

Senzooe AD9954

Senzooe AD9954 DDS Signal Generator Module User Manual

1. INTRODUCTION

This manual provides instructions for the safe and effective operation of the Senzooe AD9954 DDS Signal Generator Module. The AD9954 is a direct digital synthesizer capable of generating high-frequency, high-resolution sine and square waves. Please read this manual thoroughly before use and retain it for future reference.

2. SAFETY INFORMATION

- Always ensure proper power supply voltage (DC 5V). Incorrect voltage can damage the module.
- Avoid short circuits on any pins or output connectors.
- Do not expose the module to moisture, liquids, or extreme temperatures.
- Handle the module with care to prevent damage to sensitive electronic components.
- Ensure proper grounding when connecting to other equipment.
- Do not attempt to modify or disassemble the module, as this may void any potential warranty and could lead to damage or injury.

3. PRODUCT OVERVIEW

The Senzooe AD9954 module features a compact design with various input and output connectors for signal generation and control.

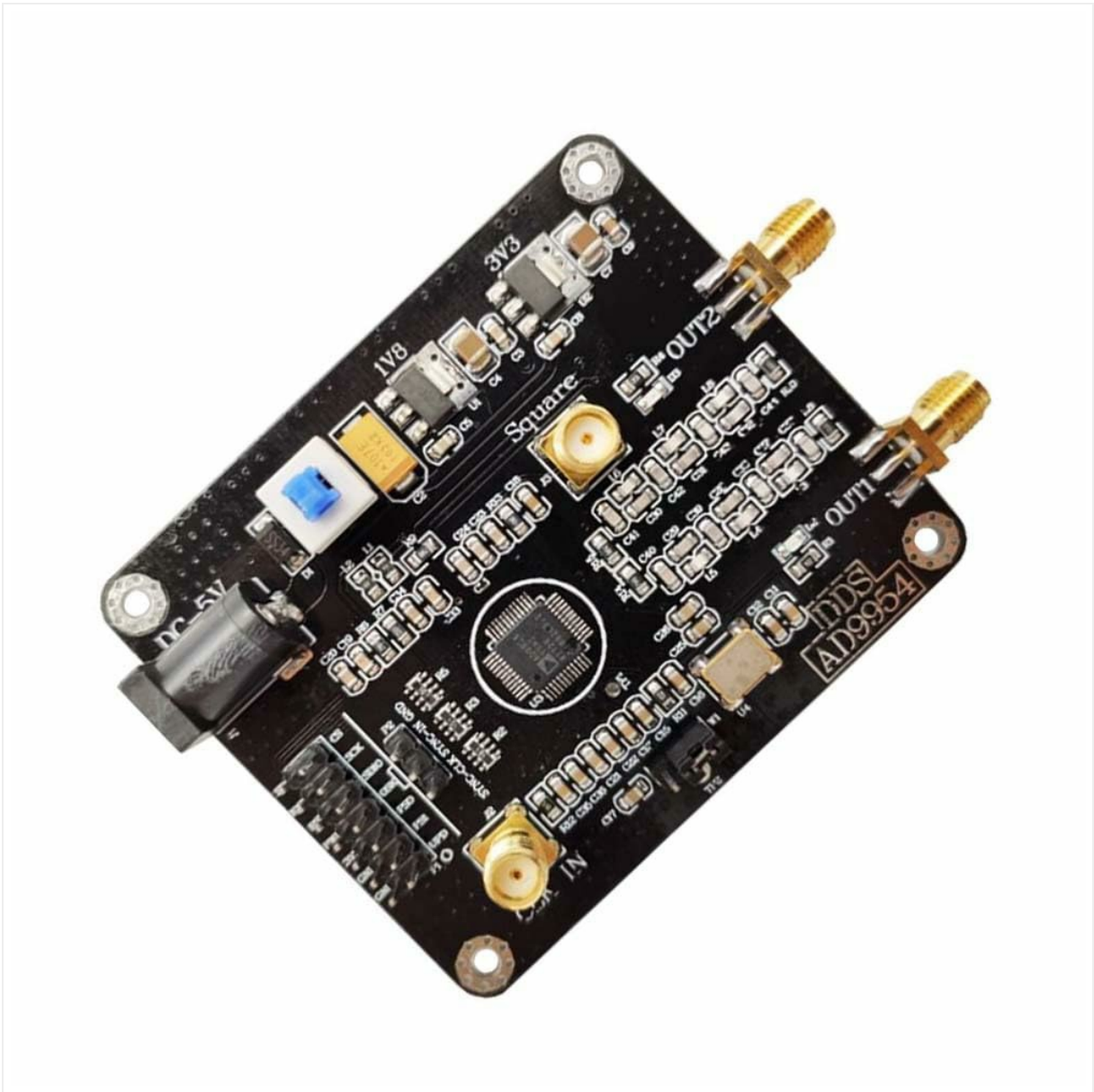


Figure 3.1: Top view of the AD9954 DDS Signal Generator Module, highlighting the DC 5V power input, two SMA output connectors (OUT1, OUT2), and a multi-pin header for digital control signals. The AD9954 chip is centrally located.



Figure 3.2: Detailed top view of the AD9954 module, showing the 'Square' marking which indicates a dedicated square wave output or selection. Also visible are the 1V8 and 3V3 voltage regulators, essential for the module's operation.

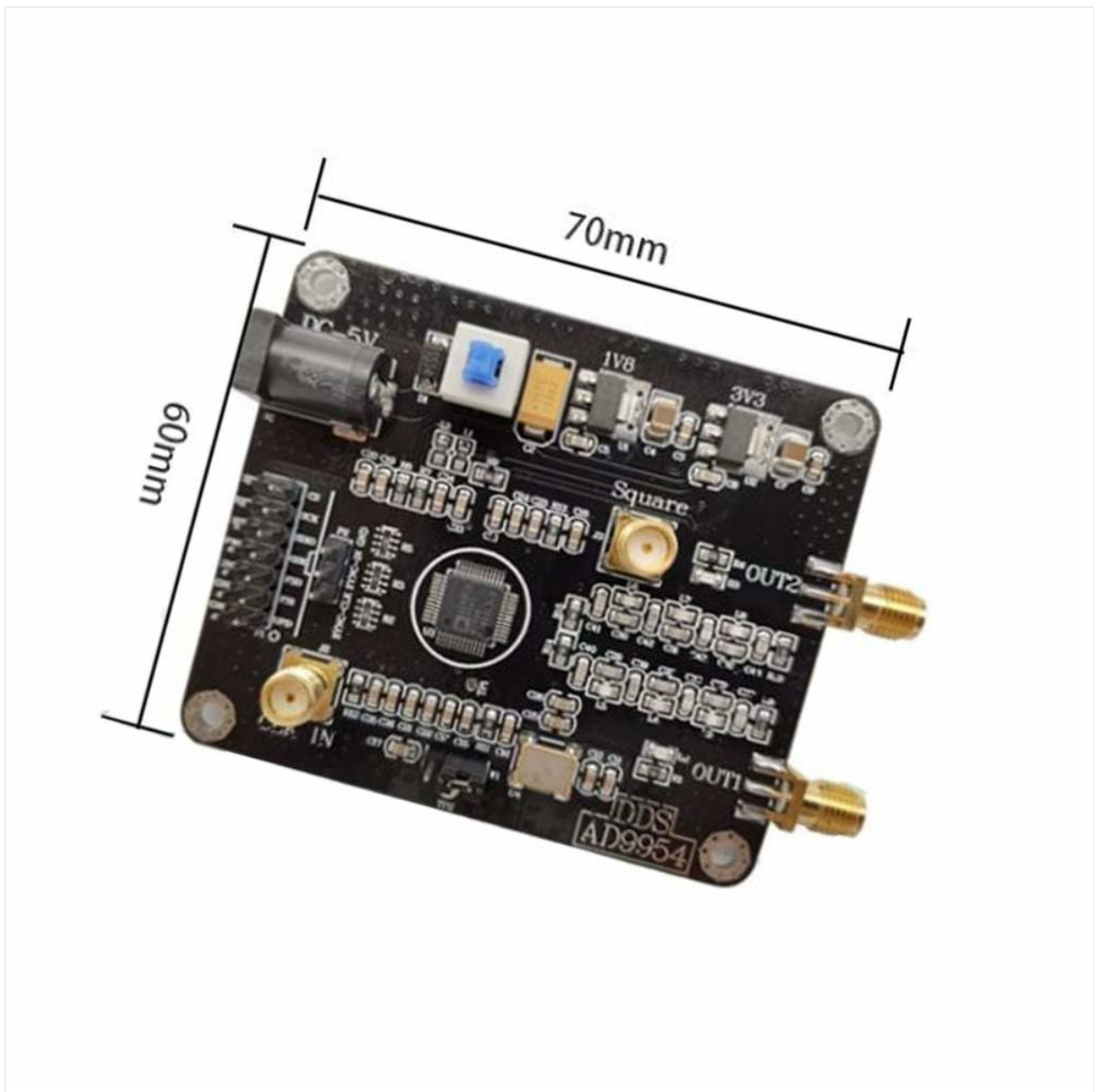


Figure 3.3: Physical dimensions of the AD9954 module, indicating a length of approximately 70mm and a width of 60mm, providing a clear understanding of its compact size.

Key Components:

- **DC 5V Input:** Power supply connection point.
- **OUT1 / OUT2:** SMA connectors for signal output.
- **IN:** Likely an external clock input or reference input.
- **SYNC/CLK-IO-GND Pins:** Multi-pin header for digital control interface (e.g., SPI) and synchronization.
- **AD9954 Chip:** The core Direct Digital Synthesizer IC.
- **1V8 / 3V3 Regulators:** Onboard voltage regulators providing necessary power rails for the AD9954 chip.
- **'Square' Marking:** Indicates a dedicated square wave output or a selection point for square wave generation.

4. SETUP

1. **Power Connection:** Connect a stable DC 5V power supply to the DC 5V input jack on the module. Ensure the power supply can provide sufficient current for the module's operation.

2. **Signal Output:** Connect the desired output (OUT1 or OUT2) to your measurement device (e.g., oscilloscope, spectrum analyzer) or target circuit using appropriate SMA cables.
3. **Control Interface:** Connect the appropriate data, clock, and control lines from your microcontroller or control system to the SYNC/CLK-IO-GND pins. The AD9954 typically uses a serial peripheral interface (SPI) for configuration. Refer to the AD9954 datasheet for detailed pin assignments and communication protocols.
4. **Reference Clock (Optional):** If using an external reference clock, connect it to the 'IN' port. Otherwise, the module will use its internal reference.

5. OPERATING INSTRUCTIONS

The AD9954 module generates sine and square waves, with frequency, phase, and amplitude controlled digitally.

- **Digital Control:** The primary method of operation is through a digital interface, typically SPI, from an external microcontroller (e.g., Arduino, Raspberry Pi, FPGA). You will need to program your microcontroller to send specific commands and data to the AD9954 registers to set the desired output frequency, phase, and amplitude.
- **Sine Wave Generation:** By default, or with appropriate register settings, the module will output a sine wave.
- **Square Wave Generation:** The 'Square' marking on the board suggests a dedicated square wave output or a configuration option. This is typically enabled or selected via specific register settings through the digital control interface. Consult the AD9954 datasheet for details on configuring square wave output.
- **Frequency Tuning Word (FTW):** The output frequency is determined by a Frequency Tuning Word written to the AD9954 registers. The formula for output frequency is generally: $F_{out} = (FTW / 2^{32}) * F_{sysclk}$, where F_{sysclk} is the system clock frequency.
- **Amplitude and Phase Control:** The AD9954 also allows for digital control of output amplitude and phase, which are configured by writing to specific registers.

For detailed programming instructions and register maps, refer to the official Analog Devices AD9954 datasheet.

6. SPECIFICATIONS

Brand	Senzoote
Model	AD9954
Power Input	DC 5V
Output Waveforms	Sine Wave, Square Wave
Dimensions (Approx.)	70mm x 60mm
Manufacturer	Senzoote
Country of Origin	China

7. MAINTENANCE

- **Cleaning:** Keep the module clean and free from dust. Use a soft, dry cloth to gently wipe the surface. Avoid using liquid cleaners or solvents.
- **Storage:** Store the module in a dry, cool environment, away from direct sunlight and sources of electromagnetic interference.
- **Handling:** Always handle the module by its edges to avoid touching sensitive components.

8. TROUBLESHOOTING

- **No Output Signal:**
 - Check if the DC 5V power supply is correctly connected and providing the specified voltage.
 - Verify that the output cables are securely connected to OUT1 or OUT2 and your measurement device.
 - Ensure your microcontroller is correctly sending configuration data to the AD9954 via the digital interface.
- **Incorrect Frequency/Waveform:**
 - Review your microcontroller code for correct register programming, especially the Frequency Tuning Word.
 - Confirm the system clock frequency (F_{sysclk}) used in your calculations matches the actual clock provided to the AD9954.
 - Check if the 'Square' output option is correctly enabled/disabled as per your requirements.
- **Module Not Responding:**
 - Ensure all digital control lines (data, clock, chip select) are correctly wired and making good contact.
 - Verify the logic levels of your control signals are compatible with the AD9954.

If issues persist after following these steps, consult the AD9954 datasheet or seek assistance from qualified technical support.

9. WARRANTY AND SUPPORT

Specific warranty terms for the Senzooe AD9954 DDS Signal Generator Module are not provided in this document. For warranty information, please refer to the purchase documentation or contact your retailer.

For technical support or further inquiries, please contact your point of purchase or the manufacturer, Senzooe, through their official support channels.