Rakstore DY-HV20T

Rakstore DY-HV20T Voice Playback Module Board Instruction Manual

Model: DY-HV20T

1. INTRODUCTION

This manual provides detailed instructions for the Rakstore DY-HV20T Voice Playback Module Board. This module is designed for MP3 and WAV audio playback with various control options, making it suitable for a wide range of DIY electronic projects and embedded applications.

2. PRODUCT FEATURES

- Supports MP3 and WAV audio decoding.
- Supports sampling rates (KHz): 8, 11.025, 12, 16, 22.05, 24, 32, 44.1, 48.
- Features 24-bit DAC output, supporting a dynamic range of 90dB and an SNR of 85dB.
- Wide supply voltage range: DC 6V to 35V.
- Supports up to 32GB memory cards (microSD). Audio files can be updated and stored by connecting to a computer via a USB data cable.
- Audio output capabilities: Maximum 20W when driving a 4Ω speaker, and maximum 10W when driving an 8Ω speaker.
- UART control protocol allows playback of up to 65535 music tracks. Functions such as Play, Pause, track selection, and volume adjustment (+/-) can be controlled. The communication baud rate is 9600bps.
- Supports playing up to 255 music tracks via IO triggering.
- One-line control protocol enables control over Play, Pause, track selection, and volume adjustment (+/-).
- Seven distinct work modes can be easily selected using the onboard DIP switch.
- Equipped with ESD protection for 8 IOs.

3. SETUP AND CONNECTIONS

This section details the physical connections required for the DY-HV20T module to function correctly.

3.1 Power Supply

Connect a DC power source within the specified range of 6V to 35V to the designated power input terminals. Ensure correct polarity to prevent damage to the module.

3.2 Speaker Connection

Connect your speaker to the SPEAKER output terminals. The module supports:

- Maximum 20W output for a 4Ω speaker.
- Maximum 10W output for an 8Ω speaker.

Ensure the speaker impedance matches the module's output capabilities to prevent damage and ensure optimal audio quality.

3.3 Memory Card Installation

Insert a microSD card (up to 32GB capacity) into the card slot. Audio files, in MP3 or WAV format, should be stored on this card for playback.

3.4 USB Connection for File Transfer

The module can be connected to a computer via a standard micro-USB data cable. This connection allows for convenient updating and storage of audio files directly onto the inserted memory card.

3.5 Control Interface Connections

The module offers various interfaces for control:

- **UART Control:** Utilize the TX and RX pins for serial communication. The baud rate is fixed at 9600bps.
- **IO Triggering:** The IO pins (IO1-IO7) can be used for direct trigger control, allowing for simple event-driven audio playback.
- **One-line Control:** The ONE_LINE/IO4 pin provides a simplified control method using a single line.

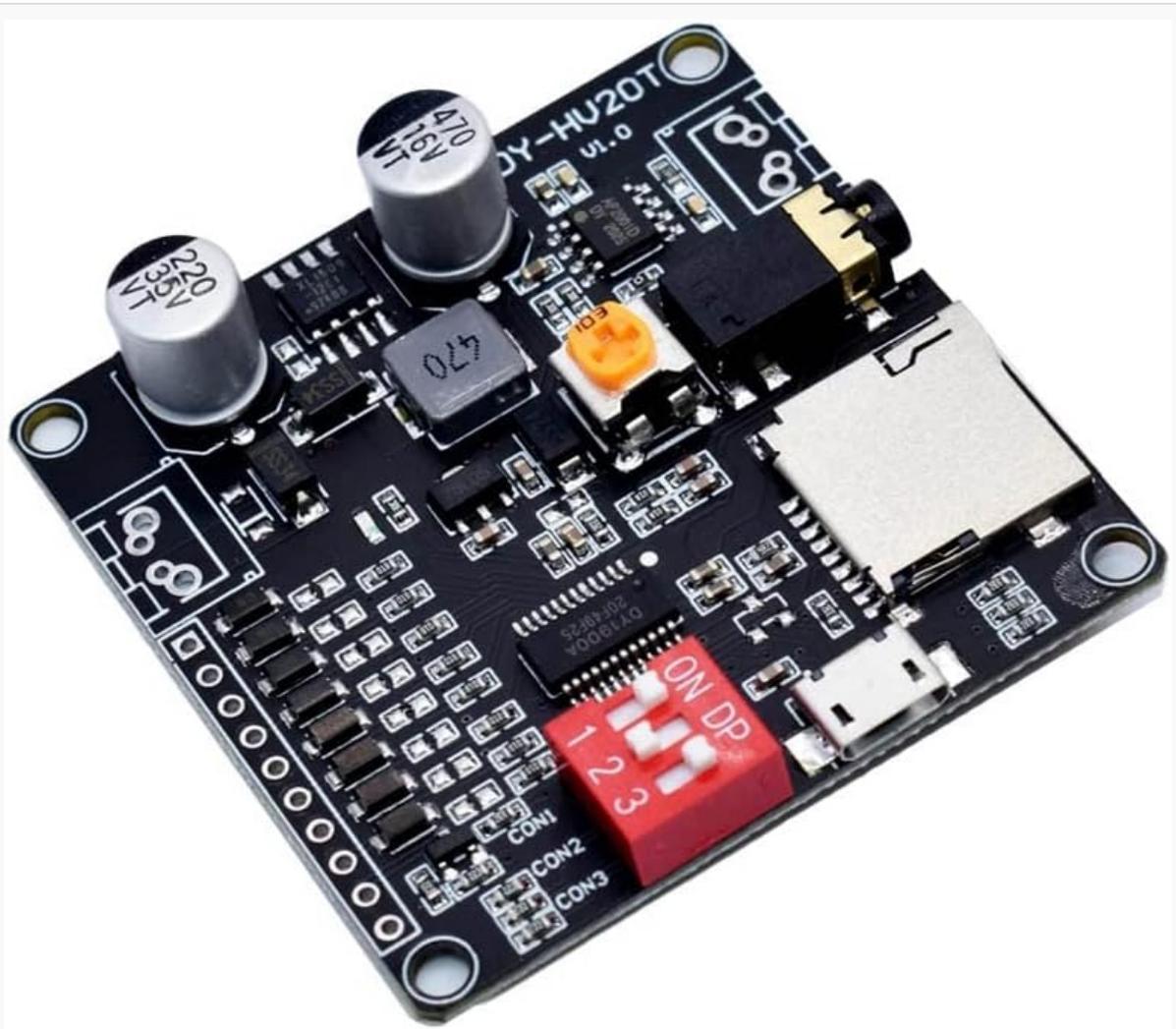Refer to the pinout diagram provided in the images for specific connection details.

Figure 1: Top view of the DY-HV20T module. This image displays the top side of the DY-HV20T module, highlighting the main components. Visible are the power input, speaker output, microSD card slot, micro-USB port for data transfer, and the red DIP switch for mode selection. Various control pins are also arranged along the edges.
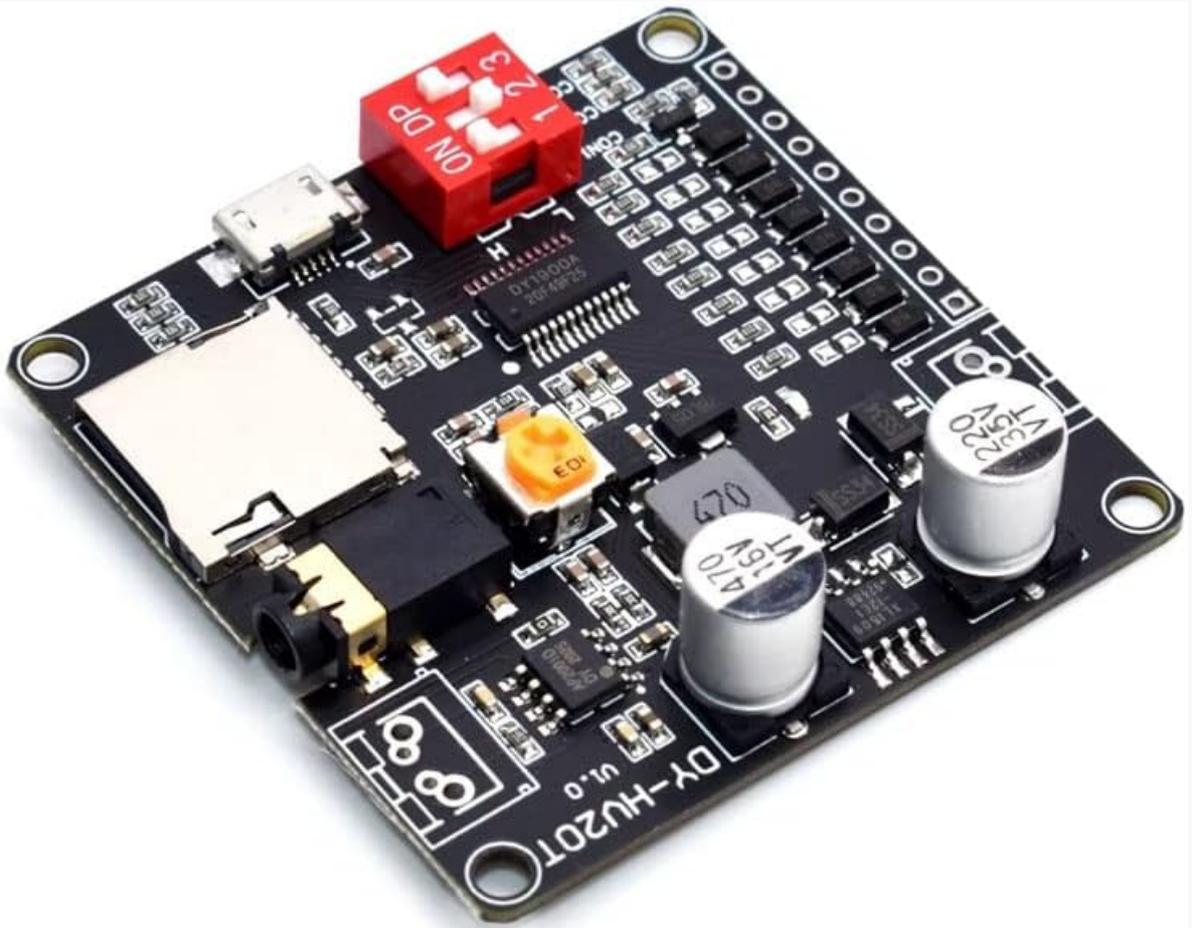
Figure 2: Angled view of the DY-HV20T module. An angled perspective of the DY-HV20T module, providing a clearer view of the microSD card slot and the three-position red DIP switch. This switch is crucial for selecting the module's operating mode.
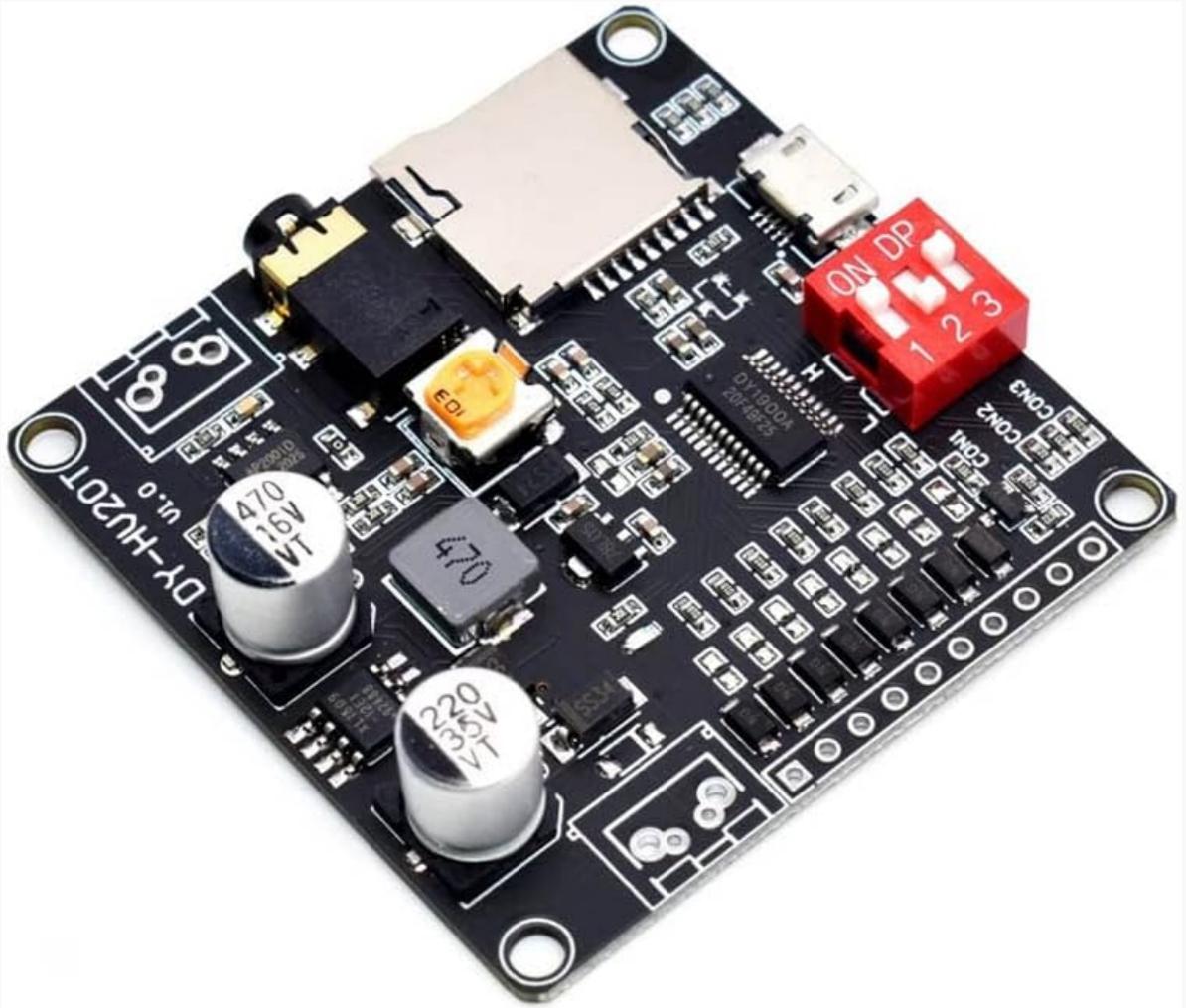
Figure 3: Alternate angled view of the DY-HV20T module. This image offers another angled view, focusing on the audio jack, power capacitors, and other surface-mount components. It provides a good sense of the module's compact design.
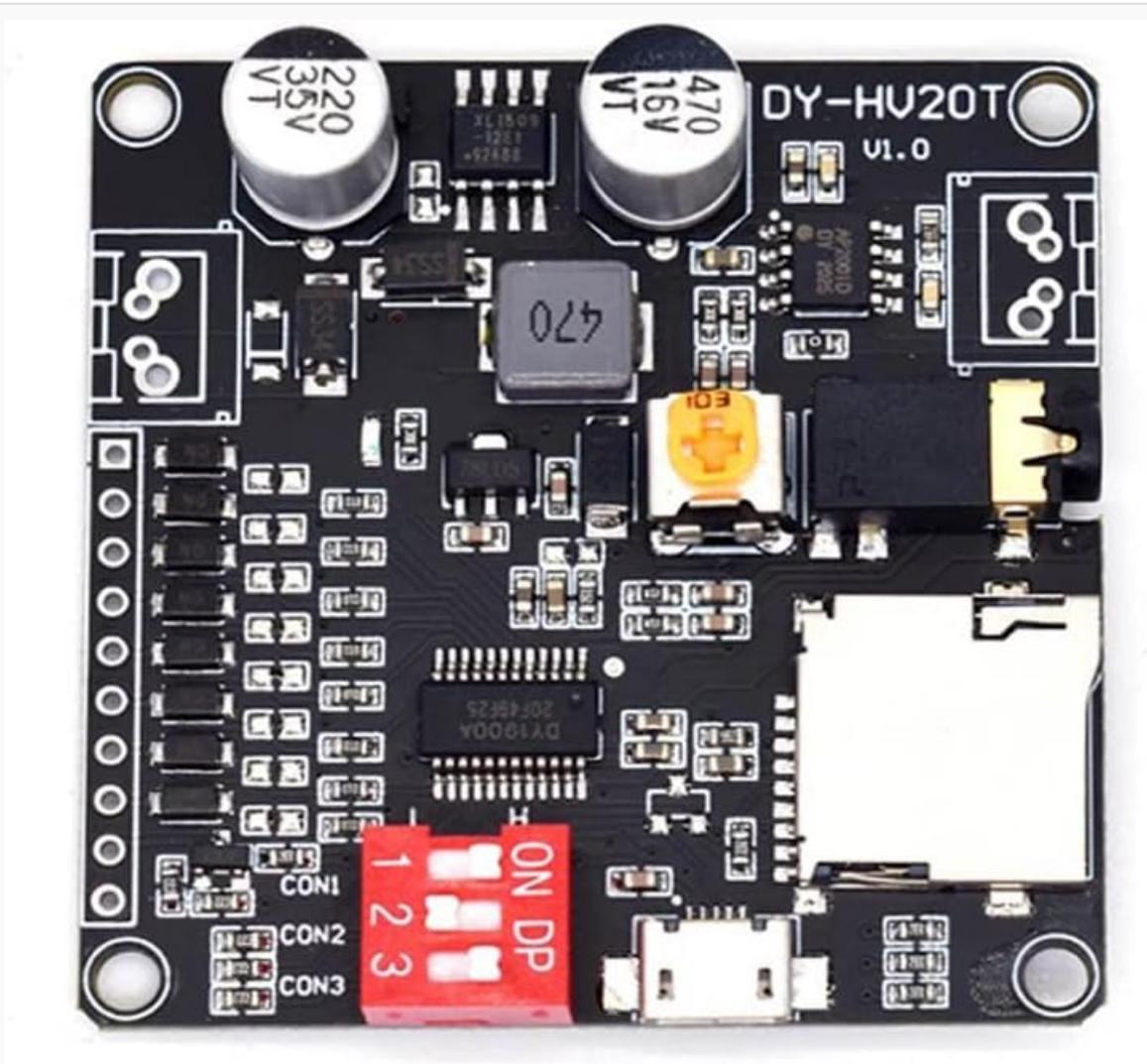
Figure 4: Overhead view of the DY-HV20T module. A direct top-down view of the DY-HV20T module, clearly showing the layout of all components, including the main chip, capacitors, DIP switch, microSD slot, and the various labeled pins for power, data, and control.
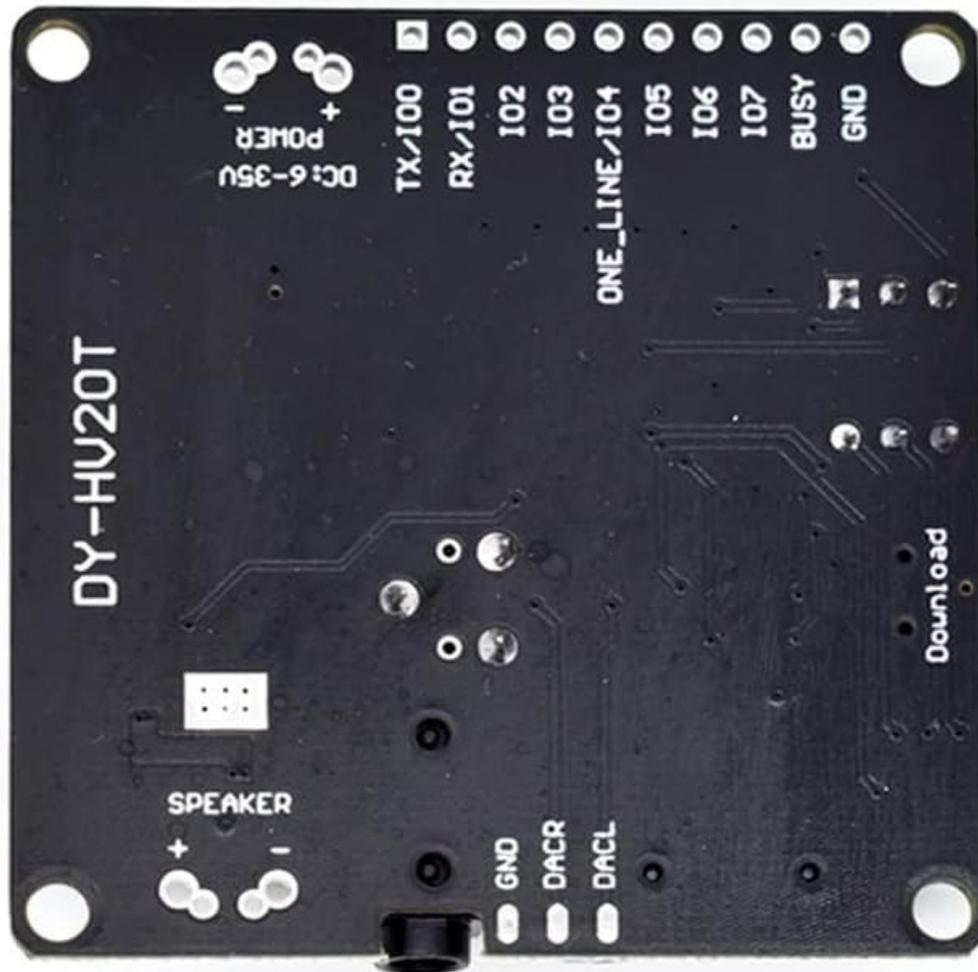
Figure 5: Bottom view and pinout of the DY-HV20T module. This image shows the bottom side of the DY-HV20T module, which includes the pinout labels. Key labels visible are "DC:6-35V" for power input, "TX/IO0", "RX/IO1", "IO2", "IO3", "ONE_LINE/IO4", "IO5", "IO6", "IO7", "BUSY", "GND" for control, and "SPEAKER" for audio output. This diagram is essential for correct wiring.

4. Operating Modes

The DY-HV20T module supports 7 different work modes, which are selected using the onboard DIP switch. The specific configuration for each mode will determine how the module responds to commands and triggers.

4.1 DIP Switch Configuration

The red DIP switch has three individual positions (labeled 1, 2, 3). The combination of ON/OFF settings for these switches determines the module's operating mode. For a detailed table of specific configurations for each of the 7 modes, please refer to the module's comprehensive technical datasheet, which typically outlines the functionality of each switch combination.

4.2 UART Control Protocol

In this mode, the module can be controlled via serial communication (UART) using the TX and RX pins. The communication baud rate is fixed at 9600bps. Commands can be sent to perform various functions:

- **Baud Rate:** 9600bps
- **Functions:** Play, Pause, Next Track, Previous Track, Volume Up, Volume Down, Select Specific

Track (up to 65535 tracks).

This protocol allows for advanced control and seamless integration with microcontrollers or other serial devices.

4.3 IO Triggering

This mode enables direct triggering of audio playback using the module's dedicated IO pins. By applying specific signals to these pins, up to 255 different music tracks can be played. This method is ideal for simple, event-driven audio playback scenarios.

4.4 One-line Control Protocol

A simplified control method that utilizes a single line (the ONE_LINE/IO4 pin) for basic functions. This protocol can control actions such as Play, Pause, and Volume adjustment, reducing the number of required control lines for simpler applications.

5. TECHNICAL SPECIFICATIONS

- **Audio Decoding:** MP3, WAV
- **Supported Sampling Rates:** 8/11.025/12/16/22.05/24/32/44.1/48 KHz
- **DAC Output:** 24-bit
- **Dynamic Range:** 90dB
- **Signal-to-Noise Ratio (SNR):** 85dB
- **Supply Voltage:** DC 6V ~ 35V
- **Memory Card Support:** MicroSD card, up to 32GB
- **Speaker Output (4Ω):** Maximum 20W
- **Speaker Output (8Ω):** Maximum 10W
- **UART Baud Rate:** 9600bps
- **IOs:** 8 pins with ESD protection
- **Manufacturer:** Rakstore
- **Model:** DY-HV20T
- **UPC:** 768788443746

6. MAINTENANCE

Proper maintenance ensures the longevity and reliable operation of your DY-HV20T module.

- Keep the module in a dry environment to prevent moisture damage, which can lead to corrosion and malfunction.
- Avoid exposing the module to extreme temperatures, direct sunlight, or excessive dust.
- If cleaning is necessary, gently wipe the board with a soft, dry, lint-free cloth. Do not use liquid cleaners, solvents, or abrasive materials.
- If the module is enclosed in a case, ensure adequate ventilation to prevent overheating.

7. TROUBLESHOOTING

If you encounter issues with your DY-HV20T module, refer to the following troubleshooting steps:

- **No Power:**
  - Verify that the power supply voltage is within the specified 6V-35V range.
  - Check all power connections for correct polarity and ensure secure contact.

- **No Sound Output:**
  - Ensure the speaker is correctly connected to the SPEAKER output terminals.
  - Verify that the speaker impedance (4Ω or 8Ω) is compatible with the module's output.
  - Check if audio files are properly loaded onto the microSD card and are in MP3 or WAV format.
  - Confirm that the module is in an active playback mode and not paused or idle.

- **Control Issues (UART, IO, One-line):**
  - For UART control, verify the baud rate is set to 9600bps and that the command syntax is correct.
  - For IO triggering, ensure correct pin connections and that the trigger signals are being applied as expected.
  - Check the DIP switch settings to confirm the module is configured for the desired operating mode.

- **Module Not Recognized by PC (USB):**
  - Ensure the USB data cable is functional; try a different cable if necessary.
  - Try connecting to a different USB port on your computer.
  - Verify that the memory card is properly inserted into the module.

8. Warranty and Support

For warranty information, technical support, or any inquiries not covered in this manual, please contact your retailer or the manufacturer, Rakstore. It is recommended to retain your proof of purchase for any warranty claims.