
User's Manual

Frequency Synthesizers

Model: MFS09190

List of Contents

1	Introduction	3
2	Package Contents.....	3
3	General Overview of instrument capabilities	3
4	Installation of Equipment and Safety.....	5
5	Operation and Setup.....	5
	5.1 <i>Equipment Setup and Operation</i>	5
	5.2 <i>GUI Instrument control</i>	6
6	Technical Support	13

1 Introduction

This User's Manual describes the MFS09190 9 to 19GHz MFS Frequency Synthesizers. Most of the pertinent information can be quickly located through the table of contents and highlighted sections.

2 Package Contents

The MFS Frequency Synthesizer unit and packaging material weight approximately 1.5Kg. Before unpacking, check for any physical damage to the shipping container. If any noticeable damage is observed, immediately contact manufacturer. Carefully open the shipping container and inspect the MFS Frequency Synthesizer for any visible signs of damage. Save the shipping container to repackage the MFS Frequency Synthesizer, or for submitting necessary damage claims to the transporter. Remove the documentation packet and any other separately supplied components before attempting to remove the MFS Frequency Synthesizer unit from the shipping container. It is highly recommended as a preventative measure, to exercise antistatic safeguards when handling the MFS Frequency Synthesizer unit.

Verify that all of the following components are included with the shipment:

Item	Quantity
MFS Frequency Synthesizer unit	1
Installation Disk	1
Parallel Port	1
USB Cable	1

Table 1: Packing List

3 General Overview of instrument capabilities

The MFS09190 is a single channel frequency synthesizer. The block diagram for this unit is shown in [figure 1](#). This unit provides one RF output channel with programmable output frequency. The output frequency range is programmable from 9GHz to 19GHz in 1MHz/step control protocol. The detailed performance specifications are listed in [Table 2](#). The user may control the frequency from the Parallel Port .

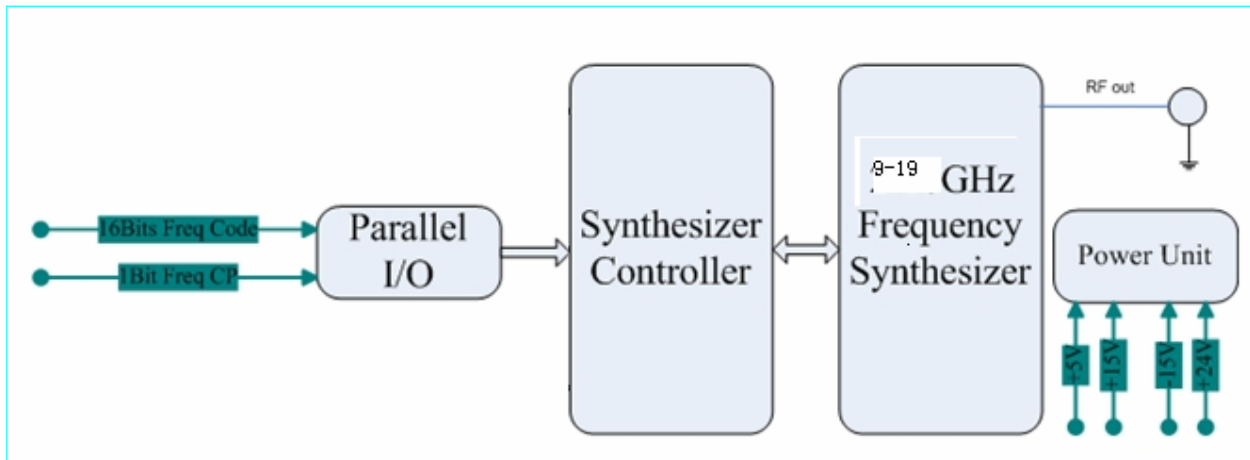


Figure 1: MFS09190 Block Diagram

Frequency Range	9 ~19GHz
SSB Phase Noise	-70dBc @ 100Hz -80dBc @ 1KHz
Fout= 9~19GHz	-82dBc @ 10KHz
Tuning Step Size	1MHz(Via GPIO_CP_Control)
Power Level	0dBm
Harmonics	-55dBc
Spurious	-60dBc
Freq Tuning Speed	1mS
Output Impedance	50 ohm
External Refence	10MHz; 0±3dBm Level
Freq Temperature Stability	same as external Refence 10MHz
Aging	same as external Refence 10MHz
Phase Lock Indicator	3.3V-TTL High_LOCK LOW_UNLOCK
DC Supply	+5V/760mA +12V/440mA -5V/90mA +24V/10mA
Operational Temperature	-10~+50°C
Humidity	10-90%
Altitude	10km
Weight	1500g
Dimensions	See Appendix

Table 2: Electrical Specifications

4 Installation of Equipment and Safety

The bulleted guidelines shown below must be followed for proper installation of the MFS Frequency Synthesizers equipment:

- The MFS Frequency Synthesizers equipment is not protected against moisture.
- Utilize appropriate ESD handling procedures and precautionary measures when installing this equipment.
- During install make certain there are no obstructions that would impede air flow to the venting of the unit on the top of the enclosure.
- Ensure that all external components and RF/microwave coaxial cables are in proper condition.

5 Operation and Setup

The MFS Frequency Synthesizers control features and setup are detailed in this section.

5.1 Equipment Setup and Operation

1. Connect DC power cable to power interface in [Figure 2](#) correctly.

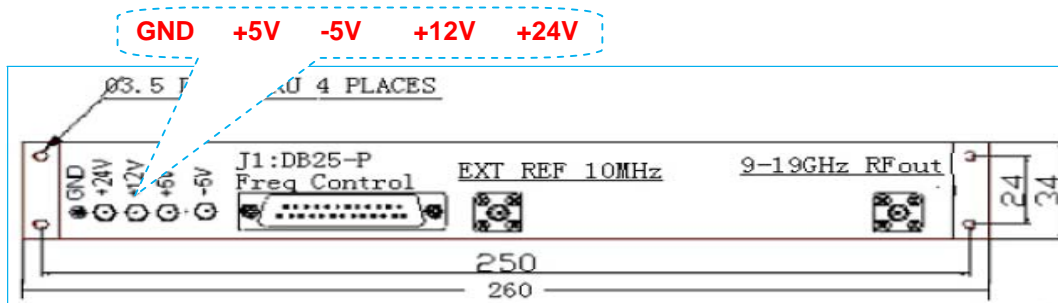


Figure 2:Interface of MFS09190

2. If you will use [GPIO_CP_Bus](#) please refer to the [MFS09190 Programmer's Guide](#) and Connect the GPIO in [Figure 3](#) correctly.

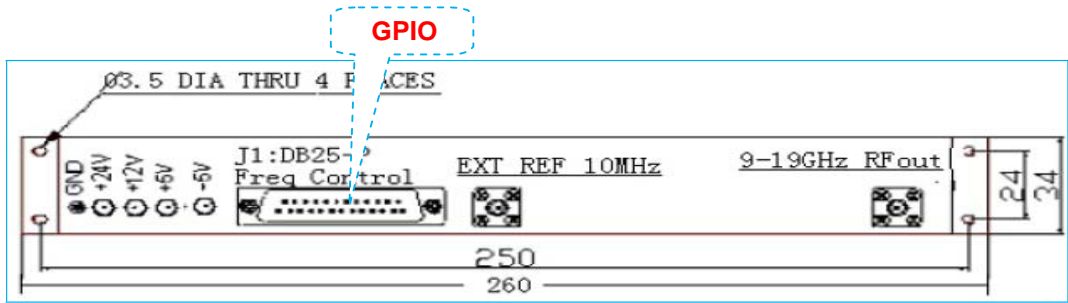


Figure 3:Interface of MFS09190

Notice: If you want to know how to program to send data, please refer to the [MFS09190 Programmer's Guide](#).

5.2 GUI Instrument control

The instrument may be controlled from a computer using the GUI application. The features of the GUI are described in this section. A picture of the GUI is shown in [figure 7](#).The process of installing the software please see [MFS09190 Quick Start Guide](#) if you have already installed the software, please click the icon in [Figure 4](#).

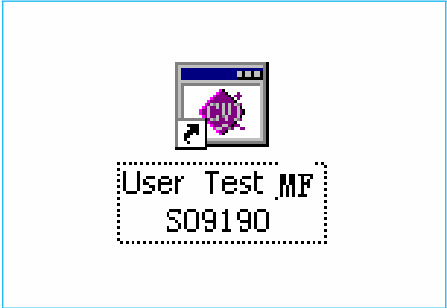


Figure 4: Software icon

If you have already installed the software, please click the icon in [Figure 4](#). After that, a dialog box in [figure 5](#) will open. The software is checking the USB_To_UART_Port, please wait a moment.

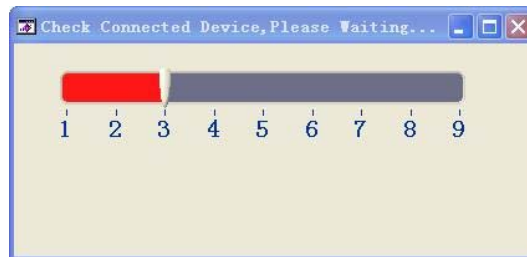


Figure 5: Check USB_To_UART_Port dialog

If you have already connected to the USB cable, the Control_Via_BUS dialog in [Figure 6](#) will open. please select OK.



Figure 6: Control_Via_BUS dialog

You will see GUI in [figure 7](#).

Control_Via_Bus

The frequency synthesizer supports one modes to send data to control.

GPIO_CP_Bus mode, You can select it by dragging the red slider. Other modes are invalid.

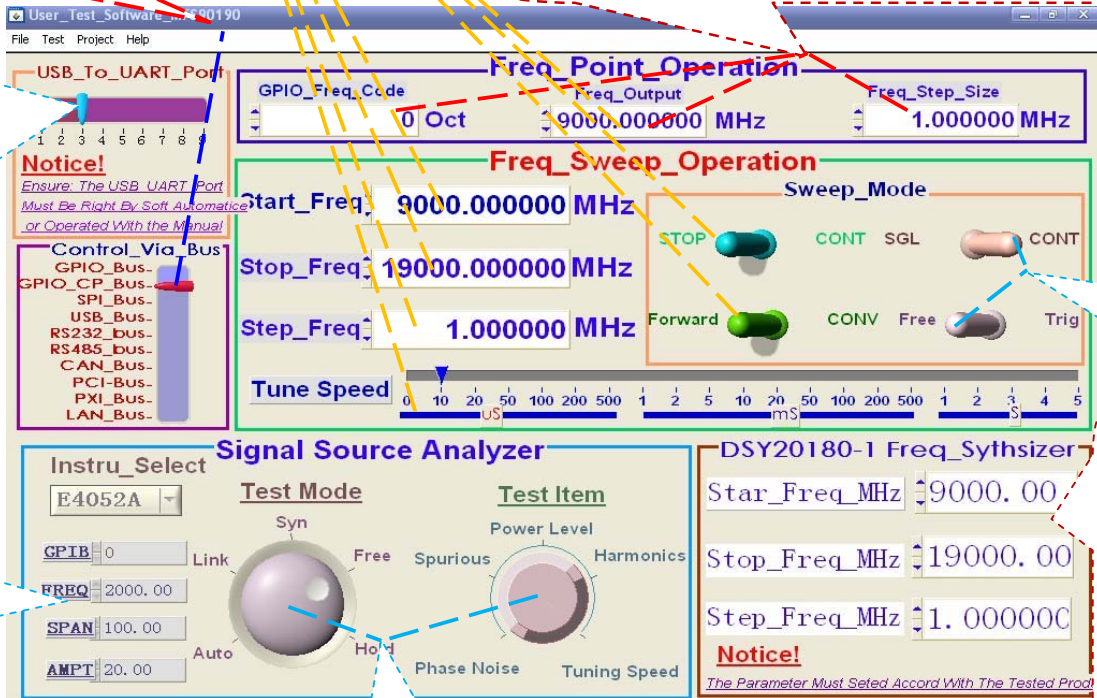
Freq_Sweep_Operation

Sweep-frequency operation: The mode of operation is achieved through seven controls. **Freq_Output**, **Start_Freq**, **Stop_Freq**, **Step_Freq**, **Tune_Speed**, **STOP-CONT** and **Forward-CONV**. Detailed operational procedures please refer to **Details** on the next page.

Freq_Point_Operation

Point-frequency operation: The mode of operation is achieved through three controls. **GPIO_Freq_Code**, **Freq_Output** and **Freq_Step_Size**. Detailed operational procedures please refer to **Details** on the next page.

Start software automatically detects the port



Ignore these controls

Ignore these controls

Ignore these controls

The frequency synthesizer output frequency range, beyond this range is invalid.

Figure 7: GUI

If you have not yet connected to the USB cable, or USB interface has problems. The warning dialog in **figure 8** will open. Please follow the tips.



Figure 8: warning dialog

Details

Freq_Point_Operation:

GPIO_CP_Bus Mode(Via DB25)

Please drag the red slider to the GPIO_CP_Bus as **Figure 9**.

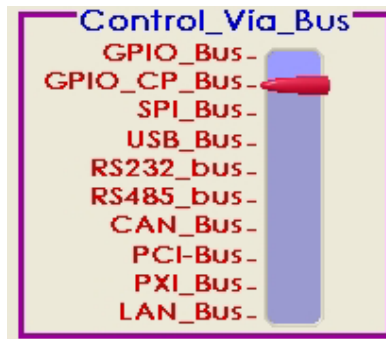


Figure 9: Select Control_Via_Bus

If you have already connected to the frequency synthesizer, the Control_Via_Bus dialog in **Figure 10** will open. please select OK.



Figure 10: Control_Via_BUS dialog

If you have not yet connected to the frequency synthesizer, the Control_Via_Bus dialog in **figure 11** will open. Please connect the frequency synthesizer.



Figure 11: Control_Via_BUS dialog

Assuming frequency synthesizer connected well. Now you can control the Point-frequency output through the following GUI in **Figure 12**.



Figure 12: Freq_Point_Operation

GPIO_Freq_Code: Frequency code.

Freq_Output: Frequency out.

Freq_Step_Size: Frequency step.

Frequency calculate formula:

Frequency out = Frequency code + 9000 (unit :MHz)

For example : frequency out = 15,011MHz

Then:

$$\begin{aligned} \text{Frequency code} &= 15011 - 9000 \\ &= 6011 \end{aligned}$$

So that:

$$\begin{aligned} \text{F15-F0} &= 177\text{BH} \quad (\text{Hex code}) \\ &= 1011101111011 \quad (\text{Binary}) \end{aligned}$$

Notice: In **GPIO_CP_Bus** mode, Frequency step must be an integer multiple of 1MHz.

After change the data in Freq_Output edit box, the Frequency code will send immediately.

Freq_Sweep_Operation:

GPIO_CP_Bus Mode(Via DB25)

Please drag the red slider to the GPIO_CP_Bus as **Figure 13**.

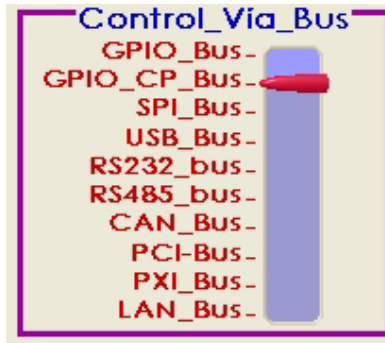


Figure 13: Select Control_Via_Bus

If you have already connected to the frequency synthesizer, the Control_Via_Bus dialog in **Figure 14** will open. please select OK.



Figure 14: Control_Via_BUS dialog

If you have not yet connected to the frequency synthesizer, the Control_Via_Bus dialog in **figure 15** will open. Please connect the frequency synthesizer.



Figure 15: Control_Via_BUS dialog

Assuming frequency synthesizer connected well. Now you can control the Sweep-frequency output through the following GUI in **Figure 16**.

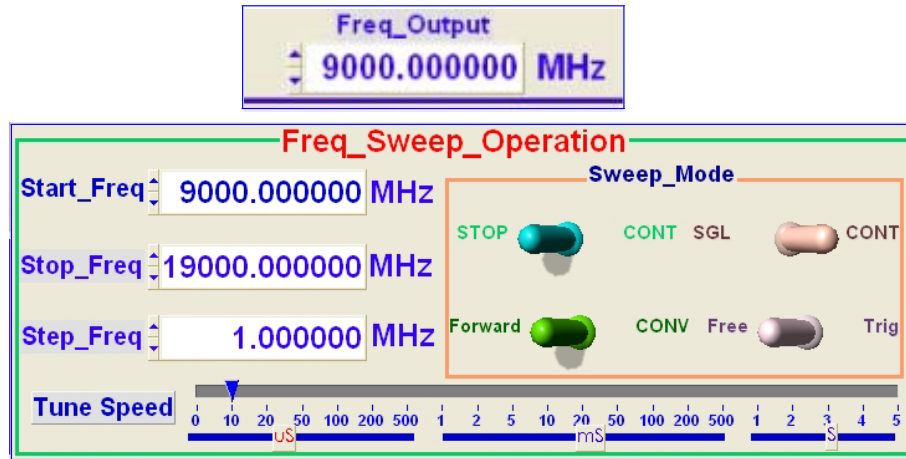


Figure 16: Freq_Sweep_Operation

Freq_Output: Frequency out.

Start_Freq: Start Frequency.

Stop_Freq: Stop Frequency.

Step_Freq: Frequency Step.

Tune_Speed: Tune Speed.

STOP: Stop Sweeping Frequency.

CONT: Continue Sweeping Frequency.

Forward: Forward Sweeping Frequency.

CONV: Backward Sweeping Frequency.

Frequency calculate formula:

Frequency out = Frequency code + 4000 (unit :MHz)

For example : frequency out = 15,011MHz

Then:

$$\begin{aligned} \text{Frequency code} &= 15011 - 9000 \\ &= 6011 \end{aligned}$$

So that:

$$\begin{aligned} \text{F15-F0} &= 177\text{BH} \quad (\text{Hex code}) \\ &= 1011101111011 \quad (\text{Binary}) \end{aligned}$$

Notice: In **GPIO_CP_Bus** mode, Frequency step must be an integer multiple of 1MHz.

6 Technical Support

Please request the MFS09190 technical departments.

Appendix:

