	196.1	5,000.0	Vertical			
1890.30	8.9	35.6	44.5	168.1	6,045.1	Vertical			



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#### Results of Tx mode: PASS

Field Strength of Fundamental Emissions									
	Average Value								
Frequency Measured Correction Field Field Limit E-I						E-Field			
	Level @3m	Factor	Strength	Strength	@3m	Polarity			
MHz	$dB\mu V$	dB/m	dBμV/m	μV/m	μV/m				
315.05	28.1	15.9	44.0	157.9	6,045.1	Vertical			

Field Strength of Spurious Emissions									
	Average Value								
Frequency Measured Correction Field Field Limit @3m E-Field									
	Level @3m	Factor	Strength	Strength		Polarity			
MHz	dΒμV	dB/m	_dBµV/m_	μV/m	μV/m_				
630.10	10.3	22.1	32.4	41.6	604.5	Vertical			
+ 1575.25	3.6	31.8	35.4	58.5	500.0	Vertical			
1890.30	-1.6	35.6	34.0	50.2	604.5	Vertical			

#### Remarks:

FCC Limit for Fundamental Average Measurement =  $41.67(315.05)-7083=6045.1\mu V/m$ 

+: Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 were not adjusted for averaging and the limits of FCC Rules Part 15 Section 15.209 were applied.

\*: Adjusted by Duty Cycle = -10.5dB

Duty Cycle Correction =-20dB, if the calculation duty cycle correction >-20dB

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty (30MHz - 1GHz): 4.6dB

(1GHz - 18GHz): 4.4dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.



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## Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Emilia for Rudiuced Emissions [1 CC 47 CTR 15:207 Class B].				
Frequency Range	Quasi-Peak Limits			
[MHz]	$[\mu V/m]$			
0.009-0.490	2400/F (kHz)			
0.490-1.705	24000/F (kHz)			
1.705-30	30			
30-88	100			
88-216	150			
216-960	200			
Above960	500			

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

#### Result of Tx mode (9kHz - 30MHz): PASS

Emissions detected are more than 20 dB below the limit line(s).

#### Results of Tx mode (30MHz - 1GHz): PASS

Radiated Emissions Quasi-Peak										
Emission										
Frequency	Polarity	@3m	@3m	@3m	@3m					
MHz	-	dBµV/m	dBμV/m	μV/m	μV/m					
30.6	Horizontal	32.5	40.0	42.2	100					
863.3	Horizontal	42.7	46.0	136.5	200					
31.5	Vertical	30.3	40.0	32.7	100					
532.4	Vertical	37.1	46.0	71.6	200					

#### Results of Tx mode (Above 1GHz): PASS

Radiated Emissions								
Peak Value								
Emission	Emission E-Field Level Limit Level Limit							
Frequency	Polarity	@3m	@3m	@3m	@3m			
MHz		dBμV/m	dBμV/m	μV/m	μV/m			
1206.0	Horizontal	38.1	74.0	80.4	5012			

#### Remarks:

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty: 9kHz - 30MHz): 3.3dB

(30MHz – 1GHz): 4.6dB (1GHz – 18GHz): 4.4dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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#### 3.2 20dB Bandwidth of Fundamental Emission

Test Requirement: FCC 47 CFR 15.231(c)

Test Method: ANSI C63.4:2009 (Section 13.1.7)

Test Date: 2015-09-09 Mode of Operation: Tx mode

#### **Test Method:**

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

#### **Test Setup:**

As Test Setup of clause 3.1.1 in this test report.



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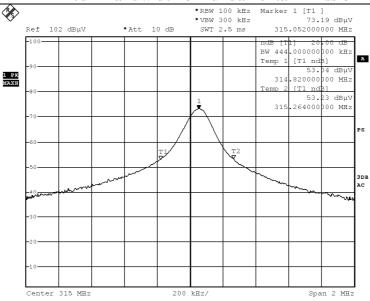
#### Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range	20dB Bandwidth	FCC Limits *
[MHz]	[kHz]	[kHz]
315.05	444.0	787.625

\*: FCC Limit for Bandwidth measurement = (0.25%) (Center Frequency)

= (0.0025)(315.05)= 787.625kHz

## 20dB Bandwidth of Fundamental Emission



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## Appendix A

List of Measurement Equipment

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EMD004	LISN	ROHDE & SCHWARZ	ESH3-Z5	100102	2015.3.24	2016.3.24
EMD022	EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	100314	2015.3.24	2016.3.24
EMD035	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	100441	2015.3.24	2016.3.24
EMD036	EMI Test Receiver	ROHDE & SCHWARZ	ESIB 26	100388	2015.3.24	2016.3.24
EMD041	TWO-LINE V- NETWORK	ROHDE & SCHWARZ	ENV216	100261	2015.3.24	2016.3.24
EMD061	Biconilog Antenna	ETS.LINDGREN	3142C	00060439	2014.11.29	2016.11.29
EMD062	Double-Ridged Waveguide (1GHz – 18GHz)	ETS.LINDGREN	3117	00075933	2014.11.15	2015.11.15
EMD084	MULTI-DVICE CONTROLLER	ETS.LINDGREN	2090	00060107	N/A	N/A
EMD088	Video Contol Unit	ETS.LINDGREN	Y21953A	2601073	N/A	N/A
EMD093	Monitor	ViewSonic	VA9036	Q8X064201876	N/A	N/A
EMD102	Intelligent Frequency	Ainuo Instrument Co., Ltd	AN97005SS	79707454	N/A	N/A
EMD103	Intelligent Frequency	Ainuo Instrument Co., Ltd	AN97005SS	79707455	N/A	N/A
EMD105	FACT-3 EMC Chamber	ETS.LINDGREN	FACT-3	3803	N/A	N/A
EMD106	Shielding Room #1	ETS.LINDGREN	RFD-100	3802	N/A	N/A
	100V Insertion Unit	ROHDE & SCHWARZ	URV5-Z4	100464	2015.3.24	2016.3.24
EMD113	Pre-Amplifier	ROHDE & SCHWARZ	N/A	1129588	2015.3.24	2016.3.24
EMD124	Loop Antenna	ETS-Lindgren	6502	00104905	2014.04.28	2016.04.28
EMD131	Standard Gain Horn Antenna (18GHz – 26.5GHz)	Chengdu AINFO Inc.	JXTXLB-42- 15-C-KF	J2021100721001	2015.06.27	2017.06.27

#### Remarks:-

N/A Not Applicable



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## Appendix B

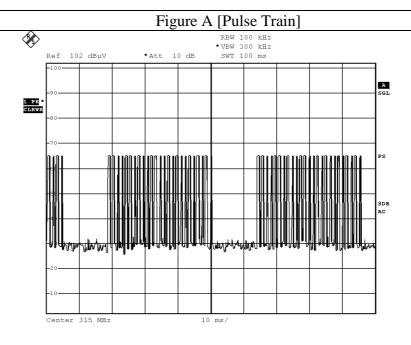
#### **Duty Cycle Correction During 100msec**

Each packet period (100msec) never exceeds a series of 26 (0.76msec) long and 28 (0.36msec) short pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered (0.76\*26+0.36\*28) msec per 100msec = 29.84% duty cycle. Figure A through D shows the characteristics of the pulses train for one of these functions.

#### Remarks:

Duty cycle factor = 20Log [(0.76\*26+0.36\*28)/100]=-10.5dB

The following figures [Figure A to Figure D] showed the characteristics of the pulse train for one of these functions.



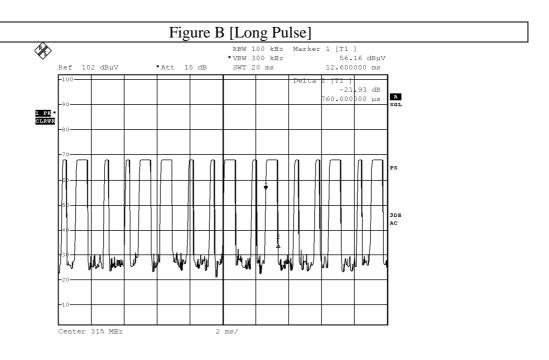
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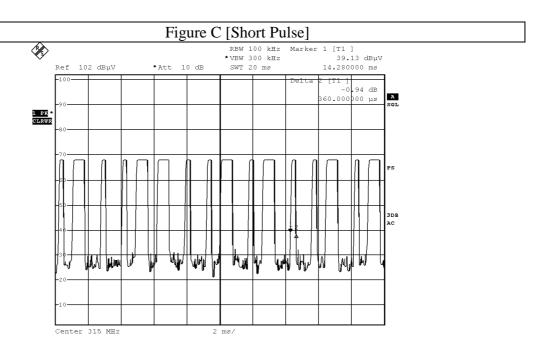
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ВМР

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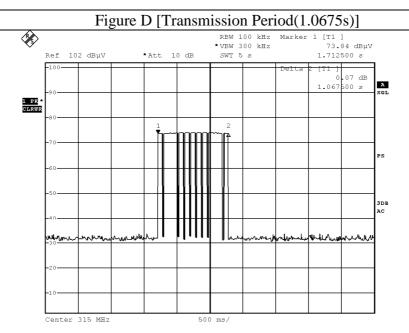
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## **Appendix C**

#### Manual Operated Transmitter Transmission Time [FCC 47CFR 15.231(a)]

According to FCC 47CFR15.231 (a). A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. The EUT ceases transmission almost immediately upon being released and appears to finish the current packet being transmitted. Therefore the longest period of time the transmitter should take to deactivate is a packet length.



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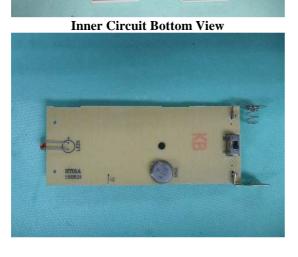
## Appendix D

## **Photographs of EUT**

Front View of the product



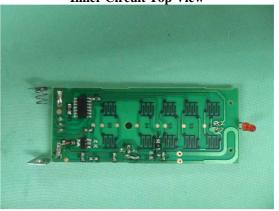




Rear View of the product



**Inner Circuit Top View** 



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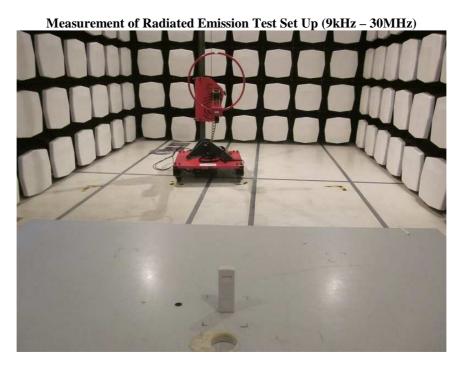
Tel : (86 769) 8111 9888 Fax : (86 769) 8111 6222 E-mail : dgstc@dgstc.org Homepage : www.dgstc.org

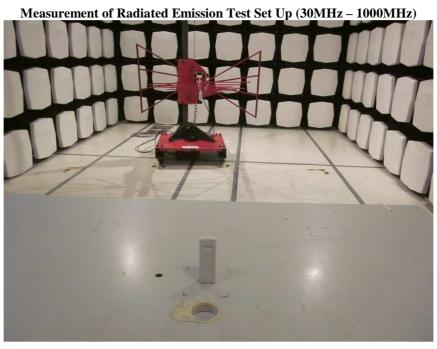


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## Photographs of EUT





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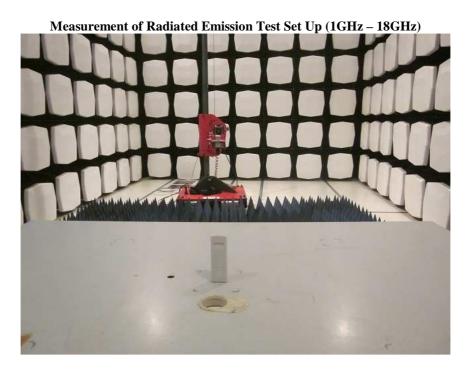
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## Photographs of EUT



\*\*\*\*\* End of Test Report \*\*\*\*\*