

Measurement Settings

Meas

Provides swept SA and VSWR, as well as multiple advanced measurement functions, including time-domain power, adjacent channel power, multi-channel power, occupied bandwidth, emission bandwidth, C/N ratio, harmonics, and TOI.

Swept SA

Measures with swept analysis (frequency-domain), FFT analysis (frequency-domain), or zero span analysis (time-domain).

After you select **Swept SA**, the advanced measurement function (AMK) is off by default. Press **Meas Setup** to set the corresponding parameters for swept SA.

Advanced Measurement Function (AMK)

This function is an option for RSA3000, and the function is only available when the advanced measurement kit (AMK) is installed. When you enable the measurement function, the screen is divided into two windows, with the upper window (the basic measurement window) displaying the sweep trace and the lower window displaying the measurement results.

1. Meas Off

Disables the advance measurement function and returns to the swept SA interface in GPSA mode.

2. T-Power

The system enters the zero span mode and calculates the power within the time domain. The available power types include Peak, Average, and RMS.

Select **T-Power** and then press **Meas Setup** to set the corresponding parameters.

3. ACP

Measures the power of the main channel, the power of adjacent channels, and the power difference between the main channel and each of the adjacent channels. When this function is enabled, the span and resolution bandwidth of the analyzer will be adjusted to smaller values automatically.

Select **ACP** and then press **Meas Setup** to set the corresponding parameters.

4. Multichan Pwr

Measures the power and power density of multiple channels or that of the specified channel bandwidth. When this function is enabled, the span and

resolution bandwidth of the analyzer will be adjusted to smaller values automatically.

Select **Multichan Pwr** and then press **Meas Setup** to set the corresponding parameters.

5. Occupied BW

Integrates the power within the whole span and then calculates the bandwidth occupied by this power according to the specified power ratio. The OBW function also indicates the difference (namely "Transmit Freq Error") between the center frequency of the channel and the center frequency of the analyzer.

Select **Occupied BW** and then press **Meas Setup** to set the corresponding parameters.

6. Emission BW

Measures the bandwidth between two points on the signal which are X dB below the highest point within the span.

Selects **Emission BW** and then press **Meas Setup** to set the corresponding parameters.

7. C/N Ratio

Measures the power of the carrier and that of the noise with the specified bandwidth, as well as their power ratio.

Select **C/N Ratio** and then press **Meas Setup** to set the corresponding parameters.

8. Harmo Dist

Measures the power of each order of harmonic and THD (total harmonic distortion) of the carrier. The highest order of harmonics for measurement is 10. The fundamental harmonic amplitude of the carrier signal must be greater than -50 dBm; otherwise the measurement will be invalid.

Select **Harmo Dist** and then press **Meas Setup** to set the corresponding parameters.

9. TOI

Measures the third-order intercept (TOI) of a two-tone signal (with the same amplitude and similar frequency), including the frequencies and amplitudes of Lower Tone, Upper Tone, Lower 3rd TOI, and Upper 3rd TOI, as well as the intercept points of both the Lower 3rd TOI and Upper 3rd TOI.

Select **TOI** and then press **Meas Setup** to set the corresponding parameters.

Restart

VSWR

Enables or disables the VSWR measurement function. When the VSWR measurement function is enabled, the user interface is divided into two sections automatically (the lower section provides the measurement wizard). At this time, you can perform the VSWR measurement according to the wizard. Press **Meas Setup** to set the corresponding parameters.

Tip:

The VSWR bridge and tracking generator are required in VSWR measurement. Therefore, this function is only available for RSA3045-TG/RSA3030-TG installed with VSWR bridge. When the VSWR measurement is enabled, the tracking generator is enabled automatically, and the backlight of **TG** on the front panel turns on.

Meas Setup

Open the parameter setting menu of the function selected in the **Meas** menu.

Swept SA

1. Avg Number

Specifies the number of counts (N) for Average, Max Hold, and Min Hold. For Average, the greater the value of N, the smoother the trace is displayed. In Average, Max Hold, and Min Hold modes, when performing the single measurement, the instrument stops sweeping after the sweep count has reached N.

Table 2-28 Swept SA Average Count

Parameter	Remarks
Default	100
Range	1 to 10,000
Unit	None
Knob Step	1
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	1

2. Avg Mode

The average modes include "Log", "RMS", and "Scalar".

- **Log:** In this mode, all filtering and averaging processes select the log unit (dB). This average type is the most effective one for finding the low-level signal that is close to the noise amplitude. The formula is shown as follow:

$$NewAvg = \frac{(k - 1) \times OldAvg + Newdata}{k} \quad (2-15)$$

In the above formula, the parameter unit is dB.

- **RMS:** In this mode, all filtering and averaging processes work on the power (the square of the amplitude) of the signal. This average type is best for measuring the true time average power of complex signals. The formula is shown as follows:

$$NewAvg = 10 \log \left(\frac{(k - 1) \times 10^{\frac{OldAvg}{10}} + 10^{\frac{Newdata}{10}}}{k} \right) \quad (2-16)$$

In the above formula, the parameter unit is dB.

- **Scalar:** In this mode, all filtering and averaging processes work on the voltage envelope of the signal. This average type is the most appropriate one for observing the great envelope fluctuations of AM or pulse-modulated signals such as radar and TDMA transmitters. The formula is shown as follows:

$$NewAvg = 20\log \left(\frac{(k-1) \times 10^{\frac{OldAvg}{20}} + 10^{\frac{Newdata}{20}}}{k} \right) \quad (2-17)$$

In the above formula, the parameter unit is dB.

3. Avg State

Enables or disables the auto average function. When the auto average function is enabled, the instrument will select the best average type based on the current settings. When you select one of the average types manually, the instrument will apply the selected type, and the auto average function is disabled automatically.

4. Limit

Sets the parameters of limit lines. After you press **Preset**, the limit line measurement function is disabled, but the data of the limit lines will be reserved. The limit line data will only be deleted when the loading mode is Default. When you exit the measurement mode, the limit line data will not be deleted.

1) Test Limits

Selects whether the displayed traces are tested against the corresponding limit lines. For each displayed trace, the corresponding limit line is turned on, and a message will be displayed at the upper-left corner of the trace to indicate whether the test passes or fails.

2) Select Limit

Selects the current limit line. By default, it is Limit1.

3) Limit State

Enables or disables the display of the limit line. When the limit line is on, the measurement interface displays the limit line, and the corresponding traces are tested based on the current limit lines. Each limit line is displayed in a different color.

4) Edit Limit

When "Display State" of the limit line is set to "On", this menu is valid. When you press this key to enter the editing menu, open the limit editing window. Then, the current limit line will be turned on. Close the peak table, and open the trace that corresponds to the limit line.

- **Type:** Selects the type of the current limit line to be "Upper" or "Lower". If the trace amplitude is greater than the amplitude of the upper limit line and smaller than that of the lower limit line, then the test fails.
- **X To CF:** When "Fixed" is selected, the frequency of the current editing point will not be affected by the center frequency. When "Relative" is selected, the frequency of the current editing point is the difference between the frequency of the point and the current center frequency. At this time, if the center frequency changes, then the position of the

- current editing point changes along with the center frequency.
- **Y To Ref:** When "Fixed" is selected, the amplitude of the current editing point will not be affected by the reference level. When "Relative" is selected, the amplitude of the current editing point is the difference between the amplitude of the point and that of the current reference level. At this time, if the reference level changes, then the position of the current editing point changes along with the reference level.
 - **Margin State:** Enables or disables the display of the margin. When you enable the display of the margin, the measurement interface displays the margin lines; when you disable the display of the margin, the margin is invalid.
 - **Margin:** Sets the margin for the current limit line.
 - **Navigation:** Selects the first line of the limit line table.
 - **Frequency:** Edits the frequency of the current point. When Rel Freq is selected, edit the frequency difference between the frequency of the current point and the center frequency.
 - **Amplitude:** Edits the amplitude of the current point. If the Rel Ampt is enabled, edit the amplitude difference between the amplitude of the current point and the reference level.
 - **Append Point:** Inserts an edit point.
 - **Delete Point:** Deletes the point that you are editing.
 - **Build From:** Sets a trace for building the limit line. The range is from Trace1 to Trace6.
 - **Build:** Builds the limit line according to the selected trace.
 - **Copy From:** Copies the selected limit line into the current limit line. The range is from Limit1 to Limit6.
 - **Copy:** Performs the limit line copy operation.
 - **X Offset:** Sets the frequency offset of the current limit line.
 - **Y Offset:** Sets the amplitude offset of the current limit line.
 - **Apply Offset:** Adds the X and Y offsets to each point of the current limit line, then resets the X and Y offset values to 0.

Tip: You can touch any point in the trace display window on the screen to edit the current point to be the limit line data point. You can also drag the point to adjust the position of the current edit point, that is, to change the frequency/amplitude of the current point.

5) Test Trace

Sets the trace for the current limit line test.

6) Delete Limit

Deletes the currently selected limit line. The data of the current limit line will be cleared and they will be restored to factory defaults.

7) Deletes All Limits

Deletes all limit lines. After you press the menu, the data of all the limit lines will be cleared and they will be restored to factory defaults.

5. Auto Couple

When you enable "Auto Couple" function, all the manual/auto settings in the current measurement mode will be set to "Auto". This operation does not affect other measurement modes.

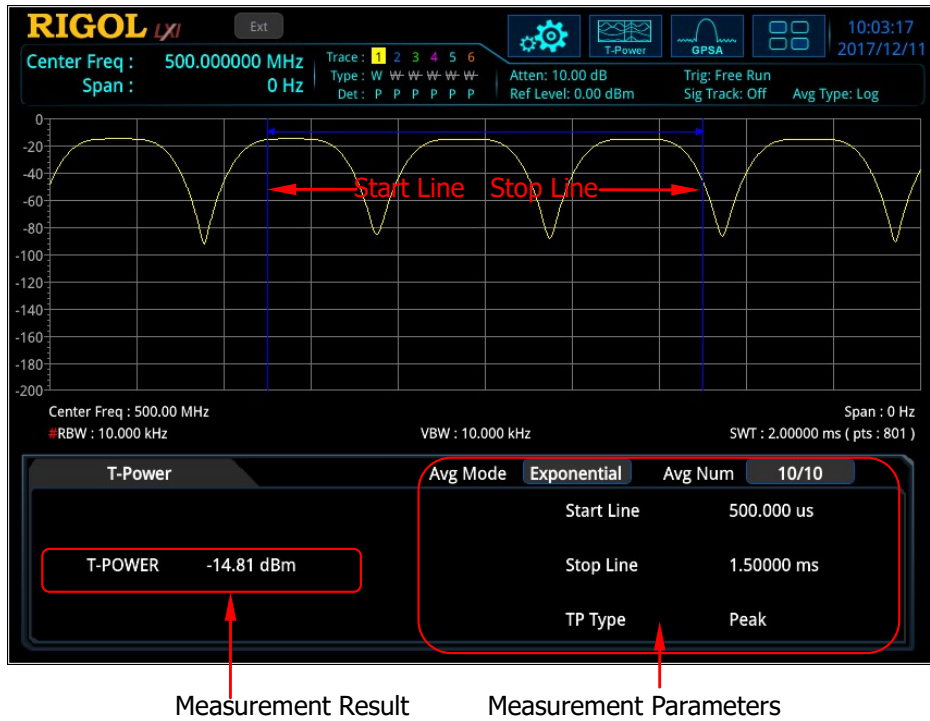
In auto state, the auto coupled parameters are changed with their coupled parameters. The auto coupling operation will ensure the optimal performance of the instrument. After the operation, all the auto coupled parameters will immediately be automatically reset based on the coupled parameters.

6. Meas Preset

Restores all parameters of the current measurement mode to their factory default values.

Time-domain Power (T-Power)

Measurement Interface:



Measurement Result Measurement Parameters

Figure 2-5 T-Power Measurement Interface

Measurement Result: T-power, i.g. the power of the signal from the start line to stop line.

Measurement Parameters: average count, average mode, average auto, power type, start line, and stop line.

1. Avg Number

Specifies the number of times for averaging the measurement results. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-29 Average Count of T-Power Measurement

Parameter	Remarks
Default	10
Range	1 to 1,000
Unit	None
Knob Step	1
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	

2. Avg Mode

Sets the average mode to "Exponential" or "Repeat". The default average mode is "Exponential".

- When "Exponential" is selected, the result is the exponential average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").
- When "Repeat" is selected, the result is the arithmetic average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").

3. Avg State

Selects whether to auto averaging the measurement results. By default, it is set to "On".

4. TP Type

- **Peak**
Displays the power of the signal (with the maximum amplitude) between the start line and stop line. The detector type is set to "Pos Peak" automatically.
- **Average**
Displays the average power of signals between the start line and stop line. The detector type is set to "Voltage Avg" automatically.
- **RMS**
Displays the root mean square value (expressed in W) of the voltages of signals between the start line and stop line. The detector type is set to "RMS Avg" automatically.

5. Start Line

Sets the left margin (in time unit) of T-Power measurement. The calculation range for the data of T-Power measurement is from the start line to the stop line. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-30 Start Line for T-Power Measurement

Parameter	Remarks
Default	0 μ s
Range	0 μ s to (current value of stop line)
Unit	s, ms, μ s, ns, ps
Knob Step	sweep time/600, Min = 1 μ s
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

6. Stop Line

Sets the right margin (in time unit) of T-Power measurement. The calculation range for the data of T-Power measurement is from the start line to the stop line.

You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-31 Stop Line for T-Power Measurement

Parameter	Remarks
Default	1 ms
Range	current value of start line to current value of sweep time
Unit	s, ms, μ s, ns, ps
Knob Step	sweep time/600, Min = 1 μ s
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

7. Auto Couple

When you enable "Auto Couple" function, all the manual/auto settings in the current measurement mode will be set to "Auto".

In auto state, the auto coupled parameters are changed with their coupled parameters. The auto coupling operation will ensure the optimal performance of the instrument. After the operation, all the auto coupled parameters will immediately be automatically reset based on the coupled parameters.

8. Meas Preset

Restores all parameters of the current measurement mode to their factory default values.

ACP

Measurement Interface:

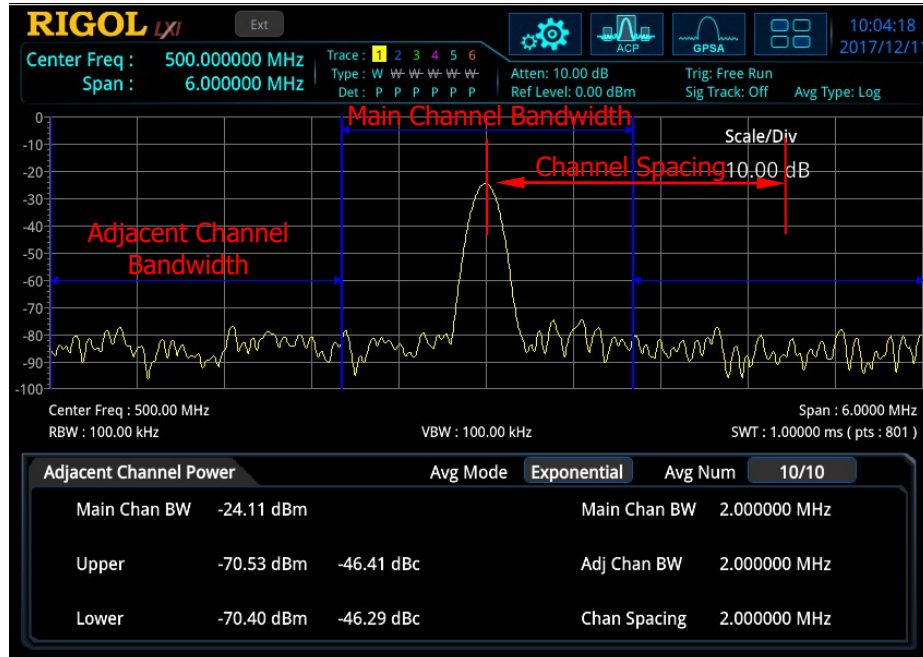


Figure 2-6 Adjacent Channel Power Measurement Interface

Measurement Results: main channel power, upper-adjacent channel power, and lower-adjacent channel power.

- Main channel power: displays the power within the bandwidth of the main channel.
- Upper: displays the power of the upper channel and the power difference between the upper channel and the main channel (in dBc).
- Lower: displays the power of the lower channel and the power difference between the lower channel and the main channel (in dBc).

Measurement Parameters: average count, average mode, auto average, main channel bandwidth, adjacent channel bandwidth, and channel spacing.

1. Avg Number

Specifies the number of times for averaging the measurement results. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-32 Average Count of ACP Measurement

Parameter	Remarks
Default	10
Range	1 to 1,000
Unit	None
Knob Step	1
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	

2. Avg Mode

Sets the average mode to "Exponential" or "Repeat". The default average type is "Exponential".

- When "Exponential" is selected, the result is the exponential average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").
- When "Repeat" is selected, the result is the arithmetic average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").

3. Avg State

Selects whether to averaging the measurement results. By default, it is set to "On".

4. Main Chan BW

Sets the bandwidth of the main channel, and the power of the main channel is the power integral within this bandwidth. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-33 Main Channel Bandwidth for ACP Measurement

Parameter	Remarks
Default	2 MHz
Range ^[1]	33 Hz to 1.5 GHz
Unit	GHz, MHz, kHz, Hz
Knob Step	main channel bandwidth/100, Min = 1 Hz
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	

Note^[1]: If option RSA3000-BW1 is installed, the available range is from 3 Hz to 1.5 GHz.

5. Adj Chan BW

Sets the frequency width of the adjacent channels.

- The adjacent channel bandwidth is related to the main channel bandwidth, and the settable range is from (main channel bandwidth/20) to (main channel bandwidth x 20).
- You can use the numeric keys, the knob, or arrow keys to modify this

parameter; you can also use the touch screen to modify the parameter.

Table 2-34 Adjacent Channel Bandwidth for ACP Measurement

Parameter	Remarks
Default	2 MHz
Range^[1]	33 Hz to 1.5 GHz
Unit	GHz, MHz, kHz, Hz
Knob Step	adjacent channel bandwidth/100, Min = 1 Hz
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	
	at 1-1.5-2-3-5-7.5 step

Note^[1]: If option RSA3000-BW1 is installed, the available range is from 3 Hz to 1.5 GHz.

6. Chan Spacing

Sets the spacing between the center frequency of the main channel and that of the adjacent channels.

- Adjusting this parameter will also adjust the distance between the upper/lower channel and the main channel.
- You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-35 Channel Spacing for ACP Measurement

Parameter	Remarks
Default	2 MHz
Range^[1]	33 Hz to 1.5 GHz
Unit	GHz, MHz, kHz, Hz
Knob Step	channel spacing/100, Min = 1 Hz
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	
	at 1-1.5-2-3-5-7.5 step

Note^[1]: If option RSA3000-BW1 is installed, the available range is from 3 Hz to 1.5 GHz.

For details about the **Auto Couple** and **Meas Preset** menus, refer to their descriptions on Page 2-44.

Multichan Pwr

Measurement Interface:

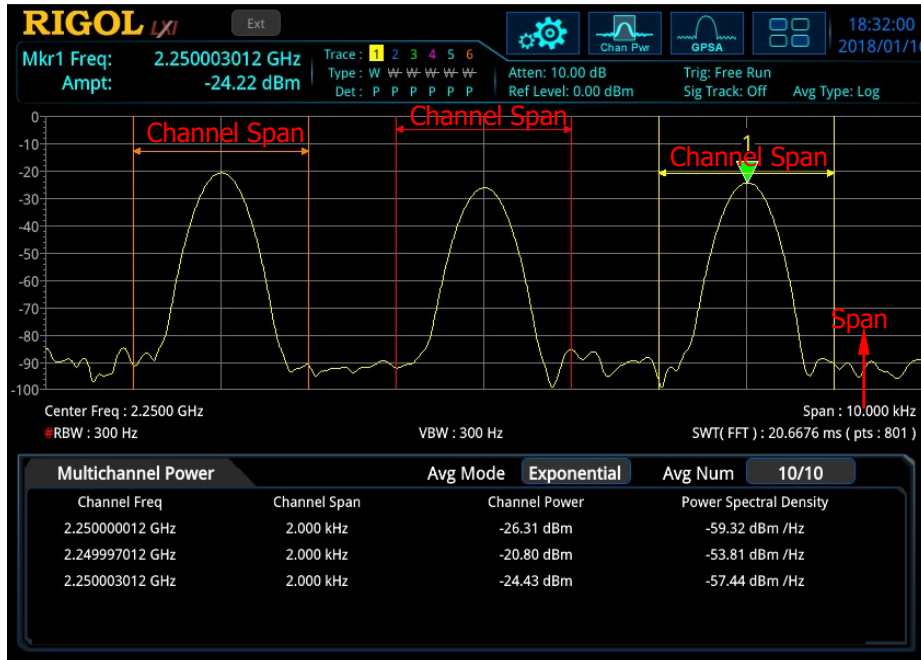


Figure 2-7 Multi-channel Power Measurement Interface

Measurement Results: channel power and power spectral density

- Channel Power: power within the channel span.
- Power Spectral Density: power (in dBm/Hz) normalized to 1 Hz within the channel span.

Measurement Parameters: average count, average mode, auto average, channel frequency, and channel span.

1. Avg Number

Specifies the number of times for averaging the measurement results. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-36 Average Count for Multi-channel Power Measurement

Parameter	Remarks
Default	10
Range	1 to 1,000
Unit	None
Knob Step	1
Left/Right Arrow Key Step	1
Up/Down Arrow Key Step	1

2. Avg Mode

Sets the average mode to "Exponential" or "Repeat". The default average mode is "Exponential".

- When "Exponential" is selected, the result is the exponential average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").
- When "Repeat" is selected, the result is the arithmetic average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").

3. Avg State

Selects whether to averaging the measurement results. By default, it is set to "On".

4. Edit Channel

1) Channel Sheet

Opens or closes the channel editing table. When you select "On", the screen is split into two sections. The left section displays a channel editing table, and the right section displays the traces.

2) Navigations

Selects the first line of the channel editing table.

Note that when you select "Off" under **Channel Sheet**, this menu is invalid.

3) Channel Frequency

- In the channel editing table, when a channel is selected, this menu displays the center frequency of the selected channel. If you modify the frequency at this time, the center frequency of the corresponding selected channel will be updated at the same time.
- When no channel is selected in the channel editing table, this menu displays the center frequency of the last selected channel. At this time, you can set the center frequency of the channel according to your needs, and then press **Add Channel** to add a channel.

4) Channel Span

Sets the frequency width of the channel to be tested, and the power of the channel is the power integral within this bandwidth. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

- In the channel editing table, when a channel is selected, this menu displays the channel span of the selected channel. If you modify the span at this time, the span of the corresponding selected channel will be updated at the same time.
- When no channel is selected in the channel editing table, this menu displays the span of the last selected channel. At this time, you can set

the span of the channel according to your needs, and then press **Add Channel** to add a channel.

Table 2-37 Channel Span

Parameter	Remarks
Default	4.5 GHz
Range^[1]	100 Hz to 2*Min[(channel frequency - start frequency), (stop frequency - channel frequency)]
Unit	GHz, MHz, kHz, Hz
Knob Step	channel span/100, Min = 1 Hz
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

Note^[1]: If option RSA3000-BW1 is installed, its minimum value can be set to 10 Hz.

5) Add Channel

- If a channel is selected in the table editing table, pressing this key can add a channel that is the same as the selected channel to the table.
- When no channel is selected in the channel editing table, pressing this key can add a channel whose center frequency is the same as the value under **Channel Freq** and whose span is the same as the value under **Channel Span**.

Note that when you select "Off" under **Channel Sheet**, this **Add Channel** menu is also valid.

6) Delete Channel

Press this key to delete the currently selected channel.

Note that when you select "Off" under **Channel Sheet** or no channel is selected, this **Delete Channel** menu is invalid.

7) Deletes All Channels

Press **Del All Channel** to clear data in the channel editing table, i.g. deleting all the channels.

Note that when you select "Off" under **Channel Sheet**, this **Del All Channel** menu is also valid.

For details about the **Auto Couple** and **Meas Preset** menus, refer to their descriptions on Page 2-44.

Occupied BW

Measurement Interface:

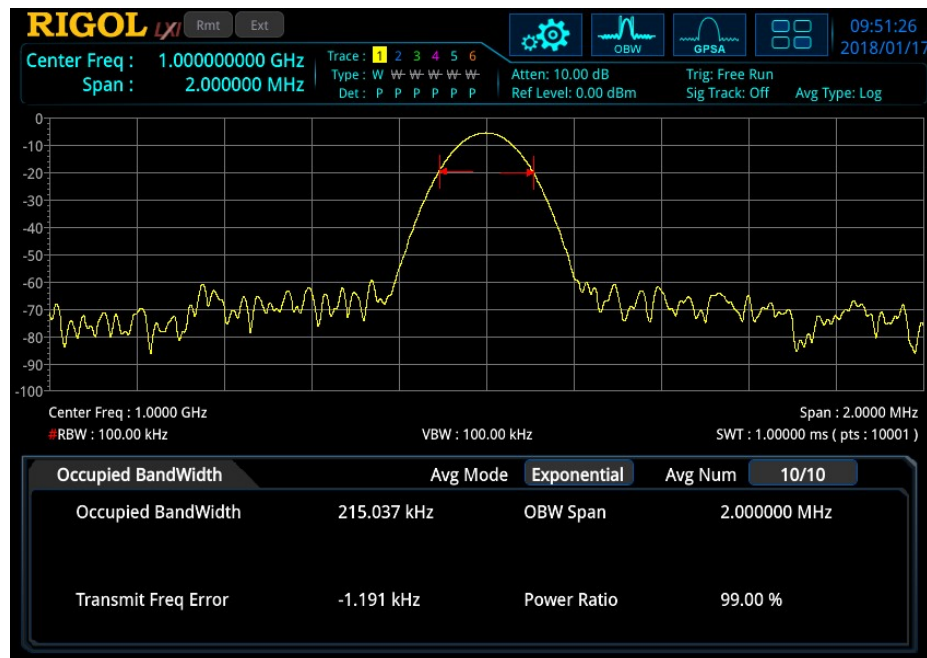


Figure 2-8 OBW Measurement Interface

Measurement Results: occupied bandwidth and transmit frequency error.

- **OBW:** Use the integral calculation method to calculate the power within the whole span, and then calculate the bandwidth occupied by the power based on the specified power ratio.
- **Transmit Frequency Error:** indicates the difference between the center frequency of the channel and that of the spectrum analyzer.

Measurement Parameters: average count, average mode, auto average, max hold, span, and power ratio.

1. Avg Number

Specifies the number of times for averaging the measurement results. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-38 Average Count for OBW Measurement

Parameter	Remarks
Default	10
Range	1 to 1000
Unit	None
Knob Step	1
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	1

2. Avg Mode

Sets the average mode to "Exponential" or "Repeat". The default average mode is "Exponential".

- When "Exponential" is selected, the result is the exponential average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").
- When "Repeat" is selected, the result is the arithmetic average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").

3. Avg State

Selects whether to averaging the measurement results. By default, it is set to "On".

4. Max Hold

Enables or disables max hold. By default, it is "Off".

- When Max Hold is enabled, each measurement result is compared with the previous result, and then display whichever is the maximum.
- When Max Hold is disabled, the current measurement result is displayed.
- Max Hold and average measurement mode are mutually exclusive. When Max Hold is enabled, the average measurement mode will be automatically disabled.

5. OBW Span

Sets the frequency range of integral calculation. The span is consistent with that of the spectrum analyzer. It is the frequency range of sweep. After it is set, the span of the spectrum analyzer will also be changed. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-39 Span for OBW Measurement

Parameter	Remarks
Default	2 MHz
Range^[1]	100 Hz to 4.5 GHz
Unit	GHz, MHz, kHz, Hz
Knob Step	OBW span/100, Min = 1 Hz
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

Note^[1]: If option RSA3000-BW1 is installed, the available range is from 10 Hz to 4.5 GHz.

6. Power Ratio

Sets the percentage the signal power takes up in the whole span power. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-40 Power Ratio for OBW Measurement

Parameter	Remarks
Default	99%
Range	1% to 99.99%
Unit	%
Knob Step	0.01%
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	1%

For details about the **Auto Couple** and **Meas Preset** menus, refer to their descriptions on Page 2-44.

Emission Bandwidth (EBW)

Measurement Interface:



Figure 2-9 EBW Measurement Interface

Measurement Results: EBW, i.g. the bandwidth between two points on the signal which are X dB below the highest point within the span. During the measurement, the analyzer first determines the frequency (f_0) of the maximum amplitude point within the span, and then finds the two frequency points (f_1 and f_2) at the left and right side of f_0 at which the signal amplitude is X dB below the maximum amplitude. The EBW equals to $f_2 - f_1$.

Measurement Parameters: average count, average mode, auto average, max hold, span, and X dB.

1. Avg Number

Specifies the number of times for averaging the measurement results. You can use the numeric keys, the knob or arrow keys to modify this parameter.

Table 2-41 Average Count for EBW Measurement

Parameter	Remarks
Default	10
Range	1 to 1,000
Unit	None
Knob Step	1
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	1

2. Avg Mode

Sets the average mode to "Exponential" or "Repeat". The default average mode is "Exponential".

- When "Exponential" is selected, the result is the exponential average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").
- When "Repeat" is selected, the result is the arithmetic average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").

3. Avg State

Selects whether to averaging the measurement results. By default, it is set to "On".

4. Max Hold

Enables or disables max hold. By default, it is "Off".

- When Max Hold is enabled, each measurement result is compared with the previous result, and then display whichever is the maximum.
- When Max Hold is disabled, the current measurement result is displayed.
- Max Hold and average measurement mode are mutually exclusive. When Max Hold is enabled, the average measurement mode will be automatically disabled.

5. EBW Span

This span is consistent with the span of the spectrum analyzer. It refers to the frequency range of the sweep. After it is set, the span of the spectrum analyzer will be modified accordingly. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-42 Span for EBW Measurement

Parameter	Remarks
Default	2 MHz
Range^[1]	100 Hz to 4.5 GHz
Unit	GHz, MHz, kHz, Hz
Knob Step	EBW span/100, Min = 1 Hz
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

Note^[1]: If option RSA3000-BW1 is installed, the available range is from 10 Hz to 4.5 GHz.

6. EBW X dB

Sets the value of X dB, which is used for EBW calculation. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-43 X dB for EBW Measurement

Parameter	Remarks
Default	-10 dB
Range	-100 dB to -0.1 dB
Unit	dB
Knob Step	0.1 dB
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	1 dB

For details about the **Auto Couple** and **Meas Preset** menus, refer to their descriptions on Page 2-44.

C/N Ratio (CNR)

Measurement Interface:

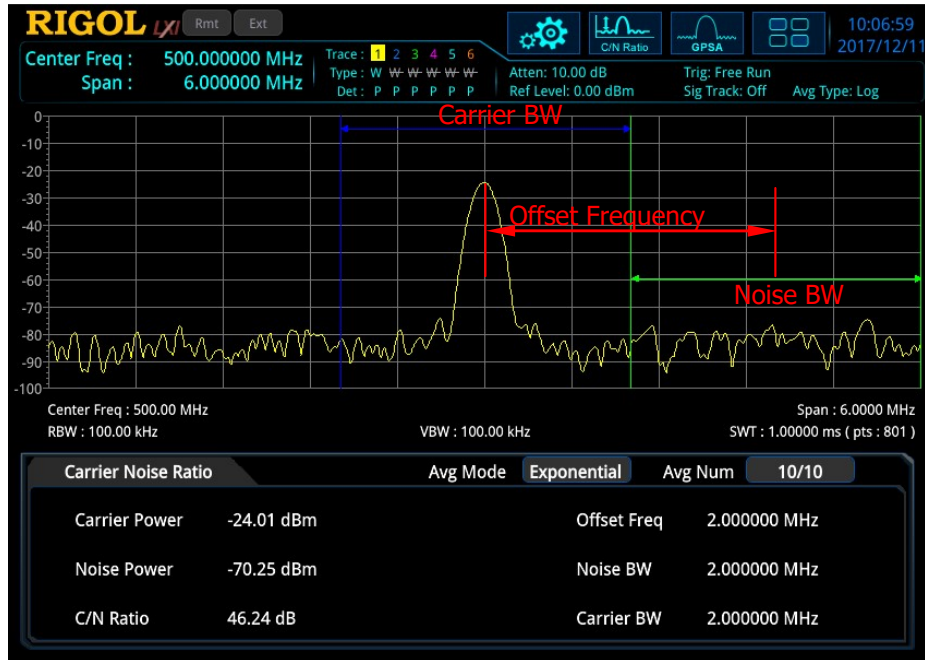


Figure 2-10 C/N Ratio Measurement Interface

Measurement Results: carrier power, noise power, and C/N ratio.

- Carrier Power: power within the carrier bandwidth.
- Noise Power: power within the noise bandwidth.
- C/N Ratio: the ratio of the carrier power to the noise power.

Measurement Parameters: average count, average mode, auto average, offset frequency, noise BW, and carrier bandwidth.

1. Avg Number

Specifies the number of times for averaging the measurement results. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-44 Average Count for C/N Ratio Measurement

Parameter	Remarks
Default	10
Range	1 to 1,000
Unit	None
Knob Step	1
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	

2. Avg Mode

Sets the average mode to "Exponential" or "Repeat". The default average mode is "Exponential".

- When "Exponential" is selected, the result is the exponential average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").
- When "Repeat" is selected, the result is the arithmetic average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").

3. Avg State

Selects whether to averaging the measurement results. By default, it is set to "On".

4. Offset Freq

Sets the difference between the center frequency of the carrier and that of the noise. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-45 Frequency Offset for C/N Ratio Measurement

Parameter	Remarks
Default	2 MHz
Range ^[1]	33 Hz to 1.5 GHz
Unit	GHz, MHz, kHz, Hz
Knob Step	offset frequency/100,
Left/Right Arrow Key Step	Min = 1 Hz
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

Note^[1]: If option RSA3000-BW1 is installed, the available range is from 3 Hz to 1.5 GHz.

5. Noise BW

Sets the bandwidth of the noise to be measured. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-46 Noise Bandwidth for C/N Ratio Measurement

Parameter	Remarks
Default	2 MHz
Range ^[1]	33 Hz to 1.5 GHz
Unit	GHz, MHz, kHz, Hz
Knob Step	noise BW/100, Min = 1 Hz
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

Note^[1]: If option RSA3000-BW1 is installed, the available range is from 3 Hz to 1.5 GHz.

6. Carrier BW

Sets the bandwidth of the carrier to be measured.

- The carrier bandwidth is related to the noise bandwidth, and the settable range is from (noise bandwidth/20) to (noise bandwidth x 20).
- You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-47 Carrier Bandwidth for C/N Ratio Measurement

Parameter	Remarks
Default	2 MHz
Range^[1]	33 Hz to 1.5 GHz
Unit	GHz, MHz, kHz, Hz
Knob Step	carrier noise/100, Min = 1 Hz
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

Note^[1]: If option RSA3000-BW1 is installed, the available range is from 3 Hz to 1.5 GHz.

For details about the **Auto Couple** and **Meas Preset** menus, refer to their descriptions on Page 2-44.

Harmo Dist (THD)

Measurement Interface:

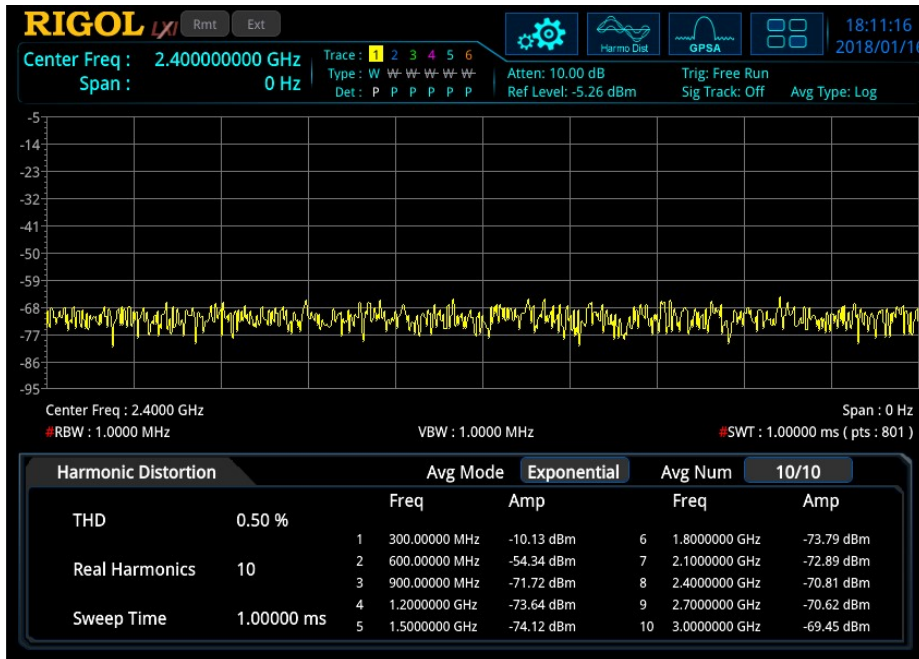


Figure 2-11 Harmonic Distortion Measurement Interface

Measurement Results: The amplitude of each order of harmonic and THD (total harmonic distortion) of the carrier. At most, 10th-order harmonic can be measured.

Measurement Parameters: average count, average mode, auto average, number of harmonics, and sweep time.

1. Avg Number

Specifies the number of times for averaging the measurement results. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-48 Average Count for Harmo Dist Measurement

Parameter	Remarks
Default	10
Range	1 to 1,000
Unit	None
Knob Step	1
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	

2. Avg Mode

Sets the average mode to "Exponential" or "Repeat". The default average mode

is "Exponential".

- When "Exponential" is selected, the result is the exponential average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").
- When "Repeat" is selected, the result is the arithmetic average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").

3. Avg State

Selects whether to averaging the measurement results. By default, it is set to "On".

4. No. of Harmo

Sets the number of the harmonics to be measured. It is used to calculate the total harmonic distortion. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-49 Number of Harmonics for Harmo Dist Measurement

Parameter	Remarks
Default	10
Range	2 to 10
Unit	None
Knob Step	1
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	1

5. Harmonic ST

Sets the sweep time of the harmonic measurement, namely the sweep time of the spectrum analyzer. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-50 Sweep Time for Harmo Dist Measurement

Parameter	Remarks
Default	1 ms
Range	1 μ s to 6 ks
Unit	s, ms, μ s, ns, ps
Knob Step	1 μ s
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	100 μ s

For details about the **Auto Couple** and **Meas Preset** menus, refer to their descriptions on Page 2-44.

Third-order Intercept (TOI)

Measurement Interface:



Figure 2-12 TOI Measurement Interface

Measurement Results:

Base Lower, Base Upper, 3rd Order Lower, 3rd Order Upper, frequency and amplitude of the above four signals, the amplitude difference between each signal and the base lower signal, as well as the 3rd order intercept point (Intercept) of the base lower signal and base upper signal.

3rd order lower intercept point = (power of base lower signal - power of 3rd order lower signal) + power of base lower signal; 3rd order upper intercept point = (power of base upper signal - power of 3rd order upper signal)/2 + power of base upper signal.

Measurement Parameters: average count, average mode, auto average, and span.

1. Avg Number

Specifies the number of times for averaging the measurement results. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-51 Average Count for TOI Measurement

Parameter	Remarks
Default	10
Range	1 to 1,000
Unit	None
Knob Step	1
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	1

2. Avg Mode

Sets the average mode to "Exponential" or "Repeat". The default average mode is "Exponential".

- When "Exponential" is selected, the result is the exponential average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").
- When "Repeat" is selected, the result is the arithmetic average of the measurement results obtained in the past N times (N is specified in "**Avg Number**").

3. Avg State

Selects whether to averaging the measurement results. By default, it is set to "On".

4. TOI Span

This span is consistent with the span of the spectrum analyzer. It refers to the frequency range of the sweep. After it is set, the span of the spectrum analyzer will be modified accordingly. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-52 Span for TOI Measurement

Parameter	Remarks
Default	2 MHz
Range	100 Hz to 4.5 GHz
Unit	GHz, MHz, kHz, Hz
Knob Step	TOI distortion span/100, Min = 1 Hz
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

Note^[1]: If option RSA3000-BW1 is installed, the available range is from 10 Hz to 4.5 GHz.

For details about the **Auto Couple** and **Meas Preset** menus, refer to their descriptions on Page 2-44.

VSWR

Measurement Interface:



Figure 2-13 VSWR Measurement Interface

Measurement Results: return loss, reflection coefficient, and VSWR.

- Return loss: also called reflection loss. It is calculated according to the formula: $RL(dB) = 10 \lg(P_r/P_i)$. Wherein, $RL(dB)$ is return loss, P_i is incident power, and P_r is reflected power.
- Reflection coefficient: indicates the ratio of reflected voltage to the incident voltage.
- VSWR: indicates the ratio of maximum voltage to minimum voltage in standing wave pattern.

VSWR bridge and the tracking generator (RSA3045-TG/RSA3030-TG) are required during measurement. Two measurements have to be performed according to the measurement wizard at the lower section of the interface: measurement with the DUT disconnected (represented by Trace6) and measurement with the DUT connected (represented by Trace1). The return loss is determined by the difference (represented by the math trace) of the results of the two measurements. The reflection coefficient and VSWR are calculated according to the return loss.

1. Reset

Resets the VSWR measurement parameters to their default values.

2. Cal Open

After you disconnect the instrument, press this key, and then the instrument executes the first measurement. The measurement result is represented by Trace6.

3. VSWR

After you connect the instrument, press this key, and then the instrument executes the second measurement. The measurement result is represented by Trace1. At the same time, the analyzer calculates the difference (represented by the math trace) between the two measurement results. Then the return loss, reflection coefficient, and VSWR are calculated based on the difference.

4. Selected Marker

Select one of the eight markers. By default, Marker1 is selected. When a marker is selected, you can set its state. The selected marker is marked on the math trace. The measurement result at the current marker is displayed in the measurement wizard.

5. Marker Mode

Sets the type of the currently selected marker.

6. Marker Freq

Sets the frequency of the selected marker.

7. Ref Value

Sets the reference level to adjust the vertical position of the trace on the screen.

- Different from **Ref Level** under the **AMPT** menu, modifying this parameter does not affect the reference level of the analyzer.
- You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-53 VSWR Ref Value

Parameter	Remarks
Default	0 dB
Range	-200 dB to 200 dB
Unit	dB
Knob Step	1 dB
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	10 dB