RF MICROTECH ELECTRONICS

INSTRUCTION MANUAL

For the

RFUSE

SIGNAL SOURCE

OPERATING MANUAL

Table of Contents

Introduction to RFSS Individual:

RFSS GUI (Graphical User Interface) is a software developed by RFME which can be used to expand the capabilities and usability of RFME's Broadband Signal Source with easy to use interface and operational modes.

RFSS has an auto-detect feature which will detect the device connected through USB automatically. Connect the Signal Source through USB cable to the PC and software will search for the active ports and recognize the device's type and model number.

RFSS has three different modes of operations:

- Single Mode
- Sweep Mode
- Pulse Mode

Each mode of operation has several usages and expansions. RFSS can fulfill many needs just by these three modes. In Single Mode, one can control the test frequency and amplitude independently to perform any single or small band experiments with the utilizing RF On/Off. In sweep mode, one can check several bands with precise timing control. In sweep mode there are several types:

- Continuous Cycle:
    - Single Sweep Range.
    - Multi Sweep Range.

- Finite Cycle:
    - Single Sweep Range.

In Pulse Mode, specific frequency and amplitude can be implied with T-on (period of RF On) & T-off (period of RF Off). These cycle of toggling RF on & off will create pulsated CW with RF frequency in the on-time. Amplitude and frequency can be selected through the panel.

There can be as many application as one can imagine by using RFME's software and equipment. Our vision is to make people more confident and familiar with the vast ocean of innovation which is RF.

Installation for Windows 10

A. Open the RF_KIT.msi file.

B. Welcome screen will be shown first. Press next to continue as shown in **Diagram 1.1**.

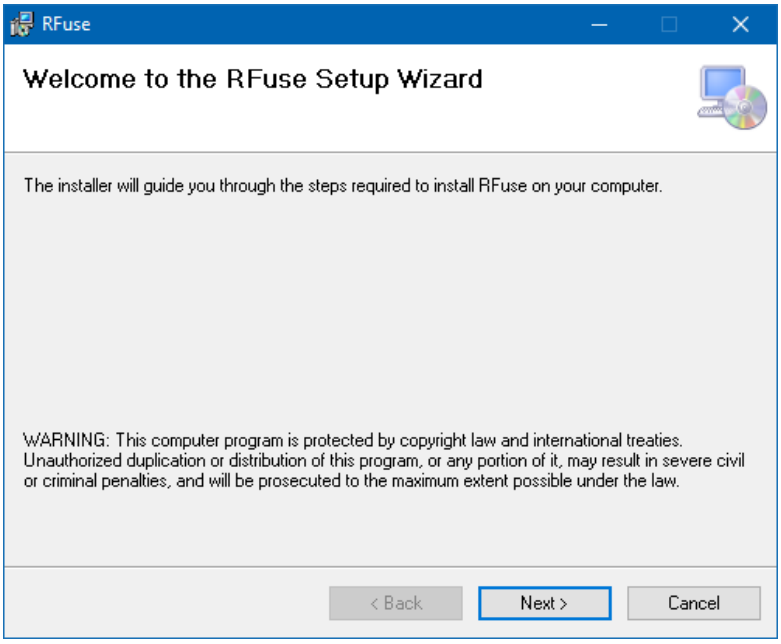

Diagram 1.1

C. Default location for installation is mentioned in **Diagram 1.2**. Press next to continue.

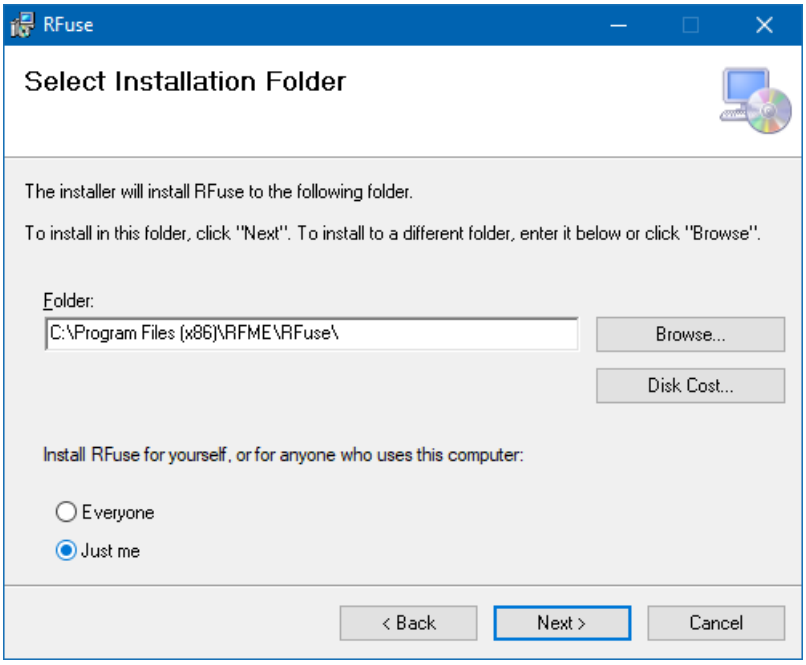

Diagram 1.5

D. Press Next to continue.

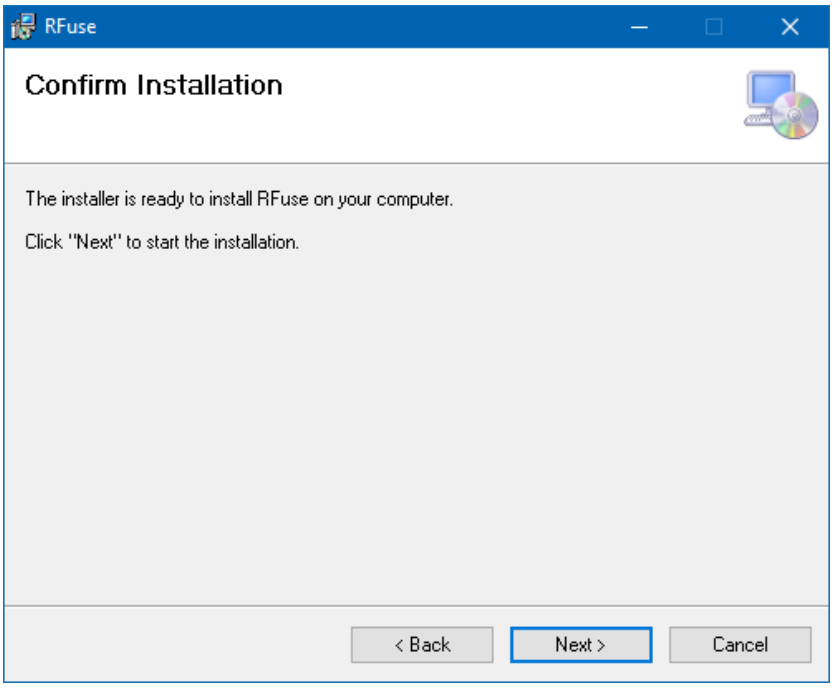

Diagram 1.6

After Installation, desktop as well as Windows Menu Bar will have its shortcut enabled.

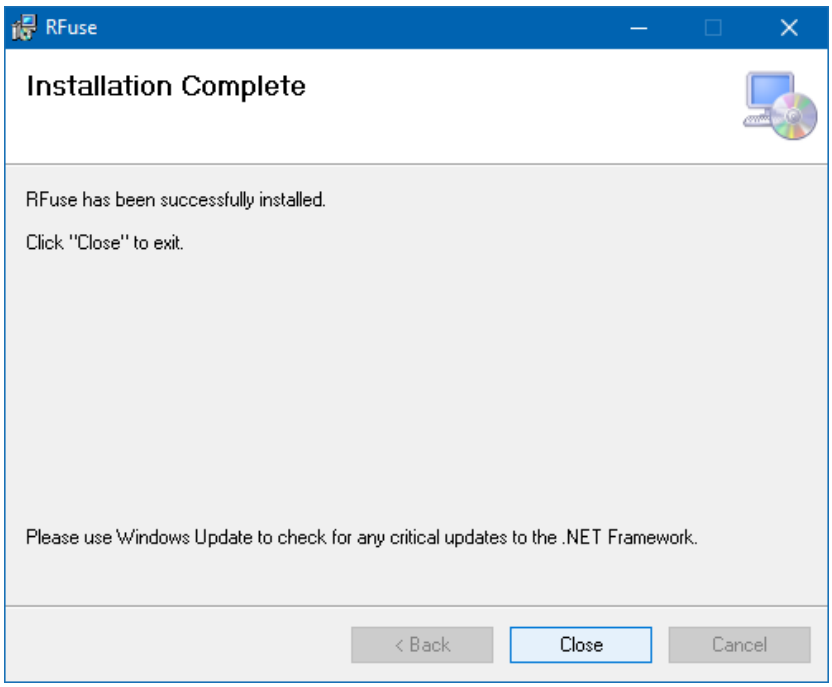

Diagram 1.7

RF GUI LOGIN PAGE

Open the RF GUI.

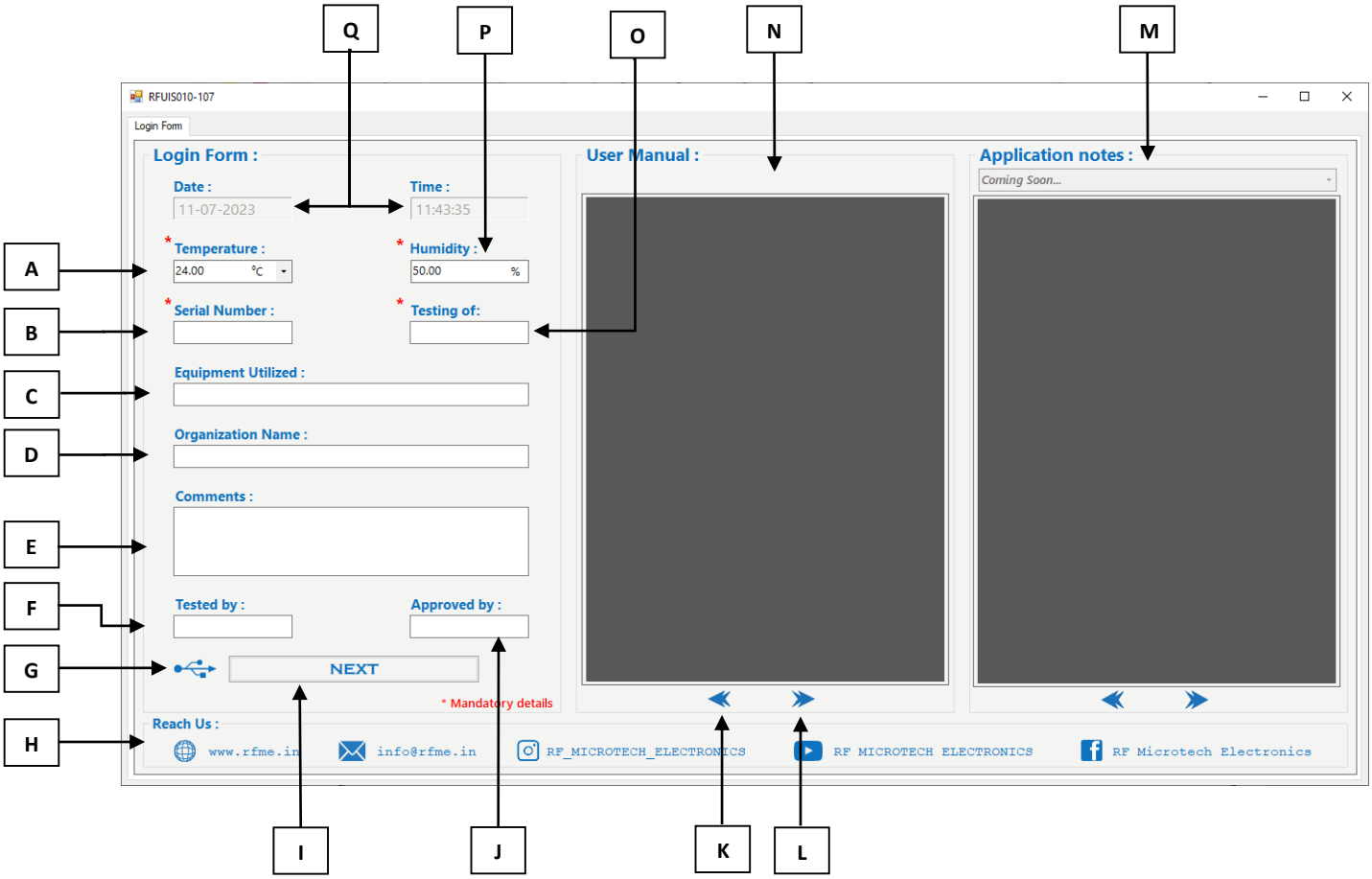

Diagram 2.0

Default window of the software is shown in the **Diagram 2.0**

A. Enter temperature of test environment.

B. Enter Serial Number of EUT.

C. Enter the Utilized Equipment Name.

D. Enter the Name of Organization.

E. Additional detail for the test.

F. Name/Initials/Designation viz. Tested by.

G. Shows the connection status of the device. If device is connected, USB symbol will be in Blue otherwise it will be Grey.

H. This box shows the Social Media Links.

I. **NEXT** button. For more information, read **Operation Procedure**.

J. Name/Initials/Designation viz. test approved by.

K. Show the **PREVIOUS PAGE** button. Click this button for going back to previous page of the selected PDF.

L. Show the **NEXT PAGE** button. Click this button for moving forward to next page of the selected PDF.

M. PDF of selected Application notes will be displayed in this space.

N. PDF of selected user manual will be displayed in this space.

O. Enter the name of the device, on which the testing will be done.

P. Humidity of the test environment.

Q. Shows the DATE & TIME, which will be detected automatically from the system, and this window is not editable.

Operation Procedure

To operate the device with RFSS individual GUI turn on the device and let the device pass the self-test process, for more information please refer the instruction manual of the unit.

After the self-test connect the Signal Source with PC using USB cable.

After the connection one pop-up will be shown referring the model number of the connected device. Default window after the connection is shown in **Diagram 2.1**.

[Note: Fill necessary details and select appropriate device to proceed.]

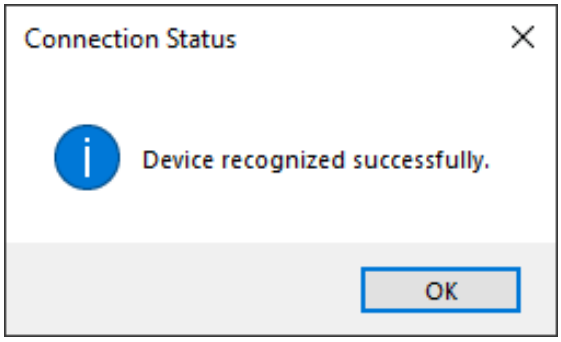

Diagram 2.1

Press "OK" button in the pop-up window to proceed.

After filling all mandatory details and selecting appropriate device, default window of the software is shown in **Diagram 2.2**

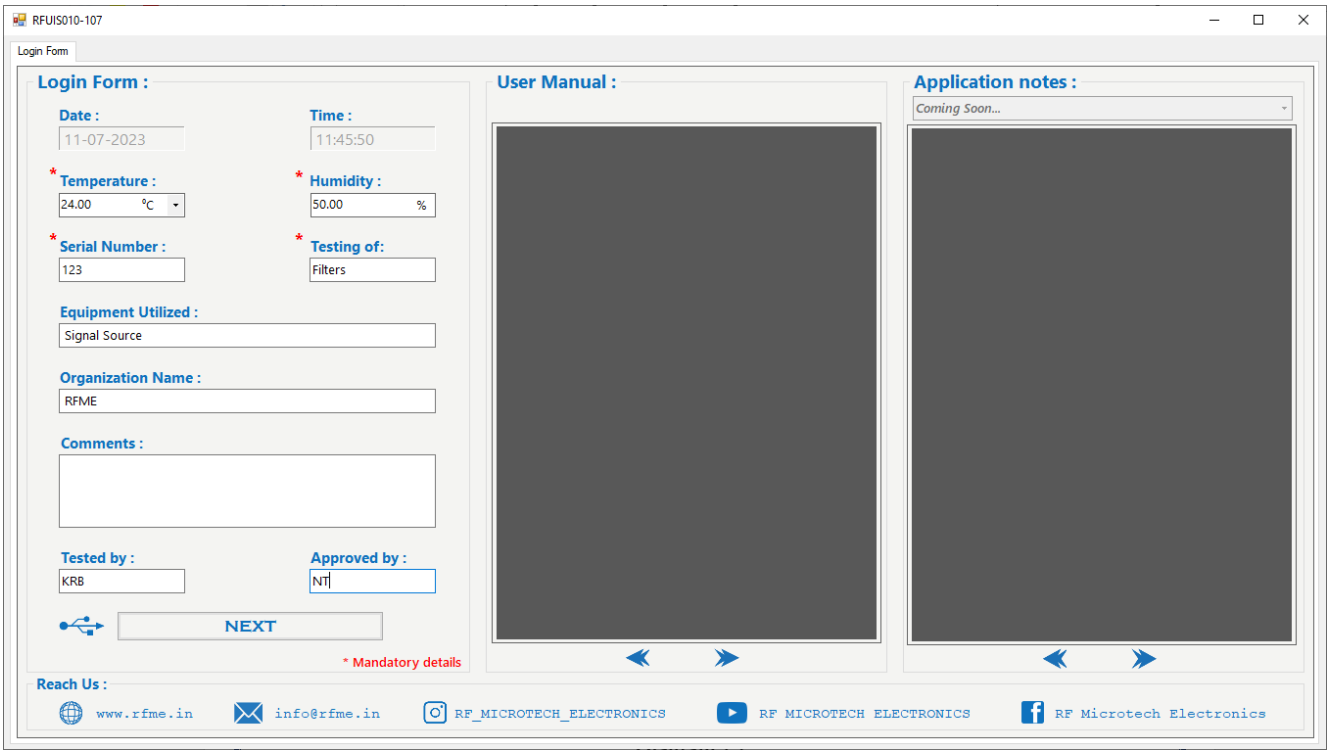

Diagram 2.2

Now click on "**NEXT BUTTON**" to start RFSS individual GUI.

Operating Panel:

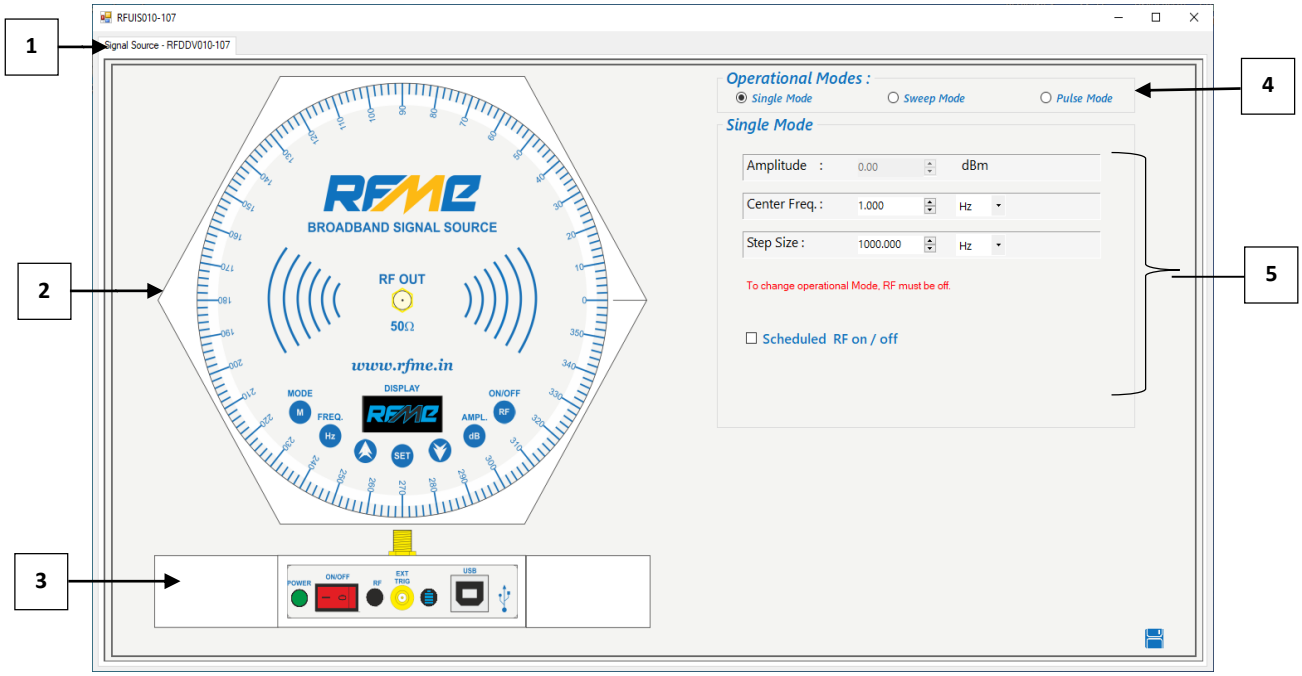

Diagram 3.1

1. Shows the type of the device connected.
   Default window is shown in **Diagram 3.1**.

2. **Top Panel:** This window shows the operation of top panel as per **Diagram 3.2**.

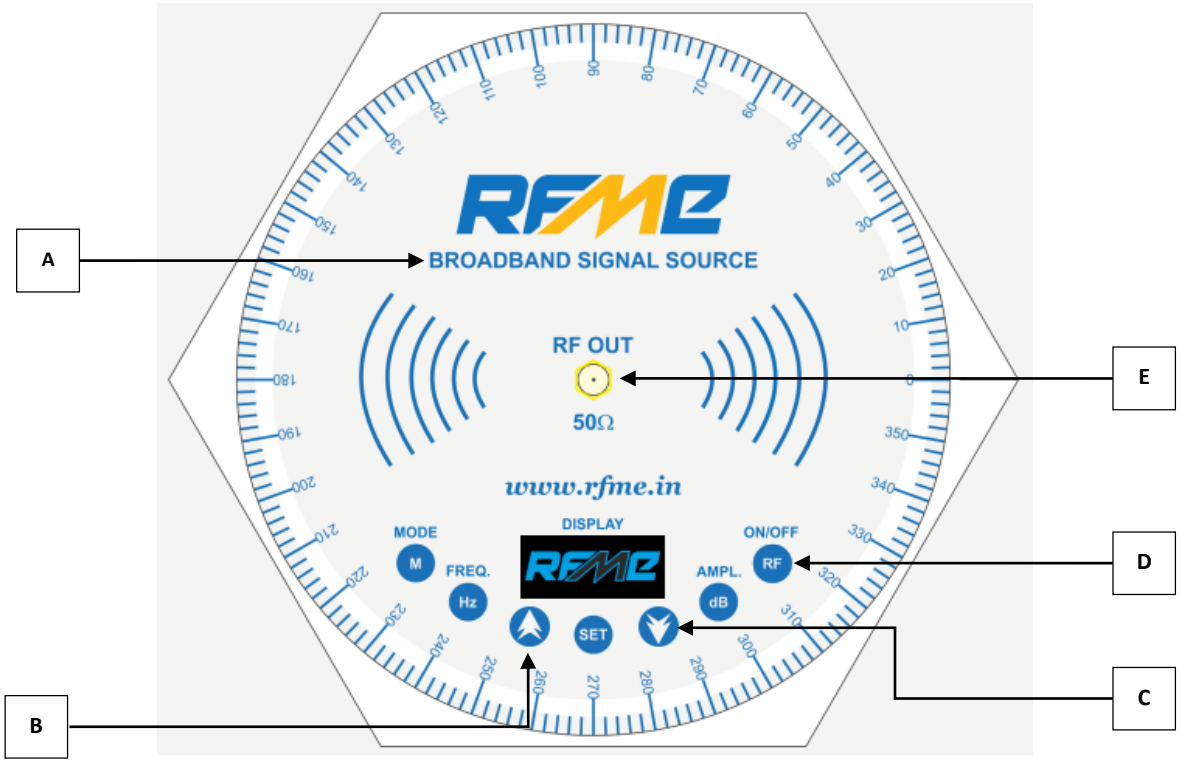

Diagram 3.2

A. Shows the type of the device connected

B. Shows the **Increment** button. Click this button to increase the centre frequency with respect to the Step size in the **Single Mode**.

C. Shows the **Decrement** button. Click this button to decrease the centre frequency with respect to the Step size in the **Single Mode**.

D. Shows the **RF** button. Click this button to toggle RF on/off.

E. Shows the **SMA Connector**. RF will be directed outwards from this connector.

3. **Front Panel:** This window shows the status of the unit as per **Diagram 3.3**.

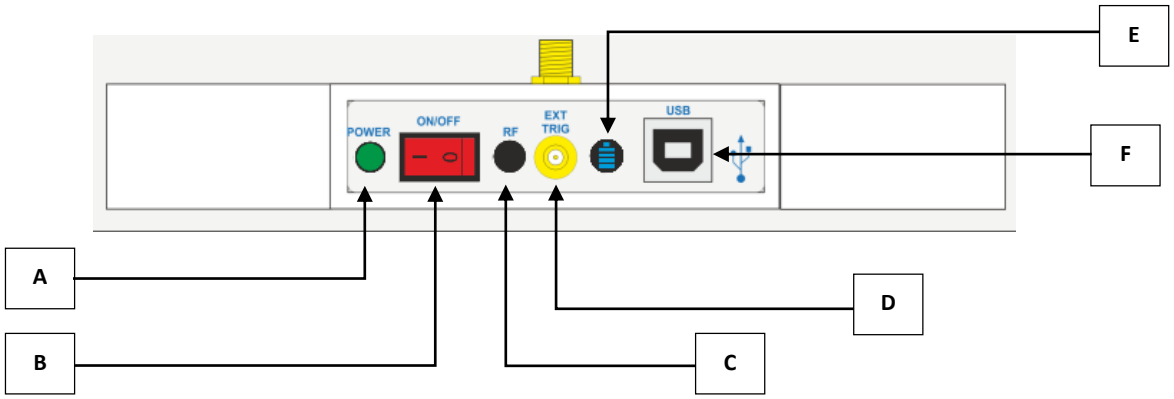

Diagram 3.3

A. LED shows the power status of the unit. For more information, refer the instruction manual.

B. Switch shows the configuration of the rocker switch

C. LED shows the status of RF.

- No indicates RF off
- Green indicates RF on

D. This shows the SMB connector, SMB connecter is used as external trigger signal for Sweep Mode. For more information, refer the instruction manual.

E. LED shows the charging status of the unit. If blue LED is on then device is charging.

F. USB connector of the device.

4. **Mode Selection:**

This window will be used to switch between operational modes which is shown in **4** of **Diagram 3.1**.

5. **Operational Parameter:**

This window will display the parameters of operation. Display window will be different for every **Mode**.

Editable input boxes will be used to change the parameters.

Follow the guidelines mentioned in below chapters to operate the unit in correct manner.

Diagram 3.4 shows the default parameter of **Single Mode** if **RFSSV236-608** is connected.

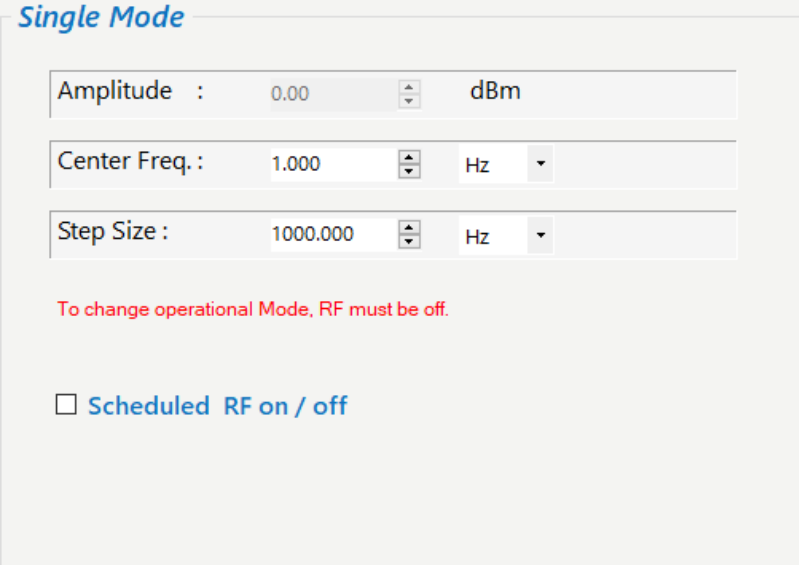

Diagram 3.4

Single Mode Operation

Diagram 5.0

After the connection, default mode of the GUI is **Single Mode**. As discussed previously single mode is useful for precise selection of frequency and amplitude. Operational parameters for the single mode are shown in **Diagram 5.0**.

RF will be off by default. RF button can be used to toggle the RF.

Note - For the initial synchronisation user has to toggle RF button once to chain the process.

A. This textbox will change the amplitude of the unit. Amplitude might vary from device to device. To change the amplitude, enter the desired value in the input window, nearest value allowed will be updated.

B. This input window will change the center frequency of the unit. **Increment or Decrement buttons** are used to change the frequency w.r.t. the step size. Minimum operating frequency is **23 MHz** and maximum operating frequency is **6000 MHz** for **RFSSV236-608**.

C. This input box will change the step size of the center frequency. Minimum step size allowed is **100 KHz / 0.1 MHz** and maximum is **2500000 KHz / 2500 MHz**.

D. By checking the "Scheduled RF on/off", new operation window will be shown as per diagram 5.1. All the above parameters will get locked when scheduled operation is selected.

In this, the scheduled start time is entered in the input area, which is highlighted with the red box in the bellow diagram, and by pressing the "SET" button timer will be started.

When the scheduled time is reached, RF will be toggled.

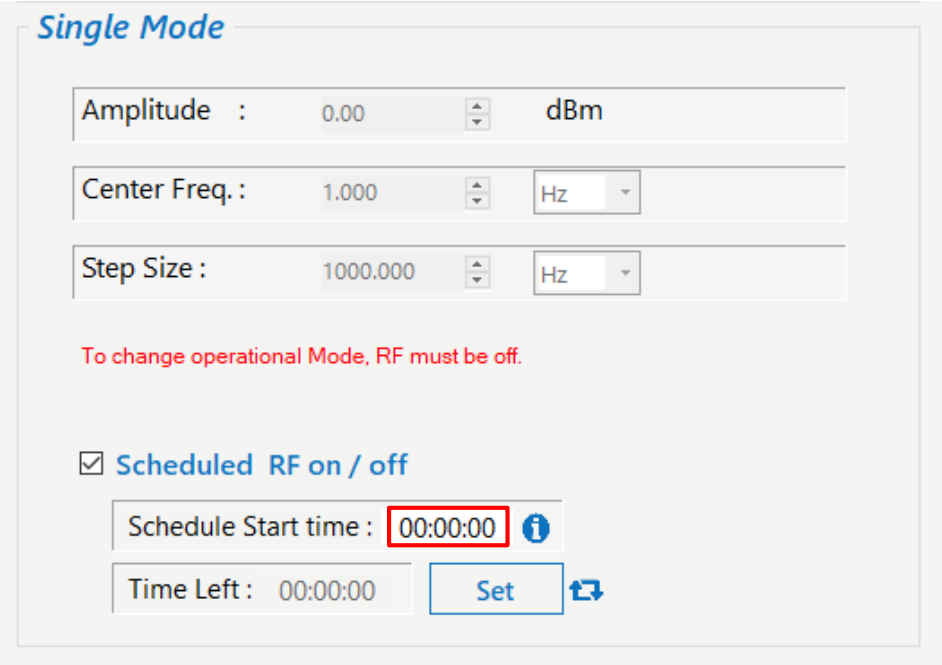

Diagram 5.1

Note: Each parameter updated from the active window will have immediate effect on the RF output. After enabling the **RF,** parameters will be directly updated as per selection, conscious awareness is required when connected the device to any EUT.

Sweep Mode Operation

Second mode of operation is **Sweep Mode**.

Default window is shown in **Diagram 6.0**. In this mode device will produce consecutive frequencies i.e. from **Start Frequency** to **Stop Frequency**, entered by the user.

This process will be completed in the specified **Sweep Time** entered by the user. Incremental steps will be adjusted automatically from the input.

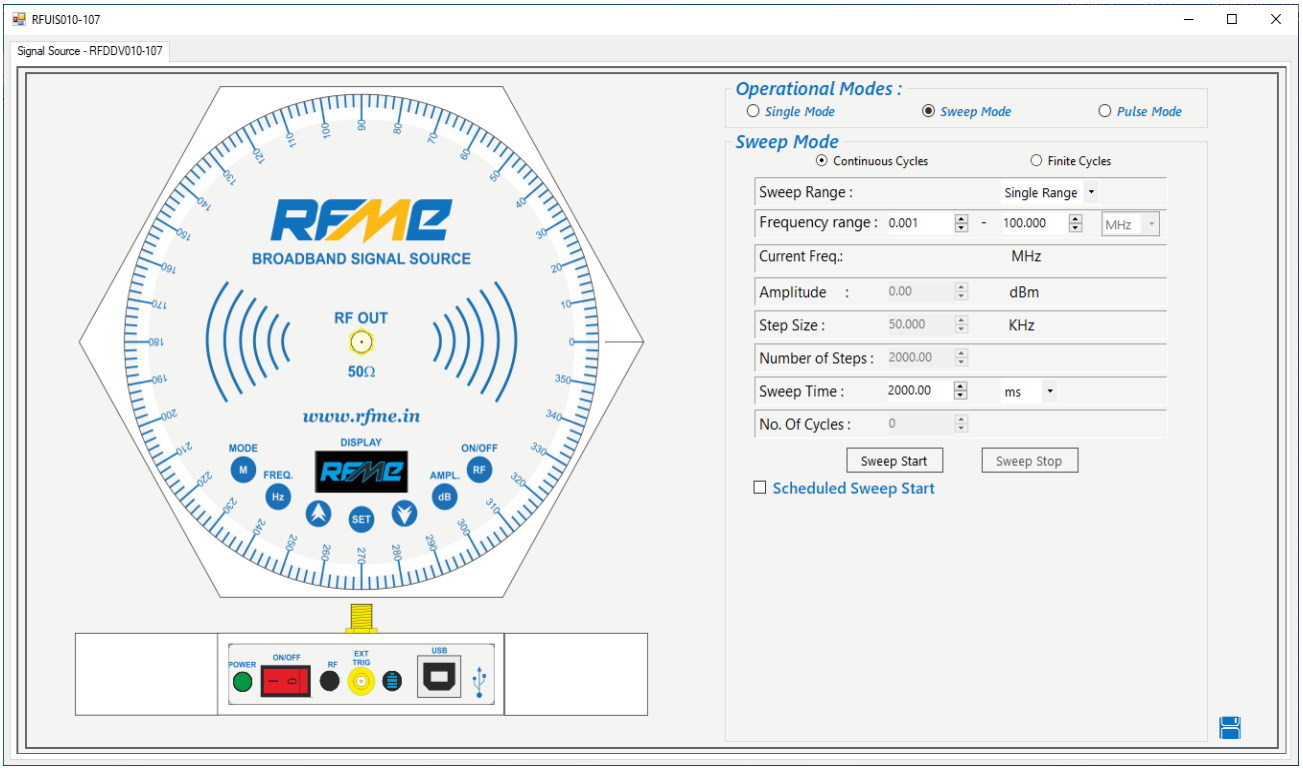

Diagram 6.0

Diagram 6.1 shows the operating parameter of this mode.

Continuous Cycle will be the default operating mode when **Sweep Mode** is selected.

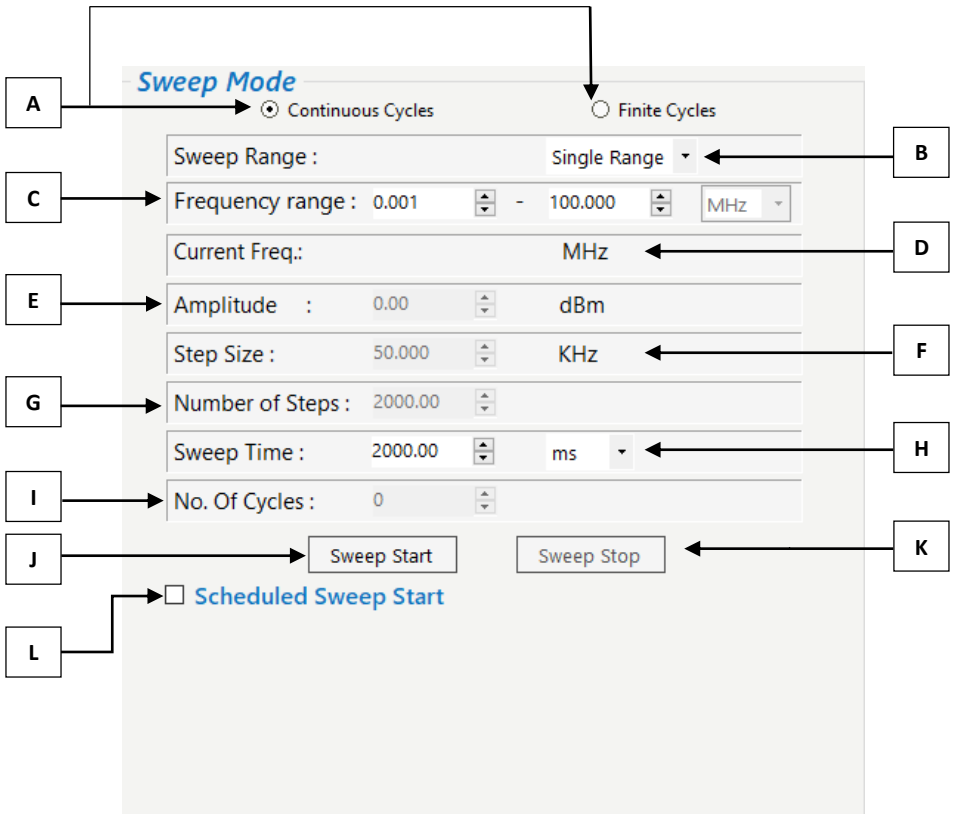

Diagram 6.1

Sweep Mode, in single range, can be segregated into two ways:

- Continuous Cycle - Sweep will be repeated continuously until triggered manually by stop button (**K** in **Diagram 6.1)**.
- Finite Cycle - Sweep will be repeated for the given number of cycles and then stopped automatically.

A. This will select operational mode i.e. continuous or finite cycle.

B. This will be used to select particular range or band to sweep in. One can select multiple sweep ranges varying from 1 to 5. For single range device will continuously sweep from **Start Frequency** to **Stop Frequency** (If "Continuous Cycle" is selected).

For dual range, device will sweep from 1st **Start Frequency** to 1st **Stop Frequency** than automatically shift to 2nd **Start Frequency** to 2nd **Stop Frequency** and repeat the cycle by pressing the "Sweep Start" button

for every range. Similarly, it will take three ranges in triple and so on.

Diagram 6.2 – 6.5 shows **Multi-Sweep** windows.

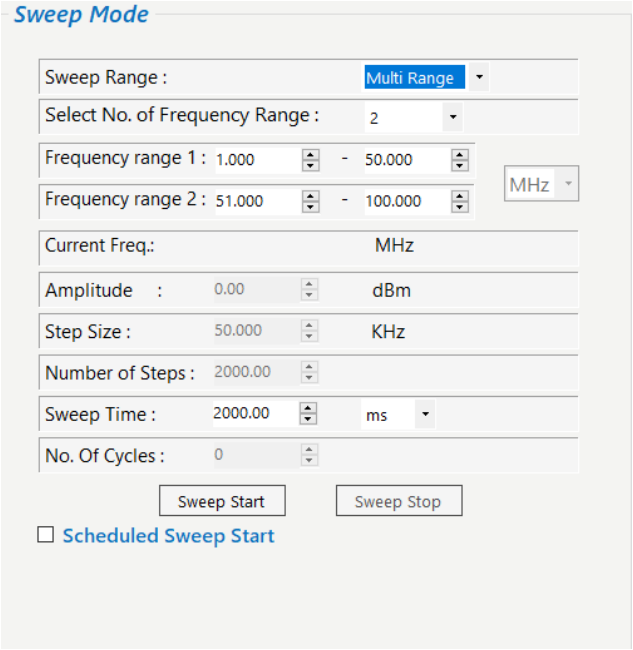

Diagram 6.2

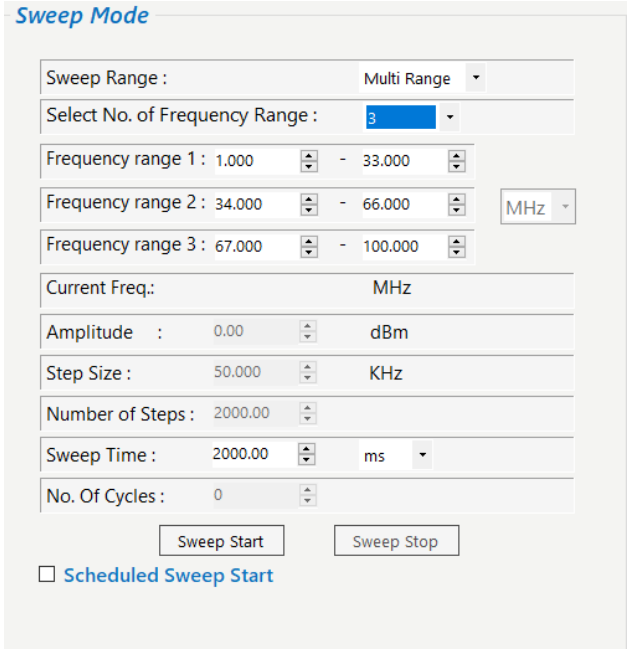

Diagram 6.3

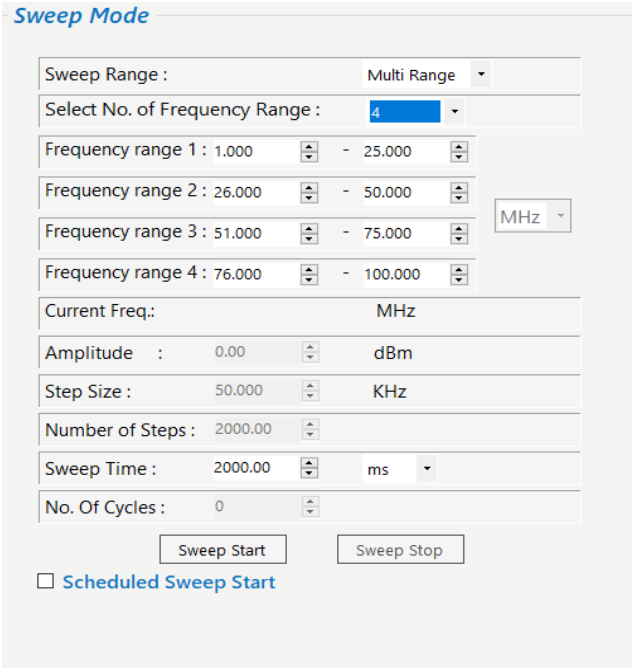

Diagram 6.4

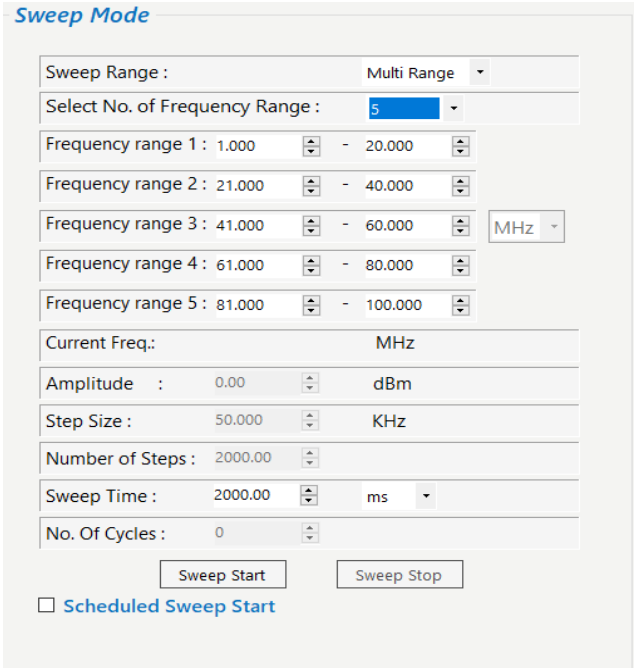

Diagram 6.5

C. This will define the **Start Frequency** and **Stop Frequency** of the sweep. According to the Start Frequency and Stop Frequency, parameters will be updated such as **Step Size** and **Number of Steps**. Stop frequency should be greater than start frequency or else sweep will not begin.

D. This will display the **Current Frequency**. Display will only be updated when sweep start is triggered.

E. This will show the amplitude level in the sweep range. Amplitude variation will be in ± 3 dB for full range. To change the amplitude, enter the desired value, nearest value will be updated automatically. For more information, refer the datasheet as well as calibration data provided with the unit.

F. This will display the **Step Size** or the resolution of each step while sweeping. Frequency will be incremented according to the step size entered until stop frequency is achieved. In multiple sweep range, step size may vary in between ranges as start frequency and stop frequency might not be equal in each selection.
When sweep time is changed it will affect the **step size** as resolution is changed. As sweep time is increase step size will also decrease, as more corresponding frequency will be generated in between.

G. This will display the **Number of Steps,** between the entered start and stop frequency as well as Step Size.

H. This textbox, will show the total time taken to complete the whole sweep range. As mentioned above, change in the sweep time will also changes step size. Minimum sweep time can be entered is 100 milliseconds and it will go upto maximum of 50,000 milliseconds / 50 seconds.

Note - While entering the parameters one should be consciously aware of the selection made and physical connection done with the EUT.

I. This display will show the number of cycle completed. When **Finite Cycles** is selected one more input box will be displayed shown in **Diagram 6.6**. This input will define number of sweep cycles to be completed before stopping.

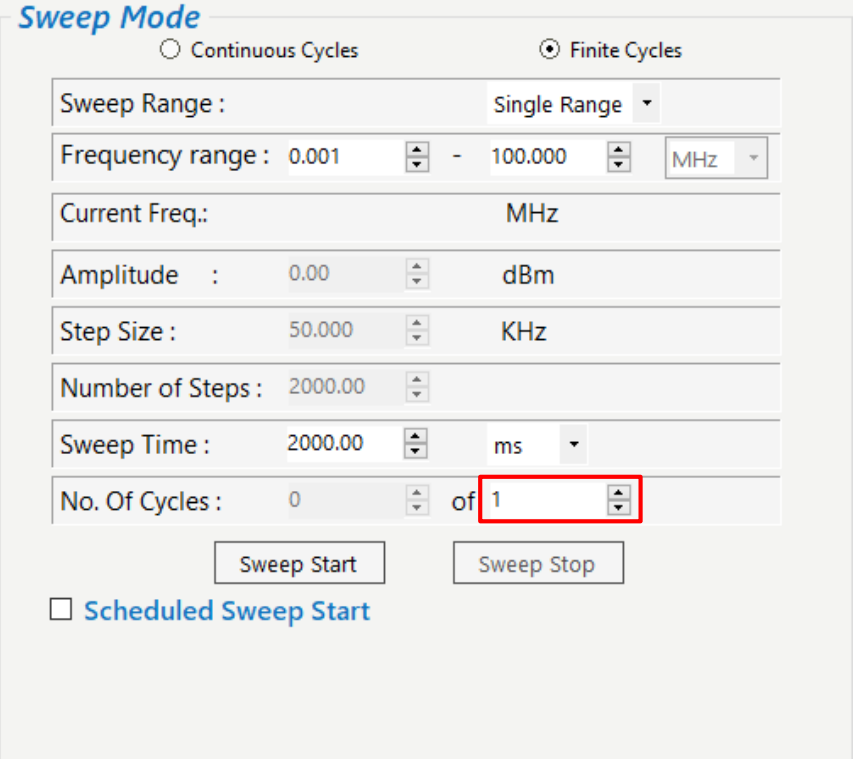

Diagram 6.6

J. **Sweep Start** button will initialize the sweep process. Number of sweep cycles will be displayed in the **H** of **Diagram 6.1**. If "Finite Cycle" is selected, then sweep will continue until entered cycle is matched. After pressing the start button.

While sweeping all the parameters will be locked no changes is allowed while device is in sweep. Only "Sweep Stop" button will be enabled to stop the sweep process.

Diagram 6.7 shows the default window when sweep is enabled.

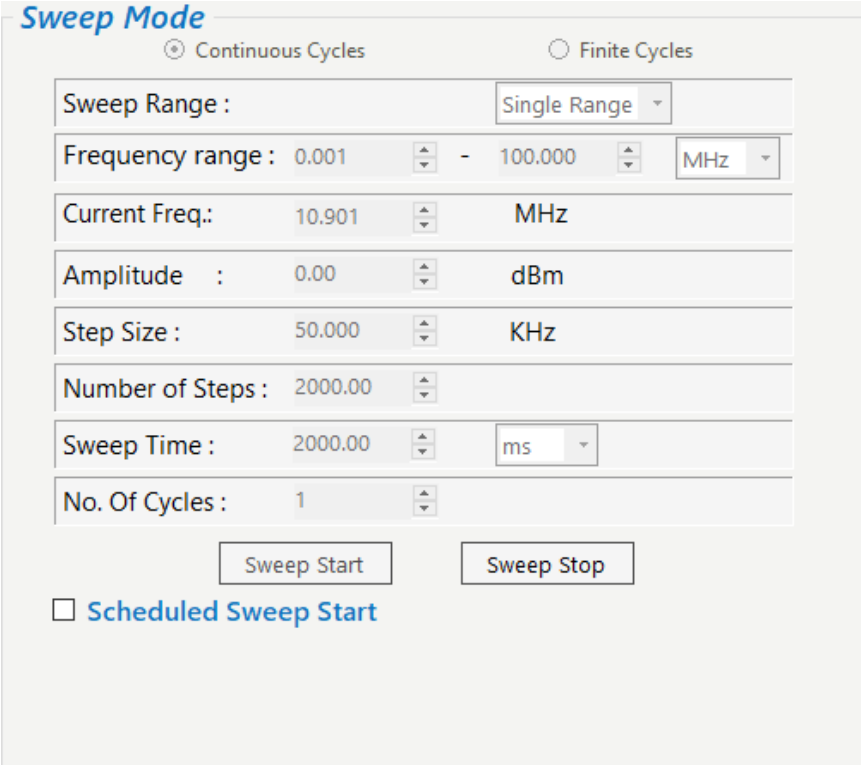

Diagram 6.7

[Note: Current Frequency will be visible only when Sweeping is ON, in normal condition Current frequency display box will not be visible.]

K. Sweep Stop button will eliminate the sweep process completely. After pressing the button, sweep will be reset and all the parameters will be unlocked.

L. By checking the "Scheduled Sweep Start", new operation window will be shown as per diagram 6.8. And all of the above parameters will get locked when scheduled operation is selected.

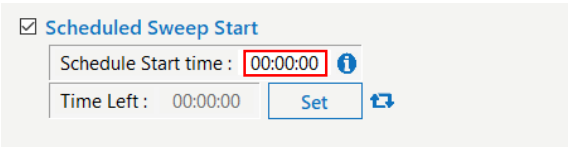

Diagram 6.8 (Single Range)

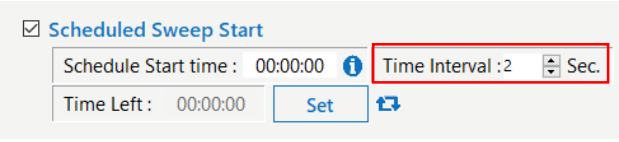

Diagram 6.9 (Multi Range)

In this, the scheduled start time is entered in the input area, which is highlighted with the red box in the diagram 6.8, and by pressing the "SET" button timer will be set.

At the scheduled time, Sweep will start automatically.

For Multi-range, one more parameter will be added which is "Time interval" and it will give a pause of specific time between the ranges which are going to sweep.

Scheduled time can be reset by pressing [🔁] button. It will also eliminate the Sweeping process completely.

Pulse Mode Operation

Third mode of operation is pulse mode. Default window of the **Pulse Mode** is shown in **Diagram 7.0**. In **Pulse Mode** device will produce a particular frequency at given amplitude for specified on-time and for specified off-time. In the on-time RF frequency will be generated and then switched off. These switching will create controlled pulsated RF output with require center frequency, amplitude, on-time and off-time.

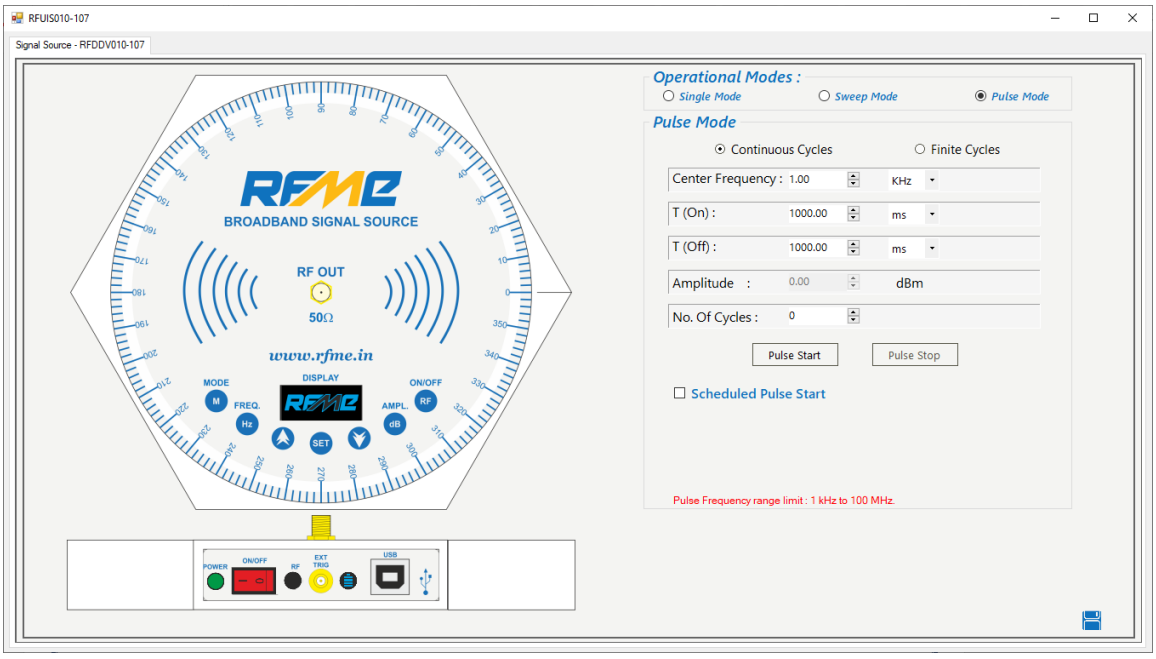

Diagram 7.0

Pulse Mode can be segregated into two ways:

- Continuous Cycle - Pulses will be repeated continuously until stopped manually.
- Finite Cycle - Pulses will be repeated for the given number of time and then stopped automatically.

Continuous Cycle will be the default operating mode when **Pulse Mode** is selected.

Diagram 7.1 shows the operating parameter of this mode.

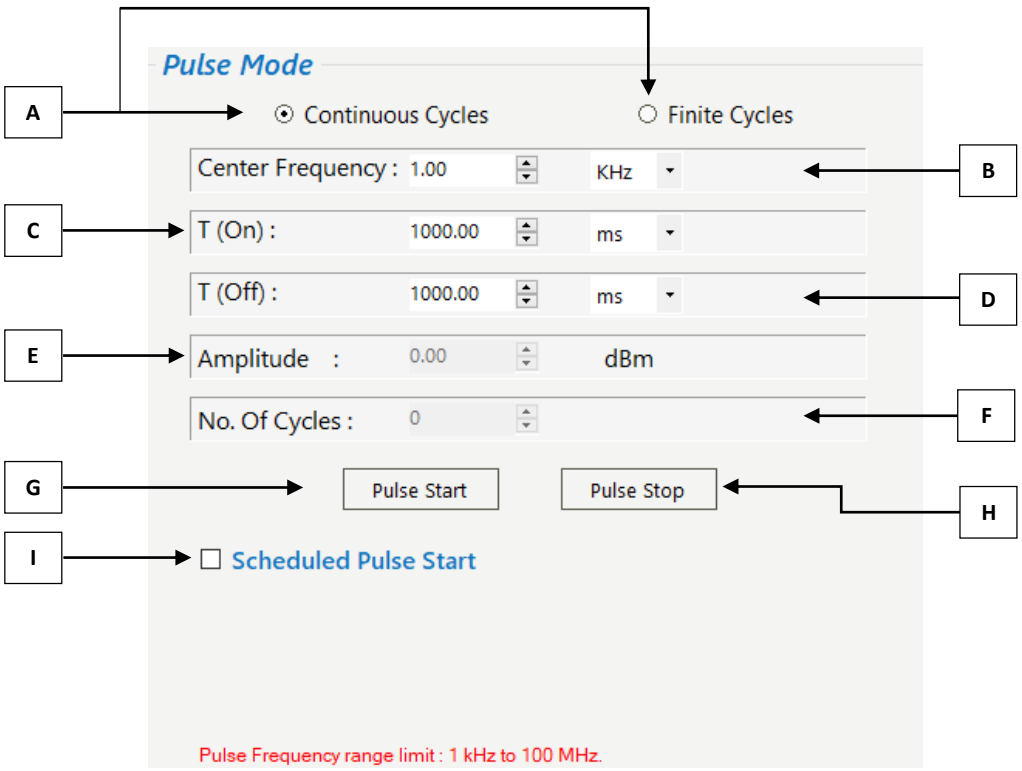

Diagram 7.1

A. This will select operational mode i.e. continuous or finite cycle.

B. This will select the **Center Frequency** of which pulse will be generated. By default, **RF** will be disabled. **RF** will only be produced while pulsating.

C. This will set the **On-Time** of the pulsated output. **RF** will be enabled for this particular interval only.

D. This will set the **Off-Time** of the pulsated output. **RF** will be disabled for this particular interval only.

E. This will define the **Amplitude** on the pulsated output. To change the amplitude, enter the desired value. Nearest value will be updated automatically w.r.t. centre frequency.

F. This display will show the number of cycles completed. When **Finite Cycles** is selected one more input box will be displayed shown in **Diagram 7.2**. This will define number of pulse cycles to be completed before stopping. So in this, unit will pulsate for the given number of cycles i.e. 5.

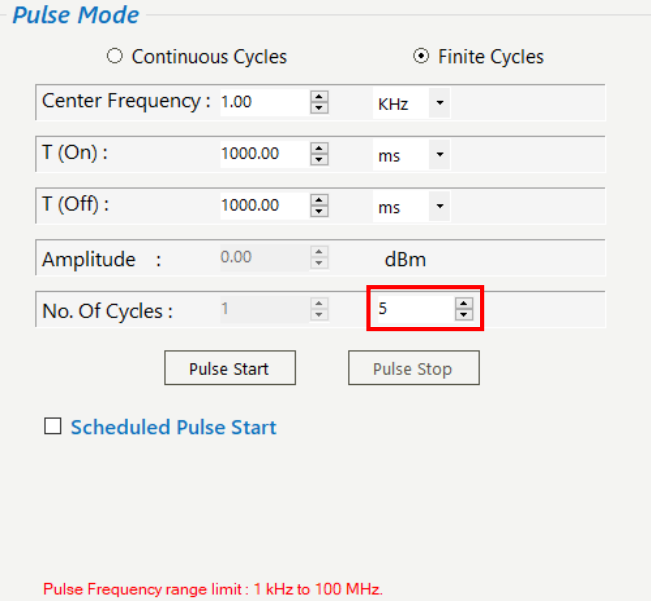

Diagram 7.2

G. **Pulse Start** button will initialize the pulsating process. Number of pulse cycles will be displayed. If "Finite Cycle" is selected, then pulsating will be done depending on the number of cycle entered as shown in **Diagram 7.2**. Pulse Start button will be disabled until all the parameters are inserted correctly, after pressing the start button, it will be disabled until pulse is stopped either manually or automatically. While pulsating all the parameters will be locked no changes will be allowed. **Diagram 7.3** shows the default window when pulse is enabled.

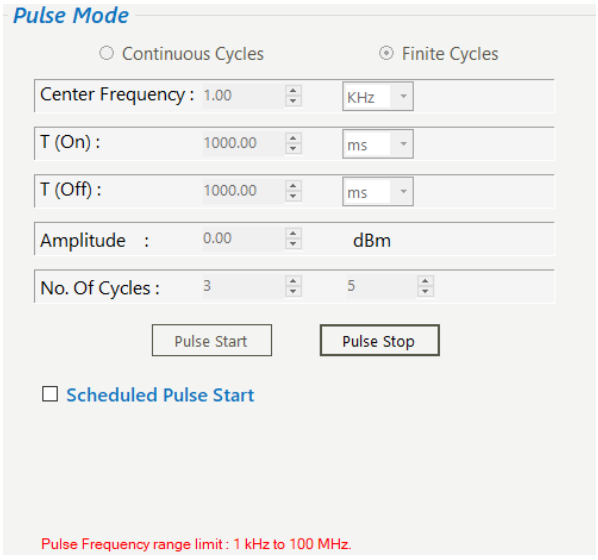

Diagram 7.3

H. **Pulse Stop** button will eliminate the pulsating process completely. After pressing the button pulse will be reset and all the parameters will be unlocked.

I. Pulsating can be scheduled by checking the "Scheduled Pulse Start". Operation functionality will be as same as described in the sweep mode.

[NOTE: Pulsating Sequence will be OFF – ON sequence (first OFF and then ON)]

Export/Import Data

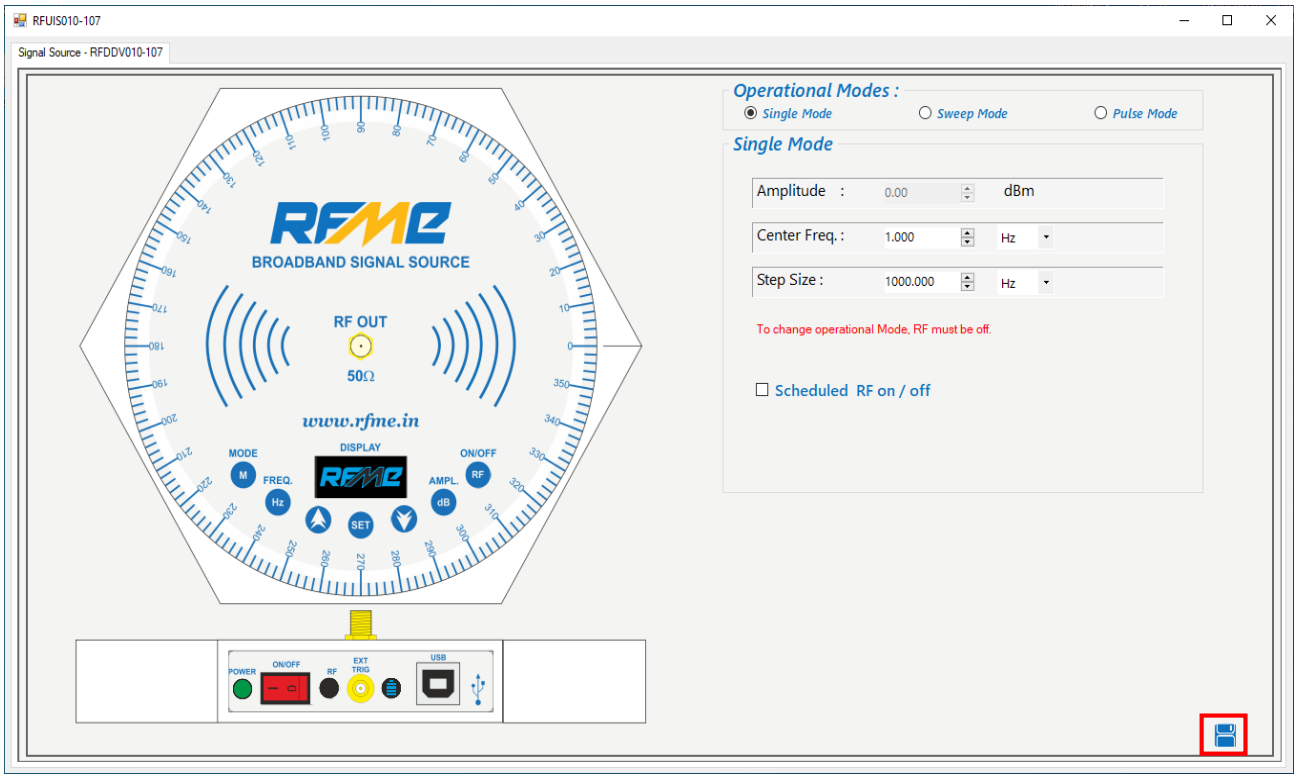

Diagram 8.1

This feature allows to Export as well as Import all the operational parameters.

By pressing the [] button, shown in the **Diagram 8.1,** one dialog box as per **Diagram 8.2.**

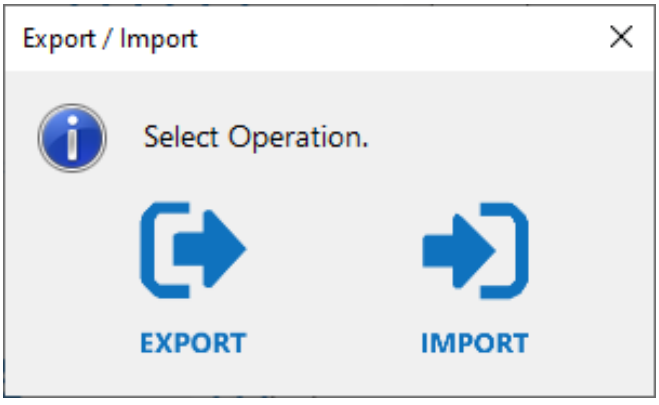

Diagram 8.2

To save all the parameters, select **“EXPORT”** option and save the file in desired location and name. (File extension will be “.rfme” only.)

To import saved data, select **“IMPORT”** option and choose previously saved file (.rfme file only) , all the parameters will be updated as per saved data.

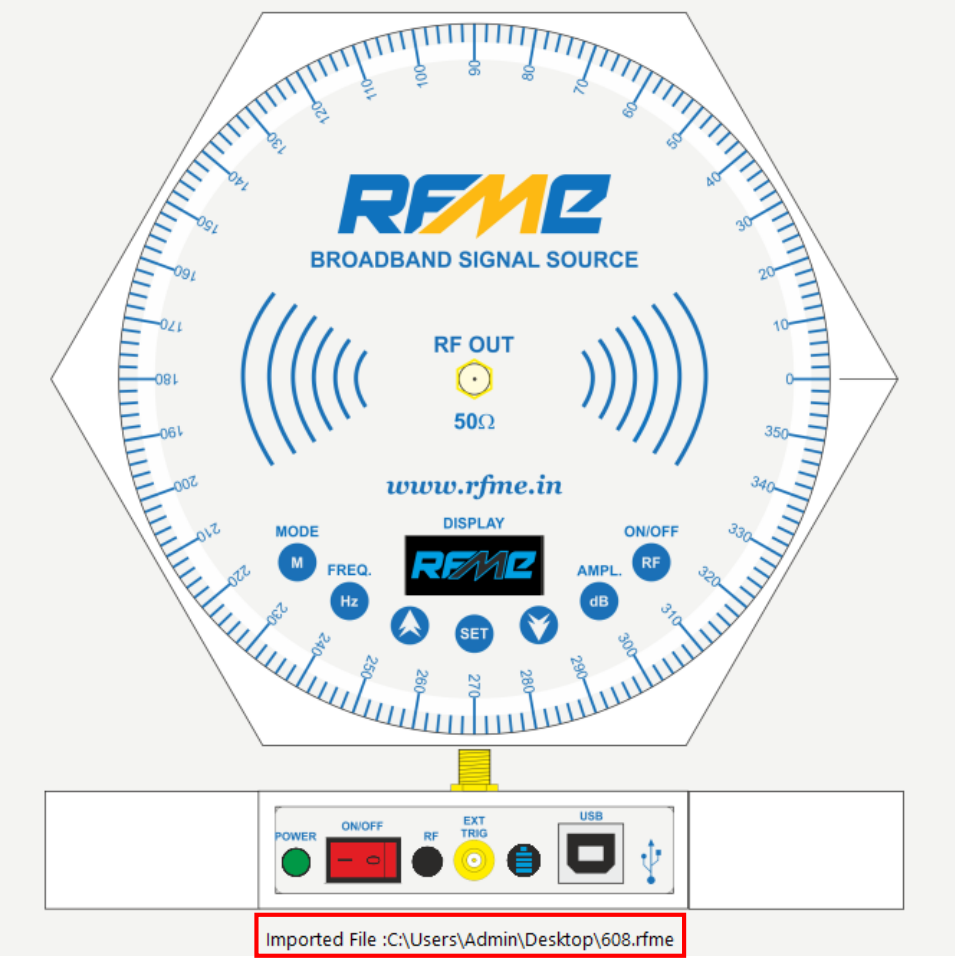

Diagram 8.3

Imported file path will be displayed as per shown in **diagram 8.3.**