Connected By TCP Remote Control Manufacturing Documentation

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Revision 1.0

Document Revision

Document Revision	Author	Date
1.0	Dustin Cairns	11/1/13

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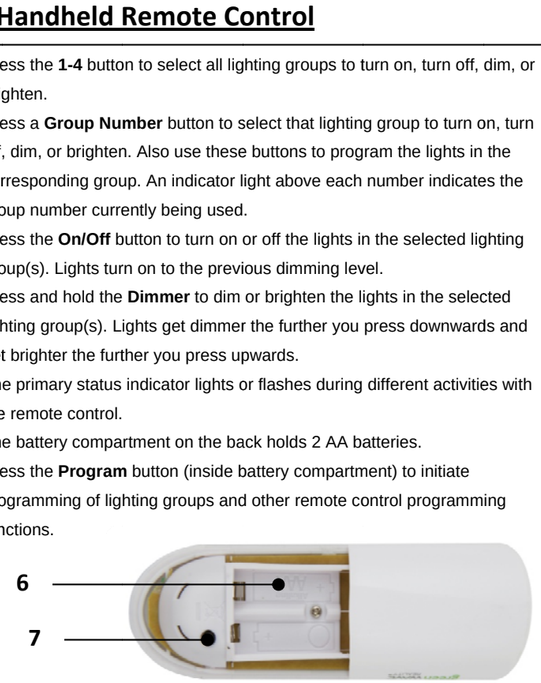
1.0 Overview

The Connected By TCP Remote Control is part of the Connected By TCP home lighting control system.

Handheld Remote Control

1. Press the **1-4** button to select all lighting groups to turn on, turn off, dim, or brighten.
2. Press a **Group Number** button to select that lighting group to turn on, turn off, dim, or brighten. Also use these buttons to program the lights in the corresponding group. An indicator light above each number indicates the group number currently being used.
3. Press the **On/Off** button to turn on or off the lights in the selected lighting group(s). Lights turn on to the previous dimming level.
4. Press and hold the **Dimmer** to dim or brighten the lights in the selected lighting group(s). Lights get dimmer the further you press downwards and get brighter the further you press upwards.
5. The primary status indicator lights or flashes during different activities with the remote control.
6. The battery compartment on the back holds 2 AA batteries.
7. Press the **Program** button (inside battery compartment) to initiate programming of lighting groups and other remote control programming functions.



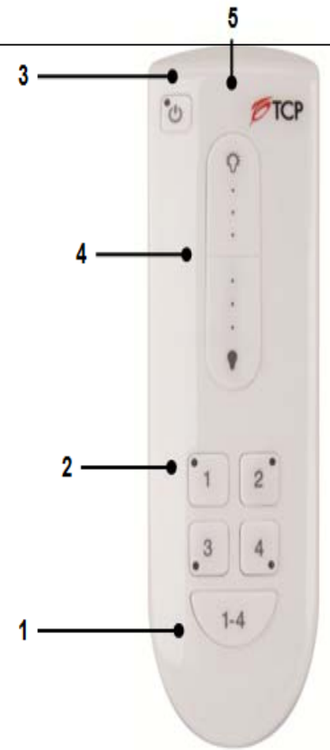


Figure 1 Remote Overview

2.0 Physical Characteristics

2.0.1 Cosmetics Inspection Acceptance

Surface identification

'**A**' surface	Front or Top, most viewed surface
'**B**' surface	Back/bottom textured surface. Not viewed as often as 'A'
'**C**' surface	Internal surfaces

Defects	A	B	C
Color Snow White (Pantone: 11-0602TPX)	Refer to limit sample	Refer to limit sample	Refer to limit sample
Weld lines/ blush	Refer to limit sample	Refer to limit sample	Refer to limit sample
Specks	≦ 0.20 mm^2 Allow 1 per 400mm^2	≦ 0.30 mm^2 Allow 2 per 400mm^2	Acceptable
Sink	Not allowed	Not allowed	Acceptable
Scratches	W ≦0.15mm L ≦3mm Allow 1 per 400mm^2	W ≦0.20mm L ≦5mm Allow 2 per 400mm^2	Acceptable
Dent	Not allowed	≦ 0.50 mm^2 Allow 2 per 400mm^2	Acceptable

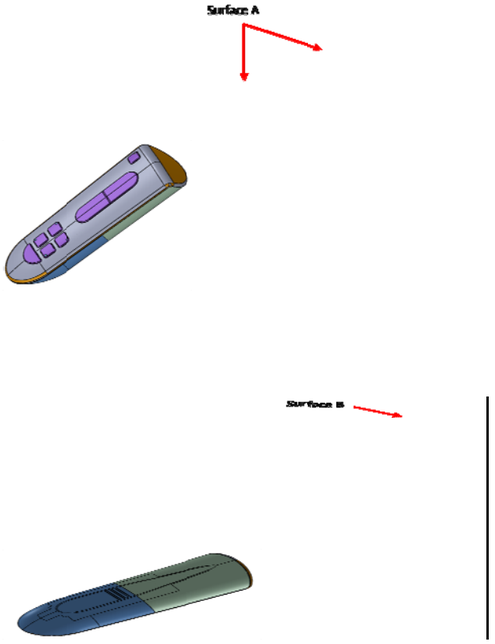


Figure 2 Cosmetic Acceptance Chart

2.0.2 Labeling

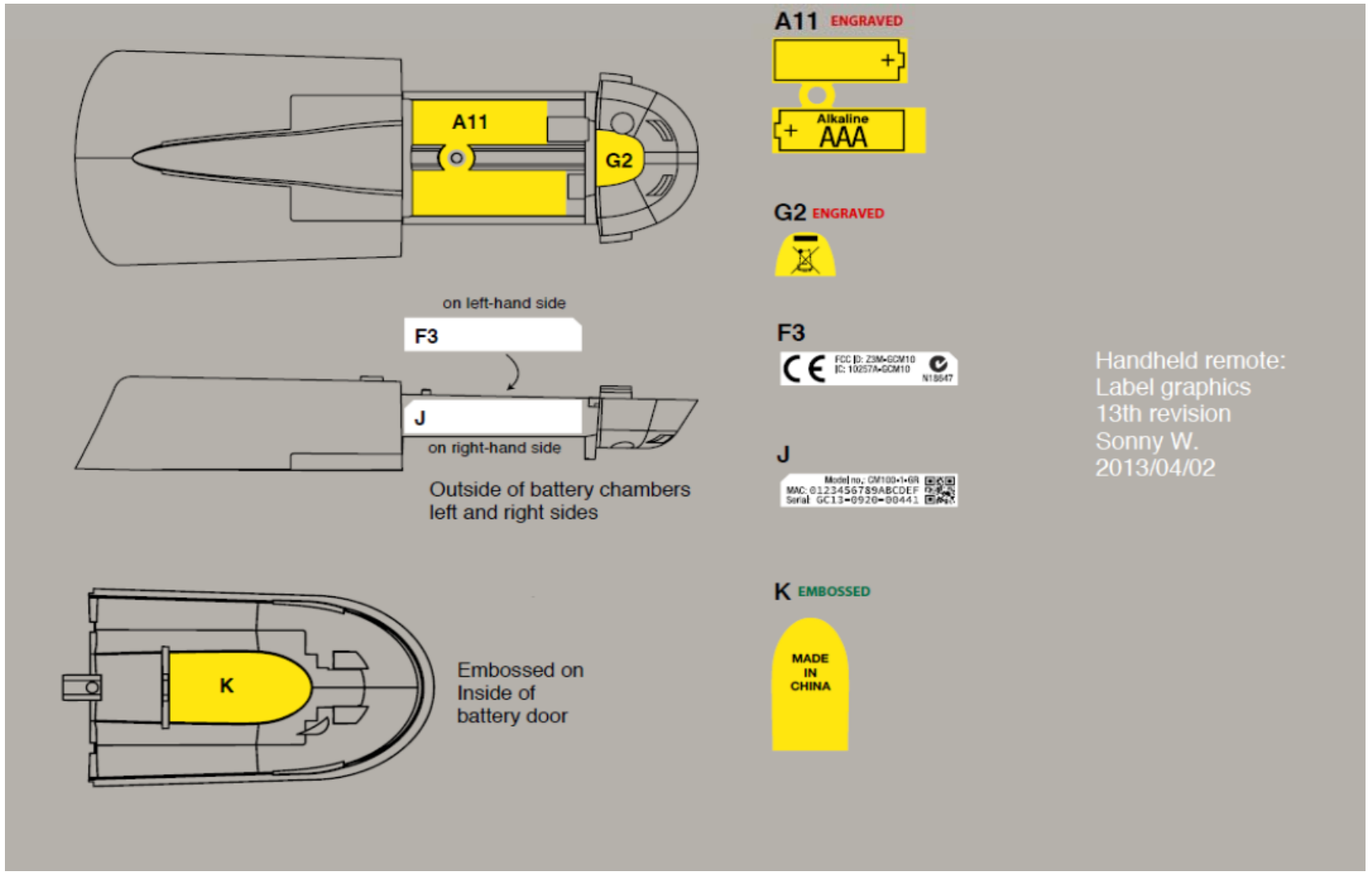
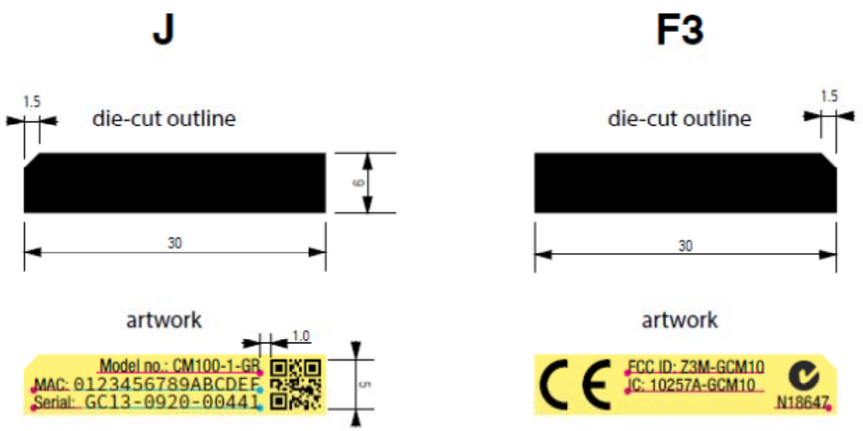


Figure 3 Label Layout



Fonts used

1 Helvetica57-condensed Roman 5pt

0123456789
the quick brown fox
jumped over the lazy dog
ABCDEFGHIJKLMNOPQRSTUVWXYZ

Made in China
1.5V LR03 ALKALINE
Model no. CT220-1-ZZ
FCC ID: Z3M-YYYY
IC: 10257A-XXXXX

http://www.myfonts.com/fonts/linotype/neue-helvetica/helvetica-57-condensed/

2 Source Code Pro Regular 5.5pt

0123456789
the quick brown fox
jumped over the lazy dog
ABCDEFGHIJKLMNOPQRSTUVWXYZ

GC13-0892-00440
0123456789ABCDEF
A8B1C2D3E4F5A6B7

http://sourceforge.net/projects/sourcecodepro.adobe/

Free open source font replaces OCR-B for serial number printing on small labels such as this.

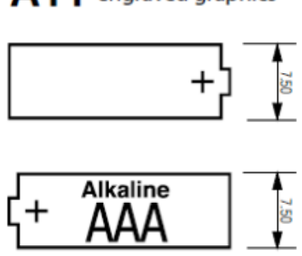
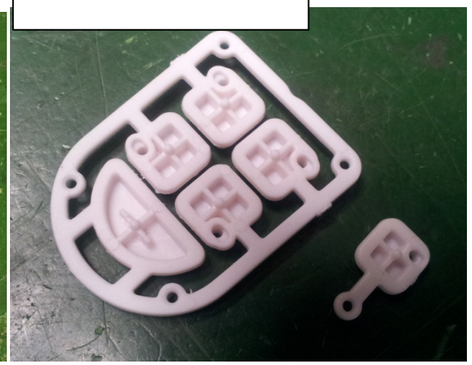


Figure 4 Label Layout

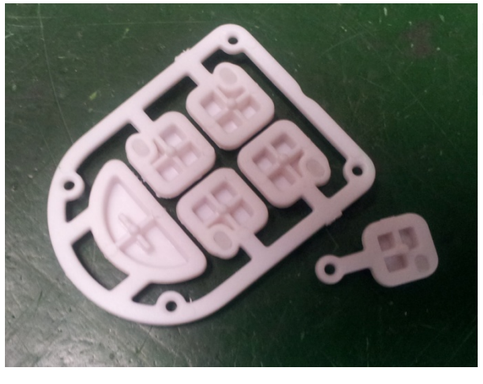
2.0.3 Mechanical Parts

Light Pipe

Buttons



Front cabinet



Buttons + Light Pipe

Front cabinet Assy

Figure 5 Mechanical Parts

2.0.4 Overall Circuit Board

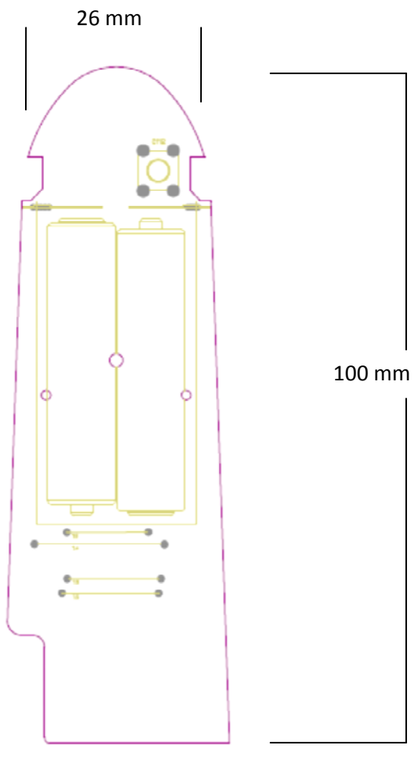


Figure 6 Overall Dimensions

Circuit board layout improvements

Currently the circuit board for the remote control contains two separate circuit boards, one for the RF components and one for the rest of the components.

A way to possibly reduce the number of manufacturing issues with circuit boards is to create a single board that may eliminate issues caused by poor placement of the

RF board on the current main board.

目前遥控器的电路板由两块组成，一个是 **RF** 板，另一个是其他电路元件。为了减少由工艺引起的问题，需要使用一个 **PCB** 板。

RF Board soldered onto main circuit board

Figure 6b Secondary RF Circuit Board soldered onto main board

2.0.5 Overall Circuit Schematic

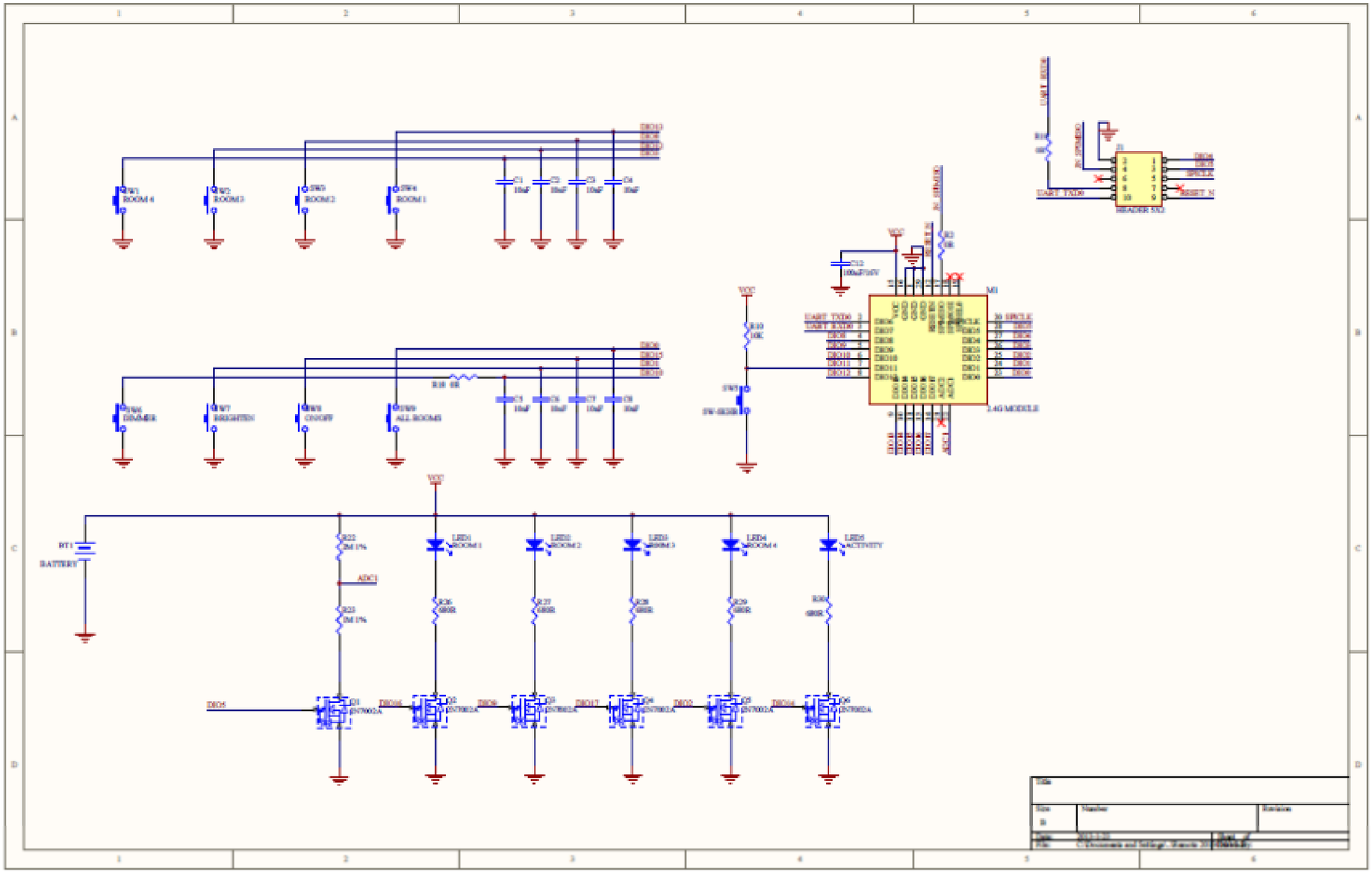


Figure 7 Connected By TCP Remote Control Schematic

3.0 Bill of Materials

LEMARK
多阶标准成本表　　ASRA0600TC001
制表日期:2013-06-28

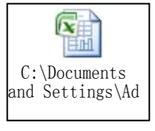
阶次	元件品号	品　名	规　格	单位	属性	标准用量	供应商
0		遥控器主机 (Remote)	SRA0600 (CM100-1-TP) 2.4G 遥控器主机 TCP	SET	自制件	0	
.1	BSRA060000001	主机半成品 (Remote Sub-Assembly)	2.4G 遥控器 主机 半成品	SET	自制件	1	
..2	5230ARA060001	锅仔片	4mm 圆形五点 180gf 带膜	PCS	采购件	1	源力
..2	3010507000001	轻触开关 (Tact Switch)	160gf 6X6mm H=9.5mm DIP	PCS	采购件	1	凯威电子
..2	2060000400001	跳线 (Wire Jumper)	D=0.4mm 3+12+3mm	PCS	采购件	1	
..2	PSRA060090001	PCB 半成品 (PCB)	2.4G 遥控器 PCB 半成品 SMT	SET	托外加工件	1	
...3	199ARA0600021	单层 PCB (Single Layer PCB)	JN MAIN V1.0 100*33*1.0mm 94v-0	PCS	采购件	1	时代快捷
...3	1039910030001	贴片陶瓷电容 (Capacitor)	10nF/16V ±10% 0402 X7R	PCS	采购件	7	三星
...3	1039910040003	贴片陶瓷电容 (Capacitor)	100nF/16V ±10% 0402 X7R	PCS	采购件	1	三星
...3	1039910030005	贴片陶瓷电容 (Capacitor)	0.01uF/16V ±10% 0805 X7R	PCS	采购件	1	三星
...3	1019000000001	贴片电阻 (Resistor)	0Ω ±5% 1/8W 0805 TAPE	PCS	采购件	3	风华
...3	1019468010003	贴片电阻 (Resistor)	680Ω ±5% 1/16W 0402 TAPE	PCS	采购件	5	风华
...3	1019410030002	贴片电阻 (Resistor)	10KΩ ±5% 1/16W 0402 TAPE	PCS	采购件	1	风华
...3	1019610050001	贴片精密电阻(Resistor)	1MΩ ±1% 1/16W 0402 TAPE	PCS	采购件	1	风华
...3	1019420050002	贴片精密电阻(Resistor)	2MΩ ±1% 1/8W 0805 TAPE	PCS	采购件	1	风华
...3	108982N700001	贴片场效应管 (Diodes)	2N7002A N-Channel SOT-23 DIODES	PCS	采购件	6	DIODES
...3	1090013220001	LED	19-213/G6C-BM1N2B/3T 黄绿 1.75-2.35V 567.5-575.5nm 0603 亿光	PCS	采购件	5	光晖
...3	ZSRA060000001	2.4G 模块 (Jennic IC)	802.15.4 标准 JN5168A	PCS	采购件	1	赛诺派
.1	1200400150001	碱性电池 (Batteries)	LR03"AAA" 1.5V "Maxell"	PCS	采购件	2	劲量
.1	Y3SRA06001001	结构件 (Silkscreen)	2.4G 遥控器 面壳丝印“TCP"Logo 结构件	SET	虚设品号	1	
..2	4010ARA060001	面壳 (Front Housing)	SRA0600 ABS 白色 丝印“TCP"Logo	PCS	采购件	1	辰虹实业
..2	4011SRA060301	底壳 (Rear Housing)	SRA0603 ABS 白色 无丝印	PCS	采购件	1	辰虹实业
..2	4031ARA060001	POWER 按键	SRA0600 ABS 白色 一按键	PCS	采购件	1	辰虹实业
..2	4031ARA060002	调光按键 (Brightness Control Button)	SRA0600 ABS 白色 二按键	PCS	采购件	1	辰虹实业
..2	4034ARA060001	HOME 按键	SRA0600 ABS 白色 五按键	PCS	采购件	1	辰虹实业

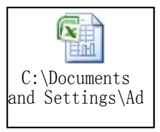
..2	4150ARA060001	导光柱 A	SRA0600 PC 乳白半透明	PCS	采购件	4	辰虹实业
..2	4150ARA060002	导光柱 B	SRA0600 PC 乳白半透明 Power 键用	PCS	采购件	1	辰虹实业
..2	4041ARA060001	电池盖	SRA0600 ABS 白色	PCS	采购件	1	辰虹实业
..2	4140001001001	电池绝缘片	30*15mm H=0.1mm PET 红色	PCS	采购件	1	卓佳
..2	5110176030151	螺丝	1.7×6mm PA"+" NI	PCS	采购件	1	宇创
..2	5223ARA060001	电池片	SRA0600 正负极连接片 弹簧钢镀镍 厚 0.3mm	PCS	采购件	1	辰虹实业
..2	5221ARA060001	电池片+	SRA0600 弹簧钢镀镍 D=0.5mm	PCS	采购件	1	辰虹实业
..2	5222ARA060001	电池片-	SRA0600 弹簧钢镀镍 厚 0.3mm	PCS	采购件	1	辰虹实业
.1	Y1SRA0600TC01	包装（刀格）	SRA0600（CM100-1-TP）2.4G 白色遥控器包装 BOM	SET	虚设品号	1	鸿发
..2	674SRA0600010	外箱	B=B，320*300*260(H)mm RoHS	PCS	采购件	0.01	鸿发
..2	665SRA0600010	外箱平卡	B3B，300*282mm RoHS	PCS	采购件	0.03	鸿发
..2	660SRA0600010	长刀格	308*116mm,B3B,每刀格都要是 24mm RoHS	PCS	采购件	0.12	鸿发
..2	660SRA0600020	短刀格	B3B，284*116mm,每刀格都要是 46mm RoHS	PCS	采购件	0.22	鸿发
..2	603SRA0600010	主机 SN 号标贴	白色 PET，30*6mm 左上角有倒角 背胶（买回的是空白，厂内打印,内容随订单变化）RoHS	PCS	采购件	1	日月条码
..2	6400220000010	CE 标贴	白色 PET，30*6mm 右上角有倒角 背胶 （买回的是空白，厂内打印,内容随订单变化）RoHS	PCS	采购件	1	日月条码
..2	6400230000010	提示标贴	80g 铜版纸，过 PP，45*8mm PANTONE 178 C 白底红字 背可移胶 RoHS	PCS	采购件	1	凡悦
..2	612SRA0600010	外箱标贴	80g 铜版纸，背胶 105*67.5mm 白底黑字（买回的是空白，厂内打印,内容随订单变化）RoHS	PCS	采购件	0.02	凡悦
..2	6530135006001	双面汽泡袋	135MM*60MM(开品)*0.05MM 厚,印黑色 LDPE 标志 RoHS	PCS	采购件	1	常兴

Figure 8 Connected By TCP Remote Control EBOM

4.0 Final Product Characteristics (5.0 and 6.0)

	ID	Item	Condition	Duration (Days)	Sample Size	Criteria	Factory Commitment (Y/N)	Date	Remarks from factory (if Any)
ITY	1	Thermal Cycling (Non Operating) -20 Deg C to 70 Deg C	1) -20 Deg C dwell time 20 min 2) 70 deg C dwell 20 min	6	4	1)All the parts normally 2) Rapid ramp to surface any weak joints no			



		3) Ramp rate 2 C/min 4) 80 thermal cycles			damage 3) Remain full functional at same performance; no appearance damage 4) Solid solder joint			
2	Thermal Cycling (Operating) 0 deg C to 45 deg C  	1) Ramp rate at 0.5 Deg C / Min 2) Dwell time 3 hrs 3) 12 cycles	5	4	1) All the parts normally 2)Rapid ramp to surface any weak joints no damage 3) Remain full functional at same performance; no appearance damage 4) Solid solder joint			
3	Storage Test  	1) High / Low Temperature Test at low Humidity (60C,20%RH, -10C) 2) High / Low Temperature Test at high Humidity (60C, 80%RH, -10C)	7	2	Remain full functional at same performance; no appearance damage			
4	Drop Test	1) Height of drop: 1m (Free drop onto the wooden floor) 2) Number of drop: one time on 6 faces (left, right, front, rear, bottom and top side). 3) DUT status: with battery inserted		3	1) The function of key components should be normal after the test. 2) Appearance shouldn't be cracked or other damage. 3) Battery cover or battery separate from handset is allowed (if any) 4) It's acceptable that recover the separation between upper and bottom panels except crack.			
5	Keypad/ Button Life Test	1) Test times: 20,000 times with metal dome 2) Force: 200gf 3) Frequency: 4.8Hz 4) Test Sample Status: Power-off		4	1) The function of key components should be normal after the test.			
6	Battery Life Test	a) Measure current/voltage of the tested unit when 1)Batteries just installed and 2) The 5 LEDs turn ON before the test. b) Using the group button “1-4” on the remote to pair with a light-bulb. c) After pairing, select the group button then press the on/off button. You should see the light-bulb turn on and off as well.		1				

		d) Start the battery life test by pressing the on/off button at 9 sec interval, monitor voltage and check LED/light-bulb on/off until battery die.						
7	Printed Material Strength Test	1) Test times: 100 times (1 time= from one side to the other) 2) Liquor: Alcohol 95% 3) Pressure: 500g/cm^2 at less		4	1) No sign of peeling shall be appeared.			
8	Salt Spray Test	1)喷雾液：5% NaCl PH=6 2）实验室温度 35℃ 饱和空气桶温度 47℃ 3）喷雾量：1.3ml/80cm^2/H		4	>2H No Sign of corrosion to metal			
9	Battery Door Test	Open and close 50 times		4	Battery Door should be able to function normally without becoming loose			
10	Effective RF range	1) At least 70m (line of sight) without Range Extender (PA), bulb at 1m height, remote 1.0-1.2m			RF range > 75m			
11	RF Power	Signal directly input instrument			0±3dBm			
12	RF Frequency	RF radio based on IEEE802.15.4 (2.405 - 2.485GHz)			2.405-2.485GHZ			
13	Button function test	Test function of all buttons to work with 4 light bulbs			Button function OK			
14	Nominal voltage	Test operating voltage to work with a paired light bulb.			2.1-3.0V			
15	Standby current	Measure current in standby mode at 3.0V			< 2uA (to be confirmed after 1st 500 build)			
16	Operating current	Measure current in operation mode when 5 LEDs turn on at 3.0V			<35mA(to be confirmed after 1st 500 build)			
17	Electrical discharge test	Air discharge volt = 8kV, contact discharge = 4kV			No functional failures and no parts should suffer damage, acc. To EN61000-4-2 performance criteria B			

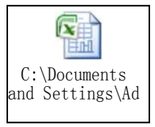
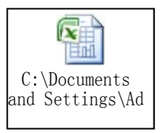
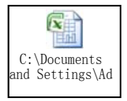
	18	Reverse polarity of battery	Batteries are deposited in the incorrect way. Press a button. The batteries are then installed in the correct way.			Product shall not be damaged			
RELIABILITY TESTS (B)	19	MTBF Demonstration Test (50,000 hours)	1) 90% CL at 35 Deg C		30	1) Record time to failure data 2) Tear down to inspect all parts after test for any abnormality and potential failures			
	20	Package Drop Test	1) Height : 76 cm 2) Number of Drop: 1 corner, 3 edges, 6 faces, 10 drops in total		4	1) RF performance should meet the measure specification. 2) The function of key components should be normal after the test.			
	21	Package Vibration Test	1) Type of Vibration: Random 2) Duration: 60 minutes for each axis 3) Frequency: 5~500Hz 4) Acceleration: 1.88G 5) DUT status: Power-off 6) Axis: X, Y, Z axis		4	1) RF performance should meet the measure specification. 2) The function of key components should be normal after the test. 3) ID part shouldn't be cracked or other damage.			
	22	Tumbler Test (Multi drop test)	1) Height of drop: 0.5m (Free drop onto wooden floor) 2) Number of drop: 50 time on random faces. 3) DUT status: with battery inserted		3	1) The function of key components should be normal after the test. 2) Appearance shouldn't be cracked or other damage. 3) Battery cover or battery separate from handset is allowed (if any) 4) It's acceptable that recover the separation between upper and bottom panels except crack.			
	23	Crystal oscillation frequency	Replace batteries with DC supply and measure frequency at 2.1/3.0V under 0/25/45 degC			32MHZ+/-3.2KHZ			
	24	Oscillation stop voltage	Replace batteries with DC supply and measure minimum voltage			2.2V or less			
	25	Press test	100N with 4mm squared pin on random places of the device.			No mechanical, electrical and functional failures are allowed			
	26	Key force	Press button with a 4.5mm diameter pin and measure key force until LED lit.			170g +/- 30g			

27	Battery insert and remove test	Perform 50 times of insert/remove test routine with human finger		3	The funcation of the battery contact should be normal after the test.			

Figure 9 Overall Product Characteristics

4.0 Final Product Characteristics (5.0 and 6.0) Bilingual Version

RELIABILITY TESTS (A)

ID	Item 项目	Condition 测试条件	Duration (Days) 天数	Sample Size 测试样品数量	Criteria 标准	Factory Commitment (Y/N) 生产商	Date 日期	Remarks from factory (if Any)
KFR-100	Thermal Cycling (Non Operating) -20 Deg C to 70 Deg C  热循环测试（非工作状态）-20 度到 70 度	1) -20 Deg C dwell time 20 min -20 度停留时间：20 分钟 2) 70 deg C dwell 20 min 70 度停留时间：20 分钟 3) Ramp rate 2 C/min 梯度 2 度/分钟 4) 80 thermal cycles 80 循环次数	6	4	1)All the parts normally 所有元器件正常 2) Rapid ramp to surface any weak joints no damage 快速升温表面，所有薄弱点没有损伤 3) Remain full functional at same performance; no appearance damage 保证各种功能正常，无表面破损 4) Solid solder joint 焊点牢固	Y (T1)		
KFR-110	Thermal Cycling (Operating) 0 deg C to 45 deg C  热循环测试（工作状态） 0 度到 45 度	1) Ramp rate at 0.5 Deg C / Min 梯度 0.5 度/分钟 2) Dwell time 3 hrs 停留时间：3 小时 3) 12 cycles 12 循环次数	5	4	1) All the parts normally 所有元器件正常 2)Rapid ramp to surface any weak joints no damage 快速升温表面，所有薄弱点没有损伤 3) Remain full functional at same performance; no appearance damage 保证各种功能正常，无表面破损 4) Solid solder joint 焊点牢固	Y (T1)		
KFR-200	Storage Test  储藏测试	1) High / Low Temperature Test at low Humidity (60C,20%RH, -10C) 在低湿度的高/低温度测试 （60 度，20%相对湿度，-10 度） 2) High / Low Temperature Test at high Humidity (60C, 80%RH, -10C) 在高湿度的高/低温度测试 （60 度，80%相对湿度，-10 度）	7	2	Remain full functional at same performance; no appearance damage 保证各种功能正常，无外观破损	Y (T1)		
KFR-400	Drop Test 跌落测试	1) Height of drop: 1m (Free drop onto the wooden floor) 跌落高度：1 米（自由跌落到实木地板） 2) Number of drop: one time on 6 faces (left, right, front, rear, bottom and top side). 跌落次数：6 面各一次（左面，右面，前面，后面，底面和顶面） 3) DUT status: with battery inserted		3	1) The function of key components should be normal after the test. 跌落测试后，关键元器件功能正常 2) Appearance shouldn't be cracked or other damage. 外观无裂缝或其他损伤 3) Battery cover or battery separate from handset is allowed (if any) 电池后壳或电池允许掉出	Y (T3)		

		测试条件：装有电池的情况下			4) It's acceptable that recover the separation between upper and bottom panels except crack. 允许复合上下面板，但是不能有裂损			
KFR-600	Keypad/ Button Life Test 按键寿命测试	1) Test times: 20,000 times with metal dome 测试次数：用金属圆顶 20,000 次 2) Force: 200gf 力度：200gf 3) Frequency: 4.8Hz 频率：4.8Hz 4) Test Sample Status: Power-off 测试样品状态：断电源		4	1) The function of key components should be normal after the test. 测试后，关键元器件功能正常	Y (T1)		
KFR-610	Battery Life Test 电池寿命测试	a) Measure current/voltage of the tested unit when 1)Batteries just installed and 2) The 5 LEDs turn ON before the test. 测量电流/电压当 1）电池刚刚插入 和 2）5 个 LED 指示灯全亮 b) Using the group button “1-4” on the remote to pair with a light-bulb. 用遥控器上全组键“1-4” c) After pairing, select the group button then press the on/off button. You should see the light-bulb turn on and off as well. d) Start the battery life test by pressing the on/off button at 9 sec interval, monitor voltage and check LED/light-bulb on/off until battery die.		1		(T2)		
KFR-700	Printed Material Strength Test	1) Test times: 100 times (1 time= from one side to the other) 2) Liquor: Alcohol 95% 3) Pressure: 500g/cm^2 at less		4	1) No sign of peeling shall be appeared.	T1/T2 - PASS, T3 - FAIL		
KFR-900	Salt Spray Test	1)喷雾液：5% NaCl PH=6 2）实验室温度 35℃ 饱和空气桶温度 47℃ 3）喷雾量：1.3ml/80cm^2/H		4	>2H No Sign of corrosion to metal	Y (T1)		
KFR-1000	Battery Door Test 电池盖拆装测试	Open and close 50 times 拆装电池盖 50 次		4	Battery Door should be able to function normally without becoming loose 电池盖功能正常，无松动。	Y (T3)		
	Effective RF range	1) At least 70m (line of sight) without Range Extender (PA), bulb at 1m height, remote 1.0-1.2m			RF range > 75m	Y (T1)		

	RF Power	Signal directly input instrument			0±3dBm	Y(0 dBm, T1)		
	RF Frequency	RF radio based on IEEE802.15.4 (2.405 - 2.485GHz)			2.405-2.485GHZ	Y (T1)		
	Button function test 按键功能测试	Test function of all buttons to work with 4 light bulbs 测试所有键的功能（控制 4 个灯泡）			Button function OK 按键功能正常	Y (T1)		
	Nominal voltage 标称电压	Test operating voltage to work with a paired light bulb. 测试控制灯泡的工作电压			2.1-3.0V 2.1-3.0V	Y (T1)		
	Standby current 静态电流	Measure current in standby mode at 3.0V 在 3.0V 下测试静态模式的电流			< 2uA (to be confirmed after 1st 500 build) 小于 2 微安（第一次 500 只制造后确定）	Y (T1)		
	Operating current 工作电流	Measure current in operation mode when 5 LEDs turn on at 3.0V 在 3.0V，5 个 LED 指示灯全亮的工作模式下测工作电流			<35mA(to be confirmed after 1st 500 build) 小于 35 毫安（第一次 500 只制造后确认）	Y (T1)		
	Electrical discharge test	Air discharge volt = 8kV, contact discharge = 4kV			No functional failures and no parts should suffer damage, acc. To EN61000-4-2 performance criteria B	Refer to regulatory test result (T2)		
	Reverse polarity of battery 反置电池极性测试	Batteries are deposited in the incorrect way. Press a button. Then install the batteries in the correct way and verify the product operates correctly. 电池极性被错放，并且进行操作按键。然后将电池用正确的方向安装，检查遥控器是否还可以正常工作。			Product shall not be damaged 遥控器不能被损坏。	Y (T1)		
RELIABILITY TESTS (R)								
KFR-300	MTBF Demonstration Test (50,000 hours)	1) 90% CL at 35 Deg C		30	1) Record time to failure data 2) Tear down to inspect all parts after test for any abnormality and potential failures			
KFR-500	Package Drop Test	1) Height : 76 cm 2) Number of Drop: 1 corner, 3 edges, 6 faces, 10 drops in total		4	1) RF performance should meet the measure specification. 2) The function of key components should be normal after the test.	Will do when volume production started		

KFR-510	Package Vibration Test	1) Type of Vibration: Random 2) Duration: 60 minutes for each axis 3) Frequency: 5~500Hz 4) Acceleration: 1.88G 5) DUT status: Power-off 6) Axis: X, Y, Z axis		4	1) RF performance should meet the measure specification. 2) The function of key components should be normal after the test. 3) ID part shouldn't be cracked or other damage.	Will do when volume production started		
KFR-800	Tumbler Test (Multi drop test)	1) Height of drop: 0.5m (Free drop onto wooden floor) 2) Number of drop: 50 time on random faces. 3) DUT status: with battery inserted		3	1) The function of key components should be normal after the test. 2) Appearance shouldn't be cracked or other damage. 3) Battery cover or battery separate from handset is allowed (if any) 4) It's acceptable that recover the separation between upper and bottom panels except crack.	Y (T3)		
	Crystal oscillation frequency	Replace batteries with DC supply and measure frequency at 2.1/3.0V under 0/25/45 degC			32MHZ+/-3.2KHZ	Y (T2)		
	Oscillation stop voltage	Replace batteries with DC supply and measure minimum voltage			2.2V or less	Y (T2)		
	Press test	100N with 4mm squared pin on random places of the device.			No mechanical, electrical and functional failures are allowed	Y (T1)		
	Key force 按键力测试	Press button with a 4.5mm diameter pin and measure key force until LED lit. 用 4.5mm 直径针按遥控器按键，测试按键力直至 LED 指示灯亮			170g +/- 30g 作用力在 170+/- 30g	Y (T1)		
	Battery insert and remove test 电池拆装测试	Perform 50 times of insert/remove test routine with human finger 人工进行 50 次电池拆装测试		3	The function of the battery contact should be normal after the test. 测试后电池接点功能正常，接触良好	Y(T3)		

7.0 Product Functional Testing

7.0.1 Setup Connected By TCP system

Figure 10 Overall Connected By TCP Test Setup

7.0.2 Functional Test with remote

For now we are going to just perform functional testing of each remote. Below is the test coverage and tests that need performed.

Component to Test	Test Number	Comments
Power Button	1,2	
Power LED	1,2	
Group 1 Button	1,2	
Group 2 Button	1,2	
Group 3 Button	1,2	
Group 4 Button	1,2	

Group 1 LED	1,2	
Group 2 LED	1,2	
Group 3 LED	1,2	
Group 4 LED	1,2	
Group 1-4 Button	1,2	
Slider Up	1,2	
Slider Down	1,2	
RF Subsystem	1,2,3,4	
Power (Battery) Subsystem	1,2,3,4	

Figure 11 Functional Test Remote Control Component Coverage

Test 1: **Test if you can add one new/reset light bulb to the network (kit doesn't have Gateway):**

a. Turn power to the light fixture on. Check if the bulb begins to brighten and dim.

b. Remove the battery cover from the back of the remote control so that you have access to the **Program** button.

c. On the remote control, press and hold group button "1" for three seconds. When the light bulb is found and is being configured by the remote control, the remote control's primary indicator light flashes rapidly.

d. ~~When one light bulb turns on at full brightness, return the remote control back to normal operation by pressing the **Program** button.~~

e. Press button "1" to test if it can turn on, turn off, dim and brighten the bulb. Press the group all button "1-4" to test if it can work as well.

f. Repeat and test if other new light bulbs can be added to button "2", "3" and "4" separately following the same procedure.

Test 1: 测试是否可以成功添加一个新的/重置的灯泡到遥控灯网络（不含 Gateway 组合）

a. 供电到灯泡，检查该灯泡是否开始明暗闪烁。

b. 卸掉遥控器电池后盖，露出**程序键**。

c. 长按遥控器上"1"号键 3 秒钟。当灯泡被遥控器识别并配对时，遥控器上的主指示灯会快速闪烁。

d. ~~当被识别的灯泡变到稳定的最大亮度时，再按程序键，使遥控器回到正常操作状态。~~

e. 测试"1"号键是否可以开，关，调暗，调亮被配对的灯泡。按"1-4"全组键，测试该键是否可以同样工作。

f. 重复测试实验，检查其他键"2"，"3"，和键"4"是否可以成功添加灯泡。

Test 2: **Test if you can add multiple light bulbs to the same group number (kit doesn't have Gateway):**

a. Turn power to the light fixture on. Check if the bulb begins to brighten and dim.

b. Remove the battery cover from the back of the remote control so that you have access to the **Program** button.

c. On the remote control, press and hold group button "1" for three seconds. When the light bulb is found and is being configured by the remote control, the remote control's primary indicator light flashes rapidly.

d. When one light bulb turns on at full brightness, repeat step c to add another bulb to group button "1".

e. ~~Return the remote control back to normal operation by pressing the **Program** button.~~

f. Press button "1" to test if it can turn on, turn off, dim and brighten all the bulbs. Press the group all button "1-4" to test if it can work as well.

g. Repeat this test to add more light bulbs to the same group number.

Test 2: 测试是否可以成功添加多个新的/重置的灯泡到遥控器上的指定键（不含 Gateway 组合）

a. 供电到灯泡，检查灯泡是否都开始明暗闪烁。
b. 卸掉遥控器电池后盖，露出**程序键**。
c. 长按遥控器上“1”号键 3 秒钟。当灯泡被遥控器识别并配对时，遥控器上的主指示灯会快速闪烁。
d. 当被识别的灯泡变到稳定的最大亮度时，重复步骤 C，添加另一个灯到“1”号键。
e. ~~按程序键，使遥控器回到正常操作状态。~~
f. 测试“1”号键是否可以开，关，调明，调暗所有被配对的灯泡。测试“1-4”全组键是否同样工作正常。
g. 重复测试实验，添加更多的灯泡到同一键。

Test 3: Test if you can remove light bulbs from the network (kit doesn't have Gateway):

1) Remove both lights which are assigned to the same group:
   a. Have two or more bulbs which are assigned to the same group number on the remote turned on.
   b. Remove the battery cover from the back of the remote control so that you have access to the **Program** button.
   c. On the remote control:
      i. Press and hold the **Program** button.
      ii. While pressing the **Program** button, press and release the **ON/OFF** button (keep the **Program** button pressed).
      iii. While still pressing the **Program** button, press and release the **Group Number** button for the lighting group assigned to the light bulbs you want to remove; (keep the **Program** button pressed, regardless of the group button you press).
      iv. While still pressing the **Program** button, press and release the **ON/OFF** button again.
      v. Release the **Program** button.
   d. Check if all lights in that group number begin to brighten and dim.
   e. Repeat these steps to remove light bulbs from another lighting group.

Test 3: 测试是否可以删除遥控灯网络里的灯泡（不含 Gateway 组合）

1) 删除在同一组里的遥控灯：
   a. 准备两个以上遥控灯并成功配对到遥控器上同一组。
   b. 卸掉遥控器电池后盖，露出**程序键**。
   c. 在遥控器上，
      i. 按住**程序键**。
      ii. 在按住**程序键**的同时，按下并放松 **ON/OFF** 键。
      iii. 继续在按住**程序键**的同时，按下并放松**要删除灯泡所在的组键**。
      iv. 继续在按住**程序键**的同时，按下并放松 **ON/OFF** 键。
      v. 放松**程序键**。
   d. 检查所删除组键里的所有遥控灯是否开始明暗闪烁。
   e. 重复测试过程，删除其他组键里的灯泡。

Test 4: Reset remote control back to the default settings from the factory:

a. Use a remote which can control light bulbs by different group buttons, or prepare one if need be.
b. Remove the battery cover from the back of the remote control.
c. Remove one battery from the remote control.
d. Press and hold the **Program** button.
e. While still pressing the **Program** button, re-insert the battery into the remote control and continue to hold the button down for about 5 seconds.
f. Release the **Program** button.
g. Test if the remote control has been reset to factory default setting and can't control the bulbs.

Test 4: 恢复出厂设置测试

a. 准备一组遥控器和无线灯，遥控器可以用不同的组键控制不同灯。
b. 卸掉遥控器电池后盖，露出**程序键**。
c. 卸掉遥控器中一个电池。
d. 按住**程序键**。
e. 在按住**程序键**的同时，重新插入电池，继续按住**程序键** 5 秒钟。
f. 放松**程序键**。
g. 测试遥控器是否恢复到出厂设置，并且不能控制原来网络里的灯泡。

7.0.3 Per Lot – 24 Piece Test with Remote

7.0.3.1 RF Testing

Test 1: RF Testing (From Test 10-12 Above)

Using appropriate equipment the test per the specifications above (TX power >=-2dBm, Active current <=20mA)

Test1: 射频测试

用合适的仪器测试以上的产品规格（发射功率>=2dBm, 动态电流<=20mA）

7.0.3.2 Remote Control Cloning Testing

遥控器克隆测试

Test 1: Test to clone remote:

a. On the **ORIGINAL** remote control:

b. Press and hold the **Program** button. While pressing the **Program** button, press the **On/Off** button **three** times.
c. Release the **Program** button. The primary indicator indicator starts flashing steadily.
d. On the **NEW** remote control:
e. Press and hold the **Program** button, while pressing the **Program** button, press the **1-4** button **three** times.
f. Release the PROGRAM button. The primary LED indicator starts flashing rapidly.
g. Once the data transfer process begins between the remote controls, the primary LED indicator on the **original** remote control starts flashing rapidly. When the new remote control has finished obtaining the network information, the primary LED indicators on both remote controls light solid for five seconds and then turns off.
h. Test if the new remote can work the same way as your original remote control. Test if all of the lighting groups and settings are the same and that the original remote can work correctly as well.

Test1：测试遥控器克隆功能：

a. 在**原遥控器**上：
b. 按住**程序键**。在按住**程序键**的同时，按下 **ON/OFF 键 3 次**。
c. 放松**程序键**。主指示灯会缓慢闪烁。
d. 在**新**遥控器上：
e. 按住**程序键**。在按住**程序键**的同时，按下“**1-4”全组建 3** 次。
f. 放松**程序键**，主指示灯会快速闪烁。
g. 当两个遥控器数据开始传送时，**原遥控器**上的主指示灯会开始快速闪烁。当新遥控器完成所有数据传输时，两个遥控器上的主指示灯会全亮 5 秒钟然后变灭。
h. 测试新的遥控器是否可以像原遥控器一样工作。测试新遥控器上所有按键是否像原遥控器一样能够控制灯泡，并且原遥控器工作正常。

Test 2: Reset the cloned remote control, and clone it from the original one again :

a. Have the cloned remote from the previous test.
b. Reset this remote according to the Test 4.
c. Repeat test 7.0.3.2 Test 1 steps a-h.
d. Check if this clone test succeeds.

Test 2: 恢复被克隆的遥控器到出厂设置，并且再次克隆：

a. 使用上一测试中被克隆的遥控器。
b. 恢复该遥控器到出厂设置(根据 Test4)。
c. 重复 Test 7.0.3.2 Test1 步骤 a-h。
d. 测试克隆是否成功。

Test 3: Reset a remote control, and clone it from another remote:

a. Reset a remote from the previous test according to Test 4

b. Repeat test 1 from step a to step h.to another remote

c. Check if this clone test succeeds.

Test3: 出厂设置遥控器，并且用它克隆另一个遥控器：

a. 恢复出厂设置遥控器(根据 Test 4)。

b. 重复 test1 步骤 a 到 h 到另一个遥控器。

c. 检查克隆是否成功。

Test 4: Reset remote control back to the default settings from the factory:

h. Use a remote which can control light bulbs by different group buttons, or prepare one if need be.

i. Remove the battery cover from the back of the remote control.

j. Remove one battery from the remote control.

k. Press and hold the **Program** button.

l. While still pressing the **Program** button, re-insert the battery into the remote control and continue to hold the button down for about 5 seconds.

m. Release the **Program** button.

n. Test if the remote control has been reset to factory default setting and can't control the bulbs.

Test 4: 恢复出厂设置测试

h. 准备一组遥控器和无线灯，遥控器可以用不同的组键控制不同灯。

i. 卸掉遥控器电池后盖，露出**程序键**。

j. 卸掉遥控器中一个电池。

k. 按住**程序键**。

l. 在按住**程序键**的同时，重新插入电池，继续按住**程序键** 5 秒钟。

m. 放松**程序键**。

n. 测试遥控器是否恢复到出厂设置，并且不能控制原来网络里的灯泡。

FCC statement

- This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

• This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules.

• These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

• If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

Certification information (SAR)

This device is also designed to meet the requirements for exposure to radio waves established by the Federal Communications Commission (USA).

NOTE: THE GRANTEE IS NOT RESPONSIBLE FOR ANY CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE. SUCH MODIFICATIONS COULD VOID THE USER’S AUTHORITY TO OPERATE THE EQUIPMENT.

IC Radiation Exposure Statement for Canada

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.