7880SA
Spectrum Analyzer
User Manual

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IMPORTANT SAFETY INSTRUCTIONS

⚡	The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "Dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
!	The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (Servicing) instructions in the literature accompanying the product.

- Read these instructions
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

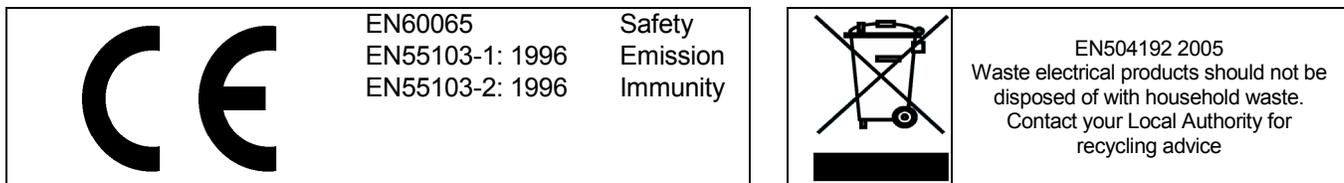| **WARNING**
TO REDUCE THE RISK OF FIRE OR ELECTRIC – SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE |
|---|
| **WARNING**
DO NOT EXPOSE THIS EQUIPMENT TO DRIPPING OR SPLASHING AND ENSURE THAT NO OBJECTS FILLED WITH LIQUIDS ARE PLACED ON THE EQUIPMENT |
| **WARNING**
TO COMPLETELY DISCONNECT THIS EQUIPMENT FROM THE AC MAINS, DISCONNECT THE POWER SUPPLY CORD PLUG FROM THE AC RECEPTACLE |
| **WARNING**
THE MAINS PLUG OF THE POWER SUPPLY CORD SHALL REMAIN READILY OPERABLE |

INFORMATION TO USERS IN EUROPE

NOTE

CISPR 22 CLASS A DIGITAL DEVICE OR PERIPHERAL

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the European Union EMC directive. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

	EN60065	Safety
C E	EN55103-1: 1996	Emission
	EN55103-2: 1996	Immunity

	EN504192 2005 Waste electrical products should not be disposed of with household waste. Contact your Local Authority for recycling advice

INFORMATION TO USERS IN THE U.S.A.

NOTE

FCC CLASS A DIGITAL DEVICE OR PERIPHERAL

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

Changes or Modifications not expressly approved by Evertz Microsystems Ltd. could void the user's authority to operate the equipment.

Use of unshielded plugs or cables may cause radiation interference. Properly shielded interface cables with the shield connected to the chassis ground of the device must be used.

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REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First Release	Jan 2017
1.1	Updates Throughout	Jun 2017
1.2	Updates Throughout	Jan 2020

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1. OVERVIEW

The 7880SA module is Evertz spectrum measurement and analysis module providing high-end performance at a low price. It is available as a 7800 series module as well as an integrated option to Evertz XPRF14-128x128 routing platform. When installed in a 7800 multi-frame, it can function as independent spectrum analyzer in a satellite, cable or terrestrial network or as integrated monitoring device with Evertz RF transport and VLPro NMS solution.

7880SA uses state of the art digital technology and Fast Fourier Transformations to make lightning fast and accurate measurements. With a very low noise floor and large dynamic range, it is well-suited to measure any type of satellite, cable or terrestrial wireless carrier, including very small carriers, beacon signals and for carrier monitoring applications. 7880SA accepts all signals from 5 MHz to 3 GHz and input power levels ranging from -110 to +5 dBm. RBW varies from 1 Hz to 15 MHz. The 7880SA can be connected to an external 10 MHz reference for improved frequency accuracy and stability. All data communications with the 7880SA occurs via its built-in Ethernet port.

The 7880Sa's powerful Graphical User Interface (GUI) is available using any standard web browser. No additional software is required. The GUI is very easy to use and operates like most traditional spectrum analyzers. It provides user-selectable colors for markers and traces, allows storage of multiple traces and provides measurement reporting. The 7880SA GUI also includes a powerful built-in Carrier Monitoring function, which provides notification via email or SNMP of carrier measurements that exceed user-defined limits, offering you peace of mind that up to 100 of your carriers are operating as expected.

The 7880SA provides network access to all technical staff connected to the facility network or a corporate wide area network. This allows all technical staff the ability to monitor feeds and carriers at any time and form any location in the world using only a web browser.

For integration into a satellite terminal or measurement system, the 7880SA can be operated via its built-in GUI or the user can create a separate user interface using the publicly available API. An SNMP status interface is also provided.

Features and Benefits

- Covers full satellite L-band plus cable and wireless bands from 5 MHz to 3 GHz

- Built-in Carrier Monitoring function

- External 10 MHz reference or internal interface reference

- Web browser control

- SNMP status interface

- Available as 7800 module as well as integrated +SA optional on the XPRF router
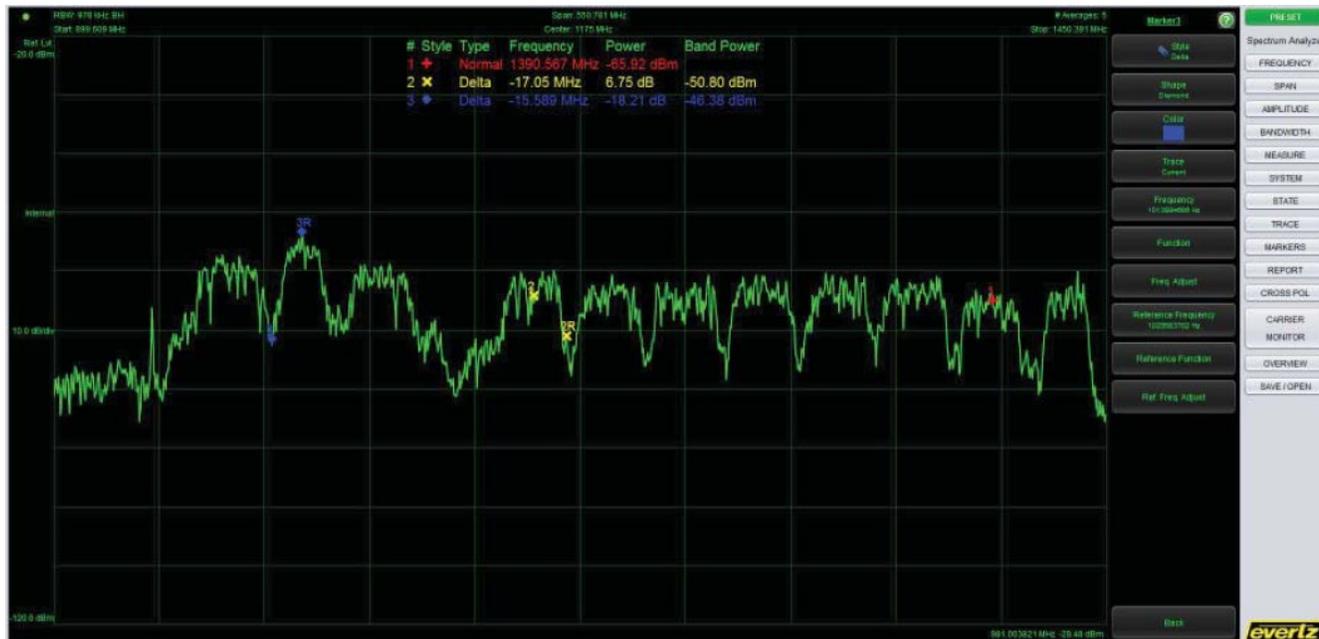
Figure 2.1-1

Figure 2.1-2 : 7880SA Rear Panel

2. SPECIFICATIONS

2.1. RF INPUT

Number	1
Connector	50Ω BNC
Input Frequency	5 to 3000 MHz
Input Power	-110 to +5 dBm (aggregate)
Maximum Safe Input	+15 dBm
Noise Floor atten	-160 dBm/Hz typical at min atten, -160 dBm/Hz typical at max
Phase Noise	-80 dBc/Hz at 1 kHz offset
(worst case at 3 GHz)	-95 dBc/Hz at 100 kHz offset, -125 dBc/Hz at 1 MHz offset

2.2. CONTROL

Number	1
Connector	RJ -45, 10/100base-T half or full duplex
Interface	TCP/IP API, SNMP, HTTP

2.3. ELECTRICAL

Voltage	+12 VDC
Power	18W max
Temperature	0-55°C

2.4. PHYSICAL

Number of Slots	1

2.5. MEASUREMENTS

Amplitude Accuracy	± 0.5 dB (at 25°C)1, ± 1.0 dB (0 to 55°C)
Frequency Accuracy	± 2.6 ppm (internal) or as per external reference
Frequency Resolution	1 Hz
Resolution Bandwidth	1 Hz to 15 MHz
Analysis Bandwidth	up to 220 MHz
Spurious:	

- **Images** < -55 dBc (typical)
- **Aliasing** < -55 dBc (typical)
- **DC Offset** < -30 dBc (typical)

Averaging	up to 255 averages

2.6. MEASUREMENT SPEED

- **500 MHz span**   1 MHz RBW, 200 ms
- **200 MHz span**   30 kHz RBW, 630 ms
- **80 MHz span**   100 kHz RBW, 170 ms
- **3.5 MHz span**   8kHz RBW, 90 ms

2.7. FFT WINDOWS

FFT Windows   Flattop, Hanning, Hamming, Rectangular, Blackman-Harris

2.8. FFT SIZES

FFT Sizes   128, 256, 512, 1024, 2048, 4096, 8192

2.9. MODES OF OPERATION

- **Raw Snapshot Mode**   Number of IQ time samples is approx 32 million
- **Linear Power/Bin**   4096 samples, up to 255 averages
- **Log Power/Bin**   4096 samples, up to 255 averages
- **Raw IQ Samples**   Decimated 16-4092 in steps of 4-sampling frequency up to 3.7 MHz

- **Selectable Spectral Inversion**

- **Programmatic measurement and control over Ethernet based API**

1. Measurement conditions: 10 averages, input level between -8 dBm and -68 dBm, 3 sigma
2. Resolution bandwidth auto or manual adjustable
3. Expected rates with 10 averages, speed optimization
4. All specification at 25°C unless otherwise noted and are subject to change

3. OPERATION GUIDE

3.1. SYSTEM DESCRIPTION

For installation instruction for the 7880SA, refer to Section 4.

3.1.1. Physical Description

A picture of the 7880SA circuit card is shown in Figure 3-1.
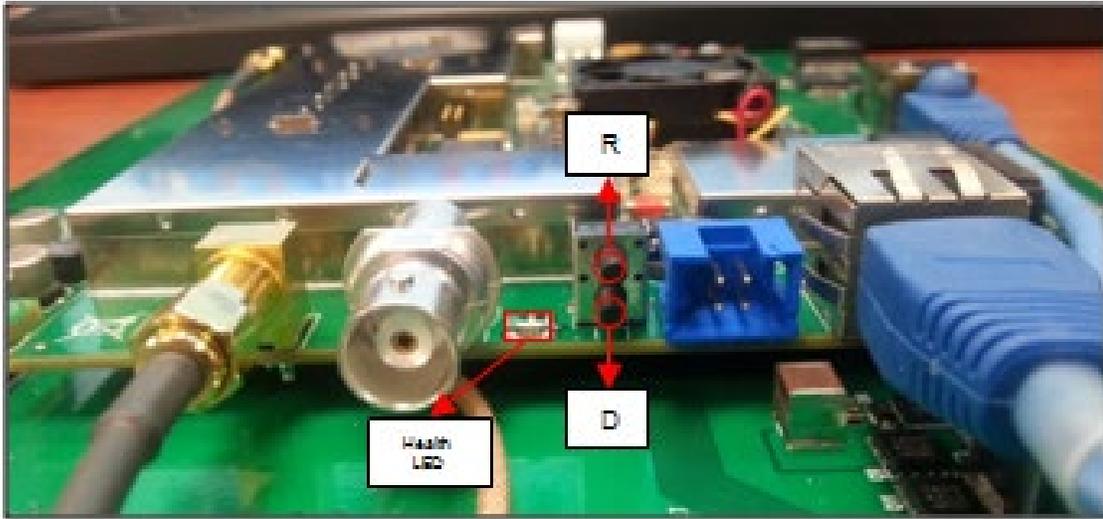
Figure 3.1-1: 7880SA Rear Plate

3.1.2. Client Computer Requirements

The following minimum capabilities are recommended for the client computer.

- 2.33 GHz Processor (or better)
- 4 GB of RAM (or better)
- An operating system that supports a web browser and Java VM as listed below
- A web browser such as Internet Explorer, Safari or Firefox
- Java JVM 1.4.2 or newer for 7880SA software versions up to 1.5.13 and Java JDK 1.6, release 10 or newer for 7880SA software versions 2.0.0 and up
- An Ethernet connection available for the 7880SA to connect to the computer

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4. 7880SA INSTALLATION AND CONFIGURATION

This section is a complete reference of all capabilities of the 7880SA. In some cases, the relevant information was provided in previous section and the corresponding section here will refer back to it.

4.1. USER INTERFACE SECURITY

No security restrictions are incorporated into the 7880SA's Java Applet Socket Interface. Refer to 4.8 for details on the Web Configuration Manager Security.

4.2. USER INTERFACE CONNECTION DETAILS

The 7880SA Java is designed to allow up to 10 remote connections simultaneously. However, multiple connections will impact the speed at which the 7880SA can make measurements, as measurement requests on all connections are handled on a first come first serve basis.

4.3. 7880SA INSTALLATION CONSIDERATIONS

The 7880SA will be installed in a single slot of Evertz' 7801FR or 7800FR frame.

The 7880SA can be set up as either dedicated or shared access. With dedicated access, an Ethernet cable is connected directly between the client computer and the 7880SA. In this configuration only the client computer can access the 7880SA. With shared access, an Ethernet cable is connected between the 7880SA and a hub or switch. In this configuration any computer on the network can access the 7880SA. Any hub or switch is compatible with the 7880SA but 10BaseT products will slow down the measurement speed.

No software, other than the Java runtime, needs to be installed on the client computer in order to use the 7880SA from a browser – the Java Applet will automatically be downloaded by the web browser.

4.3.1. 7880SA Setup Checklist

The following is a summary of the steps to follow when setting up your 7880SA:

1. Connect a LAN cable from the 7880SA to the network.
2. Connect the RF input to the 7880SA.
3. Wait 120 seconds to allow it to boot up.
4. Navigate to the WCM to configure the 7880SA (one time).
5. Start viewing the UI (refer to the "Java Applet Software" section).

4.3.2. 7880SA Configuration

The 7880SA uses a Web Configuration Manager (WCM) to modify the network configuration, calibration files, port names and license.

4.3.2.1. Accessing the WCM

The 7880SA network configuration factory defaults are:

- IP Address =   192.168.10.1

- Net Mask =   255.255.255.0

- Gateway =   192.168.10.1

To access the WCM, enter <7880SA IP address>/cgi-bin/wmc.cgi into a web browser's address bar. For example, to access the 7880SA on the default IP address, use the following:

        http://192.168.10.1/cgi-bin/wcm.cgi

This will display the following web page (Figure 4-1). To log in, select an access level and enter the password. The default password for access level admin is 'admin' (without the quotes). The password is case sensitive.
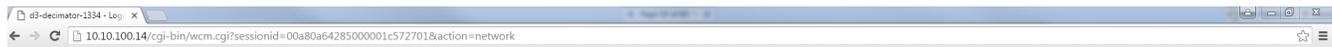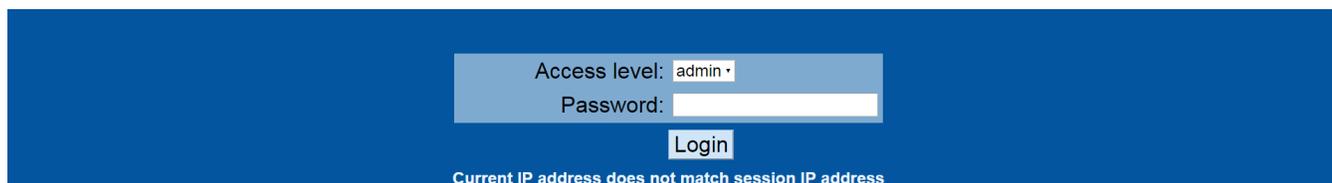
Figure 4.3-1 : Web Configuration Manager Login page

The client computer, whether using the Java Applet, or WCM, must have the appropriate network routes to access the 192.168.10.xxx subnet. If a ping or inspection of the routing table determines that no connectivity exists, then a route needs to be configured. To   configure connectivity for a Windows 2000/XP/7/8/10 computer, enter the route from a command window. For example, if the client computer has an IP address of 192.168.123.100, enter the command:

route add 192.168.10.0 mask 255.255.255.0 192.168.123.100

4.3.2.2. Modifying the Network Configuration

To change the 7880SA's network configuration, log in to the Web Configuration Manager and navigate to the Network tab as is shown in Figure 4-2.

Figure 4.3-2 : Changing the 7880SA's network configuration

Enter the network information and click Save Changes. The following page will be displayed. (Figure 4-3)
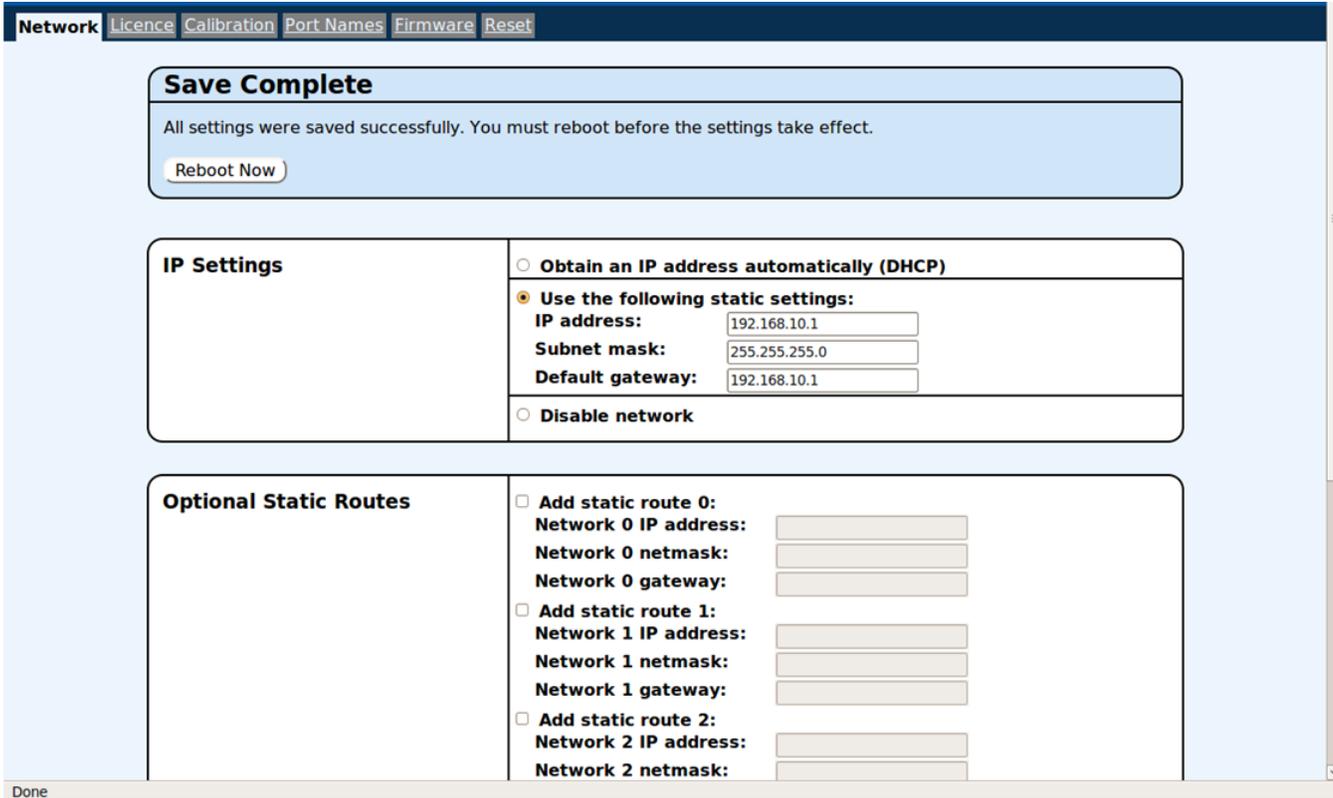
Figure 4.3-3 : Network changing complete window

Click "Reboot Now" to reboot the card and begin using the new settings.

4.3.2.3. Restoring the Factory Defaults

The reset switch on the rear of the 7880SA can be used to restore the 7880SA's network configuration to the defaults. Any calibration or license files installed will remain unchanged. The procedure to restore the factory default settings is as follows:

1. Locate the factory defaults (D) switch on the Connection Plate. Then Press the switch and hold.

2. Locate the reset switch (R) on the Connection Plate. Then press the switch and release.

3. Keep holding the factory defaults switch (D) until the health monitor LED is green. This can take up to 120 seconds.

4. The factory defaults are now connected.

4.4. JAVA APPLET SOFTWARE

There is a built-in graphical user interface (GUI) that can be displayed using any web browser, such as Internet Explorer, Safari or Firefox. Note that the new versions of Google Chrome (Version 45 and up) has blocked the use of Java applets and will not run the 7880SA Applet. The GUI is quite intuitive to use and allows interactive use of the 7880SA for any general purpose investigation that a traditional digital or analog spectrum analyzer can be used for.

Refer to Figure 4-4 for a picture of the main applet for the 7880SA. The applet window is divided into two areas: the screen, on the left side main area, and the control buttons, on the right side column.
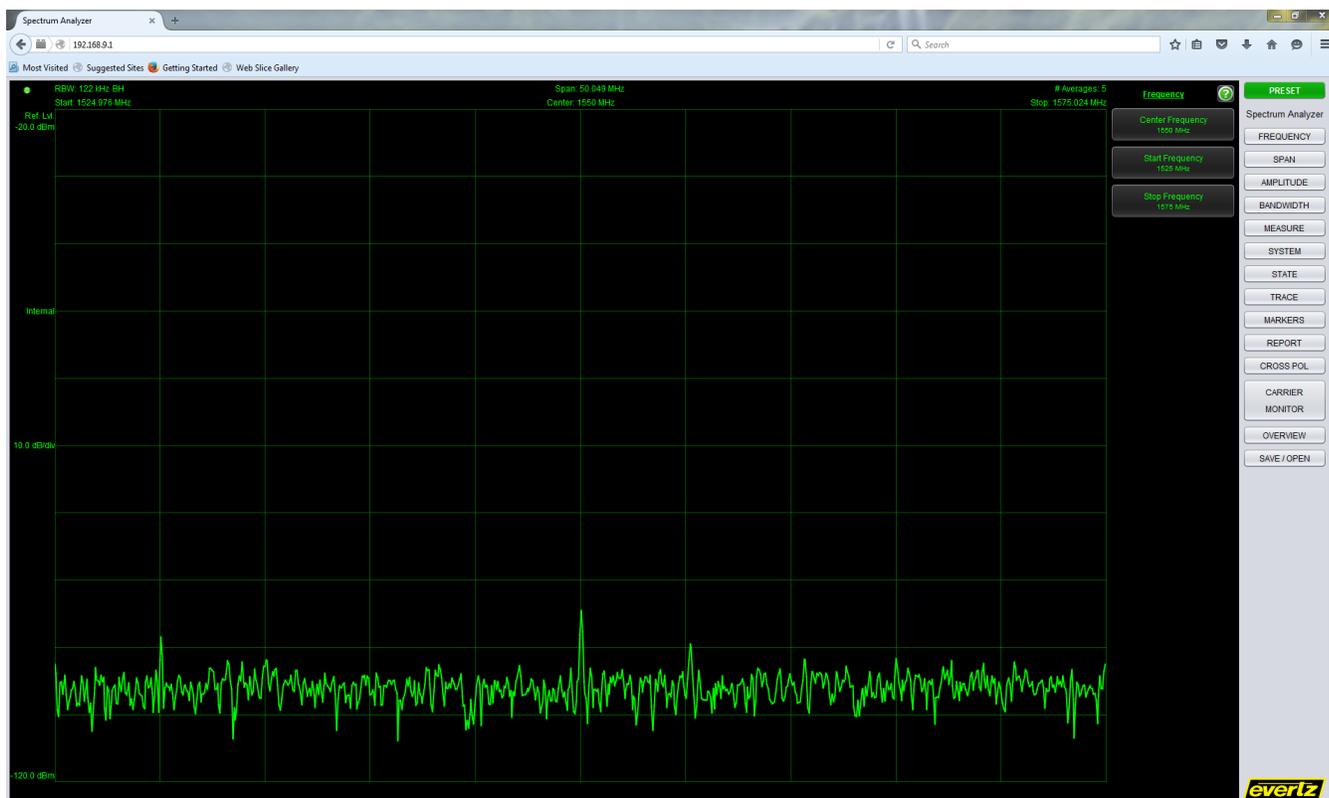
Figure 4.4-1 : 7880SA Main Applet

For the spectrum mode, the basic operations made by the 7880SA are to collect the samples required for the selection made, perform a windowed FFT (see Advanced Settings), and present the spectrum data to the operator. Similar to traditional spectrum analyzers, the speed of the measurement is a function of the RBW and the span.

4.4.1. Main Screen

The screen consists of four areas, as shown in Figure 4-5. This window will allow the user to control the Y axis scaling and reference, as well as the attenuation level.

The Plot Area, to the center, is included the grid and plot of the signal. Marker values show up at the top of the plot area.

The North Settings Bar, along the top, is included the connection LED, RBW, Span, # Averages, Start

Frequency, center Frequency and Stop Frequency.
The West Settings Bar, along the left, is included the Reference Level, Reference Select, Scale per Division and minimum displayed power level.

And finally, the South Mouse Indicator Bar, along the bottom, is included the mouse cursor positions frequency and amplitude.

The Screen Area will automatically update the values of the various parameters in real time as the signal changes or the user changes parameters.
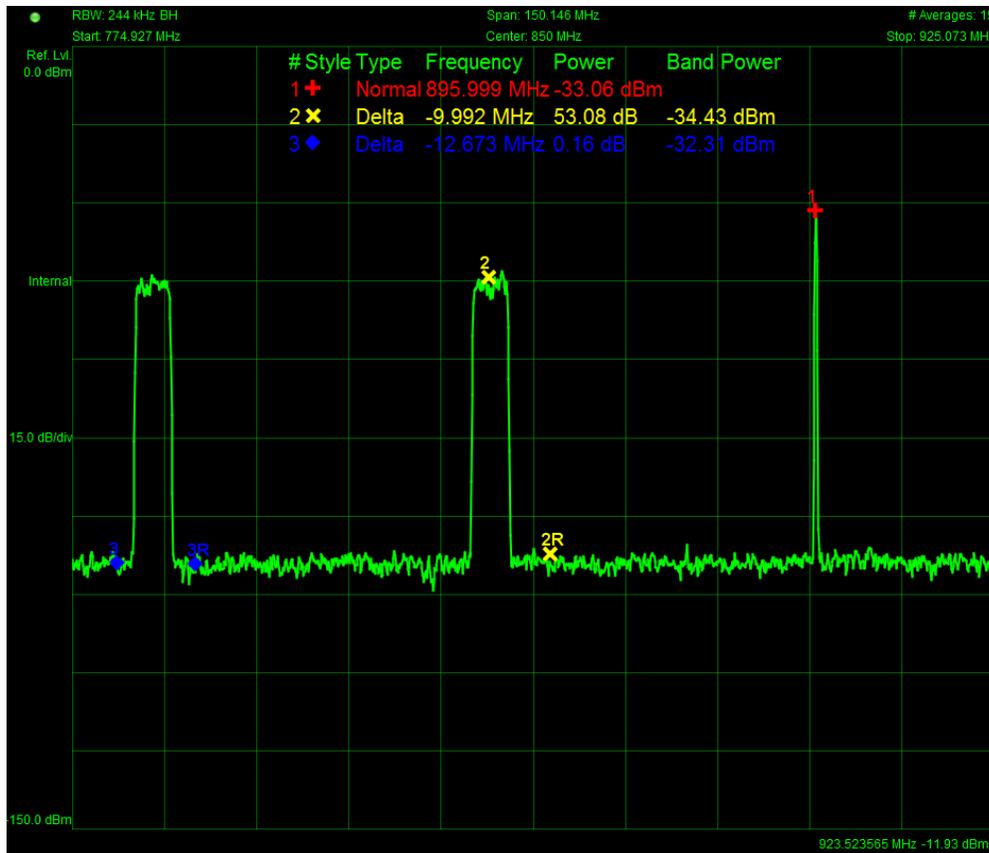
Figure 4.4-2 : 7880SA GUI Main Screen

4.4.2. Control Buttons and Menu

The Control Buttons reside along the right side of the applet in two columns. The right most column of buttons consists of the major functions and the column of buttons to the left of it are the context-sensitive buttons as dictated by the present major function that is selected.

Clicking on one of the major function buttons will change the context sensitive buttons to the available editable options. Clicking on one of the context sensitive buttons will either apply that option or bring up a separate dialog box that can be edited to a value or chosen from a drop down list.

The options available for each context sensitive function can be multiple levels deep. The menu options can be multiple and their specific functionality are outlined in the below tables.
The following tables describe in detail each button and data field of the 7880SA's GUI. Use of the GUI is described further in the Help file under the system button.
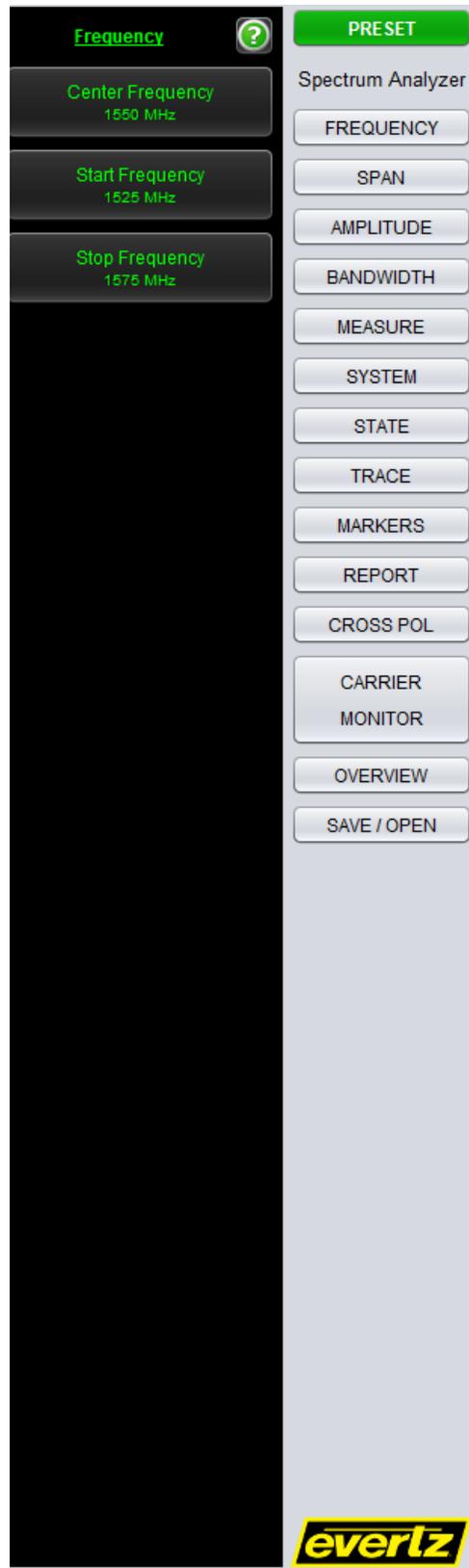
Figure 4.4-3 : 7880SA GUI Control Buttons

Button	Menu Item	Description
Preset	N/A	Sets the 7880SA back to its default settings and clears any stored traces, states and markets.
7880SA Logo	N/A	This is the application logo only.
Frequency	Center Frequency	The Center Frequency displays the desired and actual center frequency values. Clicking on the menu item displays the Center Frequency Edit dialog. Setting a value too low or too high is automatically adjusted to the actual value of the card's limit.
	Start Frequency	The Start Frequency displays the desired and actual start frequency values. Clicking on the menu item displays the Start Frequency Edit dialog. Setting a value too low or too high is automatically adjusted to the actual value of the card's limit.
	Stop Frequency	The Stop Frequency displays the desired and actual stop frequency values. Clicking on the menu item displays the Stop Frequency Edit dialog. Setting a value too low or too high is automatically adjusted to the actual value of the card's limit.
Span	Span	The Span displays the desired and actual span values. Clicking on the menu item displays the Span Edit dialog. Setting a value too low or too high is automatically adjusted to the actual value of the card's limit.
	Full Span	Sets the span to 1200 MHz and center frequency to 1550 MHz. The 7880SA is in wide sweep mode.
	Min Span	Sets the span to 16 kHz.
Amplitude	Auto Y-axis	Whether or not the 7880SA will set the Reference Level and Scale / Div to an appropriate value to show the entire active trace in view. Possible options are True or False.
	Reference Level	The Reference Level or Power Level at the top of the screen in dBm. This value will be automatically set if Auto Y-axis is set to true.
	Scale/Div	The scale per vertical division in dB. This value will be automatically set if Auto Y-axis is set to true.
	Auto Atten	The attenuation level is automatically set to the appropriate value, depending on the power level of the incoming signal. Possible options are: True-Disables manual Atten.Menu false-Disables manual Atten.Menu
	Manual Atten	Stepped increments to adjust the input attenuation manually.

Table 1: 7880SA GUI Button and Menu Descriptions (Continue)

Button	Menu Item	Description
Amplitude (Continue)	Max Ref Line	A horizontal reference line is drawn at the maximum power value of the trace analog with a label of the power value. Clicking this menu item sets it visible. **Visible:** Whether or not the reference line is visible. Possible options are Show and Hide. **Color:** The color of the reference line. It displays a color edit dialog. **Thickness:** The thickness of the reference line in pixel. Possible values are 1, 2(Default), 3, 4 and 5. **Back:** This field allows the user to navigate back to the Trace menu.
	Min Ref Line	A horizontal reference line is drawn at the minimum power value of the trace analog with a label of the power value. Clicking this menu item sets it to be visible. **Visible:** Whether or not the reference line is visible. Possible options are Show and Hide. **Color:** The color of the reference line. It displays a color edit dialog. **Thickness:** The thickness of the reference line in pixel. Possible values are 1, 2(Default), 3, 4 and 5. **Back:** This field allows the user to navigate back to the Trace menu.
Bandwidth	RBW	The resolution bandwidth or spacing between the points. Clicking on the menu item displays a combo box with a list of the appropriate RBWs given the current span and FFT Window. The minimum RBW is 1 Hz.
	RBW Mode	It shows what mode is used. Values are: **Auto(Default):** Sets the RBW=span/ratio **Manual:** Ratio is disabled, users have full control to independently specify an RBW
	Ratio	The ratio of the span to the RBW and is used only in Auto RBW Mode.
	VBW Mode	The VBW Mode used. Values are: **Average (Default):** This field uses the averages when capturing a trace, enables average minimum, disables VBW menu item. **VBW:** This field uses VBW when capturing trace, enables VBW menu item, disables Average menu item.
	Average	The number of averages. Displays the desired and actual number of averages. Clicking on the menu item displays the Number of Averages Edit dialog. Lower limit is 1.
	VBW	The video bandwidth used when capturing a trace.

Table 2: 7880SA GUI Button and Menu Descriptions (Continue)

Button	Menu Item	Description
Measure	Capture Mode	This field allows the user to set the Capture Mode. Possible options are: **Continuous**, **Single** and **Stopped**
	Restart	This field allows the user to restart the measurement if the capture mode is selected as **Continuous**. This is useful if Max Hold, Min hold or Min Max Active mode is on while in continuous mode.
	FFT Window	This field allows the user to set the Fast Fourier Transform window type. Possible options are: **Rectangular**, **Flattop**, **Blackman-Harris** (Default), **Hamming** and **Hanning.**
	Spectral Inversion	This field allows the user to set the Spectral Inversion. Possible options are **Off** and **ON**.
	Optimization	This filed allows the user to set the Optimization. Possible options are: **Spurious** and **Speed**.
	Detector	This field allows the user to set the Detector which is used. Possible options are **Normal** and **Peak**.
	Hold	This filed allows the user to set the Hold mode. Possible options are: **Normal** (None), **Max Hold**, **Min Hold** and **Min Max Active**.
State	State 1 to State 10	Store to restore the state of 7880SA from storage of one of 10 states. When the state is captured, a gear marker icon is shown on the menu item. Hovering over the menu item when a state is captured, displays the state in an HTML tool tip. **Clear:** Clears the state. **Capture:** Stores the current state. **Apply:** Applies the stored state in a display dialog. **View:** View the stored state in a display dialog. **Name:** Name the state. The name will appear on the menu item.

Table 3: 7880SA GUI Button and Menu Descriptions (Continue)

Button	Menu Item	Description
System	Reference Select	This field allows the user to select the reference. Possible options are: **External**, **Internal** and **Audio**
	Switch Port	This field allows the user to set the switch port. On 7880SA, the value will be set to 0 and disabled.
	Color Scheme	The color scheme of the back ground and grid lines. Possible options are: **Normal** (Black and Green) **Print** (White and Black)
	Connection Timeout	The number of seconds to wait for a response from the 7880SA in addition to a minimum of a second. Default is 30 seconds. Minimum is 1 second. Setting the number to 1 second will detect network failures quicker. Setting the number to 60 seconds will provide more time when running the UI over a WAN and/or when connecting through the 7880SA proxy.
	Session Name	The value for session name appears on the following: • **Browser Tab** • **South Toolbar shortcut label** (Ideal for inclusion in email notifications rich HTML screenshots.) • **Carrier Watch Title Caption**
	Reset	This field allows the user to perform software reset on the card.
	Status	This field displays the status of the card in a display dialog. A tool tip does the same.
	Error Log	This filed displays a list of errors received by the 7880SA UI. The dialog automatically pops up when an error is encountered.
	Help	Display the 7880SA UI help in the default browser.

Table 4: 7880SA GUI Button and Menu Descriptions (Continue)

Button	Menu Item	Description
Trace	Active	**Visible:** whether or not the active Trace is visible, the values are Show and Hide. **Color:** This filed allows the user to set the color of active trace. This field displays a color edit dialog. **Thickness:** This file allows the user to set the thickness of the active trace in pixels. Possible values are: 1, 2(default), 3, 4 and 5. **Export to CSV:** Export the Trace points to a CSV file. This field displays a File Save as Dialog. **Back:** This field navigates back to the Trace menu.
	Trace 1 to Trace 4	These are memory based traces. The trace color is shown in the menu item. **Capture:** This field copies the active trace to the stored trace. Displays a graph icon on the menu item and on the Trace menu item one level above when captured. **Clear:** This filed clears the trace from memory. **Visible:** whether or not the active Trace is visible, the values are Show and Hide. **Color:** This filed allows the user to set the color of active trace. This field displays a color edit dialog. **Thickness:** This file allows the user to set the thickness of the active trace in pixels. Possible values are: 1, 2(default), 3, 4 and 5. **Freq.Rendring:** This field allows setting the Frequency Rendering mode. Possible values are: • **Overlay:** Displays the trace exactly as was taken, disregarding the frequency. This is a WYSIWYG of the trace when it was captured. • **Absolute:** Renders the trace in the exact frequency location. It may be off screen. • **Shifted:** Renders the trace centered in the center of the screen but scale it in the frequency direction according to the new Span. **Ampl.Rendering:** This field allows setting the amplitude rendering mode. Possible values are: • **To Scale:** Renders the trace in the vertical direction to scale. • **Overly:** Rendering the trace in the vertical direction as was taken during capture, disregarding the reference level. **Export to CSV:** Export the Trace points to a CSV file. Displays a File Save as Dialog. **Details:** This field displays the setting at the time the frame was captured. **Back:** This field navigate back to the Trace menu list.

Table 5: 7880SA GUI Button and Menu Descriptions (Continue)

Button	Menu Item	Description
Markers	Marker 1 to Marker 5	Markers that can be applied to traces. The markers are added to the active trace and then can be moved to memory-based traces. The trace color is shown in the menu item. Note that markers can only be dragged using the mouse on memory-based traces that have the Freq. Rendering set to absolute. **Style:** This field allows the user to set the style of the marker. When it is set to Normal or Delta, a paper clip graphic is shown. Possible values are: • **OFF:** Turns off the marker. • **Normal:** A single marker. • **Delta:** A pair of markers. **Shape:** This filed allows setting the shape of the marker. Possible values are: **Plus**, **X**, **Diamond**, **Up facing Triangle**, **Down Facing Triangle**, **and Right facing Triangle**, **left Facing Triangle**, **Circle**, **Do Not Enter** and **Circle Plus**. **Color:** This field allows setting the color of the marker. It displays a color edit dialog. **Trace:** This field shows what Trace marker is attached to. It ossible values are: **Current** (Active) **1**, **2**, **3** and **4**. **Frequency:** This field is enabled when the style is Normal, Delta. It displays the Frequency Edit Dialog to adjust the marker frequency. **Function:** This field is enabled when the style is Normal or Delta. It displays the functions that can be performed on the marker frequency. Possible values are: **Peak Search**, **Marker to Center Frequency**, **Marker to Reference Level**, **Next Peak Right**, **Next Peak Left**, **Next Lower Peak** **Freq.Adjust:** This field is enabled when the style is Normal, Delta. It displays a previous and next button. The buttons will move the marker one point to the left or right. **Reference Freq:** This field is enabled when the style is Delta. It displays the Frequency Edit Dialog to adjust the reference frequency maker. displays the Function that can be performed on the reference frequency maker. Possible values are: **Peak Search**, **Marker to Center Frequency**, **Marker to Reference Level**, **Next Peak Right**, **Next Peak Left**, **Next Lower Peak** **Ref.Freq. Adjust:** This field is enabled when the style is Delta. It displays a previous and next button. The buttons will move the reference frequency marker one point to the left or right.

Button	Menu Item	Description
Report	Export to CSV	This field exports the active trace and any captured memory based traces to a CSV file. It displays a file which is saved as dialog.
	Export to HTML	This field exports the screen, traces, markers and states to an HTML file report. It displays a File Save as Dialog to specify a target directory. The 7880SA UI optionally displays the report HTML file in the default browser when done.
Carrier Monitor	New measurement	This field allows the user to create a new measurement using the current state of the 7880SA. It provides a name and specifies which analyses to run.
	Measurement Delay	This field displays the measurement delay in seconds. This is the time to wait between successive measurements.
	Log Directory	The output Log directory for traces and analysis files. If blank, logging will not occur. Log files will be in a subdirectory off this root log directory in a format root_log_dir/yyyy_mm_dd/measurement_name/ Within that directory there will be a BandPower.csv(if Band Power analysis is configured) PresenceOfACarrier.csv (if Presence of a Carrier Analysis is configured) Trace subdirectory containing a trace file per trace with an hh_mm_ss_uuu.csv format
	Log File Lifespan	The length in days to preserve log files written in the Log Directory. If the value is set to something greater than 7, for example 10, log files older than 10 days will be purged. The system will check the network drive during the 0th hour in the day only, to so as not to continually access the disk all the time. Possible values are: **0**(default) turned off. Don't purge any Log files. Log files will have to be deleted manually by a user if disk space becomes an issue. **>=7**: This is the number of days to preserve log files. 7 is the minimum since Carrier watch software uses this for historical analysis.

	SNMP	An edit window to specify:
		• **Master Switch:** enables SNMP
		• **Trap Destinations:**
		  o IP Address
		  o Port
		  o Community
		    ▪ Test button: Select a trap destination and click the test button to send a test trap. Default values used.
		    ▪ Show MIB button: Extract the MIB file from the application and prompt the user to save the file to local disk. This MIB file can be loaded directly

Button	Menu Item	Description
		into an NMS.

Carrier Monitor (Continue)	Email	An edit window to specify:
		• Master Switch: Enables email
		• Mail Server:
		   ○ Name
		   ○ Port
		• Authentication
		   ○ None
		   ○ SSL
		      ▪ Username
		      ▪ Password
		   ○ TLS
		      ▪ Username
		      ▪ Password
		• From
		   ○ Email
		   ○ Name
		• Recipients
		   ○ Email
		   ○ Name
		   ○ Style
		      ▪ Simple Text: Text Only
		      ▪ Rich HTML: Text and screen shot
		• Test Button: Select a recipient and click the test button to send a test email.
		
		Note: Ensure that nothing is blocking port 25, such as virus software. You will need to remove or disable that port blocking for email to work.

	Band Power	Displays sub menus for the default band Power analysis. **Nominal Power:** Edit the default Nominal Power in dBm. **Tolerance Power:** Edit the default Tolerance Power in dBm.
	Presence of a Carrier	Displays sub menu for the default presence of a carrier analysis. Delta Power: Edit the default Delta power in dB.

Table 6: 7880SA GUI Button and Menu Descriptions (Continue)

Button	Menu Item	Description
Overview	Overview Mode	This field allows setting the Overview mode. Possible values are **ON** and **OFF** (Default). Setting the value to ON, makes the Overview Bar and Refresh buttons visible on the screen. It also takes acquires an Overview trace and renders it on the Overview Bar.
	Refresh	This field allows the user to refresh the Overview bar by acquiring a new trace. Enabled if the Overview Mode is on.
Save/Open	Save Screen to PNG	Save the screen to a PNG file. It displays a file save as dialog.
	Save Project	Save the current settings, memory based traces, markers attached to memory based traces, and states are loaded from the project xml file.
	Open Project	Opens a saved project from file and loads the data into the 7880SA UI. The current settings, memory based traces, markers attached to memory based traces, and states are loaded from the project xml file.

Table 7: 7880SA GUI Button and Menu Descriptions (Continue)

4.4.2.1. Advanced Measurement Settings

Pressing the Measure button (Measure Setup on software version prior to 3.0.0) allows access to some advanced settings, not typically changed for most measurements, but available if desired. These settings allow the user to select the FFT Window type and Optimization. On Software versions prior to 3.0.0, Spectral Inversion and FFT Overlap are also available.

A selection of FFT windows types have been made available to provide the user with expanded analysis capability. The available window types and their respective characteristics are shown in Table 6.4-9.

FFT Window	Highest Side Lobe Level (dB)	Equivalent Noise BW (bins)	3.0 dB BW (bins)	Scallop Loss (dB)
Rectangular[1]	-13.0	1.00	0.89	3.92
Flattop[2, 3]	-93.6	3.77	3.72	0.005
Blackman-Harris[1]	-92	2.00	1.90	0.83
Hamming[1]	-43.0	1.36	1.30	1.78
Hanning[1]	-32.0	1.50	1.44	1.42

Table 8: FFT Window Type Figures of Merit

[1] "On the Use of Windows for Harmonic Analysis with Discrete Fourier Transform", Fredric J. Harris, Proceedings of   the IEEE, Vol. 66, No. 1, January 1978

[2] "Extremely Flat-Top Windows for Harmonic Analysis", Irini S. Reljin, Branimir D. Reljin, Veljko D. Papić, IEEE Transactions on Instrumentation and Measurement, Vol. 56, No. 3, June 2007"

[3] "Technical Review, Windows to FFT Analysis", Brüel & Kjær, No. 3 1987

Configuring the 7880SA to an Optimization setting of Spurious will increase the measurement time but reduce, and in most cases remove completely, the spurious signals generated within the 7880SA. It is recommended that speed Optimization be used when measuring modulated or noise signal band power, as spurious optimization can reduce measurement accuracy. An Optimization setting of speed will increase measurement speed at the expense of leaving internally generated spurious signals visible to the user.

4.4.3. Overview Bar

The Overview Bar is a navigational assistance feature recently added in the 7880SA to help the user to set center frequency and span more efficiently. It is a full span bar that provides an overview of the entire spectrum. The blue selection block indicates the selected span for the trace in the plot area. The selection block can be dragged left or right to create a new center frequency in the plot area.

The selection block edges can be dragged to create a new span and center frequency in the plot area. Mouse moving on the Overview Bar updates the frequency on the Mouse Location Bar and mouse clicking sets the center frequency at that frequency. The Overview Bar full span trace can be refreshed manually with the Refresh button.
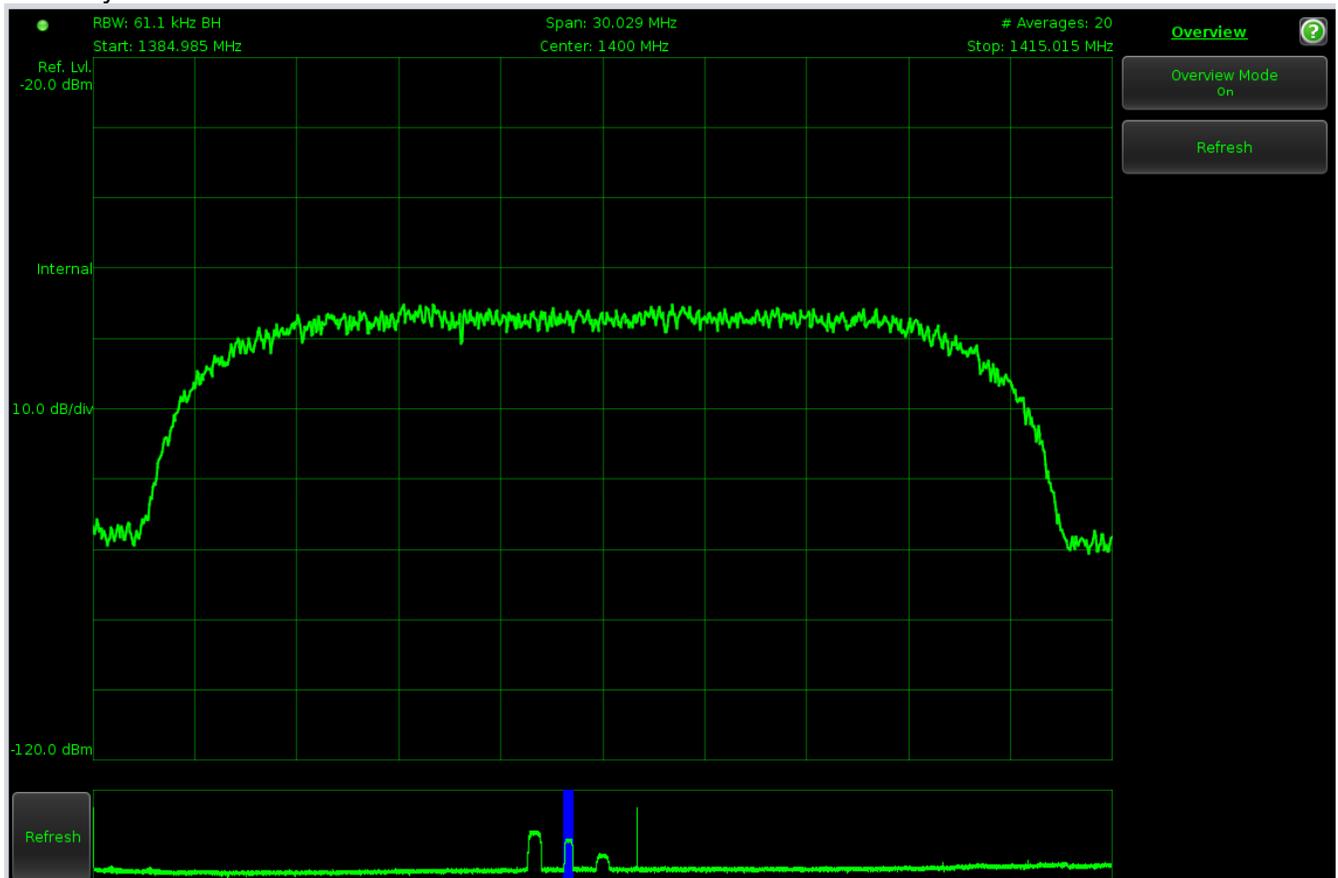

Figure 4.4-4: Overview Bar

4.4.4. Carrier Monitor (Optional with License)

The 7880SA can be configured to monitor up to 100 carriers, validating the captured trace for limits within acceptable Band Power and Presence of a Carrier thresholds. The measurement is defaulted to use the entire span of the view port. If configured, email or SNMP trap notification events will be raised when an alarm threshold is exceeded. To use the carrier monitor, a new measurement must be configured then enabled.

4.4.4.1. New Measurement

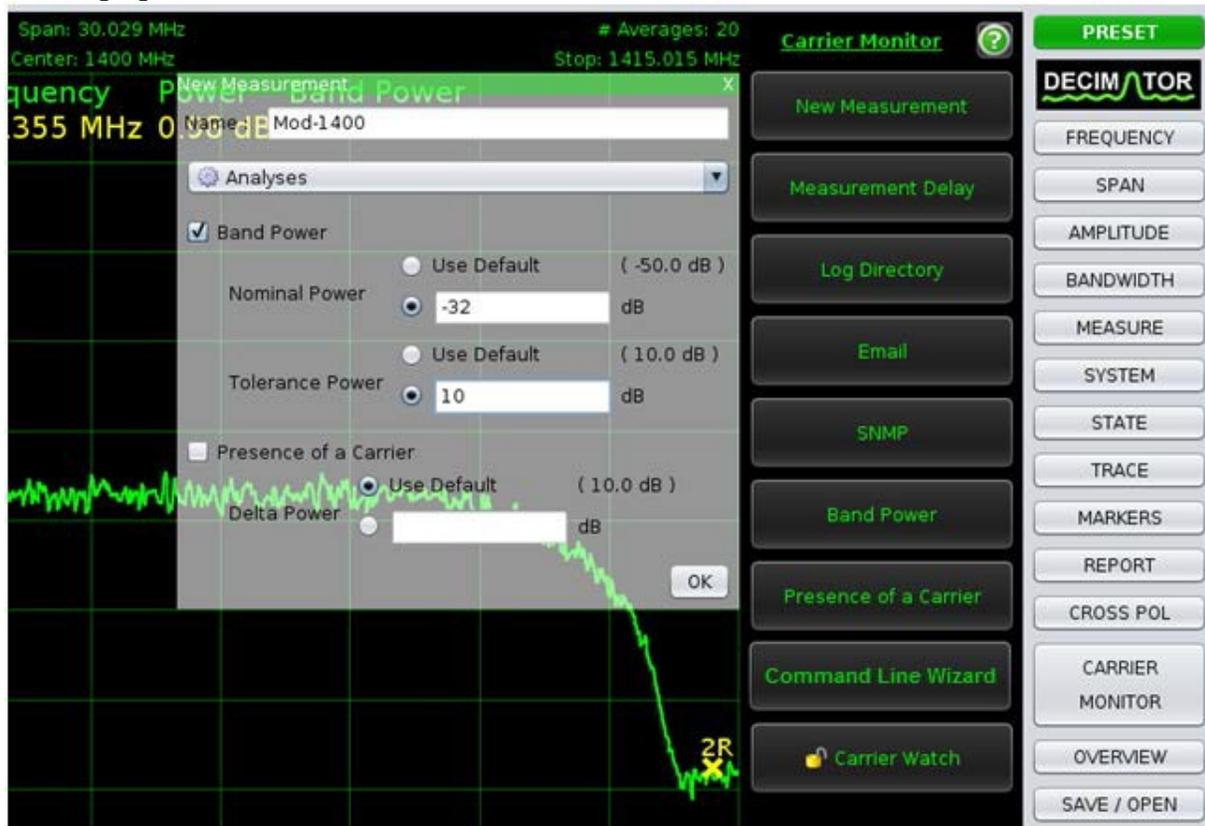The following figure shows the New Measurement window.

Figure 4.4-5: New Measurement

To add a measurement:

- Click the Carrier Monitor button

- Click the New Measurement menu item

- On the New Measurement display:

    - Enter a unique carrier name

    - Specify the Analysis to perform

    - Specify the threshold parameters by accepting the default ones or overriding

    - Click OK

- The measurement is added to the table in the Carrier Monitor toolbar

- Alternatively click on the add button on the carrier monitor toolbar

A unique name must be giving to each new measurement. Use the drop down box to configure the options for Analyses, Notifications, and State. Note that the state options are not configurable through this menu. These values are determined from the current Java Applet configuration.

4.4.4.2. Carrier Monitor Toolbar

The carrier monitor toolbar appears after one New Measurement has been configured. Moving the mouse cursor over the toolbar widens it to make the measurement names visible. Figure 0–13 shows the Java Applet with 4 Carrier Monitor measurements configured in the toolbar. Note that the measurement has been 'Played' so many of the Carrier Monitor Toolbar buttons have been disabled. The selected carrier ("Mod-1400" from the Measurement Table) has up to 24 hours of results shown in the Carrier window.
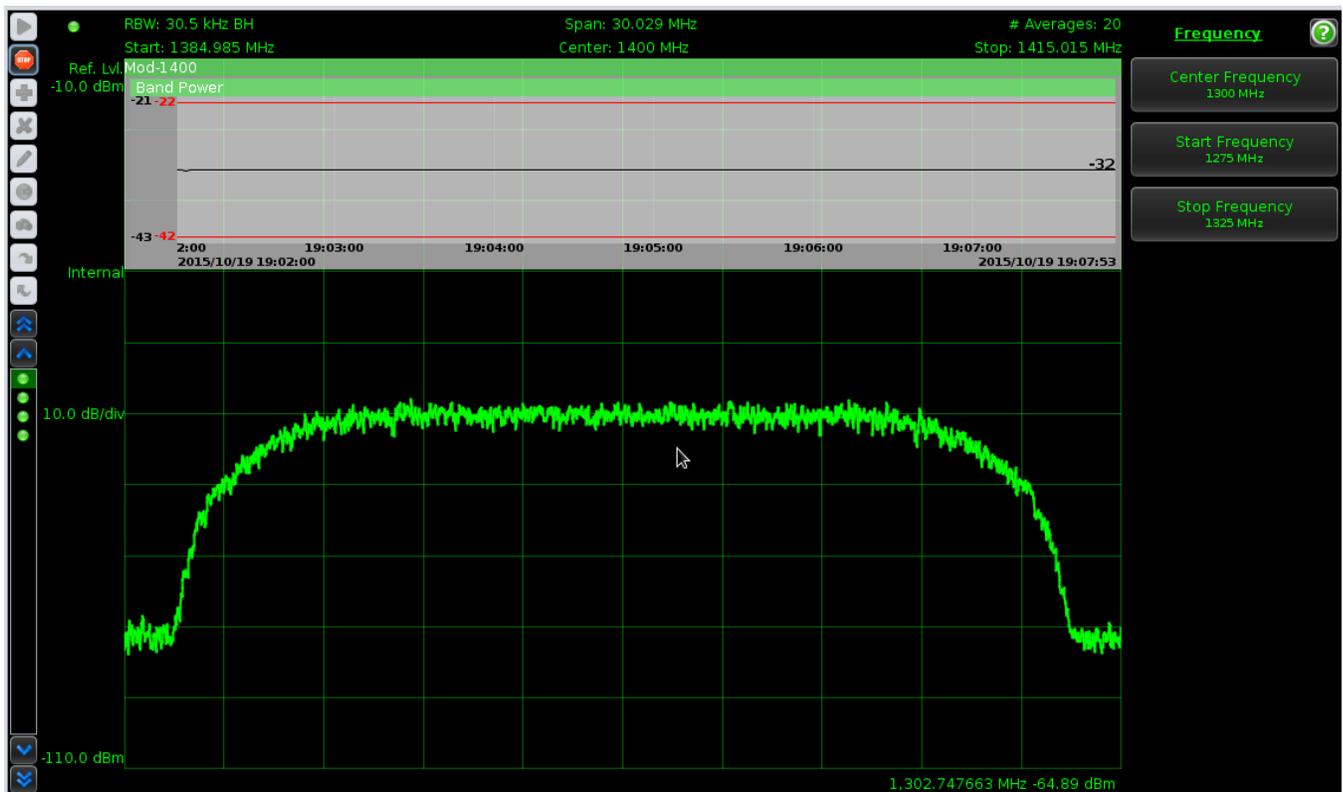

Figure 4.4-6: Carrier Monitor

Table 9 describes each of the Carrier Monitor Toolbar buttons.

Button Name	Button Graphic	Description
Play		Start the carrier monitor. This will sequentially process the carrier monitor measurements. If a threshold is exceeded Measurement Status LED will go red and, if enabled, a notification will be sent
Stop		Stop the carrier monitor measurements
Add		Create a new measurement
Delete		Delete the selected measurement
Edit		Edit the selected measurement
Recall State		Recall the 7880SA state from the selected measurement
Capture State		Capture the state of the 7880SA to the selected measurement
Move measurement down		Move the selected measurement down one
Move measurement Up		Move the selected measurement up one
Scroll to Top		Scroll to the top of the measurement table
Scroll Up		Scroll up one
Measurement Table	OR ● Carrier 1 ● Carrier 2 ● Carrier 3	When the mouse cursor is not in the Carrier Monitor Toolbar area, then only the Measurement Status LED is shown. Otherwise, a two column table with Measurement Status and Measurement Name is shown LED: Gray is unknown, Green is success, Red is failure
Scroll Down		Scroll down one
Scroll to Bottom		Scroll to the bottom of the measurement table

Table 9: Carrier Monitor Toolbar Buttons

4.4.4.3. Play

To start playing in carrier monitor mode, click the **Play** button.
The current measurement state will be set, a trace acquired, analysis run, measurement status evaluated and displayed, optional logging of results and any notification event(s) rose if necessary. A measurement overlay is added to the screen in the upper left indicating the current measurement in progress. The Measurement Table updates the selection. The overlay contains the last 24 hours of historical data for each analysis configured. Each analysis is evaluated and its status is rendered in the caption bar.

4.4.4.4. Stop

To stop playing in carrier monitor mode, click the Stop button.

4.4.4.5. Delete a measurement

To delete a measurement, select the measurement and click **Delete**.

4.4.4.6. Edit a measurement

To edit a measurement, select the measurement and click **Edit**. Or, move mouse over the measurement in the Measurement Table.

Then modify the Measurement's Analyses, State or Notification Events. Users may Recall the state when editing a measurement and adjust the State as if they were normally modifying the settings of the 7880SA and Capture the State.

4.4.4.7. Recall State

To recall the state of a measurement, select the measurement and click **Recall State**. Or, move mouse over the measurement, select State and click Recall.

4.4.4.8. Capture State

To capture state to the selected measurement, select the measurement and click **Capture State**. Or, move mouse over measurement, select state and click capture.

4.4.4.9. Carrier Monitor Notifications

The Carrier Monitor can be configured to send Email (non secure, SSL or TLS) or SNMP V2 trap notifications if a measurement threshold is exceeded.

Email

Email notification events are raised if and only if:
- The master email switch is on, and
- The individual email notification is on within the measurement, and
- There is a status change in the measurement

SNMP
To view the specific SNMP trap raised, click the "Show MIB" button to save the MIB file to disk. This can be loaded into an NMS. SNMP traps are raised if and only if:
- The master SNMP switch is on, and
- The individual SNMP notification is on within the measurement

4.4.5. SNMP Interface

The 7880SA supports monitoring of the operational status through the SNMP interface. MIB definitions are available to provide translations of the OIDs to readable labels. The SNMP interface provides read-only data concerning the device operations.

The OIDs of interest are the device identification and version information, as well as the operational status.

The device identification is provided in the ISO branch of the object ID structure. The ENTITY - MIB file contains the translations for these nodes. Notable entries are as follows:

.1.3.6.1.2.1.47.1.1.1.1.8   Hardware revision.
.1.3.6.1.2.1.47.1.1.1.1.10   Software revision.
.1.3.6.1.2.1.47.1.1.1.1.11   Serial number.

Status information on the device operations is provided in the ISO branch as well. The IADC-MIB file contains the OID translations. Entries are as follows:

.1.3.6.1.4.1.9633.4.1.1.0	Input overload status.
.1.3.6.1.4.1.9633.4.1.2.0	Overall device status, indicates if a major fault occurred.
.1.3.6.1.4.1.9633.4.1.3.0	System up time, indicates how long the device has been running since last reset.
.1.3.6.1.4.1.9633.4.1.4.0	Voltage of the onboard 1.2V power supply.
.1.3.6.1.4.1.9633.4.1.5.0	Voltage of the onboard 2.5V power supply.
.1.3.6.1.4.1.9633.4.1.6.0	Voltage of the onboard 5.0V power supply.
.1.3.6.1.4.1.9633.4.1.7.0	Voltage of the onboard 12.0V power supply.
.1.3.6.1.4.1.9633.4.1.8.0	Voltage of the onboard 17.0V power supply.
.1.3.6.1.4.1.9633.4.1.9.0	Onboard temperature.
.1.3.6.1.4.1.9633.4.1.10.0	The center frequency of the current capture.
.1.3.6.1.4.1.9633.4.1.11.0	The span width of the current capture.
.1.3.6.1.4.1.9633.4.1.12.0	The resolution bandwidth of the current spectrum capture. If a time capture is in progress, the value is 0.
.1.3.6.1.4.1.9633.4.1.13.0	Spectral Inversion setting.
.1.3.6.1.4.1.9633.4.1.14.0	Internal clock setting.
.1.3.6.1.4.1.9633.4.1.16.0	Auto attenuation setting.
.1.3.6.1.4.1.9633.4.1.17.0	Number of available IF switch ports.
.1.3.6.1.4.1.9633.4.1.18.0	The currently selected IF switch port.

The MIB OID files are available from the HTTP interface of the 7880SA. To obtain the files, enter the filename for each into the URL field of a browser and then save the file for use by your SNMP tools. Example, to access the files using the default IP address, use the following URLs:

http://192.168.10.1/ENTITY-MIB.mib
http://192.168.10.1/IADC-MIB.mib
http://192.168.10.1/SEDSYSTEMS-MIB.mib

4.4.6.   Input Signal consideration

The input to the 7880SA must be in the range listed in specifications section. Note that the input can be limited by an external filter to the band of interest within this range in order to avoid reducing the signal to noise ratio of the instrument. The more broadband noise allowed into the 7880SA, the lower the dynamic range available for the 7880SA using. The total power in the full L-Band range should not exceed the input power level specification for 7880SA. Any band pass, high pass, or low pass RF filter suitable for 75-ohm (or 50-ohm) applications may be used on the input to the 7880SA.

4.4.7.   Updating the firmware

The 7880SA incorporates a web page to manage updating the firmware. This eliminates the need to return the unit to the factory for updates.

Restart the 7880SA before installing firmware and ensure that there are no connections made, including the Java Applet, after the restart and during the installation. The 7880SA can be restarted in the Configuration->Reset tab of the Web Configuration Manager or by cycling the power to it.

The Firmware Upgrade tab as is shown in Figure 0–14 is the default tab displayed after successfully logging in to the 7880SAs WCM.

Figure 4.4-7: Firmware Upgrade Tab

The firmware update file, supplied by Evertz, can be transferred to the 7880SA using a local host computer. After specifying the server information and clicking Upload, the file will be obtained and then the following screen will be displayed:

Figure 4.4-8: Flash Firmware Window

Clicking on Begin Flash will update the 7880SA firmware. When complete, the 7880SA will be automatically reset. If the firmware file fails the integrity check, it is highly recommended that the Cancel Firmware Upgrade button be pressed or there is a risk that the 7880SA may be rendered unresponsive.

4.5. SAFETY CONSIDERATIONS

The 7880SA User's Manual must be reviewed before installation and operation of the unit. Failure to do so can result in damage to the unit or injury to the user. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. Heed all warning signals.

⚡	The **CAUTION, RISK OF ELECTRICAL SHOCK** symbol indicates high voltages may be present which can cause injury or death.
⚠	**CAUTION** Symbols can be found within this manual or on the instrument. The **CAUTION** symbol denotes a hazard. It calls attention to a situation that could result in personal injury or damage to the product. Do not proceed beyond a **CAUTION** until the indicated conditions are fully understood.

5. WARRANTY/REPAIR CONTACT INFORMATION

If your 7880SA is not operating correctly, contact the Service Department for support and a   Return Material Authorization (RMA) number if applicable. There are no serviceable parts inside   the unit.

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