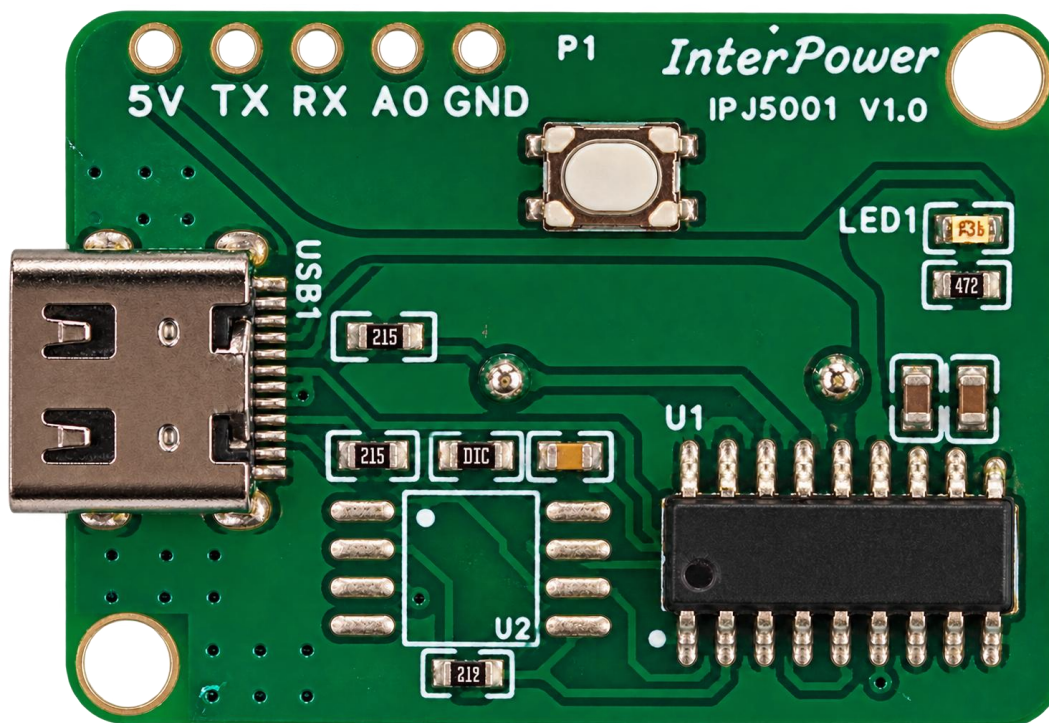




PCBA Module Product Manual

IPJ5022 Audio Playback PCBA

USB Audio Download Button and UART Control Product Integration



IPJ5022 combines an audio controller, USB Type-C port, pushbutton and speaker for sound prompts and voice announcements. Customers integrate the PCBA with their enclosure, power supply and end product.

Workflow: connect the board, add audio and set parameters, download with the PC software, then power-cycle the board to check playback.

The board shown is marked IPJ5001 V1.0. The supplied model and storage variant depend on the order and actual board.

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1 Hardware and Enclosure Integration

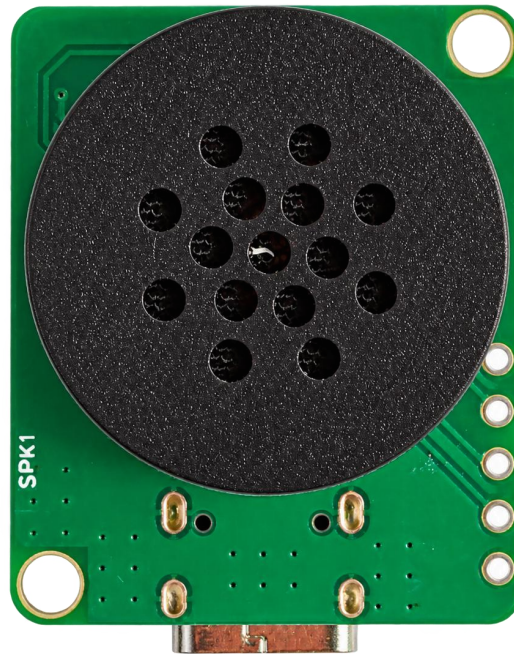


Figure 1 Speaker side — keep the sound outlet clear

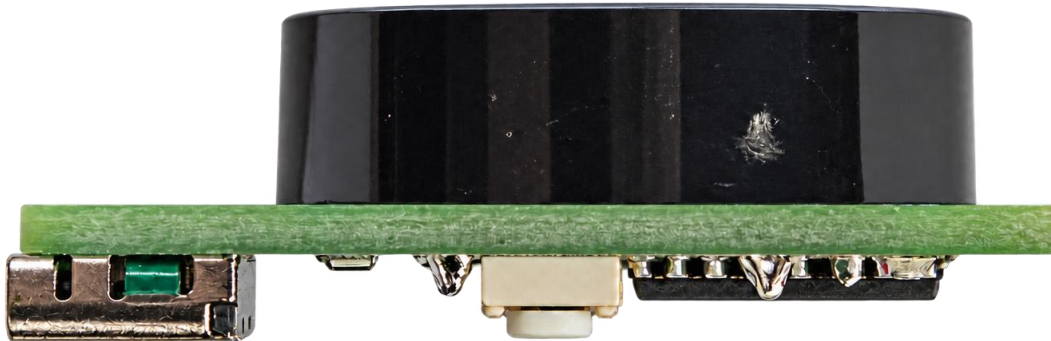


Figure 2 Side view — allow access to the USB port and pushbutton

Mounting Guidelines

Keep the speaker outlet unobstructed and allow room for USB insertion and button travel. Mounting hardware and metal enclosures must not contact solder joints, components or traces.

Use the engineering files and actual board for outline, hole positions and component heights; do not measure from these images. External Flash at U2 is not fitted in the component-side photo. Select the storage variant to match the actual hardware.

2 Interfaces and Power Connections

View the component side as shown on the cover, with USB on the left and P1 at the top. From left to right, the P1 pads are 5V, TX, RX, A0 and GND. Check the silkscreen and schematic before wiring.

Pin	Marking	Signal and Connection
1	5V	VBAT power input; directly connected to USB VBUS
2	TX	UART_TX: connect the module transmitter to the controller RX
3	RX	UART_RX: connect the module receiver to the controller TX
4	A0	PA0 BUSY output: high when idle, low during playback
5	GND	Power ground and signal reference ground

Power and Logic Levels

USB VBUS and P1 5V are directly connected in the schematic. Use one power source. If both sources must be connected, provide power isolation to prevent backfeeding.

TX, RX and A0 use the chip's VDDIO logic levels. The 5V power marking does not mean that signal pins tolerate 5 V. Use compatible controller levels or a level shifter. Do not connect an RS-232 voltage interface directly.

Onboard Functions

Part	Function and Operation
USB1	Type-C power and download port; use a data-capable USB cable
SW1 / PB1	Short press: next track. Hold for about 1 second: stop playback
PA0 / A0	Active low: low during playback; high when idle, stopped, finished or after a decoding error
LED1	Power indicator circuit, powered from VBAT through a current-limiting resistor
SPK1	The schematic specifies an 8 Ω , 0.5 W speaker; this is not the module's rated output power

Connect the speaker across SPK+ and SPK-. Do not connect either differential speaker output directly to ground.

3 Audio Download and PC Software

Use InterPower IPJ5022 Audio Studio on Windows 10/11 x64. Launch the single-file edition, or run IPJ5022.exe from the complete application folder.

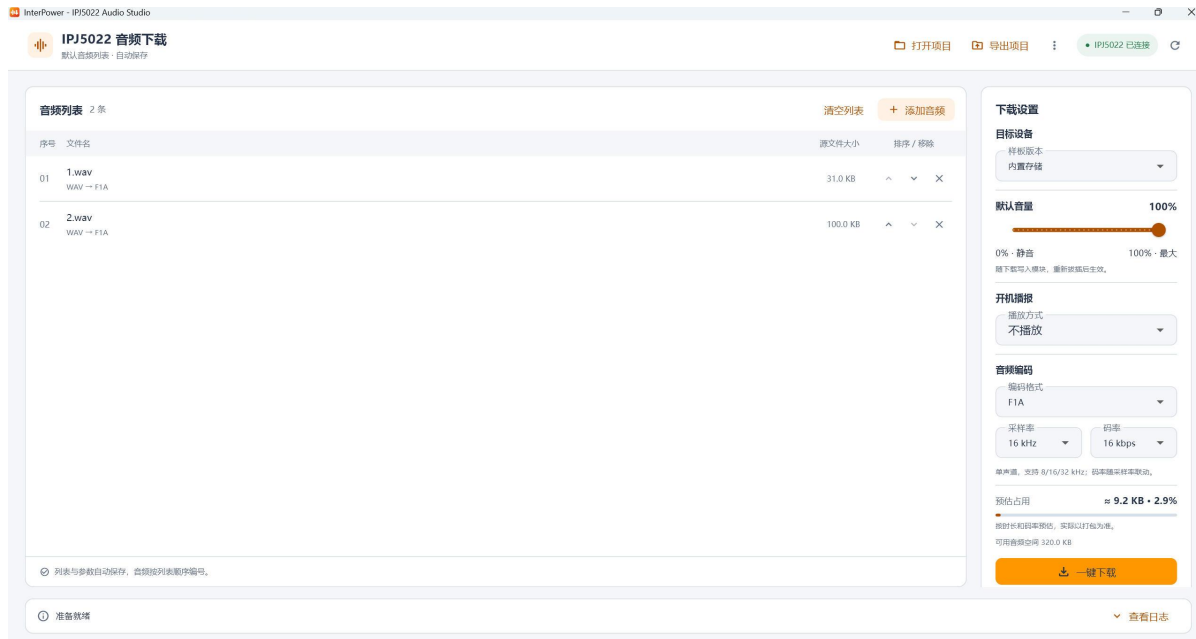


Figure 3 Actual Chinese-language interface — audio list and settings are saved automatically

Download in Four Steps

- 1 Connect: use a board with its initial firmware already programmed. Connect only one target board and check the green IPJ5022 connection indicator at the top right.
- 2 Add audio: use Add Audio at the top right of the list to import WAV, MP3 or other files. Use the reorder buttons to set the sequence. Track numbers start at 1.
- 3 Configure: in the right-hand panel, select the matching storage variant, default volume, startup playback and encoding parameters. Check the capacity indication.
- 4 Download: click the orange download button at the bottom right. Keep USB connected during conversion, packaging and programming. On success, power-cycle the board and press PB1 to test playback.

Default encoding is mono F1A at 16 kHz / 16 kbps. Volume 0% is mute and 100% is maximum. Startup playback can be off, once or looped. Volume and startup settings take effect after downloading and power-cycling.

Final package validation determines capacity. To back up or move a project, use Export Project at the top right and retain the whole project folder. Downloading updates firmware and audio; copying files as to a USB drive is not supported.

4 UART Control and Playback Status

UART uses 9600 bps, 8 data bits, no parity and 1 stop bit. Cross-connect TX/RX and connect both grounds. This section applies to firmware with a fixed trailer byte; update older checksum-based firmware first.

Data Frames with Fixed Trailer EF

Request, 6 bytes: AA 55 CMD VL VH EF. The value is little-endian: VL is the low byte and VH is the high byte. The last byte is fixed at EF; no checksum is required.

Response, 7 bytes: AA 55 (CMD | 80) STATUS VL VH EF. The response command is the request command ORed with 0x80; the trailer is EF. All frame bytes are hexadecimal. Do not append CR/LF.

CMD	Function and Value	Request Example
01	Play track 1–999, limited by the number of audio files	AA 55 01 01 00 EF Play track 1
02	Stop; request value 0. Returns the last successfully played track number	AA 55 02 00 00 EF
03	Volume 0–31. Power-up restores the default volume set during download	AA 55 03 14 00 EF Set volume to 20
04	Query; request value 0. Bit 15 is playback status; bits 0–14 are the last track number	AA 55 04 00 00 EF
05	Next track; request value 0. Wraps to track 1 at the end	AA 55 05 00 00 EF
06	Query count; request value 0. Returns the number of packaged audio files	AA 55 06 00 00 EF

Responses and Playback Behavior

STATUS: 0 = success; 1 = unknown command; 2 = invalid parameter or resources not mounted; 3 = file or decoding failure. Invalid frames or trailers other than EF are ignored. Reception resets after about 200 ms with no new byte within a frame. Status is reported only on request.

Normal button playback plays one track and does not continue automatically. To exit startup looping, short-press or hold PB1, or send a UART Play, Stop or Next command.

5 Schematic and Storage Variants

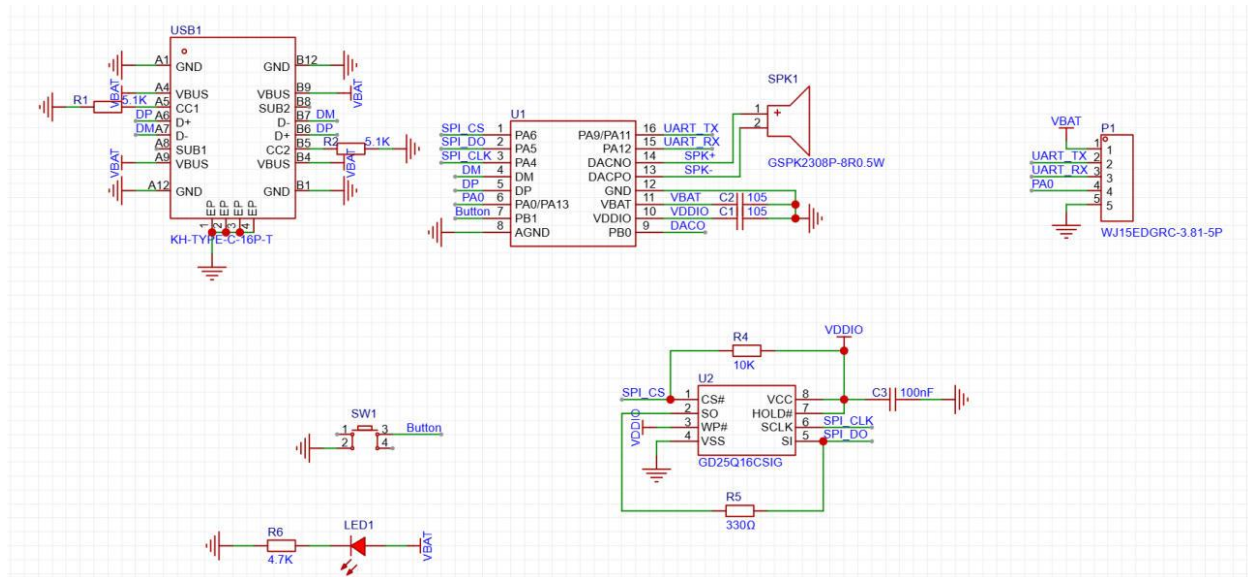


Figure 4 PCBA schematic — zoom in within Word for details

Circuit Overview

USB1 provides power and USB data. U1 is the controller and SPK1 is the speaker. P1 exposes power, UART and BUSY. SW1 is the PB1 button; LED1 is the power indicator circuit.

U2 is labeled GD25Q16CSIG and connects to the controller over SPI. Whether U2 is fitted depends on the board variant; it is not fitted in the component-side photo. A0 corresponds to PA0, and 5V to VBAT.

Storage Configurations

Variant	Flash Configuration	Current Audio Budget
Internal storage	IPJ5022, 512 KiB internal Flash	320 KiB
External storage	IPJ5022 + external SPI Flash Up to 128 Mb (16 MiB)	Depends on Flash capacity and firmware configuration

128 Mb means 128 megabits, equivalent to 16 MiB. Flash also stores firmware and reserved areas. The current PC software external-storage option uses a 2 MiB configuration with a 1856 KiB audio budget. Other capacities require matching firmware and tool configurations. Actual audio space is determined by the software indication and final package validation.

6 Delivery and Contact Information

Responsibilities

InterPower Provides	Customer Provides
IPJ5022 PCBA hardware	Audio files, playback order and application requirements
Agreed firmware configuration and integration support	Enclosure, power supply, mounting and packaging
Manuals, download software and hardware troubleshooting	End-product validation, target-market requirements and sample acceptance

The order determines whether power supplies, enclosures and other accessories are included. Both parties confirm the variant, firmware configuration, quantity and acceptance criteria.

Three Stages of Sample Testing

- 1 Power and detection: check the supply, USB data cable and board variant. Confirm detection in the PC software.
- 2 Download and playback: verify audio programming, playback order, default volume, button operation and UART control.
- 3 Enclosure and retest: check the sound outlet, interface access and mounting. Power-cycle to verify startup playback and end-product operation.

If detection fails, check the data cable, driver and initial firmware. If there is no sound after download, check the volume and audio list, then power-cycle. Save error logs for troubleshooting support.

Contact InterPower

WhatsApp

+86 138 2963 2935

WeChat: scan the QR code on the right

Website: <https://interpower-pcba.com/>



WeChat QR code

For inquiries, provide expected quantity, audio duration and file count, control method, enclosure plan and schedule.