

Data Analysis and Data Output

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- Data Output

Data Analysis

Data Analysis

- Analyzing Data on Trace Using Marker
- Searching for Positions that Match Specified Criteria
- Determining Mean, Standard Deviation, and Peak-to-Peak of the Trace
- Comparing Traces/Performing Data Math
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Analyzing Data on Trace Using Marker

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Other topics about Data Analysis

About Marker Functions

The marker can be used in the following ways:

- Reading a measured value as numerical data (as an absolute value or a relative value from the reference point)
- Moving the marker to a specific point on the trace (marker search)
- Using the value of the marker to change the stimulus (sweep range) and scale (value of the reference line)

For more information, refer to Searching for Positions that Match Specified Criteria.

For the procedure used to change the sweep range and scale by using the marker, refer to Specifying Sweep Range by Using Marker.

The E5052B is capable of displaying up to 10 markers (10 normal markers or 9 normal markers and 1 reference marker) on each trace. Each marker has a stimulus value (the value on the X-Axis) and a response value (the value on the Y-Axis).

Reading Values on Trace

You can read the value of a marker displayed on the trace.

You can set the marker for the selected measurement window.

The marker response value is always in the same data format as that of the Y-Axis.

Operational Procedure

1. Press **Trace Next** or **Trace Max** to activate the trace on which you want to use the marker.
2. Press **Marker**. At this point, marker 1 is turned on and becomes active (you can operate the marker). When using marker 1, you can omit [Step3](#).
3. Select a **marker** and turn it on. The softkey used to turn on a marker is used to activate that marker.

Softkey	Function
Marker 1	Turns on marker 1, which has been turned off;






	activates marker 1
Marker 2	Turns on marker 2, which has been turned off; activates marker 2
Marker 3	Turns on marker 3, which has been turned off; activates marker 3
Marker 4	Turns on marker 4, which has been turned off; activates marker 4
:	
Marker 10	Turns on marker 10, which has been turned off; activates marker 10


- 4.
5. Change the marker value in the entry area. This operation enables you to move the marker to a point on the desired trace.

The marker value in the entry area can be changed by one of the following methods.

NOTE

To change the value in the entry area, the figure in the box should be highlighted. If the figure is not highlighted, press the softkey for the marker you are using (**marker 1** to **marker 10**) or **Focus** to highlight the figure.

- Enter a numeric value using the ENTRY block key on the front panel.
- Turn the rotary knob  on the front panel.
- Press the up or down arrow key  () on the front panel.
- Using the mouse, click one of the buttons ( ) on the right side of the entry area.

You can move the marker by dragging and dropping either one of the marker position pointers above or below the graph () (pressing the button on the object to be moved and releasing the button on the destination). You can also move a marker itself by dragging and dropping it.

5. When using other markers, repeat [Step3](#) and [Step4](#).

Read the marker stimulus value and marker response value displayed in the upper part of the trace screen.

To turn off marker(s), press the **Clear Marker Menu** and then select the desired softkeys.

Softkey	Function
All OFF	Turns off all markers on active trace
Marker 1 to Marker 10	Turns off one of markers 1 through 10 on active trace

Changing Display Position of Marker Value

You can change the display position of the marker value on the graph.

Operational Procedure

1. Press **Trace Next** or **Trace Max** to activate the trace on which you want to use the marker.
2. Press **Display**.
3. Press **Marker Information** to change the display position.

Softkey	Function
Left	Displays marker value in upper-left part of graph
Right	Displays marker value in upper-right part of graph

You can also view the marker values in a list. For more information, refer to Listing All Marker Values in All Displayed Traces.

Specifying Sweep Range by Using Marker

You can copy the active marker value to the position of start, stop or center. If multiple markers are present on the active trace, only the active marker can be moved.

For **TR Measurement**: Marker to Target Frequency and Phase reference can be set using **Marker --> > Marker -> Target Freq** (or **N2 Target Freq**) and **Marker --> > Marker -> Phase Reference** (or **N2 Phase Reference**). For more information on phase reference, refer to Using the phase reference frequency.

NOTE

For **AM / BB / PN / PS Measurement**: An additional marker option is available at **Marker --> > Marker -> Omit Spur**.

It is recommended to use this function with the Discrete value ON as: **Marker > More functions > Discrete > ON**. When it is used this function with **Discrete > Off**, it is possible to specify the frequency data that is not effective at omit of the specific Spurious.

In **Omit Spur** option, when X-axis data of Spurious List is not within the X-axis for Trace Data, the data equivalent to outside of scope is ignored. For information on Omit Spur, refer to Setting Omit Specified Spur.

Operational Procedure

1. Press **Trace Next** or **Trace Max** to activate the trace on which you want to use the marker.
2. Press **Marker -->**.
3. Press the **corresponding softkey** to specify the sweep range.

Softkey	Function
Marker to Start	Changes start value to be equal to stimulus value of active marker on current active trace
Marker to Stop	Changes stop value to be equal to stimulus value of active marker on current active trace
Marker to Center	Changes center value to be equal to stimulus value of active marker on current active trace

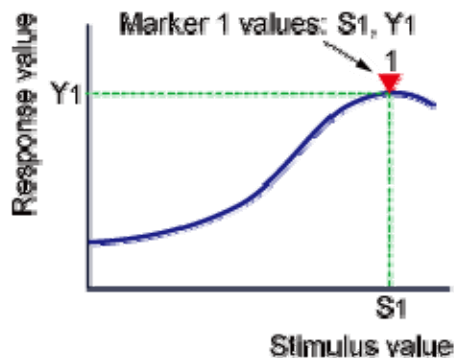
4.

Reading Relative Value From Reference Point on Trace

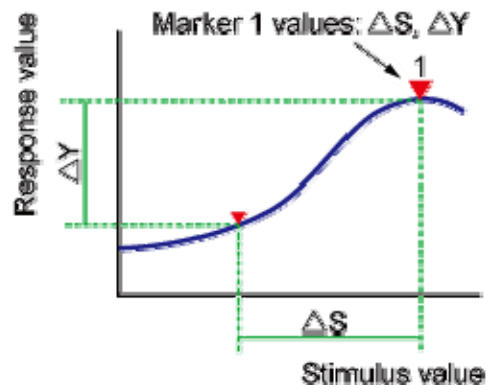
You can convert the marker reading to a relative value from the reference point.

Reference Marker Mode

Reference Marker Mode: OFF



Reference Marker Mode: ON



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Operational Procedure

1. Press **Trace Next** or **Trace Max** to activate the trace on which you want to use the marker.
2. Press **Marker**.
3. Press **More functions**.
4. Press **Ref Marker** to specify the reference marker (Marker 1 through 10).

By default, marker 1 is set as the reference marker.

5. Press **Ref Marker Mode** to turn on the reference mode.

Activate the reference marker if it is not active.

With the reference mode turned on, the stimulus values and response values are indicated in relative values referred to by the position of the reference marker.

NOTE

While the reference marker mode is turned on, you cannot view the relative value from the reference point unless the delta marker mode is set to 'ON'.

Following [Step4](#) in Reading Values on Trace, place the reference marker on the point to be used as the reference.

Following [Step3](#) to [Step4](#) in Reading Values on Trace, place markers 1 through 10 on the desired points to read the values.

To use the list view of the marker values, refer to Listing All Marker Values in All Displayed Traces.

Reading Only Actual Measurement Point/Reading Value Interpolated Between Measurement Points

The point on the trace on which a marker can be placed differs depending on how the discrete marker mode is set up.

Setting	Description
<i>Turning on discrete mode</i> (Discrete ON)	A marker moves only between actual measurement points. When a specific marker stimulus value is specified as a numerical value, the marker is placed at the measurement point closest to the specified value. A marker that is placed between interpolated points with the discrete mode off automatically moves to the nearest measurement point when the discrete mode turns on.
<i>Turning off discrete mode</i> (Discrete OFF)	The marker can move from one actual measurement point to another. Because it is interpolated, it can also move in the space between measurement points.

Marker Discrete Mode

Operational Procedure

1. Press **Trace Next** or **Trace Max** to activate the trace on which you want to use the marker.
2. Press **Marker**.
3. Press **More functions**.
4. Press **Discrete** to turn the discrete mode **ON** or **OFF**.

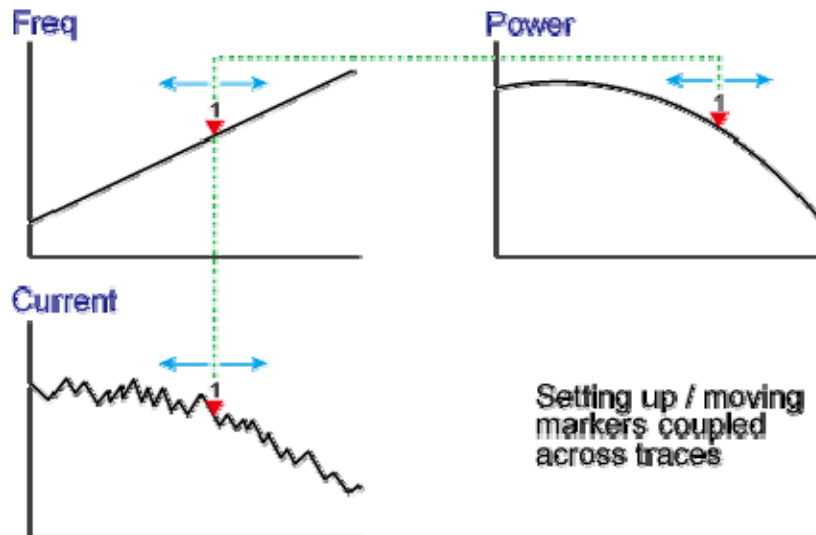
Setting Up Markers for Each Trace/Setting up Markers for Coupled Operations Between Traces

Markers can be set up and moved either in a coupled operation for all traces in a channel or independently for each trace.

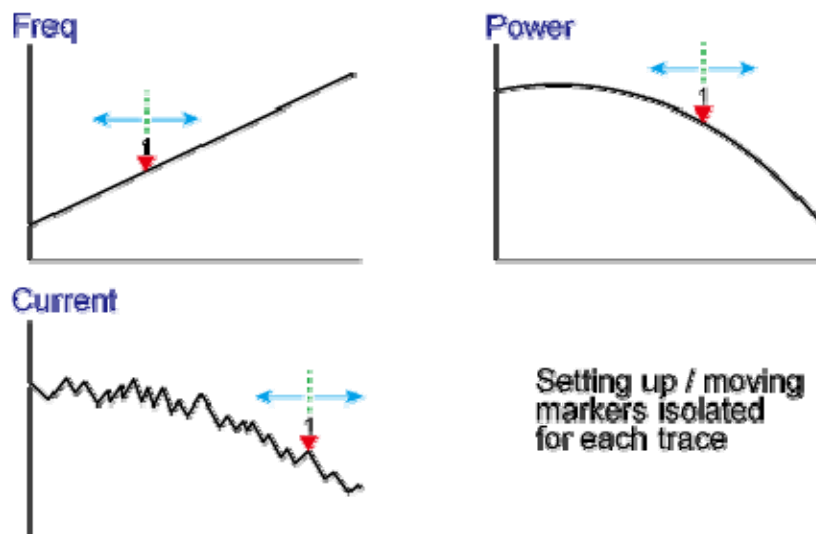
You can set up marker coupling for frequency/power measurement, transient measurement and the user window.

Marker Coupling

Marker Coupling: ON



Marker Coupling: OFF



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Setting	Description
<i>Marker Couple is on</i> (Couple ON)	Markers are set up and moved in coupled operation on all traces in a channel.
<i>Marker Couple is off</i> (Couple OFF)	Markers are set up and moved independently for each trace.

Operational Procedure

1. Press **Trace Next** or **Trace Max** to activate the trace on which you want to use the marker.
2. Press **Marker**.
3. Press **Couple** to turn the marker coupling on or off.

NOTE

For the transient measurement, both the marker coupling (Couple) and the marker discrete mode are turned on, where the active marker on the active trace operates in the discrete mode; however, the other subsequent markers are not always on the measurement point, since they are coupled with the value.

Listing All Marker Values in All Displayed Traces

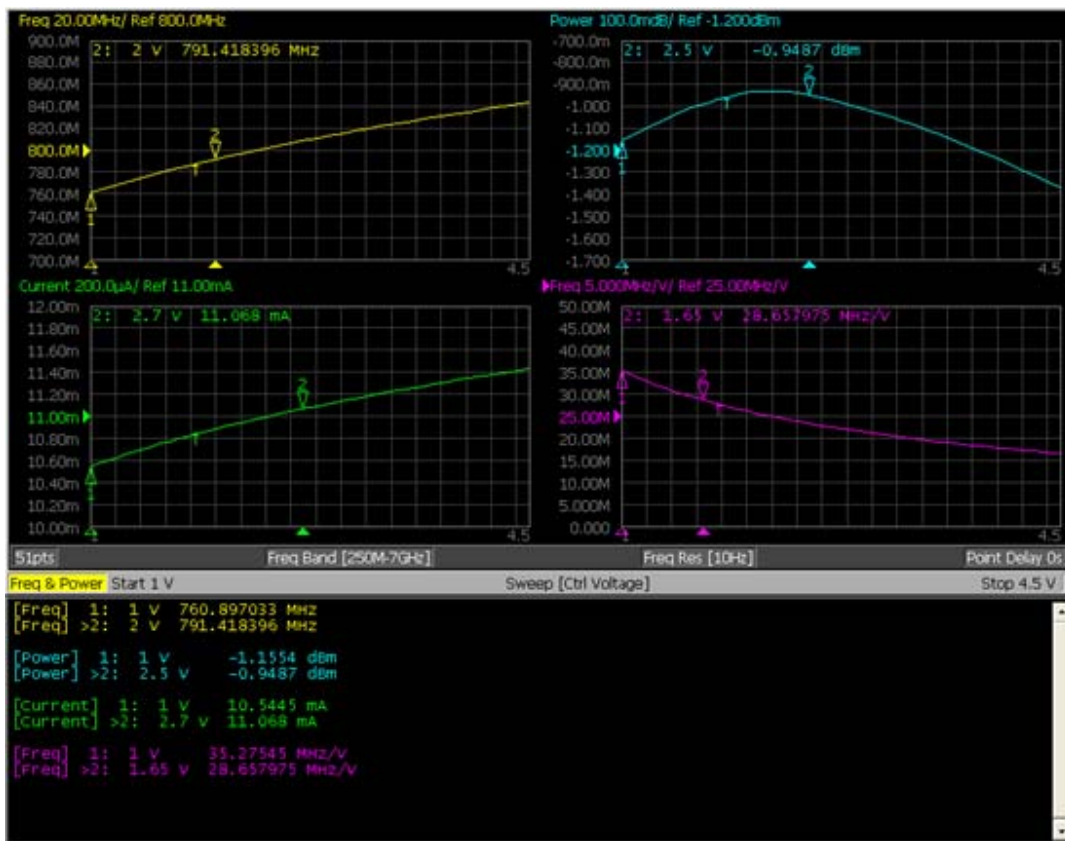
You can list all of the marker values for all traces on the marker list display.

Operational Procedure

1. Press **Marker**.
2. Press **Marker List** to turn on the marker list display.

The marker list is displayed in the lower part of the screen as shown in the following figure.

Turning on Marker List



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Searching for Positions that Match Specified Criteria

- Overview
- Setting Search Range (Bandmarkers)
- Searching in Specified Range
- Setting up Bandmarker for Each Trace Setting up Markers for Coupled Operations Between Traces
- Automatically executing search each time Sweep is done (search tracking)
- Searching for Maximum and Minimum Measured Values
- Searching for Target value
- Searching for Peak
- Searching for Multiple Peaks

- Searching for Spurious
- Searching for Multiple Spurious

Other topics about Data Analysis

Overview

You can search for a position that matches your specified criteria by using the Marker Search feature.

Marker Search allows you to search for a position that matches the following criteria:

- Maximum value
- Minimum value
- Target (a point that has a target measurement value)
 - Target nearest to marker position
 - Target nearest to left-hand side of marker position
 - Target nearest to right-hand side of marker position
- Peak
 - Maximum peak (for a positive peak), minimum peak (for a negative peak)
 - Peak nearest to left-hand side of marker position
 - Peak nearest to right-hand side of marker position
- Spurious
 - Spurious nearest to left-hand side of marker position
 - Spurious nearest to right-hand side of marker position

Setting Search Range (Bandmarkers)




The Marker Search feature allows you to set part of the sweep range as the search target (Bandmarker feature) as well as the entire search range.


Procedure to Set Search Range

1. Press **Trace Next** or **Trace Max** to activate the trace on which you want to use the marker.
2. Press **Marker Fctn** (or press **Marker Search**).
3. To set the search range for the X-Axis, turn on **Bandmarker X**.

4. Set the search range using **X start**, **X stop**, **X center** and **X span**.




Each value for the search range can be changed by one of the following methods.


- " Enter a numeric value using the ENTRY block key on the front panel.
- " Turn the rotary knob () on the front panel.
- " Press the up or down arrow key () on the front panel.
- " Using the mouse, click one of the buttons () on the right side of the entry area.

You can move the search range by dragging and dropping either one of the bandmarker position pointers () above the graph (pressing the button on the object to be moved and releasing the button on the destination). You can also drag and drop the start/stop line of the search range.

5. To set the search range for the Y-Axis, turn on **Bandmarker Y**.
6. Set the search range using **Y start**, **Y stop**, **Y center** and **Y span**.

Each value for the search range can be changed by one of the following methods.

- " Enter a numeric value using the ENTRY block key on the front panel.
- " Turn the rotary knob () on the front panel.
- " Press the up or down arrow key () on the front panel.
- " Using the mouse, click one of the buttons () on the right side of the entry area.

You can move the search range by dragging and dropping either one of the bandmarker position pointers () above the graph (pressing the button on the object to be moved and releasing the button on the destination). You can also drag and drop the start/stop line of the search range.

Searching in Specified Range

Procedure to Set Search Range

1. Press **Trace Next** or **Trace Max** to activate the trace on which you want to use the marker.
2. Press **Marker Search**.
3. To perform the partial search for the stimulus value (X-Axis), press **Search Range(X)** to select Bandmarker.

4. To perform the partial search for the response value (Y-Axis), press **Search Range(Y)** to select Bandmarker.

Setting	Description
<i>Full Range (Full Scale)</i>	All data are obtained from all traces.
<i>Bandmarker (Bandmarker)</i>	Partial data are obtained from within bandmarker.

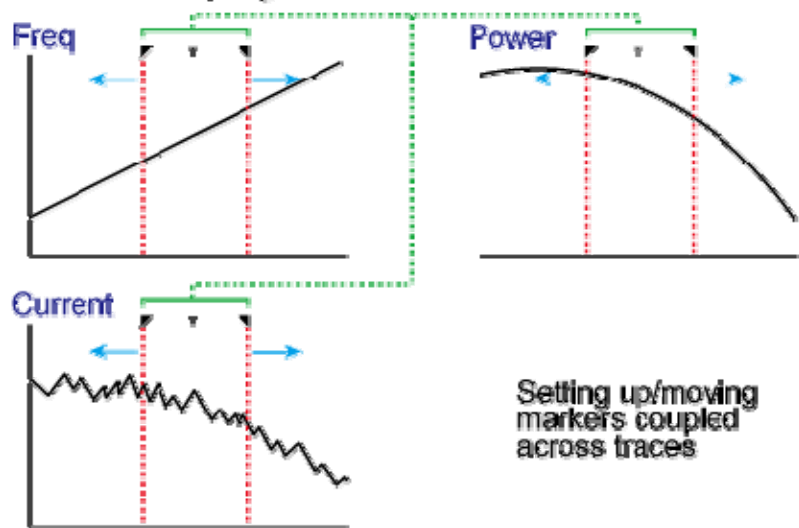
Setting up Bandmarker for Each Trace/Setting up Markers for Coupled Operations Between Traces

The bandmarkers can be set up and moved either in coupled operation for all traces in a channel or independently for each trace.

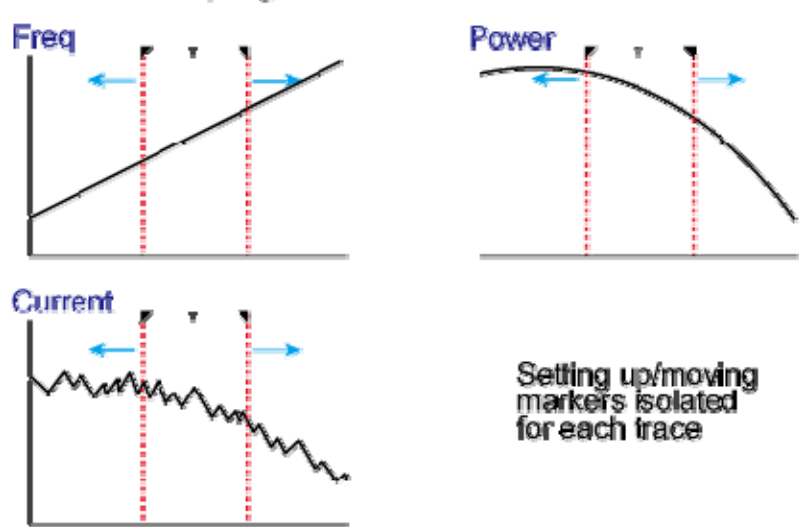
You can set up bandmarker coupling for frequency/power measurement, transient measurement and the user window.

Bandmarker Coupling

Bandmarker Coupling: ON



Bandmarker Coupling: OFF



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Setting	Description
<i>Bandmarker Couple is on</i> (Couple ON)	Bandmarkers are set up and moved in coupled operation on all traces in a channel.
<i>Bandmarker Couple is off</i> (Couple OFF)	Bandmarkers are set up and moved independently for each trace.

Operational Procedure

1. Press **Trace Next** or **Trace Max** to activate the trace on which you want to use the marker.
2. Press **Marker Fctn** (or press **Marker Search**).
3. Now you can set up the bandmarker. For more information, refer to [Setting Search Range \(Bandmarkers\)](#).
4. Press **Couple** to turn the marker coupling on or off.

NOTE

You cannot turn on the bandmarker coupling for the X-Axis.

Automatically Executing Search Each Time Sweep is Done (search tracking)

Search tracking is a function that sets a search to be repeated every time a sweep is done. This function facilitates the observation of measurement results, such as the maximum value of traces.

Operational Procedure

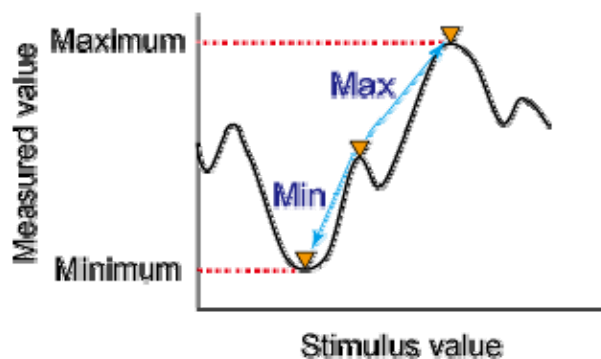
1. Press **Trace Next** or **Trace Max** to activate the trace on which search tracking is set up.
2. Press **Marker Search**.
3. Press **Tracking** and specify the parameters of the search tracking function.

Setting	Description
<i>Off</i>	Turns off search tracking function.
<i>Maximum value</i>	Specifies the maximum value for search tracking function.
<i>Minimum value</i>	Specifies the minimum value for search tracking function.
<i>Peak</i>	Specifies the peak for search tracking function.
<i>Target</i>	Specifies the target for search tracking function.
<i>Spurious</i>	Specifies the spurious for search tracking function.

Searching for Maximum and Minimum Measured Values

You can search for the maximum or minimum measured value on the trace and move a marker to that point.

Searching for Maximum and Minimum Measured Values



ssa0021

Setting	Description
<i>Search for maximum (Max)</i>	Moves active marker to point on trace where measured value is greatest.
<i>Search for minimum (Min)</i>	Moves active marker to point on the trace where measured value is lowest.

Operational Procedure

1. Following Step1to Step3in Reading Values on Trace, activate the marker you will use to search for the maximum and minimum values.
2. Press **Marker Search**.
3. Press the corresponding softkey to move the marker to the maximum or minimum measured value.

Softkey	Function
Search Max	Performs a search for the maximum value.
Search Min	Performs a search for the minimum value.

Searching for Target Value (target search)

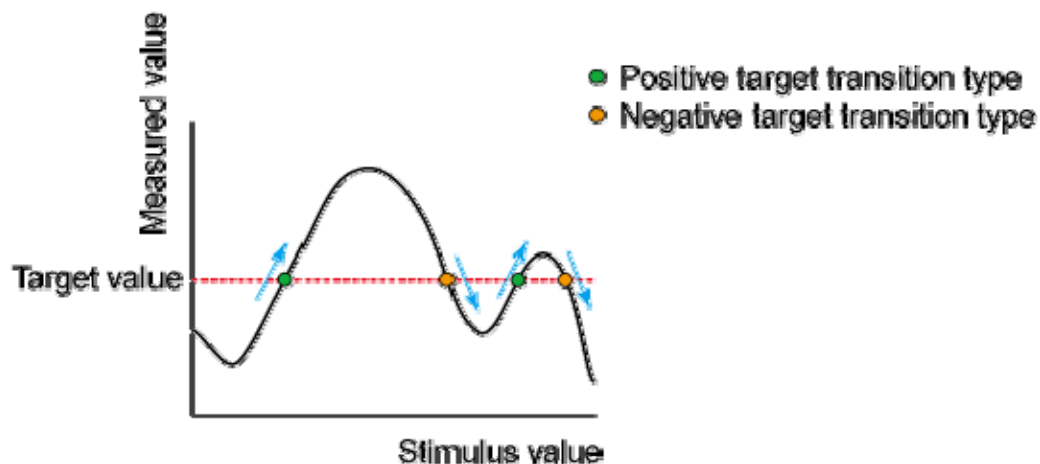
The target search function enables you to move the marker to the point that has the target measured value.

Target and Transition Types

A target is a point that has a specific measurement value on the trace. Targets can be divided into the two groups shown below depending on their transition type.

Setting	Description
<i>Transition type:</i> <i>positive</i> (Positive)	When the value of the target is larger than the measurement value that immediately precedes it (on the left side).
<i>Transition type:</i> <i>negative</i> (Negative)	When the value of the target is smaller than the measurement value that immediately precedes it (on the left side).

Target and Transition Types



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About Target Search Function

The target search is a function that searches for a target that matches the pre-defined target value and transition type(s) (positive, negative, or both positive and negative) and then moves to the peak with maximum response value if the peak polarity is Positive or Both or to the peak with minimum response value if the peak polarity is Negative.

The following three methods are available for executing the target search:

Setting	Description
<i>Search target</i> (Search Target)	The marker moves to the nearest target in the stimulus value from the position of a present marker.
<i>Left search</i> (Search Left)	Executes search from current marker position to the smaller stimulus values and moves marker to first target encountered
<i>Right search</i> (Search Right)	Executes search from current marker position to the larger stimulus values and moves marker to first target encountered

Target Search (when transition type is set to both positive and negative)



ssa0023

Operational Procedure

1. Following Step1through Step3 in Reading Values on Trace, activate a marker you are using for the target search.
2. Press **Marker Search**.
3. Press **Target**.

4. Press **Target Value** and enter a target value in the entry box that appears.

The marker target search will be executed based on the newly set target value and the transition type defined.

5. Press **Target Transition**.
6. Select a transition type.

Softkey	Function
Positive	Selects positive as transition type.
Negative	Selects negative as transition type.
Both	Selects both positive and negative as transition type.

The marker target search will be executed based on the definitions of the currently set target value and the newly set transition type. Each marker is allowed to have the peak excursion value and the peak polarity individually.

7. Press the corresponding softkey to move the marker to the target.

Softkey	Function
Search Target	Executes target search.
Search Left	Executes left search.
Search Right	Executes right search.

Searching for Peak

The peak search function enables you to move the marker to the peak on the trace.

Definitions of Peaks

A peak is a measurement point whose value is greater or smaller than the adjoining measurement points on its right and left sides. Peaks are classified into the following types depending on the difference in magnitude from the measurement points on either side of it.

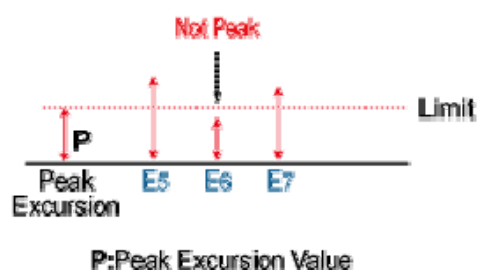
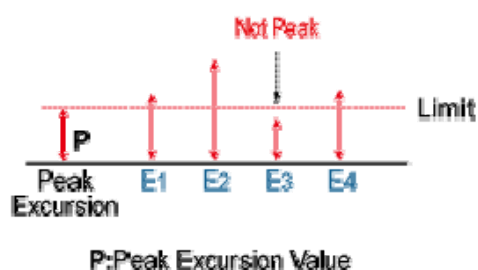
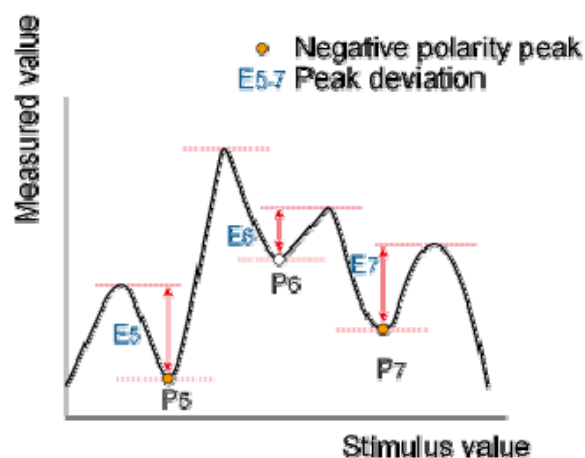
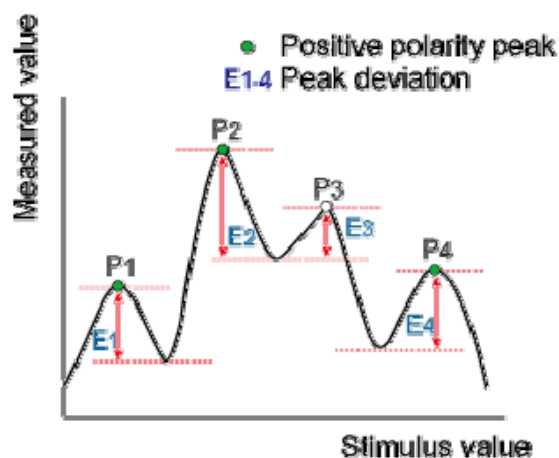
Setting	Description
<i>Positive peak</i> (Positive)	A peak whose measurement value is greater than those of the measurement points on either side of it (peak polarity: positive)
<i>Negative peak</i> (Negative)	A peak whose measurement value is smaller value than those of measurement points on either side of it (peak polarity: negative)

About the peak search function

The peak search is a function that searches for a peak that matches a pre-defined lower limit for the peak excursion value and peak polarity (positive or negative) and then moves the marker to this peak.

The peak excursion is the smaller of the differences in measurement values from the adjoining peaks of the opposite polarity.

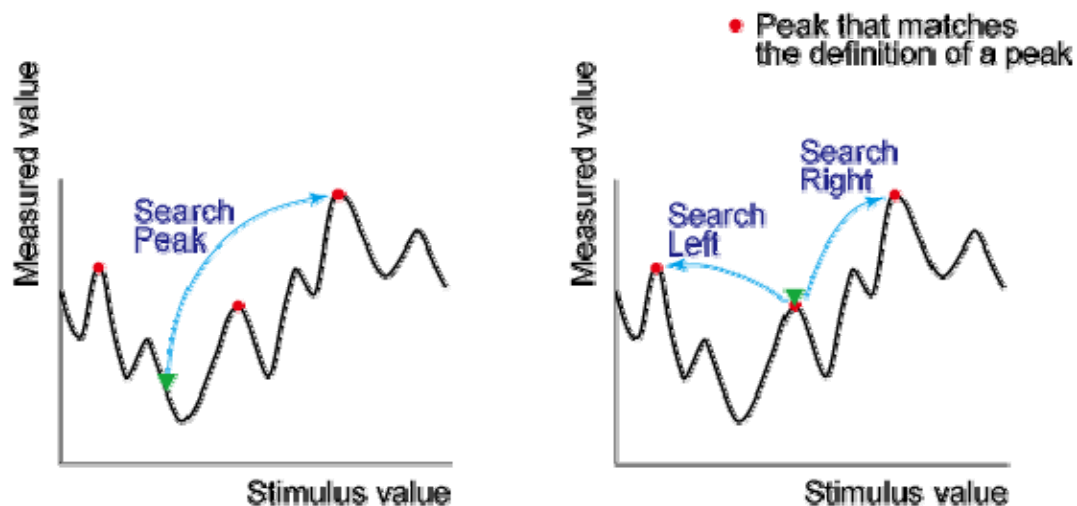
Positive Peak, Negative Peak and Peak Excursion



The following four methods are available for executing the peak search:

Setting	Description
<i>Search peak</i> (Search Peak)	Moves marker to the maximum peak when peak polarity is Positive or Both ; moves marker to the minimum peak when peak polarity is Negative
<i>Search all peaks</i> (Search Peak All)	Moves marker to the maximum peak when peak polarity is Positive or Both ; moves marker to the minimum peak when peak polarity is Negative
<i>Search left</i> (Search Left)	Executes search from current marker position to the smaller stimulus values and moves marker to the first peak encountered
<i>Search right</i> (Search Right)	Executes search from current marker position to the larger stimulus values and moves marker to the first peak encountered

Peak Search (when peak polarity is positive)



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Operational Procedure

1. Following Step1 through Step3 in Reading Values on Trace, activate a marker you are using for the peak search.
2. Press **Marker Search**.
3. Press **Peak**.
4. Press **Peak Excursion** and enter the lower limit for the peak excursion value.

The marker peak search will be executed based on the definitions of the newly set lower limit for the peak excursion value and the currently set peak polarity.

5. Press **Peak Polarity**.
6. Select a peak polarity.

Softkey	Function
Positive	Selects Positive as the peak polarity
Negative	Selects Negative as the peak polarity
Both	Selects Both Positive and Negative as the peak polarity

The marker peak search will be executed based on the definitions of the currently set lower limit for the peak excursion value and the newly set peak polarity. Each marker is allowed to have the peak excursion value and the peak polarity individually.

7. Press the corresponding softkey to move the marker to the peak.

Softkey	Function
Search Peak	Executes peak search
Search Left	Executes left search
Search Right	Executes right search

Searching for Multiple Peaks

The multi-peak search function enables you to display markers on multiple peaks on traces.

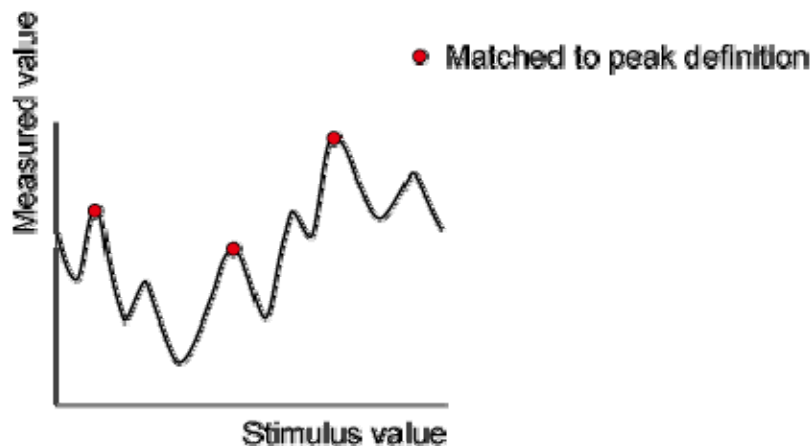
About Peak Search All Functions (Peak Search All)

The peak-search-all is a function that searches for peaks that match a pre-defined lower limit for the peak excursion value and peak polarity (positive or negative) and then displays the markers on these peaks. Up to 10 markers can be displayed.

The peak excursion is the smaller of the differences in measurement values from the adjoining peaks of the opposite polarity.

NOTE About the matched to peak definition see Searching_for_Peak.

Peak Search All (when peak polarity is positive)



ssa0026

Operational Procedure

1. Following Step1 through Step3 in Reading Values on Trace, display the multiple markers you are using for the peak search.

NOTE The peak search is executed as many times as the number of markers displayed (up to 10).

2. Press **Marker Search**.
3. Press **Peak**.
4. Press **Peak Excursion** and enter the lower limit for the peak excursion value.

This sets the multiple peak searches to be executed based on the definitions

of the newly set lower limit for the peak excursion value and the currently set peak polarity.

5. Press **Peak Polarity**.
6. Select a peak polarity.

Softkey	Function
Positive	Selects Positive as the peak polarity.
Negative	Selects Negative as the peak polarity.
Both	Selects both Positive and Negative as the peak polarity.

This sets the multiple peak searches to be executed based on the definitions of the currently set lower limit for the peak excursion value and the newly set peak polarity.

7. Press **Search Peak All** to move the marker to the peak.

Searching for Spurious

The spurious search function enables you to move the marker to the peak value on the trace. You can use this function when the spurious judgment is enabled. For more information, refer to Confirming Spurious.

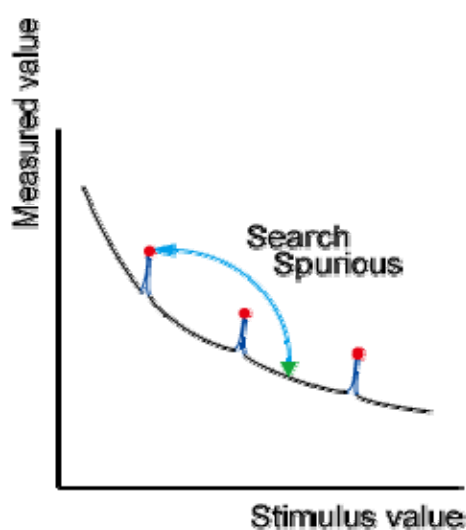
About spurious search function

The spurious search is a function that searches for a spurious and then moves the marker to this spurious.

The following three methods are available for executing the spurious search:

Setting	Description
<i>Search spurious</i> (Search Spurious)	Moves marker to the maximum spurious
<i>Search left</i> (Search Left)	Executes search from current marker position to the smaller stimulus values and moves marker to the first spurious encountered
<i>Search right</i> (Search Right)	Executes search from current marker position to the larger stimulus values and moves marker to the first spurious encountered

Spurious Search



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Operational Procedure

1. Following Step1 through Step3 in Reading Values on Trace, activate a marker you are using for the peak search.
2. Press **Marker Search**.
3. Press **Spurious**.
4. Press the corresponding softkey to move the marker to the peak.

Softkey	Function
Search Spurious	Executes spurious search
Search Left	Executes left search
Search Right	Executes right search

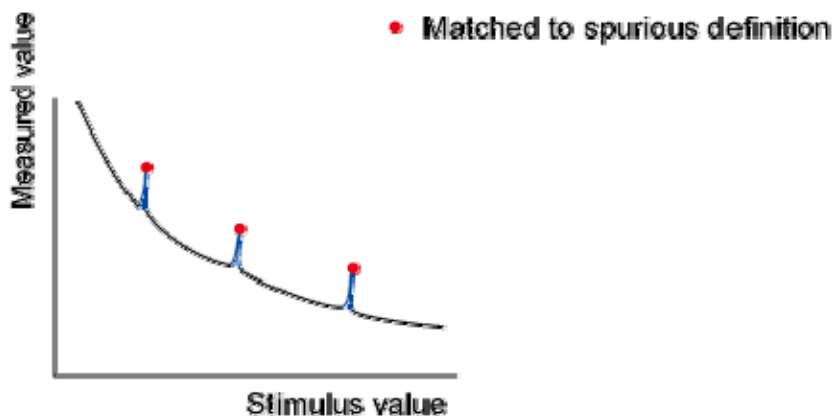
Searching for Multiple Spurious

The multi-peak spurious function enables you to display markers on multiple spurious on traces.

About Spurious Search All Functions (Spurious Search All)

The spurious-search-all is a function that searches for spurious and then displays the markers on these spurious. Up to 10 markers can be displayed.

Spurious Search All



ssa0188

Operational Procedure

1. Following Step1 through Step3 in Reading Values on Trace, display the multiple markers you are using for the peak search.

NOTE

The spurious search is executed as many times as the number of markers displayed (up to 10).

2. Press **Marker Search**.
3. Press **Spurious**.
4. Press **Search Spurious All** to move the marker to the spurious.

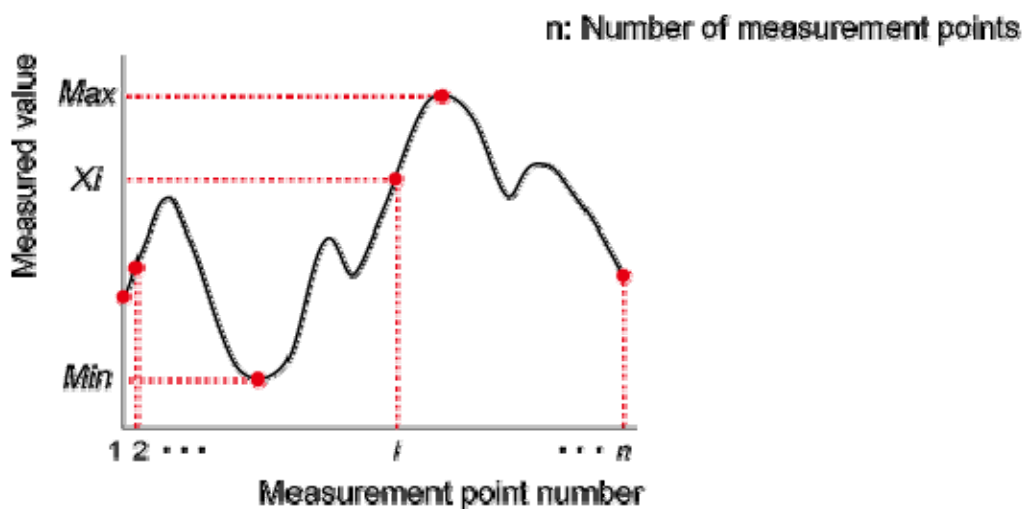
Determining Mean, Standard Deviation, and Peak-to-Peak of the Trace

- Specifying Range for Statistical Data
- Displaying Statistical Data

Other topics about Data Analysis

You can easily determine the statistics data for the trace between bandmarkers (mean, standard deviation, and peak-to-peak). The following figure and table show the definitions for the statistics data elements.

Parameters Used for Calculating Statistics Data



ssa0027

Statistics data element	Definition
Average (Mean)	$\frac{\sum_{i=1}^n x_i}{n}$ <p>(n: number of points; xi: i measured value at the i-th measurement point)</p>
Standard deviation (S. Dev)	$\sqrt{\frac{\sum_{i=1}^n (x_i - mean)^2}{n-1}}$ <p>(n: number of points; xi: measured value at the i-th measurement point; mean: mean)</p>
Peak-to-Peak (PtoP)	<p>Max - Min</p> <p>(Max: greatest measured value; Min: smallest measured value)</p>

Specifying Range for Statistical Data

1. Press **Trace Next** or **Trace Max** to activate the trace for which you want to obtain statistical data.
2. Press **Marker Fctn** > **Analysis Range (X)**.
3. Press **Marker Fctn** > **Analysis Range (Y)**

Specify the range (X/Y-Axis) from which you want to obtain statistical data.

Analysis Range	Description
<i>Full Range</i> (Fullscale)	Statistical data are obtained from all traces.
<i>Bandmarker</i> (Bandmarker)	Statistical data are obtained from within bandmarker.

To set up the bandmarker, refer to Setting Search Range (Bandmarkers).

Displaying Statistical Data

1. Press **Trace Next** or **Trace Max** to activate the trace for which you want to obtain statistical data.
2. Press **Marker Fctn**.
3. Specify the range (X/Y-Axis) from which you want to obtain statistical data. For more information, refer to Specifying Range for Statistical Data.
4. Set the **Analysis Type** to **Integral | Statistics | Linear Regression**.

NOTE

The values of Analysis type depend upon selected measurement. The values are different for different measurements.

Turning on the marker list displays statistics data in a list. To display the marker list, refer to Listing All Marker Values in All Displayed Traces.

Comparing Traces/Performing Data Math

- Overview
- Operational Procedure

Other topics about Data Analysis

Overview

Each of the traces for which measured data are displayed is provided with an additional trace, called a memory trace, that temporarily stores the measured data. You can use the memory trace to compare traces on the screen or to perform data math between the memory trace and measured data.

The following data math operations are available:

Operation	Description
<i>Data / Memory</i>	Divides measured data by the data in the memory trace; this function can be used to evaluate the ratio of two traces (e.g., evaluating gain or attenuation).
<i>Data * Memory</i>	Multiplies measured data by a memory trace.
<i>Data - Memory</i>	Subtracts a memory trace from measured data.
<i>Data + Memory</i>	Adds measured data and data in the memory trace.

Operational Procedure

1. Press **Trace Next** or **Trace Max** to activate the trace that you want to save in the memory.
2. Press **Trace View**.
3. Press **Data -> Mem** to store the measured data in memory.
4. Press **Data Math**.
5. Select the data math operation to perform.

Softkey	Function
OFF	Turns off data math functions (Do not perform data math).
Data / Mem	Divides measured data by the memory trace and stores result in the data trace.
Data * Mem	Multiplies the data trace by the memory trace and stores result in the data trace.
Data - Mem	Subtracts the memory trace from data trace and stores result in the data trace.
Data + Mem	Add the data trace and memory trace and store the result in the data trace.
USER Equation	Applies User Equation created in Equation Editor.

6. Press **Display Trace**.
7. Select the type of data to display on the screen.

Softkey	Function
Data	Displays only data trace on the screen.
Mem	Displays only memory trace stored by Data > Mem operation on the screen.
Data & Mem	Displays data trace and memory trace on the screen (You can now easily compare the data trace and memory trace on the screen.)
Off	Turns off display of the trace

8. Apply the trigger to make measurements.

Comparing Measurement Results in User Window

- Copy Traces to User Window
- Add Annotation to Each Trace in User Window

Other topics about Data Analysis

Up to eight measurement data can be retained in a user window. You may want to copy the multiple data that were measured with different settings to the user window so that you can compare them on the same screen.

When you copy traces of phase-noise measurement to the user window, carrier frequency and level are also copied in the upper-right area of the graph. Since this value is treated as annotation, you can change or delete it later.

Copy Traces to User Window

1. Press **Trace Next** or **Trace Max** to activate the trace you want to copy.
2. Press **Trace View > Copy to USER**
3. From **Copy to USER1** to **Copy to USER8**, select user window trace of the copy destination.
4. Press **Meas/View > User** to select the user window. The trace that has been copied to the user window is displayed.

NOTE

Note that you are viewing the sweep range of the active trace in the user window.

Add Annotation to Each Trace in User Window

You can add annotation to each active trace, and only the annotation of the active trace is displayed in the upper-right area of the graph.

NOTE

The carrier frequency and/or level information in annotation will be hidden according to the setting of security level.

1. Press **Trace Next** or **Trace Max** to activate the trace to be copied.
2. Press **Trace View > Trace Annotation**
3. When the dialog box appears, enter the annotation using either the on-screen keyboard or a connected keyboard.

Limit Test

The limit test feature allows you to set the limit line for each trace and then perform the pass/fail judgment for the measurement result.

- Concept of Limit Test
- Displaying Judgment Result of Limit Test
- Defining Limit Line
- Initializing Limit Lines

Other topics about Data Analysis

Concept of Limit Test

The limit test is a function to perform pass/fail judgment based on the limit line you set.

In the limit test, if the upper limit or lower limit indicated by the limit line is not exceeded, the judgment result is pass; if it is exceeded, the judgment result is fail for all measurement points on the trace. Measurement points in a stimulus range with no limit line are judged as pass.

NOTE

The targets of the pass/fail judgment are measurement points only. Parts interpolated between measurement points are not judged.

You define the limit line by specifying the stimulus value (Begin Stimulus) and response value (Begin Response) of the begin point, the stimulus value (End Stimulus) and response value (End Response) of the end point. For more information, refer to Defining Limit Line.

When the limit test is on, measurement points that fail are displayed in red on the screen and the measurement's pass/fail judgment result based on the results of individual measurement points (fail if one or more measurement points on the trace fail) is also displayed. For more information, refer to [Displaying Judgment Result of Limit Test](#).

In addition to viewing the screen, you can check the judgment result of the limit test by the following methods.

- Using the status register.
- 24-bit I/O.

Displaying Judgment Result of Limit Test

Measurement points determined as "Fail" will be displayed red on the screen. The determination result of a measurement can be displayed in the following two methods:

- Either "Pass" or "Fail" is displayed in the lower-right part of the measurement window. The result can be seen whenever the limit test is turned on.
- "Fail" can be displayed in the center of the measurement window. You can specify display/hide by following the steps below.
 1. Press **Display**.
 2. Press **Limit Test** to display the limit test menu.
 3. Press **Fail Sign**. Each press toggles between on/off.

NOTE

In the tester mode during the frequency/power measurement mode, either "Pass" or "Fail" is displayed in the lower and the upper right part of the measurement window. Measurement data determined as "Fail" will be shown in red.

Turning On or Off the Beeper in Limit Test

Turn on the warning beeper if you want to sound an alarm when a measurement is determined as "Fail" in the limit test. Refer to the [Setting the Beeper \(Built-in Speaker\)](#) to turn on or off the warning beeper.

Defining Limit Line

You must define the limit lines before you can use the limit test function. The upper and lower limit lines can be retained for each trace, and up to 100 limit lines (segments) can be defined in each limit line.

Defining Segment

Follow the steps below to define the segments.

1. Create upper and lower values for limit lines in the following format, and then save them in the CSV format (with the *.csv extension).

```
x_start, y_start, x_stop, y_stop
x_start, y_start, x_stop, y_stop
:
x_start, y_start, x_stop, y_stop
```

Parameter	Overview
x_start	The starting point for the stimulus value on the limit line
y_start	The starting point for the response value on the limit line
x_stop	The ending point for the stimulus value on the limit line
y_stop	The ending point for the response value on the limit line

NOTE

Save the upper limit values together into one file, and the lower limit values into another.

One line represents one segment. Even when specifying 0 for the stimulus range, you must provide both the start and the stop values.

For the tester mode during the frequency/power measurement mode, the response value corresponding to a stimulus value of 0 will be used as the limit value.

1. Activate the trace to which you want to apply the limit test function.
2. Press **Display > Limit Test** to display the Limit Test menu.
3. Press **Import Upper Limit Line.../Import Lower Limit Line...** to open the file with the *.csv extension, which contains the predefined upper/lower values.

NOTE

In order to edit the predefined upper/lower values file and reflect it to the limit test, you must once again open the file by pressing Import Upper Limit Line.../Import Lower Limit Line....

NOTE

You can specify the limit lines so that they may overlap other limit lines as you like. If you set limit lines on which stimulus ranges overlap one another, the measurement points within the range will have multiple limit values. In that case, the limit value to be used for the limit test will be as follows:

*If multiple upper limit values exist within the same range, the lowest value will be used as the upper limit value.

*If multiple lower limit values exist within the same range, the highest value will be used as the lower limit value.

Turning On or Off the Limit Test

You can set the limit test on/off for each trace individually. Follow the steps below to set the limit test to on/off.

Operational Procedure

The following steps describe how to save/call the limit table. Use the external keyboard and mouse for the operations listed below.

1. Activate the trace to which you want to apply the limit test function.
2. Press **Display** > **Limit Test** to display the Limit Test menu.
3. Press Limit Test and turn on the Limit Test. You can also display the limit lines on the screen by turning on the Limit Line. In tester mode during the frequency/power measurement, the limit values can be turned on or off with the Limit Line softkey.

Initializing Limit Lines

The following operations initialize the limit lines.

- At power-on
- When presetting
- When **Delete Upper Limit Line/Delete Lower Limit Line** is pressed in the Limit Test menu

Linearity Evaluation of Chirped FM Signal

- Overview
- Create Reference Regression Line
- Evaluate the Linearity

Other topics about Data Analysis

Overview

The linearity evaluation of a chirped FM signal is a function that statistically evaluates errors in test signals by using a reference regression line created by changing the test frequency to the line's values.

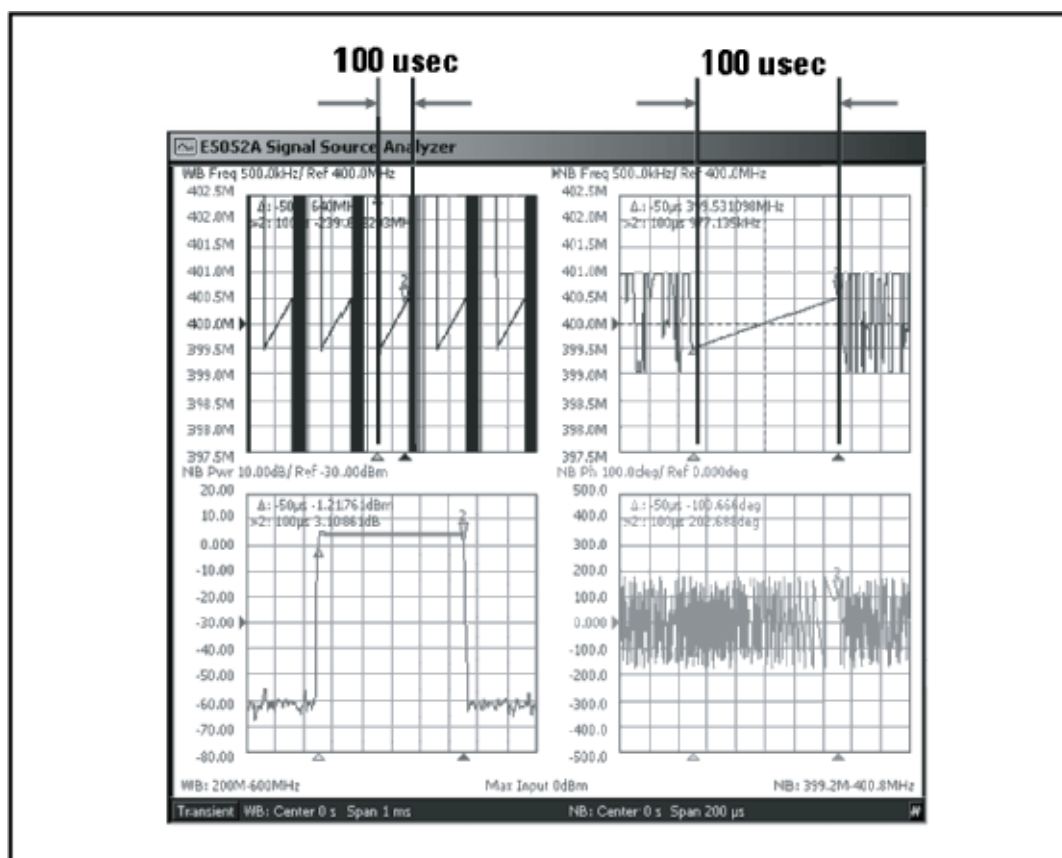
This function has two processes: creating the reference regression line and evaluating the linearity of test signals. When evaluating linearity, you can specify the analysis range by using the band marker.

The linearity evaluation of chirped signals can be used for transient measurements.

Create Reference Regression Line

This section describes steps to create a reference regression line based on the following chirped FM signal in transient measurement.

Measurement example of chirped FM signal in transient measurement



Procedure

1. Press **Trace Next** or **Trace Max** to activate the trace in which you want to save the trace memory.
2. Press **Marker Fctn**.
3. Press **Band Marker X** to enable it, and then set the analysis range.
4. Press **Return**

5. Press **Trace View**.
6. Press **Memory Trace - Line(Y = AX + B) - A** to enter the value (slope) of the regression line coefficient ($Y = aX + b$).
7. Press **B** to enter the value of b (intercept) of the regression line coefficient ($Y = aX + b$).
8. When you want to assign the measurement value currently displayed to the linear regression coefficient, the values of a and b can be obtained by pressing the **DATA Trace -> A,B** button.

NOTE

When fewer than two measurement points are in the analysis range, the values of a and b return to zero.

8. Press **Set Line to Memory** to write into the memory trace.

Evaluate the Linearity

After obtaining the regression line coefficient, calculate error from reference by comparing traces. Here, statistics are used for calculating error (refer to Determining Mean, Standard Deviation, and Peak-to-Peak of the Trace).

Procedure

1. Press **Trace/View**.
2. Press **Data Math** and select **Data - Mem** to perform data math.
3. Press **Maker Fctn**.
4. Set **Analysis Type** to **Statistics** to display the analysis results.

NOTE

When the marker list is on, statistics are displayed on the screen of another window. For display method of the marker list, refer to Listing All Marker Values in All Displayed Traces.

When you want to compare traces, set **Data Math** to off and display traces and trace memory on the screen. For the display method, refer to Comparing Traces/Performing Data Math.

Confirming Spurious

- Spurious Criteria
- Setting Minimum Spurious Level
- Setting Spurious Sensibility
- Confirming Spurious using Threshold table
- Setting Omit Specified Spur

Spurious Criteria

Spurious can be defined by either of the following two methods. The threshold is defined by selected method. Then, when the measured value exceed over the threshold, it is defined as a spurious.

- Define the threshold in terms of the standard deviation (σ) value which is calculated from the measurement result moving average.
Threshold can be set at the standard deviation (σ) \times sensitivity. Refer to Setting Spurious Sensibility.
- Using the csv file which define the threshold. Refer to Confirming Spurious using Threshold table. The threshold csv file should be defined in advance.

Setting Minimum Spurious Level

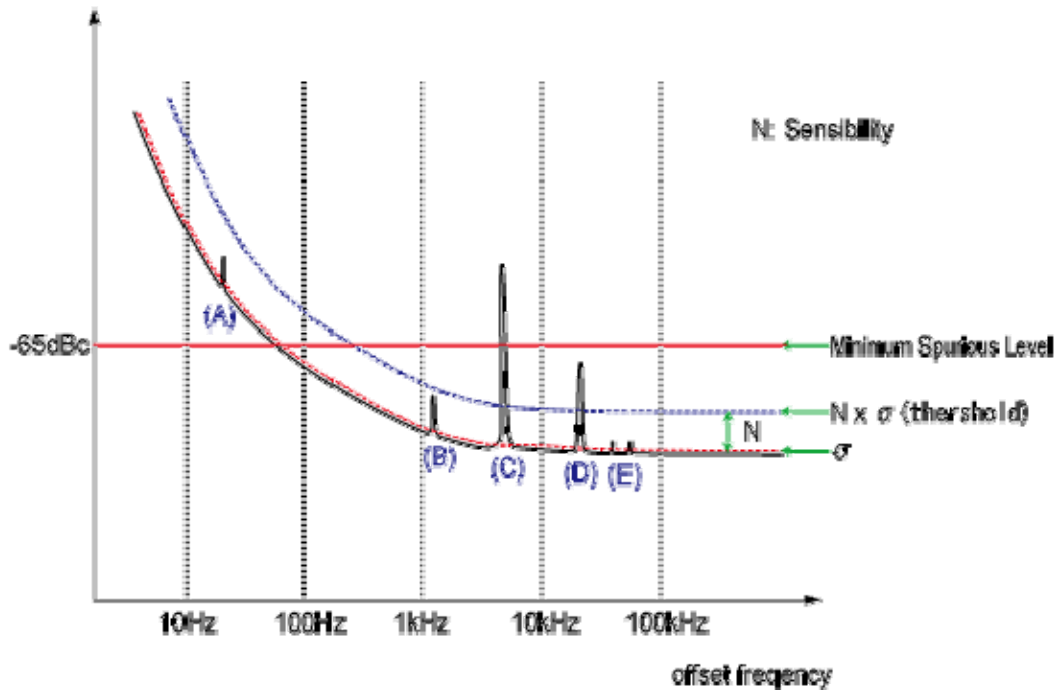
If the spurious data is bigger than this minimum spurious level, it is omitted the spurious data, or displayed it with **Power (dBc)**.

For example, there are two peaks (C) and (D) which are detected as a spurious in the figure below. When it is displayed with Power (dBc), the part of peak (C) which is above the minimum spurious level is colored in white.

NOTE

This function does not affect data itself even if the peak is detected as a spurious.

1. Press **Trace/View** > **Spurious** > **Minimum Spur Level** to adjust the minimum spurious level.



ssa0192

Setting Spurious Sensibility

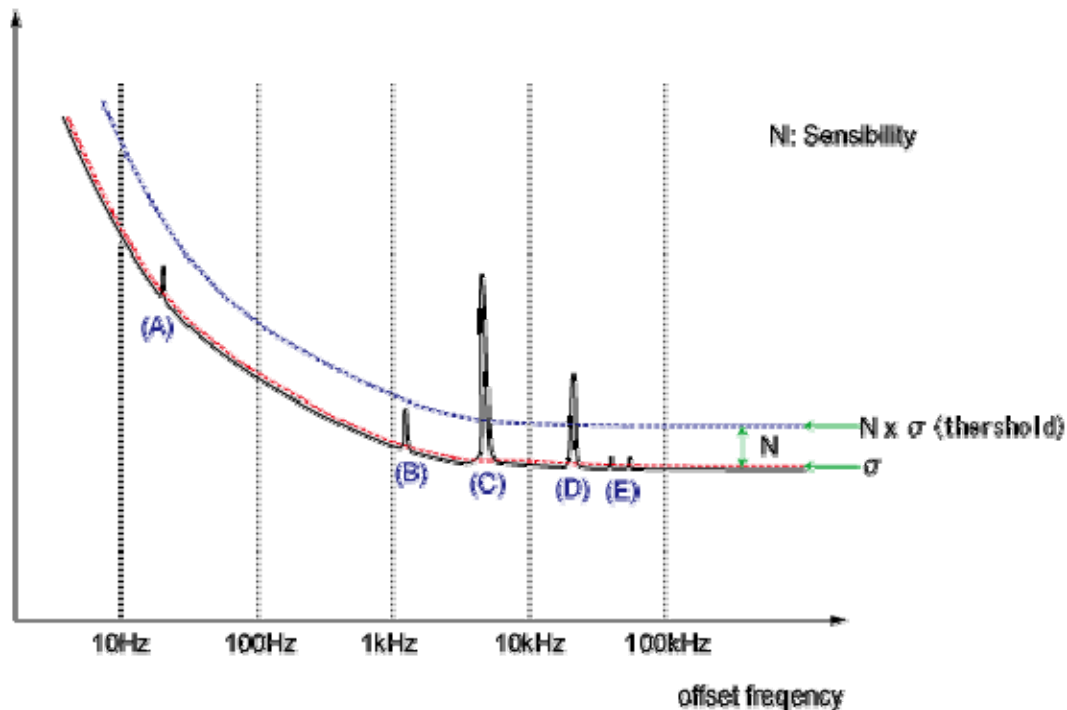
Follow the steps below to use the spurious sensibility function.

1. Press **Trace/View** > **Spurious** > **Spur Sensibility**
2. Enter the spurious sensibility value in the data entry field that appears in the upper part of the screen.

NOTE

The low peak has real sensibility when the value is small.

Spurious Judgement using spurious sensibility



ssa0191

Confirming Spurious using Threshold table

The E5052B obtains a reference waveform based on the moving average of the phase noise, AM noise, Baseband and segment phase noise measurement results, and regards any data as spurious that may vary significantly from the reference waveform.

1. Press **Trace/View** > **Spurious**.
2. Press **Import Threshold table...** to import the threshold data file that you defined in advance.
3. Press **Power** (**dBc** for Phase Noise/AM noise and **dBV** for BaseBand). The data regarded as spurious is displayed by highlight. You can view the stimulus and response values for each peak of spurious in a text file by pressing **Spurious List**.

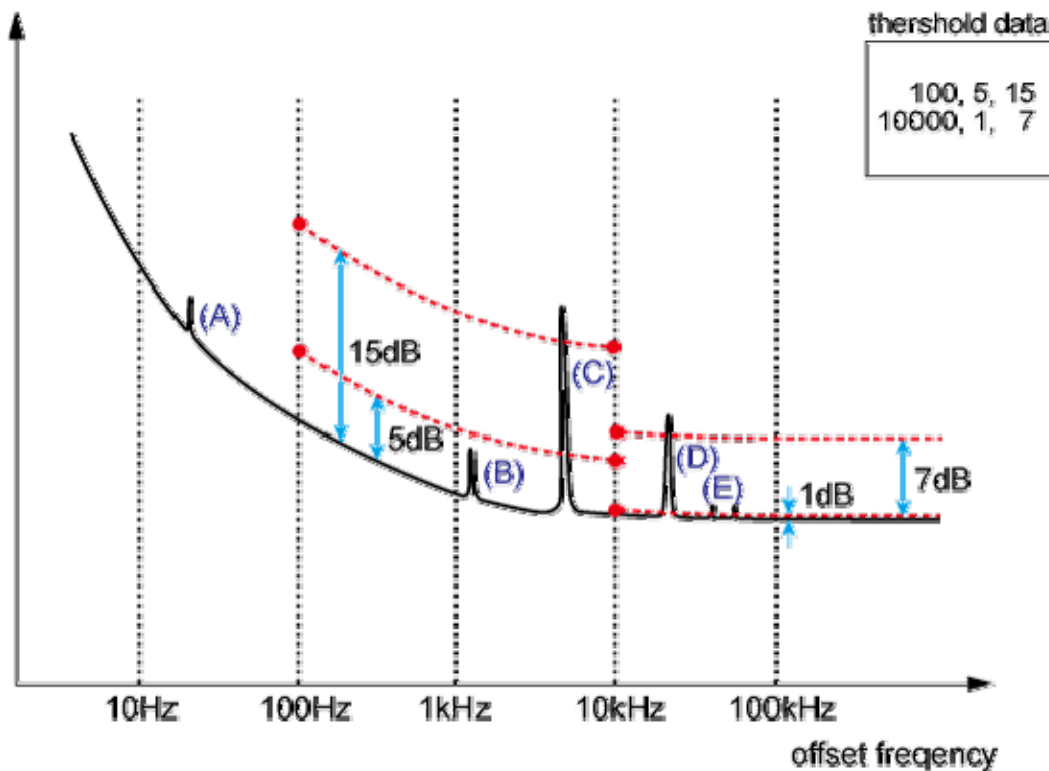
By Pressing **Omit**, the data regarded as spurious is replaced by the reference waveform that the E5052B calculated. By pressing **Normalized** (**dBc/Hz** for Phase Noise/AM noise and **dBV/Hz** for BaseBand), the data displayed is back to the measurement data.

- Press **Trace/View** > **Spurious** > **Minimum Spur Level** to adjust the minimum spurious level.

If the spurious data is bigger than this minimum spurious level, it is omitted the spurious data, or displayed it with **Power (dBc)**.

NOTE

By pressing **Clear Threshold Table**, the threshold table is cleared and set to the initial value, 0, 2, 30. By pressing **Explorer**, the file explorer is activated to find a file.

Spurious Judgment using threshold table

ssa0005

You can view the measurement points regarded as spurious in power (dBc). You can also provide any user-defined threshold for determining spurious.

Spurious judgment

(A), (E)	For measurement values falling in the range for which no threshold is specified (A), or between the upper and lower thresholds (E), the E5052B determines whether or not they are spurious based on its own determination criteria.
(B)	The E5052B considers the spurious smaller than the lower threshold as non-spurious regardless of its own determination criteria.
(C), (D)	The E5052B considers the spurious greater than the upper threshold as spurious regardless of its own determination criteria.

Define the threshold table

To specify the threshold for spurious, you must define the threshold table in advance. Define the threshold data in the following format, and then save it in the CSV format (with the extension of *.csv).

freq_from, threshold_min, threshold_max

freq_from, threshold_min, threshold_max

:

freq_from, threshold_min, threshold_max

Parameter	Overview
freq_from	Setting the start point of the threshold for spurious. You can not specify the end point. If the next start point and upper/lower threshold values are not specified, this threshold is valid until the stop frequency.
threshold_min	Lower threshold value
threshold_max	Upper threshold value

NOTE

One line represents one segment, and you can specify up to 50 segments in the threshold table.

If the upper threshold is smaller than the lower threshold, the former will take precedence.

You can comment out the line by placing "#" at the beginning of the line.

NOTE

Phase Noise is usually presented logarithmically as a plot of phase modulation sidebands in the frequency domain, expressed in dB relative to the carrier power per Hertz of bandwidth [dBc/Hz]. The default setting of the phase noise measurement on the SSA is [dBc/Hz] and the bandwidth is almost 1% of the offset frequency. The spurious is distinguished from noise, and the spurious power level is expressed in dB relative to the carrier power normally.

NOTE

The difference between the phase noise measurement and a spectrum analyzer in measuring single sided spurious is 6 dB. If single sided spurious is present, its level can be measured on a spectrum analyzer. However, the measured data in phase noise measurement for a single sided spurious is 6dB lower from its true amplitude because the phase noise measurement assumes double sided spurious.

The E5052B employs a phase detector method like other phase noise measurement systems, which measures double side band (DSB) noise and then converts it to single side band (SSB) noise.

Setting Omit Specified Spur

This function analyzes the data state to omit specific spurious. Log interpolation is applied to deleted data by using the neighbouring data.

1. Press **Trace/View** > **Spurious** > **Omit specified Spur**.
2. Select **Omit** > **On** | **Off** from the softkey menu list.

NOTE

OmitS is displayed at the bottom of screen.

3. Select **Import Spurious Table...** to import the spurious data file.
4. Select **Export Spurious Table...** from the softkey menu list.
5. By pressing **Clear Spurious Table**, the spurious list is cleared.

NOTE

It is available to set the value of frequency to be Omit, using marker. For information on Marker to Spurious, refer to Specifying Sweep Range by Using Marker

NOTE

It is not possible to be likely to omit the spurious only by specifying the frequency at one point. When it is judged the spurious still remains, it is required to expand the specified frequency and target it in omit.

Registering Spurious

The existing Spurious list data cannot be read directly due to jitter value so it is read corresponding to the X-axis frequency.

Input/Output for Spurious Frequency List

The operation for input/output is same as Limit test. Enter the number of spurious input with COUNT, then register the spurious with FLISt. The following commands are used for input/output spurious frequency list:

```
SCPI.CALCulate.AM(Ch).TRACe(Tr).SPURious.OSSPur.FLISt.CLEAr
SCPI.CALCulate.AM(Ch).TRACe(Tr).SPURious.OSSPur.FLISt.COUNT
SCPI.CALCulate.AM(Ch).TRACe(Tr).SPURious.OSSPur.FLISt.DATA
SCPI.CALCulate.BB(Ch).TRACe(Tr).SPURious.OSSPur.FLISt.CLEAr
SCPI.CALCulate.BB(Ch).TRACe(Tr).SPURious.OSSPur.FLISt.COUNT
SCPI.CALCulate.BB(Ch).TRACe(Tr).SPURious.OSSPur.FLISt.DATA
SCPI.CALCulate.PN(Ch).TRACe(Tr).SPURious.OSSPur.FLISt.CLEAr
SCPI.CALCulate.PN(Ch).TRACe(Tr).SPURious.OSSPur.FLISt.COUNT
SCPI.CALCulate.PN(Ch).TRACe(Tr).SPURious.OSSPur.FLISt.DATA
SCPI.CALCulate.PS(Ch).TRACe(Tr).SPURious.OSSPur.FLISt.CLEAr
SCPI.CALCulate.PS(Ch).TRACe(Tr).SPURious.OSSPur.FLISt.COUNT
SCPI.CALCulate.PS(Ch).TRACe(Tr).SPURious.OSSPur.FLISt.DATA
```

Input/Output through csv file

The following command enables to read the matrix data array with csv:

```
SCPI.MMEMory.AM(Ch).TRACe(Tr).LOAD.SPURious.OSSPur.FLISt
SCPI.MMEMory.AM(Ch).TRACe(Tr).STORe.SPURious.OSSPur.FLISt
SCPI.MMEMory.BB(Ch).TRACe(Tr).LOAD.SPURious.OSSPur.FLISt
SCPI.MMEMory.BB(Ch).TRACe(Tr).STORe.SPURious.OSSPur.FLISt
SCPI.MMEMory.PN(Ch).TRACe(Tr).LOAD.SPURious.OSSPur.FLISt
SCPI.MMEMory.PN(Ch).TRACe(Tr).STORe.SPURious.OSSPur.FLISt
SCPI.MMEMory.PS(Ch).TRACe(Tr).LOAD.SPURious.OSSPur.FLISt
SCPI.MMEMory.PS(Ch).TRACe(Tr).STORe.SPURious.OSSPur.FLISt
```

Equation Editor

- [Overview](#)
- Starting Equation Editor

- Using Equation Editor
- Applying User Equation
- Equation History
- [Functions and Constants](#)
- [Operators](#)

Other topics about Data Analysis

Overview

Equation Editor allows you to enter an algebraic equation of standard mathematical operators and functions, referencing data that is available in the E5052B. Once a valid equation is entered and enabled, the display of the active trace is replaced with the results of the equation, and updated in real-time as new data is acquired. For equations that can be expressed with Equation Editor's supported functions, operators, and data, there is no need for off-line processing in a separate program.

Starting Equation Editor

Equation Editor can be accessed through **Trace/View > Equation Editor** (1 in the Figure below).

Using Equation Editor

Equation Editor can be used to enter an algebraic equation with measurement functions available in the trace. For example, "**Eq1 = data + 52.555**", can be applied to the measurement where the "Eq1" will be displayed on the measurement as a label. In case you do not wish to apply a label to be displayed, enter the equation directly, for example as "**= data + 52.555**".

NOTE

The length of the equation should be within 254 characters, and the length of equation label should be within 20 characters. If the label is more than 20 characters, then the equation label is truncated to 20 characters.

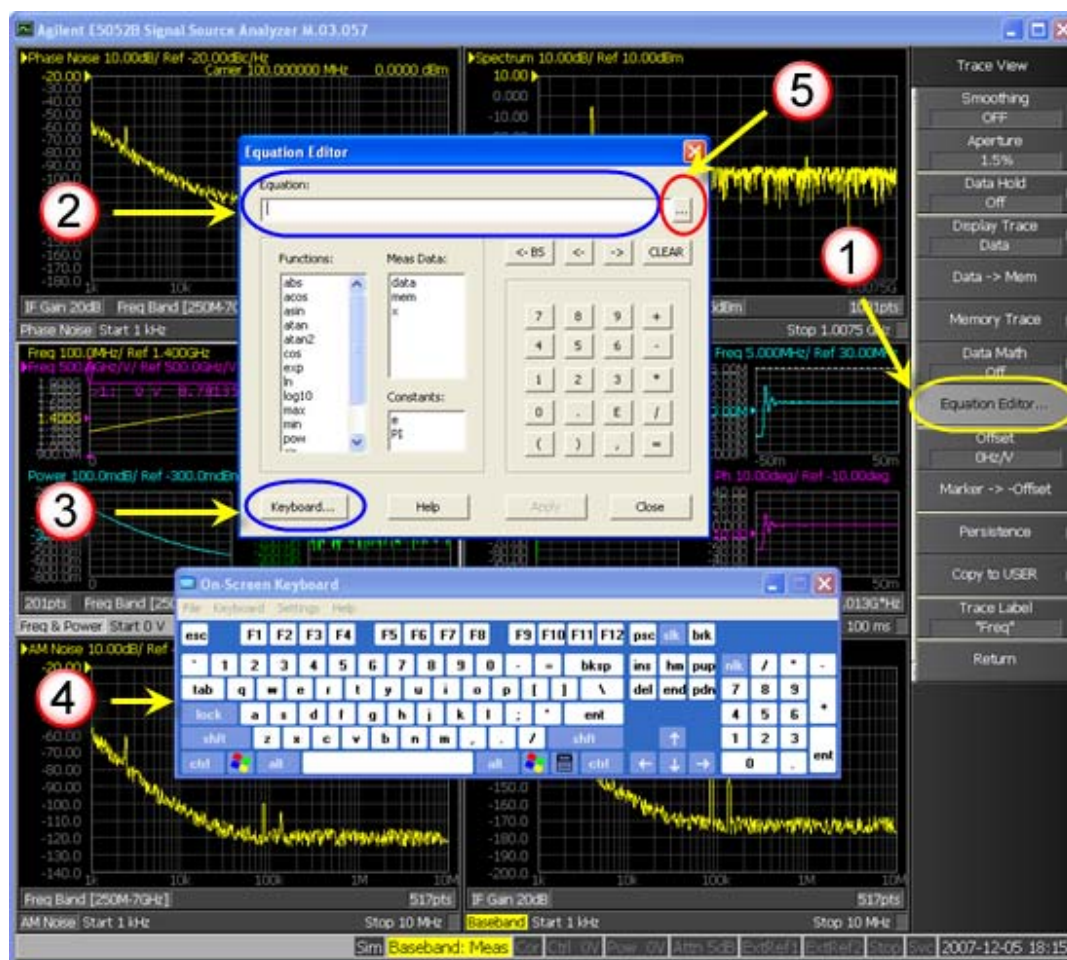
NOTE

If the equation label contains an invalid character, then an error (Error No: 170, Invalid equation label) is generated.

NOTE

If the equation is more than 254 characters, or if the equation formula is invalid (For example, if the case arc is not pair), then an error (Error No: 171, Invalid equation expression) is generated.

The available data is the data that is able to be measured by an active source port in the same channel. The equation can be entered by the on-screen key board (3 and 4).



Applying User Equation

User Equation created in **Equation Editor** can be applied to a measurement by selecting **Trace/View > Data Math > User Equation**.

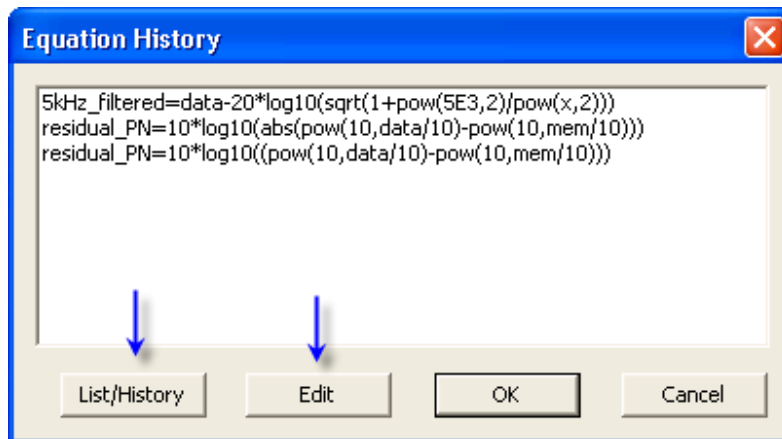
Equation History

The Equation Editor has the capability to store and use all previously used equations, and can be accessed by clicking the ... button shown as **5** in the figure above. The ... button in E5052B Equation Editor provides an option to view either the **List** or the **History** of Equation entered in the Equation Editor.

The key difference between **History** and **List** is that **History** contains all the equations that are used in the Equation Editor and **List** stores specific equations that are manually added using the **Edit** button in the Equation History dialog box. The commands visible in **History** are lost when the firmware is restarted but commands manually saved in **List** are stored permanently in a text file located at **F:\Equ_list.txt**.

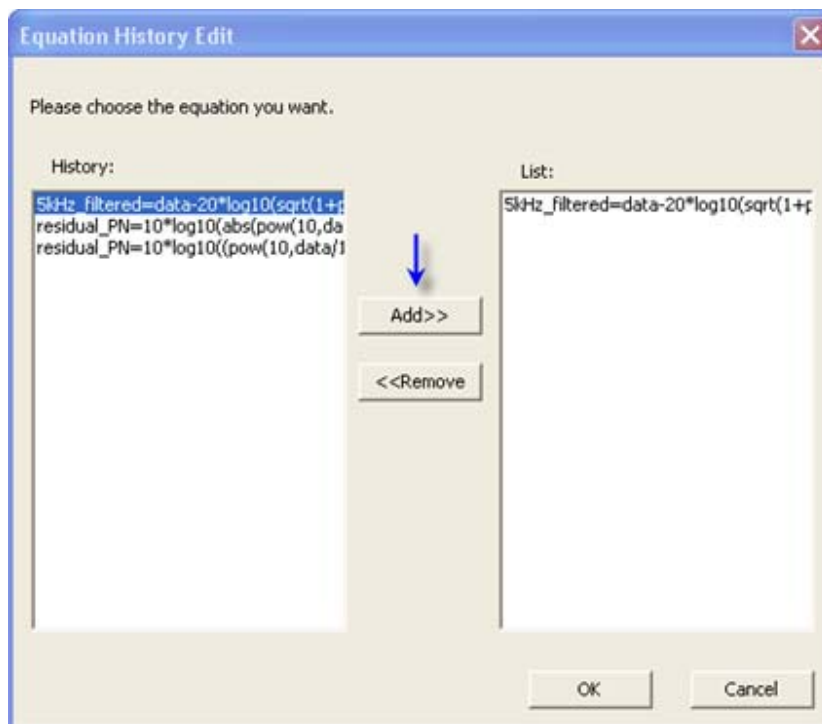
To save the equations in List, follow this procedure:

1. Open Equation Editor by **Trace/View > Equation Editor**
2. Enter the equation you wish to store permanently, say **"5kHz_filtered=data-20*log10(sqrt(1+pow(5E3,2)/pow(x,2)))"**, click **Apply**, and click ... button (5 in the figure above). This opens the **Equation History** dialog box.

**NOTE**

To store an equation, the equation must be applied first. This can be done by clicking on the **Apply** button.

3. Click **Edit**. The **Equation History Edit** dialog box appears.



4. Select the equation/s you wish to store permanently in **History** tab and click **Add** to add them in the **List** tab.
5. Click **OK** to save the equations. The equations are stored in a text file located at **F:\Equ_list.txt**.

NOTE

The **List/History** button in **Equation History** dialog box (as shown in Step 2) opens the saved List of equations. If **History** contains 3 equations and you have saved only 1 equation in the List, then pressing this button will display only 1 equation in the List.

NOTE

The **History** can save a maximum of 10 equations and **List** can save a maximum of 15 equations.

Functions and Constants

The following table describes the different functions and constant available in the E5052B Equation Editor:

Functions	
abs(a)	returns the absolute value of a
acos(a)	returns the arc cosine of a in radians
asin(a)	returns the arc sine of a in radians
atan(a)	returns the arc tangent of a in radians
atan2(a, b)	returns the phase of (a, b) in radians
cos(a)	gets a in radians and returns the cosine
exp(a)	returns the exponential of a
ln(a)	returns the natural logarithm of a
log10(a)	returns the base 10 logarithm of a
pow(a,b)	returns a to the power b
sin (a)	takes a in radians and returns the sine
sqrt(a)	returns the square root of a
tan(a)	takes a in radians and returns the tangent
max(a, b)	returns the maximum value a or b

min (a, b)	returns the minimum value a or b
Constants	
e	2.718281828459045
PI	3.141592653589793

NOTE

a and b are of double data type.

Operators

The following table describes the various operators that can be used in the E5052B Equation Editor:

Operators	
+	Addition
-	Subtraction
*	Multiplication
/	Division
(Open parenthesis
)	Close parenthesis
,	Comma - separator for arguments
=	Equal (optional)
E	Exponent (as in 23.45E6)

Data Output

Data Output

- Managing Files/Folders
- Saving Trace on File
- Hiding Numeric Information
- File Saving and Loading Instrument Status Settings

- Saving Display Screen
- Printing Screen Image

Managing Files/Folders

- Running Windows Explorer
- Copying Files/Folders
- Moving Files/Folders
- Removing Files/Folders
- Changing the Name of File/Folder

Other topics about Data Output

You can manage the files and folders by using Windows ® Explorer, which provides such standard operations as copy, move, remove, change name, and format floppy disk.

CAUTION Do not change any content (i.e. folders or files) of the drives other than A and F: This may cause serious damage to the E5052B 's functions and performance.

Running Windows Explorer

1. Press **Save/Recall**.
2. Press **Explorer...** to open Windows Explorer.

Copying Files/Folders

1. In Windows Explorer, select any source file or folder for copying.
2. On the menu bar, select **Edit > Copy**.
3. Open the target folder for copying.
4. On the menu bar, select **Edit > Paste**.

Moving Files/Folders

1. In Windows Explorer, select the file or folder of origin.
2. On the menu bar, select **Edit > Cut**.
3. Open the destination folder.
4. On the menu bar, select **Edit > Paste**.

Removing Files/Folders

1. In Windows Explorer, select the file or folder to be removed.
2. On the menu bar, select **File > Delete**.

Changing the Name of File/Folder

1. In Windows Explorer, select the file or folder for which you want to change name.
2. On the menu bar, select **File > Rename**.
3. Type the new name for the file or folder and then press **Enter** on the keyboard.

Saving Trace on File

- Specifying Carrier Information
- Saving Trace Data File
- Saving Trace Memory

Other topics about Data Output

Specifying Carrier Information

You can set the carrier information (additional information) on/off when you want to save the trace data. Follow the steps below to set the carrier information to On/Off.

This function is available in Phase Noise, AM Noise and Segment PN.

NOTE

This function cannot be used when you want to save the trace memory. In addition, even if you recall the file with carrier information into the trace memory, the carrier information is not set on the E5052B.

NOTE

When the security level is set at Frequency Blank, the carrier frequency value is saved as "****" into the file.

Operational Procedure

Follow the steps below to save the trace data of the E5052B.

1. Press **Trace Next** or **Trace Max** to activate the trace on which you want to save the trace data.
2. Press **Save/Recall**.
3. Press **Additional Info** to toggle **ON/OFF** the carrier information.

Save Condition as follows:

	Additional Info : ON		Additional Info : OFF	
	DATA	MEM	DATA	MEM
SAVE	Y	N	N	N

Y:Possible N:Impossible

Recall Condition as follows:

	Additional Info : ON		Additional Info : OFF	
	DATA	MEM	DATA	MEM
SAVE	Y	N	Y	N

Y:Possible N:Impossible

- E5052B with rev. A.03.10 can recall the trace data with additional information. In that case, the additional information is not set.
- E5052B can recall the file which has only the data of carrier information (both or either frequency and/or power). The additional information can be set.

About User Measurement

When the trace data is copied to the User Measurement with Copy to User function, the additional information is also copied.

Saving Trace Data File

You can save the trace data of the E5052B's active trace in the CSV format (with the extension of "*.csv") to recall them for later use on the PC application software.

The trace data are saved in following format (Carrier Information : ON)

Example of Saved Trace Data (phase noise measurement)

Carrier Frequency (Hz),+1.00000000000e+008

Carrier Power (dBm),+0.00000000000e+000

Offset Frequency (Hz),Phase Noise (dBc/Hz)

+1.00000000000e+002,-6.11082572643e+001

+1.01800975118e+002,-6.14881381403e+001

+1.03634385350e+002,-5.77826152313e+001

+1.05500814844e+002,-5.81658293608e+001

The first line is a title and a data of carrier frequency.

The second line is a title and a data of carrier power.

The third line is a header indicating the trace data items that are output from the fourth line onward.

From the fourth line, the trace data are output at an amount equivalent to the number of frequency points.

The trace data are saved in following format (Carrier Information : OFF)

Example of Saved Trace Data (phase noise measurement)

Offset Frequency (Hz),Phase Noise (dBc/Hz)

+1.0000000000e+002,-6.11082572643e+001

+1.01800975118e+002,-6.14881381403e+001

+1.03634385350e+002,-5.77826152313e+001

+1.05500814844e+002,-5.81658293608e+001

The first line is a header indicating the trace data items that are output from the second line onward.

From the second line, the trace data are output at an amount equivalent to the number of frequency points.

Operational Procedure

Follow the steps below to save the trace data of the E5052B.

1. Press **Trace Next** or **Trace Max** to activate the trace on which you want to save the trace data.
2. Press **Save/Recall** to open the Save/Recall menu.
3. Press **Save Data Trace** to open the "Save As" dialog box. This operation should be conducted using the external keyboard and/or mouse. For information on the Save As dialog box, refer to the description of Save As dialog box. Here, the CSV Files (with the extension of *.csv) are selected for the file type.
4. Specify the destination folder for saving, enter file name, and then press **Save** to save the file.

NOTE

For TR measurements, additional option to save scroll data is available at **Save/Recall > Save Scroll Data...**

Saving Trace Memory

You can save the trace memory of the E5052B's active trace in the CSV format (with the extension of ".csv") to recall them for later use on the PC application software.

The trace memory is saved in the following format:

Example of Saved Trace Memory (phase noise measurement)

Offset Frequency (Hz),Phase Noise (dBc/Hz)

+1.0000000000e+002,-6.11082572643e+001

+1.01800975118e+002,-6.14881381403e+001

+1.03634385350e+002,-5.77826152313e+001

+1.05500814844e+002,-5.81658293608e+001

The first line is a header indicating the trace memory items that are output from the second line onward.

From the second line, the trace memory is output at an amount equivalent to the number of frequency points.

Operational Procedure

Follow the steps below to save the trace memory of the E5052B.

1. Press **Trace Next** or **Trace Max** to activate the trace on which you want to save the trace memory.
2. Press **Save/Recall** to open the Save/Recall menu.
3. Press **Save Memory Trace** to open the "Save As" dialog box. This operation should be done with the external keyboard and/or mouse. For information on the Save As dialog box, refer to the description of Save As dialog box. Here, the CSV Files (with the extension of *.csv) are selected for the file type.
4. Specify the destination folder for saving, enter the file name, and then press **Save** to save the file.

Hiding Numeric Information

- Hiding Frequency Information on Screen
- Hiding All Numeric Information Screen

Other topics about Data Output

You can hide numeric information on the screen for purposes such as security.

Hiding Frequency Information on Screen

Follow these steps to display frequency information on the measurement screen and frequency information in softkeys and data entry box as asterisks (***)...

1. Press **Display** > **Security Level**.
2. Select **Frequency Blank** from the security level setting.

Security Level Setting

Softkey	Function
None	Displays all information on the screen.
Frequency Blank	Displays frequency information as asterisks. You cannot return the setting to None with the Security Level menu. You need to execute Preset or Recall to return the display setting to None.
All Numeric Blank	Displays all numeric information as asterisks. You cannot change the security level with the Security Level menu. You need to execute Preset or Recall to return the display setting to None or Frequency Blank.

NOTE

Once you set the security level to Frequency Blank, the frequency readouts are disabled (any frequency readouts are marked as asterisks, "****") unless cycling power, executing **Preset** or recall a setting whose security level is None.

Hiding All Numeric Information Screen

Follow these steps to display all numeric information on the measurement screen and numeric information in softkeys and data entry box as asterisks (***)...

1. Press **Display** > **Security Level**.
2. Select **All Numeric Blank** from the security level setting.

NOTE

Once you set the security level to **All Numeric Blank**, the **Security Level** is no more changed by the user unless cycling power, executing **Preset** or recall a setting whose security level is None or Frequency Blank.

File Saving and Loading Instrument Status Settings

- Saving Procedure
- Recalling Procedure
- Recall Procedure Using Recall by File Name Feature

Other topics about Data Output

You can save the state of the instrument as a file in a hard disk, or any storage equipment via USB connector, and recall the file for later use. You can choose one of the two options below for file saving.

Type	Content to be saved and used
State Only	You can save the E5052B's state settings and recall them later to set up the instrument to the same state as previously used.
State and Data	You can save the E5052B's state settings and trace (formatted data arrays and formatted memory arrays) and recall them later to set up the instrument to the same state as previously used. Here, the trace can also be recalled and displayed on the screen.

NOTE

Irrespective of the selected measurement window, all of the state settings and settings/data are saved or recalled.

If an incompatible file is recalled, the settings will be preset due to error.

Compatibility of Files Related to Saving and Recalling

		Recalling	
		Standard	Option 011
Saving	Standard	Yes	Yes
	Option 011	Yes	Yes

Parameter	Value saved with the standard model	Value will be changed when recalling with the option 011
Phase noise - Correlation	Other than 1	1
Phase noise - IF Gain	Higher than or equal to 20 dB	Changed to 20 dB
Frequency & power - Trigger mode	Analyzer mode	Tester mode
Phase noise -- Start offset frequency	1 (Hz)	10 (Hz)

Type	Content to be saved and used
State Only	You can save the E5052Bs state settings and recall them later to set up the instrument to the same state as previously used.
State and Data	You can save the E5052Bs state settings and trace (formatted data arrays and formatted memory arrays) and recall them later to set up the instrument to the same state as previously used. Here, the trace can also be recalled and displayed on the screen.

Saving Procedure

Selecting Content To Be Saved

NOTE

The following steps affect both file saving and memory saving of the instrument state.

1. Press **Save/Recall**.
2. Press **Save State**.
3. Press **Save Type**.
4. Press the softkey corresponding to the content of the instruments state you want to save.

Softkey	Function
State Only	Selects State Only to save only the state settings of the E5052B
State & Data	Selects State and Data to save the state settings and the trace of the E5052B

Saving Data

Follow the steps below to save the internal data of the E5052B.

1. Press **Save/Recall**.
2. Press **Save State**.
3. **When you save the state using the defined file on drive F (State01.sta - State06.sta, Autorec.sta):**
4. Press **State01 - State06** or **Autorec**.

Softkey	Description
State01 to State06	Save the instrument state into the state number.
Autorec	<p>Save the instrument state as the auto recall setting. The E5052B is automatically configured with this state at the startup.</p> <p>This key saves the state into the "C:\Autorec.sta".</p> <p>When Autorec.sta file is found on the C: drive at startup, the E5052B is automatically configured using the saved settings. To disable the auto recall function, delete the Autorec.sta files.</p> <p>You must have a preset setting file that has been saved with the state at AutoRec, to execute the user-preset function.</p>

NOTE

Irrespective of the selected measurement window, all of the state settings and settings/data are saved.

NOTE

F:\Autorec.sta (F drive) can be recalled automatically whenever the E5052B is powered on. If both C:\Autorec.sta and F:\Autorec.sta

exist, the former is called. To disable the auto recall function, remove **Autorec.sta**.

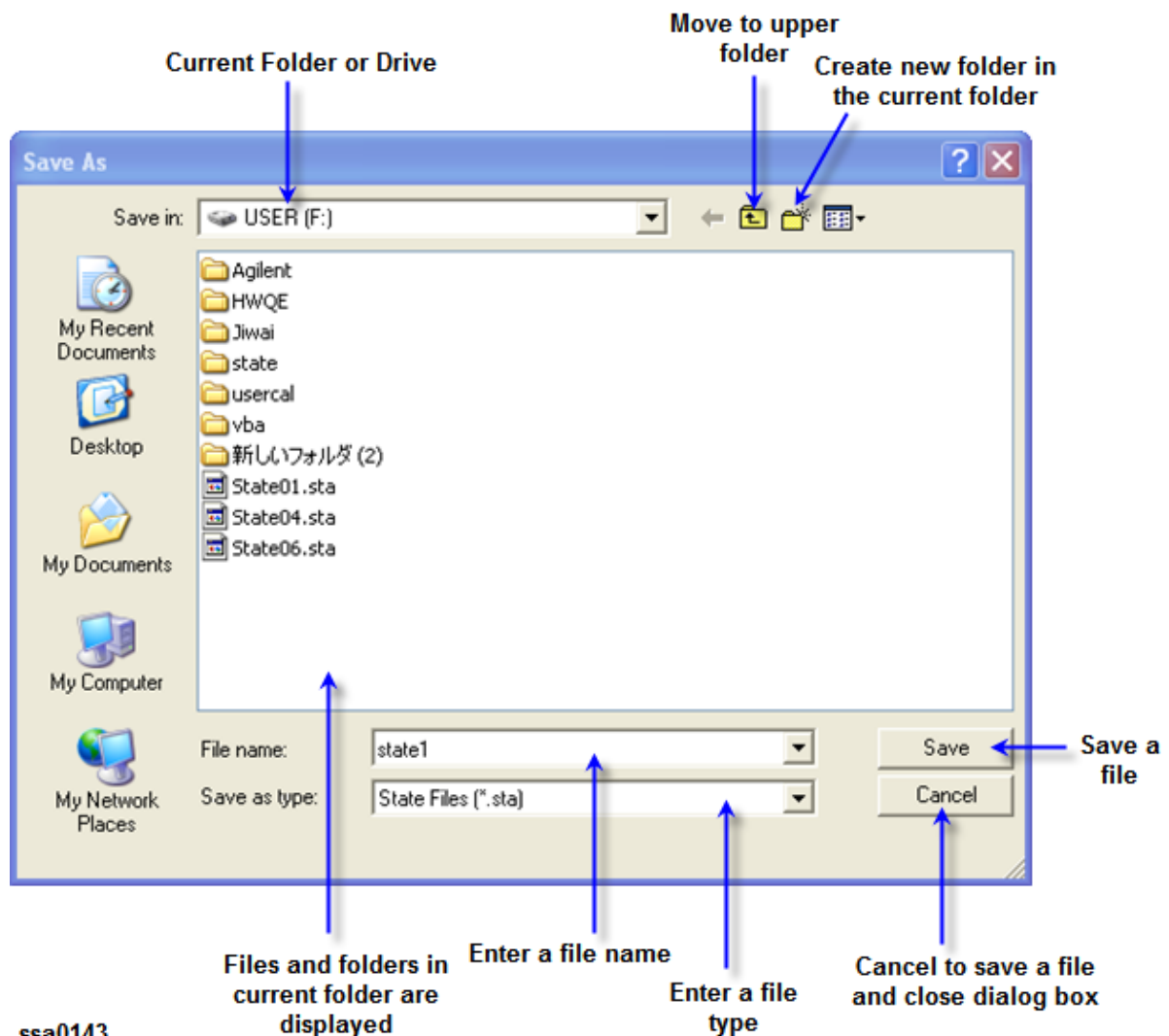
NOTE

If the file already exists, the * mark will appear to the right of the softkey label. If you specified overwrite of the existing file, it will be copied with the name **backup.sta**, and then the original file will be overwritten.

When you save the state with any file name:

1. Press **File Dialog...** to open the dialog box. This operation should be done with the external keyboard and/or mouse. The figure below shows the user interface elements in the Save As dialog box.
2. Specify any folder, and enter the file name.
3. Press **Save**.

Save As dialog box



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The E5052B provides the following drives to save/recall files. Select a drive in the **Save In** area of the [Save as dialog box](#) .

Drive name	Description
[F:]	Uses a hard disk (F) drive for saving/recalling the file.

NOTE

Do not change any content (i.e. folders or files) in the drives other than C and F. Doing this may cause serious damage to the E5052Bs functions and performance.

Recalling Procedure

NOTE

In recalling the file in which the trace is saved (**State & Data** is specified for saving the content), the trigger sources are recalled and trigger mode is automatically set to HOLD.

1. Press **Save/Recall**.
2. Press **Recall State**.
3. When you recall State01.sta - State06.sta - Autorec.sta:
4. Press **State01** - **State06** or **Autorec**.

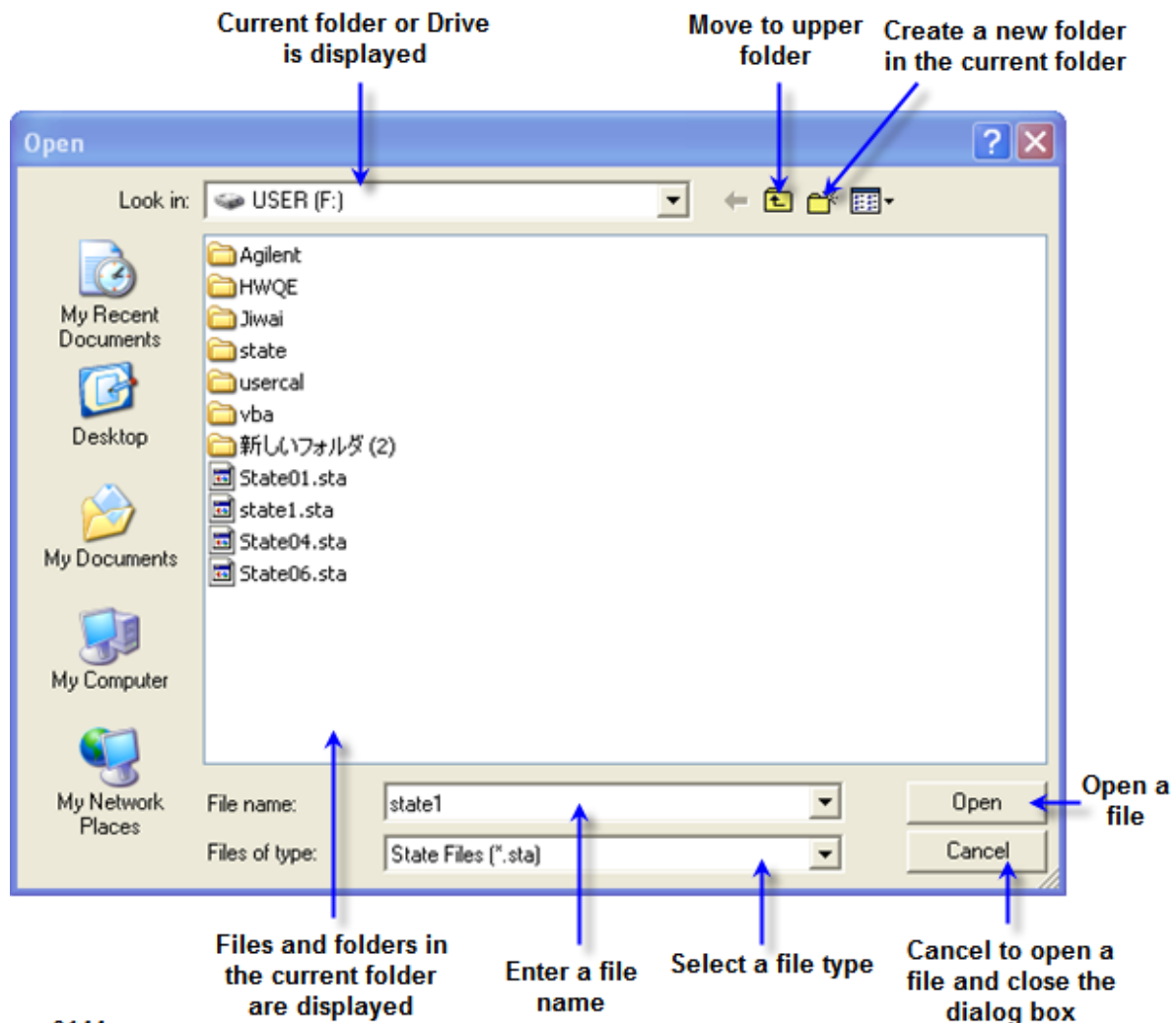
When you recall any file:

1. Press **File Dialog...** to open the Open dialog box. This operation should be conducted using the external keyboard and/or mouse. The figure below shows the user interface elements on the Open dialog box.
2. Specify the folder that contains the file, and then select the file. Press **Open** to recall the saved internal data.

NOTE

Irrespective of the selected measurement window, all of the state settings and settings/data are recalled.

Open Dialog Box



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Recall Procedure Using Recall by File Name Feature

You can use the recall feature with the **Recall by File Name** softkey for files you have named freely and saved in the F:\State folder. This function lets you recall a file you have named freely and saved by simple softkey operation, eliminating annoying operation using the Open dialog box.

NOTE

Although there is no limit to the number of files saved in a folder, only up to 50 files are displayed on the softkeys. If more than 50 files are saved in a folder, they are sorted in the order of numbers 0 to 9 and alphabetic characters A to Z and the first 50 files are displayed as softkeys.

Although there is no limit to the number of characters of a file name, only up to 12 characters are displayed on the softkey. If a file name

exceeds 12 characters, the first 12 characters are displayed on the softkey and the remaining characters are omitted and replaced with

Note that different files may be displayed on softkeys with the same name or a saved file is not displayed on any softkey because of the above limitations.

1. Press **Save/Recall**.
2. Press **Recall by File Name**.

Files that have been named and saved in the F:\State folder are displayed on softkeys. Press the key for the file you want to recall.

NOTE E5052B firmware Rev. A.03.00 can recall files saved with State Only of E5052A firmware Rev. A.02.50.

When attempting to recall files saved with State & Data of E5052A firmware Rev. A.02.50 or lower, a warning "Incompatible recall file" may appear and some data cannot be recalled.

E5052A firmware Rev. A.02.50 or lower cannot recall files saved with E5052B firmware Rev. A.03.00.

Saving Display Screen

You can save the E5052B's screen image on a file in the bitmap or PNG format. The saved file can be recalled for later use with PC application software.

Operational Procedure

Follow the steps below to save the screen image on a file.

1. Display the screen that you want to save on a file.
2. Press **System** to display the system menu. Use the following softkey from the System menu.

Softkey	Function
Dump Screen Image	Saves the screen information on a file

NOTE The image displayed on the screen just before pressing **System** is saved in the file.

For more information, refer to Images You Can Print/Save.

3. Press **Dump Screen Image** to open the "Save As" dialog box. For information on the Save As dialog box, refer to the description for Save As dialog box. In this

case, either Bitmap Files (with the extension of *.bmp) or Portable Network Graphics (with the extension of *.png) is selected as the file type.

4. Select the file type.

5. Specify the folder in which you want to save the file and enter the file name. Press **Save** to save the screen image of the E5052B in a file.

Other topics about Data Output

Printing Screen Image

- Overview
- Images You Can Print/Save
- Printing Procedure

Other topics about Data Output

Overview

By connecting a printer to the USB port of the E5050B, you can print the displayed screen of the E5052B.

Images You Can Print/Save

You can print/save the images that are stored in the clipboard. However, unless images are stored on the clipboard, the current screen image will be printed/saved.

Storing Images in Clipboard

The **System** > **Dump Screen Image** key provides a screen capture function as well. In other words, the image displayed on the screen just before pressing **System** > **Dump Screen Image** is saved on the clipboard.

NOTE

The images stored on the clipboard are cleared after executing print/save operations.

Printing Procedure

Preparing Printing

Follow the steps below to prepare for printing.

1. Power off the E5052B.
2. Power on the printer and then connect it to the E5052B.

NOTE

Do not connect unsupported printers to the E5052B.

3. Power on the E5052B.

4. Press **System**.
5. Press **Printer Setup** to open the "Printers" window. Select the printer you want to use and set it up by referring to the instruction manual for the printer.
6. The Printers window will close.

Printing

Follow the steps below to print the screen image.

1. Display the screen that you want to print out.
2. Press **System** to save the current screen image on the clipboard.
3. As required, press **Invert Image** to toggle the selection of printing either in the displays's actual colors or in the image's inverted colors. (This can save much ink by, for example, printing with a white rather than black background.)
4. Press **Print** to start printing.

Pressing **Abort Printing** during the printing operation stops the printing.

NOTE

If you start printing before the printer is ready (e.g. not powered on yet), the Printers Folder dialog box may be displayed as shown below. In this case, press **Cancel** to close the Printers Folder dialog box and retry the operation after the printer is ready.