

User guide

USB/Ethernet Synthesized Signal Generators



SSG-15G-RC
10 to 15000 MHz: -50 to +15 dBm
Ultra Wideband, very fine freq. resolution



SSG-6000RC
25 to 6000 MHz: -65 to +14 dBm
Wideband, fine frequency resolution



SSG-6001RC
1 to 6000 MHz: -70 to +15 dBm
Wideband, fine frequency resolution

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Mini-Circuits

13 Neptune Avenue
Brooklyn, NY 11235, USA
Phone: +1-718-934-4500
Email: sales@minicircuits.com
Web: www.minicircuits.com



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Page 2 of 50

Table of Contents

Chapter 1 – General Information	5-11
1.1 Scope of the User Guide	5
1.2 Warranty	5
1.3 Definitions	5
1.4 General Safety Precautions	5
1.5 Introduction	6
1.6 Service and Calibration	6
1.7 Contact Information	6
1.8 Model Selection	7
1.8.1 Available Models in SSG series:	7
1.9 Model Description	7-11
1.9.1 SSG Series Features	7
1.9.2 SSG-15G-RC front and rear panels	8
1.9.3 Intended Applications	8
1.9.4 SSG-6xxx series front and rear panels	9
1.9.5 Conformity	10
1.9.6 Supported Software Environments	11
1.9.7 Included Accessories and Options	11
 Chapter 2 – Installation and Setup	 12-16
2.1 Software Setup	12-13
2.2 Installation	14-15
2.3 SSG Series Physical Setup	16
 Chapter 3 – Using Mini-Circuits Generator GUI <u>Program</u>	 17-49
3.1 Starting the Generator Software in USB control	17-19
3.2 Starting the Generator Software in Ethernet control	20
3.3 Main Screen	22-24
3.3.1 Top Row (Fig 3.3):	22
3.3.2 Frequency (Fig 3.3):	22



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Page 3 of 50

Table of Contents

3.3.3 Power (Fig 3.3):.....	22
3.3.4 Bottom Row (Fig 3.3):	23
3.3.5 Right side of screen (Fig 3.3.5):.....	23-24
3.4 Frequency Scroll Bar Step Size screen	24
3.5 Power Scroll Bar Step Size screen	25
3.6 Sweep & Hop Mode	26-30
3.6.1 Common functions:	26
3.6.2 Power sweep:.....	27
3.6.3 Frequency sweep:.....	28
3.6.4 Hop Mode:	29
3.6.5 Save or open a prepared sweep:.....	30
3.7 Pulse Mode:.....	31-36
3.7.1 Free Run Pulse Source :	32
3.7.2 Triggered Pulse Source :.....	33
3.7.3 Square Pulse Source :	33
3.7.4 External Modulation Pulse Source :.....	34
3.7.5 Dynamic pulse mode (SSG-15G-RC only) :.....	35
3.7.6 Pulse width limits :	36
3.7.7 Pulse rate limit :.....	36
3.8 Multi Generator Control:	37-39
3.8.1 Top of Screen:.....	37
3.8.2 Bottom of screen:	38-39
3.8.3 Save or Open a prepared sweep:.....	39
3.9 Updating Generator Firmware:	40-44
3.10 Tracking Calibration status:	45
3.11 Power Up state configuration(For SSG-6000RC only):.....	47
3.12 Using Reference and Trigger Signals:	48-49
Chapter 4 – Revision History.....	50



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Chapter 1 – General Information

1.1 Scope of the User Guide

This user guide provides general introduction, installation instructions and operating information for the Mini-Circuits Synthesized Signal Generator series and its Graphical User Interface (GUI) application measurement software.

1.2 Warranty

See Mini-Circuits website <http://www.minicircuits.com/support/ordering.html> for warranty information.

1.3 Definitions

Note: A note advises on important information you may need to ensure proper operation of the equipment. This information does not indicate risk to either the equipment or the user.

CAUTION

A caution advises about a condition or procedure which can cause damage to the equipment (no danger to users).

WARNING

A warning alerts to a possible risk to the user and steps to avoid it. **DO NOT** proceed until you are sure you understand the warning.

1.4 General Safety Precautions

Please observe the following safety precautions at all times when using Mini-Circuits SSG Synthesized Signal Generators.

WARNING

Ensure that all instruments using mains power supply are properly grounded to prevent risk of electrical shock.

CAUTION

1. Use the power cord provided with the generator.
2. Ensure the generator air vents are clear
3. Do not provide inputs to the generator exceeding the limits specified in the datasheet



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1.5 Introduction



Figure 1: SSG-15G-RC

The Mini-Circuits SSG wideband synthesized signal generator series covers the frequency range of 1 MHz to 15,000 MHz with up to 85dB dynamic range. All models feature a 50 Ω RF out, 10 MHz reference in and out connections and LVTTTL trigger in and out ports, making them a low cost replacement for conventional RF/Microwave signal generators. The provided user-friendly software and USB cable connect the generator to a notebook or a PC with a USB port, providing the additional benefits of frequency and power sweeps, pulse mode output, GUI, easy interface with most lab test software, and much more. SSG models are powered by supplied by an included AC/DC adapter.

1.6 Service and Calibration

The only user-performed service possible for the SSG models is external cleaning of the case and connectors as needed. Do not use any detergents or spray cleaning solutions to clean the SSG unit. To clean the connectors use an alcohol solution and to clean the SSG case a soft, damp cloth. The recommended calibration cycle for Mini-Circuits SSG series Synthesized Signal Generators is once every two years or every 4160 operating hours (See **section 3.10** on automatic tracking of operation time). Calibration service is available from Mini-Circuits, for details; see the Ordering, Pricing & Availability Information link from individual model pages on the website.

1.7 Contact Information

Mini-Circuits inc.
13 Neptune Ave
Brooklyn, NY 11235
Phone: 1-718-934-4500
General Fax: 1-718-332-4661
Sales / Customer Service Fax: 1-718-934-7092
sales@minicircuits.com
For regional offices and tech support see <http://www.minicircuits.com/contact/offices.html>



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1.8 Model Selection

- Mini-Circuits' generators are capable of CW, pulsed RF, and both frequency and power sweeps up, down or bi-directionally.
- The generators are supplied with Graphical User Interface (GUI) software and DLL files to allow control through third party applications on both 32 and 64 bit operating systems.
- Mini-Circuits' control software (included) can manage multiple generators simultaneously including synchronized frequency or power sweeps.

1.8.1 Available Models in SSG series:

Parameter	SSG-15G-RC	SSG-6000RC	SSG-6001RC
Frequency Range (MHz)	10 – 15000	25 – 6000	1 – 6000
Power Range (dBm)	-50 to +15	-65 to +14	-70 to +15
Frequency Resolution (Hz)	0.1	3	3
Power Res. (dBm)	0.5 (0.1)*	0.25	0.25
Minimum Dwell Time (ms)	20	20	20
Maximum Pulse Rate (kHz)	500	90.909	33.333
DC Power Supply (V)	6	12	12
Ethernet speed	100 Mbps	10 Mbps	10 Mbps

*Power resolution of 0.1 dB is possible, however spec is only guaranteed at 0.5 dB steps.

For detailed data sheets, performance data and graphs, outline drawings and environmental ratings click on the individual part number or check out our website at <https://www.minicircuits.com/WebStore/PortableTestEquipment.html>

1.9 Model Description

1.9.1 SSG Series Features

- Synthesized Signal Generator
- Wide Dynamic range
- Wide frequency range
- RF Out port, ports for Ref In, Ref Out, Trigger In and Trigger Out
- USB HID, no driver required (Plug and Play operation)
- HTTP and Telnet control
- Frequency and power sweep and hop modes (up, down, or bi-directional)
- Synchronized multi-generator sweep mode (up, down, or bidirectional)
- Pulse modulation
- Easy installation and operation
- Internal 10 MHz reference signal (external reference also accepted).
- Compatible with 32/64-bit Windows® or Linux® operating systems, as well as LabVIEW®, Delphi®, C++, C#, Visual Basic®, and more (see programming handbook and application note [AN-49-001](#) for details)
- User-friendly Graphical User Interface for any Windows® 32 or 64 bit computer. Command line support for Linux® computers.
- AC/DC Power adapter included



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1.9.2 SSG-15G-RC front and rear panels

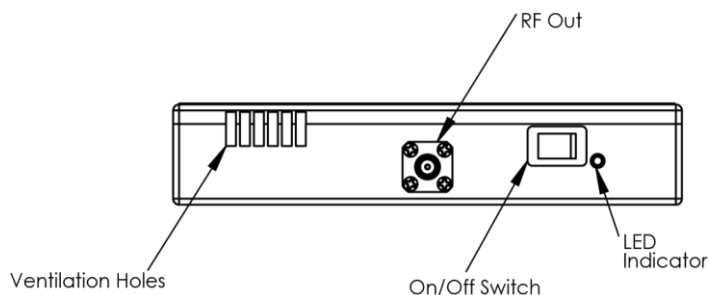


Figure 1.9.2a SSG front panel

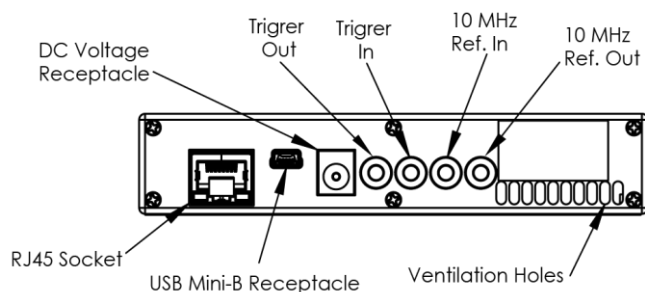


Figure 1.9.2b SSG rear panel

#	Name	Description
1	Front ventilation holes	Front and rear ventilation holes must be kept clear to allow airflow
2	RF Output	SMA Female connector for RF output
3	Power LED	Static LED indicates model is on Blinking LED indicates model power or temperature exceeds the specified limits
4	Power Switch	On/Off Switch
5	Rear ventilation holes	Front and rear ventilation holes must be kept clear to allow airflow
6	Reference Output	Output for the generator's internal 10MHz reference (BNC female).
7	Reference Input	External reference input, if no signal is detected the generator will default to internal reference (see section 3.12 for details)
8	Trigger Input	Trigger input, see model datasheets for voltage levels (SMB Jack)
9	Trigger Out	Trigger output, see model datasheets for voltage levels (SMB Jack)
10	Power supply	Power supply connection, 6V power.
9	USB socket	USB type Mini-B socket for USB control of generator
11	LAN socket	Provides Ethernet control of Generator (see section 3.2 for details)

1.9.3 Intended Applications

Mini-Circuits Synthesized Signal Generators are intended for indoor use in the following applications:

- Lab and test equipment setups for both manual and automated measurement.
- Production line testing
- Field testing

The SSG series models can be used by anyone familiar with the basics of electronics measurements.

1.9.4 SSG-6xxx series front and rear panels

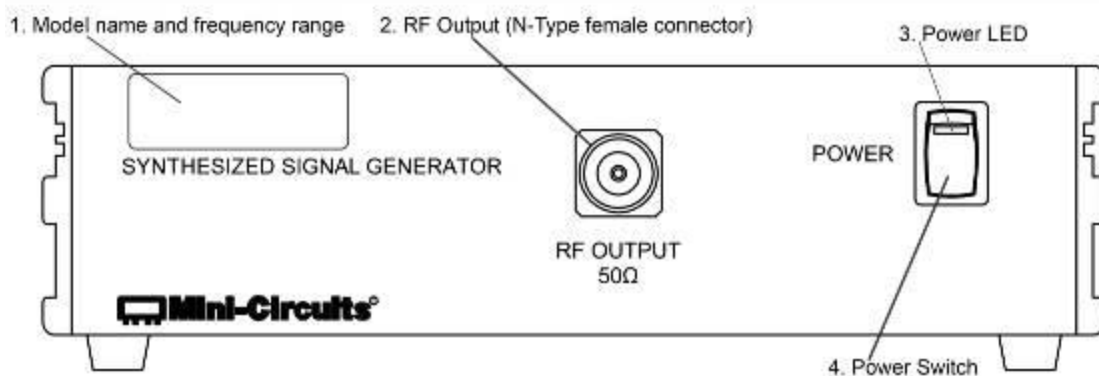


Figure 1.9.4a SSG front panel

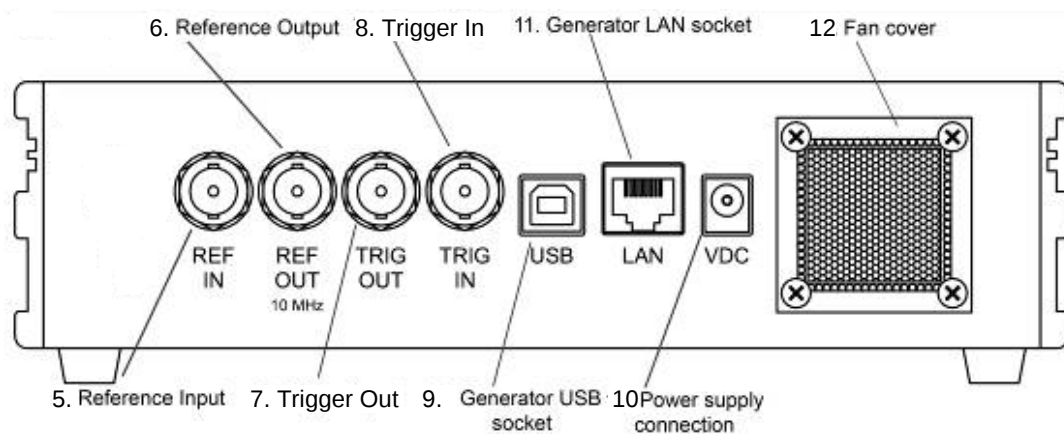


Figure 1.9.4b SSG rear panel

#	Name	Description
1	Model name and frequency range	Label showing the model name and frequency range
2	RF Output	N-Type Female connector for RF output
3	Power LED	Static LED indicates model is on Blinking LED indicates model power or temperature exceeds the specified limits
4	Power Switch	On/Off Switch
5	Reference Input	External reference input, if no signal is detected the generator will default to internal reference (see section 3.12 for details)
6	Reference Output	Output for the generator's internal 10MHz reference (BNC female).
7	Trigger Out	Trigger output, see model datasheets for voltage levels (BNC female)
8	Trigger Input	Trigger input, see model datasheets for voltage levels (BNC female)
9	USB socket	USB type B socket for USB control of generator
10	LAN socket	Not available in SSG-4000xx models. Provides Ethernet control of Generator (see section 3.2 for details)
11	Power supply	Power supply connection, note power supply specifications for each model.
12	Fan Cover	Fan cover and slots on the side of the generator must be kept clear to allow airflow

1.9.5 Conformity

Mini-Circuits Synthesized Signal Generators conform to all requirements for the following international standards:

- RoHS – The models comply with EU directive for Restriction of Hazardous Substances for 6 substances.
- USB 2.0 – The models meet the specifications of the Universal Serial Bus Ver. 2.0 communication standard as described by USB-IF.
- USB HID – The models meet the requirements for Universal Serial Bus Human Interface Devices according to USB-IF's Device Class Definition for Human Interface Devices firmware rev. 1.11
- TCP/IP – Ethernet communication complies with the specifications of the Transmission Control Protocol (TCP) and Internet Protocol (IP) as defined in RFC 791 and RFC 793.
- HTTP – SSG models support all requirements for communicating with the Hypertext Transfer Protocol (HTTP) as defined in RFC 1945.
- Telnet – SSG models support all requirements for communicating with the Telnet protocol, as defined in RFC 854.
- SSH – The SSG-15G-RC also supports the requirements for SSH protocol, as defined by RFCs 4250-4253, 4419, 5647, 5656 and 6668.

1.9.6 Supported Software Environments

Mini-Circuits SSG series synthesized signal generators have been tested in the following operating systems:

32 bit systems: Windows 10, Windows 8, Windows 7, Windows Vista, Windows XP Windows 98

64 bit systems: Windows 10, Windows 8, Windows 7, Windows Vista, Linux

The signal generators will work with almost any software environment that supports ActiveX or .Net including: C++, C#, CVI®, Delphi®, LabVIEW® 8 or newer, MATLAB® 7 or newer, Python, Agilent VEE®, Visual Basic®, AutoIT, Visual Studio® 6 or newer, and more

For more information see the Synthesized Signal Generator [Programming](#) Manual and application note [AN-49-001](#) on our website.



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1.9.7 Included Accessories and Options

SSG-15G-RC comes with the following accessories included:

- 6.6 ft. USB mini-B to USB A cable
 - 6V AC/DC power adaptor
 - 2 x BNC(M)-SMB(M) cables for Trigger and Reference
 - 110-220V power cord suitable for one of: US, Europe, UK, China & Australia, Israel
- Additional options available:
- 2.7 ft USB mini-B to USB A cable
 - 5 ft Ethernet cable
 - Calibration service.

SSG-6000RC & SSG-6001RC come with the following accessories included:

- 2.7 ft. USB B to USB A cable
 - 12V AC/DC power adaptor
 - 110-220V power cord suitable for one of: US, Europe, UK, China & Australia, Israel
 - 5 ft Ethernet cable
- Additional options available:
- 6.6 ft USB B to USB A cable
 - 11 ft USB B to USB A cable
 - Bracket mounting kit
 - Calibration service.

For additional details and ordering information see specific model datasheet.



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Chapter 2 – Installation and Setup

This chapter provides information on installing the operating software and setting up Mini-Circuits' Generators. System requirements for USB control are a computer (Pentium II or better) with support for USB HID and a power source of 110-220V (a power cord matching the required power supply should be selected when ordering the SSG unit).

For Ethernet control an Ethernet port with support for HTTP or Telnet, and a suitable power source are needed.

To run the GUI program (described in chapter 3) a Windows operating system (either 32 or 64 bits) is also needed.

2.1 Software Setup



If you have had any problems installing the software, we're here to help.

Try following these complete step-by-step instructions. If you still experience problems, give us a call at Mini-Circuits Worldwide Technical support. It's (718) 934-4500, or e-mail apps@minicircuits.com for North America, or go to minicircuits.com/contact/worldwide_tech_support.html for other regional numbers and addresses.

2.1.1 First, save all work in progress and close any other programs that may be running.

2.1.2 Next, download the full CD software from minicircuits.com. Unzip the downloaded files to a temporary folder on your desktop or C: drive, then open the file folder you created and double-click the "Install" icon.

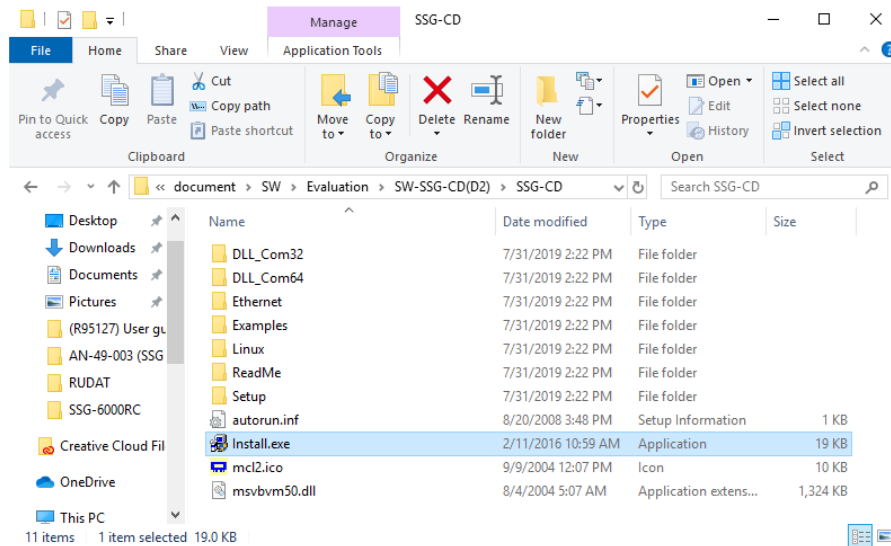


Figure 2.1.2 CD file listing window



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2.1.3 **Alternatively, you may** just download and open without saving the setup files, from https://www.minicircuits.com/softwaredownload/SG_Setup.zip. Then double click on the setup.exe icon.

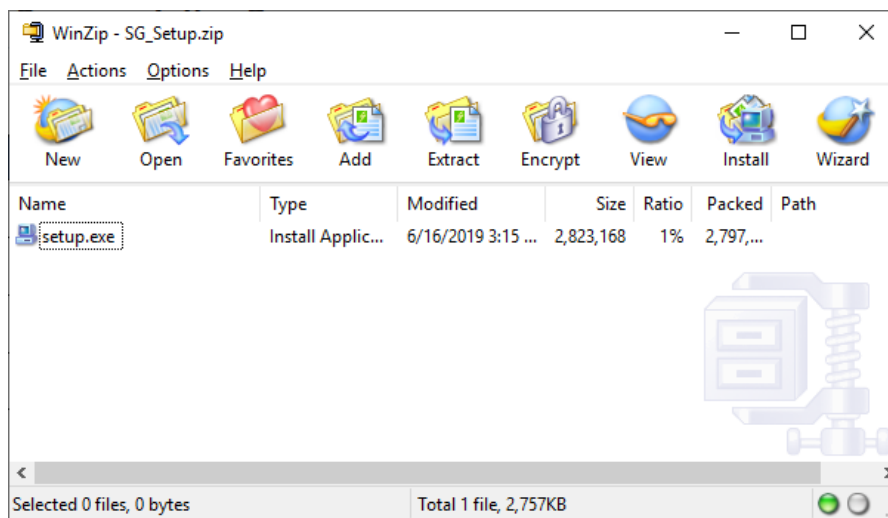


Figure 2.1.3 Setup file listing window

2.2 Installation

2.2.1 **The installation start window** should now appear. Click the “Install Now” button (if you downloaded only the setup files skip to 2.2.2).

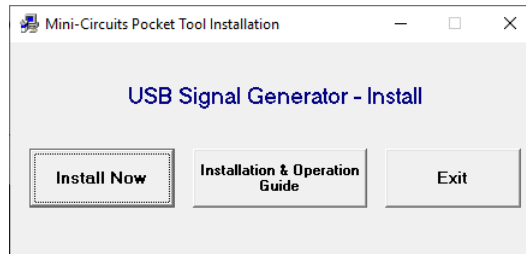


Figure 2.2.1 Installation start window

2.2.2 **The installer window** will appear. Click “Next”.

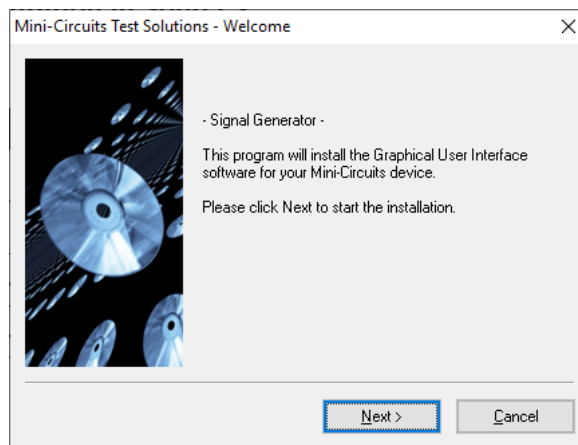


Figure 2.2.2 Installation window

2.2.3 **The license agreement** should now appear. To proceed, click “Yes” to accept the agreement.

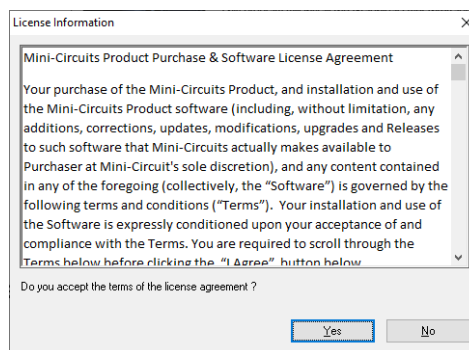


Figure 2.2.3 License agreement

2.2.4 *The installation program will install (will take a few seconds).* Click the “Exit” button to close the installer.

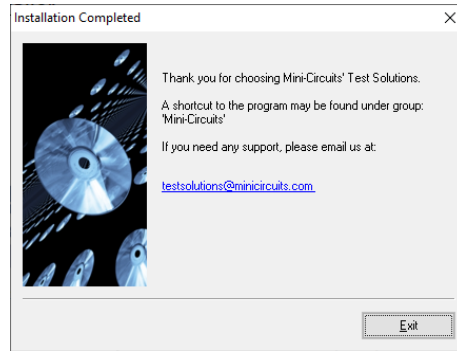


Figure 2.2.4 Installation program window

2.2.5 *The signal generator program will be* located in the C:\Program Files (x86)\Mini-Circuits\SSG folder, with shortcuts placed on the Windows Start Menu (under Mini-Circuits -> Signal Generator) and on your desktop.

2.3 SSG Series Physical Setup

2.3.1 **Before** connecting the SSG unit, ensure the power switch is in the OFF position and the control software (either the supplied GUI software or a customer-written application) is shut down.

WARNING

Ensure the 110-220V mains power supply socket you use to power the Signal Generator is intact and connected to a proper ground.

CAUTION

Ensure the power adapter matches the generator. Connecting an SSG unit to an incorrect power supply may cause damage or incorrect operation.

2.3.2 **For USB control, connect** the Signal Generator as follows:

- Connect RF out port to load.
- Connect the supplied power adapter to 110-220V mains power supply with the supplied power cord.
- Connect the DC connector of the power adaptor to the SSG unit's DC power socket.
- Connect USB cable between SSG unit USB port and computer USB port
- Turn on the SSG unit, note that the LED lights up (For SSG-15G-RC you will also hear the fan start up with a sharp whistle, then settle down after a few seconds).

2.3.3 **For Ethernet control, connect** the Signal Generator as follows:

- Connect RF out port to load.
- Connect the supplied power adapter to 110-220V mains power supply with the supplied power cord.
- Connect the DC connector to SSG power socket.
- Turn on the SSG unit, note that the LED lights up (For SSG-15G-RC you will also hear the fan start up with a sharp whistle, then settle down after a few seconds).
- Connect the Ethernet cable to SSG LAN port and to available network port - note the SSG port lights up with one light steady and the other blinking (may take a few seconds, depending on your network)

2.3.4 **Connecting Reference and Trigger signals**

- To use External reference connect the SSG unit REF IN port to an external signal of power matching the levels specified in the datasheets.
- In order to use SSG internal reference to synchronize with other devices, simply connect the REF OUT port of the SSG to the devices in question – the SSG constantly produces a 10 MHz, reference signal (see datasheets for power levels).
- The trigger in and trigger out of the SSG generator can be used simultaneously. Connect whichever you wish to use and set the operation mode in the software (See section 3.5 and 3.6 for using Mini-Circuits GUI, or the programming handbook for setting the trigger option in your own software).

See section 3.12 for further details.

CAUTION

1. **Check Maximum safe input power for Reference In and Trigger In ports in the individual model datasheets. Exceeding these levels may cause permanent damage to the SSG unit's reference or Trigger port circuitry.**
2. **Keep SSG air vents unobstructed. Prolonged operation of the SSG with obstructed air vents may result in the unit over-heating and eventual damage to the SSG unit.**

Note: connecting a signal which does not match the specified reference frequency may result in incorrect operation of the SSG.



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Chapter 3 – Using Mini-Circuits Generator GUI Program

3.1 Starting the Generator Software in USB control

3.1.1 **Go to the Start menu** and select All Programs>Mini-Circuits Generator (default), or go to the other destination address you selected earlier. The “Mini-Circuits Generator” icon should be waiting there for you. Click on it, and get started!

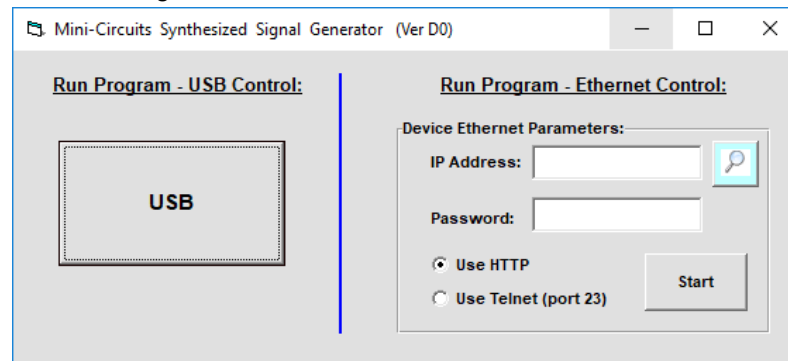


Figure 3.1.1: Startup screen

3.1.2 **The startup screen allows you** to select the control method you wish to use for the SSG, USB or Ethernet control. For USB control click on the USB button, for Ethernet control see section 3.2.

3.1.3 **If multiple generators are** connected via USB the initial screen will show a list of S/N for connected units. Select the unit you wish to start with and click **OK**, or click **Cancel** to exit the program. The program can handle up to 24 units connected *simultaneously*.

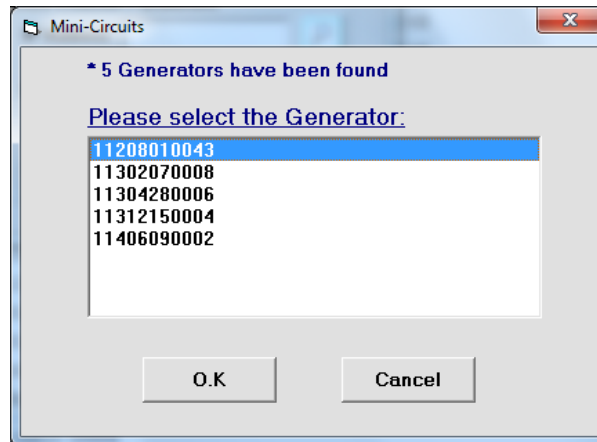


Figure 3.1.3: Unit selection screen

3.1.4 If USB control, or DC power are not properly connected when you start the program or are interrupted during operation, a pop-up window will appear advising you to check power and USB connections. Clicking on 'Retry' after the problem has been resolved will cause the pop-up to disappear, allowing you to operate the generator. Clicking 'Cancel' will cause the program to shut down.

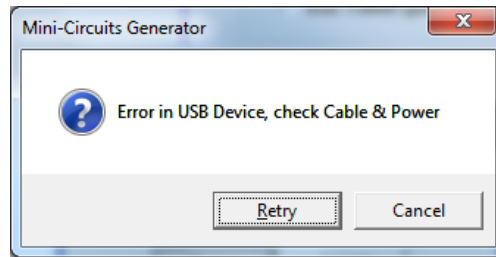


Figure 3.1.4: Interrupted Power error

3.1.5 The Ethernet configuration can only be accessed from the USB control main screen. Click on the Ethernet-Config button shown in the figure below and the Ethernet configuration screen will appear.

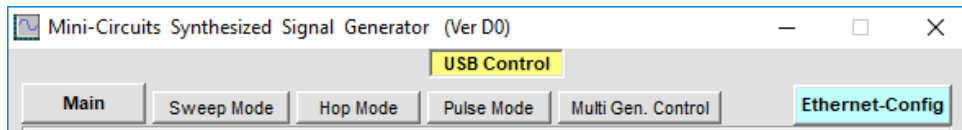


Figure 3.1.5: Ethernet Config button

3.1.6 The Ethernet Configuration screen will open showing the current configuration. **Fig 3.1.6** is showing the factory default of the generators. If these settings fit your local network, you do not need to access the setup before connecting the generator to the network.

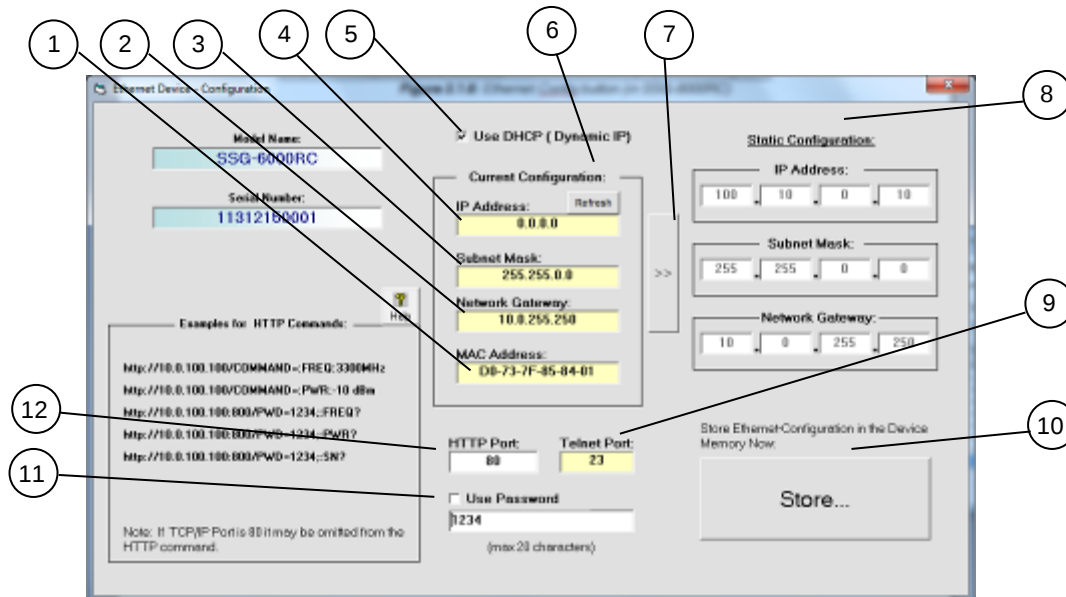


Figure 3.1.6: Ethernet Config. screen (showing factory default state)

Note: If you are using a proxy server for your LAN connections you may need to define a name for the generator IP address, or disable the proxy server to connect to the generator via Ethernet.

3.1.7 The Ethernet Configuration Settings are:



INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

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Page 18 of 50

#	Name	Description
1	MAC Address	Media Access Control Address – a unique, unchanging identifier for the generator unit.
2	Network gateway	IP address of the network gateway. When DHCP is selected this is assigned automatically by the server.
3	Subnet Mask	The Network's Subnet Mask. When DHCP is selected this is assigned automatically by the server.
4	IP Address	The IP address of the unit in your Network. When DHCP is selected this is assigned automatically by the server.
5	Use DHCP	Use Dynamic Host Control Protocol. When selected the Generator will automatically query the server for appropriate parameters (IP Address, Subnet Mask and Network gateway); otherwise these must be entered manually.
6	Refresh	Request IP address, Gateway and Subnet mask from Server.
7	Copy state	Copies the current dynamic IP settings to the static configuration section (not available when DHCP is selected).
8	Static Configuration	When DHCP is not selected the User must specify the IP Address, Subnet Mask and Network gateway values manually.
9	Telnet Port	Port to be used for Telnet communication. Cannot be changed by User
10	Store	Save all user changes to the Ethernet configuration.
11	Password	Limit user access to the generator by selecting "Use Password" and entering the desired password (up to 20 characters).
12	HTTP Port	Specify the port to use for HTTP communication with the Network (default is port 80). Note: Port address does not get assigned by the Server when DHCP is selected. Port 23 is reserved for Telnet and cannot be used for HTTP communication.

3.1.8 *After making the changes you want, click on "Store"* and the changes will be saved to the generator's memory. See section 3.2 for working with Ethernet control.

3.2 Starting the Generator Software in Ethernet control

3.2.1 **starting the GUI (section 3.1.1) you** can select the control method you wish to use for the SSG, USB or Ethernet control. All models support USB control. To start operation with USB see **section 3.1**. For Ethernet control either type the IP address and port of the generator, or click on the search icon.

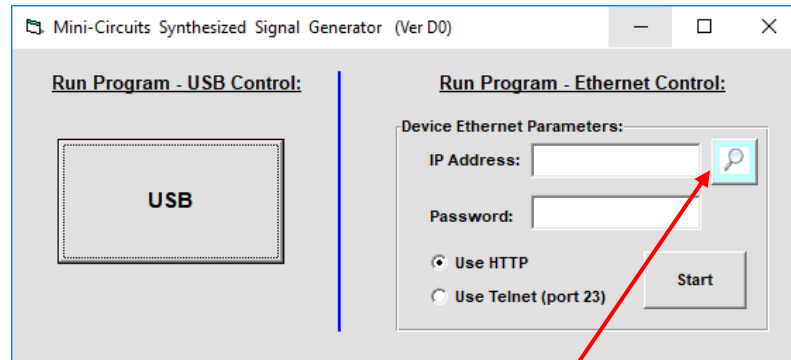


Figure 3.2.1: Startup screen (search icon)

3.2.2 Clicking on the search icon opens the IP search window (see **Fig 3.2.2**), showing a list of available generator IP addresses and their HTTP ports on the left side of the screen, with full details of each unit on the right. Mark the IP address you wish to use and click select. The search window will close and the IP address will be entered in the IP address field of the initial screen automatically.

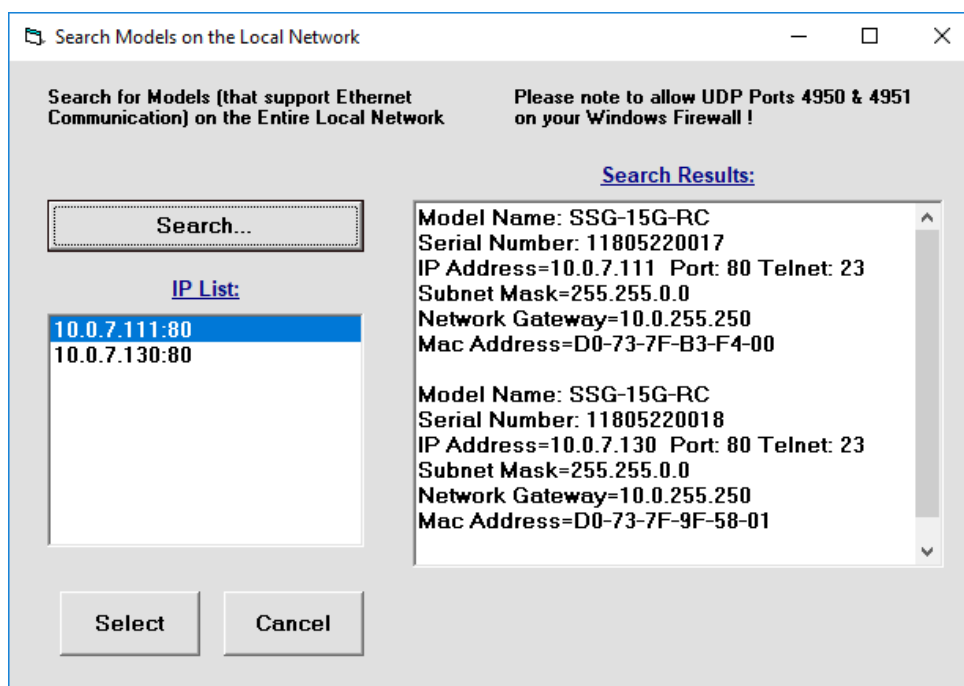


Figure 3.2.2: Ethernet IP search window

Notes:

- 1) To refresh the list of units found click on the Search button.
- 2) The search function uses ports UDP 4950 and UDP 4951 for communication, ensure your firewall allows access to these ports.

3.2.3 After entering the IP address enter your password if you set one (see **section 3.1.6**), select the communication protocol you wish to use (HTTP or Telnet) and click start, the unit's main screen will open

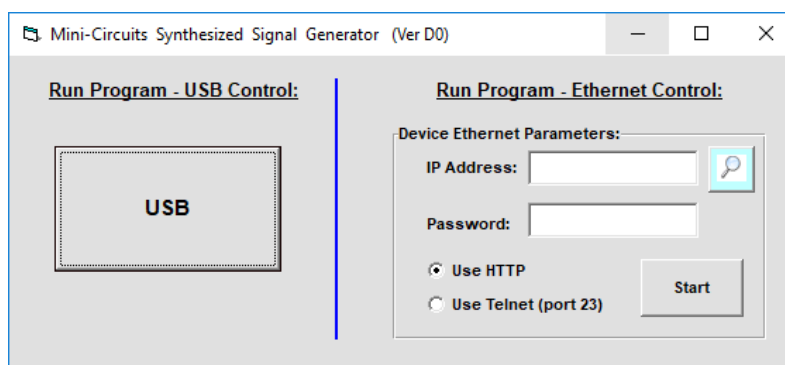


Figure 3.2.3: Ethernet startup screen

Note: changing Ethernet settings is only possible via USB control, see section 3.1.6 for details.

3.3 Main Screen

The main screen provides a simple and easy-to-use interface for setting the SSG to produce **CW RF** signals (See **Fig 3.3**).

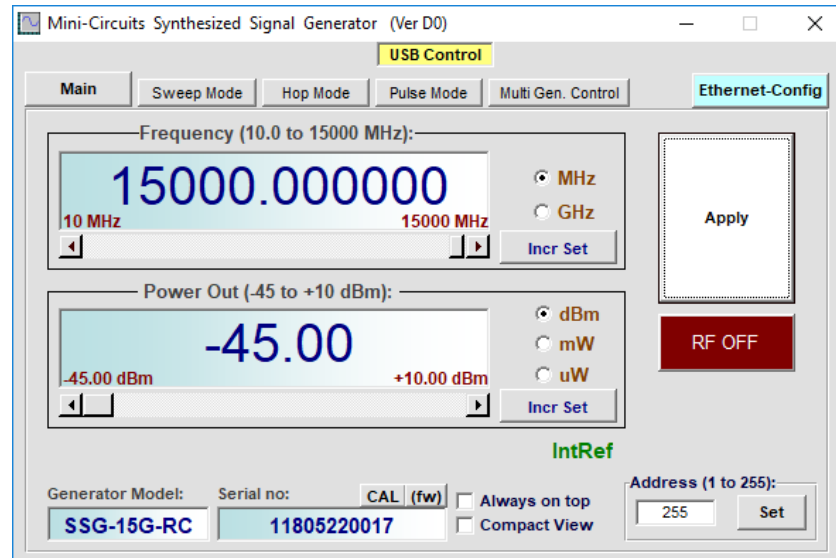


Figure 3.3 Main Screen – initial window

3.3.1 Top Row (Fig 3.3):

These buttons allow the user to switch between output modes in order to enable swept, hopped, or pulsed output sequences. Changing modes will not, on its own, cause a change in the generator output signal.

3.3.2 Frequency (Fig 3.3):

Frequency Display – Shows the signal frequency and can be changed by dragging the scroll bar beneath the display for a large change, clicking on the arrows at either side of the scrollbar for a small change, or typing in the desired value.

Frequency Incr. Set – Button on the right of the frequency scroll bar – clicking on it opens the Frequency Scroll Bar Step Size window (see section 3.4) which allows you to set the size of the large and small frequency changes implemented by the scroll bar and arrows.

Frequency Units – Select either **MHz** or **GHz** units for the Frequency display.

3.3.3 Power (Fig 3.3):

Power Display – Shows the signal output power and can be changed by dragging the scroll bar beneath the display for a large change, clicking on the arrows at either side of the scrollbar for a small change, or typing in the desired value.

Power Incr. Set – Button on the right of the power scroll bar – clicking on it opens the Power Scroll Bar Power **Step Size** window (see section 3.5) which allows you to set the size of the large and small power changes implemented by the scroll bar and arrows.

Power Units – Select **dBm**, **mW** or **μW** units for the power display.

3.3.4 Bottom Row (Fig 3.3):

Generator Model – Displays the model **P/N** of the generator in use.

Serial Number – Displays the **serial number** of the generator in use.

PU – Power Up Configuration. For SSG-6000RC only. Clicking on the button will open the power up state window, allowing you to set the conditions the generator will assume on power up. (see **section 3.11**)

CAL – Calibration and Tracking. Clicking on the button will open Calibration tracking window (see **section 3.10** for details).

(fw) – Firmware revision status. Clicking on the button will open Firmware info window (see **section 3.9** for details)

IntRef / ExtRef – A notice advising the current reference status (see **section 3.12** for details).

Always On Top – Click here to keep the generator screens on top of other applications.

Compact View – Reduces screen to minimal functions required. When selecting this option, a popup alert will appear (See **Fig 3.3.4a**). Acknowledge the pop-up, and the program will shift to compact view (See **Fig 3.3.4b**).

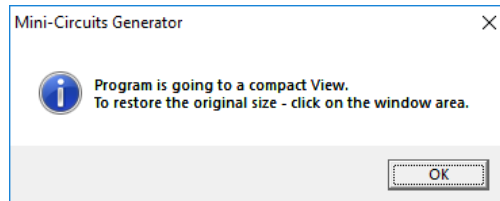


Figure 3.3.4a Compact View pop-up alert

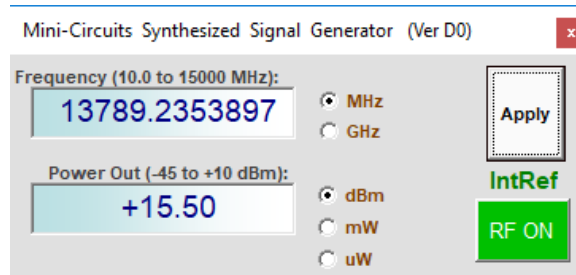


Figure 3.3.4b Compact View window

3.3.5 Right side of screen (Fig 3.3.5):

Apply – Applies the power and frequency settings shown in the frequency display and power display fields on the left, to the generator. This is needed when typing values in the fields in question.

RF ON/ROFF – Clicking on this button toggles the output signal between ON & OFF. The button will show the current state of the generator “**RF OFF**” on a **red** background or “**RF ON**” on a **green** one.

Address (1 - 255) – This shows the current address of the generator connected and allows you to set it by entering an integer in the 1-255 range and clicking ‘set’. When creating your own program to control the generator via USB you can address the generator by either its serial number or this address. For more information see the generator programming guide.

3.4 Frequency Scroll Bar Step Size screen

This screen (**Fig 3.4**) allows you to set the frequency step size for the scroll bar and arrows of the scrollbar. Click the "Incr Set" button on the main screen frequency display section to access.

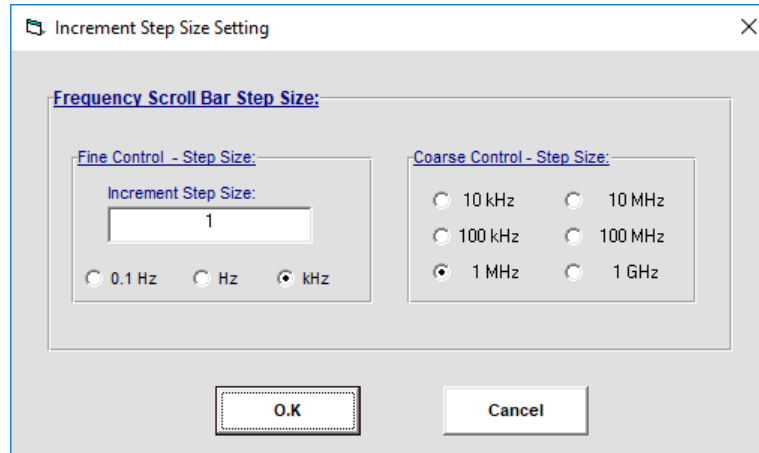


Figure 3.4 Frequency Scroll Bar Step Size window

Fine Control – Sets the minimum frequency step size (in Hz or kHz) when clicking on the main screen arrows. Note frequency resolution of model when setting this.

Coarse Control – Sets the minimum frequency step size (10 kHz to 1GHz step) when dragging the frequency scroll bar.

3.5 Power Scroll Bar Step Size screen

This screen (**Fig 3.5**) allows you to set the **power step size** for the scroll bar and arrows on the main screen and the minimum and maximum limits for generator output power. Click the "Incr Set" button on the main screen power display section to access. Please note that power steps are always in dB, regardless of the display units set on the main screen.

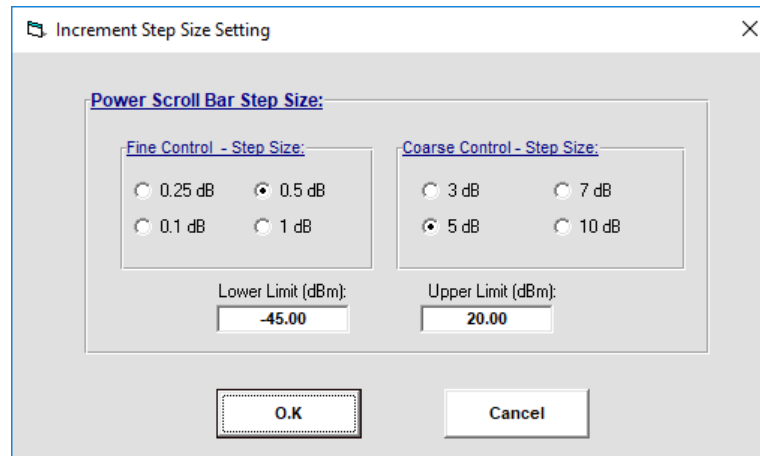


Figure 3.5 Power Scroll Bar Step Size window

- Small Change** – Sets the **minimum power change (in dB)** when clicking on the main screen **arrows**.
- Large Change** – Sets the **minimum power change (in dB)** when dragging the power **scroll bar**.
- Lower Limit** – Sets the **minimum power value (in dBm)** for the **output RF** signal.
- Upper Limit** – Sets the **maximum power value (in dBm)** for the **output RF** signal. This is especially useful when the generator is connected to an amplifier or other device with a max. input power spec that cannot be exceeded.

3.6 Sweep & Hop Modes

This screen (**Fig 3.6.2, 3.6.3 and 3.6.4**) allows you to set **power** or **frequency** sweeps of the output signal, or to specify an arbitrary list of power & frequency settings (Hop Mode) for a single generator. For synchronized sweeps of multiple generators see section **3.8 Multi Gen. Control**.

3.6.1 Common functions:

A number of functions at the top and bottom of the screen remain the same, regardless of the specific sweep mode selected, the common functions are:

Freq Sweep – Sets the screen to Frequency Sweep mode (see section **3.6.3**).

Power Sweep – Sets the screen to Power Sweep mode (see section **3.6.2**).

Hop Mode – Sets the screen to Hop (arbitrary list) mode (see section **3.6.4**).

Generator Model – Displays the model **P/N** of the generator in use.

Serial Number – Displays the **serial number** of the generator in use.

Icons – The icons circled in **Fig 3.6.2** allow (from left to right): Clearing all settings of the sweep/list; recalling a previously stored sweep or list; saving current settings. (see section **3.6.5**)

Dwell Time – The duration of each point in the sweep. Check individual model datasheets for minimum dwell time.

Trigger In – Controls what trigger input is required. Options are:

Ignore: No trigger input, the generator will sweep continuously.

Before Each Point: A trigger input is required before switching to the next point in the sweep.

Before Cycle: A trigger input is required before commencing each sweep/restarting the list.

Trigger Out – Controls when the generator will produce a trigger output. Options are:

Ignore: No trigger produced.

At Each Point: A trigger produced at the start of each point in the sweep.

At end of Cycle: No trigger produced for individual points in the sweep. However, a trigger will be produced at the end of every cycle of the sweep pattern.

Direction – Controls the sweep direction. Options are:

Forward(From start of list): Sweep goes from Start point to Stop point, then repeats from Start point.

Reverse(From end of list): Sweep goes from Stop point to Start point, then repeats from Stop point.

Bi-Directional: Sweep goes from Start point to Stop point, then Sweeps back to Start point before repeating.

Off – Stops the current sweep.

Run Sweep – Starts the sweep with the specified parameters. Once started, additional changes in parameters will have no effect until after the sweep is stopped.

PC Timing control – Closes the sweep window and transfers to antiquated Sweep & Hop control screen with the timing of each point controlled by the PC instead of the generator. This method introduces additional communication delays between the PC and generator.

Notes:

1. SSG models use a trigger of '1'.
2. Any command sent to the generator during the Sweep/Hop will result in stopping the sequence.

3.6.2 Power sweep:

This mode generates a power sweep at a specified set frequency (**Fig 3.6.2**)

Sweep Mode - SSG timing control

☐ Freq Sweep
☒ Power Sweep
☐ Hop Mode

Generator Model: SSG-15G-RC Serial Number: 11805220017

Main Control [Document Icon] [Folder Icon] [Disk Icon]

Power Sweep:

Start: -45 dBm

Stop: 10 dBm

Step Size: 1 dB

Freq: 25 MHz Dwell Time: 1 mSec (1 msec - 10 sec)

Trigger IN: Ignore Trigger OUT: Ignore

Direction: Forward

OFF Run Sweep

Go to Power Sweep - PC timing control...

Figure 3.6.2 Power Sweep window

Power Sweep specific functions

Start – Start power value of the sweep in dBm.

Stop – Stop power value of the sweep in dBm.

Step Size – The power delta value, in dB, between two sequential points in the sweep.

Freq. – Frequency, in MHz for all the frequency points in the power sweep.

3.6.3 **Frequency sweep:**

This mode generates a frequency sweep at a specified power level (**Fig 3.6.3**)

Sweep Mode - SSG timing control

☒ Freq Sweep
☐ Power Sweep
☐ Hop Mode

Generator Model: SSG-15G-RC Serial Number: 11805220017

Main Control [File Icon] [Folder Icon] [Save Icon]

Frequency Sweep:

Start: 10 ☐ Hz ☐ kHz ☒ MHz ☐ GHz

Stop: 15000 ☐ Hz ☐ kHz ☒ MHz ☐ GHz

Step Size: 1 ☐ Hz ☐ kHz ☒ MHz ☐ GHz

Power: -20 dBm Dwell Time: 1 ☐ Sec ☒ mSec
(1 msec - 10 sec)

Trigger IN: Ignore Trigger OUT: Ignore

Direction: Forward

OFF Run Sweep

Go to Freq. Sweep - PC timing control...

Figure 3.6.3 Frequency Sweep window

Frequency Sweep specific functions

Start – Start frequency point of the sweep, in Hz, kHz, MHz or GHz as selected.

Stop – Stop frequency point of the sweep, in Hz, kHz, MHz or GHz as selected.

Step Size – The frequency delta between two sequential points in the sweep, in Hz, kHz, MHz or GHz as selected.

Power dBm – Power level, in **dBm** for all the points in the frequency sweep.

3.6.4 Hop Mode:

This mode sweeps through a list of arbitrary frequency and power points (**Fig. 3.6.4**).

Sweep Mode - SSG timing control

☐ Freq Sweep
☐ Power Sweep
☒ Hop Mode

Generator Model: **SSG-15G-RC** Serial Number: **11805220017**

Main Control [Icon] [Icon] [Icon]

Hop Mode: Max No Of Points: 100

Point #	Freq (MHz)	Power (dBm)
1	11000	-40
2	7555	-40
3	100	-40
4	10	-40
5	11000	10
6	7555	10
7	100	10
8	10	3.3
9	4900.000001	-15.3
10	53.000044	0
11	7777.7777	0

Note: To delete a point - click on the point # to select the row then press Delete.

Trigger IN: **Ignore** Dwell Time: **1** ☐ Sec ☒ mSec
(1 msec - 10 sec)

Direction: **Bi-directional** Trigger OUT: **Ignore**

OFF **Run Sweep**

Go to Hopping - PC timing control...

Figure 3.6.4 Hop mode window

Hop Mode specific functions

Table of Entries – type the desired values of your list in the table. All entries must have both power and frequency values within the generator's specified range. To delete a point entered click on the number at the leftmost column then the delete button.

3.6.5 **Save or open a prepared sweep:**

Clicking on the diskette or folder icons below the serial number will open a browse window (**Fig. 3.6.5**). Opening the window by clicking on the diskette icon allows you to save a sweep you prepared with any name you choose. There is no required file ending for the saved sweep.

Opening the window by clicking on the folder icon allows you to open a previously saved sweep by either double clicking on the name of the file or typing the file name and clicking **O.K.**

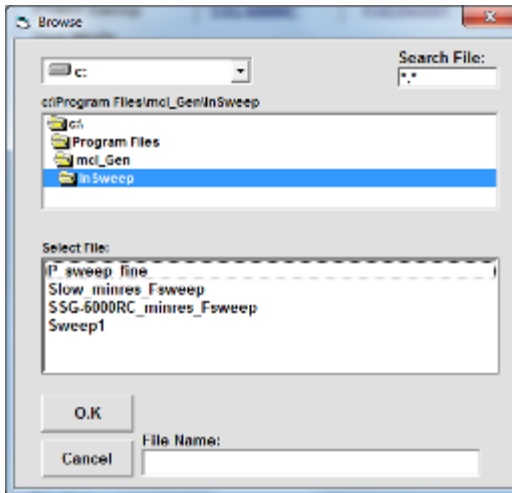


Figure 3.6.5 Sweep Mode –Open &Save window

3.7 Pulse Mode:

This screen (**Fig 3.7**) allows you to specify a pulsed RF signal in one of several formats selected by clicking on the desired option of the Pulse Source listed in the upper left corner of the screen.

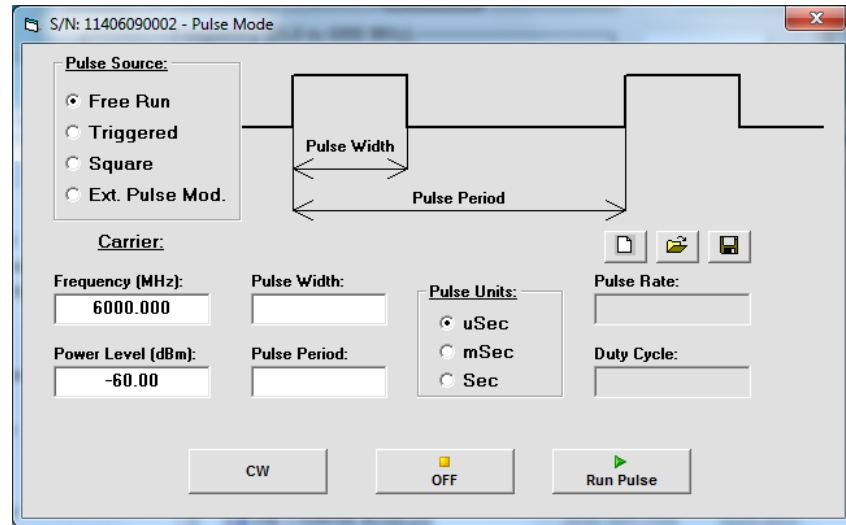


Figure 3.7a Pulsed RF initial window

Pulse Source – Selects the type of pulsed RF signal to generate (see below for explanation).

CW – Begins generating a CW RF signal at the specified frequency and power levels.

OFF – Stops RF output, same as clicking on the 'RF ON/OFF' button on the main screen.

Run Pulse – Begins generating a pulsed RF signal according to the conditions specified.

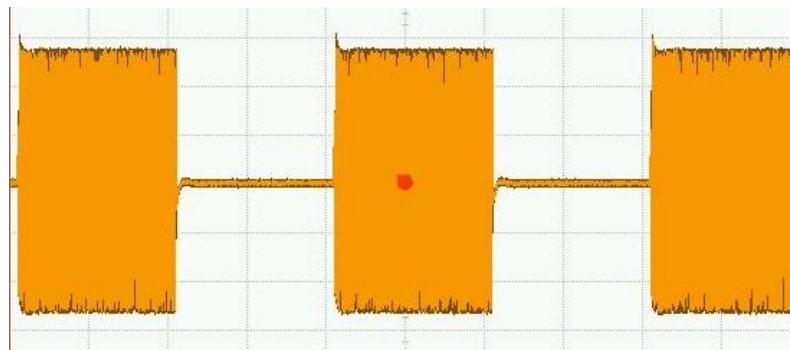


Figure 3.7b Pulsed RF, signal plot

3.7.1 Free Run Pulse Source :

Selecting Free Run Pulse Source will cause the buttons in the central portion of the screen and the plot at the top of the screen to change to those of Free Run RF pulse mode (**Fig 3.7.1**). In this mode, you can generate a sequence of RF pulses with selected pulse width (resolution 1 μ Sec, see model datasheet for minimum pulse width) and total pulse period, which will be generated continuously with the specified carrier wave until stopped.

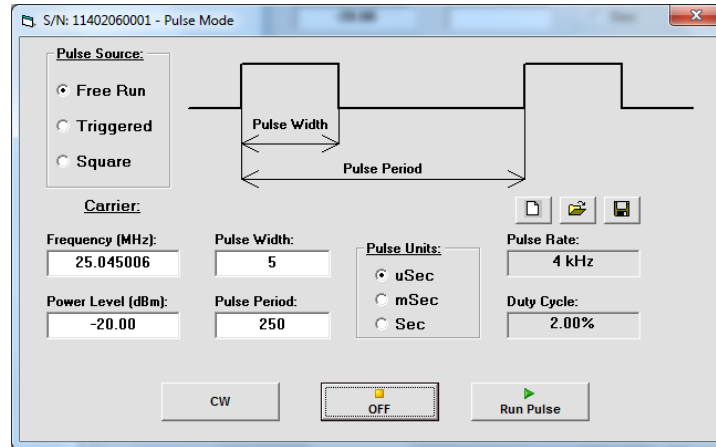


Figure 3.7.1 Free Run pulse mode window

Frequency (MHz) – The carrier frequency, in MHz, for the pulse width active period.

Power Level (dBm) – Power level of the carrier signal in dBm (of the active RF pulses).

Pulse Width – Duration of the active RF pulse, in the specified time unit (integer number).

Pulse Period – Time between the start of two consecutive RF pulses in the specified time unit (must be greater than Pulse Width).

Time Units – Specifies the time unit for Pulse Width and Pulse Period as micro seconds (μ Sec), milliseconds (mSec) or seconds (Sec).

Pulse Rate – Shows the calculated frequency at which the pulses repeat, based on the values entered.

Duty Cycle – Shows the calculated ratio between Pulse Width and Pulse Period.

3.7.2 Triggered Pulse Source :

Selecting Triggered Pulse Source will cause the buttons in the central portion of the screen and the plot at the top of the screen to change to those of Triggered RF pulse mode (**Fig 3.7.2**). In this mode you can generate RF pulses with selected pulse width (1 μ Sec resolution) each of which starts on an external trigger, with the specified carrier wave.

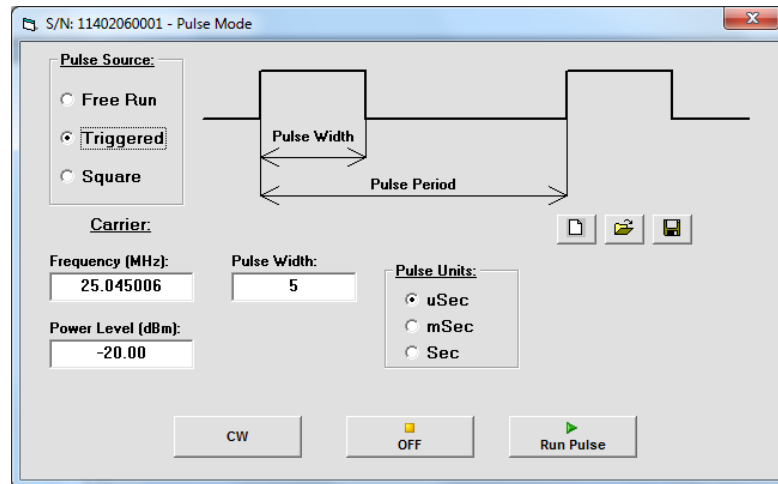


Figure 3.7.2 Triggered pulse mode window

Frequency (MHz) – Frequency of the carrier, in MHz, for the RF pulses generated.

Power Level (dBm) – Power level, in dBm of the active pulses.

Pulse Width – Duration of the active pulse, in the specified time unit (minimum 1 μ Sec).

Time Units – Specifies the time unit for Pulse Width as micro seconds (uSec), milliseconds (mSec) or seconds (Sec).

3.7.3 Square Pulse Source :

Selecting Square Pulse Source will cause the buttons in the central portion of the screen and the plot at the top of the screen to change to those of Square RF pulse mode (**Fig 3.7.3**). In this mode you can generate RF pulses of set, 50% duty cycle with selected pulse rate and the specified carrier wave.

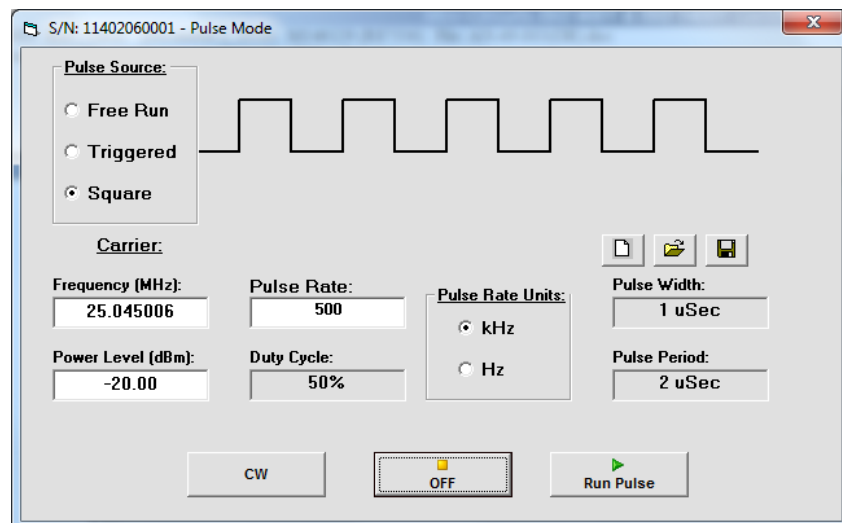


Figure 3.7.3 Square pulse mode Window

Frequency (MHz) – Frequency of the Carrier, in MHz for the RF pulses generated.

Power Level (dBm) – Power level, in dBm of the active pulses.

Pulse Rate – Frequency of the pulse sequence, in the specified unit. (See section 3.7.7 for limits on pulse rate values).

Duty Cycle – Shows the set ratio between pulse width and pulse period, fixed at 50% in square pulse source.

Frequency Units – Specifies the frequency units for pulse rate as Hz or kHz.

Pulse Width – Shows the calculated duration of the active portion of each cycle based on the values entered.

Pulse Period – Shows the calculated time between the start of two consecutive pulses based on the values entered.

3.7.4 External Modulation Pulse Source :

Not available in all models, see table below for supported units. When Ext. Pulse Mod. Pulse Source is selected the Trigger In port will act as a Modulation In port, and the generator will produce a pulse modulated signal modulated according to the external pulse pattern input at the Trigger In port. As long as '1' is present at the Trigger In Port the generator will produce the specified RF signal, when Trigger In port is at '0' no RF signal will be produced. As the pulse characteristics will be according to the external signal the buttons in the central portion of the screen and the plot at the top of the screen will be blank (**Fig 3.7.4**).

Model	SSG-6000RC	SSG-6001RC	SSG-15G-RC
Earliest supported firmware	A5	A4	All versions

Note: Limitations of Pulse rate will vary according to model. See specific model datasheet for details.

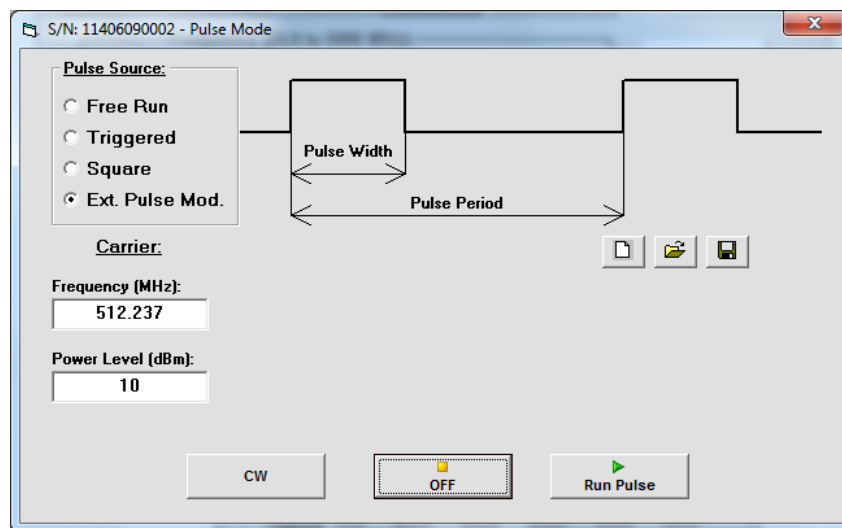


Figure 3.7.4 Square pulse mode Window

3.7.5 Dynamic pulse mode (SSG-15G-RC only) :

This mode, currently available only in the SSG-15G-RC allows setting a sequence of up to 100 different pulses with pulse width, pulse period and RF signal power and frequency set individually for each signal. To start this mode click on the dynamic pulse button and a new window will open.

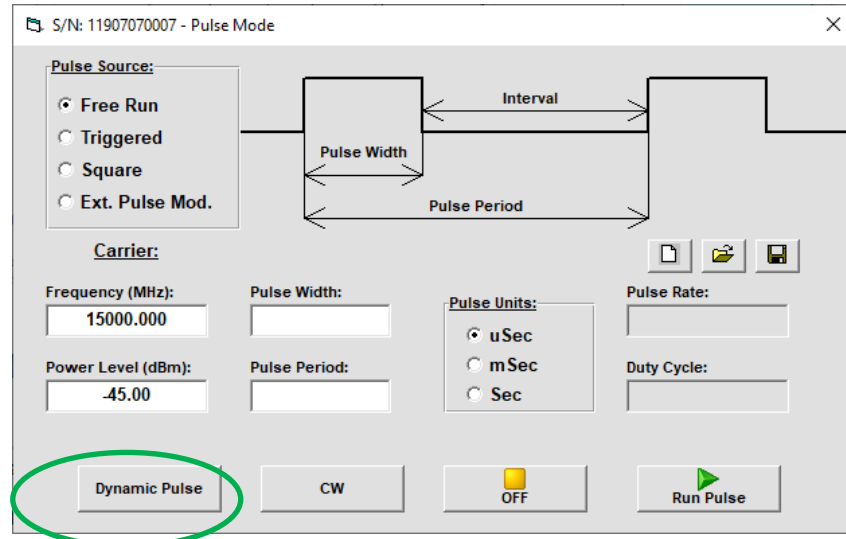


Figure 3.7.5a Dynamic pulse mode button

Enter in the new window the parameters of the signals you wish to run, then select 'run continuously' to have the sequence run repeatedly until stopped, or enter the number of times you wish it to run, and click 'Run'. The sequence of signals will begin to run.

Note: Pulse width can be set as low as 0.1 μ s, however performance may degrade at low pulse width. Please check datasheet for limits of guaranteed performance.

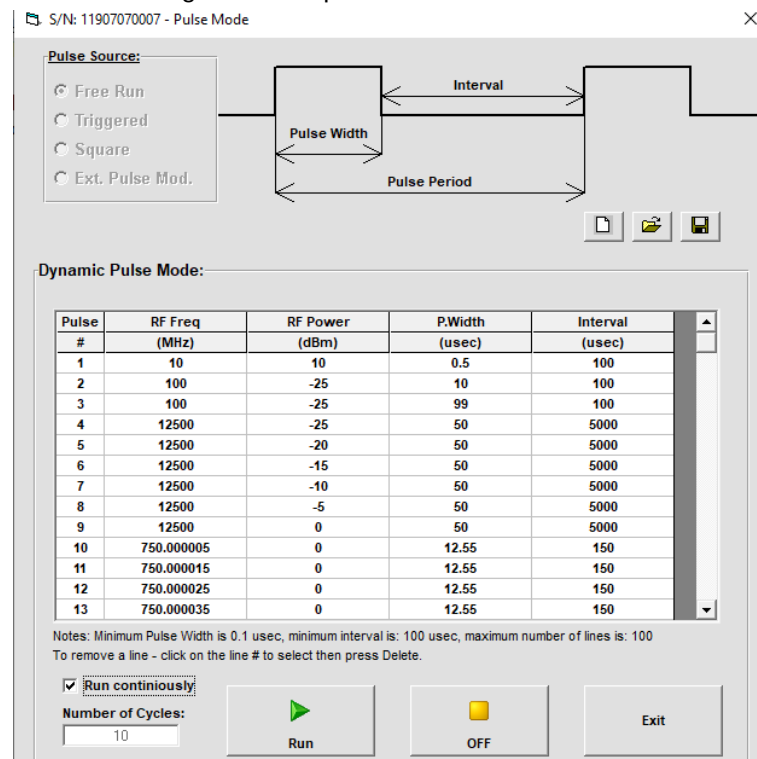


Figure 3.7.5b Dynamic pulse mode window

3.7.6 **Pulse width limits :**

In Free Run and Triggered modes, the pulse width has a minimum resolution of 1 μ sec and must be specified as an integer, in dynamic pulse mode the minimum width is 0.1 μ s. If the value entered does not meet these requirements, an alert will appear when attempting to generate a pulsed RF signal (**Fig 3.7.6**). Click to dismiss the alert, then adjust the pulse width to a legal value and click Run Pulse again.

Note: Due to the requirement to specify an integer value times fractions of a millisecond should be specified in micro seconds, i.e 1500 μ sec instead of 1.5msec

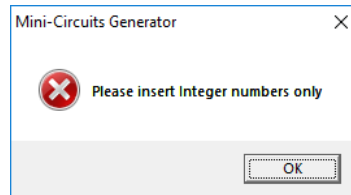


Figure 3.7.6 Pulse width alert window

3.7.7 **Pulse rate limit :**

With Pulse Source set to Square, the Pulse Rate must be specified with a value such that the calculated pulse width is a multiple of 1 μ Sec. If the value entered would result in an illegal pulse width, an alert will appear when attempting to generate the RF signal (**Fig 3.7.7**). Click OK to dismiss the alert, and the pulse rate will be automatically adjusted to the nearest legal frequency.

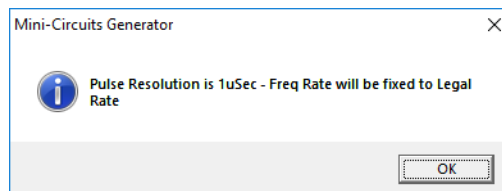


Figure 3.7.7 Pulse rate alert window

3.8 Multi Generator Control:

This screen (**Fig 3.8**) allows you to specify frequency or power sweeps of multiple generators at once (up to 4 generators can be controlled from a single screen).

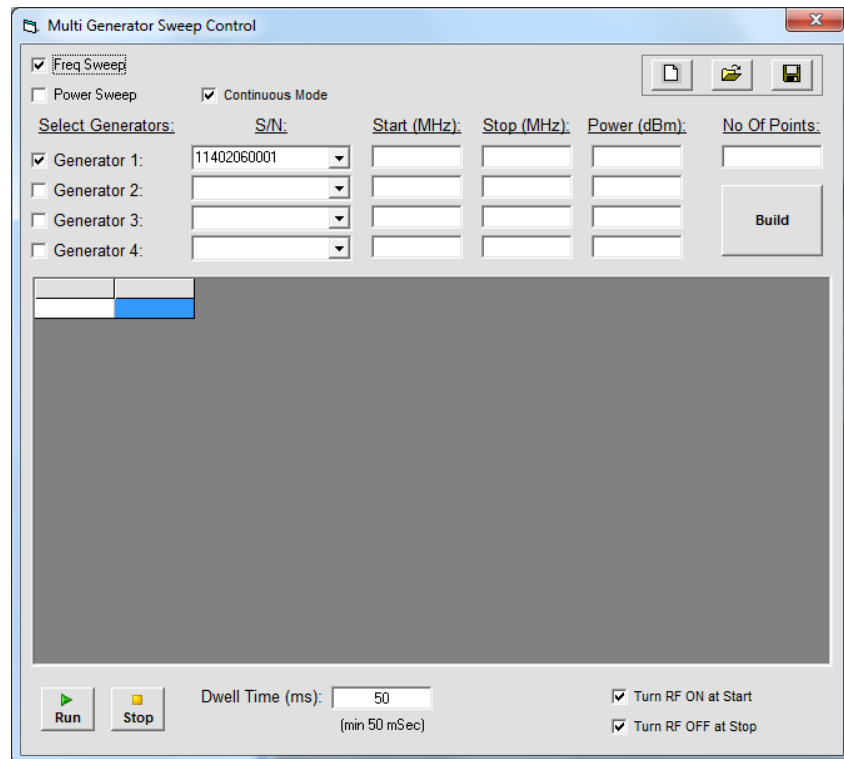


Figure 3.8 Multi Generator sweep –initial window

3.8.1Top of Screen:

Freq Sweep
Power Sweep

— Toggles between two sweep modes. When '**Freq Sweep**' is selected, the three data entry columns are (from left to right) '**Start (MHz)**', '**Stop (MHz)**', and '**Power (dBm)**' and function the same way as the '**Start**', '**Stop**' and '**Power dBm**' boxes in the single generator frequency sweep (section 3.6.3). When '**Power Sweep**' is selected the columns change to '**Start (dBm)**', '**Stop (dBm)**', and '**Freq (MHz)**' and function the same way as the '**Start**', '**Stop**' and '**Freq**' boxes in the single generator power sweep (section 3.6.2).

Continuous Sweep – Repeats the sweep in a continuous loop until stopped.

Select Generator – Select how many generators you want to sweep by clicking on the checkboxes.

S/N – Use the drop boxes to select which of the generators connected will be swept. Make sure the power and frequency range of each generator match the range of the sweep specified for them.

No. of Points – Specify how many points there will be in each sweep. Note that while each generator can have a different start and end point to its sweep, they all have the same number of points in the sweep.

Build – Clicking on this will cause the program to generate the table of frequency and power points as shown in **Fig 3.8.1**.



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Page 37 of 50

Multi Generator Sweep Control

☒ Freq Sweep
☐ Power Sweep ☒ Continuous Mode

Select Generators: S/N: Start (MHz): Stop (MHz): Power (dBm): No. Of Points:

☐ Generator 1: 11208010043 50 500 0 46
☒ Generator 2: 11302070008 52 502 0
☒ Generator 3: 11312150004 55 505 -5
☒ Generator 4: 11304280006 60 510 -5

Build

Gen-2		Gen-3		Gen-4	
(MHz)	(dBm)	(MHz)	(dBm)	(MHz)	(dBm)
52.000	0.00	55.000	-5.00	60.000	-5.00
62.000	0.00	65.000	-5.00	70.000	-5.00
72.000	0.00	75.000	-5.00	80.000	-5.00
82.000	0.00	85.000	-5.00	90.000	-5.00
92.000	0.00	95.000	-5.00	100.000	-5.00
102.000	0.00	105.000	-5.00	110.000	-5.00
112.000	0.00	115.000	-5.00	120.000	-5.00
122.000	0.00	125.000	-5.00	130.000	-5.00
132.000	0.00	135.000	-5.00	140.000	-5.00
142.000	0.00	145.000	-5.00	150.000	-5.00
152.000	0.00	155.000	-5.00	160.000	-5.00
162.000	0.00	165.000	-5.00	170.000	-5.00
172.000	0.00	175.000	-5.00	180.000	-5.00
182.000	0.00	185.000	-5.00	190.000	-5.00
192.000	0.00	195.000	-5.00	200.000	-5.00
202.000	0.00	205.000	-5.00	210.000	-5.00
212.000	0.00	215.000	-5.00	220.000	-5.00

Run **Stop** Dwell Time (ms): 50 (min 50 mSec) ☒ Turn RF ON at Start ☒ Turn RF OFF at Stop

Figure 3.8.1 Multi Generator sweep –Table of data points window

3.8.2 Bottom of screen:

Run – Clicking ‘Run’ after the table of frequency and power points was generated will start the sweep (See **Fig 3.8.2**).

Stop – Clicking on this will stop the sequence.

Dwell Time (ms) – Specifies (in milliseconds) the time the generators will hold each point before moving on to the next point in the sweep. Minimum dwell time is 50 mSec.

Turn RF ON at Start – Selecting this will ensure that all the generators selected will switch to **RF ON** at start. If this option is not selected, you need to go to the main screen of each generator to select **RF ON** before starting a sweep. While the sweep is running the current output of each generator will be highlighted (see **Fig. 3.8.2**).

Turn RF OFF at Stop – Selecting this will ensure that all the generators selected will switch to **RF OFF** as soon as the sweep is stopped. If this option is not selected, the generators will continue outputting the last signal when you click on ‘**Stop**,’ or the sweep ends.

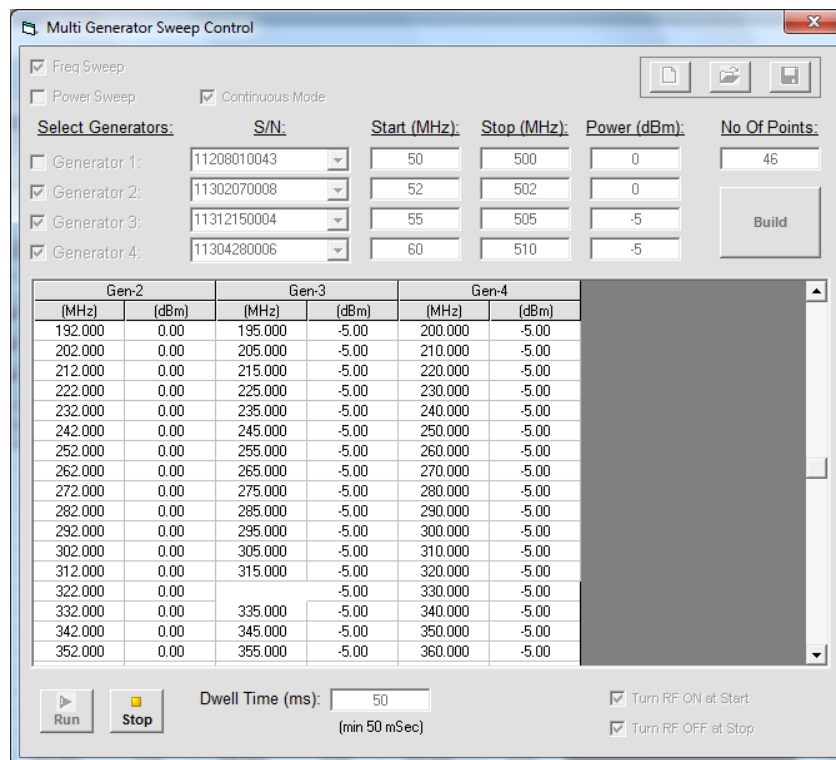


Figure 3.8.2 Multi Generator sweep –Sweep Control window

3.8.3 Save or Open a prepared sweep:

Clicking on the diskette or folder icons at the top right corner of the screen will open a browse window (**Fig. 3.8.3**). Opening the window by clicking on the diskette icon allows you to save a multi-generator sweep you prepared with any name you choose. There is no required file ending for the saved sweep. Opening the window by clicking on the folder icon allows you to open a previously saved sweep by either double clicking on the name of the file or typing the file name and clicking O.K.

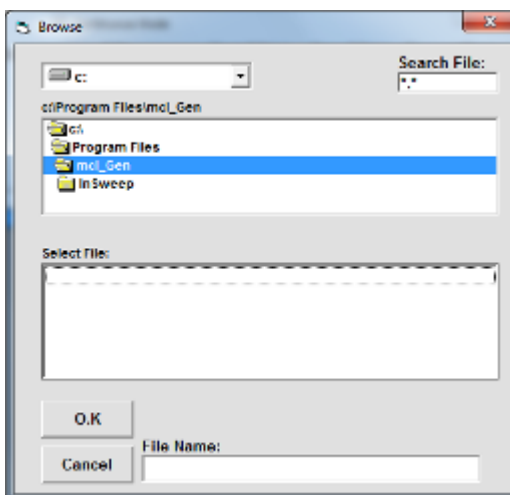


Figure 3.8.3 Multi Generator sweep –Open &Save window

3.9 Updating Generator Firmware:

3.9.1 **All SSG units are shipped with** the latest available firmware and an update is usually not required. Mini-Circuits occasionally makes firmware update files available as a courtesy to add additional features or correct known issues. Please contact testsolutions@minicircuits.com for details.

3.9.2 **Once the SSG GUI** is installed and started (see chapter 2) you will note an **(fw)** indicator the main screen, above the serial number. Clicking on it will open the firmware information window.

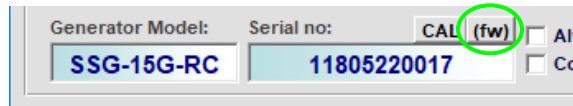


Figure 3.9.2 Firmware Button

3.9.3 **In order to update your generator firmware** you need to copy the firmware .hex file to your computer, without changing the name.

CAUTION

The firmware update process has the potential to render the device inoperable in the event of communication failure. Updates should only be carried out with a stable PC and USB connection, and in-line with Mini-Circuits guidelines.

3.9.4 **Click on the (fw) button;** this will cause the Firmware - Info window to open (see Fig 3.9.4). The 'Firmware' listed is the version of the firmware installed in your generator. To change firmware revision click on "Update Firmware", or click 'Exit' to close the Firmware – Info window.

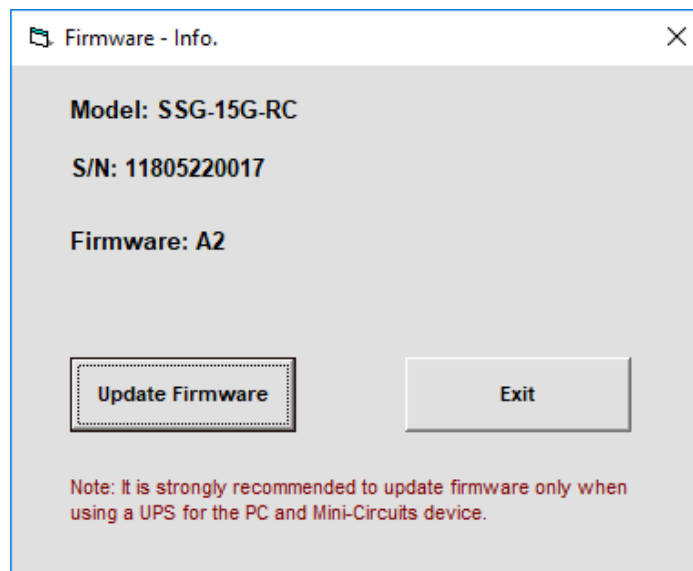


Figure 3.9.4 Firmware – Info window

3.9.5 For SSG-15G-RC, after clicking on the “Update Firmware” button an alert will appear (see Fig 3.9.5). Click **Yes to have the generator program shut down and a special Firmware upgrade Application start, or **No** to return to the Generator program.**

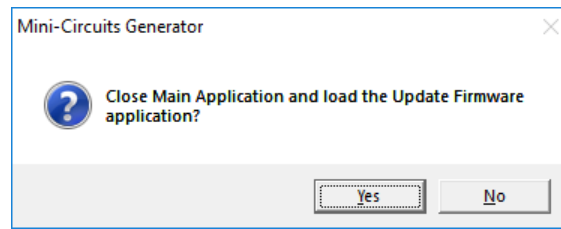


Figure 3.9.5 SSG-15G-RC Firmware upgrade alert

CAUTION

1. **Do not disconnect the generator or shut down the program while the firmware is being updated. Doing so may damage the generator.**
2. **Before clicking on ‘Connect’ verify you have a firmware upgrade file for the SSG-15G-RC, once you start the upgrade process the old firmware will not function.**

3.9.6 After the Firmware Upgrade application starts click connect, the SSG firmware will shut down and the Application will list the Firmware boot loader revision. Click on “Load Hex File” button – a browse window will open. Navigate to where you saved the upgrade file and double click on it, then click on “Upgrade Firmware”

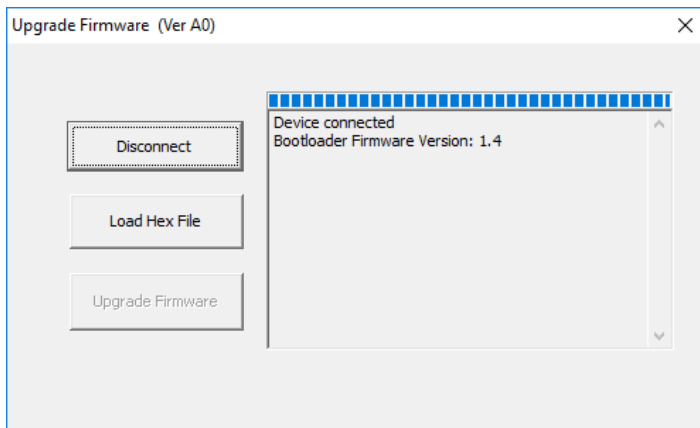


Figure 3.9.6a Firmware Upgrade App. – connection

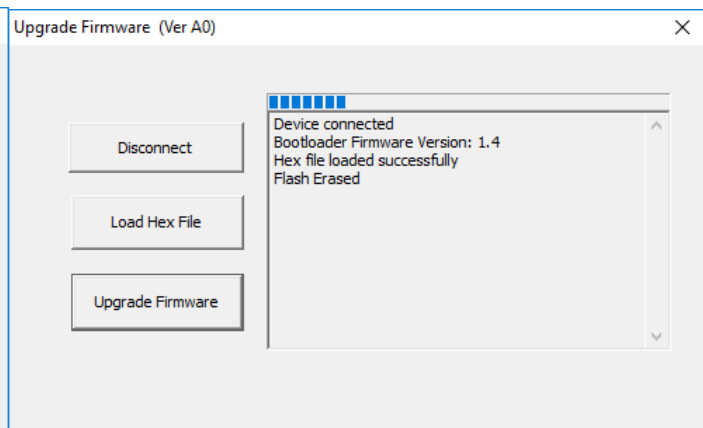


Figure 3.9.6b Firmware Upgrade App. – Upgrade

3.9.7 After the firmware has updated, an alert will appear. Click **OK**. The Firmware Upgrade Application will shut down and you can restart the GUI.

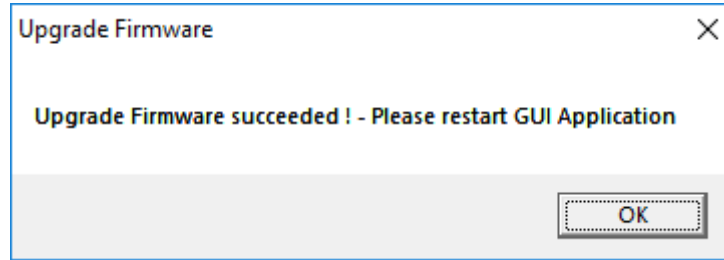


Figure 3.9.7 SSG-15G-RC Firmware success notice.

3.9.8 If the firmware update process was interrupted, the firmware will be corrupted and the next time you start the GUI program with the SSG unit connected you will see an alert advising you the firmware was corrupted. Click **Yes** to restore the firmware from the upgrade file you have as per sections 3.9.6 to 3.9.7 (SSG-15G-RC) or sections 3.9.10 to 3.9.12 (SSG-6xxxRC models).

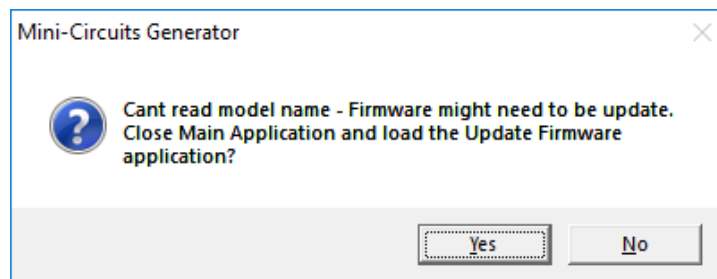


Figure 3.9.8 SSG-15G-RC Damaged Firmware alert

3.9.9 If the firmware was damaged, but you do not have a firmware upgrade file, contact testsolutions@minicircuits.com to receive a hex file for your generator model.

3.9.10 **For SSG-6xxxRC models , a browse window will open with the default firmware directory** (see Fig 3.9.10). Navigate to the directory where you saved the firmware file, and select the file (note the file name matches the model P/N) and click O.K. For firmware upgrade of SSG-15G-RC see section 3.9.5.

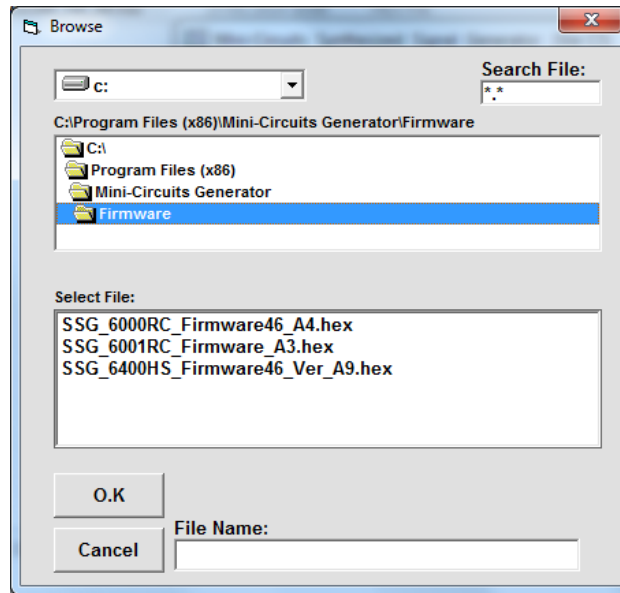


Figure 3.9.10 Firmware – Browse window

3.9.11 **The selected firmware version** will start copying to the generator. The process will take about a minute.

CAUTION

Do not disconnect the generator or shut down the program while the firmware is being updated. Doing so may damage the generator.

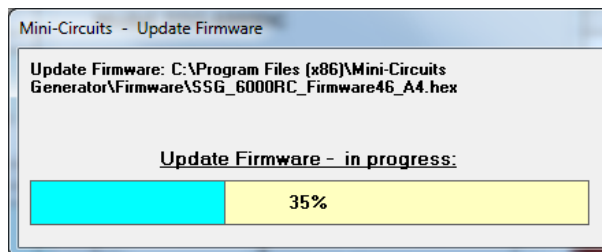


Figure 3.9.11 Firmware – Progress bar window

3.9.12 After the firmware has updated, an alert will appear. Click **OK**. The generator program will shut down and then automatically restart after a few seconds.

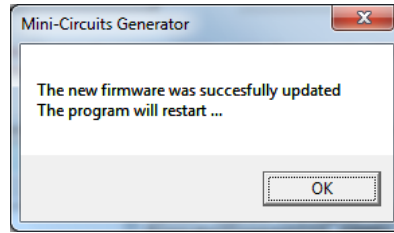


Figure 3.9.12 Firmware – successful update

3.10 Tracking Calibration status:

In the main screen, above the serial number is a **CAL** button. Clicking on it will open the Calibration tracking window.

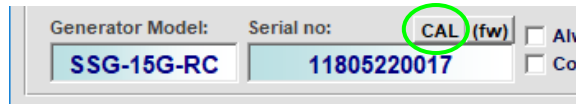


Figure 3.10 Calibration status button

3.10.1 **Not all firmware revisions support** the tracking of operating time and calibration status. See Table below for required firmware revision.

Note: Upgrading from a firmware version which does not support operating time tracking to one which does, will result in the operating time being counted from when the firmware was upgraded, instead of from last calibration.

Model	SSG-6000RC	SSG-6001RC	SSG-15G-RC
Earliest supported firmware	A2	All Rev.	All Rev.

3.10.2 **The calibration tracking window** shows the operating time from last calibration and allows calibration reminders to be scheduled based on either operating time (recommended interval 4160 hours) or date (recommended interval 2 years).

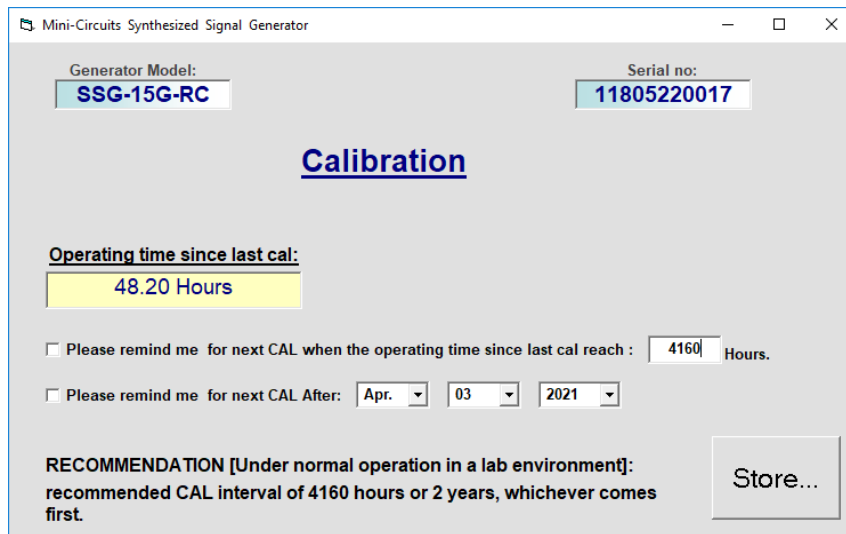


Figure 3.10.2 Calibration Tracking Window

3.10.3 **Once the condition selected for** the calibration reminder is reached, the **CAL** button in the main screen will turn red, and upon starting the program pop-up alert will appear.

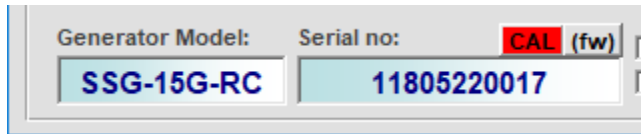


Figure 3.10.3a Red CAL button

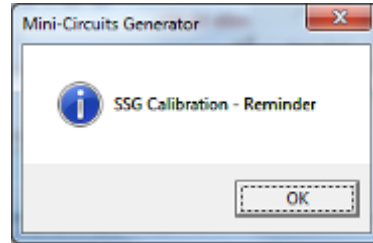


Figure 3.10.3b calibration reminder pop-up

3.11 Power Up state configuration(For SSG-6000RC only):

3.11.1SSG-6000RC allows the user to configure the generator state at power up. To configure the power up state click on the PU button above the Serial number, this will open the Power Up state configuration window.

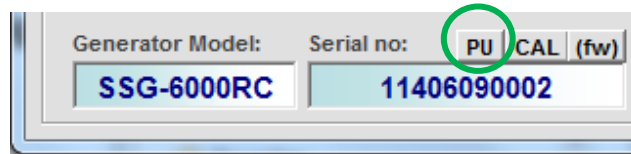


Figure 3.11.1 PU button

3.11.2 The user can configure the power and frequency settings the generator will assume at power up to max frequency with minimum power level (factory default), the last state assigned to the generator, user selected power and frequency settings. Additionally the user can specify if RF output will automatically turn on at the specified settings, or remain off.

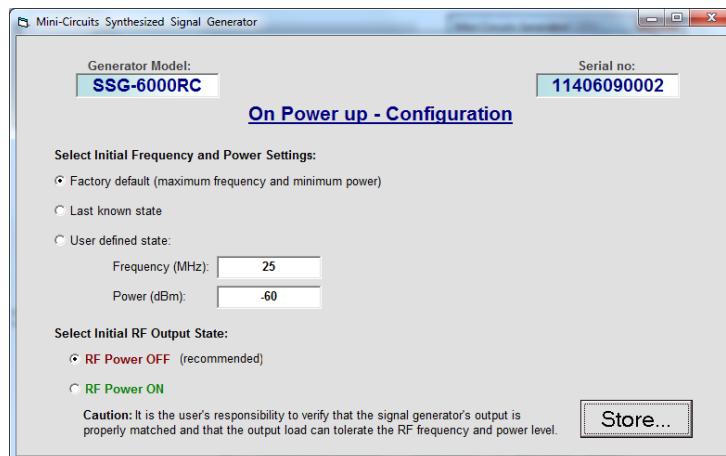


Figure 3.11.2 Power up configuration screen

3.12 Using Reference and Trigger Signals:

3.12.1 **Mini-Circuits Synthesized Signal Generators** can operate either with an external reference allowing them to be synchronized to the rest of the test setup, or with their own internal reference to simplify the setup. Additionally, they can provide a 10 MHz reference to synchronize other devices and provide or accept LVTTTL triggers.

3.12.2 **When using external** reference, an **ExtRef** notice appears in green letters below the right hand corner of the Power Out readout (See **Fig. 3.12.2**). This will happen automatically whenever a signal of sufficient strength is connected to the REF IN port. If the alert flickers, or the RF output signal is excessively noisy, check the connections to the source of the reference signal and ensure the signal strength at the generator REF IN port is greater than the minimum signal strength noted in the datasheet for the model.

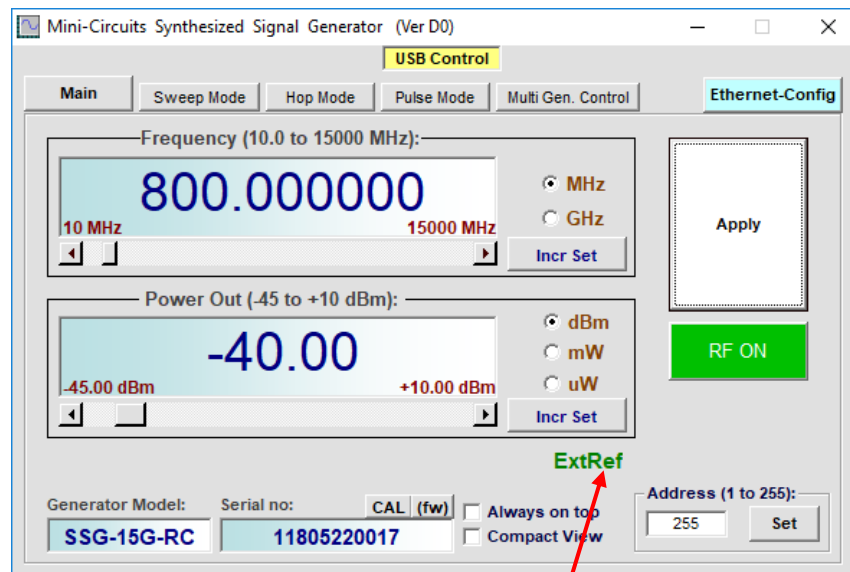


Figure 3.12.2: External Reference mode

3.12.3 **The Ref. Out signal** is a 10 MHz sinusoid (check individual model data sheet for specific power level). Ensure the device you intend to synchronize with can accept such a signal before connecting the reference.

3.12.4 **Before Using the Trigger** In or Out you need to specify in the software (GUI or user prepared) the trigger conditions. See sections 3.6 and 3.8 for using Trigger options with sweep or hop functions via the supplied GUI, or the [generator programming manual](#) for preparing your own software to use the Trigger function.

3.12.5 **The Trigger Out** of the SSG models is normally '0' and rises to '1' (3.3V) whenever a Trigger Out is required. The signal then drops back to '0' (0V) after a few milliseconds.

3.12.6 **When a "Trigger In" option** is selected, the SSG models will trigger at a rising edge. The SSG will register a trigger as short as 100 nSec.

3.12.7 **During Internal Pulse modulation** SSG-6000RC and SSG-6001RC produce a trigger out at the start of every pulse automatically.



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Page 49 of 50

Chapter 4 – Revision History

September 8, 2013: Updated user guide per CD software Rev B9, SSG-6000 Firmware Rev B8, SSG-4000LH Rev. B9 and SSG-4000HP Rev. B9

October 13, 2013: Updated user guide per CD Rev. C0, adding USB/Ethernet selection. Added software environments section; Added links to table of contents.

March 25, 2014: Added Calibration tracking section, added SSG-6000RC and associated Ethernet controls

November 25, 2014: Updated legal notice

December 8, 2014: Removed SSG-6000, added SSG-6001RC and SSG-6400HS; Added Modulation section for SSG-6400HS;

February 9, 2015: Added modulation screenshots

March 20, 2015: Added Power up state setting section and Ext. pulse modulation section

Feb 4, 2016: Corrected typo in section 1.6 regarding calibration interval and edited firmware upgrade section to match latest format.

April 16, 2019: Removed SSG-6400HS, SSG-4000LH and SSG-4000HP models, added SSG-15G-RC. Added description of Firmware upgrade App for SSG-15G-RC. Clarified power up settings are currently only supported by SSG-6000RC.

August 28, 2019: Added dynamic pulse function for SSG-15G-RC and updated installation process instructions.



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Page 50 of 50