RSA6100A Series
Real-Time Spectrum Analyzers
Printed Help Document

Tektronix

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Welcome

This help provides in-depth information on how to use the RSA6100A Series Real-Time Spectrum Analyzers. This online help contains the most complete descriptions of how to use the spectrum analyzer. For a shorter introduction to the spectrum analyzer, refer to the *RSA6100A Series Real Time Spectrum Analyzer Quick Start User Manual*.

Your Tektronix Spectrum Analyzer

The RSA6100A Series will help you to easily discover design issues that other signal analyzers may miss. The revolutionary DPX spectrum display offers an intuitive live color view of signal transients changing over time in the frequency domain, giving you immediate confidence in the stability of your design, or instantly displaying a fault when it occurs. This live display of transients is impossible with other signal analyzers. Once a problem is discovered with DPX, the RSA6100A Series of Real-Time Spectrum Analyzers (RTSA) can be set to trigger on the event, capture a continuous time record of changing RF events and perform time-correlated analysis in all domains. You get the functionality of a wideband vector signal analyzer, a spectrum analyzer and the unique trigger-capture-analyze capability of a Real-Time Spectrum Analyzer — all in a single package.

Trigger

- Tektronix exclusive 40 MHz and 110 MHz Frequency Mask Triggers (FMT) offer easy event-based capture of transient RF signals by triggering on any change in the frequency domain.

Capture

- All signals up to 110 MHz spans are captured into memory (Option 110 only, 40 MHz span standard).

- Up to 1.7 seconds acquisition length at 110 MHz bandwidth provides complete analysis over time without making multiple acquisitions.

Analyze

- Extensive time-correlated multi-domain displays connect problems in time, frequency, phase and amplitude for quicker understanding of cause and effect when troubleshooting.

- Power measurements and signal statistics help you characterize components and systems: ACLR, Multi-Carrier ACLR, Power vs. Time, CCDF.

- Advanced Measurement Suite (Opt. 20): Pulse measurements including rise time, pulse width, duty, power, frequency and phase provide deep insight into pulse train behavior.

- General Purpose Digital Modulation Analysis (Opt. 21): Provides vector signal analyzer functionality.

Product Description

The RSA6100A Series of Real-Time Spectrum Analyzers can trigger on RF signals, seamlessly capture them into memory, and analyze the frequency, time, and modulation domains with time-correlated views.

Key Features

Tektronix spectrum analyzers are high-performance solutions that capture a continuous time record of changing RF events and enable time-correlated analysis in the frequency, time, and modulation domains. The series features exceptional signal acquisition performance, operational simplicity, and open connectivity to the design environment. Classic analog-style controls, a large display with a touch-sensitive screen, and graphical control panels provide intuitive control. Open access to the Windows operating system enables unprecedented customization and extensibility. Key features include:

- Real Time Analysis and Frequency Mask Trigger (optional) bandwidth of 40 MHz or 110 MHz (optional)

- Trigger Sources: RF Input, Trig In, Trig2 In, Gated Line

- Trigger Types (for RF Input source): Frequency Mask (optional), Power

- DPX Minimum Event Time Capture 24 ms (option 110), 31 ms (standard)

- General Signal Viewing Displays: Spectrum, DPX Spectrum, Spectrogram, Amplitude, Frequency, Phase, and more

- RF Power Measurements: Channel Power, Adjacent Channel Power Ratio, Multi-carrier Power Ratio, and CCDF

- Modulation Measurements: EVM, Phase Error, Magnitude Error, Origin Offset (Carrier Feedthrough), Gain Imbalance, Symbol Table, Constellation and more

- Pulse Measurements: Average ON Power, Peak Power, Average Transmitted Power, Pulse Width, Rise and Fall Time, Repetition Interval (seconds), Repetition Rate (Hz), Duty Factor (%), Duty Factor (Ratio), Ripple, Droop, Pulse-Pulse Phase Difference, Pulse-Pulse Frequency Difference, RMS Frequency Error, Maximum Frequency Error, RMS Phase Error, Maximum Phase Error, Frequency Deviation, Phase Deviation, and Time.

- Full programmability, with an extensive GPIB command set

- Access to the instrument from any location through the Windows XP Remote Desktop function

- Capture instrument screens for documentation using Alt+PrtScn function

Product Software

The instrument includes the following software:

- System Software: The product software runs on a specially configured version of Windows XP, As with standard Windows XP installations, you can install other compatible applications. If you need to reinstall the operating system, follow the procedure in the *Restoring the Operating System* chapter in the RSA6100A Series Real-Time Spectrum Analyzers Service manual (Tektronix part number 071-1914-01 or newer). You can download a PDF version of the Service manual at

www.tektronix.com/manuals. Do not substitute any version of Windows that is not specifically provided by Tektronix for use with your instrument.

■ Product Software: The product software is the instrument application. It provides the user interface (UI) and all other instrument control functions. You can minimize or even exit/restart the instrument application as your needs dictate.

Occasionally new versions of software for your instrument may become available at our Web site. Visit www.tektronix.com for information.

Software and Hardware Upgrades

Tektronix may offer software or hardware upgrade kits for this instrument. Contact your local Tektronix distributor or sales office for more information.

Standard Accessories

The standard accessories for the RSA6100A Series instruments are shown below. For the latest information on available accessories, see the Tektronix Web site .

Quick Start User Manual

■ English - Option L0, Tektronix part number 071-1909-XX

■ Japanese - Option L5, Tektronix part number 071-1911-XX

■ Russian, Option L10, Tektronix part number 071-1912-XX

■ Simplified Chinese - Option L7, Tektronix part number 071-1910-XX

Applications Instructions

■ Tektronix part number 071-2590-XX

Product Documentation CD-ROM

The Product Documentation CD-ROM contains PDF versions of all printed manuals. The Product Documentation CD-ROM also contains the following manuals, some of which are available only in PDF format:

■ Declassification and Security Instructions manual PDF, Tektronix part number 077-0170-XX

■ Service Manual PDF, Tektronix part number 071-1914-XX

■ Programmer Manual PDF, Tektronix part number 071-1913-XX

■ Specifications and Performance Verification PDF, Tektronix part number 071-1915-XX

■ Release notes

■ Other related materials

NOTE. *To check for updates to the instrument documentation, browse to* www.tektronix.com/manuals *and search by your instrument's model number.*

Important Documents Folder

■ Certificate of Calibration documenting NIST traceability, 2540-1 compliance, and ISO9001 registration

Power Cords

■ North America - Option A0, Tektronix part number 161-0104-00)

■ Universal Euro - Option A1, Tektronix part number 161-0104-06

■ United Kingdom - Option A2, Tektronix part number 161-0104-07

■ Australia - Option A3, Tektronix part number 161-0104-05

■ 240V North America - Option A4, Tektronix part number 161-0104-08

■ Switzerland - Option A5, Tektronix part number 161-0167-00

■ Japan - Option A6, Tektronix part number 161-A005-00

■ China - Option A10, Tektronix part number 161-0306-00

■ India - Option A11, Tektronix part number 161-0324-00

■ No power cord or AC adapter - Option A99

Optical Wheel Mouse

Product Software CD

Recommended Accessories

The recommended accessories for the RSA6100A Series instruments are shown in the following table. For the latest information on available accessories, see the Tektronix Web site .

Item	Ordering part number
Additional Removable Hard Drive for use with Option 06 (Windows XP and instrument software installed)	RSA61RHD
Transit Case	016-1963-00
Rackmount Installation Kit	016-1962-00
Additional Quick Start User Manual (paper)	071-1909-XX
Additional Documents CD (all manuals in PDF format)	063-3930-XX
Service Manual (paper)	071-1914-XX

Options

You can view a listing of the software options installed on your instrument by selecting **Help** > **About Your Tektronix Real-Time Spectrum Analyzer**. The window that appears contains information about the options installed on your instrument. There is a label on the rear-panel of the instrument that lists installed hardware options.

Options can be added to your instrument. For the latest information on available option upgrades, see the Tektronix Web site .

Documentation

In addition to the instrument online help, the following documents are available:

■ **Quick Start User Manual** (071-1909-XX - English). The Quick Start User Manual has information about installing and operating your instrument. The Quick Start User Manual is also available in Simplified Chinese (071-1910-XX), Japanese (071-1911-XX), and Russian (071-1912-XX).

■ **Application Examples Reference** (071-2590-XX). The Application Examples Reference provides examples of specific application problems and how to solve those problems using an RSA6100A Series spectrum analyzer.

■ **Programmer Manual** (071-1913-XX). The Programmer Manual is provided as a printable PDF file, which is located on the Documents CD. See the Documents CD-ROM for installation information. The Programmer manual is also available in printed form as an optional accessory.

■ **Service Manual** (071-1914-XX). A service manual, in printed format, is available as an optional accessory; it includes procedures to service the instrument to the module level and restore the operating system.

■ **Specifications and Performance Verification Technical Reference Manual** (071-1915-XX). This is a PDF-only manual that includes both the specifications and the performance verification procedure.

Other Documentation

Your instrument includes supplemental information on CD-ROM:

- Documents CD (Tektronix part number 063-3930-XX)

Connecting an RF Signal

The spectrum analyzer has a single RF signal input located on the front panel. The input impedance is 50 Ω. The input frequency range is 9 kHz to 6.2 GHz (RSA6106A), 9 kHz to 14 GHz (RSA6114A). The maximum measurable continuous input power is 1 W.

To connect an RF signal:

1. If the source signal is greater than 1 Watt (+30 dBm), connect the source signal to an attenuator. Connect the attenuator output to the RF Input connector.

⚠ **CAUTION.** *To prevent damage to the spectrum analyzer, do not connect signals greater than +30 dBm (1 Watt).*

⚠ **CAUTION.** *To prevent damage to the spectrum analyzer, do not turn the equipment under test on or off with a LISN (Line Impedance Stabilization Network) RF cable connected to the spectrum analyzer. The power cycling of the equipment under test causes surge currents that can damage the sensitive input of the spectrum analyzer.*

2. Connect the signal to the RF INPUT connector.

The maximum limits for the input signal are as follows:

Characteristic	Description
Maximum DC Voltage	± 40 V (RF input)
Maximum Measurable Input Power	+ 30 dBm (RF input, RF ATT Auto)
	75 Watts peak (RF Band, RF ATT Auto (<10 ms pulse width, 1% Duty Cycle repetitive pulses)

Connecting a Signal Using a TekConnect Probe

You can connect a signal to the spectrum analyzer using a TekConnect Probe by using an RTPA2A Real-Time Spectrum Analyzer TekConnect Probe Adapter. The RTPA2A enables you to use Tektronix P7000 Series active and differential probes to connect to signals. See the RTPA2A Instruction Manual for instructions on how to connect the probe adapter and a probe to the spectrum analyzer.

To use the RTPA2A probe adapter with the RSA6100A Series instruments, you may need install a device driver for the RTPA2A probe adapter.

Installing the RTPA2A Probe Adapter Device Driver

When the RTPA2A probe adapter is connected to the instrument's USB port for the first time, the Windows XP Add Hardware wizard may automatically start. If the wizard does start, use the procedure below to install the device driver for the new hardware. (If the wizard does not start, the probe adapter device driver is already installed.)

To properly install the probe adapter device driver:

1. Select the option for Windows to install from a specific location (then select **Next**).

2. Only search for the driver in **C :\Program Files\Tektronix\RSA6100A\ProbeAdapter**.

3. If Windows XP warns about Windows Logo testing, select **Continue Anyway**.

4. Select **Finish** after the Found New Hardware wizard completes.

Connecting External Trigger Signals

External trigger signals are connected to the spectrum analyzer using the **Trig In** connector on the front panel. There is also an additional trigger input on the rear panel, the Trig 2 In.

To connect a trigger signal to the spectrum analyzer, connect the signal to the **Trig In** connector on the front panel, or the **Trig 2 In** connector on the rear panel.

Table 1: External trigger signal input requirements

Input	Level	Impedance
Trig In	-2.5 V to +2.5 V	50 Ω or 5,000 Ω
Trig 2 In	+5 V (TTL)	10,000 Ω

Measurements

The measurements available include RF power measurements, digital modulation measurements, and pulse measurements.

Power measurements

Measurement	Description
Channel Power	The total RF power in the selected channel (located in the ACPR display).
Adjacent Channel Power Ratio	Measure of the signal power leaking from the main channel into adjacent channels.
Multi-Carrier Power Ratio	The ratio of the signal power in the reference channel or group of channels to the power in adjacent channels.
Peak/Avg Ratio	Ratio of the peak power in the transmitted signal to the average power in the transmitted signal (located in the CCDF display).
CCDF	The *Complementary Cumulative Distribution Function* (CCDF). CCDF shows how much time a signal spends at or above a given power level relative to the average power of a measured signal.

Modulation measurements

Measurement	Description
EVM	The normalized RMS value of the error vector between the measured signal and the ideal reference signal over the analysis length. The EVM is generally measured on symbol or chip instants and can be reported in units of percent or dB. EVM is usually measured after best-fit estimates of the frequency error and a fixed phase offset have been removed.
Phase Error	The RMS phase difference between the measured signal and the ideal reference signal.
Magnitude Error	The RMS magnitude difference between the measured signal and the ideal reference signal.
IQ Origin Offset	The magnitude of the DC offset of the signal measured at the symbol times. It indicates the magnitude of the carrier feed-through signal.
Gain Imbalance	The gain difference between the I and Q channels in the signal generation path. Constellations with gain imbalance show a pattern with a width that is different from height.
Rho ρ	The normalized correlated power of the measured signal and the ideal reference signal. Like EVM, Rho is a measure of modulation quality. The value of Rho is less than 1 in all practical cases and is equal to 1 for a perfect signal measured in a perfect receiver.
Frequency Error	The frequency difference between the measured carrier frequency of the signal and the user-selected center frequency of the analyzer.
Quadrature Error	The orthogonal error between the I and Q channels. The error shows the phase difference between I and Q channels away from the ideal 90 degrees expected from the perfect I/Q modulation. Constellations with quadrature error will show some leakage of I into Q and vice versa.

Pulse measurements

Measurement	Description
Average ON Power	The average power transmitted during pulse on.
Peak Power	Maximum power during pulse on.
Average Transmitted Power	The average power transmitted, including both the time the pulse is on and the time it is off, and all transition times.
Pulse Width	The time from rising edge to falling edge at the 50% level. Level is user selectable for Volts or Watts.
Rise Time	The time required for a signal to rise from 10% to 90% (or 20% to 80%) of its ON voltage amplitude.
Fall Time	The time required for a signal to fall from 90% to 10% (or 80% to 20%) of its ON amplitude.
Repetition Interval	The time from a pulse rising edge to the next pulse rising edge.
Repetition Rate	The inverse of repetition interval.
Duty Factor (%)	The ratio of the width to the pulse period, expressed as a percentage.
Duty Factor (Ratio)	The ratio of the pulse width to the pulse period.
Ripple	The sum of the absolute positive maximum difference and the absolute negative difference. See also, Ripple (see page 182).
Droop	The slope of the straight-line best-fit representing the top of the pulse.
Pulse-Pulse Phase Difference	The phase difference between the selected pulse and the first pulse in the analysis window.
Pulse-Pulse Freq Difference	The difference between the frequency of the current pulse and frequency of the previous pulse. The instantaneous frequency is measured at a user-adjustable time following the rising edge of each pulse.
RMS Freq Error	The RMS Frequency Error measurement is the RMS average of the Freq Error vs. Time trace, computed over the Measurement Time.
Max Freq Error	The maximum frequency error is the difference between the measured carrier frequency of the signal and the user-selected center frequency of the analyzer.
RMS Phase Error	The RMS Phase Error measurement is the RMS average of the Phase vs Time trace, computed over the Measurement Time.
Max Phase Error	The phase is measured at each point during the pulse's ON time. The phase error for each point is the difference between the measured phase value and the calculated ideal phase value. After the phase error is calculated for all points in the acquisition record, the largest error in the positive direction and the largest in the negative direction are determined. Whichever of these two values has the greater absolute value is designated the Max Phase Error.
Freq Deviation	The Frequency Deviation measurement is the difference between the maximum and minimum measured values of the signal frequency during the Measurement Time.
Phase Deviation	The Phase Deviation is the difference between the maximum and minimum Phase values measured during the ON time of a pulse.
Time	This is the time in seconds relative to the time reference point in the first acquisition record in the data set.

Running Alignments

Alignments are adjustment procedures. Alignments are run by the instrument using internal reference signals and measurements and do not require any external equipment or connections.

There are two settings for Alignments:

- Automatically align as needed

- Run alignments only when the **Align Now** button is pressed

If **Automatically align as needed** is selected, alignments run whenever the spectrum analyzer detects a sufficient change in ambient conditions to warrant an alignment.

If **Run alignments only when "Align Now" button is pressed** is selected, the spectrum analyzer never runs an alignment unless you manually initiate an alignment using the Align Now button.

NOTE. *There are a few critical adjustments that must run occasionally even if Automatically align is not enabled.*

Alignment Status

When the spectrum analyzer needs to run an alignment, it displays a message on screen. If no message is displayed, you can assume that the spectrum analyzer is properly aligned.

Initiating an Alignment

1. Select **Setup** > **Alignments**.

2. Select the **Align Now** button.

The spectrum analyzer will run an alignment procedure. Status messages are displayed while the alignment procedure is running. If the instrument fails the alignment procedure, an error message will be displayed. If the instrument fails an alignment, run Diagnostics (Tools > Diagnostics) to see if you can determine why the alignment failed.

NOTE. *While an alignment is running, both the IF and IQ outputs are disabled.*

Alignments During Warm-Up. During the warm-up period, the spectrum analyzer will run alignments relatively frequently as it warms to operating temperature (if Auto mode is selected). During the specified period for warm-up, the instrument performance is not warranted.

Alignments During Normal Operation. Once the spectrum analyzer reaches operating temperature, alignments will run less frequently than during the warm-up period. If an alignment becomes necessary during a measurement cycle (if Auto mode is selected), the measurement is aborted and an alignment procedure is run. Once an alignment procedure is completed, the measurement cycle restarts.

Alignments are Not Calibrations

Alignments are adjustment procedures run by the instrument using internal reference signals and measurements. Calibrations can only be performed at a Tektronix service center and require the use of traceable test equipment (signal sources and measuring equipment) to verify the performance of the instrument.

Triggering

The spectrum analyzer has two triggering modes: Free Run and Triggered.

Free Run

In Free Run mode, the instrument initiates acquisitions without considering any trigger conditions. It is a fast and easy way to see the signals. Free Run is usually adequate for the Spectrum display unless you need to specify a particular time at which to collect the data record.

Triggered

In the Triggered mode, the instrument initiates an acquisition when a trigger event is recognized. The conditions that define a trigger event depend on the selected trigger source. There are several source selections available for choosing the signal to monitor for a trigger event. If the RF input is the selected trigger source, you can choose to use power or frequency mask triggering as the trigger methods. If other inputs are selected as the trigger source, you can select the slope and level of the trigger point. With the Gated source, you also specify the gating signal level.

Frequency Mask Triggering. Frequency Mask Triggering allows you to trigger the instrument when a signal in the frequency domain violate the mask. You can draw a mask to define the conditions within the real-time bandwidth that will generate the trigger event. It allows you to trigger on weak signals in the presence of strong signals. This triggering is also useful for capturing intermittent signals.

Power Level Triggering. Power Level triggering triggers the instrument on time-domain signal characteristics. The incoming data is compared to a user-selected level in dBm. You can select the time-domain bandwidth and trigger on the rising or falling edge.

You can define the following event parameters by selecting the respective tab in the Trigger control panel:

- Event source, event type, and event definition.

- Time parameters that define where a trigger occurs within the acquired memory and whether to delay the trigger for a set amount of time.

- Advanced parameters automatically save the acquired data to a file or trigger each segment in the swept acquisition mode.

Setting Up Triggering

To setup triggering, use the Trigger control panel. To display the Trigger control panel:

■ Press **Trigger** on the front panel or click **Trig** in the Application toolbar or select **Tools** > **Trigger**.
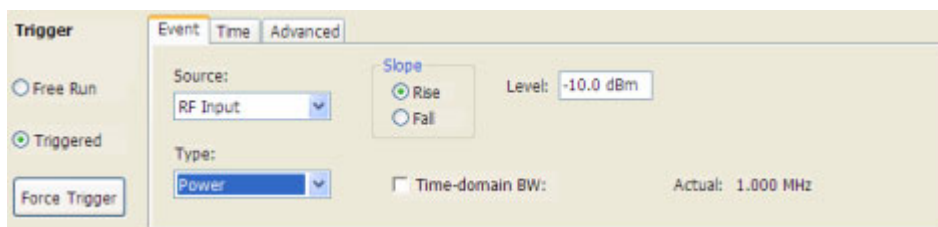
Using Free Run Trigger

To set Triggering to Free Run:

■ Click the **Free Run** option button.

The spectrum analyzer will acquire a signal without regard to any triggering conditions.

Using Power Trigger

To trigger acquisition based on the power of the signal:

1. Click the **Triggered** option button.

2. Select **Power** from the **Type** drop-down list.

3. For further information on setting the power level parameters, see Event Tab (Triggering). (see page 141)

Using Frequency Mask Triggering

To trigger acquisition based on violations of a user-defined mask:

1. Click the **Triggered** option button.

2. Select **RF Input** from the **Source** drop-down list.

3. Select **Frequency Mask** from the **Type** drop-down list.

For further information on setting the frequency mask parameters, see Event Tab (Triggering) (see page 141) and Mask Editor. (see page 160)

Saving and Recalling Data

You can save different types of data for later recall and analysis.

Data type	Description	Save as type
Setup files	Saves all of the setup information for all displays, except those settings that are not part of Preset.	Setup
Picture of Selected Display (PNG/JPG/BMP)	Saves a capture of the screen in the specified format. This option is useful for including the graphic in reports or other applications. Marker readouts and other information are included.	Picture
Results Export files	Saves the trace and numeric data for the selected display. The trace and numeric data is saved as CSV files.	Results export
Measurement Settings	Saves a list of settings relevant to the selected measurement to a text file. This option is useful for including the measurement settings in reports.	Measurement settings export (TXT)
Trace	Saves a trace for later recall back into the display from which it was saved.	Selected trace
Data	Saves data for reanalysis by RSA6100A Series Real-Time Spectrum Analyzers or as data to use with external software (either CSV (comma-separated value) or MAT (MATLAB format).	Acquisition data with setup; or Acquisition data export (CSV or MAT)

Saving Files

Saving files follows the same procedure regardless of the type of data being saved. To save setups (including application presets), pictures, results, or acquisition data:

1. Select **Save As. . .** from the **File** menu to open the **Save As** dialog box.

2. Navigate to the folder where you want to save the setups, or use the default location.

    - To save setups so that they appear in the Application Presets window, save your setup in the folder **C:\RSA6100A Files\Application Presets**. The saved setup will appear in the Application Presets window with the name you give the file.

3. Enter a file name.

4. Select the type of file to save from the **Save as type** drop-down list.

5. Click **Save**.

Recalling Files

You can recall three types of files: Setup files, Selected Trace, and Acquisition data with setup. Recalling data follows the same procedure regardless of the type of data being recall.

1. Select **Recall. . .** from the **File** menu to open the **Open** dialog box.

2. Navigate to the folder containing the file you want to recall.

3. Select the type of file to recall from the **Files of type** drop-down list. This selection determines the files that appear in the Open dialog box.

4. Select the file to recall.

5. Click **Open**.

Setup Files

You can set up the instrument as desired and then save the settings in a setup file. This enables you to quickly setup the instrument by recalling previously saved setups.

Exporting Results

Save for further analysis of results in other programs, such as MATLAB or Excel.

Pictures of the Selected Display

You can save pictures of the instrument display for documentation purposes. When saving pictures of the display, you can select from three file types: BMP, JPG, or PNG.

Measurement Settings

You can save a list of settings relevant to the selected display to a file for documentation purposes. The exported file uses tab characters to separate values. The settings included in the file depend on the selected display. The contents of the file are the same as a Results export except it doesn't include the results.

Saving Acquisition Data with Setup

Save for later analysis with the spectrum analyzer. Saving the data with setup ensures the analysis parameters are the same when the data is recalled.

Saving Acquisition Data Export in CSV Format

Save for examining results in other programs, such as MATLAB or Excel.

Amplitude vs. Time Display

The Amplitude vs. Time display plots the signal amplitude against time. The amplitude appears on the vertical axis while time is plotted along the horizontal axis.

Note that the trace(s) in the Amplitude vs. Time display can be set to a maximum of 100,000 points (however, the actual number of trace points can extend up to 1,000,000 points if Max trace points is set to Never Decimate). If the Analysis Length includes more than the selected Max trace points value, the trace is decimated (using the method specified with the Detection control) to be equal to or less than the Max trace points setting (except when Max trace points is set to Never Decimate). This decimated (or

undecimated) trace is what is used for marker measurements and for results export. You can set the Max trace points on the **Settings** > **Prefs** tab.

To show Amplitude vs Time display:

1. Press the **Displays** button or select **Setup** > **Displays**.

2. In the **Select Displays** dialog, select **General Signal Viewing** in the **Folders** box.

3. In the **Available displays** box, double-click the **Amplitude vs Time** icon or select the icon and click **Add**. The Amplitude vs Time icon will appear in the **Selected displays** box and will no longer appear under Available displays.

4. Click **OK**.

Elements of the Display
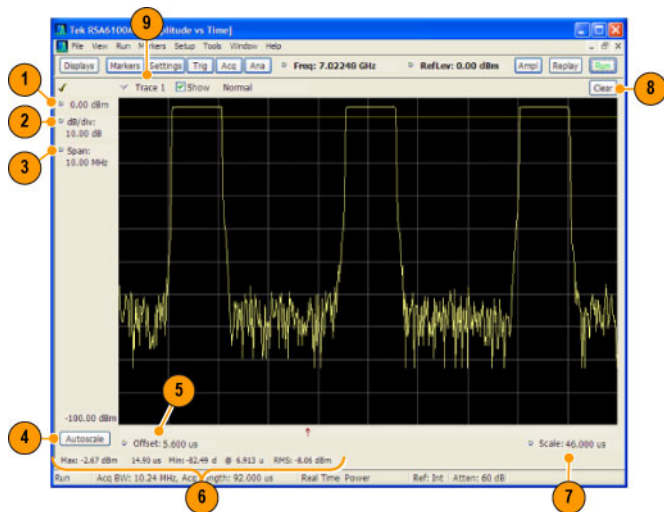
Item	Display element	Description
1	Vert Offset	Adjusts the vertical display offset.
2	Vertical scale adjustment	Adjusts the vertical scaling.
3	Span	Adjust the bandwidth of the data to be analyzed. (Not the period of time shown in the display.)
4	Autoscale	Adjusts the vertical and horizontal settings to provide the best display.
5	Offset	Adjust the horizontal offset.
6	Max and Min readouts	Displays the maximum and minimum amplitudes, as well as when those values occur.
7	Scale	Sets the time spanned by the graph.
8	Clear button	Restarts multi-trace functions (Avg, Hold).
9	Trace function	Displays the current trace function setting (Settings > Trace tab > Function).

Reference.   Changing Amplitude vs Time Display Settings (see page 104)

DPX Spectrum Display

To display the DPX Spectrum (see page 141) view:

1. Select **Freq** and use the front panel knob or number keys to set the measurement frequency.

2. Select the **Displays** button or **Setup** > **Displays**. This displays the **Select Displays** dialog.

3. From the **Folders** box, select **General Signal Viewing**.

4. Select **DPX Spectrum** from the **Available displays** box.

5. Click the **Add** button. This will add the DPX Spectrum icon to the Selected Displays box (and remove it from the Available displays box).

6. Click the **OK** button. This displays the DPX Spectrum view.
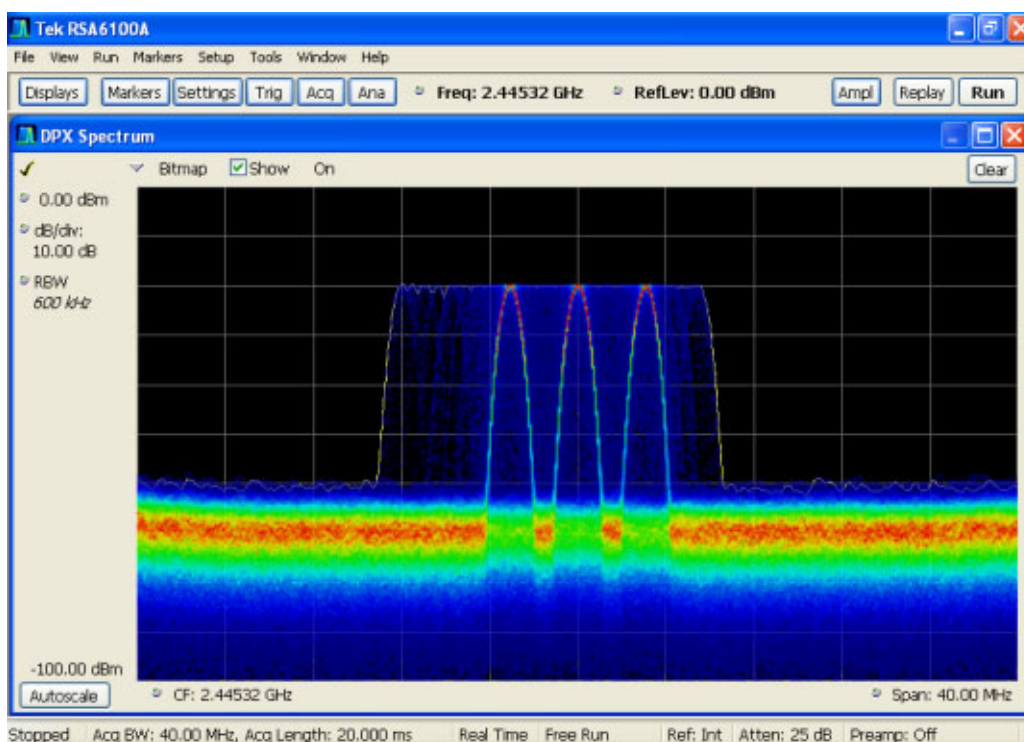
Selecting Traces for Display

Five traces can be shown in the DPX Spectrum display. The default traces are Bitmap and +Peak. In addition, you can choose to display the maximum values, minimum values, average value and a math trace (subtracting one trace from another).

Trace	Type	Description
Bitmap	data density	Displays the density of acquired data. The number of data points acquired at each pixel (representing a particular amplitude level at a specific frequency is indicated by color).
+Peak	Maximum	Displays the maximum values acquired in each update. Normal and Hold functions are available for this trace.
-Peak	Minimum	Displays the minimum values acquired in each update. Normal and Hold functions are available for this trace.
Average	Average	Displays the average of all the values acquired in each update. Normal and Hold functions are available for this trace.
Math Trace	Math	Displays the difference between two traces. The two traces used are set in the Traces tab of the Settings panel.

To select a trace for display:

■ Select a trace from the Trace drop-down list.
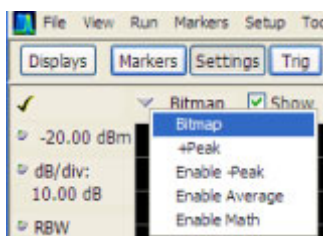
Selecting **Enable -Peak Trace** from the Trace list displays the -Peak detected values trace.

Specifying How Maximum, Minimum, and Average Traces are Displayed

You control how the maximum, minimum and average traces are displayed from the Traces tab of the Settings control panel. From the Traces tab, you can also specify whether these traces display results from single updates or results collected over multiple updates.

To change how the traces are displayed:

1. Select **Setup** > **Settings** or click the **Settings** button.

2. Select the **Traces** tab.

3. Select the trace type from the drop-down list.

4. If you select +Peak Trace or -Peak Trace, use the **Function** drop-down list to select either **Normal** or **Hold**.

    a. Select Normal to set the trace to display the maximum/minimum values acquired in each individual update.

    b. Select Hold to set the trace to display the maximum/minimum values acquired over time. The trace values are updated only if they exceed the existing values.

5. If you select Avg Trace, use the **Function** drop-down list to select either **Normal** or **Average**.

    a. Select Normal to set the trace to display the average values acquired in each update.

    b. Select Average to set the trace to display an average of the average values. Use the Averages box to enter the number of times the trace is averaged.

Determining Which Trace Types are Displayed

You can see the status of all the traces by selecting the Trace drop-down list. Traces that are not displayed are preceded by "Enable". In the following figure, you can tell that the Bitmap and -Peak Trace traces are displayed but the +Peak, Average, and Math Traces are not displayed.
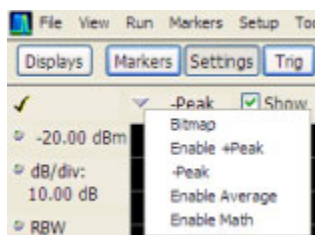
You can see which trace is enabled by looking at the **Show** check box. The "active trace" is selected in the Trace list. The Show check box is checked when the selected trace is enabled. To the right of the show box are readouts for detection of the selected trace (+Pk, Avg., ...) and its function (Hold, Normal,...). You can enable/disable the selected trace by checking or unchecking Show.

Which specific trace is displayed is indicated by the trace shown in the Trace list. A reminder of the type of trace appears to the right of the Show box. In the figure below, you can see that the **+Peak** trace is selected and the **Show** box is checked. The Detection method, **+Pk**, also appears to the right of the Show box. The Function setting (trace processing), Normal, is also displayed.
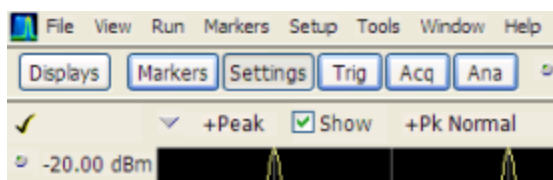
Reference.

Frequency vs. Time Display

The Frequency vs. Time Display shows how the signal frequency varies with time.

Note that the trace(s) in the Frequency vs. Time display can be set to a maximum of 100,000 points (however, the actual number of trace points can extend up to 1,000,000 points if Max trace points is set to Never Decimate). If the Analysis Length includes more than the selected Max trace points value, the trace is decimated (using the method specified with the Detection control) to be equal to or less than the Max trace points setting (except when Max trace points is set to Never Decimate). This decimated (or undecimated) trace is what is used for marker measurements and for results export. You can set the Max trace points on the **Settings** > **Prefs** tab.

To display the Frequency vs Time Display:

1. Select the **Displays** button or **Setup** > **Displays**.

2. In the **Select Displays** dialog, select **General Signal Viewing** in the **Folders** box.

3. In the **Available displays** box, double-click the **Frequency vs Time** icon or select the icon and click **Add**. The Frequency vs Time icon will appear in the **Selected displays** box and will no longer appear under Available displays.

4. Click **OK** to display the Freq vs Time display.

Elements of the Display
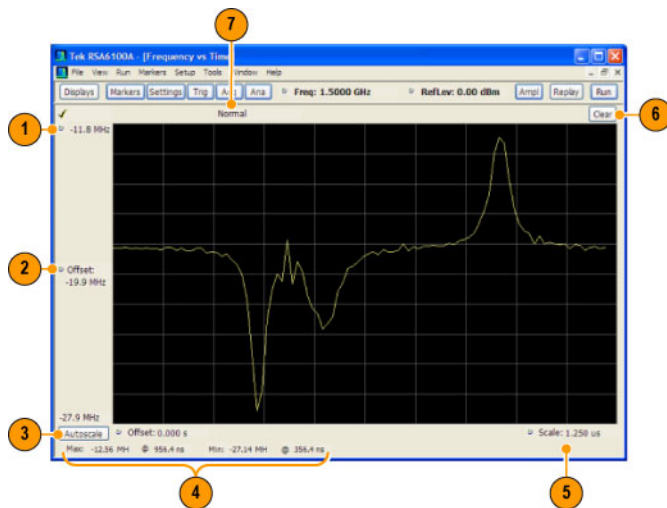
Item	Display element	Description
1	Top of graph adjustment	Use the knob to adjust the frequency range displayed on the vertical axis.
2	Offset adjustment	Adjusts the frequency shown at the center of the display.
3	Autoscale button	Adjusts the offset and range for both vertical and horizontal to provide the best display.
4	Maximum and Minimum frequency readouts	Displays the maximum and minimum values, as well as when those values occur.
5	Horizontal Scale	Sets the time spanned by the graph.
6	Clear button	Restarts Average trace.
7	Trace function	Displays the current trace function setting (Settings > Trace > Function).

Phase vs. Time Display

The Phase vs. Time display plots the signal phase against time. The phase appears on the vertical axis while time is plotted along the horizontal axis.

Note that the trace(s) in the Phase vs. Time display can be set to a maximum of 100,000 points (however, the actual number of trace points can extend up to 1,000,000 points if Max trace points is set to Never Decimate). If the Analysis Length includes more than the selected Max trace points value, the trace is decimated (using the method specified with the Detection control) to be equal to or less than the Max trace points setting (except when Max trace points is set to Never Decimate). This decimated (or undecimated) trace is what is used for marker measurements and for results export. You can set the Max trace points on the **Settings** > **Prefs** tab.

To display Phase vs Time:

1. Press the **Displays** button or select **Setup** > **Displays**.

2. In the **Select Displays** dialog, select **General Signal Viewing** in the **Folders** box.

3. In the **Available displays** box, double-click the **Phase vs Time** icon or select the icon and click **Add**. The Phase vs Time icon will appear in the **Selected displays** box and will no longer appear under Available displays.

4. Click **OK** to show the Phase vs Time display.

Elements of the Display
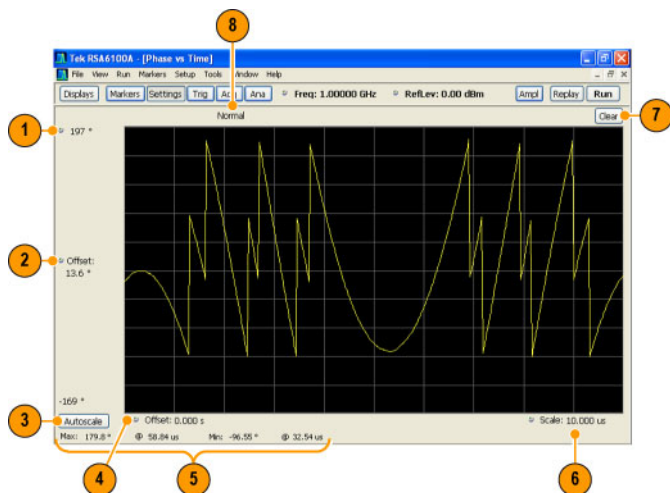
Item	Display element	Description
1	Top of graph adjustment	Adjusts the vertical scale. Use the knob to adjust the value of the top of the graph.
2	Vertical offset adjustment	Adjusts the phase error shown at the vertical center of the display.
3	Autoscale button	Adjusts the vertical and horizontal settings so that the entire trace fits in the view.
4	Horizontal Offset	Adjusts the horizontal position of the trace.
5	Max and Min readouts	Displays the maximum and minimum value of the phase error within the analysis times and the times at which they occurred.
6	Horizontal Scale	Sets the time spanned by the graph.
7	Clear button	Restarts multi-trace functions (Avg, Hold).
8	Trace function	Shows the trace function as set on the Settings > Trace tab.

RF I & Q vs. Time Display

This is a plot of the baseband In-Phase (I) and Quadrature (Q) components of a modulated carrier. The plot is in the time domain, with I and/or Q values the Y-axis.

Note that the trace(s) in the RF I & Q vs. Time display can be set to a maximum of 100,000 points (however, the actual number of trace points can extend up to 1,000,000 points if Max trace points is set to Never Decimate). If the Analysis Length includes more than the selected Max trace points value, the trace is decimated (using the method specified with the Detection control) to be equal to or less than the Max trace points setting (except when Max trace points is set to Never Decimate). This decimated (or

undecimated) trace is what is used for marker measurements and for results export. You can set the Max trace points on the **Settings** > **Prefs** tab.

To display an RF I & Q vs. Time display:

1. Select the **Displays** button or select **Setup** > **Displays**. This shows the **Select Displays** dialog.

2. From the **Folders** box, select **General Signal Viewing**.

3. Double-click the **RF I&Q vs Time** icon in the **Available Displays** box. This adds the RF I & Q vs. Time icon to the **Selected displays** box.

4. Click the **OK** button.

Elements of the Display
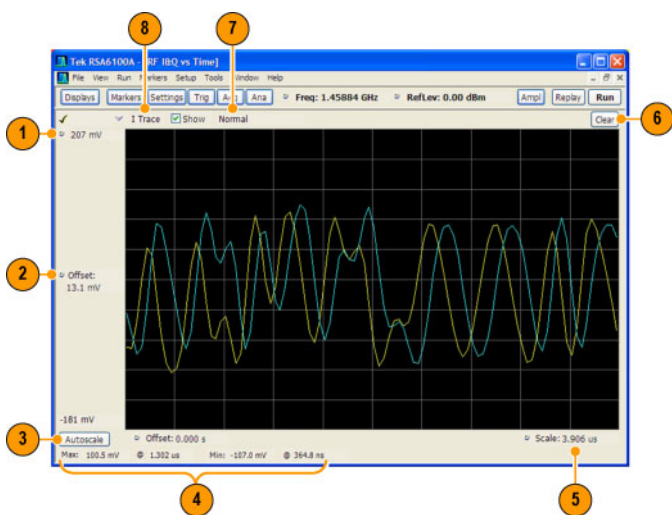
Item	Display element	Description
1	Top of Graph adjustment	Use the knob to adjust the vertical scaling.
2	Vertical offset adjustment	Adjusts the level shown at the center of the display.
3	Autoscale button	Adjusts the offset and scale for both vertical and horizontal to provide the best display.
4	Maximum and Minimum level readouts	Displays the maximum and minimum values, within the Analysis Time, as well as the times at which they occurred.
5	Scale	Sets the time spanned by the graph.
6	Clear button	Restarts multi-trace functions (Avg , Hold).
7	Trace function	Displays the current trace function setting (Settings > Trace > Function). If the traces are averaged, the number of averages is displayed.
8	Trace Control	Selects which trace is displayed (using the drop-down list) and which trace is active (click on the trace name to display a menu).

Spectrogram Display

The Spectrogram is a display with the vertical axis (time) composed of successive spectral displays, each having the amplitude represented by color or intensity. The horizontal axis represents frequency. The most recently acquired spectrum results are added to the bottom of the spectrogram. The addition of a new spectrum can occur at the fastest rate that new spectra can be plotted, or, if you choose, new spectra can be added at a timed rate. The spectrogram view is well-suited to displaying long-term trends of spectral data. The maximum number of lines that can be displayed in a spectrogram is 125,000.

NOTE. Spectrogram data is shared with the Spectrum display. There is no linkage between DPX and Spectrogram.

To display a Spectrogram:

1. Select the **Displays** button or select **Setup** > **Displays**. This displays the **Select Displays** dialog.

2. From the **Folders** box, select **General Signal Viewing**.

3. Double-click the **Spectrogram** icon in the **Available Displays** box. This adds the Spectrogram icon to the Selected displays box.

4. Click the **OK** button. This displays the spectrogram view.

Elements of the Spectrogram Display
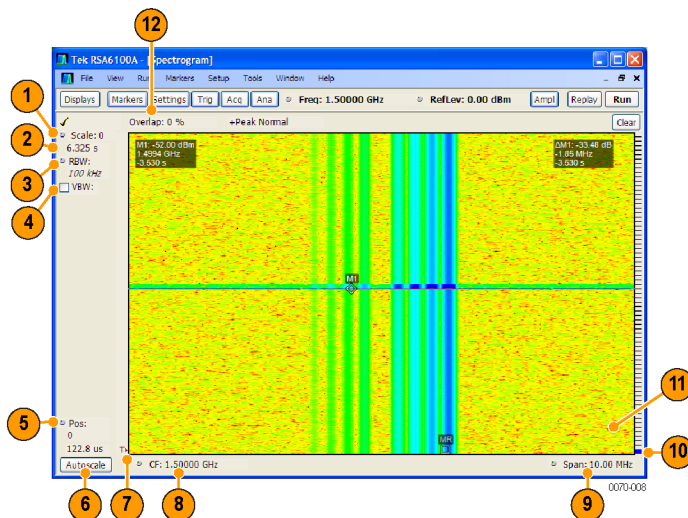
Item	Display element	Description
1	Scale	Sets the vertical scale factor, increasing or decreasing the amount of time in each line.
2	Total time	This value represents the total time displayed in the Spectrogram.
3	RBW	Sets the resolution bandwidth. Note that when the RBW is set to Auto, its value is italicized.
4	VBW	Enables the VBW (Video Bandwidth) filter. See Setup > Settings > BW tab (see page 127).
5	Pos	Position indicates the bottom line visible in graph.
6	Autoscale	Resets Vertical and Horizontal scale and Pos to default values.
7	T	Trigger indicator. This icon indicates the trigger point within the current acquisition.
8	CF	Sets the Center Frequency.
9	Span	Sets the span of the spectrogram display.
10	Current data record indicator	This blue line indicates the current data record. When the analysis length is short, the blue line appears as a thin line much like the selected indicator line. When the analysis length is relatively long, the blue line is much taller, as shown in the illustration.
11	Selected indicator	This line indicates the line that will appear in the Spectrum display (if the Spectrogram trace is enabled in the Spectrum display). This line is attached to the selected marker.
12	Overlap	Shows what portions of its time period a given line shares with previous or later lines.

The Spectrogram can show results from one or multiple acquisitions and it can show one or multiple lines for each acquisition.

Changing the Spectrogram Display Settings (see page 114)

Spectrum Display

To display a spectrum:

1. Click the **Displays** button or select **Setup** > **Displays**.

2. From the Folders box, select **General Signal Viewing**.

3. Double-click the **Spectrum** icon in the **Available displays** box. This adds the Spectrum icon to the **Selected displays** box (and removes it from the Available displays box). Alternately, you can click the Spectrum icon and then click the Add button to select Spectrum for display.

4. Click the **OK** button.

Elements of the Spectrum Display
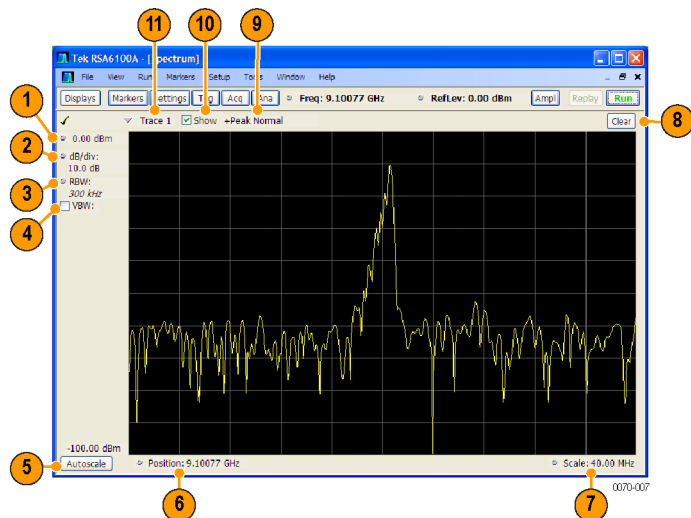
Item	Display element	Description
1	Vert Offset	Sets the top of graph value. This is only a visual control for panning the graph. The Reference Level is adjusted in the Toolbar and the Ampl control panel. By default, Vert Offset = Ref Level.
2	dB/div	Sets the vertical scale value. The maximum value is 20.00 dB/division.
3	RBW	Sets the resolution bandwidth. Note that when the RBW is set to Auto, its value is italicized.
4	VBW	Enables the VBW (Video Bandwidth) filter. See Setup > Settings > BW tab (see page 127).
5	Autoscale	Adjusts the Vertical and Horizontal scaling to display the entire trace on screen.
6	Position	Default function is CF - center frequency (equivalent to the Freq setting). If Horizontal scaling has been manually adjusted in Settings > Scale, then Offset will replace CF as the setting at the bottom-left corner of the screen.
7	Span / Scale	Default function is Span - frequency difference between the left edge of the display and the right edge. If Horizontal scaling has been manually adjusted in Settings > Scale, then Scale will replace Span as the setting at the bottom-right corner of the screen.
8	Clear	Restarts multi-trace functions (Avg, Hold).
9	Function	Readout of the Detection and Function selections for the selected trace.
10	Show	Controls whether the selected Trace is visible or not. When trace is Off, the box is not checked.
11	Trace	Selects a trace. Touching here pops up a context menu listing the available traces, whether they are enabled or not. If user selects a trace that is not currently enabled, it will be made enabled.

Touchscreen Actions On Markers in the Graph Area

Action	Description
Mouse click within 1/2 div. of a marker	Selects the marker and updates the marker display to show the selected markers values.
Touch marker to select and then use knob, or arrow keys	Adjust the setting associated with the Marker.
Touch and drag a marker	Changes marker position to the "drop point".

Changing the Spectrum Display Settings (see page 114)

Time Overview

The Time Overview is a display that shows the entire acquisition record and shows you how the spectrum time and analysis time fit within the acquisition record. This enables you to see how you can adjust the spectrum time and analysis time to measure portions of the data.

Note that the trace(s) in the Time Overview display is limited to 10,000 points. If the Analysis Length includes more than 10,000 sample points, the trace is decimated (using the +Peak method, similar to +Peak detection in a Spectrum display) to 10,000 points. This decimated trace is what is used for marker measurements.

The Time Overview window displays the Spectrum Length and Analysis Length. The Spectrum Length is the period of time within the acquisition record over which the spectrum is calculated. The Analysis Time is the period of time within the acquisition record over which most measurements (such as Amplitude vs. Time) are made. The Spectrum Length and Analysis Length can be locked together so that the data used to produce the Spectrum display is also used for measurement displays; however, they do not have to be tied together. They are by default specified separately and used to analyze different parts of the acquisition record.

Elements of the Display
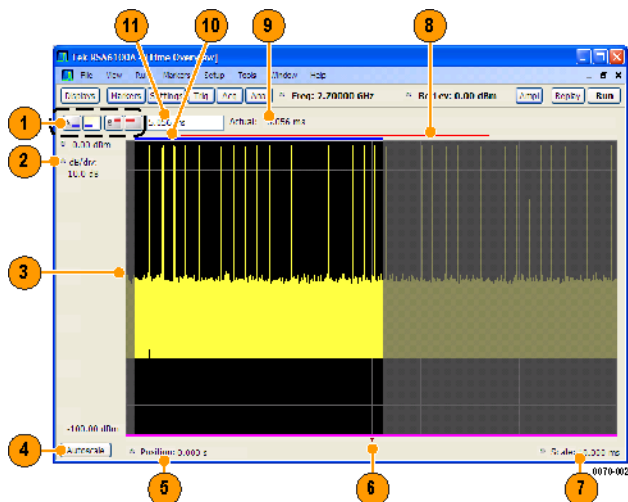
Item	Element	Description
1	Analysis Time Control	Click a button to select the value to be adjusted. In order, the buttons represent Analysis Offset, Analysis Length, Spectrum Offset, and Spectrum Length.
2	Offset and Scale	Adjusts the vertical scale and offset.
3	Amplitude vs. Time graph	The trace represents the entire acquisition record (at full horizontal scale). The graph indicates the Analysis Length or Spectrum Length on the graph with a darker background.
4	Autoscale button	Resets the horizontal scale to display the entire acquisition record and the vertical scale to show all trace points.
5	Horizontal Offset	Adjusts the horizontal offset.
6	Results Timeline	This fuchsia line indicates the portion of the record actually used for calculating the selected result. For example: if a pulse measurement is selected, it shows the period of the specific pulse. For a constellation display, it shows the points included in the demodulation.
7	Horizontal Scale	Adjusts the span of the graph. By decreasing the scale, the graph essentially becomes a window that you can move over the acquisition record by adjusting the offset.
8	Spectrum Length and Offset Indicator	This red line indicates the Spectrum Length and Offset. The longer the time, the longer the bar. Adjusting the offset shifts the bar left or right.
9	Actual length display	Displays the actual time for the selected value. If the user-adjusted length extends past the end of the acquisition record, the realizable analysis length is less than requested.
10	Analysis Length and Offset Indicator	This blue line indicates the Analysis Length and Offset. The longer the time, the longer the bar. Adjusting the offset shifts the bar left or right.
11	Setting Adjustment box	Click in this box to adjust the value selected by the Analysis Time Control buttons.

NOTE. *The area with black background (not gray) in the Amplitude vs Time Graph highlights the control selected in the Analysis Time Control drop-down list.*

Changing the Time Overview Display Settings (see page 115)

Constellation Display

The Constellation Display shows a digitally-modulated signal in constellation form.

NOTE. *A maximum of 80,000 samples can be analyzed.*

To show the Constellation Display:

1. Select the **Displays** button or select **Setup** > **Displays**. This shows the **Select Displays** dialog.

2. From the **Folders** box, select **GP Digital Modulation**.

3. Double-click the **Constellation** icon in the **Available Displays** box. This adds the Constellation icon to the **Selected displays** box.

4. Click the **OK** button. This shows the Constellation display.

Elements of the Constellation Display
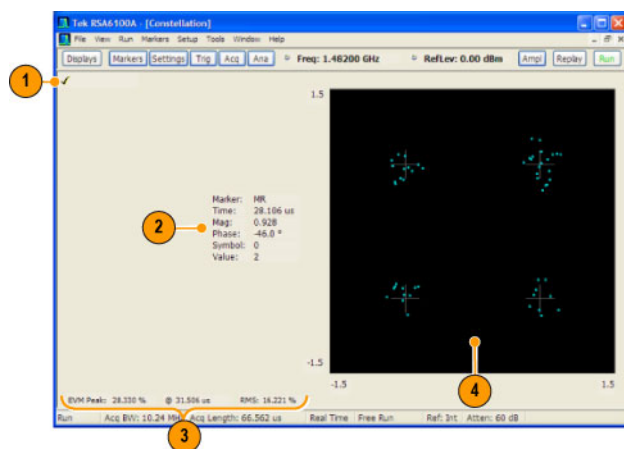
Item	Display element	Description
1	Check mark indicator	The check mark indicator in the upper, left-hand corner of the display shows when the Constellation display is the optimized display.
2	Marker Readout	Located to the left of the constellation plot or below it, depending on the size of the window. If markers are enabled, the marker readout shows the time, mag, phase, symbol marker and symbol value of the point with the selected marker.
3	EVM Readouts	The EVM readouts are located below the Constellation plot. The readout shows EVM Peak (%) and location, RMS (%).
4	Plot	Constellation graph.

Changing Constellation Display Settings (see page 107)

EVM vs Time Display

The EVM vs Time Display shows the Error Vector Magnitude plotted over Time.

NOTE. *A maximum of 80,000 samples can be analyzed.*

To show an EVM vs Time display:

1. Press the **Displays** button or select **Setup** > **Displays**. This shows the **Select Displays** dialog.

2. From the **Folders** box, select **GP Digital Modulation**.

3. Double-click the **EVM vs Time** icon in the **Available Displays** box. This adds the EVM vs Time icon to the **Selected displays** box.

4. Click the **OK** button. This displays the EVM vs Time view.

Elements of the EVM vs Time Display
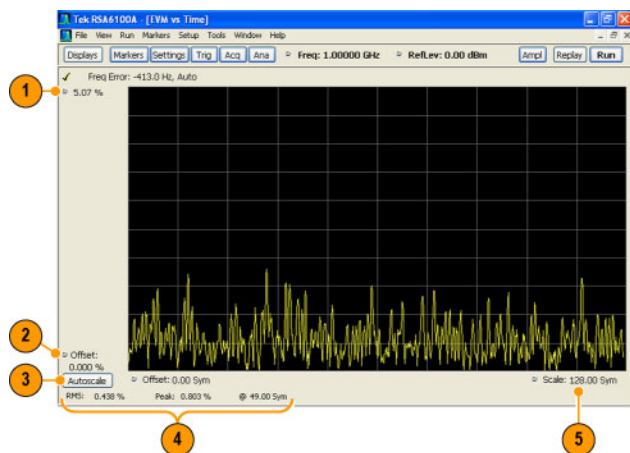
Item	Display element	Description
1	Top of graph adjustment	Use the knob to adjust the vertical scale.
2	Offset	Adjusts the vertical position.
3	Autoscale	Adjusts the Horizontal and Vertical scale to show the entire trace.
4	Peak and RMS value readout	Shows the maximum result, the time it occurred, and the RMS of the result over the entire analysis length.
5	Scale	Sets the length of time shown in the graph.

Changing the EVM vs Time Display Settings (see page

Magnitude Error vs Time Display

The Magnitude Error displays the magnitude of the symbol error. The amplitude appears on the vertical axis while time is plotted along the horizontal axis.

NOTE. A maximum of 80,000 samples can be analyzed.

To display Magnitude Error vs Time:

1. Select the **Displays** button or **Setup** > **Displays**. This displays the Select Displays dialog.

2. Select **GP Digital Modulation** in the **Folders** box.

3. Double-click the **Mag Error vs Time** icon or select the icon and click **Add**. The icon will appear in the **Selected displays** box and will no longer appear under Available displays.

4. Click **OK**.

Elements of the Display
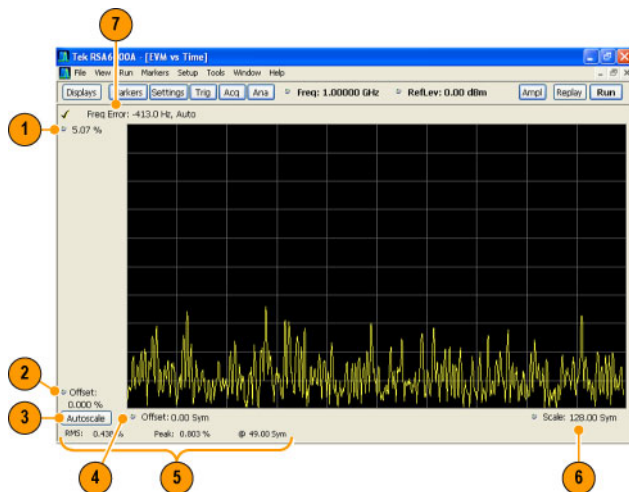
Item	Display element	Description
1	Top of graph adjustment	Use the knob to adjust the value of the vertical scale.
2	Offset adjustment	Adjusts the level shown at the bottom of the display.
3	Autoscale button	Adjusts the vertical and horizontal settings to provide the best display.
4	Horizontal Offset	Adjusts the horizontal position of the signal. Units can be either Symbols or Seconds (Settings > Analysis Time tab > Units).
5	Peak and RMS value readout	Displays the Peak value of the magnitude error, the RMS value of the magnitude error, and the time at which it occurs within the acquisition. Units can be either Symbols or Seconds (Settings > Analysis Time tab > Units).
6	Horizontal Scale	Sets the time spanned by the graph. Units can be either Symbols or Seconds (Settings > Analysis Time tab > Units).
7	Freq Error	Freq Error is the difference between the Center Frequency and the measured frequency of the signal being tested. This readout will be Freq Offset if the Freq Offset parameter on the Settings > Advanced Params (see page 120) tab is set to Manual.

Changing Magnitude Error vs Time Display Settings (see page 108)

Phase Error vs Time Display

The Phase Error vs Time display shows the phase angle of the symbol error over time. The phase is plotted along the vertical axis while time is plotted along the horizontal axis.

NOTE. A maximum of 80,000 samples can be analyzed.

To show the Phase Error display:

1. Press the **Displays** button or select **Setup** > **Displays**.

2. In the **Select Displays** dialog, select **GP Digital Modulation** in the **Folders** box.

3. In the **Available displays** box, double-click the **Phase Error** icon or select the icon and click **Add**. The Phase Error icon will appear in the **Selected displays** box and will no longer appear under Available displays.

4. Click **OK** to display the Phase Error.

Elements of the Display
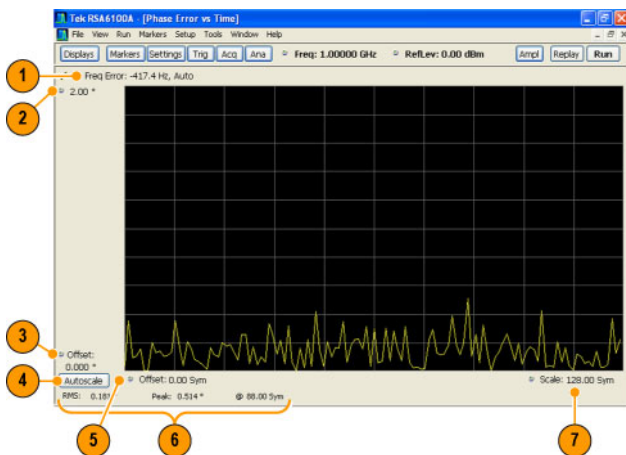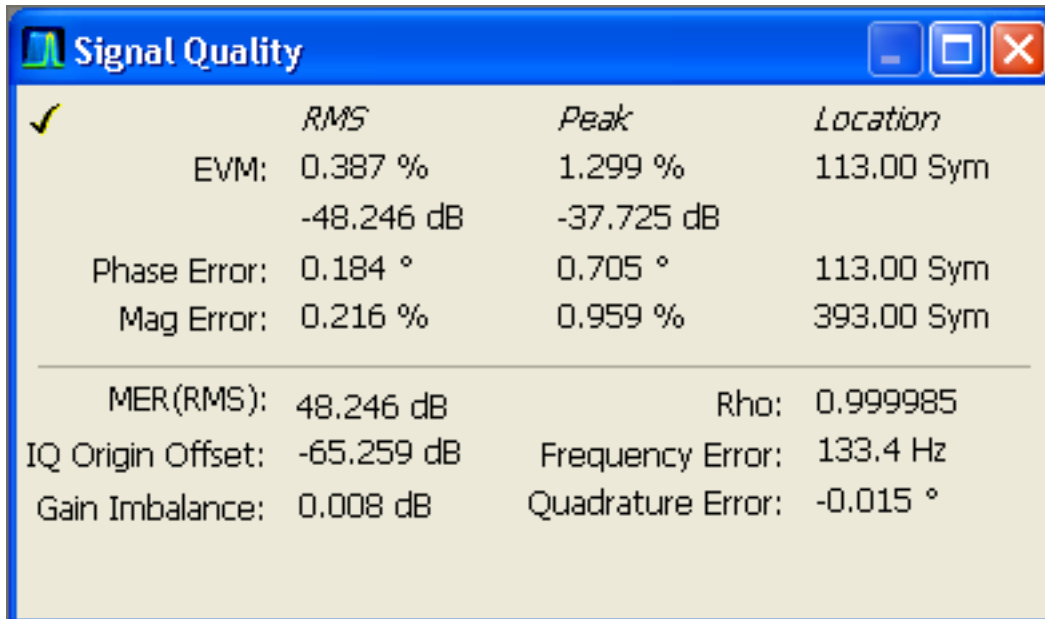
Item	Display element	Description
1	Freq Error	Freq Error is the difference between the Center Frequency and the measured frequency of the signal being tested. This readout will be Freq Offset if the Freq Offset parameter on the Settings > Advanced Params (see page 120) tab is set to Manual.
2	Top of graph adjustment	Adjusts the phase angle shown at the top of the graph.
3	Offset	Adjusts the vertical offset.
4	Autoscale	Adjusts the vertical and horizontal settings so that the entire trace fits in the graph.
5	Offset	Adjusts the horizontal offset.
6	Peak and RMS readouts	Displays the Peak value of the phase error and the time at which it occurred. Also displays the RMS value over the analysis length.
7	Scale	Sets the time spanned by the graph.

Changing the Phase Error vs Time Display Settings (see page 110)

Signal Quality Display

The Signal Quality display shows several measurements of signal quality.

✓	RMS	Peak	Location
EVM:	0.387 %	1.299 %	113.00 Sym
	-48.246 dB	-37.725 dB	
Phase Error:	0.184 °	0.705 °	113.00 Sym
Mag Error:	0.216 %	0.959 %	393.00 Sym

MER(RMS):	48.246 dB	Rho:	0.999985
IQ Origin Offset:	-65.259 dB	Frequency Error:	133.4 Hz
Gain Imbalance:	0.008 dB	Quadrature Error:	-0.015 °

Elements of the Display

Measurement	Description
EVM	The normalized RMS value of the error vector between the measured signal and the ideal reference signal over the analysis length. The EVM is generally measured on symbol or chip instants and is reported in units of percent and dB. EVM is usually measured after best-fit estimates of the frequency error and a fixed phase offset have been removed. These estimates are made over the analysis length. Displays RMS and Peak values with location of Peak value.
Phase Error	The RMS phase difference between the measured signal and the ideal reference signal. Displays RMS and Peak values with location of Peak value.
Mag Error	The RMS magnitude difference between the measured signal and the reference signal magnitude. Displays RMS and Peak values with location of Peak value.
MER (RMS)	The MER is defined as the ratio of I/Q signal power to I/Q noise power; the result is indicated in dB.
IQ Origin Offset	The magnitude of the DC offset of the signal measured at the symbol times. It indicates the magnitude of the carrier feed-through signal.
Frequency Error	The frequency difference between the measured carrier frequency of the signal and the user-selected center frequency of the instrument.
Gain Imbalance	The gain difference between the I and Q channels in the signal generation path. Constellations with gain imbalance show a pattern with a width that is different form height.
Quadrature Error	The orthogonal error between the I and Q channels. The error shows the phase difference between I and Q channels away from the ideal 90 degrees expected from the perfect I/Q modulation. Not valid for BPSK modulation type.
Rho	The normalized correlated power of the measured signal and the ideal reference signal. Like EVM, Rho is a measure of modulation quality. The value of Rho is less than 1 in all practical cases and is equal to 1 for a perfect signal measured in a perfect receiver.

Changing the Signal Quality Display Settings (see page 113)

Symbol Table Display

The Symbol Table Display is like the Constellation Display except that a text table is used to display data bits at a symbol rather than a graph. The Synch Word characters, if used, are in bold font.

To display the Symbol Table:

1. Select the **Displays** button or select **Setup** > **Displays**. This displays the **Select Displays** dialog.

2. From the **Folders** box, select **GP Digital Modulation**.

3. Double-click the **Symbol Table** icon in the **Available Displays** box. This adds the Symbol Table icon to the **Selected displays** box.

4. Click the **OK** button. This displays the Symbol Table view.
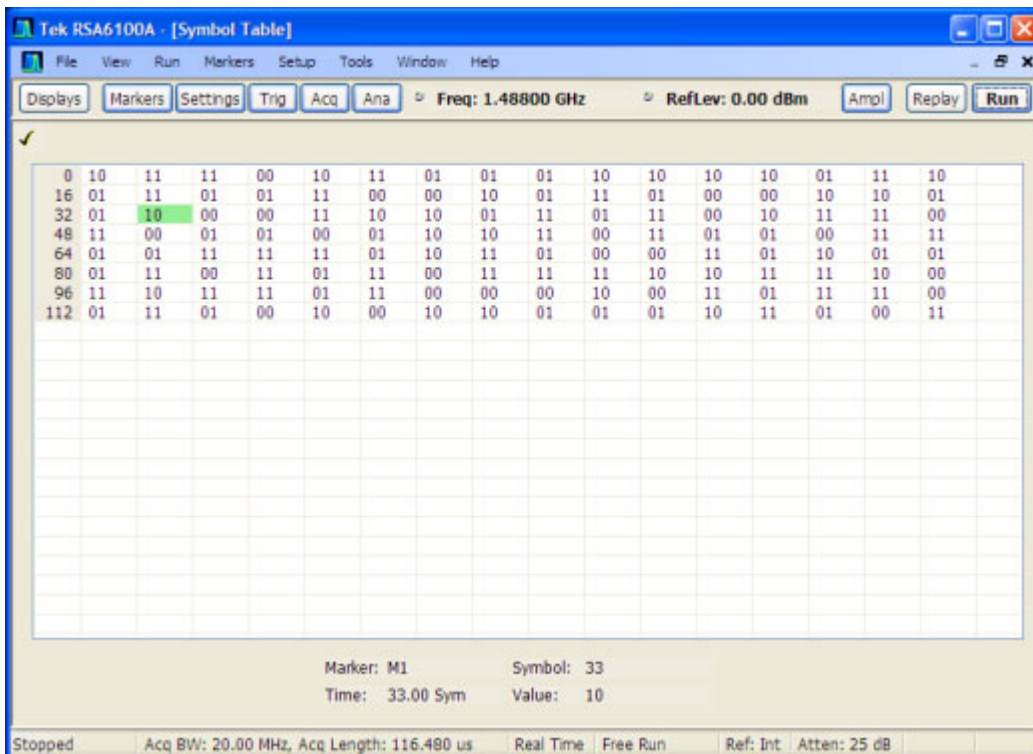
Using Markers

Markers are indicators in the display that you can position on a trace to measure values such as frequency, power, and time. A Marker always displays its position and, if the Delta readout is enabled, will display the difference between its position and that of the Marker Reference. Within the Symbol Table, colored cells indicate the location of markers. The selected Marker is highlighted with a light green background. All other markers are highlighted with a light gray background. In the Symbol Table, the marker readout below the table shows the marker location in time, symbol numbers and symbol value.

Changing the Symbol Table Display Settings (see page 115)

CCDF Display

The CCDF (Complementary Cumulative Distribution Function) is a statistical characterization that plots power level on the x-axis and probability on the y-axis of a graph. Each point on the CCDF curve shows what percentage of time a signal spends at or above a given power level. The power level is expressed in dB relative to the average signal power level. The CCDF Display also shows the Average power level and the Peak/Average ratio.

To show the CCDF display:

1. Press the **Displays** button or select **Setup** > **Displays**. This shows the **Select Displays** dialog.

2. From the **Folders** box, select **RF Measurements**.

3. Double-click the **CCDF** icon in the **Available Displays** box. This adds the CCDF icon to the **Selected displays** box.

4. Click the **OK** button.

Elements of the CCDF Display
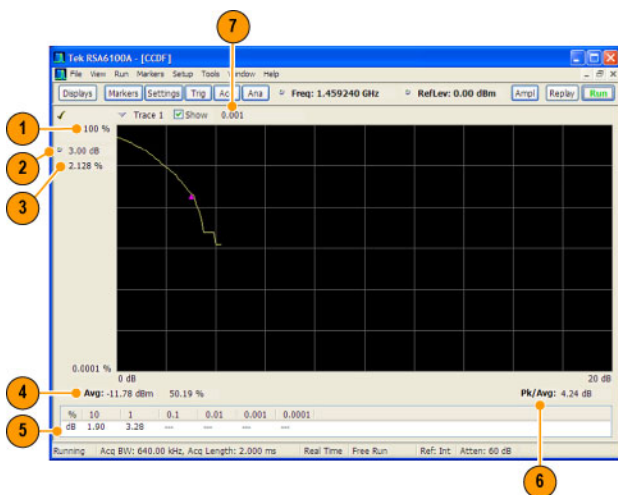
Item	Display element	Description
1	100%	The top of the graph represents the 100% probability that the signal will be at or above the average signal level.
2	Power level select	Adjust to display the value of the CCDF curve at a specific power level. The selected power level is indicated by a small triangle on the CCDF curve.
3	CCDF value	Readout of the value of the CCDF curve at the selected power level.
4	Avg	Readout of the Average power level and the CCDF value at the Average power level.
5	Readout Table	Readout of the CCDF curve at six points.
6	Pk / Avg	Readout of the Peak to Average power ratio.
7	Measurement time	Readout of the length of time used for the measurement. Displays **--- s** when the Measurement time is set to continuous.

Changing the CCDF Display Settings

Channel Power and ACPR (Adjacent Channel Power Ratio) Display

Use the **Channel Power and ACPR** measurement to measure channel power by itself, or adjacent channel leakage ratio with one main channel.
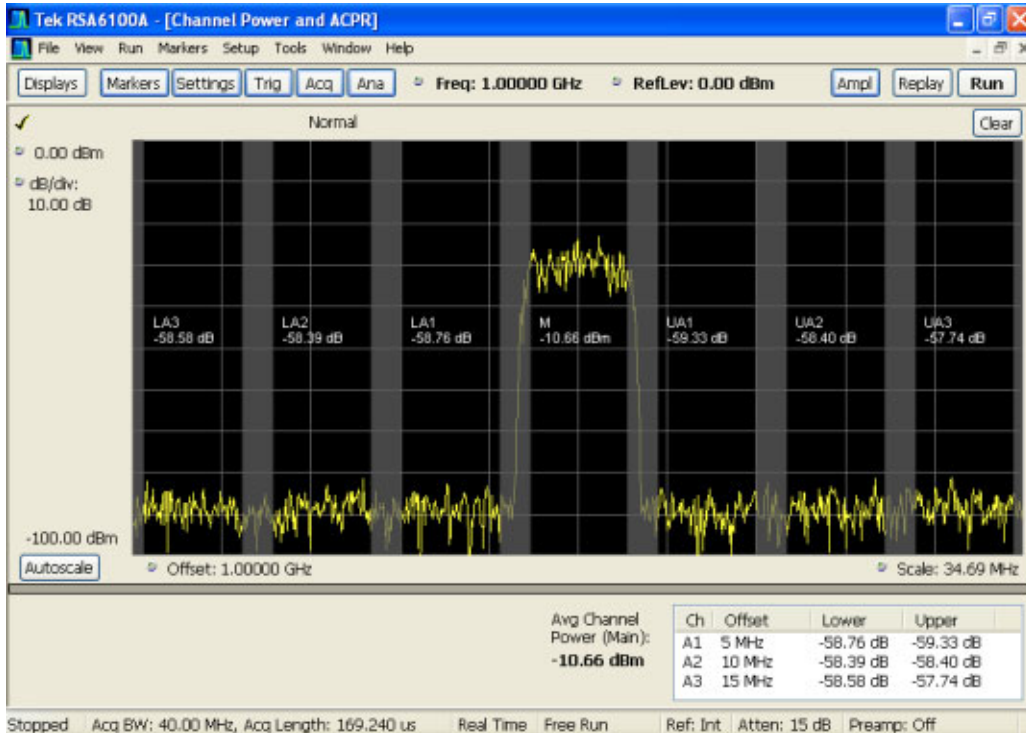
Measuring Adjacent Channel Power Ratio

1. Select the **Displays** button.

2. Select **RF Measurements** from the **Folders** box.

3. Double-click **Chan Power and ACPR** in the Available displays box. Click **OK** to complete your selection.

4. Press the front-panel **Freq** button and use the front panel keypad or knob to adjust the frequency to that of your main channel.

5. Press the **Settings** button. This displays the control panel for Chan Power and ACPR (the tab displayed will be the tab displayed the last time the Settings panel was opened).
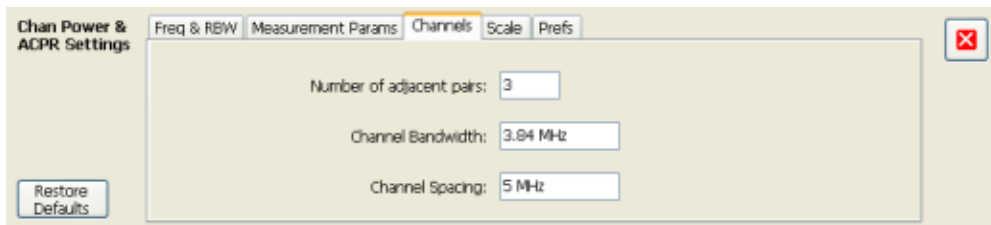
6. To set the number of adjacent channels, select the **Channels** tab. Enter the number of channels in the **Number of adjacent pairs** value box. If zero is entered for the number of adjacent pairs, the resultant measurement will be channel power only.

NOTE: As you add adjacent channels, the span of the display is adjusted so that all the channels can be seen. Use the horizontal scale and offset to zoom the display in on any portion of the trace.

7. To set the spacing between channel centers, enter the required value in the **Channel Spacing** value box.

8. To set the channel bandwidth, enter the required value in the **Channel Bandwidth** value box.

9. After you have configured the channel settings, click the close button ( ) in the Settings panel or press the **Settings** button again to remove the settings panel.

10. Press the **Run** button to take the measurements.

Viewing results

Measurement results are displayed in a table below the graph and within the graph itself (which can be enabled/disabled in the Settings > Prefs tab). To see all measurements, you might need to scroll the table. The size of the results table can be changed by dragging the horizontal divider bar between the graph and table areas.

Avg Channel Power (Main): -10.66 dBm	Ch	Offset	Lower	Upper	
	A1	5 MHz	-58.76 dB	-59.33 dB	
	A2	10 MHz	-58.39 dB	-58.40 dB	
	A3	15 MHz	-58.58 dB	-57.74 dB	

Heading	Description
Channel	Identifies the displayed channels. A1 means the first adjacent channel. A2 means second adjacent channel. Adjacent channels are numbered according to their offset from the Main channel. The closest channel is numbered 1. The next closest channel is numbered 2; and so forth.
Lower	The power measured for the lower adjacent channel. Adjacent channel power measurements are displayed in dB relative to the Main channel.
Upper	The power measured for the upper adjacent channel. Adjacent channels power measurements are displayed in dB relative to the Main channel.
Avg Channel Power (Main)	The power measured for the Main channel. The detection type used for measuring channel power and adjacent channel powers is Average. This means that the average of the linear (pre-log) samples is used to determine the power. The Main channel power is displayed in dBm.

Setting ACPR Measurement Parameters (see page 165)

MCPR (Multiple Carrier Power Ratio) Display

Use the MCPR measurement to measure adjacent channel power ratio for multiple main channels or when adjacent channels have different offsets and/or bandwidths. The MCPR display show the Reference Power and the ratio of each adjacent channel to the Reference Power. You can select whether the Reference Power is the total of all active channels or a single channel.

Measuring Multiple Carrier Power Ratio

1. Press the front-panel **Displays** button.

2. From the **Select Displays** window, select **RF Measurements** from the Folders box.

3. Double-click the **MCPR** icon in the **Available displays** box. Click **OK** to complete your selection.

4. Press the front-panel **Freq** button and use the front panel keypad or knob to adjust the frequency to that of the main channel. Select **Meas. Freq** to set the measurement frequency. Use the front panel knob to adjust the frequency.

5. Press the **Settings** button. This displays the control panel for MCPR (the tab displayed will be the tab displayed the last time the Settings panel was opened).
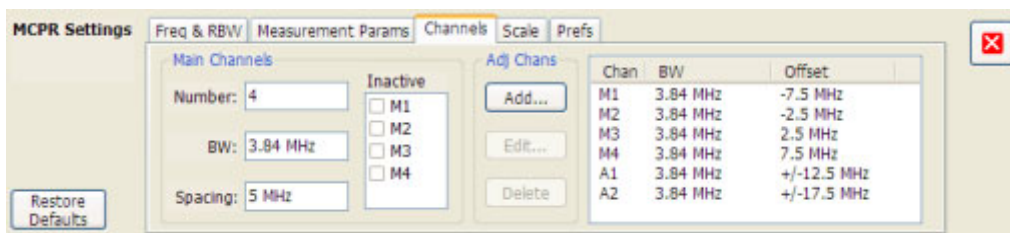
6. Click on the **Channels** tab. To set the number of Main channels, enter the number of Main channels in the **Number** text entry box under **Main Channels**.

NOTE. *As you add channels, the span of the display will be adjusted so that all the channels can be seen.*

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7. To set the bandwidth of all main channels, enter a value in the **BW** value box.

8. To set the spacing between the main channels, enter a value in the **Spacing** value box.

9. To prevent a main channel power level from being included in the Power Reference (Total) calculation, select the channel to be excluded in the **Inactive** box.

10. To add adjacent channels, click the **Add...** button under **Adj Chans**.
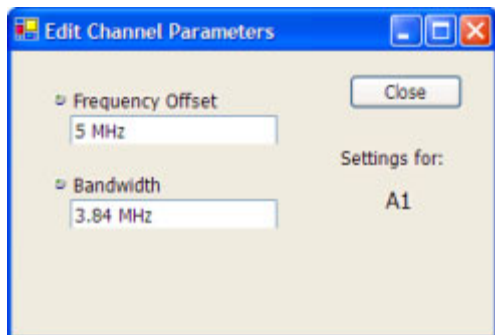
11. To edit Frequency Offset or Bandwidth, click within the value box and use the front-panel knob or your keyboard to set the value. Click **Close** to save your changes.

NOTE. *Frequency Offset is the difference between the center frequency of the selected channel and the Measurement Frequency. All channels (Main or Adjacent) are specified by their offset from the Measurement Frequency.*

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12. After you have configured the Main and Adjacent channels, click the close button ( ) in the Settings panel or the **Settings** button to remove the settings panel.

13. Click the Run button ( ) to take the measurements.

Viewing results

MCPR measurement results are displayed both in the main display and in a table below the spectrum display. Individual Main channel power measurements appear in the Main display under the channel identifier. Individual adjacent channel power ratios also appear in the main display under the adjacent channel identifier.
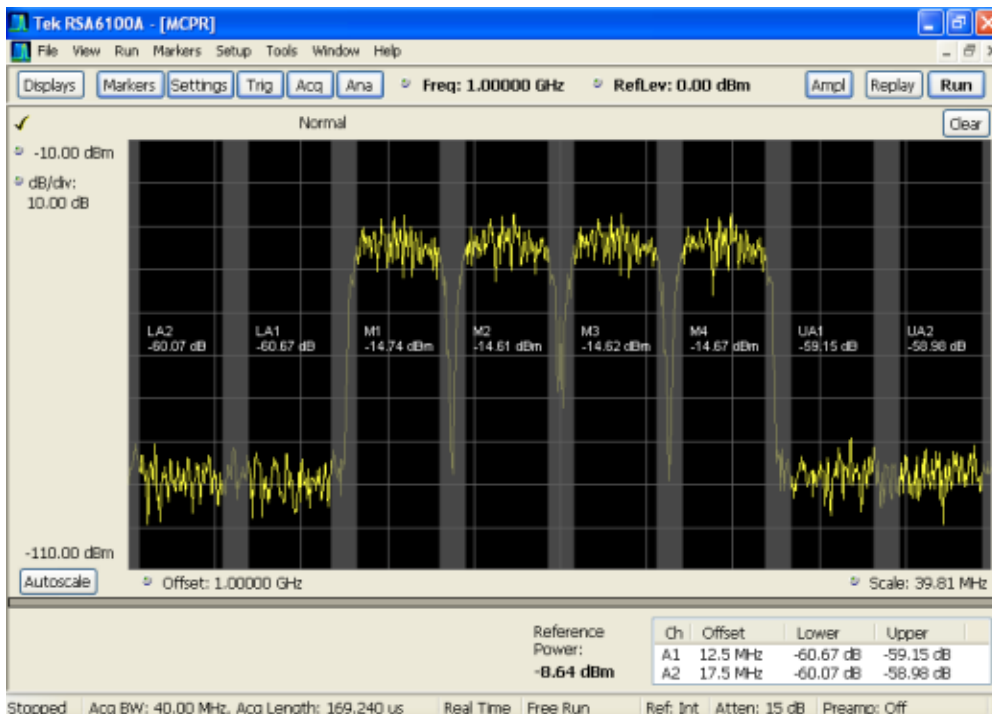
The following table details the entries in the results table.

Heading	Description
Ch	Identifies the adjacent channels. Adjacent channels are numbered according to their offset from the Main channel. The closest channel is numbered 1. The next closet channel is numbered 2; and so forth.
Offset	The offset is the difference in frequency between the Measurement Frequency and the center frequency of the channel.
Lower	Displays the ratio of the lower adjacent channel power to the Power Reference.
Upper	Displays the ratio of the upper adjacent channel power to the Power Reference.
Power Reference	The result of averaging the Main Channels together (excluding inactive channels).

Depending on the number of adjacent channels, to see all the measurements, you might need to drag the divider bar between the main display and the results table at the bottom of the window to change the height of the results table.

Occupied BW & x dB BW Display

The Occupied BW display shows the bandwidth within which 99% (a user-defined value, the default is 99%) of the power transmitted within the measurement bandwidth.

To show the Occupied BW display:

1. Press the **Displays** button or select **Setup** > **Displays**.

2. In the **Select Displays** dialog, select **RF Measurements** in the **Folders** box.

3. In the **Available displays** box, double-click the **Occupied Bandwidth** icon or select the icon and click **Add**. The Occupied Bandwidth icon will appear in the **Selected displays** box and will no longer appear under Available displays.

4. Click **OK** to display the Occupied Bandwidth.

Elements of the Display
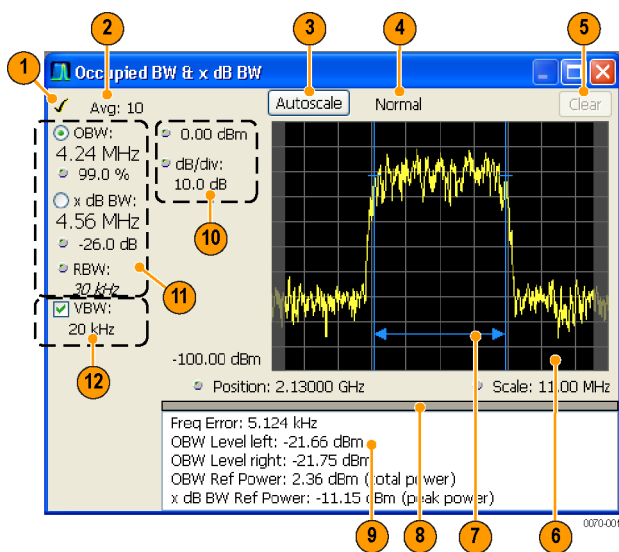
Item	Display element	Description
1	Check mark indicator	The check mark indicator denotes the display for which the acquisition hardware is optimized. This indictor appears only when the display is the selected display.
2	Averaging readout	Appears when averaging is enabled (Settings > Parameters tab > Average results). Displays "Avg: n of m" while averaging the results and "Avg: m" once the requested number of results have been averaged.
3	Autoscale	Adjusts the vertical and horizontal settings so that the entire trace fits in the graph.
4	Trace function readout	Displays either Normal or MaxHold to indicate trace function.
5	Clear	Resets count for Average and MaxHold functions. Enabled only when Averaging or MaxHold is enabled. Pressing Clear will clear the trace and, if acquisition is running, restart the averaging or hold process.
6	Graph	Displays the input signal. Shaded areas indicate the measurement bandwidth (Settings > Parameters tab > Measurement BW).
7	Blue lines	The blue lines indicate where the selected results (selected in the Main results area) are being measured on the trace.
8	Grid divider	Determines the portion of the display allocated to the graph and detailed results area. You can move the grid divider all the way to the top or bottom and any position in between.
9	Detailed results area	Displays additional measurements results.
10	Position and dB/div	Position sets the top of graph value. The dB/div setting is the vertical scale value.
11	Main results area	Displays results for Occupied Bandwidth (OBW) and x dB bandwidth. Use the two radio buttons to select which of the two results are illustrated in the graph with the blue lines and arrows. There are also controls for adjusting OBW % Power, x dB BW Level, and RBW.
12	VBW	Enables the VBW (Video Bandwidth) filter. Displays current VBW filter setting. See Setup > Settings > Freq & RBW tab (see page 150).

Detailed Results Readouts

Measurement	Description
Freq Error	The frequency difference between the measured carrier frequency of the signal and the user-selected center frequency of the analyzer.
OBW Level left	The signal level at the left edge of the occupied bandwidth.
OBW Level right	The signal level at the right edge of the occupied bandwidth.
OBW Ref Power	The total power measured within the measurement bandwidth.
x dB BW Ref Power	The peak power measured within the measurement bandwidth.

Changing the Occupied Bandwidth Settings (see page 109)

Phase Noise Display

To show the Phase Noise display:

1. Click the **Displays** button or select **Setup** > **Displays**.

2. From the Folders box, select **RF Measurements**.

3. Double-click the **Phase Noise** icon in the **Available displays** box. This adds the Phase Noise icon to the **Selected displays** box (and removes it from the Available displays box). Alternately, you can click the Phase Noise icon and then click the **Add** button to select Phase Noise for display, or drag the Phase Noise icon to the Selected Displays box.

4. Click the **OK** button.

Elements of the Phase Noise Display

Item	Display element	Description
1	Check Mark Indicator	Indicates the display for which the acquisition hardware is optimized.
2	Vert Position (dBc/Hz)	Sets the top of graph value. This is only a visual control for panning the graph.
3	Trace selector	Selects a trace.
4	Show checkbox	Shows/hides the selected trace.
5	Detection method / Average count	Displays the Detector method used for the trace. If Average detection is enabled, the number of averaged traces appears here.
6	Measurement Marker readout	Readout of the value of the phase noise at the selected offset. The Phase Noise measurement marker does not affect the results reported in the readouts or table below the graph, nor is it associated with markers in any other display.
7	Clear	Restarts multi-trace function (Average).
8	Horizontal stop	Readout of the Right Horizontal frequency value. This setting affects only visual scale, not measurement bandwidth. (See Settings > Scale (see page 189))
9	Measurement marker	Indicates the position of the measurement point.
10	Integration frequency range indicators	The gray-shaded areas denote the frequencies outside the integration frequency range. (See Settings > Frequency (see page 155))
11	Phase Noise Table	Displays the phase noise values at different offsets.
12	Horizontal start	Readout of the Left Horizontal frequency value. Affects only visual scaling, not measurement bandwidth. (See Settings > Scale (see page 189))
13	Measurement results readouts	Display of the different measured values.

Elements of the Measurement Results Readout / Phase Noise Table

Readout	Description
Carrier power	The power level at the carrier frequency.
Freq Error	The measured carrier frequency error.
RMS Phase Noise	The RMS value of the phase noise, measured over the Integration BW.
Jitter	The jitter in seconds, measured over the Integration BW. Includes the effects of random and coherent jitter.
Residual FM	The residual frequency modulation, measured over the Integration BW.
Trace 1	The phase noise on trace 1 at different frequency offset values.
Trace 2	The phase noise on trace 2 at different frequency offset values.

Changing the Phase Noise Settings (see page 110)

Spurious Display

To show the Spurious display:

1. Click the **Displays** button or select **Setup** > **Displays**.

2. From the Folders box, select **RF Measurements**.

3. Double-click the **Spurious** icon in the **Available displays** box. This adds the Spurious icon to the **Selected displays** box (and removes it from the Available displays box). Alternatively, you can click the Spurious icon and then click the Add button to select Spectrum for display.

4. Click the **OK** button.

Elements of the Spurious Display
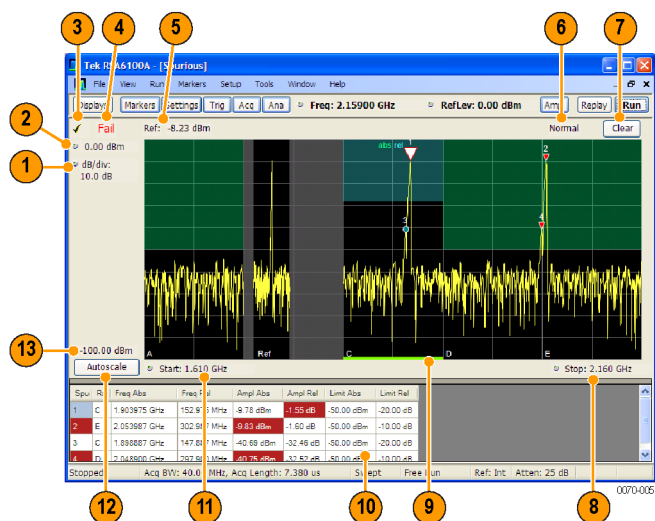
Item	Display element	Description
1	dB/ div	Sets the vertical scale value. The maximum value is 20.00 dB/division.
2	Vert Position	Sets the top of graph value. This is only a visual control for panning the graph. The Reference Level is adjusted in the Toolbar and the Ampl control panel. By default, Vert Position = Ref Level.
3	Check Mark Indicator	Indicates the display for which the acquisition hardware is optimized.
4	Pass / Fail readout	Indicates whether one or more spurs have exceeded a limit specified on the **Settings** > **Limits** tab.
5	Ref:	If enabled, displays the power reference level.
6	Trace function	Indicates the trace processing method. If Average or Max Hold is selected, this readout displays the number of traces being processed (averaged or compared for the Max Hold value).
7	Clear	Restarts multi-trace functions (Average, Max Hold).
8	Stop	Adjusts the graph stop frequency. This setting affects only visual scaling, not measurement parameters.
9	Green bar	Indicates the range that is selected on the Settings > Ranges and Settings > Limits tabs.
10	Spur table	Displays spur measurements. See table below for details.
11	Start	Adjusts the graph start frequency. This setting affects only visual scaling, not measurement parameters.
12	Autoscale	Adjusts the Vertical and Horizontal scaling to display the entire trace on screen. Selects Multi-range display mode.
13	Bottom-of-graph readout	Indicates the amplitude at the bottom of the graph. This value changes with the dB/div and Vertical Position settings.

Elements of the Spurious Graph Display
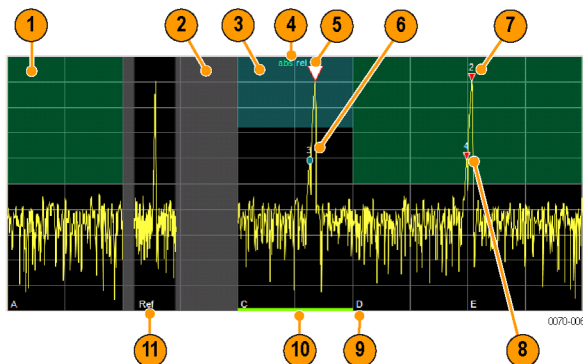
Item	Display element	Description
1		The green line or shading indicates an Abs (absolute) limit. The absolute limit is enabled when the mask is set to Abs, Abs & Rel, or Abs OR Rel. Note that absolute and relative amplitude masks can overlap.
2		The gray-shaded area indicates a portion of the spectrum where no measurements are being taken.
3		The cyan line or shading indicates a Relative limit. The relative limit is enabled when the mask is set to Rel, Abs & Rel, or Abs OR Rel. Note that absolute and relative amplitude masks can overlap.
4	abs rel	Reminder that green-shaded areas highlight absolute limits and cyan-shaded areas highlight relative limits.
5		This indicates the selected spur, when it is in violation of the limits. In Run mode, this is the peak spur violation. The selected marker is highlighted in the Spur table below the graph with a blue background.
6		A spur marker. Indicates a spur that does not exceed the mask settings. See the Settings > Limits tab (see page 158).
7		A violation marker. Indicates a spur that exceeds the mask settings. See the Settings > Limits tab (see page 158).
---		Indicates the selected spur when it is not in violation of the limits. The selected marker is highlighted in the Spur table below the graph with a blue background.
8	1, 2, 3...	A Spur number. The number indicates the row in the spur table that corresponds to the spur. The instrument can display up to 999 spurs.
9	A, B, C, D...	Identifies the enabled ranges.
10	Green bar	Indicates the range selected on the Settings > Limits (see page 158) and Settings > Ranges (see page 177) tabs.
11	Ref	Indicates the location of the power reference. See Settings > Reference (see page 179).

Elements of the Spur Table

Spur	Range	Freq Abs	Freq Rel	Ampl Abs	Ampl Rel	Limit Abs	Limit Rel
1	E	2.053987 GHz	302.987 MHz	-10.18 dBm	-2.05 dB	-50.00 dBm	-10.00 dB
2	C	1.903975 GHz	152.975 MHz	-10.25 dBm	-2.12 dB	-50.00 dBm	-20.00 dB
3	E	2.052888 GHz	301.887 MHz	-16.96 dBm	-8.83 dB	-50.00 dBm	-10.00 dB
4	C	1.903012 GHz	152.012 MHz	-17.24 dBm	-9.11 dB	-50.00 dBm	-20.00 dB
5	E	2.051925 GHz	300.925 MHz	-22.86 dBm	-14.74 dB	-50.00 dBm	-10.00 dB
6	C	1.901912 GHz	150.912 MHz	-22.98 dBm	-14.85 dB	-50.00 dBm	-20.00 dB
7	E	2.050962 GHz	299.962 MHz	-28.55 dBm	-20.42 dB	-50.00 dBm	-10.00 dB
8	C	1.900950 GHz	149.950 MHz	-28.85 dBm	-20.72 dB	-50.00 dBm	-20.00 dB
9	C	1.899025 GHz	148.025 MHz	-39.65 dBm	-31.52 dB	-50.00 dBm	-20.00 dB
10	D	2.049037 GHz	298.037 MHz	-39.81 dBm	-31.68 dB	-50.00 dBm	-10.00 dB

Column	Description
Spur	A number that identifies a spur in the graph area. The instrument can display a maximum of 999 spurs.
Range	The letter representing the frequency range where the spur is located.
Freq Abs	The absolute frequency at which the spur occurs.
Freq Rel	The relative frequency at which the spur occurs. The relative frequency is the difference between the absolute frequency (absolute) and the carrier frequency.
Ampl Abs	The absolute amplitude of the spur.
Ampl Rel	The relative amplitude at which the spur occurs. The relative amplitude is the difference between the absolute amplitude and the carrier amplitude. See the Settings > Limits tab.
Lim Abs	The value of the absolute amplitude limit at the spur frequency. This value can vary even with small spur frequency changes if the start and stop limit values are different. See the Settings > Limits tab (see page 158).
Lim Rel	The relative amplitude limit at which the spur occurs. This value can vary even with small spur frequency changes if the start and stop relative amplitude limit values are different. See the Settings > Limits tab (see page 158).
Blue background	The cell in the Spur column with a blue background identifies the selected spur.
Red background	Cells in the Spur column with a red background identify violations.
	Cells in the results area with a red background identify the measurement that exceeded a limit.

Rearranging the Columns in the Spur Table

You can rearrange the order of the columns in the Spur Table. To move a column, click on the column heading and drag it to the desired position.

Sorting the Rows in the Spur Table

You can sort the rows in the Spur table by clicking on the column heading. For example, if you click on the Freq Abs heading, the results in the Spur table will be sorted by frequency. If you click on Range, the rows will be sorted by range. Clicking a second time on the same heading reverses the order.

Changing the Spurious Display Settings (see page 115)

Pulse Statistics Display

The Pulse Statistics display shows measurement statistics for RF pulses. The Pulse Statistics view displays a plot of a pulse measurement's values for every pulse in the analysis period. For example, the Pulse Statistics display will show the rise time measurement for each of 30 pulses, with rise time on the Y axis and pulse number on the X axis. Alternately, the Statistics Display can show an FFT trace for the values of a measurement over all the pulses analyzed.

Elements of the Pulse Statistics Display

Item	Display element	Description
1	Optimized indicator	The check mark indicator in the upper, left-hand corner of the display shows when the Pulse Statistics display is the optimized display.
2	Result	Use this list to select which measurement statistics to display. The measurement chosen here selects the same result to be displayed in the Pulse Trace display and the Pulse Table display. Selecting a result in any of these views causes the same result to be selected in all of them.
3	Pulse	Selects which pulse result is shown. Like the Result, this selection is shared with the Statistics and Table views.
4	Statistics summary	Display of measurement statistics for the selected Result.
5	Vertical range	Located at the top of the left graph edge and at the bottom of the left graph edge, use these controls to adjust the values at the top of the graph and the bottom of the graph.
6	Plot	Selects between Trend and FFT for the trace.
7	Autoscale	Set the axes to values that show all trace points.
8	Horizontal offset	Adjusting this value moves the graph right or left.
9	Trigger indicator	Indicates the trigger point on the pulse train if the trigger occurred during the time frame of the pulse measurements.
10	Pulse indicator	Indicates the pulse selected by the Pulse setting.
11	Pulses	Adjusts the horizontal scale.

Changing the Pulse Statistics Display Settings (see page)

Pulse Table Display

Pulse measurements can be displayed in a table or individually. The Pulse Table lists the selected measurements in a spreadsheet format, showing the pulse number on which the measurement was

taken and the value of the measurement for the pulse number. Pulses are numbered according to their relationship to a time reference (either the Acquisition Start point or the Trigger point). Those before the reference point have negative numbers and those after it are positive.

The spectrum analyzer takes the following pulse measurements: Average ON Power, Peak Power, Average Transmitted Power, Pulse Width, Rise Time, Fall Time, Repetition Interval (Sec), Repetition Rate (Hz), Duty Factor (%), Duty Factor (Ratio), Ripple, Droop, Pulse-Pulse Phase Difference, Pulse-Pulse Frequency Difference, RMS Frequency Error, Maximum Frequency Error, RMS Phase Error, Maximum Phase Error, Frequency Deviation, Phase Deviation, and Time. See Measurements (see page 11) for definitions.

Displaying the Pulse Table

1. Press the **Displays** button or select **Setup** > **Displays**.

2. Select **PulsedRF** in the Folders box.

3. **Double-click Pulse Table** in the **Available displays** box to add the display to the Selected displays box.

4. Click **OK**.

Selecting the Measurements to Take

1. With the Pulse Table selected, press the **Settings** button.

2. In the Pulse Table Settings control panel, select the **Measurements** tab.

3. Select the measurements you wish to take from the list of measurements.

4. Click the close box ( ) to remove the Settings control panel.

Pulse Trace Display

The Pulse Trace display enables you to take and display measurements on pulses. The Pulse Trace display shows the RF pulse that is being measured in the display and shows the measurement results along the left side of the window. You can also choose to display arrows and lines in the graph that illustrate where on the pulse the measurement is being taken.

Elements of the Pulse Trace Display

Item	Display element	Description
1	Optimized indicator	The check mark indicator in the upper, left-hand corner of the display shows when the Pulse Trace display is the optimized display.
2	Result	Use this list to select the measurement to show. The measurement chosen here selects the same result to be displayed in the Statistics view and highlighted in the Table view. Selecting a result in any of these views causes the same result to be selected in all of them.
3	Pulse	Selects which pulse result is shown. Like the Result, this selection is shared with the Statistics and Table views. The maximum number of pulses that can be measured is limited to 1000.
4	Pulse threshold indicator	This green triangle indicates the power threshold used to detect pulses. See Settings > Params > Power threshold to detect pulses.
5	Autoscale	Set the axes to values that show all trace points.
6	Horizontal offset and scale	Located along the bottom edge of the trace display, these controls specify the offset and scale on the horizontal axis.
7	Top of graph adjustment	Sets the power level shown at the top of the graph. If the number is greater than the Ref Level, a white line will appear in the graph to indicate the Ref Level.
8	Vertical scale	Sets the vertical scale value.

Define Markers Control Panel

The Define Markers Control Panel is used to enable markers and set their properties. You can set up to five markers including the marker reference. Markers are shown in most displays.

Markers have two types of on-screen readouts: Absolute and Delta. When **Readouts** is set to **Absolute**, each readout displays only the marker's position on the trace. In Frequency displays, this means the marker readout shows the frequency and power of the trace at the marker position. When **Readouts** is set to **Delta**, each delta marker (M1-M4) readout displays both the marker's position on the trace and the difference between its position and the position of the Reference Marker (MR).

Defining Markers
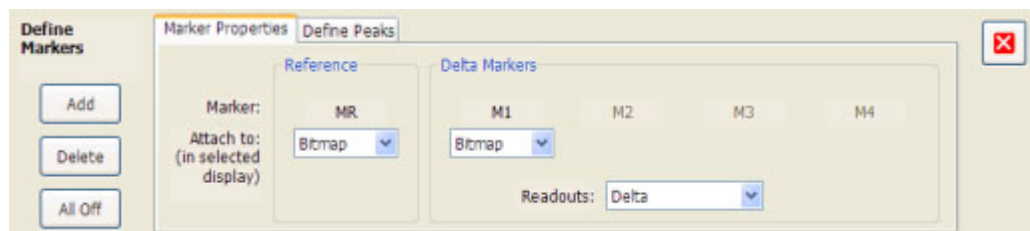
1. Select **Markers** > **Define Markers** to display the Define Markers control panel.

2. Select **Add** to turn on the next marker. A drop-down list under the marker label allows you to assign the marker to a trace.

NOTE. *The first marker defined will always be* **MR**. *The MR marker is the reference for delta marker readouts.*

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3. Select the trace to which the marker should be attached from the drop-down list.

4. Click **Add** to add additional markers.

5. Click the close button to remove the Define Markers control panel.

Defining Peaks

You can specify two amplitude values that define peaks. For the DPX Spectrum display, you can also define peaks based on signal density characteristics.
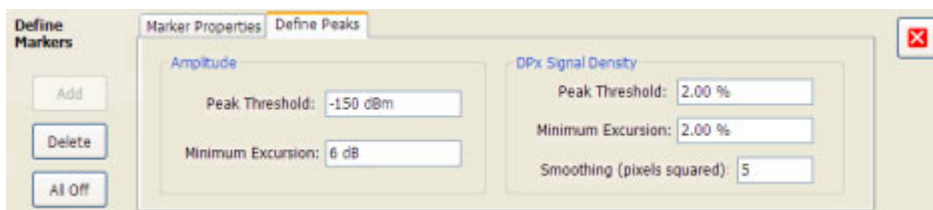
Amplitude

Peak Threshold	Peak Threshold specifies the level that the signal must exceed to be considered a peak.
Minimum Excursion	Minimum Excursion specifies how much the signal must decrease and then increase before another peak can be declared.

DPX Signal Density

Peak Threshold	Peak Threshold specifies the signal density (number of hits per displayed pixel) that the DPX bitmap must exceed to be considered a peak.
Minimum Excursion	Minimum Excursion specifies how much the signal density must decrease and increase again before another peak can be declared.
Smoothing	Smoothing specifies the number of pixels around the marker that are averaged together to reduce "noise" in the readout of signal density. The value of this control is the number of pixels on each side of the square area used for averaging. With Smoothing = 1, no averaging is done and the marker z-axis readout is the hit count (density) of a single pixel.. Use this control to characterize how wide or narrow a range of pixels should be averaged to determine the signal density.

1. Select **Markers** > **Define Markers** to display the Define Markers control panel.

2. Select the **Define Peaks** tab.

3. To define the level for Peak Threshold, enter a value in the Peak Threshold number entry box.

4. To define the amount the trace must dip, enter a value in the Peak Excursion number entry box.

5. Click the close button to remove the Define Markers control panel.

Using Markers

Markers are indicators in the display that you can position on a trace to measure values for the X and Y axes, such as frequency, power, and time. A Marker always displays its position and, if enabled, will display the difference between its position and that of the Marker Reference (MR).

You can display up to five markers including the marker reference. Markers can all be placed on the same trace or they can be placed on different traces. There are two types of Markers, Reference and Delta Markers. The Marker Reference (labeled MR in the graph) is used for calculating differences when Delta readouts are enabled. The Delta Markers (labeled M1 to M4 in the graph) are used to measure other points on the trace or the difference between the Marker Reference and the Delta marker.

Measuring Frequency and Power

To measure the frequency and power at a point on a Spectrum trace:

1. Select **Markers** > **Define Markers**.

2. Select the **Marker Properties** tab.

3. Click **Add**. This displays a drop-down list under **MR** (Marker Reference), found inside the **Reference** box. The first marker defined is always designated the Marker Reference. Subsequently defined markers are designated as Delta Markers (you can also select and adjust markers by clicking on an existing marker on a trace).

4. From the drop-down list, select the trace to which you want to assign the marker.
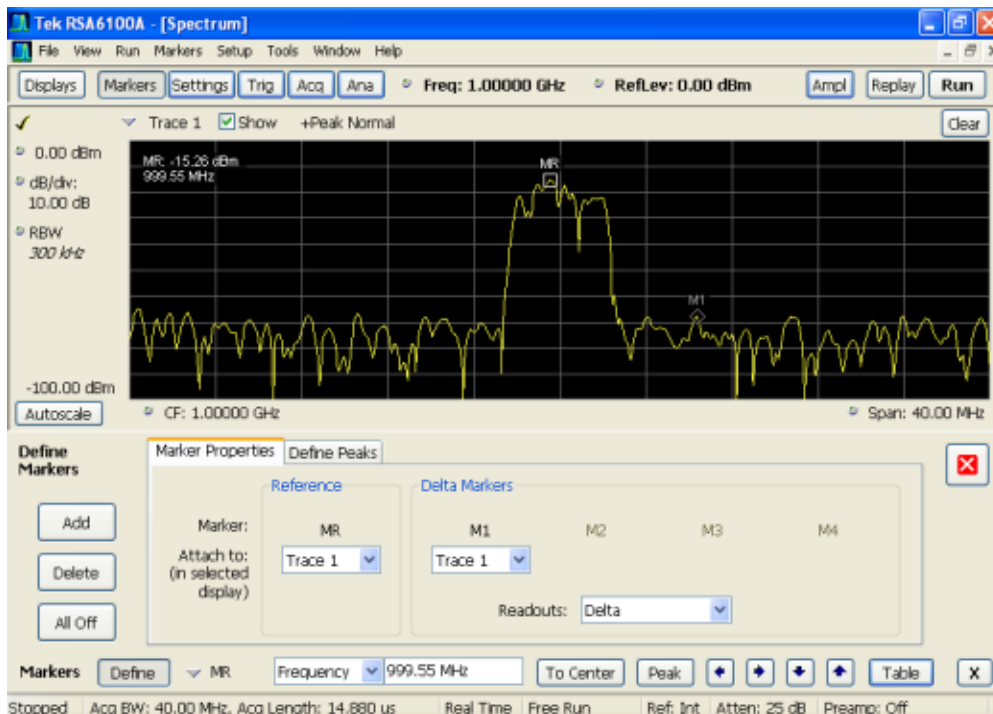
5. Click the close control panel button ( ) to remove the Define Markers control panel.

6. Click on the marker on the trace to activate that marker.

7. Use the knob or the arrow keys on the front panel to move the marker to the desired location on the trace.

8. Read the frequency and power level of the marker position on the display.

9. Read the signal density, frequency and power level of the marker position on the display.

Measuring Signal Density, Frequency and Power on a DPX Bitmap Trace

To measure the signal density, frequency and power at a point on a DPX Bitmap trace:

1. Select **Markers** > **Define Markers**.

2. Select the **Marker Properties** tab.

3. Click **Add**. This displays a drop-down list under **MR** (Marker Reference), found inside the **Reference** box. The first marker defined is always designated the Marker Reference. Subsequently defined markers are designated as Delta Markers (you can also select and adjust markers by clicking on an existing marker on a trace).

4. From the drop-down list, select **Bitmap**.

5. Click the close control panel button ( ) to remove the Define Markers control panel.

6. Touch or click on the MR marker on the trace to activate the marker.

7. Drag the marker to the desired location on the trace.

NOTE. *Markers on the DPX Bitmap trace can be placed on any point in the display, unlike markers in other displays that can be placed only on a trace. This enables you to measure the signal density, frequency, and power level at any point on the graph.*

Searching for Peaks on the DPX Bitmap Trace. To locate peaks on the DPX Bitmap trace, use the arrow buttons on the Marker toolbar. The left / right arrows move the selected marker to the next peak lower or higher in frequency. The up and down arrows search for peaks at the same frequency. The peaks on the DPX Bitmap trace are defined by the settings for the DPX Signal Density on the Markers > Define Markers > Define Peaks (see page 57) tab.

The following table shows the appearance of the four types of marker readouts.

Marker Reference Readout	Absolute Marker Readout	Delta Marker Readout	DPX Bitmap Marker Readout

The following table shows the appearance of the marker indicators as they appear on the trace.

Marker Reference	Absolute Marker	Delta Marker
MR	M1	M1

Controlling Markers with the Touchscreen Actions Menu

In addition to controlling the marker actions from the front panel or screen menu items, you can use the touch screen actions menu to move markers or add and delete markers.
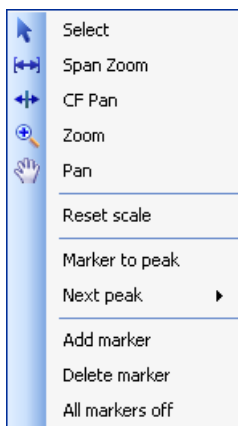
▲	Select
↔	Span Zoom
↔	CF Pan
⊕	Zoom
✋	Pan
	Reset scale
	Marker to peak
	Next peak ▶
	Add marker
	Delete marker
	All markers off

To use the Touchscreen Actions menu, touch the display and hold for one second, then remove your finger. You can also use a mouse to display the Touchscreen Action menu by clicking the right mouse button.

Menu item	Description
Marker to peak	Moves the selected marker to the highest peak. If no marker is turned on, this control automatically adds a marker.
Next Peak	Moves the selected marker to the next peak. Choices are Next left, Next right, Next lower (absolute), and Next higher (absolute).
Add marker	Defines a new marker located at the horizontal center of the graph.
Delete marker	Removes the last added marker.
All markers off	Removes all markers.

Using Markers in Noise Mode

In the Spectrum display, you can set Markers to Noise Mode to measure noise on the trace. Markers in Noise Mode operate just as they do in normal mode; but the readouts for the markers are in dBm/Hz and dBc/Hz.

dBm/Hz is the power in milliwatts referenced to a 1 Hz bandwidth. To make this measurement, the spectrum analyzer assumes that the measured signal is random noise. It then converts the measured power (made at any RBW) to the power that would be measured had a 1 Hz filter been applied for the measurement.

dBc/Hz represents dBm/Hz referenced to a carrier. Here, it is assumed that the carrier is a CW signal, and its signal level does not change when the RBW is changed, so the Reference Marker measurement on the carrier is unchanged from any other marker measurement. However, the delta marker values are converted to dBm/Hz, and then a difference value, in dBc/Hz, is calculated between each delta measurement and the reference.

Measuring Noise

To measure noise on a Spectrum trace:

1. Select **Markers** > **Define** to display the Markers control panel.

2. Click **Add**. The first marker defined is always designated the Marker Reference. Subsequently defined markers are designated as Delta Markers (you can also select and adjust markers by clicking on an existing marker in the display).

3. Click **Add** again so that there are at least two markers defined.

4. Check that **Readouts** is set to Delta.

5. If you have more than one trace defined, use the drop-down list for each marker to set it to the trace on which you want to measure noise.

6. Select the **Settings** button to display the Spectrum settings control panel.

7. Click the **Prefs** tab.

8. Click the **Marker Noise Mode** check box so it is checked.

9. Click the **Traces** tab.

10. Verify that Detection is set to **Average** for the trace you are using for this measurement.

11. Click the **Ana** (Analysis) button.

12. Select the **Units** tab.

13. Select **dBm** for the Amplitude units.

14. Click the Close button to remove the control panel.

15. Use the knob or the arrow keys on the front panel to move the markers to the desired locations on the trace.

16. Read the frequency and power level for the selected marker in the upper corners of the display. To display the delta measurement in dBc/Hz, select the delta marker (M1, M2, M3 or M4) by clicking on it or pressing the front-panel Select button until it is selected.
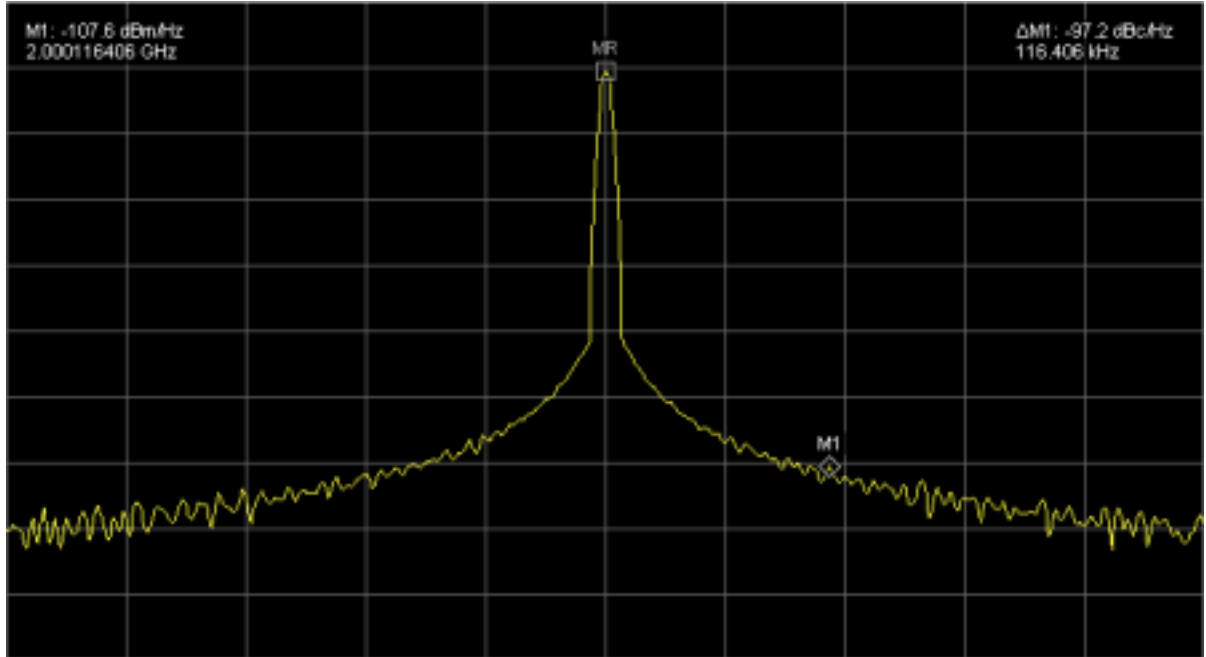
Front Panel Connectors
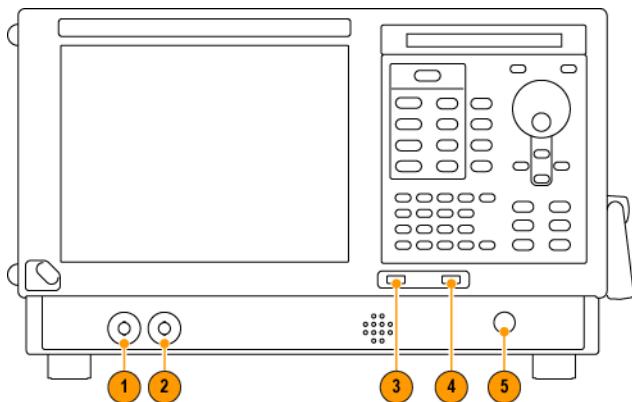
Item	Connector	Description
1	Trig Out	Trigger output connector. 50 Ω, BNC, High > 2.0 V, Low < 0.4 V, (output current 1 mA).
2	Trig In	External Trigger input connector, –2.5 V to +2.5 V (user settable).
3	USB 1.1	USB 1.1 Mouse connector.
4	USB 2.0	USB 2.0 connector.
5	RF Input	RF input connector 50 Ω.

Front-Panel Controls
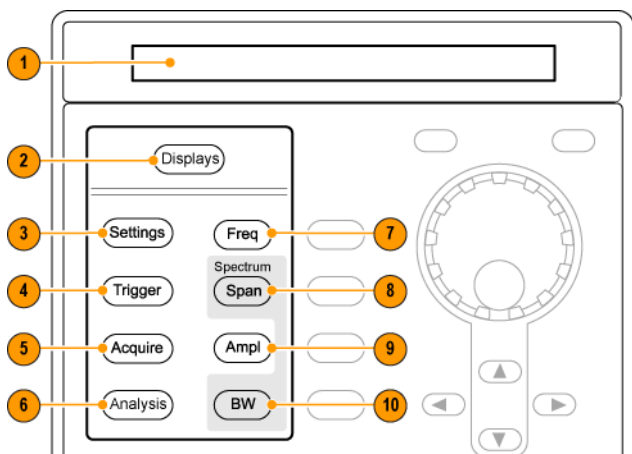
Reference	Item	Function	Menu Equivalent
1	Media	DVD-RW or removable hard disk drive.	
2	Displays	Opens the Displays dialog box enabling you to select which displays to open.	Setup > Displays
3	Settings	Opens/closes the Settings control panel for the selected display.	Setup > Settings
4	Trigger	Opens/closes the Trigger control panel.	Setup > Trigger
5	Acquire	Opens/closes the Acquire control panel.	Setup > Acquire
6	Analysis	Opens/closes the Analysis control panel.	Setup > Analysis
7	Freq	Press to adjust the measurement frequency.	Setup > Analysis > Frequency
8	Span (Spectrum)	Press to adjust the span or press and hold to display the Freq & Span control panel for the General Signal Viewing displays.	
9	Amplitude	Opens/closes the Amplitude control panel.	Setup > Amplitude
10	BW (Spectrum)	Press to adjust the bandwidth or press and hold to display the BW control panel for the General Signal Viewing displays.	
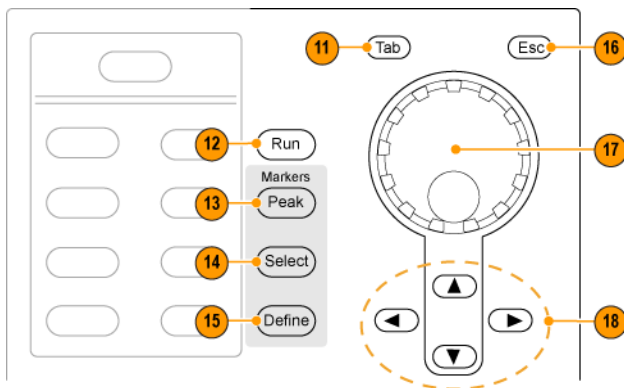
Reference	Item	Function	Menu Equivalent
11	Tab	Moves the cursor to the next entry in the dialog box or control panel. Same as pressing the Tab key on an external keyboard.	
12	Run	Starts and stops acquisitions.	Run > Start Run > Stop
13	Peak (Markers section)	Moves the active marker to the maximum peak of the trace in the selected display. If markers are turned off, the marker reference (MR) will appear at the maximum peak.	Markers > Peak
14	Select (Markers section)	Selects the next marker. If markers are turned off, the MR marker (marker reference) will appear.	
15	Define (Markers section)	Opens the Markers control panel. If markers are turned off, the MR marker (reference) will appear.	
16	Esc	Exits a dialog box without saving changes: the same as Esc on an external keyboard.	
17	Control knob	Changes values in numeric and list controls. Pressing the knob (clicking it) is the same as pressing the Enter key on a keyboard.	
18	Arrow keys	Move the Markers. The Up arrow moves the selected marker to the next highest peak. The down arrow moves the selected marker to the next lower peak value. The right and left arrows move the selected marker to the next peak.	
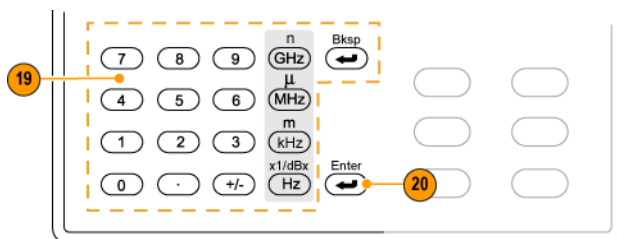
Reference	Item	Function	Menu Equivalent
19	Keypad	Enters values in numeric controls.	
20	Enter	Completes data entry in controls. Same as pressing the Enter key on an external keyboard.	
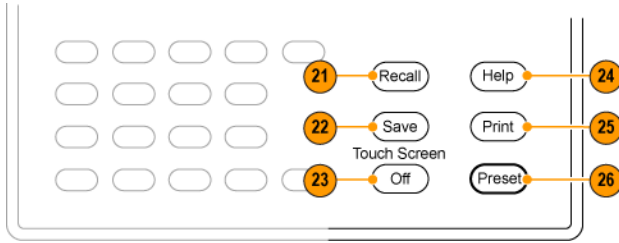
Reference	Item	Function	Menu Equivalent
21	Recall	Opens the Recall dialog box.	File > Recall ...
22	Save	Opens the Save As dialog box.	File > Save As
23	Touch Screen Off	Turns the touch screen on and off. It is off when lighted.	
24	Help	Displays the online help.	Help > Online Manual
25	Print	Displays the Print dialog box.	File > Print
26	Preset	Returns the instrument to the default or preset values.	Setup > Preset

Touch Screen

You can use touch to control the instrument in addition to the front-panel controls, mouse, or extended keyboard. Generally, touch can be used anywhere that click is mentioned in this online help.

To disable the touch screen, push the front-panel **Touch Screen Off** button. When the touch screen is off, the button is lighted. You can still access the on-screen controls with a mouse or keyboard.

You can adjust the touch screen operation to your personal preferences. To adjust the touch screen settings, from Windows, select **Start** > **Control Panel** > **Touch Screen Calibrator**.

NOTE. If the instrument is powered on in Windows Safe Mode, the touch screen is inoperative. You will need to use a mouse or keyboard to restore normal operation.

Touch-screen Actions

You can use the touch screen to change marker settings and how waveforms are displayed by using the Touch-screen Actions menu.
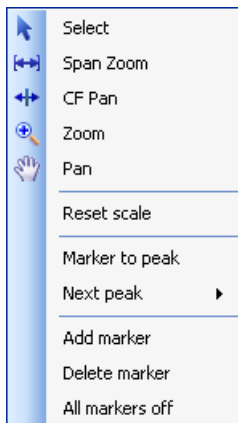
To use the Touch-screen Actions menu, touch the display and hold for one second, then remove your finger. You can also use a mouse to display the Touch-screen Action menu by clicking the right mouse button.

Icon	Menu	Description
▶	Select	Selects markers and adjusts their position.
↔	Span Zoom	Zooms the graph area about the selected point. Touch the graph display at a point of interest and drag to increase or decrease the span about the point of interest. Span Zoom adjusts the span control and can affect the acquisition bandwidth.
↔	CF Pan	Adjusts the Center Frequency according to horizontal movement.
⊕	Zoom	Adjusts horizontal and vertical scale of the graph. The first direction with enough movement becomes the primary scale of adjustment. Adjustment in the secondary direction does not occur until a threshold of 30 pixels of movement is crossed.
		Dragging to the left or down zooms out and displays a smaller waveform (increases the scale value). Dragging to the right or up zooms in and displays a larger waveform (decreases the scale value).
✋	Pan	Adjusts horizontal and vertical position of the waveform. The first direction with enough movement becomes the primary direction of movement. Movement in the secondary direction does not occur until a threshold of 30 pixels of movement is crossed.
-	Reset Scale	Returns the horizontal and vertical scale and position settings to their default values.
-	Marker to peak	Moves the selected marker to the highest peak. If no marker is turned on, this control automatically adds a marker.
-	Next Peak	Moves the selected marker to the next peak. Choices are Next left, Next right, Next lower (absolute), and Next higher (absolute).
-	Add marker	Defines a new marker located at the horizontal center of the graph.
-	Delete marker	Removes the last added marker.
-	All markers off	Removes all markers.

Touch-screen Menu for Spurious Display

The Touch-screen actions menu in the Spurious display has some minor changes compared to the standard version used in other displays.
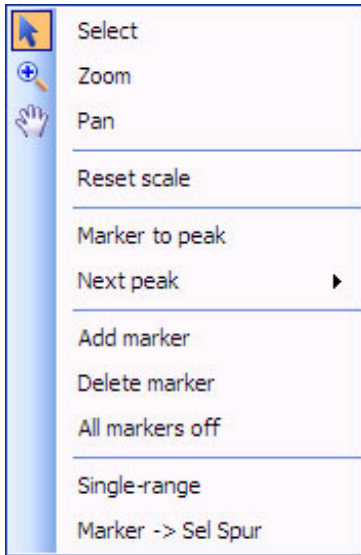
Icon	Menu	Description
-	Single-range	Changes the current multi-range display to a single range display. The displayed range is the range in which you display the touchscreen-actions menu. Selecting Single-range from the menu is equivalent to selecting Single on the Settings > Parameters tab.
-	Multi-range	Changes the current single-range display to a multi-range display. Selecting Multi-range from the menu is equivalent to selecting Multi on the Settings > Parameters tab.
-	Marker -> Sel Spur	Moves the selected marker to the selected spur.

Rear-Panel Connectors
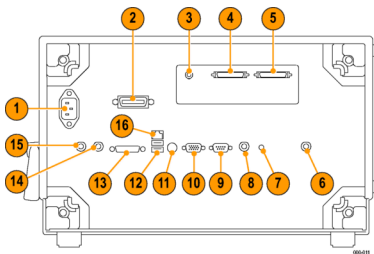
Item	Description
1	AC Input, main power connector
2	GPIB
3	IF Output (optional)
4,5	Real Time IQ Output (optional)
6	+28 V DC Output, switched
7	Headphone, audio output connector
8	Trig2 In
9	COM 2, serial port for connecting peripherals
10	VGA external monitor output
11	PS2 keyboard input
12	USB2.0 ports for mouse and other peripherals (printers, external hard disks)
13	TekLink - reserved for future use
14	Ref Out, reference frequency output
15	Ref In, reference frequency input
16	Ethernet network connector

Elements of the Display

The main areas of the application window are shown below.
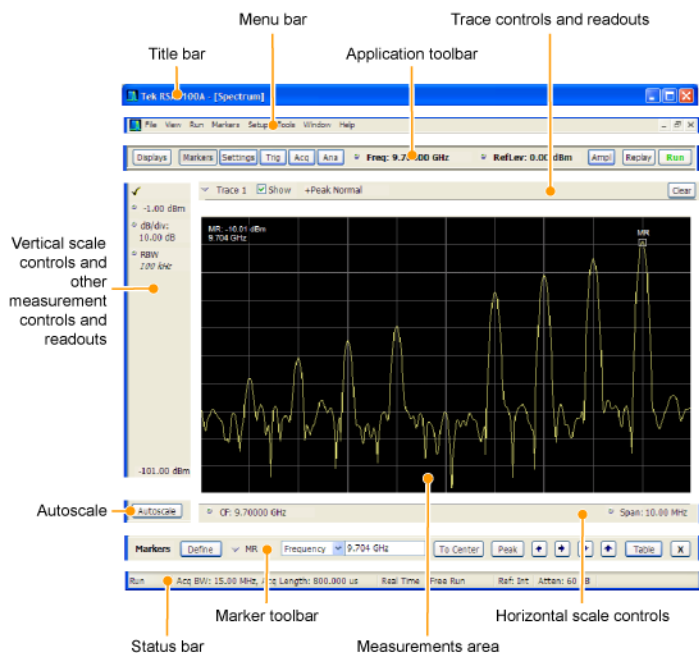
Specific elements of the display are shown below.

Ref number	Setting	Description
1	Displays	Opens the Select Displays dialog box so that you can select measurement displays.
2	Markers	Opens or closes the Marker toolbar at the bottom of the window.
3	Settings	Opens the Settings control panel for the selected display. Each display has its own control panel.
4	Trigger	Opens the Trigger control panel so that you can define the trigger settings.
5	Acquire	Opens the Acquire control panel so that you can define the acquisition settings.
6	Analysis	Opens the Analysis control panel so that you can define the analysis settings such as frequency, analysis time, and units.
7	Center Frequency	Displays the Center Frequency. To change the value, click the text and use the front panel knob to dial in a frequency. You can also enter a frequency with the front panel keypad or use the front panel up and down buttons.
8	Reference Level	Displays the reference level. To change the value, click the text and enter a number from the keypad or use the front panel up and down buttons.
9	Amplitude	Opens the Amplitude control panel so that you can define the Reference Level, configure internal attenuation, and enable/disable the (optional) Preamplifier.
10	Replay	Runs a new measurement cycle on the existing acquisition data record using any new settings.
11	Run	Starts and stops data acquisitions. When the instrument is acquiring data, the button label has green lettering. When stopped, the label has black lettering. You can specify the run conditions in the Run menu. For example, if you select Single Sequence in the Run menu, when you click the Run button, the instrument will run a single measurement cycle and stop. If you select Continuous, the instrument will run continuously until you stop the acquisitions.
12	Check mark indicator	The check mark indicator in the upper, left-hand corner of the display indicates the display for which the acquisition hardware is optimized.

Data File Formats

You can save different types of data for later recall and analysis.

Saved File Types

File Type	File Extension	Description
Setup files	.setup	Setup files enable you to save instrument settings for later recall. Using these files saves setup time and ensures consistent measurements.
Picture	.png/.jpg/.bmp	Screen capture of RSA6100A application window. They are useful for documenting results in test reports.

File Type	File Extension	Description
Results Export	.csv	Results files contain the trace points and numeric values that were produced by the selected measurement. The header of a Results file includes key acquisition and analysis settings to aid in the interpretation of the data. The file is saved as a plain text file, but the contents are formatted as CSV (comma-separated values). Results files can be opened from applications such as Microsoft Excel and MATLAB.
Measurement Settings	.txt	Measurement settings files contain a list of settings that describe how the instrument is set up for the selected measurement. The list contains measurement settings (for example, Span), trace settings (for example, whether or not a trace is selected) and global settings (for example, Frequency and Reference Level). The list of settings contained in the file varies depending on which display is selected.
Selected Trace	varies with display	Trace files contain the trace results data in binary format. These files are only readable by the RSA6100A application. Several of the instrument's measurements allow you to recall a Trace file for visually comparing a saved trace to a live trace.
Acquisition Data with Setup	.tiq	These files contain the acquisition data record and complete instrument setup (in binary format). Use these files to save data for later recall and analysis. When you save an Acquisition Data file, the current Setup is always saved with the file. At the time of recall, you will be asked whether you want to restore only the acquisition data or both data and setup. If the instrument is already set up for a specific measurement, you will probably want to recall only the acquisition data. Recalling both data and setup returns the instrument to the same state it was in at the time you saved the file.
Acquisition Data	.csv	These files contain IQ sample data before it has been processed by a measurement. The acquisition data points are saved as IQ pairs. Use this format to import the acquisition data into Microsoft Excel for further analysis.
Acquisition Data	.mat	These files contain IQ sample data before it has been processed by a measurement. The acquisition data points are saved as IQ pairs. Use this format to import the acquisition data into MATLAB for further analysis.
Range file	.csv	These files contain a list of settings that describe how the instrument is set up for the Spurious measurement. The file contains the number of ranges enabled, the start and stop frequencies for each enabled range, the limits for each enabled range, the mask type and more.

Results Export File Format

The Results Export format contains trace points and/or scalar results produced by the measurement. The file contains general information about the measurement settings at the top of the file and the results data in the second part of the file. Groupings of settings or results are headed with [text], as described below.

At the top of the file is the measurement name and the date and time data was acquired.

The first grouping of settings are the [Global Parameters]. These settings include the Measurement Frequency, Acquisition Data, Reference Level and others.

The second grouping of settings is [Parameters]. These settings are specific parameters which vary depending on the measurement.

The next group is [Trace Parameters], which may not be present, depending on the measurement. Within this group, there are parameters specific to a trace. There will be a Trace Parameters group for each trace shown on the display.

The next group is [Results]. These are scalar results for the measurement.

Next is [Traces]. The Traces group consists of one or more [Trace] groups. There is one Trace group for each trace. Each [Trace] group contains background information about the trace (units, number of points, x scaling, and others depending on the measurement) at the top of the group, followed by the trace points.

Acquisition Data with Setup File (.tiq) Format

The file consists of two parts - the header that is in XML and the data that is in binary format.

Header. The header consists entirely of the DataFile element. This element is broken down into sub-elements.

1. DataSetsCollection

2. Setup

DataSetsCollection. The DataSetsCollection contains a DataDescription element, a DataSet element, and a ProductSpecific element.

Binary Data. Binary data is a sequence of Int32 values, which are IQ pairs (I,Q,I,Q, ...) in binary Little Endian format.

To convert these values to Volts, multiply the individual values by the Scaling value in the DataDescription.

The binary data starts at an offset into the file == the "offset" attribute in the DataFile element. This offset number will always start at the 19th character into the file (starting with 1), and will always be 9 characters long.

NOTE. *You should not casually modify the XML header, because this will change the offset to the start of the binary data.*

Acquisition Data Files (.csv)

The acquisition data files have two sections. At the top of the file is the following information:

- SamplingFrequency - The sampling frequency in Hertz.

- NumberSamples - The number of IQ samples in the file.

- DateTime - When the data was acquired.

- Frequency - The center frequency in Hertz.

- AcquisitionBandwidth - The acquisition bandwidth Hz.

Following the AcquisitionBandwidth are the data. The data are IQ pairs, in Volts.

Groupings of settings or results are headed with [some text].

The first thing in the file is the measurement name and the date/time when the acquisition was taken.

The first grouping [Parameters] are global parameters. Measurement Bandwidth in this group is the measurement bandwidth used by the General Signal Viewing measurements (Spectrum, Amplitude vs Time, etc). It also includes some source settings, like Acq BW, Dither, Preamp, and RF Attenuation.

The second grouping [Parameters] are measurement-specific parameters.

Another grouping which may occur is [Trace Parameters]. Within this group, there will be a set of parameters, one for each trace that is currently shown.

Another grouping is [Results]. These are scalar results for the measurement.

Another grouping is [Traces]. It has [Trace] groups under it, one for each trace. Each [Trace] group has some background information about the trace (units, number of points, x scaling, etc), and the trace points themselves.

Acquisition Data Files (.mat)

The acquisition data files saved in MatLab format contain the following MatLab variables:

- InputCenter - The center frequency in Hertz.

- XDelta - The sample period in seconds.

- Y - A complex array containing IQ pairs.

- InputZoom - Always 1, and indicates complex data.

Error and Information Messages

Error and Information Messages

The list below describes some of the common error and information messages that might appear during instrument operation. Messages that apply specifically to one or more measurements appear in the

displays. Messages that pertain globally, such as those about hardware status, are shown in the Status Bar at the bottom of the RSA6100A application window.

Acq BW too small for current setup

The display needs a wider acquisition bandwidth than what the current data record contains. This can be due to any of the following reasons:

■ A display other than the one you intended has been selected. The selected display has requested a smaller acquisition bandwidth to achieve a better accuracy or dynamic range for its particular measurement.

Select the display that contains the message. Click Run if the instrument is not already acquiring data.

■ Acquisitions are not running and the measurement now requests a wider bandwidth than the last acquisition.

Click Run to perform a new acquisition with a wider bandwidth.

■ The data is from a recalled file.

There is no way to increase the acquisition bandwidth for saved data. You must adjust the measurement settings so that less bandwidth is required.

■ The current Frequency setting is different than that of the data record, causing the measurement bandwidth to fall at least partly outside the bandwidth of the data.

Acq Sampling params: manual control

A reminder message that the Sampling Parameters (see page 183) are in manual mode.

Aligning

The instrument is running an alignment. Signal acquisition does not occur during alignments.

■ If you wish to halt to alignment process, select Setup > Alignments and click on the Abort button.

NOTE. *There is one alignment that cannot be halted or prevented. This occurs when the instrument reference frequency has drifted and must be reset to maintain internal oscillator lock. This alignment takes approximately 20 seconds.*

Analysis failure: <description of error>

The instrument is unable to complete a measurement due to difficulty in characterizing the signal. For example, due to either the signal or settings, the instrument may not be able to recognize a pulse so it can compute the pulse measurements.

■ Try changing settings to improve analysis. For example, when Pulse Trace is displayed, try changing the settings on the Settings > Params.

Analysis failure: Carrier detection failed

The instrument was unable to locate a carrier signal. Try adjusting the Carrier Threshold or Integration BW values, if the measurement has these controls.

Analysis Length was limited

This message appears if the "Results Length", the time over which the measurement computed its results, is less than the Actual Analysis Length reported in the Analysis Time control panel tab and the Time Overview display. The Results Length is indicated by the magenta line below the Time Overview graph. This can occur because the acquisition contained more data samples than a measurement can process (for example, digital demodulation is limited to 80,000 samples) or the measurement had to use some of the first and last samples for pre-measurement processes.

Analysis length too small for current setup

Increase the Analysis Length or decrease the RBW (Spectrum, ACPR, MCPR).

Avg Tx not available in Volts units

The Average Transmitted Power measurement is not defined for Volts.

Can't get acquisition data record

No acquisition record currently exists in memory (run an acquisition or recall a file), or an error has occurred. Repeat the acquisition.

Can't replay data from swept acq.

The measurement could not produce results because it is a real-time only measurement but was asked to reanalyze (Replay) an acquisition taken in swept mode.

Can't replay. Live data needed for swept settings

The measurement could not produce results because it was asked to reanalyze (Replay) the acquisition but it is in Swept acquisition mode. Swept-mode measurements cannot analyze recalled data.

CISPR accuracy limited by acq memory. Adjust RBW or freq range

The CISPR function was applied, but the available data did not represent a long enough time to satisfy CISPR requirements. Increasing RBW reduces the amount of time needed for analysis. Reducing frequency range (for example, by reducing Span), decreases sample rate, allowing the available memory to cover a longer time period.

Data acquired during hardware failure

An acquisition was completed even though a hardware failure was detected. This message refers to the acquisition data currently being analyzed, but not necessarily to the current status of the instrument. See the explanation for "Hardware Failure".

If this data is from a saved file, the error cannot be cleared.

Data acquired during RF ADC overrange

An acquisition was completed but the signal was outside the range of the analog-to-digital converter at the time this data was acquired. This message refers to the acquisition data currently being analyzed, but not necessarily to the current status of the instrument. See the explanation for "RF ADC overrange".

If this data is from a saved file, this error cannot be cleared.

Data acquired during RF digital gain overflow

This data was acquired when the input signal contained peaks greater than 6 dB above the Reference Level setting.

See the definition for "RF digital gain overflow".

If the data is from a file, this error cannot be cleared.

Data from unaligned instrument

The acquisition data was captured when the instrument was not aligned. This message refers to the acquisition data currently being analyzed, but not necessarily to the current status of the instrument. Measurements made on this data might not be accurate.

Data from uncalibrated instrument

The acquisition data was captured when the instrument was not calibrated. This message refers to the acquisition data currently being analyzed, but not necessarily to the current status of the instrument. See the definition for "Not calibrated".

If this data is from a file, the error cannot be cleared.

Data acquired with 3 GHz preamp

This is a warning that signals above 3 GHz are likely to be severely attenuated because the Preamp was on when the data was acquired. The (optional) Preamp is not specified for operation above 3 GHz.

Disabled: data is from swept acquisition

The display needs to run in real-time mode. The display associated with this message cannot run now because it is not the selected display, and the selected display is performing multiple acquisitions (it is in swept mode).

■ Change the settings of the selected display so it is performing real-time acquisitions.

■ Select the associated display to make it the selected display. When it is selected, it will force the acquisition parameters to change to meet its own needs.

Disabled: Freq Mask Trigger in use

The DPX Spectrum display cannot run while the instrument is set to use Frequency Mask Trigger.

■ To run the DPX Spectrum display, you must turn off Frequency Mask Trigger.

DPX disabled: RefLev too low for Volts/Watts units

The Reference Level value is set too low. It is possible to set a RefLev value so low that DPX can't run if volts or watts are the selected amplitude units. Reset the Reference Level to a higher value.

Needs swept acq or larger AcqBW - Acquire data while display is selected

The display is not running because it needs to perform multiple acquisitions (it must be in swept mode) but it is not the selected display. Only the selected display can perform multiple acquisitions.

■ Select the display showing this message to give it control of acquisitions parameters.

Sometimes, only one display can work and the others will be blank and show errors. This happens when different displays have conflicting demands on the acquisition data record.

Dither: manual control

This is a reminder that the Dither control (see page 121) has been set to manual, which might affect the quality of measurement results.

Export failure: file not saved

An error occurred while exporting Results. The file was not created.

■ Export the results again.

Export failure: unable to open results file for export. File not saved.

The Export Results file could not be opened for writing, so the export of results was not completed.

■ Verify that there is sufficient free space on hard disk.

External Frequency Reference signal not valid.

The instrument is no longer locked to the external reference signal because it can no longer detect a signal with proper amplitude and frequency.

■ Verify that the external reference signal is still connected to the instrument.

Hardware failure detected by Diagnostics

A hardware failure was detected while running Diagnostics. To see a description of the event initiated by the failure, display the Windows Event Viewer (see page 139). There is a shortcut to the Windows Event Viewer on the Windows desktop.

Hardware failure - see Windows Event Viewer

A hardware failure has occurred. To see a description of the event initiated by the failure, display the Windows Event Viewer (see page 139). There is an shortcut to the Windows Event Viewer on the Windows desktop.

Insufficient data for CISPR. Acquire while display is selected

This message appears when a measurement is not the selected measurement and CISPR filters are selected. Set the measurement to be the selected measurement and reacquire the signal.

IQ Processing Error: 8012

This message occurs in GP Digital Modulation displays. The most likely cause for this message is that there are not enough symbols to analyze. This can happen if

■ The Analysis Length is set too short. Increase the Analysis Length (see page 123).

■ The Analysis Offset has pushed the Analysis Time so far out that the actual Analysis Length is too short, even though the user-requested Analysis Length would have been long enough without the excessive offset. Decrease the Analysis Offset (see page 123).

■ The input signal is bursted, and the burst does not contain enough symbols.

Locking to ext freq ref signal...

This a status message displayed while the instrument is attempting to lock to an external reference signal. The message disappears when the instrument locks to the reference signal.

Needs swept acq or larger Acq BW - Acquire data while display is selected

The display has one of two problems: It is not the selected display, which prevents it from controlling the hardware acquisition parameters, and setting the acquisition mode to Swept; or its settings require a wider data bandwidth.

- Select the display that you are interested in and it will change the acquisition to meet its own needs.

- Increase the acquisition bandwidth manually or by changing the selected display's settings to cause the wider bandwidth.

No Math trace: unmatched trace lengths

A math trace could not produced because the traces selected to generate the math trace do not have the same number of points. This can easily happen if both traces are recalled, but were saved under different "Points" settings. This can also occur if one of the selected traces is a live trace and the other trace is a recalled trace.

- In a Spectrum display, as long as one trace is live, you can change the "Points" setting (Setup > Settings > Freq & Span tab) to match the recalled trace.

- If you are using two recalled traces to generate the Math trace. You must recreate at least one of the traces.

Not aligned

The instrument needs to be aligned. When the instrument is not aligned, measurements might not be accurate.

- Select Tools > Alignments > Align Now to alignment the instrument.

No burst detected

The Burst Detection Mode (see page 150) is On, but no burst was detected in the signal.

- Check that the Threshold setting is properly set.

Not calibrated

The instrument requires calibration. Calibration can be performed only at a Tektronix Service center. Contact Tektronix) to schedule a calibration.

Not enough samples for current setup

The measurement was not able to run because the combination of analysis length, offset, and measurement bandwidth relative to acquisition bandwidth, were such that not enough samples were available for the measurement to analyze. This can occur when two or more displays are shown and one display requires a wide acquisition bandwidth and another display requires a much narrower bandwidth. The display requiring the much narrower bandwidth must decimate and filter the acquisition record which can result in too few samples left for the measurement.

- Increase the Analysis Length to provide more samples.

- Close any displays you don't currently need.

No FFT (not all pulses have results)

If a pulse cannot be measured (because its shape is too indistinct or it does not meet the parameters that define a pulse (see page 172)), its results will be "- -" for every measurement on that pulse. The instrument cannot compute an FFT.

No pulses found

The instrument was unable to find any complete pulses in the signal.

- Make sure the analysis length (see page 122) includes at least one complete pulse cycle, from before one rising edge until after the next rising edge.

Pulse Detection Error

The instrument was unable to detect a pulse.

- The pulse Measurement Filter (see page 172) needs to be smaller. Try reducing the bandwidth and/or selecting the Gaussian filter.

- Detection threshold is not set to the proper level for the signal. Adjust the Power threshold to detect pulses (see page 172).

- The pulse interval is too long for the current settings. Try decreasing the filter bandwidth (see page 172), as this may reduce the number of data points to a manageable quantity.

RBW conflict. Increase Span or Analysis Length

The measurement is not running because the actual RBW used by the measurement is too large for the current acquisition span. Typically, the analysis length is too short as well.

- Either increase the span or increase the Analysis Length.

RBW decreased

The current span or acquisition bandwidth is too small to allow a wider RBW filter.

- Increase the span or acquisition bandwidth if the decreased RBW is not acceptable.

RBW increased

The current Spectrum Length (or Analysis Length if Spectrum Length is not Independent) is too small to allow the requested RBW.

- Increase the Spectrum Length (or Analysis Length) if the increased RBW is not acceptable.

RBW limited by AcqBW to: XX Hz

The requested RBW is too close to the acquisition BW. Increase the frequency range of the measurement (for example, Span)

RBW too small/large for current Acq BW

If the RBW is set manually, it is possible for the acquisition bandwidth to be incompatible with the RBW setting.

- Change the RBW setting.

- Adjust the Acq BW setting, either directly (Setup > Acquire > Sampling Params: select on of the manual modes) or by adjusting the measurement bandwidth of the selected display (Setup > Acquire > Sampling Params: All Auto).

Recall error: Setup not completely restored

An error occurred while recalling a Setup file. Thus, the current setup may be a combination of settings from the Setup file and the previous Setup.

■ Recall the setup again.

Recall failure: problem with file or file contents

An error occurred while recalling a Setup, Trace or Data file. This can occur because of a problem opening the file (operating system error) or because of a problem with the contents of the file.

■ Recall the file again.

Restoring acquisition data...

This is a status message displayed while data is being restored from a file.

RF ADC overrange

This input signal power is outside the range of the analog-to-digital converter circuitry.

■ Decrease the input signal power or increase the internal attenuation setting.

■ Increase the Reference Level setting.

RF Attenuator: manual control

This message is just a reminder that the <u>internal attenuator (see page</u> <u>104)</u> has been set to manual mode.

RF digital gain overflow

The input signal contains peaks greater than 6 dB above the Reference Level setting.

■ Increase Reference Level

■ Decrease input signal power

Save failure: file not saved

An error occurred while saving a Setup or Data file.

■ Save the file again.

Saving acquisition data...

This is a status message displayed while data is being saved to a file.

Selected VBW does not use full Spectrum Length

This message can occur when the Spectrum Length is greater than required for the VBW filter. If you look at the Time Overview display, the Magenta line for Results Length indicates the part of the Spectrum Length that was actually used. The measurement results are correct, but don't include some of the data in the selected Spectrum Length. To clear this message, you can set the Spectrum Length to Auto.

Setup error: <description of error>

When this message appears, it includes text that explains the problem. For example, the ACPR display might show: "Setup error: channels can't overlap". Setup errors are the result of conflicts in instrument settings. These types of errors occur when a user makes manual changes to settings. In the example

above, the channel settings in the Channel Power and ACPR display have been set so that the channels overlap in frequency.

■   Adjust the instrument settings, or change a setting back to Auto, to eliminate the error.

Setup error: Integration BW exceeds MeasurementBW

When this message appears, it includes text that explains the problem. Setup errors are the result of conflicts in instrument settings. These types of errors occur when a user makes manual changes to settings.

■   Adjust the instrument settings, or change a setting back to Auto, to eliminate the error.

Setup error: Measurement time for Freq & Phase results

The Measurement time for Freq & Phase results (see page 138) specifies how far across the pulse top the instrument should wait before measuring the Phase Difference and Frequency Difference for each pulse. If this value is set too large for any of the pulses in the signal, the measurement point ends up on the falling edge or during the pulse off time.

■   Decrease the Measurement time for Freq & Phase results setting (Settings > Define tab).

Swept: RF Trig invalid for most signals

This is an status message that appears when the instrument is in swept acquisition mode and Power Trigger mode at the same time. When the acquisition is swept, it captures the requested bandwidth using multiple acquisitions, each for a different portion of the bandwidth. The trigger system evaluates each of these separate acquisitions for trigger events, so unless a valid event exists in each of these smaller frequency ranges, the acquisition will not complete.

Unexpected software error. Please cycle power and try again. If the problem persists, contact your Tektronix Service Center.

An unrecoverable error has occurred, and the instrument application software will be shutdown.

■   Switch the instrument off and restart it or relaunch the RSA6100A application.

Unable to lock to External Frequency Reference.

The instrument is no longer locked to the external reference signal.

■   Verify that the external reference signal is still a valid signal.

■   Select External on the Frequency Reference tab in the Config In/Out control panel.

VBW not applied - Acq BW too small

Increase VBW or measurement bandwidth. Make sure Sampling Parameters are set to Auto.

VBW not applied - Spectrum Length too short

This message occurs when the requested VBW can't be produced because the Spectrum Length is too short.

To clear this problem, set the Spectrum Length to Auto or manually increase the Spectrum Length (see Setup > Analysis > Spectrum Time tab). If Spectrum Length is coupled to Analysis Length, set Analysis Length to Auto or manually increase it (see Setup > Analysis > Analysis Time tab).

Setting Up Network Connections

Because the RSA6100A Series spectrum analyzers are based on Windows XP, you configure network connections for the instrument the same way you would for any PC based on Windows XP. See **Help and Support** in the **Start** menu to access the Windows Help System for information on setting up network connections.

Menu Overview

The main menus are:

Menu	Description
File (see page 85)	Select measurements, open and save files, print documents, and preset.
View (see page 92)	Change display size, display the Marker toolbar and Status bar.
Run (see page 94)	Start, stop and abort acquisitions, replay measurements, select single or continuous acquisition mode.
Markers (see page 97)	Define markers and search for signal peaks.
Setup (see page 97)	Change settings for acquisition, trigger, analysis, measurements, amplitude, alignments, and configure in/out settings.
Tools (see page 98)	Access diagnostics, install upgrades and configure user preferences.
Window (see page 101)	Controls the size and layout of displays within the RSA6100A application.
Help (see page 101)	Access the online help, display information about the instrument hardware and software.

File Menu

Command	Description
Recall (see page 85)...	The Recall dialog enables you to recall saved data, setups and traces.
Save (see page 86)	Saves a file without asking for a file parameters (based on most recent settings).
Save As... (see page 86)	Displays the Save dialog enabling you to specify the parameters of the save operation.
Print (see page 87)...	Prints the selected display.
Print Preview (see page 87)	Displays a preview of the print output.
Preset (see page 91)	Preset resets the instrument to factory defaults. Acquisition data and settings that have not been saved will be lost.
Exit	Closes the RSA6100A application. Exit does not shut down the instrument.

Recall

Menu Bar: File > Recall

Front Panel: Recall

Use the Recall command to load previously saved acquisition data, setups or trace data.

To recall data or setups

1. Select **File** > **Recall**. This displays the **Open** dialog.
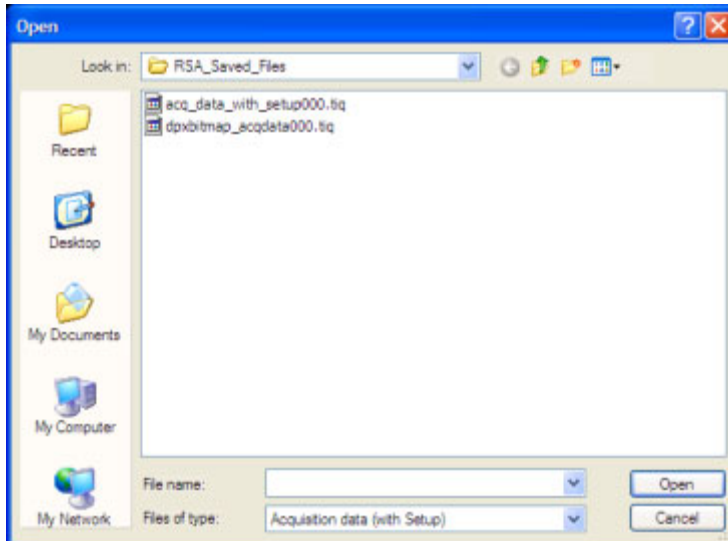
2. Select the file type to be recalled and click **Open**.

Save / Save As...

Menu Bar: File > Save / Save As...

Use Save / Save As... to store acquisition data, setups, and traces. Save is also used to export traces, results and pictures of the display for use in other programs.

Difference Between Save and Save As

Use Save As to specify what kind of data you want to save and where the data should be saved. Use Save to quickly save the same data as you saved the last time you executed a Save, without having to specify the data type and location.

For example, suppose you wish to save a picture of a spectrum trace each time you adjust a circuit to document how the adjustments affect the output of the circuit. The first time you want to save a picture of the display, you will need to select Save As. From the Save As dialog box, you specify the type of data you want to save (Picture of Selected Display) and specify the location of the saved file. As long as the Save and Export option (see page 100) is set to automatically name saved files, the next time you want to

save a picture of the display, you can just press Save on the front panel and a picture of the selected display will be saved without requiring you to type a filename or the location of the file to be saved.

What Data Types Can Be Saved

Data type	Description
Acquisition Data	Data collected during acquisition that can be recalled for later analysis. Data is saved in a format readable only by RSA6100A instruments.
Setup	Configuration information detailing instrument settings. Data can be saved in a format readable only by RSA6100A instruments or in a text file.
Selected Trace	Saves the selected trace for later analysis by RSA6100A applications. Data is saved in a format readable only by RSA6100A instruments.
Exported Traces and Numeric Results	Save traces and results in a file format that can be used by other programs.
Pictures of the Display	Save screen images in graphic image file formats that can be used in other programs.
Exported Acquisition Data	Save acquisition data records in a file format that can be used by other programs. Acquisition data can be saved in either comma-separated-variable format or MATLAB format.

Data File Formats (see page 73).

Options for Saving Pictures of the Display

Option	Setting	Description
Image Format	PNG	Saves exported screen captures in Portable Network Graphics format.
	JPG	Saves exported screen captures in Joint Photographic Experts Group (JPEG) format.
	BMP	Saves exported screen captures in Windows bitmap format.

Print

Menu Bar: File > Print

Front Panel: Print

Print displays the Windows Print dialog box for printing a screen capture of the display. To save ink when printing, use the Colors tab to set the color scheme. See Options Settings (see page 100)

Print Preview

Menu Bar: File > Print Preview

Print Preview shows how a print job will appear when it is printed.

Application Presets

Menu Bar: File > Application Presets

The spectrum analyzer includes a set of configuration files that are tailored to specific applications. These configuration files, referred to as Application Presets, open selected displays and load settings that are optimized to address specific application requirements. You can add to the default application presets by creating your own application presets. See Creating Application Presets (see page 91). You access the application presets through the Application Presets menu item.

To load an application preset:

1. Select **File** > **Application Presets**. This opens the **Applications Presets** dialog window.

2. Select the application preset that suits your needs.

3. Click **OK** to recall the application preset.

Application Preset	Description
Modulation Analysis	The Modulation Analysis setup application preset provides you with the most common displays used during modulation analysis.
Pulse Analysis	The Pulse Analysis application preset provides you with the most common displays used during pulse analysis, and makes changes to the default parameters to settings better optimized for pulsed signal analysis. Option 20 is required to use the pulse measurements applications preset.
Spectrum Analyzer	The Spectrum Analysis application presets provide you with the settings commonly used for general purpose spectrum analysis.
Time and Frequency Analysis	The Time-Frequency preset configures the instrument with settings suited to analyzing signal behavior over time.

Modulation Analysis

The Modulation Analysis application preset opens the following displays:

- DPX Spectrum Display: Shows you a continuous spectrum monitoring of the specified carrier frequency.

- Signal Quality: Shows a summary of modulation quality measurements (EVM, rho, Magnitude Error, Phase Error, and others).

- Constellation: Shows the I and Q information of the signal analyzed in an I vs. Q format.

- Symbol Table: Shows the demodulated symbols of the signal.

To use the Modulation Analysis preset:

1. Select **File** > **Application Presets** > **Modulation Analysis**.

2. Set the measurement frequency using the front-panel knob or keypad. Your signal should appear in the DPX spectrum display.

3. Set the reference level so that the peak of your signal is about 10 dB below the top of the DPX spectrum display.

4. Set the modulation parameters for your signal. This includes the Modulation Type, Symbol Rate, Measurement Filter, Reference Filter and Filter Parameter. All of these settings are accessed by pressing the Settings button.

For most modulated signals, the Modulation Analysis application preset should present a stable display of modulation quality. Additional displays can be added by using the Displays button, and other settings can be modified to better align with your signal requirements.

Pulse Analysis

The Pulse Analysis application preset opens the following displays:

■ DPX Spectrum: The DPX spectrum display is opened with the maximum available span.

■ Time Overview: Shows amplitude vs. time over the analysis period.

■ Pulse Trace: Shows the trace of the selected pulse and a readout of the selected measurement from the pulse table.

■ Pulse Measurement Table: This shows a full report for the user-selected pulse measurements.

You can make a selected pulse and measurement appear in the Pulse Trace display by highlighting it in the Pulse Measurement Table. Key pulse-related parameters that are set by the Pulse Analysis application preset are:

■ Measurement Filter: No Filter.

■ Measurement Bandwidth: This is set to the maximum real-time bandwidth of the instrument (40 MHz in a base instrument or 110 MHz with instruments with Option 110). Note: The label on the "Measurement Bandwidth" setting is just "Bandwidth". Like the main instrument Preset command and the other application presets, the Pulse Analysis application preset also sets most other instrument controls to default values.

■ Analysis Period: This set to 2 ms to ensure a good probability of catching several pulses for typical signals.

To use the Pulse Analysis preset:

1. Select **File** > **Application Presets** > **Pulse Analysis**.

2. Set the Center Frequency control to the carrier frequency of your pulsed signal.

3. Set the Reference Level to place the peak of the pulse signal approximately 0-10 dB down from the top of the Time Overview display.

You may need to trigger on the signal to get a more stable display. This is set up in the Trigger control panel. ("Trig" button). Using the Power trigger type with the RF Input source works well for many pulsed signals.

4. Set the Analysis Period to cover the number of pulses in your signal that you want to analyze. To do this, click in the data entry field of the Time Overview window and set the analysis length as needed.

Spectrum Analysis

The Spectrum Analysis application preset opens a Spectrum display and sets several parameters. There are two presets are available for spectrum analysis, as follows.

- **Spectrum Analysis (0.1- 6.2 GHz)**: This sets the frequency range to 0.1 to 6.2 GHz, and sets RF/IF optimization to **Minimize Sweep Time**. This application preset is configured for use with the RSA6106A, but it can be also used with the RSA6114A.

- **Spectrum Analysis (0.1-14 GHz)**: This sets the frequency range to 0.1 to 14 GHz, and sets the RF/IF optimization to **Minimize Sweep Time**. This application preset is configured for use with the RSA6114A. If you use this preset on the RSA6106A, you will have to manually adjust the center frequency and span. If you have Option 110 installed in your instrument, using **Minimize Sweep Time** will improve the screen update rate for wide spans approximately 3X compared to the auto settings. If Option 110 is not installed, no improvement in sweep speed is gained by minimizing sweep time.

To use the either of the spectrum analysis application presets:

1. Select **File** > **Application Presets** > **Spectrum Analysis (0.1-14 GHz)** or **Spectrum Analysis (0.1-6.2 GHz)** as appropriate.

2. Set the measurement frequency using the front-panel knob or keypad.

3. Adjust the span to show the necessary detail.

Time and Frequency Analysis

The Time and Frequency Analysis application preset opens the following displays:

- Time Overview: Shows a time-domain view of the analysis time 'window'.

- Spectrogram: Shows a three-dimensional view of the signal where the X-axis represents frequency, the Y-axis represents time, and color represents amplitude.

- Frequency vs. Time: Enables measurement of the frequency of the signal vs. time. This display's graph plots changes in frequency over time and allows you to make marker measurements of settling times, frequency hops, and other frequency transients.

- Spectrum: Shows a spectrum view of the signal. The only trace showing in the Spectrum graph after selecting the Time-Frequency Analysis preset is the Spectrogram trace. This is the trace from the Spectrogram display that is selected by the active marker. Stop acquisitions with the Run button because its easier to work with stable results. In the Spectrogram display, move a marker up or down to see the spectrum trace at various points in time.

The analysis period is set to 5 ms.

To use the Time-Frequency application preset:

1. Select **File** > **Application Presets** > **Time-Frequency Analysis**.

2. When the preset's displays and settings have all been recalled and acquisitions are running, adjust the center frequency and span to capture the signal of interest.

3. Set the reference level to move the trace vertically, so it is visible in the Spectrum display's graph.

4. If the signal is transient in nature, you might need to set a trigger to capture it. For more information on triggering in the time and frequency domain, see Triggering (see page 14)

When the signal has been captured, the spectrogram shows an overview of frequency and amplitude changes over time. To see frequency transients in greater detail, use the Frequency vs. Time display.

The Time and Frequency Analysis preset sets the analysis period to 5 ms. The Spectrum Span is 40 MHz. The RBW automatically selected for this Span is 300 kHz. For a 300 kHz RBW, the amount of data needed for a single spectrum transform is 7.46 μs. A 5 ms Analysis Length yields 671 individual spectrum transforms, each one forming one trace for the Spectrogram to display as horizontal colored lines. This preset scales the Spectrogram time axis (vertical axis) to -2, which means that the Spectrogram has done two levels of time compression, resulting in one visible line for each four transforms. This results in 167 lines in the Spectrogram for each acquisition, each covering 29.84 μs.

Creating Application Presets

You can add your own application presets to the list that appears in the Application Presets dialog. Create a Setup file and save a copy of it to **C:\RSA6100A Files\Application Presets**. The name you give the file will be shown in the Application Presets list along with the sets provided by Tektronix. For instructions on how to save a Setup file, see Saving Data (see page 16).

If the Tektronix application presets files are accidentally deleted, you can restore them by reinstalling the RSA6100A software. The software installation process will not remove user files you have placed in the Application Presets directory.

Preset

Menu Bar: File > Preset

Preset resets settings and clears all acquisition data. Settings and acquisition data that have not been saved will be lost. Settings in the Config In/Out (see page 106) control panel are not reset by Preset.

After Preset resets the spectrum analyzer settings, it displays the Spectrum view.

Preset does not affect time or date settings; the Windows XP operating system settings, or Tools Menu items.

View Menu

The View menu enables you to control the display of items in the application window.

Command	Description
	Toggles all views between full-screen size and user-selected size.
	Shows or hides the Marker toolbar. Enables you to define Markers and perform Peak searches.
	Shows or hides the Status bar.

Full Screen

Menu Bar: View > Full Screen

When unchecked, clicking **Full Screen** resizes the application window to fill the screen. Full Screen mode maximizes the application window, and turns off the application title bar.

When checked, clicking **Full Screen** restores the application window to its previous size. The application title bar is restored.

Marker Toolbar

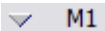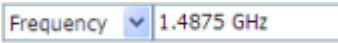**Front Panel / Application toolbar: Markers**

Menu bar: View > Marker Toolbar

Select **Marker Toolbar** to display or hide the Marker Toolbar in the application window. The Marker Toolbar enables you to operate existing markers or define new markers.

| Icon / Readout	Description
Define	Opens the Define Markers control panel.
⌄ M1	Selected marker readout. This readout shows which marker is selected. The pop-up menu allows you to choose the selected marker, add markers, and turn all markers off.
Frequency ⌄ 1.4875 GHz	Marker position controls. For frequency displays, this readout shows the marker position in Hertz. For time displays, this readout shows the marker position in seconds. The position of the selected marker can be changed by selecting the numeric readout and using the knob to adjust the value.
To Center	Changes the spectrum analyzer's Center Frequency to the frequency of the selected marker. Not selectable for time markers.
Peak	Moves the marker to the highest peak on the signal. On displays that scale about zero on the vertical axis (for example, Magnitude Error, EVM, and Frequency vs Time), the highest peak selected by the Peak button is an "absolute value", therefore, negative peaks are included in the search for the highest peak.
◀	Moves the selected marker to the next peak to the **left** of the current position.
▶	Moves the selected marker to the next peak to the **right** of the current position.
▼	Moves the selected marker to the next **lower** peak value. The peak value here refers to the numeric value of the peak amplitude. Thus, when repeatedly moving the marker, it can move to the right or left depending on the location of the next lower value.
▲	Moves the selected marker to the next **higher** peak value. The peak value here refers to the numeric value of the peak amplitude. Thus, when repeatedly moving the marker, it can move to the right or left depending on the location of the next higher value.
Table	Displays/hides the marker table from the display.
x	Removes the Marker Toolbar from the display.

Status Bar

The Status Bar displays information on specific instrument settings. It contains only status information; it does not display any error information. The Status bar has no controls. It can be hidden.

Analyzing Acq BW: 20.00 MHz, Acq Length: 22.320 us   Real Time Free Run   Ref: Int Atten: 10 dB Preamp: Off

Elements of the Status Bar

Area within Bar	Description
Run Status	Displays the running state. For example, some run states are Arm, Ready, Triggered, Analyzing, or Stopped.
Status message area	Displays status messages (for example, ADC Overrange). When there no status messages to report, displays current acquisition parameters (for example, Acq Length: 22.320 us).
Acquisition mode	Displays either Real Time or Swept. Indicates how the next acquisition will be acquired.
Trigger Settings	Displays Trigger settings. For example, you will see Free Run, Power, Trig In (front), Frequency Mask and others.
Frequency Reference Setting	Indicates whether the internal or external reference source is selected. Displays Ref: Int or Ref: Ext.
Internal Attenuator setting	Displays the setting of the internal attenuator.
Preamp Setting	If Option 01 is installed, this indicates whether the preamp is on or off. If the preamp is on, displays Preamp: ON, 3 GHz max. as a reminder that the input frequency range is restricted when using the preamp.

Run Status Indicators

Indicator	Description
Acquiring	The spectrum analyzer is capturing the signal.
Analyzing	The spectrum analyzer has captured the signal and is processing the signal record.
Arm	The trigger circuitry is filling the pretrigger portion of the signal record.
File Data	The spectrum analyzer is analyzing recalled acquisition records.
Ready	If Ready is displayed, the spectrum analyzer is waiting for a valid trigger.
Stopped	If Stopped is displayed, Signal acquisition has been halted. This can occur because the Run button has been pressed or because a trigger event has occurred, signal acquisition has occurred and Run mode was set to Single.
Triggered	If Triggered is displayed, the spectrum analyzer has recognized a valid trigger and is filling the posttrigger portion of the signal record.

Showing or Hiding the Status Bar

■ Select **View** > **Status** to toggle the display of the Status bar.

Run Menu

The Run menu provides access to commands that control the signal acquisition.

Command	Description
Run (see page 95)	If acquisition mode is Stopped, selecting Run begins a new measurement/acquisition cycle. If acquisition mode is Run, pressing Run halts the current measurement/acquisition cycle after it completes.
Resume	Restarts data acquisition, but does not reset accumulated results, such as Average or MaxHold. This allows you to stop acquisitions temporarily, then continue. If the accumulation is already complete, for example, 10 acquisitions or 10 averages have already been completed, each subsequent Resume command will cause one more acquisition to be taken, and its results added to the accumulation. Not available if instrument settings have been changed.
Abort (see page 95)	Immediately halts the current measurement/acquisition cycle. Use this to compute new results for old data after you change settings.
Replay (see page 96)	Reruns measurements using the current acquisition data or a saved file.
Replay all frames	When FastFrame is enabled or a FastFrame saved acquisition record has been recalled, replays all the frames in the acquisition record.
Single Sequence (see page 96)	Selects the single-sequence acquisition mode. This is only a mode selector, it does not initiate an acquisition.
Continuous (see page 96)	Selects the continuous acquisition mode. Selecting Continuous does initiate acquisitions.

Run

Menu Bar: Run > Run

Application Bar / Front Panel: Run

Selecting **Run** begins a new acquisition/measurement cycle.

Resume

Menu Bar: Run > Resume

Restarts data acquisition, but does not reset accumulated results, such as Average or MaxHold. This allows you to stop acquisitions temporarily, then continue. If the accumulation is already complete, for example, 10 acquisitions or 10 averages have already been completed, each subsequent Resume command will cause one more acquisition to be taken, and its results added to the accumulation. Not available if instrument settings have been changed.

Abort

Menu Bar: Run > Abort

Selecting **Abort** immediately halts the current acquisition/measurement cycle. In-process measurements and acquisitions are not allowed to complete.

Replay

Menu Bar: Run > Replay...

Selecting **Replay** causes the current measurement to be rerun using the existing acquisition data.

Replay All Frames

Menu Bar: Run > Replay All Frames

When FastFrame is enabled, selecting **Replay All Frames** causes the current measurement to be rerun using all of the frames in the acquisition data.

Single Sequence

Menu Bar: Run > Single

Selecting **Single** sets the Run mode to Single. In Single mode, as soon as one acquisition sequence completes, acquisition stops.

Note that a single acquisition sequence can require more than one acquisition. For example, in a spectrum view, the trace function might be set to Average 100 acquisitions. Thus, a complete acquisition sequence would consist of 100 acquisitions to produce 100 intermediate traces that are averaged together to create the final trace that is displayed. Once the 100 acquisitions have been completed, acquisition stops.

This is only a mode selector, it does not initiate an acquisition.

Continuous Acquisition Mode

Menu bar: Run > Continuous

Selecting **Continuous** places the spectrum analyzer in the Continuous acquisition mode. In Continuous mode, the spectrum analyzer acquires and displays acquisitions repeatedly. The Continuous and Single Sequence acquisition modes are mutually exclusive.

Selecting Continuous restarts acquisitions.

Markers Menu

The Markers menu provides to settings that define and control the location of markers.

Setting	Description
Peak (see page 174)	Moves the selected marker to the highest peak on the trace.
Next Peak >	Moves the selected marker to next peak depending on the setting chosen.
Marker to Center Frequency	Sets center frequency to the frequency of the selected marker.
Define Markers (see page 56)	Displays the Define Marker control panel.

Setup Menu

The Setup menu provides access to control panels that specify parameters for numerous spectrum analyzer functions.

Command	Description
Displays (see page 97)	Displays the Displays control panel.
Settings (see page 102)	Displays the Settings control panel for the selected display.
Trigger (see page 116)	Displays the Trigger control panel.
Acquire (see page 103)	Displays the Acquire control panel.
Analysis (see page 105)	Displays the Analysis control panel.
Amplitude (see page 104)	Displays the Amplitude control panel.
Configure In/Out (see page 106)	Displays the Configure In/Out panel.
Preset (see page 98)	Initiates the Preset.

Displays

Menu Bar: Setup > Displays

Application Toolbar: Displays

Use the **Select Displays** dialog to choose the displays that appear on the screen.
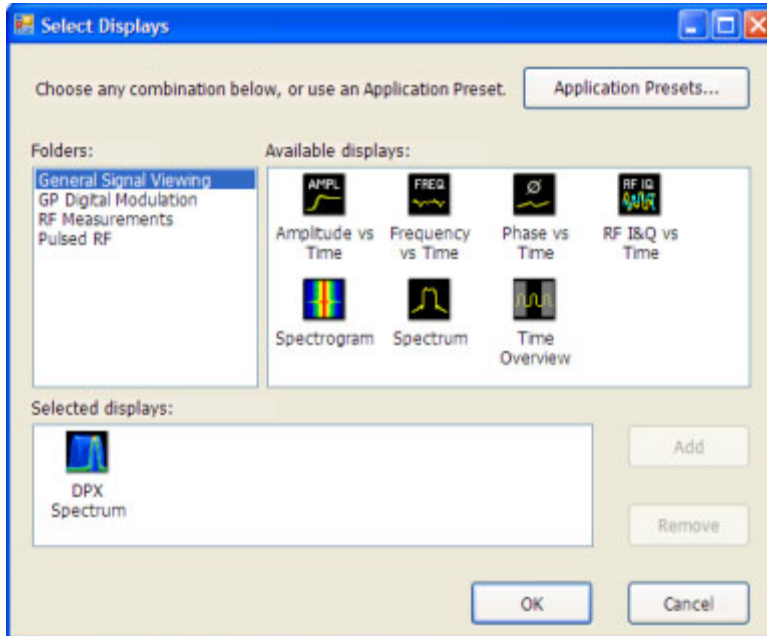
To select displays:

1. Press the **Displays** button or select **Setup** > **Displays**.

2. Select one of the choices under **Folders**. The folder chosen determines the choices available in **Available displays**.

3. Double-click the desired display in the **Available displays** box or select the desired display and click **Add**.

4. Click **OK**.

Preset

Menu Bar: Setup > Preset

Preset resets settings and clears all acquisition data. Settings and acquisition data that have not been saved will be lost. Settings in the Config In/Out (see page 106) control panel are not reset by Preset.

After Preset resets the spectrum analyzer settings, it displays the Spectrum view.

Preset does not affect time or date settings, the Windows XP operating system settings, or Tools Menu items.

Tools Menu

Provides access to several utilities for controlling instrument functions.

Command	Description
Search... (see page 113)	Enables you to locate and highlight specified signal levels in Spectrum displays.
Alignments (see page 13)	Displays the Alignments dialog.
Diagnostics (see page 99)...	Displays the Diagnostics dialog.
Install Upgrades... (see page 100)	Used to activate upgrades you have purchased.
Options (see page 100)	Displays the Options control panel.

Alignments Dialog

Menu Bar: Tools > Alignments

The spectrum analyzer can adjust itself, optimizing the internal signal path used to acquire the signal you measure. Alignment optimizes the spectrum analyzer to take more accurate measurements based on the ambient temperature. The Alignments dialog enables you to specify when alignments occur, either automatically or only when manually initiated.
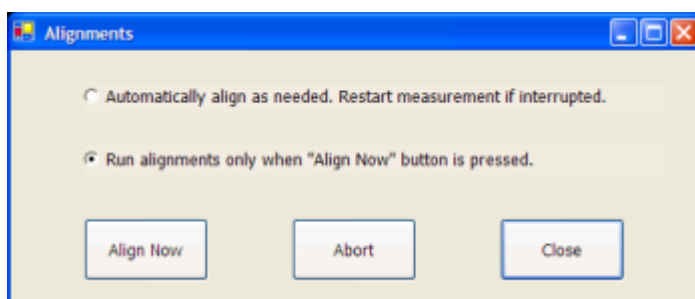
Elements of the Alignments Dialog

Setting	Description
Automatically align as needed	Specifies that alignments run as ambient conditions require.
Run alignments only when "Align Now button is pressed.	Specifies that alignments will never run unless manually initiated.
Align Now	Use to manually initiate an alignment.
Abort	Stops the alignment process.
Close	Closes the Alignments dialog.

Diagnostics

Menu Bar: Tools > Diagnostics

The Diagnostics menu item displays the Diagnostics Tests window, which enables you to run variety of tests to verify the operation of the spectrum analyzer. For detailed information on running diagnostics, refer to the *RSA6100A Series Real-Time Spectrum Analyzer Service Manual*, Tektronix part number 071-1914-XX.
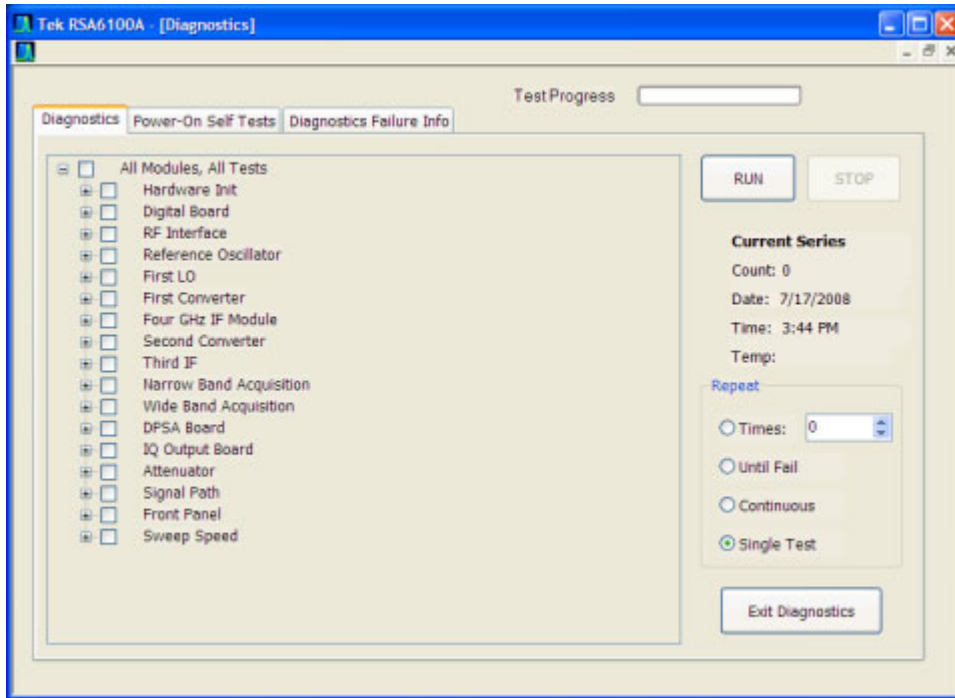
Install Upgrades

You can install upgrades on your instrument as your needs change. To install upgrades, you will need an Option Installation Key. For information about available options or to make a purchase in North America, call 1-800-833-9200. Worldwide, visit www.tektronix.com to find contacts in our area.

Full instructions on how to install your upgrade and activate the option with the Option Installation Key are provided in the upgrade kit instructions.

Options Settings

Menu Bar: Tools > Options

The Option settings control panel allows you to set some global parameters.

Settings tab	Description
Save and Export	The instrument can automatically name saved files by appending a number to a base file name. Use this tab to enable/disable automatic naming of files. For example, if **Automatically Increment Filename Number** is disabled, when you select Save from the File menu, you will have to enter a name for the file.
GPIB	Use this tab to set the primary GPIB address for the instrument.
Security	Selecting the **Hide Sensitive readouts** checkbox causes the instrument to replace measurement readouts with a string of asterisks.
Colors	Use this tab to select different color schemes for the measurement graphs.

Colors

The Color scheme setting provides three color schemes for the measurement graph. The color scheme setting does not change the overall instrument application or Windows color scheme.

- Thunderstorm — This scheme displays graphs in shades of blue. This provides a less vibrant color scheme than the default setting.

- Blizzard — This scheme displays graphs with a white background to save ink when printing.

- Classic — The default setting. This scheme displays graphs area with a black background.

Window Menu

The Window menu provides control of how windows are displayed.

Command	Description
Close View	Closes the selected view.
Cascade	Positions windows in a cascade view (not available when Lock Windows is selected).
Tile Horizontally	Positions widows in a horizontal orientation (top to bottom).
Tile Vertically	Positions widows in a vertical orientation (side by side).
Lock Windows	Locks the windows into their current position, preventing them from being moved.
(List of windows)	A numbered list of open windows.

Help Menu

The Help menu provides access to the online help and version information about the spectrum analyzer hardware and software.

Command	Description
User manual	Displays the online help.
About the Tektronix Real-Time Spectrum Analyzer	Displays information about the spectrum analyzer model and installed applications.

Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The Settings menu item enables access to control panels that allow you to change settings for the selected display. The control panel that appears when you select **Settings** depends on the selected display. The Settings control panel for the Spectrum display is shown below.
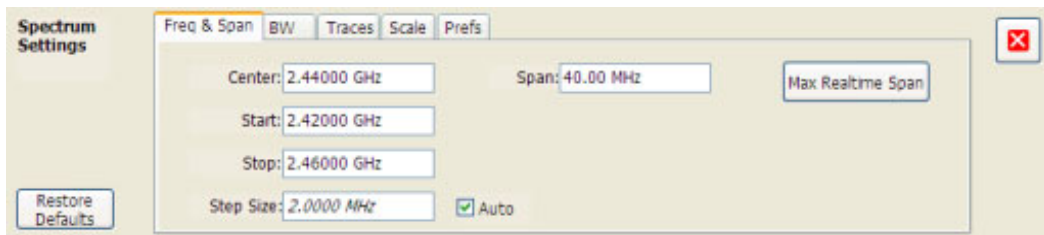
The control panel for the CCDF display is shown below.
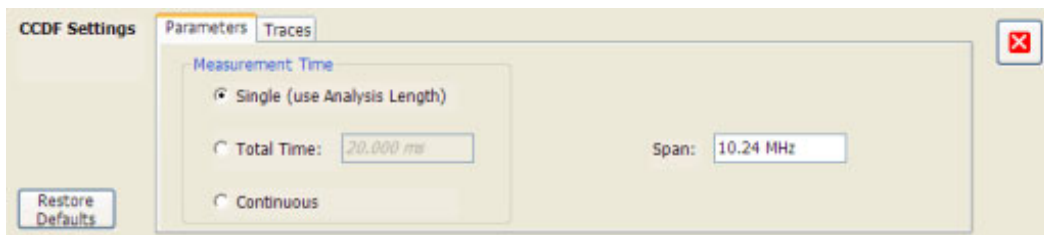
Settings Control Panels

ACPR Settings (see page 106)

Amplitude Settings (see page 104)

Analysis Settings (see page 105)

Configure In/Out Settings (see page 106)

Constellation Settings (see page 107)

DPX Spectrum Settings (see page 107)

EVM vs Time Settings (see page 108)

Acquire

Menu Bar: Setup > Acquire

Application Toolbar: Acq

Selecting **Acquire** displays the Acquire control panel. These settings control the hardware acquisition parameters for the spectrum analyzer. Normally, sampling parameters are automatically adjusted for selected measurements. You can use Acquire to change these parameters if necessary.
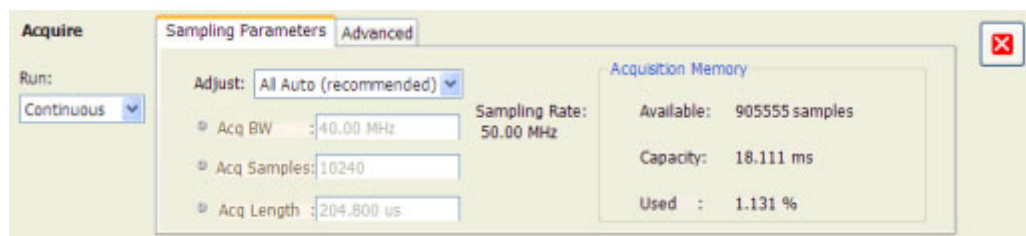
Setting	Description
Sampling Parameters (see page 183)	Sets the parameters that control the acquisition of the signal.
Advanced (see page 121)	Sets the Dither parameters.

Run

Run mode specifies whether the spectrum analyzer will stop acquiring data after it completes a measurement sequence.

■ **Continuous** - In Continuous mode, once the spectrum analyzer completes a measurement sequence, it begins another.

■ **Single** - In Single mode, once the spectrum analyzer completes a measurement sequence, it stops.

NOTE. A measurement sequence can require more than one acquisition. If the spectrum analyzer is configured to average 100 traces together, the measurement sequence will not be completed until 100 traces have been acquired and averaged.

Amplitude Settings

Menu Bar: Setup > Amplitude

Application Toolbar: Ampl

The Amplitude control panel provides access to settings that are used by all displays within the RSA6100A application.
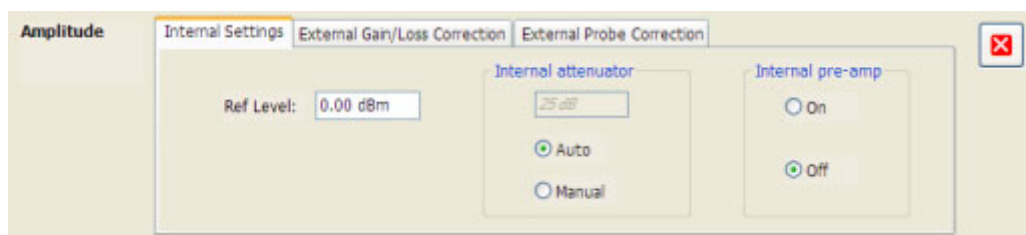
Setting	Description
Internal Settings (see page 156)	Sets the parameters that control the acquisition of the signal.
External Gain/Loss Correction (see page 146)	Specifies whether a correction is applied to the signal to compensate for the use of external equipment.
External Probe Correction (see page 121)	Specifies whether a correction is applied to the signal if the spectrum analyzer detects a probe is connected to the instrument. (Probes are connected to the spectrum analyzer through the RTPA2A Real-Time Spectrum Analyzer TekConnect Probe Adapter.)

Amplitude vs. Time Display Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The settings for the Amplitude vs Time display are shown in the following table.

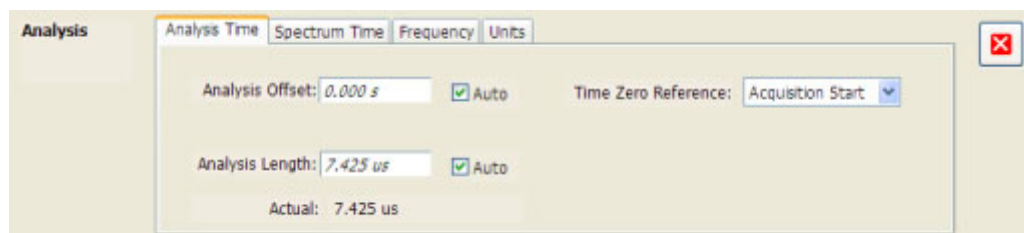| Settings tab	Description
BW (see page 128)	Sets the Bandwidth Method used for setting the measurement bandwidth.
Traces (see page 202)	Allows you to select the type of trace to display and their functions.
Scale (see page 184)	Sets the vertical and horizontal scale parameters.
Prefs (see page 174)	Specifies whether certain display elements are visible.

Analysis Settings

Menu Bar: Setup > Analysis

Application Toolbar: Ana

The Analysis control panel provides access to settings that are used by all displays within the RSA6100A application. These settings affect only post processing and they do not control hardware settings.

Setting	Description
Analysis Time (see page 122)	Specifies the length of time to use in measurements.
Spectrum Time (see page 196)	Specifies whether the Spectrum Analysis display uses the same Analysis Time parameters as all the other displays or if it uses a different Offset and Length.
Frequency (see page 154)	Specifies the measurement frequency (center frequency).
Units (see page 218)	Specifies the global Power units for all displays.

CCDF Display Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The settings for the CCDF Display are shown in the following table.

Settings tab	Description
Parameters (see page 170)	Specifies the time to be measured.
Traces (see page 198)	Select the trace to be measured and select reference trace for display.

Channel Power and ACPR Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The settings for the Channel Power and ACPR display are shown in the following table.
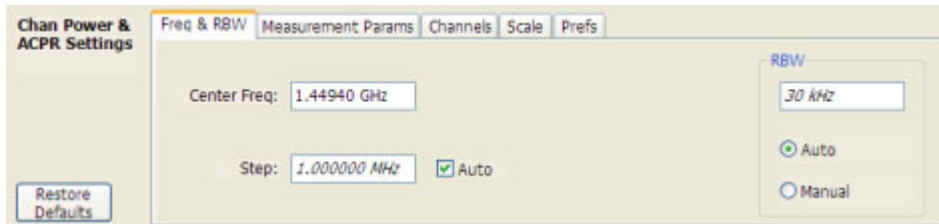
Settings tab	Description
Freq & RBW (see page 150)	Specify the frequency and resolution bandwidth used for the ACPR measurement.
Measurement Params (see page 165)	Specify several parameters that control the measurement, such as channel filter, chip rate, averaging, and correcting for noise floor.
Channels (ACPR) (see page 130)	This tab specifies the BW and offset parameters of the Channels for the selected ACPR measurement.
Scale (see page 193)	Specifies the vertical and horizontal scale settings.
Prefs (see page 174)	Specifies whether certain display elements are visible.
Restore Defaults (button)	Sets parameters for a 1-channel WCDMA measurement.

Configure In/Out Settings

Menu bar: Setup > Configure In/Out.

The Configure In/Out control panel enables you to configure the spectrum analyzer inputs. The settings in this control panel are shared by all application windows.

Settings tab	Description
Trigger I/O	Specifies the impedance for the Trig 1 input.
Frequency Reference	Specifies the source of the Frequency Reference. You can select between an Internal (10 MHz) source and an external source.
Other Outputs (see page 169)	Specifies whether the 28 VDC, Analog IF and IQ outputs are on or off. Additional settings are available for IF and IQ outputs.

Constellation Display Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings.

The settings for the Constellation view are shown in the following table.

Settings tab	Description
Modulation (see page 166)	Specifies the type of modulation used for the input signal and other parameters.
Advanced Params (see page 120)	Specifies additional parameters.
Find (see page 150)	Used to set parameters for finding a burst within the data record and for entering a Synch word.
Analysis Time (see page 123)	Contains parameters that define the portion of the acquisition record that is used for analysis. Also allows you to specify the Units (Seconds or Symbols) for the GP Digital Modulation displays.
Trace (see page 214)	Allows you to set the trace display characteristics.
Prefs (see page 174)	Enables you to set characteristics of the measurement display.

DPX Spectrum Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The measurement settings for the Digital Phosphor display are shown in the following table.

Settings tab	Description
Freq & Span (see page 151)	Sets frequency and span parameters for the DPX Spectrum display.
BW (see page 129)	Sets Resolution Bandwidth.
Traces (see page 204)	Allows you to select the number and types of traces to display and their functions.
Scale (see page 185)	Sets the vertical and horizontal scale parameters.
Prefs (see page 174)	Specifies whether certain display elements are visible.
Audio Demod (see page 124)	Enables and sets parameters for audio demodulation function.

EVM vs Time Display Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The settings for the EVM vs Time display are shown in the following table.

Settings tab	Description
Modulation (see page 166)	Specifies the type of modulation used in the input signal and other parameters that controls the demodulation of the input signal.
Advanced Params (see page 120)	Specifies Freq Offset, Magnitude normalization parameters, and enables swapping I and Q.
Find (see page 150)	The Find tab is used to set parameters for finding bursts within the data record.
Analysis Time (see page 122)	The Analysis Time tab contains parameters that define how the signal is analyzed in the general purpose digital modulation displays.
Trace (see page 206)	Specifies the display characteristics of the displayed trace.
Scale (see page 186)	Specifies the horizontal and vertical scale settings.
Prefs (see page 174)	Specifies whether certain display elements are visible.

Frequency vs Time Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The Setup settings for Frequency vs Time are shown in the following table.

Settings tab	Description
Freq & Span (see page 151)	Sets the frequency and span parameters.
Trace (see page 214)	Sets the trace display parameters.
Scale (see page 187)	Sets the Vertical and Horizontal scale and offset parameters.
Prefs (see page 174)	Specifies whether certain display elements are visible.

Magnitude Error vs Time Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The Setup settings for Magnitude Errors vs Time are shown in the following table.
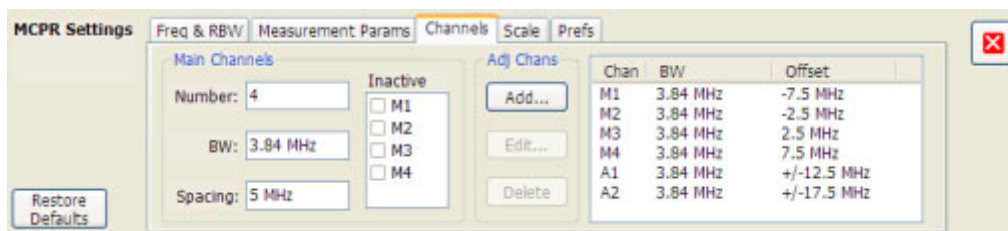
Settings tab	Description
Modulation (see page 166)	Sets parameters defining signal modulation characteristics.
Advanced Params (see page 120)	Sets additional parameters defining signal modulation characteristics.
Find (see page 150)	The Find tab is used to set parameters for finding bursts within the data record.
Analysis Time (see page 122)	Sets parameters defining analysis time.
Trace (see page 206)	Sets traces parameters.
Scale (see page 186)	Sets vertical and horizontal scale parameters.
Prefs (see page 174)	Sets the whether or not different display elements are shown.

MCPR Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The Setup settings for MCPR (Multiple Carrier Power Ratio) are:

Settings tab	Description
Freq & RBW (see page 150)	Specify the frequency and resolution bandwidth used for the MCPR measurements.
Measurement Params (see page 165)	Specifies parameters controlling how the MCPR measurement is made.
Channels (see page 131)	Specifies the parameters of the channels to be measured.
Scale (see page 193)	Specifies the vertical and horizontal scale and offset values.
Prefs (see page 174)	Specifies whether or not certain display elements are shown.
Restore Defaults (button)	Sets parameters for a 4-carrier WCDMA measurement.

Occupied Bandwidth Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The settings for the Occupied Bandwidth display are shown in the following table.

Settings tab	Description
Freq & RBW (see page 150)	Allows you to specify the Center Frequency, Step size and RBW.
Params (see page 170)	Allows you to specify the Occupied BW % Power, x dB level, Measurement BW, enable averaging and the Max Hold function.
Scale (see page 188)	Allows you to set the vertical and horizontal scale parameters.
Prefs (see page 174)	The Prefs tab enables you to set characteristics of the measurement display.

Phase Error vs Time Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The settings for the Phase Error vs Time display are shown in the following table.

Settings tab	Description
Modulation (see page 166)	Allows you to specify the type of modulation used for the input signal and other parameters.
Advanced Params (see page 120)	Allows you to specify the frequency offset, magnitude normalization method and allows for swapping the I and Q signals.
Find (see page 150)	Find tab is used to set parameters for finding bursts within the data record.
Analysis Time (see page 123)	The Analysis Time tab contains parameters that define the portion of the acquisition record that is used for analysis.
Traces (see page 206)	Allows you to set the points/symbol and enable trace averaging.
Scale (see page 188)	Allows you to set the vertical and horizontal scale parameters.
Prefs (see page 174)	The Prefs tab enables you to set characteristics of the measurement display.

Phase Noise Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The measurement settings for the Phase Noise display are shown in the following table.

Settings tab	Description
Frequency (see page 155)	Specify whether the graph displays one range or multiple ranges. Specifies whether all spurs are shown or only spurs over specified limits. Enables the use of CISPR filters and detectors.
Parameters (see page 171)	Specifies the Optimization method.
Traces (see page 209)	Specifies trace parameters such as detection method and whether smoothing in enabled. Traces can also be saved and loaded for reference from this tab.
Scale (see page 189)	Specify vertical and horizontal scale settings.
Prefs (see page 174)	Specify appearance features of the graph area.

Phase vs Time Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The settings for the Phase vs Time display are shown in the following table.

Settings tab	Description
Freq & Span (see page 151)	Sets the frequency and span parameters.
Trace (see page 214)	Sets the trace display parameters.
Scale (see page 189)	Sets the Vertical and Horizontal scale and offset parameters.
Prefs (see page 174)	Specifies whether certain display elements are visible.

Pulse Statistics Display Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The settings for the Pulse Statistics Display are shown in the following table.

Settings tab	Description
Params (see page 172)	Specifies several parameters that control how pulses are counted and defined.
Define (see page 138)	Specifies parameters that control where measurements are taken on a pulse.
Levels (see page 157)	Specifies parameters that control the method and levels used to calculate some pulse values.
Freq Estimation (see page 152)	Specifies the reference used for computing frequency errors.
Scale (see page 190)	Specifies the vertical and horizontal scale settings.
Prefs (see page 174)	Specifies whether or not certain elements of the display are shown.

Pulse Table Display Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The Setup settings for the Pulse Table Display are shown in the following table.

Settings tab	Description
Measurements (see page 164)	Selects the measurements to be show in the Pulse Table.
Params (see page 172)	Specifies several parameters that control how pulses are counted and defined.
Define (see page 138)	Specifies parameters that control where measurements are taken on a pulse.
Levels (see page 157)	Specifies parameters that control the method and levels used to calculate some pulse values.
Freq Estimation (see page 152)	**Specifies the reference used for computing frequency errors**.

Pulse Trace Display Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The Setup settings for the Pulse Trace display are shown in the following table.

Settings tab	Description
Params (see page 172)	Specifies several parameters that control how pulses are counted and defined.
Define (see page 138)	Specifies parameters that control where measurements are taken on a pulse.
Levels (see page 157)	Specifies parameters that control the method and levels used to calculate some pulse values.
Freq Estimation (see page 152)	Specifies the reference used for computing frequency error.
Scale (see page 191)	Specifies the vertical and horizontal scale settings.
Prefs (see page 174)	Specifies whether on not certain display elements are shown.

Restoring Default Settings

To restore the spectrum analyzer to its factory default settings:

■ Select **File** > **Preset** to return the spectrum analyzer to its default settings.

Preset resets all settings and clears all acquisition data. Settings and acquisition data that have not been saved will be lost.

RF I & Q vs. Time Settings

Menu Bar: Setup > Settings

**Front Panel / Application Toolbar: Settings**

The Setup settings for RF I & Q vs. Time are shown in the following table.

Settings tab	Description
Freq & Span (see page 151)	Sets the frequency and span parameters.
Trace (see page 216)	Sets the trace display parameters.
Scale (see page 187)	Sets the Vertical and Horizontal scale and offset parameters.
Prefs (see page 174)	Specifies whether certain display elements are visible.

Search (Limits Testing) Settings

Menu Bar: Tools > Search...

Selecting **Search** displays the Search control panel. These settings define search parameters and specify actions to be performed when the search condition is met.
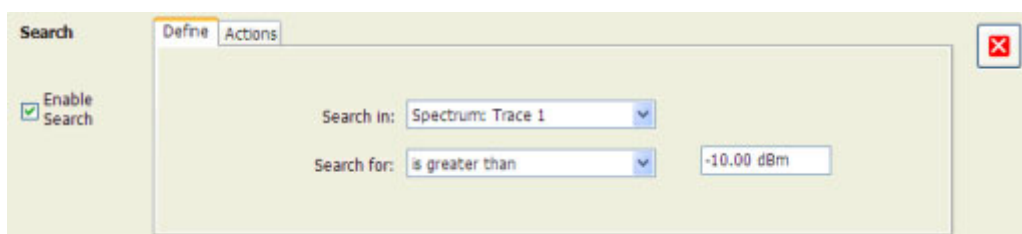
Setting	Description
Enable Search	Select to perform a search.
Define (see page 135)	Specifies which trace to search and what to search for.
Actions (see page 119)	Specifies the action to take when the search condition is met.

Signal Quality Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The Setup settings for Signal Quality are accessible only when the Signal Quality display is selected.

Settings tab	Description
Modulation (see page 166)	The Modulation tab specifies the type of modulation used for the input signal and other parameters.
Advanced Params (see page 120)	The Advanced Params tab specifies frequency offset, magnitude normalization method and allows you to swap the I and Q signals.
Find (see page 150)	Find tab is used to set parameters for finding bursts within the data record.
Analysis Time (see page 123)	The Analysis Time tab contains parameters that define the portion of the acquisition record that is used for analysis.
Prefs (see page 174)	The Prefs tab enables you to set characteristics of the measurement display.

Spectrum Display Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The Setup settings for the Spectrum display are visible when Spectrum is the selected display.

Settings tab	Description
Freq & Span (see page 151)	Sets frequency and span parameters for the Spectrum Analysis display.
BW (see page 127)	Sets Resolution Bandwidth and windowing parameters.
Traces (see page 207)	Sets Trace display parameters.
Scale (see page 194)	Sets vertical scale parameters.
Prefs (see page 174)	Specifies whether or not certain display elements are shown.

Spectrogram Display Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The Setup settings for the Spectrogram display are visible when Spectrogram is the selected display.

Settings tab	Description
Freq & Span (see page 151)	Sets frequency and span parameters for the Spectrogram display.
BW (see page 127)	Sets Resolution Bandwidth and windowing parameters.
Trace (see page 211)	Sets Trace display parameters.
Scale (see page 193)	Sets vertical scale parameters.
Prefs (see page 174)	Specifies whether or not certain display elements are shown.

Spurious Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The measurement settings for the Spurious display are shown in the following table.

Settings tab	Description
Parameters (see page 172)	Specifies whether the graph displays one range or multiple ranges. Specifies whether all spurs are shown or only spurs over specified limits. Enables the use of CISPR filters and detectors.
Reference (see page 179)	Specifies the Power Reference level.
Ranges (see page 177)	Specifies start and stop frequencies of ranges and which ranges to take measurements in. Sets parameters that define a spur. Review, save and load the Range table from this tab.
Limits (see page 158)	Specifies Pass/Fail limit parameters.
Trace (see page 213)	Specifies the trace Function.
Scale (see page 195)	Specifies the vertical and horizontal scale settings.
Prefs (see page 175)	Specifies the appearance features of the graph area.

Symbol Table Display Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The Setup settings for the Symbol Table view are shown in the following table.

Settings tab	Description
Modulation (see page 166)	The Modulation tab specifies the type of modulation used for the input signal and other parameters.
Advanced Params (see page 120)	The Advanced Params tab specifies additional parameters.
Find (see page 150)	Find tab is used to set parameters for finding bursts within the data record.
Analysis Time (see page 123)	The Analysis Time tab contains parameters that define the portion of the acquisition record that is used for analysis.
Prefs (see page 174)	The Prefs tab enables you to set characteristics of the measurement display.

Time Overview Display Settings

Menu Bar: Setup > Settings

Front Panel / Application Toolbar: Settings

The Setup settings for Time Overview are shown in the following table.

Settings tab	Description
Scale (see page 196)	Adjusts the vertical and horizontal scale and offset of the display.
Prefs (see page 174)	Specifies whether or not certain display elements are shown.

Trigger Settings

Menu Bar: Settings > Trigger

Application Toolbar: Trig

Front Panel: Trigger

The Trigger control panel allows you to set the parameters that define trigger events and how the instrument responds to them.

Trigger Modes

There are two trigger modes: Free Run and Triggered.

Mode	Description
Free Run	Acquires and displays the signal without triggering.
Triggered	Acquires a data record after the defined trigger event is recognized.

Trigger Tabs

Use the Trigger tabs to access controls for setting the different trigger parameters.

Tab	Description
Event (see page 141)	Sets parameters that control triggering on the selected trigger source.
Time (see page 197)	Sets values used to adjust time of acquisition with respect to time of trigger event.
Advanced (see page 121)	Sets controls for triggering in swept acquisitions.

About the RSA6100A Series

This window displays information about the software and hardware versions for the spectrum analyzer.
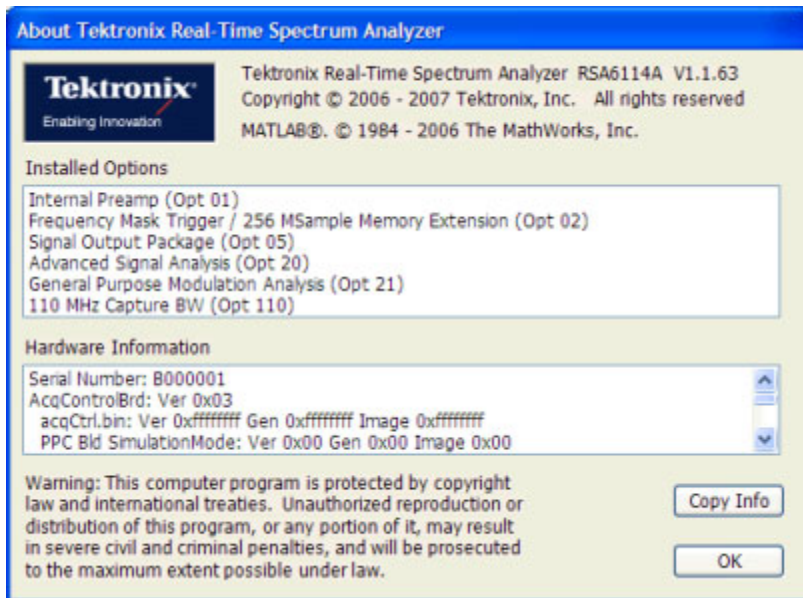
Version

At the top of the window is a line that displays the version of the spectrum analyzer application software.

Installed Options

This text box lists the instrument options installed on the spectrum analyzer. This window does not list every option installed on the instrument, just those that can be detected by the software.

Hardware Information

This text box lists information about the instrument hardware versions.

Copy Info

The Copy Info button copies information about the instrument to the Windows clipboard. This information may be useful if you need to have your instrument serviced. The following text is an example of the information copied when you click Copy Info:

Tektronix Real-Time Spectrum Analyzer

RSA6114A V1.0.1359

Installed Options:

Internal Preamp (Opt 01)

Frequency Mask Trigger / 256 MSample Memory Extension (Opt 02)

Signal Output Package (Opt 05)

Advanced Signal Analysis (Opt 20)

General Purpose Modulation Analysis (Opt 21)

110 MHz Capture BW (Opt 110)

Hardware Information:

Serial Number: B000001

AcqControlBrd: Ver 0x02

    acqCtrl.bin: Ver 0x0f Gen 0x05 Image 0x00

    CPLD: Ver 0xa0 Gen 0x00 Image 0x00

NBAcqBrd: Ver 0x02

    nbacqbrd_d8.bin: Ver 0x70 Gen 0x03 Image 0x03

WBAcqBrd: Ver 0x02

    wbDdc.bin: Ver 0x20 Gen 0x03 Image 0x01

ContinuousTimeAcqBrd: Ver 0x01

    freqDPSA.bin: Ver 0x0a Gen 0x05 Image 0x02

RfInterfaceBrd: Ver 0x02

    rffpga_top.bin: Ver 0x05 Gen 0x00 Image 0x00

FirstConverterBrd: Ver 0x02

    firstconverterfpga_top.bin: Ver 0x00 Gen 0x00 Image 0x00

FirstLOBrd: Ver 0x02

    1stLO_top.bin: Ver 0x10 Gen 0x00 Image 0x00

SecondConverterBrd: Ver 0x02

ThirdIFBrd: Ver 0x02

    thirdiffpga_top.bin: Ver 0x05 Gen 0x00 Image 0x00

ThirdIFSigPathBrd: Ver 0x02

FourGHzIFBrd: Ver 0x02

    if_4ghz_top.bin: Ver 0x00 Gen 0x00 Image 0x00

ReferenceOscillatorBrd: Ver 0x02

ref_oscillator_top.bin: Ver 0x0e Gen 0x00 Image 0x00

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Actions Tab

The Actions tab is used to specify an to action to be taken when the search condition is met.

Setting	Description
During Run or Replay	Actions specified here will occur in either Run mode or Replay mode.
Beep	The spectrum analyzer beeps when the search condition is met.
Stop	The spectrum analyzer stops when the search condition is met.
During Run Only	Actions specified here are taken only during Run mode (while acquiring live data).
AutoSave acquisition data	Saves acquisition data to a file when the search condition is met.
AutoSave trace	Saves Trace data to a file when the search condition is met.
AutoSave picture	Saves a screen capture to a file when the search condition is met.

AutoSave File Naming

When one of the AutoSave actions is enabled, the name of the saved file is automatically incremented even if the **Automatically generate filenames** option (Tools > Options > Save and Export) is not enabled. When the file is saved, it will be saved to the last location a file was saved. You can check this location by selecting **File** > **Save As**. The Save dialog will show you the current save location. If you wish to save the file in a different location, save a file (any type) in the desired location. This resets the save destination to the new location.

Adjacent Channel Leakage power Ratio

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the mean power centered on the assigned channel frequency to the mean power centered on an adjacent channel frequency. In the 3GPP specification, both the main channel and adjacent channels are required to be filtered with RRC (Root Raised Cosine) filters.

Adjacent Channel Power

Measure of the signal power leaking into nearby channels.

Advanced Params Tab

The Advanced Params tab specifies additional parameters that control the demodulation of the signal.
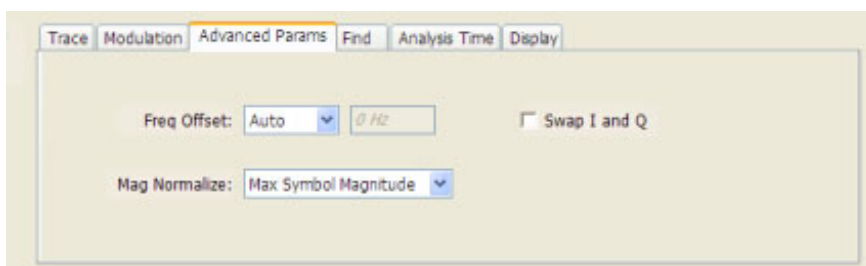
Parameter	Description
Freq Offset	Specifies the kind of offset used in some graphs. Choices are Auto or Manual. When Manual is selected, a number entry box is enabled for entering the frequency offset value.
Frequency Offset Value	Use to enter an offset frequency value. This box is enabled only when Manual is selected for Freq Offset.
Mag Normalize	Select RMS Symbol Magnitude or Max Symbol Magnitude. This setting applies to Mag Error and EVM.
Swap I and Q	When enabled, the I and Q data are exchanged before demodulating.

Freq Offset

The Frequency Offset setting is used when the center frequency setting does not match the signal frequency. When Auto is selected, the spectrum analyzer measures the offset. When Manual is selected, a number entry box is available that enables you to set the needed frequency offset.

Mag Normalize

Specifies whether Magnitude Normalization uses the RMS Symbol Magnitude or the Maximum Symbol Magnitude as the basis for normalization.

Swap I and Q

Use this check box to swap the positions of the I and Q signals in the graph.

Advanced Tab (Acquire)

Provides access to Advanced Acquire settings.

Setting	Description
Disable data caching when FastFrame is not in use	Speeds updates if FastFrame is disabled.
Dither	Can be set to Auto or Manual. In Auto mode, each measurement sets Dither as appropriate for the measurement. In Manual mode, the user setting overrides the measurement preference.

Dither

Dither is the process of adding noise to the analog signal prior to the analog-to-digital conversion. The use of Dither reduces noise over the dynamic range of the instrument. For digital modulation analysis, dither is not needed.

In general, you should leave the Dither setting on Auto (the default setting). In the Auto mode, individual measurements will select the proper dither setting (on or off). In Manual mode, the user setting overrides individual measurements' dither settings.

Advanced Tab (Triggering)

Menu Bar: Setup > Trigger > Advanced

Application Toolbar: Trig > Advanced

Provides access to an Advanced Triggering setting.

Setting	Description
Trigger each frequency segment in Swept acquisition mode	Sets the spectrum analyzer to wait for a trigger for each acquisition in a swept spectrum or other measurement requiring multiple acquisitions worth of span.

Analog IF Output

The Analog IF Output is a means for you to observe the spectrum analyzer analog IF signal with external equipment. It has two primary uses. One is to supply a frequency translated signal for an external receiver. The second use is to provide a signal for display by an oscilloscope.

Analysis Time Tab (Analysis Control Panel)

The Analysis Time tab contains parameters that define the portion of the acquisition record that is used for analysis.

Setting	Description
Analysis Offset	Specifies the location of the first time sample to use in measurements.
Auto	When enabled, causes the instrument to set the Analysis Offset value based on the requirements of the selected display.
Analysis Length	Specifies the length of time to use in measurements.
Auto	When enabled, causes the instrument to set the Analysis Length value based on the requirements of the selected display.
Time Zero Reference	Specifies the zero point for the analysis time.
Actual	This is a displayed value, not a setting. It is the Analysis Length (time) being used by the spectrum analyzer; this value may not match the Analysis Length requested (in manual mode).

Analysis Offset

Use analysis offset to specify where measurements begin. Range: 0 to [(end of acquisition) - Analysis Length)]. Resolution: 1 effective sample (or symbol).

Analysis Length

Use the analysis length to specify how long a period of time is analyzed by a measurement. After you enter a value, this box changes to show the actual value in use, which is constrained by Acquisition Time. This setting is not available when Auto is checked. Range: minimum value depends on modulation type to Acquisition Length. Resolution: 1 effective sample (or symbol).

Time Zero Reference

The analysis offset is measured from this point. Choices are: Acquisition Start or Trigger Point.

Parameter	Description
Acquisition Start	Offset is measured from the point at which acquisition begins.
Trigger Point	Offset is measured from the trigger point.

Analysis Time Tab (GP Digital Modulation)

The Analysis Time tab contains parameters that define how the signal is analyzed in the general purpose digital modulation displays.

Setting	Description
Analysis Offset	Specifies the location of the first time sample to use in measurements.
Auto	When enabled, causes the instrument to set the Analysis Offset value based on the requirements of the selected display.
Analysis Length	Specifies the length of time to use in measurements.
Auto	When enabled, causes the instrument to set the Analysis Length value based on the requirements of the selected display.
Time Zero Reference	Specifies the zero point for the analysis time.
Actual	This is a displayed value, not a setting. It is the Analysis Length (time or symbols) being used by the spectrum analyzer; this value may not match the Analysis Length requested (in manual mode).
Units	Sets the units of the Analysis Length to either Symbols or Seconds.

Analysis Offset

Use analysis offset to specify where measurements begin. Range: 0 to [(end of acquisition) - Analysis Length)]. Resolution: 1 effective sample (or symbol).

Analysis Length

Use the analysis length to specify how long a period of time is analyzed by a measurement. After you enter a value, this box changes to show the actual value in use, which is constrained by Acquisition Time.

This setting is not available when Auto is checked. Range: minimum value depends on modulation type. Resolution: 1 symbol. The maximum number of samples that can be analyzed is 80,000.

Time Zero Reference

The analysis offset is measured from this point. Choices are: Acquisition Start or Trigger.

Parameter	Description
Acquisition Start	Offset is measured from the point at which acquisition begins.
Trigger	Offset is measured from the trigger point.

Audio Demod Tab

Audio demodulation can help you identify unknown radio signals. You control the audio demodulation function with the Audio Demod tab. You access the Audio Demod tab from the Settings control panel of the DPX Spectrum display.

NOTE. *Audio Demodulation is available only in real-time acquisition mode (not swept acquisition), and the Trigger mode must be set to Free Run (not Triggered).*
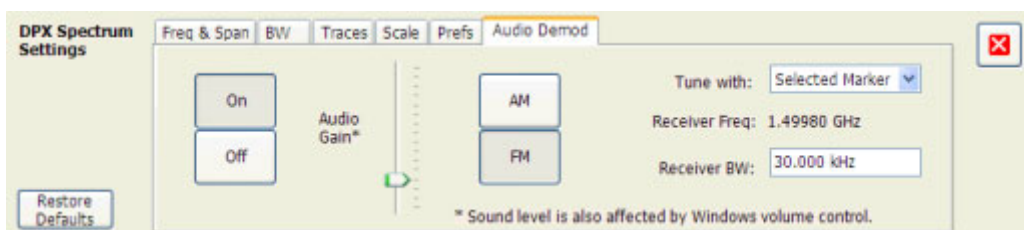
Setting	Description
On/Off	Enables/disables audio demodulation.
Audio Gain	Adjusts the volume of the demodulated audio.
AM	Selects Amplitude Modulation as the demodulation method.
FM	Selects Frequency Modulation as the demodulation method.
Tune with	Specifies how the frequency to be demodulated is specified. You can select markers or the frequency control.
Receiver Freq	Readout of the frequency to be demodulated.
Receiver BW	Adjusts the equivalent receiver bandwidth for the audio demodulation. The range of values is 1 kHz to 500 kHz.

AM / FM

Note that these buttons select the demodulation method; they do not specify a frequency band.

Tune with

The choices for this setting are: one of the markers (MR, M1, M2, M3, M4) or the Frequency control (either the front-panel knob or the Freq control in the application).

To use a marker to specify the frequency to be demodulated:

1. Select **Markers** > **Define Markers** to display the Define Markers control panel.

2. Select **Add** to turn on the next marker.

NOTE. *The first marker defined will always be* **MR**. *The MR marker is the reference for delta marker readouts*.

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3. Select the trace to which the marker should be attached from the drop-down list.

4. Click **Add** to add additional markers. Assign them to the appropriate trace.

5. Click the close button to remove the Define Markers control panel.

Select Markers. Select one of the markers in the Tune with drop-down list and then set the location of the marker to the frequency you want to demodulate. If the marker you select is not enabled, the spectrum analyzer will tune to the frequency the marker was last set to.

Receiver BW

The Receiver BW setting will not change the acquisition bandwidth. Thus, if the acquisition bandwidth is too narrow, audio demodulation will be disabled. The following three cases illustrate the relationship between the Acquisition BW, Receiver Frequency, and Receiver BW.

Case 1. In this case, the upper limit of the Receiver BW exceeds the upper limit of the acquisition bandwidth. When this occurs, audio demodulation is disabled.
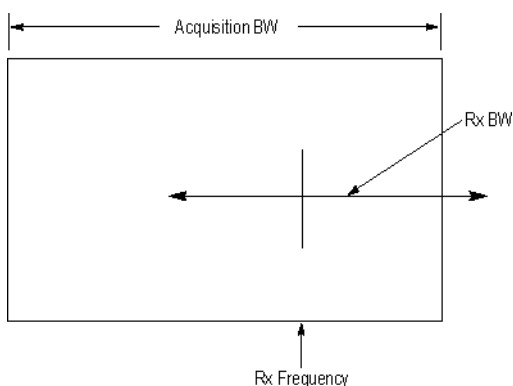
Case 2. In this case, the upper and lower limits of the Receiver BW exceed the upper and lower limits of the acquisition bandwidth. When this occurs, audio demodulation will be disabled.
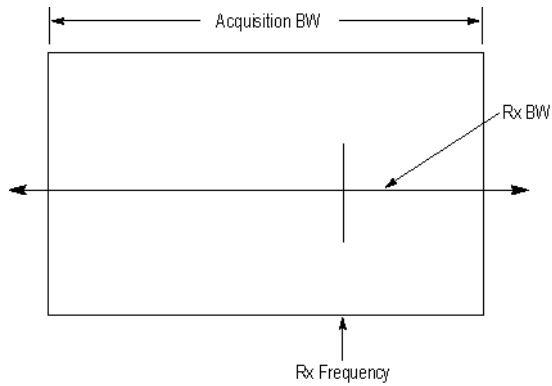
Case 3. In this case, the upper and lower limits of the Receiver BW fall within the upper and lower limits of the acquisition bandwidth. This is the desired relationship between the three settings, and audio demodulation is enabled.
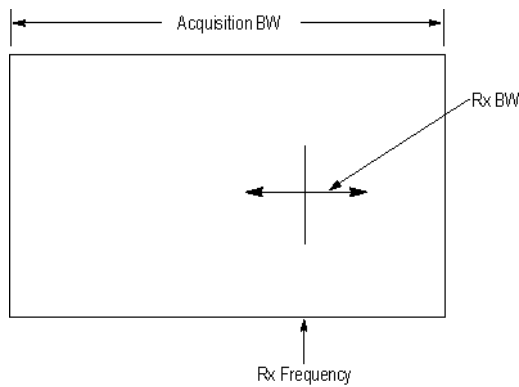
Average Channel Power (Pulsed RF Displays)

The total RF power in the selected channel (located in the ACPR display).

Average ON Power (Pulsed RF Displays)

The average power transmitted during pulse on.

BW Tab

The BW (bandwidth) tab allows you to change Resolution Bandwidth and Video Bandwidth settings, set the windowing method used by the transform process by selecting a filter shape, and specify how gain and bandwidth are optimized.
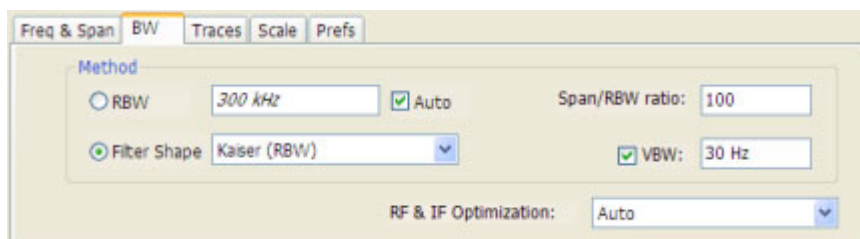
Setting	Description
RBW	Sets the Resolution Bandwidth value to be used in the spectrum analysis view. The value is italicized when Auto is selected.
Auto	When Auto is checked, the RBW is calculated as a percentage of the Span. Kaiser is selected as the windowing method. When Auto is unchecked, the RBW is set by the user. Selecting any Window other than Kaiser changes the RBW setting to manual.
Span/RBW ratio	If Auto is checked, this value is used to calculate the RBW. If Auto is unchecked, this setting is not selectable.
Filter Shape	Specifies the windowing method used for the transform (when Auto is unchecked).
VBW	Adjusts the VBW (Video Bandwidth) value.
RF & IF Optimization	Specifies how the gain and bandwidth should be optimized (in the RF and IF stages of the front end). Choices are Auto, Maximize Dynamic Range and Minimize Noise.

Filter Shape Settings

In the spectrum analyzer, computationally efficient discrete Fourier transform algorithms such as FFT (Fast Fourier Transform) or CZT (Chirp-Z Transform) are generally employed to transform time-domain signals into frequency-domain spectra. There is an assumption inherent in the mathematics of Discrete Fourier Transforms that the data to be processed is a single period of a periodically repeating signal. The discontinuities between successive frames will generally occur when the periodic extension is made to the signal. These artificial discontinuities generate spurious response not present in the original signal, which can make it impossible to detect small signal in the presence of nearby large ones. This phenomenon is called spectral leakage.

Applying a filter such as Kaiser to the signal to be transformed is an effective method to combat the spectral leakage problem. Generally the filter has a bell shape. Multiplying the transform frame by the filter function eliminates or reduces the discontinuities at the ends of the frame, however, at the expense of increased RBW.

Filter Shape Characteristics

The choice of filter shape depends on its frequency response characteristics such as side-lobe level, equivalent noise bandwidth and maximum amplitude error. Use the following guidelines to select the best filter shape.

Filter Shape	Characteristics
Kaiser (RBW)	Best side-lobe level, shape factor closest to the traditional Gaussian RBW.
-6dB RBW (MIL)	These filters are specified for bandwidth at their -6 dB point, as required by military EMI regulations.
CISPR	These filters comply with the requirements specified in the P-CISPR 16 -1-1 document for EMI measurements.
Blackman-Harris 4B	Good side-lobe level.
Uniform (None)	Best frequency resolution, poor side-lobe level and amplitude accuracy.
FlatTop	Best amplitude accuracy, best representation of brief events captured near the beginning or end of the time-domain data frame, poor frequency resolution.
Hanning	Good frequency resolution, high side-lobe roll-off rate.

VBW

The VBW setting enables/disables the Video Bandwidth filter. VBW is used in traditional swept analyzers to reduce the effect of noise on the displayed signal. The VBW algorithm in the RSA6100A emulates the VBW filters of traditional swept analyzers.

The maximum VBW value is the current RBW setting. The minimum VBW value is 1/10,000 of the RBW setting. VBW is disabled when the Filter shape is set to CISPR.

NOTE. If you are following a procedure that says to "set VBW to three times the RBW value or greater", it means that the test should be conducted with no VBW effects. In the RSA6100A, this condition is met by disabling the VBW function.

BW Tab (Amplitude vs Time Display)

The BW (Bandwidth) tab allows you to specify the Bandwidth Method used for setting measurement bandwidth. This determines what Acq BW the measurement will request.
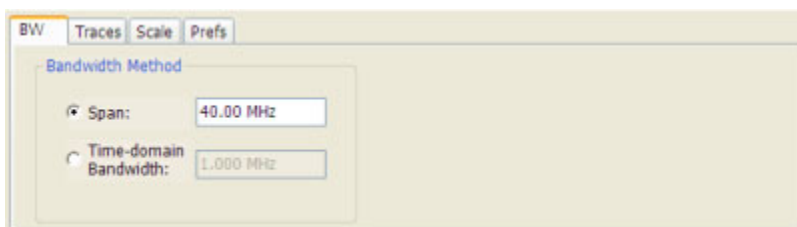
Settings	Description
Span	The frequency span used for analysis in the Amplitude vs Time display.
Time-domain Bandwidth	Time-domain Bandwidth is a filter used to process the input signal before the acquisition system analyzes the signal.

BW Tab (DPX Spectrum)

The BW (bandwidth) tab allows you to change the Resolution Bandwidth settings.
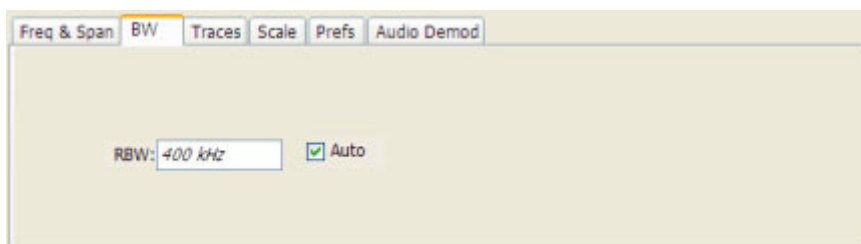
Setting	Description
RBW	Sets the Resolution Bandwidth value to be used in the DPX Spectrum display. The value is italicized when Auto is selected.
Auto	When Auto is checked, the RBW is calculated as a percentage of the Span. When Auto is unchecked, the RBW is set by the user.

Carrier Feedthrough Measurement

The carrier feedthrough is the offset of the constellation from zero power. The feedthrough is measured in dB relative to either the RMS symbol magnitude or the Peak Symbol magnitude as selected by the user.

CCDF - Complimentary Cumulative Distribution Function

The Complementary Cumulative Distribution Function (CCDF) represents the probability that the peak power above average power of a measured signal exceeds a threshold.

CCDF is a plot of the percent of time that a signal's power value exceeds it average value versus the amount by which it exceeds the average. The CCDF plot has a log of probability on the Y-axis (100% at the top) and dB above average amplitude on the X-axis (0 at the left).

Channels Tab (ACPR)

The Channels tab is where you specify parameters for the channels measured in the ACPR display.

Setting	Description
Number of adjacent pairs	Specifies the number of adjacent channel pairs. Range: 1 - 50; Resolution 1.
Channel Bandwidth	Specifies the frequency width of each channel (all channels share the same value).
Channel Spacing	Specifies the difference in frequency between the centers of each channel.

The following figure illustrates the settings controlled from the Channels tab.
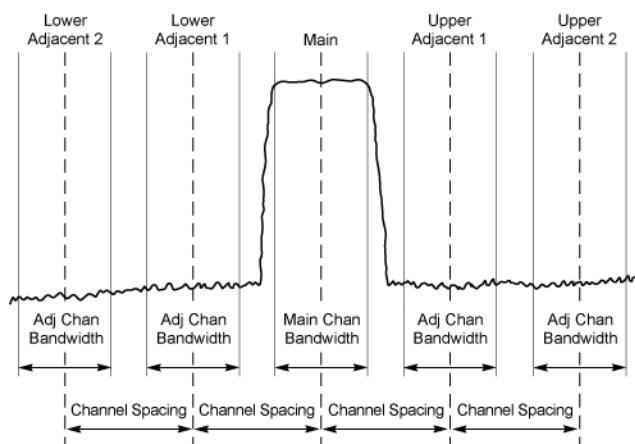
Changing the Number of Adjacent Pairs

1. Select **Number of adjacent pairs** number entry box.

2. Enter a value for the number of adjacent pairs using the knob or the keypad.

NOTE. As you change the value for the number of adjacent pairs, the spectrum analyzer will update the spectrum display to identify the adjacent channels.

3. Select the Close box when you have finished making changes.

Changing the Channel Bandwidth

1. Select the **Channel Bandwidth** number entry box.

2. Enter a value for the number of adjacent pairs using the knob or the keypad.

NOTE. As you change the value for the number of adjacent pairs, the spectrum analyzer will update the display to indicate the channel bandwidth

3. Select the Close box when you have finished making changes.

Channel Spacing

1. Select **Channel Spacing** number entry box.

2. Enter a value for the difference in center frequency between channels using the knob or the keypad.

NOTE. As you change the value for the number of adjacent pairs, the spectrum analyzer will update the display to indicate the channel bandwidth

3. Select **Close** when you have finished making changes.

Channels Tab (MCPR)

Path: Setup > Settings > Channels

Application Toolbar / Front Panel: Settings

The Channels tab is where you specify the parameters for the channels measured in the MCPR display.
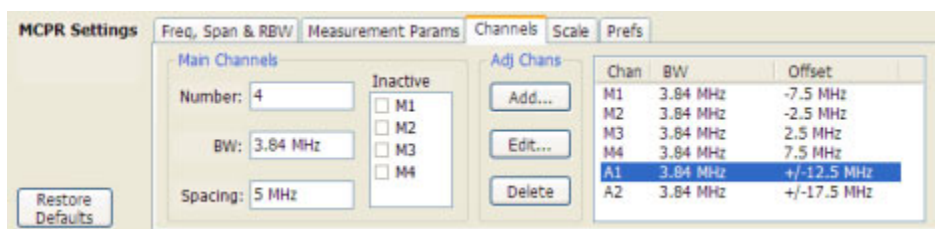
Setting	Description
Main Channels	
Number	Sets the number of Main channels.
BW	Sets the bandwidth of the Main channels.
Spacing	Sets the frequency difference between the centers of the Main channels.
Inactive	Selected channels are ignored by the measurement routine.
Adj Chans	
Add...	Opens the Edit Channel Parameters dialog, which you use to specify the parameters of a new pair of adjacent channels. You can add up to 50 adjacent channel pairs.
Edit...	Opens the Edit Channel Parameters dialog. (You must first select a channel to enable the Edit button.)
Delete	Deletes the selected main channel or adjacent channel pair.
Add Adj.	Add a new pair of adjacent channels at the bottom. Their parameters are copied from the channels just above them.
Channel Definition table	A table of the parameters for every channel. Offset is the frequency difference between the Center Frequency and center of the selected channel. Nothing in the table is editable directly.

The following figure illustrates the settings controlled from the Channels tab.
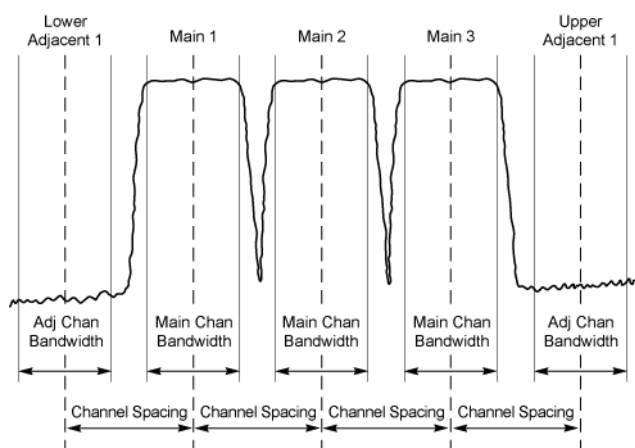
Editing Channel Parameters

To edit the offset or bandwidth of a Main channel:

1. Select the value in the **BW** or **Spacing** number entry boxes.

2. Adjust the value as required. All the Main channels share the same BW and Spacing.

3. Select the appropriate checkbox to make a channel Inactive, as appropriate.

4. Select the Close box when you have finished making changes.

To edit the offset or bandwidth of an Adjacent channel:

1. Select the channel to be edited in the channel definition table.

2. Select **Edit**. This displays the **Edit Channel Parameters** dialog.

3. Adjust the values for the **Frequency Offset** or **Bandwidth** as required.

4. Select the Close box when you have finished making changes.

Adding Channels

To add a main channel:

1. Select the **Number** entry box.

2. Use the knob to enter a value for the desired number of Main channels.

3. Select the Close box when you have finished making changes.

To add an adjacent channel pair:

1. Select **Add...**. This displays the **Edit Channel Parameters** dialog.

2. Use the knob to enter values for the **Frequency Offset** and **Bandwidth** as required. The Frequency Offset is measured from the Center frequency of the Main channels.

3. Select the Close box when you have finished making changes.

Deleting Channels

To delete a main channel:

1. Select the **Number** entry box.

2. Use the knob to reduce the number of channels or enter a new value using the front-panel keypad.

3. Select the Close box when you have finished making changes.

To delete an adjacent channel:

1. Select the channel to be deleted in the channel definition table.

2. Select **Delete**. This removes the selected channel from the channel table.

3. Select the Close box when you have finished making changes.

Channel Power

The total RF power in the selected frequency band. The detection type used for measuring channel power is Average. This means that the average of the linear (pre-log) samples is used to determine the channel power. To measure channel power, use the ACLR measurement, and set the number of adjacent channels to zero. This results in only the channel power being measured.

Common Information Messages

The following table lists some of the common information messages that might appear during normal operation.

Message	Explanation and recommended action
Acq BW too small	The display needs a wider acquisition bandwidth than what the current data record contains. This can be due to several reasons:
	The impacted measurement is not the selected display. The selected display has requested a smaller acquisition bandwidth to possibly achieve a better dynamic range.
	Select the display that contains the message and click Run, if the instrument is not already acquiring data.
	Acquisitions are not running and the measurement now requests a wider bandwidth than the last acquisition.
	Click Run to perform a new acquisition at a wider bandwidth.
	The data is from a recalled file.
	There is no way to increase the acquisition bandwidth for saved data. You must adjust the measurement settings so that less bandwidth is required.
Selected display is swept	When any display requires a swept acquisition, the other displays are unable to process the swept data. This is because the swept data is customized for the selected display.
	Select the display that you are interested in and it will change the acquisition to meet its own needs.
RBW min : nnnkHz	The current Spectrum Length or Analysis Length is not long enough to allow a narrower RBW filter. RBW Min. is the narrowest allowable RBW for the current analysis length of the spectrum.
	If the Length control is set to Manual, try setting it to Auto so that the Analysis Length will increase to the required value.

Connecting to the IQ Output Signals

Connect to the IQ output signals on the rear panel of the spectrum analyzer. The rear panel connectors are LVDS connectors. For full details on the connectors, see the *RSA6100A Series Specifications and Performance Verification Technical Reference*, part number 071-1915-XX. A PDF file of the manual is located on the Documents CD that shipped with your instrument. If you do not have access to the Documents CD, a PDF of the manual can be downloaded from the Tektronix Web site, www.tektronix.com/manuals .

NOTE. *The IQ and IF outputs are disabled when an alignment is running.*

Define Tab (Search)

The Define tab sets the parameters for a search. From this tab, you specify which trace to search and what kind of violation to search for.
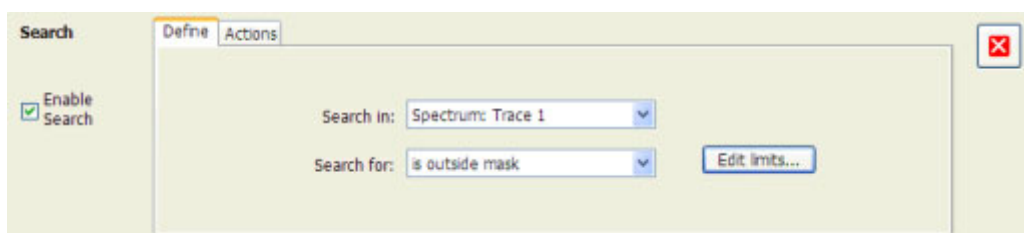
Setting	Description
Search in	Specifies which trace to search.
Search for	Specifies what to search for. You can specify a search based on a signal level or a mask.

Search In

The choices for **Search in** are: Spectrum Trace 1, Spectrum Trace 2, Spectrum Trace 3, Spectrum Math Trace, and Spectrogram Trace.

NOTE. If you select a trace in the display that is not the selected trace, you will not see the results of the Search until you select the trace in the spectrum display that is the "Search in" trace.

Search For

The **Search for** setting has four selections. The first two selections are simple "less than" and "greater than" searches. The second two selections are for mask searches. If you select a greater than/less than search, you also specify the level that defines a violation. If you specify a mask-based search, then you need to edit the mask to specify the levels that define a violation.

Greater Than/Less Than Searches

When you select either **is greater than** or **is less than**, a text entry box appears to the right of the drop-down list. Use the text entry box to specify the signal level you wish to search for.

Mask-based Searches

When you select **is outside mask** or **is inside mask**, an Edit limits button is displayed. Select the Edit limits button to display the Mask Editor.
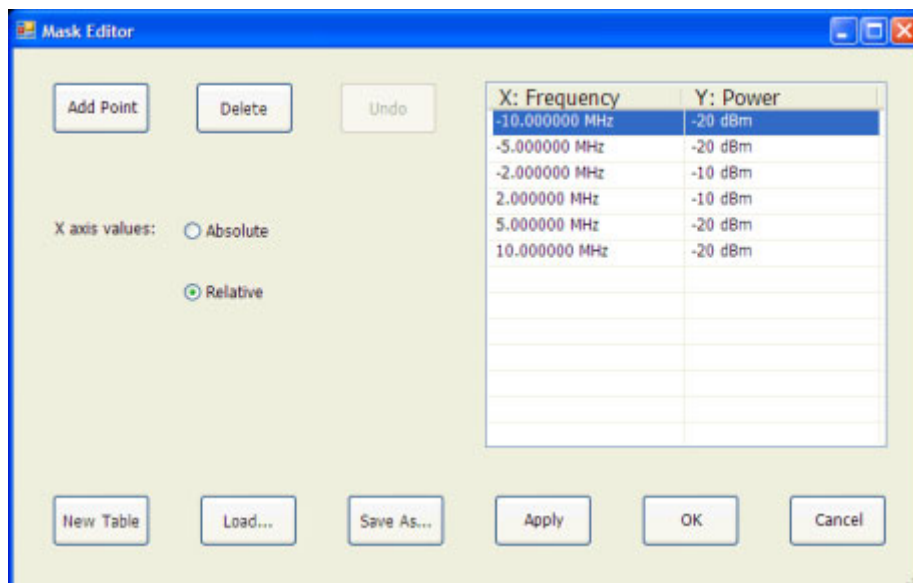
To edit a search mask:

1. Click **Edit limits...** to display the Mask Editor.

2. Click **New Table** to create a table. This clears the existing points and loads the default table.

3. Select the **X axis values** setting:

   a. Select **Absolute** to specify mask point locations based on signal frequency.

   b. Select **Relative** to specify mask point locations as offsets from the center frequency.

4. To edit values in the table:

   a. To edit an existing value, double-click on the cell you want to edit.

   b. To add a new point to the table, click on **Add Point**. Edit the values as required and click **Apply** when you are finished with your changes.

To specify a frequency multiplier, you can type K, M, or G. For the power level, you only need to specify a numeric value. The unit is set to the current Units setting (Setup > Analysis > Units).

1. To delete a point from the table, select the point to be removed, and click **Delete**.

2. To close the Mask Editor without saving your changes, click **Cancel** (if you have already clicked Apply, this only cancels changes since the last time Apply was clicked).

3. If Search mode is already enabled and the instrument is in Run mode, you can run a Search using your changed points without closing the Mask Editor, by clicking **Apply**.

4. To save changes and close the Mask Editor, click **OK**.

5. To save the mask to a file for later recall, click **Save As....**

6. From the Save As dialog, name the file and save it in the desired location.

Masks are saved only in CSV (Comma Separated Value) format.

Performing a Mask-based Search

To perform a Search using a mask:

1. Select **Tools** > **Search**.

2. Click the **Enable Search** checkbox.

3. Select the trace that you wish to search from the **Searchin** drop-down list.

4. Verify that the trace you selected to search is the selected trace in the display.

5. Select either **is outside mask** or **is inside mask** from the Search for drop-down list.

6. Click the **Edit limits** button.

7. Edit the table as necessary or click **Load** to use a previously saved mask.

8. If you load a saved a mask, use the Open dialog to locate and open the mask file.

9. Click **OK**.

The following figure shows the results of an **is outside mask** Search. The vertical red bar highlights results that match the Search definition.

This readout identifies the selected trace
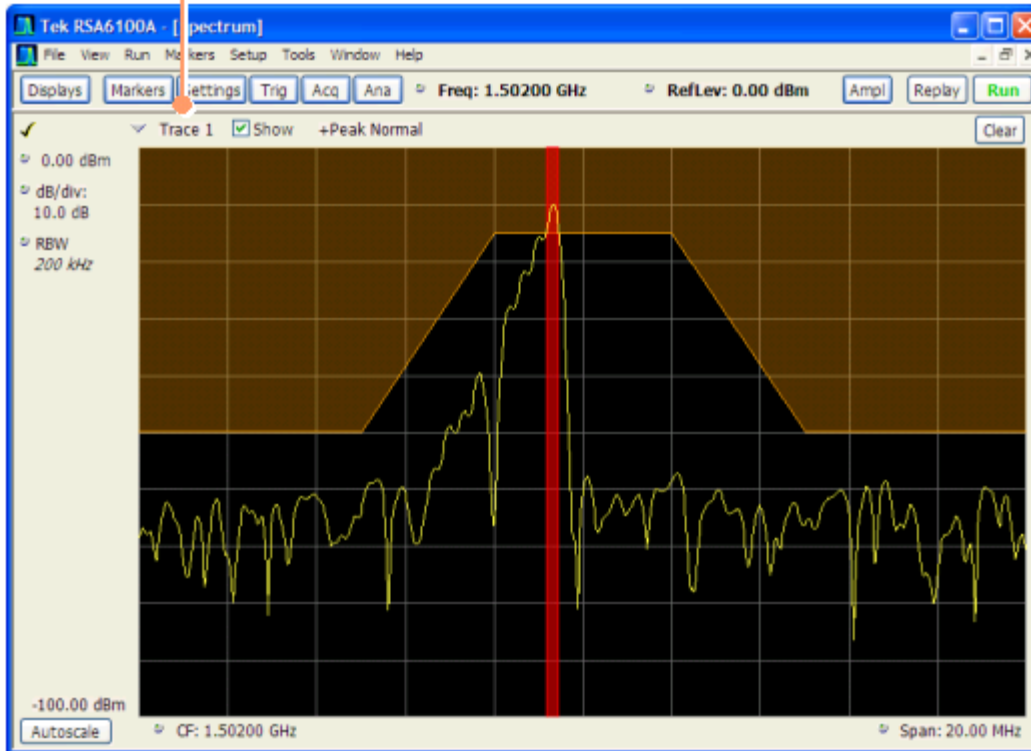
Define Tab (Pulsed RF)

The Define tab enables you to specify parameters that control where measurements are made on a pulse.

Setting	Description
Measurement point for pulse-pulse results	Specifies the position along the pulse tops where the phase is measured. This is a time delay from the rising edge 50% point of each pulse. Range: 5 ns - 100 ms; Resolution: 0.1 ns for keyboard entry; proportional increment/decrement: between 1 - 10% of current value
Portion of pulse top for Ripple	Adjust how much of the ON time to use in computing the measurement. Range: 10 - 100%; Resolution: 1%; Default: 50%.
Measurement time for Freq & Phase results	Specifies the location on a pulse where the in-pulse frequency and phase measurements are taken.
Auto	When checked, measurements are taken from the 90% point on the rising edge to the 90% point on the falling edge. Start and Stop controls are disabled when Auto is selected, but they display the values in use.
Start	Specifies where the starting point is located for frequency and phase measurements. Range: ±100 ms; Resolution: 3 digits; Default: 0
Stop	Specifies where the stopping point is located for frequency and phase measurements. Range: ±100 ms; Resolution: 3 digits; Default: 0

Start / Stop

Start and Stop times should not overlap. If the start and stop times do overlap, the affected measurements display " - - " as a result and an error message is displayed: *FreqPhase meas start is later than stop*.

Digital I/Q Output

The Real-time Digital I/Q Output is a means for the you to obtain the spectrum analyzer digital baseband I/Q signals in a real-time data stream. This output enables you to use the spectrum analyzer as a down-converter and then pass the down-converted baseband I/Q signals to external equipment for either additional processing or storage.

Displaying the Windows Event Viewer

When the spectrum analyzer generates an error message, information about the error is logged to the Windows Event Viewer.

To display the Windows Event Viewer:

1. Select Start > Control Panels.

2. Select Administrative Tools. (If your instrument displays control panels in Category View, select Performance and Maintenance and then select Administrative Tools.)

3. Double-click Event Viewer.

4. From the Event Viewer window, select Application. this displays a list of all errors that have been reported to the operating system from applications.
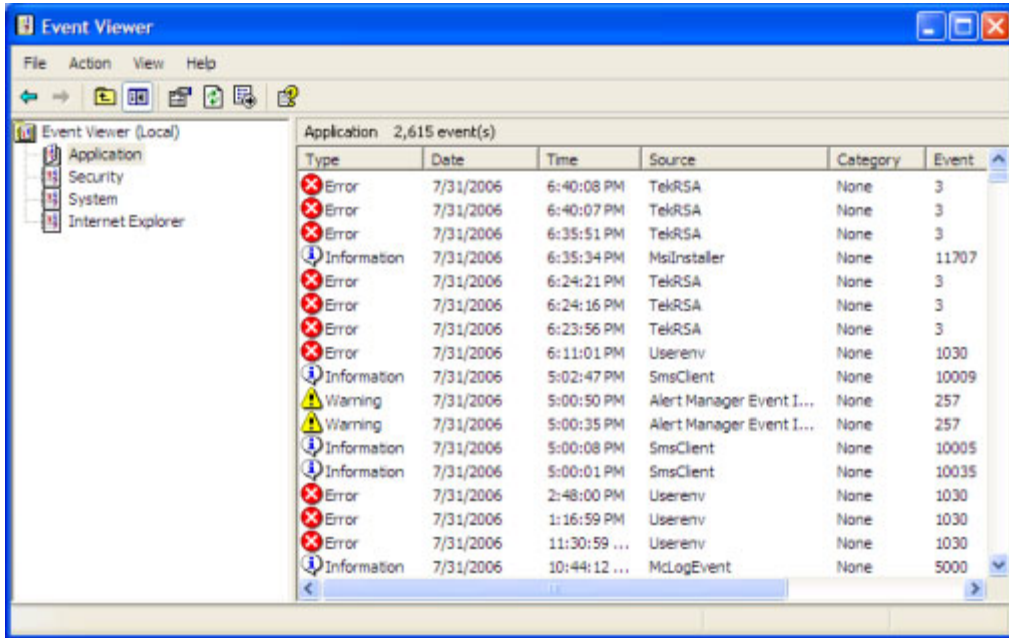
Errors reported to the Event Viewer from the spectrum analyzer application appear under Source as TekRSA.

5. Double-click the last error reported for TekRSA to see details on the most recently reported error.
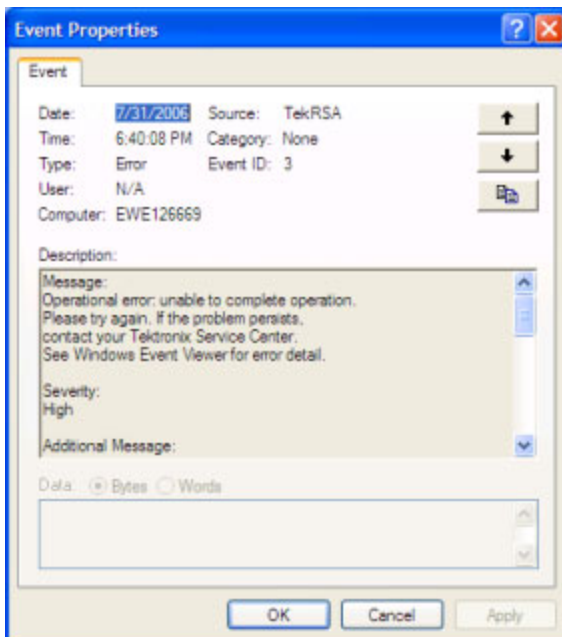
DPX Spectrum

DPX Spectrum technology enables you to see how traces change over time and thus displays signal events that cannot be seen on a swept spectrum analyzer. A DPX Spectrum indicates how traces change in two ways. First, it uses color shading to show how consistent the shape of a trace is. Second, it uses persistence to show how the trace shape changes. Persistence reflects the rate-of-occurrence for signal features.

The DPX Spectrum display works by using a two-dimensional array to represent points on the display. Each time a trace writes to a point on the display, a counter in the array is incremented. A color is assigned to each point in the display based on the value of its counter. Thus, as acquisitions occur over time, a colored waveform, the Bitmap, develops on the display that shows how frequently a display point has been written to.

An important feature of the DPX Spectrum display is persistence. Persistence sets how long a point on the display will be visible. You can set the Display Persistence to be Variable or Infinite. In variable persistence mode, you specify a decay period that limits how long a point will be displayed. In infinite persistence mode, once a point in the display has been written to, it will remain visible indefinitely. Persistence is what enables the spectrum analyzer to display events that occur only rarely.

Droop Measurement (Pulsed RF Display)

Droop is the power difference between the beginning and the end of the pulse On time. A straight-line best fit is used to represent the top of the pulse. The result is a percentage referenced to the Average ON Power.

Duty Factor (%) Measurement (Pulsed RF)

The ratio of the width to the pulse period, expressed as a percentage.

Duty Factor (Ratio) Measurement (Pulsed RF)

The ratio of a pulse width to the pulse period.

Event Tab (Triggering)

The Event tab is used to set the parameters that define trigger events. The parameters that appear on the Event tab change depending on the selected Trigger source and type.

Source

Source specifies the source of the signal to be monitored for a trigger event. The choices available are: RF Input, Trig In (front), Trig 2 In (rear), Gated, and Line. The Source drop-down list is always visible on the Event tab.

Type

Type defines the trigger type as either Power or Frequency Mask. When Type is set to Power, the level of the selected source determines a trigger event. When Type is set to Frequency Mask, trigger events are defined by where and how the input signal crosses or fails to cross the edge of the mask. The Type selection is only present when Source is set to RF Input.

Source = RF Input.

Setting	Description
Type	Type specifies whether a Power or Frequency Mask violation will define a trigger event. For the Power setting, if the RF input signal crosses the specified level (in the direction set by Slope), a trigger event occurs. A trigger event does not occur if the power level of the signal simply exceeds the level setting, there must be a power level transient that crosses the specified level. For the Frequency Mask setting, events where the trace crosses the edge of the mask when it should not or when the trace does not cross the edge of the mask when it should define the trigger event. Use **Mask Editor** (on the Event tab when Type is set to Frequency Mask) to create and modify Frequency Masks.
Slope	The slope control determines whether the spectrum analyzer finds the trigger point on the rising or falling edge of the RF input signal.
Level	The Level setting determines the power level that will be recognized as a trigger event. The Level is indicated in the display with a dark cyan colored-line.
Time-domain BW	Time-domain BW is a filter used to process the trigger input signal before the trigger system analyzes the signal.

Source = Trig In (front).

Setting	Description
Slope	The slope control determines whether the spectrum analyzer finds the trigger point on the rising or the falling edge of the trigger input signal.
Level	The Level setting determines the signal amplitude that will be recognized as a trigger event.

Source = Trig 2 In (rear).
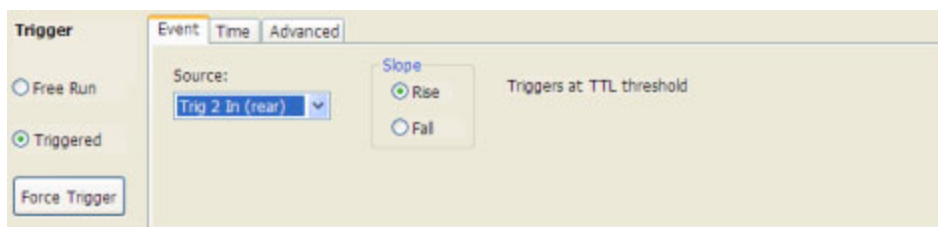
Setting	Description
Slope	The slope control determines whether the spectrum analyzer finds the trigger point on the rising or the falling edge of the trigger input signal. The trigger level is automatically set at a TTL level.

Source = Gated.   When the Source is set to gated, the front panel **Trig In** source is monitored for the trigger event and a signal on the rear panel **Gate / Trig 2 In** is used to determine when a trigger event is valid.

Setting	Description
Slope	The slope control determines whether the spectrum analyzer finds the trigger point on the rising or the falling edge of a signal.
Level	The Level setting determines the signal amplitude that will be recognized as a trigger event.
while Trig 2 In (rear)	Specifies whether a High or Low signal at the **Trig 2 In** input (rear panel) allows a trigger event on the **Trig In** (front) input to be accepted.

Source = Line.

The spectrum analyzer triggers off of the AC line supply.

Source = RF Input and Type = Frequency Mask.

Setting	Description
Violation	These selections define the state or transitions of the signal used to define a trigger event.
Mask Editor	Displays the Mask Editor so that you can create and edit Frequency Masks.
Load from file	Invokes the Open dialog for selecting a previously saved frequency mask file.

Violation. Violations are state changes (or a sequence of state changes) defined by the whether a point on the signal falls within the frequency mask or outside the frequency mask. A True violation occurs if a single point on a signal falls inside the mask. Conversely, a False violation occurs if a single point on a signal falls outside the mask.
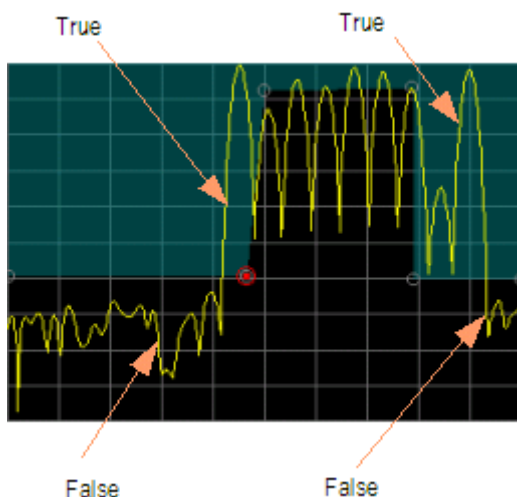
A trigger event is initiated based on the type of violation that occurs and the sequence of violations that occur.

Violation	Description
T	Only one state is required to initiate a trigger event. The signal has at least one data point inside the mask. The trigger event occurs at the first point that appears inside the mask. A trigger event could occur on the first acquisition.
F	Only one state change is required to initiate a trigger event. The signal has at least one data point outside the mask. The trigger event occurs at the first point that appears outside the mask. A trigger event could occur on the first acquisition.
T - F (Out)	Two states are required to initiate a trigger event. The signal must be inside the mask and then passes out of the mask. The trigger event occurs at the first transition where the signal passes out of the mask.
F - T (In)	Two states are required to initiate a trigger event. The signal must be outside the mask and then passes into the mask. The trigger event occurs at the first transition where the signal passes into the mask.
T - F - T (Out & In)	Three states are required to initiate a trigger event. The signal starts inside the mask and then passes out of the mask. Next, the signal must pass into the mask. The trigger event occurs at the second transition where the signal passes back into the mask.
F - T - F (In & Out)	Three states are required to initiate a trigger event. The signal starts outside the mask and then passes into the mask. Next, the signal must pass back outside the mask. The trigger event occurs at the second transition where the signal passes back out of the mask.

Mask Editor. Launches the Mask Editor (see page 160) that enables you to create and edit Frequency Masks.
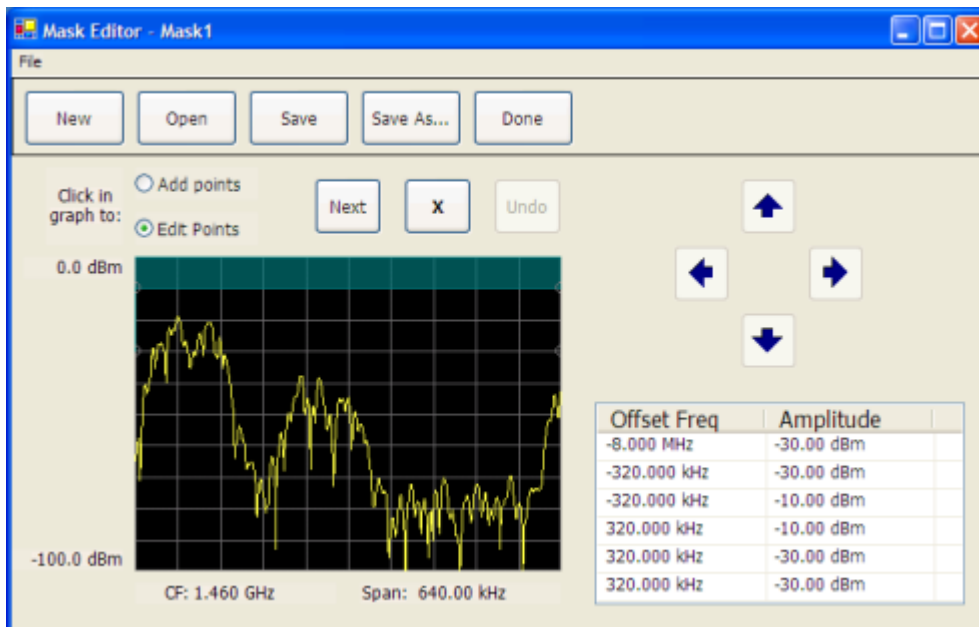
Load from File. Enables you to load an existing frequency mask for use with Frequency Mask Trigger.

EVM (Error Vector Magnitude) Measurement

The normalized RMS value of the error vector between the measured signal and the ideal reference signal over the analysis length. The EVM is generally measured on symbol or chip instants and can be reported in units of percent or dB. EVM is usually measured after best-fit estimates of the frequency error and a fixed phase offset have been removed. These estimates are made over the analysis length.

External Gain/Loss Correction Tab

The External Gain/Loss Correction tab allows you to apply a correction to a signal to compensate for the use of external equipment, such as an amplifier or attenuator. The corrections on this tab apply to all graphs and results.
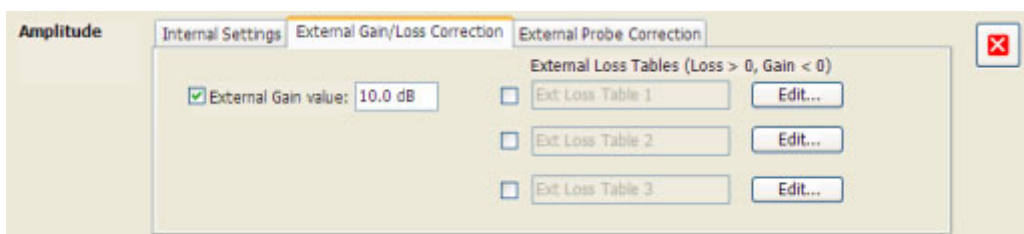
External Gain Value

Use the External Gain Value setting to apply a flat gain/loss correction to the signal. Positive values represent a gain and negative values represent a loss. The range is -50 to +30 dB. Resolution is 0.1 dB.

NOTE. *Selecting Preset clears the checkbox, but it does not change the value.*

External Loss Tables

Use an External Loss Table to apply a frequency dependent gain/loss correction to the signal. When an External Loss Table is selected, the spectrum analyzer adjusts the signal according to the values in the table. An external loss table allows you to compensate the signal level for variations in cable loss, antenna frequency response or preamp frequency response.

You can create external loss tables from the spectrum analyzer application and save them as files. External loss tables are saved as plain text files in CSV (Comma Separated Value) format. The tables have a CSV file extension.

You can change the title for each table. However, note that the title is only a label. It is not tied to the file name of any table you may have loaded or saved.

NOTE. *If you are using an External Loss Table for antenna corrections, be sure to set the Amplitude units (Setup > Analysis > Units) to dBuA/m or dBuV/m.*

Creating an External Loss Table

You can create an external loss table with the spectrum analyzer application. No external application is required.

To create an external loss table:

1. **Click Edit.. to display the Table Editor.**
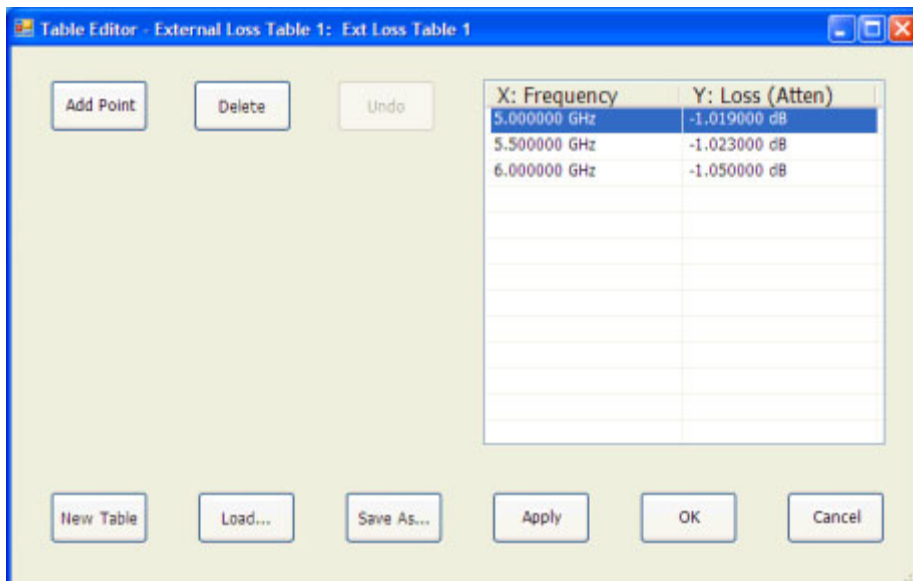
2. Click **New Table** to create a table. This clears all entries in the existing table and loads the default table.

3. To edit values in the table:

   a. To edit an existing value, double-click on the cell you want to edit.

   b. To add a new point to the table, click on **Add Point**. Edit the values as required.

   c. Click **Apply** if you want to test your table without closing the editor (the table must be enabled with the checkbox in the control panel and measurements must already be running).

      To specify a frequency multiplier, you can type K, M, or G.

4. To delete a point from the table, select the point to be removed, and click **Delete**.

5. When you have entered all the necessary values, click **Save As...** (to save the table in a file) or click **OK**.

6. From the Save As dialog, name the file and save it in the desired location.

   External loss tables are saved in CSV (Comma Separated Value) format.

Loading an External Loss Table

To load an external loss table file:

1. Click **Edit...** to display the Table Editor.

2. Click **Load....** to display the Open dialog.

3. Navigate to the location of the desired file, select it and click Open.

4. Click **OK**.

External Probe Correction Tab

The External Probe Correction tab is used to specify whether a correction factor is applied to the signal when a Tektronix P7000 Series probe is connected to the spectrum analyzer through the Tektronix RTPA2A Real-Time Spectrum Analyzer TekConnect Probe Adapter.
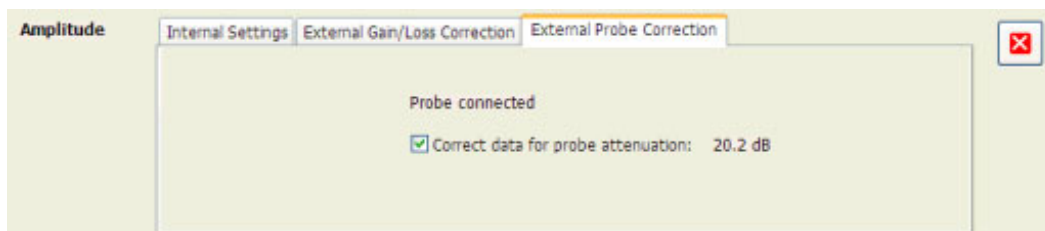
The spectrum analyzer can detect when an RTPA2A TekConnect probe adapter is connected to the instrument. The only setting available on the tab specifies whether a correction is applied to the signal or not. The amount of correction is specific to the probe and is communicated to the spectrum analyzer through the RTPA2A TekConnect probe adapter.

When the spectrum analyzer detects an RTPA2A probe adapter, it automatically applies a correction. However, you can choose not to apply the correction. This would enable you to keep the probe adapter connected to the spectrum analyzer even if you chose not to use a probe to connect to a signal.

If the spectrum analyzer does not detect a probe adapter, the setting to correct for a probe is dimmed and **No probe detected** is displayed on the tab.
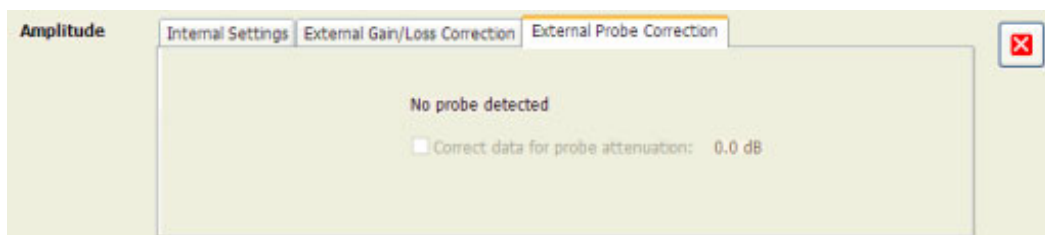
Fall Time Measurement (Pulsed RF Display)

The time required for a signal to fall from 90% to 10% of its maximum steady-state amplitude.

Find Tab (GP Digital Modulation)

The Find tab is used to set parameters for finding bursts within the data record. This is a post-acquisition operation.

Setting	Description
Burst Detection: Mode	Select whether to analyze bursts or not
	- Auto: If a burst is found, analyze just that burst period. If a burst is not found, analyze the whole analysis length.
	- On: If a burst is found, analyze just that burst period. If a burst is not found, display an error message.
	If the signal isn't adequate for demodulation, an error message is shown.
Burst Detection: Threshold	Sets the level required for the signal to qualify as a burst. Enter a value in dBc down from top of the signal.
Use Synch Word	When enabled, specifies the string of symbols to look for. Enter the search string with external keyboard or the on-screen keyboard.
Clear	Blanks the search string field.

Freq & RBW Tab (RF Measurements)

The Freq & RBW tab specifies frequency parameters for the Channel Power & ACPR, MCPR, and Occupied Bandwidth measurements.
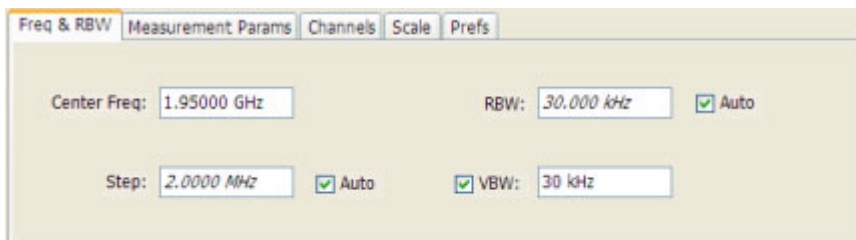
Setting	Description
Center Freq	Specifies the center/measurement frequency.
Step	The Step control sets the increment/decrement size for the knob adjustment of the center frequency. Arrow key adjustment of frequency is also affected (it is 10x the knob adjustment). If Auto is enabled, the spectrum analyzer will adjust the Step size as required.
RBW	Select Auto or Manual. Adjusts the RBW for the entire measurement. This setting is Independent of the Spectrum view's RBW setting.
VBW	Adjusts the VBW (Video Bandwidth) value. VBW Maximum = current RBW value. VBW Minimum = 1/10,000 RBW setting.

NOTE. *While the center frequency and step settings on this control tab are shared between ACPR, MCPR and Occupied Bandwidth, the RBW setting is not shared. The RBW setting is unique for each measurement.*

VBW

The VBW setting enables/disables the Video Bandwidth filter. VBW is used in traditional swept analyzers to reduce the effect of noise on the displayed signal. The VBW algorithm in the RSA6100A emulates the VBW filters of traditional swept analyzers.

The maximum VBW value is the current RBW setting. The minimum VBW value is 1/10,000 of the RBW setting.

NOTE. *If you are following a procedure that says to "set VBW to three times the RBW value or greater", it means that the test should be conducted with no VBW effects. In the RSA6100A, this condition is met by disabling the VBW function.*

Freq & Span Tab

The Freq & Span tab provides access to settings that control frequency settings for the trace display.
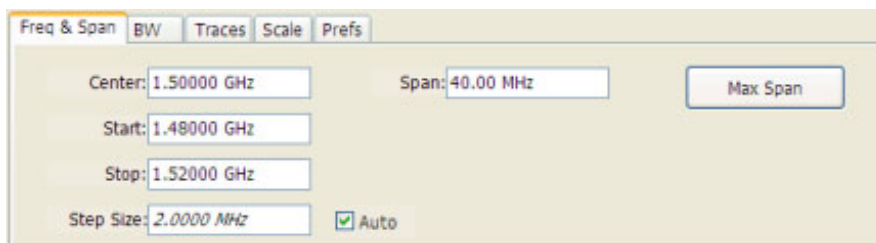
Setting	Description
Center	The frequency at the center of the trace display.
Start	The frequency at the left edge of the trace display.
Stop	The frequency at the right edge of the trace display.
Step Size	Sets the increment/decrement size for Center, Start and Stop values.
Span	The difference between the start and stop frequencies.
Max Span	Sets the Span to the maximum value.

Center, Start, Stop, and Span Frequencies are Correlated

Changing the values for Center frequency, Start frequency, Stop frequency or Span will change the values for the other settings, depending on which setting you change. For example, if you change the Center frequency, the Start and Stop frequencies will be adjusted automatically to maintain the same Span.

Note however that if the Start and Stop frequencies are changed so that they are closer than the minimum span setting, the Start and Stop frequencies will be adjusted to maintain the minimum Span setting.

Setting Changed Manually	Settings Changed Automatically As a Result	Setting Not Automatically Changed
Start	Center, Span	Stop
Stop	Center, Span	Start
Center	Start, Stop	Span
Span	Start, Stop	Center

Freq Estimation Tab

Use the Freq Estimation tab to specify parameters used for determining frequency error.
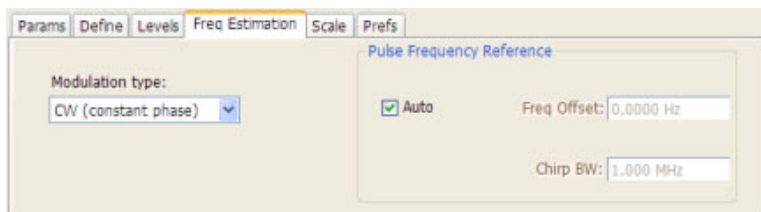
Setting	Description
Modulation type	Specifies which algorithm to use for estimating frequency error.
Pulse Frequency Reference	Specifies the method used to determine the pulse frequency reference.
Auto	Selecting Auto causes the instrument to calculate the values necessary to determine the pulse frequency reference.
Freq Offset	If Auto is not enabled, specify the value for frequency offset here. If Auto is enabled, this readout displays the calculated frequency offset.
Chirp BW	If Auto is not enabled, specify the value for Chirp BW here. If Auto is enabled, this readout displays the calculated Chirp BW. This setting is used only when the modulation type is set to Linear Chirp.

Modulation Type

Frequency estimation is performed by the instrument using selectable methods, depending on signal type. The selections for modulation type are CW (constant phase), CW (changing phase), Linear Chirp and Other. Select the method of frequency method based upon a best match to your signal based on the descriptions below:

- CW (constant phase): The signal is not designed to change in either frequency or phase during the measured pulse train.

- CW (changing phase): The signal does not change the carrier phase within each pulse, although it could change the phase from one pulse to another pulse. The signal is not designed to make frequency changes.

- Linear Chirp: The signal changes frequency in a linear manner during each pulse. The signal has the same carrier phase at the same time offset from the rising edge of the pulse.

- Other: The signal is not one of the listed types. You must manually enter the Frequency Offset value.

The following table maps the appropriate signal type selection with the signal characteristics.

Signature	Phase offset from one pulse to another	
	Zero	Any (unknown)
CW	CW Constant Phase	CW Changing Phase
LFM	Linear Chirp	N/A

Frequency Deviation Measurement

The Frequency Deviation measurement is the difference between the maximum and minimum measured values of the signal frequency during the Measurement Time.

Frequency Error Measurement

The frequency difference between the measured carrier frequency of the signal and the user-selected center frequency of the analyzer.

Frequency Mask Trigger

The frequency mask trigger monitors the signal for changes in the frequency domain, and captures user-defined violations into memory.

The frequency mask trigger function monitors all changes in frequency occupancy within the capture bandwidth (40 MHz or 110 MHz). A Power Trigger, working in the time domain and in any capture bandwidth, can be armed to monitor for a user-set power threshold to be crossed during a moment in time. Resolution bandwidths may be used with the power trigger for band-limiting and noise reduction. Two external triggers are available for synchronization to test system events.

In most cases, the Frequency Mask Trigger has a range of 80 dB below Reference Level. However, for values of Reference Level lower than -50 dBm, this range decreases as the RefLevel decreases. The FMT range is also reduced when the Acquisition Bandwidth contains frequencies near 0 Hz. In both these situations, the underlying reason the trigger range is reduced is because the instrument is using various amounts of "digital gain" in addition to hardware gain.

The following topics describe the frequency mask trigger controls:

Event tab (see page 141): explains how to configure frequency mask triggering parameters.

Mask Editor (see page 160): explains how to create and edit frequency masks.

Triggering (see page 14): explains how to initiate frequency mask triggering.

Frequency Tab

The Frequency tab specifies the center frequency parameters used by all views within the application window.
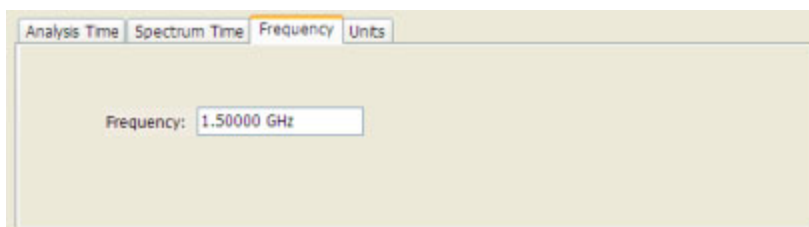
Settings tab	Description
Frequency	Specifies the center or measurement frequency.

Frequency Tab (Phase Noise)

Use the Frequency tab to specify parameters used for taking the Phase Noise measurement.

Setting	Description
Measurement BW	Sets the start and stop points for the Phase Noise plot.
Start Offset	Sets the starting point for the Phase Noise plot. Offset is from the carrier frequency. The minimum start offset is 10 Hz. The maximum start offset is 100 MHz. The setting is limited to powers of ten (1, 10, 100...).
Stop Offset	Sets the stopping point for the Phase Noise plot. Offset is from the carrier frequency. The minimum start offset is 100 Hz. The maximum stop offset is 1 GHz. The Stop offset value must be at least 10X the Start offset value. The setting is limited to powers of ten (1, 10, 100...).
Integration BW	Sets the frequency range for most of the results of this measurement. Integration BW Start and Stop offset values must be within the Measurement BW Start and Stop Offset values.
Start Offset	Specifies the start offset from the carrier frequency. Integrated measurements are taken over the range between the start and stop offset frequencies.
Stop Offset	Specifies the stop offset from the carrier frequency. Integrated measurements are taken over the range between the start and stop offset frequencies.
Track carrier frequency	The instrument measures the carrier frequency at least once each time the Phase Noise measurement is taken and reports the error between the Freq setting and the measured frequency of the carrier. When Track carrier frequency is enabled, the measurement adjusts its tuning to counteract the carrier error or drift. When carrier tracking is disabled, the measurement is made using the Freq setting specified by the user.
Carrier threshold	The minimum power level required for the signal to be recognized as a carrier. If no signal is found above this level within 20 MHz of the Freq setting, the Phase Noise measurement will fail.

Gain Imbalance Measurement

The gain difference between the I and Q channels in the signal generation path. Constellations with gain imbalance show a pattern with a width that is different from height.

Internal Settings Tab

On the Internal Settings tab, you can specify the Reference Level for the spectrum analyzer's RF front end, the settings for the internal attenuator, and enable/disable the internal preamp (Option 01, if installed).
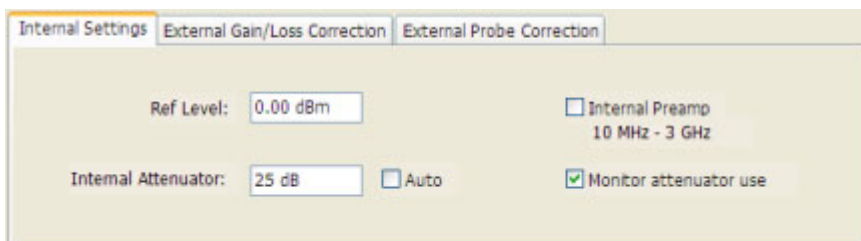
Internal Attenuator

The Internal Attenuator setting can be set to Auto or manual. When Auto mode is enabled, the attenuation setting is displayed but is not adjustable. When Auto is disabled, the attenuator operates in manual mode, allowing you to set the internal attenuation. The internal attenuation setting range is 0 - 75 dB.

Internal Preamp

If your instrument has Option 01 installed, use this setting to switch the preamp on or off.

Monitor attenuator use

The input attenuator relays are rated for several million cycles. Some measurement settings result in high rates of attenuator switching and could prematurely age the relays. Enabling this function causes the instrument to monitor the attenuator switching rate. When a high rate of switching is maintained for more than an hour, the instrument will halt acquisitions and display a message about the condition. To restart acquisitions, press Run. If the checkbox is not selected, the monitoring function is disabled.

NOTE. This feature is provided to prevent accidental long-term high-rate attenuator switching (thus extending attenuator life). If you need to run the instrument for extended period, such as overnight or over a weekend, disable the setting to prevent the halting of acquisitions.

IQ Origin Offset Measurement

The magnitude of the DC offset of the signal measured at the symbol times. It indicates the magnitude of the carrier feed-through signal.

Levels Tab

Use the Levels tab to set parameters that control the method and levels used to calculate some pulse values.

Setting	Description
100% Level	Specifies the method used to determine the 100% level(s).
50% Level	Specifies the method used to determine the 50% level on the pulse.
Rise/Fall Levels	Select whether to use the 10% to 90% or 20% to 80% points (based on voltage level) to define the rise and fall times.

100% Level

Use the 100% Level settings to select the method used to determine the 100% level(s) used for calculating pulse parameters, for example, Rise, Fall, and Width.

The Pulse Average Amplitude defines the pulse top as the average of the values of all the points along the pulse top. This average is used as the 100% level, from which the 10, 20, 50, 80 and 90% levels are calculated. Pulse measurements are referenced against these various levels. For example, Rise is the time between the 10 and 90% (or 20 and 80%) levels on the rising edge of the pulse. When the Pulse Average Amplitude method is selected, the same 100% level is used for both rising and falling edges.

Because some RF pulse types have droop (a height difference between the beginning and ending points of the pulse top), the 100% percent level on the rising edge may not be equal to the 100% level on the falling edge. The Independent method of pulse point location is designed for pulses with different 100% levels at their rising and falling edges. The Independent method calculates the 100% level for the rising edge separately from the 100% level of the falling edge. As a result, the 10, 20, 50, 80 and 90% levels are also different for the rising and falling edges, allowing for more accurate measurements on pulses with droop.

50% level

Select Voltage to use -6 dB as the 50% point. Select Power to use -3 dB as the 50% level.

Limits Tab (Spurious Display)

Use the Limits tab to specify the pass/fail parameters for the Spurious measurement. When the Mask setting is set to any value except off, the instrument identifies any signal peak that exceeds the specified limits as a violation and displays Fail on the screen. If no signal peak exceeds the limits, the instrument displays Pass on the screen.

Setting	Description
Range	Selects the frequency range to which the settings on this tab are applied.
Start	Readout of the start frequency for the selected range.
Stop	Readout of the stop frequency for the selected range.
Edit	Click this button to edit the Spurious Frequency Plan, which defines the range frequency and whether or not measurements are taken in a range (enabled/disabled).
Enabled	Specifies whether or not measurements are taken in the specified range.
Mask	Selects the type of limits used for Pass/Fail testing. Spurs that exceed the mask settings are considered violations.
Abs	Spurs that exceed the Absolute limits settings are identified as violations.
Rel	Spurs that exceed the Relative limits settings are identified as violations.
Abs & Rel	Spurs that exceed both the Absolute and Relative limits settings are identified as violations.
Abs OR Rel	Spurs that exceed either the Absolute or Relative limits settings are identified as violations.
Off	Turns off limit testing for the selecting range. Measurements are still taken in the range, but violations are not flagged. Signal peaks that exceed the Threshold and Excursions values will still be identified as spurs.
Absolute ampl	Absolute amplitude limits are not based on the measured carrier amplitude or manual reference. Start and stop values can be different.
Start	Specifies the limit at the start frequency of the range.
Stop	Specifies the limit at the stop frequency of the range.
Same	Sets the limit at the start and stop frequencies to the value set for the start frequency.
Relative ampl	Relative amplitude limits are calculated from the Power Reference. If the Power Reference is set to the Carrier level, the relative amplitude limits will change with the carrier level. Start and stop values can be different.
Start	Specifies the limit at the start frequency of the range.
Stop	Specifies the limit at the stop frequency of the range.
Same	Sets the limit at the stop frequency to the value set for the start frequency.
Review table	Click to display the Ranges table. The Ranges Table shows the enabled ranges, and all the settings specified on the Ranges and Limits tabs associated with the enabled ranges.
Save table	Click to save the current Range table to a file.
Load table	Click to load a saved Range table from a file.

Performing Pass/Fail Limit Testing

To set limits:

1. Press **Settings** to display the **Spurious Settings** panel.

2. Press **Limits** to display the Limits tab.

3. Press **Edit** to display the **Range and Carrier Frequencies** dialog box.

4. Adjust the start and stop frequencies as required for each range you wish to test.

5. For ranges that you wish to test, verify that the Enabled box is checked. Click **OK**.

6. Select a range you want to test from the **Range** drop-down list.

7. Select the desired **Mask** type from the drop-down list.

8. Set the limits as desired in the **Absolute ampl** and **Relative ampl** boxes. The values you can edit depend on the mask type you select.

9. Repeat steps 5, 6 and 7 for each range you wish to test.

10. Verify that the **Threshold** and **Excursion** values on the <u>Ranges (see page</u> <u>177)</u> tab are set as required. These are the values that define a spur.

11. Press the close box to remove the Settings panel.

12. Press **Run** to begin testing.

Magnitude Error Measurement

The RMS magnitude difference between the measured signal and the reference signal magnitude.

Marker to Center Frequency

Changes the center frequency to match the frequency of the selected marker.

Mask Editor (Frequency Mask Trigger)

The Mask Editor is used to create masks that are used by the Frequency Mask Trigger function. The Frequency Mask Trigger (FMT) function is used to define trigger events to capture signal anomalies based on their frequency and amplitude.

Displaying the Mask Editor

To display the Mask Editor:

1. Press **Trigger** on the front panel or select **Trig** from the Application toolbar.

2. Select the **Event** tab.

3. Set **Source** to **RF Input**.

4. Set **Type** to **Frequency Mask**.

5. Select **Mask Editor**.

Creating a Mask

The simplest way to create a mask is to use the **Auto draw** function.
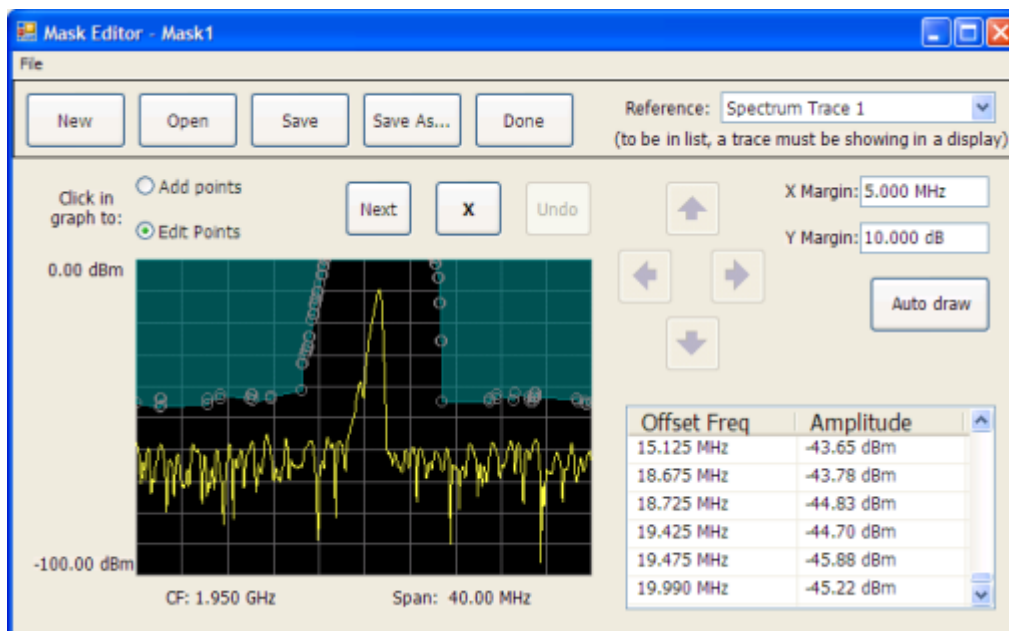
To create a new mask using **Auto draw**:

1. Select the trace on which to base the mask from the **Reference trace** drop-down list. (Only traces that are shown can be selected from the drop-down list. To show a trace that isn't currently in the list, open its display and enable the trace of interest.)

2. Specify the margins to be applied between the mask and the reference trace. Enter values for the X Margin and the Y Margin.

3. Click **Auto draw**.

The following screen shows a mask created with Auto draw.
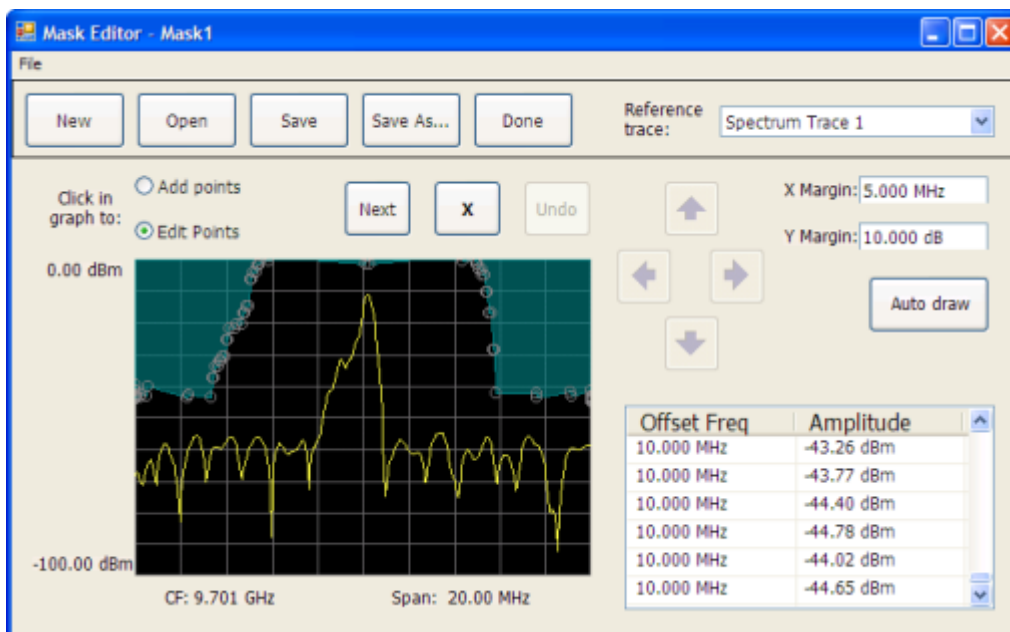
To create a new mask without using Auto draw:

■ Click the **New** button.

Changing a Mask

A mask is a collection of points specified by their frequency (defined by their offset from the center frequency) and their amplitude. You can change a mask by adding (or removing) points and editing points.

NOTE. When placing points in the frequency mask, keep in mind that in most cases, the Frequency Mask Trigger has a range of 80 dB below Reference Level. However, for values of Reference Level lower than -50 dBm, this range decreases as the RefLevel decreases. The FMT range is also reduced when the Acquisition Bandwidth contains frequencies near 0 Hz. In both these situations, the underlying reason the trigger range is reduced is because the instrument is using various amounts of "digital gain" in addition to hardware gain. You are not prevented from placing mask points outside the usable range of the instrument, but at the time the mask is applied, the instrument adjusts its range. When the mask is adjusted, you can see this in the Spectrum display and the Mask Editor. The mask's shaded fill shows the usable vertical range. Points outside this range are shown, but will not cause a trigger.

Adding Points

To add a point to a mask:

1. Click the **Add points** option button. (Alternatively, you can right-click on the desired point location (or left-click and hold for about a second) and release.)

2. Click in the graph area where you want the new point added to the mask.

You can also add a point to the mask while it is in Edit Points mode:

■ Right-click in the graph area where you wish to add a point to the mask. You can also left-click and
   hold the button down for one second. You can duplicate this method on the touchscreen by touching the
   screen for one second.

If you add a point by accident, click **Undo**. You can click Undo until the Undo button is grayed out.

Editing Points

When you edit a point, you change its offset from the center frequency and/or its amplitude. There are
two ways to edit the offset and amplitude of a point on a mask. First, you can drag a point to the desired
position. Second, you can double-click on the offset or amplitude value in the table and enter a new value.

To edit a point on a mask:

1. Click the **Edit Points** option button.

2. Click on the point you wish to change.

3. Change the position of the point using the following methods:

   a. Dragging it with the mouse to the desired position.

   b. Clicking the arrow keys in the Mask Editor window to move the point to the desired position.
      Use the left/right keys to change the frequency offset. Use the up/down arrow keys to change the
      amplitude. Once you click an arrow key, you can use the front panel knob for fine adjustments.

4. To edit another point, click **Next**.

You can also edit a point by double-clicking on the value in the table that you want to change and typing
in a new value.

Deleting Points

To delete points from the mask:

1. Click the **Edit Points** option button.

2. Click on the point to be removed and click the **X** button to delete the point.

You can also delete a point by clicking on the point in the table that you want to delete and clicking
the **X** button.

If you delete a point by accident, click **Undo**. You can click Undo until the Undo button is grayed out.

Saving a Mask

To save a mask:

■ Click the **Save** button.

To save an edited mask under a new name:

■ Click the **Save As** button.

Opening an Existing Mask

To open an existing mask:

1. Click on **Open**. This displays the Open dialog box.

2. Navigate to the location of the mask file.

3. Select the desired file and click **Open**.

Maximum Frequency Error Measurement

The maximum frequency error is the difference between the measured carrier frequency of the signal and the user-selected center frequency of the analyzer.

Maximum Phase Error Measurement

The phase is measured at each point during the pulse's ON time. The phase error for each point is the difference between the measured phase value and the calculated ideal phase value. After the phase error is calculated for all points in the acquisition record, the largest error in the positive direction and the largest in the negative direction are determined. Whichever of these two values has the greater absolute value is designated the Max Phase Error.

Measurements Tab

The Measurements tab is used to specify the measurements that appear in the Pulse Table.

Show in Pulse Table

Checked measurements appear in the Pulse Table.

Measurement Params

The Measurement Params tab is where you set parameters that control the ACPR and MCPR measurements.
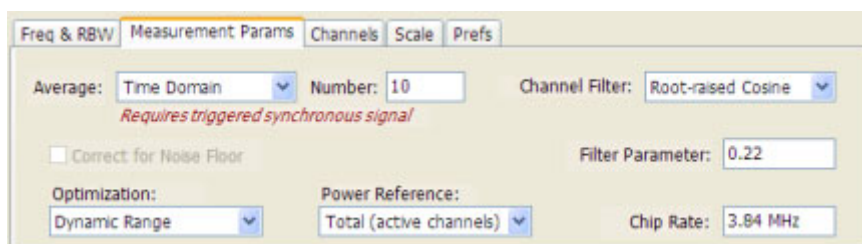
Measurement	Description
Average	Enables/disables measurement averaging. Averaging can be enabled in either the Frequency Domain or Time Domain.
Number	When Averaging is set to Frequency Domain, this value specifies the number of acquisitions to be averaged. When Averaging is set to Time Domain, this value is the number of successive capture records that are averaged.
Correct for Noise Floor	Enables/disables the Noise Floor Correction function.
Optimization	Sets the Noise Floor Correction function to optimize for the greatest dynamic range or the widest real-time bandwidth.
Power Reference	Specifies power against which the results are compared. Choices available are each of the existing main channels and "Total power in main channels".
	Only present when MCPR is the selected display.
Channel Filter	Specify the channel filter used. Select between None (default) and Root-raised Cosine.
Filter Parameter	Value entry box for the Root-raised Cosine filter Adjacent Channel Filter.
	Present only when the Channel Filter is set to RRC.
Chip Rate	Value entry box for the RRC chip rate.
	Present only when the Channel Filter is set to RRC.

Correct for Noise Floor

When this setting is enabled, the instrument applies a correction to the ACPR or MCPR measurement to reduce the effect of instrument noise on the results. It generates this correction by taking a preliminary acquisition to measure the instrument noise floor. Once this is done, the measurement proceeds, applying the correction to each result. When any relevant settings (reference level, attenuator, frequency, or span) are changed, the instrument performs a new noise measurement and correction.

Optimization

There are two settings for Optimization: Dynamic Range and Realtime BW.

Realtime BW: Choose Realtime BW when you want to see time-correlated results in other displays. Optimizing for real-time bandwidth causes the instrument to set its acquisition bandwidth to span the channel set, as long as the bandwidth of the channel set is less than the real-time bandwidth of the instrument (40 MHz or 110 MHz, depending on model). However, if the bandwidth of the channel set exceeds the realtime bandwidth of the instrument, the instrument will have to switch to swept mode and stitch multiple acquisitions together to make the ACPR/MCPR measurement. If the instrument must switch to swept acquisition mode, time-correlated results in other displays are not possible.

Dynamic Range: Choose Dynamic Range when maximum dynamic range is more important than time-correlated results in other displays. The Dynamic Range setting optimizes the dynamic range by using a 40 MHz (or less) real-time bandwidth setting to make the acquisition. If the channel set bandwidth is greater than 40 MHz, the instrument uses the swept acquisition mode to stitch multiple 40 MHz bandwidth acquisitions together to capture the entire width of the channel set.

Modulation Tab

Menu bar: Setup > Settings > Modulation

The Modulation tab specifies the type of modulation used in the input signal and other parameters that control the demodulation of the input signal.
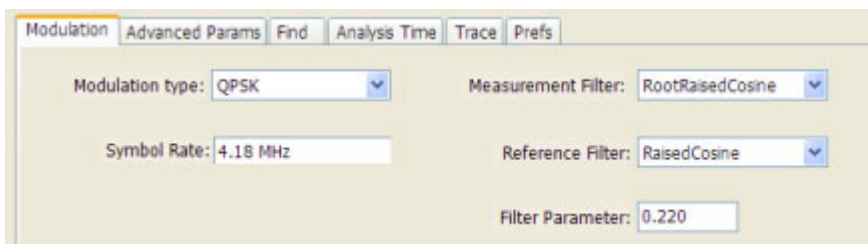
Parameter	Description
Modulation type	Specifies the type of modulation used in the input signal.
Symbol Rate	Specifies the symbol rate in Hertz.
Measurement Filter	Specifies the filter used for measurements.
Reference Filter	Specifies the filter used as a reference.
Filter Parameter	Enter a value used for the Measurement Filter and Reference Filter.

Modulation Type

The modulation types that can be demodulated are:

Modulation type	Description
QPSK	Quadrature Phase Shift Keying
8PSK	8-Phase Shift Keying
D8PSK	Differential Eight Phase Shift Keying
DQPSK	Differential Quadrature Phase Shift Keying
PI/4DQPSK	Pi/4 Differential Quadrature Phase Shift Keying
BPSK	Binary Shift Keying
16QAM	16-state Quadrature Amplitude Modulation
32QAM	32-state Quadrature Amplitude Modulation
64QAM	64-state Quadrature Amplitude Modulation
128QAM	128-state Quadrature Amplitude Modulation
256QAM	256-state Quadrature Amplitude Modulation
MSK	Minimum Shift Keying

Symbol Rate

Enter the appropriate value for the Symbol Rate in this entry box.

Measurement Filter

The available measurement filters are:

- None
- Root Raised Cosine
- Raised Cosine
- Gaussian
- Rectangular
- IS95TX-MEA
- IS95TXEQ-MEA
- IS95Ref

The measurement filter is applied before the demodulation bit is detected and the ideal reference is calculated.

Reference Filter

The available reference filters are:

- Raised Cosine
- Gaussian
- Rectangular

- IS95TX-MEA

- IS95TXEQ-MEA

- IS95Ref

The reference filter is applied to the internally generated ideal reference signal before the EVM is calculated.

Filter Parameter

The filter parameter specifies the alpha for the Root Raised Cosine or Raised Cosine filter, or the BT for the Gaussian filter.

Multiple Carrier Power Ratio

The ratio of the signal power in the reference channel or group of channels to the power in adjacent channels.

Next Peak (Markers menu)

Selecting Next Peak displays a submenu that enables you to move the selected marker to the next peak.

Setting	Description
Next Left	Moves the selected marker to the next peak to the left of the current marker position.
Next Right	Moves the selected marker to the next peak to the right of the current marker position.
Next Lower	Moves the selected marker to the lower level peak on the trace.
Next Higher	Moves the selected marker to the higher level peak on the trace.

Online Help

Menu Bar: Help > Online Help

This menu item displays this online help. The online help is a standard Windows help system. The Online Help menu item is the only method available to display the online help; there are no other links to the online help within the software.

On/Standby Switch

Use this button to power the instrument on or to shut down (set the instrument to standby).

Before shutting down, it is recommended that you first exit the instrument application and any other active Windows applications to avoid error messages on shutdown or the next power up.

Other Outputs

The IF and IQ output settings appear only when the option is installed.

Analog IF Output

Analog IF Output enables you to use the spectrum analyzer as a high-quality downconverter. The instrument will shift the RF input signal down to a frequency that other test equipment, such as an oscilloscope, can display.

The BW drop-down list allows you to apply filters to the signal. The 120 MHz flat-top filter selection provides the widest possible bandwidth out, which means faster rise times but results in more overshoot and other aberrations. The Gaussian filter reduces the bandwidth out and reduces aberrations. The BW setting is enabled only when the IF Output is On. The selections are **120 MHz (Flat-Top)** and **60 MHz (Gaussian)**. Default: 120 MHz.

IQ Output

The Digital IQ Output transmits the digitized RSA6100A data for capture and storage by external equipment. The I/Q data is provided in 16-bit, two's complement format, along with clock and data-valid signals.

There are three selections available for the IQ Output: Off, On, and Test. When in the "Off" position, the IQ Output is disabled, and all lines are static. When in the "On" position, the data is output as described in the **RSA6100A Series Real-Time Spectrum Analyzer Specifications and Performance Verification Technical Reference** (Tektronix part number 071-1915-XX).

Use the "Test" position to verify operation when setting up your equipment. When in the "Test (Counting Pattern)" position, the I channel data will be counting up and the Q channel data will be counting down. The EXT_IQ_CLK and EXT_IQ_DAV signals will operate at a rate consistent with the instrument SPAN setting.

Parameters Tab (CCDF Display)

The Parameters tab enables you to specify several parameters that control signal acquisition for the CCDF Display.
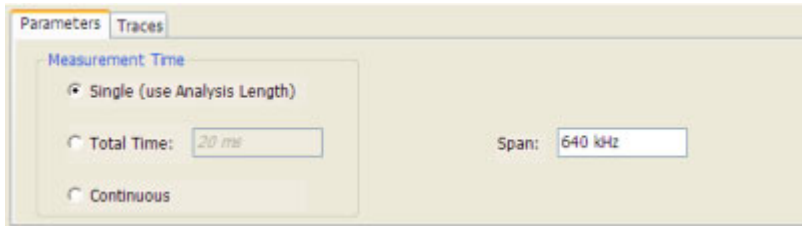
Setting	Description
Single	When this Single is selected, the CCDF measurement is based on the Analysis Time parameters set on Analysis control panel (Setup > Analysis > Analysis Time).
Total Time	When Total Time is selected, you can adjust its value. The value set here does not affect Analysis Length value set in the Analysis control panel.
Continuous	When Continuous is selected, the CCDF measurement combines each new record (Actual Analysis Length) into the existing result. It does not erase and start over until user presses STOP or CLEAR.
Span	Specifies the range of frequencies used for analysis.

Single

Depending on the Analysis Time setting, the CCDF display may present error messages:

■ If the Actual Analysis Time is greater than 1 ms, the CCDF Display will calculate the trace without any problems.

■ If the Actual Analysis time is less than 1 ms, the CCDF Display will measure the data as best if can, but if it receives fewer than 20 samples, the CCDF display will clear the trace and report "Not enough samples" .

Parameters Tab (Occupied BW)

The Parameters tab enables you to specify parameters that control the Occupied BW measurement.

Setting	Description
Occupied BW % Power	Specifies the proportion of power within the occupied bandwidth (referenced against the total power in the measurement bandwidth).
x dB level	x dB level defines the x dB BW level search threshold.
Measurement BW	Specifies the frequency range used by the measurement.
Max Hold spectral data	Enables the Max Hold function.
Average results	Enables/disables results averaging. Note that this is not an averaging of the trace, but an averaging of the results.
Count	Specifies the number of results averaged to calculate the Occupied BW. Range: 2 to 10,000.

x dB Level

The x dB level determines the x dB BW. The instrument analyzes the spectrum trace to locate the frequencies at which the level is x dB down from the peak level calculated over the measurement bandwidth. The frequency difference between the upper and lower crossing thresholds is the x dB BW.

Range: -80.0 to -1.0 dB; Resolution: 0.1%; Inc/dec small: 0.1%, large: 1%; Default: -26 dB

Max Hold Spectral Data

Max Hold displays the maximum value in the acquisition record for each display point. Each new trace display point is compared to the previous maximum value and the greater value is retained for display and subsequent comparisons.

Parameters Tab (Phase Noise)

The Parameters tab enables you to specify acquisition settings that control the Phase Noise measurement.

Setting	Description
Optimization	Selects setting to optimize for speed or dynamic range.
Speed	Optimizes acquisition for speed.
Dynamic Range	Optimizes the acquisition for dynamic range. For this setting, the instrument uses small bandwidth steps and attenuator optimization to maximize the dynamic range of the measurement.
Average	Specifies whether averaging is used or not. This setting affects integrated numeric results and the trace display. The range for this setting is 2 to 100. The default setting is disabled.

Parameters Tab (Spurious)

The Parameters tab enables you to specify settings that control the Spurious measurement.

Setting	Description
Frequency Ranges	
Multi	Enables the instrument to display all enabled ranges in the graph.
Single	Limits the graph to the display of only one range. The displayed range is set to the range that contains the selected spur.
List Spurs	
All spurs	Displays any spur that exceeds the Threshold and Excursion values set on the Ranges tab.
Over Limit	Displays only spurs that exceed both the Threshold and Excursion values set on the Ranges tab and the limits specified on the Limits tab.
RF & IF Optimization	Specifies how the gain and bandwidth should be optimized (in the RF and IF stages of the front end). Choices are Auto, Maximize Dynamic Range and Minimize Noise.

Params Tab (Pulsed RF)

The Params tab enables you to adjust several measurement parameters for Pulsed RF displays.

Setting	Description
Measurement Filter	Specify whether a filter is used to limit the bandwidth of the input signal.
Bandwidth	Sets the bandwidth of the measurement filter.
Power threshold to detect pulses	Specifies the level used for locating pulses in the data.
Minimum OFF time between pulses	Specifies the time the signal must fall below the power threshold for two pulses to be considered separate pulses.
Max number of pulses	Specifies the number of pulses to measure within the analysis time.

Measurement Filter

Three choices are available for the measurement filter:

- **No Filter - Max BW**: The widest acquisition bandwidth available is used. The **Bandwidth** setting is disabled, but shows the value in use.

- **No Filter**: - This is the default. The Bandwidth control is enabled for you to specify an acquisition bandwidth.

- **Gaussian** - The Bandwidth control is enabled for you to specify a value. The instrument uses an acquisition bandwidth two times wider than the entered value.

Power threshold to detect pulses

Specifies the minimum power level the trace must exceed to be detected as a pulse. The range for this setting is: 0 to -70 dBc. The setting resolution is 1 dB. The default value is -10 dB.

Max number of pulses

If the Analysis Time contains fewer pulses than specified, the spectrum analyzer will measure all the pulse within the analysis time. If there are more pulses in the Analysis Time, than the specified number, the spectrum analyzer measures the specified number of pulses and ignores the rest. The range for this setting is: 1 - 1000. The setting resolution is: 1. If this setting is not checked, the spectrum analyzer will measure all pulses within the Analysis Time, up to a maximum of 1000 pulses.

Peak (Markers Menu)

Selecting **Peak** from the Markers menu moves the selected marker to the highest level peak within the acquisition record.

Peak/Average Ratio (Pk/Avg) Measurement (CCDF Display)

Ratio of the peak power in the transmitted signal to the average power in the transmitted signal (located in the CCDF display).

Peak Power Measurement (Pulsed RF Display)

The Peak Power measurement shows the maximum power during pulse on.

Phase Deviation Measurement

The phase deviation is the difference between the maximum and minimum Phase values measured during the ON time of a pulse.

Phase Error Measurement

The RMS phase difference between the measured signal and the ideal reference signal.

Prefs Tab

The Prefs tab enables you to change parameters of the measurement display. The parameters available on the Prefs tab vary depending on the selected display, but include such items as enabling/disabling Marker Readout, switching the Graticule display on/off, and Marker Noise mode. Some parameters appear with most displays while others appear with only one display.

Prefs Tab (Spectrum)

The Prefs tab enables you to change appearance characteristics of the Spectrum display.
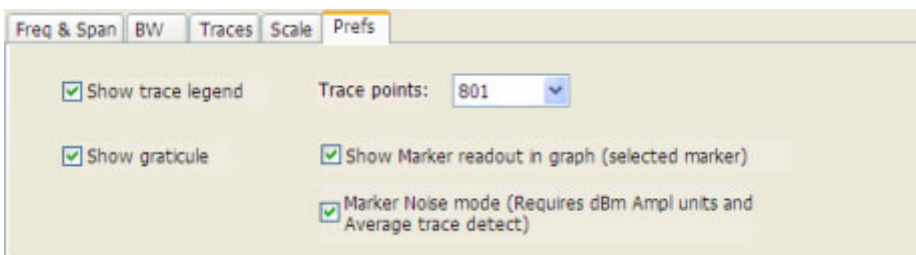
Setting	Description
Show trace legend	Enables display of a legend in the measurements area that shows the Detection method and Function setting for displayed traces. The color of the legend text matches the color of the associated trace.
Show graticule	Select to display or hide the graticule.
Show Marker readout in graph (selected marker)	Shows or hides the readout for the selected marker in the graph area.
Marker Noise mode	Select to enable or disable the Marker Noise mode. Use this mode to measure noise on the trace. See Using Markers in Noise Mode (see page 61)

Prefs Tab (Spurious)

The Prefs tab enables you to change appearance characteristics of the Spurious display.
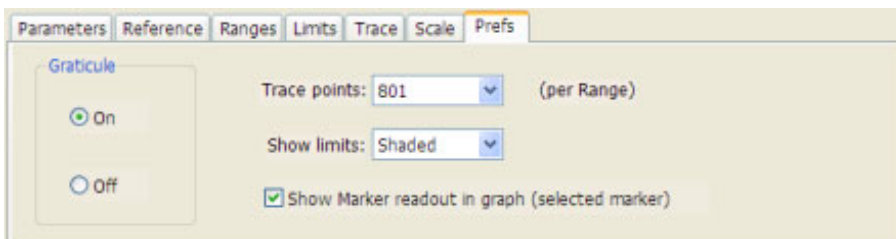
Setting	Description
Graticule	Select On or Off to display or hide the graticule.
Trace Points	Select the desired number of points per range.
Show limits	Specifies how limits are shown in the graph.
Shaded	The region above the Limit (see page 158) is indicated by a shaded area.
Line Only	The limit values are indicated by a green line.
Off	The limit values are not indicated in the graph.
Show Marker readout in graph (selected marker)	Shows or hides the readout for the selected marker in the graph area.

Pulse-to-Pulse Frequency Difference

The Pulse-to-Pulse Frequency Difference measurement is the difference between the frequency of this pulse and frequency of the first pulse. The instantaneous frequency is measured at a user-adjustable time following the rising edge of each pulse.

Pulse-to-Pulse Carrier Phase Measurement

The phase difference between the first pulse and the selected pulse in the analysis window.

Pulse Width Measurement

The time from the rising edge to the falling edge at the -3dB level (50%) of the mean power for the pulse-on.

Quadrature Error Measurement

The orthogonal error between the I and Q channels. The error shows the phase difference between I and Q channels away from the ideal 90 degrees expected from the perfect I/Q modulation. Constellations with quadrature error will show some leakage of I into Q and vice versa.

Ranges Tab (Spurious)

Use the Ranges tab to specify the parameters that control the Spurious measurement. From the Ranges tab, you specify the start and stop frequencies for ranges, whether or not a range is enabled, the parameters that specify what constitutes a spur, measurement filter shape and bandwidth, and the detection method used for processing signals.

Setting	Description
Range	Selects the frequency range to which the settings on this tab are applied.
Start	Readout of the start frequency for the selected range.
Stop	Readout of the stop frequency for the selected range.
Edit	Click this button to edit the Spurious Frequency Plan, which defines the range frequency values and whether or not a signal is measured in a range (enabled/disabled).
Enabled	Specifies whether or not measurements are taken in the specified range.
Filter shape	Specifies the filter shape used for the Spurious measurement.
BW	Specifies the bandwidth used for the selected filter shape.
Auto	Sets the BW automatically. If CISPR is selected for Filter shape, this control is disabled.
Detection	Sets the processing method used for compressing excess intermediate data into the desired number of trace points.
Threshold	Specifies the level that must be exceeded for a signal peak to be recognized as a spur. A signal peak must also exceed the Excursion setting to be considered a spur.
Excursion	Specifies the peak to peak magnitude that must be exceeded for a signal peak to be recognized as a spur. A signal transition must also exceed the Threshold setting to be considered a spur.
VBW	Adjusts the VBW (Video Bandwidth) value. VBW Maximum: RBW current value; VBW Minimum: 1/10,000 RBW setting. Disabled when Filter shape is set to CISPR.
Review table	Click to display the Ranges table. The Ranges Table shows the enabled ranges, and all the settings specified on the Ranges and Limits tabs associated with the enabled ranges.
Save table	Click to save the current Range table to a file.
Load table	Click to load a saved Range table from a file.

Changing the Range Start and Stop Frequencies
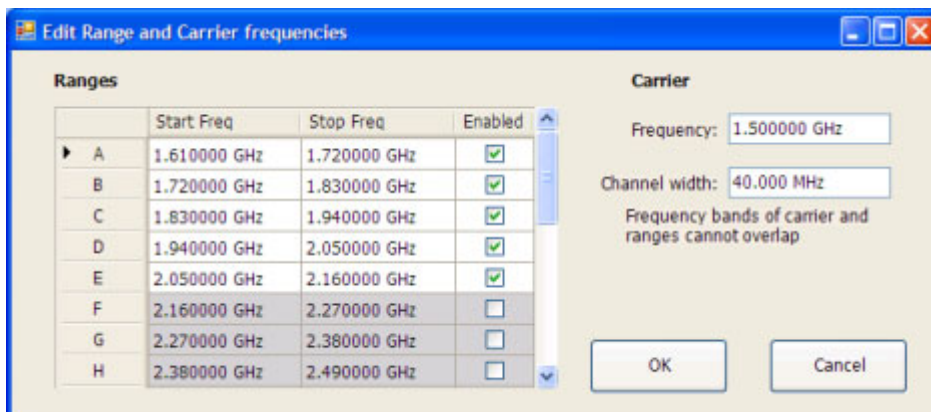
To change the range start and stop frequencies, edit the Spurious Frequency Plan:

1. Click the **Edit** button on the **Settings** > **Range** tab.

2. Click the **Enabled** box for a range to take measurements in the range.

3. Click on the frequency setting to change it. Type in a number for the frequency and a letter as a multiplier, then press **Enter** on the front panel. You can use k, m, or g to set the frequency multiplier.

4. Click **OK** to save your changes.

You can enable a range on the Ranges control panel tab by selecting the range from the Range drop-down list and clicking the Enabled check box. If you need to change the frequency of a range, you must edit the spurious frequency plan using the Edit button.

Specifying Spur Requirements

A spur is a signal peak that exceeds both the Threshold and Excursion settings on the Ranges tab. The Threshold and Excursion settings are absolute values; they are not calculated relative to a reference. The Threshold and Excursion settings are specific to the selected range. If you want to use different settings for spurs in different ranges, you have to set the values separately for each range. The Excursion control is used to avoid interpreting a single spur as multiple narrower spurs by requiring the amplitude to drop by the Excursion amount between spurs. Raising the Threshold value means that fewer, larger signals will be identified as spurs.

To specify the spur requirements for a range:

1. Select the **Range** for which you want to specify the spur requirements.

2. Set the **Threshold** value.

3. Set the **Excursion** value.

Reference Tab (Spurious)

The Reference tab enables you to specify the Power Reference parameter. The Power reference parameter is used to calculate relative values in the Spur table and to calculate relative amplitude limits.
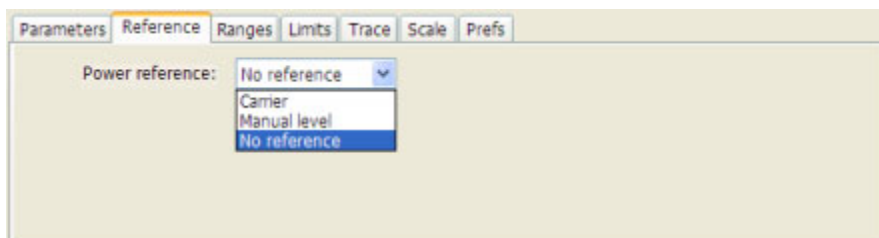
Setting	Description
Power Reference	Specifies the power reference level used for relative values and limits.
No reference	Power level readings are calculated only for absolute values, no relative values are calculated.
Manual level	The reference level for relative measurements is specified by the Reference power level setting.
Carrier	The reference level for relative measurements is based on the power level calculated at the specified carrier frequency.

Setting the Power Reference Level to No Reference
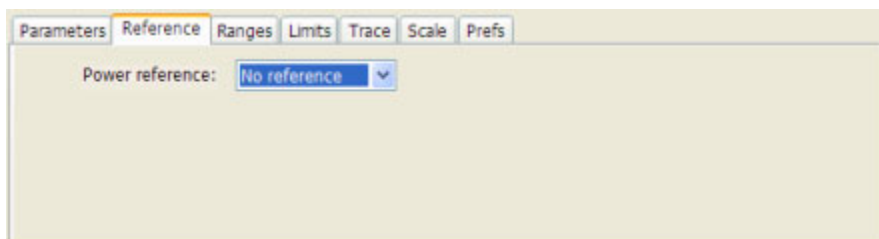
To set the power reference to No Reference:

■ Select **No reference** from the **Power reference** drop-down list.

Setting the Power Reference Level to Manual Level
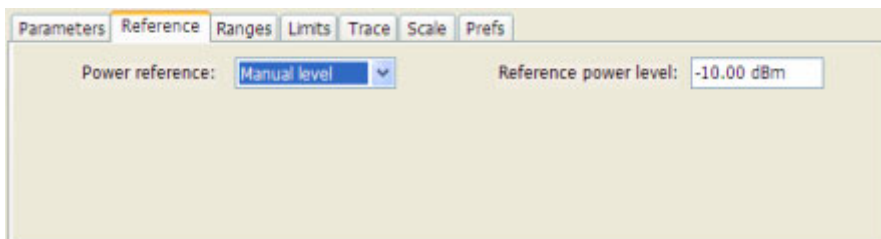
To set the power reference to manual level:

1. Select **Manual level** from the **Power reference** drop-down list. This displays the **Reference power level** entry box.

2. Specify the desired power level in the **Reference power level** entry box.

Setting the Power Reference Level to Carrier
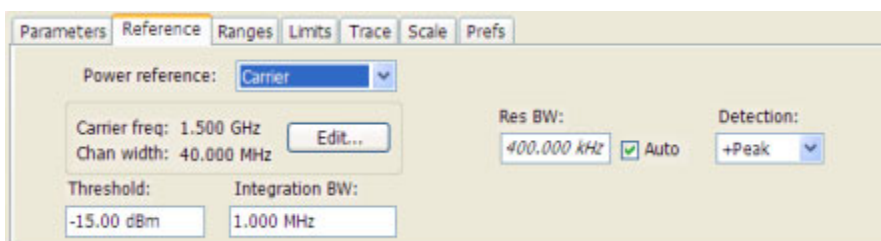
To set the power reference to Carrier:

1. Select **Carrier** from the **Power reference** drop-down list. This displays several parameters.

2. To set the Carrier frequency, click **Edit**. This displays the **Edit Range and Carrier frequencies** dialog box.
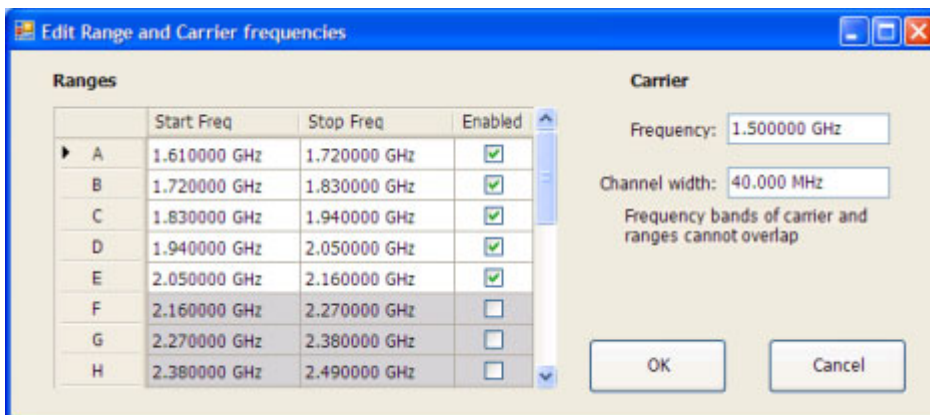
3. Specify the necessary values in the **Frequency** and **Channel width** entry boxes under **Carrier**. Click **OK**.

4. Specify the **Threshold** level.

5. Specify the **Integration BW**. The Integration BW is the bandwidth over which the carrier is measured.

6. Although Auto is the recommended setting, you can specify the Resolution Bandwidth by changing the value in the **Res BW** entry box.

7. Set the **Detection** method. Select either **+Peak** or **Average**.

NOTE. *If the power level measured over the Integration BW about the carrier frequency is below the threshold level, the instrument concludes that no carrier is present and no relative measurements will be taken. Absolute measurements will still be taken.*

Repeat

Menu Bar: Run > Repeat

Selecting **Repeat** sets the Run mode to Repeat. In Repeat mode, as soon as one acquisition sequence completes, another begins.

Note that an acquisition sequence can require more than one acquisition. For example, in a spectrum view, the trace function might be set to Average 100 acquisitions Thus, a complete acquisition sequence would consist of 100 acquisitions that are averaged together to create the trace that is displayed.

Repetition Interval Measurement

The time from a pulse rising edge to the next pulse rising edge.

Repetition Rate Measurement

The inverse of repetition interval. Repetition Interval is the time from a pulse rising edge to the next pulse rising edge.

RF Channel Power Measurement

The RF channel power gives an indication of the total average (and other measures) RF power in a given channel.

For some communications systems, there is an "out-of-service" total power measurement defined in the specifications that calls for a specified constant modulation. In this case, the output power should be relatively constant. For many measurements, this may not be the case, and the Power Measurement results will vary as the signal varies.

Average power is the square root of the sum of the squares of the voltage samples over the measurement time.

The defined "channel" width for the Power Measurement defines the bandwidth and shape of the filter used to remove any RF power on frequencies outside of the channel bandwidth.

Rho Measurement

The normalized correlated power of the measured signal and the ideal reference signal. Like EVM, Rho is a measure of modulation quality. The value of Rho is less than 1 in all practical cases and is equal to 1 for a perfect signal measured in a perfect receiver.

Ripple

The Ripple measurement is calculated as follows:

Ripple = | Positive Maximum Difference | + | Negative Maximum Difference |

where the maximum differences are calculated as shown in the following illustration.
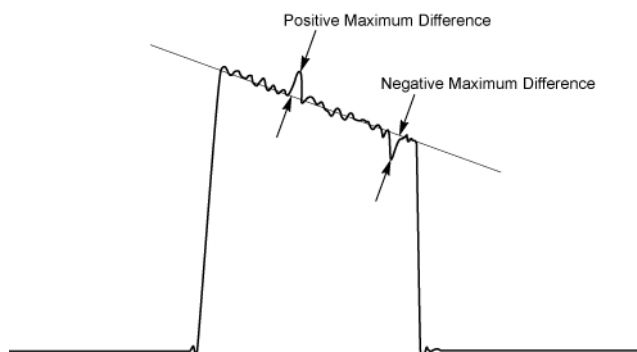
Ripple Measurement (Pulsed RF Displays)

Ripple is the peak-to-peak ripple on the pulse top. It does not include any preshoot, overshoot, or undershoot. By default, the first 25% and the last 25% of the pulse top is excluded from this measurement to eliminating distortions caused by these portions of the pulse.

The units for this measurement can be set to either Watts (default) or Volts.

Rise Time Measurement (Pulsed RF Displays)

The time required for a signal to rise from 10% to 90% (or 20% to 80%) of its maximum steady-state voltage amplitude.

RMS Frequency Error Measurement

The RMS Frequency Error measurement is the RMS average of the Freq Error vs Time trace, computed over the Measurement Time.

RMS Phase Error Measurement

The RMS Phase Error measurement is the RMS average of the Phase vs Time trace, computed over the Measurement Time.

Sampling Parameters Tab

The Sampling Parameters tab enables you to set the controls for real-time acquisition. There is two settings on the Sampling Parameters Tab, the Adjust setting and FastFrame. Depending on the setting chosen for Adjust, two additional parameters can be set. Normally, the best results are achieved by leaving the Adjust control set to All Auto.
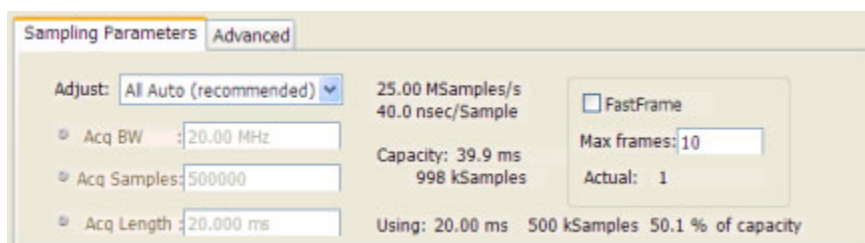
Sampling Control

There are three acquisition parameters that interact with each other: Acquisition Bandwidth, Acquisition Length, and Acquisition Samples. Acquisition Bandwidth is the frequency range of the acquisition. Acquisition Length refers to the time over which the acquisition occurs. Acquisition Samples is the

number of samples acquired over the acquisition time. The parameters available for Adjust and how the parameters are determined are shown in the following table.

Adjust	User Sets		Analyzer Calculates
All Auto	N /A	N /A	All values based on the selected measurement
Acq BW / Acq Samples	Acq BW	Acq Samples	Acq Length
Acq BW / Acq Length	Acq BW	Acquisition Length	Acq Samples

Acquisition Memory Usage

The center portion of the tab shows how the acquisition memory is used.

Readout	Description
Samples/s, sec/Sample	Readout of the acquisition sample rate and sample period.
Capacity	The maximum period of time and number of samples that can be acquired with the current sampling parameters.
Using	The total amount of acquisition memory that will be used based on the current settings.

FastFrame

FastFrame is a feature that allows you to segment the acquisition record into a series of frames, or data records. A typical use of FastFrame is to record data samples around signal events of interest, while not wasting memory on irrelevant data between these events. FastFrame is only valid for real-time acquisitions. If any measurement is configured for swept acquisitions, an error message is displayed: Disabled: *FastFrame doesn't support swept settings*.

Setting	Description
FastFrame	Enables FastFrame acquisition mode.
Max Frames	Specifies the maximum number of frames to record in a single acquisition process.
Actual	Shows the actual number of frames that will be acquired into the acquisition memory. This number changes based on the Acq BW, Acq Samples, and Acq Length values. This number will never be greater than the value set by Max Frames.

# Scale Tab (Amplitude vs Time)

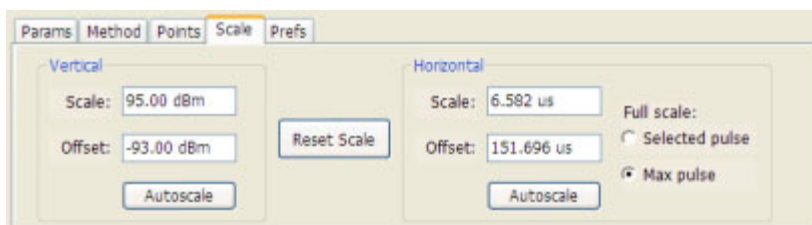The Scale tab allows you to change the vertical and horizontal scale settings. Changing the scale settings changes how the trace appears on the display but does not change control settings such as Measurement Frequency. In effect, these controls operate like pan and zoom controls.

Setting	Description
Vertical	Controls the vertical position and scale of the trace display.
Scale	Changes the vertical scale.
Offset	Vertical Offset adjusts the reference level away from top of the graph.
Autoscale	Resets the scale of the vertical axis to contain the complete trace.
Horizontal	Controls the span of the trace display and position of the trace.
Scale	Sets the period of time shown in the graph.
Offset	Allows you to pan a zoomed trace.
Autoscale	Resets the scale of the horizontal axis to contain the complete trace.
Reset Scale	Resets all settings to their default values.

Scale Tab (DPX Spectrum Display)

The Scale tab allows you to change the vertical scale settings and set the color scheme used for the Bitmap trace. Changing the scale settings changes how the trace appears on the display but does not change control settings such as Measurement Frequency.

Setting	Description
Vertical	Controls the vertical position and scale of the trace display.
Scale	Changes the vertical scale.
Offset	Adjusts the Reference Level away from the top of the trace display.
Reset Scale	Sets Scale to its default value and Offset to zero. Disabled when Units (Setup > Analysis > Units) is set to Watts or Volts.
Autoscale	Resets the scale of the vertical axis to contain the complete trace. Disabled when Units (Setup > Analysis > Units) is set to Watts or Volts.
DPX Bitmap	Controls the appearance and scale of the Digital Phosphor Bitmap trace.
Color	Displays the Options dialog with the Colors tab on top. this allows you to set the color scheme used for the Bitmap trace.
Max	Sets the hit density represented by the top of the color scale. "Clipping" occurs for densities greater than this value. Range: 1 - 100%; resolution: 1%; Default: 100%.
Min	Sets the number of hits per pixel that will be at the bottom of the color range. Range: 0 - 99%; Resolution: 1%; Default: 0.

Scale Tab (EVM / Magnitude Error vs Time)

The Scale allows you to change the vertical and horizontal scale settings. Changing the scale settings changes how the trace appears on the display but does not change control settings such as Measurement Frequency.

Setting	Description
Vertical	Controls the vertical position and scale of the trace display.
Scale	Changes the vertical scale units.
Offset	Vertical Offset adjusts the reference level away from top of the graph.
Autoscale	Resets the scale of the vertical axis to contain the complete trace.
Horizontal	Controls the span of the trace display and position of the trace.
Scale	Allows you to, in effect, change the span.
Offset	Allows you to pan a zoomed trace without changing the Measurement Frequency. Offset is only enabled when the span, as specified by Freq/div, is less than the acquisition bandwidth.
Autoscale	Resets the scale of the horizontal axis to contain the complete trace.

A Note About Units

The Units used for the horizontal scale can be either Seconds or Symbols. To set the units for the horizontal scale, display the **Analysis Time** tab. On the tab, select the appropriate units from the **Units** drop-down list.

Scale Tab (Frequency vs Time)

The Scale allows you to change the vertical and horizontal scale settings. Changing the scale settings changes how the trace appears on the display but does not change control settings such as Measurement Frequency.

Setting	Description
Vertical	Controls the vertical position and scale of the trace display.
Scale	Sets the scale of the vertical axis.
Offset	Vertical Offset adjusts the reference level away from top of the graph.
Autoscale	Resets the scale of the vertical axis to contain the complete trace.
Horizontal	Controls the span of the trace display and position of the trace.
Scale	Allows you to, in effect, change the span.
Offset	Allows you to pan a zoomed trace without changing the Measurement Frequency. Offset is only enabled when the span, as specified by Freq/div, is less than the acquisition bandwidth.
Autoscale	Resets the scale of the horizontal axis to contain the complete trace.

Scale Tab (Phase Error vs Time)

The Scale tab view allows you to change the vertical and horizontal scale settings. For the Phase vs Time view, the vertical axis represents the phase while the horizontal axis represents time.
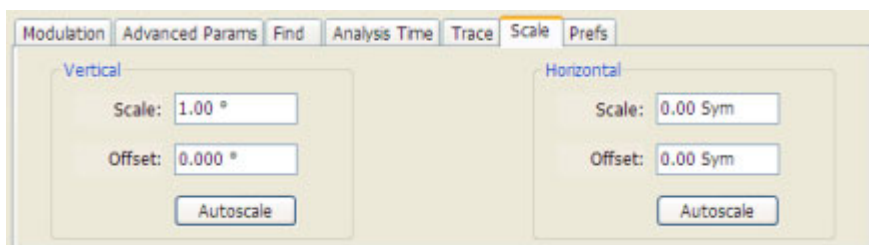
Setting	Description
Vertical	Controls the vertical position and scale of the trace display.
Scale	Sets the scale of the vertical axis. Units are in degrees.
Offset	Sets the start value for the vertical axis. Units are in degrees.
Autoscale	Resets the scale of the vertical axis to contain the complete trace.
Horizontal	Controls the span of the trace display and position of the trace.
Scale	Sets the horizontal scaling in symbols or second (units are set on the Analysis Time tab).
Offset	Sets the start value for the time axis.
Autoscale	Resets the scale of the horizontal axis to contain the complete trace.

Scale Tab (Phase Noise)

The Scale tab allows you to change the vertical and horizontal scale settings. Changing the scale settings changes how the trace appears on the display but does not change control settings such as Measurement Frequency. In effect, these controls operate like pan and zoom controls.
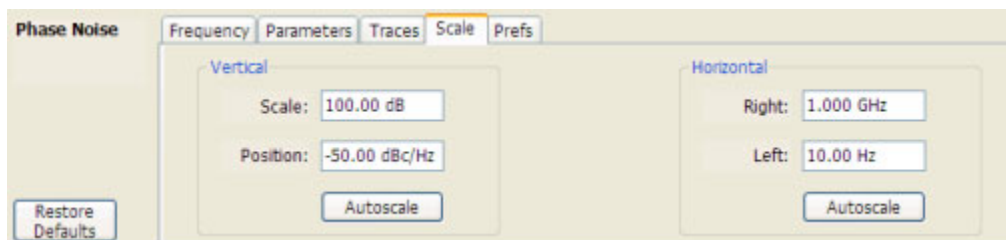
Setting	Description
Vertical	
Scale	Changes the range shown between the top and bottom of the graph.
Position	Adjusts the level shown at the top of the graph.
Autoscale	Resets the Position so that the highest level on the trace appears below the top of the graph.
Horizontal	
Right	Adjusts the frequency shown at the right side of the plot.
Left	Adjusts the frequency shown at the left side of the plot. This value does not change the frequencies of the ranges.
Autoscale	Resets the Left and Right frequencies to the lowest and highest values of the enabled ranges.

Scale Tab (Phase vs Time)

The Scale tab for the Phase vs Time view allows you to change the vertical and horizontal scale settings. For the Phase vs Time view, the vertical axis represents the phase while the horizontal axis represents time.
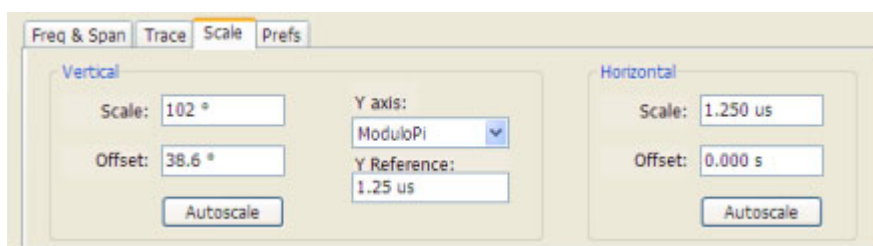
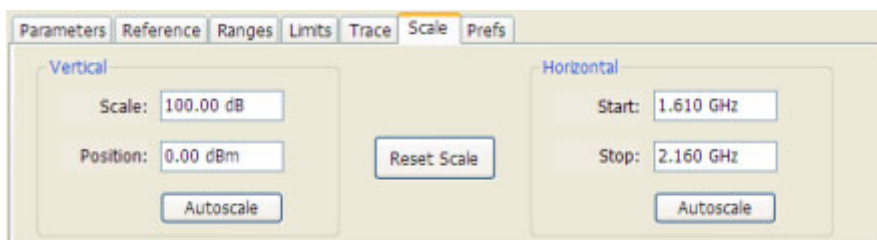| Setting	Description
Vertical	Controls the vertical position and scale of the trace display.
Scale	Sets the range of the vertical axis. Units are in degrees.
Offset	Sets the start value for the vertical axis. Units are in degrees.
Y Axis	Sets the Y-axis scale to either Continuous or Modulo +/-pi. Continuous mode unwraps the phase. Modulo +/-pi mode maps the phase to values between pi and -pi.
Reference	Sets which time point in the analysis period is used as the zero-phase-value reference.
Autoscale	Resets the scale of the vertical axis to contain the complete trace.
Horizontal	Controls the span of the trace display and position of the trace.
Scale	Sets the horizontal scaling in second/division.
Offset	Sets the start value for the time axis.
Autoscale	Resets the scale of the horizontal axis to contain the complete trace.

Scale Tab (Pulse Statistics)

The Scale tab allows you to change the vertical and horizontal scale settings. Changing the scale settings changes how the trace appears on the display but does not change control settings such as Measurement Frequency. In effect, these controls operate like pan and zoom controls.

Setting	Description
Vertical	Controls the vertical position and scale of the trace display.
Scale	Changes the vertical scale. The units for this setting depend on the statistic selected from the Result drop-down list in the Pulse Statistics display.
Offset	Adjusts the Reference Level away from the top of the trace display. The units for this setting depend on the statistic selected from the Result drop-down list in the Pulse Statistics display.
Rescale	Resets the scale of the vertical axis to contain the complete trace.
Horizontal	Controls the span of the trace display and position of the trace.
Number of pulses	Specifies the number of pulses to use to calculate statistical values.
First pulse to show	Sets the first pulse to display. (The first pulse after the start of acquisition (whether free run or triggered) is considered Pulse0. It is the first pulse after the global time reference.
Rescale	Resets the scale of the horizontal axis to contain the complete trace.
Plot	Specifies either the FFT or Trend plot.
Reset Scale	Restores all settings to their default values.

Scale Tab (Pulse Trace)

The Scale tab allows you to change the vertical and horizontal scale settings. Changing the scale settings changes how the trace appears on the display but does not change control settings such as Measurement Frequency.

Setting	Description
Vertical	Controls the vertical position and scale of the trace display.
Scale	Changes the vertical scale units. This is only accessible when the vertical units are set to dBm.
Offset	Adjusts the Reference Level away from the top of the trace display.
Autoscale	Resets the scale of the vertical axis to contain the complete trace.
Horizontal	Controls the span of the trace display and position of the trace.
Scale	Allows you to change the span.
Offset	Allows you to pan a zoomed trace without changing the Measurement Frequency.
Autoscale	Resets the scale of the horizontal axis to contain the complete trace.
Full Scale	Specifies the Horizontal scale default.
Selected Pulse	Sets the horizontal scale default to be based on the result value for the currently-select pulse.
Max Pulse	Sets the horizontal scale default to be based on the largest value for the selected pulse measurement.
Reset Scale	Resets all values to their default values.

Scale Tab (RF I & Q vs Time)

The Scale allows you to change the vertical and horizontal scale settings. Changing the scale settings changes how the trace appears on the display but does not change control settings such as Measurement Frequency.

Setting	Description
Vertical	Controls the vertical position and scale of the trace display.
Scale	Sets the scale of the vertical axis.
Offset	Vertical Offset adjusts the reference level away from top of the graph.
Autoscale	Resets the scale of the vertical axis to contain the complete trace.
Horizontal	Controls the span of the trace display and position of the trace.
Scale	Allows you to change the time displayed in the graph, in effect, zooming in on the trace.
Offset	Allows you to pan a zoomed trace.
Autoscale	Resets the scale of the horizontal axis to contain the complete trace.

Scale Tab (RF Measurements)

The Scale tab allows you to change the vertical and horizontal scale settings. Changing the scale settings changes how the trace appears on the display but does not change control settings such as Center Frequency.

Setting	Description
Vertical	Controls the vertical position and scale of the trace display.
Scale	Changes the vertical scale units. This is only accessible when the vertical units are set to dBm.
Offset	Adjusts the Reference Level away from the top of the trace display.
Autoscale	Resets the scale of the vertical axis to contain the complete trace.
Horizontal	Controls the span of the trace display and position of the trace.
Scale	Allows you to, in effect, change the span.
Offset	Allows you to pan a zoomed trace without changing the Measurement Frequency. Offset is only enabled when the span, as specified by Freq / div , is less than the acquisition bandwidth.
Autoscale	Resets the scale of the horizontal axis to contain the complete trace.

Scale Tab (Spectrogram Display)

The Scale tab allows you to change the vertical and horizontal scale settings and set the color scheme used for the spectrogram trace.

Setting	Description
Vertical (Time)	
Scale	Changes the vertical scale or the length of time shown in the graph. The most recent acquisition appears at the bottom of the graph.
Offset	Offset adjusts which of the lines is placed at the bottom position in the graph.
Autoscale	Resets the scale of the vertical axis to contain the complete trace for one acquisition.
Allow Overlap	Allows the use of overlapped frequency transforms.
Horizontal (Frequency)	
Scale	Allows you to change the range of frequencies shown in the graph without changing the span or measurement frequency.
Offset	Allows you pan the graph.
Autoscale	Resets Scale to the Span setting.
Color (Power)	
Color	Displays a drop-down list that allows you to set the color scheme used for the spectrogram trace.
Max	Sets the maximum power level represented by the top of the color scale.
Min	Sets the minimum power level represented by the bottom of the color scale.

Vertical Scale

The Spectrogram display allows you to zoom in and out in the time scale. Positive values zoom in (expand the scale) and negative values zoom out (compress the scale). If the Scale control does not allow positive values, either the Analysis Length (Setup > Analysis > Analysis Time) provides only enough time for a single spectrogram line (manually increase the Analysis Length as needed) or Allow Overlap is disabled.

Scale Tab (Spectrum)

The Scale tab allows you to change the vertical scale settings. Changing the scale settings changes how the trace appears on the display but does not change control settings such as Measurement Frequency. In effect, these controls operate like pan and zoom controls.
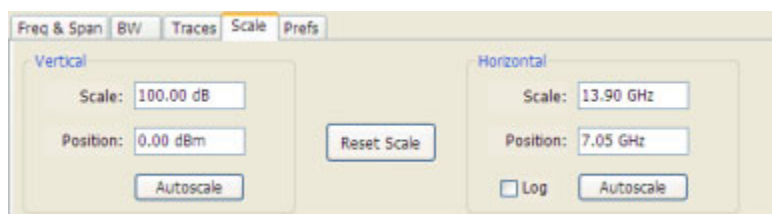
Setting	Description
Vertical	
Scale	Changes the vertical scale.
Position	Vertical Offset adjusts the reference level away from top of the graph.
Autoscale	Resets the Offset so that the trace appears below the top of the graph.
Horizontal	
Scale	Allows you to change the range of frequencies shown in the graph without changing the span or measurement frequency.
Position	Allows you pan the graph.
Autoscale	Resets Scale to the Span setting.
Reset Scale	Resets all settings to their default values.
Log scale	Resets the display to show the frequency axis in a logarithmic scale.

Scale Tab (Spurious)

The Scale tab allows you to change the vertical and horizontal scale settings. Changing the scale settings changes how the trace appears on the display but does not change control settings such as Measurement Frequency. In effect, these controls operate like pan and zoom controls.

Setting	Description
Vertical	
Scale	Changes the range of the amplitude shown between the top and bottom of the graph.
Position	Adjusts the level shown at the top of the graph.
Autoscale	Resets the Position so that the highest level on the trace appears below the top of the graph.
Horizontal	
Start	Adjusts the frequency shown at the left edge of the graph. This value does not change the frequencies of the ranges.
Stop	Adjusts the frequency shown at the right edge of the graph. This value does not change the frequencies of the ranges.
Autoscale	Resets the Start and Stop frequencies to the lowest and highest values of the enabled ranges.
Reset Scale	Resets all settings to their default values.

Scale Tab (Time Overview)

The Scale tab allows you to change the vertical scale settings. Changing the scale settings changes how the trace appears on the display but does not change control settings such as Measurement Frequency. In effect, these controls operate like pan and zoom controls.

Setting	Description
Vertical	Controls the vertical position and scale of the trace display.
Scale	Changes the vertical scale.
Offset	Vertical Offset adjusts the reference level away from top of the graph.
Autoscale	Resets the scale of the vertical axis to contain the complete trace.
Horizontal	Controls the scale of the trace display and position of the trace.
Scale	Allows you to change length of time shown within the graph.
Offset	Allows you to pan the graph.
Autoscale	Resets the scale of the horizontal axis to contain the analysis length.
Reset Scale	Resets all settings to their default values.

Show Pulse Definition

The Show Pulse Definition check box enables the display of colored lines that overlay the measurement pulse and show the points on the waveform where the measurement is being taken. A green arrow along left edge shows where the Pulse Detection threshold is set vertically.

Spectrum Time Tab

This tab controls whether the Spectrum display uses the same Analysis Time parameters as all the other views or uses a different Offset and Length. These settings do not apply to the DPX Spectrum display because it has no acquisition record or analysis time.

Settings	Description
Spectrum Time Mode	
Independent	Causes the spectrum analysis views to use the settings unique to those displays.
Use Analysis Time settings	Causes the spectrum analysis views to use the settings on the Analysis Time tab.
Spectrum Time (only available when *Independent* is selected)	
Spectrum Offset	Sets the beginning of Spectrum Time with respect to the selected time reference point (selectable in the Analysis Time tab as either Acquisition Start or Trigger).
Spectrum Length	The amount of data, in terms of time, from which spectrum traces are computed.
Auto	When enabled, causes the instrument to set the Spectrum Length value based on the RBW setting.
Actual	This is a displayed value, not a setting. It is the Spectrum Length (time) being used by the spectrum analyzer; this value may not match the Spectrum Length requested (in manual mode). The actual spectrum length is always an integer multiple of the time needed to support the RBW value.

Time Measurement

This is the time in seconds relative to the time reference point in the first acquisition record in the data set.

Time Tab

The **Time** tab allows you to set timing parameters that control the position of the trigger event.

Setting	Description
Position	Sets the point along the acquisition record the trigger event should occur.
Delay	Sets how long after the trigger event specified by the Position setting, the spectrum analyzer should wait before actually initiating the trigger event.

Traces (Math) Tab

This tab is not a distinct tab, it is just how the Traces tab appears when Math is selected in the Trace drop-down list.
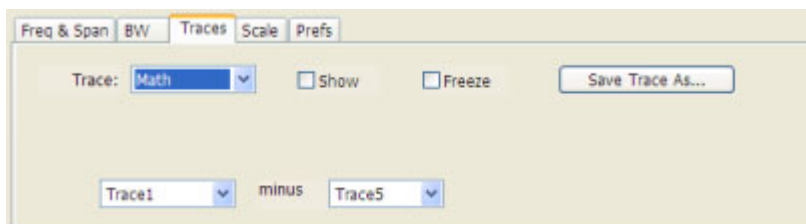
Trace 4 is a mathematically-derived trace defined as Trace A minus Trace B. You can select Trace 1, 2, or 3 to serve as either Trace A or Trace B.

Setting	Description
Trace	When set to Trace 4 (Math), this tab is displayed.
Show	Shows / hides the selected trace.
Freeze	Halts updates to the selected trace.
Save Trace As...	Saves the selected trace to a file for later recall and analysis.
Trace minus Trace	Selects which traces serve as Trace A and Trace B.

Traces Tab (CCDF)

The Traces tab enables you to select traces for display. You can choose to display a live trace, a saved trace, and a reference trace.
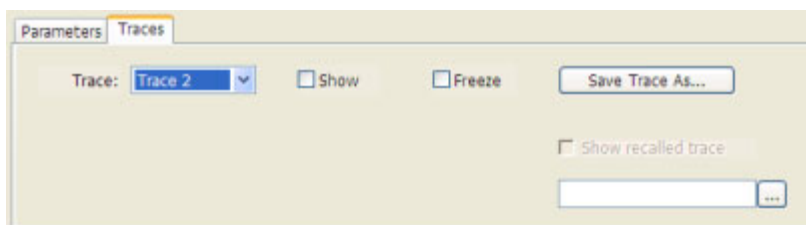
Setting	Description
Trace	Selects a trace for display. Choices are Trace 1, 2, and Gaussian. Trace 1 and 2 can be saved traces.
Show	Shows / hides the selected trace.
Freeze	Halts updates to the selected trace.
Save Trace As...	Saves the selected trace to a file for later recall and analysis.
Show recalled trace	Used to select a saved trace for display.

Saving Traces

To save a trace for later analysis:

1. Select the **Save Trace As** button. This displays the Save As dialog box.

2. Navigate to the desired folder or use the default.

**3.** Type a name for the saved trace and click **Save**.

Recalling Traces

You can recall a previously saved trace for analysis or comparison to a live trace.

To select a trace for recall:

1. Select the trace into which the recalled trace will be loaded, from the Trace drop-down list.

2. Check the **Show** checkbox.

3. Click the **...** button to display the Open dialog box.
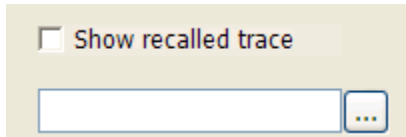
1. Navigate to the desired file and click **Open**.

2. Check the **Show Recalled Trace** checkbox.

3. Verify that the trace's **Show** checkbox is selected (either on this tab or next to the drop-down list located at the top-left corner of the graph).

Gaussian Trace

The Gaussian trace is a reference trace that you can compare your trace against. Because the Gaussian trace is for reference, there are no settings for the trace other than whether or not it is shown.
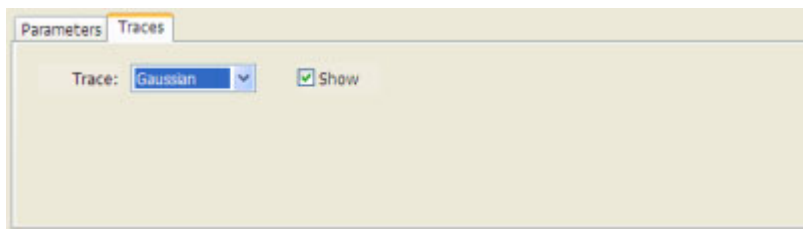
Traces Tab (DPX Spectrum Bitmap)

The Traces Tab allows you to set the display characteristics of displayed traces in the DPX Spectrum display. The Traces tab for the DPX Spectrum display has two versions. One for the DPX Bitmap trace (described in this topic) and one

Setting	Description
Trace drop-down list	Select Bitmap to set the parameters of the DPX Spectrum Bitmap trace.
Intensity	Use Intensity to control the visibility of events. An increased intensity level allows a single, short event to be seen. This also makes such an event subject to the persistence controls. This allows you to see the effect of the Persistence controls on infrequent events. Range is 1-100%. Resolution: 1.
Show	Specifies whether or not the selected trace is displayed.
Dot Persistence	Sets how long a dot is visible if it is not updated with new data. Choices for this setting are Variable and Infinite.
Variable	The Variable dot persistence setting controls how long a point in the display is visible before fading. This setting has no units associated with it. Range: 1-1000. Resolution 0.1.
Infinite	The Infinite dot persistence setting prevents a point in the display from fading.
Freeze	Halts updates to the selected trace.
Save Trace As...	Saves the selected trace to a file for later recall and analysis.
Show Recalled Trace	Displays a saved trace instead of a live trace.

Dot Persistence

Dot Persistence is the characteristic of the DPX Spectrum (see page 141) display that determines how long a pixel in the display remains visible.

To set the Persistence:

1. Select **Setup** > **Settings**.

2. Select the **Traces** tab.

3. Select **Dot Persistence**.

4. Select either **Infinite** or **Variable**.

5. If you select Variable, enter a value in the text box. The Variable persistence value can be set from 1 to 1000.

Saving Traces

To save a trace for later analysis:

1. Select the **Save Trace As** button. This displays the Save As dialog box.
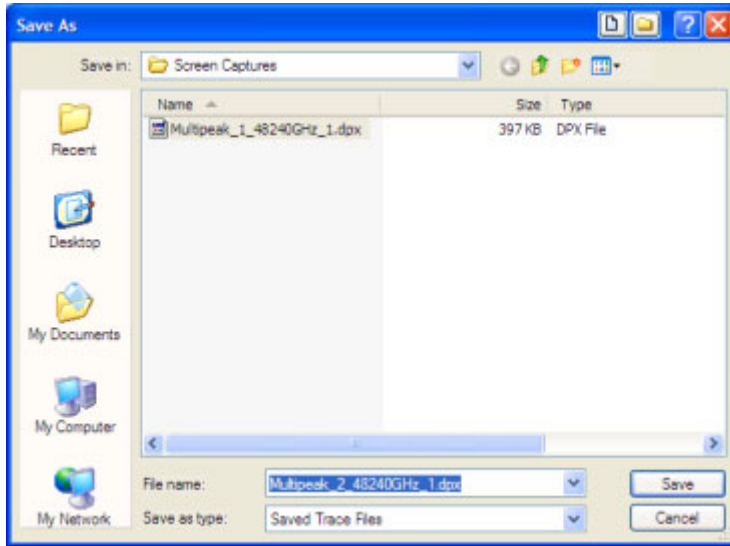
2. Type a name for the saved trace and click **Save**.

Show Recalled Trace

You can recall a previously saved trace for comparison to a live trace. First, specify a trace for recall and second, enable Show Recalled Trace.

To select a trace for recall:

1. Select the **...** button to display the Open dialog.
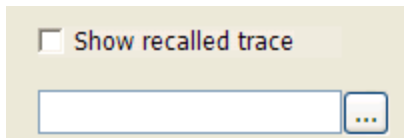
2.

3. In the Open dialog, navigate to the location of the saved trace.

4. Select the desired trace file.

5. Select **OK** to complete your selection.

6. Select the **Show recalled trace** checkbox.

7. Verify that the trace's **Show** checkbox is selected (either on this tab or next to the drop-down list located at the top-left corner of the graph).

Traces Tab (Amplitude vs Time Display)

The Traces Tab allows you to set the display characteristics of displayed traces.
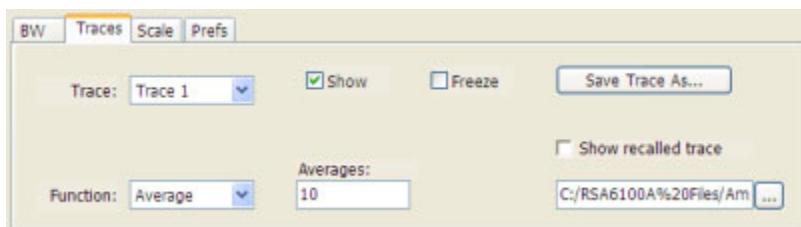
Setting	Description
Trace	Selects a trace.
Show	Shows / hides the selected trace.
Function	Selects the trace processing method. Available settings are: Normal, Average, Max Hold, and Min Hold.
Averages	Sets the number of traces averaged to generate the displayed trace.
Freeze	Halts updates to the selected trace.
Save Trace As	Saves the selected trace to a file for later recall and analysis.
Show Recalled trace	Displays a saved trace instead of a live trace.

Trace Processing

Traces can be processed to display in different ways. The Function setting controls trace processing.

■ **Normal** - Each new trace is displayed and then replaced by the next trace. Each data point contains a single vertical value.

■ **Average** - Multiple traces are averaged together to generate the displayed trace. There is one vertical value for each underlying frequency data point. Once the specified number of traces have been acquired and averaged to generate the displayed trace, each new trace takes the place of the oldest trace in the calculation. The **Number of Traces** setting specifies how many traces averaged.

■ **Max Hold** - Displays the maximum value in the trace record for each display point. Each new trace display point is compared to the previous maximum value and the greater value is retained for display and subsequent comparisons.

■ **Min Hold** - Displays the minimum value in the trace record for each display point. Each new trace display point is compared to the previous minimum value and the lesser value is retained for display and subsequent comparisons.

Saving Traces

To save a trace for later analysis:

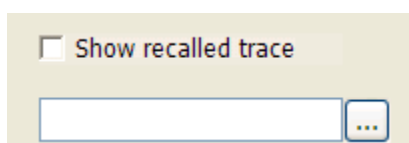**1.** Select the **Save Trace As** button. This displays the Save As dialog box.

2. Navigate to the folder where you wish to save the trace or use the default.

3. Type a name for the saved trace and click **Save**.

Recalling Traces

You can display saved traces for comparison by selecting the **Show recalled trace** checkbox.

To display a recalled trace:

1. Click the **...** button to display the Open dialog box.
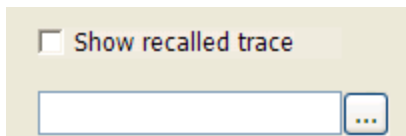
2. Navigate to the desired file and click **Open**.

3. Click the **Show Recalled Trace** checkbox so it is checked.

4. Verify that the trace's **Show** checkbox is selected (either on this tab or next to the drop-down list located at the top-left corner of the graph).

Traces Tab (DPX Spectrum)

The Traces Tab allows you to set the display characteristics of displayed traces in the DPX Spectrum display. The Traces tab for the DPX Spectrum display has two versions. One for non-Bitmap traces (described in this topic) and one for the DPX Bitmap trace (see page 200).
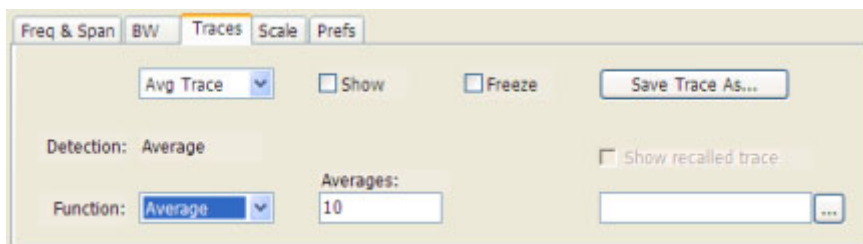
Setting	Description
Trace drop-down list	Selects the type of trace displayed. Available settings are: Bitmap, +Peak, -Peak, AVG Trace, and Math Trace.
Show	Specifies whether or not the trace shown in the Trace setting is displayed.
Freeze	Halts updates to the selected trace.
Detection	Displays the detection method used. This parameter is not settable, though it will change depending on the selected trace.
Function	Selects the trace processing method. Available settings are: Normal, Average, and Hold.
Save Trace As...	Saves the selected trace to a file for later recall and analysis.
Show Recalled Trace	Displays a saved trace instead of a live trace.

DPX Trace Processing

The +Peak, -Peak, and Average traces can be processed to display in different ways. The Function setting controls trace processing.

- **Hold** - Displays the value in the trace record for each display point. Each new trace display point is compared to the previous maximum value and the greater value is retained for display and subsequent comparisons.

- **Normal** - Displays the trace record for each display point without additional processing.

- **Average** - Default setting for the Average. Multiple traces are averaged together to generate the displayed trace. There is one vertical value for each underlying frequency data point. Once the specified number of traces have been acquired and averaged to generate the displayed trace, each new trace takes the place of the oldest trace in the calculation. The **Averages** setting specifies how many traces averaged.

Saving Traces

To save a trace for later analysis:

**1.** Select the **Save Trace As** button. This displays the Save As dialog box.
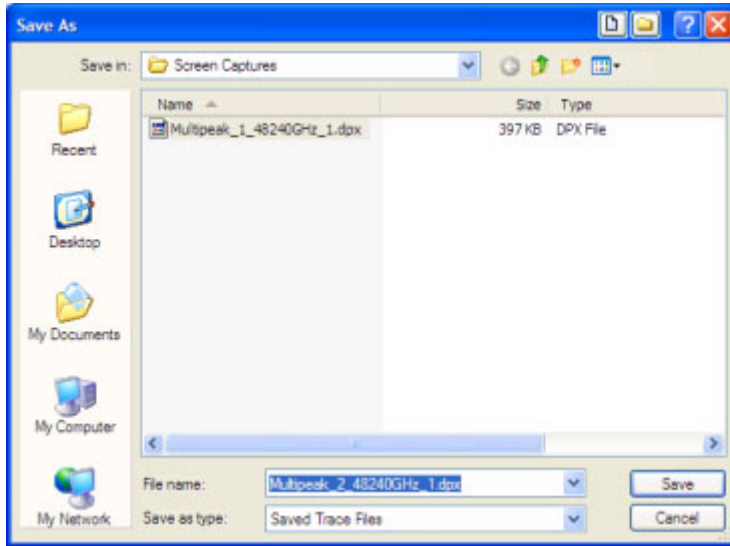
2. Type a name for the saved trace and click **Save**.

Recalling Traces

You can recall a previously saved trace for comparison to a live trace. First, specify a trace for recall and second, enable Show Recalled Trace.
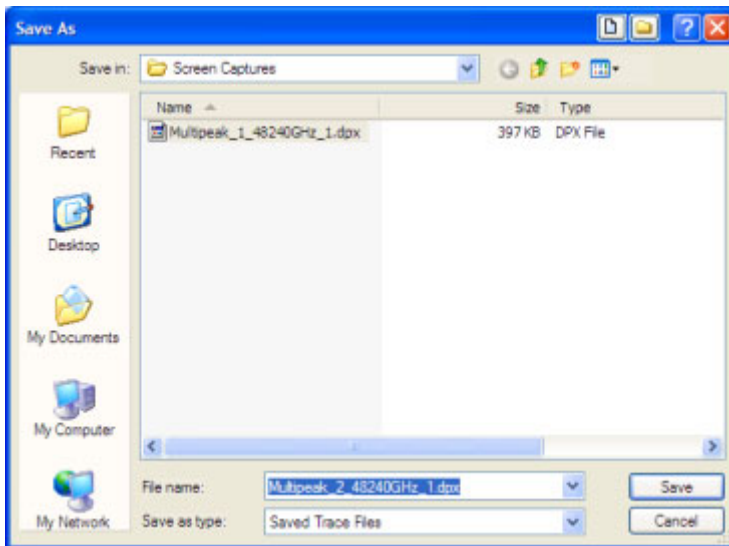
To select a trace for recall:

1. Click the **...** button to display the Open dialog box.
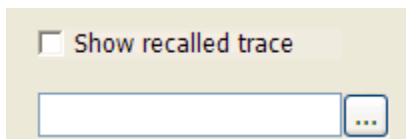
2. Navigate to the desired file and click **Open**.

3. Check the **Show Recalled Trace** checkbox.

4. Verify that the trace's **Show** checkbox is selected (either on this tab or next to the drop-down list located at the top-left corner of the graph).

Traces Tab (Error vs Time Display)

The Traces Tab allows you to set the display characteristics of the displayed trace.
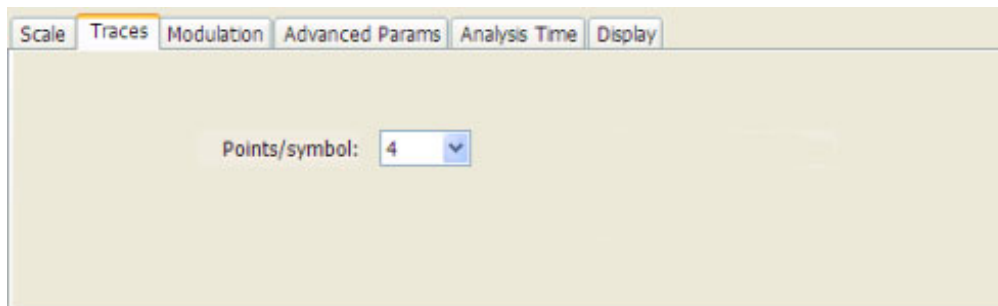
Setting	Description
Points per Symbol	Select how many points to use between symbols when connecting the dots. Values: 1, 2, 4, 8.

Traces Tab (Spectrum Display)

The Traces Tab allows you to set the display characteristics of displayed traces.
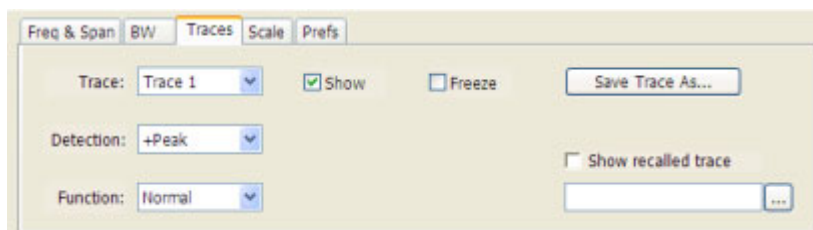
Setting	Description
Trace	Selects a trace.
Show	Shows / hides the selected trace.
Detection	Sets the Detection method used for the trace. Not available for saved traces.
Function	Selects the trace processing method. Available settings are: Normal, Average, Max Hold, and Min Hold.
Number of Traces	Sets the number of traces averaged to generate the displayed trace. (Present only when Function is set to Average.)
Freeze	Halts updates to the selected trace.
Save Trace As	Saves the selected trace to a file for later recall and analysis.
Show Recalled trace	Displays a saved trace instead of a live trace.

Trace

Available traces are: Trace 1, Trace 2, Trace 3, Math, and Spectrogram. Traces 1-3 are based on the input signal and enable you to display the input signal using different processing. For example, you

could display Trace 1 with Function set to Normal, Trace 2 with Function set to Max Hold and Trace 3 with Function set to Min Hold.

The Math trace is the result of subtracting one trace from another.

The Spectrogram trace is displayed only if the Spectrogram display is shown. The Spectrogram trace shows the trace selected in the Spectrogram as a spectrum trace.

Trace Processing

Traces can be processed to display in different ways. The Function setting controls trace processing.

- **Normal** - Each new trace is displayed and then replaced by the next trace. Each data point contains a single vertical value.

- **Average** - Multiple traces are averaged together to generate the displayed trace. There is one vertical value for each underlying frequency data point. Once the specified number of traces have been acquired and averaged to generate the displayed trace, each new trace takes the place of the oldest trace in the calculation. The **Number of Traces** setting specifies how many traces averaged.

- **Max Hold** - Displays the maximum value in the trace record for each display point. Each new trace display point is compared to the previous maximum value and the greater value is retained for display and subsequent comparisons.

- **Min Hold** - Displays the minimum value in the trace record for each display point. Each new trace display point is compared to the previous minimum value and the lesser value is retained for display and subsequent comparisons.

Saving Traces

To save a trace for later analysis:

1. Select the **Save Trace As** button. This displays the Save As dialog box.

2. Navigate to the desired folder or use the default.

3. Type a name for the saved trace and click **Save**.

Recalling Traces

You can recall a previously saved trace for analysis or comparison to a live trace.

To select a trace for recall:

1. Select the trace into which the recalled trace will be loaded, from the Trace drop-down list.

2. Check the **Show** checkbox.

3. Click the **...** button to display the Open dialog box.

4. Navigate to the desired file and click **Open**.

5. Check the **Show Recalled Trace** checkbox.

6. Verify that the trace's **Show** checkbox is selected (either on this tab or next to the drop-down list located at the top-left corner of the graph).

Traces Tab (Phase Noise)

Use the Traces tab to select the trace display parameters.

Setting	Description
Trace	Selects a trace.
Show	Shows or hides the selected trace. Only two traces can be displayed.
Detection	Sets the Detector method used for the trace. Only +/- Peak and Averaging are available for the Phase Noise display. This setting is not available for saved traces. +/-Peak detection results in a trace with two Y values for each X location, with shading between.
Smoothing	When enabled, diminishes point-to-point trace variations. Smoothing +/- Peak traces treats + and - lines independently. The smoothing value adjusts how many points are in each filter set. Range: 1 - 20; Default: 5.
Freeze	Halts updates to the selected trace.
Save Trace As	Saves the selected trace to a file for later recall and analysis.
Show Recalled trace	Displays a saved trace instead of a live trace.

Saving Traces

To save a trace for later analysis:

1. Select the **Save Trace As** button. This displays the Save As dialog box.


2. Type a name for the saved trace and click **Save**.

Recalling Traces

You can recall a previously saved trace for analysis. First, specify a trace for recall and second, enable Show Recalled Trace.

To recall a previously saved trace:

1. Click the **...** button to display the Open dialog box.
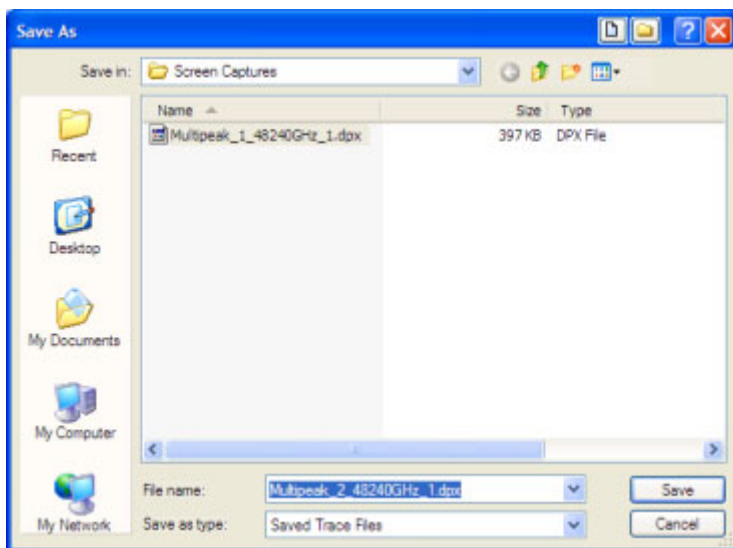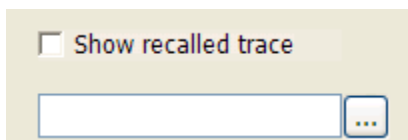
2. Navigate to the location of the saved Phase Noise trace.

3. Select the desired trace and click **Open**.

4. Check the **Show Recalled Trace** checkbox.

Trace Tab (Spectrogram Display)

The Traces Tab allows you to set the display characteristics of displayed traces.
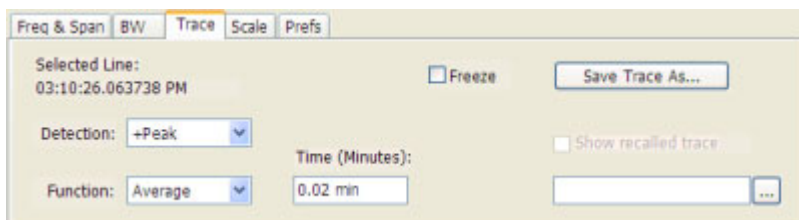
Setting	Description
Selected Line	Displays the time at the Selected Line. The selected line is the first line of the current acquisition. If Markers are enabled, the selected line is positioned by the selected marker.
Detection	Sets the Detector method used for the trace. Not available for saved traces.
Function	Selects the trace processing method. Available settings are: Normal, Average, Max Hold, and Min Hold.
Time (Minutes)	Sets the period of time the spectrum trace is averaged to generate each line of the displayed spectrogram.
Freeze	Halts updates to the selected trace.
Save Trace As	Saves the selected trace to a file for later recall and analysis.
Show Recalled trace	Displays a saved trace instead of a live trace.

Trace Processing

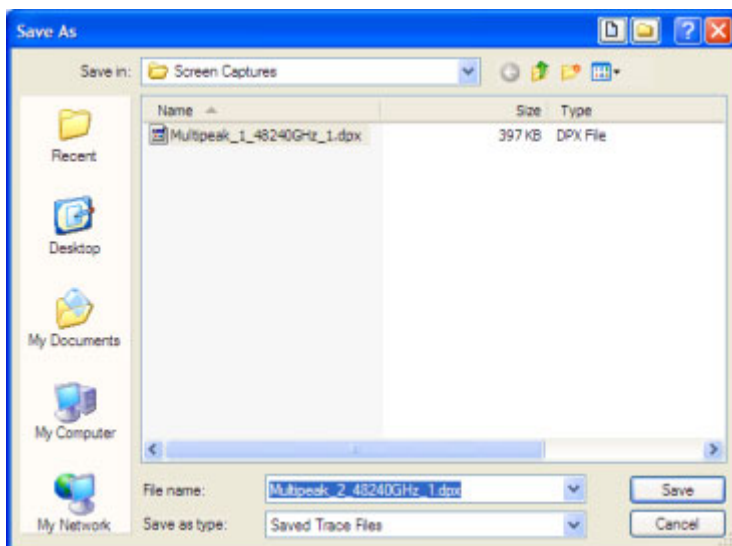Traces can be processed to display in different ways. The Function setting controls trace processing.

■ **Normal** - Each new trace is displayed and then replaced by the next trace. Each data point contains a single vertical value.

■ **Average** - Multiple traces are averaged together to generate the displayed trace. There is one vertical value for each underlying frequency data point. Once the specified number of traces have been acquired

and averaged to generate the displayed trace, each new trace takes the place of the oldest trace in the calculation. The **Number of Traces** setting specifies how many traces averaged.

■ **Max Hold** - Displays the maximum value in the trace record for each display point. Each new trace display point is compared to the previous maximum value and the greater value is retained for display and subsequent comparisons.

■ **Min Hold** - Displays the minimum value in the trace record for each display point. Each new trace display point is compared to the previous minimum value and the lesser value is retained for display and subsequent comparisons.

Saving Traces

To save a trace for later analysis:

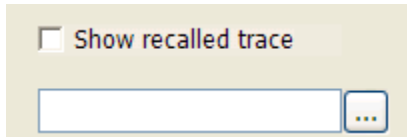**1.** Select the **Save Trace As** button. This displays the Save As dialog box.

2. Type a name for the saved trace and click **Save**.

Recalling Trace

You can recall a previously saved trace for analysis. First, specify a trace for recall and second, enable Show Recalled Trace.

To recall a previously saved trace:

1. Click the **...** button to display the Open dialog box.
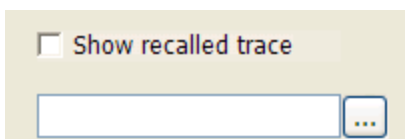
2. Navigate to the location of the saved spectrogram trace.

3. Select the desired trace and click **Open**.

4. Check the **Show Recalled Trace** checkbox.

Trace Tab (Spurious)

Use the Trace tab to select the trace function or freeze the displayed trace.
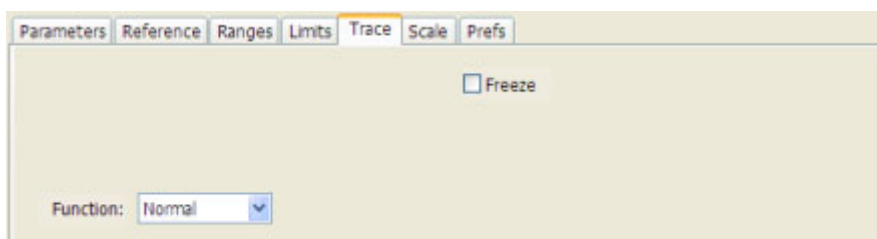
Setting	Description
Function	Selects the trace processing method. Available settings are: Normal, Average, and Max Hold.
Freeze	Halts updating of the trace in the display. Trace processing continues but the displayed trace is not updated.

Trace Processing

Traces can be processed to display in different ways. The Function setting controls trace processing.

■ **Normal** - Each new trace is displayed and then replaced by the next trace. Each data point contains a single vertical value.

■ **Average** - Multiple traces are averaged together to generate the displayed trace. There is one vertical value for each underlying frequency data point. Once the specified number of traces have been acquired and averaged to generate the displayed trace, each new trace takes the place of the oldest trace in the calculation. The Number of Traces setting (the box with the number in it) specifies how many traces averaged.

■ **Max Hold** - Displays the maximum value in the trace record for each display point. Each new trace display point is compared to the previous maximum values and the greater value is retained for display. The Number of Traces setting (the box with the number in it) specifies how many traces are compared to determine the Max Hold value.

Trace Tab (Constellation Display)

Menu Bar: Setup > Settings > Trace

Application Toolbar/Front Panel: Settings

The Trace tab allows you to set the trace display characteristics of the Constellation display.
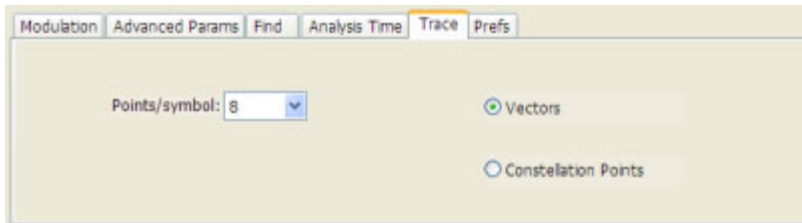
Setting	Description
Points per Symbol	Select how many points to use between symbols when connecting the dots. Values: 1, 2, 4, 8.
Vectors / Constellation Points	Selects whether to draw lines (vectors) between constellation points in the display.

Trace Tab (Frequency vs Time)

The Trace Tab allows you to set the display characteristics of the trace.

Setting	Description
Show	Shows / hides the trace.
Function	Selects the trace processing method. Available settings are: Normal, Average, Min Hold, and Max Hold.
Averages	Sets the number of traces averaged to generate the displayed trace.
Freeze	Halts updates to the trace.
Save Trace As	Saves the selected trace to a file for later recall and analysis.
Show Recalled trace	Displays a saved trace instead of a live trace.

Trace Processing

Traces can be processed to display in different ways. The Function setting controls trace processing.

- **Normal** - Each new trace is displayed and then replaced by the next trace. Each data point contains a single vertical value.

- **Average** - Multiple traces are averaged together to generate the displayed trace. There is one vertical value for each underlying frequency data point. Once the specified number of traces have been acquired and averaged to generate the displayed trace, each new trace takes the place of the oldest trace in the calculation. The **Number of Traces** setting specifies how many traces averaged.

- **Max Hold** - Displays the maximum value in the trace record since the acquisition began. Each new trace display point is compared to the previous maximum value and the greater value is retained for display and subsequent comparisons.

- **Min Hold -** Displays the minimum value in the trace record since the acquisition began. Each new trace display point is compared to the previous minimum value and the lesser value is retained for display and subsequent comparisons.

Saving Traces

To save a trace for later analysis:

1. Select the **Save Trace As** button. This displays the Save As dialog box.

2. Type a name for the saved trace and click **Save**.

Recalling Traces

You can recall a previously saved trace for analysis. First, specify a trace for recall and second, enable Show Recalled Trace.

To display a previously saved trace:

1. Click the **...** button to display the Open dialog box.
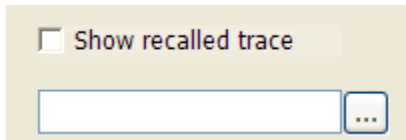
2. Navigate to the location of the saved trace.

3. Select the desired trace and click **Open**.

4. Check the **Show Recalled Trace** checkbox.

5. Verify that the **Show** checkbox is selected.

Trace Tab (RF I & Q vs Time)

The Trace Tab allows you to set the characteristics of displayed traces.
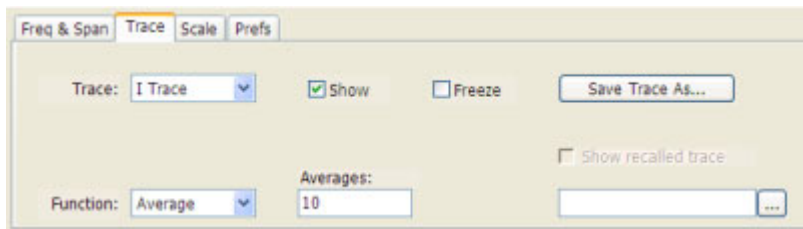
Setting	Description
Trace	Specifies the selected trace.
Show	Specifies whether or not the selected trace is displayed.
Freeze	Halts updates to the selected trace.
Function	Selects the trace processing method. Available settings are: Normal, Average, Min Hold, and Max Hold.
Averages	Sets the number of traces averaged to generate the displayed trace (visible only when Function is set to Average).
Save Trace As...	Saves the selected trace to a file for later recall and analysis.
Show Recalled Trace	Displays a saved trace instead of a live trace.

Trace Processing

Traces can be processed to display in different ways. The **Function** setting controls trace processing.

■ **Normal** - Each new trace is displayed and then replaced by the next trace. Each data point contains a single vertical value.

- **Average** - Multiple traces are averaged together to generate the displayed trace. There is one vertical value for each underlying frequency data point. Once the specified number of traces have been acquired and averaged to generate the displayed trace, each new trace takes the place of the oldest trace in the calculation. The **Number of Traces** setting specifies how many traces averaged.

- **Min Hold** - Displays the minimum value in the trace record for each display point. Each new trace display point is compared to the previous minimum value and the lesser value is retained for display and subsequent comparisons.

- **Max Hold** - Displays the maximum value in the trace record for each display point. Each new trace display point is compared to the previous maximum value and the greater value is retained for display and subsequent comparisons.

Saving Traces

To save a trace for later analysis:

1. Select the **Save Trace As** button. This displays the Save As dialog box.

2. Type a name for the saved trace and click **Save**.

Recalling Traces

You can recall a previously saved trace for analysis or comparison to a live trace.

To select a trace for recall:

1. Select the trace into which the recalled trace will be loaded, from the Trace drop-down list.

2. Check the **Show** checkbox.

3. Click the **...** button to display the Open dialog box.

4. Navigate to the desired file and click **Open**.

5. Check the **Show Recalled Trace** checkbox.

6. Verify that the trace's **Show** checkbox is selected (either on this tab or next to the drop-down list located at the top-left corner of the graph).

Units Tab

The Units tab specifies the global Amplitude units for all the views in the analysis window.
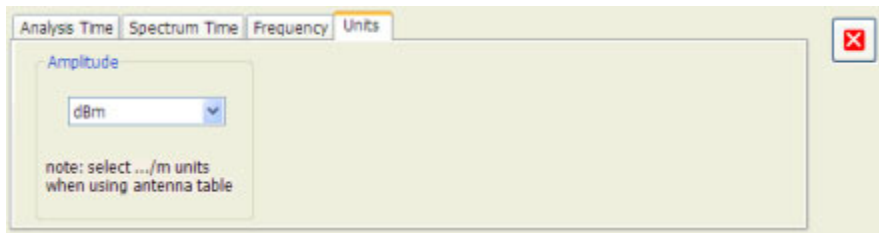
NOTE. *If you are using an External Loss Table for antenna corrections (Ampl > External Gain/Loss Correction), set the Amplitude units to dBuA/m or dBuV/m.*

Accuracy

The closeness of the indicated value to the true value.

ACLR

Adjacent Channel Leakage power Ratio is the ratio of the RRC (Root Raised Cosine) filtered mean power centered on the assigned channel frequency to the RRC filtered mean power centered on an adjacent frequency (defined in 3GPP).

ACPR Measurement

Adjacent Channel Power Ratio (ACPR) is the ratio of the mean power centered on the assigned channel frequency to the mean power centered on an adjacent channel frequency. In the 3GPP specification, it is called ACLR (Adjacent Channel Level Ratio) and both the main channel and adjacent channels are required to be filtered with RRC (Root Raised Cosine) filters.

Acquisition

A series of time-contiguous frames. This is also called a Block.

Analysis Length

The length of time in the Analysis Time.

Analysis Time

The portion of the acquisition record over which one or more measurements are calculated.

ASK

Acronym for Amplitude Shift Keying. The process, or result of a process, in which the amplitude of the carrier is varied in accordance with the state of a digital input signal.

Block

An integer number of time-contiguous frames. See also: Acquisition.

Calibrator

A signal generator producing a specified output used for calibration purposes.

Carrier

The RF signal upon which modulation resides.

Carrier Frequency

The frequency of the CW component of the carrier signal.

Carrier Signal

The electrical signal, typically a sine wave, upon which modulation is impressed.

Carrier-to-Noise Ratio (C/N)

The ratio of carrier signal power to average noise power in a given bandwidth surrounding the carrier; usually expressed in decibels.

CDMA

Acronym for Code Division Multiple Access.

Center Frequency

The frequency corresponding to the center of a frequency span of the spectrum analyzer display.

Check Mark Indicator

The check mark indicator in the upper-left corner of the display indicates the display for which the acquisition hardware is optimized. When you have more than one display open, the display with the check mark indicator has control over the acquisition hardware. To give a display priority over any others, click its title bar.

CISPR

International special committee on radio interference. (Comité international spécial des perturbations radioélectriques)

CW

Acronym for Continuous Wave.

CW Signal

Continuous wave signal - a sine wave.

DANL

Acronym for Displayed Average Noise Level. See Sensitivity (see page 231).

dBfs

A unit to express power level in decibels referenced to full scale. Depending on the context, this is either the full scale of the display screen or the full scale of the analog-to-digital converter (ADC).

dBm

A unit of expressed power level in decibels referenced to 1 milliwatt.

dBmV

A unit to express voltage levels in decibels referenced to 1 millivolt.

dBuV

A unit to express voltage levels in decibels referenced to 1 microvolt.

Decibel

Ten times the logarithm of the ratio of one electrical power to another.

Display Reference Level

A designated vertical position representing a specified input level. The level may be expressed in dBm, volts, or any other units.

Distortion

Degradation of a signal, often a result of nonlinear operations, resulting in unwanted signal components. Harmonic and intermodulation distortion are common types.

Dynamic Range

The maximum ratio of the levels of two signals simultaneously present at the input which can be measured to a specified accuracy.

EVM

Acronym for Error Vector Magnitude.

Export

Save data to a file in a format other than application-native.

FastFrame

FastFrame segments the acquisition record into a series of frames and then captures acquisitions as single frames. You can then view and measure each frame individually.

FFT

Fast Fourier Transform - a mathematical process to calculate the frequency spectrum of a discrete number of time domain sample points.

Filter

A circuit that separates electrical signals or signal components based on their frequencies.

FM

Acronym for Frequency Modulation.

Frame

A series of time-contiguous samples, long enough in duration and at a sufficient sample rate to produce a spectrum view of a specified span and RBW.

Frequency

A series of time-contiguous samples, long enough in duration and at a sufficient sample rate to produce a spectrum view of a specified span and RBW.

Frequency Band

The continuous range of frequencies extending between two limiting frequencies, expressed in hertz.

Frequency Domain View

The representation of the power of the spectral components of a signal as a function frequency; the spectrum of the signal.

Frequency Drift

Gradual shift or change in displayed frequency over the specified time due to internal changes in the spectrum analyzer, where other conditions remain constant. Expressed in hertz per second.

Frequency Mask Trigger

A flexible real-time trigger based on specific events that occur in the frequency domain.

Frequency Range

The range of frequencies over which the performance of the instrument is specified.

Frequency Span

A continuous range of frequencies extending between two frequency limits.

GPIB

Acronym for General Purpose Interface Bus, the common name for the communications interface system defined in IEEE Std. 488.

Graticule

The calibrated grid overlaying the display screen of spectrum analyzers, oscilloscopes, and other test instruments.

Grayed Out

An on-screen control is "Grayed Out" if it is not adjustable.

I/Q

Acronym for In-phase / Quadrature.

IF

Acronym for Intermediate Frequency.

Import

Bring data into the application from a file of some format other than application-native.

Input Impedance

The impedance at the desired input terminal. Usually expressed in terms of VSWR, return loss, or other related terms for low impedance devices and resistance-capacitance parameters for high impedance devices.

LISN

Acronym for Line Impedance Stabilization Network.

Local Oscillator (LO)

An oscillator which produces the internal signal that is mixed with an incoming signal to produce the IF signal.

Marker

A visually identifiable point on a waveform trace, used to extract a readout of domain and range values represented by that point.

Max Hold

Digitally stored display mode which, at each frequency address, compares the incoming signal level to the stored level and retains the greater level. In this mode, the display indicates the peak level at each frequency after several successive acquisitions.

MCPR (Multiple Carrier Power Ratio)

The ratio of the signal power in the reference channel or group of channel to the power in adjacent channels.

Min Hold

Digitally stored display mode which, at each frequency address, compares the incoming signal level to the stored level and retains the lower level. In this mode, the display indicates the minimum level at each frequency after several successive sweeps.

Modulate

To regulate or vary a characteristic of a signal, typically in order to transmit information.

Modulating Signal

The signal which modulates a carrier. The signal which varies or regulates some characteristic of another signal.

Modulation

The process of varying some characteristic of a signal with a second signal.

Noise

Unwanted random disturbances superimposed on a signal which tend to obscure it.

Noise Bandwidth (NBW)

The exact bandwidth of a filter that is used to calculate the absolute power in dBm/Hz.

Noise Floor

The noise intrinsic to a system that represents the minimum limit at which input signals can be observed; ultimately limited by thermal noise (kTB). The spectrum analyzer noise floor appears as a "grassy" baseline in the display, even when no signal is present.

Occupied Bandwidth

Bandwidth within which 99% of the power transmitted on a single channel lies.

Open (Recall)

Bring data into the application from a file of application-native format.

OQPSK

Acronym for Offset QPSK (Quadrature Phase Shift Keying).

PM

Acronym for Phase Modulation.

Primary Marker

The marker displayed in the Single Marker mode whose frequency and/or position is changed when tuning with the general purpose knob.

PSK

Acronym for Phase Shift Keying. The process, or result of a process, in which the carrier phase is varied discretely in accordance with a digital code.

QAM

Acronym for Quadrature Amplitude Modulation. The process, or result of a process, in which the amplitude and phase of the carrier are varied concurrently by synthesizing two orthogonal ASK waves (see ASK).

Real-Time Analysis

Measurement technique based on triggering on an RF signal, seamlessly capturing it into memory, and analyzing it in the frequency, time, and modulation domains.

Real-Time Bandwidth

The frequency span over which real-time seamless capture can be performed, which is a function of the digitizer and the IF bandwidth of a Real-Time Spectrum Analyzer.

Real-Time Seamless Capture

The ability to acquire and store an uninterrupted series of time domain samples that represent the behavior of an RF signal over a long period of time.

Reference Level

The signal level represented by the uppermost graticule line of the spectrum analyzer display.

Residual FM (Incidental FM)

Short term displayed frequency instability or jitter due to instability in the spectrum analyzer local oscillators. Given in terms of peak-to-peak frequency deviation and expressed in hertz or percent of the displayed frequency.

Residual Response

A spurious response in the absence of an input signal. (Noise and zero pip are excluded.)

RBW

The RBW determines how well the analyzer can resolve or separate two or more closely spaced signal components.

RTSA

Acronym for Real-Time Spectrum Analyzer.

Secondary Marker

The "second" marker displayed only in the Delta Marker mode.

Sensitivity

Measure of a spectrum analyzer's ability to display minimum level signals, usually expressed as displayed average noise level (DANL (see page 221)).

Shape Factor (Skirt Selectivity)

The ratio of the frequency separation of the two (60 dB/3 dB) down points on the response curve to the static resolution bandwidth.

Signal

As used in this online help, the signal refers to the input signal before it is processed. The signal is an input.

Span

Span is the range of frequencies displayed in a spectrum window. Span, start frequency and stop frequency are related by the following equation: Span = (stop frequency) - (start frequency). The settings for center, start and stop frequencies are related to the setting for span; when one parameter is changed, the other are changed automatically.

Span per Division (Span/Div)

Frequency difference represented by each major horizontal division of the graticule.

Spectrogram

Frequency vs. time vs. amplitude display where the frequency is represented on the x-axis and time on the y-axis. The power level is indicated by variations in color.

Spectrum

The frequency domain representation of a signal showing the power distribution of its spectral component versus frequency.

Spectrum Analysis

The technique or process of determining the frequency content of an RF signal.

Spectrum Analyzer

A device for determining the frequency components of a signal.

Spectrum Time

Analysis Time for spectrum analysis views. Spectrum time can be the same as Analysis Time, but it can be different.

Spur

A spur is a signal peak that exceeds a user-definable threshold (See Spurious > Settings > Ranges) and excursion setting. A spur that also exceeds a limit (either Absolute or Relative) specified on the Settings > Limits tab is considered a violation.

Spurious Response

A response to a spectrum analyzer wherein the displayed frequency is not related to the input frequency.

Time Reference

The point in time during the acquisition record used as the zero point for counting time. The time reference can be set to either the start of the acquisition record or the trigger point.

Trace

As used in this online help, trace refers to the displayed signal. The displayed signal can be a processed version of the input signal (for example, it may be averaged.) The trace is a result or output.

Vertical Scale Factor, Vertical Display Factor

The number of dB, volts, etc., represented by one vertical division of a spectrum analyzer display screen.

Violation

A violation is a spur that exceeds either an Absolute or Relative limit (depending on the selected mask) specified on the Settings > Limits tab. A spur is a signal peak that exceeds a user-definable threshold (See Spurious > Settings > Ranges) and excursion setting.

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