D12113-Alexa 44-Key Direct Connection Music Controller

Product Specification

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Revision history

Issue No.	Revised by	Revision date	Revise the content
V1.3	Wang Ning	2022-6-30	Add some tips, including "Direct connection is only supported from the second generation of Echo, etc.".
V1.2	Wang Ning	2022-3-9	Add a section of description about Alexa App. Add a section of description about voice control. Add accessory material.
V1.1	Wang Ning	2022-3-2	add a section of controller appearance photos.
V1.0	Wang Ning	2022-1-17	Initial version.

1 Purpose

This paper defines the specifications of D12113 project controller as the main reference for colleagues in sales, purchasing, production, quality and other departments.

2 Scope

This paper covers D12113 controller basic functions, indicators, parameters, use methods, etc.

This article is prepared by the R&D department for the reference of colleagues in the internal sales, procurement, production and quality departments of the company, and shall not be circulated without approval.

3 Terms and Definitions

The serial number	Term or definition	Instructions
1	Alexa	Amazon smart voice assistant, which is similar to Siri from Apple Inc. And Xiaoai from Xiaomi Inc. Please pay attention that Alexa is not just a term for Echo speaker. Echo speaker is just a channel of Alexa.
2	Echo	Amazon smart speaker, including Echo、Echo Dot、Echo Studio、Echo Show, etc.
3	Network Configuration	The process of connecting devices to the Internet or Gateways is called Network Configuration. Echo. Echo speaker is Bluetooth Gateway, so the process of connecting controller to Echo is called Network Configuration.
4	Gateway	The device that helps "other devices" connect to network is called Gateway. "Other devices" can only connect to the network via this device, and connecting to the network directly is not allowed. If the connection of the Gateway and "Other devices" is through Bluetooth, this Gateway can be called"Bluetooth Gateway"
5	J3/J7/F3/F7	In this article, JUMP3、JUMP7、FADE3、FADE7 is abbreviated respectively as J3、J7、F3、F7。

4 Product overview and pictures

D12113 is a full-color RGB light strip controller project that can be quickly connected to Echo series speakers via Bluetooth Sig Mesh technology. Users can control the light strip directly with their voice through the Echo speaker, or through the Alexa APP. The supported voice commands are actually limited by Alexa, which will be demonstrated in detail below. In addition, users can also control the light strip via a 44-key infrared remote control.

D12113 **features:**
- Static input voltage: DC 12V
- Static voltage interface: DC interface
- Static output voltage: DC 12V
- Maximum power: 12V 3A
- Working temperature: -20℃ ～ +60℃
- Waterproof level: IP20
- Authentication:
- The controller (shell) size:

- Output channels:RGB three routes
- Output connection mode: co-positive (12V in total)
- Control mode: PWM
- Infrared control: support(44-keys music remote control)
- Infrared reception distance: 10M
- Wireless protocol: Bluetooth Sig Mesh 2.4GHz
- Alexa Bluetooth direct connection: Support
- Bluetooth effective distance: 20 meters (the straight-line accessibility distance between the device and Echo speaker is no more than 20 meters)
- Adapted APP name: Alexa APP (Amazon)
- Network Configuration method: long press ON button for 5 seconds or unplug the power cord 3 times

Main accessory materials：

- DC socket：containing copper high temperature resistant flame retardant. Center positive pole, negative pole of contact piece .
- PCB board: double-sided glass fiber board
- MOS tube：
- Infrared：
- Double outlet：
- Shell material：

Product pictures：

The picture below is PCBA of the controller and appearance of the product.
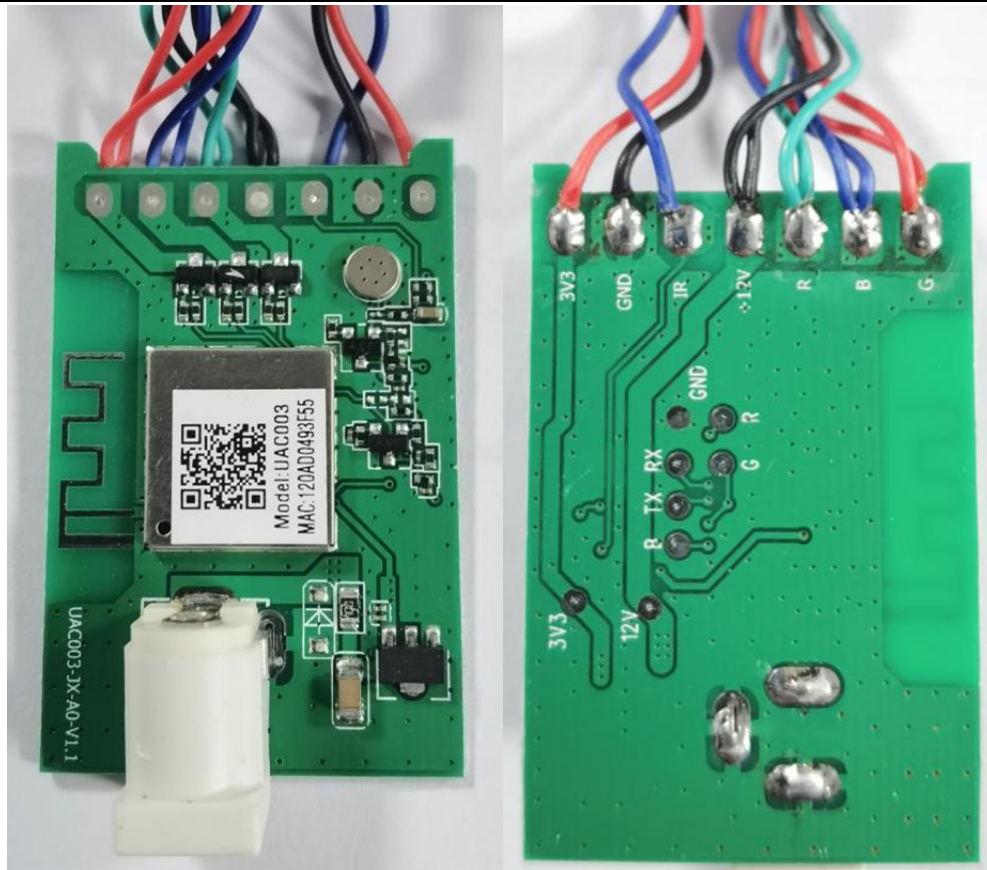
Front side and back side of PCBA

Appearance of product(controller with shell)

5 Specific Function Definition

5.1 Network configuration

Support long press IR remote control ON-key for 5 seconds to enter the network configuration state.

Highly recommend users choose this method to configure network.

It also supports　powering off and up 3 times to enter into the network configuration state. That is, in the power-on state, after "power off- power on-power off-power on-power off-power on" , the product starts to enter into network configuration state, which should not exceed 10 seconds per power-up state, this requirement is actually very lenient. This method can be written in the manual as the 2nd method, and users can use this method when the remote control is not available.

It is recommended that users plug and unplug the connecting wires of the controller and power adapter, and do not plug and unplug the plug of the power adapter to avoid safety problems.

Network configuration status: Red light flashes with 100% brightness, and frequency is 1 time/sec.

The remote control button can still take effect in the network configuration status. The network configuration continues in the background, and the duration of the network configuration is 3 minutes.

Network configuration success: the light changes from red flashing to green long light. However, if there is a remote control operation during the process, then the remote control operation is executed.

Network configuration timeout: If the network configuration is not succeeded within 3 minutes with no remote control button operation, the network configuration will time out. The red light will long light with 100% brightness.

As long as the device is not successfully configured, it will be in the configuration state by default for the first 3 minutes of each power-up, so that users can try to configuring directly after powering up. Due to the power-off memory function, the light strip will continue the state of the last light when it is powered on, instead of the red light flashing, unless the user does not change the state of the light with the remote control.

5.2 Power off memory

Support power-off memory. That is, after power off and power on again, the light strip will continue the last state.

The controller will remember it only after 3 seconds of an operation, so if the user presses the remote control and then immediately power off (less than 3 seconds), the light strip will light up according to the previous state, not the last operation.

5.3 Support Alexa APP operation

Alexa APP for lighting devices currently has only three functions: on/off, brightness and color. This product supports these functions.

Modifying the status of the light through Echo voice, the functions supported by Alexa App will be fed back to Alexa APP.

Modifying the status of the light through the remote control, the functions supported by Alexa APP, including switch, brightness and color, will also be fed back to Alexa APP.

5.4 Support color setting

There are 20 keys for color setting on the remote control, which can be pressed directly to set up the corresponding color.

Color of light strip can also be set up via Echo voice or Alexa App

5.4 Support brightness adjustment

Support brightness adjustment. If light is off, the brightness is 0.

As long as the light is on, the minimum brightness value is 10% (corresponding to 1% of the brightness bar) and the maximum brightness is 100% (corresponding to 100% of the brightness bar). That is, the "actual brightness range" is 10%-100%, which is evenly mapped to the "user brightness range".   That is, 1%-100%.

Each time you press the brightness up or down button, the brightness will be increased or decreased by 10% (user brightness).

Support 4 fixed brightness values set by remote control: 25%, 50%, 75%, 100%.

Support white light limiting, which means the maximum brightness of white light is 75%, not 100%. Color light (light that consists of two colors of RGB) does not limit the current.

5.5 Support remote control timing

Support timing function on IR remote control.
Each time you press the timer key, the white light flashes with 100% brightness 2 times, and the

frequency is 2 times/sec, which indicates successful setting.

Four keys can be used for Timing (countdown). That is 1H/2H/3H/4H respectively.

5.6Support a series of dynamic mode J3/J7/F3/F7/AUTO/FLASH

The default speed for these dynamic modes is 4th gear, 14 in total. Both speed and brightness are adjustable. Brightness follows global brightness. The speed is adjusted by the QUICK/SLOW key.

QUICK: Each press decreases the speed by one stop, 14 stops in total (1st is the fastest, 14th is the slowest).

SLOW: Each press increases the speed by one stop, 14 stops in total (1st is the fastest, 14th is the slowest).

5.6.1 JUMP3

Red-Green-Blue, three colors jump in cycles.

5.6.2 JUMP7

Red-Orange-Yellow-Green-Cyan-Blue-Purple, seven colors jump in cycles.

5.6.3 FADE3

Red-Green-Blue, three colors fade in cycles.

5.6.4 FADE7

Red-Orange-Yellow-Green-Cyan-Blue-Purple, seven colors fade in cycles

5.6.5 AUTO

J3-J7-F3-F7, four modes cycle

5.6.6 FLASH

The default is white flashing. When the user presses a color key and then presses the FLASH key, it will blink in the color selected by the user. There are 20 color keys on the 44-key music remote control of this product, and all of them can be selected by the user.

5.7Support device rhythmic lighting

Support four rhythm modes. They are J3, J7, F3 and F7, which correspond to the 4 buttons from left to right at the bottom of the remote control.

The speed and brightness cannot be adjusted in rhythm mode. The brightness is the highest by default. The speed changes with the music.

Rhythm mode can adjust the sensitivity of the device, the default sensitivity is the 5th gear, a total of 10 gears. Sensitivity can be switched through pressing the brightness key.

5.8 Support white light limiting

Support white light current limiting. Based on *the White Light Current Limiting Requirements V1.2*.

Users do not need to know this. This should be considered when matching the power adapter to the kit.

6 How does the device connect to Echo speaker?

This product requires the Echo speaker that is already connected to WIFI and can work properly as a prerequisite.

The latest confirmation is that the first generation of Echo does not support direct connection.

Direct connection is available only from the 2nd generation.

First confirm that the Echo speaker is connected to the network, working properly. Perform the following steps to connect Alexa.

Step 1: Power up the controller and plug in the light strip.

*If the light is not on, press the "ON" button, press the "brightness +", if still not, check whether the 4-pin connector sequence of the light is correct and whether the power supply has power. Make sure the light is on. There is no requirement for the state of the light.

Step 2: Aim the remote control at the infrared head. Pressing the key to select the color, the light will follow the change. This step is to confirm that the infrared remote control is working properly. The user's manual does not need to write this step.

Step 3: Aiming the remote control at the infrared head and long pressing the ON button for 5 seconds, the light band begins to flash red, indicating that the state of the network configuration.

Step 4: Say "Alexa, find device" or "Alexa, discover device" to the Echo speaker. The speaker starts to search for devices. At this point the user can press the remote control to change the lights, but it is not recommended that the user change, because the network success indicator (green) will not be seen later.

Step 5: The light changes from a red flashing light to a long green light, indicating that the network configuration is successful. It takes generally within 5 seconds (this time period do not write the user manual) from the speaker begins to search for devices to the first light becomes green.

If there are more than one controller at the same time in the network configuration status, it will turn green one after another. If the number of devices is large (more than 8), there may be the first time no device found. You can let Echo search again, configuration will certainly be successful later.

Step 6: The network configuration is successful. At this point the lights on the Echo speaker in the search state will continue for some time, and then will prompt vocally to find a new device. Users can start to control the lights with the remote control. Voice control is available until the Echo speaker prompts to find a new device.

Step 7: If there is no successful network configuration, the controller will exit the network configuration state after 3 minutes. You can press and hold the ON button of the remote control again to let the controller enter the configuration state. If the Echo network connection works, there will be no unsuccessful pairing within 3 minutes, unless the device has problems. At this point, the user is prompted to plug and re-power, (you can enter the pairing state without the remote, because as long as the device has not been paired with a network, it is in the pairing state by default for 3 minutes before each power up), and then let Echo search for the device.

Disconnecting the pairing needs to be done on the Alexa APP. Just select the device in Alexa APP and delete it. The device automatically enters the pairing state after deletion.

7 Alexa APP operation instruction

The Alexa APP needs to be downloaded from the Apple App Store or Google Play, and the name of the app is "Amazon Alexa".

Once the device is connected to Echo, the device will appear on the Alexa APP. The path is shown in Figure 7-1 below, "devices->lights".

Find the connected device in the device list and click into it. As shown in Figure 7-2.

Alexa APP can control the "on/off, brightness, color" of the device, as shown in Figure 7-3 and 7-4.

If you want to remove the device, enter the settings interface from "Settings" in the upper right corner of Figure 7-3, as shown in Figure 7-5, click the "Trash" icon in the upper right corner, and then click to confirm.

In the settings interface of the device, you can click "Edit Name" to change the name of the device and use the new name for subsequent voice control.
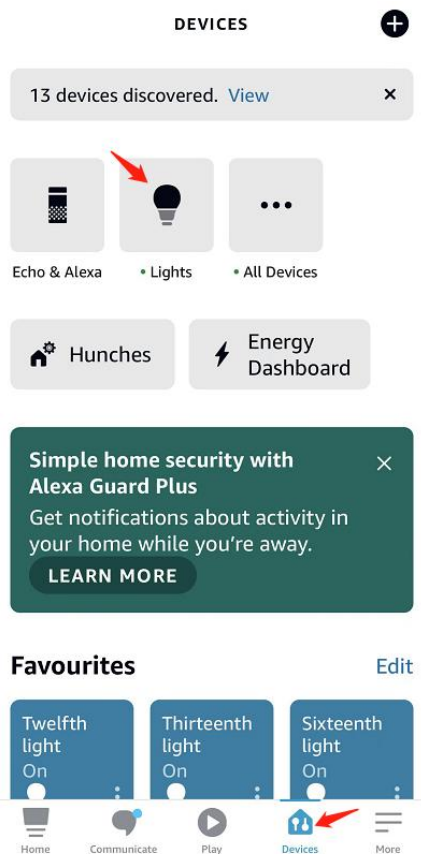

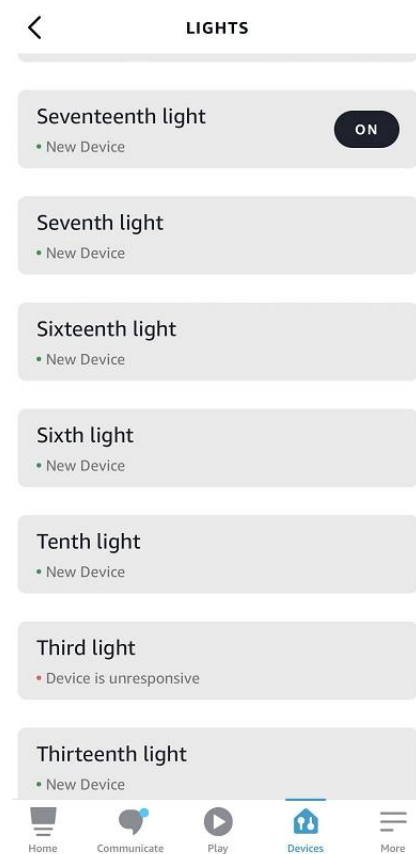Figure 7-1 Connected devices appeared in Alexa APP

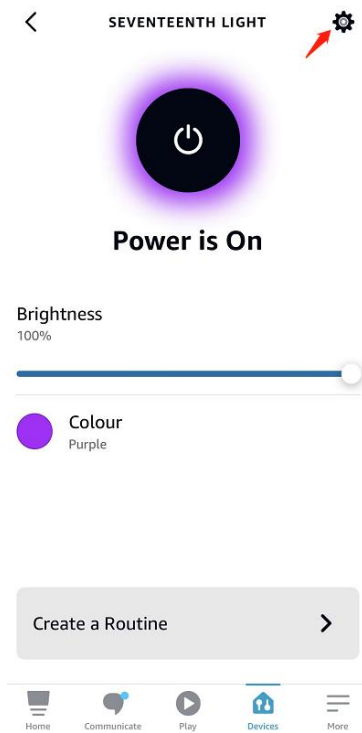

Figure 7-2 Device list in Alexa APP

Figure 7-3 Device control interface-On/off & Brightness

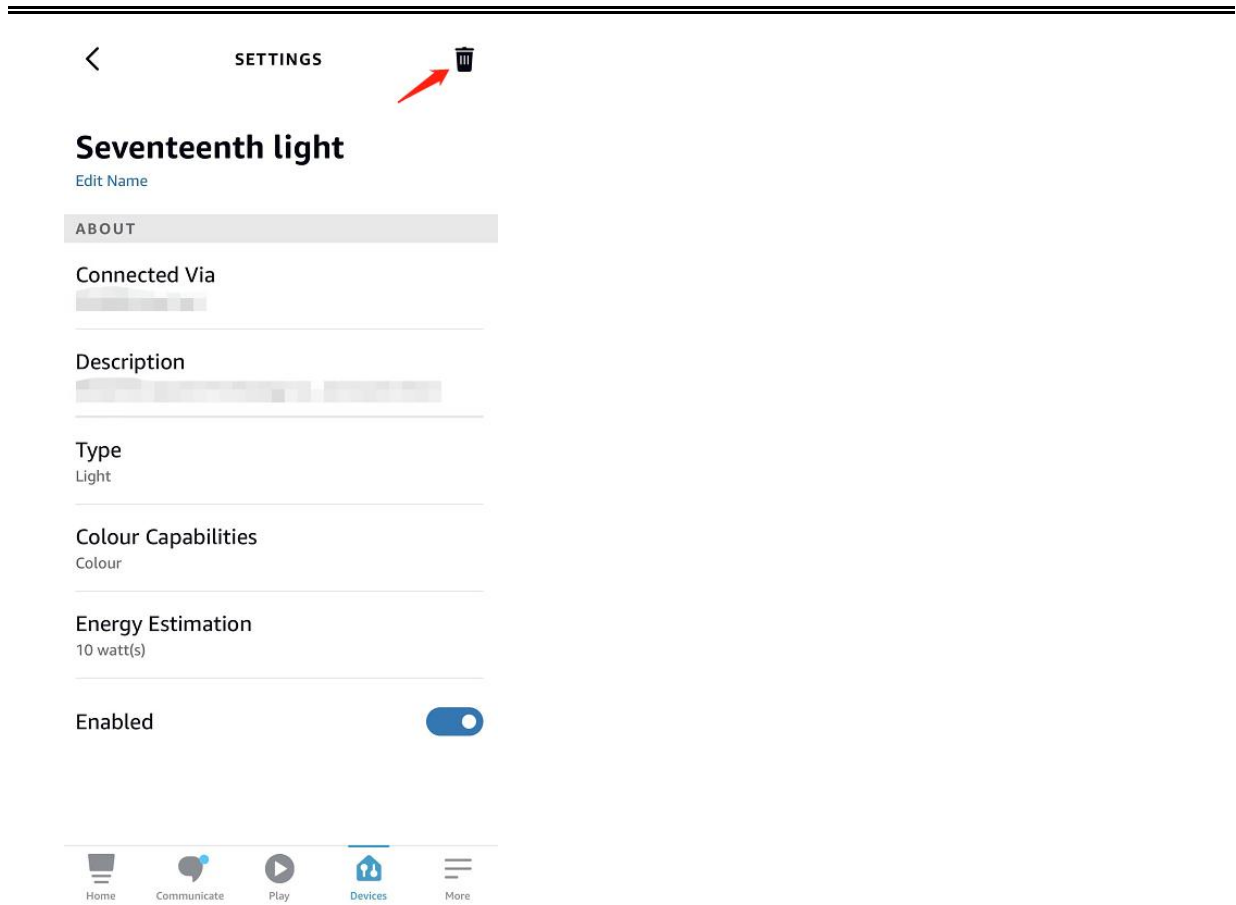Figure 7-4 Device control interface-Color

Figure 7-5 remove the device

8 device control via voice assistant

Device can be controlled by issuing voice commands to either the Echo speaker or the Alexa APP. The list of available voice commands is below.

功能	唤醒词	语音指令	备注和例子
发现并连接设备	alexa	discover device(s)	结尾有没s不影响
	alexa	find device(s)	结尾有没s不影响
开灯	alexa	turn on xxx	
关灯	alexa	turn off xxx	
开所有灯	alexa	turn on all light(s)	结尾有没s不影响
关所有灯	alexa	turn off all light(s)	结尾有没s不影响
调整灯的亮度	alexa	increase xxx brightness	每次提高25%即 1/4亮度（最高亮度是100%）。 注意，如果当前灯是彩色，即RGB灯珠点亮，则调节是RGB的组合亮度，这与全彩灯带相同。 如果当前灯是白光，则调节是对应白光灯珠的亮度，色温是不变的。
	alexa	decrease xxx brightness	每次降低25%即 1/4亮度（最低亮度是0%，即灯完全不亮）
	alexa	increase xxx by xx percent	用by这个词
	alexa	decrease xxx by xx percent	用by这个词
	alexa	dim the xxx	直接降到一个很低的亮度
	alexa	dim xxx xx percent	xxx和xx之间不用加to
	alexa	set xxx brightness to xx	xx不用加百分比
	alexa	set xxx to xx percent	要加上pecent才是百分比。要有to。
设置色彩或色温	alexa	set xxx color to xx	xx是色温或色彩，具体见另外表格
	alexa	turn xxx to xx	
	alexa	make xxx xx	xx代表颜色和色温都可以。
	alexa	set xxx to xx	不加color也是可以的
	alexa	change xxx to the color xx	
调整灯的色温	alexa	make xxx whiter	
	alexa	make xxx cooler	
	alexa	make xxx whiter	
	alexa	set xxx softer	
	alexa	set xxx cooler	
	alexa	set xxx warmer	

9 Remote control key instruction

This product supports the 44-key music remote control as shown below. The function of each key is shown in the figure.

亮度 +/-
或灵敏度（律动模式）　　关灯　　开灯（短按）
或配网（长按 5 秒）

预设色彩

动态模式
的速度调整

定时关灯
（1H/2H/3H/4H）

预设亮度

律动模式

动态模式
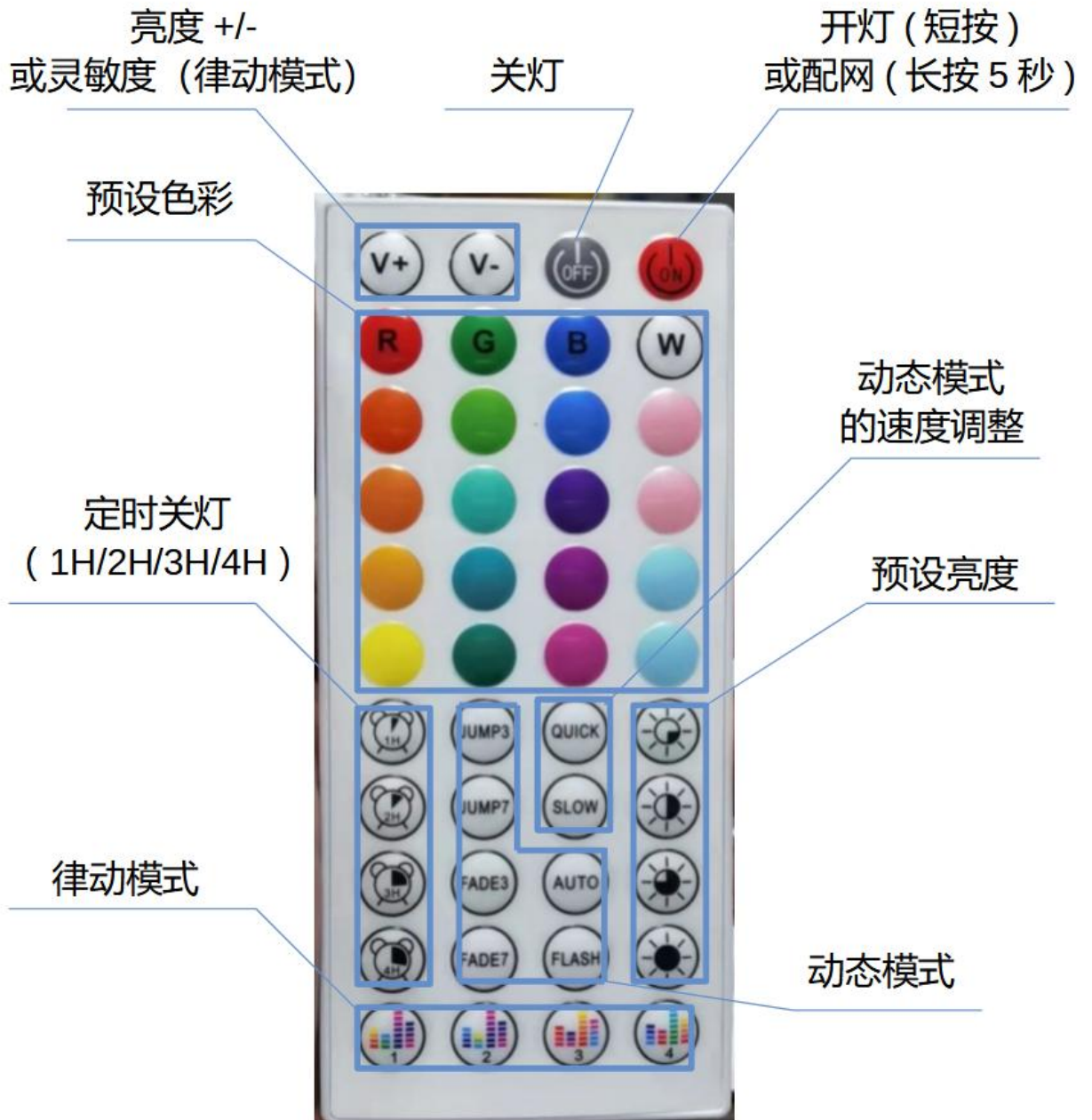
10 Cautions

✓ When first used, remind the user to upgrade the software of the Echo speaker to the latest. In the manual, let the user ask echo whether the latest firmware "Alexa, is your software up-to-date?", or unexpected problems may take place. It is important to keep the firmware up-to-date to ensure the user experience, because the Alexa direct connect solution is constantly being updated,.

✓ Remind users that too many devices on the Alexa APP will affect Echo connection stability. When the

device is re-paired with Echo, the original device is not automatically deleted on Alexa APP. It needs to be manually deleted on APP.

✓ Remind users that if they want to change their Alexa account, they need to unbind the device on the old Alexa APP account first, and then log in to the new Alexa account. Otherwise the connection between the speaker and the new device will be invalid, and the device needs to be rewired with the network. The method of unbundling can be found in the pdf.

✓ Remind users that as the Echo software continues to be updated, the software of the device is also continuously upgraded. If you encounter problems, please contact customer service.

✓ The 1st generation Echo does not support direct connection. It is available from the 2nd generation.

✓ The success rate of group control will be low when the number of devices connected to Echo is too many. For example, a voice command is about to set 6 lights to red, then the probability of success at once is very low. This is the limitation of Echo's control mechanism. This prompts the user to try 1 or 2 more times. If it is an on/off light operation (not a color or brightness adjustment), the success rate of successfully operating multiple devices with a single voice is high.

✓ If the user is unsuccessful in pairing, try to pair the device next to the Echo first, because relatively far distance will affect the success rate of wiring. After the network is completed, you can move the device and put it within the effective distance of Bluetooth.

✓ Some devices may have been connected to Echo before. that is, there is a network record, then you must enter the network configuration state to connect to the new Echo speaker. So it is necessary to let the user press the remote control to enter the network configuration state, and new device cannot be considered in the network configuration state once the power is on. This can be confirmed by the flashing light status.

✓ The wall penetration effect can not guarantee, because the thickness and material of the wall of each user's home is difficult to determine, it is not recommended to promise the user through the wall effect. We have a test through a 30 cm thick brick wall with no problem.

FCC Warning

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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: 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.

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.