Wireless Doorbell Workshop User Guide

Revision: V1.20 Date: November 13, 2024

www.holtek.com

Table of Contents

1. Description

The Wireless Doorbell Workshop is a software development platform for wireless doorbell applications. Users can easily complete a wireless doorbell application solution by editing ringtone or voice data and setting functional parameters through the development platform, and downloading them to the wireless doorbell development system that Holtek has already developed, thus saving the lengthy program development time.

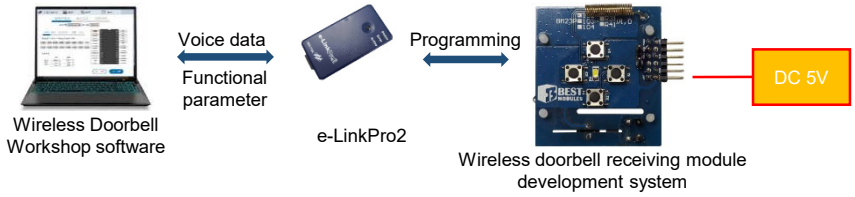
The wireless doorbell system includes an RF transmitter and an RF receiver. The transmitter has two functional combination schemes: (RF IC + Key) and (RF IC + PIR). The receiver is a wireless doorbell module, that integrates (RF IC + Voice OTP MCU), which also includes power control, keys, a LED indicator, a speaker and programming device connection interface.

Both the RF IC and the Voice OTP MCU programs have been developed and programmed by Holtek. The user only needs to edit the ringtone and select the function corresponding to the keys, and download the data to the Voice OTP MCU internal Flash Memory through the development platform. There is no need to perform any program development, which greatly reduces the product development time.

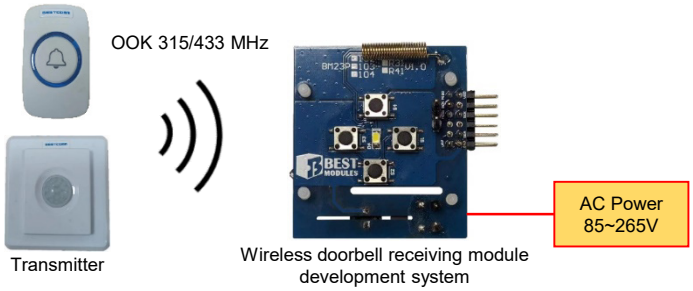
2. Development Environment

2.1 System Configuration

2.1.1 Development



2.1.2 Test and Application



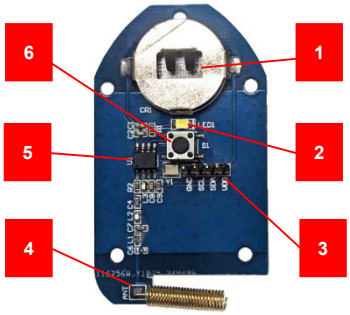
2.2 Software: Wireless Doorbell Workshop

- Select the RF frequency band
- Select the RF trigger function
- Set the button function
- Set maximum/minimum volume (1~15), volume adjustment order (1~7)
- Load and program ringtone singles (WAV) and sentences
- Ringtone data programming file output and ringtone data download

2.3 Hardware

2.3.1 Wireless Doorbell Transmitter(Two schemes):

a. RF TX IC + Key: Using key to trigger RF transmitting signal



1.Battery: CR2032 × 1

2. LED indication

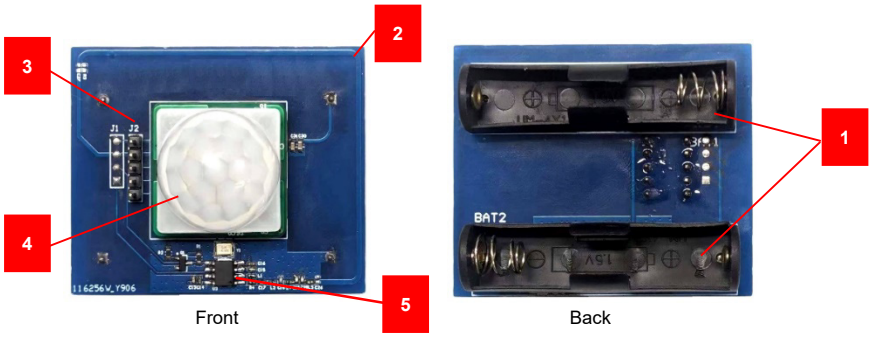
3. RF TX IC programming interface

4. Transmitting antenna

5. RF TX IC

6. Key

b. RF TX IC + PIR: Using PIR to trigger RF transmitting signal



1. Battery: AAA × 2

2. On Board transmitting antenna

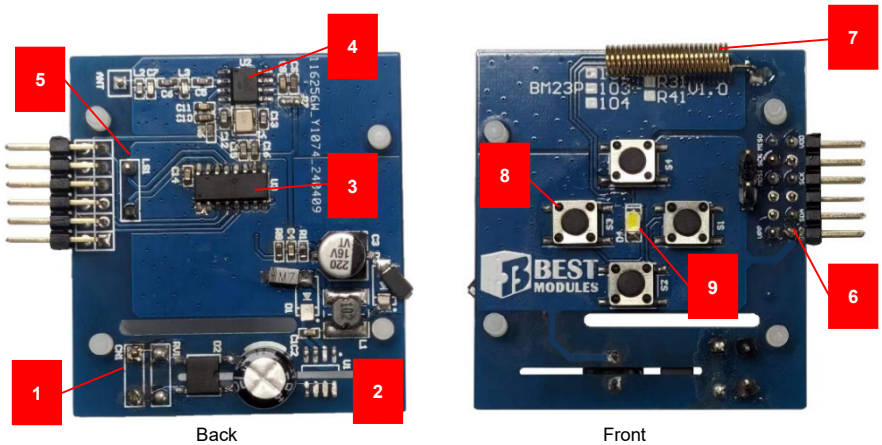
3. RF TX IC programming interface

4. PIR sensor

5. RF TX IC

2.3.2 Wireless Doorbell Receiver

RF RX IC + Voice OTP MCU

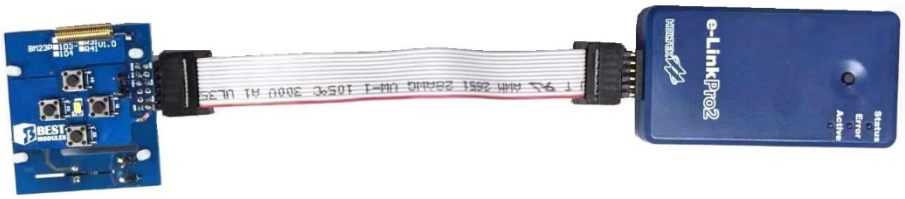


Back Front

1. AC power input: $85V_{AC}$ ~ $265V_{AC}$
2. Power Unit
3. Voice OTP MCU
4. RF RX IC
5. Speaker connection interface
6. Programming interface: Use to download ringtone data (During development, this interface provides a DC 5V, without using AC power)
7. Receiving antenna
8. Function keys: S1 ~ S4 (8 different functions can be set)
9. LED indicator: ringtone playback /RF pairing indicator

2.3.3 e-LinkPro2

The Wireless Doorbell Workshop updates the ringtone data and functional parameters of the wireless doorbell module through e-LinkPro2 (The wireless doorbell application will be programmed simultaneously if the Voice OTP MCU has not be programmed).



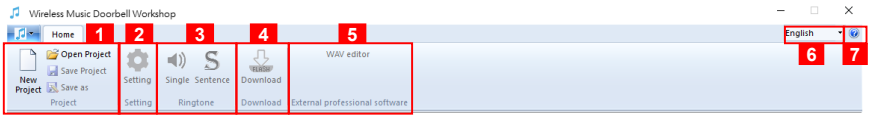
VPP			MOSI	SCK	MISO
GND	SDA	X	SCK		VDD

BM23P10x-Rx1

MISO	SCK	MOSI			VPP
VDD		SCK	X	SDA	GND

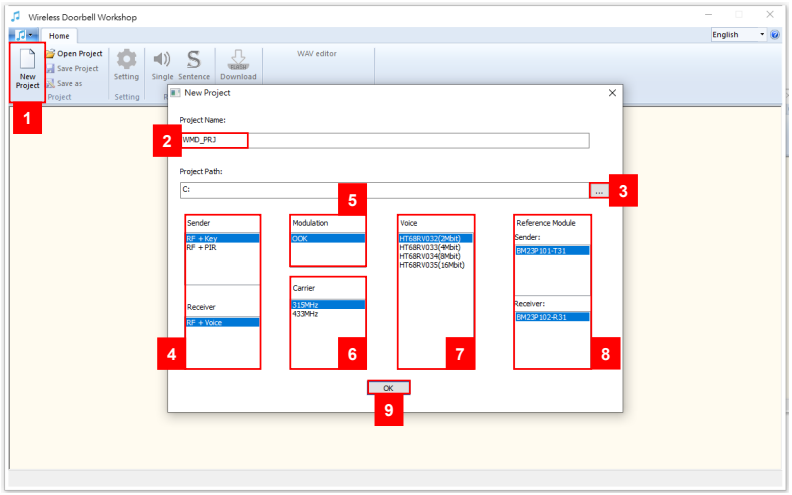
e-LinkPro2

3. Wireless Doorbell Workshop Operating Instructions



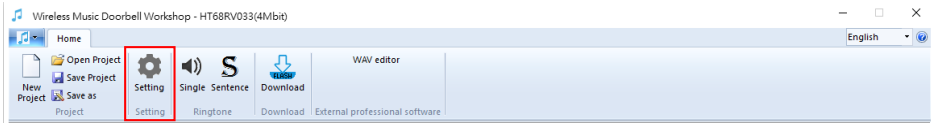
1. Project: New Project/Open Project/Save Project/Save as project
2. Setting: Operating frequency/wireless trigger function/volume/key function/LED control
3. Ringtone: load and program ringtone singles (WAV) and sentences
4. Download: ringtone data programming file output, ringtone data download
5. External professional software: WAV editor
6. Interface language switching: supports three language options which are English, Simplified Chinese and Traditional Chinese
7. About: Software version

3.1 New Project

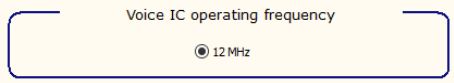


- Step 1: Click the “New Project”
- Step 2: Set the “Project Name”
- Step 3: Set the “Project Path”
- Step 4: Set the schema mode
  - Transmitter (1 out of 2):
    - RF: Use key to trigger the RF transmitting signal
    - RF+PIR: Use PIR sensor to trigger the RF transmitting signal
  - Receiver:
    - RF+Voice: Receive RF and trigger the Voice MCU to play audio
- Step 5: Set the RF modulation mode, currently only supports OOK
- Step 6: Select the RF band, which can support 315MHz and 433MHz
- Step 7: Select the Voice MCU capacity
- Step 8: Display the transmitter and receiver module models that match the settings from the previous steps
- Step 9: Click the “OK” to create the project

3.2 Setting

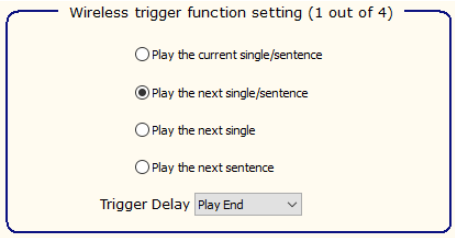


3.2.1 Voice IC Operating Frequency



The voice IC currently only supports 12MHz.

3.2.2 Wireless Trigger Function Setting



Set the voice playback mode when receiving RF trigger.

- Play the current single/sentence

  Play the currently set single or sentence, the single/sentence mode switching is set by the key function.
- Play the next single/sentence

  Play the next single or sentence. If it is currently in the single mode, only the single will be played in a loop. If it is currently in the sentence mode, only the sentence will be played in a loop.
- Play the next single

  Only loop the next single.
- Play the next sentence

  Only loop the next sentence.

Trigger Delay

Set the time interval for receiving RF triggers continuously. If the time interval is set longer than the voice playback time, the RF trigger can be received again when the voice playback.

The optional settings are described as below:

- Play End:

  The next RF trigger will be received only after the voice playback.
- 0.5 s:

  The next RF trigger will be received only after an interval of 0.5s.
- 1.0 s:

  The next RF trigger will be received only after an interval of 1.0 s.
- 1.5 s:

  The next RF trigger will be received only after an interval of 1.5 s.
- 2.0 s:

  The next RF trigger will be received only after an interval of 2.0 s.

- 2.5 s:

  The next RF trigger will be received only after an interval of 2.5 s.

- 3.0 s:

  The next RF trigger will be received only after an interval of 3.0 s.

3.2.3 Volume

Set the volume adjustment mode, with the volume range settable from 1 to 15, totaling 15 levels.

- Maximum volume

  Set the maximum volume adjustment level, with a setting range from 1 to 15

- Minimum volume

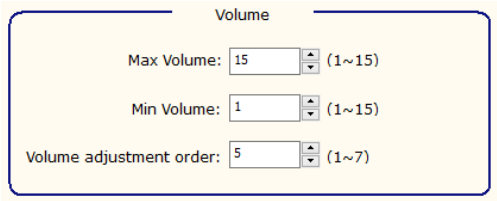
  Set the minimum volume adjustment level, with a setting range from 1 to 15.

- Volume adjustment order

  Set the increment or decrement steps for volume adjustment each time it is triggered by the button function, with a setting range of 1 to 7 steps.

The following provides an example of the volume adjustment mode.

When the setting values are as shown in the figure below.



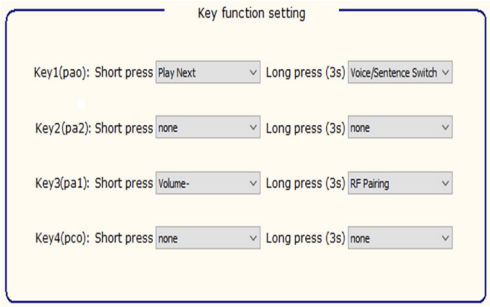
When pressing the volume increase button each time, the volume value sequentially cycles through as follows.

… → 1 → 6 → 11 → 15 →1 → 6 → 11 → 15 …

Conversely, when pressing the volume decrease button each time, the volume value sequentially cycles through as follows.

… →1 → 15 → 10 → 5 → 1 → 15 → 10 → 5 …

3.2.4 Key Function Setting



Supports up to 4 keys, each key can be set with 2 functions: short press and long press (3 seconds), the setting function is described as follows:

- none

  No function. Unused I/O should be set to none for both short press and long press functions.

- Play/Stop Current

  Play the currently set “Single” or “Sentence”. If the key is pressed during playback, the playback will stop.

- Reset to First

  Set the current “Single” and “Sentence” as the first audio source and play it.

- Play Next

  Play the next “Single” or “Sentence”.

- Play Direct

  Play the currently set “Single” or “Sentence”.

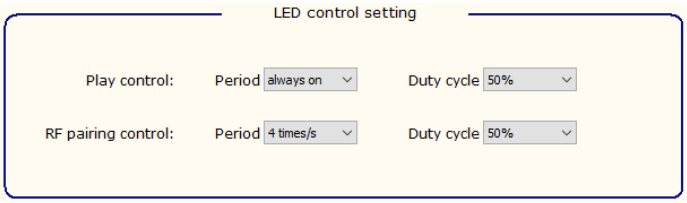
- Voice/Sentence Switch

  Switch the Single/Sentence mode and play.

- Volume+ : Volume increase function
- Volume- : Volume decrease function
- RF Pairing

  Enter the RF pairing mode, capable of simultaneously pairing with up to 4 RF transmitters, if exceeded, the earliest matched one will be replaced.

3.2.5 LED Control Setting



The LED lighting mode can be set separately when playing audio and when entering the RF pairing mode.

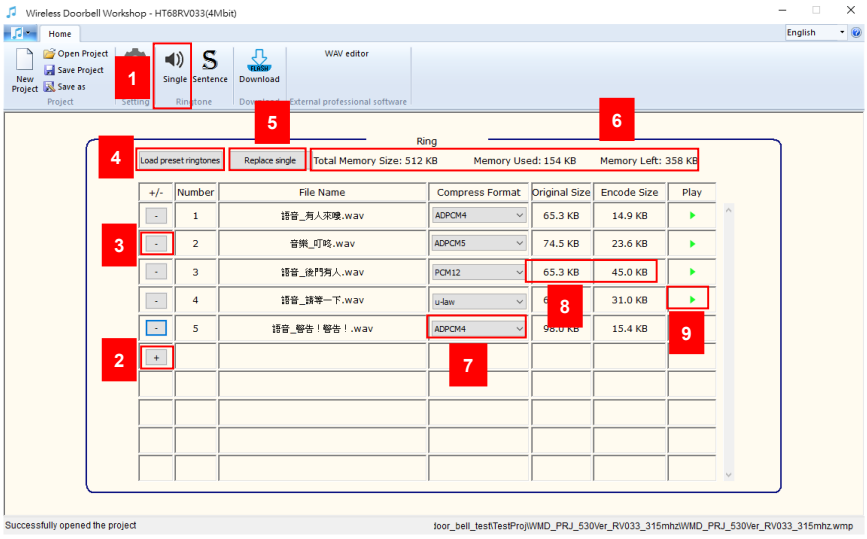
The Period setting value is described as follows:

- always off: always off
- 4 times/s: Flashing 4 times per second
- 3 times/s: Flashing 3 times per second
- 2 times/s: Flashing 2 times per second
- 1 time/s: Flashing 1 time per second
- always on: always on

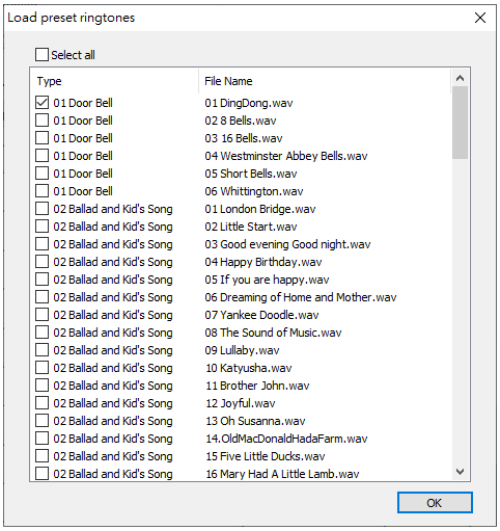
The Duty cycle setting value is described as follows:

- 10%: The light is on for 10% of the flashing period
- 20%: The light is on for 20% of the flashing period
- 30%: The light is on for 30% of the flashing period
- 40%: The light is on for 40% of the flashing period
- 50%: The light is on for 50% of the flashing period
- 60%: The light is on for 60% of the flashing period
- 70%: The light is on for 70% of the flashing period
- 80%: The light is on for 80% of the flashing period

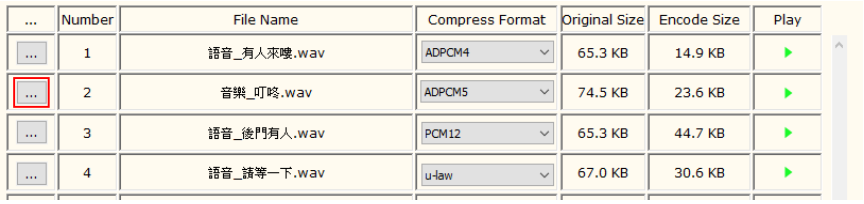
3.3 Ringtone – Single Configuration



1. Click the “Single” to enter the setting page
2. Add: Click the icon [+] to add a new single
3. Delete: Click the icon [-] to delete a new single
4. Preset ringtone library: Click the “Load preset ringtones” icon to select the single to be loaded from the preset ringtone library

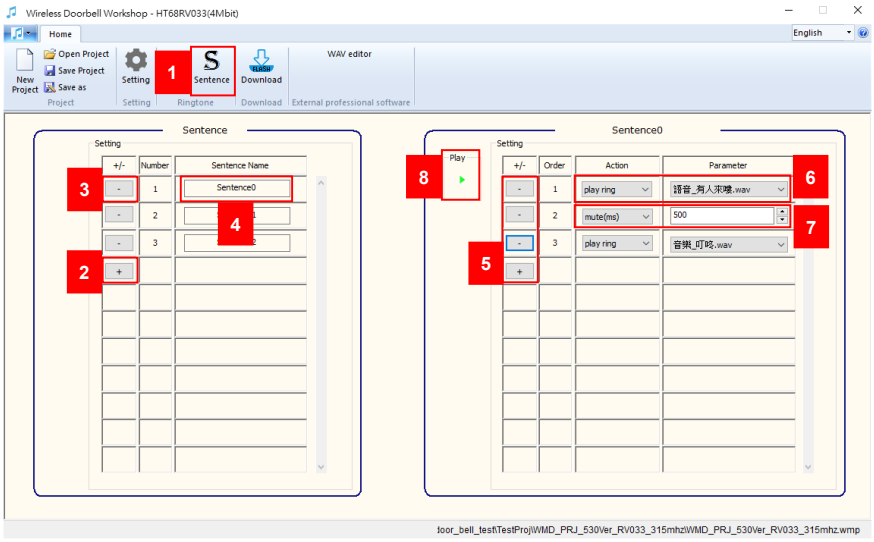


5. Replace: After clicking the “Replace” ,the icon [-] will be changed to [...] Click it to replace the single.



6. Display the current Flash memory usage information
7. Set/change the audio compression format, including ADPCM4, ADPCM5, PCM12 and u-law
8. Display the original audio and compressed file size
9. Click the icon ▶ to play the single on the platform

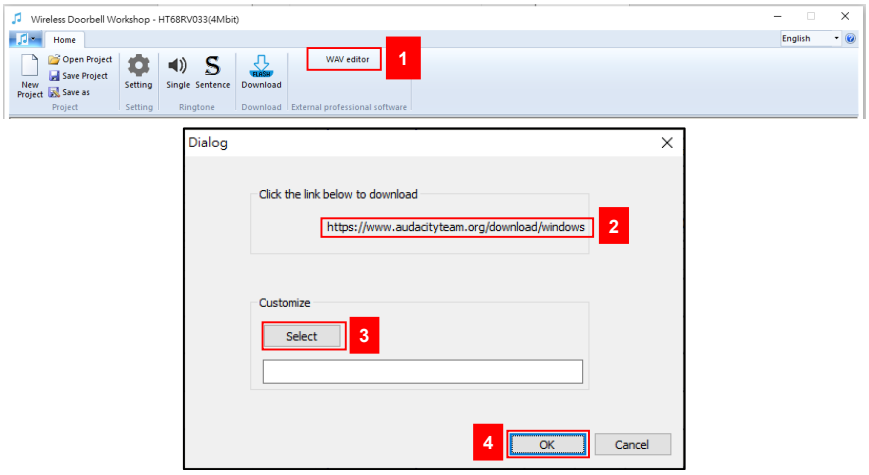
3.4 Ringtone – Sentence Configuration



The Wireless Doorbell Workshop supports ringtone scheduling: It is possible to combine multiple ringtone singles into a statement and mute time can also be added.

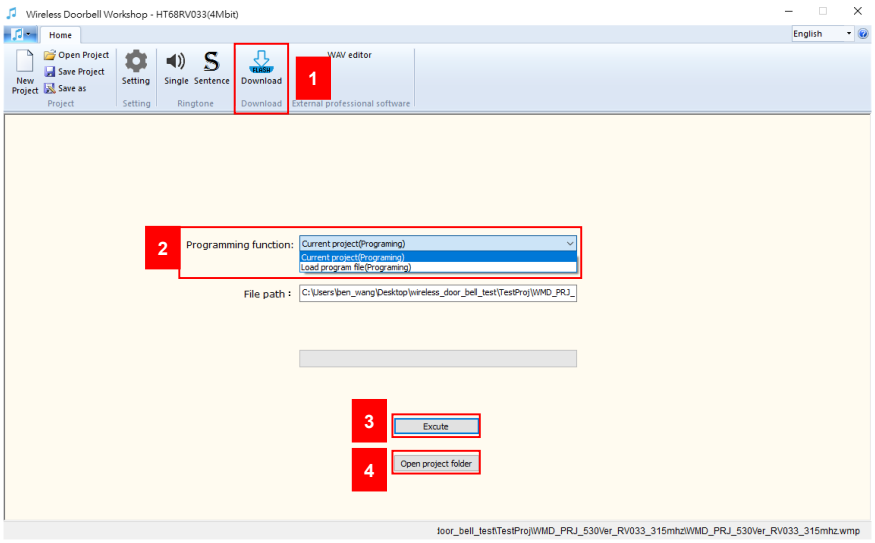
1. Click the “Sentence” to go to the sentence configuration page
2. Click the icon “+” to add a sentence
3. Click the icon “–” to delete a sentence
4. Click the “Sentence0” to edit the sentence schedule in the right field
5. Click the icon “+” or “–” to add or delete scheduling action
6. When the schedule action is set to “Play Ringtone”, select the desired ringtone from the loaded ringtone single
7. When the schedule action is set to “Silent”, enter the duration of silence in milliseconds in the parameter
8. Click the “Play” to play the arranged sentence on the platform

3.5 WAV Editor



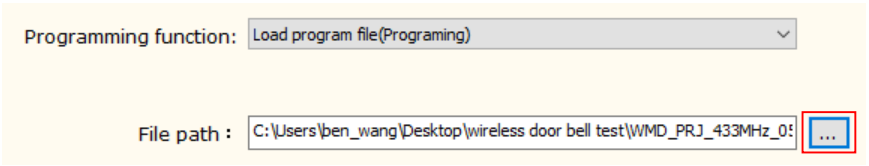
1. Click the “WAV editor” will pop up the window shown in the figure above.
2. The free editor software can be downloaded
3. Customize the usual editing software
4. Click the “OK” to complete the setting, and then the software will be opened directly if the “WAV editor” is clicked

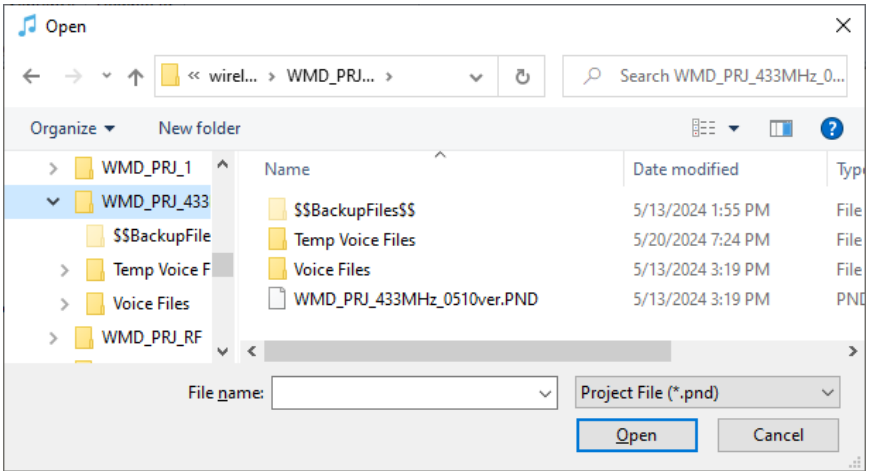
3.6 Download



1. Click the “Download” to enter the setting interface
2. Select the programming method, including “Current project” or “Load program file”

   Click the icon ... to select the programming file (*.PND) to be loaded When choosing the “Load program file”

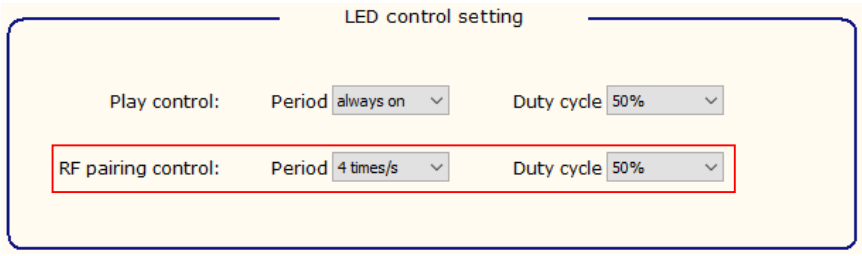




3. Click the “Execute”, the platform starts to programming data and download it to the Voice MCU
4. Click the “Open project folder” to open the folder

4. RF Pairing Operation

- Step 1: User enters the pairing mode by the key function.
- Step 2: Observe whether the LED flashing mode conforms to the LED control setting value, and confirm entering the pairing mode



- Step 3: The RF transmitter is triggered to transmit signal
- Step 4: The receiver receives an RF signal, triggers the Voice MCU to play the audio, and then saves the pairing parameters to complete the matching
- Step 5: Automatically exits the pairing mode

5. Parameter Automatic Storage

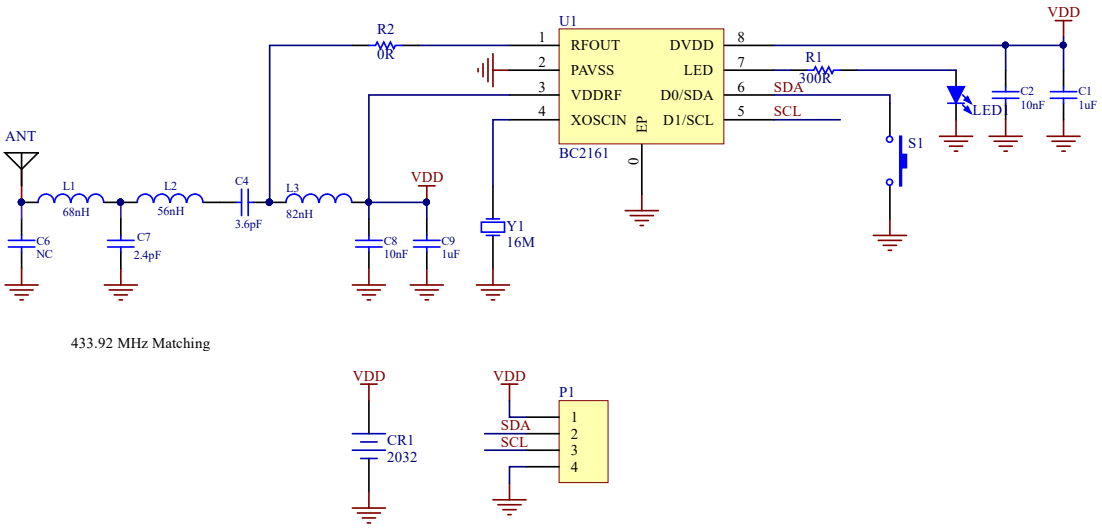
The play mode (single/sentence), play track and volume settings will be automatically saved under the following operating conditions, the settings will still be saved even after the power is restarted.

Parameters will be automatically saved if any of the following button functions are triggered, and no further triggers of the following events occur within 24 seconds after the initial trigger:

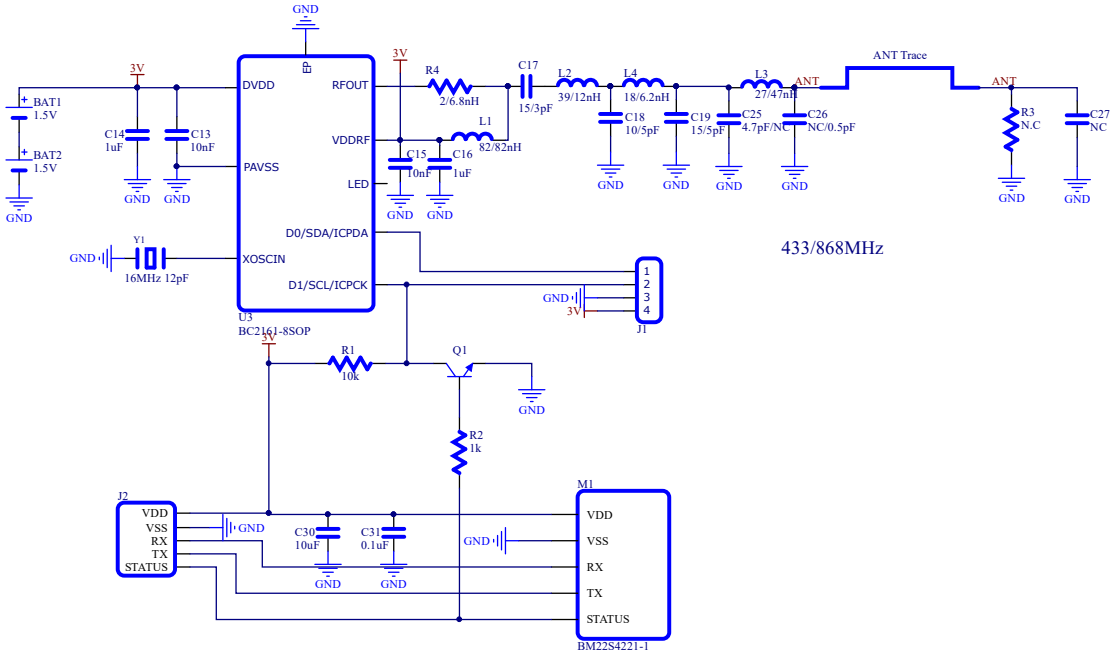
- Reset to First
- Play Next
- Voice/Sentence Switch
- Volume +
- Volume –

6. Appendix

6.1 Appendix A – BM23P101-TX1 Circuit Diagram (RF TX IC + Key)



6.2 Appendix B – BM23P102-TX1 Circuit Diagram (RF TX IC + PIR)



6.3 Appendix C – BM23P10x-RX1 Circuit Diagram (RF RX IC + Voice OTP MCU)